THE BRICKBUILDER

DEVOTED TO THE INTERESTS OF

ARCHITECTURE IN MATERIALS OF CLAY

PUBLISHED MONTHLY
BY ROGERS AND MANSON
OFFICE, 85 WATER STREET BOSTON MASS.

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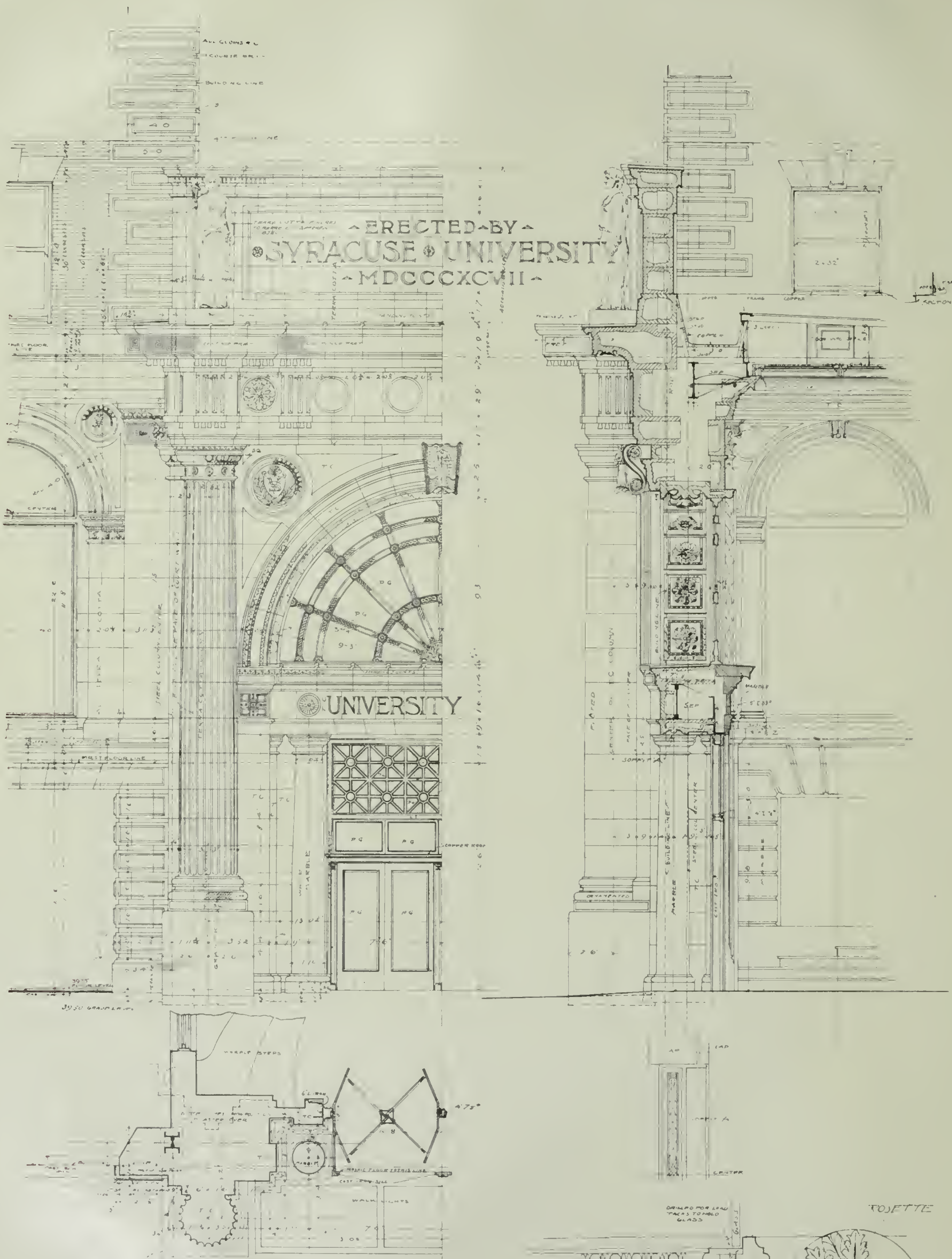

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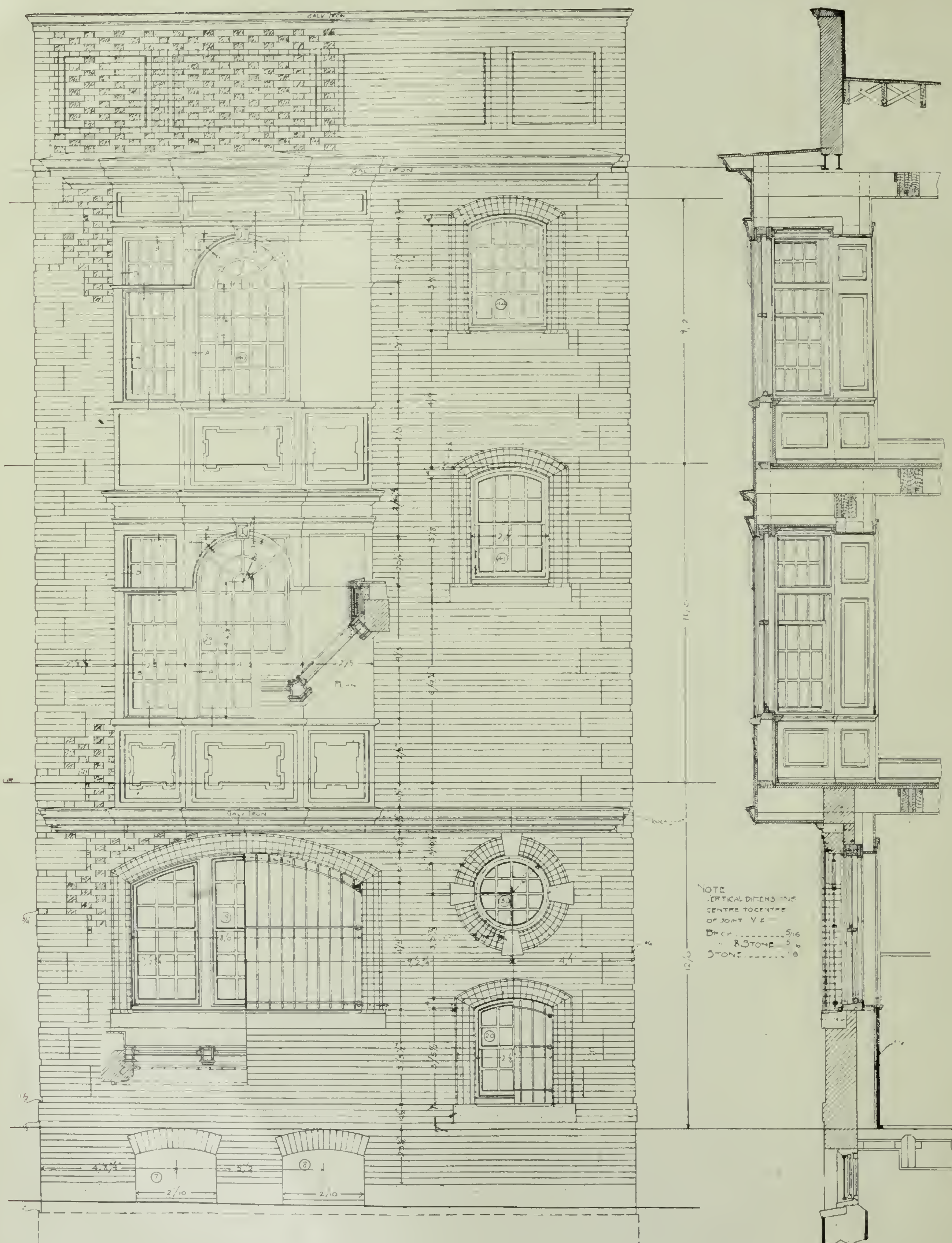

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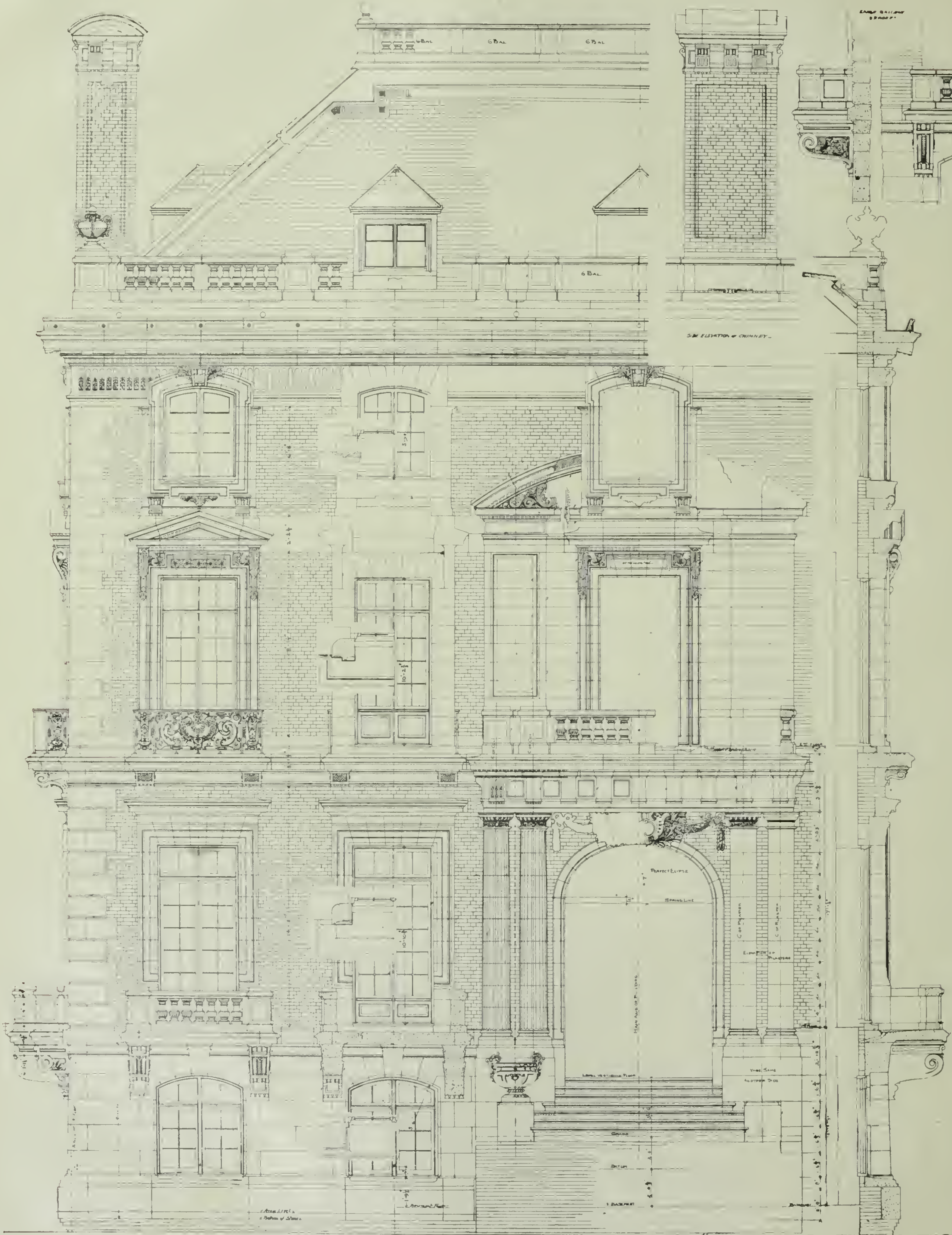

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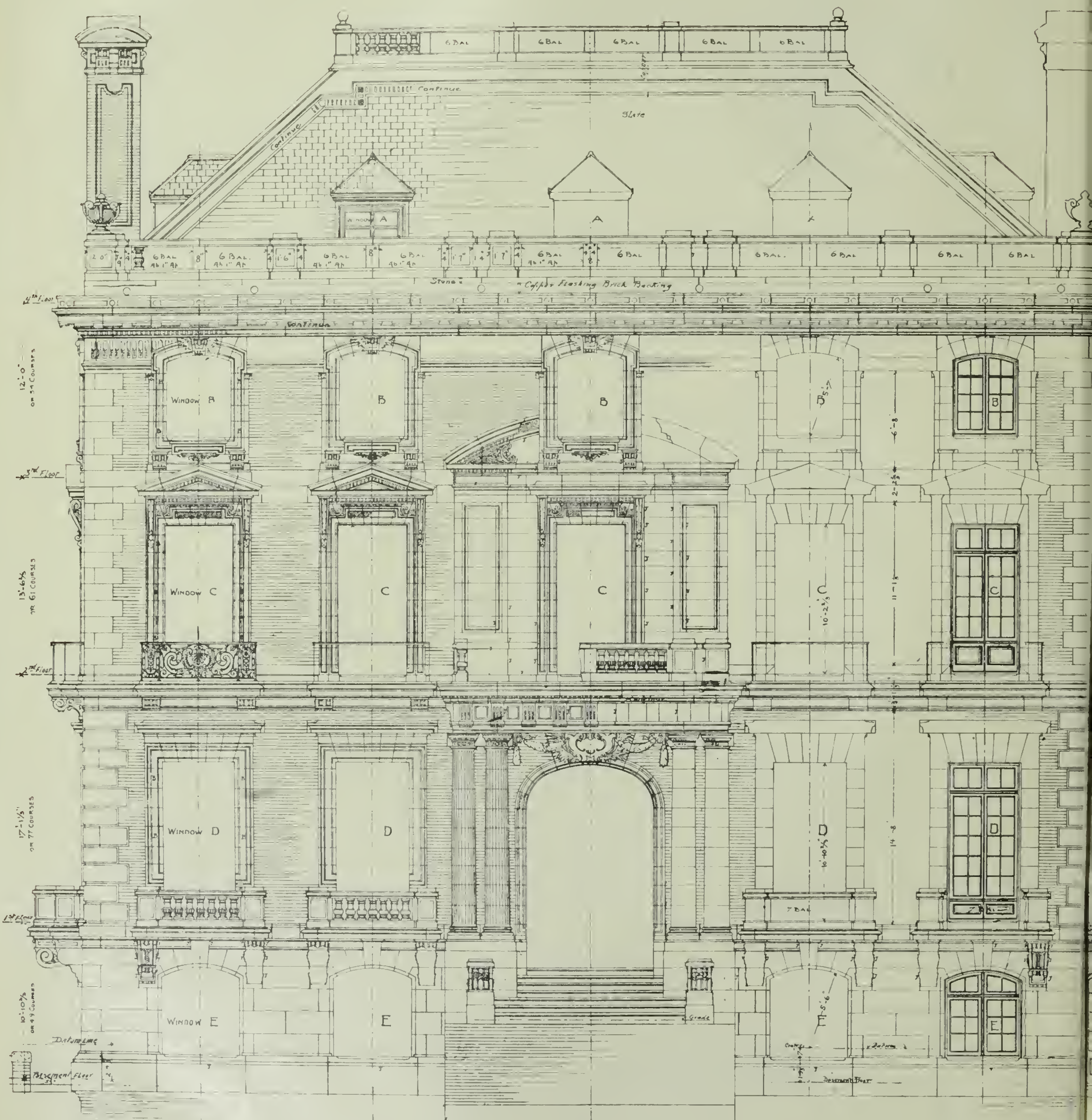

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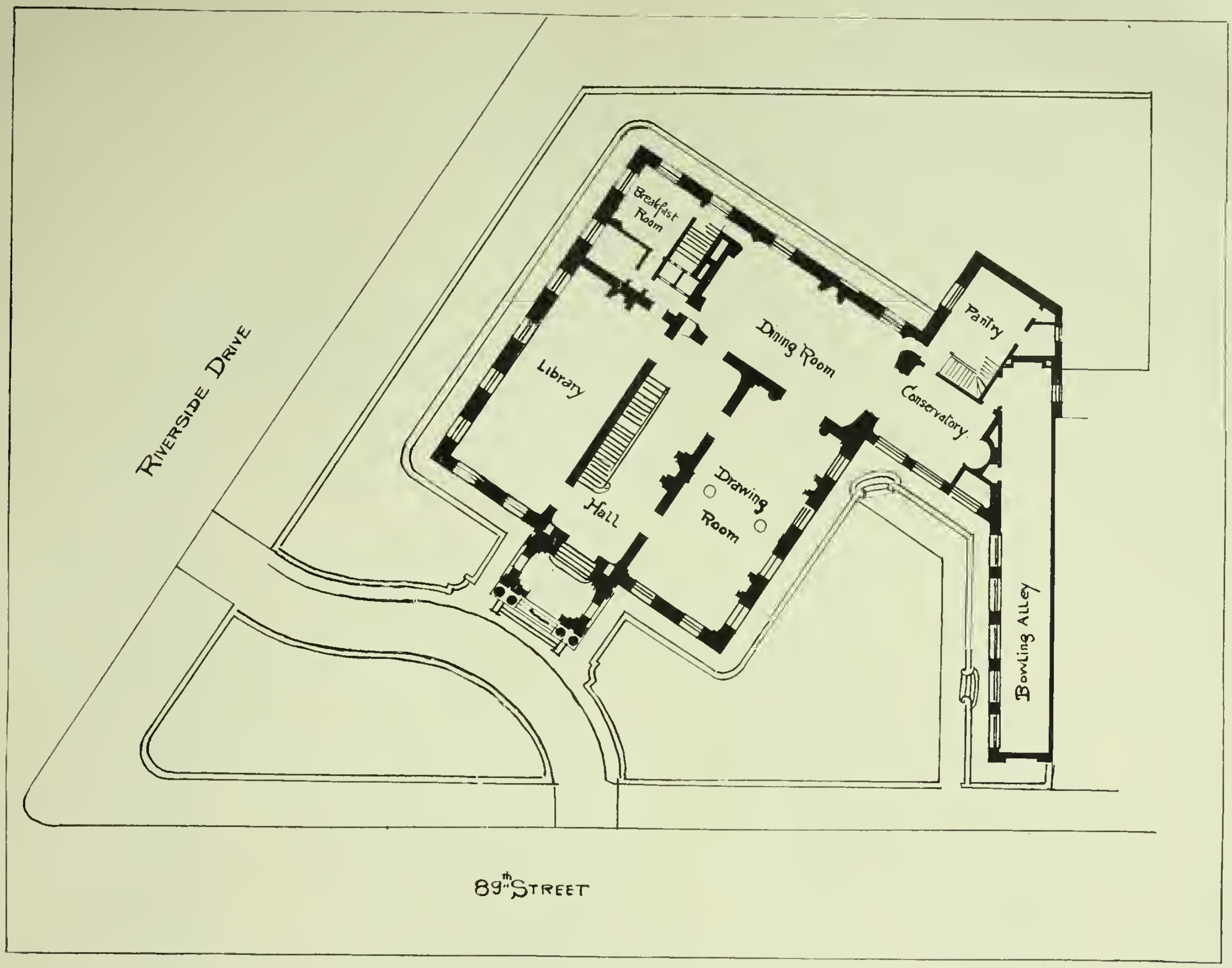

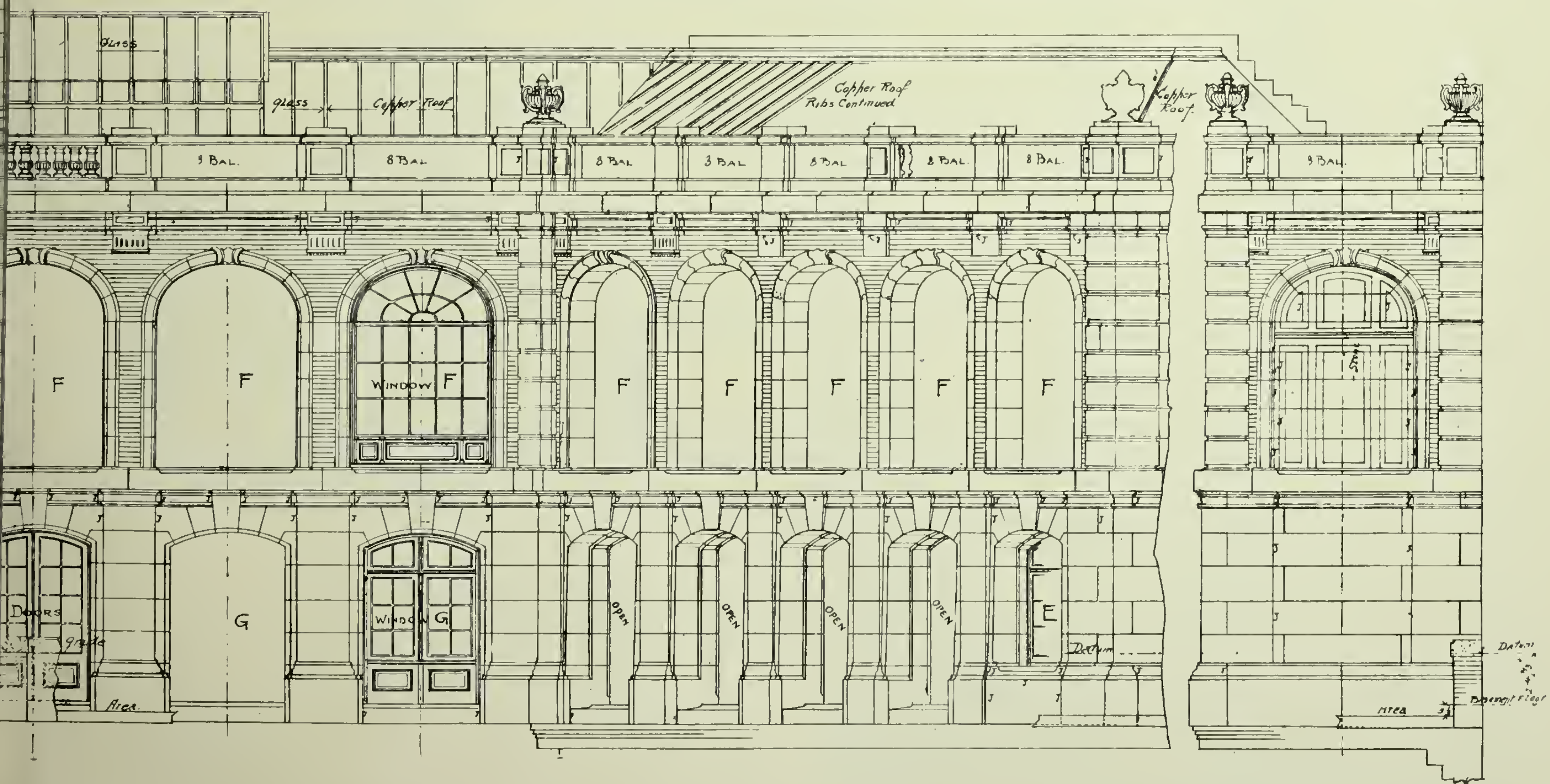

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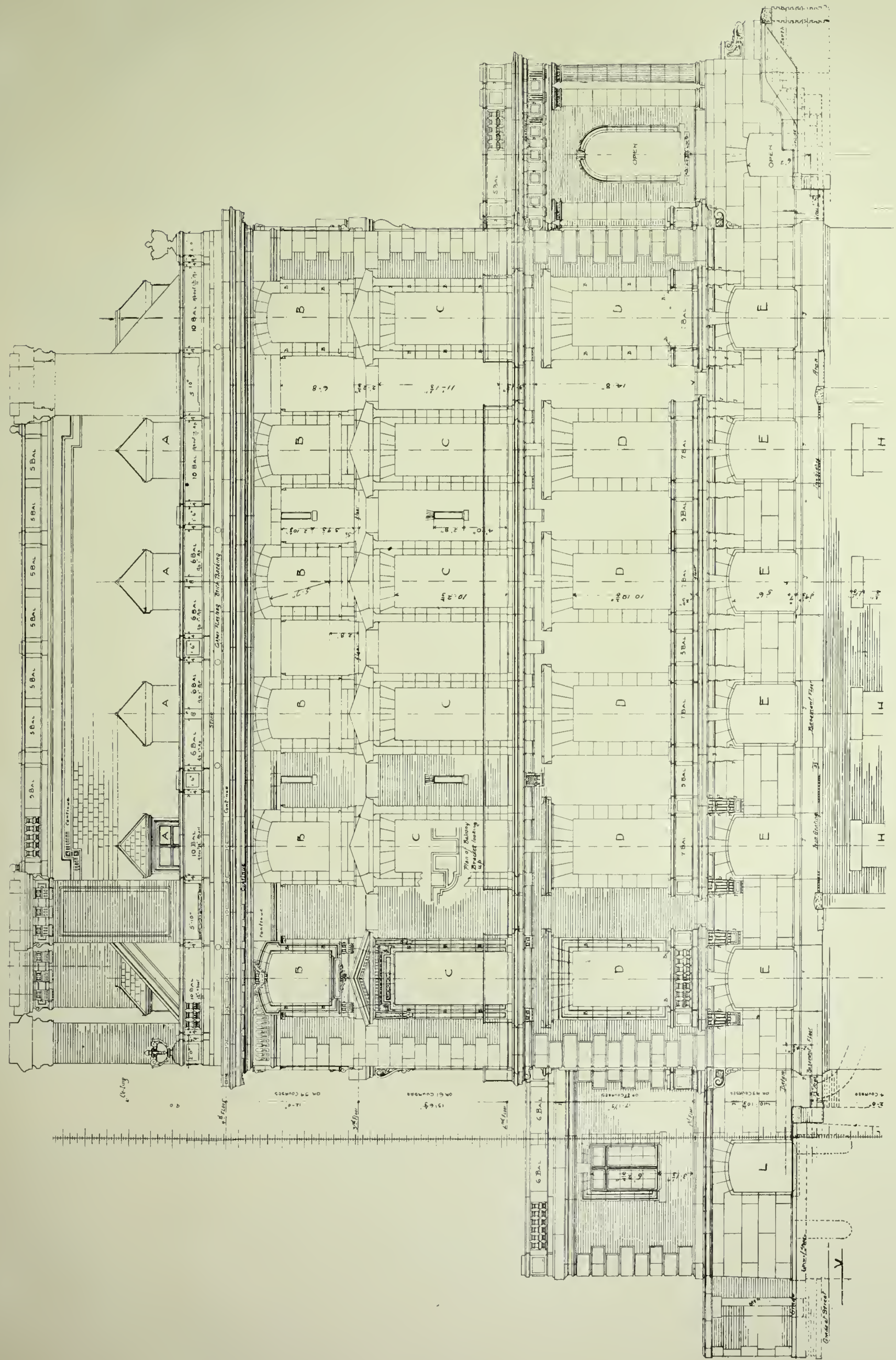

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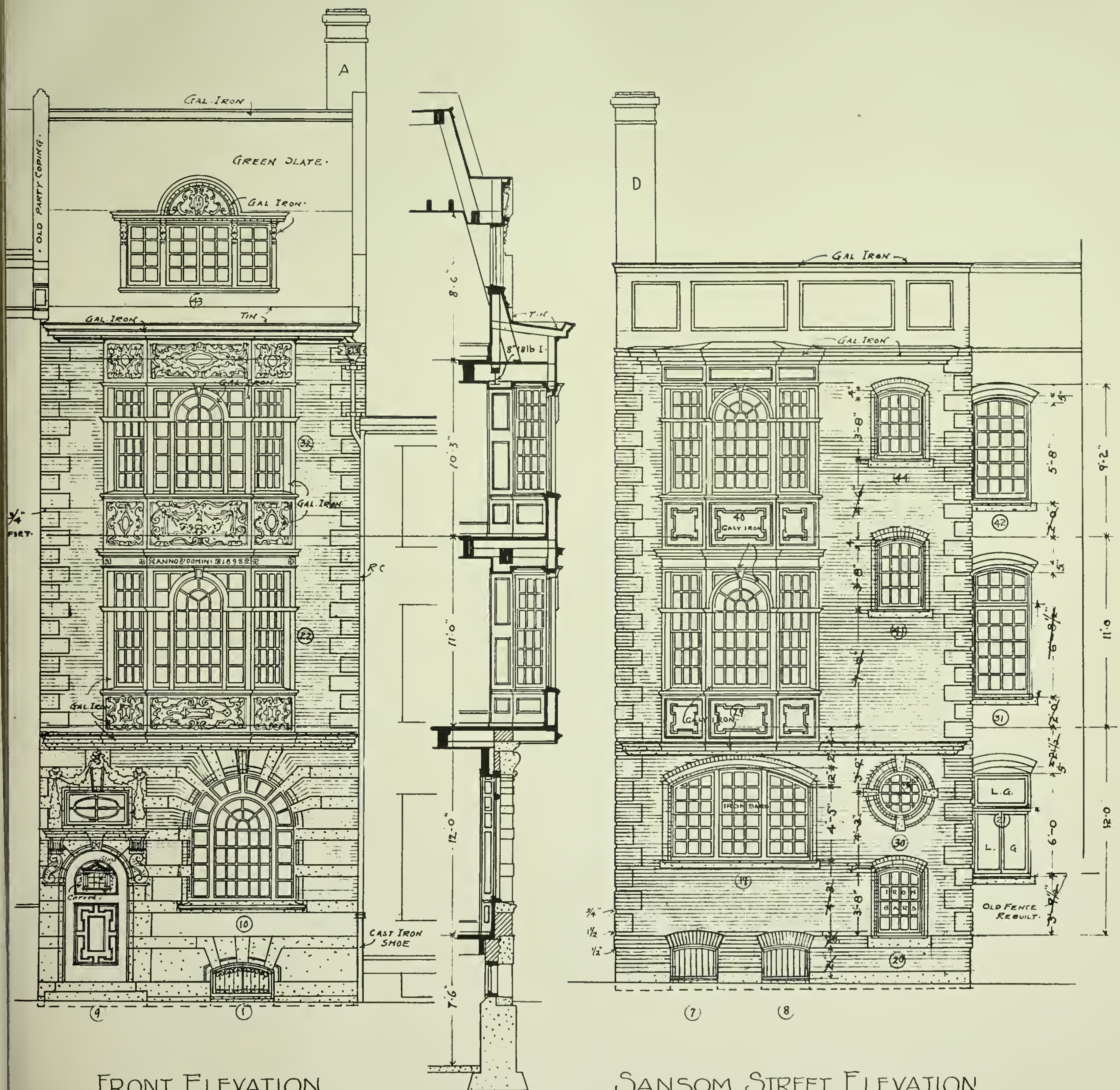

FRONT ELEVATION.
· EAST ·

SANSOM STREET ELEVATION.
SOUTH ·

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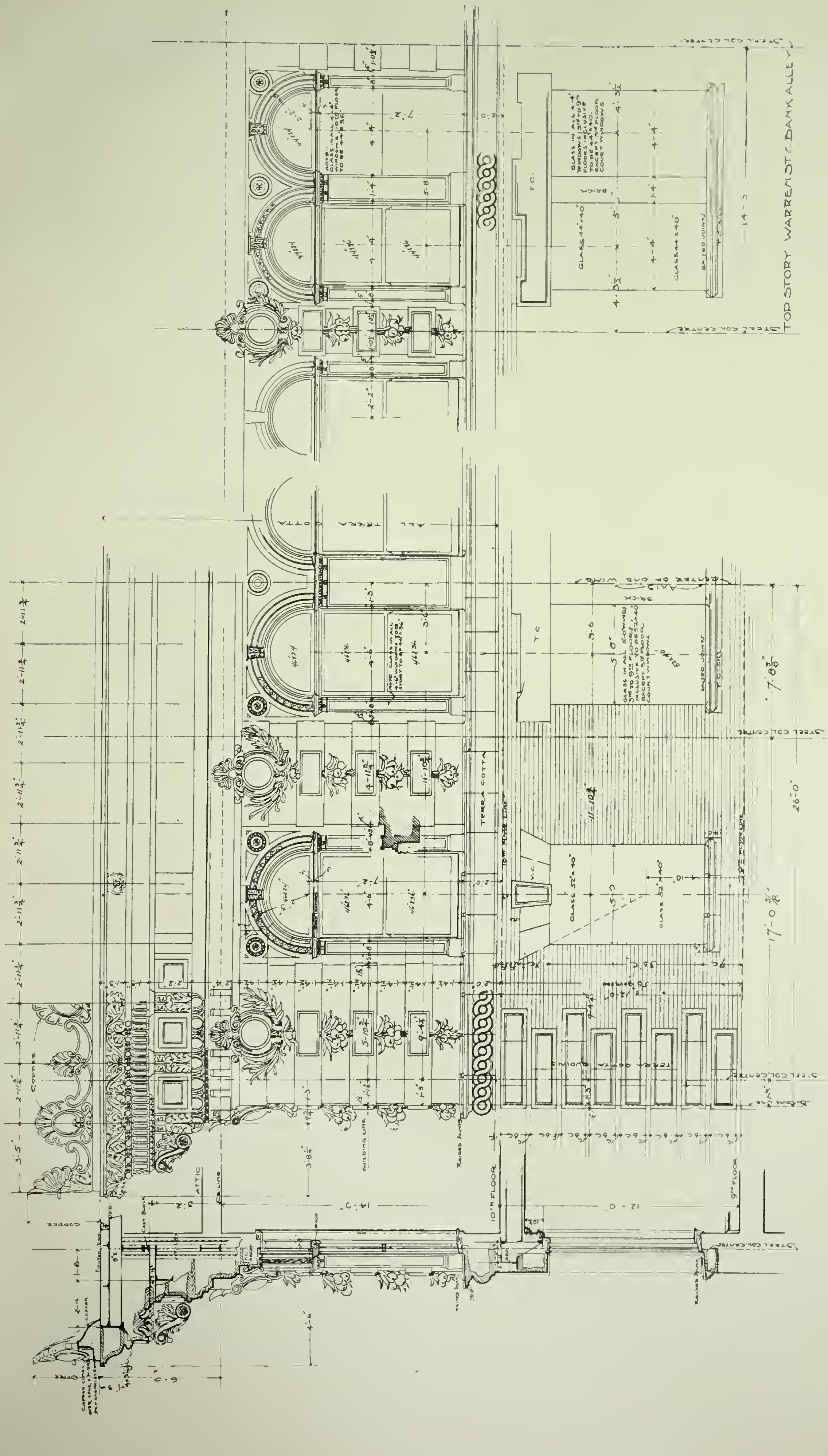

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SYRACUSE UNIVERSITY BLOCK, SYRACUSE, N. Y.
GREEN & WICKS, ARCHITECTS.

(Elevation shown on page 19.)

VOLVME VIII JAN. 1899 No. 1

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

ROGERS & MANSON,

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P. O. BOX 3282.

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FIRE-PROOFING.

THE old adage that "Necessity is the mother of invention" accounts for a very large proportion of the advance which has been made at different times in constructive methods. Probably no country in the world has ever developed its structural architecture so speedily as the United States, and certainly no other country has had as many object lessons to teach what to avoid. Experience keeps a very dear school, and though it may hardly be fair to say that we belong to the numerous category of those individuals who will learn in no other, it is a fact that our best lessons have been derived from our worst failures. Elsewhere in these columns we comment at some length upon some of the more manifest lessons of the New York fire, a catastrophe which will undoubtedly lead to improvements in some of the details of our construction, just as it has demonstrated the value of certain accepted methods of fire protection. This country has not, however, arrived by one step at the construction which stood the fire so successfully last month. We can all remember the long period when mediums were used and methods were employed which would not now be tolerated for a moment, but which were supported by much the same arguments that are used now in favor of our hollow-tile arches and terra-cotta protection. It was then claimed that those methods and materials would stand fire and water to just the same extent that the systems now in the market claim complete immunity for themselves. Our eyes in the past were opened not so much by our investigations as by the stern teachings of hard experience. We learned that all materials were not immaculate, and by a process of natural selection and the acceptance of the fittest the best constructive minds of this country have agreed upon terra-cotta and brick as the only materials which can be depended upon to withstand the extreme action of fire. The Home Life Building is an epitome of the experiences of the past twenty-five years. The failures therein have a manifest cause; the successful resistance is due to preconceived methods. It rests now with the profession to assimilate the results of failure and to eliminate the possibility of a repetition of disasters of this sort; for a disaster it certainly is. The fact that the steel frame was not materially affected is a triumph for that particular detail of the construction; but a building which can have its upper six stories gutted, in which the fire can travel from room to room, even though it takes only one floor at a time and all the start comes from outside, certainly leaves something to be desired. The New York *World*, in an editorial of December 5, sums up the two most prominent morals of this fire: —

"Moral No. 1: If the Rogers, Peet & Co. building had been reasonably fire-proof, there would have been no fire in the buildings of its neighbors, the Home Life and the Postal Telegraph Companies. Why should any but fire-proof buildings be allowed in the city? Moral No. 2: When a fire-proof building is put up, its owners ought to insist that no furniture or curtains or anything else should be put into it without first being fire-proofed by a perfectly simple and inexpensive treatment with tungstate of soda. It was the furniture and that sort of thing which destroyed the upper stories of the Home Life Building last night."

The fact is that our modern business methods and modern constructions have advanced much more rapidly than the science of the prevention of fires. We can build a fire-proof building without any difficulty, but we cannot construct either fire-proof tenants or a fire-proof fire department; and so long as a great municipality will permit such structures as that in which this fire started to exist in the very heart of the business district, disastrous results must be expected to adjoining structures, no matter how scientifically they may be constructed. All our great cities are undergoing at present a species of regeneration. The old structures are disappearing, and new buildings, built to resist fire within and without, are rapidly taking their places; but any transition state of this kind has its dangers. The risk to a modern fire-proof building through its neighbors is not anywhere near as great as it was ten years ago, and the more fire-proof buildings that are erected, the more the chances are lessened of such a result as accompanied the conflagration of December 4. The fact still remains that not a single properly constructed fire-proof building in this country has ever been destroyed to any considerable extent by a fire starting within its own walls.

HIGH BUILDINGS.

IT seems to be quite the fashion just at present for officials to voice a certain amount of public sentiment in regard to a curtailment of height of commercial structures. Governor Wolcott, of Massachusetts, in his inaugural address, urged upon the Legislature the advisability of restricting the areas in the neighborhood of the State House, so that no high structure can be erected thereon. Mayor Quincy, of Boston, in his message to the Common Council, alluded to a certain Commonwealth Avenue hotel, which is the only one on that street carried to a height greater than about 80 ft., and expressed the hope that some way might be devised for compelling the removal of the upper portion of this building. The subject of high buildings is very largely a personal one. The real-estate owner who desires to draw all the income possible from his property puts up a tall building and objects to his neighbor doing likewise. The architect and the lawyer, who seek light and air and the outlook, will take the top story in preference, and will be very indignant with the neighbor across the street who blocks the view with a similar sky-scraper. Fifteen years ago no one would have dared to predict the present extreme expansion of tall buildings. Fifteen years hence we may look back with horror, or we may look down on them from structures so much higher that these will seem small by comparison. Whether these tall structures are right or wrong, whether the principle is pernicious, or whether we are only just beginning to fly, there is one indisputable fact: that the tall commercial structures of to-day have done more to teach architects and constructors how to build, how to use material, what material to use, and how to executively handle large work, than would have been possible with a dozen generations of the kind of buildings which were called first class a generation ago. They have served and are still serving a useful purpose in our architectural development. We may grow out of them and may regret our own flights of fancy, but surely no architectural problem was evei more resolutely adapted nor more scientifically nor, on the whole, satisfactorily solved than these very sky-scrapers.

EXTENSION OF FIRE LIMITS IN BOSTON.

THROUGH the energetic efforts of Mayor Quincy, the question of the extension of the so-called fire limits in the city of Boston is again up for consideration. A commission is in process of formation, including representatives from the Society of Architects, the Master Builders' Association, and the Real Estate Exchange, which is to consider the advisability of so amending the existing laws that the area within which anything but brick buildings shall be tolerated shall be considerably extended. This is emphatically a movement in the right direction and will undoubtedly result in materially lessening the fire risk of the city. A brick building is by no means necessarily a fire proof one, but it is certainly a great deal better than the fungous growths of wooden structures which flourish so luxuriantly in the debatable line between the residence and the business sections of the city.

PERSONAL AND CLUB NEWS.

PARR & HULSEBUS, architects, have opened an office in the Y. M. C. A. Building, Peoria, Ill.

HARVEY J. BLACKWOOD, architect, Scranton, Pa., has removed his offices to the Connell Building.

EDGAR V. SEELER, architect, Philadelphia, has removed his offices to the Real Estate Trust Building, Broad and Chestnut Streets.

MR. BAGGALEY, of Pentecost & Baggaley, architects, Buffalo, N. Y., has retired from that firm and taken up his residence in England. Mr. Pentecost will continue the business at 406 Fornes Building, Buffalo.

THE PRATT INSTITUTE, Brooklyn, N. Y., is holding an exhibition of a collection of antique European and Oriental textiles. The exhibit closes January 31.

THE WASHINGTON ARCHITECTURAL CLUB held its regular meeting January 7. The subject for the evening was a competition for "A Station House for the District of Columbia." The criticism was led by Mr. Snowden Ashford, and the competition was won by Mr. G. A. Dessez.

THE fourteenth annual exhibition of The Architectural League of New York will be held from Saturday, February 11, to Saturday, March 4, inclusive, in the building of the American Fine Arts Society, 215 West 57th Street, New York City. Exhibition hours: 10 A. M. to 6 P. M.; 8 P. M. to 10 P. M; Sundays, 12 M. to 6 P. M. The annual dinner of the League occurs Thursday, February 9, at 7 P. M.

THE third annual "smoker" of the Pittsburgh Architectural Club was held in the studios of Mr. H. S. Stevenson, 413 Wood Street, on Friday evening, Dec. 23, 1898. Mr. Edward Stotz, architect, gave a talk on "Shadows." The musical program was given under the direction of Mr. Frank T. Thuma and Mr. David T. Moore. Committee, Messrs. W. H. Stulen, S. C. Irwin, and R. G. Dickson.

RECENT happenings at the Chicago Architectural Club are as follows: On Monday evening, January 9, Mr. Dwight Heald Perkins addressed the club, his subject being "A Study of Recent International Expositions." The lecture was illustrated by the stereopticon. Monday evening, January 16, Mr. Thomas Jones read a paper on "Plastering." An interesting discussion followed. The drawings for the Church Window Competition were on exhibition during the evening.

THE PITTSBURGH ARCHITECTURAL CLUB has commenced a series of competitions to be held during the winter months. The club has been fortunate this year in obtaining rooms at the Carnegie Institute, and is carrying on its work with a great deal of success. Two classes have been started: one in drawing from cast and one in modeling, both under the best of instructors. December 23, the club held a smoker at the studio of Mr. H. S. Stevenson. It is to be regretted that the club, in connection with the local chapter of the American Institute of Architects, has given up holding an exhibition this year.

ILLUSTRATED ADVERTISEMENTS.

CONKLING-ARMSTRONG TERRA-COTTA COMPANY, page v, details of Crozer Building, Philadelphia; Frank Miles Day & Bro., architects. This illustration is one of a series

BALUSTRADE ON RESIDENCE BLOCK, CENTRAL PARK, WEST, NEW YORK CITY.
Executed by the New York Architectural Terra-Cotta Company.
James E. Ware & Son and Herbert S. S. Harde, Associate Architects.

which is to be selected from their recently issued and beautiful catalogue, and to be shown in theii advertisement.

Fiske, Homes & Co., page x, a new mercantile building, Boston; Gay & Proctor, architects.

Raritan Hollow and Porous Brick Company, page xx, Home Life Insurance Building, New York City (damaged by fire); N. Le Brun & Sons, architects.

Ludowici Roofing Tile Company, page xxvi, Presbyterian Church, Evanston, Ill.; D. H. Burnham & Co., architects.

The Celadon Terra-Cotta Company, Ltd., page xxvii, Grove Hall Engine House, Boston, Mass.: Perkins & Betton, architects.

Bricks and Tiles for Interior Finishing. I.

BY RUSSELL STURGIS.

ONE of the hygienic maxims or principles of Dr. Richardson,— him of the "model City of Health," — was that the interior walls and ceilings of rooms must absolutely be made of non-absorbent material, or, at least, that their surfaces be made non-absorbent. Glazed or enameled tiles and bricks[1] were obviously the materials which the doctor had in mind, and they are those which would occur to any builder or architect who might consider the possibility of carrying out this counsel of perfection. We have all of us tried the experiment, or proposed, or wished to try the experiment, of lining a hospital ward with glazed brick or tile, floor, wall, and ceiling alike, and that with rounded corners, so that the ward might be emptied of its beds and of other furniture once in so often, and then subjected to the rigorous purgation of a fire hose. The tiles which would be used for such a purpose as this would be most commonly inexpensive, soft-paste squares of baked clay with a very high gloss on one side; but those for the floor need to be very hard, and with a resistant quality in their enamel, which most of the tiles in the market do not possess; those of the dado, or lowermost 6 ft., more or less, of the wall need to be nearly as hard as those of the floor, while those of the upper wall and the ceiling may be soft and proportionally cheap. Perhaps, indeed, a finish of such a high gloss is not absolutely necessary. Among all the dull tiles and hard face-bricks now on the market there may well be found, on testing, many which are sufficiently non-absorbent to meet sanitary requirements: — certainly many as efficient, in this respect, as plaster and, moreover, free from the danger of cracking and of having holes knocked in them. Such brick and tile would be, generally, even less expensive, and far more effective in the way of decoration than those of high finish. All this is non-decorative. A very pretty effect of pale tints may indeed be got, and those in a hospital ward may be as subdued in tint as the directing physician or the authorities in charge of the structure might decide, for all shades of green and gray are within reach of the skilled tile-maker. But this, as has been said, is not exactly decorative work. Those who are familiar with the ground floor rooms of the Café Savarin, in New York, in the basement of the Equitable Life Insurance Company's building, and occupying the front on Pine Street with a return on Broadway, will remember the very pleasing effect of these low, large rooms divided by stout and stumpy, round columns, and lined and faced everywhere, columns, walls, and ceiling, with enameled tiles of a rather bright buff tone, in the reflecting surface of which a thousand repetitions of the electric bulbs repeat one another forever. The result is not so dazzling to the eyes as might be supposed, for the multiplicity of little points of light produces the effect of a general uniform illumination which is very agreeable, and the buff tone is sufficiently subdued, sufficiently "off white," to prevent the glare which weak eyes fear the most. The restaurant in the basement of the Dunn Building, at the corner of Broadway and Leonard Street, New York, opened for the first time in the summer of 1898, shows a further use of color in glazed surfaces than had been previously attempted in modern business buildings at least. Here there is an effect similar to that in the Café Savarin, but with a good deal more deliberate attempt at decoration. The difference between these two interiors is practically the difference between the room which seeks only to be pleasing in general effect, neat, smooth, and highly finished and thoroughgoing in appearance, and the room which has more pretense at artificial decoration.

FIG. 1.

Now, there are two ways of lining a room or a passageway with baked clay; and one of these is the way of surface finishing, such as has been dealt with in the previous paragraph. There is nothing to be said against it; the wall which, in our larger cities at least, will usually be of brickwork, solid and good enough in all fairly well planned and well handled buildings, allows of being coated with tile of any shape and any sort. We shall see in a moment that there are many shapes and many sorts which are quite available for our purpose. The other plan, the constructional plan, is certainly in many ways more interesting. It is more interesting because of its very difficulty. Let us suppose that the architect has, as all architects should have, a strong desire to get his decorative effect out of the very structure itself. He will then find that he wishes very much to build the interior face of his wall with enameled bricks, whereby the interior face of his wall will be of one mass with the solidity of the wall itself. He will then be led to consider, in advance, the place in his interior wall surface for the richer band of inlaid color near the ceiling and the plainer echo of it below, the possible addition of relief patterns, and so on. We are all familiar with enameled bricks, because the courtyards of the great business buildings are lined up with them. Those in the courtyards are white or cream colored, or of a very light gray, and this because their very object — the very reason for their presence — is their reflecting quality and the way in which they retain that reflecting quality though soiled with smoke or stained with the weather. Already considerable progress has been made in producing enameled bricks of good tints ranging from "off white," through all gradations of yellow and buff,

FIG. 2.

[1] Let us maintain the distinction of "enameled" for that which is covered with an opaque coat; "glazed" for that which has a transparent covering.

to reddish browns: and even more decided colors are not rare. Besides the examples mentioned above, agreeable effects are to be seen in the courts of the Congressional Library at Washington, and in the soffits of the floor arches of the eastern extension of the Grand Central Station, New York. Even better shades will be given us undoubtedly; and for the present, where stronger color is desired, and the thin surface tile, applied after the wall is built, is what we have to consider.

One of the pavilions in the Paris Exhibition of 1878 was walled with painted tiles of the most splendid sort. The lunette over the great doorway of entrance, with its triumphal composition of Grecian architecture, was painted on small square tiles. On similar tiles was painted a much larger composition under the arch on either hand which made up the triple arcade. In each, a single landscape picture embraced at once the great lunette, in which were the tops of the trees and their spreading branches, and the smaller square frame below, in which were seen the trunks of the same trees and a landscape foreground with rocks, buildings, and water. This was treated as if a landscape seen through the openings of an architectural screen, which screen was made up of two Ionic pilasters with their entablature and niches on either side. Two arched, window-like panels, one on either side of the large landscape picture, were filled with figure subjects, and these also were painted on small tiles.

FIG. 3.

Fig. 1 shows a detail of similar work in the Paris Exposition of 1889. A fantastic Japanese figure embodies tobacco and the joys of smoking; an idealized German country woman stands for the hop and the delights of beer. No matter what advertising names are given to this painting, it remains good, old-fashioned ceramic decoration still.

Every one has seen in a museum trophies of Persian tile brought at immense cost from the Levant, and in which a decorative or pictorial composition is carried out in a great number of separate tiles, each piece 5 or 6 ins. square. The French example discussed above is interesting as showing how the modern requirements of the European world are more readily to be met than by any more direct imitation of the Oriental originals. When color decoration becomes rich and elaborate with us of European blood, it is much easier to find it in realized pictorial composition, such as can be matched and executed easily and readily by the highly trained men whom we call artists in painting, than to resort to any more purely decorative scheme. The mural painter carries it over the decorator as soon as the work becomes rich. The first-named Parisian example was on a great scale, of course. The panels of figure subject were less than 6 ft. high in the clear, and the total height of the large landscape picture was at least 30 ft.; so that the trees may almost be said to be of natural size. Such majestic decoration as that will stand us in good stead, if we bear it in mind as a possibility to be realized only in those rare cases when an architect finds that space and funds alike are ample, and that he can for once have his way. In domestic interiors, and even in the rooms and halls of government buildings, civic buildings, municipal buildings, a somewhat smaller scale of adornment must certainly be adopted. Such a smaller scale is seen in use in the frieze of the dining room shown in Fig. 2. The subjects here are the fairy tales of childhood and the tales of adventure beloved by youth, — the "Arabian Nights," the French stories collected by Perrault, Peter Wilkins and his Flying Island, "Robinson Crusoe," and the rest. These schemes are carried out on rather large squares of tile, for the frieze must be nearly 4 ft. wide in the clear, and the tiles themselves at least 9 ins. square. This, however, is indifferent: and many an artist would prefer the broken and irregular effect produced by many more squares, many more joints, and many more of those diversities and inequalities of surface which come of putting together pieces of material which have been made separately and which there is no means, fortunately, of scraping down to a dead level. If, however, these decorations again are not too large, at least too costly, — altogether out of reach of the ordinary adorner of dwelling houses, of town halls, of libraries, — let us consider the design shown in Fig. 3, in which conventional groups of familiar flowers are seen, each with its name displayed in mediæval fashion by means of letters, which do not follow one another with any great regularity, each group being contained in its own painted arch of the little arcade which forms the main composition. In the center of the picture are iris, called here "purple flag," and tulips, directly over the head of the bed. Poppies, hyacinths, and foxgloves are on the left: anemones of the large and showy kind known to travelers in Italy and California, chrysanthemums, and "the miter lily" are on the right. It is hardly necessary to say that the formalizing of flowers which are otherwise treated naturalistically is rather disagreeable to the eye which has not been trained in that singular school of decoration of which William Morris is the best known master. It is not thus that one would have his floral compositions made up. And yet the suggestion is clearly intelligent and clearly attractive; and if this can be done, anything can be done in the way of floral ornamentation.

FIG. 4.

Another course is open to the architect of neo-classic tastes, and who demands rather panels which he can enclose in an architectural framework than continuous broad friezes. Fig. 4 is a panel of modern Sèvres porcelain, and this as a *tour de force* is painted on a single slab. But that is an inessential detail. The effect would be finer if it were enlarged and painted upon about twelve square tiles.

One word more before the subject of enameled tile is abandoned. When tile or brick without an enameled surface are used for wall lining, and, indeed, when any other material than tiles or bricks are used, enameled tile are still of the greatest value when used for the dado. Up to a height of 4 ft. in some cases, of 6 or 7 ft. in other cases, the wall should really be covered with a hard, resistant, non-absorbent material, and for this purpose, while marble is excellent, tiles are still better, because they can easily be made still more incapable of absorbing impurity, and because, also, the decoration which can be put upon them is immeasurably more interesting than even the most beautiful veins and stains of the natural material. This subject of dado, then, might be treated by itself and at considerable length, but it is only possible to say here that it would be well if our makers of tiles would give us in their richly illustrated catalogues some suggestions of what they are ready to offer in this direction.

FIG. 5.

The mention of trade catalogues and the thought of the tiles which are commonly offered in the market bring up the serious consideration of patterns for a large continuous surface. There is, of course, the mosaic which is made of separate pieces of baked clay; small square, specially shaped, or irregular tesseræ, or 4 in. and larger flat tiles.

But it is mainly the painted tiling and its patterns which are now in question. There are two kinds of patterns which are to be discussed, namely, diaper and that which, though often classed as a kind of diaper, is more properly called a sowing or semé. Heralds maintain this distinction, and they are right. If, for instance, you adorn a surface of velvet with an embroidered fleur-de-lis repeated over and over again, you have not a diaper but a sowed or semé pattern. A diaper pattern is, more properly, one of which the unit of design constantly repeats itself without break, or in which two or even three units alternate and in like manner flow one into the other. The essence of the distinction is that nowhere must the unit of the diaper be a wholly independent and isolated figure. The semé pattern, while adopted for stuffs and embroideries, that is to say, for curtains, for hangings, for dress, and the like, where the folds of the stuff give it irregularity and break its monotonous repetition, is extremely dangerous for flat wall surfaces. In tile work it is peculiarly important to avoid the pattern of isolated figures, because the tendency will then be to paint one figure upon a tile and then to face the wall with hundreds of such tiles put edge to edge. Any one who has observed the effect of this kind of pattern in use will feel the unfortunate effect that it produces.

The diaper pattern, on the other hand, is capable of greater refinement, because of the passing of one element of the pattern into another, and it is also devoid of that strong tendency towards spottiness of effect which is the fatal characteristic of semé patterns. Some of the most splendid compositions of purely decorative character in the world are those which are to be found upon large surfaces of tile in Persian and in Cairene mosques. Two examples, from Persian mosques, are seen in Figs. 5 and 6. The conventional flower design is apt to be extraordinarily effective, and a larger surface can be adorned in this way, it is found, than by any other constantly recurring pattern whatever. Still, however, those who are familiar with photographs of the interiors of Oriental mosques, as in Cairo, are aware how monotonous, how dull, how heavy, can be the effect of these large surfaces of wall covered with constantly recurring pattern. Nor is it to be alleged that the absence of color and the substitution of the rather ugly purplish brown of the photograph explain this monotonous look of the wall surface. The loss, in the small scale of the photograph, of the irregularities, the breaks, the uncertainties, and inequalities of surface of the original makes a greater difference, but still the general effect of large wall surfaces covered with even the best diaper patterns, especially if in strong contrast with the background, is depressing. The modern designer for tile decoration should, therefore, be ready to imagine and to realize separate compositions: sometimes vertical candelabra with a decided foundation, or root, and an equally decided termination at the top; sometimes boskets of trees or bouquets of flowering plants.

A century ago the Chinese used to send to England and Holland and to the richer towns of our own Atlantic seaboard, wall papers in which a series of flowering trees or plants of bamboo succeeded one another on the wall, while small figures accompanied them and formed a foreground of great variety. The same idea may be carried out in tiles without undue extravagance. It is better, of course, that each separate pilaster, candelabrum, or anthemion have its own beginning at the top of the dado and its own termination at some distance below the uppermost line of the ornamented band, but this is not absolutely essential, and cheaper work may have the vertical stripes of ornament passing from top to bottom of the frieze and disappearing. Moreover, horizontal as well as vertical division of the sort may be made.

FIG. 6.

For the sake of clearness of comprehension, let us suppose a plain, dark dado, and the surface to be adorned with tiles coming above this dado and extending over 8 ft. of vertical height. Such a surface as this can be adorned with horizontal bands, which may be exactly alike or may come in a wider and narrower, a richer and a plainer, a more brilliant and a more somber alternation. Or a single very rich band of scroll ornament, 2 ft. wide or more, may pass horizontally around the room in the upper part of this 8 ft. band, perhaps in its uppermost third, and this may be echoed by a much narrower band immediately above the dado. In either of these cases — in the horizontal as well as in the vertical treatment — the surface not occupied by the richer patterns may, indeed, be ornamented by small and not very noticeable spots, as of gold, or brown, or some neutral gray, or by groups of such spots; but it will generally be found that the irregularity of the background produced by the small tiles will sufficiently diversify the surface, which, after all, is a foil, or set-off for ornament.

The American Schoolhouse. XIV.

BY EDMUND M. WHEELWRIGHT.

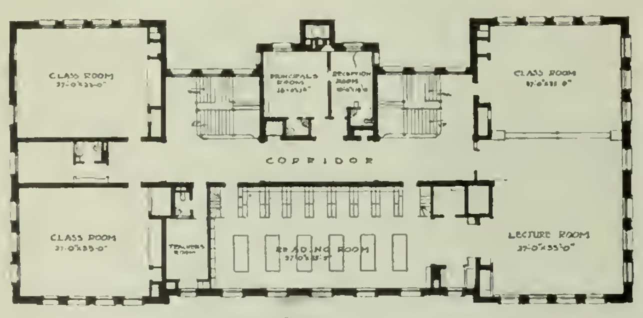
THE NORMAL SCHOOL.

THE normal school, being primarily for the training of teachers, has features analogous to that of a college, *i. e.* its principal function is to give recitation rooms, laboratories, drawing rooms, etc., for instruction in special subjects; but unlike a college, it is required that there should be a large assembly and study room in which the students prepare their recitations and where they join in general exercises; also, as in the English schools, small classes may recite in this large room without disturbance to others in their studies. In fine, the method of instruction in the normal schools is that which is given to the higher classes in schools of the type of the Roxbury Latin School, whose traditions are based on the English method of individual instruction.

With the advanced age of the pupils and the advanced studies in our best high schools, there seems to be no good reason why the upper classes in these latter schools should not be placed under the systems adopted in the normal schools. If this were done, the plan of the high school would be materially affected and the cost of such constructions materially decreased from that involved by the graded class system, which is generally followed in our high schools.

Aside from its collegiate characteristics, the normal schoolhouse plan when fully developed gives class rooms for the kindergarten, primary, and grammar grades. The pupils in these "model departments," as these branches of normal schools are designated, are not a picked company of children, but are taken without selection from districts which are established by the local school committees. The teachers for these "model departments" are nominated by the principal of the normal school and are elected by the city school committee. The aim of these departments is to produce actual school conditions and to afford to the students in the upper class of the normal school an opportunity for practical application of the teacher's art. Other normal school students than those especially assigned to instruct these pupils are permitted to observe the work. These departments have become essential to a thoroughly equipped normal school, so that class rooms and other provisions for their accommodation are a requirement of the fully developed plan of this type of building. We therefore find in the typical normal school plan an "assembly study room" with single desks and chairs for say, two hundred and fifty students, class rooms for the kindergarten, primary, and grammar school, which are given an en-

STATE NORMAL SCHOOL, NEW HAVEN, CONN.
Hartwell, Richardson & Driver, Architects.



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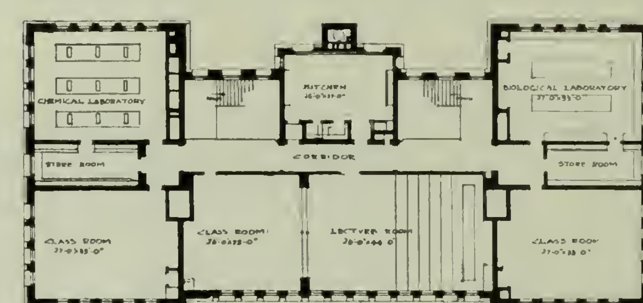

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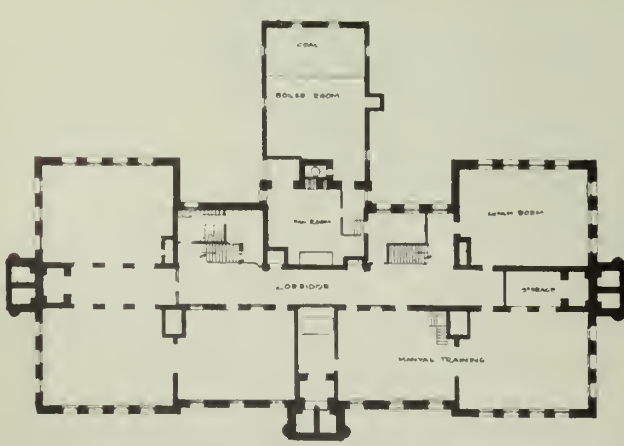
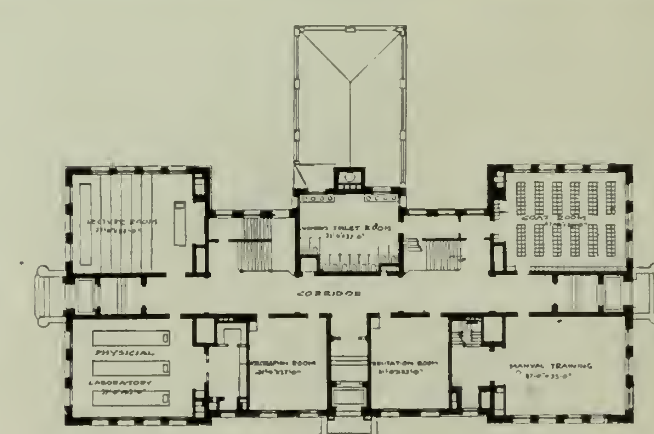


BASEMENT PLAN.



FIRST FLOOR.

STATE NORMAL SCHOOL, NEW HAVEN, CONN.

trance to the class rooms and a stairway to toilet accommodations in the basement distant from the portion of the building assigned to the normal students.

Special class rooms should be furnished for instruction in geography, mineralogy, zoology, history, literature, "pedagogy," and languages, as are physical, botanical, and chemical laboratories; rooms for instruction in drawing, music, and manual training are also required. A well-appointed gymnasium is also properly held to be an essential feature of such schools. The library is also important in such an institution.

STATE NORMAL SCHOOL, NORTH ADAMS, MASS.
H. Neill Wilson, Architect.

A good example of the normal school building is that shown in the State Normal School at Salem, Mass. In the basement of this building are located the heating and ventilating apparatus, the toilet and play rooms for the pupils of the "model department" schools, a well-equipped gymnasium with dressing room, the industrial laboratory, a lunch room, and store rooms for supplies.

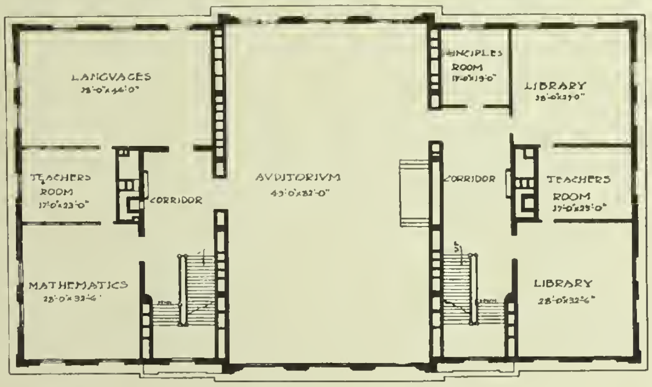
On the first floor are the toilet and cloak rooms provided with individual lockers for the students of the normal school, a system of clothing disposal which we have seen to have been gradually adopted in several high schools recently constructed. Two outside entrances give access to the portion of the building assigned to normal school scholars. In either wing is an entrance for the pupils of the "model" schools. The rooms for these schools are nine in number and accommodate over three hundred pupils. These rooms have been planned so as to be entirely distant from the space assigned to the normal school proper, and the stairways to the basement are so planned that they may be used by the children without disturbance to the normal school students, while easy communication between the two departments is provided.

On the second floor is the assembly and study room, 60 by 85 ft. On this floor is the principal's office, reception room, teachers' meeting room, with toilet room, library, supply and recitation and work rooms.

The third floor is mainly devoted to instruction in science. Here are the rooms and laboratories for instruction in physics, chemistry, botany, geography, mineralogy, and zoology. Here also is a lecture room with seats arranged in tiers, and two rooms on the north side furnish accommodations for instruction in drawing.

The smaller State Normal School at North Adams is designed to meet similar requirements, but the "model department" school is in a separate building on the same lot of land. In this building is a gymnasium equipped for the Swedish method of instruction.

In the North Adams Normal School proper we find the cloak and toilet rooms on the first floor, as in the Salem school, but here, also, since "model" class rooms are provided for, as above noted, four natural science laboratories are placed on the first floor. On the second floor is an assembly hall, the office, libraries, and class



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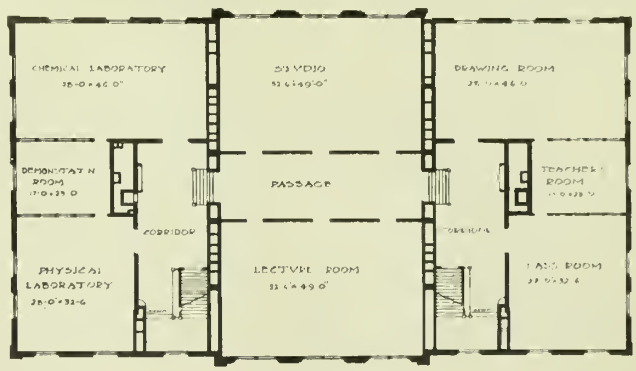

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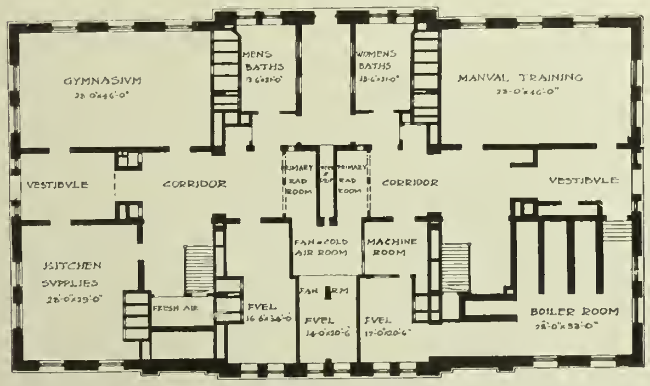
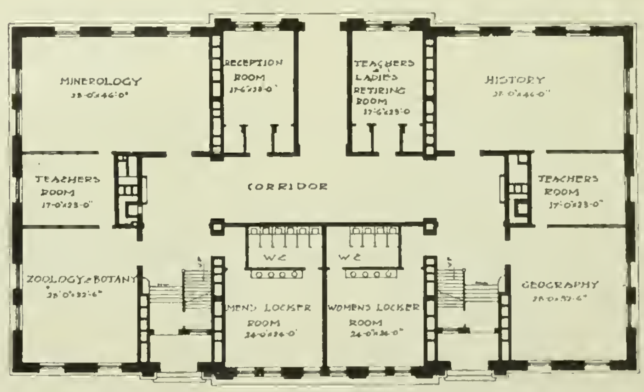


BASEMENT PLAN.



FIRST FLOOR.

STATE NORMAL SCHOOL, NORTH ADAMS, MASS.

room for mathematics and languages. In the third story are the physical and chemical laboratories, the drawing rooms, and class rooms.

In the normal school at Lowell in the same State the cloak and toilet rooms are on the first floor, as in the other two schools; for the "model" departments a kindergarten class room only is provided, the other "model" being furnished in adjacent public schools. The assembly hall and study room are united as in the Salem school, and, as in that school, this room is placed on the second floor.

STATE NORMAL SCHOOL, LOWELL, MASS.
Stickney & Austin, Architects.

The State Normal School building at New Haven, Conn., as here shown, is but a portion of the structure contemplated for the future needs of the institution.

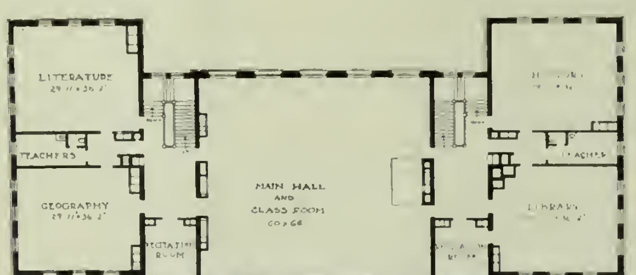
The main building is 155 ft. 4 ins. long, with an extreme depth of 70 ft. 4 ins.

It is expected that wings will later be built projecting from the rear of the present building, which will then occupy three sides of a hollow square, with the heating plant in the center.

This proposed extension accounts for a disposition of the staircases that would otherwise have been extravagant.

The clear height of the first story above the street is 12 ft.; that of the second, 13 ft., while the third is the same as the first, except that the lecture room and class room, which open together, are 16 ft. in the clear.

But little of the basement is occupied at the present time. One room is arranged for a lunch room. Two other rooms are thrown together, which are devoted to manual training, while the remainder is unoccupied, awaiting future development.



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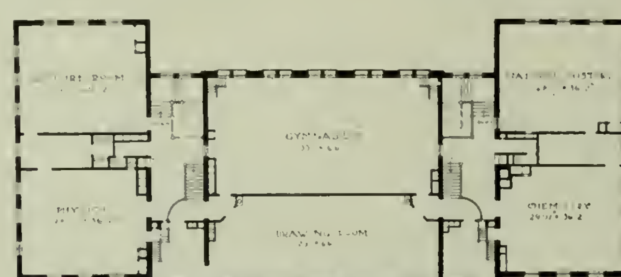

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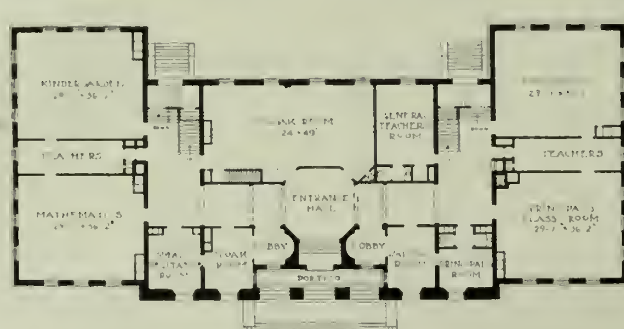


FIRST FLOOR.

STATE NORMAL SCHOOL, LOWELL, MASS.

The clothing lockers, which are now placed in a room upon the first floor, will doubtless finally be placed in the basement as originally planned, and the space they now occupy will be used for class rooms.

There will then be upon the principal floor one class room, a manual training room of the same size, with an alcove for the convenience of the instructor, from which stairs descend to the rooms in the basement devoted also to manual training. In the floor a hinged trap door opens upon an inclined plane, by means of which stock and other articles are passed from the basement to the room above, where the finer work is expected to be done.

There are also two recitation rooms, a physical laboratory, with alcove, store room, and closets, a lecture room of same size, with alcove, and a women's toilet room. This toilet room has no direct connection with the rest of the building, and is entered by a passage underneath and behind one of the main staircases. The men teachers have their toilet room in the basement.

In the second story, the northerly end of the building is occupied wholly by one class and one recitation room, which open together by means of double rolling partitions.

Corresponding to these in position at the opposite end of the building are two class rooms, while the library, or, as it is designated in this case, reading room, is centrally located along the front, with a length of about 55 ft. (or an extreme length, measuring into the alcove at the end, of 65 ft.), and a depth from front to rear of 25 ft.

Book shelves in alcove form, two stories in height, cover the rear wall opposite to the light.

This library and reading room is connected with the lecture room just mentioned by double rolling partitions, having an opening 8 ft. in width.

The second story also contains the principal's office and reception room, a teachers' room, and a retiring or emergency room, each having its individual toilet accommodation.

In the third story are the chemical and biological laboratories, each with its large store room and two class rooms.

Another class room opens by sliding partitions into a still larger lecture room, the two having an extreme length of 73 ft., with a height of 16 ft., as previously stated.

In the center, at the rear, is a kitchen or cooking school, fitted with closets, sinks, dressers, and lockers, and with a lift running from the basement.

It will be noted that the requirements in the case of this school are different from those of the normal schools of Massachusetts.

Certain of the Massachusetts requirements are not demanded in this institution or are met by accommodations in the city schools.

The following quotation from the catalogue of the North Adams school, describing the administration and the facilities for practise in teaching, given in the training school, may be of interest to those unacquainted with the Massachusetts Normal School methods.

"Unusual opportunities are afforded for the study of children and the practise of teaching. Students begin their work in this school immediately upon their entrance into the normal school, and continue it regularly throughout the course. The rapidity of progress through the various stages of the training-school work depends on the ability and previous experience of the student. In general, the order of work is as follows: —

"*First Year.*— First term: reading of individual children begun. Second term: observation of teaching begun.

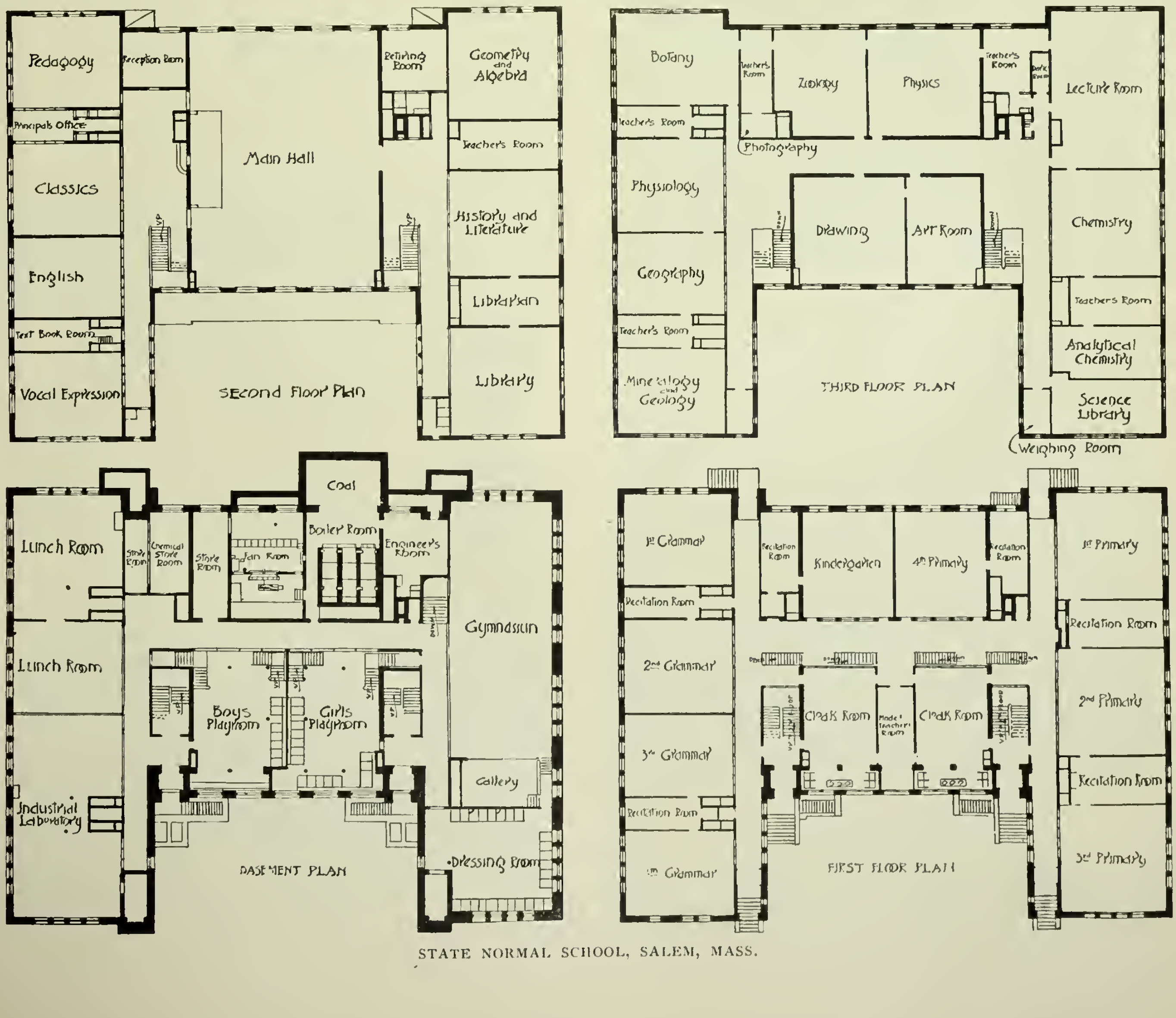
"*Second Year.*— Third term: study of school organization and management, and assisting in teaching and management. Fourth term: practise in teaching, the amount of responsibility conferred depending on the ability of the student.

"*Third Year.*— Responsible charge of classes, elective work. Students who have taught successfully before entering will be given opportunities for practise in teaching and disciplining as early in the course as their abilities warrant.

"Close and appropriate supervision and instruction are given students by the regular teachers of the several grades and by the principals of the various departments, thus insuring reasonable progress to students requiring extra opportunities in the practise work of teaching.

"In the kindergarten department, which occupies a suite of three rooms, which can be opened into one, students not only are trained to be kindergartners, but also are taught the importance of and the ways of continuing the kindergarten spirit into primary work. They observe and practise in the early primary grades, and are fitted thus to become kindergarten or primary teachers in the public schools as they may elect."

STATE NORMAL SCHOOL, SALEM, MASS.
J. P. Rinn, Architect.



STATE NORMAL SCHOOL, SALEM, MASS.

Church Architecture in Materials of Clay.

BY THOMAS CUSACK.

THE brick churches of moderate cost yet to be built in this land of the Pilgrim Fathers, to supersede or replace such as otherwise would be (or are) of wood, offer a wide field for the legitimate use of terra-cotta. In many of those already built it has been used extensively, giving enhanced reputation to rising architects who have anticipated the wants of the community immediately concerned, and contributing something towards the less specific demands of those interested in the abstract question of street architecture. In many churches of comparatively recent erection, however, the terra-cotta has been limited to gable coping, roof cresting, and, perhaps, a few grotesque finials. These meager items but serve as reminders of what *might* have been done on a more extended scale in the same building had the architect been endowed with artistic perception, united to a faculty for wise discrimination in the choice of materials. If, in addition to other acknowledged excellences, the weather-resisting qualities of terra-cotta have justified its use in the more exposed situations, why stultify these candid admissions by withholding it from the entrance, the apse, the spire, the buttress weatherings, and the window tracery? The same work that served medieval builders for these and other purposes remains to-day intact, while stone of the same age has long since yielded to the tooth of time. So, too, in our own experience, thoughtful men have turned it to good account in every part of the edifice, interior as well as exterior, not even excepting the font, chancel screen, and reredos. Such examples, creditable and encouraging as they undoubtedly are, render more conspicuous a wilderness of wasted opportunites, most of them chargeable to the force of conventionality, the inexperience, or the want of resource on the part of architects. The reminiscent architect to whom these strictures would apply must often feel the force of Whittier's couplet : —

FIG. 1. CAMPANILE OF SAN GOTTARDO, MILAN.

"For of all sad words of tongue or pen,
The saddest are these : 'It might have been.'"

We are not, of course, referring invidiously to mission buildings, or to merely temporary outposts of the Christian religion, in which no architect of standing has had a share, or in which four walls and a roof may have exhausted the (usually limited) means at the building committee's disposal. The sins of omission and commission to which exception is taken are everywhere noticeable in city churches, built for prosperous — even fashionable — congregations. Door and window jambs without the semblance of a molding, buttresses without a pinnacle, pointed arches filled with pretentious "tracery" from a planing mill, amount to a travesty on Gothic architecture. As for stained glass, we hold it as much out of place in a frame of perishable wood as a diamond, or other precious stone, surrounded by a nickel-plated setting. Granted that the public taste has yet to be educated up to this standard, and that even church members need an occasional reminder of "the eternal fitness of things," it is to those who are professionally engaged in what has been truly described as the greatest of all the arts that they must needs look for enlightenment.

The relationship in which an architect stands to his client and the status accorded to him in the community are largely of his own making. Like other professional men, his opinions will command respect and his advice will be accepted with a degree of deference equal to the measure of success achieved in work already executed under his direction. The average American architect has been content to occupy a somewhat dubious position in this respect compared with that of his European contemporaries. Of late years, however, he has made good his claim to a much higher place in public estimation. This improved position has not always been gained by wordy self-assertion, or merely adventitious circumstances. In most cases, it has been the well-deserved reward of merit, displayed in the conception and execution of work bearing evidences of taste, utility, varying degrees of originality, free from fads and eccentricities. Assuredly, it has not resulted from catering to the whims

FIG. 2. CHURCH AT LEVER BRIDGE, LANCASHIRE, ENGLAND.
Edmund Sharpe, Architect.

of a client, be he an individual or a noun of multitude, or by following too literally notions that may be crude or commonplace, perhaps irreconcilable. The architect who can resist these influences, adhering to his own (presumably trained) judgment with firmness and in

FIG. 3. RECTORY, LEVER BRIDGE.

moderation, has done much to prove his fitness as the interpreter of his client's actual wants, and as a safe guide in their ultimate attainment.

The responsibilities inseparable from such a position cannot be minimized or ignored; they are the price paid for an established reputation, and are not without compensating advantages. On every building for which an architect is responsible, he has written his name in letters that cannot be effaced, repudiated, or recalled, so long as the building exists. It is a challenge to public criticism, becomes part of his life's record, on which he must stand or fall. If it stands the test, that name will find favor in his own time and be known to future generations, for the good, even more than the evil things that architects do, are destined to live after them.

The architects of northern Italy, from the twelfth to the sixteenth century, accepted these conditions in their fullest significance. Their work has survived until our own time, and will continue a font of inspiration for ages to come. The excellence of their designs and the soundness of their construction were in accord with their choice of an enduring material. In this latter particular, the physical disadvantages by which they were beset did not cause dismay. On the contrary, they were faced in such a way as to make them a help instead of a hindrance. The scarcity of stone did not force them to temporize with wood for structural purposes, or deprive them of a means wherewith to make themselves known to posterity. Turning to the rich deposits of clay which had trickled down into the valley of the Po, they molded it into building blocks, using the inflammable wood to fire the kilns, in which to render them imperishable. It is by their skilful and extensive use of burned clay that the architects of Lombardy achieved lasting renown. We, more fortunate than they, have clay banks of much greater extent and variety; for its preparation, we have engine power and appliances of the latest approved pattern, where they had hand labor; we have chemists and mineralogists vying with each other in their desire to reveal the secrets of nature. With all these advantages, shall we not try to imitate — if we cannot improve — the examples in church building left by men who lived in the Middle Ages, before "the revival of learning"?

With a superabundance of material wherewith to illustrate the preceding paragraph, we must forego that privilege until a more opportune moment presents itself. From Santa Eufemia at Pavia to "Santuario di Crema" represents fully four centuries of incessant church building throughout Lombardy, in all of which terra-cotta and brick came to be used as a matter of course. Midway in this period arose the graceful campanile of San Gottardo, Milan, seen in the foreground of Fig. 1, surrounded by a setting of brick chimneys rising out of an unstudied ensemble of red roofing tile: on every hand a changing vista of variously designed but similarly constructed roofs, chimneys, and campaniles. In this view, while there is much to charm, there is nothing to offend, the eye of an artist. It embodies the essence of the prevailing material, and may be said to typify the style of architecture that came into existence in an age and country known to us, above all others, for its exemplary use of burned clay.

An eminent English architect and author, Mr. Edmund Sharpe, must have reasoned with himself from these premises, until he reached a satisfactory conclusion, which he did in 1842. Previous to that time the manufacture of terra-cotta in England had been confined to busts, medallions, and other isolated features of a purely decorative character. Beyond these no serious attempt had been made to convert it into a *bona-fide* building material. Notwithstanding this, Mr. Sharpe conceived the idea of building a church entirely of terra-cotta, the same to be made from fire-clay, obtained as a by-product in the coal measures of Lancashire. The immediate outcome of this initial effort is shown at Fig. 2, and the one that followed it, two years later, at Fig. 4, both of which we commend to the notice of our friends, whether architects or architectural clay workers. The author of "Sharpe's Parallels" and other standard works reunited the two functions and proved himself preeminent in both.

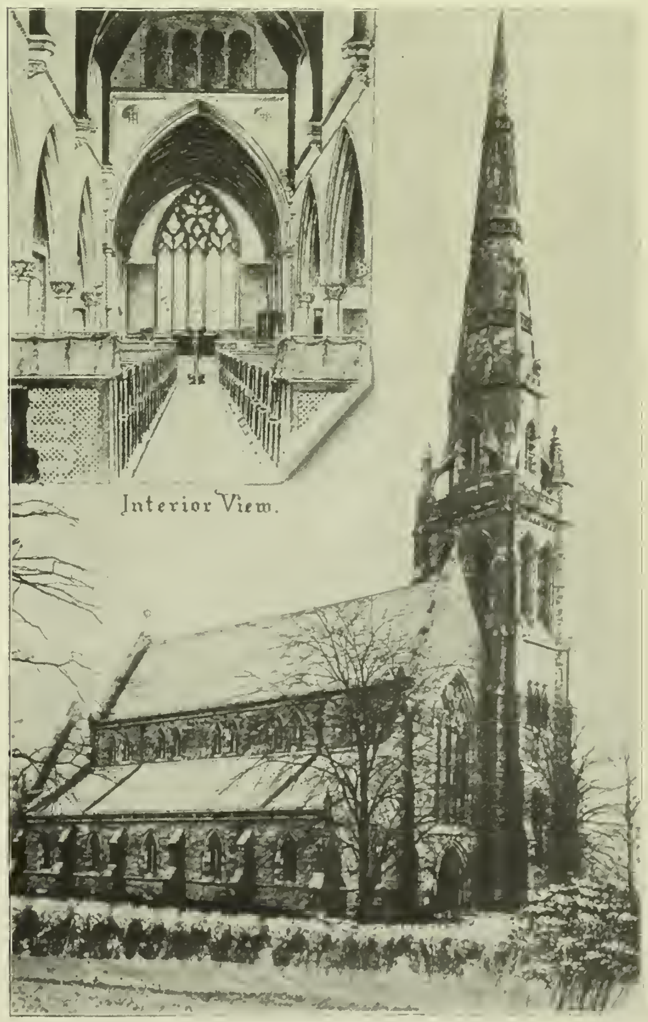


FIG. 4. PLATT CHURCH, MANCHESTER, ENGLAND.
Edmund Sharpe, Architect.

For the information of those who have not read our description of three years ago,[1] it should be noted that the whole of the *interior*, as well as the exterior, of the first-named church is finished in terra-cotta. This applies to the seat ends and finials, the tracery panels in the seat backs, the font, pulpit, organ screen, and even the communion table, all of which are shining examples of finished workmanship. While not prepared to advise the use of terra-cotta in some of these items, it is hard to withhold our admiration for an architect who displayed such steadfast faith in its claims and capabilities.

To the church at Lever Bridge, a schoolhouse and rectory have now been added, in which, needless to say, the same unexceptionable material has been used, — used in such way as to produce a group that is truly picturesque. That richly crocketed, open-traceried spire is still intact, and through it, on the occasion of our visit, slants of sunlight were gleaming down into the vestibule, lighting up the somber habiliments of the female bell-ringer, at that moment calling the parishioners to Lenten service. This spire does not owe anything to an interior anatomy of steel; nor does it contain a metal dowel, cramp, or anchor of any description. If it has withstood the frosts and storms and weekly vibrations of the bell for more than fifty years, there need be no apprehension as to the general condition of the edifice. The fabric of the whole establishment remains, and is likely to remain, unimpaired for an indefinite period. While waiting for a train on the high ground at Darcy Lever, black smoke from the neighboring cotton mills and mounds of colliery slag were closing in a limited perspective, but the unique ensemble of this little terra-cotta village in the foreground was enough to redeem the bleakest of landscapes, rendering hospitable the otherwise dreary outlook towards Bolton-le-Moor.

The Platt Church is built upon lands forming part of an estate of that name, which, in the middle of the twelfth century, had been conveyed to those truly militant champions of Christianity, the Knights of St. John of Jerusalem. It is now a residential suburb on which the city of Manchester is making rapid encroachments: bounded, as yet, on one side by an expanse of meadow land which renders the scene more pastoral if less picturesque than the one just described. Our visit, interesting as it would have been, was made additionally gratifying by the friendly greeting received from the rector, the Rev. W. H. Finney, to whom we are likewise indebted for some useful information.

The metal gutters behind the diapered parapet appear to have become leaky of late years, giving cause for portions of the roof timbers to be renewed. The delicate undercut ornament inserted in the hollow of the molded door jambs has, in some instances, broken off, and the finial on gable of chancel had been displaced during a recent wind storm. With these trivial exceptions, no block of terra-cotta in the building shows the slightest symptom of decay. Indeed, to quote the words of Mr. Finney: "It is not possible, apparently, to find a single one that has been affected by time or weather." In 1896, this church having been built fifty years, pastor and people were looking forward to the celebration of its jubilee. Barring shocks of earthquake, lightning, or the less likely danger from invading artillery, coming generations will celebrate, perhaps, more than one centenary of its existence without finding any need for restoration of the fabric.

These two churches were not only the first of their kind that had been built in modern times; they were the forerunners of all that has followed in structural terra-cotta in England — therefore, in America. In many respects the work will stand comparison with the best of our recent efforts this side the Atlantic; while in some it is, perhaps, ahead of anything that has been accomplished during the intervening half century. Considering the boldness of the venture, the responsibilities of the task, the untold difficulties incident to its execution, this terra-cotta lastingly associated with the name of Edmund Sharpe might well claim to be the Mecca of modern clay-workers. It was a precursor, and is, therefore, a fitting preface to what may be said subsequently on behalf of burned clay in church architecture.

[1] A descriptive commentary on these two churches appeared in THE BRICKBUILDER, February, 1896, and was continued in the June number of that year, on which occasion adequate illustrations were promised at some later date. Since that time, the writer has revisited these two remarkable specimens of terra-cotta architecture, and, not unmindful of the foregoing promise, obtained the negatives from which these plates have been made.

Fire-proofing.

THE TEACHINGS OF THE NEW YORK FIRE.

IF one of the provinces of the architect is to assist in the education of the general public, the recent fire of December 4, in New York, by which the Home Life Insurance Building was partially gutted, has demonstrated that the efforts of the profession have not been in vain. Whenever a fire has occurred in a building which has any more than ordinary solid construction, the daily press has been wont to make remarks about fire-proof construction and to assume that any building not manifestly dilapidated must have been intended to be fire-proof. In the newspaper comments on the New York fire, however, the amount of tangible appreciation of structural conditions manifested by the reporters has been somewhat remarkable, as showing how well the lessons of fire-proof construction have been assimilated by the press. Of course there has been a certain amount of slopping over, and the scare headlines which came out at first would seem to infer a belief that the Home Building was a total failure, but on the whole, the comments of the press on the fire and its result have been very intelligent and have shown a reasonable fairness in judgment of conditions. Several of the papers also have shown a commendable desire to submit judgment upon questions of this sort to experts. Mr. W. W. Kent, the well-known New York architect, made, to the New York *Herald*, a very complete report of the condition of the Home Building, which undoubtedly had a great deal of weight in moderating the yellow journals, which are only too prone to jump on a suspicion of failure. In its issue of December 6, the New York *Tribune* published an editorial apropos of the fire, which is of interest to quote.

"Sneers over the burning qualities of fire-proof buildings will doubtless be much in evidence because of the fire at Broadway and Warren Street on Sunday night. The result of that conflagration, properly interpreted, however, stands much to the credit of modern 'fire-proof construction.' The fact that the Home Life Insurance Company's building was not utterly ruined, but that only a few floors were gutted, is, under the circumstances, strong testimony to the endurance of such structures and their great value as barriers to the progress of a fire. The existence of some defects in the design of the building, which apparently prepared the way for such damage as was done in it, only serves to emphasize the effectiveness of terra-cotta covered steel in resisting flames when it is properly disposed and an edifice is not planned with an open door for the entrance of a passing fire."

The *World* was not quite as successful in its statements: —

"The 'fire-proof sky-scraper' in New York was tested by fire last night. It did not stand the test. The lofty Home Life Insurance Company's building on Broadway, opposite City Hall, 280 ft. high, absolutely 'fire-proof,' caught fire from a burning building next door to the north. The flames were not confined to that floor of the Home Life's building in which they first ignited. Devouring everything combustible, they ate their way to the roof, floor by floor. Their progress was very slow, of course, but finally only the stone and iron and terra-cotta remained in the floors through which the fire had soared. The fire burned itself out, for the firemen, fighting insuperable difficulties, could not put it out."

Our readers who studied the presentation of the condition of the Home Life Building, as set forth in our last issue, will appreciate that the *World's* statement in regard to the flames not being confined to one floor of the Life Building is hardly a fair one, for though some six floors were gutted, the evidence of the newspaper reports is on the whole quite clear that the fire was communicated to each story individually from without. One of the best descriptions of the manner in which the fire was communicated from one building to another was published as follows in the New York *Sun*: —

"The clothing store was all in a blaze in a quarter of an hour. Then it burned as a whole until the floors fell, one after another. At

11 o'clock there was nothing left to burn. Meantime, the big insurance building, against which this white-hot mass of fuel had been sending up steady sheets of flame for a full hour, had just begun to catch fire, this notwithstanding the fact that the windows had no iron shutters on them."

We believe that the disasters of this fire, which are really very considerable, though confined so closely to mere externals or non-essentials of construction, will prove of vast benefit to the profession and the public in that they will do a great deal towards the educational development of our architects, our builders, and our real-estate owners. This fire has demonstrated that a building properly devised and properly constructed has great resisting powers against heat. It has also demonstrated that a structure of this sort is a very effectual fire stop. The possible consequences of a fire of this sort are simply appalling. Mr. Brady, of the New York Building Department, was asked by one of the reporters if, in the light of what has happened to the Home Life Building, there was such a thing as a fire-proof building.

"Yes," he replied. "I think that is a fire-proof building. Look at it. The walls, the floors, the tower, are all standing intact. Very little of it has been burned. The fire was practically confined to the contents of the offices; and let me tell you that if it had not been a fire-proof building, the firemen would be blowing up buildings to-day away down below the Astor House, in an effort to stop the progress of a conflagration. With the gale that was raging last night, the firemen would have been utterly powerless against such a conflagration, had there not been such a bulwark as this building interposed between the flames and the blocks beyond it. When we speak of a fire-proof building, we use the word in a comparative sense. Certain heats will burn anything, but this building showed itself able to stand up against as fierce a fire as we are likely to have. Whether or not buildings should be as high as this I don't care to say. That is a question with which I am not dealing at present."

Surely, this is pretty good testimony to the value of this particular construction. But we will not learn a great deal by limiting ourselves to congratulations that the building stood so well, but rather by considering if it were possible for it to have stood a great deal better, and this is manifestly the case. The omission of all external shutters on the side towards the fire was bad enough. As a matter of fact, it is very difficult to put shutters on an office building and keep them closed. Real-estate owners have found it again and again the rule that the tenants object to having their shutters closed. There is no way of closing them simultaneously without giving trouble to the occupants of the rooms, and there is hardly a building in existence with windows situated as those on the inner side of the Home Life which are not equally unprotected. Shutters sound all right, and the press is united in saying that had they been in place the Home Building would not have suffered; but they are impracticable from a business point of view, and we imagine that most owners of buildings would much prefer to take their chances of an external fire destroying their building entirely than to be put to the continual annoyance of trying to close these shutters. But even with the openings unprotected by shutters, there are methods of vastly diminishing the risks of fire from without. Wire glass has repeatedly been alluded to for protection in cases of this sort. The wire glass now in the market is not suitable for use in windows, but we understand that the glass companies are preparing to issue a product which is essentially a plate glass with wire embedded therein. This wire is so fine that it does not materially obstruct the vision, and tests have shown that the glass will melt before it will allow the flames to go through, and a heat which will melt glass, though by no means uncommon in a conflagration, occurs only in spots and lasts for only a very short time.

But even aside from the lack of shutters, the lack of wire glass, and admitting for an extreme argument that wooden window frames and sashes might be tolerated in a modern fire-proof building, there was a grave defect in the interior arrangement of the offices in the Home Life Building, a defect for which nobody but the renting public is to blame, namely, the cutting to pieces of the partition walls by rows of light sashes in the upper portion nearest the ceiling. Mr. Kent, in his report to the *Herald*, says that, "Perhaps the most striking fact in connection with the entire disaster is the thorough manner in which the hall and room partitions were overthrown by the heat. I say heat advisedly, inasmuch as it was impossible to throw any water into the upper part of the building. On almost every floor in which the fire had gained much headway the destruction of these partitions was seen at a glance to be due very largely to the fact that the fire-proofing only continued up about 5 ft. from the floor to the bottom of the interior sash, which gave borrowed light to the hallways, corridors, and passages."

VESTIBULE CEILING (GUASTAVINO SYSTEM), CITY HALL, BINGHAMTON, N. Y.
Ingle & Almirall, Architects.

There is not the slightest reason why these interior windows should ever be tolerated in a building which claims to be fire-proof. An external conflagration might destroy the window frames, the finish around the windows, and the furniture of an individual room, but it has repeatedly happened in offices which were enclosed by tight walls that the entire contents has been consumed without the fire spreading beyond that particular office. Indeed, there are a few cases on record where the presence of the fire was not even suspected until the following morning. Consequently the windows in the interior partitions of the Home Life Building were undoubtedly responsible for a very large proportion of the damage. Then, again, the construction of the partitions themselves leaves a great deal to be desired, aside from the cutting off by the rows of windows. These partitions were built of hollow blocks, the openings for the doors being spanned overhead by a wooden trimmer.

Quoting again from Mr. Kent: "I do not recall a single instance in recent great fires in large so-called fire-proof buildings where the ordinary terra-cotta block partition has not met with disaster, and as this special form of partition has so many admirable qualities, both in strength and in fire resistance and as a sound deadener, it would seem as if in some way it could be made much better on the point of stability under conditions like these."

This is a severe indictment of the terra-cotta block partition work; but the indictment is limited to the manner in which the material is used rather than the material itself. We cannot have a fire-proof partition unless it is able to stand fire and water. This seems axiomatic, but the axioms of construction are the ones which are most often ignored.

Then, again, the results of this fire seem to show that wire lathing and plastering are not the most advisable protection possible for structural steel work. In fact, we would draw a deduction even further than this and say that in a modern building, to be thoroughly fire-proof, there ought to be no lath and plaster whatever, except possibly for decorative purposes, and that in the offices themselves the ceiling ought to be of terra-cotta, so arranged that it will form its own finish. We appreciate the argument that the terra-cotta floor blocks as now used are of themselves fire-proof, and that the plastering applied to them is an additional safeguard; but on the other hand, the fact that the soffits of the arches are to be plastered makes it possible for a careless builder to do his work in a very rough manner without being found out, and we see no reason why we should not be able to produce a good ceiling without the use of metal lathing and plastering to cover up the carelessness of the workmen.

There are points about the floor construction of the Home Life which might be improved upon. The air space left under the wooden floor boards is a menace, and ought not to be. But the amount of actual damage to the floor construction in the Home Building was surprisingly slight. It will be noted that a safe weighing two tons fell through the tenth floor into the office of the Rapid Transit Commission on the ninth floor, and there stopped. This apparently shows two things: one that the particular floor arch over which the safe stood on the tenth floor was of faulty construction, and the other that the remaining arches were unusually well built.

The damage to the exterior of the building by the fire is what might have been expected. Perhaps it is too much to hope the time will come when our architects will feel that only a few building materials are suitable for the exterior of a structure in a crowded business district of the city. We believe Boston is the only city which recognizes officially the non-fire-proof character of granite, its building laws requiring all granite supporting work below certain levels to be protected by brick or terra-cotta. But, though the temptation to use elaborate stonework is one which is very strong to an architect who takes a pride in producing a certain effect, it is more logical to admit in the beginning that no building stones can be depended upon to resist a fire, and that if we are to be consistent with the surroundings, with the conditions which are very apt to prevail at times in a commercial structure located on a crowded street, the choice of material for the exterior must be limited to burnt clay in some of its various modifications. Quoting again from Mr. Kent's report to the *Herald*: —

"The total ruin of half of the front repeats the old and expensive lesson of how utterly useless in a great fire any building material is except such as has already been through a great fire before, namely, terra-cotta or brick. The white marble stood as well as any stone could be expected to stand, but I believe had brick or terra-cotta been in its place, it would still be there in a much less mutilated form. At the great fire of the Bedford Street stores, in Boston, built by H. H. Richardson, of brown sandstone, the effect of fire and water on this stone was at the time noted as very disastrous, and I believe that in all cases where most of our well-known building stones have been subjected to great heat they have failed to stand the test like brick."

We need hardly more than repeat what has often been stated in these columns, that brick and terra-cotta are preeminently the building materials of the nineteenth century, and are especially suited to the wants of our modern commercial structures, to an extent unequaled by any other product available to the architect or builder.

In fact, the lessons of the fire are such as we imagine any intelligent architect could have written out in advance. The failures have taken place precisely where they could have been expected to occur, and without an exception the damage done to this building is the result of concessions to popular demand, either in the line of arrangement or of external decoration.

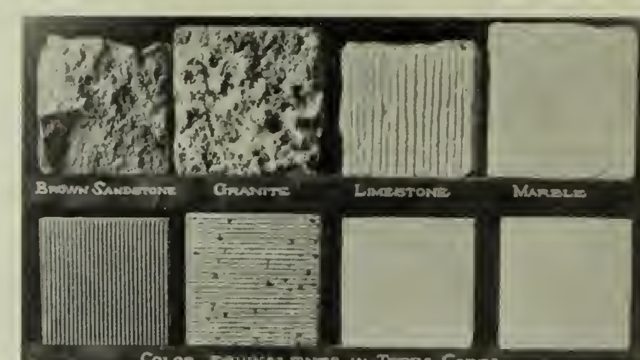
LESSONS FROM THE HOME LIFE BUILDING FIRE.

BY THOMAS CUSACK.

WHILE the reports and comments of the technical press have been all but unanimous in pointing out the contributory causes of this disaster, there is a corresponding agreement upon the things necessary to minimize the effect of fires that must occur, notwithstanding all that can be done to render them less frequent. The echoes that continue to reverberate through the offices of our leading architects show the widespread interest excited by this instructive, if expensive, object lesson. Those who have not been taught by reason may glean something from experience, while the residue will, at least, be amenable to the dictates of stern necessity.

The present writer has been favored by many freely expressed opinions confirmatory of the conclusions reached in his own summary, contained in last issue of The Brickbuilder. Some of these have been delivered verbally, and some received in writing, from architects who are identified with the higher types of modern construction in New York, Chicago, Philadelphia, etc. The verdict of this highly competent jury may be summarized in the tersely stated findings of two of its most eminent members, F. H. Kimball, New York, and Louis H. Sullivan, Chicago.

The former architect admits that marble and limestone are converted into lime in the presence of fire; that granite will disintegrate, and that sandstone will flake beyond redemption when exposed to fire and water. When an owner expresses a decided preference for stone, his architect is expected to acquiesce; but he considers that



BEFORE TEST.

terra-cotta has many claims to favorable consideration, the more notable of which are its undoubted weather and fire-resisting qualities.

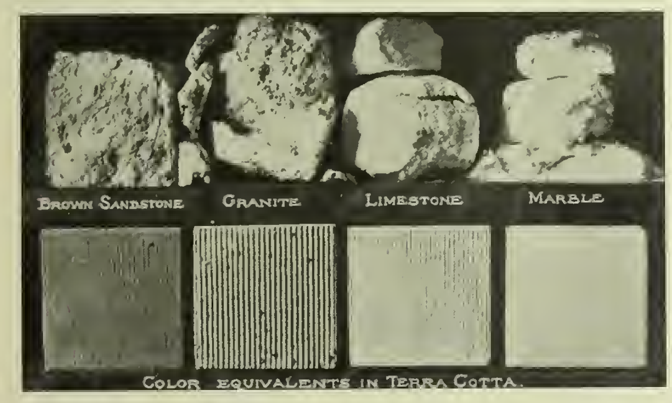
He suggests a double casing of fire-proofing with a 2 in. air space between, around all first-story columns in buildings where inflammable merchandise must be held in stock. He would have all fire-proof arches floated off in cement flush with top of the strips to which the flooring is nailed. This has been done in his latest erections, in one of which he displays unqualified confidence by having his own offices situated on the twenty-first floor.

He denies the validity of Chief Bonner's plea based on an alleged inability to raise water beyond the 150 ft. limit. If this cannot be done at present, or with the means at his disposal, then a new and better system must be invented that will enable him to do so. But the remedy lies in leveling up to present requirements, not in leveling down to a standard that has been found altogether inadequate. While the height of modern buildings has been increasing, the fire department has remained nearly stationary, and, without improved appliances, would soon become obsolete.

Mr. Sullivan writes: "I indorse every word that you have to say. As you are perhaps aware, I have, for a number of years, been an advocate of the use of terra-cotta for covering the steel work of the modern tall building. I have erected such a building in New York City, on Bleecker Street, 150 ft. east of Broadway. In that building I took additional precaution to provide for coiling steel shutters in all the openings on the street fronts, although these shutters have not yet been put in place. The Guaranty Building in Buffalo (now the Prudential Building), the Chicago Stock Exchange Building, and the Schiller Theater Building, both in Chicago, are all of them terra-cotta buildings erected from my designs. I trust that the effect of your article may be to bring about a further increase in the use of terra-cotta for building purposes, as I consider it a superior material, with almost inexhaustible artistic possibilities, and the manufacture of which, excellent though it may be, is still in its infancy."

These two statements fittingly represent the concurrence of Eastern and Western ideas in which advanced practise, up to date of writing, is epitomized. The writer of an otherwise reliable report contained in the *Scientific American*, December 17, allowed himself to say that, "The northern brick wall has been badly disintegrated by fire, and will also need repairs, if not replacing." We have re-examined this wall in the light of that divergent note, which bears evidence of having been made inadvertently, and find no warrant for any such statement. Beyond the smoke, which will wash off, the only injury which this wall has sustained is confined to the stone window lintels. They are all more or less blown and splintered, and will certainly have to be replaced; but the comparatively uninjured condition of the brick wall is a thing that seems to impress the most casual observer.

The accompanying photograph shows the immediate result of a recent test made by the writer, on 3 in. cubes of sandstone, granite,



RESULT OF TEST.

limestone, and marble, with an equal number of terra-cotta tablets representing approximately the same color equivalents. The former were exposed to a jet of flame produced by crude oil and compressed air for about ten minutes, when they were withdrawn and allowed to cool gradually, no water having been applied. The latter were heated under the same conditions for a period of fifteen minutes and until they had reached a nearly white heat, when they were raked out and dropped directly into a pail of cold water. Had they been allowed to cool in the same way as the pieces of stone, the heat would not have made any perceptible impression on them.

The moisture absorbed from the air was sufficient to "slack" the calcined limestone and marble, both of which fell to powder. The feldspar contained in the granite, accelerated by the alkalies present, began to fuse at a rose-red heat, liberating the particles of quartz, which, when cool, fell asunder. The piece of brownstone resisted the fire better than any of the others, but it, too, cracked into a mosaic and became worthless as a building stone. The corresponding piece of terra-cotta cracked slightly on the face, but adhering together with great tenacity, would still stand a test equal, perhaps, to half its original crushing weight of 5,000 lbs. to the square inch. The tablet next to it was merely crazed on the face, while the other two underwent very little change, notwithstanding the sudden reaction from white heat to water a little above freezing point. We present this demonstration to all whom it may concern without comment beyond a bare recital of the facts.

Masons' Department.

SOME MISTAKES OF CONTRACTORS AS VIEWED BY AN ARCHITECT.

BY F. E. KIDDER.

(*Continued.*)

CONTRACTORS often make mistakes in assuming responsibilities without proper compensation and in taking unnecessary risks.

Not a few contractors will estimate on a hazardous piece of work on the basis that everything will proceed favorably, and if any mishap occurs they have no provision for meeting the expense invariably occasioned. The contracting business necessarily involves the taking of some chances, as in the rise of the price of materials or labor, but when unusual chances are to be taken, as in remodeling, underpinning, or supporting old buildings, or in the case of uncertain foundations, the contractor should protect himself by estimating so that in case unexpected, although possible, difficulties are encountered he will not lose more than his profit. It is much better to let some one else have the job than to take it at a figure which will allow a profit only under the most favorable conditions.

Then many contractors are careless about allowing their work to be damaged by other workmen or through orders of the owner or architect. For instance, a mason contractor has built a cellar or basement wall, and the excavator wishes to fill against it on the outside before there is sufficient weight on the wall to insure its stability, or perhaps he may be directed so to do by the architect or owner. If the excavating is under the control of the mason, he can forbid the filling until such time as it may be done with safety, but if he has no control over it, he should protect himself by notifying the owner in writing, that if the filling is done it must be at his, the owner's, risk, otherwise if the wall springs or falls the mason contractor will be expected to make it good.

Similar risks or chances of injury frequently arise in connection with other portions of the building, especially when the work is done under several contracts, and the wise contractor will protect himseif as far as possible from damages that may happen to his work through the ignorance or carelessness of others. If a contractor executes a given piece of work in conformity with the plans and specifications, and it is injured through the fault of persons working under another contract with the owner, it is evident that the first contractor should not be made to suffer from the damage; but it is the experience of all who have had charge of building operations that, unless some unusual precautions are taken, it is difficult for the contractor to collect damages for repairing his work, and he must leave it in good condition before it will be accepted.

Contractors also occasionally run a risk in attempting to execute work that is not properly designed or has not sufficient strength. For example, a stone lintel may be shown on the drawings with a span so great that it is doubtful if the stone will support its own weight and that of the load upon it. Now, if the contractor goes ahead and puts in the lintel without comment, and it breaks, the chances are ten to one that the architect or owner will insist on his putting in another stone or remedying the defect in some way, at his, the contractor's, expense. The same thing might happen in the case of an arch without sufficient abutment, or of a flat arch with no support under it. It is therefore the business of the contractor to carefully consider all of the constructive features of the building before he commences work on them, and if he believes that any part of the work cannot be safely executed, as shown by the plans, he should call the attention of the architect to it and try and have it changed, or extra provision made to give the necessary strength, so that there will be no risk of failure. In case the architect declines to make any change, the contractor should serve a written notice on the owner that he will not be responsible if the work fails, and at the same time he should take care to see that the work is executed in the best manner, and in strict conformity with the plans and specifications, so that in case it does fail there will be no opportunity to show defective work as a cause. Generally it will pay the contractor to go to some extra expense himself to insure the safety of the work rather than to run any risk of a dispute or possible lawsuit.

The writer has known of a number of instances where contractors have suffered considerable loss from carelessness or negligence in this respect.

Occasionally a contractor permits himself to be imposed upon by the architect in the way of details. Not a few architects have the fault of showing much more work on their details than is implied by the scale drawings, and of expecting the contractor to carry out whatever they may choose to draw. Of course, if the details are made before the contract is awarded, and the contractors have an opportunity to examine them, it makes no especial difference if the drawings do not exactly correspond, as the details would determine the character of the work to be done, and the tender would, or should, be based on them. When the details are made after the contract is signed, however, the contractor is not obliged to adhere to them if they show more expensive work than is reasonably implied by the scale drawings and specifications. Thus, for illustration, where carving or dentils are put on the detail drawings, but are neither shown in the original scale drawings nor mentioned in the specifications, the contractor may claim an extra price for the extra work, or refuse to execute it. A claim for extra remuneration, however, would probably not be allowed unless made in writing before commencing the work, and acknowledged by the architect. It is therefore best, in such cases, for the contractor to politely call the attention of the architect to the discrepancy, and show him that the work cannot be done for the price at which the original work was figured. If he is then unwilling to either allow an extra price for the work, or to change the details, the contractor must choose between omitting the extra work or putting it in at his own expense. If to carry out the details means a loss on the contract, it will probably be best to refuse to do more than the contract drawings call for, but if only a small amount is involved, it may pay the contractor to retain the good-will of the architect by doing the work. Very often such extra work is put on the detail drawings by draughtsmen, without the knowledge of the architect, and when his attention is respectfully called to it, he will have the details revised.

In conclusion, the writer suggests that while the main object of a contractor is to make a profit from his business, or, in other words, to make a success of it, such success depends upon the exercise of a considerable degree of intelligence and tact, and that a successful contractor must have in mind the interest of the owner and architect as well as of his own; also that a successful business does not necessarily imply that a profit must be made from every piece of work. Not a few successful contractors owe their success in a considerable degree to the fact that they have carried out their unprofitable contracts with the same thoroughness with which they have executed their profitable ones.

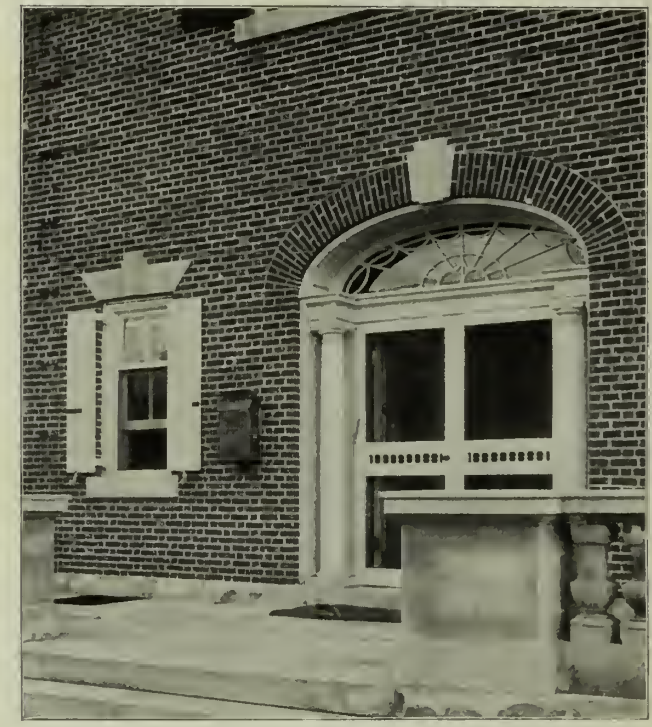
HARDENING CEMENT PAVING.

PORTLAND cement paving will attain a considerable degree of hardness without any dressing or any special treatment; but paving laid in damp weather will ultimately attain a greater degree of hardness than that laid in very hot weather. Further hardening of the surface may be produced by keeping the work moist by means of wet cloths, or by damped sawdust or sand laid over the paving as soon as it has set; flooding the work with water, where possible, will be best of all. Miller mentions that cement work may be rendered tough and hard by gauging the material with 10 to 15 per cent. of minion — the siftings of iron stone after calcination. Indurating concrete slabs causes them to become very hard; by it their density is increased and porosity lessened. —*British Brickbuilder.*

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — A few shrewd investors, who have "nerve" enough to take risks, have taken advantage of the prevailing dulness and consequent close competition in bidding, and have erected buildings much cheaper than they could have at any other less favorable time, and the chances are that they will not lose by it.

It is really astonishing to contemplate the long list of new apartment buildings for which plans are filed every week. The upper part of the city is now a complete network of apartments, most of them very complete with elevators, steam heat, etc., and for these there is great demand. One reason for their popularity is that, when built in the best manner with fire-proof construction, the yearly bills for repairs and deterioration become extremely small. As is well known, these bills are large in all other flat and tenement property, and in much of it they are simply appalling after the first few years, whereas in the modern fire-proof apartment they are almost nothing. Tenants



DOORWAY, MANHEIM CRICKET CLUB, GERMANTOWN, PA.
McKim, Mead & White, Architects.

here are of the kind that stay, and a flat with a tenant who stays, as is well known, requires about half as much decorating and repairing as one with tenants who move in and out frequently.

Although very seldom of any interest architecturally, the amount of money expended on these buildings commands the attention of all who are interested in brick and terra-cotta materials, of which such buildings are largely constructed. Below we give a list of some of the more important apartment buildings for which plans were filed during the past month. St. Nicholas Avenue, corner 114th Street, a seven-story brick store and apartment; cost, $250,000; Neville & Bagge, architects. 100th Street, near Lexington Avenue, sixteen five-story brick and stone flats; cost, $300.000; Thomas Graham, architect. West Central Park, near 98th Street, two seventy-story brick apartment buildings; cost, $140,000; G. F. Pelham, architect. 120th Street and Seventh Avenue, two six-story brick apartment buildings; cost, $150,000; G. F. Pelham, architect. Third Avenue, near 171st Street, four four-story brick flats; cost, $88,000; Rudolph

MANHEIM CRICKET CLUB, GERMANTOWN, PA.
McKim, Mead & White, Architects.

Werner, architect. 122d Street, corner Hamilton Terrace, three five-story brick and stone store and apartment buildings; cost, $150,000; Neville & Bagge, architects. 80th Street, near West End Avenue, six-story stone and brick apartment; cost, $95,000; Janes & Leo, architects. East 54th Street, four five-story brick and stone flats; cost, $120,000; Schneider & Herter, architects. 114th Street, near Amsterdam Avenue, a six-story brick and stone apartment; cost, $75,000; Neville & Bagge, architects. 100th Street, near Amsterdam Avenue, a five-story brick and stone apartment; cost, $100,000; Henry Anderson, architect; and many others which limited space prevents us from mentioning.

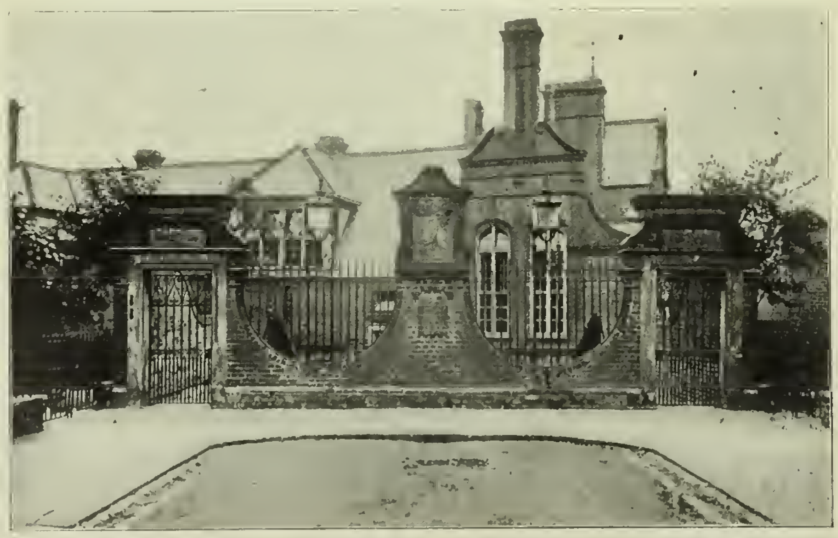
TERRA-COTTA ORNAMENT, STORE BUILDING, WASHINGTON, D. C.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Wm. J Marsh, Architect.

Among the items of news are: A new church for the Christian Scientists is to be erected on the corner of 68th Street and West Central Park. It will be built of marble, granite, and brick, and cost $250,000. Andrew Carnegie will build a costly residence on Fifth Avenue, between 90th and 91st Streets. It is said that he will spend $900,000, but the architect's name is not known. C. R. Sefert has planned a twelve-story brick, stone, and iron business building to be built on Broadway, corner of Waverly Place; cost, $175,000. Charles C. Haight has prepared plans for a brick gymnasium and dormitory building for the General Theological Seminary, to be built on Tenth Avenue, corner 21st Street, at a cost of $100,000. Henry Fouchaux has planned an eight-story business building, to be built on East 19th Street; cost, $100,000.

CHICAGO. — In Chicago, for the first time since 1893, a new year has dawned with a real hope for a turn in the tide of affairs, which for more than four years has been bearing out into the depths of discouragement, architect, builder, and landowner together. Founded upon reports of an unparalleled revival of trade and industry, overtopping in December even the brightest record for the great year of 1892, these hopes put fresh heart into every individual whose prosperity is dependent upon activity in real-estate investments. Chicago, with over five hundred licensed architects, overbuilt at the close of the World's Fair, has never before passed through such a long period of building trade depression. In the fat years that we trust are upon us may the architect, like the gold-seeker who has made a "strike," have the prudence to put away a large factor of financial safety against the days when many sketches are made for sky-scrapers whose foundations remain forever in the air.

As to current work of general interest, there is little of note going up at present. The only large building in the business center is the new Ayer Building, replacing the fire-trap on Wabash Avenue, which destroyed many lives last summer. The architects, Messrs. Holabird & Roche, have adopted for their steel structure a large plan-unit and a simple, straightforward scheme of covering, in glazed cream-white terra-cotta, which, with its fine, unobtrusive, Renaissance detail, promises to be very clean, quiet, and agreeable. The Reliance Building, the first in Chicago to be clothed in glazed white terra-cotta, is still quite clean and fresh after four years of exposure to our notorious smoke nuisance. Hence, presumably, this material will soon receive the recognition its merits deserve. If our tall buildings were all glazed cream white or buff in color, with window shades of light, warm colors, there would certainly be less gloom and obscurity for our "Cliff Dwellers" on the lower levels.

The erection of a novel building will soon be begun by the congregation of All Souls Unitarian Church, whose pastor is the Rev. Jenkin Lloyd Jones. All precedents have been ignored, and a building has been designed to meet in the simplest, quietest,



SCHOOLHOUSE AND GATEWAY, TRURO, ENGLAND.

TERRA-COTTA PANEL, RESIDENCE, CINCINNATI.
Executed by the Northwestern Terra-Cotta Company.
M. H. Burton, Architect.

and most natural way the peculiar conditions imposed upon the architects. These required, besides a large auditorium with the usual accessories, a gymnasium, baths, etc., a store, and a free reading room on the ground floor in front of the auditorium, a suite of rooms for the Unity Club, a suite of living apartments for Mr. Jones, and four floors of offices and chambers, with a Masonic hall and its accessories covering the entire eighth floor. The exterior walls, which are isolated from other buildings on all sides, will be of solid brick construction, and the general scheme is dignified and plain, almost to severity, depending chiefly for its effectiveness upon largeness and coherence of composition and refinement of the very sparing detail. The auditorium will be barrel vaulted and richly treated in brick, mosaic, and plaster in Mr Wright's original way, which is a restrained and agreeably geometrified phase of "Sullivanesque." Frank Lloyd Wright and Dwight Heald Perkins are the associated architects.

TERRA-COTTA PANEL.
Executed by the New Jersey Terra-Cotta Company.
Kurtzer & Rohl, Architects.

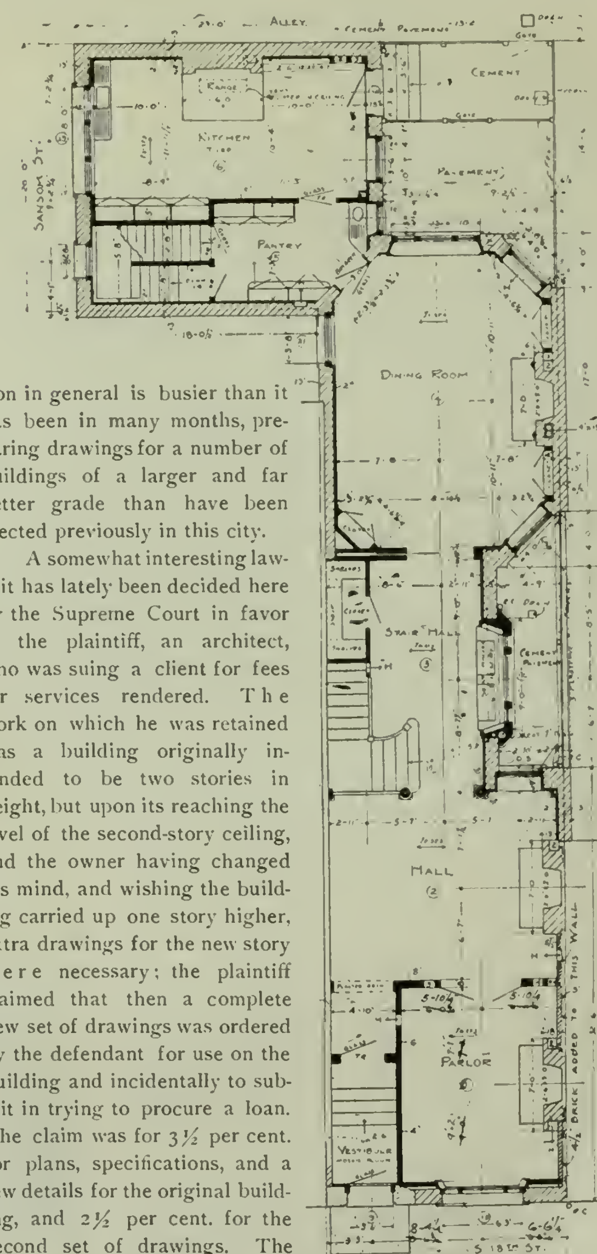
PITTSBURGH. — Real-estate business has already commenced to show such an improvement that there seems very good grounds for the opinion expressed everywhere that building operations here will be good this spring. There have been a number of sales of large tracts in the suburbs, where the buyers intend to build a number of blocks of houses, and there have also been a number of transfers of real estate in the business part of the city. There have been rumors of several large office buildings to be built this year.

Among the items of building news may be mentioned: —

Rutan & Russell are preparing plans for a new colonial residence to be built at Sewickley. Alden & Harlow have let the contracts for three large summer homes near Sewickley. F. J. Osterling is at work on a block of seven houses. W. Ross Proctor is at work on a new store and office building, to be built on Penn Avenue. It is to be built of brick with marble trimmings. He is also at work on plans for a house and gate lodge, to be built near Sewickley. J. E. Allison is the architect of a new brick colonial house on Pacific Avenue, East End. Work has been commenced on the Passavant Hospital. It is built of brick and stone, and costs $50,000. The Westinghouse Company are building large new shops and a five-story office building at East Pittsburgh. Thomas Rodd is the architect.

BUFFALO. — The feeling that the coming season will be one of comparative activity for architects, and consequently builders as well, seems to be widespread and assured, and already the profession in general is busier than it has been in many months, preparing drawings for a number of buildings of a larger and far better grade than have been erected previously in this city.

A somewhat interesting lawsuit has lately been decided here by the Supreme Court in favor of the plaintiff, an architect, who was suing a client for fees for services rendered. The work on which he was retained was a building originally intended to be two stories in height, but upon its reaching the level of the second-story ceiling, and the owner having changed his mind, and wishing the building carried up one story higher, extra drawings for the new story were necessary; the plaintiff claimed that then a complete new set of drawings was ordered by the defendant for use on the building and incidentally to submit in trying to procure a loan. The claim was for 3½ per cent. for plans, specifications, and a few details for the original building, and 2½ per cent. for the second set of drawings. The verdict was in favor of the plaintiff, allowing him a certain sum of money, which, taken together with what he had already received in the shape of remunera-



FIRST-FLOOR PLAN

HOUSE FOR J. P. DOHERTY, ESQ., PHILADELPHIA, PA.
Cope & Stewardson, Architects.
(For elevations see plates 2 and 7.)

SYRACUSE UNIVERSITY BLOCK, SYRACUSE, N. Y.
Green & Wicks, Architects.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: Rowland & Bostwick, 504 Maeder Building, Pittsburgh, Pa.; Parr & Hulsebus, 514 Y. M. C. A. Building, Peoria, Ill.; Oscar Kuehue, 171 Center Street, Chicago, Ill.; Fred C. Watson, 8 Gerring Street, East Gloucester, Mass.

CURRENT ITEMS OF INTEREST.

E. E. NICKSON, 411 John Hancock Building, Boston, Mass., has been appointed agent for the Conkling-Armstrong Terra-Cotta Company.

THE ILLINOIS SUPPLY AND CONSTRUCTION COMPANY, of St. Louis, have just shipped on order 30,000 of their steel-gray brick to the city of New York.

THE PITTSBURGH TERRA-COTTA LUMBER COMPANY have appointed Mr. E. E. Nickson, 411 John Hancock Building, as their representative.

THE FAWCETT VENTILATED FIRE-PROOF BUILDING COMPANY has been awarded the contract for the structural steel and fire-proofing to be used in the large printing house to be erected at Philadelphia for Walter Herring.

tion, amounted to 3½ per cent. on the first set, and about 1 per cent. on the second set.

Architect Waite has lately been commissioned by two of the largest corporations in Canada to prepare drawings for two immense structures, which are to be started as soon as possible. One of these two buildings is to be the new terminal station of the Grand Trunk Railroad at Montreal, and which it is expected will cost more than a million of dollars. It is also rumored that Mr. Waite has been retained by the Metropolitan Railway Company, of London, England, to make the designs for a large station in that city.

Mr. George J. Metzger, the local supervising government architect for the Federal Building, now in course of erection, having recently resigned his position, Mr. E. A. Kent, architect, this city, has been appointed his successor, and the appointment seems to be very pleasing to the others of the local fraternity.

The long-mooted resolution for purchasing of the four sites for new schoolhouses, which are so much needed, has again been postponed by the councilmen. One good plan, however, that our city fathers have lately adopted is that all future public schools are to be fire-proof as nearly as possible, and are to be built of more than sufficient size for the present number of scholars in each district.

A newly let contract calls for a large eight-story steel-constructed building on the northeast corner of Main and Mohawk Streets, of which Esenwein & Johnson are the architects. The contract calls for the building to be ready for occupancy March 31 next, with a heavy penalty if not completed on that day, and the same amount as bonus for each day if completed before that date. The limit of time allowance for such a building as this is almost if not totally unprecedented in this city, but it is confidently expected, in consideration of the class of firms engaged on the work, that the building will be finished in good season.

W. L. DAVIS, of Berlin, Conn., has just placed an order with Chambers Bros. Co. for a complete outfit of machinery to make hollow brick, which includes machines for making end-cut hollow brick, side-cut brick, an all iron and steel pug mill, clay elevator, shafting, pulleys, etc.

BURGY & MCNEILL, Pittsburgh, Pa., dealers in architectural clay products, are sending with their compliments a handsome calendar entitled "Three of a Kind"; the same referring to three *fin-de-siècle* young ladies of charming mien, who compose the subject of the illustration of the calendar.

THE WINKLE TERRA-COTTA COMPANY, St. Louis, are to supply

GATE AND GATE LODGE OF THE WOODLAWN CEMETERY, EVERETT, MASS.
Wall copings in dull green faience; balls, capping gate post, of dark green, high-glazed enamel. Faience and enameled work made by the Grueby Faience Company, Boston, Mass.
Wm. Hart Taylor, Architect.

the architectural terra-cotta on the following new contracts: Maccabers Temple, Port Huron, Mich., George L. Harvey, architect; the Republic Building, St. Louis, Isaac S. Taylor, architect.

The St. Louis Terra-Cotta Company is now making the white semi-glazed terra-cotta for a row of flats at St. Louis; and the silver-gray semi-glazed terra-cotta for the new Wittenberg Building, same city. They are also supplying the enameled terra-cotta for the C., B. & Q. R. R. Station at Creston, Iowa; the colors are to be cream and green.

In accordance with a yearly custom, F. W. Silkman, 231 Pearl Street, New York, importer and dealer in minerals, clay, chemicals, and colors, has issued a very attractive calendar for 1899. The neatness and simplicity which characterize the design are gratifying in the agreeable contrast offered to the many flaunting incongruous subjects so freely used in calendar adornment.

The American Mason Safety Tread Company is making rapid progress in the erection of its new factory at Lowell, and has orders on its books requiring the employment of all its present facilities for many weeks to come. Among these orders is included work for seven vessels of the navy, and for schoolhouses, mills, and mercantile buildings in large cities throughout the country.

TERRA-COTTA DETAILS, PLUM BUILDING, NEWARK, N. J.
Executed by the Standard Terra-Cotta Company.
Thomas Cressey, Architect.

Charles Bacon, Boston representative of Sayre, Fisher & Co., has recently closed the following new contracts: cream-white brick, residence, Brookline, Mass., J. A. Schweinfurth, architect; mottled gray brick, pumping station, Brookline, Mass., Shepley, Rutan & Coolidge, architects; plain gray brick, police station, Brookline, Mass., J. A. Schweinfurth, architect; mottled buff brick, residences, Pittsfield, Mass., Francis R. Allen and J. W. Vance, architects.

"Absolute Fire-Proofing" is the title of a little pamphlet just issued by Henry Maurer & Son, New York, for the purpose of explaining, in a manner clear to the ordinary understanding, the detail construction of what is known as steel-constructed fire-procf buildings. The little work covers its mission ably, and makes irrefutable arguments in support of this mode of construction. It has, we feel, a usefulness not confined to "laymen" merely, but extending to architects and builders as well.

SWIMMING TANK, NEW YORK ATHLETIC CLUB.
Lined with enameled brick manufactured by the American Enameled Brick and Tile Company.
William Cable, Architect.
The floor is laid with brick glazed on the flat; the sides are lined with regular brick, English size.

John H. Black, Buffalo representative, will supply the Akron impervious red pressed brick to be used in the new Burgess Apartments, at Buffalo; also the glazed white terrra-cotta manufactured by the Excelsior Terra-Cotta Company, which is to be used in the same building, U. G. Orr, architect; also Kittanning gray bricks for the Mayer & Weill Building, of which Esenwein & Johnson are the architects.

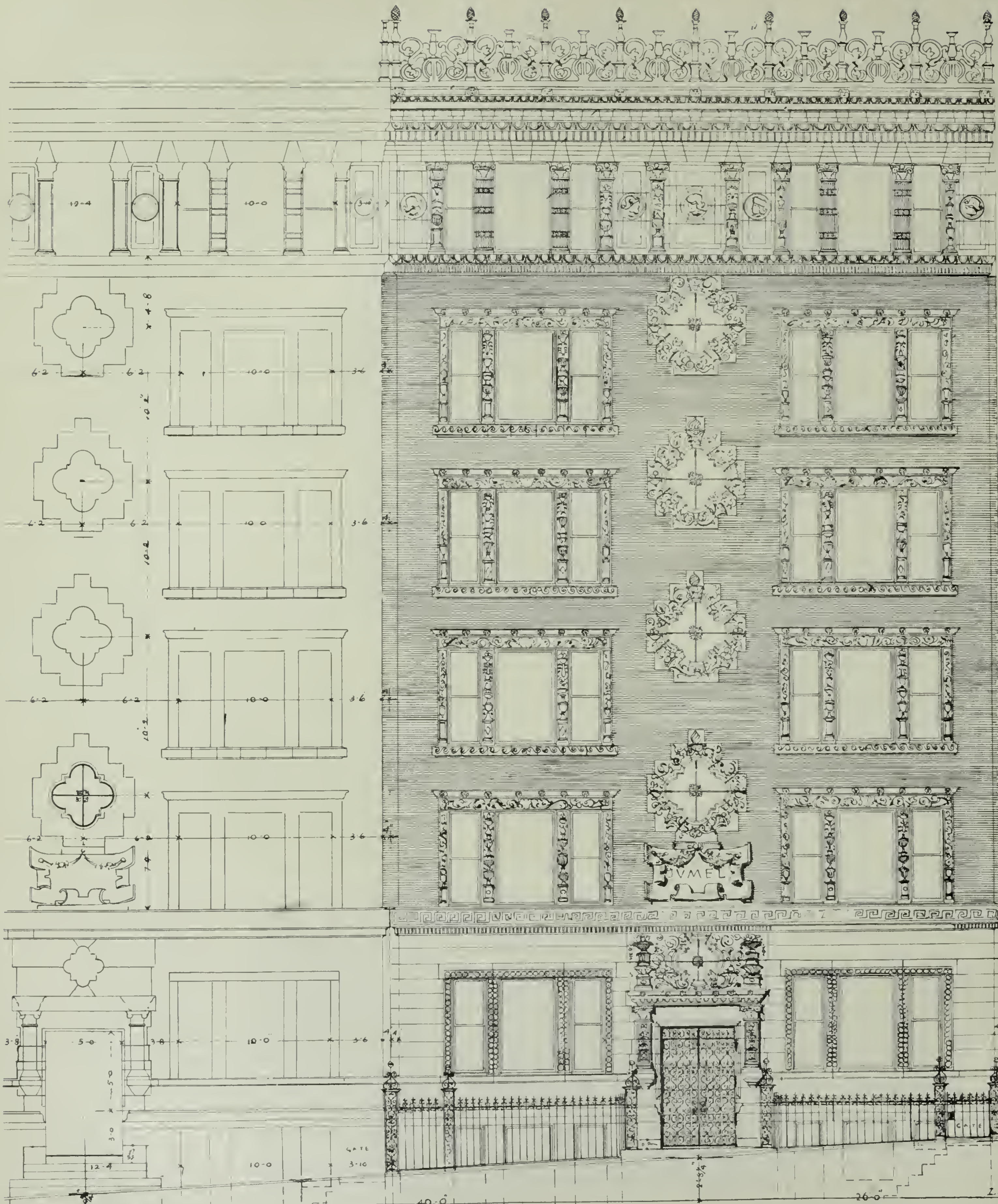
A few of the prominent buildings in Greater New York in which the Bolles Revolving Sash or the Queen Overhead Pulley, or both, are now being incorporated are the following: the Vincent office building, New York City, sixteen stories, George B. Post, architect; the Bourne office building, New York City, Ernest Flagg, architect; sixteen-story office building, W. Wheeler Smith, owner and architect, next to the corner of Broadway and Wall Street, New York City; public schools, Mott Avenue, Audubon Avenue, Amsterdam Avenue, Brook Avenue, 169th Street, New York City, C. B. J. Snyder, architect; New York Hospital, Cady, Berg & See, architects; Byrnes apartment house, Fifth Avenue and 45th Street.

The new catalogue issued by Chambers Bros. Co., Philadelphia, is deserving of special comment as being most comprehensive in the information contained relative to machines for making brick by the stiff-tempered process. It is no mere list of clay-working implements, but is a carefully compiled treatise, giving a technical description of the mechanical construction of their various machines, and the special adaptation of each for manipulating clays of peculiar characteristics.

The catalogue contains some one hundred and twenty pages of text matter and some hundred illustrations of different machines made by the company. Aside from matter relative simply to these machines, there is much data and general information concerning the stiff-tempered process of brick making.

For some thirty-five years now, the company has been prominently identified with this process of clay-working implements, and during that time has won for itself a national reputation for building machinery of the highest standard of quality and ingenuity. They were the pioneers in the field of this line of manufacture. It is of interest to note, as showing the immense developments in the clay industries, that when application was made by them for their first patent on brick machines, the invention was so novel that not a single patent had been granted by the United States Patent Office for that class of brick-making implements. Lack of space does not permit

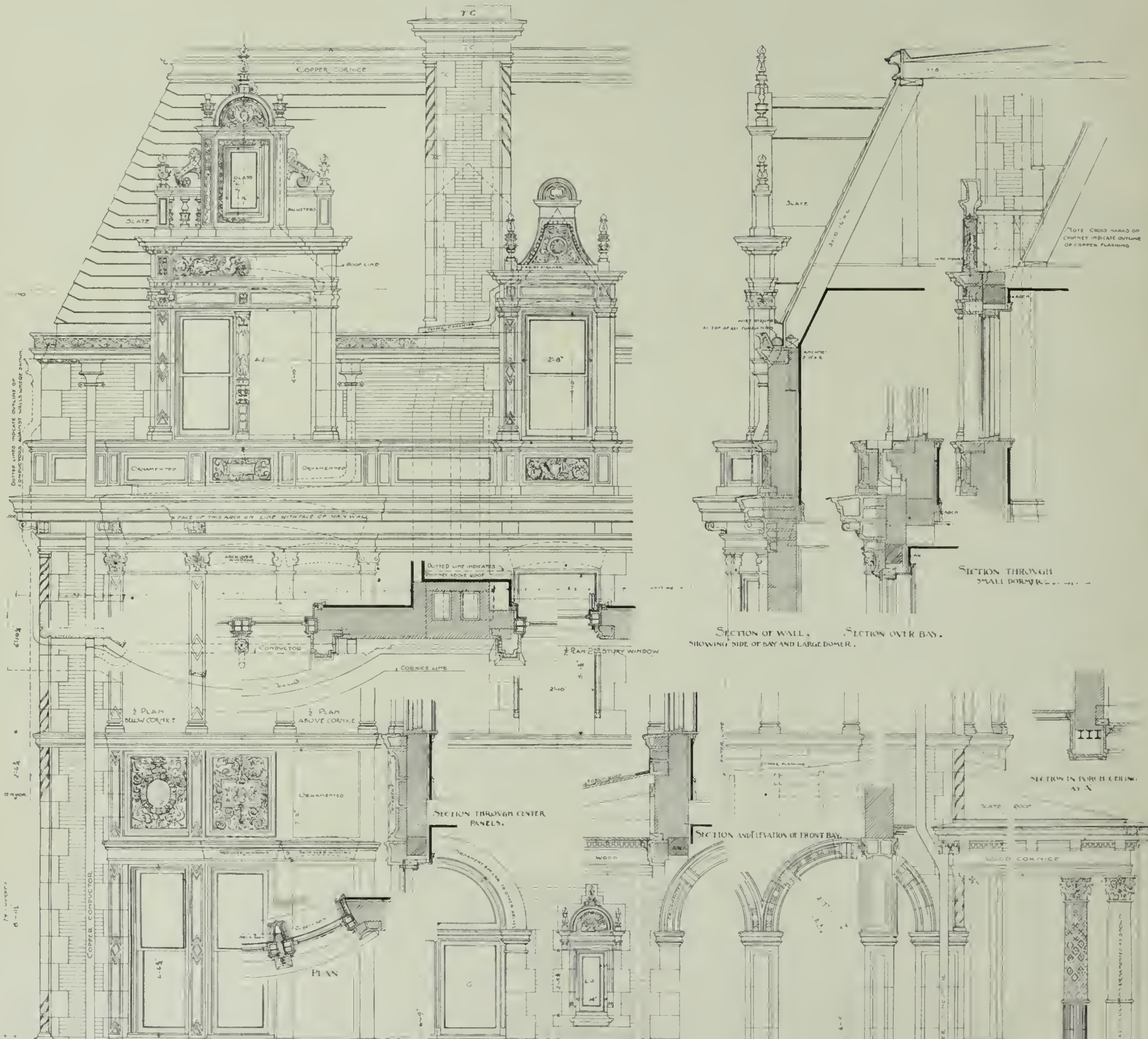
VOL. 8. NO. 2. PLATE 9.



Front Elevation.

APARTMENT HOUSES, WEST 142D STREET, NEW YORK CITY.

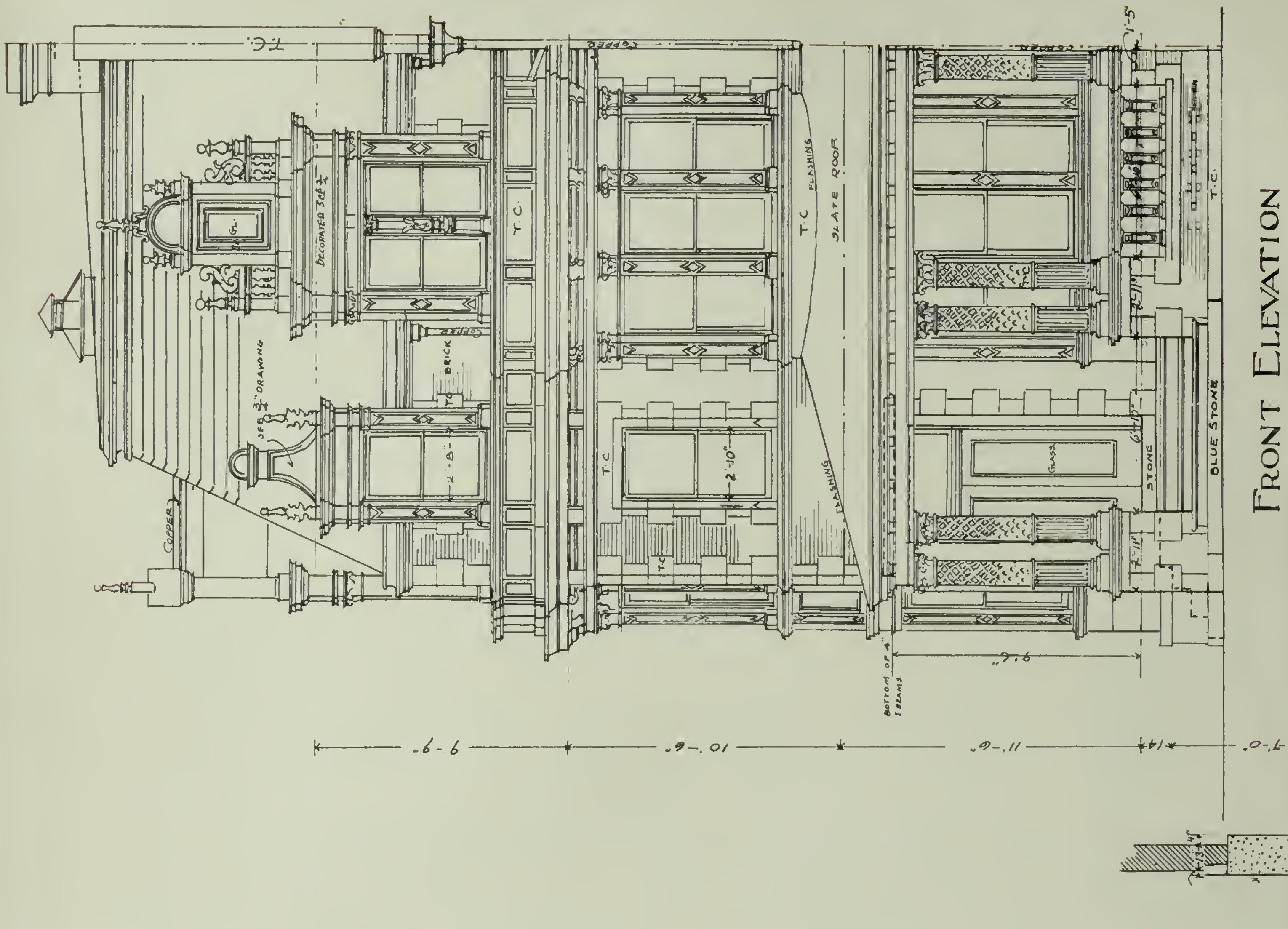
J. A. SCHWEINFURTH, Architect.



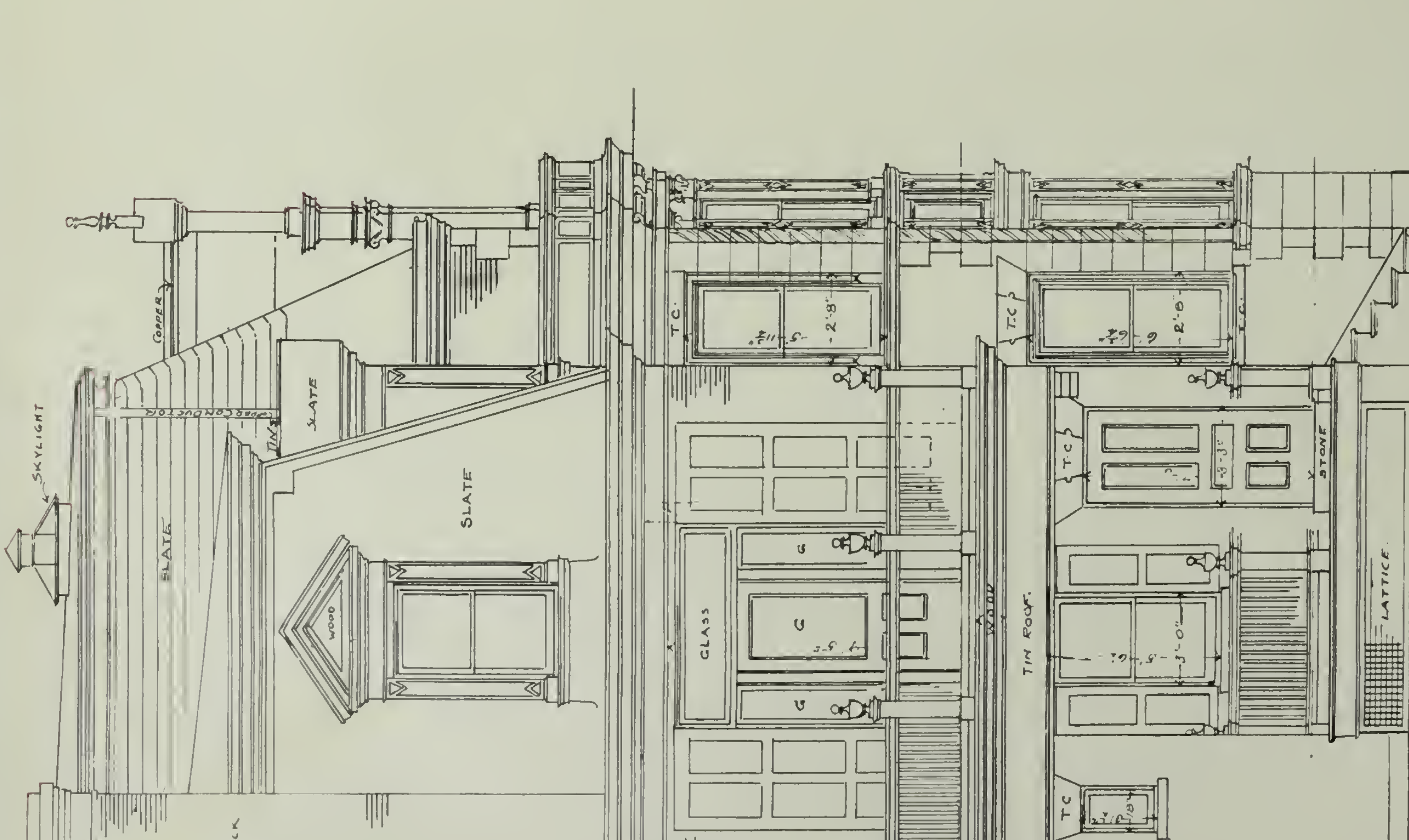
TERRA-COTTA AND WINDOW DETAILS.

A PAIR OF SEMI-DETACHED HOUSES, TIOGA STREET, PHILADELPHIA, PA.

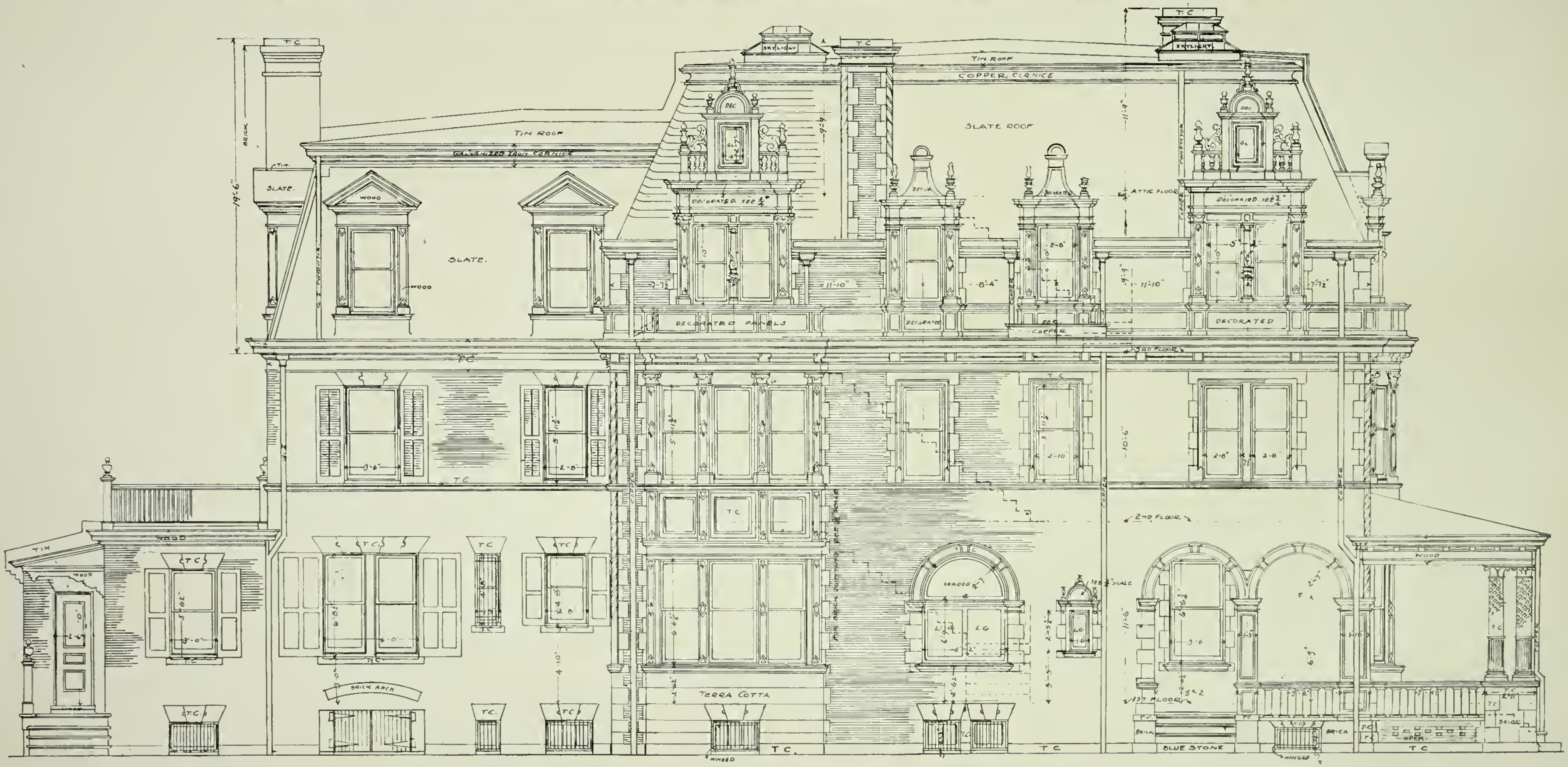
EDGAR V. SEELER, Architect.



FRONT ELEVATION

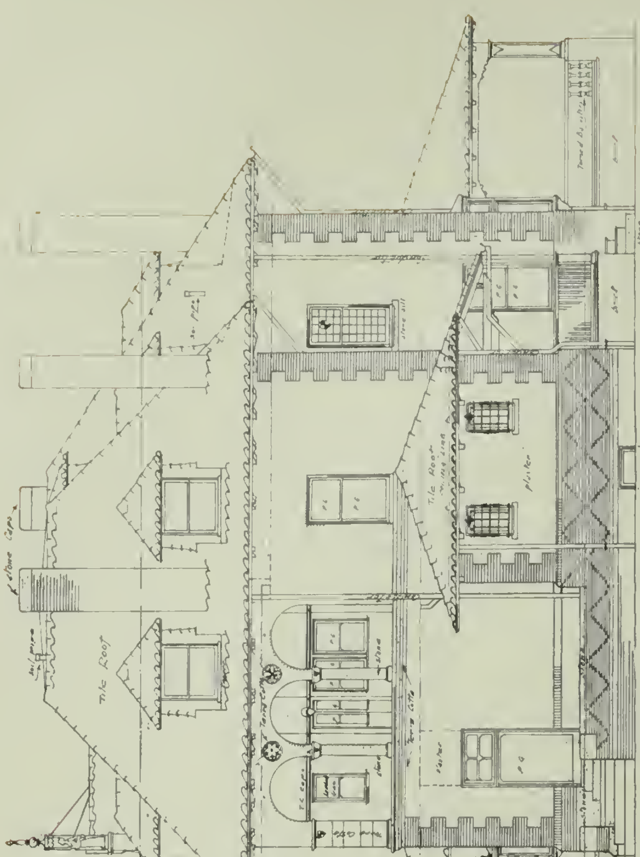


REAR ELEVATION

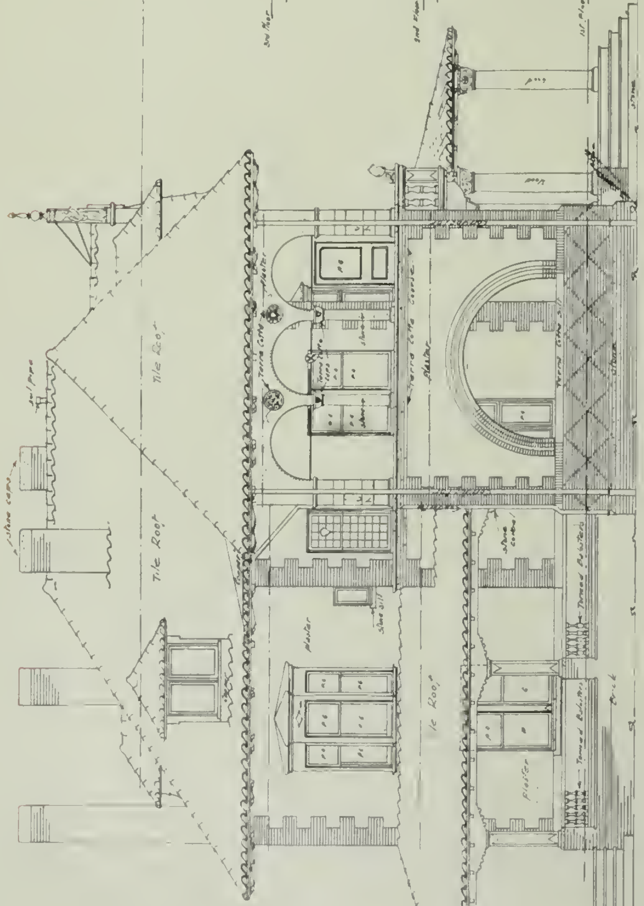


Side Elevation.

A PAIR OF SEMI-DETACHED HOUSES, TIOGA STREET, PHILADELPHIA, PA. EDGAR V. SEELER, Architect.



SIDE · ELEVATION



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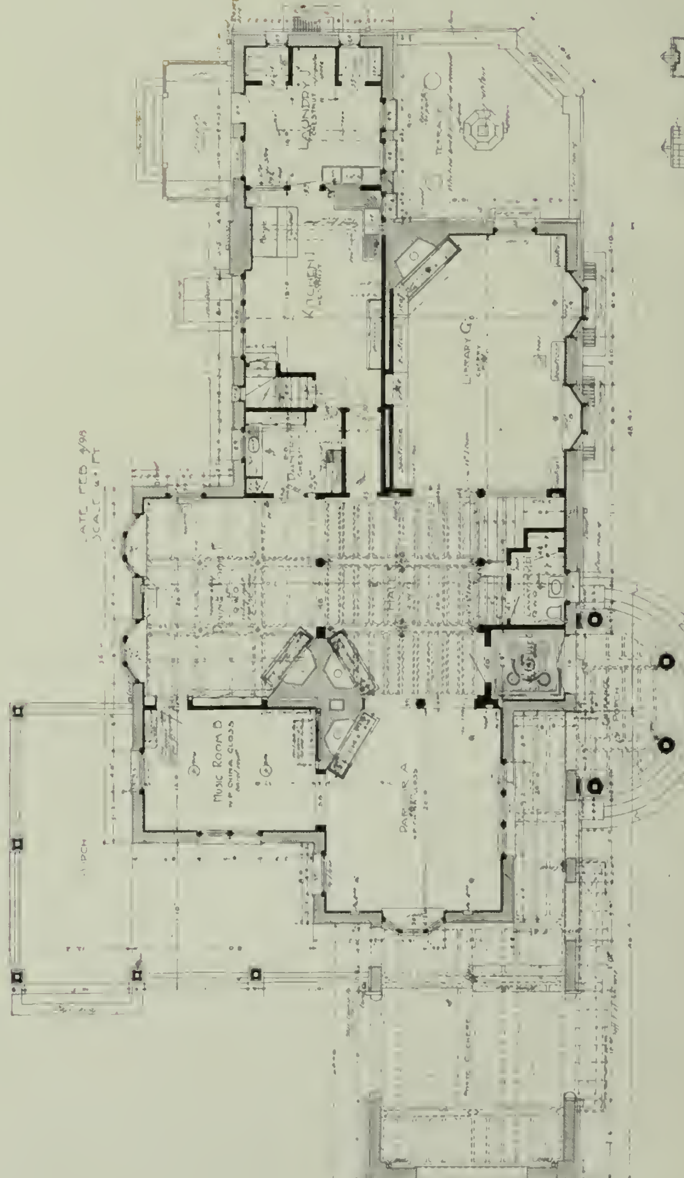
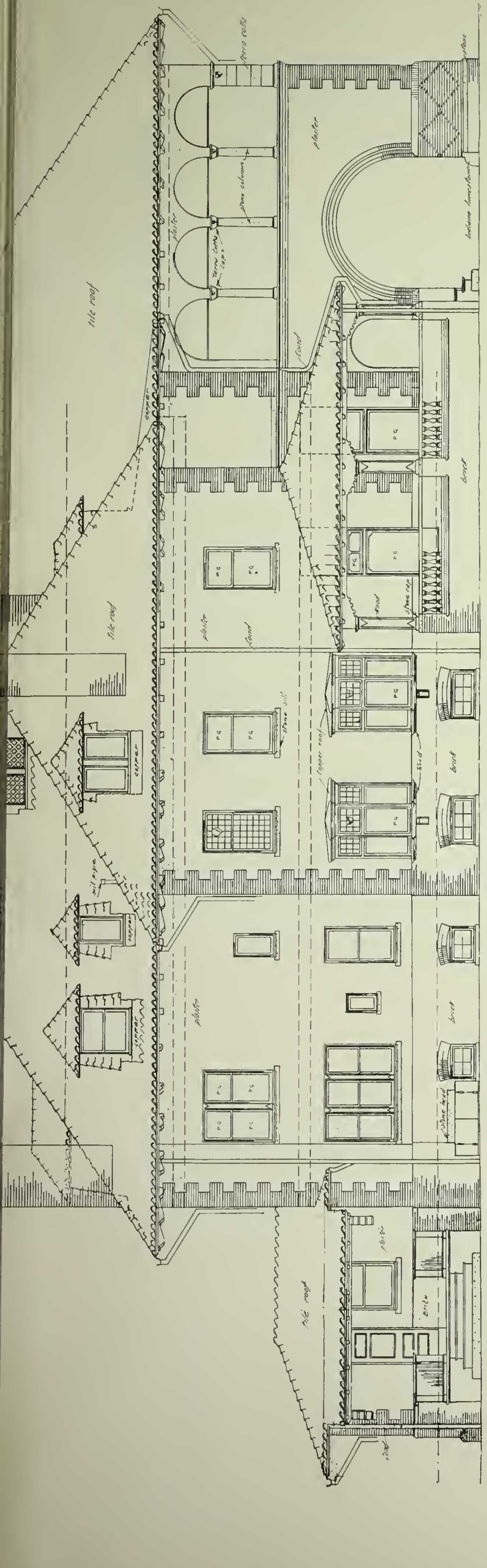
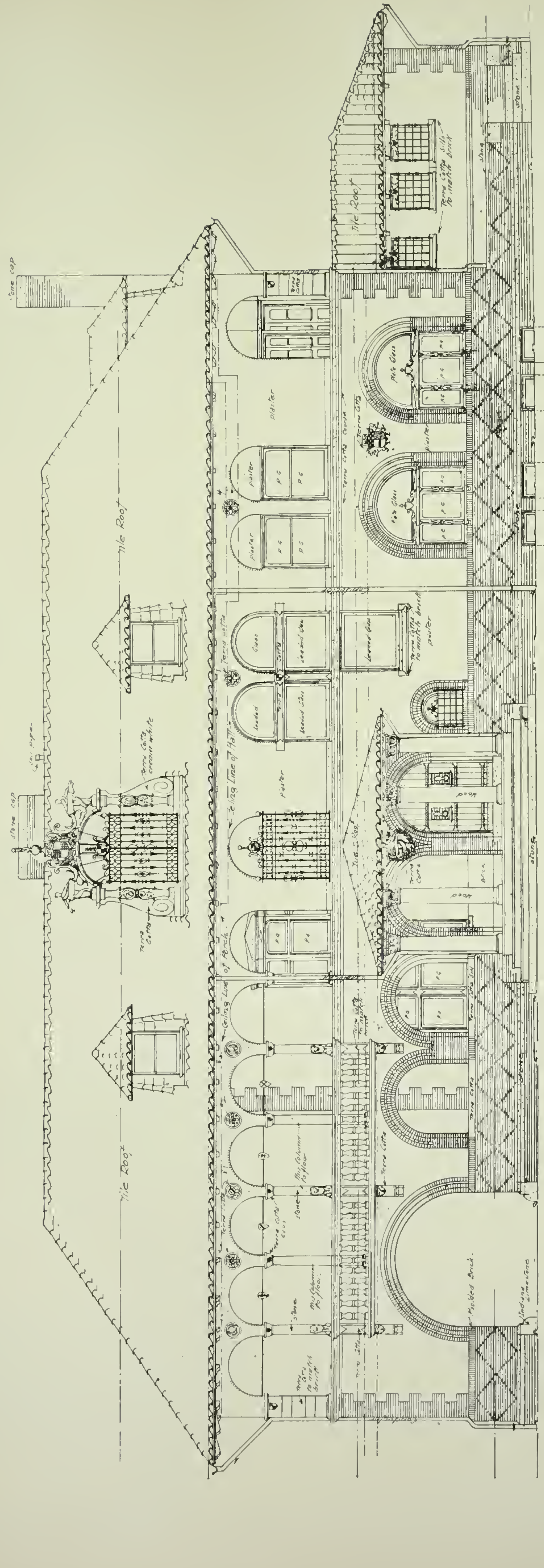


PLAN OF FIRST FLOOR

PLATES 12 and 13.



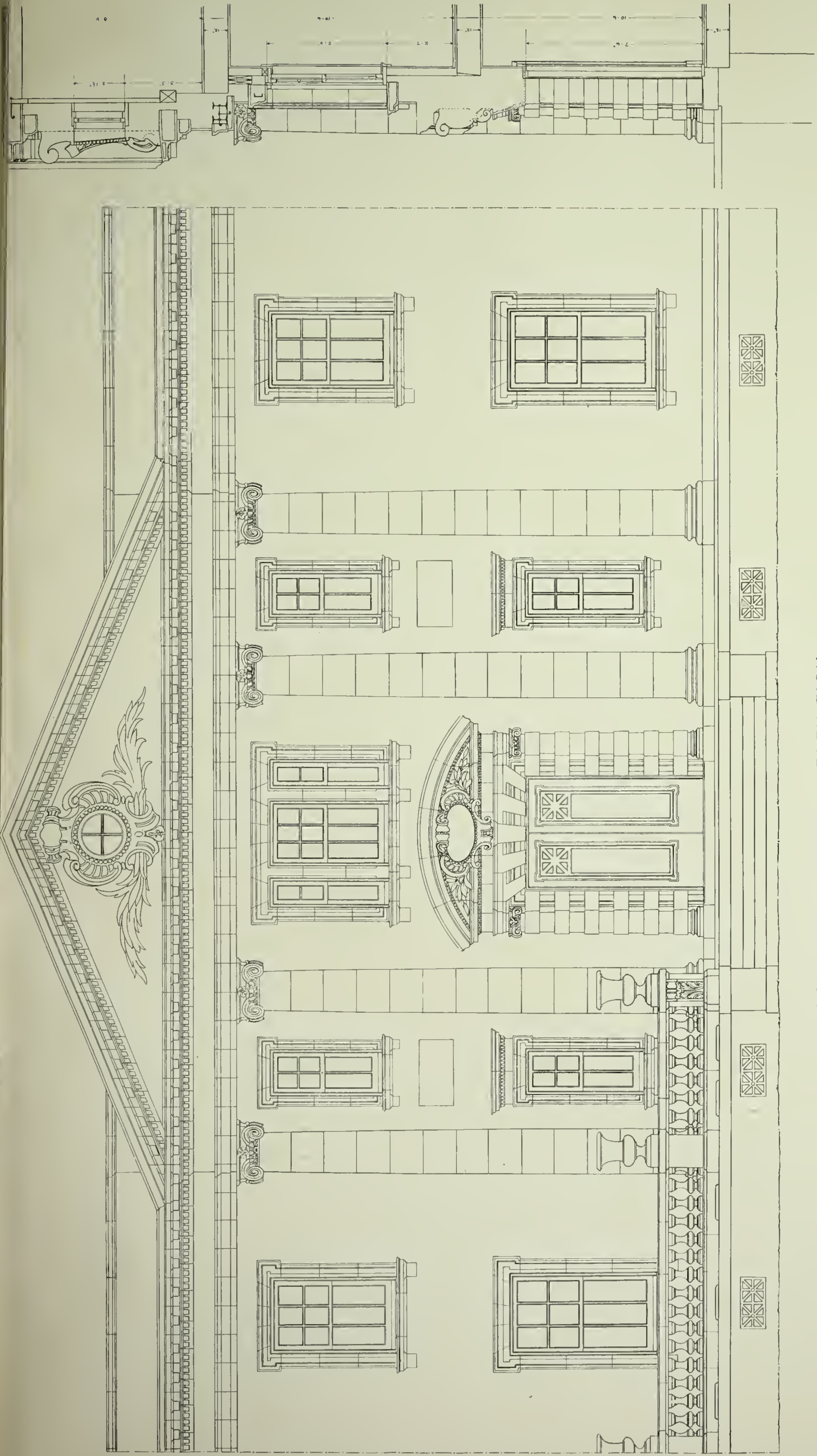
·REAR·ELEVATION·



·FRONT·ELEVATION·

RESIDENCE, OGONTZ PARK, OGONTZ, PA.

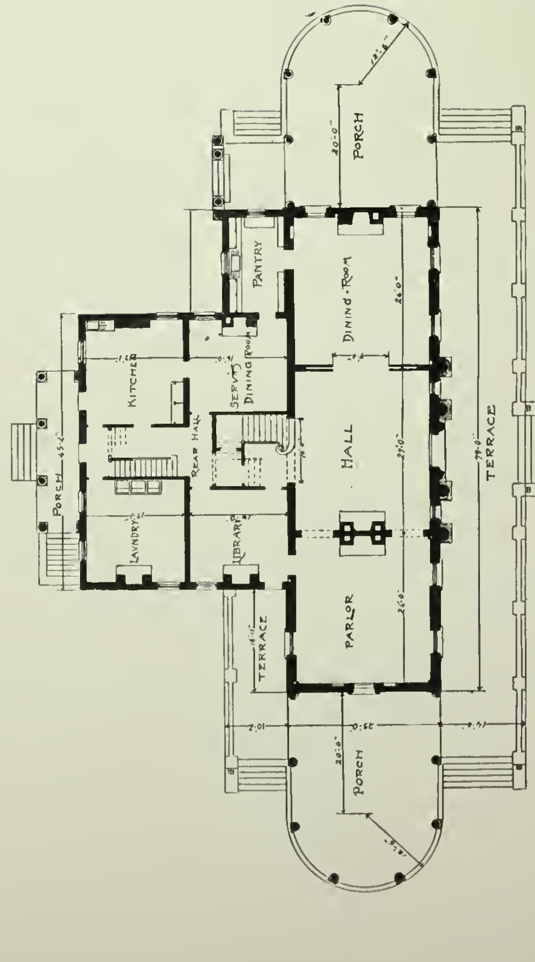
KEEN & MEAD. ARCHITECTS.



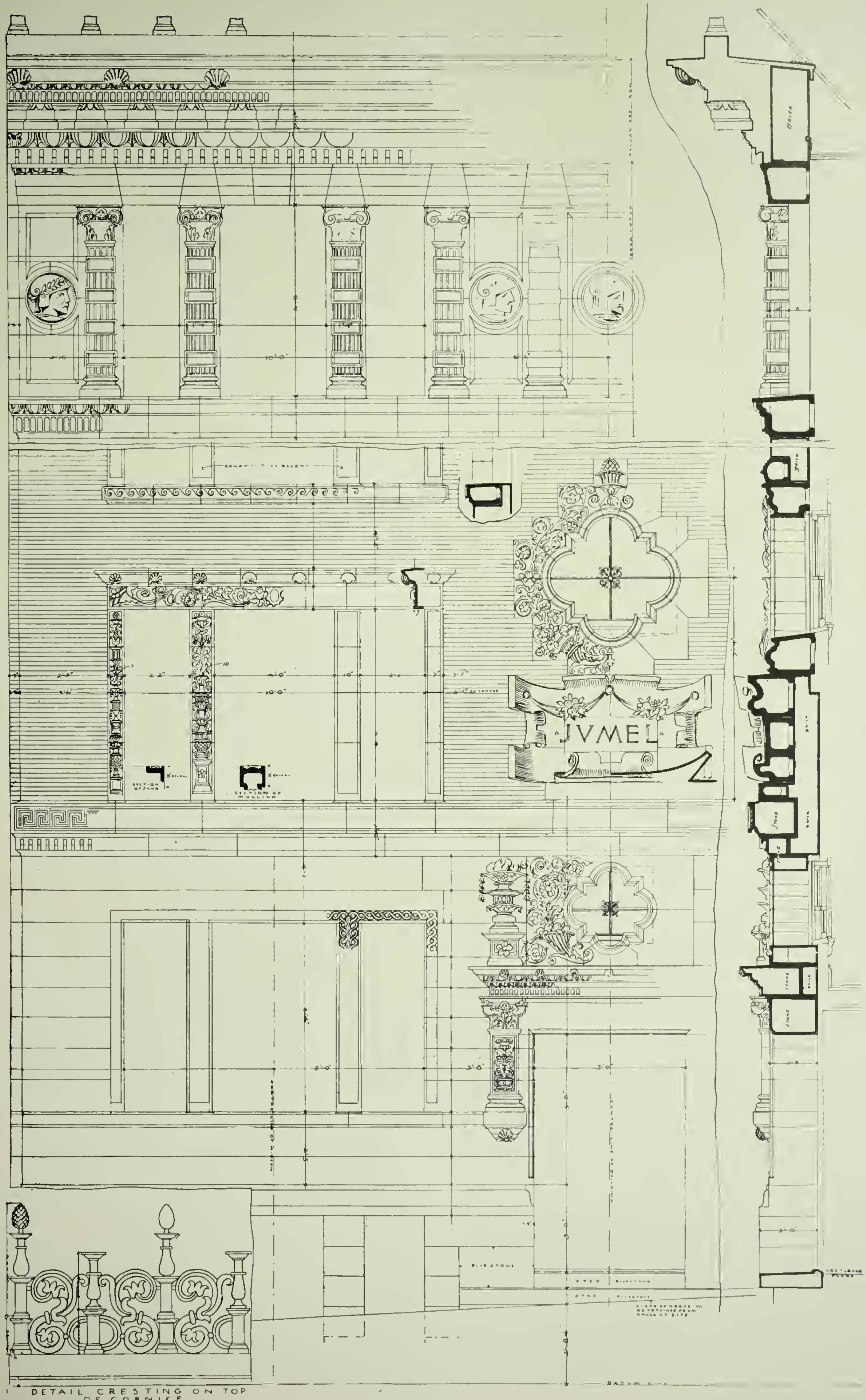
PORTION OF FRONT ELEVATION

RESIDENCE AT BELAIR, HARFORD COUNTY, MARYLAND.

WYATT & NOLTING, ARCHITECTS.



FLOOR PLAN



DETAILS.

APARTMENT HOUSES, WEST 142D STREET, NEW YORK CITY.

J. A. SCHWEINFURTH, ARCHITECT.

VOLVME VIII FEB. 1899 No. 2

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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THE BRITISH FIRE PREVENTION COMMITTEE.

IN our editorial of last month regarding the lessons of the fire in the Home Life Building, New York, we referred to the value of stern experience of this sort in teaching us how to overcome difficulties. We have just received another evidence of the manner in which a great calamity may become a means of very tangible and permanent good. Our readers will remember the fire which occurred in the Cripplegate district of London in November of 1897, one of the most disastrous conflagrations which has visited the British metropolis for several generations. As a direct result of this fire an organization has been effected of those who are interested in fireproofing methods and constructions, the organization taking the name of the British Fire Prevention Committee. It counts among its membership some five hundred architects, surveyors, engineers, municipal officers, and others directly or indirectly interested in fire prevention, among whom are practically all of the leading members of the professions named. It has offices, wherein is a library including files of some fifty technical journals from all parts of the world, and the regulations and building acts of all countries. The founder was Mr. Edwin O. Sachs, the well-known architect, and the objects of the committee are defined as follows : —

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of *preventive* measures.

To use its influence in every direction towards minimizing the *possibilities* and dangers of fire.

To undertake such independent investigations and tests of materials, methods, and appliances as may be considered advisable.

In order to meet these objects a testing station has been established and a series of tests begun to obtain data as to the exact fire resistance of the various materials, systems of construction, or appliances used in building practise. The circular announcing the organization of this committee throws in the statement that the few independent tests made in the United States have so far been of only minor importance. We do not quite agree with that statement. On the contrary, it is possible to cite a very long series of most admirable tests which have been made in our principal cities with these distinct objects in view, and in fact we believe that the amount of exact knowledge of fire-resisting materials is quite as abundant in this country as anywhere else in the world. Still there is plenty of room for more. The objects of this Fire Prevention Committee are most admirable and it would be a very excellent idea to copy the scheme right among us. Though our tests have been well conducted and have demonstrated certain facts, they do have one serious drawback, namely, that with very few exceptions they have been principally under the direction of parties who were interested in proving the capacity of their special products. If it were possible to organize here a committee entirely distinct from any manufacturers' combinations, whose sole object would be to make a rigid, impartial investigation, and not only begin such investigation, but keep it up periodically, as is the evident intention of the British committee, the resulting good to our profession and to methods of proper construction would be almost incalculable. The British architects go about things more deliberately than we do. They do not have the rush and dash which seems to be a necessary concomitant of our work, and as a result thereof we get a great deal more done, but we slop over more easily, and are inclined to adopt systems of construction before they have been thoroughly tested. This British committee has our most hearty approval, and we shall await with a great deal of interest the results of these tests. We can only regret that a similar movement might not be started right off here in this country.

THE series of articles by Mr. Russell Sturgis, of which the second instalment appears with this issue of THE BRICKBUILDER, touches some new notes on the subject of brick and tile work for interior finish. Mr. Sturgis emphasizes one point which we have repeatedly urged in these columns, namely, that decorative tile and terra-cotta can be made as dainty and graceful in design and as purely artistic as is possible with any other material. Indeed, some of the prettiest and most graceful effects are obtained by the proper treatment of burnt clay. The public that pays for the buildings is so inclined to associate a certain rudeness of finish and coarseness of effect with enameled terra-cottas and tiles, and it is so seldom that the proper spirit is applied to this sort of work, that it is not always understood how readily a thoroughly decorative and at the same time appropriate treatment can be adopted in the designing of terra-cotta work. Mr. Sturgis's statement that it is always well to go back to the Orient for suggestions for the best ways of using tiles is worthy of careful consideration. Among what we call the civilized nations of the world, the decorative sense is acquired, rather than *sui generis*. It is the Orientals, especially the Persians and the Hindoos, who have that innate sense of color which has found expression in enameled terra-cottas and tile work of a kind which we can only imitate. We certainly are hardly likely to produce them from our own resources in this generation.

But, as Mr. Sturgis's article so aptly shows, there are lessons to be learned from the tile work of many other countries. We are so hampered by commercial considerations, and are so inclined to limit our choice to what the market ordinarily affords, that our comparisons are often limited to the product of the terra-cotta companies, and we forget the wide range of possibilities which the experience of the past has developed in the terra-cotta and tile industries. The difference between the work of North Germany, the Saxon china, and the fairy-like enamels of Persia, shows a range of possibilities of which we ought to be more ready to avail ourselves. There is surely nothing coarse or unworthy of high effort about the Delft chinas, and the Spanish islands of the Mediterranean show a species of tile which in a decorative sense is unique. We need not limit ourselves to the pages of a trade catalogue in order to find a high expression of art in terra-cotta, and Mr. Sturgis's line of argument is one which ought to open our eyes most effectually to the possibilities of this most fascinating material.

BOSTON has not kept up with the procession in the matter of architectural exhibitions. Indeed, there have been only two such in the past that were in any sense more than purely local in their character. In the fostering of the allied arts, however, a fine beginning was made two years ago by the exhibition of the Society of Arts and Crafts which was held at Copley Hall, under the direction of a carefully selected committee, including architects, artists, and craftsmen, and with so much success that it is to be repeated this year. The Society of Arts and Crafts hopes to bring designers and craftsmen into mutually helpful relations and to encourage workmen to execute designs of their own. It endeavors to stimulate in workmen an appreciation of the dignity and value of good design, to counteract the popular impatience of law and form and the desire for over-ornamentation and specious originality. The exhibition is to be held in April, and New England craftsmanship in great diversity will be shown, including metal work, jewelry, cabinet work, modeling and carving, pottery and glass work, stained glass and decorations, illustrations, printing, bookbinding, engraving, and artistic photography, textiles, embroidery and leather work, designs for carpets, wall papers, etc. The field is certainly a large one, and there is plenty of opportunity for a display of a quality which ought to have a very decided influence upon the arts and crafts.

PERSONAL, CLUB, AND SUNDRY NEWS ITEMS.

FRANK ELWOOD BROWN, formerly of Brown & Berger, architects, New Haven, Conn., has opened an office at 61 Orange Street, New Haven.

EDGAR B. FOX, architect, Columbus, Ohio, has withdrawn from the firm of C. A. Stribling & Co., and opened an office at 85 North High Street.

JAMES S. A. MERCER, architect, has opened an office at 1300 Broadway, New York City, for the purpose of establishing a practise as a contractor's quantity surveyor.

ROCKWELL M. MILLIGAN, formerly chief draughtsman in the building department of the Board of Education of the city of St. Louis, has opened an office for the practise of architecture in Suite 1103, Chemical Building, St. Louis, Mo.

GEORGE L. HEINS, of Heins & La Farge, New York City, has been appointed State Capitol Commissioner of New York to succeed Isaac G. Perry. The position calls for supervision of all State buildings, including hospitals, armories, reformatories, etc.

THE third competition for the John Stewardson Memorial Scholarship in architecture is announced. The scholarship is for a term of one year to be spent in travel and study in Europe. The income is $1,000.

THERE is a bill before the legislature of California which, if it becomes a law, will require all architects of the State to take out a license at an initial cost of twenty-five dollars and an annual cost of five dollars thereafter.

RECENT happenings at the Chicago Architectural Club: Mr. Louis J. Sullivan addressed the club on Monday evening, January 23, on "The Principles of Architectural Design." Mr. Lorado Taft addressed the club on Monday evening, February 6; the subject was "A Tramp Through Normandy and Brittany," illustrated with lantern slides.

THE New Jersey Society of Architects at their annual meeting elected the following officers for the ensuing year: president, Paul G. Botticher, Newark, N. J.; first vice-president, James H. Lindsley, Newark, N. J.; second vice-president, Robert C. Dixon, Jr., township of Union, N. J.; secretary and treasurer, George W. Von Arx, Jersey City, N. J. Trustees for three years: Albert Beyer, Hoboken, N. J., and Henry C. Klemm, Newark, N. J.

THE St. Louis Architectural Club has decided to hold an exhibition of architectural drawings, sculpture, etc., at the Museum of Fine Arts, from April 26 to May 2, inclusive. This being the second attempt of the club to hold an exhibition, every one is striving to make it a success. The club is doing more good work than at any previous time. A goodly number of drawings are submitted in the monthly problems. The club has lost one of its most valued members in Mr. B. H. Brown, who died on January 30. Mr. Brown has been for the past few years the superintendent of construction on the new City Hall.

THE thirteenth annual convention of the National Brick Manufacturers' Association was held at Columbus, Ohio, February 7, 8, 9, and 10. The papers read before the convention were of unusual interest, and the discussions which followed showed the keen interest that is taken by our burnt-clay manufacturers in the scientific and practical questions which their business presents. The following officers were elected for the ensuing year: president, W. D. Richardson, Shawnee, Ohio; first vice-president, F. B. McAvoy, Philadelphia, Pa.; second vice-president, W. H. Hoagland, Cayuga, Ind.; third vice-president, W. G. Titcomb, Providence, R. I.; secretary, T. A. Randall, Indianapolis, Ind.; treasurer, J. W. Sibley, Coaldale, Ala.

A BILL to abolish the New York City Building Commission, recently appointed by the Municipal Assembly, and to repeal the Building Code adopted by it, was introduced in the New York Legislature on February 6. A second bill was also introduced, which provides that a new commission consisting of eleven members shall be appointed by the governor, as follows: a member of the Board of Buildings; chief of the fire department; one representative of the health department, one member of the Tenement House Commission, who shall be an architect; one representative of the Board of Fire Underwriters; one civil engineer, to be chosen from a list of three names to be submitted to the governor by the American Society of Civil Engineers; three architects, to be chosen from a list of nine names to be submitted to the governor by the New York Chapter of the American Institute of Architects; one practical builder of at least five years' experience in the construction of modern fire-proof buildings; and one attorney and counselor at law who has been admitted to practise in the State of New York for at least five years. The Commission is to report to the legislature, not later than Jan. 15, 1900, a code of building laws for New York City.

INDEX TO THE BRICKBUILDER, VOL. VII.

THE index to this volume, which is the first index that has been published in connection with THE BRICKBUILDER, will be mailed with the March number.

League and T Square Club Exhibitions.

ONE of our best friends, who, by the way, is certainly in a position to know whereof he speaks, declares that after a visit to New York he always feels as if he had been living on champagne cocktails for a week. Our personal experience of a diet of that kind is not of a nature to serve as a guide, but certainly one can hardly visit New York, see the work which has recently been going on, and then take in the League Exhibition, without the architectural pulse being quickened to a degree which suggests the most vivifying influence, while the extent to which the New York architects seem to have the opportunity to lavish money upon the erection of large, magnificent buildings makes one feel that, after all, Boston is only in the provinces, and Philadelphia a mere village of a million souls. To be sure there are compensations, and we return to Boston or Philadelphia with quite as much love for our native cities, though fully appreciating the tremendous opportunities which the New York architects seem to be enjoying just at present. The Fourteenth Annual Exhibition of the Architectural League is in some respects one of the best that has been held. It is essentially an exhibition of New York architecture. Very little has come from outside of that city; even Philadelphia sent but a scant quota, and of the New York architects themselves some of the best names are not represented. But withal the exhibition has so much of interest, and the promise it shows of the kind and the extent of work to which the New York architects are looking forward is so large, that a study of the drawings is very inspiring. The catalogue, which has come to be apparently so essential a feature of all these exhibitions, gives only a slight idea of the kind of work which is really exhibited. Modesty would certainly be lost in an exhibition of this sort, and mere size seems to have been considered in preparation of the drawings, for there is one tremendous sheet measuring 20 ft. long and 9 ft. high, a ¾ in. scale drawing of the proposed central pavilion of the Metropolitan Museum, which quite throws into the shade any drawing on a smaller scale or less pretentious in area. And yet, going over the exhibition a second time does not reveal much real greatness in the designs, and one has a flavor of disappointment that where there is so much that is good there should not be, with so great elaboration of architectual drawing, more truly monumental pieces of work. The New York architects are manifestly lacking neither in imagination nor in facility of expression, but elaboration does not necessarily constitute good architecture. Any one can pile a profusion of details on a drawing; indeed, as one of our prominent architects once remarked, "What do we buy books for anyway?" but the fundamental conception of idea in mass, the monumental feeling, which should be the basis of all architecture, is not as conspicuously displayed in the designs exhibited here as one might wish. There is plenty of froth and foamy billows, but not the suggestion of a steady, increasing tide of good, solid growth which we should hope to see. It is as if our architects, having ceased to be original and bad, had reached the second stage, where mere copying of detail masked absence of pure conception. Fergusson, in his "History of Architecture," used to sarcastically remark that the American idea of planning was to cut out slips of paper the sizes of the desired rooms and somehow fit them together like a gem puzzle. It might now almost be said of the present New York fashion of design, that the *modus operandi* is to accept almost any general mass or arrangement, and by liberal borrowing from Cæsar Daly and the *projet médaillé*, paste it all over with a swirl of ornament, and if perchance some clean wall spaces are left, make up for the neglect by piling it on a little thicker somewhere else. There is one consolation, however. Like the present abominable styles of woman's dress, this is a passing fashion, and when our architects have recovered from our *fin de siècle* madness the profession will at least find itself with a greater facility in the use of our architectural tools.

But this is not brick architecture. Indeed, it is hard to separate out all the designs which might have been executed in brick, for the reason that the color often masks the real material in the drawings, but there is hardly a design exhibited at the League which could not be studied to advantage by any one who would even wish to limit his architecture to expression in burnt clay. Cope & Stewardson, one of the few outsiders, send in a very interesting drawing of the University of Pennsylvania Law School. They also exhibit an unusually interesting drawing of the central pavilion of the dormitories for the same institution, a Tudor design in brick and stone, with a big archway in the ground floor flanked by oriel windows and side towers, the whole very successfully pulled together and shown by a very clever drawing.

RESIDENCE OF JOHN C. SIMS, ESQ.
Cope & Stewardson, Architects.
(By permission of the T Square Club.)

On the opposite wall are several of the charming post-offices for which the government architect office is indebted to Mr. J. K. Taylor, who is an artist as well as a good architect, and shows it in the way he treats the problem of a post-office in small towns, a problem which, by the way, has seldom been treated properly, though offering great possibilities. There are also, as would naturally be expected, several designs exhibited for residences in the Ecole des Beaux Arts style, which seems to have fastened itself so thoroughly upon the affections of New Yorkers, the red brick and stone trimming sort of design, which is so familiar to the Parisians, and which we are beginning to see dotted around New York. Janes & Leo have a pleasing study for a house on upper Fifth Avenue, and close by is shown a very clever and knowing pencil sketch, daintily colored, for a city house, designed by Palmer & Hornbostel. Mr. T. Henry Randall sends some studies for a residence at Tuxedo Park, which seem in character quite a charming innovation as compared with some of the earlier creations of that exclusive suburb, — a design in the Tudor style, to be carried out in brick and terra-cotta, facing on a broad, liberally proportioned terrace giving upon a formal garden, shown by a drawing which is well studied, appropriate, and presented in a very happy manner. Ingle & Almirall exhibit a drawing for the design of the Binghamton Savings Bank which is excellent of its kind, though it is so much akin to the motives which seem to have been appropriated for private residences that it would hardly suggest a bank. Haydel &

Shepard contribute, in the fashionable line, an elevation of an elaborate residence in buff brick and white stone ornamented in the accepted French style.

Of the public work, perhaps one of the most notable contributions is made by the competitive designs for the Jersey City Public Library, one of the numerous public buildings in which brick has been successfully applied. C. W. & A. A. Stoughton show a very well studied design in red brick and stone, and the designs for the same building by Mr. Freedlander, Benson & Brockway, Lord, Hewlett & Hull, and Stone, Palmer & Hornbostel, as well as the premiated design by Brite & Bacon, show a proposed use of brick, and the problem on the whole has been very satisfactorily worked out by all of them. The United States Immigrant Station, at Ellis Island, New York, by Boring & Tilden, is represented by both an elaborate rendered drawing and a large plaster model. This building is apparently in a buff brick of strong color, with white stone or terra-cotta trimmings. Our readers doubtless remember the procedure by which the architects for this building were selected as the result of a public competition, and certainly this exhibition would seem to justify in the fullest measure the choice of the jury. Then, on a smaller scale, the Grace Hospital Nurses' Home, by Nettleton & Kahn, is a well-balanced design in Tudor style, indicating red brick and white stone. The Plainfield Library, by Tracy & Magonigle, shows a scheme of pale brick and white trimmings, chaste, in thoroughly good design, and excellent in color, illustrating how well brick can be adapted to monumental purposes if properly designed.

Mr. Bruce Price exhibits a perspective of a design for the Hotel Brunswick, rendered by Hughson Hawley, a combination of red brick, white trimmings, a rainy day, a crowd of people with umbrellas watching a procession, and a thunderous, cloudy sky, a drawing which makes one feel that both the architect and the draughtsman must have had lots of fun over it, for, aside from the picturesque treatment, the design builds up in a rich, opulent, New York fashion, with a profusion of really admirable motives and carefully studied details. The treatment of the first story seems to be especially good. Mr. Price also sends a design for the Oikopolis, also rendered by Hughson Hawley, a huge structure, which might be an office building or a modern hotel, but on the face of it it is chiefly an interesting composition. In this building brick is used for a central motive, in the emphatic, straightforward manner which Mr. Price knows so well how to adapt to the exigencies of a large design.

THE LUTHERAN PUBLICATION HOUSE, 1424 ARCH STREET, PHILADELPHIA, PA.

Frank Miles Day & Bro. and George C. Baum, Associate Architects.
(By permission of the T Square Club.)

The *pièce de resistance* of the exhibition, from a burnt clay standpoint, is a store front, which occupies the greater portion of one end of the room, being not merely a full-size model, but the actual construction of a two-story store building, which has been erected by the Perth Amboy Company, chiefly as an experiment to determine the possibilities of enameled colored terra-cotta. The photograph of the building itself, which we publish herewith, will show the character of the design. The wall surface, of which there is very little, is a light buff in tone. The window finish and the balusters of the cornice are white, or as near so as we can get in terra-cotta. The pedestal and horizontal moldings generally are strong gray buff, the pilasters of the same, but colored a dull red in the hollows of the flutes. The frieze of the cornice has a green ground with running ornament in white picked out with a little red. In the egg-and-dart course of the cornice, the eggs are red, the darts black, and the fillets green. The pilaster bases and foliage of the caps are green with a dash of white in the latter. Green also appears in the ornamentation of the panels under the windows and in the pedestal course. The general effect is all pale buff, red, and green, the buff being varied only slightly by the use of white. The red is a dull Indian red, and the green is a strong though not a bright emerald. The terra-cotta is glazed, with the surface cut down to a smooth, velvety appearance by the use of sandblast. The mortar is in general colored to match the adjoining terra-cotta. Without undertaking to discuss the architectural merits of the design, as an attempt in color, it is a brave endeavor deserving every encouragement, and the general effect is soft and pleasant. It is a kind of success which, while by no means perfect and leaving much to be desired both in the quality of the colors and in the relative application thereof to the architecture, shows, or at least indicates, the possibilities of this kind of treatment. The architecture is of design to which color can be applied with perfect propriety, when a larger or more pretentious scheme might be simply ruined or frittered thereby. It used to be a maxim of the school, that color and form in decoration should not be used together. This is a mistake which we are growing out of slowly, and the dogma was probably formulated from the timidity or crudity into which one can so easily slip. Certainly this essay of the Perth Amboy Company shows that color and form can be allied most successfully.

A noticeable feature of the exhibition is the extent to which models have been shown: models not merely of fragments of ornament, but of all schemes of development for houses and their surroundings. There are no less than thirty serious models of this sort forming a part of the exhibition, and they not only help out the interest very materially, but they show how thoroughly our architects are studying the problems which are presented to them.

T SQUARE CLUB CATALOGUE.

Of recent years the illustrated catalogue has come to be a very prominent feature of our architectural life. It is by no means sure, however, that the illustrated catalogue, *per se*, is a highly desirable factor, and the hope has often been expressed that the day may come when, if catalogues must be, and they must be illustrated, it will not be necessary to levy contributions on the builders and manufacturers to pay the expenses thereof. There is an ethical question involved therein which is susceptible of very extended discussion, and there is a sort of feeling on the part of a good many architects that the exhibition ought to pay its own bills rather than call upon the kindness of the manufacturers. But taking things as they are rather than as they might be, the catalogue of the T Square Club exhibition of Philadelphia for this year is certainly in the lead of the procession. It is well gotten up, the illustrations are admirably selected, and it forms a sort of an annual round-up which has interest not only for Philadelphia but for the country and the profession at large. The Quaker City has been passing through an architectural development in which the T Square Club has been by no means an inconsiderable factor, and with its customary enterprise the club this year has in its catalogue inaugurated a departure in the shape of an introduction which deals with matters architectural in a way that would perhaps be possible only in a publication of this sort. The introduction forms a review, having as its well-defined purpose the encouragement of honest, unaffected architecture. It begins with a very clear summary of the principal architectural events of the year 1898 which are of moment to Philadelphia, and it would be difficult to overestimate the good that this summary of the municipal work might accomplish. The emphatic protest against the condition of the public building in Philadelphia, upon which millions have been sunk and upon which millions must yet be expended before it will be anywhere near complete, ought not to pass unheeded. It is an old story to all of us, and the characterization of the kind of work which every municipality seems to have to content itself with is a standing reproach to our methods of civic architecture. This particular building, however, is no worse than the Pennsylvania State Capitol, a design for which was accepted for a structure, the cost of which was to be something over $300,000, which is still so incomplete that the building commissioners now have the audacity to ask for an approriation of $3,000,000 to complete it.

The introduction of the catalogue also contains an interesting symposium upon the very trite subject, "An Unaffected School of

GARDEN AND DORMITORIES FOR THE UNION LEAGUE CLUB, PHILADELPHIA.
Mead & Keen, Architects.

(By permission of the T Square Club.)

Modern Architecture in America — Will it Come?" with replies to the question from a number of the most prominent architects and educators throughout the country. The symposium itself is a good presentation of the architectural bent of those who took part in it, and perhaps unconsciously there is more to be read between the lines than occurs in the actual words, for as the contributors are all leading men, the discussion presents some phases which perhaps were not intended. The forces are pretty evenly divided now as to what constitutes good architecture. There are those who feel that the sun rises in France and stays there, and that only faint reflections of glory reach our shores. There are others equally sincere who claim that "It is not a thinkable proposition that from a people democratic and free, self-reliant, resourceful, possessed of their own bodies, possessed of their own souls, self-centered, deep of aspiration, there shall not some day suspire as an exhalation an architectural art germane to those gifts, responsive to that throb, eloquently voicing every form, every aspect of what is genuine in our national life." There is a good deal of the holier-than-thou spirit in some of the replies which were sent in to this question, but there is also a good deal of earnest, straightforward, logical discussion of the subject which will do any one good to read. Mr. D. H. Burnham, in his terse, straightforward manner, summarizes in a very few words one view of the subject by saying: "There is little in the details used on the exterior of our buildings that is exclusively American; but architecture is not detail: it is the whole expression of a building, and in their whole expression there are American buildings that are fresh and original, and some of them are good from an artistic standpoint." Mr. John M. Carrere very aptly suggests that the development of an unaffected school of modern architecture in America is the sort of thing which is usually looked back upon and not forward to, and it is truly to be doubted whether we are really able to judge of what is going on about us. We may be like Molière's *Bourgeois Gentilhomme* and be talking most excellent architectural grammar all the time without knowing it. Indeed, perhaps this is what Professor Ware has in mind when he advises the T Square Club not to worry. "The practise of architecture in this country seems to me to be, in the main, in a perfectly natural and wholesome condition, full of health and vigor, growing in grace and stature and in favor with gods and men, if there be any deities which concern themselves with its destinies. Speculative meddling can only do mischief." Mr. Cass Gilbert voices much the same thought when he says that if the architecture of our country is beautiful and appropriate the question of originality will take care of itself. All this discussion certainly tends to keep alive the spirit of investigation, the questioning attitude, the progressive thought, which must in the end conduce to the kind of architecture of which we should all be proud, and the T Square Club has drawn about this trite subject a very interesting expression of opinion, presented in such a way that it will be read and pondered by all those who are directly interested in good architecture.

STORE FRONT, OF ENAMELED COLORED TERRA-COTTA; FULL-SIZE MODEL SHOWN AT THE LEAGUE EXHIBIT.
Executed by the Perth Amboy Terra-Cotta Company.

Another admirable feature of the introduction is a list of the names of those who have gained recognition in consequence of individual proficiency in the highest institutions at home and abroad, including the American graduates in architecture from the Ecole des Beaux Arts and the holders of the various traveling scholarships. It is interesting to note in this list that there are only twelve American graduates from the French school, three in 1895, three in 1897, and six in 1898. The work of these graduates has not yet made itself felt in the architecture of our country, but there are many others owing their training to the Ecole who are striving to make us all believe that therein lies our salvation. If, however, the illustrations which the catalogue contains of the accepted designs for the Electricity Building and for the main entrance to the Paris International Exposition of 1900 are to be taken as typifying the most recent expression of the possibilities of the Ecole des Beaux Arts treatment, it can only be hoped that such influences may be rendered innocuous by disinfection in crossing the Atlantic, for no wilder, ghastlier scheme of architecture, no more truly incongruous, irrational constructive nightmare could be evolved than the design of the Electricity Building, while the main entrance is like nothing in the heavens above nor the earth below. The value of the Ecole des Beaux Arts training is beyond question. The high quality of the work which is at times turned out by the French architects is deserving of the sincerest form of admiration, but if the tendencies of the Ecole are to degenerate at the rate they seem to have been traveling during the past few years, we shall not need to go to Paris to find our distinctive American inspirations.

All this need not imply any censure of the T Square Club or its catalogue. The one is a worthy representative of the excellent spirit and organization of the other, and both are eminently successful.

THE Chicago Architectural Club has announced its twelfth annual exhibition of works of architecture and the allied fine arts, to be held at the Art Institute, Chicago, from March 28 to April 16, 1899. This exhibition will include architectural drawings and sketches; projects for public and monumental work; interior decorations and furnishings; architectural and decorative glass, mosaic, and metal work; sculpture — architectural and decorative — models.

Bricks and Tiles for Interior Finishing. II.

BY RUSSELL STURGIS.

IN the first of these articles mention was made of the easy practicability of so using painted tiles as to give more than a mere pattern decoration to a wall. It was suggested that vertical bands of scroll ornament and the like could be used with an effect midway between strictly architectural designing and that of flat wall decoration. What are often called, by a very bold extension of the term's significance, candelabra may be carried much farther than is done in the Chinese examples cited above. Those who remember the front of the house in Paris situated on the Cours-la-Reine, and known as the house of Francis I., or those who remember its rather close study in the front of the Fine Arts Society's building in West 57th Street, New York, will remember the sculptured uprights, whose design is midway between that of an engaged column and that of an inverted torch. It is a motive not uncommon in French Renaissance architecture and not incapable of the finest inventions of that intelligent, vigorous, and most interesting style. Such quasi-architectural decoration seems eminently fitted for carrying out in terra-cotta, whether colored or uncolored, whether large or small in scale, whether in bold relief, as for large and high rooms, or in delicate half-seen projection, as if of Spanish tiles. That such motives of design are as workable in relief as they are in flat color will be readily granted by those who have seen the effective use of terra-cotta in the recent American exteriors. The pleading here is merely in favor of the freer use of such design as applied to interior decoration, where, of course, a less conservative method and a more ready trusting to one's own initiative may be looked for and may be safely condoned than in exterior compositions.

It is always well to go back to the Orient for the suggestions of the best ways of using tile, for it is in the Orient that such work has reached its higher development. Fig. 1 is a representation of a piece of wall decoration in the mosque at Damietta, in lower Egypt. The tiles of the absolutely plain dado are green; those of the *dessus de porte* are green above and blue with a yellow pattern below; those of the outermost architrave are orange with a red pattern; those of the lintel band with the Arabic letters are dark blue, the scrolls in yellow, the letters in white; those of the broad architrave with the leaf-shaped continuous pattern are bluish gray with dark blue bands outlining the member; those of the innermost vertical panel, which represents a door, a niche, a wall opening, what you please, are green with only the curious little spandrels at the top of a strong orange yellow. It will be noticed that the two inner members of this architectural composition are composed of tiles modeled in slight relief as well as decorated in color. All the rest of the design is very flat, and the very narrow fillet which surrounds the whole and runs along the top of the dado may be supposed to be flush or nearly flush with the plastering outside. Now, this way of adorning the interior face of any door opening or window opening with its setting and its appliances is the normal one. Whatever you call your outside architrave and however you may disguise its nature by make-believe construction, — by pilasters, by engaged columns, by a fronton and an entablature of no matter what importance at the top, — you still have it, the outside architrave and no more. The predilection of the present writer is strongly in favor of seeing things as they are, of refusing to disguise what is really a flat band intended chiefly for needed ornamentation under forms and under names borrowed from Greco-Roman architecture of a different destination and of a different class of work. Other critics, other designers, have a different notion and cannot dispense with the associations of the pilaster and what it carries. This is indifferent; the only essential point is that the outer band of the door piece or window piece be considered now from the point of view of the maker of decorative objects in baked clay. In one of the most interesting buildings connected with the Paris Exhibition, the Pavilion of the City of Paris, the outer doorways were designed on this principle and entirely of baked clay, so far as their surface decoration was concerned. Band within band the rows or orders of tiles succeeded one another, the whole being framed in an actual structure of light ironwork. If one may trust a recollection twenty years old, the outer band was of brown terra-cotta with pattern in relief, the separate tiles being at least 20 ins. square. With this, with only a slight border to separate the two, was a second band of tiles, also in slight relief, but these very highly decorated in color and thickly glazed so as to have considerable vitreous luster. There was no more affectation of architectural details, of pilasters or pillars, in this case than in the Cairene portal before us; but there was a great deal of relief, for the broad architraves of the Paris door were not flush with the wall which enclosed them one with another, but had here a splay, there a change of surface from a more projecting to a less projecting plane, and this play of shadow enhanced the portal-like character while it increased the chromatic effect of the whole. Within smaller limits similar variety of treatment is called for in our interiors as well. If one were to carry out an interior without many restrictions as to space occupied or expense incurred, he would probably demand that treatment of a door piece which would at once facilitate the use of the doorway considered as a means of exit and entrance, and also suggest its purpose in this way. The treatment of the windows in the same room as the door in question would almost inevitably be akin to the treatment of the doorway, though in the case of the windows the same reason for splayed or rounded corners of the jamb would not exist.

FIG. 1.

More formal architectural treatment may be given to the terra-cotta used in interior decoration, and this is made comparatively easy by the enterprise of some of the firms who are doing what they can to increase the familiarity of the public with the use of this inexpensive and convenient material. It should never be urged that any architect employ the patterns in stock except in so far as those patterns are of the very simplest character, mere bosses, nailheads, elements of moldings, and the like. Every designer worthy of the name will long for, and on occasion will insist upon, the privilege of designing his work afresh, even to the volutes of his Ionic capital; and yet it is manifest that the familiarity of the workmen in the factories with the forms, the dimensions, and the general character of the blocks needed in an architectural composition has done much, and may do much more, to cheapen such material and to expedite its use. When a room is to be treated with an order of pilasters raised upon a dado, a familiar device but one of which the designers and the public seem never to weary, it would be as easy to carry it out in baked clay as in any other material. It would also be much cheaper

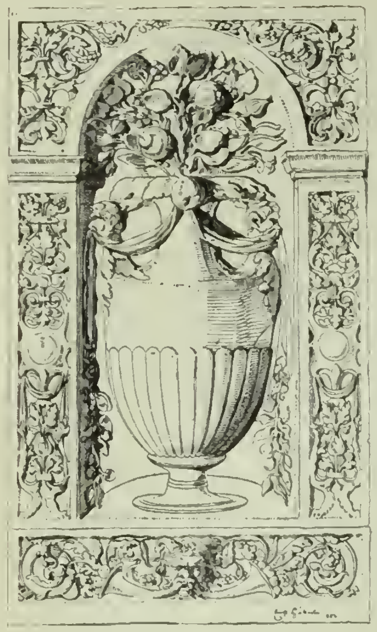


FIG. 2.

than stone of any kind and much more valuable and permanent than in plaster or in wood. Moreover, there is nothing to prevent such an internal facing of a room from being built thoroughly well into the actual brick wall. The upper courses of the dado may be built with the wall itself, and that would be an ideal plan, while the pilasters above would be keyed or anchored into the wall at frequent intervals, and all this semi structural decoration would be in place before the remainder of the wall surface, as any paint, any plaster, any textile fabrics, any leather, or any tapestry, should be applied.

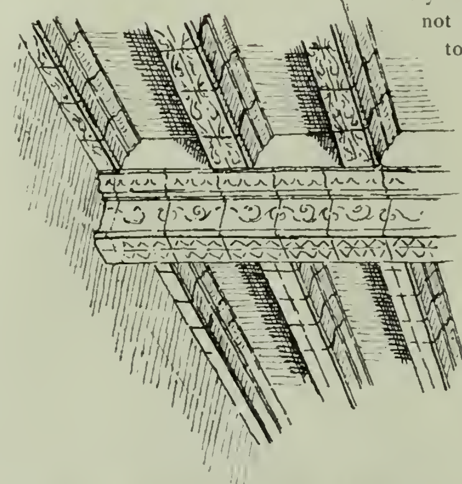


FIG. 4.

At the same time it is more easily suggested by the nature of the material which we are considering that its parts should be rather small, its ornamentation varied and fantastic rather than formal, its use more nearly like the use of woodwork than that of the wall masses themselves. The little pilasters of the Renaissance properly so called, Italian of the fifteenth or French of the sixteenth century, with their non-regulated, unrestricted little friezes, capitals, and face moldings, are probably more in the way of the worker in baked clay than are the more academical designs of a later and less original school of designers. Fig. 2 shows this tendency toward the small and fantastic and the strictly decorative carried almost to an extreme. It represents a panel of sixteenth century German work, the original being in glazed and colored terra-cotta of great boldness of design and of relatively bold relief. The original may be seen by the curious in the well-known castle of Nuremberg, the favorite place of resort of all artistically minded travelers. It may be well, perhaps, to add for the information of those who might otherwise seek this panel and its fellows in wall friezes or dados, that this particular unit of decoration is taken from a stove, the work of the celebrated Hirsvogel. It seems even worth while to give the whole of the stove in a slight and sketchy fashion. It is so given in Fig. 3. Such a stove, standing 8 ft. high and glowing with color, enhanced in its effectiveness at once by its relief and the vitreous gloss of the surface, forms the chief decorative object in many an ancient German palace hall. Nowadays, that the inexpensive and certainly inadequate method of heating which this stove represents has been done away with by more complete and far more costly modern appliances, we can only look at the stove with longing; but its suggestiveness as a combined piece of pilaster work, niche work, scroll work, of decorated moldings, of free-and-easy, semi-classical treatment of details still exists and is still considerable. In connection with this the obvious utility of painted and molded tiles in our modern fire-proof construction is to be considered. The builders of the day, the owners of the day, the tenants of the day will not listen to omitting wood from their buildings, so great is the prejudice in America against any flooring, any door, any window sash that is not of the time-honored material. Instead of omitting the combustible from the building, they prefer to protect against the possible effects of its combustion the iron which forms the main structure of the edifice. If now, instead of filling up our floors to a solid mass, we were to desire to regain some of the ancient picturesqueness, something of the vigorous light and shade given by an open ceiling with its beams showing from the under side, what more natural than that we should do as the Greeks did in Phidias's time and put a shell of decorated terra-cotta around each separate beam? The whole ceiling — the whole top of the room — would then be cased in terra-cotta, glazed, richly painted and flat, or in relief, as might be desired, and all so put into place with tie joints and perfect continuity of surface that flame would be excluded and even excessive temperature kept out by the continuous jacket of non-conducting material. There is no room here to insist on some most astonishing results of recent experiment in which the temperature of the space within a brick pier has remained at an inconceivably low figure while a deliberately made fire raged without and around it. It is enough to remind our readers of what every architect well knows, that nothing is so good a protection for either wood or iron as a sufficiently thick and, above all things, perfectly continuous and

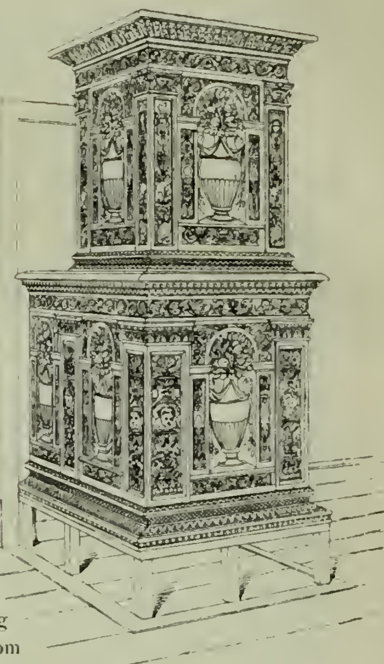


FIG. 3.

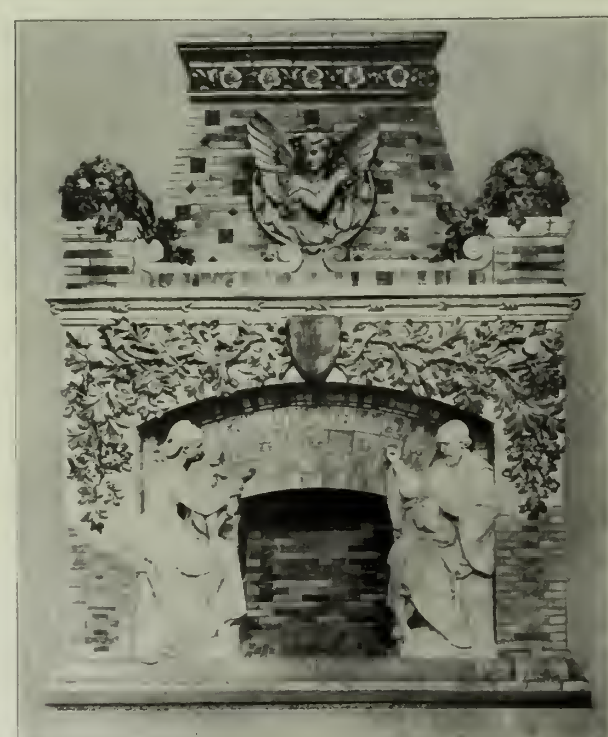


FIG. 5.

unbroken coating of earthenware with a certain amount of air space between this fire-proof shell and the material to be safeguarded.

FIG. 6.

Fig. 4 shows a study for such a ceiling freely adopted from a detail in a noble French chateau.

In these ways we may try to line our rooms with ceramic ware; and, in this connection, it will readily be seen how important is the consideration of sculpture, whether colored or without the use of polychromy. Fig. 5 is an instance of a chimney-piece built of brick of unglazed brown terra-cotta and of enameled terra-cotta, the whole combined in one design by Mr. Paul Sedille, of Paris. It is very far

FIG. 8.

from being an ideal composition. Some of the plain mantelpieces in an office building in New York, the design of Mr. George B. Post, in which a plain "commercial" terra-cotta mantel is attached to the front of the chimney breast built of dark red brick, are more effective in design than this one. But this one contains a vast amount of applied decoration, some of it good in itself, though none of it seems to be exactly called for by the design or to be in any strict sense of the word constructional or even very appropriate. The most valuable part of the whole composition is probably the placing in the jambs of the fireplace two figures modeled by Mr. André Allar. It will be generally felt, no doubt, that these figures are crowded on the one side by the open hearth, where glowing coals may be expected to lie and a bright blaze flash up for six months of the year, and on the other side by the projecting breast pieces against which they lean. They are too crowded; they will inevitably be broken by the servant who makes the fire; they are in the way of those persons who would gather round the fire, and in their verisimilitude of life form too much a part of the living group. At the same time, the whole of the composition is not without suggestion for those who would see at one and the same time free and realized sculpture, such as the men of our time are capable of producing, combined with architectural adornment of their interiors, and to see the whole of this varied effect produced in the material baked clay. A much better piece of sculpture, and a much more appropriate architectural setting, is that shown in Figs. 6 and 7, parts of the great doorway in the famous 100 ft. gallery (Galérie de 30 Metres) at the

FIG. 7.

exhibition of 1889. The architecture in itself is feeble enough, a forlorn little reminiscence of the weaker kind of Romanesque: but the use of its outlines as frames for the panels of sculpture is unobjectionable and the panels themselves are admirably fitted to their shape, size, and position. The little ceramists are at work: first, firing up and mixing clay; second, tempering and handling the clay and turning pots on the wheel; third, modeling more important pieces by hand and adjusting handles and sinking bas-reliefs; and so on to the last panel in Fig. 7, where they are at work on a mosaic, — small in scale, as it must be admitted. Such intelligent use of sculpture in relief is really the most obvious of all the ways of decorating our interiors in a thoroughly artistic and thoroughly modern manner. At the same time, a word of suggestion from very ancient times indeed is always in place when the ancient times are those of artistical Greece, and it is worth while to look at the terra cotta tablets shown in Figs. 8 and 9 for their composition, — for their treatment of relief on a ground of the same color and for the admirable combination of figure sculpture with purely decorative forms which they show. The conventionalized winepress and vintage festival shown in Fig. 9 is of extraordinary interest to any sculptor who would learn the secret of making his art serve the purpose of the architectural designer. Our modern tendency is that the architect shall do nothing but build, and appropriate his ornamentation ready made; that the sculptor shall do nothing but model with sole reference to his sculpturesque conceptions and disregarding all possible application of it to a larger and heavier, a more constructional, piece of work. Six months' study of the terra-cottas in the Musée

FIG. 9.

Campana, from which are taken these two friezes, would suffice to show those sculptors how they might be of some use to the architects. Some few of them have the instinct of decoration as well as the instinct of unapplied fine art of form, but not all have this gift by nature.

The American Schoolhouse. XV.

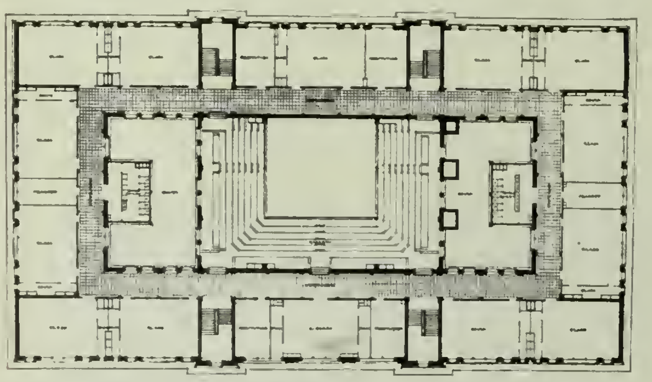
BY EDMUND M. WHEELWRIGHT.

WE have in the Newark High School and the Springfield High School interesting examples of high schools with the interior lighted by courts, and with the assembly hall placed within, gaining its main light from the ceiling. The Newark school presents in its general features the better ordered plan of the two, but this may be observed without discrediting the architects of the Springfield school, who had originally designed a building with essentially the same arrangement as that shown in the Newark school, but who were not permitted to carry out their ideas by the commission in charge of the work. The Newark school, in a broad way, presents, therefore, a more satisfactory treatment of the high-school problem. It is interesting to note that in the Newark school the general arrangement of plan not only follows that of the continental schools, but the continental method of lighting the schoolrooms from one side only is followed, but apparently with the retention of the American width of schoolroom, 28 ft., which does not give adequate lighting. In the Springfield school the clothing is hung in alcoves adjoining the corridors from which the schoolrooms give, thus following the latest German method of clothing disposal, an arrangement which is not advisable. In the Newark school the cloak rooms are in the basement, following thus the method found in the latest American high schools.

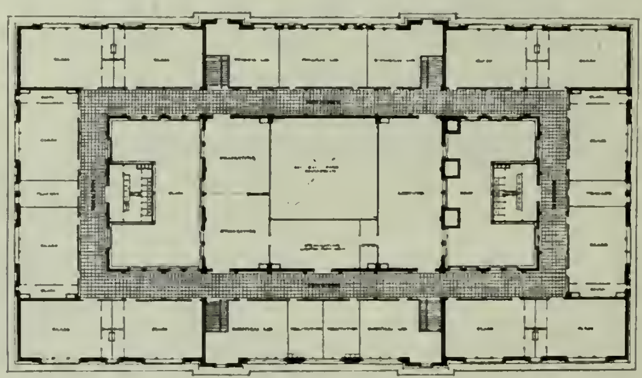
NEWARK HIGH SCHOOL, NEWARK, N. J.
Howard & Cauldwell, Architects.

The Springfield school has several large schoolrooms, in this arrangement approximating to that found in the English schools and in our normal schools, and such as was and as still is the arrangement in our old-fashioned academies. This system was also maintained in the district schools of this country before the German method of graded schools supplanted the English system. The Newark school has apparently schoolrooms of like size to those in our graded grammar schools; the plan being in fact almost that of a grammar school, except that the wardrobes do not adjoin the schoolrooms, but, as noted above, are placed in the basement.

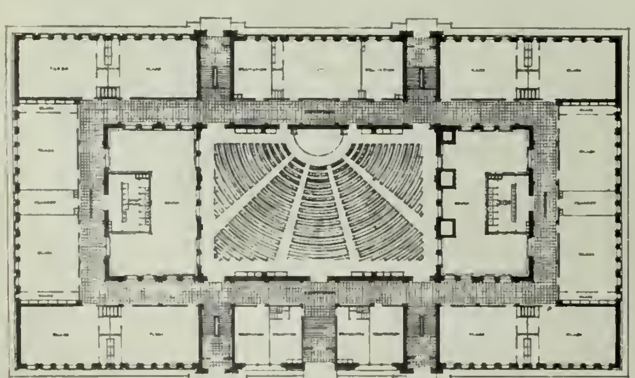
It is interesting to note the varying eclectic use of schoolhouse features derived from or analogous to examples to be found in other countries, an eclecticism probably to be ascribed in part to the varying ideas of the school authorities and in part to the preference of the architects. From whatever source they may come, the adoption of these varying features shows that our methods in high-school planning are not as rigid as they have become in our primary and grammar schools. This is fortunate, as



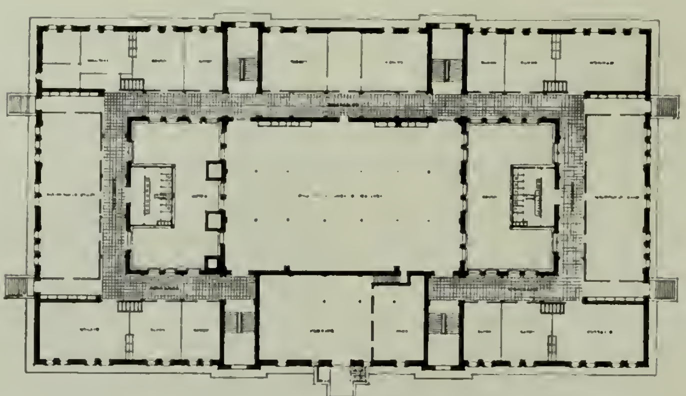
SECOND FLOOR.



THIRD FLOOR.



FIRST FLOOR.



BASEMENT.

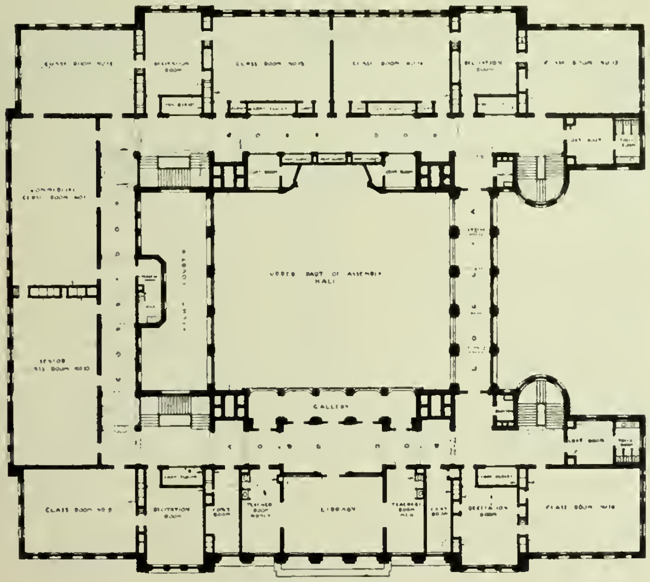
PLANS, NEWARK HIGH SCHOOL.

the high school, if we leave out of consideration the mechanic arts and the normal schools, is the highest of the schoolhouse types, and from the varying experiments in this type we may expect to derive the greatest advance in schoolhouse planning, especially in the manner of lighting. It is mainly in the high schools that the German method of excluding windows immediately in face of the teacher is seen, and it is from the adoption of this feature in the primary and grammar schools that the main future improvement in the planning of these graded schools will come; as associated with this change a less width should certainly be adopted for the class rooms in primary and grammar schoolhouses if they are to be properly lighted.

SPRINGFIELD HIGH SCHOOL, SPRINGFIELD, MASS.
Hartwell, Richardson & Driver, Architects.

The disadvantages of the undeveloped condition of high-school planning cannot be better illustrated than by the plans here presented of a high school in a city of the State of New York.

The achievements of the architects of this building in other lines of their profession make this failure in schoolhouse designing the more to be deplored. The practical requirements have been sacrificed for exterior effect in an



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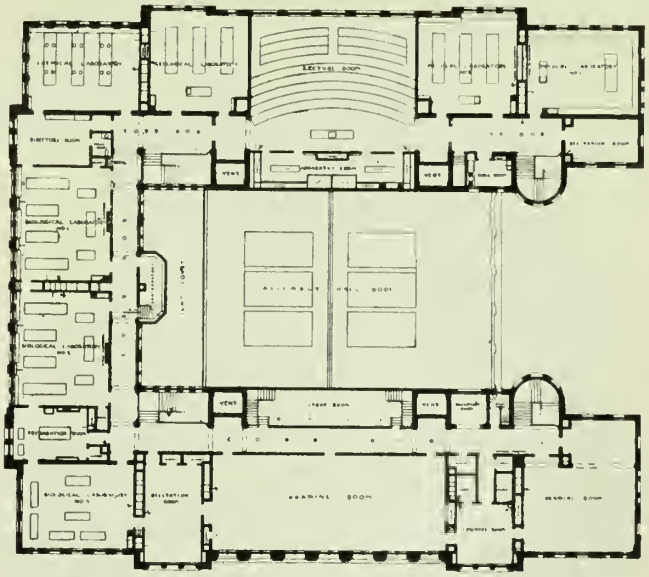

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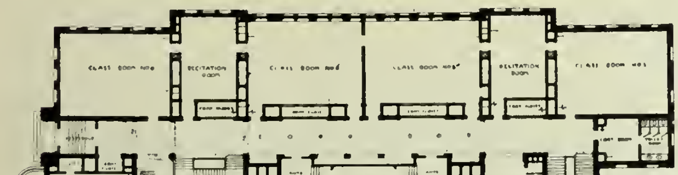


FIRST FLOOR.

BASEMENT.

PLANS, SPRINGFIELD HIGH SCHOOL.

extraordinary manner when the general advancement of schoolhouse planning in this country during the past decade is considered. The

LATIN SCHOOL BUILDING, CAMBRIDGE, MASS.
Hartwell, Richardson & Driver, Architects.

design does not show one properly lighted schoolroom. Two of these schoolrooms, with windows inadequate for proper lighting even if on the outer wall, are shadowed their whole length by an arcade which has the sole function of supporting a balustraded platform on the second story. The distance between the outer walls of the schoolrooms and the outer face of the arcade which shadows them is fully 15 ft.

This schoolhouse is given a high pitched roof like that of a Louis XIV. chateau, which is apparently not utilized.

The designers of the Newark school have also constructed a Beaux Arts *projet*, but they have used the architectural forms which they have chosen in a satisfactory manner, albeit in seeking external effect they have been led to injure the light by the use of transom bars. They have also given some of the schoolrooms of the first floor less window surface than those immediately above them, a sacrifice of utility of purely academic origin, which is not justified even by any better external effect than would have been given if a more reasonable expression of the plan had been adopted.

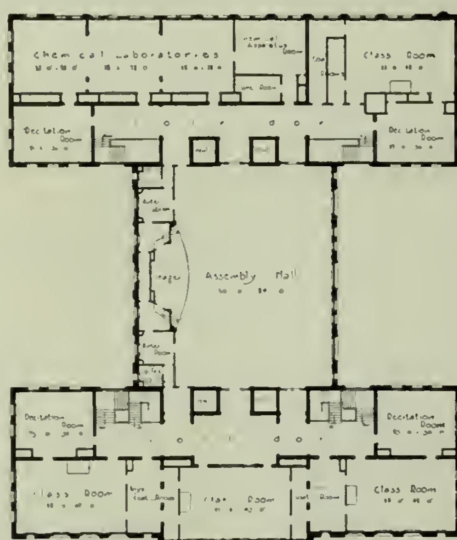
As originally designed, the building intended to accommodate the Springfield High School was larger, and at the same time more simple in plan, than the present building. It was to have accommodated one thousand pupils. The assembly hall was in the center upon the first floor, as in the building that was built, but the class rooms were grouped around this hall, forming four sides of a rectangle instead of three, as at present.

Upon a review of the whole, the commission in charge of the construction of the building decided to reduce the number to be accommodated to eight hundred, and to so arrange the building that the hall could be conveniently used for other than school purposes, and that the building should be given a somewhat more monumental and costly exterior than was first intended. The result was the building as now shown, whose faults as a monumental plan are clearly recognized by its designers. Its merits as a practical schoolhouse plan, with the special conditions imposed borne in mind, are evident to all conversant with such work.

The basement contains a large lunch room, and aquarium, bicycle rooms, toilet rooms, battery and storage rooms, and room for girls' gymnasium.

The boilers for heating are located outside the building.

Upon the principal floor is the assembly hall, occupying the center of the plan. This is approached from the principal entrance, and through the corridor opposite; also by a broad iron staircase, by means of which an audience may pass out upon the west side and down to the level of the grade surface between this and the old high-school building, which still remains standing a short distance away. To the right and



THIRD FLOOR.

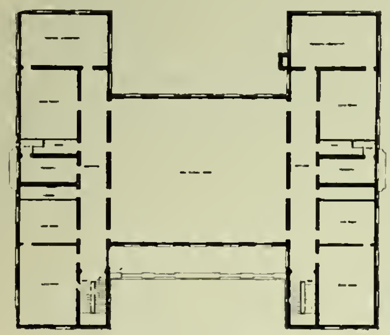
SECOND FLOOR.

FIRST FLOOR.

BASEMENT.

PLANS. CAMBRIDGE LATIN SCHOOL.

left of the main entrance are the office and the private reception room of the principal, the office of the secretary, and a room for delivery of stationery and a limited number of books. Eight class rooms and four recitation rooms are also upon this floor.



SECOND FLOOR.

FIRST FLOOR.

HIGH SCHOOL IN A CITY IN THE STATE OF NEW YORK.

A broad covered passageway crossing by the west side of the hall, from which exit is made to the staircase previously mentioned, provides a thoroughfare between the front and rear portions of the building, which would otherwise have remained disconnected by the removal of this section of the original rectangle. Similar connection is made in the second story, but in this case the passage becomes a loggia, from which in passing one looks down into the hall below.

The plan of the second story is much like the first, except that immediately over the main entrance is the library. Drawing rooms, laboratories, and physical lecture room, with large storage rooms for apparatus occupy the third story, while a 12 ft. copper dome, projecting into an inner light well, is used as an astronomical observatory. This dome is so placed as to be invisible from the ground level, except at a very remote distance, and does not essentially affect the architectural expression of the building.

The assembly hall is also used for concerts, lectures, and other entertainments not directly connected with the work of the school.

The Latin School at Cambridge, Mass, is an interesting type of a high school, and demonstrates the fact that a plan in the form of a letter H gives a better opportunity for thoroughly lighting the wide American schoolrooms than is afforded by the courtyard type. In the letter H plan there can be eight instead of, as in the courtyard plan, four wide class rooms having light on two sides, an arrangement of windows which is essential for the proper lighting of a schoolroom 28 ft. wide; and further, the assembly hall may be made a much more cheerful and dignified room than is permitted by the courtyard plan when this hall is placed in the center of the courtyard.

This building shows coat rooms conveniently adjacent to the class rooms but less absolutely conforming to the "wardrobe" arrangement of graded schools, as was noted to be the case in some of the plans given above. It must certainly be an error of a draughtsman which shows on first-floor plan a class room which is accessible only through the cloak room, for such an arrangement would neutralize absolutely the advantage of a separate enclosure for storage of outside clothing. The width of 30 ft. is given certain of the class rooms lighted from one side only, while rooms on the corner, and hence lighted from two sides, are given a width of 28 ft.

This arrangement appears to be made to give the required dimensions for the exhibition hall, but the lighting of class rooms required that the excess of width should be given the corridor that runs between the class rooms.

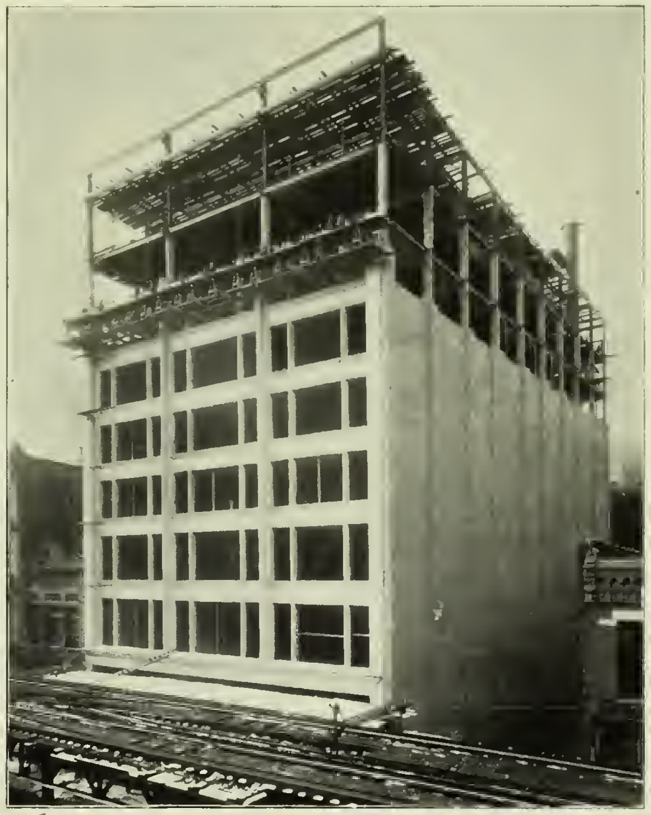
Fire-proofing.

RECENT IMPROVEMENTS IN FIRE-PROOF CONSTRUCTION AT CHICAGO.

THE AYER BUILDING.

BY PETER B. WIGHT.

THE Ayer Building illustrates what is now being done at Chicago in fire-proof construction and architecture in clay. Our half-tone illustration, through the kindness of the architects, Messrs. Holabird & Roche, shows how it looked in January, 1899. In the foreground is seen the superstructure of the Union Elevated Railroad with glimpses of the street below. The photograph was taken just after a snow flurry. The top of the sidewalk protection is seen between the railway structure and the building line, and is really about 8 ft. below the tracks. This obscures the first story,



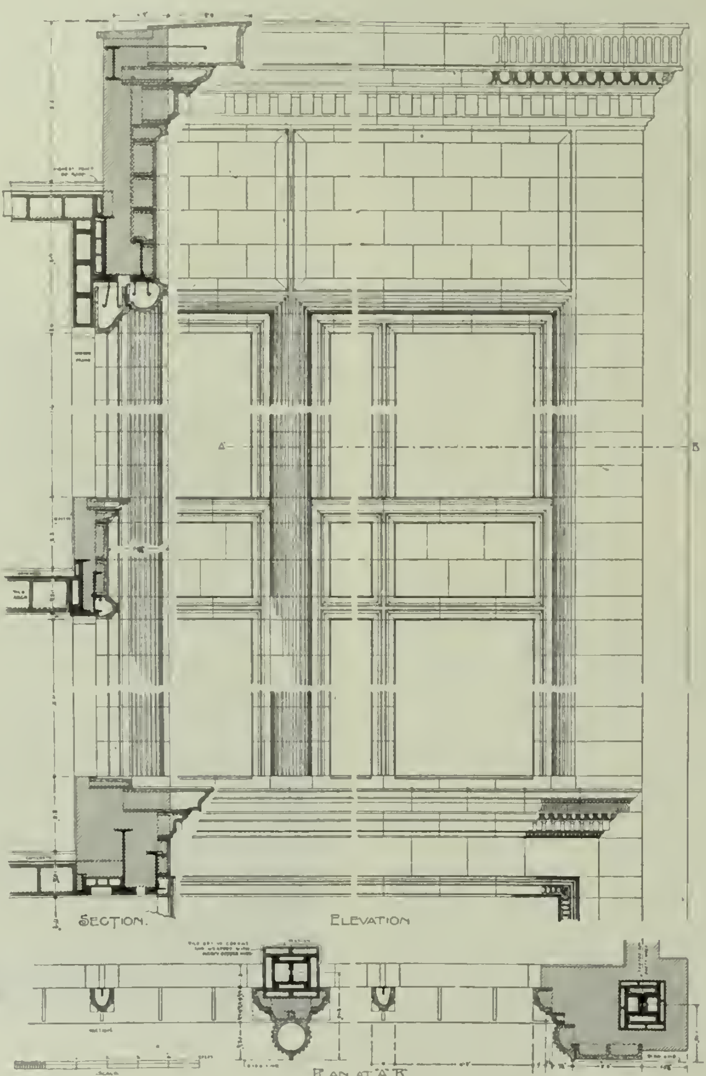
AYER BUILDING, CHICAGO.
Holabird & Roche, Architects.

which is treated as a single opening, though two of the steel posts supporting the front are inside of the sash line. The building is 80 by about 150 ft. and nine stories high, being just within the 130 ft. limit of height, as now required by law. It is a good illustration of the result of the agitation against "sky-scrapers" in the home of their birth, and still it is high enough to make a good investment; and it might be added that it still provides a good field for steel skeleton construction. Situated on the best part of Wabash Avenue, which is second only to State Street as a high-priced retail thoroughfare, it is built so that it may be adapted to the varying demands of business for many years to come. It may be used for one retail business throughout its whole extent, or it may be divided into three retail shops on the first story and have a different business on each of the floors above, which may be subdivided indefinitely. It receives daylight only from the front and rear, and has no light shafts.

Steel skeleton construction is used throughout, supported on a foundation partly of piles and partly of caissons filled with concrete. The latter were used to satisfy the objections of the owners and occupants of the small building on the south. The wall on the north side, where the adjoining property is vacant, is a party wall built by agreement, consisting of Z-bar steel posts covered with hollow porous terra-cotta tile and connected by a 12 in. brick wall, which is continued around the posts on both sides, outside of the porous tile, and 4 ins. in thickness. This 12 in. wall on each story encloses a horizontal I-beam, which carries its weight, story by story. From this it will be seen that, used as a fire wall, it occupies only 6 ins. of each lot, and it could only be knocked down one panel at a time.

