THE BRICKBVILDER

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DEVOTED TO THE ART, SCIENCE AND BUSINESS OF BUILDING

Index—Volume Twenty-two

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1913

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AN ARCHITECTVRAL MONTHLY

VOL. 22

JANUARY
1913

NO. 1

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THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

VOLVME XXII JANVARY 1913 NVMBER 1

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CHURCH OF PANHAGIA PAREGORITISSA
(THE VIRGIN OF CONSOLATION)
ARTA, EPIRUS, GREECE.

End of thirteenth century. Typical of the last flowering of Byzantine art. All the patterns are formed of simple combinations of common brick, squared stone, and colored tile.

THE BRICKBUILDER

JANUARY, 1913

VOLUME XXII. NUMBER 1.

Court House Planning.

ARTICLE I.—THE ESSENTIAL REQUIREMENTS.

BY JUDGE HENRY D. HARLAN.

THE court house is primarily the Temple of Justice, the place where the power and majesty of the law are vindicated, where wrong is righted, where life, liberty, and property are protected, where greed and oppression are rebuked, and where virtue, truth, and righteousness must have their habitation, or our boasted civilization and republican institutions are vain and unsubstantial shadows. More and more we are coming to recognize that our public buildings should be dignified and imposing structures, that in their architecture they should typify their uses and purposes, and that they should teach those who look upon them that there is no incongruity between beauty and utility. There are sound practical reasons as well as real economy in making the public buildings of a city contribute markedly to the beauty of the city, in making them impress the people with what they stand for and represent, in making the city itself a more attractive place in which to dwell and transact business. Every architect who is called upon to design a court house, one of the most important buildings of any city or town in which it is located, has offered to him a rare opportunity, the significance of which he should not underestimate, for service to his profession, to the public, and to the community. Nor does this mean wastefulness or extravagance in the use of public money, or unnecessary and useless additions to the tax rate. The exterior of the court house, and of this I am now speaking, need not have columns, domes, and towers or wealth of ornamentation and carving, to be dignified and beautiful. There is a beauty in form, in lines and in proportion, even in simplicity, which is of the highest order; but whatever the size of the structure it should by all means be an example of good, sound construction.

Building committees and commissioners do not always appreciate the significance of these considerations, and it is often by no means the least difficult part of the architect's work to make them see it. There is no model court house which may serve as a type for all others. Every state and city has its own system of courts. Sometimes a building must be designed for occupancy by one court, exercising a general and comprehensive jurisdiction and presided over by a single judge; sometimes for a number of courts of independent and separate jurisdictions, each presided over by one or more judges; sometimes for a court composed of a number of judges, who at times and for some purposes sit together, and at times and for other purposes sit separately and in different rooms. We might almost say "Of making many courts there is no end." We have long been familiar with Appellate Courts and Courts of First Instance for the trial of civil and criminal causes, with Probate Courts, with Admiralty Courts, and Equity Courts. But we now have Commerce Courts, Customs Courts, Appeal Tax Courts, Juvenile Courts; New York has a Domestic Relations Court, and the Chicago Vice Commission has lately suggested the creation of a Morals Court.

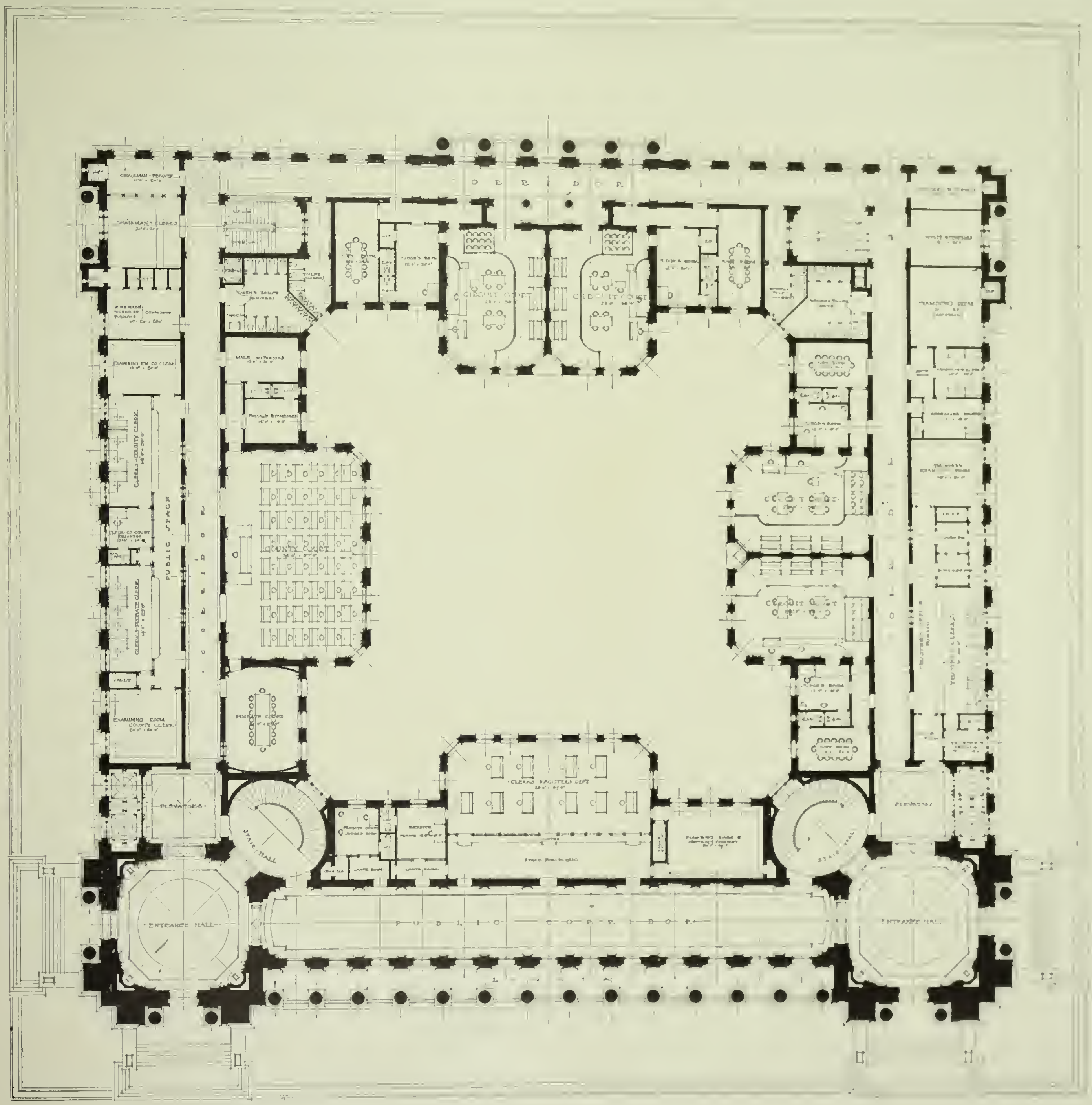
A constituent part of a court is the clerk, who is the custodian of the court records and indexes, is charged with the filing and preservation of the numerous papers, issues all the writs and process of the court, and makes an accurate entry upon his dockets of the successive steps that are taken in every case and of the judgment of the court, constituting a contemporaneous history of every cause. The court too has its executive officers, the sheriff or marshal who serves its writs and enforces obedience to its commands. It may fall to his lot to have the custody of a prisoner, who is on trial for his life or his liberty, of a refractory suitor or witness, who has been arrested for failing to obey the process of the court; or he may have been required to seize and hold property, pending a sale or other disposition. Then there are the bailiffs, the tipstaves, the criers, the interpreters, the messengers, jurors, witnesses, suitors, lawyers, and the public, all of whom have to be considered in connection with the accommodations that are to be provided in court house planning. Each court house is necessarily a distinct problem and the architect and building committee who would solve it wisely must understand not only the exact kind of court which it is to house, but must gain detailed information of the exact relation of the court to the public and to all its officers, with the functions which each has to perform and the amount and character of space required therefor. If we were to take the simplest form of a court, a court of one judge, whose jurisdiction was to hear and decide, with or without a jury, as suitors might elect, controversies arising out of breaches of contract or for the redress of injuries to person or property, this would involve a room for the hearing of these controversies, usually designated the court room, in which there would be proper accommodations for the suitors, their witnesses and lawyers, for the presiding judge and the jury and for the several court officers, clerks, sheriff, bailiffs, interpreter, stenographer, reporter, and for such reasonable portion of the public as might be likely to wish to attend. This court room or hearing chamber is the most important room and dominates the structure. It must have its lobby and certain subsidiary rooms, the judge's private room or chamber, one and preferably two jury rooms, to which the jury may retire to deliberate upon their verdicts, and witness rooms in which witnesses may be segregated when it is desirable, as it often is, to exclude from the court room all of the witnesses except the one who is testifying, and which rooms at other times are useful for consultations, or for taking care of persons who are taken ill, as frequently happens in the court room, or for the accommodation of mothers with babes in arms or young children who accompany their parents to court from necessity. All of these rooms should have direct communication with the court room and each should have toilet accommodations. The sole means of access to the jury room should be through the court room, so that no communications with a jury deliberating upon a verdict may be had except under the eye of the court. A model court room should also have connected with it a cloak room for the use of at least the jurors, lawyers, and court officers. Some of these subsidiary rooms may be placed in mezzanine stories and reached by stairs leading from doors opening upon the court room. In addition to the toilet facilities provided in the rooms subservient to the court room, at a proper place in the court house there should be toilet accommodations adequate for all whose business takes them there, as well as for the public. Few of our cities have sufficient public comfort stations, though these are now recognized as an essential of the up-to-date municipality. Public buildings afford an opportunity to provide public toilet facilities which should be considered. These should be an example of hygienic construction and cleanliness.

If the court has a civil, in addition to its criminal, jurisdiction, wherever, as is almost universal in the United States, the common law procedure for the trial of crimes prevails, provision must be made for the Grand Jury, an inquisitorial body, sitting in secret, inquiring whether there is probable ground to believe that some one has committed a crime for which he should be put on public trial, hearing sometimes a large number of witnesses, who are called before it one by one, and reporting the findings to the court, having frequent occasions for communication with the judge, the clerk of the court, and with the official prosecutor, generally designated the state's or district attorney, for whom also it is almost universal, and highly desirable, to provide suitable offices in the court house, convenient to the court, the clerk's offices, and the grand jury quarters. The clerk of the court and the sheriff must each be provided with suitable offices. The number and character of rooms which each may require will depend upon the amount of business passing through the court. If the latter is an active court, constantly in session, trying many cases, both the clerk and the sheriff will require a number of deputies. The clerk will require ample storage space for the constantly accumulating papers, records, and dockets, and as these are public records they should be capable of being stored so as to be accessible to the public and yet be under official supervision, to prevent destruction or mutilation. The sheriff will require, in addition to office room for himself and his deputies, one or more lockups, in which he may temporarily detain persons committed to his custody. Though this is not usual, I believe that the sheriff should be provided, either in the court house or elsewhere, a storeroom in which he may keep property taken under a levy and held for sale or other disposition under the direction of the court. Such a room would save litigants the storage charges which often make an execution fruitless.

As the court in reality consists of the judge, the clerk, and the sheriff, communication between these officials is frequent, and the accessibility of the offices of the clerk and sheriff to the court and to each other is a matter of importance ; but as the clerk and sheriff have functions to perform toward the public, the accessibility of their offices to the public must not be lost sight of. The court room and the offices of the clerk and sheriff should all be spacious enough for the present and provide for future growth. There are few of the court houses in the larger cities, even the newest ones, that, if they are not already outgrown, are not seen to be inadequate for more than one or two decades. Even the simplest form of court house, such as I have indicated, will offer to the architect an interesting study in heating, lighting, ventilation, arrangements, and construction. The court room itself is a hearing room and its acoustic properties are of prime consideration. The room may be one in which a practised orator could easily make himself heard, but even if lawyers and judges may be expected to be practised in public speaking, it must be remembered that the evidence by which the causes are to be decided comes from witnesses, many of whom are in unfamiliar surroundings, are frightened or timid and cannot be induced to speak loudly, and it is essential that they should be heard, not only by the lawyers, but by the judge and the jury. Nothing is more tiresome than continually reminding witnesses to speak louder, while the jury and judge are straining their ears in a vain endeavor to hear ; and this difficulty should be diminished as far as practicable by having a room in which hearing is not only possible but easy. The court room should be lighted by windows on *two* sides and preferably on two opposite sides. The proper heating and ventilating of the court room are scarcely less important than its acoustics. The audience in a court room fluctuates considerably, not only from day to day, but during the hours of the same day. The temperature of the room and the purity of the air are largely affected by the number of persons who are in it and the length of time they remain.

The plans and specifications of the court house must take into account the fact that all kinds and conditions of people come to the court room, the washed and the unwashed, the well and those bearing the seeds of disease, and it should be a room that is sanitary in its construction and appointments, and that can be easily and quickly cleaned. The ordinary court room for the trial of causes in the first instance is no place for plush hangings, carpets, and draperies. It should be as sanitary in its construction and furnishings as the ward of a modern hospital.

When we pass the simplest form of court house, suitable for a county seat or small town, and come to the elaborate structure needed to house the complicated and varying system of courts provided for our larger cities, with their numerous parts and officers, the architectural problem becomes more difficult and complex. Its satisfactory solution can only be obtained by a full understanding of the exact public functions the several courts perform, of their interdependence and their relationship to one another and to the numerous officials connected therewith. The vital questions of convenience of arrangement, of heating and ventilation, and acoustics are all presented in a more acute form, and the architect who, with the aid of the building committee, shall resolve them wisely has a task that may engage his best talents and most consummate skill. "Quo difficilius eo præclarius" is a motto that comes back to me in this connection, from my college days. If he succeeds he should be illustrious. In many of our cities where unfortunately and unnecessarily the smoke nuisance still prevails, the air which is to be introduced into the court rooms must be screened of dust and dirt, as well as artificially heated in cold weather or cooled in hot weather, to a proper temperature. The nearer automatic a heating and ventilating plant can be made the better; and whatever cannot be automatic should be as simple and as easily operated as practicable. I have seen the cheese cloth cut from screens when it became clogged with dirt, because this was easier than renewing it, and I have seen exhaust fans at the top of stacks left idle for long periods because they were difficult of access for purposes of oiling and repair, and because, in the absence of complaints on the part of the patient occupants of rooms, the operators thought they could be dispensed with.

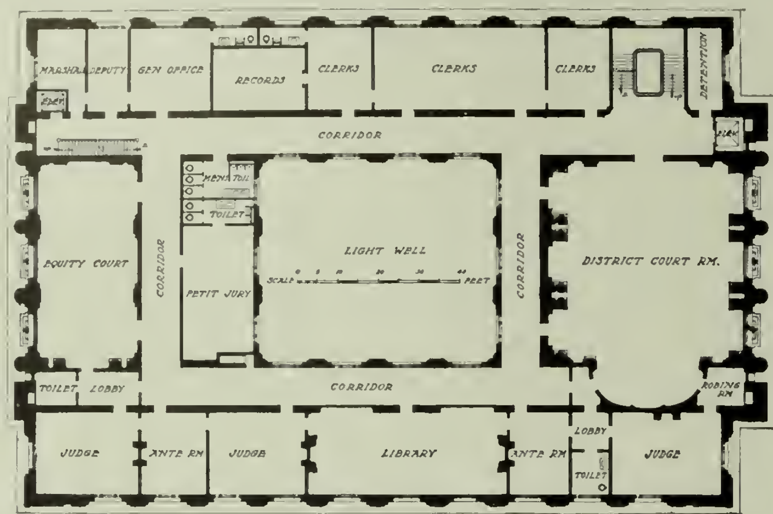


FIRST FLOOR PLAN.

SHELBY COUNTY COURT HOUSE, MEMPHIS, TENN.
Herbert D. Hale and James Gambel Rogers, Architects.

The problem of acoustics is often accentuated in cities by the street noises and traffic. If possible, the site of the court house should be sufficiently large to allow the building to be surrounded by grounds or gardens spacious enough to remove it from such disturbances. The architectural features of the building will not only be enhanced, but the grounds will afford a small public park.

The progressive city of to-day is concerned with city planning, and when a new court house is contemplated it should by all means be located so as to form part of the city plan or civic center where, with proper surroundings, may be grouped the more important municipal buildings. Where it is not possible to remove the court house from the street sufficiently to minimize street noises, probably the best that can be done is to place the offices on the exterior sides of the structure and to have the court rooms opening upon interior light courts. This arrangement has proved very satisfactory in some of the modern court houses whose façades are directly upon busy thoroughfares, such as the Baltimore and Boston court houses.



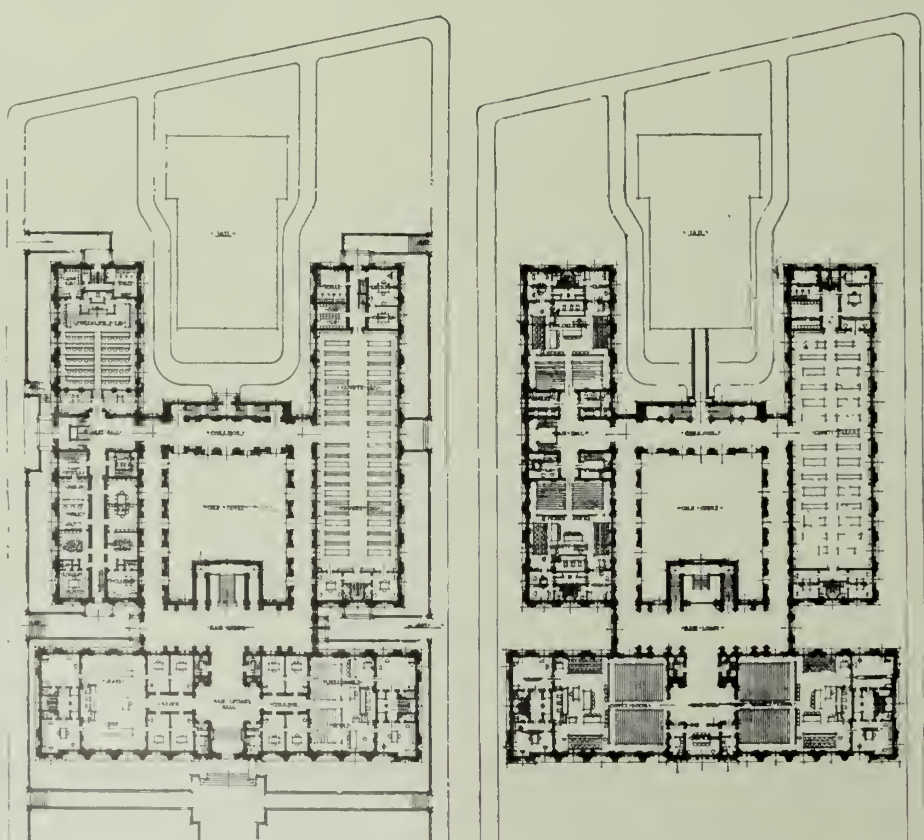
THIRD FLOOR PLAN.

U. S. POST OFFICE AND COURT HOUSE, PROVIDENCE, R. I.
Clarke & Howe, Architects.

The court houses of the country are usually the storehouses of the books and records containing the evidence upon which depends the title of all real estate, and every court house should, in addition to the other security it affords these records, be an absolutely fireproof structure. It should not only be fireproof, but it should have adequate interior fire protection. It was not only the character of its construction, but its interior fire equipment, which preserved the Baltimore Court House from more serious injury in the great conflagration which befell that city in 1904 and saved the citizens the untold loss and litigation which would have resulted from the destruction of the land records stored therein.

I probably cannot better close this paper than by accompanying it with the floor plans of the court house with which I am most familiar, having been a member of the building committee under which it was constructed, and, as a judge of the Supreme Bench which occupies it, having sat in every court room it contains and heard it variously praised and criticized.

It is a white marble building, resting upon a granite base of classic architecture of the Ionic order. It cost, exclusive of ground, $2,261,110.38. The building committee, appointed under an ordinance of the mayor and city council, and unpaid, was composed of business and professional men who were required to select the architect and plans of the building by a public competition among architects. The building committee first selected a professional adviser, the late Prof. Wm. R. Ware of Columbia University. Under his direction they prepared a prospectus of information for the use of the competitors. This information had been gathered from every person who had any connection with the courts — judges, lawyers, clerks, sheriff, and officials of the city. These

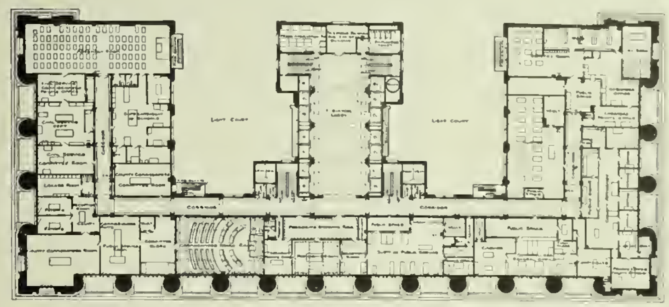


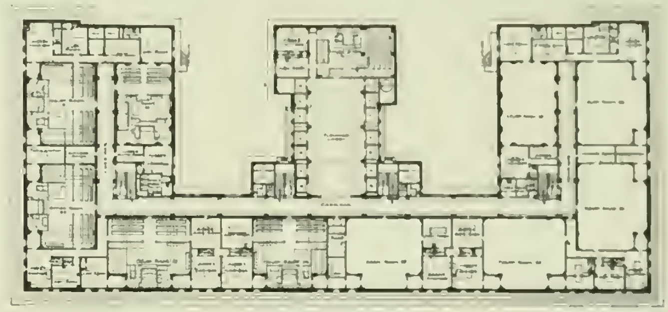
FIRST FLOOR PLAN. SECOND FLOOR PLAN.

WESTCHESTER COUNTY COURT HOUSE.
Lord & Hewlett, Architects.

were asked, in detail, what rooms they needed for present use and future growth, how they were to be used, how connected, how located with reference to courts and corridors, what size rooms were required, what papers and books they had to care for, what toilet accommodations, wash rooms, etc., were desired. All of the information was carefully gone over by the committee in consultation with the officers and with their professional adviser, and after the reasonableness of requirements was fully considered, the prospectus was compiled and issued to the architects in a printed pamphlet containing a description of the site, the difficulties to be overcome, the accommodations required in the building, and the rules of the competition. I am not here concerned with the merits of a competition, or the best method of conducting one, but as a result of the method adopted, a plan was found which offered a satisfactory solution of the problem, and when the names of the authors of the plan, J. B. Noel Wyatt and Wm. G. Nolting, were revealed, being recognized as competent and experienced in their profession, they were appointed architects of the building and commissioned to give to the problem more careful study on the lines of the plan submitted and prepare the detail drawings and specifications.

The building is not only notable for its architectural beauty, but it has, in use, proved in the main highly satisfactory. It was designed to accommodate a Criminal Court, three courts of ordinary common law jurisdiction (called respectively the Superior Court, the Common Pleas Court, and the Baltimore City Court), two Equity Courts, an Orphans' Court, and a Supreme Bench, at that time consisting of six members. The judges of the Supreme Bench sit together for a few purposes, but its members are assigned to hold the other courts, above mentioned, except the Orphans' Court, which has a separate bench of judges. Each of these courts has its clerk or register, and there is one sheriff serving the process of all the courts. The care and custody of the record books, in which deeds, mortgages, and other papers affecting the titles to land are recorded, are a part of the duty of the clerk of the Superior Court. The court house was also designed to accommodate the board of police commissioners and the marshal and deputy marshal of police, and the library of the Baltimore bar, with its many thousand volumes of law books. The site of the court house is a whole city block, and the surrounding streets are busy thoroughfares. The block was not large enough to withdraw the façades of the structure from the streets, and the problem of street noises had to be contended with. It was met, as I have previously indicated, by placing the more important court rooms on the interior of the building, with windows opening upon light courts on two sides, as many as six court rooms and the record office being so located. As illustrating how


FIFTH FLOOR PLAN.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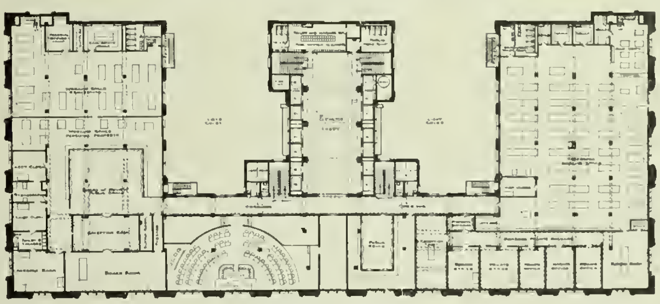
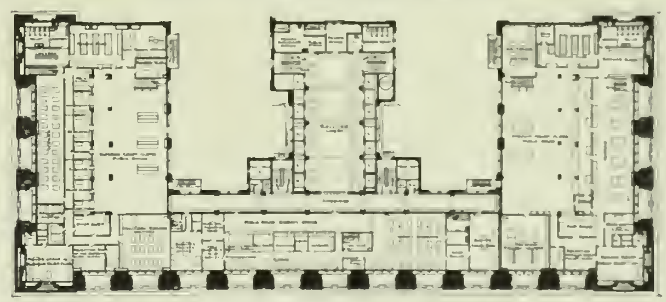
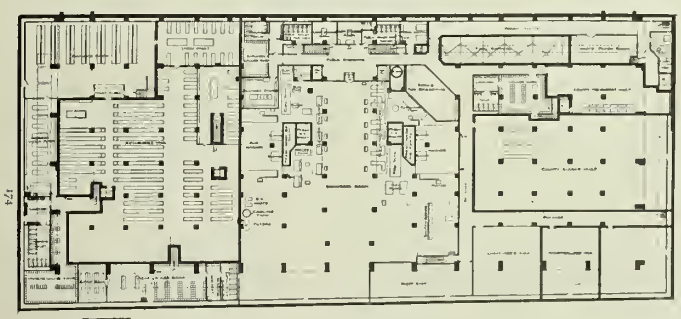
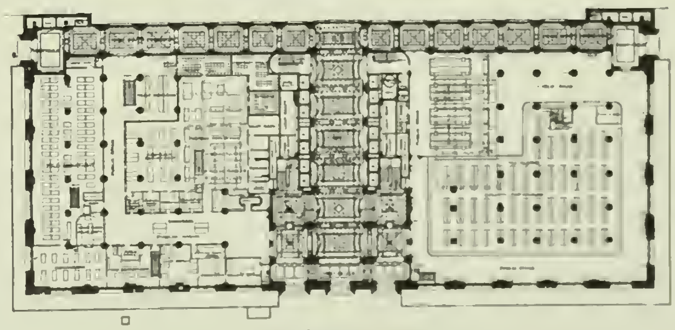

THIRD FLOOR PLAN.


FOURTH FLOOR PLAN.


BASEMENT PLAN.


FIRST FLOOR PLAN.

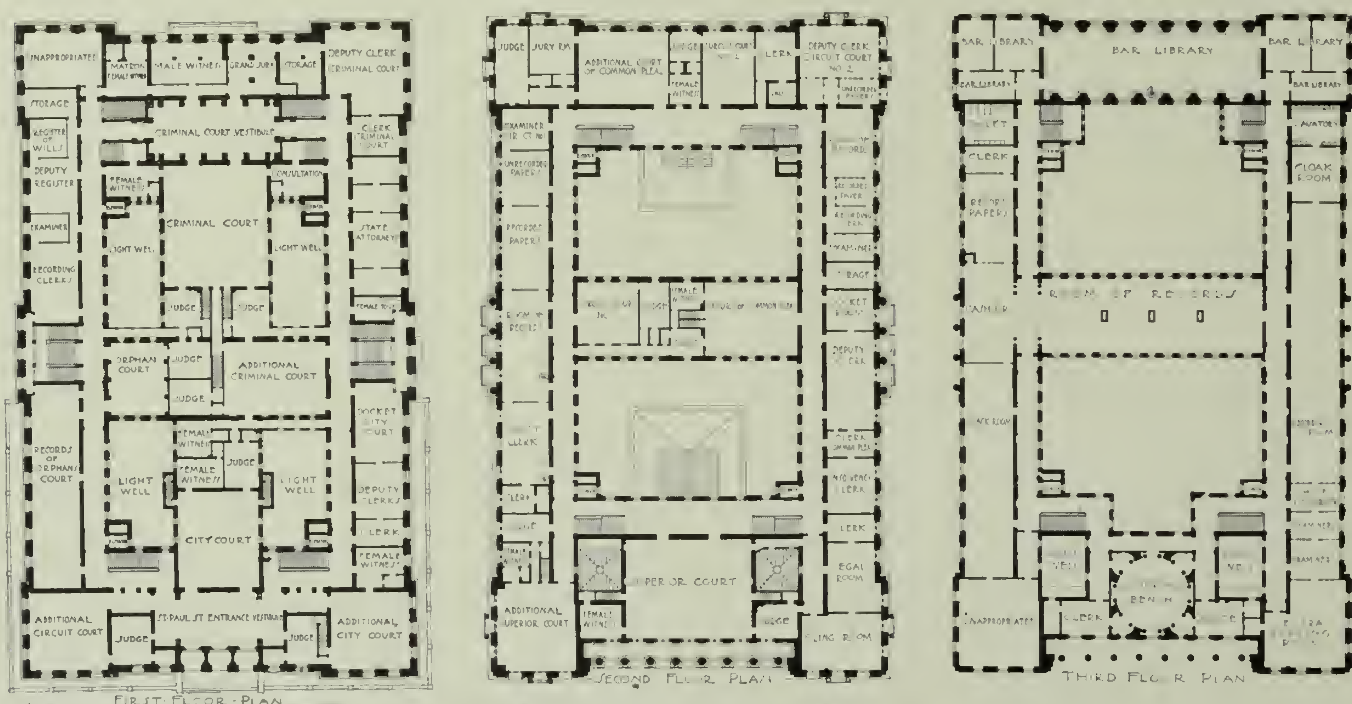
COOK COUNTY COURT HOUSE, CHICAGO, ILL.
Holabird & Roche, Architects.

difficult it is to anticipate the future, it may be mentioned that, inasmuch as but one additional court had been found necessary for the city of Baltimore in the preceding quarter of a century, it was thought that if additional court rooms were provided, which would allow the doubling of the Supreme Bench in the next half century, this would be sufficient. The court house had not been occupied for a decade, when four of the additional court rooms were already occupied by additional judges of the Supreme Bench and another by the judge of the Juvenile Court, a new tribunal which was not contemplated at all when the court house was planned.

The first floor plan of the Baltimore Court House will show the location of some of the principal court rooms on interior courts, and one of them, the Criminal Court, will serve as an example of a court room, of admirable dimensions, quiet, removed from street noise, well lighted and ventilated, sanitary, conveniently located with reference unload in a court yard away from the public, and ascend to the lockups where they are kept until their cases are called, and they enter the court room from the rear and out of the reach of public attack or possible rescue. The judge also has a private entrance to his chambers, from a side corridor, and ascends the bench without having to pass through that portion of the court room open to the public.

It is not often, fortunately, that our public officials are in danger of personal attack at the hands of individuals, but there have been and may still be such times, and both convenience and safety may be proper considerations in planning for the entrance of the judge to the court room. The marble screen around this portion of the court room also affords a cloak room.

The modern court house is coming more and more to be considered not only the Temple of Justice but a place where people may be taught the value and beauty of art,



THE BALTIMORE COURT HOUSE, BALTIMORE, MD.
Wyatt & Nolting, Architects.

to the clerk's office, states attorney's offices and the grand jury rooms, and with subsidiary rooms, sufficient in number, admirably arranged and answering well the purposes for which they were intended. This room is wainscoted in marble to the height of ten feet, and has a terrazo-mosaic floor, which can be washed in the night, and all the fixed furniture is of marble. The judge's bench is opposite the entrance from the lobby, and is in front of a marble screen of the same height as the wainscoting, which screen extends entirely across this end of the room and along that part of the adjacent sides which is behind the jury boxes. Behind this screen the jury retire to their rooms, which are in mezzanines below. The judge also retires to his private room behind this screen, and the prisoners are taken to the lockups in the basement, where there are separate accommodations for male and female prisoners, with toilets, and a room where they can consult with their attorneys out of the presence of the guard. The prisoners are brought from the jail in vans, which where the noble deeds of the past and the present may be commemorated by great mural paintings, and where the portraits and statues of great lawyers, statesmen, and citizens may be preserved.

No architect could of course sacrifice the utility of his building or any part of it to provide spaces for decorations, but he may well remember that some of the wall spaces may in the future, if not immediately, become places for such decorations, and he may take this into consideration when locating such things as flues and ventilators and electric lights. I have seen a splendid wall space rendered unsuitable for mural decoration by a hideous black register placed right in the middle of it.

Court house planning is full of interest, and while there are some matters which are common to the planning of all court houses, I must reiterate that each court house is a distinct and separate problem, the planning of which is worthy of any architect's best endeavor and most careful study.

A House of Unusual Architectural Merit.

THE THAW RESIDENCE, SEWICKLEY HEIGHTS, PA.

SELECTED FOR TREATMENT BY BENNO JANSSEN, ARCHITECT.

I WAS requested some time ago to write a short article describing briefly some country house which impressed me as having unusual merit from an architectural standpoint.

It has been my good fortune to find such a place near at hand, in Sewickley Heights. It is the property of Mrs. Wm. Thaw, Jr., and through the kindness of the family I was permitted to take numerous photographs of the place and inspect it thoroughly. In this house the unity between the landscape and the architecture is very complete, and the house looks as if it had grown from its surroundings in a very natural way. The proportions of this house are exceptionally fine and the grouping of the various parts is most successfully done. On entering the grounds from the main highway there is no sign of the house, only beautiful trees and planting, and only when within a very short distance of the entrance does the house come to view, as shown in the accompanying picture, the first view of this charming house. As will be seen, the long beautiful lines of the place are contrasted by the vertical ones of the poplar trees.

In the next picture will be seen the porte-cochère, which is a very useful one as well as being good looking. Passing from the porte-cochère to the main house through a gallery of some length one enters the main hall, directly under the fine staircase, which is of great beauty. On either side are coat rooms, and from here one passes to the garden site. The interior of the house is very charming and carried out in the best and simplest of taste, and it is seldom that I have seen an effect of such simplicity and artistic merit.

On leaving the interior of the house one enters a long porch, which can be seen in the ensemble of the house in picture of garden side of house. It runs the entire length of the house and is most comfortable. The view from this porch is very fine, and overlooks a beautiful country on which there are no buildings whatever and, hence, it gives the effect of a beautiful park.

There is a fine garden at one end of the house which is enclosed in pergolas, which in themselves are works of art, on account of their architectural simplicity and the magnificent planting with which they are covered. The little garden itself is exquisite in its layout, and I cannot describe the beauty that impresses one upon entering it.

THE PORCH.

On the other end of the house are the servants' quarters and service yard. This service yard is most skilfully and beautifully arranged, as the pictures illustrate. The level of this service yard is much lower than the level of the main terraces of the house, and it is entirely surrounded by walls which are beautifully planted. In this place is also the drying yard, and one would be at a loss to find where this necessary portion of the house is located. It is usually entirely too much in evidence.

STUDIO ENTRANCE SIDE.

The house is situated on the top of a hill, which slopes very gently in all directions and is a natural site, which was not difficult to build upon. The terraces are simply of grass, as will be seen in the photographs, and it was unnecessary to build large, heavy walls, as the ground did not necessitate it.

Another feature of this estate is the excellent way in which the stables, garage, and servants' quarters are arranged. They are built around a little garden yard entirely out of sight of the main house and at a much lower level, and the little buildings themselves are exceptionally attractive.

In conclusion I wish to say that I think this house and grounds have all the chief underlying principles of good architecture and good gardening, and it is merely for this reason that it is a success. The details and materials, however, are very important in the result. I regret that the photographs are not better than they are, as it certainly would be possible to get better illustrations of this place, but I hope that they will answer their purpose in showing to any one who is interested in beautiful architecture and landscape work a splendid example, and one which is full of inspiration for the architect, owner, and every one who has anything to do with this sort of place.

KITCHEN WING.

STUDIO ENTRANCE SIDE.

GARDEN SIDE OF HOUSE.

GARDEN VIEW OF HOUSE. THE THAW COUNTRY HOUSE, SEWICKLEY HEIGHTS, PA.

FORMAL GARDEN

ENTRANCE SIDE.

DETAIL OF PERGOLAS

INFORMAL GARDEN.

GARDEN END OF HOUSE

ENTRANCE SIDE.

GARDEN END OF HOUSE

DINING ROOM

BED ROOM

THE THAW COUNTRY HOUSE, SEWICKLEY HEIGHTS, PA.

Recent American Group-Plans.

IV.—COLLEGES AND UNIVERSITIES: DEVELOPMENT OF NEW PLANS.

BY ALFRED MORTON GITHENS.

AS the older American colleges have retained and developed the *Campus*, enlarging it as much as existing buildings permitted, so in most of the recent plans for altogether new sites, the Campus forms the central motive. The plainest and simplest as well as the more elaborate have given it great importance; the central groups of Piedmont and Rollins in the south and the George Peabody College in Tennessee are each nothing more than a Campus surrounded by separate buildings, a broad stretch of greensward bordered by paths or driveways with the buildings on the farther sides, just as the white-painted houses stretched along the marginal roadways of the Village-Green in Colonial New England. The long rectangular form has been changed to the "P" of Rollins College or the oval of Piedmont, or the T-shaped upper Campus of Peabody, but the similarity is clear; the marginal paths are edged by rows of trees or even colonnades to bind together the separate buildings beyond them.

These three are not competitive plans, given as an architect's personal conception, but the result of close personal contact between architect and client. As a type they show several usual desiderata of college trustees; for instance, in the wide separation of the buildings, that the wind may blow around and between them, in the possibly erroneous belief that thus they are better ventilated; further, that a fire might be more easily confined to one (this, of course, in a non-fireproof construction); again, that the president be able to point on the plan to a certain site and say to a possible future donor:

"This is the hall you must give; it will be a lasting memorial; you may name it Such-and-Such Hall; it is a unit in our scheme, part of no other building, and its design and details you may govern, subject only. . ." etc.

The Peabody College, on a much larger scale than the other two, is more formal and closely knit together in its parts, with varied levels of upper and lower campus and further extensions to the side beyond Hillsboro Road. The trustees desired that all buildings be connected under cover and had in mind the colonnades of one or two old Southern colleges and perhaps the University of Virginia, which Peabody College suggests in other ways; there is the same composition, and a stateliness in its architecture without a hard formality. The tree-masses of the Lower Campus enhance a certain softness, sweetness, humanness — whatever one can call it — furthered by several irregular groups of trees remaining in the Upper Campus, somewhat as Thornton suggested for the University of Virginia when he advised that "the site be chosen in the woods, clearing out whatever is not wanted, clumping the most beautiful and thriving of the forest trees in handsome groves, and leaving straggling ones occasionally,

PIEDMONT COLLEGE, DEMOREST, GA.
Beverly S. King, Architect.

ROLLINS COLLEGE, WINTER PARK, FLORIDA.
Whitfield & King, Architects.

Irregularly shaped Campus; Chapel as dominant on minor axis, which passes through Railroad Station and Stadium; the whole an unsymmetrical composition on two axes, defective in that there is no worthy building in place of honour at head of main axis.

PERSPECTIVE, GEORGE PEABODY COLLEGE, NASHVILLE, TENN.
Ludlow and Peabody, Architects; Warren H. Manning, Landscape Designer.
Forecourt and Campus, Instructional Buildings, natural woodland to remain cleared of underbrush; group at head of plan, Residential and Social, composed of Chapel and Fine Arts Museum surrounded by Dormitories. Sustained interest effected by the several terraced levels, each inviting exploration.

by which Nature may be so artificially imitated as to produce a perfect picture . . ."

On the contrary, in the new plans for Minnesota University there has been no attempt in any way to reduce the formality. Of the highest dignity, austere, cold; with Campus conventionalized until it is more the nature of a Court of Honour, these plans outdo Columbia in severity and recall the originally accepted Bénard plan for California, now discarded; clipped tree-hedges take the place of Thornton's scattered clumps; Nature is no longer "Artfully imitated"!

The "single great impression" has been attained — a high development and a direct and consistent of the Open Court, for which the Closed Court of the competitive drawing was thrown over. A sense of great distance follows the removal of the building at the foot. Whereas the competitive plan's impression was limited by the enclosing buildings, that of the new includes the water-gate, the river and the shores beyond, far greater, a group-plan surpassed in dignity by none of the other colleges, the expositions, or even the civic centers, Washington alone excepted.

Great monumentality, one is sometimes tempted to think, is opposed to variety. Boston College of the Jesuits has chosen variety; wisely, since it is comparatively small, without the monumental possibilities of Minnesota. The premiated and second-placed designs show different points of view. The site is a curved hill-top, paralleling South street to the west and sloping toward the east to Lawrence Basin. The second-placed design is a frank and absolutely natural expression of the topography. The curved Campus follows the hill-crest; flanking the forecourt are the semi-public church and auditorium; bordering the Campus are the buildings for administration, instruction, and the college chapel; the court of the dormitories, or Houses of Retreat as they call them, is beyond, opening to the southeast, and the gymnasium and athletic field close the curved axis, segregated but united organically with the college proper. Except for the entrance tower set awkwardly athwart the main approach, and a lack of coordination between several of the buildings, it seems an almost perfect plan, but open to one criticism which probably affected the award. Until all the buildings for instruction should be completed, the Campus would appear

SUCCESSFUL COMPETITIVE PLAN.
A Closed Court: ground gently sloping toward foot of Court, then abruptly down to Water-Gate; present buildings on irregular oval above head of Court and not included in the composition.

RESTUDIED AND OFFICIALLY ADOPTED PLAN.
Composition changed to Open Court; closely fitting contours; interesting development of abrupt slope at foot of Court, with Water-Gate, Classic Theater, and Botanic Gardens. Auditorium in place of honour, flanked by Library and Museum.

UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.
Cass Gilbert, Architect.

GENERAL PLAN.

WM. M. RICE INSTITUTE, HOUSTON, TEXAS.
Cram, Goodhue & Ferguson, Architects.

Formal but complex arrangement of many small Open and Closed Courts, strongly united by lines of circulation; Variety and Intimacy sought, rather than the "Simple Impression," therefore adapted to a gradual construction with group after group built as required.

formless and straggling, and the same is true of the dormitory court, a fence lacking several palings, as it were.

The successful plan groups the instruction and administration about four courts so that one may be completed after another, as one Oxford quadrangle was completed after another, and the group may appear finished at each of its several stages. On plan it appears as a single composition, the type formerly described as the Pyramid, with the Recitation Hall as the center; but in reality this hall is little higher than the others, and its tower (actually changed to a metal cupola), insufficient in mass to dominate, as for instance the domed library dominates Columbia, not only by its greater height but by its simpler, larger motives and different material. In short, the Boston plan is a complex composition of four courts, the squarish mass of the four-fronted Recitation Hall common to them all.

The dormitories seem somewhat straggling, placed to fit the irregular ground, but being much of a size and shape seem casually dropped into their several positions. The exterior of the group seems, too, somewhat disjointed compared with that of the other competitor, and the gymnasium as dominating the athletic field is less fortunately placed; but the plan has the important possibility of sectional construction, and one great quality outweighs many minor faults. Such a plan is elastic; positions of buildings are not rigidly fixed and the several parts can be restudied as the plan is carried out.

Imagine this in the Cour d'Honneur of Minnesota, or the same Cour d'Honneur with several buildings not yet constructed! To be sure the court could be first finished and the groups beyond the side streets considered as future extensions, but such evidently is not the intention. One is somehow tempted to think the whole scheme too grandiose for its purpose.

Rice Institute seems to have solved this difficulty in a somewhat different way. The land is perfectly flat; there were no existing buildings. The large central court was first surveyed, planted, and developed; now the buildings around it have begun to be erected. The several subsidiary courts can be finished one after another, so at no time may the group seem a great attempt impractical to carry out. It is a curious composition in many ways, a series of open and closed courts intimately connected, rather original, and suggests the same author's Sweet Briar Institute.

A similar development has actually taken place in the University of Georgia. Seven years ago the college consisted of thirty-odd acres with a group of buildings about a Campus similar to the Village Green in every way, open at the foot, with separate buildings along the sides and the College Chapel at the head. Recent purchases have added some nine hundred acres beyond the Chapel, and there one group after another is being developed: the Engineering group beyond on the main axis, the Women's College to the east, the Athletic Field to the west, and the Agricultural School at the head of great farms and woodland beyond, with the various cottage dormitories scattered about the side of the highroad; a clever and an absolutely natural development, and therefore worth attention; the development of group after group.

Group after group can be constructed, too, in the Western University of Pennsylvania, an Acropolis, a college city crowded on a hill-top with plazas, streets, and avenues. Of course, a pyramidal composition was forced by the site, and to better accomplish this, the central building in the later study of the plan here given was advanced to the edge of the slope, in the center of what was, in the competitive plan, the Court of Honour. The lower buildings clustered about it, — the professional schools and laboratories on the terraced slopes in front, the library and dormitory courts behind.

So much for the classic plans. Altogether different principles of composition are developing from the traditions of the English universities. They first each consisted of two or three small closed quadrangles, exactly similar to the contemporary manor-houses, such as Had-

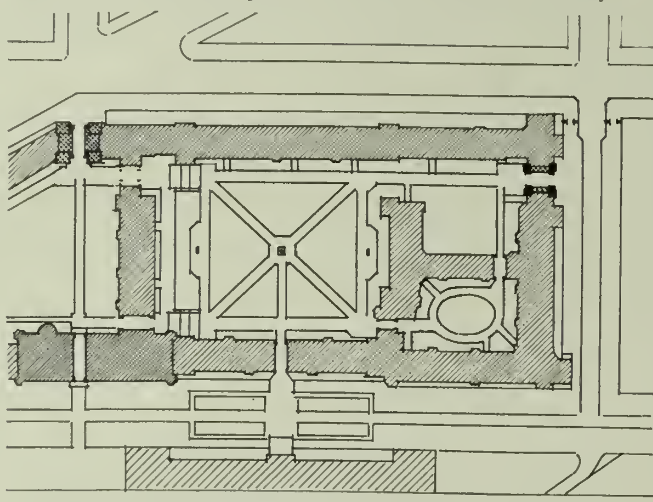
REVISED AND ACCEPTED PLAN.

WESTERN UNIVERSITY OF PENNSYLVANIA, PITTSBURGH, PA.
Palmer & Hornbostle, Architects.

In effect a College City, on a steep hill; Pyramidal Composition, to enhance which and prevent its foreshortening from below, the Central Building is brought forward to the center of what was the Court of Honour; Technical Buildings around it, Professional Schools on the lower slopes, Dormitories in the rear.

don Hall. Doctor Kays, or Caius, as he preferred to spell his name, bitterly opposed the closed courts, and in rebuilding his own college at Cambridge shut in the southern side by merely a low wall, for better ventilation. The "Open-Fronted Quadrangle," Mr. Edward Warren recently called it. Trinity later sought to accomplish the same result in a different way. Wren built his library over an open arcade, that the wind might blow under it and thoroughly air the quadrangle.

Among the first to introduce the English Closed Quadrangle in America — at the University of Pennsylvania — were Cope and Stewardson, who held that the air of a quadrangle was not stagnant; that the wind blowing across the buildings struck the range on the further side and caused a convection current which swept the enclosure clean. They have had such faith in this that the later dormitories there show quadrangles smaller than ever. But at Princeton and Bryn Mawr they developed what may be called *Ranges*, irregular buildings end to end in a continuous broken line, at Princeton, for instance, several hundred feet in length, the dormitories of Blair Hall and Stafford Little, and the gymnasium. This is the type of that portion of the Sage-Pierson group of laboratories now under construction at Yale.



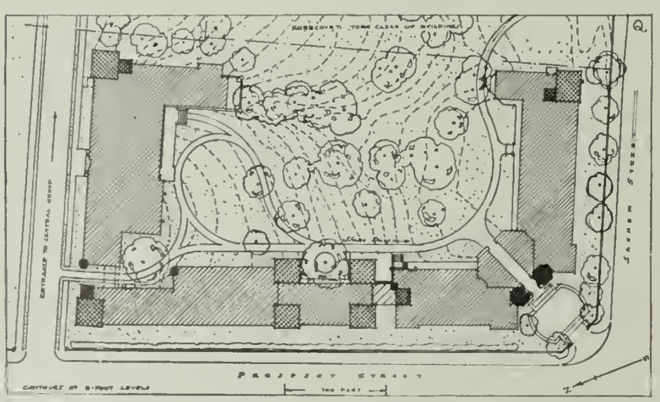
UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA.
Cope & Stewardson, Architects.

The type fits itself to irregular ground, as in the rather erratic Richmond College, more erratic in drawing than in reality since the Ranges follow the crest of an extremely irregular hill and enclose a tortuous, somewhat star-shaped plateau at the summit.

On a flat site the Range of course becomes an Open Court, as at Andover. In this form it was perhaps first used here by Mr. Charles Haight in old Columbia and the General Theological Seminary in New York; but on irregular ground the Range is at its best, following the lie of the land, forward and back, an Open Court here, a Closed Court there, natural, of a varied and interesting skyline, completely flexible, never appearing as unfinished, of infinite variety and picturesque possibilities. Does this suggest a fault with such a plan as that of Peabody or Minneapolis? Either group will appear part finished until the last building is done. Before this happens a totally different construction may be necessary, just as the laboratories of twenty years ago must be put to other uses now. There is no way of completely varying the type, or after the court is finished of expanding, except by starting a new group which will remain unfinished in its turn. Are we trying so hard to do things in a noble way that perhaps would be better if we approached them more naturally?

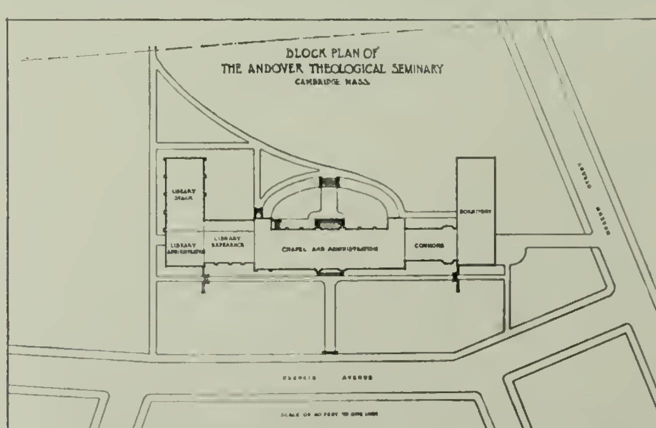
On the other hand, certain donors will insist that their particular buildings be separated from all others, and with a frequent repetition of this demand the effective Range is spoilt. True, they have not taken this stand at the Pennsylvania dormitories, for each donor has given a "house" or set of chambers, which, though it has a separate entrance and is shut off at the ends with fire-walls, is nevertheless part of a long continuous building.

After all, the clients determine the style, and as long as they are all at odds as to what they want, there seems little hope for harmony in the design of American colleges. The architects are apparently as much at odds among themselves and the war goes merrily on. Formality seems proper to some, the more formal the better; a picturesque irregularity to others; separate buildings on the one hand, Ranges on the other; classic traditions of the Academy and Stoa Poikile against Anglo-Saxon of the Hall and Quadrangle. There seems no tendency toward compromise. The latest classic at Minneapolis is more rigid and cold than the first at Virginia, the last Gothic at Richmond more riotously irregular than the first at old Columbia or the comparative tranquillity of the University of Pennsylvania. The types are steadily diverging, and as to a possible local college style, it has crashed into the gap between them!



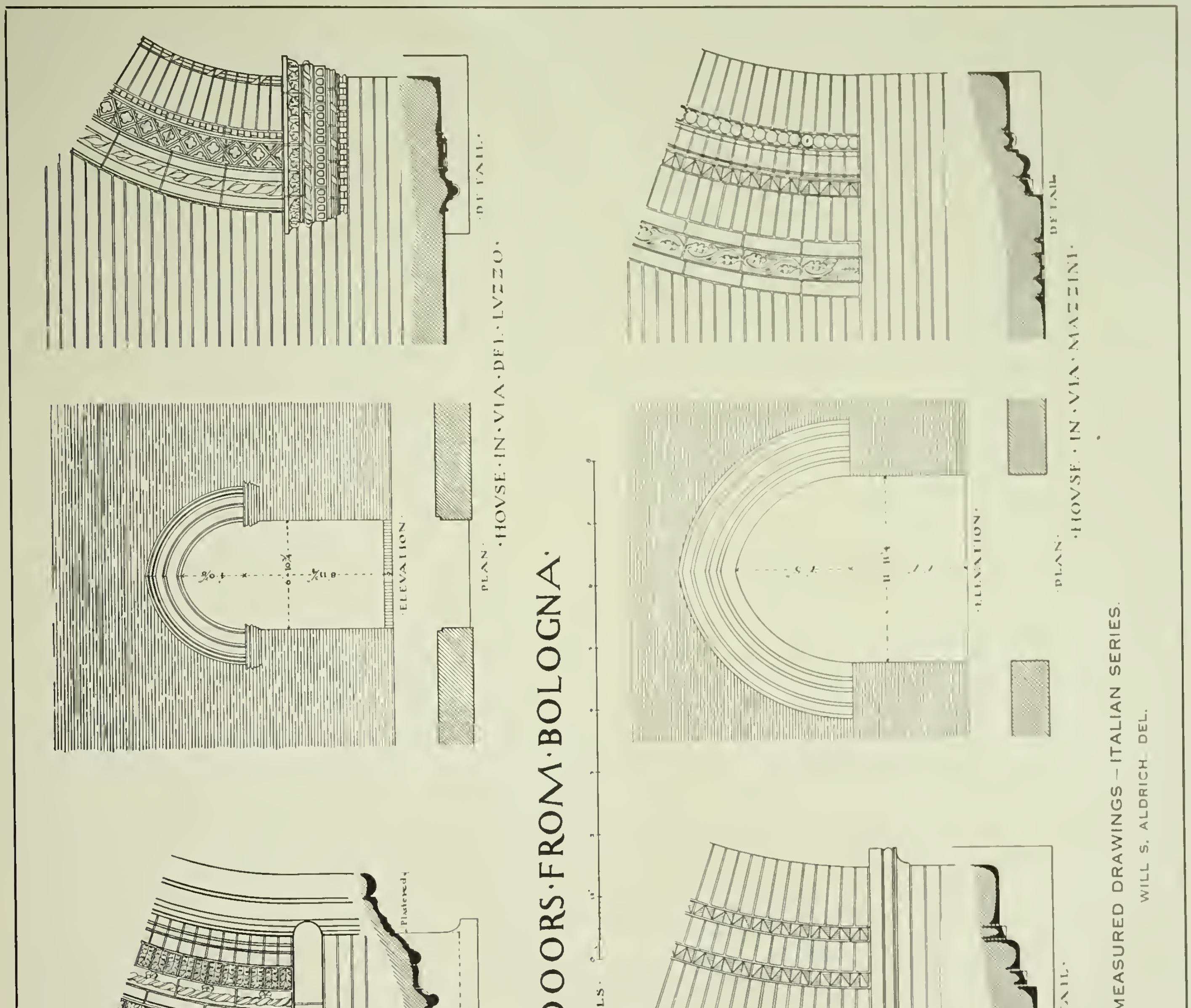
SOUTHWEST CORNER, SAGE PIERSON DEVELOPMENT, YALE UNIVERSITY.
Chas. C. Haight, Architect.

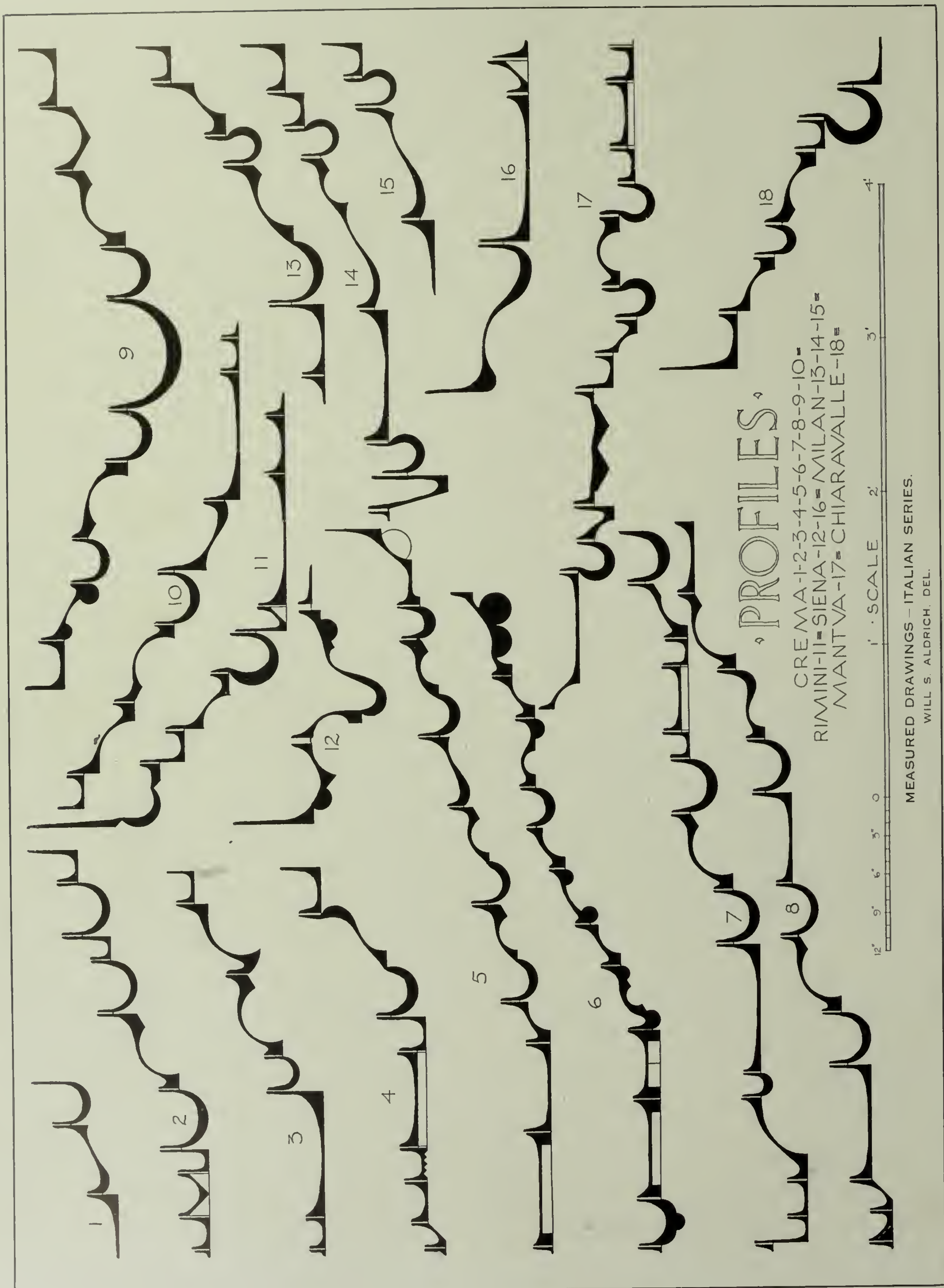
Laboratories of Physics, Botany, and Zoölogy: in composition typify the Range rather than the Open Court, an American development of the English tradition.



ANDOVER THEOLOGICAL SEMINARY, CAMBRIDGE, MASS.
Allen & Collens, Architects.

English tradition, formally treated as an Open Court; a connected series of various buildings.


·DOORS·FROM·BOLOGNA·
·FROM·THE·PALAZZO·PEPOLI·
·HOVSE·IN·VIA·DEL·LVZZO·
·HOVSE·IN·VIA·MAZZINI·
·HOVSE·IN·VIA·MAZZINI·
·SCALE·OF·DETAILS·
ELEVATION
PLAN
DETAIL
MEASURED DRAWINGS — ITALIAN SERIES.
WILL S. ALDRICH, DEL.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RIMINI-11- SIENA-12-16- MILAN-13-14-15-
MANTVA-17- CHIARAVALLE-18-
SCALE
12" 9" 6" 3" 0 1' 2' 3' 4'
MEASURED DRAWINGS – ITALIAN SERIES.
WILL S. ALDRICH. DEL.

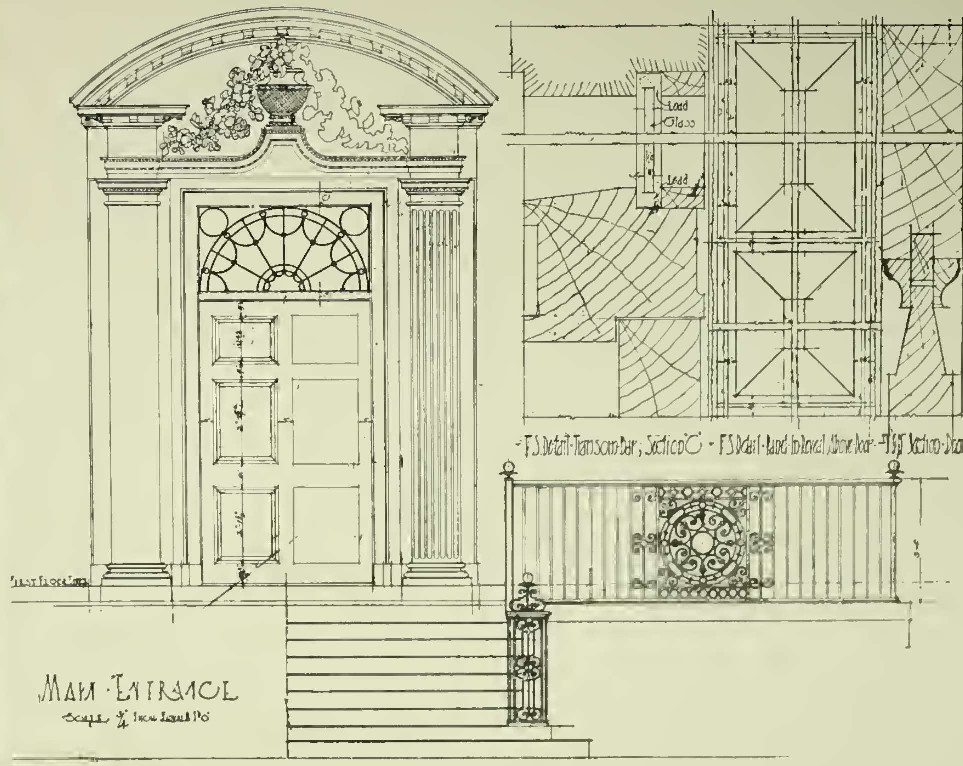
THE GILMAN COUNTRY SCHOOL FOR BOYS, BALTIMORE, MD.
PARKER, THOMAS AND RICE, ARCHITECTS

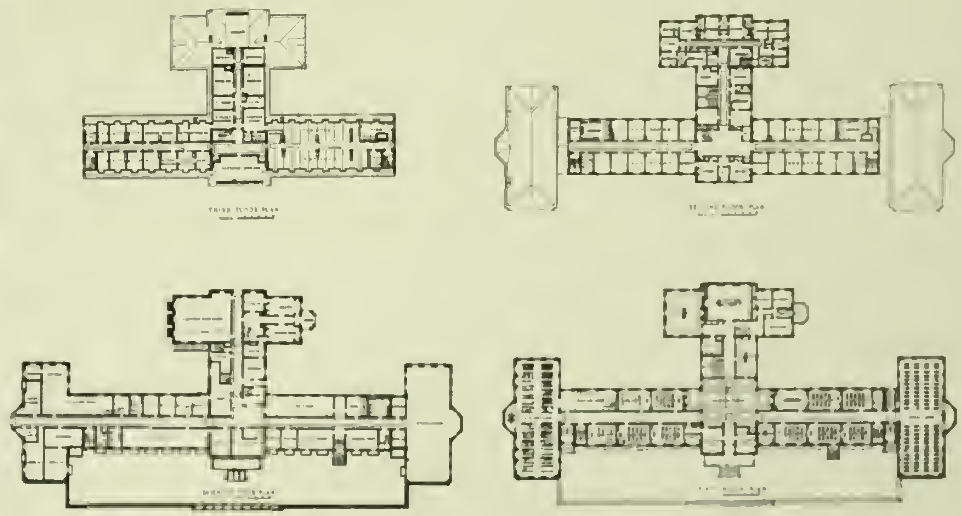
VOL. 22, NO. 1. PLATE 2.