The construction of the front wall is best shown in the detail drawing, which gives in section the second floor, any one of the intermediate floors, and the roof. The two intermediate steel posts set back from the front, which is carried on the 24 in. I-beam at the second story floor and brackets above. The posts are fire-proofed all around with hollow porous terra-cotta blocks, after their recesses have been filled with the same All horizontal beams in the front are also fire-proofed with porous terra-cotta independent of all other covering. The exposed front and mullions are entirely built of nearly white terra-cotta, the method of setting and fastening being shown in the detail. The half-tone print testifies to the perfection and uniformity of this material, which the workmen are seen to be setting. The floors are all of I-beams and flat end-pressure hollow porous terra-cotta arches, with soffit plates under the beams. All girders (which are transverse) and interior posts are covered with porous terra-cotta independent of the floor arches.

In the eighth floor the arches are seen completed and the centers are struck. In the ninth floor the arches in the picture are built and the centers are still in place. The centering planks are in place ready for the roof arches. The photograph was taken so as to show the method and order of the construction. The detail drawing shows how the work will be completed. The steel chimney in the rear is lined with fire brick and enclosed in a square wall of hollow tile. This is the method now in general use for the largest Chicago buildings.



DETAIL OF FRONT OF AYER BUILDING.

The Ayer Building is on the site formerly occupied by a new seven-story building of mill construction, which was burned about a year ago, when many lives were sacrificed in the burning, which occupied about thirty minutes. It will have every element of protection against fire known to science, except covering for the front windows. This building is an open confession that where the fenestration calls for the greatest possible amount of daylight, the risk of fire from such an exposure must be accepted, and this will be so as long as tenants refuse to use rolling steel shutters even if they are provided. In this case, however, the street has a clear width of 100 ft. and the risk is greatly lessened thereby. In design the front is an illustration of what Holabird & Roche have so often done before,—showing that when windows much wider than their height set horizontal *masses* in opposition to vertical *lines*, the application of such a treatment to the high building problem gives more satisfaction to the eye than any other that has been attempted. The simplicity and refinement of detail in this street front is another illustration of the tendencies of architectural design at Chicago, especially where terra-cotta is used.

FIRE-PROOFING FIFTY YEARS AGO.

WHILE engaged in our periodical hunt through a mass of second-hand books in one of our stores, we came across a copy of *Harper's Magazine* for December, 1865, containing a description of the printing and publishing establishment occupied by Harper & Brothers in Franklin Square, erected in 1854. The construction of this building, which was then supposed to be fire-proof, was so interesting, judged from our modern standpoints, and some features of the description thereof were so naively innocent of what we now call the principles of fire resistance, that the account would be of interest to any one who has followed the development of modern constructions. We quote:—

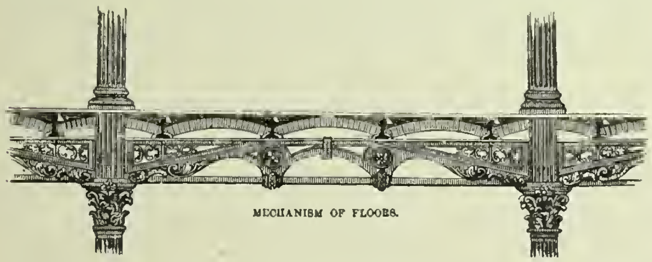
"Hitherto no fire-proof building had been built which contained more than a single story wholly available for any practical use. The floor of this main story was upheld by a series of arches and columns, filling almost all the space, and darkening what was not filled. There was no known means of making the flooring of the main story strong enough to support stories above without sacrificing a great portion of the space. For examples of fire-proof buildings before the iron age, one needs but to look at the building at the corner of Wall and Nassau Streets, once used for the Custom House and now used as the Sub-Treasury, and the old Merchants' Exchange, now the Custom House, on Wall Street. The architect of the former building gave up a third of the space to utterly useless porticoes, and in the latter case, besides giving up much space to the great portico, constructed the walls and windows in such a manner that nearly half of the rooms must be artificially lighted during a great part of the day.

"The whole interior structure of both buildings is supported upon a series of iron columns, rising from story to story. From column to column in each story extends a girder composed of a cast-iron arch and a *wrought*-iron tension-rod. This rod, about the size of a man's arm, is dovetailed at each end into the head of a column; the arch, of which it forms a part, can only be broken down by a weight at the top sufficient to pull this rod asunder. The iron which composes this arch is cast into shapes, which not only economize material by putting it just where wanted, but present an ornamental appearance.

"Across the top of these arches are placed a series of beams of rolled iron to support the floors. These beams, shaped much like the ⊥ rail of a railroad, lie four feet apart. The floors consist of a series of low brick arches turned from beam to beam. These are laid dry, grouted, and then filled up level with cement on the upper side, making a solid floor of brick and cement. Over this, for comfort, is laid a covering of wood, which is really only a carpet."

This was before the days of rolled I-beams. The structure still stands and has been in use for forty-four years; but if it were to be replaced by a modern building, it goes without saying that the whole construction would be fundamentally changed, and as we look at such things now in the light of experience of the past ten years, a building of this sort would not survive a fire more than three or four hours. One of the hardest fallacies to overcome with the early developers of fire-proof construction was the idea that iron of itself would resist heat, and the combination of wrought and cast iron which was used in this case for the girders is one which is peculiarly liable to give way under heat.

This instance also suggests a cycle of development. The Post. Office and the Sub-Treasury Building to which it invidiously refers



MECHANISM OF FLOORS.

were solid masonry constructions, guiltless of iron as a supporting factor. They can still fairly rank as fire-proof, and as architectural designs they are justly admired, even though not fully suited to modern commercial necessities. Iron, which in 1854 was just beginning to make its appearance, has passed through a whole gamut of development, until now we conceal it entirely and try to do without it, while in such structures as the Boston Public Library, which is probably as nearly absolutely fire-proof as any other type of construction, iron is as conspicuous by its absence as it is in the older New York buildings; which would seem to imply a return to a preference for masonry construction.

THE following sample of fire reporting is taken from the Associated Press dispatches of February 2, from Columbus, Ohio.

"A fire wall, 4 ft. thick, separated the fine block of Green, Joyce & Co., wholesale dry goods and notions, from the others, but this was no barrier, and at one o'clock this morning the fire had eaten its way through and was burning fiercely in the upper stories."

FULLY 90 per cent. of the fire-proof buildings constructed during the past twenty years have been built of porous terra-cotta, and whenever such material has been adequately used and properly set (and when we say adequately, we mean that every particle of metal should be protected thereby) it has indicated its thorough efficiency when called upon.

We advocate giving the manufacturer of hollow tile the privilege of setting his own material, grant him at the same time leeway to supply any petty deficiencies in the general fire-proofing which his experience teaches him is vital, and under these conditions you will secure a structure as thoroughly impervious to fire as the present appliances of science can furnish. — *Insurance Press.*

Mortar and Concrete and Mason's Department.

SOUNDNESS OF CEMENT.

BY IRA O. BAKER, MEMBER AMER. SOC. OF CIVIL ENGINEERS, PROFESSOR OF CIVIL ENGINEERING, UNIVERSITY OF ILLINOIS.

SOUNDNESS refers to the ability of a cement to retain its strength and form unimpaired for an indefinite period. Soundness is a most important element, since if a cement ultimately loses its strength it is worthless, and if it finally expands it becomes a destructive agent. A cement may be unsound because of the presence in it of some active elements which cause the mortar to expand or contract in setting, or the unsoundness may be due to exterior agencies which act upon the ingredients of the cement. Most unsound cements fail by swelling and cracking under the action of expansives, but sometimes the mortar fails by a gradual softening of the mass without a material change of form. A sound cement is both constant in volume and permanent in strength.

The presence of small quantities of free lime in the cement is a frequent cause of unsoundness. The lime slakes, and causes the mortar to swell and crack, and perhaps finally disintegrate. The degree of heat employed in the burning, and the fineness, modify the effect of the free lime. Lime burned at a high heat slakes more slowly than when burned at a low temperature, and is therefore more likely to be injurious. Finely ground lime slakes more quickly than coarsely ground, and hence with fine cement the lime may slake before the cement has set, and therefore do no harm. The lime in finely ground cements will air-slake sooner than that in coarsely ground.

Free magnesia in cement acts very much like free lime. The action of the magnesia is much slower than that of lime, and hence its presence is a more serious defect, since it is less likely to be detected before the cement is used. The effect of magnesia in cement is not thoroughly understood, but seems to vary with the composition of the cement, the degree of burning, and the amount of water used in mixing. It was formerly held that 1½ or 2 per cent. of magnesia in Portland cement was dangerous, but it is now known that 5 per cent. is not injurious, while 8 per cent. may produce expansion. Since many of the natural cements are made of magnesium limestone, they contain much more magnesia than Portland cements, but chemists are not agreed as to the manner in which the different constituents are combined, and consequently are not agreed either as to the amount or effect of free magnesia in such a cement. Fortunately, it is not necessary to resort to a chemical analysis to determine the amount of lime or magnesia present, for a cement which successfully stands the ordinary test for soundness for seven, or at most twenty-eight, days may be used with confidence.

The effect of lime and magnesia seems to be more serious in water than in air, and greater in sea water than in fresh water.

TESTS OF SOUNDNESS.

Several methods of testing soundness have been recommended. Of those mentioned below, the first two are called cold tests, since the mortar is tested at ordinary temperatures, and the remainder accelerated or hot tests.

The Pat Test. The ordinary method of testing soundness is to make small cakes or pats of neat mortar 3 or 4 ins. in diameter with thin edges, upon a sheet of glass, and examine from day to day for twenty-eight days (if possible), to see if they show any cracks or signs of distortion. The test is usually made with neat cement mortar. The amount of water used in mixing (see page 165, The Brickbuilder), within reasonable limits, seems to have no material effect on the result. The first evidence of bad quality is the loosening of the pat from the glass, which generally takes place, if at all, within one or two days. Good cement will remain firmly attached to the glass for two weeks at least. The cracks due to expansion occur usually at the edges of the pat, and radiate from the center. These cracks should not be confused with irregular hair-like shrinkage cracks, which appear over the entire surface when the pats are made too wet and dry out too much while setting.

The German standard specifications require the cake to be 1.5 centimeters (0.5 in.) thick at the center, to be kept twenty-four hours in a closed box or under a damp cloth, and then stored in water. The French, to make sure that the pats do not get dry before immersion, recommend that the cakes be immersed immediately after mixing, without waiting for the mortar to set. Some really sound natural cements will disintegrate if immersed before setting has begun.

Expansion Test. Various experiments test the soundness of cement by measuring the expansion of a bar of cement mortar. The French Commission recommend either the measurement of the expansion of a bar 32 ins. long by ½ in. square, or the measurement of the increase of circumference of a cylinder. The German standard tests require the measurement of the increase in length of a prism 4 ins. long by 2 ins. square. The apparatus for making these tests can be had in the market, and it is not wise to occupy space here with a description thereof. The tests require very delicate manipulation to secure reliable results.

Accelerated Tests. The ordinary tests, extending over a reasonable period, sometimes fail to detect unsoundness; and many efforts have been made to utilize heat to accelerate the action, with a view of determining from the effect of heat during a short time what would be the action in a longer period under normal conditions. Some of these tests have been fairly successful, but none have been extensively employed. It is difficult to interpret the tests, as the results vary with the per cent. of lime, magnesia, sulphates, etc., present, and with their proportions relative to each other and to the whole. There is a great diversity as to the value of accelerated tests.

Many natural cements which go all to pieces in the accelerated tests, particularly the boiling test, still stand well in actual service. This is a strong argument against drawing adverse conclusions from accelerated tests when applied to Portland cement.

The *warm-water test*, proposed by Mr. Faija,[1] a British authority, is made with a covered vessel partly full of water maintained at a temperature of 100. to 115 degs. Fahr., in the upper part of which the pat is placed until set. When the pat is set, it is placed in the water for twenty-four hours. If the cement remains firmly attached to the glass and shows no cracks, it is probably sound.

The *hot-water test*, proposed by Mr. Maclay,[2] an American authority, is substantially like Faija's test above, except that Maclay recommends 195 to 200 degs. Fahr.

The *boiling test*, suggested by Professor Tetmajer, the Swiss authority, consists in placing the mortar in cold water immediately after mixing, then gradually raising the temperature to boiling after about an hour, and boiling for three hours. The test specimen consists of a small ball of such a consistency that when flattened to half its diameter it neither cracks nor runs at the edges.

The *kiln test* consists of exposing a small cake of cement mortar, after it has set, to a temperature of 110 to 120 degs. C. (166 to 248 degs. Fahr.) in a drying oven until all the water is driven off. If no edge cracks appear, the cement is considered of constant volume.

The *flame test* is made by placing a ball of the cement paste, about 2 ins. in diameter, on a wire gauze and applying the flame of a Bunsen burner gradually, until at the end of an hour the temperature is about 90 degs. C. (194 degs. Fahr.). The heat is then increased until the lower part of the ball becomes red hot. The appearance of cracks probably indicates the presence of an expansive element.

The *chloride-of-lime test* is to mix the paste for the cakes with a solution of 40 grams of calcium chloride per liter of water, allow to set, immerse in the same solution for twenty-four hours, and then examine for checking and softening. The chloride of lime accelerates the hydration of the free lime. The chloride in the solution used in mixing causes the slaking before setting of only so much of the free lime as is not objectionable in the cement. The chloride of calcium has no effect upon free magnesia.

As before stated, there is a great diversity of opinion as to the value of accelerated tests for soundness; for example, one really competent expert will defend some particular accelerated test and condemn all others, while another equally competent authority will commend some other hot test and condemn all others. Probably each is correct for the limited field of his investigation. Owing to this state of affairs, it is not wise to discuss the subject further here. Fortunately, the pat test, as described above, when carefully conducted, is sufficient for most practical purposes.

[1] Trans. American Society of Civil Engineers, Vol. XVII., p. 223; also Vol. XXX., p. 57.

[2] Trans. American Society of Civil Engineers, Vol. XXVII., p. 412.

THE PRODUCTION OF PORTLAND CEMENT IN THE UNITED STATES IN 1897–98.

AN excerpt has been issued by the United States Geological Survey from the annual report of the director for 1897–98, Part V., Mineral Resources of the United States, giving the data for the production and consumption of hydraulic cement in this country in 1897, which contains some interesting figures in regard to the production of American Portland cement. In 1895 less than 1,000,000 barrels were made; in 1896 over 1,500,000 barrels was the output; while in 1897 this had risen to 2,677,775 barrels, an increase of 1,134,752 barrels over 1896, or nearly 74 per cent. The domestic production in 1896 was only 34.7 per cent. of our entire consumption, whereas in 1897 it had increased to 56.8 per cent. The increase in the production was, as in former years, largely in the Lehigh Valley region, where the product nearly doubled and amounted to 74.8 per cent. of the entire output of the country. New York produced 14.7 per cent., Ohio, 5.5 per cent., and all other sections, 5 per cent. These figures show that the increase in production outside of the Lehigh Valley has been very slow and has not kept pace with the consumption of Portland cement in those regions, this industry being still an insignificant one there. The Lehigh Valley is, therefore, the center of the Portland cement industry of the country and the increase in its production in seven years has been tenfold.

The imports of Portland cement decreased in 1897 nearly 900,000 barrels, from 2,989,597 to 2,090,924 barrels. The imports from Germany were 53 per cent. of the whole and decreased much less than those from other countries. The imports from Great Britain were less than one half of those made in 1896. English Portland cement has fallen into disrepute and is seldom met with except on the Pacific coast. Next to Germany, Belgium makes the largest exports of cement to us, but these have fallen off from 742,237 barrels in 1896 to 529,686 barrels in 1897. Other foreign countries made insignificant exports.

It is stated that during 1897 the increase in the domestic production of Portland cement has, for the first time, greatly exceeded the increase in consumption in this country, more than one half of our consumption being of American manufacture. This is due largely to the very high grade materials produced by American manufacturers, much of it having been found to show decidedly higher tests than the imported article. American Portland cements have also been superior in fineness of grinding, and Professor Newberry states that it is gratifying to find that an industry, so new to this country and one requiring so high a degree of technical knowledge, has already developed to a point beyond that which it has reached in Germany.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

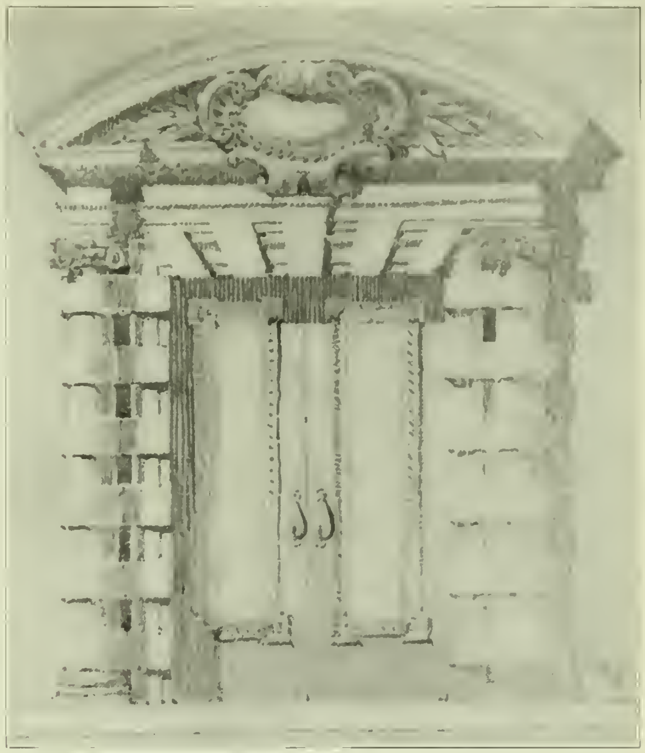
NEW YORK.— Having just completed the first year of our existence as "Greater New York," it is a fitting time to pause and consider whether we are in a better condition now that we are banded together under one charter. To begin with we have an increase of $330,000,000 in the assessed valuation of real estate in

TERRA-COTTA DETAIL FOR RESIDENCE AT BALTIMORE.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Wyatt & Nolting, Architects.

Manhattan and Bronx. Provision has been made for the issue of $35,000,000 of bonds, the margin for this increase of funded debt being created by the enormous advance in the assessed valuation, which in the whole city on real and personal property will be at least $500,000,000.

What is to be done with the $35,000,000 and more to be received for the new bonds? Is the vital pressing need of the people for adequate underground transit to be met? Not at all. A third of this vast sum is set aside for parks and several millions for bridges, which, of course, are necessary and will be a great benefit to the city, but the crying need of the metropolis now is swift and comfortable transit.

As the conditions are at present, it is much more comfortable and convenient to live in one of our many beautiful suburbs, even in the neighboring State of New Jersey, than in the city of New York. As the *Herald* puts it, "What a spectacle we present, with a set of rulers who are at once raising the salaries of office holders, piling new taxation on the people, heaping up funded indebtedness, and



DETAIL, FRONT ENTRANCE, RESIDENCE AT BALTIMORE, MD.
Wyatt & Nolting, Architects.
Elevation and plan shown in plate form.

deliberately standing in the way of the improvement most vitally needed for the comfort of the citizens who foot the bills!"

Property owners and real-estate dealers alike insist that the increased valuations will seriously affect the real-estate market. They will hurt property because the property while taxed very heavily cannot produce any more rent than is produced now, because, in their judgment, the rental limit in the Borough of Manhattan has been reached.

FAIENCE MANTEL FOR RESIDENCE AT ALBANY, N. Y.
Executed by the Atwood Faience Company.
Franklin H. Janes, Architect.

To give an idea of the enormous increase in the assessed valuations we cite here a few of the more important of our public buildings, showing their assessed valuation this year and last: —

	1898.	1899.
Bowling Green Building	$1,500,000	$2,500,000
Equitable Life Building	4,150,000	6,000,000
Mutual Life Building	2,200,000	3,500,000
New York Life Building	2,000,000	3,000,000
Waldorf-Astoria Hotel	3,550,000	5,500,000
Grand Central Station	2,500,000	3,500,000

Our only hope now is that there will be a rearrangement of taxation on a more equitable basis. Many properties are taxed too high in comparison with the rest of the city; many more are taxed too low. This is unquestionably the chief reason why there has been so little dealing in large properties in the heart of the city while at the same time there has been considerable of a boom in property in the outlying districts. The auction sales of lots have been particularly successful, in one case a large parcel of property having been closed off in two hours and for much higher prices than was anticipated. This, of course, is encouraging and will mean a season of activity among architects and builders whose work is in the line of dwellings and buildings of medium cost.

Among the most interesting projects now under consideration is a scheme to bring Cathedral Heights within easier access from down town by a viaduct connecting the crest of the hill with the 116th Street Station of the elevated railroad. This has already interested many property holders on the plateau and promises to take form in an application to the borough board of improvements in a few days.

HOTEL TOURAINE, BOSTON, MASS.
Fire-proofed by the Boston Fire-proofing Company; front brick furnished by the Sayre & Fisher Company.
Winslow & Wetherell, Architects.

It is an interesting sight to observe the clever way in which the burned and ruined front of the Home Life Building is being removed and replaced without disturbing the occupants.

We are glad to be able to report that our new Hall of Records is to be begun at once. Judging from the plans of the architect, Mr. J. R. Thomas, it will be a fine building and a credit to the city. We can only hope now that the old structure in use at present will not burn down before the completion of the new one, which will probably be about May 1, 1900.

The competition for the new building of the New York Yacht Club has been decided in favor of Messrs. Warren & Wetmore, a a firm of young architects hitherto unknown, whose design is in every way French.

Among the few items of important new work are : —

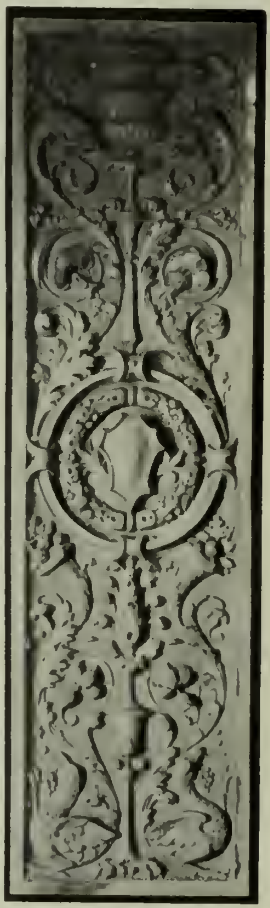
A new club house for the Union Republican Club is contemplated. It will cost $200,000 and will be erected on 164th Street, corner Third Avenue.

Hugo Smith, architect, has planned a $175,000 office and theater building to be erected on Broadway and Flushing Avenue, Brooklyn.

C. P. H. Gilbert, architect, has filed plans for a twelve-story fireproof office and storage warehouse to be erected on 125th Street near Park Avenue. It will be built of marble and light gray brick, and will cost $300,000.

It is reported that the People's Tabernacle is to erect a new building on 102d Street near Madison Avenue, to cost about $40,000.

CHICAGO. — A damage suit was recently tried in the Circuit Court here, which serves to call attention to a very bad and flimsy feature common to all local flat building construction. A tenant, who fell to the ground from the rear porch of a lower flat in this city, through the giving way of a defective or broken railing, brought suit against the parties who owned the building and was awarded damages in the sum of $800. The evidence showed that the porch and railing were all of wood, and put together in the most flimsy and slipshod manner, like hundreds of others in connection with buildings of the same class, the horizontal rails being merely butted against, and "toe-nailed" into, the end supports. Not long ago an elderly woman fell from the second floor of a similar porch through the giving way of the railing and was killed.

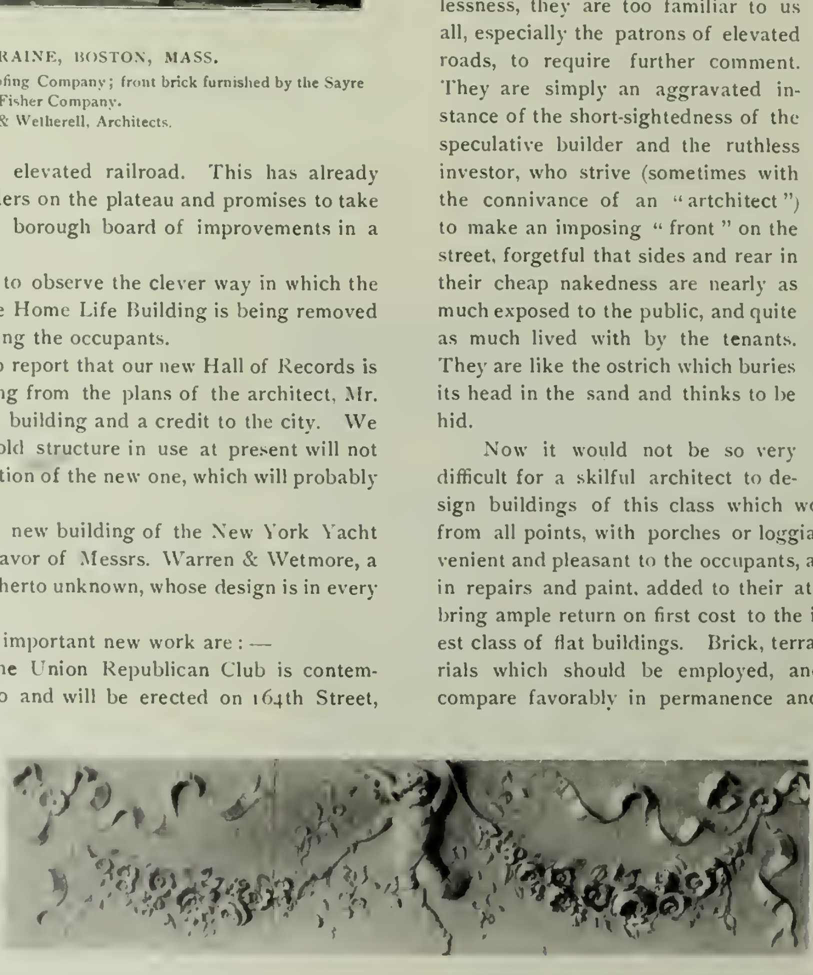


PANEL FOR AN APARTMENT HOUSE, NEW YORK CITY.
Executed in terra-cotta by the New Jersey Terra-Cotta Company
Kurtzer & Rohl, Architects.

So much for the dangerously flimsy nature of these eyesores, — these cheap makeshifts. As for their ugliness and poverty-stricken cheerlessness, they are too familiar to us all, especially the patrons of elevated roads, to require further comment. They are simply an aggravated instance of the short-sightedness of the speculative builder and the ruthless investor, who strive (sometimes with the connivance of an "artchitect") to make an imposing "front" on the street, forgetful that sides and rear in their cheap nakedness are nearly as much exposed to the public, and quite as much lived with by the tenants. They are like the ostrich which buries its head in the sand and thinks to be hid.

Now it would not be so very difficult for a skilful architect to design buildings of this class which would be agreeable to the eye from all points, with porches or loggias and stairs in the rear, convenient and pleasant to the occupants, and so durable that the saving in repairs and paint, added to their attractiveness to tenants, would bring ample return on first cost to the investor, even with the cheapest class of flat buildings. Brick, terra-cotta, and iron are the materials which should be employed, and the "rear porch" should compare favorably in permanence and careful treatment with the Italian loggia or cortile.

Fire has just destroyed the old building at the northwest corner of Madison Street and Wabash Avenue, which has been occupied for many years by the McClurg bookstore. Many priceless volumes and manuscripts were de-



EXECUTED IN TERRA-COTTA BY THE NORTHWESTERN TERRA-COTTA COMPANY.

stroyed. A modern fire-proof building will doubtless soon be erected on this, one of the best corners in the fashionable retail district.

It seems a certainty that Marshall Field will erect a bank and office building on the northeast corner of Clark and Adams Streets, and that D. H. Burnham & Co. will be the architects. The proposed cost, as stated, is in the neighborhood of $2,000,000. Present prospects, therefore, indicate that there will be a renewal of Chicago's normal activity in important down-town improvements during the approaching season.

Altogether, even the pessimists are becoming convinced that capitalists and investors have begun to weary of the wild speculative activity which has directly followed the return of prosperity, and are now ready to turn their attention to real estate and building as in days before the panic.

SEAL OVER ENTRANCE NEW YORK BOTANICAL MUSEUM, BRONX PARK.
Executed by the New York Architectural Terra-Cotta Company.
R. W. Gibson, Architect.

ST. LOUIS. — There is a feeling of expectancy in building circles, and some hopeful indications of improvement with the advancement of the season, which is doubtless stimulated by the prevailing low rate of interest and the amount of money seeking investment.

The chief center of interest lately has been Washington Avenue, where a number of large commercial buildings have been erected or are contemplated, among the most recent of which is a ten-story building on 10th Street. It is to be of fire-proof construction, and the contract was awarded, a few days ago, for $175,000, by the architect, Mr. Isaac Taylor.

No small interest centered in the recent competition for the decoration of the two assembly rooms in the new City Hall. Mr. W. W. Davis was the successful competitor, out of nine, the price being $10,000.

A movement to commemorate in 1903 the centennial anniversary of the Louisiana Purchase has been successfully launched, and an endeavor is to be made to eclipse all previous efforts at holding exhibitions. Should the scheme succeed, there will be much of interest to the architects and builders in due course of time, as there will doubtless be some unique problems to solve.

The local chapter of the American Institute of Architects is trying to induce the legislature to pass a bill licensing architects. The bill seems to have the hearty support of the Master Builders. The purpose of the bill, of course, is the "elevation of the profession," by requiring a standard of proficiency and preventing incompetent builders and draughtsmen from preparing plans for buildings. There is evidence of the necessity of some such protection for the sake of human life if nothing more. Only recently a building collapsed during construction, owing to overloaded column and girders, causing loss of life.

HOUSES, MELBURY ROAD, KENSINGTON, ENGLAND.
Wallace & Stevenson, Architects.

The mayor has promised to commence the new City Hospital this spring. The old building was destroyed some years ago by the cyclone, and since that time the city has been occupying old buildings illy suited to such purposes, and the necessity has arisen for some immediate action to relieve the situation.

ILLUSTRATED ADVERTISEMENTS.

EXCELSIOR TERRA-COTTA COMPANY, page iv, details of main entrance St. Raymond's Roman Catholic Church, West Chester, N. Y.: George H. Streeton, architect. The elevation is shown elsewhere in this number.

Conkling-Armstrong Terra-Cotta Company, page v, stock designs in terra-cotta, some of which were employed in houses illustrated in Plates 11 and 14.

Fiske, Homes & Co., page x, detail of molded brickwork, Plymouth Building, Minneapolis, Minn.: Frederick Kees, architect.

Ludowici Roofing Tile Company, page xxvi, Frances E. Willard School, Chicago, Ill.: Norman S. Patton, architect.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: Rockwell M. Milligan, Chemical Building, St. Louis, Mo.; Frank Elwood Brown, 61 Orange Street, New Haven, Conn.; Edgar B. Fox, 85 North High Street, Columbus, Ohio; James S. A. Mercer, 1300 Broadway, New York City.

CURRENT ITEMS OF INTEREST.

THE CLEVELAND WIRE SPRING COMPANY has recently closed contracts for over a million of their wall ties, for use in New York, Philadelphia, and Chicago.

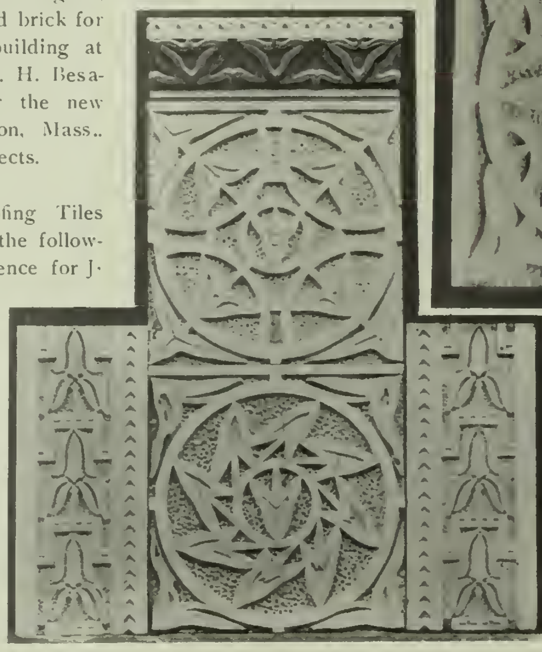
THE MOORE & WYMAN ELEVATOR AND MACHINE WORKS reports business as improving, they having received contracts for a number of passenger and freight elevators during the past month.

THE architectural terra-cotta used in the new Hoxie Building, Fort Worth, Texas, and the new high-school building at Lincoln, Ill., will be supplied by the St. Louis Terra-Cotta Company.

THE DAGUS CLAY MANUFACTURING COMPANY reports business as being good with them. They have recently made large shipments of brick to Philadelphia, New York City, and Pittsburgh.

The architectural terra-cotta for the new Sullivan Building at St. Louis, Isaac S. Taylor, architect; also for the fine new residence for Corwin H. Spencer, Esq., St. Louis, Barnett, Haynes & Barnett, architects, will be supplied by the Winkle Terra-Cotta Company.

The American Enameled Brick and Tile Company will furnish, through their Boston agent, J. W. Hahn, the enameled brick for a new primary school building at South Boston, Mass., W. H. Besarick, architect; also for the new Hecht Building, Boston, Mass., Weisbein & Jones, architects.



DETAIL FOR THE NEW LAW BUILDING, INDIANAPLIS, IND.
Executed in terra-cotta by the Indianapolis Terra-Cotta Company.
Louis H. Gibson, Architect.
Mr. Gibson chose for his motive, the arrow-shaped lily which grows in great abundance in the ponds of Indiana.

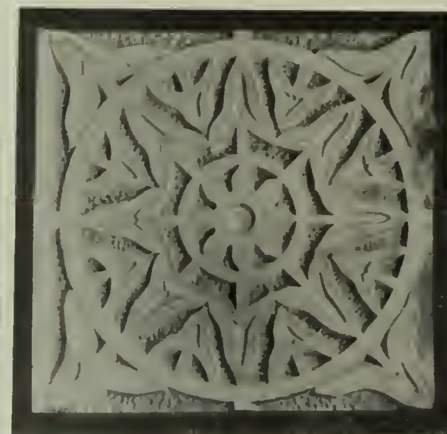
The Celadon Roofing Tiles have been specified on the following new buildings: residence for J. D. Sawyer, Esq., Stamford, Conn., Mrs. E. E. Holman, architect; residence for Nathaniel Witherill, Esq., Greenwich, Conn., N. C. Mellen, architect; residence for E. B. Harvey, Esq., Buffalo, N. Y., M. C. Miller, architect.

The Powhatan Clay Manufacturing Company reports the following new contracts: Cream-white brick for the new residence of W. H. Parrish, Esq., at Richmond, Va., Muhlenberg Bros., architects; silver-gray bricks for the Petersburg Savings and Insurance Company's new building at Petersburg, Va., Peebles & Sharpe, architects; front bricks for a new office building at Newport News, Va., H. W. Silsby, architect.

SHELTER HOUSE, PROSPECT PARK, BROOKLYN, N. Y.
Guastavino enameled tile ceiling.
McKim, Mead & White, Architects.

The White Brick and Terra-Cotta Company has closed new contracts as follows: Residence, New Rochelle, N. Y., for John G. Agar, Clinton & Russell, architects; residence, 105th Street and Riverside Drive, C. H. P. Gilbert, architect; apartments, 108th Street and Central Park, West, Angell & Higginson, architects; apartments, 103d Street and Boulevard, D. W. King, architect; laboratory, Northampton, Mass., Herts & Tallant, architects.

At the recent convention of the National Brick Manufacturers' Association, held at Columbus, Ohio, Chambers Bros. Company placed on exhibition a full-size automatic side-cutter, of their new design, which attracted a great deal of attention, and is a novelty in this class of mechanism. They also exhibited a working model of their automatic end-cut brickmaking machine, running the machine with the aid of an electric motor.



The American Enameled Brick and Tile Company is now prepared to fill orders in enameled brick made up on the old German standard size, the enameled bricks being 3 by 6 by 3. These bricks can be used most advantageously for kitchen hearth work, or for lining kitchens themselves. They have adopted this line because of having been requested by several architects to offer a brick of these dimensions.

H. H. Meier & Co.'s Puzzolan Cement is being supplied for brickwork at the following buildings by Waldo Brothers, agents: Hotel, Beacon Street, Boston, W. T. Sears, architect; Adams House, Boston, W. Whitney Lewis, architect; Back Bay Station, Boston, Shepley, Rutan & Coolidge, architects; Proctor Building, Boston, Winslow & Wetherell, architects; school, Groton, Mass., Peabody & Stearns, architects; house, Thompson, Conn., Shepley, Rutan & Coolidge, architects.

The fine new Union Station at Kansas City, Mo., designed by Van Brunt & Howe, has all stairs fully equipped with Mason Safety Tread. The new buildings of the Jefferson Medical College in Philadelphia, James Windrim, architect, and the new Hochelaga and Montmorency mills at Montreal, T. Pringle & Sons, engineers, are also provided with these treads, furnished by the American Mason Safety Tread Company, of Boston.

The Columbus Face Brick Company, of Columbus, Ohio, presents its card to the readers of The Brickbuilder in the advertising columns of this issue. This company is incorporated under the laws of Ohio, with a paid-up capital of $100,000, and is making a specialty of mottled brick in gold, bronze, and ivory shades. The plant is a perfect one from the most exacting brickmaker's standpoint and has at this time a capacity for making 7,500,000 per annum.

The property of the company contains within its own borders a wide variety of clays and several great veins of coal, so situated that both are transported by gravity from mine to machine.

The mottled brick is made from a natural composition which they have named the "Ironclay," and the effects produced are said to be quite unsurpassed for beauty of finish and perfect coloring.

Mr. J. P. Hazelton, the vice-president, a competent and experi-

PORCH, RESIDENCE, JAMAICA PLAIN, MASS.
Wheelwright & Haven, Architects.

enced brickmaker, is in charge of the plant, and Mr. David C. Meehan is the secretary and general manager.

The company is now engaged in providing a large stock for ready distribution, and will be prepared to meet all demands in ample time for the coming building season. Agencies are being established in the principal cities and correspondence is invited.

BRICKS FOR SEA WALLS.

IT is well known that many stones employed by the engineer for marine works decay rapidly from the action of boring mollusca. Plymouth and Portland breakwaters, amongst numerous other works, have frequently been cited in this connection. The reason stone is preferred to any other substance commonly employed for constructional purposes is because it is found in such large blocks, which give the sea more work to do in breaking them up than if the stones were simply of the size of bricks. At Portland the method is to feed the marine molluscs with odd blocks of Portland stone, which are tipped over the breakwater to the seaward side, and which thus afford protection to the main structure. Such stone is composed almost entirely of carbonate of lime, and the boring mollusca find no difficulty in dealing with it. It would be otherwise, however, if bricks were employed; and the enormous expense attending the feeding alluded to would be considerably minimized. We are not aware that *Saxicava*, *Lithodomus*, or *Pholas* has ever been able to get through a really good, substantial, heavy, and compact vitrified brick. In marine walls and the like these can be very readily laid in thin courses of hydraulic cement, and form quite as compact a wall as do many of the odd blocks and rubble so frequently thrown together with a plentiful cement between, which constitutes the average modern sea wall and esplanade. We go farther, and state that the use of superabundant cement, which must be employed when odd blocks of variable size are the chief substances in the wall, is a direct invitation to these deleterious molluscs. For though they may not be able, conveniently, to bore into the rubble stone, they can deal with the cement, unless this latter contains much carbonate of magnesia. In short, although bricks are already used to a large extent for sea walls, in our opinion they should still further supersede stone for that purpose. Where the hydraulic cement is of first-rate quality, the bricks are bound together quite as firmly into large blocks as when Nature does the work. Indeed, a good cement is, as a rule, much more durable in the atmosphere also than the cement binding together grains of sand to form sandstone, and oolitic spherules as in the formation of an oolite. Good, sound, heavy, vitrified bricks only could, of course, be permitted. — *British Brickbuilder.*

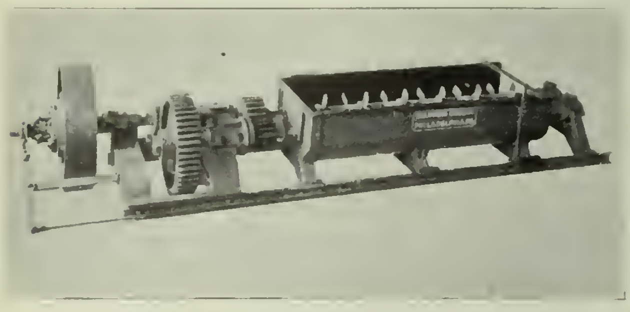
MEMPHIS, TENN. — Thanks to the strictest of quarantines and additional sanitary precautions, yellow fever has been kept out of Memphis during 1898, and the many projected improvements that were started in 1897, but postponed by the scare in the fall of that year, will be realities in 1899. A new City Hall and Union Depot are to be erected at an early date, which with the new Telephone Exchange will mean the expenditure of nearly

ST. RAYMOND'S ROMAN CATHOLIC CHURCH, WEST CHESTER, N. Y.
Terra-cotta work executed by the Excelsior Terra-Cotta Company.
George H. Streeton, Architect.

a million dollars for buildings public and private during the coming year.

Mississippi has finally laid hands on sufficient funds for her much-needed new capitol building to be erected at Jackson. Texas has enjoyed a phenomenal year of abundant crops and the outlook for building has never been brighter. The same can be said of Georgia, Arkansas, Alabama, and Louisiana, where colleges, schools, churches, and residences are beginning to spring up on every hand, and a most decided improvement is noticeable in the architectural handling of buildings of every class all over the South. Especially is this true in the employment of brick, terra-cotta, and stone where wood was formerly used.

THIS mill is shown with open top, but is so designed that the top may be covered, say one half or two thirds of the distance back



THE CHAMBERS NO. 6 DOUBLE SHAFT HORIZONTAL MIXING AND PUGGING MACHINE.

from the discharge end. It is a double-geared machine, with all bearings outside the tub and away from the material to be worked. It has two 5 in. diameter shafts, carrying forty-eight steel knives — twenty-four in each shaft — so secured that they can be set at any desired angle. The driving shaft is $2\frac{15}{16}$ ins. diameter and is fitted with friction clutch pulley, 36 ins. diameter by $8\frac{1}{2}$ ins. face, with starting lever located at a convenient position for the attendant. The whole machine is on a framework of steel channels, and all the driving gear is journaled in one solid casting. Width of frame, 3 ft.; length, exclusive of driving pulley, 13 ft. 6 ins. From bottom of frame to top of tub, 2 ft. Weight, unboxed, about 5,500 lbs.

W. P. GRATH, secretary and treasurer of the Illinois Supply and Construction Company, St. Louis, has invented a gas-producing, consuming, and coking furnace, which can be applied to brick kilns, boilers, annealing furnaces, etc. A public test of this furnace was recently held at the plant of the American Hydraulic Pressed Brick Company, for the benefit of a delegation of St. Louis brickmakers. The results were extremely gratifying and even more successful than Mr. Grath had claimed they would be.

In this furnace nothing but the cheapest grade of slack coal is used, from which the gases are first extracted and consumed, leaving a mass of red-hot coke, which is then shoved over on the grates and burned. The incandescent heat from this coke ignites and burns the gases from the fresh supply of slack, which is then put on the gas or coking tables. Sixteen of these furnaces were used to a kiln. After the fires in these furnaces were once thoroughly ignited, no black smoke whatever came out of the stack, showing that the gases generated were consumed and the combustion perfect.

These furnaces are now for sale in connection with the Grath Patent Down Draft Brick Kiln (invented 1895).

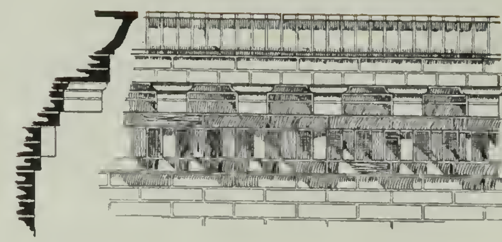
The American Hydraulic Pressed Brick Company have six of these Grath Patent Kilns at their plant at Collinsville, Ill., and state that they have given the best of results in burning pressed brick. In burning red pressed brick these kilns burn a clear No. 10 shade on top, and a No. 3 and No. 4 shade on the floor: the burning is also uniform from side to side, and front to back. The results are even more remarkable in burning colored bricks: buff, gray, etc. From a kiln of gray brick just burned, 99 per cent. were sent directly to the building for first-quality face brick.

One concern, the Hunter Brick Works, Thurber, Texas, who have eight of these kilns, say that provided the brick are properly made in the first place, every one of them comes out of the kiln good enough to deliver as first-class front brick.

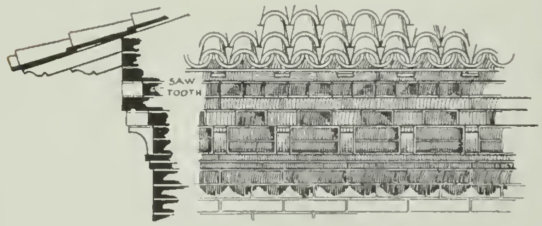
Parties interested in burning brick should write to the Illinois Supply and Construction Company, St. Louis, Mo., for information regarding this kiln and coking furnace.

·DETAILS·OF·ITALIAN·BRICKWORK·
·MEASVRED·AND·DRAWN·BY·WILL·S·ALDRICH·

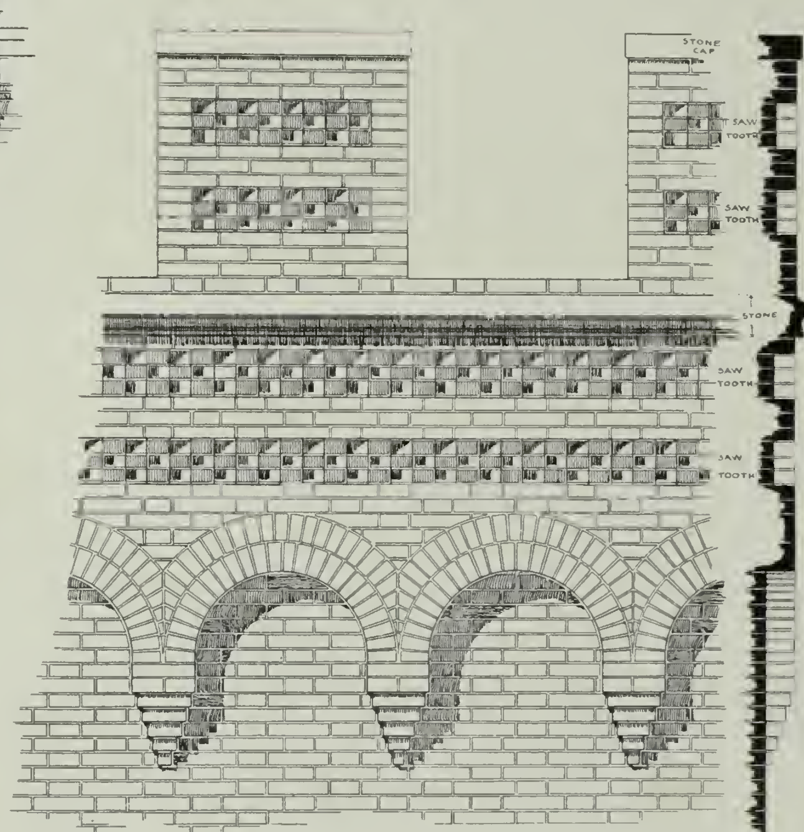
·CORNICES·



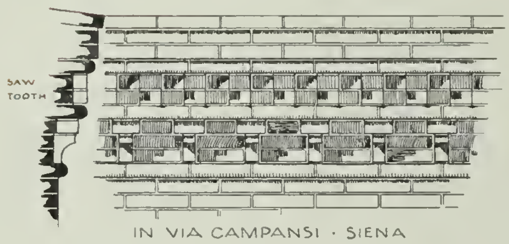
IN VIA CAVOVR · SIENA ·



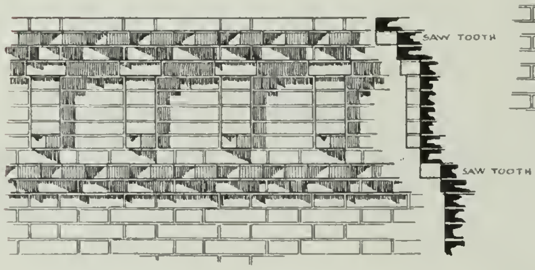
· SIENA ·



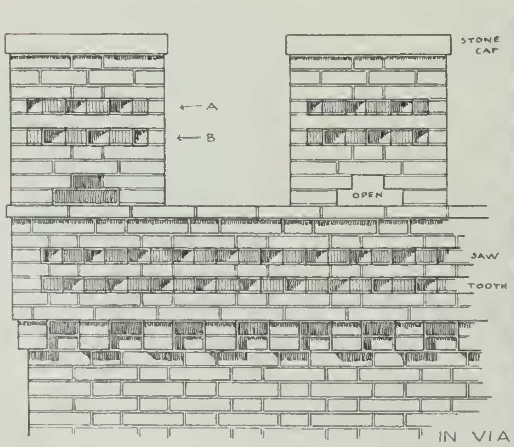
CORNICE OF THE MONTE DI PASCHI · SIENA

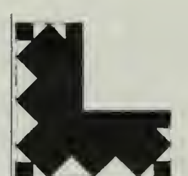


IN VIA CAMPANSI · SIENA

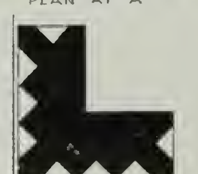


WALL CORNICE · SIENA ·



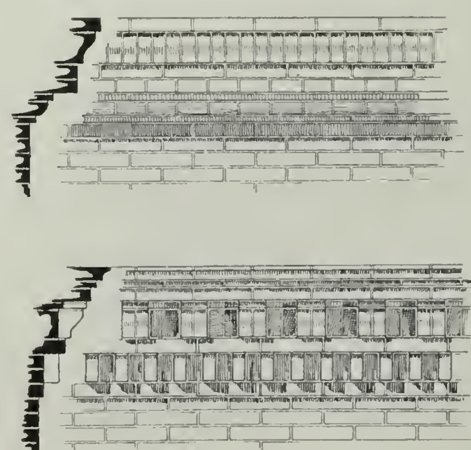


PLAN AT "A"

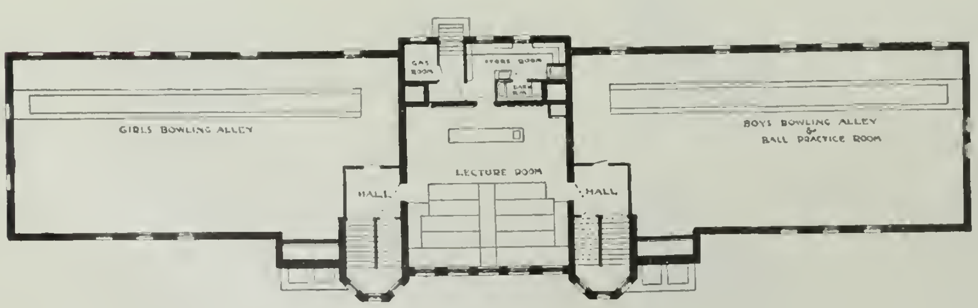


PLAN AT "B"

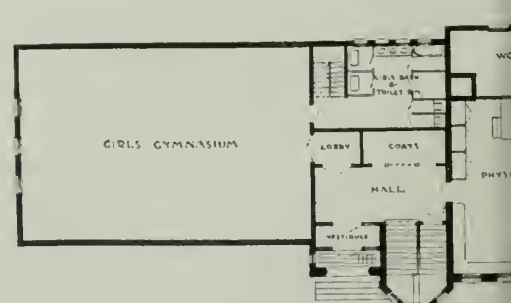
IN VIA CAMPANSI · SIF·



TWO SIMPLE CORNICES FROM S·SPIRITO · SIENA



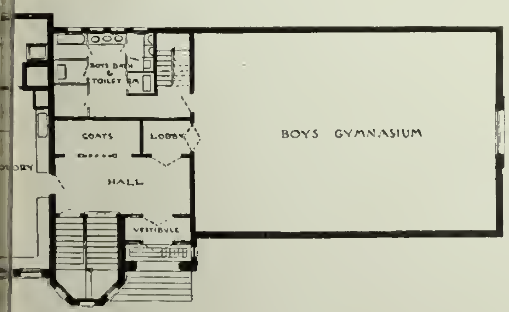
BASEMENT.



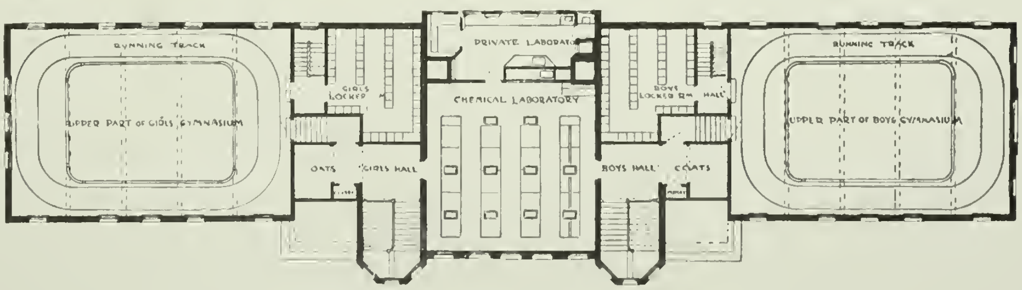
FIR

LABORATORY AND GYMNASIUM BUILDIN

HARTWELL, RICHAR



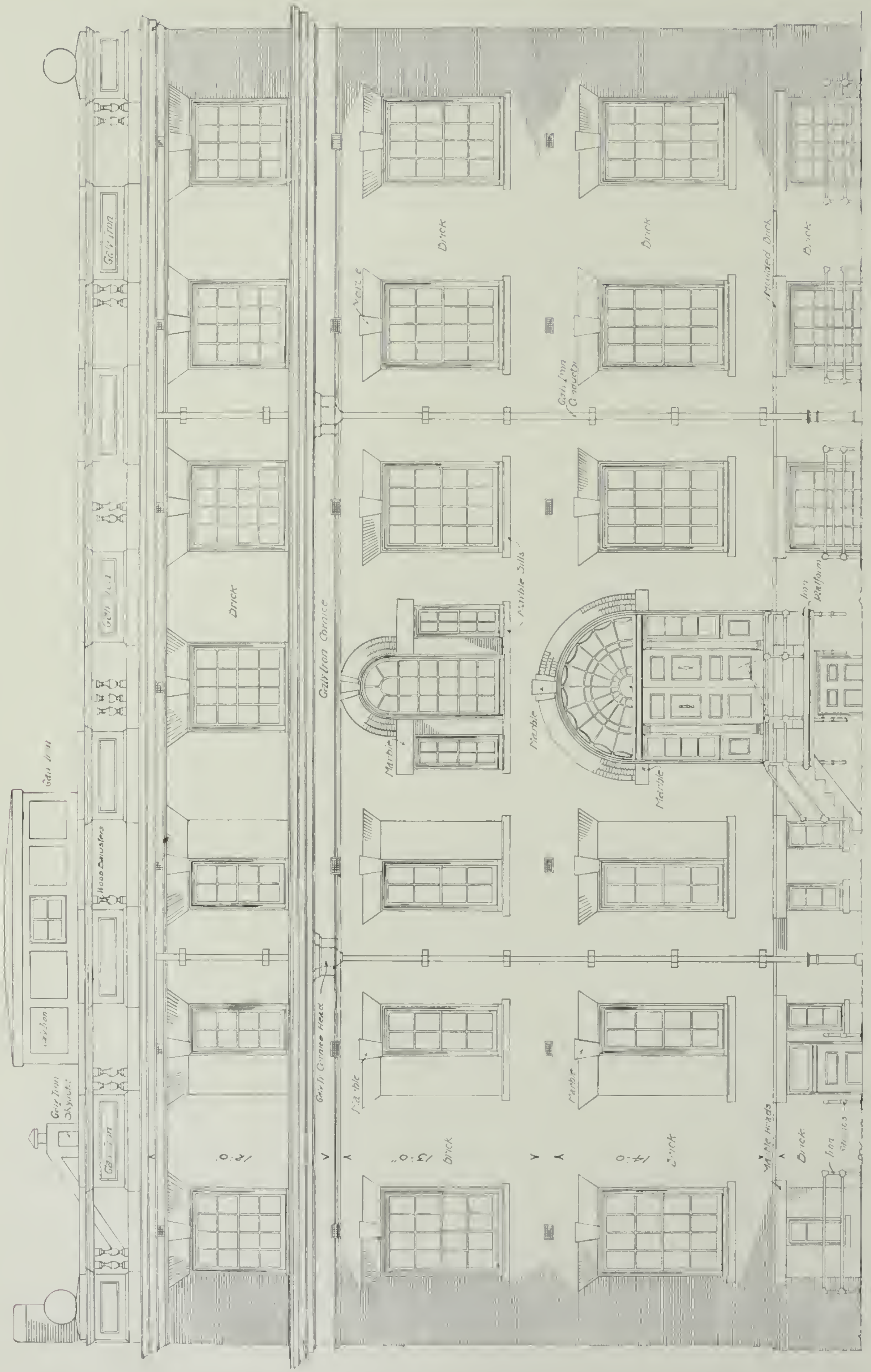
R.



Second Floor.

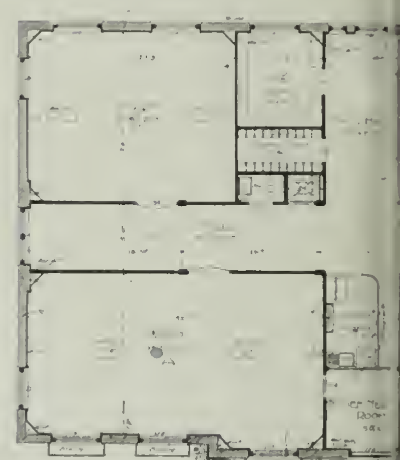
ACADEMY AT SOUTH BRAINTREE, MASS.

DRIVER, Architects

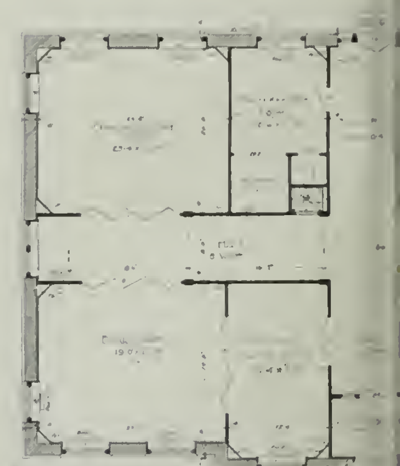


REAR ELEVATION.

THIRD F

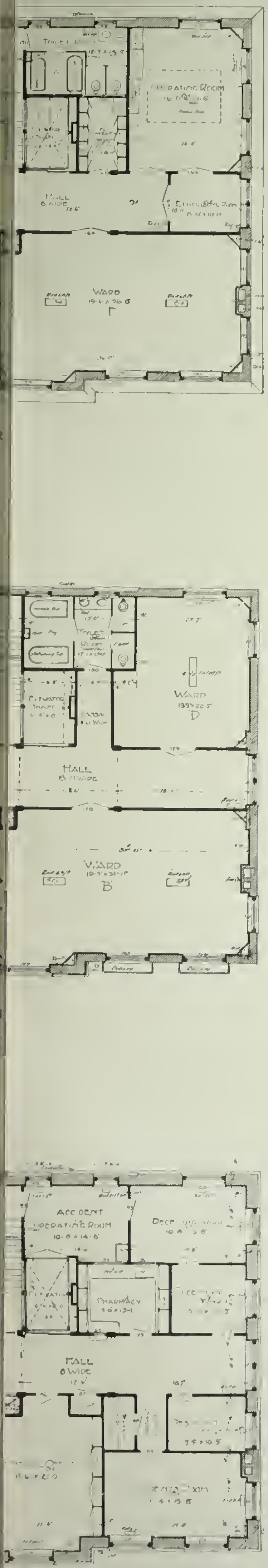


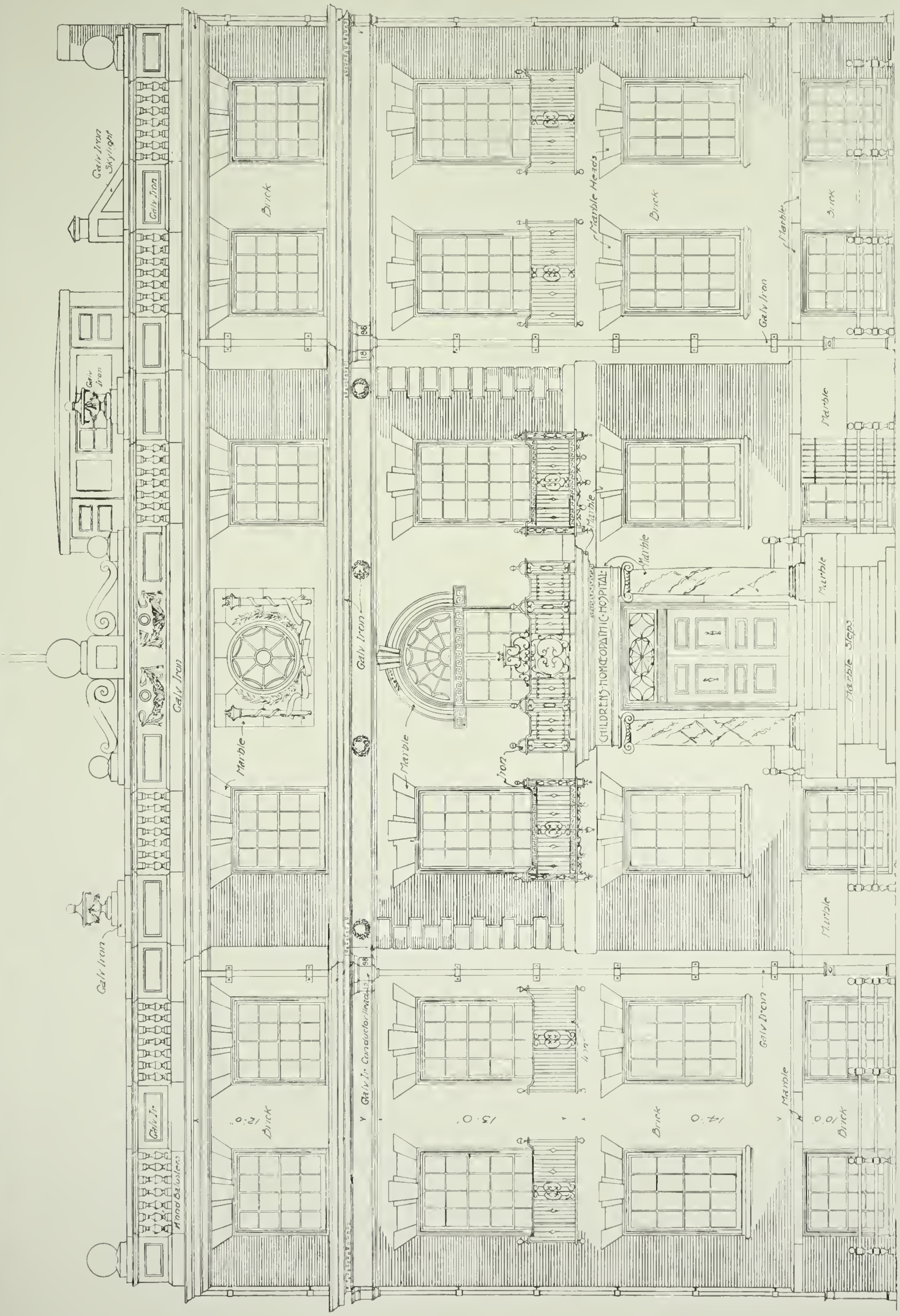
SECOND F



FIRST F

PLATES 19 and 22.



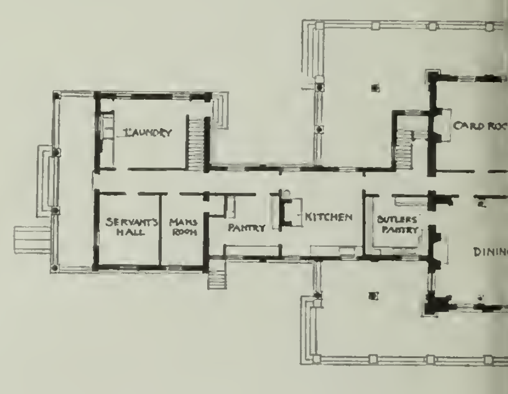


FRONT ELEVATION.

ADMINISTRATION BUILDING OF THE CHILDREN'S HOMEOPATHIC HOSPITAL, PHILADELPHIA, PA.

KEEN & MEAD, ARCHITECTS.

NORTH



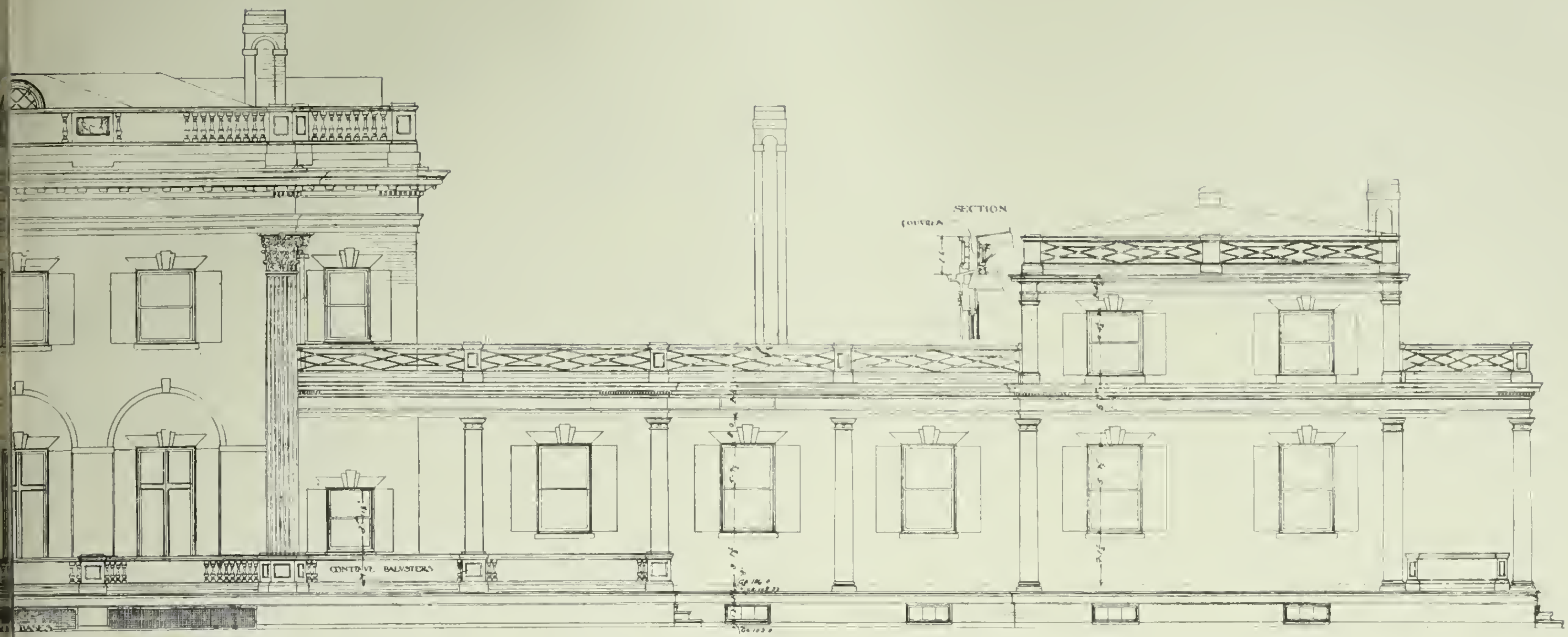
FIRST F

SOUTH E

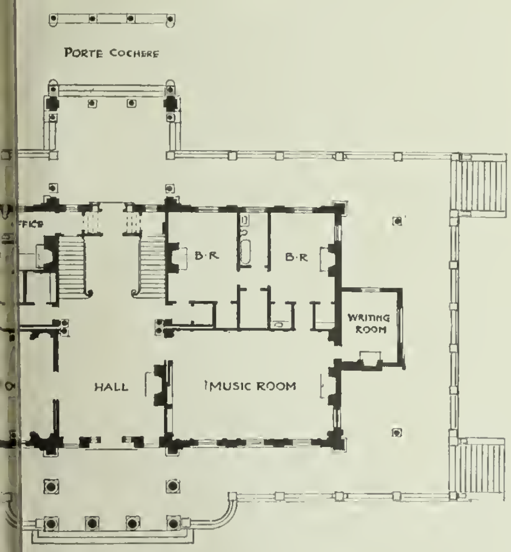
HOUSE AT THOMPSON. CONN., FOR NOR

SHEPLEY, RUTAN & CO

PLATES 20 and 21.



TION.

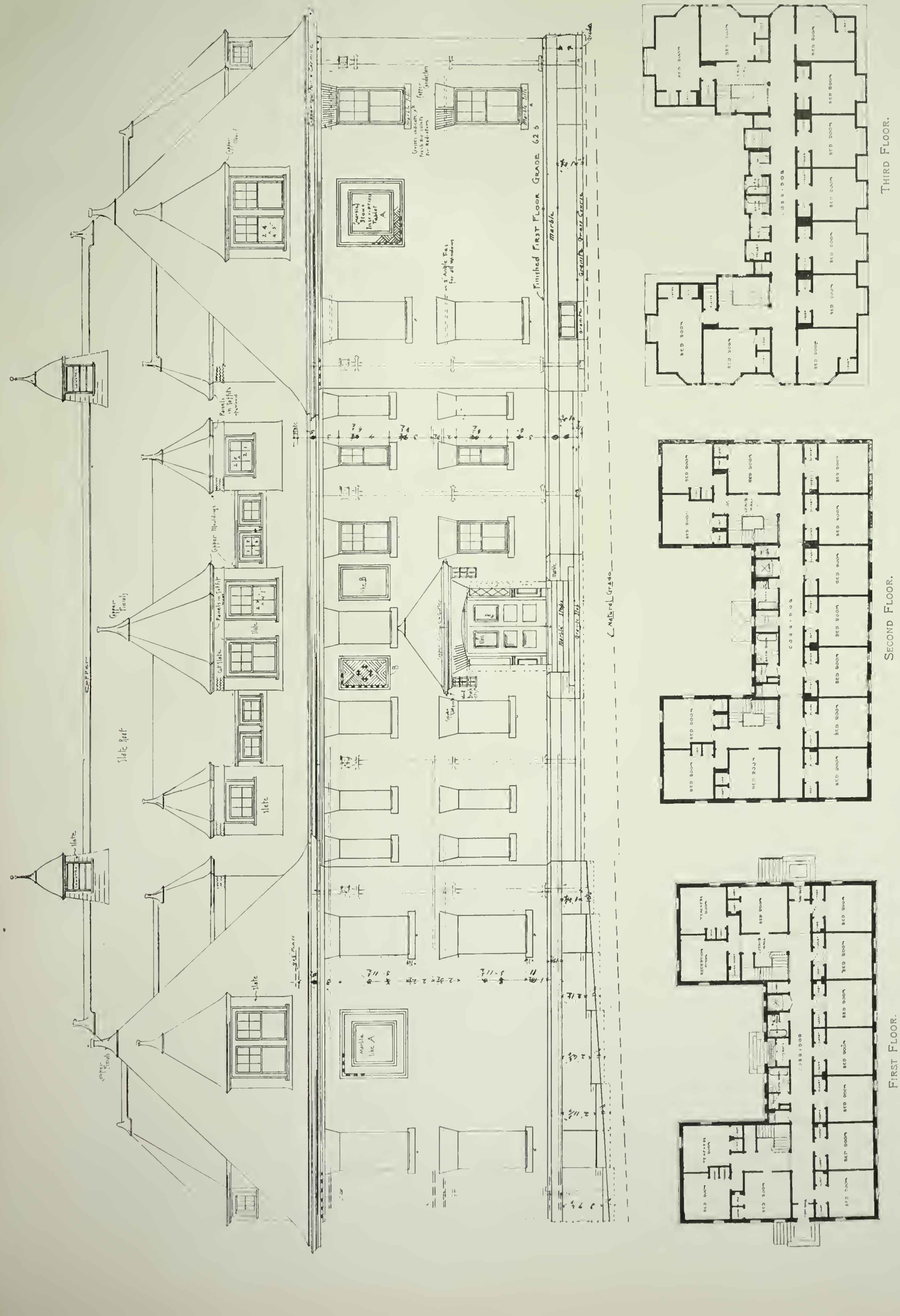


PLAN.

TION.

N B. REAN, ESQ., OF CHICAGO, ILL.

DGE, ARCHITECTS.



DORMITORY BUILDING, STATE NORMAL SCHOOL, BRIDGEWATER, MASS.
HARTWELL, RICHARDSON & DRIVER, ARCHITECTS.

VOLVME VIII MARCH 1899 No. 3

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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CUSHING BUILDING, 85 WATER STREET, BOSTON.

P. O. BOX 3282.

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THE WINDSOR HOTEL FIRE.

WE seem to be having more than our share of experience this year. The fire in the Windsor Hotel, New York, is one of those regrettable features of modern civilization for which it is hard to find any excuse. There is no good reason why structures of that sort should be tolerated at all in any community. It requires no special constructive knowledge to appreciate that the hotel was a mere fire-trap, and that it would go like a flash if fire once got started. The various stories which have appeared in the papers hinting at a possible incendiary origin are by no means necessary to satisfactorily account for the origin of so destructive a conflagration. The building itself was all ripe for ruin, and the conditions have been exactly the same for years. The so-called fire precautions in the way of standpipes or sprinkler service when installed in a structure of that character would be of doubtful efficiency in saving the building or in preventing loss of life. We had occasion a short time since to examine a hotel which was in process of demolition, after having been occupied for a period of sixty or seventy years. During that time the floors had probably never been wet down, and we found the beams and the interior woodwork generally in such a highly inflammable condition that it would not have needed the efforts of an incendiary to set the whole ablaze in a twinkling. The wooden floor beams of the Windsor were undoubtedly in the same condition, and once the fire got in between the timbers there was no hope for the structure, while with the antiquated arrangements of stairs, fire escapes, and the absurdly inadequate dependence upon ropes for means of fire escape, the fate of a good many of the tenants was a foregone conclusion.

A catastrophe of this description sets every one to thinking, especially every one who lives in or even casually occupies a hotel. Whether this suggested thought will crystallize into any action tending to lessen the liability of such danger for the future is a conundrum which will probably have to be answered in the negative. Vested interests are hard to molest, and when one thinks of the number of hotels built on exactly the same principle as the Windsor and every bit as dangerous in case of fire, and how utterly impracticable it is to make these hotels over as they ought to be made, one can easily appreciate that we are likely to have repetitions of exactly the same horror. The danger to be guarded against is not from hotels which may be built in the future, — that is locking the stable door after the horse has been stolen. There is no question about what constitutes good construction nowadays. We may not be able to build a hotel which is absolutely fire-proof, but we certainly can build a structure wherein nothing but the contents can be consumed, and wherein the fire can be localized so effectually that the danger to life if not to property is very slight. Our laws relating to new structures are in thoroughly good shape, and the danger from future hotels or from hotels which have been built within the last few years is not to be feared. It is from the old hotels, which cannot be reached by existing laws, which grow worse every year, and in which the chances of carelessness resulting in disaster are yearly becoming larger, that we are to apprehend the most serious danger. There have been at times spasmodic attempts to remedy this manifest incongruity of our modern civilization. The city of Boston some years ago had a very admirable law to the effect that whenever any existing hotel building was added to or altered the whole structure, including both old and new, should be made thoroughly fire-proof. This was a practical prohibition of adding to or alteration of existing hotels, which was precisely what was intended by the law, the evident hope being that by discouraging alterations to old buildings the owners would be encouraged to tear them down entirely and build new. The property interests, however, were too great and the law was repealed. So far as we know, the provision was never applied to any hotel, and as a result thereof we have to-day in this city one hotel in which a fire would result in far greater catastrophe than was the case in the Windsor, a hotel which would go like a flash, and in which the occupants, even in broad daylight and with no confusion, are not always sure of finding their way out straight. Besides this, there are other hotels of less note which would undoubtedly be totally destroyed by a chance fire. Indeed, so far as we know, there is only one of the down-town transient hotels in this city which can fairly be called fire-proof. Nor is the condition in any of our large cities very much better. We trust to luck and the insurance company instead of compelling our property owners to build in such manner that a building cannot be entirely destroyed, and then when a fire like the Windsor occurs we can only shudder and regret.

In this connection we want to call attention to the absurdity of some of the building laws which make the height of a building a measure of the degree to which it should be fire-proofed. Just as though a four-story building could not burn down as easily as a fourteen! As a matter of fact the Windsor was not a very high building, as high buildings go nowadays, and yet in several of our cities fire-proof construction is not mandatory for constructions of this sort if kept below a certain limit of height. We believe the time is coming when a wise public policy will demand that not merely hotels or apartments houses, but structures of every sort in the heart of a large city, shall be constructed on the principles of so-called fire-proof construction; when good brick and good terra-cotta will be depended upon rather than insurance policies and hazards of fate; and when the rights of all will be considered rather than the rights of the few who have inherited estates covered with inflammable structures.

PERSONAL, CLUB, AND SUNDRY NEWS ITEMS.

M. R. BURROWES, architect, has opened an office at Sarnia, Ontario.

W. G. ECKLES, architect, has opened an office in the Citizens' Bank Block, New Castle, Pa.

KURT W. PEUCKERT, architect, Philadelphia, has removed his office to 259 South 4th Street.

ARTHUR PEABODY and William Jean Beauley, architects, have formed a copartnership, with offices at 1649-50-51 Monadnock Building, Chicago.

LOUIS MULLGARDT and J. Morrison Dunham, architects, St. Louis, Mo., have formed a copartnership, under firm name of Mullgardt & Dunham, offices 415 Commercial Building, St. Louis, Mo.

"MUNICIPAL RECONSTRUCTION," a lecture illustrated by lantern slides from original drawings and photographs, was delivered before the Civic Club, of Philadelphia, on Saturday, March 4, by Mr. Albert Kelsey.

THE Brooklyn chapter of the American Institute of Architects, on the evening of March 15, gave a luncheon and press view of its forthcoming architectural exhibition, which is to be held at the Brooklyn Museum of Arts and Sciences.

AT the regular monthly meeting of the T Square Club, held on February 15, the subject for competition was a gentleman's stable for a country place. Before the criticism began, Mr. Wm. M. Baily, of Baily & Truscott, gave an illustrated lecture upon the subject.

The result of competition was as follows: First mention, Wetherill P. Trout; second, B. Edward Hill; third, Alfred Morten Githens.

THE 523d regular meeting of the Society of Arts was held at the Massachusetts Institute of Technology, on Thursday, March 9. Mr. Theodore H. Skinner, S. B., '92, superintendent of construction at the University of Virginia, for McKim, Mead & White, presented a paper on "The Construction of the University of Virginia, Old and New." Views of the original plans made by Thomas Jefferson, with the buildings as formerly constructed and now rebuilt and extended, were shown on the curtain, and a full description given of the unusual structural problems involved.

THE interesting events of recent date at the Chicago Architectural Club are as follows: Monday evening, February 20, Mr. J. H. Vanderpoel addressed the club on "Reminiscences of a Trip Through Holland." Monday evening, February 27, a comedy by Mr. E. C. Hemmings, a member of the club, entitled "The New Draughtsman," was given. Monday evening, March 6, Mr. Frank L. Wright addressed the club on the "Practical Nature of the Artistic." Monday evening, March 13, Mr. James R. Willett addressed the club on "Heating and Ventilation." Monday evening, March 20, Mr. John K. Allen addressed the club on "A Trip Through Norway."

THE regular dinner and meeting of the Society of Beaux-Arts Architects was held on February 20, at Flouret's, 18th Street and Fifth Avenue, and was exceptionally well attended, forty members and guests being present, including several from Boston and Philadelphia.

Under the head of new business Mr. Charles Morris introduced the following resolutions: —

Whereas, The Society of Beaux-Arts Architects fully appreciates Secretary Gage's public-spirited enforcement and wise application of the Tarsney Act, and the splendid results which are now being obtained under the same by Mr. James Knox Taylor, Supervising Architect of the Treasury, in his endeavor to elevate the standard of artistic merit of the United States Government buildings;

Resolved, That in the judgment of this society it is much to be desired that the rules of competitions established by the Supervising Architect's office, especially for important buildings, such as the proposed New York Custom House, should be instituted so as to permit of the participation in those competitions by the largest possible number of competitors, as was the case under conditions generally regarded as most satisfactory in the competition for the New York Public Library;

Resolved, That the Society of Beaux-Arts Architects hereby petition the Supervising Architect, and through him the Secretary of the Treasury, to modify the rules governing competitions for United States Government buildings in such a manner as to permit of the accomplishment of the above object.

THE Boston Architectural Club will conduct an architectural exhibition at the St. Botolph Club, 2 Newbury Street, Boston, from May 15 to May 27, 1899, inclusive. Contributions not previously exhibited in Boston are requested. Drawings, models, and photographs of architectural and landscape design, drawings, models, photographs, and examples of executed work in mural decorations, mosaic, stained glass, interior decoration and furniture, wood and stone carving, metal work, and the applied arts generally will be received, subject to the approval of the jury of admission. The committee are especially desirous of exhibiting photographs of executed work accompanied by plans.

Drawings should be marked "For the B. A. C. Exhibition," and sent either to the Boston Architectural Club, 5 Tremont Place, Boston, Mass., or to the agents in New York or Philadelphia, on or before the date of collection in these cities. Drawings from the League Exhibition which go on to Chicago or St. Louis will, subject to the consent of the exhibitors, be forwarded to Boston and returned from there without expense to exhibitors, or can be sent direct from League Exhibition.

Collections will be made in Boston on Friday, April 28; in New York, by Messrs. W. S. Budworth & Son, agents, 424 West 52d Street, on Wednesday, April 26; in Philadelphia, by Messrs. James S. Earle & Sons, 816 Chestnut Street, on Tuesday, April 25.

Contributions must be received on or before May 1, 1899.

Each work must bear a label giving its title, the name and address of the exhibitor, and explicit directions for its return.

All drawings and photographs must be framed.

Entry blanks properly filled out must be sent on or before May 1, 1899, to the Exhibition Committee of the Boston Architectural Club, 19 Exchange Place, Boston, Mass.

Special Exhibition Committee: George E. Barton, chairman; R. Clipston Sturgis, Irving T. Guild, Albert Chapman Fernald, and J. Randolph Coolidge, Jr., of the Boston Society of Architects; Richard Howland Hunt, of New York; Wilson Eyre, Jr., of Philadelphia.

The American Schoolhouse. XVI.

BY EDMUND M. WHEELWRIGHT.

THE writer would say that when he has criticized the lighting of class rooms 28 ft. wide with windows upon one side only, that such criticism can be made concerning every schoolhouse which he has designed. The responsibility for this particular defect in American schoolhouse construction does not rest with the architects. It is the result of conditions imposed by school boards.

In the last month's consideration of the Newark High School the writer spoke of the class rooms of that building, all of which were lighted from one side only, as "apparently 28 ft. wide," and stated that with such width these rooms could not be adequately lighted. The plan of this building, which was before the writer, was a reproduction of a drawing upon which the sizes of rooms were not given, and assuming that the rooms were 32 ft. long, it appeared that the width was 28 ft.

The architects of the building write that these rooms are but 23 ft. wide, and the writer is glad to correct his error and to commend this notable step towards the scientific lighting of schoolrooms.

PUBLIC SCHOOL NO. 153, NEW YORK CITY.
C. B. J. Snyder, Architect.

The writer was again misled by the reproduction of the plan in regard to the out-door clothing disposal adopted in the Newark school. Certain lines which appeared to be in the reproduction representative of partitions, he now sees are the letters "cloak room," and in addition to the large cloak rooms provided in the basement there is adjoining each class room a "wardrobe," provided with two doors from the class room, but with no door to the corridor. Each of these wardrobes has outside light.

The writer prefers for the out-door clothing disposal in high school individual lockers in large rooms of the basement, but he recognizes the arrangement shown in the Newark school as preferable to the grammar school wardrobe so often found in high schools, a feature which is designed to meet the requirements of discipline of a graded school, and which is not nicely adapted to the requirements of a high school.

Until within the past few years the public schoolhouses of New York City have offered few, if any, worthy examples of such buildings; but within a comparatively short time this condition has been changed to a marked degree. Under the present superintendent of school buildings of New York, radical and interesting innovations in schoolhouse architecture have appeared in that city. These may be briefly described by the following quotations from a letter of Mr. C. B. J. Snyder, the architect of these buildings: —

It must be admitted that the conditions which we have to confront here in New York are entirely different from those presented by any other city in this or any other country. The density of population and the number of children coming from the blocks and acres of five-story, four-family tenements in various parts of the city is simply appalling. School buildings accommodating 2,500 children are numerous in the lower East Side, but new ones are being erected all the time, and yet there is a demand for further accommodations. That this population is somewhat cosmopolitan can be judged from the fact that frequently twenty and more languages and dialects have been represented in one class of the lowest grade, 50 per cent. of which could not speak a word of English beyond the words "yes" or "all right," "no" being usually a scowl and shrug or a scream.

These conditions, which are without parallel, beget large buildings, especially since it has not been unusual to expend $250,000 to $300,000 for a plot of ground, of say 20,000 sq. ft., secured not by purchase, but through condemnation proceedings, conducted by commissioners appointed by the Supreme Court. Such large cost, as well as the limited area of the block fronts, precludes the possibility of allowing one inch of ground area to go to waste; indeed, it is almost the same problem as an office building where the fronts must be placed on the building line and land being only reserved at the rear to insure light. Even this at times has been most difficult where the plots are only 100 ft. deep, while the building of necessity must occupy 62 to 65 ft. of this depth.

PUBLIC SCHOOL NO. 20, NEW YORK CITY.
C. B. J. Snyder, Architect.

That such districts are not slighted in the kind of buildings can be seen by the cut of Public School No. 20. All buildings now being erected, one story or more in height, are of fire-proof construction. Those of four stories and more are of the steel "skeleton" type used in office building and other work, the adoption of the system being due to the building laws, which exact certain thicknesses of wall over and above a specified amount for every 10 per cent. or fraction thereof in which the openings in a bearing wall exceed 25 per cent. of its area.

As our window frames are usually 10 ft. 6 ins., or 11 ft. by

16 ft., or 17 ft. 6 ins., our walls would be 36 ins. or so in thickness in the first story, instead of the 16 ins. permissible under the steel "skeleton" type of construction. I believe that a schoolroom should be lighted from one single source of light stretching as nearly as may be from the rear to within 4 ft. or so of the front of the room at the left side of the pupils, and not by a series of windows alternating with brick or stone piers, which means light and shadow for each alternate 4 or 5 ft., hence cross lights.

Your published work would not indicate that we are agreed on this point, but I trust you will kindly admit of an honest difference of opinion, as it occurs to me that you have not had to meet such hard conditions as we have in striving to properly light a room from one side only, it not being possible to have corner rooms but in a few instances.

Photographs are sent of Public School No. 165, the first-story plan showing indoor play room and outside play courts, and second story plan, which shows the typical arrangement and design of all buildings of this type. Girls' high school, plans and perspective of which are sent, is also of this type of schoolhouse plan.

This H type of building has been designed to meet the needs when avenue property is expensive and the traffic so great, either by trolley, elevated, or otherwise, as to render it practically impossible to open the windows at any time, and in fact to hear with the windows closed.

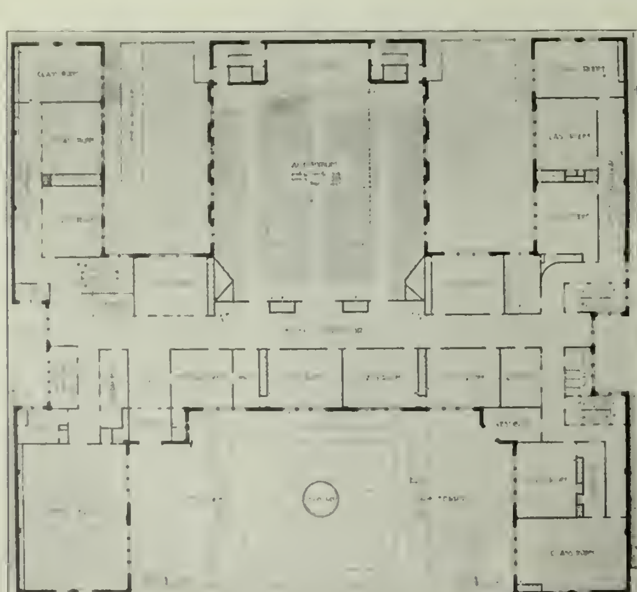
It must be borne in mind that all our blocks are about 200 ft. in depth from street to street and about 600 ft. between the avenues. Ground being costly and there being often stables, horseshoe shops, factories, etc., in the near neighborhood, the plan provides for a blank wall on the party line, excepting a slight recess at the center of the block, which is seldom built across by the adjoining owners. All noise and nuisance are cut off, while good clean available spaces are provided by the courts fronting on the streets, which have also an evident advantage of improved light and air. The height of our class rooms is 14 ft. 3½ ins. in the clear. The tops of the windows are within 6½ ins. of the ceiling.

In each of these buildings, the cellar, which is below grade, is given over entirely to the heating and ventilating apparatus, for as we must build on our party lines, we must, in order to protect ourselves, excavate and carry our walls to a depth of at least 11 ft. below curb, and as the sentiment here is opposed to basement play rooms, even one step below grade, we are obliged in most cases to give over the entire first story for an indoor play room, which is paved with asphalt and wainscoted with glazed brick 5 ft. 6 ins. high, and lighted so as to be used for evening lectures, for which portable seatings are provided. Occasionally a quiet corner of the first floor is set aside for a kindergarten. The second, third, and fourth stories are divided into class rooms, six or eight of which are arranged by means of sliding doors as to admit of their being used as an assembly room, as is shown in second-floor plan of Public School No. 165.

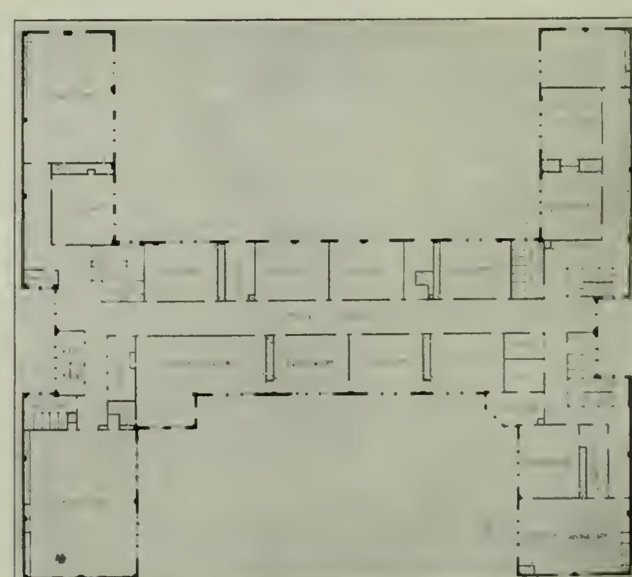
This we are obliged to do, as property is so expensive we cannot afford to form an assembly room which cannot be used for any other purpose.

The fifth story is given over to manual and physical training, cooking room, and a gymnasium. In each of the examples here cited, the high-pitched roofs are utilized for obtaining head room for the gymnasiums and other rooms, the space above being devoted to the necessary vent flues. The fifth stories also afford accommodations for clay model-

GIRLS' HIGH SCHOOL, 58TH STREET AND 10TH AVENUE, NEW YORK CITY.
C. B. J. Snyder, Architect.



FIRST FLOOR PLAN.



THIRD FLOOR PLAN.

GIRLS' HIGH SCHOOL, NEW YORK CITY.

ing, sewing rooms, and a large library. Toilet accommodations are provided in abundance on the first and fifth stories, with a limited number on the intermediate floors.

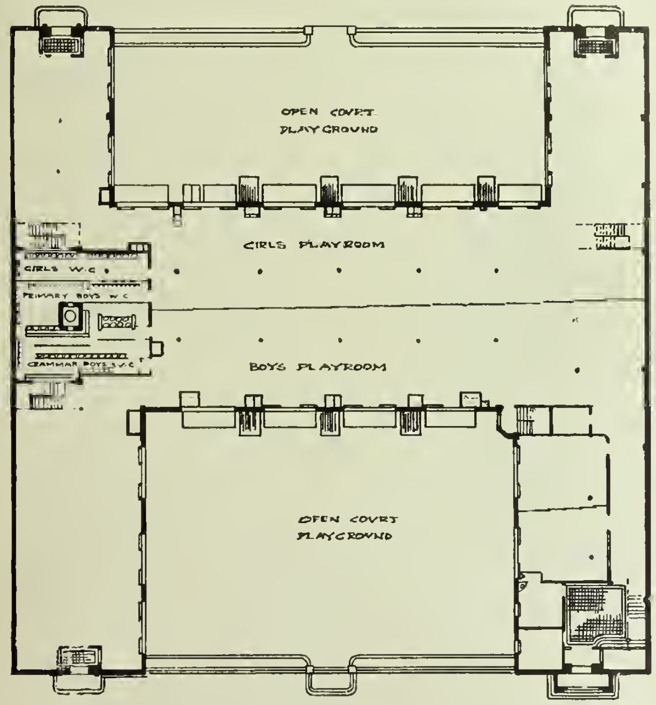
The smallest building we have yet been called upon to erect is Public School No. 153, which is, however, fireproof throughout.

The heating and ventilation of all our buildings is by steam or hot water, engines and blowers of a capacity sufficient to supply 30 cu. ft. of fresh air per occupant per minute.

All desks and seats are of the single adjustable type.

All work is let through

PUBLIC SCHOOL NO. 165, NEW YORK CITY.
C. B. J. Snyder, Architect.



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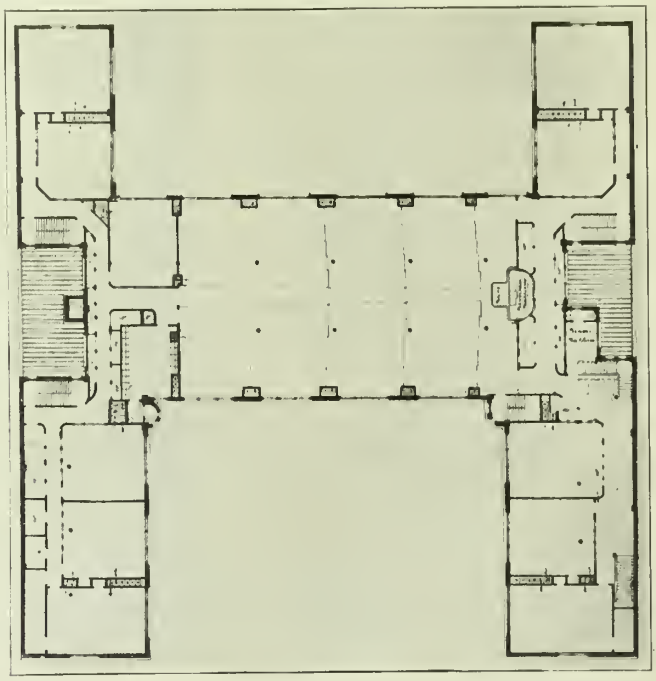


SECOND FLOOR PLAN.

PUBLIC SCHOOL NO. 165, NEW YORK CITY.

public advertisement of two weeks, the contract being awarded to the lowest responsible bidder. Ten sets of ¼ in. scale plans, complete details, and three hundred copies of printed specifications are provided prior to advertisement of a job, and absolutely no drawings are made after the contract is awarded, the number of sheets of details running at times to over one hundred for one building.

I hold that the only correct method of estimating is on the basis of cubical area. In making our calculations all figures are taken from the level of the cellar floor, which averages 11 ft. below grade, although the footings are generally 15 ft., and in the case of School No. 154, St. Ann's Avenue, they were 32 ft. below grade for two thirds of the building.

In comparing the number of class rooms with the cost, consideration must be had of the fact that the entire fifth story of each building is devoted to manual and physical training purposes, and in order to obtain the true cost per class room, the total cost should be divided by the number of rooms given, plus one third, since the cellar is never used but for the heating plant; the first story only for an indoor play room; the second, third, and fourth stories for class rooms: the fifth for manual and physical training, and in some cases the roof for a playground.

Therefore, in the case of the last-named school, which covers on the second-story line 15,480 sq. ft., has 48 class rooms, physical and manual training rooms, and roof playground, the cost of which, without heating and ventilation, excepting the galvanized iron ducts, and exclusive also of the furniture, was $253,942, *i.e.* 15¾ cents per cubic foot, the cost per class room figured at 48 would be $5,707, while at 48, plus one third, would be $3,968, without deducting anything for the cost of first story or roof playground. Further costs are as follows: —

School No.	Location.	Class rooms.	Cost per cubic foot.	Cost.	
20	Rivington, Forsythe, and Eldridge Sts.	48	$ .15¾	$253,942	Manual and physical training rooms, roof playground.
154	147th St. and St. Ann's Ave.	48	.17¾	253,000	Manual and physical training rooms, foundations 32 ft. deep.
159	119th and 120th Sts. near Third Ave	48	.16	307,000	Manual and physical training rooms, H type.
166	89th St. near Amsterdam Ave.	35	.18	233,000	Manual and physical training rooms, cellar excavated in solid rock from above grade line.

The contracts for two buildings on the H plan have been let recently. They provide for 48 class rooms, etc., and the cost per cubic foot for the one last put under contract was $15\frac{6}{10}$ cents per cubic foot.

Space does not permit the writer to comment on the foregoing in this issue. Such comment will be given in the April article, which will be the last of this series.

Church Architecture in Materials of Clay.

BY THOMAS CUSACK.

IN the opening paper of this series we gave some account of two churches in which the Gothic revival of sixty years ago was coincident with the revived use of burned clay as a constructive building material. The style chosen for one of them belonged to an early, and for the other to a later, period in the fourteenth century, thus affording the architect a wide range wherein to test the possibilities of this plastic medium in which he afterwards had reason to repose unfaltering confidence. In the former he had, in addition to many items of a peculiarly exacting character, long stretches of open parapet, and that wonderful spire of pierced curvilinear tracery — in itself a truly remarkable piece of self-supporting terra-cotta construction, with a test of fifty-five years to its credit. In the latter case, he constructed a tower and spire 170 ft. high, supported and embellished by flying buttresses springing from an embattled parapet. He did not shrink from the introduction of clustered shafts, floriated capitals, and five-light windows filled with flowing tracery, all of which were executed without stint or compromise. The difficulties incident to work of this character were not discovered by accident, or, as often happens, after he had gone too far to turn back. They had all been discounted before his arduous undertaking had been entered upon; for, in addition to being a man of wide practical experience in building, Mr. Sharpe was a high authority on every phase of Gothic, from its earliest appearance to its latest development.

An American architect of much promise and some creditable performances in other styles of work favored us a year or two ago with some thoughtful remarks on the principles of terra-cotta treatment. In one of the less thoughtful, he questioned the applicability of that material to "English Gothic architecture." We did not have time to reason this point with him just then, but as he is a diligent reader of THE BRICKBUILDER, we may now be able to dispel his misgivings through that medium. To this end we would merely refer him to the foregoing recital of accomplished facts, in opposition to the cursory expression of a necessarily theoretic opinion. The term "English Gothic," though a very palpable, is likewise a very comprehensive one, therefore a somewhat ambiguous expression. It would include everything from the simplicity of Salisbury to the fan-tracery of Henry VII.'s Chapel, and onward to the end of the Tudor period, not to mention the changes that have been rung on most of these phases of Gothic during the present century. We have already given two distinct types of purely native growth, in both of which the utility of terra-cotta has been demonstrated to a degree that cannot be gainsaid.

The first church, and one of the first buildings of importance on which structural terra-cotta was used in New York, is situated on West 57th Street, and is now illustrated from a recent photograph at Fig. 5. This church was built in 1885, a year or so prior to the introduction of terra-cotta manufacture in any part of New York State. The color is a medium shade of red, with brick of fairly even match, these materials being used exclusively above the basement level. It was designed by and erected under the direction of Mr. F. H. Kimball, and, though one of the least pretentious, is considered one of his happiest efforts.

The governing factor in this case lay in a frontage of 50 ft., situated about the middle of a block, and hemmed in by an abutting tenement of six stories on one side and a residence of five stories on the other. How to obtain sufficient light with the least sacrifice of space, at the same time to devise a plan that would admit of a seemly exterior, was surely enough to test the ingenuity of any architect. A similar task has often been essayed in the building of small city churches, but we doubt whether it has been accomplished with a greater degree of success than is to be found in the present instance. In it the central idea took shape under very exacting conditions; progressing on lines of logical continuity, the final development is such that no interpreter is needed to tell the tale of its inexorable environment. Our own humble opinion, thus compressed into the briefest space, is sustained by that of many and far more competent critics, among them Montgomery Schuyler, who, in reference to style and treatment, avers that "There is no more scholarly Gothic work in New York." This, from one who is himself considered a scholar among contemporary writers on architectural topics, is praise indeed.

FIG. 5. CATHOLIC APOSTOLIC CHURCH, WEST 57TH STREET, NEW YORK CITY.

The author of the observation just quoted has likewise remarked with approval the extent to which the detail throughout this building has been adapted to the materials of which it is built. On this aspect of the subject we feel rather more at home; and speaking from a manufacturing point of view, his commendation in that regard can be indorsed without reservation. The need for such adaptation as would tend to facilitate the processes of manufacture was, of course, more urgent at the time this church was under way than it would be at present; yet the architect was not forced to modify, much less abandon, his original conception on that account. Indeed, the main features of the design need not have been changed had stone been used instead of terra-cotta, yet no attempt has been made to give it the appearance of stone in color, jointing, or surface finish. While the plasticity of the material is recognized, it was not allowed to tempt the designer into a display of his entire stock in trade, or to lure him from the path of architectural rectitude.

To the technical reader, who craves a more intimate acquaintance with the things that facilitate execution and therefore affect the cost of production, we shall point out such of them as occur in the work now before us. A vertical line drawn through the center of this frontage divides it into a right and left counterpart, on both of which blocks from the same mold can be repeated. In other words, the molds that would have been necessary in the case of one entrance will produce a sufficient number of blocks for two, the second doorway, therefore, being obtained at less than half the cost of the first. This applies equally to the windows above, to those of clearstory and transepts; likewise, and more especially to the four pinnacles, in all of which the needful variety resolves itself into the fewest number of separate shapes. So, too, with the individual components of these and like features throughout the building, the analysis of which will become more intelligible if reference is made to them as they occur in Fig. 6, drawn chiefly with that end in view.

On the inner jamb of doorways a mold would be required for the plain starting blocks, of which there are only four. But then between these and the springing line we have twenty-eight others with panel and rosette, which, being uniform in size and ornament, are all pressed from the same mold. A similar arrangement is made in the radius blocks, of which there are thirty-two, all of them interchangeable save those at the springing and apex, which receive the necessary adjustment after they leave the mold. The same thing holds good in the outer archivolt and in the hood molding. The stilt on the two right and left springers, in which the lines change from a curve to a tangent, is formed by hand on two newly pressed blocks taken from the regular mold. In the apex blocks, which are larger, an extra piece must be "slipped" to each of four regular blocks and cut so that on coming together the joint will be in the center; this vertical joint, by the way, being considered orthodox in Gothic arches. By making a mold for the largest quoin, all the other sizes could be wire-cut or pressed to correct size by using a series of stops, on the principle that the greater includes the less. In much the same way a mold can be made for a base or capital of this description, which, in technical parlance, would "work right and left."

The blocks used in receding courses, shown in section at AA, are much shorter than was at all necessary. There was no reason, economical or otherwise, for making them less than 2 ft. As it is, there are sixty-two of them, all of which were pressed from two molds, the return miters on lower course being made by hand. The same may be said of the buttress weathering and gablets, all of which, however, are cut up into unnecessarily small pieces. So also are the jambs and mullions of a very effective five-light window. The shafts stand clear, and, like those of the doorways, are without joints. The jointing through cusps may be said to look constructional, — certainly it does preserve a uniformity of scale,— but beyond that every four blocks, of which the rosette forms the center, might have been made in a single piece.

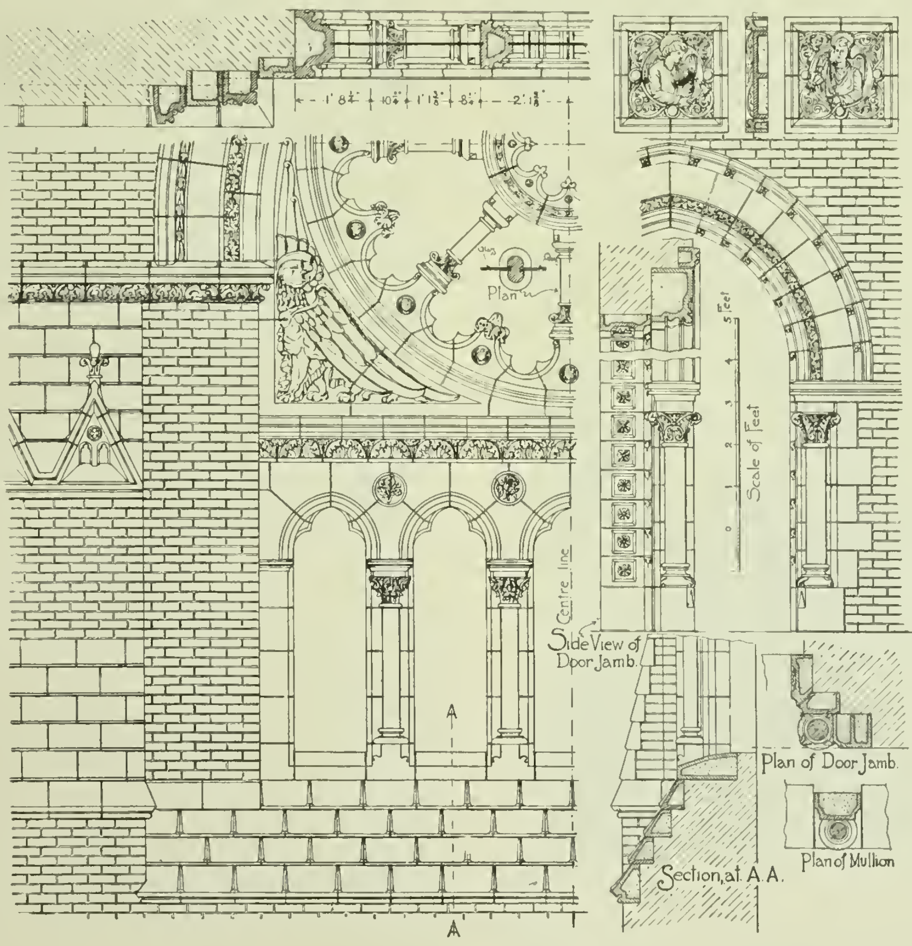


FIG. 6.

That most admirable rose window, the distinguishing feature of the whole composition, is likewise one of the best adapted for easy and successful execution. Considering that the combination contains sixty-four pieces, all of moderate size, in which there are only seven distinct shapes, the scheme of jointing is hardly susceptible of improvement. True, the cusping from the capital outward might have been jointed into sixteen, or half the present number of pieces, subject, however, to the qualifications admitted in regard to the jointing of window below. At the same time, it will be seen that these reasons are of less importance in the latter than they were in the former case, a further qualification and one worth considering. In the small medallions, all of which stand vertical, the cincture only would be molded in the block, thus allowing the heads to be modeled separately, therefore with different poses and expressions: *vide* the cloisters of the Certosa, Pavia.

The main archivolt is turned in three courses, for each of which a single mold will suffice, subject to the necessary changes at stilt and apex. These changes would be made in the way described for outer arch over entrances, where the need for special molds was easily obviated. The same principles of procedure would apply to most of the remaining items throughout this building, the dominant characteristic of which might be compressed into a single word — compactness. That quality permeates most of its members, enters into the individual blocks, and must have been of prime importance in determining the cost of manufacture.

We have gone into these particulars because of their bearing on subsequent examples; secondarily, in order to show that the purity of style need not be sacrificed out of consideration for the material. In the present case, a suitable phase of Gothic having been adopted as a settled fact, the scheme of jointing and construction was simply modified and arranged in accordance with the known exigencies of manufacture. In matters of this kind, Mr. Kimball seems to be actuated by the guiding principles which we have, here and elsewhere, endeavored to elucidate. That, aside from other considerations, is sufficient reason for selecting this interesting composition in brick and terra-cotta as an elementary example of what to do under like conditions, and how to do it, so as to obtain the maximum of merit at a minimum cost.

There is one exception to be noted, and it applies to the dishonest and inartistic stretcher bond in which no headers are permitted to appear. Against a practise so irredeemable we must continue to protest. The demand for honest artistic brick bonding now being made by architects of eminence[1] may encourage others to "take up arms against a sea of troubles, and by opposing, end them."

A brick and terra-cotta church of moderate cost, but highly attractive appearance, was built some years ago in what was then a residential suburb of New York (Fig. 7). Portions of the surrounding territory are now passing through a period of transition, by reason of their absorption in the greater city's scheme of consolidation, together with a more rapid utilization of its Long Island water front. The immediate neighborhood, however, has not suffered from this march of progress as yet. There is enough foliage left to form an agreeable background to the church; and through it come glimpses of white colonial residences, built in most cases by the ancestors of

[1] See article by Mr. Flagg, BRICKBUILDER, December, 1898.

those who now occupy them. In this setting, and on a sloping hillside, stands a church of red brick, interspersed with terra-cotta of a lighter shade, from which focus a glow of cheerfulness and hospitality radiates throughout its vicinity.

The only really remarkable thing about this otherwise simple exterior is the brick-built spire, with terra-cotta quoins and terminal. Judged by the favorable effect, directly traceable to the presence of this spire, the conception was certainly a momentary stroke of genius on the part of its designer. Compared with the framed and shingled or slated affairs that commonly do duty for a spire in small churches such as this, the present one conveys an idea of permanence and stability. These characteristics are in admirable keeping with the place, as we hope they are indicative of the congregation to whom this church owes its existence.

In matters of minor detail there are many things that are crude and lacking refinement. Though simple and easy of execution, there are certain improvements that could have been made with a few strokes of a pencil, and the changes would not have added to the cost

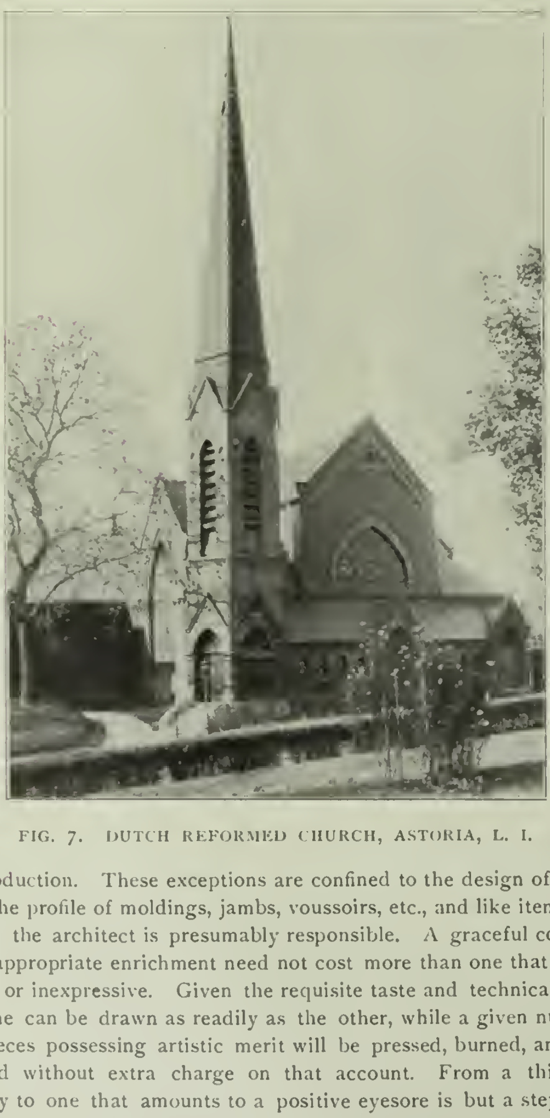


FIG. 7. DUTCH REFORMED CHURCH, ASTORIA, L. I.

of production. These exceptions are confined to the design of capitals, the profile of moldings, jambs, voussoirs, etc., and like items, for which the architect is presumably responsible. A graceful contour with appropriate enrichment need not cost more than one that is uncouth or inexpressive. Given the requisite taste and technical skill, the one can be drawn as readily as the other, while a given number of pieces possessing artistic merit will be pressed, burned, and delivered without extra charge on that account. From a thing of beauty to one that amounts to a positive eyesore is but a step, and in terra-cotta architecture that step is a far shorter one than is generally supposed. Much of the detail in this church stands midway between these two extremes, while none of it rises above the commonplace. One is inclined to regret such lapses, which, on close examination, detract somewhat from the appearance of a building that is, in many respects, a master-stroke of its kind. The work itself was among the first contracts undertaken by a firm that has since produced highly creditable specimens of architectural terra-cotta, some of which we may have occasion to illustrate in greater detail.

Fire-proofing.

EFFECTS OF HEAT UPON NATURAL STONE AND BURNT CLAY.

BY CHARLES J. EVERETT.

SOME natural stones are rapidly destroyed by fire; others resist for longer periods, and a few are but little affected by continued high temperatures. What is the cause of these observed unequal effects? Why is one stone broken into large fragments by the same temperature which reduces another stone to fine granules and only abrades the surface of a third?

In 1895 I prepared an elementary manual upon the principles and materials of fire-proof buildings. While engaged in this work I was struck by the almost entire absence of authentic records concerning our subject matter. The meager records of the behavior of various building materials in burning buildings were found to be of little value, and often carried their own refutation to any one acquainted with the chemical and structural constitution of such materials. Engineering and architectural literature were searched in vain for evidence of extended or systematic experiments for determining the relations of stone, or of any other inorganic building constituent, excepting iron, to fire.

As the results of my investigations were never published, I have thought it advisable to bring forward for public discussion one of the subjects therein treated, in the hope that it may aid in bringing to light some definite knowledge and guiding principles in place of the deplorable ignorance which now prevails.

Tyndall once said: "Right or wrong, a thoughtfully uttered theory has a dynamic power which operates against intellectual stagnation, and even by provoking opposition is eventually of service to the cause of truth."

It is in this spirit that we offer this desultory contribution to the subject under consideration.

Let us first briefly review some of the published facts and opinions concerning great conflagrations which may shed some light upon the intricate problem before us. On the occasion of the great fire in Boston, Dr. Nichols, of the Boston *Journal of Applied Chemistry*, commenting upon the fire, said that Pearl Street was lined with granite buildings, and that after their destruction "fine granitic sand from the disintegrated stone covered the pavement several inches deep." The editor of the *Scientific American* of New York reprinted this statement, and added that "the granite front walls of which many of the burned buildings were composed cracked and exploded, falling in fragments upon the street." Much of the so-called granite destroyed in the Boston fire was Quincy syenite, containing hornblende, but that does not affect the matter now before us.

Mr. Edward Atkinson, president of the Boston Manufacturers' Mutual Insurance Company, states that he has seen "granite posts 12 ins. square reduced to sand" by a fire in the lower part of a building which did not entirely destroy unprotected wooden posts in the immediate vicinity.

Mr. F. C. Moore, president of the Continental Fire Insurance Company of New York, says "granite yields to combined fire and water, . . . sandstones bear heat, but all stones are ruined by fire."

The Universal Schedule of Fire Rates of the Associated Fire Insurance Companies doing business in the United States contains this clause (Sec. 109): "Stone columns subjected to fire and water are certain to disintegrate and wreck the building if in the interior of the building."

Prof. R. H. Thurston, of Cornell University, in Vol. I. of his work on the "Materials of Engineering," also condemns granite, together with "gneiss, syenite, quartz, mica-slate, and other primary rocks. These usually contain some water. When exposed to fire they crack and even explode. Walls constituted of these stones are apt to crumble rapidly in a hot fire."

Limestones, including marble and the magnesian limestones or dolomites, are almost universally carbonates. Professor Thurston declares that in the great fire of Chicago the carbonic acid of the limestones constituting the burned buildings "was expelled with violent explosive disruption." He adds: "Magnesian limestones are little if any better. Uncrystallized sandstones, somewhat porous and free from feldspar, are the most refractory of common building stones. Clay-brick, especially when approximating to fire-brick in composition, is perhaps the best building material now known." I predict that in future editions Professor Thurston will omit the "perhaps."

Major-Gen. C. W. Pasley, of the Corps of Royal Engineers, in his work on "Limes and Calcareous Cements," published in London fifty years ago, said: "Having attentively considered the effects of great fires on houses and other buildings of the usual construction, . . . I have invariably found that good brickwork seems to be a perfectly fire-proof material. . . . I have also observed that large stones when exposed to a strong fire are invariably injured and defaced by fragments detaching themselves from the surface."

In the great fire of London (1666), Pepys, an eye-witness, in his diary tells that "even the very stones of the churches proved combustible"; and John Evelyn, writing upon the same subject, uses the following language: "The stones of Paules (St. Paul's Church) flew like granados. . . . At my return I was infinitely concerned to find that goodly church of St. Paules now a sad ruin, and that beautiful portico, for structure comparable to any in Europe, as not long before repaired by the late king, now rent in pieces, flakes of vast stone split asunder, and nothing remaining entire but the inscription in the architrave showing by whom it was built, which had not one letter of it defaced. It was astonishing to see what immense stones the heate had in a manner calcined, so that all the ornaments, columns, friezes, capitals, and projectures of massive Portland stone flew off, even to the very roofe," etc. . . . "I did not see . . . many stones but what were calcined white as snow."

The Portland stone of London is a limestone. The effects of heat upon the sandstones of northern New Jersey, fairly durable as regards weather, we have often observed, and have found them lose their coherence and afterwards crumble by heat that had left brick uninjured.

The influence upon stone of the lesser alternations of temperature due to climatic changes, annual or diurnal, may aid us in our inquiry.

Dr. David Livingstone, when exploring the vicinity of Lake Nyassa in southeast Africa, observed the effects upon rocks of rapid but quite limited diurnal alternations of merely atmospheric temperature. In the valley of the Goa, or Gova, he was at first much perplexed by the large accumulations of freshly broken, angular fragments of the granitic mountains whose slopes formed the valley, as well as by strange sounds heard at night. Watchful investigation disclosed the fact that during the day the sun's rays heated the surface of exposed rocks to a temperature of about 137 degs. Fahr., while at night the rocks cooled rapidly by radiation; the contraction induced rupture, and angular fragments weighing from a few ounces to 200 lbs. were separated and thrown violently off, producing the noises heard by Livingstone. This disintegration occurred, it will be noted, at temperatures very much above the freezing point.

Prof. James D. Dana, the late geologist, adduces as one of the causes of disintegration of fragmentary rocks like sandstone, "expansion and contraction due to daily and annual changes of temperature." He does not limit this action to cold weather.

All rocks are more or less porous, and absorb water from the atmosphere. Collating such authorities as are at hand, Professor Thurston, Gen. Q. A. Gillmore, General Totten, and some others, the absorption of water by some building stones may be roughly stated as follows: granites, one tenth of 1 per cent. by weight; limestones, ¼ to 5 per cent.; sandstones, ½ to 6 per cent. Besides this hygroscopic water, which varies in quantity with atmospheric and other conditions, some crystals of rocks contain water permanently confined in cells. Quartz crystals may contain at times as much as 5 per cent. of their volume.

The hygroscopic water which in freezing disintegrates some building stones is asserted by some writers to be a principal, if not the only, cause of the destruction of certain stones in fires. Professor Thurston attributes the rupture of granite under heat to this absorbed water, or its steam. Prof. C. J. H. Woodbury, of Boston, in his pamphlet on "Conflagrations in Cities," expresses the same opinion. But all who discuss this subject, so far as we can learn, seem to overlook some of the conditions of the problem. Let us examine the expanded water hypothesis as an explanation of the destruction of building stone by fire.

There are serious if not insurmountable objections to this hypothesis. The expansion of water, as such, through a range of say Fahr. 0 to 212 degs., is about one twenty-fifth, or 4 per cent., of its volume, quite insufficient, when the small percentage of water in the stone is considered, to account for the extensive disruption and disintegration observed. Above 212 degs. the new ratio of expansion is immensely greater, and sufficient to explain the phenomena, provided the generating steam is confined and cannot escape. But is this the case? I cannot admit the proposition. Stone or other solids sufficiently porous to admit the entrance of water from the atmosphere are likewise porous enough to permit escape of such water by the same channels as soon as pressure begins, whether it passes off as water or as steam. Why should there be any more hindrance to its outward passage than to its absorption? But why then does *freezing* water within the pores of stone expand with sufficient force to disrupt it, as constantly observed? The explanation is simple. In these cases, the water is subject to no expansion or pressure until in the very act of congealing, when its condition at once changes from that of a liquid to that of a solid or semi-solid. Its expansion, too, instead of reducing it to a more attenuated condition, as in steam, is a thickening, solidifying process. The sudden increase of volume of about 9 per cent. in freezing water is an adequate cause for its destructive effect upon rocks in cold weather. Building brick absorb water even more freely than any natural stone, but did any one ever know of well-burned brick disrupting or disintegrating in the fire? Yet, structurally, there is no reason for any distinction, so far as the effect of expanding water in fires is concerned.

Again, excluding the exceptional cell water of some quartz crystals, both limestones and sandstones on the average contain a much larger proportion of water than the granites. Observation informs us, however, that the destruction of granites in fires is equal to that of limestones and greatly in excess of that of the far more absorbent sandstones. Surely, the water theory does not agree with the phenomena.

Then there is the carbonic-acid theory, supported by Professor Thurston. Many unreflecting writers have espoused this hypothesis in the face of its obvious refutation by the phenomena of every fire where marbles are exposed to moderate heat. In the first place, carbonic dioxide is not liberated from its base in limestones by temperatures below a full red heat, and that continued for sensible periods; and in lime burning we find that many of the amorphous stones are not disrupted at all, but retain their shapes under red heat. This process of calcination necessarily destroys the structural condition of a crystalline limestone like marble, and at once changes its external surfaces to a degree that is unmistakable. The crystals of lime carbonate disappear under the loss of nearly half their weight of carbonic acid; the bright, glistening surfaces give place to a dead white or a yellowish color, and atmospheric moisture and carbonic acid soon attack the resulting quicklime and reduce it to a crumbling hydrate.

If any sensible portion of the standing walls of a marble front building have ever become heated to a full red heat during a conflagration in our land, I have yet to learn the fact. In the hottest fires of New York, I have never seen any near approximation to such temperature in walls of any inorganic material.

Immediately after the burning of the Manhattan Savings Bank and other adjacent buildings at Broadway and Bleecker Street in November, 1895, I made an exhaustive examination of the premises. On the white marble front of the Bleecker Street Savings Bank (adjoining the Manhattan Bank) was a colonnade with massive marble columns. The bank front was exposed to merely radiated heat from burning buildings opposite, yet slabs were thrown off from the columns, one of which measured 6 ft. in length, 1 ft. in width, and 2 ins. in thickness, while pieces weighing from 50 to 350 lbs. were detached from the marble cornice and other parts by the same heat. One of the battalion chiefs and some of the firemen who were present during the fire informed me that the temperature of this marble front was at no time very high, that there was no fire within the building, and that no water was thrown on the heated stone. The bank's wooden entrance doors and casings just behind and between the injured columns were not even burned through. A minute examination of all marble fragments and of stones from which they were detached revealed in every case a fractured surface of bright, uninjured crystals, while the outer exposed surfaces, discolored by dirt and age, showed a like crystalline structure when cleaned.

In the recent case of the partly burned Home Life Insurance Building in this city, I made a similar investigation, and with precisely the same results. In neither of these buildings just mentioned was I able to detect any sign of calcination or decomposition of crystals in these marble fronts, save in very circumscribed edges of some window sills of the latter building, where the escaping flames beat most fiercely. In the Home Life Building, also, 12 in. diameter marble columns were split from top to bottom by the heat, far above the reach of a stream of water.

The alleged calcination of limestones in the London fire observed by John Evelyn may readily be explained in another way. In London, all light-colored building-stones rapidly become discolored, even to blackness. Their freshly fractured surfaces in strong contrast with their dark exteriors would easily mislead an observer at such an exciting time. Newspaper reporters are frequently deceived in the same way here. But if separated fragments of limestone fell into burning ruins they might easily be heated to calcination degree.

In the instance related by Dr. Livingstone no argument is needed to show that neither expanding water nor carbonic acid were factors in the continual breaking of the rocks. We seem to be thrown back upon the hypothesis of rupture of building stones in the fire by unequal expansion of different parts of the same block, consequent upon unequal temperatures of the different parts. But here, again, we are met by the fact that ordinary red sandstone has a rate of expansion by heat which is double that of granite and one and three quarters that of white marble, yet the sandstone is more durable in the fire than either of the other two stones.

Granites and marbles, the most susceptible among building stones to high temperature, are crystalline in texture. Whether of igneous or aqueous origin, their crystals are alike imperfect, irregular or deformed in shape, indicating restraint or coercion during the crystallization and solidification of the rocks. Resistance to perfected normal crystalline forms by great external pressure would leave the solid under a stress. Such stones may reasonably be regarded as existing under a strained condition of their crystalline constituents, so that a slightly increased stress, under new conditions of environment, may lead either to violent rupture or to rapid disintegration.

All crystals except those of the cubic system expand by heat along their different axes in unequal ratios, and in such expansion their angles are altered, and each crystal undergoes a sensible distortion of form. With rare exceptions, crystals of the cubic system are not found in quartz, feldspar, hornblende or limestones, including dolomites. This strain of unequalized expansion of each individual crystal of such stones as marble and granite, under moderate heat, may be sufficient in the aggregate to induce rupture; but there is also the possibility of a further stress growing out of the abnormal conditions of the genesis of the rocks, as just indicated. We leave the subject here for the consideration of those who are better equipped for pursuing this investigation to a final issue.

Masons' Department.

CONTRACTS.

BY JOHN LYMAN FAXON.

IT may be well to state that the use of the words "contractor" or "contractors" in these papers does not refer solely to contractors of the whole, but to all — both of the whole and "subs." — who contract for work of any kind; and generally, the evils of the present systems, which I am considering, are of the sub-contractors rather than of the contractors of the whole.

As to the nature of contracts *per se*, it would seem at first thought that the nature thereof needs no elucidation or explanation, and yet the general idea as to the full meaning and force of a contract is so vaguely understood and the obligations so lightly held, that some extended consideration seems desirable.

It may be said with truth, I think, that all contractors would, individually, decidedly object to an owner's attempt to beat the contractor out of from 1 to 5 per cent. of the contract price, and yet many contractors think it quite legitimate business to beat the owner out of from 1 to 5 per cent. of the work, materials, and labor which has been contracted for. Contracts generally are of two forms, oral and written (sometimes implied, but implied contracts are rare, except as parts of an oral or written contract, so I will not deal with them separately), and usually both embrace some things implied and not specifically spoken or written.

An oral contract may be and is just as binding as a written one, provided the terms are simple, direct, and made before two or more witnesses; for instance: if A agrees with B to furnish something in six months from date, for a stated sum or consideration, it matters not whether the value of the thing to be furnished by A goes up or down; if it goes up, A cannot plead that he cannot or will not fill his part of the agreement because he will lose money; and on the other hand, if the value goes down, B cannot plead that he will not fill his part of the agreement because the thing can be procured for less money: the original terms constitute the contract. A cannot furnish a poorer thing, and B must pay the full sum or consideration. The law will hold A and B to the bargain, if reputable witnesses are at hand to prove the terms of the contract. A contract *per se* is an agreement by and between two parties to do certain specific acts, each party agreeing to do or provide something which is to stand as an equivalent for that which the other party is to do or is to provide. The nature of the specific contract (legally) may not imply, or provide, mean, or guarantee, that what one party is to do or provide is to be, or of necessity must be, a full equivalent for what the other party is to do or provide (morally, of course, it should be so; and on the other hand, *morally*, a contract once made, its terms should be faithfully performed whether they are equivalent or not, providing the making of it was not gained by fraud). The contract is *prima facia* evidence that the things to be done or provided by the parties were considered, at the time of making the contract, as equivalent: and the terms must be fully performed by both parties. If X contracts with Y to deliver a ton of beans, of specific grade and quality, for one dollar, the contract is just as binding as if Y was to pay the full market value of the beans. X must furnish the kind of beans specified, and Y must pay the dollar; and the same would be the case if Y had agreed to pay twice what the beans were worth. The law, rightly and judicially, cannot go back of the specific terms of the contract, providing said terms have not been modified, and have been strictly adhered to: if Y ordered X to furnish two tons of beans and then refused to pay for them, Y can be made to pay, for the additional ton, at fair market rate, provided it was not understood to the contrary, — the second ton of beans would be "an extra," so to speak; and on the other hand, X is bound to furnish 100 per cent. of a ton of beans, and not 99 or 95 per cent.

So also, if a contractor duly agrees to erect a building for a specified sum, it matters not whether the sum to be paid is a fair market value for the building: either way; the execution of the contract is *prima facia* evidence that both parties knew what they were about and doing at the execution of the contract; and the law will hold the parties to it, so far as it goes, taking into account the evident nature and use of the building and the evident intent and meaning of the contract, as applied to the particular building in question.

A building contract, or one that pertains to a building, differs materially from all other contracts, because the very nature of it embraces and contemplates innumerable details of essential importance, and many things which of necessity must be implied rather than specifically mentioned or illustrated. It is therefore needful that contractors should know and understand that the greater includes the less; that the contract *per se* includes and governs the plans and specifications, and that the plans and specifications do not govern the contract, only in so far as they are specifically illustrative and explanatory of the contract. The contract goes further than the plans and specifications, for the contract may imply — generally does — things not specifically set forth in plans or specifications, but which are needful and requisite to the due and proper execution of the contract and the erection and completion of the specific building according to its class and destined use. Most contractors do not understand or realize this implied element of contracts, which is, nevertheless, an integral and essential part of all building contracts; and herein comes the need of that technical training which I will refer to in a following paper. In illustration of the implied conditions I recall two separate cases, of parallel nature and effect. Contracts were made for the erection of two houses, which provided that said houses should be "built and completed," or words to the same effect; in the one case, the architect omitted to specify the finish flooring, and in the other, the architect specified the boards, but omitted to specify the laying. The contractors refused to furnish and lay, the cases went to court, and the courts decided against the contractors, and rightly, for in either case (without specific conditions to the contrary) the houses would not have been properly built and completed, or the contracts duly performed, without the finish flooring, properly provided and properly laid; for the courts hold that a contractor cannot take advantage of an evident unintentional omission of the architect which is essential to the due and proper erection and completion of a building, which is general and customary in and for a building of its class. The extent to which details (not specifically set forth in specifications) may be carried depends of course upon the architect (if there is one, as there should be in all cases), and what one architect may or does require has no bearing upon what another architect may require, except in case of disputed contract being taken to court, when the finding will probably rest on the testimony of competent experts; and in such case it would be a question of extent and quality and not of outright omission. Nine times out of ten, contractors had best rest their case with a reputable architect rather than take it to the courts. The architect's technical knowledge and his faculty of looking at all sides of a question best fit him to decide such matters.

And herein comes the *professional duty* of the architect to see that his plans, contracts, and specifications are clear, specific, and technically intelligible. Architects are not responsible for lack of knowledge in contractors, as to the reading of plans or the technical terminology of contracts and specifications. Plans and specifications are prepared for the intelligence of the trained mind; they are of necessity technical and scientific when properly prepared; all ambiguity and chance for misconstructions should be carefully avoided; the architect should know what he wants, and clearly specify it, and require that and nothing else to be furnished. On this rests his professional reputation, and the solidity, finish, and economy of his work. Some architects err in the making of plans less full than what they should be, and in the attempt to "boil down" specifications. This is a mistake, both as regards clients and contractors; while brevity is the soul of wit, brevity is not the most desirable quality in plans and specifications. For as things are, competition will always be sharp, and the temptation "to get the job" sometimes gets ahead of the judgment of even the best contractors, while others figure to "get the job anyway," trusting to luck, persuasion, or other means to be "let up on" when the building is under way. The architect will therefore avoid misunderstandings, trouble, and vexation, by making his plans and specifications specific and careful in detail, so as to facilitate intelligent estimating, and avoid misconstructions and "extras."

Some contractors object to plans and specifications "too much in detail," as such plans and specifications do not allow "chances for a lot of extras." This is a mistake on the contractor's part. Clients do not take kindly to "extras." The most satisfactory contract all around, and the *strongest* for both sides, is that one which is complete in itself, and under which a building is erected and completed without "extras." This is not always feasible or possible, but it is the best policy when possible.

Another erroneous idea which many contractors have is that the provisions of one contract have a bearing upon another contract; and they try to enforce their argument by what they consider "customary" or "my way of doing it." Now it needs to be clearly understood that such arguments have absolutely nothing whatever to do with a contract; the provisions of two contracts out of the same architect's office have no bearing whatever one upon the other. Each contract is of itself apart, separate from all others, and is to be considered and executed solely in respect to the individual case which it represents. Circumstances alter cases, and it does not follow, because an architect specifies a certain thing, or a specific manner of doing work in one case, that he desires or deems it advisable in the next. The trained architect learns something between one "job" and another which he did not know before; he keeps ahead of himself, so to speak. Contractors should, therefore, carefully examine and read each set of plans and specifications and contracts, and thoroughly digest them, and not take things for granted, or "guess at the cost of it"; the time has gone by for such things.

I recall an instance, back in 1873, which may be worth the telling. At that time the city buildings were being done by two architects: X would have one, then Y, then X, then Y, and so on, and the plans were not such as our best architects now prepare. They usually consisted of a barely necessary number of sheets, with little or no detail on them, more or less colored to make them "look pretty," and a few pages embraced the specifications. Scene: an architect's office; time, 11.45 A. M.; bids on schoolhouse to close at 12 M.; contractors around table making up figures. In walks "Uncle Ben," a tall, lank, familiar figure of those days. He lifts up the cover of the portfolio containing the plans, counts the sheets, eleven of them, reaches back to his hip pocket, takes out a tape measure, scales the plan and elevations, makes a few figures on an envelope which he takes from his hat, tears off a scrap of paper, writes his bid on it, calls for an envelope, directs it and deposits on architect's desk, and walks out. One of the contractors, who has watched the proceeding, gathers up his papers and leaves, remarking as he goes that "he'll be 'embalmed' if he figures against a man who uses a tape measure." "Uncle Ben" got the job. The secret of the matter was that "Uncle Ben" had just completed a schoolhouse, to all intents and purposes just like the one being figured on. Architects were not over and above particular in those days, and the science and demands of planning and building were not what they now are.

The immoral effect of profit or loss on the contractor and its reaction on the architect is another evil of the present system; it may be argued that contractors need, must, take into account profit and loss; granted, but the time to take this into account *is at time of estimating*, and *before* the contract is executed, not afterwards. No law compels a contractor to take a contract at a loss; he is a free agent in the matter; but after the contract is executed, the question of profit or loss has absolutely nothing whatever to do with the matter, and should not be referred to or considered, either by contractor or architect. The altogether too prevalent custom of endeavoring to influence the architect's judgment and requirements by reference to profit or loss is distinctly immoral and reprehensible, and lowers the tone of that integrity which should be the guiding rule of action in such matters. There may arise honest differences of opinion as to details; these should be settled *per se*, without reference to profit or loss, and by the determination of the architect, he being the only competent person to rightly interpret the plans, specifications, and contract. It may be claimed that "architects are sometimes exacting, over-exacting"; nevertheless I do not think that such claim can be substantiated, certainly not to any material extent, and certainly not with any architect who is well qualified for practise of his profession. The difference lies in the different points of view of contractors and architects, and I think, as a general proposition, it may be said that there is more need of contractors advancing to the architect's point of view than the reverse.

Another consideration which should be taken into account is, that every architect who demands and requires the honorable and full execution of contracts in his hands is doing just so much to drive "low bidders" and irresponsible and incompetent contractors out of the field, and is doing just so much of good and benefit to every reputable and responsible contractor, and doing much towards establishing honest work at a fair price. Architects should bear in mind that poorly prepared plans and loose, ambiguous, and carelessly drawn specifications and contracts are a boon to the low bidder and irresponsible contractor.

Reputable architects desire to deal with reputable contractors, who can be depended upon to carry out the architect's plans and directions in a friendly spirit of honorable compliance, and take pride in doing so; and to such contractors, architects wish them a fair price with a fair profit. The *best* work is none too good, and is the only kind which will redound to the credit of the contractors and architects, and is the only kind which is for the client's interest.

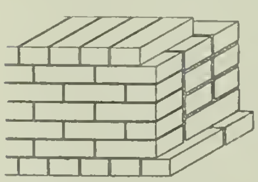
FULL-FACE HEADERS FOR PRESSED BRICK.

EDITORS THE BRICKBUILDER: —

Dear Sirs: — Will you kindly, through your journal, answer the following question: —

How should the headers be laid in a wall faced with press-brick, to comply with the following specification? Specification: "Pressed brick to be worked in regular bond and tied with full-face headers every sixth course, or less if common brick backing will so work."

We should say that this specification calls for headers of pressed brick, laid in at most every sixth course. We are also of the opinion that a "full-face header," worked in regular bond, means a special header brick, made 8 ins. square, so that when laid in the wall it has the appearance of a stretcher, while in reality it extends back 4 ins. into the common brickwork. Where regular or plumb bond is used, this is the best method of tying pressed brick to its backing, by means of brick, although a good metal tie may answer as well.



As only a few manufacturers make square bricks, however, it would perhaps not be fair to put this interpretation to this specification, unless it had been explained to the contractor what was desired.

We would therefore say that by this specification the contractor should be required to tie the pressed brick as shown in the accompanying illustration.

BOND FOR PERFORMANCE OF BUILDING CONTRACT.

THE Supreme Court of Michigan has ruled that sureties on a contractor's bond conditioned for his faithful performance of a building contract, which provides that the consideration is to be paid to the principal at times therein specified as the work progresses, are released from all liability on the bond, if the payments are made before they are due under the terms of the contract.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

THE BRICK ARCHITECTURE OF WASHINGTON, D. C.

BY F. W. FITZPATRICK.

NAPOLEON, so tradition says, upon his return from one of his frequent little surprise-party excursions into the country of his neighbors, the enemy, — and he had them on all sides, — was met outside a frontier town by the mayor and dignitaries of the place. The mayor, with much bowing and scraping, began a long apology for not greeting him, as was the proper caper, with salvos of artillery; going on, with much volubility, to give the impatient and hungry conqueror seventy-six reasons for not so saluting; the first was that there was not then nor had there ever been a cannon in the place. "Hold on, my boy," said His Emperorship, "skip the other seventy-five and bring on the savory viands," or words to that effect.

THE DUDDINGTON AND VAN NESS MANORS.

This is a somewhat analogous case. I am volubly inclined, so truthful friends warn me, and I know of ninety-nine good reasons for not writing upon the above-entitled subject. The least important of these is that I know but little about the subject. And now the impatient reader may turn to the next article if he, like the mighty Bonaparte, thinks *that* sufficient reason and hungers for meat: I can offer him but broth.

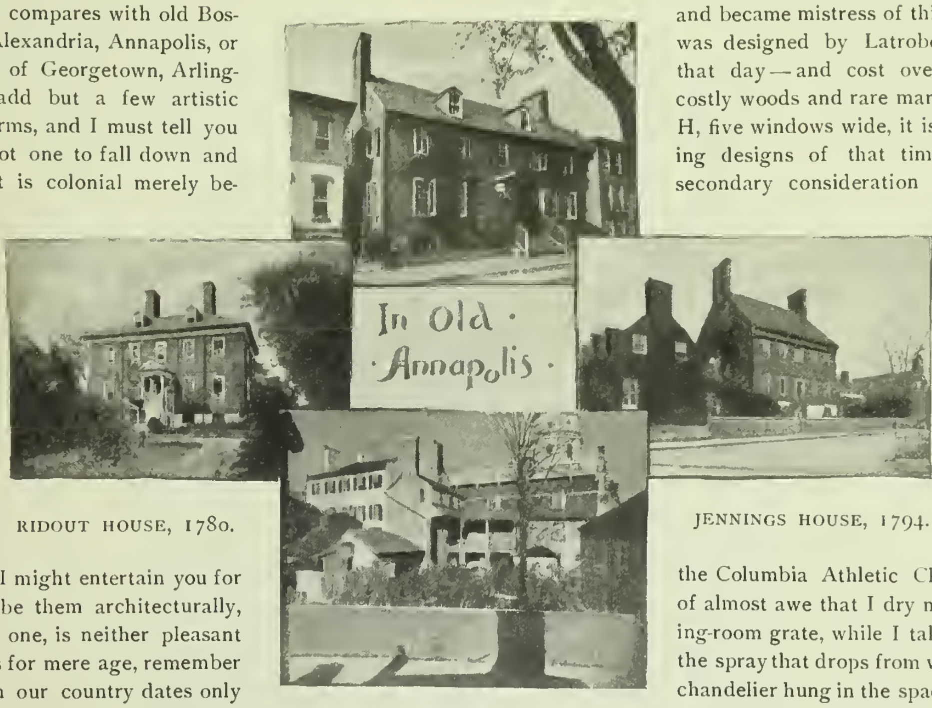
It's not altogether my fault, however, for when THE BRICKBUILDER invited me to contribute this paper I mildly protested that while I loved brick and appreciated its possibilities, force of circumstances had kept me, nearly all my life, in far closer touch with just mere granite and stone; and I ventured to suggest a learned treatise upon those, to me, familiar materials, or upon steel, or "The Ethics of Architecture as She Is Preached *vs.* The Observance Thereof," or "Twenty Reasons Why the Other Fellow Always Wins Out in a Competition," or anything of that sort; but these were all scorned by THE BRICKBUILDER, who'd have nothing, of course, but brick, and "Brick in Washington" at that!

Now, Washington is one of the last places on earth one would select voluntarily to make a study of its brickwork. It was begun during a period of transition. Unlike the cities of Flanders, of Holland, and of continental Europe generally, where "in brick was wrought the perfection of their art," Washington blossomed forth at a time when the Americans had almost ceased to bring brick from England; were manufacturing a rather imperfect article themselves, and invariably plastered over it, defects and all, a thick coating of stucco most painfully "poynted off to represent ye coigns and cources of ye solid stone." The trimmings were of real stone or counterfeited in wood, and the important buildings were entirely of stone, so Dame Fashion then decreed. Then, by a train of circumstances over which no one seemingly has any control, our modern buildings of brick are, as a rule, costly, elaborate, but, with rare exceptions, generally worse than atrocious in design. Of these more anon.


TUDOR HOUSE, GEORGETOWN.

There is hardly anything in the brickwork of old Washington that compares with old Boston, old Philadelphia, Alexandria, Annapolis, or Baltimore. Its suburbs of Georgetown, Arlington, and Bladensburg add but a few artistic touches to its faded charms, and I must tell you right here that I am not one to fall down and worship everything that is colonial merely because it *is* of colonial times.

If I could deal with the histories of our old buildings, other than structural, the great men and the stately dames who have lived in them, the tragedies, the comedies, national and domestic, that have been enacted within their walls, I might entertain you for a while; but to describe them architecturally, the task, while an easy one, is neither pleasant nor interesting. And as for mere age, remember that the oldest house in our country dates only to 1564, — the old *coquina* monastery, of St. Augustine, Fla., and it has not only no peer in the land, but not even a mate of the same century!



PEGGY STEWART'S HOUSE, 1763.
RIDOUT HOUSE, 1780.
JENNINGS HOUSE, 1794.
THE FRANKLIN AND BELLIS HOUSES, PRIOR TO 1760.

The Duddington Manor, the old Carroll mansion, was the first brick house of any importance built in the new capital. It stands to-day a dilapidated, uncared-for relic of the former grandeur that perched for a time on Capitol Hill. A broad, shallow house, nine windows wide and but two in depth, absolutely void of brick detail, two stories high, the home of Daniel Carroll, one of the three commissioners appointed by Washington to lay out the Federal city; and it was the location of this house right in the middle of New Jersey Avenue, I believe, that raised the rumpus terminating in Major l'Enfant's dismissal from the service but two months after his plan of the city had been approved, — a plan, by the way, that Jefferson hád as much to do with as did l'Enfant. What a genius was Jefferson! Sage, diplomat, President, scholar, architect,— verily the most versatile American in our history! Washington owes much of its beauty to his taste, and not only did he design his own beautiful house and the College, but his letters would also indicate that most of the manors of his time and built by his friends here and elsewhere had their inception in his fertile brain.


MACKALL HOUSE, GEORGETOWN.


OLD HOUSE AT GEORGETOWN.

In 1820 the Burns house was completed,— the David Burns who stood out so long against the blandishments of the commissioners, and of Washington himself, who tried to induce him to sell his farm to the proposed city. His daughter, a great beauty, married a Van Ness and became mistress of this stately old manor. It was designed by Latrobe — the Richardson of that day — and cost over $60,000; finished in costly woods and rare marbles, shaped like a thick H, five windows wide, it is one of the most pleasing designs of that time. But brick was of secondary consideration there, too, merely the plain wall surfaces, stone, wood, and metal, being the ornamental and beautifying mediums of the exterior. Its grounds were spacious and must have been beautiful. To-day we use a part of them for a running track, tennis courts, and field sports of the Columbia Athletic Club. It is with feelings of almost awe that I dry my sweater by the drawing-room grate, while I take a shower bath from the spray that drops from whence the grand crystal chandelier hung in the spacious dining room! Yet, methinks, this is less of a desecration than its former use, for when we took it it was a beer garden.

About the beginning of the century Col. John Tayloe built the Octagon house, a near neighbor to the Van Ness mansion,— a pretentious house with the savor of London about it: externally plain, three stories and basement, of a red brick with marble trimmings, and its interior spacious, artistic, and costly, as befitted the home of a man whose "income was princely, and whose artisans and slaves were so many that without calling upon outside help his own people felled the forest, wrought iron, worked the fields, and built and sailed his ships." The building, restored and rejuvenated, is now the home of the American Institute of Ar-


BRIDGE STREET PRESBYTERIAN CHURCH, GEORGETOWN, 1782.

chitects, but *in transitu* it too passed through unsavory repute. Near by are the abandoned Everett and Wirt mansions, as ancient and replete with history as the last named, but for our present purpose of little interest. Around Lafayette Square, neighbors to the White House, are grouped the later buildings of "ye olden time," most of them built just after the War of 1812: St. John's Church, still the fashionable place of worship, a good example of colonial ecclesiastical architecture, of brick, but stuccoed. Commodore Decatur's home, now occupied by Mrs. McLean, a very plain brick house, stands upon another corner opposite the square, and diagonally opposite this is the rather handsome Italian villa known as the Corcoran house; very large, well built of brick and stone, it is still one of *the* houses of the city. The late Senator Brice lived there for years in great pomp and splendor. The other Tayloe house, now occupied by Vice-President Hobart, is one of the most interesting of this octet of fine homes. Of yellow brick, with plenty of green blinds, foliage, and railings to relieve it, one never tires of passing by its cheerful front. Then there is the Dolly Madison house, now the Cosmos Club, brick, but stuccoed.

OLD CORCORAN ART GALLERY.

In Georgetown are some fine old homes, not architectural beauties, merely brick and stone put together in more or less true colonial proportions, but surrounded by broad acres, high, commanding a splendid view, and with histories. The old Tudor place, built in the middle of the last century, and still occupied by the kin of the Father of his Country, and well kept up, with its stiffly laid-out rose plats, its boxwood hedges, and other colonial accessories, is one of the best of its time. Washington, the Lees, and other notables of the long ago have danced upon its waxed floors and eaten at its well-spread mahogany. Of later date and more pretentious is the Linthicum manor, once the Russian Legation, now the Blount home, of brick, interesting, very large, and well kept; the Mackall house, the old Scott house, occupied by Grant during the war and more recently by yours truly, who can attest that there is no better nursery for seven riotous youngsters than one of these grand old baronial dining rooms, nor no better shade than these grand old oaks offer for the weary progenitor of those seven to swing his hammock under, and read and smoke and forget the cares of yesterday.

THE OLD COLUMBIA BANK, GEORGETOWN.

In the same category may be placed other near-by old homes, such as the old Dumbarton house, near the Zoological Park, Dumblane on the Tennalytown road, and the old Lee home at Arlington, now the superintendent's headquarters of the great National Cemetery. All of these are of brick, most of it concealed, however, under stucco or paint, but interesting, quaint, treated in a simple, dignified manner, and so restful to the eye after gazing at some of our modern, patchy, crazy-quilt efforts called designs.

Two good examples of last century's brick structures were the old Presbyterian Church (Bridge Street), that vied with Christ Church, of Alexandria, in historical interest and in the beauty and simplicity of its design, and the Columbia Bank, reputed to have furnished the money for the defense of the country in 1812.

As stated before, some of these are kept in repair, are habitable, sightly, and, with the splendid old Capitol and departmental buildings, give the dignity of age to our city that is one of its chiefest charms: but most of them, alas! are mere crumbling ruins, relics of bygone grandeur, decrepit veterans of many wars.

The older brickwork is, of course, in the good old "English bond," alternate courses of headers and stretchers, averaging 9 by 4½ ins. by 2¼ ins. thick, laid in lime mortar, that will still outlive much of our high-priced, high-test "cements." The facing bricks are generally gauged and rubbed to a pretty good surface, with clean-cut angles, "queen closers," and neatly laid. Naturally, when the "Flemish bond" craze was revived in England the buildings here of the same period followed suit, and we have several examples of alternate header and stretcher, followed in the later work by our more modern interpretation of "English bond," one course of headers to three, four, and five courses of stretchers.

. . . .

The Capitol, the Treasury, the White House, the Patent Office, and most of the government structures are of marble, granite, or other stone, — generally fine specimens of architecture, and some unsurpassed anywhere in beauty and stateliness, designed by master hands, and they stand out in sharply accentuated contrast with those built of brick. It seems strange that whenever brick was decided upon, or when appropriations would not warrant stone structures, the designing was left to inferior hands and minds, — a slight upon brick that we should resent, all who appreciate and realize the possibilities of that splendid medium of expressing one's ideas. It remains for us to so impress our legislators with its advantages that past mistakes will not be repeated. Brickmakers, the editors of BRICKBUILDER, and all interested in the development of that material, should make it their business to see that their congressmen "urged" the adoption of brick for a portion, at least, of the sixty odd United States buildings appropriated for by this last Congress. Urging is potent, oh! so potent in such matters, and no one appreciates its potency more than the poor fellow who receives the urging.

Walk with me down the "Mall." Note the Smithsonian Institution, a stone structure, graceful, dainty, almost poetic, a "symphony in form," it has been called, and without stretching the point. Then glance — a glance will be enough — at its neighbors: the Bureau of Engraving and Printing, a great bleak, brick barn, but possessing one redeeming feature, in that it makes no pretense at being anything else than a factory; a little further on there is the National Museum, with portals, pavilions, turrets, and other "accessories after the fact" in red brick relieved by beauteous spots of yellow and of black brick, a splendid

CORCORAN HOUSE.

foil to make one appreciate the charms of the Smithsonian; the next member of the "conspiracy against brick," as I have heard our United States brick buildings termed, is the Department of Agriculture; French in feeling, $300,000 worth, Mansard-roofed, its red brick also relieved with more spots, this time of black and of yellow, it puts one into a melancholy, despondent, *Et tu, Brute!* feeling that almost prevents one's proper appreciation of the beauty of its surrounding trees, flowers, and verdure. But as a fitting climax, let us leave the "Mall" and stroll over to Judiciary Square, and there take in the charms, the very apotheosizing of brick in governmental architecture, the Pension Bureau. A drawing even by Pennell or Gregg, or any of the other lights, would utterly fail to give the faintest idea of the reality, a camera fails more dismally still, and my pen, steeped even in gall, cannot give you a word picture of the *index* to its description. It has one of the best sites in the country, open on every side, second in location only to the Capitol,— verily a lost opportunity.

Technically speaking, it is three stories high, surmounted by a clearstory; it covers a space of 400 by 200 ft., and was finished in 1885, and, as stated in an official report of that time, "is built to resemble the great Italian palaces" — ye gods! Its greatest charm, apart of its being of pressed brick (and, unfortunately, of good workmanship), is its ornamental course of yellow terra-cotta over the first-story windows: a continuous line of that color and the only relief from the red there is about the entire — I was going to say *composition*. This frieze represents either four or six infantrymen, I forget which, but it makes little difference, marching on to war; these are followed by two mules being furiously lashed by a darky, they (the mules) evidently carrying supplies through the mud to the advance lines; these mules followed by more mules dragging a field-piece, and again more mules surmounted by the general staff or just mere cavalry; then the four or six infantrymen pursued by the aforesaid mules again, and so on for twelve hundred feet of frieze, containing, roughly guessing, about thirteen thousand feet of infantry, cavalry, and mules, — a miniature not over two feet high, a very rebus in feet!

THE CHASE HOUSE, ANNAPOLIS, 1770.

One consolation we have is that that building was not perpetrated by an architect, but by an army engineer (eminent in bridge structures, water fronts, and fortifications, a great and good man, though, peace to his ashes! he so cruelly wronged our art), and yet even that consolation is counteracted by the sad thought that being nearly all of brick it is practically fire-proof and almost indestructible.

GEORGETOWN CAR BARN.

Washington is a city of churches. There are some rather handsome ones in stone, but those that are of brick are so close of kin to those you see every day, everywhere, — so commonplace,— that they merit no special mention. Generally supposed to be Gothic, at least, they nearly all have ogival windows with beautiful wooden tracery in them, and real red, blue, and green stained glass here and there; a pointed roof with a gold-leafed cross or finial at its apex, and one of the same brand surmounting its "tall and willowy" spire, that shelters—every blessed one of them—that hidden foe to our peace and contentment, a bell. Are *they* not Gothic?

VICE-PRESIDENT HOBART'S HOUSE.

Of the other semi-public and commercial brick buildings, some are interesting, few are beautiful, and many neither interesting nor beautiful. Our schools are about on a par with our churches: you see them everywhere from New York to San Francisco; they are excelled here in ugliness by the fire stations generally. The Metropolitan Club, a red brick, has the good taste to not be pretentious, and in that does not challenge criticism. The Columbia Athletic (lately gone under the hammer to the Y. M. C. A. — *vale*, old friend!) is pretentious, red, and ugly; the Army and Navy is also red, not bad, weak in detail, but masses up pretty well. The Convent of the Visitation, red and black, is *very* ordinary. Our stores and office buildings (there are remarkably few of the latter; this is not an office city, though a city of offices) merit hardly any notice. They are generally pretty well covered over with signs, a virtue in most cases, and would rank with those of a fifth-rate city. There is not even a savor of metropolitanism about them. Two or three have lately been erected, among them the Western Union Building, the Columbian Office Building, and the Inter-Ocean Building, plain, unremarkable affairs; no one would ever stop to look at them, but true, too, there is nothing that calls for criticism: they are *just* mere buildings.

The hotels and apartment houses, and they are legion, are mostly of brick; generally old buildings kept well painted, but not architecturally important. The newer ones have suffered the same fate as did the governmental brick structures; put mildly, they are not masterpieces. The Shoreham, the Grafton, the Cochran, the Buckingham, and the Richmond are much cut up, lack repose or style, and not one of them but could have been wonderfully bettered, and without additional cost, by the artistic handling of some one who did *not* design them.

Two, however, merit particular anathematization: the Portland, that stands upon a rather trying lot, it is true, a triangular corner piece, and whose designer solved the problem by making an accordion-plaited affair of it on plan and gave it the semblance of an Indian pagoda in elevation,— a wonderful building in design, form, and color, and merits the worst you can say of it because its architect boldly challenges you to it, courageous man! The other is the Cairo, a great big thing, some twelve or thirteen stories high; at least, you see it from all over town. It, too, asks you to hit it, — clumsy, pretentious, bad. Its designer saw one of Sullivan's daintily decorated, rather fascinating East Indian creations in brick and steel, and, like the speckled rods of old, it had a peculiar effect upon him, for he brought forth that thing, — a hat box with a projecting and very thick lid on it, with here and there Sullivanesque *motifs* judiciously spattered about it.

PORTLAND FLATS.

The old Corcoran Art Gallery merits a visit just to note what we used to call a beautiful brick building in 1875. Look at its picture, then offer up a prayer of gratitude that the standard has been raised a bit.

The hotels are receiving a new member that, however, does not belong to their class. The Raleigh is building an addition to its present quite old and ordinary structure that is very handsome indeed. When the old building is replaced by a continuation of this new wing it will be one of the most ornate and handsomest hotels in the country. The lower portion and most of the ornamental work above are of stone, but the masses, piers, and plain parts are of a pearl-gray brick, so it is about as much of a brick building as most of the big fellows are. As near as I can judge from what has been erected it is a pre-Renaissance treatment, tending to a German rococo, something on the order of the Waldorf-Astoria, and by the same architect, Mr. Hardenbergh, of New York, and goes far towards the redemption of brick building in Washington from the slough it seems to have fallen into.

Of this same class of redeeming brick structures are the Lafayette Theatre and the Columbia University, good, plain, eminently respectable, light-colored brick, well designed, and welcome additions to our architecture. We have two railway stations, half a dozen markets, and other such buildings of brick, none of which merit any architectural attention, unless one were compiling a treatise on "Dont's" or "What Not to Do."

One of the newest big buildings is the Georgetown street-car barn, a confection in gray stone and liver-colored brick, — well built, really a good piece of engineering, and undoubtedly well fitted for its purpose, but of a most wonderful design, "surmounted by a tower of noble proportions." Whoever designed the thing, and I hope it was not an architect, has contributed liberally to the retarding of our progress in artistic brick structures.

There are a couple of brick breweries whose positions upon the river front, high chimneys, towers, ventilators, and other minaret-like adjuncts make them quite picturesque affairs — from the great distance one generally sees them. It might be different if one could get near them.

(*Continued.*)

ILLUSTRATED ADVERTISEMENTS.

CONKLING-ARMSTRONG TERRA-COTTA COMPANY, page v, Dental Hall, University of Pennsylvania, Philadelphia; Edgar V. Seeler, architect.

Fiske, Homes & Co., page x, fireplace mantel; Henry B. Ball, architect.

Boston Fire-Proofing Company, page xxii, Hotel Touraine, Boston; Winslow & Wetherell, architects.

Celadon Terra-Cotta Company, Ltd., page xxvii, Gate and Gate Lodge of the Woodlawn Cemetery, Everett, Mass.; William Hart Taylor, architect.

NEW YORK. — The Fourteenth Annual Exhibition of the Architectural League has just closed, and the results are most gratifying. More interest has been shown by the press and public than during any former exhibition; particularly interesting notices with many illustrations having appeared in the *Tribune*, the *Herald*, *Harper's Weekly*, and the *Art Interchange*, and the attendance has been as large as at any of the contemporary exhibitions of paintings, which is saying a great deal.

In regard to the present status in the real-estate and building world our hopes are being realized, with great satisfaction to those whose special efforts have been in the line of dwellings, apartments, etc., and there are a few buildings of more than ordinary importance under way, notably the large apartment house designed by Messrs. Boring & Tilton, to be erected on 43d Street. This building will be unique in many ways. It is planned primarily as a woman's apartment house, a field which bachelors have considered heretofore their own. A unique feature of this building will be a chapel in the center, an innovation which might be of use to bachelors.

Another new building is the hotel designed by Messrs. Barney & Chapman, which is now being erected on 38th Street, corner of Seventh Avenue. It is a ten-story, fire-proof structure, faced with brick and terra-cotta. It is designed in French Renaissance, and promises to be a most successful building artistically.

The city is gradually being worked up into a frenzy of excitement over the attempt of the trolley companies to grab Amsterdam Avenue, one of our finest thoroughfares, for their own uses, and to place four tracks on it. There have been protests from all the residents, owing to the great danger which would surely follow the consummation of such an act, and a bill has been introduced in the State legislature, which if passed, as seems likely at this writing, will prevent such vandalism.

Among the more interesting items of new work are: J. B. Snook & Sons have planned an eight-story store and office building, to be erected corner of Broadway and Warren Street, to take the place of the Rogers, Peet & Co. building which was destroyed by fire. It is to cost $150,000. C. P. H. Gilbert is at work on plans for an elaborate residence to be built for Mr. F. W. Woolworth on the corner of 80th Street and Fifth Avenue. It will be semi-fire-proof and faced with brick and stone; cost, about $90,000. G. Kramer Thompson has planned a seven-story steel construction warehouse, with brick and stone exterior, to be built on 42d Street, near Sixth Avenue; cost, $100,000. Stein, Cohen & Roth have planned a ten-story apartment to be built corner of 70th Street and Central Park, West. It will be of brick and terra-cotta, and cost about $700,000. John Hauser has planned seven five-story brick and stone flat buildings, to be erected on Seventh Avenue, between 140th and 141st Streets; cost, $300,000. Ralph S. Townsend has prepared plans for an eight-story store and loft building, to be

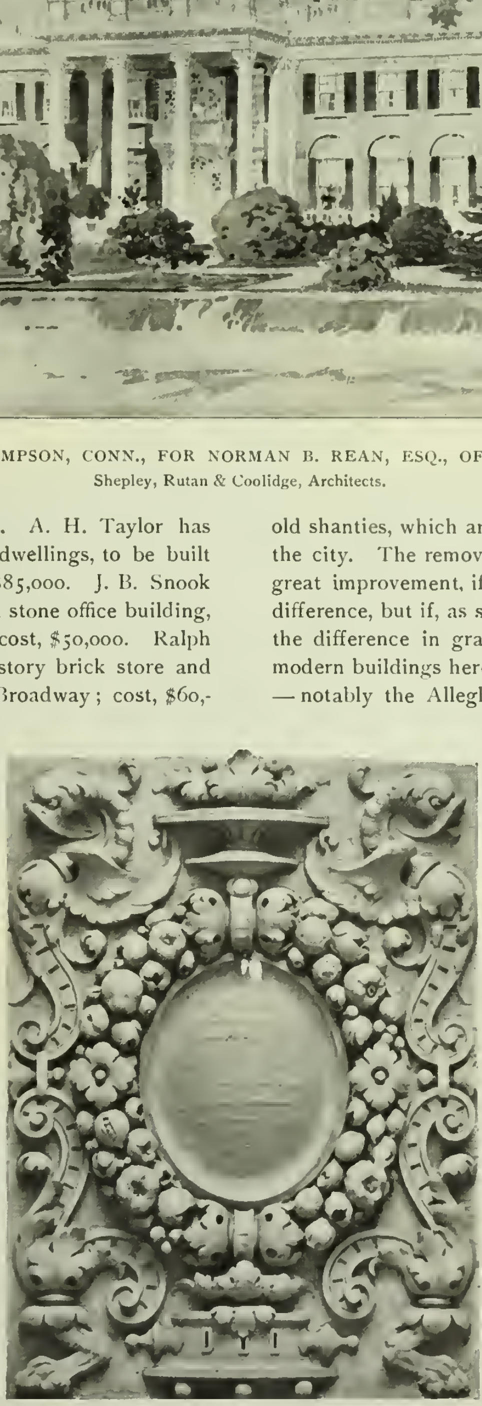
TERRA-COTTA FIGURE.
Executed by the Northwestern Terra-Cotta Company.

erected on 51st Street. It will be built of light brick, Indiana limestone, terra-cotta, and granite, and cost $60,000. Henry Anderson is at work on plans for six five-story brick dwellings, to be built on 95th Street, near Madison Avenue; cost, $104,000. A. H. Taylor has planned five three-story brick and terra-cotta dwellings, to be built on 118th Street, near Seventh Avenue; cost, $85,000. J. B. Snook & Sons have planned an eight-story brick and stone office building, to be built on Maiden Lane, near Broadway; cost, $50,000. Ralph S. Townsend has prepared plans for an eight-story brick store and loft building, to be built on Bond Street near Broadway; cost, $60,000. De Lemos & Cordes are planning an extension to the Siegel-Cooper Building at 18th Street and Sixth Avenue. It will be six stories in height, and will cost $100,000. W. Wheeler Smith is preparing plans for a four-story brick and stone dwelling, to be built on 53d Street; cost, $200,000. Lord, Hewlett & Hull are the successful competitors for the proposed hotel building, to be erected by the Astor Estate at the corner of 130th Street and Lenox Avenue. The approximate cost will be $200,000. The other competitors were Hoppin & Koen and Whitney Warren. Clinton & Russell are preparing plans for a twelve-story fire-proof office building to be built on the site of the present Chesebrough Building. The cost will be about $750,000.

HOUSE AT THOMPSON, CONN., FOR NORMAN B. REAN, ESQ., OF CHICAGO, ILL.
Shepley, Rutan & Coolidge, Architects.

PITTSBURGH.— Almost every architect's office here seems to have an unusually large amount of work on the boards, and if it should all be carried out our expectations for a busy year would certainly be realized.

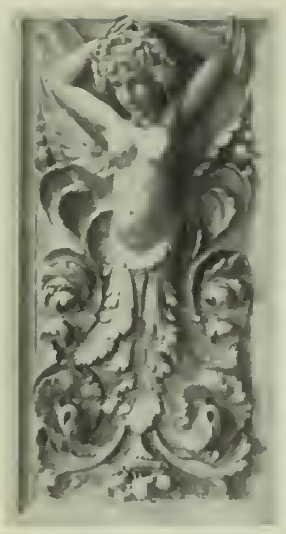
The annual agitation for the widening of Diamond Street and for the removal of "the hump" on Fifth Avenue above Smithfield Street has been renewed. That Diamond Street, or alley, as it is often appropriately called, should be widened, no one doubts; it would open up for business purposes a large tract in the heart of the city which at present is given up to old shanties, which are mere fire-traps, and a menace to this part of the city. The removal of "the hump" on Fifth Avenue will be a great improvement, if enough is taken off to make an appreciable difference, but if, as seems now likely, but 8 or 10 ft. are removed, the difference in grade would hardly be noticeable. Most of the modern buildings here have been built with this in view, however, — notably the Allegheny County Court House and the Carnegie Office Building, — so that it is only the older buildings which will suffer.



TERRA-COTTA DETAIL, HOUSES, TIOGA STREET, PHILADELPHIA.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Edgar V. Seeler, Architect.

Most, if not all, of the schemes for new office buildings which were talked of earlier in the year have been abandoned for the present. A number of small apartment houses are being built, but as yet there is hardly to be found here what would in any other city be considered a first-class apartment building. There is scarcely a fire-proof building among them. It seems as if only those with small capital are attracted to this kind of an investment, and that those who could put up larger and more expensive buildings are either seeking better investments or are not interested in building operations.

The following items of building news have been noted: Edward J. Carlisle & Co. have prepared plans for a fourteen-room school building at Braddock; cost, $60,000. They are also at work on the Sterrett sub-district school building; cost, $100,000. Rutan & Russell are preparing plans for the Church of St. Augustine. U. J. L. Peoples is planning a new school for the eighteenth ward; cost, $100,000. S. F. Heckert has planned a new building for St. Joseph's Academy, at Wheeling,



TERRA-COTTA PANEL.
Executed by the New York Architectural Terra-Cotta Company.

W. Va., and is at work on a new academy building at Gallitzin, Pa. T. E. Billquist has let the contract for a new residence at Sewickley. Alden & Harlow are at work on plans for four houses to be built at Homestead by the Carnegie Steel Company. The contract has just been let for a new residence on Fifth Avenue, East End, to cost $100,000. A Pittsburgh paper described it as being built of "Roman sized Pompeian brick." A New York firm are the architects.

The Pittsburgh & Lake Erie Railroad will soon commence work on a new depot, to be built on the South Side. They will spend some $300,000 on the building, not counting the train sheds, but unfortunately have decided not to employ an architect, but to allow their engineers to make the plans. So we may expect another of our engineers' buildings, which are always structurally safe, but rarely good to look at. A new high-school building is to be built at McKeesport, to cost $100,000.

MINNEAPOLIS AND ST. PAUL. — Prospects in the Twin Cities for 1899 give promise of being ahead of any of the past ten years, which means much or little, as one views it. There will be an unusual amount of residence building, the bulk of which will be done without the assistance of the architectural profession. Much as this is to be regretted, there is no apparent remedy up to date.

APARTMENT HOUSES, CHICAGO.
350,000 iron mottled flashed brick, Roman shape, were used in this building; supplied by the Ohio Mining and Manufacturing Company.
Edmund R. Krause, Architect.

The Tribune Building was visited by a disastrous fire a week since, which completely gutted the structure, leaving only front and rear walls fit for further service. As the building was of "slow-burning" construction, and as it seemed to burn freely, — yes, fiercely, — there has been considerable fun poked at that form of construction. No doubt the construction prevented a much worse fire and enabled the several hundred employees who were in the building to escape without injury. The presence of a thick fire wall was all that prevented the adjoining Century Building from a similar fate.

The Boston Block, which was burned some twelve years since, was also visited a second time by fire within the past month, the damage being only slight. Electric wires are blamed for this. The fact that the roof was of fire-proof material saved the structure from a worse fate.

Minneapolis will indulge in more brick paving this year probably, the experience of the past three or four years demonstrating forcibly its superiority from every point of view. Asphalt may be all right where there is a more even temperature, but for our climate, with its range from 40 degs. below zero to 100 degs. above, and the attendant frosts, penetrating this winter to a sufficient depth to freeze some of our water mains solid, there is too much certainty of fissures from the resulting contraction and expansion to insure any form of pavement from injury. There is a prospect that brick paving will be cheaper than ever before, in addition to its other advantages.

In Minneapolis a number of interesting projects are in the air, with a goodly prospect of eventually getting down to solid ground. Among them are a new Music Hall for the various societies, for rehearsals, meetings, etc.; a new seven-story brick business building at Nicollet and 5th Streets; the completion of the city side of the new City Hall and Court House; the erection of a new Chamber of Commerce, to cost a quarter of a million dollars; extension of our post-office building to extent of $50,000; a new hospital building for Asbury M. E. Hospital, to cost $100,000. Among architects the following: Court House at Balsam Lake, Wis., $25,000, Orff & Guilbert, architects; school building, at Wells, Minn., eight rooms, $20,000, same architects; high-school building at Salina, Kan., to cost $32,000, same architects: school building at Marshall, Minn., faced with pressed brick, cost, $35,000, W. B. Dunnell, architect; State Odd Fellows' Home, Northfield, Minn., to cost $25,000, H. W. Jones, architect; residence for F. B. Semple, at Vine Place and Franklin Avenue, to cost $50,000, Long & Son, architects; flats at Harmon Place and 12th Street, cost, $35,000, H. W. Orth, architect; flats at First Avenue and 10th Street: three double buildings, thirty flats, faced with pressed brick, cost, $50,000, E. P. Overmin, architect. The parishes of St. Mark's and St. Paul's Churches have united, and will erect a fine modern church structure in another year, on a site further out than the present St. Mark's.

In St. Paul there seems to be less projected in the line of important enterprises than in her sister city, there being some important work, however, as follows: School building, at Wheaton, Minn., seven rooms, brick and stone, cost, $15,000, Buechner & Jacobson, architects; State Normal School, at St. Cloud, Minn., addition and improvements, cost, $25,000, C. H. Johnston, architect; additions to Minnesota Club, to cost $15,000, Cass Gilbert, architect.

The City Market property has been transferred to the Library Board, who propose to transfer the property to a syndicate, which will erect a large business block thereon, and in another part of the city a magnificent Public Library building, to cost $500,000.

TERRA-COTTA DETAIL.
Executed by the White Brick and Terra-Cotta Company.
Albert Wagner, Architect.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: M. R. Burrowes, Sarnia, Ontario; W. G. Eckles, Citizens' Bank Block, New Castle, Pa.; E. G. Worden, Board of Trade Building, Scranton, Pa.; Wiskocil & Co., 107 Wisconsin Street, Milwaukee, Wis.; John Kiewit, Jr., New York Life Building, Omaha, Neb.

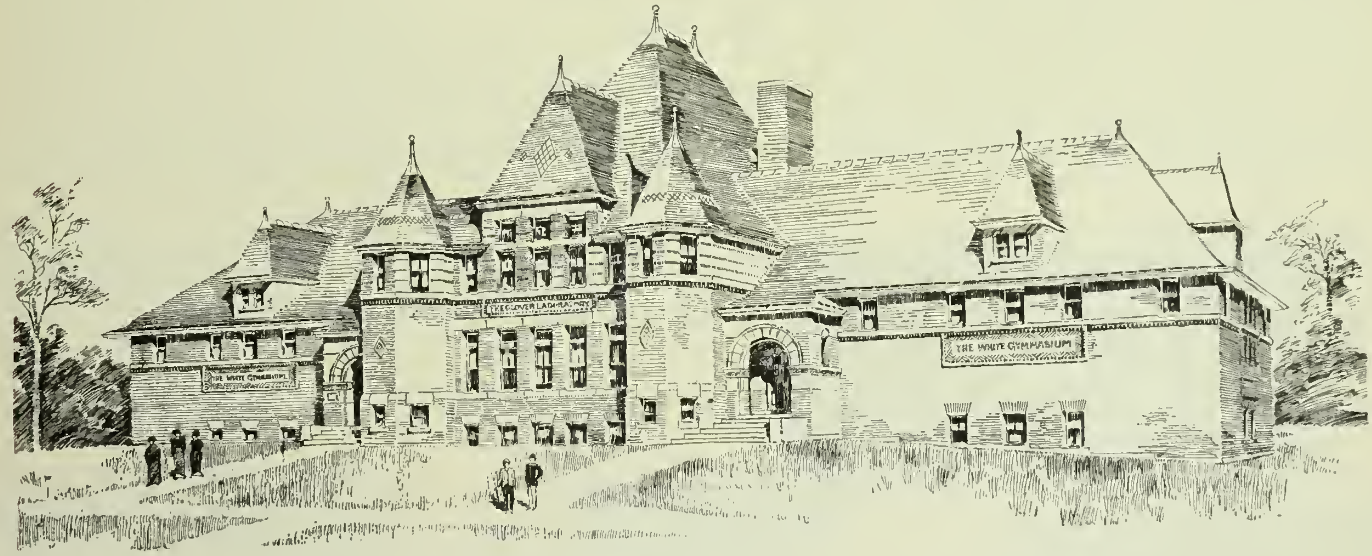
CURRENT ITEMS OF INTEREST.

WALDO BROS. are supplying Atlas Portland cement to McNeil Bros. at Hotel Bellevue, Beacon Street, Boston.

THE ILLINOIS SUPPLY AND CONSTRUCTION COMPANY is adding new machinery to make ornamental brick.

AN ENGLISH MANOR HOUSE.

THE following-named buildings are being fire-proofed by the Boston Fire-Proofing Company: Lynn Library, Lynn, Mass., George A. Moore, architect; East Boston High School, John Lyman Faxon, architect; Dorchester High School, Boston, Hartwell, Richardson & Driver, architects; South Boston High School, Herbert D. Hale, architect; extension to Adams House, Boston, William Whitney Lewis, architect; new "Proctor" and South Street buildings, Boston, Winslow, Wetherell & Bigelow, architects; Hotel Bellevue, Boston, Peabody & Stearns, architects.



LABORATORY AND GYMNASIUM BUILDING FOR ACADEMY AT SOUTH BRAINTREE, MASS.
Hartwell, Richardson & Driver, Architects.

RESIDENCE AT OAK PARK, CHICAGO.
Built of Kittanning Roman gray brick.
George W. Maher, Architect.

WALDO BROS., agents for Perth Amboy Terra-Cotta Company, have secured the contract for new building, South and Essex Streets, Boston; Winslow, Wetherell & Bigelow, architects.

THE HAUNCHWOOD BRICK AND TILE COMPANY, England, is installing a Grath Gas and Coking Furnace; W. P. Grath, inventor, St. Louis, Mo.

WALDO BROS. have been awarded the contract for Portland cement by the government at Fort Warren, Atlas having the preference over several other brands.

THE ST. LOUIS TERRA-COTTA COMPANY will supply the architectural terra-cotta for the new building for the Frankel Improvement Company at Des Moines, Iowa; Liebbe, Nourse & Rasmussen, architects.

THE DAGUS CLAY MANUFACTURING COMPANY will supply 150,000 of their buff bricks for the new high-school building at Mt. Vernon, N. Y.; also 200,000 for a new building at Crosby, Pa.; and their flashed Roman tile for a new residence at Pittsburgh, Pa.

THE contract for front brick for the new Chesebrough Building, Pearl, State, and Bridge Streets, New York City, Clinton & Russell, architects, has been awarded to the Powhatan Clay Manufacturing Company.

THE architect of the new office building at Newport News, Va., reported in our February number, was stated to be H. W. Silsby. This was an error, Mr. Silsby being the owner and J. Wyley Anderson the architect.

SAMUEL CABOT is mailing to architects a large plate of the new Southern Terminal Station, at Boston, from a negative by Soderholtz, advertising the fact that 62,000 sq. ft. of Cabot's Insulating Quilt was used in the station for insulating the heating and ventilating ducts. The quilt was specified by Prof. S. Homer Woodbridge, who has used it many times before.

THE following contracts have been closed for the roofing tile manufactured by the Celadon Terra-Cotta Company, Ltd., by their Boston agent. Charles Bacon: Beaconsfield Terrace, Brookline, Mass. (10 in. red Conosera tile), S. Butterworth, architect; pumping station, Spot Pond, Stoneham, Mass. (10 in. red Conosera tile), Shepley, Rutan & Coolidge, architects.

PANEL FOR PLUM BUILDING, NEWARK, N. J.
Executed by the Standard Terra-Cotta Company.
Thomas Cressey, Architect.

TERRA-COTTA DETAIL, HOUSES, TIOGA STREET, PHILADELPHIA.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Edgar V. Seeler, Architect.

WITHIN the last month, Charles Bacon, Boston representative of Sayre & Fisher Company, has placed contracts for nearly 700,000 bricks, viz.: South Boston High School, Herbert D. Hale, architect; Hotel Bellevue, Boston, Peabody & Stearns, architects; Spot Pond Pumping Station, Stoneham, Mass., Shepley, Rutan & Coolidge, architects; church interior, Lenox, Mass., Peabody & Stearns, architects: high school, Brookline, Mass., J. A. Schweinfurth, architect.

THE WHITE BRICK AND TERRA-COTTA COMPANY will supply the architectural terra-cotta on the following new contracts: Apartments, 83 Washington Place, New York, Quinby & Broome, architects; stores and lofts, Broadway and Canal Street, New York, Jordan & Giller, architects; school, East Orange, N. J., Boring & Tilton, architects; apartments, 85th Street and Riverside Drive, Henry Anderson, architect; residence, Westbury, L. I., Wallace & Gage, architects.

THE POWHATAN CLAY MANUFACTURING COMPANY, Richmond, Va., will hereafter occupy the commodious offices, Nos. 507-8 Townsend Building. The persistent efforts of this company have met with unprecedented success during the past season, and, taking into consideration that this was an "off" year, the record of their cream-white brick being used in fully 80 per cent. of the operations in which that class of brick was specified, is one of which the officers of the company can well be proud. Their gray brick is coming to be well known and liked by architects and contractors generally for its purity of color and general excellence, and has already been used in apartments and dwellings in the best portions of the city, although practically introduced only last year. Mr. Sol. Rosenbaum, second vice-president of the company and manager of the New York office, has been indefatigable in his efforts to place the product of the company at the top, and has certainly met with an unqualified success. Mr. H. K. Terry, vice-president and general manager, is in charge of the company's factory, and the perfection of the brick in regard to color and workmanship, and the prompt manner in which deliveries are made, prove that the management of this concern is in excellent hands. Noteworthy instances where the brick manufactured by this company have been used are the Chesebrough Building, Pearl and State Streets; the apartments at 79th Street and Amsterdam Avenue; The Livingston, at 86th Street and Central Park, West; the stores and lofts, 580 to 590 Broadway; the Powhatan and Tecumseh Apartments, 34th Street, near Seventh Avenue: Christ English Evangelical Lutheran Church, Brooklyn; the Hammerstein Company's new theater; The Victoria, 42d Street and Seventh Avenue, and a hundred other representative buildings. — *Record and Guide.*

THE LUDOWICI ROOFING TILE COMPANY has been conspicuously successful in its introduction in this country of the German system of interlocking roofing tiles. In the older European countries where roofing tiles have been for many years so perfectly made and so generally used, the more primitive patterns requiring cement in

CITY ELECTRIC LIGHT STATION, CHICAGO, ILL.
Adolph Finkler, Architect.

their joints or the long shingle lap have been superseded by the modern effective interlocking systems.

The use of nails in fastening a brittle material to structures where slight motion is possible, and dependence on perishable cement for joints in an otherwise imperishable roofing material, are radical defects, which are definitely avoided by the Ludowici system.

INTERIOR VIEW OF ROOF, CITY ELECTRIC LIGHT STATION, CHICAGO, ILL.

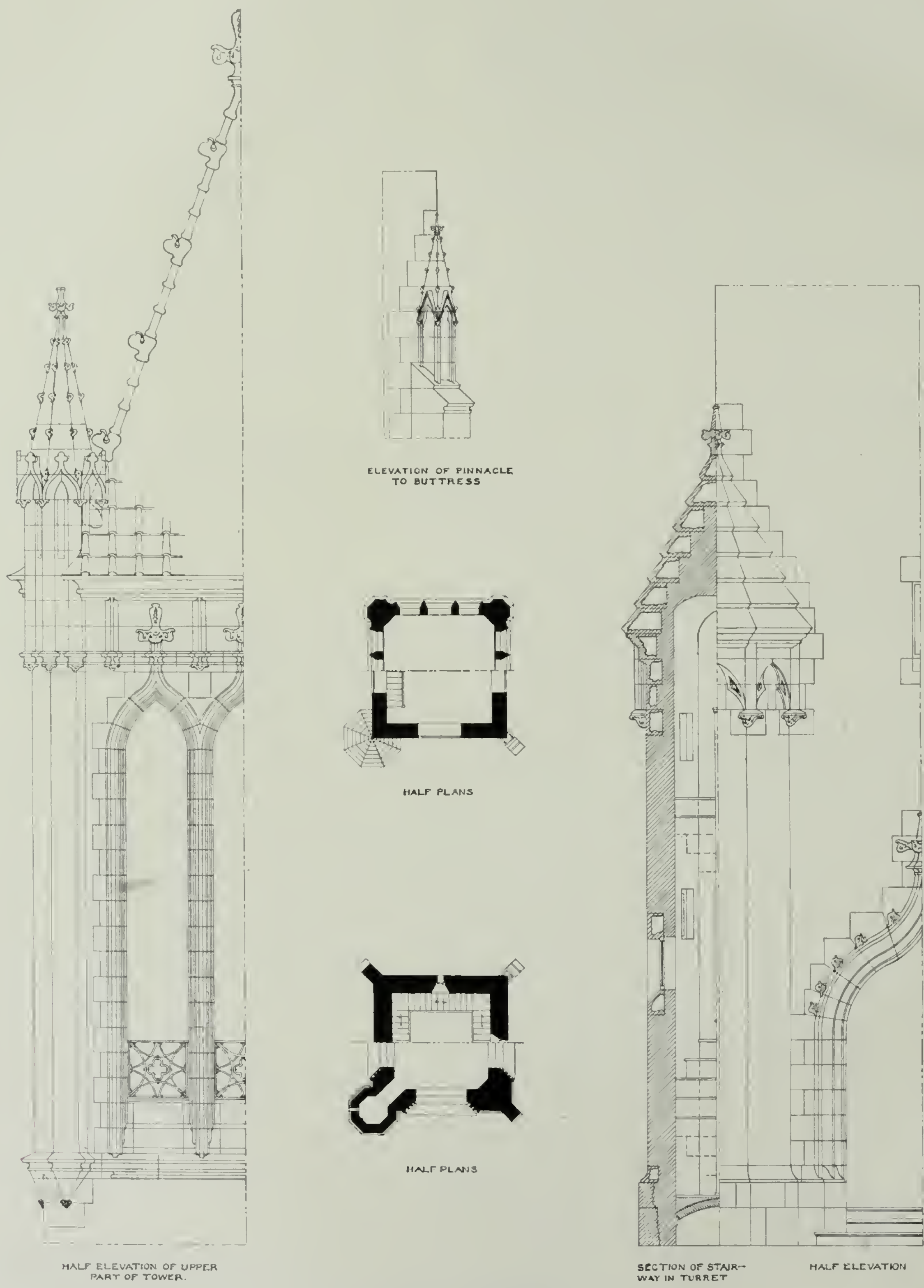
Beside the highest class of glazed ware for expensive work, the Ludowici Company offers equally durable interlocking tiles at prices so low that they are extensively adopted for factories and warehouses. Laid directly on iron purlins without sheathing or book tiles, their T-1 pattern affords thus a light, fire-proof, effective, and durable roof, and one which for ultimate economy is in advance of all else. The Carnegie Company, Illinois Steel Company, McCormick Company, Deere & Co., of Moline, Ill., are using Ludowici tiles on their manufacturing buildings, and *not* for *esthetic reasons*. Those who appreciate substantial construction, and can afford to be *truly economical*, will be interested in looking into this.

The accompanying illustrations of this use of tiles show them over dynamos where they have been in place four years. There is *no drip* of *condensation* from the Ludowici tiles. This most desirable feature is due to the fact that the Ludowici tiles are never vitrified, a condition in roofing tiles to which this company is unalterably opposed. The durability of properly made roofing tiles, hard burned, but not vitrified, they have established beyond question.

WANTED,

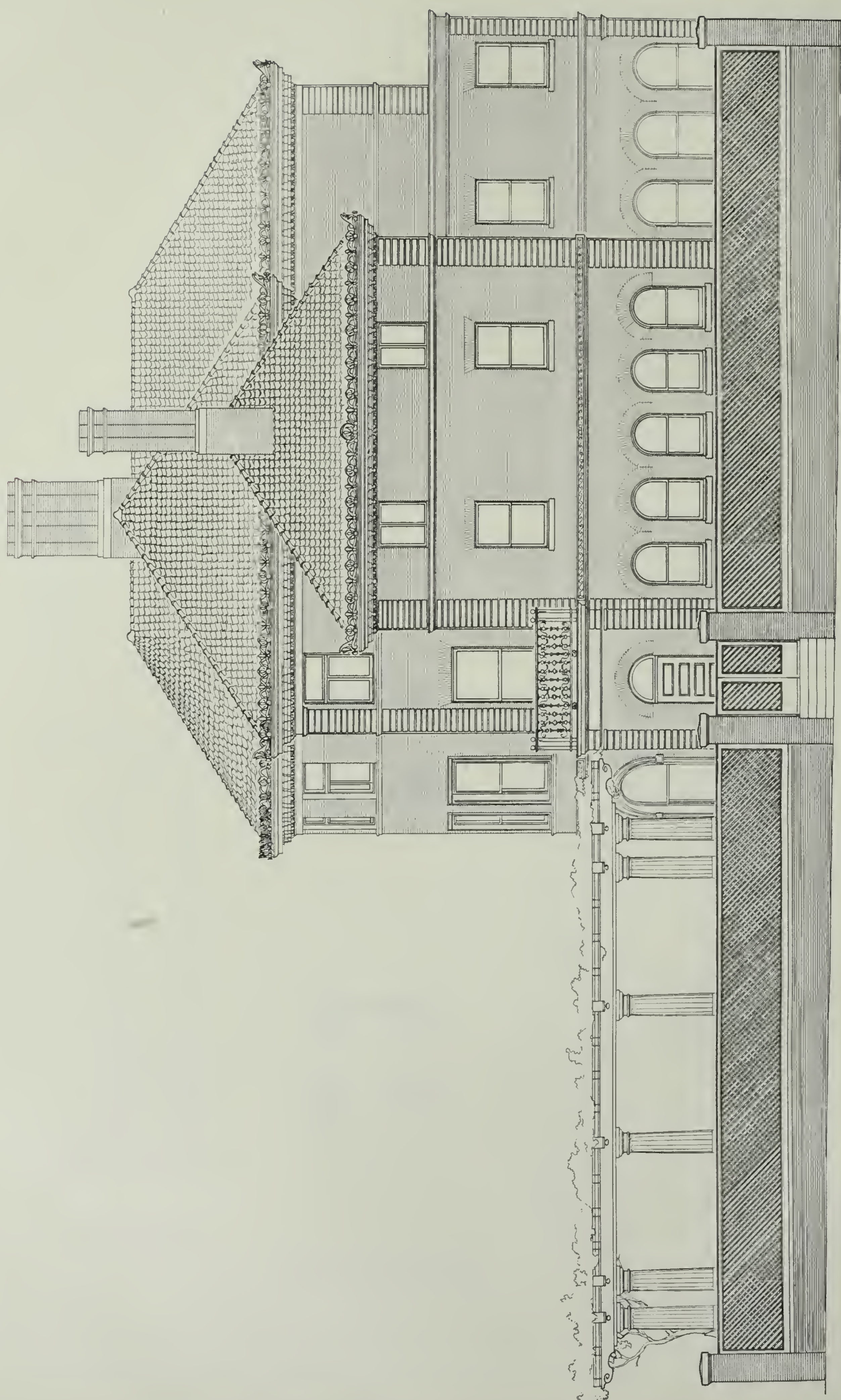
A COUPLE OF STRICTLY FIRST-CLASS DRAUGHTSMEN; ONE GOOD DESIGNER AND THOROUGHLY COMPETENT IN DETAIL WORK FOR ALL CLASSES OF BUILDINGS, AND THE OTHER A GOOD FREEHAND SKETCHER AND DESIGNER IN RESIDENCE WORK. STATE SALARY EXPECTED. ADDRESS, W. J. KEITH, LUMBER EXCHANGE, MINNEAPOLIS, MINN.

INDEX TO ADVERTISEMENTS.



A MEMORIAL CAMPANILE.
IOWA STATE AGRICULTURAL COLLEGE.

GEO. E HALLETT ARCHITECT
DES MOINES IA.

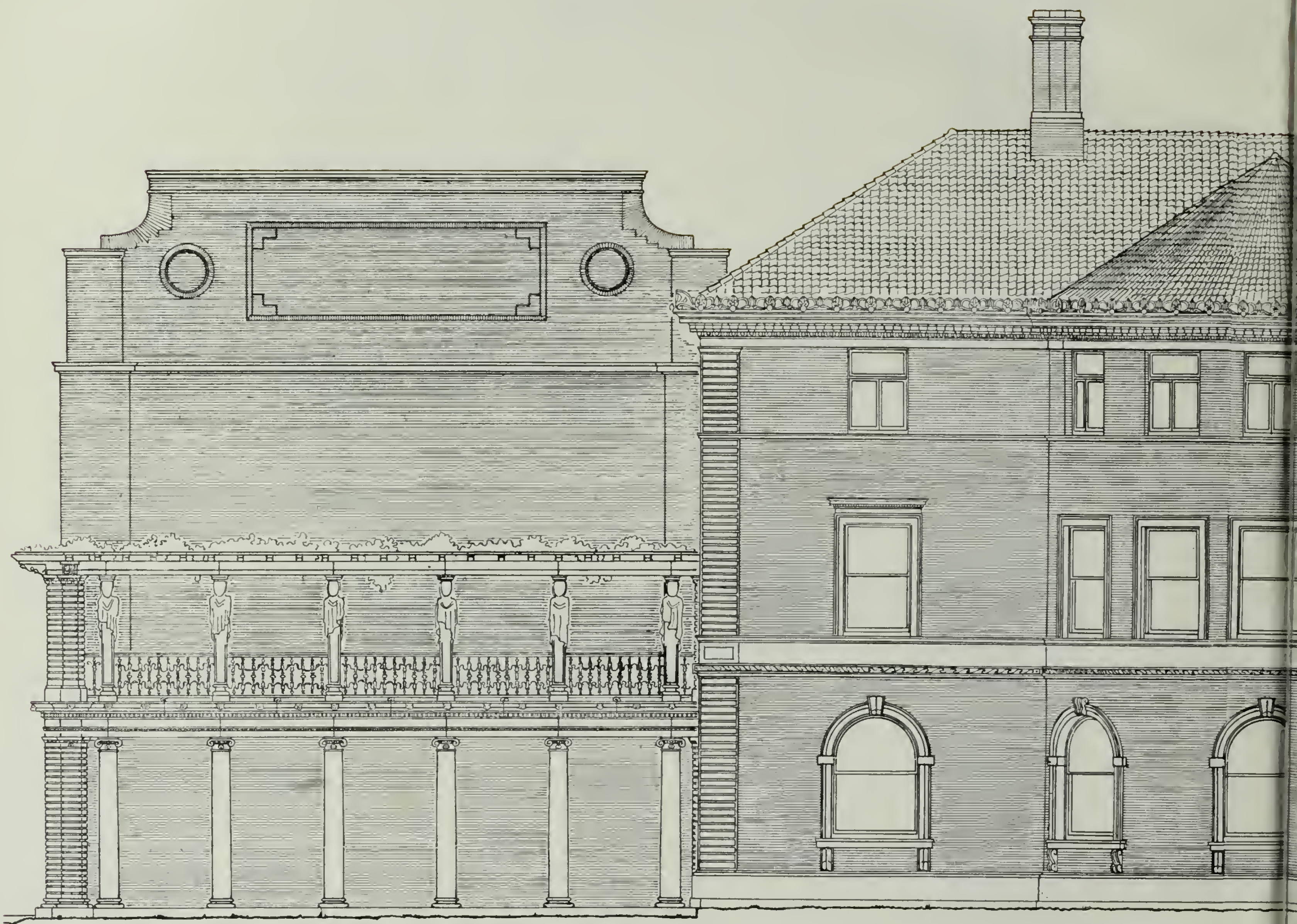


East Elevation.

HOUSE AT BROOKLYN, N. Y.

BABB, COOK & WILLARD, Architects.

VOL. 8. NO. 4.



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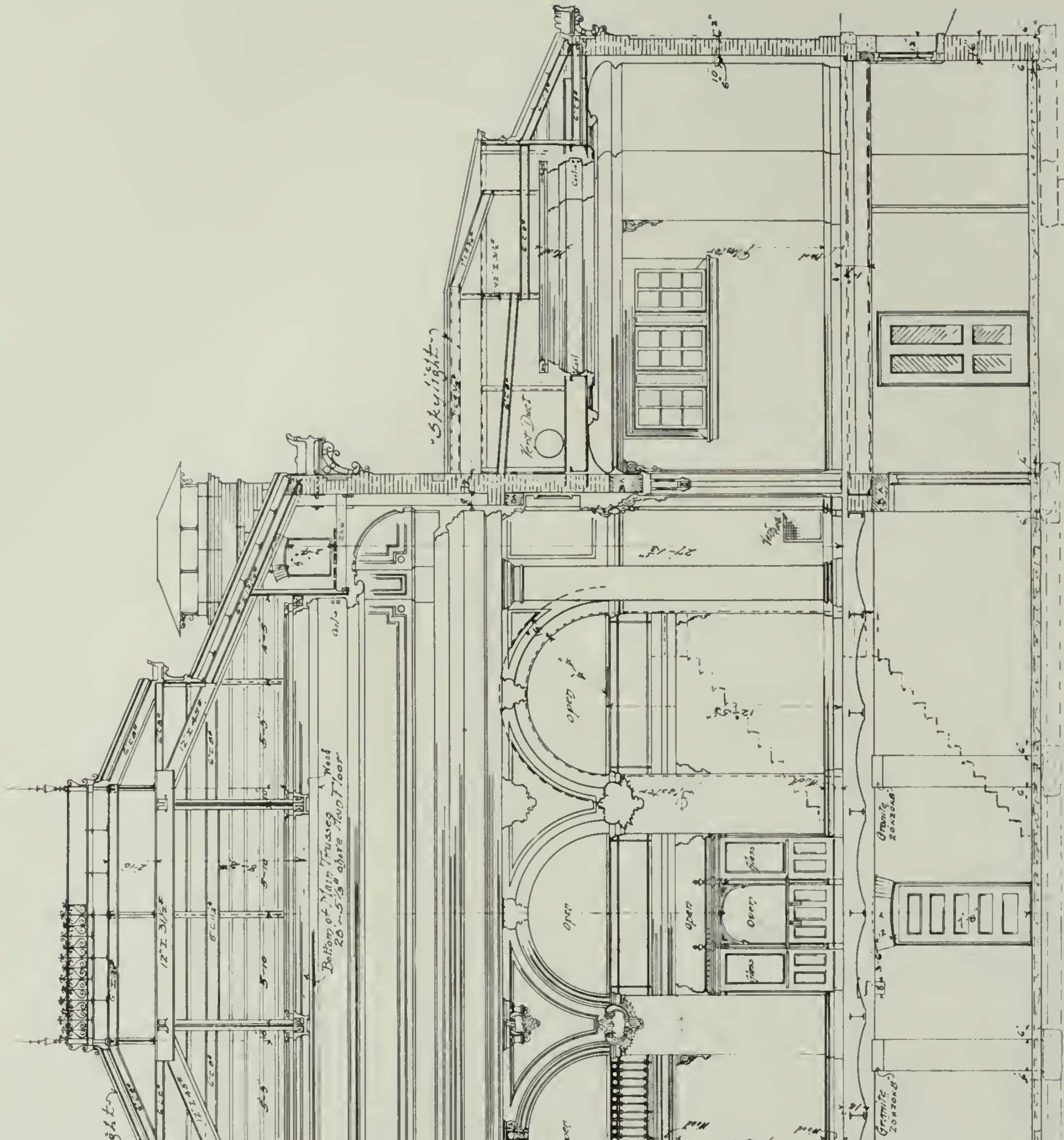

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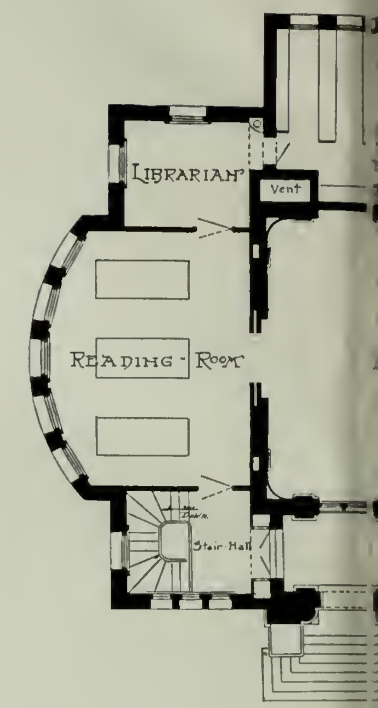

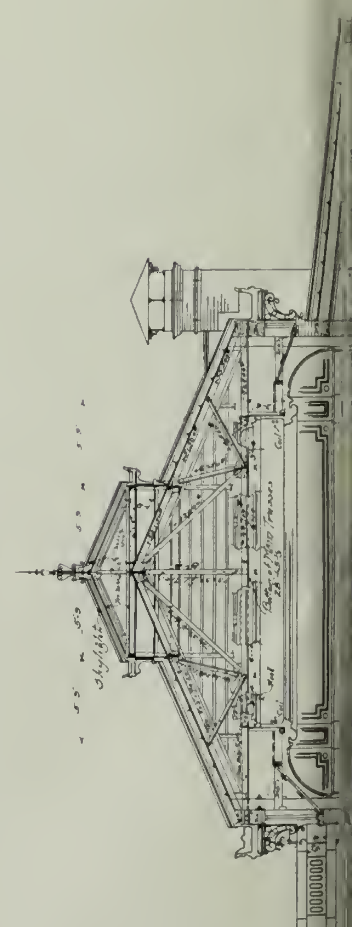

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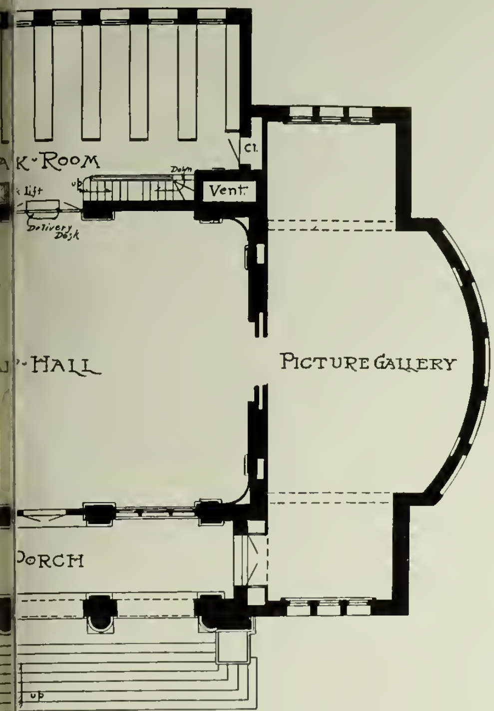

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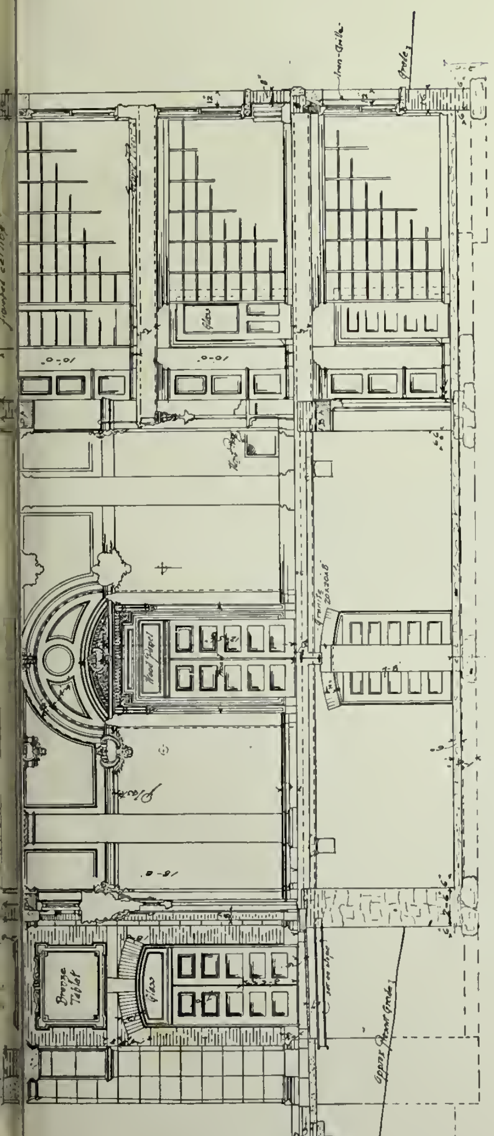

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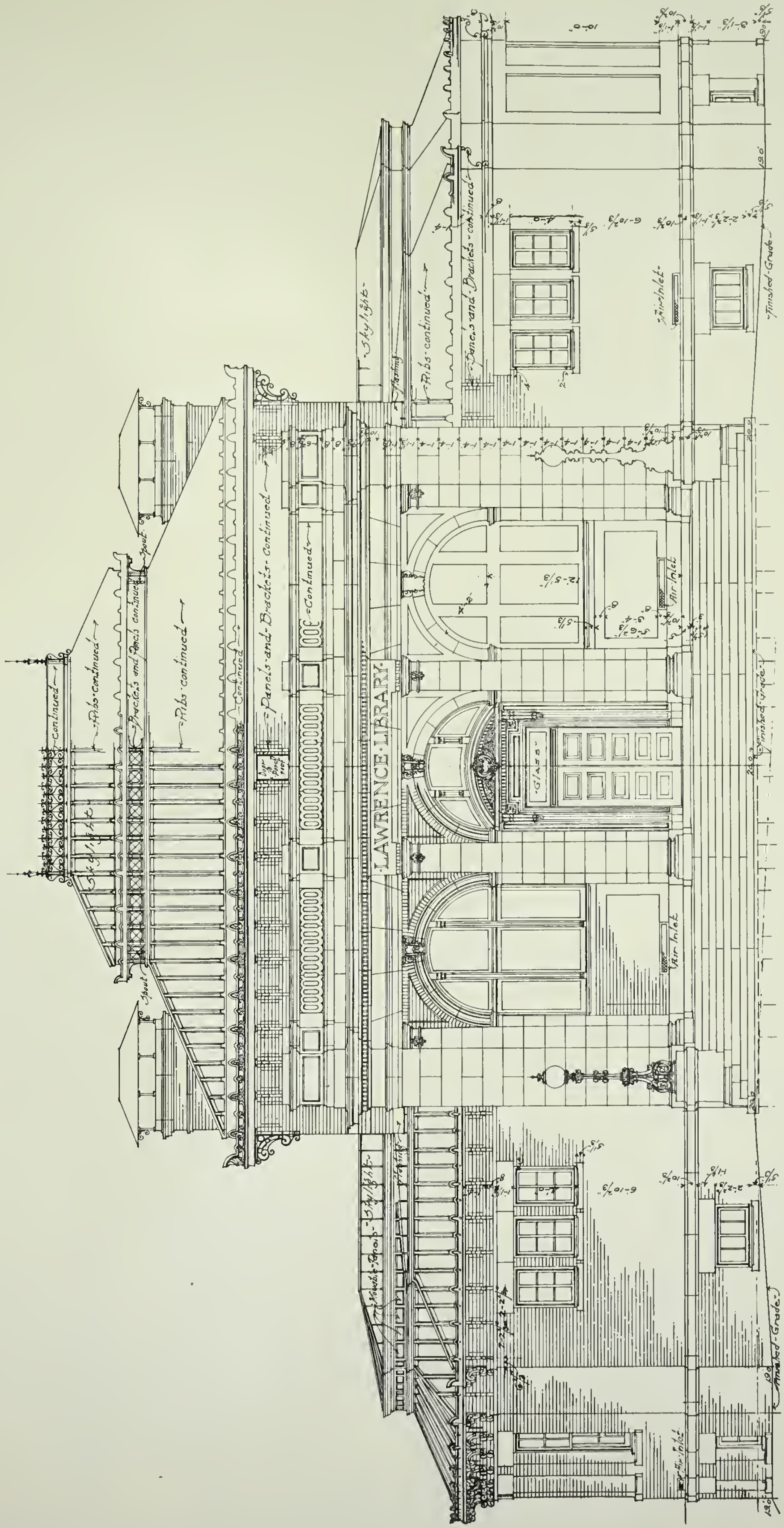
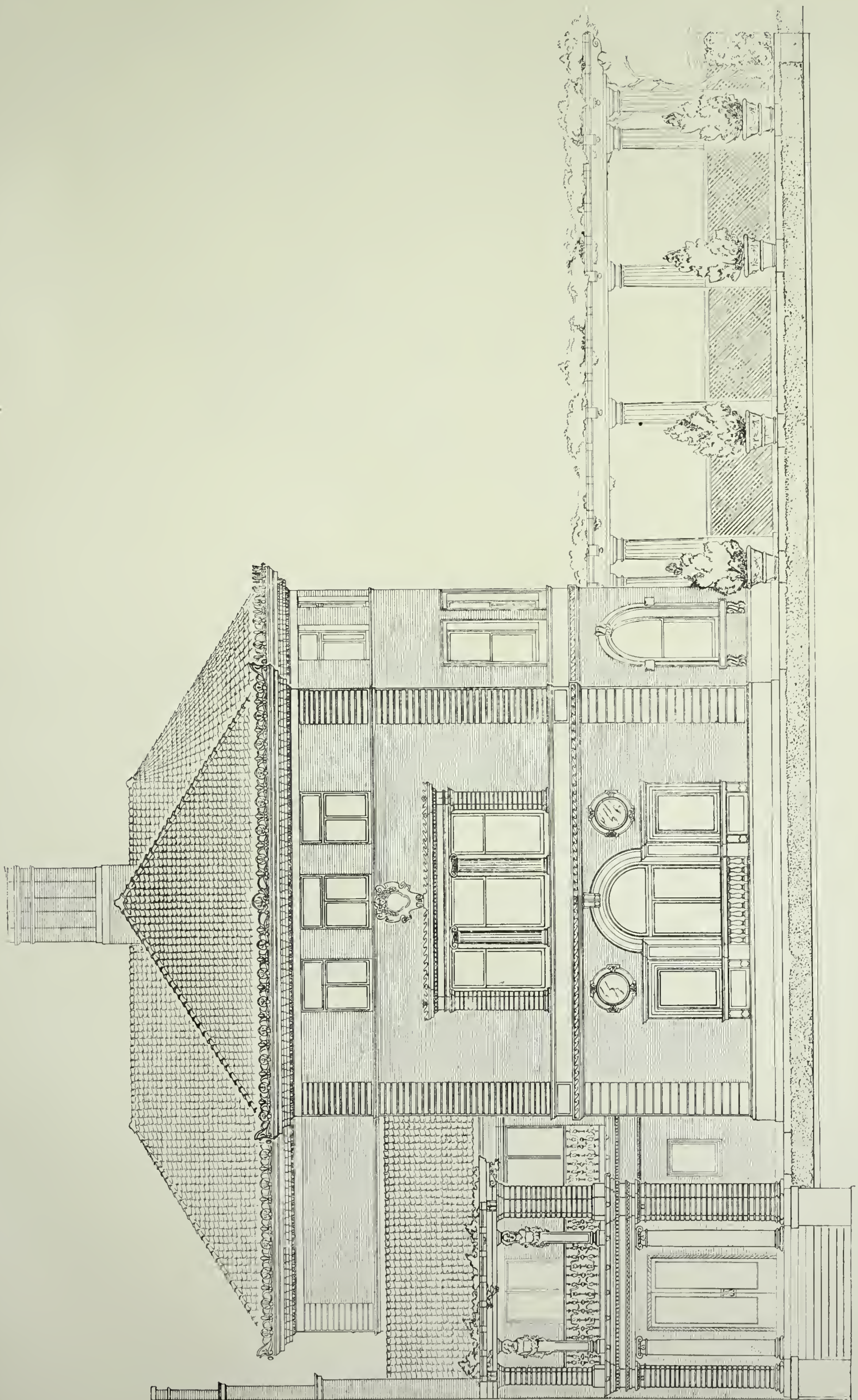


FRONT ELEVATION.

LAWRENCE LIBRARY, PEPPERELL, MASS.

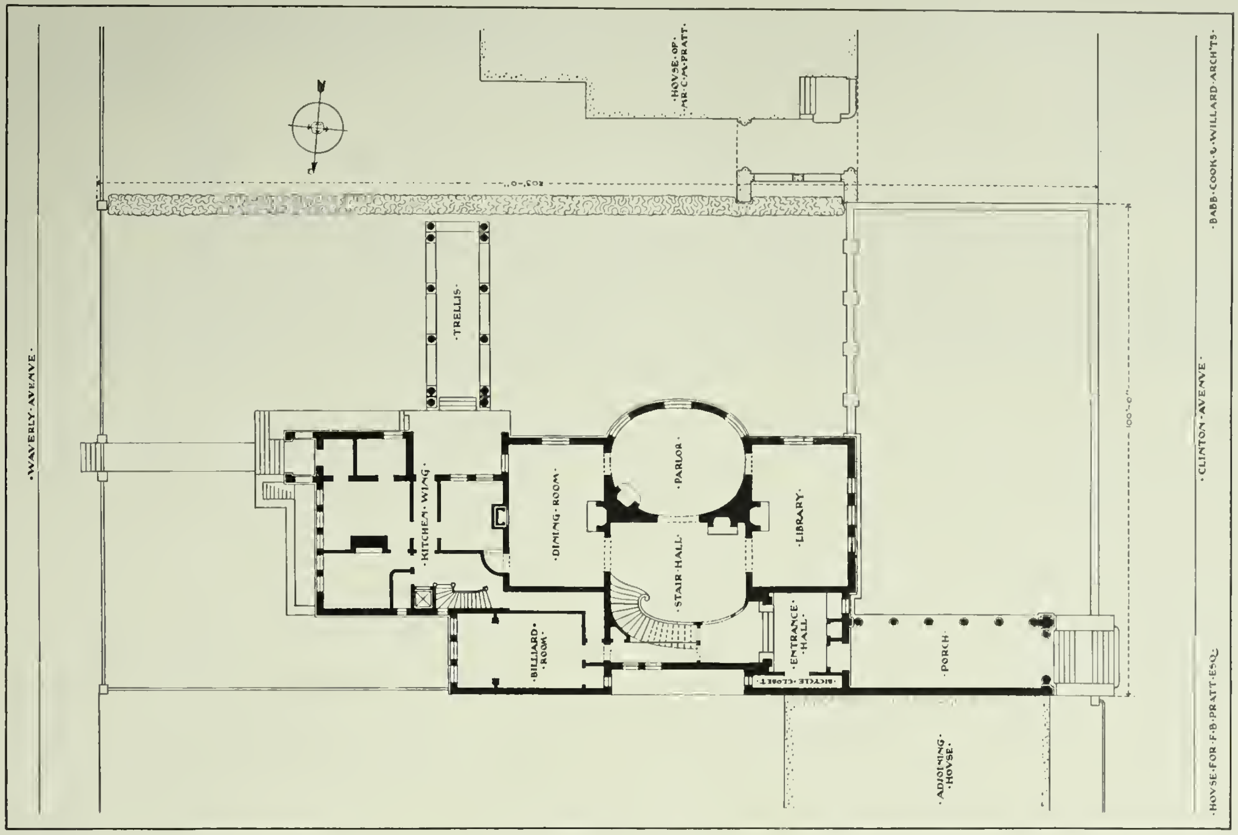
ERNEST FLAGG AND W. B. CHAMBERS, ARCHITECTS.



West Elevation.

HOUSE AT BROOKLYN, N. Y.

BABB, COOK & WILLARD, Architects.



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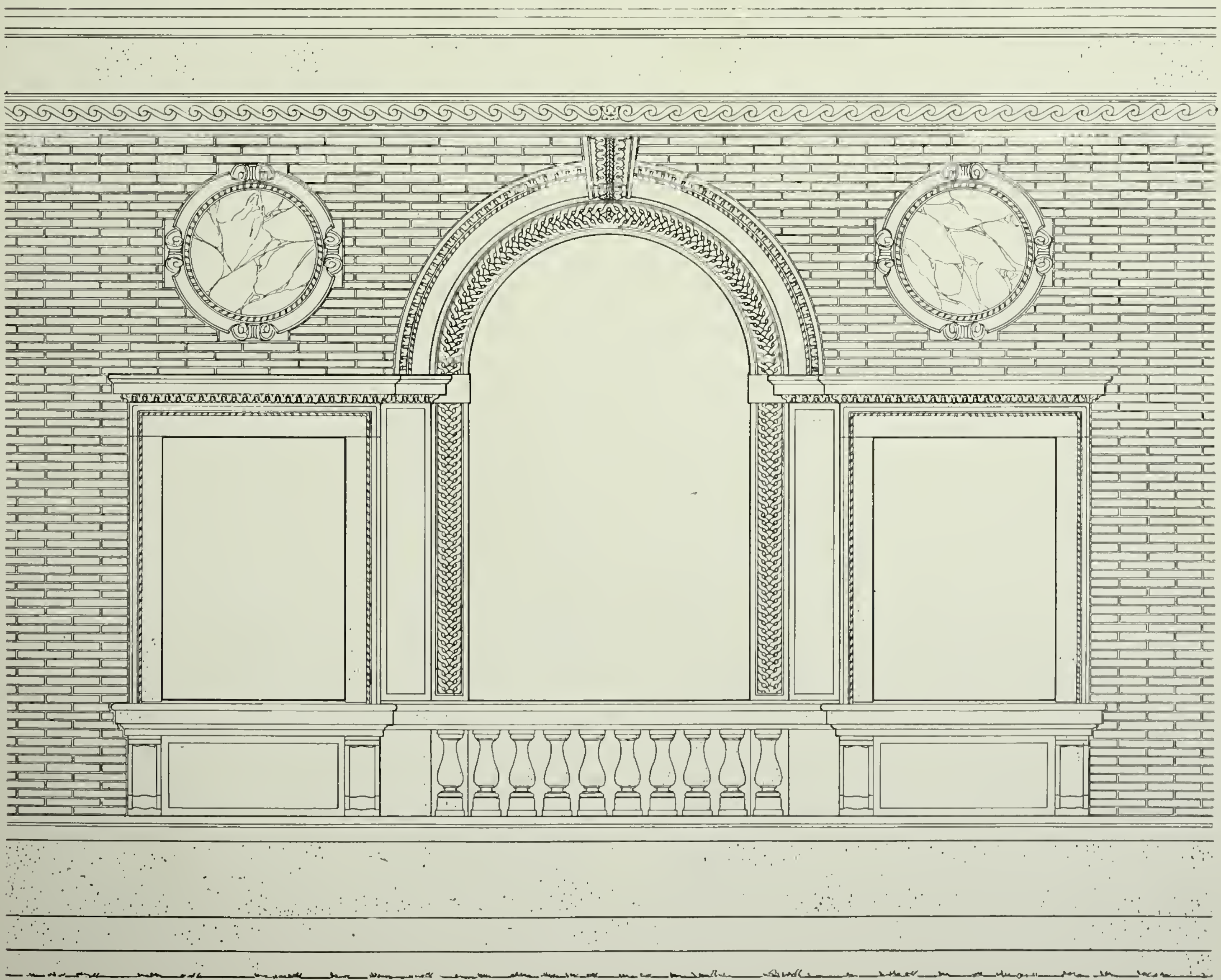

DETAIL, FIRST-STORY WINDOW, WEST FRONT.

HOUSE AT BROOKLYN, N. Y.

BABB, COOK & WILLARD, ARCHITECTS.

VOL. 8 NO. 4

THE BRICKBVILDER

APRIL, 1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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WE have been much interested in an editorial which appeared some time since in the *British Architect* under the above heading. It involves a question which sometimes comes very close to the heart of an architect, especially when after long and persistent study he has evolved a successful design only to have it reproduced by some inferior architect, who seizes upon his good ideas and tries to transplant them bodily. As the publishers of a journal which presents to the public the best work which is produced, we feel an interest in the subject, as the drawings which we offer are manifestly intended to be in certain directions of immediate and available help to architects who see our pages. It would seem at first thought as if by publishing a good design an architect were voluntarily surrendering his rights; for while every architectural publication as a whole is copyrighted, it is pretty hard to protect all the features of a design so that an unscrupulous person might not help himself thereto. There is, however, another, and we are inclined to believe a fairer, way of looking at it. In the first place we have yet to know of a single instance wherein the same design can be used for more than one piece of work. The conditions are always varying, and even though an architect deliberately starts out to copy a design, it is very seldom that he is able to do so, and he will almost invariably find that he has evolved a new design, and that comparatively few features of the original have been retained. Also, we have noticed that the architects and designers who are most fearful of having their designs copied, who would be most prone to seek protection in a copyright, are the ones whose designs really have the least merit, and generally for no other reason than that they have been obliged to labor so hard over their evolutions they are most desirous of building a fence around them, while the leaders in the profession, the men whose work we should all be glad to emulate, are seldom troubled with any apprehension of piracy. As the *British Architect* very truly states, the general run of architectural design has hardly enough original merit to make it worthy of copying, and in the case of architects whose work is sufficiently individual and characteristic to render it liable of being copied, it is a question whether the architect so plundered is greatly injured. We feel that the broader spirit is the better one, that there are enough ideas in this world to go around and to spare, that a certain amount of architectural expression is common property, and that all of us, beginners and masters alike, gain by the freest interchange of ideas. We grow from without quite as much as from within, and a copyright or any restriction placed on the free exchange of thought among the members of our profession would operate both ways by restricting the borrower and the lender. There probably never has been a man in this country who made a more liberal use of his books than the late H. H. Richardson, but he was a most royal borrower, and from whatever source his inspirations may have started they ended by being thoroughly and truly his own. We do not believe that many of our successful architects would ever care to do the same thing twice, or to solve the same problem in design twice in exactly the same way, and our experience has been that those whose designs we most honor are most ready to have them placed where they will benefit their weaker brethren to the greatest extent. A copyright in architectural design is perfectly practicable, but it would do more harm than good: it would narrow the spirit of the profession which is so free and generous at present in this country, and, moreover, there would be but slight necessity for it.

This brings to mind one feature to which we have frequently alluded in these columns which ought to be a settled custom with architects in good practise, namely, to have every one of their buildings signed in just the manner that a painter would sign his pictures. If the architect feels his name is going to be cut on the building before all who want to see it, he will be much more careful what sort of creation he puts up, and less prone to try to excuse a bad design by vague reference to the limitations of the owner or the builder.

THE intelligent observer, if candid and able to dissociate sentiment and patriotism from clear, unprejudiced thinking, cannot but admit that the painted wooden architecture of our suburban and country towns falls far short of entirely satisfying. Not that our shingle and clapboard houses are not comfortable and warm; not that they do not meet the conditions of good living; not that they are not frequently good to look at. All this must be granted; but that they do lack that great essential quality of good architecture, — namely, substantialness, permanence, — is undeniable. Born as we are to the heritage of our wooden vernacular, we are prone to think it good and all-sufficient, and we naturally resent criticism of it; but as our view broadens, as we know other countries better, we come to realize that our chauvinistic tenacity to this national custom is blind and illogical, and not commensurate with our advance in other lines among the nations of the world. It is too much to expect, however, that this state of things can change all at once. Wooden architecture must for a long time — possibly always — be somewhat cheaper than any other, even if the present heedless slaughter of our forest trees be not checked, and a man of moderate means must either build a wooden house or no house at all. But architects have before them a wide field of missionary work in inducing their well-to-do clients to build in something more enduring than wood. Perhaps it is not to be deplored that the greater part of the building of the last few generations is destined to early decay. Peace to its ashes! Our many wisely conducted schools of architecture, and intelligent study and travel have now bred us a class of architects who are ready and able to change all this, and upon them depends the character of the work of the coming century. Brick and stone have always been, and always will be, the vehicles of the highest architectural expression of advanced civilization, as they are likewise the most indelible record of architectural progress. It is the especial province of The Brickbuilder to stimulate the use of brick and burnt clay products. It entered the field of professional journalism for this express purpose, and it is gratifying to us to see already a sure awakening of architectural sense and conscience, and to know we are in the company of the wisest and ablest architects. From our intimate touch with them we know that amongst their clients there still exists much prejudice against the use of brick. The taste for inch boards, clapboards, and paint dies hard, but it is surely waning. Not the least of the many virtues of brick is that, in substituting it for wood, much of the *prettiness* of our house architecture will become impossible, and the *real* beauty and picturesqueness of simplicity, reason, and permanence will perforce take the place now held by the ornate, the queer, and the ephemeral.

NO argument is needed to establish the truth of the proposition that color-hunger is congenital in the human species, and that color-sense is one of the earliest that strives for gratification in all races. Man has never been satisfied with a shelter which simply kept out wet, wind, cold, and heat. As soon as these functions were subserved he has felt the need of graceful form and pleasing color. In the matter of color, vegetable and mineral stains were obviously the first to be used, being ready to hand. But these do not stay fixed after exposure to the weather; like modern pigments, they all fade, more or less. In fact, few natural products can withstand the bleaching effect of sunlight or the disintegrating processes of dampness, frost, and heat. The tendency of all exterior painting is to lose its original color, and degenerate into a dull, lifeless, dusty, neutral drab. Any street of new, painted wooden houses will show this in a few years, however varied they may have been at first. When this stage is reached the house owner repeats the process of painting, and with characteristic national unrest he generally tries a new color or combination of colors, — and in a few years more, *da capo*. Now, if there is anything in our domestic architecture more distressing than a neglected wooden house, gone shabby, it is its smart neighbor in a fresh garb of spring paint upon which you cannot look without blinking; but it must be confessed that there is still a preponderant liking for this brand-newness in the community. Compare such a house with one of the simple brick houses of last century, of which there are many examples in our seaboard States, North and South. This latter is still in vigorous health, is growing each year to be more and more an integral part of its environment. It has adjusted itself to its surroundings; it belongs there; it has grown soft and mellow, not faded, with years; with decent care it is always clean, not shabby; and it civilizes. Its little woodwork — window frames, etc. — must be painted, of course, for protection, but there is no periodical ruthless tearing down of vines in order to slap its walls with the paint brush.

We believe that the wood and paint day has passed its meridian and that the twentieth century will see substantial progress towards a wider use of the most imperishable of all known building materials, brick and the allied burnt clay products. Never have they been so many and so varied as now. All possibilities of form, color, and texture are here, and the material that comes out of the kiln is practically everlasting. Born of fire, fire cannot harm it, and time and the elements make but small impression on it, unless indeed it be to beautify it.

PERSONAL, CLUB, AND SUNDRY NEWS ITEMS.

Elmer Gerber, architect, has opened an office in the Reibold Building, Dayton, Ohio.

Alden & Harlow, architects, announce the removal of their offices on April 1, to 314 Fourth Avenue, opposite the Vandergrift Building, Pittsburgh, Pa.

J. H. Considine and Ornan Waltz, architects, of Elmira, N. Y., have formed a partnership, under the firm name of Considine & Waltz, and will continue in the same offices, 323 Carroll Street, Mechanics Building.

H. E. Weeks, formerly chief draughtsman with H. Neill Wilson, architect, Pittsfield, Mass., has been admitted to the firm, the new style of which is Wilson & Weeks; offices in Savings Bank Building.

The annual meeting of the St. Louis Architectural Club was held on the evening of April 4, at which the following officers were elected: President, R. M. Milligan; first vice-president, F. A. Seifert; second vice-president, Ernst Helfeusteller; secretary, F. A. P. Burford; treasurer, John C. Stephens; advisory members of executive board, William B. Ittner and Charles Pfeil.

In accordance with his instructions at the regular monthly meeting in March, when the new T Square Club Fellowship was announced, Mr. Seeler, president of the club, has appointed Walter Cope, Prof. Warren P. Laird, and Albert Kelsey a committee to formulate a program and prepare a code of rules to govern this competition. It is further stated that these will be cast in a new field, so as to include an indigenous sociological problem for architectural treatment.

At a recently held meeting of the Washington Architectural Club the following resolutions were adopted: —

To the Architects and Laymen of the United States: —

We, the members of the Washington Architectural Club, a representative body of architects of the District of Columbia, in meeting assembled, believing that,

While it is true that for a long time in the history of the office, known as that of the Supervising Architect of the Treasury, there existed a state of affairs which deserved the adverse criticism of the profession at large, those conditions have now been so altered for the better that adverse criticisms are unjustifiable and detrimental to the best interests of the profession, do hereby

Resolve, That this club extend to the Supervising Architect and his staff its moral support, and desires to uphold them in their earnest efforts to improve governmental architecture; and

Resolved, That this club resents the unjust and sweeping charges of incompetency and mismanagement which have recently been made in the legislative halls of the national Congress, and it is hereby further

Resolved, That this club believes it unjust to hold the present Supervising Architect responsible for work executed under the direct supervision of his predecessors in office.

Edward W. Donn, Jr.,
President.
Arthur B. Heaton,
Secretary.

The American Schoolhouse. XVII.

BY EDMUND M. WHEELWRIGHT.

(*Concluded.*)

THE work done by Mr. Snyder in the designing and construction of schoolhouses for our largest and most cosmopolitan city, work which is typically illustrative of the part our people are playing worthily in the civilization of our time, is most interesting and instructive.

The merit which this work has as a whole may make any criticism of it appear somewhat hypercritical, but in the treatment of a subject where the object is to collect and compare examples of schoolhouses that by such comparison the several types may be improved, some criticism of the buildings under consideration cannot well be avoided, and the writer believes that he should state his own preference for certain features of school buildings and his reasons for such preference when he finds such differences of opinion.

Mr. Snyder gives preference to mullioned windows instead of evenly spaced windows distributed in the class-room walls.

Except where the mullioned windows practically fill the whole wall whence the light is derived, the writer is of the opinion that the rooms would be better lighted if the windows were evenly distributed in the wall. He also maintains that for reasons previously given transom bars should be excluded from class-room windows, and that no architectural "style" should be chosen in the treatment

PUBLIC SCHOOL NO. 154, NEW YORK CITY.
C. B. J. Snyder, Architect.

which would make such a feature necessary. This opinion is not simply a dogmatic assertion; it is made with the conviction that a satisfactory expression can be given to a schoolhouse where even such minor considerations of utility are accepted as a governing condition. It is by the regard for such considerations that some approach can be made to what is being sought by some as an "indigenous" architecture, but which others look upon simply as architectural expression of practical needs carefully considered and freed from traditional forms foreign to the best requirements of a given building.

As to the methods of disposal of outside clothing adopted in these New York schools, the writer recognizes the stern financial necessity that the problem of popular education in New York presents; but he must assert his opinion that even when provided with special ventilation, as in these cases, that the separate "wardrobe" enclosure with outer light is far preferable to any method of outdoor clothing disposal immediately adjoining the corridors which is unprovided with outside light and is not permanently a separate enclosure. The writer again expresses the opinion that economy of space in high schools can be gained, and indirectly a desirable freedom be given such pupils, if individual clothing lockers in large rooms in the basement are provided instead of "wardrobes" on the several stories. It may be a small matter, but the former method appears to the writer indicative of a system in which due respect is

ROOF PLAYGROUND, PUBLIC SCHOOL NO. 147, NEW YORK CITY.
C. B. J. Snyder, Architect.

shown the individual, and that it is best to treat the high school scholar more as an individual than appears to be possible to be done in the case of pupils of the lower grades.

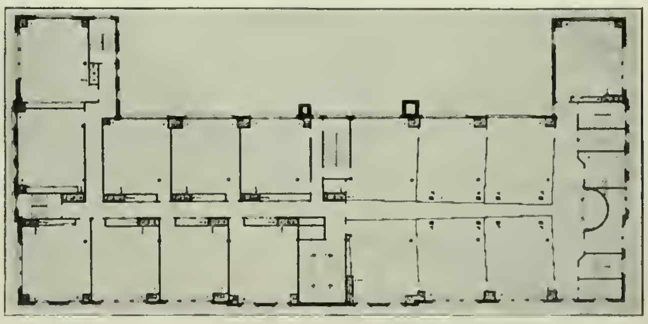
The later H plans adopted for these New York schools certainly present, under the conditions which Mr. Snyder describes, a better method of schoolhouse lighting than is shown in plans like that of public school No. 154.

The larger amount of wall surface shown in the first floor of this latter school is justified because this floor is not used for class rooms but for indoor play rooms. The writer believes that if the system of evenly spaced instead of mullioned windows had been here adopted, the design would have not given such broad wall surface in the central pavilions, and the class rooms placed in this section of the building would have been more satisfactorily lighted.

It is to be noted that the Girls' High School presents the features of large study rooms which have been commended in these articles as differentiating the high from the grammar school type.

It would appear better to have adopted a somewhat more expensive method of framing than that evidently used in schoolhouse No. 154, so that the columns which obstruct in a measure the floors of the class rooms of this building would have been covered in the partitions.

The introduction of the roof playground in New York schools is a most interesting innovation and one of practical economy where



FOURTH STORY PLAN, PUBLIC SCHOOL NO. 154, NEW YORK CITY.

schoolhouses are built upon costly sites. In these New York schools the first floor is generally used for covered playgrounds analogous to like features usual in English schoolhouses. This arrangement appears to entail a needlessly extravagant use of space, for with windows of proper height the basement play rooms serve the same purpose without danger to the health of the pupils.

Some of the German schoolhouses are placed in pleasant park-like grounds, but as a rule the gymnasiums afford the principal recreation space for the pupils, and there the pupils are under as rigid discipline as they are in the class rooms.

PLAYGROUND, FIRST FLOOR, PUBLIC SCHOOL NO. 154, NEW YORK CITY.
C. B. J. Snyder, Architect.

The French appear to attempt to a greater degree to give the playgrounds features which cultivate the sense of beauty. The playgrounds are usually enclosed by brick walls on which trees are trained, which, when in leaf, mass the whole wall in green, and further well-restrained landscape gardening effects are made.

There remains yet much to be improved in American schools as regards arrangements for recreation and physical training as well as bathing facilities and in the more decorative treatment of schoolhouse grounds.

In closing these articles the writer presents his general conclusions on the most important consideration in schoolhouse construction, namely, the lighting and air capacity of class rooms.

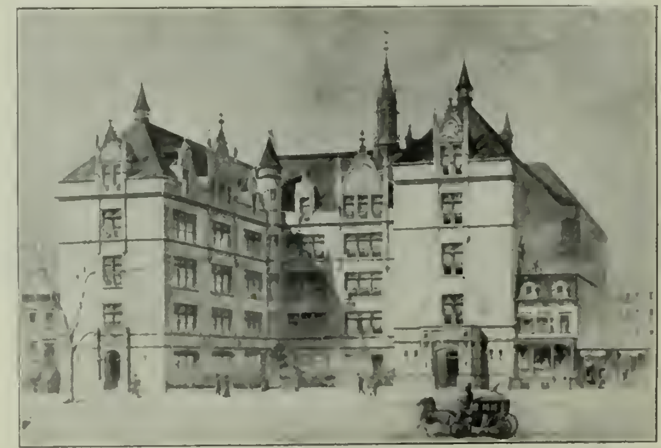
Class rooms of Europe and in the United States are usually 32 ft. in length. A greater length makes it difficult for the teacher's voice to reach, without strain, the pupils in the last row of seats, and at a greater distance the pupils' work on the blackboards at the end of the room cannot be readily seen from the platform. On the Continent, as in Germany, for instance, the same length is generally adopted, although 30 ft. is that preferred by most of the European authorities in schoolhouse construction. In the German schools analogous to those of grammar grades, in the United States, the class rooms are generally 32 ft. long, 22 ft. wide, and 13 ft. high, and accommodate, upon forms seating four each, fifty-six pupils, giving a floor area of 12½ sq. ft., and an air enclosure of 163 cu. ft. for each pupil. In the schools more recently built in Prussia, as in the Gemindeschule No. 204 of Berlin, which has recently been seen by the writer, although there are rooms of greater capacity, because of greater length most of the class rooms are approximately 32 ft. long, 20 ft. wide, 13 ft. high, and accommodate forty-six pupils, giving a floor area of 14 sq. ft., and an air enclosure of 182 cu. ft. for each pupil.

The grammar class rooms in the schoolhouses built within recent years in Boston, and in many other cities of the United States, are 32 ft. long, 28 ft. wide, 13½ ft. high, accommodating fifty-six pupils, seated at single desks, giving a floor area of 16 sq. ft., and an air enclosure of 216 cu. ft. for each pupil.

While the areas above noted are much in excess of those found in the latest and best Prussian schools, they fall far short of those advised by Dr. Risley, the most recent medical writer upon this subject. Dr. Risley advises a schoolroom 32 ft. long, 24 ft. wide, 15 ft. high to accommodate forty-five grammar school pupils, seated at single desks, giving a floor area of 19 sq. ft., and an air enclosure of 250 cu. ft. for each pupil.

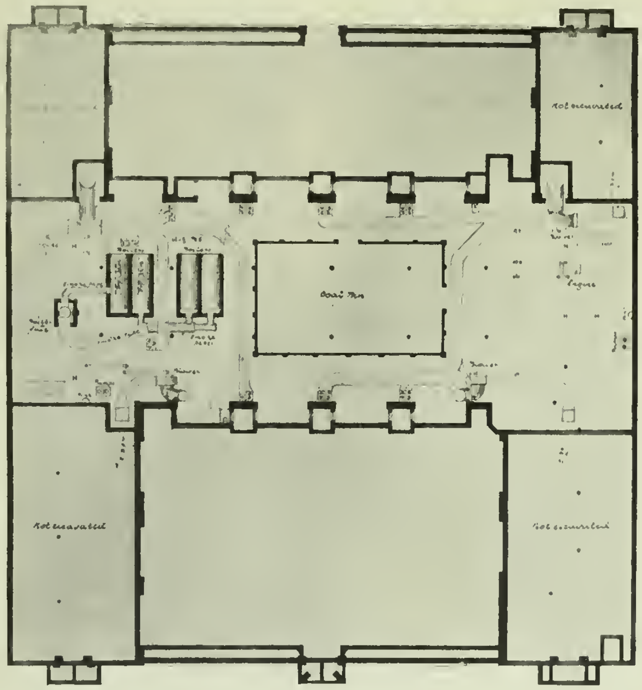
The seating of the pupils of American schools at individual desks, which elsewhere only maintains in Switzerland, and there, the writer believes, but in the upper grades, is not likely to be discarded in America. In the best practise the minimum floor area and the minimum cubical area of air for each pupil, 16 sq. ft. and 216 cu. ft. respectively, should be accepted, and with these factors determined, the question of the satisfactory lighting of the class rooms remains the principal consideration.

The code of rules established by the French government for the construction of schoolhouses fixes the minimum allowed height of a class room at 13 ft., and where the light comes from one side only, requires that the minimum height of the room shall be two thirds of its width measured from the inner wall to the face of the outer wall of the building. In a brick schoolhouse fitted with double sash, a class room lighted from one side only, 32 ft. long, 28 ft. wide, accommodating fifty-six grammar school pupils, would require a height of 19 ft.; a room of the same length, 24½ ft. wide, would accommodate forty-eight pupils, and would require a height of 17 ft.; a room of the same length, 21 ft. wide, would accommodate forty pupils, and would require a height of 14 ft. It will be seen that this French rule requires a greater height of ceiling than that recommended by Dr. Risley, *i. e.* 15 ft. in height for a room 32 ft. long, 24 ft. wide, accommodating forty-five pupils. It is probable that in the clear atmosphere of the United States, a room would have on the average, throughout the year, much better lighting than would a room of like dimensions in any part of the north of the Continent or in England. Even rooms 28 ft. wide are fairly well lighted by the



PUBLIC SCHOOL NO. 159, NEW YORK CITY.
C. B. J. Snyder, Architect.

four windows on one side of a room but 13½ ft. high. It is probable, therefore, that if the class rooms in American grammar schoolhouses were given a width of 24½ ft., they would be well lighted if given a height of 13½ ft. The disadvantages of height are obvious, providing of course that adequate lighting can be given by other means; but it is possible that the stud of 14 ft. 3 ins., adopted in the more recently built schools in the city of New York, may be that finally adopted in the grammar schools of the United States, especially in those of several stories in height. With this ceiling height economy of space can be gained by placing two tiers of toilet rooms in the height of a full story. In the United States, with ceiling height noted above, class rooms with windows on one side only and 28 ft. wide would probably be found not to be ill lighted; but American architects should not be content with the lighting which can be given a room, lighted from one side only, 28 ft. wide, with 13½ ft. of ceiling height, which are the customary dimensions given grammar grade class rooms in the United States.