REAR ELEVATION

THE GILMAN COUNTRY SCHOOL FOR BOYS, BALTIMORE, MD.

PARKER, THOMAS AND RICE, ARCHITECTS

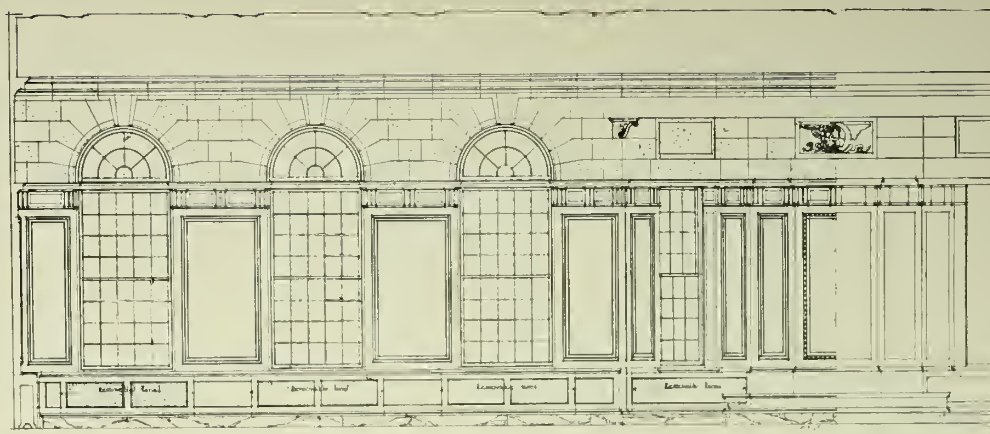




THE GILMAN COUNTRY SCHOOL FOR BOYS, BALTIMORE, MD.

PARKER, THOMAS AND RICE, ARCHITECTS

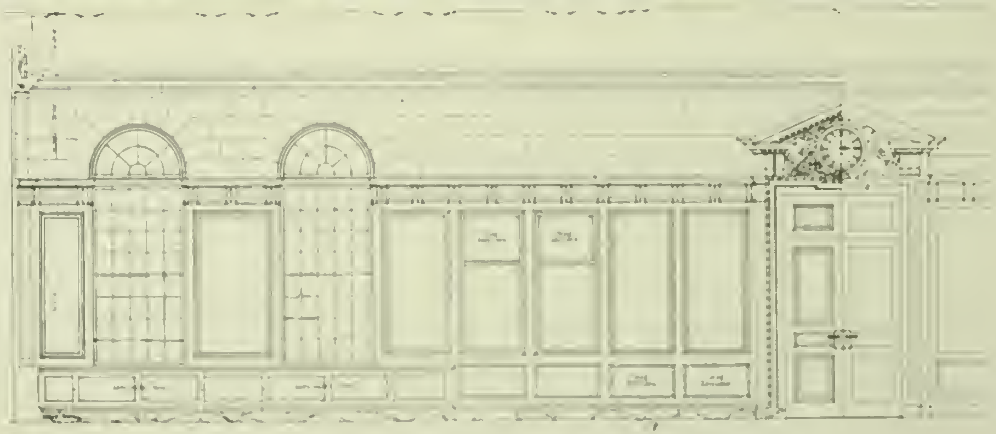
COMMON ROOM



STUDY ROOM – ELEVATION TOWARDS BAY WINDOW

STUDY ROOM

LIBRARY



STUDY ROOM – ELEVATION TOWARDS CORRIDOR

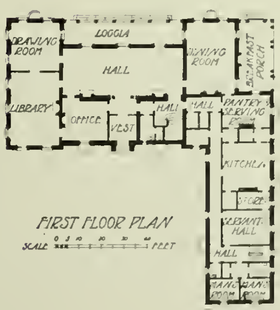
THE GILMAN COUNTRY SCHOOL FOR BOYS, BALTIMORE, MD.

PARKER, THOMAS AND RICE, ARCHITECTS

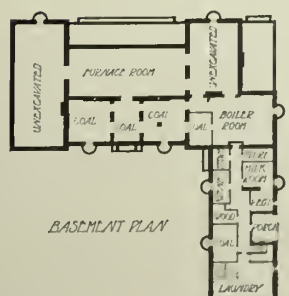
HOUSE AT MATINECOCK, LONG ISLAND
CARRÈRE & HASTINGS ARCHITECTS

GARDEN ELEVATION

SECOND FLOOR PLAN



FIRST FLOOR PLAN

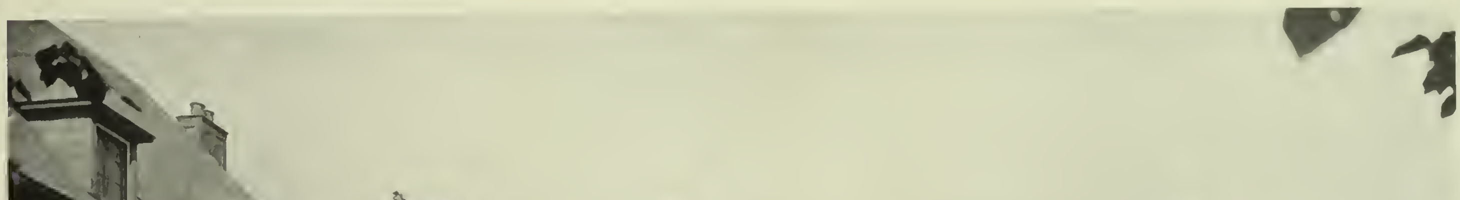


BASEMENT PLAN

HOUSE AT MATINECOCK
LONG ISLAND
CARRERE & HASTINGS, ARCHITECTS

MAIN ENTRANCE

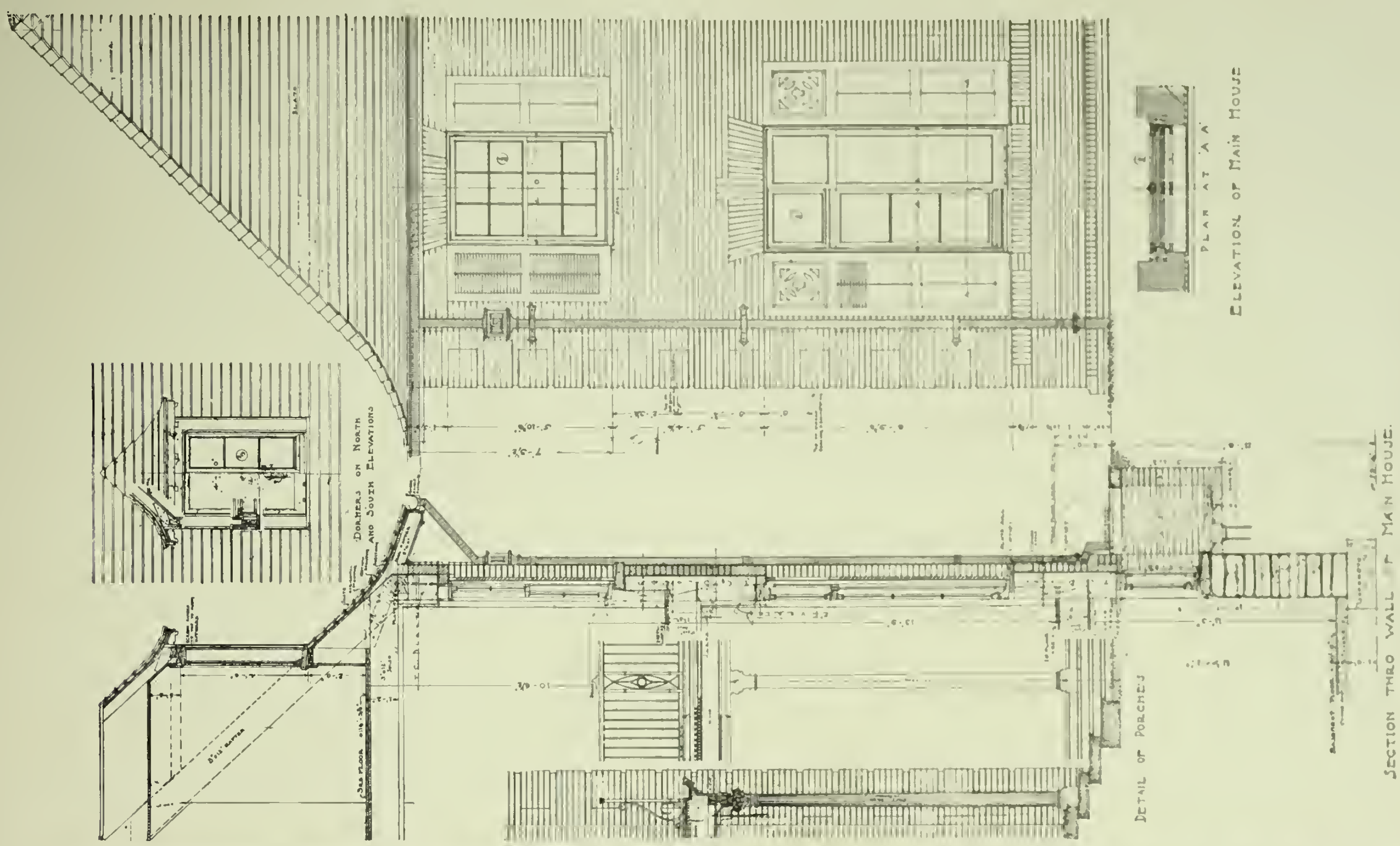
STABLE



ENTRANCE COURT

HOUSE AT MATINECOCK, LONG ISLAND

CARRÈRE & HASTINGS, ARCHITECTS

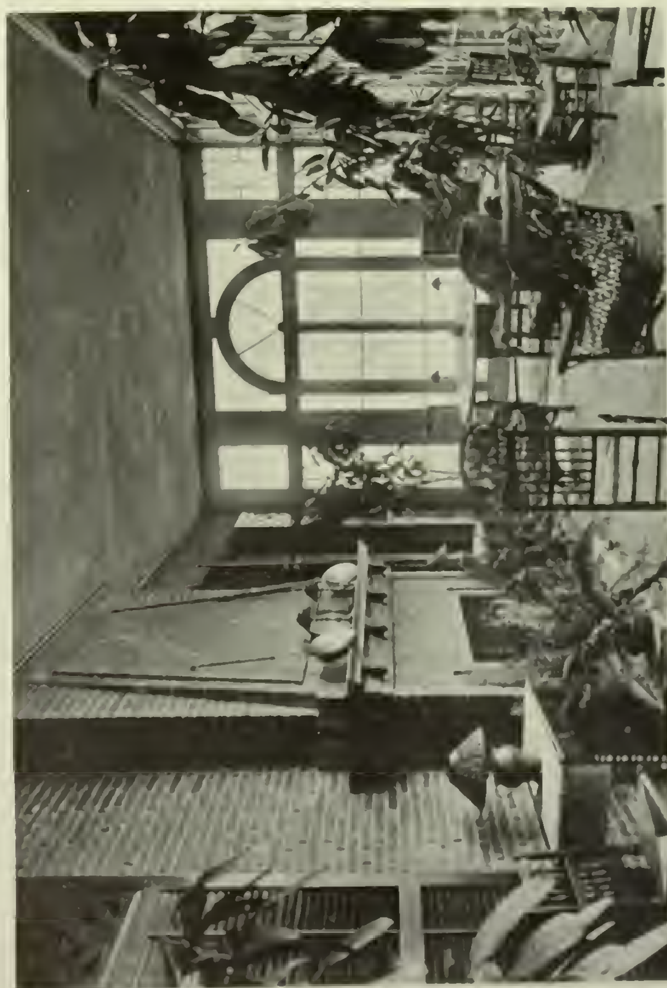


HOUSE AT MATINECOCK, L. I.
CARRÈRE & HASTINGS, ARCHITECTS

LIVING ROOM

DINING ROOM

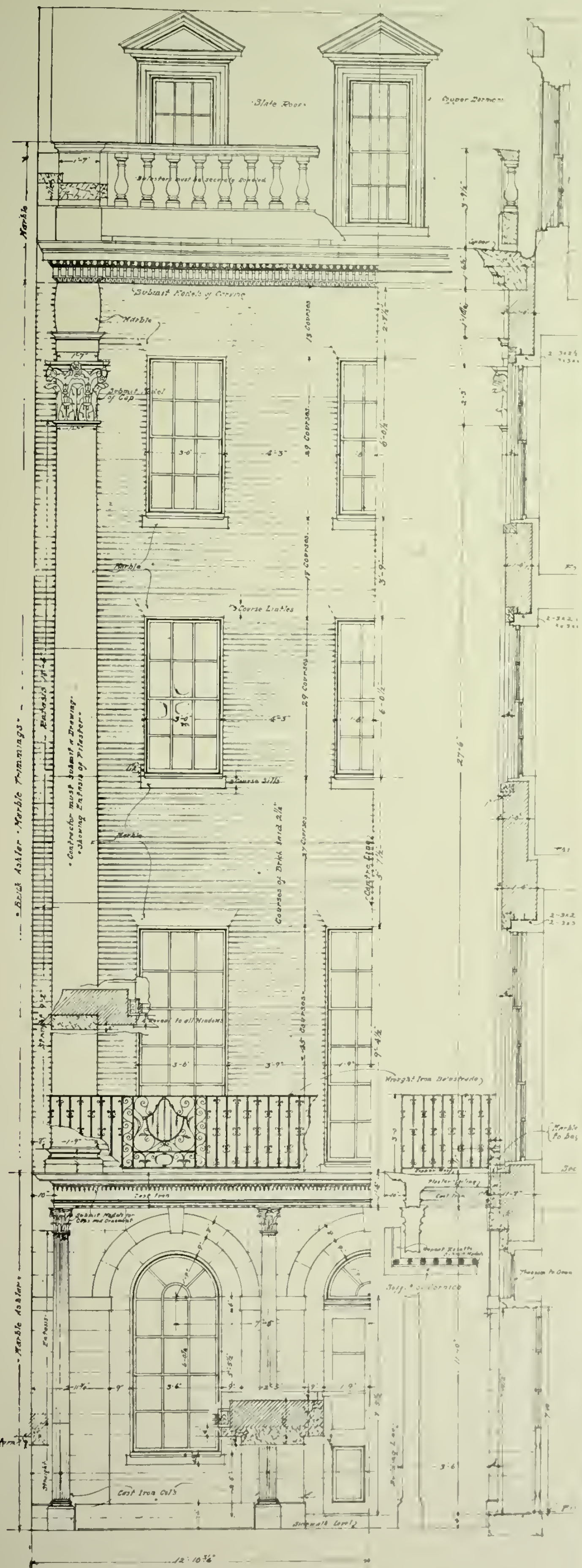
STUDY



OUTDOOR LIVING ROOM

HOUSE AT MATINECOCK, LONG ISLAND

CARRÈRE & HASTINGS ARCHITECTS

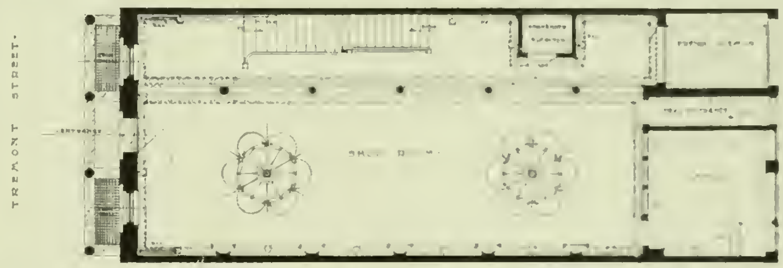


· ELEVATION · · SECTION ·

ELEVATION

PIANO SHOW ROOM, TREMONT STREET, BOSTON, MASS.

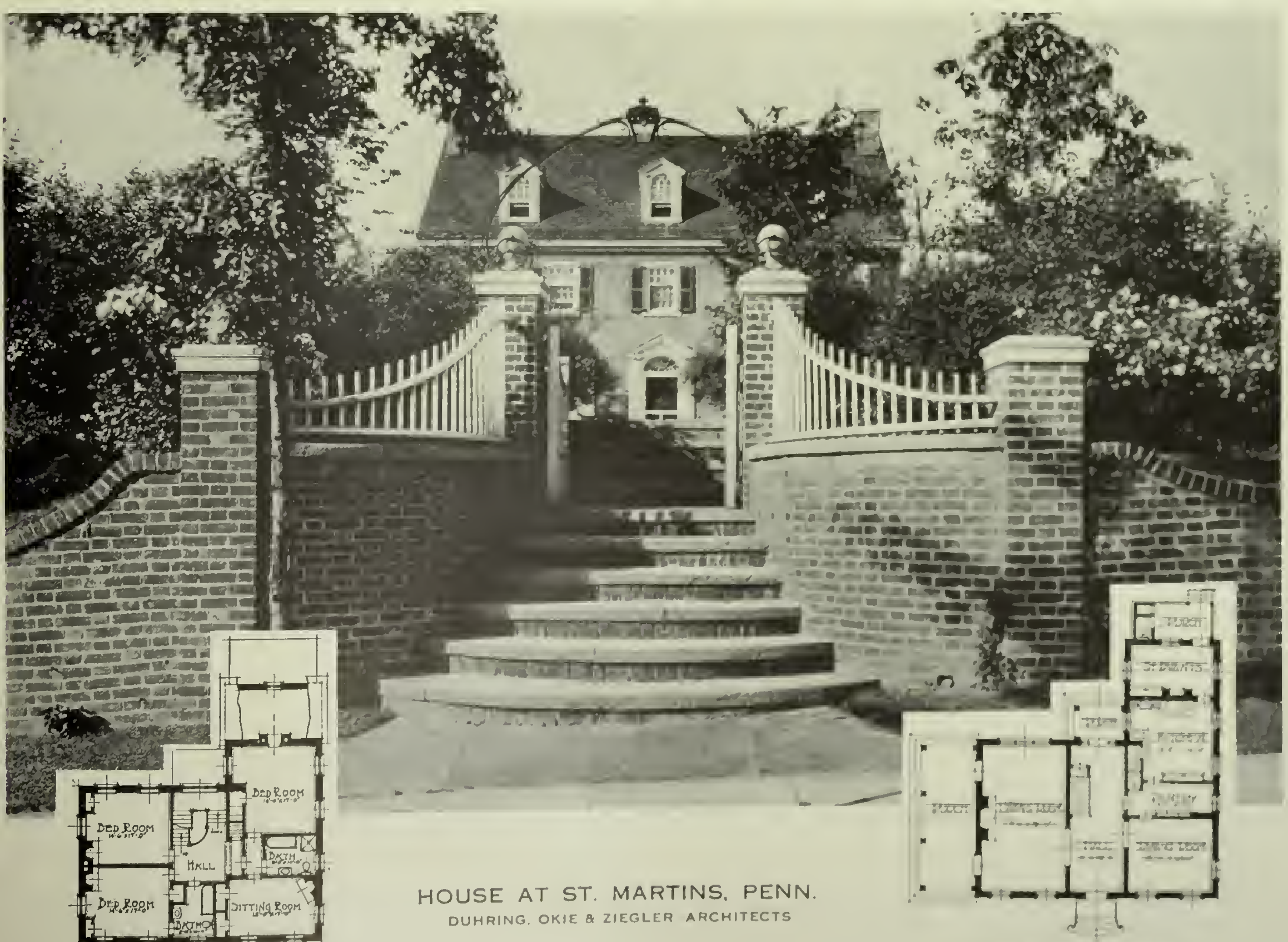
RICHARDSON, BAROTT AND RICHARDSON ARCHITECTS



·ALTERATION OF BUILDING NO
·TREMONT ST BOSTON MASS
·CHICKERING & SONS PIANO

PIANO SHOW ROOM, TREMONT STREET, BOSTON, MASS.

RICHARDSON, BAROTT AND RICHARDSON, ARCHITECTS



SECOND FLOOR PLAN

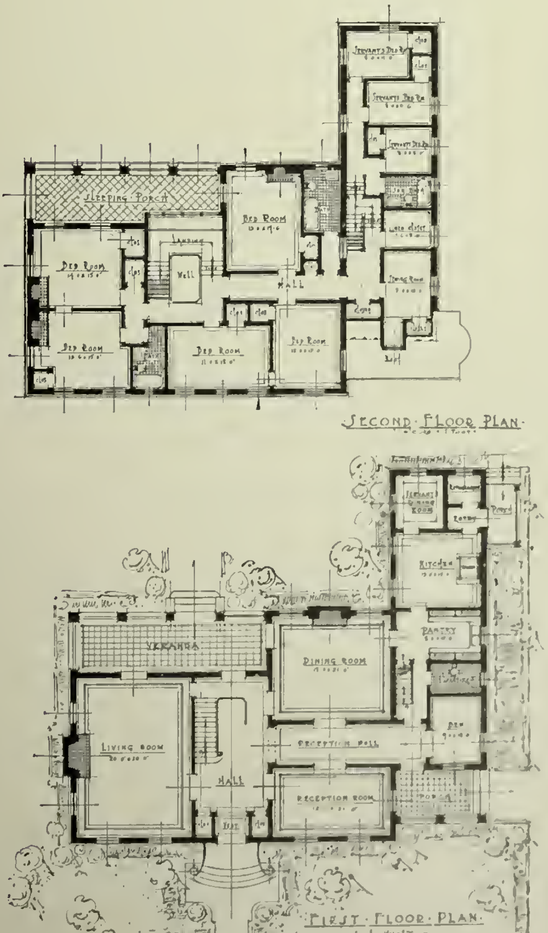
HOUSE AT ST. MARTINS, PENN.

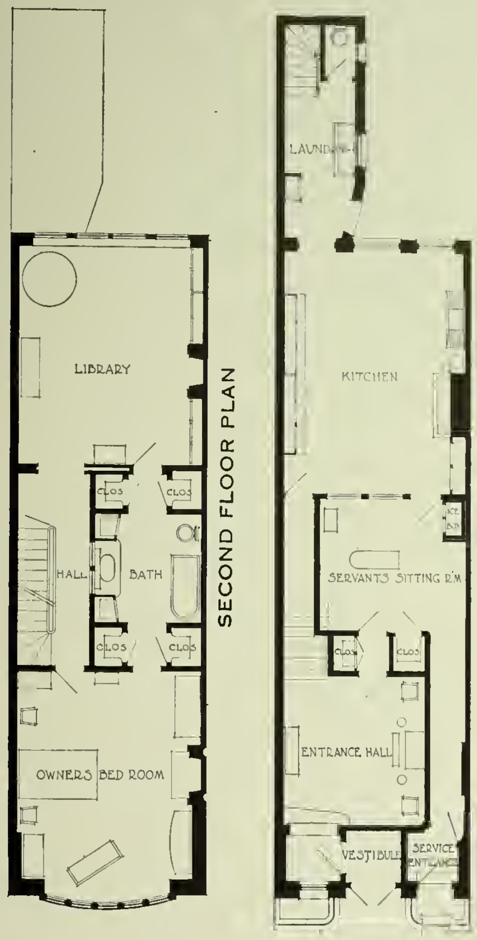
DUHRING, OKIE & ZIEGLER ARCHITECTS

FIRST FLOOR PLAN

HOUSE AT ORANGE, N. J.

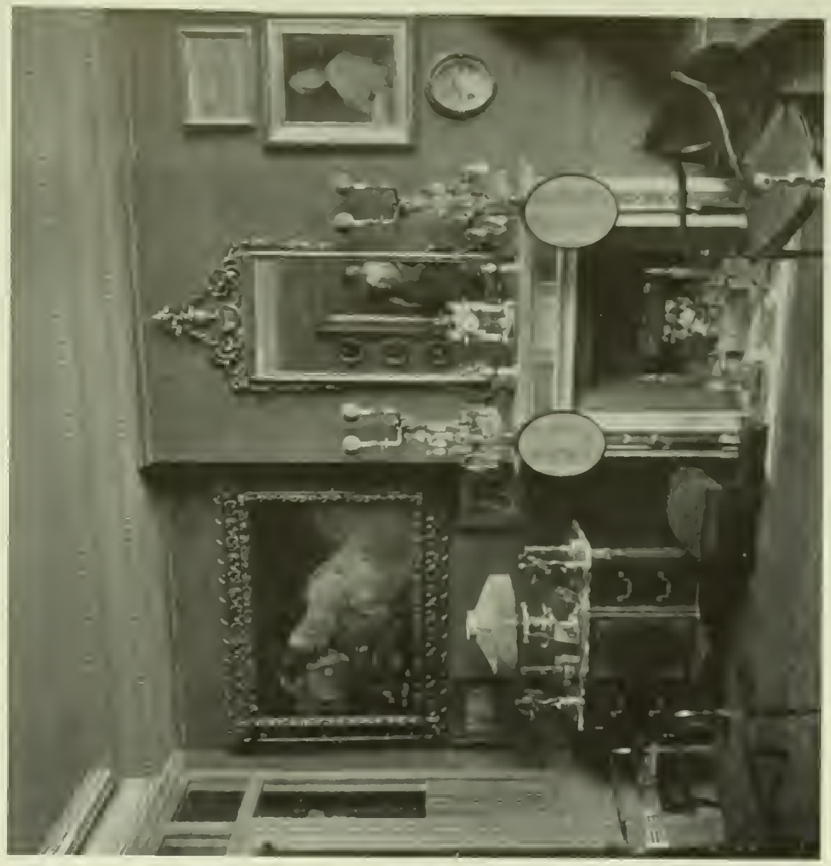
MANN & McNEILLE, ARCHITECTS





SECOND FLOOR PLAN

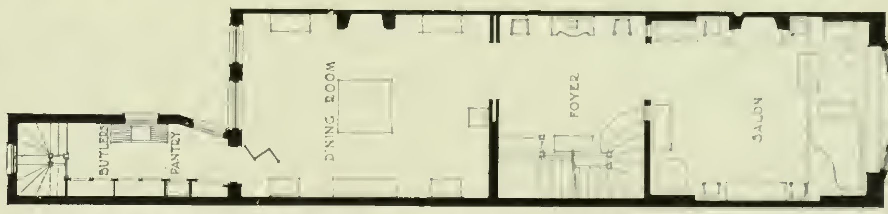
GROUND FLOOR PLAN



SALON

HOUSE OF MR. DONN BARBER, NEW YORK CITY

DONN BARBER ARCHITECT



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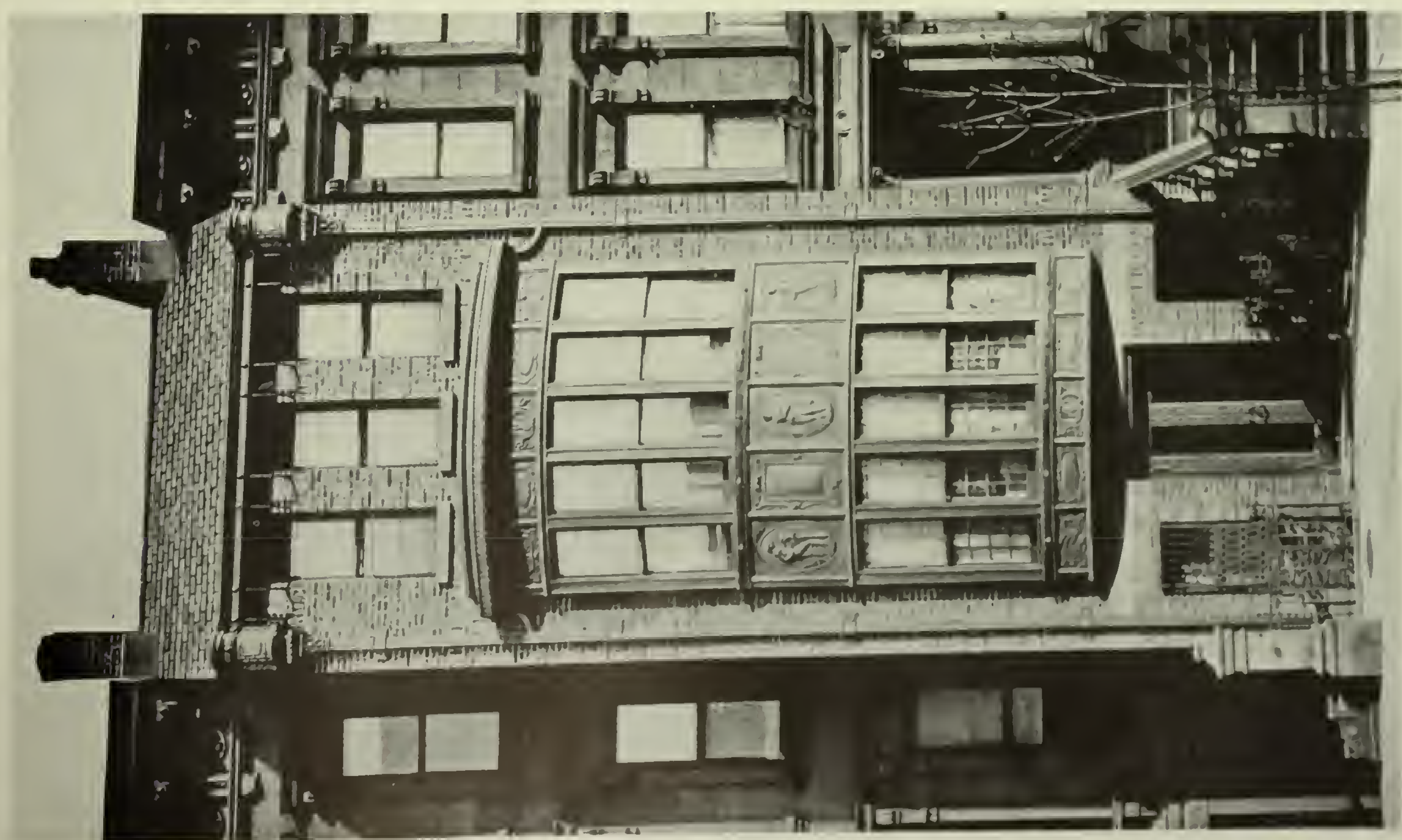
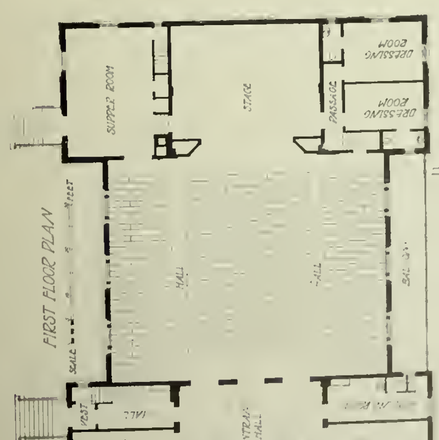


ENTRANCE DETAIL

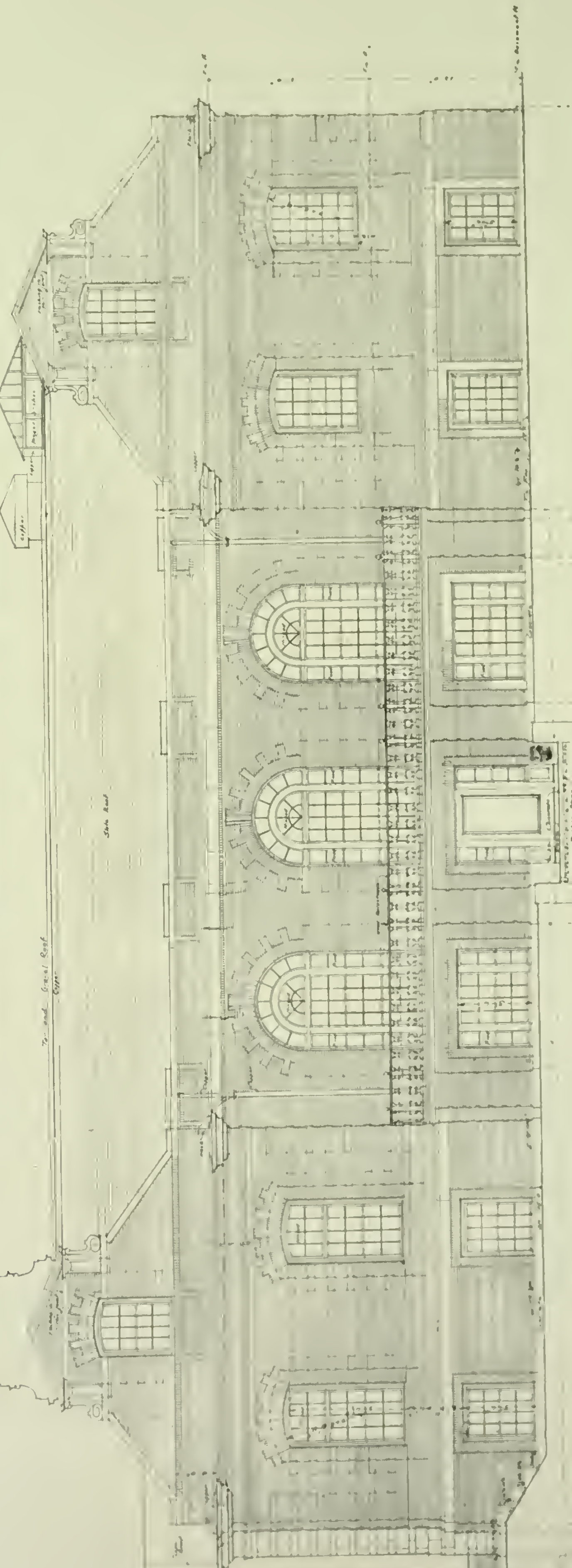
SIDE ELEVATION

THE TOWN HALL, NAHANT, MASS.

ANDREWS, JACQUES & RANTOUL, ARCHITECTS

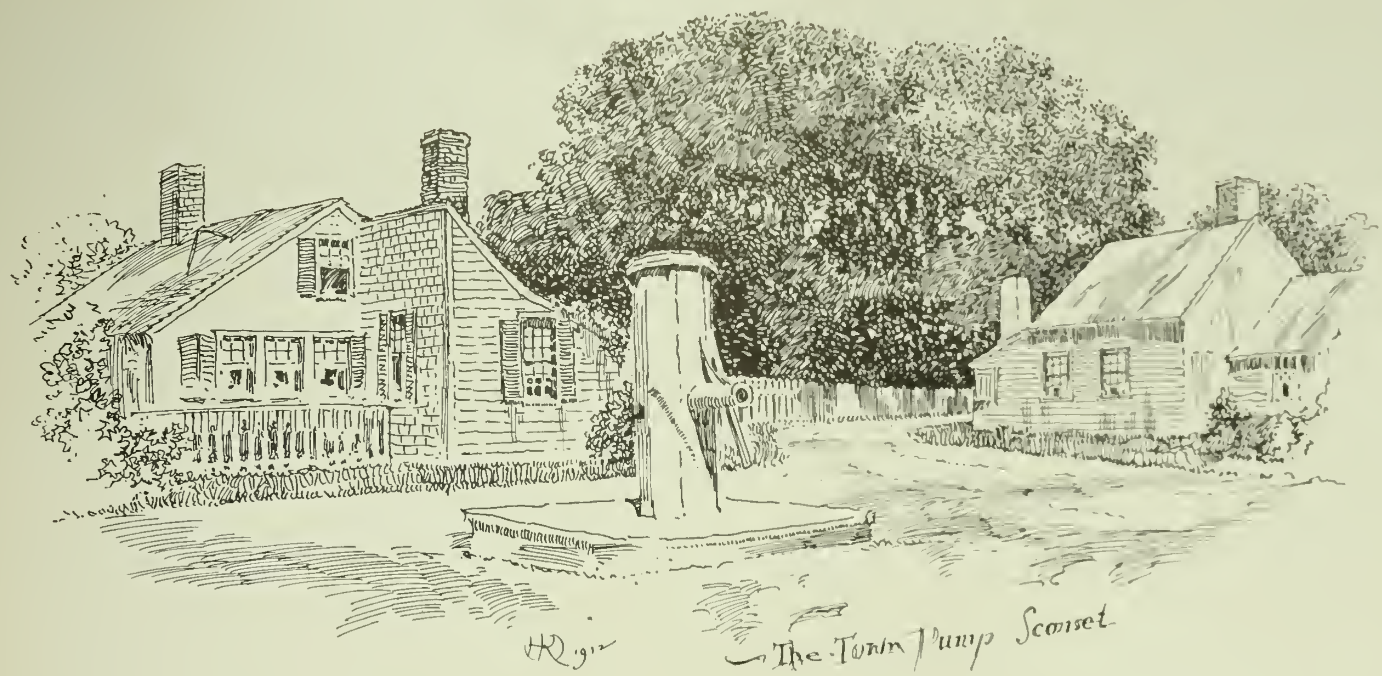


SIDE ELEVATION



THE TOWN HALL, NAHANT, MASS.

ANDREWS, JACQUES & RANTOUL, ARCHITECTS



A Nantucket Pilgrimage.

BY HUBERT G. RIPLEY.

IT IS now time to return to the square and there take a ten-cent carriage to the bathing beach. Here are all the modern appliances and plenty of clean white sand. Flocks and bevies of corn-fed Venuses, either taking a sun bath or dashing through the clear warm waves, lend added charm to the view. The pursuit of art need not be abandoned here, as Nantucket in all her moods is equally charming.

After a refreshing bath in the ocean, followed by a lunch or luncheon, depending upon the fancy of the voyager, the afternoon may either be profitably employed in further rambles about the town, or a little trip to some of the attractions further afield. Only a very few of the good things to be seen can be mentioned. An essay might be written on the subject of Nantucket doorways, another on the "walks" to be found on most of the roofs of the old houses, from which coign of vantage the departure and return of the old sailing vessels was watched. One might suppose that a piazza on the roof of a house would be a disfigurement, but these are all handled so naturally and unobtrusively as to lend an added attraction to the simple façades. There is one house where a smuggler is said to have lived, in which a secret cellar is reached only by going first up on the "walk" on top of the roof. This is not generally known and was told us in confidence.

The Athenæum is a fine Greek structure of the 1840 type, the lower story being used as a public library, and there is a museum or Historical Society building not far away, full of marvelous wonders pertaining to a seafaring community. The old curiosity shop on the same street is a perfect microcosmos and pantechnicon of delight to the collector. There may be found exposed for sale most anything the fancy could desire, from a pious tract containing an account of the death of Mary Ann Clap, only daughter of Jabez and Mehitable Clap, to a large saucer of eye stones, and a model of a full-rigged ship. Honorable mention should be made of the Ice Cream Cone Shop near by, where home-made, simon-pure, etherial, and flaky gaufrette cones, like mother used to make, may be had for a most moderate sum.

A trip to Nantucket without making a visit to Siasconset would be only half a feast, and it is immaterial whether the journey is taken in the morning or the afternoon. In either case it will be necessary to do a marathon from the hotel to the railroad terminus after breakfast or lunch, or else hire a carriage and drive over in luxury. There is not much difference in the cost, if there are four or more in the party, as the railroad fare is sixty cents a round trip for an eight-mile journey. The railroad is a narrow gauge affair with a preraphaelite engine and two cars, which rattle and bump and bang, and back and fill and wheeze, and snort and scream and groan, and finally land one safely only by the grace of an all-wise and overseeing Providence. If the trip is made in the morning there will be a good opportunity, after wandering about the town, to take a dip in the ocean, and let the big rollers, that come straight across the Atlantic Ocean all the way without interruption direct from Spain, tumble you over and over and fill your mouth and ears with sand. Everybody goes in bathing at eleven o'clock. The beach is splendid and stretches for miles and miles in either direction, and there is no end to the amount of sand, dazzlingly white and fine, piled up in great mounds and hummocks, so that when the waves up-end the bather, one lands on a nice soft surface. The combers are often of great size, but there is no under tow and an entire absence of rocks.

Originally Sconset was a fishing village, and the houses composing it were used only for a few weeks in the spring and fall seasons, the fishing being pursued from dories launched with some considerable skill through the heavy breakers. As little was needed in the way of accommodation, the houses are all very tiny and built on the scale of about six inches to the foot. Everything is one-half full size or even less, and perhaps that is the reason why they look so good. We all know our drawings look well at small scale, while the actuality at full size is sometimes appalling.

Rarely do any of the houses have a second story and most all of them show evidences of additions and alterations made by the summer residents, who have purchased the old fishing cottages and adapted them to their needs. Strangely enough these changes have not in the least spoiled the original outlines, rather have they added to their picturesqueness. The whole village is perfectly ripping, an absolute scream from one end to the other with but few exceptions.

There must be at least a thousand corking subjects for sketching purposes and innumerable variations on each theme. There are several "oldest" houses and, while all the types are similar and harmonious, no two are just alike.

Sankaty lighthouse is at the extreme end of the village and picturesquely located on the high sand dunes. It is a pleasant little walk to Sankaty, and if a longer ramble is desired, one can keep on following the shore to Quidnet, about a mile and a half further. This is a small settlement of a handful of uninteresting houses and is called Sachacha, the site of the ancient Indian village of Pee-dee, A.D. 1700.

The most curious and interesting sight in the village is a gateway made by using the two jaw-bones of an enormous whale as gate-posts. This was surely some whale in its day, capable of swallowing, whole, a trolley car or a Baptist picnic. Each bone is about sixteen feet long and of the diameter of a barrel in its largest part.

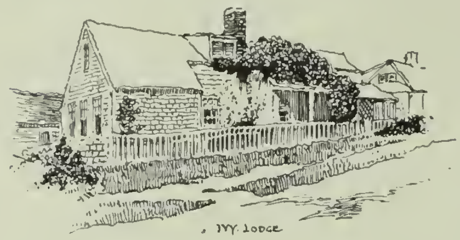
After wandering about until tired, and still not having half seen all that is desirable, it would be a wise and judicious thing to do, to stop in for tea at the "Chanticleer." This is a bully little place, neat as wax and far nicer and with better things to eat and drink than can be found in either Dorsetshire, Herts, or Bucks. The sandwiches are delectable, the cakes divine, and the tea steaming hot and fragrant, with little puffs of spicy incense that project themselves from the kitchen in advance of its arrival. There are a number of these small tea rooms both in Sconset and Nantucket that specialize on various

WATER-COLOR RENDERINGS - HUBERT G RIPLEY

"A NANTUCKET PILGRIMAGE."

aliments, and when fatigued from sight-seeing it is a pleasing relaxation to visit the one most handy. Between Nantucket and Sconset are moors which are not the least of the attractions of the island. Covered with scrub pine and low bushes they afford a variety of coloring which every painter delights in. Lonely fishermen's cottages are dotted throughout the moors, some of which are commonly believed to have been the haunts of smugglers. To a visitor unfamiliar with New England towns where many fine old houses are to be found, Nantucket is a revelation and delight, Sconset is absolutely unique.

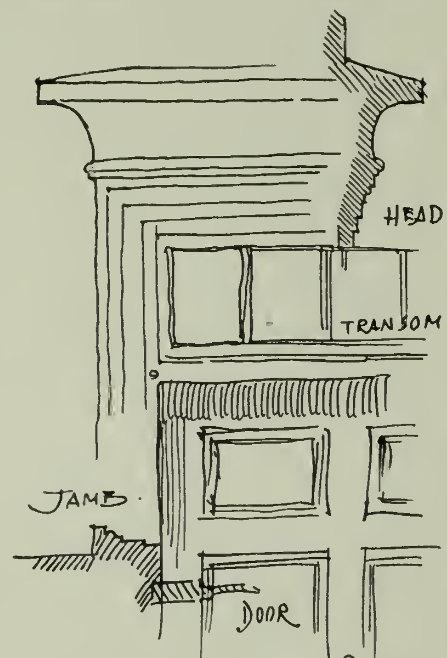
Village Street · Sconset



My Lodge

After having once taken a trip to Sconset even the most hardened and blasé traveler will wish to go again; in fact, one trip to the island only whets the appetite for another, and the going soon becomes a habit and the departure a regret. To quote a celebrated writer, "Nantucket is the Ultima Thule of the poet's dreams. It is the rose of the garden of ocean islands. It is vain to try to set forth its many charms in the hope of doing it justice, — it is a place to dream in while there, and to dream about when absent. It is an earthly paradise." Quoting still another who has become enthusiastic, "A town seated like an empress on her throne upon the rising shore and encircling bluffs, and looking out on the peaceful harbor and beyond the restless sea. Historic in respect to a great industry, now dead, the nursery of noted men and high-bred women." In the little poem entitled "Sconset," Bliss Carman has presented a picture expressing better than any sketch or photograph the beauty and attractiveness of the island, which will appeal to all those who have been there, and which will make all others long to go.

A Typical Fireplace



A Typical Door Detail

Did you ever hear of 'Sconset, where there's nothing much but moors,
And beach and sea and silence, and eternal out-of-doors,
Where the azure round of ocean meets the paler dome of day,
Where the sailing clouds of summer on the sea-line melt away,
And there's not an ounce of trouble
Anywhere?

Where the field-larks in the morning will be crying at the door,
With the whisper of the moor-wind and the surf along the shore;
Where the little shingled houses down the little grassy street
Are grey with salt of sea-winds, and the strong sea-air is sweet
With the flowers in the door-yards;
Me for there.

— Bliss Carman.

The North American Building, Chicago, Ill.

HOLABIRD & ROCHE, ARCHITECTS.

THE North American Building, on the northwest corner of State and Monroe streets, forms another link in the long chain of high office building development in Chicago. From the time of the old Monadnock Block, when composition and not conglomeration began to be studied by architects in the design of their buildings, two main attempts at the solution of the problem have gone on. The first endeavored to make an ideal entity out of the complexity of motives. The composition became simple and well composed, with no accentuation of any one of the number of steel features forming its framework, whose actual sizes as conceived by the eye were not in proportion to their inherent strength, and whose functions had not the same simplicity as those of stone. The second, following the line of structural expression, accentuated the main structural features, generally the perpendicular supports, and developed these at the expense or forgetfulness of the others. In the North American Building there seems to be a combination of the two above-mentioned solutions. It is designed as an immense glass show-case, supported by a lace-like framework of slender columns, mullions, and spandrels. Thus the entity of the building has been striven for and the framework truthfully expressed in the exterior features of the design.

The difficulties of the problem determined the final resulting design. The main obstacle lay in the demand of the lessees of the lower floors, that as far as possible an unbroken glass front, especially in the show window of the first floor, should be maintained. Hence came to be posed the project — upon a wall of glass three stories high, in which only a few of the supports are visible — to erect a building sixteen stories higher, in plan 96 x 130 feet, to the height of 275 feet. To solve this problem was an engineering and an architectural feat which would have been impossible at any other period than the present, and yet in commercial communities the architect has often been called upon and compelled to attempt it. The Pylon treatments on the corners of the building partly destroyed that which the general design attempted to do, which was to lead the mind away from the distressing fact of a building held in mid-air by unseen supports. So followed the partie of an all-over glass treatment, and the selection of that style and that material for exterior veneer which would best subserve the effect of lightness and best express the steel-supporting framework.

The Gothic style, associated with concentrated points of support and least possible wall surface, with predominance of the vertical, with lines which run from the ground to the pinnacles, and with small projections, adapts itself well to the design. While in general the Gothic feeling is adhered to, a free adaptation of the English perpendicular with Renaissance motives have been intermingled in the detail, and except for the entrance arch there is not a single arched window in the entire structure. The square-headed windows, however, add to the commercial character and show a truthful handling of the need for good lighting in the offices. Where the inspiration of the Gothic is greatest, in the arched entrance doorway and in the battlemented and pinnacled attic, the beholder is given the greatest pleasure, especially so by the attic and its delicate tracery, its perforations, its pinnacles, and its decorations.

This termination of the building is its greatest architectural asset and is one of the very few attempts to depart from the monotonous line cornice which seems to be the box trademark of almost every high office building structure in Chicago. No matter how beautiful these cornices are, they emphasize the roofing line of the building they finish off, and in a large city become tiresome without sloping roofs or towers to offset the grimness of the masses. The lacework of acroteria tacked above the cornice only seem to smile at their own inadequacy. The North American is a very positive contrast to these, and may point the way to better silhouettes in the roof lines of the future ; to balustrades and vertical motives, even if these must be at the expense of the cornice.

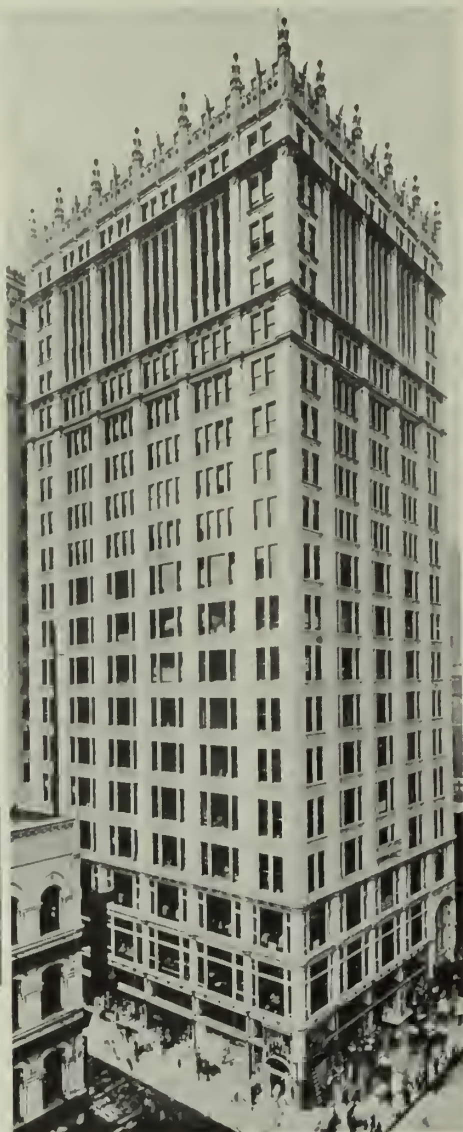
By restraint in the projections throughout, by the use of no decorations which would have unnecessarily added to the initial cost of the building and be unaccounted for in the rental return, by comparatively small window reveals, and by having procured the largest amount of light obtainable by a maximum of glass surface, there has been secured an individuality or architectural character to the building which is *bien en rapport* with the type of building which it pretends to be. This honesty of expression and design which places the building in the class to which it belongs, "not too great nor small to suit its spirit and to prove its powers," has been attained here.

Enameled terra cotta was the material rightfully used as the fireproof incrustation of the iron framework and as a decorative veneer to display the design. There have been no new methods of handling terra cotta in this building, which have not previously been described in THE BRICKBUILDER. That by using terra cotta instead of stone one half the weight of a stone exterior was saved in the design of the steel, and that forty to fifty per cent of the cost of the exterior was also saved ; that terra cotta is easily fastened to the steel frame ; that it is washable, durable, and one of the best fireproof materials, are all facts sufficient to explain its use. The color selected was of ivory white, which carries out the light effect of the framework and contrasts agreeably with the more somber and grayer buildings around.

The building looks its best when seen at a sharp angle or from a block or two away. In perspective at these distances the long vertical columns form in line and give the opposite impression than is received when the building is seen in elevation. Instead of all glass the effect is that of an all masonry treatment, the windows being lost in the reveals and the resulting impression being that of a solid mass. At sunset, from Michigan and Monroe streets, or in the early morning north or south on State street, there are glimpses and touches of the vertical lines and pinnacled terminations of this building which are very beautiful.

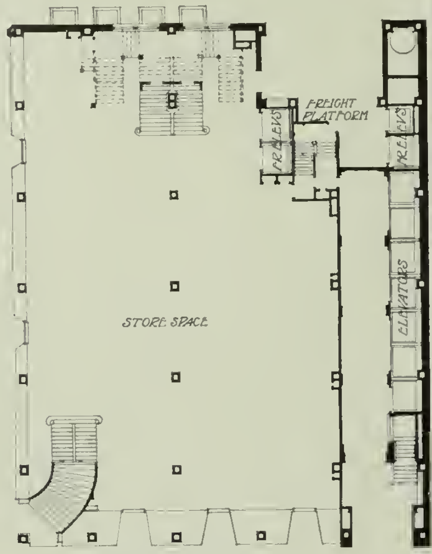
The cost of the building was approximately $1,500,000 at forty cents per cubic foot.

ORNAMENT IN TYPICAL SPANDRELS
5TH TO 14TH STORIES

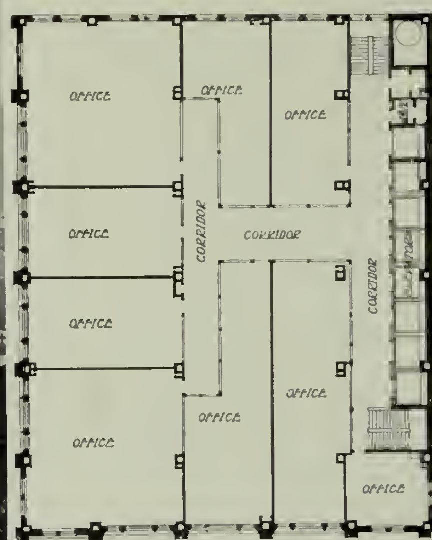


PERSPECTIVE.

PIER CAP AT ENTRANCE TO OFFICES.



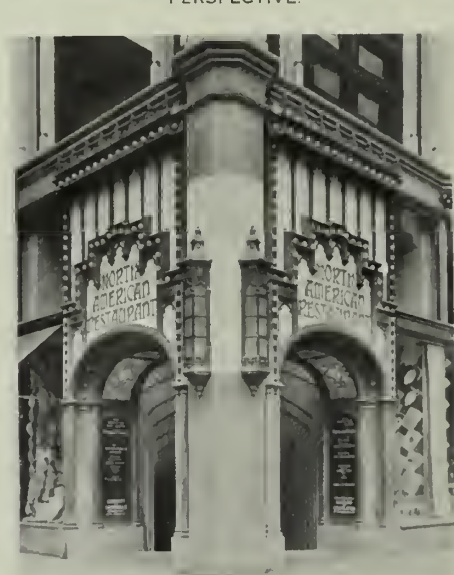
FIRST FLOOR PLAN
SCALE 0 5 10 20 30 FEET



TYPICAL FLOOR PLAN

THIRD STORY SPANDREL.

ORNAMENT OVER ENTRANCE.

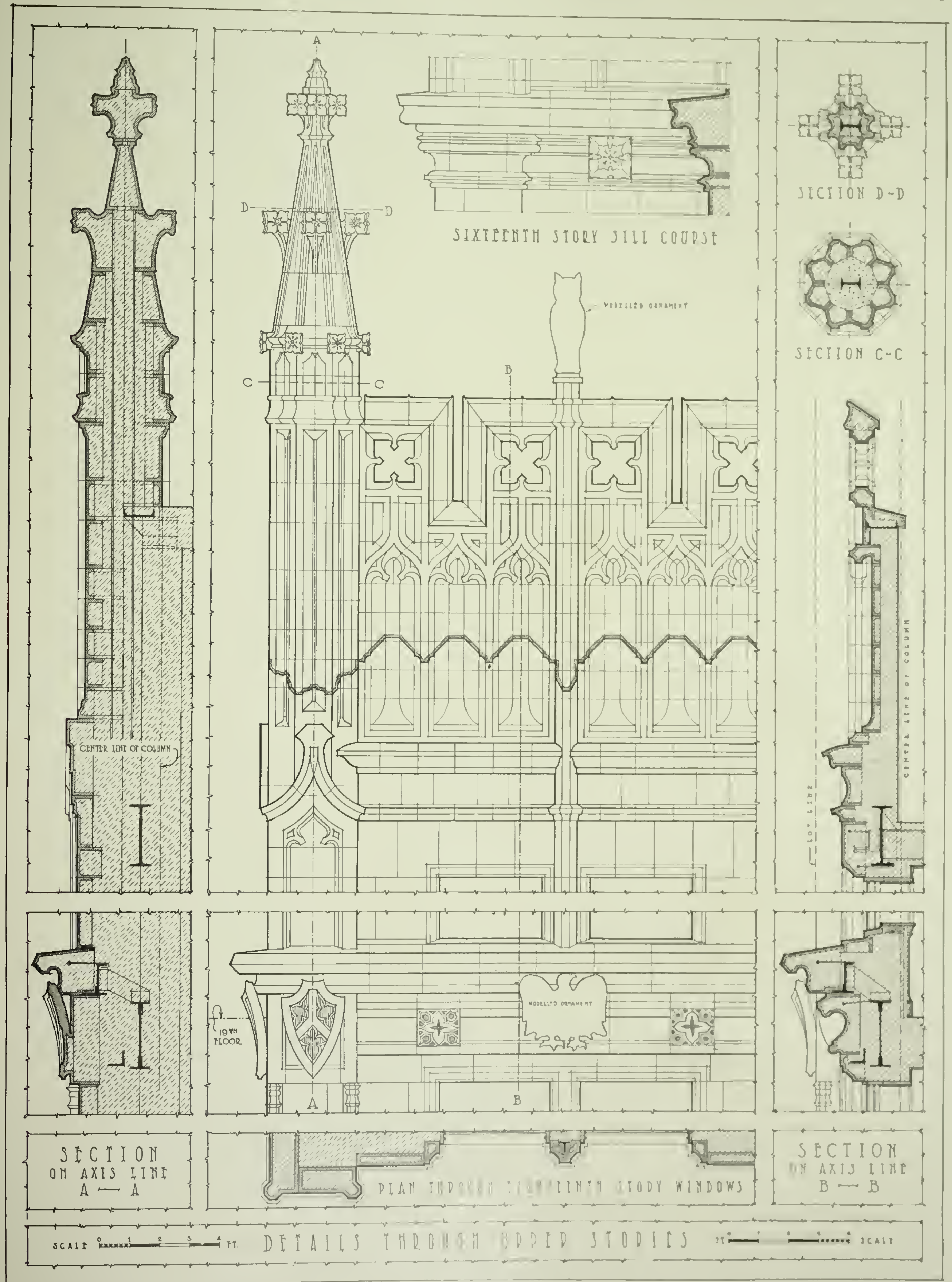


RESTAURANT ENTRANCE

ORNAMENT OVER ENTRANCE.

ORNAMENT, SILL COURSE, 2D STORY.

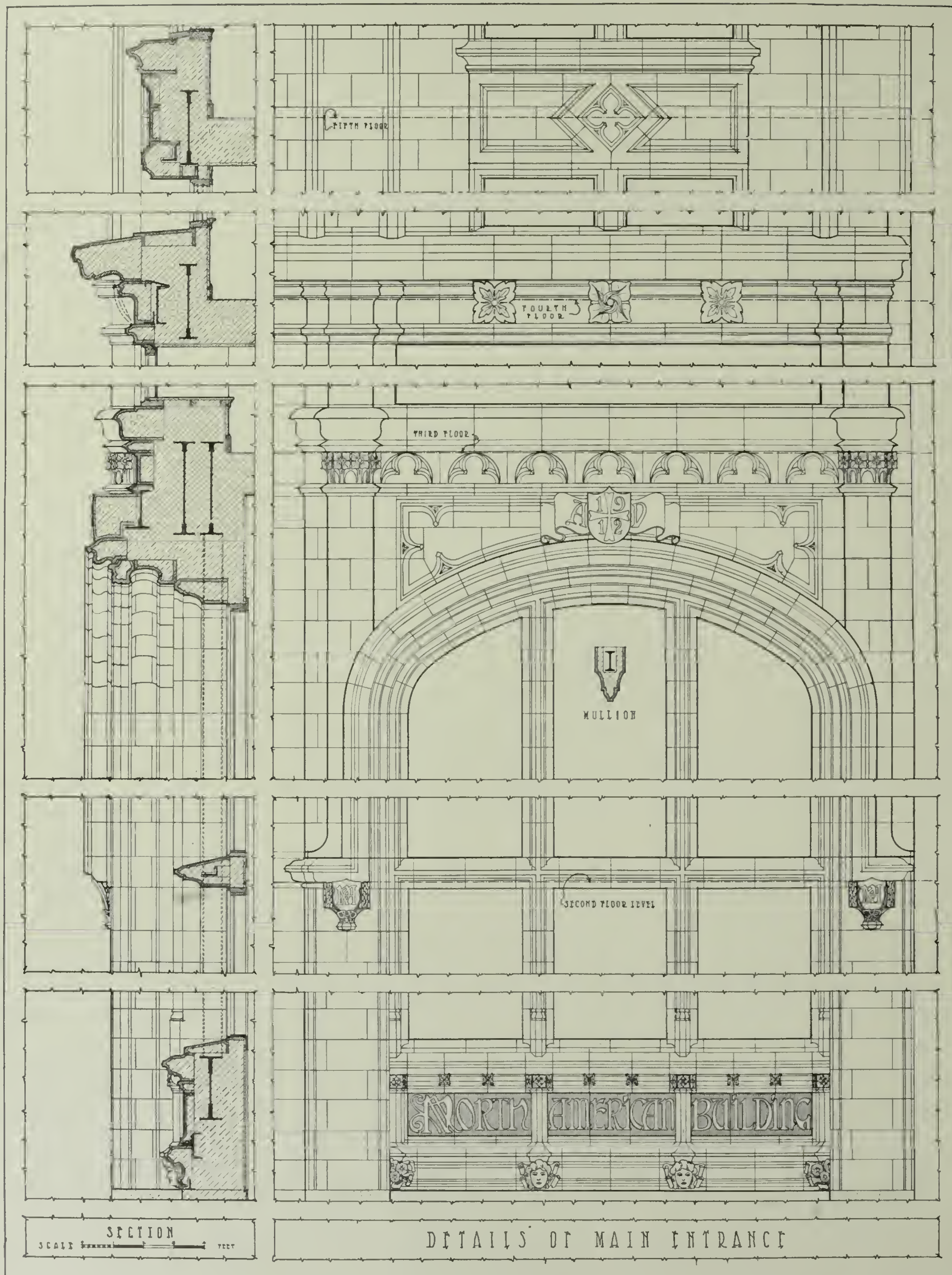
THE NORTH AMERICAN BUILDING, CHICAGO, ILL.
HOLABIRD & ROCHE, ARCHITECTS.



TERRA COTTA DETAILS

HOLABIRD & ROCHE ARCHITECTS

THE NORTH AMERICAN BUILDING, CHICAGO, ILL



TERRA COTTA DETAILS

HOLABIRD & ROCHE, ARCHITECTS

THE NORTH AMERICAN BUILDING, CHICAGO, ILL.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

ARCHITECTS' FEES

IT IS of interest to both the public and to members of the architectural profession to note that during the past few years a new method of computing just compensation for architectural services has been experimented with and in some instances adopted by well-known and respected architectural offices in this country.

This new basis for computing compensation is founded on the principle of charging the client the exact cost of producing his work, plus a just fee to the architect for professional experience and service. Working with this principle in mind, two methods of determining the charges to clients are said to have been tried: first, — the practice of charging the client twice the amount of the salaries of the draftsmen employed on the client's work, plus a fixed sum (determined in proportion to the cost of the enterprise) as fee for professional service; second, — the practice of charging the client four times the sum of the draftsmen's salaries employed on his work, in which case the architect's professional fee is included in this amount. Radical as this new principle of basing charges on draftsmen's salaries may seem, it is claimed to be a just substitute for the commission basis, in fact one that is founded on the "percentage of the cost of the work complete system," sanctioned by the American Institute of Architects. Those who have experimented with the idea state that it is in no way an attempt to do work for a rate less than the minimum amount upheld by the Institute, but rather a system which is fundamentally based on the six per cent principle adopted at the 1908 convention.