PLAN OF CELLAR, PUBLIC SCHOOL NO. 165, NEW YORK CITY.

The dimensions given the best American class rooms for the grammar grade assure ample light only for the corner rooms, where, disregarding theoretical requirements, a good diffusion of light can be gained by taking it from the backs as well as from the left-hand side of the pupils. The inside rooms, even in most of the best designed schoolrooms of the United States, are planned to accommodate the same number of pupils as the corner rooms, under conditions of lighting which are approved by no authority on the subject. Dr. Cohn says, "There never can be too much light in a schoolroom," and he has, in this opinion, the support of all who have given practical consideration to the lighting of schoolhouses.

In writing exercises it is advantageous to have the major part, if not all, of the light from one side only, and that on the left of the pupil, but otherwise the quantity of the light, and not the direction whence the light comes, is the most important consideration. It is, therefore, better with corner class rooms 28 ft. wide to have four windows in the long wall and at least two, if not three, in the other outside wall. A window directly opposite the teacher's desk is objectionable, for the preservation of a teacher's eyesight is no unimportant consideration. A constant glare of light directly in one's eyes is certainly not desirable, and hence, as is often done in France and sometimes in the United States, it appears desirable that the portion of the wall directly opposite the teacher's desk should be blank, and that the windows on either side of this space should be placed as near the corners of the room as the construction makes possible, or as may be advisable for the external appearance of the building.

In the schools of the Continent, the class rooms are seldom more than 22 ft. wide, and the regulations generally provide the lighting of class rooms from one side only, but this regulation is in the majority of cases respected.


PUBLIC SCHOOL NO. 166, NEW YORK CITY.
C. B. J. Snyder, Architect.

From the foregoing it would appear that as far as the lighting of the corner rooms of American schoolhouses are concerned, they might retain their present large dimensions, but that,- in rooms lighted from one side only, if their height is not increased to 14 or 15 ft., should have in the rooms not more than 24 ft. of width, and in such rooms forty-eight instead of fifty-six pupils should be accommodated.

Class rooms in primary schools, if given a ceiling height of 13 ft., should be 32 ft. long by 22 ft. wide, and thus furnish accommodations for fifty-four instead of fifty-six pupils.

In Germany light from the north is permitted at the backs of the pupils; in France additional lighting through the wall opposite that through which the main light comes is required; while certain Swiss authorities condemn, and the regulations of certain Swiss cantons forbid, lighting from two opposite sides. The common sense view of the lighting question appears to be that all possible light should be gained for a class room, providing that if from a side of the building exposed to the sun the major part comes from the left-hand side of the pupils, that none comes in their faces, and that when on a side of the building exposed to the sun there should be no window directly opposite the teacher's desk.

The conditions seldom exist which permit the construction of a schoolhouse with the orientation which its designer would give it if there were no other governing conditions. There is by no means an unanimous opinion in regard to the best method of placing such buildings in regard to exposure to the sun. Most authorities agree that the eastern exposure is that most desirable for class rooms; but others whose opinions are also authoritative maintain that the northern light is preferable for these rooms, providing the windows are furnished with double sash and that the rooms are thoroughly warmed and ventilated. Probably most would agree that the greater advantages would be gained in a building whose main façade had a southeastern exposure, by which the sun can shine on three faces of the building for the greater part of the year. There is a substantial agreement that, on the whole, a westerly is less desirable than a northerly exposure, providing the building is well heated and ventilated. The question of the relative merits of the northerly and southerly exposure for class rooms may be left to be decided, as the advantages of a steady, clear northern light and that of the healthful and cheerful light from the south may be given the greater importance.

The Formal Garden. I.

BY ELMER E. GARNSEY.

THE scope of architectural design embraces much more than the planning and construction of buildings. The modern architect who has schemed out the general arrangement of floor space and communication, of plan and façade, has only begun his work; while, too often, his province is considered to be limited to the design of the actual structure, and he is debarred from the control of both interior and exterior matters, which are important factors in the artistic sum total of his labors.

Of these, the most important, so far as exterior effect is concerned, is the proper consideration of the approaches to and the grounds about the building.

That the varying conditions of site and surroundings exert a strong influence upon architecture needs no argument; and that an architectural design should in some degree include its surroundings is equally logical.

A building, unlike a ship, does not change its anchorage; it is a stationary structure, and if it is properly designed in relation to its environment and the design of that environment is in harmony with the building itself, there will be no suggestion of the possibility of its removal to another and equally appropriate site.

Too many buildings appear either to have been casually dropped on the ground or to have been towed in and temporarily anchored in the position they occupy. That design, therefore, is not complete which does not take into consideration the approaches to the building and the character and detail of the grounds in which it stands. The architect is not always at fault, even in this matter; for the client, either singular or collective, too often knows exactly what is most desirable, and is too seldom restrained from "laying out" the grounds in close proximity to the building,— either leaving the matter to the engineer, who is a man of curves and grades, to the gardener, whose laudable ambition is to make a great many blades of grass grow where none are desired and to cause the earth and every portion thereof to put on foliage and flower, or else the client, grown exceedingly wise in his generation, leaves nature to design the surroundings. As if nature was to be depended on to curb herself into harmony with man's handiwork!

IN THE GARDEN OF THE VILLA MEDICI, ROME.

Nature does her own work, and usually does it much better than man does his; and it is just because she is inimitable in her own way that man's art, architectural or otherwise, suffers by contrast. Nature is free and unconfined, while architecture at its best is the result of careful and painstaking study of rules and traditions, of proportion and symmetry; and when the freedom of the one is brought into immediate contrast with the studied forms of the other, incongruity rather than harmony is achieved.

It is necessary, then, that the architectural plan should include the laying out of the grounds about the building, that the axis of the one should be the axis of the other, that the proportion of building to grounds should be carefully considered, and that the details of each should be harmonious. These are basic principles and perhaps trite enough; but we need to be reminded of basic principles occasionally, "lest we forget."

The architect and not the gardener should design the grounds; the office of the latter being to execute the work of planting and pruning in accordance with the specifications of the other, just as the builder constructs the house from the architect's drawings and specifications; while the gardener's taste in design is no more to be relied upon than that of the mason or carpenter, to say nothing of the painter. The problem is not one of gardening or floriculture, but purely of design; not one of raising flowers or fruits, but of esthetics; and if the taste and judgment of the architect, in prescribing the style of architecture best adapted to a certain site, is conceded to be sufficient, how much more should he be consulted in the completion of that design, by the planning of its immediate surroundings! The value of these approaches and accessories can hardly be over-estimated, and few of the great monuments of architecture in the world owe nothing to their assistance.

The avenues of obelisks and sphinxes leading to an Egyptian temple convey an impression of distance and majesty unattainable without their long perspectives. St. Peter's, at Rome, robbed of its superb approach of elliptical colonnade, fountains, and terraced platforms, would lose much in dignity and impressiveness.

St. Mark's, in Venice, belongs to the piazza in which it stands, whose pavement is part of the ground plan on which it is built; and if this appreciation of plan be carried to its logical conclusion, we shall find Paris itself a great city built on an architectural or formal plan, studied in relation to the monuments which mark its axes and accent its vanishing perspectives.

It is probably too late to attempt the planning anew of our American cities, when the widening of a single New York street for a mile costs millions of dollars; but it is not too late to consider the individual building and its environment, nor to recommend the study of the subject to those who are, or shall be, responsible for the beauty or ugliness of our public and private buildings.

The architectural problem in our great cities is almost invariably limited to the area covered by the actual structure, and only in the case of public buildings has the town architect any opportunity to show his skill in bringing the edifice into harmony with its surroundings. He may exemplify some appreciation of the matter by the slight platform on which his building stands, for even this will effect a gradation between structure and street; while if he is so fortunate as to have a few extra feet of area, this platform may be emphasized by columns, balustrades, or vases, thus echoing his vertical or horizontal lines, and adding the touch of beauty, it may be, to a utilitarian structure. But it is when architecture is really juxtaposed with the nature of woods and fields that the need is felt for something more than simply "building up." We must "build out" as well; and when some suggestion of this sort is apparent, we shall find we are really building in harmony with nature, neither affronting her on the one hand, nor vainly striving to imitate her on the other.

There must ever be a sense of the inharmonious in stepping from the threshold into a quasi-wilderness; yet certain modern notions of landscape gardening seem to have for their objective the reproduction of natural growth and tangle, by the avoidance of straight lines in walks and planting, and the transparent and abortive attempts at the imitation of nature's subtle carelessness in lawn and garden.

It is pleasant to feel that we are not entirely at the mercy of nature as soon as we step from our habitation; that we have subjugated her in some degree, and that the dwelling place is somewhat extended beyond the actual walls of the domicil.

The porch or loggia, roofed and partially enclosed, should lead to the terrace, where, although the roof is no longer interposed between ourselves and the sky, a sense of protection is still maintained by the wall or balustrade, and the pavement protects us from direct contact with the soil. If possible, the terrace should be placed on that side of the house from which may be obtained the best view of the landscape; and if it is bounded by a balustrade or wall, this strong horizontal base line will be of great value to the picture.

Indeed, no landscape is seen at its best without some architectural line as a basis of the composition; for proof of this we have only to observe the great paintings of the past, where we shall find that the masters appreciated the principle, exemplifying it in their works; while for the reality one may look across the Roman Campagna from the terraces of the Villa d'Este at Tivoli; over Rome itself from the Pincian Hill; at Fiesole from the Piazza Michelangelo above Florence, or on Washington from the terraces of the Capitol.

THE ATRIUM IN THE CASA DEI VETTI, POMPEI.
An attempt at the restoration of the garden has been made here, and the statuettes, fountains, tables, etc., have been erected as nearly as possible in their original positions.

The treatment of the terrace must depend largely on local conditions; and in the best examples of the past may be found the most valuable object lessons. It may be a simple walk, paved, graveled, or turfed, its dimensions in scale with the house. Its reason for being is no less practical than esthetic, as it raises the ground about the house and carries water away from the foundation walls, as well as providing the structure with a base commensurate with its mass.

From the terrace we should descend into the garden; which, properly speaking, is an enclosed space of ground, separated from the outside world by a wall or hedge. It belongs to the house rather than to nature, and not until its boundaries have been passed should the restraint and conventionality of man's design and handiwork give place to the freedom and exuberance of nature's growth.

The question of design in the garden is of the utmost importance. What kind of a garden is it to be? An English author says, "People with a feeling for design and order will prefer the formal garden, while the landscape system, as it requires no knowledge of design, appeals to the average person who 'knows what he likes,' if he does not know anything else." (How seldom it is that those who "know what they like" appreciate really good art!)

The formal garden, then, appeals to those who appreciate order and design; in other words, those who are not insensible to the beauties of classic architecture; and the Italian villa, house and grounds considered together in one plan, that a classic plan, is the prototype from which all excellent formal gardening has been derived since the early Renaissance period, and to which the architect and amateur must look for the best knowledge and tradition now attainable.

Formal gardens and villas were not invented in the Renaissance, for the Romans had appreciated the charm of out-of-door life to the utmost, and had built extensive and elaborate pleasure palaces in southern Italy, while the country about Rome was once a vast garden, composed of the villas of nobles and wealthy citizens. Pliny's description of his own villas and the ruins of that of Hadrian are evidences of the enormous labor and expenditure of the Imperial age.

The awakened appreciation of the Greek and Roman classics exerted no small influence upon the arts of design in the fifteenth and sixteenth centuries, and architects, sculptors, and painters eagerly studied the remains and ruins of ancient art. That the antique was appreciated at a high value may be learned from the writings of the time, in which the work of contemporary artists was constantly compared with that of their predecessors of ancient Greece and Rome.

Michelangelo himself made an imitation of an antique statue for the purpose of selling it as a genuine antique, and, what is more, did so sell it through an agent; and this, while not a particularly creditable example, is an instance of the value put upon works of reputed antiquity.

Many of the Italian villas of the Renaissance period remain to show how wisely they were planned; and while some of these are perhaps more picturesque in their present ruined state, the majority have suffered severely from the tooth of time and the stupidity and vandalism which have robbed them of much of their ordered stateliness and tasteful decorations.

The introductions to the tales of Boccaccio present charming descriptions of the villas of his time, and would not be out of place in an essay on formal gardens, although a technical review can hardly be expected to offer its readers quotations from the Decameron.

While the Italian artists of the Cinque Cento may have been influenced to some extent by classic traditions, their own just appreciation of the advantages to be derived from the intimate association of the works of man and of nature in architectural design was their strongest incentive in the planning of formal gardens; and exactly the same reason may be advanced in this country to-day, in pleading for the formal treatment of grounds and gardens.

It may be said that our climate and landscape are so different from those of Italy that Italian gardens would be incongruous here; but it is the architectural principle which remains the same, while details may be altered or adapted to the altered conditions. As a matter of fact, we have almost a Neapolitan summer as compensation for our rigorous Siberian winter; and while we have no stone pines, or indigenous orange or bay trees, wherewith to form the perspectives of avenues, or to beautify our gardens, our American pines, firs, and cedars possess as much character, albeit of a different sort: while the bay trees and orange trees may be kept indoors during the cold and inclement season, to be brought out with the other summer paraphernalia to deck our gardens during the warm months. The charm of marble or terra-cotta columns and statues against

SMALL FOUNTAIN AND BALUSTRADE ON THE TERRACE OF THE VILLA BORGHESE, ROME.

a background of glossy green is as delightful in summer in New England as under the softer blue of the Italian sky. At any rate, we live in America, not Italy, and if we cannot enjoy all the delights of that summer clime all the time, that is no reason why we should be debarred from their enjoyment while we may.

The term "formal garden" has been a stumbling block to many, for we Americans dislike the notion of being formal anywhere, especially in our homes. But formality in garden design should be considered as relating to the plan and arrangement of the garden, not to our use and enjoyment thereof. The achievement of a ten-minute walk in a quarter acre of lawn by tortuous paths through clumps of shrubbery is not an artistic triumph, the landscape gardener to the contrary notwithstanding. This is the sort of art which clutters a drawing room with so much furniture and bric-a-brac that the visitor must tack and go about a dozen times before he finally moors alongside the tea table of the hostess.

Nor should the lover of gardens be faint hearted because his domain is circumscribed and small, nor seek to magnify its area by the exaggeration of nature's unstudied designs. A large house with a correspondingly large garden is desirable; but a small house with a small garden designed in harmony therewith is not to be despised.

Even in towns where the genius of improvement has removed all fences and walls, and everybody's lawn is nobody's lawn, where no house presumes to approach nearer to the street nor to shrink farther back therefrom than its neighbors, where all sense of privacy is lost as soon as we go out of doors, the wise man may contrive a bit of formal garden behind his house, where a brick wall or modest hedge will serve to bound his little paradise, within which graveled walks bordered with orderly box, a tinkling jet of water, a few orange or bay trees set in terra-cotta pots, and even a statue or two, with gay flower beds in their season, will all combine to make his peace secure and his happiness complete.

The best inspiration for such simple efforts, as well as for more

IN THE GARDEN OF THE FRENCH ACADEMY, ROME.

important and impressive schemes, may be found in the old gardens of the Old World; and for those who have neither opportunity nor inclination to go abroad to visit them, books have been written and illustrated on the subject; the most suggestive of them being that called "Italian Gardens," by Charles A. Platt, an American artist whose high reputation as a painter and etcher seems likely to be eclipsed by his triumphs in the planning of formal gardens in the United States.

NOTHING more clearly marks the line which separates the good from the vulgar artist than the power which the former always retains to use and not abuse his material, or his opportunities for its free use. The good artist in brick values properly the use of molded brick and terra-cotta, and uses them whenever he can do so safely and artistically. The bad artist seems, on the other hand, to rejoice in the endless profusion of ornament with which the cheap reproduction of molded forms supplies him; and the consequence is, that in some of the fronts of the later Italian churches we are annoyed and disgusted by the endless repetitions of features which would never otherwise have been marked at all. Such are the rich string courses, and eaves, and gable moldings, which are everywhere to be seen, and which ought never to be imitated. — *British Brickbuilder.*

Fire-proofing.

SIMPLE RULES FOR FIGURING THE STRENGTH OF TERRA-COTTA ARCHES.

BY HENRI G. CHATAIN, E. E., AND WM. M. EVERETT.

MANY excellent treatises have been written on the theory of the masonry arch and much concise information may be derived from them, but generally for the architect or builder who desires the needed information quickly these works are too complex and usually buried under a heap of mathematics. This article, like others of the same class, contains facts and principles that have been long and widely known combined with as little mathematics as possible.

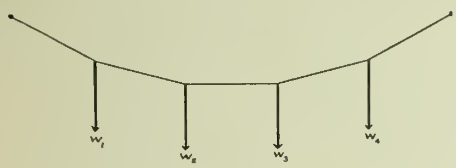


FIG. 1.

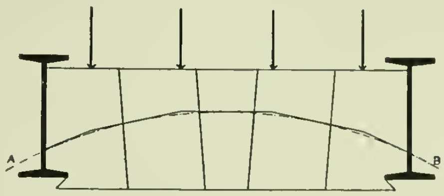


FIG. 2.

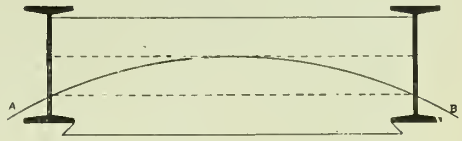


FIG. 3.

Let us first consider the "flat arch." If a straight line be drawn through each joint of the arch "blocks" (voussoirs) representing the position and direction of the resultant of the pressures at that point, the straight lines so drawn form a polygon, and each of the angles of that polygon is situated in the line of action of the resultant external force acting on the arch blocks, so that the polygon is similar to a polygonal frame loaded at its angles with the forces which act on the arch blocks (their own weight included). A curve inscribed in that polygon so as to touch all its sides is the *line* of *pressures* of the arch. For an example of the above, assume an elastic cord loaded as in Fig. 1.

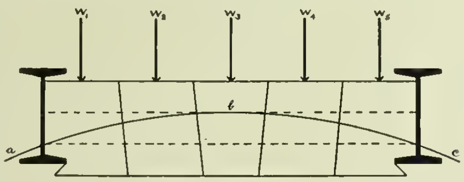


FIG. 4.

Now let us reverse the conditions and superimpose the loads W_1, W_2, etc., upon the arch, and for illustration we have Fig. 2. The line of pressures would be as represented by AB. But the smaller and more numerous the arch blocks into which the arch is subdivided, the more nearly does the polygon coincide with the curve; and the curve, or line of pressures representing an ideal linear arch, which would be balanced under the uniformly distributed forces which act on the real arch under consideration. The points where the linear arch cuts the joints in the arch may be taken, without any great error, for the center of resistance.

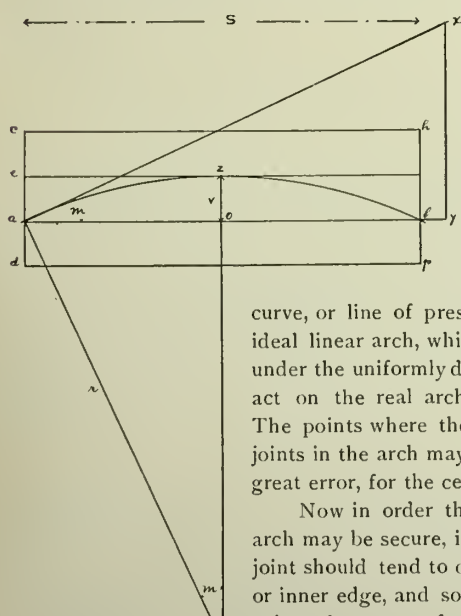


FIG. 6.

Now in order that the stability of the arch may be secure, it is necessary that no joint should tend to open either at its outer or inner edge, and so that such a condition exists, the center of resistance of each joint should not deviate from the center of the joint by more than one sixth of the depth of the arch; that is to say, the center of resistance should be within the *middle third* of the depth of the arch. Fig. 3 shows where line of pressure should be in a properly constructed and loaded arch.

AB shows the line of pressures, and dotted lines show the middle third. From which follows the well-known theorem: The stability of an arch is secure if a linear arch balanced under the forces which act on the real arch can be drawn within the middle third of the depth of the arch. It is true that arches have stood, and still stand, in which the centers of resistance of the joints fall beyond the middle third of the depth of the arch, but the stability of such arches is precarious. To insure stability of friction between the mortar and blocks themselves, the normal to each joint must not make an angle greater than the angle of repose (for the material in question) with a tangent to the line of pressures drawn through the center of resistance of that joint, but for our requirements under ordinary conditions, if blocks are used with a batter of one inch to the foot, the angle of repose for terra-cotta and mortar will not be exceeded.

In our following deductions a resistance to compression of 208 lbs. per square inch, which is considered safe by the New York Building Department, will be used, and introduced for convenience in the formulas directly. Judging from numerous tests made upon the material, which vary from 1,000 lbs. to 3,000 lbs. per square inch as the ultimate resistance to crushing, 208 lbs. per square inch would seem safe enough. It is further assumed that the arches are properly set with cement mortar, especially where they abut beneath the beams or supports as usually set.

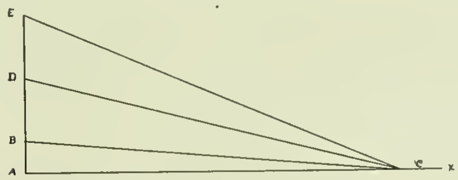


FIG. 5.

Assuming that we are to determine the allowable load per square foot upon an arch, let us take any arch, as Fig. 4, made of blocks of any given length, say one foot long, and through the middle third pass an assumed line of pressures (segment of circle) through the points *abc*.

The concentrated loads W_1, W_2, W_3, W_4, W_5 (placed as shown in the diagram) which would produce this particular line of pressures may be determined graphically as follows:—

$$\text{Lay off (Fig. 5) AB} = \frac{W_3}{2}$$

Through A perpendicular to AB draw a line Ax any length.

Now on the curve *abc* (Fig. 4) draw a tangent to a point midway between W_3 and W_4, and ascertain its slope, and draw a line with same slope through B (Fig. 5) intersecting Ax at C. Then lay off DB $= W_1$ and DE $= W_5$. Draw EC and DC.

These two last lines will also be tangential to the line of pressures at points midway between the points of loading.

Assuming that the area of a section of arch 1 ft. wide is A, then our total safe resistance to compression would be 208 A; but the weakest points in our arch are the points *a*, *b*, and *c* (Fig. 4), where the line of pressures touches the upper and lower third of the arch, so the pressure at these points would therefore be equal to twice the mean pressure on the total block, or

DIAGRAM OF ALLOWABLE LOADS.

SIDE-CONSTRUCTION "FLAT ARCHES." [MATERIAL SEMI-POROUS.]

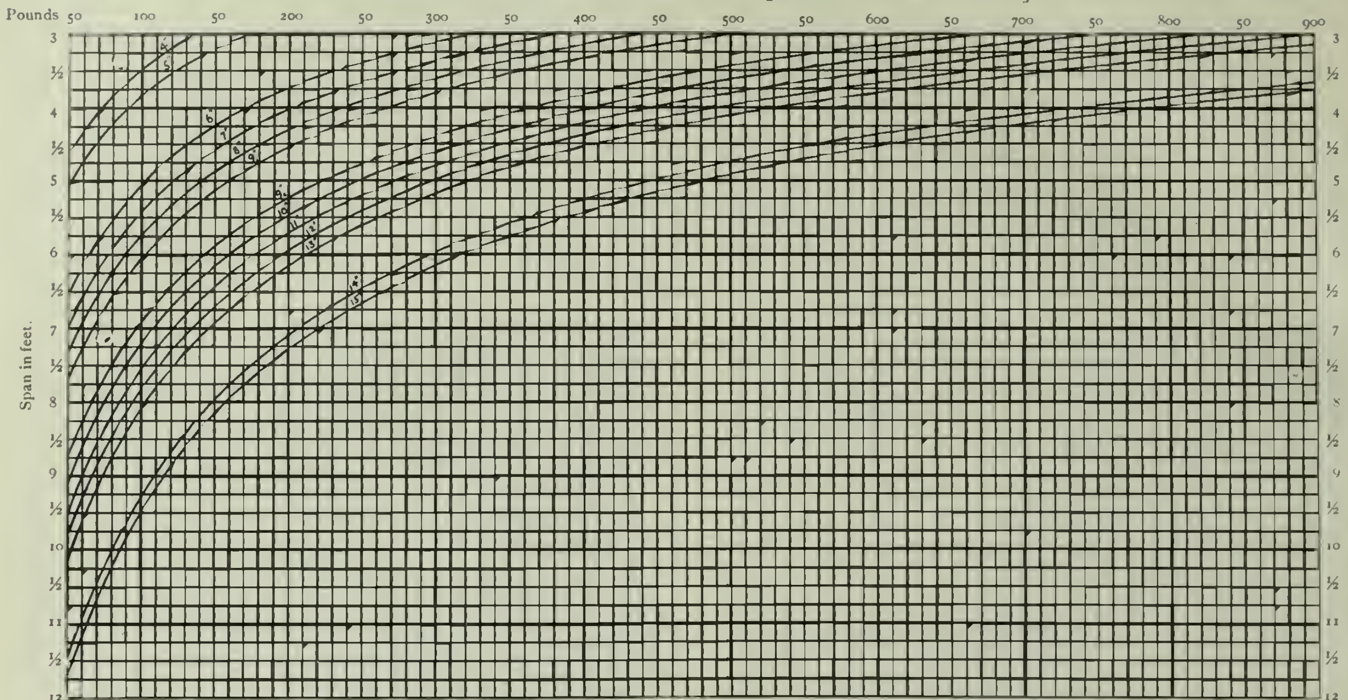


PLATE 1.

$$\frac{208\ A}{2} \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (a)$$

equals greatest allowable pressure in pounds, or graphically in the case in question, equal to the line EC. Therefore, comparing EC and ED, we can obtain the value in pounds of ED, which would be the allowable safe load per square foot of arch.

Let the rectangle *cdhp* (Fig. 6) represent any "flat arch."

$\therefore r = r'$ and $x'y = ao$ or $\frac{S}{2}$

$$r = \frac{V^2 + \frac{S^2}{4}}{2\ V}.$$

Or very nearly $r = \frac{S^2}{8\ V} \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (1$

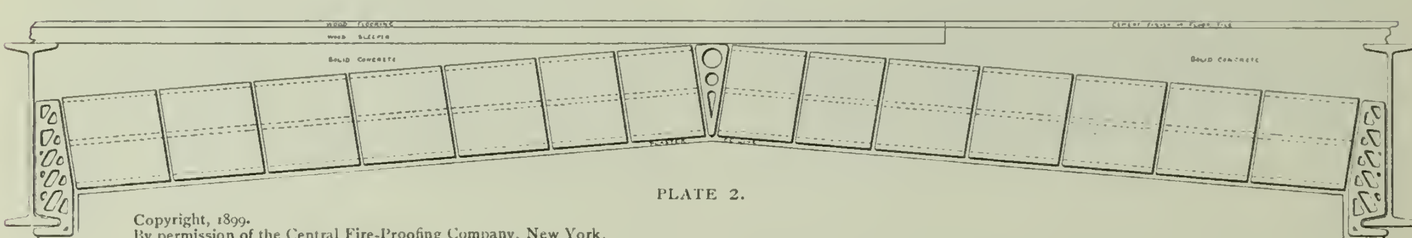


PLATE 2.

Let $ce = ea = ad$ by construction.

$ab = S =$ span of arch.

$ca = V = \frac{cd}{3}.$

$D =$ depth of arch.

Pass an arc of a circle through *azb* with *x* as the center.

Also $V = \frac{D}{3}$, substituting value of V in (1).

$$r \text{ or } r' = \frac{S^2}{2.7\ D} \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (2)$$

From the graphical demonstration previously described of the line of pressures in arches, we find that ax' is equal in magnitude

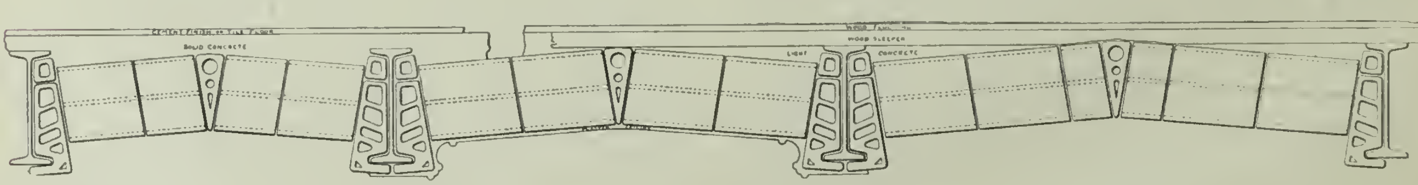


PLATE 3.

Draw zx perpendicular to ez.

Draw ax, and ax' perpendicular to ax; $\therefore$ by construction ax' will be tangent to the arc azb, at the point a.

Lay off $ax' = ax$, and draw $x'y$ perpendicular to ay.

Then by similar triangles and construction we have $ax'y = aox$.

and direction to the maximum pressure when the arch is considered loaded uniformly.

Let W = load per square foot in pounds.

T = total resistance in direction of line of pressures. [In pounds.]

A = the least cross sectional area of an arch 1 ft. wide.

From equation (a)

$T = 104 A$ ....(3)

$\therefore Wr' = T$ (r' in linear feet expressed as units)..........(4)

Substitute values in (4) of T and r' from (2) and (3).

$$W \frac{S^2}{2.7 D} = 104 A.$$

Reducing and transposing,

$$W = \frac{280.8 AD}{S^2}$$

Or approximately,

$$\text{Formula: } W = \frac{280 AD}{S^2} \quad \text{..............................(A)}$$

In which

A = least cross sectional area of an arch one foot wide. [In square inches.]

D = total depth of arch. [In feet.]

S = span of arch. [In feet.]

W = allowable load per square foot. [In pounds.]

Plate 1 shows a series of curves obtained by means of formula A. The calculations were made on that style of arch which is generally used, *i. e.* parallel webs and shells of ⅝ in. thickness. The allowable load per square foot for an arch at any span will be found directly above the intersection of the line representing the span and the curve representing the arch.

It will be noted in the diagram that two 9 in. arches are given, but this is due to the fact that the calculations were based on two different sections, of one and two horizontal webs respectively. It is not advisable to use formula A for very small spans, as the error in the formula becomes excessive, but for all practical spans it is near enough.

A new style of arch, the "serrated arch" recently devised by Henry L. Hinton, of the Central Fire-proofing Company of New York, is here illustrated in Plates 2 and 3. These arches will be fully described in future articles and their adaptability to various requirements will be shown.

A formula especially applicable to this style arch has been deduced and is as follows: —

From the demonstration of "flat arches" we have

$$r = \frac{S^2}{8 V} \quad \text{..............................(1)}$$

In this case $V = \frac{D}{3} + x$, in which x = rise of arch in feet.

Substituting this value of V in (1),

$$r = \frac{S^2}{\frac{8 D}{3} + 8 x}$$

But $W r = T$.

$T = 104 A$.

$$\therefore \frac{WS^2}{\frac{8 D}{3} + 8 x} = 104 A.$$

Transposing and reducing, we have approximately

$$W = \frac{280 A (D + 3 x)}{S^2} \quad \text{..............................(2)}$$

In the "serrated arch" $x = \frac{S}{24}$, *i. e.* ½ in. rise per foot of span.

Substituting this value in (2),

$$W = \frac{280 A (D + \frac{S}{8})}{S^2} \quad \text{Or,}$$

$$\text{Formula: } W = \frac{280 AD}{S^2} + \frac{35 A}{S} \quad \text{..............(3)}$$

The notation in (3) is of course the same as that used in the "flat arch" formula. In case a rise of other than ½ in. per foot of span, formula (2) could be used by substituting the proper value for x, but it must be expressed in feet. However, it is advisable not to use this formula for a rise greater than 1 in. per foot of span. For greater rises and regular segmental arches a formula will be given.

Fineness of Cement.

BY IRA O. BAKER.

M. Am. Soc. of C. E., Professor of Civil Engineering, University of Illinois.

CEMENT until ground is a mass of partially vitrified clinker, which is not affected by water, and which has no setting power. It is only after it is ground that the addition of water induces crystallization. Consequently the coarse particles in a cement have no setting power whatever, and may for practical purposes be considered as so much sand and essentially an adulterant.

There is another reason why cement should be well ground. A mortar or concrete being composed of a certain quantity of inert material bound together by cement, it is evident that to secure a strong mortar or concrete, it is essential that each piece of aggregate shall be entirely surrounded by the cementing material, so that no two pieces are in actual contact. Obviously, then, the finer a cement the greater surface will a given weight cover, and the more economy will there be in its use.

Fine cement can be produced by the manufacturers in three ways: (1) by supplying the mill with comparatively soft, under-burnt rock, which is easily reduced to powder; (2) by more thorough grinding; or (3) by bolting through a sieve and returning the unground particles to the mill. The first process produces an inferior quality of cement, while the second and third add to the cost of manufacture.

It is possible to reduce a cement to an impalpable powder, but the proper degree of fineness is reached when it becomes cheaper to use more cement in proportion to the aggregate than to pay the extra cost of additional grinding.

There has recently been introduced an article called sand-cement, which is made by mixing cement and silica sand, and then grinding the mixture. The grinding of the mixture greatly increases the fineness of the cement. A mixture of one part cement and three parts silica sand when reground will carry nearly as much sand as the original pure cement, which shows the striking effect of the very fine grinding of the cement. This statement is illustrated by the following data, which came before the writer in a purely accidental way while this article was in process of preparation.

Proportions.		Age when tested.	Ordinary Portland cement.	Sand-cement, reground.
Cement.	Sand.			
1	0	6 days.	392	217
1	0	13 days.	494	236
1	0	20 days.	462	277
1	0	27 days.	513	304
1	0	3 months.	577	365
1	0	6 months.	639	484
1	1	6 days.	232	164
1	1	27 days.	345	279
1	2	6 days.	175	130
1	2	27 days.	214	227
1	3	6 days.	139	89
1	3	27 days.	178	155
1	4	6 days.	102	57
1	4	27 days.	143	115

The sand-cement employed in securing the results in the last column is the Portland cement, giving the results in next to the last column, mixed one part cement to two parts silica sand and then reground. The tests were made under identical conditions, and hence the results are at least relatively correct. The data is not the most striking that could be formed, but it serves to illustrate the advantage of fine grinding. On the average, the American Portland cements are considerably finer ground than the imported.

Incidentally fineness is tested when in determining the tensile strength of a mortar a mixture of cement and sand is employed. However, it is wise to determine the fineness also directly by sifting through one or more sieves, since the results of tests with sand are liable to a wide difference due to the character of the sand, and consequently it is not always possible to know whether the difference is due to the sand or to fineness of the cement.

MEASURING FINENESS.

The degree of fineness is determined by weighing the per cent. which will not pass through sieves of a specified number of meshes per square inch. In the past, three sieves have been used for this purpose, viz.: sieves having 50, 75, and 100 meshes per linear inch or 2,500, 5,625, and 10,000 meshes per square inch respectively. These sieves are usually referred to by the number of meshes per linear inch, the first being known as No. 50, the second as No. 75, and the third as No. 100. In each case the diameter of the mesh is about equal to that of the wire. The per cent. left on the coarser sieves has no special significance, and hence the use of more than one sieve has been almost abandoned. More recently in this country a No. 120 sieve (14,400 meshes per square inch) has been employed, and sometimes a No. 200. On the continent of Europe the sieve generally used has 70 meshes per linear centimeter, corresponding to 175 meshes per linear inch (30,625 per square inch).

DATA ON FINENESS.

Nearly all Portland cements are so ground as not to leave more than 20 per cent. on a No. 100 sieve, and many of them will not leave more than 10 per cent. on a No. 100 sieve or more than 20 per cent. on a No. 200 sieve, and some manufacturers claim less than 10 per cent. on a No. 200 sieve. As a rule, American Portlands are finer ground than German, and German finer than English.

Most of the natural cements are usually ground so as to give not more than 20 per cent. on the No. 100 sieve; and many of them will not leave more than 10 per cent. on the No. 100 sieve; and a few will leave only 10 per cent. on the No. 200 sieve.

A common specification is that not more than 10 per cent. shall be left on a No. 50 sieve. Such a test simply prevents the adulteration of the cement with very coarse particles, but does not insure any considerable proportion of impalpable powder (approximately that which will pass a No. 200 sieve), which alone gives value to the cement.

Since the natural cement is not so hard burned as the Portland, there is more impalpable powder in proportion to the per cent. left on the test sieve than with the Portland; and consequently a severe test for fineness is not as important for natural cement as for Portland. Farther, since natural cement is much cheaper than Portland, it is more economical to use more cement than to require extra fineness. Again, since natural cement is weaker, it is not ordinarily used with as large a proportion of sand as Portland, and hence fineness is not as important with natural as with Portland.

MOST ECONOMICAL CEMENT.

It not infrequently occurs that several samples of cement are submitted, and it is required to determine which is the most economical. One may be high priced and have great strength; another may show great strength neat and be coarsely ground. If the cement is tested neat, then strength, fineness, and cost should be considered; but if the cement is tested with the proportion of sand usually employed in practise, then only strength and cost need to be considered.

Table I. shows the method of deducing the relative economy when the cement is tested neat; and Table II. (repeated from page 189, Vol. VII., for sake of comparisons) shows the method when the cement is tested with sand. The data are from actual practise, and the cements are the same in both tables. Results similar to these could be deduced for any other age; the circumstances under which the cement is to be used should determine the age for which the comparison should be made.

The above method of selecting the most economical cement gives the advantage to a cement which gains its strength rapidly and which is liable to be unsound. Therefore this method should be used with discretion, particularly with short-time tests.

TABLE I.

RELATIVE ECONOMY OF CEMENTS TESTED NEAT AT 7 DAYS.

Cements.	Fineness.		Tensile strength.		Cheapness.		Relative economy.	
	Per cent. passing No. 100 sieve.	Relative.	Pounds per square inch.	Relative.	Cost per barrel.	Relative.	Product of relative fineness, relative strength, and relative cost.	Rank.
A	90.0	98.1	628	81.5	$2.30	100.0	79.95	2
B	88.0	95.9	771	100.0	2.34	98.3	94.26	1
C	88.7	96.6	477	61.9	2.40	95.8	57.28	4
D	91.8	100.0	391	50.7	2.45	93.8	47.55	5
E	81.5	88.8	660	85.6	2.47	93.1	70.79	3

TABLE II.

RELATIVE ECONOMY OF CEMENTS TESTED WITH SAND AT 7 DAYS.

Cements.	Tensile Strength, 1 C. to 3 S.		Cheapness.		Relative Economy.	
	Pounds per Square Inch.	Relative.	Cost per Barrel.	Relative.	Product of Relative Strength and Relative Cost	Rank.
A	168'	95.4	$2.30	100.0	95 40	2
B	176	100 0	2.34	98.3	98.30	1
C	166	94.3	2 40	95.8	90 33	3
D	135	76.7	2 45	93 8	71 94	4
E	135	76.7	2.47	93.1	71.40	5

THE Portland cement industry in 1898 will probably show an advance in production over that of 1897 quite equal to that of 1897 over 1896. It is conservatively estimated by good authorities that the output in the Lehigh Valley in 1898 was about 2,500,000 barrels, or nearly 1,000,000 barrels more than in 1897, and that the American production in 1898 will reach 3,500,000 barrels. It is also estimated that the production in the Lehigh Valley will increase in 1899 over 1898 from 900,000 to 1,000,000 barrels, making the output of Portland cement in the United States for the present year approach 4,500,000 barrels. The imports during 1898 and again in 1899 will probably decrease, as the reports of the Bureau of Statistics of the Treasury Department for the fiscal year ending June 30, 1898, show a decrease in the first six months in 1898 over the imports for a similar period in 1897.

Unfortunately, in the reports which are available, there are no statistics of the amount of silica or sand-cement and of the several kinds of slag cement which are produced in this country. These industries, however, do not turn out a sufficient output to be seriously considered. It is understood that the manufacturers of slag cement are turning their attention to the production of normal Portland, if possible, from their slags by amending their composition and burning them to a clinker. It is stated that the use of the rotary kiln has continued to increase in this country, 49 per cent. of the total product having been burned in this way in 1897.

The production of natural cement increased in 1897 over 1896 by 341,238 barrels, or 4.28 per cent. As the capacity for production exceeded the demand by about 25 per cent., prices were somewhat depressed. As the manufacture of Portland cement develops in this country it is probable that that of natural cement will gradually decrease.

For the year the total output of natural cement was 8,311,688 barrels, more than one half being made in New York State.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

THE BRICK ARCHITECTURE OF WASHINGTON, D. C

BY F. W. FITZPATRICK. (*Concluded.*)

WASHINGTON is famed for its homes; a city of homes perhaps more than a city of churches even. Statesmen during their terms of office reside here from necessity, become enamored of the place — and it *is* naturally and artificially a beautiful city — and continue to reside here from choice. Men of large interests come here on a visit, or to foster those interests, — it is also a great place for fostering, — fall a prey to the same charms, and build expensive homes. Men retired from business come here to acquire the social distinction their families crave for, and then others come to live with us because still others are here. Like a great snowball, rolled by our enthusiastic progeny, Washington keeps on gathering wealthy residents, and she can boast of being second only to New York in the lavishness and number of her expensive homes. Many are built of brick, some have cost fortunes, some have broken their owners. The streets are wide, beautiful trees, fine vistas, elegant opportunities, but you can count the really artistic, beautiful exteriors on your fingers, and I'll not swear that you cannot count them on the fingers of one hand. And why? It is one of the unsolved mysteries of the times. Boston, New York, Philadelphia, Chicago, Minneapolis, Cleveland, Detroit, Denver, and Portland, in far-away Oregon, can show, not only proportionately, but, regardless of size, far more beautiful homes, tastily designed (and evidently designed for the places they occupy) than can Washington; and few homes in those cities, excepting, of course, in New York, have cost nearly as much as ours. I can recall but two places where the domestic architecture struck me as being generally as unimpressive, except for its ugliness, as that of our nation's capital, — London and San Francisco. There may be others, but those three places I think ought to be crowned as *hors concours*. There are expensive homes on Massachusetts, on Connecticut, and Rhode Island Avenues, Columbia Heights, and dotted all over the northwestern part of the city; a great many of them of brick, and generally the most expensive ones, the aggressively conspicuous ones are chiefly conspicuous for their inartistic qualities.

RESIDENCE, SECRETARY JOHN HAY, WASHINGTON.
H. H. Richardson, Architect.

RESIDENCE, THOMAS NELSON PAGE, WASHINGTON.
McKim, Mead & White, Architects.

RESIDENCE, L. Z. LEITER, DUPONT CIRCLE, WASHINGTON.
F. P. Chandler, Architect.

The middle-aged brick homes of importance are the English Embassy, the Pollock house (whose master and mistress went down upon the ill-fated *Bourgogne*), and the Blaine (now the Westinghouse) home. These are large and quite ordinary in design, and that is all that can be said of them. The Stewart "Castle," as it is called, fortunately is stuccoed, so few know it to be brick, and for the sake of brick I am glad of it. The Leiter home is probably the most striking brick house here, a light cream brick with gray stone trimmings, rather attractive, well detailed, or, at least, not sinning very grievously; though if Mr. Chandler had it to do over again, I doubt if he would be satisfied with the same lines. It certainly occupies the finest site in town, an ideal lot for a mansion, and about the most conspicuous one, too. Allah be praised! that the house is not only "good" but "quite good"; in fact, judged by the Washington standard, it is "perfect."

RESIDENCE, MRS. JENNESS MILLER, WASHINGTON.
F. F. Schneider, Architect.

RESIDENCE, W. J. BOARDMAN, WASHINGTON.
Hornblower & Marshall, Architects.

Thomas Nelson Page has recently finished a brick home by McKim, Mead & White that attracts a great deal of attention. A mottled gray Roman brick with white trimmings, colonial in style, chaste, offending none of the canons, it merits attention and certainly represents one finger when you count up the really good houses here. That I do not like the style and question the propriety of using something that one instinctively feels ought to be surrounded by a fine lawn, stately trees, fountains, and winding drives right on a town lot, bang up to the sidewalk, should not reflect against it — but one may express an opinion.

RESIDENCE, W. C. WHITTEMORE, WASHINGTON.
Harvey Page, Architect.

The Hay-Adams double house (Secretary of State Hay), by Richardson, shows what can be done in brick. It is a red brick, and nearly all the upper detail is in brick; the lower story is of buff sandstone. There is some rather good brick carving, good window treatment, altogether one of the few really good brick structures, public or domestic, here. The usual gloom of a red brick is relieved by dashes of ivy, fern, and palms, accessories that are not to be despised by the architect.

The other important brick houses here are shown by the accompanying illustrations. There is really nothing in most of them that would justify more than a photograph. There are quite a number of narrow "fronts" of brick, 25 and 30 ft.

RESIDENCE, SENATOR FORAKER, WASHINGTON.
Paul J. Peltz, Architect.

RESIDENCE, SENATOR HALE, WASHINGTON.
Roach & Tilden, Architects.

party-wall affairs, that are not bad; but even among these only one or two merit a place in an architect's portfolio; that is, if he uses his portfolio to browse in for ideas, or to gauge what is being done worthy of note by his fellows.

. . . .

Brick has been made in and about Washington for many years. In the fifties there was a rather handsome red brick made here and in Alexandria. One or two moldings, an egg-and-dart, and a dentil were made; the bricks used for face work were gauged and rubbed, and very good work indeed was the result. To-day there is but one pressed-brick works here, to my knowledge; from 70,000,000 to 150,000,000 of a very good common brick are made, and on January 25 last nine of the fourteen plants combined under one management, and their product sells for about $8.50 a thousand, "kiln-run."

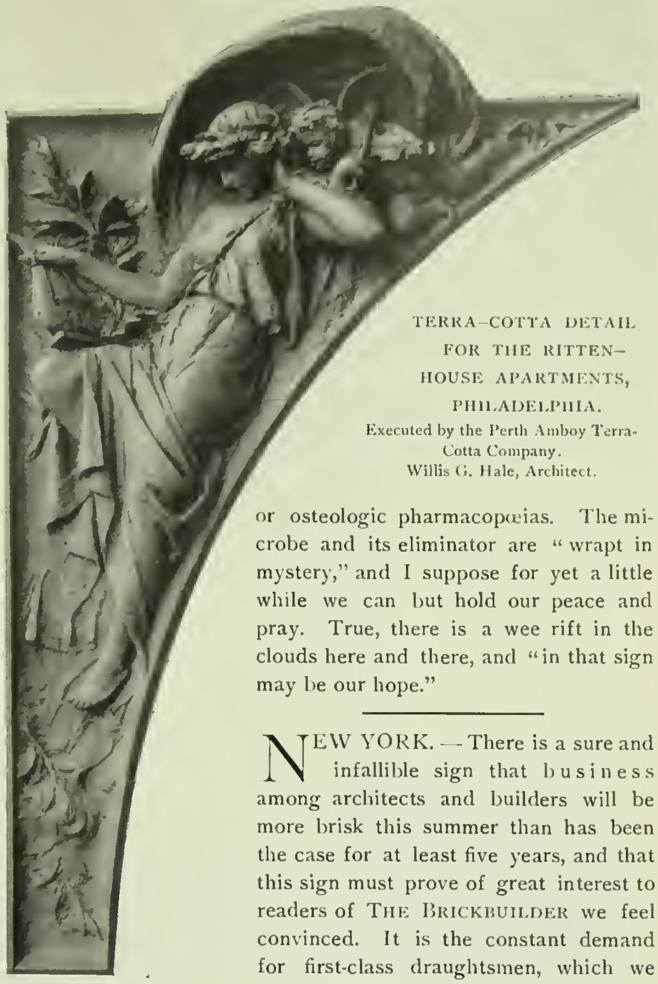
. . . .

In glancing over this paper, in order to properly place the illustrating photos (most of them and the views in Annapolis contributed by Mr. Frank Upham, of Mr. Cobb's Washington office, a young camera as well as architectural enthusiast, and to whom I

RESIDENCE, MRS. GEORGE W. CHILDS.
Furness & Evans, Architects.

am greatly indebted for adding pictorial interest to matter that could not, by any stretch of courtesy or generosity, be considered as interesting *per se*), I am compelled to acknowledge that the impression they leave upon me, an unprejudiced reader, is that they are the handiwork of a dyspeptic. I assure you I am not, however; my health and digestion are of the very best and my temperament, under ordinary circumstances, most seraphic; nor am I generally hypercritical. But knowing the beauties that can be extracted from brick, and having seen that they have been taken advantage of elsewhere, it makes me exceedingly wroth, aye, willing to commit a breach of the peace even, to see how in this grand city, that every one visits, the cynosure not only of neighboring but of *all* eyes, and where there are so many such grand, such masterly works in stone, that nearly every time that brick has been used, or is used, all its beauties have been extracted — when the architects made their drawings! And one cannot lay all the blame at the doors of our local *confrères*. While perhaps sharing in the guilt, they are not the worst offenders. Our buildings are cosmopolitan as far as architects are concerned. New York, Boston, Philadelphia, and even the West, all have sinned here in brick, and sinned most grievously, too.

The causes leading to these sins are more or less evident, but for a remedy one will seek in vain through allopathic, homeopathic, or osteologic pharmacopœias. The microbe and its eliminator are "wrapt in mystery," and I suppose for yet a little while we can but hold our peace and pray. True, there is a wee rift in the clouds here and there, and "in that sign may be our hope."



TERRA-COTTA DETAIL FOR THE RITTENHOUSE APARTMENTS, PHILADELPHIA.
Executed by the Perth Amboy Terra-Cotta Company.
Willis G. Hale, Architect.

NEW YORK. — There is a sure and infallible sign that business among architects and builders will be more brisk this summer than has been the case for at least five years, and that this sign must prove of great interest to readers of THE BRICKBUILDER we feel convinced. It is the constant demand for first-class draughtsmen, which we trust for the sake of the advance guard of the great army of draughtsmen will result in a return to the old-time good salaries which first-class men received some years ago. Upon investigation we find that this promised season of activity will be mainly among the architects, whose work lies in the direction of apartments and suburban homes, although many corporations who held off on account of the late war have become infected with the feeling of confidence and security which is abroad and are now ready to invest.

During the past year there has been a decided falling off in the number of large office buildings built, and in this column about a year ago we expressed a fear that there was an over-supply of such large buildings, many of which are capable of housing the inhabitants of a city. We also expressed the confidence that we felt in the well-established corporations and shrewd business men who com-

TERRA-COTTA CAPITAL.
Executed by the New Jersey Terra-Cotta Company.

posed the syndicates by whom these buildings were erected. It has been abundantly proved that this last surmise was correct. Never has there been such a demand for offices in modern well-equipped

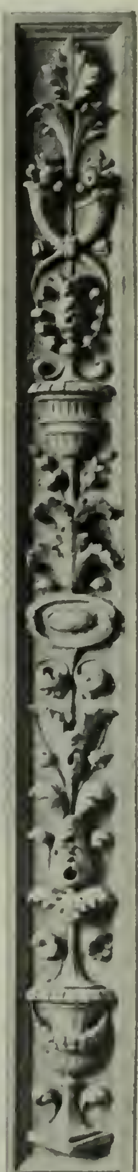
A MEMORIAL CAMPANILE, IOWA STATE AGRICULTURAL COLLEGE.
Geo. E. Hallett, Architect.

fire-proof buildings, and we can now safely say that there is room for more of them. Strange to say, the rents charged for offices in these buildings are the same or very little more than the rents charged for offices of equal size in old ramshackle buildings with no modern equipments. Even the enormous Park Row Building, which we thought would be hard to fill, promises to prove a bonanza. In spite of the large floor area, owing to the peculiar advantages of the lot, it has not an office which is not abundantly lighted,

PANEL, BAY WINDOW CURTAIN WALL.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.

and as a step in advance there is a telephone in every office which connects with the public telephone on the ground floor.

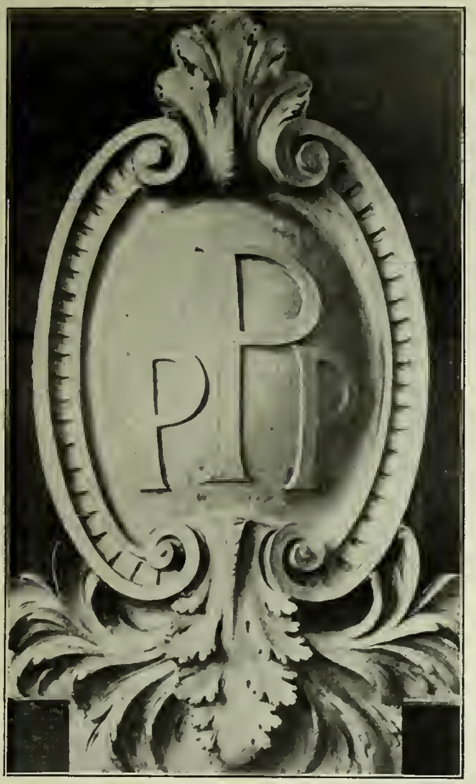
At the time of this writing there has been another fire horror in New York in which thirteen lives were lost. The fire occurred at 2 A. M. in a modern four-story residence in the "millionaire" district. It seems as though American wealth and ingenuity should be equal to the task of constructing dwellings which are something better than fire-traps. The Windsor disaster has caused no end of bills to be introduced at Albany with the design of rendering hotels less dangerous; but what are we to do about the thousands of private dwellings? We have a fire department of which we are justly proud, but when a fire occurs in the lower part of a dwelling the most heroic exertions fail to rescue the inmates. Even if the inmates contrive to reach the upper windows there is no way to descend, and unless rescued with difficulty from without they are doomed to horrible death. In case of fire the residences of the wealthy are in most instances more dangerous than the tenements of the poor, for the law compels the erection of fire escapes upon these, while the owner of a private residence will not disfigure it with these contrivances and objects to the existence of a fire-engine house in his immediate neighborhood. It certainly should be possible to descend from the upper floors by ladders or stairways *outside* the house. These could be arranged on the rear, where they will not disfigure the appearance of the house, or one of the many patent fire escapes which roll up like rope ladders and are attached to the sills could be used. With the cheapening of iron and other non-combustible building materials, future structures should be made safe. If they are not absolutely "fire-proof," the fire would be confined long enough to give the inmates a chance to escape. That the casual ignition of a curtain should lead to the heartrending casualties which we so frequently read about is too dreadful to be tolerated by a wealthy, ingenious, and intelligent people.



TERRA-COTTA PANEL FOR RESIDENCE AT PHILADELPHIA.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Baker & Dallett, Architects.

The following items of new work have come to our notice: —

Babb, Cook & Willard are at work upon plans for a palatial mansion to be built for Mr. Andrew Carnegie, on Fifth Avenue between 91st and 92d Streets. Mr. Howard Gould has purchased a site for a handsome residence on the corner of Fifth Avenue and 73d Street. Howard & Cauldwell have filed plans for a twelve-story hotel, to be built of limestone and brick, and to be erected at Madison Avenue and 56th Street; cost, $250,000. Albert E. Parfitt is preparing plans for a new parish building and rectory, to be built for St. Augustine's Roman Catholic Church, at the corner of Park Place and Sixth Avenue, Brooklyn; cost, $150,000. McKim, Mead & White have prepared plans for a new hospital, to be erected on First Avenue and 27th Street; cost, $500,000. C. L. W. Eidlitz has planned a three-story brick building for the New York and New Jersey Telephone Company, to be erected on 58th Street; cost, $30,000. C. P. H. Gilbert is preparing plans for a six-story brick store and office building, to be built on Fifth Avenue; cost, $100,000. Barney & Chapman have planned a ten-story hotel building, to be built for the White estate on Seventh Avenue, corner of 38th Street; cost, $450,000. Clinton & Russell



TABLET ON EACH SIDE OF PRINCIPAL ENTRANCE TO CENTENNIAL BUILDING, BROAD STREET, NEW YORK.
Work executed by the New York Architectural Terra-Cotta Company.
Ralph Townsend, Architect.

are preparing plans for a six-story brick dwelling, to be built on East 84th Street; cost, $40,000. The same architects have planned three three-story brick dwellings, to be built on East 84th Street; cost, $45,000. J. B. Snook & Sons have planned an eight-story brick store and office building, to be built on Broadway, corner of Warren Street; cost, $150,000. Chas. C. Haight has planned a five-story brick dormitory building for the General Theological Seminary; cost, $65,000. C. B. J. Snyder, architect to the Board of Education, has planned two new schoolhouses, costing respectively $260,000 and $125,000 each. Wm. C. Hazlett has prepared plans for a ten-story store and loft building, to be built on 12th Street, corner University Place; cost, $160,000.

CHICAGO. — Sharp advances in the prices of building materials amounting to at least 12 per cent. threaten to postpone for a considerable period the revival in building operations. Also, just now the usual uncertainty as to labor troubles tends to further retard the launching of new projects.

The younger members of the profession are at present interested in the Twelfth Annual Exhibition of the Chicago Architectural Club, which opened on the 30th inst. at the Art Institute. An unusually large number of drawings has been received from other cities, and the average quality of the work is exceptionally high. A new idea has been adopted in the selection and exhibition of work from the various architectural schools. The number of designs from each school has been limited to fifteen, carefully selected by the several faculties, and all the school work is hung in one room. This should be an incentive to the students, as their drawings, when exceptionally good, are not only seen by many prominent architects, but they are likely to be selected for reproduction in the catalogues — always an honor for young draughtsmen.

Louis H. Sullivan is the architect of the façade of that portion of the new McCormick Building on Michigan Avenue to be occupied by Gage Brothers. Holabird & Roche are the architects for the rest of the work, for which piling is now being driven. This façade is in Mr. Sullivan's best vein. The three units composing the front are unusually wide, and the treatment is severely a lintel treatment: a steel frame simply clothed above the first story in delicately modeled terra-cotta, finely detailed and decidedly geometric in feeling, except in the case of the rich orchid-like bursts of foliated ornament beneath the cornice at the upper terminals of the intermediate pier ribs. The cast-iron covering of the first-story skeleton is decorated with a remarkably beautiful interweaving combination of geometrical and foliated forms. All the upper sash are glazed flush outside with Luxfer prisms.

ORNAMENTAL PANEL, BOYS' INDUSTRIAL SCHOOL, LANCASTER, OHIO.
Executed by the Indianapolis Terra-Cotta Company.
Richards & McCarty, Architects.

The recently issued first triennial report of the State Board of Examiners of Architects gives in detail the results accomplished by the first State law enacted for the legalizing of the profession of architecture and the registration of practitioners. The first meeting of the board was held Sept. 31, 1897, and prior to Feb. 11, 1899, seven hundred and fourteen applications for license had been received and seventy-three rejected. This law, as well as the city ordinance, requiring that all plans submitted to the department of buildings for approval must be stamped by a State licensed architect, seems to be popular; the violators are now few, and none are persistent.

MAIN ENTRANCE, HARTFORD LIFE INSURANCE BUILDING, HARTFORD, CONN.
Executed in gray terra-cotta by the Excelsior Terra-Cotta Company.
F. R. Comstock, Architect.

The Chicago Architects' Business Association has been devoting much time and energy to secure the amendment of the present cumbersome and intricate lien law, and is seeking the aid and support of the Chicago Real Estate Board and the various organizations connected with the building trades. The proposed amendments, if enacted by the legislature before the close of the present session, will probably restrict the operation of the law so that only architects, original contractors, and mechanical labor shall be able to establish a lien.

The present law has worked grave injury to the building interests here, and early relief from some of its most objectionable features is greatly to be desired.

An interesting alteration is in progress on Michigan Avenue, where the Hotel Richelieu, once famous for its rare wines and goodly entertainment under the rule of "Cardinal" Bemis, is being converted into a furniture factory. The entire structure, floors, partitions, everything, has been demolished and removed, leaving only the exterior walls standing without tie or brace of any kind. The front portion is six and the rear eight stories in height. It looks as though a heavy gale from the lake would strike the front wall with dangerous force, but the contractors completed this demolition of the interior over a week ago and seem in no haste to begin the erection of the new, slow-burning construction, or to brace the outer walls.

The building record for March shows that the total cost covered by permits amounted to only $2,405,980. This is $722,240 less than the amount for March, 1898, and is the poorest record for that month during the past ten years in Chicago. The next lowest corresponding record is that of 1895, which was $2,628,890.

Many store front alterations are in progress in the retail district, consisting chiefly of plate glass, Luxfer or other illuminating prisms, and light cast-iron work. Most of the out-of-date commercial structures which were rushed up after the fire seem destined to be thus freshened up to hold their own for a few years longer before being wholly demolished and replaced.

Suburban home building promises to be quite active this season. The early completion of the Northwestern Elevated Road and the extension of the Lake Street Elevated through Austin, by the means of an incline and direct trolley connection west to Maywood, promises to give an impetus to residence work north and west. The long-continued cold of the winter which has prevailed without a break into April, together with the scanty snowfall, leaves the ground still full of frost, and makes the season an unusually tardy one for suburban building operations.

RESIDENCE AT ST. LOUIS, MO.
Terra-cotta executed by the Winkle Terra-Cotta Company.
Barnett, Haynes & Barnett, Architects.

ST. LOUIS.— The general improvement in business during the past two years has caused quite a demand for substantial business houses. As has been previously mentioned, Washington Avenue has become the center of the wholesale and light manufacturing interests. When buildings were erected in the vicinity of 9th Street a few years ago they were considered quite a risk, but almost the entire property to 12th Street has been built up with large buildings, and now Shepley, Rutan & Coolidge are preparing plans for a seven-story building, for the Lindell Real Estate Company, which will cost $200,000 or more; to be located on 12th Street.

The same firm has also prepared plans for a seven-story building for Judge Wilbur F. Boyle, to be erected on Washington Avenue, between 11th and 12th Streets; cost, $55,000.

The St. Louis University has commenced another building on their premises on West Pine Boulevard and Grand Avenue. It is to be four stories high, and contain one hundred rooms. It will be of brick with stone trimmings, and in the Gothic style; cost, $60,000.

The Second Presbyterian Society is about to commence their new church, the chapel of which was built some years ago. It will cost $125,000, and is by T. C. Link. Music-loving people will soon have a music hall, which is being built on Grand Avenue, at a cost of $100,000. Albert Swasey is the architect. Mr. Swasey has also a ten-story building at New Orleans.

Washington University some years ago acquired a tract of land in the vicinity of Forest Park, and is about to commence the erection of several buildings upon same, preparatory to moving the University there at as early a date as possible. A number of the prominent citizens have donated the five principal buildings at a cost of over half a million dollars, while other citizens have contributed to the endowment fund handsomely, increasing it at least by as much more. Landscape architects have been employed and preliminary studies made, but no architect has been selected for the buildings.

Real estate has become quite active, much more so than during

EAGLE FOR THE "REPUBLIC" BUILDING, ST. LOUIS, MO.
Executed in terra-cotta by the Winkle Terra-Cotta Company.
Isaac S. Taylor, Architect.

the several past years, especially in down-town properties, many of these investments looking forward to substantial improvements.

Doubtless the forthcoming World's Fair will have a tendency to stimulate prices and increase the amount of building, but it is believed that there will be no boom, with its evil after effects, such as has been under like conditions in other cities. The matter is as yet only in its preliminary state, but nevertheless the probable site and architects in chief are subjects of general discussion.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: H. C. Evans, Wilmington, Del.; Elmer Gerber, Reibold Building, Dayton, Ohio; Considine & Watz, Elmira, N. Y.

NEW CATALOGUE.

THE Kittanning Brick and Fire Clay Company, Pittsburgh, Pa., has just issued an exceedingly interesting and attractive catalogue descriptive of the various shapes, colors, etc., of the Kittanning Impervious Brick. In the compilation of this work care has been taken to illustrate and describe the product of the plant in such a comprehensive way as to give much valuable information on the subject of the use of brick generally in connection with ornamental and molded brickwork.

In the arrangement of the catalogue mention is made first of the character of the clays from which the Kittanning brick are manufactured, and special stress is given to the soft, warm effects of the various shades of their buff and gray brick, which make them so desirable for use in the construction of municipal buildings. This portion of the work is rendered particularly interesting by a very fine collection of thirty or more illustrations of various types of buildings located in New York, Chicago, Boston, and Buffalo, designed by well-known architects, and constructed of the Kittanning brick. A wide range is covered in the character and style of these buildings, each one of which is selected as being of especial interest as an example of artistic rendering of brickwork.

The main purpose of the catalogue is to show for the convenience of architects using molded brick the large assortment of shapes which the company carry in stock. To this end two hundred different designs of molded brick are illustrated by outline plate drawings reduced to one half scale. Considerable space is also given to scale drawings of details of arches and arch brick.

We heartily recommend to our readers a perusal of this catalogue as being a work of real interest and value in connection with architecture in brick construction. As the number issued by the company is somewhat limited, those wishing a copy should request same at an early date of the Kittanning Brick and Fire Clay Company, Duquesne Way and 10th Street, Pittsburgh, Pa.

CURRENT ITEMS OF INTEREST.

THE BOLLES REVOLVING SASH COMPANY has removed its New York office to 13-21 Park Row.

THE AMERICAN ENAMELED BRICK AND TILE COMPANY has removed its New York office to the Metropolitan Building, 1 Madison Avenue.

MEEKER, CARTER & BOORAEM, New York City, have removed to a larger suite of offices in the Metropolitan Building, 1 Madison Avenue.

WALDO BROTHERS, agents for the Perth Amboy Terra-Cotta Company, will furnish the terra-cotta for St. Margaret's Church, Dorchester, Mass.

EXCELSIOR terra-cotta will be used in the new apartment at Roxbury, Mass., W. C. Collett, architect; contract by Charles Bacon, Boston representative.

INCREASED business has made it necessary for the Brick, Terra-Cotta, and Supply Company, of Corning, N. Y., to add to its plant a new muffled kiln and a terra-cotta drier.

JOHN H. BLACK, Buffalo representative for the Akron Hydraulic Press Brick Company, will supply their impervious red front brick for the new public school, No. 19, at Buffalo, R. A. Wallace, architect.

STORE BUILDING FOR JOSEPH HORNE & CO., PITTSBURGH, PA.
Peabody & Stearns, Architects.

THE BRICK, TERRA-COTTA, AND SUPPLY COMPANY, of Corning, N. Y., will hereafter be represented as sales agent in New York City by Mr. E. H. Thomas, of 874 Broadway.

TIFFANY white enameled brick will be used in the new public schoolhouse, No. 16, at Buffalo, F. C. Mohr, architect; also for the new No. 19 schoolhouse, same city, R. A. Wallace, architect. These orders were placed through John H. Black, Buffalo representative.

Waldo Brothers have the contracts for Atlas cement for Hotel Bellevue, Boston, Peabody & Stearns, architects; new building, South and Essex Streets, Boston, Winslow, Wetherell & Bigelow, architects; Spot Pond Pumping Station, Melrose, Mass., Shepley, Rutan & Coolidge, architects.

The Cleveland Car Company is required by increased business to add considerably to its plant. The company makes cars for hauling clay from the pit, and their increasing business would indicate a returning prosperity to the clay workers, and logically a revival of building operations.

The St. Louis Terra-Cotta Company will supply the architectural terra-cotta on the following new contracts: C. R. I. and P. depot at Council Bluffs, Ia.; Glovur Building, Joplin, Mo., Leon A. Hunter, architect; M. E. Church, Vicksburg, Miss., W. A. Cann, St. Louis, architect.

The Reese-Hammond Fire-Brick Company, Bolivar, Pa., is running its four plants to their full capacity, and is doubling the capacity of its No. 4 plant by putting in new machinery, erecting a new drier and other buildings, adding twelve new kilns, and expect in sixty days to have the capacity of the No. 4 plant up to 75,000 brick per day.

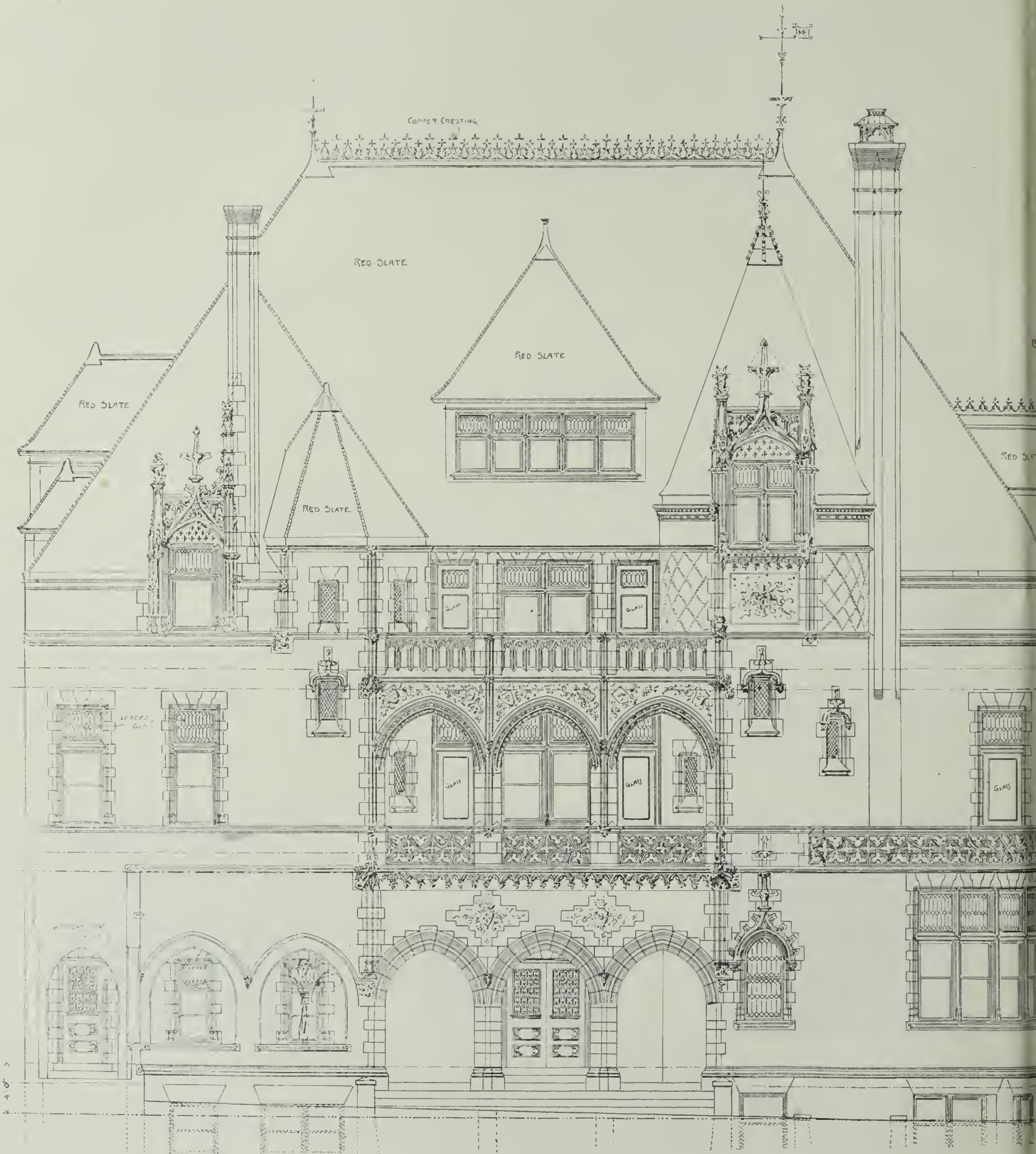
Charles Bacon, Boston agent for Sayre & Fisher Company, has closed the following new contracts for brick: Mercantile Building, Congress Street, Boston, Wheelwright & Haven, architects; houses, Beaconsfield Terrace, Brookline, Mass., S. Butterworth, architect; building for Edison Electric Light Company, Boston, Winslow, Wetherell & Bigelow, architects.

Brick-built cities suffering from the "smoke nuisance" are finding relief from the results thereof in treating the injured walls with Cabot's Brick Preservative, which renews the color, and at the same time waterproofs the bricks, so that the soot does not collect nearly as rapidly as on untreated bricks when water-soaked. The preservative is made in red and cream. Pittsburgh is beginning to revel in it.

The American Mason Safety Tread Company has, during the past month, removed to its new factory in Lowell, a three-story building, 60 by 150 ft., with all modern conveniences. The increasing business of the company has rendered this large increase of floor space necessary, as well as the addition of several machines of special construction for various processes in the manufacture. The number of new buildings in which the Mason Tread has been specified by architects insures an active season for the company.

Chambers Brothers Company, Philadelphia, will ship this month to Porto Rico a complete outfit of brick-making machinery for the manufacture of ordinary building and hollow brick. The plant will have a capacity of over forty thousand brick per day, and makes one of several manufacturing enterprises to be conducted by a large company of Philadelphia capitalists that has obtained some valuable franchises in the city of Ponce. Mr. Frank B. McAvoy, a well-known brick manufacturer of Philadelphia, is interested, and will give general direction to the brick-making end of it.

The Celadon Terra-Cotta Company, Ltd., have closed the following contracts for their roofing tile: Episcopal Church, La Crosse, Wis., Detweiler & Resticeux, architects, Columbus, Ohio; First Presbyterian Church, Fort Smith, Ark., H. I. Goddard, architect; foundry, Moline Plow Company, Moline, Ill., W. L. Paul, architect; United States Mint Building, Denver, Col., James K. Taylor, architect; Roman Catholic Church, Our Lady of Sorrows, Chicago, John F.



EAST ELEVATION.

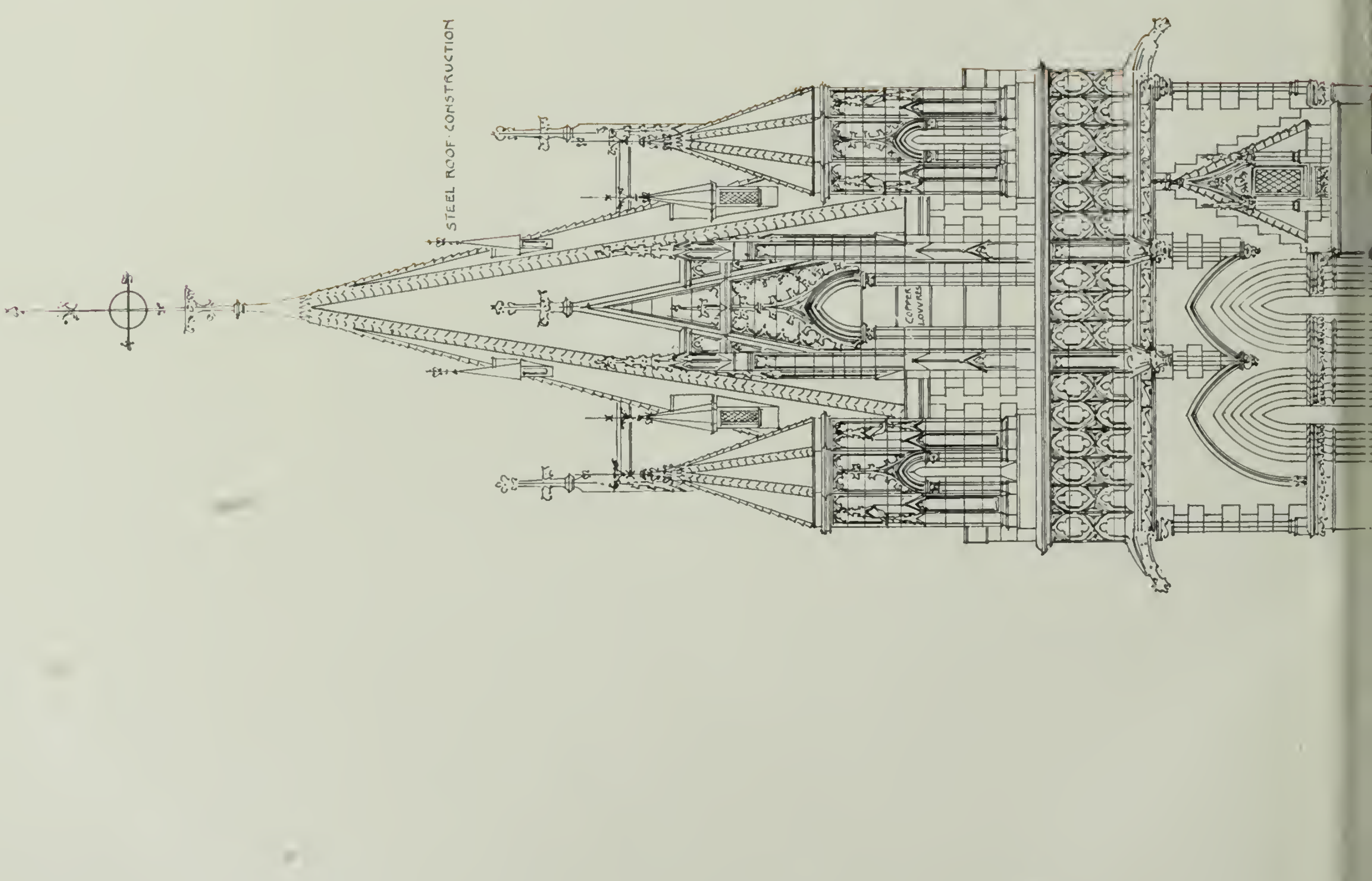
ST. CHRISTOPHER'S HOUSE, EAST 88TH STREET, N

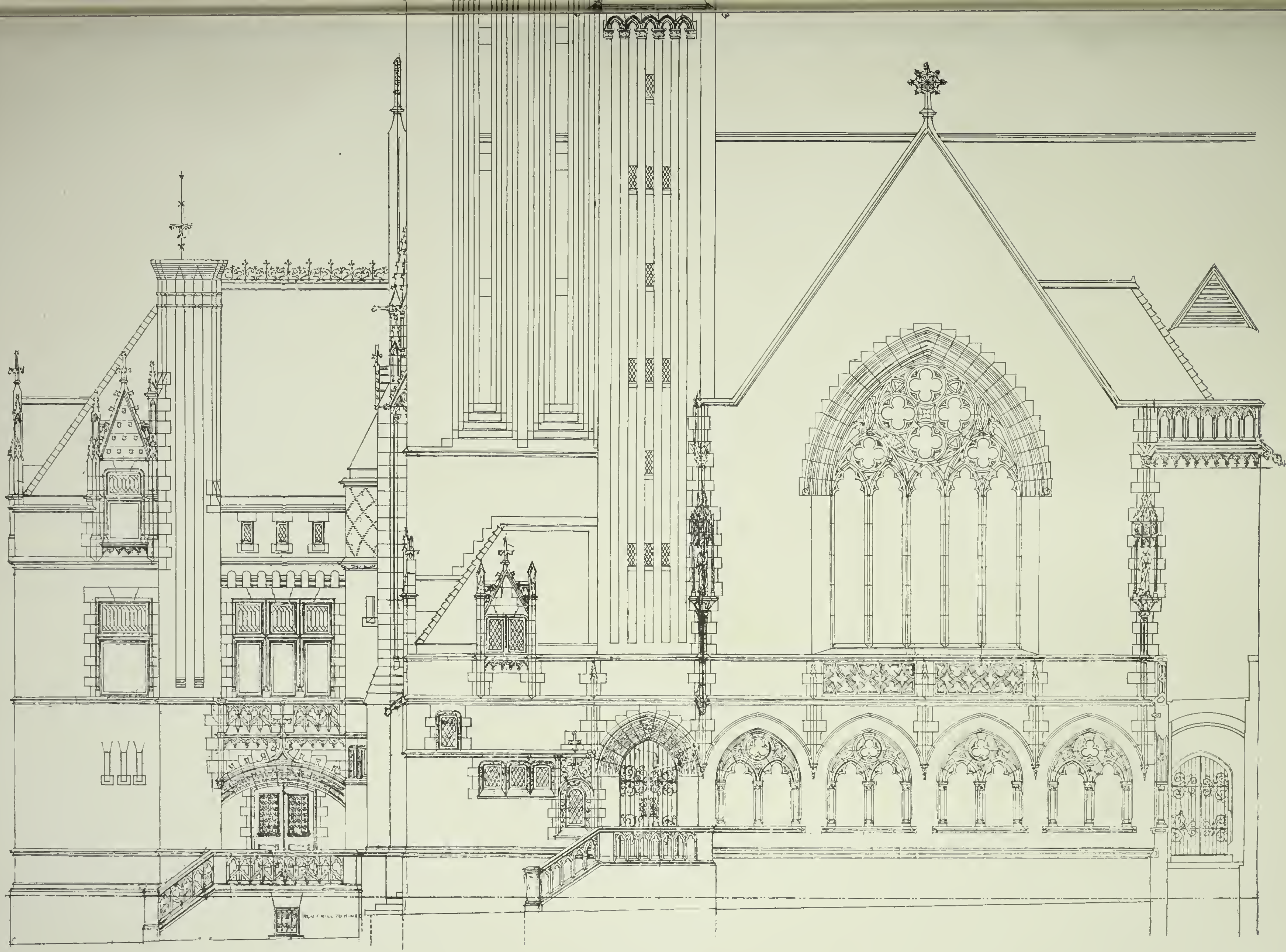
BARNEY & CH

North Elevation.

ORK CITY. FOR MISS SERENA RHINELANDER.

Architects.


STEEL ROOF · CONSTRUCTION
COPPER LOUVRES



West Elevation.

CHURCH AND CLERGY HOUSE, EAST 88TH STREET, NEW YORK CITY. FOR MISS SERENA RHINELANDER.

BARNEY & CHAPMAN, Architects.

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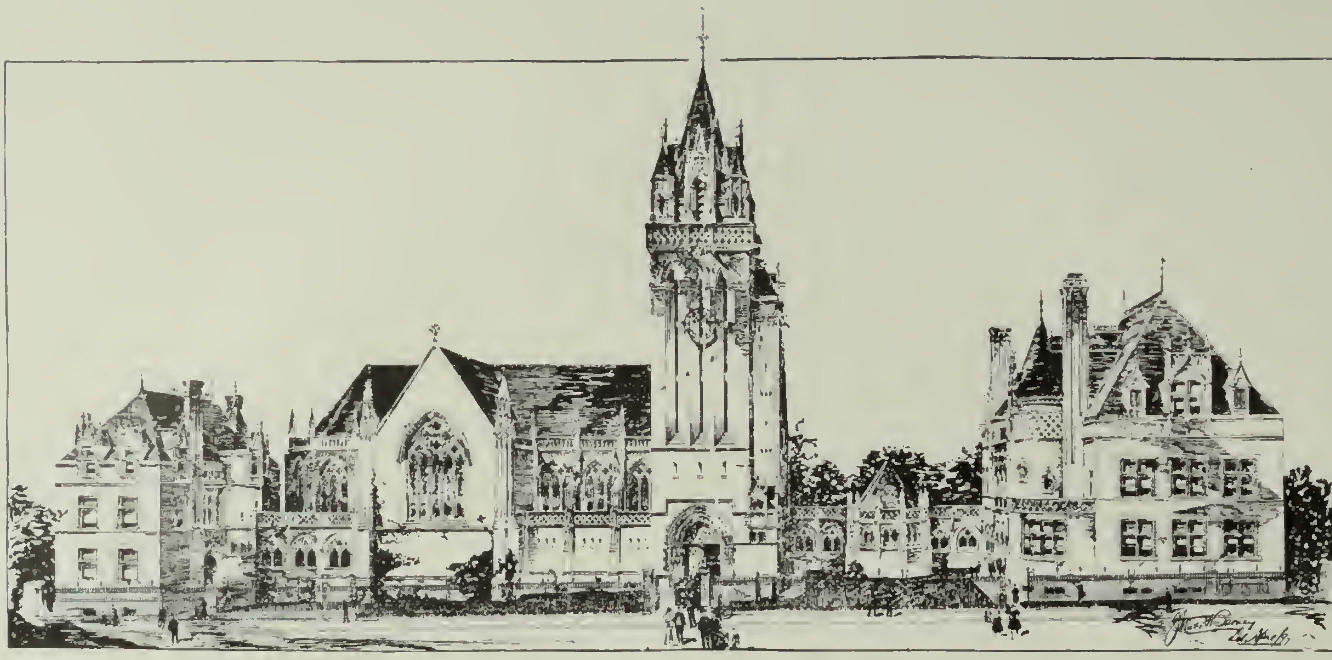
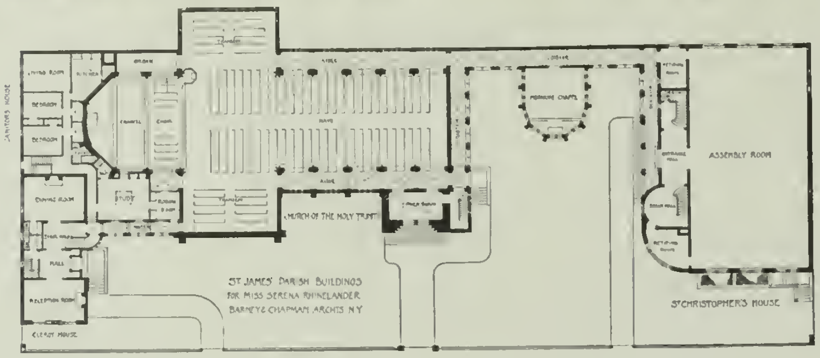
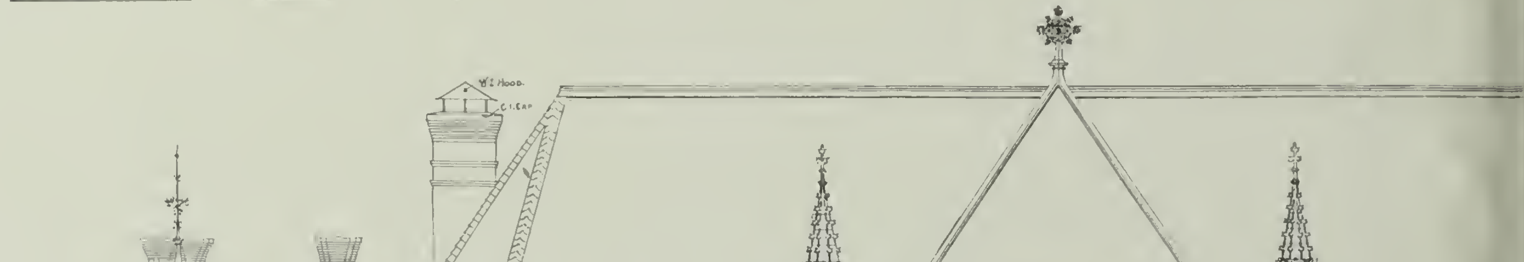






NORTH

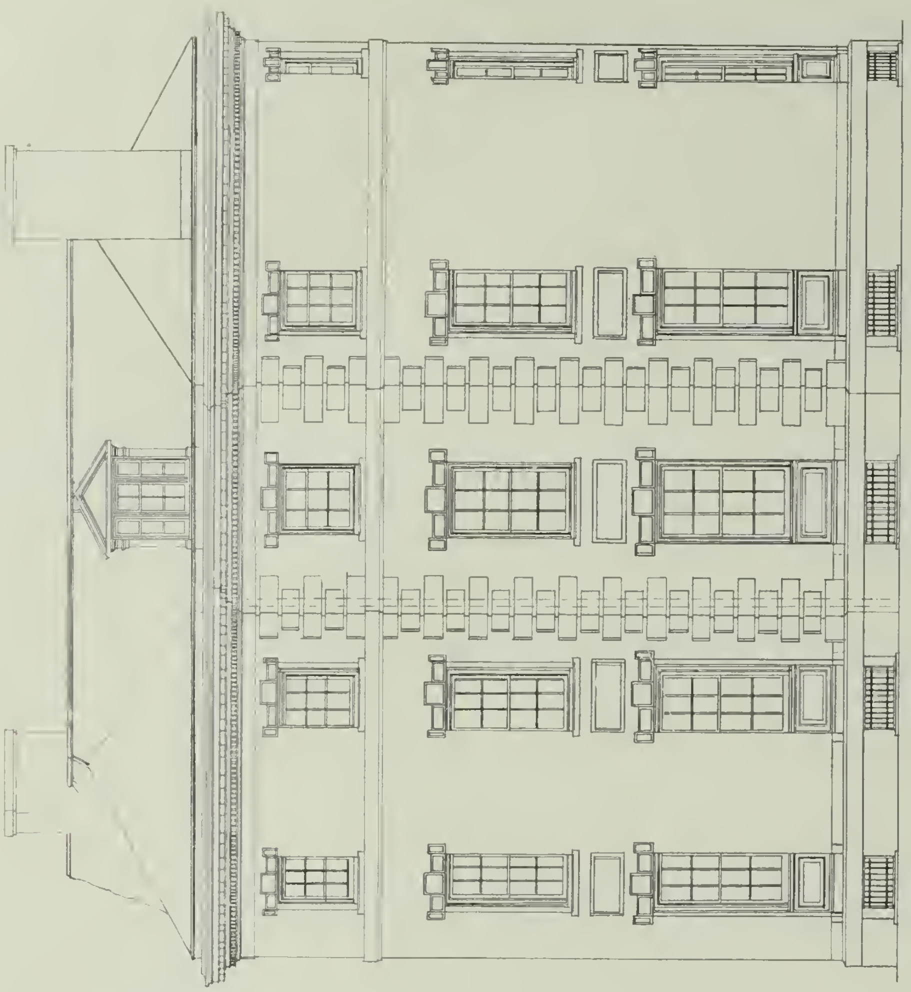
CHURCH AND CLERGY HOUSE, EAST 88TH STREET,

BARNEY & C

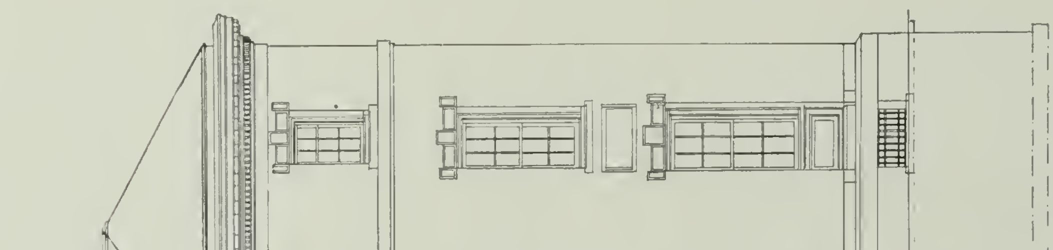
PLATES 35 and 38.

ATION.

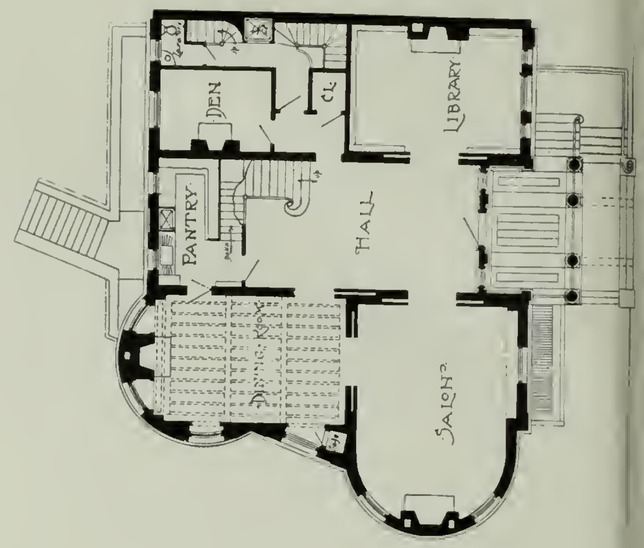
W YORK CITY. FOR MISS SERENA RHINELANDER.

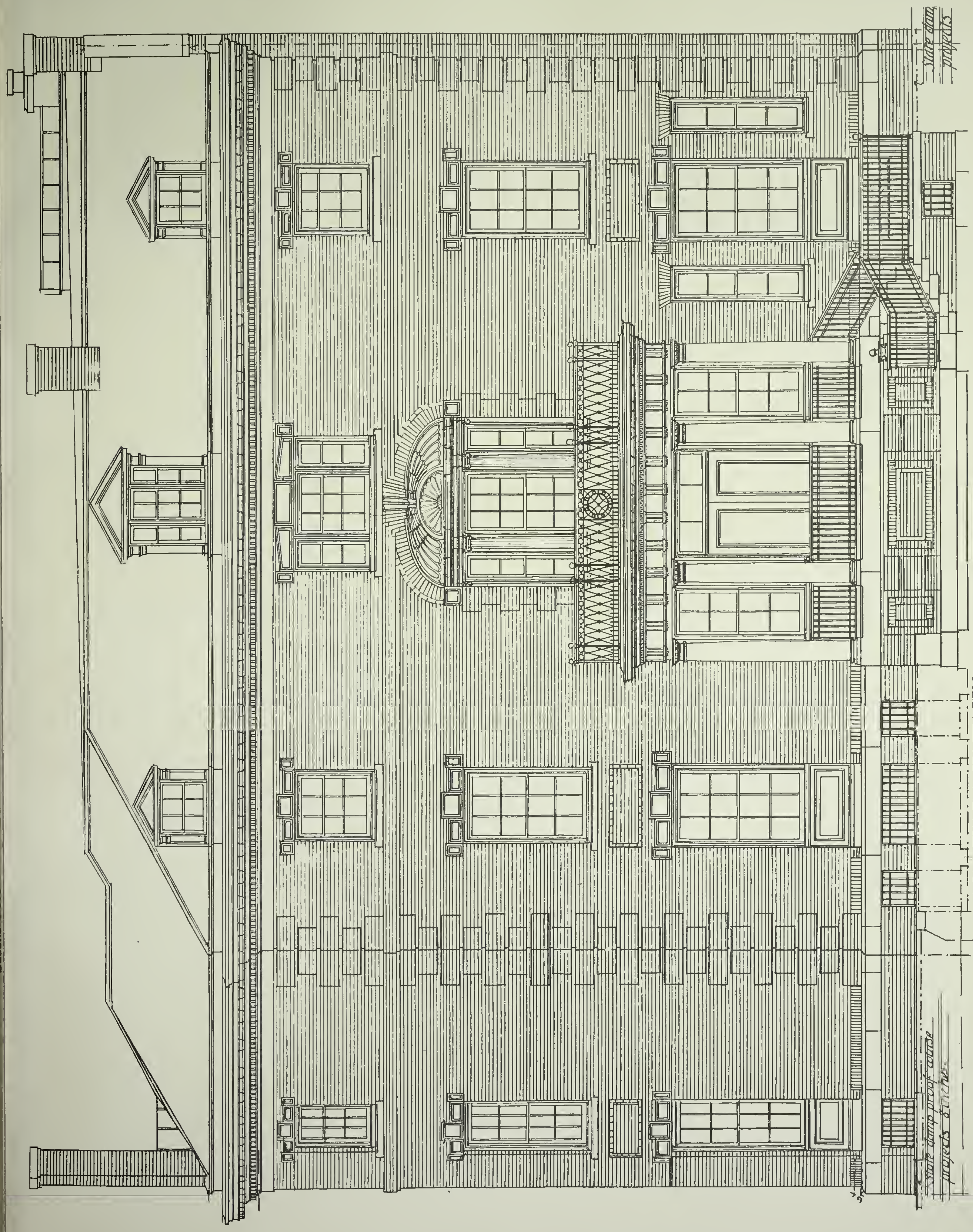


Side Elevation.



Rear Elevation.





FRONT ELEVATION.
RESIDENCE AT WASHINGTON, D. C.
McKIM, MEAD & WHITE, ARCHITECTS.

VOL. 8 NO. 5

THE BRICKBVILDER

MAY 1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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CONVENTION OF ARCHITECTURAL CLUBS.

WE have received copies of a letter which has been sent to each of the architectural clubs in the United States by the Chicago Architectural Club, with the sanction and support of the T Square Club, of Philadelphia, and the St. Louis Architectural Club, and with the informal approval of the Boston and Cleveland Clubs, calling for a convention of delegates from the various architectural bodies to be held at Cleveland, Ohio, Friday and Saturday, June 2 and 3, the object of this convention being to promulgate reciprocity among the different clubs, to bring about a more friendly feeling through a better understanding, and to discuss such plans as will be of the greatest mutual interest, such as club organization, management, and work. To all acquainted with the management of architectural clubs the great benefit to be derived from such discussion is too obvious to need mention, and this movement is certainly deserving of the strongest moral support.

The movement which has resulted in architectural club growth had its origin in 1880, when the New York Architectural League was organized by a few earnest junior members of the profession. Originally nothing but a mere association of draughtsmen, the Architectural League soon recognized that it had a broader field and scope of action, and a reorganization, which was effected about 1883, threw open the membership to artists and art amateurs, and so broadened the possibilities of the League that it has since been able to grow into its position as a leading factor in art matters of not only New York City, but to a very considerable extent the country as a whole, while the fact that it is not merely an architectural association, but rather an association of those who have a keen interest in architecture, has given to its deliberations and to its acts a value which a strict professional body might not be accorded.

The League was followed by the organization of the T Square Club in Philadelphia, the Boston Architectural Club, and the Chicago Architectural Club, all of which have had a steady, persistent growth and have been emulated by clubs in Cleveland, St. Louis, and a number of other cities. Nearly all of these clubs have been upon practically the same general plan, namely, an association of those who were interested in architecture, making little, if any, distinction between the practising architect with years and experience behind him, the draughtsman fresh from school, or the artist amateur, the members uniting upon the common ground of interest in the profession and cooperation of ideas with the painters, sculptors, and decorators. Incidentally, all of these clubs have been able to foster very considerable social feeling among the members, and the amenities of life, as well as the niceties of professional practise, have been considered to advantage. The strong work, however, accomplished by these societies has been strictly in the line of architecture, and all our readers know the great influence which has been exerted by these bodies, especially by the League and the T Square Club, which are recognized powers in their respective communities.

The positions which these bodies have acquired carry with them responsibilities which we are glad to see are fully recognized by the leading men therein. The architectural clubs can take positions that would not be within the province of the American Institute and can take a part in the civic life which would not be in harmony with the dignified, conservative position of the strictly professional body, while the mingling of the architects and the representative of the allied arts gives a possible weight to the deliberations of the club, which we imagine would count for more with the average layman than the acts of a purely professional body. All of these clubs seem to have agreed upon making it one of their chief aims to hold annual exhibitions. This is something which was rarely attempted by any of the chapters of the Institute, and is a work which has naturally fallen to the clubs, and has, on the whole, been so worthily carried out that one can find little to complain of.

The clubs also have very generally done a great deal in a field which has been too much neglected in this country, namely, the education of the draughtsman. Any one who recalls the conditions existing in this country twenty or twenty-five years ago and compares the average draughtsman of those days with what we can reasonably expect now, can readily appreciate that a tremendous advance has been made in the development of architectural education, and while of course the fundamental work has been done by our architectural schools, the clubs have been able to reach the class of young men who have not been able to profit by the opportunities of the technical schools. In their attitude towards public policy the Philadelphia and the New York clubs have been preeminently successful and each organization has counted very materially in molding public sentiment.

There is every reason, therefore, to expect that this convention may not only be fully attended, but that the representatives may be picked men from the various organizations, who will appreciate all the possibilities of this movement, and that the convention may result in giving new life to architectural education and the expansion of the club influences.

HIGH BUILDING LEGISLATION.

WE referred in these columns some months since to a recommendation made to the State legislature by Governor Wolcott, of Massachusetts, advising a restriction of height of buildings to be built adjacent to the State House. This recommendation bore fruit in the shape of several measures which were presented for consideration, one of which finally reached the legislature in the shape of a bill, very far reaching in its scope, which was to restrict to 100 ft. the height of all buildings hereafter to be erected throughout the State. As the Boston *Herald* very truly said, if this law had been enacted it would have been a decided advantage to Boston, and would have led to a more harmonious and artistic form of construction. The difficulty in enactment of any such law as this, however, is that the real-estate values throughout the city have all been adjusted during the past few years to the basis of the earning capacity of a building carried to the present legal limit of 125 ft. Boston is peculiarly constructed in that the greater portion of the city is occupied by buildings of so slight value in a commercial sense that in any transactions for the sale of the land the value of the building is practically disregarded. The attempt at this date to arbitrarily slice off 25 per cent. of the possible earning capacity of the land is too revolutionary not to encounter the strongest opposition, and very naturally the proposed bill was promptly and emphatically rejected by the legislature. It is rather doubtful if any such measure is proposed again in this Commonwealth, for while a building of 125 ft. seems very high by comparison with the average business structure of twenty or twenty-five years ago, it is small as compared with the towering structures of New York. As a matter of fact, few of the exigencies of modern business conditions lend themselves favorably to artistic success, and the argument that a high building, though a commercial necessity, is an artistic blot, is one which, however true it might be in principle, would not seriously weigh in the minds of many legislators, if we may judge by the fate of the recently proposed bill.

There are other directions, however, in which the legislators can act to the greatest advantage, namely, in the extension and more rigorous enforcement of fire proof construction. The Boston *Herald* advised that no building not absolutely fire-proof should be carried to a height greater than 70 ft., that no building to be used for a large number of families should be built of wood, and that no wooden building unprotected by brick walls should be constructed within a minimum number of feet of another wooden building. We have repeatedly advocated an even greater extension of fire-proof construction, and we hope the time will come when no building of what is called second-class construction, namely, without fire-proof floors, will be tolerated anywhere within the business districts. A bill is now before the legislature prohibiting wooden buildings within a large area of the city, or, rather, prohibiting the erection of wooden buildings anywhere except under special permit. This bill will undoubtedly pass, and we believe will receive very little opposition from interested parties. As a whole, it is one of the most important of the many attempts which have been made within the past few years to amend the building laws of this city.

EVOLUTION *vs.* ORIGINALITY IN DESIGN.

TO THE EDITOR OF THE BRICKBUILDER: —

The stand you have taken in your editorial in the April number of THE BRICKBUILDER on "Copyright in Architectural Design" ought to be satisfying to any candid observer of the progress of architecture in this country. There may be a few cases in which architects' designs have been copied for the sole purpose of getting something without paying more than a nominal amount to a draughtsman for the cost of copying, but even in these the first architect is not a loser, because the man who orders a copy made by an outsider would be the last to employ any one and pay the full price for a copy or a new design. On the other hand, if the copy is a good one it is a compliment to the original designer, and he can claim all the benefits of the advertisement.

A common cause for grumbling among young architects is that the owner sometimes erects a second house from the plans made for the first one, which he has paid for, without giving the architect additional compensation. In these cases the owner thinks it will not only be economical, but that he can avoid any dispute as to whether or not the plans should be paid for twice, by employing some one else to supervise it. The really mean thing he does is to secure a set of copies surreptitiously, and generally from a builder. In the latter case the architect discovers too late that he has neglected to protect himself in a way that all know about, by stamping all copies as his property and to be returned. In every case the architect discovers too late that he might have copyrighted his plans, and thereby protected himself in a measure, though there are many ways to get around copyright for architectural designs. His loss is generally only in disappointment and temper, and he has little cause for either, because any architect with business sense would only, under these circumstances, charge his client for additional copies of the plans and specifications, and his fee for supervision, if the latter were desired. But it is from the artistic side that the least objection to having buildings copied can hold; and this can only be so in the case where a cheap imitation of a good design is made. The materials of construction may be changed and the details indifferently executed. The author of the original design is under the necessity of protesting to his friends that the imitation is not his own, and to the public that his reputation is endangered by the possibility of being given the credit for it. But, as you say, the architect of reputation can afford to be indifferent to this.

Now, aside from all personal considerations, I hold that a disposition to copy the designs of buildings already executed is one indication of a healthy architectural evolution. A copyist will not copy anything that he does not think to be good. If he makes changes, they will be either in the direction of omitting superfluities or adding what he thinks will be improvements. It was always so in the great periods of art; and why should it not be so now? The many unfortunate attempts to display originality have done more than anything else to debase the arts of this century. Whenever it ceases to be considered as "bad form" or as showing want of natural ability for an architect to copy or imitate the work of a rival, thoughtful and judicious designers will generally do so; and it is only absurd notions of propriety and the false ethics of the profession in this regard that stand in the way. Instead of this being regarded as piracy, it should be considered as a compliment by the architect whose ideas are followed and developed.

You have well said that no man of ability is likely to wish to reproduce his own works. The time between the making of a design and its final execution enables the designer to see many things in it which might have been better done. If he were called upon to reproduce it, his second effort would be an improvement in some particular, and thus the same evolution would be going on within him which others should be privileged to share with him for the good of their art. Should he prefer to make an entirely new and original design for the purpose of displaying his own versatility, he might not only make a worse one, but would stand in the way of the development of his own esthetic powers. He would be doing what — according to the ethics of the profession accepted by so many — it is expected that his neighbor should do, if called upon to reproduce or copy his work. Such are the ethics of selfishness and egotism. They are monopolistic as applied to an art which has no vitality unless it is free to all, and based on the natural and recognized laws of evolution. These views, once repugnant in the extreme to the writer, are now the result of many years of experience, study, and observation.

PETER B. WIGHT.

The Formal Garden. II.

BY ELMER E. GARNSEY.

HAVING considered some of the general principles of formal gardening in the preceding paper of this series, the subject may now be taken up in detail.

Time and money are always matters of importance, and the formal garden, as a problem in design and construction, must be considered from both standpoints, and it may be said at the outset that fine gardens are not to be had cheaply, nor may they be brought to perfection in a short period of time. Good taste is, of course, not to be measured in terms of dollars and cents, but the gratification of luxurious tastes must entail considerable expenditure, and the ideal garden must depend in great measure on the intrinsic beauty of its constructive details, the materials employed therein, and the adornment of that construction.

The modern American architect is often as much of a necromancer as Aladdin's genie of the lamp, who created palaces in a night; but even his magic touch is powerless to work the spells which Nature alone can accomplish, and no client, however insistent, can put her under forfeiture to complete her work by a certain date, nor will she put on an extra force of mechanics to gain any premiums which may be offered her. For while the garden may be properly planned, built, and garnished with statues, trees, and flowers, the alchemy of time is required to wed man's handiwork with that of Nature, and if harmony of effect is to be acquired this must be accomplished.

The location of the garden may not always be a matter of choice, but when possible sloping ground is usually favorable for satisfactory treatment. The garden itself should be level, but charm of effect is best obtained where its level spaces are contrasted with rising ground on one side and a slope on the other. Such a location also permits the employment of water effects to a greater extent and with less labor and expense, and no one who has seen and appreciated the exquisite charms of old French and Italian gardens, where water is made to trickle from the brims of marble basins, to slip and ripple along tiny stone conduits, to flash gloriously in the sunlight from some great fountain, or to sleep unruffled in broad pools overhung with shrubbery,—no one sensitive to such beauty would willingly lose the opportunity for realizing in his own garden something at least of this sort.

It would be fortunate if a grove of trees, already full grown, should be found where their mass would count as a background for the garden, shut out from it by the boundary wall, yet sufficiently near to compose properly with its architectural lines.


A SIMPLE FORMAL GARDEN IN NEW ENGLAND.

After the location has been determined, the plan becomes of the greatest importance. Its scale has presumably been set by that of the house or building which it adjoins, and as its ground plan is a study of horizontal planes, in contrast with the vertical planes of structure and trees, the opposing effect of the other is thereby reduced or emphasized. If the rectangular masses of the house are contrasted with curved or rococo forms in the garden, the desired end of carrying the structural forms of the building out into nature will be thereby less successfully achieved.

Simplicity and symmetry of plan are always admirable and especially so in a garden, for as the latter is situated so we may look into it from the house, the anatomy of its plan should be at once recognizable and uncomplicated. Its principal axis should be at right angles with the façade of the building, and preferably coincident with some axis of the structure. The main axes of the garden are expressed by the principal walks which traverse it, and


AN EXAMPLE OF VILLA ARCHITECTURE IN NEW ENGLAND.

as these bisect in the center of the garden, it logically follows that we have at once divided it into four parts of approximately the same area. Other walks follow closely the boundary walls, and the plan of the garden becomes in a word a cross laid in a rectangle.

The four plats may be again divided and subdivided, that access may be had to the flower-beds, but the same system of symmetrical division is so certain of accomplishing good results that it may safely be recommended as the best to follow.

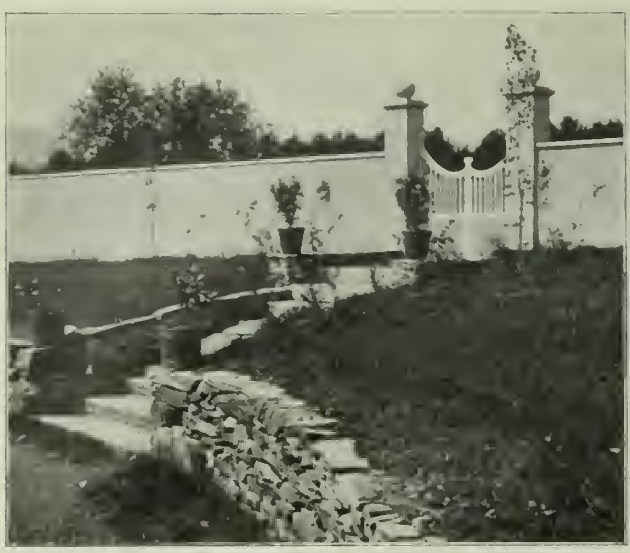
The intersection of the principal walks would naturally be accented by a circular central space, whose radius should be twice the width of the walks, and while in many examples the center of this circle is occupied by a statue, fountain, or similar object, it is desirable that it should remain unencumbered, leaving the axis unbroken from end to end.

Some architectural form, as a casino or pavilion, should mark the further end of the garden, and by recalling the structure at the opposite end this will aid in fixing the bit of nature between walls, making it completely a part of the habitation, as it should be.

The casino or pavilion should be open on the side facing the house, and its floor of marble tiles or brick should be raised some steps above the level of the garden. The interior may be plastered and decorated with painting or mosaic, and furnished with such tables and chairs as the Pompeians used, with bronze legs and marble and leather coverings, and in this delectable retreat "my lady" will preside at high tea on summer afternoons, with her court all in attendance.

The fountain, for there will be at least one fountain, may be placed in front of the pavilion, its basin of marble or terra-cotta, the spray issuing from perforated pipes whose openings are just at the surface of the pool. For a small fountain nothing better has been devised than a shallow circular basin supported by a central shaft, into which the water flows silently and steadily until it brims over and trickles from the margin in plashing drops and tiny streams. The garden fountain is at its best when it is simply an *obbligato*, not a strident and uneasy thing, in haste to quit a quiet retreat.

The Pompeian fountains, which consisted of a series of steps set in a niche, down which a thin sheet of water rippled softly into the basin beneath, were designed by men who appreciated the charm of falling water to just the degree to which it becomes a thing of beauty, and these mosaic fountains might be as readily adapted



ENTRANCE TO AN AMERICAN VILLA.

to the American formal garden as they were in the portico of the New York State building at the Columbian Exposition.

The severity of our climate compels the most careful consideration of foundations for walls, walks, and all garden architecture, for these are to be as permanent as the construction of the buildings. Effect for a single season may be easily gained. Indeed, one enthusiast whose patience and pocket were both limited built a garden wall in New England with wooden posts, lathed and plastered, and for one summer he enjoyed the privacy which this afforded. A single winter's frosts and snow were sufficient to teach him the lesson that nothing is too good for a garden wall, for the plastering fell off in sheets, and the posts stood awry before the springtime came again.

The wall goes a long way toward making the garden. It gives the sense of enclosure and protection and should be so studied that it may be architecture as well as building.

Piers and proper divisions relating to the general plan of walks and beds, niches for statues or vases, and permanent seats should all assist in making it something more than simply a permanent fence; but permanence it must possess, and this is to be gained only by excellent foundations.

AN EXAMPLE OF THE VALUE OF ARCHITECTURAL LINE IN LANDSCAPE, AT WINDSOR, VT.

Frost delves deeply in this latitude, and the laying up of stone foundations is too often left to an ignorant or careless workman, without the constant supervision which is essential to satisfactory construction. The material of which the wall is built is of no little importance, for it forms a background for the whole scheme. Native stone, where such exists, may be employed, but the surface should be reasonably smooth. Rubble work is not suitable for this purpose, as it is too "rustic" and characterless.

Good red brick is the most acceptable material both as to color and texture, contrasting agreeably with the masses of green in the beds and the graveled walks. Trellises may be built against the wall, upon which climbing plants and roses may be trained, and these should be of bamboo poles fastened in the brick joints with copper "holdfasts."

The walks are to be bordered with strips of marble, terra-cotta, or brick, and when expense must be carefully considered these borders may be of wood.

Within the plats, closely following the borders, a hedge of small box trees emphasizes the walks and begins the plant motive. The box should be kept closely trimmed in formal fashion, flat on top and vertical on both sides.

In some old Italian and English gardens the box has grown to a great height, rising on each side of the walks as living walls of green, and needing only a roof to transform the garden into an actual structure for habitation. The Quirinal Gardens in Rome have such hedges 30 ft. in height, giving a most unique and charming effect, although they are decidedly out of scale and are to be admired less for imitation than for individuality.

English landscape gardeners have long been enthusiasts in the art of "pleaching" or trimming box and other trees into geometrical and fanciful forms, debasing a perfectly proper and valuable process into a bizarre and ridiculous caricature, for while it is allowable to trim a tree into a symmetrical form, one in which it is conceivable that it might have grown under natural conditions, it is absurd to pleach it to the shape of an animal or to the contour of an inverted cone or pyramid. The very acme of absurdity is reached in the gardens at Packwood, in Warwickshire, where the Sermon on the Mount is literally represented in clipped yew! And at Risley, in Derbyshire, two enormous doves are clipped out in green, standing on the hedge, their bills forming an archway over the walk.

The foundations for the walks are almost as important as those for the walls, and must be deeply laid with large stones at the bottom for drainage. The walks are finished with gravel, which should be white, or as nearly white as may be obtained, well rolled and slightly crowned, that the water may be drained off at the side. Provision for carrying off this water must also be made, that the walks may dry quickly after the passing summer shower.

Small trees of formal shape are of great value in the garden, and while indigenous pines and cedars are reasonably adapted to this purpose, bay and orange trees are much to be preferred. Their solidity of foliage and adaptability to spherical clipping, supported by slender and branchless trunks, add dignity to the garden, and in a way they give the sense of height that is needed to break the monotony of the horizontal plane. These trees must of course be placed in pots or tubs so they may be removed to protected quarters during the winter. They may be planted in wooden tubs with handles for carrying, but large terra-cotta pots should be provided into which the tubs may be set.

The Neapolitan pots are of agreeable form and tradition, copies of which may now be obtained in this country. These copies are hardly as individual in modeling as their prototypes, but as they are made of better clay and are harder they are less liable to injury in handling.

As the placing of these trees plays an important part in the effect of the garden, their location should be determined by the architect who plans the villa, and he will naturally arrange them in such a manner that they will emphasize the symmetry and formality of the whole scheme, by placing them along the principal walks, at their intersections, and at the corners of the plats.

In Italy, where almost every vineyard and garden produces a crop of archæological or artistic treasures, it has been customary to utilize these fragments in the decoration of the gardens, and many Roman villas are veritable museums of antique art, where statues and busts, usually mutilated and frequently miserably restored, sarcophagi, vases, columns, and capitals, bits of entablature and inscriptions are displayed against or upon the walls, and frequently are built into them.

These fragments, gnawed by time and discolored by the elements, are peculiarly adapted to the enrichment of a formal garden, and we can only regret that the American aborigines could not have been more considerate of posterity, and left us a more plentiful supply of antiquities suitable for the adornment of our gardens of to-day. The supply from Italy and elsewhere in Europe, although apparently inexhaustible, is yet unequal to the demand; and while we should hardly be willing to deny ourselves the possession of Roman antiques, although not of our native soil, the lack of such excellent art should make us the more appreciative of the talent and wares of our own sculptors and manufacturers.

We have successfully competed with European bridge builders and locomotive makers, and such material triumphs ought to incite us to further victories in both industry and art; and if our people of refinement and wealth would encourage our artists and artisans to produce the best of which they are capable, offering them a certain market for their best productions, there would be both a revelation and a revolution in American industrial art, the sure and only foundation upon which would eventually arise a national triumph in the fine arts.

It may be said that our eminent painters and sculptors are striving for important public commissions, and that they place a high estimate on the value of their services; even so, there is a legion of young and clever artists, men and women of taste and talent, who would be only too glad to give their best efforts in creating beautiful things for the adornment of our homes, both within and without the house, for comparatively small remuneration, if they should receive the smallest recognition and encouragement from those whose culture and wealth practically make them, under our form of government, responsible for the upbuilding of our national art.

European gardens abound in sculpture, good, bad, and indifferent. It is an extremely poor statue that does not look fairly well framed in, or silhouetted against a background of living green: and a good statue seldom appears at better advantage than in association with verdure; for proof of which see the annual Paris Salons, our own Sculpture Society and architectural exhibitions. But many of those who can afford to buy sculpture at all are inclined to buy it when in Florence or Rome; where a few hundred francs will purchase a life-size "Marguerite" in white marble, with the loveliest plaited hair, blowing petals from the most natural looking daisy imaginable, or some other equally smooth and smug "example of art."

The French and English artists of the last century used lead and zinc for garden statuary, painting it white or gray in imitation of marble; and where the paint has worn off, as in the fountain groups at Versailles, the effect is most unprepossessing and dismal.

Good marble work is comparatively expensive, and save in rare instances, the finished work does not bear the impress of the sculptor's hand, who invented and modeled the figure, — it is a translation of his work by a mechanic.

Terra-cotta, however, is one of the most personal of materials, retaining the very imprint of the sculptor's hand; it is capable of receiving any texture, and while its natural color is very agreeable, it is now possible to apply to it a wide range of beautiful polychrome, rendering it the most pliant sculptural material in use.

Church Architecture in Materials of Clay.

BY THOMAS CUSACK.

THE last example given in illustration of this subject was a small suburban church whose chief claim to distinction lay in its very attractive brick and terra-cotta spire. We now turn to a group of ecclesiastical buildings in New York, of much greater magnitude and complexity, calling for a relatively high degree of technical and artistic skill in a successful execution of the architects' intention. These buildings cover ten city lots, or 25,000 sq. ft., and extend through the block between 13th and 14th Streets, a little east of First Avenue. Brick and terra-cotta are the materials used on both elevations, from sidewalk to the finials on the turrets of the tower. The color is a light brown, not in simulation of any building stone with which we are acquainted, but possessing a degree of uniformity not surpassed by nature's own product. A general view of the 14th Street elevation is given at Fig. 8, and a few of the more important details are reproduced on a scale equal to the space at our disposal. The architects in this case, as in that of another and somewhat similar establishment in brick and terra-cotta, to which some attention will be given on a future occasion, are Messrs. Barney & Chapman.

Starting with a handsome and well-arranged church as a nucleus, the scheme develops into a clergy house, parish house, club house, and a hospital; all of which, if not under the same roof, are covered by a series of adjoining roofs, and are under the same general management. These institutions are again subdivided into apartments in which industrial trades are taught, with room for a gymnasium, kindergarten, etc., and — which is by no means the least important — a cooking school. Ready access and exit are provided to and from all these apartments by corridors and stairways, the main connecting link being a cloister running north and south parallel to the nave. East of this cloister is a large open court from which uninterrupted light and air, with a fair proportion of sunshine, enter three sides of the quadrangle at all seasons.

The buildings comprising this compact yet comprehensive establishment bespeak a practical as distinguished from a merely doctrinal interpretation of the Christian religion. Faith and good works are evidently the keynote in this community. Churches conducted on these lines will attract many adherents from among those who believe that temporal well-being is not incompatible with eternal salvation. This center of missionary enterprise is, we believe, an offshoot from Grace Church, that unique but unobtrusive landmark that nestles in the bend of Broadway, punctuating with a full stop the easterly continuation of 11th Street. Though situated in the heart of a heterogeneous population, it is admirably adapted to the wants of the immediate neighborhood and will in time become assimilated with its surroundings. Like the parent church, in its relation to the great commercial highway, this really picturesque settlement is a welcome relief to the eye, in a region where the otherwise unmitigated double tenement holds high carnival.

With a blending of religion and philanthropy, we have here an equally happy combination of things ancient and modern in point of architectural style and treatment. The two pavilions to the left of the picture constitute the hospital, that word being given its original English meaning — literally, a house of hospitality. The needful Gothic feeling has been infused into the contour of moldings, more especially into the design of dormer windows, etc., but this has been done without shutting out the light or in any way marring the cheerfulness of these home-like habitations. Though approached from a cloister, — in this case, merely a convenient covered passage, — they have been adapted to the necessities of every-day life in the waning years of the nineteenth century. But now comes a bold Gothic tower with a loopholed octagonal shaft on one of its angles that takes the mind back to the Middle Ages. True, the rampart, moat, and drawbridge are missing, and the smooth asphalt pavement has not yet been worn by the hoofs of prancing steeds carrying mailed and visored chieftains on missions of knight-errantry; but the low arch in the center, through which a deep recess is dimly visible, suggests the possibility of a portcullis and the clank of armed retainers within the keep. Our train of thought, however, is broken as we approach, for instead of chains, arrow-headed spikes, and oaken bars, we see a partly open gate and hear the sound of music mingled with voices that bid us welcome. Any lingering illusion would now be dispelled by the presence of St. Paul in his hooded niche above this portal (Fig. 9), were it not for his enormous sword, easily mistaken for a Scottish claymore. But this archway really leads to the cloister, thence to all parts of a free and estimable institution.

The second of the two archways is the main entrance to the church; and that ornate apsidal projection, Fig. 10, is known as the Morning Chapel. In the little triangular space abutting the property line, a fountain has been provided, at which thirsty wayfarers are invited to refresh themselves. This invitation is given on the scroll above in a text that may be taken literally as well as figuratively, though in words from Isaiah, "Ho, every one that thirsteth." An aggressive gargoyle on the salient angle of a buttress offers a challenge to every boy in the neighborhood, but, greatly to their credit, they have resisted that form of temptation up to date of writing. This immunity from mutilation may be out of respect for St. James, the son of Alpheus, who occupies a niche on the same buttress, book in one hand, pastoral staff and bottle in the other, likewise the traditional shell on his breast (Fig. 11). In addition to these two saints, there are eight winged cherubs on the four dormers of the belfry, yet we fear that these "angels and ministers of grace" bear but a small proportion to the sinners that pass each day along 14th Street. How different in European cities, especially in those of Spain! In Burgos, for example, Théophile Gautier assures us that on one tower of the cathedral — and it the smallest of three — the stone population must exceed that of flesh and blood inhabiting the town.

The fine rose window in the gable is worthy of more than a passing notice, in view of what was said in THE BRICKBUILDER for December, 1898, on behalf of terra-cotta tracery in general. The present example is a reminder, in miniature, of the great rose window in the west front of Notre Dame, which is rather more than twice its size. From the central hub to the first cusping there are twelve radial lines in both windows; but in Notre Dame an intermediate bar is introduced, dividing the outer periphery into twenty-

FIG. 8.

FIG. 9.

FIG. 10.

four lights. Of course, the sectional area of the bars is in proportion to the immense size of the window, otherwise there would be a want of lateral stiffness, with a consequent tendency to buckle at the joints under a strong wind pressure. In the present case the jointing is arranged in the manner shown at Fig. 12, and the window is entirely self supporting, no iron or other expedient being employed in its construction. All joints are made on the principle of mortise and tenon, with sufficient freedom allowed for the introduction of cement, which, setting in the rebates, becomes the best kind of dowel. Doubts as to the safety of this window were expressed during the early stages of its execution, but these were set at rest when the pieces had been assembled and the last one keyed into position. This window was tested soon after setting in 1894, and found to be quite rigid at all points. Judging from recent examination, it is likely to remain so indefinitely.

The making of a window such as this is not particularly troublesome or expensive, provided the right methods are adopted from the outset. For the tracery but seven different molds are required, out of which eighty-five pieces are obtained. One mold could be made to produce the whole of the thirty-six pieces required for the outer arch, by having the ashlar of sufficient size to contain the largest bond, all the others being wire-cut by hand to a templet, so that the steps would course with the brick walling. In this we get a total of one hundred and twenty-one pieces from eight molds, a fair average in point of repetition, considering that there is but one such window in the building. This is a much higher average than would be possible on some kinds of merely commonplace work, in which comparatively little effect is obtainable at an equal, or even greater, expenditure per cubic foot. We shall have other opportunities of demonstrating the practicability and economy of terra-cotta as

FIG. 11.

against stone tracery, but nothing more conclusive as to that can be adduced than the facts and inferences furnished by the foregoing example.

What has been said in reference to tracery would apply to every block of terra-cotta in tower, from the arcading of the base to the finials on the dormer gablets (Fig. 13). Much of this work reaches a high degree of elaboration, presenting a series of rather

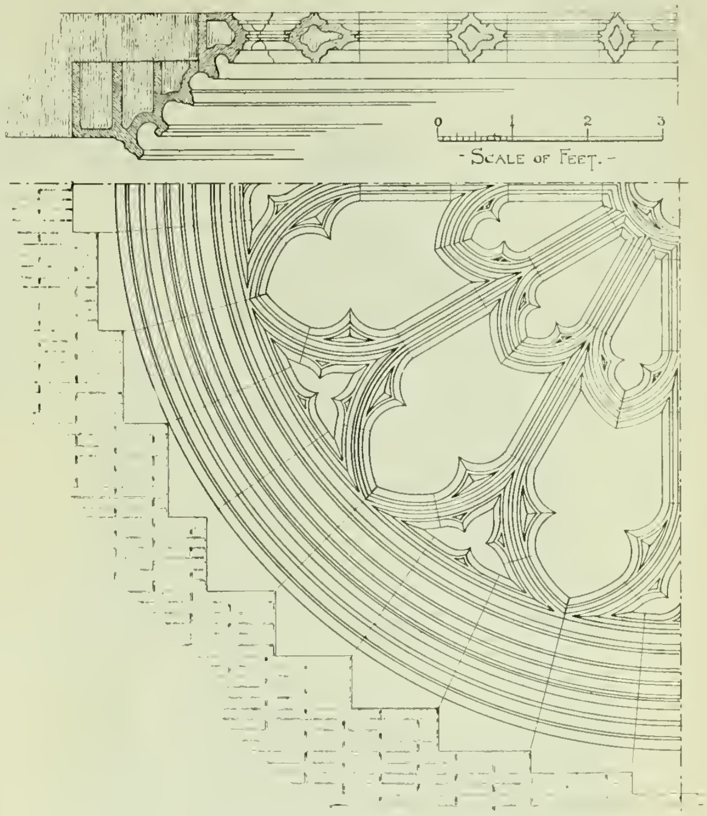


FIG. 12.

intresting problems in jointing and in construction generally. The setting out of work such as this must be conducted on geometrical principles, correct in theory and at the same time conformable to approved workshop practise. If these two elements are embodied in the working drawings, and adhered to intelligently in making the plaster models, the resulting terra-cotta blocks will find their respective places with little, if any, subsequent adjustment. Moreover, the habit of "fitting" the blocks after burning is not one that ought to be encouraged. At best it is a makeshift, made necessary by a want of skilled experience in controlling the shrinkage, or a want of accuracy in the models. There is no reason why either of these wants should be tolerated in an industry that has now passed the infantile stage of development.

In the hands of really competent men there is nothing to prevent the great bulk of a factory's output being shipped from the kiln door direct, without the touch of a chisel. We know that the traditions of a bygone time say otherwise, and though most of the conditions and some of the men have changed places of late years, the ancient fallacy holds its ground from force of habit. If it be true that "custom is our greatest friend or cruellest foe," then there is one here that certainly belongs to the latter category.

Of course, things are liable to happen in the progress of a building that cannot be foreseen, much less provided for before their existence has become known. Mistakes in height and in the size of piers and openings, etc., often occur through careless setting out on the building. The mischief arising from all such oversights or deviations generally falls on the terra-cotta manufacturer, however accurately his work may agree with the data from which all hands had been expected to work. A remedy or expedient must then be resorted to, in which case the service of a fitter comes into immediate demand. We can remember a time when it was taken for granted that anything in the way of a misfit or misadventure that might happen on a building must be owing to the intractability of the "—— terra-cotta." In some quarters, and until recently, this

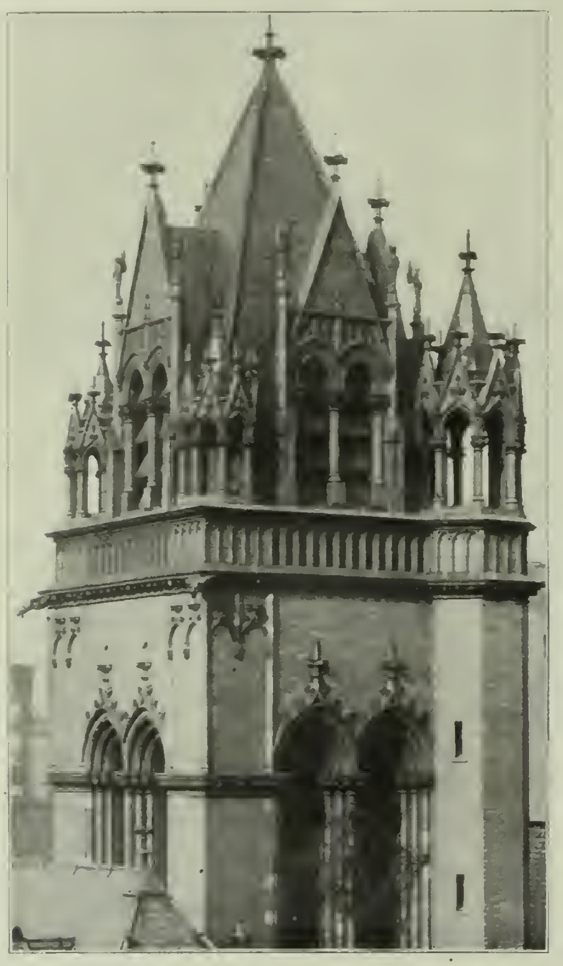


FIG. 13.

stupid notion amounted to an article of faith, the propagation of which was convenient as well as highly fashionable. The absurd maxim is now being gradually exploded, and more often than otherwise the setting drawings that accompany the terra-cotta take precedence over all others, as a safe guide in cases of undefined or disputed measurement.

How far any of these several conditions prevailed in connection with the belfry of Grace Chapel, we are not prepared to say. We can say, however, and that as a result of critical inspection, that every piece fits into its allotted place, that they are free from warping or distortion, and that the color is remarkably uniform throughout. Results such as these should be the aim in regard to every part of a building, be it ever so far removed from the eye, yet one is inclined to regret that work of equal merit has not been given a place of honor around the chancel.

In the matter of iron anatomy it may be stated that a 2½ by 3 T section, fastened to a cross beam below the bell deck, passes up through each shaft of the turrets. This is connected to a similar raking section forming each hip, all of which unite at the apex of roof. In order to prevent spreading, a tie-rod passes horizontally through these ribs a little above the crown of the arch. This, we think, is an improvement on the method usually adopted of inserting the tie-rod at the springing of arch, where it is unsightly and liable to rust, — two disadvantages against which there is no offset.

Brick and Marble in the Middle Ages.

BY G. EDMUND STREET.

CHAPTER X.—*Continued.*

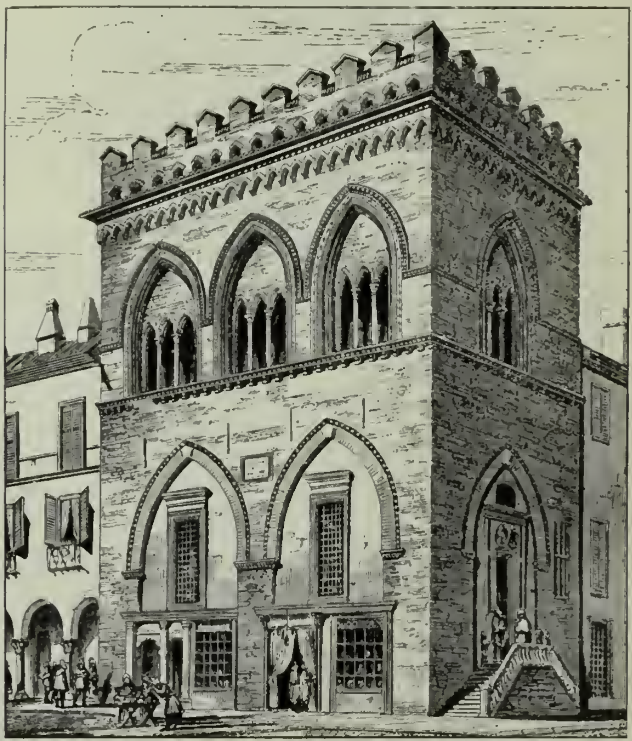
[The photographs A, B, and C are not taken from Mr. Street's work, but are added as additional illustrations of the Italian brickwork.—EDS.]

CREMONA is a city full of interest. The piazza in front of the cathedral is equal in effect to almost any small piazza I know of. On one side is the great marble west front of the Duomo, backed by its immense brick campanile, whose wide fame is proved by the old rhyme, of which the Cremonese are still so proud : —

"Unus Petrus est in Roma,
Una turris in Cremona."

On another side is the Lombard baptistery, a grand polygonal building; on the third, a most interesting domestic building — the palace of the Jurisconsults — and the Gothic Palazzo Publico; whilst on the fourth, a narrow, busy street makes up, by the diversity of colour and costume of the crowd which is always passing along it, for what it wants in architectural beauty.

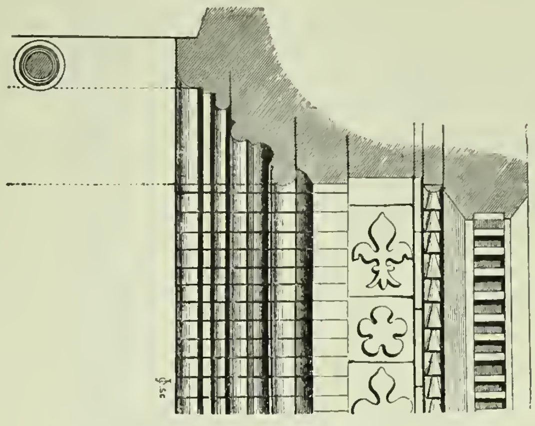
The cathedral must be first described, and it is rather difficult to do this clearly; but so far as can now be made out it seems much as though it had at first been built upon a simple plan, with nave, north and south aisles, and three semicircular eastern apses; and that then to this, in the fourteenth century, had been added, with hardly any disturbance of the original fabric, immense transepts, loftier even than the nave, and so long and large as to give the impression now that two naves have been placed by some mistake across each other. The groining of the nave is original in its outline, but barbarously painted in sham panelling so as entirely to spoil its effect, but otherwise there is little to notice in the interior, the whole of the church having been converted with the plasterers' help into



PALACE OF THE JURISCONSULTS, CREMONA.

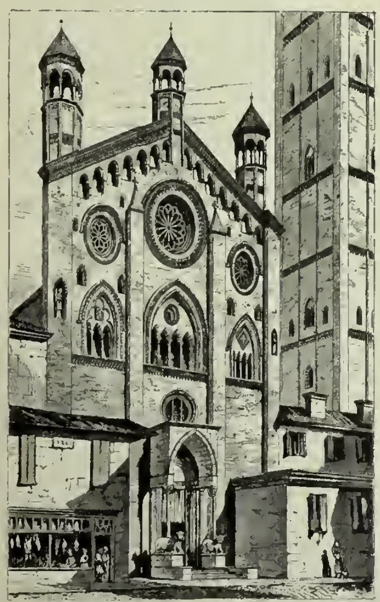
Renaissance in the most approved manner. The walls are covered with painting, and round the columns, when we were there, were hung great tapestries, all of which gave the building a rich though rather gloomy colour.

The west front (if you can forget that it is a great mask only to the real structure) is rather grand from its large plain surface of arcaded wall; it has been grievously damaged by alterations, but the old design is still not difficult to trace. The doorway is very noble, and the open porch in front of it is carried up with a second stage, in which, under open arches, stand a very fine figure of the Blessed Virgin, and figures of other saints of more modern character on either side of her; above this is a great circular window, whilst the wall on either side of the porch and window is nearly covered with small arcading. The marbles in the wall, where the arcading does not occur, are arranged very regularly in horizontal lines alternately of red and white, each course being about ten inches or a foot high, and divided from the next by a strip of white marble about two or three inches in height. The great rose window is all of red marble, with the exception of one line of moulding which looks like green serpentine. There are some round windows in the lower stage on each side of the entrance, but they are quite modern.

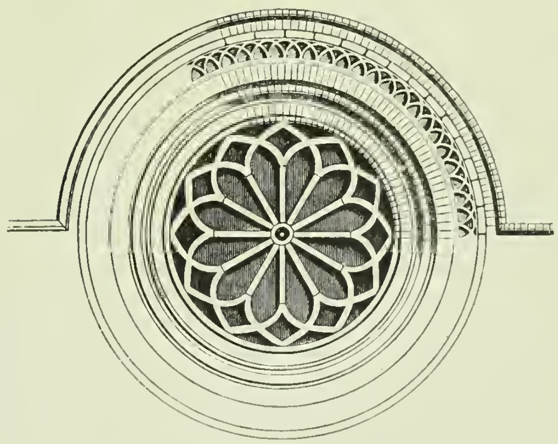

WINDOW JAMB, PALACE OF JURISCONSULTS.

On the north side of the nave rises the Torrazzo, as the campanile is called here — the "una turris in Cremona" — rising about four hundred feet from the pavement of the piazza. Its design is much like that of all the other brick campanili in this district — a succession of stages of nearly equal height, divided by arcaded string-courses, and marked with perpendicular lines by small pilasters, and almost without windows until near the summit. The dark red outline of this magnificent tower tells well against the deep blue Italian sky, which shone brightly behind it when we saw it; and the effect of its immense and almost unbroken outline, rising to such an extraordinary height, is so utterly unlike that of any of our Northern steeples that we need not trouble ourselves to compare them. Both are fine in their way; but the Italian campanili are made up of the reiteration of features so simple and so generally similar that we cannot fairly class their builders with the men who raised in England such a multitude of steeples, all varying one from another, and yet all so lovely.

A door in the east wall of the north transept leads into a small courtyard, sacred now to the cathedral clergy, from which the original scheme of the eastern part of the church may be fairly well seen. It appears to have been a stone building treated in the common fashion of Lombard churches, but with buttresses and a passage through them round the apse in front of the windows. There is a modernized crypt under the choir. The side walls of the north transept are seen very well from the same courtyard; they are well arcaded in brick, and entirely concealed from sight elsewhere by the enormous false transept-fronts, the backs of which as seen from here are certainly among the most ungainly works ever erected for the mere sake of being beautiful.


NORTH TRANSEPT, CATHEDRAL, CREMONA.

The rest of the exterior of the Duomo is almost all of brick. The most remarkable features are the two transept fronts, which are certainly magnificent in their detail, though most unreal and preposterous as wholes; they are, both of them, vast sham fronts, like the west front, in that they entirely conceal the structure of the church behind them, and pierced with numbers of windows which from the very first must have been built but to be blocked up. They have in fact absolutely nothing to do with the building against which they are placed, and in themselves, irrespective of this very grave fault, are, I think, positively ugly in their outline and mass. And yet there is a breadth and grandeur of scale about them which does somewhat to redeem their faults, and a beauty about much of their detail which I cannot but admire extremely. Both transepts are almost entirely built of brick and very similar in their general idea; but, whilst only the round arch is used in the south transept, nothing but the pointed arch is used in the northern, and it is quite curious to notice how very much more beautiful the latter looks than does the former. The filling-in of stilted round-arched windows with ogee pointed tracery and much delicate cusping gives the south transept a singularly Eastern look, and it is impossible not to feel that some such influence has been exercised throughout its design. It would indeed be most interesting to find out what this was, but I am not aware that there is likely to be any clue to it. The date of the work is in all probability somewhere about the latter part of the fourteenth century. The detail and management of the whole of the brickwork are exceedingly delicate and effective, surpassing in their way anything I have yet seen.


ROSE WINDOW, CREMONA CATHEDRAL.

The putlog-holes are left unfilled, as they almost always are in Italy. The only stone used is in the doorway and the window-shafts, and these last are almost always coupled in depth. The windows are elaborately moulded, and courses of chevrons, quatrefoils, and other ornaments are introduced occasionally as a relief to what might otherwise be the tedious succession of mouldings which are necessarily rather similar. The cusping of brick arches is always managed in the same way; the bricks all radiate with the arch (not from the centre of the cusp), and look as though they might have been built, allowing plenty of length of brick for the cusps, and then cut to the proper outline, the edges of the cusps being almost invariably left square. Some of the terra-cotta arch ornaments and diapers are exceedingly good of their kind. The most remarkable feature, however, about these transepts is the prodigiously heavy open arcade which runs up the gables under the eaves cornice — so heavy and so rude-looking, that, taken by itself, it would probably be put down as being of much earlier date than it really is. The façade finishes with three heavy pinnacles arcaded all round, and finished with conical caps.

To the north transept very nearly the same description would apply, save that the doorway is much finer, and entirely of marble.[1] It is part of the original Lombard church, and has no doubt been taken down and rebuilt where we now see it. The tracery of the rose windows is all finished in brick, and the detail generally is better and more delicate in its character than that of the south transept. In both the bricks are all of a pale red colour, and no dark bricks are anywhere used.

BRICK WINDOW, CREMONA CATHEDRAL.

The baptistery — which, as has been said, stands southwest of the Duomo — is entered by a doorway with a projecting porch, whose shafts rest on the backs of animals. It is octagonal in its plan, built of brick with the exception of the side in which the door is placed, this being of marble, and is very simple in all its detail. There are three altars in it, and an immense erection of masonry in the centre, which, though not open, is evidently a font, amply large for immersion. Each side has three recessed arches on marble columns, above which the whole is of red brick with stone stringcourses between the stages. These have corbel-tables under them, which are the only enrichments in the building. All the brickwork is left to view inside, and the light is admitted by a pierced arcade very high up in the walls. The whole is domed over with an octagonal vault of brick, in the centre of which is a small lantern, and the effect is exceedingly fine and solemn, and enhanced very much by the grave sombre colour of the bricks.

Close to the baptistery is a building, called in Murray's Handbook the Palace of the Jurisconsults, turned when I first saw it into a school for a not very polite set of children and teachers, who all apparently felt the most lively interest in my architectural pursuits. It was originally open below, but the arches on which it stood are now filled up. This upper stage is very simple and beautiful, and the whole is finished at the top with a cornice and parapet, with battlements pointed at the top like those in the Torrazzo, and not forked as we have been lately so accustomed to see them. At one end of this parapet a chimney rises above the battlement, which is, so far as I have seen, a unique example of the ancient Italian contrivance for this very necessary appendage.[2] It is exceedingly good in its detail, and coeval with the rest of the work. There is a simplicity and truthfulness of construction about this little building which make it especially pleasing after the unreal treatment of the great transept-fronts of the Duomo.[3] By its side stands the Palazzo Publico, out of one side of which rises one of those singular and very tall brick towers, without any openings whatever in its walls, which give such peculiar character to some Italian cities, and of which we afterwards saw good store at Pavia. The whole of the building shews either traces of arcades or perfect arcades upon which the upper walls are supported; they are, however, so much modernized as to be comparatively uninteresting, though enough remains to shew that their detail was once very good. The building incloses a quadrangle, which is rather small, but arcaded on three sides, and opens from the piazza by open arches under the principal façade, and probably dates from the middle of the thirteenth century, the date 1245 being given in an inscription in the courtyard.

[1] The two transepts are so very similar, that it seemed unnecessary to engrave my sketches of both.

[2] The chimneys so common in Venice are ancient, but yet hardly redeemed from ugliness. They are cylindrical, with heads sloping out in a strange fashion, and in the form of inverted truncated cones.

[3] This building has recently (1872) been restored, and with not much gain, though the barber's shop which used to occupy the ground-floor has been removed.

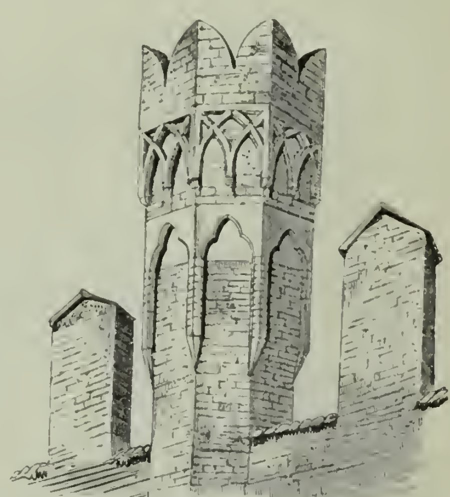
There are many churches in Cremona, all more or less appearing to be founded upon the work in the transepts of the cathedral, but generally very inferior to them in merit.

San Domenico has a west front singularly like theirs, but debased in its detail. It has, however, a very fine campanile, lofty, very simple, and pierced with pointed windows in each stage, one above the other. The interior is completely modernized, and not worth notice.

SS. Agostino and Giacomo in Breda is another church of the same class, with a west front which is again a very bad second edition of the cathedral, and which has been horribly mutilated and modernized inside. It is, however, to be remembered gratefully for a most lovely picture by Perugino, representing the Blessed Virgin with Our Lord seated, with SS. Augustine and James on either side. The Virgin is very calm, dignified, unearthly, and very simple and stately. Our Blessed Lord, in her arms, has perhaps rather too much the character of an ordinary infant; and the two saints have more than is quite pleasant of the bend in their figures of which he was so fond: the heads stooping forward, and the knees considerably bent, are a little too evidently straining towards a reverential posture. Such a criticism is a bold one to venture upon with the recollection of so glorious a picture fresh in my mind — one from which I really derived intense pleasure. The date of this very fine work is A. D. 1494.

Sta. Agata is another church which still has its old campanile intact, with round-arched windows, very simple and not large. The church which has been built against it tells its story so well, that at first we all mistook it for a theatre! So much for Classic symbolism.

Another church, dedicated in honour of Sta. Margherita, is a very poor erection of brick, with a simple campanile. One or two other churches we saw with fair brick campanili, which were not otherwise remarkable; and one there was, San Luca, close to the Milan gate, which seemed to be very singular in its arrangements. It had a projecting western porch, with its columns supported on beasts; and at the north-west angle an octagonal building of brick, of exceedingly late date, which appeared to be a baptistery.



CHIMNEY AND BATTLEMENT, CREMONA.

I enjoyed the architectural remains in Cremona very much indeed: its rich array of buildings in elaborate brickwork is very striking; and the campanile of the cathedral, towering up high above the many other steeples, combines well with them in the general views, and helps to convert into a fine-looking city what is, perhaps, in its streets and houses generally, very far from being anything of the kind. The way in which the old walls and towers of the Palazzo Publico combine with the steeple of the cathedral is extremely fine, a large piazza a short distance to the west of the palazzo affording perhaps the best point of view.

From Cremona we went to Lodi, on our way to Pavia, and had a very pleasant drive. The heat was intense when we started, and the drivers of all the carts we passed were prudently ensconcing themselves in the baskets swung beneath their carts, to escape its effects. Throughout the Lombardo-Venetian territory there is a great traffic always going on, and there is a much nearer approach to English arrangements, in the way of harness and tackle, than it is at all usual to see on the Continent; though, indeed, it ought in fairness to be said, that their carts are much more scientific than ours generally are. Any vehicle with more than two wheels is rarely if ever seen; and these two wheels are sometimes of prodigious size — I should say quite ten feet in diameter — whilst the length of the cart from end to end is immense. The extent to which they are loaded is almost incredible, and of course it requires great care in order to make the trim exact; but when loaded, the draught must be light for the weight. It is impossible to talk about horses and carts without thinking of the magnificent cream-coloured oxen which are everywhere doing hard work on the roads and in the fields. They have most magnificent, large, calm eyes; and this, with their great size and slow and rather dignified motion, makes them look very grand. They are always yoked to a pole, which rises up above their heads at the end, and has a carved crosspiece attached to it, against which they press their foreheads.

At Pizzighettone we crossed the Adda, here a very fine and full stream, and then, changing horses, went on rapidly towards Lodi. Leaving the main road, we travelled along a less frequented by road, infinitely more pleasant, and in many places very pretty indeed. We followed the course of a small river, which was turned to good account for irrigation; its stream being at times divided into no less than three channels, in order to water the pasture-land on which are fed the cows whose milk is to produce the far-famed Parmesan cheese. Some part of the road reminded us pleasantly of English lanes and English scenery, but here and there a distant glimpse of the Apennines far behind us, and of the Alps beyond Milan before us, made us aware that we were indeed in Italy.

(A) THE LARGE CLOISTER, ABBEY OF MONTE MAGGIORE, SIENA (13TH CENTURY).

(B) WINDOW OF COURT, TOWN HALL, SIENA (13TH CENTURY).

There is little to be seen in Lodi. It has a large and rather shabby-looking piazza, at one corner of which is the cathedral, whose only good feature is its doorway, which is, however, very inferior to the western doorway of the cathedral at Cremona, to which it bears some little resemblance.

Another church has a Gothic brick front. The real roof is one of flat pitch, spanning nave and aisles; but in the façade the central portion is considerably higher than the sides, so as to give the idea of a clerestory. This is a foolish sham, and unhappily only too common in late Gothic work in Italy. The centre division of the front is divided into three by pilasters, which are semicircular in plan. In the central division are a door and a circular window, in each side division is a pointed window, and a brick cornice finishes the gable, crowned with five circular brick pinnacles.

Another church in Lodi has a very beautifully painted ceiling; this has been engraved by Mr. Grüner, but unluckily I did not know of its existence until I returned home; it seems to be an admirable piece of colour, and to be well worth careful study.

There seemed to be nothing else worthy of notice in Lodi; but, as in duty bound, we walked down to the bridge,— a rough, unstable-looking wooden erection over the broad rapid Adda, with nothing about it to recall to mind the great event in its history, its passage by Napoleon in 1796.

We left very early in the morning for Pavia: our way led us through a country most elaborately cultivated, and irrigated with a great display of science and labour; every field seemed to have some two or three streams running rapidly in different directions, and the grass everywhere was most luxuriant. No view, however, was to be had on either side, as the road found its way through a very flat line of country, and all the hedges were lined with interminable rows of Lombardy poplars. It was a country which would have done more good to the heart of a Lincolnshire farmer than to that of an architect!

The only remarkable building passed on the road was a castle at Sant' Angelo: a great brick building, with square towers set

(C) OLD WELL NEAR SIENA (13TH CENTURY).

diagonally at the angles. The walls were finished with a battlement of the Veronese kind, and there were several very good early pointed brick windows with brick monials in place of shafts. A campanile, detached near one angle, has fine machicolations in stone, now, however, partly destroyed. The effect of the whole building was very grand.

CORRESPONDENCE.

EDITORS THE BRICKBUILDER: —

Dear Sirs: — Please give me your opinion and suggestions in regard to the manner of carrying the brickwork both above and on the face of the girder as shown in the enclosed sketch (Fig. 1). The specification will call for the work in Portland cement mortar with the joints raked out and repointed with the finishing mortar. The weight on the beam is less than thirty tons — 20 ft. 8 ins. span. Is the anchoring of the brickwork to face of the beam the best that can be got?

We do not think that the construction shown by our correspondent is quite safe, for the reason that the bearing of the brickwork on the lower flange of the beam will be only about 2⅝ ins., and what is more objectionable, the bearing (beam flange) has a slope or angle of 2 ins. in 12 ins., so that we think it will be quite impossible to hold the bricks so that they will not slip on the beam. The ¼ in. plate on the top web would offer very little resistance to the brickwork above, and we are inclined to think that a large proportion of the weight of the outside facing of the wall will be transmitted to the lower flange of the beam. In our opinion, the ¼ in. plate would be of practically no value in supporting the wall, except as a foundation for starting the first courses.

We would recommend that instead of a single beam, a beam

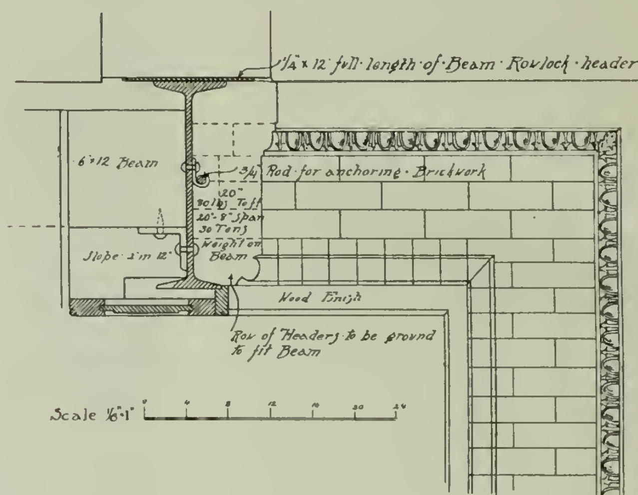


FIG. 1.

and channel, connected with bolts and separators, be used, as in Fig. 2. These have about the same strength as the 20 in. beam, and weigh a little more, but give much better support for the wall. Owing to the molding on the bottom brick, the bearing has to be limited, but it is perfectly level, and by riveting a small angle to the channel at A, so as to just catch the top of the bottom brick, it will be impossible for it to tip. By bonding the bricks above the beam, as shown in the sketch, but very little weight will be imposed on the bottom plate. It would be still better construction if the back of the channel could be set within 4 ins. of the face of wall, but that would necessitate different moldings.

If it is deemed necessary to adhere to the single beam, we would recommend that a 4 by 4 in. angle be riveted to the outside of the beam, opposite the inner angle, and that the brickwork be brought on to these angles on *both sides* of the beam, and the plate on top dispensed with. This would necessitate substituting terra-cotta, wood, or metal for the lower or inner molded course. Terra-cotta

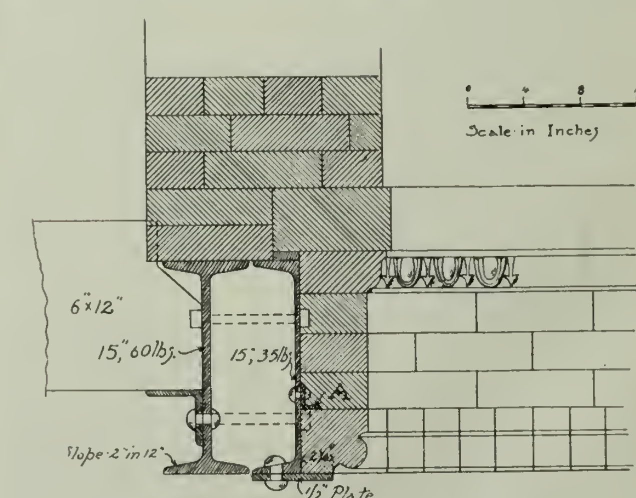


FIG. 2.

can be hung almost anywhere by means of interior rods and hooks, but to drill the bricks and hang them in place is impracticable if not impossible.

EDITORS.

Fire-proofing.

THE SERRATED ARCH.

BY HENRI G. CHATAIN, E. E.

IN a previous article a new style of terra-cotta arch, the "serrated arch," was partially illustrated, and is here shown and explained at greater length.

The primary object of this arch is to furnish a construction possessing practically the same strength as a segmental arch of the same depth and rise, without the disadvantages of the latter. The rise is obtained by using a skewback and key with a batter of 2 ins. to 1 ft., and voussoirs with a batter of 1 in. to 1 ft. The difference between these batters gives to the arch a rise of 1 in. per foot of half the span, or one twenty-fourth of the total span. In setting these arches the centers may be of the ordinary type generally used for "flat arches," hung either from the beams directly, or from joists across the top of the beams, with the addition of a beveled strip laid on each stringer. This strip can be used for different spans, as the angle of rise is always the same.

A careful examination of the cuts here shown will give an idea of one of the principal advantages this arch possesses over a segmental arch in having the ends of all the blocks, or voussoirs, parallel, thus giving mortar joints of even thickness at the top and bottom. This also applies to the skewbacks and keys. This is seldom the case in a segmental arch, as blocks battered on both ends to fit a certain rise and span seldom fit any other span with any degree of nicety. The combination of side-construction skewbacks and keys and end-construction voussoirs used in this arch has many advantages. A side-construction skewback can be made with a protecting flange beneath the beam, thus doing away with the soffit tile, and moreover presents a smooth, flat surface against which the abutting voussoir can be well mortared. In placing the key, its smooth surface materially aids the mason in securing a good and uniform joint.

FIG. 3.

FIG. 2.

FIG. 1.

As stated in a previous article, the line of greatest pressures in a "flat arch" approaches the upper and lower sides at the key and skewbacks respectively, and therefore it is more necessary to have good firm joints at these points than at any other places in the arch; and as these arches have such a small rise, the same rule applies. It will also be noticed that the keys and skewbacks are made exceptionally heavy and the material distributed so as to present the greatest resistance where it is most needed. The webs of the skewbacks are designed with a slope, which is most efficient for an average span, but which is near enough for all practical purposes at the most extreme spans to which the arch is applicable.

In the matter of strength these arches compare very favorably with segmental arches made of side-construction blocks. An end-construction block properly set in an arch has its entire section available for resisting compression, as the shells and webs extend from end to end, while a side-construction block has only the horizontal webs and the upper and lower shells in direct compression, the remaining parts serving only to hold the block together and to resist diagonal strains, due to the resistance to bending at the joints.

A casual inspection might lead one to infer that a long span uniformly loaded would have a tendency to buckle downward, say half-way between the center and either end, but it must be remembered that if a circular arc can be drawn inside of the middle third of an arch, it will be stable, if uniformly loaded. It is always assumed that the haunches are filled with concrete to at least level with the highest point of the arch, so that the depth of the arch at any point may be taken as the sum of the depths of terra-cotta and concrete at that point, as the solid section of light (cinder) concrete may be safely taken at the same compressive resistance as a section of the hollow terra-cotta block of the same dimensions. Of course every inch of concrete above this adds materially to the strength of the construction, but the safest plan is to design an arch to safely carry the desired load, and to depend upon the extra concrete to withstand any unforeseen shocks or excentric loading.

"Flat arches" act as braces in a building to a certain degree, and these arches may be depended upon to the same extent, as it would be a practical impossibility to buckle them by pressure on the ends, owing to their slight rise. Although intended more for constructions requiring great strength, such as the floors of warehouses, breweries, etc., these arches are perfectly applicable to any buildings not requiring such strong construction, being so light for their strength.

The serrated ceiling is an innovation which it is believed will be appreciated by the architect and owner, combining greater strength than a "flat arch" of the same weight, with a most pleasing effect to the eye. A serious objection to the segmental arch is the irregular ceiling effect where a floor is divided into small rooms, as the partitions may divide an arch so as to mar the whole effect. These serrated arches, having only a very small rise, obviate this difficulty entirely, for, as in the case just cited, the ceiling may be plastered level wherever considered necessary, and at a small extra cost. In places where the plastering is very thick, large-headed iron spikes driven into the arch, leaving enough projection to be thoroughly embedded in the plastering, will insure a good bond and obviate the danger of the ceiling falling in consequence of its extra weight.

Fig. 1 shows a 6 in. raised serrated arch at 4, 5, and 6 ft. spans, capable of safely sustaining loads of 612, 434, and 330 lbs. per square foot of floor, respectively. The weight of the terra-cotta arch alone is about 20 lbs. per square foot of floor. The dotted lines show the position of an 8 in. arch, and in the central span is shown the effect of the finished ceiling. In Fig. 2 a 12 in. arch is shown at 4, 5, and 6 ft. spans, capable of safely sustaining loads of 1,357, 931, and 688 lbs. per square foot of floor, respectively. The weight of the terra-cotta arch alone is about 30 lbs. per square foot of floor.

Fig. 3 shows a 15 in. arch at 7 and 9 ft. spans, capable of safely sustaining loads of 700 and 461 lbs. per square foot of floor, respectively. The weight of the terra-cotta arch alone is about 36 lbs. per square foot of floor. Figs. 2 and 3 show the regular serrated ceiling with several different styles of flooring, all of which are equally applicable. In this arch, as in an end-construction "flat arch," any sections of voussoir may be used, the strength varying directly as the cross sectional area in arches of the same depth.

Masons' Department.

SOME EVILS OF PRESENT SYSTEMS.

BY JOHN LYMAN FAXON.

As to the form of contracts in use, they are, naturally, of somewhat varied phraseology, though aiming at like results; and in this paper I will briefly comment on two, which fairly illustrate the extremes of such instruments, of extended form: first, as to the "uniform contract" as approved by the National Association of Builders and the American Institute of Architects.

"ARTICLE I. The contractor under the direction and to the satisfaction of Blank & Blank, architects, acting for the purposes of this contract as agents of the said owner, shall and will provide all the materials and perform all the work mentioned in the specifications and shown on the drawings prepared by the said architects for the, etc., which drawings and specifications are identified by the signatures of the parties hereto.

"ART. II. The architects shall furnish to the contractor such further drawings or explanations as may be necessary to detail and illustrate the work to be done, and the contractor shall conform to the same as part of this contract *so far as they may be consistent with* the original drawings and specifications, referred to and identified, as provided in Art. I. It is mutually understood and agreed that all drawings and specifications are and remain the property of the architects."

I have italicized the words "so far as they may be consistent with," because it seems to me that therein lies much chance for controversy, which should be avoided.

Who is to determine whether or not the architect's detail drawings or explanations *are* consistent with the originals or with the contract? the contract does not say, whether it is to be the owner, the contractor, or the architect, or by arbitration under Art. III.

The owner may claim that he or the architect is to so determine or that it is to be by arbitration, according to the owner's bias of thought at the time; the contractor may claim that he or the owner is to so determine, or that it is to be by arbitration, according to the contractor's bias of thought at the time: the architect may claim (and rightly) that he is to so determine, for, having prepared the plans and specifications, the architect *is the only person who knows* just what the true intent and meaning and consistency is. In short, Art. II. is vaguely indefinite — contracts should be definite, as far as possible.

Art. III. provides for arbitration by "three disinterested arbitrators"; but as things go, it would be rather difficult, I imagine, to secure *disinterested* arbitrators, in the best sense of that term: each party would naturally select one who would be friendly to his interests, and with the probability that the arbitrators would have little or no knowledge of the legal aspects of the matter. In case of such arbitration, it should be provided that the referee shall consist of an architect, a lawyer, and a contractor.

Arts. VII. and VIII. provide for arbitration, on matters of much less importance than under Art. V.— yet Art. V. provides for determination by the architect, without appeal. Surely, if the architect is competent to act under Art. V., he is also competent to act under Arts. II., III., VII., and VIII.

Art. VIII. provides that "the owner agrees to provide all labor and materials not included in this contract in such manner as not to delay the material progress of the work, and in the event of failure so to do, thereby causing loss to the contractor, agrees that he will reimburse the contractor for such loss; and the contractor agrees that if he shall delay the material progress of the work so as to cause any damage for which the owner shall become liable (as above stated), then he shall make good to the owner any such damage. The amount of such loss or damage to either party hereto shall, in every case, be fixed and determined by the architect or by arbitration, as provided for in Art. III. of this contract."

In respect to labor and materials, Art. VIII. comes into conjunction with Arts. II. and III. *Who* is to determine as to *what* labor and materials, and just *how much*, the owner is to provide, and the consistency thereof, in respect to the contract? the contract does not say, except in so far as damages for delay are concerned, and that by architect or arbitration; but it does not say who is to determine as to whether it is to be by the architect or by arbitration.

This form of contract is at cross purposes, and conducive to disagreements; it says in Art. I. that the labor and materials shall be satisfactory to the architect, and then goes on to practically provide for some other satisfaction. The contract nowhere says that the *building*, as a whole, shall be satisfactory and acceptable to the architect, or that the building, as a structure, shall be a complete and perfected one of its kind, subject to the specific things which the owner is to provide.

The bias of the uniform contract is distinctly in favor of the contractor as against the owner and architect.

The "Contract" of the city of Boston goes to the other extreme, and is distinctly in favor of the owner, as may be noted by the following extracts: —

"ARTICLE 1. The contractor, with materials and workmanship of the best quality, shall, for the City of Boston, Mass., do the work described in the specifications of the work at the end of this contract, conforming so far as they go to the provisions of this contract, and completing the work as required in said specifications; and if the contractor is delayed in doing the work by anything for which the city is legally responsible, he shall have no claim for damages therefor, but shall have further time for completing the work equal to the time he is so delayed.

"ART. 2. The contractor shall permit the chairman and the person provided for in the specifications of the work to be the architect therefor, hereinafter designated as architect, and persons designated by them or either of them, to enter upon and inspect the work at all times and places, and shall provide safe and proper facilities for such entry and inspection; shall conform to all determinations and directions of the architect relating to the commencement of the work, the order and manner of doing the work, the proper interpretation of the plans and specifications, the suitableness, amount, quality, and value of everything done or used on the work, and the date of the completion of the work, or relating to any other question which may arise relating to the method and materials used in, and the time of doing the work, and the architect shall be deemed the referee of both parties to make such determinations and directions.

"ART. 3. The contractor shall take all responsibility of the work, and bear all losses resulting therefrom, or from the amount, character, or method of doing the work, or from the nature of the land in or on which the work is done, or from the weather, elements, or other cause; shall not take any advantage or make any claim for damages on account of any discrepancy or error in the specifications or plans, but shall report the same to the chairman as soon as it comes to his knowledge: and shall, when requested by the architect, dismiss any employé, and not allow to be again employed on the work any employé so dismissed.

"ART. 4. The contractor shall assume the defense of all claims and suits against the city, its agents and employés, or any of them, arising from the use in doing the work, of any invention, patent, or patent right, material, labor, or implement, or arising from any act, omission, or neglect of the contractor, his agents or employés, in doing the work: and shall indemnify and save harmless the city, its agents and employés, from all such claims and suits," etc., etc.

There is no form of contract with which I am familiar, which requires and depends so much upon the intelligence, experience. and integrity of the architect for fair, equitable, and just determination; yet this form goes to some lengths which are disadvantageous to the city, in the majority of cases, in encouraging to a more or less extent the present tendency to gamble in estimating; for it is as much against the city's interest for work to go for an excessively low price as it is for work to go for an excessively high price, and leads sometimes, logically and unavoidably so, to determinations by the architect which appear to be to the contractor unreasonable and arbitrary, yet clearly justified by the contract.

The civic buildings of a large and important city should be regarded as the most desirable works to be obtained, and there ought to be a strong, healthy, civic spirit among contractors to see that such buildings be erected in the most thorough, substantial, and perfected manner, with the polish of fine workmanship, to the end that such buildings may reflect, not only the intelligence and liberality of the citizens, the professional acumen of the architects, but the ability, integrity, and pride of the builders.

This last desideratum can be secured by the most reputable and responsible contractors taking a more active interest in the city work than has been the rule in the past.

Leading contractors complain that they have no chance in securing such contracts under the present system of advertising for bids, under which any self-styled "contractor," particularly those with "gumption" and those who "mortgage the job" to get a certified check, are allowed to bid for the work. This is largely so, and I see no way to better present conditions in this respect, except to put civic work upon the same basis as private work, *i. e.* by direct invitation to selected contractors to bid on the work. There is no good reason why this procedure should not be in vogue, and there are many reasons why it should be, and the city would be the gainer thereby.

It is argued, principally by "contractors," that "a citizen has a right to public work," and as much profit as possible out of it; but this proposition does not appear to be either logical or conclusive. In respect to securing and executing contracts, defects and abuses exist, which may be summarized under the following heads:—

(*a*) Lack of technical knowledge in accurate reading and understanding of plans and the terminology of specifications and contracts.

(*b*) Guessing at cost per square foot or per cubic foot.

(*c*) Too many figures made in estimating.

(*d*) Deliberate omission to estimate on some part of work, or estimating for different quality or kind of work than that specified,—"to get the job" or "to get extras."

(*e*) Taking estimates of irresponsible "subs.," and not using responsible "subs." at all in making up bids.

(*f*) Dickering in "subs." after award of contract.

(*g*) Mischievous hustling of material agents.

(*h*) Attempted evasion of contract obligations.

(*i*) Indisposition to accept fair prices for "extras," or to allow fair prices for "omissions."

(*j*) Lack of *system* in estimating and execution of work.

In respect to (*a*), the average contractor is lamentably deficient in the architectural and technical knowledge, which should be a part of the stock in trade of all who undertake contracts for the erection of buildings. In acquisition of the requisite knowledge, the architect works from the concrete to the abstract: from known facts to the scientific application of them, the architect needs to be ahead of his time; his principle of action is subjective, not objective; and his duty to his profession and to the public is, in its largest sense, greater than that to his client. It is this broader, ethical culture which contractors fail to understand, and which leads contractors to think of architects as "visionary, impractical, and cranky." On the other hand, the contractor works from the abstract (the plans) to the concrete (the building and profit); nevertheless, it is necessary that the contractor should have the same education as the architect, to the end that mutual understanding may be upon a higher plane.

Contractors, as a rule, do not study the history of architecture, or the scientific applications of architectural engineering: given the requisite training, a contractor would be able to *read* a set of plans and specifications as easily and as intelligently as a book in good, clear, precise English. Plans are merely language graphically expressed. But as things are, not one contractor in fifty is at all familiar with the different styles of architecture and the characteristic and essential details; not one in fifty appreciates or understands the artistic, individual differentiation of an Erechtheion, Palladian, or Scamozzi Ionic capital; or Byzantine, Roman, or Renaissance Corinthian; or Renaissance, Francis I., or Gothic style, *per se*: such nomenclature is meaningless to the average. Familiarity with them would, when estimating, tell a contractor, at a glance, what the plans represented and what measure and elaborateness of detail would be needful and required to express the general design, and would enable him to estimate accordingly.

I am quite of the opinion that 99 per cent. of all complaints of contractors, against architects, of "crowding on details" is the fault of the contractor, and due to lack of needful training, and quite of the opinion that it is desirable and needful for contractors to pursue the same course of training at some established professional school as that which is the basis of the trained architect, and with such training honest work at a fair price would be the rule and not the exception.

In regard to (*b*), I know from experience and observation that the average contractor makes too many *figures* in estimating, and gets befogged in a maze of calculations and sheets. The science of estimating is to aim at results with the least expenditure of time, the easiest method and accuracy. I will illustrate some examples of estimating in a following paper. Also in respect to (*c*).

In regard to (*d*), the practise is altogether too prevalent and should be discarded. The ethics of the matter is summed up in the broad and general principle of strictly honest work at a fair price, and I doubt if the reputable contractor will question the principle, and I am well convinced that the reasonable client will not, for in twenty-five years' practise, I have never had a client (except one, so far as I can remember) who has asked me to "beat down" a contractor, after I had explained the difference and risk of poor work at a low price and best work at a fair price.

It is one of the unfathomable mysteries why any contractor will estimate for a poorer quality of material and workmanship than that called for in specifications, or expects, after he has got the job, to be allowed to provide from 5 to 10 per cent. of inferiority in quality of work required. The arguments offered that something else is "just as good," or that "there isn't any profit in the job" have no bearing on the case. The practise is dishonorable, and the architect has no concern with profit or loss to the contractor. It is the business of the contractor to execute the contract as determined by the architect, and contractors should realize that the courts hold them to the contract, whether they are "supervised" or not.

I have been consulted time and again by contractors, in respect to requirements of contracts and specifications, other than those from my hand,—cases in which the contractors considered that they were called upon to comply with "excessive and unreasonable" directions, and nine times out of ten the contractor has been at fault, because the contractor failed to grasp the meaning of the contract in its entirety.

In case specifications are vague or ambiguous, contractors should ask the architect for definite statements regarding such points before estimating, and it is a good practise for the architect to post his answers, for the information of all contractors prior to closing of bids. The contractor had better lose the job than get it at too low a figure and then have misunderstandings, lack of profit, and hard feelings afterwards.

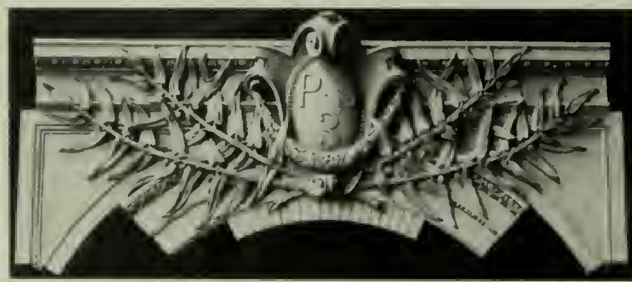
Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK.— There is every evidence now of a wave of prosperity in every line of business and, as a natural sequence, among architects and builders. Although it costs more to build now than it did last fall, and the prices of all building materials are higher, there is a vast amount of new work under way and on the boards. For the capitalist who is not absolutely dependent upon quick returns on his investments, and who took advantage of the low prices of materials and labor last fall, there are big profits in sight; but the average investor undoubtedly was wise in waiting until this spring, when money is easy to borrow if needed. The steady supply of small sales has kept brokers busy in all parts of the city, a feature that has continued uninterruptedly now for a long period, but veritable sensations in the way of big investments have made the reports of the market additionally interesting almost every day. And the end is not yet.

The St. James Building, by Bruce Price, one of the finest office buildings in the up-town district, and a fine example of the use of brick and terra-cotta in office buildings, has been sold to the Security Trust and Life Insurance Company of Philadelphia for $2,725,000. The company will occupy two floors and rent the remainder of the building.

The old Real Estate Exchange Building, a landmark down town, has been sold to a syndicate composed of John E. Crimmins, Hugh J. Grant, and others. It is expected that a large office building will be erected on the site, which is an unusually fine one.

Among the more important items of new work might be mentioned: C. P. H. Gilbert is preparing plans for a five-story brick and stone dwelling, to be built on West 53d Street; cost, $50,000. The same architect has also prepared plans for a five-story stone and brick fire-proof dwelling, to be built on Fifth Avenue, corner 80th Street; cost, $130,000. Albert E. Parfitt has planned a five-story brick fire-proof store and loft building, to be built on Fulton Street, corner Bridge Street, Brooklyn; cost, $75,000. The College of St. Francis Xavier is going to erect a four-story brick and stone parochial school building on West 17th Street; cost, $100,000. James B. Baker has planned a brick and stone Training School for Nurses in connection with the Post Graduate Hospital, to be built on 20th Street, near Second Avenue; cost, $100,000. Neville & Bagge have prepared plans for a four-story brick and stone convent, to be built on 152d Street, near Amsterdam Avenue: cost, $50,000. L. C. Holden has planned a seven-story brick factory for the Hammond Typewriter Company, to be built on East 69th Street; cost, $50,000. Israels & Harder have planned a five-story brick and stone tenement building, to be erected on Eighth Avenue; cost, $20,000. Schneider & Herter are preparing plans for three six-story brick flats, to be built on East 12th Street; cost, $85,000. Pollard & Stemain have planned two five-story brick flats, to be built on First Avenue, corner 93d Street; cost, $40,000. Franklin Baylies has planned an eight-story brick and terra-cotta store and loft building, to be built on East 20th Street. Clinton & Russell have planned an eighteen-story fire-proof office building, to be erected for the American Exchange National Bank on the corner of Broadway and Cedar Street.



DETAIL OF GATEWAY TO PUBLIC SCHOOL NO. 3, NEW YORK CITY.
Executed in terra-cotta by the Standard Terra-Cotta Company.
C. B. J. Snyder, Architect.

CHICAGO.— The advent of warm weather has brought some encouraging increase of activity in building notwithstanding existing and threatened labor troubles.

Contracts have just been let for the erection of the new ten-story "Cable Building" on the southeast corner of Wabash Avenue and Jackson Boulevard. The style is the simple-severe, commercial type with very large glass areas; wide bays, two on the front and five on the side, and terra-cotta covering with rather small and flat detail. The cost given is $165,000.

Factory building continues active; the largest recent undertaking in that line being the immense new factory building for the McCormick Harvester Company, at Western Avenue and the South Branch, costing over $200,000.

The success of another big undertaking is fully assured by the purchase of the 70 ft. of frontage adjoining the old Libby Prison site on the south. The newly acquired property added to the latter premises on Wabash Avenue furnishes the required space for the new colosseum. Upon the south end will be built an annex with accommodations for horses and menagerie animals on the lower floors, and banquet, press, and committee rooms above for use during conventions, balls, or big social gatherings. The main building will be 300 by 165 ft., and will seat, including the main gallery, over 10,000 people. For circus and carnival entertainments the gallery seating can be extended to the main floor. The building will be strictly fire-proof and will cost, according to present estimates,

IVY CLUB HOUSE, PRINCETON, N. J.
Cope & Stewardson, Architects.

about $250,000. The architects are Frost & Granger.

The Marshall Field Wholesale Warehouse, famous as one of the late H. H. Richardson's most successful buildings, is having another floor put in according to the original plans, under the direction of Messrs. Shepley, Rutan & Coolidge. No visible change will be made in the exterior, as this upper floor is to be lighted from above. When the daily papers first reported the fact that another story was to be added to the building, there was a great deal of apprehension among local architects lest the dignity and perfect proportions of this splendid pile might be seriously impaired.

Labor troubles have been affecting suburban building operations. One Chicago architect, whose particular field of work is Evanston, had nine special policemen sworn in to protect as many buildings in Evanston and in Lake Forest. No damage was done by strikers except in one building.

A new organization, at present limited to a membership of twenty, and known as the Architects' Guild of Chicago, has been recently formed for the purpose of promoting the interests of architecture and the allied arts, for mutual encouragement and benefits, and for professional comradeship among the younger and more enthusiastic practising architects whose professional training and aspirations make them congenial. The members dine together every fortnight, and informal talks and discussions over questions of professional interest serve to make these little symposiums helpful as well as delightful, and the society intends to bear an active and aggressive part in making Chicago more beautiful, — or perhaps it might be better to say, for the present at least, less ugly. One of our greatest curses is dirt,— dirt in the air, dirt in the streets, dirt all over our drawings, and dirt all over our buildings, until bronze and light sandstone are all of a color.

The Chicago *Record* is making a strong fight for cleaner streets, but the police continue to be very negligent in the matter of arresting offenders who sweep or throw rubbish into the streets and alleys. There are laws enough making for clean streets, but public sentiment has grown very lax; in fact, there seems never to have been a very strong public sentiment back of them. When the people demand clean streets and smokeless chimneys, as they recently demanded their right to control street railway franchises, then we may hope for the first step toward having a beautiful city.

ENTRANCE TO THE BREWERS' EXCHANGE, BALTIMORE, MD.
Terra-cotta executed by the New York Architectural Terra-Cotta Company. Joseph Evans Sperry, Architect.

TERRA-COTTA GROUP FOR PUBLIC BUILDING.
Executed by the Conkling-Armstrong Terra-Cotta Company.

PITTSBURGH.— With the beginning of May we are threatened by a general strike among the carpenters, brick masons, plasterers, and tile setters; whether the general contractors will grant the increase in wages is as yet not known, but it is to be hoped that building operations, which now promise so much in contrast with the past few years, will not be seriously retarded. But it is a question whether the increase in wages, coupled with the rapidly increasing price of building materials, will not deter many from building. However, at present business seems to be good in all the offices and there is a general demand for first-class draughtsmen.

The Pittsburgh Fire Department has recently had a rather unusual fire to fight. Parts of the city are built over deserted coal mines; when these were worked mining was not done as thoroughly as at present, and large quantities of coal were left in them. One of these mines caught fire, and after smoldering for a time broke through the surface in several places in the thickly settled parts of the city. Shafts were sunk around it and the fire smothered, and now it is proposed to fill up these shafts to prevent any such occurrences in the future.

The most important event in the building world here during the past month has been the announcement by Mr. Carnegie that he had placed $1,750,000 in the hands of the trustees of the Carnegie Institute to be used in building the proposed addition. There seems to be no reason why the work should not be soon commenced if the city will provide the necessary site, but the land in the rear of the present building must be first condemned and bought in by the city; at present there is a bill before councils to provide by an issue of bonds the money necessary for this and for the removal of "the hump" on Fifth Avenue, which was mentioned several months ago. Mr. Carnegie has also promised sums varying from $50,000 to $100,000 to a number of towns in the vicinity for public libraries. In a competition recently held for one to be built at Carnegie, Pa., the design of Struthers & Hannah was placed first. It is to cost about $100,000.

Among items of interest recently noted are: F. J. Osterling has been awarded the first place in a competition for a new court house at Wilkes-

RESIDENCE AT PITTSBURGH, PA.
Roof of Akron Vitrified Tile, made by J. C. Ewart & Co.
George S. Orth & Bros., Architects.

barre, Pa. It is to cost $500,000. Plans for a new school building at Homestead have also been prepared by the same architect. W. J. East has prepared plans for a large business block. Edward Stotz has made plans for a new church to be built at West Newton, and also for a block of stores to be built at Braddock. Geo. S. Orth & Bros. have several brick houses to be built at Sewickley.

W. Ross Proctor is at work on what is probably the largest country house near here. It is a brick and half timber structure, 155 ft. across the front, and with the large formal gardens which will be laid out in connection with it, it will form one of the most pleasing country places in the vicinity of Pittsburgh. Mr. Proctor also has a large city house at Albany, N. Y.

Alden & Harlow have recently let the contract for a five-story hotel and apartment house in the East End, to cost $75,000, and also for a $10,000 stable, both for Mr. R. B. Mellon. They are at work on three large houses at Sewickley and one at New Brighton, and also are preparing plans for the Mt. Washington branch of the Carnegie library, to cost $25,000. S. F. Heckert has planned the St. Michael's Orphan Asylum and also the Mt. Oliver Convent. Rutan & Russel are the architects of a large brick residence at Sewickley. C. M. Bartberger has prepared plans for the twenty-seventh ward school, cost, $65,000, and for a five-story business block for The Ward-Mackey Company. F. C. Sauer has planned a new three-story school at Tarentum, Pa. Vrydaugh & Wolfe have let the contract for a church at Wilkinsburgh, to cost $75,000. There are rumors that Mr. H. C. Frick will build a $200,000 residence in the East End.

MINNEAPOLIS. — Probably the largest single item to report this month is the new Chamber of Commerce, which is now assured. The plan as at present outlined contemplates a building 181 by 155 ft., nine stories high, of stone, brick, and terra cotta, thoroughly fire-proof and modern throughout. The estimated cost is $800,000.

The corner immediately opposite the site of the new Chamber was recently purchased by a syndicate. They will improve the corner at once with a modern fire-proof office building about same height as the new Chamber. The corner diagonally across from the new Chamber is owned by William Deering, of Chicago, who is understood to stand ready to make improvements equal to the others when the proper time arrives. The result of these improvements is bound to put new energy into business improvements in Minneapolis, which have been lagging for several years.

Several years since an experiment was made looking to the establishment of a down-town "mission," to care for the homeless and unfortunate men. They now propose the erection of a new brick building adapted especially to their growing needs. It will probably be 66 by 157 ft., and some five or six stories high, modern throughout, and such a place that the clerk or traveler who cannot afford the high-priced hotels will be glad to avail himself of the clean and respectable hostelry. It will do what the "Mills Hotels" of New York are doing and more too. It will care for men's moral and spiritual wants as well as the physical. As it has paid its way thus far, there seems no reason to suppose it will not continue so doing.

The city will spend about $250,000 on her schools during the long vacation. The fact that some 15,000 pupils could not be satisfactorily accommodated during the year now closing gives an idea of the pressing need for more room; this, too, in spite of the fact that several new buildings have been erected each year.

Among the projects in the Twin Cities already assured are the following: Minneapolis branch for Northwestern Telephone Exchange Company, cost, $10,000, W. B. Dunnell, architect. Cass Gilbert has planned an office building, to be erected on Broadway and Chambers Street, New York City, for the Andrews Estate of Boston, to be eighteen stories high, of modern steel and fire-proof construction, Bedford stone for lower three stories, balance buff pressed and ornamental brick and terra-cotta, cost, $700,000; contract has been let to Geo. A. Fuller Company.

ANOTHER CASE OF MISTAKEN IDENTITY.

EDITORS THE BRICKBUILDER: —

Dear Sirs: — The subject allotted to your Washington correspondent does not appear to have been a congenial one, notwithstanding the tendency to volubility, against which his candid friends

TERRA-COTTA FENCE.
Executed by the Northwestern Terra-Cotta Company.

have warned him. He enters upon it with frankly confessed misgivings, and pursues it at length in a style that is in turns discursive, reminiscent, apologetic, but never seriously critical. In his remarks on the Hotel Raleigh he draws on his imagination in a way that is quite entertaining. "The lower portion and most of the ornamental work above are of stone." Indeed? Ask Mr. Fitzpatrick to take another look at the Raleigh; it will repay him the trouble of a second and less superficial inspection. He will, I think, find that the two lower stories *are* of stone, above which come nine stories of brick and terra-cotta.

In point of style this building bears a much closer resemblance to the Hotel Martinique, 33d Street and Broadway, New York, than it does to the neighboring Astoria. These three hotels were designed by the same architect, and the terra-cotta for all of them was executed by the same company.

The Martinique starts with four stories of excellent cut stone, surmounted by twelve stories of terra-cotta and brick walling, to which has been awarded the palm for superior excellence. Doubting readers — if such there be — who happen to pass that way are hereby invited to pause long enough to make the comparison. It may help to round the angularities off their prejudices. The upper portions, including the dormers, are the more interesting; but as they reach a height of three times the width of the street the view would be at an angle of about 70 with the horizon. Unlike Melrose, these features are not seen to advantage by "the pale moonlight." If viewed aright, that must be under "the gay beams of lightsome day" soon after sunrise, and from adjacent housetops, or from an upper window in the northwest corner of the Astoria.

Yours very truly, T. CUSACK.

VESTIBULE, NEW DETROIT OPERA HOUSE.
Finished with dull green enameled frieze, consoles, and 4 by 8 in. tiles, made by the Grueby Faience Company, Boston, Mass.
Alpheus W. Chittenden, architect of the interior construction.

DETAIL OF ENTRANCE TO ST. JOSEPH ROMAN CATHOLIC CHURCH, ALLEGHENY CITY, PA.
Built of gray brick, made by the Kittanning Brick Company.
F. C. Sauer, Architect.

ILLUSTRATED ADVERTISEMENTS.

CONKLING-ARMSTRONG TERRA-COTTA COMPANY, page v, details, Carruth House, Philadelphia; Hazelhurst & Huckel, architects.

Excelsior Terra-Cotta Company, page iv, detail of main entrance, St. Raymond's Roman Catholic Church, West Chester, N. Y.; George H. Streeton, architect.

The Northwestern Terra-Cotta Company, page ix, pavilion, exhibited at the World's Fair, Chicago.

Fiske, Homes & Co., page xxii, Plymouth Building, Minneapolis, Minn.; Frederick Kees, architect.

Raritan Hollow and Porous Brick Company, page xxvi, business block and public hall, Madison, N. J.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: Alfred H. Jacobs, 1114 Octavia Street, San Francisco, Cal.; Heacock & Hokanson, 931 Chestnut Street, Philadelphia; C. R. Dennison, Packard Building, Warren, Ohio; Charles B. Skinner, 104 Irvington Street, Cleveland, Ohio; Arthur B. Heaton, Washington Loan and Trust Building, Washington, D. C.; Grant B. Williams, Citizens National Bank Building, Parkersburg, W. Va.

CURRENT ITEMS OF INTEREST.

THE ATLANTIC TERRA-COTTA COMPANY report that they are making additions to their plant that will more than double its present capacity.

A NEW blue book for the use of architects interested in their products has been issued by the American Mason Safety Tread Company, of Boston. It will be sent on application.

DURING the year 1898 the F. W. Dodge Company sent over three million (3,000,000) reports to their subscribers, together with five thousand two hundred (5,200) answers to special inquiries.

JAMES A. DAVIS & CO., Boston, report that they have the contract to furnish the cement for the new sewerage system being put

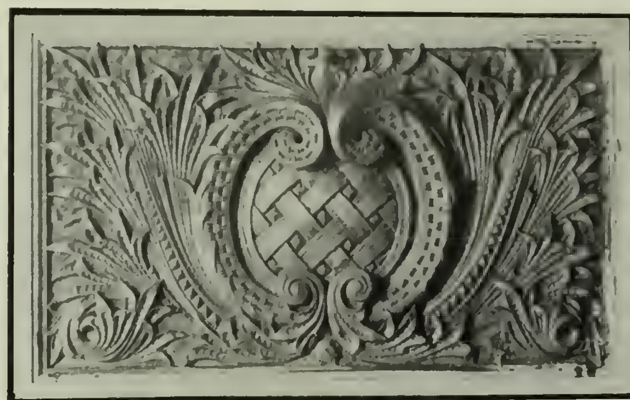
FRONT ELEVATION.
Residence by Cope & Stewardson, Architects

in at Worcester, Mass. The Lehigh Portland cement is the brand specified.

The use of hollow building brick in Detroit seems to be constantly on the increase, and Chambers Brothers Company, Philadelphia, have just shipped a complete outfit of their hollow brick-making machinery to the F. H. Wolf Brick Company, of Detroit.

The Canton Sparta Brick Company, Canton, Ohio, are supplying their brick for the new Burnett House and a business block at Lima, Ohio; also for the Iron Valley Bank Building at Canal Dover, Ohio. They report having numerous other orders in Cleveland and elsewhere.

The Powhatan Clay Manufacturing Company are furnishing their cream-white brick for the recreation buildings now being erected by J. H. L. Hommedieu, Son & Co., for George Gould at Lakewood, N. J., after plans drawn by Bruce Price. They are furnishing their silver-gray brick for the new bank building at Petersburg, Va., Peoples & Sharpe, architects, Norfolk, Va.; Petersburg Savings and Insurance Company, owners.



TERRA-COTTA PANEL.
Executed by the New Jersey Terra-Cotta Company.

The Mt. Savage Enameled Brick Company, Mt. Savage, Md., is furnishing the enameled brick for the new post-office building at Buffalo, N. Y., James Knox Taylor, supervising architect. This is in many respects a particularly interesting piece of enamel brick-work, having one hundred and thirty-one Gothic arches, forty-three flat arches, and a large elliptical arch. The brick are of a light shade of cream buff.

The C. P. Merwin Brick Company, Berlin, Conn., have made many important improvements to their plant during the last four months, chief among them being the addition to their burning and storage capacity, also the addition of a thoroughly equipped narrow gauge railway. The Central New England Brick Company, office at New Britain, Conn., are selling the productions of this yard at the present time.

We have received from the Pennsylvania Enameled Brick Company two samples of their "Sanitary Brick." These brick are faced with an impervious glazed surface upon a stiff mud body, are light in color, and easily cleaned. They are especially adapted for schoolhouses, hospitals, hallways, lavatories, etc., where an absolutely impervious surface is required at a small cost. We understand that the company have sold a large number of these brick this season.

The Winkle Terra-Cotta Company have secured contracts to supply the architectural terra-cotta for the following buildings: the 11th Street Realty Company Building, height seven stories, St. Louis, Mo., Isaac S. Taylor, architect; the Lindell Realty Company Building, height seven stories, St. Louis, Mo., Shepley, Rutan & Coolidge, architects; building for the Hon. Wilbur F. Boyle, trustee, height seven stories, St. Louis, Mo., Shepley, Rutan & Coolidge, architects.

J. C. Ewart & Co. are supplying their Akron roofing tile for a large church near Pittsburgh, Pa., for the new office building of the Monessen Steel Company, for a residence at Halifax, Nova Scotia, for a residence at St. Louis, also for a number of residences at New York City and Philadelphia. They wish stated that they are now making a specialty of 6 by 9 in. flat tile thoroughly vitrified for flat roofs; also of their Summit roofing tile for large work.

The Celadon Terra-Cotta Company, Ltd., are furnishing their roofing tile for the following buildings: The Laclede Gas Light and Coal Company Building, St. Louis (German tile used), W. Morava, engineer; station for the C. R. I. & P. Ry., at Council Bluffs, Iowa (open shingle tiles used), Frost & Granger, architects; Lagonda Cottage, Boys' Industrial School, Lancaster, Ohio (10 in. Conosera tiles used), Richards & McCarty, architects; pumping station, Newport News, Va. (8 in. Conosera tiles used), Alexander Potter, engineer.

Moore & Wyman, elevator and machine works, Boston, have recently secured orders for their elevators as follows: An electric passenger and an electric freight elevator for the Parker Building,

REAR ELEVATION.
Residence by Cope & Stewardson, Architects.

corner Summer and South Streets, Boston, Chapman & Frazer, architects; an hydraulic plunger elevator for the Metropolitan Water Works at the pumping station, Chestnut Hill Reservoir; a belt freight elevator and hydraulic plunger elevator for F. W. Bird & Son, East Walpole, Mass.; two electric freight elevators and one electric passenger elevator for the Winch Bros. Building, 590 Atlantic Avenue, Boston, Christel Orvis, architect. They are also building a large amount of special machinery on recent orders.

THOMAS BROTHERS, Detroit, Mich., wish to announce that their suite of offices as now arranged permits of a fine display of the various lines of clay products which they handle. Their exhibit room contains a number of brick panels laid up in a manner calculated to show the color effects of different bricks as they appear when in a building. Samples of their other lines, such as roofing tile, terra-cotta, etc., are also shown to advantage. The company are agents for the Cleveland, Findlay, St. Louis, Illinois, New York, and Chicago Hydraulic-Press Brick Companies, also for the Ludowici Roofing Tile Company, the American Terra-Cotta and Ceramic Company, the Mosaic Tile Company, and the Mackolite Fire-proofing Company.

THE COLUMBUS FACE BRICK COMPANY, Columbus, Ohio, report phenomenal success in the making and selling of its "gold mottled" face brick, the "Ironclay," which is now out in standard and Roman sizes and ornamental shapes. The excellent quality and beautiful coloring of this new line have received the praise of architects and builders wherever it has been shown. The company has many fine contracts in hand, and is busy day and night with preparations for the prompt filling of its orders. Agencies are being established in the principal markets as fast as the increasing production will justify promises of shipments, for it is a cardinal principle of the management to keep its promises to all patrons alike.

THE new catalogue just issued by the Lehigh Portland Cement Company, Allentown, Pa., descriptive of their works and products, is an attractive and instructive little booklet of some thirty-five pages. Illustrations are shown of the plant both as a whole and in detail, and also of some of the prominent buildings and public works wherein this cement has been used. A number of tests by competent engineers who have used the cement are quoted as showing some of the excellent records made by this brand. The closing pages of the catalogue are devoted to a collection of suggestions for cement users, under the title of "Instructions for Using Portland Cement." These rules are practical and instructive. Parties desiring one of these catalogues should request same of the company, or of James A. Davis & Co., agents, 92 State Street, Boston.

THE CLEVELAND HYDRAULIC-PRESS BRICK COMPANY report that at no time in the history of their company have they entered so large an amount of good orders as during the present year. In addition to the increased business for their products in the general markets an unusual number of orders have developed in the cities of Cleveland, Cincinnati, Pittsburgh, and Buffalo. The company desire to call special attention to their two new shades of impervious brick, brown and pink. These brick have all the individual characteristics peculiar to their well-known "Akron Red" brick, and the demand for them has been so large that it has been impossible to accumulate much reserve stock. As regards the "Akron Red" brick, the company announce that they carry a reserve stock that seldom falls below 3,000,000, and are therefore in a position to handle promptly any orders on same, even if the requirements are unusual.

THE COLUMBUS BRICK AND TERRA-COTTA COMPANY are furnishing the brick for the following operations: Deaf and Dumb Institution, Columbus, Ohio, dark gray and dark buff; St. Hedwig's Church, Chicago, Ill., dark gray; colored Baptist Church, Lynchburg, Va., light buff; Presbyterian Church, Lynchburg, Va., light gray; South High School, Columbus, Ohio, light buff; public school, Polo, Ill., dark buff and light gray; United Brethren Church, Union Furnace, Ohio, dark buff. They report large sales of their mottled shades in New York, Rochester, Pa., Detroit, Mich., Marion, Ind., and Columbus, Ohio. In the latter city they have under construction over forty structures, in various shades of their buff, terra-cotta, and gray; also several fronts of glazed bricks. They have orders entered for several hundred thousand Romans, including one large operation in Troy, N. Y.

NOTHING better illustrates the advance in design and construction of buildings we now see witnessed about us than the return to the first principles of man in his wild estate, viz.: light and fresh air. It is remarkable how careless of this very important consideration builders were even a few years past.

The recognized method of securing good ventilation to-day is by the use of well-designed ventilators. The "Star" Ventilator, manufactured by Merchant & Co., Incorporated, of Philadelphia, New York, and Chicago, seems to be very nearly perfect in its design. The functions of the ventilator are to practically give a free discharge of air from within a building and to prevent the entrance of air within the building from without, and at the same time be storm proof and free from drip due to condensation. The "Star" accomplishes all these results to perfection. The recent large order this company received from the United States Government for nearly a thousand ventilators speaks for itself and is an indorsement of which any one may well be proud. Any designer or constructor of a building should communicate with this company before deciding on their details for ventilators or skylights. It is made with or without a glass top when required. Merchant & Co., Incorporated, also make a specialty of Spanish tiles, which are very extensively used.

THE SIMPSON BRICK MACHINERY COMPANY, Chicago, is placing on the market a repress that is everywhere giving eminent satisfaction under the severest tests. The machine is called the Simpson Challenge Double-Mold Repress. The following will give an idea of the mechanical construction of the machine: —

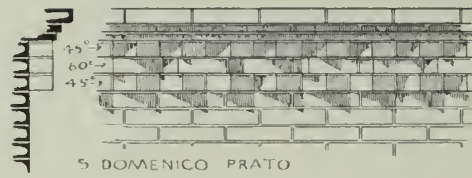
"The main principle of the Challenge Repress is a double crank, one of which is situated between two master gears and operates the top plunger. The other cranks are situated at the end of the main shaft and outside of each frame. These two cranks operate the lower plunger. The pressure is given to the brick by the difference in length of these cranks, the center crank being longer than the outside crank; the former moves faster than the latter, and consequently the brick is pressed by this differential movement of the cranks, due to their difference in length.

"It will be seen that the brick is moving while it is being pressed, and not only this, but the pressing of the brick is finished when the top plunger is at least 3½ ins down into the mold. This 3½ ins. added to the thickness of the brick gives from 5½ to 6 ins. of mold travel, in ejecting the brick upwards out of the mold. This has the effect of giving the surface of the brick a splendid polish, making it equal in finish to a dry press-brick, which is a feature so far unattainable in a repress.

"The ejectment of the brick from the mold is accomplished by the reverse movement of the cranks."

·DETAILS·OF·ITALIAN·BRICKWORK·
·MEASVRED·AND·DRAWN·BY·WILL·S·ALDRICH·

·CORNICES·



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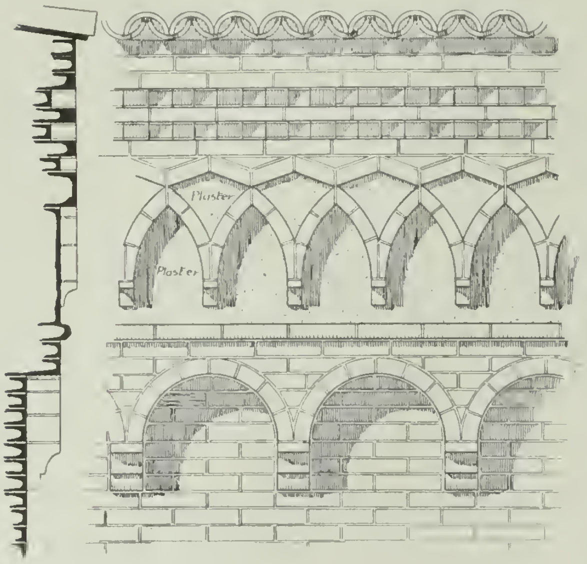

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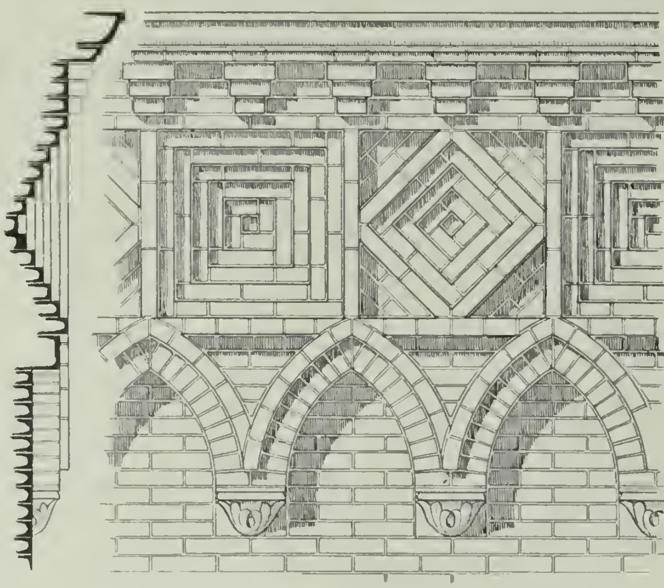

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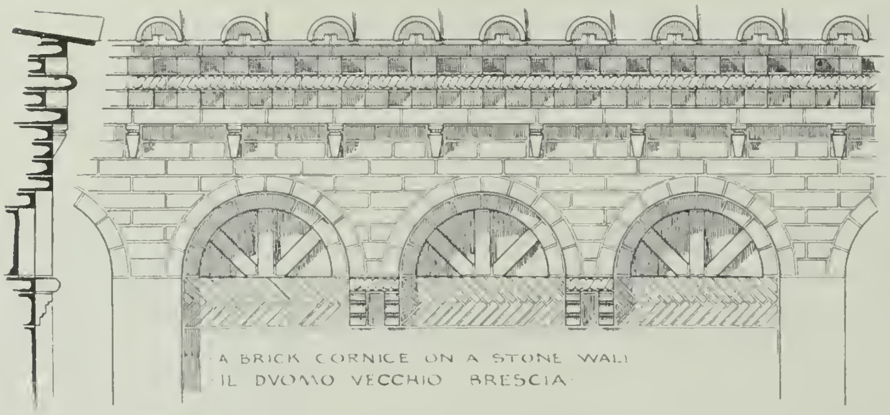
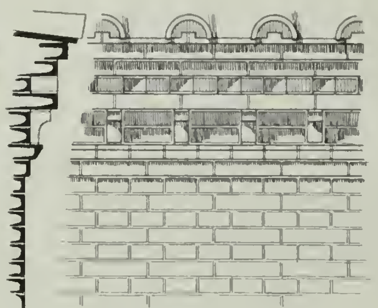


A BRICK CORNICE ON A STONE WALL
IL DVOMO VECCHIO BRESCIA



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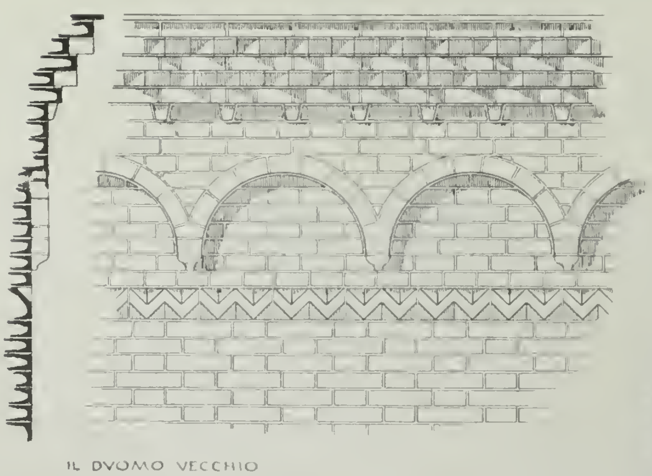

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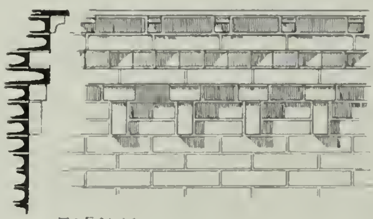

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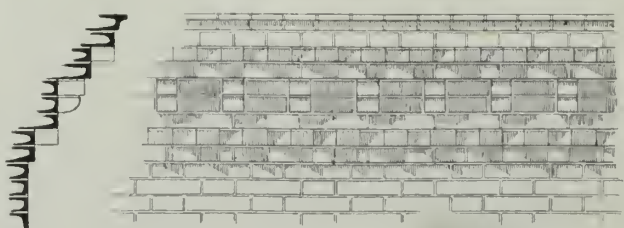
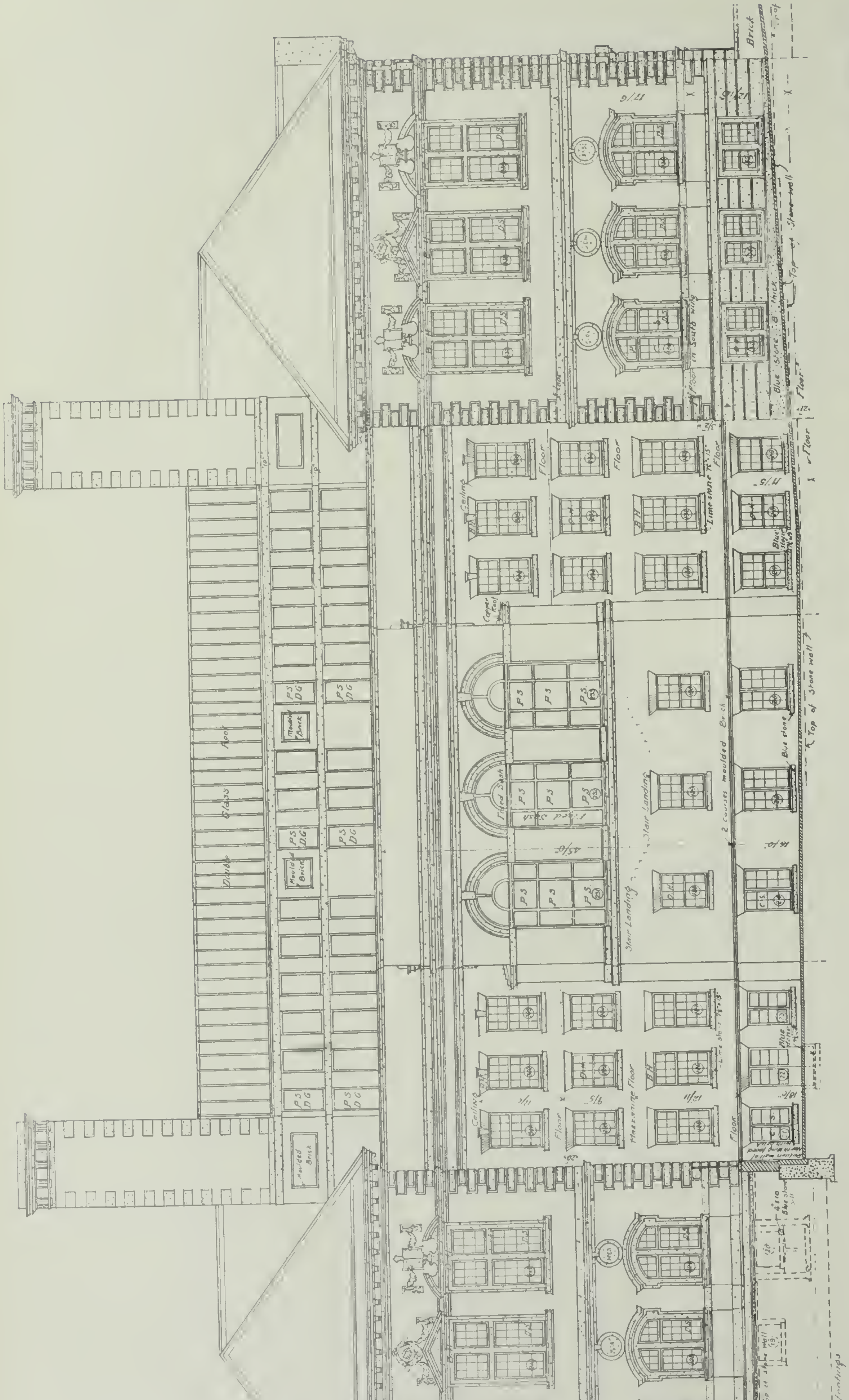


ROME·



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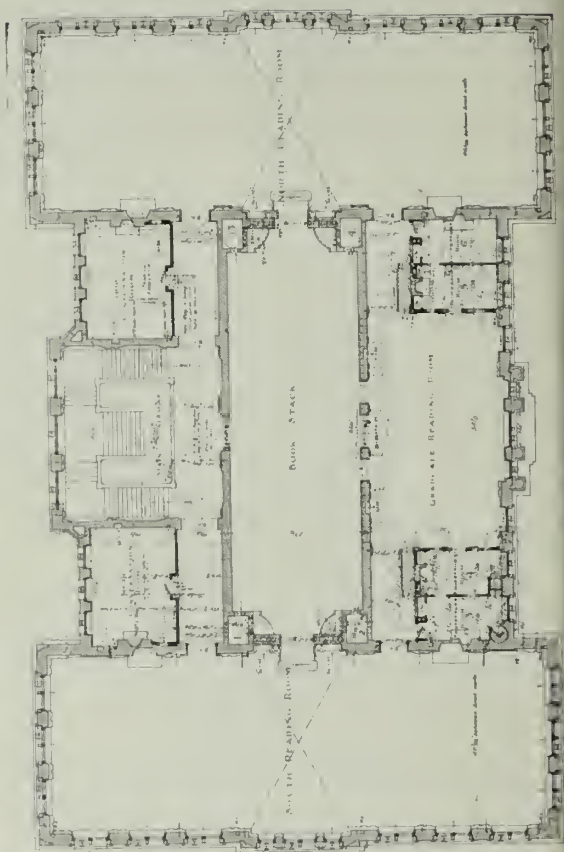
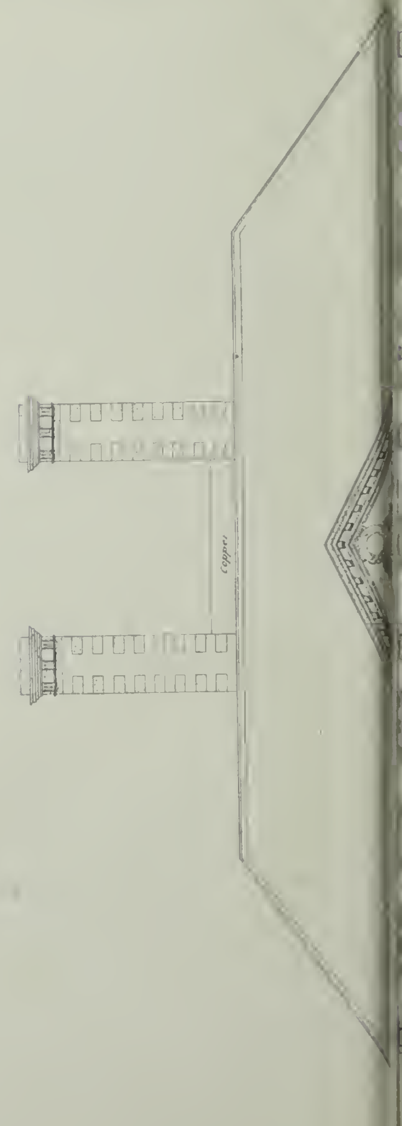
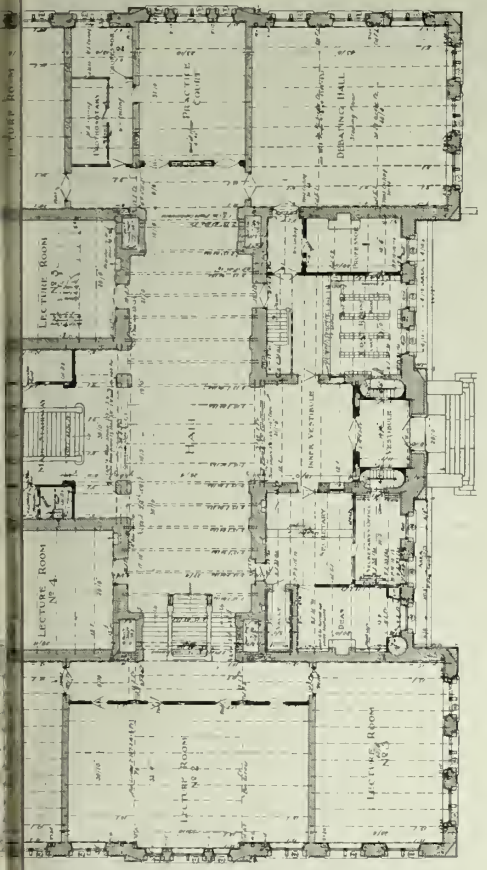
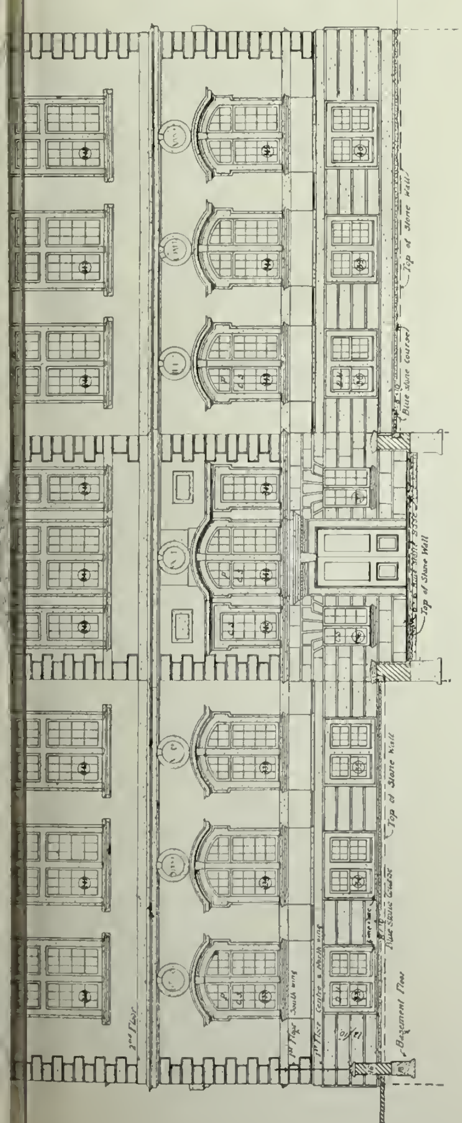




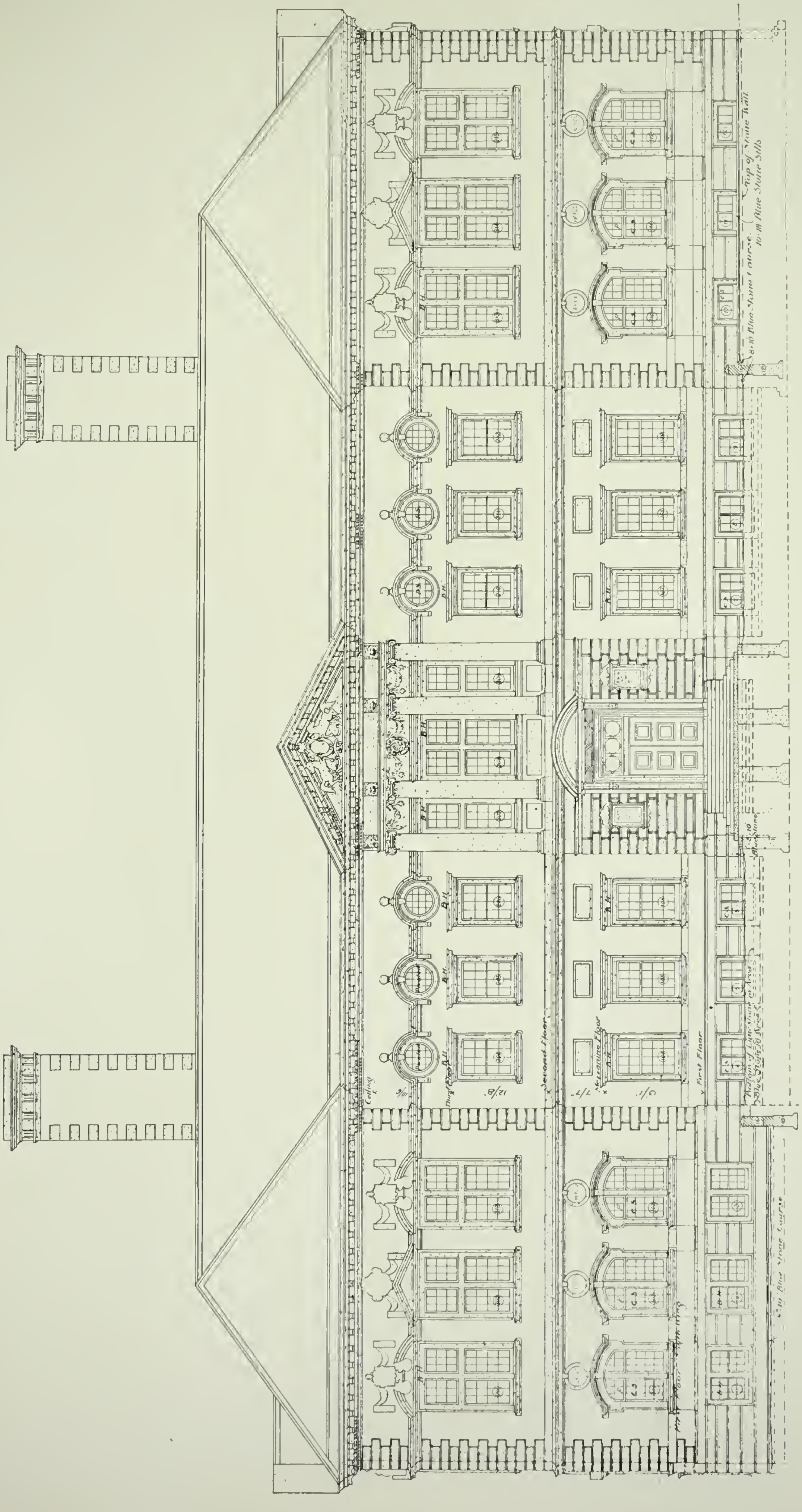
PLATES 42 and 47.



FIRST AND SECOND FLOOR PLANS.



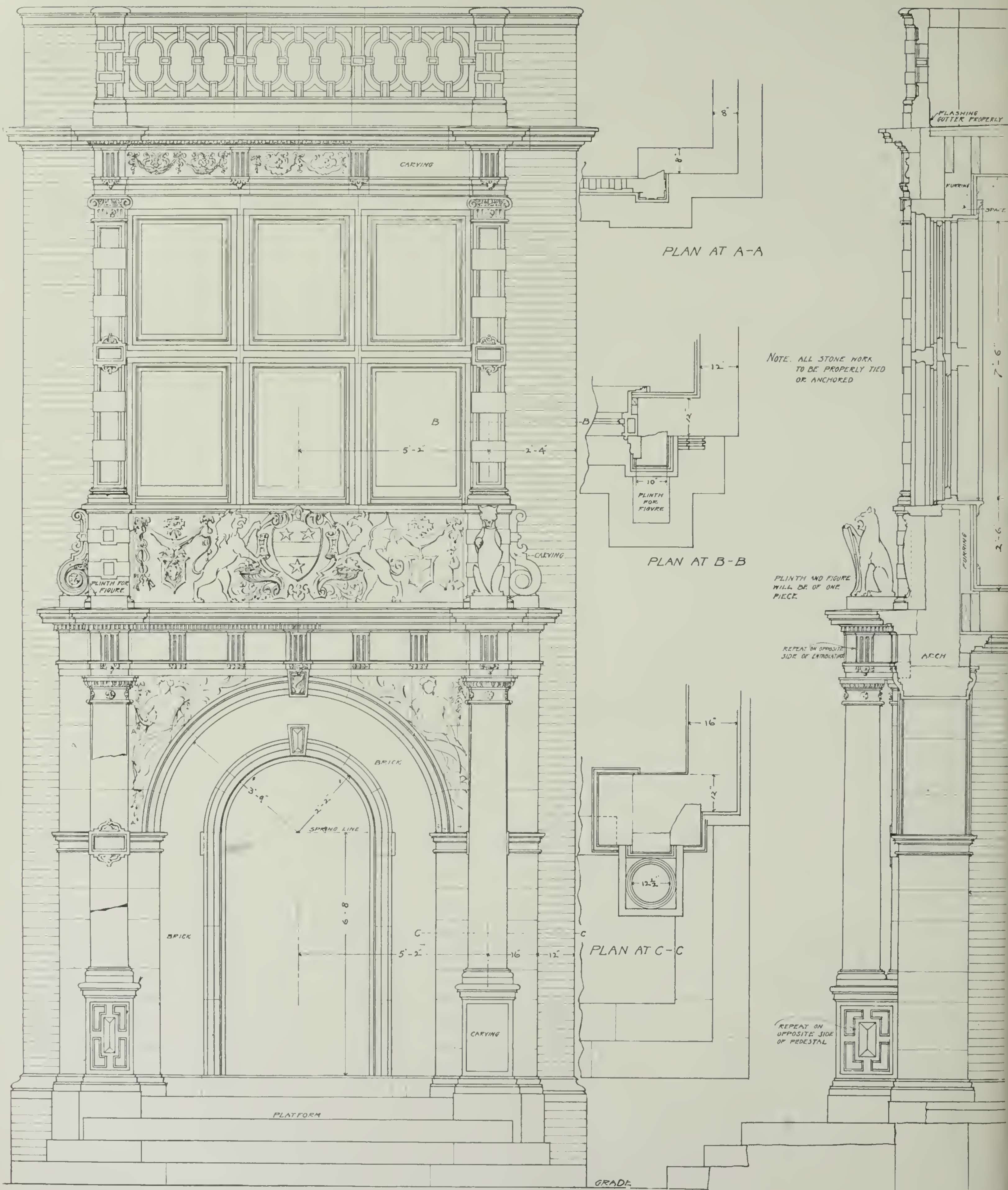
SIDE ELEVATION.



FRONT ELEVATION.

LAW SCHOOL, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA.

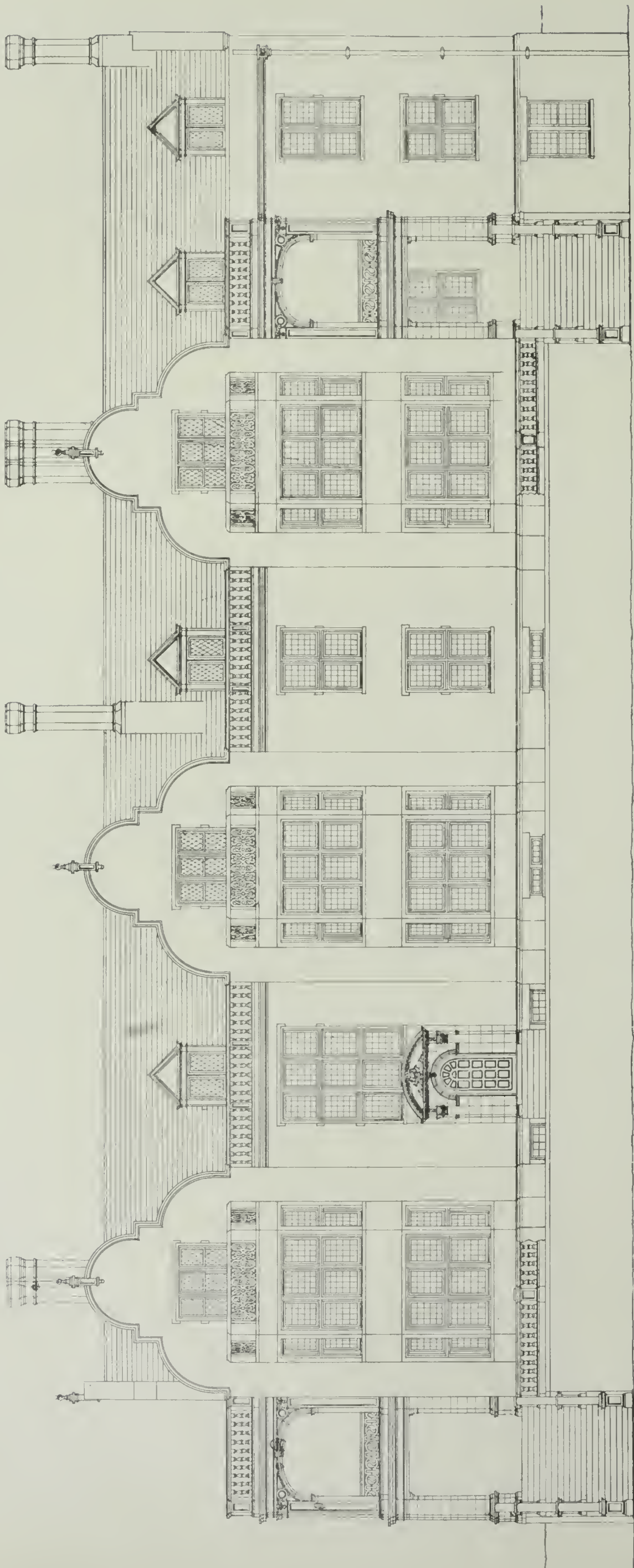
COPE & STEWARDSON, ARCHITECTS.



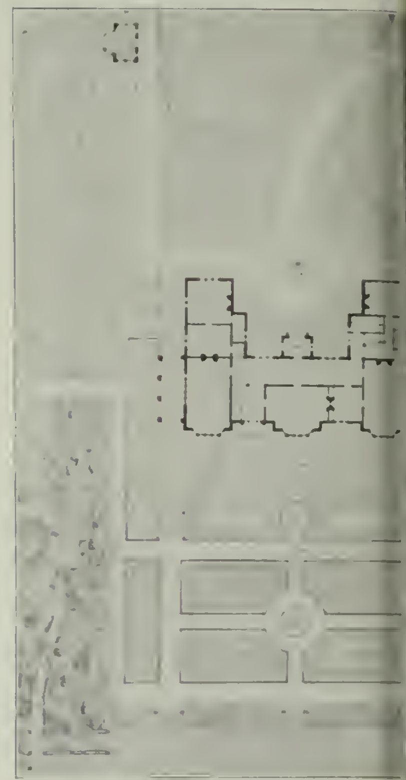
Detail of North Entrance.

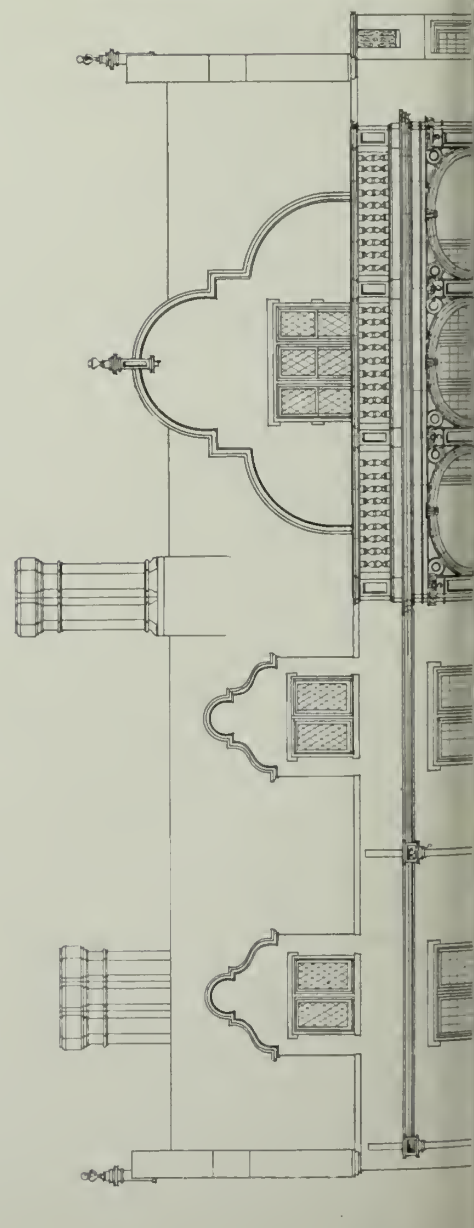
HOUSE AT TUXEDO PARK, NEW YORK.

T. HENRY RANDALL, Architect.

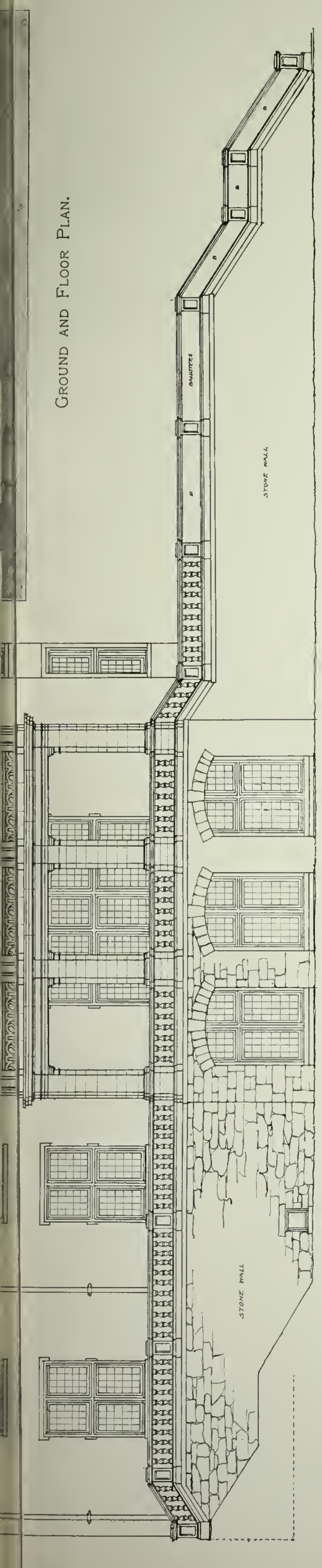


South Elevation.

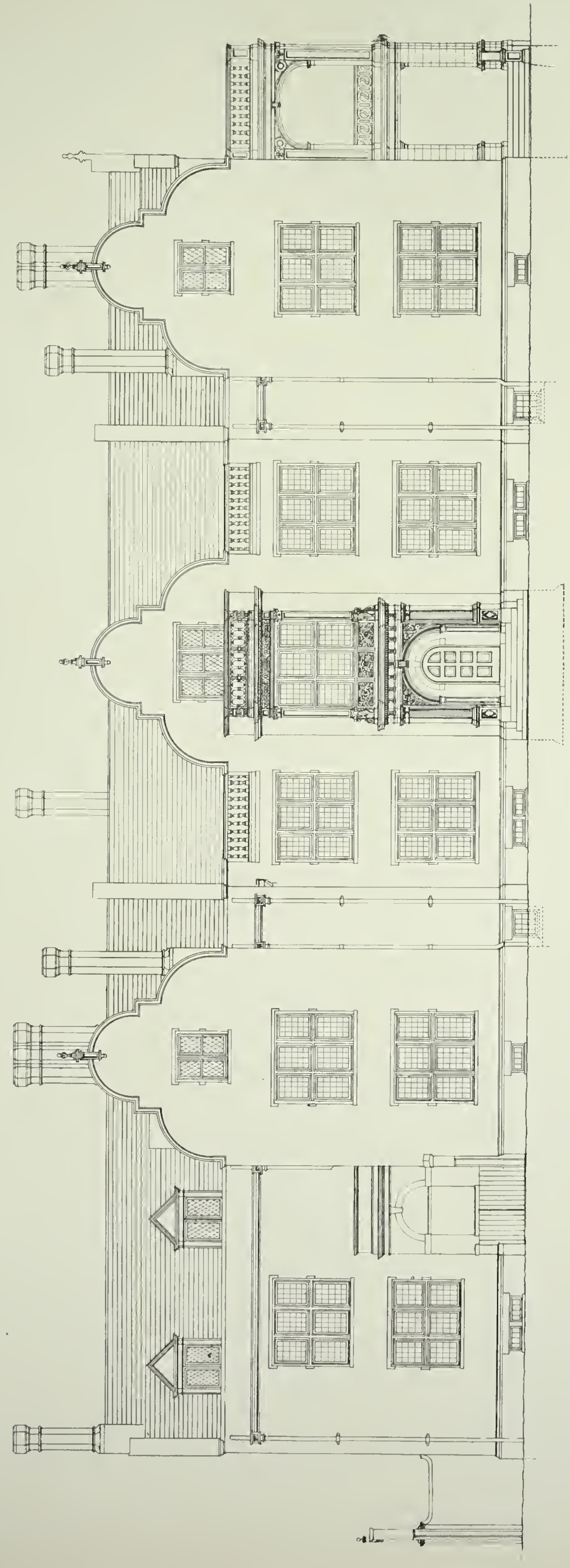




Ground and Floor Plan.



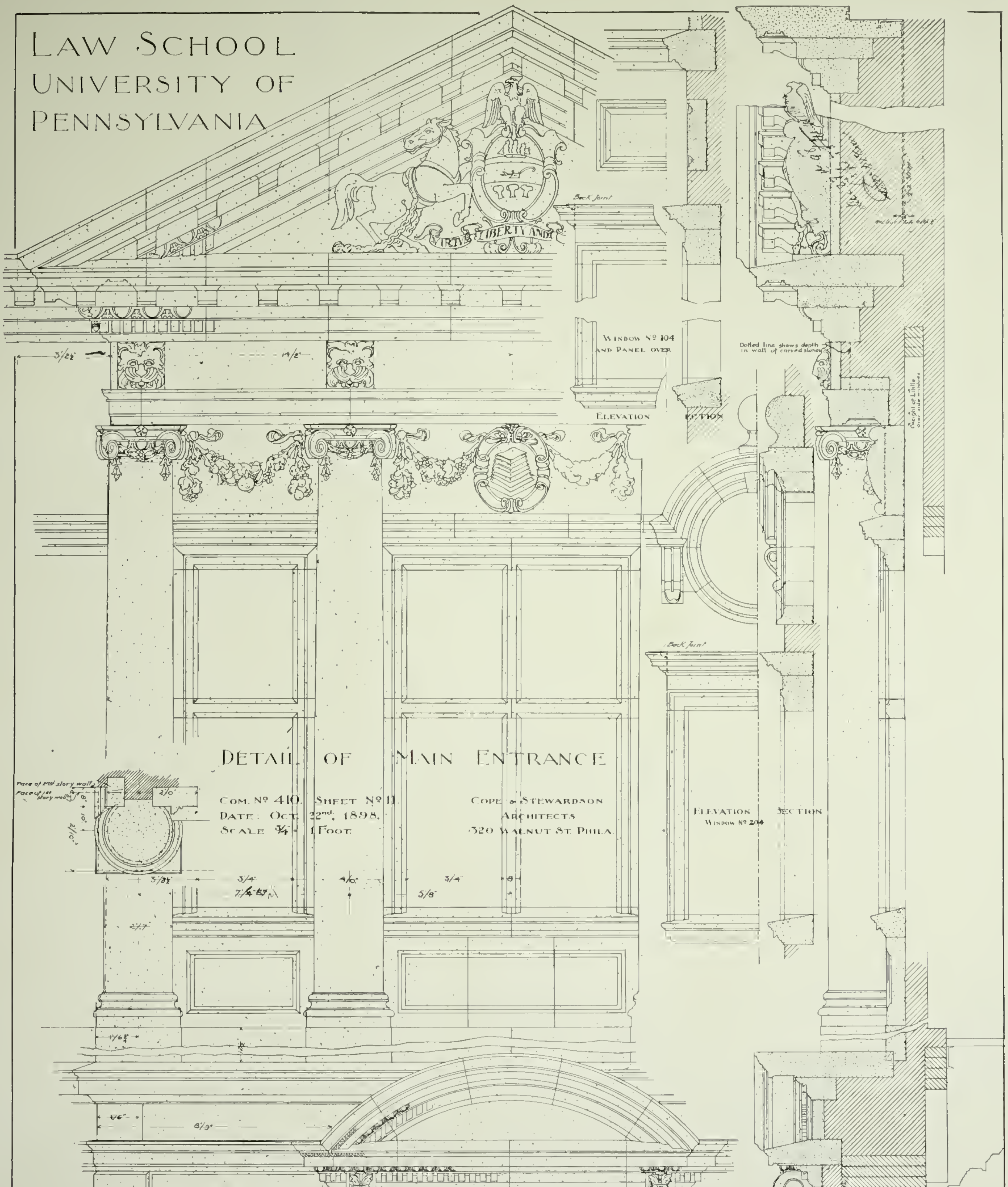
West Elevation.



North Elevation.

HOUSE AT TUXEDO PARK, NEW YORK.

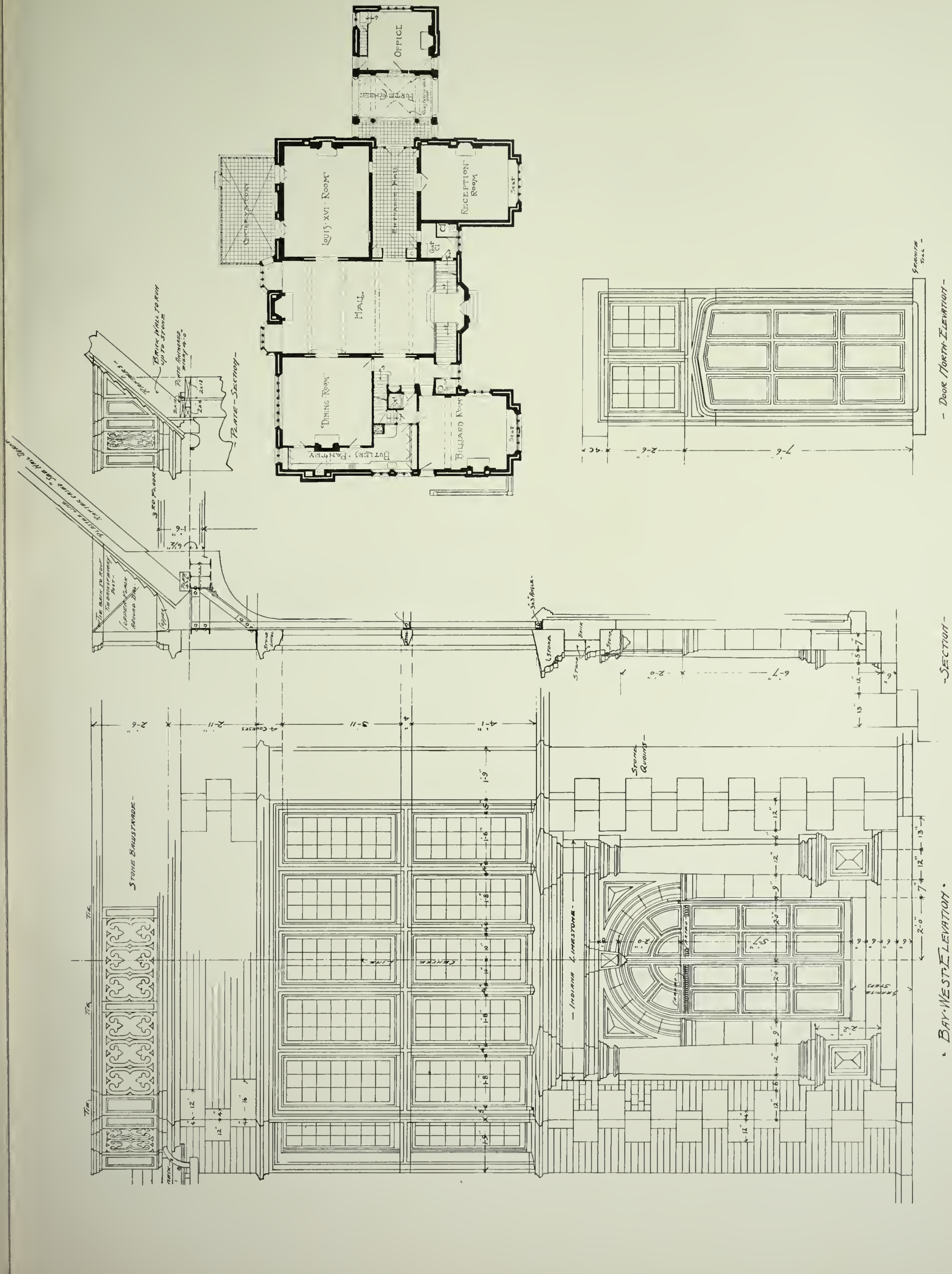
T. HENRY RANDALL, Architect.



Detail of Main Entrance.

LAW SCHOOL, UNIVERSITY OF PENNSYLVANIA.

COPE & STEWARDSON, Architects.



HOUSE AT HAMILTON, MASS.

WINSLOW, WETHERELL & BIGELOW, ARCHITECTS.

Elevation shown on page 111.

VOL. 8
NO. 6

THE BRICKBVILDER

JUNE
1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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THE past year has witnessed several destructive fires in buildings which were constructed on approved fire-proofing systems, and though in every case the manifest advantage of fire-proofing has been beyond question, and its efficacy has been demonstrated to be all that is claimed for it, the average newspaper has not always seen fit to award it its fair due. The recent fire in the Hotel Rexford, Boston, however, was of a different sort. This is a structure erected only a few years since in a district which is crowded with inflammable structures. The hotel itself, though by no means first-class in its appointments, seems to have been constructed on the whole in a very thorough manner, and the fire-proofing, which was on the Fawcett system, was equal to the test made upon it by a fire which started in the basement late one afternoon. While the exact cause of the fire is open to doubt, it certainly started from a portion of the basement where was stored a considerable quantity of oil, and this oil fed a conflagration which threatened to be very disastrous for a while. A series of explosions, followed by a brisk blaze shooting up the large ventilating shaft, destroyed everything in the basement of the hotel, and the flames, entering into the open windows above, caused considerable damage up as far as the seventh floor. Had this structure been of any ordinary construction, there is no doubt that the whole edifice would have been consumed and a large loss of life might have ensued, as the hotel had about four hundred guests at the time. One employé was badly burned about the face and head, and the total damage was confined to about eight thousand dollars. The basement was a total wreck. The bar was blown to pieces, and in the upper stories the lace curtains caught from the upward rushing flames, so that fire almost instantly spread through a number of rooms, and all the conditions for a serious conflagration were certainly present, so that an excellent opportunity was afforded of demonstrating the check that can be put upon fire in buildings of this character. If we remember rightly, at the time this hotel was built it was found that the cost of building it fire-proof throughout was something less than 10 per cent. more than the cost of ordinary construction. The Boston building law does not allow any hotel to be built of anything but fire-proof construction. But even had the proprietors of this building had the option, it is evident that the added cost of fire-proofing has been more than repaid to them by the immunity from serious loss. The Boston *Herald*, commenting in an editorial on this fire and its results, said: "We are having quite a number of strictly fire-proof buildings put up in Boston. Several citizens that we know are contemplating constructing dwellings of this type for their own use, and if we are to have fires it is well that they should occur under conditions that furnish object lessons of the many advantages which this form of construction has over that of all other classes."

IT is a common tendency of human nature to think that our neighbors are a little better off than ourselves. In a recent number of the *British Architect*, in the reports of some discussions before an architectural society regarding the housing of the poor, we notice that the use of wood for dwellings of this nature was spoken of as offering great possibilities and being in some respects more advantageous and costing considerably less than brick. We have been trying so long and hard to make our clients and friends believe that brick is the best material for a dwelling house, that it comes like a shock that our English cousins, whose example we emulate, and to whose work we point with pride, should to the slightest extent envy us our cheap wooden buildings. In only one respect have we found a wooden house more advantageous than brick; it is cheaper in first cost. In every other respect, it would certainly be a backward step for English constructors to consider anything like an imitation of our shanties.

NOTES AND CLIPPINGS.

RELICS IN THE TOWER OF LONDON.— Unusually interesting and valuable discoveries have been made in the Tower of London in the process of laying the foundations for the erection of a new guard room near the White Tower. The workmen cut the Roman wall of the second century and found a number of perfectly preserved flue tiles for the diffusion of hot air from the hypocaust. The tiles are excellent specimens. They measure 15 ins. in length, 6½ ins. in width, and 4½ ins. in depth.— *New York Sun.*

INCREASED USE OF BRICK.— One phase of building operations in this city, as shown by statistics published in our real-estate column to-day, is of interest to the general public. An analysis of the figures shows the increased use of brick, as compared with wood, as a building material. It might be supposed that, as the area restricted to brick, iron, or stone buildings becomes more nearly built up, and outside the Back Bay district little of it remains unimproved, the relative proportion of new brick buildings to wooden would decline. But the contrary is the case, and much of the new brick construction is in localities where wood might legally be employed, showing that the use of the more lasting and fire-resisting material is growing because of its own merits. The fact that so many builders find it more profitable to use brick, even outside the brick limits, goes to prove that an extension of them would not be so burdensome as has been represented, and also the shortsightedness in allowing the better construction to be menaced by the poorer.

In May, 1895, only 10 per cent. of all the new buildings for which permits were granted were of brick; the next year the percentage rose to 25; in 1897, it was 23; in 1898, 28, and this year it reaches 32, nearly a third. Much the same showing is made by the first five months of the last eight years, during which the percentage of new brick buildings to the whole was as follows: 1892, 15; 1893, 23; 1894, 16; 1895, 21; 1896, 23; 1897, 20; 1898, 24; 1899, 35. A noteworthy feature of recent construction is the substitution of brick for wood in many cases where the latter might be used for three-family houses, although there is still erected a lamentable number of frame three-family dwellings. The new tenement or apartment house,— that is, substantially a building for more than three families, and required to be fire-proof by the Boston building law,— has nearly disappeared, and where it is seen it is almost invariably a structure six or more stories in height. For anything under six stories, the three-family house is almost invariably the maximum in this city, having displaced the four-story apartment house, so popular before the fire-proofing law was enacted. The latter house now thrives in Cambridge and other near-by suburbs where the Boston law does not apply. There is an unusually large amount of important building going on in this city at the present time, hotels, office buildings, and warehouses constituting the bulk of it, with one theater and a music hall being planned.— *Boston Herald.*

County Supervisors' Valuations of Architects' Services. — When does the architectural profession of California intend to do something, through its organizations or individually, to circulate information regarding the ethics of architectural practise, so that public bodies and others may not unknowingly continue to make ridiculous announcements when inviting designs for public or other work?

In our issue of May 17, we drew attention to an offer of a fee of $25 (!!!) from the supervisors of Mariposa County, for plans and specifications for certain additions to and improvements at their county hospital buildings, and this magnificent sum was to be paid to the "successful" architect. (The quotation marks are our own.)

If that be architectural "success," what *are* we coming to? But it may be the supervisors acted in perfectly good faith, and really "expected" to receive designs from *bona-fide* architects of standing in return for the opportunity of winning this $25 prize in a competition with each other. And now, again, we have the supervisors of Shasta County asking for competitive designs for a $10,000 hospital building, and for which work $75 has been put aside to pay the architect whose design *may* be selected. The presumption is that the supervisors are to be the sole judges as to which *is* the best design submitted. But can these gentlemen really know that if an architect were engaged to render the necessary professional services for such a building, the recognized fee would be $500, or without supervision say $250? Little enough in all conscience for efficient and faithful service! But if these gentlemen expect $250 worth of services on the off chance of such a sum as $75 being awarded to *one* of them, there can be only one result from such a proposition. If, on the other hand, these gentlemen know so little of the practise and responsibilities attending the work of *bona-fide* architects as to expect efficient service simply on the chance of one of their number receiving this princely sum, then we are doing them (and any other boards with similar ideas) a kindness in thus drawing attention to the absurdity of such a proposition. Any body of gentlemen having such views would also probably be so little acquainted with architecture itself that they might experience some difficulty in selecting the really best design after all, a matter which we know from experience is oftentimes a very difficult one even for a professional assessor to decide. Architects of experience and standing will not, of course, for a moment have anything to do with such competitions as these, and it is to be hoped that the unemployed junior members of the profession will have more self-respect than to assist public bodies in getting designs under such conditions as those offered in the present instances. — *Pacific Builder.*

PERSONAL AND CLUB NEWS.

Van Vleck & Goldsmith, architects, New York City, have removed their offices from 156 to 111 Fifth Avenue.

The last regular monthly meeting of the Sketch Club, of New York, was held in the Fine Arts Building, West 57th Street, through the courtesy of the Architectural League. These rooms have been procured for future meetings of the club.

BOOK REVIEWS.

English Country Houses. Boston: Bates & Guild Company.

The English mansion represents a type of architecture so entirely *sui generis* and so full of its own peculiar charm that one never feels like comparing it with anything else in the whole realm of art. The English country house is something unique, and the publication by Bates & Guild of one hundred photo-prints of the best examples of the old work will be welcomed by every artist, appealing as it does so strongly to the lover of quaint, picturesque simplicity. The photographs are most carefully chosen, and were throughout, we believe, selected under the direction of one of our foremost architects. We can hardly hope to have just such work in this country. Our habits of life are not such as to promise the results which here seem to have been accomplished so easily. For that matter, it is very rarely that a modern English house is able to have just the particular character which is so charming in the older work; but we always profit most by aspiring towards what we may not perhaps quite achieve, and if our country architecture could have a tithe of the delicious spirit which these photographs so well portray, we would be going a long way on the road towards a national style. Much of the work shows the half-timbered and rough cast style, but there are also numerous examples of charming use of brick, either alone or in combination with half-timbered work, such as is illustrated by Hunstanton Hall in Norfolk, or Westwood in Worcestershire. For that matter, though it may seem heresy to acknowledge it, it is not always the material which counts most in this old work. The general effect is so quiet and unobtrusive in the best of it that it matters very little whether the wall be of brick, stone, or rough cast plaster, for the result in either case is a charming habitation. We most heartily commend this publication.

Sanitary Engineering of Buildings. By Wm. Paul Gerhard, C. E. In 2 vols. New York: William T. Comstock, 23 Warren Street. 1899.

This volume comes at the end of a long series of publications representing in one sense the development of sanitary engineering into a science from the early days of the "plumber and sanitary engineer," when the acme of household sanitation was represented by the obsolete Hellyer pan closet. Mr. Gerhard is so well informed on this subject that he is able to present the facts about household plumbing in a manner that makes them of value to the reader, and though much of what he says has come to be quite trite, and seems almost superfluous in a volume of this year, still the educational necessity of work of this kind is an ever present one, and though it is not easy to present anything that is especially new on the subject of plumbing, it is hardly saying too much to claim for this book that it is one of the best publications on the subject which have been offered to the public.

Architectural League of America.

ON June 2 and 3 a convention of the architectural clubs of the country met at Cleveland, Ohio. It was notable not only for its practical results but as the germ and evidence of a wide and energetic movement for the furtherance of architecture in America.

The movement began in the practical necessity of uniting the efforts of single architectural clubs into a working unit. The rapidly increasing number of architectual exhibitions throughout the country had brought confusion to both manager and contributor. The architect had had his desk covered with entry blanks for a dozen conflicting exhibitions, and hanging committees looked in vain for drawings which could not be traced in their wanderings.

The St. Louis Architectural Club, in December, 1898, first voiced the need for a systematic cooperation between the scattered exhibition committees. Acting upon this suggestion, the Chicago Architectural Club, with the indorsement of Philadelphia and St. Louis, and the informal assent of Boston and Cleveland, called a meeting of the architectural organizations of America at Cleveland.

Ninety-seven registered delegates represented thirteen societies: The Architectural League and the Society of Beaux Arts Architects of New York, the architectural clubs of St. Louis, Chicago, Cleveland, Boston, Philadelphia, Pittsburgh, Detroit, and Toronto (Canada), and the Illinois, Pittsburgh, and Cleveland chapters of the American Institute of Architects. The majority of the delegates were the younger element of the profession, averaging about thirty-two years of age, and being about evenly divided between practising architects and prominent draftsmen, and they brought the greatest enthusiasm to the work. Cheering interrupted the speeches; the special committees worked till early morning, and the convention gave up an excursion rather than adjourn the session.

The address of welcome to the city was delivered by the president of the Cleveland club, Mr. Albert E. Skeel, to which the president of the Chicago club, Mr. J. C. Llewellyn, responded, outlining the object of the meeting simply as a free interchange of ideas between the members. Mr. Llewellyn was made chairman, and Mr. N. Max. Duning, also of Chicago, secretary of the convention. A press committee was appointed to place the work of the association accurately before the public.

Discussion was opened with a paper by Mr. Adin B. Lacey on "Club Organization and Management," drawn from the experience of the T Square Club, of Philadelphia, of which he is president, and much of the success of which can be attributed to the business of the club being in the hands of a carefully selected, working, executive committee, leaving the time and thought of the members free for the main object of design. He was followed by representatives of every club, who compared the circumstances under which each was organized, and the means and results of their work.

The practical object of the convention was expressed by Mr. Henry W. Tomlinson, of Chicago, in his paper on the "Annual Exhibition." To effect the needed reforms a committee was appointed to arrange a schedule of consecutive exhibitions, forming a circuit by which a drawing once entered can pass through each subsequent exhibition; the hanging committee of each exhibition retaining its independence and the owner being at liberty to designate at which cities he wishes his drawings to appear. In order to simplify the details of business, an overlapping of committees was arranged, by which each exhibition committee is to contain one member from the previous exhibition of the circuit. It is evident that the clerical expense, the annoyance to contributors by repeated solicitation, and the difficulties of management are thus minimized.

For the collection of exhibits a national committee was formed with a resident foreign member, who will make it his business to secure a selection of drawings from England and France. These

COUNTRY HOUSE.
Meroyn Macartney, Architect, London.

COTTAGE, HARPENDEN. HOUSE FOR ERNEST GEORGE.
Ernest George & Peto, Architects, London.

drawings, which before were difficult for Western clubs to obtain, will now make the entire circuit before being returned to Europe. Being in bond to the custom house, no exhibition except those in the designated cities can secure these drawings.

As there are a few dates in the schedule still open, the officials of the League will be glad to communicate with any club wishing to enter the circuit. The League will do all in its power to foster new architectural organizations. If a few architects, in no matter how small or remote a town, will club together and send one of their members to the next convention, he will likely bring back ideas on which a successful chapter can be built.

The suggestion was also made to add a local "arts and crafts" section to every exhibition, so as to knit the allied arts with architecture. The subject of the exhibition catalogue, yearly demanding more care from the club, and becoming at the same time more interesting to the general public, was discussed in relation to the architectural magazine, with which it seems to enter into competition. The decision stood that the catalogue ought to explain and enforce the central idea and object which an exhibition to be worth anything must have. It becomes a year-book to present to the public the results of the club's work in the cause of good architecture and to point the way to local municipal improvements. Sufficient text to point the moral of the drawings is thus a distinct advantage.

The morning session was concluded by a paper by Mr. Julius F. Harder, of New York, earnestly advocating the establishment of a rigid code to govern competitions. The form drawn up by the joint committee of the Architectural League, of New York, and the T Square Club, of Philadelphia, and approved by both of these organizations over a year ago, was accepted by the convention, which recommended its adoption by all the other individual clubs.

In the afternoon, as the guests of the Cleveland Club, the delegates were driven in tally-hos through the system of parks which ultimately will form a continuous wooded avenue engirdling and penetrating the entire city. In the evening, by special invitation of a committee of the Cleveland Chamber of Commerce, the delegates of the convention were present in the library of the Chamber at an address by Mr. Bush-Brown, of New York, on "The Grouping of Public Buildings," in reference to the contemplated municipal buildings of the city of Cleveland, to which much careful attention is being paid. He gave a striking example of what economists would call the "utility of the beautiful" in the Congressional Library at Washington, where the decoration of carving and color, at an expense of 7 per cent. of the total cost, produces 90 per cent. of the attraction or "drawing power" of the building.

The lecture of Mr. Bush-Brown was in line with the sentiment of the convention that the architectural club has a work to do beyond mere self-improvement. Representing the best taste and artistic culture of the community, it should be in the fighting line of municipal improvement. City councils and building committees should be made to realize that if the medical profession can maintain a board of public health, the architectural club is a self-constituted board of public art. A resolution was therefore offered by Mr. Bush-Brown, which was adopted: —

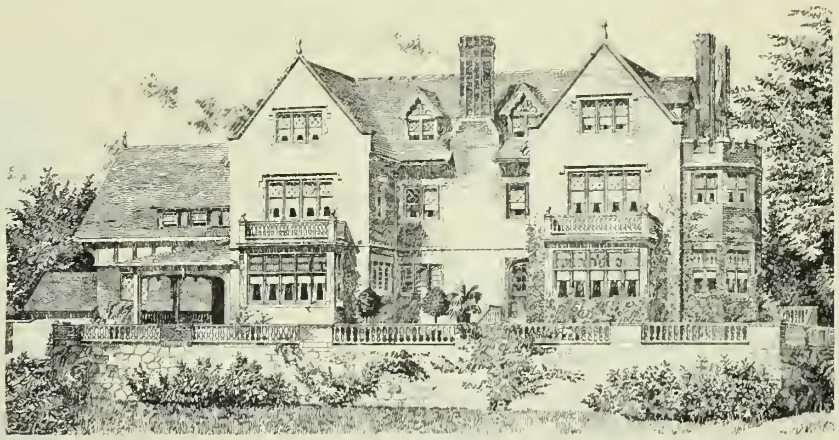
That the League announces that in its judgment, to further the best interests of municipal development and improvement, it would be wise for municipal authorities, civic clubs, and public-spirited individuals interested in these matters in all cities, no matter how remote, forming a local committee to which they invite the president of the

BASSETT CHURCH, SOUTHAMPTON.
E. P. Warren, Architect, London.

HOUSE AT HAMILTON, MASS.
Winslow, Wetherell & Bigelow, Architects, Boston.
(Sheet of detail and plan shown on Plate 48.)

League, to appoint an advisory committee of four experts, to act in conjunction with the first three as a committee of seven in formulating a comprehensive scheme, it being understood that advisers are to be chosen from different cities and will act for a nominal fee. Let us suppose, for instance, Milwaukee to be the city contemplating civic improvement. The president would then in all probability appoint experts from Chicago, St. Louis, Detroit, and Cleveland, if in his judgment men of suitable capacity were to be found at that end of the circuit. This is not so much for developing the large Eastern cities, where local and municipal fine art societies exist, as for the smaller cities of the United States, where there is an abundance of civic pride and a dearth of well-trained, expert advisers.

"The Architectural Society and its Progressive Influence," by Mr. Albert Kelsey, of Philadelphia, was the first paper of the morning session. He pointed out a still wider field for the united effort of the members of the convention. Whatever lack of sympathy existed between the public and the profession was due to the fact that architects followed obsolete precedents and foreign traditions instead of going down to the heart of American life and working outward, the logical result of its needs and conditions. Mr. Louis H. Sullivan, in a ringing paper read by the secretary, enforced the necessity of a vital architecture on modern and American lines, and Mr. Dwight H. Perkins pointed out that, like all great men and movements, architecture must be of and for the people. Mr. Ernest Flagg regretted his inability to attend and sent his fullest sympathy. The secretary read, also, numerous letters and telegrams from prominent practising architects, professors, and draftsmen, expressing their sympathy with the convention. These came from representative architectural scholars ranging from New Orleans to Milwaukee, and from Milwaukee to Paris, and spoke eloquently of the future of American architecture.



HOUSE AT BROOKLINE, MASS.
Chapman, Frazer & Blinn, Architects.

HOUSE AT BROOKLINE, MASS.
Chapman, Frazer & Blinn, Architects.

The feature of the afternoon session was a paper by Mr. Peter B. Wight, secretary of the Illinois State Board of Examining Architects, on "The Operation of the Illinois License Law." He advocated this movement toward the internal improvement of the profes-

ROTUNDA, UNIVERSITY OF VIRGINIA.
McKim, Mead & White, Architects, New York.

four alternates of such delegates, who may be members of any other active member, except that no member of the executive board shall be appointed an alternate.

"All the delegates of one active member shall collectively have one vote. Dues shall be uniform, regardless of membership of the individual associations, and sufficient to meet the running expenses of the League. The management of the League between conventions shall be vested in an executive board, to be composed of a president, first vice-president, second vice-president, secretary, and treasurer, to be elected annually, and the convention shall have power to appoint necessary committees.

"These articles of organization shall continue in force until the next convention."

Under this constitution the following officers were elected: President, Albert Kelsey, Philadelphia; first

sion for every State, and the committee recognized it as one in which time only was necessary to complete success. Mr. Wight, as a member of the Illinois Chapter of the American Institute of Architects, assured the League of the sympathy and moral support of the Institute.

The committee on permanent organization, composed of Mr. Julius F. Harder, chairman, Architectural League of New York; Irving T. Guild, of the Boston Architectural Club; Albert Kelsey, T Square Club, Philadelphia; William B. Ittner, St. Louis; Herbert B. Briggs, Cleveland; J. C. Llewellyn, Chicago, presented articles of organization at the morning session, which were unanimously adopted by the convention. Much of the credit for these belongs to Mr. Harder, the chairman of the committee.

The articles provide for a confederation of independent societies which every year meet for mutual understanding and exchange of ideas. The League does not attempt in any way to interfere in the affairs of the individual club nor with professional practise except in the case of some flagrant abuse.

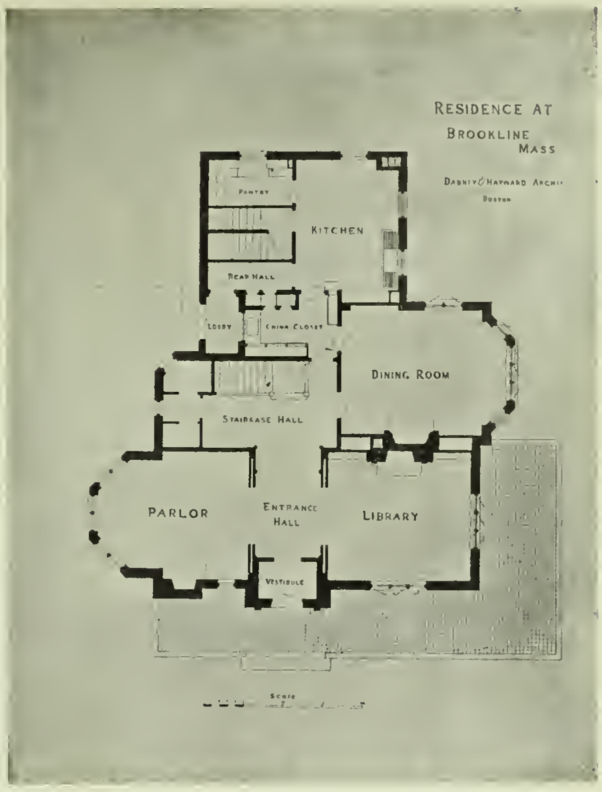
The objects of the Architectural League of America, as the association is formally named, are, in the larger sense, to promote American architecture and the allied fine arts, to encourage a native architecture inspired from modern ideas, to unite individual organizations in order to work out their common interests to the best advantage.

The articles of organization continue as follows: —

"There shall be an annual convention to be composed of delegates from the associations composing this League, to be held at a time hereafter to be designated. Every allied member shall be entitled, unless otherwise provided in the terms of alliance, to be represented at every meeting of this League, by not more than four delegates or duly appointed alternates of such delegates, having collectively one vote. Every member must appoint four delegates to represent it at every meeting of the League, and such delegates must be members in good standing of such member, and may also appoint

SIDE DOOR, HOUSE OF C. E. PATTERSON, ESQ., TROY, N. Y.
H. L. Warren, Architect, Boston.

HOUSE AT BROOKLINE.
Dabney & Hayward, Architects, Boston.



PLAN OF HOUSE AT BROOKLINE.
Dabney & Hayward, Architects, Boston.

vice-president, William B. Ittner, St. Louis; second vice-president, J. W. Case, Detroit; secretary, H. W. Tomlinson, Chicago; treasurer, Herbert B. Briggs, Cleveland.

The convention closed with a reception and banquet at the rooms of the Century Club, on the fifteenth story of the New England Building, overlooking the illuminated city and Lake Erie beyond. The toastmaster was Mr. Herbert B. Briggs, of Cleveland. The speeches of the evening were: "Welcome," by Mr. Benjamin S. Hubbell, of Cleveland, to which the new president of the League responded, using "Progress before Precedent" as his text; "What We Gain by Concerted Movement," Mr. William B. Ittner, of St. Louis; "Reciprocity between Architectural Clubs and Architectural Publications," Mr. Irving T. Guild, of Boston; "The Architectural School from an Architect's Standpoint," Mr. George R. Dean, of Chicago.

The next convention will be held at Chicago, on Thursday, Friday, and Saturday June 7, 8, 9, 1900. It will be looked upon with interest by the general public as well as the members of the profession who are alive to their responsibilities.

The convention of the Architectural League of America was remarkable for the enthusiasm with which a new idea was received and indorsed. From a meeting called to adjust the business details of exhibition committees and for an informal discussion of club affairs, it has become a national organization with a definite purpose. It has touched live questions, entered a wide and new field, and has shown the energy which guarantees success.

THE BOSTON ARCHITECTURAL EXHIBITION.

THE Boston Architectural Club, in conjunction with the Boston Society of Architects, has just concluded a very successful exhibition of architectural drawings, which in some respects has been unique. It was held in the rooms of a private institution, the St. Botolph Club, which is essentially *the* art club of Boston, though the name is usurped by another organization. The available room at the St. Botolph Club was small, being limited to a gallery hardly more than 20 by 30 ft. Consequently, the exhibition itself was quite restricted. There was hardly a drawing or photograph exhibited which was not worthy of study, and, since the choice was so restricted, large drawings were barred out and the contributors felt under a sort of esthetic obligation to send in of their choicest and best. The result showed an exhibition which was a delight to the soul of him who loveth not the day of great endeavors, but can take pleasure in the contemplative and the

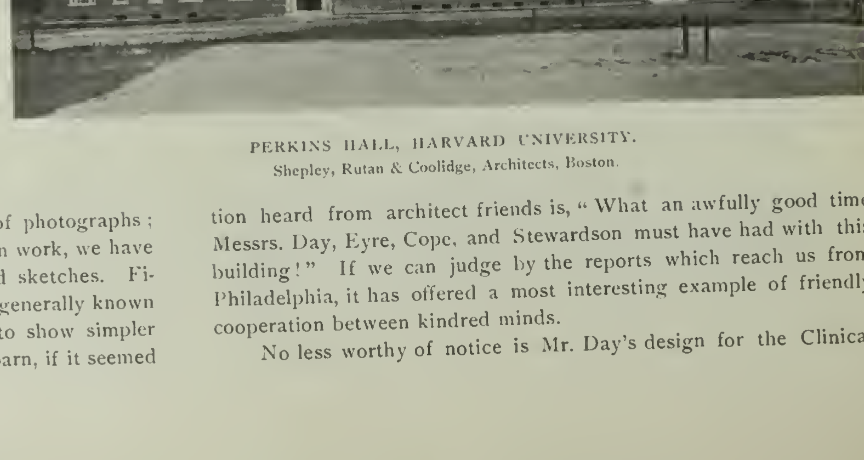
ST. PATRICK'S CHURCH, WHITINSVILLE, MASS.
Maginnis, Walsh & Sullivan, Architects, Boston.

studious. We are all in too much of a rush now-a-days, and we all know it and are all ready to applaud the contemplative type, even though unwilling for the sake of our competitors to let up on the pressure; and the object lesson of these choice, carefully selected drawings is so obvious in its moral application that if it went no further the exhibition would have accomplished a great deal. It is an easy thing to collect two or three thousand drawings now-a-days, but to winnow through a mass of contributable stuff and narrow the choice down to the contents of a small room means work on the part of the committees, which will surely be appreciated by any one who has had to do with such a mill in the past; and the committees were able to gather not only from Boston, but by a happy combination of circumstances were able to present a very fair showing of English work side by side with what was gathered from Boston, New York, and Philadelphia.

FORECOURT OF RESIDENCE, GEO. K. BIRGE, ESQ., BUFFALO, N. Y.
Little & Browne, Architects, Boston.

Now, a mere description of the drawings which are sent in to an exhibition is not of much value. The catalogue will do that a great deal better than the columns of THE BRICKBUILDER. And where there is so much that might be said, we can at best only touch upon the more obvious features of the exhibition. We do not know whether to be grateful or otherwise for the mind which is responsible for the catalogue of the exhibition being printed with stiff board covers. On the whole, we are inclined to think it is an advantage, for although the volume is quite too large to be safely entrusted to one's side pocket, it does form an admirable pad for notes, and we are inclined to treat it much more respectfully than if it were a brochure, which could be doubled up and thrown into most any corner of one's hip pockets. Inside the covers, the catalogue follows the precedent of the T Square Club by presenting some literature. The committee nailed their colors to the mast by a statement that "Instead of confining ourselves largely to drawings, we have admitted a considerable proportion of photographs; and, instead of putting the chief emphasis on modern work, we have exhibited many old examples, both photographs and sketches. Finally, instead of giving the greatest space to what is generally known as 'important work,' we have deliberately chosen to show simpler and smaller things, not even ruling out the homely barn, if it seemed to have, in outline and composition, qualities which would appeal to an artist." Then there follows a very readable *résumé*, by Mr. C. Howard Walker, of the laws covering architecture in relation to the growth of cities, which is certainly apropos of the existing legislative disturbances anent building operations, even if possibly a little irrelevant to the being of an architectural catalogue. The survey of the year's architecture which follows, by Prof. H. Langford Warren, is full of good suggestions. We get far too little general criticism of this sort. Our work is judged only too shallowly by our friends or too unfairly by our casual enemy, and we would there were more of the restrained cautious spirit by which Mr. Warren measures the work of the day. For the rest, the catalogue is all that could be desired, barring the ever-present and numerous advertisements, but as the sinews of war are essential to even the most select exhibitions, and as architects are notoriously poor, and the public will not pay a high price for a catalogue, the advertisements must be, unless some day a generous and exceptionally fortunate architect should be minded to endow permanently a catalogue which shall be forever independent of the advertiser.

We cannot forbear just a little complacency in recalling how many of the buildings illustrated in this exhibition meant the employment of brick and terra-cotta. Numbers, however, do not count, but if every example of brick dwellings could be as thoroughly charming as the houses at Princeton, N. J., and at Chestnut Hill, Pa., by Cope & Stewardson, we would all want to build our houses with brick, and shingles would be a drug on the market. Indeed, for that matter, nearly all of the Philadelphia work which is shown is preeminently an exemplification of what can be done in brick and terra-cotta. The building for the Natural History Museum, in connection with the University of Pennsylvania, is undoubtedly the most successful brick and terra-cotta structure which has been erected of recent years in this country. It is the product of three of the best known firms of architects, and might be pardoned if presenting a certain confusion in conception, but on the contrary it is thoroughly consistent throughout, and has a charm which is seldom found this side of North Italy. The whole spirit of the design is so delightful that the repeated exclamation heard from architect friends is, "What an awfully good time Messrs. Day, Eyre, Cope, and Stewardson must have had with this building!" If we can judge by the reports which reach us from Philadelphia, it has offered a most interesting example of friendly cooperation between kindred minds.



PERKINS HALL, HARVARD UNIVERSITY.
Shepley, Rutan & Coolidge, Architects, Boston.

No less worthy of notice is Mr. Day's design for the Clinical

Amphitheater, an excellent, straightforward Florentine Renaissance structure, with plenty of simple wall space and a broad, generous shadow from an ample cornice. Mr. Wilson Eyre contributed a number of his characteristic drawings. One of them is peculiarly typical of the man and of his point of view. It is nothing but a rough sketch looking down Broad Street, Philadelphia, with the tall mass of the City Hall in the distance and an unfinished steel skeleton looming up on the right, but if we could only train our eyes to see things as Mr. Eyre saw them in this sketch, we would have no need to go abroad to cultivate our love for the picturesque, for if there is any prosaic spot on earth it is the vicinity of the Philadelphia City Hall, and yet this sketch shows the charming flavor of romance which tells us that the elements were there, only we have not known how to appreciate them.

It is by no means a jump from the Philadelphia work to the English examples. On the contrary, exactly the same spirit is shown in both. And the difference between the drawing which is styled "A Preliminary Essay," by Mr. F. Inigo Thomas, who bears a name which ought to carry with it a large sense of responsibility, and the study by Mr. Eyre of a "Garden for Beauveau Borie at Jenkintown" (save the combination!) is one of locality rather than character. The English drawing is a most ingenious combination of perspective sketches, fragmentary floor plans, bits of interiors, and straight elevations, all combined to illustrate a simple block of dwellings most charmingly disposed with surrounding grounds; brick buildings of course and naturally successful, though the clever way in which the design itself is made manifest and easily apparent even to the eyes of an incredulous client, is by no means the least charm of the drawing. There was also in the exhibition some of the characteristic work of Ernest George and Peto, together with some of the modern English ecclesiastical work. Here, again, a comparison might be made with our friends Cram, Goodhue & Ferguson, and although comparisons are very apt to be invidious, we have seen few of the English modern churches which excel such work as is shown by the proposed All Saints Church, Brookline. A younger firm shows in this exhibition a different kind of work equally serious and successful: the design for St. Patrick's Church, at Whitinsville, by Maginnis, Walsh & Sullivan, which we trust marks the beginning of a new era in the building of Catholic churches in this country. With all the opportunities which a Catholic church can offer to the architect, the structures which have been imposed upon the community in the past have been a reproach to architecture, but here we have the substance of things hoped for, the evidence of things not heretofore seen.

RESIDENCE AT BROOKLINE, MASS.
Shepley, Rutan & Coolidge, Architects.

RESIDENCE AT BROOKLINE, MASS.
Shepley, Rutan & Coolidge, Architects.

Polychromy was not strongly in evidence in this exhibition. There was one ambitious attempt, however, deserving of study. Mr. Cass Gilbert's drawing for the Broadway Chambers showed an eighteen-story office building in which the three upper stories, presumably in brick and terra-cotta, were carried out with an attempt of color, which on the drawing seemed quite successful. There was also evidence of a certain amount of color treatment about the building for the Museum of the University of Pennsylvania, one of the porches showing a suggestion of some extremely knowing inlaid brick mosaics, which implied a feeling for color that is most satisfactory.

Of the work nearer home, there was shown some photographs of Wheatleigh at Lenox, by Peabody & Stearns, which is about as near as we can hope to come to an Italian villa. The same architects also exhibited photographs of a house at Pittsburgh, which sees all the charm of the old John Hancock house and goes it considerably better. Then of the Birge house at Buffalo, by Little & Browne, there was exhibited both the very fine brick and iron gateway, the picturesque colonial stable, and the stately mansion itself. Surely, no one is able to more successfully treat the colonial style than this firm. Of a different type was Mr. Wheelwright's recently completed building for the Horticultural Society in Boston, a dignified, thoroughly successful adaptation of the best colonial motive.

We would also like to mention Shepley, Rutan & Coolidge's design for Conant Hall, and Coolidge & Wright's Randolph Hall, two of the best of the Harvard dormitories, and the building by Chamberlin, Stickney & Austin for the Cambridge Homes for Aged People, a simple, straightforward, colonial brick structure set in a quaint, old-fashioned garden, and shown by a water-color drawing which has all the charm of outdoor air. And finally, we cannot stop without another reference to Philadelphia. The building of the Lutheran Publication Society, by Frank Miles Day, was too good to pass unnoticed, and though of the simplest of motives, a three-story gabled front, it was worked out so cleverly, with a large archway in first story, two pedimented windows above, and four little windows in the attic with a little dot of an eye in the center of the gable, it is not unfit to stand as a type of the kind of work the Philadelphia coterie is striving so sincerely to produce. And though we want every one to have a chance, and the workers are many, yet may we another year have the annual exhibition as small, as select, and as thoroughly artistic as this has been.

Sand for Mortar.

BY IRA O. BAKER.

M. Am Soc. C. E., Professor of Civil Engineering, University of Illinois, Champaign.

THE quality of the sand has an important effect upon the strength and durability of the mortar, although its importance is generally overlooked, even when the cement is subject to rigid specifications.

The chemical nature of the sand appears not to have any important bearing upon its value for mortar. Silicious sand is usually the best. Calcareous sands are usually friable, *i. e.* composed of soft particles, in which case they are less suitable for making mortar. Although calcareous sand is ordinarily inferior to silica sand, nevertheless it is certainly true that crushed limestone makes a stronger mortar, in both tension and compression, than natural sand, and the difference of strength seems to increase with the age of the mortar. Part of the greater strength is unquestionably due to the greater sharpness of the screenings, and the part that increases with the age of the mortar seems to be due to some chemical action between the cement and the limestone.

The dampness of the sand is a matter of some importance. If the sand is very damp when it is mixed with the cement sufficient moisture may be given off to cause the cement to set partially, which may materially decrease its strength. This is particularly noticeable with quick-setting cements. Ordinarily for the best results the sand should be practically dry.

The usual specifications for sand for mortar are that it "shall be sharp, clean, and coarse." To these requirements should be added a fourth, viz., the proportion of voids should be as small as possible.

Sharpness. Sharp sand, *i. e.* sand with angular grains, is preferred to that with rounded grains on the assumption (1) that the angular grains are rougher and therefore the cement will adhere better; and (2) that the angular grains offer greater resistance to moving one on the other under compression. On the other hand, the sharper the sand the greater the proportion of the interstices between the grains, and, consequently, the greater the amount of cement required to produce a given strength or density. But a high degree of sharpness is more important than a small per cent. of voids.

The sharpness of sand can be determined approximately by rubbing a few grains in the hand, or by crushing it near the ear and noting if a grating sound is produced; but an examination through a small lens is better. Sharp sand is often difficult to obtain, and the requirement that "the sand shall be sharp" is practically a dead letter in most specifications.

Cleanness. Clean sand is necessary for the strongest mortar, since an envelope of loam or organic matter about the sand grains will prevent the adherence of the cement.

The cleanness of sand may be judged by pressing it together between the fingers while it is damp; if the sand sticks together when the pressure is removed it is entirely unfit for mortar purposes. The cleanness may also be tested by rubbing a little of the dry sand in the palm of the hand; if the hand is nearly or quite clean after throwing the sand out, it is probably clean enough for mortar. The cleanness of the sand may be tested quantitatively by agitating a quantity of sand with water in a graduated glass flask; after allowing the mixture to settle, the amount of precipitate and of sand may be read from the graduation. Care should be taken that the precipitate has fully settled, since it will condense for a considerable time after its upper surface is clearly marked.

Sand is sometimes washed. This may be done by placing it on a wire screen and playing upon it with a hose, or by placing it in an inclined revolving screen and drenching with water. When only comparatively small quantities of clean sand are required, it can be washed by shoveling into the upper end of an inclined V-shaped trough and playing upon it with a hose, the clay and lighter organic matter floating away and leaving the clean sand in the lower portion of the trough, from which it can be drawn off by removing for a short time plugs in the sides of the trough. Sand can be washed fairly clean by this method at an expense of about ten cents per cubic yard exclusive of the cost of the water.

Although it is customary to require that only clean sand shall be used in making mortar, a small quantity of finely powdered clay will not materially decrease the strength of the mortar. In some instances clay to the amount of 10 per cent. of the sand seems not to decrease the strength of the mortar.[1] Mortar containing considerable clay is much more dense, plastic, and water-tight and is occasionally convenient for plastering surfaces and stopping leaky joints. Such mortar is not affected by the presence of water.

Sand employed in actual work frequently has 5 to 8 per cent. of suspended matter. The specifications for the masonry on the Chicago Sanitary Canal limited the suspended matter to one half of 1 per cent.

Fineness. Coarse sand is preferable to fine, since (1) the former has less surface to be covered and hence requires less cement: and (2) the coarse sand requires less labor to fill the interstices with the cement. The sand should be screened to remove the pebbles, the fineness of the screen depending upon the kind of work in which the mortar is to be used. The coarser the sand the better, even if it may properly be designated fine gravel, provided the diameter of the largest pebble is not too nearly equal to the thickness of the mortar joint.

Table I. gives the results of a series of experiments to determine the effect of the size of grains of sand upon the tensile strength of cement mortar. The briquets were all made at the same time by the same person with the same cement and sand, the only difference being in the fineness of the sand. The table clearly shows that coarse sand is much better than fine. Notice that the results in line 4 of the table are larger than those in line 3. This is probably due to the fact that the sand for line 4 has a greater range of sizes. If this explanation is true, then since the sand in each line of the lower half of the table has greater variety of sizes than those in the upper half, the coarse sand is relatively better than appears from Table I.

TABLE I.

EFFECT OF FINENESS OF SAND UPON THE TENSILE STRENGTH OF 1:2 CEMENT MORTAR.

Reference Number.	Sand caught between the two sieves stated below.	Tensile strength, in pounds per square inch after				
		7 days.	1 mo.	3 mos.	6 mos.	12 mos.
1	No. 4 and No. 8	243	442	539	470	665
2	" 8 " " 16	269	345	473	512	572
3	" 16 " " 20	186	250	313	397	396
4	" 20 " " 30	211	281	322	402	440
5	" 30 " " 50	149	205	238	275	318
6	" 50 " " 75	122	214	260	275	308
7	" 75 " " 100	98	153	211	208	253
8	Passing No. 100	98	155	161	229	271

Table II. shows the fineness of several natural sands employed in actual construction; and as the sands were to all appearances of the same character, this table also shows, at least approximately, the effect of fineness upon tensile strength. This table agrees with the preceding in showing that the coarser sand makes the stronger mortar. This conclusion is perfectly general. As a rule, the sand employed in making cement mortar is much too fine for maximum strength or for minimum cement.

If the voids are filled with cement, uniform coarse grains give greater strength than coarse and fine mixed; or in other words, for rich mortars coarse grains are more important than small voids. But if the voids are not filled, then coarse and fine sand mixed give greater strength than uniform coarse grains: or in other words, for lean mortars a small proportion of voids is more important than coarse grains.

[1] Report of Chief of Engineers, U. S. A., 1894, pp. 3001–3010; and *Trans. Am. Soc. of Civil Engineers*, Vol. XIV., p. 164.

TABLE II.

TENSILE STRENGTH OF A 1:3 CEMENT MORTAR WITH NATURAL SANDS DIFFERING CHIEFLY IN FINENESS.

Reference Number.	Per cent. caught on sieve No.								Per cent. passing No. 100.	Tensile strength. Pounds per square inch.
	4	8	16	20	30	50	75	100		
1	0	26	21	16	11	9	8	7	2	700
2	0	29	29	13	10	12	5	1	1	447
3	0	22	21	11	17	20	8	1	1	370
4	0	13	15	10	19	33	6	1	1	341
5	0	9	10	6	11	45	15	2	1	332
6	0	13	15	7	8	38	15	4	1	309
7	0	0	0	0	1	6	69	23	2	246
8	0	0	0	0	0	0	0	6	94	200
9	0	0	0	2	3	15	45	30	5	189

The fineness of several sands employed in noted works is shown below, the larger figures being the number of the sieve, and the smaller figure preceding the number of a sieve represents the per cent. retained by that sieve, and the small figure after the number of a sieve represents the number passing that sieve: Poe Lock, St. Mary's Fall Canal, $^{5}20\,^{15}30\,^{35}40\,^{45}$; St. Regis sand, Soulanges Canal, Canada, $^{12}20\,^{26}30\,^{51}50\,^{11}$; Grand Coteau sand, Soulanges Canal, Canada, $^{14}20\,^{30}30\,^{27}50\,^{30}$. In passing it is interesting to note that a 1 to 2 mortar with the last sand was only 79 per cent. as strong as the preceding; and with a 1 to 3 mortar only 71 per cent. The specifications for the sand employed in the masonry on the Chicago Sanitary Canal was "that not more than 50 per cent. should pass a No. 50 sieve, and not more than 12 per cent. should pass a No. 80 sieve." Tables II. and III. show the fineness of a number of sands employed in actual work.

Voids. The smaller the proportion of voids, *i. e.* interstices between the grains, the less the cement required, and consequently the more economical the sand.

The proportion of voids may be determined by filling a vessel with sand and then determining the amount of water that can be put into the vessel with the sand. This quantity of water divided by the amount of water alone which the vessel will contain, is the proportion of voids in the sand. The quantities of water as above may be determined by volumes or by weight. The proportion of voids may be determined for the sand loose or rammed. In either case it is more accurate to drop the sand through the water than to pour the water upon the sand, since with the latter method it is difficult to eliminate the air bubbles, particularly if the sand be first rammed. If the sand is dirty and the water is poured upon it, there is liability of the clay's being washed down and puddling a stratum which will prevent the water penetrating to the bottom. If the air bubbles are not excluded, or if the water does not penetrate to the bottom, the result obtained is less than the true proportion of voids. Again, if the sand is dropped through a considerable depth of water, there is liability that the sand may become separated into strata having a single size of grains in each, in which case the voids will be greater than if the several sizes were thoroughly mixed.

The per cent. of voids varies with the moisture of the sand. A small per cent. of moisture has a surprising effect upon the volume and consequently upon the per cent. of voids. For example, fine sand containing 2 per cent. of moisture uniformly distributed has about 20 per cent. greater volume than the same when perfectly dry. This effect of moisture increases with the fineness of the sand and decreases with the amount of water present.

Table III. shows the voids of a number of natural sands employed in actual work.

The proportion of voids is independent of the size of the grains, but depends upon the uniformity of the size and varies with the form of the grains and the roughness of the surface. A mass of perfectly smooth spheres of uniform size would have the same proportion of voids, whether the spheres be large or small. A mass of perfectly smooth spheres packed as closely as possible would have 26 per cent. of voids; but if the spheres are packed as loosely as possible the voids would be 48 per cent. A promiscuous mass of bird shot has about 36 per cent. of voids. The difference between this and the theoretical minimum per cent. for perfectly smooth spheres is due to the variation in size, to roughness of the surface, and to not securing in all parts of the mass the arrangement of the shot necessary for minimum voids. German standard sand has grains nearly spherical and nearly uniform in size, having slightly rough surface, and has 41 per cent. voids loose (see line 2, Table III.). The difference in per cent. of voids between this sand and a mass of shot is due to the more irregular form and rougher surface of the sand grains. Standard crushed quartz retained between the same sieves as German standard sand has 55 per cent. of voids (see line 1, Table III.), the excess in voids of this over German standard sand being due to the rougher surfaces and sharp corners preventing the grains from fitting closely together.

TABLE III.

FINENESS, VOIDS, AND WEIGHT OF NATURAL SANDS.

Reference Number.	Description.	Fineness. Per cent. caught on sieve No.					Fineness. Per cent. passing No. 80.	Voids. per cent. Dry and loose.	Voids. per cent. Saturated and rammed.	Weight. Pounds per cubic foot. Dry and loose.	Weight. Pounds per cubic foot. Dry and well shaken.
		5	20	30	50	80					
1	Standard Crushed Quartz	0	0	99	1	0	0	55	43	81	86
2	German Standard Sand	0	0	99	1	0	0	41	38	94	104
3	Bibus's Bank, Urbana	0	100	0	0	0	0	46	37.8	91	99
4	" " "	0	0	100	0	0	0	45	36.3	88	97
5	" " "	0	0	0	100	0	0	44	36.0	85	92
6	" " "	0	0	0	0	100	0	45	35.7	86	97
7	" " "	0	0	0	0	0	100	47	33.3	83	94
8	" " "	0	27	21	23	9	20	41	30.0	91	100
9	Cement Walk, Champaign	0	13	17	24	39	5	44	36	83	97
10	Pumping Station, Chicago	0	41	19	18	18	3	45	37	101	113
11	Municipal Work, Chicago	0	27	19	32	14	8	28*		....	106
12	Much Used in Chicago	0	3	1	3	24	67	37*		....	98
13	Municipal Work, Illinois	0	4	1	2	12	81	37*		....	96
14	Natural Sand Artificially Mixed	0	38†	12	13	13	25‡	22*		....	123

* Dry and well shaken. † 12% on No. 10; 13% on No. 15; 13% on No. 20.

‡ 12% passing No. 100.

If the mass consists of a mixture of two sizes, such that the smaller grains can occupy the voids between the larger, then the proportion of voids may be very much smaller than with a single size of grains. For this reason a mixture of two grades of sand of widely different sizes has a smaller per cent. of voids than does any one size alone (compare lines 1 to 7 with the remainder of Table III.).

The best sand is that which has grains of several sizes, such that the smaller grains fit into the voids of the larger, the proportion of any particular size being only sufficient to fill the voids between the grains of the next larger size. If the grains are spherical and the diameter of the smaller is about one fifth of the diameter of the larger, the smaller grains will just fit into the interstices between the larger ones. The smaller the voids the greater the economy, and the more dense and stronger the mortar.

The finer the sand the more uniform the size of the grains, and consequently the less the proportion of voids. On the other hand, the finer the sand the less sharp it is and the greater the surface to be covered. Since it has been conclusively shown that the coarser the sand the better (for example, see Tables I. and II.), the argument in favor of fine sand is not as potent as that against it. Farther, the advantage of coarse sand over fine increases as the proportion of cement decreases, since with the smaller proportions of cement the voids are not filled.

Conclusion. An examination of the preceding data shows that very fine sand makes a much weaker mortar than coarse sand, and also that different sands vary considerably in the proportion of voids and therefore differ in the amount of cement required to produce any particular strength. Therefore, before adopting a sand for a work of any considerable magnitude, all available sands should be carefully examined with reference to (1) their effects upon the strength of the mortar, (2) their per cent. of voids or the amount of cement required with each, and (3) their cost. If mortar of any particular strength is desired, the proportion of cement should be adjusted according to the fineness and voids of the best available sand.

The Qualities and Limitations of Ceramic Products.[1]

BY KARL LANGENBECK.

THE builders of all ages have resorted with utmost freedom to the use of clay and the products that are made from it as structural material and as means of furnishing and beautifying the house.

This has been no less the case in the earliest times, when the adobe hovel superseded the cave dwelling, than in the latest structure of cement and terra-cotta.

It would seem trite, therefore, to discuss the subject of clay as a building material, if the manifold uses and properties of clay and its products did not bring up many problems that present themselves in different aspects to the architect and the ceramist.

As clay is the decomposition product of nine tenths of the common rocks, as it is readily transported hither and thither by rain, landslides, winds, streams, and ocean currents, its universal distribution brings it to hand almost everywhere. It differs, of course, much according to the rocks it has been derived from and according to the way it has been mixed, but its fundamental properties, chemical and physical, are so marked that every one will recognize it as *clay*, and every clay has a practical use to which it can be put. There is no such thing as a good clay and a poor clay, though, of course, a clay may be good or poor or worthless for a *particular* use.

The prime quality by which every one recognizes it, its plasticity, and the attendant quality of being able to sustain itself in masses of almost any size or shape, make for it universal utility, as its formation and transportation, which I have just pointed out, make for it universal occurrence.

These properties *alone* are the valuable ones for many builders: for instance, the railroad, hydraulic, and military engineer; not so with the modern architect. But while the architect may never be called upon again to build the adobe hut, remember that the Assyrian palace stood to our day, until its mud walls were robbed of their incrusting alabaster slabs and glazed tile.

Remember, too, that the military engineer has discarded stone walls for clay banks, and that stone forts, turreted castles, and battlements, once so formidable, are now laughed at as the bugaboos of a childish age. Are architects sure that they could not build many an incrusted mud wall to-day at less cost and greater utility than many they now build of costly material?

There is no human history of early building or fashioning with clay. We always had it, as the animals had it before us, and I believe the architect will realize some day, as the military engineer has already learned, that the grandmother arts of the wasp, the mud swallow, and the beaver can still be as modern as they are ancient.

The property of hardening in the fire is also a very early human discovery. It was an incidental observation made even before fire was kindled for a purpose, and at its very awakening human intelligence combined the idea of these two properties of clay, forming and hardening, so that we cannot put our fingers on a race in the lower stage of barbarism that has not left us vessels, figures, or utensils so made, except perhaps in the arctics.

It may be of interest in a history of building that in exploring the mound fort near Madisonville, Professor Putnam discovered that the ancient builders had hardened the surface of the embankment by burning it topically.

While these are the fundamental properties on which all the clay materials in the building arts are made, and which man has always known, they derive their greatest value to the architect from a property learned only by long experience, but which, in spite of this, he is constantly prone to forget. This is the absolute indestructibility and permanence of clay products to disintegration and wear. The bricks in the baths of Titus and Caracalla are without signs of disintegration, while the stone of the Colosseum is strongly decayed. The marble in the tessellated floors of Roman villas still preserved in France, along the Rhine in Germany, and about Bath in England, were worn through in the days of their use, while the tessera of baked clay in reds, buffs, browns, etc., used in conjunction with the marble in the same floors, are hardly touched to this day.

In the lobbies of many public buildings paved with marble tile and red or blue *clay* tile in the corners, the marble is so dished through wear that the clay tile in their corners stand ⅛ to ¼ in. above their level, yet the public and even the architects hardly believe their own senses in witnessing this common fact, for a very natural reason. The velvety texture of even a hard-burned clay *looks* soft; the polished surface of a natural stone always *looks* hard and immutable to the elements of wear and atmospheric disintegration, yet on the mineralogist's scale the hardness of the former is nine as against four to five for the best marbles.

It may be well to remind you in this connection of the scientific reason for this indestructibility of clay and clay products; it is that clay is the residuum from the breaking down of nearly all rocks. It is what is left of rocky material when the mechanical forces of the earth and the chemical action of the atmosphere have done their worst and the tooth of time can do nothing further. But less obvious properties than plasticity, solidifying under fire, and durability open out a still greater field of utility.

First, the clays themselves, depending upon their origin, burn to a great range of colors, from snowy white, through yellows, buffs, and browns, to reds of varying shades, and their affinity for oxides of chromogenic metals, such as manganese, cobalt, copper, nickel, iron, enlarges the color scale into the blues, greens, pinks, black, etc. And these colors are without exception absolutely permanent. Fading is never possible, though, of course, they may become obscured and indistinguishable, even permanently so, by griming, if the pores of the body still admit, or through careless use are allowed to take up dirt.

Again, the indifference of clay bodies to fire, and the fact that their coefficients of expansion can be brought to the same degree of expansibility and contractibility as glasses and enamels, enables melting these upon their surfaces in thin or thick layers, making the porcelain and pottery industry proper possible, and opening out a palette of brilliant colors far beyond that of the clay colors themselves, and far beyond the possibilities of decoration with pigments.

And furthermore, clay products are among the poorest conductors of heat, offer effective resistance to its fusion and cracking, and are also non-conductors of electricity. These facts now largely interest the architect, for there is scarcely a building in which he does not have to consider them.

And lastly, let me add to this brief survey of the properties of clays, the discovery that a chemical union of *clay* with mortar materials, lime and sand, effected by heat and in proper proportions, has opened out in Portland Cement possibilities in masonry and molding in the most durable of stones that would be inconceivable without such a material.

But all these conspicuously valuable properties of clay that have been utilized in the most manifold ways and have furnished the householder, the decorator, the engineer, the metallurgist, the electrician, and above all the architect, with a wealth of available utensils and materials, are all hedged in and modified by the most aggravating limitations and often the most unexpected drawbacks.

These difficulties are always present, and even attend the making of the simplest and best known articles, so that the manufacture of clay wares, from the ordinary brick to the finest of porcelain, or the production of cements, involves a technical skill and attention to subtle details almost unknown in other mechanical and chemical operations.

Particularly is this the case in the making of most building materials, so that many desirable properties are bound up with limitations, from which they are almost inseparable.

This may be illustrated by the following examples.

[1] Read before the Cincinnati Chapter of the A. I. A.

The more delicate a clay in taking fine impressions, the more plastic and fine grained it is, the more sensitive it is to the effects of pressure, which only appear after the ware is burned. This may show in the form of hair cracks or again as bulged or protuberating welts, particularly if the piece is burned to vitreousness. If in turning up such a clay upon the potter's wheel, the workman's fingers press the clay too hard, though afterward it be turned off on the lathe and polished to the smoothest surface, the fire will bring out spiral rings upon the jar or vase, showing the original track of the man's fingers. If it be a bust pressed in a mold, the fire may bring out upon the smooth cheek of a female head coarse lumps or welts where the clay was forced too energetically. In a work of art more careful handling by a skilful and higher-priced man is the remedy, but in a commercial product or in a building terra-cotta it is necessary to use a coarser clay, which, while it does not show these blemishes, also takes a rougher impression. You cannot exact of a building ornament the surface and finish of a bisque figure without risking more objectionable features or paying a price far in excess of the value of the piece for the place.

Great advance has been made in the handling and caring for ware during the perilous operation of drying: ventilated drying rooms heated by steam coils that admit of close regulation of temperature, and mechanical lifts and carrying apparatus, which avoid strains to the tender, freshly formed bodies. But the shrinkage, particularly of large pieces and of flat ones pressed from clay flour, which takes place in the drying, causes a certain percentage of loss, in spite of all precautions and corrective appliances, through cracking. Where this crack is not disfiguring, where it is beyond the possibility of observation, or does not impair the strength of the piece, why should it compel its rejection? It is cheap criticism that rejects because of an obvious but essentially unimportant blemish. It is this cheap criticism of a mechanical age that strikes from the category of our present building materials many a useful and beautiful article because the flawless ones are insufficient to pay for the loss of those foolishly rejected. If the Moorish builders had judged similarly, never would a mosque or minaret have been covered with tile.

We pay to-day an unnecessarily high price for building terra-cotta, because the manufacturer breaks and makes over many a piece that he would use in his own house, but is afraid to submit to the judgment of the architect and the building public.

Great improvements have likewise been made in the building of kilns and the management of the fire. The purpose of these improvements has been mainly directed toward eliminating the variations that the fire produces in the tint of the pieces according to their proximity to the source of heat and also to the variations in shrinkage that the same cause effects. Kilns are now built much larger than the old potters dared use, and improvements in pyrometric measurements are such that differences between the hardest and softest parts of a kiln can be detected within 25 degs. and can be regulated. Through these means larger amounts of ware of the same shade and size can be obtained than ever before.

But the variations in these can never be prevented altogether, and it is only possible to obliterate the effects of these variations by very careful sorting of the pieces according to size and shade. In the regular pottery industry this is not exacting, because the shape of the ware and the fact that the pieces are used individually lead to no exact scrutiny. But in the building materials, where many pieces are laid in close proximity, comparison to a minute degree is unavoidable, and this is particularly the case in tile. These are shaded often to forty different shades and sized to a variation which can just be recognized by the sense of touch, about $\frac{1}{64}$ of an inch. The former is done because the public demand absolute uniformity of tint, the latter because close jointing is exacted. Two rows of 3 in. tile 16 ft. long, varying but $\frac{1}{64}$ in. in the individual pieces, would show a variation of 1 in., a very important difference in a small floor.

The tile for the old English cathedrals were burned in little beehive ovens but 5 or 6 ft. in diameter and 3 ft. high. The tiler had to crawl in on his hands and knees to set the ware, and the great floors were laid with practically all of the product without sizing or shading. As we look at them to-day, they are still satisfying. The jointing, large enough to take up the inequalities in size, gives a texture to the floor, the variation in shade, a liveliness of color, and no shrill-voiced American woman ever freezes the marrow in your bones by exclaiming, "Ain't it nice — just like oilcloth!"

With all our technical improvement, with all the expense and trouble of sizing and shading, so that 1,000 ft. of tile are split up into little piles that will scarcely lay a 25 ft. vestibule each, we refine our product until it looks like the imitation, oilcloth!

I am frequently asked why it is not possible to make glazed tile that will not craze. It is possible. But if you expect to produce effects such as you obtain with the present glazes, if you demand the soft lead glasses that are highly refracting, and insist upon having the brilliancy heightened by having the glaze put on the pieces in a thick layer, the freedom from crazing can only be obtained in a small percentage of ware, the bulk of which shivers in the fire, being shattered, in other words, by the strength of the contracting glaze.

Brilliant effects of color can be obtained by the use of thin, non-crazing colored glazes, by using a number of colors in such artistic juxtaposition as to heighten the effect of each other; but where you demand a single color, as is now almost invariably the case, and expect it to be brilliant and satisfying, it can only be obtained by the conditions named, which carry the defect criticized fundamentally with them. But is this really a defect in a purely decorative ware?

Before the Paris Exposition, the manager of the Rookwood Pottery, when I was its superintendent, told me he would have to discontinue the work unless it could be made so as not to craze; it was impossible for him to sell it because of this. I told him the condition could be fulfilled, but it would then not sell at all, because it would cease to be "Rookwood." The style and quality of the ware precluded its use for other than mainly ornamental articles; why therefore ruin by technical conditions that are altogether utilitarian? The factory struggled along until its products were submitted to the arbitrament of the French people at the exposition of 1889. It became famous at a bound. A timid American suggested to a French connoisseur, "But the glaze is cracked!" "Any fool can see that," was the reply; "what of it?" No one of any sense or taste has alluded to the crazing of Rookwood ware since. But, it is claimed, a white wall tile is surely thin glazed, and should be as free from crazing as table and kitchen ware shows itself to be under much more exacting use. But the bulk of our wall tile practically all craze.

Our domestic wall tiles are all made with highly refracting lead glazes, so that the individual piece will look as smooth and glossy as possible, and that because of the lower fire required in producing them they may be uniform in shade. They belong to the same category of wares as the colored glazes, namely, faience.

If you could flatten out the curves of a cup or dish, you would be astonished to see that its glaze is not as smooth and brilliant as one of these tile, for a level surface reflecting the light entirely in one direction magnifies every inequality a hundred-fold. If you take a set of plates, looking absolutely the same in color, and cut tile out of their bottoms, placing them together as tile are laid, you would marvel at the variation in tint. When builders waive their demand for brilliant, straight, and uniformly tinted wall tile, and have them hard fired and covered with alkali lime glaze, they will get tile that will not craze. Once accustomed to the matter, I believe, too, that they will be liked better. The blare of the glassy faience wall is not in good taste. The softer, more eggshell-like texture of the alkaline, porcelain-like glazes is far more agreeable.

Without instancing more of the innumerable problems and conditions that confront the clay worker, and upon which he must ask for changed views and compromises from the architect, I should like to answer the question that probably arises in your minds: "Is all the trouble of going into these conditions and details worth while?" Of course the question will be dismissed as idle as soon as it is asked, for clay products always have and always will be used in larger and larger measure, and for finer and finer purposes. It is, however, well to bear constantly in mind that so many qualities of high merit, often no less subtle than the difficulties, appertain to clay wares, that no amount of effort in interesting oneself in these problems is without fruit.

Let me instance in this connection the superior frost-proof quality of brick, tile, and terra-cotta over all natural stones. It is a common fallacy to suppose that this property is merely attendant on density, and that these clay wares are only more frost proof in proportion as they approach vitreousness. This is by no means the case. You are familiar with very porous sandstones that are far more frost proof than hard crystalline rocks, having very little water absorption. Of course only a material having taken up some water will be shattered by frost. But a very small amount may be as destructive as a large quantity. The root of the matter lies almost solely in the homogeneity of the material.

When a body saturated with water is subjected to frost, the expansion of ice crystals does no damage to its structure if no obstruction is presented to the weaving of the crystals through the pores. If, however, the body is intersected with layers of denser or impervious matter, even if these be no thicker than a sheet of paper, an immense pressure is exerted on these planes, resulting in the cracking of the body or the splitting off of layers of the same along the planes of these denser divisions. There is scarcely a crystalline rock that is not intersected with these impervious or difficultly penetrable divisions, and under the action of the frost these are the lines along which sooner or later its structure breaks down.

Even rocks of such hardness and density as granite succumb to this disintegrating action, only topically and slowly it is true, but very distinctly for all that, as you can see on many a monument in almost any cemetery. Sufficient water for destructive action is taken up between the crystals of quartz and feldspar or hornblende; this in freezing is impeded in its free movement by the thin and tough crystals of impervious mica, often lying in continuous layers over a larger patch, and the resultant pressure is sufficient to split off thin flakes and crystals from the surface, the chemical action of the water and atmosphere continuing the action in the rough and pitted places through their solvency.

Even poorly tempered and burned clay bodies are always free from impervious or denser strata, and under all circumstances more homogeneous than any crystalline rocks, which are often, and sometimes even minutely, crossed and recrossed with denser and almost impervious layers, only discoverable by the microscope. If the baked clay body be only sufficiently burned so that the cell walls of the pores are of reasonable strength, even a large water absorption does not endanger a breaking down by frost.

Another instance in which clay products stand unique in fulfilling conditions unattained in like measure by anything else is that of asepsis. The glazed surface of wall tile, and particularly the vitreous clay floor tile, can be scrubbed or wiped up with antiseptic solutions, like bichloride of mercury, and even the most efficient of these, permanganate of potash, followed by hydrochloric acid, without the slightest damage or surface pitting. This is of course out of the question with marble or any other wall or floor covering, and is so well understood by those experienced in hospital building that it is now seldom called into question.

Numberless other instances of conspicuous qualities of clay products for particular purposes could be adduced, but these will suffice to illustrate that their difficulties and limitations are amply compensated and are worthy of consideration and compromises.

Fire-proofing.

ECONOMY OF FLOOR CONSTRUCTION.

BY CORYDON T. PURDY, C. E.

ECONOMY, or the lack of it, in floor construction does not depend alone upon choice of materials. The usual question, "What is the cheapest kind of floor?" is generally supposed to cover the subject; but really the arrangement of the construction is more important.

This was illustrated by several alternate plans suggested for the floors of a warehouse building recently designed in Boston, by Winslow, Wetherell & Bigelow, architects. They were made to afford the owners an opportunity to decide for themselves which would be the most desirable. There were two acceptable ways in which the columns could be arranged, and both of these were considered. These alternative schemes are shown in Figs. 1 to 9 inclusive. In each case the section is shown on a larger scale than the plan.

Estimates were also made of the cost per square foot of each of these floors, taking into account all the different elements of construction affected. These include the steel beams and girders, the terra-cotta arch, the column covering, the cinder concrete on top of the arches, the girder covering, the plastering, and that part of the external walls between the finished floor and the finished ceiling. The quantities were extended at the prices then current, and the results obtained are as shown in the following table:—

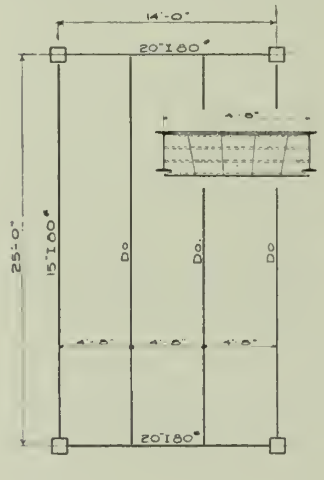


Fig 1

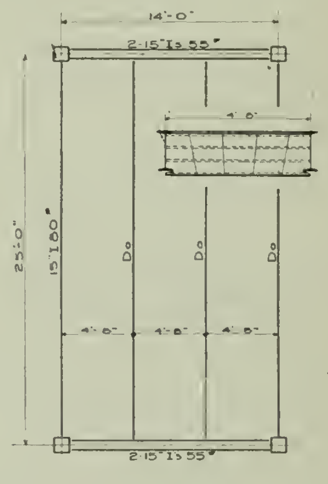


Fig. 2

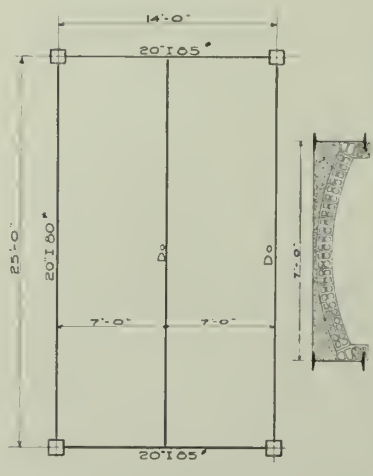


Fig 3.

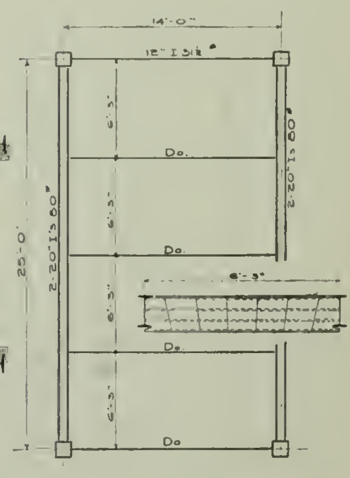


Fig 4.

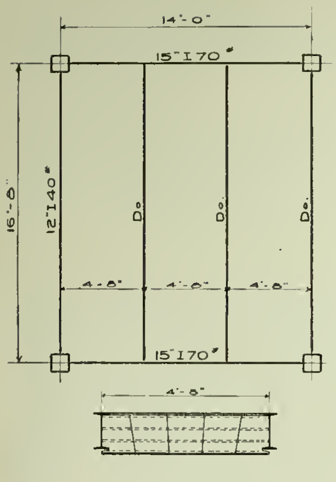


Fig. 5.

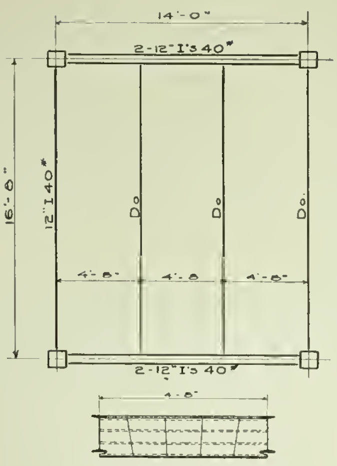


Fig. 6.

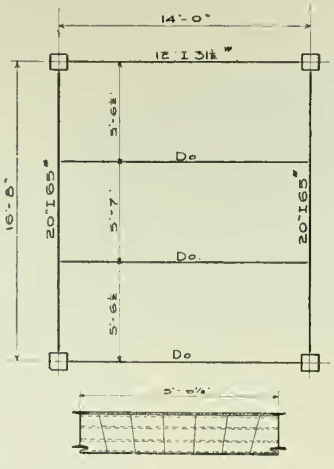


Fig. 7

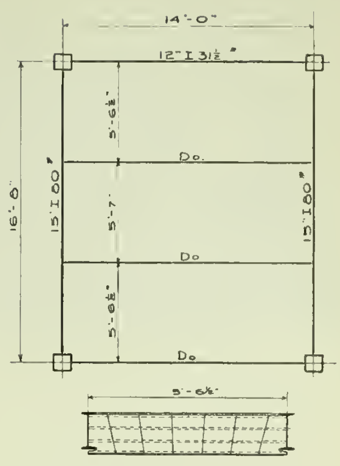


Fig. 8.

	For the scheme shown by fig.								
	1	2	3	4	5	6	7	8	9
Cost per sq ft. of floor.	0.813	0.833	0.733	0.696	0.608	0.619	0.570	0.576	0.617

It may be noted that the cost per square foot of floor in each case where the columns are spaced 25 ft. apart is more than in each case where the columns are spaced closer.

The average rate of cost for the wider spacing of the columns is \$.769, while for the closer it is \$.598, the former being therefore on the average 28 per cent. costlier than the latter.

These results do not take the cost of the columns themselves into account, but that could not materially affect the result, especially in a heavy building such as this was. The total load to carry remains the same. In all but one case the estimate calls for a flat arch 15 ins. or 12 ins. in depth, according to the depth of the beam. In the one exception, that shown in Fig. 3, it calls for a 6 in. segmental arch. The dead weight of these arches as erected, including the weight of all the other elements of the construction, is given in the following table, which also indicates the actual working strength of both the beams and the girders, in each case figured on the usual basis of 16,000 lbs. per square inch ultimate fiber stress. The difference, as shown in each case, is the superimposed live load which each of the beams and girders will carry without straining them above that standard.

For the Scheme Shown by Fig.	Member.	Approximate Dead Load.	Maximum Load Possible with Ultimate Fiber Stress of 16,000 lbs.	Approximate Live Load.
1	Girders . .	92	387	295
	Beams . .	87	388	301
2	Girders . .	92	360	248
	Beams . .	88	404	316
3	Girders . .	84	345	261
	Beams . .	81	357	276
4	Girders . .	80	372	292
	Beams . .	67	340	273
5	Girders . .	75	350	275
	Beams . .	72	368	290
6	Girders . .	76	355	279
	Beams . .	73	396	323
7	Girders . .	73	381	308
	Beams . .	69	351	282
8	Girders . .	73	345	272
	Beams . .	69	351	282
9	Girders . .	75	348	273
	Beams . .	70	379	309

Not only do these alternative plans indicate that a close arrangement of columns is most economical, but it also shows that the arrangement of the beams independent of the spacing of the columns materially affects the cost. The comparison also shows that even the simplest forms of structural iron designing can well afford to be studied. The difference in the cost of the floor per square foot between the plans shown in Figs. 2 and 7 is \$.263, which is nearly 50 per cent. of the cost of the cheaper one. In many buildings this would be 30 per cent. or 35 per cent. of the whole cost of the structural metal work in the building. In buildings even of very simple construction it is often possible to vary the arrangement of the columns in several different ways, every one of which multiplies the possibility of variation in the design of the framing. The chance of desirable or undesirable designing is therefore often greater than it was in this case, where only two arrangements could be considered and much more than is commonly realized.

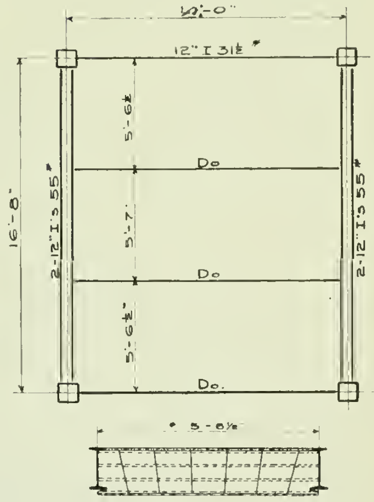


Fig. 9.

THE educational value of an object lesson is not always measured by its cost in dollars and cents. A blaze started on the fifth floor of one of the fire-proof warehouses at the corner of Fulton Street and Elizabeth Place, Brooklyn, on May 8. The flames were confined to the one apartment in which they started, the room containing about seventy-five dollars' worth of furniture. The furniture was burned, but the fire-proof walls and the terra-cotta arches and partitions were not injured a particle. We well remember, in the early days of the Palmer House in Chicago, a statement was made that any room in that then famous hotel could be piled full of furniture soaked in kerosene and set on fire and allowed to burn out without any damage resulting to the building. From our recollection of the methods of fire-proofing in vogue at that time we imagine that that was a defy which, if accepted, might have brought disaster to the building. But in the present state of fire-proofing science, it has been repeatedly demonstrated that the entire contents of the room, in any properly constructed fire-proof building, can be entirely consumed without the slightest harm to the structure of the room.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — The increase in the use of brick for all sorts of building purposes has made the recent disagreements between the manufacturers and their employés a matter of serious import, but these difficulties are now happily ended and they are making brick as fast as possible. In spite of this the active demand has kept prices up to an unusually high figure, which is probably partly accounted for by the rise in prices of all other building materials.

The usual dull summer season has begun, that is, dull in regard to the beginning of new projects of importance, although architects and builders, as a rule, throughout Greater New York are fairly busy. With the settlement of our great rapid transit problems will come undoubtedly a boom in suburban real estate, which also will be vastly helped by the completion of our proposed new bridges. Visitors to the city are invariably surprised at the inability of our traction systems to handle the great crowds who flock to New York to do business, and it would seem upon viewing the great network of trolley lines, to say nothing of the doubling up by the use of elevated railroads, that the only solution will be some sort of flying machines. It remains to be seen what our wise legislators will decide. Just now the Brooklyn members are opposed to any improvements tending to build up the Bronx district, and New York members are set against the improvement of Long Island. While the "doctors are disagreeing" the people are suffering.

Recent experiments have removed the one serious objection to the high building likely to have any weight with the community at large. That one objection was the apparent impossibility of fighting fire in the upper stories. To objections based on hygienic or esthetic reasonings, the public was quite deaf, or rather, they seemed to view them as mistaken. When the fire department maintained, as it did until recently, that it was incapable of dealing with fire more than 125 ft. from the sidewalk, that was another matter, as it invested the high building with possibilities of horror not pleasant to dwell upon. It has lately been demonstrated that protection from fire in these buildings is simply a matter of appliances and that their height has nothing to do with it. The new building code will doubtless require the installation of suitable auxiliary apparatus, approved by the fire department, in all buildings above a certain height, and graded as to sizes according to height, and that will be the end of the matter.

HOUSE AT TUXEDO PARK, N. Y.
T. Henry Randall, Architect.
(See plate form for drawings.)

TERRA-COTTA PEDIMENT FOR THE SOUTH BEND HOTEL BUILDING, SOUTH BEND, IND.
Executed by the American Terra-Cotta and Ceramic Company
Shepley, Rutan & Coolidge, Architects.

The report of the City and Suburban Home Company is interesting as showing the results of an undertaking of considerable proportions in meeting the housing wants of the industrial part of the community. The rates at which the company supplies accommodations are given, and the net results show an earning of 5 per cent. on the capital stock, so that the enterprise has proved not only philanthropic but profitable.

J. T. Williams, architect, has prepared plans for a four-story brick store and office building to be built on West Street, corner of Beach Street; cost, $125,000. Robert Maynicke, architect, has planned an eleven-story office building to be built at 244 Fifth Avenue; cost, $150,000. John H. Duncan, architect, has prepared plans for a five-story brick dwelling to be built on 54th Street, near Fifth Avenue; cost, $48,000. Ernest Flagg, architect, has planned nine six-story brick flats for the New York Fire-proof Tenement Association, 35 Wall Street, New York; the total cost will be $337,500. C. C. Haight, architect, has planned a five-story brick dwelling to be built on 78th Street, East, near Fifth Avenue; cost, $80,000.

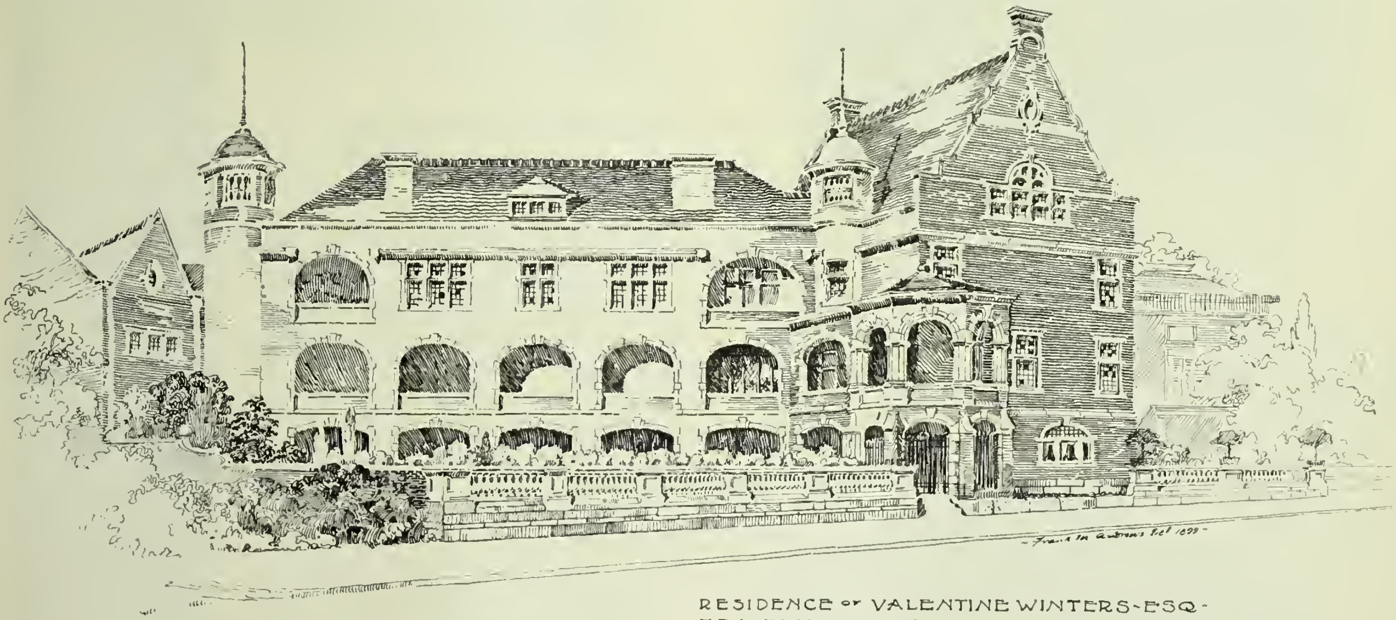
HOUSE AT TUXEDO PARK, N. Y.
T. Henry Randall, Architect.
(See plate form for drawings.)

PHILADELPHIA. — In this city to-day, it is truly said, there need not be an idle draftsman. Not for years has there been so much business in the hands of architects, and in spite of the fact that the number of architects' offices has doubled in the past decade, all are busy. That so many of the younger men have opened offices probably accounts for the dearth of draftsmen to some extent, but with universities and schools training so many for the profession, it has always been dreaded the supply would much overtop the demand.

It naturally follows that builders are very busy, some of them having many million dollars' worth of work in hand.

Amongst the larger operations may be noted the United States Mint, now at the second-story level. In spite of the criticism of one of our legislators, who thought the design too plain for a mint and too ornamental for a jail, it is certainly a credit to the supervising architect's office. The great length of its horizontal lines gives it much dignity. Like much government work, the contract for erection has been given out one piece at a time, the first contractor having put in the foundations, and the present puts the building under roof. Much controversy was raised about the material to be used for the facing; this ended in the selection of granite from the Mt. Desert quarries. The lower story looks well in granite, but it is a question whether that material be the most suitable for the upper story with the pilasters and lighter work that enter into the design.

ADMINISTRATION BUILDING, McLEAN HOSPITAL, WAVERLY, MASS.
Shepley, Rutan & Coolidge, Architects.



RESIDENCE OF VALENTINE WINTERS ESQ – FRANK M. ANDREWS ARCHITECT – DAYTON O

A huge undertaking, said to be entirely in the hands of a contractor and builder, is the rebuilding of the Wanamaker store at 13th and Market Streets. Ten stories high and covering a whole block in the most prominent part of the city, it is much to be regretted that an architect of ability has not been called upon for the design of the shell at least. The design proposed has not been made public, but it may be safely said that the builder's architecture cannot be all that Philadelphia should expect on its principal business site. In the present store may be seen in use an inclined traveling plane for the conveyance of passengers from first to second floors.

BELKNAP HOUSE FOR MEN, McLEAN HOSPITAL, WAVERLY, MASS.
Shepley, Rutan & Coolidge, Architects.

The buildings to be occupied by the Commercial Exhibition, which is to take place in the beginning of autumn, are from designs by Wilson Brothers, architects. They are not to be flimsy, temporary structures, but are of thick, brick walls and steel columns and trusses. The three main wings are intended for permanent use as a commercial museum; the temporary covering of an improved form of staff, guaranteed to stay in good condition for five years, is to be replaced eventually by stone or marble, the Renaissance design to be duplicated.

The finished portion of the University Museums is a delight to the eye of the architect. There is nothing in the design that is trite; one desiring to study the modern use of brick and terra-cotta could not do better than examine it closely.

Edgar V. Seeler has chosen the architecture of the churches of Caen for a guide in designing the exterior of the First Baptist Church just commenced at 17th and Sansom Streets. This design was selected in a competition with some half dozen competitors. The interior promises to be a fine architectural effort, the opportunity for color effects being magnificent. In plan it is a Greek cross, spanned by great semicircular intersecting vaults, the architecture naturally Byzantine.

Another church competition is announced. One might well say, when are we to have an architect sufficiently prominent to be given a church to build without submitting plans in competition? The

TERRA-COTTA DETAIL FOR THE POSNER BUILDING, BALTIMORE, MD.
Executed by the New York Architectural Terra-Cotta Company.
Chas. E. Cassell, Architect.

Wylie Memorial Church on South Broad Street is the latest. The invitation to compete is limited to five firms. The remuneration offered each is so small that it is stated some of the five do not intend to take the risk.

Architects in Philadelphia are rejoiced at the safe recovery from serious illness of one of their foremost men. Mr. Theophilus P. Chandler, who has been employer at one time or other of half the rising generation of architects, is just able to be at his office again after an attack of typhoid fever.

CHICAGO. — Reports of building operations for May show some encouraging increase in their volume as compared with the same month a year ago. While such comparisons by months are apt to mislead, it is clear that there is an increased interest in building on the part of the public, which is making itself felt here in spite of high prices and labor troubles. Chicago has been aptly spoken of as the "storm center" for labor difficulties in the building trades.

TERRA COTTA DETAILS.
Executed by the Indianapolis Terra-Cotta Company.
Edward Van Leyen, Architect.

Two headings in a recent number of the *Construction News* illustrate this: "Abolishing Machines in Stoneyards" and "Labor Unions Enjoined." Under the former heading it is stated that on and after June 1, at the behest of the Chicago Stonecutters' Union, every lathe and plane in every yard in the city and suburbs will be idle until these *fin-de-siècle* reactionists of the old English trades union type learn that instead of making work for more hands by abolishing the machine, they have simply destroyed a large percentage of the demand for cut stone,— turned men now employed out of employment and played into the hands of the brick and terra-cotta makers.

TERRA-COTTA COLUMN FOR THE SLATER HOUSE, NEWPORT, R. I.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Peabody & Stearns, Architects.

Of late years the cheapness of Indiana limestone or "buff Bedford," as it is commonly called here, no matter where quarried, has, together with improved machinery for sawing, surfacing, molding, and turning, made it possible to erect sham stone buildings, common brick building veneered with 6 ins. or even less of machine-dressed ashlar, for less than the cost of first-class brickwork. These soon turn a dark color, wholly lacking in warmth or richness, a sad, cold, neutral gray, even in the outlying districts where the atmosphere is comparatively clear. For this reason an increase in the cost of cut stone is not altogether a misfortune from the architect's standpoint.

The Winslow Brothers Company, the well-known manufacturers of architectural iron and bronze work, have recently, through a decision made by Judge Holdom, enjoined the Building Trades Council, the Architectural Iron Workers' Union, and several individual members thereof, from interfering by acts of violence, threats, intimidation, or physical force, with the reconstruction of their Lakeside building, and other work of the complainant company.

This is the first injunction ever secured against the Building Trades Council, and while the company failed to secure all that it asked for in its bill, they feel that they have gained a substantial victory. Their success will certainly encourage other sufferers from the arrogance and lawless interference of the Council to seek similar relief through the courts. While the possible abuses of "government by injunction" are certainly great, it seems the only available remedy in such cases as this.

Among recently projected structures of importance is a new building for the Chicago hospital, and a large apartment house on Grand Boulevard. The hospital is to be erected on 51st Street, near Cottage Grove Avenue, and will be one of the largest and most completely equipped private hospitals in the United States. The plan consists of a hexagonal rotunda or central pavilion, with a large portico in front and five radial wings, each over 125 ft. long. The construction is to be fire-proof and the exterior walls will be finished in brick and terra-cotta. The roof will be of tile. The central rotunda, which is to be five stories high, is to be vaulted below the fourth floor and supported on marble columns at the angles of the hexagon, with a gallery intervening at the third floor. A new feature of the interior finish in addition to mosaic, marble, cement, and tile will be the use of aluminum for doors in the operating rooms. The dining room will be on the fifth floor of the central pavilion and will be reached by two electric elevators. This room will have a

KEY, MAIN ENTRANCE, BROAD STREET NATIONAL BANK, TRENTON, N. J.
Executed in mottled gray terra-cotta by the Excelsior Terra-Cotta Company.
William A. Poland, Architect.

domed ceiling corresponding with the exterior. This utilization of a central dome is a rather unusual and certainly admirable idea. The proposed cost is about $200,000, and the architects are Messrs. Barfield and Hubbell. Wilson & Marshall have let contracts for the erection of two apartment buildings, to be known as "The Mansions," on Grand Boulevard, near 38th Street. The proposed cost is about $175,000, and the general plan is a symmetrical front court scheme, quite elaborately carried out in Gothic, with brick and stone exterior walls and steep, picturesque, red-tiled roofs. The court will be adorned with a fountain and enclosed with an elaborate iron fence and gates. There will be sixty-four apartments of from four to eight rooms, and special care has been given to thoroughly subdivide the building by fire walls.

ST. LOUIS. — An event of no small moment was the recent exhibition of the St. Louis Architectural Club, which closed on May 8. It was the second attempt of the club to hold an exhibition of magnitude, and the results have been very gratifying, especially on account of the short time following the Chicago exhibition in which to hang the drawings. The interest shown in the exhibition will doubtless encourage the club in holding similar ones. As most of the drawings have been on exhibition in the various cities and have been commented upon, it would be useless to attempt anything of the kind here. The tendency of the architecture of the different cities to reflect the distinctive characteristics of its people is strikingly manifest. This fact is pointed out clearly in an article in the recently issued catalogue of the Boston Architectural Association, and is favorably received as an indication of more serious thought and study, which may eventually give us a style of architecture of our own. There is no doubt that these exhibitions are productive of much good and should have the hearty support of all interested in the architecture of the country.

Considerable interest has been taken by the architects and builders in an effort to get a capable man appointed as building commissioner. For some years the office has been practically a dead letter, and, although St. Louis has a good building law, very few of its provisions have been enforced, and, as a consequence, the unscrupulous builder and investor have gone on unchecked.

The architects have met with disappointment in their efforts to have a bill passed by the last legislature requiring architects practising in the State to have a license.

Real estate has been very active during the spring, especially in down-town districts, and much of the trading is done with a view to improving. Washington Avenue continues to be the center of attraction, although important transactions have taken place throughout the business district, where large improvements are contemplated. Most of the architects are busy and all feel encouraged. The sudden increase in prices, together with the uncertainty as to the location of the site of the coming World's Fair, has doubtless been the cause of more or less work being held back, but this can only be for a short time. There seems to be little if any cause for anxiety about labor troubles this season, as every one seems to be well satisfied with the outlook. It is rumored that Eames & Young have the Federal prison to be built by the government in Georgia.

The city has at last decided to go ahead with the new city hospital, and an ordinance has been introduced into the municipal assembly to that effect. The City Hospital Commission made their report and submitted plans two or three years ago, but the city has been unable to commence work on account of the lack of funds. The hospital will be built on the pavilion plan on the site of the old building destroyed by the cyclone three years ago.

CURRENT ITEMS OF INTEREST.

The Grueby Faience Company have been awarded the contract for finishing with dull-surfaced enameled tiling the interior of the May Memorial Chapel, Rose Hill Cemetery, Chicago; J. L. Silsbee, architect.

The Williams Patent Crusher and Pulverizer Company are installing a No. 3 pulverizer — their largest size — at Dennings Point Brick Company, Fishkill, N. Y., for grinding bats and sand; also a No. 2 pulverizer at I. B. Stiles & Son, North Haven, Conn., for grinding bats and coal. These pulverizers are particularly adapted for the use of manufacturers desiring to powder their bats for dryer and sand.

PEDIMENT PANEL 20TH WARD SCHOOL, PITTSBURGH, PA.
Executed by the Northwestern Terra-Cotta Company.
C. M. Bartberger, Architect.

The Robert Aitchison Perforated Metal Company announce that they have added to their already large complement of dies a very complete assortment of slotted oblong sizes suited for clay screens.

UNION PASSENGER STATION, OMAHA, NEB.
Walker & Kimball, Architects.
Roofed with Ludowici Roofing Tile.

BURGY & McNEILL announce that they are putting on the market a new wall tie which has the favorable indorsement of 90 per cent. of the architects in Pittsburgh. Samples of same will be sent to all applicants.

J. C. EWART & Co. are furnishing their Akron Roofing Tile for the following buildings: a large carriage house on the Elkins estate, near Philadelphia; a block in Chicago (vitrified flat tile); also for the Williams residence in Columbus, Ohio.

THE C. P. MERWIN BRICK COMPANY, Berlin, Conn., are furnishing, through the Central New England Brick Company, the hollow brick for a library at New Britain, Conn., Davis & Brooks, architects: also for the Segel Block, Boston; and a school building at Worcester.

WE are in receipt of a small booklet from the Clinton Metallic Paint Company discussing the requirements of a really good roof cement. The company claim that their silk fiber cement possesses all the requisite qualities of such an article, and offer to send a sample pail to any party interested in using a good roofing cement.

ON May 24 a change was made in the firm of Fiske, Homes & Co., managers of the Boston Fire Brick Company, by the retirement from the concern of Mr. William Homes. The business is now conducted under the title of Fiske & Co., composed of George M. Fiske and L. Parker B. Fiske. The company will continue to handle the same general lines of burnt clay products.

THE following list comprises a few of the buildings recently equipped with the Bolles Revolving Sash: Passaic Bank, Passaic, N. J.; a residence at 7 W. 72d Street, New York City; a residence at Park Avenue and 67th Street, New York City; the Chemistry Building, Smith College, Northampton, Mass.: the Camden High School, Camden, N. J.; Schools No. 28 and No. 9, Buffalo, N. Y.: School No. 17, Jersey City; school at Plainfield, N. J.: New York and New Jersey Telephone Building, Newark, N. J.

ANDREW RAMSEY, lessee of the Mt. Savage Enameled Brick Company, has secured the contract to furnish the enameled brick for McMullen Brothers' store at Cumberland, Md., J. S. Seibert, architect. The building, as estimated, will cost about $150,000. Façade is to be of white enameled brick with brown enameled molded brick trimmings. This is the third store front in their vicinity for which this company have furnished the enameled brick.

MERCHANT & Co., INC., of Philadelphia, New York, and Chicago, report a heavy increase in tin and Babbitt metal business. They have recently taken, among numerous others, a carload order for Babbitt metal from a large Western machinery manufacturing company, the shipment consisting of an assortment of grades. This order was placed after an exhaustive list of samples from a number of manufacturers. This company has been manufacturing all grades of this metal for a quarter of a century, and their present large business in this line is a fitting tribute to their thorough experience and reliability in its manufacture.

THE WHITE BRICK AND TERRA-COTTA COMPANY have secured contracts to furnish the architectural terra-cotta for the following buildings: apartments 83d Street and West End Avenue, architect, Henry Anderson; apartments 138th Street and Third Avenue, architect, Harry T. Howell: club house, Yonkers, N. Y., architect, A. F. Leicht: terrace wall, Great Neck, L. I., architects, Little & O'Connor; apartments 107th Street and Columbus Avenue, architect, Samuel Sass; Battery Park Building, State and Pearl Streets, architects, Clinton & Russell; apartments 129th Street and Eighth Avenue, architect, Henry Anderson.

THOMAS B. FREEMAN, Pittsburgh, has moved from the Carnegie Building to larger quarters in the Smith Building. Mr. Freeman has for a number of years been identified with the building material business in Pittsburgh as a dealer in high-grade clay products. In his new offices he has increased facilities for promptly conducting business, and a better opportunity to display to advantage samples of the various lines which he handles. His specialties are face brick, architectural terra-cotta, enameled brick, floor tiling, wall ties, etc.; also the product of the Mosaic Tile Company, of Zanesville, Ohio.

FIGURE FOR RITTENHOUSE APARTMENTS, PHILADELPHIA.
Executed in terra-cotta by the Perth Amboy Terra-Cotta Company.
Willis G. Hale, Architect.

VOL. 8 NO. 7

THE BRICKBVILDER

JULY 1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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LAST year we were able to present to the readers of THE BRICKBUILDER a very interesting series of articles describing and illustrating designs for a brick dwelling costing in the neighborhood of ten thousand dollars, the contributions coming from some of our best known architects. With this number we begin another similar series, having to do in this case with a village church to cost fifty thousand dollars. It has ever been our belief that the best way to encourage good architecture is to create it, even if only on paper, and as we a e convinced of the possibilities of brick, we feel we cannot do a better service for our readers or for the profession of architecture than to call out such thoroughly good designs and commendable arrangements as we believe this series will present.

There used to be a saying that it was a poor artist who would complain of his tools. As a corollary of this proposition it might almost be stated that when an artist complains of his material the fault is in the artist rather than in the medium. It has been demonstrated over and over again through the last twenty o more centuries that noble, impressive works of architecture can be produced with combinations of burnt clay as a basic material, and especially do we find in the past successful churches of this material. It goes without saying that all churches constructed of burnt clay are not successful, and yet the brick and terra-cotta architecture of North Italy, as well as the early Renaissance work from which Mr. Sturgis has drawn, and also certain manifestations of historic art since the fifteenth century, have been so truly in the line of genuine creation that it is not fair to deny the possibilities of brick for the most sacred edifice. A difficulty which we have not yet succeeded in growing beyond is the constant tendency to design our buildings without specific reference to any one material and then to select the medium arbitrarily after the whole design is practically settled upon. Hence it comes that in many of the illustrations of current work it is often difficult to tell whether the design is to be worked out in stone, terra-cotta, or even cast iron. Our hope in presenting this series of typical designs is to aid in the evolution of a proper treatment of what we consider to be one of the most adaptable materials which man has been able to wrest from the hand of nature, and it is our hope that the designs that we shall thus call forth will show the directions in which the study of burnt-clay work can to advantage be carried.

THE past two months have witnessed a most extraordinary advance in the price of structural steel work of every description. Rolled shapes have advanced something over $15 a ton and plates have gone up even more, while as some of the mills adopted the policy of curtailing the output, there has resulted an approximation of famine for some forms, and as a consequence the cost of building has been very materially increased. We recall one building at this moment, which was figured the latter part of last month, on which the advance in steel before any award of the contract could be made was sufficient to cause an increase in price of something like $25,000. Development in building construction naturally tends to follow the path of least resistance, and it would not, therefore, be at all surprising if this large increase in the cost of iron should have the effect to very strongly develop those constructions which are independent of metal supports. We have grown so accustomed of late years to steel skeleton construction that we are apt to lose sight of the fact that it is perfectly possible to construct a building, or at least construct many types of building, without using a steel beam or steel column; and now that prices of structural metal are touching the limit of prohibition it may be a good time to see if we cannot improve our brick and terra-cotta construction, perhaps going back to the processes in use when our constructions were more scientifically fire-proof if less knowing than they are now. Surely iron can never be seriously considered a fire-proof material, and a great deal of the terra-cotta and brick which goes into a modern structure is used simply as a protection for what in one sense we would term the weaker material. The path of least resistance and the minimizing of our vertical supports have led us into our present by no means rational constructions. One has only to recall the vast spaces which were enclosed by buildings during the late Roman period to appreciate that our dependence upon iron is not a necessary one.

There is no question about the possibility of improvement in the methods of using brick and terra-cotta for the structural portions of a building. We have not yet reached the ideal application, and it is quite likely that the fact that iron has been so cheap, so handy, and can be used with so little thought has contributed quite materially to our ready acceptance of the forms of brick and terra cotta constructions which, now that steel is becoming so expensive, we might be very glad to modify. We should be glad to see the attempt made to construct a building entirely of burnt clay, omitting steel columns and beams entirely. We are apt to think of an all masonry structure as being necessarily heavy and unsuited to modern needs, and yet there never was in the whole past history of the world a lighter, more open construction than that which prevailed during the height of the Gothic development, when the supporting members were reduced to an extreme minimum, and large spaces were vaulted with a daring and skill which we should be glad to see imitated in our day. If the rise in steel has a result of developing the possibilities which lie dormant within our reach, it will have been worth while for our constructors to have paid the high prices which are now prevailing, for while undoubtedly the prices will go back to somewhere near the quotations of a year ago, the right kind of thought expended upon brick and terra-cotta construction will be sure to bring out possibilities which will enable our buildings to be lighter, better built, and more thoroughly fire proof.

THE Department of Architecture of Harvard University, though among the youngest of the schools of architecture in this country, promises to take a high rank in its relative endowments. This department was begun only about five years ago. There had been an assistant professorship of architecture in Harvard College for many years, and the lectures which were delivered by Prof. Charles Eliot Norton and Prof. C. H. Moore were of the highest character, but the purely architectural work, by which we mean the work intended to fit students to become architects rather then mere dilettanti, is of more recent date. For the first three or four years the Department was supported almost entirely by private contributors, of whom the best known to the profession was the late Mr. Arthur Rotch, he giving very freely both of money and time to the needs of the Department, and with Mr. Robert S. Peabody taking a very active share in the counsels which have given this school its peculiar character. This year the Department has received two very decided marks of success. The first was the endowment of a traveling scholarship, to be awarded under the direction of the professor of architecture, the annual money value of the prize being one thousand dollars. Following this comes the more recent announcement that some one, who does not wish his name to appear, has given two hundred thousand dollars to the University for the use of the architectural department, one half of which is to be used for the construction of a building. This structure is to be located between Quincy Street and the Fogg Art Museum, and it affords an opportunity which it is hoped Harvard will not neglect of adding to the only too few really good examples of architecture which are possessed by the University.

STUDENT work is always interesting. The enthusiasm which forms so important an element of all college work and which crops out so artlessly in some of the designs which our ambitious, aspiring, prospective architects labor over so seriously, all has a charm for even the most hackneyed practitioner. It is interesting to see how the young men do it now, and to wonder how we might have done it ourselves. And when the work is, on the whole, of as really high grade of excellence as is shown by the Year Book of the School of Architecture of the University of Pennsylvania, we can quite sympathize with the Philadelphians in their pride of this institution. The Year Book is a volume of eighty pages, strongly suggestive of the annual exhibition catalogue, even to the extent of the advertisements, but showing in its fifty or more illustrations that the University is doing serious work and that it comes under the kind of direction which ought to be of the highest value to the students who profit thereby.

MISCELLANEOUS.

THE Hearst bill recently passed by the Illinois Legislature, creating an art commission for the city of Chicago, provides that, "hereafter no work of art shall become the property of the city by purchase, gift or otherwise unless such work of art, or a design of the same, together with a statement of the proposed location of such work of art, shall first have been submitted to and approved, by the commission, nor shall such work of art, until so approved, be erected or placed in or upon, or allowed to extend over or upon any street, avenue, square, common, municipal building, or other place belonging to such city, or any park, boulevard, or public ground situated within the limits of such city. The commission may, when it deems proper, also require a complete model of the proposed work of art to be submitted. The term 'work of art,' as used in this connection, shall apply to and include paintings, mural decorations, stained glass, bas-reliefs, or other sculptures, ornaments, fountains, images, or other structures of a permanent character intended for ornament or commemoration. The term 'municipal building,' as used in this connection, shall include all public schools, and all buildings or portions thereof, and all grounds used for school purposes in such city."

The commission is to consist of the mayor, the president of the Art Institute, the presidents of the Park Boards, and three members to be named by the mayor. One of the three appointees must be an architect, one a sculptor, and one a painter. The mayor has selected respectively for these three appointments, W. L. B. Jenney, Lorado Taft, and Ralph Clarkson.

THE following suggestions were contained in the recently rendered report of the Tenement House Committee of the Charity Organizations of New York City, of which Messrs. George B. Post and Ernest Flagg are members: that there be a minimum size for living rooms; that there shall be light shafts at least 6 ft. wide; that there shall be one bath room for at least every twenty families; that the height of tenement houses shall not exceed six stories, and that playgrounds shall be provided on the roof, being made safe by carrying up the exterior walls 3½ ft.

In their communication referring to the present law the committee says: —

"It is the opinion of those whose daily occupation brings them into direct personal contact with the people living in tenement houses, and whose work takes them into these buildings every day, that the buildings erected under the present laws are in many respects much worse than the old buildings erected thirty years ago." The problem which the committee seeks to solve is how to build on the ordinary city lot so as to secure fair income to the investment, and provide healthful conditions for tenants.

STATISTICS for the six months ending June 30 indicate that the building operations of 1899 will be considerably in excess of the operations of 1898, although the rate of increase may not be as high during the latter half of the year as it was during the first six months. The official statistics from the building departments of twenty leading cities show that the operations were over one third greater during the first half of 1899 than for the same period of 1898. The total expenditure for buildings in these cities during the first six months of this year were $135,649,484 as against $98,660,254 for 1898, an increase of nearly $37,000,000, or 37.4 per cent. The comparative figures for the first six months of 1899 and 1898 are given in the following table: —

	1899		1898		Per Cent.	
	No.	Cost.	No.	Cost.	Gain.	Loss.
New York (Boroughs of Manhattan and Bronx)	4,565	$71,370,870	2,787	$42,962,519	66	....
Borough of Brooklyn	3,724	12,830,985	3,006	7,891,290	63	....
Chicago	2,118	11,865,260	2,082	10,152,800	17	....
Philadelphia	4,026	10,420,430	3,997	12,167,470	....	14
St. Louis	1,150	4,195,295	1,387	4,373,122	....	4
Washington	1,385	3,505,363	1,086	2,425,311	45	....
Cleveland	1,490	2,918,270	1,491	1,665,777	75	....
Pittsburgh	1,054	2,908,720	747	2,683,736	8	...
Detroit	1,183	2,090,700	1,076	1,938,100	8	....
Milwaukee	756	1,961,298	615	1,469,971	33	....
Kansas City	1,806	1,904,780	1,458	1,264,100	51	....
Buffalo	813	1,616,497	950	2,344,299	....	31
Minneapolis	1,720	1,512,131	1,433	1,231,275	23	....
Los Angeles	875	1,119,537	755	1,034,651	8	....
Cincinnati	1,140	1,112,124	964	1,220,315	....	9
New Orleans	864	987,210	754	680,760	45	....
St Paul	542	797,538	495	509,341	57	....
Louisville	2,263	791,527	1,033	821,508	....	4
Toledo	....	765,530	....	465,655	64	....
Allegheny	362	571,125	319	572,625	....	....
Omaha	410	404,294	530	784,623	....	48
Totals for twenty cities		$135,649.484		$98,660,254	Inc. 37.4 p. c.	

— *Construction News.*

·MONTEVENTOSO·

by BERTRAM·G·GOODHUE

IT is but a poor place, this Monteventoso, and scarce worth discovering, after all's said and done. Were it not that Italy has been so ransacked within the past seventy-five years without even a stray mention of the town finding its way into Murray or Baedeker, I should scarcely dare to notice it here. The railway from Bologna to Pistoja passes within a few miles of it, and but for a promontory of crag and cliff it would be plainly visible to the bicyclist pedaling the highway between Pievepelago and Cutigliano.

It is quite possible, though, that I am quite in the wrong, and my discovery will turn out to be well known to the *cognoscenti* in Italian travel merely as a place of very meager interest in a region so rich in historical tradition and monuments of art as is Emilia, furthermore one to be avoided as cold and uncomfortable in the matter of the hospitality dispensed at its inns, while its edifices are despised of architects as not only vastly excelled in every particular, but almost exactly paralleled by other far more famous and accessible cities. No — despite the announcement that in Monteventoso were to be found "notable" buildings, the author must beg leave to deny any responsibility for the statement.

It would be difficult, indeed, to point out in what particular the buildings of Monteventoso possess this quality of notability. To be sure, antiquity is theirs, and to most Americans antiquity makes largely for "notability," while about the old shadowy streets and glittering roofs and towers is crystallized enough legendry to equip a dozen of our States. Centuries of bloody history and clusters of hoary tradition are very pretty things in their way, but architecture is almost an exact science, a thing of scale and plumb-line; hence it is not to be wondered at if Monteventoso has received but scant consideration from those who have given us the whole history of architecture in a neat octavo volume.

Still, it is curious that the town has escaped the archeologist, for it is certainly rich in late Roman remains. Everywhere are to be espied fragments of this period. They seem to have been especially popular as quoins during the Middle Ages, while the columns and frieze of the chapel porch of the church of Santa Caterina once, so they say, formed part of the ancient temple of Boreas; and, too, the road and causeway leading down from the town, over the little river which skirts the base of the eminence, and thence out across the level plain towards Modena, bear less interesting but no less distinct traces of the heavy hand of the one-time mistress of the world. Yes, the archeologist, he who has picked, dug, or hammered his way over the land with such remarkable results, might here make a number of quite stupid discoveries, I feel sure. For instance, the author is no archeologist, but there is an archway constructed by Gian Galeazzo Visconti in 1398, almost entirely of classic fragments, at the foot of the hill at the intersection of the Roman way and the more modern Strada Maestra, and despite my very halting Latin I am quite certain that on one of its stones — the center one in the right-hand pedestal as you enter the town — is an inscription to the effect that here Marcus Brutus erected a column commemorating the loyal devotion of the inhabitants to his cause in the year 78. Then there is the strange, artificial, and doubtless funereally intended cavern above the town, now called the Grotto of Egeria, in which a more practised eye than mine might see signs of genuine Etruscan handiwork.

But, after all, these are but surmises, and even if correct, quite foreign to the purpose of this paper. Enough classic work remains to prove that Monteventoso was as unknown in the days of Alaric and Attila as it is now, and it would be pathetic indeed if, after all the centuries of repose from invasion it has enjoyed, it should at this late day fall a victim to some devastating modern Goth, one who would pick the old fragments from their long-accustomed homes, filling their places with brand-new brick and stucco, simply and solely that his name might appear "writ small" in some museum catalogue.

As elsewhere, all the life and most of the interest of the town center about the *piazza*, in spite of the fact that the principal structure, the church of St. Catherine, is perched on the hillside some little distance above. Charlemagne is currently reported to have assisted at the pious work of beginning this church, even to the extent of relaxing his regal attitude and stiffening his regal muscles sufficiently to lay the corner-stone with his own regal hands. If you demand proof of this occurrence, it is before your eyes in one of the clearstory windows; to be sure, this glass cannot be earlier than the close of the fourteenth century, but tut! in matters of this kind one shouldn't be too particular, and what suffices for the excellent old *prete* and simple townsfolk ought to be enough to quell our doubts as well.

The church of Santa Caterina (da Alessandria) served at one period of the past as a cathedral, and even to-day is often so termed by the inhabitants, though its last bishop was deposed nearly two centuries ago, and now its services are far from magnificent, conducted as they are by one poor priest with two attendant acolytes, one of whom is a lame lad and the other, when not robed in shabby red and dubious white lace, spends his time officiating as a sort of half sacristan, half gardener. With the dawn of modernism, with "United Italy," with shearing from the Holy Father all his temporal dignities, has come a forgetfulness on the part of the people of the dark, dusty old church high above them, and the contrast of an evening of the two quarters, the secular and the religious, is marked indeed. You have but to leave the *tavola rotonda* of your hotel —

the Albergo della Ruota is the better of the two barely tolerable ones — and step out into the Piazza Re Umberto, to find yourself in the midst of a very fair, though, of course, highly provincial imitation of Milan, and even of Rome. Up and down parade a throng of citizens: portly shopkeepers with their beetle-browed wives, stray soldiers having somewhat the appearance of banditti turned Knights of Pythias, sad-looking, nondescript individuals seated about the café tables; the *élite* of the town for the most part, with long names, but with purses barely long enough to purchase them the little glasses of vermouth or *aperatif* they so delight in; a band, perhaps, if it chance to be the evening of a *festa*, the strains of whose music are nearly obliterated by the screaming of innumerable children and barking of still more numerous dogs. But walk to one corner, mount the little *Contrada degli Avvellenatori* all twists, turns, and steps. In a few moments these will bring you to a region very different from the one you lately left. The blue-black shadows are but semi-occasionally troubled by lamp brackets, and it is only rarely that you meet people, strange, skulking, and noiseless, who creep eerily from black blot to black blot, creatures of the night you think, but who turn out to be only a half dozen or so poor old women on their way to deposit at the church the few *centesimi* they have managed to save during the week. God, who alone knows how, will assuredly reward them. At last, after a particularly toilsome flight of tortuous, time-worn steps, you come out into the little "Giardino Pubblico," an absurd appellation, since it contains only a few scrawny and stunted trees and wind-swept plants. Across this "garden" rises the dim façade of the church of St. Catherine, its rose window, in the form of an immense wheel in allusion to the legend of the saint's martyrdom, glimmering faintly from the few flambeaux within, and from its open doors coming the sound of a droning Gregorian, cut short every now and again by sharp gusts of the eternal winds from which the town derives its name. The unknown architect of the church evidently considered this blast a not-to-be-despised enemy when he constructed his thin but massive companile and abutments, both of which appear the more enormous when contrasted with the delicate detail of the church itself.

On the façade are many figures, in marble and pale gray terra-cotta, of different degrees of merit, from the veritable marvels of grace and action by Begarelli and Zarabaja, back to the crude and amusing but interesting early Lombard attempts to portray the "human form divine." The townsfolk, aided and abetted it is to be feared by the priest, with little reverence for mere antiquity, have not scrupled to remove the earlier and poorer of these figures to the *museo lapidario* in the library below, filling their places with smart, new, attitudinizing ladies and gentlemen in glaring white marble from the sculptors' shops of Carrara, Modena, or Pistoja. *Sic transit*, etc., though doubtless the venerable gray worthies of old time, Gervasius and Protasius, Nazarius and Celsus, even good Ambrosius of Milan himself, now find themselves far more comfortably situated among their Etruscan and Roman countrymen in the museum than they ever were huddled back in their niches of Santa Caterina to escape the bleak mountain winds.

Though there is considerable of note in and about the church, little of it is sketchable. The crypt or *'scurolo*, as it is called, seems sufficiently ancient to give color to the Charlemagne legend, and its fading and ruinous frescoes are well worth examining closely with the aid of the torch supplied you by the sacristan for a *soldo*. This crypt is but a few steps below the level of the nave, the chancel being raised as at Modena, from which it is probably copied.

In the treasury — the third floor back room of the sacristan's house — are a number of relics of Gothic and Lombard times, a manuscript *sacramentum* given to the then bishop of Monteventoso, by Queen Theodolinda, a beautifully wrought *pale* or altar front of gold, silver, uncut gems, and enamel, worthy to rank with the best extant work of the kind but by an utterly unknown artist, an *ostensorium* accredited to Cellini,— scarcely important enough to have come from his hand, it is more probably the work of some one of his imitators,— beside many less noteworthy objects, badly shattered diptychs, Renaissance candelabra, and the like.

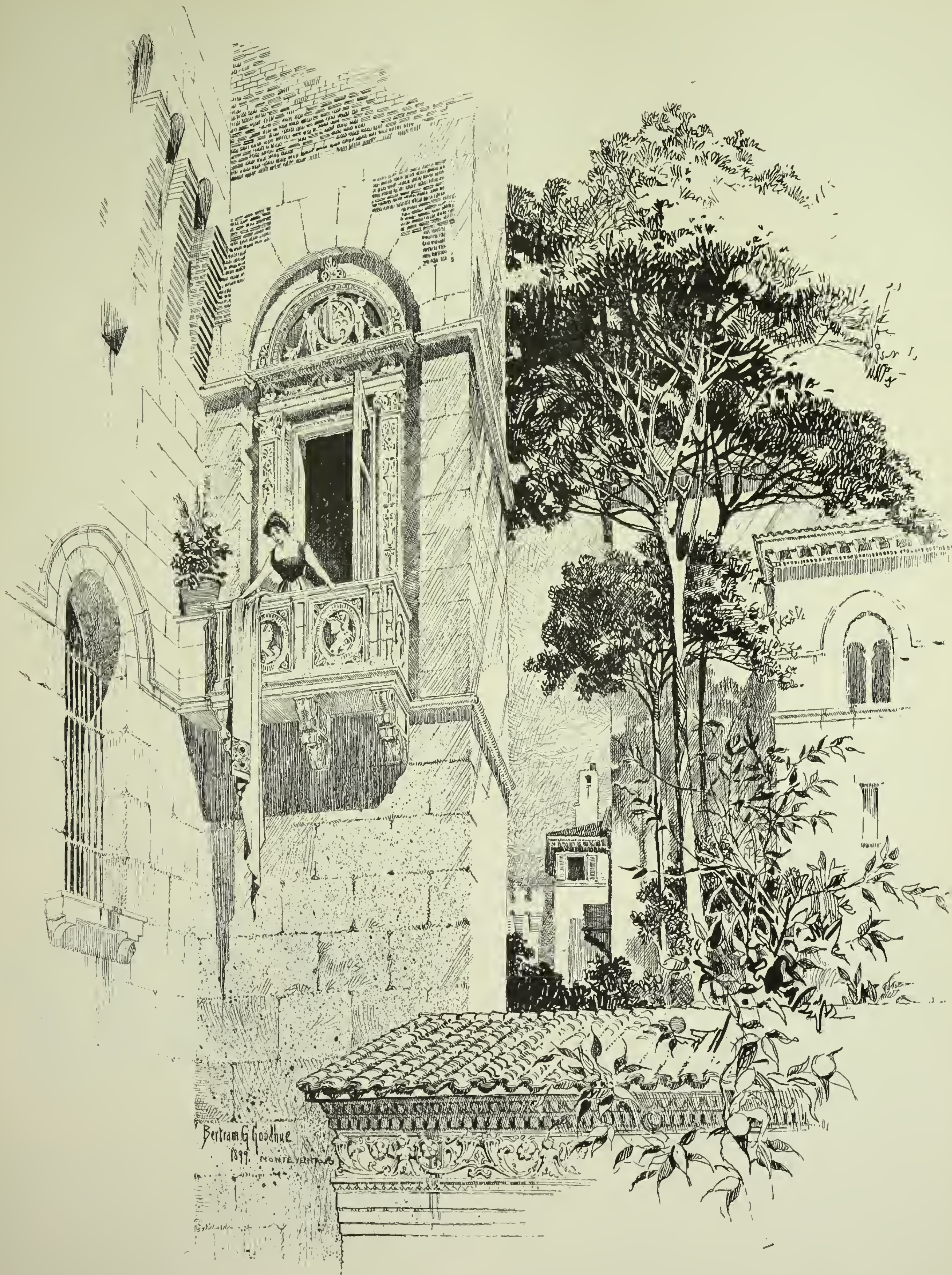
The old priest is deeply interested in the welfare of his flock, on the material rather than the spiritual side it seemed to me, and frankly and most volubly regrets that he is not permitted, for a consideration, to part with such articles appertaining to his church as possess an intrinsic and not miraculous value. The money obtainable in this way might be put to good use in the most practical of fashions; for instance, the sacristy and chapels needed retiling badly. Had not Matteo Ghitti, the roofer, so informed him? And beside, if the frescoes of the choir (by Lionello Spada and dated 1597) could only be touched up in cheerful colors by his friend, Luigi Moncalvo, the artist in the Borgo della Montagna, how much more honor would redound to the church, and, a natural sequence in the priestly brain, how the wealthy *forestieri* would flock to poor old Monteventoso! Alas! Even clericalism has been tinged by the prevailing spirit.

No, after all, if one is to become acquainted with the place it is best not to waste time poring about the dingy old church, but rather by returning to the *piazza*, its musical and unmusical sounds, its clamoring people, its miserable bronze Umberto, and rickety iron café tables. Even here, if one happens to be architect, artist, sculptor, or poet, and few sojourners in Italy escape a touch of one or all of these things after a little (I have known a Kansas City wheat-broker to turn connoisseur on a three weeks' stay and begin a mad career after extremely dubious old masters on his return to his native heath), he will grow weary of the throng and let his eye rove above the heads of the people to where the tops of the old buildings meet the sky. Among these are the library and museum of Gian Galeazzo Visconti, a large edifice in the Lombard style, in brick and terra-cotta, with the arched heads of its openings pointed for the most part, but with a curious admixture of Florentine influence, especially in the heavy, rather forbidding ground-story walls and in the cornice, which, although of terra-cotta, and consequently much lighter in effect, recalls that of the Palazzo Riccardi, so familiar to us all and so frequently in evidence now-a-days,— a mere streak at the top of some sky-scraping office building in the United States of North America. The open upper story of this building, formerly frequented by the young lords with their *bravi* as affording excellent space for fencing and tennis, has been with a commendable spirit of economy ("United Italy" again) leased to a well-to-do peasant for the raising of silk-worms and storage of acorns and chestnuts. Near the library, but on another side of the *piazza*, towers the old palace of the Signori Scogli, now converted into offices for the administration of the local government, its machicolated battlements seeming to frown down their present degradation and the *torricella* of Count Ercole, to climb up, away, anywhere to escape its fate and to forget that in its lower stories, once the haunt of valiant men-at-arms and graceful pages, a few crabbed notaries are snoring away their office hours.

Listen to the faithful chronicler's account of but one episode in the dark past of the palace which occurred about the end of the fourteenth century. I translate freely: "My gentle lord, the young, beautiful, and brave Count Ascanio, in the course of a secret mission to Perugia, had occasion to sup at the house of the Signori Baglioni. Before the company were seated it fell about that my lord's eyes met those of Narcisa, the fair daughter of his host. Now with the gentle family of the Scogli to think is to act, and finding himself on the instant madly enamoured, he begged her to pace with him the walks of her father's garden, meanwhile dispatching his page to see to it that faithful and valiant servitors should station themselves in all quietness near the enclosure wall. Now it chanced that the Baglioni were intending to mingle *acqua tofana* with the wine served their guest, and they liked not well to see the lady Narcisa pass into the darkness of the gardens with my young lord. In and about the moonlit glades and deep shadows they wandered, until they had neared the wall at the farther side. Here my lord, quickly covering the lady's mouth with his mantle that her cries might not be heard, mounted the walls with her and departed. Before the stupid Perugians could recover from their astonishment sufficiently to mount and after,

THE CAMPANILE OF SANTA CATERINA, FROM THE PIAZZA.

THE PIAZZA UMBERTO AND TOWER OF COUNT ERCOLE.



NARCISA'S BALCONY.

my lord was safe from their pursuit, and though they were insolent enough to come under the very walls of our beloved city of Monteventoso, yet my lord's retainers soon sent those that remained at the end of the day back to their foul home. But woe to the gentle and heroic house of Scogli! The lady Narcisa had accompanied my lord most unwillingly; finding resistance in vain, she had seemed to acquiesce, but on my lord's arrival, she had requested a confessor and from him had obtained a weapon, none knows how, but in all likelihood by some sweet sorcery, for she had associated from her youth with witches. That night, as my lord held converse with her in her chamber, she stabbed him to the heart, and tearing his blood-stained doublet into little strips, made for herself a rope with which she let herself descend into the arms of the rascally priest, whom she had so enchanted that he, at her command, had stationed himself below her balcony. Yet not long did the evil deed go unrewarded, for within the hour my lord's death was discovered, the lady caught in the priest's arms, and the two righteously slain before the door of the cathedral."[1] The window and balcony in the *torricella* from which the lady descended after her deed of violence are still pointed out and, besides their association with the tale, are of some architectural interest. In the panels of the balcony are glazed terra-cotta relief medallions of three of "gentle" young Ascanio's forbears, while within the very room in which he breathed his last broken and blood-choked breath hangs a beautiful profile portrait by Piero della Francesca, supposed to be that of Ascanio's unwilling but scarcely virtuous lady love.

However Monteventoso may have escaped devastation at the hands of enemies, Visigothic or Umbrian, it certainly bore its little part honorably or dishonorably during the strifes of the two great factions, and the presence everywhere of the forked battlement testifies to its loyal and constant sympathy with the Ghibellines. The ferocious Ezzelino Romano, the "scourge of God," for some time held the town, and a small, narrow-fronted house in the *Contrada degli Avvellenatori* is still pointed out as his abode, though for no better reason, apparently, than that its walls are surmounted by the above form of battlement. Through thick and thin the little town, perched upon its craggy hillside, maintained unswervingly its devotion to the party whose principles had been espoused by the Scogli, and all efforts to take or destroy it were abortive. This does not necessarily indicate any unusual degree of prowess on the part of its indwellers, but testifies rather to the shrewd foresight of its shadowy original founders, Etruscans, Boians, or what and whoever they may have been, that 'stablished it upon a well-nigh impregnable spur of rock.

Their loyalty at last brought the inhabitants substantial returns, for at the beginning of the fifteenth century the all-powerful Lord of Milan, Gian Galeazzo Visconti, was pleased to admire their town and to load it with favors. To him is due the triumphal arch or city gate, and likewise the library, the plans of which were probably drawn by Marco de Campione, though certain details seem later in date and resemble the work of Duccio, the Florentine. The three-bayed portal and vestibule, with its delicate early Renaissance detail in creamy marble surrounding reliefs in glazed and tinted terra-cotta, is certainly not the work of the Lombard, and while this portico can scarcely be said to adhere very rationally to the original structure, still the conjoining of the different styles appears less awkward than one might suppose.

The large windows of the principal story are good examples of veritable Lombard Gothic, and apart from their plastic character form charming harmonies of color among themselves and afford a most pleasant contrast to the gray walls of the Signoria. It would have been an almost impossible undertaking to make measured drawings of even one of these, but there are some very similar ones in Gruner, lacking, however, that which all drawings of such work must needs lack, the infinite variety of detail and shimmering play of tint and surface of the work itself. Not only are the ornaments constantly varied, foliated or geometrical scarcely ever repeating themselves in exactly the same form, but even the plain surfaced bricks are subtly formed of various sizes to suit different localities in a way not to be dreamed of to-day.

It is certain that here in Northern Italy, within a very restricted area, the architecture of baked clay found its fullest and most artistic expression, and that, too, during the medieval period. The purist may rail against the Italian Gothic, and with justice. The gloomy style of the "*Tedeschi*" was quite impossible of comprehension or appreciation by the Southern mind, yet before the wonderfully conceived and still more wonderfully executed detail of such structures as the Certosa di Pavia, Crema Cathedral, or even this poor forlorn church of St. Catherine at Monteventoso, he must confess that the lesser known and even quite forgotten sculptors of Lombardy, Umbria, and Tuscany succeeded in giving to their plastic fancies qualities of debonair grace and delicacy utterly unknown to the colder, more self-restrained craftsmen north of the Alps. And not only the intricate and profuse detail, but almost every portion of their buildings, was fashioned by these forgotten Italians from the same material; as a delightful author and traveler has said, "What the marble quarries of Pentelicus were to the Athenian builders, the clay beneath their feet was to these Lombard craftsmen. From it they fashioned structures as enduring, towers as majestic, and cathedral aisles as solemn as were ever wrought from chiseled stone."[2] This is the expression of no unprejudiced judge, to be sure, but of a sworn lover of the South and of all things classic, yet from one very logical point of view it is, without doubt, entirely true.

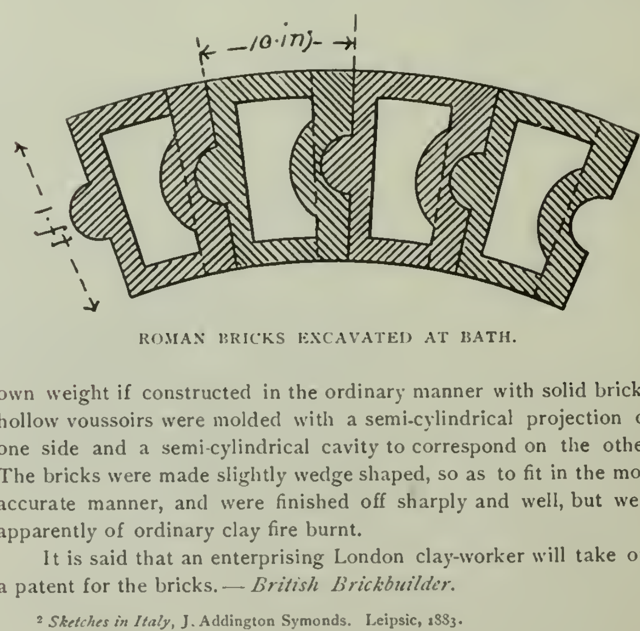
Every possible variety of tone and tint seems to have been known from deep purple through a warm gamut of color to palest dove-gray, and these contrast harmoniously or fade suavely into the marvelous coloring of their background of landscape, — the distant violet hills, the almost spiritually delicate green of the budding lemon trees, the hoary olives, the Lincoln green of the tall, columnar cypresses, or the sad tints of russet and dun of the mountain side.

(*To be continued.*)

ROMAN BRICKS AT BATH.

THE following illustration shows some bricks found a year or two ago during excavations amongst ruins at Bath, which have been unearthed by our contemporary, *The Engineer*. One or two of these bricks are still perfect, and there are a large number of pieces preserved locally, as also blocks of brickwork, showing how they were employed.

The roofs of the dressing rooms were covered in some instances with flat arches of brick, and as these would have fallen in by their



ROMAN BRICKS EXCAVATED AT BATH.

own weight if constructed in the ordinary manner with solid bricks, hollow voussoirs were molded with a semi-cylindrical projection on one side and a semi-cylindrical cavity to correspond on the other. The bricks were made slightly wedge shaped, so as to fit in the most accurate manner, and were finished off sharply and well, but were apparently of ordinary clay fire burnt.

It is said that an enterprising London clay-worker will take out a patent for the bricks. — *British Brickbuilder.*

[1] *Storia della Famosa e Valiante Casa di Scogli*, by Fra Pietro Adulatoro. Milan, 1673.

[2] *Sketches in Italy*, J. Addington Symonds. Leipsic, 1883.

A Village Church, Cost Fifty Thousand Dollars.

PROGRAM.

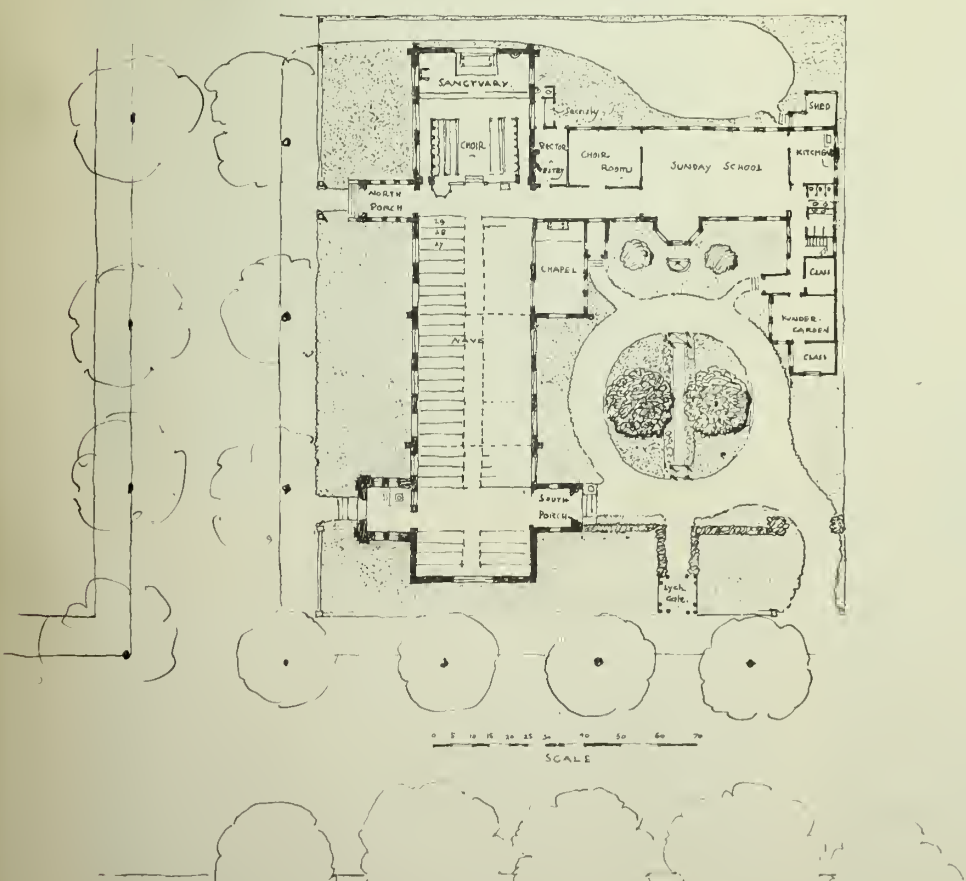
A CHURCH is to be built for an Episcopalian society in a Northern town of twenty-five thousand inhabitants. The site proposed is a corner lot 160 ft. deep and 140 ft. front, with a western exposure on the narrower front, which faces a small public park. The streets meet at right angles, are wide, and are shaded by large trees. The lot is level on the 140 ft. front, falling 5 ft. towards the rear. Directly opposite the church across the square will be built the public library.

The church is to have a seating capacity of about four hundred and fifty, with space for organ and for choir of twenty-five in a chancel, and it should be preceded by an ample vestibule. Adjoining the chancel will be a study and a room for the choir, each of about 200 sq. ft.

There will be on one side of the church a parish house, to include a Sunday-school room to seat one hundred and twenty-five, a kindergarten for twenty-five, three class rooms for twenty-five persons each, and a room for library of about 160 sq. ft. The Sunday school room is to be so disposed that it may be used for receptions and social gatherings, and in connection with it there is to be a small kitchen with pantry. There are also to be provided two sets of lavatories.

The style of the design is left optional, except that it is to be such as would be adapted for execution in brick with trimmings of molded brick and terra-cotta.

A sketch plan giving the general dimensions and a perspective of the exterior are required, together with such other sketches and details of individual portions of the design as seem desirable to elucidate some point in the scheme not otherwise expressed.



CONTRIBUTION.

BY R. CLIPSTON STURGIS.

To a certain extent a church is a public building: all approaches, entrances, and exits should therefore be obvious and easy.

The needs of the modern parish are no longer met by a building to contain a weekly congregation. The parish is a complex or-

ganization with many branches of work, requiring special buildings and rooms. These requirements, as outlined in the programme, embodying rooms for church and parish work, necessitate a group of buildings which must be independent and yet contiguous and compact.

The lot is a comparatively large one and the first consideration is the position of the church. The corner is the natural site, being most important and also most accessible. Other things being equal, it is desirable, on account of custom and association, to orientate the church. This is obviously the best arrangement here.

Of the various accessory rooms, the vestries for clergy and choir are the ones which must be nearest the chancel, and the clergy vestry and sacristy are better if absolutely adjoining.

Next to these in importance comes the Sunday school. As this is for a large number of children, it should be lofty and well lighted, while the class rooms for smaller numbers may well be lower stud. The Sunday school is therefore placed next the vestries, because of the importance of the position, which is easy of access to the church, and also conveniently approached from the outside. This enables one to accent its central position as the building from which grows the daily life of the parish.

Over the class rooms is the library, with the staircase and lavatories dividing them from the Sunday school, and thus putting the children within easy reach of lavatory and stairs to library. The kitchen is behind the Sunday school, convenient for service, out of the way, and approached for supplies, etc., from the rear. Finally the morning chapel for daily service is placed where it is as convenient as the chancel to the vestry, easy of access, capable of being heated independently of the church, and yet so arranged as to be available for extra seating in the church when needed.

The whole group now forms three sides of a quadrangle. The church is orientated, the Sunday school with light east and west is sunny both morning and afternoon, and the whole quadrangle is sunny and retired and yet obviously public and open to the street like a miniature park. This will help to harmonize it with the park opposite, and each will help the other.

The suggestion for laying out the grounds will probably explain itself. The road, which comes in at one corner so as not to break the front, reaches church, chapel, Sunday school, and stairs to library. The axis of the lot is placed arbitrarily on the Sunday-school bay, and this is further emphasized by a lych-gate on the street, hedged path to the road, a straight path bordered with narrow flower beds, across the green, arbors for climbing roses at each end of the path, and, in front of the Sunday-school bay, a drinking fountain. Large trees help to shade the green.

As to the interior, the plan is sufficiently in detail to show the general scheme, of which the chief aim has been to give the best accommodation and the most interesting masses and groups without much dependence on elaboration of detail or richness of material. The church is uniform in section throughout, but the chancel is emphasized by a chancel arch, and is narrowed by taking the communicants' passage up behind the stalls on either side. The roof is rather low pitched and is of simple open timber framing with queen-post trusses, taking the 30 ft. span. It is divided primarily into bays of 35 ft. each, and these in turn subdivided into three of 11 ft. 8 ins. Each smaller bay accommodates four pews. The vestries are one story and are ceiled. The Sunday school is 17 ft. high to the trusses, which are similar to those in the church. The kitchen has a second story, which contains room for janitor. The kindergarten wing is two stories and contains on the second floor the library, which is 13 by 30 ft., and a square bay. It is ceiled with a barrel vault of plaster following the lines of the semicircular roof.

As to the exterior, Gothic has been avoided because stone is not to be used, and in stone lies the keynote of Gothic work. A molded material is not suitable for a style where repetition is a distinct blemish. On the other hand, however, Gothic forms and masses are so associated with the whole history of the Anglican church, of which the American church is a part, that one regrets taking an absolutely classic model. Under these circumstances, we turn to the period when in England detail was classic in form, and yet the planning and masses were in the spirit of the earlier times. This gives us the long, narrow proportion of the nave, the Sunday-school room with its lofty and deep bay, and the general arrangement of the plan, hinting at symmetry, and yet not having the obvious balance of a good classic plan.

Furthermore, this style, if one may call it such, demands no elaborate detail, no traceried windows, nor much carving, but looks best with simple large openings fitted with well divided sashes, and finds its chief effect in quiet wall surfaces devoid of ornament. One can use white terra-cotta for the coping, string courses, architraves, heads and sills of windows, and for the remainder a good red brick. Thus with simple material one depends for the effect outside on the proportion of the various parts, and the relation of the masses; and for the effect inside on large rooms, well lighted and treated in simple colors, — chiefly black or brown wood, and gray or green walls.

Following these lines, the whole establishment could be built and equipped, and the grounds laid out and planted, and even the exorbitant fees of the architect paid for the amount prescribed, fifty thousand dollars ($50,000).

NOTE. — Certain departures from the programme have been made. The choir room would be too small for practise if only 200 sq. ft. It is planned 15 by 20 ft. The rector's room has been decreased to 10 by 15 ft. The kindergarten is slightly increased beyond the requirement of twenty-five little children, and two class rooms reduced slightly, while the third is combined with the library. This gives four rooms of different sizes: one 8 by 10 ft., one 10 by 13 ft., one 12 by 18 ft., one 13 by 32 ft. This latter, library and class room together, is nearly three times as large as the required library.

Church Architecture in Materials of Clay.

BY THOMAS CUSACK.

THE unexpected appearance of a shapely tower looming up against a distant horizon, about the beginning of the present year, led to the discovery of a church, rectory, and parish buildings then nearing completion. Rising abruptly out of an expanse of tin-roofed tenements, this tower furnished a standing invitation to those who had viewed it from a distance, if only as a new point of attraction in an otherwise uninteresting sky line. A nearer approach, in this case, lent some enchantment to the view; for though still surrounded by scaffolding, the skeleton of its high pitch roof became visible, flanked at the angles by four octagonal turrets and embellished on the sides by four unmistakably Gothic gablets; below this, a deep belt of surface tracery on an ashlar background; the whole resting on a string course, accentuated at intervals by gargoyles of the requisite vigor and ferocity. Closer still, and this tower proved but the finger-post that had guided our footsteps to an exceedingly interesting pile of brick and terra-cotta; for, with the exception of the steps to the several entrances, no stone has been used, inside or out. These buildings have since been illustrated in line from the

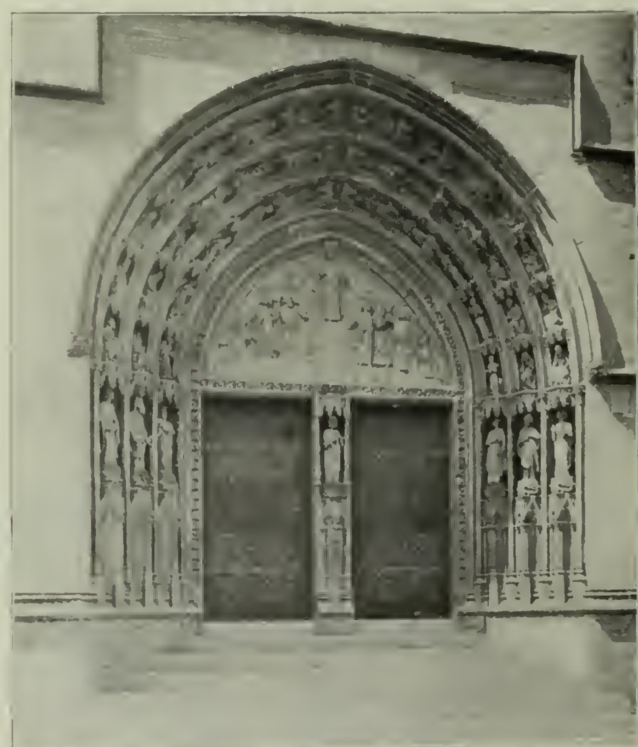


FIG. 16. PRINCIPAL ENTRANCE, CHURCH OF THE HOLY TRINITY.

architects' drawings, with a degree of liberality to which they were entitled, in a journal [1] "devoted to the interests of architecture in materials of clay."

This church, which has been named Holy Trinity, with its adjoining buildings, is in the parish of St. James, New York City, and owes its existence, we believe, largely to the munificence of the Rhinelander family. It has a frontage of 275 ft. on the south side of East 88th Street, and extends back half-way through the block. Architecturally, this important group is the work of Messrs. Barney and Chapman, and cannot fail to have added much to their reputation as church builders. They have used terra-cotta successfully, and on several previous occasions, but in this instance they appear to have gone further than the majority of American architects have

[1] THE BRICKBUILDER, May, 1899.

FIG. 14. CHURCH OF THE HOLY TRINITY, EAST 88TH STREET, NEW YORK.
Barney & Chapman, Architects.

yet dared to venture. In so doing, they have placed all who are interested in the extended use of burned clay under lasting obligations.

The manufacturers immediately concerned were therefore in duty bound to discharge their part of this indebtedness by the exercise of special care and skill in the production of work of the highest attainable excellence. Those not directly engaged were likewise interested in the degree of success that might attend the final outcome of such an important undertaking. On that must depend whether this latest effort would be repeated by the same architects; also, whether it shall be imitated or avoided by others. The influences thus exerted form an ever-widening circle, creating or canceling future contracts in which they too would in due time have an equal chance of profit and distinction. True, there are short-sighted people engaged in the business who cannot see things in this light, but they are not likely to contribute much to the advancement of terra-cotta making. Some of these delinquents are quite incorrigible, and should be placed under restraint by common agreement between our leading companies, who have an undoubted right to safeguard a great and growing industry from discredit. There are lines of business in which reputable manufacturers fix a minimum standard below which none are allowed to go, under penalty of public exposure. Something of this kind would be of advantage to those who have invested large sums in plant, appliances, and in the payment of competent help; all of which are conditions precedent to the production of creditable work. We could, for example, mention a church or two which the manufacturers at large might, as a first step in the direction indicated, agree to rebuild at their own expense, and find it a paying investment.

Our first visit to the Rhinelander church came about under the circumstances already indicated; for although we had an abstract knowledge of its existence, we were not certain of the exact location. We had listened to the comments and criticisms of others on it and the adjoining St. Christopher's House, some of which came from men who have earned their right to a respectful hearing in any assemblage of clay-workers. This fact afforded additional zest to a discovery which would, in any event, have been highly interesting. Here was an opportunity — of which we have availed ourselves on several subsequent occasions — in which to form an independent opinion on the execution of a singularly bold conception in church architecture. Viewed as a whole, this well-ordered group of buildings is quite impressive, and to any one having a share in the execution of similar problems must possess a peculiar fascination. In matters of detail, too, the architects have acquitted themselves very creditably; for, while presenting features of some difficulty, they are, as a rule, well adapted to the capabilities, and nowhere exceed the limitations of the material.

The terra-cotta, which may be described as a mottled brown, was furnished by two well known companies; between whom, if we may judge from the merits of this particular work, there is no room for discrimination. After careful comparison, we would say that they stand on an equal footing, so far as subsequent remarks may apply to either or both of them. In point of absolute durability, the Rhinelander family has been fortunate in the material by means of which a respected name will be known to remote posterity. The memorial windows are leaded into tracery that will outlast the stained glass on which that name and other more sacred subjects have been emblazoned. Every block of it has been fired to vitrifaction, and some to an extent that has produced a metallic luster.

The brick used on these buildings are Roman size, of the well-known speckled variety, with a background that would be called "old gold" by those who offer them in exchange for an equivalent in that precious metal. They differ in color from a yellowish buff to a light brown, some of the intermediate tints being found on the same brick. When set in the wall with a little artistic irregularity, so as to avoid studied patterns on the one hand, and accidental patches on the other, these various tints become interspersed and blend into a harmony of color that is only surpassed by nature's inimitable autumn foliage. The late Charles Garnier, in his "A Travers les Arts," conjured up a day dream in which the tawny tones of gold would become universal in a city which he himself had done much to beautify; where harmonies of color were to tremble under the enchanted gaze of his fellow Parisians. Had he lived to visit and — of course — write his impressions of America, he would have found that the longings of a somewhat exuberant imagination were being realized very rapidly by plain, practical, prosiac brickmakers. Whatever may be said of an adverse character, in relation to the buildings in question, there can be nothing but praise for the brickmaker, whoever he may be, for on that point we have not the faintest idea.

Color combinations between brick and terra-cotta is a subject on which no hard and fast rule can be laid down. Good and bad taste are, no doubt, at the top and bottom of the scale, but when it comes to a question as to which *is* the top and which the bottom, everybody is armed with a declaration of independence. Even among architects and men of trained artistic perception the divergence of opinion is well-nigh irreconcilable. Where authorities differ so widely it would be a hopeless as well as a thankless task for others to intervene. On this branch of the subject we shall therefore venture a few general suggestions, without invidious reference to any existing building.

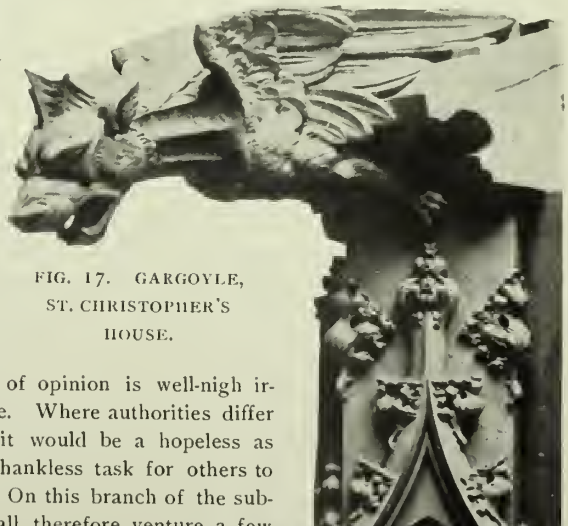


FIG. 17. GARGOYLE, ST. CHRISTOPHER'S HOUSE.

The extraordinary range and fine

gradation of color that have been produced of late years, whether by logical analysis, by repeated experiment, or as the result of accident, seems to have added an element of danger to an already doubtful situation. With less to choose from, a choice could be made without hesitation and with less room for subsequent regret. Not many days ago a business communication passed through our hands in which the writer gave what must have appeared to him a lucid definition of his requirements: for he ordered certain work to be made "a terra-cotta color." This, of course, was but an echo from a distant and almost forgotten past. But now, with an array of color ranging from dark chocolate to pure white, those who have a weakness for novelty are subjected to a degree of temptation that few of them can withstand.

FIG. 15. MORNING CHAPEL AND PORTION OF CLOISTERS, CHURCH OF THE HOLY TRINITY.

In their selection of color, architects sometimes mislead themselves (and others) by placing two or more small tablets of terra-cotta side by side on an office table. In this they are liable to forget that any of these colors when seen in the mass at a distance, under other conditions of light, may produce an effect that will prove quite disappointing. They are likewise misled at times by specially prepared "samples," or such as have not been taken at random from a purely commercial output. These samples may not have been presented with that intention, but a certain allowance should always be made in judging from work gotten up for exhibition. The usually small size of such pieces, for example, admits of a fineness of body and a degree of finish that would not be thought of in the general run of work sent to a building. A few regular building blocks of average size, laid up along with the brick proposed to be used, is a good test when in doubt as to the effect of an untried combination. Perhaps the safest, certainly the least expensive, test will be found in a critical inspection of current work on which others may have experimented with more or less success.

Whether terra-cotta should be made to match the brick used in connection with it, or to stand out in contrast with its setting, often becomes a subject of debate. The question is one that cannot be settled without reference to the style and character of the building, its situation, and surroundings. These are the governing factors on which an intelligent decision must be based. Personally, we favor a contrast, but only in so far as the conditions are suitable. Gray terra-cotta and red brick is one of the few combinations that can be depended upon under almost any circumstances. White and red, however, is much too strong; unless, perchance, there be a wide lawn in front, with plenty of green foliage for a background. That harsh, garish, or discordant contrasts should be eschewed none will deny, as an abstract proposition: yet in the application of a simple truism we do not find the same unanimity. A harmonious contrast is always a center of life and cheerfulness, while a monotone is often lacking in these desirable qualities. The latter, however, is frequently preferred in buildings where a feeling of unity and sobriety is sought to be preserved. In churches, if anywhere, it is right that these characteristics should prevail over those that are unstable or meretricious.

At present the popular fancy runs to gray, though that shade was introduced originally less as a deliberate choice than with a desire to match limestone. It has stood the test of extensive use, for it is now accorded a preference on its merits, independent of other considerations, and in cases where stone does not influence its selection. The various shades of gray have given rise to a demand for brick to be used on buildings in which a sober monotone has been aimed at by the architect. We now see on every hand one or two stories in limestone, all above being brick and terra-cotta of so perfect a match that experts have failed to draw the line of demarkation. Indeed, so great has been the insistence of late on the matching of brick and terra-cotta, that it has been deemed advisable, in some instances, to order both from the same works. Pressed from the same clay mixture and burned in the same kiln, we get the nearest approach to perfection in uniformity of tone and texture.

The very latest and most pleasing variety of these shades has a dark speck running through it, produced by an admixture of manganese, which, acting as flux, has been found to improve the quality as well as the appearance of the goods. Viewed from an opposite sidewalk, the individual specks are hardly perceptible, but at shorter range they give a granular character to the surface that is usually sought after by tooling in imitation of stone. A plain gray placed side by side with speckled work of approximately the same shade looks flat and lifeless by comparison. The production of this crystalline texture may be considered among the most notable of recent steps in the direction of advanced practise. Its application to other colors than gray, more especially to such as may be used in connection with various shades of fire-flashed brick, shall receive such attention as the exigencies of space will permit.

FIG. 18. FINIAL TO DORMERS.

Fire-proofing.

TEST OF WIDE FLOOR ARCHES.

BY CORYDON T. PURDY.

THE strength and general practicability of the 7 ft. arches called for in one of the alternative plans referred to by the writer in last month's issue of THE BRICKBUILDER were questioned.

At the suggestion of the architects, Messrs. Winslow, Wetherell & Bigelow, the Boston Fire-proofing Company proposed to have two such arches tested, one segmental and the other flat. Accordingly

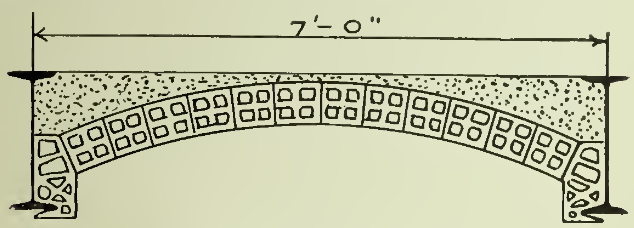


FIG. 1.

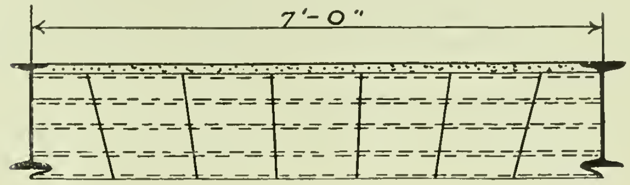


FIG. 2.

they erected inside of their factory at Boston a piece of floor 7 ft. wide and 16 ft. long carried on two heavy 15 in. beams spaced 7 ft. apart center to center. Eight ft. in length of this construction was made a 6 in. segmental arch, and the remaining 8 ft. was made a 15 in. flat arch. They were laid up with Rosendale cement mortar and covered to the level of the top of the beams with concrete composed of one part of Portland cement, two parts of sand and gravel, and three parts of cinders, with a thickness over the flat arch and over the crown of the segmental arch of about 1 in. The finished construction on top, therefore, looked like one arch. The beams were tied together with six tie rods ⅞ in. in diameter, located 2 ins. above the bottom of the beams, one at the middle of each arch, and one near each end, as shown in Fig. 3. Both arches were made of semi-porous material. The tests were made under the general supervision of the writer by Mr. George Hill, of New York, with his hydraulic testing machine.

Fig. 1 shows the section of the segmental arch.

Fig. 2 shows the section of the flat arch.

Fig. 3 shows the arches in plan, with the position and area of the applied load, also the location of the tie rods, and tie bars, and the cracks in the arches.

Fig. 4 shows the openings in the 15 in. flat arch, and the thickness of the terra-cotta walls.

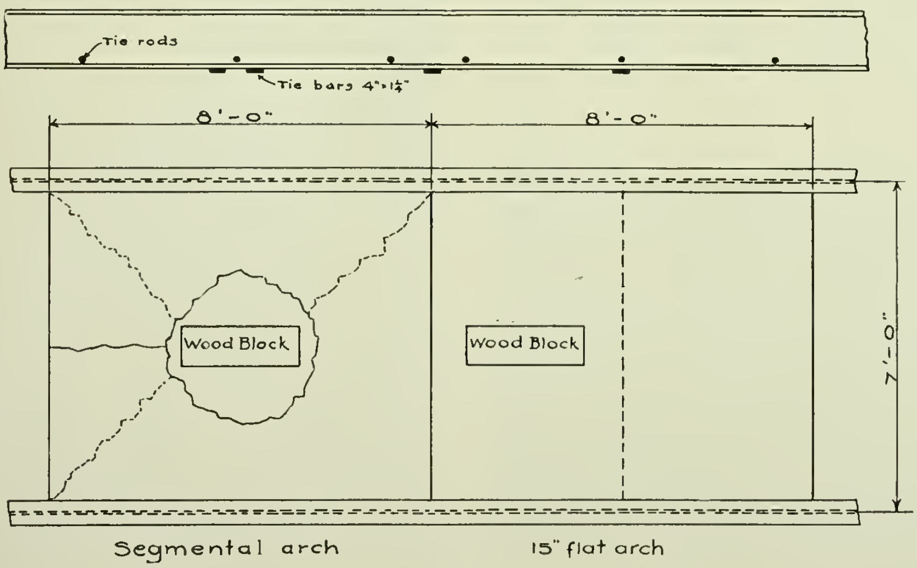


FIG. 3.

The voussoirs of the 6 in. segmental arch, which was tested first, measured 6 ins. in height, 6 ins. in width, and 12 ins. in length. They were placed in the arch so as to break joints transversely. The skewbacks were also 12 ins. long, and of the section shown in Fig. 1. The concrete over the arch was apparently hard and strong when the test was taken. Before it was made the weakness of the tie rods was noted and they were reinforced by two bars 2 by ½ in. in section, hooked onto the bottom flanges of the beams and only about 2 ins. apart. The load was applied to the center of the arch through a wooden block 10 ins. high, 10 ins. wide, and 2 ft. 6 ins. long. This block was placed parallel with the beams along the center of the arch, as shown in Fig. 3. The total weight of the block and packing, together with the plunger in the testing apparatus, was about 400 lbs.

The first attempt to test the arch was stopped by a misarrangement of the registers after a small load had been put upon the arch. When the test was finally made a load of 45,000 lbs. was first applied to demonstrate that the apparatus was in good working order, after which the load was immediately removed. A second load of 59,000 lbs. was then applied, when it became apparent that the 2 by ½ in. tie bars were also insufficient, and a crack developed in the key joint of the arch on the under side. All the arch blocks, however, appeared to be unaffected. The load was removed and two 4 by 1¼ in. bars were substituted for the 2 by ½ in. bars. These are shown in their position in Fig. 3. After they were put in position the pressure was renewed. At 60,000 lbs. the concrete filling separated from the top flanges of the I-beams and cracked along the connection with the 15 in. flat arch adjoining, as shown in Fig. 3. At 62,000 lbs. that portion of the skews protecting the bottom flanges of the beams began to break off, and cracks appeared in the top surface of the concrete describing a circle of about 30 ins. in diameter, tangent with each end of the loading block, with an additional crack running from the end of the loading block to the end of the arch. The maximum load was reached at 64,000 lbs. Continued pressure resulted in increasing deflection and rapidly decreasing load, with all cracks opening materially. When the load had decreased to 32,000 lbs. it was removed entirely. After a careful examination of the arch, the load was reapplied and run up to 31,000 lbs., when with increased pressure the load began again to recede, the arch continually failing. The soffit of the arch had cracks extending to the corners of the arch from three points immediately under the corresponding corners of the loading beam. In some cases these cracks occurred diagonally through the blocks and in others they followed the joints in a zigzag line. At the end of the arch the blocks showed cracks paralleled with the soffit of the arch a little above the center. Mr. Hill states that all of the blocks were practically destroyed except in the angles at the ends of the loading block.

The blocks forming the 15 in. flat arch were each about 1 ft. in length, as shown in Fig. 2. The skewbacks were similar in construction to the voussoirs, molded on end to fit the flange of the beam. In order to reinforce the tie rods, one of the 4 by 1¼ in. bars was put in place at the end of the arch where it joined the segmental construction, while the other was put in the center. As the soffit of the arch projected in the usual way below the bottom of the beams, it was necessary to cut away the entire soffit wall of the arch where it interfered with the tie bar, and the arch was then tested as though this had really cut the arch in two, leaving a good part only 4 ft. long between the tie bars.

The test of the arch was then conducted in the same way as that on the segmental arch. The pressure was uniformly applied up to 73,000 lbs., at which load some high spot of the jointing gave way, causing an increase of deflection without an increase of load. As soon as the blocking came to a new bearing the load increased to 76,000 lbs. and remained practically constant with constantly increasing deflection for about two minutes, when a sudden drop of 5,000 lbs. occurred with a momentary recovery, followed by a rapid failure of the arch. No cracks appeared either in the soffit or on the top surface. The failure came by shearing along the true arch lines.

Neither arch showed any signs of having been distorted by the center bearing load. The circular crack in the top of the segmental

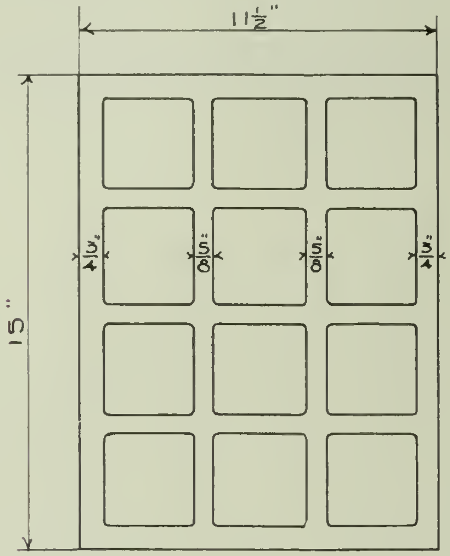


FIG. 4.

arch seems to be the result of direct crushing immediately under the loading block, while the radiating cracks in the soffit mark the boundary of the arch area actually resisting the load. On one side the material was strained, while on the other side it was not. The 64,000 lbs. on the segmental arch divided by the 56 sq. ft. of its whole area equals 1,142 lbs. per foot. The 76,000 lbs. on the flat arch likewise equals 2,714 lbs. per square foot over its whole area of 28 ft. It seems to the writer that it may properly be presumed that the unloaded half of the flat arch was some source of strength, and that this rate is really somewhat higher than it properly should be to be a fair measure of the strength of the arch; but a comparison between the two rates as well as the cracks in the segmental arch, especially those in the soffit, indicates quite clearly that if the loading block had been 7 or 8 ft. long instead of 2 ft. 6 ins., the former rate of 1,422 lbs. for each of the 56 sq. ft. of the segmental arch would have been much greater.

It must not be forgotten that if the material will stand the shear, the arch will stand a much heavier evenly distributed load than one applied only at the center, theoretically twice as much, and therefore an equivalent evenly distributed load would be twice as great or nearly so. However, without taking that into account, the arch is clearly much stronger than the beams, and stronger than needed in actual practise. It would also seem that the test ought to put to rest any question as to the strength of 7 ft. arches.

Masons' Department.

SOME EVILS OF PRESENT SYSTEMS.

(*Continued.*)

BY JOHN LYMAN FAXON.

IN regard to (*e*), sub-contractors are too apt to claim "the right" to estimate in an architect's office, or from his plans and specifications: it is a matter of privilege, not of right, — except in cases of advertised work. And contractors for the whole claim the right to have any one bid on sub-work: some contractors asking or allowing subs to estimate, to whom they haven't the slightest intention of awarding the work, this being done so that such bids may be used to dicker with better men. While the general contractor is responsible for all work, nevertheless, in these times, when sub-work often approximates 50 per cent. of the whole, it is a matter of serious importance to the architect to be sure of the standing and ability of the subs who are to execute the work under his supervision, — often work of most important character and requiring considerable direction and supervision at the best, and it is the architect's duty to approve of only those subs who know what thoroughly good work is and who will execute it faithfully. If general contractors gave the personal supervision to sub-work which contract obligations require, and would see that it was properly executed, the objections to indiscriminate sub-bids would be materially modified.

As to (*f*), when a general contractor has put in a bid, based upon the bids of reliable subs known to and approved by the architect, the contractor has no right to trade and dicker with other subs; such practise is a breach of good faith all around. The architect awards the contract, and the client *pays for work* on the basis of bids and work by certain subs, and the client is entitled to the reputation, reliability, and work of such subs, and the subs are entitled to the work and for the amount of their bids without scaling down. If all dickering in subs could be forthwith abolished, the status of the building business would be quite for the better. Contractors claim that they have to dicker, "because they all do it" — and because bids are cut so fine that they "can't make any money if they don't do so"; but this does not appear to be a sufficient excuse for a breach of good faith. And, on the other hand, if subs would make fair bids for work, stand by their bids and refuse to dicker, they could control the abuse in a few months. One trouble in this respect is that the subs do not appear to have anything like an even judgment as to what sub-work is worth; there is more variation in amounts of sub-bids, considerably more, than in bids by contractors for the whole, and as a rule the lowest sub-bids are too dangerously near cost price to promise honest work without unpleasant distrust and supervision.

In respect to (*g*), the agents of materials are responsible for a good deal of mischief. "Business is business," to be sure, in a right and legitimate way, but why an architect, after he has specified certain kinds or makes, should be troubled with from one to fifty agents, all urging something "just as good or better," or why agents go to clients when they cannot prevail with the architect, passes comprehension. Agents ought to understand that when an architect specifies a certain thing, it is quite likely that he has done so with due thought and selection, and that he is quite likely to specify something else in another case; in any event, agents should not attempt to interfere with or to undermine the architect's choice and judgment, or to euchre their fellows out of business duly provided for.

In regard to (*h*), what I have said in the first paper covers the point. I would only reiterate in substance, that the practise is unbusinesslike, immoral, and open to no excuse or justification.

In regard to (*i*), it sometimes appears as if contractors laid awake nights to exercise an abnormal ingenuity in concocting schemes for extras and omissions; certain it is that many of the schemes or excuses they offer evidence a fertile imagination and utter disregard of contract obligations. This, I have no doubt, is largely due to the practise of cutting down bids to the lowest notch to get the job, and the resultant effect on profit and loss. When contractors bid on work on the basis of honest work at a fair price, the vexatious questions of extras and omissions and "let ups" will be reduced to lowest terms and legitimate matters. On the other hand, owners are not without fault in this: the tendency, of late years especially, to get something for nothing, to get as much as possible for the least sum, has so permeated all lines of business, that the idea is sometimes carried to extreme lengths, and the contractor, anxious to secure work, is enticed into taking contracts below cost, unmindful of obligations and responsibilities so assumed. Owners are pretty sure to lay blame upon contractors or architects, in case the work does not come up to their expectations. Owners, take them by and large, know comparatively little of the art of building; they do know something of results, relation of cost to per cent. of income, repairs, etc. If a foundation settles and the building cracks, or the roof leaks, or the elevator gets out of order, or an electric wire sets the building on fire, the owner does not know just what causes bring these defects about; he does know the defects exist and naturally charges them to poor judgment on the part of the architect or to skin work on the part of the builder, unmindful of the fact that he may have influenced the contractor to propose a low bid for the contract and has already received more than his money's worth.

Modern advance in requirements of construction operating plants, finish, conveniences, etc., while of less cost, proportionately, than fifteen or twenty years ago, are much more complicated and extensive, cover a larger field, and require more scientific application and higher type of installation and adjustment, more exact efficiency and more rigid requirements in supervision of building operations, and proportionate cost; (*i. e.*, contract compensation). The best results all through will always be obtained when the architect is master builder also of the building which he has designed; this would undoubtedly, in some cases, involve something of additional cost, but I am quite of the opinion that the results would be most satisfactory and justify the expense, and in some cases the cost would be less than by contract; this has been my experience.

There is a wide difference of opinion as to what constitutes a fair price for extras or omissions. Contractors, as a rule, claim all they think they can get for extras, and allow as little as possible for omissions, and owners *vice versa*. Some contractors ask what it "costs them" to do the extra work, plus 10 per cent. to 15 per cent., and offer to allow what they "figured on it," minus the profit, for omissions, and the architect is vexed with such questions to an extent much beyond what he is paid on said accounts.

The only basis which seems to be fair for extras and omissions is the actual reasonable *net* cost of labor and materials *necessary* for the work, in either case, plus a fair profit, as may be agreed upon, mutually or otherwise, or by general acceptance. The per cent. of profit to be allowed, over actual cost of extras and omissions, might well be established by the Master Builders' Association, also said association might issue *monthly* schedules of *net* market rates, embracing all materials used generally in contract or job work and going wages, the schedule varying according to the variations of market rates, and such schedules would be of much assistance and of value in the making up of bids.

But aside from such established schedules, the cost of work will vary with individual contractors by reason of brains, experience, systems, credit, etc., or the lack of these. And inasmuch as the contractor will not admit that the owner will be right in asking the contractor to do work for nothing or at an excessively low price, because the cost to the contractor is little or nothing, from one cause or another, so the contractor cannot in fairness ask the owner to pay an excessive price, because it cost the contractor a needless and excessive amount from lack of proper system, credit, etc., in the conduct of his business.

Another point which should be carefully observed by contractors, both general and subs, is not to go ahead and do *extra* work without a definite understanding as to its nature and cost, and a written order for it at time of change as fixed by the architect, while such matters are fresh in mind, and the same applies to omissions. Contractors are apt to neglect this point, either from negligence or from an absurd feeling that the architect will feel offended if his oral directions are questioned, as implied by asking for a written order. Such feeling is a mistake, for I venture to say that architects prefer to have such matters fixed at the time, and thus avoid unnecessary misunderstandings at final settlement. Architects should bear in mind that the fixing of such matters at the time is a duty not only to clients, but to contractors as well; and contractors should bear in mind that "extras," without a written order for the same, are not valid.

In regard to (*j*), the most potent factor in matters of cost and loss of profit to contractors is a lack of *system*. I have seen some contractors fritter away the profits on a good job, and more, too, where they might have made good money, with due regard to business methods.

Space does not admit of my going into details. One of the fundamental rules which contractors should keep in mind is, "Spare no expense to economize," and one of the first considerations of economy is to find out just how the architect wants the work done, and with what materials, and then go and do it, and do it right the first time, and save doing it over again. The best workmen at best pay are the cheapest, and a high-salaried foreman to lay out and direct the job (and do nothing else), and who can read the plans intelligently and keep ahead of them, is a mighty sight cheaper than a low-priced man, who will rattle around the job and "help lay bricks," and there should be *one* foreman on the work to oversee all work, and not a half dozen with conflicting directions. Keep an accurate account of stock, day by day; don't waste it, and *don't let it run short*, and don't have stock delivered different from that specified. I have had dealings with a contractor who knew every morning just how much stock he had on each job, of each kind, and he conducted a large business. His men never waited for stock and consequently wasted no time puttering around, and the right kind of stock was always on hand. Keep the job *cleaned up;* piles of broken bricks, dirt, and general débris should not be allowed to accumulate for an hour for men to stumble over or pick their way around. Much time and money are wasted in the careless and negligent manner in this respect which characterizes the majority of work. Three or four laborers to keep the job clean and walks in shape will profitably save the time of thirty to forty workmen, and especially if the laborers are employed at night, so that the work is free and clear for a start in the morning. House *all* stock, especially in cold weather. It takes more time to properly granulate the frost lumps in sand than it does to protect it, and it costs less to neatly pile bricks than it does to chuck them in a heap and have 5 to 10 per cent. of broken stock, and the best stock in the majority of cases (even when not called for) is the cheapest in the end. Flights of rough stairs, from stage to stage, or from story to story, are cheaper than ladders. In Italy, where I have observed much work (and where time does not count as it does here), runs are provided, and the ease and quickness with which laborers swarm over a building is remarkable. Provide for sub-work at the start; don't wait till it is wanted; have it on the job when needed, and have it done right at first. A sub-contractor should understand that his work is expected and required at the building, at a certain day and hour, and that he is to have it there, with sufficient men to place it in the shortest possible time consistent with the best work. No sub-work should be given out without a written contract, stating time of delivery and finish and forfeit for delay. The usual delay in sub-work is a matter of constant and increasing vexation to contractors and architects, and of material loss to contractors and owners.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — The vacation season is here, and, consequently, a lull in transactions of importance in the building world. We have been told by one of New York's oldest and most prominent builders that this is the best year for the building trades since 1890. Almost all the builders have enough to do, and many have refused to bid on any new work. The only trouble now is the difficulty in finding enough skilled mechanics. We asked this same builder whether, in his candid opinion, it would be wiser and safer for investors to wait until fall before beginning new building operations, in the hope that the high cost of materials would drop to the low prices charged during the fall of last year, and also whether contractors will not always figure lower in the fall, because there is less work to do, competition keener, and because enough work must be secured to keep the men busy during the winter. In reply he said that he thought there would be so little difference in prices next fall that it would not be worth while to subject oneself to the annoyances, inconveniences, and delays incumbent upon building in the winter, especially as the country is now in so peaceful a state and prosperity on every hand seems to be so well established that good prices will continue.

It is the intention of the government to make the new Custom House in Bowling Green one of the finest buildings in the country. Twenty competing architects are now busily engaged on their designs, which must be submitted to the Treasury Department not later than September 18. It will be seven or eight stories high, and cost about $2,750,000. The lot is so situated that the principal architectural fronts will be in Bowling Green and State Street. The first floor will be level, or nearly level, with the sidewalk, with elevators and staircases convenient of access.

It seems a strange coincidence that the new Custom House should return to the old site of the Government House, once in Bowling Green, which was used as a Custom House in the early days of New York. The Government House was built for Washington, and was occupied by Governors Clinton and Jay.

After more than a year of quiet on lower Broadway, we are now to have two new "sky-scrapers." They are to be built on opposite corners of Broadway and Cedar Street, one being the building for the American Exchange National Bank, Clinton & Russell, architects; and the other for the Niagara Fire Insurance Company, Bruce Price, architect. H. J. Hardenbergh has planned a thirteen-story brick and stone fire-proof hotel, to be built on 45th Street, west of Fifth Avenue. W. Wheeler Smith has prepared plans for an eight-story fire-proof store and loft building, to be erected on Varick Street: cost, $80,000. C. F. Miller has planned three seven-story brick, stone, and terra-cotta flat buildings, to be built on Lenox Avenue, corner of 111th Street; cost, $135,000. Henry R. Marshall has prepared plans for a five-story brick and stone dwelling, to be built on 50th Street, for E. Morgan Grinnell. Charles Rentz has planned two six-story brick flat buildings, to be erected on 10th Street: cost, $100,000. Carrere & Hastings are preparing plans for a two-story brick office building, to be erected on South William Street, for Chutt & Meyers. Robert Maynicke has prepared plans for a ten story brick loft and store building, to be erected on Fifth Avenue, between 18th and 19th Streets; cost, $550,000. Charles Brendon has planned eight four-story brick and stone dwellings, to be erected on 49th and 50th Streets, near Park Avenue; cost, $172,000. Hill & Turner have prepared plans for a five-story brick flat building, to be erected on 26th Street; cost, $50,000. C. P. H. Gilbert has planned a five-story brick and stone dwelling, to be built on Riverside Drive: cost, $80,000.

BARNARD COLLEGE, NEW YORK CITY.
Lamb & Rich, Architects.

COURT, BARNARD COLLEGE, NEW YORK CITY.
Lamb & Rich, Architects.

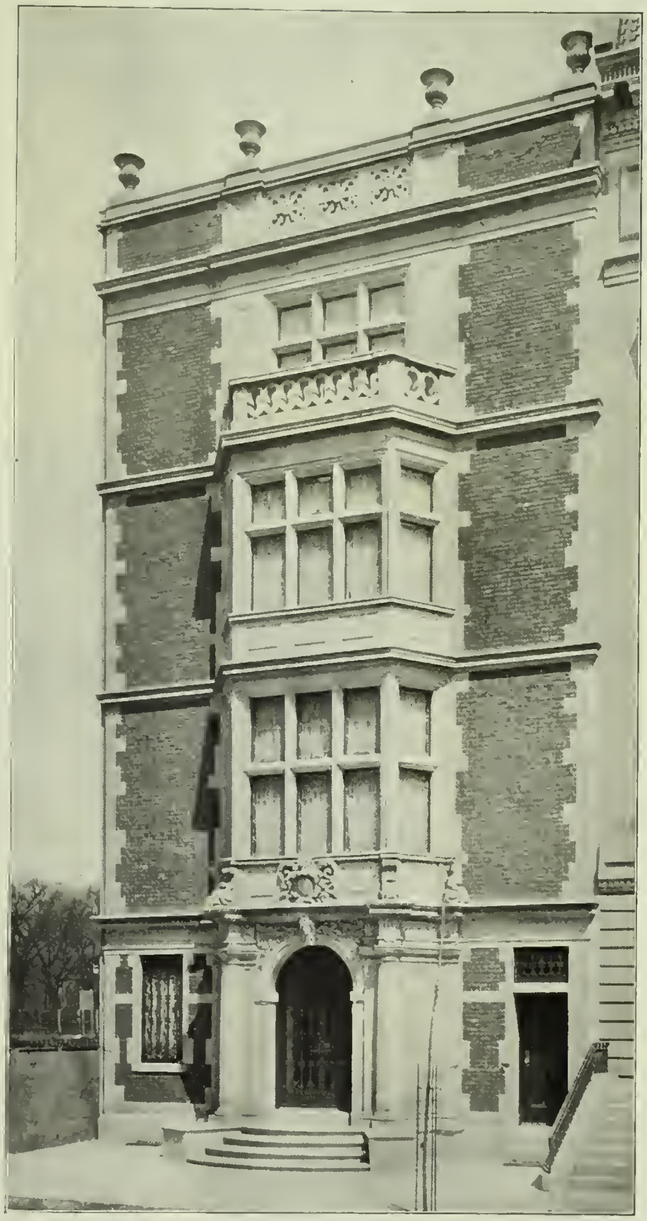
CHICAGO. — A municipal art league is soon to be an active factor in the making of a more beautiful, or perhaps it were better to say, for the present at least, a less ugly city. The preliminary meetings have been attended by some of the best known members of the artistic and architectural professions, and by several prominent and public-spirited citizens. The organization will soon be perfected, and will be ready for active work at the close of the vacation season, when a campaign against big billboards, signboard eyesores, the smoke nuisance, etc., will doubtless be begun and carried on until permanent results are accomplished. There is plenty of strong public sentiment in favor of radically improving the city from an esthetic point of view, but it needs the active, untiring leadership of a strong organization. The architects' and artists' clubs have lacked power in this direction, because made up entirely of professional men who have been chiefly active in other, though perhaps kindred, directions. It is believed that an organization which includes in its membership a large and representative body of men and women not actively engaged in artistic pursuits, yet jealous of Chicago's artistic reputation, will be strong and influential enough to awe and subdue in time the worst offenders against decency in form and color in our thoroughfares and public places.

In line with the present universal desire for a better municipality,— for making the most, though tardily, of our opportunities,— comes the announcement of the program for the Chicago Architectural Club's competition for the Illinois Chapter (A. I. A.) medals, to be opened in September and closed in time for the spring exhibition of 1900.

The program as outlined requires the designing of a new city hall and educational building on the lake front, between the Art Institute and Randolph Street, together with a monumental building or buildings at Randolph Street, on the private properties there; also a subway east of the proposed "Municipal Court," to carry the boulevard system across the river, and an additional feeder to the Randolph Street viaduct, from Washington Street, which crosses the subway. The problem of improving and beautifying the lake front, the river, and the river surroundings, and of solving the bridge question satisfactorily, is a big one, and it is to be hoped that the competition will at least result in some original and happy suggestions. It may be doubted, however, if it would not be better to omit from the problem the planning of the proposed new public buildings, and to require general suggestions only for their masses and treatment, showing their place in the grand scheme.

Local architectural engineers seem to be inclined to abandon the steel and concrete "raft" system of foundations in favor of piling driven down into hard pan. Two recent examples of this tendency toward securing solid, non-compressible bearings for large structures are the Methodist and Cable Buildings. Piles are now being driven for the latter. The foundations of the Methodist Building, now completed and ready for the superstructure, are unique, and promise to be very satisfactory. They consist of circular concrete pillars, 80 ft. deep and 4 ft. in diameter, with expanded bases 8 ft. in diameter, in a very dense hard pan. The excavation was accomplished with the help of sectional caissons, no supports being required in the hard pan. The surface friction of the pillars, in addition to their solid bearing, will, it is expected, preclude the slightest settlement. Mr. H. W. Wheelock is the architect.

The use of concrete in this manner as a substitute for wooden piling would seem to be especially advantageous in all similar cases where adjoining tall buildings might be jarred or caused to settle by pile driving. Moreover, notwithstanding the well-established durability of wood under water, it does not seem as fit a support for a steel and masonry structure as does concrete. The building on piles stands on wooden stilts; the other literally is founded upon a rock.



HOUSE NO. 1, EAST 76TH STREET, NEW YORK CITY.
Brite & Bacon, Architects.
(Drawings shown in plate form.)

PITTSBURGH. — In view of the immense increase recently in the iron and steel business in Pittsburgh, we might expect more promising building operations, for usually with the iron and steel business brisk business generally is good. Whatever the cause, it is a fact, however, that there is little new work coming on in architects' offices. The iron and steel business is almost unprecedented, and many concerns have called in their salesmen and are not seeking orders, and many are building large new plants. The Westinghouse Company, which is reported to have orders ahead to run their shops two years and a half, are making large additions, and also building a large five-story office building at East Pittsburgh. The cost of their improvements, without equipments, will amount to nearly a million dollars. The Carnegie Steel Company and the Schoen Pressed Steel Company are also installing large plants, the Carnegie Company expending a million on one new plant alone.

Bids have recently been received for adding four stories to the Westinghouse Building. This building was one of the earliest of the high buildings built here, and while fire-proof, so called at that time at least, is built with solid walls. The walls and foundations were found inadequate during the course of construction, and a most peculiar cut was made on the front to lighten the weight, but this did not prevent several large cracks from making their appearance. A curious fact also learned recently in connection with this building is that while steel or iron columns were used in the interior, the floor beams and girders are not connected to them, but simply rest on them. The effect of four stories more will be awaited with interest.

The removal of the hump on Fifth Avenue seems to have been dropped for a time at least. One of the principal obstacles in the way of this improvement seems to be in the question what to do with St. Paul's Roman Catholic Cathedral, the congregation naturally objecting to having the first floor left 25 or 30 ft. from the street level, and until a purchaser can be found for this property, which, by the way, is one of the best sites to be had in Pittsburgh, there is little likelihood of this work being done. The destruction of this building would, on the other hand, be a matter of regret, as it will be remembered by all who have seen it as one of if not the most

BERZELIUS DORMITORY, NEW HAVEN, CONN.
Brite & Bacon, Architects.
(Drawings shown in plate form.)

worked, the greatest freedom in the choice and execution of ornamental details. With other materials the possibilities of ornamentation are much more limited on account of the difficulty and expense attending the making of moldings and the carving of enriched work. With stone there is still a large field for the skill of the designer, particularly in the softer granites, limestone, and marble, and much commendable work is added yearly in these materials to American architecture.

With brick construction, which is every day growing in popularity and use, the case is entirely different, because, with the great hardness of a first-class brick, and the soft mortar joints between them when laid in the wall, it is practically impossible to do any carving on a brick front, or even to cut moldings out of bricks themselves before laying, except possibly in a very limited way, and in soft and most undesirable kinds of bricks. The use of ornamentation, therefore, in bricks, requires the pressing

interesting brick building in town. The fact, however, that it was given a coat of white paint some time ago would reconcile us in some degree to its destruction.

Competitions recently held have been for the Allegheny Observatory, to be built in Riverview Park, for the Western University of Pennsylvania, awarded to T. E. Bilquist; and for St. Paul's Orphan Asylum, awarded to Edward Stolz.

Alden & Harlow are preparing plans for a Carnegie Library, to be built at Duquesne; cost, $250,000. T. E. Bilquist has the new Edgewood Deaf and Dumb Orphan Asylum. Charles Bickel has prepared plans for a seven-story store building. F. C. Sauer is planning the Tenth Ward School for Allegheny City; cost, $80,000.

AN INTERESTING NEW CATALOGUE.

IN designing and building a house or other structure of wood the architect and contractor are allowed, on account of the ease with which the subject material can be

NUNUPTON, HEREFORDSHIRE, ENGLAND.

NUNUPTON, HEREFORDSHIRE, ENGLAND.

of the soft clay in molds to the desired shape, and the drying and burning in a kiln.

The proposition of making *specially shaped bricks to order* involves many difficulties. In the first place, several weeks' time is required by the process, which is therefore not always practical. Then there are difficulties of burning to the right color, the correct size, with straight lines and true surface free from cracks and other defects, all of which entail much trouble, and often require the remaking of some or all of the *special bricks*, with a corresponding expense and delay. All of these considerations have conspired to confine the use of brick ornamentation largely to a class of buildings where expense and trouble were of little consequence compared with the finished effect, and have prevented it from becoming popular for general use. As a result, one much oftener sees stone trimmings on a brick front than ornamentation made of the bricks themselves.

Within a few days we have received the advance sheets of a catalogue illustrating a line of molded bricks manufactured by Fiske & Co., managers, which we think deserves more than a passing notice. Not only does it illustrate the most complete line of molded bricks which we have yet seen catalogued, but it contains information particularly valuable to the designer, and in which molded brick catalogues have usually been lacking.

Some three hundred different molds are illustrated, covering almost every detail of ornamental construction necessary in the ordinary building. Many sketches giving suggestions for different constructions, such as architraves, belt courses, panels, pilasters with caps and bases, and so on, are shown; but what is of far greater importance to the designer is the fact that full details and dimensions are given on every piece, so that nothing is lacking to enable the architect to use the designs in the composition of whatever subject he may have in hand.

Thus, on each piece will be found not only the length and thickness, but the *bond* and the *projection;* and being drawn to scale, the size of the ornamental details can easily be obtained. The brick thus represented are those made by the mud process. Fiske & Co. manufacture by this method only.

The catalogue illustrates a line of moldings which are either constantly on hand in certain well-chosen colors, or for which dies are ready for immediate production, and which, being standard patterns, are made up in large quantities, from which the right color, shade, and perfect pieces may be selected for a given job.

While some objection may be raised by critics that these, being "stock patterns," do not allow the architect enough latitude in the design of his building, it should be remembered that it is in the treatment of standard materials that the architect generally develops his individuality, rather than in the selection of some unique material or peculiar shape, and while for special work special shapes may be desirable, the number of combinations, each with its own individuality, which can be made up with such a catalogue, is easily understood by the practised designer.

We believe that the building profession is to be congratulated upon this new acquisition to the already large list of available material for ornamentation of modern buildings.

While it is not the intention of the company to send out these catalogues promiscuously, yet they will be glad to distribute them among those of the architects who are interested in a work of this kind. Parties desiring a copy should address Fiske & Co., 164 Devonshire Street, Boston, Mass.

DETAIL, OPERA HOUSE, DETROIT, MICH.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.
Mason & Rice, J. M. Wood, A. W. Chittenden, Associate Architects.

CHESEBROUGH BUILDING, BATTERY PARK, NEW YORK CITY.
Built of cream-white bricks, made by the Powhatan Clay Manufacturing Company.
Clinton & Russell, Architects.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: Sylvain Schnaittacher, Adams Building, San Francisco, Cal.: John Stafford White, Chemical Building, St. Louis, Mo.

CURRENT ITEMS OF INTEREST.

The Atlas Clay Material Company, through their agents, H. E. Fuller & Co., are furnishing and setting the terra-cotta fire-proofing for a large apartment building on Leverett Street, Boston.

Bryant & Kent, 30 Kilby Street, Boston, are now acting as the special Eastern agents for the "Brooklyn Bridge" brand cement, manufactured by the New York and Rosendale Cement Company. Over 60,000 bbls. of this cement have been sold in the New England market since the first of May through this agency.

The following buildings are a few of the many recently equipped with the "Bolles" sash: Public schools, No. 19 and No. 16, Buffalo, N. Y.; six public schools, Greater New York; Kings County Hospital, Brooklyn, N. Y.; addition to store of John Wanamaker, Philadelphia, Pa.; and the Empire Building, Pittsburgh, Pa.

The C. P. Merwin Brick Company, Berlin, Conn., report very heavy business secured through their agents, the Central

INTERIOR, CHURCH OF ASCENSION, PITTSBURGH, PA.
Finished in light buff brick, furnished by the Kittanning Brick Company.
Halsey Woods, Alden & Harlow, Architects

New England Brick Company, of New Britain, on orders for both hollow and common brick. They have recently enlarged their plant and can make and ship brick to order very promptly.

WALDO BROTHERS, agents for the Perth Amboy Terra-Cotta Company, have secured the contract to supply the terra-cotta for the Whiting Building, Kingston Street, Boston, Woodbury & Leighton, contractors; also to furnish the terra-cotta for the Milton, Mass., Academy Building, Winslow, Wetherell & Bigelow, architects.

J. C. EWART & CO. are furnishing their Akron Roofing Tile for the carriage house of P. D. Armour, Jr., Chicago; for the Simmons Memorial Library, Kenosha, Wis., D. H. Burnham & Co., architects; for the superintendent's building, Oak Hill Cemetery, Evansville, Ind.; for a railroad station at Victor, Col.; for the Frostel residence, Milwaukee, Wis.; for a fire-engine house, Allegheny, Pa.; and for a high school, McKeesport, Pa.

BURGY & MCNEILL, Pittsburgh, report a shortage in all classes of brick in their city. They have orders booked for over a million red and fancy shades of front brick, and find difficulty in supplying the demand. They state that the cause of this unprecedented condition in the Pittsburgh brick market is due to the great activity in the building industry in that city, which exceeds in volume anything before known there.

THE PITTSBURGH TERRA-COTTA LUMBER COMPANY have, through their Eastern representative, E. E. Nickson, closed contracts to furnish the fire-proofing for the following buildings: Hotel Terminal, Boston, Arthur H. Bowditch, architect; Boston Dispensary, Boston, Peters & Rice, architects; Pawtucket Library, Pawtucket, R. I., Cram, Goodhue & Ferguson, architects; residence for R. S. Bradley, Boston, Little & Browne, architects.

TERRA-COTTA DETAIL, HARTFORD TIMES BUILDING, HARTFORD, CONN.
Executed by the Conkling-Armstrong Terra-Cotta Company.
A. W. Scoville, Architect.

WALDO BROTHERS are supplying Atlas Portland and Hoffman Rosendale cements for the Metropolitan Water Works at Spot Pond, Stoneham, Mass. They are furnishing Meier's Puzzolan Cement for the stonework in the building now being erected at the corner of Washington and Bedford Streets, Boston; Peabody & Stearns, architects: Norcross Brothers, builders. Also, the Welsh quarry tiles for floor work at Randall Hall, Cambridge, and Pumping Station, Chestnut Hill Reservoir.

H. E. FULLER & CO., Boston, report that they are furnishing the architectural terra-cotta for the Steiger Block, Holyoke, Mass., G. P. B. Alderman, architect; for the Masonic Block, Brockton, Mass., J. W. Beale, architect; for the Old Ladies' Home, Fitchburg, Mass., H. M. Francis, architect; and for a public school building, Somerville, Mass., Prescott & Sidebottom, architects.

THE CONKLING-ARMSTRONG TERRA-COTTA COMPANY, through their Eastern representative, E. E. Nickson, have closed contracts to furnish the architectural terra-cotta for the following buildings: Additions to the Slater Villa, Newport, R. I., Peabody & Stearns, architects; residence for H. H. Cook, Lenox, Mass., Peabody & Stearns, architects; St. John's Church, East Boston, Mass., Martin & Hall, architects, Providence.

BRACKET USED ON RESIDENCES, 108TH STREET, NEW YORK CITY.
Work executed by the New York Architectural Terra-Cotta Company.
Janes & Leo, Architects.

THE CELADON TERRA-COTTA COMPANY, LTD., have secured contracts to furnish their roofing tile for the following buildings: Billiard hall, for A. C. Burrange, Cohasset, Mass.; Frederick N. Reed, architect. Office building, Raritan Copper Works, Perth Amboy, N. J. Library for R. B. Raney, Raleigh, N. C.; C. M. Cassell, architect. Residence for James J. Mossers, Allentown, Pa.; Jacoby & Weishampel, architects. Phelps Medical and Surgical Sanitarium, Battle Creek, Mich.; Robert B. Newbury, architect. Residence, Mrs. Amelia Schlosser, Chicago, Ill.; W. A. Otis, architect. Township High School Building, Evanston, Ill. Residence for E. M. Young, Allentown, Pa.; Jacoby & Weishampel, architects. Summer house for D. R. Willard, South Hanson, Mass.; Frederick N. Reed, architect. Two houses for Adrian Iselin, New Rochelle,

N. Y.; Percy Griffin, architect. Hoagland Memorial Church at Dover, N. J.; Paul G. Botticher, architect.

The Tiffany Enameled Brick Company report that they have just received an order to furnish their white enameled brick for the front of the Tribune Building, Minneapolis, Minn., Frederick Kees, architect. The building will be handsomely trimmed with enameled terra-cotta. They also state that they will serve their cream enameled brick for the large court of the new Marshall Field office building, corner Court and Park Streets, Chicago, D. H. Burnham & Co., architects; their dull finished white enameled brick for a building front at Booneville, Mo., Samuel W. Ravenal, architect; and a similar material for the front of E. T. Mithoff's new building at Columbus, Ohio, C. A. Stribling & Co., architects. These brick are identical with those used last year by Mr. Mithoff in the Betz Building at Columbus.

TERRA-COTTA CAPITAL.
Made by the New Jersey Terra-Cotta Company.

The Ludowici Roofing Tile Company have recently issued a small pamphlet setting forth the distinct advantages afforded by the use of their terra-cotta tile on iron framing for the roofing of industrial buildings, where it is essential that the roofs shall be at once efficient, durable, and fire-proof. Particular claim is made for the slightly absorbent qualities of their tile, as providing against the annoying drip incident under certain conditions of condensation to all other non-absorbent roof surfaces. A brief description is given of the sizes, weight, etc., of the tile, its interlocking principle, and the proper manner of laying same on roof. To render this last being more readily understood, the book contains two full-page illustrations; one being a scale drawing of a roof showing the iron construction and the manner of applying tiles without sheathing or book tiles; the other being an interior view of the Chicago Electric Light Station, showing the under side of these tiles when roof has been laid.

The Ohio Ceramic Engineering Company, of Cleveland, has enlarged its plant twice during the last eighteen months, and we are now in receipt of information that it has, within the last month, purchased an entire building adjoining, for the purpose of adding to the capacity of its present establishment. This addition more than doubles the floor space, and, as the company has already made arrangements to fill the additional space with machinery suitable for its requirements, it is needless to say that it will be in a much better position to handle its business than heretofore. From Mr. Robinson, the president of the company, we learn that business has been steadily increasing, and that the enlarged plant has become an absolute necessity to enable the company to properly care for its customers' wants. The company is now in a position to furnish anything in the line of machinery for plastic work.

The following letter was received by the Tiffany Enameled Brick Company and speaks for itself regarding the desirability of using enameled brick for exteriors in cities afflicted with the smoke nuisance: —

Chicago, June 10, 1899.

Tiffany Enameled Brick Company,
Marquette Building, City.

Gentlemen: — We wish to tell you how greatly we are pleased with the enameled brick front on our branch store at South Chicago. We erected this building in 1893 and used enameled brick as an experiment, and we have been delighted with the result. They make a very handsome front in the first place, and the ease and cheapness with which the brick can be cleaned makes them especially desirable for smoky cities like Chicago. You are at liberty to refer any one to us regarding your brick, should you care to do so.

Yours very truly,
Geo. B. Carpenter & Co.

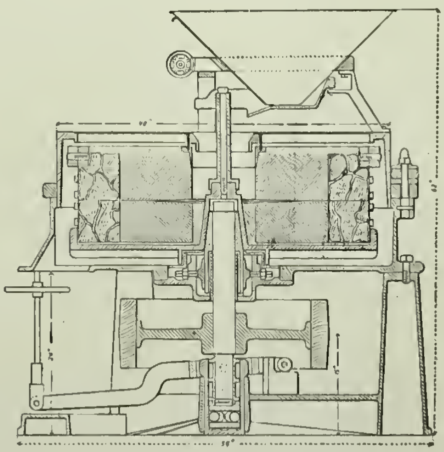
The Atlantic Terra-Cotta Company is now supplying the architectural terra-cotta for the following buildings: Terminal Hotel, Atlantic Avenue, Boston, Mass; Arthur H. Bowditch, architect. New York Yacht Club Building, New York City; Warren & Wetmore, architects. Building for the Penn Mutual Life Insurance Company, 921 Ludlow Street, Philadelphia, Pa.; Louis Hickman, architect. Dwelling houses, 105th Street and West End Avenue, New York City; Janes & Leo, architects. Apartment house, 182d Street and Broadway, New York City; Stein, Cohen & Roth, architects. Pittsburgh & Lake Erie Railway Station, Pittsburgh, Pa.; A. W. Falk, architect; J. A. Atwood, chief engineer. Delta Phi Building, Philadelphia, Pa.; Yarnell & Goforth, architects. Fire house, Yonkers, N. Y.; E. A. Quick & Son, architects. Apartment house, 40th Street and Girard Avenue, Philadelphia, Pa.; W. H. Whitall, architect. Apartment house, 12th and Spruce Streets, Philadelphia, Pa.; Yarnell & Goforth, architects.

The process of grinding by the use of millstones is one of the oldest mechanical arts known to man. It is, however, only within a comparatively recent period that any decided advance has been made in the use of improved millstones. This improvement consists in substituting for the softer stones in ordinary use millstones made from large blocks of Rock Emery.

Rock Emery, being as hard as a diamond, is peculiarly adapted to this purpose. An emery stone is always sharp; it never glazes, and cuts with unexampled rapidity.

Rock Emery Millstones are formed from blocks of emery rock in its natural state set in a filling of metal that is nearly as strong as iron. In use the metal filling about the blocks wears gradually away, slightly exposing the hard edges of the emery blocks, which cut like files. The bosom of this millstone and the furrows are made of a softer stone, that is easily cut away to suit any class of grinding.

To the small miller, as well as to the grinder of the hardest rocks, Rock Emery Millstones have an especial interest; as the emery face seldom requires dressing, thus dispensing with the necessity of a skilled miller.



PATENT HORIZONTAL MILL.

Emery Millstones are not expensive. They grind everything, and are by far the fastest grinders known. They are so hard and strong that they easily reduce rocks that would soon destroy all other mills. More than twelve hundred factories, some of them among the largest in the world, are using Rock Emery Millstones, reducing cements, paints, chemicals, carbon, soapstone, slate, marble, plaster, phosphates, barytes, infusorial earth, sand, and a long list of hard and soft materials.

These millstones are manufactured by the Sturtevant Mill Company, of Boston, Mass., and are made to fit any mill frame.

The cut shows a *mill* made especially for Rock Emery Stones. This mill has a 5 in. steel shaft, to which the runner is firmly fixed. The lower stone is raised and lowered by means of the hand wheel and lever, and the stones are kept in perfect tram without any attention of the miller.

The stones automatically separate to throw out bits of iron getting between them. They are fitted with special anti-friction ball-bearing steps which run in oil. The bed stone is bolted in, and cannot be got in wrong.

The stones can be entirely worn out without resetting, an advantage possessed by no other mill. It is difficult to obtain skilled millers, and this mill frame with emery stones not only grinds everything faster and finer than others, but requires less attention, and is capable of reducing substances that would soon destroy any other grinder. It is constructed to do a large amount of work, and to give the least possible trouble. Its few parts are interchangeable, and can be replaced at small expense.

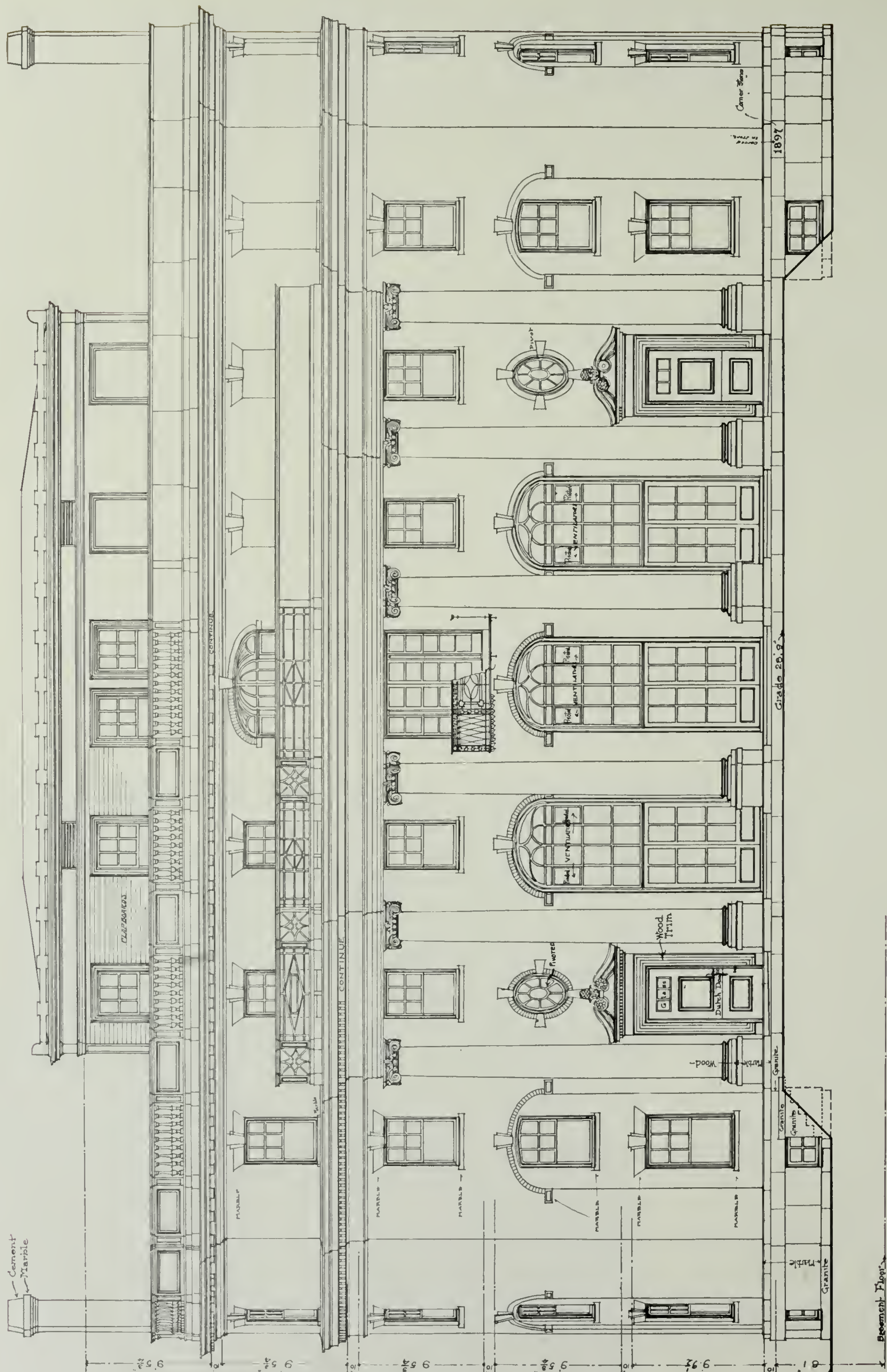
We think any miller will recognize by the cut that this mill is the simplest, strongest, and by far the best he has yet seen.

The face of the Rock Emery Stone, it will be remembered, seldom requires dressing and is always sharp.

WANTED.

PRESSERS AND FINISHERS WANTED AT THE WORKS OF THE PERTH AMBOY TERRA-COTTA CO., PERTH AMBOY, N. J. APPLY TO FOREMAN, W. W. HENRY.

VOL. 8. NO. 7. PLATE 49.

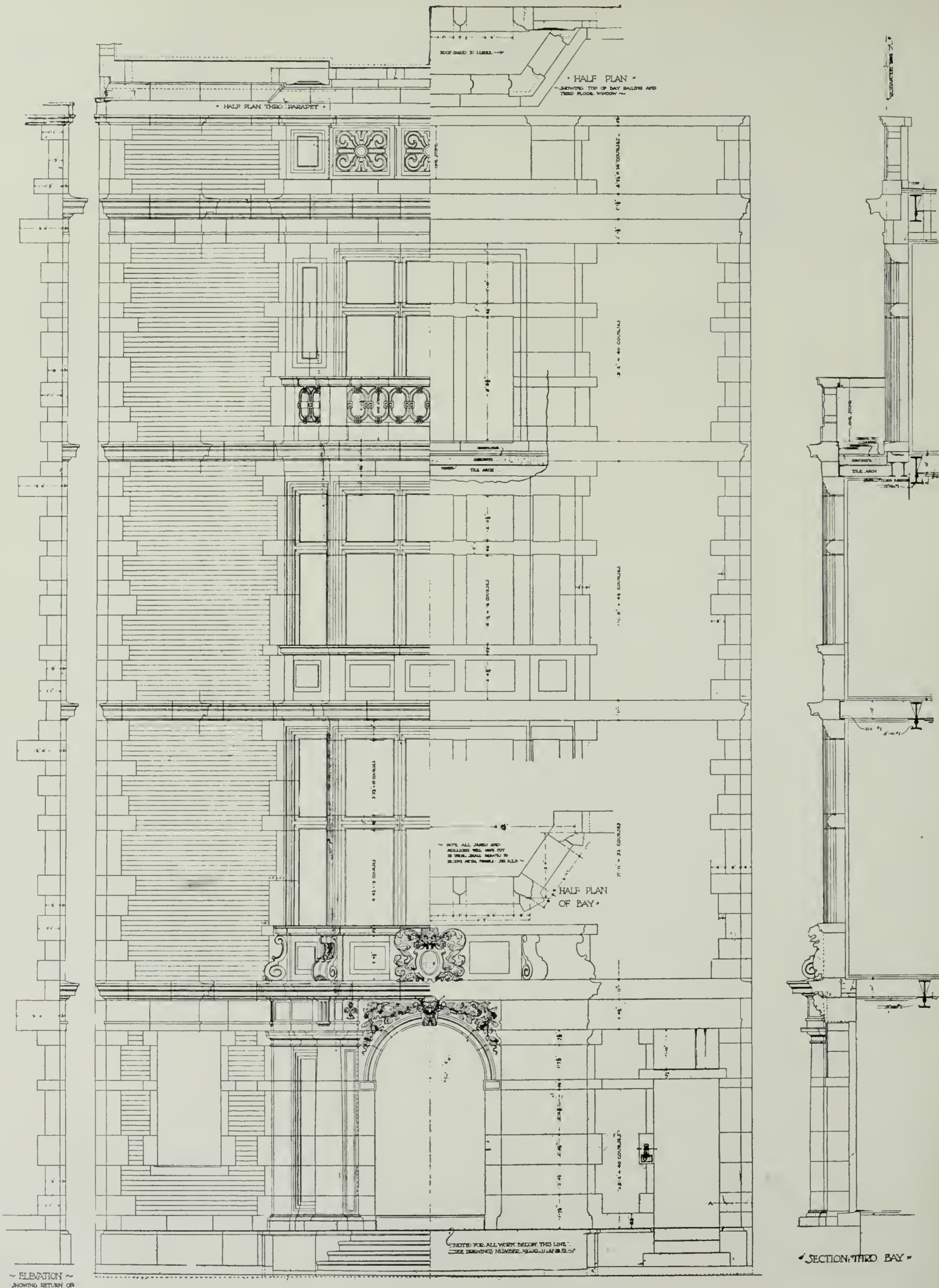


FRONT ELEVATION.

BERZELIUS DORMITORY, NEW HAVEN, CONN.

BRITE & BACON, ARCHITECTS.

(Illustration from photo. of building shown on page 144.)

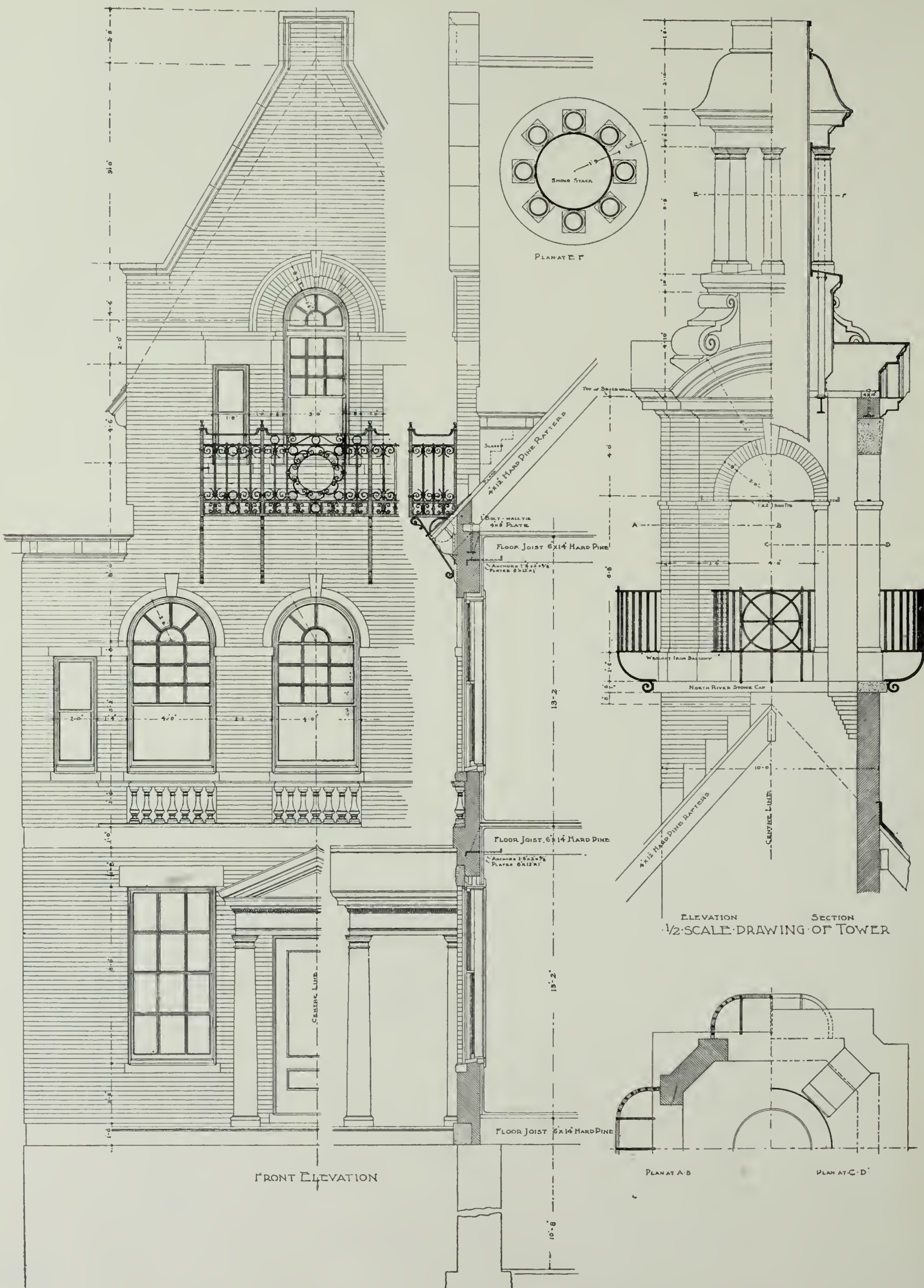


DETAIL, FRONT ELEVATION.

HOUSE No. 1 EAST 76TH STREET, NEW YORK CITY.

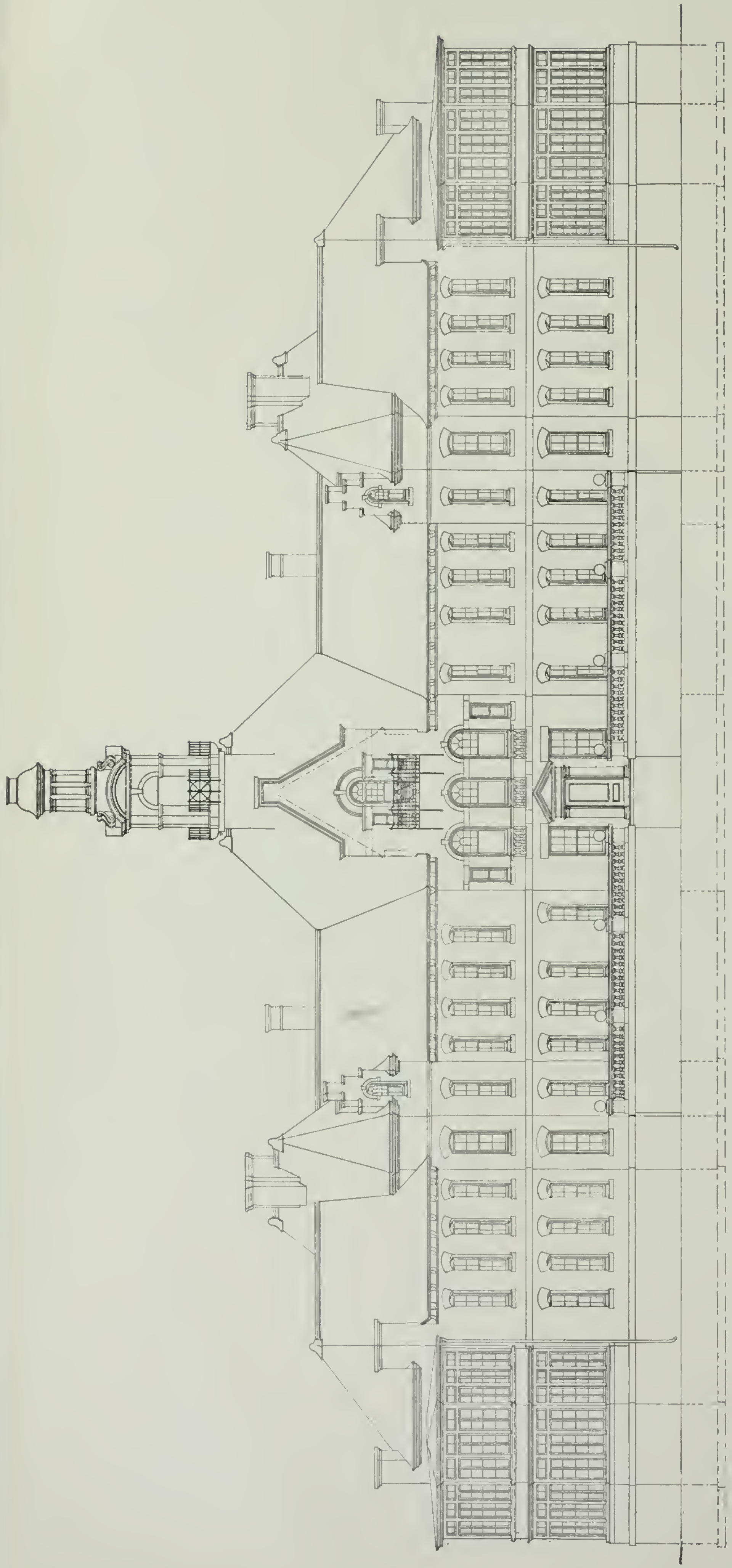
BRITE & BACON, ARCHITECTS.

(Elevation shown on page 143.)

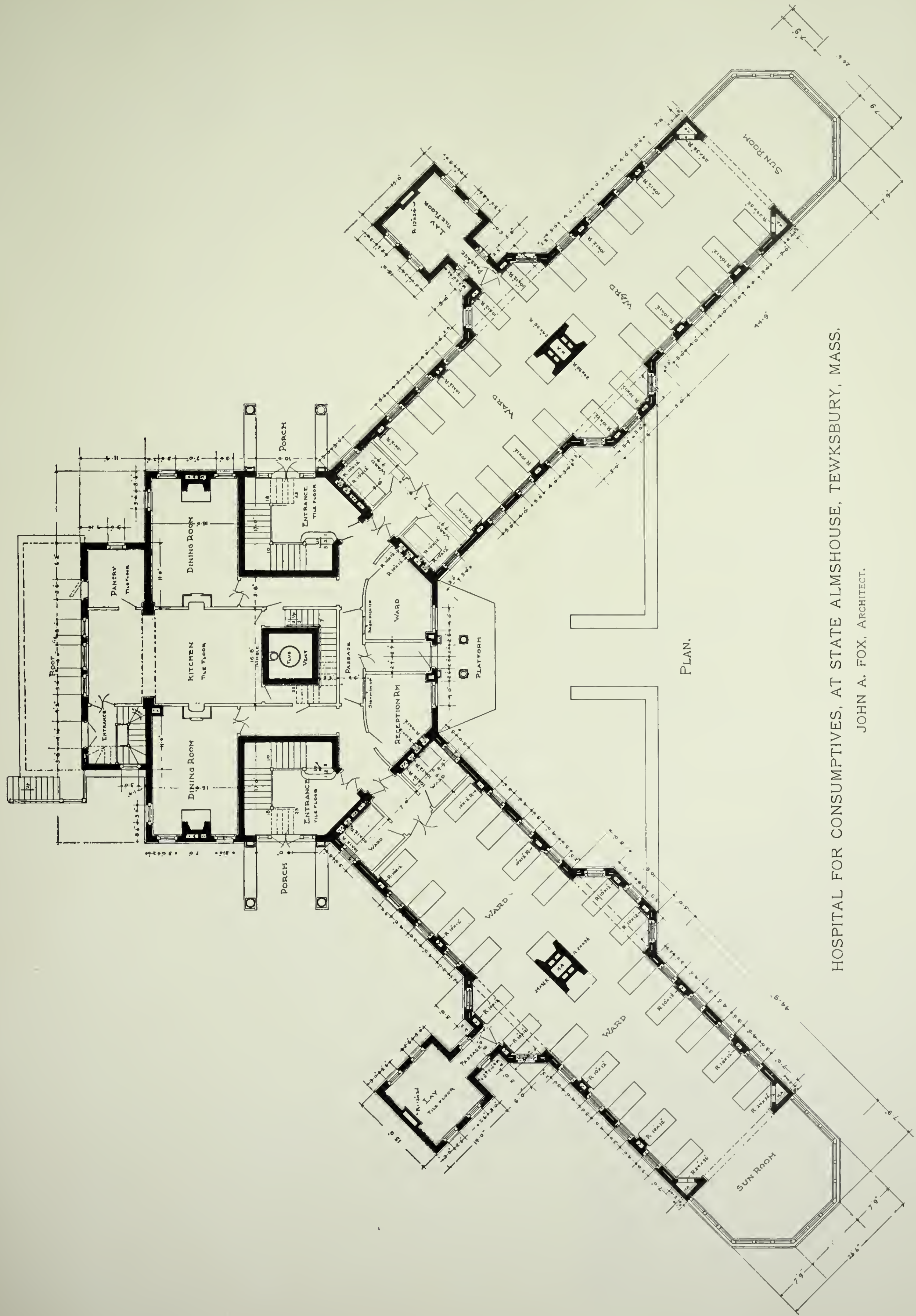


HOSPITAL FOR CONSUMPTIVES, AT STATE ALMSHOUSE, TEWKSBURY, MASS.

JOHN A. FOX, ARCHITECT.



FRONT ELEVATION.

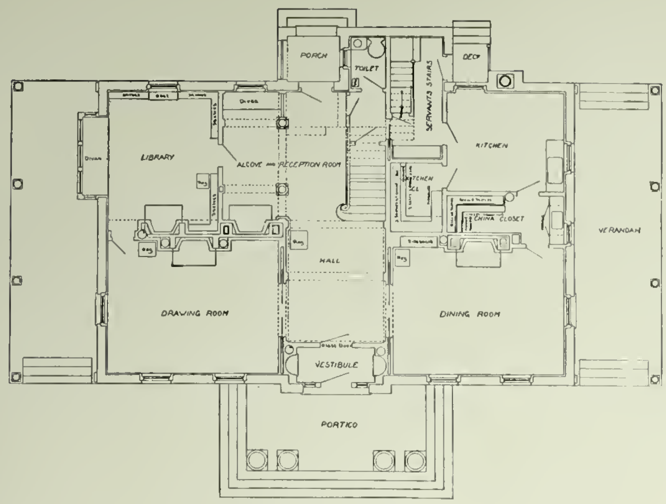


PLAN.

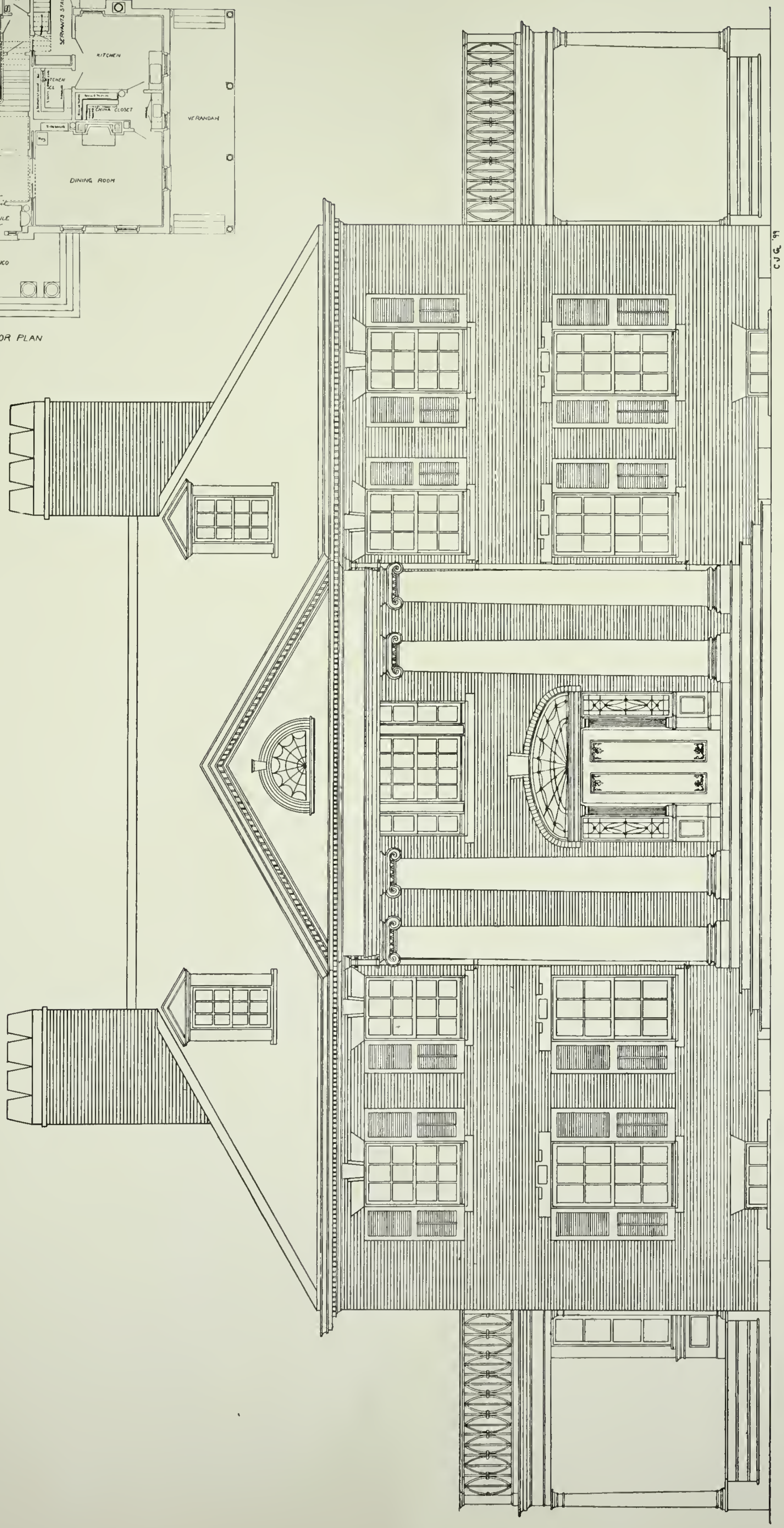
HOSPITAL FOR CONSUMPTIVES, AT STATE ALMSHOUSE, TEWKSBURY, MASS.

JOHN A. FOX, ARCHITECT.

VOL. 8. NO. 7. PLATE 54.

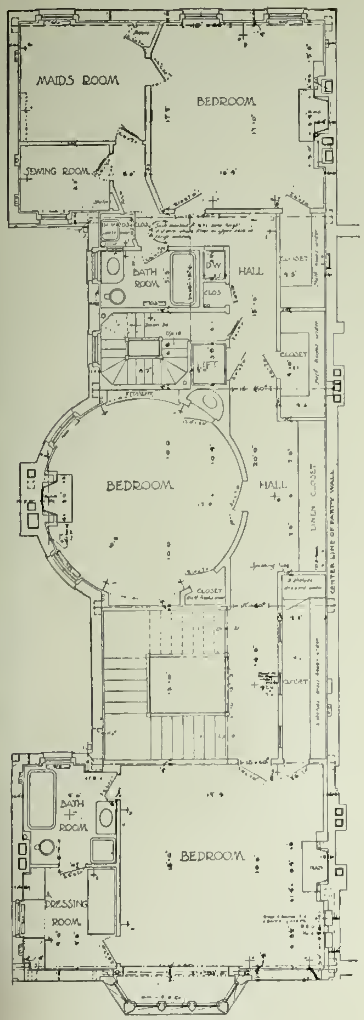


FIRST FLOOR PLAN

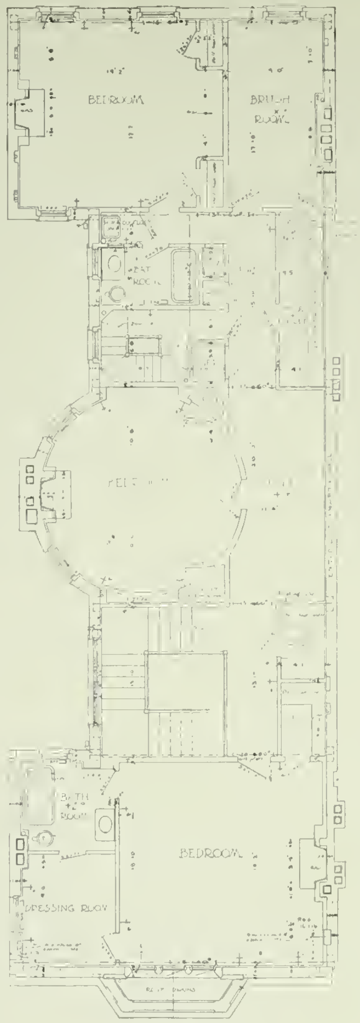


HOUSE AT ATHENS, OHIO.

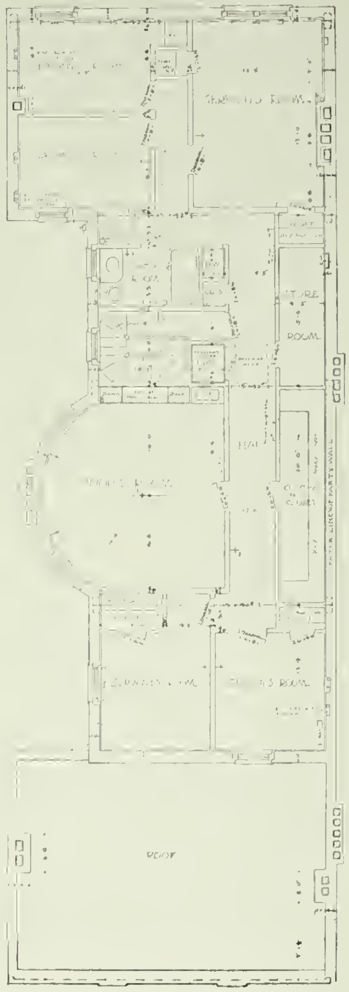
CRAM, GOODHUE & FERGUSON, ARCHITECTS.



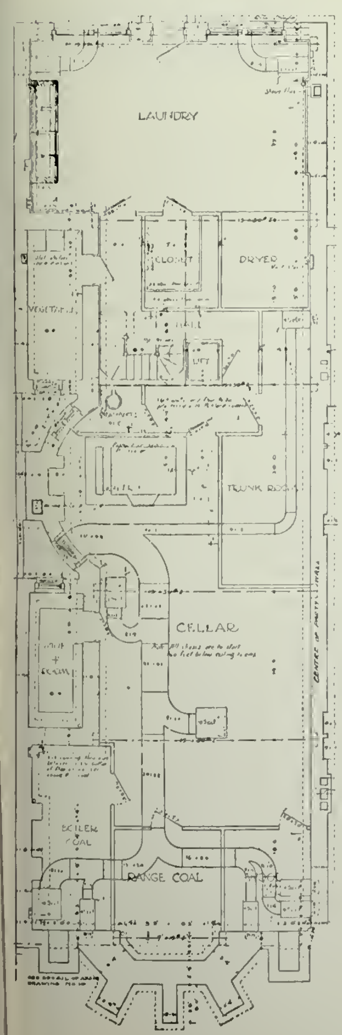
SECOND FLOOR.



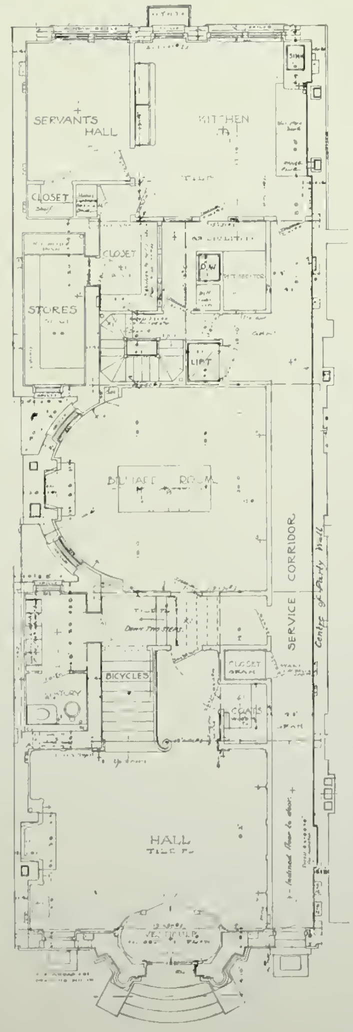
THIRD FLOOR.



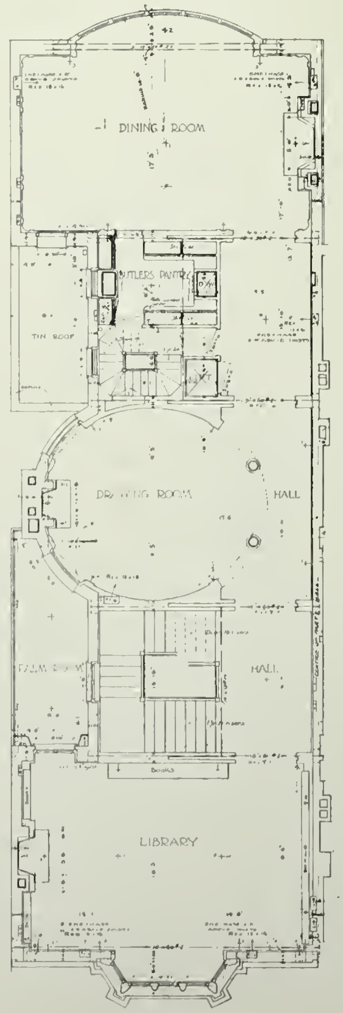
FOURTH FLOOR.



BASEMENT.

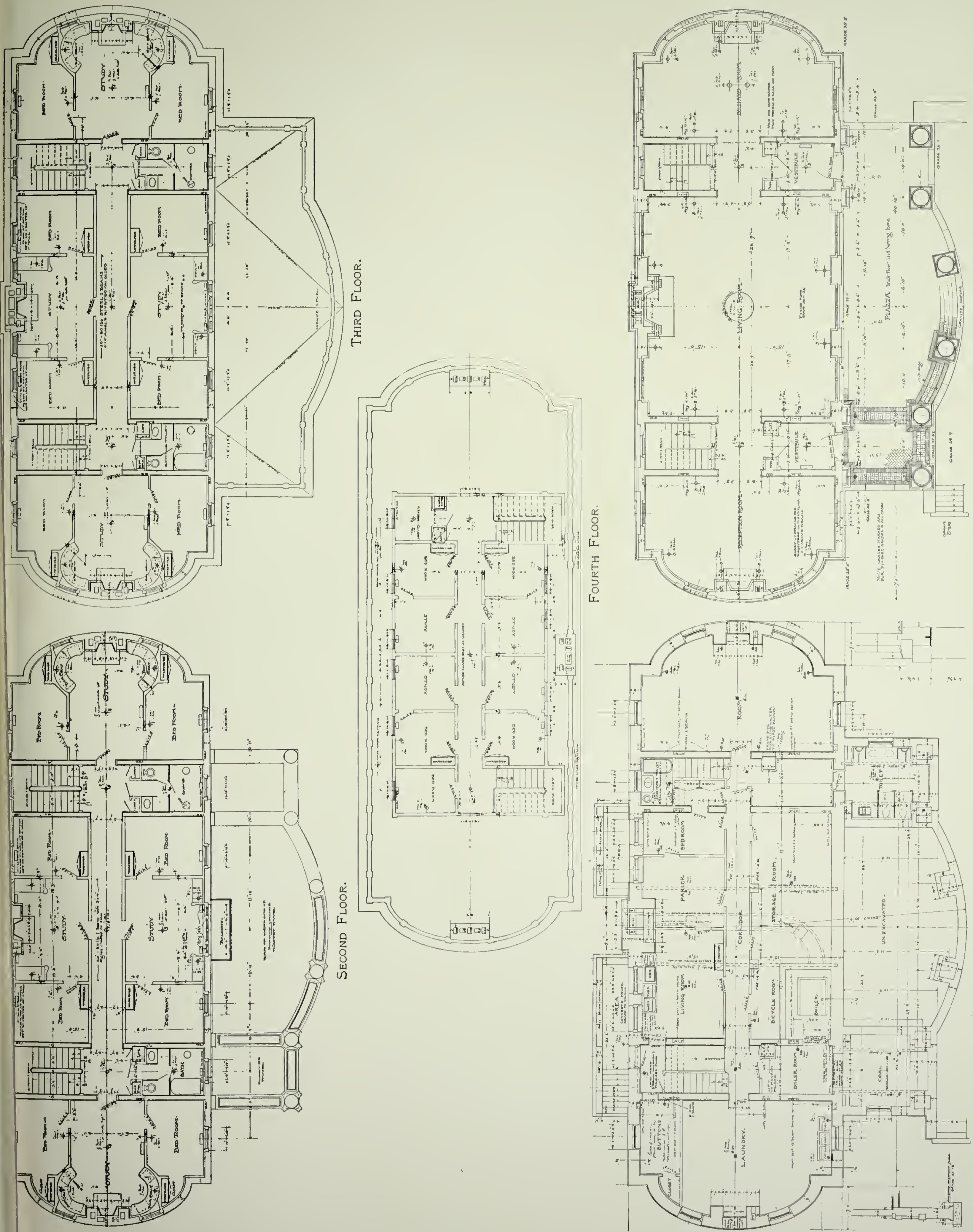


GROUND FLOOR.



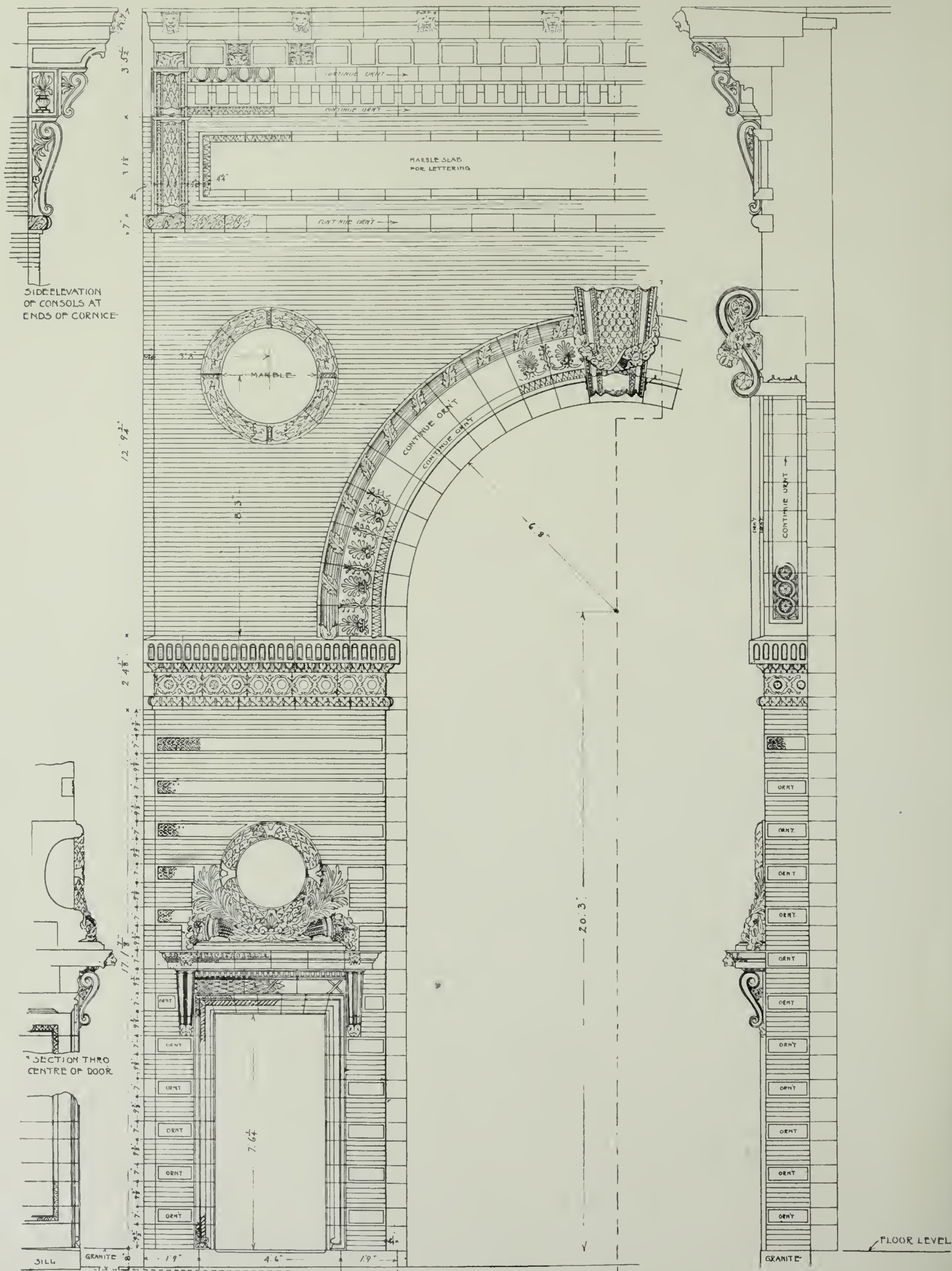
FIRST FLOOR.

PLANS, HOUSE No. 1 EAST 76TH STREET, NEW YORK CITY.



PLANS, BERZELIUS DORMITORY, NEW HAVEN, CONN.

BRITE & BACON, Architects.

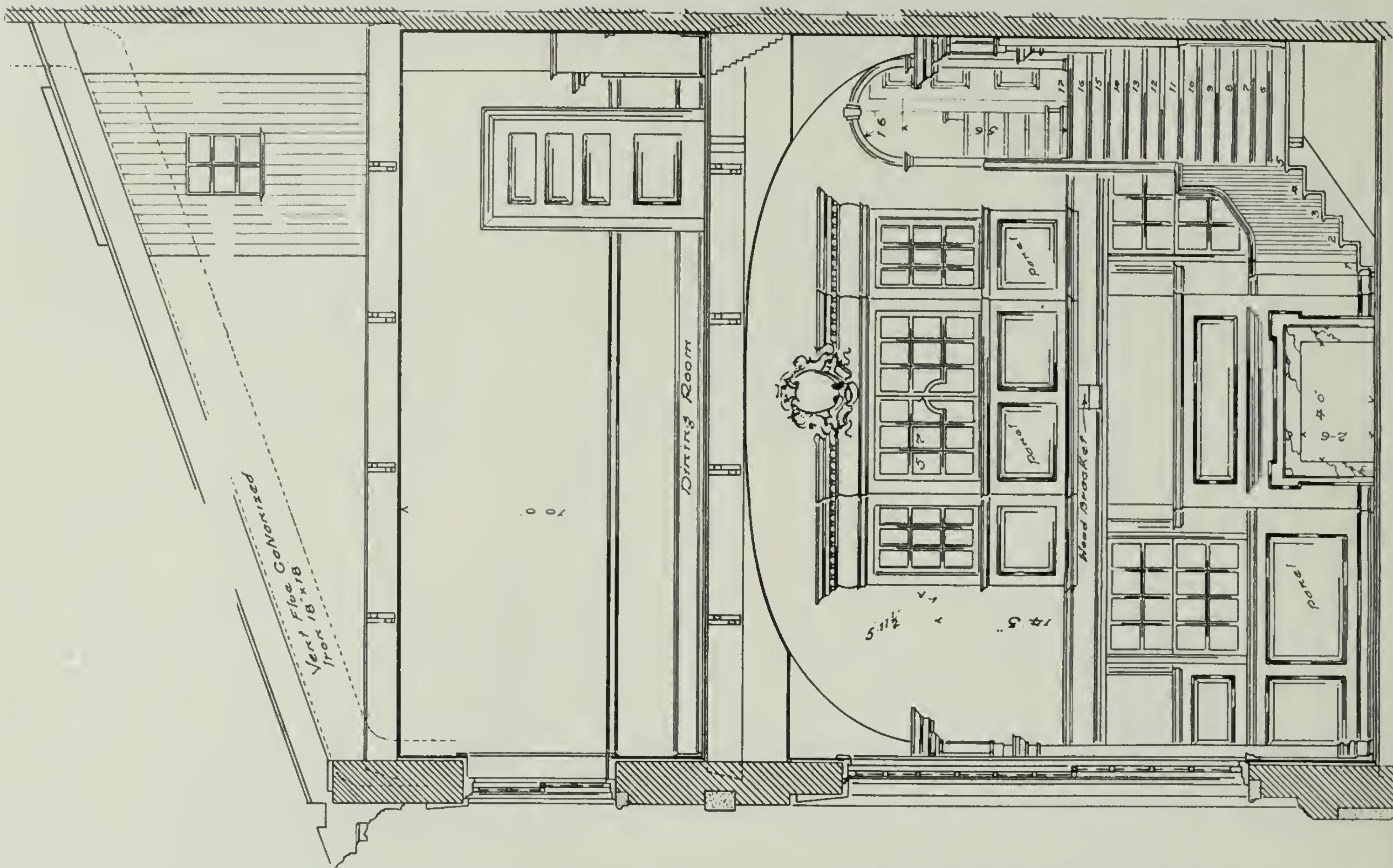


Detail of Front.