For years it has been customary for both the public and the architect to regard a percentage basis as the only available means of determining the just remuneration that an architect should receive for his professional services.

However, that this method of determining charges has for a long time been customary and recognized, does not necessarily mean that it is the only possible method of establishing a rate of charges, and it is probably because the percentage system has not in all cases proved satisfactory, either to the architect or the client, that a new method for establishing professional charges has been resorted to in some offices.

WHEN one stops to analyze the percentage system, when one compares the actual cost of carrying on in a well organized office different pieces of work which bring in identical gross profits to the architect, although the actual cost of their production shows vastly different in the deadly parallel columns of the ledgers, does this customary and long recognized method of charge, based solely and entirely upon the cost of the completed work regardless of the type of structure, seem logical?

Regarding the situation from such a view-point, the array of questions which immediately confront one are numberless. Should the architectural compensation for designing and supervising the erection of a one hundred thousand dollar mill building or storage warehouse be identical to the remuneration received for the designing and supervision of the erection of a richly ornamented theater or an elaborately detailed Gothic chapel, produced with the identical investment of capital by the client? Would it not be possible for the architect to make an unreasonably large profit on his work in connection with either of the first two enterprises, and might it not be possible for him to be forced to accept a considerable loss in carrying out his work conscientiously for his client when designing and supervising either the theater or the chapel? It would seem in these instances that the percentage system of charging proved itself unsatisfactory, in the first cases to the client, in the second to the architect.

AT THIS point let us consider the question of whether there is any reason to suppose that the cost of a completed building should bear any relation whatever to the time and money expended by the architect in studying the problem or in creating the plans, data, and supervision necessary to enable the contractor to deliver over to the owner at the completion of his work the finished structure.

Is a surgeon paid for his professional services in performing an operation in direct proportion to the cost of the anesthetics that his patient consumes? Is a painter paid for a portrait in direct proportion to the cost of the lead, oil, and canvas necessary to produce the picture? Yet are not lead, oil, and canvas just as much building materials to the painter as burnt clay, steel, and stone to the architect?

Suppose, for the sake of argument, we take the following example. If a man were to go to a painter to have a sign painted, he undoubtedly would pay him less for the work than he would had he gone to him for a miniature, regardless of the fact that the paint used in making the sign cost infinitely more than that used in producing the miniature. The artist would be receiving a profit in proportion to his skill and time expended on his work. Is this true in the architect's case? Does he not, by the percentage system, receive more for the sign than for the miniature? If, then, we admit that the case of the architect and the painter, however extravagant the comparison may seem, are to a degree analogous, doesn't this tend to make the logic of the time-honored per cent system of basing charges totter?

But this is not all. There are still other questions to be answered. If an architect spends his time and his draftsmen's time unsparingly for the sole purpose of cutting down the cost of erecting his client's building, without materially cutting down his client's requirements, is it reasonable that he should receive less profit for such study and diligence than he would if his client could afford to invest more money and, by so doing, considerably facilitate the architect's work (which is merely another way of saying, "Save the architect money")? Is it then extravagant to draw the conclusion that, in many instances, the more conscientious and faithful the architect is with his client, the less he receives for his work on the percentage basis?

ARCHITECTURE is essentially a profession in which men sell to their clients the products of their brains, but of all the professions it is the one perhaps most closely connected and affiliated with the business world. An architect's best clients are business men, men used to the system of studied business organizations. Does the percentage system seem logical to these men? Is it what they would term "good business"? Wouldn't a system by which they saw how their money was being expended, by which they knew that the architect was impartial to the amount of their investment — would not such a system appeal to their business instincts? And presuming that it would, does not this new basis of computing architectural compensations on the actual cost of producing architectural work for the client, and about which we will have more to say in our February issue, make a step toward the solution of the problem?

BYZANTINE BRICKWORK IN GREECE.

WE are prone to think of the architecture of Byzantium, like its history, as one of which the annals are brief. After its sudden glorious bloom under Justinian, we used to be told, it declined to immobility and stagnation, against which the reviving art of Italy in the thirteenth and fourteenth centuries had to struggle for freedom. As the veil of the East is lifted, however, we see an empire and an art full indeed of tragic vicissitude, but full also of irrepressible life and continued creation. Among its later products was an architecture little known, differing widely from that of St. Sophia and Ravenna, yet displaying the same qualities of beauty of massing and rich use of materials.

On emerging from the struggle over image-worship, which had disrupted it in the eighth century, the Byzantine empire, with marvelous and unexpected recuperative powers, entered on a renaissance both in politics and in art, justly called the second golden age. Between the middle of the ninth century and the end of the twelfth, under the Macedonian and Comnenian emperors, the empire flourished as scarcely even in the time of Justinian. The reconquering of lost provinces went hand in hand with internal prosperity and intellectual stimulation. Both Macedonians and Comneni were great builders. Though their principal churches and palaces there have now disappeared, travelers of the day without exception testify to the incomparable luxury and splendor of Constantinople at that period. The activity at the capital soon spread to the provinces, where it was furthered by the power and wealth of monasticism, especially in Greece.

In Greece during the tenth century were founded the most ancient monasteries of Athos; in the eleventh, the great convents of Saint Luke in Phocis and Daphni near Athens. The artistic influence extended even beyond the political frontiers, to Georgia and Armenia, to Russia, full of monuments almost purely Byzantine, even to Italy and Southern France. Thanks to this new flowering, the Byzantine style retained a preëminence which it yielded only to the victorious Gothic of the thirteenth century.

Hitherto we have been familiar with but few buildings from this period except Saint Mark's at Venice, which we were apt to regard rather as an isolated survival of the style of the early period than as an offshoot of a living contemporary development. Only in the last dozen years has an awakened interest resulted in such scholarly illustrated monographs as those of Schultz and Barnsley on the monastery of Saint Luke and of Millet on Daphni and Mistra, in M. Diehl's compendious "Manuel," in a grist of articles in the archeological journals. The Greek government, alive to this rich heritage, has now carried out a comprehensive photographic survey of these monuments, side by side with those of classical antiquity. A series of unrivaled photographs, taken by the experts of the Royal Prussian Photometric Institute with its superb equipment, and exhibited by Greece at the Roman exposition of 1911–1912, has made accessible for the first time the great number of Byzantine churches scattered throughout the kingdom, with their wealth of unhackneyed detail and above all their masterly and charming treatment of brick.

THE BRICKBUILDER begins with the present issue a series of Frontispieces selected from the best examples recently photographed. We will continue the presentation from month to month throughout the year, accompanying same with descriptive text.

A HOUSE BUILT BY GEORGE WASHINGTON.

AT Glasgow, Ky., there is a residence built by George Washington in 1790, for General Spotteswoode, then Governor of Virginia, in which State Glasgow was included at the time. There is nothing remarkable in the architecture of the building, but in respect of construction it is very unlike modern houses. The walls are of solid brickwork, 36 inches thick. The floors are of chestnut, 2 inches thick, and laid with dowels. The original roof covering, part of which still remains, consisted of chestnut shingles, ½ inch thick, secured with wood pegs. The building was constructed entirely without nails, which were not manufactured in the United States when the house was built. The original windows were of glass imported from France, as this material was not produced in America at the time. The windows illustrate the wear and tear of structural materials, for it is stated that the glass remaining intact has worn so that it is no thicker than paper, and is readily broken by rainstorms. The house has not been remodeled in any way, and presents substantially the same appearance as when built one hundred and twenty-two years ago. — *London Builder.*

COMPETITION FOR THE DANIEL H. BURNHAM BOOK-PLATE.

BY bequest of the late Daniel H. Burnham, architect, a new Architectural Library has been established at the Art Institute of Chicago, to be known hereafter as the "Burnham Library of Architecture."

The committee in charge of this library have decided to hold an open competition to receive designs for an appropriate book-plate, seal or device, for which purpose two prizes, the first $250, the second $50, are offered.

By making this competition open to all wishing to submit drawings, the committee hopes to receive designs worthy of the memory of the late Daniel H. Burnham.

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Do you want to see the complete illustrations on The McAlpin Hotel? We shall be very glad to send the February issue of our Magazine which contains an exhaustive article on the plumbing of this job. Also a copy of our new L M Catalogue just off the press.

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THE BRICKBVILDER

AN ARCHITECTVRAL MONTHLY

VOLVME XXII FEBRVARY 1913 NVMBER 2

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PLATE ILLVSTRATIONS

LETTERPRESS

PVBLISHED MONTHLY BY

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CHURCH OF KATO PANHAGIA,
ARTA, EPIRUS, GREECE.

Stone and common brick, cut to shape
for friezes and panels.

THE BRICKBVILDER

FEBRVARY, 1913

VOLVME XXII. NVMBER 2.

A House of Unusual Architectural Merit.

THE HITT RESIDENCE, WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT.

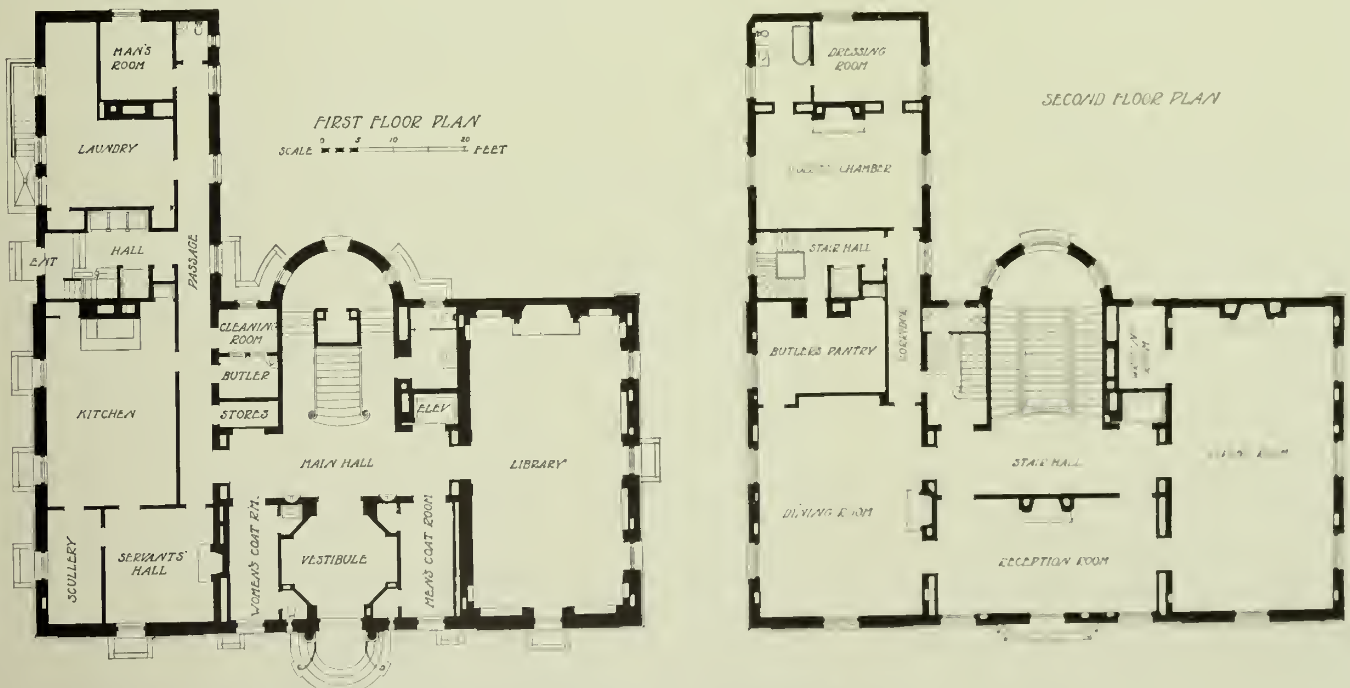
SELECTED FOR TREATMENT BY WADDY B. WOOD, ARCHITECT.

IN writing an article to accompany the beautiful illustrations of the Hitt house in Washington, it does not seem necessary to go into any technical description of the plan, and style, and material, but rather to try, if possible, to point out the general reasons why it is so much more satisfying than most residences being designed to-day.

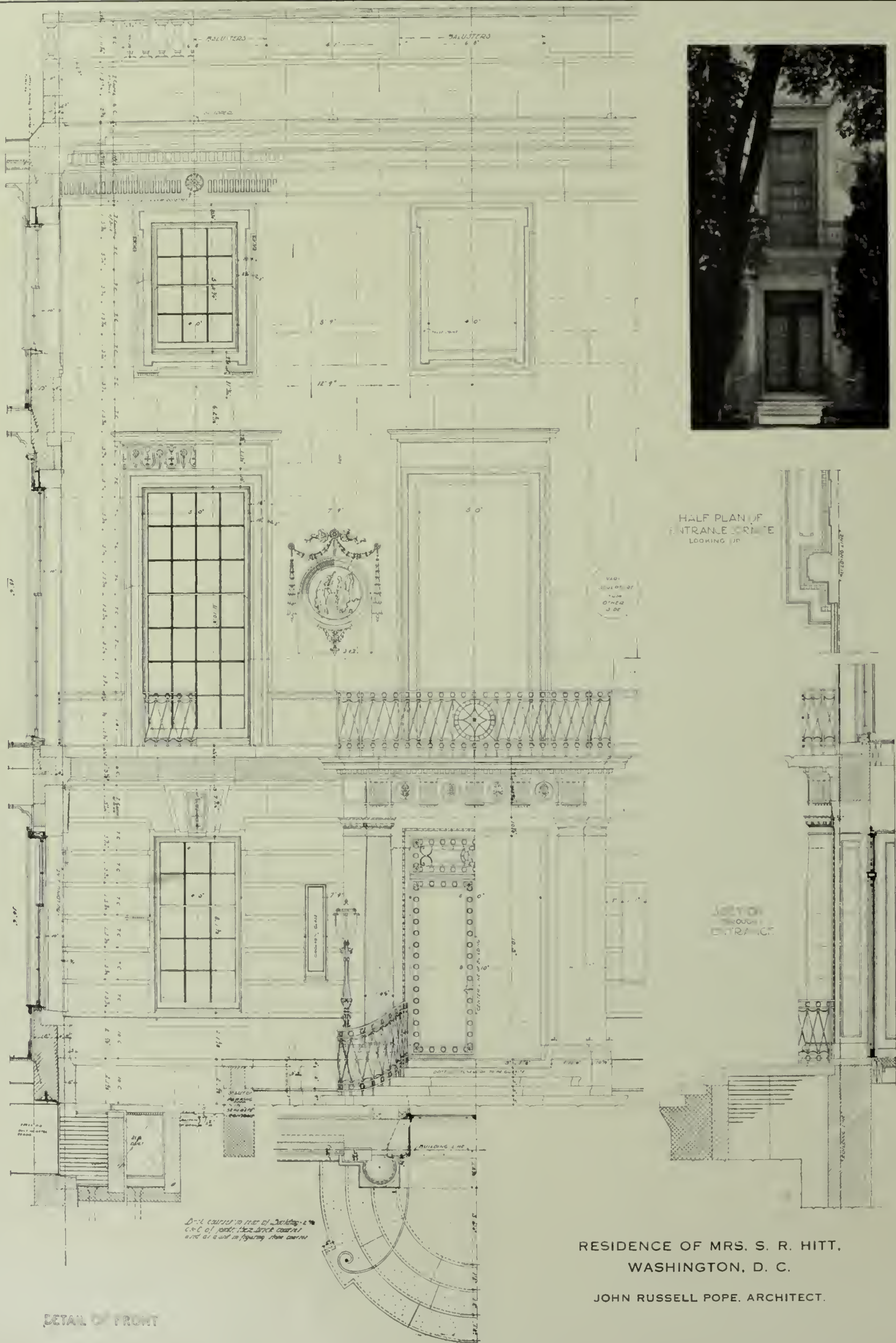
During a visit to Venice a few years ago, I was sitting on the plaza of St. Mark's with two architects, in view of the wonderful Renaissance Library by Sansovino, and the majestic old Doges Palace. I asked them which they thought was the better piece of architecture and they both said, "The Library." I then asked them which they would rather look at and they both answered, "The Doges Palace." I agreed with them at the time and then began to wonder why, and arrived at the one and only conclusion, which is, that the Doges Palace is the more charming because it is the more human, and being human, after all it is the better architecture. It may not be as satisfying structurally; it may not have its ornament arranged as we are taught to believe it should be; its composition maybe is peculiar; and yet we architects and laymen alike love to look at it. If this result is obtained, it is good architecture; and I have reached the conclusion that in criticism we should try to discover why the good is good.

The Hitt house is as good as the Doges Palace because it is human; and it takes a thinker and not a draftsman to make a new building human. Mr. Pope has the rare quality of being both, which I believe is rather unusual. The Doges Palace is human because of the countless ages of humanity that have left their impress on it as well as because the original designer constructed it to tell the story of his time. A new house has to be born with a voice, to speak to people as the Doges Palace does.

The Hitt house is formal without being stiff, simple



THE HITT RESIDENCE, WASHINGTON, D. C.
John Russell Pope, Architect.



RESIDENCE OF MRS. S. R. HITT,
WASHINGTON, D. C.

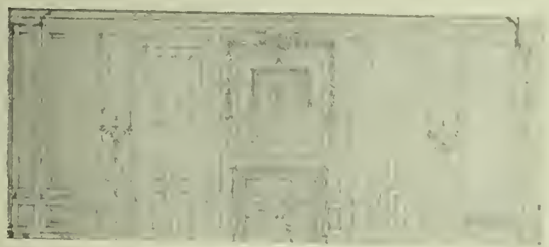
JOHN RUSSELL POPE, ARCHITECT.

RESIDENCE OF MRS. S. R. HITT, WASHINGTON D.C.
JOHN RUSSELL POPE, ARCHITECT

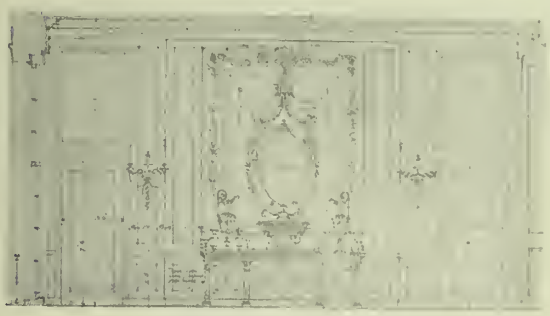
LIBRARY.

RESIDENCE OF MRS. S. R. HITT, WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT



SCALE DETAIL OF DINING ROOM



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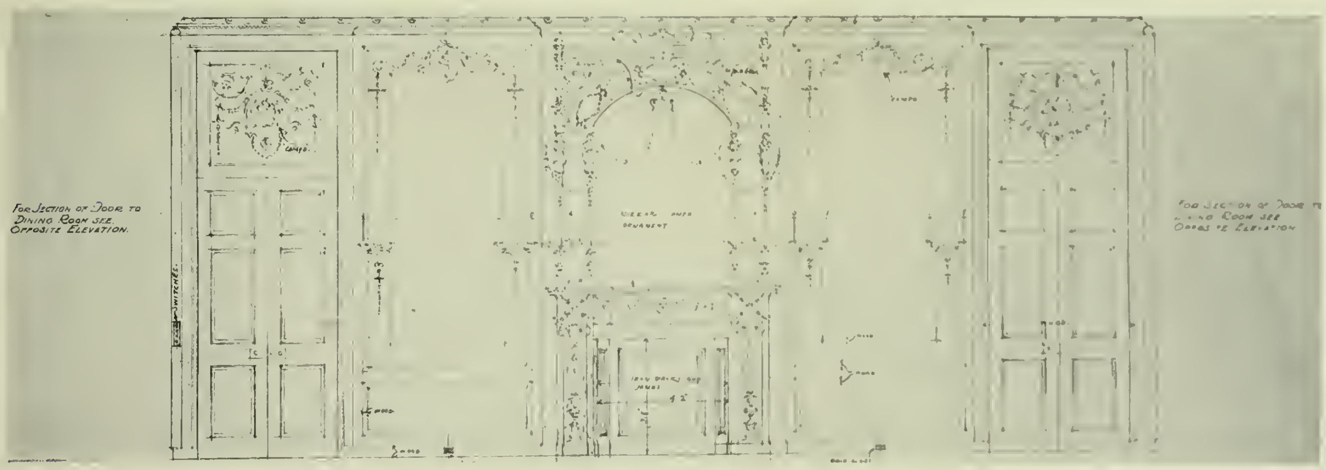
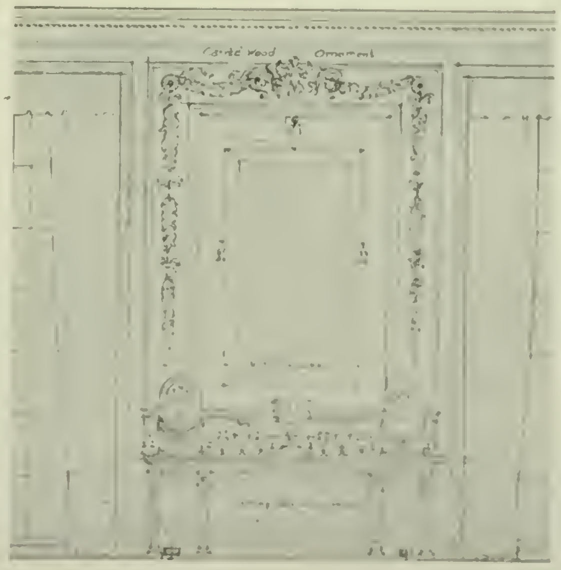
DINING ROOM.



SCALE DETAIL OF RECEPTION ROOM.

RECEPTION ROOM.

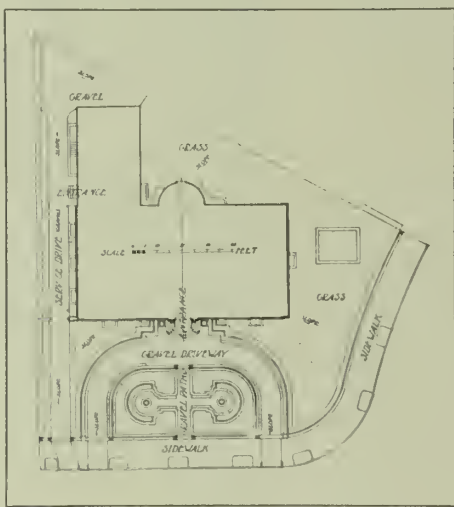


SCALE DETAIL OF DINING ROOM

RESIDENCE OF MRS. S. R. HITT, WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT

without being plain, scholarly without being dry, and finally is very human. I believe that my readers will agree with me in the above statements from a glance at the illustrations which directly follow this page. When a man can accomplish a design which is at once formal, simple, scholarly, and human, it seems that his work is not only extremely rare, but so far above our average of American architecture as to warrant most careful study. It is by this means that we may lift our own work to a higher plane. There are many of us practising architecture that have his talent, and still more who have had his training; but I know of no architect now actively engaged in the practice of his profession who combines as he does both talent and training. His work is the result of this combination, and the Hitt house has an advantage over his other works in being done from a riper experience. It shows that he has arrived at his steady gait after feeling around in a more or less haphazard way in his earlier residence designs.



LOT PLAN.

THE HITT RESIDENCE, WASHINGTON, D.C.
John Russell Pope, Architect.

On the return of a Washington draftsman from a trip to New York, I asked him for his impressions. He said, "Well, I will tell you. There are two distinct styles of architecture in that city." Knowing the many men of such different ideas and ideals there, and the straining after everything that has ever been done before which they are trying to do, I could not quite see how he could make such a statement. It seemed to me that if any city in the world had been cursed with a conglomeration, made possible by too much money and too many books, it was New York; so I asked with considerable interest what the two styles were. His answer was, "One well-known firm of architects and *the others*." A truer thing was never said, and his answer naturally makes one pause to wonder how he can get that individuality into his own work as does this well-known combination. Unless he is a genius the answer will never come. He can greatly help his work, though, after arriving at this stage and help greatly to make his country more beautiful, because he has an ideal above his reach. The Hitt house has those qualities which have made the work of that one firm classified above stand out above all others, although totally differently expressed — qualities which make the rest of our Washington residences look like "the others." This is done in a quiet, dignified way and in a way that makes one realize that it was far from the thought of the designer to strain after individuality. When a man tries to get individuality and fails, it is pitiful; all we see is the fall. Individuality is born in one, is God-given, and if properly directed can lead others on to better things.

A glance at the Hitt house façade shows individuality properly directed, and without an effort to do more than simply express the home of a cultivated American woman. That was the problem and it seems to me that Mr. Pope has solved it. Our architects have tried every conceivable style for this purpose and have failed in almost every case. I do not think these failures were entirely due to the styles adopted or the lack of education or taste of the designer, but to the fact that they were not conceived out of the mind of the designer for the purposes for which they were to be used. They were adopted from memory and training and lacked the vitality of something born into the world. A vital thing born with life or in one's mind, reared brutally or with due regard for precedent, is always interesting to any one whether architect or layman. This house has life and was reared with refinement; therefore, it not only is interesting, but something to love. I have found that people not trained in architecture are interested in it, which proves its life; and liked because of its refinement, which shows the blessing the designer enjoys of having had a thorough training. We can get the training, that we know; we do not know how large the spark or conception in us is, but one hope we all have, that it is there, however small. When this spark is fanned into a flame by ambition and controlled by training and work, then we can hope to do work as good and interesting as the Hitt house in Washington.

VESTIBULE — HITT HOUSE, WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT.

HOUSE ON LONG ISLAND, NEW YORK
LA FARGE & MORRIS, ARCHITECTS

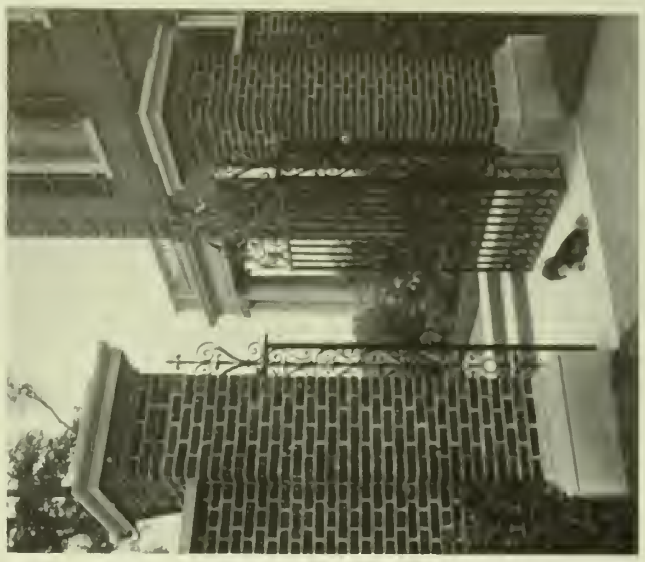
HOUSE ON LONG ISLAND, NEW YORK

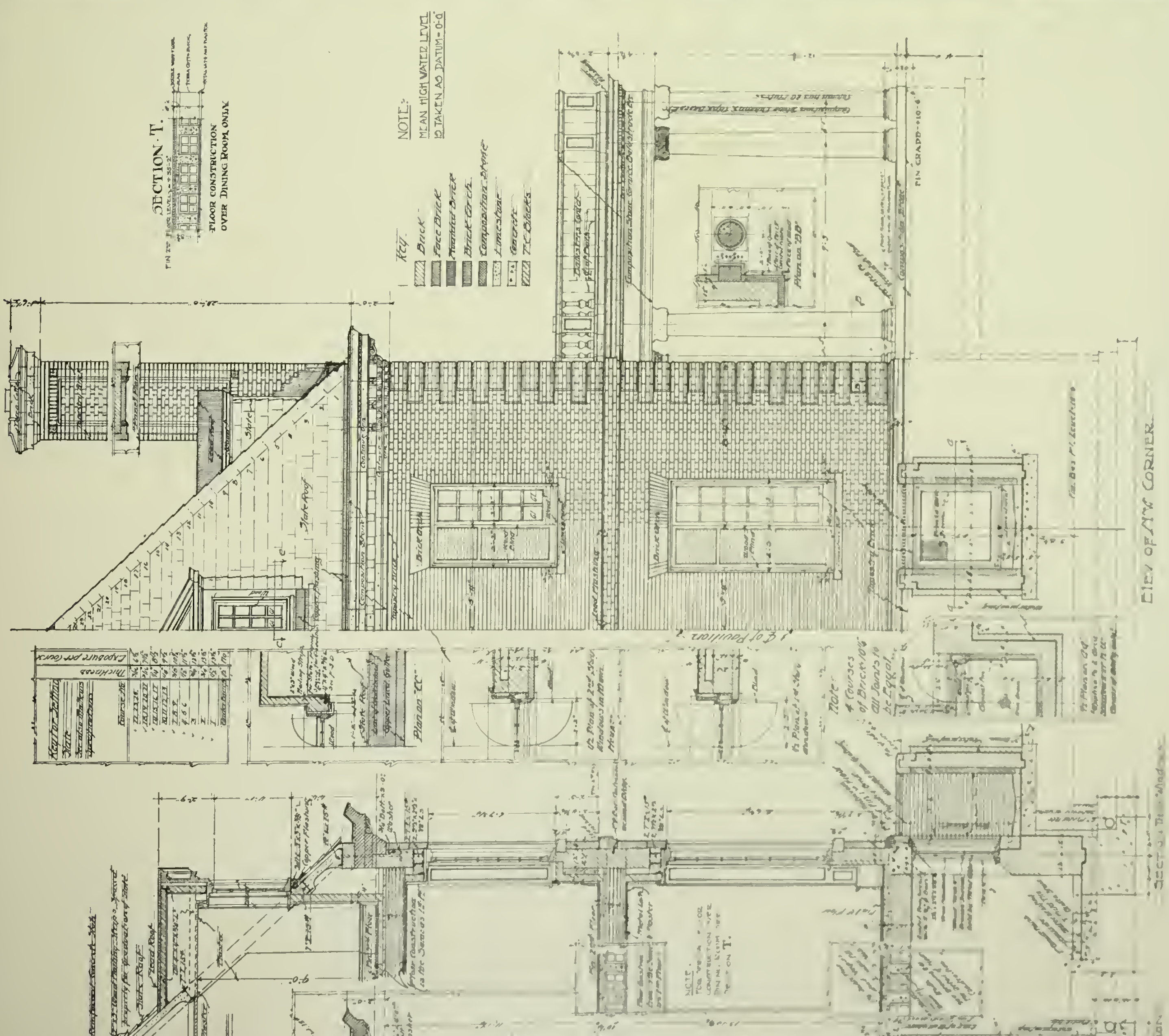
LA FARGE & MORRIS, ARCHITECTS

NORTH ELEVATION

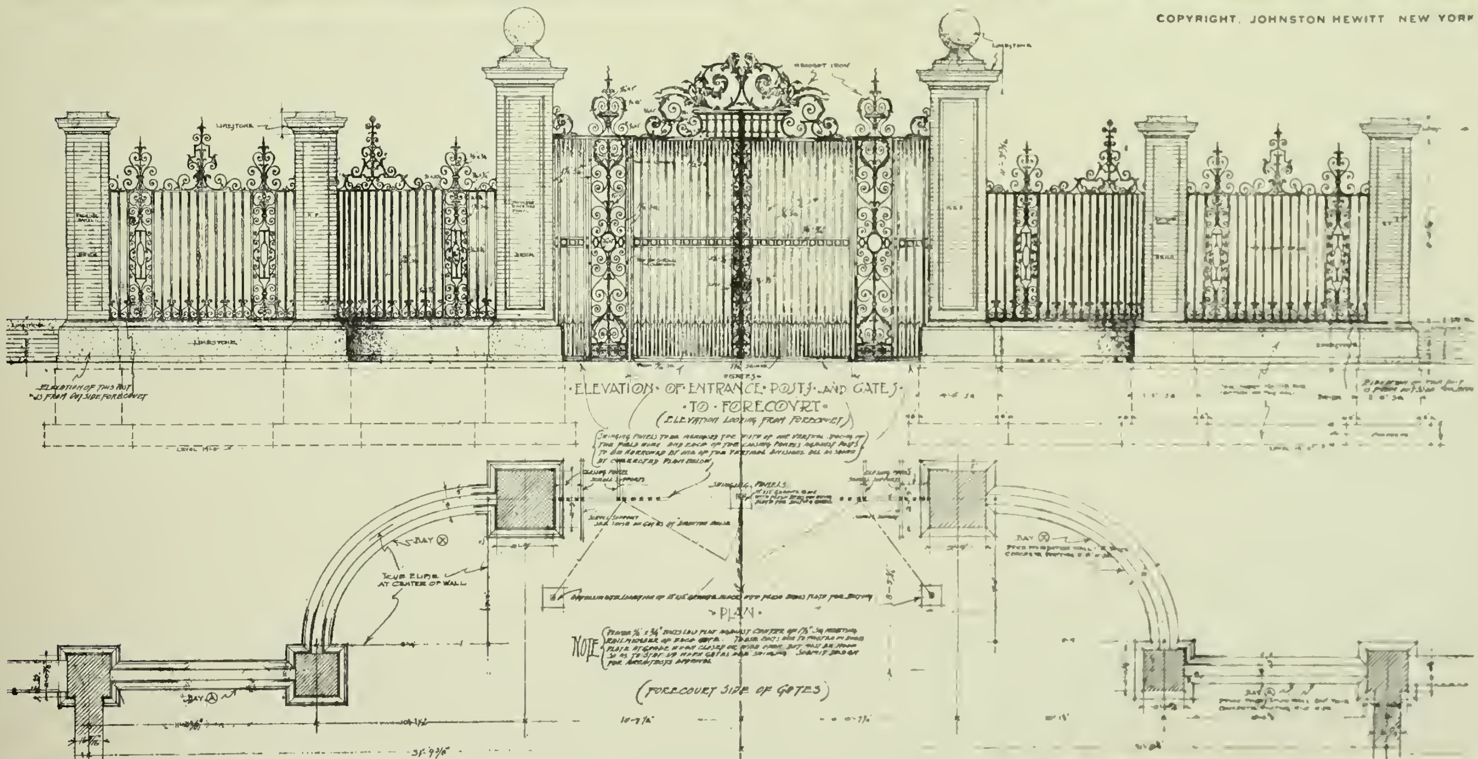
NORTH DOORWAY DETAIL

SOUTH DOORWAY DETAIL





HOUSE ON LONG ISLAND, NEW YORK
LA FARGE & MORRIS, ARCHITECTS



ENTRANCE GATES

STABLE ON
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NEW YORK

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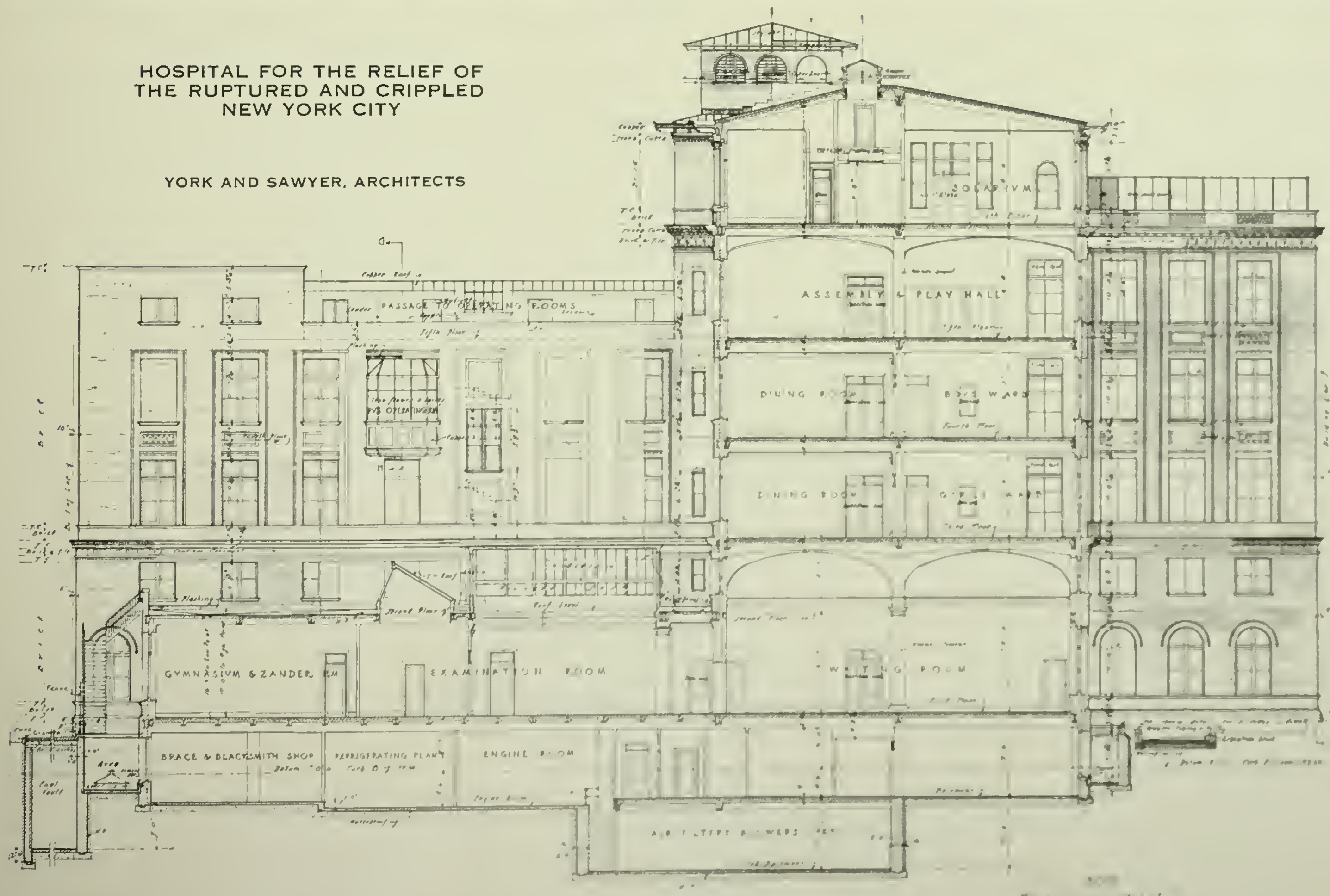
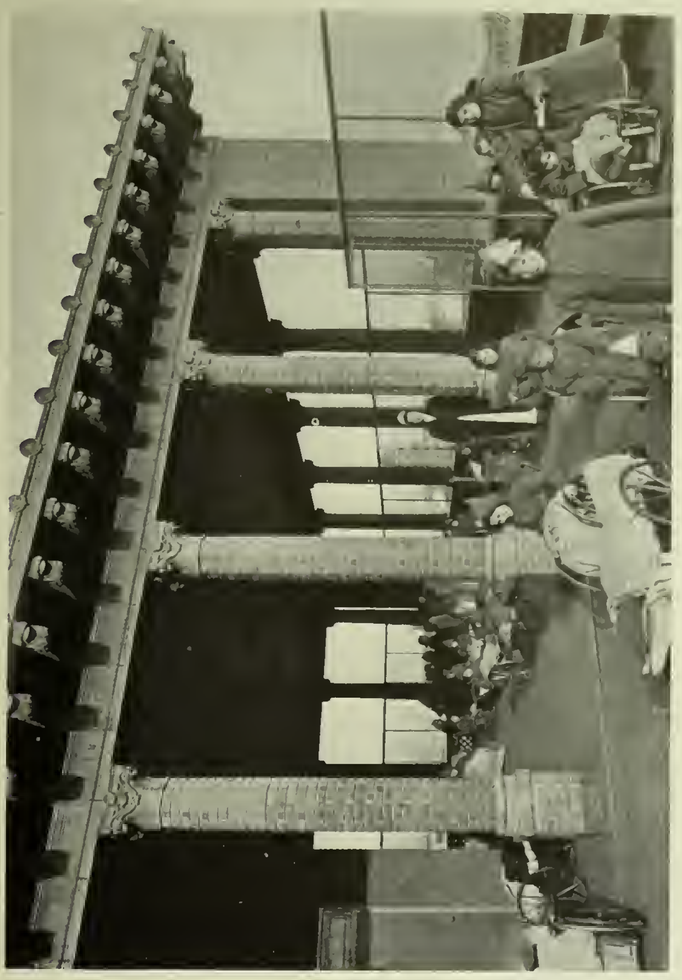
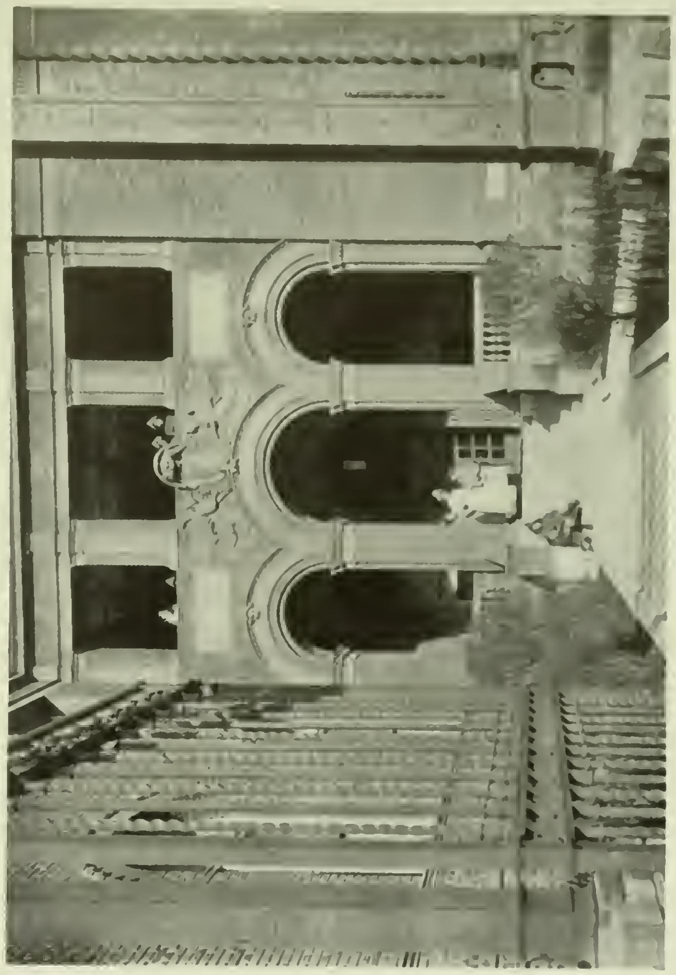
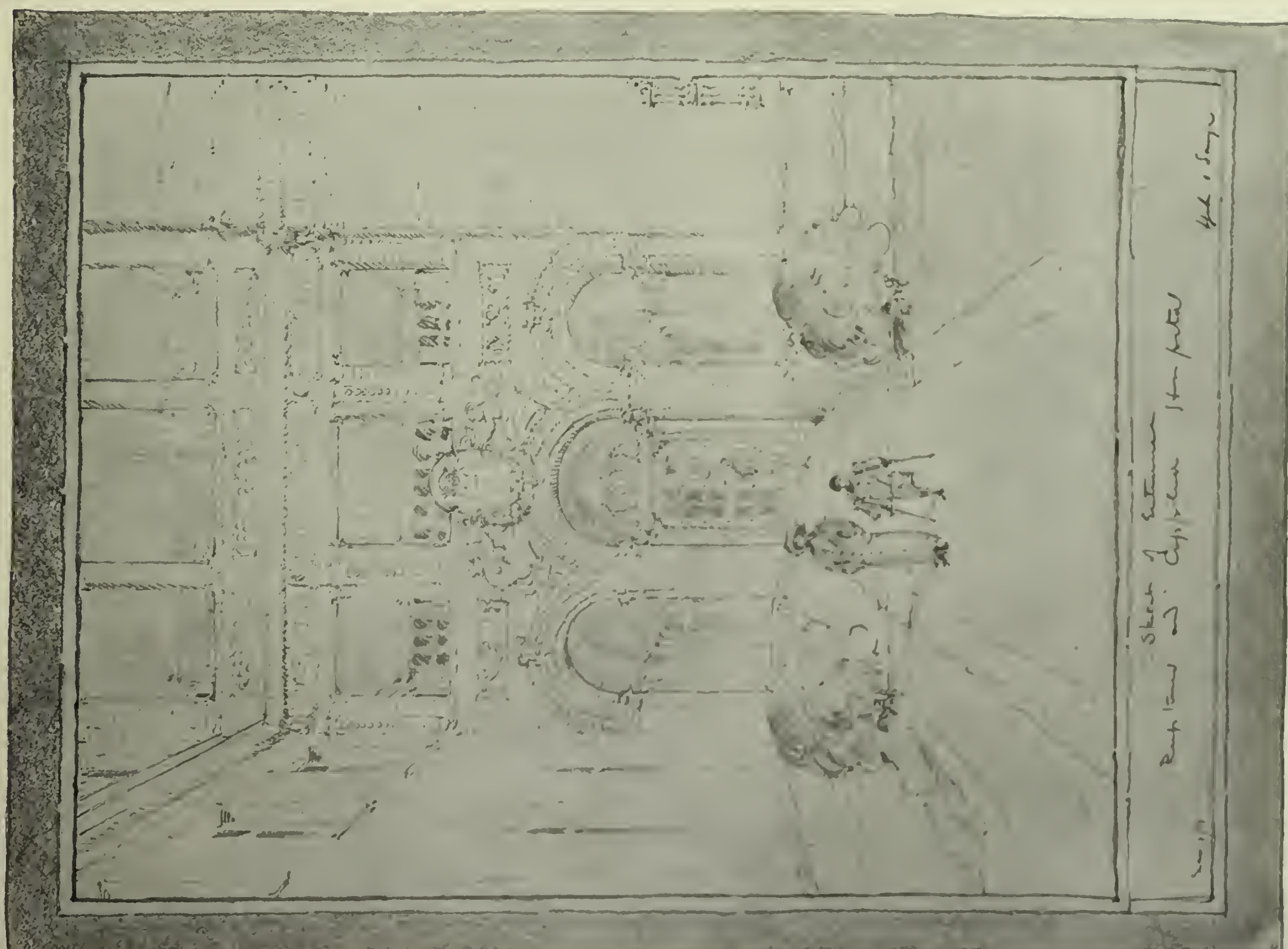


• LONGITUDINAL SECTION •







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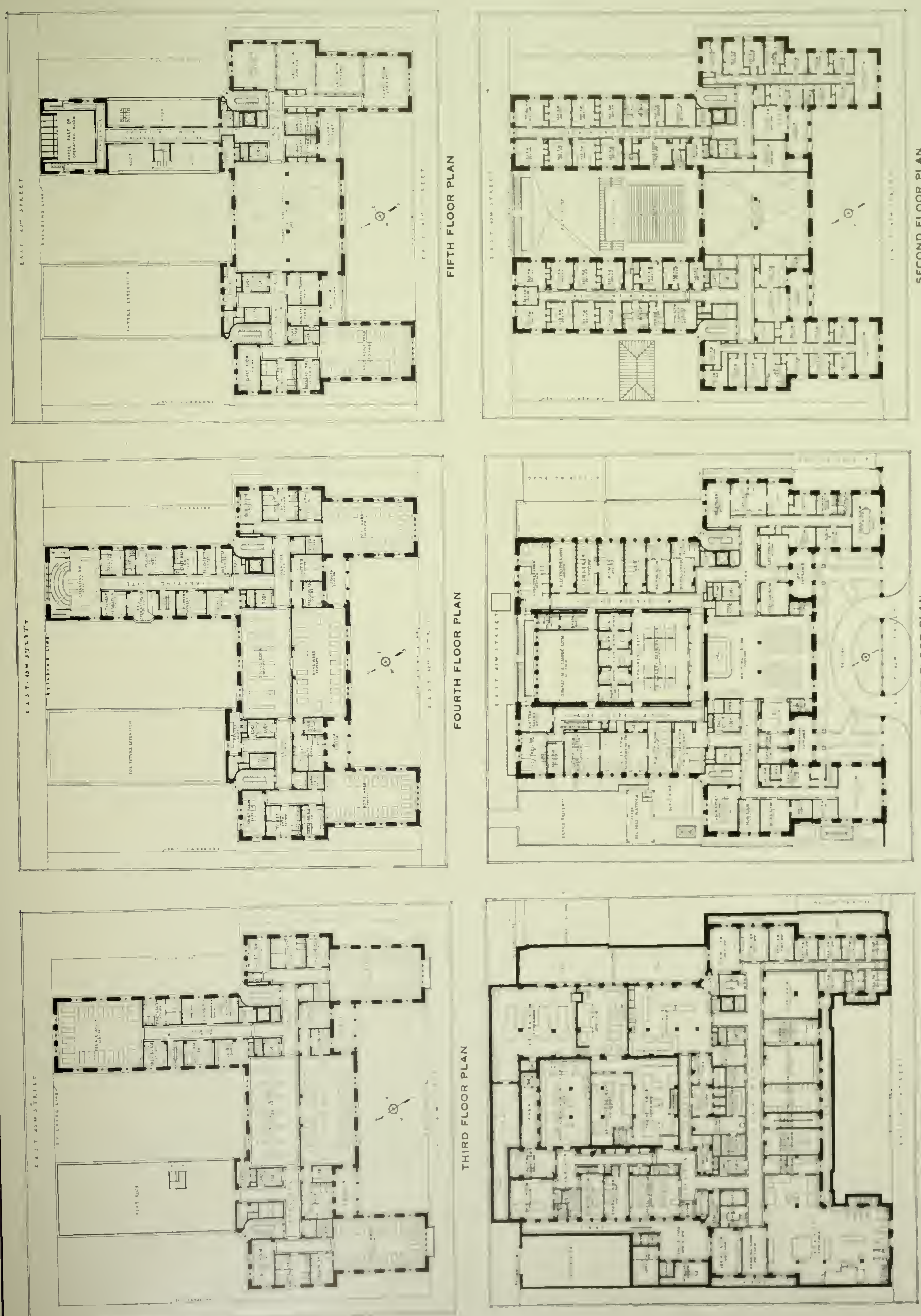
YORK AND SAWYER ARCHITECTS



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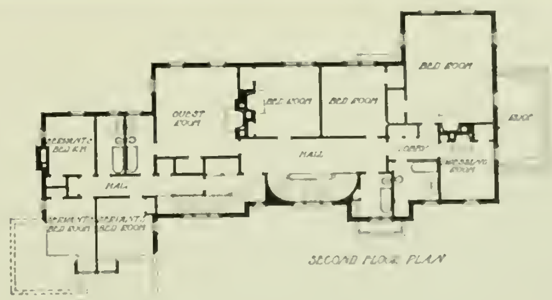
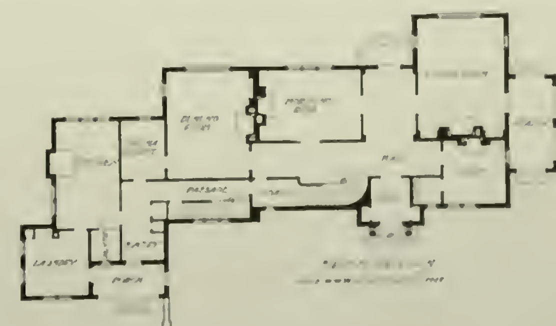
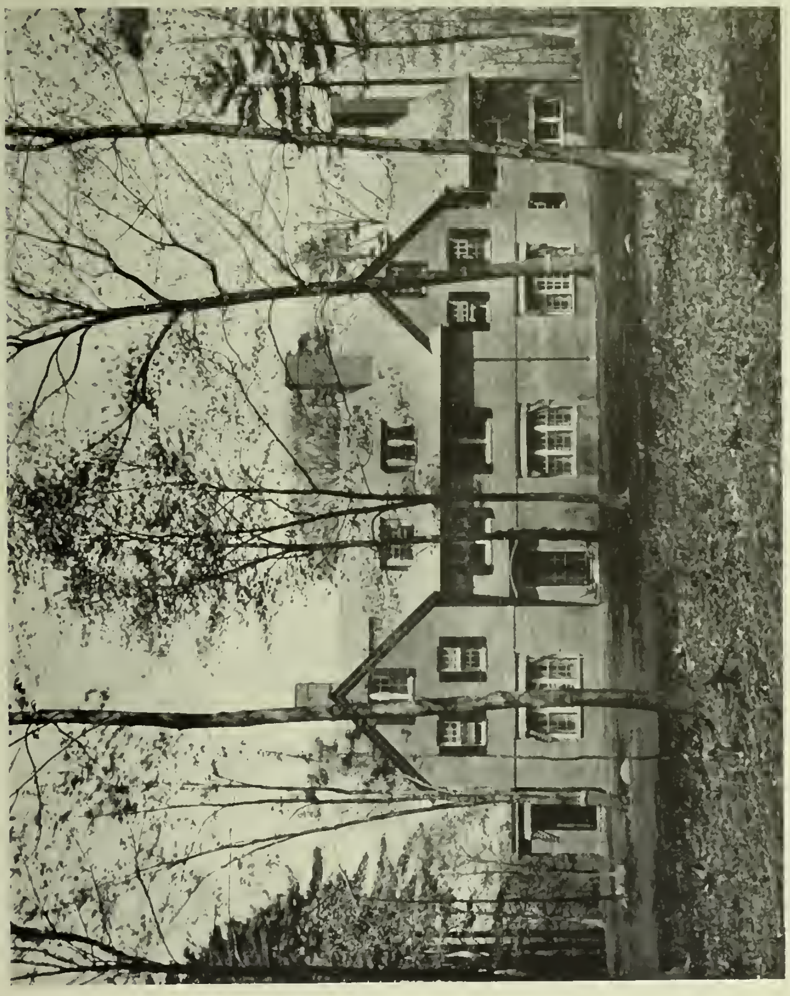
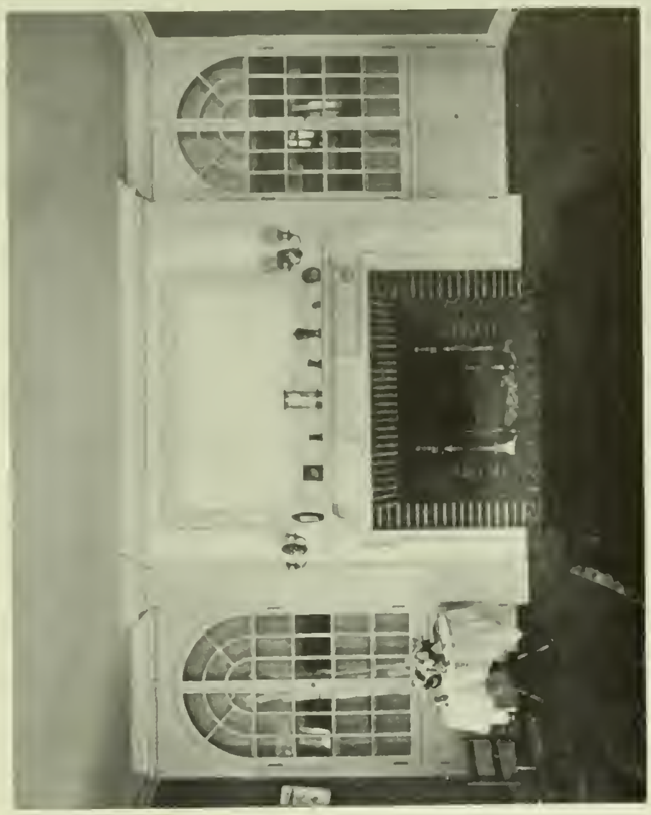


HOUSE AT MILTON, MASS.

JAMES S LEE
ARCHITECT





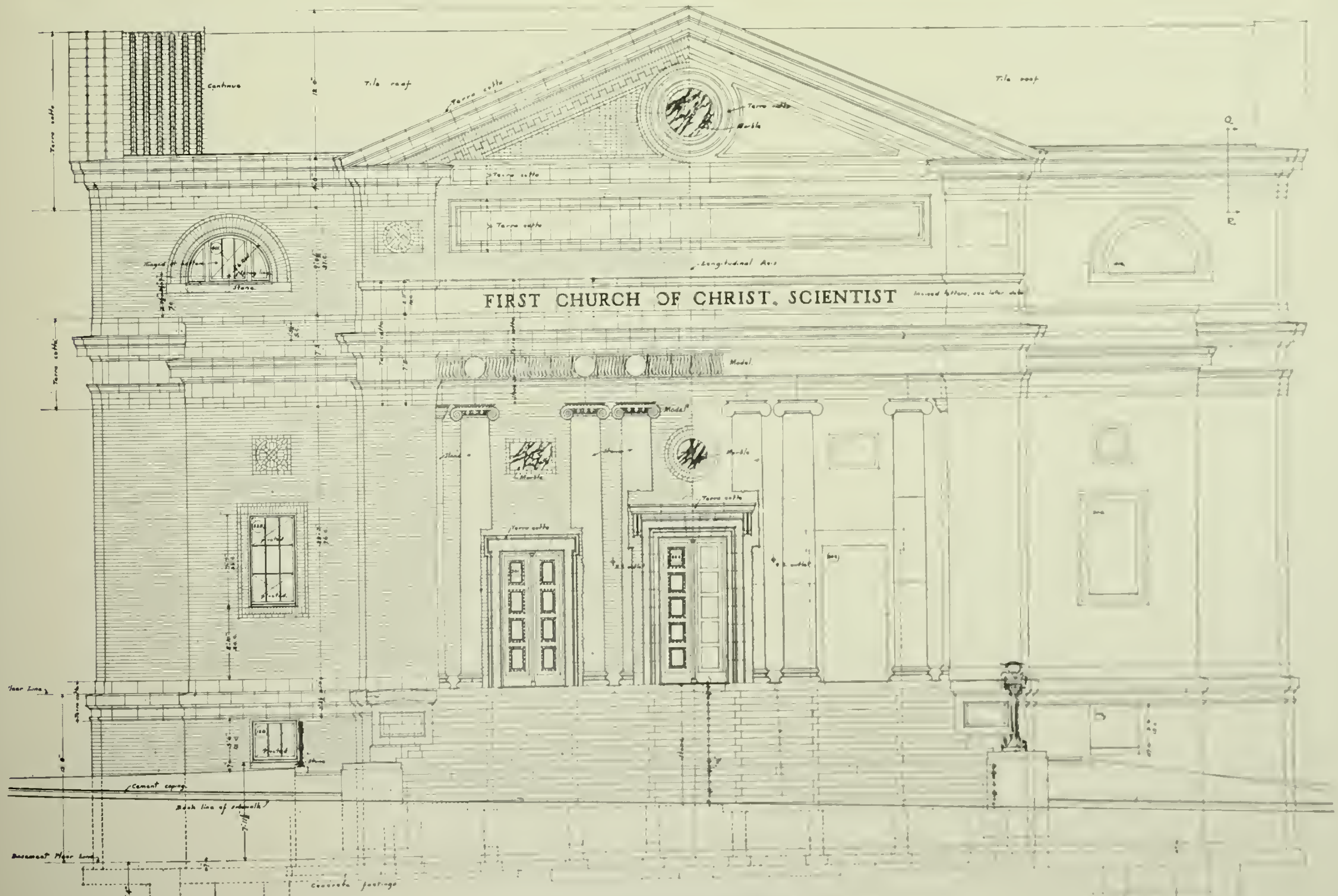


LIVING ROOM

HOUSE AT MILTON, MASSACHUSETTS

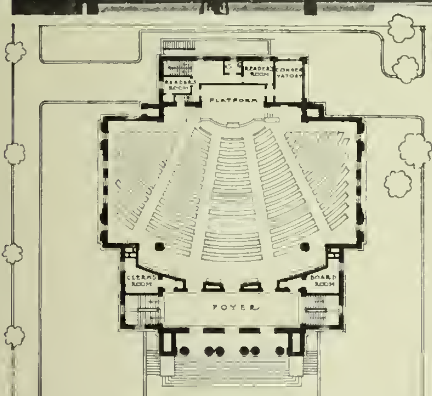
JAMES S. LEE
ARCHITECT

HALL



·NORTH·(FRONT)·ELEVATION·
Scale: ¼ inch = 1 foot.

FIRST CHURCH OF CHRIST, SCIENTIST, WASHINGTON, D. C.
MARSH AND PETER & E. D. RYERSON, ASSOCIATE ARCHITECTS



AUDITORIUM FLOOR PLAN

FIRST CHURCH OF CHRIST, SCIENTIST
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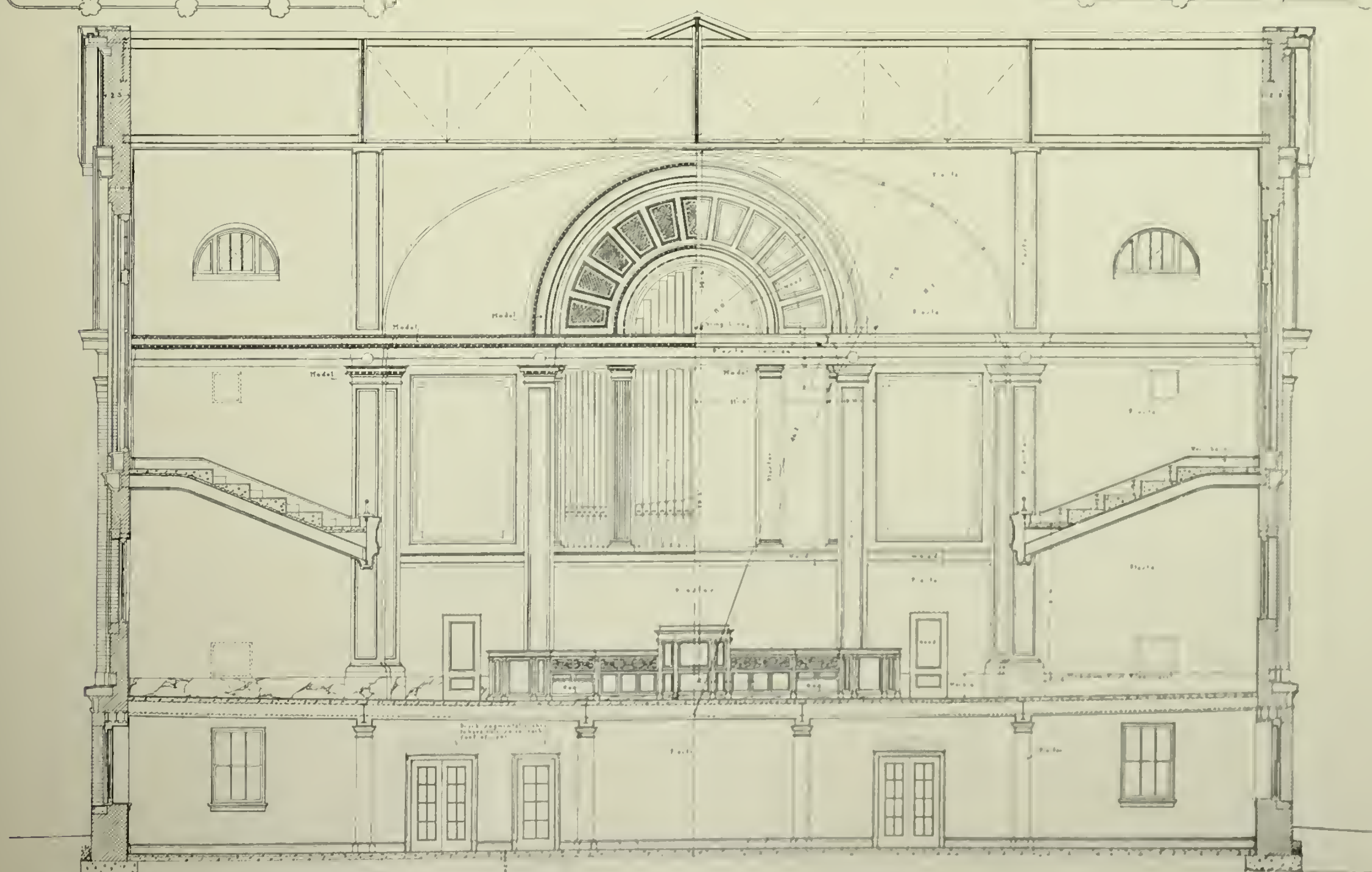
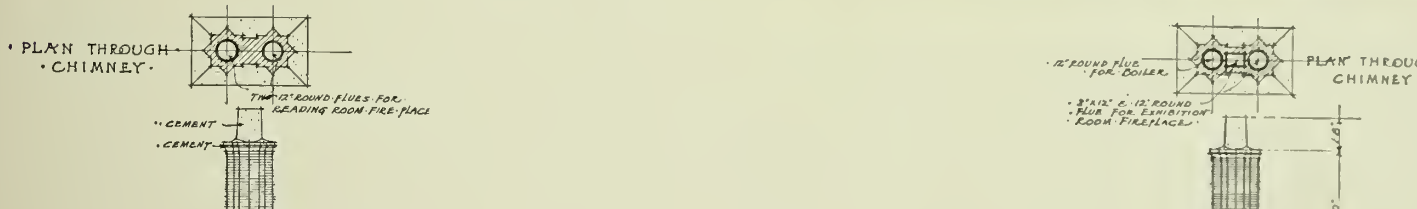


CROSS SECTION



· FRONT · ELEVATION ·

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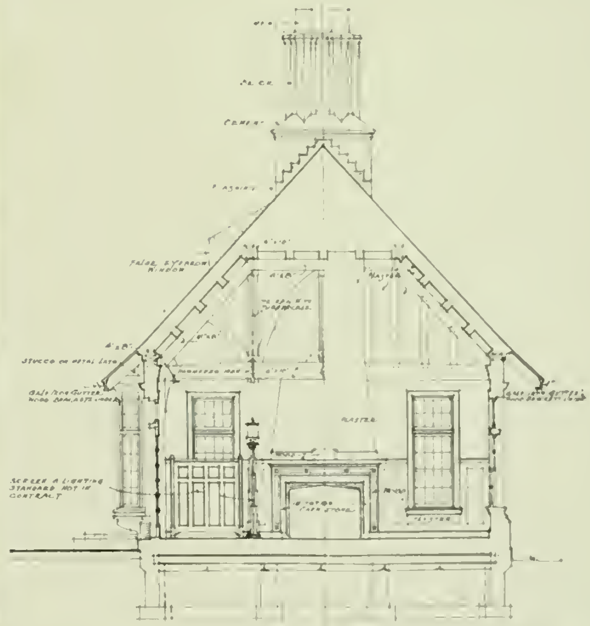
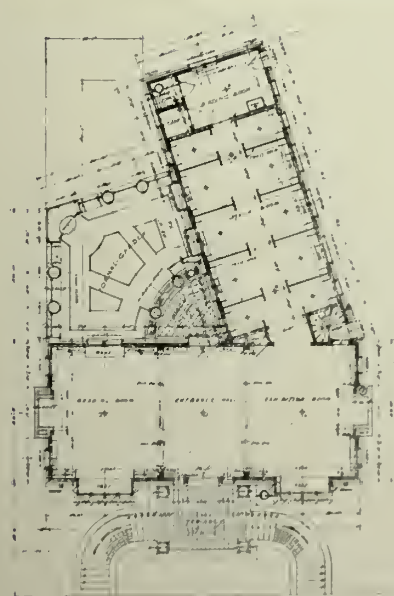
AYMAR EMBURY II, ARCHITECT


LOOKING INTO GARDEN


DETAIL OF REAR


INTERIOR




PLAN


EXTERIOR

EASTHAMPTON PUBLIC LIBRARY, EASTHAMPTON, L. I.

AYMAR EMBURY II, ARCHITECT

HOUSE AT NEW HAVEN, CONN.

MURPHY & DANA
ARCHITECTS

SECOND FLOOR PLAN

FIRST FLOOR PLAN

RECEPTION ROOM

DINING ROOM

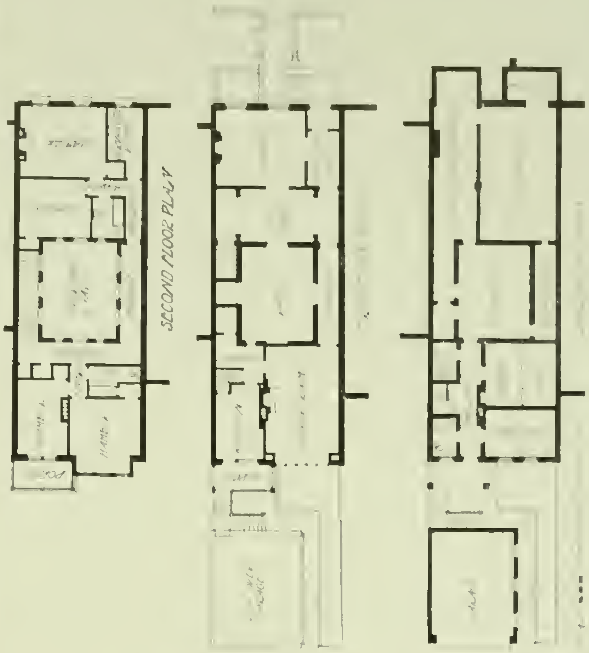
LIBRARY

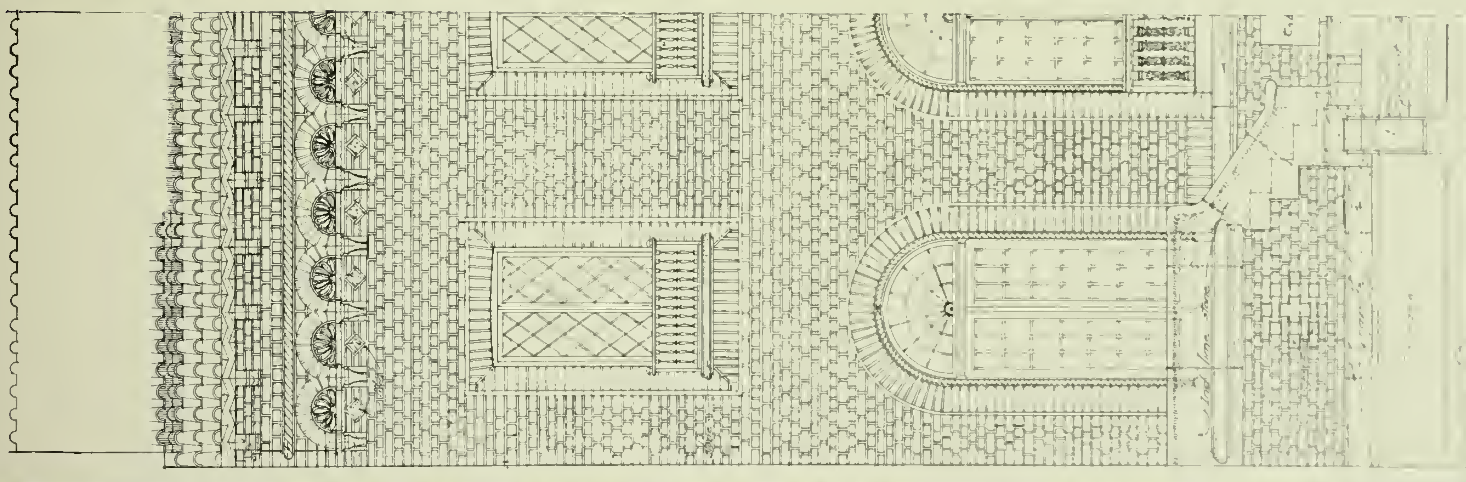
STAIR HALL

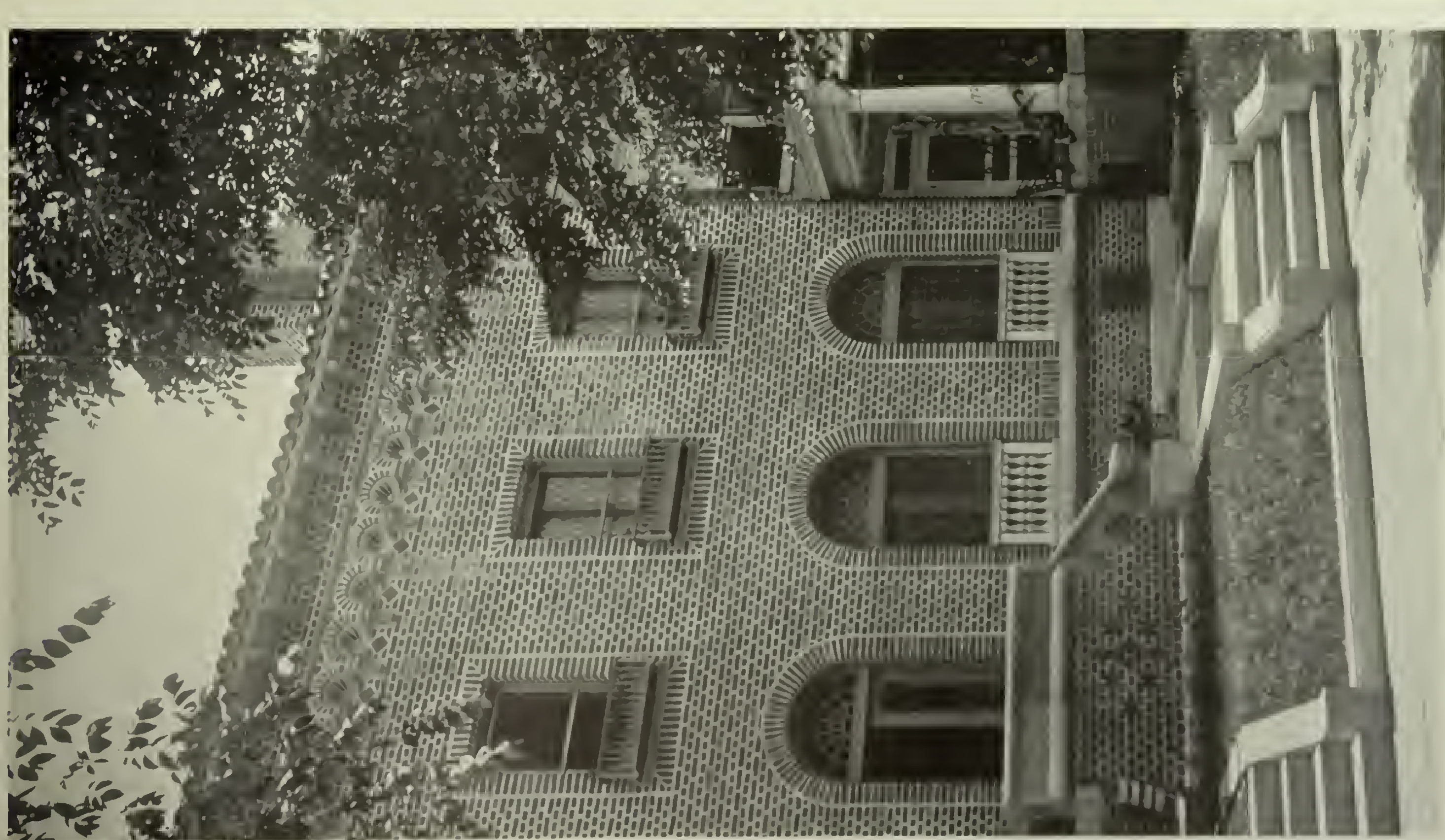
HOUSE AT NEW HAVEN, CONN.

MURPHY & DANA, ARCHITECTS

PATIO







HOUSE AT WASHINGTON, D. C.
WOOD, DONN & DEMING
ARCHITECTS

The Unit Power Plant for Isolated Buildings and Small Groups.

PART I. — PRELIMINARY CONSIDERATIONS.

BY CHARLES L. HUBBARD.

We start herewith a series of articles which will take up in a simple and concise form the isolated power plant as applied to single buildings of different types and to small groups. The matter has been treated especially from the architect's point of view, and data presented in such form that it may be used without extensive reading. Among the subjects considered are the uses of steam and power in buildings of various kinds; the determination of boiler, engine, pump, and dynamo capacities for different purposes, such as heating, ventilating, lighting, refrigeration, elevator service, etc. Apparatus of various kinds is discussed in detail, with special reference to the selection of equipment best adapted to the requirements of any particular case, taking into account comparative costs, both of installation and operation. The conditions under which it is advisable to install a power equipment in combination with the heating plant, with examples showing the saving which may be made with certain relations between power and heating requirements, will be studied. Details of design are considered to some extent, such as piping layouts for boiler and engine rooms, and underground conduits for steam and hot-water distribution to the various buildings of a group. The last article of the series treats of water supply by mechanical means, discussing briefly different sources of supply, reservoirs and tanks, pipe lines, and pumping machinery of various kinds, with a comparison of costs. — *The Editors.*

FOR the benefit of those who may be a little hazy upon certain terms and quantities employed in power and heating work, we will take up in a simple manner some of those in most common use.

Steam Boilers. Power and large heating boilers are usually rated on a *horse power* basis; one horse power being the capacity to evaporate 30 pounds of water per hour, from a feed-water temperature of 100 degrees, into steam at 70 pounds pressure. This quantity will vary somewhat with changes in the relation between temperature and pressure, but for the pressures commonly carried in this class of work, and where the feed-water is heated, the boiler may be safely proportioned on a basis of 30 pounds of steam per horse power per hour.

General Proportions. The commercial horse power of a boiler is commonly based upon its heating surface; horizontal fire-tube boilers being rated on a basis of 12 square feet of heating surface per horse power, and water-tube boilers on a basis of 10 square feet.

The required grate area depends upon the rates of combustion and evaporation. The rate of combustion meaning the pounds of coal burned per square foot of grate surface per hour, which, with a natural draft, will run from 12 to 15 pounds for anthracite and 15 to 18 pounds for bituminous. The rate of evaporation means the pounds of steam generated per pound of coal. With the best makes of power boilers, well cared for and skilfully fired, this will run from 8 to 10 pounds, although the lower figure probably comes nearer the actual result in the average power plant of small size. The grate surface in any particular case is found by the following formula,

$$S = \frac{H.\,P. \times 34.5}{E \times C}, \text{ in which,}$$

S = grate area in square feet.
E = rate of evaporation.
C = rate of combustion.
H.P. = horse power of boiler.

Table I, computed by the above method, gives the square feet of grate area per horse power for different rates of evaporation and combustion.

TABLE I.

Rate of Evaporation.	Rate of Combustion. 12 lbs.	15 lbs.	20 lbs.
10 lbs.	.28	.23	.17
9 "	.32	.25	.19
8 "	.36	.29	.22

The approximate coal consumption per boiler horse power per hour may be found by multiplying the square feet of heating surface per horse power by 0.3, which gives $12 \times 0.3 = 3.6$ pounds for horizontal fire-tube boilers, and $10 \times 0.3 = 3$ pounds for water-tube boilers. In computing the total boiler horse power for any building, first determine the maximum weight of steam required per hour for all purposes, and divide the result by 30.

Chimneys. The successful operation of a boiler plant is largely dependent upon the action of the chimney, unless mechanical draft is employed. The latter method is not usually required in plants of small size, although used quite extensively under certain conditions in larger ones. The draft of a chimney is dependent upon the height, while the power, or capacity for carrying off the waste gases, varies with the sectional area of the flue. The required draft varies largely with the kind of fuel used, because the finer the grade of coal the greater the pressure necessary to force the air through it. The following heights have been found to give good results in plants of moderate size, and produce sufficient draft to force the boilers from twenty to thirty per cent above their rating. Free burning bituminous coal, 75 feet; anthracite of medium and large sizes, 100 feet; slow-burning bituminous, 120 feet; anthracite pea coal, 130 feet; anthracite buckwheat coal, 150 feet.

Table II gives the diameter and height of flue for different boiler horse powers. To use the table, first select the proper height for the grade of fuel to be used, and then from the table find the required diameter for the given horse power of boilers to be provided for.

TABLE II.

Diameter of Flue.	Height of Chimney and Boiler Horse Power. 60′	70′	80′	90′	100′	125′	150′
24″	54	58	62				
27″	72	78	83				
30″	92	100	107	113			
33″	115	125	133	141			
36″	141	152	161	173	182		
39″		183	196	208	219		
42″		216	231	245	258	271	
48″			311	330	348	365	389
54″				427	449	472	503
60″				536	565	593	632
66″					694	728	776
72″					835	876	934

Steam Engines. The power of a steam engine is also rated in horse power, but on an entirely different basis. In this case one horse power means the capacity of doing work at the rate of 33,000 foot pounds per minute. The indicated horse power (I.H.P.) means the total power developed, and includes that required for overcoming the friction of the engine itself, while the brake or delivered horse power (D.H.P.) means the power delivered by the engine and available for driving other machinery. This, at full load, will vary from eighty to ninety per cent of the I.H.P. depending upon the type and size of engine. For machines of medium size, the average of these or eighty-five per cent may be used. The ratio of the delivered horse power to the indicated horse power, $\left(\frac{D.H.P.}{I.H.P.}\right)$ is called the mechanical efficiency, and enters into computations involving the power of engines for different purposes.

The *water-rate* of an engine is the weight of steam required per I.H.P. per hour for driving it. This quantity varies greatly in different types of engines, and also in the same type when operating under different conditions. Table III gives average water-rates of engines of medium size and first-class make, when running at or near full load.

TABLE III.

Type of Engine.	Pounds of Steam per I.H.P per Hour.
Simple High Speed	32
Simple Medium Speed	30
Simple Corliss	28
Compound High Speed	26
Compound Medium Speed	25
Compound Corliss	24

The above figures are for non-condensing engines, that is, where the exhaust steam is turned outboard to the atmosphere or into a heating system operating under a slight pressure. When a condenser is employed in connection with an engine, the water-rate, under ordinary conditions, is reduced to about eighty per cent of the above.

Steam Turbines. The principle of the steam turbine is such that its capacity cannot be expressed in indicated horse power, and the brake or delivered horse power is used instead. This makes it necessary, when comparing the power or water-rate of engines and turbines, to reduce them both to brake horse power. The steam economy of a turbine depends largely upon a low vacuum at the exhaust end, and hence, to get the best results, must be run condensing. For this reason they have not in the past been used to any great extent in small sizes and on non-condensing work because of the excessive amount of steam required as compared with a reciprocating engine. Recent developments along this line have produced small and medium sized non-condensing turbines which compare very favorably in steam economy with simple high-speed engines operating under the same conditions. When run condensing, the advantage in economy is in favor of the turbine, especially on a variable load.

Gasolene Engines. Steam engines and turbines are more commonly used for generating power, in the class of work under consideration, because the exhaust can be used for heating purposes during the winter. On the other hand, there are instances where power is simply wanted during the summer season, as in the case of estates occupied for only a portion of the year. In plants of this kind an outfit employing gasolene or oil engines will often be preferable on account of its simplicity and lower first cost. The amount of fuel for operating an engine of this type will vary somewhat, according to size and make, but for the average machine it may be taken as about 0.8 pound per brake horse power.

Electric Power. Both direct and alternating currents are used for power and lighting, but the former, at 125 or 250 volts, is usually to be preferred for the unit plant where motors are to be supplied. With a direct current it is possible to use direct-connected slow-speed motors for the driving of ventilating fans, which is a matter of considerable importance in certain types of buildings. Furthermore, the speed regulation of motors driven by a direct current is more satisfactory. Electricity is measured commercially by the *kilowatt hour;* a kilowatt (Kw.) being equal to 1,000 watts. A watt is the unit of measurement, being equal to the product of 1 volt x 1 ampere.

For example, a current of 4 amperes, flowing under a voltage of 250, will have a capacity of 4 x 250 = 1,000 watts, or 1 Kw., and a kilowatt hour is the electrical energy delivered per hour by a current of this capacity.

Electric generators or dynamos are rated in kilowatts, and have an efficiency at full load of about ninety per cent for those of medium size.

This means that for every 100 horse power of mechanical energy expended in driving a generator, 90 horse power of *electrical* energy will be given out. The indicated horse power of an engine for driving a generator is given by the formula, $I.H.P. = \frac{Kw. \times 1,000}{746 \times A \times B}$, in which

I.H.P. = indicated horse power of engine.

Kw. = capacity of generator in kilowatts.

A = efficiency of engine.

B = efficiency of generator.

For generators ranging from 25 Kw. to 250 Kw., the I.H.P. of engine may be taken as 1.7 times the Kw. rating of the generator, with sufficient accuracy.

Efficiency Losses. When a steam engine is used for driving a generator, and the electrical energy from this again transformed into mechanical energy by means of a motor, there is a loss in each transformation. In other words, there is one loss in the engine, another in the dynamo, and another in the motor, all of which must be taken into account when computing the sizes of motor, generator, engine, and boiler, to do a given amount of work. The efficiencies of small motors, such as are used for fan work, will average about eighty per cent, while larger ones for elevator and similar service have an efficiency of about ninety per cent at full load.

Assuming, then, efficiencies of eighty, ninety, and eighty-five per cent for motor, generator, and engine respectively, it will require $\frac{1}{.80 \times .90 \times .85} = 1.63$ indicated horse power at the engine for each horse power delivered by the motor; or conversely, the total efficiency of the three machines is $.80 \times .90 \times .85 = .612$, or practically sixty per cent.

Electric Lighting. There are two common methods of determining the sizes of generator and engine for electric lighting. One is to prepare a list of all the lamps, together with the current in amperes required by each. The total current, multiplied by the voltage of the system, will give the watts required, and this in turn divided by 1,000 will give the Kw. rating of the generator.

The second method takes into account the candle power and efficiency, the latter being expressed in watts per candle power. In this case the candle power of each lamp is multiplied by its efficiency and the total of these products divided by 1,000 to obtain the Kw. rating of the generator. Having determined the capacity of the generator, the I.H.P. of the engine for driving it is obtained by the methods already given.

It is often desirable in preliminary work to approximate the power required for lighting before the number and type of lamps have been worked out. In cases of this kind the necessary current may be based upon the floor space to be lighted, using the following assumptions. For general lighting with incandescent lamps, as in the case of offices, halls, etc., from 1.0 to 1.2 watts will be required per square foot of floor space, while drafting rooms and other places requiring a more brilliant illumination will take twice that amount. For arc lights with opal globes, the following may be used for rooms used for different purposes.

TABLE IV.

Use of Room.	Watts per Sq. Ft. of Floor Space.
Clothing Store	1.30
Hall	1.00
Drafting Room	2.00
Machine Shop	0.75
Weave Room	1.20

Elevators. The elevators employed in stores, hotels, office buildings, etc., are of two general kinds, hydraulic and electric; the latter being subdivided into the drum, duplex, and screw types. The power required for running an elevator varies a good deal with the type, speed, and general conditions under which it is operated.

In the figures given below, average loads, speeds, and efficiencies have been assumed for the various types; also, the different methods of counterbalancing the cars have been taken into account, together with the additional power required for accelerating the load when first starting. The usual custom has been followed, where definite information is not at hand, of computing the power required for running all of the cars at one time under full load and taking 0.7 of the result.

Under these conditions, hydraulic elevators require from 0.6 to 0.7 *delivered* horse power per square foot of floor space in the cars. Elevators of this type are driven by direct-acting steam pumps, and in order to determine the necessary boiler power for this purpose, the water-rate of the pump must be known.

For average conditions, this is given in Table V for different types of pumps.

TABLE V.

Type of Pump.	Pounds of Steam per Delivered Horse Power per Hour.
Simple, Non-condensing	120
Compound, Non-condensing	65
Triple, Non-condensing	40
High Duty, Non-condensing	30

Electric elevators of the drum and duplex types require from 0.4 to 0.5 delivered horse power per square foot of floor space, and the screw type about 1 horse power. As electric elevators are motor driven, the efficiencies of the various machines through which the energy passes must be taken into account as already described. That is, the I.H.P. of the engine driving the generator must be approximately 1.6 times the power delivered to the car.

Refrigeration. There are two methods of refrigeration commonly employed, known as the *compression* and *absorption* methods. As the latter does not require mechanical power for its operation, only the former will be considered in the present article. The capacity of a refrigerating plant is commonly expressed in "tons of refrigeration" or "ice-melting effect." That is, a 5-ton machine will produce the same cooling effect in 24 hours as the melting of 5 tons of ice. The ammonia compressor is commonly driven by a direct-connected steam engine or electric motor, although small machines are often belted to a convenient counter-shaft, if one is available. Under average conditions, 1 I.H.P. at the steam cylinder of the compressor will produce about 0.75 ton of refrigeration per 24 hours. For example — a 5-ton machine will require $5 \div 0.75 =$ 6.6 I.H.P. at the steam cylinder for driving it. If the compressor is motor driven, the efficiencies of motor and generator must be taken into account, which will call for approximately 2 I.H.P. per ton of refrigeration at the engine driving the generator. The above figures apply to the form of refrigeration commonly employed in hotels, etc., for cold storage and not to the actual manufacture of ice.

Heating. The simplest method of determining the quantity of steam required for heating is to base it upon the amount of radiating surface to be supplied. This, for ordinary conditions, may be taken from the following table, which gives the pounds of steam condensed per square foot of radiation per hour for different forms of surface.

TABLE VI.

Type of Radiating Surface.	Pounds of Steam Required per Sq. Ft. of Surface per Hr.
Direct Steam	0.3
Indirect Steam	0.6
Direct Hot Water*	0.2
Indirect Hot Water*	0.4

*In forced hot-water systems where the water is heated by exhaust steam.

Ventilation. In case the building, or a portion of it, is supplied with fresh air by means of a fan independently of the heating system, it is customary to assume a temperature rise from zero to 70 degrees.

Under these conditions it will take 1.5 pounds of steam for each 1,000 cubic feet of air supplied, which includes that used in generating the power for driving the fan.

Hot-Water Heating. In some buildings, like hotels, hospitals, etc., the item of hot-water heating for toilet and laundry purposes is an important one.

This will require approximately 1 pound of steam for each gallon of water heated from 50 to 170 degrees, which may be taken as average conditions during the winter season.

Utilizing Exhaust Steam. If the exhaust steam from the engines and pumps is used for heating and ventilating purposes, as should always be done under ordinary conditions, this should be deducted from the total quantity of steam required for all purposes, when computing the boiler horse power. The available heat in the exhaust will depend somewhat upon the type of engine used, initial pressure, etc., but it will be safe to consider eighty per cent, at least, of the steam delivered to the engines available in the exhaust for heating purposes.

Summary.

Boilers. One boiler horse power (B.H.P.) is required for each 30 pounds of steam per hour. Average coal consumption, 3.6 pounds per B.H.P. for fire-tube boilers, and 3 pounds for water-tube boilers.

For grate area, see Table I.

Engines. Average efficiency eighty-five per cent.

Indicated horse power (I.H.P) equals approximately 1.2 x delivered horse power (D.H.P.).

For water-rate, see Table II.

The use of a condenser reduces the water-rate twenty per cent.

Steam Turbines. Water-rate approximately the same as reciprocating engines working under same conditions.

Oil Engines. About 0.8 pounds of oil required per delivered horse power under average conditions.

Electric Power. Commercially measured by the kilowatt hour.

Average efficiency of generators, ninety per cent. Indicated horse power of engine for driving generator is equal to 1.7 times kilowatt rating of generator.

Efficiency Losses. The loss in power between that generated by a steam engine and that delivered by a motor is approximately forty per cent, or 1.6 indicated horse power must be provided at the engine for each horse power delivered by the motor.

Electric Lighting. Total current, times voltage, divided by 1,000, will give Kw. rating of generator, or candle power, times efficiency, divided by 1,000.

Approximate method — allow 1 to 1.2 watts per square foot of floor space for ordinary lighting; also see Table III.

Elevators. For hydraulic, 0.6 to 0.7 delivered horse power per square foot of floor space; see also Table IV.

For electric, 0.4 to 0.5 delivered horse power per square foot of floor space for drum and duplex types, and 1 horse power for the screw type. See "Efficiency Losses."

Refrigeration. For steam compressors, provide 1.3 indicated horse power per ton of refrigeration, and for motor-driven machines, 2 indicated horse power at main engine per ton of refrigeration.

Heating. Steam consumption based on square feet of radiation.

See Table V.

Ventilation. Provide 1.5 pounds of steam for each 1,000 cubic feet of air supplied in zero weather.

Hot-Water Heating. Provide 1 pound of steam for each gallon of water to be heated from 50 to 170 degrees.

Utilizing Exhaust Steam. About eighty per cent of the steam supplied to engines and pumps is available in the exhaust for heating purposes.

Order of Computation. (1) Reduce the horse power to be delivered by all motors to electrical horse power (E.H.P.), by formula (*a*).

$$(a)\ \text{E.H.P.} = \frac{\text{D.H.P.}}{0.8}$$

(2) Reduce electrical horse power to kilowatts, by formula (*b*).

$$(b)\ \text{Kw.} = \text{E.H.P.} \times 0.746,$$

and to this add kilowatts required for lighting, to find size of generator.

(3) Find indicated horse power of generator engine by formula (*c*).

$$(c)\ \text{I.H.P.} = \text{Kw.} \times 1.7$$

(4) Find maximum weight of steam required in pounds per hour, deduct such part of the "available exhaust" as may be used for heating purposes, and divide the remainder by 30 to find the boiler horse power.

$$(d)\ \text{B.H.P.} = \frac{\text{Pounds of steam per hour}}{30}$$

Example. A building is to contain 12,000 square feet of direct steam radiation, 4,000 square feet of indirect, and is to be provided with 300,000 cubic feet of fresh air per hour.

Hot-water supply, 300 gallons per hour. The building is also to contain the following equipment:

One 5-ton refrigerating machine of the steam compressor type. Three hydraulic elevators, each having a floor area of 30 square feet. One duplex electric elevator with a floor area of 12 square feet. Miscellaneous motors amounting to 10 horse power.

The electric lighting service will call for a total of 400 amperes at 125 volts.

The problem is to compute the capacity of generator, the indicated horse power of the engine for driving it, and the boiler horse power. Computations to be made on the assumption that the entire plant will be in operation at one time, and that the available exhaust steam will be used for heating purposes.

Starting with the electric elevator we have $12 \times 0.5 = 6$ D.H.P. required, which added to the miscellaneous motor output amounts to $6 + 10 = 16$ D.H.P. This reduced to E.H.P. by formula (*a*) gives E.H.P. $= \frac{16}{0.8} = 20$, which reduced to Kw. by formula (*b*) calls for $20 \times 0.746 = 14.9$ or 15 Kw. capacity in the generator.

The generator capacity for lighting amounts to $\frac{400 \times 125}{1{,}000} = 50$ Kw., making a total of $15 + 50 = 65$ Kw.

Power of driving engine, by formula (*c*), is $65 \times 1.7 = 111$ I.H.P.

The next step is to compute the steam required for power purposes, and determine the available exhaust.

Assuming a simple high-speed engine for the generator, the steam requirement will amount to $111 \times 32 = 3{,}552$ pounds per hour. The power for the hydraulic elevators will amount to $3 \times 30 \times 0.7 = 63$ D.H.P.

If compound non-condensing pumps are used it will require $63 \times 65 = 4{,}095$ pounds of steam per hour.

A small slow-speed simple engine for driving the refrigerating machine will have a water-rate of about 40 pounds per I.H.P., which, in the present case, amounts to $5 \times 1.3 \times 40 = 260$ pounds of steam per hour.

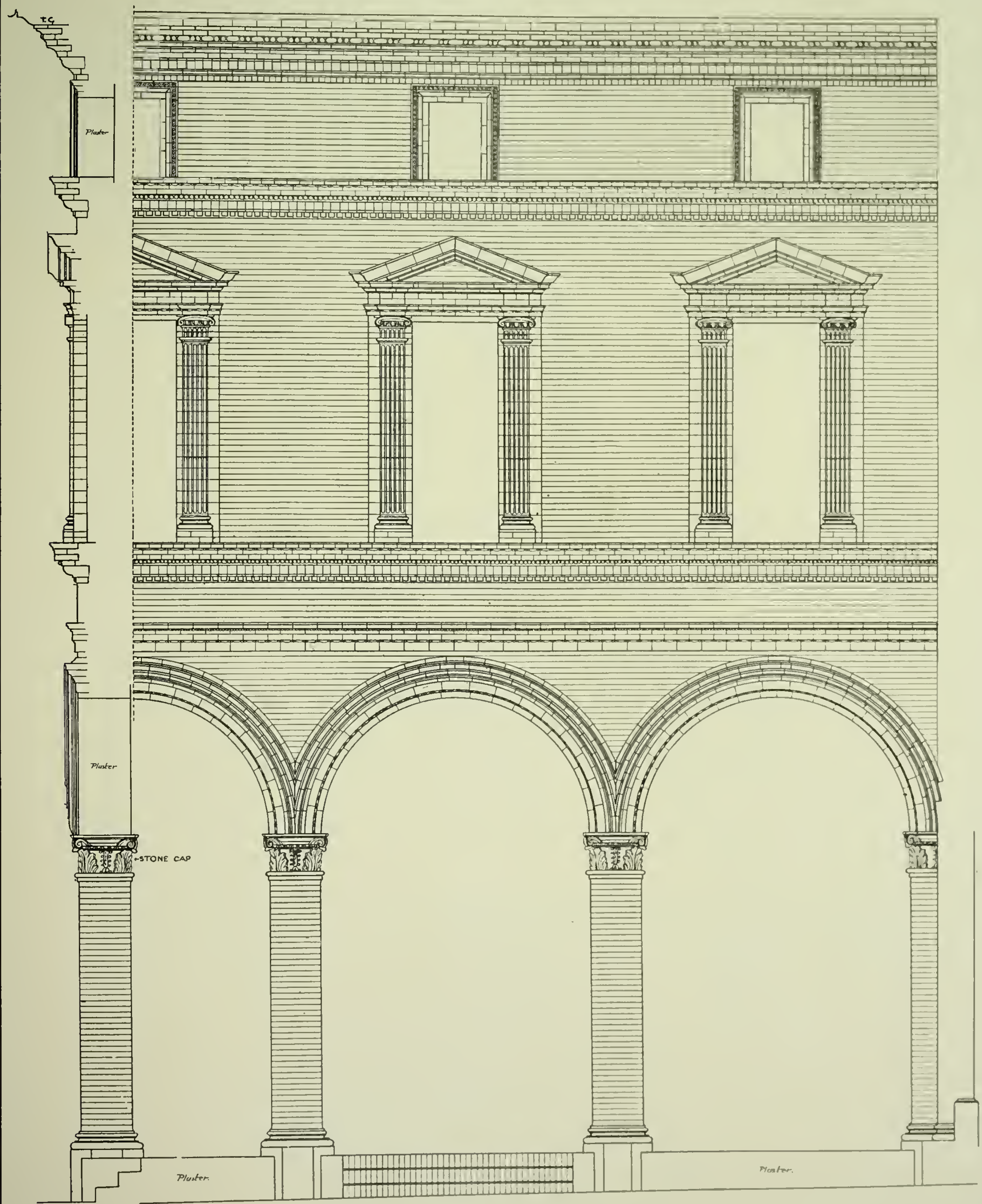
This gives a total of $3{,}552 + 4{,}095 + 260 = 7{,}907$ pounds of steam per hour for power purposes, of which $7{,}907 \times .80 = 6{,}325$ pounds are available in the exhaust for heating purposes.

The steam required in pounds per hour for heating purposes is as follows:

Direct radiation,	12,000 × .3 =	3,600
Indirect radiation,	4,000 × .6 =	2,400
Ventilation,	300 × 1.5 =	450
Water heating,	300 × 1 =	300
Total,		6,750 pounds per hour

The available exhaust amounts to 6,325 pounds, so that only $6{,}750 - 6{,}325 = 425$ pounds of live steam per hour are required for heating. This calls for a boiler capacity of $\frac{7{,}907 + 425}{30} = 278$ H.P.

In the above example it has been assumed that all of the apparatus would be in use at its full capacity at the same time. A following article will take up cases varying from this condition.



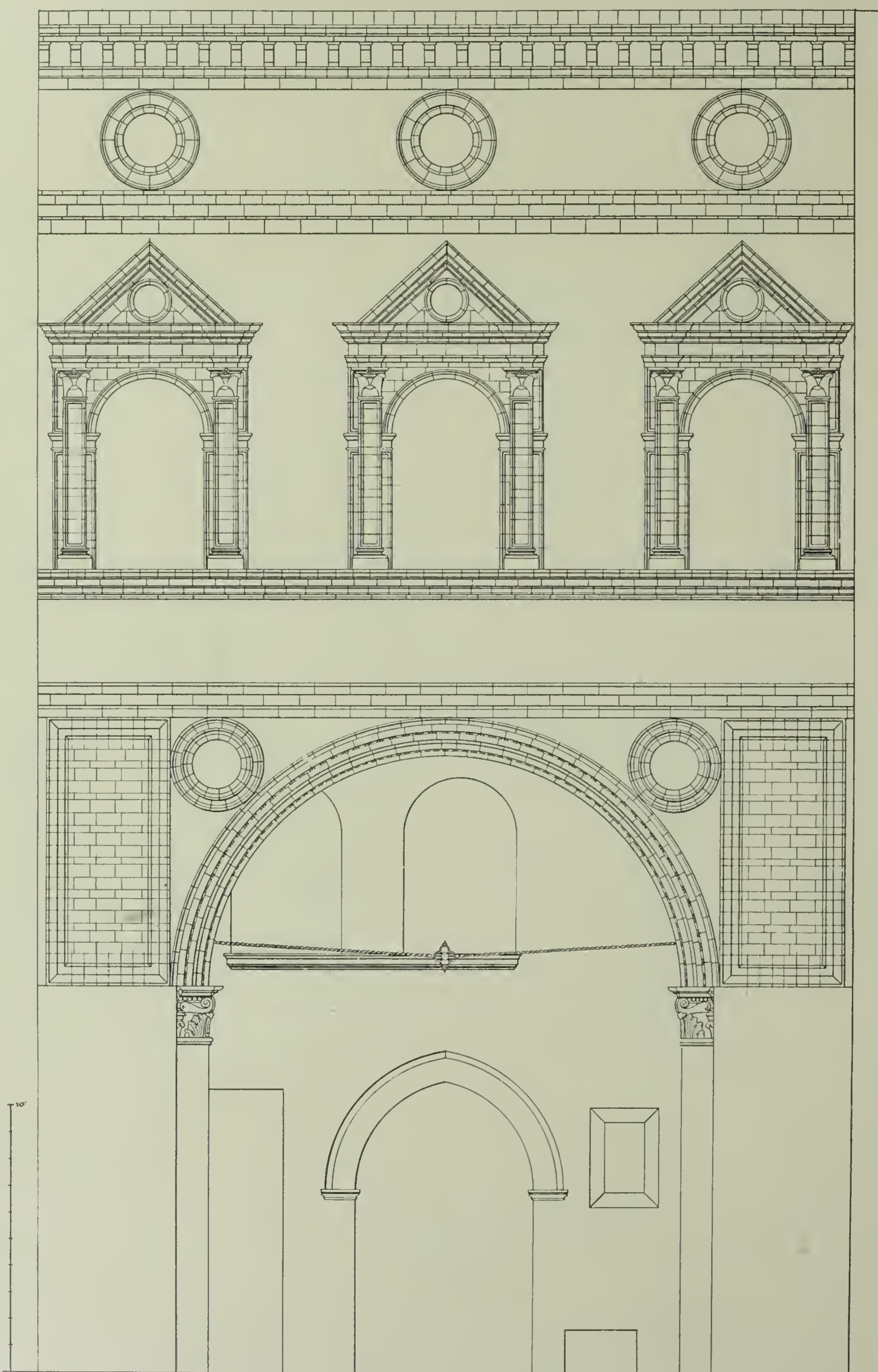
SECTION

ELEVATION

SCALE

HOVSE IN VIA SAN VITALE
BOLOGNA ITALY

MEASURED DRAWINGS ITALIAN SERIES.
WILL S. ALDRICH, DEL.



PALAZZO TACCONI, BOLOGNA, ITALY.

MEASURED DRAWINGS—ITALIAN SERIES.

WILL S. ALDRICH, DEL.

MORRISTOWN SCHOOL, MORRISTOWN, N. J. Boring & Tilton, Architects.
A closely connected group composed as an "Open Court," according to the best classic traditions.

Recent American Group-Plans.

V. — PREPARATORY SCHOOLS AND INSTITUTIONS.

BY ALFRED MORTON GITHENS.

PASSING from the colleges to the schools, one finds no abrupt division; the smaller colleges and the larger schools seem quite the same thing in problems to be solved and in types of solution adopted. The following Analytical Table classifies the usual requirements:

SCHOOL OR COLLEGE	Instruction	Administration. Chapel. Auditorium. Library. Class Rooms. Laboratories.
	Residence	Dormitories. Refectory. Infirmary. Students' Clubs. Masters' Houses.
	Athletics	Gymnasium. Playing Fields.

There is usually also a power plant. Universities may add various professional schools; any of the divisions may be missing; in the Boston Normal and Latin School there is neither Athletic nor Residential divisions.

As to architectural style, of course the great monumental college groups find no counterpart among the schools. The Tome Institute in Maryland is one of the most formal and nearest a college in expression. It is being built from a comprehensive plan; a winding drive leads up to a garden, treated with the formality of a Court of Honour; the Instructional buildings surround it; the dormitories are around a practice-field and the primary department surrounds a play ground; the masters' houses edge the hill to the east.

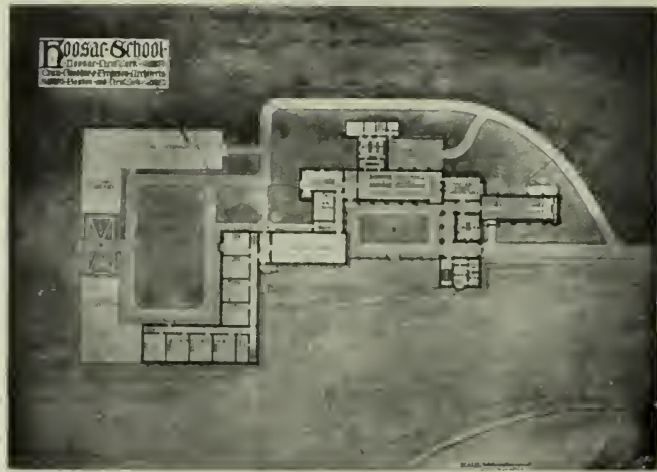
Phillips Exeter, Phillips Andover, and St. Paul's, Concord, are counterparts among the larger schools of that hap-hazard college which grew up in the latter half of the eighteen hundreds. Exeter has one great lesson in its concentrated Instruction and Residence and the enormous space given the third great division, Athletics; surely as needful to a boy as anything else and too often left for the strong lad while the under-developed, needing it the most, avoids it. This condition Exeter attempts to improve. The catalogue states that "during the first two months of the fall term all members of the school are urged to engage in football or other sports appropriate to the season. The prescribed gymnasium work begins early in November and continues to the end of the winter term. Thereafter all students are required to report regularly at the Playing Fields four times a week, where they participate in baseball or track sports, or tennis, or golf, as the individual may prefer."

Perhaps Bénard was not very far wrong when he placed the gymnasium and its field in the most important position of his great plan for the University of California. The trend is toward a fuller development of this branch in schools for both sexes, as proved by the prominence of the gymnasium and terraced tennis-courts in the Dow School for girls, the parade of the New York Military Academy, and the tennis, football, and baseball fields in the proposed plan for St. George's, Newport. Like the Tome Institute, this is one of the few larger school groups being built from a definite plan; but whereas the Tome is designed according to the monumental traditions of the École des Beaux Arts as applied to the generally accepted American ideals, St.

TOME INSTITUTE, PORT DEPOSIT, MARYLAND.
Boring & Tilton, Chas. W. Leavitt, Jr., Architects.
On edge of plateau overlooking Susquehanna River; interesting subdivision by groups; usual arrangement of Scholastic buildings in Entrance group, Dormitories more remote; compare State Normal School, Troy, Ala.

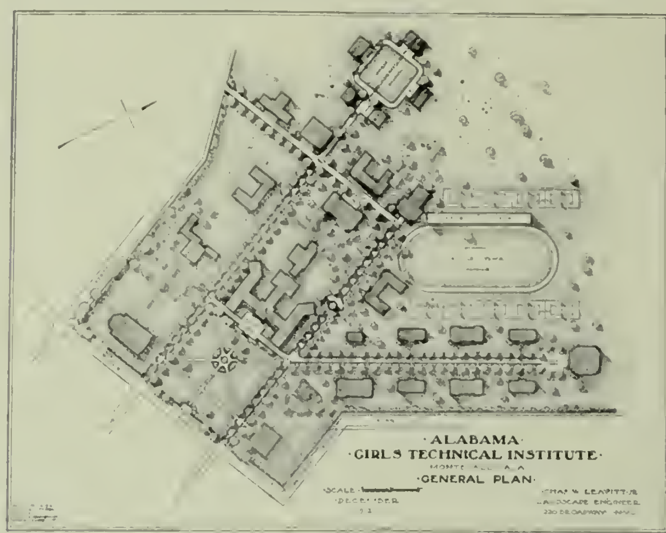
George's blends an English naïveté with the graceful dignity of the lesser Italian gardens. One might fancy it embodied the inspiration that an imaginary architect of Wren's time might have brought back with him from Italy. The Tome is a group of wide spaces, of openness; St. George's charm would be impaired were the buildings separated from each other. It is an example of the "Range," that English type of composition which was perhaps first suggested by the irregular Gothic courtyard shorn of its entrance side, as at Sutton Place in Surrey, or part destroyed, part rebuilt South Wingfield in Derbyshire.

Hoosac School is an example of it among the lesser schools; in Institutional groups it seems seldom to have been used; for Ecclesiastic groups, as at the Intercession in New York, it has apparently come to stay. It easily adapts itself to the close connection under cover desired by most small schools, but on the other hand this can just as well be obtained in the formal plan, as by the curved colonnades of Morristown. The older Hotchkiss School ingeniously places its buildings alternately along a wide corridor and so arrives at a compact connection recalling the arrangement of the shops at the Carnegie Technical Schools of Pittsburgh. The dormitories of the Hoosac School are in a second floor; all other rooms are below, the refectory, chapel, and gymnasium extending through both stories. The refectory divides the boys' from the masters' portions and is arranged like an English hall, with entrance and screen at one end and dais for the masters at the other. The gymnasium, being for the boys, terminates their portion; the chapel, for both school and visitors, naturally is next the entrance and administration. Most small schools seem to prefer the dormitories or chambers in the upper floors, as in the Hoosac, the Ely and the Dow Schools for girls, the Hotchkiss, Taft, and Morristown; the larger schools have separate dormitory buildings, as at St. George's, St. Paul's, the Tome and the Exeter Schools. The analysis of the various groups shows that the administration is generally in the central and most important building, seldom displaced by a Social Hall as at Peabody College, or a library as at Columbia University; that school rooms are generally close to the administration,



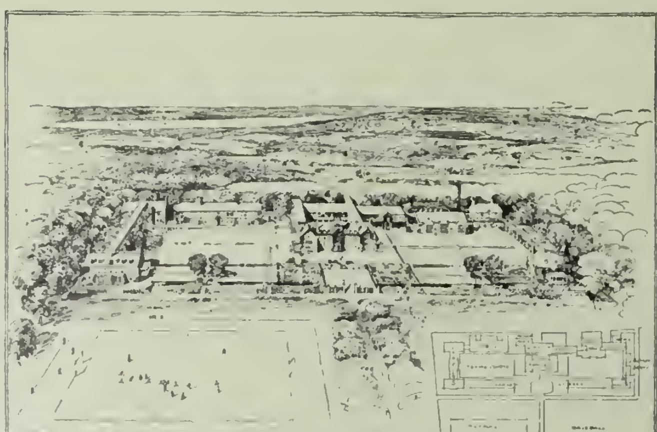
HOOSAC SCHOOL, HOOSAC, N. Y.
Cram, Goodhue & Ferguson, Architects.

Typical modern "Range"; the Semi-Monastic, Semi-English-Collegiate ideal adapted to an American school; the "Hall" central, used as a Commons by masters and pupils and arranged exactly as in the traditional model.



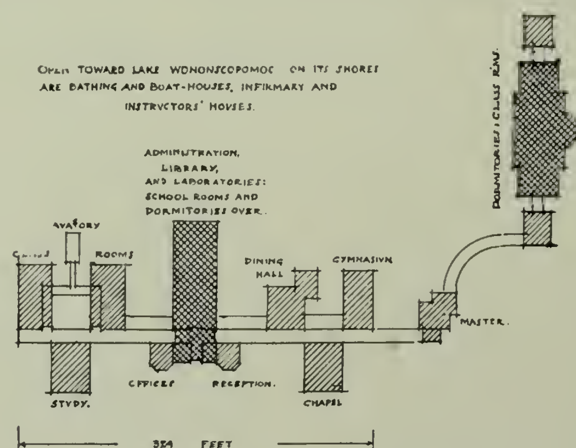
ALABAMA GIRLS' TECHNICAL INSTITUTE, MONTEVALLO, ALA.
Chas. W. Leavitt, Landscape Engineer.

Central School-building, with Auditorium and unassigned building in front; Chapel to the left; special schools to the right, ending in Library; Commons, Dormitories, and Service behind; Farm-School group in extreme rear. Interesting connection of diagonal axis; several existing buildings incorporated in the plan.



ST. GEORGE'S SCHOOL, NEWPORT, R. I.
Architect unannounced.

Marginal Ranges of buildings giving the greatest possible area for open playing fields and turf; unusual arrangement; completely different from typical plan, as at State Normal School, Troy, Ala.



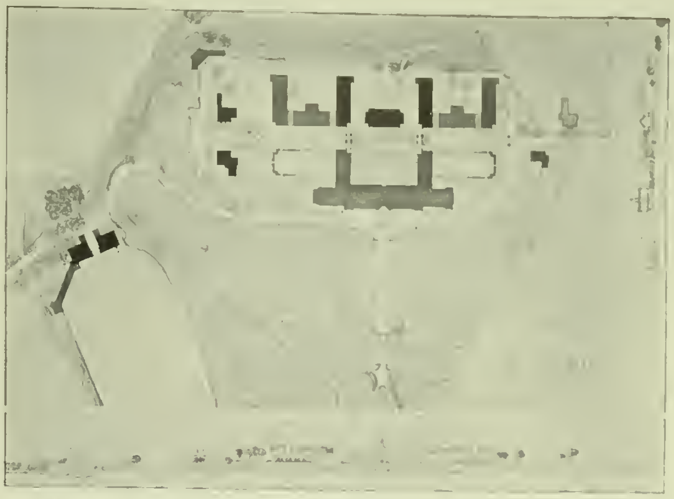
HOTCHKISS SCHOOL.

A closely connected compact type with buildings jutting from a central wide corridor; rarely used; compare Palmer and Hornbostle's shops of Carnegie Technical Schools, Pittsburgh, Pa.

though not at Hoosac or Hotchkiss; that the refectory may be near the dormitories, or widely separated as at St. George's, where its position is governed by the infirmary, which required the same service and yet was to be as far as possible from the dormitories. In the Dow School there is no attempt to separate the infirmary, while the principal's house is distant; in the Hoosac School this arrangement is exactly reversed. The central group of the Morristown has administration and dormitories in the central building, while the refectory is to the left and the class rooms to the right in separate buildings, the three linked together by curved colonnades in the academic manner.

A comparison of each school with the Analytical Table is interesting; there is great diversity in functional arrangement, for each head master has his own particular views. It is therefore evident that an architectural competition for a school must be most uncertain. Apparently this explains the recent reversal of the Loomis Institute award, the professional adviser preferring one arrangement, the head master another. The site is a bleak, windswept hill-top overlooking the Farmington River to the northeast, with low lying meadows to the south and west. The program called for connection under cover between school, dormitories, and refectory; choice of "partie" was between either a close-knit grouping or a distribution of buildings around a large campus with connecting colonnades. The scale of the plans is quite different, a series of small open quadrangles as opposed to one great enclosure.

In several of the schools, as at St. Paul's, Concord, there is a division of the Residence group into several classes according to age; sometimes each has its own school rooms. Such, however, is more typical of the institutions. The Perkins Institute for the Blind has its instructional portion between two dormitory groups, boys to the right and girls to the left, each in ranges of buildings around a long close, suggesting the arrangement of a medieval English monastery like the Vicar's Close at Wells. The smaller children have a quadrangle of their own. The central chapel tower dominates them all; unfortunate that the children can never see it nor be influenced by the delicious

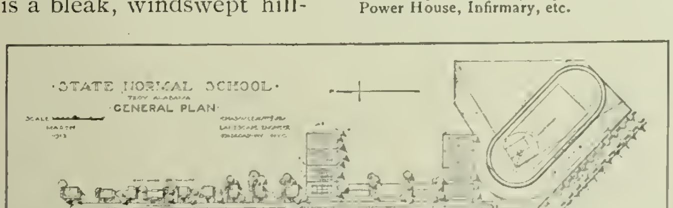


COMPETITIVE PLAN, LOOMIS INSTITUTE, WINDSOR, CONN.
Design placed first by Professional Adviser.
Charles C. Haight and Githens, Architects.

A compact type of small quadrangles open to southeast; shortest possible communication between Dormitories, School, and Refectory; Masters' houses in ends of Dormitories; service by encircling roads, inner quadrangle and green for pedestrians only. Loomis Homestead and old Garden to remain; Power House, Gymnasium, and Field in separate composition.

LOOMIS INSTITUTE, WINDSOR, CONN.
Successful competitive plan; Murphy and Dana, Architects.

Site, an exposed hill-top; views to north and southeast; principal approach from north, with required right-of-way through property to other properties to the south. The separate-building type with connecting colonnades around a large court; direct communication from Dormitories to School and Refectory; entrance to court through Schoolhouse; exterior appearance of group subordinated to interior of court, as proved by position of Power House, Infirmary, etc.



STATE NORMAL SCHOOL, TROY, ALA.
Chas. W. Leavitt, Landscape Engineer.

Unusual relation of the three divisions, Scholastic, Residential, and Athletic, as entrance court is used for Dormitories, and school court is behind, with Academic-Administrative building common to both; arrangement selected because there is more communication with town (lying to the southeast) from Dormitories than from school. Typical American plan in every way, with all advantages and defects of the style.

JEWISH PROTECTORY AND AID SOCIETY, HAWTHORNE, N. Y.
Harry Allen Jacobs and Max G. Heidelberg, Architects.

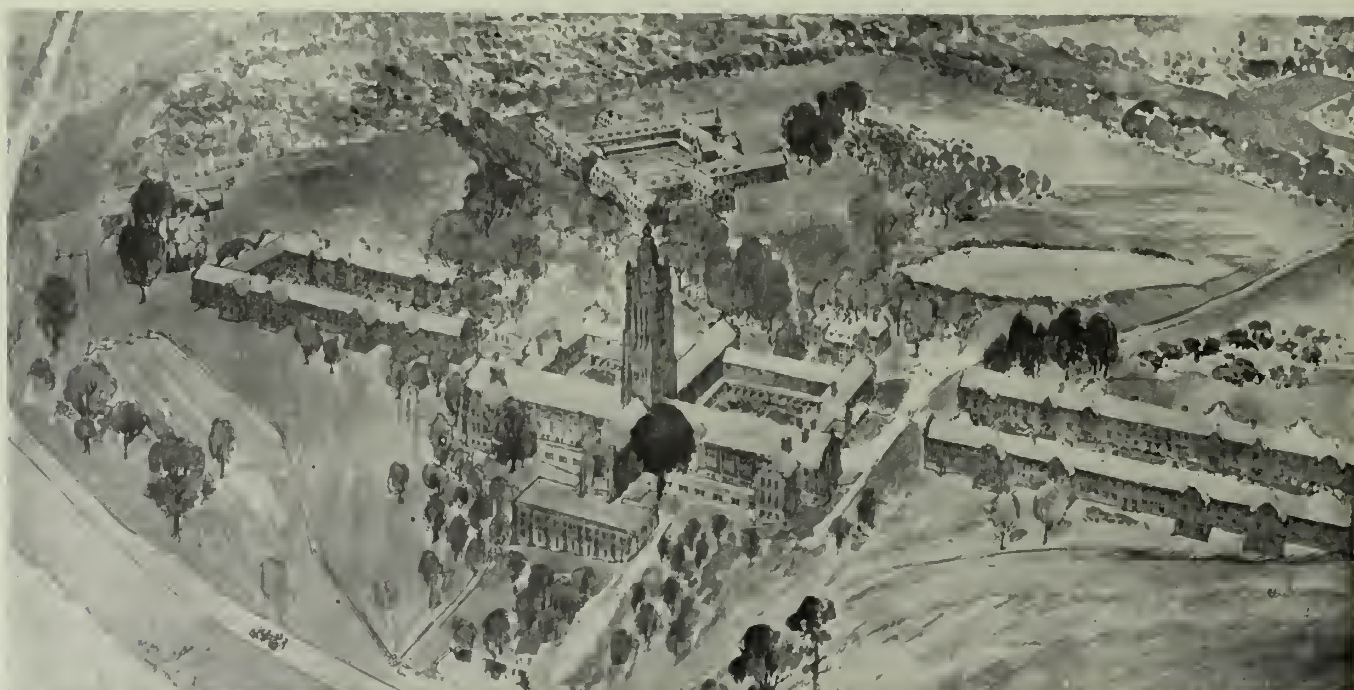
On a long hill-crest in open country. Central Administrative-Scholastic-Social group with separate cottage-dormitories each with its garden, bordering a "Village Green."

semi-Georgian, semi-Medieval architecture. Difficulties in the way of existing roads bordered the greater part of their length by fine trees, the orchards of pears and apples, the formation of the land as it slopes towards the south to the Charles River,—these have all been used to such good account that the group has gained thereby. In its architecture it vindicates the desirability of the "Range."

On the opposite principle is the Jewish Protectory at Hawthorne. This is the cottage scheme, and a modern ideal Beaux Arts plan, perfectly composed with the functional divisions clearly marked — administration, refectory and school in the center and the separate cottage dormitories, each with its playground, right and left, down each side of the "Village Green." The widely-spaced cottages are free from the ragged, crowded appearance of the average institutional plan of the separate-building type. The group stretches along the straight ridge of a hill of such even contour that the regularity of plan is appropriate; but unfortunately in other examples the symmetrical plan seems to occur over and over again where the contours least warrant it, or opposed to great irregular hills with the same effect of petty silliness that some of the modern watering-places show at the foothills of the Alps. The plans look so well on a sheet of paper that the Boards of Governors or Trustees, or whoever they be, enthusiastically adopt them. Every one knows what a fiasco the gridiron plan of San Francisco has proved; simplicity on paper, but in reality with many of the paved streets so steep that there is no attempt to drive thereon. Perhaps in the future we shall see the winding road adopted, as the Germans have recently developed it in several of their smaller towns. It has been impossible to show grades on the illustrations here, though they are so vitally important; or to show the relative height of the various buildings to each other or to the spaces between them. Buildings may look far apart on plan and crowded in reality; one of the large courts or quadrangles now so much in favor may look bare and straggling, because the marginal buildings are too low. The relationship a plan shows may not be at all evident in reality. As some one suggested, if Manhattan Island were bordered by rows of buildings, they might be ever so well balanced on plan and each sufficiently wide as to count on paper as proportional to the space between them, but in reality they would not form a group. Perhaps there is some absolute ratio of height of buildings to space between them that must not be overstepped. One who is trained in plans can only see a group as a plan, and, after all, a plan is only a decorative arrangement in black and white on a sheet of paper.

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, BOSTON, MASS.
R. Clipston Sturgis, Architect.

Utilization of old roads with bordering trees, and old orchards; segregation of ages and sexes; compact schools and administration with central tower as an effective Dominant to the entire group.



PERSPECTIVE.
PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND.
R. Clipston Sturgis, Architect.

TILE floors have a practical value; they also have great decorative value, and it is with the latter that we are at present concerned.

Owing to the peculiar limitations of the material and the method of manufacture, tiles are necessarily small units. To cover a large surface with these units, obviously requires numerous joints. Therefore, the joints, as well as the tiles, should be given importance in the design. From a designer's point of view, the limitations of a material are its greatest asset, each material requiring its own peculiar treatment.

Not many years ago, all the tiles that were available for floors were of the machine-made variety, so perfect in workmanship that they could be laid in a floor with joints of a hair's breadth. These tiles were made in a variety of shapes and colors, but it was useless to lay out a pattern in one color, because the pattern of the joints could not be discovered without close inspection. If pattern was to count, it was necessary to use color, and the effect was generally hard, dry, and uninteresting. Conditions have since changed, and we have come to realize the value of the joints. It is seldom necessary to lay a floor of plain tiles with joints less than one-quarter of an inch in width. Whether these joints are left the natural color of cement, or are colored, they will always count in the design, and the slight unevenness of the tiles themselves will give a texture that is not as hard and uninteresting as the floors of mechanical perfection.

The character of the building and the location of furniture and rugs affect the design of the floor. If the floor is in an important room of a monumental building and is free from large pieces of furniture, it may well be treated so as to be in accord with the architectural treatment of the walls, but if there is to be much furniture and many rugs on the floor, it is better treated as a whole. This is a point that is often lost sight of in railway waiting rooms and restaurants.

Church floors afford as great an opportunity for tile work as the windows do for stained glass. Much could be said on this subject alone, but it is sufficient here to make the following observation: The nave aisles should be simple, the choir somewhat more elaborate, and the sanctuary very rich in pattern, symbols, and color. In short, the elaboration increases as the altar is approached.

It is not necessary to use large tiles in a large room to get scale, as the tiles can be arranged so that the unit is composed of several small tiles and the scale of the pattern increased or reduced at will.

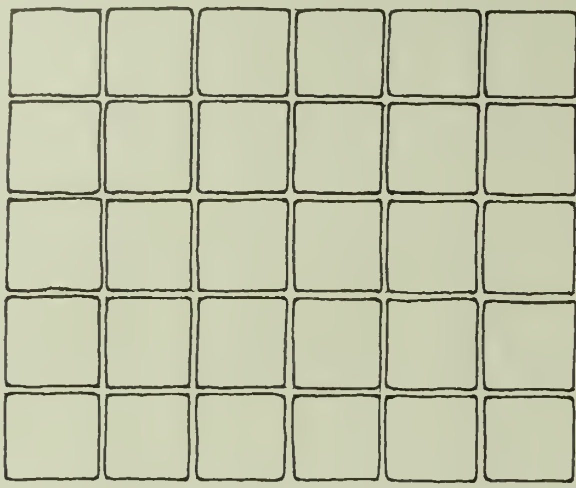
It is not essential that all the tiles laid in a floor come from one factory. Herein has the tile setter great advantage, especially in colored tiles. In the matter of shapes and designs, clay is so easily moulded that there is almost no limit to the variety that the smallest factory can produce. It is in the matter of glazes and quality that manufacturers differ.

There are many patterns that have been common property ever since the beginning of tile making, and are to be found, with slight variations, in many tile manufacturers' lists. New designs can be readily produced and old ones revived; the process is simply a model in clay or wax, from which a plaster mould is made, then the clay pressed in by hand, removed from the mould, dried and baked; a simple primitive process, to which tiles owe much of their charm. The difficulties are in the composition of the clay and glazes; these, of course, it is assumed have been overcome by the manufacturer.

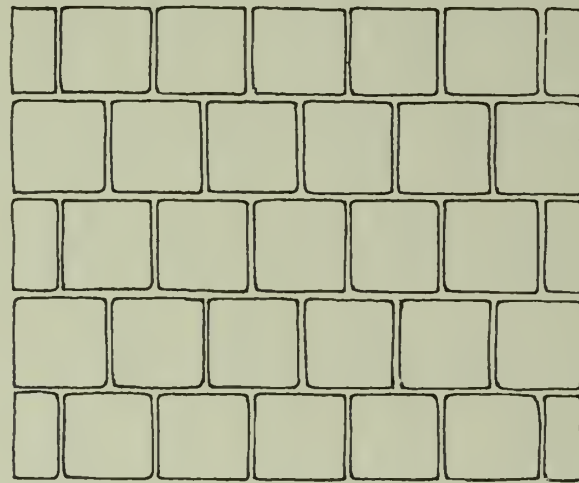
The ideal method of designing a floor is to arrange a general scheme and then lay out the details on the job, changing and rearranging details as occasion arises. This, of course, requires an artist as a workman — and there are such — or constant supervision. This is not always possible, but when it is done, the result is spontaneous and free from the mechanical look that might come from a hard and fast plan laid out on the drawing board.