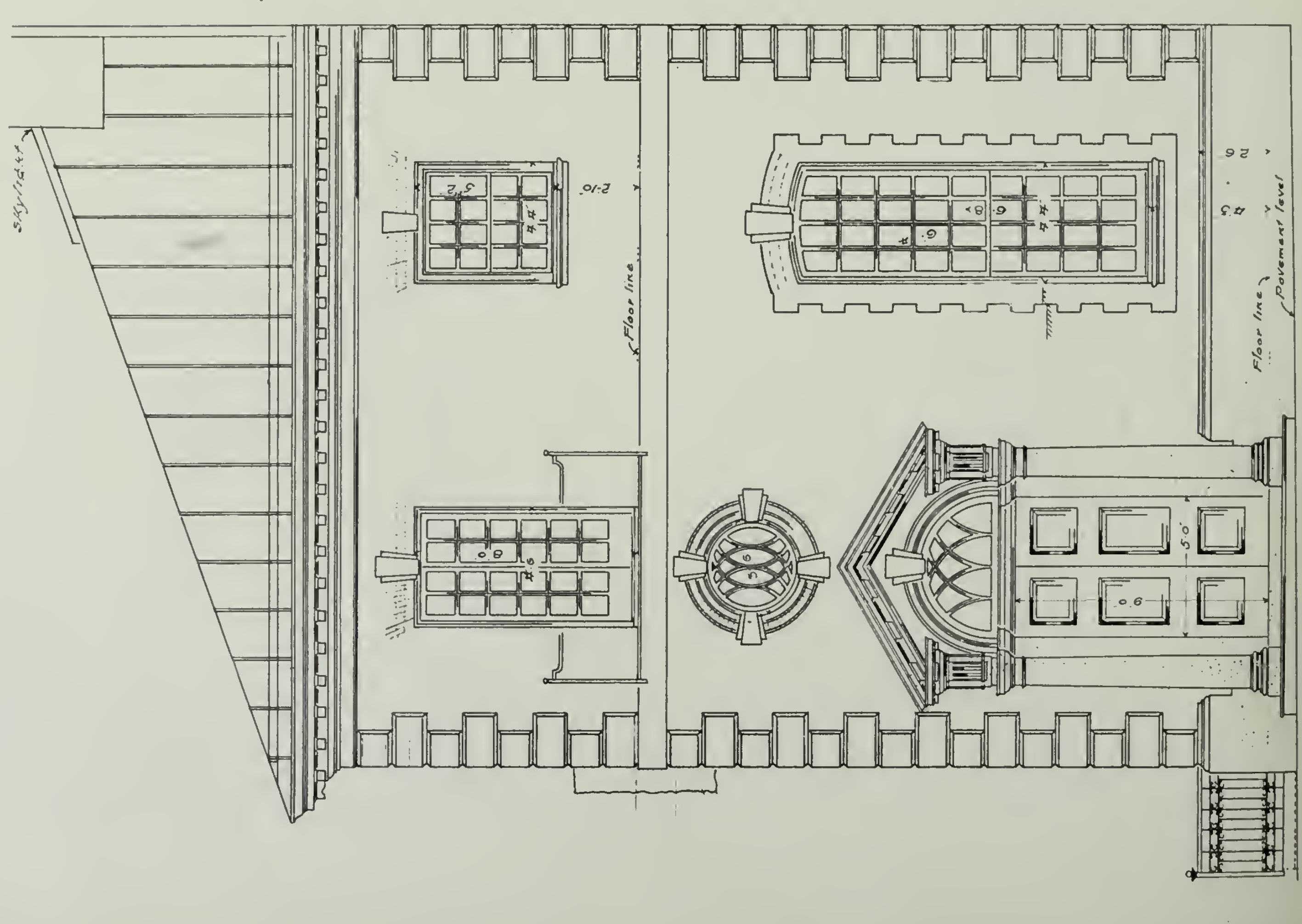
COMMERCIAL NATIONAL BANK BUILDING, PITTSBURGH, PA.

ALDEN & HARLOW, Architects.

VOL. 8. NO. 8.



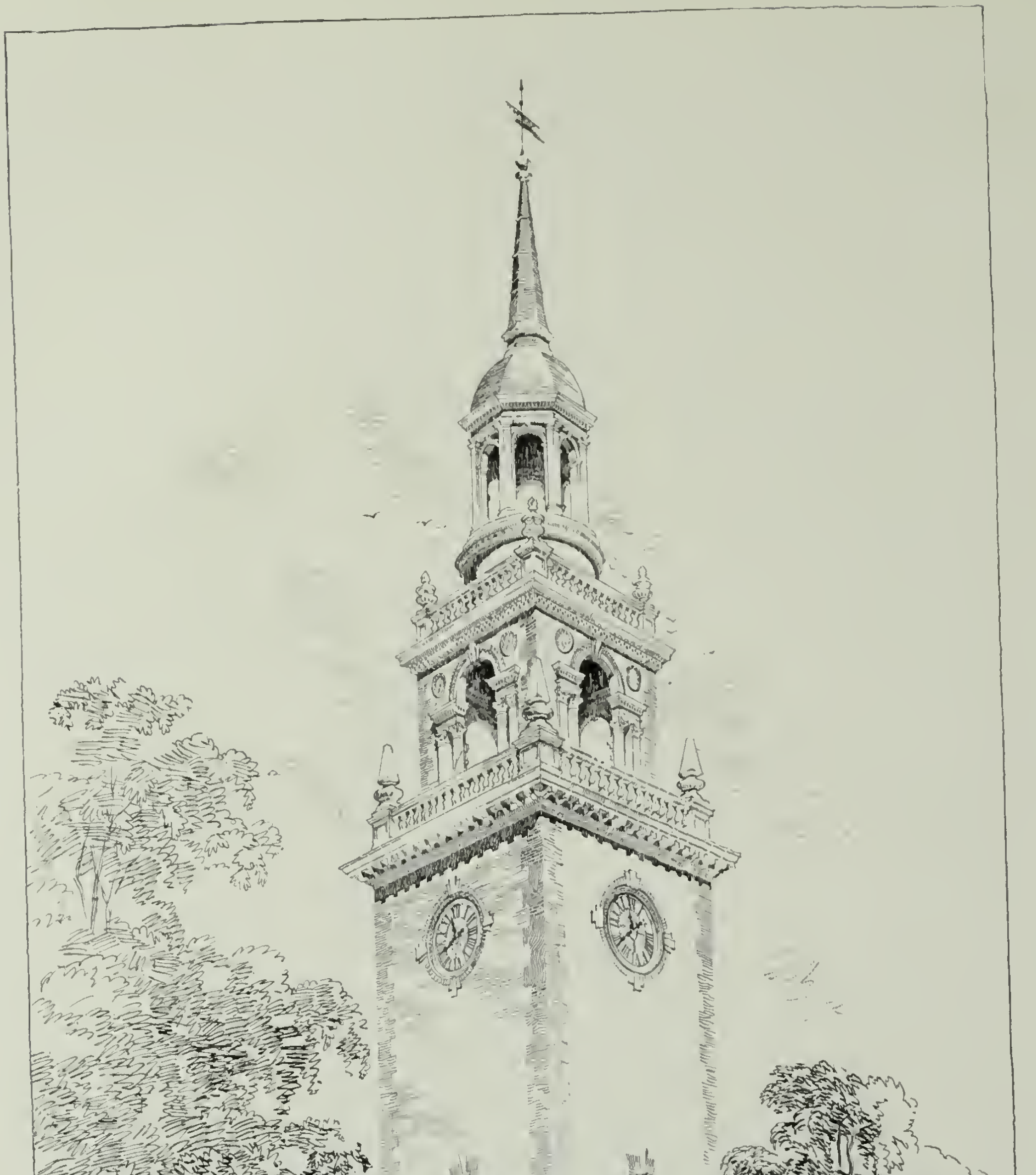
Transverse Section.



Chestnut Street Elevation.

COMPETITIVE DESIGN FOR A MEMORIAL MONUMENT, TO BE ERECTED BY THE STATE, AT DORCHESTER HEIGHTS, BOSTON, MASS.

CRAM, GOODHUE & FERGUSON, Architects.



SUCCESSFUL DESIGN.

COMPETITIVE DESIGN FOR A MEMORIAL MONUMENT, TO BE ERECTED BY THE STATE, AT DORCHESTER HEIGHTS, BOSTON, MASS.

PEABODY & STEARNS, ARCHITECTS.

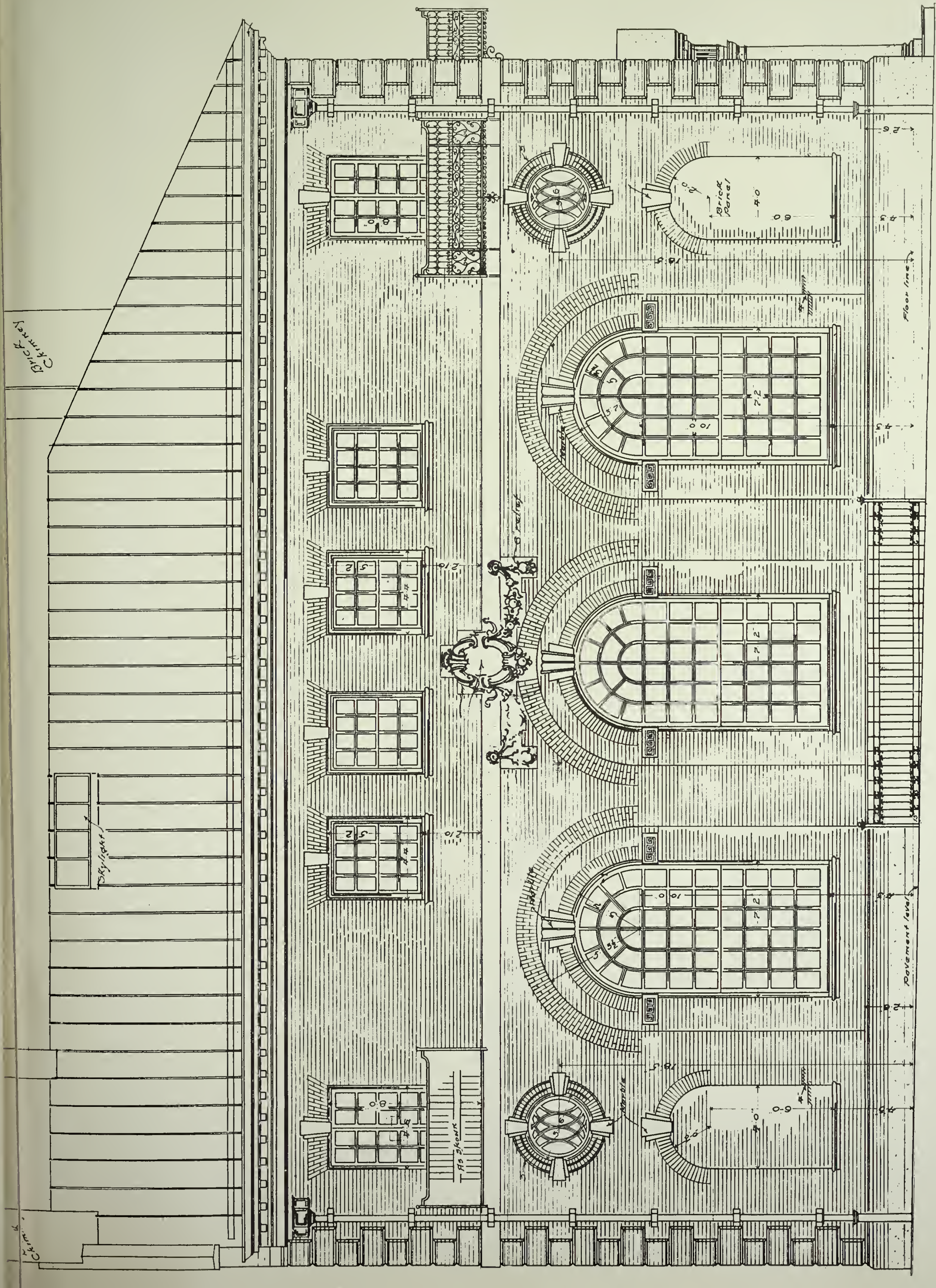
COMPETITIVE DESIGN FOR A MEMORIAL MONUMENT, TO BE ERECTED BY THE STATE, AT DORCHESTER HEIGHTS, BOSTON, MASS.

A. W. LONGFELLOW, JR., ARCHITECT.

COMPETITIVE DESIGN FOR A MEMORIAL MONUMENT, TO BE ERECTED BY THE STATE, AT DORCHESTER HEIGHTS, BOSTON, MASS.

R. CLIPSTON STURGIS, Architect.

PLATES 58 and 63.

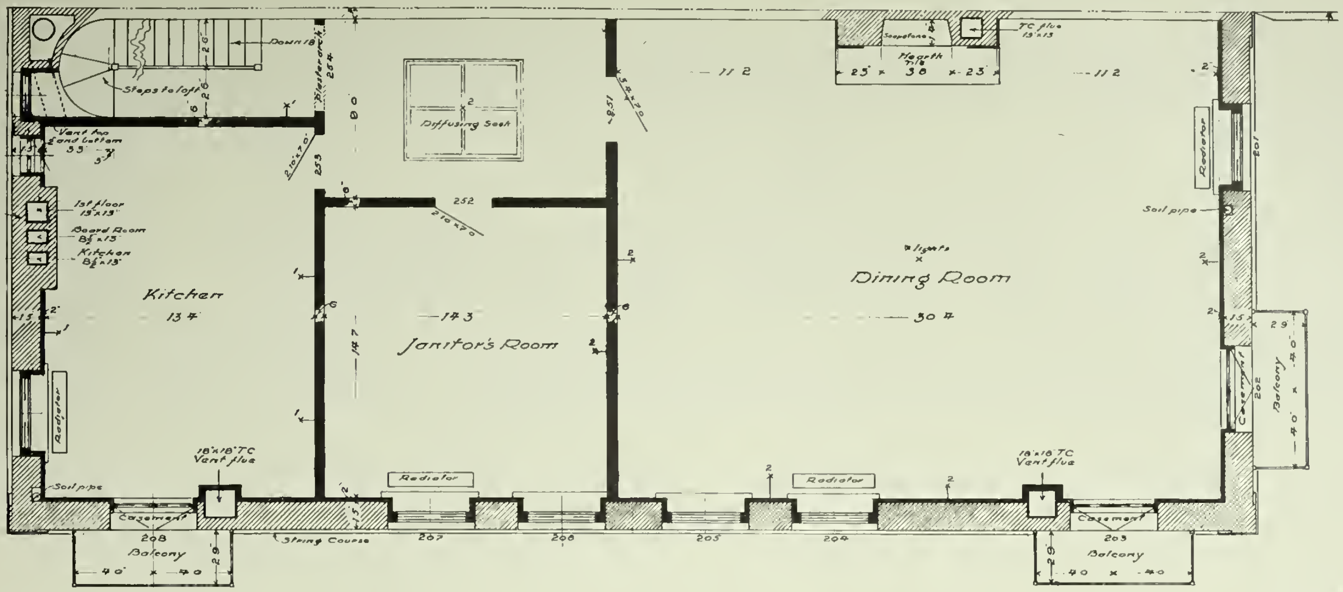


THIRD STREET ELEVATION.

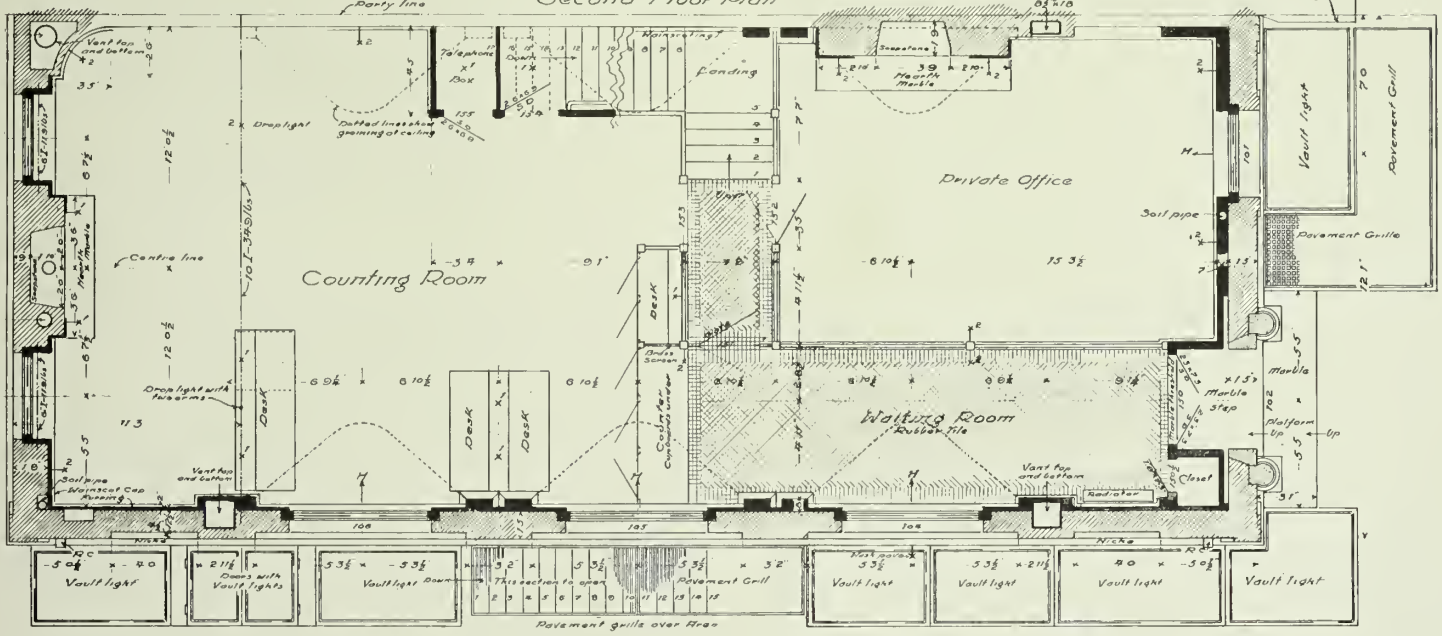
COUNTING HOUSE, THIRD AND CHESTNUT STREETS, PHILADELPHIA, PA.

WILSON EYRE, JR., ARCHITECT.

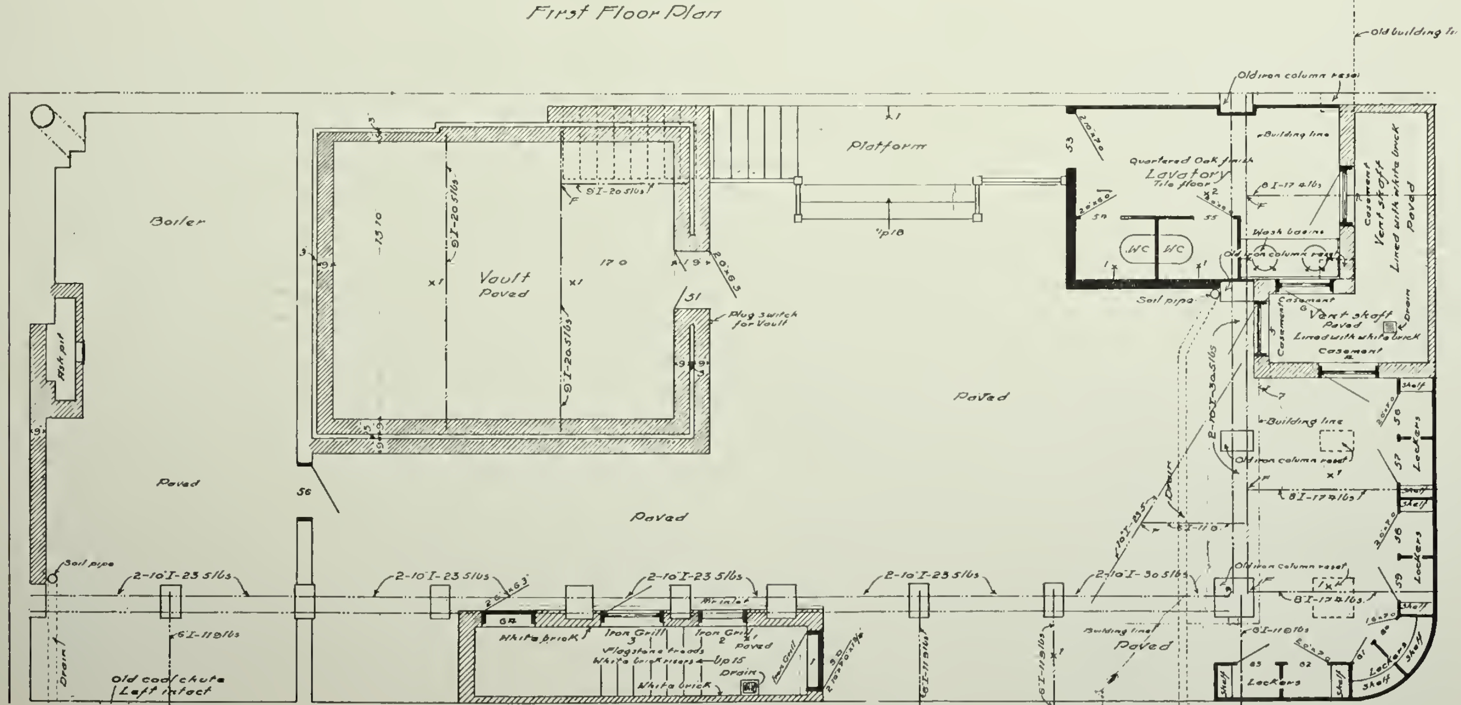
(See additional illustrations in letterpress.)



Second Floor Plan



First Floor Plan



Basement.

PLANS, COUNTING HOUSE, THIRD AND CHESTNUT STREETS, PHILADELPHIA, PA.

WILSON EYRE, Jr., Architect.

THE BRICKBVILDER
VOL. 8
NO. 8
AUGUST
1899

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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P. O. BOX 3282.

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TIME IN BUILDING.

THE saying that time is money is an adage which is so thoroughly recognized in our modern business undertakings, that anything looking towards a reduction of time required is considered a regardable factor in every undertaking. This is particularly true in building. When we read accounts in the past of how a building of no more magnitude than the Farnese Palace consumed year after year, and, in fact, almost generations of continued effort, and compare the results with what is often accomplished nowadays in a few months, we have an uneasy feeling that either our ancestors took too much time, or that we do not give the work the attention which it requires. As a matter of fact, however, speed in building operations is by no means inconsistent with the best of workmanship. That is to say, that through the proper organization on the part of the builder with the facilities which are within reach of every one who has the money to buy them, it is possible to erect a building of almost any size in the course of a very few months. There have been phenomenal stories from time to time of the rapid rate at which some of our Western structures have sprung up, almost like mushrooms. We recall one case particularly of a building covering 8,000 ft. which was practically completed, as far as related to all the structural work, inside of ninety days. The function of the burnt clay industries in reducing the necessary time for building is unquestionable. We hear complaints of delays due to terra-cotta, and how hard it is to get orders filled promptly and on time, and yet any one who has had practical experience with stone knows that while the crude material, if it can be obtained, can be set quickly and effectively, only half the battle is then won, as it has to be cut in place and by hand, which would not be the case with the more readily obtained, more elastic, and more readily duplicated terra-cotta. Of course, given ample time in advance to get out every stone and to have everything numbered and ready to put right in place, one material can serve as well as another; but such conditions rarely obtain in a modern commercial building. Seldom are the plans definitely decided upon until after the contract is signed, and it has been our experience that under such conditions, if there is a great deal of repetition in a building, terra-cotta is the only material which lends itself to rapidity of execution.

As regards the main bearing walls in an ordinary building, brick is the only material which can be depended upon in a rush job. We have to wait for cast iron, we always wait for structural steel, and usually have to wait for cut stone, but brick can be had by the million on short notice in all our large cities, and it is the use of brick and terra-cotta, and the fact that it can be put in so readily, set in place without delay, and handled without special machinery that enables our modern commercial buildings to so outdistance the records of the past.

One of our largest builders some time since amused himself by making calculations as to how much time he would require with modern machinery and appliances to construct the great Pyramid. Our recollection is that the time was something like sixteen months. This is on the assumption that it was to be constructed of block granite, but if it were to be constructed of brick throughout, he estimated that he could contract to complete the whole inside of nine months. This would be at the rate of something less than one hundred million brick a month. These are mere speculations, to be sure, but the fact is almost beyond question, that to secure the economy of time which is so necessary to modern investment, the burnt clay products of necessity are called upon to furnish the bulk of material.

MONTEVENTOSO.

IF an essential element in the temperament of an architect is a liberal endowment of vivid imagination, we are quite sure that no one will question Mr. Goodhue's ability. "Monteventoso" is an artist's dream which must appeal to every one who loves pure imaginative design, and if discoveries of the sort which Mr. Goodhue has made at the base of the Apennines could be extended so as to reflect a little of the same spirit in more of our modern structures, and cast a measure of romance over the humdrum steel beams and brick arches of our daily bread and butter, our metaphors might become decidedly mixed, but our art would be far happier. It is a curious phase of the present state of architecture in this country that we see the extremes of the most matter-of-fact, dry-as-dust, uninteresting, constructive work right alongside of the most poetic, imaginative work which in some respects the world has ever seen. And in our streets, though commerce reigns supreme and questions of return on the investment are assumed to be more important than matters of pure art, we yet see every day a constantly increasing proportion of the purely picturesque and an ever growing tendency on the part of our architects to look at their art through the rose-colored glasses which make life so enjoyable. We have now the opportunities in the way of materials, our clients have the money, and if we do not succeed in producing within the next generation works of a high esthetic character it will not be because they are unexpected or unwelcome. We need the imaginative treatment which Mr. Goodhue has manifested so happily. We need more of it in our brick and terra-cotta, in our decorations, and in our point of view as well, and perhaps "Monteventoso" may be an incentive to some of the younger men, who seem to be in the rut of mere routine, to lift their eyes beyond the everyday, uninteresting work which forms the bulk of the grind in every large office, and see the delights and the esthetic possibilities of architecture, the most fascinating of the arts.

WE were witness to a rather interesting test of the strength of a brick arch a few days since. A building was in process of demolition which had stood in place ever since 1858. The floors were constructed of brick arches turned between cast-iron beams: steel was not known in those days. The arches were 4 ins. thick at the crown, spanning about 4 ft. 6 ins., and the haunches were filled up level with concrete. The mortar in which the bricks were set appeared to have very little cement in it. In taking down the upper portion of the building a heavy stone weighing in the vicinity of a ton dropped from a height of about 30 ft. It struck fairly in the center of one of the arches and broke a hole clean through the brickwork slightly larger than the stone, without, however, dislodging any of the remainder of the brickwork. The masonry about the gap was perfectly secure, and did not seem to be damaged at all by the shock. This is the result which it is usually claimed will follow an accident, though we have no doubt considerable of the strength of this particular arch was due to the mortar, which had been slowly hardening during the last forty years.

A. I. A. CONVENTION.

PREPARATIONS are being made for the annual convention of the American Institute of Architects, which is to be held in Pittsburgh the 13th, 14th, and 15th of November next, and with the prosperity which seems to be dawning upon architects it ought to be possible for many of the profession to attend this convention and derive great mutual benefit therefrom. The value of conventions of this sort does not lie in the mere addresses or exhibitions which are offered in connection therewith, though these are often of very decided merit, but it is rather in the comparing of notes, the readjustment of mutual standards, the bringing together of different minds from different parts of the country, and the awakening process which usually results therefrom that the benefit to the profession is most surely to accrue. It is not good for man to be alone in this world, and the best of architects would do but poor work if they had no one but themselves to depend upon. We are fortunately obliged to help each other. And while past conventions of the American Institute have left much to be desired, and have not always attained the high standard of possibilities which their being might imply, we cannot afford to forego what they have offered, and each year it seems as if there was more reason for their existence, and more positive measurable good resulting to those who attend them in the spirit of mutual help and study.

MISCELLANEOUS.

A CHALDEAN BRICK. — What is asserted to be the oldest brick in existence was recently exhibited at a meeting of the Académie des Inscriptions et Belles-Lettres, of Paris, by M. Henzey, the keeper of the Louvre. It is supposed to date from the fortieth century before Christ, and was discovered at Tello, the ancient Sirpulo, in Chaldea, by the French archæologist, De Sarzee. The brick in question was curved in shape, and, while it had been baked, it did not show any signs of having been pressed or molded. The mark of the maker was merely the impress of his thumb, and the specimen is, without doubt, one of the earliest marks of civilization ever discovered. As brickmaking is the earliest of the known arts, this particular piece must mark very nearly the dawn of civilization. — *New York Evening Post.*

ARCHITECTS FOR PAN-AMERICAN EXPOSITION, BUFFALO. — The allotment of the architects for the various buildings of the Pan-American Exposition to be held at Buffalo in 1901 is as follows: Liberal Arts and Agriculture, Shepley, Rutan & Coolidge, of Boston; Machinery and Transportation and Electricity, Green & Wicks, of Buffalo; Electric Tower, Howard, Cauldwell & Morgan, of New York; Stadium and Administration, Restaurant, Station, and Cloister, Babb, Cook & Willard, of New York; Horticulture, Forestry, and Graphic Arts, Peabody & Stearns, of Boston; Temple of Music, Esenwein & Johnson, of Buffalo; Mines, Ethnology, and three entrances, George Cary, of Buffalo; landscape plan, bridge, south approach, and all formal landscape work, except the entrance court, Carrere & Hastings, of New York. The block plan has been adopted for the general arrangement of the buildings, the site of which will comprise a tract of about 212 acres adjoining Delaware Park.

HIGHER COST OF BUILDING. — The *Record and Guide*, of New York, in discussing the higher cost of building as applied to that city, presents some interesting figures as follows: —

One of our busy architects has given us a case that is typical of general conditions. About three months ago he drew plans for an eight-story mercantile building, the cost of which, estimated upon then current prices, was to be $45,000. His client proceeded to finance the operation upon that basis, and three months later, that is, the other day, concluded to begin work. Actual estimates were then received, and it was found, to the confusion of every one, that prices had advanced about one third. We are speaking now of the lowest estimate obtainable. Instead of costing $45,000, nearly $60,000 were needed to complete the building. As illuminating the subject, we append a few of the actual estimates received, comparing them with those of three months ago: —

	Prices Three Months Ago.	Lowest Present Prices.
Ironwork	$14,500	$23,895
Plumbing	1,280	1,975
Steam heat	2,400	3,600
Roofing, etc.	1,800	2,800

Mason work, labor 10 per cent. advance.
Hardware, 100 per cent. advance.

Exactly in what way the matter will work itself out, it is not easy to see. Some people are inclined to think that a great many of these "suspended" operations will only be temporarily delayed. Investors and operators will wait for a time, but when they find that the advance in prices is not a merely temporary circumstance they will adjust themselves to the situation and get to business. Work must go on. Prices may even go higher, and each advance will frighten a certain number of people into doing something from fear of finding themselves in a worse position by and by. We are inclined to think that the builder will be wisest who accepts the present market as being as favorable as anything he will get for at least a year or two to come. Prices that have ruled, of recent years, have been ruinously low, and the man who did not take advantage of them has missed his chance for the present. The prosperity of the country must have its due effect on the building material market and on real estate, and the facts which we have just been discussing indicate that the "marking-up" process has commenced in earnest. Real-estate investors and owners should note these facts.

MONTEVENTOSO·
by BERTRAM·G·GOODHVE
(Concluded)

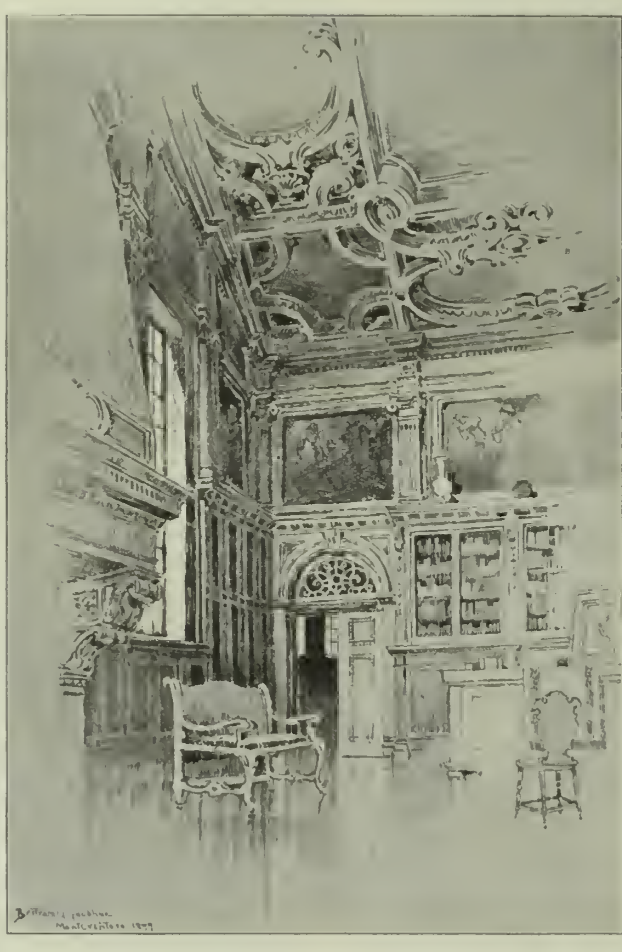
IN every Italian town, even the humblest, there are many things of interest, perhaps grandeur, and in and about the narrow streets of Monteventoso one can scarcely stroll more than a few moments without coming across something, a window or balcony, a fountain or loggia, which is bound to arrest the attention of the passenger.

In the Borgo della Montagna,— a strange, dirty quarter on the western slope of the hill which is surmounted by the church of Saint Catherine, and almost as steep and unexpectedly laid out as the *Contrada degli Avvellenatori*,— is the most architectural, if one may use the word, portion of the town, the haunt of the most delightfully unexpected glories. At one time apparently the Borgo della Montagna was the aristocratic ward — the Faubourg Saint Germain, so to speak. Starting at the corner of the *piazza* it stretches down the hill to the Arch of Gian Galeazzo Visconti and southward to the old monastery garden, now used by the peasants as a sort of Pingreeized space set apart for their special delectation in the way of raising vegetables, and by the goats as a public training ground.

Just before you reach the top of the hill — that is, about three hundred steps from it — is an old stone palace of Ghibelline tendencies, outwardly as stern and uncompromising as the vengeance its owners were wont to wreak. But despite its severity it is now the home of the most genial of men, for at one corner of the *pian' terreno*, if you can call that a ground floor which has two stories below it on one side, is the curiosity shop of Signor Simone Truffaro. Old Simone is a rogue, of course; with a very few things worth buying — I am poor, and they are, I dare say, still there — bristle a whole cartload of falsities of various kinds, false old masters, false diptychs and triptychs, false furniture, and I fear false smiles on the part of old Truffaro and his pretty but equally false daughter Lizetta. There is one thing in the house that is indubitably real, and wonderfully preserved, only you must needs show yourself very much of a connoisseur indeed, and be a very great friend of the proprietor, before he will show it to you — you can't buy it and honestly I don't believe he would sell it if he could. It is the courtyard.

As I have said, the exterior of the building is of stony severity, but one of its former proprietors, during the gracious days of the early Renaissance, being weary of wars, saw fit to recase, if indeed he did not entirely reconstruct, the courtyard with pale gray terra-cotta and colored and glazed reliefs of the same material. Being very circumscribed in extent, these ornaments have the advantage of meeting the eye at so little distance that every refinement of modeling, every subtlety of surface is manifested at once. It is strange how — when first the world of Italian art had turned its thoughts to "the Glory that was Greece and the Grandeur that was Rome" — how completely and absolutely it seemed to give up everything else. One would think there was enough in the history of more recent times, cruel and shameful as it was, to inspire them in their work, but no; everything must needs be classic, and author, artist, and architect harked back to Myth for subjects, from the greatest of masters, such as Alberti, in the church of San Francisco at Rimini, down to the poorest pedant of them all, whose vain and forgotten verses are one masquerade of gods and muses, nymphs and shepherds.

The "high" Renaissance is unforgivable to the romanticist, and the cathedral of Chartres remains a book written in the most undecipherable of dead languages to the academy graduate, but in the early Renaissance for a trifle of time there seems to exist a common meeting ground about whose sun-flecked and shadow-dappled paths the modern and architectural Guelf and Ghibelline can wander at will, conversing amicably enough and without need of recourse to blows. And this little nameless courtyard is one of the most satisfactory of examples. It is true that it is the work of none of the great masters of the period, but more probably of some local modeler in clay, who, chancing to visit Florence, laid to heart the new spirit at work there. Poring perhaps over the manuscripts sent by the Eastern emperor to Cosmo de Medici, and stored in the new library, on his return by some fortunate chance he was commissioned to execute this courtyard, while his heart still throbbed and mind still tingled with what he had heard, read, and seen. Here are the nymphs and muses (with a singular reticence or forgetfulness the designer seems to have omitted all the high gods), the shepherds, the eggs-and-darts, the dentils, and beads of classicism, but somehow — perhaps because of the strangeness of the material to the subject — everything seems invested with an unworn and unwonted charm, quite as different from real, classic works like the Elgin marbles as the Mars and Venus of Botticelli in the National Gallery at London must needs be different from the ocher-colored pictures by Apelles of which we are now unhappily bereft. The main body of the work, caps, bases, architraves, etc., is of pale gray terra-cotta, but such a gray and such a surface! The color is, first of all, gray to the sight, but as you look there begin to be visible hints and ghosts of other tones, strange pinks and blues, yellows and greens, softly veiled by the glaze; and the term "glaze" is hardly correct, since there is no vulgar shine like that we all know and abhor in the catafalque called a piano, and even sometimes found in materials more nearly resembling those of which I am speaking now. No, this glaze is deep and semi-transparent, filling the interstices and hollows of the modeling with soft liquid spaces, its surface not shiny but dulled, whether by age or handcraft I do not know, into something that shimmers and casts back lights when desired, or by its smooth and reflectionless surface serves to bring out without change of word or thought the meaning of the modeler. In the spandrels of the arches are medallions of various classic characters, all scarcely sculpture, but rather what an architect would substitute for sculpture if it lay within his wishes, and — a harder task — power to do so. Not coarse, muscular, masculine figures or rotund and rather shameless dames, such as one sees in modern French and German works — alas! even in American, too — things for which the greatest architect in the world could but provide a more or less unsuitable *encadrement*, if that is the word. All the figures here are so gracefully and tenderly molded as to completely escape the strutting appearance that sculpture usually wears, but, not satisfied with the miracle of modeling he had performed, the artist cast about his creations the added glamourie of color, now faint and delicate as the gray by which they are surrounded, and then in some shadowy spot gleaming with splendid smalt and tawny cadmium. In the center stands a small fountain with its figure, and here, if anywhere, a fault makes itself felt. The pedestal and basin are gray-green, but the figure, a youth without distinguishing attributes, which cannot be later in date since it is evidently by the same hand, is absolutely colorless though glazed to the last point. Whether the artist felt as does the organist, who, having climbed through chords and melodic mazes to the grandest summit of sublimity, and fearing a Phaeton-fall into the sea of banality and the commonplace, ends abruptly on some unfinished phrase, or whether he had worked out a fantastic theory that the focus of so much magnificence could be naught else than white, dazzling and pure, one may not tell; in certain lights with the sun at the meridian there creep in certain justifications for such a theory, but for the greater portion of the time you can but wonder that after so much the master should have so stayed his hand just short of perfection. It is needless to apologize for the lack of any sketch of this place; if a thing is good enough to be worth sketching it is too good for me to sketch, and the little photograph I shamefacedly snapped of it turned out worthless with the verticals all distorted and the exposure hopelessly undertimed. If by any chance you should find yourself in Monteventoso and find the shop (I don't think you will, but it is just possible), mention my name to Signor Truffaro and perhaps he'll show you this courtyard, but when you come out through the shop be particularly careful about your purchases, for, if he notices that you are *distrait* you are lost. Above all, don't let him sell you anything of any value: it's sure to be quite worthless.



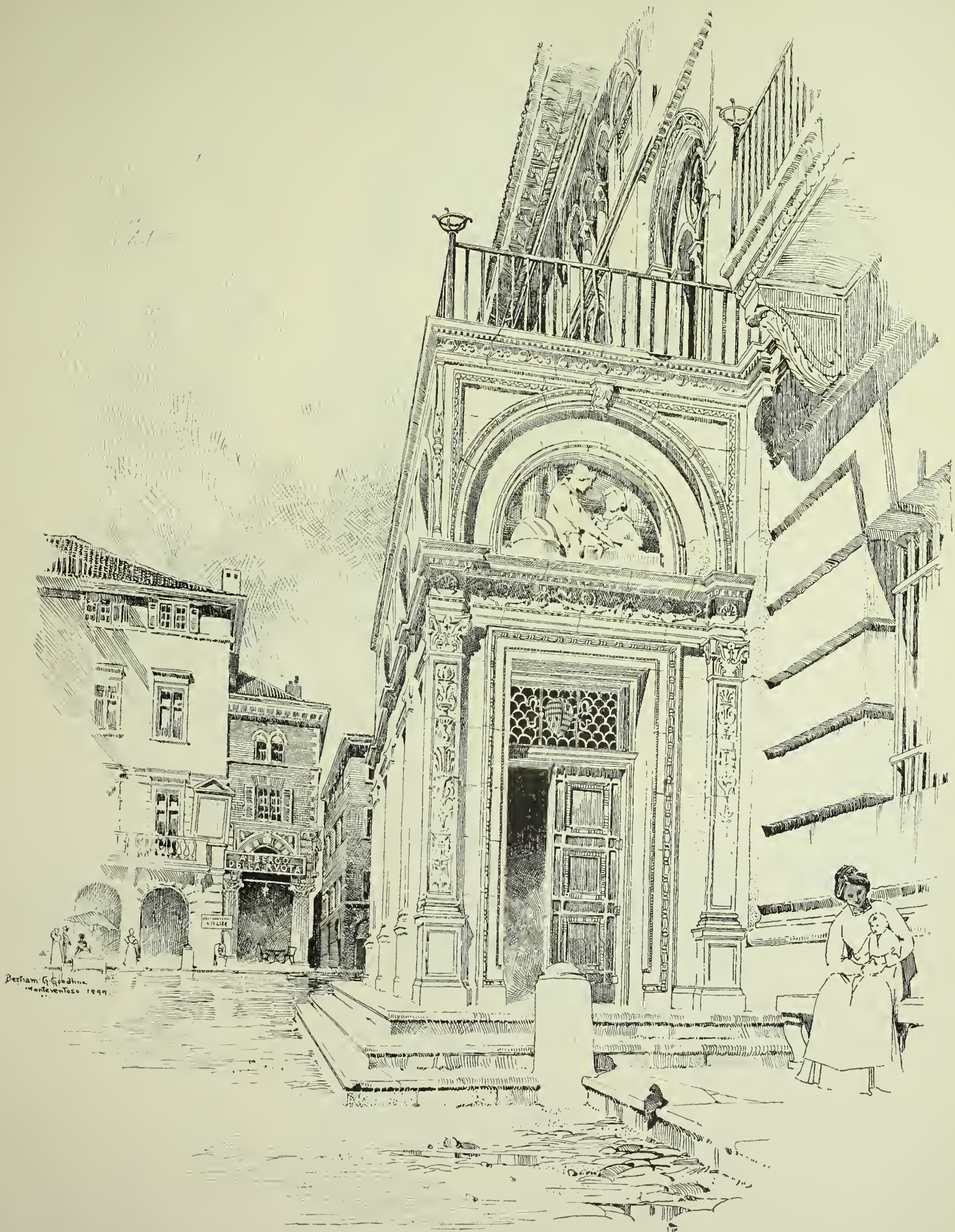
THE CABINET OF COUNT TEBALDO.

There is one grave objection to northern eyes in almost all southern countries: anything which we can dignify by the name of greensward is practically unknown. In the Jardin Borda, at Cueruavaca, in Mexico, that realized and lovely dream of a fabulously wealthy mining king and poetical adventurer, one may wander for hours without feeling the lack of grass, so bright is the scene, so soothing the mossy cisterns and fountains of cement, so all-abounding the tropical fruits and flowers; but when you come to recall the place you remember, with a slight shock, that grass — genuine green grass, such as the meanest dooryard at home possesses — was nowhere in evidence. To be sure, at certain seasons, I am given to understand, grass does grow in Mexico, but at such times I have not been there, and so remain skeptical.

In Italy, where everything you see seems merely an efflorescence on the mold of vanished, even prehistoric civilizations, they have had more time in which to remedy the shortcomings of nature; so in the more favored localities the "personally conducted" are enabled to gaze — not tread — on sward as green and as perfect as at home. But always the peevish one complains, especially if he or she be of the variety that is constantly comparing things abroad with things at home to the utter discomfiture of the first named: "So that is Monte Rosa. Ah, yes — fine — but you should see Mount Wachusett, when the sun is just setting." Or in Chamounix: "Pretty? yes, indeed, but I bet you was never in the grand cañon of the Dead Goat River, in Kootchie-Kootchie County, Colorado — it's strange how so many Americans come over here before seeing the wonders of their own heaven-blessed free country — unpatriotic I call 'em," etc., etc. Probably you are as impatient of this sort of talk as I, but let us confess that on the subject of grass such travelers are more than usually well entrenched, while remembering with shame and sorrow that the Briton visiting our hospitable shores can scoff at our grassy pretensions quite as lustily as we — some of us — do at Mexico's or Italy's.

Throughout Emilia, the moment one leaves the carefully cultivated gardens of the wealthy city or citizen, as the case may be, and steps outside the walls or enclosure gates, he soon finds himself walking on barren rock or sun-browned and hardened *tufa*.

Everywhere, that is, but at Monteventoso, and even there in but



THE ENTRANCE TO THE VISCONTI LIBRARY.

one circumscribed way, for down the mountain side to join the little river at the foot comes, I can't say roars or tumbles or even falls — indeed, trickles is almost too grand a word — a small thread of water through a rod-wide meadow of the greenest green grass. When I first found it I supposed it had its source in some wild glade among the oaks and chestnuts high above and. with a faint sensation of homesickness for my native forests, I set out to climb up to this suppositi-tious point for a view of the town spread bird's-eye fashion below. As I walked, first past low, straggling *campanni* half hidden in veritable bowers of ilex and olive, and before which old hags and cow-eyed girls were washing clothes in the pools, then past rather more pretentious dwellings varied by occasional spaces of pasture, I grew conscious that my barbarian longings for savage fastnesses were little likely of realization, since things seemed to be growing more and more well-cared-for at every step. At last, following a sudden turn made by the brook, I was brought to a standstill by a steep and flowered incline down which the water dribbled silently; looking up for some way to follow the brook, I noticed the tiled roofs and stained white walls of a tiny villa, set deep among the trees above, and languidly curious, I made my way by a rather circuitous flight of stone steps to the summit of the cliff. Here were the two things for which I had come in search; for, before me, among the flowers and statues of a bewilderingly lovely garden close was a small, rectangular pool in the midst of which rose a fountain — now silent — and figure of some nymph — the Arethusa of the stream, perhaps; while, turning, I looked out over the tree-tops, among which glistened the thin thread of water winding its way downward past the little cottages with their washerwomen, through the rocks and sand, past the foul and grimy walls of the town, to the river and plain. Below me in the now windless and shimmering atmosphere huddled the purple and red roofs of the town, the tortuous streets marked by narrow courses of liquid purple through the gold and salmon roofs and walls, from whose midst rose the campanile, clear cut against the hazy distance, the detonation of its bells on the instant breaking the air into an invisible tempest, while its forked battlements seemed less to bring to mind "old, unhappy, far-off things, and battles long ago" than to accent the peace and stillness of to-day, the time and the place. Architect and American as I was, and in Italy for the stern practical purpose of study among the monuments of the past, with little enough leisure even for that laudable purpose, I felt a bit softened (the walk had been hard and I was, perhaps, tired), so seeing no one of whom to ask permission, and a marble bench standing cool and inviting on the terrace beside me, I made bold to sit down to waste some of my precious time: I say precious, since I had agreed for a consideration to supply a certain periodical with an alarmingly large quantity of pictures and text before a date at that time altogether too near, — a clear, logical, and argumentative article on the influence of a certain newly invented portable centering for the construction of vaults, with isometric drawings to point a moral rather than adorn a tale.

IN THE BORGO DELLA MONTAGNA.

And instead of being at work in my stuffy little cubicle of a bed room in the Albergo della Ruota below, here I was, high on the mountain side, sitting in somebody's private garden close on somebody's private marble bench, gazing out across the plain toward distant Modena (which I fancied I could even see), dreaming a world of things none of which had any possible relation to architecture. In the boskage behind me the birds were singing about the same things that filled my mind; small beasts moved cautiously; little green lizards sat on the parapet and looked softly at me; a nightingale, feeling the approach of dusk, tried over a few notes by way of practise for the coming serenade to the rose; the breeze, the eternal wind of Monteventoso, also began to stir in his sleep and to stretch himself among the leaves, and — the present came back with a shock as I heard a gentle voice murmur something which, strangely enough, I could not seem to hear, and I sat up stiffly — feeling most guilty — the trespasser before the owner, the peccant before his judge. A second look convinced me that the judge was likely to be merciful, for I was gazing into the face of no bag-wigged official, or even absurdly pompous *gendarme*, but that of a lady, — not a beautiful Satanita or Biancabella of old time, but the intensely modern sorrow-scarred visage of a mondaine, who knew her Rome and Paris, even London and New York — yes, even Boston. She was speaking French, but at my first sally of stammering apology changed to English as grammatical as my own, yes, more so, but with a charming quaintness of diction and precision of pronunciation that would have told me, even if her air had not, that here was no countrywoman. The Contessa Paolina Scogli d'Illusioni Perduti, for such was her name and title, invited me cordially not to embarrass myself, but to remain for the actual sunset, a most beautiful occurrence in this part of the Apennines. The dear English speech sounded so sweet to my ears, and the Countess' voice was so gentle, that I needed no further excuse for staying. She was a descendant of the same Scogli whose history had been so frankly and faithfully set down in the volume from which I have already quoted, a work you may be sure I was careful not to mention, but in her seemed to be exemplified all the bright face of that history of which Fra Pietro gives only the

THE CHURCH OF SAINT CATHERINE, FROM THE GIARDINO PUBBLICO.

one circumscribed way, for down the mountain side to join the little river at the foot comes, I can't say roars or tumbles or even falls — indeed, trickles is almost too grand a word — a small thread of water through a rod-wide meadow of the greenest green grass. When I first found it I supposed it had its source in some wild glade among the oaks and chestnuts high above and, with a faint sensation of homesickness for my native forests, I set out to climb up to this suppositi-tious point for a view of the town spread bird's-eye fashion below. As I walked, first past low, straggling *campanni* half hidden in veritable bowers of ilex and olive, and before which old hags and cow-eyed girls were washing clothes in the pools, then past rather more pretentious dwellings varied by occasional spaces of pasture, I grew conscious that my barbarian longings for savage fastnesses were little likely of realization, since things seemed to be growing more and more well-cared-for at every step. At last, following a sudden turn made by the brook, I was brought to a standstill by a steep and flowered incline down which the water dribbled silently: looking up for some way to follow the brook, I noticed the tiled roofs and stained white walls of a tiny villa, set deep among the trees above, and languidly curious, I made my way by a rather circuitous flight of stone steps to the summit of the cliff. Here were the two things for which I had come in search; for, before me, among the flowers and statues of a bewilderingly lovely garden close was a small, rectangular pool in the midst of which rose a fountain — now silent — and figure of some nymph — the Arethusa of the stream, perhaps: while, turning, I looked out over the tree-tops, among which glistened the thin thread of water winding its way downward past the little cottages with their washerwomen, through the rocks and sand, past the foul and grimy walls of the town, to the river and plain. Below me in the now windless and shimmering atmosphere huddled the purple and red roofs of the town, the tortuous streets marked by narrow courses of liquid purple through the gold and salmon roofs and walls, from whose midst rose the campanile, clear cut against the hazy distance, the detonation of its bells on the instant breaking the air into an invisible tempest, while its forked battlements seemed less to bring to mind "old, unhappy, far-off things, and battles long ago" than to accent the peace and stillness of to-day, the time and the place. Architect and American as I was, and in Italy for the stern practical purpose of study among the monuments of the past, with little enough leisure even for that laudable purpose, I felt a bit softened (the walk had been hard and I was, perhaps, tired), so seeing no one of whom to ask permission, and a marble bench standing cool and inviting on the terrace beside me, I made bold to sit down to waste some of my precious time: I say precious, since I had agreed for a consideration to supply a certain periodical with an alarmingly large quantity of pictures and text before a date at that time altogether too near, — a clear, logical, and argumentative article on the influence of a certain newly invented portable centering for the construction of vaults, with isometric drawings to point a moral rather than adorn a tale.

IN THE BORGO DELLA MONTAGNA.

And instead of being at work in my stuffy little cubicle of a bed room in the Albergo della Ruota below, here I was, high on the mountain side, sitting in somebody's private garden close on somebody's private marble bench, gazing out across the plain toward distant Modena (which I fancied I could even see), dreaming a world of things none of which had any possible relation to architecture. In the boskage behind me the birds were singing about the same things that filled my mind: small beasts moved cautiously; little green lizards sat on the parapet and looked softly at me: a nightingale, feeling the approach of dusk, tried over a few notes by way of practise for the coming serenade to the rose; the breeze, the eternal wind of Monteventoso, also began to stir in his sleep and to stretch himself among the leaves, and — the present came back with a shock as I heard a gentle voice murmur something which, strangely enough, I could not seem to hear, and I sat up stiffly — feeling most guilty — the trespasser before the owner, the peccant before his judge. A second look convinced me that the judge was likely to be merciful, for I was gazing into the face of no bag-wigged official, or even absurdly pompous *gendarme*, but that of a lady, — not a beautiful Satanita or Biancabella of old time, but the intensely modern sorrow-scarred visage of a mondaine, who knew her Rome and Paris, even London and New York — yes, even Boston. She was speaking French, but at my first sally of stammering apology changed to English as grammatical as my own, yes, more so, but with a charming quaintness of diction and precision of pronunciation that would have told me, even if her air had not, that here was no countrywoman. The Contessa Paolina Scogli d'Illusioni Perduti, for such was her name and title, invited me cordially not to embarrass myself, but to remain for the actual sunset, a most beautiful occurrence in this part of the Apennines. The dear English speech sounded so sweet to my ears, and the Countess' voice was so gentle, that I needed no further excuse for staying. She was a descendant of the same Scogli whose history had been so frankly and faithfully set down in the volume from which I have already quoted, a work you may be sure I was careful not to mention, but in her seemed to be exemplified all the bright face of that history of which Fra Pietro gives only the

THE CHURCH OF SAINT CATHERINE, FROM THE GIARDINO PUBBLICO.

dark reverse. She knew, it seemed, certain acquaintances, almost friends, of mine in London and New York, and had stopped with people in the suburbs of Boston with whose names I could scarcely help but be familiar, since they occur almost diurnally in the column next the real-estate news of the *Transcript* and frequently even in that column itself. Thanks to her, I was enabled to see certain things closed to the ordinary tourist in Monteventoso, such as the cabinet of her ancestor, Count Tebaldo, in the Signoria below, with its carved and inlaid paneling and heavily molded and gilt ceiling, the flat spaces of which contained rather ill done pictures of the school of Francia, or the Gothic retable with its altar-piece by Signorelli, representing the Apocalypse, which, long sought by amateurs and dealers, had never, she thought, been exposed to their covetous gaze, since it was in the private chapel of one of her cousins, a lady so poor that we in America could scarcely conceive such utter impecuniosity, but so proud of her family's past — here the Countess smiled an apologetic smile — that were Mr. Vanderbilt or Mr. Morgan to come to Monteventoso, with the intent of purchasing the picture, they would be forced to return empty-handed, for the picture was literally priceless.

But it was not alone in things pertaining to her people that the Countess proved herself a *cognoscente*. She knew many of the dates of the different portions of the church, was not so inclined to smile at the thought of Charlemagne's having laid the corner-stone as I was, told me of a number of things I had quite overlooked in the church itself, and finally the legend of the vanishing frescoes in the crypt. In the dim past there was a monastery on the same spot, which antedated the present church by several centuries, and among the brotherhood was one, a scoffing, light-minded young man, who had come there not so much through penitence as through the desire of his father, a noble Venetian, to remove him as far from the scene and consequences of a particularly serious peccadillo as possible.

This young brother had some artistic pretensions, and so, alas! had the abbot, who had engaged some miserable, strolling painters to decorate the crypt. One day the superior and this youth were watching these men as they worked, when the latter broke out in a most unholy fit of laughter, and stated, it is to be feared with a certain oath more familiar among the gay young *garzoni* of Venice than among simple and God-fearing monks, that he could paint better in the dark than these men in broad daylight. The abbot's reproof at the time was gentle, but that night his patron, Saint Gemigniano, appeared to him in a vision and commanded that such godlessness should go no longer unpunished, and that the user of oaths be imprisoned in the crypt until he should have completed the work, which was therefore done, though of course not in complete darkness, since the pictures are sufficiently good to indicate that at least torches were supplied the youth along with the food, which was lowered to him daily.

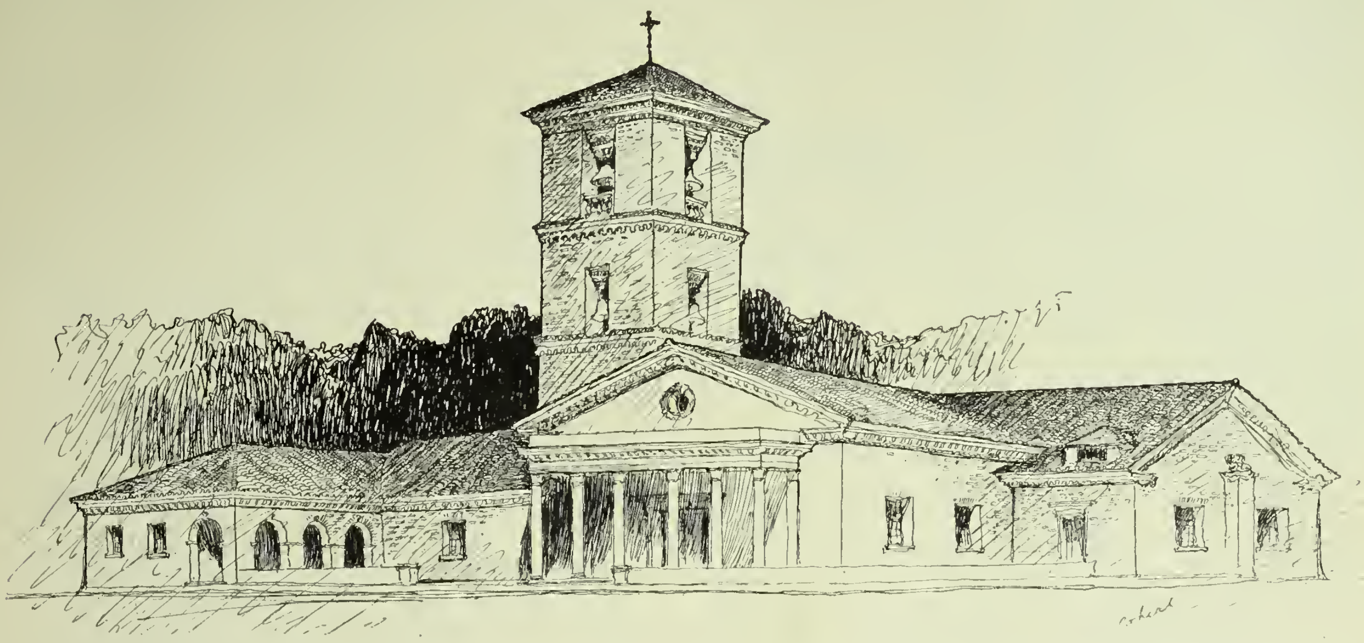
When the Countess had finished the tale, which I have considerably condensed, I thanked her for her kindness and rose to bid her farewell. She was good enough to regret that my departure on the morrow would prevent her asking me to appear before her again at this time, but she trusted I would come again to Monteventoso. She was an old woman, and her poor house resented being left alone as much as she had been in the habit of doing, and no doubt she would be still in Monteventoso should I come, besides — she smiled brightly — who could tell, perhaps soon, even the following summer — for the ——s had invited her — I would come to Nahant to see her, and then I might tell her the legends of Boston. A reference to Peter Rugg here showed she knew them quite intimately already, and I had visions of employing Mr. Waterman as a tutor against her arrival. Then with a cordial handshake, I took my leave. After stumbling down the darkling pathway through the ilexes to the steps in the cliff, I turned again and looked back. All was still, and the thin crescent moon just touched with its finger of light the panes of the "windows fast and obdurate! How the gardens grudged me grass where I stood!"

A Village Church, Cost Fifty Thousand Dollars.

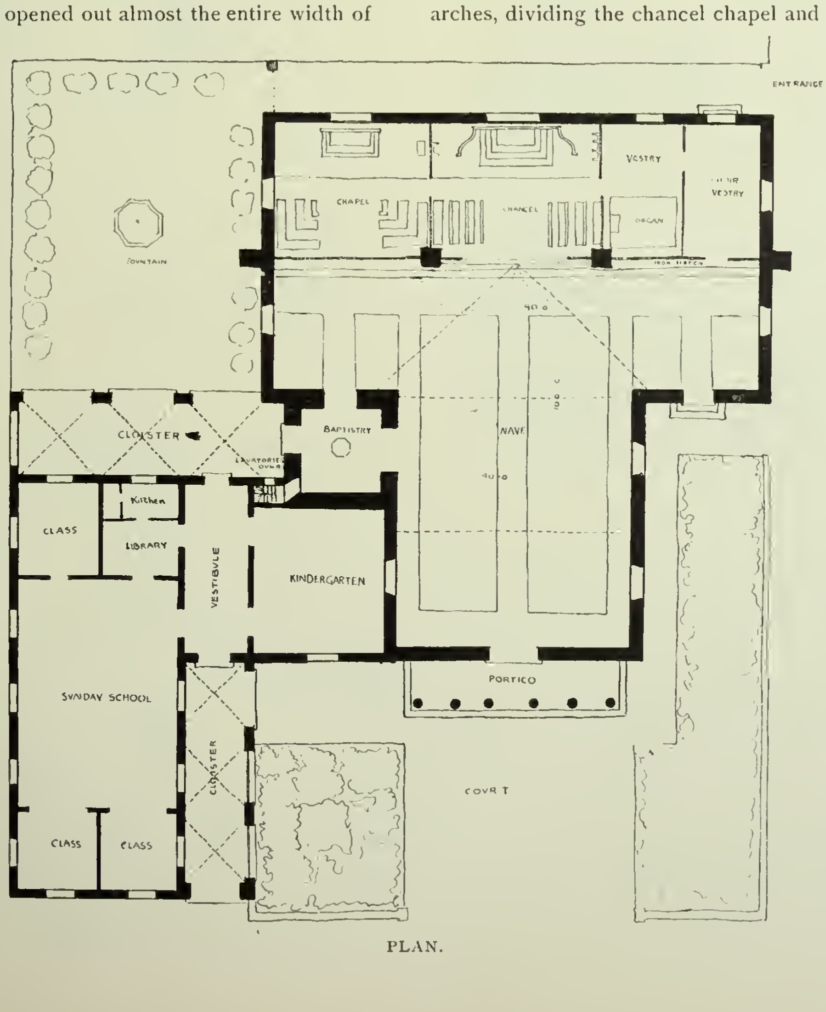
BY ERNEST COXHEAD.

ECCLESIASTICAL architecture is architecture as we find it in church building. Popular taste in America indicates now and always has, in the best work, a preference and appreciation for what is classic, and it is naturally deduced that church building should have a character consistent with this prevailing temper, which has taken so firm a hold upon American favor. This is a plea for consistency in church architecture rather than the advocacy of any of the so-called styles. Until the revivals of the nineteenth century, it would seem, from reference to history, that the church has always sought to be pliant in this matter, maintaining harmony with contemporary tendency in art, which elevates in this connection the practical and utilitarian to its highest expression; the churches of the Middle Ages express this entire agreement between religious and civic buildings, and are stamped with the character that proclaims, without doubt, the inspiration of church building to have been also the art impulse of the people. Scholarly work will always show an avoidance of mere picturesque dilettanteism, and the church, always catholic, grappling as it must with the whims of the high, as well as ignorance of the low, should guard against pretense or any departure from the simple and honest, and can, by accepting the best aim in popular architecture of to-day, attain as great success as the master church builders of earlier periods. From east to west the early beginnings of church architecture in America show a native impulse toward consistency as the greatest practical need in this matter and unaffected acceptance of popular taste, as illustrated by the colonial churches and the Spanish mission churches of California; this harmony seems only to have been interrupted by a transitory wave of medievalism, whose term of enduringness must of necessity be limited.

The problem in hand is one easily recognized as a frequent demand of the times, and one which should incite the architect to undertake an unaffected part in the exercise of his skill. While serving with utmost simplicity the purpose for which it is ordained, the building should be stamped with a dignity and a repose that its focal relation to the village plan exacts. The nave of the church of to-day is differentiated from the nave of medieval times in that it is a space arranged for the comfortable gathering of a congregation; the relative proportions of the chancel to the auditorium, and the convenient accommodations for priest, choir, and people depending chiefly upon the degree of ritual observed. In this instance we have assumed that the service would be fully elaborated and that an unobstructed view of it throughout the building would be considered desirable. This object has been attained by roofing the nave with a low single span of 40 ft. Assuming that our church is to be located in a California village, roof timbers of the length and thickness requisite to carry a heavy Spanish tile roof of these dimensions would be easily procurable from the redwood forests. The rafters would be of irregular sizes, ranging from 10 by 10 ins. to 8 by 14 or 16 ins., and the tie beams holding the roof together would be say 18 by 30 or 36 ins., and would sustain themselves without trussing. The cross roof spanning the transepts and chancel, etc., would be constructed in a similar manner, except that being of a wider span than the nave roof, the rafters at the ridge line would be supported on three arches, the center one being the chancel arch. The rafters would be spaced 3 or 4 ft. apart and covered with 1½ in. planking, varying in width from 18 ins. to 3 ft. to the plank. The whole of the roof timbers to be rough hewn, and left without stain or varnish, — just as they come from the adze. The tie beams crossing the nave and the ridge beams afford opportunity for enrichment in the roof by carvings of a very bold and free nature, such as would be effectively seen at this height from the floor, and this enrichment, carried along the beams and the brackets supporting them, could be supplemented by broad dashes of color stenciled on the wood and carried into the moldings, all the woodwork first being charred to a brownish-black tone. The walls internally could be finished with plaster prepared for color treatment. The three arches supporting the ridge of the cross roof would be of equal spans, and a very rich ornamental



screen of wrought iron, almost wholly filling each arch, would separate the chapel chancel and vestries from the nave and transepts. The idea of this screen work is merely suggested in the sketch of the interior, but from the plan the general effect of such a screen can readily be imagined. The screen to the chancel arch is designed so that during service it would be opened out almost the entire width of the arch in two gates; that part above the horizontal bar supporting the rood or cross remaining stationary, and having much hammered leaf work. All the ironwork of these screens would be hammered and forged. The soffits of the arches and the piers supporting them should be terra-cotta or molded brick. To the east of these arches, the roof, following the lines of the gables, would slope down to the east wall, with a dormer window breaking through the roof opposite each arch to supplement the side lights of this end of the church. This arrangement of the roof over the chancel, etc., is unusual, but it has the advantage of greater simplicity, and consequently allows of a more elaborate and bolder treatment of the altar and reredos. The altar itself would set forward from the east wall, giving ample space on either side as well as in front. On either side of the chancel, and dividing it from the vestries and chapel, there is designed to be iron screen work similar to that under the arches. The organ is located on the south side and would stand free within the screen enclosures, so that its sound would be carried equally to all parts of the church. It is not intended that the clergy vestry should be anything more than a place for routine official work to be done, so that a pastor's study would be provided elsewhere. The chapel, designed to seat about forty, is in most Episcopal churches now found to be of the greatest convenience for daily services. In front of the arches, dividing the chancel chapel and vestries from the nave, there are shown to be two stone steps extending from transept to transept. The sanctuary floor is again raised above these several steps to give the altar proper elevation.



PLAN.

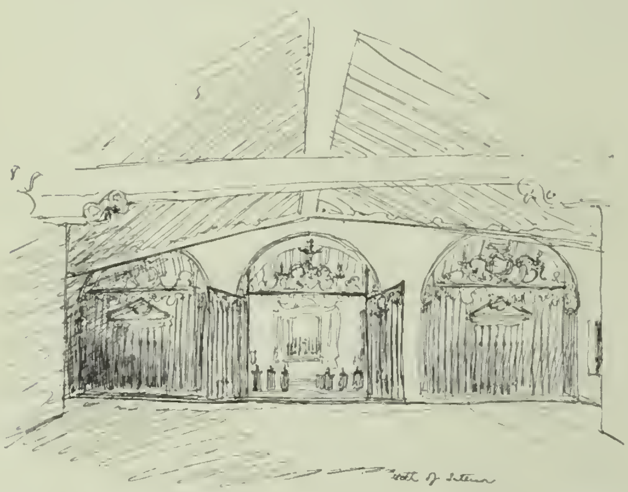
The lower part of the tower, while serving as a vestibule and connecting link between the Sunday school and nave of the church, also affords opportunity to place the font by itself. The tower entrance gives access to a cloistered garden at the northeast corner of the lot, — a pleasant breathing space for clergy and congregation before and after service. This garden might also be used in fair weather for open-air Sunday-school services, etc. In the upper chambers of the tower would be suspended the bells, with the bell-ringer's room below.

The details of the arrangement of the Sunday school are more a matter of individual preference,

WEST ELEVATION.

and in this plan the endeavor has been to comply with the more usual demands.

The floor of the entire church and Sunday school would be laid in concrete, finished in the case of the aisles, in nave and chancel, with stone flags in large squares, and elsewhere under the seats and in the Sunday school with wood blocks bedded in asphaltum. This method would render the floors permanent and noiseless.



Externally, the walls would be faced with *klinkered* or overburned burred common brick, laid with large joints, with terra-cotta or molded brick for the cornices, etc.

The tile used for the roof would be the large, half-round, dark Spanish tile, glazed.

With a view to the more or less secular functions for which the Sunday-school building is at times used, it was thought better to locate it at the west end of the lot, as far as possible from the precincts of the chancel. The relative position of the Sunday school to the church has a symbolic significance, as it is here that the young are instructed before entering into the full privileges of the church. The principal entrance is from the west, facing the park or plaza, and here a simple Corinthian portico, 30 ft. wide and 24 ft. high, is provided to give protection from the elements and shade the entrance. The cloisters, garden court, and front court would be paved with hard brick laid edgewise in ornamental designs.

In the matter of external design, much has been left to the nature of the material used to supply animation and interest. This the rough quality of the klinker brick, in combination with a bold rich cornice and the picturesque sky line, would do adequately.

The width of the nave is 44 ft., and the total length of the church inside 100 ft., the width across the transepts 90 ft., the height of nave from floor to ridge 36 ft., and the height of the tower 86 ft.

If the principle that endurance of his work should be the foremost aim of every architect, applies to one class of buildings more than to another, it is perhaps in church buildings that effort in this direction is to be specially encouraged. Good building lends tangibly to the moral support of every institution, individual, or enterprise so fortunate as to possess a habitation, and inasmuch as that in almost every community the church has its field of usefulness, it should have, as a power to promote the best effort in architecture, few if any rivals. The backbone of every building is made up of walls and roof. Style follows upon proper observance of the principles of sound construction, and beauty comes with convenience and proportion.

Brick and Marble in the Middle Ages.

BY G. EDMUND STREET.

CHAPTER X.—*Concluded.*

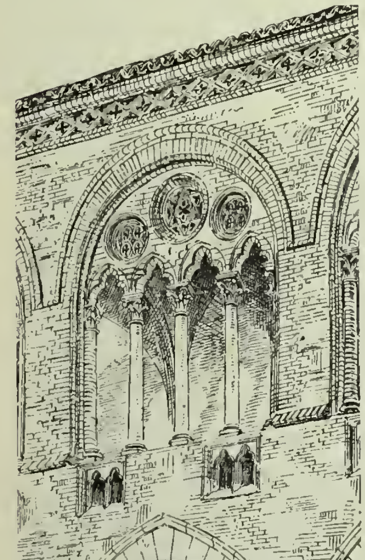
[The illustrations A, B, C, D, E, F, and G are not taken from Mr. Street's work, but are added as additional illustrations of the Italian brickwork.— EDS.]

WE soon reached Pavia, and were, as we expected to be, well rewarded by its churches. The general aspect of the city is singular, owing to the number of tall slender brick towers which seem to have formed a necessary appendage to almost every house in the Middle Ages. They are entirely without openings or ornaments of any kind beyond the scaffold-holes, and one can compare them to nothing that I know so well as to the great shot-tower at Waterloo Bridge, save that they are always square and not circular.

We did our best to see the cathedral, but were unsuccessful; it was being repaired, and was so full of scaffolding that we could see nothing. It contains a shrine said to contain the body of S. Augustine, which I much wanted to see, but seemed in most respects to be an unprepossessing church.

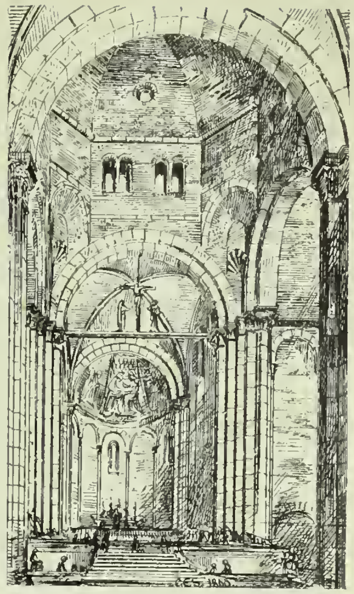
From the cathedral we found our way to San Michele, a very celebrated church, and as interesting to an antiquary in search of curiosities as to an architect in search of the beautiful. The west end is very curious, and has a succession of sculptures, introduced in the most eccentric manner, and with but little method in their arrangement. There are three western doorways, and all of them are elaborately ornamented with carvings, the central door having above it a very singular figure of S. Michael.

San Michele, together with San Teodoro and San Pietro, seem all to be of about the same date, and are of the same character; the most remarkable feature being in each case the octagonal cupola, which rises above the crossing of the nave, choir, and transepts: externally these cupolas are arcaded all round under the eaves, and roofed with flat-pitched roofs, and are far from being graceful; open arcades are introduced under the eaves and up the gables, and everywhere there is a profusion of carving. It is likely enough that this Lombard-Romanesque style, as we see it at Pavia and elsewhere, did, as has been supposed, set the example which was very soon after followed in the great churches at Köln and elsewhere along the borders of the Rhine. In size, however, the children far exceeded their parents, for San Michele is not remarkable for its dimensions, except in the width of the transept.

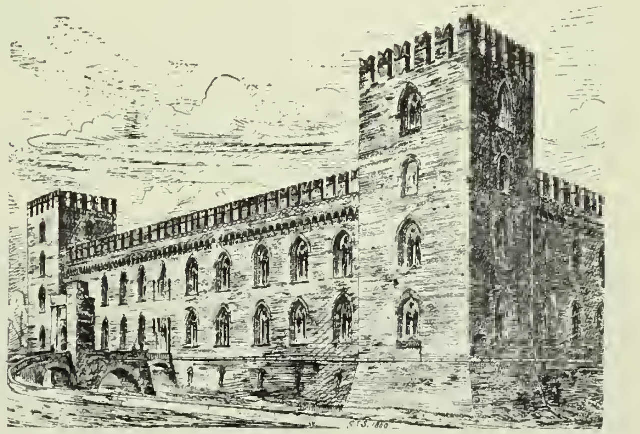


CASTLE, PAVIA.

The church consists of a nave and aisles of four bays, a transept of great length, a central lantern, and a short choir with circular eastern apse; small apses are also built in the east walls of the transepts. A fine crypt is formed under the whole of the eastern arm of the cross, and is entered by steps on each side of the thirteen steps which lead up to the choir. The nave aisles have a second stage or triforium, groined throughout; and the whole of the church is vaulted, the transepts having barrel vaults and the three apses semi-domes. The internal effect of the lantern is extremely good; the pendentives under the angles are very simple, and low windows are introduced in a stage between them and the octagonal cupola or vault. The whole church is still left in its original state with red brick walls and stone piers and arches, save where, as in the eastern apse, the vault is painted with a Coronation of the Blessed Virgin, executed in the fifteenth century. It is very seldom, consequently, that a church of this age is seen to so much advantage; and undoubtedly the fine, simple, but well-ordered arrangement of the plan, and the dignified character of the raised choir and the central lantern, would, even if the colour were not as picturesque and agreeable as it is, make this interior one of extreme interest. One of the best portions of the exterior is the east end. Its extreme loftiness is enhanced by the groups of shafts which divide it into bays, and rise from the plinth to the cornice. This part of the building is mainly of stone, except in the fine gallery below the eaves-cornice, where brick and stone are used together. In addition to the west door already mentioned, there are two very elaborate doorways north and south of the nave in the bay next to the transepts.



SAN MICHELE, PAVIA.



CASTLE, PAVIA.

San Michele is, on the whole, the most interesting building in the town, but is hardly superior to the grand remains of the old fortified castle of the Visconti, which stands just on the outskirts of the city, close to the Milan gate. This is only a portion of the original erection, only three sides of a great quadrangle which is inclosed by the building now remaining. The plan originally was a vast square with lofty square towers projecting at the angles, and of these only two remain. The whole front is still very nearly perfect, and is not far from five hundred feet in length, the main building of two stories in height and the towers of four, and all the old windows more or less intact. The whole is crowned with a forked battlement, and the

WEST END, S. FRANCESCO, PAVIA.

old bridge still remains opposite the entrance with its outer gate, though the drawbridge has given way to a fixture. This grand pile is now used as a barrack; its most valuable architectural features are all towards the internal quadrangle, which is of grand dimensions, more than three hundred feet in the clear. Towards this court there is the same sort of arrangement throughout (though many modifications of detail) — an open arcade of pointed arches below, and a series of fine windows lighting a corridor above. The lower arches are of stone, everything else of brick, and the details everywhere are refined and delicate almost beyond those of any brickwork that I know elsewhere. The original scheme is best seen on the south side of the quadrangle, of which I give an illustration. This work dates, I suppose, from about A. D. 1300, but it was soon found to be inconvenient to have open traceries for the upper corridor, and the arches on the other two sides were filled in before the middle of the fourteenth century with very good two-light windows. Fortunately the whole of this work is still in very excellent preservation, and deserves much more notice and study than it has ever, I believe, received.[1] The ordinary bricks used here measure 10½ in. × 5 in. and are 3 in. high, whilst in San Pantaleone they are 3½ in. high and as much as 15 in. long. Here (as generally in the centre of Italy) the bricks have all been dressed with a chisel, with which diagonal lines have been marked all over the face. I can

THE CERTOSA OF PAVIA.

only assume that this has been done to improve the texture of the bricks in appearance, and, perhaps where two bricks are side by side on the same plane, to make a little distinction between them by tooling the bricks in opposite directions. Two other features of Pavian brickwork may also here be mentioned: one, that the depth of the arch-bricks is almost always increased from the springing line to the centre — the intrados and extrados not being concentric; the other, that the arch-bricks do not radiate from a centre, but are arranged so as to obtain a vertical joint in the centre. The first is a very defensible practice, the second seems to me to be the contrary.

WEST FRONT, S. PANTALEONE, PAVIA.

There are several other churches to be noticed here. The most interesting to me after San Michele is that of Sta. Maria del Carmine, or San Pantaleone (for it seems to rejoice in a double dedication), which, in some respects, is more akin to our northern Gothic work than any other Italian church I have as yet described. The plan and all the details of the interior are exceedingly simple. The nave is divided into four groining bays, each of which has two arches into the aisles; the transept takes one bay and the choir one, and there are an aisle and a row of chapels on either side of the nave, and chapels on the east side of the transept. The only openings between the arches and the groining are small circles by way of clerestory, ludicrously small as compared with the immense

(A) DOOR TO CHURCH FROM CLOISTER, CERTOSA, PAVIA.

[1] Mr. Grüner has published some very careful drawings of these details, in which he has restored the painted decorations with which the coloured construction of the walls was enriched. The style of decoration was much like that of Sta. Anastasia, Verona.

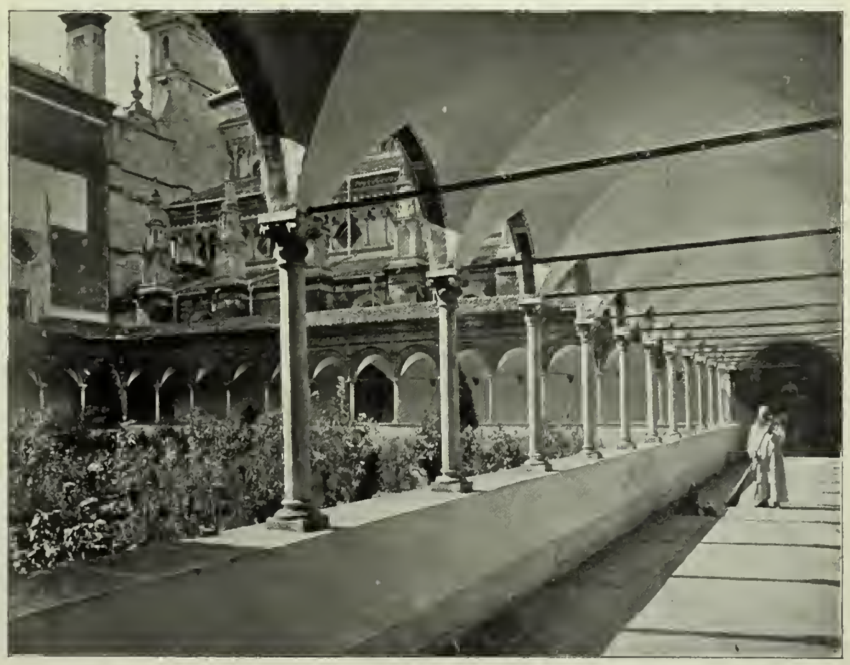
(B) CERTOSA, PAVIA.

space of blank wall below them, which seems to call loudly for decorative painting. The whole of the interior is executed in red brick, which has, however, been much daubed with a coloured wash; its effect is, notwithstanding, very fine and well worthy of imitation. As in Italian churches generally, the choir is very short as compared to the length of the nave. The exterior is even better worth examination than the interior; the design of the west end is an exaggerated example of the mode of finishing west fronts not uncommon in Italian Gothic; it is to some extent a sham, and therefore bad, but there is much which is of value in its detail, as it is even more than usually elaborate; and apart from the general outline of the mass, which pinnacles and pilasters cannot redeem from ugliness, there is considerable beauty in the group of windows and doors arranged so as to rise gradually to the centre. The cornices are very heavy and elaborate, and the whole front may be looked at as a masterpiece of terra-cotta and brick architecture. It is purely Italian in its great breadth and general arrangement, and, I confess, very far from being to my taste, though I could wish that we had more often some of the same breadth and simplicity in our own elevations.

It is very curious that this west end is the only elevation in this church which is at all distinctly Italian in its design; for those of the transepts and choir might much more reasonably be put down as imitations of Northern work; they are very similar, and a description of the latter will therefore suffice. It is flanked by massive buttresses, and has two large and lofty trefoiled lancets, surmounted by a circular window of great size; the whole is very richly moulded and executed entirely in brick. The buttresses and roof finish at the top in a rude temporary-looking manner, and it is therefore impossible to solve the interesting question of their original terminations, which must, I imagine, have been pinnacles. The ordinary bricks used here are about 10 in. × 3 in. in size, and laid with very wide joints of mortar; those used for window-jambs and arches are of much deeper colour and finer clay than the others. There is something quite refreshing in coming suddenly and unexpectedly upon such a simple and English-looking elevation, after the multitude of thoroughly Italian fronts it has been our fate to see lately.

On the north side of the nave there seems to have been a fine row of pointed windows, but they have been all destroyed to make way for Renaissance improvements. There are very large buttresses dividing the bays in this aisle — a feature which is unusual in Italy, and which, in addition to the design of the choir and transepts, would seem to show that this church was not entirely the work of an Italian. In the plan, too, it is remarkable that, though the general arrangement is quite that of the large Italian churches, such as the Frari at Venice and Sta. Anastasia at Verona, in one particular it is unlike them. The groining bays of the aisles are square, and not oblong; and as two of the aisle arches make one bay of the nave, the groining compartments in both are as nearly as possible square. This is an arrangement which occurs often in German Romanesque, but is not seen so often in Italy.

There is a fine campanile between the south transept and the choir; it has four stages above the roof of the church, and scarcely any opening below the belfry windows; these are exceedingly good, of three trefoiled lights under an inclosing arch, with two plain circles pierced in the tympanum, the monials being shafts of white marble. A low spire of circular bricks finishes, but does not improve, this



(C) CLOISTERS, CERTOSA, PAVIA.

(D) ARCADE FROM THE CLOISTERS, CERTOSA, PAVIA.

very beautiful belfry. There is another brick pointed church at Pavia — San Francesco — which has a fine west front redeemed from the common Italian character by the grand window-arch in its central division; and though this has been filled in with later and barbarous work, to the entire concealment of the tracery, its effect upon the whole front is astonishingly good. The detail is very elaborate, and in the arch a great number of terra-cotta ornaments are introduced. The front is divided by large pilasters into a centre and wings corresponding with the nave and aisles, but these are again subdivided by smaller pilasters, each of which is composed of three circles on plan, and finished rather nicely with a kind of finial at the top.

San Francesco is lighted by a succession of small clerestory windows, and the aisles have large buttresses, the greater part of the upper portion of the west front being a mere mask to make out the desired outline. I begin really to wonder whether I shall see a west front before I leave Italy which is not a purely unnecessary and unprepossessing sham!

Pavia is a busy and a pleasant city, and one that improves on acquaintance: it is true that it was very hot and sultry, but to this I have been fairly acclimatized, and so rather enjoyed it, except when a piazza had to be crossed in the sun, or a walk to be taken along a street unprotected by arcading, which by the way is much rarer here than in Padua, Mantua, and other cities which I have been describing. The main street of the city is very picturesque, with somewhat of a fall towards the south, so that just a glimpse is obtained between the houses of the distant Apennines.

From Pavia we went, on our road to Milan, to pay a visit to the renowned Certosa. The road thither, which is also that to Milan, pursues a monotonously straight course by the side of a canal, or canalized river, and between rows of stiff trees, until, about four miles from Pavia, a turning at right angles out of the main road soon leads to the gateway of the monastery, and through this — which stands open apparently rather through carelessness than out of hospitality — we drove into the courtyard in front of the church. This, grown all over with weeds, looked certainly very desolate and wretched, and but a poor preface to the polished marbles of the west front, and the riches and paintings of the interior of the church.

The west front is of great magnificence of material, though of a kind of design which seems to have proceeded upon the principle of setting all established architectural styles and customs entirely at defiance. This indeed may be said of the whole church, which is a kind of mixture of Lombard-Romanesque features with some Gothic, and no slight dash of the Renaissance spirit; altogether a most magnificent hybrid, but certainly a hybrid. The doors stand wide open, and from the decaying and desolate court in front of the church we enter into the nave, full of everything that is magnificent in material, and all preserved with jealous care and in admirable order; we look up to the lofty vault which spans the grand width of the nave, and find the groining ribs arched overhead in pure pointed form, and cannot help marvelling how far this one pointed feature harmonizes — I had almost said sanctifies — the whole interior, though in fact, save this one point, there is scarcely a single detail throughout the church which would ever pass muster as really being of Gothic character.

I think it is hardly possible to scan or criticize the architecture of such a building; it is better to follow the guidance of the cicerone, and look at the pictures behind the many altars set around with precious stones, and inclosed within reredoses made of such an infinite variety of marbles, that, with some degree of envy, one thinks how precious such an array would be on this side of the Alps, even if spread through fifty churches.

The nave and aisles are divided from the side chapels and from the transepts by high metal grilles, and the transept is again divided by another screen from the choir: this produces a very singular and unusual effect, and makes the transept appear somewhat like a nave placed at right angles to the choir. All the chapels on either side of the nave communicate with one another, so that the monks are able, without entering the nave, to obtain access to all of them, whilst females are carefully excluded both from the chapels and from the transepts and choir. Except a Perugino in one of the chapels on the north side of the nave, and one picture in the sacristy, there seemed to be no pictures of any very great value; in fact, travellers are asked rather to admire the value of the stones which are used in the altars, and the marbles in the reredoses behind them, than the paintings

(E) ARCADE FROM THE CLOISTERS, CERTOSA, PAVIA.

which they inclose. The groining of the church, enhanced as it is in effect by the way in which it is painted — with a blue ground,

(F) ARCADE FROM THE CLOISTERS, CERTOSA, PAVIA.

powdered very richly with gold stars — conduces more than anything else to the very fine effect of colour which the nave produces; and the beautiful pavements, composed mainly of red and white marbles, laid in elaborate geometrical patterns, increase not a little the general effect. This is an instance of the superiority of decorative painting over pictures as far as improvement of architectural effect is concerned.

South of the church are two cloisters; that nearest to the church of ordinary size, but the other, to which it leads, prodigious in its dimensions, and very singular in its effect, being surrounded at regular intervals by the houses of the monks rising out of and above the regular line of the cloister roof. I went into one of these houses, and found its accommodation exceedingly ample; three rooms, closets, and a garden being provided for each monk. The arches of the cloisters are exceedingly rich in terra-cotta ornaments, and throughout the exterior of the church and other buildings it is remarkable how very elaborate these ornamental mouldings are; they are left in the natural reddish colour, and, as the walls are white-washed, they have a very singular effect. We found here, as at other places, men busily engaged in making casts for the Crystal Palace at Sydenham, whose managers certainly seemed to have ordered casts of everything that could be modelled throughout Europe!

There are now[1] twenty-five monks at the Certosa, and the number appears to have been gradually on the increase since the reconstitution of the monastery in 1844; it was certainly very gratifying to see that, whilst all the rest of the buildings looked forlorn and dilapidated, the church itself was most scrupulously well preserved, presenting in this respect a great contrast to the fate of monastic churches generally in the north of Italy.

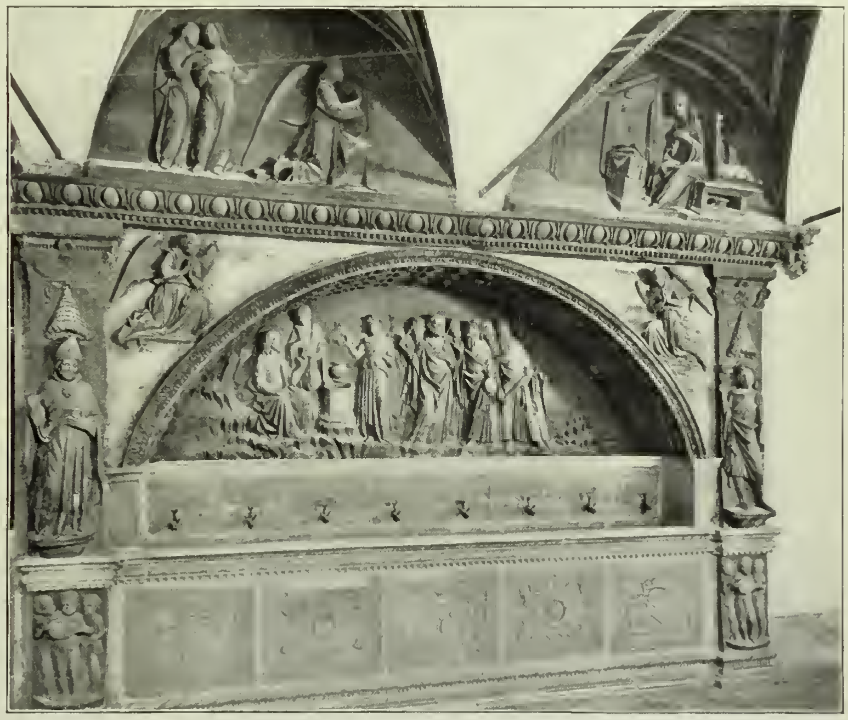
A tedious drive by the side of a long straight canal, passing on our way large well-managed farms and other signs of uncommon agricultural activity, took us from the Certosa to Milan; and long before we arrived there the white pinnacles of the Duomo, with the Alps in the far distance, came in sight; certainly, seen thus, the Duomo is one of the least satisfactory or imposing great churches I have ever seen, and does but little in the way of imparting character — as most cathedrals do — to the city which lies at its foot. At last we reached Milan, and entering through a triumphal arch — the Ticinese Gate — and passing the front of Sant' Eustorgio, we threaded our way down a very long narrow street, by the side in one place of a row of Roman columns, still standing tolerably perfect in the midst of the crowded highway, until at last we found ourselves housed in a more luxurious hotel than it has been our fortune to meet with for some days.

[1] This was written in 1855.

GARDEN WALLS OF BRICK.

TRAVELERS to the Old World are often surprised and pleased at finding the use of brick so general, wherever it is possible to employ them. They are in evidence in street paving, in sidewalks, in curbs, in floors for cottages, floors for barns, poultry houses, factory floors, gate posts and fences, and wherever used are so arranged and chosen as to appear as if nature had intended the brick and nothing else to serve the purpose.

The old garden walls and dividing fences, which still show the limits of the domain belonging to the old ruins, are chiefly of brick, coped with stone or slate, and many of them to-day are in a good, serviceable condition, though they have done service, in some instances, over seven hundred years. The Cathedral of St. Albans, which is one of the oldest in England, is built of brick, as are some of the walls surrounding it, and the curb of the great well was also built of brick of Roman make, brick that have had the conflict of wind and weather, battle and breeze, for upward of fifteen hundred years.— "*Architect*," *in Clay Record.*



(G) LAVABO, CERTOSA, PAVIA.

Fire-proofing.

SOME DEDUCTIONS FROM THE EVOLUTION IN FIRE-PROOF CONSTRUCTION.

BY CORYDON T. PURDY.

BUILDINGS that could not easily be destroyed by fire were constructed in very ancient times, and the notion of using materials and methods of construction, having this particular object in view, is therefore a very old one. The words and phrases expressing the art, now in common use in the English language, came into that common use, however, only about the middle of the present century, when they signified practically the same as they do now.

The Romans built a massive construction of brick and concrete with masonry floors and groined arched ceilings, sometimes covering very wide spans. Partitions, as we understand the word, were practically unknown. Division into rooms was accomplished by thick masonry walls, similar in character to the exterior construction. There was little or no combustible material used and the buildings were practically indestructible. When floors were supported by timber, the heavy beams generally used were exposed in the ceiling, but the final floor construction was invariably masonry finished with concrete, stone, or tile. The essential constructive features of this architecture were, of course, much older than the Romans, but they gave it permanence and character, and the construction was copied in later times throughout southern Europe and, to a considerable extent, in the tropical Spanish countries of America.

In northern Europe, however, and in the United States and Canada, where timber was more available, and the climate was better suited, and the commercial demand was not so much for permanence as for immediate use, wood was always used to a much greater extent. On this account fires have always been more prevalent in London than in Paris, and in America more than in Europe.

Up to the end of the eighteenth century wooden beams were used almost exclusively in these parts of the world for floors and roof construction, even in the largest cities and most costly buildings, but they were often, especially in northern Europe, combined with concrete materials or clay products, to secure a partial protection from fire. As cities grew in importance and fires became proportionately more destructive, the importance of fire protection was emphasized. Either the southern methods must be followed, or newer methods must be made indestructible, or greater dependence must be had on a protective service. So it seemed to them in that day, and though we have progressed greatly in experience and knowledge since then, the question is much the same even in this day.

The English Parliament appointed a committee about 1775 to investigate the question. However, little good came of it, and it was really not until the middle, or near the middle, of this century that the English were thoroughly aroused to the importance of the question in their own country. The London fire officers tried for years to secure better methods of building, and English architects and technical papers discussed the matter at great length. Practical and economic considerations gave character and force to this agitation. In Paris the methods of building had been more conservative, and losses by fire had been less; but in these same days they also were theorizing and experimenting and equally as ready as the English to improve their methods.

Cast-iron beams and brick arches began to be used in the beginning of the nineteenth century and up to about 1850 they were used extensively in the best buildings in England, France, and Germany. It is this period that gave birth and importance to the experiments and investigations into the strength and other characteristics of cast iron, much of which is now of little importance to the architectural and engineering world. Rolled iron beams were invented about 1850, and within a very few years were being manufactured and used in all the leading countries. In America, they were first rolled by Peter Cooper, at Trenton, N. J., in 1854. From the beginning they were used to carry the floors of buildings. It did not then seem possible that a fire could gain sufficient headway to materially injure them. No one anticipated that it would be necessary to cover them, and it was confidently predicted by both the fire officers of London and by English architects generally that they would solve the problem, and that the rolled beams carrying brick arches would make perfectly fire-proof floors. About fifteen years later, however, such construction was condemned by the same fire department. Many floors were constructed, both in England and on the Continent, in warehouses and other important buildings, with the rolled beams exposed on the bottom, and in every great fire the destruction was complete. The idea that the rolled beams could be completely protected and that this protection was really the essential element of all fire-proof construction, involving rolled beams, was comprehended very slowly. In 1866, a Frenchman obtained a patent involving as one feature a method of covering the bottom of the beam with burned clay material. The soffit tile in common use in America is an American invention, made in 1883. The recent substitution of steel for wrought iron has not altered the fire-proofing problem, but has materially widened the limit within which structural material may safely be used.

The use of plaster of Paris beton and cement concrete with wood, to secure a construction much less liable to burn than an all-wood construction, grew greatly in favor in the latter part of the eighteenth century and the first part of this one. After rolled beams were invented, similar methods in combination with iron continued to be employed both in England and in France, especially in buildings for dwelling-house purposes, but the chief dependence in important buildings was then, as it has continued to be, in brick arches or their equivalent. Most improvements in burned clay products were born in Europe and developed and perfected in detail and made practical in America. Not only were the inventions covering the

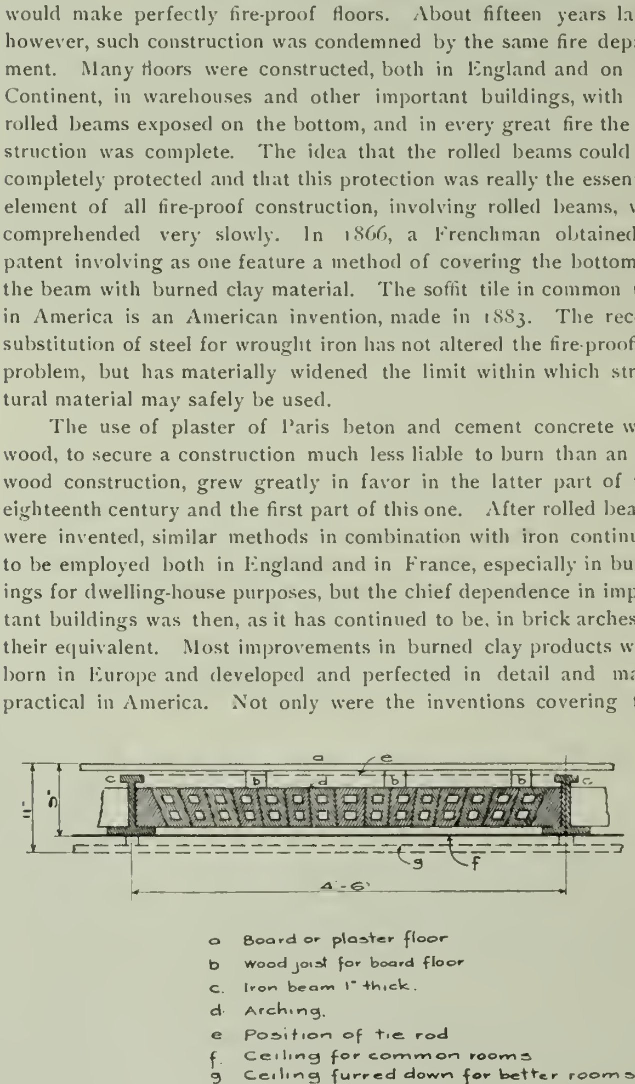


FIG. 1.

important principles of fire-proofing construction first taken out by Europeans, — English, French, and German, but if the records are correct, they were for the most part first put to practical test in those countries.

Though it has been repeatedly stated to the contrary, the first flat hollow clay tile arch is older even than the rolled beam, and of English construction. An account of this arch was published in England in 1854 It is stated that about 15,000 sq. ft. of such arches resting on cast iron beams were constructed in a lunatic asylum known as "The Retreat," belonging to the Society of Friends, in York, England. The beams were 4 ft. 6 ins. to 5 ft. apart, and the whole calculated to carry the dead load and a reasonable live load, in the usual way then, and equally usual way to-day. Fig. 1

shows a section of this construction as given by the author, Mr. Pritchett. But this is not the only interesting feature of this record, for he testifies to an even very much earlier construction of flat arches in floors. "I first adopted this mode of arching," says the writer, "in the erecting of the pauper lunatic asylum, at Wakefield, in 1817: an account and section of which was published in 1819, with the plans, etc., of that building. These bricks were not hollow, and the size was limited by the Act of Parliament, but at 'The Retreat' they are 12 ins. long, and of the size and shape shown in the drawing. The arches weighed, when finished, 31 lbs. to the superficial foot, and cost in York 16s. per square in mortar and 25s. in cement. The soffit is very nearly flat. I used to allow an inch of camber, but found the settlement so very small that the camber occasioned a waste of plaster, as nearly all the buildings at Wakefield were finished flush with the beams. At 'The Retreat' the beams are beaded on the edges to quirk the plaster to, except in the best rooms, where light ceiling joists are used. Where the arches abut against internal walls the springing bricks are walled in, but in outer walls they spring from a light iron beam in the wall, to which tie rods are attached to prevent thrust till the whole gets set and becomes one solid mass."

The first use of special hollow burned clay material in America was in Cooper Institute, in 1855, but in this case single pieces were used reaching from beam to beam. The first hollow flat arches, similar to those used by Mr. Pritchett, were not used in America until 1873.

And so the features of construction that relate to fire protection have improved through all this century. It has not been a very steady progression, though it has been a definite one. Here and there an enthusiast has dreamed of a better thing and labored to materialize it. In the same indifferent manner science has helped it. Demand and supply has also figured as a creative force, though probably the former was always as inactive as it is now. As a rule the demand is not for the best, not for that which signifies growth, but rather for a moderate degree of protection limited by the expense of it. The supply, too, has often been of like character: the manufacturer has not always cared so much to provide improved products as he has to make those he could sell to the best advantage. There have been decades of growing and decades of standing still. One nation has suggested while another has developed.

In the present decade the spirit of progress has received a great impetus. Every feature of construction is being experimented with as never before, and the public is demanding of those who are especially interested exact information more than in any previous period.

A proper conception of the problem must always depend upon a full understanding of the characteristics of all the materials entering into the construction of buildings, and also of what might be called the general constructive principles governing their design. The development of the art in the future will depend upon the growth of our knowledge along both lines. The more complete this knowledge, the more perfect the conception.

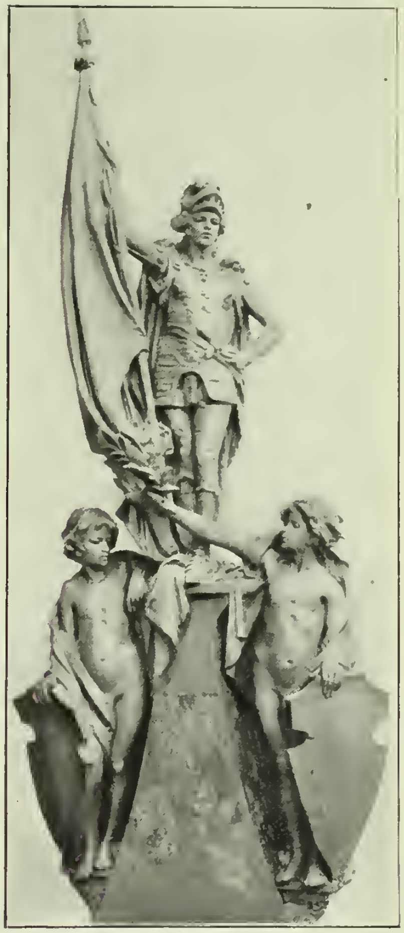
Regarded from the point of resistance to destruction by fire, there are really two quite different classes of construction, and we need first of all to thoroughly appreciate the distinction between them. In one the fire-proof qualities are dependent upon the effectual construction of solid masonry, brick, and stone, while in the other they are chiefly dependent upon what we ordinarily call "fireproofing materials." The former might be termed a "massive construction," while the latter is widest known as "skeleton construction." It is interesting to note in this connection that this expression was first suggested by a comparison with the human frame clothed with all that gives perfection, presumably made for the first time in a discussion at a conference of the Royal Institute of Architects in 1877, long before this method of construction had taken shape in American designing. In the United States it was probably first used in print by Mr. Wellington, former editor of the *Engineering News*.

(*Continued.*)

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — At this midsummer season, when business is dull in every line and there is consequently little new work to report, it is interesting to look over the work of the past half year and to draw a few comparisons. From January to June there has been a gain of 66 per cent. in the amount of money invested in building operations in New York over the corresponding period last year. This shows very clearly that the general improvement in business throughout the country is stimulating business activity.

In a total increase of about $37,000,000 for the twenty leading cities of the country, over $30,000,000 of that amount is credited to Greater New York. As a center of building operations the metropolis dwarfs any other city in the country very decidedly. It is equal to more than six Chicagos and seven Philadelphias. Of course, not all of the $84,000,000 worth of new buildings projected in New York will be instantly carried out; and even with the big proportion that will be promptly undertaken, some time must elapse before the money expenditure involved will be distributed for labor and materials. But the statistics are the forerunners of actual activity. They may safely be taken as the beginning of unusually brisk conditions. We have had further successful tests in this city showing how our tall buildings can be of benefit in fighting fires in their neighborhood. Judging from the success of these tests, when seven streams



TERRA-COTTA DETAIL.
Executed by the Perth Amboy Terra-Cotta Company, for the Rittenhouse Apartments, Philadelphia.
Willis G. Hale, Architect.

PANEL.
Executed by the White Brick and Terra-Cotta Company, for residence at New Rochelle, N. Y.
Clinton & Russell, Architects.

COUNTING HOUSE, THIRD AND CHESTNUT STREETS, PHILADELPHIA, PA.
Wilson Eyre, Jr., Architect.

were thrown simultaneously across Broadway from the standpipe in the St. Paul Building, — one from the roof, while six branch lines were in full operation below, — it was shown not only that two of the largest steam fire engines in use by the fire department of this city can draw sufficient water from one hydrant to fight a fire, but also that a fire in one of these tall buildings — provided it is properly equipped with a standpipe — can be fought and extinguished without any more difficulty than is met with in putting out a fire in a structure whose height does not exceed the average. More water than was being used could have been pumped to the roof by the two engines, one of which had to be stopped during the second part of the test, as too much water was pumped for the outlet, and fifteen lines could have been employed and as strong a stream obtained as with the seven actually used. Under these circumstances, it would seem that legislation should be obtained whereby the owners of high buildings should be compelled to put standpipes where at present there are none.

The movement to secure proper park treatment to the seven acres of land given to Brooklyn by the town of Gravesend fifteen years ago for park purposes is a good one and ought to be successful. This is not a case where the city has to buy land through a tedious legal process, but where it already possesses a suitable tract that can be turned into a park at a moderate expense. This piece of property is located at the end of Ocean Boulevard. It faces the ocean and extends from 18th Street to Brighton Beach.

Plans are being prepared in competition for a new office building, to be erected at Broad, New, and Wall Streets, for the New York Stock Exchange. Among those competing are Bruce Price, George Kramer Thompson, and George B. Post. De Lemos & Cordes have planned a six-story brick and stone department store, to be built on Sixth Avenue, between 21st and 22d Streets, for Adams & Co.; cost, $1,250,000. Carrere & Hastings have prepared plans for a brick and stone dwelling, to be built on 89th Street, near Fifth Avenue; cost, $75,000.

PHILADELPHIA. — So much is said about civic pride by hopeful advocates of higher architectural achievement in public buildings in Philadelphia, without, seemingly, unsettling the calm composure of city officials, that it is noteworthy that in one department of city work a proud glance may be cast over recent improvement. A few years ago, the fire stations, engine houses, truck houses, and all, in this good, strait-laced city, were a horror to behold, from an architectural standpoint. The fire department has always stood high for efficiency, but it was housed most ignobly. Old buildings, too unattractive to rent longer as stores, were fitted up in good order inside, but outside, with the addition of a funereal row of cast-iron boxes in the main front, standing slimly between the wide doors, nothing was improved, and so was had an engine house.

Since Mr. Windrim, the architect, served a term as director of public works, a change set in, and now architects as prominent as

COUNTING HOUSE, THIRD AND CHESTNUT STREETS, PHILADELPHIA, PA.
Wilson Eyre, Jr., Architect.

GATEWAY, JESUS COLLEGE, CAMBRIDGE, ENGLAND.

Edgar V. Seeler and James H. Windrim design many of the new buildings for the department, so that if the present system prevails, in a few years the engine and truck houses should be noted, not for their dingy ugliness, but for their suitable and proper architectural character.

Possibly in nothing so much as public school buildings is the need of architectural reform in evidence. Putting aside the huge granite high-school structures, which are not such as to educate the student in things esthetic, one fails to note in the average school even the attempt at architectural treatment. This state of affairs is undoubtedly to be attributed to the system under which all architectural work, if such it may be called, is turned out by a bureau of the board of education, the chief position in which offers a salary so small as to be no temptation to an architect of high ability.

The approaching Grand Army Encampment in Philadelphia has caused the city to form the project of another "Court of Honor" on the order of that of last winter, this to have the high-sounding title of "Avenue of Fame."

The inflated price of steel is having a marked effect on building speculation. The proposed new hotel on the site of the Girard House lags, apartment and office building plans await the downward turn of the market, while builders have great difficulty in getting small orders at any price.

The University is still adding to its large group of buildings. The huge Law School by Cope & Stewardson, in all the brightness of white stone and red brick, stands ready for the roof, and estimates are asked for a large addition to the dormitory system, in architecture agreeing with that of the initial portion finished some four years ago. The closing side of the triangle is now to be built, with a tower as a memorial to University students lost during the war with Spain.

A gymnasium for the college is projected, and numerous club houses connected with the University are building in the University quarter.

CHICAGO. — The month of July has shown a very gratifying increase in building operations as compared with the same month a year ago, when 370 buildings were started, costing $1,803,525. The figures for July, 1899, are 358 buildings, costing $2,583,000, an increase of 43 per cent. Building interests are still hampered by the brickmakers' strike, and there seems no hope of an early settlement.

Messrs. E. C. and R. M. Shankland, the well-known civil engineers and designers of structural steel work, have been commissioned by the Crown Prince of Japan to design the framework for his new palace. It is said that the Carnegie Company will furnish the steel. The estimated cost of the building is between two and three millions of dollars.

The scarcity of structural steel seems likely to seriously hamper the more important building operations in the near future. A local architect, just receiving estimates on a factory building, has been told that no steel could be promised him before January 1. This means an increased use of cast iron for compression members, and will be a good thing for the local foundry men, who are already very busy.

The most serious result of a recent severe storm was the wrecking of the steel frame of a large church on the north side, which was complete and ready for the masonry enclosure. The ceiling was to be vaulted, and the steel arches of some 60 ft. span were in place. The temporary braces and guys had been carelessly removed, and when the wind struck it a sledgehammer blow with a sudden gust, moving fifty miles an hour, the uprights slowly tottered and leaned, then went crashing and roaring over against and through the brick walls of the adjacent parish school building amid a gorgeous display of sparks struck from the twisted metal. The total loss will be in the neighborhood of $15,000.

A fine educational building is to be erected facing the northern end of Lincoln Park. It will be devoted to the use of the new normal school endowed by Mrs. Emmons Blaine, and is to be built by

COMMERCIAL NATIONAL BANK BUILDING, PITTSBURGH, PA.
Alden & Harlow, Architects.

RESIDENCE, PITTSBURGH, PA.
Roofed with Akron vitrified shingle tile, made by J. C. Ewart Company; architectural terra-cotta by the Northwestern Terra-Cotta Company.
Alden & Harlow, Architects.

her from plans by one of Chicago's Beaux Arts medal men, -- Mr. John Gamble Rogers.

Mr. J. C. Llewellyn has designed a very interesting group of brick and red tile buildings for the agricultural department of the State University at Urbana. One of its features is a large court for the display of agricultural machinery and appliances.

A number of architects are at work on huge schemes, destined perhaps some of them never to take tangible form, but all signs point hopefully to the arrival, somewhat late, it is true, of an era of real prosperity for the architectural profession in Chicago.

ST. LOUIS. — There seems to be much dissatisfaction among the builders and architects with the present condition of business. It was thought in the early part of the season that there would be much building done during the year, and the indications at the time were such as to warrant conclusions of this character. There was talk everywhere of building, and a number of improvements of considerable magnitude were started, which were mentioned at the time. It is a little remarkable that nearly all of these buildings are on

CAPITAL FOR THE NEW UNION STATION, DAYTON, OHIO.
Executed by the St. Louis Terra-Cotta Company.
Elzner & Anderson, Architects.

Washington Avenue, between 10th and 13th Streets, and one visiting that locality only might be led to believe the entire city was rebuilding. These buildings are intended for commercial and factory uses, and are of mill construction, therefore giving little employment to skilled mechanics.

The sudden rise in price of all kinds of building materials before contracts could be awarded was no doubt the cause of much contemplated work not going ahead. When prices have become fixed and business adjusted to the new order of things there is little doubt but much important work will be commenced, as at the present low rate for money there can be no better investment than a good commercial or office building.

No little interest has been taken in the forthcoming competition for the buildings of the Washington University. The trustees have invited Messrs. Eames & Young, of St. Louis; Carrere & Hastings and McKim, Mead & White, of New York; Cope & Stewardson, of Philadelphia; Cass Gilbert, of St. Paul, and Shepley, Rutan & Coolidge, of St. Louis, to submit drawings, but it is rumored that the terms were so unsatisfactory that some of these refused to enter. The buildings will cost about $600,000, and are to be located upon the new property west of Forest Park, where the University will move as soon as the new buildings can be occupied.

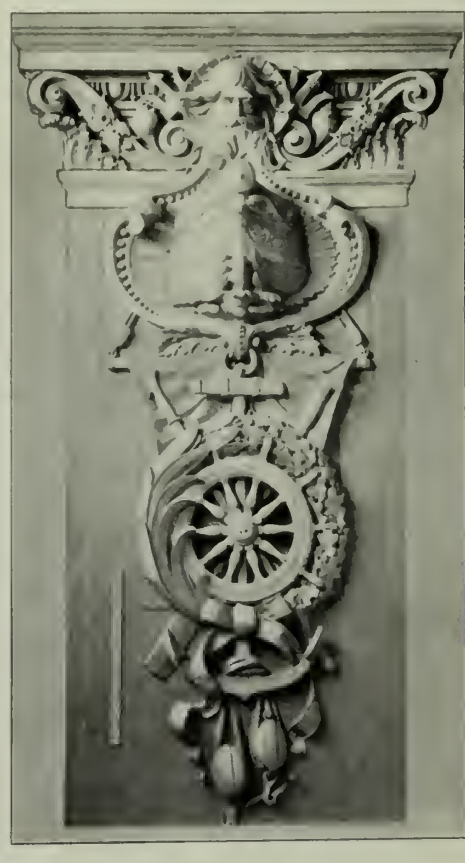
Holy Trinity parish will soon complete a new church on the southeast corner of Mallinckrodt and 14th Streets, at a cost of $125,000. The building will have an auditorium 117 ft. by 90 ft., with a seating capacity of 1,100. It is in the transitional style, with two towers on the principal façade, and a lantern at the interception of the nave and transepts.

Architect J. L. Wees has prepared plans for a hospital for the Homeopathic Medical College, on the southeast corner of Jefferson Avenue and Mullanphy Street. It will be four stories high, and be built of light brick and terra-cotta. The cost will be $60,000.

Reports from the World's Fair committees are very encouraging, and if they meet with the success that will guarantee the holding of the Fair, there will likely be many buildings started by the beginning of the year.

NEW CATALOGUES.

THE new catalogue entitled "Artistic Roofing Tiles," recently issued by the Celadon Terra-Cotta Company, Limited, is an exceptionally interesting treatise, calculated to make much better appreciated, both from an artistic and practical standpoint, the advantages of having buildings constructed with burnt clay tile roofs. The catalogue contains a full description of each variety of tile which the company manu-



PIER PANEL, AND CAPITAL OVER SAME, AT RIGHT AND LEFT OF MAIN ENTRANCE TO ROTUNDA, SANATORIUM AT SAILORS' SNUG HARBOR, S. I.
This panel is 12 ft. high, and was executed in white terra-cotta by the Excelsior Terra-Cotta Company.
Horgan & Slattery, Architects.

facture; to render these more readily understood, sectional cuts are given of each tile described, showing it individually, also in its relative position when laid on the roof. The advantage of such a complete description is most material to an architect, as by it he can determine which of the various styles represented will best suit the purpose and condition of any roof he has in contemplation.

The catalogue is profusely illustrated, having half-tone cuts of all the various styles of tile made by the company, and also of some twenty different structures roofed with Celadon tiles.

Interspersed through the catalogue is a series of lists of buildings equipped with this make of tile. These lists give name of owner, location of building, and name of architect, and are so divided that each style of tile comes under a separate list. The buildings thus enumerated number over three hundred. The concise, clear arrangement of the catalogue, and the essential worth of the matter which it contains, make it a book of much value to an architect as a work of reference. Parties desiring a copy should address the Celadon Terra-Cotta Company, Limited, Alfred, N. Y.

ANTHONY ITTNER, St. Louis, has recently issued Catalogue No. 4, descriptive of his line of pressed and ornamental bricks. This catalogue is arranged in convenient size for pocket use, and is attractively bound in black morocco. It contains over two hundred and fifty illustrations of the designs of molded brick which are made at the Ittner yards. Besides these, considerable space is devoted to stock designs of mantels, some very attractive patterns of same being shown. The arrangement of this little work is particularly good, every detail being presented in a clear and intelligible manner. Exact dimensions accompany the cut of each style of brick illustrated. In several instances sections of arches, panels, etc., are shown with the bricks laid, to more fully demonstrate the use of certain designs of ornamental brick.

FIRST NATIONAL BANK BUILDING, HARTFORD, CONN.
White brick for front and side walls made by the Pennsylvania Enameled Brick Company.
Ernest Flagg, Architect.

CURRENT ITEMS OF INTEREST.

JAMES A. DAVIS & Co. report that they are furnishing the cement to be used in the construction of the New Music Hall, corner of Massachusetts and Huntington Avenues, Boston, McKim, Mead & White, architects. The "Lehigh" Portland cement will be used exclusively.

THE COLUMBUS FACE BRICK COMPANY, Columbus, Ohio, report that they have secured the contract to furnish their "Ironclay" mottled brick for the new St. Augustine Church, Pittsburgh, Pa., Rutan & Russell, architects. This is said to be the largest church contract let in western Pennsylvania this year. Three hundred thousand brick will be required.

CORBEL UNDER BAYS IN HALLOWELL BUILDING, PHILADELPHIA.
Work being executed by the New York Architectural Terra-Cotta Company.
E. V. Seeler, Architect.

THE EXCELSIOR TERRA-COTTA COMPANY, through their Buffalo agent, John H. Black, have closed the contract to supply the terra-cotta for the First Baptist Church, Buffalo, R. A. Wallace, architect. The Celadon Terra-Cotta Company, Limited, through Mr. Black, will furnish their Conosera Tiles for the roof of the above-mentioned church.

THE MOSAIC TILE COMPANY, Zanesville, Ohio, have recently received several important contracts to furnish their tiles on new building enterprises. Among these are the Peabody Hotel, Memphis, Tenn., the Lindell Hotel, Lincoln, Neb., and the Nashville (Tenn.) Terminal Station. The company have doubled their capacity for manufacturing Roman Mosaic Tile by the addition of special machines and kilns.

THE ST. LOUIS TERRA-COTTA COMPANY have the contracts to furnish the architectural terra-cotta for the Thornton High School, Harvey, Ill., O. L. McMurry, architect, and for the Isaac Walker Hardware Company's Building, Peoria, Ill., R. H. Salter, architect. The company have recently completed a three-story addition to their factory and are now building two new muffled kilns to further increase the capacity of the plant.

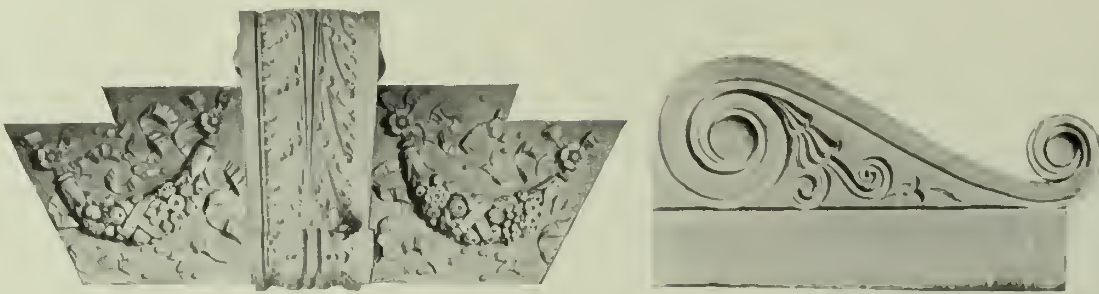
THE WHITE BRICK AND TERRA-COTTA COMPANY has closed contracts to furnish the architectural terra-cotta for the following buildings: Baptist Church, Elizabeth, N. J., A. F. Leicht, architect; store and lofts, 12th Street and University Place, New York, W. C. Hazlett, architect; residence, Tuxedo Park, N. Y., Hoppin & Koen, architects; restaurant building, 1164 Broadway, N. Y., D. W. King, architect; residence, 112 East 38th Street, New York, Wallace & Gage, architects.

THE CHAMBERS BROTHERS COMPANY have recently received an order for an outfit of their brickmaking machinery to go to Germany, and upon the installation of this plant will probably complete arrangements for a resident agency in that country. The outfit comprises disintegrator, elevator, pug mill, and common hollow brickmaking machinery. The order was given after several months of

TERRA-COTTA DETAIL, APARTMENT HOUSE, HARTFORD, CONN.
Executed by the Conkling-Armstrong Terra-Cotta Company.
George B. Rogers, Architect.

study of brickmaking as conducted in this country by a member of the firm who will operate this new plant in Germany.

THE UNITED STATES ENAMELED BRICK COMPANY, chartered June 19, held a meeting of stockholders in the office of the Reese-Hammond Fire Brick Company, Bolivar, Pa., on June 24, and elected the following board of directors: J. B. Hammond, E. R. Hammond, B. F. Reese, Leonard Roden, all of Bolivar, Pa., and J. B. Sommerville, of Wheeling, W. Va. The following officers were also elected for the ensuing year: J. B. Hammond, president; B. F. Reese, vice-president; W. M. Wynn, secretary; E. R. Hammond, treasurer, and Leonard Roden, general manager. It is the intention of the company to take the small experimental plant of the Reese-Hammond Fire Brick Company, and enlarge the same at once, and to be in the market within ninety days. The secret process that this company owns and controls by which the brick will be made will enable them to produce a brick that will not craze. All parties interested, stockholders as well as officers, are men of large experience in the clayworking business.



ARCH AND SECTION OF KEY, APARTMENT HOUSE, NEW YORK CITY.
Executed by the New Jersey Terra-Cotta Company.
Neville & Bagge, Architects.

J. C. EWART & Co. are furnishing their Akron Roofing Tiles for the following building operations: Schoolhouse at Pittsburgh, Pa., C. M. Bartberger, architect; First National Bank Building, Media, Pa.; sixteen houses for F. Keemon & Son, Philadelphia, Pa.; residence for P. A. B. Widener, Ashburne, Pa.: residence for John Wanamaker, Philadelphia, Pa.; residence for Collins Marsh, Pittsburgh, Pa.; residence for John Keim, Louisville, Ky.; a residence in Chicago; a residence in New York: fire-engine house, No. 15, Allegheny, Pa.

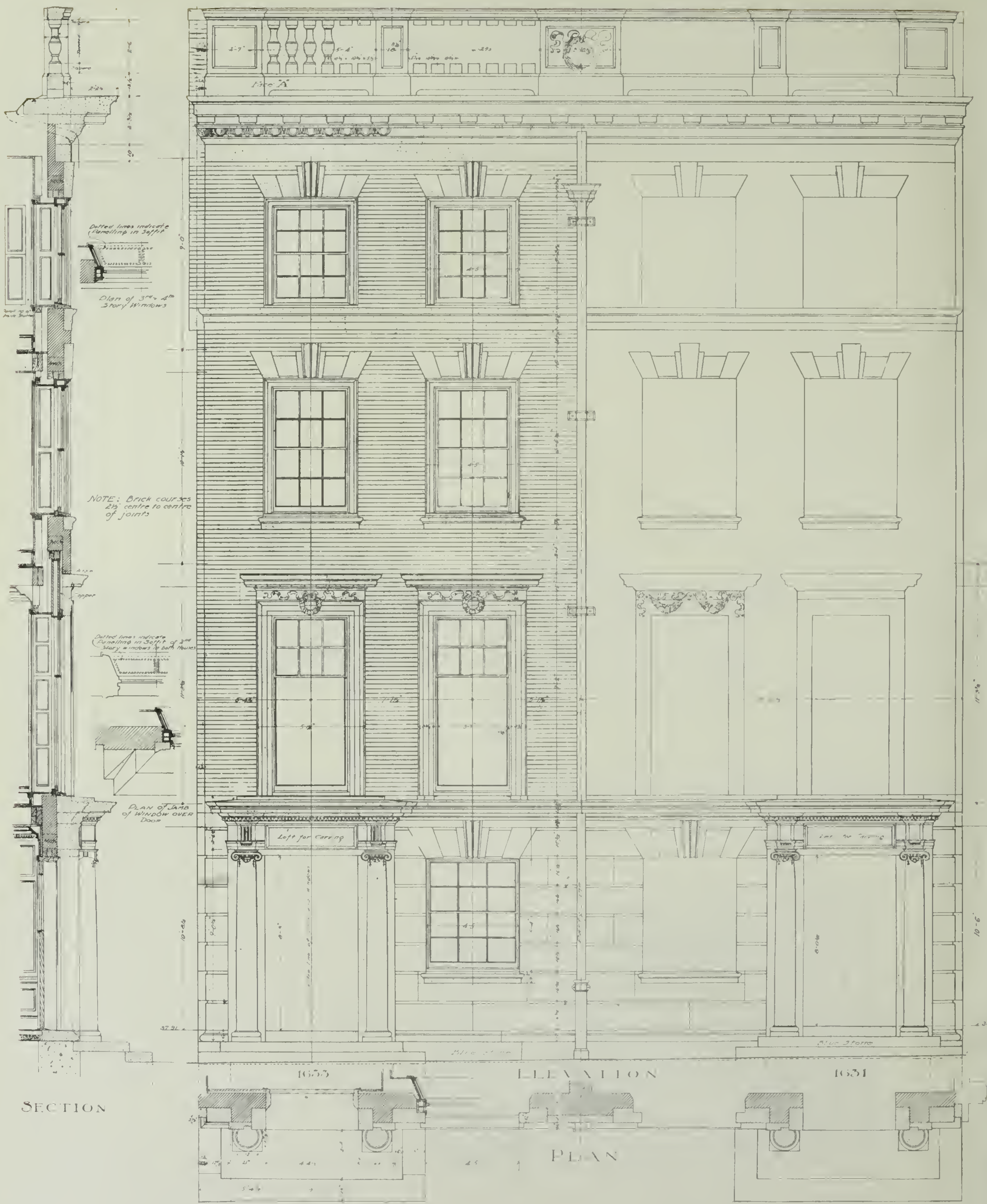
WE note in *The Iron Age* of late date the announcement of a shipment by Messrs. Merchant & Co., of Philadelphia, of 30,000 lbs. of seamless drawn condenser tubes to Glasgow, Scotland. The present duty on "seamless brass tubes" is 45 per cent. *ad valorem.* The fact that our manufacturers are able to export these articles for sale in foreign markets would seem to indicate that the 45 per cent. duty is unnecessary.

THE MASON SAFETY TREAD is now being very generally specified by architects and engineers throughout the country, and the day seems to be rapidly approaching when this device will be in as common use in other large cities as it now is in Boston, where Mason Tread is included as a matter of course in nine tenths of the important buildings under construction. Four different architects in Buffalo have included it in their specifications for four large school buildings, of which two are now under contract; and one or more school buildings in each of nine other cities are to have this modern equipment. Among other recent orders are the Central Union Depot in Cincinnati, Mt. St. Joseph's Convent (nickel-plated treads), near that city; Mehl & Co.'s large factory at Jersey City; Queens County Court House, New York; the Western Union Building at Pittsburgh; the new hotel and business block at North Adams; three New York police stations; about two hundred more street cars at Cleveland: and eight large platforms on the battle ship *Indiana.* A newly published blue book for architects will be sent on application to the American Mason Safety Tread Company, Boston.

THE CELADON TERRA-COTTA COMPANY, LIMITED, have closed contracts for the use of their roofing tiles as follows: From the Alfred Plant: Residence for Mr. John Swisher, Newark, Ohio, Wilbur T. Mills, Columbus, Ohio, architect; apartment building for S. B. Scoville, Oak Park, Ill., Patton, Fisher & Miller, architects; residence, New York, Thomas Graham, architect; bank building, Monticello, N. Y., H. Gardiner Sibell, Brooklyn, architect; residence for Mr. John L. Waterbury, Morristown, N. J., Howells & Stokes, architects; stable for Mrs. Fred. O'Donnel, Dubuque, Iowa, Wm. D. Williamson, Chicago, architect; First Baptist Church, Buffalo, R. A. Wallace, architect; high school at Morristown, N. J., Seymour Davis, architect; residence, L. B. Price, Kansas City, Mo., Sheppard & Farrar, architects; residence,

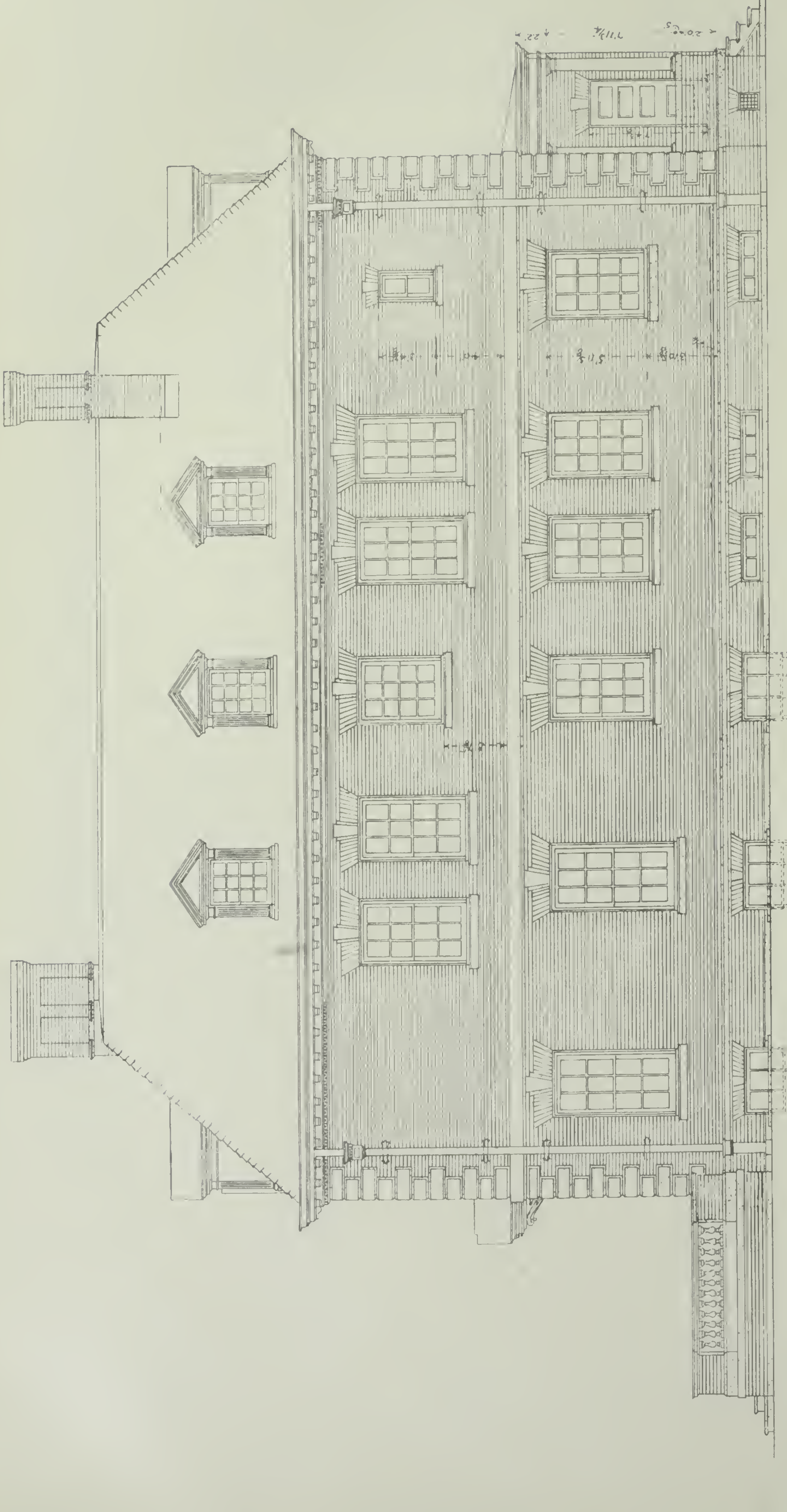
RESIDENCE AT PITTSBURGH, PA.
Built of "Shawnee" brick, made by the Ohio Mining and Manufacturing Company, and furnished by Burgy & McNeill, Pittsburgh Agents.
Sidney T. Heckert, Architect.

VOL. 8. NO. 9. PLATE 65.

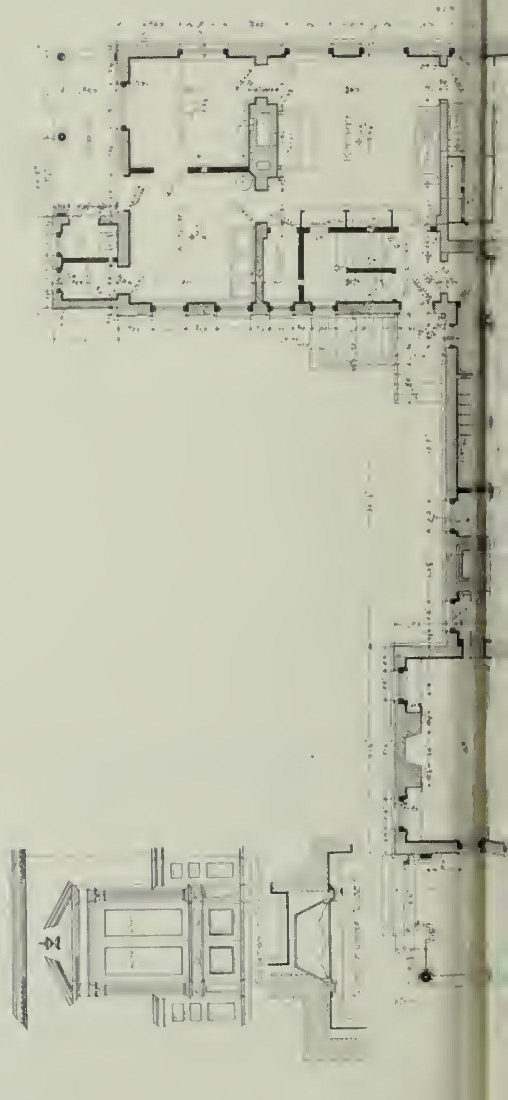


HOUSES AT PHILADELPHIA, PA.

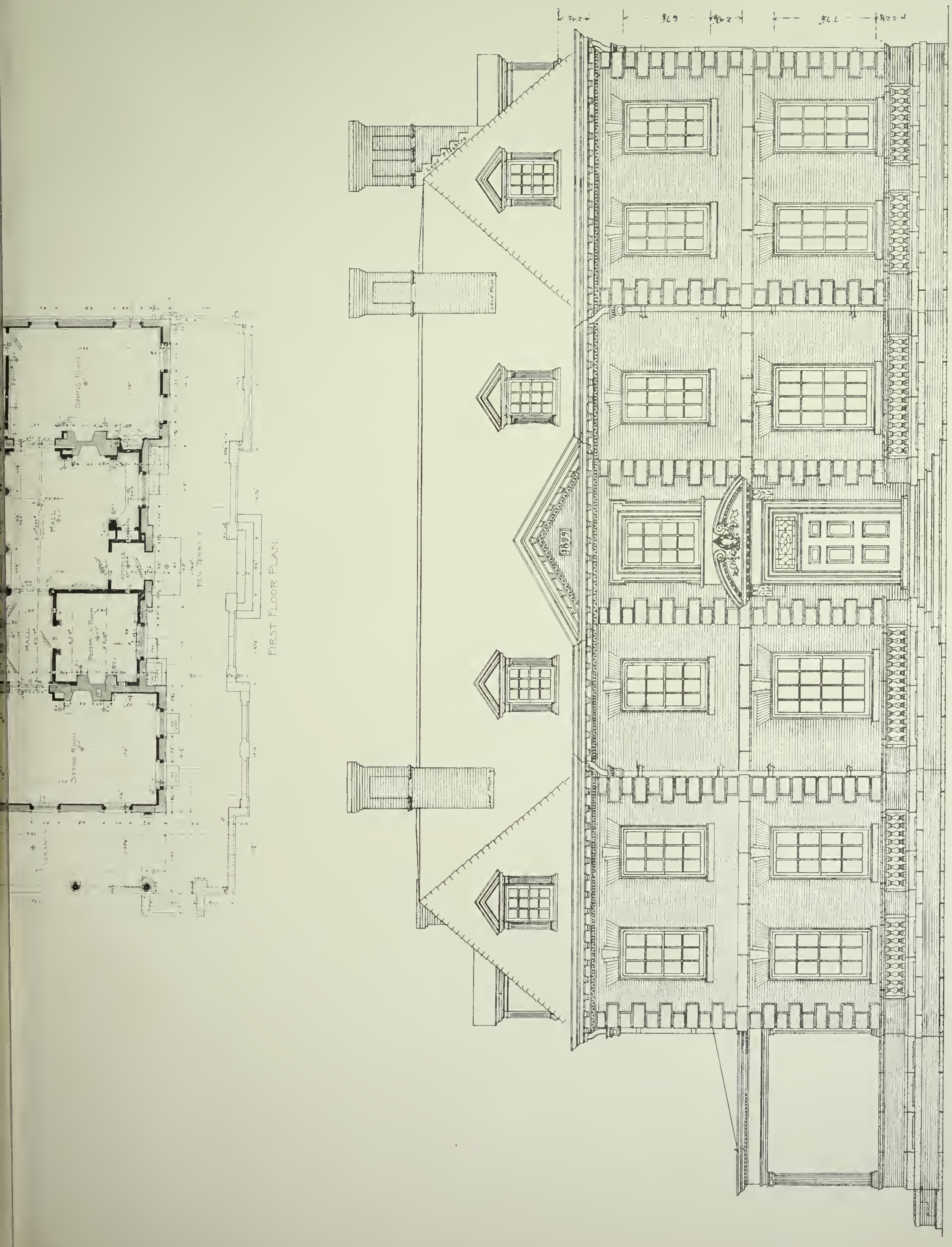
COPE & STEWARDSON, ARCHITECTS.



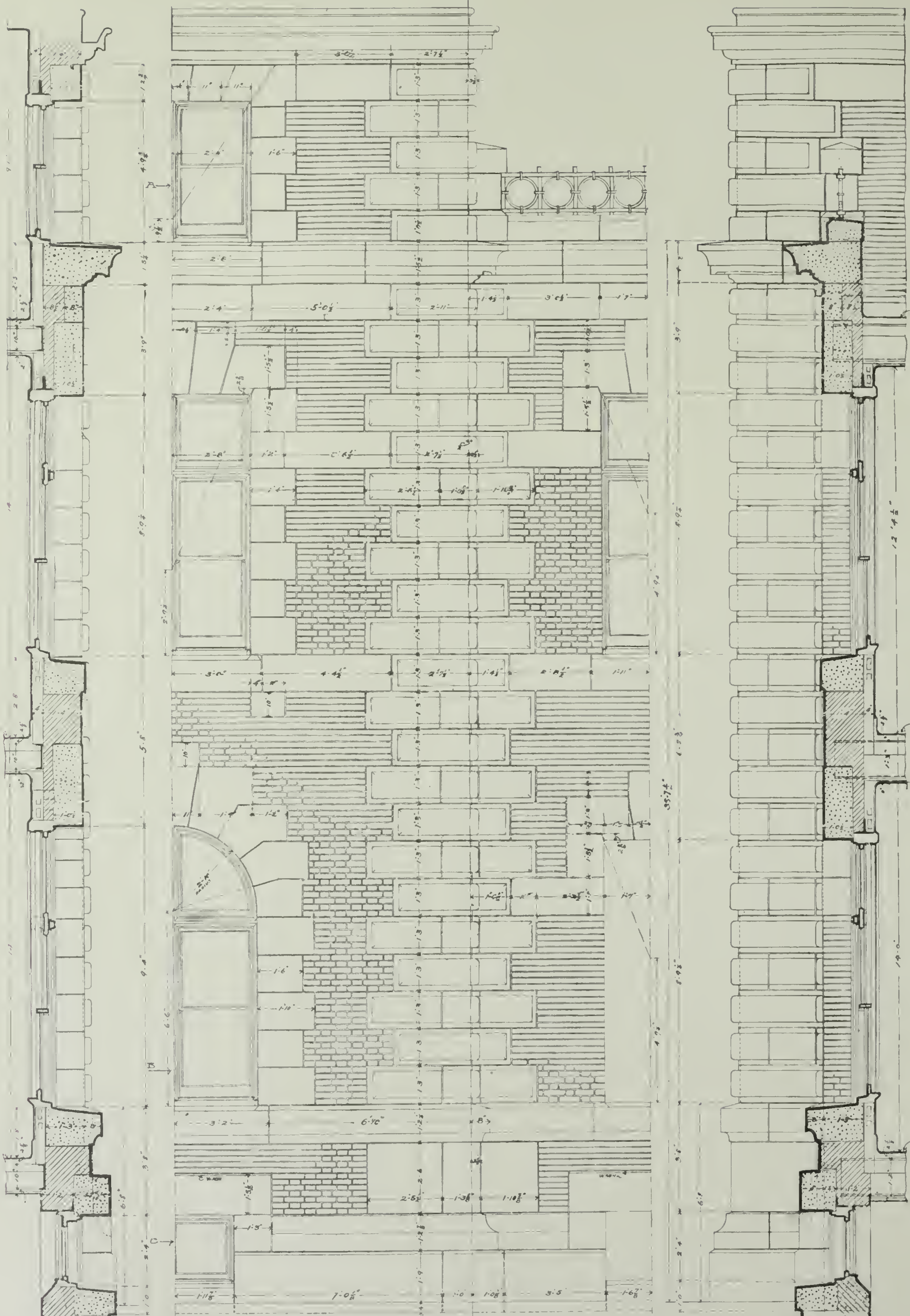
SIDE ELEVATION.



PLATES 66 and 71.



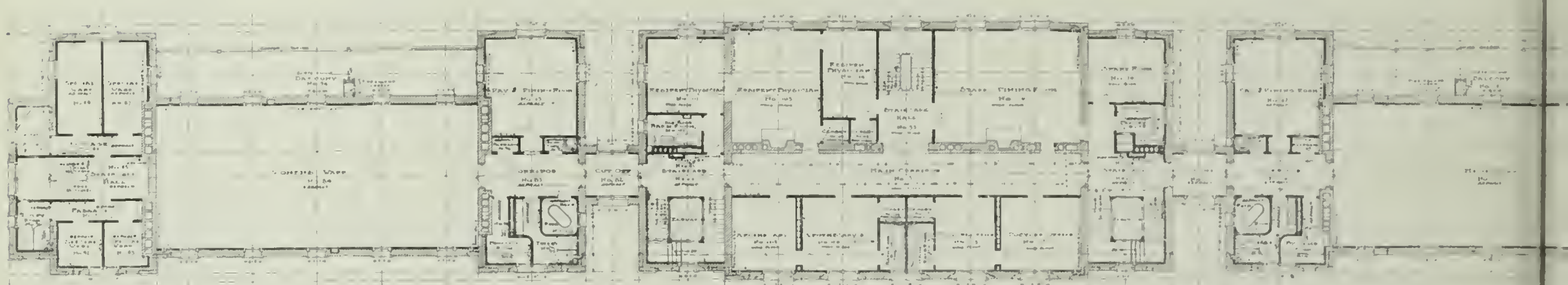
Front Elevation.
HOUSE AT GERMANTOWN, PA.
RANKIN & KELLOGG, Architects.



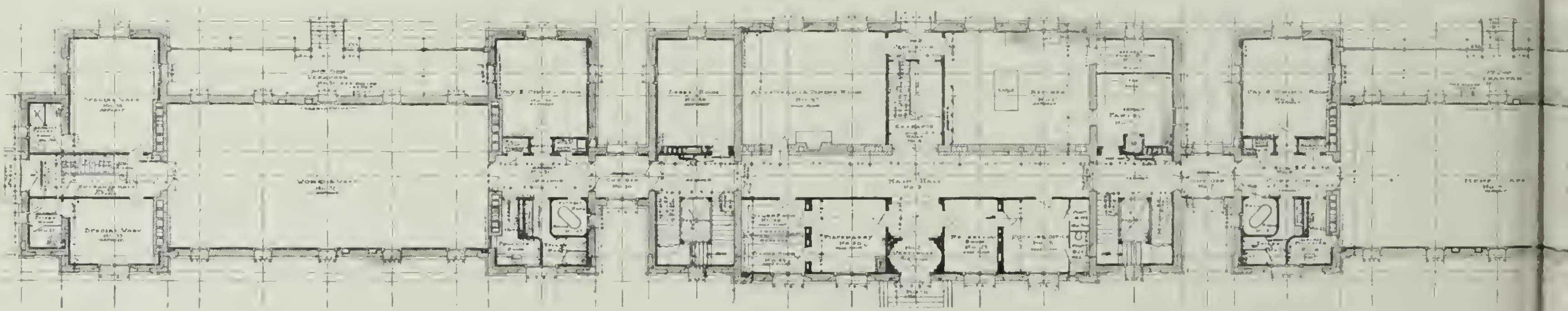
Detail, Portion of Front Elevation.

U. S. GOVERNMENT HOSPITAL, ELLIS ISLAND, NEW YORK.

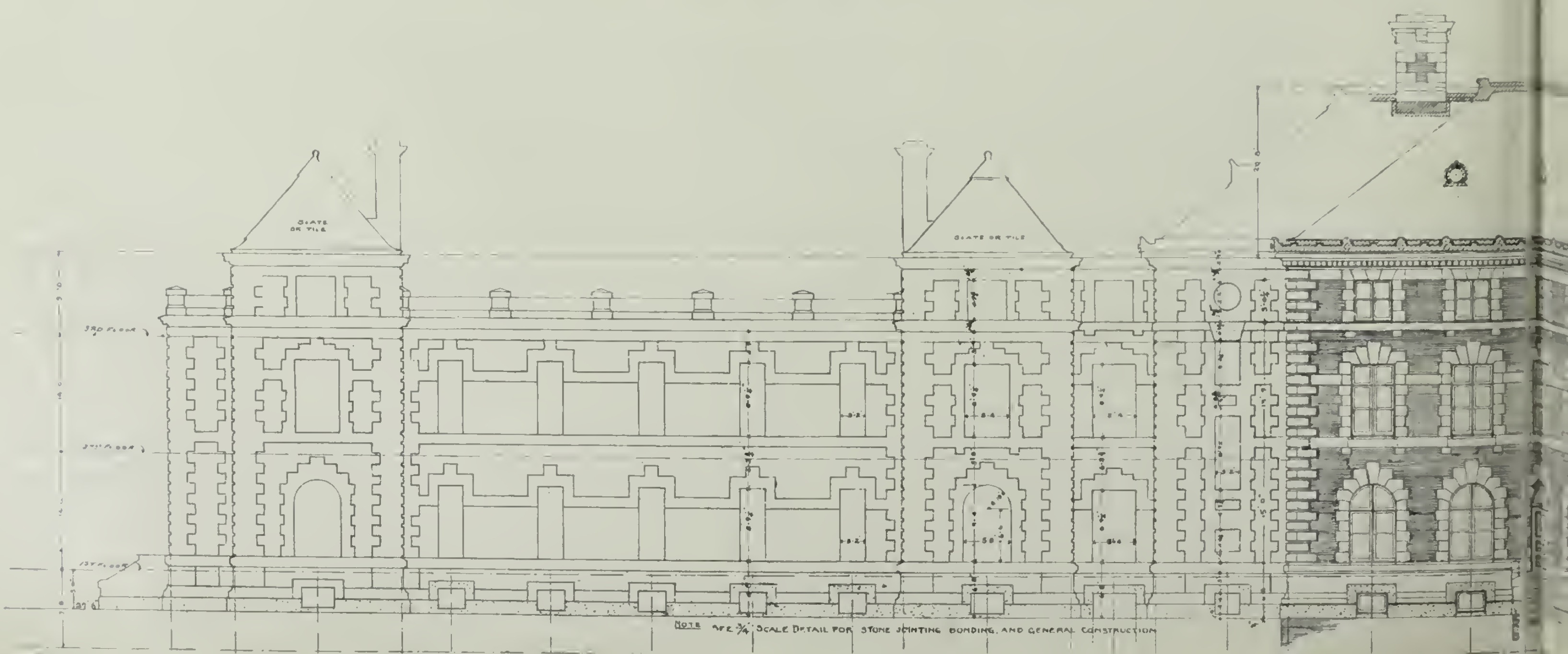
BORING & TILTON, Architects.



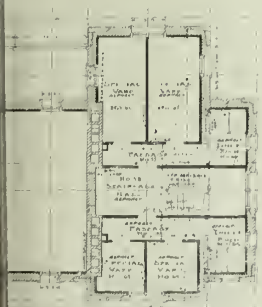
SECOND FLOOR.

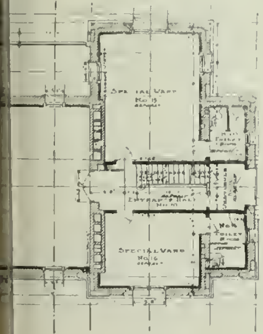


FIRST FLOOR.

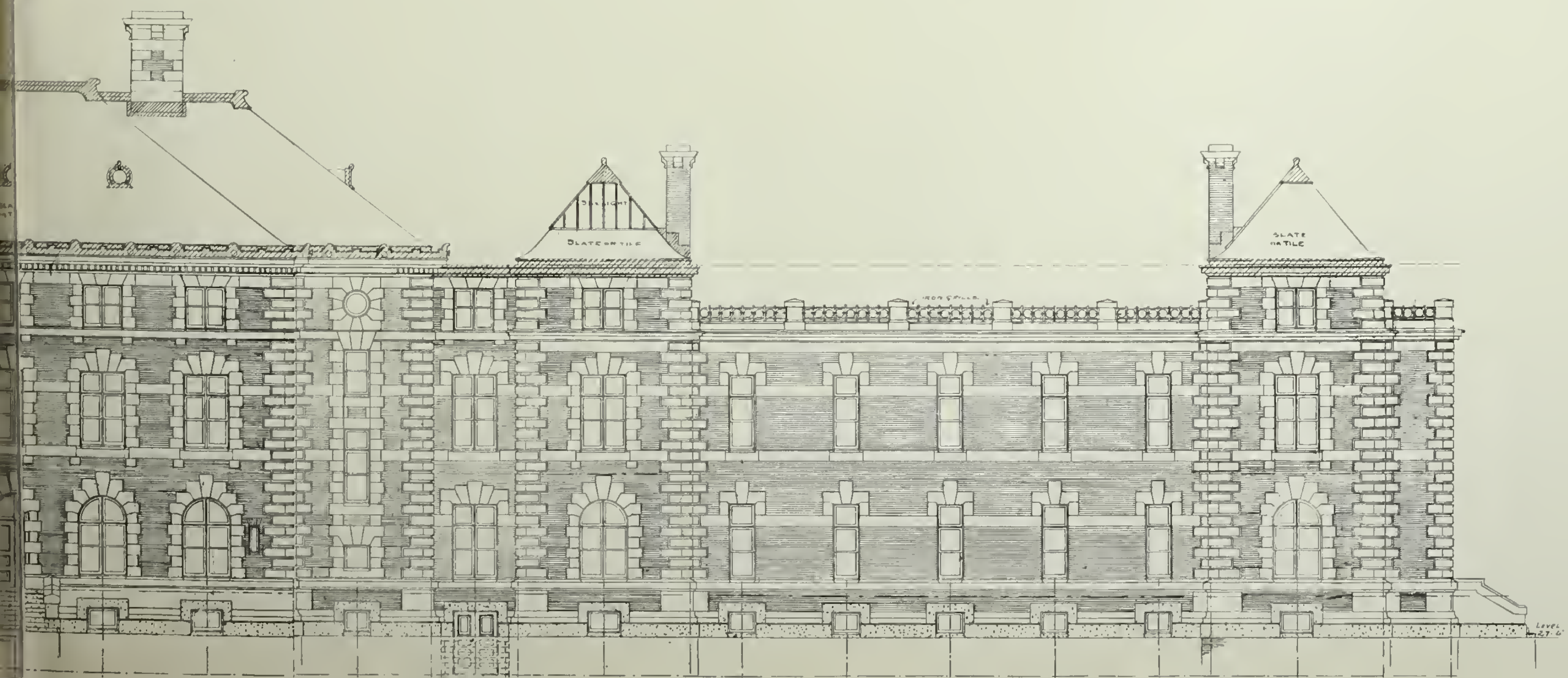


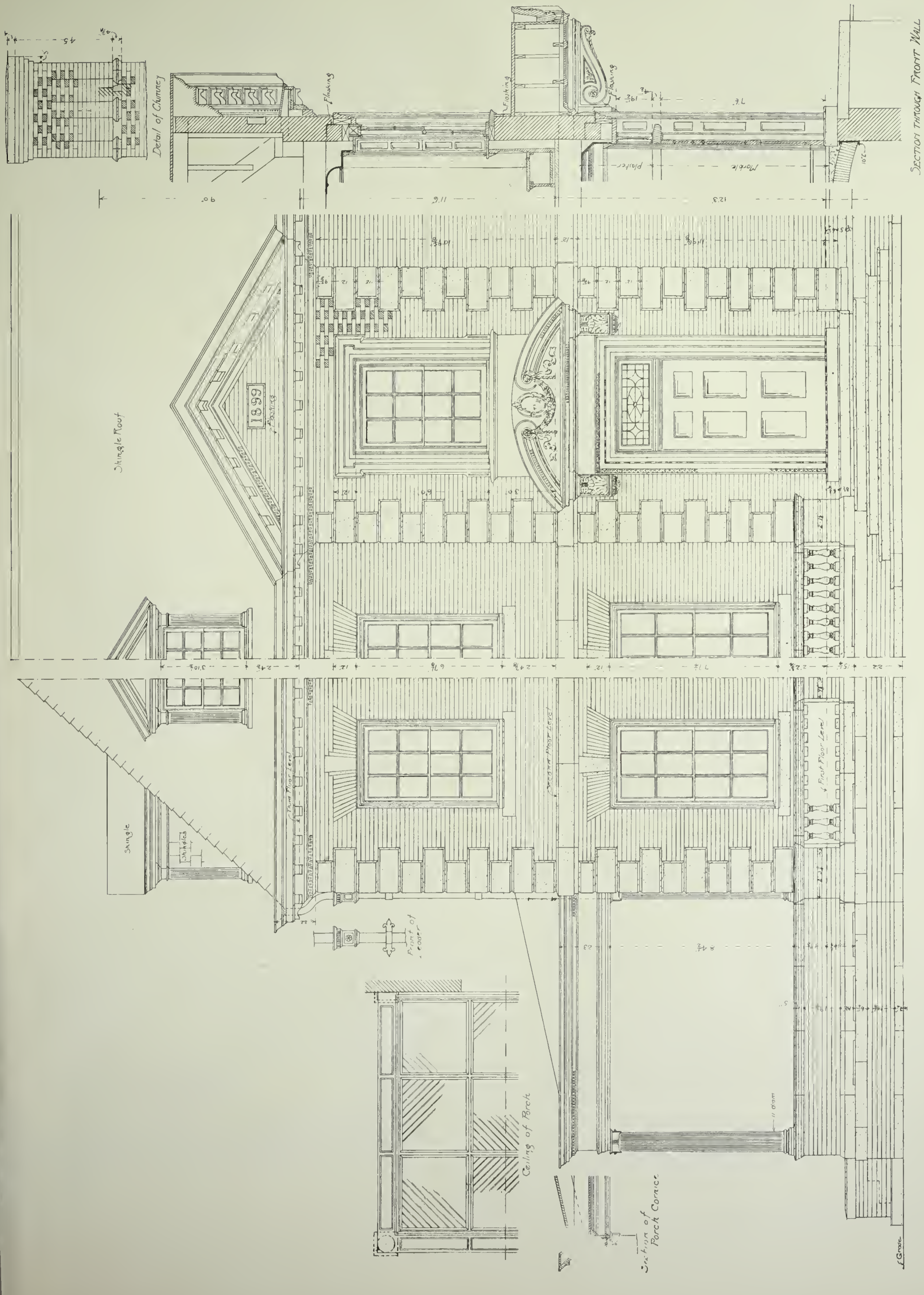
PLATES 68 and 69.





FRONT ELEVATION.

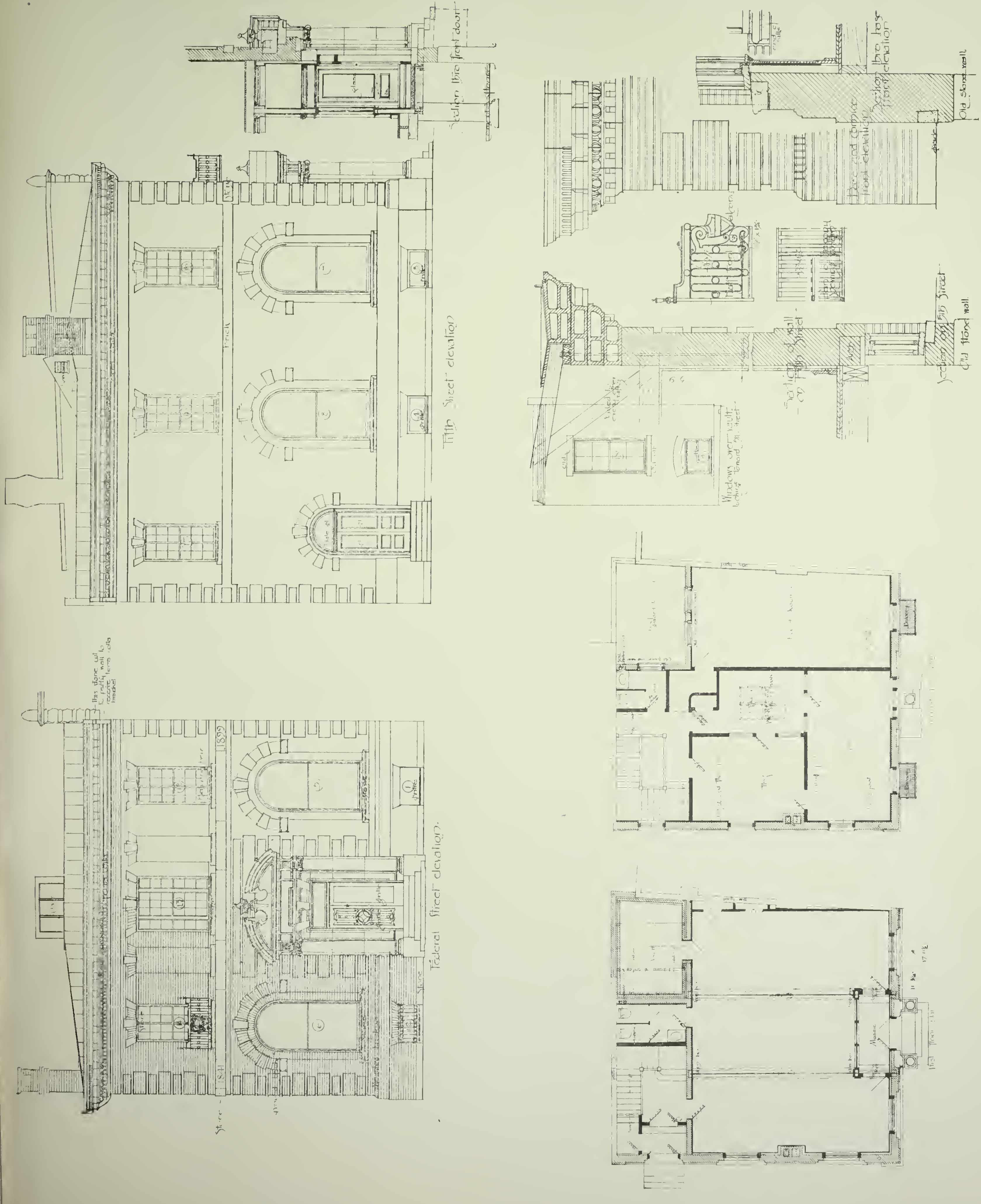




DETAILS OF FRONT ELEVATION.

HOUSE AT GERMANTOWN, PA.

RANKIN & KELLOGG, ARCHITECTS.



BUILDING FOR THE CAMDEN FIRE INSURANCE ASSOCIATION, CAMDEN, N. J.

BAILY & TRUSCOTT, ARCHITECTS.

VOL. 8 NO. 9

THE BRICKBVILDER

SEPT. 1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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THE STRENGTH OF A BRICK.

IT is so seldom in modern practise that masonry of any sort is loaded anywhere near to its limit, that we are apt to forget how large a factor of safety has come to be considered wise, and how little real reliance is placed upon the innate strength of the units which go to make up the masonry walls. There have been a few cases on record where brickwork has been actually crushed by a load unwisely placed upon it in a building, but, generally speaking, the kind of brick that is considered advisable for use has practically a resistance to crushing so great that the determining factor in the designing of a wall or pier is not the strength of the unit, but rather the lateral stability of the completed structure. Indeed, measured by any tests which we can apply, the most ordinary sort of light hard brick has sufficient strength to satisfy the mere letter of even the most exacting building law. This was brought to our notice very clearly a short time since by some tests which were made by Norcross Brothers, the well-known builders, in connection with the construction of one of the large buildings in this city. A selection was made of a number of different qualities of brick, ranging from what would be termed a rather indifferent light hard up to a thoroughly hard burned dark brick equal to the best quality which is manufactured. The tests were upon a half brick only, the loaded area averaging about 15 sq. ins. A record was kept of the load which produced the first crack in the material, as well as the ultimate crushing strength per square inch. The former ran from 2,720 lbs. per square inch for the poorest of the bricks up to 8,000 lbs. per square inch for the best quality, while the ultimate strength ran from 3,149 lbs. per square inch for the poorest sample up to 10,532 per square inch for the hardest. Or, reduced to tons per square foot, this means that the poorest sort of brick cracked under the equivalent of a load of nearly 196 tons per square foot with an ultimate strength of 226 tons per foot, while the best sample cracked under 576 tons a foot, and only yielded under an ultimate strain of a little over 758 tons per foot. When we consider that the utmost that the building laws of most of our large cities consider as safe is a strain of 15 tons per square foot on masonry walls laid up in cement mortar, this unit strain, as compared with the ultimate resistance of the poorest of these bricks of 220 tons per foot, allows for a factor of safety of nearly 15, while in the case of the hardest bricks the factor is over 50.

Now we would not argue from this that it is perfectly safe to use light hard bricks, or that the wise builder can save the difference in cost between a good and an indifferent brick and secure just as good a building. As we stated in the beginning of the preceding paragraph, the strength of a wall is not wholly measured by the resistance of the units of which it is composed, but rather by the stability of the whole. Our modern methods of scientific analysis have enabled us sometimes to shade construction within some pretty perilously close scientific limits, and we cannot afford to take the chances of poor workmanship or unexpected concentrated loads and trust to anything but the best bricks for a first-class building. Still it is a satisfaction to the architect or constructor who is at the mercy of a careless or indifferent workman to know that if a brick pier is built up reasonably well, the material itself is innately so strong that there is very little risk of failure.

In this connection we recall the case of a large building erected some distance from Boston in which by an oversight the piers supporting an enormously heavy tower were built of a size which seemed so small as to arouse the fears of a constructor, who, to set his mind at rest, made some practical experiments on piers of the full size of the ones in the building, constructed in the same manner, which he loaded to destruction after having allowed ample time for a good hard set on the mortar. We have not the figures at hand which give the crushing strength of the pier, but as a result of these experiments, the builder felt there was not the slightest risk in loading good brick piers to 25 tons per square foot.

VALUABLE HIGHWAY.

WE were all much interested in the shrewd scheme which found so many supporters a short time since to extract gold from sea water. A no less subtle swindle betrayed many people a few months ago, which claimed to work the precious metal out of the dust of our streets; but an enterprise which seems quite as unreasonable was to dig diamonds out of macadamized roads. This is actually what took place some time since at Kimberley, in South Africa, where formerly existed a road which could fairly be quoted as the most valuable highway in the world. It was built out of the blue clay deposit taken from the diamond mines at a period before the consolidation of the companies, and upon investigation was found to be so thickly studded with diamonds that by improved processes of separation millions' worth of gems were taken from it. We always knew that clay was a good thing.

CARVED BRICK.

WE are sorry to see an indication of a possible revival of carved brickwork as an ornament to the building. While having the utmost confidence in burnt clay as a medium of expressing the highest ideals in architecture, we also feel that every material has its legitimate use, and that the time will never come when burnt clay in any form can be treated like stone. To cut away the surface of brick or terra-cotta is to destroy its distinctive character, to lay bare its weakest sides, and to attempt a cheap imitation of what can be done far better in stone. We do not need to imitate another material in order to get the best results out of brick.

A LESSON FROM A BUILDING ACCIDENT.

IN one of our Western cities, last spring, a building partially collapsed through the failure of a brick pier, and as the form of construction there employed is quite common, a description of the "accident" may be instructive to the readers of this journal.

The building was of three stories, with a flat roof, and built on an inside lot, of 25 ft. frontage. The first story was intended for stores, and the upper stories for lodging rooms. To give light and ventilation to the rooms in the second and third stories, an area was formed at one side of the building, about 4 ft. 6 ins. deep and 41 ft. long. The walls of this area were of brick and rested on steel beams, placed about flush on top, with the second story floor joists, and framed as in Fig. 1. There were no posts in the first story; the longitudinal beams being supported by the cross beams, A, B, C. The wall WW and the pier P extended only to about the level of the second floor. The area was roofed over the store by a skylight, and the weight of this skylight was all that came upon the walls at WW, the walls being practically curtain walls. The pier P, however, was required to support the end of beams BB. From the bottom of the beams to the first floor was about 11 ft. 4 ins. The walls and pier were built and bonded together.

About five o'clock, one afternoon, the steel beams, and the portion of the building supported by them, suddenly fell to the cellar without warning. A few minutes before, the owner of the building was in the cellar, where the accident occurred, but at the time of the accident the building was fortunately vacant.

The second and third stories had just been rough plastered (brown coated), but not the first story. The only weight on the beams and walls was that of the material used in the construction of the building, which could be closely computed.

After the collapse, the beam A was found broken short off (with a clean fracture) where the beams D were framed into it, and the broken end of the short piece was embedded in the cellar floor, the wall end being in the air. The wall end of the long piece was pulled out of the wall, but the piece was leaning against the wall with the broken end on the cellar floor.

The end of beams BB, which had been on pier P, were resting on the cellar floor, and the other end against the opposite wall. Beam C remained in position, but was badly twisted. Most of the connections were more or less broken, but the longitudinal and cross beams were not wholly disconnected.

About 5 ft. of the upper portion of the pier P was thrown down, making a hole in the wall from 4 to 5 ft. long, part of the bricks being on the outside of the wall and part on the inside. The rest of the wall was not apparently injured.

The actual loads on the beams, at the time of the accident, as near as can be computed, were 20 tons at point X, Fig. 1, and 38.3 tons at point Y. This is just about the safe load for the beams. The load transmitted to the pier P by the ends of beams BB would be 30.75 tons, or 7.23 tons per square foot, the pier itself being 3 ft. long and 17 ins. thick, with a hard laminated stone on top the full size of the pier. The beams BB rested on the stone template as shown in Fig. 2.

Owing to the broken end of the beam A being buried in the ground, it looked at the first inspection of the ruin as though the beam had broken from some defect in the steel, although the fracture had the same appearance as the broken edges of the connecting angles.

When the beams A and C were removed from the rubbish, however, they were found to be bent horizontally, about as shown in Fig. 3, while there was practically no deflection vertically. This points very decidedly to the conclusion that the pier P must have failed first, and the sudden jerk on beams A and C, caused by the falling of beams BB, bent the former, and for some reason the beam A broke (sideways) first, which relieved the strain on C. Also, when the pier fell, pieces of brick were thrown across a passage, about 3 ft. wide, and through a window of the adjoining building. The pier was also built during freezing weather.

Considering all of these points, and also the way in which the beams BB rested on the pier, the engineers employed on behalf of

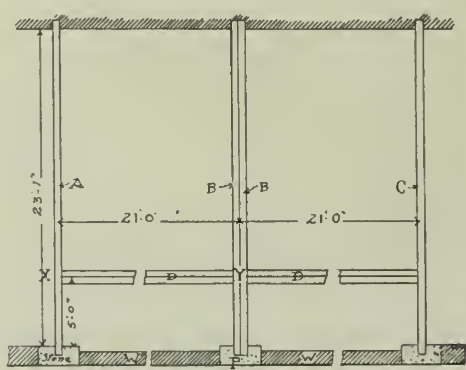


Fig. 1

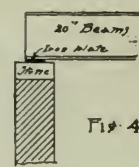


Fig. 4

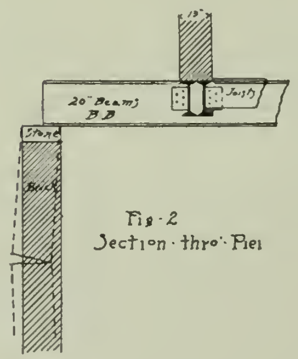


Fig. 2
Section thro' Pier

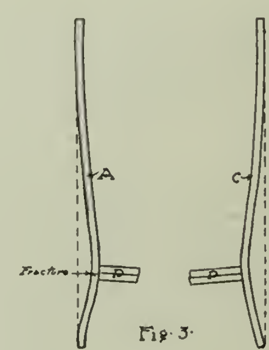


Fig. 3.

the company that furnished the steel came to the unanimous conclusion that the collapse was caused by the buckling of the pier P, something in the manner indicated by the dotted lines in Fig. 2.

The above concisely states the facts in the case. The lesson to be drawn is the necessity for closely computing the sizes of all structural work, especially where loads are concentrated, and the importance of *loading piers symmetrically.*

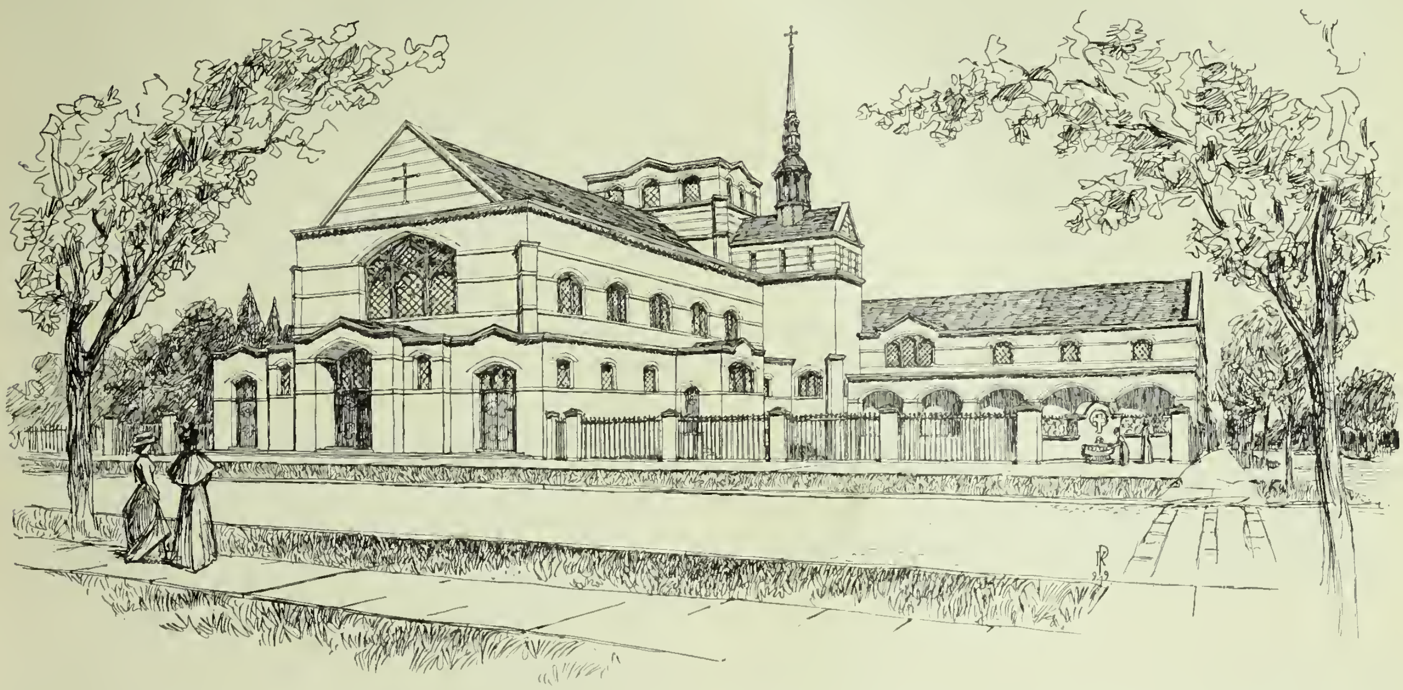
The materials of which the pier was built were of good quality, for the locality, and the curtain walls also added strength to the pier.

If the beams had rested on the pier, as shown in Fig. 4, the pier would probably have supported the load, although when the building was completed and occupied, and perhaps had a foot of snow over the roof, probably no engineer would have pronounced it safe.

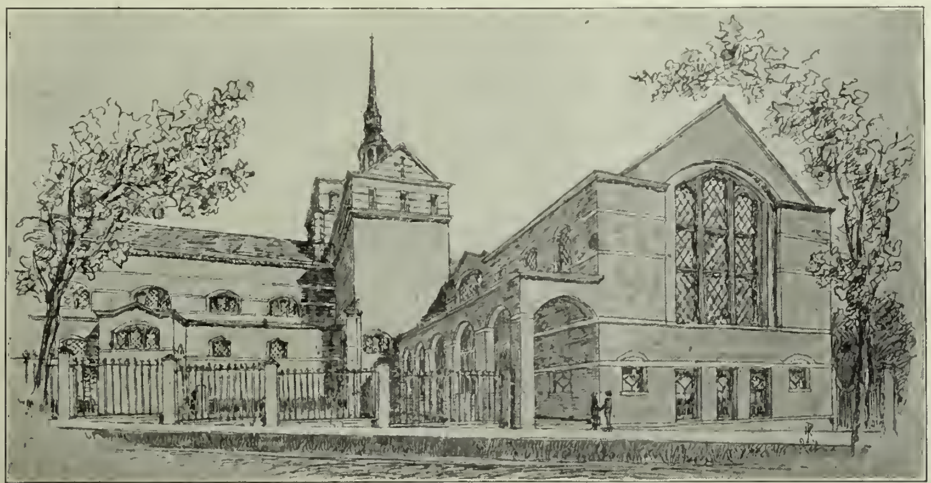
A Village Church, Cost Fifty Thousand Dollars.

BY ALLEN B. POND.

A CHURCH building committee has sometimes seemed to me a most impossible thing, a veritable hydra, with a profusion, or rather confusion, of heads. And now comes THE BRICKBUILDER, bearing oil and wine, and saying: "Behold a village of 25,000 inhabitants, needing a church. Here is the lot. The conditions are thus and so. There are ready for your use $50,000. Have your own way. Do as beseemeth you best."



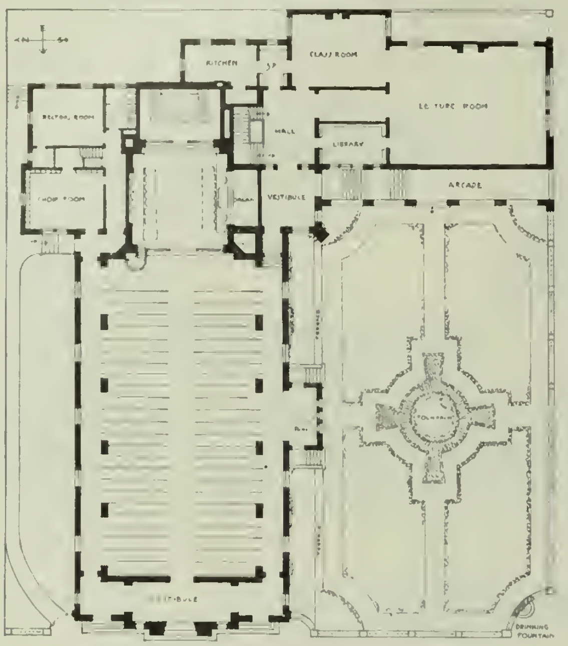
Before we begin the definite study of our plan problem and the simultaneous synthetic prevision of the forms with which our plan is to be bodied forth, let us, for a moment, turn aside to consider the church as an institution and to ask ourselves what its function is in modern life, what part it ought to play in the modern community. From the broad-viewed windows of our attic workshop we look down observantly on the tendencies and drift of the thought and life below us. We note that the pulpit as a platform for the affirmation of *ex-cathedra* doctrines or for the assertion of creeds curiously remote from the pathways of modern thought is losing ground. We see one group of men seeking to stem the tide by reversion to liturgy and ritualism, another group seeking to convert the church from a platform for doctrinaire discussion into an organization for multiform social and communal activity,—a so-called institutional church; yet other groups reaffirming with grieved and combative spirit the supremacy and efficacy of their several opinions and beliefs; while still other groups timidly or boldly assert that the day of the church is done, that its place was in the twilight of ignorance, not in the clear light of the sun of science.



It is plain that many functions that the church once wholly or in large part filled have passed or are passing from its grasp. The control of temporal government, the rendering of judgment and execution of justice between men, the monopoly of organized charity, exclusive jurisdiction over marriage and divorce, education of all grades,— these functions, in many places and over long periods, either from the necessity of the case devolved on the church, or were claimed by the church as of right. Once, learning, the custody of books, the dissemination of literature, almost the entire intellectual life of the community, inhered in and centered about the church.

Is the church then an anachronism? Is the church building which we are to erect destined to satisfy only the passing desire of a few, and not a deep and permanent need of the community? What functions are left for the church in our busy, industrial, scientific, modern life? One, certainly, and that of deepest moment to a humanity whose chief distinction is that it is differentiating itself from the beast. Among all the beneficent agencies of modern life there is none other that directly functions the life of the spirit. We have scratched the shell of science, only to apprehend more clearly the magnitude of that main miracle, an ordered cosmos, evolving, progressive; and, conscious of reason, we bow in reverence and humility to the all-comprehending mind. Struggling painfully with conflicting desires and with weakness of will, we yet feel the stirring of "a power within us, not ourselves, that works for righteousness"; and, conscious of love, we are fain to believe that the beneficent power springs from a mighty and a loving heart. In our utter loneliness in the great crises of the soul, our spirits strain for communion with a something that knows and understands; and, conscious of spirit, we reach upward with desperate faith to an understanding Being whose essence is spirit, and whose spirit is akin to ours.

We have spasms of cynicism; we are nagged by doubts; but ineradicable in humanity, forever recur the reverence, the humility,



the love, the faith; and from these grow religion and the worship of the spirit that we name God. The optimism and the courage that are indispensable to wholesome living and to strong creative work are dependent on this reverence, this humility, this love, this faith; when they are lost to an individual in any age his life becomes a routine of bitter duty, or descends to the animal plane; and the age to which they are lacking falls barren, and the life of the spirit shrivels away.

The act of worship cannot of itself create reverence and faith, but the psychological reaction needs no argument; the systematic expression of a feeling gives to it life and growth. Here then is a vital and permanent function for the church: to foster the life of the spirit; to stimulate reverence, humility, love, hope, faith; to give definite expression to these feelings by the act of worship; to inculcate that attitude of mind toward life that inheres in and springs from these feelings, and thus intimately to influence the conduct of life. The pulpit as a doctrinaire platform may pass away; creeds may come and go; but the church as the "house of worship" must remain, its liturgies and its rituals, purified and refined, voicing for men their deepest feelings, their loftiest aspirations, their noblest ideals.

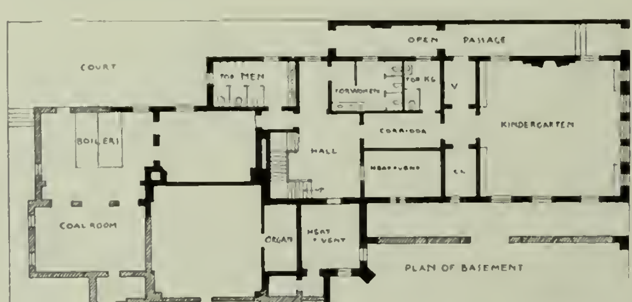
Our diversion has led us back to our building and has served to indicate to us broadly certain ends we are to seek and certain limits we are to heed. Our task is to design a building which shall be a fit "house of worship," a place beautiful as befits the life of the spirit, a place instilling by its aspect calmness of mind, a place in harmony with feelings of reverence and of faith, and calculated by subtile suggestion to stimulate these emotions.

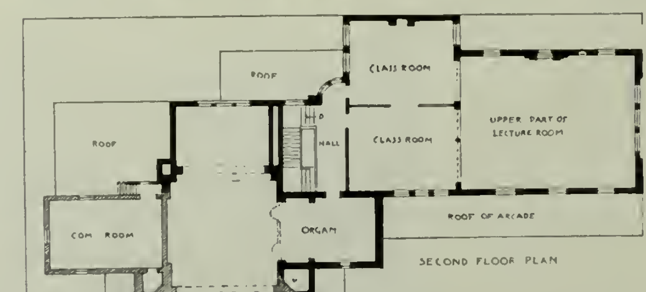
To this end we are to avoid forms and combinations, perhaps not inappropriate in themselves, but by common use connected with and directly suggestive of other and irrelevant moods and activities. Only the most urgent reasons will induce us to depart from this principle in any instance, and then the departure, instead of being flaringly emphasized, will be carefully subordinated to the general effect. Whatever we may see fit to use of new forms and arrangements, we shall best serve our end if we combine them with and subordinate them to forms and types, good in themselves and suited to our particular need, which by long usage and deep-seated power of association are calculated to suggest the mood for worship. To startle and to amaze do not belong to the church; the fantastic and the bizarre, the puerile and the ostentatious have no place here.

The activities of our community are not those of war, and our building will not be boldly defiant, half fortress and half church. We are not the center of a great metropolitan district, and the type of the great, high-arched cathedral is not for us. The wide, well-shaded streets, the little park across the way, and the snug library beyond the park, combine to give us the desired keynote. Our church must not jar on this environment, must not be bumptious and self-assertive, but, fitting quietly into place, must evidently belong where it is. Even so, we might properly give it the distinction of a lofty spire, symbolizing thus the aspirations and the ideals of the worshipers; but, low and broad in its masses, with only a slender lantern on the close-clipt tower, it seems to us, in this instance, to express our conception better and to typify in its restfulness that peace of God that its worshipers so greatly need in the hurried and strenuous and complicated life of the modern community.

We have found a sufficient *raison d'etre* for the church in its fostering of the life of the spirit, in its nourishing of reverence and faith, and in its persuasion to the worship of God, the Father of spirits; but the church has still other work to do in our complex modern world. Not the least striking phenomenon in the growth of the early Christian church was its breaking down, within the sphere of its own organization, of distinctions of class and caste, its affirmation of the brotherhood of man as a corollary to the fatherhood of God, its effort to express in daily life its sense of social unity. The lapse of nineteen centuries has witnessed radical changes in the forms of social life; but the need of the affirmation of brotherhood is greater if possible in the American community of to-day than it was in the Roman world of the Cæsars.

In theory many forces are at work for social unification: facility of travel, multiplicity of newspapers, common-school education, a democratic organization of political life. In actuality there is to-day a seeming growing antagonism of interests and classes. From





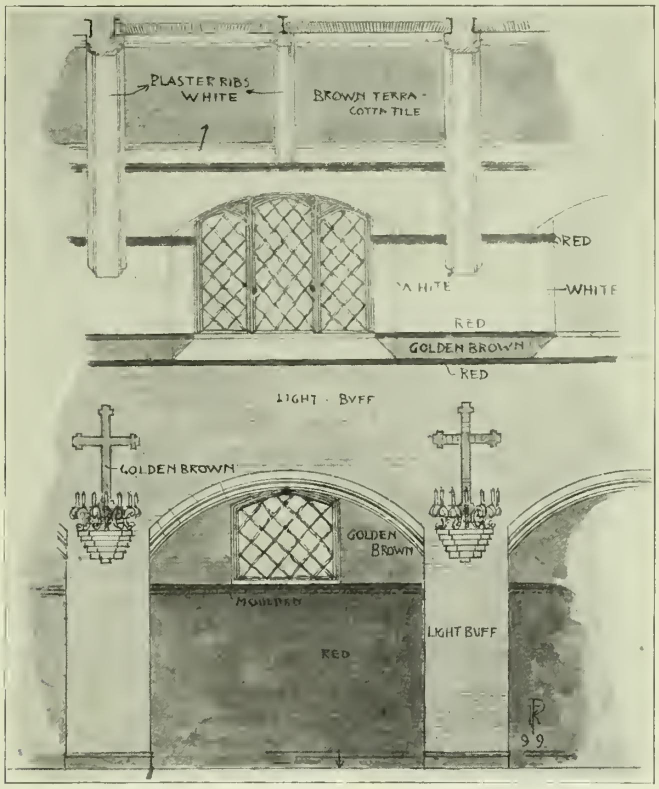
our high attic windows we note the ranging of employed against employer, of laborer against capitalist, of corporation against individual, of rich against poor, of white against black; we hear in each growing community a jargon of tongues like unto Babel, emblematic of a jargon of points of view far more to be dreaded. We seem to discover that we are, in our industrial and social life, heterogeneous, disparate, antagonistic; that class irritability is displacing the consciousness of solidarity; that a renewed and vivifying sense of the brotherhood of man is imperative, in order to pave the way for social progress, if not to avert disaster.

The church, if true to itself, can know neither caste nor class; its message is the gospel of sonship, of brotherhood, of love; it stands for forbearance, for self-control, for justice, for solidarity. Among all the beneficent agencies of modern life there is none other that can so singly, so unswervingly, so effectively function solidarity, the oneness of society. In the church of the future we shall hear little of the reconciliation of God to man; in the church of the future, unless it fail wholly of its function and be cast aside like a worn-out garment, there shall go on unceasingly and triumphantly the reconciliation of men with men. It is this phase of the character of the church that is behind the impulse toward the "institutional church," a church that shall not be remote from life, foreign to our thought, and alien to our necessary activities. It is for the more adequate expression of this phase of church life that we need to supplement the church as the house of God with the church as the house of Man; and hence, by the side of, or, better still, united to our house of worship, we will plan a parish house, with provision for social activities, for the expression of and upbuilding of social unity. The type of our parish house will be ecclesiastical, because it is still the church, though in its social aspect; but there will be in it also a hint of the home feeling, the arcaded porch reminiscent of cloistered calm, and the fireplace potent with cheeriness.

Our church building shall stand well to the north of the lot, its chief entrance to the west by an ample vestibule, kept low to admit the western light through the window at the nave end. A similar window to the east will abundantly light the altar space; and from the high windows above the choir will fall a diffused and softened light. The choir room, the pastor's study, and a room set aside for the meetings and records of the vestry and the parish board committees, we will provide north of the choir, with access from the aisle

and by a separate doorway from the narrow close at the north of the church.

The parish house shall lie well toward the east of the lot, with sunlight from south and east and west. Here shall be a lecture room and a drawing room and various study and club rooms, having their entrance up the cloistered walk at the garden side by a vestibule un-



der the low, square tower. The rooms shall be reached severally, and yet be *en suite.* Toilet and cloak rooms easy of access shall be placed down the stairs, where also for the little tots shall be a kindergarten flooded with sunlight and having its separate access from the east, and toilet and wardrobes of its own. In the parish house shall be a kitchen and a serving room, and a miniature stack room for a parish library. But we shall place bookcases, *sans* doors and open to all, in the lecture room; and if no equipment fund is forthcoming, we shall write a specification for some rattling good books, and shall include them in our contracts.

We will bind our two buildings together by placing the tower in the angle at the head of the cloistered walk and of the southern aisle; and the tower vestibule will serve to connect our house of God with our house of Man, emphasizing thus the necessity of an intimate connection between the life of the spirit and the activities of men. We will clothe the exterior walls with a purplish-gray brick trimmed with white terra-cotta; the roofs shall be covered with a moss-green shingle tile; and the lantern, clad in terra-cotta, shall echo the purple-gray of the walls. In the cloister, as in both vestibules, shall be a patterned pavement of dull red bricks; cool gray bricks will fit better for the walks of our garden. For in the angle between the buildings we shall plan a formal garden, open on the highway to west and south; and, as the ground falls away to the east some five feet in the length of our lot, we will sink the garden so that it shall be entered from the lower cloister level, and the passer-by shall look down through the wrought-iron guard onto its walks and turf and into its sparkling fountain. A terrace shall rise from the garden to the church, and from the south aisle a little porch, containing the font, shall give upon the terrace by doors to east and west.

In the church interior we will seek to unite the pervasive charm of rich, soft colorings with a marked breadth of architectural treatment,— a chaste severity of line, a fitting dignity of form. We shall avoid plaster for the most part, and shall achieve permanent first-hand decorative effects by the use of brick and terra-cotta. The walls of both vestibules and the aisle walls, forming a background for the nave, shall be faced with brick, red below and golden brown above. The piers carrying the nave walls, and the nave walls up to the clearstory window sills, shall be in buff brick, light almost to a cream, and then, above belts of red and golden brown, in white brick to the cornice line. The chancel walls shall be enriched by dull-finish glazed bricks in warm, strong tones.

The exigencies of our climate, its extremes of heat and cold, forbid us to let the real roof form the ceiling; and, supported from the roof trusses by light tee iron, we will suspend a ceiling of book tiles, yellowish brown in effect, but not selected for uniformity of color, and varying, as they come from the kiln, from warm buffs through reddish browns to a tile here and there as deep as umber. The lower member of the trusses will project below the tile, and we will finish these with plaster colored an ivory white. Our woodwork will be black oak, partaking in its general design of the prevailing simplicity, but blossoming into greater elaboration at the pulpit, the organ, and the chancel. Miscellaneous, hit-or-miss, wishy-washy, or hard-visaged, memorial windows, donated in a misguided spirit of mingled pride or devotion, shall be barred out. No glass will be permitted to be set, except such as has the true, deep, rich color that will give to the whole interior that soft, indescribable glow that we already see in our mind's eye. All memorial windows must pass our approval as to design and execution. For the present we are likely to use only a simple, unobtrusive, geometrical subdivision, and to content ourselves with color unaided by design.

In the parish-house interior we shall not be able to afford facings of brick, but we shall take care that our plastering has a finish that will give a texture effect to the colorings we shall choose. Here, while avoiding any freakishness or triviality of treatment, we shall relax the severity of style, and shall seek to impart a certain homelikeness well suited to the expression of the building's purpose.

In the end we shall hope to have made our church typify its purposes so clearly and yet withal so alluringly that the passer-by, pausing for a cup of water at the fountain at the crossing of the ways, and looking down into the garden, shall be tempted to turn aside into the cloistered walk, and to enter the parish house and church, and that entering he shall linger for a moment, and lingering shall become conscious, even though dimly, of a something that puts the spirit in touch anew with God and Man.

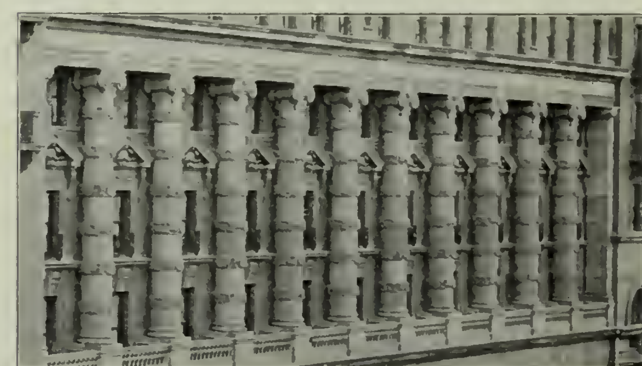
THE amount of live load as distinguished from weight of materials in construction, which should be assumed in calculating the strength of the floors and columns of the modern commercial building, is a matter which has been in dispute among the best authorities, and erring as they do generally on the side of safety, nearly all of our building laws have required an excessive amount of material, providing for loads which in practise never occur. In the new building law which has been proposed for New York City, an attempt has been made to recognize the absence of any necessity for excessive provision of this kind. In New York and Boston the laws as they at present exist call for provision for live loads of 100 lbs. per foot in an office building, the whole of this load over every square foot of floor being assumed as transferred to the girders, and thence to the columns, and so down to the foundations and the ground. In Chicago the practise has been to scale down these loads, assuming that only a certain portion of the floor is loaded as a whole at any one time, and that if, for instance, 100 lbs. is assumed for the live load of the floor a load of only 80 lbs. need be assumed in calculating the girders, still less in calculating the columns immediately supporting the girders, and considerably less for the bottom columns, the foundations, etc. Actual investigation has shown that the loads on the floors of a modern commercial building seldom exceed 15 lbs. a foot. While this might be a dangerous minimum for the law to recognize, the change in the New York laws is certainly a move in the right direction.

Design and Construction of Terra-Cotta Columns.

IN an article of recent date, appearing in *The Architectural Review*, Mr. Russell Sturgis offers a number of timely suggestions on "How to Treat the Classical Orders." Without intending to dispute, much less deny, the abstract beauty of Grecian forms in their original purity, he accepts the inexorable conditions of life in our own time, and would meet them, in each case, by a free adjustment befitting the environment. To quote his opening sentence: "It seems clear that no order which any Greek devised, and none which was used in Roman imperial buildings, will, without alteration, serve the turn of the twentieth century." In this, he has no thought of turning away from the perfected types of an age when architecture, as an art, had reached its zenith; but he would insist on a less literal reproduction of accepted examples. Even the Roman Ionic — itself a bold adaptation, due to the arch having in a measure superseded the lintel — Mr. Sturgis holds open to needful modification. Referring to the Theater of Marcellus, he is especially emphatic in that contention. "To take the proportions and minute details of that order and apply them to the thin-walled modern building, or to use them at all without alteration for the parts of a free colonnade, is to do a thing devoid of intelligent propriety."

HOUSE OF MELEAGER, POMPEII.

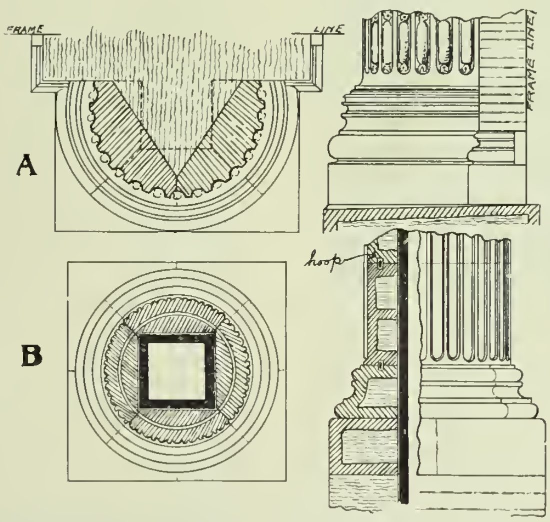
This is, no doubt, a perfectly justifiable assertion, one that would not be disputed by cultivated architects; yet worse things than that are of common occurrence, and usually pass muster without protest. We could mention a building, for which eminent members of the profession are responsible, and in it stilted semicircular arches spring from Grecian Ionic capitals — a combination that would seem equally open to criticism, yet the effect is not by any means disagreeable. A replica of the Erechtheum capital might be said to look out of place against a background of plate glass in a modern store front; but there it would, at least, support a trabeation of the kind for which it was originally intended. As a matter of fact, that capital is frequently employed without material change, and sometimes on shafts with which considerable liberties have been taken. An illustration of such use may be seen on a somewhat extensive scale in the Posner Building, Baltimore, now in course of erection.



COLONNADE, 34TH STREET ELEVATION, ASTORIA HOTEL, NEW YORK CITY.

COLUMN USED AS WINDOW MULLION, POSNER BUILDING, BALTIMORE, MD.

On the first story of that building there are, in all, ten of these columns; and, as will be seen on plan, a cast-iron core carries the superincumbent weight, the same being cased with thin segments of cream-white terra cotta. The flutes, in this case, are filled with a convex billet to the full height of column, stopped at necking by an inverted honeysuckle, which is also something of an innovation. This device, by tending to subdue the needless severity of a fluted shaft, renders slight imperfections less noticeable than they would otherwise be at close range. It also helps to strengthen the fillet and offers less chance for such wilful or accidental defacement as may be expected when delicate members are within reach of the passing throng on a city's sidewalks. It will be noticed that the size of the square core, in a necessarily slender cylinder, reduces the thickness of casing to a minimum of 1 ½ ins. at the neck, and so makes it impossible to break joint with successive segments. The vertical joints had, therefore, to be continued without break, which made it imperative to devise some means of holding the segments securely in position. This is managed very effectually by inserting a hoop of galvanized iron at every joint, half of which goes into a groove in the top and bottom bed, respectively, of each course. This work is set tight, the exposed joints averaging about one eighth of an inch, but the rebate in the ends and the interstices around the hoops leave sufficient room for a bedding of cement, which, when set, holds the components of the outer casing immovable. In his reference to the colonnade that embraces the third, fourth, and fifth stories, on the 34th Street elevation of the Astoria, Mr. Sturgis falls into a curious mistake; which, paradoxical as it may appear, goes to show how thoroughly he grasps the main facts of his subject. In assuming that "That colonnade, too, comes close home to our requirements, for it is of terra-cotta and in hollow cylinders, set one upon another, and surrounding an iron column as beads are strung upon a thread," he has described what *ought* to have been more accurately than what is. Certainly an iron core is there, for the ten stories above must needs be supported; but the hollow cylinders are, for some reason that is still quite inexplicable, cut out of stone, instead of having been molded in clay to the required shape, like all other work above the third story on the same building.



A. COLUMNS, HIGH SCHOOL, TROY, N. Y.
B. COLUMNS, POSNER BUILDING, BALTIMORE, MD.

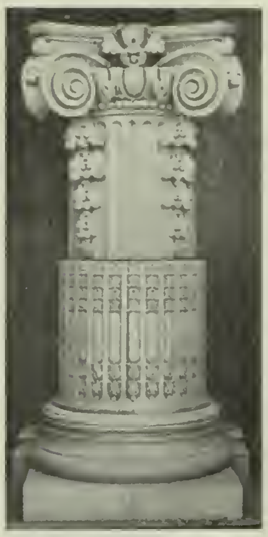
To fit these stones around the flanges of a riveted column, to flute the drums and carve all the alternating bands, as well as the capitals, was a laborious undertaking, and one that must have entailed great expense. They had, moreover, to be made in segments, for the riveted connections precluded the possibility of their being put on in any other way. In view of the fact that there are ten of these columns, the same design could have been carried out with greater facility and in a more enduring material at perhaps one third their actual cost in stone. Of all the terra-cotta used on that immense building there is nothing better adapted to the peculiarities of burned clay, hardly anything on which good modeling could have been displayed to better advantage, and no single item that would afford so wide a margin for the exercise of legitimate economy in cost of production. With conditions so exceptionally favorable, we cannot wonder that the choice of so fitting a medium should have been set down as a matter of course. We have searched for but failed to discover any obstacle likely to be encountered in the execution of this colonnade, beyond what has obviously been overcome in connection with the three tiers of terra-cotta windows in the screen wall immediately behind it. Far more exacting subjects had to be dealt with in the dormers and pavilions around the fifteenth story, while the engaged columns at the tenth and eleventh stories called for much greater nicety, because of the absence of projecting bands, which serve to conceal possible imperfections at the joints.

It is, of course, possible that the architect desired and expected to obtain a degree of uniformity in color beyond what he supposed procurable in terra-cotta. If so, he must have been grievously disappointed; for the result not only falls short of any such expectation, but goes far to reverse what was once conceded to be the natural order of things. It is in the terra-cotta that we find a uniformity, which in the adjacent stonework is conspicuous by its absence. Those who have seen the building do not need to have this remarkable contrast pointed out to them; those who have been denied that privilege can form some idea of the extreme variation in the stone by turning to our illustration, which is made from a recent photograph.

COLUMN USED AT ENTRANCES, SCHOOL NO. 10, TROY, N. Y.

A column, not too large to be made in complete drums, is used as a window mullion in the upper stories of the Posner Building. The architect, Mr. Charles E. Cassell, at the suggestion of present writer, agreed to a style of treatment similar to that already described, so far as the absence of fluting is concerned. The effect of reed and fillet is much better than might be supposed by those who have not tried the experiment. This deviation from classical precedent is admitted, but it can be urged in extenuation that greater, and, we think, less justifiable departures could be charged against the Greco-Romans, who, by the way, were not quite so punctilious in their adaptations as some of our modern copyists. Among the columns recovered from the ruins of Pompeii and Herculaneum, to which Mr. Sturgis has directed attention, some were left entirely plain. Another variety had the lower third plain and the upper two thirds fluted; while a further compromise was effected by reeding the lower and fluting the upper portion. On the shafts of one peristyle the fluting was merely indicated in outline; while the capitals appear to have been improvised rather than copied from earlier examples, which must, at that time, have abounded on every hand.

We have not resurrected these remnants of Roman architecture as models of refined detail worthy of unqualified acceptance. Still less do we refer to them in order to excuse the crudities too common in current work, perpetrated by men who think they have been born to create something that did not previously exist. But they serve to show that every age has had its own problems to solve, and that the people who had vanquished their comparatively effete predecessors set about the task that lay before them with characteristic vigor and fertility of invention. We are not expected to do exactly as the Romans did, though there are many points of resemblance between their work and that of to-day. Their spirit of self-reliance and resource should be a valuable stimulus to those who are, perforce, the pioneers in a new era of architectural development. Just as the Roman arch gave rise to new systems of building more than two thousand years ago, so the steel skeleton has revolutionized modern methods, if not beyond recognition, certainly beyond possible expectation. In some respects they are rendered far more complex, yet in others they have been greatly simplified, and in nothing is this more noticeable than the increased facilities afforded for the use of terra-cotta columns.



COLUMN USED ON HIGH SCHOOL, TROY, N. Y.

The skeleton of a modern building, made up mainly of vertical and horizontal lines, resolves itself into successive tiers of posts and lintels. While this anatomy is self-supporting, it requires a protective casing on which varying degrees of embellishment are permissible, and the voids must be enclosed to make it habitable. This casing takes the form of brick piers built around the main structural supports, with sill courses below, entablatures above, and intermediate columns, pilasters, etc., between the windows. The latter are often decorative rather than supporting members, and, therefore, have little weight resting upon them. Up to a diameter of say 16 ins., columns of this kind can be made in single drums, capable of sustaining an enormous weight without any core whatever. If a stanchion should be introduced in those of smaller diameter to prevent buckling, or as a necessary part of the steel frame, these drums can be left hollow and provision made for threading them on from above. Or, where this plan is found impracticable by reason of riveted attachments, they can be molded in two pieces and the joints broken in setting successive courses. In larger diameters, whether the core be metal or built solid in brick and cement, the casing need not average more than 6 ins. in thickness, as it would be jointed up in three or more segments. In the latter case, vertical joints should be broken every course, the brick filling bonded into the chambers, all interstices being grouted with cement.

A good specimen of the free-standing Roman-Ionic column will be found in an adjoining illustration. It is 16 ins. in diameter at the base, and 13¼ ins. at the neck, and is made in complete drums, each about 20 ins. in length. Without core or filling of any sort, it might be used with safety under a load of 20 tons. though it is not called upon to support more than one tenth of that weight. Two of them carry an entablature of slight projection at each entrance of School No. 10, recently erected in Troy, N. Y. The base and capital, with the top and bottom sections of an engaged column, is likewise shown from a photograph, which will be better understood by referring to the accompanying plan. This column is not bonded into the wall; but — which we consider much better — the wall is bonded into the column in such way as to render steel or cast-iron reinforcement altogether unnecessary. Four of these are used on the principal elevation of a new high school in the last-named city, for which Messrs. M. F. Cummings & Son are the architects. Rather larger columns of the same general character in design and principle of construction occupy a similar situation on a building designed by Mr. J. E. Sperry, of Baltimore. In another building with which we are acquainted, a cast-iron upright stands part in the wall and part in column, to which the floor and roof beams are, we presume, connected; otherwise, it too might have been omitted without risk of crushing the core or its casing.

With the exception of granite monoliths, which cannot be surpassed for work on a first story, there is hardly a situation to be met with in current practise where terra-cotta columns may not be used in preference to stone. To quote Mr. Sturgis on this point: "We can still, when we have an open portico, build it of iron and sheathe every part of it with baked clay in the most approved fashion of fire-proofing; we can obey the law, meet the requirements of the higher common sense, and design in a pure Greco-Roman taste — all at once. We can also design in a pure modern taste, taking our traditional suggestion from the finest things of the past, working it out on lines of our own, going slowly, because our successors will do better than we in the light of our own experience and our own partial successes. . . . It was said above that we could make our constructional columns decorative, by means of terra-cotta, by using that material to sheathe the iron uprights essential to the structure. It might also have been said that we can perfectly well make terra-cotta columns do their work without the iron within; for in many of the smaller colonnades the structural purpose is only apparent, or, at most, only secondary, and a very slender upright of metal, such a stud as serves for stiffening partitions in our dwelling houses, will serve the turn. Whether the colonnade is to decorate the veranda, while it carries the veranda roof, or to adorn the interior of a ballroom or theater, the proper relationship of design to construction is not at all abandoned by the concealment of the actual metal upright, bolted at top and bottom, by a jacket of defensible material. That is the essence of all our future building; the concealed slender skeleton, the clothing of brick and cement, as if of bodily muscle, and the sheathing of the whole in its terra-cotta skin." Having read this comprehensive summing up, one can but regret that Mr. Sturgis should have retired, as we think, too soon from the active practise of his profession.

CENTRAL FEATURE, BREWERS' EXCHANGE, BALTIMORE, MD.

Brick and Marble in the Middle Ages.

BY G. EDMUND STREET.

CHAPTER XI.

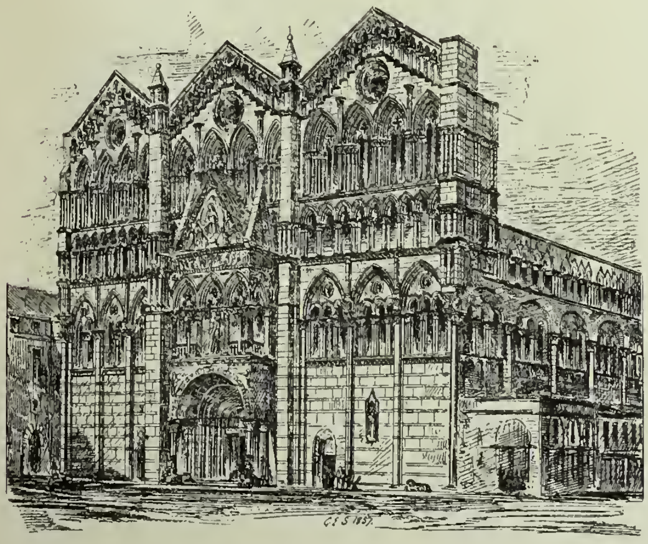
"In the elder days of art,
Builders wrought with greatest care
Each minute and unseen part,
For the gods are everywhere."
— *Longfellow.*

Drive from Padua to Ferrara — Monselice — Rovigo — Ferrara: Cathedral — Castle — Gallery — Road to Bologna — Altedo — Bologna: Cathedral — San Petronio — San Domenico — San Giacomo — Sta. Maria Maggiore — San Francesco — San Stefano — Leaning Towers — Casa dei Mercanti — Domestic Remains — Academy — Modena: Cathedral — Parma: Cathedral — Correggio — The Baptistery — Piacenza: The Palazzo Publico — Cathedral — San Francesco — Sant' Antonino — San Giovanni in Canale — Asti: Cathedral — San Secondo — Campanili.

[The illustrations A, B, C, D, and E are not taken from Mr. Street's work, but are added as additional illustrations of the Italian brickwork.— EDS.]

ANY one who has followed the route from Venice to Milan described in the last chapter will do well, instead of following it on a subsequent visit, to make a *détour* from Padua to Ferrara and Bologna and thence by Parma, Modena, and Piacenza to Milan. I shall give some notes of such a journey in this chapter, the towns visited on the road completing the subject which I have set before me in this volume, and leaving no important city north of the Apennines, save Ravenna, undescribed. This exception is serious; but the omission will be remedied naturally when, as I hope I soon shall, I ask my readers to go with me to the towns on the east coast of Italy.

The journey from Padua to Bologna is now, and I suppose always was, extremely uninteresting. The only objects on the road which possess much attraction for the artist aie the towns I have mentioned, and these certainly much more repay a visit than do those on the parallel line of road which we have just travelled. Scenery there is none to speak of, and fortunately a railway makes the journey a quick one now; but when I first travelled it I retained no recollection at the end of the route save of long straight and



DUOMO, FERRARA.

dusty roads lined on either side with tall poplars, and wearisome to the last degree. At Monselice we found a picturesque town domineered over by the ruins of a large castle, whose walls climb the steep sides of the hill on which it stands. Here I saw a good and little altered Romanesque church, with pilasters in place of buttresses, and walls crowned with the usual eaves-arcade. At Rovigo,

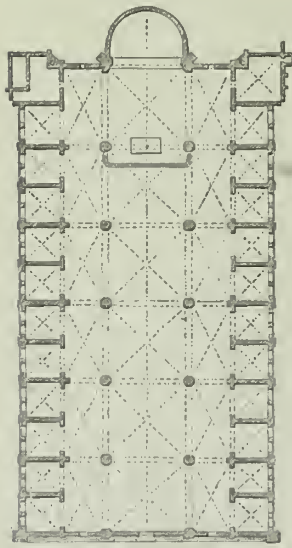
(A) CHURCH OF SAN PETRONIO, BOLOGNA.

further on, there is one of the tall brick towers so common here, with its Ghibelline battlement perfect. Just before reaching Ferrara we crossed the Po — here a large, unbridged, and dreary-looking river, flowing rapidly between high artificial banks to the sea. Its bed is, I suppose, now quite above the level of the plain, and year by year the question becomes more urgent and yet more difficult of answer, what is to be done with it? Certainly there are rivers and rivers; and this great stream left none but painful and disagreeable impressions on my mind. At length, after ten hours and a half of the slowest of drivers and worst of vehicles, we reached Ferrara — a *trajet* now performed by railway in about an hour and a half, with advantage to every one's time and temper, and no counterbalancing loss.

The entrance to the city through a dirty suburb of tumble-down houses was not prepossessing. I knew nothing of what I had to see, and my delight was therefore all the greater when we drove into the piazza in front of the Duomo, and I found myself gazing at a building which at first sight looked as though it had been brought straight from the North of Europe, and planted here in the thirteenth century as a warning against Italian fashions! Further examination proved that I was not far wrong in my first estimate of the west front; but it revealed also, I am sorry to say, that this and part of the south side were the only parts of the old cathedral which had been spared, when in the seventeenth century the whole of the church was gutted and converted into about as bad a Renaissance building as one could wish not to see.

The west front is a great screen, and does not and never did follow the line of the roofs. It has three gables of about equal height covered with arcading, which increases in depth and richness of moulding and shadow to the top, where there are very fine open arched galleries, stepped up to suit the raking lines of the gables. I know no Italian work which imitates so closely as this does the extreme richness which some of the Norman and English churches of the same period exhibit. The arches of the arcades are carried upon clusters of columns which are set with extraordinary profusion one behind the other. The centre of the three divisions of the west front is almost wholly filled with a very fine porch of three stages in height, and finished with gables on its front and sides. The lower stage of this porch, as indeed of the whole church, is round-arched, and belongs probably to the church consecrated here in 1135. The knotted shafts which carry the front wall rest on figures sitting on lions. The doorway is deeply recessed, and has figures of saints with scrolls.[1] The tympanum of the arch has a sculpture of S. George and the Dragon, and the lintel below it eight subjects, beginning with the Salutation, and ending with the Baptism, of Our Loid. At the top of this stage is an inscription which contains the date given above. The next stage is later, and has three arches with traceries carried upon chevroned and twisted shafts, with a statue of the Virgin and Child in the centre. This stage forms a sort of balcony. The upper stages are covered with sculpture. In the gable is Our Lord as Judge in a vesica-shaped aureole; around and above Him are saints and angels, and below a group of angels dividing the good from the bad. The subject is continued on to the wall on each side of the porch, where on one side are represented the souls of the just in the lap of God, and on the other the descent of the wicked into the jaws of Hell. The whole scheme is a picturesque and unusually disposed treatment of the Last Judgment. There is, however, not much merit in the sculpture as a work of art, though as an enrichment of the buildings it is most effective. The statue in the centre is said to be by Nicola Pisano. The south front of the cathedral has a long range of arcading carried on engaged columns, each arch inclosing a small arcade of three divisions. Above this, below the eaves, is a very fine arcade of later date all carried on groups of shafts, and treated in the Venetian manner with ogee-arched labels above round arches. This stage is built of red marble; the lower part of the wall, of brick and stone.

SAN PETRONIO, BOLOGNA.



PLAN, SAN PETRONIO, BOLOGNA.

A large font of white marble is the only relic of the original church which is still to be seen inside.

There is not much more to see here. The castle is remarkable as standing surrounded by its moat in the very midst of the city. The old portions of it are much like the castle at Mantua, and present the same boldly battered base, and the same heavy machicoulis and battlements. I saw also two or three old churches here, but of no interest; they were of the latest phase of Gothic — bordering on Renaissance — and very poor in their detail.

The picture-gallery is in a rather magnificent palace of the D'Este family. Garofalo — the best of Ferrarese painters — is represented by a fine Adoration of the Magi, and other works. But the collection generally is not interesting. There are also in the churches a great number of works of other Ferrarese painters, and most travellers go also to see the house of Ariosto and the prison of Tasso. But on the whole the attractions of the city are not great. The streets are grass-grown and deserted, lined with palaces of coarse and bold but uninteresting design, and I was in no way sorry to leave it for Bologna, expecting to find there much more to interest and occupy me.

The drive from one city to the other was very wearisome. The land was rich with vines, mulberry-trees, and rice-fields. The grapes were being gathered, and everywhere along the road we met vast casks borne in grand wagons drawn by white oxen, carrying home the grapes to the wine-press. These wagons have an elaborately carved tree from back to front, and the wheels and casks are also similarly adorned. They are really very handsome, and quite carry one back to those old

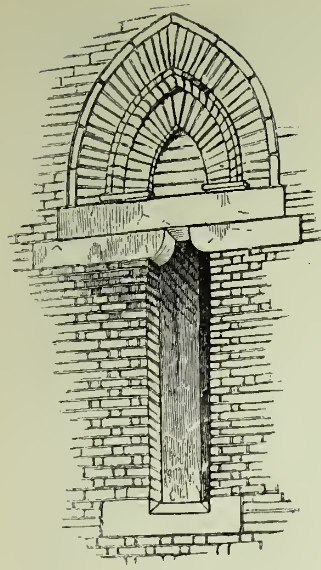
SECTION, SAN PETRONIO, BOLOGNA.

times when even in utilitarian England the adornment of a carriage was not thought beneath the notice of an artist.

On the road we changed horses at Altedo, where I sketched the good brick campanile of the church.

Bologna is, I fear, only known to many Englishmen at the present day as the one station in Italy at which you may always depend on getting some food, and not less as a station which seems to be on the road to and from every part of the peninsula. There is no excuse, therefore, for not visiting it; and if the general feeling is not one of enthusiasm for what one sees, there is still very much that is worth seeing, and in San Petronio a fragment of a church which, had it been completed on the scale intended, would have been one of the finest and, I suppose, almost the largest in Italy.

[1] Said to have been carved by Nicolò, who is supposed to be the same man who wrought on the west door of San Zenone, Verona. This does not appear to me to be likely; the work at Verona being, I think, earlier than that at Ferrara.

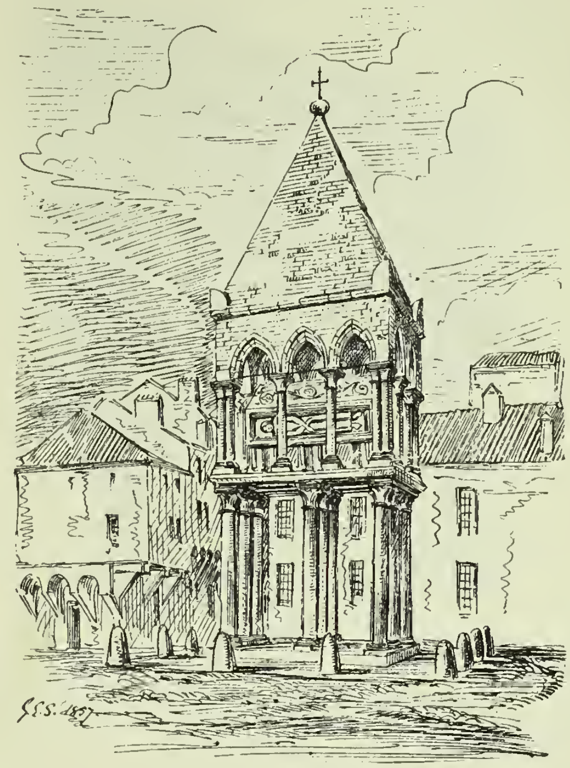


BRICK WINDOW, PALAZZO PUBLICO, BOLOGNA.

The streets are not of the best. They are very narrow, and often arcaded with pointed arches supported on circular columns, but contain few houses of any interest, whilst the churches have been a good deal altered and damaged in modern times.

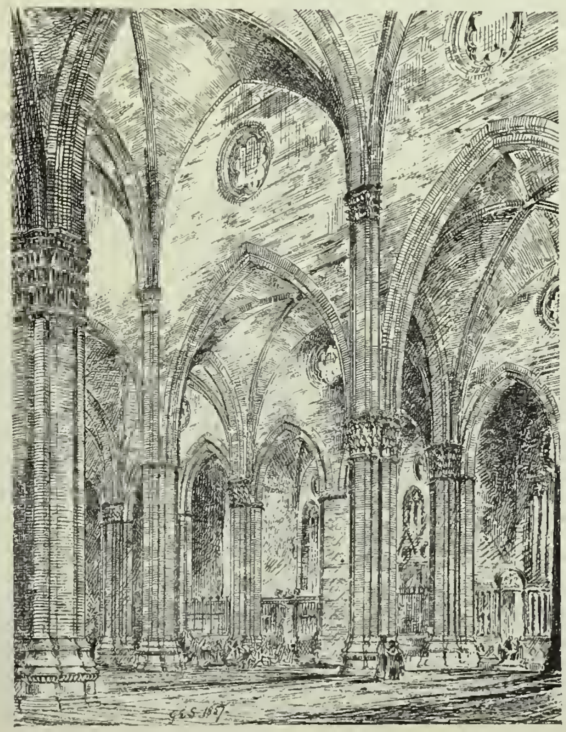
The cathedral is a recent building of no beauty. Two lions which once supported the columns of a Lombard doorway now carry the holy-water stoups; and in a passage near the sacristy is a carved, painted, and gilded rood of the twelfth century — a piece of furniture which is rarely found remaining in Italian churches. The grandest church in Bologna is undoubtedly San Petronio, which is well placed on one side of the Piazza Maggiore. It was not commenced until 1390, so that we must not be surprised to find the faults in detail which mark the period. But the general scheme of the church is so magnificent that these faults do not strike the eye at all offensively. As it stands even now, with only its nave and aisles finished, it gives a vast idea of size and space, though this is hardly appreciated at first, owing to the enormous dimensions, the fewness of the parts, and the extreme simplicity of all the details. The west front is of immense size and width, but its only finished parts are the plinth and doorways, the whole of the rest being left in rough brick. The detail of this finished part is of poor character, and later than the fabric. It is rather richly carved with figures, which are sometimes much praised, but which seemed to me (with the exception of a Pietà over the south-west doorway) to be of poor style and character. Going round to the side of the building, the design is of earlier date and much more interesting. The aisle-windows are noble designs of four-lights in each bay, separated by buttresses and surmounted by steep-pitched gables. The detail is an extremely good combination of brick and stone, whilst a magnificent plinth of stone and marble gives great force to the work. The transept was never built; but at the point where it was intended to be connected with the aisle, there is a curious conceit — a window at a projecting corner with half its arch and tracery facing south, and the other half facing west. It is, so far as I remember, a unique example in a church, but is just a little like the angle-windows in some of the Venetian palaces, though these never indulge in such an absurdity as is the construction of two halves of pointed arches over such an opening.

The interior is very magnificent. The columns, arches, and walls generally are of brick, now coloured and whitewashed (but originally intended to be seen, as is evident from parts of the incomplete work where the internal brickwork is still exposed and is executed with the greatest care), the capitals and bases being all of stone. The columns of the nave are bold clusters; they are about sixty feet from centre to centre, rather short in proportion to the height of their capitals, which are carved with stiff foliage. Above these is a large pier running up to carry the groining, and there are pointed arches opening to the aisles of very lofty



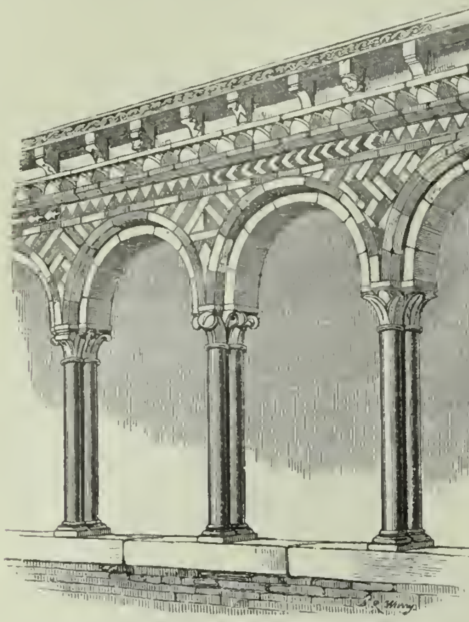
MONUMENT, BOLOGNA.

pitch, but which, owing to their great size, certainly look very attenuated. Two chapels open into each bay of the aisles: these are lighted by the large four-light windows already mentioned, whilst both nave and aisles have no windows except cusped circular ones of no great size, placed as near as possible to the groining, which is very simple throughout the church. There is scarcely a horizontal string-course or a label to be seen, and the mouldings are few and simple; yet, nevertheless, the effect is grand. Such a church may well trouble the mind of the English student who thinks that no building is complete which has not its arcade, its triforium, and its clerestory. One of our puny churches would stand — nave, aisles, chancel, tower, and spire and all — within one of the bays of the nave and aisles here; and there is a grand sense of restraint and simplicity about this work which impresses me more each time I see it. At the same time the interest is of this grand kind — there is a sense of the immense and infinite, but no condescension to the love of detail and delight in dainty variety which undoubtedly strikes us in most good Gothic works, and makes them so enjoyable.



SAN PETRONIO, BOLOGNA.

The church which inspired the design of this was, no doubt, the cathedral at Florence. But of the two the design of San Petronio seems to me to be the more beautiful. The addition of chapels beyond the aisles and the traceries in their windows make the design a little less bald and insipid, and also give a somewhat truer impression of the real scale than one has at Florence. But at the best such work does not create enthusiasm. The principal effort of the architect was to build something very big, and he succeeded; unfortunately he so contrived as very nearly to prevent one from quite realizing how vast his work is, and I hardly know a more serious charge that can be made against an architect than this.[1]



CLOISTER, SAN STEFANO, BOLOGNA.

From this church I went to San Domenico, famous for a very elaborate tomb or shrine of the saint by Nicola Pisano. This is not a work that entirely pleases me. It is a high coped tomb covered with sculpture on the sides, erected behind the altar. The history of its erection by Nicola Pisano in 1265 gives it value as a dated work by a great artist. He seems to have been a good deal assisted by his scholar, Fra Guglielmo Agnelli, whose work is by no means equal to his master's. The tomb alone is the work of these artists, the rest of the work about the altar having been frequently added to and altered in later days, and each sculptor employed having done his best to glorify his own skill and dexterity instead of thinking, as Nicola Pisano evidently did, simply of telling his story in the most straightforward way.

The stories represented in the bas-reliefs had more than common value for a sculptor of original power. In the centre is the Madonna; on one side the resuscitation by S. Dominic of a youth who had been thrown from his horse, and on the other the saint disputing with heretics and burning their books. At the angles are the four Doctors, and at the back two more subjects from the Life of S. Dominic, probably designed but certainly not executed by Nicola Pisano.

The church which contains this tomb has been ruthlessly modernized; but in the open piazza on the north side of it are two monuments of much interest. One of these has a square basement of brick, supporting detached shafts, above which are round arches, the whole being finished with a brick pyramid. Under the canopy thus formed is placed the sarcophagus, marked with a cross at the end, and finished at the top with a steep gabled covering. The detail of this is all of late Romanesque style. The other monument is of later date and much finer design, though keeping to the same general outline. In place of the brick basement of the first this has three rows of three shafts, which support a large slab. On this are arcades of pointed arches, three at the sides and two at the ends, carried on coupled shafts, and within this upper arcade is seen the stone coffin carved at the top, and with a stiff effigy of the deceased carved as if lying on one of the perpendicular sides. This monument is also finished with a brick pyramid. The whole design is certainly striking; it has none of the exquisite skill that marks the best Veronese monuments, but it is a very good example of the considerable success which may be achieved by an architectural design without any help from the sculptor, without the use of any costly materials, and with only moderate dimensions. The upper tier of arches is kept in position by an iron tie, and, in spite of its slender look, still stands after five hundred years' exposure, in perfect condition.

San Giacomo is another example of a modernized church, which has, however, some interesting features. On the exterior there is a rather good treatment of the polygonal apse, with steep gables and pinnacles over the windows on each side. This is somewhat like the apse of San Fermo, at Verona. The campanile on the south-east of the nave is a very lofty late Gothic erection, finished with an incomplete Renaissance belfry-stage. The old portion is divided into a succession of stages of equal height, and is mainly striking on account of its good colour — being all of red brick — and simple outline. The west front is, as is usual here, a great gable divided into three parts by pilasters and half columns; the doorway is of the thirteenth century, and its columns rest on lions' backs. The detail of the windows at the ends of the aisles is extremely good, and seemed to me to be of the same date. The windows are of two-lights, with shafts for monials, and a broad transome of plate tracery; the tympanum of the arch at the top is similarly filled: here, though the jambs are of brick, the whole of the rest of the design is executed in stone, and the likeness to some of the later Venetian church windows in the Madonna dell' Orto and SS. Giovanni e Paolo is too great not to be observed. The cornices here are very good. I noticed not only bricks of unusual shapes, very well arranged for effect, but also disks of earthenware, set with the convex side in view, and of brilliant glazed colour, generally blue or green. Their effect is extremely good.

PALAZZO DEL PODESTA, BOLOGNA.

The church of Sta. Maria Maggiore is less

[1] The complete church was to have been 800 feet long, and 525 feet across the transepts, with a central dome 130 feet in diameter.—Fergusson's 'History of Architecture,' ii. 210.

(C) CHURCH OF SAN CATERINA, BOLOGNA.

altered internally than the rest. It is of great length, groined throughout, and in general effect and proportions seemed to me to have a somewhat less Italian air than the other churches. The apse has an aisle and chapels round it of which the brick detail externally is effective. Here there are large tiles cut to a trefoil shape placed flat against the wall-face as an ornament. They are good-looking, but have not stood well.

In front of this church there is a court or atrium, surrounded with a perfectly open arcade, which is continued all along the north side of the church next the road and over the public footpath. The columns are very slender and of marble; and though the arches which they carry are segments of circles (not an agreeable form), the whole effect is extremely light and graceful.

San Francesco *was* one of the finest churches in the city. It is now so shabby and decayed outside, and so covered with painters' and decorators' work inside, that all its good effect is ruined. Its interior was the victim of what was, I daresay, a very well-meant restoration some years ago, and little of it has been left in its original condition. It has a chevet with aisles and chapels, and externally the rare feature (in Italy) of flying buttresses to support the choir vault. They were built by men who had never seen one before, I suppose, and are as crude and misshapen as they well could be.

Two campanili close to each other, south of the choir, group strangely with it in the perspective view. They are unlike in size and design, and illustrate the perfect indifference with which all mediæval architects viewed the gravest departures from laws of symmetry. The larger of the two has rather rich Gothic details, the belfry-stage having traceried windows of three lights with spiral shafts for monials. The gables in this church have large white marble crosses let into them; these are rounded at the ends, and each end has a bright green tile disk inserted. The west front is of the usual description — a great sham front of hideous outline. Most of its windows are lancets, new, but probably copied from old examples, and the doorway under a canopy is of good character.

I have left to the last what, I suppose, is in fact the oldest of the Bolognese churches — San Stefano. It is a collection of seven churches, rather than one church, and, in spite of modernization without end, it is still a most curious and interesting jumble of old buildings. The churches are dedicated to — 1, San Stefano; 2, San Lorenzo; 3, San Sepolcro (a circular church); 4, The Corte di Pilato (a cloister); 5, Sta. Trinità; 6, SS. Pietro e Paolo (with three Romanesque apses); and 7, San Giovanni. No. 3 has an aisle round the circular portion, and was probably a baptistery, and there is still an old ambon in it. One gets fairly puzzled in this nest of queer little churches or parts of churches, and I found but little of architectural — as distinguished from antiquarian — interest in them. The brickwork in the cloister and in some of the external walls is extremely good. Some of the latter are diapered or reticulated on the face with square yellow tiles with dividing lines of red brick, and the cornices are of the same two colours also. In the cloister the columns and inner order of the arches are of stone, the rest of the walls and cornices being of red and yellow bricks, and in one part there is a course of red, green, and yellow tiles alternated. The effect of this work is extremely pretty.

Probably travellers remember Bologna more by its two leaning towers than by any other feature. One comes here however, from either side, after rather a surfeit of this sort of thing. On the one side is Pisa, with its leaning tower, and on the other we may see them at Rovigo, Ferrara, and elsewhere. The soil here is generally bad for foundations, I suppose, and these plain brick towers without any projection at the base are the most ill-contrived constructions for such foundations that one can conceive. In this case it is possible to get views of the two towers which show an apparently impossible

(D) ENTRANCE, CHURCH OF SAN CATERINA, BOLOGNA.

amount of overhanging on the part of the smaller one, and I confess to a strong preference for walking to what one may call the windward side of such an erection! There is no beauty in these towers, their only features being the vast array of putlog holes in their walls, and the machicolated battlement of the higher of the two.

Of domestic buildings of the Middle Ages there are not many remains. The Casa dei Mercanti, though it dates from the end of the fourteenth century, is not pleasing. The front has two lofty pointed arches on the ground story, and a canopied Ringhiera of very poor design above. But as the whole front has been restored, the bricks painted bright red, and the stonework cleaned and repaired, I am disposed to believe very little in the antiquity of any of the details. Certainly I found it not worth sketching, which was the more disappointing as I had heard of it always as a fine building. The Pepoli Palace has some old brickwork and a Ghibelline battlement of unusually picturesque outline. The Piazza Maggiore in front of San Petronio is certainly the best feature in this not very striking city. As always in Italian towns, it must be visited early in the day if it is to be seen to advantage. In the morning it is crowded with fruit and vegetable dealers, sitting under bright-coloured umbrellas;

(E) PALAZZO ALBERGATI, BOLOGNA.

in the afternoon it is *triste* and deserted, save by the cabmen, who pursue the stranger with their importunities. One side of this piazza is occupied by the Palazzo Publico — a large pile of building altogether Gothic in its inclosing walls, I fancy, but they have been so much altered from time to time that not much detail remains. It seems, however, to have been much like the Castle at Mantua in its character, with bold machicoulis at the top of the walls, and a well battered-out base to the whole building. In a tower here there is a window which I engrave, because it shows well how good an effect may be produced by the skilful use of the very simplest materials. The combination of stone with brick adds much to the effect; and though this is in itself a very small and unimportant work, it appears to me to be exceedingly suggestive.

Fire-proofing.

SOME DEDUCTIONS FROM THE EVOLUTION IN FIRE-PROOF CONSTRUCTION.— *Concluded.*

BY CORYDON T. PURDY.

THE Roman architecture was perfectly typical of this massive construction. Government buildings, museums, libraries, and quite often banks, cathedrals, churches, and other important and costly buildings, though not necessarily high ones, both in Europe and America, are quite commonly built on this order, while warehouses, and office and business buildings of all kinds, especially in America, are now commonly built of skeleton construction. It is true that many buildings are of mixed construction and typical of neither one class or the other. It is also true that the one has been evolved from the other by many different changes, no one of which was sufficiently pronounced to make an era. Nevertheless, there are marked distinctions between the two classes.

One is massive, not only in appearance, but in fact, while the other is open and light, even more than it seems to be. One is characteristic of the old in architecture and conservative, while the other is radically new. One is fire-proof, because the construction is everywhere so thick and massive that the effect of a fire cannot be far-reaching, while the other depends entirely upon the good character and perfect indestructibility of the exposed materials used chiefly for the protection they afford to a metal frame which could not alone resist a great fire. One may be constructed simply of incombustible material, which may suffer injury to some extent without the destruction of the building as a whole, while the exposed material of the other must be not only incombustible, but it must also be equally indestructible. Otherwise, even its partial collapse may expose the frame and directly or indirectly bring about the complete destruction of the building. In one the construction is comparatively simple and direct, while the other involves many technical considerations and more or less complicated detail. One is necessarily limited in its application. The character of the materials fixes, to some extent, both the height of the building and the arrangement of its rooms, while the other class is practically unlimited in its application. If the cost can be provided, almost anything can be made.

The massive construction has always been practically and satisfactorily proof against fire, while it has taken half a century to produce an equally fire-proof building of skeleton construction, the first general and well-defined efforts in this direction practically dating with the invention of the rolled beam.

It may be desirable to make a massive construction of the exterior, and a skeleton construction of the interior of a building, or indeed some other combination, but it is, nevertheless, important that these distinctions should be perfectly understood. An apparently massive construction of brickwork, or stone, or concrete, which is not massive in fact, is often a dangerous experiment, when the same materials, particularly in buildings not greatly exposed from without, may confidently be used, if the walls are really heavy, and the construction on the whole is thoroughly substantial. On the other hand, a building of skeleton construction must be designed with more care as to the character of all the materials employed in its finish, and as to the details of their use, or in the emergency of a fire the structure will be found wanting in fire-proof qualities.

Full protection from outside fires depends upon the treatment of the window exposure, upon the choice of materials used in the exterior walls, and if the building has an iron frame, upon the covering and protection of the ironwork used in its exterior construction.