By the use of color in pattern, and pattern in individual tiles, there is almost no limit to the richness and elaboration possible for tile floors, but on the other hand, it is also possible to make an interesting floor of plain tiles in one color by taking advantage of the joints.

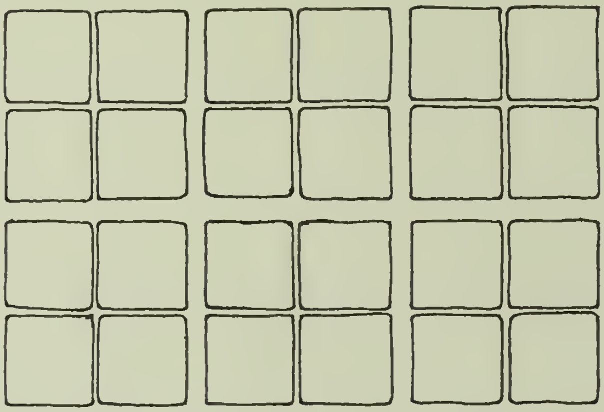
The following diagrams will serve as reminders that the joints are of equal importance with the tiles.



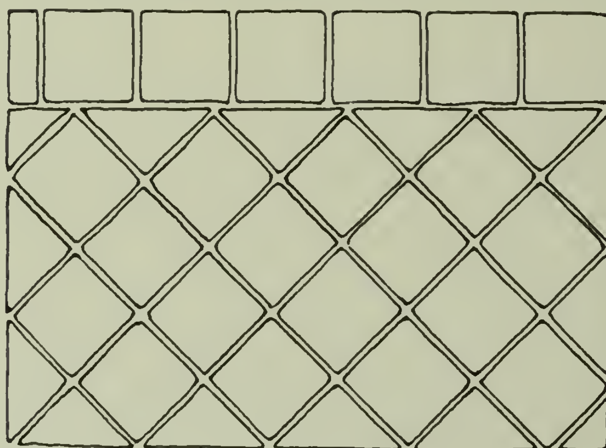
The simplest floor of square tiles is interesting if the joints are in scale.



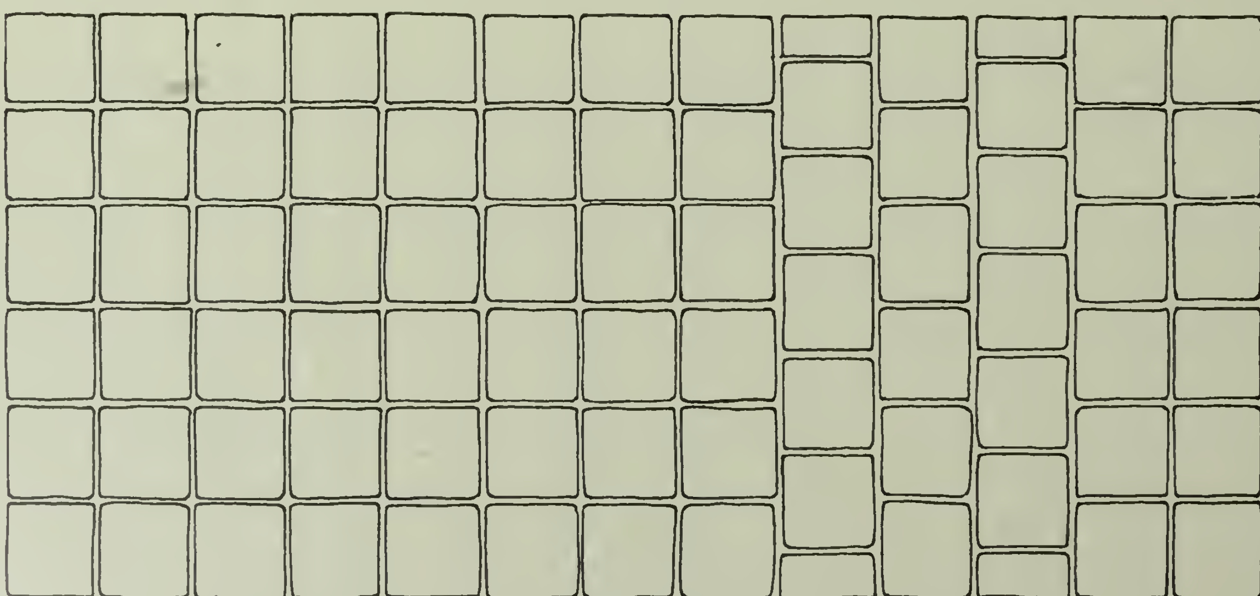
When square tiles are laid with broken joints, long lines in one direction are the result.



By groups of four squares as a unit separated by wider joints, the scale is increased.



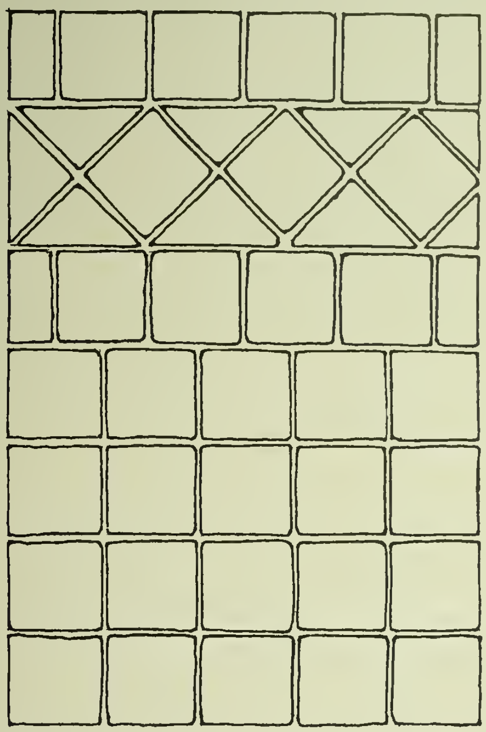
A diagonal pattern of square tiles is emphasized by a border.



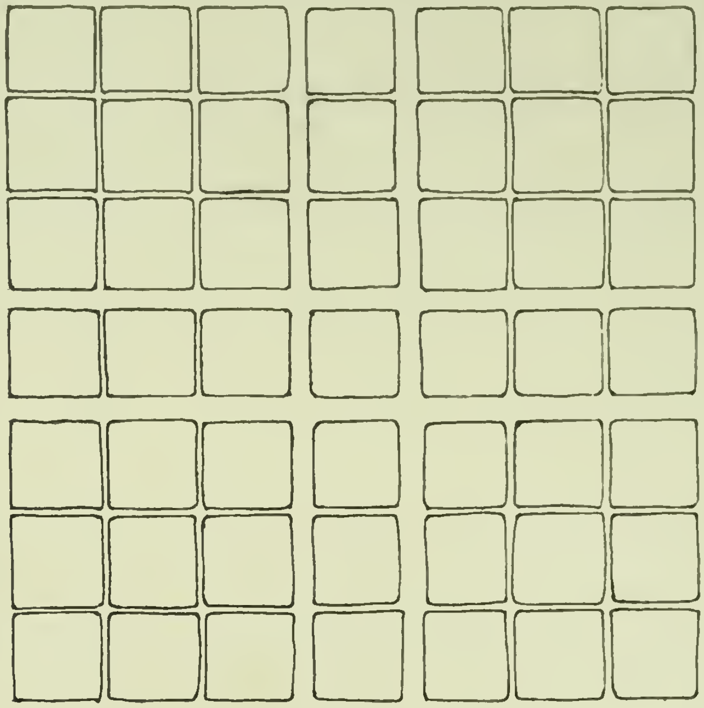
By a few rows of broken joints, an effect of border is produced in a field of square tiles.

DIAGRAMS—TILE FLOORS.

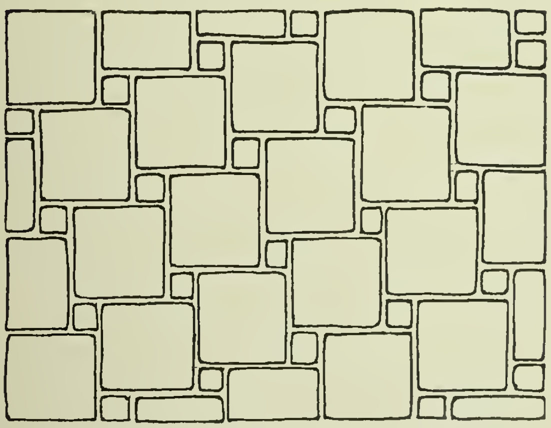
A. B LE BOUTILLIER, DEL.



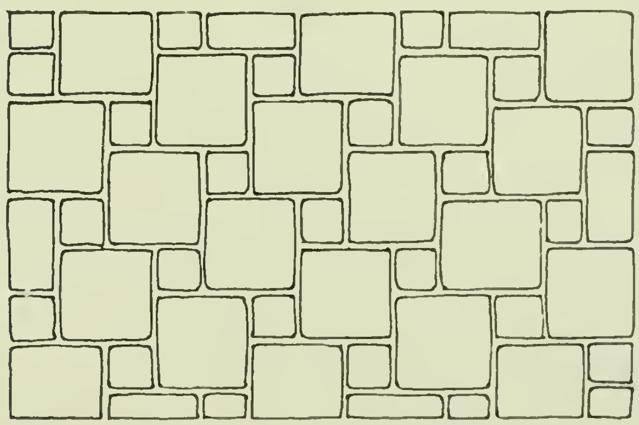
By breaking joints in one course, the border is made wide.



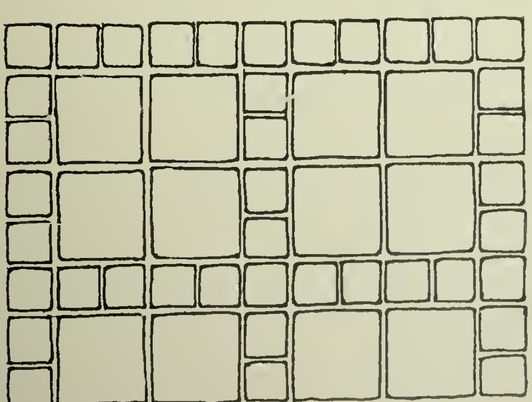
An arrangement adapted to large rooms.



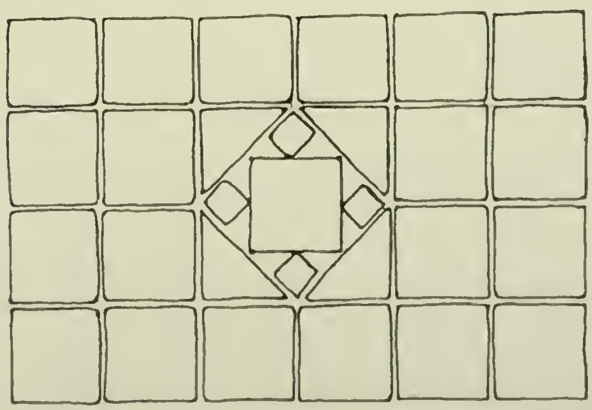
When the small squares are less than one-quarter of the area of the large squares, the pattern runs off at the side.



When the small squares are one-quarter of the area of the large squares, the pattern has more repose.



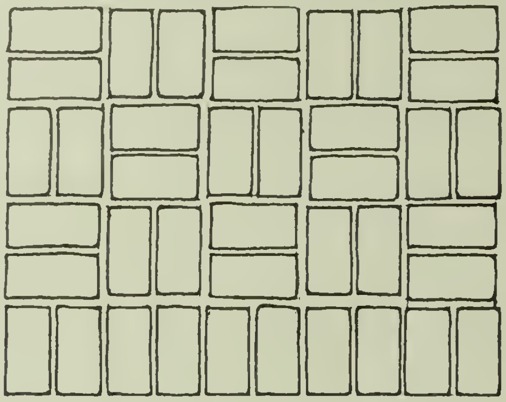
Another way to increase the scale with small tiles.



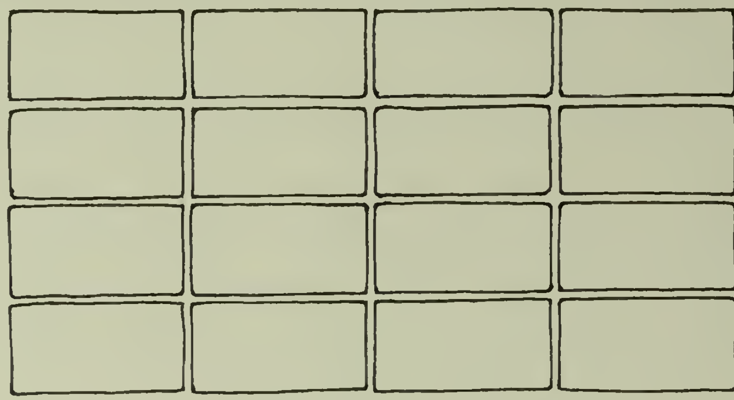
A decorative pattern that can be made on the job.

DIAGRAMS—TILE FLOORS.

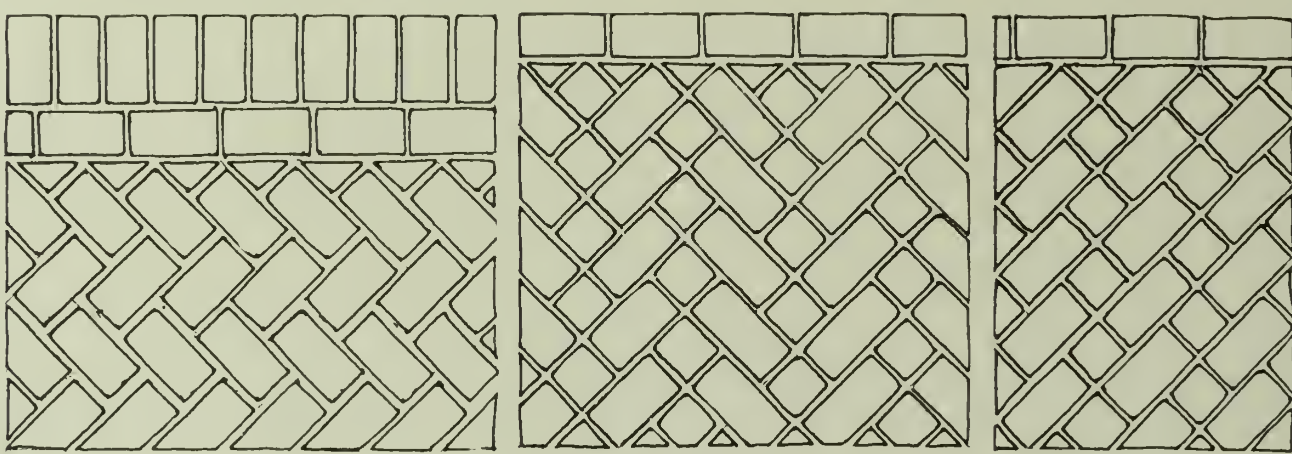
A B LE BOUTILLIER DEL



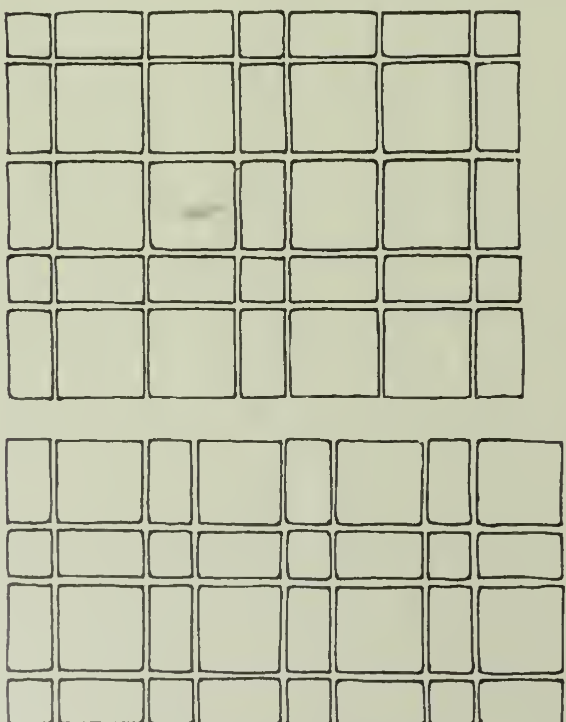
When double squares are laid "basket pattern," the necessary allowance for joints adds interest.



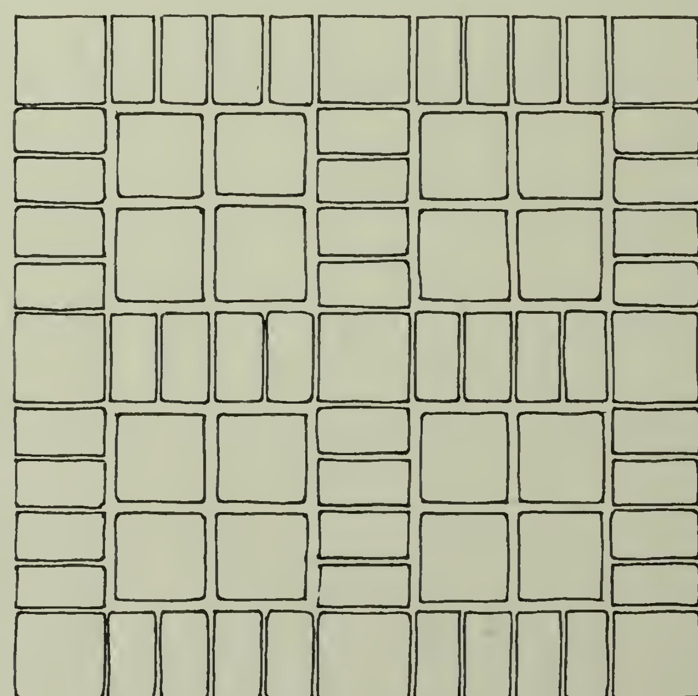
A good pattern for corridors.



Varieties of "herringbone."



Two combinations suggesting plaids.



A simple device for a panel or a floor for a large room.

DIAGRAMS—TILE FLOORS.

A. B. LE BOUTILLIER, DEL.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

ARCHITECTS' FEES

LAST month we discussed two new methods by which architectural fees might be computed. We shall now discuss the advantages of these methods, and then point out their defects.

First let us consider the method of charging the client double the salaries of the draftsmen employed on his work plus a fixed sum for professional services. A client comes to an architect to discuss a building operation. Given the type of structure the architect should be able to approximate the cost of the completed building even if the client has no preconceived ideas other than the amount he wishes to invest. As stated in the January number, those who have experimented with the new systems of charging claim them to be based on the six per cent commission basis. The architect therefore calculates the amount of his commission on this basis. If it were a one hundred thousand dollar building the commission would be six thousand dollars. It is reasonable to suppose that if the work went ahead without hitch the architect would make a net profit of one-half of this commission, because if we analyze his expenses we find them somewhat as follows: Experience and bookkeeping have shown that draftsmen's services and overhead expenses (office rent, stenography, clerical work, supplies, blue-printing, etc.) run about even when prorated to individual jobs. If the progress of the work were smooth, it is reasonable to suppose that the drafting work on the average one hundred thousand dollar building would take three thirty dollar a week men about three to four months' time to complete. In other words, the actual drafting expenses on the work would be in the neighborhood of fifteen hundred dollars. If the building were a factory, mill construction, this expense might be reduced; if it were a private house, it might be increased. Now as the general overhead expenses can be rated as approximately equal to the drafting expenses, we find that three thousand dollars will practically cover the cost incurred if the work is carried out under ideal conditions for the architect, that is, if he has full sway to carry on his work from start to finish without innumerable unforeseen delays, making the job drag on for two or three years, and so eat up his profits. But an architect's work is very seldom carried on under such ideal conditions, and to average a profit of one-half of the gross commissions, although it may be done now and then, is not usual if the work is carried on conscientiously, and especially if the work is small. The architect therefore goes over the situation with his client and finally makes him the proposition that he, the architect, receive three thousand dollars for professional compensation, and that the client pay him double his draftsmen's salaries. By such an arrangement the architect makes sure of his profit in the beginning, and except from the standpoint of personal inconvenience he does not care how long the client procrastinates in his building operations.

The situation for the client also has its distinct advantages; he is certain that the architect is disinterested in the total cost of his structure. The client is simply paying a fixed sum for the architect's professional services, and the actual cost of producing the drawings and specifications. He is practically hiring the architect to run an office for him.

Now, let us see just where the client stands, and in order to do this let us take a concrete example with which to demonstrate. An architect is designing a bank. In this bank is a large and lofty banking-room. The architect tells his client that he can make it a beautiful room in two ways. He suggests either paneling the walls with costly marbles or carefully and elaborately decorating the room, treating the surfaces in plaster of Paris. The former treatment depends largely on the material for its beauty, the latter on the complexity and refinement of its detail. It is possible that the cost of these two treatments might be identical. If the architect were working on the six per cent commission basis, it is possible that the elaborate decorative plaster drawings that he would have to produce would completely annihilate his profit, whereas marble paneling could be drawn up and carefully specified, with but little expense. But the architect is working for a definite sum, the client has paid him for his professional services, and if the decorative plaster treatment is decided upon, the burden of the cost of producing the drawings for it rests where it should, on the man for whom the draftsmen are working — the client.

What then are the defects of this system from the architect's point of view? How can he lose? He can lose considerable profit in the case possibly of a factory or mill in which the drafting, and consequently the overhead expenses, would in no way approach fifty per cent of a total six per cent commission. But letting alone the question as to whether or not it is just that the architect should receive a profit out of proportion to the work he does, what he loses on the mill job he makes up with the guarantee of an assured, just, and reasonable profit on the house, bank, church, etc. It would seem then that the system was of benefit to the architect.

What then are the client's arguments against it? It is reasonable to suppose that his first question would be, "How am I to know how many and how expensive draftsmen it is warrantable for my architect to employ on my work?" If it is entirely at the discretion of the architect as to how many and how expensive draftsmen he may employ on the client's work, doesn't the system of paying double the draftsmen's salaries set a premium on inefficiency on the part of the architect?

We have already stated that experience shows that overhead expenses can be calculated as equal to the drafting expenses. This is true if the work is efficiently and conscientiously carried out by the architect, but if the architect were to employ a man receiving forty dollars a week to do the work of a man receiving ten dollars a week, the overhead expense column would not tally with the extravagant pay-roll. The client sees then that if he is paying double the draftsmen's salaries, he must have implicit confidence in the conscientiousness and practicality of his architect.

It would seem, therefore, that by "the professional bonus, plus twice the draftsmen's salary" basis, the architect could lose nothing but that the client might lose considerable through inefficiency in drafting-room management. The other alternative system suggested, that of charging four times the draftsmen's salaries, simply increases this difficulty, the importance of which we will discuss more fully in our March number.

PRIZE WINNERS — THE BRICKBUILDER'S ANNUAL ARCHITECTURAL TERRA COTTA COMPETITION.

THE Jury of Award for the Public Garage, Automobile Sales and Service Building Competition awarded First Prize, $500, to John S. Sheridan, New York City; Second Prize, $250, to Valere de Mari, Chicago, Ill; Third Prize, $150, to Ralph Herman Hannaford, Boston, Mass; Fourth Prize, $100, to Arthur O'Neil Geddes, New York City. Mentions: Sampson J. Fountain, College Station, Texas; Claud W. Beelman, Toledo, Ohio; Frederick Scholer, Chicago, Ill; H. P. Beers, Chicago, Ill.; F. N. Roberts and S. Nesselroth, Boston, Mass.; G. Evans Mitchell and Wm. F. Burkhart, Jr., New York City.

The competition was judged in Boston, January 25th, by Prof. Jas. Knox Taylor of the Massachusetts Institute of Technology, Burt L. Fenner of the firm of McKim, Mead & White, D. Everett Waid, Walter H. Kilham (Kilham & Hopkins), J. Lovell Little, Jr., and F. L. W. Richardson (Richardson, Barott & Richardson).

PLATE DESCRIPTION.

Hospital for the Relief of the Ruptured and Crippled, New York City. Plates 21, 22, and 23. — The building is designed in the Renaissance style of northern Italy. The wall surfaces and the shafts of the octagonal columns are constructed of a buff wire cut brick laid in Flemish bond. The secondary cornice band courses, capitals, etc., are of ornamental terra cotta of a color toning in with the brickwork. The main cornice is of copper. As the building site is in the middle of a block, extending through from street to street, it was important to have large courts for light in the upper stories and wide areas for sufficient light and ventilation in the basement. The body of the building was therefore placed across the lot in front of its center, with two wings on the north and two on the south. The building is of the most modern type of fireproof construction. The two main staircases, located in the east and west ends of the main building, are entirely enclosed and separated from the corridors by fireproof doors. The floor plans show in detail the departments on each floor. The sixth floor is planned with a flat roof for outdoor treatment and recreation. The solarium divides this into two sections, one for the boys and the other for the girls. A large part of each section is roofed over so that patients may be out, even in the most stormy weather. As the view in all directions is most attractive, the masonry parapet is kept low and a wire mesh screen built above it for protection.

First Church of Christ, Scientist, Washington, D. C. Plates 26, 27. — This new building is of fireproof construction, the floors of reinforced concrete and partitions of brick or terra cotta blocks. The materials for the exterior are Ohio gray-canyon sandstone for entrance portico and base, in combination with gray terra cotta and 3 by 12 inch gray facing bricks, of a rough texture, laid in Flemish bond with wide recessed joints. The roofs are covered with Greek pattern unglazed tiles in a soft shade of green. The three main entrance doors are of bronze. The staircases are of gray Tennessee marble with wrought iron balustrades. The woodwork of interior, including pewing and platform railings and desk, is Mexican mahogany, and the floors of auditorium and Sunday school room are of quartered white oak in parquetry patterns. The floors and wall bases of foyers are of gray Tennessee marble, and the floors of entrance portico and terrace are of 13 by 12 inch red Welsh quarry tiles.

The building contains 538,500 cubic feet, measured from the lowest floor lines, and the entire cost, exclusive of organ, was $140,000, or at a rate of twenty-six cents per cubic foot.

Easthampton Public Library, Easthampton, L. I. Plates 28, 29. — The donor of the library, remembering the fact that Easthampton was settled by people from Maidstone, England, desired to construct a building which would recall the architecture of the Maidstone Library, which was formerly an English Manor House. Certain details of the Easthampton Public Library were copied pretty closely from the old, especially the fireplaces and certain pieces of furniture and the andirons. The front of the building, divided by removable screens into three parts, is arranged to open into one for lectures and entertainments. As the library is used largely in the summer, a garden and fountain were made a feature of the design at the rear, enclosed by trellises. The peculiar shape of the plan is due to the fact that the lot lines ran at quite an acute angle with the street front. The furniture, the lighting fixtures and decorations, even to rugs, were purchased for the owners by the architect, and a considerable part of the furniture was designed and built especially for its present location.

THIS month we are illustrating the Church of Kato Panhagia, Arta, Epirus, Greece.

These churches, like those of the new period elsewhere, are almost invariably very small, rarely exceeding 30 feet in their greatest dimension. On the other hand, they were built in incredible numbers, frequently with considerable richness and delicacy of execution. Their size is perhaps to be ascribed to the practice of having but a single altar in each, in contrast with the Western custom which assembled many minor shrines as chapels of a single great building.

WE acknowledge, with regrets, that the name of the architectural firm, George S. Orth and Bros., Pittsburgh, Pa., the architects of the Thaw House, Sewickley, Pa., was inadvertently and not intentionally omitted by both author and publisher in an article pointing out the architectural merits of this particular house. This article appeared in our January, 1913, issue.

THE BRICKBVILDER

AN ARCHITECTVRAL MONTHLY

VOLVME XXII — MARCH 1913 — NVMBER 3

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PLATE ILLVSTRATIONS

LETTERPRESS

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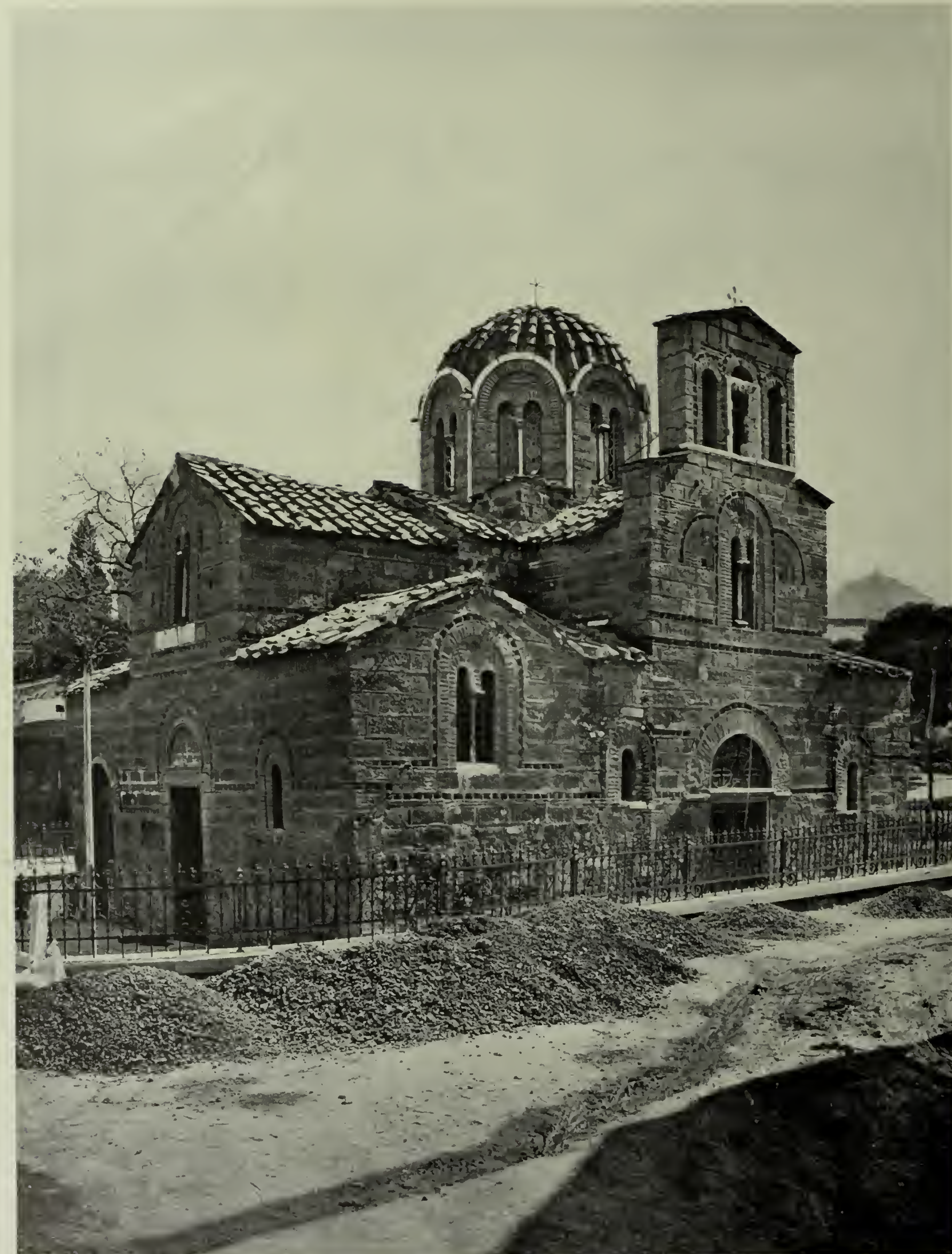


Photo by Royal Prussian Photometric Institute.

CHURCH OF ST. THEODORE, ATHENS.

Peiraic yellow sandstone with intermediate courses of brick. Below the clerestory windows is a curious terra cotta frieze of Oriental character. Middle of twelfth century.

THE BRICKBVILDER

MARCH, 1913

VOLVME XXII. NVMBER 3.

The Planning of a Young Men's Christian Association Building. — Part I.

BY LOUIS ALLEN ABRAMSON.

IN a recent issue of THE BRICKBUILDER there appeared a very able and concise presentation of the basic principles that must govern the successful planning of a building for the Young Men's Christian Association. In this article, and those to follow, it is the author's intention to supplement the former more theoretical treatise with a practical study in regard to the plan, detail, and construction of the integrant rooms and departments that compose the Association building of to-day.

A perusal of the descriptive matter of any Association will immediately establish the fact that the initial purpose of a Young Men's Christian Association is "To Make Men" — to develop manhood from the raw material, "Youth." But as the Association is practically always, and intentionally so, partially dependent upon the community in which it exists for sustenance, the planning of the building must, above all else, make possible the consummation of its purpose at a minimum cost for overhead carrying charges.

This is accomplished when the following conditions are brought about:

(a) Construction must be of durable materials, selected only after a thorough test as to their fitness from a utilitarian standpoint.

(b) The plan must permit of the maximum flexibility and varied usages for the same rooms. Reapportionment of area for the different apartments must be relatively simple.

(c) The plan must permit of efficient supervision by a minimum staff of paid employees.

(d) The mechanical equipment must be possible of operation by other than skilled engineers; and so designed that all possible sources of unnecessary consumption of energy are avoided.

Under the first classification we are to deal entirely with the problem of the choice of proper materials, their use and abuse. This will be discussed at greater length in a future chapter. But in passing, we shall regard one example. It is common practice to construct the ceilings of the natatorium and shower rooms of plaster or galvanized iron. The former, unless constantly repainted, will ultimately disintegrate and become loosened; while the latter will rust where it has been sheared, or punctured at the nailing points. To illustrate the second condition: The gymnasium should be planned so that it can readily be converted into a place of public assemblage — having direct entrance and exit to the street and adequate stairs to the running track, temporarily serving as gallery. That this arrangement might be feasible, it is necessary to provide a large room on the same floor level as that of the gymnasium (an exercise room or boys' gymnasium), into which all apparatus can be moved. Again, the several locker rooms should be planned with regard to the future requirement of the physical department. The rooms should adjoin one the other and be divided by wire mesh or other movable partitions as, invariably, the proportions of the junior to the senior members, as determined before the erection of the building, does not accurately materialize and is otherwise always subject to reapportionment.

To efficiently and economically supervise, it is necessary to centralize and amalgamize the points of control and the focal point of each story where such supervision is required, *e.g.*, basement and first floor.

Finally, an absolute control of the light and heat must be had of each department independently of all others. For example, during winter it is necessary to provide a constant supply of heat in the boys' department during the entire day. However, it is an advantage to discontinue the supply of the dormitories during the greater part of the day. It is therefore necessary that the dormitory rooms be controlled independently of other departments, and so eliminate the necessity of visiting each room and there closing each radiator valve.

There is no one building that can be chosen as being ideal, except as to its type. Nor could a plan be devised that could reasonably be termed ideal; for each community has its individual problems, and the peculiarities of its membership, the privileges afforded to both members and non-members, and the extent of its executive force, all tend greatly toward the determination of the proper plan. An analytical study of local conditions must be made by the architect in consultation with the secretary and committees, if a plan adapted to the needs of the community is to be obtained. The author is aware of the existence of several buildings of exactly similar plan and designed by the same architects of which the original building has successfully met the demands; and the others dismally failed. A total collaboration between the architect and his committee is more essential in Association work than in any other form of institutional building. Professional obstinacy to suggestions and precedent predetermines failure. In this paper the author will take as a subject for illustration and discussion the units that compose the average building adaptable to the needs of the community of eight to ten thousand, and will study these units separately and in conjunction with their related parts. Generous reference should be made to the diagrams and other illustrations reproduced herewith.

BASEMENT.

Hall. The termination of the main stairs in the basement should be directly in a hall. This hall should be ample in its dimensions to prevent congestion, as is apt to occur after the discharge of gymnasium classes. From this hall, entrance should be had to all other departments, supervised, and some mechanically controlled, by the attendant in charge of the basement. The position of this attendant's desk must be such that from it a careful supervision can also be obtained of the activities in the different rooms. In conjunction with this desk there is often a moderate

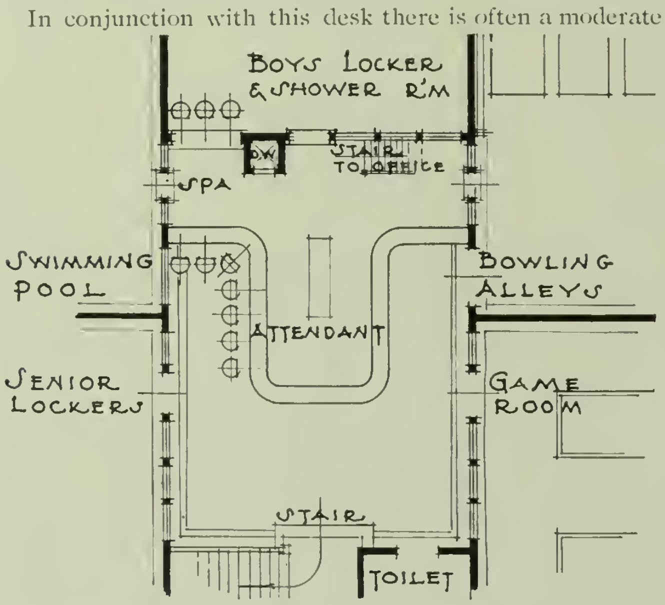


FIG. I.

An arrangement insuring ideal supervision and control from the attendant's desk. Notice that the spa serves both juniors and seniors.

lunch counter or spa where light refreshments can be procured. This lunch counter is mostly used in the morning by the dormitory men and by the physical department members after exercising. It should obviously be placed in the line of their circulation, but still be recessed sufficiently to avoid becoming obtrusive. It is decidedly of advantage to have the serving space in direct communication with the kitchen on the second floor by means of a dumb-waiter. Care must be taken to adequately and rapidly ventilate this serving space so that the offensive odors will not be carried into other rooms or up the stairs into the social rooms of the first floor.

The position of the attendant must be such that in addition to the duties mentioned above he can collect tolls for the use of the bowling alleys and game room (if in the basement). During certain periods of the day it is often necessary for the attendant to be away from his desk, and a circular stairway, or other convenient means of access, should exist between the main desk on the first floor and that of the basement. However, this stair should never lead through an open well in the floor, as otherwise the noise of the basement will be communicated directly to the office and become decidedly objectionable.

Physical Department. A study of the natatorium and baths, likewise the locker rooms, will be taken up later. Suffice it to say that certain rigid laws affecting light and ventilation must be strictly adhered to. There are several locker systems in successful operation. Some have merit by reason of their space-saving possibilities; others permit of greater sanitation; and again, some have virtue by reason of their economy.

Toilet. Provide ample toilet accommodations, but reduce standing room to the minimum to discourage the room's use as a rendezvous. Two water-closets, one urinal, two basins, and a slop sink are ample.

Game Room. This room, containing the pool and billiard tables, is not always provided, local protestation sometimes forbidding its initial introduction. However, if not originally provided, experience has taught that provision should be made for its future installation, whether in the basement or on the first floor. The maximum equipment will, in most instances, probably consist of four tables, full size. Ample provision must be made for spectators, preferably along the walls and not between the tables. If the spectators' chairs are placed on a raised platform, the tendency will be to keep the visitors from encroaching upon the playing space. (Fig. II.)

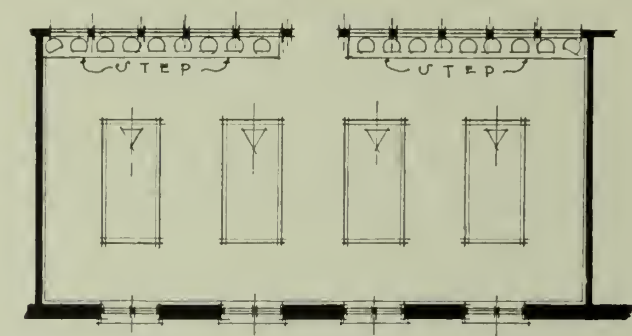


FIG. II.

An exceptionally good arrangement for the game room. Note that the windows are opposite each table and that spectators reach their chairs without interfering with players.

Bowling Alleys. The bowling alley equipment (Fig. III) should always be of the regulation size, of the latest model and complete in every particular. Otherwise, their patronage will soon be diverted to quarters offering more satisfactory inducements. The number of alleys to be planned for depends entirely upon local demand, the usual installation being two pair. Spectator space on stepped platform should be provided behind the runway, likewise alongside of alleys and next to the exterior wall, if the source of light, so that (*a*) spectators will not be obliged to face a strong blinding sunlight; (*b*) splashing rain cannot enter the windows and ruin the surface of the alleys; (*c*) radiators and steam-pipes placed along the exterior walls can be reached and valves adjusted without walking over and consequently mutilating the surface of the alleys. There must be no posts or other obstructions between the alleys that will prevent a clear view along the entire length of the bowling alleys. Discretion should be exercised in determining the position of the alleys so that the noise generated will in no way annoy other activities in progress at the same time. As the junior department is least active in the evening and the bowling alleys have their maximum usage at this time, it is advisable to locate the alleys under the boys' rooms with the pin pit farthest

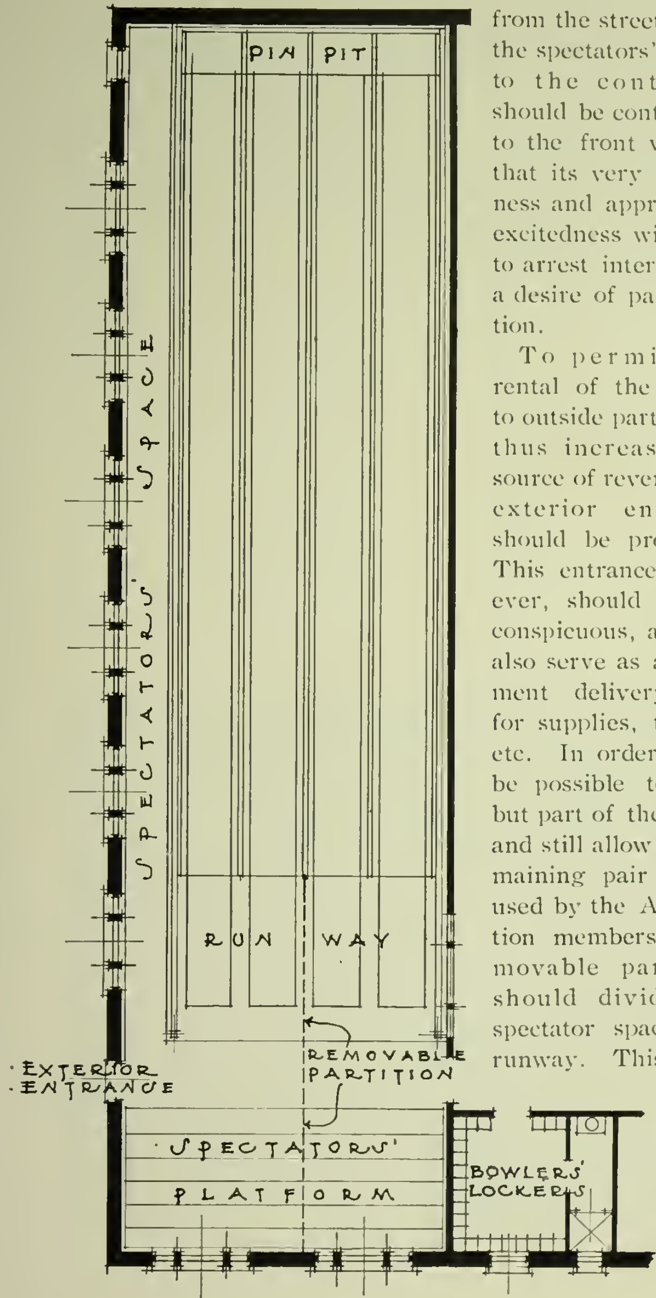


FIG. III.
Note the absence of windows on the rear wall, eliminating a source of annoyance to the players.

from the street. But the spectators' space, to the contrary, should be contiguous to the front wall so that its very activeness and appropriate excitedness will tend to arrest interest and a desire of participation.

To permit the rental of the alleys to outside parties and thus increase this source of revenue, an exterior entrance should be provided. This entrance, however, should be inconspicuous, and can also serve as a basement delivery way for supplies, trunks, etc. In order that it be possible to rent but part of the alleys and still allow the remaining pair to be used by the Association members, a removable partition should divide the spectator space and runway. This partition can either be in the form of an obscure, glazed sliding sash or else rolling shutters. The latter are more desirable, for when not in use the vertical guides can be removed and the lines of vision unobstructed. For tournament purposes a considerable number of chairs are required, and for their storage a convenient room should be provided. In a community where bowling is active, a small locker room with a shower bath for the exclusive use of the bowlers is a very profitable adjunct.

Storage Room. A capacious room is necessary for the safe storage of such equipment that is only to be used from time to time. Again, certain activities, as, for example, some of the educational classes, are discontinued during certain seasons, and their especial apparatus must be safely preserved.

FIRST FLOOR.

Entrances. While the exterior of the building must of necessity be simple and modest, the main entrances, that is, to the junior and senior departments, must be accentuated, preferably by exaggerating the scale of the masonry opening in relation to all other fenestration, and so give the entrances an aspect of openness and shelter. Architecturally, the junior entrance should not be quite as prominent or imposing as that provided for the seniors. The entrance steps should be confined within the vestibule, to discourage loitering on the part of the members and others, and further to reduce the possibility of accident through negligence in not removing snow and ice. The entrance to the lobby must be direct and not circuitous. Upon entering one should immediately see the lobby and not come face to face with a barring wall. Minimize the distance from the entrance to the center of activity.

Senior Department — Lobby. Careful study should be given to the location and plan of the lobby and its related rooms. Being the hub of the building, its position must be central and the entrances to the other rooms, halls, and stairs must be directly from the lobby proper and within the control of the attendant's desk. The lobby should present an extremely dignified and genteel atmosphere, unpretentious and hospitable, as its function in the building is that of a social center; and its outward appearance must be such that it will command the proper respect and regard of its members. If poorly lighted and cheaply constructed of sheathed partition and common partition sash, having columns scattered here and there, and bizarre fresco decorations, quite naturally the members will refrain, perhaps unconsciously, from cultivating a proper sense of dignity. A room well illuminated, free of obstructing columns, of studied proportions, and imparting an hospitable atmosphere of the home living room will obtain the desired respect from the members.

FIG. IV.
An absolute, unobstructed view of all alleys from any point on the spectators' platform.

FIG. V.
An example of excellent supervision — entrance, lobby, game room, stairs, coat room, etc.

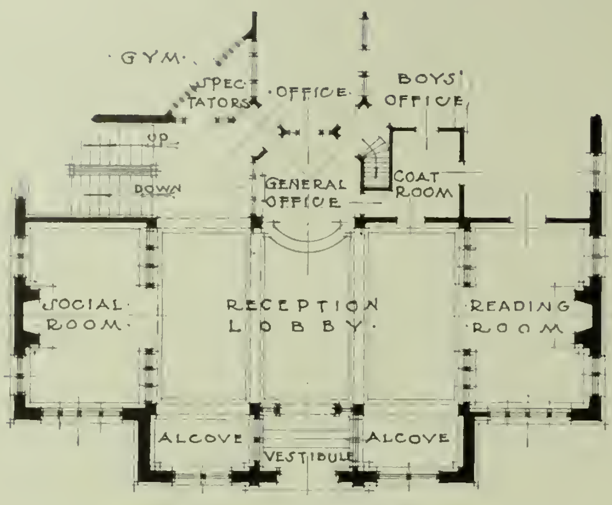


FIG. VI.
Perfect supervision and control.

As implied above, the attendant, from his position, must be able to conveniently supervise the movements of the men entering and circulating to all other parts of the building. Therefore the means of entrance, stairs and corridors, must be within the possible visual, if not physical, control of the attendant. Non-members must be detected and properly directed to their destinations. (Fig. VI.)

General Desk and Offices. The proper relationship for the desks and offices is best expressed in Fig. VII. This arrangement groups the offices, so that in addition to a supervision by each secretary of his own department, at certain times, partial control can be had by either from their offices, of the other departments. It is decidedly advantageous to have each office so placed that the secretary, remaining in his office at his labors, can yet be able to greet the members as they enter. This, however, should be arranged for through a glazed partition, rather than through an open door, as otherwise each man so welcomed would accept the greeting as an invitation to linger.

The boys' secretary's office need only be of sufficient size to comfortably accommodate his desk and such other usual furniture, but the general secretary's office must be of such size that it will accommodate committee and board meetings. If space is limited, and the committees large, then it must be possible to convert two or more

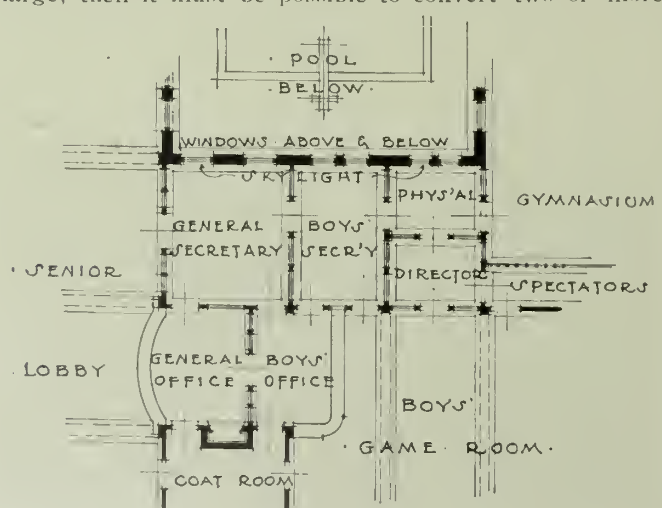


FIG. VII.
An ideal combination of offices permitting supervision of all departments by one man.

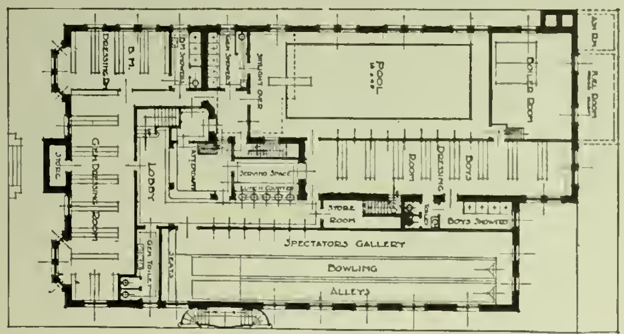
offices into one. This, however, is not ideal, as it necessitates the moving of cumbersome furniture. Here the question of expansion and flexibility becomes very important. As the work of the Association increases, additional offices are established, such as for employment and religious work, and provision should be made for their accommodation. A vault for the storage of documents and silver service, about 18 inches deep and 5 feet wide, is of great value and its location should be within the general office space. Light and air for the offices should be obtained, if at all possible, through windows, and not through skylights. The advisability of providing a special toilet for the secretarial staff is questionable. It is considered by the author to be an advantage to the work if one of the compartments in the general toilet be reserved and so keep the conditions familiar to the force.

Coat Room. The coat room should do service for both senior and junior departments. It must consequently be contiguous to both desks, as the office attendants are in charge the greater part of the time. It should be placed at a point not too distant from the entrance and on the line of circulation to and from the main stairs, but never

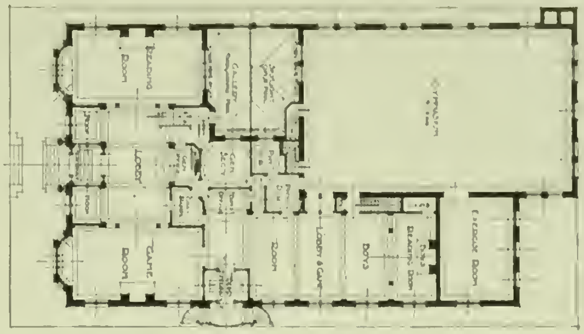
FIG. VIII.
A group of well arranged, light executive offices.

on a corridor. The size of the coat room depends entirely upon the service it is to perform. That is, whether it is to be used by members only or also by those attending general meetings. The door should be of the Dutch type, not less than 3 feet in width, with brass-rimmed shelves 16 inches at its maximum width. If the coat room is to be used on occasions of general public meeting, then there should be a secondary door of the same size and type to accelerate the service. In addition to coat and hat racks, provision should be made for the reception of umbrellas, school books, tennis rackets, and members' outgoing and incoming laundry. A steam coil should be placed close to wall with a metal shield to deflect the radiation vertically and be operated during inclement weather.

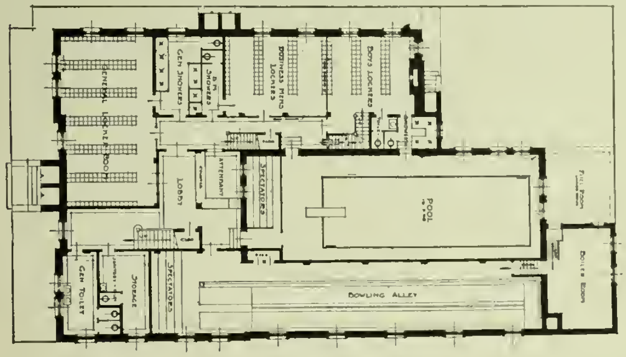
Stairs. The stairs, both up and down, should start from a point in the lobby adjacent to and in direct view of the desk. An arrangement similar to Fig. VI. is ideal, as it compels one to pass the desk and so insures against promiscuous entry. Furthermore, at such times as the attendant is not at his desk in the basement, the general office



BASEMENT PLAN



FIRST FLOOR PLAN



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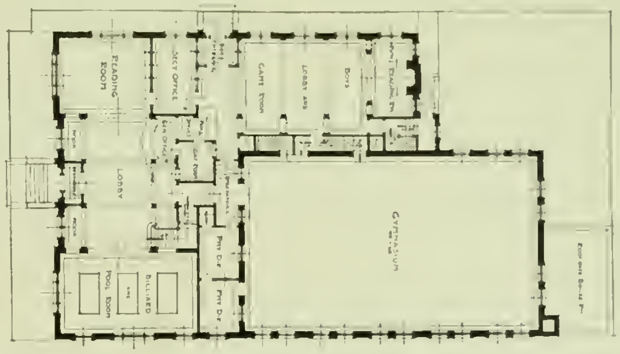

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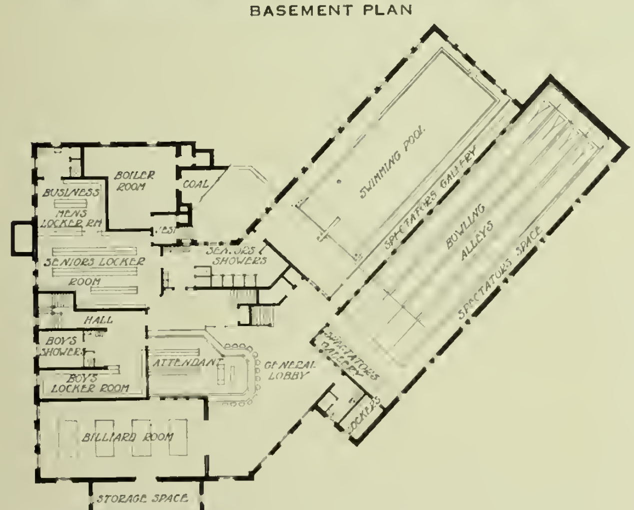

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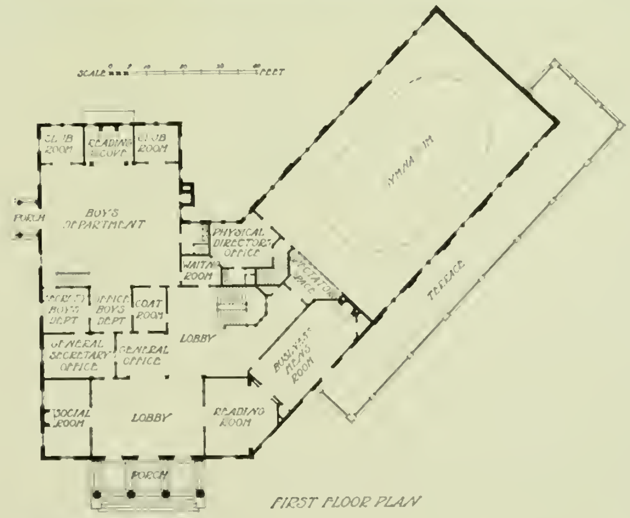

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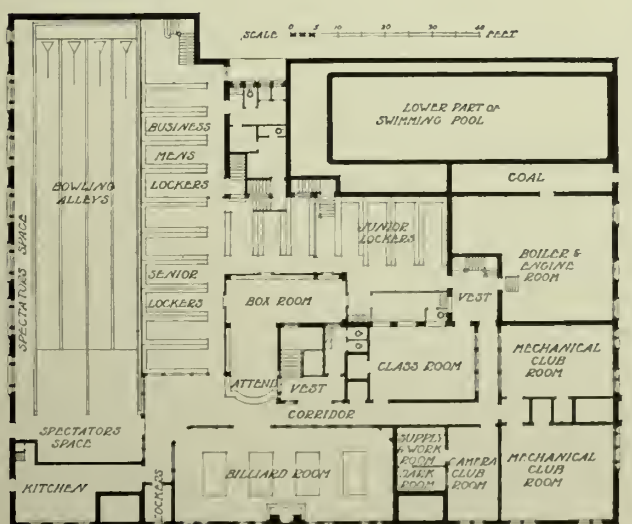

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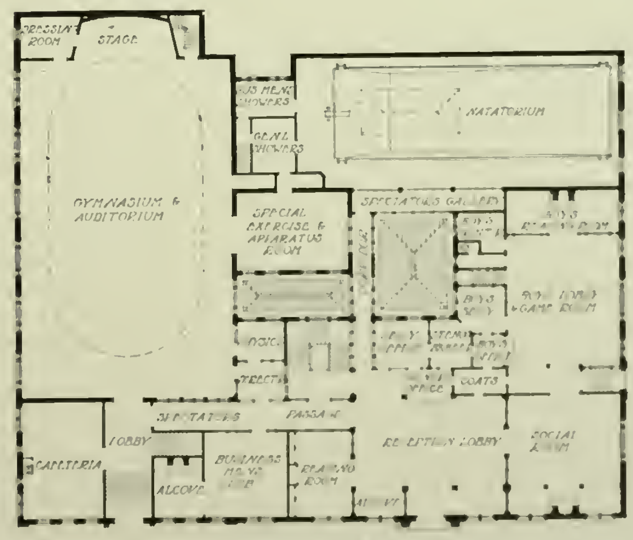


FIRST FLOOR PLAN

BASEMENT AND FIRST FLOOR PLANS SELECTED FOR STUDY

THE PLANNING OF A YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING desk can control the circulation to the basement, by operating an electrically controlled door at the head of the stairs. If that part of the basement at the foot of the stairs is in the proximity of the bowling alleys, or other rooms where shouting is common, then doors must be placed at the head or the foot of the stairs to check this disturbance.

Reading Room. The Association does not usually attempt to vie with the public library as customarily books are not for circulation. The reading room does not, except in few instances, even attempt to co-operate with the educational department in supplying reference books. Its function is more that of a retreat, where books and periodicals are accessible and where the members of the educational department can retire in advance of their classes. It should therefore be isolated to insure quietude. Enclosed bookcases to a height within standing reach should line the walls. A fireplace is extremely well fitting and useful.

Social Room. The social room, usually placed symmetrically to the reading room with regard to the lobby, contains the smaller game tables such as checkers and chess and is really an adjunct to the lobby. At times it will be used as a meeting place in conjunction with it, and the separating partition should really be a glazed screen with wide doors.

The social life of the Association is exemplified in the lobby social and reading rooms. They therefore should be placed along the main façade, so that passers-by can be favorably impressed by the activeness and attracted at night by the brilliant and symmetrical illumination of these rooms. It logically follows that the junior department, dormant at night (except when used by employed boys), should be relegated to a less important section of the building than that given over to the seniors.

Junior Department. The location of the junior department is also determined by other factors. As is readily conceived, the social rooms of this department at times become a bedlam and their location should therefore not be such that their presence will disturb and handicap other departments, especially when day classes are given. Modern practice, as a result of a varied experience, demands a segregation of the boys' work from that of the seniors. In the smaller type of building, however, the segregation is only confined to the social rooms and the shower and locker rooms. In the larger buildings, however, it has been found advisable to provide independent gymnasium and natatorium.

Entrance. The boys' entrance to the lobby can, if continued upward, become a night entrance to the dormitories, and, where the meeting room of the second floor is used extensively by the general public, the same entrance can be converted into a special one for this room.

Lobby or Game Room. The social rooms provided for boys' work differ in purpose from those given to the senior department, inasmuch as a general lobby is not necessary. Boys will not sit around unless otherwise occupied, and will therefore rather be found playing at their games in the reading room or else in physical exercise. Consequently, a large room, furnished with the required game tables (pool, shuffle board, carroms), and a reading room are necessary. Several club rooms, about 10 feet by 12 feet, are desirable, and should be arranged with connecting folding doors. (Fig. IX.)

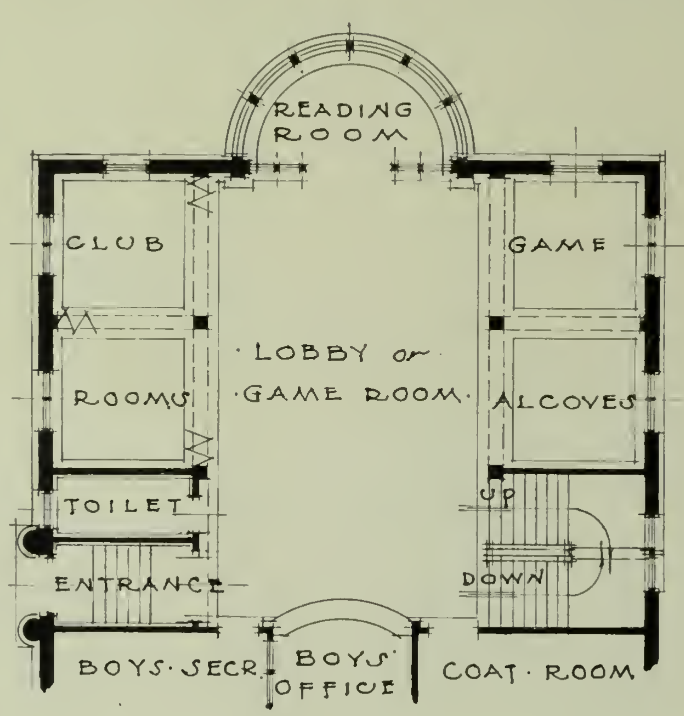


FIG. IX.
A well arranged boys' department under good control.

The importance of the boys' work has only recently been generally established, and modern practice is compelling a further segregation according to ages. Where the boys' work is, or promises to become, extensive, the lobby or game room should be divided, by movable partitions or glazed screens, into three distinct departments: Junior boys (grammar school), senior boys (high school), and employed boys.

Reading Room. The reading room, similarly, should be divided for junior and senior boys, separated from the lobby by transparent screens. Constant supervision must be had at all times by the boys' secretary of his entire department. And consequently it must be possible for him, from his desk or office, to thoroughly control the activities and circulation of his members until they pass into the physical or educational departments, where they immediately should come within the supervision of the secretary in charge. For this reason, as much as possible of this department should be located on one floor, and that, the main floor. The boys' toilet should never be placed in the basement, but adjacent to the desk and under its supervision. The stairs to and from the boys' lobby should be so placed that they can be most easily controlled. It is well to enclose them within wire glass partitions with the doors mechanically controlled from the secretary's desk.

Mr. Abramson will continue in the April number to discuss the "Theory of the Planning of Y. M. C. A. Buildings." The series will further treat of the "Materials of Construction" and "Physical Department" (comprising Gymnasium, Exercise Rooms, Hand Ball Courts, Locker Rooms, Baths, and Natatorium). — *The Editors.*

Architectural Landscape Design.

ILLUSTRATING THE USE OF BRICK AS A GARDEN EMBELLISHMENT ON THE ESTATE OF C. W. LASELL, ESQ. JOSEPH D. LELAND, 3D, ARCHITECT.

BY ELSWORTH STODDARD.

QUITE the most unique and effective brickwork that has been seen since the late Stanford White discovered the Harvard brick is found in the walls, buttresses, and arches of the garden of Mr. Chester W. Lasell, at Whitinsville, Mass.

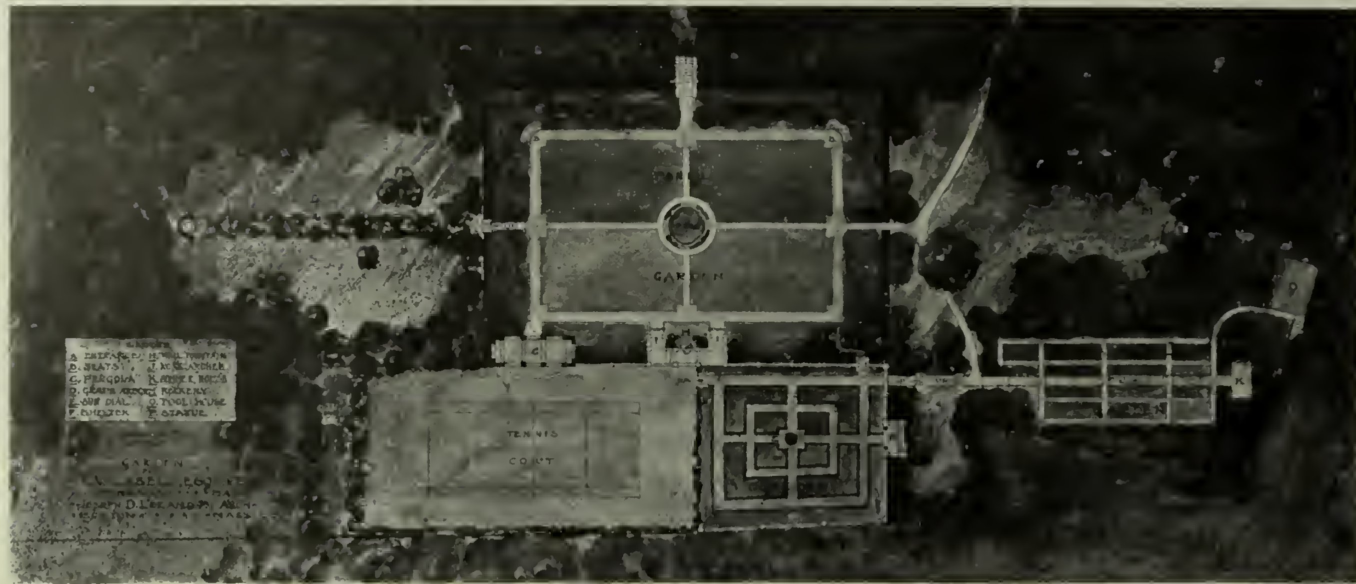
Here are seen brick ranging in color from delicate orange to rich reds and deep violet tints like the brick which is so picturesque in Southern France. They are found to be brick that heretofore have been thrown away by the thousand, or used in partition walls, because they came from over the arch in the kiln and so near to the fire that they became badly twisted. Being so near the fire in the baking they vary widely in color. Looked at separately, the individual brick are almost hideous, but, when put together in walls, the colors blend most effectively and harmonize with the planting.

The accompanying photographs show the manner in which the odd brick were utilized, but, unfortunately, do not give any idea of the rare coloring. The pictures do show, however, what rapid work can be done in garden construction. Less than a year before the photographs were taken there was no garden on the site at all.

The design of the garden was limited by certain fixed conditions, viz., a privet hedge bordering three sides of a vegetable garden, 150 feet by 80 feet, and near it, on a lower level, an old gravel tennis court. Both of these were to be preserved. The owner expressed himself very firmly about not wanting the hedge harmed in any way.

The vegetable garden was on a level 5 feet higher than the tennis court, and, between the two, was an old retaining wall. With this situation the architect worked out the following general scheme: The vegetable garden, which had a slope of about 5 feet to the south, was leveled and made into what is now called the upper garden. This has grass panels and is surrounded with an herbaceous border and the old hedge. Upon the old retaining wall was placed a 3-foot paneled wall made of the multi-colored brick; a handsome wall fountain and steps were built to the lower level. Here was the old tennis court on the right, to which was added, on the left, a rose garden, with high walls of the unusual brick. In order not to have a 5-foot bank on the north side of the garden, the hedge, which must not be damaged, was dropped 3 feet. This ticklish job was done without the loss of a single plant. A 2-foot terrace was then built, in front of which was planted the herbaceous and perennial border of the paneled garden. In back of the hedge the ground was graded into the natural slope toward the house. The whole garden is nestled amid fine trees, and for the background on the north of the paneled upper garden are large chestnuts, oaks, and pines on slightly rising ground. In addition to lowering the hedge, whole trees, some of them 35 feet high, were moved into harmonious positions.

It will be noticed in the photographs that the bond of the brickwork changes throughout in order to make the surfaces more interesting, being Flemish in the upper garden and English in the rose garden. In fact, the garden is full of pleasant surprises and no matter which way one turns one is always coming upon new patterns in brick design which show they have been carefully studied and



PLAN — THE LASELL GARDENS.
Joseph D. Leland, Architect.

harmonize effectively with one another. A three-quarter inch joint has been used throughout.

Let us take a short stroll into the garden. Passing from the house down a short gentle slope, shaded with big trees, and then down an easy flight of brick steps, laid in pattern and flanked by two large Roman urns, we enter the paneled upper garden. Directly in front of us, in the center of this upper garden, is a circular, stone-coped lily pond with a small fountain. In two of the corners of the upper garden are marble seats in the form of quarter circles.

Not being able to see it all at once, the garden draws you on, and, crossing through the middle of the upper portion, we come to a picturesque wall fountain, around which are two flights of steps. The pictures describe the wall fountain, but they do not bring out the fine coloring of the brick or the delicate yellow and rose tints of the stucco work around the lion's head, from whose protruding tongue the water falls in the shape of a fan into an Italian well-head. The water then overflows from the well-head into another basin at the bottom.

Before going down to the lower garden, the pergola to the right is of interest. This is on the line of the old retaining wall and is at the southwest corner of the upper garden, while its balcony overlooks the tennis court. This balcony is cantilevered with steel beams encased in concrete, the floor is inlaid with a brick pattern, and the roof is of red tiles which can be seen from inside the pergola. It makes a charming resting spot, and yet has the advantage of being a good viewpoint. Returning to the wall fountain, and passing down one of the two flights of ten steps which meet on a platform below, the brickwork again attracts attention. The back of the fountain

THE UPPER GARDEN.

GARDEN STEPS

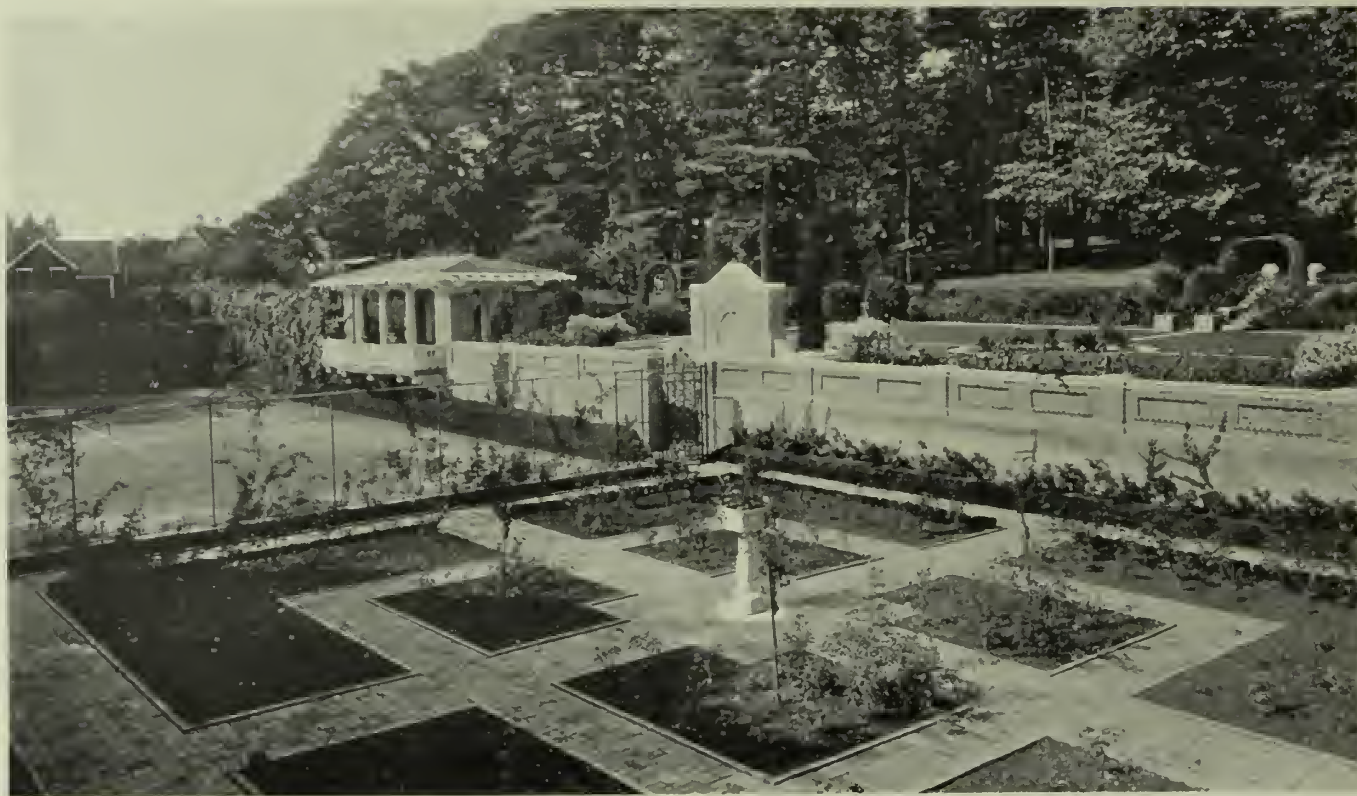
WALL FOUNTAIN

PERGOLA

GATE TO ROSE GARDEN

THE LASELL GARDENS, WHITINSVILLE, MASS.

JOSEPH D. LELAND ARCHITECT



GENERAL VIEW FROM ROSE GARDEN.

has a recessed brick arch and panel, in which the brick are laid in a cross pattern. These brick are a deep purple. On this wall surface is a bronze grotesque dwarf who is blowing bubbles out of a tiny pipe. This pipe, in reality, is a sanitary, bubbling drinking cup where the tennis players can find cold water near at hand.

At the foot of the steps one can either pass into the tennis court on the right, or, mounting two steps and passing through a handsome wrought-iron gate, go into the delightful rose garden. The walls of this lower garden are 7½ feet high and are made of the picturesque many-colored brick. The pathways in the garden are paved with Harvard brick, the kind used in the walls being too rough and irregular to be comfortable for walking. On one side of this garden is a charming little recessed pergola. From the rose garden a flight of steps and a skedaddle path lead through the border planting into the upper garden, and another gate, under an arch, leads to an annual and bulb garden, which is not shown in the pictures.

The garden is not yet completed. Vases for the top of the walls, a sun-dial, statues at the end of several vistas, a rockery and grape arbor, which all form a part of the general plan, have yet to be put in place and much of the planting has yet to be done. The photographs, therefore, show the rather remarkable results of less than one year.

CORNER OF ROSE GARDEN.

The Unit Power Plant for Isolated Buildings and Small Groups.

PART II. — TYPES OF APPARATUS AND PLANT DESIGN.

BY CHARLES L. HUBBARD.

THE architect who is interested in the subject of power plant installation should provide himself with a collection of catalogues of the best makes of apparatus. These contain a considerable amount of practical data, and it has seemed best to refer the reader to this source of information rather than to reproduce the same matter here.

Boilers. The boilers used in power and heating work are classed as fire-tube and water-tube boilers, according to their construction.

The horizontal return tubular boiler, with a brick setting, is the type of the former most frequently used. It is so designed that the hot gases pass through the tubes which are enclosed in a shell and surrounded with water. This form of boiler is used extensively for heating work, and also for power to a considerable extent. It has a large water capacity, is simple in construction, requires less head room than some types of water-tube boilers, and is also lower in cost. As boilers are rated on the amount of heating surface which they contain, there is a tendency on the part of some makers to crowd in too many tubes for the best efficiency.

Specifications may be obtained from the Hartford Steam Boiler Inspection and Insurance Company of Hartford, Conn., giving the principal details of construction for boilers of different sizes. Copies of these should be placed on file by the architect who wishes to take charge of this part of the equipment of his building.

The principle of construction of the water-tube boiler is the reverse of the fire-tube, as the name implies. In this case, the water is inside the tubes, which are surrounded by the hot gases. This type of boiler is used extensively for power purposes for various reasons, among which its greater safety is one of the most important. This is due to the division of the water into small masses, which tends to prevent serious results in case of rupture. Other advantages of this particular form of construction are, the large proportion of heating surface exposed directly to the fire, which results in an increased transmission of heat and a more rapid circulation of water, ample draft area, and a slower movement of the gases over the tubes. As to efficiency, there is probably very little difference between the two types when equally well designed and cared for. In city buildings, and others where there are many occupants, the water-tube boiler is usually preferred for power work on account of its greater safety at higher pressures. There are many different forms of water-tube boilers designed to meet almost any requirement as to floor space and height for a given power. Much valuable data relating to capacity, dimensions, settings, etc., will be found in the catalogues of the various manufacturers.

Steam Engines. Steam engines are classified partly according to their mechanical construction and partly with reference to speed. The high-speed single-valve engine and the medium-speed four-valve engine are the types most frequently used for isolated plants. High-speed engines have come into general use for driving electric generators on account of the desirability of connecting the generator directly with the shaft of the engine. The moderate-speed engine is more economical in the use of steam, and may also be direct-connected to a generator of suitable design.

The principal waste in an engine is due to cylinder condensation, and where steam economy is of great importance this may be overcome, to some extent, by the use of multiple expansion engines. In a *simple* engine, the total expansion takes place in a single cylinder, while in a *compound* engine two cylinders are employed, so arranged that the steam first enters the high-pressure cylinder, expands a certain amount, and then exhausts into the low-pressure cylinder where expansion is completed.

Compound engines are of two general forms, the *tandem* and *cross-compound*.

In the former, both pistons are placed upon the same rod, with the axes of the cylinders in line. Only one set of reciprocating parts is required, and except for the two cylinders, the appearance is the same as that of a simple engine. Cross-compound engines are made up of two complete machines, except for the main shaft and fly wheel, which are common to both. One advantage which this form has over the simple and tandem engines is that the cranks may be set at ninety degrees from each other so that there is no "dead center." The cross-compound engine is more expensive to make and requires a larger floor space than the tandem engine, hence it is not so well adapted to the isolated plant as the latter. In triple-expansion engines the steam is expanded in three stages instead of two. Three cylinders are usually employed, the high, intermediate, and low, with the cranks one hundred and twenty degrees apart. Engines are made both vertical and horizontal in form. While the former requires less floor space than the latter, it is more difficult to balance the reciprocating parts, and the horizontal type is usually preferred for high-speed work on this account. The selection of an engine for any particular location depends upon the conditions under which it is to operate. For sizes under 100 horse power, and for larger sizes where the exhaust is to be utilized for heating, the simple non-condensing engine operating under a pressure of 80 to 90 pounds is generally used.

The best type as regards speed depends much upon the available room. In office buildings and similar locations where floor space is valuable, the high-speed engine is used almost exclusively. For central lighting plants in connection with public institutions, where floor space is not so limited, the moderate-speed engine is a good type. When all of the exhaust can be utilized for heating purposes there is of course no advantage in installing a high-priced engine for the sake of economy in steam consumption, but if conditions are such that only a comparatively small part of the exhaust can be used, or if the heating season is short, it may be an advantage to install compound engines, at an increased cost of perhaps thirty per cent over that of simple engines. The steam consumption in the case of high-speed, non-condensing engines at full load is from twenty to thirty per cent less for the compound type, while the increase in fuel consumption required to raise the boiler pressure from 80 to 125 pounds is only about one per cent. In order to secure satisfactory results with a compound engine it should always be operated within its economical range, which is from fifty per cent load to full load, and under a steam pressure of 100 to 125 pounds.

Steam Turbine. Steam turbines are of two general types, the *impulse* and *reaction*. Practically all of those built in the smaller sizes for isolated plant work are of the former type, in which the steam is blown in jets against the vanes of a revolving wheel. Turbines are especially adapted to the driving of electric generators and centrifugal pumps, and are also used to some extent in connection with ventilating fans. The conditions under which they are used are practically the same as for reciprocating engines.

Gasolene Engines. As previously stated, these are particularly adapted to cases where power only is required, and where it is desired to simplify the equipment as much as possible.

A general idea of the different types of both turbines and gasolene engines can best be obtained from a study of the catalogues of some of the best makes.

Condensers. Condensers are of two general types, the *surface* condenser, where the exhaust steam is condensed by contact with a series of tubes through which cold water is forced, and the *jet* condenser where the steam mingles with the water and is condensed by direct contact. Condensers are not used in connection with combined power and heating plants, except in some cases during the summer, where condensing water can be obtained from a near-by river or water front free of cost, except for pumping. In large central stations condensing equipment is always provided. The weight of condensing water required in connection with reciprocating engines is about thirty times the weight of steam condensed for a jet condenser and thirty-five times for a surface condenser.

Feed-Water Heaters. A feed-water heater should form part of every power plant equipment, no matter how small, for use at such times as the steam from the engine is exhausted outboard, as by this arrangement about one-seventh of the heat contained in the exhaust may be saved. Furthermore, it will add to the life of the boilers if the water is heated before being fed into them. In the winter season, when the exhaust is used in the general heating system, the feed-water heater may be cut out of service and the make-up water fed into the receiving tank with the condensation from the radiation. Feed-water heaters are of two forms, the *open* and *closed*. In the first of these the water and steam mingle in a common chamber, which also serves as a receiving tank for the return of condensation from the heating system. In the closed heater the steam and water are separated the same as in a surface condenser. There is no particular difference in the efficiency of the two types, but the open heater has the advantage of acting also as a purifier where the water contains certain scale-forming salts of lime and magnesia.

Feed Pumps and Injectors. The boilers are commonly fed by means of a direct-acting steam pump, supplemented by an injector for use in case of accident or repairs to the pump.

Boiler feed pumps are of the *piston*, *inside plunger*, and *outside packed plunger* types. The first of these is commonly used where the water is free from grit, the second where it is liable to be slightly gritty, and the third where conditions are such that there is likely to be considerable wear, making it necessary to pack the plunger at frequent intervals. With the latter type, this can be done without dismantling the pump. In the case of heating systems, automatic governors are used which start and operate the pump as condensation accumulates in the receiving tank.

Special Apparatus. Steam separators should be provided in the supply pipe to each engine for removing the entrained water from the steam before it enters the cylinder. Oil separators should also be placed in all exhaust lines leading to the heating system in order to prevent cylinder oil from the engine being returned to the boilers with the condensation.

In exhaust heating systems the maximum pressure should be limited by a back-pressure valve placed in the outboard exhaust pipe. This is a special form of relief valve which may be set to open when the desired pressure is reached and discharge the surplus exhaust outboard. On the other hand, a live steam connection should be made with the heating main, the same being provided with a pressure reducing valve, which opens and admits live steam to the system whenever the exhaust proves insufficient to supply the needs for heating purposes. These two valves work in connection with each other to maintain a supply of steam within the heating system which shall automatically meet the varying demands at a constant pressure. Separators are so constructed that they may be connected into either vertical or horizontal pipes, as most convenient. They are drained by traps which discharge the condensation from the steam separators into the receiving tank, from which it is returned to the boilers, while the drip from the oil separator is turned into the sewer.

Both back-pressure and reducing valves are adjustable, although the latter are limited in range; for this reason, when specifying a valve, the initial and final pressures should be stated so that it may be equipped with the proper springs or weights for the special conditions under which it is to work.

Steam traps for drainage purposes are made for both high- and low-pressure work, and the conditions under which they are to operate should always be specified, as a smaller discharge valve is employed when used under high pressure. Water-line traps, so called, are employed in combined power and heating plants where it is desired to seal the main return pipes with water. In the case of a low-pressure system, where the condensation is returned by gravity, this is done by carrying the pipes below the water line of the boiler; but with high-pressure boilers, this is impossible, and the water must be raised in the returns by means of a special form of trap. While the subject of ventilation in general is not included in the present series of articles, a word should be said regarding equipment for the ventilation of the boiler and engine rooms. It is customary in the case of boiler rooms to blow in cool outside air, discharging the same downward in front of the boilers through galvanized iron pipes with flaring outlets. Discharge ventilation is largely through the furnaces, as a considerable proportion of the air thus supplied is needed for combustion.

Engine room ventilation may be partly by the exhaust method, if means are provided for the entrance of cool fresh air to replace that which has been removed. Centrifugal fans driven by direct-connected motors are commonly used for this class of work.

Cost of Equipment. The cost of power-plant equipment will, of course, vary considerably under different conditions, but may be approximately estimated by use of the following table.

TABLE VI.

Kind of Equipment.	Cost Installed.	
Horizontal Tubular Boilers	$10–$12	per B.H.P.
Water-Tube Boilers	12– 15	,, ,,
High-Speed Simple Steam Engines	12– 15	,, I.H.P.
Medium-Speed Compound Engines	17– 21	,, ,,
Gas Engines	30– 36	,, ,,
Oil Engines	45– 50	,, ,,
Dynamos — Direct-Connected	13– 16	,, Kw.
Switchboard	5– 10	,, ,,
Foundations	5– 10	,, ,,
Steam Fitting, including Auxiliary Apparatus, such as Feed-Water Heater, Separators, Exhaust Head, Tanks, Pumps, etc.	15– 18	,, I.H.P.

Tables of this kind usually give the cost of all equipment in kilowatts. This is convenient for plants generating electricity only, but for the combined power and heating plants, and where power is required for other purposes, such as refrigeration, etc., the cost per horse power is also convenient.

Plant Design. There are two general conditions under which isolated power plants are installed. The first of these being where the location is remote from a central electric station, so that it must be provided anyway, regardless of competition or of its relation to the heating system.

The second condition relates to cases where the building, or group of buildings, is in a territory served by a central station, and where there is a question as to whether it will be more economical to purchase electric current from the local company or generate it on the premises. The desirability of the latter method will depend largely upon the relation of the exhaust steam to that required for the various heating purposes, and also upon the amount of exhaust which may be utilized in this way. Although there may be sufficient exhaust steam in the course of twenty-four hours to do all, or a considerable portion, of the heating, if it be produced within a period of a few hours so that a large part of it must be thrown away, it is evident that the advantage will be much less than when the hourly balance of supply and demand is more nearly equal. In computing cost of operation, the *available* exhaust from the power plant is simply that which can be utilized as fast as it is discharged from the engines, for it is not possible in practice to store it for future use.

In order to determine the available exhaust in any particular case, make out a table like the following, which will show the relations between steam supply and demand for each hour in the day.

TABLE VII.

1	2	3	4	5	6	7
Hour of the day.	I.H.P. of engine.	Total exhaust, pounds per hr.	Steam required for heating, pounds per hr.	Available exhaust, pounds per hr.	Exhaust wasted, pounds per hr.	Live steam required, pounds per hr.
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In the above, column No. 1 gives the hour of the day, column No. 2 the indicated horse power of the engine necessary to produce the average power required during that hour. This is obtained approximately by estimating the lights and motors in use and reducing electrical energy to indicated horse power at the engine, as described in a previous article. The quantities in column No. 3 are found by multiplying the corresponding horse powers in column No. 2 by the water-rate of the engine and taking eighty per cent of the result. Column No. 4 gives the total amount of low-pressure steam required for all heating purposes during this hour, including the warming of building, ventilation, hot-water heating, etc. Column No. 5 shows what part of the exhaust may be utilized for heating purposes. If No. 3 is greater than No. 4, place the difference in column No. 6 ; and if it is smaller, place the difference in column No. 7.

The most difficult quantities to estimate are those in column No. 4, as the steam required for both heating and ventilating changes with the outside temperature, which varies from day to day and from hour to hour throughout the heating season. For ordinary work a table like the above should be prepared for an *average day* representing each month of the year. This may be made up by consulting the weather charts for two or three years back, and giving to each average day the average temperature of the month for which it stands, as obtained from the weather charts. Actually the temperature will vary from hour to hour, but it will be sufficiently accurate for ordinary work to assume a constant temperature throughout the day. The methods given for computing the weight of steam for heating and ventilation are based on an outside temperature of zero. It is evident that as the temperature rises the steam requirements will become less. Theoretically, the heat loss from a building is proportional to the difference between the inside and outside temperatures. If the amount of heat given off by the radiators could be regulated to exactly balance the heat loss from the building, it would be a simple matter to estimate the weight of steam required. In practice, however, it is not possible to do this, as the regulation in different buildings will vary from keeping steam on the radiators and opening the windows, to one of the more or less efficient systems of automatic temperature control. Table VIII has been prepared for different systems for varying outside temperatures, and will be found useful in approximating the steam required for different seasons of the year. To use, first compute the weight of steam required for zero weather by the methods given, and multiply the result by the factor in Table VIII corresponding to the outside temperature and type of system used. The factors under column "A" are for the ordinary low-pressure gravity system; "B" for a vacuum system; "C" for a forced hot-water system; and "D" for a system provided with automatic temperature regulation, either steam or hot water.

TABLE VIII.

Outside Temperature.	A	Factors. B	C	D
0°	1.00	1.00	1.00	1.00
5°	.97	.95	.94	.93
10°	.94	.91	.89	.86
15°	.92	.87	.83	.79
20°	.89	.83	.77	.72
25°	.86	.79	.72	.65
30	.83	.75	.66	.57
35°	.80	.70	.60	.50
40°	.77	.66	.54	.43
45°	.74	.62	.49	.36
50	.71	.57	.43	.29
55°	.68	.53	.37	.21
60°	.66	.49	.31	.14
65°	.63	.44	.25	.07
70	.60	.40	.20	.00

Example. If a building contains 5,000 square feet of direct steam radiation, not provided with means for automatic temperature regulation, the following amount of steam will be required per hour for different outside temperatures, as shown below:

Outside Temp.	Steam per Hour.
0°	5000 × .2 × 1.0 = 1,000 lbs.
10°	5000 × .2 × .94 = 900 ,,
20°	5000 × .2 × .89 = 890 ,,
30°	5000 × .2 × .83 = 830 ,,
40°	5000 × .2 × .77 = 770 ,,
50°	5000 × .2 × .71 = 710 ,,
60°	5000 × .2 × .66 = 660 ,,

The factors in Table VIII are based on the assumption that when the outside temperature is at zero, all of the radiation will be in use, and when it reaches seventy degrees above zero, sixty per cent of the radiation in the direct gravity system will still be turned on; and in like manner, forty per cent in the vacuum system, and twenty per cent in the forced hot-water system. When automatic control is used, all radiators will be shut off at seventy degrees. These factors, except in column "D," will of course vary somewhat according to the care given to temperature regulation by the inmates of the building, but under average conditions will not be far from the figures given in the table.

The assumption that the temperature will remain constant throughout the "average day" will not of course be fulfilled under actual conditions, as it will vary from hour to hour according to the amount of sun and wind, and also with general changes of the weather. However, when the average weather of the entire month is taken into account it will be sufficiently accurate for all practical purposes to assume a constant temperature throughout the twenty-four hours.

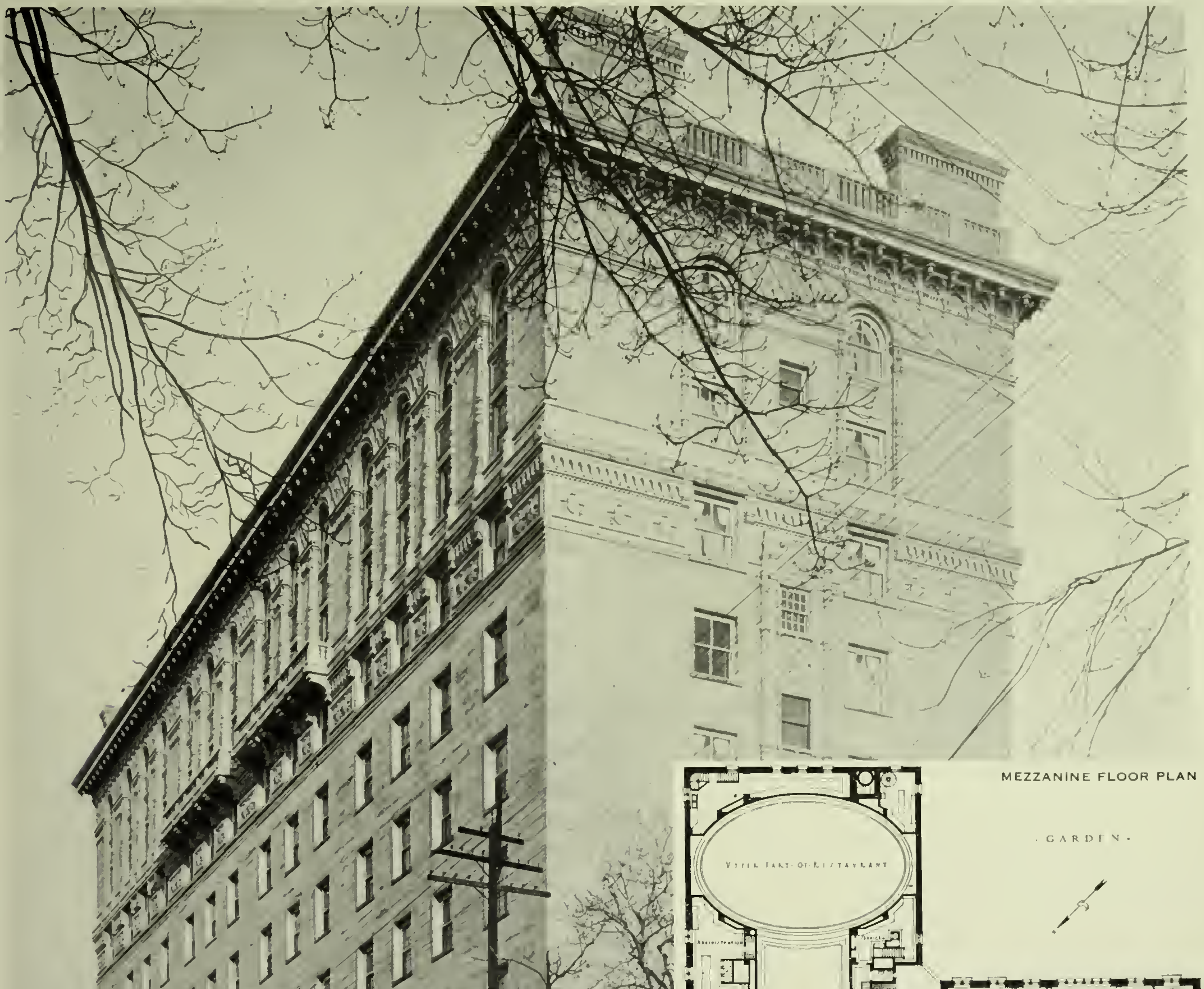
In estimating the exhaust steam at different parts of the day, each item for which power is required must be taken up separately, and the time and amount considered together. For example: a refrigerating machine runs continuously, while motors for operating ventilating fans, elevators, etc., run only at certain hours of the day. The period for lighting varies both in length and time of day with the season, and must be estimated accordingly when computing the power required at different hours of the day. Also a certain allowance must be made for cloudy weather and for lights which are burned all day, when making up the total.

When making an estimate for comparing with central station rates, reduce all electric current required for different purposes, to kilowatt hours, for a year, and then compute the additional cost over that for heating alone, taking into account interest, taxes, depreciation, etc., on first cost of the power equipment, also additional fuel cost, miscellaneous supplies, repairs, and extra labor. From this data the average cost per kilowatt hour for the year may be found for comparison with the central station rates for the same service.

Mr. Hubbard will continue his paper in the April number. "Details of Design" will be discussed and followed by a paper on "Water Supply by Mechanical Means." — *The Editors.*

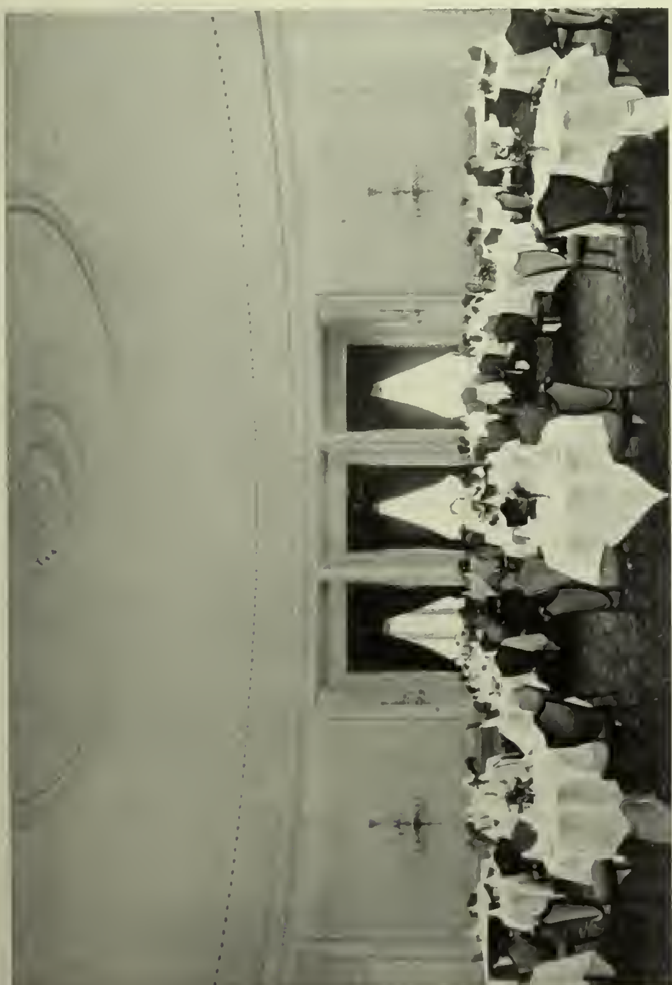
PALAZZO TACCONI, BOLOGNA, ITALY.

See page 38, February Number, for Measured Drawing.



THE RITZ-CARLTON HOTEL, MONTREAL, CANADA
WARREN & WETMORE, ARCHITECTS

DETAIL OF BALL ROOM

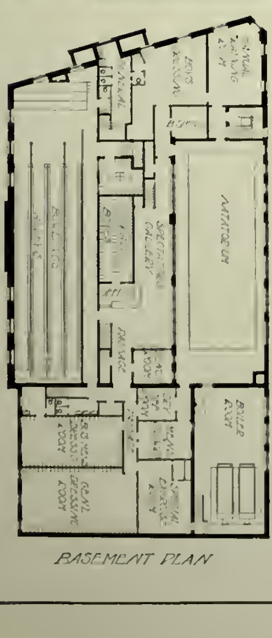


MAIN DINING ROOM

ENTRANCE FOYER

THE RITZ-CARLTON HOTEL, MONTREAL, CANADA

WARREN & WETMORE, ARCHITECTS



BASEMENT PLAN

Y. M. C. A.
BUILDING

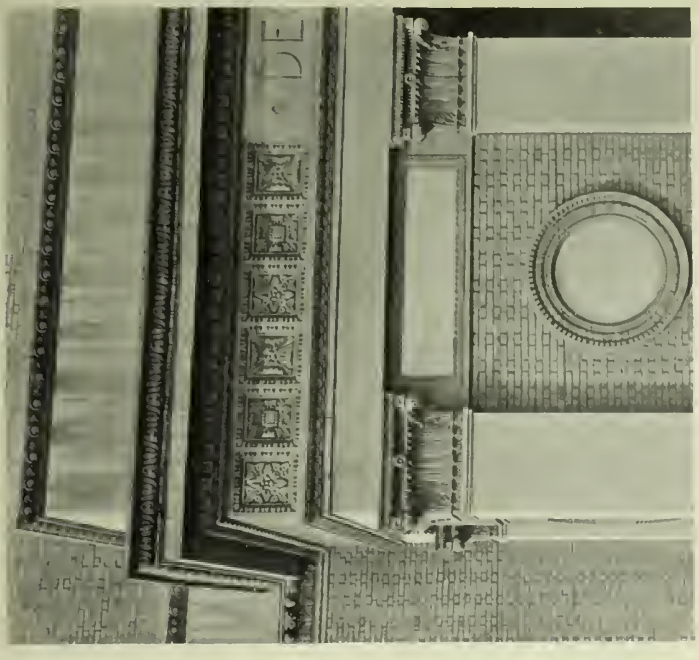
LAWRENCE.
MASS.

BRAINERD & LEEDS
AND
O A THAYER

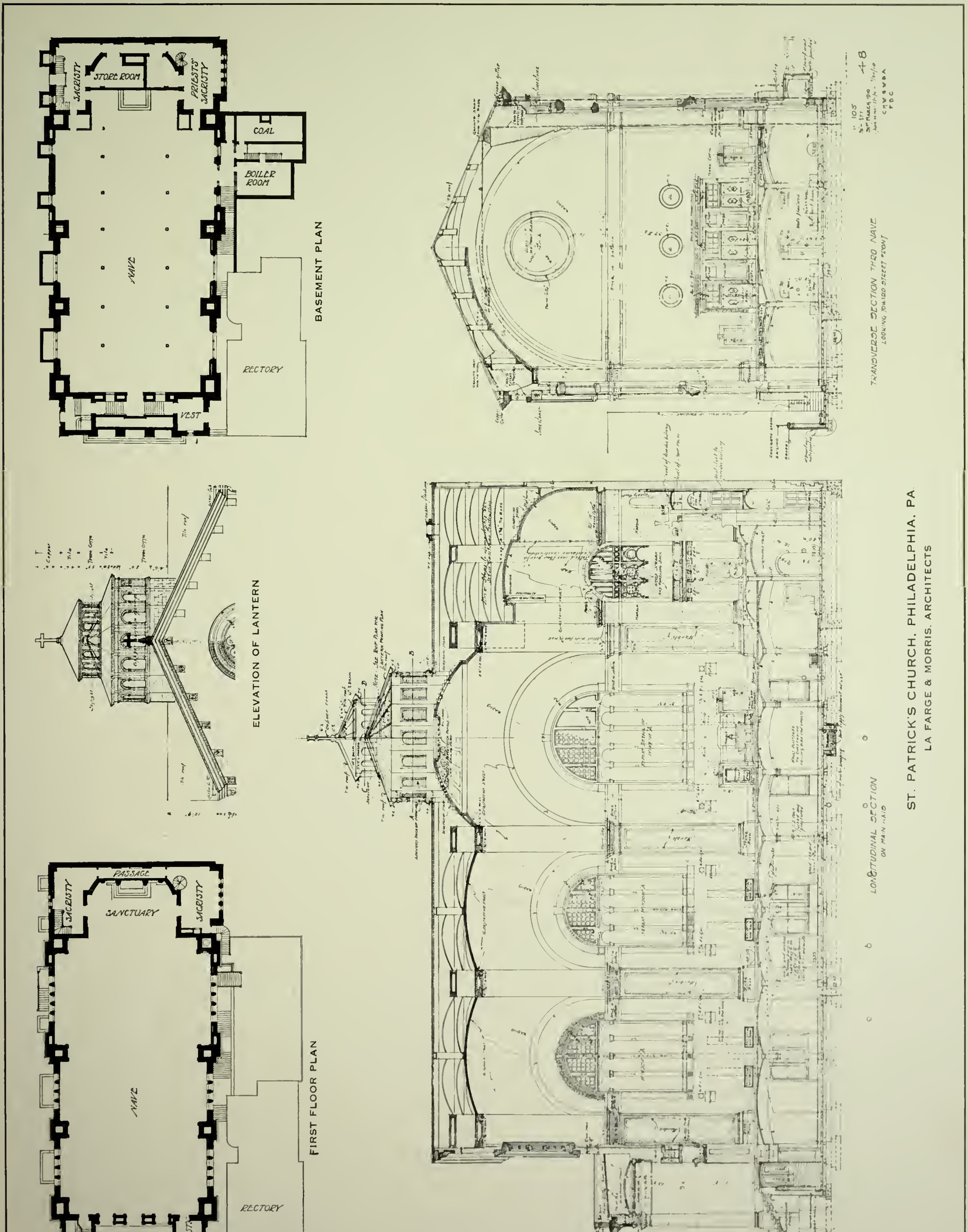
ARCHITECTS

THIRD & FOURTH FLOOR PLANS

Y. M. C. A. BUILDING, LAWRENCE, MASS.
BRAINERD & LEEDS AND O A THAYER ARCHITECTS



ST. PATRICK'S CHURCH, PHILADELPHIA, PA.
LA FARGE & MORRIS, ARCHITECTS



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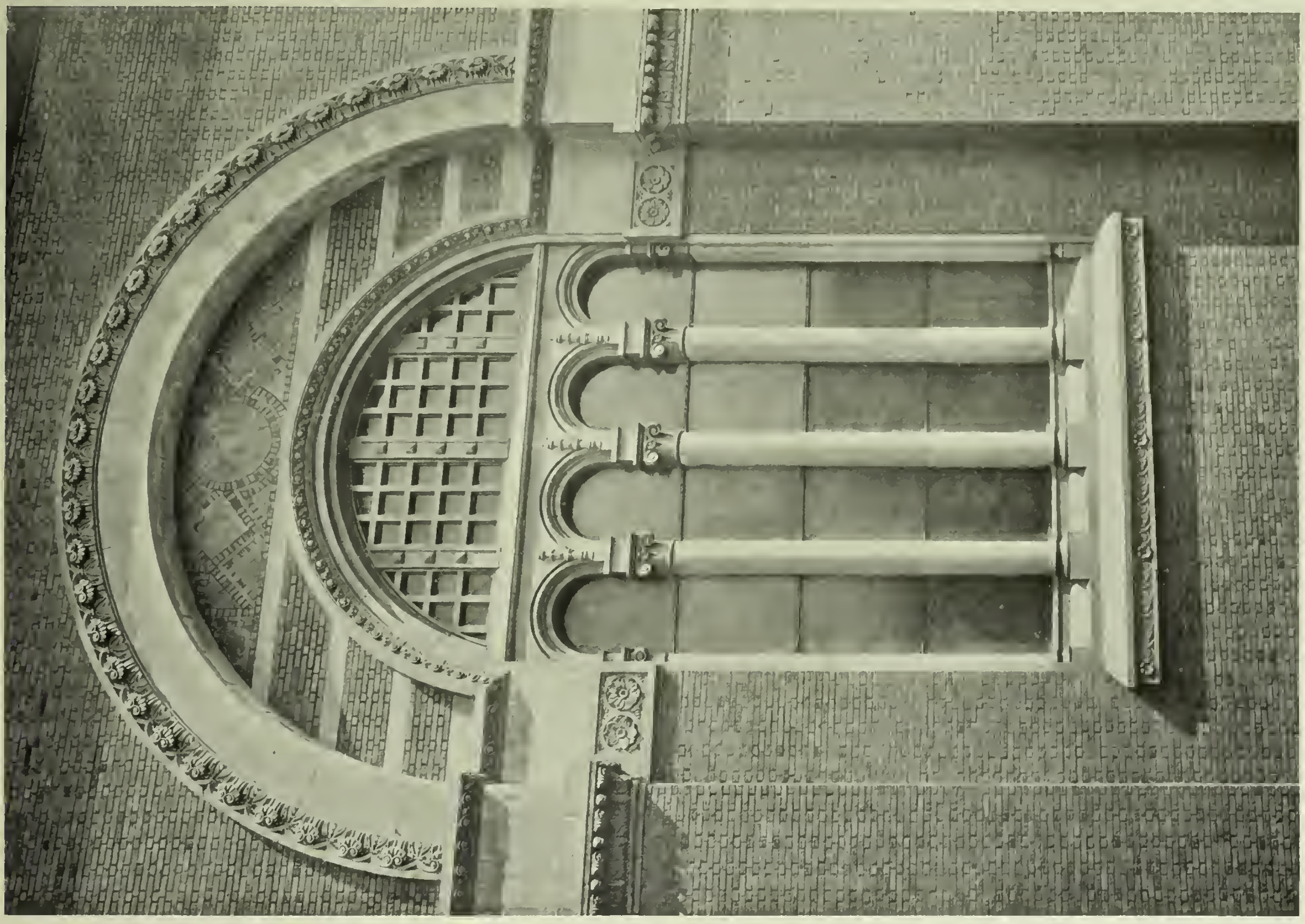
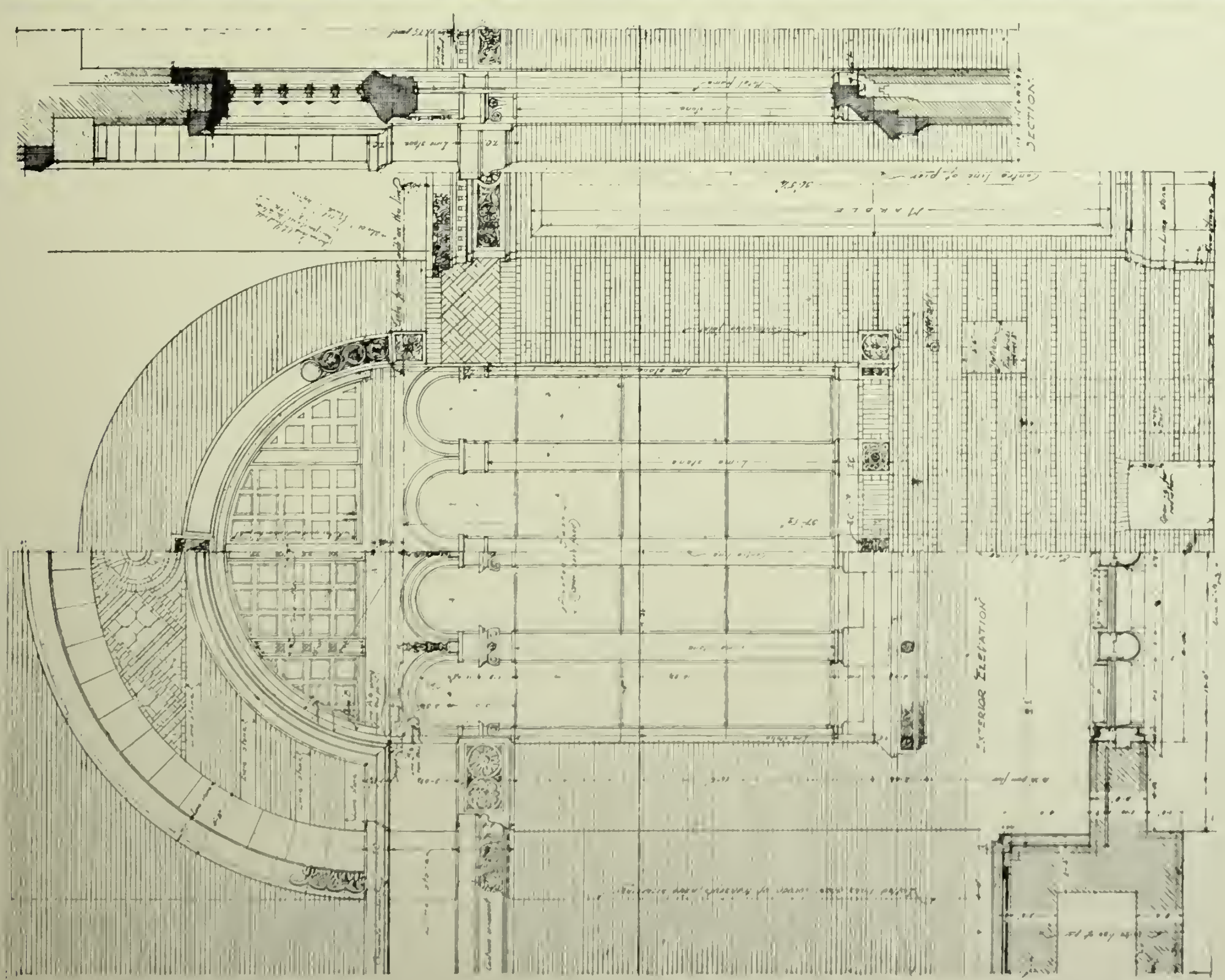
LA FARGE & MORRIS, ARCHITECTS



DETAIL—WINDOW IN NAVE

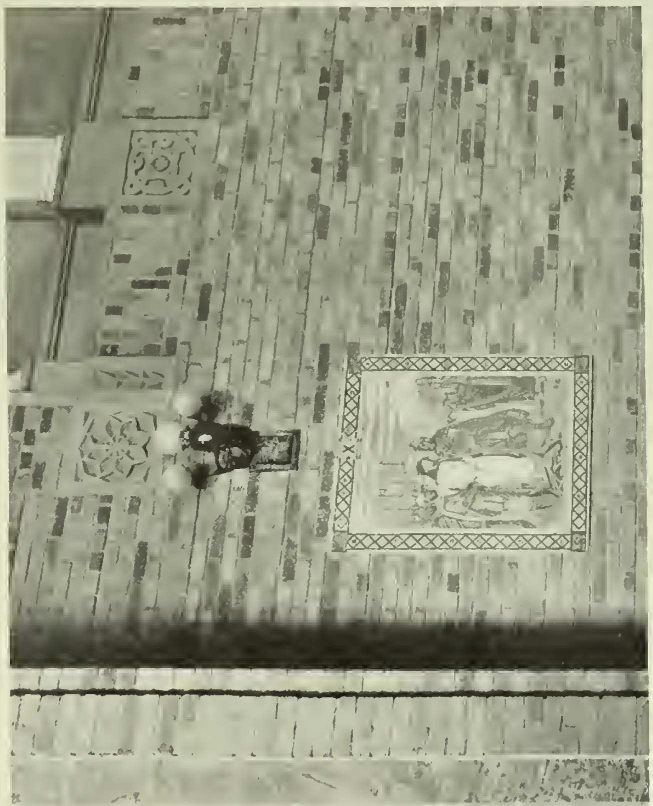


WORKING DRAWING—DETAIL OF WINDOW IN NAVE

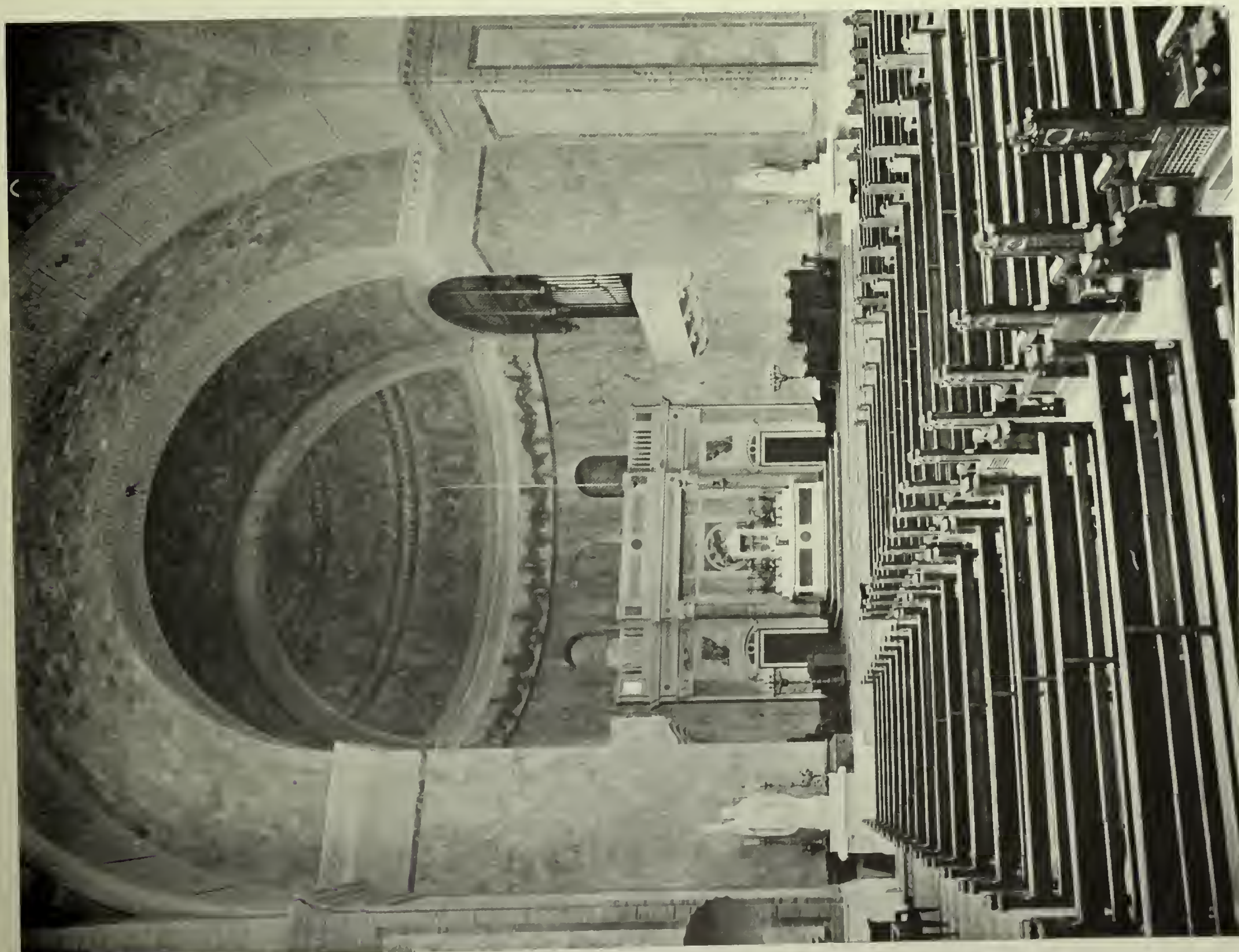
ST. PATRICK'S CHURCH, PHILADELPHIA, PA.

LA FARGE & MORRIS, ARCHITECTS

LOOKING TOWARDS REAR



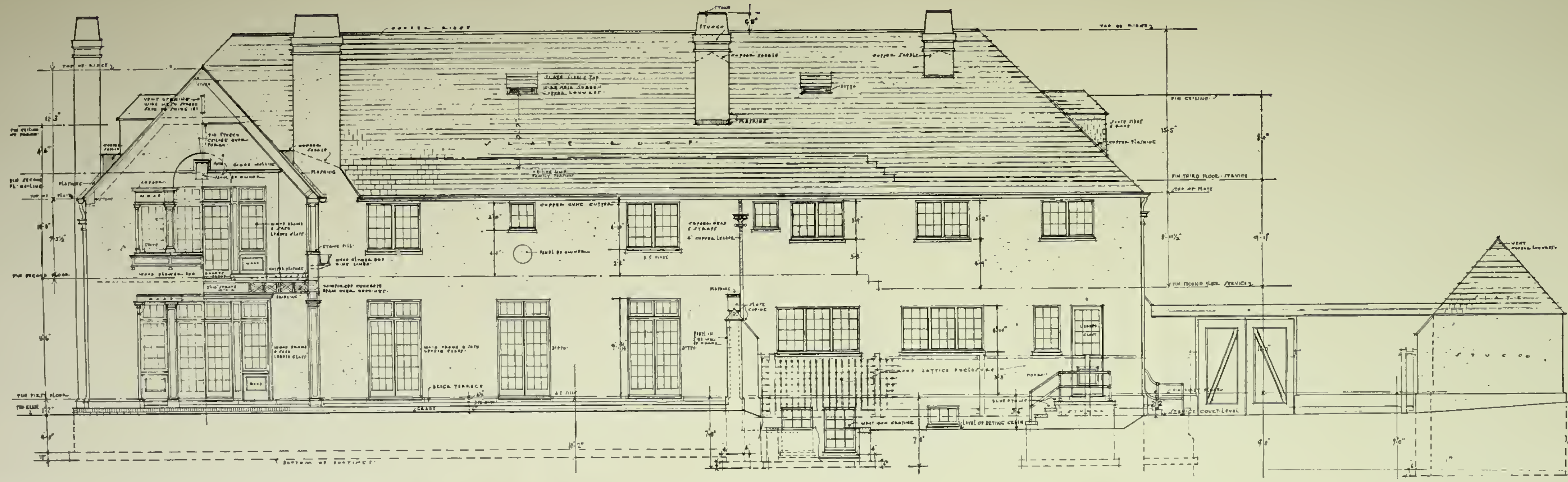
SIDE WALL TREATMENT



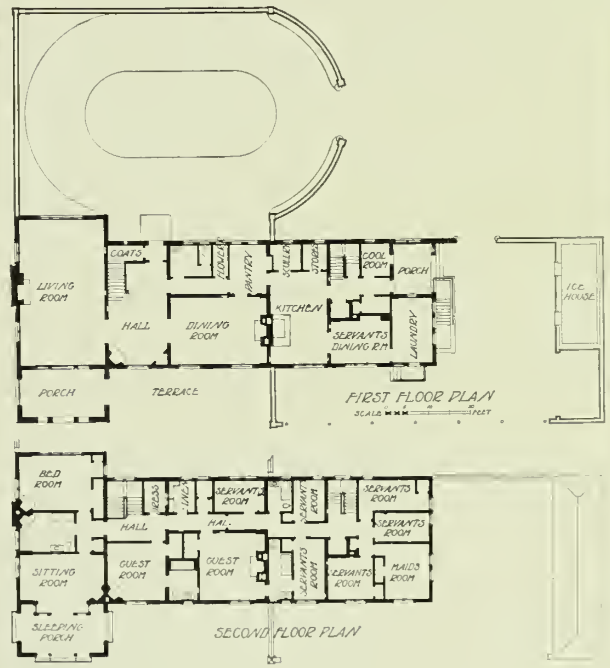
ST. PATRICK'S CHURCH, PHILADELPHIA, PA.
LA FARGE & MORRIS, ARCHITECTS

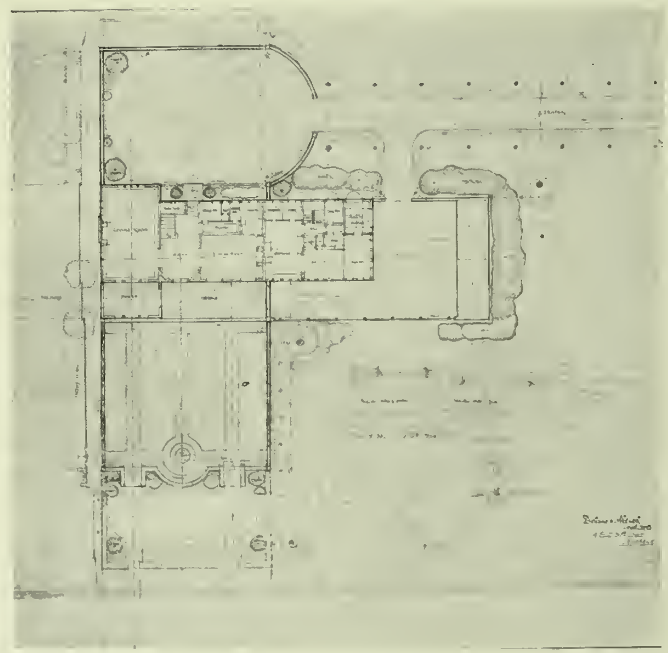
HOUSE AT BERNARDSVILLE, NEW JERSEY
EXTERIOR WALLS OF TERRA COTTA HOLLOW TILE
DELANO & ALDRICH, ARCHITECTS

HOUSE AT BERNARDSVILLE, NEW JERSEY
EXTERIOR WALLS OF TERRA COTTA HOLLOW TILE
DELANO & ALDRICH, ARCHITECTS



GARDEN ELEVATION





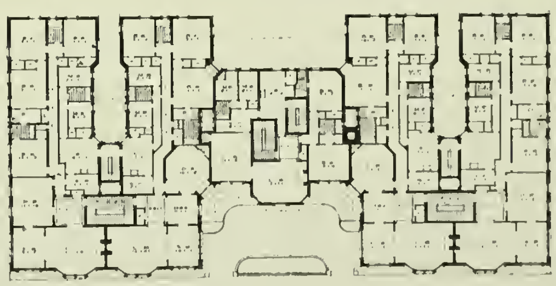
HOUSE AT BERNARDSVILLE, NEW JERSEY
EXTERIOR WALLS OF TERRA COTTA HOLLOW TILE
DELANO AND ALDRICH, ARCHITECTS


ENTRANCE COURT

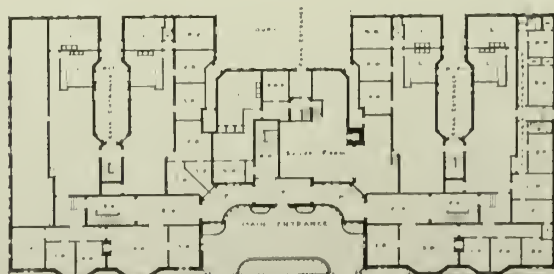

FOYER

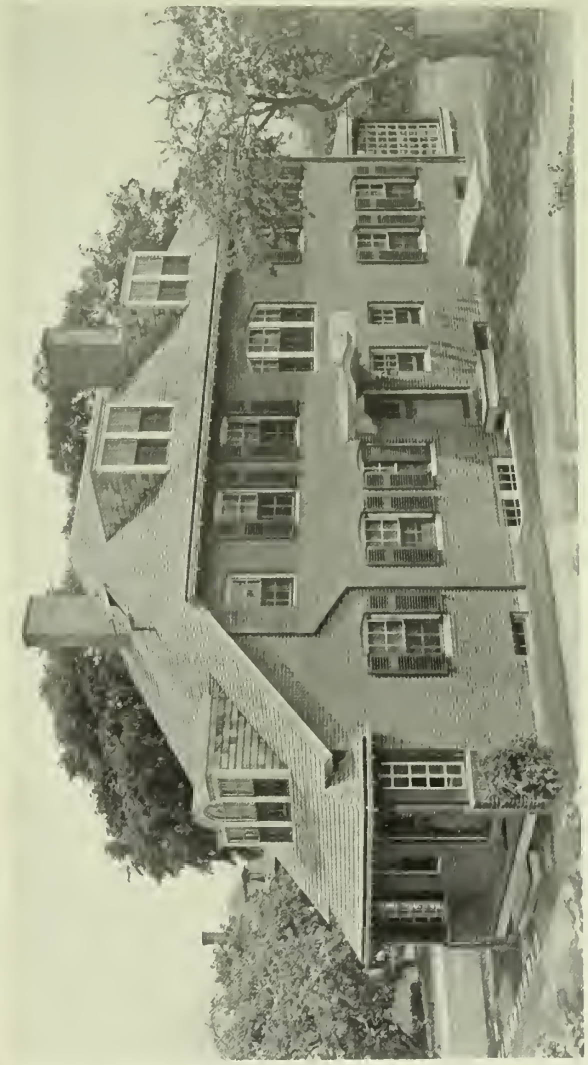

ENTRANCE DETAIL

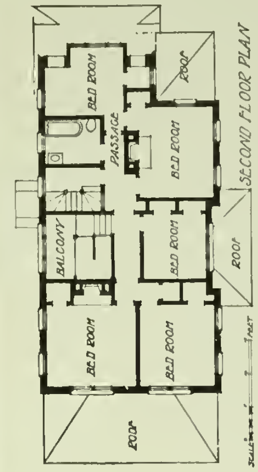
APARTMENT
AT
CHICAGO, ILL.