Without question the first is the most important consideration, for it is at once the most dangerous point and the most difficult to meet. Ordinary glass will surely go to pieces if exposed to a great heat. It is a problem not yet solved. The common practise of using outside shutters of sheet iron, or of wood covered with iron, on windows facing alley and court and in rear elevations, has been even in these places of but partial advantage. It is practically impossible for owners to compel tenants to close them, and it would add from 2 to 5 per cent. to the expense of operating some buildings if the owner tried to do it. It would also require the employment of several men, even in an ordinary building, if they are to be closed as soon as offices are vacated. If the fire occurred in the daytime, the chances are quite possible that circumstances would prevent their being closed. It is true that they may be made effective on very large windows on the ground floor and in exceptional cases elsewhere; but generally considered, on street fronts exterior shutters are undesirable because they destroy the architecture of the building and in show windows prohibit their use as such except during business hours. Interior rolling shutters have been used to a considerable extent and there is much to say to their advantage. It would seem that the solution of the problem must depend upon their adoption, or upon the invention of a glass that will resist the efforts of heat. In many fires the wooden sash and wood window frames have been the first things to take fire, when the glass would otherwise have withstood the exposure. This difficulty, however, is now easy to meet, for both the frames and the sash can now be covered with metal by American manufacturers so neatly and so well that they are scarcely discernible from the wood itself.

The choice of materials for exterior walls is particularly important when the exposure is as great as it ordinarily is in city construction. Granite, marble, and limestone, and also some sandstones, will go to pieces if badly exposed, and will be injured with even slight exposure. If iron is used in the construction of the wall, its covering and protecting is doubly important. An indestructible material should always be used. The too common practise of covering iron columns in exterior walls with a few inches of marble, or granite, or of any kind of stone without other indestructible material intervening, is so radically wrong that it should be prohibited by law in every large city. Hard burned clay material in the form of brick or hollow porous fire-proofing seems to be the only absolutely reliable material for the purpose. The protection of brickwork was shown by an experiment in Vienna in 1895. This was described in THE BUILDER, in a July number of that year as follows: "Experiments were made a short time ago in Vienna, under the supervision of the city surveyor, with the object of testing the efficiency of various building materials against fire, and also to ascertain what protection they were capable of affording to ironwork. To make these tests a brick chamber some 12 ft. by 8 ft. in plan and 11½ ft. high was built, and in the center an iron column was constructed consisting of two channel bars, 5½ by 2¾ ins. These channels were placed 2½ ins. apart, back to back, and were braced together with light lattice bars. Within the space between the channels, test bars, composed of various alloys melting at temperatures between 150 degs. Fahr. and 1,650 degs. Fahr., were placed, the column afterwards being surrounded with brickwork in mortar, thus forming a pier some 18 ins. square. In order that the test should, as nearly as possible, resemble the conditions met with in actual practise, the column was loaded with a sufficient weight to cause a stress of 3¼ tons per square inch on the ironwork. Fuel was then strewed over the floor of the chamber to a depth of some 3 ft., and the firing was fully maintained for a space of two and a half hours and was subsequently extinguished by the fire brigade. The heat had, however, been so great that it was not until the next day that a thorough examination of its effects could be made, but it was then discovered that although the edges of the brickwork pier were crumbled to an extent of 1½ ins., the iron column was quite uninjured, and only the test bar, capable of fusing at 150 degs. Fahr., showed any indication of melting. It would thus appear that the brickwork was of ample thickness to protect the ironwork, and that when such construction is adopted in actual practise a building is probably as fire-proof as it is possible to make it."

The problem of protecting a building from the spread of an internal fire is more complicated. Destruction or material injury on this account may be due to one or more of the following causes: —

1. Fire-proofing materials and combinations, one or both, which are not indestructible, though the material may be incombustible.
2. An excess of combustible material in trimming, wainscoting, doors, floors, etc.
3. Ordinary glass windows for borrowed light in partitions.
4. The support and division of fire-proof partitions with wooden frames.
5. Continuous openings over large areas under wood floors.
6. The imperfect covering of the bottom flanges of beams or other ironwork in floors not necessarily protected by the regular arch construction.
7. The imperfect covering of columns.
8. The imperfect use of granite, marble, and other such materials.

In any of these particulars a mistake in design or faulty workmanship may lead to great loss in an otherwise perfectly fire-proof structure.

The material used in floors and partitions must be indestructible. Simply incombustible material will not do. It should be able to endure heating to a temperature of 2,000 degs. Fahr. and cooling again either slowly or quickly without crumbling or cracking. Indeed, all its physical conditions should remain unchanged by this treatment, including its strength as a building material.

The result should be the same, whether a whole section of the material is subjected to test, or only one surface of it. As a matter of fact, in the actual test of a fire in a building, it is generally one side only that is exposed. All fire-proofing materials expand under heat and contract again on cooling. It is owing to this fact that partial heating may shatter material which might remain uninjured if fully heated. In burned clay materials it is quite as much a question of the skilful shaping of the walls as it is of the material itself. It must not be forgotten, however, that it is the partition as a whole or the floor completed that must be indestructible, and that it is, therefore, quite as much a constructive question as one of material or of skilful manufacture. Otherwise good terra-cotta partitions have been thrown down in fires because the blocks were not well bonded together, or the adhesive qualities of the mortar were destroyed. It may be considered proper to call any building in which wood is not mainly relied upon a fire-proof building, for architects generally and manufacturers use the words that way. In such buildings wooden frames are conveniently used in the construction of partitions. Such fire-proof buildings burn. If a real fire-proof building, one that will not burn, is intended, wood should never be used constructively in partitions, or in floors, or anywhere else. It cannot possibly be employed without danger. A partition cannot be too well put together, or too strong laterally, as viewed from the point of fire resistance. If its strength is great enough to resist the possible exigencies of a bad fire it should be strong enough for any purpose. The contrary is equally true of a floor. If that is built well enough and strong enough for utility it should be strong enough to resist fire.

The elements, then, of a perfect terra-cotta partition are these: —

1. A material which is uninjured by 2,000 degs. of heat, or the subsequent cooling, however it may be.
2. Walls in the block thick enough to resist the effects of unequal expansion and contraction.
3. Mortar which will also endure great heat without destruction.
4. Thoroughly good workmanship in erection.
5. At least four inches in thickness before plastering.
6. Iron framing for all openings, the side pieces extending from the floor to the ceiling if the openings are for doors.

Injury in a terra-cotta constructed floor on account of the expansion and contraction of the material is more likely than in a partition. Its resistance depends upon the use of porous material and skilful designing, though clays vary so greatly that it is not possible to say that no hard burned clay can be made to serve the purpose.

Good partitions and floors are made of other materials, but none that have so fully filled the requirements as those made of terra-cotta. Concretes of all sorts are so dependent upon good workmanship that generally that factor becomes the most important element of their success. Considerations of time, expense, moisture, resistance to sound, etc., may not be involved in their fire-proof qualities, but they may have much to do with determining their use or rejection.

Next to the use of wood in the construction of terra-cotta partitions, the use of ordinary glass in openings for borrowed light has probably permitted the spread of fires in office buildings more than any other one thing. Glass is now manufactured which will preserve its integrity under the severest treatment. If iron sash or iron-covered sash are used, there is therefore no reason why these openings should not prevent the spread of destruction equally with the body of the partition. Sash doors and trimming of all kinds are now made in the form of metal-covered ware, which will keep its perfection of form indefinitely, and which is an almost perfect imitation of woodwork. Its extensive use is to be urged wherever the best work is desirable. It reduces the inflammable material upon which the fire can feed, which cannot fail to be of advantage. It hardly seems necessary to do away with wood-finished floors, even in the best buildings, but they should be laid so that there is no opening underneath, and especially so, over large areas. If properly constructed they can burn but slowly, even if the fire is great. When everything else in a room has been consumed the floors often remain after a fire only partially destroyed.

The covering of the bottom of the beams in the ceiling is often very badly done. It has been a difficult detail to satisfactorily meet. Nothing yet used has fully satisfied the demand. It is all practically dependent on good workmanship, which is hard to get, especially in such a small detail. The adoption of metal in certain forms supplementary to the arch material may finally prove the best solution. In any case the covering should be substantial and should provide an air space under and around the structural iron protected.

The best covering of columns is also still a disputed question. Here the problem of protection from corrosion is even more important than that of fire. The covering should thoroughly protect the metal from moisture at all times, and from heating in case of fire. It is therefore necessary that it should be strong in itself so that the fire and the water, the destruction of adjoining constructions, or falling bodies cannot throw it down or pull it off. Slabs of marble or granite, or other material, is of course unsuitable for this purpose. If used at all about columns, it should always be without reference to protection.

A fire of internal origin in an office building may be expected to destroy the contents of the room, the finishing woodwork in floors and walls, and the decorations, but if it is built as well as it can be the fire ought not to spread to adjoining rooms.

The treatment of department stores and warehouses, where the openings extend over very large areas, is a more difficult matter. It seems as if there can be no safeguarding the contents of such great rooms, or even of a whole building, where floors are open to each other through large vertical spaces. It may be that some system of partitions made of metal and movable may be made to divide the space at night and reduce the risk.

The stairways in every large building should be made of solid metal, both treads and risers. No point needs more to be relied on to the very last in a great fire, and no place will yield quicker than a stairway with marble treads. The possibility of making a strictly fire-proof building, even by our most modern methods of protected steel frames, is now a demonstrated certainty. The problem of the future is to so improve on these methods, or to so cheapen them, that their use in dwelling houses, apartments, and tenements will become general. Efforts in this direction cannot fail to hasten the day when the law in several of our largest American cities will make fire-proofing methods compulsory in buildings of all kinds, prohibiting the use of wood entirely, except for temporary use and as a finishing material. The work that has been done is great enough, but there is a greater still unfinished.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — It is very gratifying to note that although the prices of most building materials have gone up and that building costs at least 15 per cent. more than last year, there has been unusual activity all summer; in fact, in some localities the record of new buildings exceeds that of last summer.

A unique ceremony which has provoked considerable discussion was celebrated in this city a few weeks ago, when a bronze tablet was placed at the entrance to the Tower Building, No. 50 Broadway, to commemorate and establish for future time the record of the erection of the first skeleton construction building in the United States. The era of high buildings began in 1870. The "cage" construction, by which is meant a framework of iron and steel columns and girders which carry the floors only and do not carry the outer walls, developed the first high buildings, but the Tower Building inaugurated the fullest departure, being of "skeleton" construction, or a framework of iron or steel columns and girders which carry the weight of the outer enclosing walls together with the floors down to the foundations at initial points. A Chicago architect made a claim of priority, but the *Record and Guide* gives abundant proof that the Tower Building, designed by Mr. Bradford L. Gilbert, is entitled to the honor.

A tenement-house exhibition is to be held in this city in December, under the auspices of the Charity Organization Society, at which it is proposed to present all phases of the tenement-house

RESIDENCE, FIFTH AVENUE, NEW YORK CITY.
McKim, Mead & White, Architects.

CAPITAL FOR UNION STATION, DAYTON, OHIO.
Executed by the St. Louis Terra-Cotta Company.
Elzner & Anderson, Architects.

problem. It is apparently the intention to show the good and the bad tenement houses by models, and if this is done fairly, it will form a very useful and instructive exhibit from the technical as well as the sociological point of view. In this connection it is interesting to note that the tenement-house population in New York is smaller by 10,800 than it was a year ago. A reasonable theory seems to be that the larger part, if not the whole, of the lost tenement population has migrated to the suburbs, particularly in the Bronx and Brooklyn boroughs. Agents for suburban property say that most of the inquiries received in response to advertising come from people who live in Manhattan flats. Prospects of greater privacy, larger quarters, and the possibility of becoming their own landlords prove strong attractions to flat-house tenants, who are consequently seeking the frontiers in considerable numbers. Besides, laborers employed in constructional work naturally migrate to the chief seats of speculative building. In the line of big deals nothing is more interesting than the rumor that William Waldorf Astor is to sell all his holdings in New York City; a truly princely array.

WESTERN RESERVE HISTORICAL SOCIETY BUILDING, CLEVELAND, OHIO.
Spanish tile for roof made by J. C. Ewart & Co.
F. S. Barnum & Co., Architects.

Thomas Graham has planned four six-story brick and stone apartment houses to be built on 89th Street, at a total cost of $400,000. The architect is also owner and builder. Clinton & Russell are preparing plans for a five-story brick and stone residence to be built on East 78th Street; cost about $50,000. George F. Pelham has prepared plans for two six-story brick store and flat buildings on First Avenue, at a total cost of $60,000. George Keister is at work upon plans for a ten-story brick and stone apartment building to be erected at 92d Street, corner Central Park West, at a cost of about $600,000. Louis Korn has prepared plans for a nine-story brick hotel to be erected on Madison Avenue, corner 92d Street; cost, $350,000. F. T. Camp has prepared plans for a seven-story brick flat and store building, to cost $200,000, and to be erected on Amsterdam Avenue, corner 79th Street.

CHICAGO.—A strange fatality seems inherent in the name "Coliseum" when applied to buildings here. The recent appalling disaster in which the trusses of the new Coliseum, on Wabash Avenue, went down, killing twelve men and seriously injuring as many more, is the third event of a series which causes superstitious people to shake their heads. The first Coliseum, in which the last Democratic National Convention was held, collapsed during the erection of the framework and several lives were lost. Less than two years later it was totally destroyed by fire. In the present instance the exact cause of the wreck has not yet been determined.

SPANDREL FOR BINGHAM HOUSE, PHILADELPHIA, PA.
Executed in terra-cotta by the Conkling-Armstrong Terra-Cotta Company.
Willis G. Hale, Architect.

The coroner's jury has fixed the blame on the Pittsburgh Bridge Company, but only a searching expert investigation will settle the question of responsibility. The steel structure was designed by E. C. and A. M. Shankland, the well-known engineers; the auditorium being spanned by twelve arches of 150 ft. span and 66½ ft. rise. They were of the three-hinged type, similar to those in the Manufacturers and Liberal Arts Building at the World's Fair. It has been suggested that a rope from the hoisting engine to the traveling crane caught in the north truss and toppled it over, the purlins and diagonal bracing not being completed at that end of the building. The north arch fell to the south, and the others went down like a row of cards.

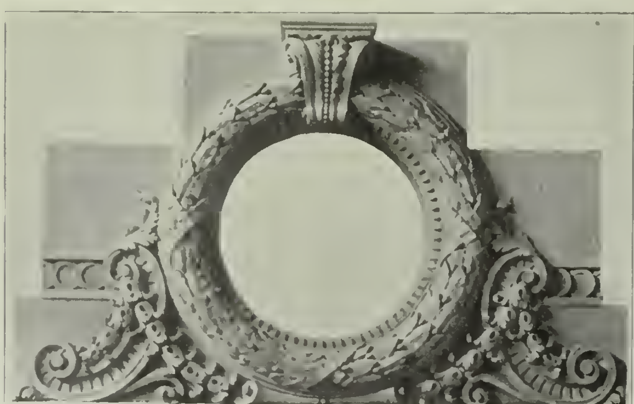
It is interesting to note here and there in the ornamental detail of new buildings, attempts to follow the rich and involved motives, for the invention and development of which Mr. Louis Sullivan has been given so much well-deserved credit. It is to be hoped that this exquisite and highly organized style will have many intelligent and original disciples, able to create and differ-

CAPITAL AND COLUMN, SECOND STORY, NEW YORK MEDICAL COLLEGE AND HOSPITAL FOR WOMEN.
Executed by the Excelsior Terra-Cotta Company.
Wm. B. Tuthill, Architect.

entiate on similar lines according to their several individualities; not depending for ideas, as seems to be the case with some at present, upon the remarkable skill of one or two modelers who are past masters in the interpretation of Mr. Sullivan's rough but highly suggestive sketches. The multiplication of buildings in this style will, if they are intelligently done, do much to give a strong local character to our architecture.

It is surprising that there are not more modern transient hotels and lodging houses to accommodate the large number of down town lodgers of humble means who are at present very poorly cared for. Work has recently been begun on a model building for the above purpose, on Van Buren Street, between State Street and Wabash Avenue. It is also rumored that a scheme is on foot to erect a larger building for similar purposes, modeled after the Mills Hotels in New York City. It would work great improvement in one of the most unsightly and unsavory sections of the city if some of the old buildings in the "Levee" district could be torn down and one or two large hotels of this class erected in their stead. While nearly all large American cities are rather dilapidated and unsightly in their depot neighborhoods, it seems as though Chicago were particularly so. There is no good reason why our depots should be surrounded by saloons, slums, and ugly buildings, nor why the streets leading to them should be so dirty and disreputable that people of refinement hesitate to walk through them, especially after dark. The city of Milwaukee is a pleasing exception in this respect, both of her stations (the St. Paul and the Northwestern) being rather pleasing modern structures, each of which faces a well-kept park. Strangers arriving receive at once a happy first impression. When one considers the fact that our railways are the great public highways by which many thousands enter our great cities every day, it seems rank carelessness and short-sighted indifference to permit these highways to be lined with squalid habitations, ill-kept manufacturing plants, and an infinitude of unsightly signs and billboards.

The Chicago Architectural Club has published in a neat little booklet a general code governing competitions in design, which was adopted by the club last April for its own competitions. It is prac-



PEDIMENT OVER THIRD STORY WINDOWS, NEW YORK MEDICAL COLLEGE AND HOSPITAL FOR WOMEN, NEW YORK CITY.
Executed in terra-cotta by the Excelsior Terra-Cotta Company.
Wm. B. Tuthill, Architect.

BALCONY BRACKET, 4 FT. 2 INS. PROJECTION. REAL ESTATE COMPANY'S BUILDING, PHILADELPHIA.
Work executed by the New York Architectural Terra-Cotta Company.
Edgar V. Seeler, Architect.

RESIDENCE, NEW YORK CITY.
S. M. Holden, Architect.

HOTEL SCHENLEY, PITTSBURGH, PA.
Rutan & Russell, Architects.

DETAIL, CHAMBER OF COMMERCE BUILDING, CLEVELAND, OHIO.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.
Peabody & Stearns, Architects.

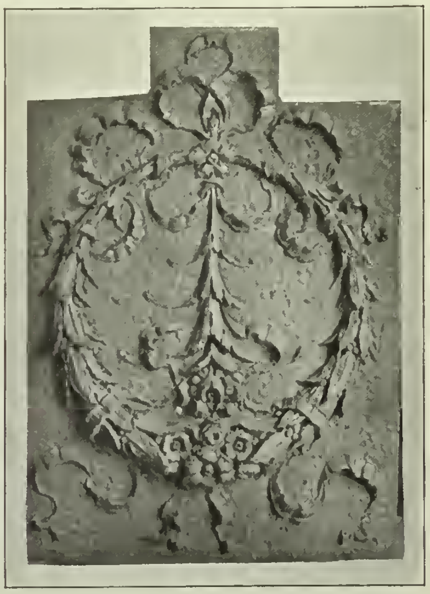
tically identical with the codes adopted by the other leading architectural clubs. The club will use its best endeavors to get copies of the code into the hands of building committees and individuals who are about to ask for competitive designs. The first competition to be held under the code will soon be announced. The prizes offered will amount to $1,000, and will be given by a certain local bridge company for the architectural treatment and ornamentation of a proposed new bridge across the Chicago River. It is to be hoped that the competition will show more ability in handling unusual problems in design, where precedent counts for less than originality and logical invention than was evidenced in the Luxfer Prism competition of last year, in which the majority of competitors were so bound to precedent that their suggestions were of little value. The excessive rise in cost of building, taken in connection with the still stationary condition of land values, tends to hold all speculative building very much in check. A marked rise in land values accompanied by a reasonable drop in prices of building materials, where there has been a forced inflation, ought to result in great building activity next year.

BEGGS BUILDING, COLUMBUS, OHIO.
Front of enameled brick and glazed terra-cotta, furnished by the Tiffany Enameled Brick Company and the American Terra-Cotta and Ceramic Company.
C. A. Stribling, Architect.

BOSTON.— Thus far this year the building operations in Boston show a considerable gain over those for a corresponding period last season, the building permits issued for brick buildings up to Sept. 1, 1899, being 467, as against 317 issued up to Sept. 1, 1898. This gain represents much more than a mere numeral increase, as the buildings represented by this year's permits are, generally speaking, operations of considerable more magnitude, and average a much higher cost than those of last season. The outlook, as far as can be estimated, is for a continued activity of this class of building, for some months at least, as the projected new enterprises of this character are considerable.

At the present time there is a marked absence here of speculative building. In consideration of the heavy losses attendant on such schemes during the past three years, the building material concerns are rejoiced at the healthy, legitimate enterprises that now occupy their attention. In fact, speculative schemes receive but little or no consideration at their hands.

While there is a good demand for burnt clay material, amounting in some lines to almost a shortage, there has not been a proportionate rise in prices of same; these materials selling at within 5 or 10 per cent. of the figures of last year. It is generally conceded by manufacturers and dealers that these prices are by far too low, as the



PANEL FOR GRINNELL APARTMENTS, DETROIT, MICH.
Executed by the Indianapolis Terra-Cotta Company.
Edward C. Van Leyen, Architect.

HOUSE AT CHICAGO, ILL.
Built entirely of terra-cotta made by the American Terra-Cotta and Ceramic Company.
Jennie & Mundie, Architects.

cost of production in these lines has heavily increased within eight months. It is confidently expected that owing to these conditions some advance will naturally arise in these materials by January 1. Boston is following the example of other large cities in forming a brick trust to include all the common brick plants in New England. The prospects are favorable of such a combination being made within thirty days. The completion of the South Terminal Station, and the great tide of travel in its immediate section which its occupancy by four lines of railroad has produced, has caused many changes in the commercial character and value of streets leading to it. What was formerly a neighborhood devoted exclusively to the wholesale trade is now being rapidly converted into a retail district. With this has followed much alteration in the character of buildings in this vicinity: many old buildings have been remodeled, or taken down and replaced by structures suitable to the new conditions. It is probable that within the next two years much new building will be done thereabouts.

TERRA-COTTA PANEL, APARTMENT BUILDING, NEW YORK CITY.
Executed by the White Brick and Terra-Cotta Company.
David W. King, Architect.

NEW CATALOGUE.

WE are in receipt of a pamphlet composed of the "advanced sheets" of a catalogue, now in press, which is shortly to be issued by the Central Fireproofing Company. In publishing this work, the aim has been to compile a treatise that should far exceed the limitations of a mere catalogue, and by means of it supply the architect, the engineer, and the contractor with a handbook on the subject of the fire-proofing of buildings, which will occupy the same relative position as the handbooks published by the rolling mills concerning steel structural work, etc. It will also furnish the insurance companies, the investors in real estate, and such of the public as are interested in building operations, with the means of investigating the strength and the refractory qualities of burnt clay fire-proofing, and in obtaining other necessary information concerning fire-proofing materials. The work, as far as published, is a most successful endeavor to treat the subject generally in a scientific way, and will be of great service to architects and builders in estimating on the employment of this material in building construction. Parties desiring a copy of this pamphlet should communicate with the Central Fireproofing Company, 874 Broadway, New York City.

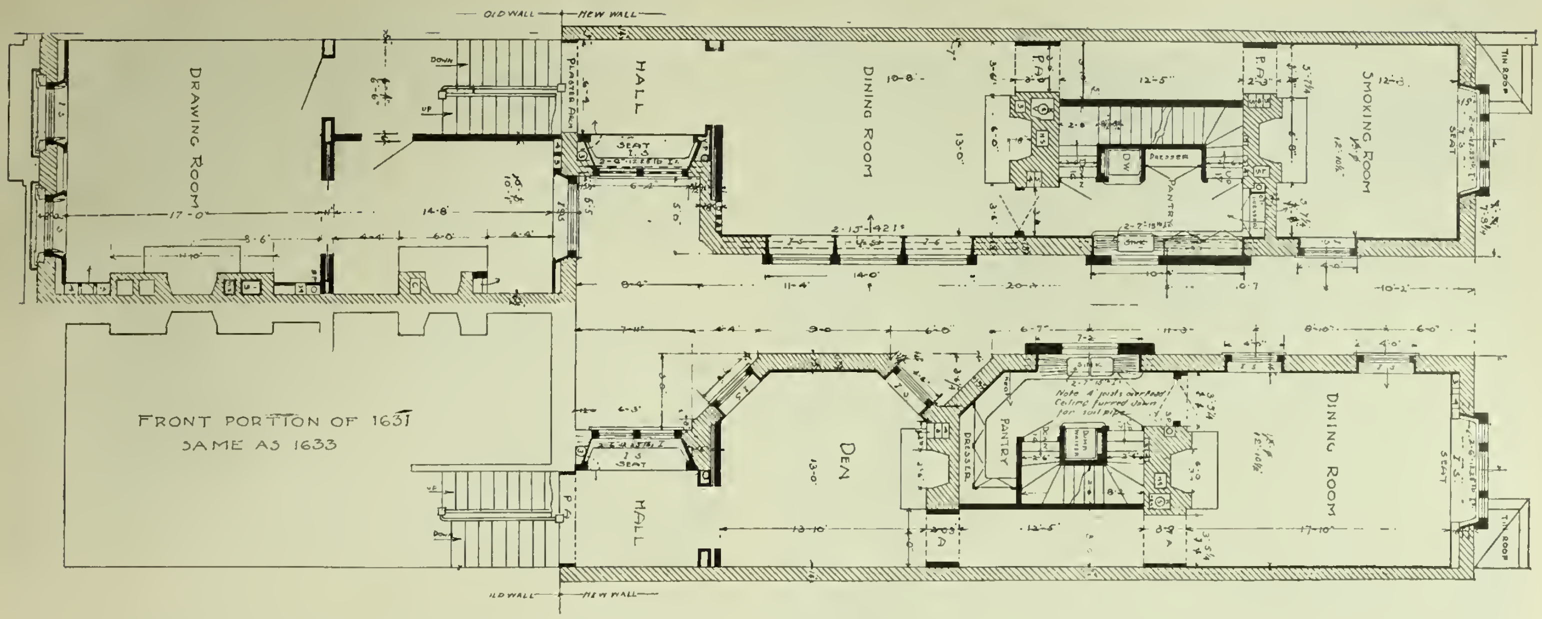
METHODIST ORPHANS' HOME, ST. LOUIS, MO.
Brick furnished by the Hydraulic-Press Brick Company.
T. B. Annan, Architect.

CURRENT ITEMS OF INTEREST.

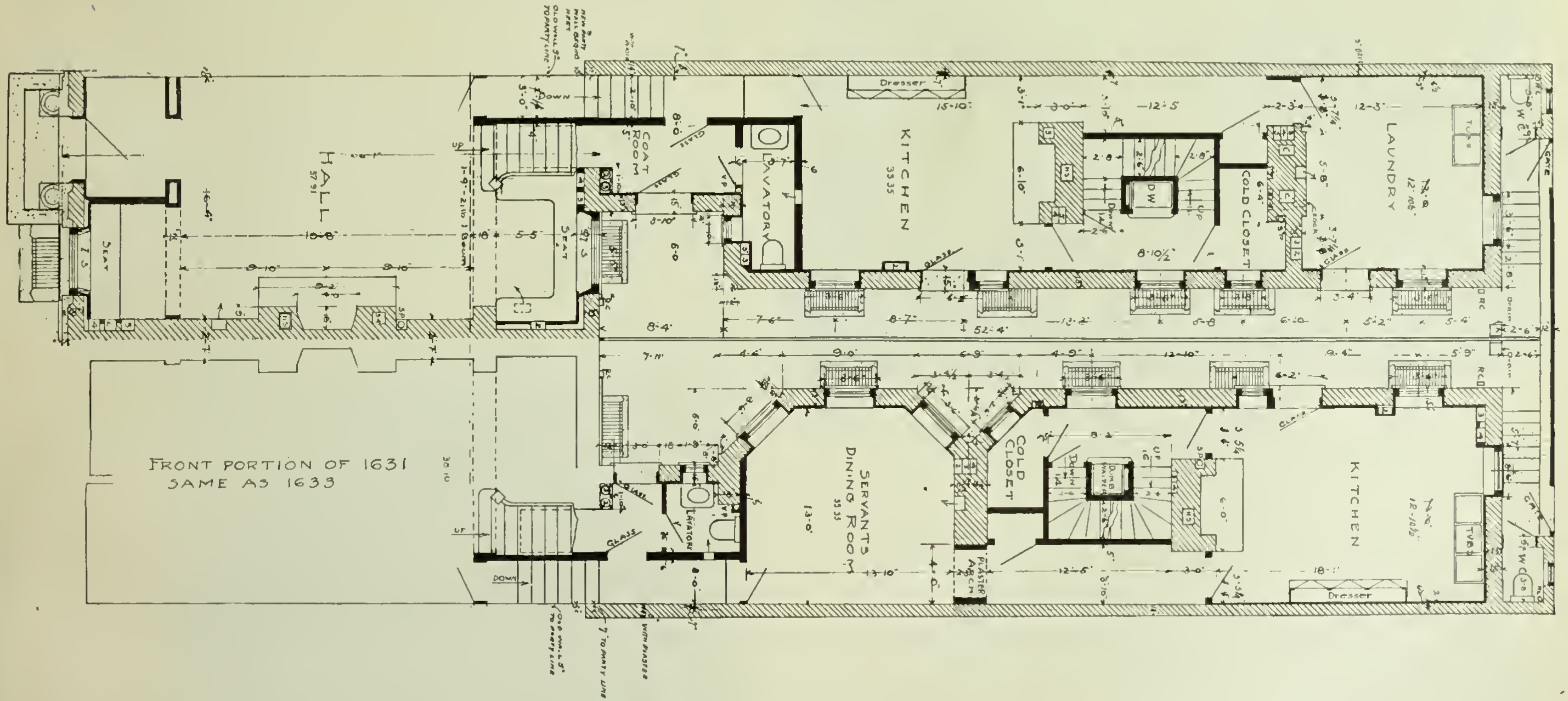
JAMES A. DAVIS & Co. are furnishing large quantities of Lehigh Portland Cement for the gun batteries at Fort Greble, and other important government work in Newport Harbor, R. I.

THE ROBERT AITCHISON PERFORATED METAL COMPANY report numerous orders for their screen material from the brick manufacturers. This company carries in stock a complete assortment of suitable sizes for such work.

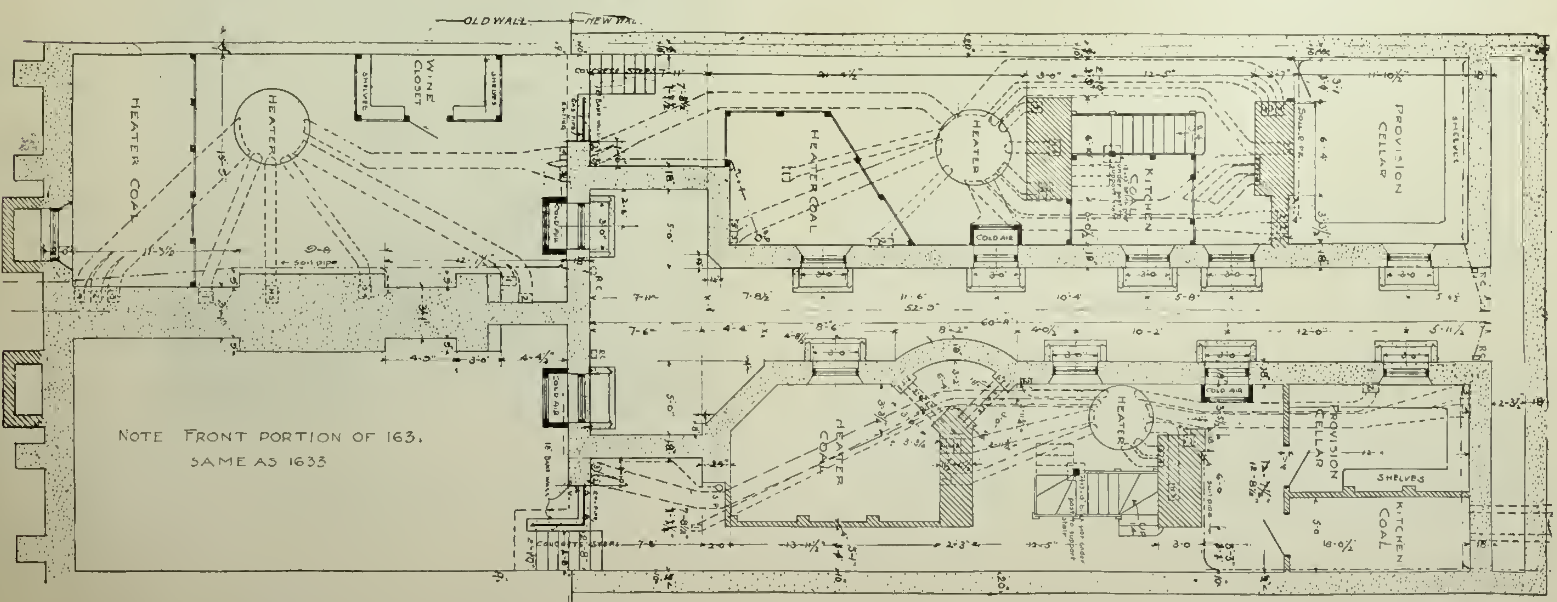
THE AMERICAN MASON SAFETY TREAD COM-



SECOND FLOOR PLAN.



FIRST FLOOR PLAN.



CELLAR PLAN.

PLANS, HOUSES AT PHILADELPHIA, PA. (Elevations Shown in Plate Form.)
Cope & Stewardson, Architects.

BUSINESS BLOCK, BROADWAY, NEW YORK CITY.
Built of gray speckled brick, Roman shape, manufactured by the Columbus Brick and Terra-Cotta Company.
J. B. Snook & Sons, Architects.

PANY report that over forty buildings in process of erection in Boston, or plans of which are now on architects' boards, have Mason Safety Tread or Mason Safety Sidewalk Light specified.

E. E. NICKSON, who has been representing the interests of the Pittsburgh Terra-Cotta Lumber Company in Boston, will assume, on October 1, the position of general sales agent for that company, with headquarters in Pittsburgh.

ANTHONY ITTNER, St. Louis, reports the following recent sales: 500,000 bricks to the National Enameling and Stamping Company, Granite City, Ill.; 250,000 bricks to Miller Bros., Pittsburgh, and 250,000 bricks to the Southern Illinois Construction Company.

THE COLUMBUS FACE BRICK COMPANY wish especial attention called to the announcement which appears in their advertisement in this issue (see page xv), to the effect that they are now prepared to contract for the prompt delivery of their "Ironclay" mottled flashed brick.

THE POWHATAN CLAY MANUFACTURING COMPANY are furnishing their "Salt and Pepper" and "Silver Gray" bricks for the facing of the North Carolina University, at Chapel Hill, N. C., Frank P. Milburn, architect; 160,000 bricks will be required. Their "Silver Gray" brick have been specified for the New Southern Railway Passenger Depot, at Richmond, Va., Frank P. Milburn, architect.

THE PHILADELPHIA AND BOSTON FACE BRICK COMPANY have recently contracted to serve their molded and face brick on the following contracts: Morse-Oliver Building, Bangor, Me., W. E. Mansur, architect; interior arches for St. John's Church, East Boston, Martin & Hall, architects; parochial school, Lawrence, Mass., W. P. Regan, architect; Bridgeport Orphan Asylum, W. C. Briggs, architect; the Franklin Building, Rutherford, N. J., Rossiter & Wright, architects; Woodruff Building, Columbus, Ga., Lockwood Bros., architects.

THE AMERICAN TERRA-COTTA AND CERAMIC COMPANY are supplying the architectural terra-cotta on the following building operations: Andrus Building, Minneapolis, F. B. and L. L. Long, architects; Tribune Building, Minneapolis, Frederick Kees, architect; Albion Building, Minneapolis, E. Kennedy, architect; Cable Building, Chicago, Holabird & Roche, architects; Edison Electric Building, Chicago, Shepley, Rutan & Coolidge, architects; Scoville Building, Chicago, Patton, Fisher & Miller, architects; the Marine Hospital; a number of schoolhouses at Chicago, and a schoolhouse at Detroit.

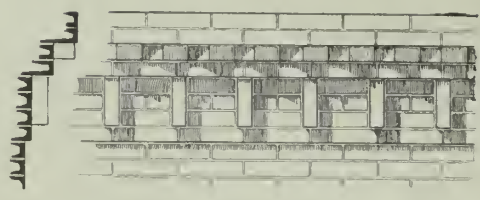
THE AMERICAN ENAMELED BRICK AND TILE COMPANY have closed a contract with Dwyer & Huntington to furnish 70,000 glazed brick in one shipment, for the Union Depot Subway, at Albany, N. Y.

WE have received from the Columbus Face Brick Company a sample in a new form of their "Ironclay" mottled brick. This sample, though only about one half inch in thickness, shows correctly and conveniently the full face, general mottled effect, and color of this company's standard size building brick in the shade indicated by the stamp on the back of the brick. These brick are made in several shades, varying from a very light ivory to a very dark bronze, and are

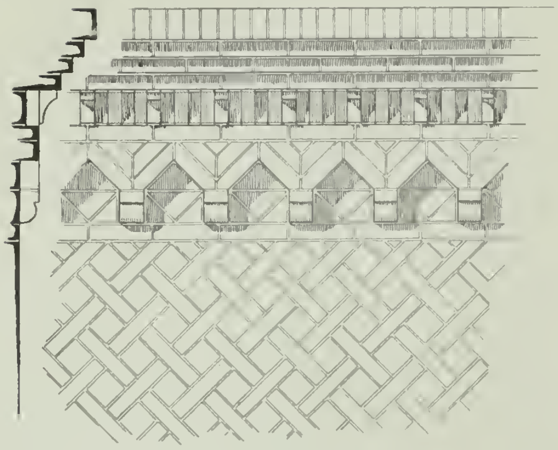
ENTRANCE, PIAZZA & BOTTO BUILDING, VICKSBURG, MISS.
Terra-cotta executed by Evens & Howard Company.
Alfred Zucker, New York City, Architect.

·DETAILS·OF·ITALIAN·BRICKWORK·
·MEASVRED·AND·DRAWN·BY·WILL·S·ALDRICH·

·CORNICES·

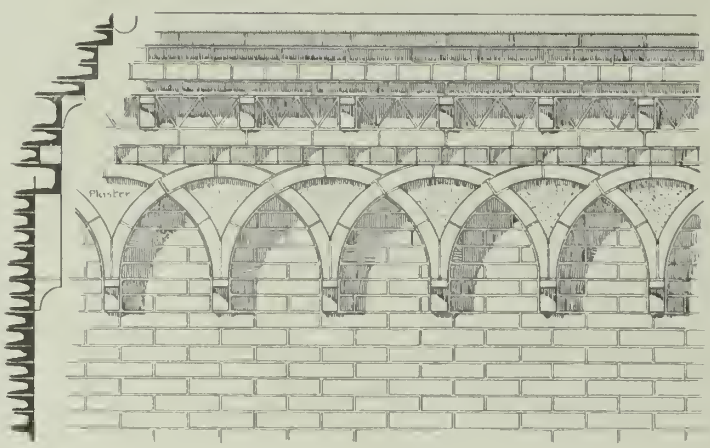


BOLOGNA

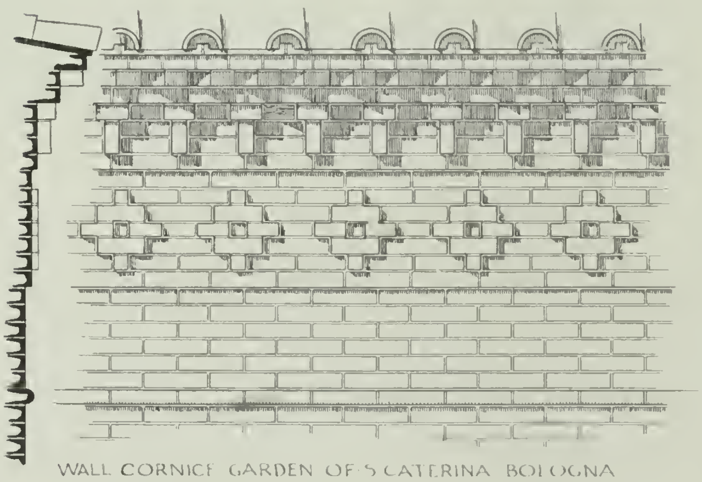


WALL OF BRICK WITH STONE SQUARES

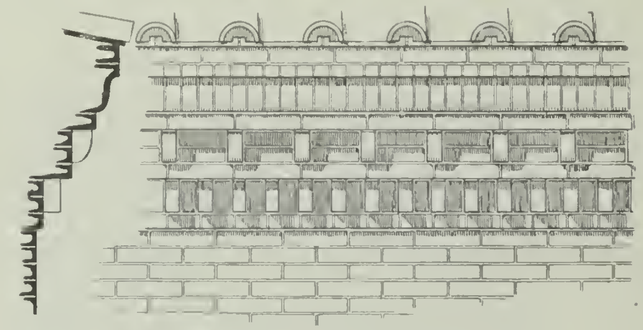
SAN STEPHANO BOLOGNA·



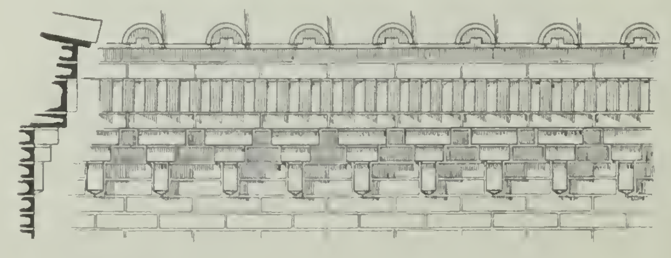
SAN STEPHANO· BOLOGNA



WALL CORNICE GARDEN OF S CATERINA BOLOGNA



S CLEMENTE BOLOGNA·



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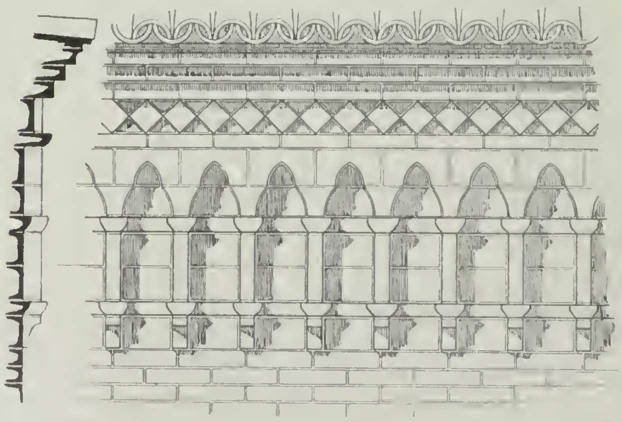

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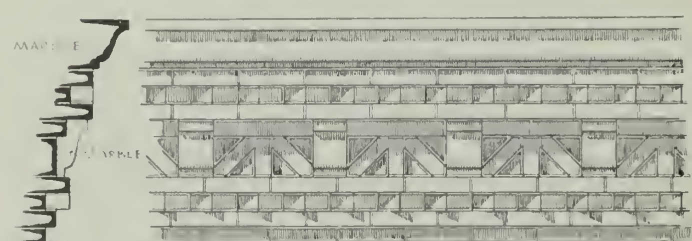
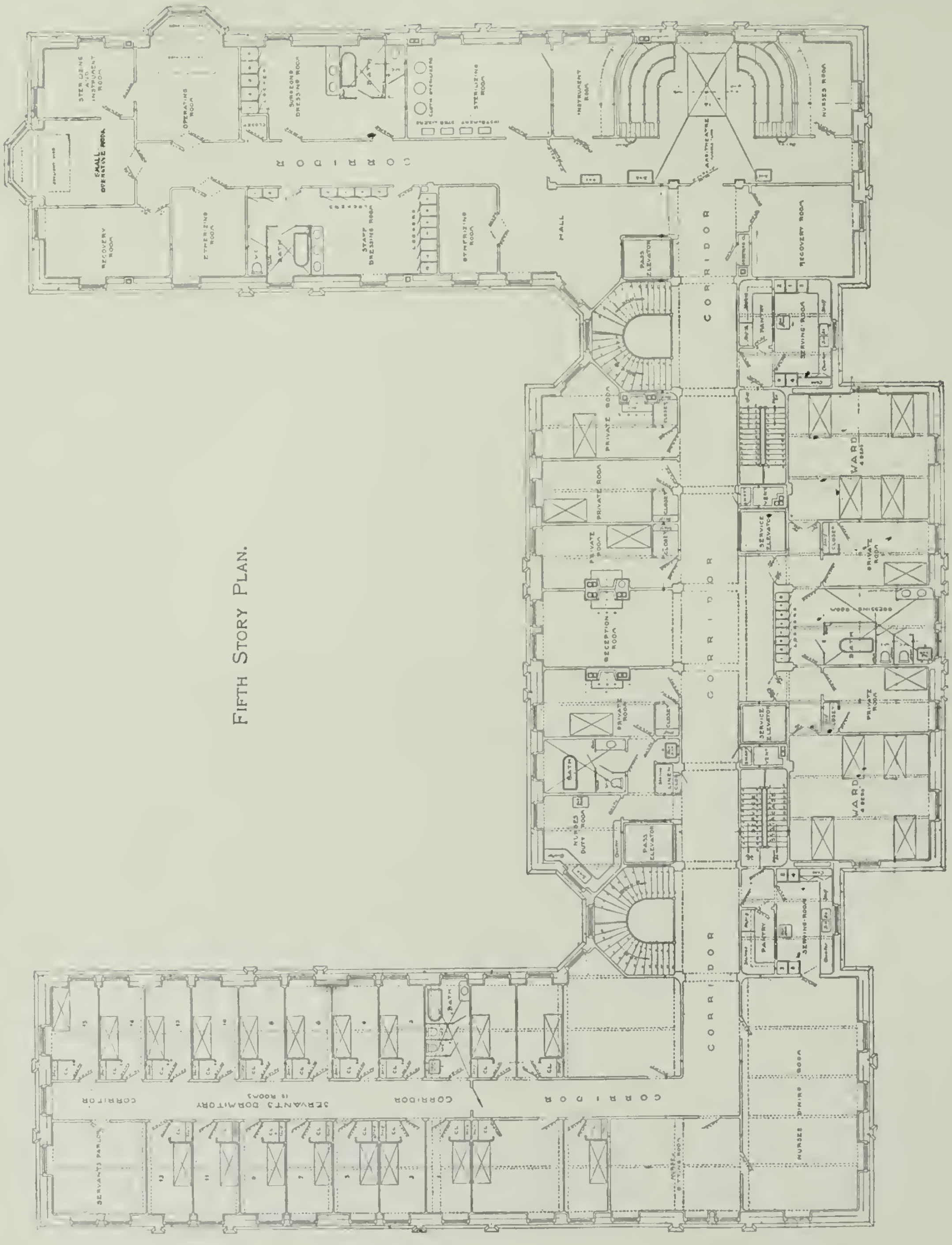
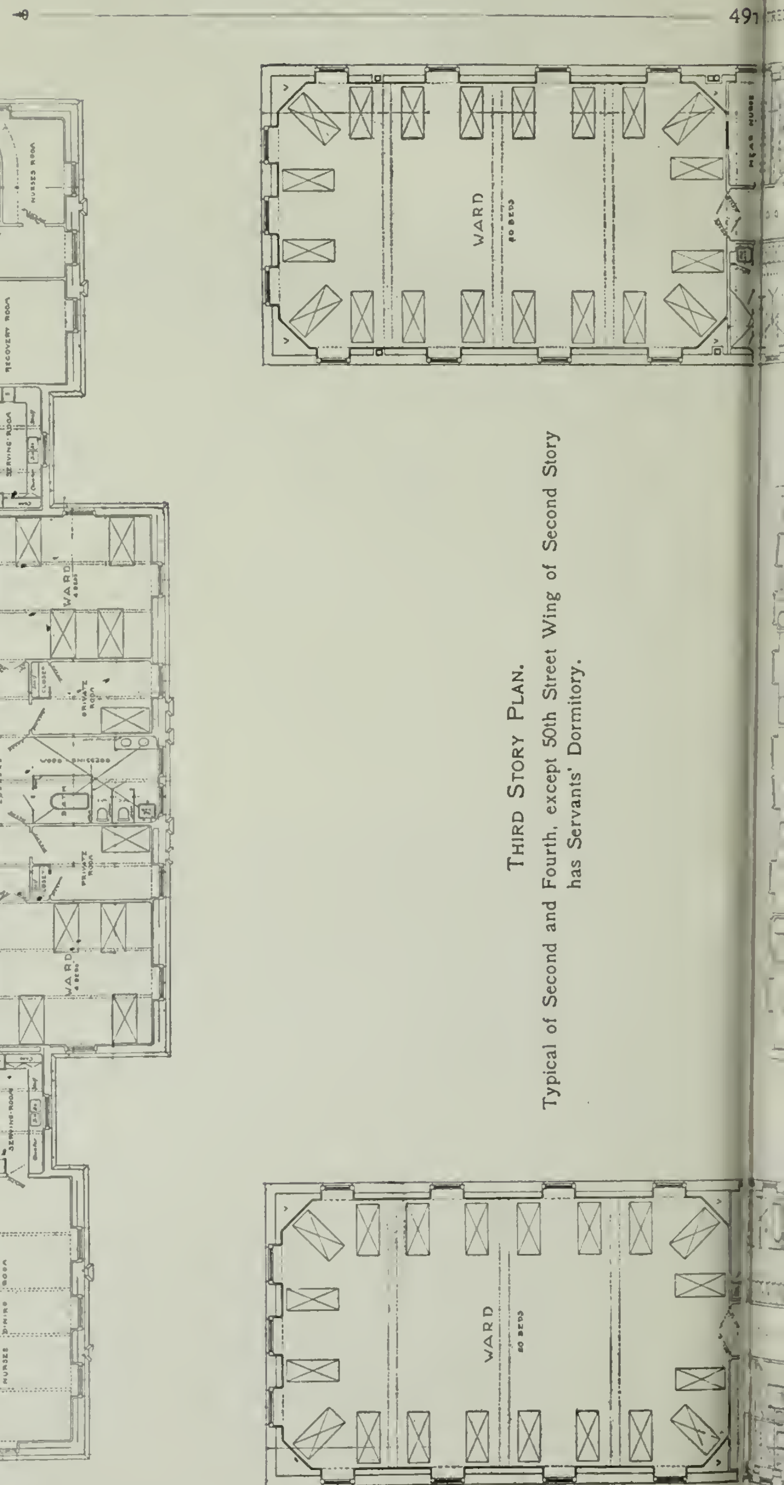


ROME·



FIFTH STORY PLAN.



THIRD STORY PLAN.
Typical of Second and Fourth, except 50th Street Wing of Second Story has Servants' Dormitory.

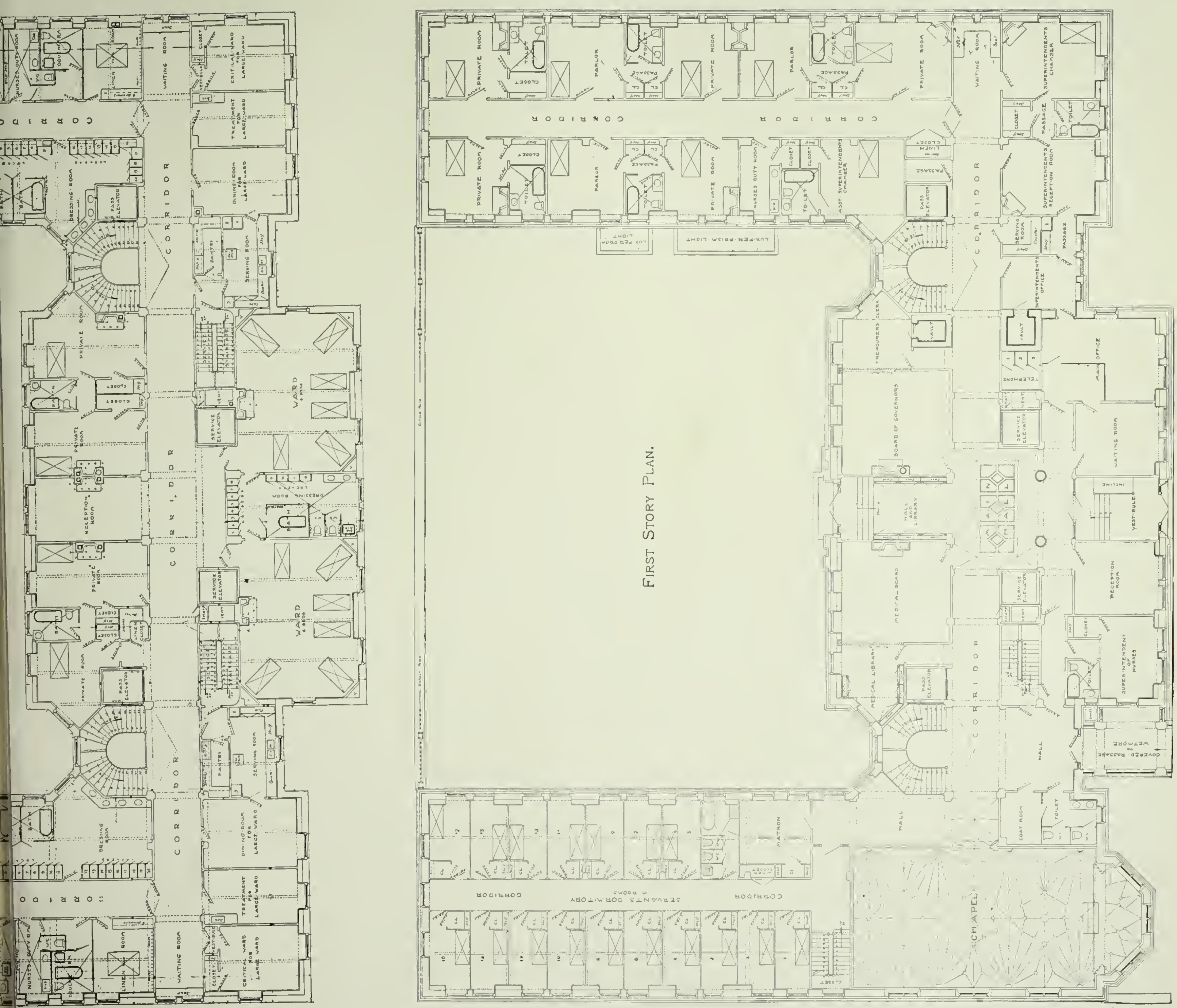
NOTE. Sixth Story Plan has Hospital Staff Dormitory in 50th Street Wing, and upper part of Amphitheater and Solarium in 49th Street Wing. Kitchen and Stores are in Central Pavilion.

PLANS, WOMAN'S HOSPITAL IN THE STATE OF NEW

ALLEN &

PLATES 74 and 79.

REET.



STREET.

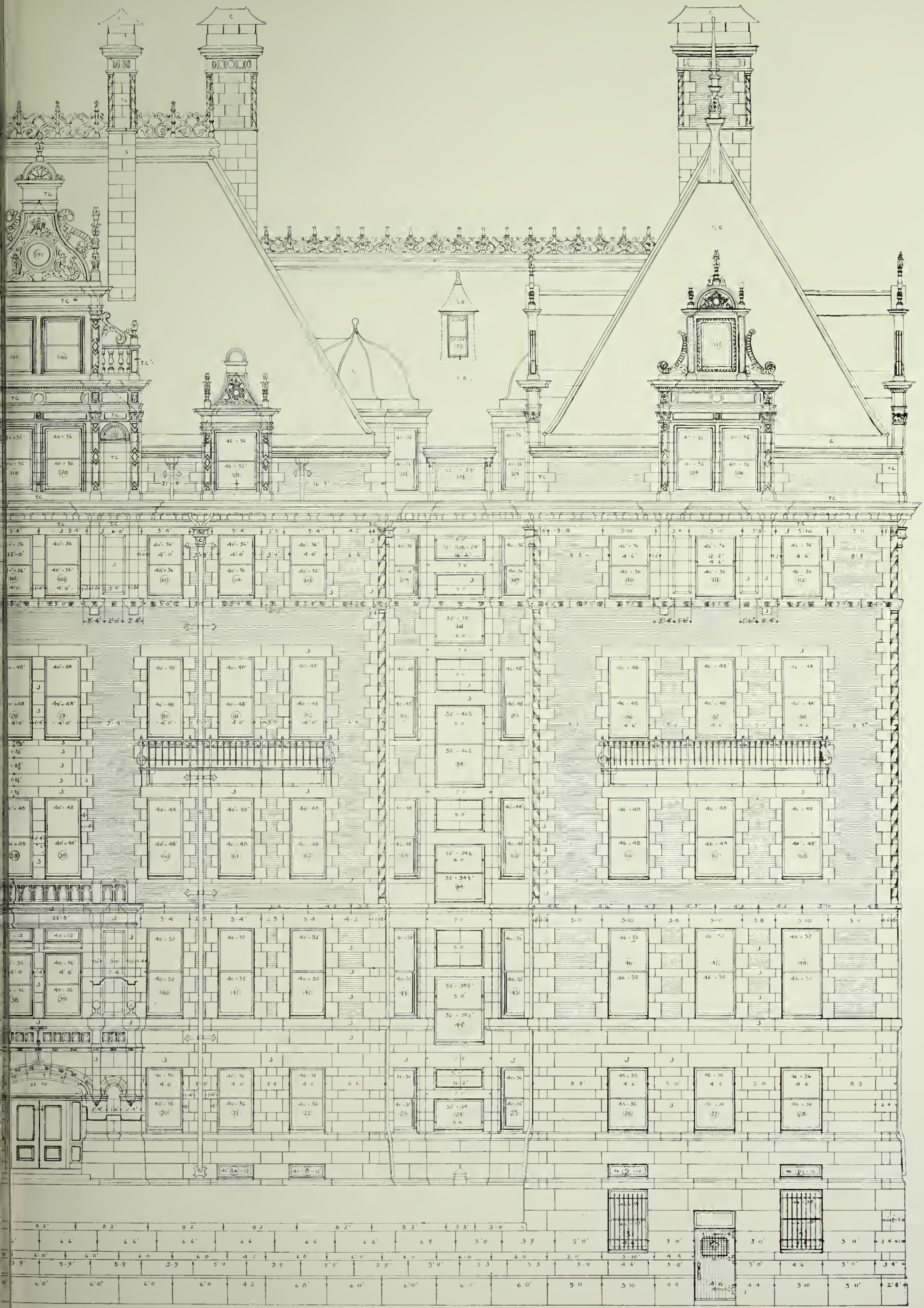
Note. Basement: 49th Street Wing has Clinic, Laboratories, etc.
50th Street Wing, Engineer's and Janitor's Rooms and Work Shop.
Central Pavilion, Elevators, Heating and Ventilating Machinery.

RK LEXINGTON AVE. AND 49TH STREET, NEW YORK CITY.

NC Architects.

LEXINGTON AV
WOMAN'S HOSPITAL IN THE STATE OF NEW YORK
ALLEN &

PLATES 75 and 78.



E FACADE.

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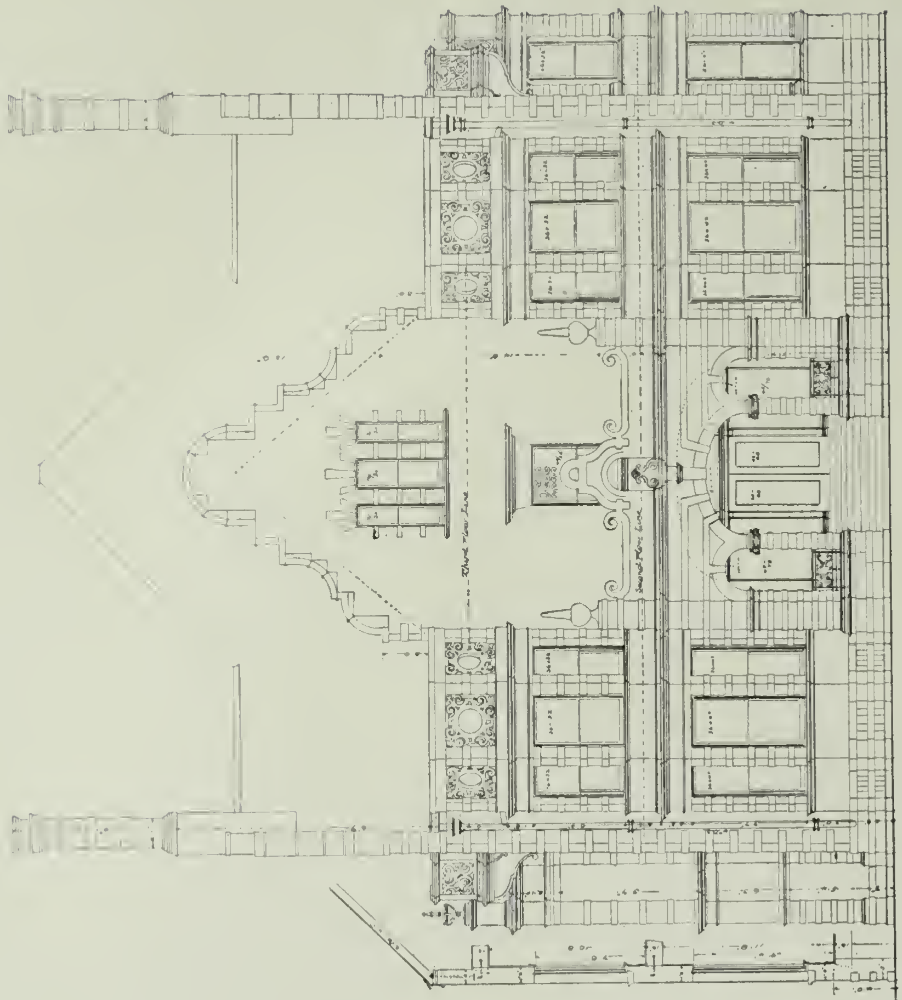
ARCHITECTS.

VOL. 8. NO. 10.



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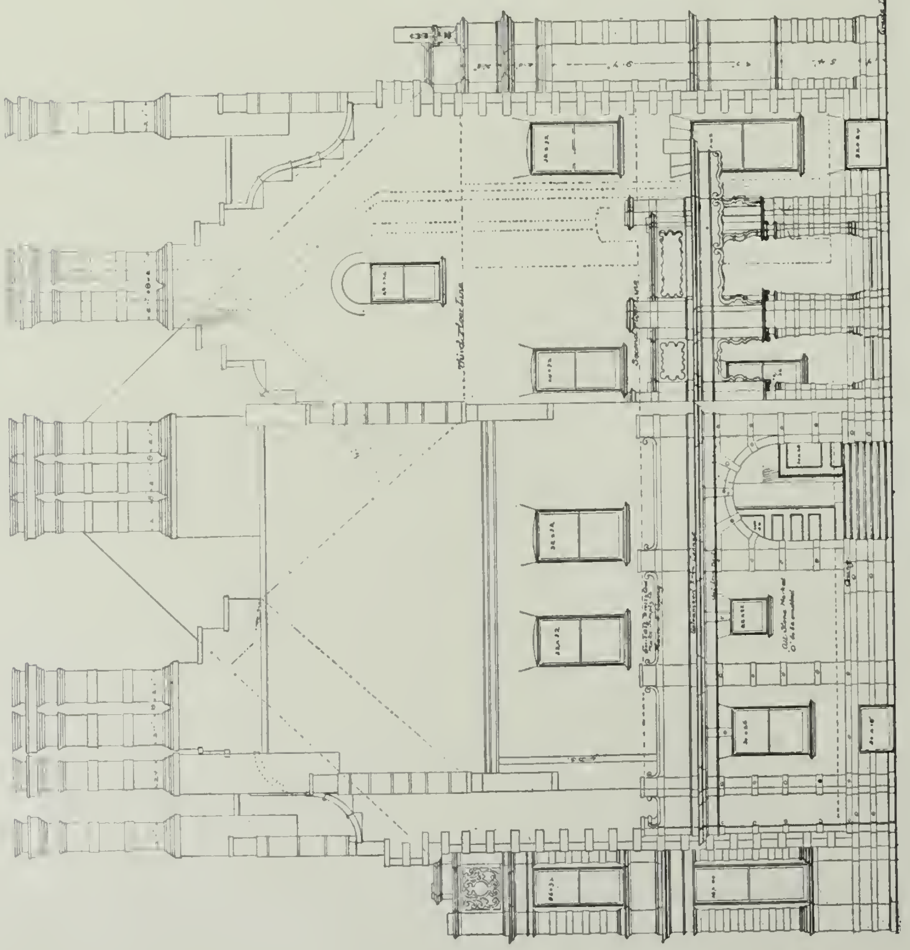

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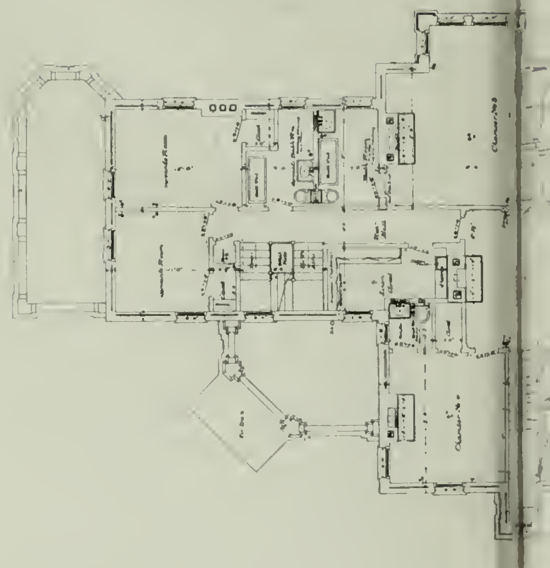

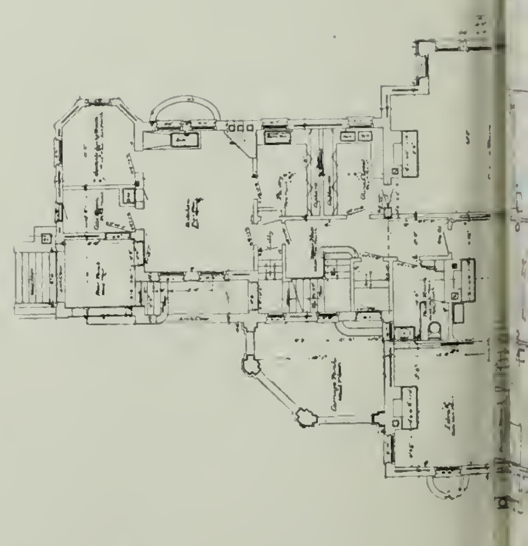

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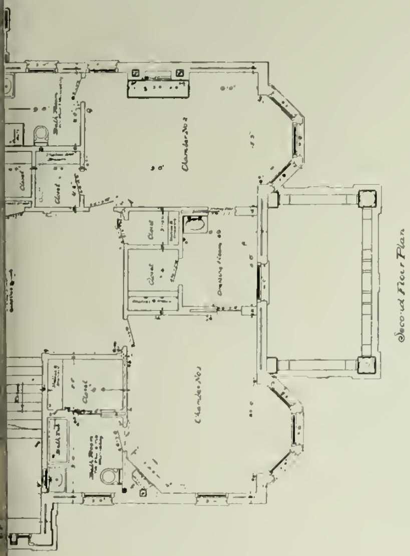

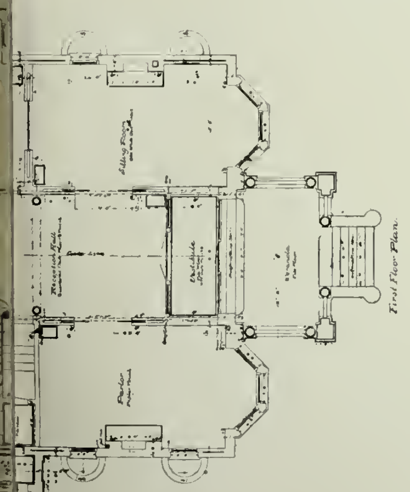

HOUSE AT TOLEDO, OHIO.

E. O. FALLIS, Architect.

Elevation from Park Avenue.

WOMAN'S HOSPITAL IN THE STATE OF NEW YORK, LEXINGTON AVE. AND 49TH STREET, NEW YORK CITY.

ALLEN & VANCE. Architects.

VOL. 8
NO. 10

THE BRICKBVILDER

OCT.
1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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COLONIAL BRICKWORK.

THE whole eastern seaboard of this country is very richly endowed with deposits of clay suitable for the manufacture of brick and terra-cotta, and yet, although the first settlers in New England came directly from Holland, and were accustomed to brick in all its various forms, they were very slow to appreciate the possibilities of nature, and nearly all of the bricks used in the earlier colonial structures were imported from abroad. We had occasion some time since to visit Plymouth, and were much interested in seeing on Burial Hill the remains of the old fort which was built about 1625, and constructed of bricks imported from England. The structure itself has entirely disappeared from above ground, but every little while in disturbing the soil, fragments of old brick are found, evidently in very fair condition, though not of remarkably hard variety. In the Pilgrim Hall at Plymouth there are preserved some old bricks and tiles, which came from Marshfield, which were imported early in the seventeenth century. It was not until some considerable time after the freestone and granite quarries were opened that our early settlers began to appreciate that a more readily obtainable material was close at hand.

If we were called upon to formulate any reason for the undenied excellence of much of the colonial architecture which we find in this country, we should be inclined to ascribe this excellence in very large part to the fact that in those days such things as contracts, contract work, and architects were practically unknown. But this statement must not be understood as implying that a good architect is a detriment to a building, for in only one sense was the absence of the architect an advantage to the old work. All of us who have been through the mill appreciate how, in building almost any structure, we are prone to attempt to carry out a preconceived contract. If we have once laid it out on paper and made up our minds on paper that it ought to be about so and so, we are very apt to build it so, and if it doesn't come out quite as we expect we let it alone and try to do better next time; while on the part of the owner the feeling is so strong that changes involve extra expense that even if a change is really desirable the mere fact that it is presented by an architect or a contractor arouses the suspicion of the sometimes short-sighted owner.

In the colonial days things were done differently. We imagine the plans that existed in those days were few and far between, and the more probable procedure was for the village carpenter to start to work and frame his house without a very definite preconceived plan, except that in a general way he was to follow the lines laid down in some one of the few but generally safe architectural books at his command. After the walls were up the interior was changed about or worked up from time to time so as to give just the effect desired, and probably the exterior was handled in much the same way, so that in these buildings we find details which very generally seem to belong in place on the exterior, and within are found the charming nooks, chimney corners, or picturesque angles which are so distinctive of the best colonial work. It is not humanly possible for any architect to entirely foresee the full effect of his designs, and so long as we are tied to a contract, even though the opposition to changes may be slight, it is apt to be a hindrance to our molding the design so as to fit the necessities in the best manner. We believe that a return to the possibly more primitive manners of our forefathers would result in immeasurable good to our architecture of to-day, not only in its domestic manifestations, but also in its public buildings, where the limitations of preparatory studies as compared with final effects are even more marked. The old work which was done in this haphazard way was by no means always good, but among it there is considerable which our modern designers find very profitable to study. There is a vast deal of excellent old brickwork scattered along the Atlantic coast from Maine to Florida, which we think can be studied to most decided advantage.

ROMAN AND POMPEIAN BRICK.

IN the former days when a brick was nothing but a red parallelopipedon of approximately uniform dimensions, there was no need of names to designate varieties of brick, but with the advent of the light-colored burnt clays several appellations have been evolved, some of them with sufficient pertinence to stick and become a part of our architectural nomenclature. Two of these which are most common are the designations Roman and Pompeian. The origin of these terms is very manifest, and the names themselves appropriate to the shapes they designate. The ordinary common brick is approximately 2 by 4 by 8 ins., and this shape has obtained pretty generally in the past through France, the Netherlands, England, and this country. In Italy and in ancient Rome, however, bricks were very frequently made in different shapes. In much of the work in the Colosseum the bricks were triangular slabs of terra-cotta 1 to 2 ins. thick, and 8 ins. to a foot wide on each face, being laid side by side in courses with the points turned in to the wall, and backed up by and tied into a mass of concrete. Another very common form was 15 or 16 ins. square and not over 1½ or 2 ins. thick. These bricks laid up in the wall with very thick joints are found in much of the old work, and suggested the manufacture of a brick 12 ins. long, 4 ins. wide, and 1½ ins. thick, which form has found a great deal of favor in modern work under the name of Roman brick. As a matter of fact it is Roman only in appearance on the exterior of the wall, as the old bricks were nearly square, but in a decorative sense the term fits very fairly. The term applies wholly to the shape of the brick, being entirely independent of color or material.

Texture, that indefinite quality which is so much sought after by our architects, is a marked feature of much of the old brickwork which has been exposed to stresses of weather. Some of the old brickwork in Pompeii seems to have been made with a mixture of rather coarse volcanic sand or cinders in with the clay, which on burning would show black spots at irregular intervals over the surface. This is the prototype of what we to-day style Pompeian brick, which presents an appearance of having scattered through it a lot of rather fine, thoroughly burned cinders, giving a speckled appearance to the exterior, which for some purposes is very pleasing. These bricks suggest a wall which has passed through a conflagration, the brick having an over-burnt appearance, such as might be expected of brick dug out of a city buried for centuries under the deposits of a volcano. As a matter of fact it would be hard to find many bricks in Pompeii itself which bear any close resemblance to the speckled bricks which now are designated by the name of that city. Still the appellation is a fair one, and one which seems to fit the case, and has found sufficient favor to be considered as a permanence. The term applies wholly to the mottled, cinder-specked appearance being entirely independent of shape or size.

WHILE the science of fire-proofing, as practised and applied to large buildings in this country, leaves a good deal to be desired in some directions, the paper by Mr. Gibson, the publication of which will begin with this issue of THE BRICKBUILDER, is the best of evidence of the extent to which this science has been developed and the certainty with which it can be applied to accomplish desired results. There have been many publications within the past three or four years dealing upon this subject, and such large fires as that in the Horne Buildings, Pittsburgh, or the Home Life Building, New York, have called forth some very excellent symposiums upon the subject: but we cannot recall a single article which, on the whole, is so clearly and fully expressed, and which deals with all sides of the subject so satisfactorily as this paper. It is a thoughtful, well-rounded, and complete study of one of the most vital questions with which architects and constructors to-day have to deal.

NEW BOOKS.

IN a volume of a little over three hundred pages, Mr. Freitag has presented a very complete study of the fire-proofing of steel buildings, including a *résumé* of the development of methods in the history of steel building construction, with reports of tests of various fire-proof floors, and a careful analysis of the various systems at present on the market. The volume is an evidence of the development of this branch of building construction from a crude and little-understood, hand-to-hand system to a scientific, carefully-devised method, by which, on the whole, the results desired are achieved, notwithstanding the repeated fires in so-called fire-proof buildings. Mr. Freitag's book is a valuable addition to the current literature on the subject.

THE FIRE-PROOFING OF STEEL BUILDINGS. By J. K. Freitag, C. E. New York, John Wiley & Sons. London, Chapman & Hall, Limited, 1899.

There is a mass of data referring to the humdrum, every-day details of practise in architecture, which constitutes what might almost be termed the common law of the profession, and which is very seldom formulated in the shape of a book, but which is in some mysterious way handed down from generation to generation of draftsmen, and with slight variations in different offices is essentially the same, debarring local variations. This includes the current practise in regard to such matter-of-fact details as windows, doors, transom lights, cellar windows, and the constructive minutia of wood finish. All of these have been gathered into a very handy form under the title of "Details of Building Construction," by Clarence A. Martin, Assistant Professor of Architecture, Cornell University. It is a work which will fill a want but partially met by office traditions and the rare works of similar description which are now on the market, and it is so eminently in accord with the best practise that there is but little to find fault with.

DETAILS OF BUILDING CONSTRUCTION. By Clarence A. Martin, Assistant Professor of Architecture, Cornell University. Boston, Bates & Guild Company. $2.00.

PERSONAL AND CLUB NEWS.

V. EMILE THÉBAUD, architect, has opened an office in the Dun Building, Buffalo, N. Y.

JOHN W. VICKERY, architect, has opened an office at 905 Chamber of Commerce Building, Rochester, N. Y.

THE supervising architect for the Pan-American Exposition of Buffalo, in 1901, will be H. S. Kissam, of New York City, who for some years past has been an associate and general manager with Ernest Flagg.

PAUL A. DAVIS, 3D, who for some years has been studying abroad, having made a record at the École des Beaux Arts which would have been phenomenal for even a Frenchman, has returned to Philadelphia to practise architecture.

FRANK EATON NEWMAN, Henry Gillette Woodman, and James Russell Harris, Jr., announce that they have formed a copartnership under the firm name of Newman, Woodman & Harris, architects, Real Estate Trust Building, Philadelphia.

WE are in receipt of a circular of information sent out by the T Square Club, which society, as usual, finds itself in the van of architectural progress. Our readers will remember the convention of architectural club delegates which met last year at Cleveland, and which resulted in the organization of the Architectural League of America. If this league accomplishes no further result than to systematize the various architectural exhibitions throughout the country, it will have served a thoroughly good purpose, and apparently this has been brought about very largely, we imagine, through the active agency of the members of the T Square Club, which is to have its exhibition from Dec. 16, 1899, to Jan. 6, 1900. It is the intention that drawings intended for the T Square Club exhibition shall be sent on a circuit among the various clubs, including in rotation the Architectural League of New York, the Chicago Architectural Club, the St. Louis Architectural Club, the Detroit Architectural Club, the Cleveland Architectural Club, and the Pittsburgh Architectural Club. This would imply that drawings sent in now would be absent from their authors until about the first of July. It would also mean that, instead of having to contribute to seven different organizations, our architects can concentrate their energies on a single lot of drawings which will go the rounds of the whole; and while we can hardly hope that the individual lot will be seven times as good as the collective value of the seven separate exhibits might be, it is still quite probable that this scheme of cooperation will result in more serious work on the part of the contributors, and far better results from the standpoint of the clubs. This move is entirely to be commended, and the T Square Club for its share therein is worthy of all praise. For any further information in regard to the exhibition, reference can be made to David Knickerbacker Boyd, Harrison Building, Phildelphia.

A Village Church, Cost Fifty Thousand Dollars.

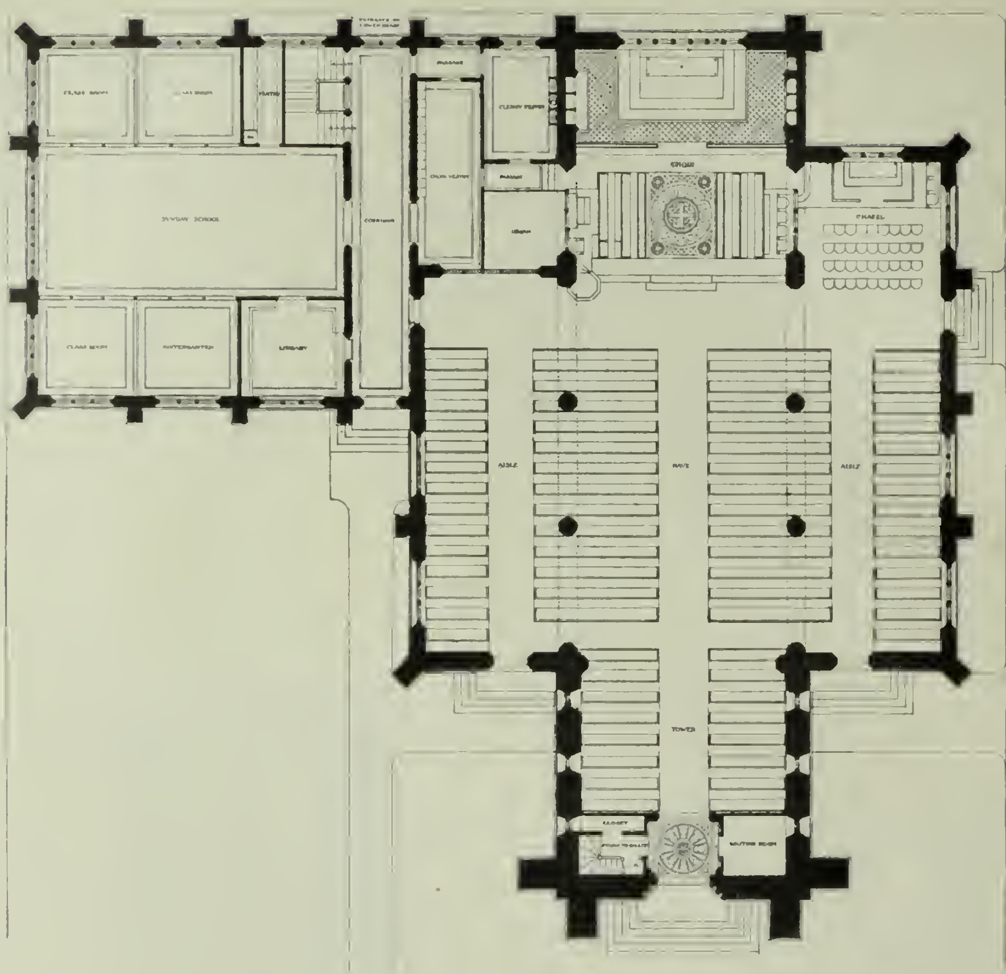
BY T. HENRY RANDALL.

THE problem herein presented is a very common one, though none the less interesting on that account. The only uncommon feature— and a great relief it is, too, to one who has had some experience in such matters — is that there is no building committee to dictate the proper solution of the problem and to demonstrate how the building should be erected when designed. That being the case, I can arrange this church and its parish house as I like, considering nothing but the requirements of the case and the conditions imposed by the program. The obvious pity, at the start, is that there is not more space in this churchyard. The building will occupy about half of the entire space, and not allow as much clear ground about it as I should hope to see. However, that is part of the problem, and as "conditions" are a necessary feature of "problems," I shall proceed to explain my reasons for placing and for planning this building as I have.

The south wall of the church is placed near the lot line to enable me to get in enough space for the parish house on the north; and in the same way the eastern facade of both buildings is placed near that border of the property to give a proper amount of open space in front of the building where it is needed most. This compels us to have a short church; but by building the tower so that it will form part of the nave (and therefore lengthen the effect of the interior), that fault can be very largely concealed. In the same way, by carrying through the lines of the nave into the choir without a break (an arch), the same result is attained. The aisles are made wide to gain the seating capacity required. The south aisle is continued into the chapel. The corresponding space on the north side of the choir is taken up by the organ, with the choir and clergy vestries adjoining. The choir is made sufficiently large to insure ample space for the service as well as to give proper effect to the most important features of the building. The material for the exterior of this building has already been mentioned among the requirements of the program — "brick with terra-cotta trimmings." The brick should be dark red, laid in Flemish or English bond, with black headers and black mortar. The terra-cotta work would be either light or dark, depending on the effect desired. For the interior of the church we would have buff brick and light terra-cotta. The roofs should be dark oak, heavily trussed and open, as seen from below. The outside covering should be copper or lead. The floor of nave and aisles should be large tiles, and mosaic should be used in chapel and choir floors. The rood-wall of stone or terra-cotta, the rail of marble, and the altar, with its steps and platform, of marble.

A second altar would be placed in the chapel, where daily services and early celebrations would be conducted. The congregation would pass out through the chapel from the choir after communing.

It has already been noted that the nave is carried into the tower, with only an arch to separate them. The western half of the tower on the main floor is occupied by the main entrance vestibule and by a waiting room. There is also a staircase here to the gallery above. The great west window above this gallery would be one of the striking features of the church and a most practical advantage at the same time.



A word might be added here about one of the peculiarities of this plan. While everything has been done to make the building appear as long and graceful as possible, it will be seen by examining the plan that all the seats, with a few exceptions, are confined to a perfect square, and that, as a rule, they are within 50 ft. of the pulpit and the lectern. Besides the main entrance by the west door in the tower, there are four smaller entrances to the church. In cold weather three of these would be used as exits only. The door to the parish house is intended to be used by the choir. The foregoing remarks seem to cover the principal features of the church. The parish house is the next factor to be considered. A wide corridor separates its principal rooms from the church. That by the east door is from the lower grade and the stairs to basement.

The central feature of this building is the Sunday-school room. Opening from it are the class rooms and the kindergarten room. These are separated by screens that can be partly removed when necessary. There would be other well lighted rooms on the basement floor besides the kitchen, store rooms, and lavatories that are required by the program, and which could be used as class rooms or for meetings of the committees that always form an important feature in the life of any well organized parish. The ceiling of the Sunday-school room would be as high as that of the aisle. Above the two vestries and connected by the staircase would be a room with opening into the choir, where sick or infirm persons could hear the service. Those in very deep mourning, or who for any other reason desired to see the service privately, could use this room as well. The style of this church and parish house is an adaptation of English Tudor Gothic to our own modern requirements, retaining the essentials of that style in their entirety, but adding certain properly recognized innovations that modern conditions of parish life and work require in the arrangement of the plan generally.

The effect of such a building can be relied upon to be imposing and eminently satisfying from every point of view. Furthermore, it stands as a link between the historical and emotional past and the practical life of the present day. It has none but the strongest reasons, both historical and practical, to recommend it in striking contrast with others, while its being the home of our mother church for so many generations makes it essentially the proper means of expressing our modern religious life and our historical continuity at one and the same time.

FIRST SKELETON CONSTRUCTION BUILDING.

EDITOR OF THE BRICKBUILDER:

Dear Sir: — In your correspondence column of the September number, a New York correspondent calls attention to the placing upon the Tower Building, 50 Broadway, New York, of a tablet to commemorate and establish for future time the record of erection of the first skeleton construction building of the United States. He incidentally remarks that a Chicago architect made a claim of priority, but that the *Record and Guide* gives abundant proof that the Tower Building, designed by Bradford L. Gilbert, is entitled to the honor. This is a question which has been raked over so often that it is a little strange to see in your columns a disregard of recorded structural achievements. The era of high buildings did not begin in 1870, as your correspondent states, but nearer 1884 or 1885, and Mr. W. L. B. Jenny has been so often acknowledged as the man who built the first complete skeleton construction in this country, the Home Life Building, Chicago, corner of Adams and La Salle Streets, that it certainly is not fair to neglect him in favor of the architect of the Tower Building. For that matter, it is a fact of record that the general scheme of skeleton construction was used by Mr. Post even earlier than this in the Produce Exchange in New York, and if we are going to ascribe to any one man an exclusive right of priority in an invention of this kind, which, after all, is a development rather than a spontaneous growth, it surely can hardly be given to Mr. Gilbert, excellent constructor as he is. It seems, on the whole, fairer to say that skeleton construction was a development of necessity, and that at about the same time several architects in New York, Chicago, and Minneapolis conceived and put into practical execution the idea of substituting steel columns for a brick wall, and that no one is entitled to all of the claim for this application.

Yours truly,

VERITAS.

The Artistic Possibilities in the Use of Roofing Tile. I.

BY W. A. OTIS.

THE constantly increasing use in this country during the past few years of tile as a roofing material has frequently been noted by casual writers with apparent surprise. To architects, however, its steady advance in favor is no wildly exciting piece of news, requiring broad or loud heralding.

This favor, with which it is now being received, is undoubtedly largely due to the very greatly improved material — as regards clay, workmanship, and fine mechanical construction — that has within recent years been generally put upon the market. It has also become a thoroughly accepted fact to the profession that satisfactory tile, while extremely economical in the long run, are not cheap as to first cost. As a result of such expense inferior materials have very naturally also been offered the public, and their use (ofttimes forced), with the inevitable disappointing results, have tended to hinder more or less the great and general appreciation of what in its best estate is really a decided boon to the building public. But notwithstanding such occasional and deserved setbacks at points here and there, there has been, upon the whole, the very general and well-known advance of this material in popular favor.

FIG. 1. TYPICAL FLAT SHINGLE TILE.

What was at first considered as a luxury has finally become a necessity, and now that it is no longer a novelty, but a well-established material, there is happily search and study going on here and there to seek out, if possible, more artistic methods of use.

Our earliest pioneers, so to speak, in the use of this material perforce contented themselves with the most simple of the tile,

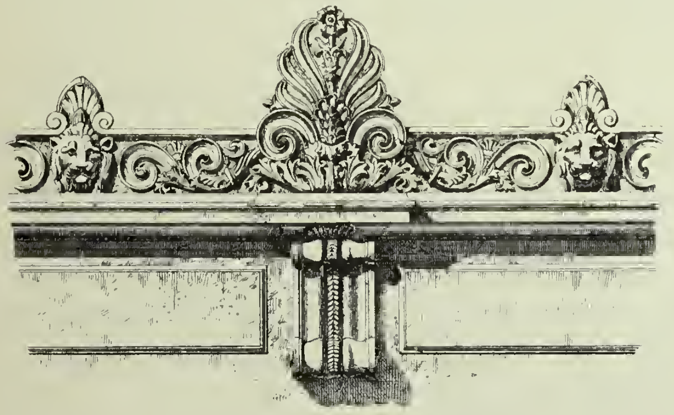


FIG. 2. ELABORATE GUTTER MOLD.

known as the flat shingle tile, from the fact that its shape, form, and method of laying are supposedly patterned in a general way after the wood shingle. The simplest expression of this tile usually takes some of the forms shown in Fig. 1. With these simple shapes, moreover, the earlier architects had little or no choice as to color. Now, however, the possibilities are very widely extended. In fact, one is sometimes tempted to think almost too much so, but the possibilities are at hand; and one can only trust that the really strong inherent though frequently untrained artistic spirit of the American designer will not permit us to be led far astray.

A study of the continuous history of roofing tile, with all its ramifications, modifications, and variations in different countries and climates, under the influence of widely diversified kinds of clay, methods of fabrication, and national taste, is interesting and curious. It may also be of considerable practical utility to one who seeks models for new or unusual shapes and combinations of material; but a knowledge and consideration of the historical side does not necessarily have much to do with the tile offered us for sale to-day. What most architects and designers are interested in is the artistic possibility of the roofing tiles now in our own markets.

The primary and essential requisite of a roofing tile, it goes without saying, is, that it should effectually keep out wind and weather. No matter how striking and even beautiful it may be, if it does not do this, it is rightly a failure, both artistically and practically in American eyes, and no amount of mere good looks will gain it any lasting favor.

Again, it needs be remembered and especially impressed upon the mind — with about 40,000 or more horse power pressure — that what is entirely satisfactory, mechanically perfect, and adaptable to one kind of a roof (for instance, of very low pitch) is often not at all desirable or practicable for another kind (say a very high pitch roof). This point, the rational use of tile, is one that cannot be too strongly insisted upon. For architecture to be really and truly artistic, it absolutely must at the same time be rational also. Yet this often seems to be entirely overlooked and ignored: for instance, a real Southern, Spanish, or Italian tile is possibly well adapted to a low, almost flat roof in Florida or New Mexico, where there is no ice or driving snow; but to insist upon using this same tile at Montreal or Duluth, upon a roof which for all practical reasons ought to be steep, becomes worse than an absurdity.

Few of us fully realize the geographical magnitude of America, and while Europe with less variations of climate is divided into a number of nationalities, each conforming more or less in their architecture to climatic conditions, we, as yet, refuse almost absolutely to recognize this factor.

A wave of fashion, so called in architecture, sweeps over the land, and Romanesque or Italian Renaissance constructions, as the case may be, are frequently designed far from the site of the building erected, entirely regardless of the real exigencies of the case, — quite indiscriminately in New York and Las Vegas, in Winnipeg and Corpus Christi, — all the time the designers entirely ignoring the slight matter of climate, and the fact that, between the extremes of temperature at such different points, there may be over 150 degs. variations inside of twelve months.

This, to use a mild expression, is unfortunate when applied to buildings as a whole; but it is absolutely bad when applied to roofing tile. Consider again a little farther: the tile mentioned above, which in its native habitat, so to speak, is laid upon a very low pitched roof, upon slats, and held in place almost entirely by its own weight, when laid upon a roof of 60 degs. slope, and in an extremely cold climate, has to be placed unnaturally upon a solid roof board covering, then nailed and cemented, and finally pointed up, — all to get simply an effect that can no longer be really satisfactorily artistic since it is no longer practical, too.

Occasionally it is desirable for good and weighty reasons to follow with extraordinary accuracy, defects and all, some one of the historical styles, but this occurs extremely rarely, and should be very sharply distinguished from the logical following of style. It is in this latter method of treatment that the best known names in American architecture have become famous, and where may be distinguished their success

FIG. 3. SIMPLE GUTTER TERMINAL FOR TILE ROOFING.

FIG. 4. ORDINARY FLAT ROOF AT PISA, ITALY.

and others' failure. These brilliant lights of the profession have used these styles, — not defects and all; but with consummate judgment, retaining especially the general outline and also the ornamental detail with extraordinary fidelity, but modifying other features, and often essential elements: so that, while following the full spirit of the old work, they yet so modified it as to fulfil modern requirements and conditions, thereby accepting the best modern applications of science and progress.

In most of the architectural styles that originated in Southern and hot countries, the roof lines are generally of very minor importance: often practically flat and concealed behind some kind of a balustrade. They have absolutely no effect upon architectural design, or else, with a very low pitch, they are of minor importance in the scheme. Beyond the mere line of color and the ornamental treatment (as in the old Greek and Roman work) of the tile, or more properly the upper member of the cornice itself, where anthemion forms accentuated the lines of the tile, everything else is extremely simple; such gutter treatment may be and occasionally is quite elaborate, as indicated in Fig. 2, while Fig. 3 is very simple. But the far greater simplicity is in reality the type of the great majority of existing buildings of Italy, Spain, and southern France, as shown in Fig. 4.

FIG. 5. STEEP ROOF WITH TILE, NUREMBERG.

On the contrary, in those styles that were perfected in the more northern countries, there was always a tendency, arising from the desire and necessity of letting snow and ice slide off as soon as possible, to make the roof high and steep. As a result, these portions became of prime importance in the design, and their study and ornamentation to make a picturesque effect was always most evident. These high roofs one finds not merely in northern France, Germany, England, and Holland (Fig. 5), but likewise in a modified degree in Japan, northern China, etc. (Fig. 6).

Naturally these high, picturesque roofs offer the best field for the display of the roof covering, and here one finds some of the most interesting historical solutions of the artistic use of tile. As the greater portion of the United States follows northern European styles, these solutions may be of especial interest in pointing out paths yet capable of fuller development by our designers.

Historical study shows that there were in reality but about three main types of tile in use from the Greek down to the Gothic period, the balance being mere variations and modifications, and they often due to inferior workmanship and machinery, or lack of machinery.

These types have become classic, so to speak, in the history of tiles, and their modern reproduction has been demanded and required almost solely from a supposedly artistic reason, but, in reality, a largely sentimental one.

On the other hand, accurate modern scientific knowledge and improvements in machinery for manufacturing have especially here in America resulted in numerous modern forms, which seem to have in themselves great artistic possibilities, and are much more satisfactory for the climate and conditions of our Northern States at least than the so-called classic shapes.

And yet with all these and other aids (to be mentioned hereafter) in the hands of the architect, the great and varied possibilities in the artistic use of roofing tile are scarcely appreciated by the average practitioner. Moreover, he is often restrained from doing what he has an inclination to do by the fear that the result will be so unusual and striking as to cause marked comment, and probably uncomplimentary or sarcastic remarks, from the self-constituted critics, since the great superiority of any critic is always shown by his adverse opinion.

This is much to be regretted, since tiles and their treatment, whether upon the roof proper or upon the sides of the building, offer very many rational, natural, and desirable aids toward the artistic effect of a completed structure: but, as this is a move in an almost unknown field to the American public, the innovators must expect to have their work very severely and seriously handled. Consequently it is essential that any steps in this direction be taken only after very careful study, so that the designer may be absolutely sure the result is really thoroughly artistic, and that in the end it will surely come out victorious from the critic's attack.

To accomplish this, perhaps unusual study is required on the roof, since curiously enough contractors complain that if there is anything of the unstudied, the inaccurate, or the impractical in a whole set of plans, it is sure to be here; and the roof, according to them, rarely, if ever, receives its full quota of study. And yet this part is in the majority of buildings confessedly one of the most important features, and the one most latent with possibilities of success or failure to the whole scheme.

If these designers are to still further accentuate this feature, it should only be after most consummate study, and that this unfortunately is often lacking in attempts at the higher flights of tile usage is sadly apparent, when one looks over photographs of such work. These are often either frightfully commonplace and evidently about half studied or else preeminently vulgar.

Bearing in mind the points and generalizations enumerated, we may now consider the actual practical surroundings or limitations of

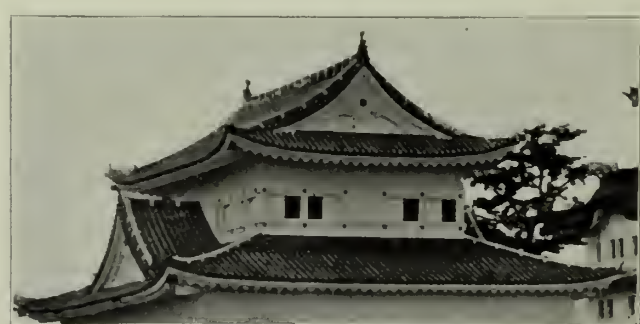


FIG. 6. PICTURESQUE HIGH ROOF, JAPAN.

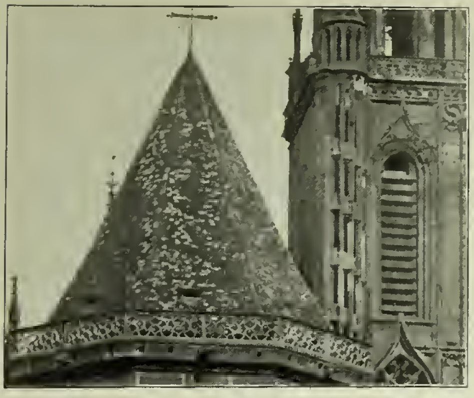


FIG. 7. APSE, ROOF OF CATHEDRAL, STRASBURG, WITH TILE OF UNEVEN COLOR.

the artistic uses of roofing tile.

In such consideration two points need be clearly borne in mind. First, that what applies to the roofs themselves applies also (although usually in a somewhat less pronounced degree) to this tile when occasionally used as covering of the sides or gables of buildings, and that the term "roofing" is here general in the broadest sense. Second, that in considering the tile, only a limited number of those upon our market are here illustrated, and that such illustrations (many from photographs furnished by the kindness of the representatives of various companies) are in no wise to be construed as anything but general or typical representations of certain types or features.

The artistic employment of tile, it appears, may very satisfactorily be grouped under three heads, as indicating in a general way the methods by which such artistic results may be obtained, viz.: First, by the color or combination of colors; second, by the shape of the tile themselves; and third, by the combination of tiles, either of same or different shapes, into groups or patterns. Examination shows that, as a matter of fact, none of these three methods are in any ways new, but have been more or less utilized by architects of all countries for many centuries, and are still full of possibilities for us.

The first one of these artistic forces put into the hands of the designer of the tile roof is then that of

COLOR.

For artistic results (especially with comparatively cheap material) every one recognizes that there is no such effective aid to the designer as color, and especially combinations of color. Its importance then with the great plain masses that go to form the covering of a building is almost self-evident.

Where tile roof is used, its size and usually brilliant effect, to a large extent, are apt to overpower every other portion of the design. Hence there is need of special care in the selection of that color itself, or, what amounts to almost the same thing, in the choice of that for remainder of building.

One cannot emphasize too strongly this matter of tint, for often upon it very largely depends the success of a design, without people being aware that such is the case.

To many persons, the name "tile roof" means nothing as far as color is concerned but a red. In fact, such is, and in a broad way always will be, the general and universal tint. As it is the natural color, so it will always be the stock color, but even this so-called natural shade is not by any means always the same, but varies considerably according to locality and material. The tile being manufactured in comparatively few places (at least up to the present time), the ones to be employed in ordinary work must be accepted in their natural color. This roof color, practically forced upon one, must then form the key note of the color scheme, and the brick may now be selected. One can here usually have several options as to shades, so that the result of roof and body of building shall form satisfactory harmony (or contrast).

FIG. 9. STRONGLY MARKED HORIZONTAL LINE IN TILE ON ROOF.

As regards color schemes with tile, there are a few general considerations that it is well to keep in mind. Except in very rare cases it is unwise to try and make the tile and the brick of a building exactly the same color. In fact, for the most artistic results it is of almost vital importance that they should not be: the difference need not be great, but some difference is very essential. Again, it is a grave mistake from an artistic standpoint to require an absolutely even shade for the tile. From an economical standpoint it is also important, since the handling over and "selecting to color" means

FIG. 8. MIXED COLORS, PARK STABLE ROOF.

a considerable increase in the expense over an equally good grade of material that is simply "kiln run."

By the slight gradations of color as they occur in the manufacture, one naturally and inexpensively obtains that variation of light and shade which adds so very materially to the essentially artistic value of a building.

The flat, dead, absolutely even tone that one frequently sees throughout an entire building, indicating that with great care and expense the brick, terra-cotta trimmings, and the roof tile have all been specially selected as to the same identical color, is a lasting monument to a lost opportunity: a building that if worked out naturally might at least have had an artistic coloring now has about as much character as a piece of raw red liver.

Fortunately, this artistic principle is again asserting itself and becoming better appreciated as well by the general public as the architects themselves: the false standard, which at one time had almost been forced upon the community by the curious idea that all fine brick (and consequently all clay work) should be of identical size and color, is being relegated to its proper position.

The old tile roofs of Europe, generally so beautiful and harmonious in color as to have often called forth praise from artists, both of word and of color painting, are types to be well considered. It is practically impossible to find one of them of even shade

FIG. 10. TILE WITH STRONG VERTICAL LINE.

throughout, and the variations add to the charming effect. Often these variations upon the same roof are extreme, and yet the result is invariably artistic. The apse roof of the cathedral of Strasburg is an example in point (Fig. 7).

In this usage, however, it is very essential that the tile should be laid with studied irregularity as to color, so that there may be no great blotches. A most effective example of this character is a roof on the Belle Isle Park stables (Fig. 8) near Detroit, where every shade manufactured by the tile company was said to have been used. Especially for picturesque work this method of treatment gives inexpensively most desirable results.

Thus far only the common red tile have been considered, but as a matter of fact the possibilities in other directions are almost without limit, and therein lie the great and perhaps the greatest possibilities of this material for the most artistic roofing.

In expensive or monumental buildings the economical argument as to standard colors becomes invalid, and there is no reason why special shades should not be manufactured, that will with especially good effect, and in the most satisfactory manner possible, prove both literally and figuratively the crowning glory of the composition. All the shades in which it is feasible to make brick and terra-cotta can naturally be duplicated when the necessary additional expense is not a serious consideration. Then the whole scale of tints becomes at once not only possible but wholly feasible, so that whether buildings be of brick or of stone there need be no difficulty whatever as to general and absolute harmony of effect.

FIG. 11. SHOWING VERTICAL, HORIZONTAL, AND DIAGONAL LINES OF TILES, DEPENDING UPON ANGLE OF VISION.

So important is this matter of color that all other artistic possibilities in relation to the use of roofing tile become very minor affairs when compared with it.

Not merely are shades feasible in the ordinary brick tints mentioned and usually considered, but when the results of glazing and all its attendant hues and special effects are added the combinations simply become innumerable. Blue, green, yellow, black, white, and other equally surprising colors are perfectly within range. These violent colorings of roof with us have as yet been so little employed that both architects and clients seem to be almost entirely deterred from such uses by fear of public criticism, and yet in China, Japan, Siam, and other countries, specially of the Orient, these combinations are frequent and much admired.

In Europe also their use (but there generally in combination with other colors) is frequent and extremely effective. Not merely is this seen in such important buildings as the cathedral at Vienna, but even in smaller constructions it is not unknown. However, it is rarely indeed entirely desirable to use such strong and exceptional colors in the solid mass, but rather as intimated, in patterns and designs upon a background of the more common red. They are thus extraordinarily effective, and deserve a much wider use than is now given them with us. Greens and yellows are the favorite colors used in combinations with reds and browns, and their beauties grow upon one the more familiar they become.

A moderate use of such combinations is especially to be desired, and the field open for a careful and conservative use of them is most attractive. At first the effect will quite probably be stigmatized by the great body of the people as "Dutchy," but the artistic qualities are so evident and self-apparent that it is a pity that courageous artists cannot more frequently be found to add to the effectiveness of their buildings these simple means so readily at hand.

With reasonable conservatism and a trained eye as to color the results cannot be doubtful. It is only an over-exuberance and a lack of color training that will lead to really serious and damaging criticism, or in any way impede the onward progress of the use of tile of this character.

But this is really not nearly so much to be feared as the ultra-conservatism which enforces the old and the commonplace. For instance, the very dark glazed so-called Spanish tile are, as a matter of fact, very difficult to form into a real harmony with many building materials, yet from the fact that the color itself is apparently so non-committal it happens that many dare to use it, but not by any means with results that with a wider range of color could not be very greatly bettered.

Thus in the matter of the color to be given the roof the opportunities with tile are almost limitless, and the finest artistic instinct can find a field for study, while with such vast facilities nothing need be crude or harsh.

Having once determined the scheme of color, the other expedients to aid in artistic results may be most naturally considered, and first would be that of the

FIG. 12. SHOWING SMOOTH EFFECT OF FLAT SHINGLE TILE WITH ENTIRELY HORIZONTAL LINES.

SHAPE OF TILE.

While the general and broad effect of color of a roof will, of course, be obtained from the tint of the tiles themselves, yet the minor and finer delicacies of shades and high light, which really add so very much to the artistic result, must be gained almost entirely by the shape of each individual tile going to form the great mass.

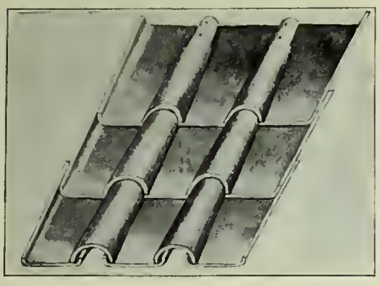


FIG. 13. ROMAN TYPE OF ROOF TILE.

From the pattern selected will result, as a matter of course, the prominence (or the total absence) of strong lines in this roof covering. As all observers are aware, these are, after the color itself, one of the great beauties of tile roofing, and it is their presence which gives so much character to many of the historical patterns. Also, it is to this possibility of strong lines that the most artistic work must eventually give prestige and preference, when the roof covering is selected.

In this connection it goes without saying that the mechanical perfection of laying is of vital importance. To have crooked or broken lines will always be a blemish. From whatever direction one looks at them they should be sharp, clear, and straight. Figs. 9, 10, 11, 12 show the beauties of different kinds of lines. In No. 12 there is the very smooth effect with scarcely appreciable horizontal lines, as produced with old-fashioned flat shingle tile.

In Fig. No. 9 there is a strongly marked horizontal line with secondary broken vertical lines; in Fig. 10 the strong vertical line; and in Fig. 11 a tile where the vertical, horizontal, and diagonal line becomes pronounced, depending upon the direction from which it is seen and the angle of the roof.

This possibility of variety dependent upon position, etc., is especially strongly marked in some of the modern forms of tile, and is a strong artistic argument in their favor.

The shapes of roofing tile are (or can be) extremely numerous. There are first what may be called the historical shapes — forms of tile that have been used in different countries and in different periods. They would include examples from not only Assyria, Greece, Rome, and all modern countries, but also from Persia and the Orient.

Then there are the more modern types of tile, capable of being molded by machinery, and which have been largely developed within comparatively recent times, mainly in Germany and France, and latterly in this country itself.

The sum total of all these is extremely large, but quite outside the present question under consideration.

Of the numerous varieties and kinds of tile in our markets, each must have at least *some* good points, but this is not the time to consider the advantages or disadvantages of glazed or non-glazed tile, or the superiority of one style of patent interlocking joint over that of some competitor, or whether all interlocking joints are a snare and delusion. Suffice it then to consider them almost exclusively from the side of the artistic possibilities, although most practitioners have ideas of their own upon the merits and demerits of different makes.

A few of the "classic" shapes, like Fig. 13, hallowed by age, are now upon the market. But the mass of material offered for sale is of the more modern type.

The practical difficulties from the maker's standpoint in many of the historical shapes are apparently twofold: First, they are essentially hand-made shapes, and as yet but little machinery has been invented that can *advantageously* reproduce these. Second, as a matter of fact, like many ancient and medieval products, the conditions to be fulfilled were by no means as severe as present requirements. Thus a small leak here and there was in reality rarely a matter of great importance.

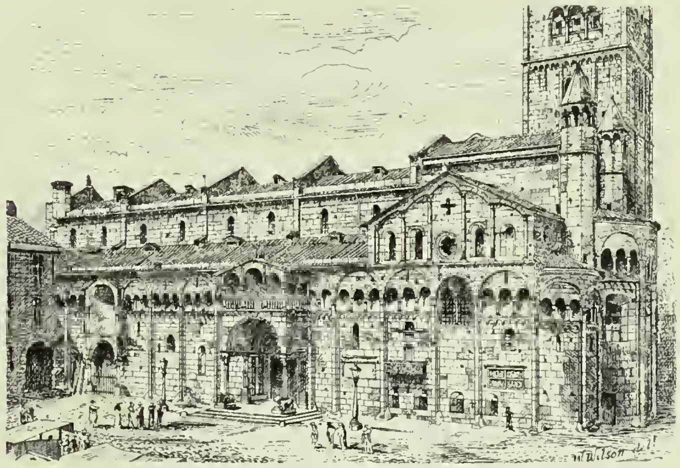
Brick and Marble in the Middle Ages.

BY G. EDMUND STREET.

CHAPTER XI. — *Concluded.*

[The illustrations A, B, C, and D are not taken from Mr. Street's work, but are added as additional illustrations of the Italian brickwork.— EDS.]

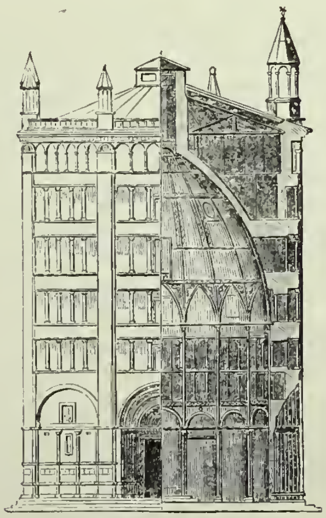
THE Academy of the Fine Arts will be visited by every one who cares for Francia, and by many who fancy they care for the Caracci. As one of the former class, I recommend it very heartily. It contains a large collection, gathered in papal times from



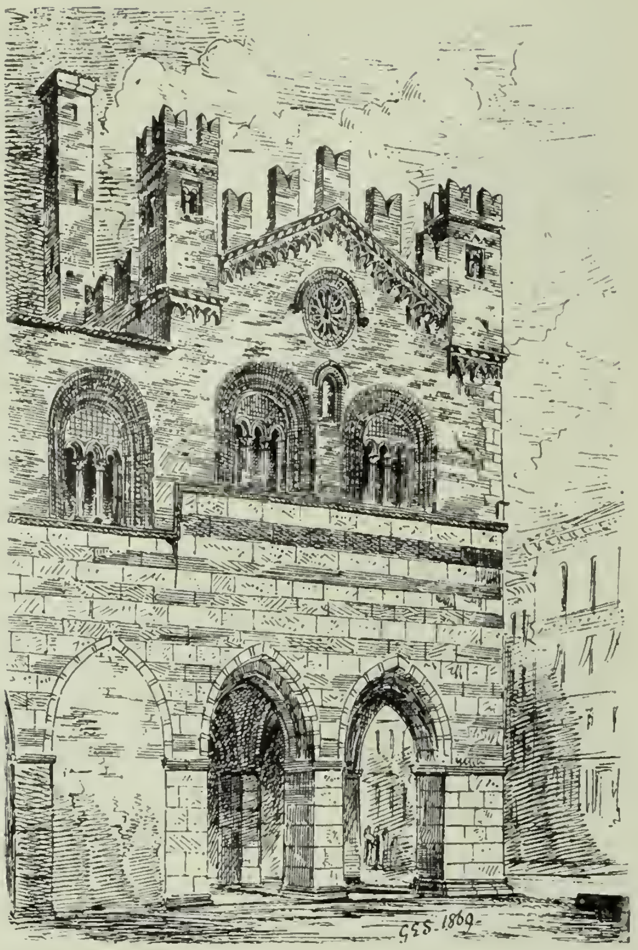
DUOMO, MODENA.

convents and churches, and mainly by painters of the Bolognese school. This school has the redeeming virtue of counting Francia on its list of painters, which may atone for much. He is seen here to advantage; and one trio, consisting of two of his pictures on either side of one of Perugino's, forms the noblest group in the gallery. Here one sees how much in common the two men had in spite of Francia's more forcible character. The same love of pure and rich colour, the same well-defined grouping, the same religious feeling mark them both. And never, I think, has the Madonna — pensive, lowly, and simple — been more beautifully represented than here by Francia. It is a face that one hopes to remember. Here, too, is Raffaelle's S. Cecilia, no doubt a very great work, but not great quite in the sense one wishes to understand the word at his hand. S. Cecilia and S. John are very fine, but S. Paul is a sort of burly ruffian. The heavenly choir is very mundane, and the whole work somewhat academical in its design and treatment. The earlier pictures here are very disappointing. The early Bolognese painters seem to have painted coarsely and heavily, and to have drawn badly, and there is no comparison for a moment between their work and that of the early Sienese and Florentine painters on the one hand, and those of Padua and Verona on the other. One has indeed in their works a sort of foretaste of what one has from their followers — the Caracci,

PLAN OF BAPTISTERY.



SECTION OF BAPTISTERY.



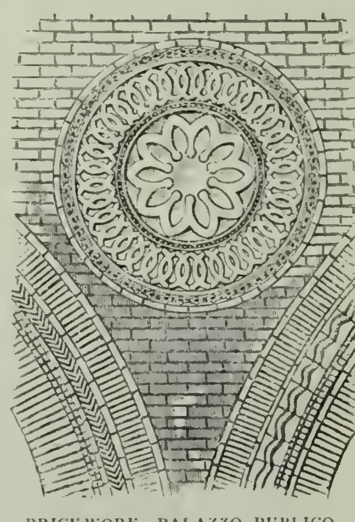
PALAZZO PUBLICO, PIACENZA.

Domenichino, Bagna-Cavallo, and to some extent Guido. Dismal colour, great striving after chiaroscuro, violent and distorted attitudes, and a purely conventional and academical style, are not great recommendations of any school, but they are things which must be accepted if one is to enjoy these works at all heartily.

A very short railway journey takes one from Bologna to Modena. The one object of interest here is the cathedral, but this is a building of extreme historical and architectural value, and has fortunately been left with so few alterations that we can make out its history with fair certainty. At Bologna everything was built of brick — here at a short distance we find our eyes rejoicing again in the sight of stone and marble.

The ground-plan of the cathedral consists of a nave with aisles terminated at the east end by three semicircular apses. There are a sacristy on the north of the choir-aisle, and a tower to the north of this. There are two doorways on the south side, three at the west end, and one on the north side. A grand crypt with arches on slender shafts occupies the whole space under the eastern part of the church. The access to the choir from the nave is by stairs against the aisle walls in the same position as at San Zenone, Verona. Here the stairs and their handrails are not later than the thirteenth century, and the choir is divided from the aisles by screens of the same age; solid below, and with a continuous cornice carried on coupled shafts above. The cathedral is said to have been founded in 1099, but an inscription on the south wall gives the date of the consecration of the building by Pope Lucius III. in July, 1184. I believe that the former date represents the age of the plan, and of most of the interior columns and arches still remaining, but that before the later date the whole exterior of the cathedral had been modified, and the groining added inside. The work of both periods is extremely good and characteristic. The columns of the nave are alternately great piers and smaller circular columns of red marble. The great piers carry cross arches between the groining bays, and each of these in the nave is equal to two of those in the aisles. The capitals here are very close imitations of Classical work, with the abaci frequently concave on plan. The main arches and the triforium openings of three lights above them are seen both in the nave and aisle, the vaulting of the latter being unusually raised. There is also a plain clerestory, and the vaults are now everywhere quadripartite. The outside elevation of the side walls is very interesting. Here we seem to have the old aisle wall with its eaves-arcade added to and raised in the twelfth century, and adorned with a fine deep arcade in each bay, inclosed under round arches, which are carried on half columns in front of the buttresses or pilasters. These arches show exactly what the original intention was at Ferrara, where it will be recollected they still in part remain. Certainly they would have made the side walls very rich in their effect, even if there had not also been two porches, a projecting pulpit, and various bas-reliefs inserted in them.

All the doorways deserve special mention. The eastern of the two on the south side, with the porch of two stages in front of it, is remarkable for the extreme skill and delicacy of its enrichment. The shafts are of white marble, and the mouldings which separate them of red, while the former are all carved in the most delicate manner. The porch is mainly built of red marble, and is carried on detached shafts, cut out of one block knotted together and resting on lions. The whole of this work is evidently an addition to the aisle, and dates from about A. D. 1180. The other doorway on the same side may probably be a work of the original foundation in 1099. It has the twelve Apostles on the jambs, and rude shafts carrying a canopy in front of it. The west doorway has also a porch, and sculptures of the twelve months on its jambs. It is covered with carving of foliage and figures executed by the same Wiligelmus who was employed on the western doorway of San Zenone, Verona. Among other figures are those of King Arthur and his knights, inscribed with his name,[1] "Artus de Bretania," above his head. The west front is very remarkable. The ends of the aisles have two arches inclosing small arcades similar to those in the bays of the side walls, and the end of the nave has the same arcade on each side of a porch of two stages in height, the lower of which is carried on detached shafts resting on lions' backs. The upper part of the porch was altered in order that a great wheel window might be inserted, sometime in the fourteenth century.



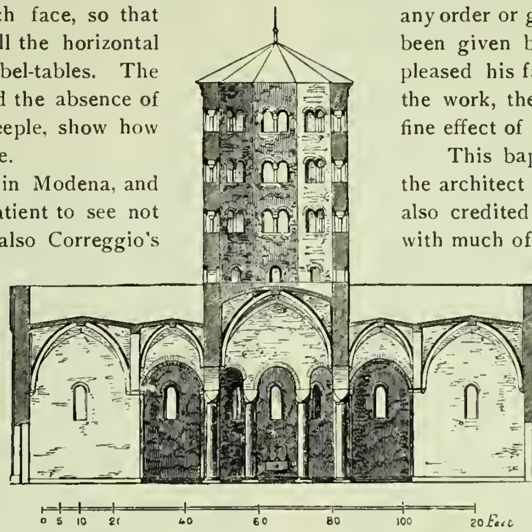
BRICKWORK, PALAZZO PUBLICO, PIACENZA.

This rose window fills the whole upper part of the western gable, and is, like many Italian examples, very unskilful in its design. The vast number of divisions or spokes, and the very slight prominence of the arcuated part of the filling-in, make it look in very truth a wheel window and nothing better. Above it are an insignificant figure of Our Lord and the Emblems of the four Evangelists sculptured in low relief. The lower portion of the walls is covered in the most promiscuous manner with bas-reliefs, and a medley of mural tablets, the number of which would delight the eyes of an English parish clerk; but nevertheless the rich character given to the work by the fine

[1] Mr. Perkins, 'Italian Sculptors,' p. 251, says that the nationality of Wiligelmus has been much disputed. Kreuser says that he came from Nürnberg; and the representation of King Arthur's victories over the Visigoths is adduced as a proof that he was not an Italian.

shadows of the arcades in the lower half of the front, is worthy of special notice and recollection. The tower and spire are very lofty. The former has six stages of nearly equal height, all round-arched, and on the top of this two octagonal stages crowned with a modern spire. The lower stage of the octagon is old, and was finished in 1317 by Enrico da Campione, one of the family of architects of whom I have before spoken. The tower has pilasters at the angles, and two intermediate on each face, so that there is a triple division in elevation, and all the horizontal string-courses are marked by arched corbel-tables. The repetition of these very simple features, and the absence of all openings in the lower part of the steeple, show how simple the elements of a good work may be.

I found nothing else of any interest in Modena, and made my way from thence to Parma, impatient to see not only the cathedral and the baptistery, but also Correggio's treatment of the decoration of the former. In spite of the great fame of these works, I fear I must at once confess that they took away most of the pleasure which I had anticipated from my visit to the cathedral at Parma. This is a grand Lombard church, fairly perfect in its architectural details and arrangements, but entirely ruined in its architectural effect by the frescoes with which most of its walls and roof have been covered. These have been painted without the slightest thought of the requirements of the building, and as a matter of course they have entirely ruined its effect. The frescoes in the dome are by Correggio, and are amongst his most celebrated works. Like all the rest of the paintings here, they present, when regarded from below without the assistance of a glass, a confused mass of distorted figures and limbs, not at all relieved by the dark and dismal colouring in which they are executed, and which doubtless is not what it once was. It is true that when examined in detail, and still more when examined in Toschi's careful engravings, they are full of beautiful drawing and skilful chiaroscuro, but the impression they have left on my mind is mainly one of the extreme risk of attempting to decorate a building without previous training in and knowledge of the requirements of architecture. As an example of Lombard architecture the cathedral at Parma is almost ruined, whilst it would be difficult to conceive a worse-fitted building for the display of Correggio's fancy and skill. The ill-assorted union, in itself ruinous to both, has been aggravated by the bad state of repair which has damaged and no doubt altered the colour of the frescoes; and the impression now produced is that of simply the gloomiest interior in Italy.



SECTION, SANT' ANTONINO.

The church is cruciform, with a central cupola and apses to the three eastern arms of the cross. The nave and aisles of seven bays are vaulted, and there is a large and striking crypt under the whole eastern part of the church which goes far to redeem its otherwise barren character. The effect here is remarkable, owing to the complex perspective and great number of single slender marble shafts carrying the vaulted roofs, and in part also to its unusual height. The capitals are all carved — frequently with coarse volutes; the church was founded in 1058, and no doubt this crypt is of about that age.

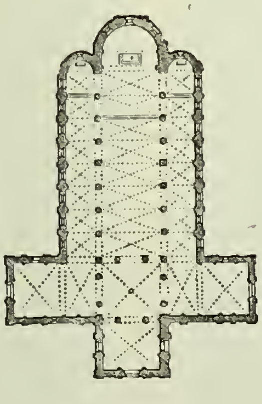
Very near to the cathedral on the south-west is the now much more interesting baptistery. This is on the exterior a large and lofty octangular building, adorned in a succession of stages by small detached shafts carrying the cornices and strings which divide the elevation. Internally the scheme is very different. The eight-sided interior is subdivided, so that sixteen shallow apses are set around the inside face of the walls. These are separated by columns, and above them on each side are two stages in height, each subdivided into three divisions, which are again subdivided by smaller columns. A great vault or cupola covers the whole, and from its height gives an air of solemnity to the interior. It seems never to have been treated as a real dome, being covered with a flat roof, resting on the external walls, which are carried up far above the vault. The paintings with which the walls are covered are arranged without any order or general scheme of design. They seem to have been given by various donors, and each gave what best pleased his fancy; but owing to the early date of most of the work, there is in parts — especially in the vault — a fine effect of colour.

This baptistery is said to have been commenced by the architect Benedetto di Antelamo in A. D. 1196,[1] who is also credited with many other works here, and specially with much of the early sculpture in the Duomo and baptistery; it was not completed until 1260.

There are three great doors to the baptistery. On the northern is sculptured the Tree of Life, and over this twelve prophets carrying medallions with half figures of the Apostles. Below are subjects from the lives of Our Lord and S. John Baptist. The western door has a sculpture of the Last Judgment, and the southern a not very intelligible, though no doubt symbolical, figure of a man seated in a tree and gathering honey. Inside there are various sculptures, and among them a series of illustrations of the labours of the months.

My day in Parma was pleasantly concluded with a visit to the Gallery, and then, finding no more mediæval remains, I pushed on to Piacenza.

This is a city of no small interest, and remarkable above everything else in the possession of a Palazzo Publico of unusual and striking design — a building of special value and interest to me, since it is a capital example of the use of brick and marble together. Before looking at any of the churches I devoted myself to this building with the more satisfaction when I found that it was really, in some respects, one of the very best works of the sort that I had ever seen.



PLAN, SANT' ANTONINO.

An inscription carved under a banner on a square stone, in the front, records the commencement of the work in 1281, and I think we may assume that no part of it is of much later date than this. It consists, as do most of these buildings, of a lofty open ground story, and a principal story above this. The façade is very dignified in effect. On the ground level are five lofty arches, very slightly moulded, and resting on square piers just rounded at the corners. The material of this stage is marble, mainly white, but with just a line of red and another of grey near the string-course which divides this from the next stage. From this point up almost the whole work is executed in brickwork of very elaborate and delicate detail. The two stages have no kind of uniformity or connection with each other, six windows being arranged above the five arches. In the centre of the first floor is the old doorway to the Ringhiera (which was altered in the seventeenth century); the windows on each side are of three lights, inclosed under a round arch with a deep archivolt very slightly recessed — all the enrichments being on very nearly the same face as the wall. These windows agree in size, but vary very much in all their details. Some of the subordinate arches are pointed, some round, and the tympana are everywhere filled with fine brick diapers. Above this stage the walls finish with a good marble

[1] The inscription on the north door is as follows: —

"Bis binis demptis. Annis de mille ducentis
Incepit dictus, opus hoc sculptor Benedictus."

cornice of intersecting arches, and then with a forked battlement. At the four angles of this are raised turrets, and the ends are finished with battlemented gables, very quaint and picturesque, as

(A) PALAZZO FABBIA DRA PALLAVICINI, BOLOGNA.

will be seen by the illustration which I give. The niches between the two arches in the principal story seem to have been intended for paintings. The marbles used here are red and white. Red is used for the arcades under the cornices, for the middle order of the rose window, and the inner order of the main arches. Elsewhere the marble is white, except the one grey course below the principal string. The whole of the lower stage is open below on all sides and groined — in brick, I think — though it is now plastered; indeed, save the parts already described as being of marble in the principal fronts, the whole of this building is built of red brick. Behind the open ground story there remains a portion of an internal quadrangle, which, incomplete as it is, shows, nevertheless, the same delicate attention to detail which is conspicuous on the façades. I know hardly any detail of Italian brickwork which is so refined and good as that in the arches and some cusped circles between them in this quadrangle.

I have seen this building, full as it is of eccentric departures from ordinary rules and customs — piers being placed over openings, and round and pointed arches used indifferently — quoted for our benefit as a remarkable example of a public building erected in the Middle Ages in the most regular and formal fashion! It is, on the contrary, if the plain truth is to be spoken, an example of a very bold disregard of such fashions indulged in without any detrimental effect.

Piacenza cannot boast of any very fine churches. They have been much ruined internally by modern alterations, and externally they do not seem ever to have been very attractive. The cathedral is a Lombard church of fine size, and with some good points. There are three western porches of two stages in height, according to the usual Lombard fashion. The doors are rudely sculptured; that in the centre with the signs of the Zodiac, and the northern door with the Annunciation, Salutation, and other subjects on its lintel. The columns rest on monsters, griffins, and men. The whole front is now finished with one large low-pitched gable, which has an arcade stepped up to suit its cornice. This is, however, a fourteenth-century alteration of the older church, as is also a rose window in the centre. A brick tower of late date rises at the north-west angle of the church, and is finished with a circular spire built of round-ended bricks. The external walls of the Lombard church were all built of stone or marble with shallow buttresses; the windows were very simple, and the effect was mainly due to the fine open arcade below the eaves, carried now on shafts, now on figures. The north-east view is very picturesque, owing to the number of angles and apsidal terminations which are seen together. These are produced by a plan of most unusual character, the transepts as well as the choir being finished with three apses, and an octagonal brick lantern rising out of the centre. Internally the cathedral, in spite of alterations, is still very interesting. The nave opens with eight arches to the aisles and transepts; but the three arches which open to the latter are much loftier than the five western arches, so as to allow of the transepts opening to the nave to nearly its full height. The groining of the nave is divided into three bays of sexpartite vaults — each bay being equal to two bays of the aisles, and there is a lantern over the two eastern bays. The transepts and aisles have quadripartite vaulting.

Under the choir is a crypt of great interest and beauty, owing to the vast number of delicate columns which carry the vault. It is

(B) INTERIOR OF CATHEDRAL, MODENA.

planned on a cruciform arrangement, with the principal altar in an octagonal central compartment. Here the priest celebrates on the eastern side with his back to the choir stalls in the apse; and his face toward the west. The access to this crypt is by two staircases at its south-west and north-west angles.

The large brick church of San Francesco is of the fourteenth century; it is very simple, but not striking in effect. The east end has been planned irregularly — to suit the site, no doubt — with an apse and aisle round it, and irregularly shaped chapels beyond the apse. The effect is bad, owing to the unskilful way in which the work has been done. The west front has the favourite sham gable adorned with circular windows, some of which are absolutely above the roofs of the aisles! San Giovanni in Canale is another church which has nothing of interest, save a few remnants of old brickwork.

Sant' Antonino is a remarkable church, hopelessly modernized with plaster enrichments. Like the cathedral, it has a lantern in the

(C) PALAZZO FAVA, BOLOGNA.

centre crossing, carried on eight columns from the ground, which produce internally a very new and really striking effect. The lantern is finished above the roof with three stages, each of which is lighted with a two-light window in each face. There is a fine early marble doorway to the north transept, with men and monsters supporting the shafts, and some delicate carving. In front of this, at the end of the fourteenth century, was built a lofty porch with a great open archway to the north. It is finished with brick pinnacles and cornices, and is higher than the transept. The hinges on the west door here are very good, and the windows in the aisles — lancets with seven cusps in the head — are quite worth notice. Piacenza struck me, both in its churches and Palazzo Publico, as a town which had possessed a very distinctly developed school of architecture of its own. The churches are peculiar, not to say eccentric, in their planning, and the Palazzo Publico is quite unique in its design and general treatment.

The only other old work I noticed here was a house in the Strada San Marco. This is all of brick, and has arches of slightly horse-shoe shape. The bricks are all axed on the face, and are of large size — 11¼ inches long by about 2¾ inches high.

Not very far to the east of Piacenza is Asti, a dull city, distinguished, however, by some remarkable features in its churches. The most important of these are the Cathedral and San Secondo. They are extremely similar in general design: they have naves with short choirs, transepts, low octagonal vaulted lanterns over the crossing, and apsidal chapels in front of the transept gables, and at San Secondo to the several bays of the aisle. Their towers are on the east side of the transepts. The peculiar feature of their detail is the very elaborate way in which brick and stone are counterchanged in the jambs and arches of windows and doorways. The moulded members of a jamb are alternately of brick and stone, and in each course stone comes above the brick of the courses below. San Secondo cannot, I think, be earlier than circa 1400, but at first sight looks like a building of 1200. The cathedral is probably somewhat though not very much earlier. Its plan was evidently derived from that of the cathedral at Piacenza. Its proportions are bad, and it is only redeemed by the picturesqueness of some of its details. Another church has an octagonal campanile; and another, one of sixteen sides. This is of brick, except the upper stage, which is coursed in brick and stone. Its sixteen sides have alternately a window and a shaft running up to the cornice, and in the stage below it there are eight windows below the shafted sides of the belfry. The composition of this tower is certainly very good.

(D) PALAZZO MALAGUTI GIA DELL' ARTE DEGLI STRAZZAROLI, BOLOGNA.

Another fine lofty tower with bold cornice and Ghibelline parapet recalls the Veronese towers to mind, and there are besides not a few remains of mediæval domestic work, so that a day may be well spent at Asti by an architect.

(*Continued.*)

Fire-proofing.

FIRE-PROOF CONSTRUCTION OF BUILDINGS IN THE UNITED STATES.

BY R. W. GIBSON (NEW YORK).

(Read before the Royal Institute of British Architects.)

FIRE-PROOF construction has been encouraged and developed in the United States more rapidly than in other countries: first, because of the vast amount of new work continually undertaken in the development of new cities, from which the evolution of improvements is natural; and, secondly, because of the growing danger and actual loss from gigantic conflagration which the dry continental climate has caused in cities constructed of combustible material. The long-recognized superiority of brick walls, of course, induced their use to some extent even in the earliest colonial days, and in places where at this time wooden construction prevails, because of its economical and hygienic desirability. The house or business building with brick walls and slate roof was valued, as compared with wooden buildings, chiefly for its fire-resisting qualities; but, with the growth of city buildings into crowded streets, and upwards many stories above them, it was soon recognized that this external casing of incombustible material gave in such a situation only a temporary respite, and that, before the heat of such fires as actually broke out, the combustible interior, with its wooden floors resting upon timber beams and divided by wooden partitions and doors, and stocked with combustible furniture and stores, made fires as hot and almost as dangerous and rapid as the original wooden buildings.

The ancient building methods of some southern peoples who preferred floors of masonwork, which, though usually resting upon wooden beams, completely incased them in brick and plaster materials, came into use to some extent in America in colonial times, and their superiority in fire-resisting qualities was soon noticed and afforded a practical lesson. Portions of buildings were constructed in this manner, such as halls and corridors in hotels, and their greater safety was appreciated so much as to impel further development of the idea. The increase in height and size of buildings was at the same time compelling a more liberal use of iron, and, later, of steel, in their construction, and the first efforts at fire-proof building were somewhat disappointing, because of a lack of perception of the difference between incombustible materials and fire proof materials. It was soon perceived that although iron is, under ordinary conditions, incombustible, it was very far from being proof against injury from fire of even moderate proportions; while, on the other hand, the small injury done to heavy timbering in the early stages of fire led to some excess of apology for its combustibility and efforts to continue its use. There were and still are many advocates of the use of timber in very massive scantlings who show with much truth that it takes longer to impair the strength of floors and pillars of this kind than it does those of unprotected iron. Yet very large conflagrations have proved that after all it is only a question of a limit to be passed when the massiveness of the timber becomes a horrible addition to the quantity of fuel. It may be safely asserted that the days of slow-burning wooden construction are numbered, so far as concerns large cities, although possibly rural factories, where economy of construction can be partly counterbalanced by an extra organization of fire-extinguishing machinery, and where the destruction of one building does not necessarily imperil any others, may advantageously use these methods for a long time to come.

At the same time, the exposed iron systems, even when the combustible materials were reduced almost to nothing, have failed signally, because the heat generated by the burning of fittings and furniture and stored goods is sufficient in even the mildest cases to destroy the strength of iron.

The modern system of fire-proofing has been developed from these experiences upon the still older patterns afforded in the old floors with beams buried in masonwork, the modern work using steel and iron instead of wood, and perfecting and systematizing fire-proof protection. Its latest and present phase is the final elimination of the last of the combustible materials tolerated now in fittings and finishings, such as doors, floors, architraves, etc. The principle insisted upon is vital, and is really the first one, viz., the absolute disuse of combustible material in the construction of the building and in its fitting and furnishing. The second principle, also now well recognized, is the selection from incombustible materials of those which are also fire-resisting, and the use of these to protect others which are not and which must not be used unless they can be so protected, because the use of the building will generally lead to the introduction of some combustibles into it as materials to be stored, or as materials to be used in business or daily life, and these cannot be eliminated.

The materials most available for the fulfilment of these conditions at the present day are steel or iron, and brick or terra-cotta and plaster,— the metal for the reception and transmission of chief strains, and the terra-cotta and plaster for the clothing and protection of the metal.

The manner of using the steel and iron may be regarded as a question of construction, since it must now be admitted that steel and iron have little or no power of fire resistance. The true fire-proofing lies in the use of a limited number of masonry materials, for it must not be overlooked that many non-combustible materials, even in masonry, are still as unreliable as the unprotected ironwork; some granites, for example, and marbles could be and have been wrought into strong and handsome staircases, with metal strings, and beams, and treads of stone, which are shattered and destroyed in the earliest blasts of a severe fire. It may be noted here that not only the intense heat, but a variation of heat, must be considered, and the destructive effect of torrents of cold water thrown upon substances raised to a white heat. Such a structure is non-combustible, but not fire-proof, and it is a good example of what is meant in this distinction. Such materials may be used where their strength is not relied upon, as in wainscotings, or where they are protected: for example, if the staircase just referred to had all its iron incased in terra-cotta, and its stone steps protected by terra-cotta, or plastered soffits, it could then be called a fire-proof staircase.

In selecting materials for the fire-proofing of others, regard must be had, not only to the destruction caused by fire, but also to injury likely to arise from the general use of the building, such as the blows and scrapes likely to be received by a column in a warehouse; and in this connection a curious but very important qualification, demanded in connection with high buildings and modern city life, is that the fire proofing must be such that, when the fire occurs, it will not be washed off by the terrific waterspouts turned upon it with modern engines. Some fire-proofing, otherwise good, has failed altogether because the water from high-pressure engines disintegrated it and tore it off.

Those most interested in fire-proof buildings, such as underwriters and fire insurance companies, recognize fully the necessity of distinction between the several classes of fire-proofing; and it is a fact that insurance rates are now adjusted according to the detailed construction of the building, instead of, as formerly, upon the broad claim that it was a fire-proof building based simply upon the possession of an incombustible floor structure. The time has now come when a sufficient series of experiences has justified the holding of definite views in comparing various materials one with another. The sum of all these experiences indicates clearly the superiority of fire-resisting terra-cotta. It is one of the oldest materials used for this purpose, and has undergone many trials, and has always well performed the duty required of it, unless misapplied or imperfectly or unfairly used. The scientific valuation thus reached is confirmed by the practical tests of an open market; an overwhelming proportion, probably 95 per cent., of the fire-proof floor work in use is of terra-cotta construction. It will be well, therefore, to describe in detail this generally accepted method. First, however, an explanatory description of the structural ironwork of the building is desirable. This may be divided into three classes, suited to as many types of fire-proof buildings. First, the building which, being of ten stories or less, is erected by the old methods of supporting walls and superimposed columns carrying floors and roof, and with only small beams and girders, or occasional independent trusses. Secondly, the building which, being of more than ten stories in height, accumulates such strains upon its walls that they must be reinforced by posts to carry the girder loads, and in which the walls require such mass in their lower parts to support their own upper parts that the metal first introduced to support the floor girders is reinforced and called upon to support the upper walls; becoming, in fact, a framing of vertical posts and horizontal girders, into which the wall is built in a series of panels of one, two, or three stories in height. This is so-called skeleton construction. When the height exceeds twelve stories, or when exposure to wind and other strains is great even at this height, the ordinary attachment of columns and girders is abandoned, and horizontal stability, no longer secured by the mass of masonry walls, is supplied by rigid riveting of all connections of posts one upon the other, and of girders to posts, and beams to girders, and by the addition of bracing in ties and struts and gusset brackets; and thus is developed the final so-called cage construction, wherein the steel receives and transmits all loads to the foundations; and the walls have become mere panels, not only without vertical loads, but without transverse bracing strains. Thirdly, an intermediate type of building has arisen, where all the internal structure and all the floor loads are supported upon columns, some of which are placed in the outside walls, but the outside walls themselves are made of self-supporting thicknesses in cases where architectural treatment demands sufficient mass for this purpose, and where the foundation presents no difficulty.

This classification is, of course, structural. Any one of these three classes of buildings may be finished in different degrees of fire-proof perfection; which will now be considered, commencing with a study of the highest class (of the third type) of construction, since it must be allowed that the massive walls are of value in resistance to fire as well as in affording stability. In a building of this class, erected for business purposes, perhaps in the form of offices for a large corporation, with many stories to be rented to tenants, there have been achieved to-day almost perfect fire-proof qualities, although few of these buildings are so rigid in their exclusion of wood as to be ideal in this direction. Yet it can be asserted that there is at no time any danger to life from fire in such buildings, nor is there any danger, with reasonable promptness, of the fire spreading from the room from which it first occurs, even though that room may be full of combustible office furniture, and may develop heat to an extreme degree. This type of building has become systematized by custom and experience, so that its structure is similar and uniform throughout the country; and this not because of building laws or other regulations, but in spite of them, since these vary greatly in different localities, and have usually been amended in fragmentary fashion to meet and treat with the new methods of design forced upon them. In New York City this is notably the case; an old building law, framed before building steel was invented, has had a few sections interpolated to regulate fire-proof building; and again, at a later day, a few sections more to regulate skeleton and cage construction; the imperfection of the result is such that the new charter for the greater city recently incorporated contemplates the appointment of a commission for the complete reconstruction of the building laws. We may therefore dismiss all reference to fire-proof construction in municipal laws as being of little value in the present discussion, because these laws follow, instead of leading, the practise of the best architects and engineers of the day. Some of the more recently amended laws may be quoted as codifications of opinion to their date, and as such may be of some value in presenting facts in tabulated form. Referring, then, to the national practise rather than to any laws, this type may be best described by quoting the specifications which have been used for the erection of an actual building.[1] In this building all the fire-proofing is effected with terra-cotta, the exception being some portions of ceiling work and girder covering. The floor loads are supported upon columns of rectangular shapes of rolled steel, the outer columns being set in the outer walls in grooves, close fitting but without bond, so as to permit of unequal movements and settlements and contraction. The girders are of rolled steel, built and riveted for large sizes, and of I-beams for smaller sizes (24 ins. and under), and are all riveted to the side columns, so that these may be continued right through the height of the building in practically one length. The bracing is done with gusset plates and angles. The beams supporting the floors are small rolled steel I-beams, laid out to what has become a standard distance apart, viz., 4½ ft., and of what has become a standard of economy in size, viz., 8 or 9 ins.

This size and spacing arise from the use of the terra-cotta arch, of from 8 to 10 ins. in thickness, which is, theoretically, good for ordinary office building loads up to a span of 5½ or 6 ft., and practically and thoroughly good and reliable up to spans of 5 ft., with sufficient factor of safety to permit of such cutting as may afterwards be necessary for the insertion of pipes, wires, etc. Many experimental tests have been made with these floor arches, with greatly varying results. They have been built with spans 7 or 8 ft., and have endured tests at these spans for very great loads; but the difficulty of securing in a building the perfect workmanship used in a test makes all such records of small value as compared with custom arising from an accumulation of experience, and such custom has decided that 4½ to 5 ft. is the span of flat floor arch combining the necessary strength with desirable economy of construction under working conditions. As thus used, these arches are very economical, very adaptable, and elastic in their application, and requiring only a moderate degree of skill on the part of the workmen. They are made of hollow terra-cotta blocks, with joints inclined at a fixed angle, which is only a rough approximation to the theoretical radiation of such joints in a flat arch; but there is no practical difference in the strength, and there is a great gain in having three patterns in all the blocks, viz., the springer, which rests on the flanges of the floor beam, the intermediate blocks, which are all cut to the same inclination, and the key-block, which, of course, has the sloped joint on both sides. The springer is made so that the lower surface forming the soffit, or ceiling, stands about 1½ ins. below the lower flange of the iron, and covers one half of that soffit. The work is set upon a centering consisting of simple scaffold boards hung 1½ ins. below the soffits of the iron beams; upon this centering the arch blocks are laid, and there jointed and flushed in cement. As soon as the work is set the centering is removed to a new panel, so the work goes on continually. It is customary to set the arches forming the floors as soon as the iron is ready for them, without regard to the condition of the walls or the absence of any roofing. In a building being hastened the ironwork will usually be seven or eight stories high before the walls are commenced, and the floors will be within two or three stories of the top at any time. Upon these arches a layer of cinder concrete is deposited, and upon this the finished floor, consisting of paving or tiling, or a composition of a concrete nature, or sleepers and wooden floor. A variety of floor arches of late date is the "end construction" arch, in which the perforations of the terra-cotta are arranged in the direction of the stress in the arch instead of at right angles to it, so that a larger quantity of material is used under strain; but it is doubtful whether this is of much real advantage — it is rather the product of severe testing than of any practical need.

(Continued.)

[1] The original specifications of the Onondaga County Savings Bank, Syracuse, N. Y. designed by the author of the paper, were exhibited in the meeting room.

Masons' Department.

ESTIMATING.

BY JOHN LYMAN FAXON.

GENERALLY, a contract nowadays embraces approximately 50% of subwork, estimated by the several subcontractors, and, as a rule, the contractor for the whole adds the aggregate of the lowest subs to his estimate of the general work (masons' and carpenters' work) to make up the bid proper, with such percentage of profit on the subs as he thinks his chances will stand; some contractors adding no per cent. in the bid, and if they get the job, then beating down the subs to get the profit which should have been added in the estimate. So, nine times out of ten, the contractor for the whole only estimates in detail on the masons' and carpenters' work and contingencies relative to subwork; and as, in nine cases out of ten, the aggregate of the subs used by all contractors for the whole is approximately the same sum, the variance in the bids is one of work estimated by the contractors of the whole. Later on I will illustrate this point somewhat in detail.

As to estimating by the cubic foot, a building may be intelligently and safely so estimated, providing the contractor has familiarized his judgment with the varying conditions of location, style, construction, finish, and general requirements of plans, more or less general and applicable to all buildings of any importance, and has ample tabulated data filed away for ready reference, consisting especially of records of ground areas, cubic contents, bids, and blue prints or published plans, and copies of specifications, from which he can deduce an intelligent basis for an estimate on the special building in hand.

But such estimating cannot be done recklessly, by simply averaging the cubic foot cost of three or four buildings, all varying materially in size, style, construction, and finish, and then multiplying the cubic foot contents of the building to be bid on by the average cubic foot cost, as in a case which came to my notice not long ago, in which case the contractor got the job, but at a good many thousands of dollars less than the next lowest bidder.

In estimating by the cubic foot, one element should be taken into account, *i. e.*, that it costs less, proportionately, to build a large building than a small one, and *vice versa*, this difference does not vary much from 4% for an increase or decrease of 25% in size (cubic feet). For instance, suppose we are to base our estimate on a building of 1,000,000 cu. ft., and which cost, when built, $200,000: now if the building to be estimated (all conditions being equal) contains 1,250,000 cu. ft., it will cost $250,000 — 4%, or $240,000. Again, if the building to be estimated contains 800,000 cu. ft., it will cost $160,000 + 4%, or $166,400. But, supposing, in either case, that the market has advanced 5% since the erection of the building taken as a basis, then the cost in the first instance will be $250,000 + 5% — 4% = $251,500; and the cost in the second will be $160,000 + 5% + 4% = $174,720; and if the market has fallen 5%, the calculations will be the reverse of above.

Now, supposing we have the same building, of 800,000 cu. ft. to estimate (on basis of 1,000,000 cu. ft., at 20 cents per cubic foot), but with varying conditions, duly noted and tabulated, the estimate will be as follows: —

	800,000 cu. ft. @ 20¢		$160,000,000
Cr.	Difference in Foundation	$896.41	
	„ „ Sandstone	1,150.25	
	„ „ Brickwork	1,916.33	(face)
	„ „ Roofing	500.00	4,462.99
			$155,537.01
Dr.	Difference in Steel Work	$2,250.00	
	„ „ Marble „	465.20	
	„ „ Electric „	360.00	
	„ „ Finish	1,875.40	
	„ „ Painting	637.28	5,587.88
			$161,124.89
	4% on a/c of reduced size		6,444.99
			$167,569.88

$167,569.88 ÷ 800,000 cu. ft. = 20 94/100 cents per cubic foot

I will now illustrate some estimating, bids by contractors, in five cases of which I have records.

(1) A building of approximately $100,000 cost, for which the plans were revised and a second call for bids made: the first bids ranged from $97,000 to $130,000, a difference of 33%. Of the several bidders, A, B, and C bid both times.

A's *first bid*,	$98,413.00
B's „ „	104,974.00
C's „ „	108,900.00

The subs amounted to $54,322.00, so that the general work (masons' and carpenters' work) stood as follows in the first bids: —

A,	$98,413.00 —	$54,322.00 =	$44,091.00
B,	104,974.00 —	54,322.00 =	50,652.00
C,	108,900.00 —	54,322.00 =	54,578.00

showing a difference (on masons' and carpenters' work) between A and C of $10,487.00, or 23 8/10%.

In revising the plans and specifications, the following reductions were made, as estimated by the architect: *a*, Subwork, $8,387.68 (the subs reduced their estimate $11,687.48). *b*, Plumbing omitted from general contract, $3,500. *c*, Masons' and carpenters' work, $2,691.20. Total, $17,878.68, which deducted from the original bids of A, B, and C *would* make them stand: —

A's revised estimate,	$98,413.00 —	$17,878.68 =	$80,534.32
B's „ „	104,974.00 —	17,878.68 =	87,095.32
C's „ „	108,900.00 —	17,878.68 =	91,021.32

The second bids of A, B, and C *were*: —

A, $93,000; B, $90,974; C, $90,900; showing that A increased his bid for the whole $12,465.68; B increased his bid $3,878.68; and C reduced his bid $121.32; but the subs, revised, amounting to $42,634.52 taken from A, B, and C's second bids, makes the estimates for masons' and carpenters' work appear as follows: —

A's *second bid*,	$93,000.00 —	$42,634.52 =	$50,365.48
B's „ „	90,974.00 —	42,634.52 =	48,339.48
C's „ „	90,900.00 —	42,634.52 =	48,265.48

showing (with $2,691.20 reduction in masons' and carpenters' work) that A increased his estimate $6,274.48: B reduced his estimate $2,312.52; and C reduced his estimate $6,312.52; and D, who did not bid the first time, came in with a bid of $84,827, or $42,192.48 for the masons' and carpenters' work, 19 3/10% less than A; and D executed the work and made a fair profit; and D's bid was within $1,200 of the architect's estimate for the whole.

(2) Four buildings, the average lowest bids being $212,000, and the average highest bids being $258,000. I will designate these as *a*, *b*, *c*, *d*, and the nineteen individual bidders as A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, respectively.

A bid on *a* and *d*.
B „ „ *a*.
C „ „ *a*, *c*, and *d*.
D „ „ *a*, *b*, *c*, and *d*.
E „ „ *a* and *b*.
F „ „ *a*, *b*, *c*, and *d*.
G „ „ *a*, *b*, *c*, and *d*.
H „ „ *b*, *c*, and *d*.
I „ „ *a*, *b*, and *c*.
J „ „ *b*.
K, L, M, N, O, P bid on *c*.
Q, R, S „ „ *d*.

The lowest and highest bids on *a* were $226,900 and $259,943, a difference of $33,043, or 14 5/10%.

The lowest and highest bids on *b* were $157,900 and $177,642, a difference of $19,742, or 12 5/10%.

The lowest and highest bids on *c* were $217,000 and $263,800, a difference of $46,800, or 21 6/10%.

The lowest and highest bids on *d* were $242,971 and $328,823, a difference of $85,852, or 35 1/3%.

The average of differences being 21%.

The difference in the subs were as follows: —

a, 40%; *b*, 43%; *c*, 43 1/5%; *d*, 36 4/5%.

Deducting the aggregate of the lowest subs from the respective bids, the estimates on masons' and carpenters' work for the several jobs appear to be as follows: —

Job *a*	A's estimate	52 8/10% of the whole.
	C's „	48 3/10% „ „ „
	D's „	48 2/10% „ „ „
	E's „	48 1/4 % „ „ „
	F's „	46 5/10% „ „ „
	G's „	46 % „ „ „
	H's „	55 % „ „ „
	I's „	48 2/10% „ „ „

A difference of 19 6/10%.

Job *b*	D's estimate	53 1/10% of the whole.
	E's „	53 5/10% „ „ „
	F's „	50 3/10% „ „ „
	G's „	54 4/10% „ „ „
	H's „	53 7/10% „ „ „
	I's „	53 4/10% „ „ „
	J's „	48 7/10% „ „ „

A difference of 11 7/10%.

Job *c*	C's estimate	59 3/10% of the whole.
	D's „	58 3/10% „ „ „
	F's „	54 4/10% „ „ „
	G's „	60 % „ „ „
	H's „	57 7/10% „ „ „
	I's „	57 3/10% „ „ „
	P's „	51 4/10% „ „ „

A difference of 16 7/10%.

Job *d*	A's estimate	51 3/10% of the whole.
	C's „	56 % „ „ „
	D's „	46 8/10% „ „ „
	F's „	52 8/10% „ „ „
	G's „	51 5/10% „ „ „
	H's „	54 % „ „ „
	Q's „	60 4/10% „ „ „

A difference of 29%.

The average of estimates on masons and carpenters being: —

a, 49 16/100%; *b*, 52 45/100%; *c*, 56 9/10%; *d*, 53 27/100%.

So on job *a*, C estimated the closest to average.
„ „ *b*, D „ „ „ „ „
„ „ *c*, I „ „ „ „ „
„ „ *d*, F „ „ „ „ „

Further, G, whose bid was lowest on job *a*, estimated highest on jobs *b* and *c;* and D, whose bid was lowest on job *d*, was near the highest on jobs *b* and *c;* and H, whose bid was the highest on job *a*, was at about the mean on jobs *b*, *c*, and *d*. So it appears — what I have observed in practise — that the contractors for the whole do not seem to have any definite or logical systems of estimating work — masons' and carpenters' work — with which they are supposed to be familiar.

A few years ago a contractor came to me to make an estimate on buildings which he "wished to get," saying that he had estimated the work, but that his estimate was so high that he was in doubt about the matter. I made a careful estimate of what I considered to be the *net cost* of the work, advising him to add such per cent. of profit as he desired. My estimate was about 20% more than the contractor's, and he, more in doubt than ever, split the difference between his estimate and mine and put in a bid accordingly. Another contractor got the job at a much lower bid, and I subsequently learned that the successful bidder had made a mistake and lost a good many thousands of dollars, and that the estimate I had made was about the correct thing.

Space does not permit of my showing in detail the various methods of estimating, good, bad, and indifferent, so as to cover any extended ground, so I will confine my illustrations to a comparatively simple, every-day matter, and one in which I think more miscalculations are made, and liable, than in most other things estimated upon by the contractor for the whole, viz., brickwork. For instance, suppose we have the external wall of a large building to estimate, which we will say is 20 ins. thick and to be built of face bricks @ $28 per M.; inside lining of best hollow bricks, and filling of best hards. Now, the average contractor will go through the laborious calculation of figuring (after getting the area of the face and outs) the cubic feet and thousands of bricks of each kind, and cost per M.; requiring much time, paper, and expenditure of mental force, with liability of not arriving at a correct or close estimate seven times out of ten, when the calculations can be made correctly with one third of the time and figures. Supposing we find that the face area of the wall is 23,642 sq. ft. and the area of voids 6,289 sq. ft., which leaves 17,353 sq. ft. Now for this 20 in. wall, the through and through brickwork will cost, say, per M.: —

4 ins. of face bricks and laying @ $40 per M. × 1 =	$40.00
12 „ „ hard „ „ „ @ $16 „ M. × 3 =	48.00
4 „ „ hollow „ „ „ @ $17 „ M. × 1 =	17.00
20 „ thickness = per face M.	$105.00

i. e., $105 per M. for superficial face through the wall. Now, the average run of 8 in. bricks will lay about (close to) 21 bricks to the cubic foot or 7 bricks to the face foot, or 143 superficial feet to the M. So, having arrived at the cost of the brickwork through the wall, per M. for its thickness, we proceed to estimate as follows: —

$$17{,}353 \div 143 \times \$105 = \$12{,}741.65,$$

to which will be added, if so designed, cost of molded bricks, extra for turning arches, etc., and per cent. for waste stock. Or, supposing we find that we have 10,892 superficial feet net of inside 16 in. wall of common brickwork, we then have 16 ins. @ $16 per M. × 4 = $64 per M. through the wall, and the calculation is

$$10{,}892 \div 143 \times \$64 = \$4{,}874.24,$$

to which we add for arches, etc., and per cent. for waste stock. When one is used to this system of estimating, calculations are made as quick as one can think, with surety and least expenditure of time and paper, to say nothing of "getting the pencil sharp," and all jobs can be estimated on the same basis, and show comparatively the same results.

Supposing the exterior wall is a 20 in. wall with selected common facing, light hard filling and hollow lining, then the basis is: —

4 in. face bricks and laying @ $20 × 1 =	$20.00
12 „ light hards „ „ @ $15 × 3 =	45.00
4 „ hollow „ „ „ @ $17 × 1 =	17.00
20 „ thickness = per face M.	$82.00

$$17{,}353 \div 143 \times \$82 = \$9{,}950.62$$

Supposing the same wall is a 16 in. wall with facing bricks 12 ins. at $48 per M.; on an 8 in. brick basis the facing will be $32 + the laying, or

4 in. face bricks and laying @ $44 × 1 =	$44.00
8 „ hard „ „ „ @ $16 × 2 =	32.00
4 „ hollow „ „ „ @ $17 × 1 =	17.00
16 „ thickness = per face M.	$93.00

$$17{,}353 \div 143 \times \$93 = \$11{,}285.46$$

An intelligent contractor can readily make out a table of brickwork and cost (two or three times a year, covering the changes of the market) embracing all conceivable combinations of stock and different thickness of walls, to fit almost any conceivable case for application in estimating; and when once the system is well in hand, the application of it will come to mind without effort.

The same idea is applicable to estimating carpenter work of all kinds, framing, finish, etc., that is, estimating by superficial foot instead of wasting time, patience, and figures on estimating in detail by stock, labor, etc.

If these papers have been, or may be, of any service or help in establishing a clearer appreciation as to what the obligations of contracts are; of a better understanding between contractors and architects, and contractors and subs; of a more ready disposition for honest work at a fair price, and a more intelligent basis of estimating, the space allotted to them will have filled its mission.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK.— There is scarcely any line of business in this city which has not felt in one way or another the effects of the great celebration welcoming Admiral Dewey. Our best sculptors dropped everything, and during the hot August days devoted all their time and energy towards the production of the magnificent triumphal arch in Madison Square, with no recompense save the love of art, and the satisfaction of having done their share in beautifying the city and educating the masses. Their work has not been in vain, for the arch was enthusiastically appreciated and probably has been seen in illustrations by the entire country. It is very gratifying to know that the arch will probably be rebuilt permanently in marble, and interest in the matter has been aroused not only among our wealthy citizens, most of whom are patriotic and public spirited, but among the poorer people also the feeling is that they would like to contribute according to their means.

HAMPTON COURT PALACE, LONDON, ENGLAND. WEST FRONT.

Amid so much rejoicing we regret being obliged to record anything unpleasant, but the recent unreasonable demands made by the local labor unions have caused much unpleasant comment. Notably, during the preparations for the Dewey days, when architects and sculptors were giving all their best efforts for no return, and when mechanics were kept busy and well paid, they took the opportunity to strike for higher wages and a half day Saturday all the year round, seriously delaying the important work in hand. It is not by want of faith that the workmen will improve their position before the public. The regrettable incident referred to shows more than ever the necessity of standing and properly accredited courts of arbitration within the trades to dispose of disputes between masters and men.

The award of first prize in the competition for the new Custom House has been given to Cass Gilbert, of St. Paul, Minn. It is said that the design will be an ornament to the city.

Architect George B. Post, of New York, has been selected as architect for the new Department of Justice Building in Washington, D. C., which is to cost $900,000. The other architects whose plans were favorably commended were Price & Aiken and Warren & Wetmore, also of New York.

In view of the rapid multiplication of elevator apartments up town, with the inevitable depressing result on rents, it will be interesting to builders to learn of the unqualified success of an experiment with a seven-story building of this nature in Washington Square, North. The house, the interior of which is only just receiving its finishing touches, contains twenty-one apartments. All but three have already been rented, and for these propositions have been received. The average rent is $1,200 for eight rooms and bath.

The dearth of iron for building purposes is one of the most discouraging problems that the contractor has to deal with to-day. The great increase in the cost of material, retarding if not upsetting millions of dollars worth of new work, was bad enough, but to have it come about that when the client is ready to pay the price it is impossible to obtain the goods, is a peculiarly aggravating misfortune. Grumbling about so unusual a situation, however, does no good, and owners and builders are striving to see whether there is not some way to turn the corner. One loophole that has been taken advantage of is the substitution of the old-fashioned, solid walls in place of the iron skeleton. In a great many cases, where buildings are of low or only moderate altitude, this substitution is perfectly feasible, and considering the higher cost of steel, it may not be so uneconomical as it was a year ago. The difference between masonry and steel construction is, of course, more apparent the higher the building is carried, not only in cost of structure, but in area of lot occupied by walls and other supports.

James E. Ware & Son have prepared plans for a new ten-story

HAMPTON COURT PALACE. FROM EAST.

HAMPTON COURT PALACE. SOUTH FRONT.

brick warehouse, to be built on 52d Street, near Seventh Avenue, for the Manhattan Storage Company; cost, $200,000. Geo. F. Pelham has planned two six-story brick and stone flat buildings, to be built on 19th Street, near Third Avenue, at a total cost of $60,000. Brun & Hauser have planned a brick church building for the French church of St. Esprit; cost, $50,000. Carrere & Hastings are preparing plans for a brick and stone church for the First Church of Christ, Scientist, to be built at 96th Street and Central Park, West; cost, $30,000. Ernest Flagg has planned a brick stable, to be built on 87th Street, near Broadway; cost, $17,000.

PHILADELPHIA. — The records of the Building Inspector's Bureau would seem to indicate that building is not falling off in Philadelphia, but unfortunately the number of permits issued by that office, each after the due filing of a drawing of the work proposed, gives but a poor idea of the amount of work emanating from the offices of architects. At the present time but few of the older and larger offices have an average number of contracts on hand. This is not to be entirely accounted for by the presence amongst us of so many younger architects, each doing his quota of business, but to a large extent to the fact that builders are gradually encroaching on the demesne of the architect, many employing quite a large staff of draftsmen on the designs, principally for business blocks, factories, and heavy operations generally, which they turn out.

That this tendency of business people to fight shy of the architect is to be deplored by others besides those of the profession goes without saying, and one is forced to ask, Is it true that the architect is apt to lavish more money on display of architectural adornment than often the circumstances warrant? After a review of recent commercial erections in the city, it is hard to deny it.

Amongst those not feeling any effect of the foregoing is the firm of Rankin & Kellogg, who, with other affairs, are preparing plans for a church to be built on Broad Street below Spruce. The new post-office by them in Camden, together with a Pompeian brick and terra-cotta bank by Frank Miles Day & Brother, are perhaps the most pleasing buildings put up in that town in recent years.

HAMPTON COURT PALACE. FOUNTAIN COURT.

TERRA-COTTA CARTOUCHE.
Executed by the New York Architectural Terra-Cotta Company.

A number of years ago, nearly all the new city houses were from the office of T. P. Chandler, but lately much of his work has lain out of town. At 22d and Locust Streets has been commenced a colonial house from his designs.

Mr. Windrim is taking every safeguard in the erection of the Smith Memorial Entrance to Fairmount Park. A model of one half of it has been erected on the site, life size. The design consists of side arches for foot traffic, while the driveway is flanked by columns. It is eventually to be in white marble.

The T Square Club has cut free from the Academy of the Fine Arts for its coming exhibition. Heretofore the architectural exhibit was part of the Academy's yearly display of art works. Naturally, the drawings from the architect's table received but scant notice from the crowds that thronged the art galleries, and it has been felt for some time that a separate exhibition was necessary to give an architectural display the dignity and to draw to it the public notice it deserves.

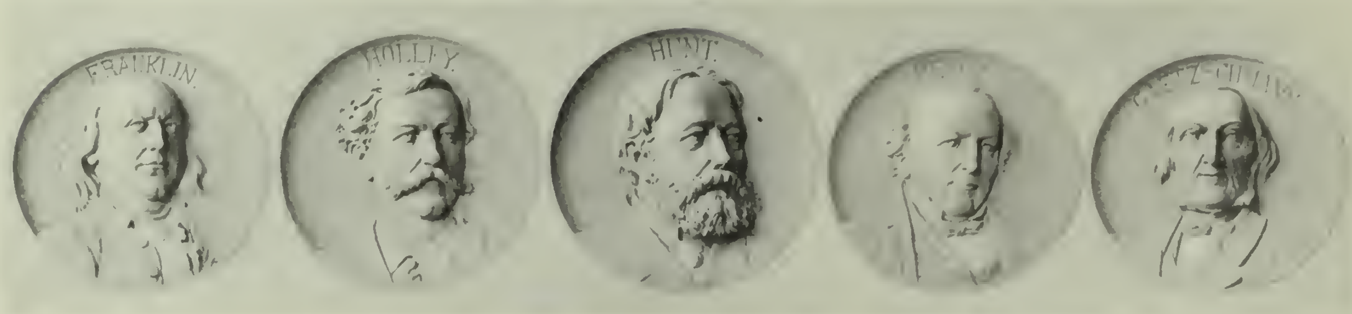
The housing of the National Export Exposition, whose gates are now open, on the west bank of the Schuylkill, seems but an insignificant affair after the World's Fair and the Omaha Exposition triumphs. Here the architecture is extremely simple, no effect of lagoon nor grand court having been attempted. A portion of the buildings are built for permanency, with the exception of the staff casing of the exterior, which is to be replaced by marble at a later time.

ST. LOUIS. — It is gratifying to note the increased interest taken in architecture by the layman, and his appreciation of the efforts of the architects to raise the standard of their profession. 'Tis only within the last few years that a limited competition for a proposed building has been heard of, or that a client would consent to pay those whom he might ask to prepare preliminary sketches. There has been three such competitions recently: the St. Louis Club last year, the buildings for the Washington University, and the St. Louis Trust Company's building. The competition for the latter resulted in Shepley, Rutan & Coolidge being selected.

The permits issued by the building commissioner for September are much below those for the same month, in a number of years, amounting to only $514,663, while for September, 1898, they amounted to $1,001,350. This is a good illustration of the condition of the building business in this city at the present time, and there is no one who can offer a reasonable explanation, as all other classes of business are unusually active. The earlier part of the season gave indication of much work being done, and there was quite a rush among architects and builders for a while, but it was short lived, and the outlook for the future offers but little encouragement.

HOUSE AT ST. LOUIS, MO.
Shepley, Rutan & Coolidge, Architects.

Barnett, Haynes & Barnett have prepared plans for a church for St. Kevins parish, which will cost $100,000. It is to be of Bedford stone, and will be in the Romanesque style. On each side of the nave in front there will be an octagonal tower.



MEDALLIONS, SCHOOL OF MINES BUILDING, BUTTE, MONTANA.
Executed in terra-cotta by the Winkle Terra-Cotta Company.

There has been but little labor trouble during the season, but now the carpenters have concluded to ask for ten cents an hour advance, beginning the first of next April, and have so notified the builders. The present rate is thirty-five cents per hour.

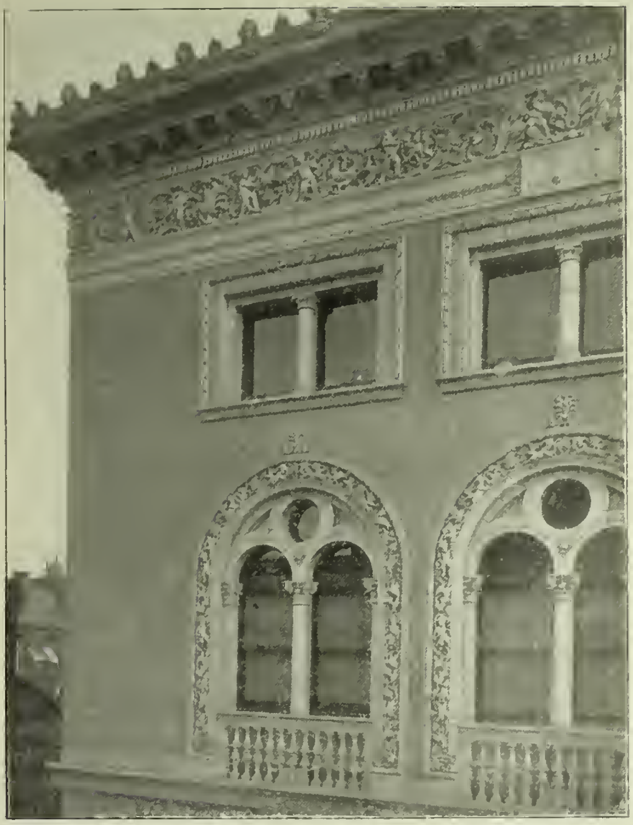
MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: August M Bleeck, 3923 Cleveland Avenue, St. Louis, Mo.; Foreman & Son, Ward-Nichols Block, Marietta, Ohio; J. R. Nevins, 307½ Main Street, Houston, Texas; Frederic Wm. Striebinger, New England Building, Cleveland, Ohio.

AN unusually interesting exhibit of pottery and antique textiles, by the Grueby Faience Company, is being held (October 2–31), in the Art Gallery of the Department of Fine Arts, Pratt Institute, Brooklyn, N. Y.

The Grueby pottery is first of all an evidence that American industrial art is not completely enslaved to machinery and mechanical reproduction. The makers of this pottery have gone back to the method of the Egyptians and the Greeks: each piece being the

TERRA-COTTA CAPITAL.
Executed for the Albany, N. Y., Railway Station, by the Perth Amboy Terra-Cotta Company.
Marcus T. Reynolds, Architect.



DETAIL, HARTFORD SAVINGS BANK, HARTFORD, CONN.
Peabody & Stearns, Architects.

handiwork of the potter and the artist and bearing the stamp of individuality. First shaped on the wheel, the form, while still plastic, is decorated by modeling upon its surface conventionalized motives taken from plant life, in such a way as to make the ornament structural and essential to the design as a whole. Simplicity and strength of design and color are its first characteristics, whatever richness or special quality of surface may afterwards be given to it in firing.

CURRENT ITEMS OF INTEREST.

Chambers Brothers Company report a contract for the instalment of a complete brick-making plant for Alexander H. Russell & Sons, near Baltimore. The equipment of this plant includes steam power outfit as well as the brick machinery. The same is now in process of erection.

The Union Akron Cement Company are supplying their Akron Star cement for the following operations: Four-story terminal warehouse for N. C. Railway, at Baltimore; an extensive addition to the American Steel and Wire Company's works at Worcester, Mass.; and for a large dam near Carthage, N. Y., for the St. Regis Paper Company.

TERRA-COTTA PANEL.
Executed for the Paul Revere School, Boston, by the Conkling-Armstrong Terra-Cotta Company.
Peabody & Stearns, Architects.

TERRA-COTTA PANEL, RESIDENCE, PHILADELPHIA.
Executed by the Conkling-Armstrong Terra-Cotta Company.
R. G. Kennedy, Architect.

Merchant & Co. have recently issued a small booklet of "Analysis and Tests," showing quality, tensile strength, and uniformity of dimensions of seamless brass and copper tubes manufactured by them. This pamphlet contains much useful information and will be of practical service as a work of reference to architects, engineers, etc.

The Indianapolis Terra-Cotta Company have been awarded the contract to supply the terra-cotta for the Globe-Werincke Furniture Factory, Norwood, Ohio, Harry Hake, architect, Cincinnati. This contract calls for over 100 tons of architectural terra-cotta. They will also furnish the terra-cotta for the Paddock & Hodge Building, at Toledo, Ohio, Joseph S. Neills, architect.

The Powhatan Clay Manufacturing Company are to supply 45,000 of their silver-gray brick for a new business block at Richmond, Va., M. J. Dimmock, architect; George L. Powers & Bro., contractors. They will also supply similar brick for seven residences, corner of 2d and Marshall Streets, Richmond, Fritz Sitterding, owner and contractor.

PANEL, MAIN ENTRANCE, CLEVELAND CHAMBER OF COMMERCE.
Executed by the Northwestern Terra-Cotta Company.
Peabody & Stearns, Architects.

The Illinois Supply and Construction Company, St. Louis, wish attention called to the Grath Steel Wall Ties which they are now putting on the market. The special claim which the company make for the tie is that "it is the only tie on the market having circular ends and diagonal center, which holds all over and forms a wedge impossible to pull out." Further particulars regarding same may be seen in the company's advertisement.

William Wirt Clarke & Sons, Baltimore, have recently published a small but exceedingly interesting volume, entitled "Architect's Hand-book on Cements," Addison H. Clarke, author. In compiling this little work Mr. Clarke has made a distinct effort to be concise in the information given, and to present in most convenient form some of the specifications and formulæ for mixing and using cement as recommended by leading authorities. To architects, engineers,

PANEL, SIXTH STORY, SOUTH BEND HOTEL, SOUTH BEND, IND.
Executed in terra-cotta by the American Terra-Cotta and Ceramic Company.
Shepley, Rutan & Coolidge, Architects.

and builders the usefulness of this work will be extensive. Parties desiring copy of same should communicate with the above company.

The White Brick and Terra-Cotta Company has closed contracts for the architectural terra-cotta for the following buildings: Engine house, Worcester, Mass., W. H. Harvey, architect; club house, Whitestone, L. I., Wallace & Gage, architects; chapel at West Point, N. Y., Heins & La Farge, architects; stores and lofts, Washington Place and Greene Street, New York, John Wooley, architect; apartments, 111th Street and Eighth Avenue, New York, L. F. J. Weiher, architect: and apartment, 129th Street, near Eighth Avenue, Henry Anderson, architect.

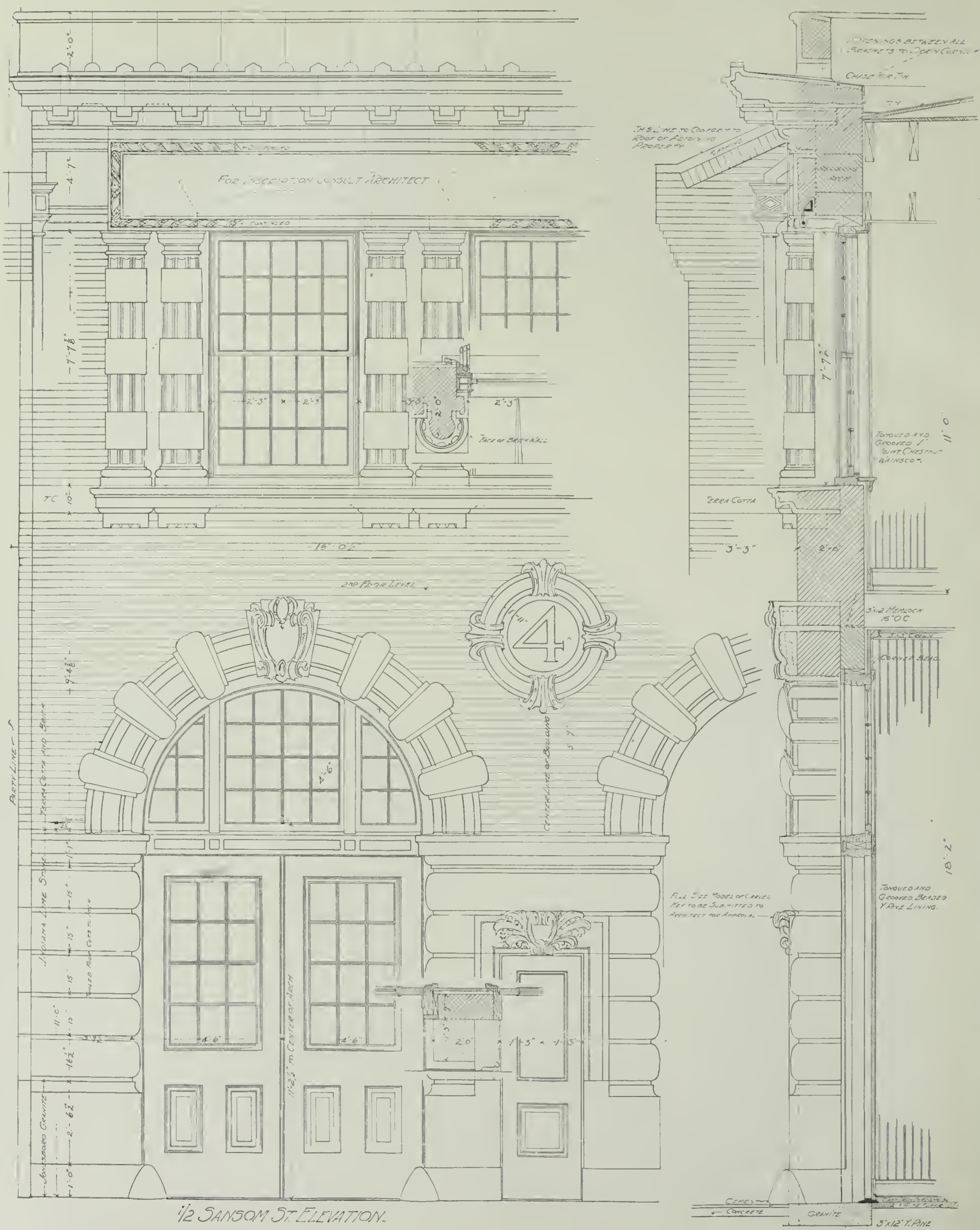
The new catalogue recently issued by the Evens & Howard Fire Brick Company, descriptive of their fire brick specialties, is a concise, interesting pamphlet of twenty-five pages. It contains some seventy-five illustrations of the different specialties that the company manufacture in these lines of materials, and gives the dimensions of the bricks, tiles, etc., so described. Price-lists and brief descriptive matter accompany these illustrations. The products of this concern have been well known in the market for over forty years, and in that time have won for themselves a distinctive reputation for unvarying excellence. The same high standard of merit will continue to be maintained by them.

PANEL, BETWEEN THIRD STORY WINDOW HEADS, NEW YORK MEDICAL COLLEGE AND HOSPITAL FOR WOMEN.
Executed by the Excelsior Terra-Cotta Company.
Wm. B. Tuthill, Architect.

HOUSE, MARLBORO STREET, BOSTON.
Gay & Proctor, Architects.

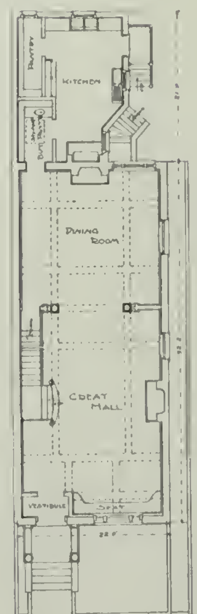
We are in receipt of a catalogue issued not long since by the Ludowici Roofing Tile Company, Chicago, which contains much information relative to the use of burnt clay tiles for roofing purposes and gives in detail directions for laying same on roofs. The extensive use in Germany of the Ludowici patent interlocking roofing tile is mentioned, and the advantages claimed for this patent are shown by means of sectional cuts representing these tiles when set in their relative position on the roof. The catalogue contains over seventy-five half-tone illustrations of the various styles of tile which the company manufacture: with these are given the dimensions of the tile and their weight per square. For the purpose of showing the artistic effect of these tiles on roofs of various designs, there are illustrations of some thirty different styles of buildings roofed with Ludowici tile. We recommend the catalogue as one that architects will find both interesting and useful in connection with their work. The company will be pleased to send copy of same to any parties on request.

TERRA-COTTA PANEL.
Executed by the New Jersey Terra-Cotta Company.



FIRE HOUSE No. 4, PHILADELPHIA, PA.

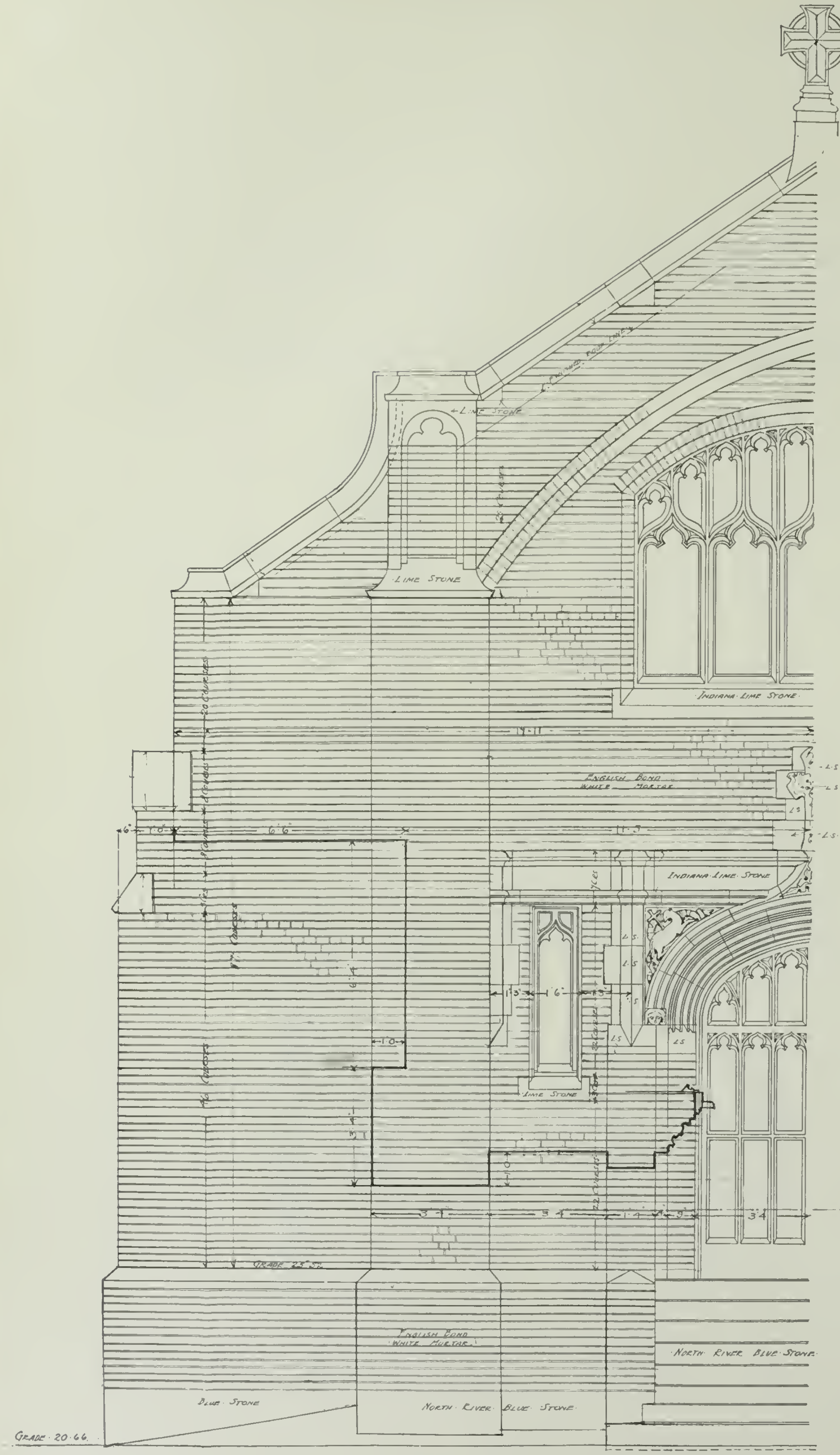
E. V. SEELER, Architect.



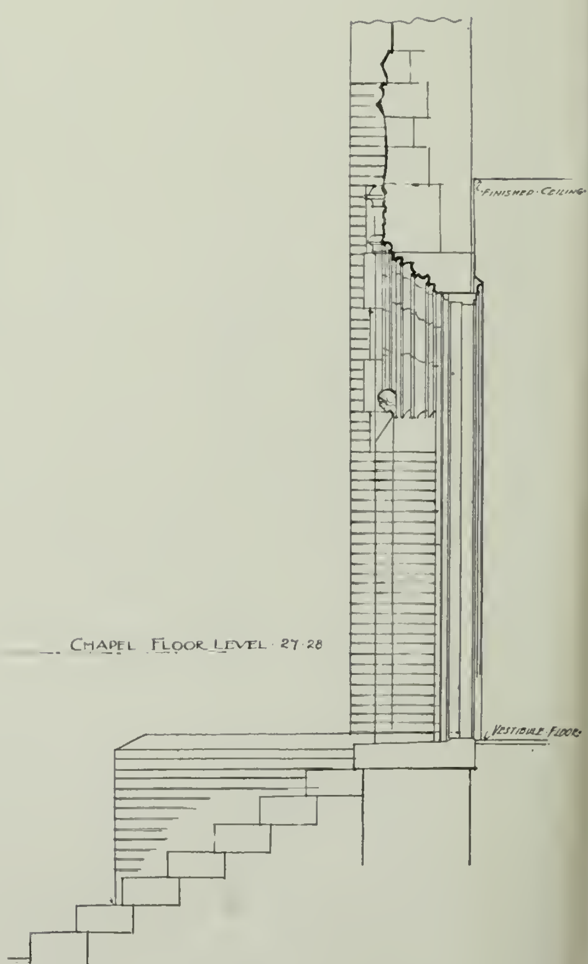
PLAN.

RESIDENCE AT WASHINGTON, D. C.

TOTTEN & ROGERS, Architects.



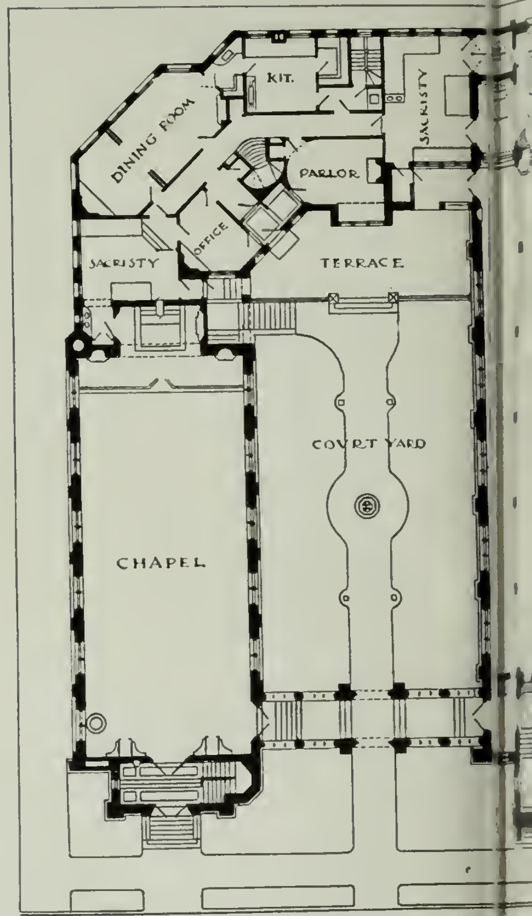
HALF ELEVATION OF CHAPEL FRONT

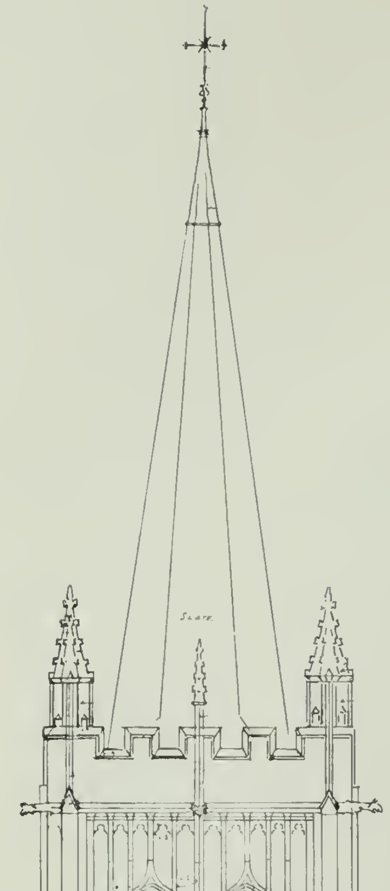
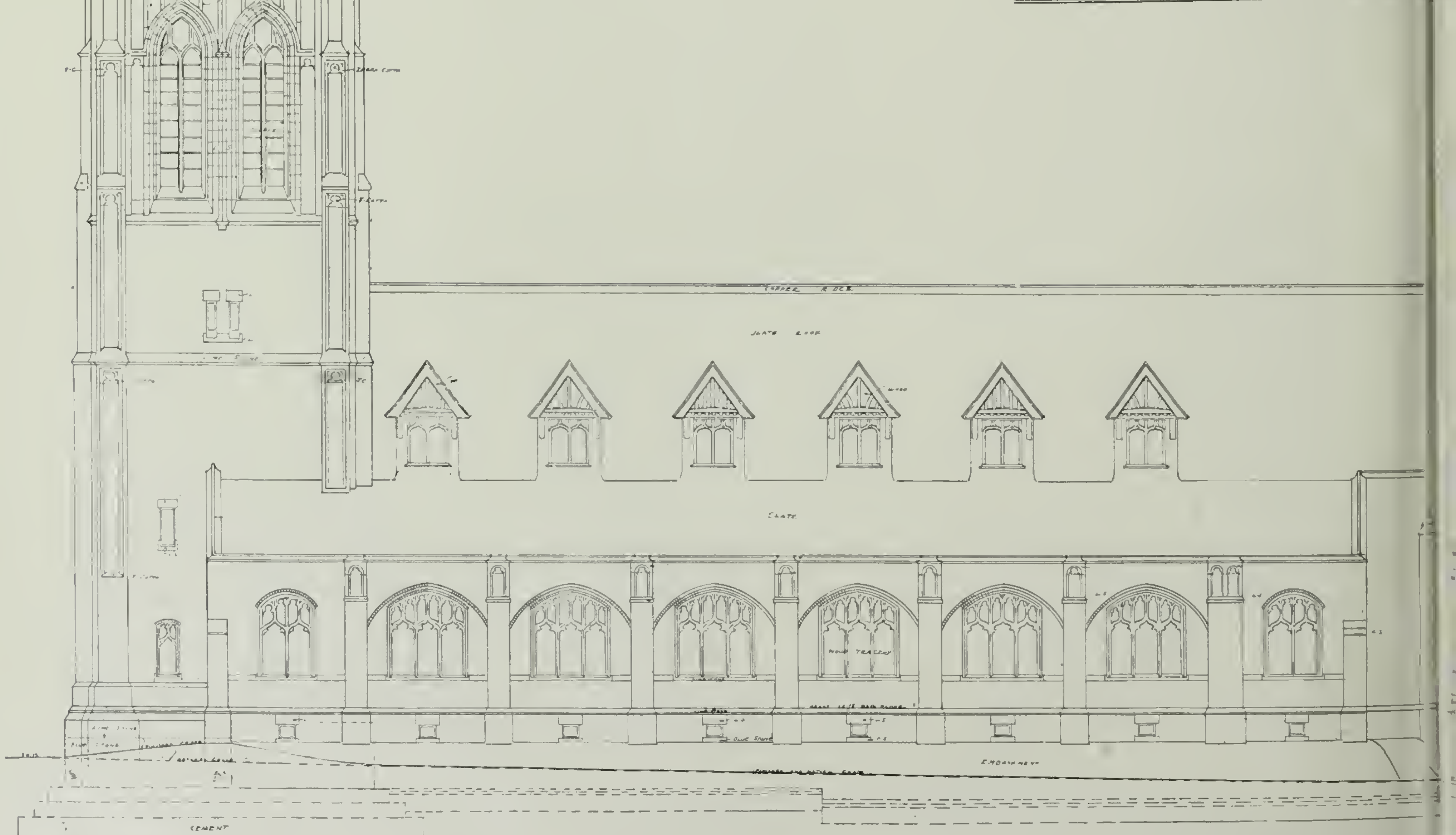


SECTION THRO CHAPEL ENTRANCE

ST. LEO'S CHURCH, LEOMINSTER, MASS.

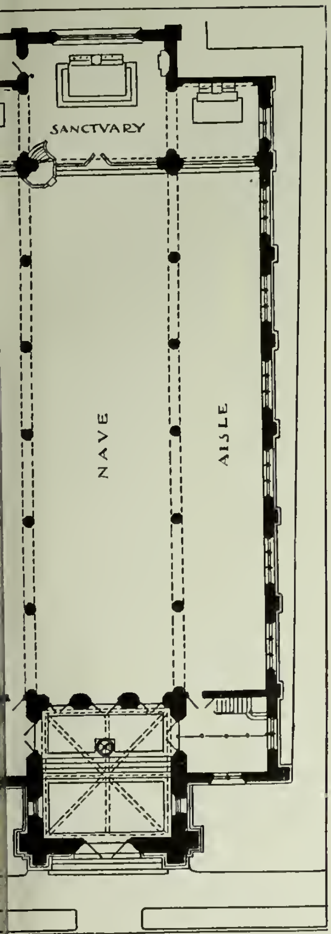
MAGINNIS, WALSH & SULLIVAN, Architects.



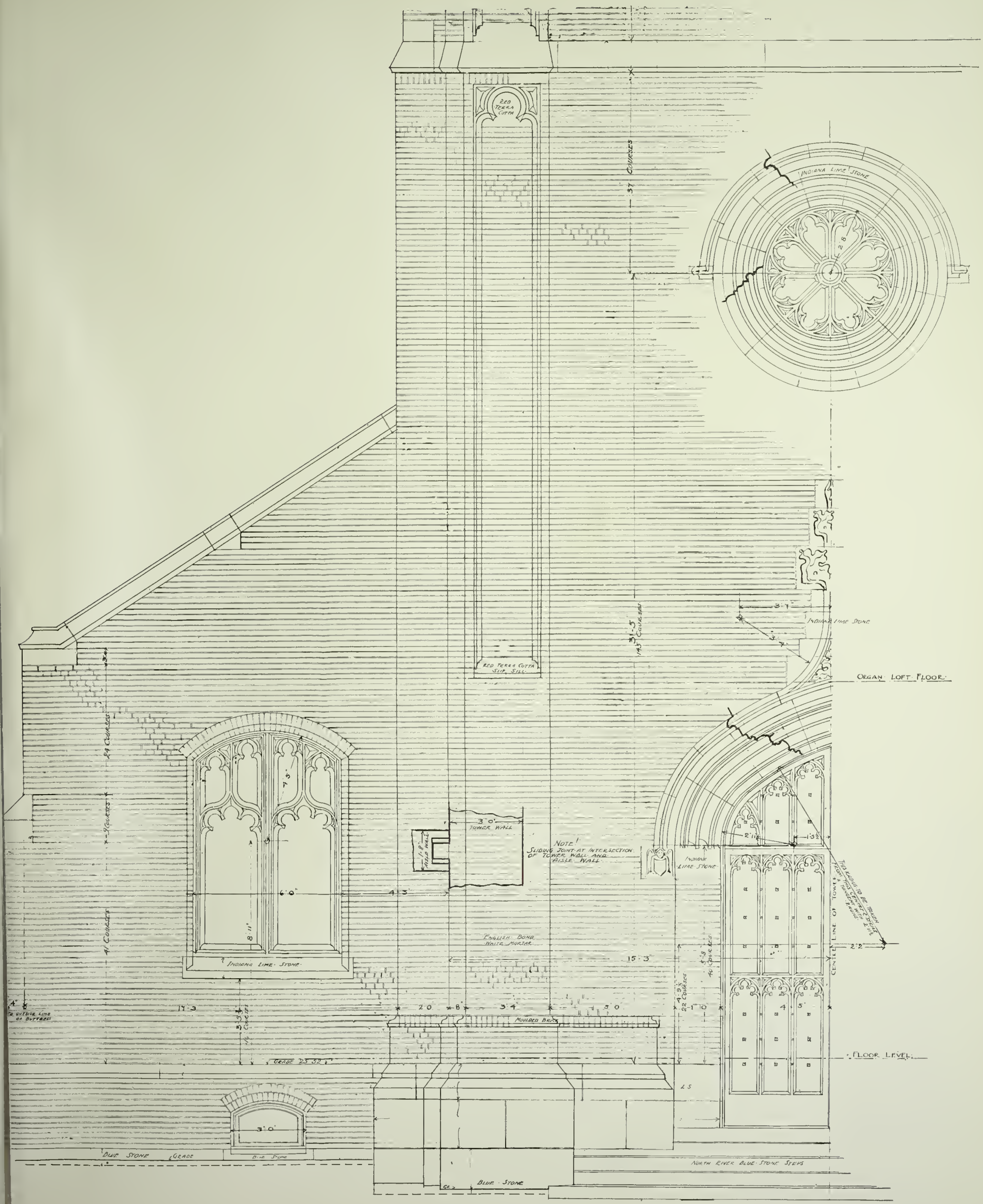
ST. LEO'S CHURCH,
MAGINNIS, WALSH &

PLATES 84 and 85.



ONSTER, MASS.

LIAN, Architects.



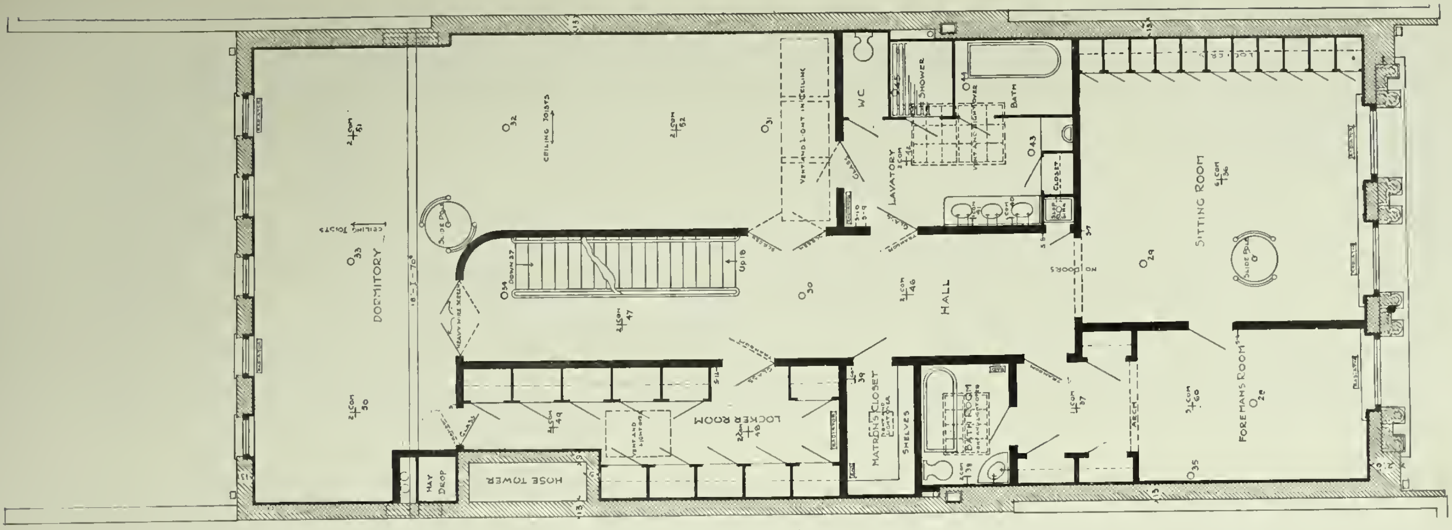
ELEVATION OF LOWER PART OF TOWER

ST. LEO'S CHURCH, LEOMINSTER, MASS.

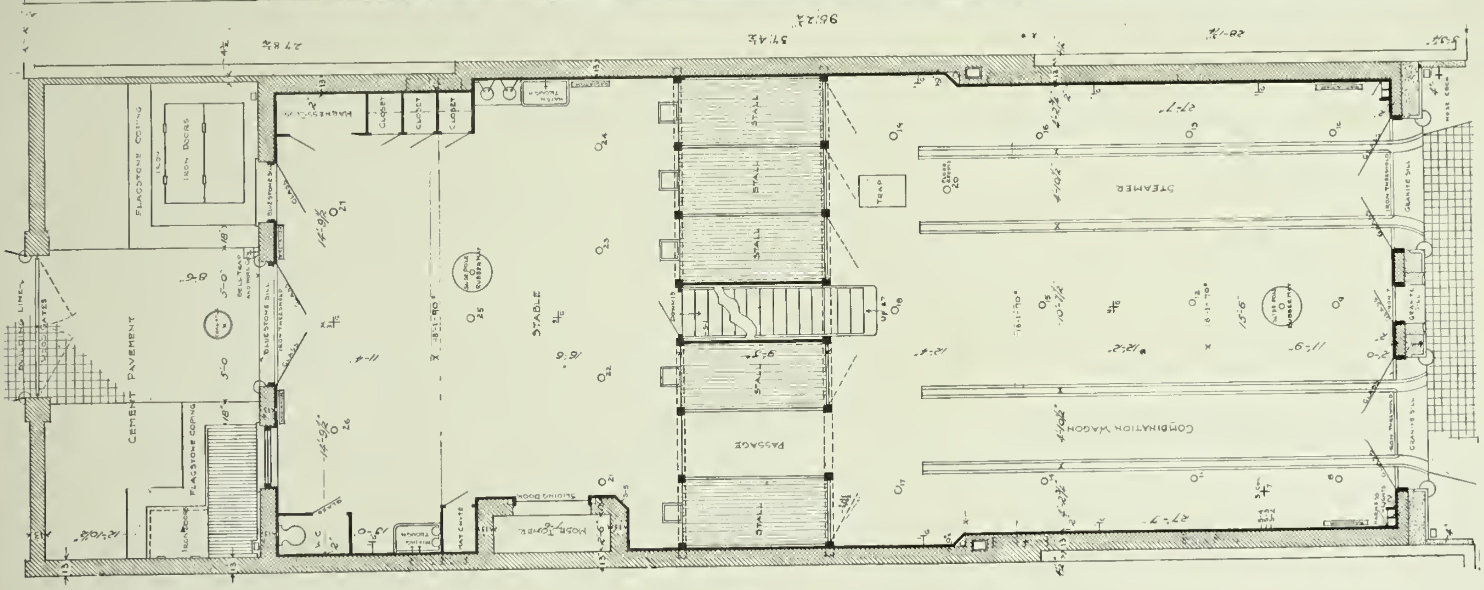
MAGINNIS, WALSH & SULLIVAN, Architects.

ST. LEO'S CHURCH, LEOMINSTER, MASS.

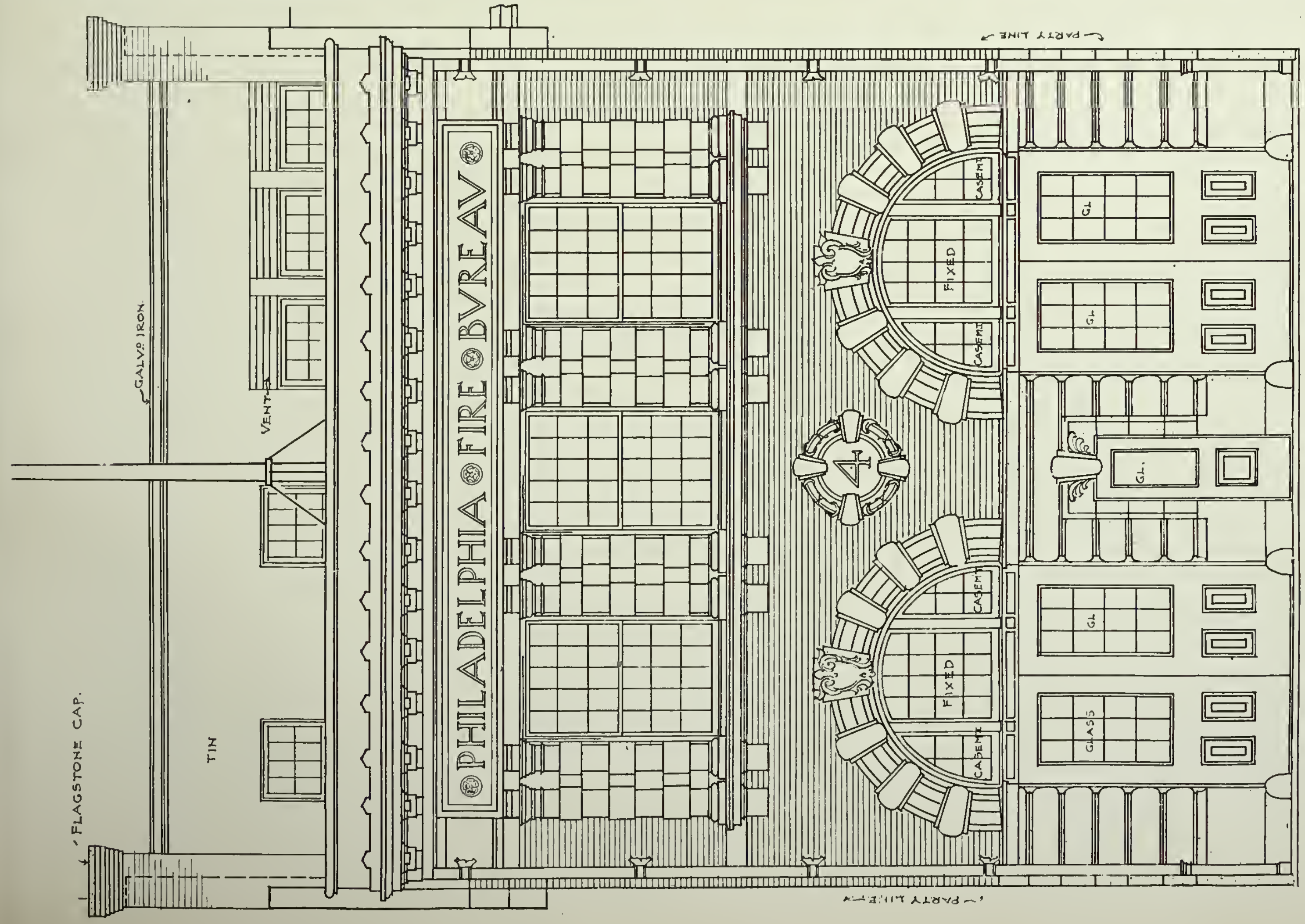
MAGINNIS, WALSH & SULLIVAN, Architects.



SECOND FLOOR.

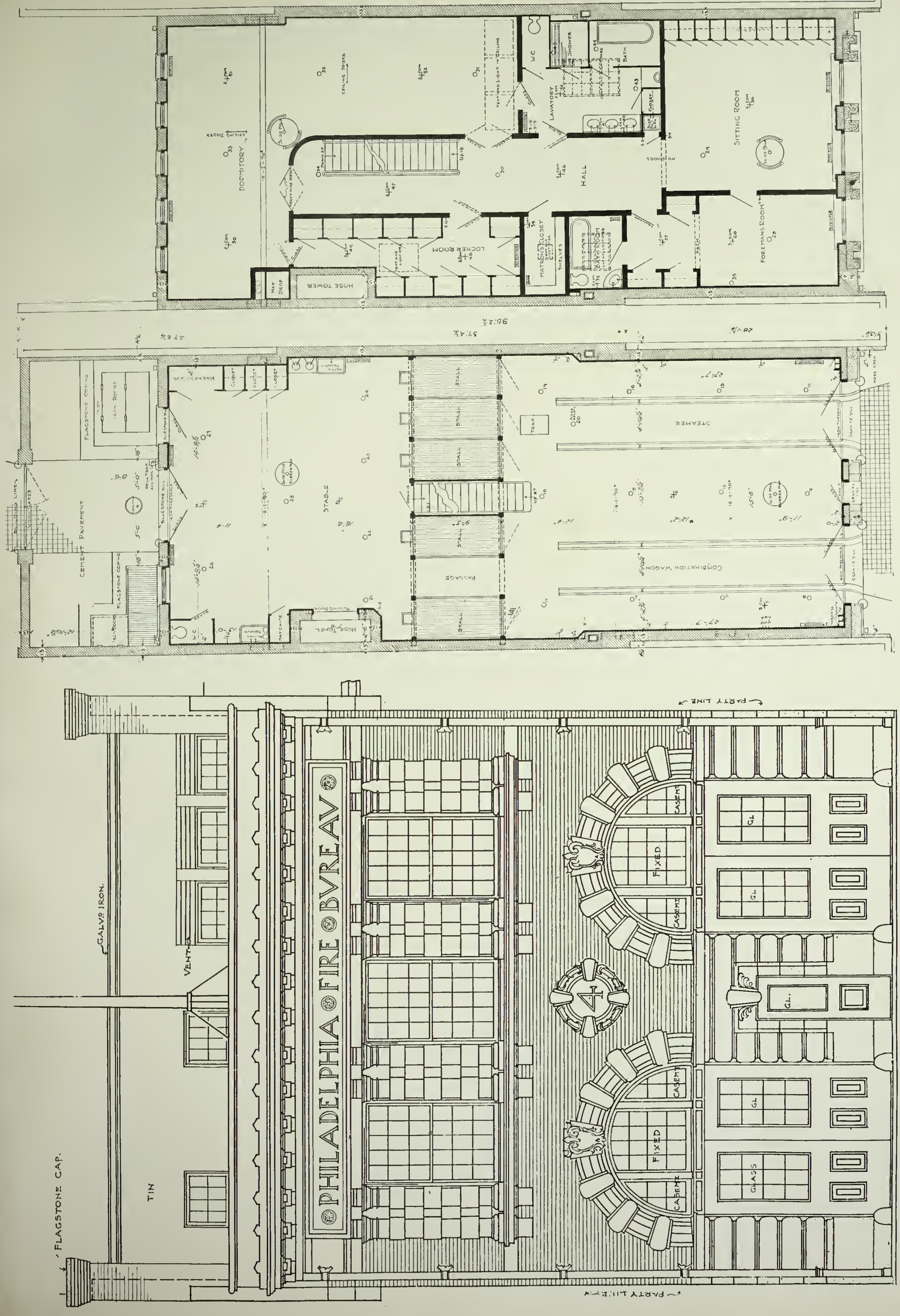


FIRST FLOOR.



FRONT ELEVATION.

FIRE HOUSE No. 4, PHILADELPHIA, PA. E. V. SEELER, ARCHITECT.



SECOND FLOOR.

FIRST FLOOR.

FRONT ELEVATION.

FIRE HOUSE No. 4, PHILADELPHIA, PA. E. V. SEELER, ARCHITECT.

VOL. 8
NO. 11

THE BRICKBVILDER

NOV.
1899

H. F. B.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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BY TAKING THOUGHT.

WE notice in a recent number of a contemporary publication a plaint from a classic contributor, who laments that there is not some way of ready reckoning by which an architect can tell just how large or how small to make the details of portions of his building which are far from his eye, and also just how to modify contours of moldings placed above the eye so they shall give the proper effect when viewed from below. There have been some very ingenious attempts to accommodate indolent persons such as the contributor in question, and it does seem too bad when one is so anxious to do the right thing there should not be some sure way of accommodating him, but, as a matter of fact, architecture is altogether too subtle in its nature to admit of any such formulation. We all remember the familiar section of the ring around the eye of the dome of the Pantheon, which seems so classically correct when viewed from below, and so abnormally distorted when viewed in right section. And we remember the pleasing, if somewhat elusive, theories which Professor Goodyear has developed in regard to variations and irregularities of the early Italian work. But there is no sure guide which will enable a man with his eyes shut, or his mental muscle relaxed, to determine the details of design. The extent to which laziness is an important determining feature of poor composition is something which the lazy ones themselves are the last to appreciate, and we imagine that most of the unsatisfactory work which the public is compelled to endure on its large buildings owes its lack of merit to sheer unwillingness on the part of the designer to buckle down to hard work and to study his design. To be sure, not one architect in ten knows how to study a design at all, and many who would possibly give the time if they had to are usually willing to let what they falsely call well enough alone, so long as it pleases the owner. There are phenomenal geniuses who appear about once in five hundred years, who are able to do things right the first time, but for all the ordinary mortals born in between times it takes hard work, and doing it over and over again, generally wrong to start with and only a little less wrong with each successive redrawing and studying, to get the design of a building into shape that means anything like success. It is so easy to crib our forms nowadays that the unthinking mind often calls the crib the end rather than the means, and sighs for a further simplification of the process by which he can merely transplant his sections or his ornament and have them increased or diminished in the scale of proportion according to a set of tables. But this is not architecture. Fortunately there is a large and ever-growing array of serious thinkers in the profession who treat architecture with the respect which it compels, and spare neither thought, energy, tracing paper, nor pencil. These do not need a ready reckoner.

A ONE HUNDRED THOUSAND DOLLAR LIBRARY.

WITH this issue we begin the publication of a series of articles illustrative of a library building to cost one hundred thousand dollars. The object of this, as of the previous series which have been published in our columns, is to call out suggestions of the possibilities of brick architecture as applied to specific problems. These series do not imply competition so much as comparison of points of view taken of the same problem by different well-known architects, and as such we believe they will be of great value to our readers and will very materially serve the purpose of fostering excellence in constructions in burnt clay. The library problem is a peculiarly interesting one just at present. The example of Mr. Carnegie has borne fruit in many parts of this country, and it is becoming, one might almost say, a fad on the part of rich individuals to present libraries, fully built and equipped in the most modern manner, to their favorite municipalities. This is certainly a feature of modern civilization to be warmly encouraged. We cannot, of course, expect a full study of the specialized practical requirements of the problem, within the scope of articles such as we present, but the essential characteristics of the design, the adaptability of burnt clay thereto, and considerations of essential fitness will, we believe, be set forward in such manner as to commend themselves to our readers.

CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.

THE American Institute of Architects has just held its thirty-third annual convention at Pittsburgh. During the three days' session some very interesting papers were presented and discussed, notably an essay upon the influence of Jews upon architecture, by J. W. Yost, of Columbus, Ohio, and a very thorough and comprehensive study of the subject of architectural competitions, by Prof. W. R. Ware. From the standpoint of the profession as a whole, the most important action taken at this convention was the adoption of recommendations made by the committee on education, in accordance with which the Institute is practically committed to such alterations of its by-laws as shall require an educational test for membership in its body. This is a move which has been agitating for many years, which has been successfully in operation by the Royal Institute of British Architects, but which has come slowly here. The unanimity with which this measure was approved by the convention was considerable of a surprise, and a very pleasant one to many who have followed the course of the agitation leading up to this during past years. In brief, it is proposed that after 1904 membership in the Institute shall be open only to those who are graduates of a recognized architectural school. or who have successfully passed such examinations as shall be prescribed by the Institute. We consider that this action of the convention marks one of the most important steps taken by this body since its formation.

Another very highly commendatory action was taken in the indorsing of the course which has been pursued by Secretary of the Treasury Gage, in relation to the competition for the New York Custom House, which has recently been decided in favor of Mr. Cass Gilbert.

The election of officers, which took place on Thursday morning, resulted in the choice of Mr. R. S. Peabody, of Boston, president; W. L. Eames, of St. Louis, first vice-president; Frank Miles Day, of Philadelphia, second vice-president; Glenn Brown, of Washington, secretary and treasurer; and for directors, Henry Van Brunt, of Kansas City, James G. Hill, of Washington, and Norman S. Patton, of Chicago.

NEW BOOKS.

MODERN FRENCH ARCHITECTURE. One hundred views chosen by Russell Selfridge, architect. Boston, Bates & Guild Company. 1899. Price, $10 in portfolio form; $12, bound.

We had thought ourselves reasonably familiar with French architecture as it exists, but confess this collection gives us a very pleasurable surprise. It is beyond question the best lot of modern architectural photographs that have been put on the market. It includes private houses, hotels, apartments, and a few civic buildings, most of the architecture, however, being confined to the domestic work of Paris itself. It is of interest to us to note, by the way, that out of forty-seven of the private houses illustrated twenty-five are principally of brick.

ESTIMATING FRAME AND BRICK HOUSES. By F. T. Hodgson. New York, David Williams Company, publishers, 232–238 William Street. 1899. Price, $1.00.

We have received a copy of a very compact volume of some one hundred and fifty odd pages, giving in detail methods of estimating the cost of frame and brick houses. This book takes up all the different features of ordinary construction, giving prices, rules for obtaining quantities, and incidentally a good deal of very cogent advice in regard to methods of construction.

PEN DRAWING. An illustrated treatise by Charles D. Maginnis, Boston. 1899. Bates & Guild Company.

ARCHITECTURAL RENDERING IN PEN AND INK. Arranged for use in the School of Architecture at the University of Pennsylvania. Edited by Frank Allison Hays, with text by Arthur Brooke.

For years the only treatise concerning itself with the large subject of pen drawing has been the monumental work of Mr. Pennell, and this is less a manual of instruction for the student than a guide to the intelligent amateur, beside being published at a price quite beyond the slender means of the ordinary draftsman. Now, quite coincidently, two volumes appear whose acknowledged purpose is the instruction of those who most need it, and both are admirable.

With the same end in view, it is but natural that there should be many points of resemblance between the two books. The direct teaching is, of course, very similar, and among the illustrations chosen to point a moral one finds two or three common to each. But with this the similarity ends.

The authors are both pen draftsmen of recognized ability, and, however much they may agree as to the main facts, it is interesting to notice several flat contradictions in matters of detail. For instance, as to pens: Mr. Brooke suggests that "if Goldsmith had been a pictorial as well as a literary artist" he would have added pens to the list of things he loved when old, — "old friends, old times, old manners, old books, old wine"; while Mr. Maginnis's dictum is "The student will find that most of the steel pens made for artists have but a short period of usefulness," — a case of doctors disagreeing with a vengeance, yet there is without a doubt a truth reconcilable with both statements. If it were possible, in the evil times upon which we have fallen, for Mr. Maginnis to gain possession of such an instrument as that of which Mr. Brooke writes, it would probably never be parted from him except through downright theft, and the reviewer remembers distinctly the pens manufactured by Messieurs Blanzy Poure et Compagnie, obtainable during his novitiate, but of late years undiscoverable at the dealers in artists' materials, here in Boston at any rate, — delightful pens, which possessed no Gallic vices, but only Gallic virtues: responsiveness, sympathy, and, above all, the faculty of growing old gracefully. As to inks, too, there seems to be considerable latitude of opinion among experts, since Mr. Brooke recommends Higgins's unreservedly, while Mr. Maginnis suggests that Bourgeois' French Ink would be quite as good, if not better, were it only put in the pleasant un-tip-over-able bottles used by Higgins.

But, after all, these are matters of no great consequence; the real aim of both books is the instruction of the unlearned in pen drawing, how best to avoid those difficulties sure to beset one at the outset. In this it must be pleasant for the two authors to observe there is little or no trenching on the other's preserves. Mr. Maginnis has succeeded in producing within the limits of a compact, unpretentious volume a deal of information most valuable to the beginner. With the utmost simplicity he sets before the reader all the vital facts of the art, taking up and disposing of the lions in the student's pathway, one by one: bad composition, lack of repose, over-elaboration and the like, drawing his illustrations from every conceivable source. His own name is familiar to all of us on so many of the best drawings in the technical periodicals that no gift of prophecy is needed to foretell a sure success for his work, a success not only for himself and his publishers, but also for those who intelligently ponder his words.

Mr. Brooke's book is very different in "get-up" from Mr. Maginnis's. It is large and rather magnificent in effect, so large and magnificent in fact that at first sight one feels that here is another error in the little understood art of book-making. Once within the covers, however, it is easy to understand that the size was necessary in order to attain the results at which the authors have aimed; for this is not only a treatise, but a genuine text-book, prepared with an eye to direct instruction in the classes at the University of Pennsylvania. Here are a number of photographs of architectural subjects carefully reproduced in half-tone, mounted and matted, and their duplicates printed in pale ink, over which it is intended the students shall work. The illustrations proper, printed as marginal notes, are apparently not quite so well reproduced as those in Mr. Maginnis's book, but the text here constitutes the item of greatest value. Mr. Brooke, had he not elected to follow the profession of architecture, might well have become a literary man of note. Not only do his sentences have a clarity and distinction rarely found in so purely technical a treatise, but, as well, a certain charm and beauty one would never have dreamed of as possible in any text-book.

Comparisons are odious, and fortunately here none is necessary. The two volumes complement rather than rival one another, and it would be well if every earnest student could possess both. So much has been given to the world under the head of art criticism without producing in its readers more than the absurd parrot talk one hears in the galleries, that it is pleasant to welcome two such able works as these, both clear, concise, and not written by mere theorists, but by acknowledged masters of the technique of their subject.

A Public Library, to Cost One Hundred Thousand Dollars.

PROGRAM.

A PUBLIC library is to be erected in a New England town of twenty-five thousand inhabitants. The proposed lot has an easterly exposure on one side of a small public square and on the axis of a prominent street. The lot measures 250 ft. on the front with a depth of 200 ft. The front is level, but the grade slopes rapidly towards the back at a radiant of one in five. No portion of the building proper is to come within 20 ft. of the front line of the lot or 10 ft. of the other three lines. Opposite the library across the square will be built the village church.

The requirements are as follows: —

A book stack (closed stack) to accommodate forty thousand volumes; a reading room with 1,500 sq. ft. of area; a delivery hall of 900 sq. ft.; a newspaper and periodical room of not less than 1,000 ft.; a trustees' room; librarian's room; a cataloguing room; unpacking and work room; toilet rooms for employés and the public. The reading room may be used as a reference library or a special room may be provided. A small room may be shown for the exhibition of pictures and photographs. Provision must be made for a future extension of the stack room to furnish accommodations for sixty thousand more volumes. The style is left optional, but it must be one that will, if possible, harmonize with its surroundings, while it must clearly express the function of the building, and adapt itself to the material used, which, so far as the exterior walls are concerned, will be exclusively burnt-clay products.

FRONT ELEVATION.

CONTRIBUTION.

BY THOMAS M. KELLOGG.

The interest manifested in public libraries is constantly increasing, and nearly every town of a few thousand inhabitants now considers the public library of equal importance with its schools and churches. It is surprising how within the past few years public libraries have sprung up in all parts of the country; nor is this rapid growth of storehouses for books by any means confined to our larger cities. Even small country villages of a few hundred inhabitants are beginning to have their free circulating libraries, where the children and even the older people may be seen on certain appointed evenings going in and out with books under their arms. It may be that the library is only an adjunct of the corner grocery store, or possibly a room set apart for the purpose in a portion of the public school, but be where it may, it is well patronized and adds greatly to the educational and intellectual development of the community. Many towns which have thus started with a nucleus of a few hundred volumes, housed in any convenient or available corner, have by the energy and public spirit of a few prominent citizens, finally dedicated a site for a building, to be devoted entirely to library purposes, and if the energy and public spirit holds out long enough, the building is sure to follow, sooner or later.

In the present instance, the site is already selected for us, and one's imagination can easily picture it to be a very fine one. A public library should always, if possible, be located on a public square, or, in other words, it should have the best the town affords. Plenty of space, light, air, and pleasant surroundings should certainly accompany a building to be devoted to literary and educational purposes. It should also be easily accessible, and treated both in its surroundings and the style of the building in such a manner that a stranger in passing should not be compelled to make inquiries as to its purpose.

Here we have a large lot, 200 by 250 ft., on one side of a public square and on the axis of a prominent street. The treatment should therefore be orderly and symmetrical so far as possible, and the suggested layout consists of a broad and inviting central main approach, a side entrance for supplies, books, etc., while in the rear, on either side, are simple flower beds, ending with an exedra stone seat under the shade of a large elm tree. A well-trimmed osage hedge forms the boundary line on three sides, while the front is finished with a low brick wall or stone coping.

The building is of course located in the center of the lot, with its axis on the street referred to in the program. A broad, open terrace leads through a moderate vestibule into a large and effective hall, which answers for the combined purpose of delivery and card catalogue rooms, and may be used for memorials, statuary, etc. The delivery desk is directly in front, while on either side, cross halls, 12 ft. wide, lead direct to the main reading room, and newspaper and periodical room, respectively. On either side of the front entrance, and opening from the hallways, are the trustees' room and a room of corresponding size for the exhibition of pictures and photographs. The librarian's room is in close touch with the working department of the library, and occupies a space on one side of the delivery hall corresponding with that devoted to cataloguing purposes on the other.

The librarian's room is also easily accessible to the trustees' room and is provided with a large fire-proof vault and private toilet. Adjoining the newspaper and periodical room is a room for files; these accumulate very rapidly, and are thus convenient of access for purposes of reference.

The cataloguing room connects with the unpacking and work room below by means of a large lift. The latter room is placed in the basement, which, owing to the rapid slope of the ground towards the rear, would be entirely above ground, and thus convenient of access for the outside delivery and unpacking of books.

It was thought best in a building of this size and character to place the toilet rooms in the basement, where they would be more retired and less objectionable. A room for bicycles would nowadays seem a necessity and this could also be placed conveniently in the basement, adjacent to the outside area entrance where shown.

A single staircase was thought sufficient for the requirements of a building of this size, leading from the basement to the first story, and to that portion above, where the height of ceilings would permit of a second floor, viz., over librarian's, trustees', and cataloguing rooms, also over room for photographs. The newspaper and reading rooms, also delivery hall, would carry up full height, and additional light and architectural effect obtained by means of skylights in the roof and ceilings.

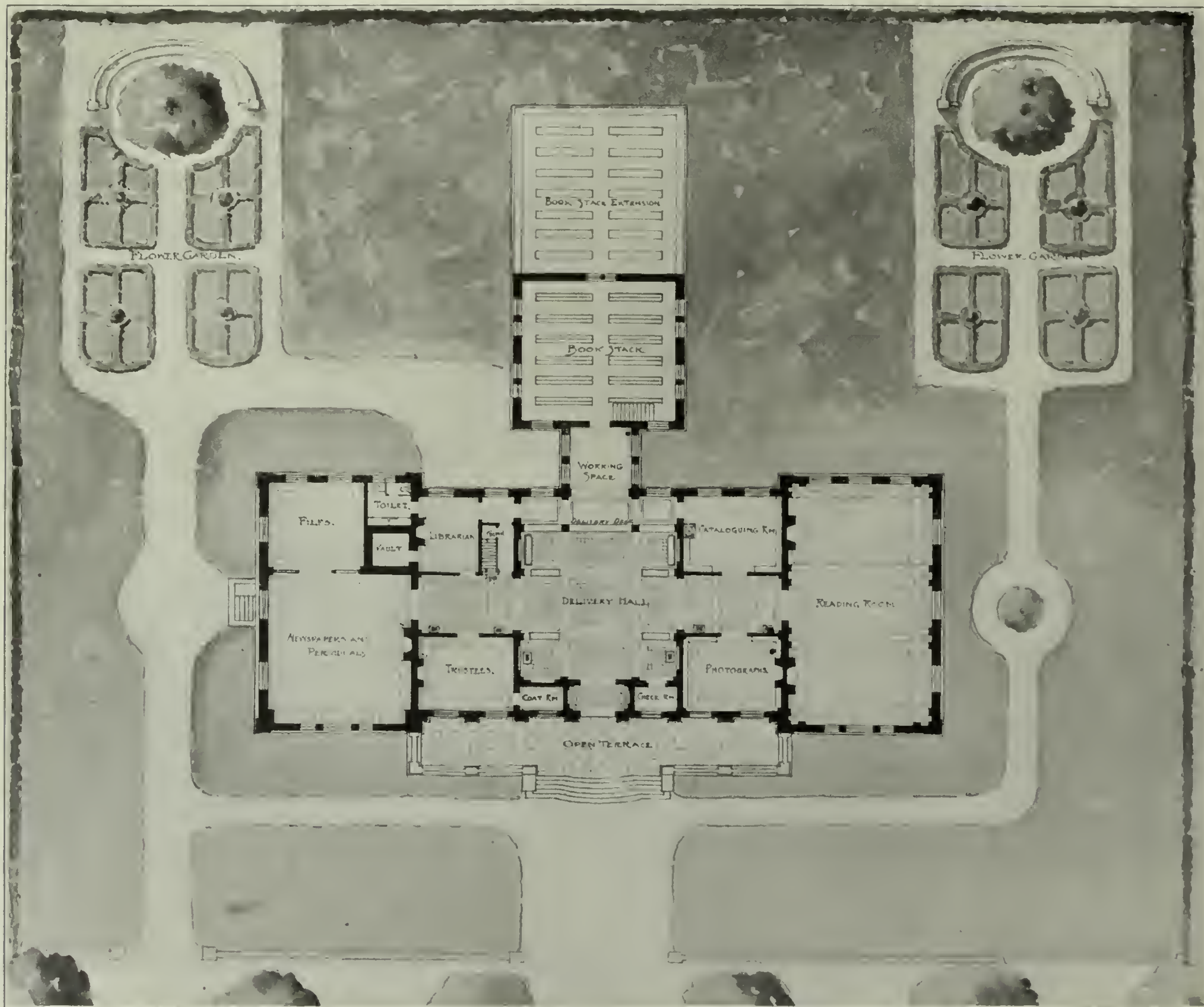
The space back of delivery desk would have a lower ceiling with gallery over, thus connecting with the upper tier of the book stack, and forming a passageway on upper floor for rooms separated by the delivery hall.

The book stack is convenient of access to the delivery desk, and is complete in three tiers, one of which is below and one above the main floor level. The present capacity is for forty thousand volumes, with a future extension shown for an additional sixty thousand volumes.

The exterior of a public library should have distinct characteristics which will enable one to determine at once the purposes of the building. Towers and broken sky-lines, undue enrichment or ornamentation seem to be wholly out of keeping and almost invariably detract from the dignity and simplicity which belong to a building of this character.

Plain wall surfaces should predominate, and whatever ornamentation is required should be concentrated in such a manner as to emphasize rather than to conceal the plain surfaces.

The principal entrance should be emphasized more by the surrounding detail than by an unnatural effort to obtain a large and monumental doorway. Unless the building be of vast proportions the scale is apt to suffer and the architectural effect of the whole building greatly injured by striving for the popular demand for what is called "an imposing entrance." In the present instance an effort has been made to keep the exterior simple and dignified, and to preserve to some extent the characteristics of a library building of moderate dimensions.



PLAN.

It is also treated in a manner entirely suitable for the required materials, and would be constructed wholly of brick and terra-cotta. The plain wall surfaces should be faced with a light golden-brown brick, with trimmings, cornice, etc., of cream-white terra-cotta. The cornice could be somewhat enriched with ornamentation, while the series of seven arches in the central portion forms ample emphasis for the entrance without injuring the general proportions.

The roof would be covered with greenish-brown unglazed tiles.

The entire building including the suggested layout of the grounds could be completed well within the limit of $100,000, which would doubtless include a sum sufficient for appropriate interior decoration and enrichment.

The Artistic Possibilities in the Use of Roofing Tile. II.

BY W. A. OTIS.

THE conditions to be fulfilled in our Northern climate are far more difficult to successfully accomplish than in most parts of Europe. The variations in temperature often even in one day are something appalling, while the extremes of winter and summer are such as to put all mechanical products to the severest tests. As a result of these two reasons the actual and exact reproductions of old or classic tile have not been most successful, and various expedients with roof boarding, nails, cement, pointing, etc., are necessary to overcome the difficulties; so that such roof covering is really only an imitation, and rarely as satisfactory as some other forms more modern and scientific.

These modern shapes, generally with patent and interlocking joints, often have a strong character of their own, even though it may not be that of the so-called classic form. Also they have practical qualities which the average modern owner regards as of far more importance than mere traditional shape; so that in nine cases out of ten their ability to better shed water and their greater economy outweigh the old conventionalities.

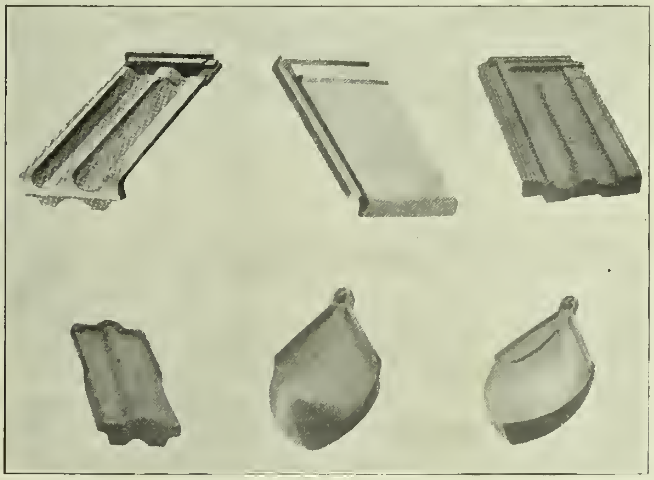


FIG. 14. MODERN TYPES OF ROOFING TILE.

Again, by their mechanical perfection they are typical of this very age, and should just as properly become a part of our architecture as steel skeleton construction, and other modern and practical devices. Figs. 14 and 15 show some of these modern interlocking types, the artistic qualities in many being very pronounced.

Moreover, if manufacturers will persist (by steadily adhering to a few approved patterns) these very forms will themselves soon become classic in American architecture, so that those who demand age as the special seal of approval to their work can then have it.

If, however, the manufacturers continue, as now seems their aim, to change every year or two their patterns, together with a multiplicity of minor variations, labeled (often falsely) "improvements," they will not gain that increased strength and prestige which rightly come from long and honorable usage.

In this connection, it is well for an architect to consider the confusion and annoyance that can overtake himself and the vexation and expense that may come to his client by the specifying of shapes or shades that are only temporarily in the market. An addition is to be made to a building, say five or six years after its completion; without making a special order there are no tile of this kind to be had! The same case may be even more provoking when possibly a dozen tile are wanted to mend a roof (say one injured by lightning, for, of course, a tile roof would need no repairs from any ordinary cause) unless only the old and staid shingle tile are employed.

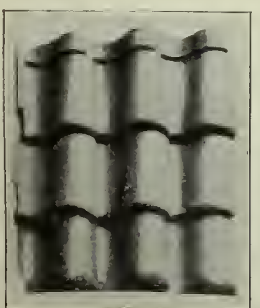


FIG. 15. MODERN TYPE OF (SO-CALLED) "SPANISH TILE."

These are much more serious and practical objections against the extended use of roofing tile to-day in *small buildings* than most of the manufacturers are willing to acknowledge, and such arguments rarely receive any consideration, and will not, until architects insist upon throwing out all patterns except such as are to be standard, and can be expected to be in stock every year for the next fifty years.

If this business is to become a very great one, it is absolutely essential (trivial as the manufacturers may declare the arguments to be) that our factories resolutely turn their backs upon the unfortunate American method of catering to and changing the fashion.

For an occasional enormous and monumental building this need not apply, but for the great mass of buildings which constitute the vast bulk of the work it is important. The manufacturers must themselves set the example, and, weeding out all but a very few of their best designs and colors, keep them always in stock. By this method the design perforce will soon become classic enough to satisfy all except an occasional taste, where expense is immaterial. But, to return to the consideration of the artistic effects obtainable by the shape of the tile themselves. Among the historical tile, now generally in the market, most prominent are the so-called Spanish tile (in reality not Spanish at all, but Dutch), as in Fig. 15, with the alternate convex and concave surface all in one piece.

The effect of light and shade upon these alternating surfaces, with the continuous lines from eaves to ridge, is the beauty of this tile, especially effective in round tower work, where the lines radiate from the apex of the roof, the tile being graduated in size.

This is almost the only curved tile in the general American market, and where the composition of any particular design seems to require such lines on the roof, it is about all we can obtain without unusual expense.

This effect of a series of straight lines (usually formed by a curved tile covering over and under one) from eaves to roof is in reality the marked feature of most of the historical tiles. Variation in character and much artistic effect are gained by the distance apart of the lines of semicircular tile, — a feature known as the alignment.

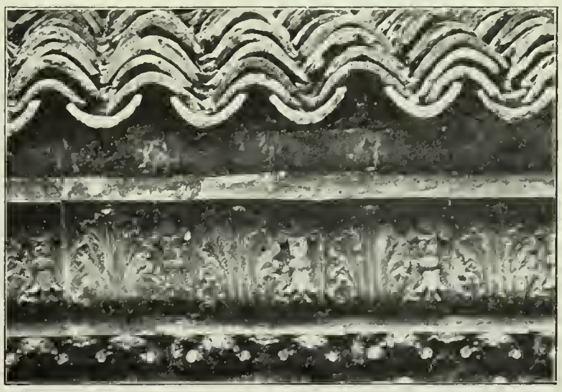


FIG. 16. ITALIAN TILE.

Where the upper and the lower member were both small, semicircular tiles of the same size, as in much Italian and Spanish work, the alignment is very small. Fig. 16 shows an example of this kind of tile from the Certosa at Pavia.

The curved lines, the delicate shades at the ends of the tile, the shading on the tile themselves, are, when viewed from a distance, unquestionably extremely beautiful, while the variety of shapes that can be obtained shows the great possibilities of artistic results that come from this style of work. But, evidently, much of the glamour of this work arises from its association in our minds with the beauties of classic and Renaissance buildings.

In strong contradistinction to these tile come the ordinary flat shingle tile, previously mentioned. In this case the only modifications feasible for artistic effect of shape are the contours of the ends, in a variety of forms, which necessarily must be quite simple, usually the round, the octagon, etc., as shown in Fig. 1.

As previously noted, many of the other varieties of tile in the market can be classed under the general head of interlocking, and are, as a whole, essentially modern in character, it having been found practically impossible to utilize or economically copy the better known historical shapes. Among these shapes are the ones already indicated in Fig. 14, while their combinations upon the roof are indicated in Figs. 9, 10, and 11, as well as in Figs. 17 and 18.

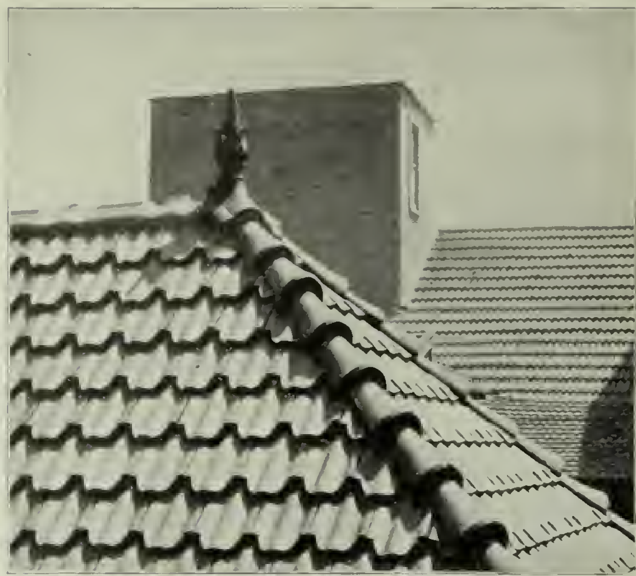


FIG. 17. MODERN INTERLOCKING TILE.

As will be seen and as is generally appreciated by architects, many of these have strength and vigor of line, and so make shades and shadows in the detail that certainly present possibilities of rendering the whole effect of roof really just as truly artistic as the old historical style, and by a judicious choice of patterns it is certainly possible to find a composition of line and shade that will effectively and properly harmonize with almost any of the historical styles of architecture which would be adaptable to the usual modern requirements.

When considering the choice of a shape to be employed, the first point to decide is whether a bold effect with deep shadows is desired, or if a merely flat effect would harmonize best with the general design. For large and high roofs the great bold forms with the deep shadow on each tile itself is usually by far the most effective; while a small roof comparatively near the eye of an observer, with this same tile, would be entirely overpowering.

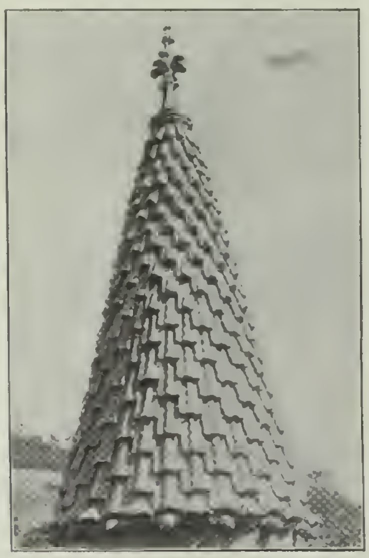


FIG. 18. A MODERN INTERLOCKING TILE.

It is astonishing how bold and large a tile may be and still not appear in the least overmuch so when above one on a large roof. Fig. 19 is an illustration of this character of tile. In very large and unbroken roof surfaces this is especially good, while for one frequently broken by dormers, gables, etc., some of the smaller forms are preferable.

In some of the Southern Renaissance styles when precedent is followed the roof is often studied to be as inconspicuous as feasible, or if not inconspicuous to at least not be at all overpowering, and a smoother effect may be sought after.