SECOND FLOOR PLAN

SCHMIDT, GARDEN
& MARTIN
ARCHITECTS

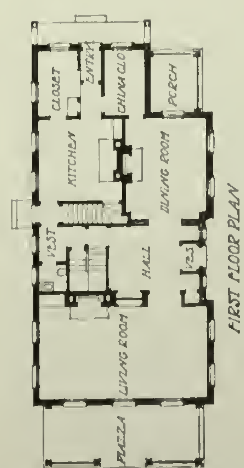

FIRST FLOOR PLAN





SECOND FLOOR PLAN

HOUSE AT ROWLEY, MASS.
FRANK CHOUTEAU BROWN
ARCHITECT

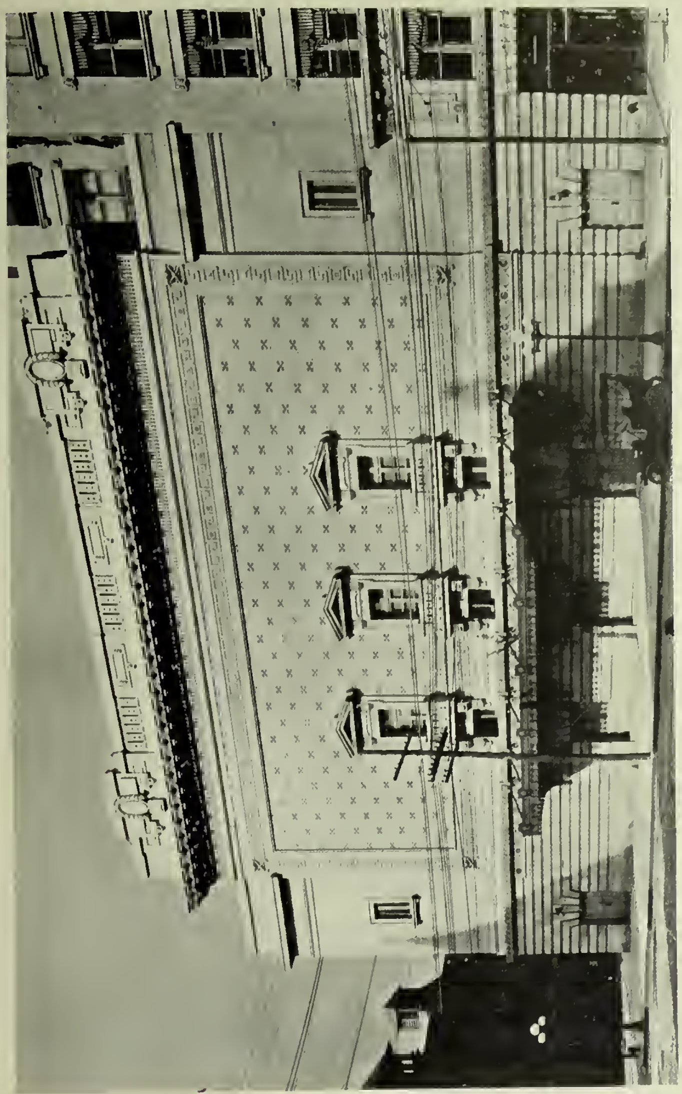


FIRST FLOOR PLAN

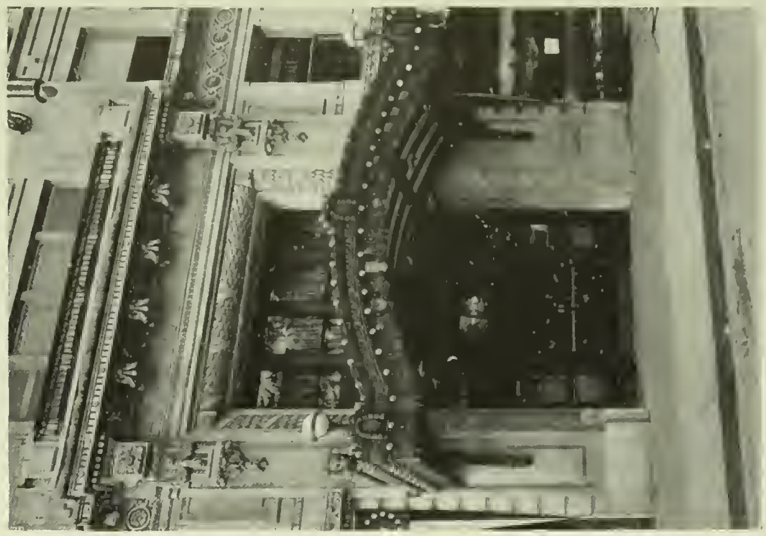
DETAIL OF SIDE ELEVATION

DETAIL OF REAR ENTRANCE

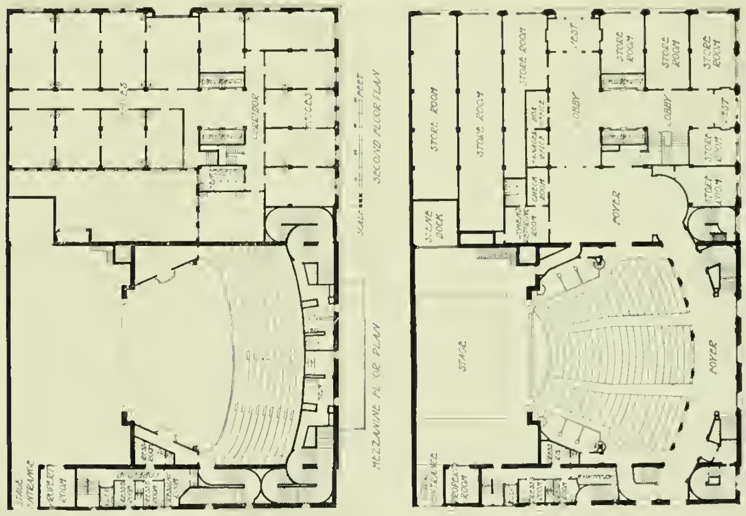
HOUSE AT ROWLEY, MASSACHUSETTS
FRANK CHOUTEAU BROWN, ARCHITECT

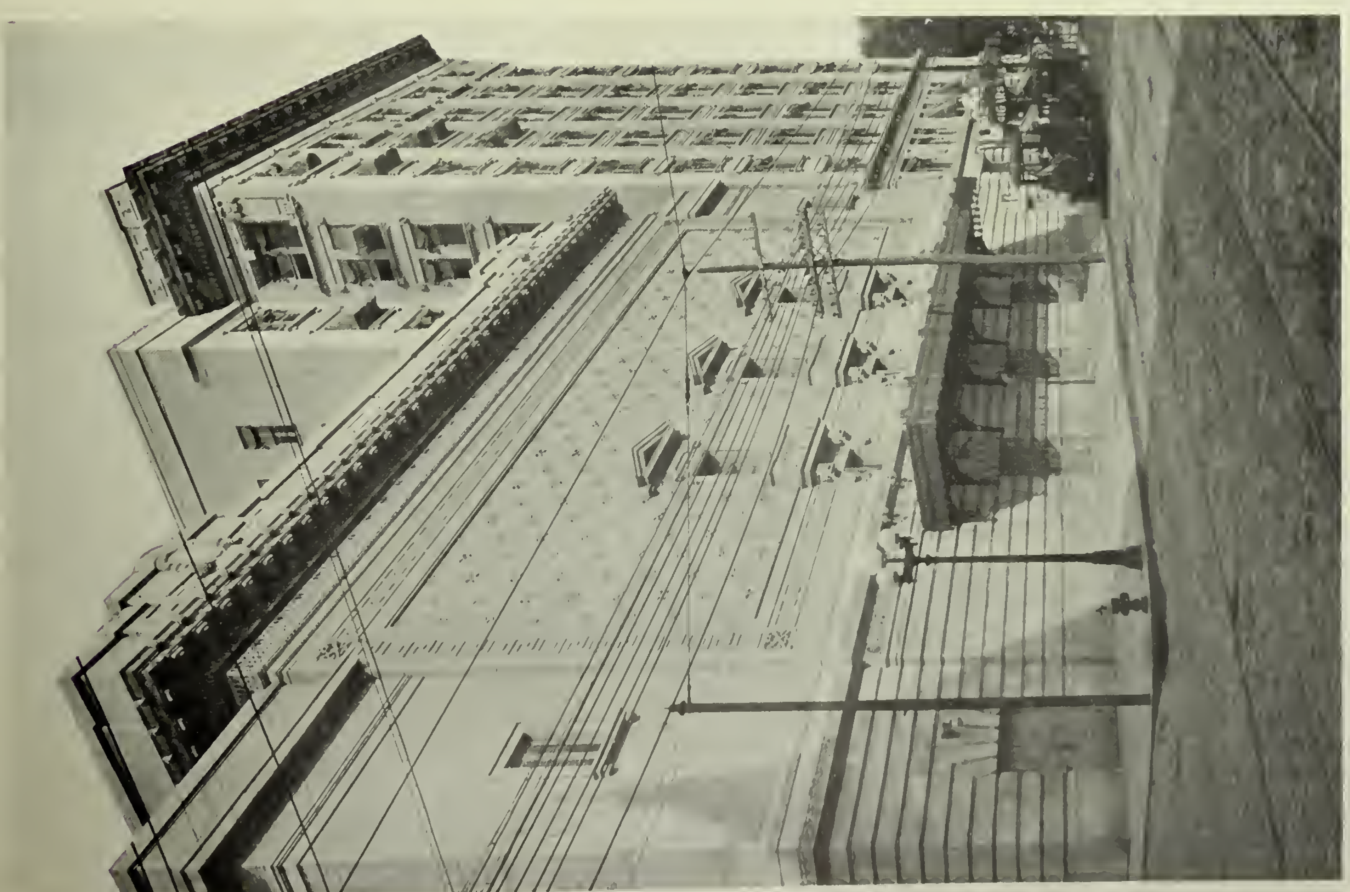


THEATRE FACADE



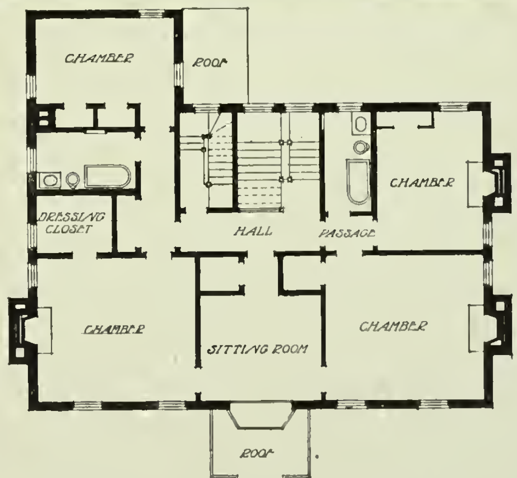
THEATRE AND BUILDING ENTRANCE



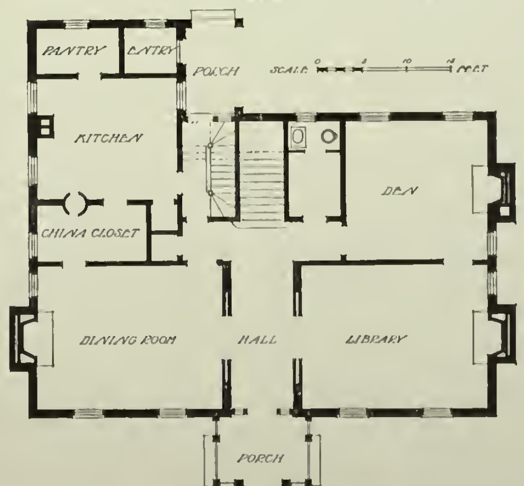


HARTMAN THEATRE AND OFFICE BUILDING, COLUMBUS, OHIO

RICHARDS, McCARTY & BULFORD, ARCHITECTS



SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE AT CHESTNUT HILL, MASS.
PAGE & FROTHINGHAM, ARCHITECTS

A Terra Cotta Grill Room.

THE CAFÉ OF THE NEW McALPIN HOTEL, NEW YORK CITY.

BY F. M. ANDREWS & CO., ARCHITECTS.

"WHERE in the world did you get that red?" asks one as he takes the small broken fragment of terra cotta held out to him. It was somewhat the tone of Egyptian jasper or of a color known as Chinese orange. "Why, it's the red of Abbey's Holy Grail. It is just the tone of the costumes he occasionally uses as the central accent of his canvases. It is astonishing what they are doing with terra cotta to-day!"

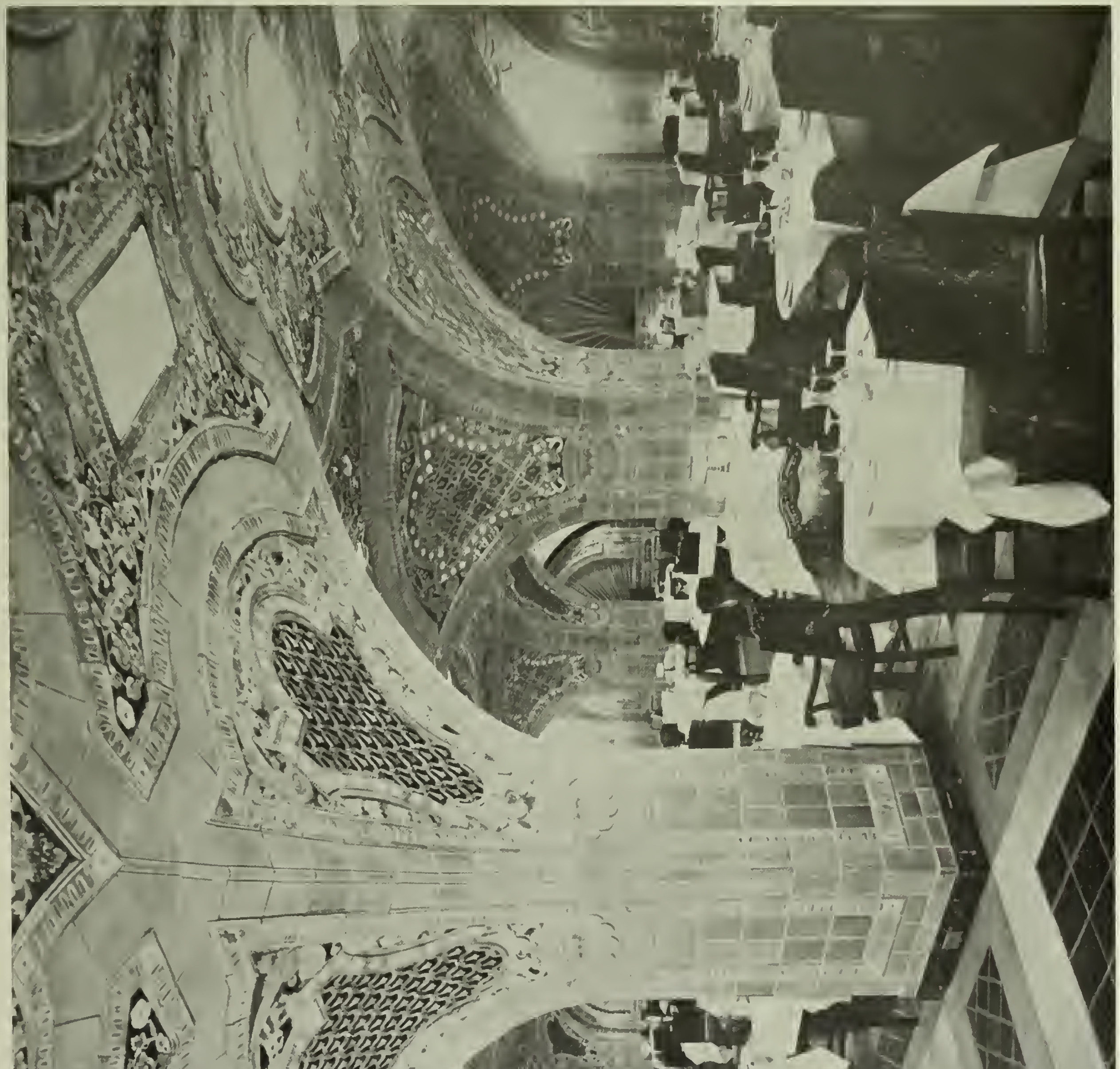
The exclamation was the outcome of a description of the Terra Cotta Grill Room of the new Hotel McAlpin, an architectural and decorative triumph of which much will doubtless be heard, as it is undoubtedly the first time that this interesting material has been used in the New World in just this particular manner. That is, it is here employed as an interior decoration, as an element of beauty, enriched, yet well able to take care of itself. It is the same as the material of the structure. In no way is it a thin sliver of clay, cemented to the under side of a brick or concrete arch. It is not a tile decoration, nor is it simply a slab in form and thickness. The sections are masonry in their size and character. To this the jointing also testifies. From start to finish the bold spirit of the mason dominates everywhere. A spirit that is omnipresent, softening and humanizing at times where condition demands.

The architect, in this assumption of the responsibility of adding in this particular way decorative ornament to the structure, has so adroitly conceived a motif of a refining nature as to make interesting every foot of the surface both of walling and vaulting. Even to the flooring, with its paneled pavement, has he assigned an important part of the scheme, so contriving it that it forms both in drawing and in color a substantial base for the composition. He has devised broad bands of countersunk ornament with rosettes and bosses at set intervals which panel the vault and the piers. Much of this is not only a tribute to the wondrously stimulating memories of Italy's sculpture wherein, cameo-like, ground and ornament vary but little in relief, but it speaks well for the color sense of the architect, who has so devised the floriated section of the ornament as to bring into the picture certain qualities somewhat unusual and very stimulating. Yet care has been exercised to treat the chamber as an entirety. The scheme throughout is big and wholesome in idea. It is broadly handled, very much after the fashion of the great Roman basilica, exhibiting everywhere a sensitive regard for color, form, growth of ornament, adjustment of accent and relation between pier and walling. The vaulting springs from square piers, which carry the building, forming two ranks through the chamber. It springs also from the walling. As a matter of fact, it is somewhat low in inches, but so skilfully is the paneling arranged that the apparent height is greatly increased. There is not any acknowledgment of the spring line, nor demarcation of the actual commencement of the vaulting. It appears to begin from the floor, — an ingeniously contrived illusion! The perpendicular paneling of the piers, the moulding of the corners, the arrangement of the jointing, the elongating of the principal panels which, cartouche like, occupy the most conspicuous part of the scheme, all tend to accent and stimulate the upward movement. This is all the more clever because, as a matter of fact, the chamber is long, and would be dreary but for skilfully devised lighting, wherein countersunk panels alternatingly circular and oblong appear in the central arch panel. The side lights are useful and so are the little personal table lights. Thanks to the shining linen, their light is thrown upward, a valuable illumination, which does serviceable work in a quiet way.

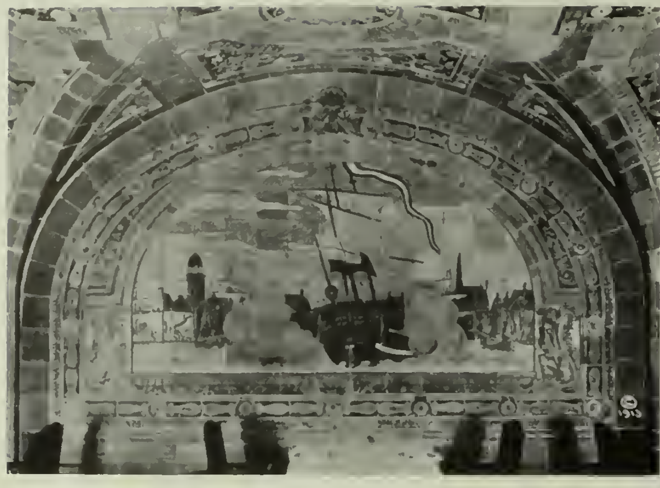
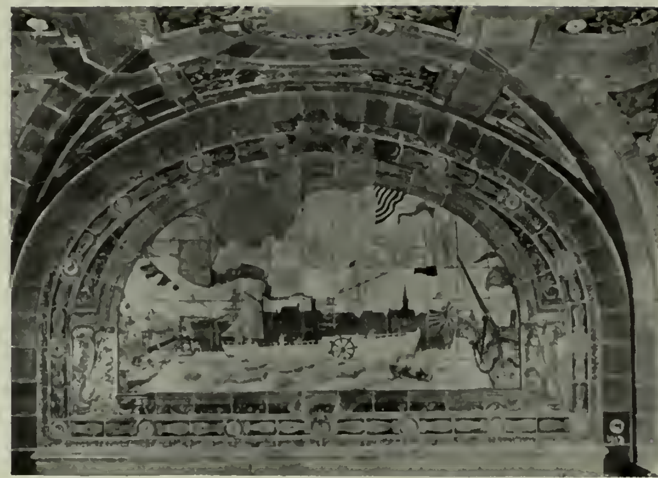
The shaping of the paneling is unquestionably the cleverest part of the composition. For a moment I am tempted to say it is the most important decorative section of the whole building. Of course the plain surfaces do much by accenting the bands and the ornament, giving an agreeable contrast, a play of light and of shade, and again introducing that subtle quality of scale. Although pre-eminently serious in idea, the ornament is full of energetic action at times. There is a movement in the leaves, stalks, tendrils, and flowers that is fascinating. They are tied here and there, caught back and restrained in their proper places. These little whimsicalities give to the sturdiness of the design an agreeable relaxation and chance for color. And here it is that the glorious red is to be found. It appears as the background to the ornament of all the main vaulting panels, as the ground of the conventional border to the narrative stories of the walling. It is the red of the scarlet geranium, of the japonica and the nasturtium, that trailing, pungent plant which madcap-like turns up everywhere in the garden, climbing the walls, setting everything on fire with its brilliancy. It is the red of the coral of the South Pacific Islands, of the lacquer of the Orient. It is the red of the sealing wax, that great vitalizer of important legal documents, and for many years the distinguishing color note of "Tommy Atkins"!

The general tone of the chamber is golden brown; perhaps it had better be termed "burned ivory." In certain lights it resembles somewhat the dull brown of "camel's hair," it is so sedate and serious. At times it is transparent, changing every few inches. It is an excellent tone to live with, one of which we rarely tire. It brings out vividly the whites and the apple greens and emerald of the rosettes which appear at the mitered intersections, cornering the panels, and of the shell-like ornaments which appear elsewhere. It gives new life to the open flowers in the main ornament. It is soft and soothing, adding mysteriously to the values of the distance, making possible the introduction of strong contrasts. See how welcome the black marble wainscoting and black iron gates and the rich red of the Welsh quarry pavement become in the scene.

TERRA COTTA PANEL — GRILL ROOM, MCALPIN HOTEL, NEW YORK CITY.
Fred. Dana Marsh, Designer.



TERRA COTTA GRILL ROOM — McALPIN HOTEL, NEW YORK CITY
F. M. ANDREWS & CO., ARCHITECTS

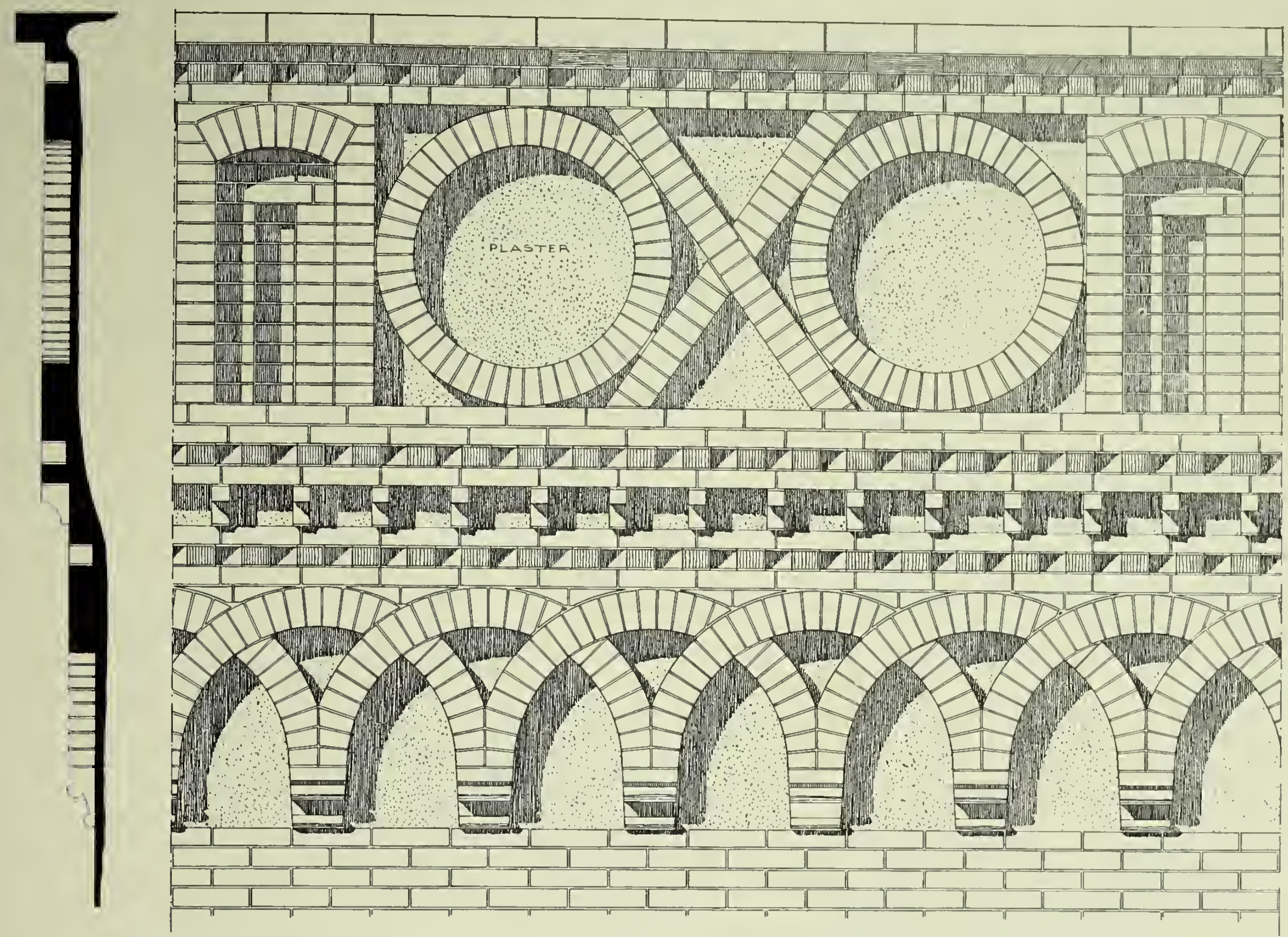
TERRA COTTA PANELS — GRILL ROOM, MCALPIN HOTEL, NEW YORK CITY.
Fred. Dana Marsh, Designer.

The narrative stories of the tympanum or lunette panels which appear at certain academic centers of the walling, one to each bay, invite individual notice. The panels were designed by Fred. Dana Marsh, and the close reproduction of water color tone values in faience is quite remarkable. In all, there are six stories of the maritime history of New York. There is the great story of the discovery of the Hudson River, where Hudson's *Half Moon* appears in the lower bay, the placid waters alive with canoes of native Indians. The quaint outline of the boat with its curious rigging is graphically illustrated by low coloring, by dark bottle greens and silver grays, transparent and occasionally iridescent. There is the British frigate firing upon New Amsterdam, and here the red of the ensign waves a momentary triumph! There is the pathetic tragedy of a hanging in the Old Fort. The river scene changes, and the majestic *Mauretania* is seen, dwarfing even the sky scrapers and blanketing the lower portion of the city; its hull and reflection a quaint symphony in greens shimmering upon the surface of the river; its upper cabins white and gray; the sky a transparent ochre; the funnels the wonderful red. Then follows a night scene of the *Commonwealth* leaving its dock, the searchlight vividly contrasting with the hazy outline of the city. The stately silhouette gives welcome scale to the picture. There is the occasion when Fulton's *Clermont* made her first voyage up the river.

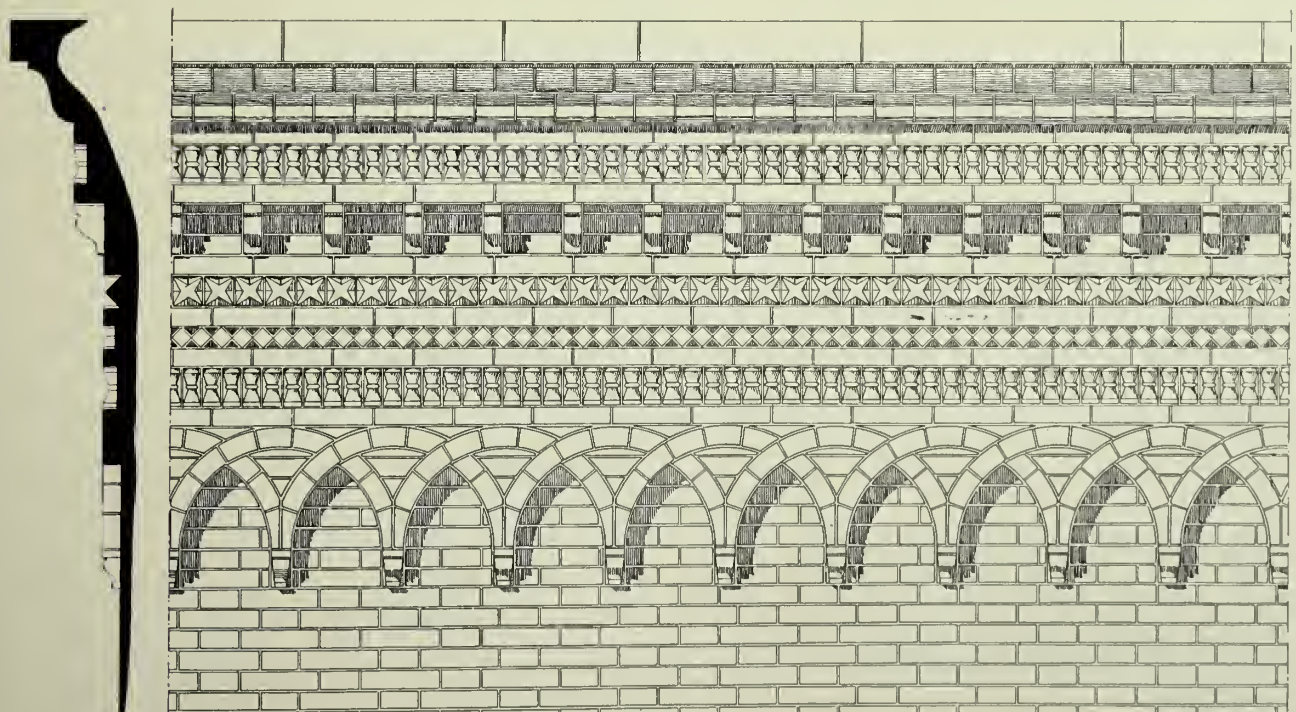
There is unusual individuality in the panels; an unaffected bubbling over of color in places; a certain modulating of surface, conventional, but natural at the same time. The full water color value is retained with the added value of a texture, neither lustrous nor dull, that has a warmth and light possible only in faience.

The craftsman of the sleepy Orient, for years familiar with many mysteries, once in a while produced small vases, purchasable at great prices. They are classed among the "Lost Arts," and generally of paste or porcelain body.

But for the stimulating enthusiasm of the architect, and his persistency with an unusual form of treatment, both as regards structure and color, these metal-bearing clays might still be sleeping in the deep bosom of Mother Earth, in the clay beds of a neighboring state. Innate love of color, applied to decorative motifs, after the fashion of the Italian sculptors Donatello and the Della Robbias, led to experimenting, and finally produced a building material of unprecedented amenability to the most critical taste for texture and color, adapted to the inclemency of weather, and without limitation as to size, shape, or proportion, yet sensitive to the most delicate modeling.



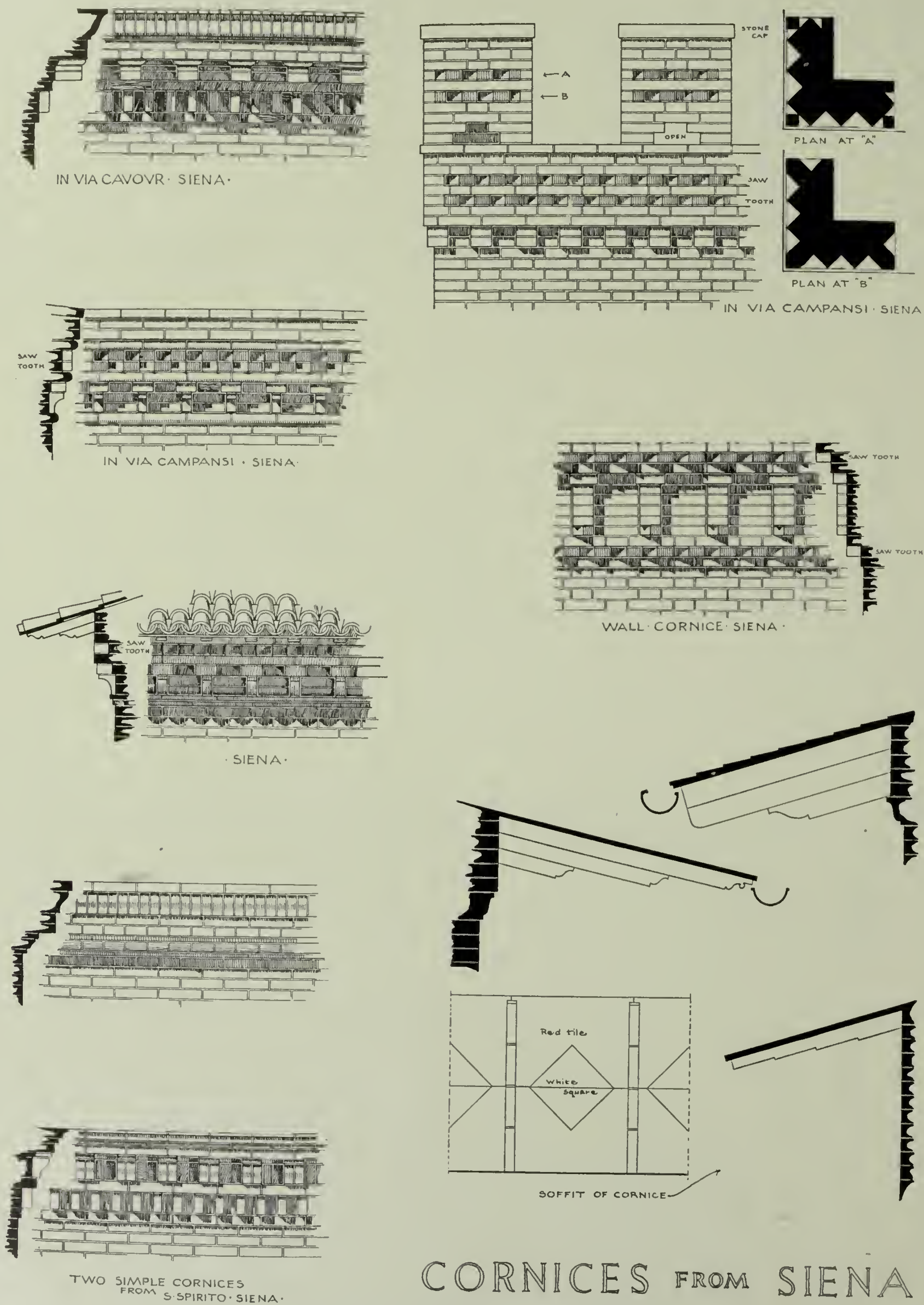
CORNICE AT SIDE OF SAN FERMO MAGGIORE · VERONA ·



CORNICE · SAN FRANCESCO · BRESCIA ·

MEASURED DRAWINGS—ITALIAN SERIES

WILL S. ALDRICH, DEL.



CORNICES FROM SIENA

MEASURED DRAWINGS—ITALIAN SERIES

WILL S. ALDRICH, DEL.

St. Patrick's Church, Philadelphia.

LA FARGE & MORRIS, ARCHITECTS.

BY ALFRED HOYT GRANGER.

TO one looking for the interesting in architecture, few cities offer more delightful surprises than Philadelphia, and one of the most delightful glimpses to be found in that city is the view of the new church of St. Patrick from the corner of 19th street and Rittenhouse Square.

I first discovered it one spring morning, months before the church was completed; but even then the play of shadow behind the tall columns and the carefully studied slope of the gable against the blue of the sky at once brought to my mind pictures of Italy, especially of Verona, where the Lombard style is at its best.

The church stands on the corner of 20th and Rittenhouse streets, but owing to the fact that the latter street does not cross 20th street in a straight line, but drops a few feet to the south, the portico of the church is almost on axis with Rittenhouse street east of 20th street.

The materials of the building are a warm faun-colored brick, quite rough in texture and almost the color of Travertine Stone, terra cotta to match the brick, with columns, pilasters, and steps of warm gray granite. The spandrels of the three great arches on the south side are inlaid in color, rich blues and greens, which at first sight seem almost too startling, but have already toned into the brick, and now the effect is quite charming. All of the ornamental details are of terra cotta, and are carefully carried out in the best spirit of the North Italian work, but are in no sense copies of any ancient models. The capitals of the great columns, the ornamentation of the frieze, and the corbels supporting the crown moulding of the main gable are particularly worthy of study. From the exterior, the great rose window is not so satisfactory and seems almost lost behind the parapet of the portico, and too small in scale. When one sees it from the interior, however, the architects are justified in its size, for there it is perfect in scale and beautifully placed. The gilt cross at the apex of the gable is, however, too small from every point of view, and looks as if it were made of wood and temporarily placed for the purpose of study in scale.

The building is rectangular in plan and consists of two stories. The interior walls in both crypt and main church above are of the same brick as the exterior. The crypt is exceedingly interesting with its faun-colored walls and ceiling of the same tone. The columns supporting the vaults are of a delicately veined white marble. The main church, raised about twelve steps above the sidewalk, is a basilica in plan, covered with three great domes. Everywhere the construction is frankly and honestly shown, as it always should be in a building dedicated to the worship of God. The predominant color is the same as the exterior, but marbles have been carefully and beautifully introduced in the pilasters, supporting the ribs of the ceiling vaults, in the apsidal-shaped chancel and around the doorways. As the church is dedicated to St. Patrick, much of the ornamentation is Celtic in character, and the architraves of the three main doors and the sill courses of the great windows are beautifully modeled. The marble walls of the chancel and the panels in the pilasters are of a delicate green Cippolino marble which harmonizes perfectly with the faun-colored walls.

The design of the high altar is particularly beautiful, the marble being white Vermont with serpentine panels. The steps to this altar have white marble treads with serpentine risers, and the effect of the chancel from the nave is one of great simplicity and almost austere purity, which is unusual in Roman Catholic churches in America. The architects have realized most fully the value of the floor as an architectural feature, a thing too often neglected. In this church the floors of nave and of chancel are of tile of a rich reddish brown color lightened up with occasional spots of greenish tone. In the center of the chancel floor directly in front of the high altar is a carpet of green tile very soft in tone and symbolical in design. One must not overlook too the risers of the chancel steps of green tile stamped with a St. Andrew's cross. One unusual feature of the chancel wall is the frieze above the high altar. At first sight this frieze, of a deep golden Siena marble, looks as if it were carved, but on closer inspection one finds that these festoons are but portions in the veining of the marble, a legitimate use of material which adds greatly to the richness and lightness of the wall treatment and carries the eye to the organ and choir galleries high up on either side of the chancel. The balconies of these galleries, which project slightly from the chancel walls, are of white terra cotta and the detail of the balustrades and supporting corbels is almost Venetian in delicacy of treatment; and this same detail of balustrade is carried across the top of the reredos, which thus forms a gallery above the altar for processionals. So much for the chancel, which is, as it should be, the focal point of interest in the church, and which the photographs show far more plainly than can any written words.

Let us turn again to the nave, which contains so much of interest. The pews are of dark oak, dignified and architectural, and, what is equally important, comfortable to sit in and placed sufficiently far apart to allow one to kneel reverently without being troubled by the feet of the one in front of him. One should not leave the church without examining very carefully the holy water fonts at the eastern doors, which were designed and given by Mr. Henry Thouron. These fonts are thoroughly Celtic in design and beautifully executed. One must also notice the iron gates to the baptistry and the iron doors on the north side of the church. These are hand wrought and particularly well executed.

The mosaic panels let into the walls of the church below the great windows and illustrating the Stations of the Cross are the only jarring features in an otherwise wholly harmonious interior. They are too harsh in color and project slightly from the wall, which is very unfortunate as now they look as if they had been tacked onto the wall surface. Had they been slightly recessed into the walls, just enough to have a shadow cast along the upper edge, the effect would have been much better.

Thus far I have spoken only of the architectural side of the church, its design, but in a building of this character one must notice the construction. It is the keynote of the design. Nothing is false, nothing hidden. Here is a temple of God built to stand the test of time and so honest that all men can feel the honesty.

One of the most interesting portions of the building is up in the attic space between the domes and the roof. Here one can see and understand the construction of the vault and in this case the roof itself is also of the same construction. Here is a structure that is essentially modern but preserves all the beauty of tradition, that great tradition which the Roman Church, more than any other known organism, has cherished and handed down from age to age. In this country of ours, until quite recently, it has seemed as if Rome were neglecting her architectural traditions, but St. Patrick's Church is a sure proof that she never forgets but only bides her time, and we can surely, with this building as a precedent, look forward to the time when the churches of Rome in this country, as in Europe, shall be the delight and inspiration of all men.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

ARCHITECTS' FEES — III.

HAVING spoken last month about the advantages of the suggested methods of computing architectural fees, it here becomes necessary to discuss the defects of same and to conclude by asking our readers for their experience and views upon this subject.

If a statesman were to receive as a yearly salary an amount equal to four times the salary of his private secretary, would it not be difficult to persuade the public, no matter how stable a reputation for integrity the statesman might have, that he was impartial to the idea of overpaying his secretary. Yet, is there not a marked similarity between the financial arrangement of the statesman and his secretary and that of the architect who receives from his client four times the amount of the salaries of the draftsmen employed on his work as the gross profits for his professional services? Isn't the architect in the position where the more he pays his draftsmen the larger becomes his gross profit on the work? The architect, then, without increasing his overhead expenses, can easily increase his profits by overpaying his draftsmen. The situation is one in which the client, having no chance whatever of controlling the cost of architectural services, must have implicit faith in his architect's discretion, and if at any time during the progress of the work he should feel that the bills for drafting were unwarrantably large, he would immediately place his architect in the embarrassing position of having his business efficiency doubted. It seems, then, that this method of charging four times the drafting services might be most unsatisfactory for the client financially, and disagreeably embarrassing for the architect in the case of a dispute.

Let us then consider the "twice the draftsmen's salaries plus a professional fee" basis of charging. If an architect is receiving a definite amount for his services and is charging his client twice the drafting salaries of the men employed on his work, to cover drafting and overhead expenses, doesn't he stand to gain by overpaying his men? The answer to this is of course "Yes," but the amount he gains is so small that "the game is hardly worth the candle." If the work warranted the services of a thirty dollar a week man, the overhead expenses would be normally in the neighborhood of the same amount, and by putting a forty dollar a week man on the work, the architect would be gaining only ten dollars a week. Besides, it is to be supposed that any reputable architect would not conscientiously run his client into excessive drafting expenses. He has a bookkeeping system in his office, and in case of a dispute he would be the first to suggest that the client's ledger be opened to his client's inspection. Any startling financial discrepancies would immediately show themselves. And certainly the majority of architects value their reputation to such an extent that, if it ever came to a point where the books were examined, it would be found that the greatest care had been taken to carry on the client's work in the most efficient and economical manner.

There are, however, those in the general public who feel that an architect is a peculiar type of person who has absolutely no idea of business principles. Such men really appreciate good business methods more than they do good architecture, and it is the architect's problem to give them both. Many business men feel that they must see in black and white where every dollar of their expenditure goes. They are satisfied to pay a man a good profit for his work, but they must know that their work is carried on in a thoroughly business-like manner. To pay an architect in addition to his just net profit double his draftsmen's salaries, taking the architect's word for the fact that overhead charges and drafting expenses run equal, would not be likely to appeal to a cut and dried business man. He will say, "If my architect is running a portion of his office for me and me only, it is only right that I should know where every cent goes." Theoretically his statement sounds logical, but is such a scheme practical, when rent, stenographic services, and research work enter into the expenses of a job? It is not. Some overhead expenses must be distributed among many jobs, a proportion of them prorated to each piece of work. It would not be possible to charge a client for a definite number of square feet of floor space for his rent. To the architect the amount of work in the office governs the overhead rent, and he endeavors to keep the size of his office in proportion to the size of his business.

But it is possible to go even farther with the "twice the draftsmen's salaries plus the professional fee " basis than we have yet gone, and a logical solution of the whole problem, a practical alternative for the six per cent commission basis, one satisfactory to both the client and the architect, is briefly sketched as follows.

Again let us take the example of a one hundred thousand dollar enterprise. On the six per cent commission basis, three thousand dollars would represent fifty per cent of the gross commission, a sum just for the architect to take as his professional fee. The other fifty per cent would go to drafting and overhead expenses. Let the architect say to his client it is reasonable to suppose that the drafting and overhead expenses will be approximately equal. That would mean that practically fifteen hundred dollars would go to drafting salaries and fifteen hundred dollars to sundry overhead charges. The client, therefore, shall pay the architect three thousand dollars for his professional fee, fifteen hundred dollars for his overhead expenses, and also the cost of the draftsmen's salaries employed by the architect on his work, and the architect shall render to the client monthly statements showing the cost of drafting expenses incurred during the previous month on the job.

This arrangement would have equal advantage for client and architect. The architect would receive his professional fee, the client would pay for the exact cost of producing the work. The system would be simple to run, as weekly time sheets would show the amount of time the men had worked for the client, and the bookkeeper would keep the overhead accounts. The professional fee could be paid in instalments as the work progressed, and the architect's monthly statement to the client of the cost of the work could be treated as a bill and paid like any monthly account.

Such a method of charging for architectural compensation as is above outlined is merely a suggestion founded on study of the problem. If the per cent commission basis has been found unsatisfactory, it is time for it to be improved. That the systems suggested in these editorials are theoretical and not practical is the criticism that many may offer. However, those who have experimented with them claim to have used them successfully and it seems hardly unfair to answer those skeptical persons who criticize them as theoretical with the question, "Is the 'percentage of the cost of the work complete' system of basing charges the last word?"

THE WHITNEY WARREN EXHIBITION IN THE AVERY LIBRARY, COLUMBIA UNIVERSITY.

As a feature of the movement which has for its objective the establishment of a French Institute and Museum in New York, a lecture on French Architecture was given by Prof. A. D. F. Hamlin, Thursday evening, February 27, in the Avery Library.

At the same time there was initiated a fine exhibition of material related to French architecture selected by Mr. Whitney Warren from his abundant collections, and loaned by him to the Avery Library for two months or more.

The chief feature of this exhibition is a series of French architectural engravings of the seventeenth and eighteenth centuries. Four of these are large plates; two representing the Galerie des Glaces, and the grand stairway at Versailles, and two representing the decorative architecture of extensive fêtes at Versailles. The remaining forty-eight plates are smaller and represent various decorative motives. These are arranged so that similar subjects are brought together, and only one or two by the same master are exhibited. In this manner an extraordinary variety of stylistic effect is secured.

The seventeenth and eighteenth centuries in France were prodigiously fertile in these inventions, which were frequently engraved directly upon the copper with great skill.

In addition to these engravings Mr. Warren exhibits several drawings from his unique collections of designs for ships made in the same period, when ships, like everything else, were expected to carry as much magnificence as possible. His collection of ships was made to assist in the design for the Yacht Club Building in New York.

Mr. Warren has also placed upon easels a rather complete series of the brilliant sketches for the decorative sculpture of the Grand Central Station, by Sylvan Salieres, Second, Grand Prix de Rome, originally from Toulouse, and now in New York City.

TASTE IN ARCHITECTURE.

Mr. H. Heathcote Statham, in his book, entitled "A Short Critical History of Architecture," undertakes, with his comments on the merits and weaknesses of the architectural styles he describes, to put his readers in the way of knowing what influences and what treatment of design produce good and bad architectures; he endeavors, he says, to make his history of architecture a lesson in architecture. He treats architecture as a continuous development. "There is not a building in the world," he remarks, "on which the historian can put his finger and say: 'Here such a style of architecture began.'"

THE VALUE OF OMISSION.

Mr. March Phillipps in his book tells us that what distinguishes Greek architecture from all other styles is that they are based on additions, while Greek art is based on subtraction, or, in other words, the resolute and determined elimination of what is not absolutely required for the attainment of the end sought. We feel that in many cases, like other able gifted writers, Mr. Phillipps pushes his theories to an extreme, but we are absolutely with him in thinking that among the qualities which go to make architecture there is hardly any one so important as reticence. Although many of our modern buildings are most blameable in this particular, redundancy of features and ornament are frequently to be met with in the past. To express one's meaning in few and simple words is often to make it forcible, and in design the same holds good. A building's function is not to show the universality of the designer's knowledge of architectural forms, but his judgment in using wisely, logically, and well what is really necessary. — *The Builder*.

THE frontispiece for this number continues the series of Greek Churches started in January. We spoke about the general size of these buildings last month. It remains to further discuss the plan and constructive features.

The typical arrangement retained nothing of the old basilican plan; it was in the form of a cross with equal arms, inscribed in a square, and crowned with five domes. The subsidiary domes were not placed over the arms of the cross, as in the churches of the sixth century by which St. Mark's was inspired, however, but over the spaces left between the arms and the corners of the square. The plan seems indeed to have been rather the logical outcome of buttressing the central dome by four barrel vaults than an adaptation primarily symbolic. The form of the cross still appears, of course, in the upper part of the walls and in the roofs covering the barrel vaults. The whole mass assumes a pyramidal form, frequently of the most pleasing proportions and silhouette. From the tenth century this form of church, for which we find only remote prototypes in the period of Justinian, was used almost exclusively.

The dominating principle of its development during the subsequent centuries was a striving for lightness and elegance. The drum on which the exterior dome was invariably raised, itself an innovation beside the low swelling of St. Sophia, became higher as time went on and was made polygonal instead of circular, so that the multiplied lines of the angles increased its vertical movement. This was furthur accentuated by the height and narrowness of the windows and by the employment of slender colonnettes at the angles, with window enframements in several orders. The external domes themselves were multiplied, both over the marthex and at the corners of the plan; indeed in the thirteenth and fourteenth centuries the builders seem often to have sought how many they could use.

Under the Latin emperors whom the Crusades raised to the throne in the thirteenth century, and under the decrepit Paleologians who succeeded them, Constantinople itself almost ceased to produce important works of art. In the new nations which were springing up on the ruins of the empire, however, and in certain provinces which still remained tributary, a surprising activity continued. Byzantine art, in a supreme final effort, seemed bent on putting forth some of its fairest flowers before the coming of Islam with its new and beautiful hybrids. In Greece, the newly founded city of Mistra, capital of the Frankish vassals of the Peloponnesus, and the despotate of Arta on the Ionian Sea, preserve a series of churches in which this development is seen at its best. The characteristic tendencies of the earlier centuries are accentuated, with a result even more lively and picturesque, a gayer polychromy, at once luminous and mellow.

Through all these centuries the materials used were much the same, common brick alternating with ashlar, and colored faience for occasional enlivenment. At the simplest a single or double course of brick alternates with one of stone, perhaps with single bricks placed vertically between the blocks of stone, or small panels of brick laid horizontally. The beds of mortar, which are very thick, are often slightly raked out, giving an outline of shadow. The archivolts are constructed of brick with their long faces showing, and rich label-mouldings, string-courses, and cornices are made of common brick set with a corner flush with the face of the wall. Common brick are also employed to fill the spandrels, sometimes in simple patterns, sometimes with the introduction of the cross or some other symbol; and at Merbaka a very effective frieze is made of a fret of the same material. Another series of effects is gained by patterns of brick embedded flush with the mortar, which in this case becomes a field on which the pattern seems to be traced. One of the best examples of this method is the church of Hagia Theodora at Arta, where an entire wall is covered with a herringbone diaper pattern floating in the mortar, to the greater attainment of decorative effect, it must be confessed, than of an appearance of stability. The most original device of the Byzantine masons was clipping the edges of common brick so embedded, in order to obtain, by the simplest means, the richest variety of free designs. The edge was simply splayed back in places by strokes of the trowel, so that when the mortar was brought flush with its face it might show any shape desired. Brick thus cut were used in friezes, especially of a guilloche design very easily made, occasionally in inscriptions, and often in small panels which are introduced between the stones of the horizontal courses. The best example of this treatment, showing both a frieze and panels, is the east end of the smaller church at the monastery of St. Luke in Phocis. The variety of designs it makes possible is well indicated by the figure, which shows a selection of the panels. A final resource of the builders was polychrome faience, at first modestly introduced, as in the scattered plaques at Merbaka, later, especially at Arta, lavishly mingled with the brick in belts and diaper patterns. No single group of colors predominates, but red, yellow, green, blue, and white are all used, harmonized by the surrounding tone of the brick. In the richer examples carved stone is not lacking, in the string-courses and in the parapets which fill the lower part of many windows. As time goes on, however, carving becomes more and more confined to the capitals alone, and the rich play of materials is alone relied on for decorative effect. Seldom indeed has such reliance been more successful. These unknown builders of the East, with no other elements than those of the most commonplace structure, have by ingenuity and fantasy produced an architecture of the rarest charm.

A MISTAKE was made on page IX of the January issue in crediting the authorship of the building at 14–18 West 46th street, New York City. This should have been given as Hazzard, Erskine & Blagden, architects; the builders as Thomas J. Steen & Co.

Announcement is made that the architectural practice of the late John S. Duckworth will be continued under the supervision of his son, John S. Duckworth, Jr., at 405 Coal Exchange Building, Scranton, Pa.

Mr. D. W. F. Nichols and Mr. J. Pender West have formed a partnership under the name of Nichols and Pender West. The address will be 911 Somerset Building, Winnipeg.

Mr. J. R. Gieske announces that he has opened an office at 503 Vinson-Thompson Building, Huntington, W. Va.

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LETTERPRESS

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CHURCH OF HAGIOS VASILIOS, ARTA, EPIRUS, GREECE.

One of the richest examples of patterning, built in the early fourteenth century. Friezes of polychrome faience and cut brick.

THE BRICKBVILDER

APRIL, 1913

VOLVME XXII. NVMBER 4.

A Comparison Between German and American Hospital Construction.

BY DR. JOHN N. E. BROWN,

Superintendent of Detroit General Hospital, and Secretary, American Hospital Association.

IN Germany a general hospital is properly so called. All sorts of patients are received, — acute mental cases, tuberculosis, and the ordinary contagious diseases; provision is also made for epidemics of cholera and plague. This permits medical students, resident medical officers, and nurses to procure an all-around training. We know of no such hospital in this country.

The hospitals of Germany are constructed by the state or municipality. The amount of money needed is asked for and can be counted on. In America we are mainly dependent as yet on the voluntary system of support; though a few of our large cities are undertaking the building of hospitals as a proper part of civic work, making appropriations in their annual budget for this public service, just as they do for their water works, street cleaning, etc. In America, hospitals start in a small way and are enlarged, so that some of our older and larger institutions present a conglomeration of buildings such as are never found in Germany. The German hospitals are planned by the municipality or state architect, an official of much dignity. The office is the goal after a long and rigorous experience and thorough technical training. This official also plans the city hall, the court house, the schools, and other publicly owned buildings.

MODEL FOR GERMAN HOSPITAL GROUP.
Usual Custom Among German Architects.

Before beginning to build a German hospital, careful inquiry is made by the authorities as to what number of patients they will provide for; what amount of room will be required for males and females respectively; what space will be given over to medical, surgical, and other sorts of cases; what space for kitchen, how much for laundry and other services. A study is made of institutions already built, and statistics relating to all services carefully investigated. The building must conform to certain governmental regulations, such as the space allowed for day rooms for convalescent patients, the construction of stairways, etc.

Architects and medical men in Germany have not the freedom they have in America to carry out novel ideas. A close observer will find fewer mistakes and fewer oversights than he discovers in this country. This may be explained by the fact that the Germans follow precedent more, and the architect and director have had advantages both in the matter of special training and extensive observation in this particular field of practise which few American architects seem to have enjoyed. It is more customary in Germany than in America for architects to construct a model of the hospital they propose to erect. The advantages of doing this are many; we can strongly commend this custom.

German hospitals are built on extensive grounds, those of the pavilion type covering sometimes eighty or ninety acres. These grounds are beautifully parked; trees and gardens surround the pavilions. There is a fine sense of space all about. The air is clean and fresh, and sunshine floods the whole place. The buildings are remote from the dust and din of traffic. Convalescent patients are seen on the lawns, sunning themselves or resting beneath the shade of the low trees. Throughout the largest hospital sites run driveways or walks which divide the grounds into rectangular blocks. On each of these blocks stand groups which correspond to a general classification of patients. One does not find as many balconies (or balcony space) or roof gardens as in America. The patients are taken out on the lawns.

The ward buildings are not high, chiefly one and two stories. The architectural effect, both of the groups and of the individual building, in this natural setting, gives a sense of pleasure to the visitor, and must be attractive to the patients.

In many instances the visitor arrives first at a lodge, — a picturesque little structure, the residence of the *Pfortner*, or at his office off the main carriage entrance, which runs

SCHŒNEBERG.
Typical ward building, showing day rooms and balconies for out-door treatment and doorway for wheeling patients to grounds.

RIXDORF.
Pfortner's lodge, showing entrance to hospital grounds (at right).

through the administration building. This official receives him, learns his business, and directs him what to do and where to go. Frequently the *Pfortner* is detailed to accompany the visitor throughout the institution.

The newer hospitals are of the most thorough masonry construction. The general finish of the exterior is cement on common brickwork, applied in many simple and charming forms. Much well designed brickwork is also seen. The roofs of red tile tone pleasantly with the green foliage.

Ward floors are generally of tile or terrazzo. There has been some effort to obtain a more comfortable floor through the use of battleship linoleum. As in America, the use of linoleum and of plastic monolithic flooring seems to be still in the experimental stage.

Windows are usually of the casement type, some having transoms at the top. One type has a double transom which upon being operated opens the outer sash at the bottom and the inner one at the top. There is now coming into favor in England and America a type of window with several cross sashes pivoted at the bottom similar to a transom. Either style of window gives practically one hundred per cent natural window ventilation. The latter type has the advantage of directing the air currents upward; the former are more quickly and more easily manipulated. The German windows generally extend close to the ceiling, and the sills are low enough to give the patients a view out of doors. We seldom see casement windows in the hospitals of this country.

The accessory rooms of the ward are grouped separately at opposite ends of the ward. This arrangement, we consider, makes for the convenience of the nurses. In America we seek to give two sides and one end of the ward to the air and sun.

The Germans make fine provision for natural treatment of

DUSSELDORF.
Entrance to grounds through Administration Building, showing Pfortner's office.

VIRCHOW.
One-story pavilion.

RIXDORF.
Administration Building from center court.

RIXDORF.
Bathhouse and two-story ward from center court.

patients on the medical side by providing, in their bathhouse, baths of all sorts, — mud, sand, carbonic acid, steam, electric, hot and cold water, in various forms. The private sanitariums provide special baths, such as sun baths and open-air baths. This bathhouse of the hospital is generally placed near the medical group of pavilions, and is related to this group much as the operation house is related to the surgical group.

It is common in Germany to see mechanico-therapy rooms — Zander rooms. These are very rarely found in America. The various apparatus in this department are most valuable in the treatment of deformities, contractures, and similar afflictions.

The operation house contains all the operation rooms with their annexes. These subsidiary rooms are fewer in number than one sees in some of the newer American hospitals. The surgeons' washup bowls are often found in the operation room proper. There does not seem to be the same accommodation for operating room nurses as is provided on this side of the water. Nurses there, however, are apparently not so numerous in attendance at operations as they are with us. Provision for sterilization is most complete, and in the room provided for this purpose you will often see apparatus for distilling water and supplying salt solution.

At the St. Georg Hospital, Hamburg, the air is filtered through gravel and sand before being forced, on the plenum plan, into the operating room. Following each operation the room is disinfected by steam. We have not noted such complete precautions anywhere in the United States.

In this country we are beginning to manufacture for our operating plants copious supplies of sterile water for surgeons' and nurses' washup; for example, the Gary Hospital, Gary, Ind.; St. Luke's, Presbyterian, and the Augustana Hospitals, Chicago; the German, Philadelphia; the German Deaconess Hospital at Buffalo, and the Harper Hospital, at Detroit.

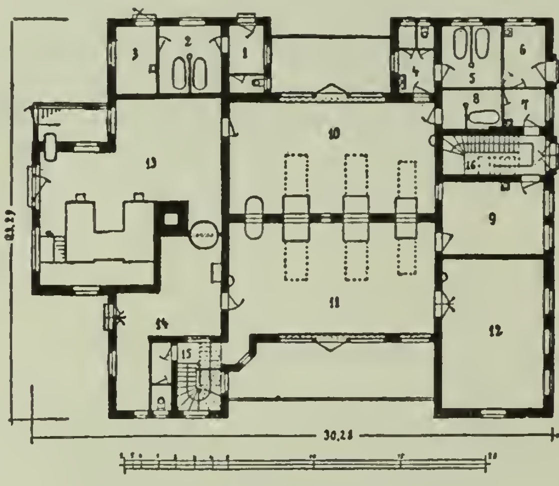
The Germans seem to agree with our latest conclusions in regard to simplicity in the matter of ventilation and heating. We have not heard of such failures of mechanical ventilation in German hospitals as we have in some of the leading hospitals in America where the plenum system seems to have proved a failure. The only place in which we saw this system working efficiently was at the Victoria Hospital, Belfast, Ireland; even there in the nurses' residence it was discarded. When on duty, nurses, like patients, submit to it, — an even temperature of about sixty-six degrees with all windows and doors tightly closed.

The Virchow Hospital, in Berlin, is ventilated in the following manner:

In the underground floor of each of the pavilions are placed one or more ventilating fans, according to the requirements. These draw in fresh air from little vertical air houses standing amid the shrubbery a few yards from the pavilions. The air passes through a chamber for straining out the dust, a cotton wool filter being used. The air is then driven into a steam-heated chamber, and

COLOGNE — HOSPITAL AUF DER LINDENBURG.
Wards and corridors along central court. Note parking.

from here through distributing channels, and hence through wall channels into the different rooms. As the local climate is sufficiently humid, the air is not moistened, as is done in some places. The foul air is withdrawn from each room by sufficient outlet channels, which extend to the roof story and terminate in a chamber in front of an exhaust fan. It is sucked from here and driven through ridge turrets into the open. In addition to this mechanical system, provision is made for natural ventilation through trap windows. The ventilating apparatus of the lavatories, kitchens, and sinkrooms is made particularly effective in order to quickly carry off the vapors and mal-odors which form there.



PLAN OF TYPICAL DISINFECTION HOUSE.

Germans have their heating and power plant placed in a service building, which building usually contains the kitchen, laundry, and employees' dormitories. The medium of heating is by means of steam or hot water. The pipes may terminate in radiators located along the center line of the room or along the walls. In the wards of the Virchow there are two four-inch hot water pipes running the whole length of the ward. These can be more easily cleaned than the ordinary radiators, and can be inspected very readily. A sensible type of radiator is the one now being put in the new measles building of the Willard Parker Hospital, New York City, there being room between the sections to allow for easy cleaning.