But as a general rule in our American work, where the endeavor, as in the early French Renaissance, is to combine a certain refined artistic feeling with the picturesque side, very much of that result will depend upon the roof, the bolder effects are especially desirable. Hence, one looks for such tile (while mechanically perfect) as will at the same time give these bold effects. As the lines and the shadows of the roof covering depend almost exclusively upon the shape of the tile themselves, so the artistic possibilities, with the present patterns in the market, are much greater than generally imagined, while if considered essential for special work, forms from historical and other sources increase the number to such an extent as ought to satisfy every designer.

A consideration of the shapes will also satisfy one that not merely by the variations of contour is one able to obtain what might be called a "pretty effect," but there are also extraordinary possibilities of more perfect harmony of design. A Gothic roof can be made with tiles where ends are shaped like a Gothic arch, etc.; while for some distinctly American composition the design of a

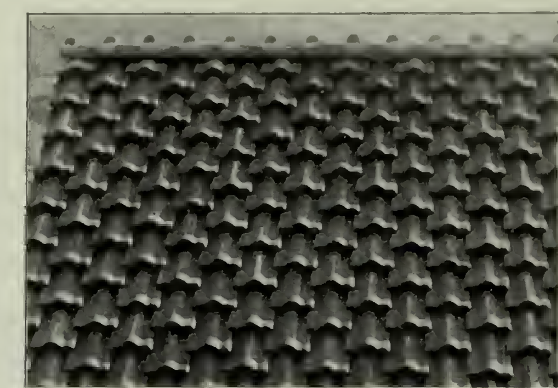


FIG. 19. LARGE BOLD TILE.

simple form, with no great attempt at ornamentation, is certainly likely to be the most satisfactory.

The consideration of the shape of the tile themselves naturally leads to the possibilities of construction of tile into

PATTERNS,

which is the third means, somewhat largely employed by designers for the artistic treatment of tile. It is emphatically the most difficult of all the methods, requiring, as it does, very decided ability and artistic feeling on the part of the designer to succeed. The great difficulty is to take the happy mean; for if the design is too unimportant and insignificant, the effect is weak, and almost as bad as if the other extreme was reached, where the pattern of the whole roof is so striking, vulgar, and offensive as to overwhelm everything else, and completely kill the architectural effect.

This method of treatment in Europe is almost exclusively a modern or medieval one, and if ever only very rarely employed in the old classic period. In the Orient, on the contrary, its use seems to

FIG. 20. AN EXAMPLE OF TILE IN PATTERNS.

have been very early, since glazed roofing tile are ancient in China; but it scarcely appears in European work before the time of the Byzantine and Romanesque.

All figures in this class of design must, of a necessity, be extremely simple and the combinations formed by straight lines. As a result of laying the tiles in rows, the figures become either straight bands following the courses, or else figures bounded by straight lines, and of these, diagonals are by far the most effective, forming as they do the so-called diamond or lozenge shapes, which are very numerous and rich.

There may be readily distinguished two groups or classes of patterns: —

First, those where the designs are produced by the introduction of tile of different shapes (but of course of the same general dimensions, so that they will lay together). These patterns as seen upon the roof are not particularly conspicuous, since the color of both pattern and field is the same, but none the less the results obtained are often decidedly artistic, and it is to be wondered that the advantages of this method of treatment are not oftener seized upon by designers. An example of this use is shown in Fig. 20, being a fragment of one of a tile company's Columbian exhibits.

The simplest treatment is by straight bands of different tile, usually those of rounded or octagonal ends forming the design. An example of this is shown in Fig. 21, from a chapel roof in Baltimore.

Such a scheme is more agreeable to the eye than the monotonous surface of a great roof, but can scarcely be called an extremely high artistic ideal.

Upon towers or spires, especially if polygonal in plan, these bands are, however, much more effective and desirable. An effect of this kind is produced on towers by changing size of tile, as Fig. 22.

The lozenge forms, however, are by far the most effective and satisfactory, and in a very quiet way may give a very dainty result. It certainly is a treatment worthy of much wider use than is general at present. Fig. 23 illustrates the possibilities of this use of tile.

FIG. 21. ORNAMENTAL EFFECT PRODUCED BY LINES OF DIFFERENT SHAPED TILE.

In the second method patterns are obtained where the tile are alike as to shape, by different colors of tile, or by patterns on the tile themselves.

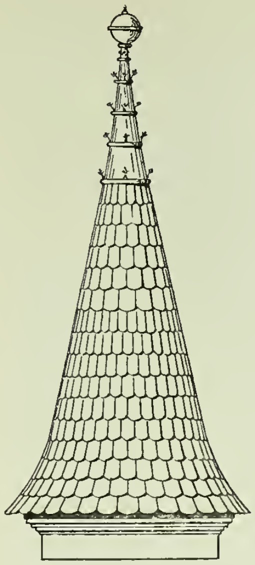


FIG. 22. SHOWING BAND EFFECT PRODUCED BY CHANGING THE SIZE OF TILE ON A TOWER.

The tile which gives such designs are usually glazed to give color effect, while the great portion or background of the roof is the common red. The most usual glazes are white, black, green, and yellow. One of the best known examples of this recently was the German Building, at the Columbian Exposition, which was extremely effective and artistic, while at the same time so thoroughly harmonious with the architecture that it was really not noticeable, strange as it may sound, and no one seems to have ever considered it necessary to criticize it.

For an effective use in this method, a large unbroken roof surface is very essential, or else a very picturesque outline, or possibly a tower, with just sufficient surface to allow small dots and points of color. The best known, and possibly one of the oldest existing roofs of this character, is on the cathedral of St. Stephen's at Vienna, where the roof scheme supplies much of the character to the old Romanesque portion of building, and its great surface is beautiful in color, with the lozenge pattern standing out boldly, as shown by Fig. 24.

In many smaller buildings, especially in Germany and adjoining countries, one finds striking and beautiful examples of this class of design. The cathedral at Basel shows similar treatment.

For large, or monumental, or even specially picturesque work, there would be on the ground of expense probably no serious objection to the glazing of a few tile for these designs, for only a very moderate expenditure is required; especially upon low domes a most effective result may be obtained, as shown by Fig. 25, from a French "projet" of a memorial chapel. But examples of this kind of ornamental use of tile are numerous in Germany and Austria, and fully demonstrate the great possibilities of its artistic use.

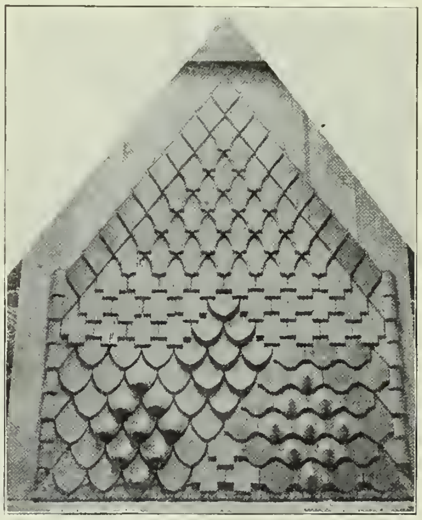


FIG. 23. AN ARTISTIC TREATMENT OF ROOFING TILE BY PATTERNS WITH DIFFERENT SHAPED TILE.

This use of tile, where color, shape, and pattern may all be combined, certainly represents the height of their artistic employment. This field, as far as America is concerned, is as yet almost untried, and if only proper study and ability are used in the solution of some future problems of this kind, the advance of tile roofing of the most artistic character will be thoroughly assured.

While the effect of tile roofing is of course gained very largely by the tile themselves, yet possibly in this more than in any other the finishing touches, so to speak, and the strongly marked qualities of individuality and artistic ability will be shown by what may be termed

FIG. 24. ROOF TILE IN COLORED PATTERNS, ST. STEPHEN'S, VIENNA.

THE ACCESSORIES,

such as the hip and ridge coverings with the finials that mark the beginning and stopping points. As the requirements of a covering for a ridge or hip are, when reduced to its simplest expression, merely a half-circled tile, there is not an extremely wide field for variation: but whether the historic Greek, Gothic, Japanese, or some more modern form be used, there is always a pronounced character, showing that even within the narrow limits permissible a decided expression may be given to these features, which will in turn give most extraordinary finishing touches and beauty to a roof; while the omission of them or the use of an undesirable pattern quickly reduces a roof to the very commonplace. As for finials, they represent either a climax of the entire artistic scheme, or else unfortunately sometimes a most frightful anticlimax. A few of the usual forms of rolls and cresting are shown in Figs. 27 and 28.

Naturally, these accessories should as much as possible be in harmony with the general character of the tile covering. Where that is bold and rugged the hips and ridges should likewise partake of that character, or where more smooth and equable the less pronounced ones are desirable.

In fact, under all circumstances, for best results they should accentuate the characteristics of the tile themselves, the knobs or the joinings of each section making clear, sharp-cut points against the sky, all of which very greatly adds to the whole artistic effect.

To the stock patterns of hips and ridges architects may usually gracefully submit, as they are generally both practical and rather artistic; also to the simplest expression of a finial there is not much criticism, but they should all be chosen with care, and not left to mere chance. As to the fine attractive finial, however, when used from time to time, a special design is almost always essential; these give an especial touch of character and individuality to a roof. A finial even of charming design that may be artistic for one place often is perfectly abominable when placed upon a totally different kind of roof. Very high finials in terra-cotta, however, seem rarely in good keeping upon the roof, and such features are more properly of metal, while the lower finials seem to be especially adapted to the heavy material.

In the more classical schools of design appear those accessories which it is a little difficult to classify, whether they are a part of the cornice of the gables or of the roof covering itself, viz., the ornaments known as acroteria, which in the old Greek and Roman architecture were so very effective, and gave to the entire roof a still further touch of artistic and refined treatment altogether charming. Examples of these are shown in Figs. 2 and 3. This feature of tile roofing quite rarely now seen in modern design is, however, an effective agent and should not be forgotten. For buildings in certain positions (especially rather isolated ones) these features are of exceptional importance and may well be studied and used much more than at present.

FIG. 25. PATTERN TILE UPON DOME.

FIG. 26. ELABORATE PATTERN TILE ROOF, VOTIVE CHURCH, VIENNA.

From the foregoing it would appear that the artistic possibilities of roofing tile are exceptionally large, while the field is as yet one scarcely touched upon by American architects.

It offers the widest range to the artistic designer, and when successfully carried out adds enormously to the real and lasting beauty of a building.

Even the best of tile roofing is not wholly satisfactory when used as a cloak for a bad design. A roof of poor outline or generally poor shape cannot be expected to become a thing of beauty, merely because covered with terra-cotta plates, when the error and trouble is a fundamental one. It can no more be remedied by a covering of roofing tile than the bad architectural design can be corrected by covering it over with carving. To be sure, the observer may be diverted and deceived for a brief time, but sooner or later the trick

FIG. 27. TYPICAL HIP AND RIDGE ROLLS.

will be discovered, and the means used, though beautiful themselves, will lose by it.

Hence, it is of special importance when a roof is to be covered with tile and become so prominently the crowning feature of the building, that the outline, construction, and general management should receive much more study than usual.

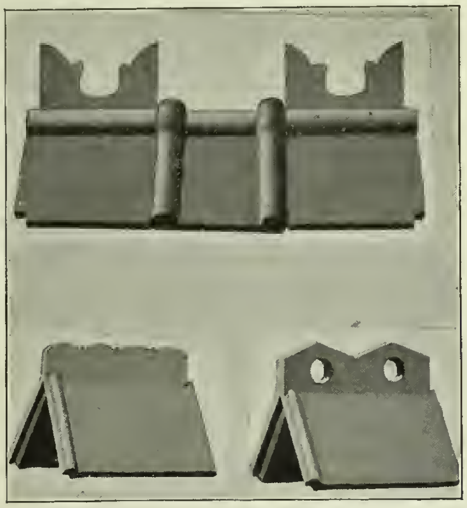


FIG. 28. SOME CRESTINGS SUITABLE FOR TILE ROOFS.

Then designers will be able to take the very fullest advantage of all the possibilities in color, form, patterns, and accessories. And if when tile are used the minor features are each studied with the care they merit and with the possibilities they possess, the artistic value of even simple buildings will be enormously increased and certainly thereby the architect will lose no glory.

Curiously enough, in this line of work the architects seem to be the ones who have always held back, for the makers of the high-grade tiles have thus far worked largely from their own inspirations. The most artistic of our designers seem rarely to have interested themselves more than to complain of the lack of the impractical and strictly historic shapes, and only occasionally shown a proper appreciation of the real riches spread before them.

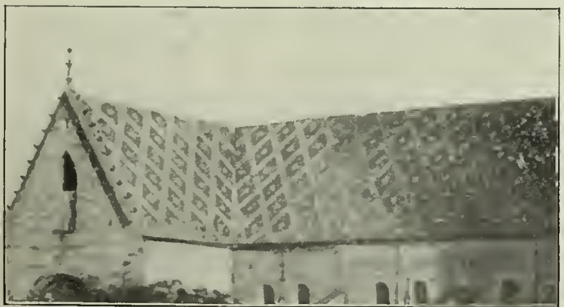


FIG. 29. TILE PATTERN, CATHEDRAL ROOF, BASEL, SWITZERLAND.

WITH CLUBS AND SOCIETIES.

THE T Square Club is this year making an experiment in the management of the competition work in design which will be looked upon with interest by other architectural clubs.

A European Traveling Fellowship is to be awarded in June on the basis of seven monthly competitions, each counting by itself, but all related to the same subject, so that the competitors have the benefit of a year's thought, and there is no chance for the scale to be turned by a mistake or a lucky hit, as is the case in the nervous haste of the ordinary competition.

The problem is a continuous one. That is to say, the subject chosen for this year is a large modern house, supposed to be built by " a progressive and public-spirited citizen, proud of his Philadelphian lineage, and a punctilious respecter of the traditions of his native town." The first competition is in the nature of a preliminary sketch demanding a general layout of the grounds. The competitions immediately following are for plans and elevations of the house, to be judged irrespective of the previous judgment on the grounds, for the stable and such other outbuildings and accessories as the competitor may care to amplify, and details at ¾ in. scale of the most important architectural elements of the design. The final competitions permit a complete revision by the competitor of his original scheme, embodying all the ideas he has gained during the year, requiring a carefully rendered plan and bird's-eye-view perspective of the entire estate.

It is interesting to know that thirteen designs were submitted in the second competition, which has just been decided. This is a novel program, and one which reflects a great deal of credit upon the club. The outcome will be watched with much interest. Most of our competitions are so spasmodic that they do not always afford a fair test of work, especially when that work is to be done by students, and the final outcome of these seven competitions ought to be the selection of a thoroughly equipped man.

ONE of the first fruits of the formation of the Architectural League of America is a code of competitions which we have received from the secretary, which has been adopted by several of the architectural societies. If all competitions were fair to both parties, and the decision of the jury could be depended upon as honest or as affording a selection of really the best design, there would be little necessity for codes. Even with the best rules, however, competitions often go awry, but certainly this code is as precise and free from unnecessary restrictions as one could wish. In the main the conditions are essentially the same as those which have been recommended by the American Institute of Architects. We notice, however, one feature which permits a jury to call in additional disinterested experts, and also the promoter, to advise with them. The essence of the code is contained in the second portion defining and explaining the program. This is as follows: —

The program is an agreement, the terms of which must be carried out in good faith by all parties.

The terms of the program are to be concisely stated and must be mandatory.

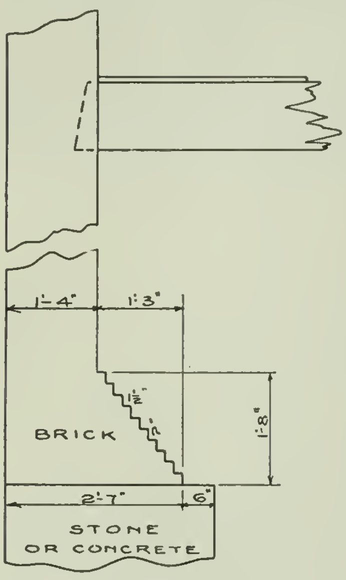
The program shall (*a*) Be headed substantially as follows: " Under the General Code Governing Competitions in Design of the Chicago Architectural Club, of which a copy is subjoined, [Name of Promoter] invites competitive proposals upon the following program": — (*b*) Contains a definite statement as to proposed cost. (*c*) Contains a definite provision as to anonymity. (*d*) Name the jury, which must include experts upon the subject under consideration. (*e*) Fix uniform requirements for drawings, models, or other forms of proposals. (*f*) Fix a definite time and place for receipt of drawings, models, or other forms of proposals. (*g*) Fix the nature or amount of the awards or prizes. (*h*) Fix the period of time within which decision will be rendered. The balance of the code relates to definitions, drawings, models, and the jury.

Foundations for Buildings.

BY HENRY W. HODGE, C. E.

IT is evident that no part of a building is secure unless it is on a thoroughly secure foundation, and, therefore, it is of the first importance that this matter receive the most careful attention from the architect or his engineer.

For the ordinary residence or small building, the weight to be carried on the foundation is so uniformly distributed and of such small magnitude that the ordinary footings under the thicknesses of walls required are amply sufficient to carry, on any ordinary material, and, therefore, this problem has not been a difficult one till recent years; but the advent of very tall buildings with concentrated loads of varying magnitudes has so complicated the problem and increased the difficulties of making a safe foundation that it has become one of the architect's most difficult undertakings, and generally requires the advice and services of an engineer experienced in such matters.



SKETCH No. 1

FOOTED OUT WALL

It is not my purpose to try to cover in this article the entire subject of foundations, which is a very broad one, but only to give a few ideas of what should generally be done, and of still greater importance, what should not be done, with a few examples of modern foundations; as these points will, I trust, be of assistance in ordinary cases; and in special cases of great magnitude no directions can be given other than to employ the best and most experienced engineer possible, as every foundation must be designed to meet the local requirements and seldom can one be exactly patterned after some previous one, and one cannot be too careful to get a perfectly secure foundation even if it does seem expensive, as almost any other portion of a building can be strengthened if found insufficient; but an insufficient foundation means a permanently insecure building, and seldom can it be remedied at anything like a practical cost.

The simplest foundation is the ordinary footed-out wall, as shown on Sketch No. 1, and it has become so customary to foot out all on one side, as here shown, to prevent encroaching on adjoining property, that some architects think a uniform pressure is thus brought to bear on the material under such footing, and the writer has often been asked to state "what is the average pressure, and where is its center of gravity."

The supposition that this footing gives a uniform pressure is entirely erroneous, as it does not; since the center of pressure is directly under the center of gravity of the wall above and the floor loads resting thereon, or practically under the center of the wall, so to get an absolutely uniform pressure the footing should be either footed out on both sides of the wall equally, or not footed out at all, as it is evident the center of the loads is fixed practically at the center of the wall, and the shape of the footing cannot possibly change this line of loads; so that the unbalanced portion of the footing, if it gets any pressure at all, must have a moment around the center of loads, and thus tends to "bulge" the wall above.

While for these reasons the above footing is not theoretically correct, it can safely and properly be used in some cases, as within limits, the wall will be strong enough to stand the bending moment and thus to some extent distribute the load on the unbalanced footing; but it is impossible to exactly compute the distribution of pressure on the footing, and this form of footing is not recommended for heavy loads, and never for a projection of more than the thickness of the superimposed wall.

It is, therefore, well wherever possible to foot out walls equally on both sides from the center of the walls, and where the bearing material is earth these footings should be wide enough to keep the pressure on the footings between 2 and 4 tons per square foot, depending on the nature of the material, though 4 tons is as high as should be put on any earth.

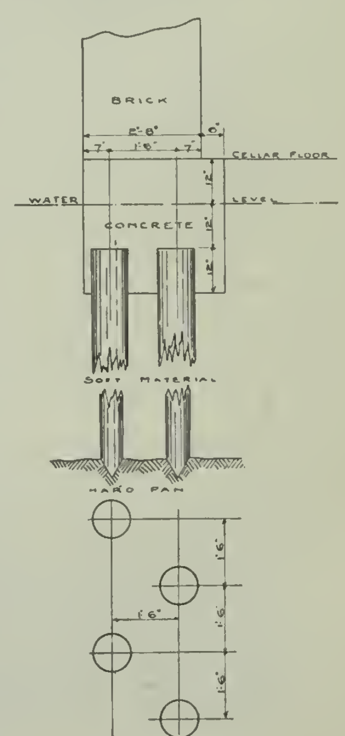
Footings are often made of rough rubble masonry, but the author much prefers concrete, as this can be shoveled in and rammed to completely fill the trenches, and if made of good Portland cement it will set as a solid monolith and be much better than stone footings. These concrete footings should not be less than 12 ins. thick, and thicker for very heavy loads, and they should project about 6 ins. beyond the face of the wall above.

On these footings brick or stone foundation walls may be built, though brick is the better material, and if stone is used the walls should be at least 4 ins. thicker than if built of brick. All these foundation walls, and in fact all masonry up to the first tier of beams above the ground level, should be laid in Portland cement mortar, as the dampness of the earth backing keeps Rosendale cement mortar from properly setting.

When the ground is too soft to put a footing directly thereon, piles should be driven and capped with concrete, as shown on Sketch No. 2. These piles should be driven as near as practicable under the wall above and should be staggered in rows, and not be closer than 2 ft. c. to c.

The load allowed on a pile will vary with the nature of the material it is driven in, but in ordinary materials well-driven piles will safely carry from 15 to 20 tons each. If the weight to be carried is so great that enough piles cannot be driven directly below it, and the footings cannot be extended on both sides of the wall, it is best to use some other style of foundation, as it is bad practise to have the center of pressure not practically over the center of the pile supports.

If driving piles through a very soft material underlaid by a hardpan, the piles should be shod with iron and well driven into the hard material, which will hold their points securely while the concrete cap, as shown, will hold the butts and thus make them act as columns even if the surrounding material is very soft. The writer has put in very satisfactory foundations of this character where the upper material was so soft that the pile would settle in it 10 ft. of its own weight, and where hardly any driving was necessary to sink the pile to the hardpan. Piles should be cut off at least a foot below the water level so as to keep them always wet, and timber capping is to be avoided, as it is liable to rot, and does not as securely hold the pile heads as concrete filled in around the piles for a depth of 1 ft. at the top, as here shown.



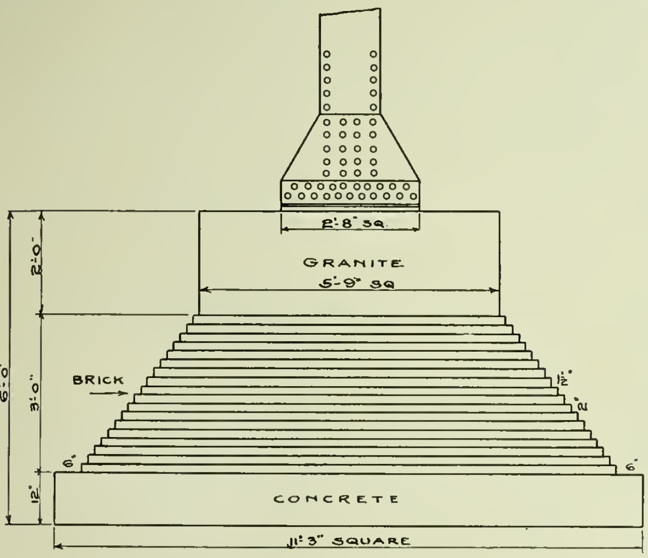
PLAN

SKETCH No. 2

PILE FOOTING

Where the rock is within 20 or 25 ft. of the cellar bottom it is far better to excavate the intervening material and found on the solid rock, as this depth of material can readily be held by 3 in. tongued and grooved sheet piling driven down by hand and supported with breast timbers as the excavations go down, and for a building of any importance it will pay better to do this excavating than to run the risk of unequal settlement and consequent cracks in the building.

When excavating deep trenches of this kind for walls, a considerable saving may be effected by simply running down piers to the rock and arching over or resting steel beams from pier to pier just below the cellar floor, making the cellar wall continuous. These piers will, of course, have to be of sufficient area to stand the crushing effect of the loads to be carried, and the front and rear piers will



SKETCH No 3.

BRICK FOOTING FOR COLUMNS

also have to be designed to stand the thrust of the end arches, if arches are used.

If the rock is inclined at much of an angle to the horizontal it should be leveled off or stepped off in horizontal steps before putting in the foundations, so as to do away with the tendency to slip.

A cheap and satisfactory foundation for light structures in very wet and soft ground can be made by putting in what is known as a "scow bottom," which is nothing other than building a regular timber scow with sides and ends 12 to 16 ins. thick, and 3 or 4 ft. deep, and bottom of two thicknesses of plank 3 to 6 ins. thick, calked all around and sunk in the soft bottom. The brick walls are built directly on the sides and ends, and the whole structure thus literally floats in the mud. If the building is of any width there must be a sill timber with a line of columns thereon supporting the floors parallel to the side walls and holding down the bottom planking against bulging. A large number of old warehouses near the water front in New York are founded in this way, and have stood without serious settlement.

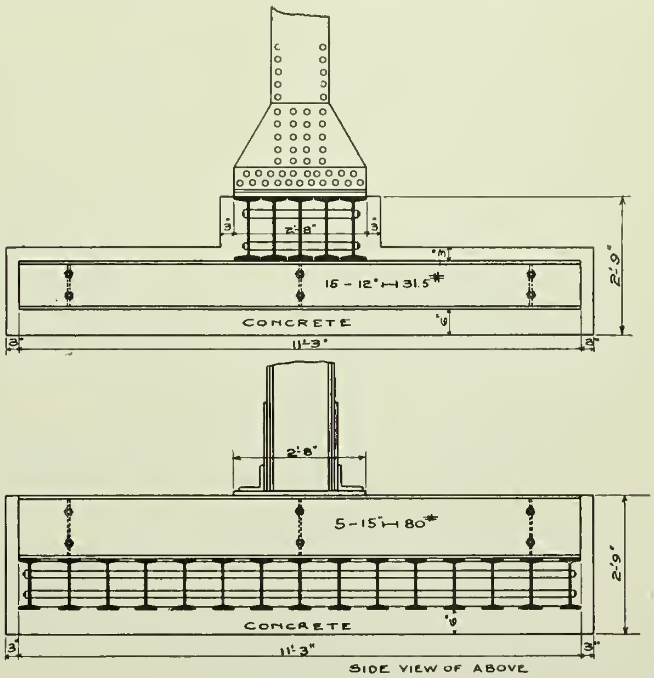
The above-mentioned foundations cover about all the cases for direct wall footings, and if sufficient bearing cannot be obtained by any of these means it will be necessary to resort to some means of extending the area of foundations, and yet keeping the lines of pressure directly over the center of such areas; this can be done by using steel beams and girders, so arranged as to deliver the loads exactly where and in such proportion as is desired. In the modern tall building the loads are not delivered to the foundations uniformly, nor are they generally on continuous walls under which footings of any of the above-mentioned forms can be placed, but they are generally delivered by isolated columns more or less irregular as to position and varying greatly in amount, and it is necessary to so arrange the foundations that each and all of these loads will be delivered centrally over its foundation, and that the pressure per square foot will be uniform for all footings regardless of the actual loads on the various columns.

This question of equal unit pressures under all footings is of the greatest importance, as the neglect of it causes serious trouble, due to unequal settlement, and the writer lately inspected an ordinary five-story building where the footings had been so designed that the pressure under the exterior walls was $1\frac{6}{10}$ tons per square foot, and under some of the interior piers supporting the floors $4\frac{3}{10}$ tons per square foot; and, naturally, the piers had settled so much more than the walls that the floors were badly out of level, and great damage had been done to the building throughout, which could only be remedied by shoring up the interior of the building, removing the center piers, and putting larger footings under them.

A still more serious example of the trouble caused by neglect of this important requirement was the United States Government Post Office and Custom House in Chicago, built in 1877, and now being replaced because it absolutely fell to pieces, entirely through the fault of improperly designed foundations.

The architect founded this building on one continuous layer of concrete about 3½ ft. thick overlying the clay, and as some portions of the building were much heavier than others, a very unequal settlement due to the unequal unit pressures took place, and parts of the building settled nearly 2 ft., while other portions hardly settled at all, and this made a complete ruin of the building, and it had to be pulled down.

That this trouble was simply due to the inequality of the pressures, regardless of the soft material on which it was built, is shown by the action of buildings properly founded on the softest material, of which a notable example is seen in the United States Government Custom House at New Orleans, which is founded on piles driven in soft mud, and the entire building has settled considerably; but as the number of piles were properly proportioned for the loads to be carried, the settlement has been uniform throughout and the floors are still level, and no serious cracks or other serious defects have developed, and the building is still as good as ever. So that if the footings are so designed as to give uniform pressures, it is not a very serious matter if some settlement does take place, as it will cause no trouble, and where the bearing strata is clay or other compressible



SKETCH No 4.

FOR STEEL COLUMN FOOTING.

material a certain amount should be allowed for and expected, as on the clay bottom of Chicago the settlement is found to be about an inch for each ton per square foot of pressure, though this settlement reaches its maximum at the end of about one year.

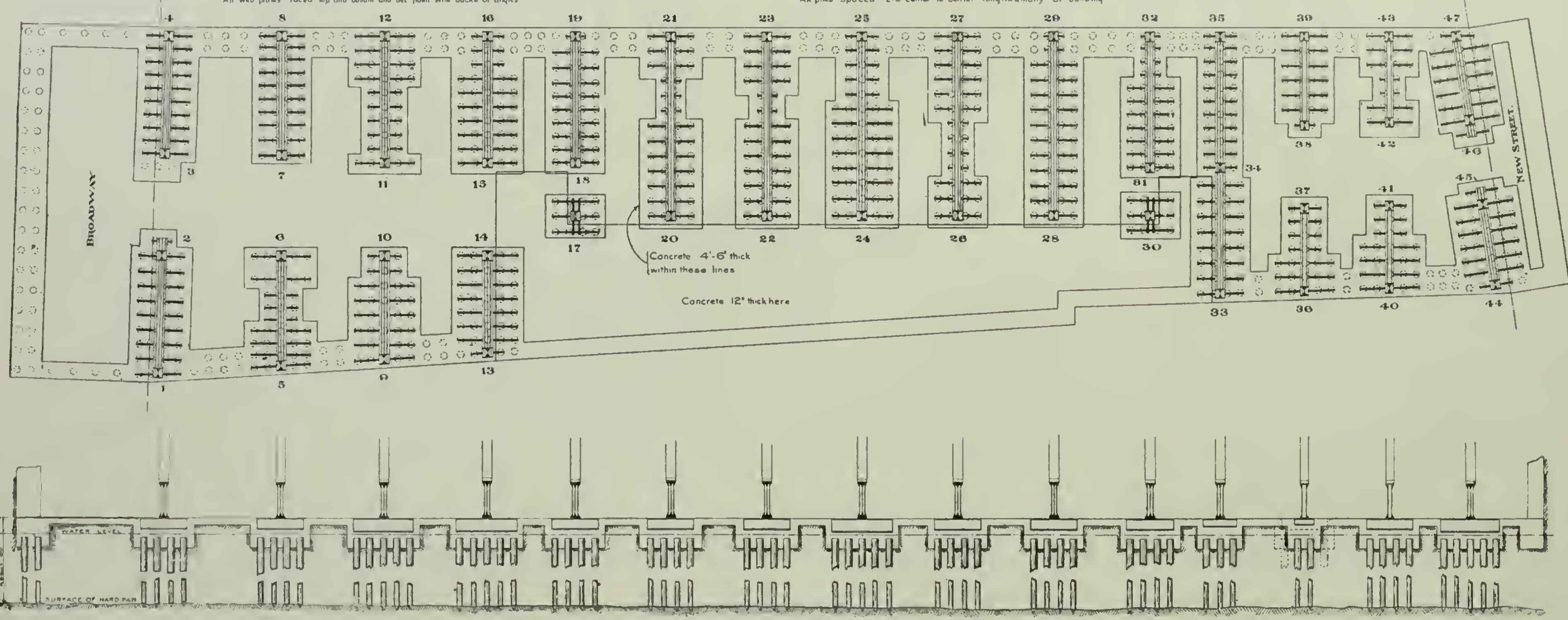
If footings can be built out on all sides of the applied load, it is

Col Nos	1 – 2	3 – 4	5 – 6	7 – 8	9 – 10	11 – 12	13 – 14	15 – 16	17	18 – 19	20 – 21	22 – 23	
Load in T	[illegible]	384 382	486 347	362 396	490 318	562 426	546 381	479 336	200	410 382	476 436	476 454	
Grillage	9 - 20" I 70# 1 - 12" I 31½#	13 - 20" I 70#	6 - 24" I 85# 3 - 15" I 45#	10 - 20" I 70#	6 - 24" I 85# 2 - 15" I 45#	5 - 24" I 85# 8 - 15" I 45#	7 - 24" I 85# 1 - 15" I 45#	7 - 24" I 85 3 - 15" I 45	3 - 20" I 70# 2 - 20" I 70#	9 - 20" I 70# 1 - 12" I 31½#	10 - 20" I 70# 3 - 12" I 31½	11 - 20" I 70# 2 - 12" I 31½#	
Girders	3 webs 60 × 7/16 8 Ls 6 × 3½ × 5/8 2 covers 18 × 5/8 full lgth 1 " 18 × 5/8 " " 1 " " 11'-0"	3 webs 60 × ½ 8 Ls 6 × 3½ × 5/8 3 covers 18 × 5/8 full lgth 1 " " 12'-0"	1 web 60 × 7/16 2 " 60 × ½ 8 Ls 6 × 3½ × 5/8 2 covers 18 × 5/8 full lgth 1 " 18 × ½ " " 1 " " 10'-0"	3 webs 60 × ½ 8 Ls 6 × 3½ × 5/8 3 covers 18 × 11/16 full lgth 1 " " 10'-0"	2 webs 60 × 7/16 1 " 60 × ½ 8 Ls 6 × 3½ × 5/8 2 covers 18 × 5/8 full lgth 1 " 18 × ½ " " 1 " " 9'-0"	1 web 60 × 9/16 2 " 60 × ½ 8 Ls 6 × 3½ × 5/8 3 covers 18 × ½ full lgth 1 " " 14'-0"	1 web 60 × ½ 2 " 60 × 7/16 8 Ls 6 × 3½ × 5/8 2 covers 18 × ½ full lgth 1 " 18 × 7/16 " " 1 " " 9'-0"	1 web 60 × 9/16 2 " 60 × ½ 8 Ls 6 × 3½ × 5/8 3 covers 18 × ½ full lgth 1 " 18 × 11/16 " " 1 " 18 × ½ 15'-0" 1 " 18 × 11/16 11'-0"		1 web 60 × 9/16 2 " 60 × ½ 8 Ls 6 × 3½ × 5/8 2 covers 18 × 15/16 full lgth 1 " 18 × 7/8 " " 1 " " 13'-0"	3 webs 60 × 5/8 8 Ls 6 × 3½ × 5/8 5 covers 18 × 11/16 full lgth 1 " " 25'-0" 1 " " 20'-0" 1 " " 16'-0"	3 webs 60 × 5/8 8 Ls 6 × 3½ × 5/8 4 covers 18 × 7/8 full lgth 1 " 18 × 11/16 " " 1 " " 15'-0" 1 " 18 × 7/8 24'-0" 1 " " 20'-0"	

Col Nos	24 – 25	26 – 27	28 – 29	30	31 – 32	33 – 34	34 – 35	36 – 37	38 – 39	40 – 41	42 – 43	44 – 45	46 – 47
Load in T	590 480	406 454	500 483	236	404 304	361 577	304	296 220	288 274	306 228	220 257	289 364	364 267
Grillage	8 - 24" I 85# 5 - 15" I 45#	9 - 20" I 70# 4 - 12" I 31½	11 - 20" I 70# 2 - 12" I 31½#	3 - 20" I 70# 2 - 20" I 70#	7 - 20" I 70# 4 - 12" I 31½#	8 - 20" I 70#	11 - 15" I 45	3 - 24" I 85# 4 - 15" I 45#	6 - 20" I 70# 1 - 12" I 31½#	4 - 24" I 85# 3 - 15" I 45#	5 - 20" I 70# 2 - 12" I 31½	6 - 24" I 85# 2 - 15" I 45#	6 - 24" I 85# 2 - 15" I 45#
Girders	1 web 60 × ¾ 2 " 60 × 11/16 8 Ls 6 × 3½ × 5/8 3 covers 18 × 1 1/16 full lgth 2 " 18 × 1 1/16 " 1 " 18 × 1 1/16 24'-0" 1 " 18 × 1 1/16 20'-0" 1 " " 15'-0"	2 webs 60 × 5/8 1 " 60 × 11/16 8 Ls 6 × 3½ × 5/8 2 covers 18 × 1 full lgth 2 " 18 × 11/16 " " 1 " 18 × 11/16 23'-0" 1 " " 18'-0"	2 webs 60 × 11/16 1 " 60 × 5/8 8 Ls 6 × 3½ × 5/8 4 covers 18 × 1 1/16 full lgth 1 " " 23'-0" 1 " " 17'-0"		2 webs 60 × ½ 1 " 60 × 9/16 8 Ls 6 × 3½ × 5/8 2 covers 18 × 5/8 full lgth 1 " 18 × 5/8 " " 1 " " 14'-0"	1 web 60 × ½ 2 " 60 × 9/16 8 Ls 6 × 3½ × 5/8 3 covers 18 × ½ full lgth 1 " " 11'-0"	1 web 60 × 7/16 2 60 × ½ 8 Ls 6 × 3½ × 5/8 3 covers 18 × 5/8 full lgth 1 " " 13'-0"	3 webs 60 × ½ 4 Ls 6 × 3½ × 5/8 2 covers 15 × 11/16	2 webs 60 × ½ 4 Ls 6 × 3½ × ½ 2 covers 15 × 11/16	2 webs 60 × ½ 4 Ls 6 × 3½ × 5/8 2 covers 15 × 7/8	2 webs 60 × ½ 4 Ls 6 × 3½ × 5/8 2 covers 15 × 5/8	3 webs 60 × 5/8 8 Ls 6 × 3½ × 5/8 2 covers 18 × ½	3 webs 60 × 5/8 8 Ls 6 × 3½ × 5/8 2 covers 18 × ½

All box girders having 3 webs to have 8 end fillers 18 × 5/8, 16 end stiffeners 5 × 3½ × 7/16 to fit tight both ends; having 2 webs to have 4 end fillers, 8 end stiffeners.
All web plates faced top and bottom and set flush with backs of angles.

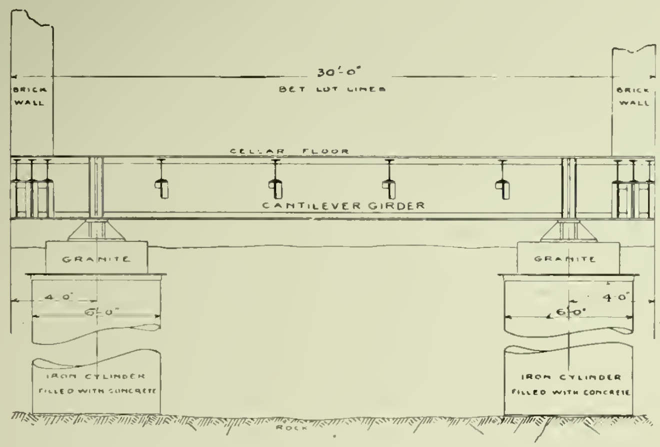
Concrete 1 Atlas or Giant cement, 2 sand, 5 broken stone. Footings 4'-6" thick, cellar floor outside of footings 12" thick.
Piles are arranged so that center of gravity of loads comes over center of gravity of groups of piles.
All piles spaced 2'-0" center to center longitudinally of building.



FOUNDATIONS OF HUDSON BUILDING.
32 AND 34 BROADWAY, NEW YORK CITY.

a very simple matter to spread the foundation pier, and thus bring the bearing pressure to the value desired. The old method of doing this was by building brick piers, as in Sketch No. 3, but this method has generally been replaced by getting the necessary spread by steel grillage, consisting of two or more layers of rolled beams or rails embedded in concrete, as shown on Sketch No. 4.

Sketches Nos. 3 and 4 are two different designs for the footing



SKETCH No 5

of an interior column carrying 500 tons, resting on a good earth bearing.

The first advantage of the grillage footing is its decreased depth and volume, as the room in the basement of modern buildings is almost as valuable as in any other floor, so that it is of great advantage to take as little room out for foundations as possible, and it is readily seen that the large brick piers shown on Sketch No. 3 would be much more objectionable in a cellar than the footing shown on Sketch No. 4, or if it were desired to put the entire footing below the cellar floor, the footing shown on Sketch No. 4 would take much less excavation than the brick footing.

The second advantage of the grillage footing is its greatly decreased weight, and the weight saved by such footings will sometimes be sufficient to compensate for adding another story to the building.

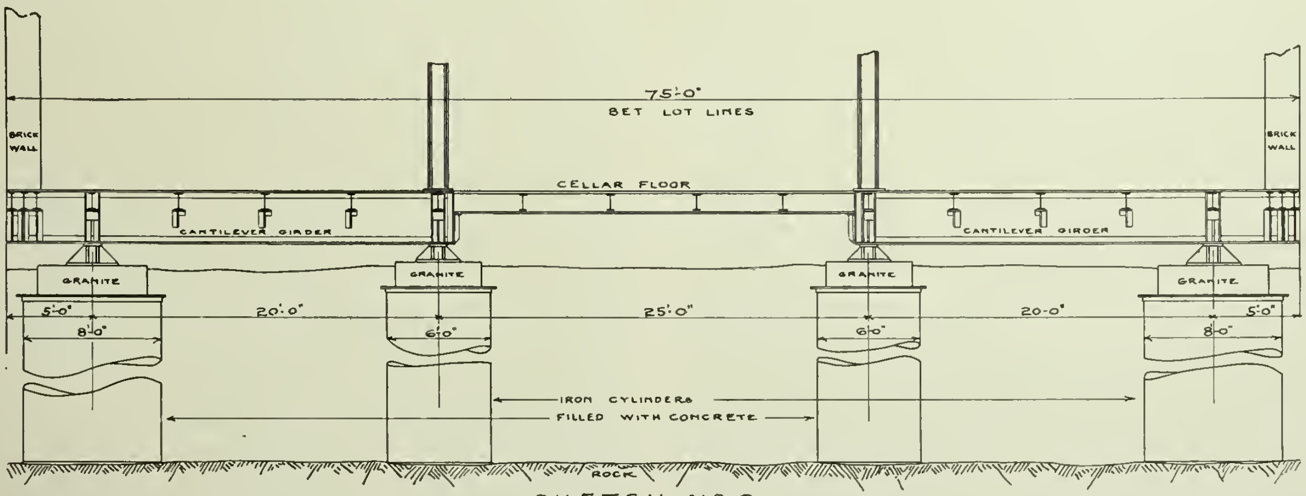
Grillage foundations need not be made square, as the tiers of beams can be arranged in any shape desired, and this style of footing is readily adapted to whatever requirements are met. A good example of the use of grillage beams resting on piles is shown on the drawing of the foundations for the Hudson Building, 32–34 Broadway, New York.

Here we had a very soft bottom overlying the hardpan and rock, and designs were made both for pneumatic caissons carried to the rock and for a pile foundation, as shown, and it was found that this foundation would cost only one third as much as the caissons supporting cantilevers.

The groups of piles under two adjacent columns were so spaced that their center of gravity was under the center of gravity of the applied loads, and after driving the points of the piles well into the hardpan the heads were cut off even below the water level, and concrete was filled in around same. On this concrete the longitudinal grillage beams were placed, and the two column loads were distributed to these grillage beams by the riveted transverse girder. This arrangement of two columns on one footing is often followed on a smaller scale where the large girder here used is replaced by rolled beams. By this method the weight from the wall columns can be most economically distributed evenly over the footings without encroaching on the adjoining property.

In cases where none of the above-mentioned foundations can be used, and where one cannot extend footings beyond the lot lines, it becomes necessary to use cantilevers to support the wall columns; and while this method of founding has been used quite extensively, it is the most expensive foundation in use, and should only be resorted to where absolutely necessary. This principle can be used in a variety of ways, but in general it consists in sinking caissons well within the lot lines to the solid rock, and supporting cantilever girders on the cassions extending out to the walls for the support of the wall columns, as in Sketch No. 5. If, however, the building is wide it may be necessary to sink more caissons, as in Sketch No. 6. These caissons may be round or square, and built of wood or steel, and their size must be proportioned for the loads they are to carry, and they may be sunk either by the pneumatic process or open excavation.

Sometimes it is convenient to place the cantilever girder at the



SKETCH No 6.

Still another advantage of grillage foundations is the rapidity with which they can be procured and put in place, as the large granite base stones, shown on Sketch No. 3, take considerable time to be quarried, cut, and delivered, and the handling and setting of such heavy pieces is slow and troublesome, whereas grillage beams can be secured immediately, and the individual pieces are easily handled and set.

These grillage foundations are somewhat more expensive than brick piers, but the advantages named above more than compensate for the increased cost.

first floor above the cellar, in which case it is only necessary to put columns on the caissons extending through the cellar, and place the cantilever girders on the tops of these columns.

The above-mentioned forms of foundations cover the most general cases, though they can be varied greatly in the details of application, as every case must be studied as to its local requirements, always bearing in mind the two fundamental principles, that the center of loads should be over the center of foundations, and that the area of each foundation should be in exact proportion to the load to be carried.

Fire-proofing.

FIRE-PROOF CONSTRUCTION OF BUILDINGS IN THE UNITED STATES.— *Continued.*

BY R. W. GIBSON (NEW YORK).
(Read before the Royal Institute of British Architects.)

AS the floor arch determined the distance apart of the floor beams, so it next regulated the distance apart of the girders. The span of the arch is indicated by its own working strength, and the depth of the beam is indicated by the thickness of the arch, because any considerable difference would have to be made up by concrete filling upon the top of the arch, which would be more expensive than the arch material itself. Then the depth of the beam having been determined within reasonable limits, its economical span is easily ascertained. This proves to be somewhere between 14 and 18 ft., which is the working distance between the main girders, and which, being a convenient size for a single office, is also taken as the unit of room width and the space allotted in the outer walls to a pair of windows. The distances will, of course, vary according to the floor loads adapted for different purposes; those mentioned apply to buildings having floors weighing from 75 lbs. to 95 lbs. dead load per foot and supporting live loads from 75 lbs. to 150 lbs., which are the usual limits for offices.

As soon as the rough steel frame is completed and the floor arches are all in, the outer walls are usually half-way up, and the roof can be given its final covering. It is constructed with arches, the same as the floors, except that sometimes the steel beams are laid to the necessary pitch of about half an inch to the foot, so as to avoid the weight and expense of filling, which would be necessitated by level beams and arches. Sometimes an intermediate floor is temporarily converted into a roof, so that the stories below it can be enclosed and warmed and finished. The walls need not be described in detail here, as they present no novelty in a building of the class under discussion. In general practise their thickness is made about two thirds of the full thickness required for walls supporting the floor loads, and they are secured to the metal framework so as to receive its assistance in resisting horizontal wind pressure; but, as before mentioned, they are built around the columns in such way as to permit of their unequal settlement. The walls containing many windows are not usually considered as walls, but rather as a series of piers and panels, whose thicknesses will be regulated by their self-supporting strength, and by requirements of architectural appearance. As examples of thickness the following may be mentioned: a wall 150 ft. high, divided into ten or twelve stories, would have thicknesses of 16 ins., 20 ins., 24 ins., and 28 ins., in about four equal sections of its height for massive buildings; while for skeleton frame buildings with walls supporting only their own weight the thicknesses might be 12 ins., 16 ins., and 20 ins., in three divisions; and for cage construction, with every story of walls supported separately on the frame, 12 ins. throughout would be good practise. The New York law stipulates, for skeleton or cage construction, that the walls shall not be less than 12 ins. for the uppermost 50 ft., 16 ins. for the next 50 ft. of height, and so on downward, adding 4 ins. to each successive 50 ft., this being required in a law influenced strongly by the fire department for the sake of the stability of the masonwork itself. It is doubtful, however, whether it is worth while to urge greater thickness of wall below than above in a structure of pure cage skeleton type, unless exposed on one side to heavy fire risk from a combustible building, against which a well-built hollow wall with considerable mass of material is no doubt the best safeguard; yet, even here, 16 ins. of brickwork, in two thicknesses of 8 ins. each, would be relied upon to withstand any fire with the assistance likely to be rendered. The thickness of material necessary to resist the weather is found to be 12 ins. at least of brickwork with terra-cotta interior furring.

Furrings are used in all American buildings, even of the cheapest class, to afford a dry and warm base for the finishing plasterwork; in cheap buildings they are light strips of pine, 2 by 1, nailed to the brick wall, which receives the lathing, just as the quarters or studs of a partition. In fire-proof buildings the furrings are hollow terra-cotta slabs or tiles, 2 ins. thick, and 16 ins. by 8 ins., or other convenient sizes, built up against the inside face of the wall and secured with iron where necessary; sometimes, to save space, furring blocks of hollow terra-cotta are made the customary size of bricks, and the innermost 4 ins. of the wall is built of these bonded with the brickwork, and this is permitted in the New York building law; but the protection against driving rain and condensation internally in damp weather is not so good. The efficiency of the wall as a clothing to the metal has been variously estimated, some authorities requiring that at least 8 ins. of brickwork or similar material should cover all iron to protect it from moisture and fire. The New York law permits a minimum of 4 ins., and there is no proof that it is insufficient, if reasonable care is exercised to prevent a concentration of moisture or heat at such a spot. It should be observed, however, that in the United States it is customary for every building to possess its own side walls independently of its neighbor, so that where important buildings actually join there are usually two walls to resist the transmission of fire; party walls are rare.

Assuming, therefore, that all the steelwork has been externally covered with masonry, affording from 4 to 8 ins. protection, the interior of the steel frame is protected in another fashion: this is, briefly, the extension over all of its exposed surfaces of the 2 ins. of terra-cotta furring before mentioned. In some places a greater thickness than 2 ins. is used, and urged, and where risk of great heat occurs it is undoubtedly wise; but a minimum of 2 ins. of hollow tile with 1 in. of plaster has been demonstrated to be thoroughly effective, if well secured, in any fire likely to occur in residence or office building structures; 3 ins. for ordinary and 4 ins. for dangerous storage may be considered good. First, all the iron posts and columns are covered, those next the walls usually to form square pilasters by the use of rectangular 2 in. slabs, and the columns standing clear by means of segmental blocks with flat backs and with circular fronts fitted to the columns so as to give a circular finish over the square steelwork. It may be noted here that most of the steel column work is formed of sections which give an approximately square column, and occasionally the column finish of terra-cotta is also square, but not often. The preference shown for square column sections is undoubtedly based on the facilities for splicing superimposed lengths, and for attaching the angles and brackets required to support the girders and beams, and on the possibility of bringing the girder load upon the column near to its axis so as to avoid undue eccentricity of load. For moderate loads the Z-bar column is a great favorite for these reasons. Supporting eight or ten stories, however, the box riveted with plates and angles offers equal or greater advantages, while for the lightest loads a latticed channel column is most economical and adaptable; all of these are square columns. The round columns, such as the Phœnix segmental and certain octagonal and polygonal columns, while theoretically perfect, as columns, are difficult to assemble, and afford only imperfect facilities for attaching girder brackets, struts, etc.

The girders are protected by slabs of terra-cotta, as before described, secured with hooks and bars and wiring, and are usually given their outer form by means of metal lath upon light iron bracketing to receive the finished plastering, thus permitting uniformity of appearance in the ceiling design, while the girders within are of sizes varying according to their span and load. The soffits of the common joists or floor beams are protected, as has been before remarked, by the lower surface of the floor arches extending beneath them. All the steelwork thus covered is plastered; the rough coat being utilized to correct the form, and the final coats being frequently one of the exceedingly hard patent plasters which have become popular of late years. The lower portions of walls and columns are frequently finished with marble slabs, 1 in. thick, or with tiling, which is certainly an additional protection against the disintegrating effect of the water, even when not of much value against fire. In work where economy is urgent, and a lower standard may be tolerated, all the iron is protected by a covering of metal lathing, and a heavy coat of cement scratched and finished with ordinary plastering; but this is liable, as has been seen, to be damaged by water, and is insufficient in its actual mass.

There is a good deal of difference of opinion with regard to air spaces within the fire-proofing, and great value is clearly proved for air spaces such as those afforded by hollow terra-cotta, which may be described as numerous and discontinuous, that is, affording no regular and extended communications; but it is clear that large and connected air spaces may, and probably will, act as flues when broken into, and actually draw flame and heat into places where it is most harmful. For this reason those methods are preferable which place the fire-proofing material close to the metal and preserve numerous and frequently broken air spaces in their own substances, rather than those which, standing away some distance from the metal, leave it liable to attack inside of the protection.

The greatest need of improvements in fire-proof work is the bringing up of the lower grades to the level of the higher by a system of insurance inspection, or something of the kind, which will present in tangible form, to a certain class of owners, the value of good work which they do not themselves understand. There is a tendency in all building, and at all times, to put inferior work in places where it is soon covered up, and in fire resistance we have been working on so small a margin that there is little chance of doing this without injury.

After the structural steel is all protected the partitions are built; these are of various patterns, the best being undoubtedly the terra-cotta blocks, 4 ins. thick for average heights, 3 ins. for moderate heights, and 6 ins. for great heights of story. They are occasionally stiffened with angle iron framing, when so cut or thinned as to be weak, but they show an extraordinary strength when well set, as they usually are, in Portland cement. Minor partitions, subdividing large rooms, and sometimes all the partitions except those next corridors, are frequently built by using light angle iron posts or quarters covered with metal lath, and plastered either like the old-fashioned wood plastered partitions, or with very thin posts and one sheet of metal lathing only, so as to make a solid plastered partition about 2½ ins. thick, which works very well, although a 3 in. tile partition will dry quicker and cost only a little more. Either of them will resist the passage of fire from one room to the next under ordinary circumstances.

When a building reaches the stage here described, that is to say, when it is ready for the joiner's work, it is probably more fire-proof than at any other time. It has practically nothing combustible in its construction. The tendency to-day is to reduce more and more the amount of woodwork admitted after this stage in finishing, and to substitute fire-resisting materials in places where it has hitherto been thought impossible; not only doors and sashes, but even glazing and office furniture, can now be obtained of fire-resisting character, and their use is of very great value. A building of first-class fire-proof construction, such as is found in New York, ten years old, to-day can, and occasionally does, become the scene of a very violent conflagration. Several such have occurred, and although with the aid of the fire department they have been subdued before spreading beyond the rooms where they started, yet the amount and character of the damage done sufficed to point out the need of much greater strictness in selecting building materials. Consider the quantity of fuel present in an active lawyer's office in two or three rooms; there will be six or eight desks, two or three hundred feet of book and document shelving, beside chairs and tables, and other customary furniture. As usually built, the roll-top desk is a perfect fire trap laid for ignition, and often the waste-paper basket is placed beneath it and filled with paper ready for the match which is dropped in by some careless smoker. Several fires have originated in just this way. When once started it is soon discovered that the amount of fuel present makes a fire which exceeds the control of the tenants and janitors. Possibly there is a wooden panel partition dividing one of these offices from the next; in any case, there are almost surely wooden doors with wooden architraves and jambs, and with glass panels, and, if the building is not of very recent date, possibly some wooden wainscoting and window paneling. The wooden floor may be pardoned, because it is rarely that fire reaches it; the natural draft upward in the supply of cool air from the bottom seems to protect the floor for a long time, and then when the water is poured into the room the floor is naturally again most protected. But all the other woodwork above mentioned should be banished in a building claiming to be fire-proof.

The doors and architraves should be of sheet metal: wood cores must still be tolerated; such are already upon the market, and have been used long enough to demonstrate their practicability. The window architraves and jambs should be of hard plaster, and the window frames and sashes of chemically treated fire-proof wood or of metal. The borrowed lights in the internal partitions generally used to light the interior corridors should have similar sash and trim, and these and the doors should have wired glass, which is also a demonstrated success in its ability to hold together and check drafts of hot air and flame, before which ordinary glass disappears. The outside glass windows must probably be tolerated in large panes of plate and sheet glass, because the value of the light and view doubtless exceeds the price paid for it in extra risk. As to the furniture, a really first-class office pretending to be fire-proof, such as that of a large bank or public department, can and should have metallic book shelving, and desks, and cabinets, letter files, etc., all non-combustible, even though they scarcely claim to be fire-proof in the same way that a safe is so made. It is of great importance that such things do not add to the fuel in the critical moment when the fire is commencing. The desks and tables may have wooden tops upon metallic frames and pedestals — in other words, the wood may be reduced to such a minimum quantity that the risk is almost nothing. Of course there remain the papers, books, implements, etc., but this risk can be taken care of by the fire hose of the building.

Every first-class building should have, and in New York does have, a number of private fire hoses so distributed that every part of the building can be reached by one of them. They are of small diameter — about two inches — and are supplied by a large tank on the roof, and frequently by an auxiliary pump in the machinery department in the basement, in case continued use is required. As it has sometimes happened that the water has failed by reason of the main being found shut off when wanted, it is undoubtedly best that the fire main should also be the chief distributing main of the building; its extra size will be no harm, but the water will be always there ready for use. Such an apparatus has nipped in the bud many an incipient fire, and with this, and the care above mentioned as to materials, a building may really claim to be fire-proof. A few buildings come almost up to this standard of protection. The use of the fire-proof doors and architraves and wired glass is yet rare, but in all other respects a high standard has been reached. One may walk into a new banking room and find it difficult to discern any combustible material in sight, except the desk tops and the window sashes; even the floors are very frequently of mosaic or some ornamental cement composition or marble, although, as before remarked, the wood floor is the smallest risk. Even in ordinary fire-proof buildings, where offices or apartments are rented, the halls, stairs, and corridors, and elevator shafts are entirely incombustible. Something remains to be desired in the protection of the staircases from flame at their soffits, because they are usually built of iron strings or carriages with marble treads all visible beneath, and, as will be shown later, fire may be carried to them from very distant points; still, the complete banishment of wood from these departments is of value. But it is true that the ordinary so-called fire-proof building still retains too much wood; what is most needed is the bringing up of this class to the higher standard; the expense is not very great, and would, no doubt, be covered by saving in insurance and risk.

(*Continued.*)

VERTICAL AND HORIZONTAL BRICK COURSES.

BY D. A. HEWITT.

THOSE whose duty it is to determine the sizes of piers and walls to work bond, know the great amount of work necessary to determine the exact dimensions of the brick and to compute the number of brick courses and the mortar joints to suit a particular space.

The draftsman who carefully works his plans to a small scale will appreciate the advantage of having the figures to plot the openings to correct widths and heights by means of "universal ready calculated" tables always at his convenience, saving the time of figuring out the face brick quantities, which otherwise would have to be done for each separate set of plans that are drawn. Then when the large detail drawings are being executed in the office, it is often necessary to have window and door frames, stonework, brick piers, panels, string courses, or terra-cotta panels bond into the brickwork. The question arises, "How will this work bond?" and if this information is ready at hand and can be figured correctly on the drawings, the architects' work has a more practical and matter-of-fact appearance to those who construct the building from having courses in heights and bonding lengths marked upon the details.

The accompanying tables present all of this information. The figures are not simply of local value, but are suitable for any part of the country. After determining how high four courses will gage and deciding whether it be a fine or coarse mortar joint, it is only necessary to look down the extreme outside columns to the figure 4, then passing to the right or left across the table to any one of the columns under the heading of common or pressed brick numbered from one to six, till the reading of such table suits the description of work under discussion. Having chosen the column, then all calculations throughout the job are based from it for the face work.

The size of all common bricks varies considerably in each lot according to the clay and the proximity to the fire at burning, the hard bricks being from ⅛ to ¼ of an inch smaller than the salmon brick. Pressed brick manufacturers use the same size molds, consequently the face brick are more uniform in size. In using this table only two quantities have to be decided upon: first, the size of brick; and second, the amount of mortar to a joint.

The same application and use of the tables can be made to old work being measured up as are used in new buildings. In surveying existing structures for alteration or additional work, it is easy to record what four courses equals in height (which in any event is a useful note to take), and thus depend upon all measurements in brick courses to plot the drawings by.

TABLE OF VERTICAL BRICK COURSES.

GIVING THE NUMBER OF BRICK TIERS OR FIGURED RESULTS OF THEM.

Number of Vertical Courses.	Pressed Brick. 1st. Feet.	Inches.	Fractions.	2d. Feet.	Inches.	Fractions.	3d. Feet.	Inches.	Fractions.	Common Brick. 4th. Feet.	Inches.	Fractions.	5th. Feet.	Inches.	Fractions.	6th Feet.	Inches.	Number of Vertical Courses.
1		2	5-8		2	11-16		2	3-4		2	7-8		2	15-16		3	1
2		5	1-4		5	3-8		5	1-2		5	3-4		5	7-8		6	2
3		7	7-8		8	1-16		8	1-4		8	5-8		8	13-16		9	3
4		10	1-2		10	3-4		11			11	1-2		11	3-4	1	0	4
5	1	1	1-8	1	1	7-16	1	1	3-4	1	2	3-8	1	2	11-16	1	3	5
6	1	3	3-4	1	4	1-8	1	4	1-2	1	5	1-4	1	5	5-8	1	6	6
7	1	6	3-8	1	6	13-16	1	7	1-4	1	8	1-8	1	8	9-16	1	9	7
8	1	9		1	9	1-2	1	10		1	11		1	11	1-2	2		8
9	1	11	5-8	2	0	3-16	2	0	3-4	2	1	7-8	2	2	7-16	2	3	9
10	2	2	1-4	2	2	7-8	2	3	1-2	2	4	3-4	2	5	3-8	2	6	10
11	2	4	7-8	2	5	9-16	2	6	1-4	2	7	5-8	2	8	5-16	2	9	11
12	2	7	1-2	2	8	1-4	2	9		2	10	1-2	2	11	1-4	3		12
13	2	10	1-8	2	10	15-16	2	11	3-4	3	1	3-8	3	2	3-16	3	3	13
14	3	0	3-4	3	1	5-8	3	2	1-2	3	4	1-4	3	5	1-8	3	6	14
15	3	3	3-8	3	4	5-8	3	5	1-4	3	7	1-8	3	8	1-16	3	9	15
16	3	6		3	7		3	8		3	10		3	11		4		16
17	3	8	5-8	3	9	11-16	3	10	3-4	4	0	7-8	4	1	15-16	4	3	17
18	3	11	1-4	4	0	3-8	4	1	1-2	4	3	3-4	4	4	7-8	4	6	18
19	4	1	7-8	4	3	1-16	4	4	1-4	4	6	5-8	4	7	13-16	4	9	19
20	4	4	1-2	4	5	3-4	4	7		4	9	1-2	4	10	3-4	5	0	20
21	4	7	1-8	4	8	7-16	4	9	3-4	5	0	3-8	5	1	11-16	5	3	21
22	4	9	3-4	4	11	1-8	5	0	1-2	5	3	1-4	5	4	5-8	5	6	22
23	5	0	3-8	5	1	13-16	5	3	1-4	5	6	1-8	5	7	9-16	5	9	23
24	5	3		5	4	1-2	5	6		5	9		5	10	1-2	6		24
25	5	5	5-8	5	7	3-16	5	8	3-4	5	11	7-8	6	1	7-16	6	3	25
26	5	8	1-4	5	9	7-8	5	11	1-2	6	2	3-4	6	4	3-8	6	6	26
27	5	10	7-8	6	0	9-16	6	2	1-4	6	5	5-8	6	7	5-16	6	9	27
28	6	1	1-2	6	3	1-4	6	5		6	8	1-2	6	10	1-4	7		28
29	6	4	1-8	6	5	15-16	6	7	3-4	6	11	3-8	7	1	3-16	7	3	29
30	6	6	3-4	6	8	5-8	6	10	1-2	7	2	1-4	7	4	1-8	7	6	30
31	6	9	3-8	6	11	5-16	7	1	1-4	7	5	1-8	7	7	1-16	7	9	31

EXAMPLE. — To ascertain the measurement of a number of vertical brick courses, including mortar (according to the thickness of joint and size of brick), select a table nearest to the quality of work required and read the corresponding figures.

By means of the accompanying table the reader, after a little study as to the method of using, may be able to very rapidly apply the amount in bricks or feet, inches or fractions, in place of performing the calculations.

The table of horizontal or stretcher brick courses is entirely different from the vertical table, in that all the quantities are known, and in its use requires only a selection to be made from the bricks manufactured at different parts of the Union and an assumption of thickness of mortar joints.

Internal piers, angles of walls, chimneys, and small bonding surfaces can readily be decided upon as to the number of bricks, or bricks and a half, to be put into them.

When this table is used in conjunction with the table of vertical dimensions, perfect brickwork as to bond will be the outcome.

AMERICAN FACE BRICK.

IN HORIZONTAL OR STRETCHER BRICK COURSES.

Giving the number of bricks or figured results.

New England, Common. 7¾ x 3¾ x 2¼ Mortar Joint ¼ in.			"Standard," Common. 8¼ x 4 x 2¼ Mortar Joint ¼ in.			Western States, Common. 8½ x 4⅛ x 2½ Mortar Joint ¼ in.			COPYRIGHTED, 1899, BY D. A. HEWITT, TORONTO.	Pressed Brick. 8⅜ x 4⅛ x 2⅜ Mortar Joint 3/16 in.			"Standard." Pressed. 8⅜ x 4⅛ x 2¼ Mortar Joint ¼ in.			Roman or Tile. 12 x 4 x 1½ Mortar Joint 3/16 in.		
Common Brick.										Pressed Brick.								
Feet.	Inches.	Fractions.	Feet.	Inches.	Fractions.	Feet.	Inches.	Fractions.		Feet.	Inches.	Fractions.	Feet.	Inches.	Fractions.	Feet	Inches.	Fractions.
	8			8	1-2		8	3-4	1 Brick + 1 Joint.		8	9-16		8	5-8	1	0	3-16
	11	3-4	1	0	1-2	1	0	7-8	1½ Bricks + 1 Joint.	1	0	11-16	1	0	3-4	1	4	3-16
1	3	3-4	1	4	3-4	1	5	1-4	2 Bricks + 1 Joint.	1	4	15-16	1	5		2	0	3-16
1	7	3-4	1	9		1	9	5-8	2½ Bricks + 2 Joints.	1	9	1-4	1	9	3-8	2	4	3-8
1	11	3-4	2	1	1-4	2	2		3 Bricks + 2 Joints.	2	1	1-2	2	1	5-8	3	0	3-8
2	3	3-4	2	5	1-2	2	6	3-8	3½ Bricks + 3 Joints.	2	5	13-16	2	6		3	4	9-16
2	7	3-4	2	9	3-4	2	10	3-4	4 Bricks + 3 Joints.	2	10	1-16	2	10	1-4	4	0	9-16
2	11	3-4	3	2		3	3	1-8	4½ Bricks + 4 Joints.	3	2	3-8	3	2	5-8	4	4	3-4
3	3	3-4	3	6	1-4	3	7	1-2	5 Bricks + 4 Joints.	3	6	5-8	3	6	7-8	5	0	3-4
3	7	3-4	3	10	1-2	4	0	3-4	5½ Bricks + 5 Joints.	3	10	15-16	3	11	1-4	5	4	15-16
3	11	3-4	4	2	3-4	4	4	1-4	6 Bricks + 5 Joints.	4	3	3-16	4	3	1-2	6	0	15-16
4	3	3-4	4	7		4	8	5-8	6½ Bricks + 6 Joints.	4	7	1-2	4	7	7-8	6	5	1-8
4	7	3-4	4	11	1-4	5	1		7 Bricks + 6 Joints.	4	11	3-4	5	0	1-8	7	1	1-8
Common Brick.										Pressed Brick.								

EXAMPLE. — To ascertain the measurement of a horizontal brick wall or piers, including mortar joints, select a table according to the quality of work required, and read results in either bricks or feet, inches and fractions.

WATER-PROOFING DAMP WALLS.

IN describing the manner in which bricks may be rendered water-proof and the dampness kept out of walls, a correspondent in one of the London architectural papers suggests that the brick or rough cast wall be saturated with several applications of hot boiled oil or linseed oil in which glue has been dissolved. The latter compound is prepared by soaking the glue for twelve hours until soft, then pouring away the surplus water and dissolving the soft glue in linseed oil in a glue pot. Another process which may prove satisfactory is to saturate the walls with a strong solution of gelatine in water and before this dries on the wall applying a solution of bichromate of potash. It is claimed that the result, if the wall be an exterior one and exposed to the light, will be a coating of water-proofing gelatine fixed in the pores of the brick or plaster. Still another plan which is suggested is to make a strong solution of good tallow soap in boiling water. Brush this well over the wall or plaster, and before it dries lay on a solution of green copperas or of bluestone, chemically known as sulphate of copper. This solution will be decomposed by the soap solution in the pores of the brick or plaster and a sebate of iron or of copper be produced in the pores, the sebates being impervious to water.— *Carpentry and Building.*

CORRESPONDENCE.

MORTAR FOR TUCK POINTING.

Editors The Brickbuilder: —

Dear Sirs: — Will you kindly inform me what kind of mortar is used for tuck pointing, *i. e.*, where mortar is put on outside of a brick building and a joint put on to make it appear like new work.

Pointer.

The composition of the mortar for tuck pointing depends upon what color is desired.

If a red joint is desired, the mortar should be composed of mineral red and very fine sand, thoroughly mixed, then worked with boiled linseed oil, and kneaded with the hands like putty. No water should be used. This composition will adhere very firmly, even to very smooth brick, and will wear for a number of years.

For a white joint, the best mortar is obtained by mixing lime putty and marble dust, with linseed oil mixed with the lime and water when the lime is slacked. Common lime putty and marble dust makes a very fair mortar, but the oil improves it. The oil must be worked in during the process of slacking and not afterwards.

For pointing stonework, where a ⅜ in. joint is generally used, and the joint raked out before pointing, Portland cement and fine sand, with a small portion of lime putty, is generally used for white mortar, while for a red joint mineral wool is substituted for the lime putty.

Editors.

Editors The Brickbuilder: —

Dear Sirs: — I desire a white cement stucco for outside work: how can I best obtain it? By answering through the columns of your journal, you will greatly oblige.

Architect.

Cement stucco, properly speaking, is composed of cement and sand, and its color is determined by that of the cement. Portland cement, which is undoubtedly best for the purpose, gives a bluish-gray color. We believe that lime is sometimes added in small quantities, which tends to lighten it somewhat. We think it might be possible by using Utica (Ill.) cement and sand, clear, to obtain a stucco that will be a sort of light buff, but we do not think it possible to obtain a white cement stucco, except by painting with white lead and oil after the stucco is thoroughly dry. In some portions of the country plaster of Paris stucco has been extensively used of late, and also staff, although generally only in the way of a frieze or cast ornaments. These are generally nailed to the wall. Their natural color is a dull white, but they require painting to preserve them, so that the natural color is of no consequence. When painted, these materials stand fairly well, especially if not much exposed to the weather, but where an entire wall is to be covered with stucco, we would recommend plastering with Portland cement and sand, and then painting.

A very good description of exterior stucco, and also of the process employed in making the staff for the World's Fair buildings at Chicago, is given in Part I. of Kidder's "Building Construction and Superintendence."

Perhaps some of our readers can give us further information on the subject.

Editors.

Editors The Brickbuilder: —

Gentlemen: — In your September number appears a reference to the failure of a brick pier which deserves a much more extended notice, and I think it would be worth while to collect more data so as to arrive at the facts of the case. Permit me to ask the following questions: —

It does not appear whether the pier in question was laid up in cement (if so, what kind, etc.) or lime mortar. If the work was done in freezing weather, how cold? Was mortar freshly made? Was sand heated? How long had the piers been built before they received their full load? How much of a bearing did the girders get on the walls? Had there been any motion on the floor, any dumping of material, or slipping or sliding? What kind of footings? Did they extend all round the pier or on one side only, as is usual with side walls in city lots? What kind of foundation was there?

It certainly does not appear that the brickwork should have crushed with a load which is hardly, if any, over that reckoned by many as a *safe* one; therefore if you have any more particulars at hand I think they would be appreciated by others as well as

Subscriber.

The pier in question was laid up in ordinary lime mortar, about the first of February; the bricks were not warmed and no especial care appears to have been taken with the work, but it was a fair average job of brickwork for the locality in which it was built, and which is there assumed to have a safe strength of about eight tons to the square foot. The temperature was above the freezing point when the bricks were laid, but dropped to about zero and possibly a few degrees below during the night.

The pier gave way about 5 P. M., of March 25, or about eight weeks after it was built. The day was stormy, and no work was being done; the day before the plasterers had completed browning the second story. The building was entirely empty, and there does not appear to have been any special cause for the accident at that time, except the wet plaster which had been applied the day before, and from the additional weight of which the pier probably commenced to fail.

The pier was built on top of a stone wall, 21 ins. thick, with footings extending on each side. Neither the bottom of the pier nor the stone wall showed any signs of moving or settlement, and, in fact, there can be little doubt but that the failure was caused by the buckling outwards of the pier, not by the pier crushing. The steel beams had a bearing on the wall of between 7 and 8 ins.

Editors.

STRENGTH OF A BRICK VAULT.

IN connection with the removal of the old Public Library building, Boston, to make way for building a new structure, it became necessary to tear out the vaulting which supported a portion of the sidewalk. There were four plain barrel vaults supported on walls at right angles to the line of the sidewalk, each vault covering about 10 sq. ft., with a rise of about 2½ ft., laid up in three rings loosely grouted over the haunches, a very ordinary form of construction, but one which was interesting by reason of its extreme cohesiveness. After the whole of the interior wall parallel to street line and three of the intermediate brick walls from which the arches sprung were entirely knocked away, the four vaults still remained in place, and were not materially weakened by a stone weighing over a ton being dropped on it repeatedly from a height of 20 ft. It was only after the crown of three of the arches was cut clear through that the work fell, and even then a considerable segment of one of the last arches remained in place, and it had to be torn down almost brick by brick. The material was ordinary good hard burned brick laid up in cement mortar. This work was laid in 1855.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — On election day a question of vital interest to New Yorkers was settled by vote of the people. By the adoption of the constitutional amendment, by which the individual debt of the counties now included in New York City is charged back upon the counties, the city's borrowing capacity is increased by thirty millions.

New York can now spend any part of sixty-five millions in completing the public library, improving the schools, insuring an ample water supply, and, most important of all, in building the sorely needed underground railway by which Harlem may be reached in fifteen minutes from the City Hall; and, as the corporation counsel's approval of the contract is assured, the Rapid Transit Commissioners will soon be able to invite bids for the construction of the tunnel. Of course, this will be an undertaking of great magnitude, as there is an underground city of which few people are aware, traversed and honeycombed by subways, sewers, and pipes of all kinds.

The delay in accomplishing this result has brought us into a period of reaction in the money markets, and it is, consequently, much more difficult to dispose of bonds than it would have been some months ago. This, however, is only a temporary difficulty. By the time the work is fairly under way, we may expect that a more plentiful supply of funds will be seeking investment, and New York's credit is so high that her bonds can always be sold on reasonably advantageous terms. Transit facilities are vitally needed, and the money put into the new road will yield splendid returns, not only directly but also indirectly, in stimulating the growth of the city and in increasing the taxable value of property in the sections opened up. No fogs will delay transit on the underground line, and such a blizzard as stopped the surface traffic last winter will not affect it. The people are eager for the new line, and work should be begun at the earliest practicable moment.

The work of demolishing the old reservoir at 42d Street to make way for the new public library has been going steadily forward; but, owing to the unusual strength and solidity of its construction, it has proved a much more difficult task than was anticipated, and is an object lesson to builders of the present day. It is always interesting to know how New York impresses foreigners, especially foreign architects. We quote from an interesting series of notes on New York, written for *The Builder*, by a London architect.

CAPITAL, ENTRANCE TO MEDICAL CHIRURGICAL HOSPITAL, PHILADELPHIA, PA.
Made by Conkling-Armstrong Terra-Cotta Company.
Herman Miller, Architect.

"There can be no doubt that it is beyond the Atlantic that we shall find the finest buildings of the future. Energy, wealth, and a desire to produce structures which shall be at once useful and beautiful, — all these things make towards the creation of finer architectural works than can be erected in an older country. Architectural individuality in New York is, moreover, given a very large field, a scope which is noticeable especially in regard to private houses. This freedom, though it necessarily from time to time must result in eccentricity, yet affords opportunity for much larger artistic effect than can be obtained in the more formal and systematic streets of English and Continental towns." Of our sky-scrapers he says: "The effect will presently be stupendous. There will be no other city like it in the world. It is all very well for passers-by to say buildings of such a size are monstrosities, but as utility is the first object of every building, it has to be admitted that the people of New York have by their system of building policy obtained not only space, but actually buildings comfortable and convenient up to the highest standard."

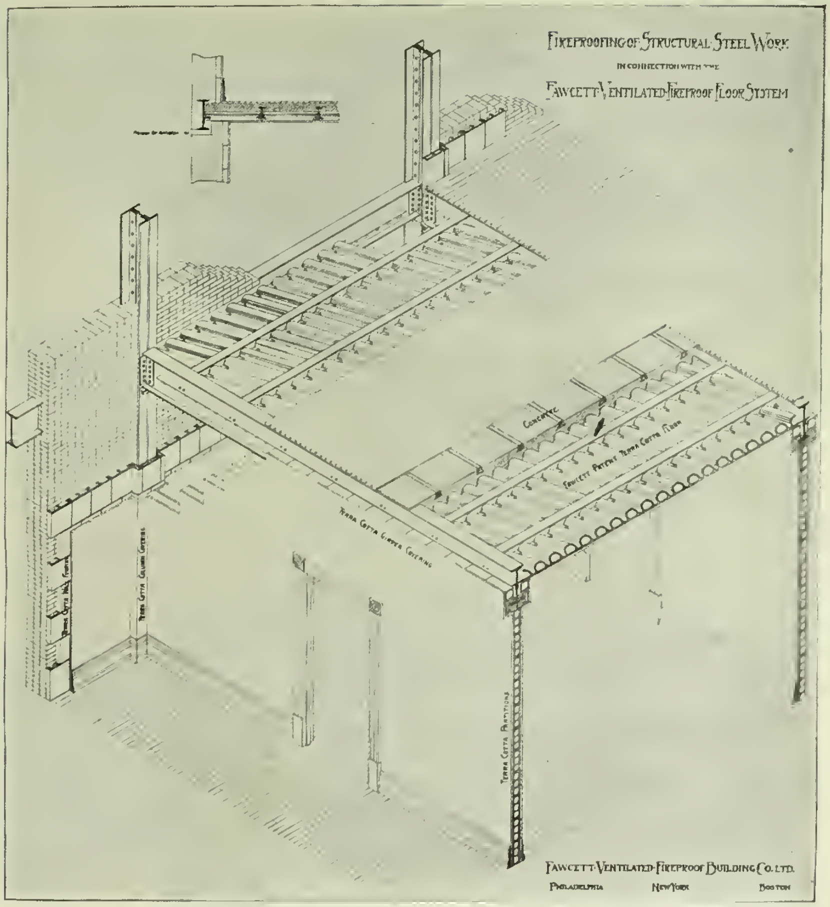
WESTMINSTER APARTMENTS, COPLEY SQUARE, BOSTON, MASS.
Front brick manufactured by the Eastern Hydraulic-Press Brick Company. Architectural terra-cotta made by Perth Amboy Terra-Cotta Company. Fire-proofed by the Fawcett Ventilated Fire-proof Construction Company.
Henry E. Cregier, Chicago, Architect.

Warren & Wetmore have planned a three-story brick, stone, and terra-cotta dwelling house, to be built at Tuxedo Park, New York, for Mr. Henry W. Munroe; cost, $150,000. C. P. H. Gilbert has prepared plans for a five-story brick dwelling, to be erected on 56th Street, for Mr. H. Seligman; cost, $80,000. Babb, Cook & Willard are planning a three-story brick and stone residence, to be erected on Fifth Avenue, between 90th and 91st Streets, for Mr. Andrew Carnegie; cost, $500,000.

Several architects have been invited to submit plans for the new Republican Club, which John Jacob Astor will erect on Fifth Avenue, near 55th Street.

ST. LOUIS. — The recent competition held for the new buildings of the Washington University resulted in the selection of the designs submitted by Cope & Stewardson, of Philadelphia. Only six firms were invited, who were to receive compensation, although the board of directors signified their willingness to receive plans from any one wishing to submit them. The invited firms were Eames & Young and Shepley, Rutan & Coolidge, of this city; Cope & Stewardson, of Philadelphia; Carrere & Hastings, McKim, Meade & White, and Cass Gilbert, of New York. Messrs. Walter Cook, of New York, R. D. Andrews and Clipston Sturgis, of Boston, were called in to assist the board of directors, and their decision seems to give universal satisfaction.

The only buildings considered were the Brookings Building, the Bush Building, two Cupples Buildings, one for civil and the other for mechanical engineering, the Liggett Building or dormitory, and the Library or Ridgely Building. This is to form the nucleus of the institution on their new property lying adjacent to Forest Park on the west, and will cost something like $700,000. The other buildings will be built when the University has disposed of its down-town site.



THE FAWCETT VENTILATED FIRE-PROOFING SYSTEM, EMPLOYED IN THE WESTMINSTER APARTMENTS, BOSTON, MASS.

FLAMBEAUX, RESIDENCE FOR W. W. ASTOR, ESQ., NEW YORK CITY.
Made by the Atlantic Terra-Cotta Company.
Clinton & Russell, Architects.

PITTSBURGH.— The extensive real-estate business of the past few months augurs well for increased building operations during the coming year; a large percentage of this has been in high-priced building lots in the best residence portions of the city, but there have been several sales in the business portion, the buyers intending to build soon.

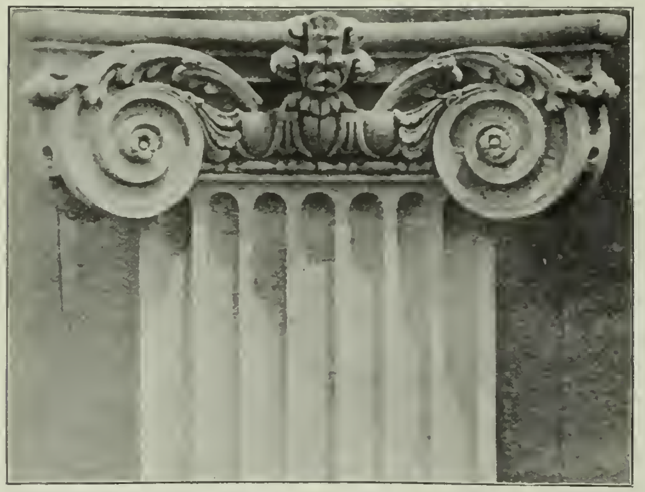
Most of the work which is now going ahead is for people who are building residences for themselves. There are, however, a large number of six and eight room houses and several apartment houses being planned and built at present, but the demand for such buildings is largely in excess of the supply. Materials are too scarce and prices too high to expect much speculative building, however, during the remainder of the year at least. There seems to be an idea in some quarters that prices will be lower by spring, but with coal, ore, and labor all advancing, this opinion does not seem to be well founded, at least so far as steel is concerned.

The scarcity of steel and iron is phenomenal. A Carnegie Company engineer stated a short time ago that he had a man at the Homestead Mills continually on the lookout for structural shapes, and then was not able to get them, and that for use on one of their own plants. Recently on a building in course of erection several extra I-beams were required, and after a thorough search of Jones & Laughlin's yards several 7 in. beams were found, but no 8, 9, 10 or 12 in. beams could be obtained. The annual exhibition at the art galleries

NORTHERN PACIFIC DEPOT, FARGO, NORTH DAKOTA.
Roofed with Ludowici Interlocking Spanish Tile.
Cass Gilbert, Architect.

WINDOW HEAD, APARTMENT, PHILADELPHIA, PA.
Made by Atlantic Terra-Cotta Company.
Yarnall & Gofarth, Architects.

of the Carnegie Institute, which was formally opened on November 2, is remarkably good this year. The first prize, a gold medal and $1,500, was awarded to Miss Cecilia Beaux, of Philadelphia, for her painting, entitled "Mother and Daughter"; the second prize, a



PILASTER AND CAP, TERMINAL HOTEL, BOSTON.
Made by the Atlantic Terra-Cotta Company.
A. H. Bowditch, Architect.

silver medal and $1,000, was awarded to F. W. Benson, of Salem, Mass.

Rutan & Russell are the architects of the P. & A. Telephone Company Building, cost $75,000, and they also have prepared plans for a residence in the East End, to cost $90,000. F. J. Osterling has the new Pathological Building for Mercy Hospital; Alden & Har-

ARCH PIECES, MAIN ENTRANCE, FEDERAL BUILDING, YOUNGSTOWN, OHIO.
Made by St. Louis Terra-Cotta Company.
D. H. Burnham & Co., Architects.

TERRA-COTTA CAPITAL.
Executed by the New Jersey Terra-Cotta Company.
Schneider & Herter, Architects.

low have prepared plans for an office building for the C., D. & P. Telegraph Company, to be built on the South Side, and also one for the same people, to be built in the Bellefield district.

MINNEAPOLIS.— Matters in the architectural line have been rather interesting, although large projects have been seriously delayed through lack of necessary structural iron and steel. The State University has several buildings under way, costing about $200,000, of which Mr. C. H. Aldrich is the architect. The Pillsbury-Washburn Company is erecting a new flouring mill, to cost $100,000. Frank B. Semple is erecting a $50,000 brick and stone residence from plans by Long & Son. The Realty Care and Improvement Company is a new organization made up of local and Eastern capitalists, for the improvement of desirable properties, and they have three or four buildings in hand at present, and promise to be a decided factor in the future of Minneapolis. One of the buildings they are ready to begin will cost $40,000. They have picked

CORBEL, ENTRANCE TO HAMILTON BUILDING, AKRON, OHIO.
Made by the Northwestern Terra-Cotta Company.
Mead & Garfield, Architects.

up several desirable corners and we may expect something substantial from them soon.

G. H. Christian is building a new brick flouring mill, to cost $100,000. Architect Fred Kees is planning an addition to Donaldson's Glass Block, to cost $60,000. The same architect is also planning a general store building for the Detroit Copper Mining Company, at Morenci, Arizona, to cost $40,000. The Methodists of the Northwest will erect a large hospital in this city next year at a cost of $150,000. It will be 297 by 100 ft., five stories, of brick and terra-cotta, fire-proof; E. P. Overmire, architect; capacity, about two hundred patients.

W. J. Keith is planning a business building for the old Westminster corner, at Nicollet and Seventh Streets, to be eight stories, fire-proof, pressed brick and terra-cotta fronts, to cost $175,000.

The deal for a new Chamber of Commerce having fallen through, they are now figuring on another, looking to enlargement of present building, at cost of about $125,000.

In St. Paul the most interesting event in architectural circles is the selection of Mr. Cass Gilbert as architect for the New York Custom House, to cost $3,000,000. The architects of the Northwest know Mr. Gilbert to be all right, morally and professionally, and regard him as the leading architect of the West and Northwest to-day, and one of the leaders of the profession in the United States. He has opened offices in New York City, where he planned a "sky-scraper" for Boston parties this year. He is planning the new $250,000 depot which the Northern Pacific Railway Company will erect at Seattle, Wash.

The Northwestern Grass Twine Company is erecting a factory building at their Como Avenue plant, to cost $60,000, from plans by F. P. Sheldon, of Providence, R. I.

BALUSTRADE OVER ENTRANCE, HIGH SCHOOL, TROY, N. Y.
Work executed by the New York Architectural Terra-Cotta Company.
M. F. Cummings & Son, Architects.

TERRA–COTTA PANEL.
Executed by the American Terra-Cotta and Ceramic Company.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: Francis J. MacDonnell, 906 Hennen Building, New Orleans, La.; Meyers & Fisher, Jamison Block, Williamsport, Pa.

CURRENT ITEMS OF INTEREST.

CHAMBERS BROTHERS COMPANY, of Philadelphia, are making an extension to their boiler house and erecting an additional boiler of 200-horse power. They are also equipping their iron, brass, and bronze foundry.

THE recently incorporated Burns-Russell Brick Company, of Maryland, will use the Chambers machinery, the whole outfit, including engine and boiler, being nearly erected and ready for use.

PORCH AND PORTE COCHERE CAPITALS,
HOUSE AT NEW ROCHELLE, N. Y.
Made by White Brick and Terra-Cotta Company.
Clinton & Russell, Architects.

THE POWHATAN CLAY MANUFACTURING COMPANY are delivering their "salt and pepper" bricks for the new station of the Southern Railway Company, at Richmond, Va.; also for a new three-story business block, and for seven new residences at Richmond.

THE EXCELSIOR TERRA-COTTA COMPANY, through their Boston agent, Charles Bacon, are supplying the terra-cotta for the following buildings: Pemberton Building, Pemberton Square, Boston, Fehmer & Page, architects; church at Leominster, Mass., Maginnis, Walsh & Sullivan, architects; church at Northampton, Mass., Maginnis, Walsh & Sullivan, architects.

SAYRE & FISHER COMPANY, through their Boston agent, Charles Bacon, are serving their brick for the following building operations in Boston: Burrage House, Commonwealth Avenue, Chas. Brigham, architect; Bradley House, Commonwealth Avenue, Little & Brown, architects; eight houses for W. D. Vinal, Bay State Road; Massachusetts General Hospital (addition to), Wheelwright & Haven, architects; Albany Building, Peabody & Stearns, architects.

THE CELADON TERRA-COTTA COMPANY, LTD., through their Boston agent, Charles Bacon, are furnishing the roofing tile for the following buildings: House at Beaconsfield Terrace, for H. M. Whitney; gate lodge at Middlesex Fells, Shepley, Rutan & Coolidge, architects; Everett School, Cooper & Bailey, architects; church at Cohasset, Mass., donated by Col. Albert Pope, Frederick Pope, architect; Wayland Library, Wayland, Mass., Cabot, Everett & Mead, architects.

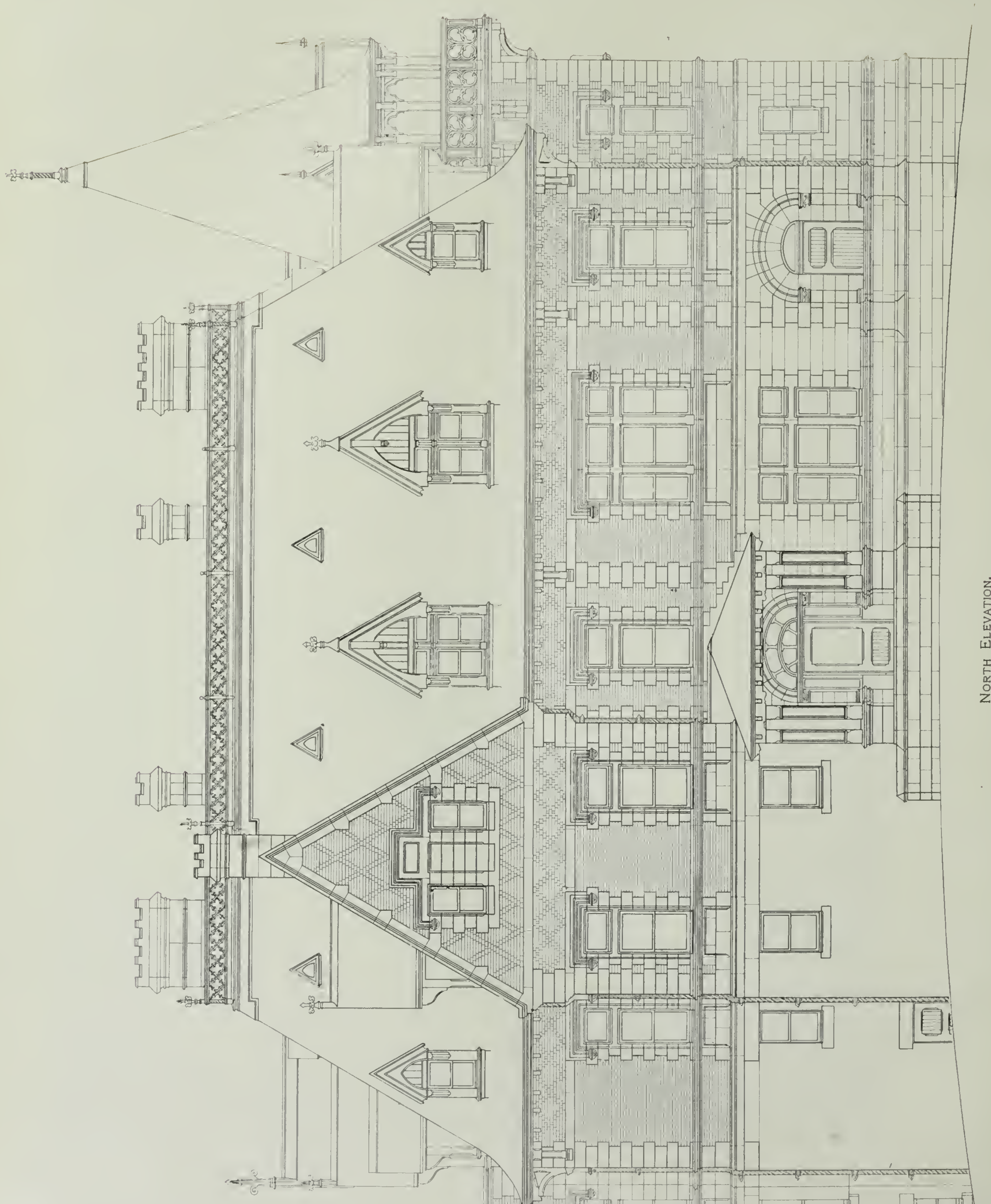
THE WHITE BRICK AND TERRA-COTTA COMPANY has lately secured the contracts to furnish the architectural terra-cotta for the following buildings: Store and lofts, West Broadway and Spring Street, New York City, Small & Schuman, architects; residence, East 80th Street, New York City, Wallace & Gage, architects; apartments, 109th Street and Broadway, New York City, Henry Anderson, architect; store building, Berkeley, Va., J. E. R. Carpenter, architect.

THE complete destruction by recent fire of the plant of the Boston Fire Brick Works, Fiske & Co., managers, has resulted in a very large increase of their orders to the various brick concerns

OHIO PYTHIAN ORPHANS' HOME, SPRINGFIELD, OHIO.

Ironclay mottled brick, the Columbus Face Brick Company, Columbus, Ohio.

Yost & Packard Architects, Columbus, Ohio.

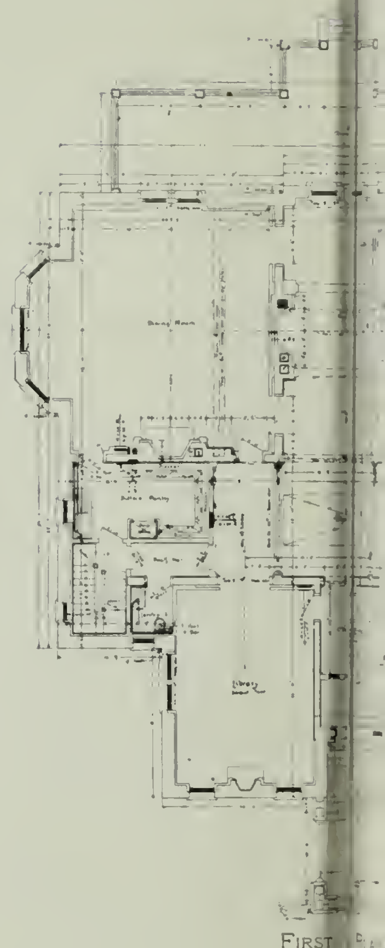


North Elevation.

HOUSE AT TUXEDO PARK, NEW YORK.

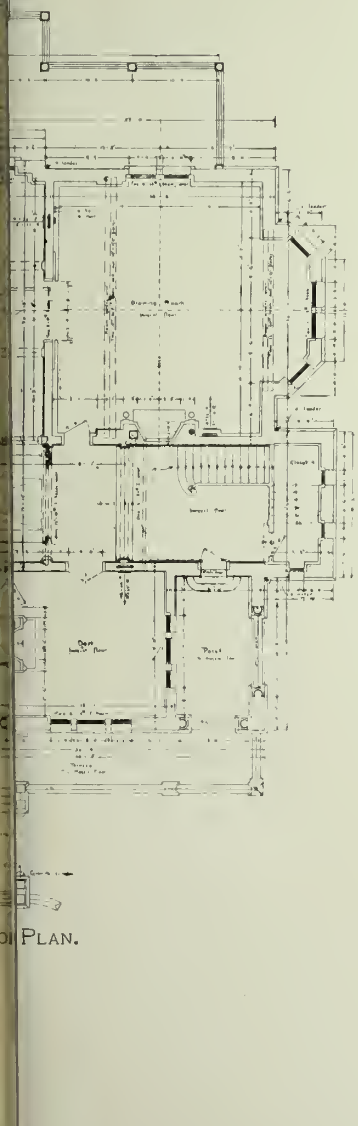
ADAMS & WARREN. Architects.

East Elevation.

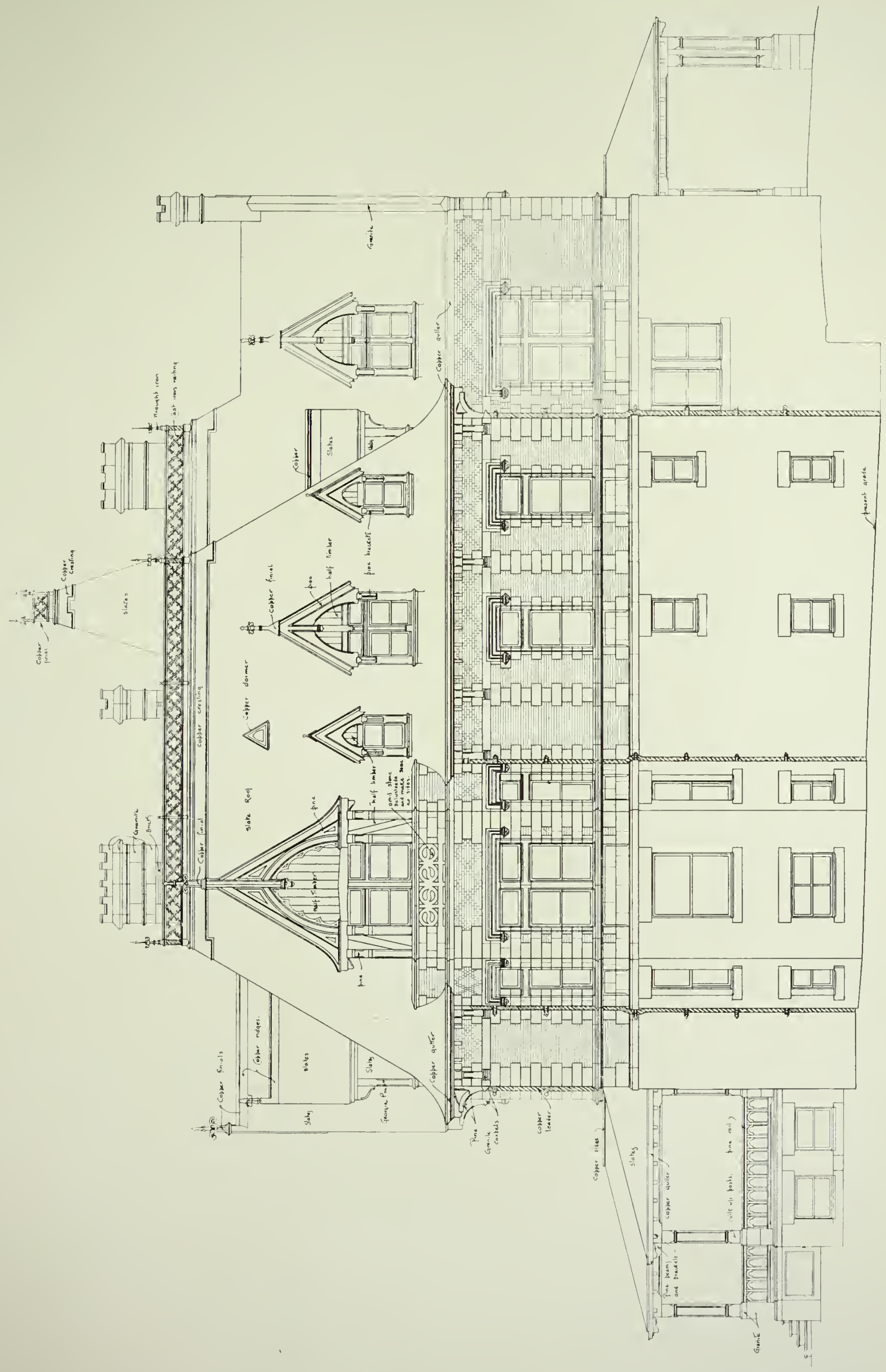


FIRST

PLATES 90 and 95.



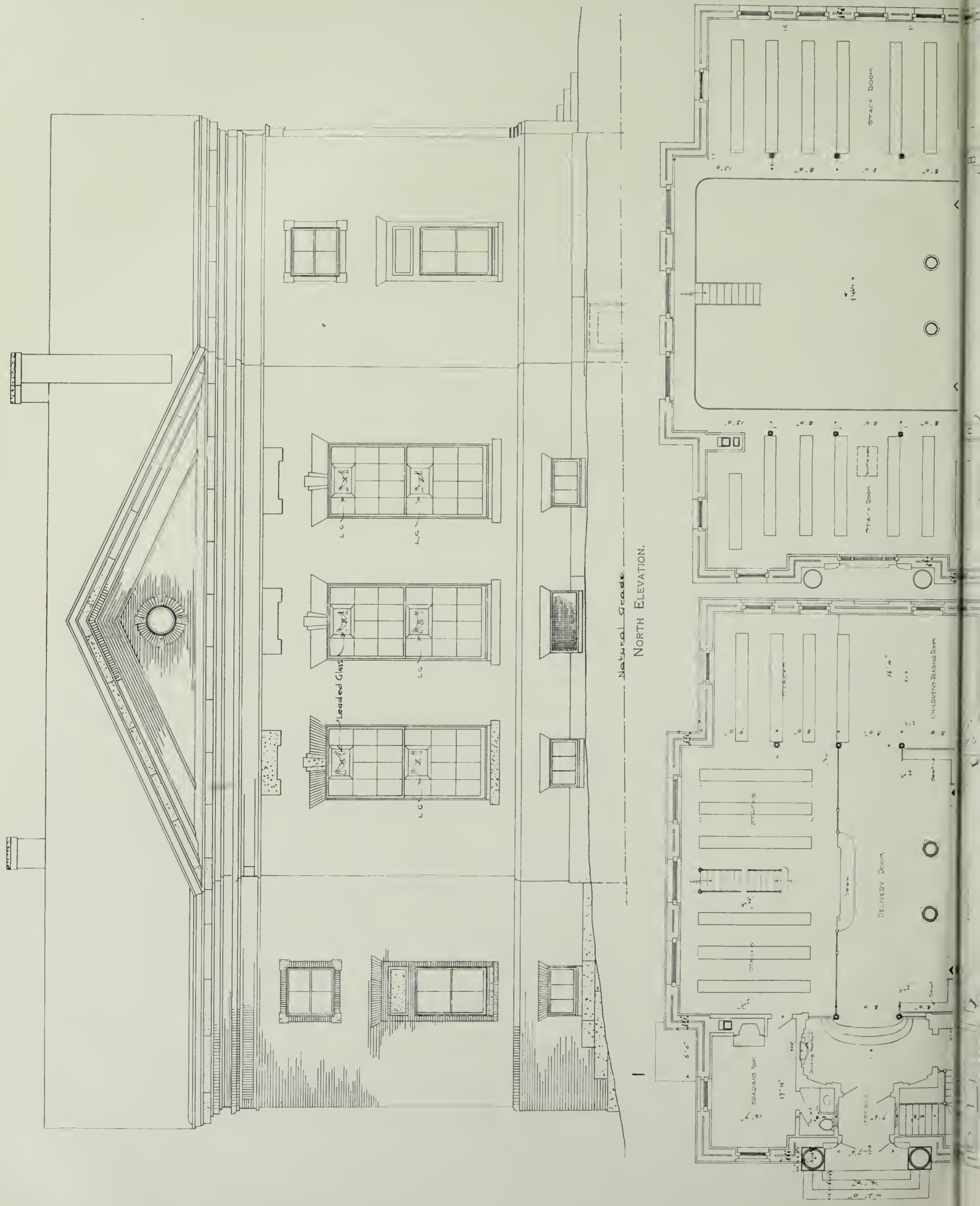
PLAN.

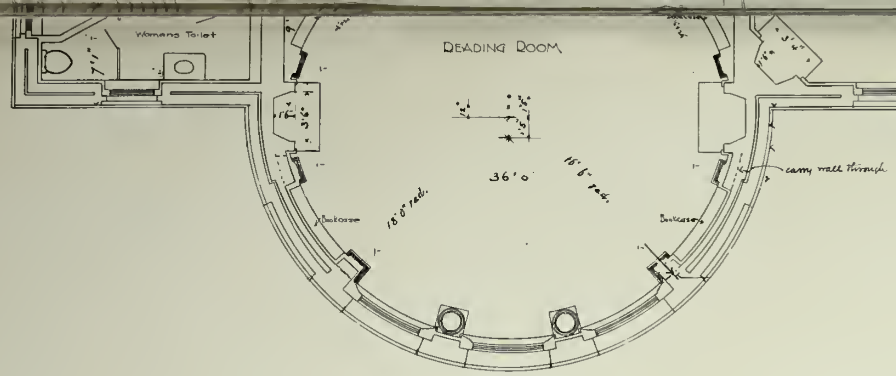


WEST ELEVATION.

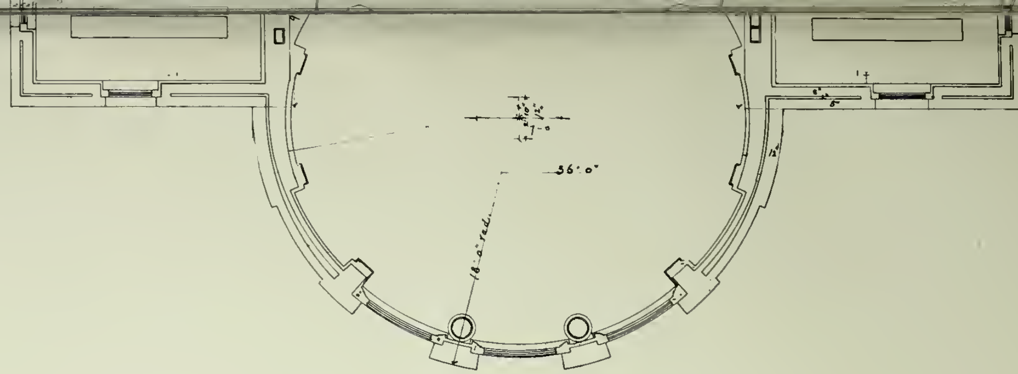
HOUSE AT TUXEDO PARK, NEW YORK.

ADAMS & WARREN. ARCHITECTS.


NORTH ELEVATION.
Natural Grade
Leaded Glass
STACK ROOM
STACK ROOM
STACKS
STACKS
DELIVERY ROOM
CHILDREN'S READING ROOM
LIBRARIAN'S ROOM



FIRST FLOOR PLAN.

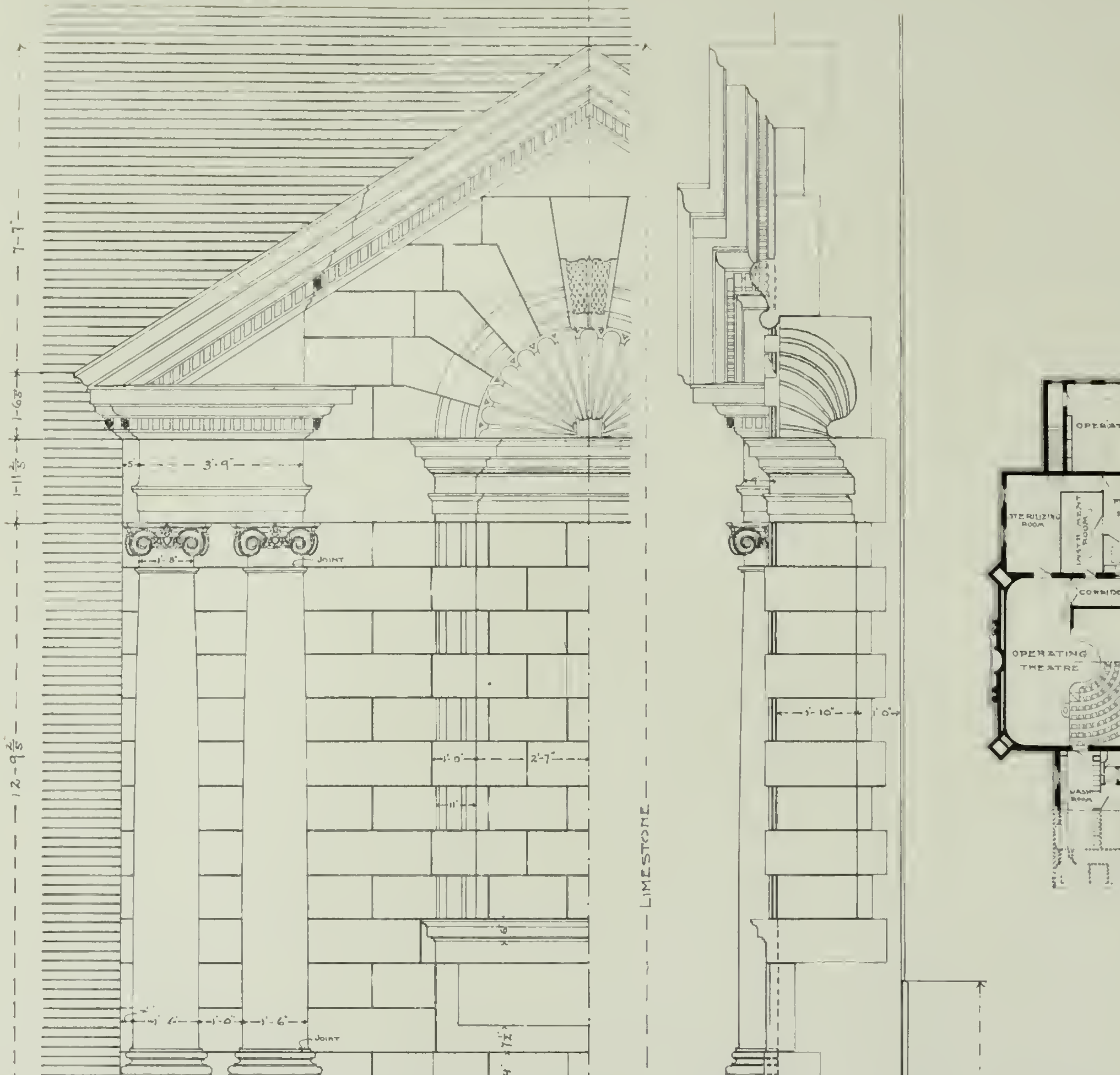


SECOND FLOOR PLAN.

FRONT ELEVATION.

LIBRARY, WAYLAND, MASS.

CABOT, EVERETT & MEAD. Architects.

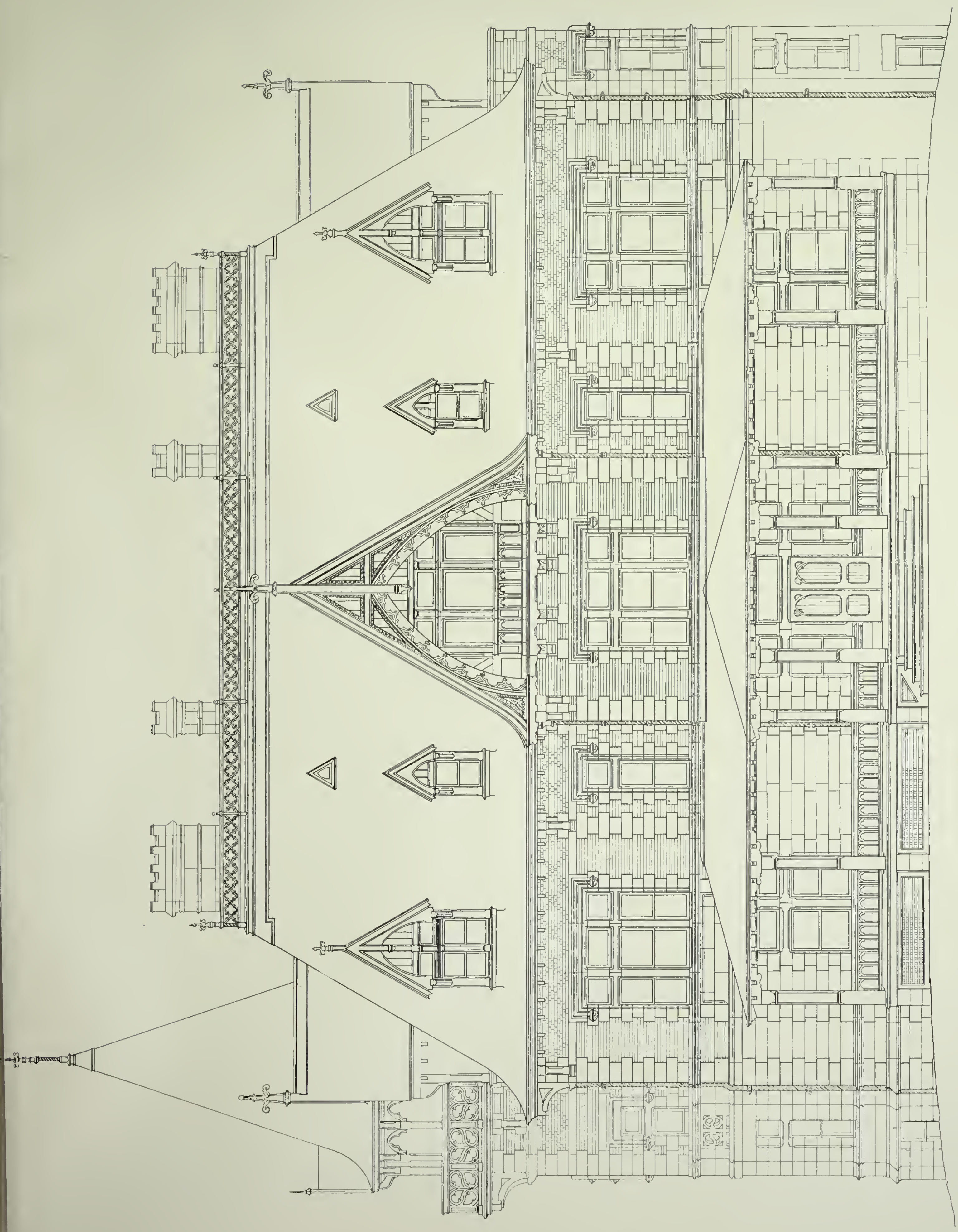


· HALF · ELEVATION · · SECTION ·

PLAN.

SURGICAL OPERATING BUILDING, M

ENERAL HOSPITAL, BOSTON.
ARCHITECTS.



SOUTH ELEVATION.

HOUSE AT TUXEDO PARK, NEW YORK.

ADAMS & WARREN, ARCHITECTS.

VOL. 8
NO. 12

THE BRICKBVILDER

DEC.
1899

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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AN announcement was made in the papers a few days since that the Boston Museum of Fine Arts had purchased property on the Back Bay Fens with the intention of abandoning its present location on Copley Square. This change will cause a great deal of regret to those who have watched the development of Copley Square from a mere marsh to one of the finest architectural centers in the country; but the change is one which could have been foreseen, and is due entirely to the encroachment upon the museum property by high buildings on two sides. The museum will be far better placed in its new location, will be entirely isolated, and will have ample grounds on all sides, so that the danger from fire is reduced to the vanishing point; and while Copley Square will suffer by the loss, the inexorable march of business development is such that the change was bound to come sooner or later. We can only hope that the building which takes the place of the present art museum may be of at least a semi-public nature rather than carrying out the lines of the apartment houses which are already too much in evidence in that locality.

In this connection it is of interest to recall a little of the history of the art museum building. This structure was erected in the seventies, at a time when architecture in burnt clay was just beginning to be developed in this country. The architects were Sturgis & Brigham. It is built entirely of brick and terra-cotta, with the exception of a very little stonework about the base, the body being in the familiar old shade of Philadelphia Peerless Red Brick, and the trimmings in a lighter shade of terra-cotta. At that time the resources of the country were not sufficient to satisfy the exactions of a building of this kind, at least it was so considered, for all the terra-cotta was made in England and imported to this country. As far as relates to mere material, the terra-cotta is about as good as anything that was ever done in this country. The matter of design is a somewhat different question. When it was built the country was in the last throes of English Gothic revival, and the influence of South Kensington work was paramount, and consequently the museum was designed in a species of Gothic which might perhaps fairly be termed a cross between early English and the style of the Orvieto Cathedral. It is quite safe to assume that when the designs for the new building are put forth they will show a building in the style of the Renaissance rather than carrying out the features of the present building, and it will be of interest to compare the new building with the present one, and to mark what progress has been made in the art of architecture during the last quarter century.

IN the good old days when a brick was a brick, and superlative worth was assumedly implied by the designation, the qualities which were deemed necessary for enduring work in burnt clay were little considered. In modern times, with the advent of numerous short-cuts toward speed in manufacture, no less than because of the indifference of poor workmen, the quality of terra-cotta has to be very carefully considered. All burnt clay is by no means good, and some terra-cottas which have every appearance of being thoroughly well burned and sufficiently hard for building purposes are in reality quite the reverse. It behooves all those who are to use this material to not only exercise care in the determination of the color and design, but to make a selection of the best manufacturers, limiting the choice to those whose product has been tried and proved satisfactory. For while terra-cotta at its best, or even the average terra-cotta, can be thoroughly depended upon for all emergencies, the temptation to use inferior earth or insufficient methods of burning is great enough to lead to pretty serious results with careless or dishonest manufacturers. Good terra-cotta ought not to scratch at the point of a knife, nor be influenced by the strongest acids, and it ought to give a thoroughly clear, bell-like ring when struck hard with a hammer. We have seen pieces of burnt clay so soft that a knife could be stuck right through an inch piece.

WHILE terra-cotta is one of the oldest of building materials, its use at the present day involves entirely new considerations. The North Italian work, for example, is built into the wall in much the manner stone is employed, the work being laid out in courses and bonded into the construction in such manner as to be entirely self-supporting. The advent of the steel frame, however, has so thoroughly changed all this that he who uses terra-cotta now is obliged to resort to schemes of balancing and tying together, which are entirely at variance with the constructive spirit of the old work. In other words, in our steel frame buildings, the terra-cotta is no longer a constructive member, but rather a decorative covering, and it has to be treated as such, and put together with the utmost care. We have at different times illustrated in these columns the construction of several of the more modern buildings, showing how thoroughly each piece has to be ironed to the frame and independently supported. It is an interesting study and one which brings dire results if neglected, and it speaks well for the care with which our hastily constructed modern work is put together that so little of the terra-cotta comes to grief.

WE had recently an illustration of the relative values of old and new work. A building which had been standing for about sixty years, and was consequently built in the period of our architectural development when it was assumed that good honest masonry was the rule, recently underwent some alterations, in the course of which it became advisable to remove the outer casing of brick wall and substitute therefor some light-colored face brick. It was found that the outer 4 ins. of the old work was laid up not only without the slightest kind of backing, but was in many cases entirely free from the rest of the wall, so that a crowbar put in behind the lining would pry off huge slabs of the face brick in one piece. In opposition to this, a wall which had been built only a few months, in connection with the same building, was found to overlap the lot line to a certain extent, and it became necessary to remove the outer 8 ins. of it. Although the wall was not supposed to be a specially good wall, but simply built up as one would ordinarily construct such work nowadays, it was found that nearly every brick had to be broken away or forcibly detached from the backing. The mortar had set up so hard it was almost impossible to drive a nail into a joint without bending and the face of the wall was, as it ought to be in all work, an integral part of the whole. We certainly do some things better than our forefathers.

WE have been interested in noting the extent, as evidenced by our correspondence, to which enameled brick has been recognized of late years as a highly desirable adjunct of modern interior work. Its cleanliness, as well as its attractive appearance, commends itself so thoroughly to all who have occasion to use it that the only surprise is that its use is not even more extended. We have just received specifications of a large, sumptuous palace to be erected by a well-known millionaire upon one of the best sites of New York. All the walls of the boiler and engine rooms from floor to ceiling, all the street area walls, the walls and ceilings in steam room in the Turkish bath, and the entire floor and wall lining of the swimming bath, occupying one end of the basement, are to be lined with enameled brick, as well as all the ceiling arches in basement, the iron beams of the construction being protected by enameled brick accurately fitted around the lower flanges. Also enameled brick are specified on all walls from floor to ceiling in machinery room, kitchen, scullery, servants' room, servants' dining room, cloak room, toilet and entrance service corridors, laundry, service stairs, and walls of kitchen elevator shaft. Though this is a somewhat extreme example of the lavish use of this material, we have received letters showing that it is by no means uncommon in New York, and we trust it will soon be the rule throughout the country generally to use enameled brick or tile exclusively for the service portions of every first-class dwelling. It goes without saying that this is really the only material that is applicable for such purposes.

ONE of the fallacies which seems to have been inherited as a part of our structural development is that cement can fairly be tested by subjecting to a tensile strain. Judging by personal experience, the test for fineness is the only one which the architect can make with any certainty. If the cement is properly ground no test applied at the building will indicate very much, for we have repeatedly seen instances of cement which after twenty-four hours set under water would not give a tensile strain of 40 lbs. to the inch, and yet within a few weeks would set up so hard in the wall that it could hardly be touched with a chisel. We have found the natural cements as a whole are less reliable now than they were twenty years ago. The processes of manufacture have so enormously increased the output that it stands to reason a great deal of inferior cement is put upon the market, and the only safeguard to the architect is to insist upon cement being thoroughly ground, and of a brand which he has actually used and has found of proper quality, not as a result of tests in the laboratory, but by actual use in building.

THE extent to which the native laborer is being replaced by the Italian emigrant is something quite noticeable of recent years. The Irishman, who fifteen or twenty years ago was the typical hod-carrier, has in some parts of the country almost disappeared, and it is by no means uncommon to find large gangs of Italian masons employed on large buildings. We seem to have noticed one peculiarity of the average Italian mason, namely, that he can be depended upon to fill the joints of stonework. This was manifested in connection with the cellar wall of a country house, where of all the masons employed only one was Italian, and he the last comer, but there was a noticeable difference between his work and that of the other men, for while the choice of stones and bonding of the wall was not attended to as carefully by him, and while he was less particular about making the work straight and pointing up nicely and smoothing over the irregularities of the outside, he built up a really better wall, and every joint and seam was filled full of mortar. It was a rough looking wall when done, but stronger and much more likely to stand than the work of the average mason, who lays the stones almost any way, and then points up a little from the outside.

NEW BOOKS.

CHIMNEY DESIGN AND THEORY. A book for engineers and architects. By William Wallace Christie. New York: D. Van Nostrand Company. 1899. Price, $3.00.

Up to the present time there has been but one book on the subject of chimneys printed in the United States, and outside of this country the only other book of any pretension is an English work, dating from 1885, and no longer obtainable. A work, therefore, which contains the latest practise in regard to theory and design of chimneys as built in the United States is of timely importance. Such a work is now before the public. It is not a book which one would need for daily practise, but it is something like a Texan's revolver, and judging from its contents would prove exceedingly valuable when wanted. It is a volume of a little over one hundred and fifty pages and goes into all the details which one would need to consider in work of this sort.

A TREATISE ON MASONRY CONSTRUCTION. By Ira O. Baker, C. E. Ninth edition revised and partially rewritten. Price, $5.00. New York: John Wiley & Sons. London: Chapman & Hall, Limited. 1899.

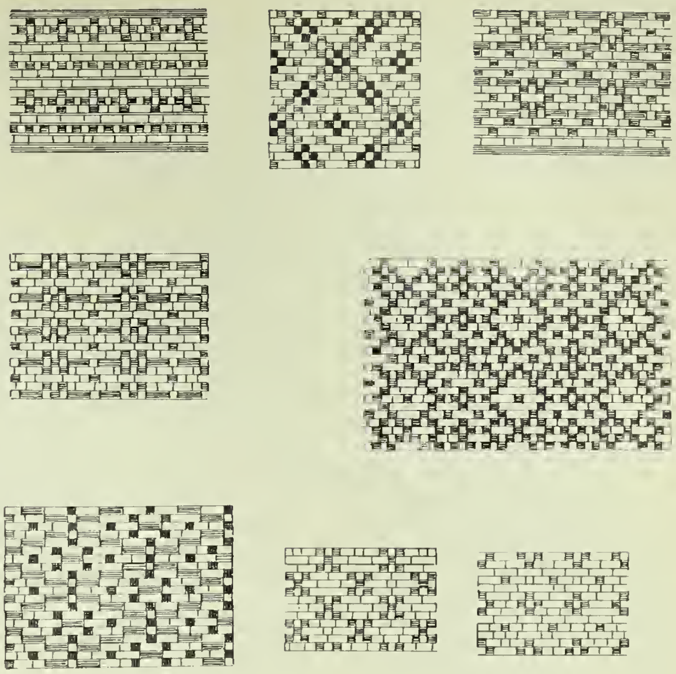
Professor Baker is one of the best authorities on masonry construction, and the ninth edition of his treatise upon the subject, which we have just received, forms a valuable addition to the architect's library. This edition is considerably extended, with several new chapters: the chapter on concrete having been rewritten and nearly doubled in extent. It includes, among others, some very careful studies of the relative economy of natural and Portland cement, these considerations being based upon a large number of experiments. The work is standard of its kind.

HOW TO USE PORTLAND CEMENT: From the German of L. Golinelli. Translated by Spencer B. Newberry, E. M., Ph. D. *Cement and Engineering News*, Chicago. 1899.

The *Cement and Engineering News* has issued a translation of a small circular on the topic of "Portland Cement," which was prepared some years since by the Association of German Portland Cement Manufacturers and distributed as a tract. This is a subject regarding which a great deal has been published, and it is to a certain extent a perennial theme; but our observation tells us that the last word has by no means been sounded on the subject, and every addition to our practical knowledge of the use of this so important building material is of great value, and this pamphlet, which claims to represent the latest German thought on the subject, will undoubtedly be of interest and value to contractors in this country.

The Minor Brick Chateaux of France.
I. The Gothic.

BY WILLIAM T. PARTRIDGE.



BRICK PATTERNS AT TROYES.

ALTHOUGH burning clay to make a sort of artificial stone has sooner or later been practised in almost all countries, this art really found its first development in alluvial regions, where real stone was hard to obtain, such as the valley of the Tigris and of the Euphrates. In the same way we naturally look for the first and best examples of its artistic employment, during the Middle Ages and the Renaissance, in Italy, in the valley of the Po, and in France, in Languedoc, and Provence.

Here, in the Cathedral of Toulouse and Albi, are the beginnings of a brick architecture which found a later and more modest development in the farm and smaller châteaux of Normandy.

These buildings were constructed entirely of brick,— walls, vaults, and buttresses,—but in other words the material is used mainly constructively, little advantage being taken of its plastic capabilities or of its color. Stone was employed both for decorative details and for reënforcing or bonding the walls and piers. If the builders considered its color or texture at all, the irregularity with which it was combined with the brick makes one think they were aiming at picturesqueness. Later, in the time of the Renaissance, these bond courses of stone were used decoratively, but in the Gothic buildings, as, for example, the *Couvent des Jacobins*, at Toulouse, the walls are entirely of brick, the only stone used is that about the entrance doorway.

The bricks used during the early part of the Renaissance were light red in color, 10 ins. to 13 ins. long, 2⅛ ins. high ; and in the courtyard of the *Hôtel des Raisins*, at Toulouse, are laid with wide, tucked, horizontal joints, and thin vertical ones, the warping of the long bricks making a wavy line, which gives to the surface much the same charm that a free-hand line gives to a drawing. They are all laid as stretchers in this example, and as the bricks vary in length, the vertical joints fall irregularly. The stone used about the doors and windows is bonded but slightly into the brickwork, which produces a very delicate effect. The angle bricks seem to have been especially shaped for their position.

In the time of the later Renaissance, color seems to have been taken into account. Bands of stone break the surface and the bonding of the stone around the openings is carried far into the surface of the brickwork. Brick molded architraves are used in the museum here ; the applied orders in the courtyard are constructed entirely of brick.

The surfaces of these walls at Toulouse are of one color save where stone is used as a contrast. Nowhere is found a pattern formed by darker or colored brick.

But at Bourges the wall of the *Hôtel Cuja* is laid in headers and is ornamented by a simple diaper, formed with blue-black brick. The door and window jambs are of stone bonded in the wall to some depth, but with no regularity. The joints are thin the bricks small, and the decorative effect is due entirely to the pattern in darker colors.

In the south the dwellings are in general confined to the cities, and built around courtyards or between party walls, while the north abounds with châteaux built sometimes near the large cities, but no insecurity was felt in a situation quite remote.

CHATEAU DE GIEN.

CHATEAU DE MARTAINVILLE.

At Gien, now nearer the center of France, is a Gothic château of considerable size where the entire wall surface is covered with varied patterns laid in a bond of alternate courses of headers and stretchers. The first story is decorated with a simple pattern formed by making every other header a dark brick. The system is reversed every three or four courses, so that no vertical lines are carried through the pattern continuously. The upper stories are decorated on this large surface with a variety of geometrical figures, squares, circles, etc., and the smaller areas filled with an endless number of diapers, zigzags, and other patterns. The scale of this decoration is so great as to impair the dignity of the architecture.

In these illustrations the red of the brickwork has photographed darker than the blue-black pattern, so that one must reverse the colors in one's mind.

Coming suddenly upon brickwork patterns in such quantity and of such boldness, one asks their origin. In portions of the fortifications of Troyes, in the central part of France, where the caravans from the Levant ended their journey, there existed as late as the year 1859, walls and towers of brick ornamented with patterns of endless variety. They were formed in dark and light brick, and in stone or chalk. They are known to have been in existence in 1542, and tradition traces them back to Byzantine times. Certainly no modern military engineer would so have decorated a work of defense. It is not unlikely that this wealth of detail, existing at so important a point, may have had great influence upon the brick architecture further north.

In Normandy, a great wealth of material awaits the student. Brick manors and châteaux abound. The colors of the brickwork give them an air of gaiety, which made it a favorite material in both the Gothic and the Renaissance period. In the smaller châteaux one can trace all the features of the larger ones, and the same plan was retained down to the time of the late Renaissance. The central staircase was then a mere tradition recalled by a slight break in the center of the façade crowned with a pediment. The bold corner towers shrank to small, corbeled turrets or slightly advancing wings.

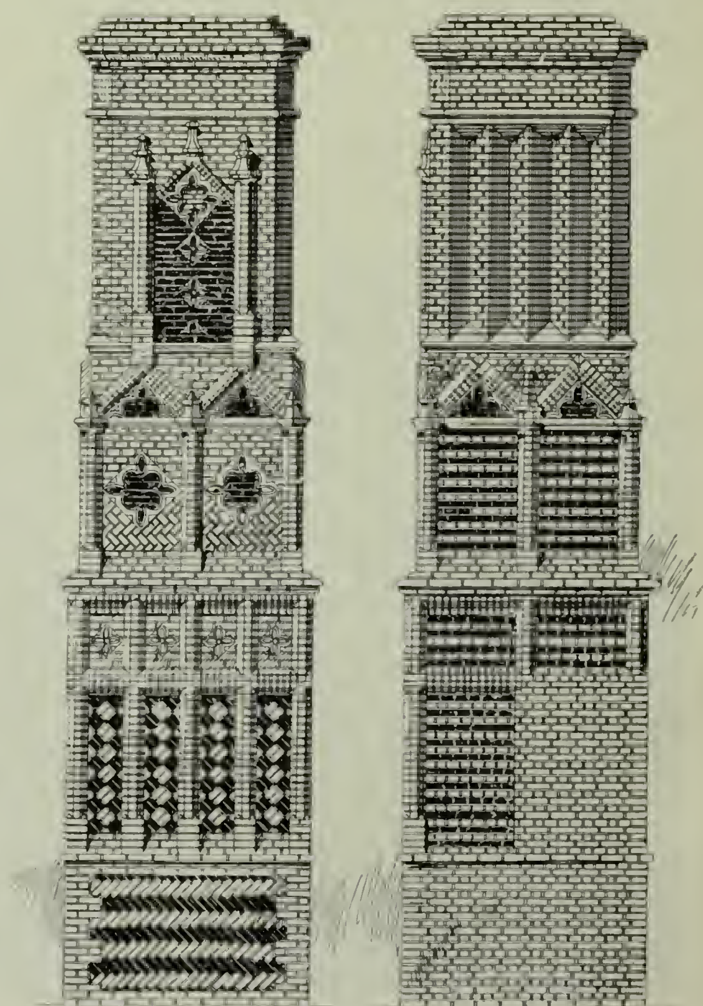
The use of brick in the construction of the late Gothic châteaux had but little effect upon their architectural forms. Brick was used strictly as a constructive material, though advantage was taken of the great variations in color possible to this material, and of its contrast to the light color of the Caen stone used throughout Normandy.

The pointed arches of the earlier Gothic work had, by the time the use of brick became general, degenerated into a low ellipse, around which all the moldings of the jamb were carried. In construction this was practically a flat arch, and the lintel which finally replaced it still carried all the moldings of the jamb, which instead of mitering either turned a quarter circle, or intersected in the complex manner so characteristic of the Flamboyant style. The corbels, dormers, and gables, and the enriched heads of the doors, as well as the sections of the moldings, all show the stone forms of Gothic domestic work without a trace of any influence from the new material.

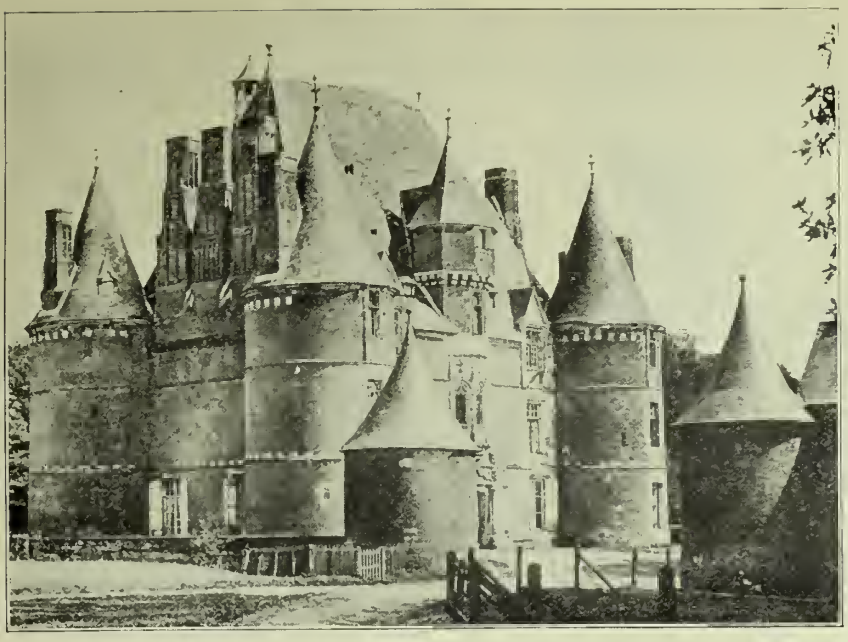
There are no molded brick such as are found in the later work of the south; the few that are used in the chimneys have simple sections of a half or quarter circle. A few small turrets are laid in bricks especially formed for the purpose, but the diameters of the larger towers were so great as not to require a special mold. Lime mortar was apparently in universal use.

The roofs and the finials and crestings are made of lead. Only in work of later date do glazed terra-cotta finials appear.

The mercantile class following in the sixteenth century close on the heels of the soldiers spread their small châteaux everywhere throughout Normandy, and in none of these is this type of dwelling better shown



BRICK CHIMNEYS, CHATEAU DE MARTAINVILLE.



CHATEAU DE MARTAINVILLE.

than in the charming *Château de Martainville.* It stands in the midst of an enclosure once defended by a high, brick wall, reënforced by towers at the angles and protected by a moat. Little remains of the defenses, though the château itself is in fair preservation. It was built in the year 1485, by a merchant prince, Jacques le Pelletier, and is for its size one of the most interesting Gothic dwellings in France. A vaulted corridor extends from front to rear, ending at the staircase, which is enclosed in a projecting tower. To the left of the entrance is a large hall, to the right the guard room and kitchen. Above the entrance is the chapel, extending out over the doorway in a little corbeled bay or oriel, with a richly decorated window with tracery.

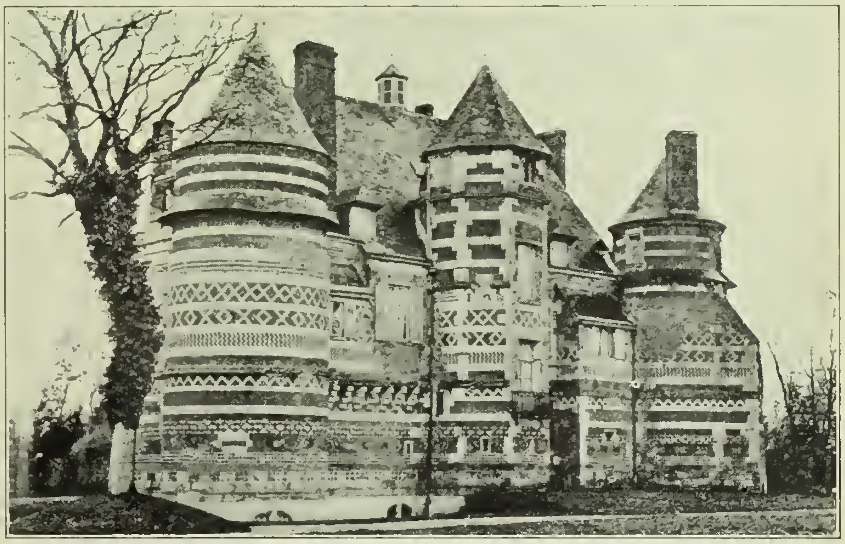
The rooms grouped on either side of the central passage form a parallelogram unbroken by the towers placed at the corners, the rooms projecting into the circles of the four towers. The planning of the rooms, the arrangement of the fireplaces, doors, and windows is unusually symmetrical.

The four corner towers, which loopholes for muskets show to have been built for use as well as for ornament, the staircase cage, and the chapel oriel are roofed with high, conical or pyramidal roofs which are united into a single composition by the towering roof of the main building.

The château is built throughout of brick laid in alternate courses of headers and stretchers. Stone string courses mark the floor levels, while the base is constructed with alternate masses of brick and stone arranged like a checkerboard. The first story is without ornament, but the upper walls are decorated with diapers of varied design, but so faded as to be hardly discernible. Above the first-story string and under the eaves, a course of isolated blocks of stones add variety to the large wall surface.

The dormers have suffered the loss of their traceried gables, but much of the brickwork of the chimneys remains.[1]

If Martainville and Gien represent the maximum of brickwork, the *Château d'O* and the *Château de Montigny* show the minimum. At Montigny the upper portion of the staircase tower and the band over the now obliterated arcade are decorated by square patches of brick and stone of the same size laid so they break bond. That is to say, the joint between two masses comes above the mass on block below. This gives a vertical zigzag pattern, which is hardly a success as a decoration. In the walls of the *Château d'O* brickwork was inserted in the same way wherever there was space for it, but the stones being irregular in length the effect in one portion is, strange to say, that of a graded wash with the smaller amount of color at the top.

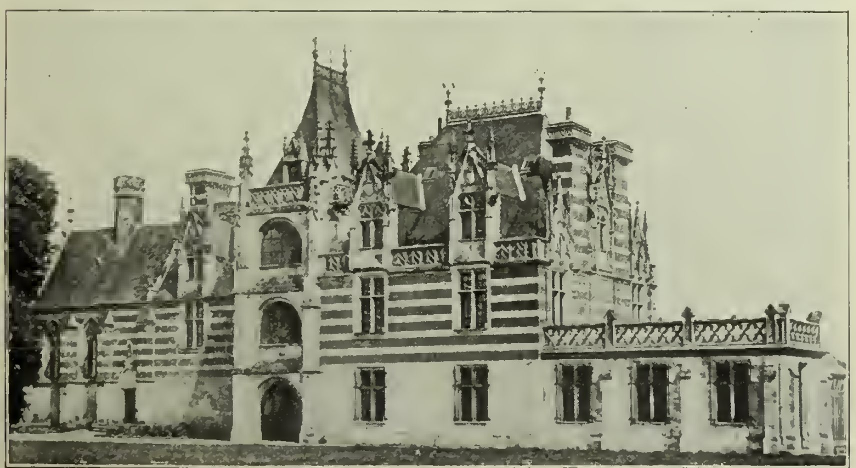


CHATEAU D'AUFFRAY.

The plans and masses of both of these buildings is quite irregular, but being each portions of a larger group the same observation as to traditions in the plans of the smaller châteaux is not.

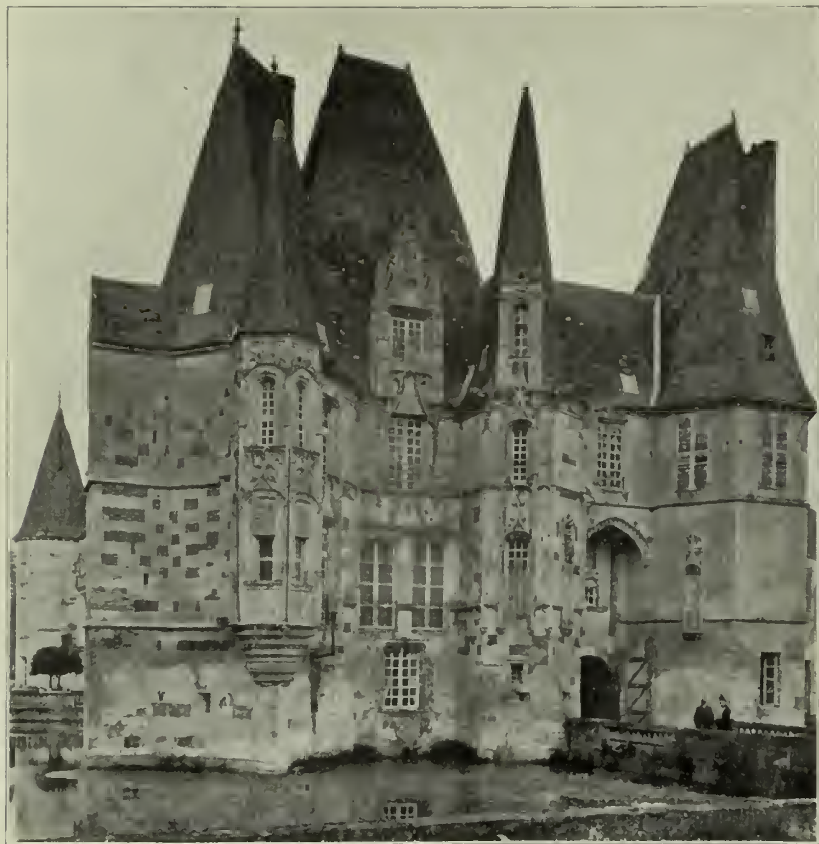
The *Château d'Auffray*, near Havre, though wanting in some of the features of Martainville, has the same general mass and plan, and was built about the same time, 1442, an inscription announces.

The entrance vestibule and corridor, like that of Martainville, is vaulted, but the workmanship is of a later date; there is a tradition that it is by one of the workmen of Chambord. The entrance façade



CHATEAU D'ETELAN.

[1] An interesting restoration of this château is published in *Sauvageot-Palais, Châteaux et Hôtels de France.* Vol. iv.



CHATEAU D'O.

at the Chicago Architectural Club his collection of foreign photographs, numbering in all about eleven thousand subjects. Other events at the club of recent occurrence are as follows: Monday, November 27, a turkey supper; Monday, December 11, a "smoker"; Monday, December 18, Mr. Robert C. Spencer, Jr., gave an informal talk illustrated by chalk drawings, on "Artistic Farm Houses." Mr. Spencer has made a special study of this subject, and his talk was especially interesting. Walter H. Kleinpell, a member of the club, has received from Pratt & Lambert the sum of fifty dollars, to be expended as prizes for the following competition, to be given under the general code governing competitions in design of the Chicago Architectural Club: A design for the full improvement of the triangular space, bounded by North State Street, Rush Street, and Bellevue Place, as a small park. The cost of any architectural features of the design must not exceed one thousand dollars, and designs the execution of which will evidently cost more than this sum will be ruled out. Competitors may make all use of foliage or shrubbery desired, as the cost of this part of the work will not be included in the one thousand dollars named.

has been altered, but beyond the cutting out of the mullions which nearly every Gothic domestic window seems to have suffered in the eighteenth century, the rear façade here shown is unchanged. Palustre, in his work on the French Renaissance, gives an illustration of the other front.

The wall decoration consists of broad bands of stone, alternating with wider bands of colored brick laid in different patterns. White, green, and black are employed, and from the picturesque standpoint, the charm of the composition is enhanced by the vine-clad tree.

The little château and chapel of *St. Maurice d'Etelan*, near Lillebonne, dates from the later part of the fifteenth century. The irregularity of its disposition is doubtless due to the difficulty of incorporating so large a chapel into the scheme.

The walls are decorated with broad bands of stone and brick with no string course. It is attractive from the picturesque staircase tower and dormers, but lacks the dignity of the more symmetrical buildings at Auffray and Martainville.

PERSONAL AND CLUB NOTES.

HIGBY BROTHERS, architects, have opened an office at 828 Ellicott Square, Buffalo, N. Y.

AMOS S. WAGNER, a prominent architect of Williamsport, Pa., died at his home in that place on Dec. 11, 1899, aged fifty-nine years.

THE SKETCH CLUB, of New York, held its regular monthly meeting December 9, in the rooms of the Architectural League, 215 West 57th Street.

MR. EDWARD J. JONES, JR., exhibited recently

CHATEAU DE MONTIGNY.

Terra-Cotta Architecture in England.

AMONG the first buildings of importance in London on which terra-cotta was introduced on its own inherent merits, the Albert Hall, Kensington, is worthy of mention. Whether fashioned into variously shaped blocks or laid up in the form of brick walling, the burned clay of which this immense auditorium is constructed was not chosen as a substitute for stone, nor is it treated in simulation of that or any other material. In trueness of line and evenness of color it does not approach the standard reached in work of later date, but there is a frankness and freedom from affectation about its make-up that is very engaging. The chief embellishment consists

ALBERT HALL, LONDON.

of a fine sculptured frieze around the rotunda, designed, we believe, by Edward J. Poynter, R. A., and dedicated to "the arts and sciences and works of industry of all nations."

In referring to a few of the more recent examples of terra-cotta and brick architecture, it may be well to recall the chief points of difference between English practise and that to which we are becoming accustomed in America. The first and perhaps most noticeable of these is the absence of stone in the lower stories of all their buildings in which terra-cotta has been seriously introduced. With us there is a tacit understanding that while terra-cotta may be used above the second or third story, it will not do to challenge inspection at close quarters. The English architect contends that when deemed advisable to use it extensively on any part of the building, the quality and finish should withstand criticism down to grade level. On that point, at least, there seems to be a consensus of opinion; for, with the utmost variety of style and treatment in other respects, there is rarely an exception to the rule in prevailing practise. This is due in great measure to a higher appreciation of the material, based on a fuller recognition of its time and smoke-resisting qualities. It is usually

OFFICE BUILDING, PARLIAMENT HALL, LONDON.

well set, and, which is equally important, protected from injury until the building approaches completion.

Considerations such as these are forced upon one's attention in viewing any of the recent work to be met with in either the business or residential quarters of London. A tall office building on the east side of Parliament Street, of which we illustrate the lower stories, proved something of a revelation to the present writer. Everything is burned clay from sidewalk to the topmost finial, save the doorstep. The entrance itself, and indeed most of the work throughout the building, furnished a severe test of skilful workmanship. The lines are true, the joints tight and of uniform size, while the intersection of moldings could not be surpassed in the best stonework. The terra-cotta is gray and the brick red, the former having a close resemblance to the oolitic limestone from the Island of Portland, which has been found to stand the corrosive atmosphere of the great metropolis better than any other. There is a total absence of broken or patched arrises. Not a single chip had been knocked off any projecting member, which showed that they had been deemed worthy of protection during the progress of subsequent operations.

Most of the above remarks will apply to the terra-cotta on Redfern's building, which also begins at the sidewalk, including a balustrade placed there, we presume, to keep intruders at a respectful distance. The workmanship here, too, is in keeping with an establishment that set the pace many years ago in the world of fashion for fit and finish. Our photograph was taken rather early

BANK BUILDING, OXFORD STREET, LONDON.

in the morning, before the carriage folk began to form in line along Conduit Street. Two window cleaners with pails and a hose had just finished washing down the lower portion of the frontage under the direction of the inevitable man in buttons. The building looked bright and cheerful after its morning bath, and thus the undeniable advantages of semi-glazed terra-cotta became obvious to the most casual observer.

The new Birkbeck Bank, just off Chancery Lane, approached by narrow streets and bounded by alleyways of time-honored antiquity, needed something to relieve the prevailing gloom of its immediate surroundings. To accomplish this, the architect has devised a color scheme made up of light brown, olive green, and white of a slightly pinkish cast. These colors are laid on in the form of an opaque enamel on a perfectly smooth surface obtained from a dense, finely ground body. To this is added a dull glaze, sufficient to seal up the pores and produce an impervious gloss without objectionable glitter. The entire building is of terra-cotta, the interior being treated in a similar manner, lighted by an immense dome of steel and terra-cotta construction. When last seen the scaffolding had not been removed; but the result, so far as could be judged, appeared very encouraging from an architectural as well as from a terra-cotta standpoint. Though not by any means the first building on which a color scheme has been attempted, it is one of the most important,

REDFERN'S STORE, OXFORD STREET, LONDON.

and will, doubtless, be the forerunner of others in which a still greater degree of success may be achieved.

Another difference between English and American practise is noticeable in the surface finish, which in the former is perfectly smooth, while we insist upon its being tooled in imitation of stone. This, like many other minor differences between the two branches of the English-speaking people, is owing chiefly to climatic conditions. A smooth vitreous face affords less foothold for smoke, and what little does collect is easily washed off, after which the building combines the freshness of youth with the mellowness that accompanies its riper years. In the clearer atmosphere of America, the tooling has certain very decided advantages. It absorbs the light instead of reflecting it, and so conceals defects instead of exhibiting them in an exaggerated form. Yet in and around manufacturing centers, unrestricted in their use of soft coal, soot will adhere to rough surfaces and, when wet, run into streaks that are beginning to disfigure many recent erections on which light colors predominate.

In Heath's hat shop, on Oxford Street, no brick is used, the whole frontage being jointed up in terra-cotta blocks. Along the wide frieze over the store windows "Ye olde London hatters" are depicted in high relief, showing the processes of hat-making, from the preparation of raw material to the sale of the latest fashion in head covering. Beyond this, ornament in its usual acceptation is introduced somewhat sparingly. This studied severity will act as an offset to some work around Essex Street, Strand, on which it is perhaps a little too plentiful. The color is a warm shade of buff, of a fairly uniform tint, but hardly equal in that respect to the American standard as set by the best work of our leading manufacturers.

It is only fair, however, to allow in this connection that it is not "slipped," as is now the almost invariable custom with us. English architects, in addition to their share of national conservatism, have a strong prejudice against the application of anything to the surface of the block after it has left the mold. They prefer it trimmed and finished up by hand in its own clay; accepting, as a matter of course, the slight variation in color, so long as the body is the same throughout. An aversion to shams is always commendable and nowhere more becoming than in things architectural, but we think that that principle, good though it be, is carried too far in this particular. It dates from a time when unsuccessful attempts were made to apply a facing of fine clay by dipping the blocks into a slip. This face did not always adhere to the block after firing, and in most cases it evinced a readiness to part company on slight provocation. Our method of blowing an almost impalpable vapor against the face of the block, by means of compressed air, is different in principle and perfectly reliable in its results. This fine spray adheres to the dry clay, and when fired sinks into the pores as a stain, producing a uniform color, with a close vitreous surface, one and inseparable from the block so long as it endures.

There is a section of the city of which Mount Street, Grosvenor Square, is the center, and in it a high grade of brick and terra-cotta residences holds undisputed sway. So, too, along the great thoroughfare between Holborn Viaduct and Hyde Park. A branch of the National Provincial Bank, on Oxford Street, must be a veritable masterpiece in the art of brick building. Whether the architect has nursed a grudge against the existence of terra-cotta we know not, but he has evidently reserved his right to an unlimited use of burned clay in the form of bricks. With the single exception of the doorstep, this building is built of brick. Panels, molded jambs. and

HEATH'S, CONDUIT STREET, LONDON.

column bases are of brick; the fluted columns are laid up in Flemish bond to correct entasis. The composite capitals and modillion cornice are brick; bonded, we presume, to approximate outline, and afterwards carved to the degree of perfection shown in our illustration.

Brickwork at the T Square Club Exhibition.

IF the contributors to architectural exhibitions could stand behind the scenes as the jury of selection is passing on their drawings, there would be an immediate and marked improvement in American architecture,—less straining after effect, more of the honest, unaffected work which is not conscious of itself. A gradual improvement in architectural standards, however, is indicated by each succeeding exhibition. Although those followers of the Beaux Arts School, who have gained the manner without the spirit, as their enemies claim, set a pernicious example, their excesses of trailing ornament and ponderous mass react against themselves. Even the commercial and untrained architect, to whom all design is an effort, has come to look at his work more soberly and to introduce some breadth and repose into it. The profession in general has become more interested in the small realities of office practise than in the gigantic school drawing. A good exhibition, like a substantial house, has a large part of it underground, and the tendency of elimination has been steadily to set aside the unreal for the actual, simple and genuine. Although there is a temptation in the facility with which terra-cotta can be wrought, to overcharge it with ornament, there is an inherent simplicity in brickwork, a homeliness and familiarity of effect, which make it the freest and most natural medium of architectural expression; and it is, therefore, in brickwork that the visitor at the exhibition is likely to find what is of genuine interest and practical value to him.

The T Square Club, having gone to considerable expense to procure foreign work through representatives abroad, there is an excellent showing at its annual exhibition in the Art Club of Philadelphia, of the designs of the best English architects — the men to whom within the last few years we have resorted for precedents in certain directions. The work of Ernest George, who has probably been the most prominent factor in our rediscovery of England, is represented by his characteristic sepia pen-drawings softened with the brush, an attractive process which we seem over-slow to learn for ourselves. The quality in his work, that of seeming not to have been actually built but to have grown up naturally from its surroundings, goes through all the English domestic work. The architects are not using an exotic and imported, but a familiar, national style; their box hedges and wicket gates are not merely a pleasant deception of rendering. There is every reason why the work should be spontaneous, and yet after leaving the charming cottages of Arnold Mitchell, for example, and the country residences like those of Ernest Newton, the Englishmen's treatment of brickwork in monumental structures is undeniably clumsy. They have constrained themselves to an affected *naiveté* and quaintness, which for the most part consorts well with smaller work, but in the solution of large problems loosens their grasp of the whole. They are attempting to work out a consistent style to its conclusion; on our side, we seem to be more at ease for taking the ancient styles in their most flexible forms and adapting them to modern uses.

COTTAGE AT RICKMANSWORTH, ENGLAND.
Arnold Mitchell, Architect, London.

Probably the most notable examples of American brickwork at the T Square Club exhibition are the two perspective views of the new dormitory buildings now in course of erection at the University of Pennsylvania, under Cope & Stewardson. The location offers excellent opportunities for picturesque composition. A horizontal range of dormitories after the Jacobean style, completing the "Triangle" constructed by the same firm several years ago, surmounts an arcaded terrace, at either end of which a monumental stair leads to archways, which are emphasized by a lofty ornamental treatment like the college gateways at Cambridge or Oxford; beyond, rise the clustered spires of the great tower and of the dining hall opposite. The same architects, who have had a long experience in college buildings at the University of Pennsylvania, Princeton, and Bryn Mawr, are now engaged, as winners of the recent competition, in making working drawings for

HOUSE, WOODSIDE, STANMORE, ENGLAND.
Arnold Mitchell, Architect, London.

HOUSE AT WOKINGHAM, ENGLAND.
Ernest Newton, Architect, London.

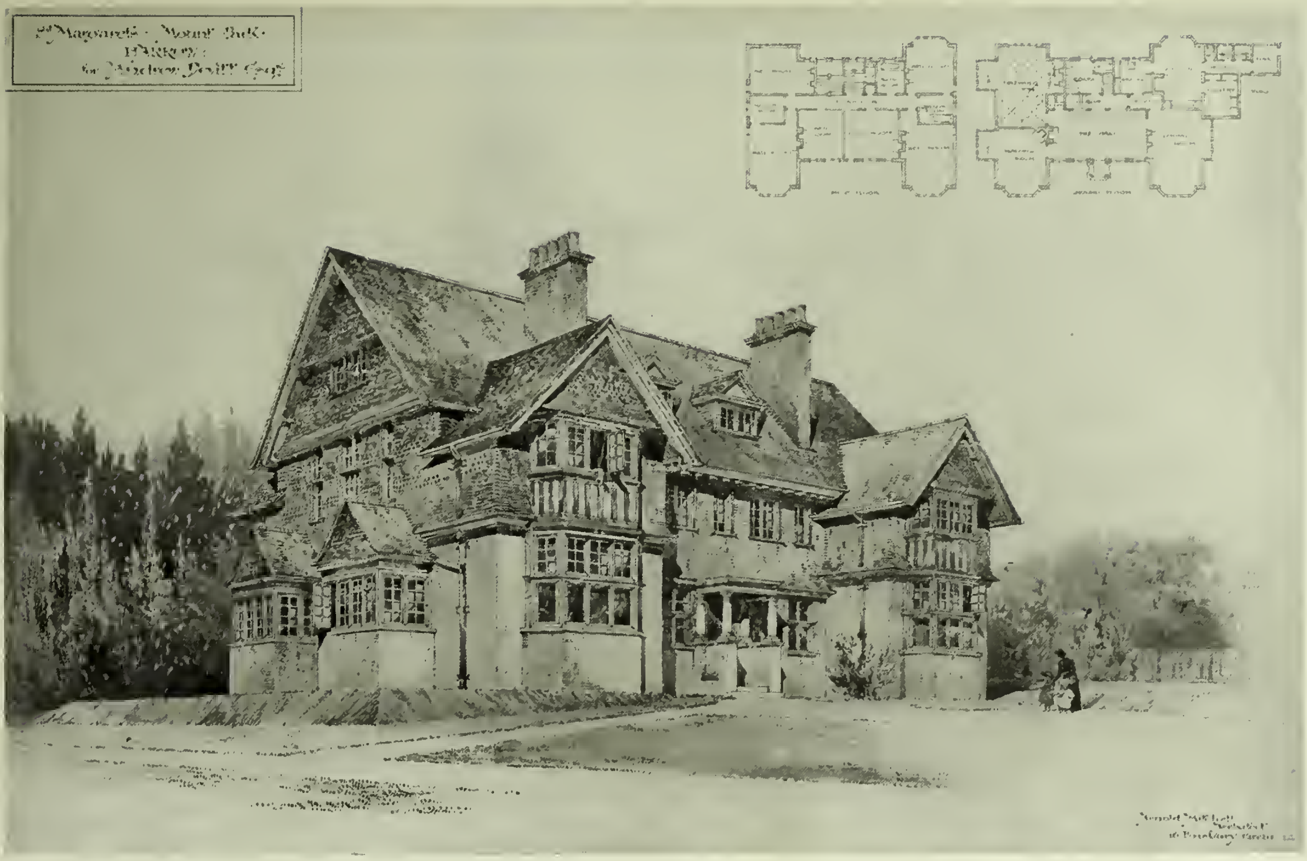
the preliminary buildings at the University of St. Louis. In the surgical operating building of the Massachusetts General Hospital, Messrs. Wheelwright and Haven present a striking example of bold, direct, and appropriate treatment. They, probably more than any others, have introduced into general practise the strong, full Georgian motives to take the place of emasculated colonial forms, and their work carries an unvarying high quality. Like all bold conceptions, this one is open to the criticism of disregarding formulæ. Timid ones are troubled about the use of the piers set diagonally on the corners, and as to what is the character of the roof hidden by the sharp perspective; but whatever fault may be registered against it, the building is straightforward and unequivocal.

An agreeable use of Georgian motives characterizes the suburban residence at Germantown, by Lawrence Visscher Boyd, and an adapted Tudor style the country house at Wayne, by W. L. Price, whose uniformly good work merits attention. Nothing is more hopeful for the future than the present decorative yet restrained treatment of American domestic architecture.

The work of Wilson Eyre is always interesting on account of his strong, artistic personality. His essays in the Georgian style have been quite as attractive as his well-known city fronts, with their delicate-pointed arches, and his shingle country houses, which conform so naturally to their surroundings. In their seemingly innate rightness of composition in motives and ornament his work bears comparison with the best of the English. He is represented at the T Square Club exhibition by a number of characteristic sketches in body color on a dark ground, which are unmistakably individual and distinguished.

In the department of ecclesiastical architecture, Maginnis, Walsh & Sullivan exhibit photographs of St. Patrick's Church, Whitinsville, Mass., a brick church with campanile after the Italian Gothic, altogether Roman Catholic in character, yet full of charm and artistic quality. This firm, though young in affairs, is already

BATTERSEA POLYTECHNIC, LONDON, ENGLAND.
E. W. Mountford, Architect.



HOUSE, ST. MARGARET'S, HARROW, ENGLAND.
Arnold Mitchell, Architect, London.

HOUSE AT WAYNE, PA.
W. L. Price, Architect.

ulation as to the future of the exhibition catalogue if it is pushed to its logical conclusion; for the rivalry between clubs and even between various administrations in the same club will make it some day impossible for the catalogue to surpass itself. The T Square Club, which by its energy in developing new ideas has been steadily in the lead of catalogue making, has again brought the final issue closer by the innovation of a stamped cloth binding and of the use of brown ink for decorative cuts. The avowed intention is to make its publication "acceptable as a permanent addition to the Architectural Library." It will certainly have the result of throwing an added responsibility on the committees of the future in the selection of their subjects, and in presenting them in an orderly and compact manner. The expressed intention of this catalogue is to furnish a manual of modern architecture of as much practical

looked upon as doing for the architecture of the Roman church, which has until lately accepted everything ugly and commonplace for its minor buildings, what Cram, Goodhue & Ferguson have done for the Anglican. A similar effort may be noted in the St. Augustine Roman Catholic Church at Pittsburgh, the work of Rutan & Russell, represented at the exhibition in a pen-drawing by J. T. Comes.

The searcher after truth in brickwork must have a glance about him, even if he is not permitted to enter at length into the interests of the stone mason and lumberman. The T Square Club exhibition is fortunate in the displays by many notable draftsmen. Joseph Pennell has sent a number of drawings from London. The work of Raffles Davison is amply presented. H. B. Pennell exhibits a collection of marvelous colored drawings, a part of the results of his tour abroad as Rotch Scholar. A half-dozen perspectives carry the distinction of a rendering by D. A. Gregg, whose pencil-work is the more welcome to us because it gives him the possibility of larger production. William Charles Hays, the second holder of the John Stewardson Memorial Traveling Fellowship, has a special exhibition of fifty of his envois, and Alfred M. Githens is distinguished by a number of masterly sketches in color, made in England last year. From the students' point of view, perhaps the most valuable feature of the exhibition is the entry by the University of California of twenty-two large carbon prints of the first eleven premiated drawings in the recent international competition won by M. Bénard. These, unfortunately, came too late for the catalogue.

The catalogue of the T Square Club exhibition is food for spec-

HALL AND PLANS OF A HOUSE ON LOCUST STREET, PHILADELPHIA.
Frank Miles Day & Bro., Architects.

DOUBLE HOUSE, GERMANTOWN, PA.
David Knickerbocker Boyd, Lawrence Visscher Boyd, Associate Architects.

value as possible, by the introduction of details, working drawings, and photographs of executed work, and by the suppression of unstudied sketches of ancient remains and architectural *tours de force.*

This is sound policy toward making the architectural exhibition a strong educational influence, a moving school of architecture, as it were. If it were then possible to achieve a method of classification for the exhibits, so difficult now in the manifold embarrassments of the hanging committee, and a system by which all the premiated drawings of recent competitions could be collected, with programs and explanations for comparative study, the architectural exhibition would begin to fulfil its possibilities; — and the possibilities opened by the organization of the Architectural League of America, with its scheme of a circuit for exhibits, and its determination for concerted effort, suggest how powerful a factor the exhibition can be made.

Economics of Cement Mortar.

BY IRA O. BAKER.
M. Am. Soc. of C. E., Professor of Civil Engineering, University of Illinois.

IT is proposed in this article to inquire primarily into the economics of cement mortar.

METHODS OF PROPORTIONING THE MORTAR.

In laboratory work the proportions of cement and sand are uniformly determined by weighing, but there is no uniform practise of measuring the proportions on the work. One of the three following methods is generally employed, but unfortunately it is not usually stated which is used.

1. *By Weight.* The ingredients are weighed, or at least the weight of a unit of volume of the sand and of the cement is determined, and the relative quantities are fixed accordingly, the actual proportioning being done by volumes. This is the most accurate, but least common, method; and it would be somewhat inconvenient in practise, and would probably add a little to the cost of the work.

2. *Packed Cement and Loose Sand.* A commercial barrel of cement is mixed with one or more barrels of loose sand, *i. e.*, the proportioning is done by mixing one volume of *packed* cement with one or more volumes of loose sand. This method is frequently used. As far as the cement is concerned, it is as accurate as the first, since the weight and volume of a barrel of cement may readily be known when only whole barrels are used, as is usually the case. Even though the cement is received in bags, the barrel of packed cement is still a convenient unit, for an integral number of bags, usually three or four, are equal in weight to a barrel. As far as the sand is concerned, this method is not as accurate as the first. The weight of the sand is affected by the amount of moisture present, but a small amount of water affects the volume in a greater proportion than the weight. For example, the addition of 2 per cent. of water (by weight) thoroughly mixed with any sand increases the volume of the sand nearly 20 per cent. Therefore, if the mortar is proportioned by volumes, damp sand will give a richer mortar than dry sand. The effect of moisture on the volume is greater the finer the sand, and decreases as the amount of moisture increases. Measuring the sand by volumes is inaccurate, owing to the packing of the sand.

Except for the inaccuracies in measuring the sand, this method gives practically the same result for Portland as the first method, since ordinarily a unit of volume of packed cement and of sand, weighs substantially the same, viz., 100 lbs. per cubic foot. Since natural cement when packed in barrels usually weighs about 75 lbs. per cubic foot, a mortar of one part natural cement to one part sand, by weight, is equivalent to one and one third parts cement to one part sand, by volumes, of packed cement and loose sand.

3. *Loose Cement and Loose Sand.* A volume of *loose* cement is mixed with one or more volumes of loose sand. The actual proportioning is usually done by emptying a bag or fractional part of a barrel of cement into a wheelbarrow, and filling one or more wheelbarrows equally full of sand. As far as the sand is concerned, this method is as inaccurate as the second, and is also subject to great variations owing to differences in specific gravity, fineness, and packing of the cement. Even though inaccurate, it is very frequently employed. It is the most convenient method when the cement is shipped in bulk, which is only rarely.

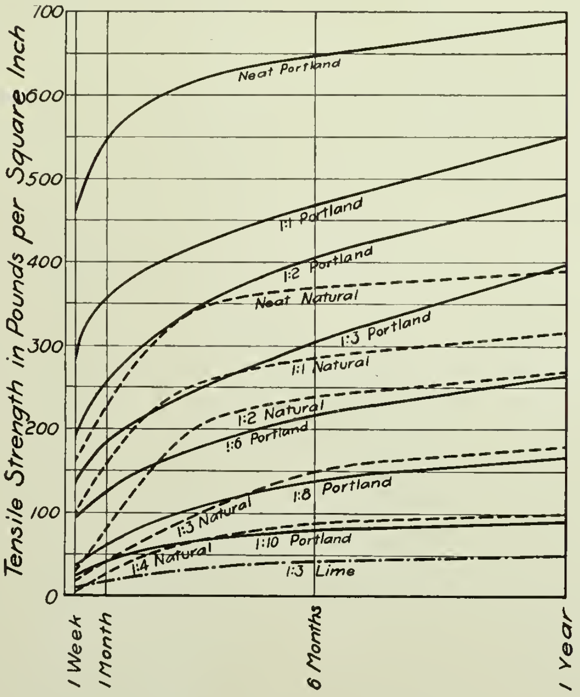


FIG. I. DIAGRAM SHOWING THE EFFECT OF TIME ON THE STRENGTH OF MORTARS.

Occasionally the actual proportioning is done by throwing into the mortar box one shovelful of cement to one or more shovelfuls of sand. This is very crude, and should never be permitted.

Since a commercial barrel of Portland will make 1.1 to 1.4 barrels if measured loose, a mortar composed of 1 part Portland cement to 1 part sand, by weight, is equivalent to 0.7 to 0.8 parts of cement to 1 part of sand, by volumes, of loose cement and loose sand; and a mortar composed of 1 part natural cement to 1 part sand, by weight, is equivalent to 0.50 to 0.75 parts cement to 1 part of sand, by volumes, of loose cement and loose sand.

TABLE I.

CEMENT AND SAND REQUIRED FOR 1 CU. YD. OF MORTAR.

Parts sand to one part cement.	Mortar proportioned by weight.					Mortar proportioned by volumes of *packed* cement and loose sand.					Mortar proportioned by volumes of *loose* cement and loose sand.				
	Portland.		Natural.			Portland.		Natural.			Portland.		Natural.		
	Cement. bbl.	Sand. cu. yd.	Western. bbl.	Eastern. bbl.	Sand. cu. yd.	Cement. bbl.	Sand. cu. yd.	Western. bbl.	Eastern. bbl.	Sand. cu. yd.	Cement. bbl.	Sand. cu. yd.	Western. bbl.	Eastern. bbl.	Sand. cu. yd.
0	7.40	0.00	8.40	7.42	0.00	7.40	0.00	8.40	7.42	0.00	7.40	0.00	8.40	6.81	0.00
1	4.05	0.57	5.23	4.62	0.51	4.05	0.57	4.87	4.29	0.58	3.87	0.63	4.66	4.11	0.60
2	2.80	0.78	3.65	3.22	0.72	2.80	0.78	3.24	2.85	0.76	2.42	0.81	2.97	2.61	0.78
3	2.00	0.85	2.70	2.38	0.80	2.00	0.85	2.38	2.10	0.81	1.73	0.88	2.12	1.87	0.84
4	1.60	0.89	2.17	1.91	0.84	1.60	0.89	1.80	1.59	0.86	1.35	0.91	1.64	1.45	0.87
5	1.30	0.91	1.74	1.54	0.86	1.30	0.91	1.48	1.31	0.88	1.10	0.93	1.22	1.07	0.89
6	1.10	0.93	1.48	1.31	0.88	1.10	0.93	1.38	1.21	0.89	1.00	0.94	1.17	1.02	0.90

INGREDIENTS FOR A YARD OF MORTAR.

Table I. shows the approximate quantities of cement and sand required for a cubic yard of mortar by the three methods of proportioning described above. The table is based upon actual tests made by mixing $3\frac{1}{2}$ cu. ft. of the several mortars[1]; but at best such data can be only approximate, since so much depends upon specific gravity, fineness, etc., of the cement, upon the fineness, humidity, sharpness, compactness, etc., of the sand, and upon the amount of water used in mixing.

The volume of the resulting mortar is always less than the sum of the volumes of the cement and sand, or of the paste and sand, because part of the paste enters the voids of the sand; but the volume of the mortar is always greater than the sum of the volumes of the paste and the solids in the sand, because of imperfect mixing, and also because the paste coats the grains of sand and thereby increases their size and consequently the volume of the interstices between them. This increase in volume varies with the dampness and compactness of the mortar. For example, the volume of a rather dry mortar with paste just equal to the voids, when compacted enough to exclude great voids, was 126 per cent. of the sum of the volumes of the paste and solids of the sand; and the same mortar when rammed had a volume of 102 to 104 per cent. If the paste is more than equal to the voids

[1] By L. C. Sabin, Assistant U. S. Engineer, in connection with the construction of the Poe Lock of the St. Mary's Falls Canal. See Annual Report of Chief of Engineers, U. S. A., 1894, p. 2326.

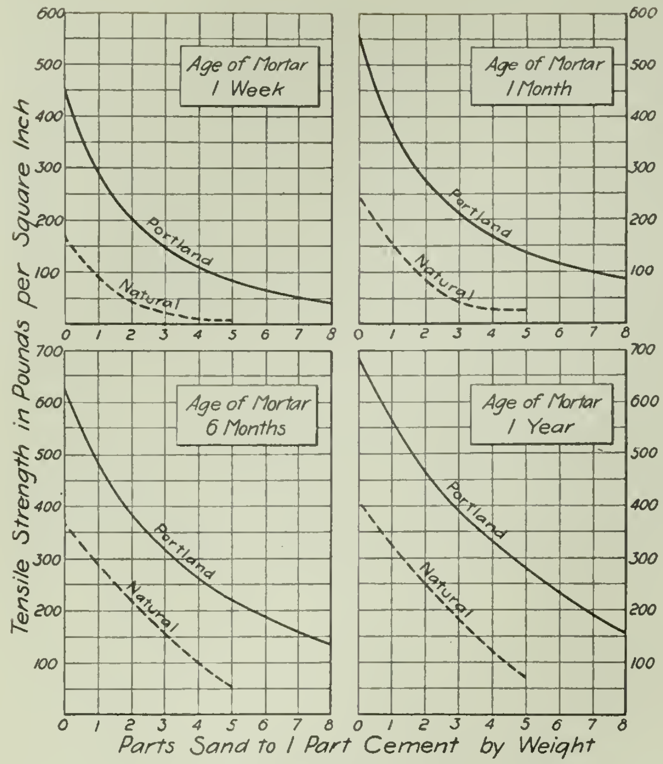


FIG. 2. DIAGRAM SHOWING THE RELATIVE STRENGTH OF CEMENT MORTAR.

the per cent. of increase is less, and if the paste is not equal to the voids the per cent. is more.

TENSILE STRENGTH.

Fig. 1 shows the effect of time upon the strength of various mortars. The diagram represents the average results of a great number of experiments made in connection with actual practise. Results which were uniformly extremely high or low as compared with other experiments were excluded on the assumption that the difference was due to the method of molding and testing. Since the individual values plotted were themselves means, there were no very erratic results, and consequently the lines are quite reliable. There were fewer experiments for the larger proportions of sand to cement; hence the curves are less accurate the larger the proportion of sand.

The line for strength of lime mortar probably represents the maximum value that can be obtained by exposing the mortar freely to the air in small briquettes. This line is not well determined.

Unusually hard burned Portland cement when tested neat will show a greater strength than that given in the diagrams. Very fine cement when mixed with sand will show greater strength than that given by Fig. 1. Again, the diagram shows neat cement, both Portland and natural, stronger than any proportion of sand; while frequently neat cement mortar is not as strong as a mortar composed of one part sand and one part cement, — particularly at the greater ages. However, notwithstanding these exceptions, it is believed that the results represent fair average practise. The proportions of sand to cement were determined by weight.

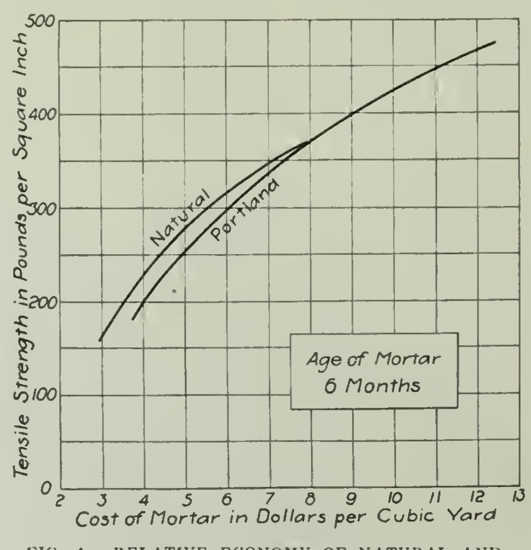


FIG. 4. RELATIVE ECONOMY OF NATURAL AND PORTLAND CEMENT MORTARS.

The results in Fig. 1 are tabulated in another form in Fig. 2 to show the effect of varying the proportions of the sand and cement, and also to show the relative strength of natural and Portland cement mortars at different ages. The curves of Fig. 2 are especially useful in discussing the question of the relative economy of Portland and natural cement. For example, assume that we desire to know the strength of a 1 to 2 natural cement mortar a year old, and also the proportions of a Portland cement mortar of equal strength. At the bottom of the lower right-hand diagram of Fig. 2 find the proportion of sand in the mortar, which in this case is 2; follow the corresponding line up until it intersects the natural line. The elevation of this intersection above the base, as read from the figure at the side of the diagram, is the strength of the specified mixture, which in this case is about 250 lbs. per square inch. The second part of the problem then is to determine the proportions of a Portland cement mortar which will have a strength of 250 lbs. per square inch. Find the 250 point on the scale at the side of the diagram, and imagine a horizontal line passing through this point and intersecting the " Portland " line; from this po nt of intersection draw a vertical line to the base of the diagram, and this point of intersection gives the required number of volumes of sand to one volume of cement, which in this case is 5.5. Therefore a 1 to 2 natural mortar a year old has a strength of 250 lbs. per square inch, and is then equivalent to a 1 to 5.5 Portland mortar.

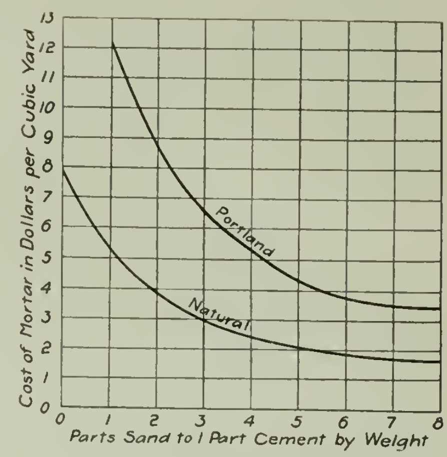


FIG. 3. DIAGRAM SHOWING THE RELATIVE COST OF CEMENT MORTAR.

COST OF MORTAR.

Knowing the price of the materials it is very easy, by the use of Table I., to compute the cost of the ingredients required for a cubic yard of mortar. The expense for labor is quite variable, depending upon the distance the material must be moved, the quantity mixed at a time, etc. As a rough approximation it may be assumed that a common laborer can mix 3 yds. per day, at a cost of say 50 cents per cubic yard. If the mixing is done by machinery, the cost may be as low as 25 cents per cubic yard. The cost of a cubic yard of mortar composed of 1 part Portland cement and 2 parts of sand, both by weight, is then about as follows: —

Cement .	2.80 bbls. @ $3.00=	$8.40
Sand . .	0.78 cu. yds. @ .50=	.39
Labor, handling material, and mixing. . . .	⅓ day @ 1.50=	.50
		$9.29

NATURAL VS. PORTLAND CEMENT MORTAR.

It is sometimes a question whether Portland or natural cement should be used. If a quick-setting cement is required, then natural cement is to be preferred, since, as a rule, the natural cements are quicker setting, although there are many and marked exceptions to this rule. Other things being the same, a

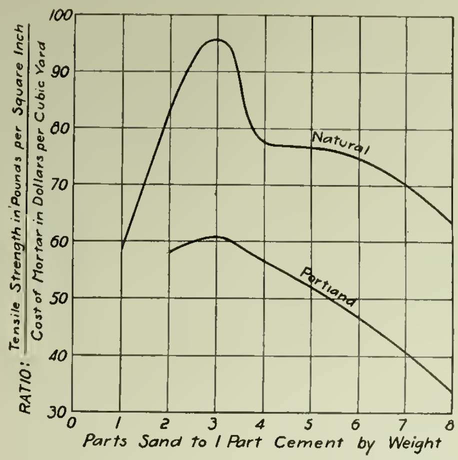


FIG. 5. ECONOMIC PROPORTIONS OF SAND.

slow-setting cement is preferable, since it is not so liable to set before reaching its place in the wall. This is an important item, since with a quick-setting cement any slight delay may necessitate the throwing away of a boxful of mortar on the removal of a stone to scrape out the partially set mortar.

Generally, however, this question should be decided upon economical grounds, which makes it a question of relative strength and relative prices. The tensile strength of natural and Portland cement mortars is shown in Fig. 2. The cost of mortar of various proportions of sand may be computed as in the preceding section; but as the cost of labor is uncertain and is substantially the same for both kinds of mortar, it is sufficient to deal with the cost of the materials only. Assuming Portland cement to cost \$3 per barrel, natural \$1 per barrel, and sand 50 cents per cubic yard, and using Table I., the cost of the materials in a cubic yard of mortar are as in Fig. 3.

By platting of Portland and natural cement mortar six months old, as given in Fig. 3, Fig. 4 is obtained, which shows the relation between the strength at six months and the cost of the mortar made of the two kinds of cement. Notice that for any tensile strength under about 370 lbs. per square inch, either natural or Portland cement may be used, but that the former is cheaper. In other words, Fig. 4 shows that if a strength of about 370 lbs. per square inch at six months is sufficient, natural cement is the cheaper. Nearly all carefully conducted tests of the strength of cement mortar six months old or over give a similar result, except that the above limit is usually between 300 and 350 lbs. A considerable change in prices does not materially alter the result, and hence the conclusion may be drawn that if a strength of 300 to 350 lbs. per square inch at six months is sufficient, *natural cement is more economical than Portland.* Mortar made of two brands of Portland or of natural cement will differ considerably in economic values, and hence to be of the highest value the above comparison should be made between the most economical Portland and the most economical natural cement, as determined by Table I. or II., page 76, of the April number of THE BRICKBUILDER.

Short-time tests do not warrant any general conclusion as to the relative economy of natural and Portland cements, since the strength at short times varies greatly with the activity of the cement. For example, the two upper diagrams of Fig. 2 when platted as in Fig. 4 show Portland to be the most economical, while other similar experiments show natural cement to be the more economical.

ECONOMIC PROPORTION OF SAND.

Fig. 5 shows the ratio of strength to cost for different proportions of sand, for both Portland and natural cements; in other words, Fig 5 shows the tensile strength in pounds per square inch for each dollar of the cost of a cubic yard. For example, if a natural cement mortar at six months has a tensile strength of 280 lbs. per square inch, and costs \$2.95 per yard, the strength per dollar is $280 \div 2.95 = 94.9$ lbs. per square inch. In this way Fig. 5 was constructed, using the cost of mortar as given in Fig. 3, and the strength as determined by L. C. Sabin in connection with the construction of the Poe Lock on the St. Mary's Falls Canal. According to this diagram, the most economic mortar, either natural or Portland, consists of 3 parts sand to 1 part cement.

Fire-proofing.

FIRE-PROOF CONSTRUCTION OF BUILDINGS IN THE UNITED STATES.—*Concluded.*

BY R. W. GIBSON (NEW YORK).
(Read before the Royal Institute of British Architects.)

IT is interesting to note from actual observation, first, how a fire starts in such a building, and, secondly, how it spreads. There seem to be three principal sources of fire: one is the engine room and rubbish heap (if such be permitted) in the cellar, including, perhaps, that part of the electric wiring which is somewhat chaotic at the foot of the shaft. Next, the waste-paper basket, with the cigar ash or match thrown in; and, next, ignition from an adjoining or opposite building already on fire. The fire originating in the basement is perhaps the greatest danger, but it is usually soon detected, as men are on duty here at all times. It is frequently found fostered by an oil store, where lamps and oil cans are abundant. Such a thing should never be permitted at the foot of a stair or elevator shaft, nor should any large quantity of such combustible be admitted. The basement end of all elevator shafts and staircases should be completely closed off by tight iron doors, not latticed, but as nearly as possible air-tight doors and screens, which will serve to prevent fire drafts, and also to cut off engine-room smells from the upper parts of the building. This is done in the best buildings, and should be done in all. Its need is recognized in the building law of New York, which compels such treatment in apartment houses, and further orders that the floor over the cellar shall be fire-proof even in apartment buildings of non-fire-proof character in other stories.

The waste-paper basket and desk origin of fires is wonderfully rapid. Such a fire will make an office absolutely untenable within ten minutes from its commencement. Inasmuch as incombustible furniture can hardly be brought into general use at once, the most practicable present defense against such a fire is the fire hose in the building, always at the disposal of tenants or any person willing to use it. With such fire-proof construction as has been before described as perfect, such a fire can be safely left to burn out its own room if the door is closed and help is not forthcoming; this, in fact, has occurred in some cases in New York.

The manner in which fire spreads in a building has been very imperfectly described, probably very little understood, except by firemen, until these recent efforts to withstand it. It is easy to see how flame is communicated from one combustible mass to another, how it burns along a hand rail or up a wooden elevator guide, or through a door, admitting flame from one room to the next; but the passage of fire from one portion of a building to a remote part, apparently skipping intervening places, has been considered mysterious and unexplainable, yet is really very simple. A hot fire in a single room will generate a great amount of combustible smoke, which consists largely of gas; this rises by reason of its heat, and, escaping through fan lights and transoms, or open doors or windows into adjoining corridors, will travel, because of the wind draft, through the building a very considerable distance without being much diluted, and occasionally it will preserve such proportions of gas and air that a leaping flame in the original fire will ignite all the smoke practically at once in a kind of a low-power explosion. This may be on a very large scale in a very large building; a whole floor of a warehouse, for example, will become a mass of flame in an instant from a little fire in one corner, or it may be only a small volume of gas that is ignited in a long corridor of an office building; but, in either case, the fire, originally upon one side, may, after such an explosion, appear in many other places remote from the first. This is one of the risks which, in fire-proof building, should be guarded against by the use of fire-proof doors and wired glass, and it is to meet this danger that it is becoming recognized that corridors and landings and stairs should not be of single unprotected construction, but should have some guard against flame, even though it be admitted that the full fire-proof flooring is not necessary.

An important effect of heat upon unprotected metal and, to a smaller extent, upon that which is protected, is the expansion, which may amount to a destructive quantity. Usually the protection herein recommended is sufficient to limit expansion to the extent necessary for riveted construction; but where ironwork, whether weight-carrying girders and trusses or merely external facings, is built upon and within masonwork walls and piers, and is unprotected from heat, it has sometimes pushed the masonwork out of plumb and thrown down portions before it actually failed of itself. It would, no doubt, be a good rule that all iron framing upon the fronts of buildings, such as bay windows and large mullions, should be protected with terra-cotta to the same extent customary in the interior.

In foundation work it is considered better in more recent practise to use heavy section rolled beams instead of railroad iron, and it is undoubtedly better to reduce the number of tiers of superimposed beams, and, if possible, construct each raft with one layer of beams and one collecting girder, which really replaces the upper tier of beams. This girder is made as deep as space permits, and partakes of the nature of an iron base stool, with offsets much elongated in one direction. Mr. Freitag's book (entitled "Architectural Engineering," published in New York, by John Wiley & Son) mentions certain forms of brick and concrete floors which are still used, and for which advantages are claimed. Other floors are constructed with light steel angle bars between the main floor beams carrying a light concrete covering, and finished underneath with a metal lath ceiling plastered in the usual way. Yet another floor uses metal ribs in segmental form between the main beams to secure the voussoirs of the arch, much like the old corrugated iron fire-proof floors. Some patents have been secured, and are being worked, claiming advantages in certain mixtures of concrete, as, for example, one which uses wood sawdust; but the practical public verdict with regard to all the systems of fire-proofing may be summarized in the statement that in an enormously large proportion, probably over 90 per cent., of all the work done some form of fire-proof terra-cotta is employed, and nearly every architect, engineer, or builder, who is unprejudiced by interest in one form or another, will admit that on the whole the terra-cotta is the most reliable and the most satisfactory.

Throughout these descriptions no mention has been made of porous terra-cotta. It should be explained that this form of material is preferred by many experts, as having better resistance to damage under either fire or water than the hard ringing terra-cotta. It is made by mixing the clay with sawdust, which in the burning is of course destroyed, leaving the earthen material in cellular form. Many of its advantages are apparent without explanation: it will hold nailings, and is therefore used for roofing slabs and blocks to support metal coverings which require holding by such methods. It is also used in brick and hard terra-cotta work for nailing blocks, just as wood blocks and plates were used in older brickwork. Porous terra-cotta nailing blocks enable the builder to entirely dispense with wooden blocks and nailings and bracketings, an improvement which is of vital importance. There seems to be no good argument against the use of porous terra-cotta throughout the flooring, partition, and furring work, except that in some localities it is rather more expensive, and although it may show slight superiority, yet the hard terra-cotta is so satisfactory that, where it is the cheaper form, it is quite justifiable to use it.

The New York City building law is so imperfect that its revision is now in hand; but its stipulations as to thicknesses of walls, and strains in various structures and materials, may be taken as typical of American practise of conservative tendency. Many cities have laws less exacting, and doubtless the new law for New York will tend in that direction. New York law stipulates 100 lbs. per superficial foot floor load for office buildings; a few years ago it demanded 150 lbs. Most of the expert opinion to-day would agree that 75 lbs. is sufficient, with the provision that any single foot of the floor should be capable of supporting a larger load, say 500 lbs., the 75 lbs. referring to distributed load over the whole surface; the reason for this distinction is that an office floor is never likely to be loaded throughout with more than 75 lbs. per foot, and beams and girders of this capacity are undoubtedly sufficiently strong, yet a concentrated load, such as a burglar-proof safe, may be placed occasionally upon a limited surface, and the structure should therefore be of such a nature that this point of strain may be equal to the emergency, assuming that the surrounding surface is not loaded. In other words, the weakest point of a beam or arch (viz., its center) should be capable of a center load of considerable magnitude, as well as being proportioned to the distributing load first stipulated. Difference of opinion and practise exists in regard to column loads. The New York law requires that the whole of the theoretical load, amounting in office buildings to about 180 lbs. (80 lbs. dead, and 100 lbs. live), should be accumulated floor by floor upon the columns, that is to say, the lowermost column should be capable of supporting every floor above it fully loaded. The Chicago architects, however, have calculated, and their views are gaining ground, that the assumed live load of superimposed stories may be decreased in calculating the strength of columns as the number of stories increases. The assumption is that the greater number of floors, or the quantity of floor space in question, the less likelihood of the maximum load in office buildings and dwellings being reached throughout simultaneously. The Chicago law has recognized this principle, although no particular rule as to its application seems to prevail. In some cases the uppermost story is calculated with the full live load upon the beams (of course the full dead load is included on all members), and about 86 per cent. of the live load upon the girders and columns; then the next story with the same loads upon the floors and girders, but only 80 per cent. of the additional load upon the columns; the next story with only 75 per cent. of the load upon the columns, and so on down; so that in the case of a building of fifteen or sixteen stories, the lower columns in the first, second, and third stories are calculated for live loads on those stories of only three or four pounds, or in some cases nothing at all; and the foundation is accurately adjusted for the dead loads with no provision whatever for live loads, it having been found that a foundation, sufficient when new, acquires considerably greater strength to support temporary loading after having properly settled and taken its bearings. This may be a somewhat daring theory, but it provides a column in the lower story which is sufficient for the full average load for the building, say about 25 lbs. per square foot of floor surface, and the material is placed in the most scientific as well as the most practical manner; but it is argued by many authorities, especially in New York, that municipal regulation of buildings is unable to completely control their uses after they are finished, and that although a building may be erected for offices or apartments, parts of it are likely to be converted to the use of light storage or light manufacture, or to other purposes, and a considerable margin should be provided to cover such contingencies. Some buildings have been designed with the live load calculated at 70 lbs. per foot on the beams, 50 lbs. per foot on the girders, 40 lbs. per foot on the columns, and nothing upon the footings, the dead load being, of course, included to its full amount, about 90 lbs. throughout.

The Onondaga County Savings Bank building, at Syracuse, N. Y., by the writer, was designed and calculated as follows: —

Load on all beams	= total dead load + 70 lbs. per ft. live load.
Load on all girders	= total dead load + 60 lbs. per ft. live load.
Load on columns of three upper stories	= total dead load + 60 lbs. per ft. live load.
Load on columns of remaining stories .	= total dead load + 40 lbs. per ft. live load.
Load on foundations	= total dead load + 20 lbs. per ft. live load.

There is no doubt that the New York building law will permit of a decreasing percentage of the floor load upon the columns of many-storied buildings, and possibly a decreasing but never vanishing proportion will be the basis of the rule: as, for example, a reduction by 5 per cent. at each story of the total live load brought down from superimposed stories, the percentage being reckoned in each case upon the total, and not upon the original floor loads; and of course, as before stated, the full dead load being included on every member throughout.

Another reason for abundant provision of strength in fire-proof office building is the custom of building fire-proof partitions, counters, and heavy desks upon the floors without special regard to their positions over beams or girder. A floor is rented by a bank, for example, and is loaded with a marble counter and steel fittings weighing possibly over 300 lbs. per lineal foot, or perhaps a partition with a very narrow base. These things cannot be prevented, and therefore should be provided for; their place cannot be anticipated, so the only provision is a general stiffness of the floor, which, however, need not be carried to the columns, except as already averaged.

As to the load on foundations, practise varies very much. The enormous pier loads showing considerable inequalities require an exact adjustment of their superficial area to the load to be supported, or else the building will be racked and cracked by unequal settlements. In Chicago settlements of 4 ins. are not at all extraordinary; in New York 1 in. is quite frequent. If two piers are made with equal size base courses, and one is loaded with 500 tons and the other with 250 tons, the more heavily loaded pier will settle more proportionately than the lighter loaded one, and the building will be out of level, and will show cracks. This has actually occurred by reason of municipal regulations as well as because of too theoretical a view in calculations. Long since the days when it was recognized that the foundation must be proportioned to the load, buildings have been erected where one pier supported 520 tons of dead load, and another pier 500 theoretical tons, of which 200 were dead load and 300 live load, an arrangement which taught the lesson that a live load which was continuously absent would have no effect upon the building, and provision for it would be injurious. As a fact, such columns and piers have been found standing from 1 to 3 ins. higher than their calculated settlement. From this position arose a custom of disregarding the dead load, by the experience, before mentioned, that a foundation, after it reached a certain age, would bear temporarily and within limits increased loads without any further settlement. Many Chicago buildings are so calculated with their dead loads equally balanced, and with no provision at all for live loads, and in most cases it has worked well; but there is always the risk of a greater load being imposed, which would cause serious damage; in fact, it happened on one occasion that a warehouse had to be emptied most expeditiously, because the column foundations were sinking into the Chicago mud with dangerous speed.

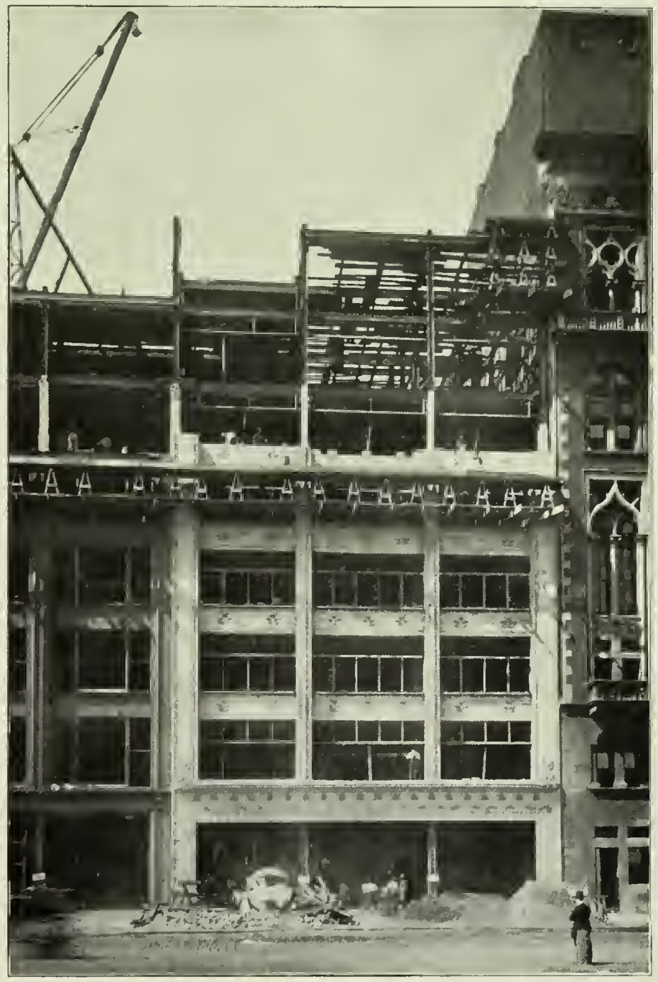
The better practise undoubtedly is to proportion the foundations to the true average load which they will have to bear, and which will be found to amount to 15 or 20 lbs. per superficial foot in offices and dwellings; sometimes something must be added to cover heavy decorations and finishings, such as marble wainscotings; but generally 20 lbs. will provide for this, and when added to the dead loads will not make the column foundations too large for their work. The character of the soil will, in some cases, permit without injury considerable variation in the load per foot upon the base course, but on all soft or compressible soils the problem is a very serious one when from ten to twenty fire-proof floors are built upon them. Superfluous strength in the columns is not injurious, it is simply uneconomical; but superfluous strength in the foundation base course is positively a danger to the building. The only safe practise, therefore, is that which arrives most correctly at the actual load to be supported, and proportions the work accordingly.

Much of the above comment relates to construction, as such, distinct from the fire-proofing; but the two are so intimately associated that they have been evolved one with and for the other. It is easy to see how the same principles of fire-proofing could be applied to construction of a different nature, and it is evident that the experience gained in regard to the fire-resisting qualities of certain materials has its scientific value quite apart from its application to any particular method of building.

Brick and Terra-Cotta Work in American and Foreign Cities, Manufacturers' Department, and Miscellany.

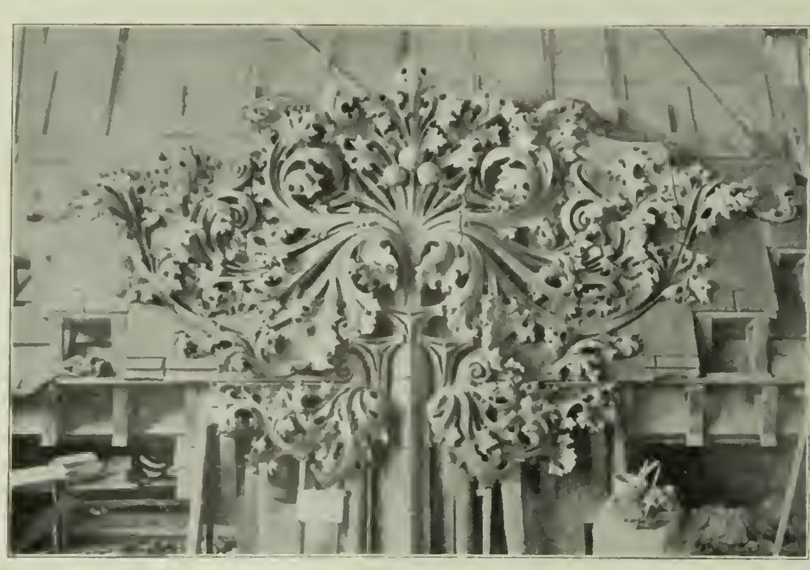
INTERESTING NEW STORE FRONTS AT CHICAGO.

THERE is now in course of construction on the west side of Michigan Avenue, facing the Grant Park, Chicago, a row of three wholesale stores belonging to Stanley R. McCormick. These are to be occupied by three of the leading wholesale millinery firms of that city. They are all built with steel skeleton construction, and embody the latest improvements in fire-proofing with semi-porous fire clay, this work being done by the Pioneer Fire-proof Construction Company. They are all planned and constructed by one firm of architects, but the front of the most northerly one is designed and built under the supervision of Louis H. Sullivan. The south



CONSTRUCTION AND ARCHITECTURAL TREATMENT OF A CHICAGO STORE FRONT.
Louis H. Sullivan, Architect.

store is six stories high, the middle one is seven stories high, and the northerly one is eight stories high, and adjoins the Chicago Athletic Club, designed by Henry Ives Cobb. The south and middle buildings have fronts of molded red brick. Mr. Sullivan's front is of gray terra-cotta, by the Northwestern Terra Company, the first story being faced with ornamental cast iron. The three stores are constructed as one, and can be thrown into one; but the party walls are built around the steel frame, first by covering the steel columns and girders with hollow semi-porous fire clay, and then enclosing the same construction with four inches of common brick, and filling the

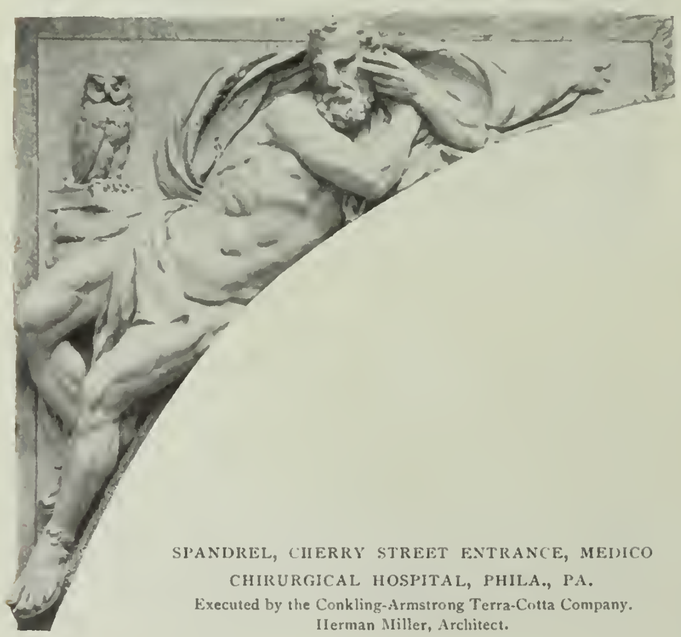


DETAIL OF TERMINALS OF INTERMEDIATE PIERS, CHICAGO STORE FRONT.
Executed by the Northwestern Terra-Cotta Company.
Louis H. Sullivan, Architect.

panels between the columns and girders with 12 in. brick walls. This has lately become the approved method of constructing party walls in Chicago, when steel skeleton construction is used.

The front shown in the illustration is 62 ft. wide. In construction and method of architectural treatment it is a repetition of the system used in the Ayer Building, which was described and illustrated in THE BRICKBUILDER for February, 1899. The photograph was purposely taken before the construction had advanced sufficiently to prevent its being seen, though when completed this will be evident to any one who knows that the steel skeleton construction has become a recognized system of building; for it will be equally evident to any one of elementary knowledge that this front could be successfully built in no other way. It is, therefore, presented as one of the rational solutions of the modern building problem, when treated by an artist of the first ability. But there is more than this in it. It is an illustration of the relation of commercialism to art that is not often found, and demonstrates how art has its commercial value in a wholesale store front. These three buildings are erected expressly for the tenants who are to occupy them on long leases. They were all leased before they were commenced, and the rent paid is a uniform percentage on the capital invested in each. The firm of Gage Bros. & Co., who are to occupy the store shown in the illustration, offered to pay additional rent at the same percentage on the increased cost of employing Mr. Sullivan and erecting such a front as he should design. They did so because they thought it would benefit their business in an equal degree. They put an exact commercial value on Mr. Sullivan's art, otherwise he would not have been called in. The other two stores are different, as will be seen in part of one of them, but the construction is on the same principle. All of them are evolutions of rational commercial architecture from steel and clay. The steelwork of the fronts is covered with fire-proof material first, and the finished front covers this, following the same constructive lines.

The illustration, taken from a photograph of part of the terra-cotta details, shows how the two intermediate piers will blossom forth when they pass above the last point of support below the cornice. It was taken from the dried but not burned clay, in the shop. The pier moldings seem to rejoice that their work is done. Any one who is fond of endives will realize whence the decorative motive came. The rest of the detail is too delicate to be seen in the main illustration. The whole as finished will be seen in a later number of THE BRICKBUILDER.



SPANDREL, CHERRY STREET ENTRANCE, MEDICO CHIRURGICAL HOSPITAL, PHILA., PA.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Herman Miller, Architect.

PHILADELPHIA. — The monthly meeting of the T Square Club was held on Wednesday evening, December 6, at which drawings were submitted for the third competition in the series of the traveling fellowship program. The subject was "The Elevations of a Semi-Suburban Residence to be Characteristically Philadelphian in Treatment," and the designs were original and especially interesting as solutions of the problem of local expression in architecture. By judgment of the club the first place was awarded to Andrew T. Sauer, the second to I. Edgar Hill. and the third to W. P. Trout.

CARTOUCHE ON XAVIER PAROCHIAL SCHOOL, NEW YORK CITY.
Executed by the New York Architectural Terra-Cotta Company.
Little & O'Connor, Architects.

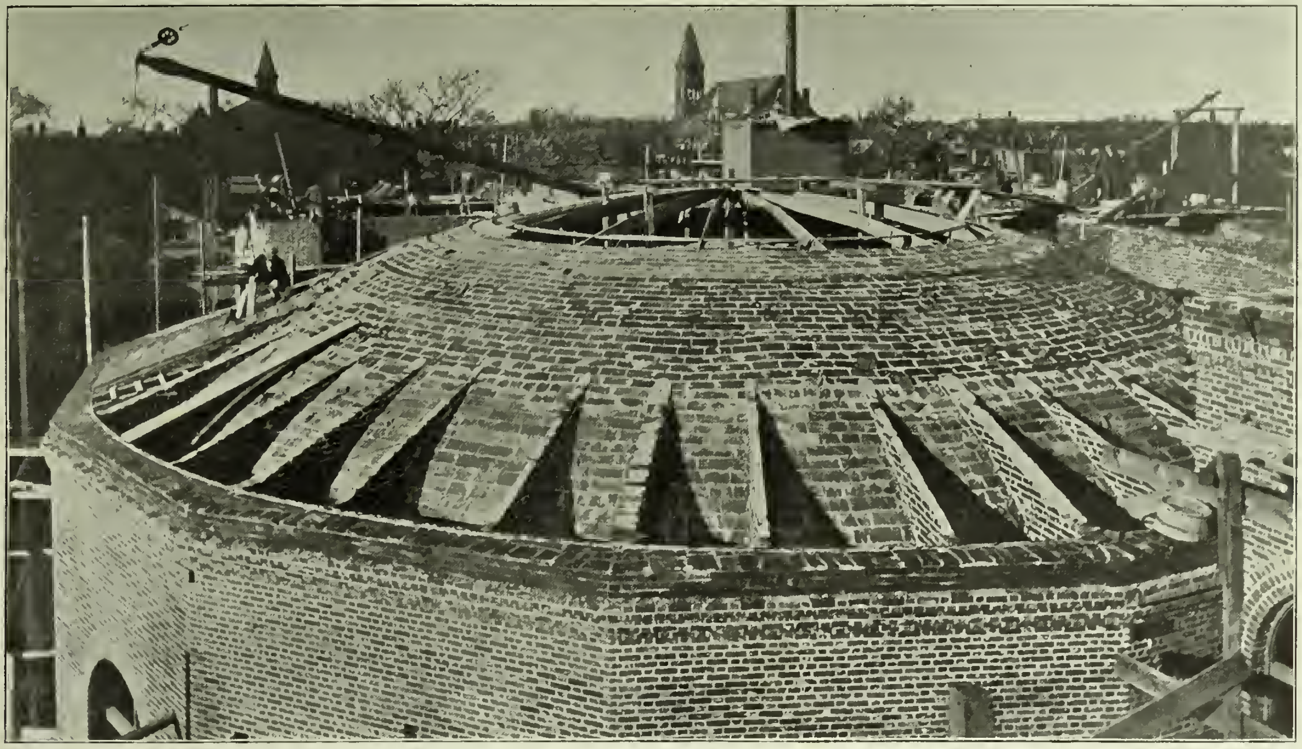
On Monday evening, December 4. after the meeting of the jury of selection of the exhibition, the visiting members, Mr. J. Randolph Coolidge, of Boston, Mr. Julius F. Harder, of New York, and Mr. John T. Comes, president of the Architectural Club of Pittsburgh, were the guests of the T Square Club, at a dinner given in the club house, at which Mr. Herbert G. Ripley, of Boston, was also present. The occasion was one to be remembered with pleasure by the club.

The annual architectural exhibition will be held at the Art Club from Dec. 17, 1899, to Jan. 6, 1900; the opening reception taking place Saturday evening, December 16.

A special meeting was held on Saturday, Nov. 18. 1899. to commemorate the sudden death of Adolfo C. Muñoz, a member, and at one time secretary of the club, and a memorial adopted as follows: —

"*Whereas*, God in His wisdom has taken from us our respected and beloved associate, Adolfo C. Moñoz. Therefore, be it

"*Resolved*, That the members of the T Square Club express to his family their heartfelt sympathy in this affliction. We deeply mourn his loss as an officer of the club, as one of its most active supporters, and as a man of marked ability in his profession. His steady adherence to the highest ideals and his fidelity of purpose stand as a permanent inspiration to us and for him as a noble memorial."



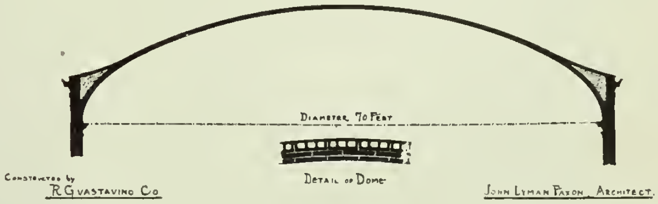
DOME OF HIGH SCHOOL, EAST BOSTON, MASS., 70 FEET IN DIAMETER.
Constructed by R. Guastavino Company.
John Lyman Faxon, Architect.

PILASTER AND CAP, HOTEL FOR WHITE ESTATE, NEW YORK CITY.
Executed by the Atlantic Terra-Cotta Company.
Barney & Chapman, Architects.

ST. LOUIS. — There seems to be some diversity of opinion as to whether the advance in building materials, with indications of further increase, together with the promised demands of labor for the coming year, may not prevent any marked improvement in building. The advance in many instances has been remarkable, considering the fact that there has been no unusual activity. Laths, for instance, have advanced from $2.00 per thousand to $7.00, while the increase in the cost of many other materials will average about 50 per cent. These prices may not be more, if as much as they were in 1893, but the sudden change is what startles the investor.

It is quite likely that the price of coal will enter very largely into the question of location of large manufacturing enterprises at St. Louis in the future, and it is causing no little discussion in building and manufacturing circles. The cost of delivering coal from the east side of the river is more than the original cost of the coal. Good slack coal costs about $1.00 per ton in East St. Louis, while it costs $2.80 on this side for the same coal. This has caused some of our largest manufacturing concerns to move to the Illinois side, in one instance

—SECTION OF DOME FORMING CEILING AND ROOF OF EXHIBITION HALL E. BOSTON HIGH SCHOOL.—



resulting in the construction of buildings at a cost of a half million dollars and the building up of an entire town. A number of suggestions to overcome the trouble have been offered, among which

TERRA-COTTA PANEL, APARTMENT HOUSE, NEW YORK CITY.
Executed by the New Jersey Terra-Cotta Company.
John Hauser, Architect.

OFFICE FOR DR. H. N. SPENCER, ST. LOUIS, MO.
J. L. Wees, Architect.

are the building of a tunnel under the river, or the construction of a large power plant on the East St. Louis side.

The St. Louis Cold Storage and Refrigerating Company are putting up a seven-story plant on the west side of Lewis Street, near Dickson Street, at a cost of $175,000. The building will be 200 by 130 ft., and occupies the former site of the Belcher sugar refinery, which was demolished to make way for it. The refinery plant originally cost about $1,000,000, and was closed by the trust.

St. Louis now boasts of an up-to-date music hall in the Odeon, which has just been finished. The building is located on Grand Avenue, and is six stories high. The stage has a seating capacity of eight hundred persons, with a proscenium of 71 ft. The acoustics seem to be very satisfactory. The building is of stone, brick, and terra-cotta, and cost $350,000. Mr. W. Albert Swasey was the architect.

Eames & Young have completed the factory building on North Broadway, for the Monarch Rubber Company, at a cost of $40,000. Barnett, Haynes & Barnett have commenced the new building on Florissant and Emerson Avenues, for St. Mary's Orphans' Asylum. It is to be 265 by 140 ft., and four stories high.

Architect J. L. Wees is putting up an eight-story building, 66 by 105 ft., on Eighth Street and Lucas Avenue. The building will be of the mill construction or slow combustion type, and will be an acceptable addition to the large group of similar buildings that have been built in that vicinity on Washington Avenue during the last few years. The Walker estate is also putting up a six-story warehouse on Washington Avenue, between Eighteenth and Nineteenth Streets.

PANEL IN PEDIMENT OVER WINDOW, APARTMENT HOUSE, NEW YORK CITY.
Executed by the Atlantic Terra-Cotta Company.
George Keister, Architect.

CAPITAL FOR RESIDENCE AT ST. LOUIS.
Executed in terra-cotta by the Evens & Howard Company.

CURRENT ITEMS OF INTEREST.

William Homes & Co. have made arrangements with the Penn Buff Brick and Tile Company to handle their "Blue Ridge" enameled bricks in the Boston market.

Chambers Brothers Company have been awarded the contract for the extensive machinery improvements to be made by the Baltimore Brick Company in their various brick plants.

The Grueby Faience Company have recently opened a new office at 2A Park Street, Boston, Mass., where samples of the Grueby tile and their other clay materials may be seen at any time, and estimates on same obtained.

UNION CLUB, ST. LOUIS, MO.
Grable, Weber & Groves, Architects.

Waldo Brothers have closed a large contract to furnish the Atlas Portland and Hoffman Cements for new work by the Massachusetts Metropolitan Sewerage Commission, Beckwith & Quackenbush, contractors.

The Mosaic Tile Company have closed the contract for floors in the sanctuary of St. Benedict's Cathedral, Savannah, Ga. They also report that they are adding new machinery to their plant and building new warehouses.

W. L. Miller, contractor, Boston, has placed his order with Waldo Brothers for a large amount of Atlas Portland Cement, to be used in the extension of Dorchester Avenue, and also in the Park Department work on Charlesgate, Boston.

Burgy & McNeill have just closed the contract to supply the brick for twenty-four brick houses to be erected in the East End district of Pittsburgh. The contract calls for 450,000 Roman brick of various shades, all of which are to be manufactured by the Ohio Mining and Manufacturing Company, Shawnee, Ohio.

Waldo Brothers have orders to furnish the gray Raritan brick for the Wheatland houses, Bay State Road, and for the Pemberton Building, Pemberton Square, Boston. They have also sold for the Perth Amboy Terra-Cotta the light-colored brick to be used in the front of the addition to the Telephone Building, corner Milk and Oliver Streets, Boston.

RESIDENCE AT LONGWOOD, MASS.
Chamberlin & Whidden, Architects.

PANEL IN BALUSTRADE COURSE, HOTEL FOR WHITE ESTATE, NEW YORK CITY.
Executed by the Atlantic Terra-Cotta Company.
Barney & Chapman, Architects.

TERRA-COTTA SHIELD.
Executed for the Main Building, University of Illinois, Urbana, Ill., by Evens & Howard Company.
J. C. Lewellen, Architect.

Fiske & Co., of Boston, have closed contract for roofing the residence of A. B. Turner, Newton, Mass., Willard T. Sears, architect, with red Ludowici roofing tiles of the Spanish roll pattern. These tiles are of an interlocking type, which secures absolute tightness against leakage. They are secured to the roof by means of wires in such a way that danger from breakage is entirely avoided. No cement is used in the setting. It is now generally recognized that the artistic effect that is produced by the use of roofing tile as a covering for buildings cannot be obtained in any other materials.

The Bolles Revolving Sash Company have secured contracts to furnish the "Queen" overhead pulley in the following buildings: Public school, Dorchester, Mass., A. W. Gould, architect; Star Building, Washington, D. C.; emigrant station, New York City, Boring & Tilton, architects; Broadway Chambers, New York City, Cass Gilbert, architect; Leggett Building, Brooklyn, N. Y., Geo. W. Morse, architect; New York Hospital, New York City, Cady, Berg & See, architects; Cheseborough Building, New York City, Clinton & Russell, architects; Williamson Building, Cleveland, Ohio, Geo. B. Post, architect.

CARTOUCHE PANEL, PADDOCK & HODGE BUILDING, TOLEDO, OHIO.
Executed by the Indianapolis Terra-Cotta Company.
George S. Mills, Architect.

The Celadon Terra-Cotta Company, Ltd., are furnishing the roofing tiles on the following building operations: Library at Torrington, Conn., Stephenson & Greene, architects; houses at 1 and 2 Beaconsfield Terrace, Brookline, Samuel D. Butterworth, Jr., architect; stable for J. B. Haggin, Lexington, Ky., Elzner & Anderson, architects; residence for Mrs. Pyne, Princeton, N. J., Clinton & Russell, architects; public school, Glen Ridge, N. J., Boring & Tilton, architects; chapel and convent buildings, Trinity College, Washington D. C., E. F. Durang, architect.

Mr. William Homes, so long and favorably known in connection with the firm of Fiske, Homes & Co., Boston, managers for the Boston Fire Brick Company, has recently established himself at 186 Devonshire Street, Brewer Building, under the style of Wm. Homes & Co. After serving an apprenticeship of twenty-two years in the old house, thirteen of which he was in the management, he now starts his own firm with the best wishes of his many friends and business acquaintances. He is representing some of the best houses in this country, and makes a specialty of front and fire bricks, and also general builders' supplies. Among these companies may be mentioned the following: Columbus Face Brick Company (celebrated "Ironclay" bricks), Columbus, Ohio; B. Kreischer & Son, New York; Columbus Brick and Terra-Cotta Company, Columbus, Ohio; Ridgway Press Brick Company, Ridgway, Pa.; Presbrey Stove Lining Company, Taunton, Mass.; Brooklyn Retort and Fire Brick Company, Brooklyn, N. Y. Mr. Harry Damon, formerly employed with the old house, has been engaged as salesman, and his fifteen odd years of experience under Mr. Homes's guidance have certainly made him a fitting representative in the new venture.

The Brickbuilder.

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The editors feel much encouraged by the successful outcome of The Brickbuilder competition for cornice designs, and hope that the happy augury will be fulfilled in the contests which are to follow. Certainly these designs show that there is no lack of ability or fancy among our younger designers. It often happens, indeed, that our architects are more successful in handling a piece of detail than in the designing the mass of a whole building. Yet the principles of design are the same in both cases. If we can only learn the dignity of restraint and the beauty there is in simplicity of design, if we only can come to realize the importance of right proportions of mass as well as of detail, and if we will only have the patience to give to our designs the careful study they deserve, there is every reason to hope for the best for our architecture. By means of good designs we shall gradually educate and elevate the public taste. At present the public, more than the designers, are to blame for the ugly, insipid, and restless buildings which so often disfigure our streets. There are enough good designers to cover the country with the best designs, if the public only had the appreciation to employ them.

It too rarely happens that our brick masons have any proper appreciation of their own work. To lay a given number of bricks in a given time is generally the highest ambition of the most conscientious, and under the *régime* of the trades unions to lay as few bricks as may be in a given time seems generally the result aimed at. We regret to think that the trades unions are largely responsible for the deterioration in the quality of our workmen. In most cases they directly encourage incompetence. Only recently the following case came to our notice: A bricklayer was at work laying a portion of wall of somewhat difficult and complicated design. It needed a man not only skilled in his work, but one who had some appreciation of the beauty of what he was at work upon, one who would take a pride not only in doing his best from a mechanical point of view, not only in producing what would be called a "workmanlike job," but one who would take some pleasure in following the design he was executing and seeing that it came out well. The fellow that was engaged upon this piece of work, so far from being what we have described, was not only indifferent and careless, anxious only to make time, but was utterly incompetent.

The difficult piece of work he was upon had to be pulled down, it was so badly executed. The foreman, having some pride and conscience in the matter, removed the incompetent workman, not from the job altogether, but merely to another part of the work, where he would have plain sailing and less chance for mischief. At once all the other bricklayers declared that that bricklayer must be put back or they would "strike." Explanation proved useless, and to avoid stopping the work altogether, the botcher had to be set to spoiling his work a second time. This is no unusual instance of the way in which the unions encourage bad work and bad workmen. The unions, properly conducted, might raise instead of lowering the standard of work, and might thus be of the greatest benefit, not only to the men, but to the trade. The true interests of no good workmen are advanced by the present methods, the tendency of which is to prevent men from rising where they deserve to rise.

Notwithstanding the fact that America is essentially a timber country, the merits of brick as a building material are rapidly becoming better understood. Experience has shown that the durability and strength of brick make its use cheaper in the end, although the first cost is greater than that of timber.

The extent to which brick was used in the erection of the cheaper class of buildings, where the choice was between timber and brick or stone, has heretofore been largely dependent upon geological conditions. In such places as Philadelphia and St. Louis, where an abundance of excellent brick earth is found, the majority of buildings have been erected in brick, as in the nature of things; but with the rapidly increasing facilities for the shipping of freight, brick will be used in places remote from the brickmaking centres, and that too in the commonest description of buildings.

In the erection of buildings where low cost is a *sine qua non*, timber is often employed to the exclusion of brick, simply because to use the latter, and at the same time keep the cost within the prescribed limits, would mean using bricks of very inferior quality, and these would not last much longer than timber. There is a way of using good bricks, and yet of keeping the cost low, and that is by employing hollow bonds.

These bonds can only be used in one-brick walls. There are two methods of laying them. The first is to lay all the bricks on edge, laying first a header and then a stretcher, and so on throughout the course. The course above is laid exactly in the same way with the headers in the centre of the stretchers below them; the ends of the courses being closed up with closers of the necessary length. The second method of forming hollow bond is first to lay a course of headers, and then upon it a course of stretchers on edge. This is followed throughout the wall, there being headers flat, and stretchers on edge alternately.

Both systems of laying brick produce a fairly strong wall that will safely carry all ordinary weights. For fence walls they may be used with advantage, and for a number of other purposes may be safely employed.

Hollow bonds are not recommended to take the place of solid walls, excepting where it is necessary to keep the cost low, and where it would be necessary to use an inferior brick if the wall were built solid. Hollow walls erected of good bricks are much superior to solid walls constructed of poor bricks.

The June number of *Scribner's Magazine* has an interesting article on "Life in New York Tenement Houses," by William T. Elsing. We do not refer to this with the intention of perpetrating any such incongruity as the discussion of social questions in a technical journal, but in order to point out an incongruity still more ridiculous, if it were not so saddening, which is too often perpetrated, not only in New York, but in other of our large cities. In the course of the article we refer to is an illustration, entitled "A New Tenement House of the Better Sort." It shows an ugly, pretentious brick building overloaded with hideous terra-cotta, which we suppose its architect would call ornament. What heartless irony the erection of a pretentious monstrosity such as this for the occupation of poor people, who doubtless have increased rent wrung from them to pay the interest on the cost of the ugly and elaborate detail! Could there be a more striking example of the want of taste, the absence of any sense of fitness, the craving for mere display, the heartless vulgarity which is characteristic of certain elements in the community? There is no possibility of any permanent and vital progress in art until the characteristics exemplified in such buildings as this cease to be conspicuous traits of the public character. We admit that this is an extreme example, but is unfortunately not an uncommon one, and we refer to it because we think the want of taste here shown, the incongruity, are more palpable than in many other instances which perhaps are really just as bad. It is easy here for any one to point the moral to the tale, and the vices of such a building as this bring out in stronger relief the desirability of the opposite qualities. A decently plain, strictly utilitarian building, whose effect should depend on pleasant proportion and mass, and relation of voids to solids, and whose detail should be of the very simplest, all in plain brick, would not only be more appropriate for a tenement house, but could not fail to be less ugly, and might even have a certain beauty. Certain it is that it is useless to attempt elaborate beauty in our architecture until we can appreciate the beauty there may be in perfectly simple design, until display ceases to be regarded as synonymous with beauty, until there exists a delicate feeling for the fitness of things, which is shocked at the incongruity as well as the ugliness of such buildings as we have referred to.

In considering the respective merits of different systems of bonding, there is one rule that may be invariably applied, and that is the extent to which the vertical joints come over one another. In a perfect bond no two joints will come over one another in any part. To understand this, imagine that a knife is thrust down vertically between a mortar joint. If the bond is a perfect one, the knife can only descend one course without striking a brick, while in less perfect bonds it may go the whole length of the wall. In running bond that is commonly used in the United States, the knife could be thrust down four, six, or eight courses, depending upon the extent to which headers were used.

OF INTEREST TO MASONS AND BUILDERS.

Any of you can build a plain wall and build it well. If you can't, there is no use in reading further. What follows is for the progressive, wide-awake builder, who takes every chance to get ahead. Then let us repeat, any of you can build a plain brick wall. Every wall has a top, and some walls have holes in them; in fact most of them do. When a wall is in a building, its top is a cornice, its holes are doors and windows. Very often the party you are building the wall for wants some ornament on it, and you use your bricks to produce patterns that will make the doors, windows, and cornice more attractive. Where do you get your ideas? From some other builder in your town? If so they are second hand. Do you get them up yourself? If so they cost you lots of time. Time is money, and if you can buy these for about a hundredth of what your time costs you, you are a big gainer. Perhaps your first ideas do not suit the owner. Then you must spend more time. Suppose, now, you are building a store front: you are up to the cornice, and the owner wants to know what it is going to be; perhaps you yourself haven't had time to decide just how you will make it. But you have a book of designs, for instance, this copy of THE BRICKBUILDER. You take it to him and say, "Here are forty-five ideas; which do you like best?" If he can't find one he likes, he is hard to suit. Suppose, though, you are only up to the windows of the second story, you must get up an idea, *unless* you take this paper regularly. If you do you will find designs for dozens of windows among the hundred or more plates of designs published each year. You may want a cornice, a door, a window, a string course, a panel, a fireplace, an outside chimney, or a simple chimney-top; you are almost certain to find a lot to choose from in some number of this paper. Take the case of a chimney-top; you may know how to build only one kind, but if you can build twenty-five, fifty, or one hundred kinds, don't you stand a better show of getting the chimneys of a frame building to build than a mason builder who knows only one or two patterns?

Every trade has its papers, except that of bricklaying. Carpenters have dozens of publications containing designs for all kinds of frame buildings and all kinds of wood details. The dressmaker has her papers showing new patterns for dresses, and she can show these to her customers for them to select what they wish. And so on through all lines of business. The mason builder whose work, when well done, is the best, the most durable, and, in the end, the cheapest, had nothing of the kind until THE BRICKBUILDER was started. It is the only periodical in the world devoted to mason builders' and contractors' work. It is worth its cost to them many times over.

These are its strong points: It is published monthly, and contains every year 100 or more full plates of practical designs and details for brick buildings. Besides details, it publishes working plans and elevations for all sorts of brick buildings. Some of these are actually built by prominent architects, others are the result of competitions for prizes, as the cornices in this number are. The next number will contain designs for chimney-tops and windows, as this one does of cornices. Then will come other details, and a little later, a number full of designs for $2,000 brick houses. We had just decided to offer prizes for designs for a brick house, when we received the very timely letter from Savannah, Ill., reprinted on page 54.

Right here let us say that this paper is in no way intended to supply the services of practising architects. Where the services of a good architect are obtainable, THE BRICKBUILDER advises owners to employ him, and pay for his services at their full value. It will be money in the owner's pocket to do so. But in all small towns and in many cities much work is done where professional service is not easily obtainable. To those builders who are often obliged to work without an architect's guidance in such cases, THE BRICKBUILDER is invaluable.

For a year this paper costs only $2.50. Besides its practical designs and details, it contains much interesting and valuable reading matter. Its numbers are always useful. You can keep this number, and find use for these designs of cornices next year, or the year after, as much as at the present. At any time the companies whose bricks are to be used will quote you prices if you write them as directed on page 54. If you think this number is worth saving, you would think the same of every number. Send $2.50 for the whole year of 1892, including back numbers, or $1.25 for the last six months of the year. We have only a few complete sets; each number is full of useful things, and worth many times the cost. The April number, for instance, contains designs for arched doorways, also two-story brick store fronts. The May number, plan, elevations, and details for a brick church.

By sending $2.50, you get the paper beginning with the first number, and so get all the designs published. If you get this paper rolled, remember only sample copies are sent rolled; all subscribers get their papers flat, sent through the mails protected with pasteboard.

THE BRICKBUILDER PUBLISHING CO.

Box 3282, Boston, Mass.

DRAWINGS OF ENGLISH BRICKWORK.

The majority of architects in this country are well acquainted with the interesting brick and terra-cotta work Messrs. Ernest George & Peto have been doing in England. These architects stand among the very foremost for good domestic work, and their work has widespread reputation. We have just received some scale drawings of a number of their best buildings, including Shiplake Court. These drawings will be published in early issues of THE BRICKBUILDER.

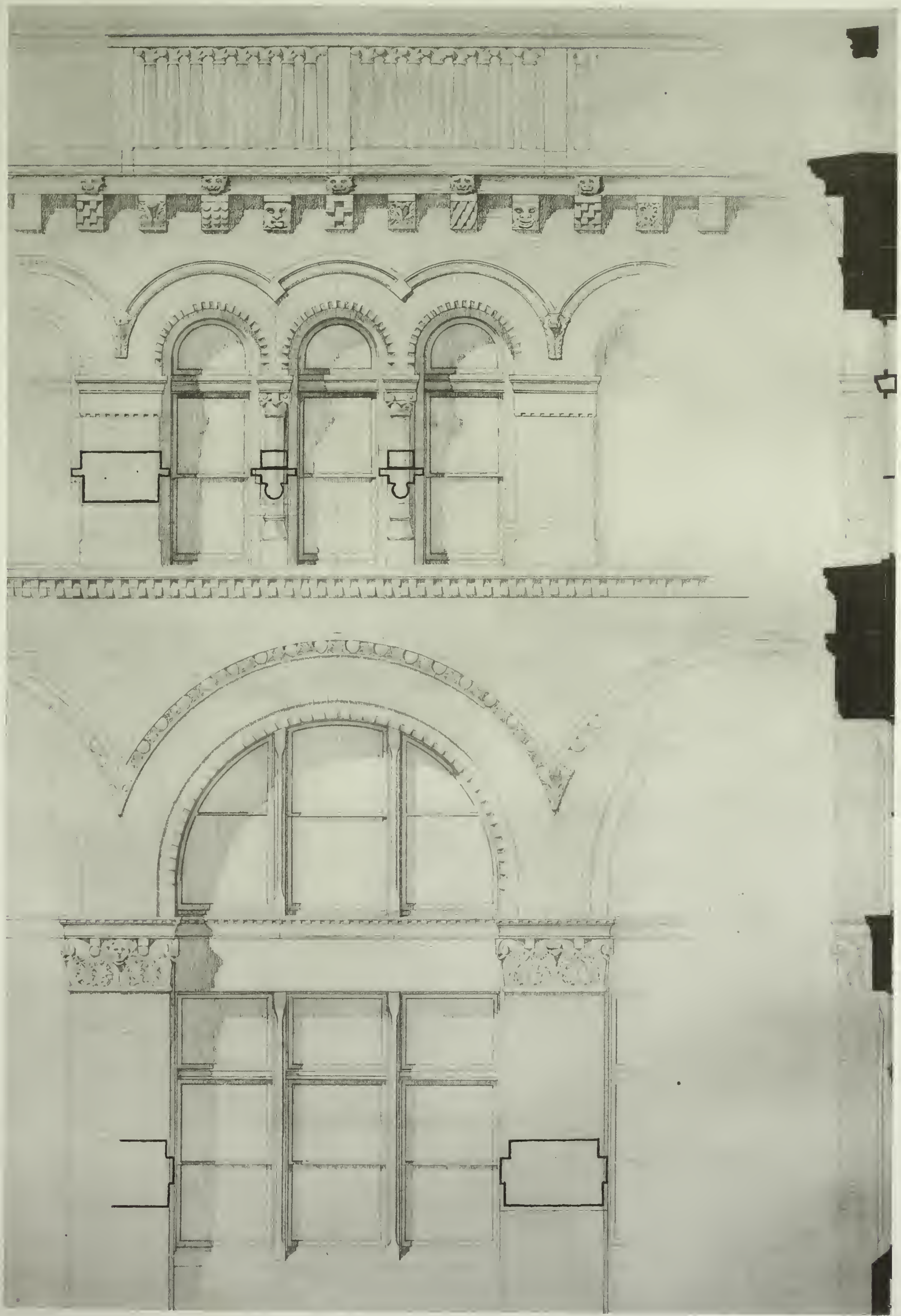
VOL. II. No. I.

PLATE I.

PORTION OF ELEVATION OF THE CHAMBER OF COMMERCE, BOSTON, MASS.

VOL. II, No. I.

PLATE II.



PORTION OF ELEVATION OF THE CHAMBER OF COMMERCE, BOSTON, MASS.

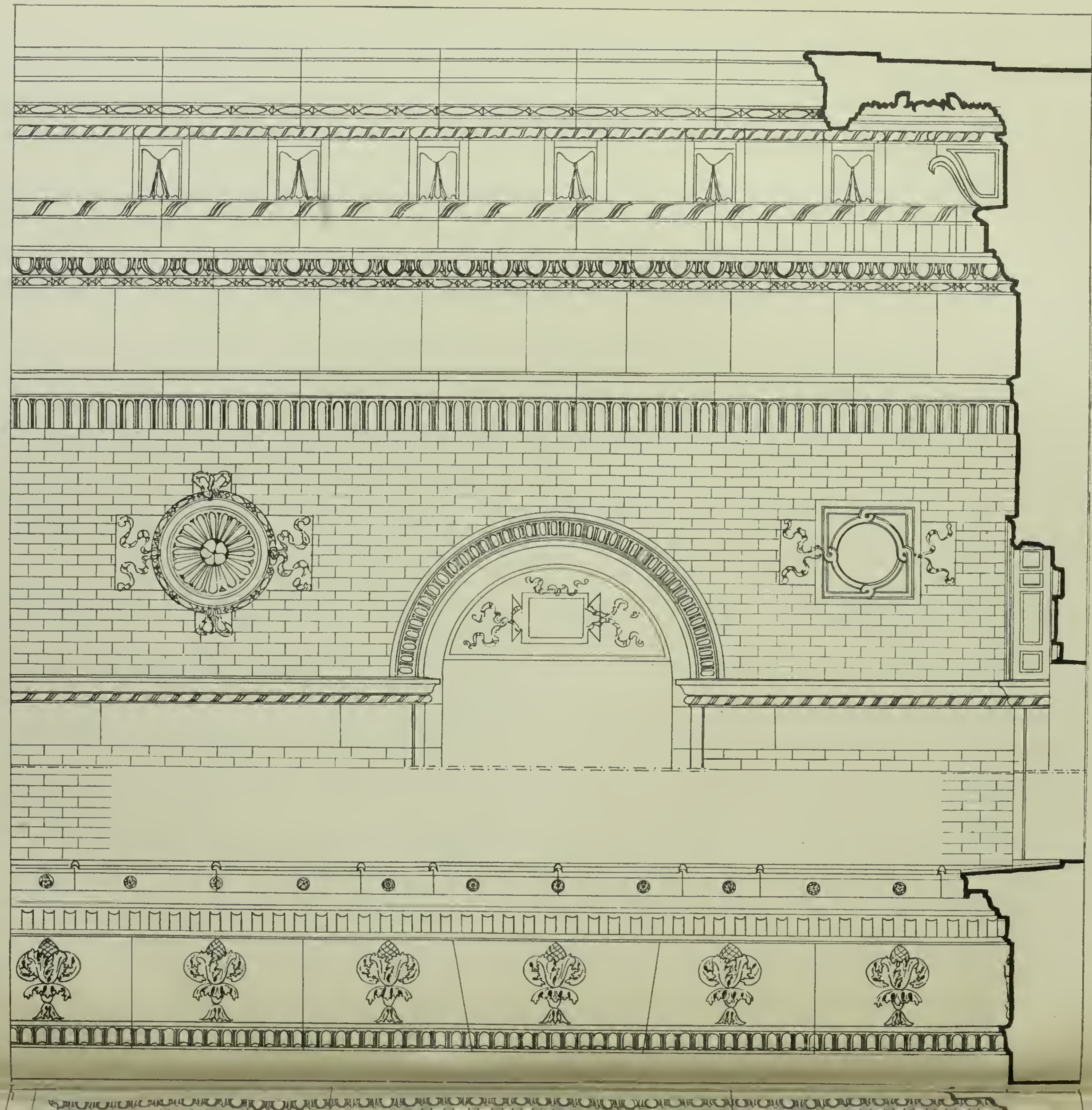
FAÇADE OF THE HOTEL DE VILLE, BEAUGENCY, FRANCE.

ENVOI BY W. T. PARTRIDGE, SEVENTH HOLDER OF THE ROTCH TRAVELLING SCHOLARSHIP.

ENVOI BY H. BA[illegible]N JR. [illegible]

COURT YARD OF THE BARGELLO, FLORENCE.

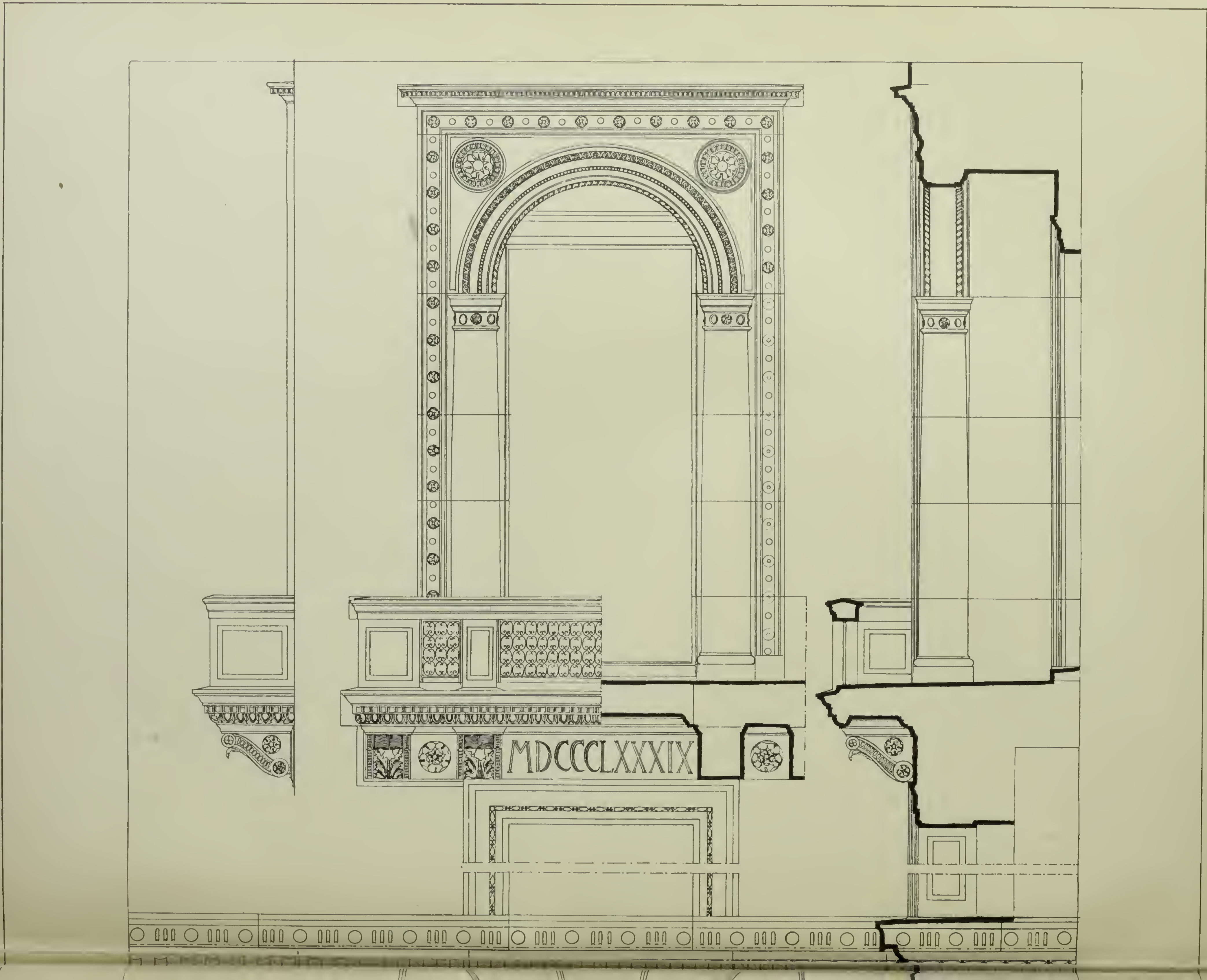
Envoi by H. Bacon Jr., sixth holder of the Rotch Travelling Scholarship.



CHAS. HART & SONS, LITH. 36 VESEY ST., N. Y.

DETAILS OF THE ARCADE BUILDING, ST. PAUL.

MESSRS. GILBERT & TAYLOR, ARCHITECTS.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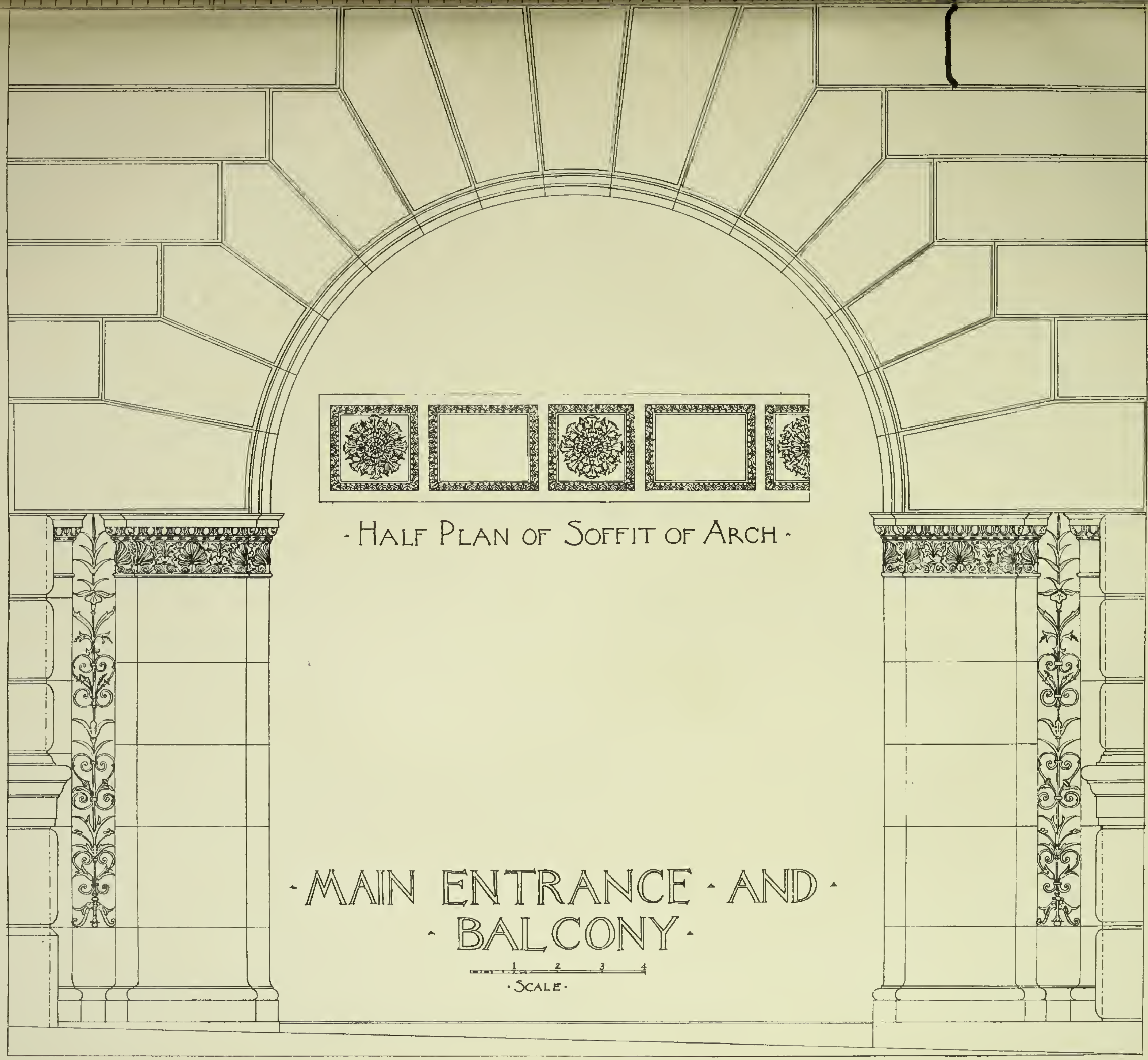
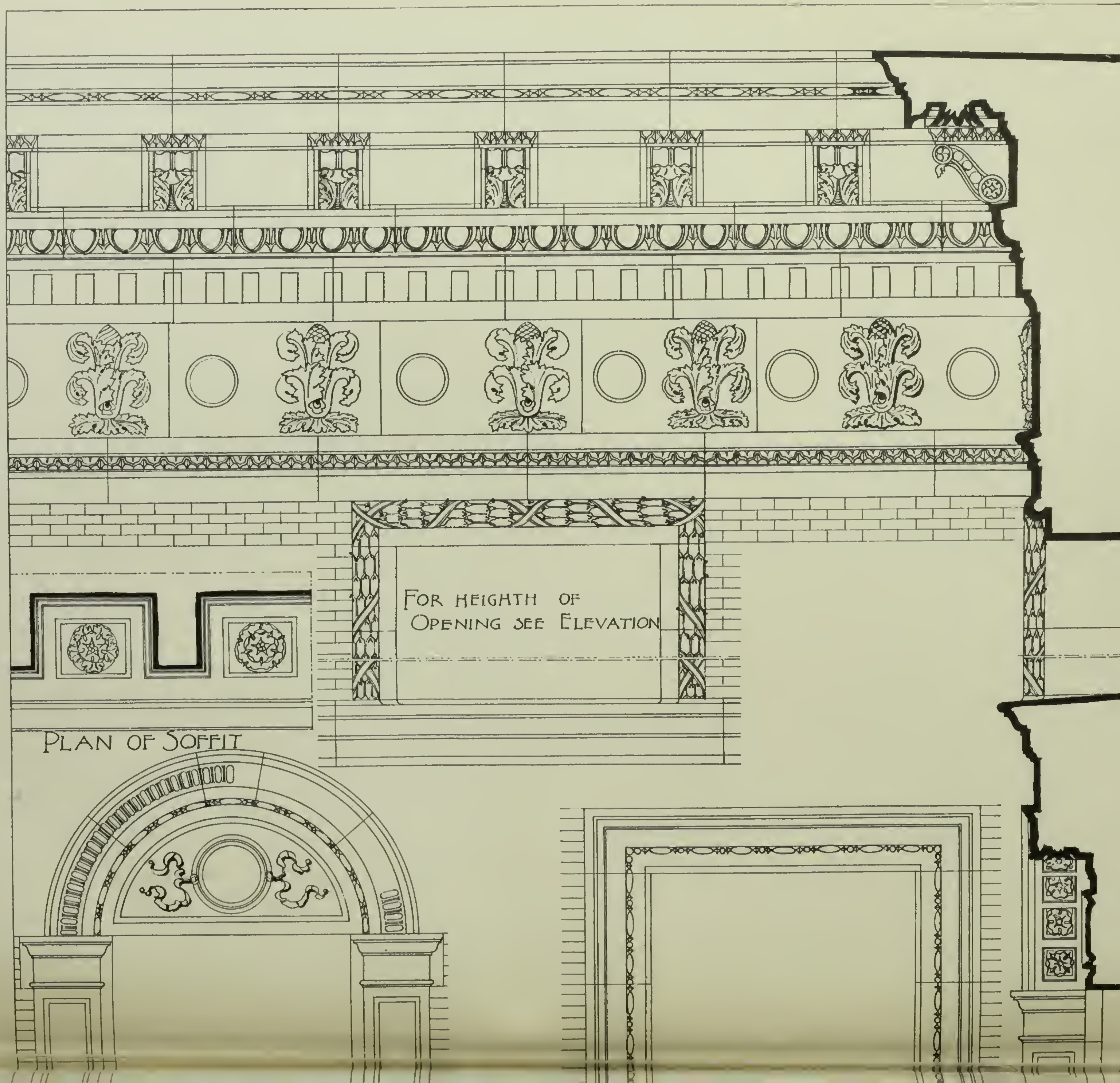


CHAS. HART & SONS, LITH. 36 VESEY ST., N. Y.

DETAILS OF THE ENDICOTT BUILDING, ST. PAUL.

MESSRS. GILBERT & TAYLOR, ARCHITECTS.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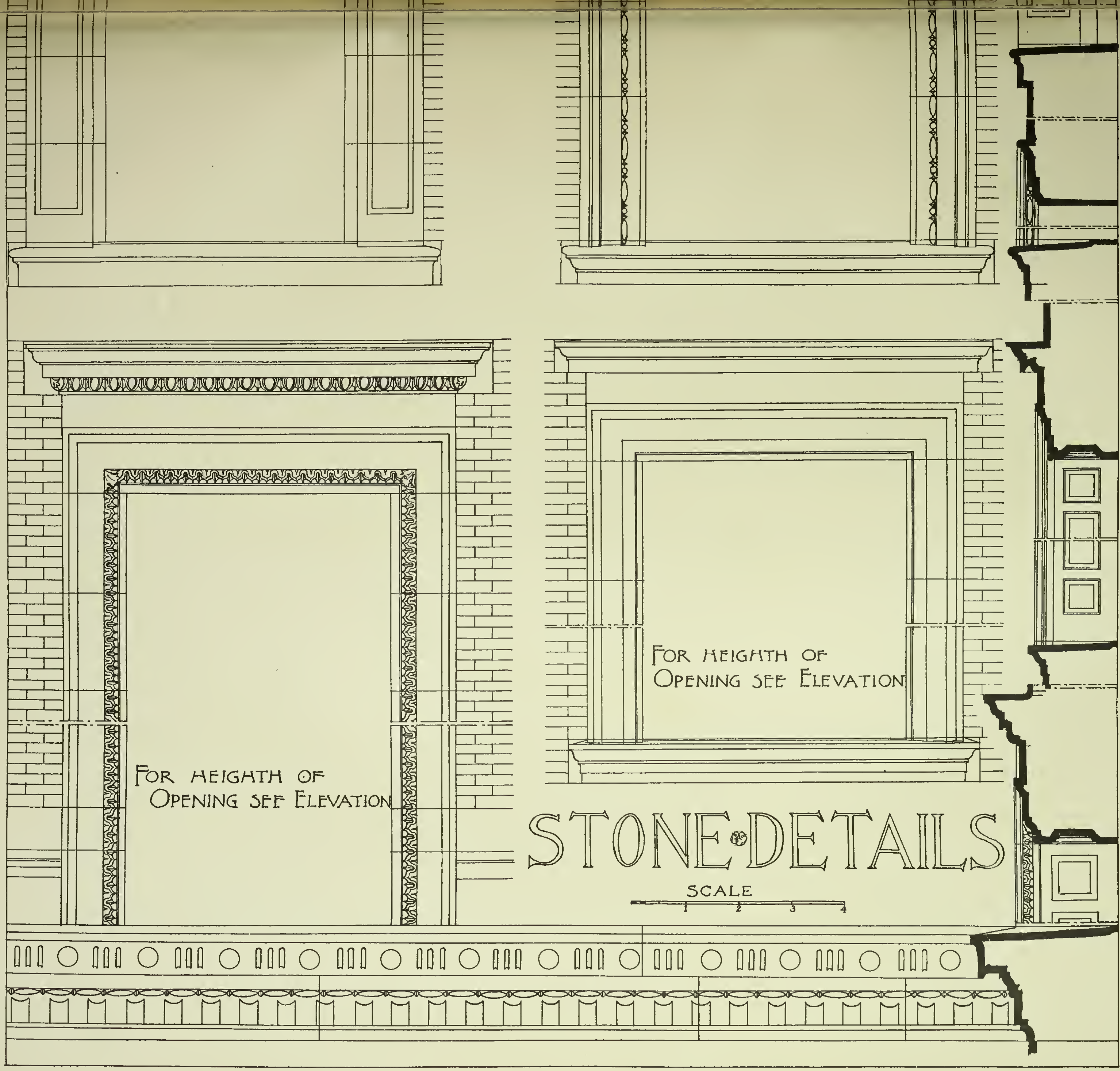
Opening see Elevation
Plan of Soffit



CHAS. HART & SONS, LITH. 88 VESEY ST., N. Y.

DETAILS OF THE ENDICOTT BUILDING, ST. PAUL.

MESSRS. GILBERT & TAYLOR, ARCHITECTS.

architecture the palm is easily carried off by the English. Such poor attempts at Gothic as Mr. Isaac Pursell's Calvary Church at Germantown, or even such Romanesque as Mason & Rice's First Presbyterian Church at Detroit, Mich., in the *Inland Architect* for December, or Mr. Potter's St. Agnes' Chapel, Ninety-second Street, New York, published in the *American Architect* for Dec. 10, are far behind such simple and satisfying successes as Messrs. Bodley & Garner's beautiful Eton Mission Church at Hackney Wick, exterior and interior views of which were published in the English *Architect* for October 28, and republished in the International Edition of the *American Architect* of Nov. 26, or Mr. Leonard Stokes's new church at Miles Platting, Manchester (*Architect*, Dec. 10), with its nobly simple interior, recalling St. Sebald's Nuremberg. The exterior of the latter, though good, does not seem to us quite equal to the best of current English ecclesiastical work. The design of the tracery window, in striving for originality, misses the characteristic quality of the best tracery; and the introduction of Renaissance detail in the gable is certainly not in this instance managed with success. The attempt of some English architects, following in the wake of Sedding, to graft Renaissance features on to late Gothic work, while often picturesque, does not seem to us likely to lead to any permanently valuable results. It is a thing to be attempted only by men of consummate knowledge and delicate artistic sense, such as Sedding was. The competitive design for the Church of St. Peter, Abbeydale, Sheffield, by G. H. Shackle & J. E. Newberry, in the *Architect* for November 25, is another example of the best current English ecclesiastical work; and even the competitive design by Messrs. Eden & Williams for St. Luke's, Wilmington, in the *Builder* of Dec. 3, in spite of its want of wall space over the clerestory windows, and the affectation of bending the chancel out of its axis (which was never done in the old churches, except from the exigencies of site or of some older foundations), and in spite of a certain poverty of design, is still a better church design than our architects often succeed in producing. But that English architects are not always successful in church design, if it needed proof, certainly gets it in Mr. H. C. Wilkinson's memorial church, published in the *Builder*, Dec. 24, a stiff, dry, and thin mixture of Renaissance and perpendicular. One thing that strikes us in looking over the foreign journals, both English and French, is the comparatively excellent work done by the inferior men, or to put it differently, the infrequency of very bad work as compared with our architecture, and a certain scholarly certainty of handling which much of our work lacks. This results largely from the fact that in the older countries half-educated men and men of no professional standing get little, if any, work, while in this country, if men of business energy and plenty of impudence, they stand perhaps even a better chance than men of superior training and artistic ability, but of more modesty and less business enterprise.

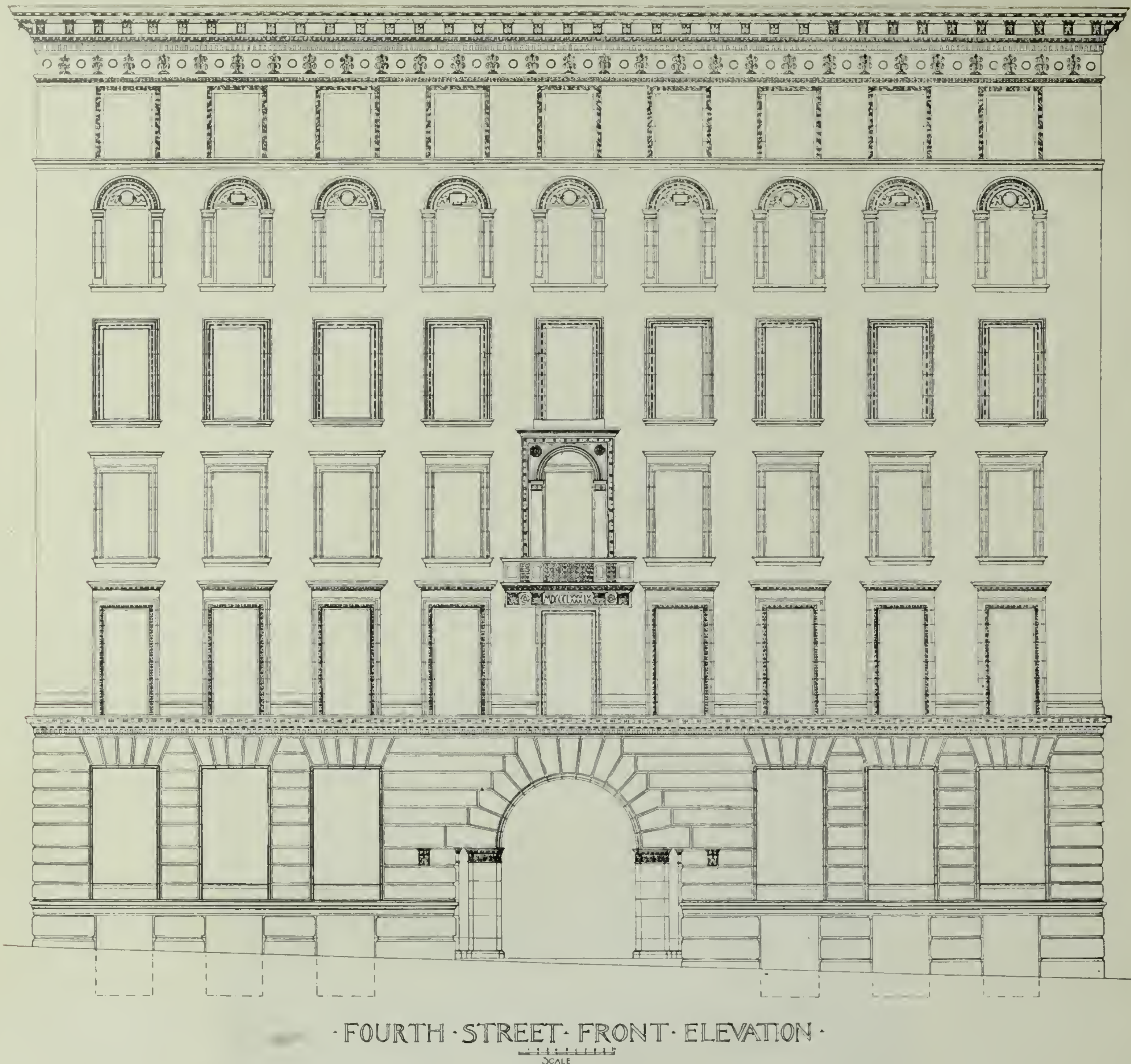
BOSTON CHAMBER OF COMMERCE.

Messrs. Shepley, Rutan & Coolidge, Architects.

La Semaine des Constructeurs, in its issue of Dec. 24, in commenting on the Panama scandal, prides itself upon the fact that among architects such malfeasance in office, such flagrant abuse of responsibility, would be utterly impossible. With regard to those of real professional standing the same is true in this country, yet so easily among us do charlatans and hustlers gain public recognition, gather a practice and parade as "architects," that we have recently had the humiliation to witness in one of our large cities the office of city architect held by a youth without adequate professional training, without professional standing, and who, while in office, abused his powers precisely in the manner which has brought the Panama Canal defrauders to the bar of the Court of Cassation. Such things as this, such bad architecture as we now have to suffer, will not become impossible until the public is so far educated as to appreciate at its true value artistic training and ability and professional standing and honor.

Plates.

Plates I. and II. — Portions of the Elevation of the Chamber of Commerce, Boston, Mass. — *Messrs. Shepley, Rutan & Coolidge, Architects.* —The details of the Boston Chamber of Commerce are convincing in one respect, that is, that the building would have been better in brick than it is in rock-



THE ENDICOTT BUILDING, ST. PAUL, MINN.

MESSRS. GILBERT & TAYLOR, ARCHITECTS.

faced granite. There is a very foolish predilection among building committees for granite buildings, and, as granite is an expensive material to cut, rock-faced granite is advocated. The result is destruction of scale and clumsiness of effect, and unnecessary heaviness of walls. Granite is usually chosen according to the desires of the committees, because there has been for years the idea prevalent that it is the best expression of durability. As a matter of fact, granite is a very perishable material as compared with brick and terra-cotta, either under the action of frost or fire. If used rock-faced the surfaces require to be large, as in the Marshall Field Building in Chicago. The Chamber of Commerce, while having an excellent general mass, is not as good in its smaller proportions. The column acting as a mullion in the large windows looks thin. The entrance seems small and cuts up into and injures the continuity of the second story windows. The belt course under the large windows should be larger. The detail sheets are of very excellent character. It is a pity that the building was not built from them.

Plate III. — ELEVATION OF FAÇADE OF THE HOTEL DE VILLE, BEAUGENCY, FRANCE. — *Envoi Drawing by W. T. Partridge, seventh holder of the Rotch Travelling Scholarship.* — The Beaugency town hall is accorded to Charles V., who was the architect of the Hotel de Ville at Orleans. Verdier & Cattois assume the date of the latter *hotel de ville* as nearly that of the *musée* of Orleans, *i. e.*, 1443. Palustre considers the Beaugency town hall later. It is our impression that this façade is very considerably later. We should place it nearly if not quite within the sixteenth century. It is certainly not the architecture of the reign of Charles VII. The drawing shows excellently the very delicate proportions of the details and the breadth of massing the openings. The shadow of the cornice is somewhat too light in its values. It actually casts a broad band of shade at the top of the façade.

Plate IV. — COURTYARD ELEVATION OF THE BARGELLO, FLORENCE, ITALY. — *Envoi Drawing by H. Bacon, Jr., sixth holder of the Rotch Travelling Scholarship.* — Mr. Bacon's drawing, which is a careful portrayal of this almost transitional building of the fourteenth century, with round arches below and pointed above, fails to give the impression of breadth and strength of the original. This is partly due to the usual flatness of an elevation, but also to the paleness of the shadows.

Plates V., VI., and VII. — STONE AND TERRA-COTTA DETAILS OF THE ENDICOTT AND ARCADE BUILDINGS, ST. PAUL, MINN. — *Messrs. Gilbert & Taylor, Architects.* — The details of these two buildings, which are in fact wings of the same building facing on two streets, are of the very best character, carefully studied. It is perhaps enough to say that we know of no better detail in recent work, and that the result of this detail upon the building has been to give it a refinement and dignity which will bear comparison with the work of the fifteenth century in Italy.

CERTOSA, AT PAVIA.

Fifth of a Series of Photographs of Foreign Brickwork.

THE STRENGTH OF MORTAR.

Some years ago a peculiar accident happened in New York City. A building used for the storage of flour fell down one Sunday night without any apparent cause. The writer went to the site of the fallen building early the next morning and made a careful inspection. The front wall had fallen bodily into the street, carrying with it the greater part of the side walls, but leaving the back wall intact. Barrels of flour, bricks, and mortar were all mixed together in confusion. On looking at the bricks it was found that they were of very good quality; they gave out a good, clear ringing sound when struck together, and appeared to be in every way of first-class quality. The mortar, however, was evidently very inferior. Portions of it taken between the thumb and finger could be crushed with very little pressure. The heap of *débris* was suggestive. Hardly two bricks could be seen clinging together; many of them were as clean as the day they were laid, while the mortar, in amongst the rubbish, was nearly all in a state of powder. It was not difficult to arrive at the conclusion that bad mortar was in some way responsible for the fall of the building. Inquiry of the owner of the place brought to light these facts: First, that the usual custom of storing barrels of flour was to arrange them on their sides, one on the top of the other, in the form of a pyramid; second, that on the day of the accident a larger number of barrels than usual had been received, which had rendered it necessary to fill up the whole of the building to the walls.

The writer quickly made up his mind that the accident had occurred primarily in consequence of bad mortar being used in the construction of the brickwork; that the walls were strong enough to stand so long as the weight was placed directly upon them as a dead load as it was when the flour barrels were arranged in pyramidal form, but that as soon as they were packed up solidly, they exerted a side pressure on the walls and so sent the front wall, which had no support, into the street. The building referred to was situated just below the Brooklyn bridge, and it was plain enough how the vibration of the cars had caused the barrels to slip and to thrust out the wall.

Accidents, where the cause can be so readily ascertained, are, of course, rare; but it is doubtless a fact — and one of which the writer, personally, has no doubt whatever — that when brick buildings fall, the fault is due, in nine cases out of ten, to imperfect mortar. It should be remembered that there are no better bricks made in the world than in the United States; in fact, no other country approaches even nearly to the degree of perfection which the American manufacturer of bricks has reached. The same cannot, however, be said of brickwork, because both the bond and the mortar are often so defective.

Perhaps brickbuilders, as a rule, do not sufficiently realize the importance of using hydraulic lime or cement in mortar. Entirely too frequently pure lime that possesses no hydraulic qualities whatever, and is fit only for inside plastering, is used to the serious detriment of the strength of the building. The nomenclature of limes divides them up into two classes, — the pure or fatty limes, that consist of pure carbonate of lime and yield a quantity of steam and heat in slaking, and the poor, meagre, or hydraulic limes that have some silica, alumina, iron, and other foreign substances in their composition, and possess the property of setting under or in the presence of water. Pure limes dissolve more or less in water, and will not set in damp situations. The terms "poor" and "meagre" applied to hydraulic limes arise from the cold appearance they possess when mixed with water in contrast with "fat" limes that have a distinctly oily or unctuous look.

Now it will readily be seen that it is necessary that mortar, to be good, shall be made only from a lime possessing some not inconsiderable hydraulic properties. While limes are divided up into two classes as above stated, they range in degree all the way from one to the other; that is, there are limes that contain only a little hydraulic qualities which would be ranked in the general class of pure limes, and so on up to those that were distinctly hydraulic in composition. The important thing for the brickbuilder to remember is, that the greater hydraulic properties his lime possesses, other things being equal, the stronger will be the mortar. Cement is essentially hydraulic, and when a lime is used that lacks or is deficient in hydraulic qualities a proportion of cement should be added. In this case it is a good plan to mix the mortar in large quantities so as to give a chance for the lime to slack perfectly. A thorough admixture is very necessary, and it is for this reason that mortar-making machines are successful. The expression sometimes used by laborers making mortar of "drowning" it, when too much water is added, is a very expressive one; no more water should ever be used than is necessary to thoroughly wet the whole mass.

Of course sharp, clean sand or its equivalent is necessary. Sea sand may be used with hydraulic cement or lime if the wall is to be under water, as the salt is in that case no objection. There are several substitutes for sand; for instance, ground coke, slag, stones, or brick. Perhaps the best substitute is burnt clay ground to a sufficient fine ess. This makes a very strong mortar.

The impo tance of making mortar as strong as possible can be best understood when it is taken into consideration that there are other strains in an ordinary building than that of a direct crushing weight. Even good mortar is very weak when subjected to a tensile or pulling strain, and its greatest strength is in resisting a crushing load. In ordinary buildings the roof exerts an outward thrust on the walls, in many cases, while the joists, bending under the weight put upon them, have a tendency to some extent to pull the wall in. Then, again, the pressure of wind is considerable at times, and puts a tensile strain on the mortar that must be provided for. In short, the mortar used in the construction of a piece of brickwork is of a necessity the weakest part of the structure, and should be made as strong as it is possible to make it.

By using hoop-iron bond, as previously referred to in these columns, the function of the mortar in holding securely together the component parts of the wall is considerably added to. The use of this iron bond is increasing, and when some enterprising manufacturer comes forward to push it vigorously, it will doubtless be the exception where it is not used rather than the rule. Its advantages are too great, and its cost comparatively too low, to make it long in coming into general use. ARTHUR SEYMOUR JENNINGS.

FIREPROOF AND DURABLE BRICKS AND MORTAR MADE FROM WASTE MATERIAL.

From the Journal of Commerce and Building Record, Texas.

In the first instance, it must be particularly and distinctly borne in mind that the writer does not hold himself responsible for any man's ignorance or prejudice against "home (Texas) manufacture."

Brogniart of France, Ure of England, and other scientists tell us that there are four classes of clays: first, fire clay; second, potters' plastic clay; third, effervescing clay; and fourth, ochre clay.

Effervescing clay is so named from the heavy presence of chalk, often interspersed with small pebbles or particles of rotten or decomposed lime, stone, carbonate of lime, and small shells.

These effervescing clays, which at present are cast aside as useless and worthless, for want of proper treatment in manufacture, are perhaps the most useful, if not the most valuable, for the manufacture of indestructible hydraulic and perfectly fireproof city building material. They were the clays of the Romans and other more ancient nations; of these they made their indestructible bricks and built their indestructible cities, indestructible wagon roads aud pavements.

The nations of the past that lived in the channels of the ancient Nile, Mexican America, and elsewhere, whose people and races are not even known in the pages of the most ancient history, all had their bricks, their vases, and their human figures in well-burnt, hard "effervescing clay."

Granite disintegrates and crumbles into particles of mica, quartz, and feldspar; marble moulders into dust of carbonate of lime; but well-burnt, hard effervescing clay bricks endure forever, as the ancient landmarks of mankind unquestionably prove.

Effervescing clay bricks, by proper treatment in manufacture, when ground into fine powder, produce "Roman cement" of the very highest order and quality. These bricks, when set or built in their own cement, produce one solid mass of indestructible, hydraulic, and perfect fireproof rock building from foundation to roof, constantly increasing in strength, beauty, and value with age and with change of temperature, constituting the old Roman indestructible city building material; and the old Roman solid hydraulic rock wagon roads, better, harder, and more indestructible to-day than the day they were built, in the days of Julius Cæsar. It is a well-known fact, beyond all doubt and argument, that the foundations of important Roman and other ancient buildings are all built of effervescing clay bricks, set in their own cement or mortar.

The foundation of the great St. Paul's of London, built by Sir Christopher Wren, is built of these clay bricks, set or built in good Roman cement mortar. The character and tenacity of these bricks are such it is said that, by proper treatment in manufacture, they will stand the high pitch of cast iron melting and the most sudden heating and cooling without cracking or falling to pieces.

Here, on the great Mounts Barker and Bonnel, adjacent to the city of Austin, these valuable effervescing clays exist in hills from three to four hundred feet high and fathoms deep; close to railway transportation, for shipment to all parts of Texas and the South; never-failing water, the Colorado River, with millions upon millions of the very best wood, cedar, and hard oaks for fuel; in one of the most beautiful and healthy climates in the world, barring none.

When our beautiful "Dam" is finished, we shall require millions upon millions of these beautiful effervescing clay bricks, and many tons of Roman and Portland cements, for the city will extend, and in the expansion the best and safest material will unquestionably be used and the effervescing clay will be selected; nor is this all, as its merits become known, its popularity will extend.

I will take pleasure in entering into a more full and minute explanation relative to these clays, their uses and proper treatment.

J. Dimelow.

Laboratory of the State of Texas and the South,
Mount Barker, near Austin, Texas, June 24, 1892.

MORTAR.

The cohesive and adhesive strength of mortar in waterbound brickwork, says the *Building News* in an article on the subject, is due not to its peculiar hardness, for that is a quality which it cannot be said to largely possess, but is due rather to its *elasticity;* for it is frequently found when cutting away or removing portions of this kind of work that a stout chisel may, without experiencing much resistive force, be driven into the mortar joints without any apparent effect beyond that of displacing so much of the mortar as previously occupied the space taken up by the chisel; the largest portion of the displaced mortar being driven into a closer molecular proximity than previously existed. The ancient Romans, who seem to have done all things well, are accredited with the practice, in the preparation of their mortars, of forming pits and burying the newly made mortars for a considerable time before using them; a statement sometimes adduced (and not unreasonably so) to account for the strength and durability of their work. In criticising the remains of old work, it is well to remember that in that, as in all things, we have the survival of the fittest; that the bad work of the ancients (if they did any) is gone, like Prospero's "insubstantial pageant faded," leaving "not a rack behind," and we are left only with the good from which to draw our inference of the whole.

Such a process of mortar-making, however desirable, cannot in these go-ahead days of heavy city ground rents and suburban building of mushroom growth be now indulged in. But the really practical man is often astonished to find in specifications emanating from high places the following words: "No more mortar to be made up at one time than is necessary for the day's consumption." This is a necessary provision when building in the winter season, and it is necessary to provide at other seasons that the mortar shall not lie about in thin isolated beds or layers until all moisture is extracted from it. But it is desirable under all other circumstances that it be allowed to lie sufficiently long to admit of the unequally burnt parts of lime taking in sufficient moisture to make them soluble, as lime that is not well burnt imbibes water very tardily.

When this is not done these parts will slake in the brickwork, forcing out portions of joints in their immediate vicinity, and raising considerable portions of the overlying brickwork off its beds. Such under-burnt parts of lime are, when slaked, distinguishable by a dark bluish-gray color, and if exposed sufficiently long to the air will resolve themselves into a fine powder.

The lines in general use in and about London are the Dorking, the Merstham and Halling, and are known as gray or stone lime. These limes are used for the first and second coats of the plasterer — viz., the rendering and floating coats — as they acquire in setting a hardness which the chalk or pure limes never attain, the chalk lime being suitable only for the third or finishing coat, known technically as "setting," and which acquires its hardness by the process of trowelling to which it is subjected by the plasterer when mixed with about one third of fine washed sand, or are otherwise gauged with plaster of Paris.

Well-burnt graystone limes imbibe water greedily, slake freely and quickly if supplied with sufficient water, while the eminently hydraulic limes imbibe water less freely, and slake very tardily, and for this reason blue lias lime, when in the lump, should be covered over with sand for two or three days, and copiously supplied with water, before putting it in the mortar-pan, the wet sand retaining some of the water applied and to some extent preventing the escape of the heat generated in the incipient stage of the slaking process, which two factors combined are generally considered to accelerate the slaking.

The advantage claimed for mortar that has been made up sufficiently long to allow it to properly cool is that the outer skin of the mortar heap becomes sufficiently hard by the process of surface evaporation and the attraction of atmospheric carbon to imprison within the bulk sufficient moisture to slake the badly burnt portions of lime, in the shape of "core," that may be in the mortar, to set up in its incipient stage the chemical action which we are told takes place between *silex* or sand-grains and dissolved lime, coating the individual grains or *nuclei*, and filling up the microscopic spaces which must exist between all angular grains, however small they may be.

By a proper process of retempering the mortar, the particles are driven closer together, the excess water is eliminated, and the mortar acquires a characteristic known to workmen practised in the use of mortar by the name of *toughness*, in which state it can be used with infinitely less liability to shrinkage than a newly made mortar.

Walls built with tempered mortar and bricks sufficiently wetted — that is, wetted to a degree short of absolute saturation, a degree which can be better determined by the practical workman than prescribed here — produces the best results. By all means avoid the use of super-saturated bricks.

It not infrequently happens that a bad mortar is produced from good material, and the one chief thing productive of this is the modern mortar-pan, coupled with the impractical idea of many of our so-called builders of to-day (largely — very largely — recruited from the ranks of builders' clerks, with a knowledge of building commensurate to the making out a list of items under the head £ s. d., and circumscribed by the four edges of a sheet of foolscap) that any unskilled workman (*i. e.*, unskilled in that particular branch) can turn out a bed of bricklayers' mortar. This work, more often than not, is assigned to the engine-driver, who does the double duty of engine-driver and mortar-pan attendant. If he be a competent driver, the chances are that he knows little, and cares less, about mortar; and years of practical experience in the supervision of work have taught the writer that the mortar is turned out of the pan either imperfectly incorporated, or, what is more frequently the case, is overground to such a degree as to be little better than mere dust when dry, the grit and body of the sand being ground out of it.

The objection to loam in sand is that it deteriorates the setting and indurating properties of the lime, coating the sand grains and forming a separating medium between them and the lime, to the injury of the tensile and cohesive strength of the resulting mortar. Mortars made of unclean or loamy sand are very liable to shrinkage and cracks. The use of water impregnated with loam or clay should be avoided, both in slaking the lime and in retempering the mortar.

BRICKS AND BRICKWORK.

A Lecture delivered at Carpenter's Hall, London, by Prof. T. Roger Smith, F. R. I. B. A.

(*Concluded.*)

Against each of these good qualities, however, we may set a corresponding defect. If brickwork is easily thrown into any shape, it is also thrown easily out of shape. It has little coherence or stability, less than masonry, and very considerable less than timber. If any unequal settlement in the foundation of a brick building occurs, those long zigzag cracks, with which we in London are only too familiar, set themselves up at once, and if any undue load or any variation in load exists, the brickwork begins to bulge. Any serious shock may cause a building of ordinary brickwork to collapse altogether, and from time to time a formidable accident occurs owing to this cause. The fact is, the bricks are each so small compared to the mass of the work, and the tenacity or hold upon them of even fairly good lime mortar is so comparatively slight, that there is really but little grip of one put upon another. Persons who have to design and construct brick buildings should never forget that they have to be handled with caution and are really very ticklish and unstable.

One or two of the methods of overcoming this to some extent may be mentioned.

The first is the introduction of what is called bond. At the end of the last century it was usual to build in, at every few feet in height, bond timbers, which were embedded in the heart of the walls. If these had always remained indestructible, they would no doubt have served their purpose to some extent. Unfortunately, timber both rots and burns, and this bond timber has brought down many a wall owing to its being destroyed by fire, and has in other cases decayed away, and caused cracks, settlements, and failures.

The more modern method of introducing a strong horizontal tie is to build into the wall a group of bands of thin iron, such as some sorts of barrels are hooped with, hence called hoop-iron. The courses of bricks where this occurs must be laid in cement, because iron in contact with cement does not perish as it does in contact with mortar. If in every story of a building four or five courses are thus laid and fortified, a great deal of strength is given to the structure.

Another method which has rather fallen into disuse is grouting. This is pouring liquid mortar, about the consistency of gruel, upon the work at about every fourth course. The result is to fill up all interstices and cavities, and to delay the drying of the mortar, and brickwork so treated sets extremely hard. I have seen a wall that has been so treated cut into, and it was quite as easy to cut the bricks (sound ones though they were) as the mortar joints.

Grouting is objected to because it interferes with the good look of the work, as it is very difficult to prevent streaks of it from running down the face, and it is apt to delay the work, but it is a valuable means of obtaining strong brickwork.

Another and more popular method is to build the work in cement, now usually Portland cement. This, of course, makes very strong, sound work, and does not involve any delay or dirt like grouting, or the introduction of any fresh material like hoop-iron; but it, of course, adds to the expense of the work considerably, as cement is much more costly than lime. I ought to add that the advocates of Scott's selenitic mortar claim that it not only sets quickly and hard, but that it is extremely tenacious and consequently makes a much more robust wall than ordinary mortar. I dare say this is true, but I have not happened to see such a wall cut into, and this is the best test of solidity.

The second deficiency in brickwork which I am bound to notice is that, though it is very fireproof, it is far from being waterproof. In an exposed situation, rain will drive completely through a tolerably stout brick wall. If water be allowed to drop or fall against it, the wall will become saturated like a sponge. If the foot of a wall becomes wet, or if the earth resting against the lower parts of it be moist, water will, if not checked, rise to a great height in it, and if the upper part of the wall be wet, the water will sink downwards. With most sorts of brick the outer face absorbs moisture whenever the weather is moist, and in time the action of the rain, and the subsequent action of frost upon the moisture so taken up, destroy the mortar in the joints, which are to be seen perfectly open as if they had been raked out. In old brickwork, and in some cases (happily not in many), the action of weather destroys the bricks themselves, the face decaying away and the brick becoming soft.

Against this serious defect in our staple building material a series of precautions has been devised. Damp, rising from the foot of the wall or from earth lying round its base, is combated by a damp-course, — a bed of some impervious material going through the wall.

Damp earth may be kept off by surrounding the walls with an open area or a closed one, usually termed a dry area. Damp against the face of the walls may be partly combated by a careful selection of a non-absorbent brick with a hard face, and by struck joints; but it is most effectually kept at bay by the expedient of building the wall hollow, that is to say, making the external wall of the house to consist of two perfectly distinct walls, standing about two inches apart, and held together by ties of earthenware or iron. The result is that the moisture blowing through the outer skin does not pass the cavity, but trickles down on the inner face of the outer wall, while the inner wall remains dry.

The ties are constructed of shapes to prevent their conducting water themselves from without to the inner wall.

In addition to this, a series of slates forming an intermediate protection is sometimes introduced, and forms an additional and most valuable screen against weather. Sometimes the two skins of the wall are closer together — say three fourths inch — and the space is filled with a bituminous material. A substance of a bituminous nature, called hygeran rock, has been of late years introduced, and is being extensively used for this purpose; it is melted and poured into the open space hot, and quickly hardens. The use of such a material is open to the objection that no air can pass through it. The rooms of our houses are receiving air constantly through the walls, and much of the constant current up our chimneys is supplied, to our great advantage, in this very imperceptible manner. The house breathes, so to speak, through the pores of its brickwork. When this is rendered impossible, it seems clear that fiercer draughts will enter through the chinks and crevices, and that there will be a greater demand upon flues not in use, occasioning down draught in the chimneys.

Another mode of keeping out weather is to cement the face of the brickwork, but this hides up the work and so tends to promote bad work, besides being often very unsightly.

Among other peculiarities of brickwork are the facilities for introducing different colors and different textures of surface which it presents, the ease with which openings and arches can be formed in it, the possibility of executing ornament and even carving, and the ease with which brickwork will combine with other building materials. It cannot be well made use of for columns, though it may readily enough be turned into piers or pilasters. It cannot, generally speaking, with advantage be made use of for any large domes, though the inner dome of St. Paul's and the intermediate cone are of brick and stand well; but it is an excellent material for vaulting arcades, and all purposes involving the turning of arches.

Brickwork must be said to be durable, but it requires care. If not of the best, brickwork within the reach of the constant vibration caused by the traffic on a railroad seems to be in danger of being shaken to pieces, judging from one or two instances that have come under my own observation. The mortar, and even in some cases the bricks themselves, will rapidly deteriorate if moisture be allowed to get into the heart of a brick wall, and in exposed situations this is very apt to happen.

Care should always be taken to keep the pointing of external brickwork in good order, and to maintain all copings and other projections intended to bar the access of water coming down from above, and to stop the overflowing of gutters and slack pipes, which soon soaks the wall through and through.

Of course, if there is a failure of foundations, brickwork, as was pointed out earlier, becomes affected at once; but if these be good, and the materials used be sound ones, and if the other precautions just recommended be taken, it will last strong and sturdy for an immense length of time. In some cases, as, for example, in the Roman ruins, it has stood for fifteen hundred years under every possible exposure and neglect, and still shows something of a sturdy existence after all, though sadly mutilated.

If we now return to the question, what can be well done in brickwork, no better answer can be given than to point to what has been and is being done, especially in London and within our own reach and observation. Great engineering works, such as railway viaducts, the lining of railway tunnels, the piers and even the arches of bridges, sewage works, dock and wharf walls, furnace chimneys, and other works of this sort are chiefly done in brickwork, and notwithstanding that iron is far more used by the engineer for some purposes and concrete for others now than formerly, still there is a great field for brickwork.

The late Mr. Brunel, who was fond of pushing size to extremes, tried how wide a span he could arch over with brickwork, and I believe the bridge which carries the G. W. R. over the Thames at Maidenhead has the widest arch he or any other engineer has successfully erected in brick. This arch has, it is stated, a span of 128 feet. It is segmental, the radius being 169 feet, and the rise from springing to crown 24 feet, and the depth of the arch 5 feet 3 inches.

Nowadays, of course, no one would dream of anything but an iron girder bridge in such a position. Mr. Brunel's father, when he constructed the Thames Tunnel, lined it with brickwork foot by foot as he went on, and that lining sustained the heavy weight of the bed of the river and the river itself.

If you leave London by either of the southern lines, all of which are at a high level, you go for miles on viaducts consisting of brick arches carried on brick walls. If you leave by the northern lines, you plunge into tunnel after tunnel lined with brickwork, and kept secure by such lining. Mile after mile of London streets and those in the suburbs present to the eye little but brick buildings. Dwelling-houses, shops, warehouses, succeed one another, all in brickwork, and even when the eye seems to catch a change it is more apparent than real. The white mansions of Tyburnia, Belgravia, South Kensington, and the neat villas of the suburbs are only brickwork, with a thin coat of stucco, which serves the purpose of concealing the real structure — often only too much in need of concealment — with a material supposed to be a little more sightly, and certainly capable of keeping the weather out rather more effectually than common brickwork would. More than this, such fine structures, apparently built entirely of stone, as are being put up for commercial purposes in the streets of the city, and for public purposes throughout London, are all of them nothing more than brick fabrics with a facing of masonry. Examine one of them in progress and you will find the foundations and vaults of brickwork, and not only the interior walls, but the main part of the front wall, executed in brickwork, and the stone only skin deep.

There are, however, two or three ways of making use of brickwork without covering it up, and of gaining good architectural effects thereby, and to these I beg now to direct your attention.

The architect who desires to make an effective brick building, which shall honestly proclaim to all the world that it is of brick, may do this and, if he will, may do it successfully by employing brickwork and no other material, but making the best use of the opportunities which it affords, or he may erect his building of brickwork and stone combined, or of brickwork and terra-cotta.

Mr. Robson, till lately the architect to the School Board of London, has the merit of having put down in every part of the metropolis a series of well-contrived and well-designed buildings, the exterior of which, almost without exception, consists of brickwork only. If you examine one of his schoolhouses you will see that the walls are of ordinary stock brickwork, but usually brightened up by a little red brick at each angle, and surmounted by well-contrasted gables, and with lofty, well-designed chimneys rising from the tiled roof. The window openings and doorways are marked by brickwork, usually also red and sometimes moulded, and though I personally must differ from the taste which selected some of the forms employed (they are those in use in this country in the seventeenth and the last centuries), I cordially recognize that with very simple and inexpensive means exceedingly good, appropriate, and effective buildings have been designed.

Among examples of architecture wholly or almost wholly executed in red brick, I cannot pass over a building built many years ago, little known on account of its obscure situation, but a gem in its way. I allude to the schools designed by Mr. Wilde, and built in Castle Street, Endell Street. Of buildings where a small amount of stone is introduced into brickwork we have a good many fine specimens in London. One of the best — probably the best — is the library in Lincoln's Inn Fields. This is a large and picturesque pile, built under Mr. Hardwick as architect, in red brick, with patterns in the blank parts of the walls done in black brick. It has splendid moulded brick chimneys, and the mullions of the windows, the copings, the entrances, and some other architectural features done in stone. The building is a good reproduction of the style of building in Tudor times, when, as has been already mentioned, brickwork was taken into favor.

Another building of the same class, but not so good, is the older part of the Consumption Hospital at Brompton. Brickwork, with a little stone, has been very successfuly employed as the material for churches, and in many such cases the interior is unplastered brickwork. Such churches often attain, when designed by skilful hands, great dignity and breadth of effect. St. Alban's, Holborn; the great church designed by Mr. Butterfield in Margaret Street; Mr. Street's church near Vincent Square, Westminster; and several churches of Mr. Brooks', such as he was kind enough to enable me to illustrate to-night, may be mentioned as examples of the sort.

Mr. Waterhouse has built an elaborate Congregational church at Hampstead which shows the use with which such effects of color may be obtained in interiors, and has kindly lent some drawings. Mr. Pearson's church at Kilburn may also be referred to as a fine example of brick vaulting.

Brick and terra-cotta seem to have a natural affinity for one another. Terra-cotta is no more than a refined brick, made of the same sort of material, only in every respect more carefully, and kiln baked. Its similarity to brick is such that there is no sense of incongruity if moulded or carved brickwork and terra-cotta are both employed in the same building, and this can hardly be said to be the case if the attempt is made to combine ornamental brickwork and stone ornaments.

At South Kensington a whole group of examples of brickwork with terra-cotta meet us. The Natural History Museum, the finest of them all, is hardly fit for our present purpose, as it is as completely encased in terra-cotta as the fronts of the buildings in this avenue are in stone. But here are the Albert Hall, a fine specimen of mass and effect, the City and Guilds Institute, the College of Music, and some private houses and blocks of flats, all in red brick with terra-cotta, and all showing the happy manner in which the two materials can be blended. In most of them there is a contrast of color; but Mr. Waterhouse, in the Technical Institute, has employed red terra-cotta with red bricks, as he has also done in his fine St. Paul's School at Hammersmith, and Mr. Norman Shaw has, in his fine pile of buildings in St. James's Street. This combination — namely, brick and terra-cotta — I look upon as the best for withstanding the London climate and for making full use of the capabilities of brickwork that can be employed, and I have no doubt that in the future it will be frequently resorted to. Some of these examples also show the introduction of cast ornaments, and others the employment of carving as means of enriching the surface of brick walls with excellent effect.

Here we must leave the subject, but in closing I cannot forbear pointing to the art of the bricklayer as a fine example of what may be accomplished by steady perseverance. Every brick in the miles of viaducts or tunnels, houses or public buildings, to which we have made allusion, was laid separately, and it is only steady perseverance, brick after brick, on the part of the bricklayer, which could have raised these great masses of work. Let me add that no one brick out of the many laid is of no importance. Some time ago a great fire occurred in a public asylum, and about £2,000 of damage was done, and the lives of many of the inmates endangered. When the origin of the fire came to be traced out, it was found that it was due to one brick being left out in a flue. A penny would be a high estimate of the cost of that brick and of the expense of laying it, yet, through the neglect of that pennyworth, £2,000 damage was done, and risk of human life was run. I think there is a moral in this story which each of us can make out if he will. — *The Building News.*

ESTIMATES ON DESIGNS PUBLISHED.

Architects, contractors, and builders, wishing to ascertain the cost of material for any of the competition designs published, when the cost is not stated, have only to write to the company or companies whose bricks are specified, stating the year and number of the plate on which the design is shown, and any particulars as to color of bricks, size of job, method of shipment, and the manufacturers will take pleasure in promptly quoting prices. The addresses of the different manufacturers may be found in our advertising columns.

CORRESPONDENCE.

SAVANNAH, ILL.

THE BRICKBUILDER, Boston, — Have just received copy of BRICKBUILDER with article "Sell more Bricks" marked. A good way to have more bricks sold is to build more brick houses, and a good way to have more people build more brick houses is to publish "taking" designs for brick houses. Now, I want to build several cheap houses for rent, and would as soon build of brick as any way, if I could get designs to suit. Can you help me out, or do you know who can? I enclose stamped envelope.

Respectfully, L. G. BURROWS.

We would advise our correspondent to secure the services of a competent architect unless he wishes to build the cheapest houses that will rent. If he must limit the cost to $800 or $1,200, he had best secure the services of a contractor or builder on whom he can thoroughly depend, and build a house of simplest design, in the best manner his funds will allow. No ornamental work, adding to the cost of the building, should be applied. After all, we believe the commission paid an architect for making quarter-scale plans, elevations, and specification would be well expended. A plain brick wall, of commonest bricks, can, with intelligent treatment, be made very attractive. A house so built, with the arrangement of wall space and windows well considered, costs no more to put up than a house designed without any regard for effect obtainable by this means. The cost comes in, in securing the services of a man who knows how to do it, and this extra cost is very slight. A rough brick wall may look bare when first built, but let our correspondent plant around his new houses a few roots of the ivy that shingles with green so many Boston brick fronts (Ampelopsis Veitchei is the botanical name), and in two years there would be nothing in Savannah more attractive.

We hope our competition for a $2,000 brick house, announced in this number, will bring in enough designs to provide suggestions for many who, like our correspondent, wish to build small houses of brick instead of wood.

BOOKS AND PAPERS.

We are in receipt of a copy of the second edition of *Hendricks's Architects' and Builders' Guide and Contractors' Directory of America*, for 1892–93, published by Samuel E. Hendricks & Co., 44 and 46 Broadway, New York.

We take pleasure in noticing this publication as it so far surpasses anything of the kind we have ever seen in arrangement and completeness. Usually these "Directories" are local affairs, originated with the sole purpose of affording opportunity to solicit advertisements, and having no real value to any one except the publishers. They usually have a nominal price, but the few copies printed are distributed free, going largely to the advertisers as proof that their advertisements have been printed. These advertisements are hardly worth the paper they are printed on.

Messrs. Hendricks & Co. have approached this work with the broader, more far-sighted view of giving their book a value, first as a directory, and second as an advertising medium, evidently realizing that the latter is dependent upon the former. They have given lists, which are almost marvellous in their completeness and correctness, of all trades and industries relating in any way to the building interests of the country. These lists are admirably arranged, their typography is the best, and the number of special paid-for headings, which in the many "so-called" directories occupy a large proportion of space, is surprisingly small. There are comparatively few advertisements scattered through the directory part, and these never interfere with the lists by breaking into them. They are, for the most part, printed on special leaves inserted at the right place. The well-arranged index of headings is also a noticeable feature.

The cost of the book, $5.00, insures an *effective* circulation, for no one would buy it but for its use. It is really indispensable to every firm supplying building materials of any sort, and architects would find it advantageous to have a copy for reference when addresses of supply firms are wanted.

THE BRICKBUILDER COMPETITIONS.

RULES: All drawings must be sent in marked with some motto or device, and accompanied by a sealed envelope marked with the same, containing the full address of the competitor. The designs are judged by a committee of well-known architects, solely upon their merits, the names of the designers remaining unknown until the award is made, when the sealed envelopes corresponding to the devices on the designs are opened. To protect the interests of our advertising patrons it is stipulated that no ornamental bricks not found in their catalogues shall be used. This is really no restriction, for practically all of the leading manufacturers will be found represented in The BRICKBUILDER. To encourage the study of effective use of the commoner materials, of two designs equally good, preference will be given that showing a skilful use of ordinary bricks to secure ornamental effect.

COMPETITION NO. 3. AWARD.

Programme. It is required of the competitor to design three brick cornices of varying heights. These heights will not exceed seven, thirteen, and twenty courses respectively. Bricks on edge will be considered a course. Simple forms are advised and a skilful use of ordinary bricks will count for more than an elaborate combination of ornamental ones. The gutter will be of terra-cotta or copper, and will be additional.

Nineteen designs were submitted besides that of "Old Dominion," which was barred from competition owing to tardy arrival. Fourteen of the competitive designs are published in our plate department, prizes being awarded as follows: —

Plate 49. First prize, $10, "Siena," J. T. Maclaren, Philadelphia, Pa.

Plate 50. Second prize, $7.50, Coat-of-Arms, Jas. C. Green, St. Louis. Third prize, $5, "Cornish," W. W. DeVeaux, New York City.

Plate 51. Two fourth prizes, $3.50 book, competitor's selection. "Classicus," Will S. Aldrich, Somerville, Mass., and "Nixy," Raymond F. Bocorselski, Hartford, Conn.

Plates 52 and 53. Four fifth prizes, subscriptions to The Brickbuilder for 1892. The Rising Sun, Max Foester, St. Paul, Minn. "Allesame," Harry Edward Prindle, New York City. Black Cross in Circle, H. G. Fletcher, Somerville, Mass., and "Brique," G. F. Crump, Albany, N. Y.

Plates 54, 55, and 56. Designs awarded honorable mention. To these competitors the paper will be sent free for the last half of the present year. "Don," W. P. Crabtree, New Britain, Conn. "Non Nemo," Chas. H. Cullen, Hartford, Conn. "Bricco," Frank W. Whiton, Hartford, Conn. "Pluto," Louis Sonntag, Philadelphia, and "Renaissance," Walter H. Volckening, Brooklyn, N. Y. "Old Dominion" is published without award by consent of its author, H. W. Olcott, Richmond, Va.

JUDGMENT IN COMPETITION NO. 3.

The designs for cornices submitted in this competition were, on the whole, so excellent and so varied, that the task of the jury in placing them in order of merit was not an altogether easy one, especially as in several cases the merit of the three cornices shown was unequal, so that a sheet containing, for instance, one very good design with two poorer ones took a lower place than the single design taken by itself would have entitled it to. It was stated in the programme that a skilful use of ordinary bricks would count for more than an elaborate combination of ornamental ones; for this reason and on account of the excellence of the profiles, the picturesque and varied play of light and shade, and the distinctively brick character of the designs, the sheet of cornices by "Siena" was placed first. Rich as is the effect produced, hardly any moulded brick occur, and these are of very simple form. The method of rendering here adopted is also to be especially commended as it shows clearly the effect of the design, and is not a mere working drawing of a cornice, as are most of the others. In the largest of the three cornices, the small brackets, No. 509 Ph. B., are somewhat too small for their position and the weight of cornice they carry, and at the height from the ground at which a cornice of this size would presumably be placed they would not tell as they ought to.

The designs distinguished by a coat-of-arms are placed second. They are not as rich in effect as those of "Siena," although the means employed are more elaborate. But the profiles are firm and bold, the designs have a distinctively brick character, though not so much so as those of "Siena," and are well proportioned; and while using rich detail in appropriate positions and with good knowledge of effect, are commendable in their dignified restraint. The increasing boldness in treatment as the size of the cornice increases shows a thoughtful appreciation of what would be required by the presumably greater height of the buildings to which the larger cornices belong.

"Cornish" also shows a commendable and effective treatment of cornices, which have a distinctively brick character and are well proportioned. The profiles follow too closely a single raking line. In this respect the central design is better than the other two. The gutter mouldings have too sharp an outline and too great projection. The largest cornice would have been much improved by having a plain projecting facia below the upper egg and dart course, in place of two of the moulded courses. In their position it would be better if at least every alternate brick were a header to tie these projecting courses securely to the wall.

"Classicus" submits some excellent designs, thoroughly brick in character and rich in effect. But there is a certain confusion of parts, and a want of perfect justness in proportion, which prevents these designs from taking a higher place. For instance, the central design, which is the least successful of the three, is too much like two cornices of differing design, superimposed one on the other. Taken as a whole, the brackets do not come in the right place in the cornice.

"Nixy" is thoroughly brick in character and commendable for the very simple means employed. But although these designs would look much better when built than they do in the rather poor rendering of this sheet, and though the profiles are fairly good, there is too much sameness and lack of interest, which even with the simple means employed might have been avoided. The largest design is the least successful.

The Rising Sun shows three excellent cornices, well proportioned, of pure and refined profile; but, though suitable for execution in brick, there is nothing distinctively brick in their character. They might with equal propriety be executed in stone or terra-cotta. But for this they would have been accorded a much higher place. The facia of the central one, indeed, has a somewhat too great projection for a single course of brick, and being the top course would have to be tied down in some way to remain in place.

"Allesame" has three very interesting designs, which, however, would be more suitable executed in terra-cotta than in brick. The profile of the lower design might easily be improved and the guilloche ornament is not quite in place in the position given to it.

Black Cross in Circle gives three good and appropriate designs, but not as interesting as those previously named. The simple little cornice at the top of the sheet is the best of the three. The lower design might be very effective in certain positions, but is not of great interest taken by itself.

The designs of "Brique" are appropriate but somewhat commonplace. The brick pattern used in the larger cornice is not good in that the joints come so frequently over each other. A good brick pattern should follow naturally from the use of some good brick bond.

The designs by "Don," "Non Nemo," "Bricco," "Pluto," and "Renaissance" are also worthy of mention. The two lower designs of "Don" are interesting in that no moulded brick whatever are employed, but more interesting results could have been obtained with this limitation. The projecting courses should have been headers, not stretchers.

"Old Dominion," coming in too late, was *hors de concours*, but his designs are worthy of publication, and are therefore put in, though not as one of the designs of the competition.

THE COST OF THE CORNICES.

With a view to making this special cornice number of more practical value by saving subscribers the time and trouble of estimating the cost, we have, from the price lists of the several companies whose bricks are used, figured the cost of the face and ornamental brick per running foot. Face brick have been figured at $30 per thousand, which is higher than the ordinary price. Prices include packing and delivery on board the cars at Boston for the Philadelphia & Boston Face Brick Co.; New York for the N. Y. Anderson Pressed Brick Co.; Winslow Junction for the Eastern Hydraulic Press Brick Co.; Philadelphia for the Peerless Brick Co.; Washington for the Washington Hydraulic Press Brick Co.; Akron, O., for the Akron Vitrified Press Brick Co., and St. Louis or Belleville, Ill., for Anthony Ittner of St. Louis. While these estimates are practically correct, THE BRICKBUILDER does not guarantee them, for it cannot hold itself responsible for changes in price lists, or variations between its own and the different makers' methods of estimating. It is well, therefore, to consider them approximate only, allowing a few cents per foot for differences, and to write the manufacturers for exact figures when building is contemplated, giving total length of cornice to be built. The prices are for red brick in all cases, and the terra-cotta or metal gutter is *not* included. In correspondence with any of the manufacturers it will be necessary only to mention the designs, as they are mentioned in THE BRICKBUILDER, *i. e.*, first, second, or third design (counting downward), of "Siena," or "Cornish," or whatever motto the designs carry.

PLATE 49.

"Siena,"	No. 1, $0.64.	No. 2, $1.02.	No. 3, $1.99.

NOTE: Pattern numbered 54 should be 541, there being no No. 54 in the catalogue, and the pattern used corresponding to No. 541.

PLATE 50.

Coat-of-Arms, . .	No. 1, $0.86.	No. 2, $1.35.	No. 3, $2.84.
"Cornish," . . .	No. 1, $0.56.	No. 2, $1.62.	No. 3, $2.42.

PLATE 51.

"Classicus," . .	No. 1, $0.93.	No. 2, $2.58.	No. 3, $2.85.

NOTE: In No. 1 A100 and A100a, should be A101 and A101a.

"Nixy,"	No. 1, $0.63.	No. 2, $0.90.	No. 3, $1.86.

NOTE. In No. 1 Ittner's 38 is numbered 62 in 1892 catalogue.

PLATE 52.

"Allesame," . .	No. 1, $0.78.	No. 2, $1.03.	No. 3, $1.92.
Black Cross in Circle,	No. 1, $0.67.	No. 2, $1.125.	No. 3, $2.55.

PLATE 53.

Rising Sun, . . .	No. 1, $0.66.	No. 2, $0.95.	No. 3, $1.53.
"Brique," . . .	No. 1, $0.70.	No. 2, $1.10.	No. 3, $2.04.

PLATE 54.

"Don,"	No. 1, $0.82.	No. 2, $0.60.	No. 3, $0.98.

NOTE: The Akron vitrified pressed bricks are supplied at $20 per thousand.

"Non Nemo," . .	No. 1, $1.05.	No. 2, $0.94.	No. 3, $3.67.

PLATE 55.

"Bricco,"	No. 1, $0.65.	No. 2, $1.31.	No. 3, $2.74.
"Pluto,"	No. 1, $0.75.	No. 2, $1.83.	No. 3, $2.48.

PLATE 56.

"Renaissance," . .	No. 1, $1.15.	No. 2, $1.74.	No. 3, $1.80.
"Old Dominion," .	No. 1, $1.07.	No. 2, $1.42.	No. 3, $2.99.

NOTE: As all face bricks here specified are Washington Hydraulic Press, they are figured in at $21 per thousand, the price quoted us by that company, instead of $30 as in the other designs, except that of "Don."

COMPETITION NO. 7.

DESIGN FOR A BRICK HOUSE TO COST $2,000.

Programme. It is supposed that the designer has a client who proposes to buy a lot of 40 feet front and 120 feet deep in a suburban town or village, the streets of which run north and south and east and west. The designer may choose his own position of lot, that is, he may have it facing north, east, south, or west as he prefers, and the plan of his house will be considered in relation to this choice. His client is limited in expenditure to $2,000 for the house, exclusive of plumbing and heating apparatus, which he expects to add later, therefore provisions must be made for them. He must have a parlor or living-room, a dining-room, a kitchen with pantry and necessary closets, etc., and a staircase-hall or vestibule on the first floor, unless the stairs can be arranged to lead from the living-room. Three chambers, with necessary closets, and a bathroom, must be provided upstairs. Designers will be allowed two sheets, 18 x 24 inches, within border lines, upon which to make drawings. Plans of cellar and each floor, a front and side elevation, all to same scale, with necessary details to a larger scale, a perspective showing front and the side not shown in elevation, and a block plan of the lot showing location of house and arrangement of ground, are required. The clever placing of the house and the laying out of the yard will count in the competition, as much depends upon these points. Graphic scales for the plans, elevations, and details must be put on. The designer is restricted to the use of the two patterns of moulded bricks corresponding to 555 and 564 of the N. Y. Anderson Co., 56 and 55 of Ittner's catalogue, or 11 and 10 of the Hydraulic Press Brick catalogue. Accompanying the design must be a brief description of the materials and construction used, so that from these notes a specification could be written, and, if possible, an estimate from some responsible builder must be secured, else the jury will have to decide whether or not the design comes within the limit placed. Drawings must be delivered carriage paid at the office of THE BRICKBUILDER on or before Dec. 1, 1892.

For the four best designs equal prizes of $25 each will be awarded. The publishers reserve the right to publish any or all the other designs, and in each instance of so doing will give the author $5 and a free subscription to THE BRICKBUILDER for 1893.

THE ILLUSTRATIONS.

All the plates, 49 to 56 inclusive, are devoted to the results of our third competition, of which full particulars, together with the criticism of the jury, are given in the department of competitions on page 55.

THE BRICKBVILDER
VOLVME IIII FEBRVARY 1895 NO·2·
OFFICE 85 WATER STREET BOSTON

BRICK AND MARBLE IN THE MIDDLE AGES.

G. EDMUND STREET.

CHAPTER VIII.

(*Continued.*)

If we return to the nave, we shall find that it is not only in general effect it is so very worthy of admiration; it still retains much of its old furniture, and, in spite of a few modern mosaics, and one or two more modern altars, is less altered in its general effect since the fourteenth century than any great church that I have ever seen. The screen between the nave and choir with the ambons on either side of it first deserve notice. The screen is mainly a work of A. D. 1394.[1] It consists of a series of columns carrying a flat lintel or cornice, on the top of which is a row of extremely good statues of the apostles. They have that grand sweep of the figure which one knows so well in early fourteenth-century work in France, and are free from the somewhat heavy and clumsy treatment which marks so much of the work of the Pisani. The screen has been raised on the base of the older Byzantine screen, which consisted of a simple continuous arcade now nearly hidden by the more modern steps to the choir. The ambons are probably of the same age as this older screen; the gospel ambon being of two stages in height, with a good staircase to it from the choir aisle, that for the epistle being comparatively low and simple, but still large enough to contain two or three modern pulpits. The screens to the choir aisles are of the same sort as the main screen, but are placed one bay to the east of it. They are all three interesting as showing that a Gothic architect could use with good effect a common Classic arrangement, and indeed lend fresh grace to it by the detail of the sculpture and inlaying with which he adorned it.

Dimly seen from the nave through the rood-screen, but far more interesting than even it, is the great baldachin or canopy over the altar in the choir. Here we have the simplest form — four columns carrying round arches, and the wall above them finished with a plain horizontal capping. The arches may be modern, though if they are so, they are copied from the old, as is evidenced by the painting at the back of the Pala d'Oro, which shows the placing of the shrine of St. Mark under a similar baldachin; but the groining is old, and the alabaster columns are of extreme interest, being covered all over with most elaborate sculptures of Scripture subjects. The subjects in the northeast column give the history of Joachim and Anna, and the birth of the Blessed Virgin Mary; the northwest has the nativity of our Lord, the marriage in Cana, etc.: the southwest, subjects from the Passion; and the southeast the miracles of our Lord. Few modes of decorating an altar are altogether so fitting and beautiful as this, and I hope the day is not far distant when we shall see many of our English altars standing under canopies of the same sort. St. Paul's Cathedral may well prepare the way for us in this, by reviving what was usually accepted as the best kind of reredos by our English church-builders in the eighteenth century.

[1] The inscription on the screen, which gives the date and the name of Doge Antonio Veyerio, gives also the names of the sculptors.

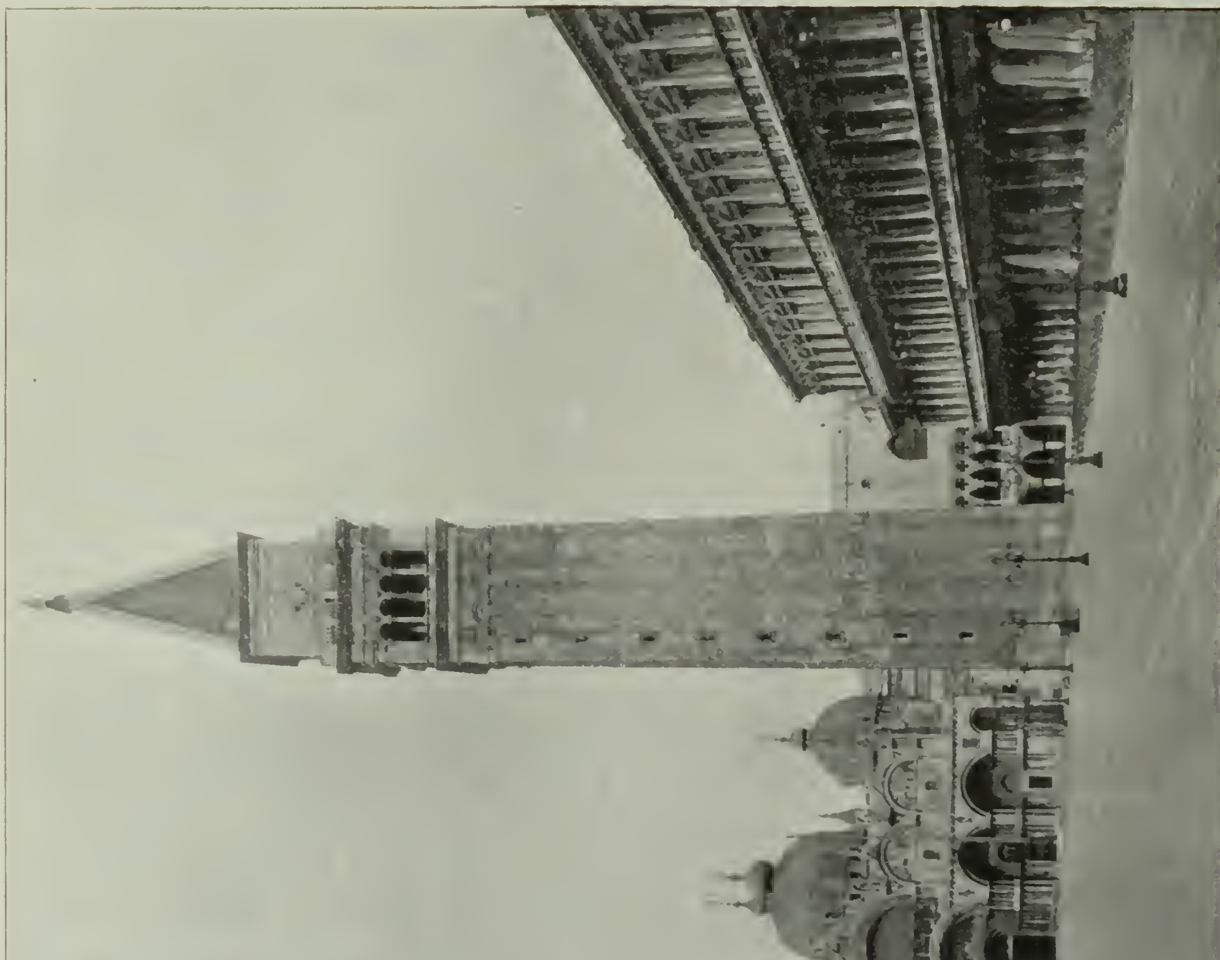
Here, too, is a brass eagle so like one of our own that one might almost give it credit for coming from an English smith or founder.

Returning to the nave, one finds nothing more worthy of admiration than another smaller baldachin over an altar between it and the north aisle. This is hexagonal, carried on shafts with stilted arches and roofed with a steep roof. Its dimensions render a small altar a necessity,— a matter of common occurrence in old examples. Another reredos and altar in a chapel at the north end of the north transept, dating from 1430, may also be noticed. Here the altar is panelled in front and carved with two angels censing a cross, and low open screens with arcades carried on shafts are placed a few inches from the ends of the altar. The footpace is not carried round the altar, so that it can only be approached from the front.

Of another sort of furniture — monuments of the dead — St. Mark's has, as might be expected, a good many examples. The earliest are the probably Roman sarcophagi,[2] which lie in the outer aisle or cloister, right and left of the entrance; the next, near them,[3] where the sarcophagus is still retained, but adorned with Christian emblems and sculpture; and of considerably later date, and much more artistic interest, are the tombs of the Doge Andrea Dandolo and of Sant' Isidoro. Here the sarcophagus is surmounted by a canopy, reverent angels stand on either side drawing back partially the curtains from the front of the effigy, and in the centre of the tomb is a bas-relief of the Madonna, and at the ends the Annunciation, St. Gabriel on one side, the Blessed Virgin Mary at the other. This is the type of monumental memorial on which so much of the time of Venetian sculptors seems to have been spent. Here, indeed, and on the very similar figures of the Virgin on so many of the tympana of doorways throughout the city, we have to study the sculptor's art from the time of the Byzantine carvers who wrought the still numerous early capitals, until the artist of the Ducal Palace came to revive the art with his original and splendid series of capitals.

But of all the features of this grand church, that which, next to the gorgeous color of the walls, most attracted me was the wild beauty of the pavement. I know not what other word to use which quite describes the effect it produces. It is throughout arranged in the patterns common in most Opus Alexandrinum, but, instead of being laid level and even, it swells up and down as though its surface were the petrified waves of the sea, on which those who embark in the ship of the church may kneel in prayer with safety, the undulating surface serving only to remind them of the stormy sea of life, and of the sea actually washing the walls of the streets and houses throughout their city. It cannot be supposed that this undulation is accidental, for had it been the consequence of a settlement of the ground we should see some marks of it in the crypt, and in the walls, and some tokens of disruption in the pavement itself. And the corresponding example of Sta. Sofia, Constantinople, where we have it on record that there

[2] The tomb of Vitale Faliero and another.
[3] The tomb of the Doge Marino Morosini.



PIAZZA S. MARCO AND CAMPANILE, VENICE.

Supplementary Illustration to "Brick and Marble in the Middle Ages."

was an intentional symbolism in just such a floor, is conclusive as to the intention of its imitators here.

Of the mosaics with which the church is richly adorned I cannot pretend to give a complete account; they deserve a volume to themselves. As regards choice of subjects, it is noticeable that the most prominent figure is that of our Lord, who is seated, and surrounded by prophets. Below are the emblems of the four Evangelists, and the four rivers of Paradise. Whilst again, in the west dome, He is surrounded by the Apostles and the Evangelists, and everywhere the general scheme is a lesson to those who, nowadays, too often forget the relative importance, or the proper order and arrangement of the divine story, in the schemes they adopt for stained glass and mural decoration. As regards color, I need not repeat what I have already said; but it may be observed that wherever modern mosaics have taken the place of old ones, there at once we see a complete collapse, and a loss of all good effect. This is mainly owing, beyond doubt, to the attemp which their designers made to produce the effect of pictures, instead of thinking first and mainly of the decorative effect of their work on the building. But, at the same time, it is obvious that their eyes had lost all feeling for good color, and that in attempting to draw with a certain amount of academical accuracy they had equally lost all sense of the prime necessity in such works of simplicity of arrangement, and directness in the telling of their story. There is no part of the church in which some of the best of this sort of decoration can be studied with more ease and advantage than in the cloister on the north side of the nave. Here the mosaics are so near the eye and the details of design and color so fine that one is never tired of admiring them.

I never leave St. Mark's without taking one look at least at the four bronze horses, which, placed as they are on columns high above the ground, add so much to the strange character of the west front, and are in themselves such exquisite examples of their kind. Strange ornaments these for the façade of the chief church of a city where horses' feet have hardly ever trod! Equally strange, if you are to have horses in such a position at all, is the way in which these are supported. They stand balancing themselves nicely on the caps of small columns. Extremes meet; and I am not so sure but that this extraordinary arrangement is not better than that which is usually adopted. If horses are to be supported above the ground, they may almost as well be so in this way as on the ordinary pedestal, which looks equally unsafe if the bronze is instinct with life. These horses were brought from Constantinople after the fourth Crusade, circa 1203. They are of admirable character, and are probably of Greek workmanship. With every other movable thing worth moving, they were taken to Paris, and returned after the Peace in 1815.

There is a picture in the Accademia by Gentile Bellini which ought to be looked at after a visit to St. Mark's. In it we see the church much as it is at present; but an enormous procession which winds its tortuous way about the piazza defiles before houses every one of which seems to be ancient, and I never look at the now uninteresting lines of houses which surround it without wishing for the resuscitation of the buildings which Gentile Bellini saw and drew.

We went into the treasury to see the treasures and plate belonging to the church, but I was much disappointed to find that, in an artistic point of view, there was really very little to admire, or else what was admirable was not shown. The treasury is a dark room lighted up by a few wax candles, but so badly that it was difficult to see at all satisfactorily.

I was unable to obtain a sight of the Pala d' Oro, as the altar piece behind the high altar is called; it is only uncovered on feast days, and I have never happened to be in Venice when it was visible. I was very anxious to have seen it, as it is a most magnificent piece of workmanship in gold and enamel. It was executed in Constantinople, and brought to Venice in 1102. Some Italian writers have claimed it for their forefathers as an Italian work; but the documentary evidence of its Eastern origin is supported by the details of the design and execution of the earliest portions of the work. M. Durand has published a very careful description of it in the "Annales Archéologiques," Vol. XX. He gives a list of no less than one hundred and sixty-nine panels or figures, in a considerable number of which the accompanying inscriptions are in Greek characters. The Pala was "restored" in the thirteenth century and again in the fourteenth, when no doubt considerable additions were made to it. The painting at the back has fourteen subjects on a gold ground, and is dated 1345.

Over and over again, when at Venice, must one go into St. Mark's, not to criticise, but to admire; and if ever in any building in which the main object is the study of art, assuredly here one must go for worship also. I think I never saw an interior so thoroughly religious and religion inspiring as this, and it is well, therefore, not lightly to pass it by as useless for our general purposes. It seems to show, as strongly as any one example can, how much awfulness and grandeur of character even a small building may attain to by the lavish expenditure of art and precious materials throughout its fabric; for it is to this that St. Mark's owes its grandeur, and to this only. There is nothing imposing either in its size or in its architecture; on the contrary, they appear to me to be both moderate, and the former rather mean; and yet this grand display of mosaics upon a gold ground makes the building appear to be both larger and better than it is, and fully atones for all other defects. Could we but place one of our cold, bare places of worship by the side of St. Mark's, and let the development of Christian art in the construction of the fabric be ten times as great in our Northern church as in the Venetian, we may yet rest assured that every religious mind would turn at once to the latter, and scarce deign to think of the former as a place of worship at all. If this is so, does it not point most forcibly to the absolute necessity for the introduction of more color in the interior of our buildings, either in their construction or afterwards by the hand of the painter? And architects must remember that this ought all to be within their province as directors or designers, and therefore that they must not, as now, venture to design cold shells which may or may not afterwards receive these necessary and indispensable decorations, but from the very first must view them as part and parcel of the work in which they are personally concerned; and then, but not till then, shall we see a satisfactory school of architects in England.

The interest of St. Mark's is not, however, only religious and artistic, on other grounds it is certainly one of the buildings most worthy of study in all Europe. Its architecture is purely Byzantine; and whether its design was derived from Constantinople or from Alexandria, it presents us with an almost unique example of the architecture of the Eastern Church transplanted almost without alteration to the domains of the Western. Nor is this all; it played no small part in modifying the distinctly Roman influence by which otherwise the whole of Northern Europe would have been affected. When we see a church so far from St. Mark's as that of St. Front at Périgeux modelled after it, and in its turn influencing a vast number of churches in that and the neighboring districts, we may realize what St. Mark's did towards the development of Romanesque into new forms and combinations, and may then value properly every portion of its fabric. Byzantine architecture was the development of Greek art in the hands of the then vigorous and active Eastern Church. It is not a direct reproduction, therefore, of Classic art which is to be seen in St. Mark's, but one stage of a development the influence of which — partly owing to the effect of commerce, partly to her isolation — was largely felt down to the very last days of active Venetian artistic life. This has been well condensed in a short sentence by Mr. Ruskin. "All European architecture," he says, "good and bad, old and new, is derived from Greece through Rome, and colored and perfected from the East. The Doric and Corinthian orders are the roots, the one of all Romanesque buildings, — Norman, Lombard, Byzantine; the other of all Gothic, — early English, French, German, and Tuscan. The old Greeks gave the shaft, Rome gave the arch. The Arabs pointed and foliated the arch." But in the coloring and perfecting the church of St. Mark had the lion's share, just as in the ground plan it is to Venice and the East that we owe the cruciform arrangement of so many of our buildings, instead of the basilican form, to which we might otherwise have been condemned.

(*To be continued.*)

THE ART OF BUILDING AMONG THE ROMANS.

Translated from the French of AUGUSTE CHOISY by Arthur J. Dillon.

CHAPTER II. — *Continued.*

II. GROINED VAULTS. — *Continued.*

PERHAPS the desire for variety in architectural compositions sometimes caused the adoption of groined vaults when they were not imposed by the exigencies of construction, but the cases where they were adopted through motives other than those relating to art of building are rare, and almost everywhere we will find that, aside from the æsthetic reasons, their use was justified by those of a material order. We have, however, rather to indicate the means employed by the Romans in planning and constructing groined vaults than to discuss the cases where they were used; let us first consider their forms.

The Romans, in all cases, having a marked preference for simple solutions, endeavored to reduce their groined vaults to those formed by the intersection of barrel-vaults of equal width, for they could then give the barrel-vaults a circular form and avoid, at least in the transverse principals of centring, elliptical curves. To be exact, the Romans seldom bound themselves to give an absolute equality to the diameters of two intersecting barrel-vaults; if there was a slight difference between them they neglected it, and contented themselves with placing the summit of the vaults at the same level, keeping them circular. It was in this manner that the central hall of the Basilica of Constantine was vaulted.

The radius of the larger vault, C D (Fig. 39), was taken as the common height, and the smaller, also semicircular, was stilted, so that its total height A B was equal to C D. This slight stilting, which was necessary in the smaller of the vaults, was far from injuring the appearance of the edifice, for it gave it, on the contrary, an air of great elegance.

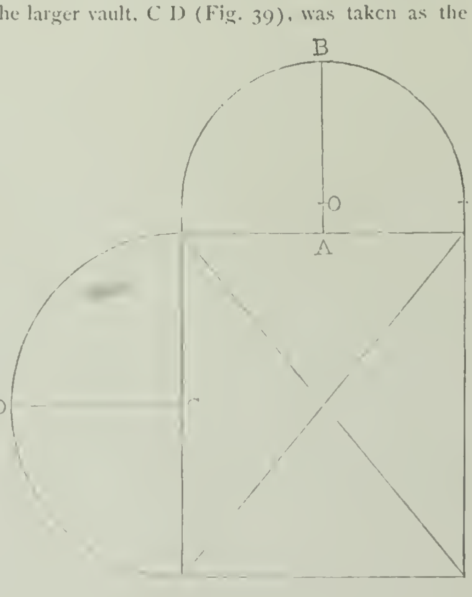


Fig. 39.

But the inequality of the sides of a hall was often so great that this expedient was not applicable, and then it was sought by means of a simple artifice to make the construction that of a vault on a square plan (Fig. 40). Thus only a square, A B C D, in the central part, made by taking A D and B C equal to the smallest dimension A B, was covered by a groined vault, while the remainder of the rectangle was covered by the extension, as A E of the longitudinal barrel-vault. This solution was quite common, but it must not be considered as universal, for it would be untrue to say that the Romans entirely excluded groined vaults of unequal sides and the resulting elliptical barrel-vaults. There is, for instance, a nearly intact hall in the Baths of Diocletian, which has three bays covered with groined vaults where the relation between the diameters of the intersecting barrel-vaults is about as two is to three. (Fig. 41, plan, and Plate IX., general view.)

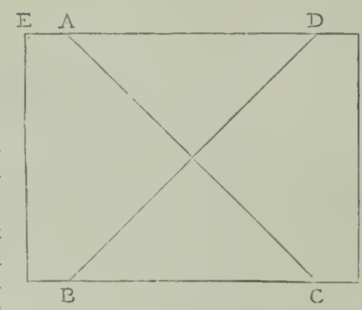


Fig. 40.

This vault is frankly *barlongue* and it is, moreover, the most remarkable instance known to me of a groined vault over a lengthened rectangle, but it is by no means the only existing example. The elliptical forms were not put aside until the time when the architects of Constantinople, the inheritors of the traditions and tendencies of the Roman art, thought of substituting for the classic groined vaults the eminently practical solution in Fig. 42.

Thanks to this ingenious arrangement of the vaulting, the more

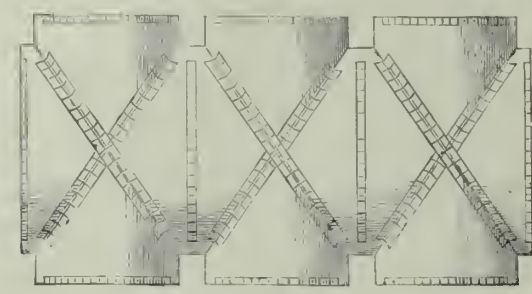


Fig. 41

or less irregular form of the plan ceased to be a cause of complications in the intersections. There might and might not have been a difference in the length of the sides, or the plan, at need, might have been a quadrilateral with unequal angles, but in every case the curves of the intersecting vaults would be semicircular, and the groins themselves were arbitrary, so that there was nothing to prevent their being drawn with the compass; and full centred principals only were necessary for centring. But here it is sufficient to indicate the relation between this Byzantine innovation and the Roman ideas; and we will again take up the question of ancient groined vaults, regarding them from the point of view of the methods of construction.

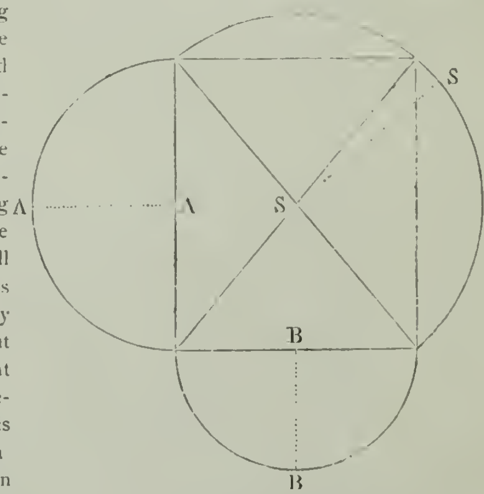
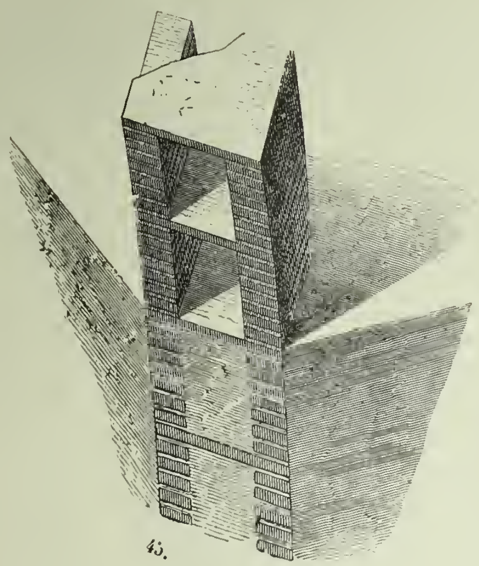


Fig. 42.

Whatever may have been the admitted forms of the groined vaults, the Romans facilitated their establishment by the employment of processes very similar, at least in principle, to those which were developed in considering barrel-vaults. Both were composed of two distinct parts, — the mass of rubble which formed the body of the vault and the open network or thin lining of brick which served as a support for the rubble during the construction, and was at least a partial substitute for the temporary centring which would otherwise have carried the load.

When they used the system of armatures of flat laid bricks, the



Romans took care to protect the groin by a solid rib; small as the bricks might be in the rest of the lining, those along the groin were never less than forty-five centimetres on a side, almost always sixty centimetres, while their thickness was about five centimetres. The greater part of these tiles at the angles have disappeared, but their imprints, which still remain, clearly show their size and form, and one can easily realize the general appearance of the armature. Seen from above, before the laying of the rubble, it had the aspect shown above (Fig. 43), which is taken from one of the halls in the Baths of Caracalla. The same arrangement, moreover, with some slight variation, is to be found in Hadrian's Villa, the Palace of the Cæsars, etc.

The method of support by means of ribs was still more easily applicable to the exigencies of penetrating vaults. Ribs M and N (Plate IX.) were placed along the lines of intersection, and, if there was need, other secondary ribs (R) were thrown transversely from one pier to the other. But as these last differed in no way from the engaged arches used in barrel-vaults, I will confine myself to the construction of those along the groins (Fig. 44).

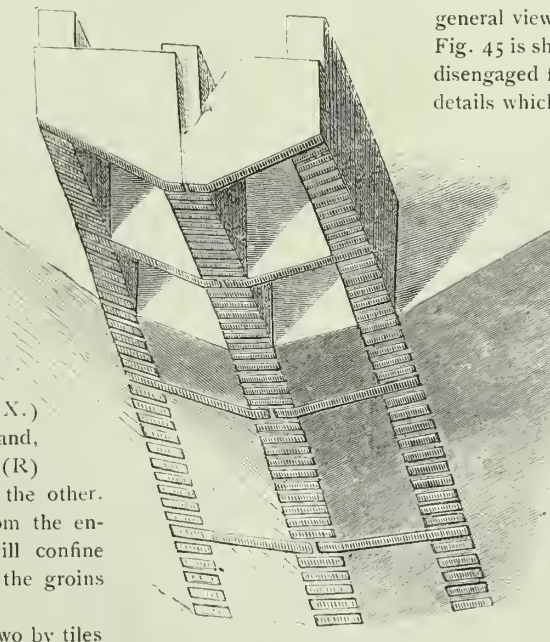


Fig 44

Three parallel arches united two and two by tiles formed, as it were, a solid backbone along the groin. It was necessary in order to place the bricks here to cut them to a certain extent in order to adjust them to the salient angle; but in place of cutting them in a regular manner by means of templates, the Romans contented themselves by clipping them as they were laid; and this was done in such a rough manner that it caused neither expense nor delay.

The only delicate operation was to construct the crossing of the diagonal ribs at the summit. There was no difficulty in closing one of the arches; M (Plate IX.), for instance, could be finished, but when it came to completing the other one, N, a complication arose, for the halves would press on the sides of the hollow rib M and threaten to crush it. Evidently it was necessary to fill with rubble the upper cells of the arch M before placing the last bricks of N, for when they were filled they were able to resist the crushing tendency, and the work could be completed without the slightest hinderance.

The great vaults in the Baths of Diocletian were constructed in this manner; and the usual method adopted for halls whose width was fifteen metres or more is of this type. In vaults of the smaller size the means of support were made less and less strong, and we will see the frame of brick simplified by degrees and its strength made proportionate to the efforts exercised on it by the mass of rubble. Following the logical sequence of the possible modifications, the Romans would have been led first to the suppression of the ribs R (Plate IX.) which cross the barrel-vault transversely; next to doing away with one of the three arches along the groins, and then two, thus reducing the armature to a single rib along each groin; and Roman architecture presents in this way all the intermediary steps between groined vaults with complete armatures and vaults with none whatever. We will endeavor to show by examples some of the different aspects which the skeletons of brick presented at different stages of this series of progressive transformations.

1. The form of armature which corresponds the closest to that which we have chosen as the type exists in a gallery of the Palatine near the southern angle of the hill (Plate VIII.). The diagonal arches are built exactly as in the Baths of Diocletian. There is the same number of elementary arches, and the method of obtaining a tie or bond between them is exactly the same, but in the Palatine the transverse arches were regarded as superfluous on account of the smaller size of the hall, so that it is exactly the combination shown in Plate IX., omitting the arches R which divide the vault into rectangular bays.

2. As an example of the diagonal ribs made of only two elementary arches I will cite only the groined vault in the central part of the so-caleld Portico of Janus Quadrifrons at Rome. A general view of the vault is given in Plate VII., and in Fig. 45 is shown a fragment of one of the diagonal ribs disengaged from the rubble which encloses it. After the details which we have already given it is hardly necessary to speak of the method of construction; one of the diagonal arches was built without considering the other; then two or three of the cells at the crown were filled and the second arch was closed.

3. We finally come to the case where the diagonal rib consists of a single arch of brick; there is an example of this simple solution in a hall of the Palace of the Cæsars (Plate VII., Fig. 4), whose ruins, isolated on a terrace of the Palatine, dominate the valley of the Great Circus. Each of the diagonal ribs (Fig. 46) consists of a single row of bricks in which are placed, from point to point, large square tiles whose shape is modified by a summary clipping.

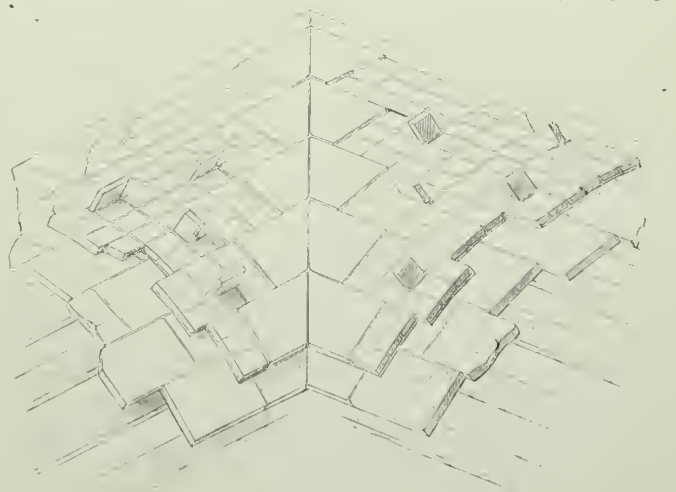


Fig. 45.

These projected from both sides of the arch and formed as it were headers which established a strong bond between the brick centre and the rubble.

We have come to the elementary form of armatures in groined vaults; to complete the picture of the transformations which this system has undergone during the centuries which precede us, it would be necessary, passing beyond the limits of Roman art, to trace across the Middle Ages the forms of the intersecting vaults built from the eleventh to the sixteenth century in the western countries of Europe. We would find in the diagonal ribs and the salient transverse arches of the vaults of those times the equivalent of the Roman skeleton; but there the arches have an additional function. The active life of the armatures in the Roman vaults was limited to the time when the rubble, not yet set, needed auxiliary support; once it had become hard the armature was confounded with it and had no more importance than the stability of the structure, while the Gothic armature, having the same utility during the time of construction, kept a distinct *rôle* even after the centring was removed. It carried the entire weight of the panels of stone which filled the spaces between the ribs, and through it the weight was transformed to a system of thrusts that were taken up by the weight of the abutments, or by the counter-thrust of the flying buttresses. The conditions of equilibrium were entirely different in the two cases, and in order to show analogies of any value we must confine ourselves to comparisons during the period of construction. Then, at least, the resemblance is perfect, and the Gothic vaults show under a new aspect all the essential characteristics of the groined vaults erected during the Roman Empire. But it would be to go beyond our programme to follow out the differences and analogies. We have shown the principal variations which were given to the armatures in groined vaults, and we will show in the following paragraphs how the same principles of construction were extended to vaults on circular plans, that is, to cupolas or domes and vaults of a quarter of a sphere.

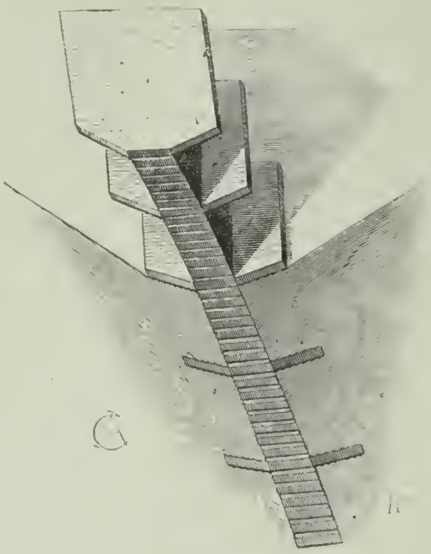


Fig. 46.

CIRCULAR VAULTS.

The vaults which bear the least on their centring are evidently domes; each horizontal section, because of its circular form, tends to sustain itself; and it would seem that a dome with a perfectly circular plan would have less need of an armature than of a mould to give it the required form. More than one ancient dome was indeed built with on other support than that afforded by its wooden centring, as, for example, the vault of the circular monument raised at the gate of Rome n honor of the mother of Constantine.

But the resistance to deformation resulting from the curvature of the surface decreased as the radius increased, and for domes like that of the Pantheon, where the curvature is almost imperceptible, the stability resulting from it may be said to be almost illusory. Even when they built on a smaller scale, the Romans seem to have feared the tendency of the masses to bear too heavily on their centres, and when the span reached a length of score of metres they considered armatures of brick useful in affording a necessary reinforcement to the temporary centring. In order to so strengthen the centring they sometimes attempted to revet the entire surface with a continuous network of brick, analagous to that shown in Plate I. But this envelope was hard to adapt to a spherical surface of a sphere. In order to do so it was necessary to place the lines of brick along the meridians of the vault, so that the meshes constantly varied in form and slowly and continuously diminished in size, — a condition which evidently would limit the application of this system. Hence circular vaults in which it is found are extremely rare; perhaps the most remarkable is that of the edifice called the "Torre de' Schiavi," at the left of the road leading from Rome to Préneste.

The method to follow in order to avoid the difficulties arising from the diminution of the meshes was to replace the continuous network by a system of isolated ribs dividing the surface of the vault into a series of segments.

On Plate X. is shown an application of this system. It is a vault from the ancient baths which stood behind the Pantheon at Rome. I have shown the armature only near the springing, for the upper parts seemed to me to be too vaguely indicated to allow of any attempt at restoration. Did the ribs of brick end suddenly by butting into a ring similar to that about the eye of the Pantheon (Fig. 49)? or did they cross like the groining ribs of intersecting vaults? The ruins give no reply; a street has been cut through the centre of the vault, and the part which still remains is, at the most, not more than the fragment shown in the drawing. The *débris*, however, has several claims to the greatest interest. If it comes, as is believed, from the Baths of Agrippa, its date is to be carried back to a time when Vitruvius alludes to baked clay as being among the usual building materials, and it is to be regarded as one of the oldest instances in the history of the art of building of the use of armatures of brick for vaults; and this supposition is certainly not contradicted by the aspect of the ruins. Everywhere the greatest care in the use of the materials is manifest, everywhere may be observed the minutest attention to the smallest details. Such characteristics would agree with a careful application of a new method; practice soon teaches builders to spare themselves pains, but here the workmanship is as good as the

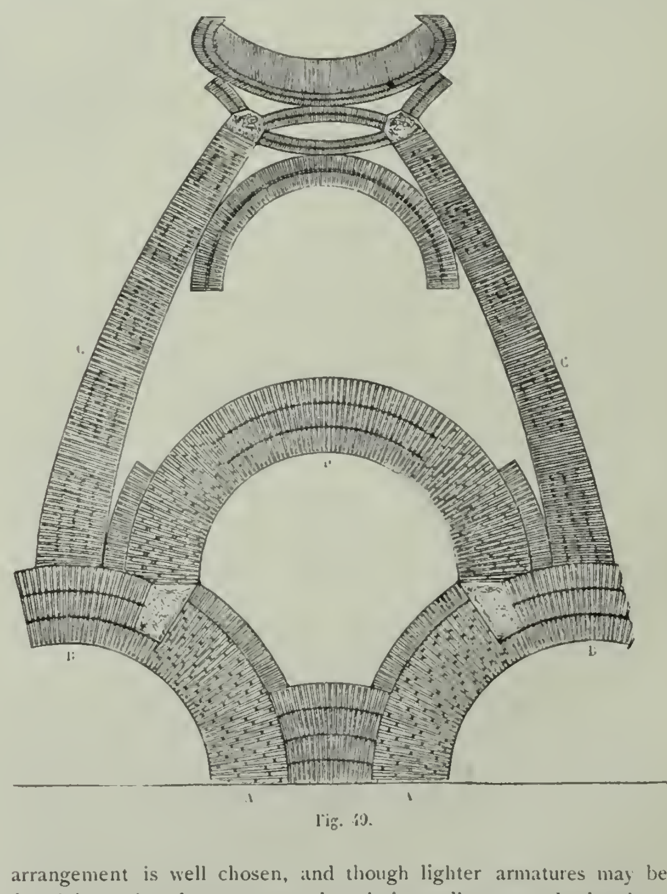


Fig. 49.

arrangement is well chosen, and though lighter armatures may be found in vaults of more recent date, it is needless to seek elsewhere for construction so correct or so irreproachable in regularity of form.

(*To be continued.*)

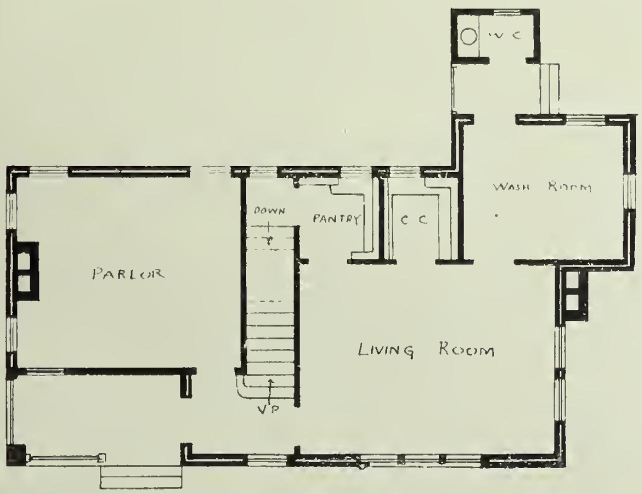
ON THE USE OF BRICK IN DOMESTIC ARCHITECTURE.

I.

WORKMEN'S COTTAGES.

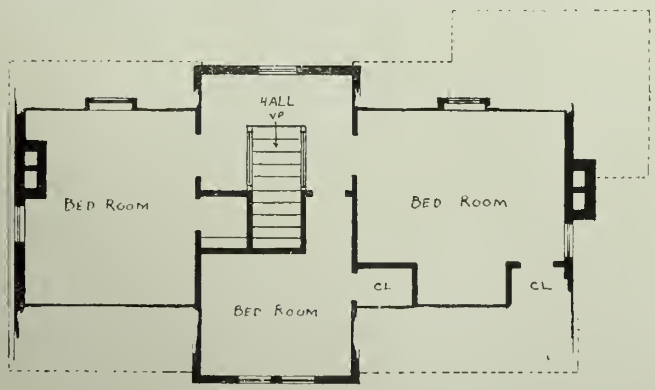
TO the traveller first visiting England there is, perhaps, no single phenomenon which surprises him more than the utter difference between English methods of building and those with which he has been familiar in America. This difference is not merely one which shows itself in works of engineering and heavy building, but it is equally obvious and even more surprising in the humblest grades of work, and in no place is it more startling than in the domain of house building, and that of the most modest kind.

In this country we are so familiar with the acres of shabby, flimsy, unkempt, wooden shanties that do duty as dwellings in the



FIRST FLOOR PLAN

lower-class sections of our villages, and with the hundreds of acres of equally flimsy and incomparably more shocking and offensive mon-

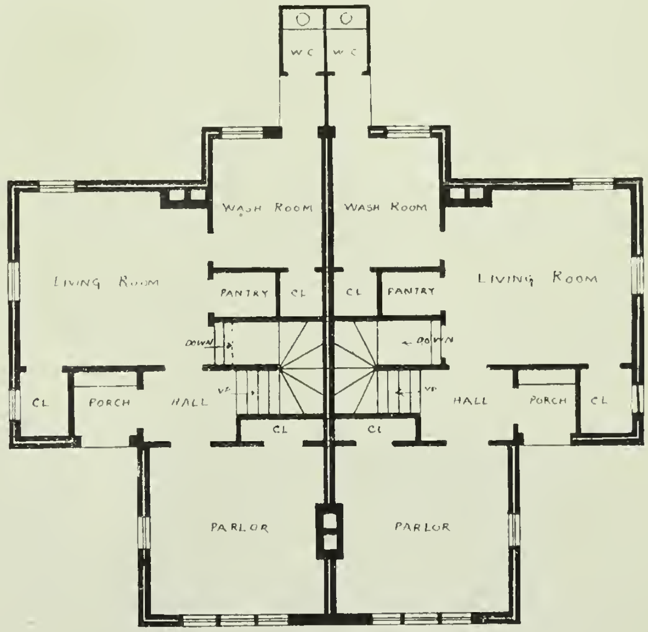


SECOND FLOOR PLAN

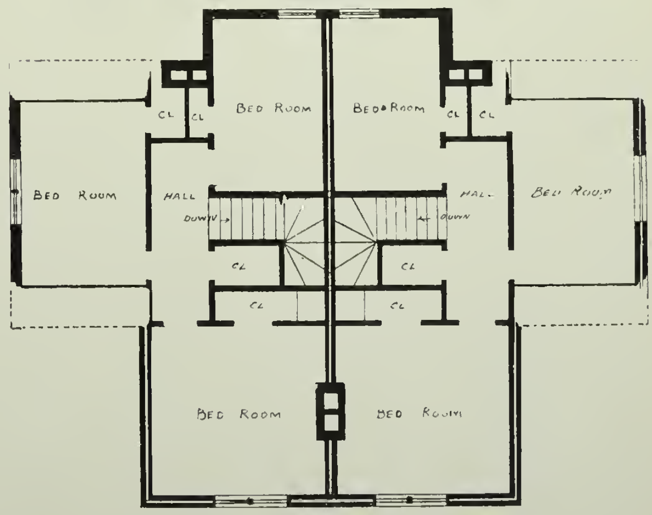
DOUBLE COTTAGE.

strosities that make up the better part of the residence portions of towns, that we never stop to think that really our wooden construction in this country from 1750 on is just as bad, just as illogical, just as stupidly inartistic as it can possibly be, and that for a century and a half we have been using a building material without the most rudimentary suspicion of its logical treatment or its great possibilities.

If it were otherwise, if we were surrounded by wooden construction like that of Warwickshire, Switzerland, Bavaria, or Japan, the shock might not be so great in passing from one of our rattletrap



FIRST FLOOR PLAN

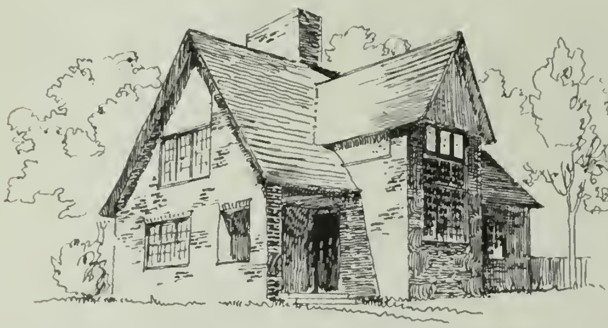


SECOND FLOOR PLAN

villages to the solidly built towns of England; but blighted as architecture has been by the ignorant misuse of a misunderstood material, perverted as our tastes have become through contemplation of imbecile wooden construction, the sudden discovery that mill towns and workmen's cottages need not be *quite* so dismally hideous and shabby as with us is apt to be something of a shock.

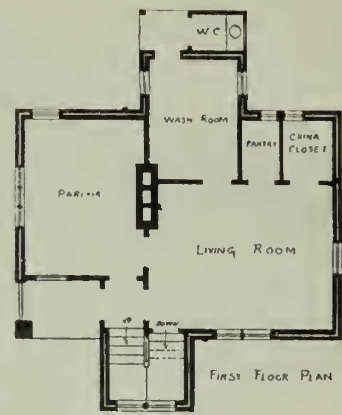
Outside the fire limits of cities the material now invariably used in the United States for the construction of the great majority of dwellings is wood. As a result we have an environment of æsthetic horror for those who live within the influence of Queen Anne, Colonial, and (save the mark) Romanesque cottages; we have flimsy, fire-trap barracks in the low-class quarters; and we have shabbiness, contagion, discomfort, and conflagration. And yet people uphold wooden construction because it is cheap, entirely forgetting that our national fashion of counting first cost only is quite as unpractical in this particular instance as in most others.

In England the matter is looked at in a more reasonable way, and as a result you find there, in the length and breadth of the country, hardly enough wooden houses to make up an ordinary American village. Every farmhouse, every workman's cottage, every barn almost, is built either of brick, stone, or half-timber work. It is unnecessary to mention the advantages thus gained; they are innumerable. Among all those which have a practical bearing on cost, sanitation, durability, protection against fire, etc., is one which is hardly considered, and that is the moral effect on the occupants. For my own part, I can't see how any man could live in an ordinary wooden factory block or a Queen Anne or Colonial cottage without being vulgarized, cheapened mentally, made uneasy, discontented, and miserable; while, on the other hand, a solid brick cottage, gathering dignified age day by day without losing anything of its stability, cannot help exerting an influence towards conservatism, permanence, self-respect, and dignity on its occupant. This may seem fanciful, but I believe it is based on reason. For an actual fact I know thousands of houses so "cheap and nasty" that I could imagine any crime, were it sufficiently sordid, being committed in any one of them, and through its direct and malign influence. Houses have more mental and spiritual effect on their tenants than we are willing to acknowledge.

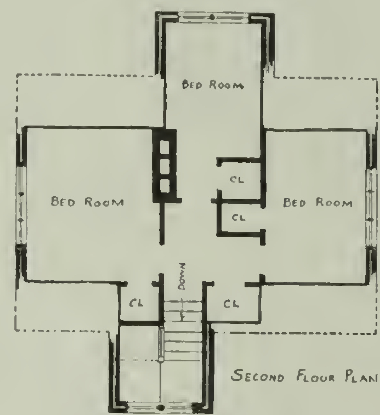


But whether this be admitted or not, it cannot be denied that as between wood and brick as materials for domestic architecture, the latter has every advantage over the rival that now occupies the entire territory. Wood is but little cheaper than brick, even at first cost. By building a ten-inch wall of common red brick, two courses of brick with a two-inch air space, and by plastering directly on the inside brick, a wall is obtained which is stable, dry, warm, fireproof, and absolutely sanitary, while it costs but little more than the ordinary flimsy wall of clapboards, sheathing paper, boards, studs, back plastering, lath and plaster, the delight of cheap builders and also of rats, fire, germs, and decay.

And if the first cost of honest and healthy construction is only a little more than that of cheap woodwork, the running cost is much less. Paint is an artistic horror, and expensive as well. It can only be used in the fashion now in vogue, among an artistically barbarous people, and a wooden house must be painted every few years in order to keep it in repair and — according to accepted ideas — in a condition of attractiveness. A brick wall, if built of common brick, is always good, and in a little time it becomes beautiful. It will last pretty nearly forever, while it is far warmer, far more healthy, than almost any other wall.

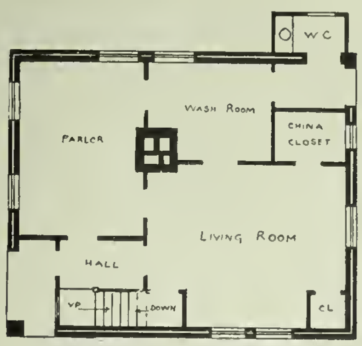


Why then is it not used? Well, first, because its cheapness is not appreciated; and second, for the reason that the mental temper of the time does not demand or even consider permanence and honesty in the construction of ordinary dwellings. The cheap builder cuts construction down to the very limit where his studs and joists and boards will hold together until the house is sold, putting what little money he spends into what he fondly holds to be



ornamentation, viz., paint, stained glass, and *papier-maché*. Consequently we find in "progressive" towns whole districts made up of flashy and tawdry horrors doomed to certain and speedy shabbiness, if before the expiration of the few years necessary to bring this result the houses themselves have not collapsed into rubbish heaps. If "cheap clothes make a cheap man," very certainly cheap houses make a cheap people, and it would do no harm for us to look to it that we avert, if it is not already too late, this undeniable danger.

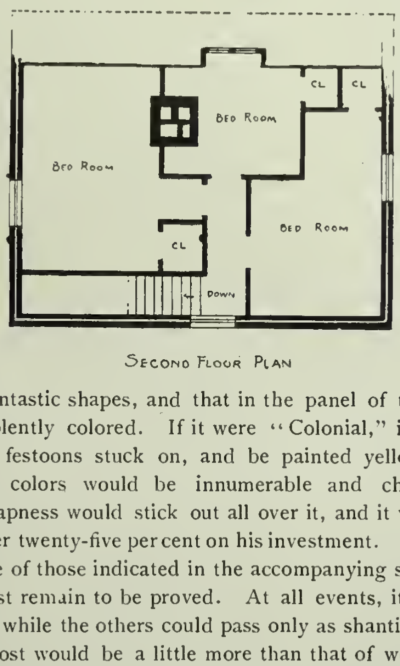
Arguments of this nature and towards this end will of course have absolutely no effect whatever in obtaining any reformation in domestic architecture; it will be necessary to show that a house may be built very largely of brick at a cost which will be but little greater than that of good wood construction. The plans and sketches which accompany this article are intended to show this. They deal with the simplest form of dwelling, a five-room, workman's cottage, to be built in the country or in villages which have no system of sewerage. In each case the accommodations are the same, viz., a kitchen or living-room, a parlor, pantry, china closet, and wash-room, on the first floor, and three bedrooms above. The cellar is under only a portion of each



FIRST FLOOR PLAN

house. and there is no furnace. The walls are built of common red brick laid in white mortar, and are ten inches thick, including a two-inch air space. Inside, the plaster is placed directly on the brick. The finished woodwork is cypress or Washington cedar, finished natural with two coats of shellac; it is perfectly plain, without mouldings, even in the doors; the living-room and halls have rift hard-pine floors.

It is easy enough to imagine the ordinary wooden house that would be built for the same amount of money that one of these cottages would cost. It would probably have clapboards on the first story, shingles on the second. If it were Queen Anne, it would have turned balusters and columns all over it, with a fluted or jig-sawed panel perhaps. Its roof would be "picturesquely irregular," with little curved dormers in it. The glass in the windows would be



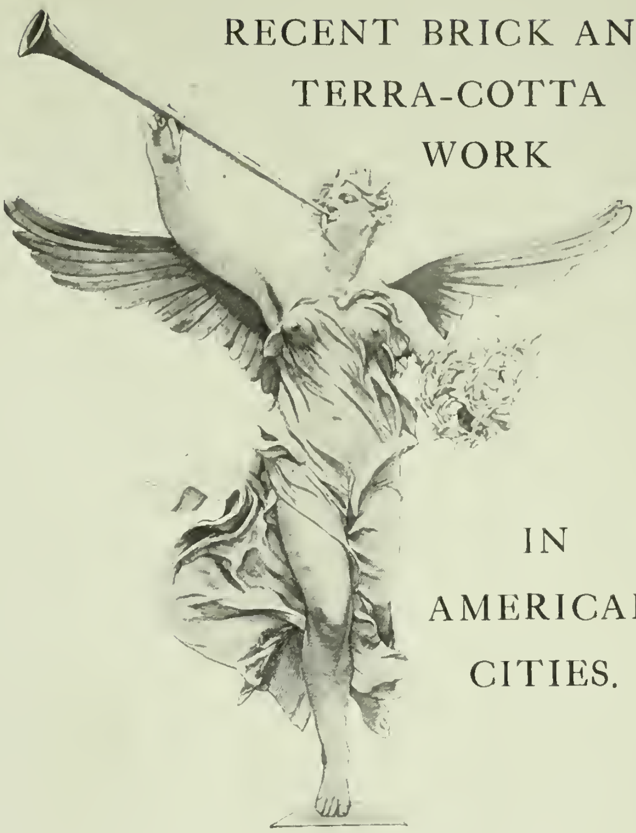
SECOND FLOOR PLAN

cut up into fantastic shapes, and that in the panel of the front door would be violently colored. If it were "Colonial," it would have *papier-maché* festoons stuck on, and be painted yellow and white; otherwise its colors would be innumerable and chaotic. Rank, ridiculous cheapness would stick out all over it, and it would sell netting the builder twenty-five per cent on his investment. Whether such a house as one of those indicated in the accompanying sketches would sell or not must remain to be proved. At all events, it would be an honest house, while the others could pass only as shanties.

Its first cost would be a little more than that of wood; this cannot be denied. But the extra cost would not exceed $150 on each house. A speculative builder would never think of squandering this sum on a house which would sell just as well if it were built of wood and "tastefully" painted; but it is hard to believe that an average workman of good sense, building a house for himself, would, if he knew the facts in the case, hesitate for a moment over the two courses before him. If men of this kind can be induced to see the immense advantages of a brick house over a wooden shanty, not only in point of health, comfort, and durability, but actually in the matter of first cost, we may yet see some good honest building in the country, where now we have only too much of shameful and shabby cheapness.

RALPH ADAMS CRAM.

RECENT BRICK AND TERRA-COTTA WORK IN AMERICAN CITIES.



TERRA-COTTA FIGURE IN HIGH RELIEF.
EXECUTED BY THE AMERICAN TERRA-COTTA AND CERAMIC CO.

THE WORTHINGTON BUILDING, BOSTON.

FEHMER & PAGE, ARCHITECTS.

THIS new building, which is to occupy the site of the old Traveller Building, 31 State Street, corner of Congress Street, covers an area of about 2,600 feet; is to be a modern office building in all respects, and absolutely fireproof throughout.

The building is designed in the style of the Italian Renaissance. The first two stories, belt courses, window trims, and main cornice are of Indiana limestone, of a light gray color; the remainder of the building is of brick and terra-cotta, made by The New York Architectural Terra-Cotta Company to match the stone work, so that the building will be uniform in color for its entire height.

The treatment of the State and Congress Streets fronts is carried around the building. The stone work around entrances and window openings will be elaborately carved, and handsome grille work of iron or bronze will be introduced in toplights and openings over same.

The steel frame has been designed to insure an absolutely substantial structure, and so constructed with steel-plate girders and uprights as to form a continuous wall of steel the entire height of the building back of the masonry.

The most careful study has been given to designing this frame to guard against wind-pressure, or from any annoyance caused by vibration.

The steel frame throughout the building will be protected on the exterior and interior by masonry.

The principal entrance is in the centre of the building, with hallways extending through to the entrance on Congress Square.

At the left, as one enters from Congress Street, is the entrance to the basement, over which, leading from the main hall, is the staircase to the second story. At the opposite end are two elevators running from basement to tenth floor.

The basement, first, and second stories are planned with the hallways occupying the centre of the building, opening off from which, through double doors, are the two large banking offices, one on each side of the hall.

In addition to this entrance from the main hall, the banking office on State Street, first story, has a private street entrance, which forms one of the features of the State Street façade.

The finish in the first and second story offices will be of mahogany, with mosaic floors and handsomely panelled ornamented ceilings.

The upper stories are planned with the elevators and staircase occupying the central portion of building on Congress Square side, with hallways extending through the centre of building and offices opening off on each side. The partitions are brick and terra-cotta blocking throughout. (See Plates 9, 10, and 11.)

MR. ROBERT H. FOEDERER'S RESIDENCE, PHILADELPHIA.

HAZELHURST & HUCKEL, ARCHITECTS.

THIS is the latest of the many elegant residenes built on North Broad Street. It is constructed of buff Roman-size brick and white terra-cotta, with first story of Indiana limestone. The columns to front entrance and loggia above third story, also spandrel over the main door, are Pabanazza marble. The terra-cotta work was made by Stephens, Armstrong & Conkling of Philadelphia, and the brick by the Eastern Hydraulic-Press Brick Co.

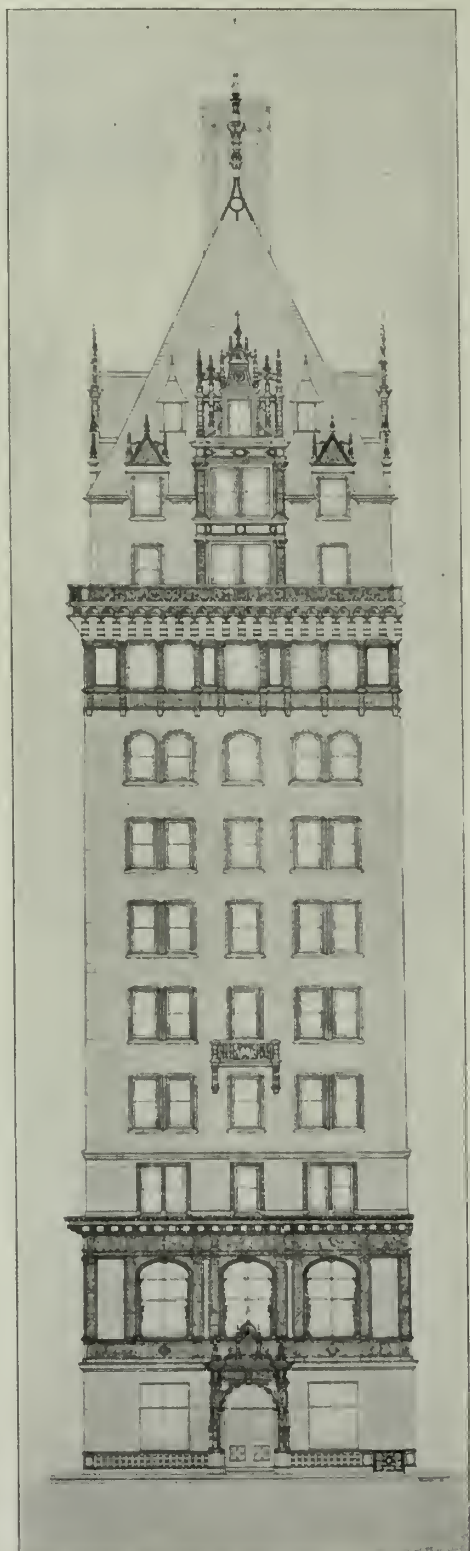
The color tone of the building is exceedingly pleasing, and, with the details and modelling, has been carried out with great care and fidelity, and is another example of the use in combination of brick and terra-cotta in Philadelphia buildings of recent date.

For elevations and plans see Plates 12, 13 and 14.

HARRISON OFFICE BUILDING, PHILADELPHIA.

A TYPICAL terra-cotta building. Terra-cotta from first to twelfth story, outside and inside, partitions, beam coverings, floors, flues, and stack, all of this material, which is so suddenly springing anew into use as a first-class building material. This building shows, more than any other in this city, the possibilities of terra-cotta as taking the place of stone in large commercial buildings, and may be considered as marking a new era in terra-cotta construction.

Beginning at the base, we have several courses of Indiana limestone to the tops of the sills of the first-story windows, where the terra-cotta commences. This stone wall is backed with bricks, and is the only instance of the use of bricks in the building. From this point to the top the walls are entirely of terra-cotta, save of course the steel framing. The first story shows massive blocks of terra-cotta, some being as large as twenty-one inches by forty inches on the face, and thirty-four inches deep in the wall. The blocks will be built up as usual in the heretofore smaller work, having a sufficient number of horizontal and vertical partitions or ribs to prevent any undue distortion of the blocks during the process of burning. They will be closed entirely on all sides, except the necessary small openings at the ends, and will be keyed on the top, bottom, and sides. The cornice blocks, bonding courses, and corbels will extend entirely through the walls and be scored on the inside to receive the plastering; other blocks will extend about half-way through the walls, forming a bond with the interior backing, which is of the same material made somewhat lighter in section and weight and likewise scored for the plastering.



THE HARRISON OFFICE BUILDING, PHILADELPHIA.
COPE & STEWARDSON, ARCHITECTS.

The face of the walls will be finished similar to fine tooling as used in stone; and the first, second, third, ninth, and tenth stories exhibit a richness of detail seldom attempted in buildings which are purely utilitarian; the second story, the two principal entrances, and the large dormer-windows being especially rich. The ornamentation of the second story is taken from one of the façades of the Hotel Bourgtheroulde, and the architects have very successfully designed the cornice over this story in perfect harmony and proportion to the ornament under it, as well as to the entire mass of the building.

The building presents several unique features. In the first place we think it sets forth the first instance where a stack for the fireplaces and boilers is constructed of a steel frame with curtain walls. It is rigidly connected to the frame of the building, and extends in height a distance of about one hundred and fifty feet from the first floor. It also shows a treatment of the party wall which is very commendable, as it is kept entirely clear of the party line, and can never be disturbed by the erection of any neighboring building. It is built of the same material as the fronts, and the upper stories are treated in the same richly ornamental manner. Thus it will be seen that the view of the building will be beautiful from all points of sight, and will not be marred by the usual unsightly party wall.

Another step well taken, we think, is the determination of the architects, Messrs. Cope & Stewardson, to prevent if possible in this building the top-heavy and hollow appearance of the walls, so perceptible in many of the high buildings recently built. They purpose to do this by building the walls with a regularly defined entasis, the same as is usual in high columns, and strengthening the effect thus produced by forward projections in the first and second stories, and by setting back or receding the walls in the extreme upper stories. In this manner the top of the wall is receded so that at the eaves of the roof the face of the wall is seventeen inches back of the face at the first story; and the perspective drawings, carefully made with a view of determining the exact effect of this treatment, show an improvement in the appearance of the whole which is entirely satisfactory. The dormer-windows and face of the stack, which extend above the eaves, are made to continue the entasis and also slant backward correspondingly, instead of being perfectly vertical.

The manner of the construction of the steel frame, which allows of the treatment above referred to, is very interesting, and in some instances unique, but cannot be dwelt upon here.

The style of the building is the French Renaissance of the period of Francis I., and it will be seen that the style has been strictly adhered to in all the details, this being true especially of the ornament, which is very rich, discreetly used, and highly appropriate.

The Perth Amboy Terra-Cotta Company, who have taken the contract for the terra-cotta required for the work, furnished about a dozen large blocks of different kinds and shades of terra-cotta, made up in the manner described, for preliminary testing, etc. They were built up, plastered, and weighed; and it was found that the plaster adhered firmly to the material, and that those blocks made with a thickness of shell and webs of one inch weighed fifty-five pounds per cubic foot, while those having shell and webs of one and one half inches weighed seventy pounds; this weight, when compared to the weight of stone or brick, gives a fair idea of the saving in total weight effected by the use of this method.

The floors are of the usual hollow arches, end construction, with a topping of cement concrete for floors, and a wood strip around the edge of each room for carpets if desired. There is no window trim, except a wood sill; and this sill, the doors, and baseboards sum up all the wood in the building. It is therefore strictly fireproof throughout.

SIBLEY MEMORIAL HOSPITAL, WASHINGTON.

CLARENCE L. HARDING, ARCHITECT.

ILLUSTRATIONS of elevation and floor plans of this hospital may be found in Plates 15 and 16. The hospital was a gift to the city of Washington from Mr. Wm. J. Sibley, as a memorial to his wife. It is considered a very good example of what can be done with a comparatively small amount of money, the entire cost not exceeding $10,000. The front is of brick and terra-cotta. The vestibule, baths, lavatories, operating and emergency rooms have floors of unglazed, vitrified, encaustic tiles. The sinks, bath-tubs, and slop-sinks are porcelain, and the plumbing is a fine feature throughout. Each ward accommodates ten beds, and the whole building is complete in all of its appointments.

MORE BRICK BUILDINGS.

A FEW more new buildings were started in Boston this January than last, the gain being in brick structures, which numbered thirty-seven against thirty in 1894. Permits for frame buildings decreased two, the number being seventy. Considering the large increase during the latter part of 1894 over 1893, this showing is favorable.

Compared with January, 1893, the gain in brick construction is remarkable, the number that month being only eight. The frame buildings this year were fourteen fewer, however.

BUFF BRICK IN NEW YORK.

BUILDERS and dealers in building material believe that the buff brick is to be a permanent and increasing conspicuous feature of New York architecture. Several considerable buildings of that material are now going up. The North Jersey fire clays, from which the buff brick is made, are seemingly inexhaustible, and the material can be brought to New York very cheaply. Some of the clays that lie near those used for these bricks are too valuable for ordinary building purposes, and are sent all over the country to be worked up for other uses. The crude clay is worth in some instances $100 a ton. If the buff brick can be reduced in price, its use will be greatly extended, because houses and office buildings of that material rent more easily than equally well-situated buildings of other materials. Luckily for house owners, the mere cost of front brick, whether red or buff, is not an important item in the construction of a considerable building, so that even a slight reduction in the price of buff brick would probably greatly extend the use of that material. — *New York Sun.*

THE STRENGTH OF OLD BRICKWORK.

AN interesting piece of information respecting the strength of old brickwork is the result of experiments carried out by Mr. A. G. Lyster, the assistant engineer to the Mersey Docks and Harbour Board. The brickwork in question was part of a wall of the Albert warehouses in Liverpool, and was built about fifty years ago of hand-made bricks laid in ground mortar made with lime from the Halkin Mountain, Flintshire. This lime is in a high degreee hydraulic, and makes mortar of exceptionally good quality. Having to demolish the wall, Mr. Lyster conceived the happy thought of leaving a piece of it in the form of a horizontal beam, having a twelve-foot span, and measuring about two feet square in section, seven courses in height of a two-foot wall. The ends of the beam were not cut free from the rest of the work. This beam was then loaded with all the weight that could conveniently be piled upon it in iron "kentledge," without appreciable deflection or other sign of weakness resulting. Two courses were then cut off, and the whole weight again put on, but without other result. The beam was further reduced by a course, leaving it four courses, or fourteen inches deep, and the ends were also cut free from the other work, the mortar beds of the twelve-inch bearings being left untouched. A centrally placed load of five tons, fifteen hundredweight was then gradually piled upon it, and was borne for several days without apparent effect upon the brickwork. Finally, the weight was increased to six tons, nine hundredweight, twenty-three pounds, which was sustained for thirty hours, when the beam collapsed during the night, and came down in pieces more like broken timber than anything else. Other tests were made with similarly astonishing results; but the above are sufficient to show what really first-rate brickwork in hydraulic lime will stand.— *British Clay Worker.*

J. W. MORRISON, architect, has opened offices at 313 Jefferson Street, Jamestown, N. Y.

THE firm of Brede & Zimmerman, architects, Detroit, Mich., dissolved partnership Feb. 1. Mr. H. A. Brede will continue the business.

FRANK HORTON BROWN, architect, has removed his offices to White Plains, N. Y. The Port Chester office will be continued as a branch at which Mr. Brown will spend Wednesdays of each week.

THE Van Rensselaer house, opposite Albany, N. Y., is believed to be the oldest inhabited house in the United States. The building was erected, it is said, in 1642, of bricks imported from — Holland. *The Southern Architect.*

THE Architectural League of New York began their tenth annual exhibition of Architecture, Painting, and Sculpture in the galleries of the American Fine Arts Society Building, 215 West Fifty-seventh Street, on the 15th of February. The exhibition closes the 9th of March.

THE Chicago Architectural Sketch Club seems to be a very much alive affair, as may be seen by the following programme: Monday evening, Jan. 21, Mr. Thomas Hastings's paper on planning was read and illustrated by stereopticon views; Monday evening, Feb. 4, a musicale by the members of the Marquette Club Minstrels; Monday evening, Feb. 11, a "Rip Snorter." (For particulars apply to Billy Gibbs, Bob Williamson, or Major Hoeppner, hosts.) On Monday evening, Feb. 18, Mr. F. G. Perkins read a paper entitled "The Comparative Merits of Steam and Hot Water Heating," this paper being the first of a series upon practical subjects.

OUR ILLUSTRATED ADVERTISEMENTS.

THE Hydraulic Press-Brick Company has chosen as the subject for this month's illustration in their advertisment (see page xvii),

THE CATHEDRAL AT ASSISI.

This company is the parent of the many hydraulic companies that exist in the several parts of the country, addresses of which are given in the advertisement, and the liberality it shows in the matter of expense in publishing these excellent examples of old brickwork is certainly commendable and very much appreciated.

THE COLONIAL CLUB,

Henry F. Kilburn, architect, one of the noteworthy buildings recently erected in New York, is chosen for illustration by the New York Architectural Terra-Cotta Co. (see page xvi). It is a pleasing example of the excellent effect that may be obtained by the use of the lighter shades of brick and terra-cotta in exterior work. We publish herewith three bits of detail executed by the New York Company who supplied the terra-cotta. The buff brick used in the façade was furnished by Sayre & Fisher Co.

Another faience medallion executed by Andre della Robbia is the fourth in the series of illustrations by the Atwood Faience Company (see page xv). Particular interest attaches itself to the work being done by this company (examples of which we shall publish in our later numbers), owing to the fact that a great deal of faience work is now being used in exterior work in Chicago.

NEW ADVERTISEMENTS.

WITH this number we begin the advertisements of Sayre & Fisher Co., of New York, manufacturers of fine pressed front and enamelled brick. (See page xiv.)

The Peerless Brick Company of Philadelphia, one of the oldest established front brick concerns in the country. (See page xiv.)

The Philadelphia Enameled Brick Works. (See page ii.)

The Northwestern Terra-Cotta Company of Chicago (see page v), who have executed some of the best designs in architectural terra-cotta that are to be found in this country.

And last, but not least, the Pioneer Fire-proof Construction Company of Chicago. (See page iv.)

NO doubt most of our readers will recall the announcement in our September number of the fact of the total loss by fire of the American Ceramic Terra-Cotta Company's works on the 20th of last September, also the statement that, with their characteristic energy, the company had commenced rebuilding at once. How rapidly this work of construction must have gone on may be imagined when it is stated that within three short months the present substantial, well-arranged buildings have been erected and equipped with all the latest and best improvements in machinery for turning out terra-cotta. Although such a catastrophe as that through which the company has recently passed is always a hard blow to immediate business, still it has some later benefits in the reconstruction of the works. As in this case, the company, profiting by their past experience, re-arranged the entire general floor plan of their buildings with a view to the most expeditious location of each departmeut for its particular work, and then equipped the same with such machinery as in their judgment was the best possible for the purpose, and which would yield the best results. We are told that in time alone (that great bugaboo to the terra-cotta manufacturer) the company have been enabled to save a quarter over that which they formally required to complete work, owing to the many advantages of their present arrangements, and this in addition to the fact of the work being better in quality than before. It would be hard to find a more interesting operation than to watch the evolution of the coarse gray clay into the graceful terra-cotta designs, with their beautiful colors and harmonious effects. That this particular branch of the terra-cotta industry is in its infancy all are ready to admit. What it shall mean to the building profession when it shall arrive at that state of incorporating into its structure all the beautiful color effects that are now promised, who dares to prophesy!

ANOTHER "BRICKBUILDER" COMPETITION.

WE are making arrangements to hold another competition, open to subscribers of THE BRICKBUILDER, for which suitable cash prizes will be offered. The subject will be "A City House," fireproof throughout, with a brick and terra-cotta front. The limit cost and details will be announced in the March number. As has been our custom, we shall publish the successful designs.

To clubs of five and ten or more draughtsmen, wishing to subscribe to THE BRICKBUILDER, we make a special rate. To one who will act as our agent in securing subscriptions, we will allow a liberal cash commission. Write for particulars.

TO DRAUGHTSMEN.

ANY draughtsman out of employment, who will send us his full address and answer the following questions: —

By whom were you last employed?
Can you furnish good recommendations from your last employer?
On what particular line of work have you been engaged?
What salary do you expect to receive?
Are you willing to go to another city?

may have his name placed in our Exchange Bureau, and will be notified of any parties desiring his services as a draughtsman.

All such communications will be regarded as confidential, and no charge will be made.

Address, EXCHANGE BUREAU,
THE BRICKBUILDER PUBLISHING CO.

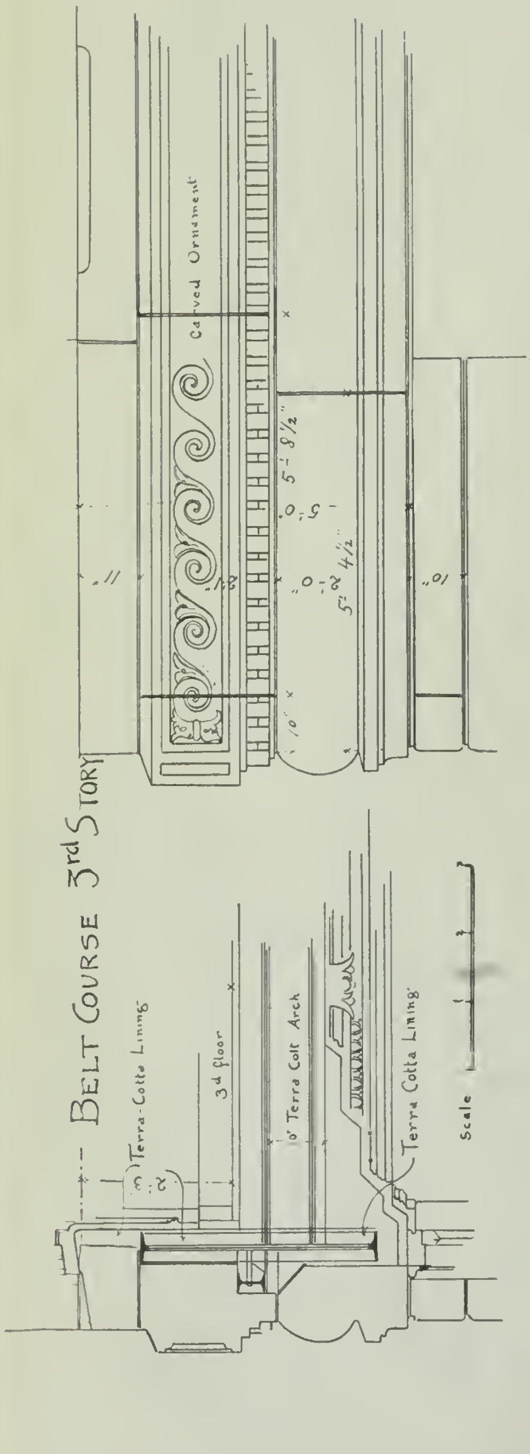
TO ARCHITECTS.

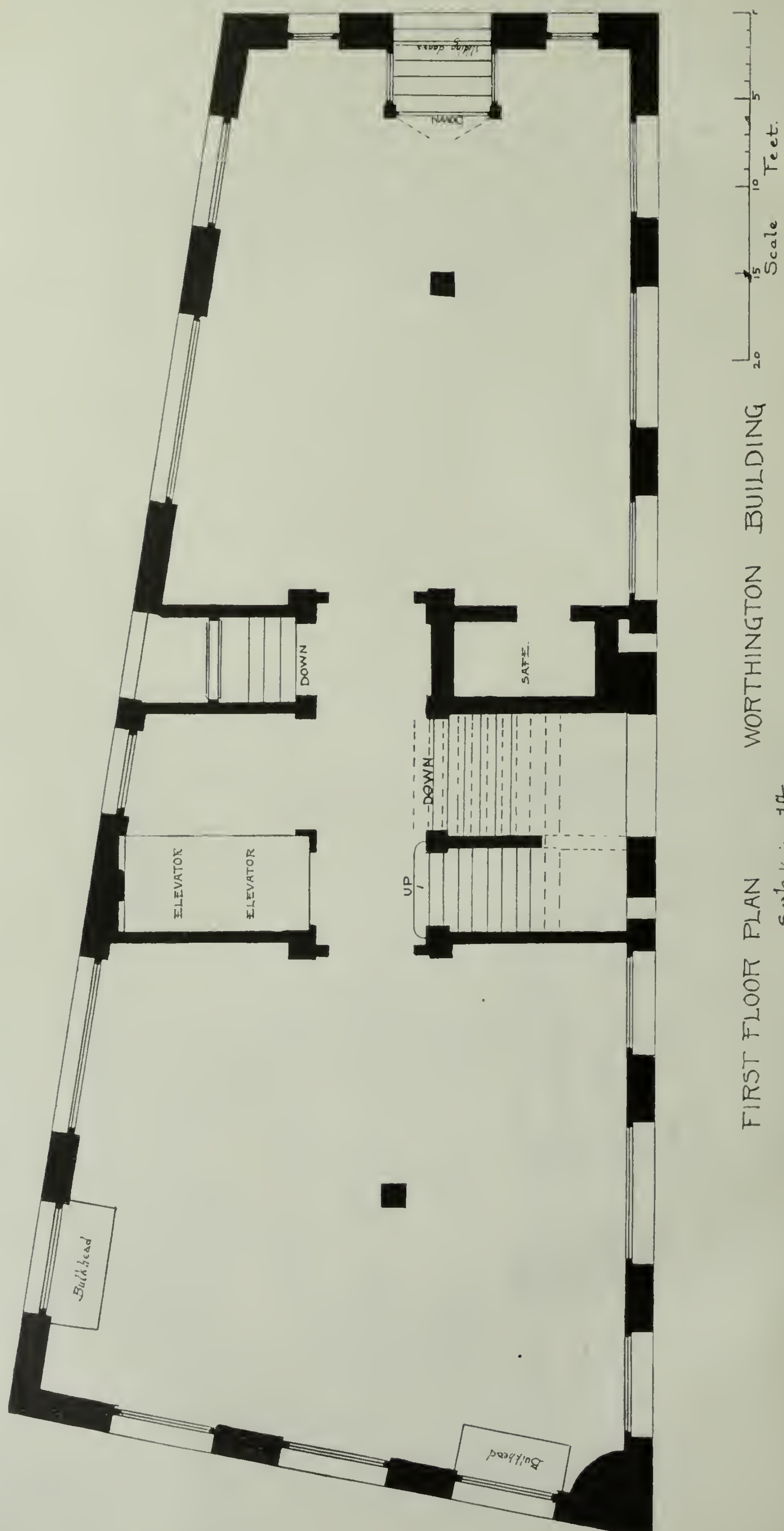
WE call your attention to the foregoing announcement, and upon your application would be pleased to put you in communication with any draughtsman whom we think would meet your requirements. All communications will be regarded as confidential, and no charge will be made.

Address, EXCHANGE BUREAU,
THE BRICKBUILDER PUBLISHING CO.

WORTHINGTON BUILDING, STATE STREET, BOSTON.
FEHMER & PAGE, ARCHITECTS, BOSTON.

BELT COURSE 3rd STORY

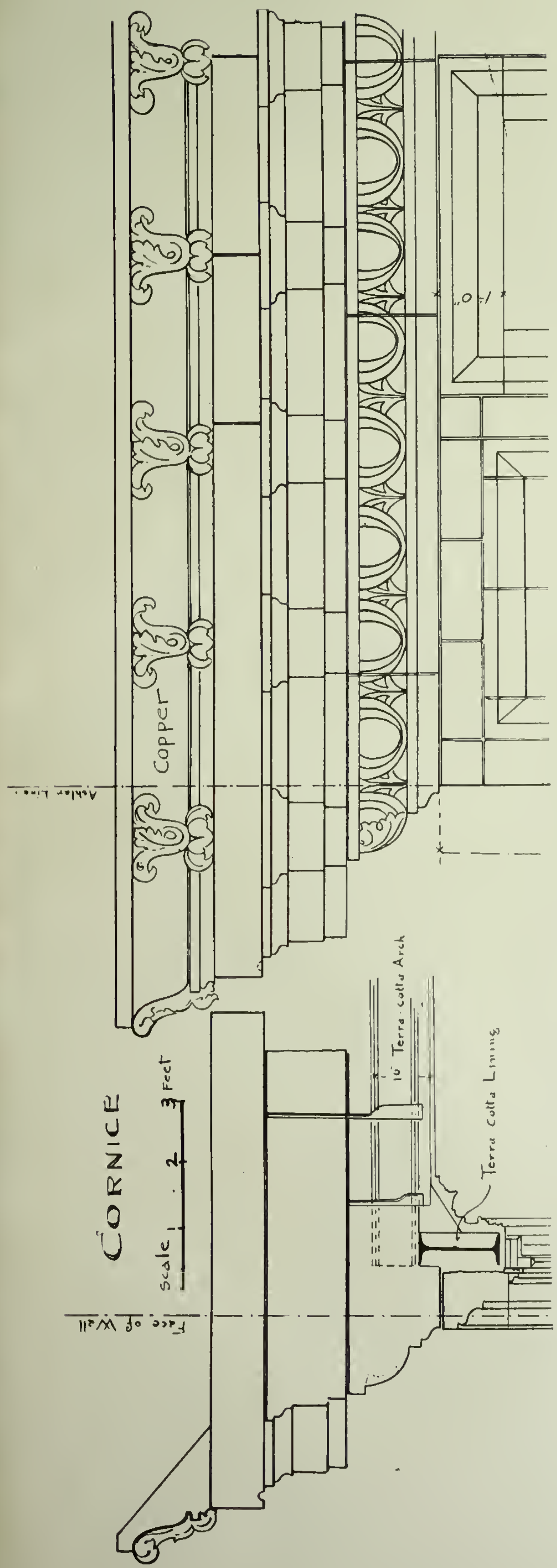


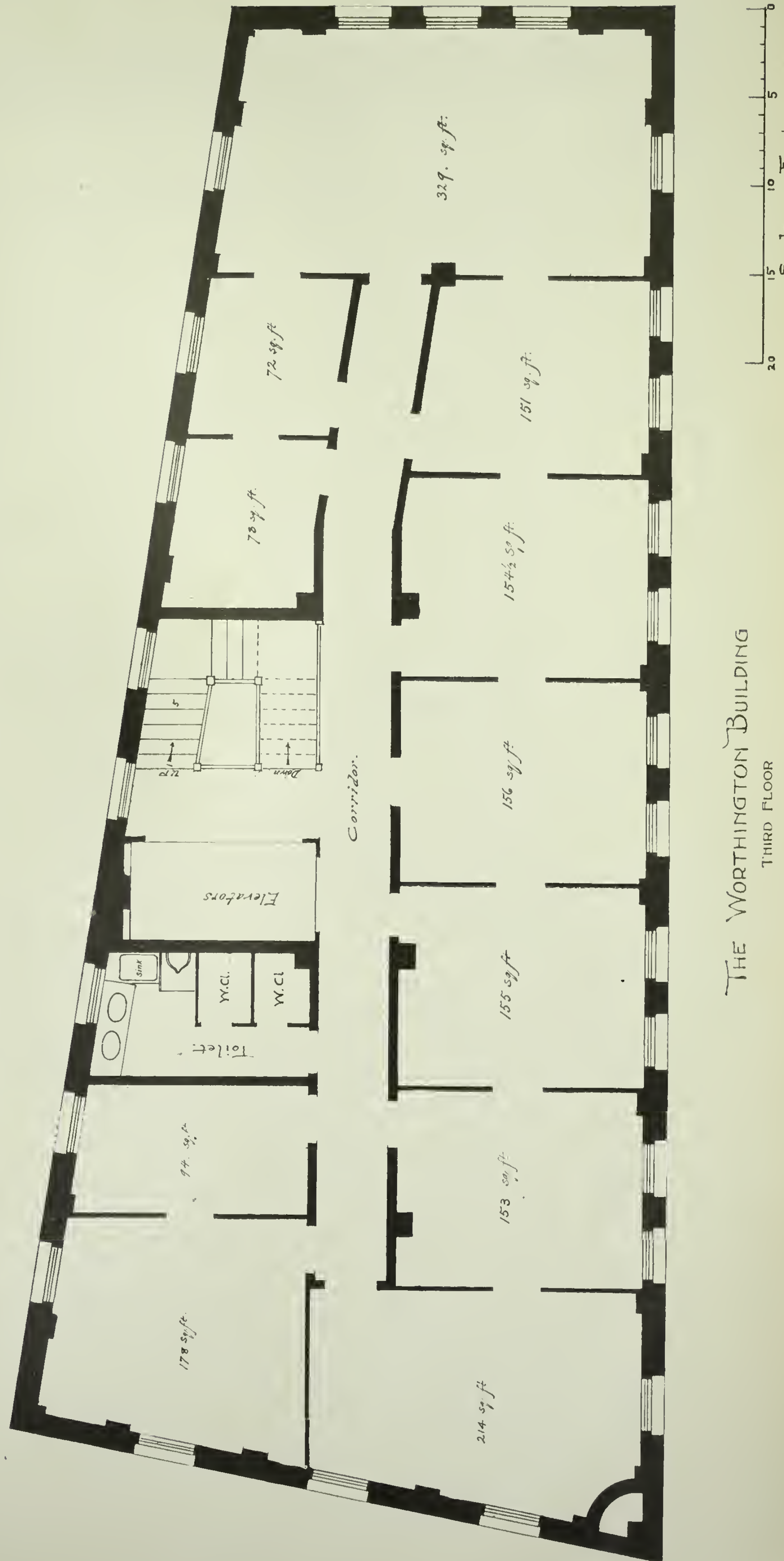


FIRST FLOOR PLAN WORTHINGTON BUILDING

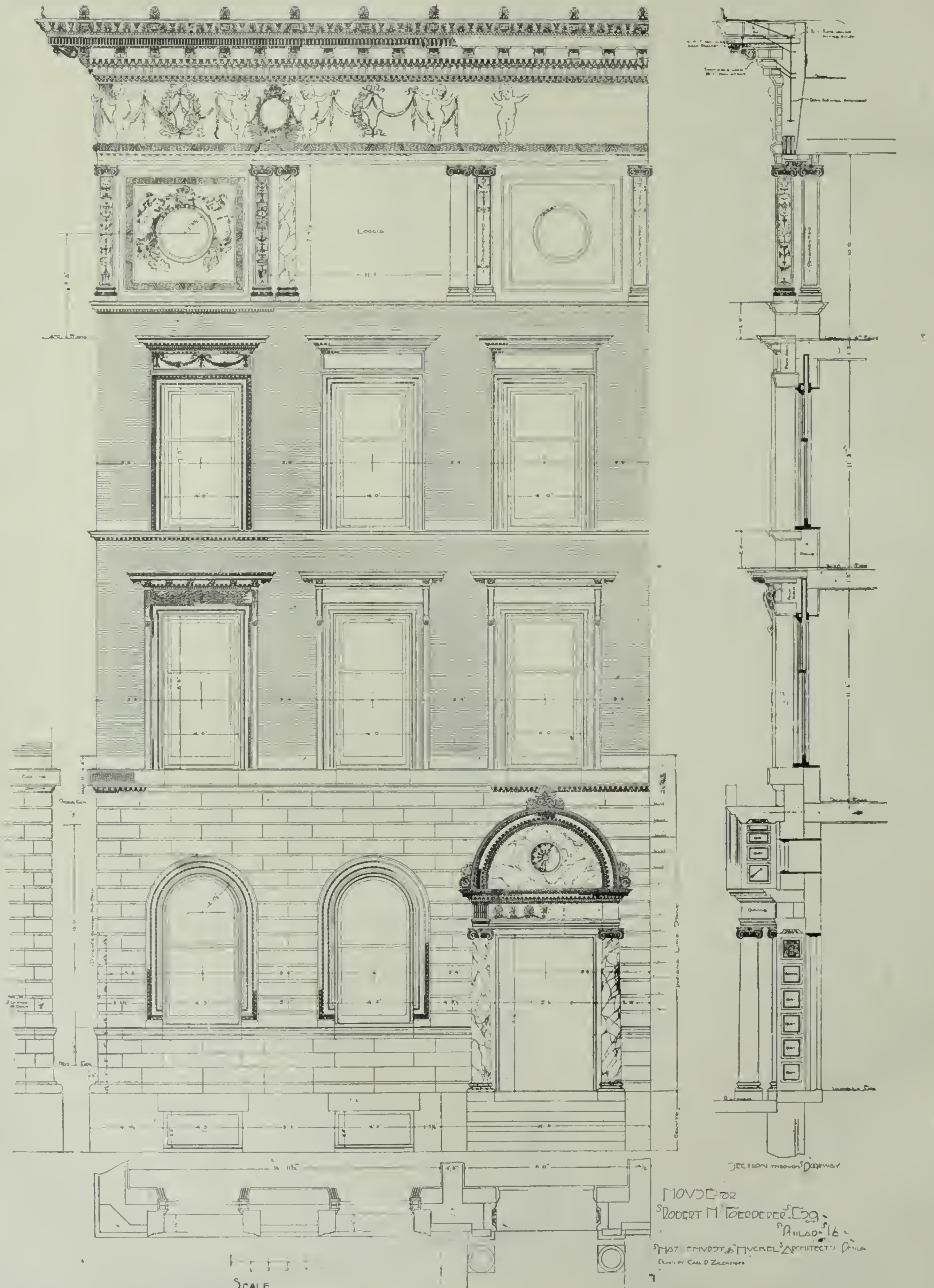
Scale 1/8 in. = 1 ft.

FEHMER & PAGE ARCHTS.

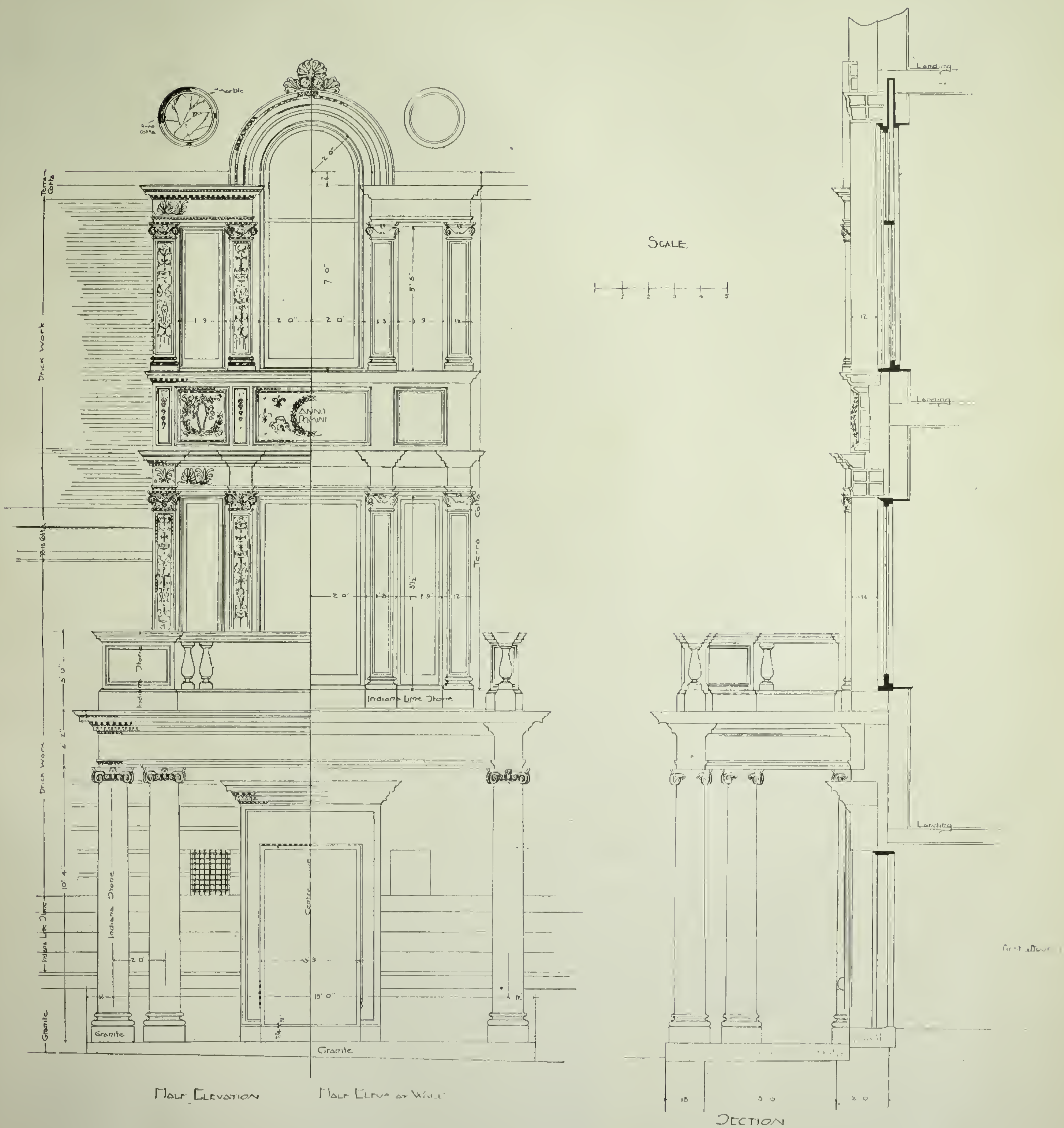




THE WORTHINGTON BUILDING
THIRD FLOOR
Scale: ⅛ inch=1 foot.



RESIDENCE FOR ROBERT H. FOERDERER, PHILADELPHIA.
HAZELHURST & HUCKEL, ARCHITECTS.



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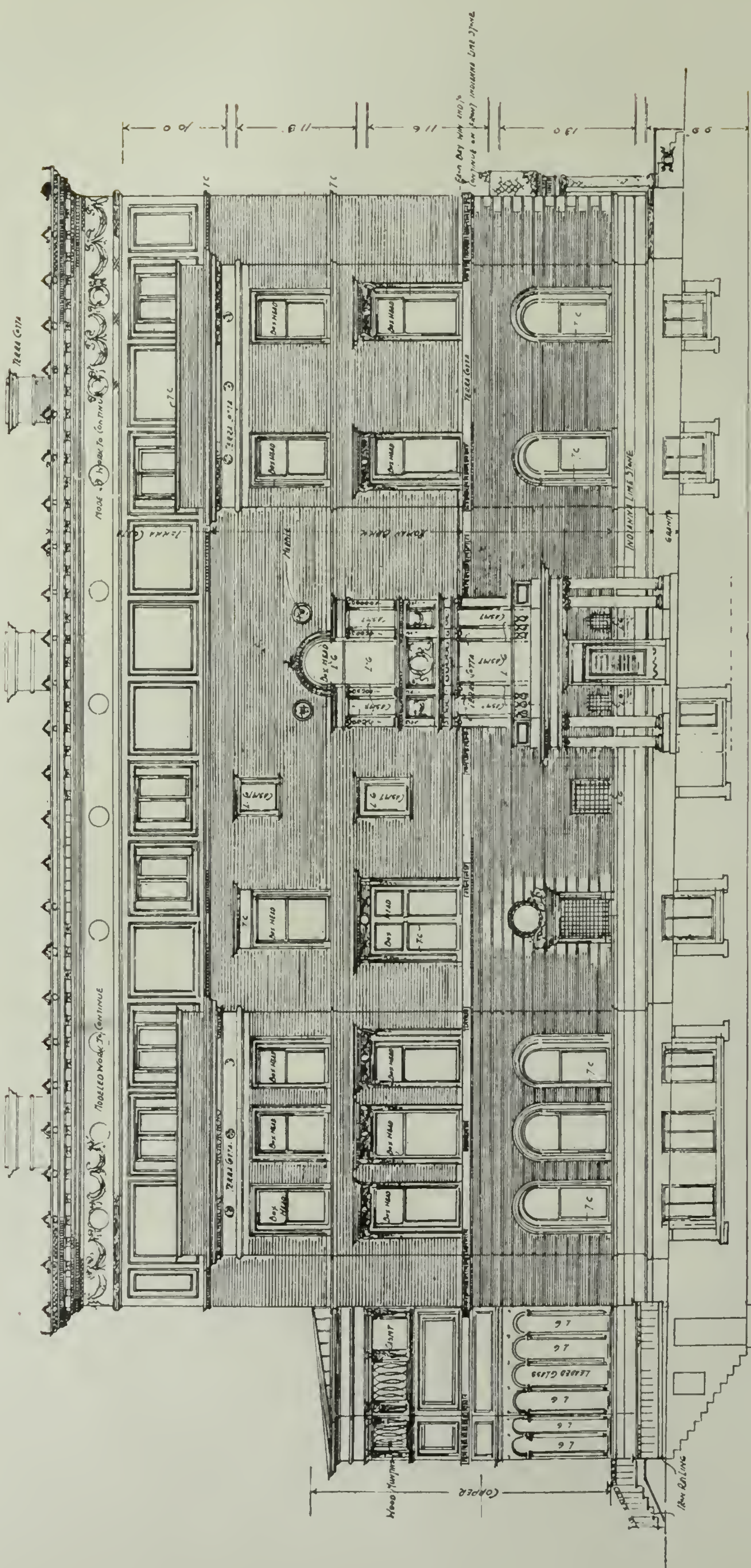
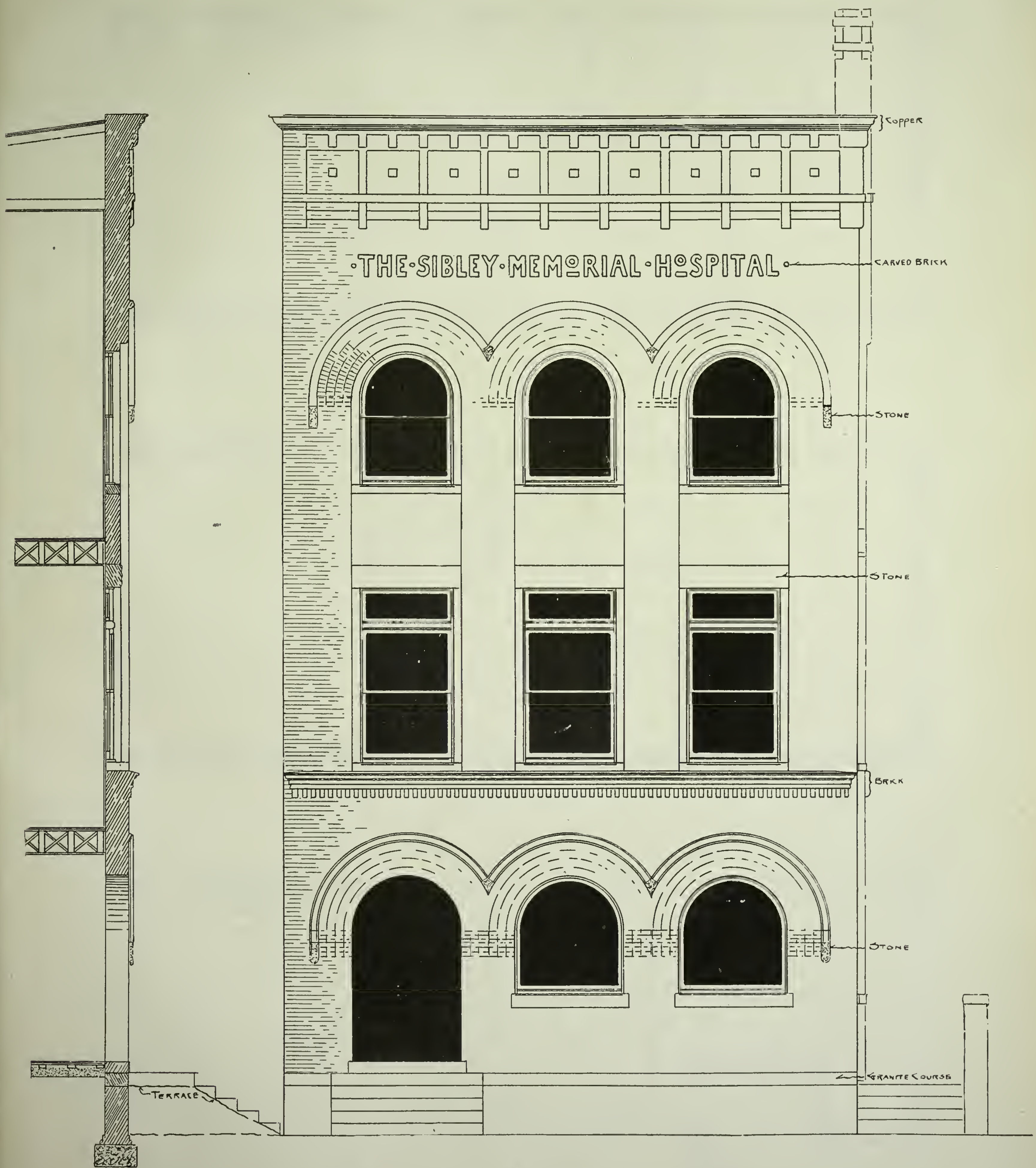
HAZELHURST & HUCKEL, ARCHITECTS.



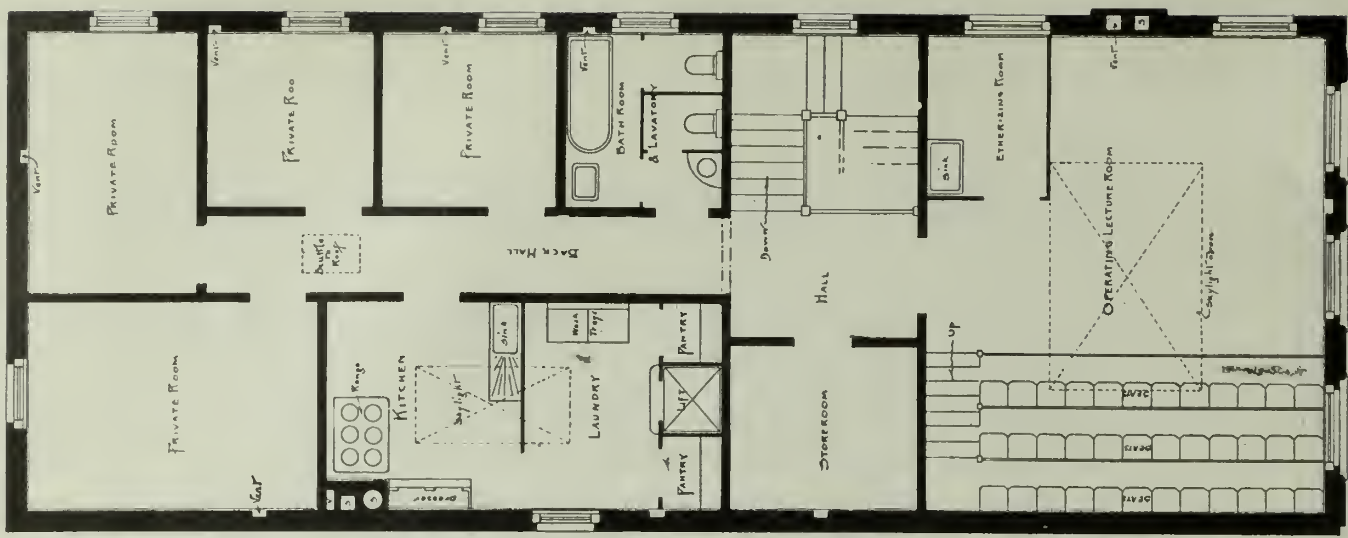
SIDE ELEVATION

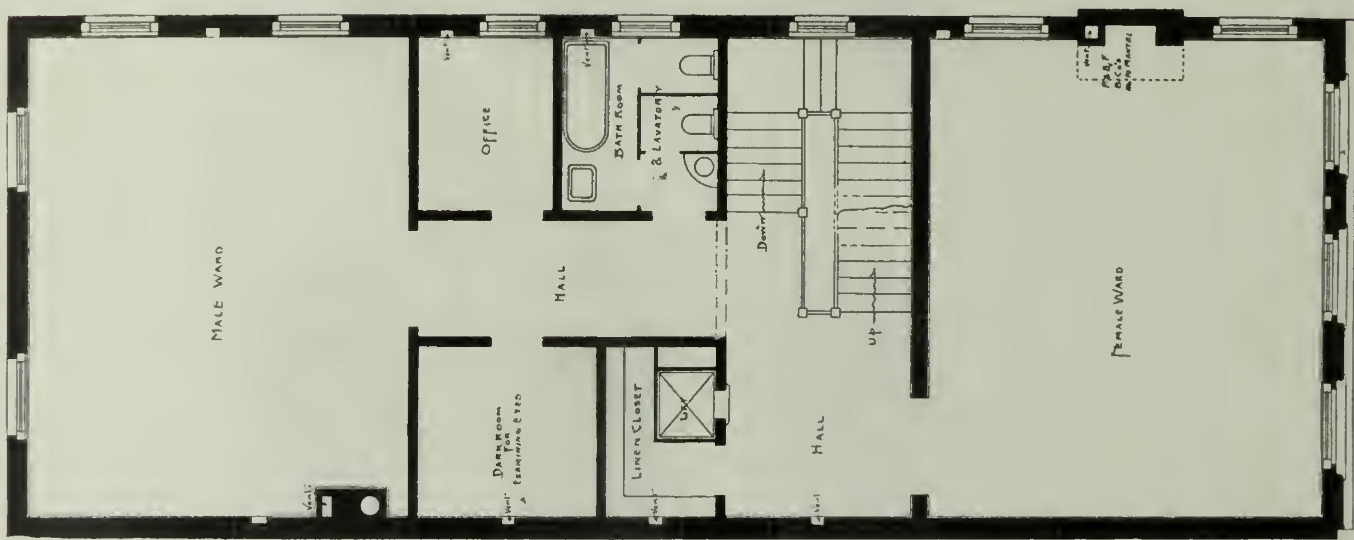
RESIDENCE FOR ROBERT H. FOERDERER, PHILADELPHIA.

HAZELHURST & HUCKEL, ARCHITECTS.



FRONT ELEVATION, THE SIBLEY MEMORIAL HOSPITAL, WASHINGTON.
CLARENCE L. HARDING, ARCHITECT.





FLOOR PLANS, THE SIBLEY MEMORIAL HOSPITAL, WASHINGTON.
CLARENCE L. HARDING, ARCHITECT.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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STEEL CONSTRUCTION AND BRICK MASONRY.

WITHIN the past few years a change has taken place in the methods of construction adopted for commercial buildings which is one of the most radical that the world has ever seen, involving not only a complete revision of the theory of construction, but also a reversal of the uses to which some of the materials have been previously put. This change has come as a result of the employment of what is known as the skeleton construction, a system in which the loads of the walls and the floors are all carried down to the ground through steel columns either isolated in the building or built into the thickness of the external walls. In this construction, when carried to its fullest development, masonry as a supporting member counts for absolutely nothing. Brick walls, as such, disappear, and are replaced by screens of brick or stone interposed between the tiers of beams and carried around the steel work, not to strengthen the supporting members, but simply to protect against fire and the elements. So that brick, which was once the fundamental material for building construction, has now simply a decorative or fireproofing function. Of course the vast majority of buildings are now and always will be built in the old method, with solid walls directly supporting the loads, but the increase in the use of the skeleton construction has been so extensive that those who are interested in the manufacture and use of brick as a building material may well ask what has been the influence of the steel construction upon the humbler material.

ACCORDING to the building laws existing in most cities, a brick wall to be carried to the height of the walls in the Manhattan Life Building, New York, would have to be six feet thick. As a matter of fact, the walls of this building in connection with the steel construction are from twelve to sixteen inches thick; so that at first thought it would seem that the skeleton construction has greatly reduced the quantity of brick which would be used in connection with building operations. This is not the case, however. No architect or engineer would dare to build a structure three hundred feet high with walls less than ten feet thick, and consequently such buildings would never have been built except for the skeleton construction; and although the walls may be a great deal thinner than would have been used with the older systems, the results, on account of the extreme heights possible with skeleton construction, show a vastly increased quantity of brick actually employed in building operations. Nor is this all. Brick, on account of the ease with which it is handled and set and the facility with which it can be built into and about the forms of beams and columns, is generally preferred to any other material for both interior and exterior masonry walls of a tall building. Stone is attached with difficulty to the skeleton construction, and is not structurally as satisfactory. Consequently brick and terra-cotta have acted to a very marked degree to drive out stone from tall building construction, so that the quantity which is now used, not only of common brick but of face brick as well, has been greatly increased by the use of the skeleton construction.

WITH the brickwork reduced to the function of a mere fire resistant, or used simply for looks, one would naturally expect the quality of the brick as to hardness to deteriorate. Indeed it is a question whether the extensive use of skeleton construction in some cities has not made possible the manufacture and sale of some notably inferior qualities of face brick. This, however, has not resulted from what could be called the best practice. On the contrary, every intelligent builder knows the absolute necessity of using the very best of brick in connection with steel construction, for the most vital part of the whole system is the endurance against corrosion of the steel itself. Unless the common brick is thoroughly well burned so as to be practically impervious to moisture, there is a great possible, though uncertain, danger to the structure itself, and consequently it is the practice of the best architects to use none but the very hardest and most thoroughly burned brick both in the external surface and for the fireproofing about the columns and beams. Although many inferior makes of face bricks have been sprung on the market and have found too credulous or too parsimonious customers, the extensive possibilities for external brick treatment which the skeleton construction can offer has opened so wide a market for the manufacture of moulded brick, fine qualities of face brick, and the more elaborate terra-cottas, that a distinct revival in burnt clay products might almost be traced directly to the introduction of steel construction. One has only to look over the advertising columns of any trade journal to see what a quantity of firms are engaged in the manufacture of brick and terra-cotta. A dozen years ago architects were tending towards the use of stone. Now the tendency seems to be directly the other way; and that our manufacturers are profiting by it is abundantly demonstrated by the excellent qualities of brick and terra-cotta which are now to be found in the market, which are in every respect far superior to what could be obtained before the steel construction came into use.

Another improvement has operated in connection with brick masonry as a direct result of the use of steel construction. The best experience tells us that the steel is most secure against corrosion when it is imbedded in the best quality of pure cement mortar. Consequently in the better class of work more care is now taken in filling the joints, and brickwork is laid up more solid in a better quality of mortar, than was the case when the walls fulfilled their expected functions in merely resisting dead load, and were made of ample thickness to allow for all the defects which usually accompanied brickwork. In other words, while as a supporting member a great deal less is now demanded of brickwork than ever before, a great deal more is demanded of it as to quality and perfection of mechanical workmanship in the laying. A structure erected in accordance with the best practice observed in the use of skeleton construction to-day affords a better opportunity for the brick manufacturer in both common and pressed brick, gives a better opportunity for the use of decorative terra-cottas, leaves the architect freer in the design of the masonry, uses a great deal more material, and is in every respect better built, more strongly constructed, and more thoroughly knit together than was possible with the system of construction which was used for large buildings a dozen years ago. Brick masonry as a supporting member disappears, and in its place there is a wide range of possibilities opened up for the most varied artistic treatment of clay products to an extent and of a quality which would have been impossible under former conditions.

FIREPROOFING.

A Department Conducted in the Interests of Building Construction to Prevent Loss by Fire.

FIREPROOF FLOOR ARCHES.

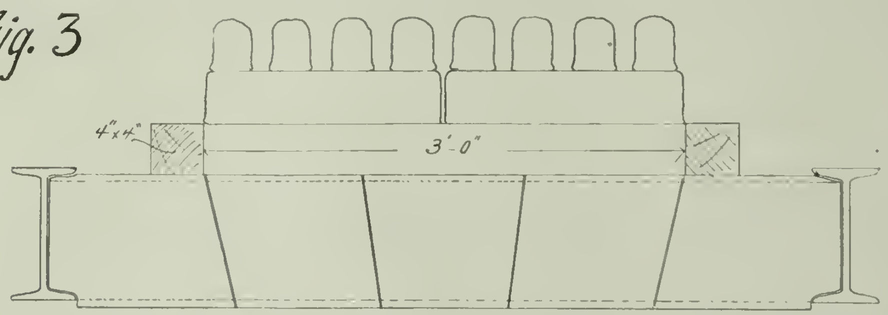
(*Continued.*)

BY GEORGE HILL, C. E.

PUBLISHED TESTS. — CONTINUED.

THE method of loading was secured by the application of pig iron, as shown by the sketch in Fig. 3, on three inches of sand filling which was placed over the arches, but we do not know whether the pig iron was all on the sand, or part on the sand and part on the wood, although one of the photographs seems to indicate that it was on the sand.

Fig. 3



This does not represent the condition which is actually obtained in the building, in which there is either a couple of inches of good concrete or else the ordinary common cinder filling and the sleepers and flooring. The method of applying the load was such as to make it difficult to destroy arches of high strength, also making it impossible to ascertain how the arch failed, since the mass of pig iron falling on the arch after it reached the ground was likely to smash many of the blocks by the impact, making it impossible to observe on what line the arch failed, losing another opportunity of determining which form of arch gave the most strength per square inch of effective section, and as a consequence which was the most economical from the point of view of the manufacturer. There are two points which should be noted in every test. They are, how the arch failed, and under what load; and any test which falls short of determining these must necessarily fall short of its full usefulness. Impact tests seem to be rather popular, really are of little utility, and simply of value as showing a special feature of one kind of arch material. They need not be further discussed. The fire and fire-and-water tests were unquestionably good so far as they went, but failed in the execution: first, because the stream of water was too small; and second, because the arch lacked its protecting covering of plaster, which under actual conditions it nearly always has. This made the result again open to dispute, raising the question of whether or not they truly showed how the material would act when in use in the building.

Any engineer taking up the general result of the static tests, with a knowledge of the usual practice of allowing a factor of safety of ten for mason work, will be surprised to see that these tests seem to show that the safe loads computed for nine square feet of area are from sixty-four pounds per square foot up to one hundred and seventy-three plus pounds per square foot, with a weight of the material alone of about forty-five pounds per square foot, which, with filling, plaster, flooring, etc., added, amounts to a total of about seventy-five pounds per square foot. When we compare this with the one thousand five hundred pounds strain, claimed by some makers, it is clear either that there is something radically wrong, or that no such factor of safety has been considered necessary by the maker. The subsequent tests will indicate the extreme irregularity of certain of the material, and perhaps afford some light on the subject of the proper factor to use.

When we note how these arches fail, we at once see a new light; those that fail did so at the skew backs. A glance at Fig. 2 will show why, since in each case the details indicate a weakness at the skew-back point, and in some cases an application of the bearing surfaces in such away as to invite exactly the shearing that occurred. If we calculate the shear per lineal foot, we will find that the arches sheared at 170 pounds per lineal foot upwards, which, if the factor of ten were applied, would limit the useful span of arches of this type to about three feet. These arches were tested when practically four days old, and as a consequence the mortar bedding, the skew backs to the beam flanges, even if well applied, was still too soft to prevent concentration of pressure at hard spots, or spots where the tile projected beyond the uniform line. As a consequence it would be possible for incipient failures to occur at one point, and then starting there, travel along the whole length of the skew backs from block to block with great rapidity, causing the failure of the whole mass, like a card house. In the case of the Lee arch, this bedding or lack of satisfactory bedding would not be of such consequence, since the bearing surfaces of each rib amounted to not more than two square inches.

In the Lee arch there were two thousand pounds per lineal foot safely carried, thus showing the crushing strength of the material per square inch to be above two hundred and fifty pounds; the shearing strength of the material was at least fifty pounds per square inch, and both of these results seemed to be very low, in the light of what we know of the compressive and shearing strength of such material.

In summarizing these results we may say that their principal use was to stimulate action in the line of better design of the arch-block section, and to demonstrate the weakness of the skew backs of the old style of construction. I think there can also be traced in the work of the manufacturers of terra-cotta a better design and a better realization of what the loads that the material are to be subjected to actually are.

Kindl Arch. (*Engineering News*, July 4, 1891, p. 3.) This is practically the Wilson arch, as was pointed out in a subsequent communication to the *Engineering News*, but differs from it in having greater depth for the suspending iron straps, and the using of hard-burned fire clay for the compression member instead of the concrete, both of these being decided improvements. It is shown in Fig. 4. The article descriptive of it says: "The practicability of this system was tested in a rude way, by building an experimental floor, as shown in Fig. 4. and loading it to the breaking point; this floor broke with a load of three hundred pounds per square foot, but if the material had been closely laid together, and a sufficient number of straps had been placed in the same, it would no doubt have been good for one thousand pounds per square foot."

This of course is quite evident; the actual safe load on the tile arch was about thirty pounds per square foot, or about that of the weight of the arch itself.

No information is given as to how the arch failed, and we therefore cannot draw any conclusions from the test; it would seem, however, as though too many questions of fidelity of workmanship were involved. Any little carelessness in the putting on of the straps, any improper bedding of the blocks to the straps, any carelessness in the putting up of the fire clay or properly wedging it at the ends, would all be likely to cause serious trouble, while if oxidation set in once it is certain that the small sections of the straps would soon be eaten away.

Cutshaw Test. (*Engineering News*, Nov. 14, 1891, p. 471.) These were made of the Empire Fireproof Construction Company's arches, single and double; the arches being made as shown in Fig. 5. These arches were covered with a thin layer of sand. Test No. 12 was made with a combination load of pig iron and brick; tests Nos. 11 and 13 were made with a load of pig iron alone, set on 1½-inch planks laid on the sand bed; all of the remaining tests were made by piling brick, and all of the loads were uniformly distributed over the area of the arch. The tests extended over a period between Nov. 15, 1890, and June 24, 1891, and are thus summarized by Col. Cutshaw:—

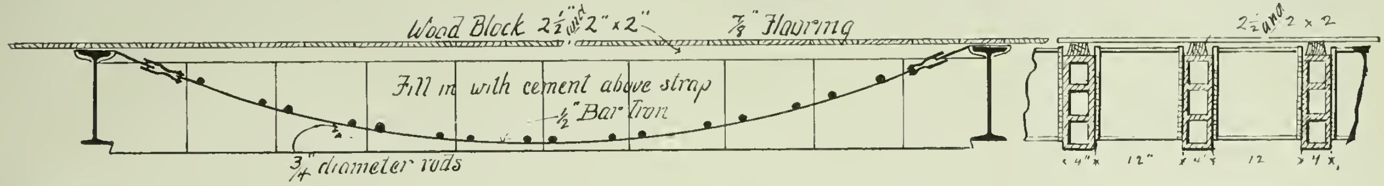


Fig. 4.

TABLE I.

TESTS OF THE EMPIRE COMPANY'S HOLLOW-ARCH BLOCKS LAID IN ROSENDALE CEMENT AND SAND MORTAR MIXED, 1 TO 2.

1st Test. — 6-inch blocks burned to a dark color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3.95 ft.	Loaded area 9.25 sq. ft.	Set one week before loading.
2,695	291.3	1-3	Slight crack in cement joint underneath at centre.		
4,410	476.7	3-8			
5,551	600.1	5-8	Not broken.		

2d Test. — 6-inch blocks burned to a light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3.95 ft.	Loaded Area 9 25 sq. ft.	Set one week before loading.
980	105.9	1-12			
2,205	238.4	1-8	Beams spread 1-2 inch at bottom.		
3,675	397.3	5-16			
4,900	529.7	1-2			
5,355	579.		Arch collapsed.		

3d Test. — 6-inch blocks burned to a light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3.95 ft.	Loaded Area 9.39 sq. ft.	Set one week before loading.
980	104.4	0	Slight crack in cement joint underneath at centre.		
1,470	156.5	1-16			
2,205	234.8	1-8	Top flanges of beams approached each other 1-16 in.		
3,675	391.4	3-16			
4,613	491.3		Arch collapsed.		

Cambered 1-2 in.

4th Test. — 6-inch blocks burned to a light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3.95 ft.	Loaded Area 9.36 sq. ft.	Set 36 hours before loading.
735	78.5	1-16			
1,225	130.9	1-8	Slight crack in cement joint underneath at centre.		
1,715	183.2	5-32			
1,960	209.4	3-16			
2,450	261.5	7-32			
2,695	288.		Arch broken.		

5th Test. — 6-inch blocks burned to a light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3.47 ft.	Loaded Area 8.81 sq. ft.	Set 24 hours before loading.
735	83.4	1-32			
1,225	139.	1-16			
1,715	196.	3-32			
2,205	261.6	1-8			
3,241	367.9		Arch broken.		

Cambered 5-8 in.

6th Test. — 12-inch blocks burned to a dark color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3.74 ft.	Loaded Area 8.23 sq. ft.	Set 40 days before loading.
950	125.	1-16			
1,782	236.	1-8			
3,089	408.	3-16			
5,352	708.	1-4			
5,352	708.	5-16	After interval of one hour stood 48 hours.		
5,572	736.	3-8			
7,603	1,005.	7-16	Left loaded for 8 days, no further deflection.		

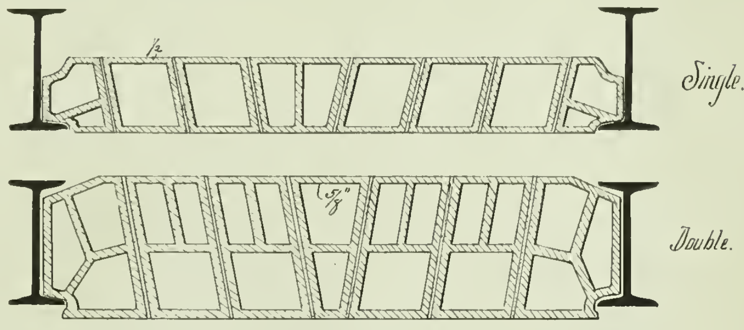


Fig. 5.

7th Test. — 12-inch arch burned to a light color.

Total Load, lbs	Load per sq. ft. lbs.	Deflection, in.	Clear Span 3 74 ft.	Loaded Area 8.23 sq ft.	Set 40 days before loading
4,752	576.	1-16	Deflection increased to 3-8 in. in 24 hours.		
5,950	720.	1-16			
6,415	778.		Collapsed in 4 hours.		

8th Test. — 12-inch arch burned to a very light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 4.37 ft.	Loaded Area 11.43 sq. ft.	Set 20 days before loading.
3,168	227.	1-16	Crack in cement joint at key.		
4,752	415.5	1-8			
6,336	554.		Collapsed in 24 hours.		

9th Test. — 12-inch arch burned to a light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 4.37 ft.	Loaded Area 11.45 sq. ft.	Set 20 days before loading.
3,168	277.	0			
4,752	415.5	1-8			
8,579	749.	1-4	Left on 48 hours.		
10,144	888.	5-16	Left on 48 hours.		
11,412	1,000.		Collapsed.		

10th Test. — 12-inch arch burned to a light color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 4.33 ft.	Loaded Area 11.34 sq. ft.	Set 37 days before loading.
1,180.8	102.	0			
1,771.2	153.	1-16			
2,066 4	178.5	1-16	Slight crack in cement joint, first block next skew back.		
2,656.8	229.5	1-8			
2,952.	225.		Slight crack in joint at key.		
3,542.4	306.	3-16			
4,428.	382.5	1 4			
5,904.	510.	1-4	Crack in key joint increased.		
6,494.4	561.	1-4	Stood with load 15 hours.		
7,084.8	612.2	5-16	Arch broken suddenly.		

11th Test. — 12-inch arch burned to a dark color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 4.33 ft.	Loaded Area 10.83 sq. ft.	Set 10 days before loading.
4,717	436.	1-16			
7,637	705.	1-8			
8,212	758.	3-16			
9,509	878.	1-2	Crack in cement joint second block		
9,701	896.	5-8	from skew back.		
11,445	1,057.		Arch collapsed.		

12th Test. — 12-inch arch burned to a dark color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 4.33 ft.	Loaded Area 11 sq. ft.	Set 19 days before loading.
3,599	327.	1-16			
6,442	586.	1-8			
8,442	768.		Collapsed.		

13th Test — 12-inch arch burned to a dark color.

Total Load, lbs.	Load per sq. ft. lbs.	Deflection, in.	Clear Span 4.33 ft.	Loaded Area 11 sq ft.	Set 23 days before loading.
2,868	261.	1-16			
6,910	628.	1-3			
8,204	746.	3-16			
9,013	819.	1-4			
9,860	896.	1-2			
10,434	949.		Collapsed.		

Had these tests been accompanied with a note of some kind, as to where the first failure took place, they would have been the most valuable of any published so far as my observation goes, in so far as they determined the actual strength of the arches. Even as it is, by assuming that the sections were practically uniform, and of the thickness given, valuable results can be deduced by calculation from them. This however belongs to a later section.

It is quite evident that the design of the six-inch arch was very bad, but still worthy of note; that the carrying capacity of the skew backs, which are of better design than those shown in Fig. 2, have been much increased. It is also worthy of note that the double arch has come up to a reasonable amount in point of strength; a safe load approximating one hundred pounds per square foot having been attained.

Pioneer Company. (Catalogue.) "End pressure arch of hard tile, Fig. No. 6, shows section of the arch and skew back."

The load per lineal foot of skew back was 1,315 pounds; the failure occurred under the load given on the sketch, generally the whole arch going at once; no special failure of the skew back was noted. The concentration gave 3,287½ pounds per square foot of loaded area, showing a decided improvement in the style of arch.

A second test was made by impact, the log dropping on its side and finally knocking out four rows of an arch of six-foot span and five feet wide. The fifth row, one foot wide of six feet one and one half inches

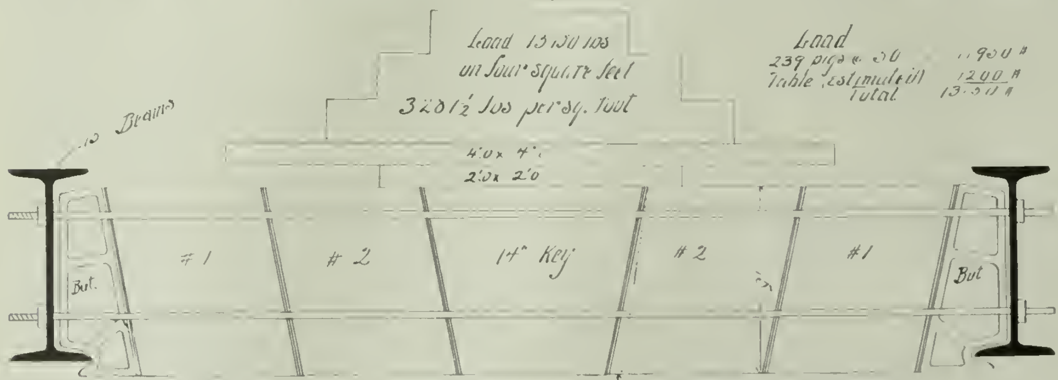
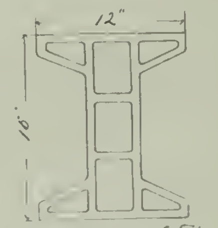


Fig. 6.

Joint opened here first and was about 1" wide before arch fell.



Section of Tile

The arches were carefully laid on rigid flat centres between I beams securely bolted together, and with joints of about one fourth inch, using shims of same material as arch blocks, where necessary to make close surfaces; and after standing till the mortar had set, a thin uniform layer of sand was spread over the arches, the centre removed and bricks placed on in regular courses till the arches broke. Tests one and six had reached prescribed limits of six hundred and one thousand pounds per square foot without breaking and were taken down. The loads of test twelve were made up of both bricks and pig iron, and of tests eleven and thirteen of pig iron alone with one and one half inch planks laid on the sand bed. These tests ran through a period of about seven months, from Nov. 15, 1890, to June 24, 1891. We may thus summarize the results: —

TABLE II.

Test.	Length along Arch Loaded.	Shear per lineal ft.	Safe Load per sq. ft. Factor of Safety 10
1	2 ft. 4 in.*	1,190 lbs.	60 lbs. +
2	2 " 4 " *	1,155 "	57.9 "
3	2 " 4 " *	993 "	46.1 "
4	2 " 4 " *	575 "	28.8 "
5	2 " 6 " *	650 "	36.8 "
6	2 " 3 " *	1,700 "	100. " +
7	2 " 3 " *	1,425 "	77.8 "
8	2 " 7 1-2 " *	1,210 "	55.4 "
9	2 " 7 1-2 " *	2,180 "	100. "
10	2 " 7 1-2 " *	1,350 "	61.2 "
11	2 " 6 " *	2,290 "	105.7 "
12	2 " 6 1-2 " *	1,685 "	76.8 "
13	2 " 6 1-2 " *	2,050 "	94.9 "

* Plus or minus.

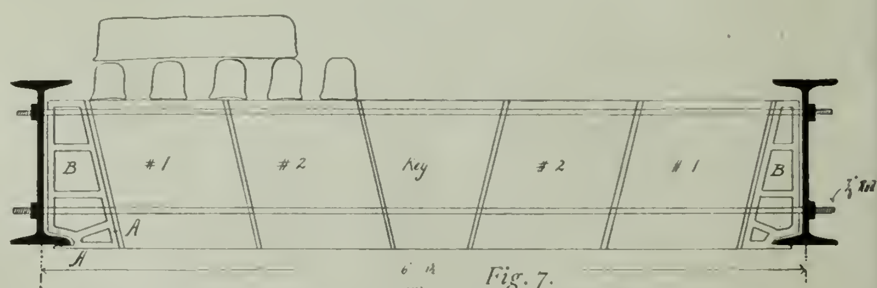


Fig. 7.

span, was left, although considerably jarred; this was then uniformly loaded with pig iron covering the entire area until 4,600 pounds was placed upon it, when the arch failed, the failure occurring first on the left-hand skew back at the point marked A on Fig. 7; the shear per lineal foot was 2,300 pounds, the safe load 76.7 pounds per square foot. This shows somewhat of a decrease from the above, but some allowance must be made, first for the failure of the skew back, which is not of good type; and second, for the shaking up which the arch received under the imposition of the impact test. The tie rods of these arches were but seven eighths inch in diameter, and probably the ends were not upset; no statement is made as to whether or not there was any elongation of the tie rod, but from our own observation we are inclined to think that such was the case to a considerable extent, thus forcing the concentration of pressure on a point which led to the failure.

(*To be continued.*)

MORTARS AND CONCRETES.

A Department devoted to Advanced Methods of using CEMENTS and LIMES in Building Construction.

AMERICAN CEMENT.

III. — *Continued.*

Smeaton, in his "Narrative of the Eddystone Lighthouse," says: "It remains a curious question which I must leave to the learned naturalist and chemist, why an intermediate mixture of clay in the composition of limestone of any kind, either hard or soft, should render it capable of setting in water in a manner no pure lime I have yet seen, from any kind of stone whatsoever, has been capable of doing. It is easy to add clay in any proportion to a pure lime, but it produces no such effect; it is easy to add brick-dust, either finely or coarsely powdered, to such lime in any proportion also; but this seems unattended with any other effect than what arises from other bodies becoming porous and spongy, and therefore absorbent of water, as already hinted, and excepting what may reasonably be attributed to the irony particles that red brick-dust may contain. In short, I have as yet found no treatment of pure calcareous lime that rendered it more fit to set in water than it is by nature, except what is to be derived from the admixture of trass, pozzuolana, and some ferruginous substance of a similar nature."

It would seem that this description by Smeaton, as to the action of pure limes, coupled with his discovery as to the hydraulicity of impure ones, ought to have annihilated the ancient fallacy, but it did not.

Quoting again from Burnell: "Some curious facts might be mentioned, not only to show the influence of a large body of masonry in retarding the solidification of the mortar in the interior but also of the danger of using rich limes in cases where such masses are necessary. Amongst them we may mention a fact cited by Gen. Treussart, who had occasion to demolish in the year 1822 one of the bastions erected by Vauban in the citadel of Strasburg in the year 1666.

"In the interior, the lime after these 156 years was found to be as soft as though it were the first day on which it had been laid. Dr. John mentions that in demolishing a pillar nine feet in diameter, in the church of St. Peter at Berlin, which had been erected 80 years, the mortar was found to be perfectly soft in the interior. In both cases the lime used had been prepared from pure limestone."

It is not known whether these lime mortars were made by an admixture of sand, burnt clay, trass, or pozzuolana with the lime, but, so far as results are concerned, they would have been the same, for nothing is more certain than that pure lime, with or without admixture of any one or all of the materials named, cannot be induced to harden by simple mechanical mixture of these substances whether in air or water. It never has done so and never will. If fat lime can be made to assume an hydraulic character, by its admixture with pozzuolana, why did Smeaton seek further? He had the rich lime and he had the pozzuolana. Why did he not use them if he believed in the tradition that had been handed down through the centuries,— that such a combination, although purely mechanical, would harden under water?

If he believed that the Romans used this material in all their wonderful hydraulic cement constructions, why did he hesitate for a moment even? The answer is plain. Simply because he tried it in every conceivable way, as he himself states, and found it was not true, that such a mortar would harden under water. That is why he sought further. And yet, all who write of Smeaton, on the subject of his great discovery, while acknowledging that he found the ancient theory false, insist that the public shall deem it true.

It is quite true, that rich lime, or even hydraulic lime, takes very kindly to burnt and powdered clay, pulverized bricks, trass, or pozzuolana, all of which are substantially one and the same thing, the latter two, however, being of volcanic origin. No one of them contains inherent hydraulic qualities, and their mechanical incorporation with rich lime can in no manner render the latter hydraulic.

Although Smeaton used pozzuolana with the Aberthaw hydraulic lime in the construction of the Eddystone Lighthouse, yet it is doubtful if he would have done so had he not "fortunately found at Plymouth (where he was cutting and fitting the stones for the lighthouse) a considerable quantity of this material which a merchant had imported on speculation, expecting to sell it to the constructors of old Westminster bridge."

Henry Reid, in his work on "Portland Cement," London, 1877, states, "The Aberthaw lime in itself could have accomplished all he" (Smeaton) "desired, for he had unlocked the mystery of hydraulicity, and felt confident in the knowledge of its cause."

The composition of trass and pozzuolana will be found in the table of analyses.

Although Smeaton had discovered during the winter of 1756–57 that certain strata in the blue lias formation would, after calcination, produce an excellent hydraulic lime, it appears that he only made use of layers containing clay in such proportion as to cause his manufactured lime to slake by hydration.

It is very probable that he calcined some of the lower layers, but, finding they did not slake readily, confined himself to the use of such layers as would do so.

The idea of pulverizing such layers as would not slake readily, then testing them, and forming thereby a very energetic hydraulic cement, did not occur to him; and this is probably the point referred to by Burnell, wherein he states, as already quoted, "An illustration of the ease with which a very acute observer may stop short on this side of the attainment of a great truth."

In 1786 De Saussure found that the lime of Chamouni set under water, and, like Smeaton, attributed this faculty to the presence of clay.

Mr. Parker, of London, in the year 1796, took out a patent for the manufacture of what he called "Roman" cement from the septaria modules of the London clay formation found in the Isle of Sheppy.

This septaria was natural cement rock, and after calcination it was reduced to powder in mills suited to the purpose. This was undoubtedly the beginning of the natural rock cement industry in modern times. Its introduction by Parker was soon followed by its manufacture from the blue lias formation, and it went into general use throughout England.

Reid says, in speaking of Parker's Roman cement, "The Thames tunnel could not have been made but for the advantages it secured, and many of the early railway tunnels were built with it as a cementing agent."

Burnell, so late as 1868, in his work on "Limes and Mortars," states in regard to Roman cement, "Almost all of the works executed in water in England at the present day are executed with it."

In 1802 natural cement was produced at Boulogne, France. The rock at Boulogne is in the form of septaria, and is sometimes called "Boulogne pebbles." Its proportions of clay and carbonate of lime are such that it is used for the production of natural Portland cement.

In 1810 Edgar Dobbs, of Southwark, London, obtained a patent for the manufacture of artificial hydraulic lime or cement, by mixing together in suitable proportions carbonate of lime and clay, and after drying, he moulded or cut it into pieces before burning. He then states that "the burning must be sufficient to expel the carbonic acid from the lime without vitrifying any of the substances."

This is the first record we have of the production of artificial cement, or, as it was then called, "artificial hydraulic lime."

From 1813 to 1818 the artificial hydraulic limes were produced in France by M. Vicat, and by Dr. John of Berlin, and Raucourt de Charleville in Russia.

In 1824 one Joseph Aspdin, of Leeds, England, obtained a patent for the manufacture of an artificial cement which, in his specifications, he designated as "Portland cement."

This being the first time the word "Portland" was ever coupled with, or in any way mentioned in connection with cement, whether natural or artificial, there is no doubt whatever that Mr. Aspdin is entitled to the doubtful distinction of inventing the term, for certainly it is a most absurd and meaningless word so far as it relates to hydraulic cement.

Mr. Parker, on the other hand, had ample justification for naming his product "Roman cement," for he had but reproduced a cement substantially identical to that used by the Romans 1800 years before, and it is to be deeply regretted that the title he then employed did not thereafter cling to the natural rock cements the world over.

URIAH CUMMINGS.

(To be continued.)

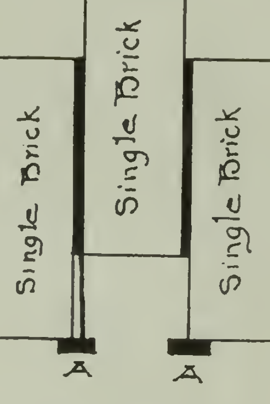
SHEARING TESTS OF MORTAR.

WHILE tests on the tensile, compressive, and transverse strengths of mortar are made in innumerable quantities every year, our knowledge of its shearing and adhesive strengths is somewhat meagre; and yet, whether the shear occurs through the body of the mortar or by sliding on the joint (whichever is the weaker of the two), a knowledge of the power required to cause this action must be always valuable and often needed.

With this end in view, experiments have been made by the author in the laboratories of McGill University on this subject.

The method of procedure was as follows: —

Three bricks were laid in mortar and tested, on end, as in the accompanying sketch. It was found necessary to place soft wood bearings at A, A, A, in order to do away with the transverse action, which tended to open out the joints; when this was done the action set up was practically a pure shear. In all, fifty-two tests were made on lime mortar 1 to 3 by weight, soft mortar; on natural cement mortar 1 to 1 1-2 by weight, 18 per cent water; on Portland cement mortar 1 to 3 by weight, 15 per cent water.



The mortars stood the following ordinary tests (see Table A).

The sand specimens were tamped lightly into the moulds, and were therefore quite near to practice in method of setting.

The following shearing results were obtained (see Table B).

In connection with these tests, experiments were made to determine the coefficients of friction between the surfaces after they had sheared. These were found to be: —

Lime-mortar surface on lime-mortar surface	.39
Natural cement mortar on brick surface	.40
Portland cement mortar on brick surface	.35

So that we are now able to determine some facts on the question.

The first one regarding lime mortar is that at one month old, at least, the adhesion is greater than the shearing strength, as in almost all cases the mortar sheared through at an average of ten pounds per square inch, regardless of the surfaces or thickness of joint, this being one third of the tensile strength at the same age, and one tenth of the compressive strength at the same age obtained on two-inch cakes and one-inch tension pieces.

Coming to the cement mortars we notice that —

1. The naturals are stronger in air, and the Portlands in water.

2. That the ratio of strengths in water, $\frac{38}{27}$, is exactly the same as tensile strength under water at the same age, *i. e.*, $\frac{132}{92}$.

TABLE A.

	Sp.	Time of Set.		Residues per cent.			Tensile Strength.							Compressive Strength.					
							Neat.			1 1-2 to 1.		3 to 1.		Neat.		1 1-2 to 1.		3 to 1.	
	Gr.	Incip.	Full.	50 Sieve.	80 Sieve.	120 Sieve.	3 days.	1 wk.	4 wks.	1 wk.	4 wks.	1 wk.	4 wks.	1 wk.	4 wks.	1 wk.	4 wks.	1 wk.	4 wks.
Lime												20	30						102
Natural Cement	2.96	45′	2° 45′	2.9	11 7	21.4	99	150	268		132			1285	2255	250			
Portland Cement	3.10	1° 0′	5° 0′	0.6	5.5	13.2	278	399	459			43	92	1362	2492			341	

TABLE B.

TABLE OF SHEARING TESTS OR MORTAR ADHESION TO BRICK SURFACES (IN SHEAR).

Kind of Mortar.	Joint.	Brick.	No. of Tests.	How Indurated.	Shear in lbs. per sq. inch. Average.	Least.	Greatest.	Remarks.
Lime 1. Sand 3	1-4″	A	5	In air.	9.7	8.4	11.9	All sheared through the mortar.
" "	1-2″	A	4	"	12.1	6.1	19.8	" " " " "
" "	1-4″	B	5	"	12.0	9.1	15 5	" " " " "
" "	1-2″	B	5	"	8.0	5.5	11.0	All came away from brick (mortar dry).
Natural Cement 1. Sand 1 1-2	1-4″	A	5	"	22.3	8.0	32.1	" " " " "
" "	1 2″	A	5	"	29.0	24.0	33.0	" " " " "
" "	1-4″	B	5	"	75 0	25.0	118.0	2 came away from brick, 3 sheared.
" "	1-2″	B	3	"	85.0	43.0	118.0	1 " " " " 2 "
" "	1-2″	B	3	In water.	38.0	34.0	42.0	All came away from brick.
Portland Cement 1. Sand 3	1-4″	A	3	In air.	10.6	10.2	11.6	" " " " "
" "	1-4″	A	3	In water.	13.0	10.2	16.4	" " " " " The brick which was on top in the original laying always sheared 1st and at a less load than that of lower one, which, of course, set under twice as much load, or pressure.
" "	1-4″	B	3	In air.	16 5	9.2	24.2	" " " " "
" "	1-4″	B	3	In water.	27.1	20.2	36 9	" " " " "

A. Common, flat, unkeyed salmon brick.
B. La Prairie pressed brick, key on one side.

3. That the pressed bricks keyed on one side only give higher results than common bricks, and therefore that the adhesions to a pressed-brick surface on which the shears took place are higher than to ordinary brickwork.

4. The average of three natural cement tests which sheared through mortar was one hundred pounds per square inch, giving the true shearing strength; if the bricks had been keyed on both sides, no shears could be obtained through the Portland cement mortar.

5. Tests made on specimens kept in air showed conclusively the superiority of rich, natural cements for this kind of work, which is usually in air, over Portland cement mortars with a *heavier* dose of sand.

It was found that mortars must be very soft to give the best adhesive results, but this is probably old history.

With such facts as the above at hand, using the coefficients of friction obtained above, we can estimate fairly well what resistances such surfaces will offer against one course sliding over another.

Because this action seldom takes place is no reason for disregarding it; on the other hand, a knowledge of such points may enable us at times to economize in our design by counting in this adhesion along with our friction, which is usually looked to, to prevent sliding one course of masonry over another.

CECIL B. SMITH, MA. E.,
McGill University,
Jan. 15, 1895. Montreal.

SAULT STE. MARIE, MICH., Jan. 31, 1895.

EDITOR OF THE BRICKBUILDER, Boston, Mass.

Sir, — Without wishing to criticise the valuable article of Mr. Fred. T. Hodgson, C. E., on "Concretes, Cements, and Mortars: Old and New," which so abounds in practical hints, it may be of interest to call attention to a few points which appear to admit of question or require some explanation. It seems probable that in the very commendable effort to put a large subject in a small space, Mr. Hodgson may have left erroneous impressions on some of those readers of THE BRICKBUILDER who have not had time to look into the subject of cements very thoroughly, but who are, nevertheless, glad to receive such concisely stated information on the subject as Mr. Hodgson presents.

In the last paragraph of his article in the December number the inference would seem to be that two hundred and fifty pounds per square inch for briquets of neat Portland cement at the age of seven days is a high requirement. The present writer does not know of an English "standard," but turning to some of the best authorities on the subject we find that even as long ago as 1870, Mr. John Grant required three hundred and fifty pounds per square inch at seven days on the London Main Drainage Works. In 1890 Mr. Henry Faija, who was an eminent English authority, recommended three hundred and fifty pounds, and in 1893 he recommended three hundred and fifty to four hundred pounds per square inch. Mr. Maclay, of the New York Department of Docks, specified three hundred pounds per square inch in 1891, and many specifications require from three hundred and fifty to four hundred and fifty pounds per square inch.

On page 17 of the January issue the statement that the finest ground cement is the heaviest may be due to a misprint. Fine grinding of course lessens the weight per cubic foot.

The ratios given for the strength of various sand mortars to the strength of neat cement mortar may apply for short-time tests, or for a poor quality of cement or sand. Combinations of good sand with good cement give better relative results than are shown in the table of Mr. Hodgson. Conclusions drawn from the experiments of others are given in the following table in connection with those stated in the paper. The ratios are only approximate of course: —

Parts Sand to one of Cement.	Ratios of strength of Mortar to the strength of neat Cement Mortar.					
	F. T. Hodgson, C. E. Proportions by Volume.	John Grant, Proportions by Volume.	E. C. Clarke, Proportions by Volume.	I. O. Baker, Proportions by Volume.	Annual Report for 1893 of Col. O. M. Poe, Corps Eng'rs, U. S. A., Proportions by Weight,	Gen. Gilmore, Results at 1 year.
0	1	1	1	1	1	1
1	1-2	3 4	3·4	3·4	1	2-3
2	1-3	1-2	2-3	3-5	3-4	2-5
3	1-4	1-3	1-2	1-2 nearly	1-2	3-10
4	1-5	1-4		1-3	1-3	1-5
5	1-6	1-6	1-3 nearly	1-4	1-4	1-8

The statement on page 18 that "cements that set quickly in air harden slowly under water, and should not be used in such positions," is a very remarkable one. There are special reasons for using a quick-setting cement for submerged work. It is true that it is the general opinion that the ultimate strength attained by a quick-setting cement is less than that attained by a slow-setting one, but the advantages in the use of the former frequently outweigh the objection. *Extreme* activity is undesirable for obvious practical reasons as well as from the fact that cements that set in a very few minutes are apt to be defective.

That "all good cements require to be used immediately after mixing, or they will set on the mortar board and become useless": and that "poor cements may stand longer, as they do not set so quickly," are also statements that would seem to require modification The author cannot mean that all good cements set "immediately," since he has said that cements that set quickly in air should not be used under water. Some cements which set in from twenty to thirty minutes and are thus "quick setting" are good, and on the other hand "good" cement may take from five to ten hours to set. It is also a fact that the opinion is gaining ground that mortar of moderately slow-setting cement may be left sometimes on the mortar board and remixed before use without injuring it, though of course this treatment is very liable to abuse.

L. C. SABIN.

BELOW we give the address of Mr. Robert Bevan, chairman of the meeting recently held in London by English manufacturers of Portland cement, for the purpose of forming an association to prevent he adulteration of cement.

In addition to Mr. Bevan's address, we print extracts from the remarks made by Mr. Leedham White, a prominent English manufacturer of Portland cement.

MR. ROBERT BEVAN. *Gentlemen*, — This meeting of cement manufacturers has been convened, not for the purpose of debating whether an association should be established, yes or no; you may take it that virtually an association is established to-day. Of course, those who form this association will be exceedingly glad to welcome every cement manufacturer who is prepared to join the association, under certain conditions, and those conditions I will explain presently. There may be differences of opinion amongst some of you. I dare say there are. I should judge that there are from the tenor of the correspondence that has come from the different cement manufacturers to Messrs. Renshaw, Kekewich & Smith, who convened this meeting. One or two of you have thought that the Chamber of Commerce of London would be the proper association; but I would just answer that suggestion by suggesting to those gentlemen who took that view that if the Chamber or Commerce had been desirous or competent to deal with this special subject which is under consideration, why have they not already done it? I really do not know what the names are of the members forming the Cement Committee, as I think it is called, of the London Chamber of Commerce; but it is just possible that they may be even members who have lent themselves to the practices which we reprobate. We, however, think it exceedingly desirable that this association, the purpose of which is single and restricted to one particular object, should be composed of those members of the trade who have utterly clean hands. We do not want to take advice in regard to the ulterior proposals that may be suggested for putting a stop to this very dangerous and inexpedient practice of adulterating. We do not propose to be associated with those who have not an entirely clean slate. It has been suggested — I think it was suggested in one of the public prints, but at all events it has been suggested among some who take a very great interest in this matter — that it would be desirable and absolutely necessary that those who become members of this association should be willing to sign a statutory declaration, taken before a commissioner of oaths, and I will read you the form of the statutory declaration which is suggested: —

"I, So-and-So, managing acting partner of the firm of Messrs. So-and-So; and I, So-and-So, resident manager of the cement works of Messrs. So-and-So, situate at": or in the case of a company, —

"I, So-and-So, managing director of such and such a company, and I, So-and-So, resident manager of the cement works of So-and-So, situate at So-and-So" (and where there is a limited company having several works it would be necessary that the managing director and the foreman or manager of each separate works should sign) "do solemnly and sincerely declare, that I am well acquainted with the practical manufacture of cement as carried on by the said firm or company, and that, according to the best of my knowledge, information, and belief, the said firm or company have not on any occasion, during the last three years, or within my knowledge at any other time, brought to and added to the calcined product of the kiln, in passing through the crushers or millstones or grinding machinery, or any other subsequent process, a separate supply of raw Kentish rag stone, other stone, furnace or oven ashes, disused or exhausted fire bricks, or any other material, so that such added material would be ground, sifted, or mixed together with the cement, and form part of the cement powder, and sent out and sold the cement in this state. And I make this solemn declaration, conscientiously believing the same to be true, and by virtue of the Statutory Declarations Act, 1835."

Now, gentlemen, of course, I am not going to suggest to other people to do what my firm are not willing to do, and have not done. There (*producing a document*) is our statutory declaration signed by our managing partner, Mr. Edmund Beven, and signed by Mr. James Weeks, the resident manager of our cement works. Now, of course, some gentlemen, I can readily understand, will rather object to sign this. Then, gentlemen, they are not eligible to be members of this association, that is all. Those who can sign it, I rather suspect, will sign it; but those who cannot sign it — of course I do not at all wish to say positively that every one who can sign it will, but I rather suspect that they will: but whatever view will be taken about signing this declaration, it is not a question for debate, because there are those who are willing to sign it, and, therefore, that is an association. But those who take a different view and think that something else ought to be signed — either that it may be permissible to mix these matters — and I understand from conversation that has taken place that there are one or two manufacturers who think it very permissible — if that be so, why, they can have another association, and they may call it what they like. It may be an Association for the Propagation of Adulterated Cement (*laughter*) or any other association that they please: but you will see from the way in which I have put it to you, that it is not between you and those — between any of you and others of you who are willing to become members of this association — it is not a debatable subject, whether or not an association should be formed, or whether or not if an association is formed this declaration will have to be undertaken. That, you see, is a settled matter, and that we do not debate. Then, of course, it may very properly be said by gentlemen here, "Well, but this comes upon us rather suddenly, and you know our Board of Direction does not meet for a few days, and we are individual members of the board, and we must take the authority of our board for the decision that we come to." Well, nothing can be more reasonable than that. Of course, this meeting will have to be adjourned. I can easily conceive that there are several and I trust a good many — and I trust all of us — who will be able to sign this declaration, and who are therefore eligible; but there may be a good many who cannot give a definite answer to-day, not being instructed by their board; and therefore nothing can be more reasonable than that there should be an adjournment of this meeting. But the purpose of an adjournment of this meeting is only to receive the signatures of those who will sign this declaration, and it is not at all for the purpose of debating whether it is an expedient thing, — whether you think it is for the advantage of the trade, or for the disadvantage of the trade. It is settled that there will be an association, and it is settled that no one will be a member of this association who cannot, under a statutory declaration, make this statement. I have told you that my firm have signed it: therefore, I think, at the present time, very little more remains to me than to invite the gentlemen who are able, without consulting their boards, or who are in a position to say that they are prepared to become members of this association on these terms, to express their willingness to sign. There is a gentleman here, a commissioner to receive oaths (*laughter*) who will be happy to take the statutory declararion (*laughter*) of any gentleman who would like to sign; so that you see everything is in an exceedingly businesslike shape, and in a forward state. I have no doubt that there will be some who will be quite willing to sign.

Mr. Leedham White. I wish it to be understood that I am not here to blow my own trumpet, or to advocate or push the firm of J. Bazley, White & Brothers; I am here speaking, as one who wishes to speak straightforwardly of what I know about the trade in general. Of course, this refers to the export trade. Now, my experience of the export trade, as the largest shippers of the article, leads me to exactly the opposite conclusion. I believe, on the contrary, and I say so, as having recently come from one of several visits to the United States, that the stress of competition, especially competition with these inferior foreign brands of natural cements, which are not really Portland cements at all, has put English firms on their mettle, and that not only we, but many other English manufacturers, who send cements all over the world, are actually sending even better qualities than we did a few years ago. I think it is most unfortunate, to say the least, that such statements, which are absolutely devoid of all foundation, should go forward at the present juncture to the public. I admit, gentlemen, that we have been distanced by German skill, and German competition, which is a different thing. I am most anxious that we should not be debarred from imitating German skill, — but that is the next point for us to consider, — because we have much to learn from the Germans. Otherwise, as I say, I came into this room in no hostile spirit to this proposition, and to what I supposed were the objects of the meeting, but rather prepared to indorse them. But whereas, on the face of that circular, it was impossible to read any other meaning in it, than that we were invited to come to this room to confer together as to the founding of an association, we are now asked to join an association which it is said has been already founded. Founded by whom, I should like to know? Any three tailors in Tooley Street might get up an association, and ask others to join it. We intend to join no association without very careful inquiry as to what lines that association intends to go on, because we do not want to be debarred, as people who intend to make progress in every shape and way, from taking advantage of scientific research. When I came into this room this afternoon I was perfectly ignorant as to this matter of Kentish rag stone, except from comparative hearsay, inasmuch as not a ton nor an ounce of that material has ever been used in any one of the four works under the control of J. Bazley, White & Brothers.

The Cotton States and International Exposition Company, Atlanta, Ga., intend to build in the grounds over "Clara Meer" a decorative concrete arch one hundred and fifty feet long. Plans from Mr. Fr. von Emperger, New York, are under consideration.

THE MASON CONTRACTOR.

A Department conducted in the interests of the Builder, and the Contractor for Brickwork.

ORNAMENTAL BRICK ARCHES.

IT often becomes necessary for the mason to cut his own arches, especially in the smaller buildings, and to do this correctly he should have a thorough knowledge of the manner in which to proceed. Of course in many of the larger structures the arches come on the job already cut, and all the mason has to do is to pick out the numbers and proceed to putting them in; but even if these ready-made arches are used, it is always best for the mason to know how to draw and cut his own.

The bricks used in these arches always show their thickness or edge in the face of the wall, which thickness generally being the full width of the brick at the extrados or outside of the arch, and diminishes toward the soffit or inside. This splay is termed the "sommering" of the arch.

The bricks used in external arches should be cut and rubbed with great care to the necessary wedge-like form, according to the gauges or regularly measured dimensions. This is not always done. Bricklayers are generally allowed sufficient time to rub the *outside* of each arch brick properly, so that their work may have a handsome appearance to the eye, but often slur over all the other parts of the work which are hidden from view. Hence in order to save time they are very apt to cut away the inside of the bricks of their arches to such a degree as may even deprive them of their proper wedge-like form everywhere except at the external surface. This neglect produces cracks, and causes the arch to bulge forward, and may even cause one of the bricks of a straight arch to drop down lower than the soffit at bottom of the arch, which defects may be frequently seen over the windows of many brick buildings. It is well known that all ornamental arches generally are nothing more than mere shells, as far as strength is concerned, and support only a portion of the outside of the wall. But if properly executed, well cut, rubbed, and set, they answer the purpose for which they are designed. It is therefore necessary that the mason should know this branch of the trade thoroughly.

Subjoined I place before him the forms of the principal brick arches in use throughout this country, and when he is called upon to construct any of these in practice, all that is necessary for him to do is to apply the rules for designing them as laid down here.

Every mason should have a pair of compasses, a T square, a set square, a drawing board, and his rule, and practise the drawing of these arches he is often called upon to construct.

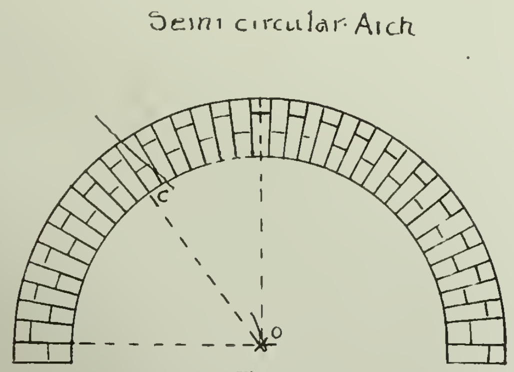


Fig. 1.

To draw and build a semicircular arch, place the point of the compass at the centre *O*, and with the radius *O C* describe the inner circle, which will answer for the soffit (see Fig. 1), then with the same centre describe the outer circle according to the depth required. The number of courses in a semicircular arch is determined by finding how many thicknesses of a brick (the kind to be used) are required at the extrados of the arch, allowing for the thickness of the joint, which is generally one eighth of an inch for pressed brick, and from these points of division drawing to the centre of the arch will determine the splay, and give the rule for rubbing the brick to their proper form. It must be remembered that all *bonded arches* must be spaced off into an odd number of courses, and the proper way to do this is to lay out the *key brick* first, divide it in the centre of the perpendicular line, from which space downwards to the springing line of the arch, making the number of spaces alike on both sides. The soffit line for the brick of the arch is got by placing a set bevel across the space occupied by one course of brick on the soffit line; this is reversed for the brick on the extrados line.

The segment arch may be worked in the same way as the preceding one, the only difference being in taking the centre line to strike it with. This is taken in the perpendicular line below the span, with radius according to the rise required, and this is the point to which all lines must be drawn, both to get the skew back, also the size of the course. (See Fig. 2.)

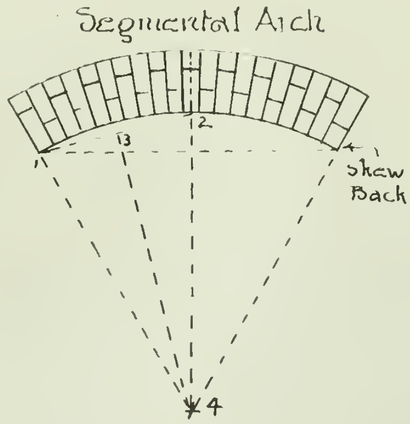


Fig. 2.

Draw the tangent line 1 2, bisect it at the point 3 at right angles with the line 1 and 2, which gives the line 3 and 4, the intersection of which with the perpendicular gives the centre from which the segmental curve of the arch is drawn, and also the point from which all the joints of the arch must radiate.

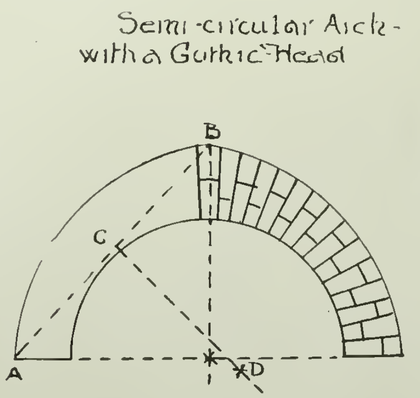


Fig. 3.

Semicircular Arch with Gothic Head. — To draw the outside portion of this arch, it is necessary to draw the line *A B*, bisect it at *C*, draw a line with the set square from *C* (see Fig. 3) at right angles with A and B to any point D, and upon this line the centre is taken to describe the outside curve of the arch according to the haunch required: and the inner ring must be divided in the same manner as the outer ring of the semicircular arch, but the bevels for the tops must be taken separately. If the depth of the arch be very deep, this inner circle must be so divided that the joint at the outer circle may not be too large.

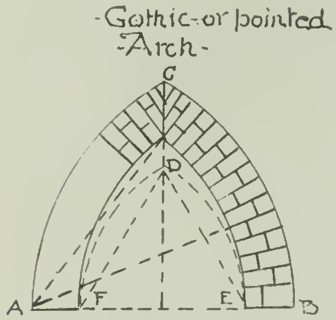


Fig. 4.

The Gothic or Pointed Arch. — (See Fig. 4.) Set out with the width of the arch A B on the horizontal line, then with A for centre and the distance A B for radius, describe the arc C B, then with A E as radius and with the same centre describe the inner arc D E; this forms one side of the arch; then with B as centre and same radius used for first half, describe the second. It will be observed that this is not the equilateral Gothic arch, which is shown, however, by the dotted lines within the pointed arch, and described by using the centre E and F, and is built as follows according to the pointed Gothic: Divide the extrados into courses according to the size of the bricks, and draw the lines to the point A as shown, taking care in dividing out the courses that half a course shall be on each side of the perpendicular line at C to answer for key brick. The bevel once set will answer for the whole of this arch, the same as semicircular. The mason should observe with attention the manner in which this arch is keyed, for in practice pointed arches are often botched in a ridiculous manner in this respect, simply because the mechanic did not know how to design it or was not allowed time to execute it properly. The best way is to draw the full size of the arch to be constructed first, form your moulds, cut and rub your brick to them, then, when everything is all right, put in your arch as quick as possible.

Sometimes the Gothic arch is cut as represented in the following figure (see Fig. 5), but it is very seldom, on account of the extra work in soffiting the bricks, for in this case each course must be cut to a separate bevel, and the lines for each course must be drawn from the centre O.

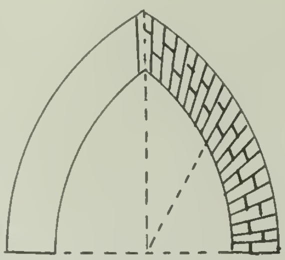


Fig. 5.

Modified Gothic. — (See Fig. 6.) To cut this arch it is necessary to draw the lines A B and B C at D and E, and from these points of bisection draw the lines to the points F F with the set square, and upon these lines the points are taken to describe the arch according to the depth required. The extrados is then divided into courses and lines drawn to the points F F, for the wedge shape of the brick if the arch is to be cut, in the same way as the Gothic arch; but if it is to be *keyed* in with an upright key, the lines must be drawn to the centre O.

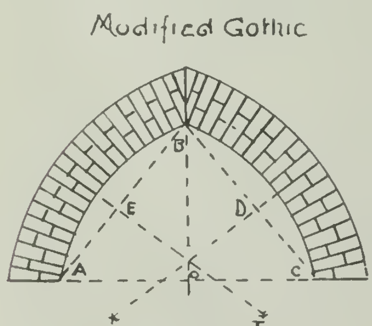


Fig. 6.

Segment Gothic. — (See Fig. 7.) To draw the segment Gothic, lay out the span A B, and describe the soffit from the perpendicular line according to the rise required as at O, the extrados of the arch is obtained as shown for the *modified Gothic.* Care should always be taken in laying out the courses of this arch that the key may appear as shown in the cut. The wedge-shape form of the brick is obtained from the centres C C. The soffit and cross joints are obtained from the centre O, but the extrados line of the arch must be cut from the centres C C, also the line of skew back.

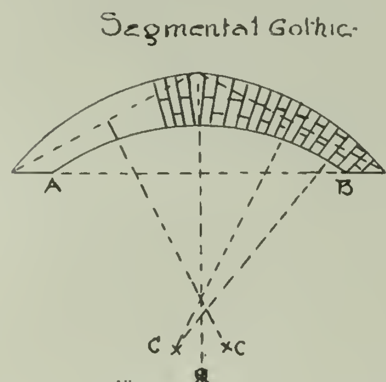


Fig. 7.

Camber Arch. — When the curve of the segmental arch is very flat, the centre from which it could be described is very distant from the intrados of the arch, the brick have their joints converging to points near the arch, and are all therefore cut to different forms, the arch is called a *camber arch.* It will be seen that in a straight arch of this kind no two bricks are alike on the same side of the key, but those on the opposite sides correspond with each other, pair by pair. The ordinary way to describe this arch is to lay out the width of the opening, draw the soffit line with a *camber slip* (a piece of board one half inch thick and as long as the opening, and triangular in shape, having a rise of one eighth inch to the foot toward the centre of the opening), bisect the perpendicular line with C as centre and C B as radius. This is the point to which the lines are drawn to get the proper skew back. It is then necessary to measure the bricks to see how they will work. If two and one half inches, set of one and one fourth inches on each side of the centre line A, and draw lines to the point C, as shown; this will give the shape of the moulds, of which there ought to be three, made of stiff cardboard, and about eighteen inches in length. If the arch is to be one foot in depth, and in proportion if more or less, then mark them all about three inches from the narrow end. Fix one of these upon the centre line as shown at A, so the line above mentioned shall be exactly at the soffit line of the arch, and then trace the other two alternately toward the skew back, keeping each line on the moulds to the soffit line each time. The bevels must be taken for each course, and marked on the mould ready for working. One bevel will answer for soffit, cross joint, and top of each course, if it is reversed for the two last named (see Fig. 8); but sometimes it would be best to leave the tops and cut them when setting the arch, for very often mistakes are made in taking the length of the courses with the templet. Be sure and have the cross joints in this arch level and the courses uniform. Plain as this arch appears to be, it is however difficult to execute properly in practice; the full size of the arch should be drawn first, and the moulds taken as described, of course allowance being made for the joint when the cardboard is being cut for the mould.

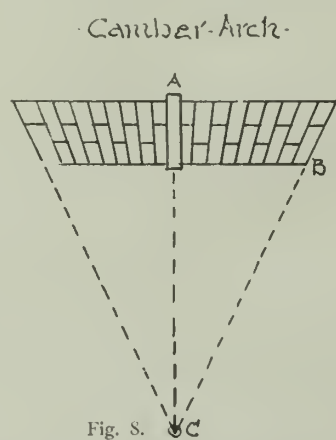


Fig. 8.

ARCHIE.

(To be continued.)

THE MANUFACTURER.

TIDINGS OF SPRING. — THE NEW ENGLAND MARKET.

AT this early day it is rather unsatisfactory to attempt to predict the building movement of the next season, especially in view of the unsettled condition of financial and business affairs. All that can be done is to state the conditions as they exist to-day in Boston and throughout New England, and to tell of the outlook as it now appears.

Brick building in Boston last year was unusually light up to the first of September, when a revival took place, which brought the total number of permits for new brick buildings to three hundred and ninety against three hundred and seventy-one the year before. This gain over the preceding year has been continued into 1895, and the permits granted up to middle of this month numbered forty-two, compared with thirty-four during the corresponding period of 1894, showing an increase of nearly twenty-five per cent, and this in spite of the unusually severe weather during the last three weeks.

There are reasons for believing that this increased activity will continue. It is generally conceded that the building of brick structures, stores, warehouses, and apartment houses has not been as large in comparison with the demand as has that of frame dwellings in the outlying wards and the suburban cities and towns. Frame apartment houses over three stories in height, now forbidden, will be allowed if certain amendments now before the Legislature, and likely to pass, are enacted. The increasing value of land in such districts as Roxbury and Dorchester, and in the centres of such places as Somerville, Cambridge, and many of the other cities of New England, make the erection of brick tenements and apartment houses more and more profitable and economical in the long run.

Another factor that is leading builders to use brick instead of wood is the nearer approach of the cost of the one to the other, the difference being narrowed constantly and, especially on high-priced land, making brick the cheapest material, considering what is obtained in the end.

The law which requires the fireproofing of the lower story and basement of a dwelling or tenement house, when the first story is used for other than domestic purposes, is very likely to be repealed. In fact it is almost sure to be, the insurance companies as well as the city and the builders being united in this movement. This will mean much to the brick makers, for the present law has put a stop to the building of houses with stores in them except on the highest priced land. It is believed that this change in the law will lead to a renewal of activity in the South End, and also the remodelling of many dwellings into stores on such streets as Columbus Avenue and Tremont Street, where the conditions would not warrant fireproofing as noted, but offer inducements to improvement without it. Even in the case of old buildings which are not entirely torn down this will lead to an increased demand for front brick, for in nearly every case a new front, more or less elaborate, is constructed when the alterations are made.

Another matter before the Legislature that will interest the terra-cotta manufacturers is a proposed amendment doing away with the masonry arches between the iron or steel beams in the construction of floors in first-class or fireproof buildings. This amendment would allow the substitution of wooden floors protected by fireproofing, such as metal lathing and plaster on the under side of the lower floor.

A number of large buildings in which brick will be used for the walls are in process of erection, or will soon be started in Boston. The most conspicuous and the largest is the new Tremont Building, to make way for which the old Tremont House is being torn down. It will have the eight upper stories built of light-colored face brick, and will cover a lot of nearly twenty-five thousand square feet. Winslow & Wetherell are the architects, and Norcross Brothers the contractors.

The Devonshire Building, of which Woodbury & Leighton are the builders, is another large office structure which calls for front brick. It will be on Washington, State, and Devonshire Streets, and the foundations are now going in.

Two large apartment hotels of brick are to be erected on Commonwealth Avenue. E. B. Horn is to build one, six stories in height, a short distance west of Massachusetts Avenve. Henry S. Mackay, of Mackay & Dunham, the architects, will build the other, between Hereford Street and Massachusetts Avenue. It will be ninety feet front and six stories high.

A new eight-story building is to go up on the corner of Tremont and Winter Streets, and another on the corner of Court Street and Cornhill. Both have been planned by Winslow & Wetherell, and brick and terra-cotta will be the principal materials used.

Even one not particularly interested in building must have noticed the great increase in the use of face brick and terra-cotta of late years in this vicinity. The State Street Exchange and the Ames building are almost the only conspicuous instances of the use of other material in an important mercantile structure recently erected, and both of these were erected before adoption of the steel frame principle of construction.

In the rebuilding following the disastrous fire of Thanksgiving day, 1889, brick was used in place of the stone that had melted before the flames. The new Farlow Building, a fireproof structure, which is going up on Lincoln Street, in place of the brownstone building destroyed in 1893, is to be built of brick. On the other side of Lincoln Street, on the corner of Essex Street, the Fred. Ames estate will build three five-story red brick buildings, aggregating over twenty thousand square feet in ground area.

A conspicuous illustration of modern construction, and a comparison with former methods showing the increased use of brick and terra-cotta, may be seen by any one who stands in Post-Office Square and looks first at the life-insurance buildings between Congress and Pearl Streets and then at the new Worthington Building on the corner of State and Congress Streets. The former are good examples of the employment of the heavy stone construction once so popular, and the latter of the newer school which employs the steel frame and the brick walls.

The beauties which lie in brick and terra-cotta skilfully handled are strikingly brought out in the new Castle Square Theatre, whose white walls and truly noble arch are a standing lesson in the artistic use of these materials, as well as objects of admiration to all who see them. Another building that has done much to show the possibilities of effective architectural work in brick is the Youth's Companion Building on Columbus Avenue, by many considered altogether the most satisfactory mercantile structure in Boston.

It is certain that not only has the use of clay products greatly increased the last few years, but that the demand for their employment in the best class of mercantile buildings is widening every day.

Considerable building of fine private dwellings on Bay State Road and other streets in the new Back Bay has been planned for this spring. The Roxbury "burned district" will also probably be rebuilt soon, and this time of brick. Driver & Dwight, architects, have plans for a large six-story apartment house in Dorchester, and W. A. & J. H. McGinty, for a large parochial school in the same district, both of which will be built this spring.

A demand has been made for a number of new schoolhouses for the city of Boston. Among those sure to be erected is a large one to be built on Myrtle Street.

Several large brick buildings will be erected by Ginn & Co. on First Street, Cambridge, to accommodate their publishing business. Another big brick building in the University city will be the new Middlesex registry of deeds, which will be begun some time this season.

The architects of this structure, Wait & Cutter, will also build an addition to the Lowell Court House.

Several new brick churches have been planned for suburban towns, among them a Methodist Temple for Cambridge, by Blackall & Newton, but this may not be begun this season.

In Lynn considerable new construction in the way of brick factories and mercantile buildings will take place, and several blocks are planned for Brockton.

Reports from Maine indicate a lively business there, and from all parts of New England come reports of a demand for new brick buildings, following reviving trade and industrial enterprise. It is impossible now to say that this promise of renewed activity will be fulfilled, but the outlook is generally regarded as hopeful.

Mr. F. N. Carter, Central Pressed Brick Co., Cleveland, has perfected a kiln which he claims is a great success in operation. He states that it is an entirely new departure from any kiln on the market, being built on the principle of a circular shaped continuous tunnel, so divided that the brick are subjected to a graduated heat from the green state to the maximum heat, and then gradually cooled to handling temperature. The manner of operation in this kiln is briefly as follows: the kiln itself is horizontal, the point of the greatest heat being midway in the circumference at equal distance from the two ends, wherein the circle of the whole is broken to admit of the entrance and extraction of the brick. The method of handling the bricks is as follows: they are laid in tiers of eight on specially constructed cars which traverse an iron track running through the entire kiln, and emerging at the same point, practically, as entering, after traversing the entire distance of the kiln. These cars are moved automatically in such a manner as to gradually approach the point of greatest heat, and after, to become gradually cool by passing from it to that of less temperature by the same onward movement of the car. Mr. Carter claims that the proper length of transit of this car to produce a properly burned brick need not to be over four days from the entrance of the green brick to exit of one perfectly burned. It should be understood that the principle of this kiln is continuous. One car follows another regularly, and as fast as may be; the speed being properly regulated to subject each car the required length of time to the burning process. The patentee claims that by his method of burning each brick may be made to assume the exact color of each and every other brick of the same composition; that the firing will be identical in degree of heat, and may be so regulated that absolute uniformity in burning can be guaranteed.

The Somerset & Johnsonburg Mfg. Co., are at present adding two new kilns to their works at Somerset, Mass. These have the capacity of twenty-two thousand each, and are built on the principle of the circular down-draft kilns.

The Tiffany Pressed Brick Co., Chicago, have secured the contract for the enamelled brick to be used in the new City Hall at Jacksonville, Fla. It is probable that the entire lot will be white enamel.

The Empire Fire Proofing Co., Pittsburg, are getting out material for the Moody Building at Buffalo. Messrs. Beebe & Son, architects.

The Industrial Press Brick Co., 46 South Street, New York, are making some alterations and extensions at their plant.

The Peerless Brick Co., Philadelphia, are about to increase the capacity of their yard.

The Winkle Terra-Cotta Co., of St. Louis, are building an extension to their works.