German laundries and kitchens are spacious. One seldom finds hoods over ranges and mangles. The black, dirty-looking stockpots of the American hospital kitchen are nowhere in evidence in Germany. Stockpots are covered with nickel, enamel, or white metal, and set on a neat, round, central foot. Some of the pots are provided with a water jacket as well as with a steam jacket, which permits their being used for a variety of purposes. Both kitchens and laundries are divided into separate rooms for the separate duties; sometimes these subsidiary rooms are merely alcoved off. In America we more often find nearly everything done, both in laundry and kitchen, in one large room.

STERILIZATION APPARATUS IN WALL.

The Germans provide in their hospitals more laboratory accommodation than we do. This is especially true of their teaching hospitals. In one of the medical or surgical units of the Charity Hospital, Berlin, for instance, you will find commodious laboratories adjoining the ward unit,—for bacteriology, for chemical pathology, for surgical pathology, for X-ray work, etc., and other special rooms for original research. Our laboratories are remote from our wards, which probably corresponds to the scientific status of our medical organization. Our clinicians are not pathologists; many of theirs have arrived at the kingdom of clinical medicine after a prolonged period in the realm of pathology, hence can combine the work of the two in one in a great measure.

Disinfection receives much more attention in Germany than in America. Disinfection houses are seen in connection with all large German institutions. In America the writer has not seen any. In a typical German disinfection-house, belonging to a large hospital, you will see provision made for disinfecting various types of material in various sized sterilizers. These sterilizers are set through a wall — the soiled or infected material being brought to the room on the "unclean side," placed in the sterilizers, and withdrawn in a room on the clean side. Off this clean room may be found the store room for the disinfected clothing. Provision is also made for the disinfection of doctors, nurses, patients, and employees. There is a room for the removal of infected clothing; adjoining this is the bath room, and beyond a clean room in which fresh clothing is put on.

Besides the complete disinfection plant in the disinfection building there is, in many hospitals, provision made in the ward unit for the disinfection of ward linen. A vessel is placed in a wall between two rooms, one half of it projects into the room for the reception of the soiled linen, the other into a small room on the other side of the wall — the clean side. After the linen is first thoroughly soaked and the blood and pus stains removed, it is disinfected by means of heat carefully applied, plus, in some instances, the use of an antiseptic solution.

Sewage from wards is piped to a cement cavehouse — the *siel grubenhaus* — and here disinfected before being allowed to run off into the general sewage system of the city. This feature is absent in America, but should be introduced. Many hospitals here allow their typhoid stools to pass into the general sewage system, not disinfected, or only partially disinfected. And many cities secure their drinking water from the lake into which this sewage is poured!

Basements are used in German hospitals for the protection and carrying of piping required for the heating, ventilation, and other apparatus, and for storage. In America, too often, basements are used for laundry, kitchen service, or even as dormitories.

For the illustrations accompanying this article the writer is indebted to Mr. W. B. Stratton, architect of the Detroit General Hospital.

The Planning of a Young Men's Christian Association Building. — Part II.

BY LOUIS ALLEN ABRAMSON.

THE Young Men's Christian Association as a power in a community reaches out beyond the zone of social and physical enterprise. It extends its co-operation in still another direction; namely, educationally, both academic and industrial, as its constituency demands. And so for a two-fold purpose. Firstly, for the benefits to be shared by the students, and secondly, by reason of the fact that the educational department forms a prolific channel through which to procreate recruits to the other branches of association endeavor.

Albeit the existence of public evening schools where the opportunity of free tuition is offered, the association has invariably successfully and profitably carried on its own educational work on a fairly extensive scale. This it has been able to accomplish by making the instruction individual, thus necessitating smaller class-units than would ordinarily be provided for school purposes.

FIG. I.
Class Room for Laboratory Work.

The class rooms, preferably located on the story immediately above the social rooms, should be located farthest from the gymnasium, running track, bowling alleys, and other sources of disturbance. If the building is situated on a thoroughfare, not subjected to the noise of heavy traffic, the class rooms should be placed along the front of the building; firstly, to take advantage of the permanent light, and secondly, so that by night their illumination will convey an impression of activeness.

Two types of class rooms should be provided: for those requiring special and permanent furniture, as for the study of typewriting, drafting, or laboratory work (Fig. I); and for those containing movable equipment, such as can be used for the study of language or stenography. The former type of class rooms should be enclosed with rigid noise-resisting partitions and used exclusively for its assigned purpose. Whereas the latter should be arranged in series, so that by operating movable partitions two or more of the rooms can be thrown together to accommodate a class or conference that would otherwise overtax the capacity of one (Figs. II and III). This arrangement makes possible the use of the entire group as a place for general assembly or banquets. The class rooms should never exceed a width of 24 feet; and if they are to be adapted for use as a banquet room, 18 feet should be the minimum width. It is advisable to vary the other dimensions of the rooms from between 12 and 18 feet to provide accommodations for classes of varied attendance. Manual training or other classes for mechanical trades which are sources of disturbance to other work should best be placed elsewhere.

Toilets for both sexes should be provided on this floor. Access to them should be had directly from the corridor.

The Association is assisted in certain work by a Ladies' Auxiliary and for it an ample size meeting room with generous storage space should be provided. The position of this room should be preferably between the kitchen and ladies' toilet. However, its use will not be confined to the above-mentioned purpose; and nothing should be included that would prohibit its use as a class or club room or meeting place for social purposes.

Storeroom. At such times as the class rooms are in use for banquet purposes the class-room furniture (student chairs, desks) should be removed to a conveniently located storeroom, which will at other times contain such furnishings (chairs, horses, etc.) as are used for banquets.

Kitchen. The size and magnitude of the equipment of the kitchen depends entirely upon local requirements. In many Associations the kitchen is used principally as a serving room and where light refreshments can be prepared. If the banquet room is subject to rental for other than association purposes, then the usual kitchen complement, including coffee urns, steam tables, etc., must be installed.

The service from the kitchen to banquet room need not necessarily be direct. As the objective of the Association banquet is primarily the conference which follows, the dishes must be served and removed rapidly and with facility. An arrangement similar to that shown in Fig. II is desirable. Obviously the corridor ordinarily used as a means of access to the class rooms is unnecessary and a single entrance to the banquet hall is sufficient. By closing the door at "A" the

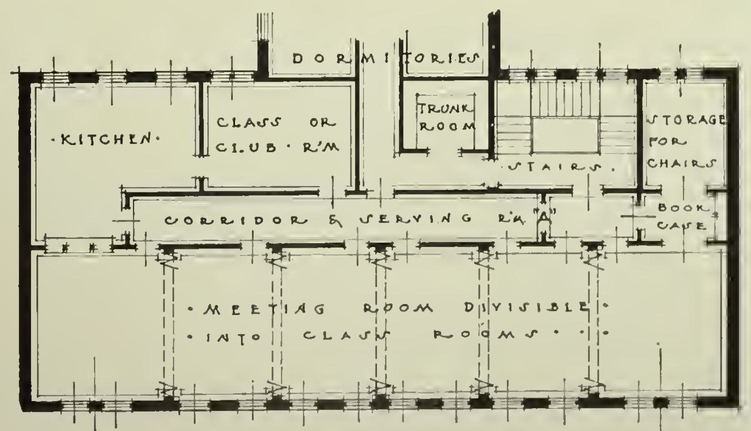


FIG. II.
Showing relation of Kitchen to Banquet Room.

corridor is converted into a serving room permitting rapid service through each class room door from the serving tables arranged in the corridor.

Dormitories.

Manifestly, the number of dormitories to be provided must be determined by a convass of the local demands. It is well to remember, however, that in no community, to the author's knowledge, have dormitories been provided in excess of the need. Further, investigation has shown that seldom has it been necessary for an Association to convert dormitories into other rooms by reason of lack of occupancy.

The arrangement of the dormitory plan itself should be given careful study and considered from many angles. As the dormitory rooms are more generally in use at night, while desirable, still the question of daylight, except to give the room a wholesome atmosphere, is not potent. But good natural ventilation is absolutely essential, as it is only in the very large Association buildings that a system of forced ventilation or even indirect heating can be maintained.

Stairways and other means of egress should be liberally

FIG. III.
Meeting room divisible into class rooms.

provided and cautiously distributed. Where dormitories occupy more than one story, and on one or more of which are other departments, a separate stair connecting the dormitory sections should be provided to make possible the circulation of men in negligée attire. Avoid an arrangement of corridors and rooms that compels the men attending classes or meetings to pass through a dormitory corridor to reach their destination.

Dormitory Room. The dimensions of the dormitory rooms vary with the types of men for whose occupancy they are provided. In a highly residential or educational community, where members acustomed to and who can afford to pay for convenience and luxury are to occupy the rooms, obviously they should be relatively large; perhaps 10 feet wide. In a manufacturing community the dormitories should be of the minimum size, between 7 feet and 8 feet 6 inches wide, so that a minimum rental can be assessed, which will place the rooms within the possibilities of the men whom the Association is most anxious to serve. When both extremes in membership must be accommodated, no definite barrier must be established between the two classes. Segregation is not desirable or wise. The depth of the room should never be less than 12 feet; it is wasteful if in excess of 15 feet.

The built-in closet has been universally adopted on account of its superiority over the movable wardrobe. It is dust-proof and more tidy, and by reason of its larger dimensions can accommodate the suit cases, boxes, etc., which are usually the possession of the room's occupant.

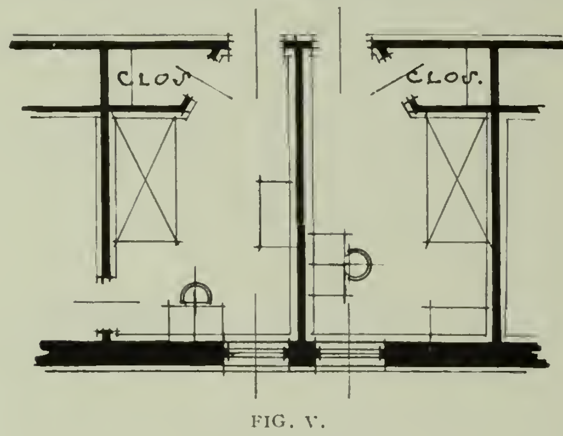


FIG. V.
A model dormitory.

It is a fallacy and indicative of a poor plan to be compelled to place closets between rooms (Fig. VI). From an economic viewpoint it is obviously wasteful, inasmuch as the periphery is of the greatest value and this arrangement decreases the possible number of rooms facing on exterior walls. Fig. V represents the model dormitory. This arrangement is by far the better, allowing a maximum number of rooms. The width of the closet should be sufficient so that the head of the bed can be placed against it. The splayed face imparts the impression of a greatly larger room than if the closet were built right-angular. The door should be hinged so that when swung open the window light will be admitted. The room door itself is placed directly opposite the window so that the circulation of air can be had without a draft over the cot. The door should be unglazed, but a transom must invariably be provided. A glazed transom is not desirable; preferably, one of wire mesh or louvres, both of which render the rooms less seclusive. Infractions of the rules can be easily detected and warning given of illness or accident. In Associations such as for army or

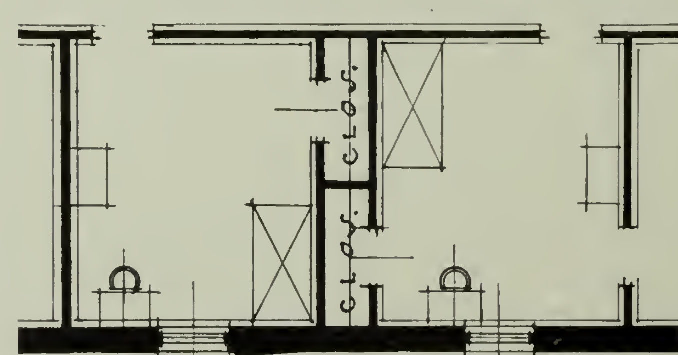
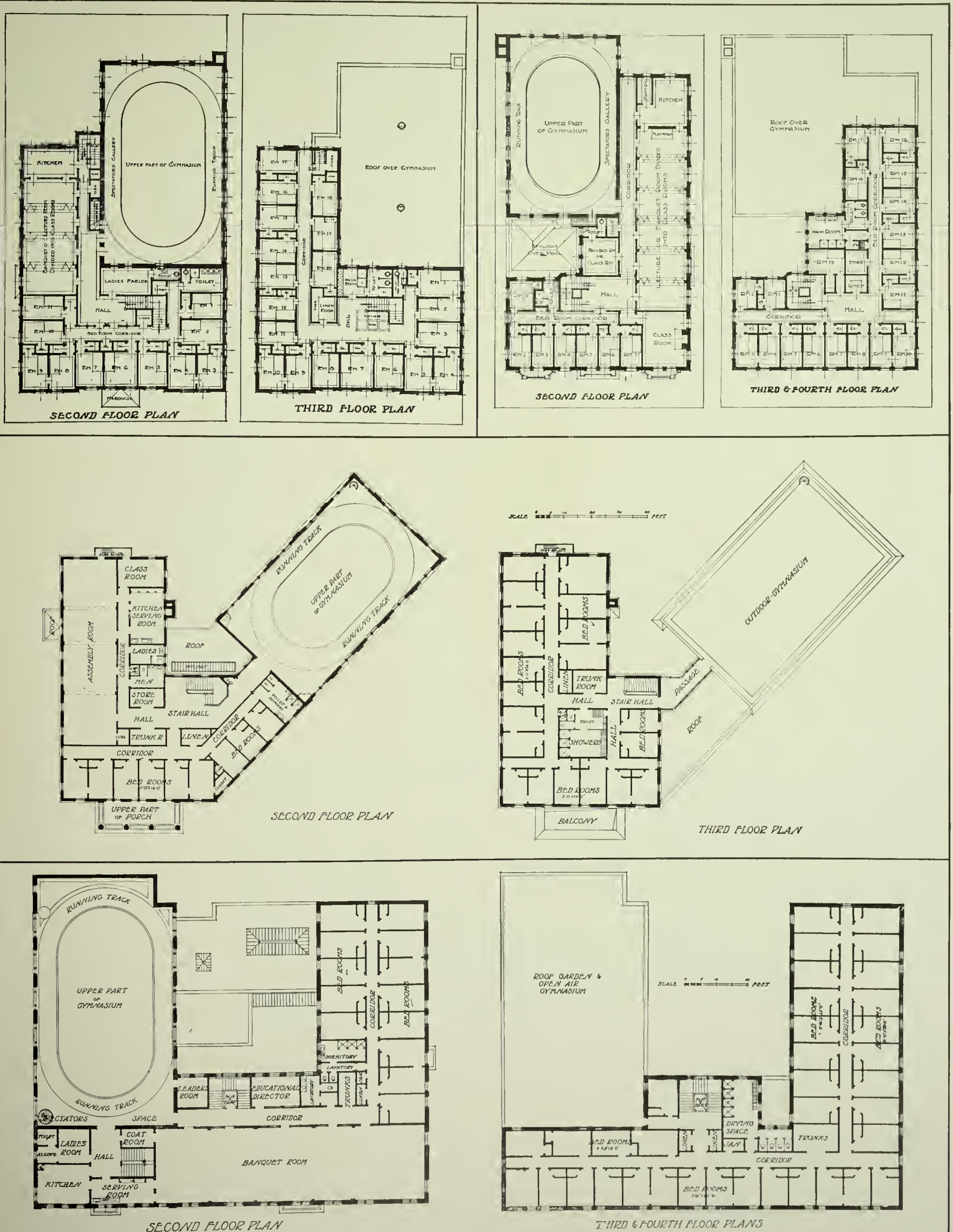


FIG. VI.
A wasteful use of dormitory space.

navy or industrial work, where the membership is such that gross violation of the rules is frequent, in addition to the open transoms the doors should be raised several inches from the floor. It has been the experience of the author that wash basins should not be provided within the dormitory rooms. Their use has been abused and the



SECOND AND THIRD FLOOR PLANS SELECTED FOR STUDY

(BASEMENT AND FIRST FLOOR OF THESE BUILDINGS ILLUSTRATED IN MARCH ISSUE)

THE PLANNING OF A YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING existence of vermin has been attributed to this indifferent usage.

Perhaps twenty-five per cent of the dormitories should be intercommunicating, preferably the corner rooms. In locating the connecting doors, care should be taken that sufficient wall space is retained that the necessary furniture can be accommodated.

General Lavatories. The position of the general lavatory obviously should be central to the rooms, preferably at the intersection of corridors. If the plan is such that direct sunlight could only be had at one point, there the general lavatory should be found, so imperative is it that this room be fresh with sunshine to vitalize the atmosphere and destroy virulent organism. However, during certain seasons it is both impractical and impossible to open windows, and it is therefore necessary to here introduce a system of indirect or forced ventilation. The simplest method is to install a ventilator and fan immediately over the showers, depending upon the rising steam to induce a circulation.

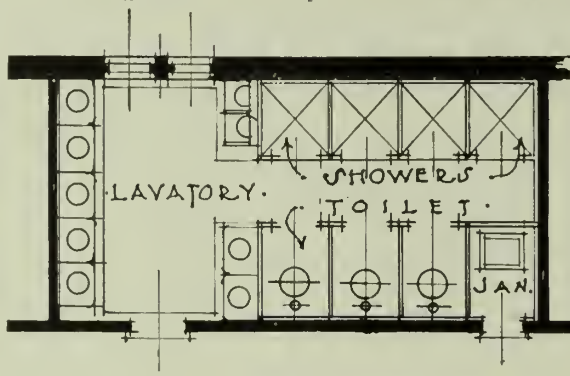


FIG. VII.
Usual Arrangement for General Lavatories.

Fig. VII indicates the usual arrangement. Fig. VIII represents the proper plan.

The number of fixtures to be provided can be safely assumed in the following proportions:

1 shower	For 8 men
1 water-closet	,, 12 ,,
1 wash basin	,, 6 ,,
1 urinal	,, 12 ,,

The shower room must be so situated that it will be unnecessary to pass through it in reaching the toilet or lavatory, otherwise water would be draggled through the corridors. Similarly, the toilet should not be in close proximity to the lavatory, as otherwise it would constitute a nuisance. The lavatory itself must be of generous size, with the basins placed directly in front of the source of light. Numerous mirrors should be arranged around the walls and not above the basins. This precaution should be taken, as otherwise men while shaving would prevent others from using the basins.

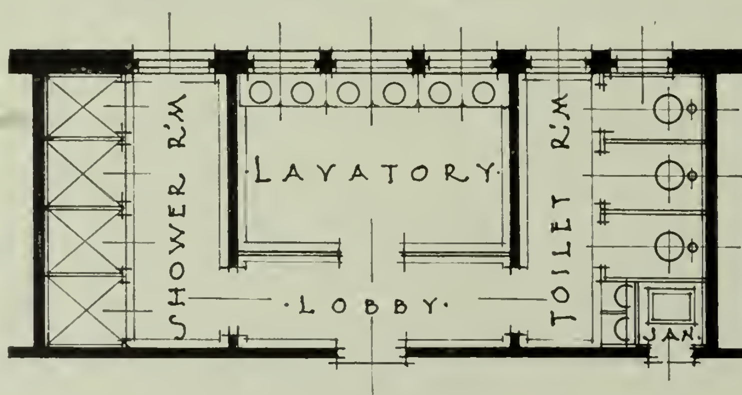


FIG. VIII.
Proper Plan for General Lavatories.

The general lavatory is taxed to capacity at times, and circulating space should not be cramped in either the lavatory or shower room. Men will stand around rubbing down after a bath, and when shaving require elbow room. In the former case, the individual after drying should not be rubbing shoulders with others just emerging from a shower. While in the latter, freedom from possible interference is essential.

Janitor's Closet. As it is possible that at some period female help be employed, the janitor's closet should not be entered from the lavatory. Provision must be made for a toilet and slop sink and for the accommodation of the usual janitor's appurtenances.

Trunk Room. The trunk room should be placed immediately opposite the stairs or the lift, if provided. Entrance should be through a wide door opening, and sufficient wall space should be provided to accommodate at least one trunk for each dormitory. It is obvious that ventilation for this room is extremely desirable. At least several registers should be installed in partitions close to floor and ceiling.

Linen Closet. A linen closet lined with cedar must be provided on each dormitory floor, in which will be kept the clean dormitory laundry supplies. The shelves should be of sufficient depth and width to comfortably store the largest pieces, as the blankets, etc., and space must be provided for a laundry hamper.

Roofs.

When the acquisition of ground area for athletic or playground purposes is impractical, recourse should be had to the roofs, which can be utilized to good advantage by the construction of cinder tracks, tennis, hand and basket ball courts. Again, the roof over the gymnasium can be constructed so that it can be used as a roller skating rink in the summer and inundated for ice skating. Caution should be exercised not to provide any of the above expensive features to satisfy the passing fancy of an inconstant membership.

Editor's Note. — The first article in this series on the Planning of a Young Men's Christian Association Building was published in the March issue of The Brickbuilder. The series will be continued in the June issue, being omitted from the May number. The author has asked for additional time in which to collect important data. This break in the continuity of the articles is regretted but we feel will be justified by the added value of the third paper.

The Unit Power Plant for Isolated Buildings and Small Groups. — Part III.

DETAILS OF DESIGN.

BY CHARLES L. HUBBARD.

AFTER having determined the total power of boilers, engines, and generators, the next step is to decide upon the number of units to employ. In plants of any considerable size a spare boiler should always be provided, not only for use in case of accident, but as a relay when cleaning or inspecting. In small plants, where power is simply required for lighting during the evening, it may be sufficient to provide a pair of boilers having a combined capacity just equal to that required, and depend upon the non-lighting period, when one of the boilers will be out of service, for cleaning and repairs. It is safer, however, to provide a spare boiler and just as economical in the long run. A good arrangement is to provide three boilers, of such size that two will easily do the work, as this always gives a spare unit to fall back upon in case it is needed. When the maximum load is required for only a short time, and it is desired to keep both space and cost at the lowest point, a boiler capacity some thirty per cent below the normal may be installed, and if there is a good chimney draft, the plant may be easily forced up to the normal capacity without serious loss of efficiency. This, however, should not be done unless the period of forcing is short and the boilers of the best design.

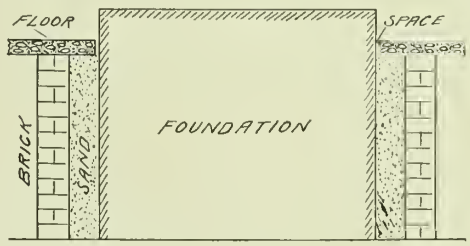


FIG. I.

It is almost universal practice at the present time to connect both engine and dynamo to the same shaft, thus doing away with belts and economizing space. Such an outfit is called a *unit* or *generating set*. As the efficiencies of both engines and generators are greatest at full load, it is desirable to have several units so arranged that as the load increases their power may be added as required. While greater economy may be secured by using machines of different sizes and operating them at or near full load, there are certain practical considerations which must also be taken into account. A method which has given satisfaction in many cases is to divide the total capacity into three units, of such size that two of them, by being overloaded twenty-five per cent, will do the maximum work. The first cost in this arrangement is less, the machines are interchangeable in case it is desired to cut one out, and only one size of parts need be kept on hand for repairs.

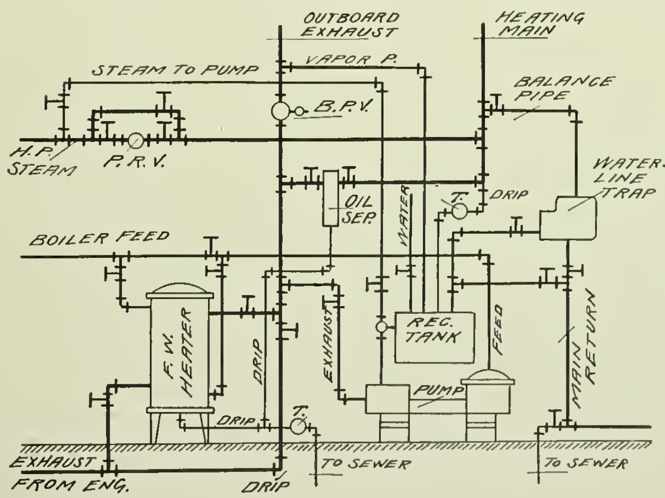


FIG. II.

The distribution of the load throughout the day has an important bearing upon this matter and should be carefully considered in each particular case.

General Arrangement. In electric power plants of large size the arrangements of the boilers and engines usually follow certain general schemes which experience has found to be desirable. When the plant is located in the basement of an office building, or forms part of the power and heating system of some public building or institution, these arrangements cannot be carried out to any extent on account of the location or limited amount of available space. This makes it necessary to work out the general scheme of each plant by itself, according to local conditions, taking care to make it as compact as possible, and so arranged as to simplify the handling of coal and ashes.

While the boiler and engine rooms should be adjacent, it is best to separate them by a heavy wall and tight closing door for keeping both dust and steam from the engine room. In general, all equipment having moving parts should be kept out of the boiler room on account of dust and grit. Exception is often made to this in case of the feed pump, which should be conveniently located with reference to the gauge glasses upon the boilers.

Foundations. These are usually constructed of concrete, both for boilers and engines. For tubular boilers, the foundations should extend from 8 to 12 inches on each side of the walls which they support. If a substantial footing is not available, a solid bed of concrete should be provided, of sufficient size to accommodate the entire setting. The depth will commonly run from 2 to 3 feet, according to the nature of the soil and size of boilers. Detail drawings of engine foundations are usually furnished by the builder. Care should be taken not only to make the foundations stable, but also to provide against vibration being transmitted to the building. This may be largely prevented by the construction shown in Fig. 1, where the main foundation is surrounded by a wall of brick or concrete from 12 to 18 inches away, and the space between filled with closely packed sand. Sometimes, when the soil is firm, the wall is done away with and the sand simply placed in a trench around the foundation. The area and depth of foundation will depend largely upon the nature of the soil and weight of the machine, and must be worked out for a live load according to local conditions.

Arrangement of Piping. When laying out a system of piping one should provide pipes of sufficient size to maintain boiler pressure; reasonable compactness to prevent excessive condensation; provision for expansion; freedom from pockets for the collection of water; and a system of drainage which shall keep the pipes free from condensation. While valves should not be provided too freely, on account of complicating the system and adding to the expense, they should be placed in such a manner that all important pieces of apparatus may be cut out for repairs, by-pass connections being provided for use at such times.

Another important matter is flexibility of the heavy piping, so that the movements due to expansion and contraction will be taken up without bringing heavy strains upon the pipe and fittings. This is usually accomplished by the use of offsets, sweep bends, and swivel joints.

Piping Material. "Wrought-iron" pipe, so called, is made *standard weight, extra strong*, and *double extra strong*. The standard weight is commonly used for all pressures up to 125 pounds per square inch, and tests show it to be amply strong for pressures considerably higher than this. Nearly all of what is commonly known as wrought-iron pipe is mild steel. There seems to be no special advantage in using wrought iron, unless for very large and heavy work, where it is desired to weld the flanges directly to the pipe. It is more expensive and is not generally kept in stock by the ordinary dealer. Cast-iron fittings, both screwed and flanged, are used for all classes of steam work. They are made in three weights, the lightest for low pressures, such as exhaust and condenser work; standard weight, for pressures up to 100 or 125 pounds per square inch; and extra heavy for higher pressures up to 250 pounds.

When pipes are to be joined permanently, couplings are used, but for all work around boilers, engines, pumps, and heaters, where it may be necessary to disconnect the piping occasionally, the joints should be made up with flanges or unions, according to the size. Pipe bends of large radius are largely used in making boiler and engine connections on account of their greater flexibility. Another important point is the method of making up the flanged joints in high-pressure work to prevent leakage.

A good type of joint for pressures around 100 to 125 pounds is made by screwing the flanges solidly to the pipe, facing off the projecting ends in a lathe, and packing the joint with a corrugated copper gasket. The type and quality of the valves is an important detail in connection with a system of piping. In general, gate valves are best for high-pressure work, and for the larger sizes, say 4-inch and above, the "outside screw" or "yoke" pattern is to be preferred, because it is not only easier to pack and oil, but also shows at a glance whether it is open or closed. For sizes 8-inch and above, the by-pass type should be employed, on account of greater ease in operation and less liability of scoring the seat when opening and closing. By first opening the small by-pass and equalizing the pressures on each side of the valve, these difficulties are avoided. The seats should be renewable, and either of bronze or of some special material adapted to high temperatures and pressures. Gate valves should not be placed with the stem in a vertical position with the wheel at the *bottom*, as they form an obstruction to the flow of condensation if not fully open. For the same reason globe valves should always be placed with the stem in a horizontal position when used in a horizontal pipe.

Expansion. Pipes fitted at a temperature of 60 degrees expand about $2\frac{1}{4}$ inches per 100 feet in length when filled with steam at 100 pounds pressure. For this reason great care must be taken to so arrange the piping that this increase will be taken up without producing strains. As previously stated, this may usually be done in engine and boiler rooms by the use of offsets and bends, but in straight runs of considerable length, as in conduit work, slip joints are commonly used.

Insulation. Steam pipes, separators, heaters, etc., should be covered with some good insulating material to reduce the amount of condensation, and also to prevent overheating the engine and boiler rooms.

The best makes of sectional covering should be used for high-pressure piping, and among these may be mentioned — "eighty-five per cent carbonate of magnesia," certain brands of "fire felt," and "cork" coverings. Certain grades of asbestos fiber also make an efficient material. Valves and fittings may be provided either with moulded or plastic covering, according to whether or not it is to be removable. Smoke connections, large heaters, tanks, etc., are commonly covered with block insulation, finished with a coat of plastic material.

Pipe Connections. The typical methods employed in connecting up the different pieces of apparatus are best shown by a series of diagrams. Fig. II illustrates in detail some of the pipe connections in a non-condensing plant where the exhaust steam is used for heating purposes. The exhaust main from the engines is carried beneath the floor and is so valved that the steam can be passed either outboard through a back-pressure valve, or into the heating system through an oil separator. A closed feed-water heater is connected with the main so that either a part or the whole of the exhaust can be made to flow through it. This arrangement allows the heater to be cut out, in case of repairs, and also makes it possible to pass all of the exhaust through it in the summer time when the heating system is not in use. A cross-connection is made with the high-pressure main for automatically supplying live steam to the heating system through a pressure-reducing valve in case the exhaust should prove insufficient at any time. The return from the heating system is trapped into a vented receiver and pumped back to the boilers automatically when the water line in the tank rises above a given point.

A typical boiler and engine room layout for a medium sized plant is shown in Fig. IV. The outfit consists of two water-tube boilers, two generating sets, duplicate feed pumps, receiver, and feed-water heater. This forms part of a combined power and heating plant, and therefore has connections with the heating main through an oil separator and pressure-reducing valve, as indicated.

Fig. III. — In this particular case the discharge water is turned into the sewer and therefore no oil separator is required. The connections are such that the feed-water heater may be by-passed and the exhaust turned directly outboard; also a relief valve is provided beyond the heater for the same purpose. When working regularly, all of the steam passes into the condensing cone where it is mixed with the cooling water and condensed.

The feed connections for a non-condensing plant are shown in Fig. V. The supply main branches into two lines, one leading to the receiving tank and the other to an injector near the front of the boilers. The discharge from the feed pump is passed through a closed heater on its way to the boilers. The arrangement for a condensing system is shown in Fig. VI, and is practically the same, except for the introduction of a second heater. In this case "B" takes steam from the main engines at condenser pressure, while "A" is supplied with exhaust from the pumps at a pressure of 1 or 2 pounds gauge.

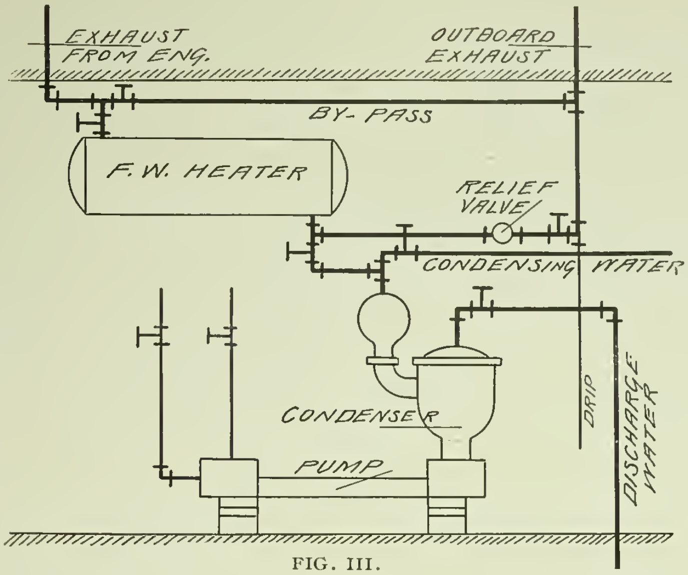


FIG. III.

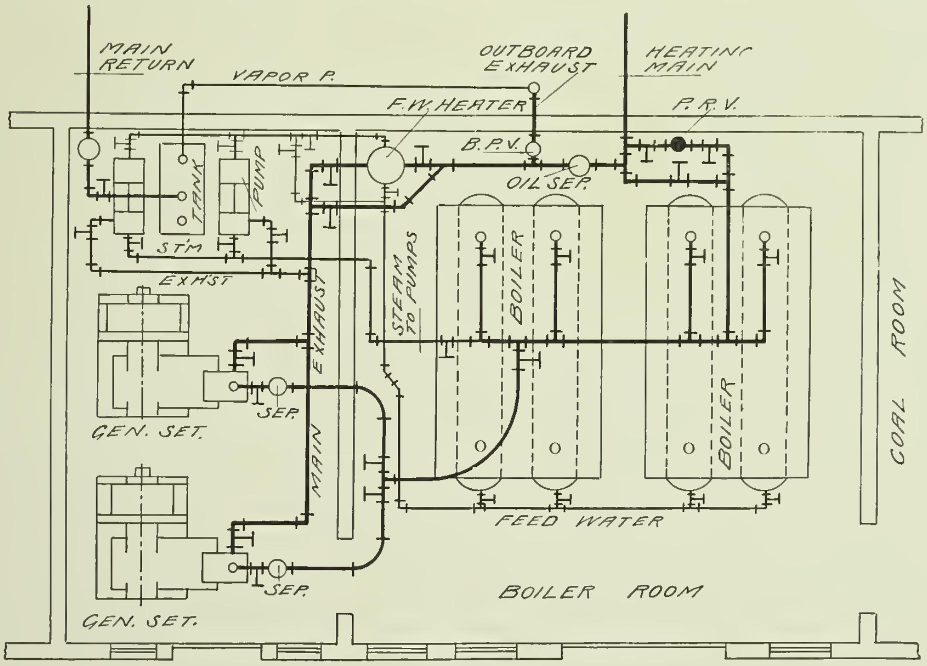


FIG. IV.

Pipe Sizes. The pipe sizes in boiler and engine rooms are largely fixed by the outlets provided on the different pieces of apparatus.

A simple method which gives pipes of ample size for average conditions is to allow 0.12 square inches per indicated horse power for supply pipes to engines, and 0.18 square inches for exhaust. For underground heating mains of considerable length, the following table may be used, based on a drop in pressure of 1 pound in 1,000 feet of run :

TABLE IX.

Size of Pipe. Supply.	Return.	Square Feet of Direct Radiation Supplied.
2½″	2″	700
3″	2½″	1,000
3½″	2½″	1,600
4″	3″	2,300
5″	3″	4,000
6″	3½″	6,500
7″	3½″	10,000
8″	4″	14,000

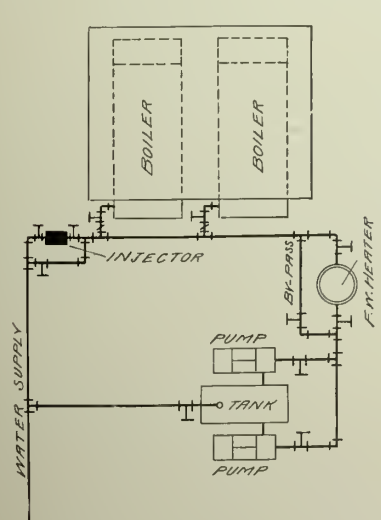


FIG. V.

Pipe Conduits. In heating a group of buildings from a central plant, the distributing mains and conduits form an important part of the equipment.

In selecting the best type of conduit, it is necessary to consider the insulation, the initial cost, and durability.

The materials in most common use are wood, vitrified tile, and concrete, while brick is used to a considerable extent in the construction of manholes. While wooden conduits are the cheapest to construct, they are not so durable as either tile or concrete, hence the problem should be considered from all sides when deciding upon the material to be used for a permanent installation.

A common form of wooden conduit is shown in Fig. VII. Solid turned logs are used for pipe sizes up to 6 inches, and staves for larger sizes. The shell varies from 2 to 4 inches in thickness according to size. The life of a wooden conduit depends upon the quality of the timber, and the thoroughness of waterproofing and underdraining, the average being from fifteen to twenty-five years. The sections of tile are

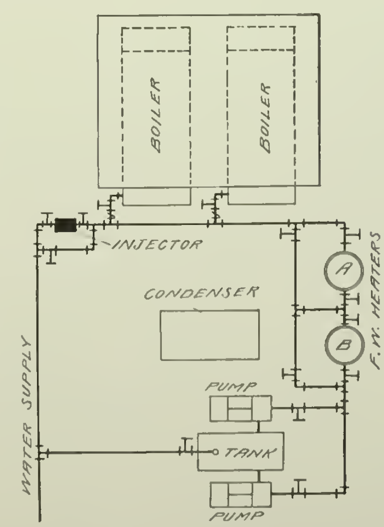


FIG. VI.

usually split lengthwise, the lower half being laid first, and after the steam pipes are run and tested, the upper half is put in place and the joints made water-tight with cement.

The pipe supports and anchors are placed in inverted tees and the lower part embedded in cement. Insulation is provided by filling the space around the pipes with specially prepared asbestos or other suitable material.

A concrete conduit is shown in Fig. VIII. By making the cover in sections and cementing the joints, it is more easily opened for pipe repairs than if made solid. When the distances are short and a number of pipes and electric cables are to be accommodated, a tunnel similar to that shown in Fig. X is much to be preferred, although considerably more expensive. This arrangement gives ample room for inspection and repairs without opening up the conduit. Fig. IX shows two methods of arranging the expansion joints and anchors. In the upper line, "A A" represent anchors, and "B" a combined anchor and double expansion joint. The direction of movement due to expansion is indicated by the arrows. In the second line, "C C" are anchors combined with single expansion joints. These special fittings consist of a heavy casting with a foot or standard which is anchor-bolted to a concrete pier embedded in the earth. This casting also forms the body of the expansion joint, which may be either single or double as desired. While slip joints are commonly used, they are liable to work loose, and if tightened up too much, to stick, thus causing the pipe to buckle when it expands.

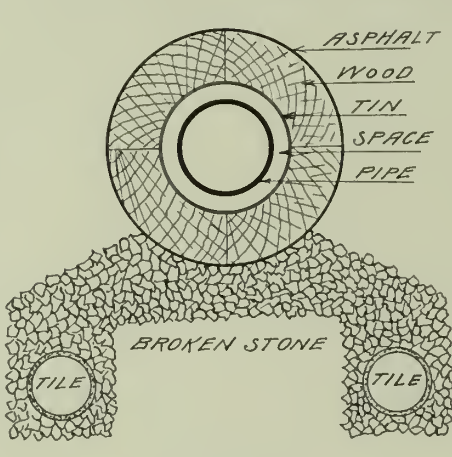


FIG. VII.

This condition has been overcome by the use of specially designed devices where the movement is taken up by means of flexible copper diaphragms instead of sliding joints. The distance between the joints will depend upon the type used and the amount of movement they are designed to take up. In general, this should not exceed 5 or 6 inches, which will limit the distance to 200 or 300 feet under average conditions.

Cost of Construction. In work as important as the laying of underground mains the type of conduit should be selected and estimates obtained by contractors familiar with local conditions. For approximate work the following table may be used, which is based on the average cost of four different kinds of conduits, and includes excavating and filling (exclusive of rock excavation), conduit, supply and return piping, and insulation :

TABLE X.

Size of Supply Main.	Cost Per Foot.
3″	$1.70
4″	2.00
5″	3.00
6″	3.40
8″	4.50

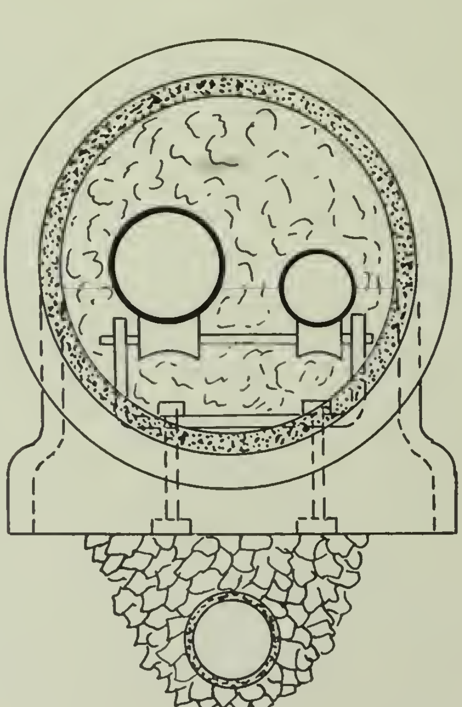


FIG. VIII.

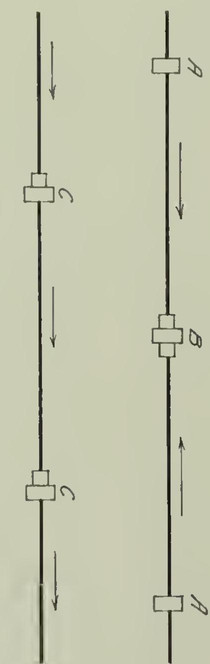


FIG. IX.

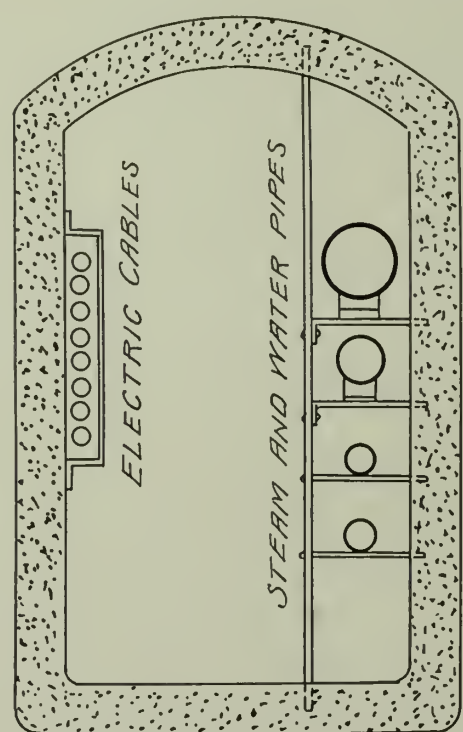
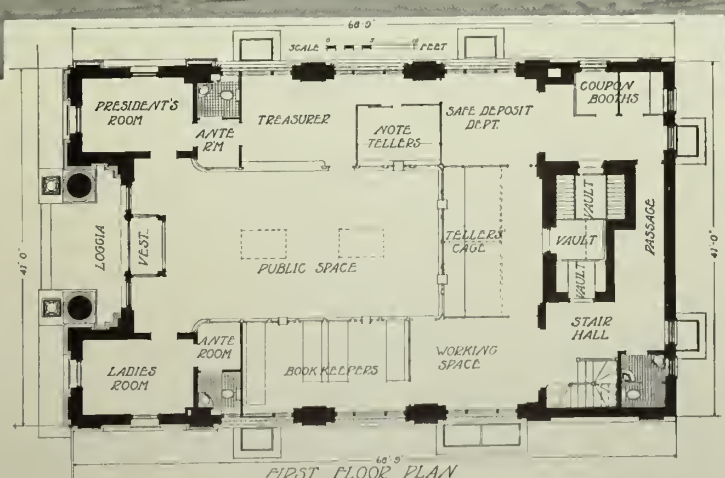


FIG. X.

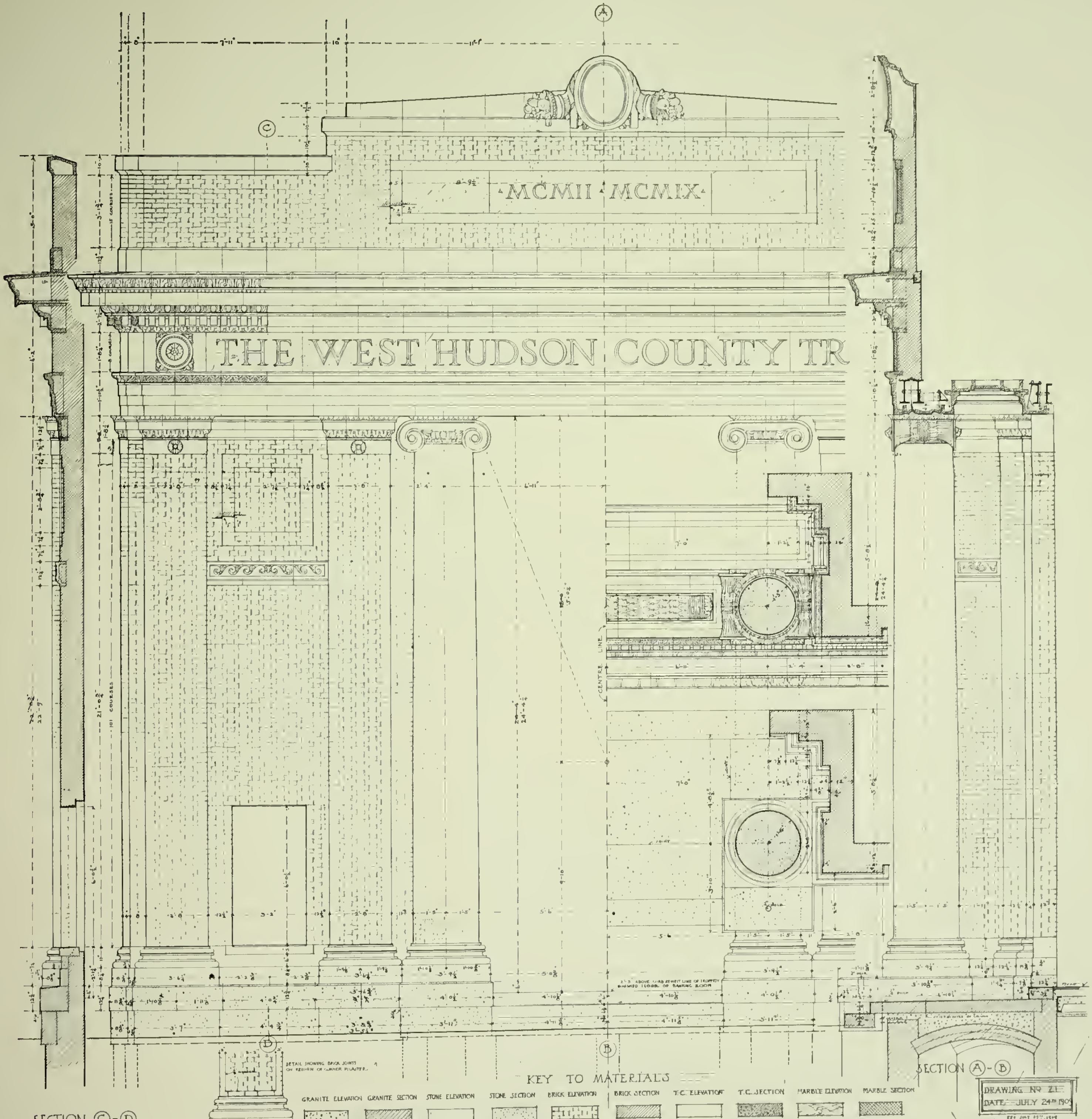


THE
WEST HUDSON COUNTY
TRUST COMPANY

HARRISON
NEW JERSEY

CROW, LEWIS
& WICKENHOEFER

ARCHITECTS



THREE-QUARTER INCH SCALE DRAWING OF SOUTH FACADE

THE
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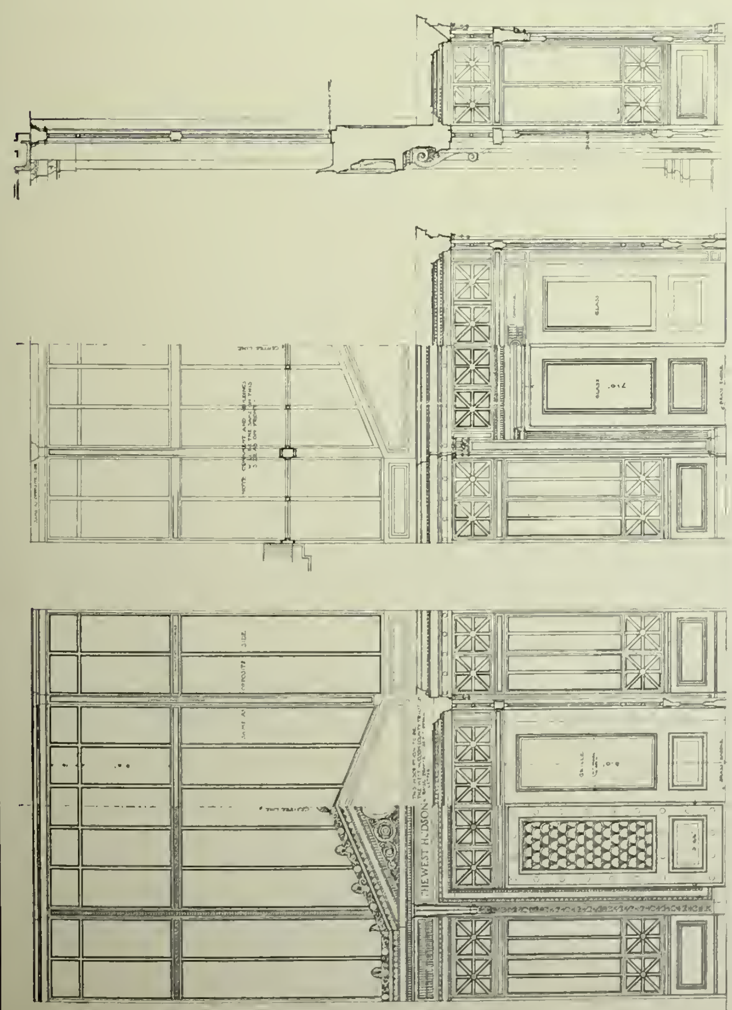
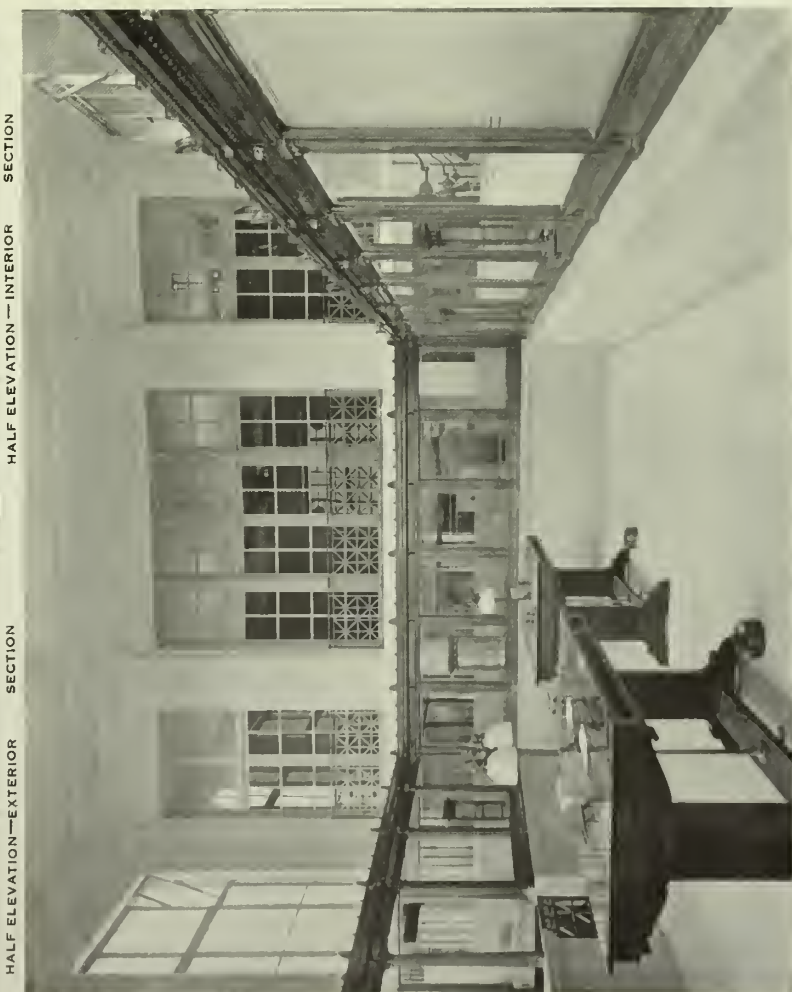
ENTRANCE DETAIL



HALF ELEVATION—EXTERIOR SECTION HALF ELEVATION—INTERIOR SECTION



INTERIOR OF BANKING ROOM

THE WEST HUDSON COUNTY TRUST COMPANY
HARRISON, NEW JERSEY
CROW, LEWIS & WICKENHOEFER, ARCHITECTS

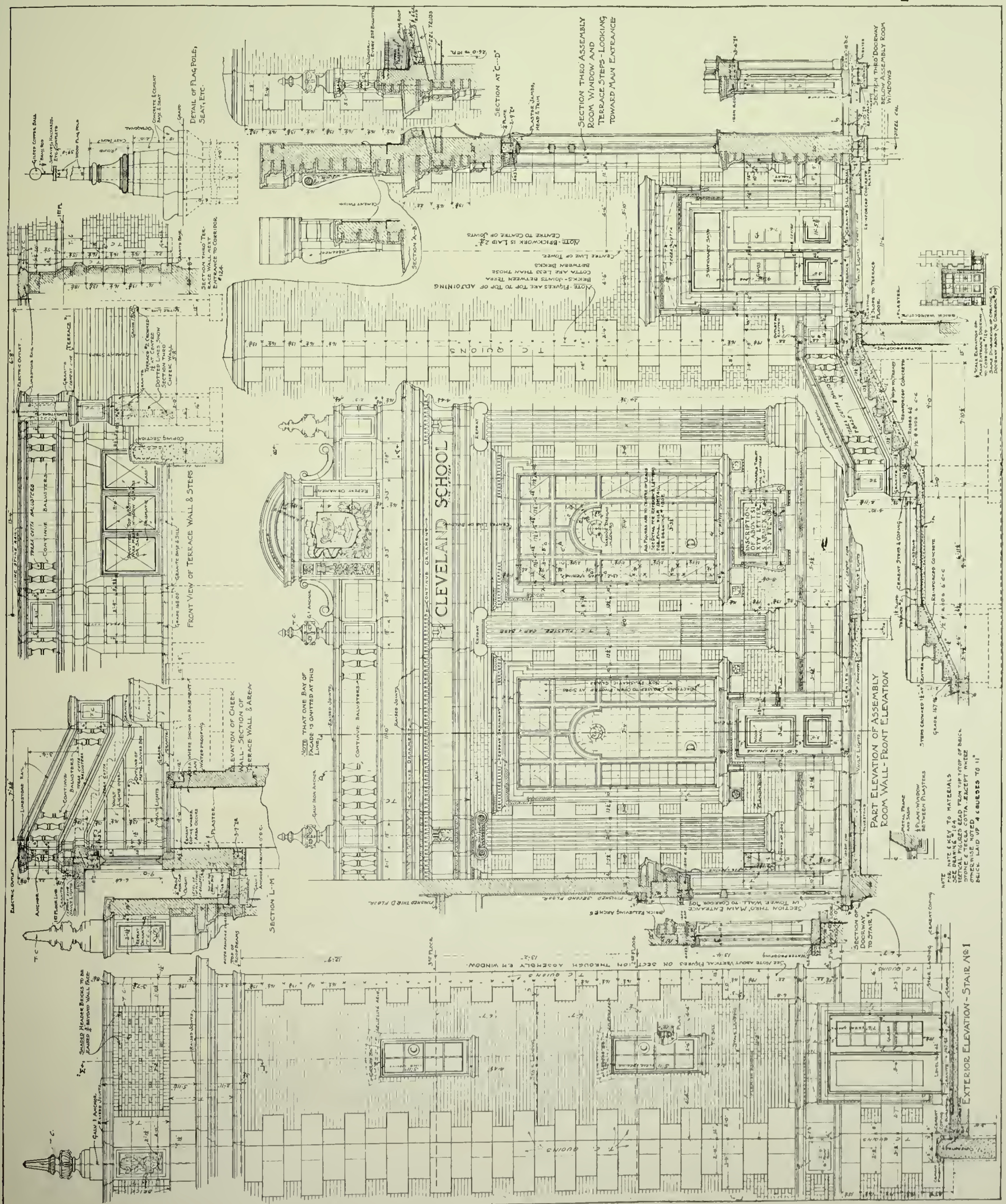
THE CLEVELAND SCHOOL, NEWARK, NEW JERSEY
ERNEST F. GUILBERT, ARCHITECT

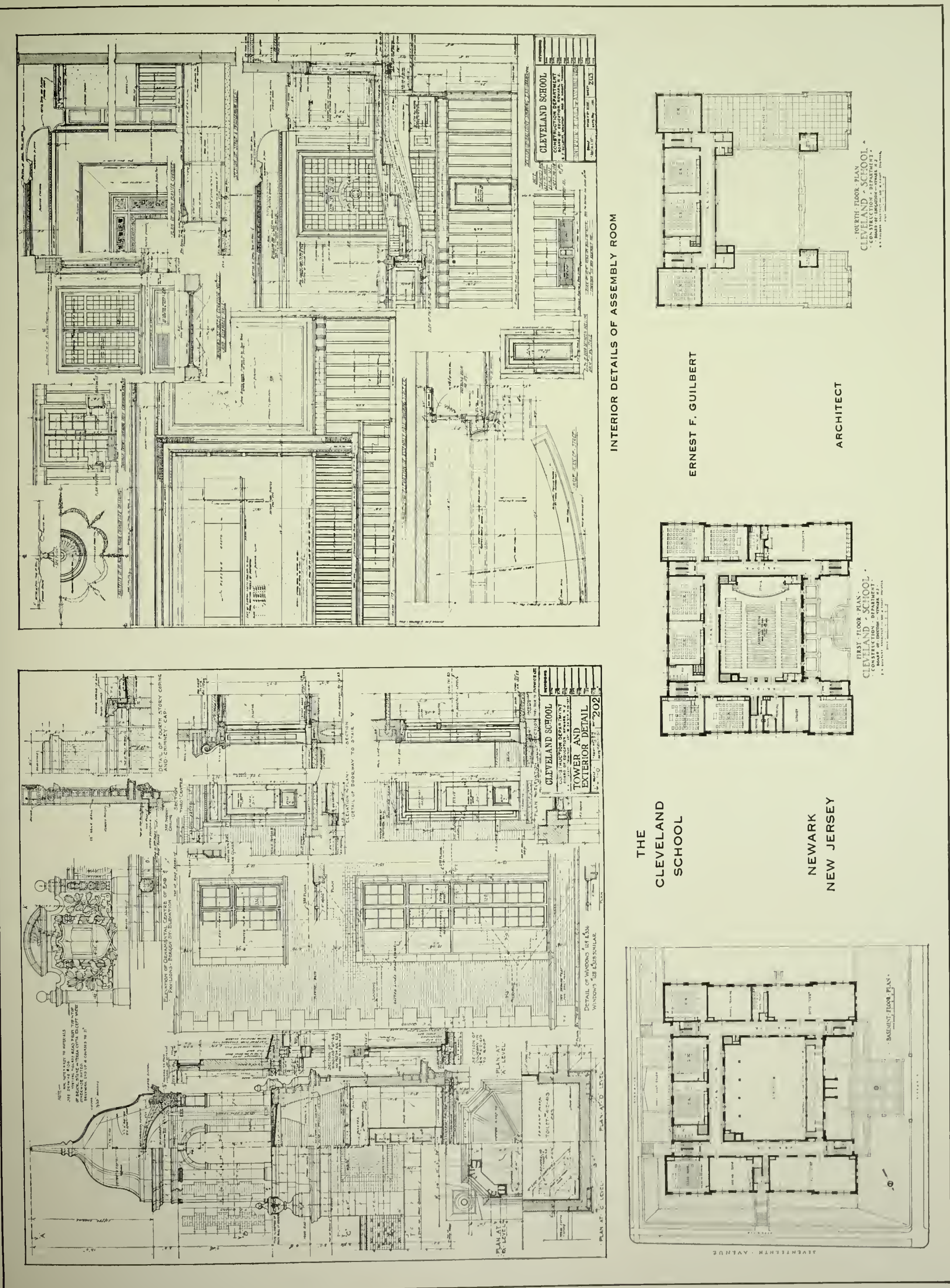
THE CLEVELAND SCHOOL

NEWARK NEW JERSEY

EXTERIOR DETAILS OF FRONT ELEVATION

ERNEST F. GUILBERT ARCHITECT





INTERIOR DETAILS OF ASSEMBLY ROOM

THE CLEVELAND SCHOOL
NEWARK
NEW JERSEY

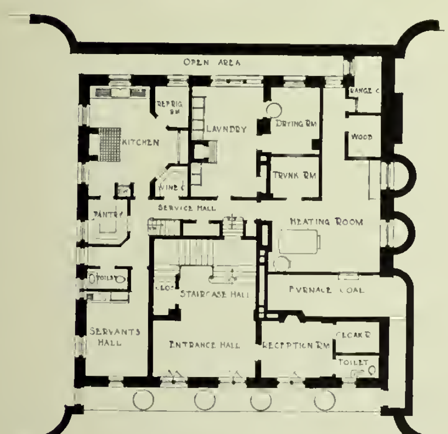
ERNEST F. GUILBERT
ARCHITECT

HOUSE AT MILTON, MASSACHUSETTS

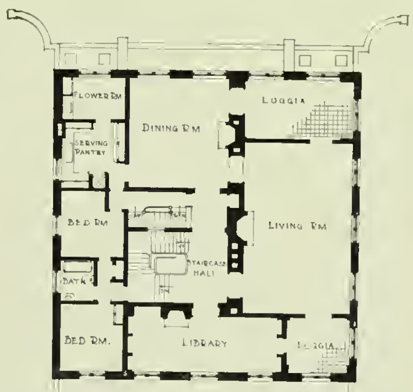
BIGELOW & WADSWORTH, ARCHITECTS

LIBRARY

LOGGIA



BASEMENT PLAN



FIRST FLOOR PLAN

SECOND FLOOR

HOUSE AT MILTON, MASSACHUSETTS

BIGELOW & WADSWORTH, ARCHITECTS

VOL. 22, NO. 4. PLATE 57.


LIVING ROOM

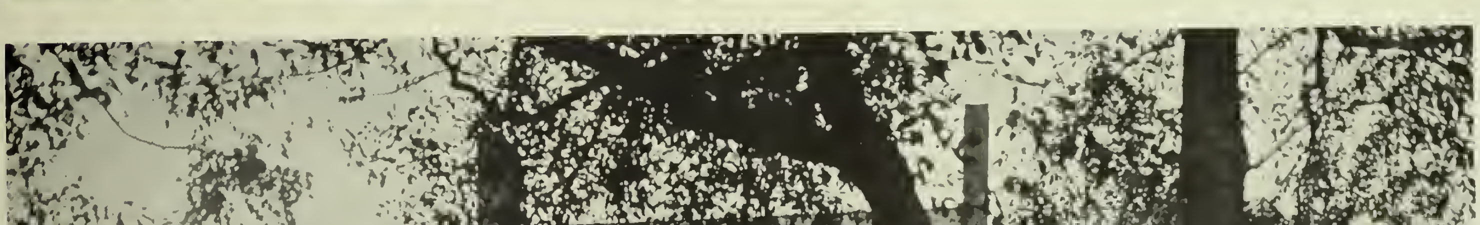

BEDROOM


RECEPTION ROOM

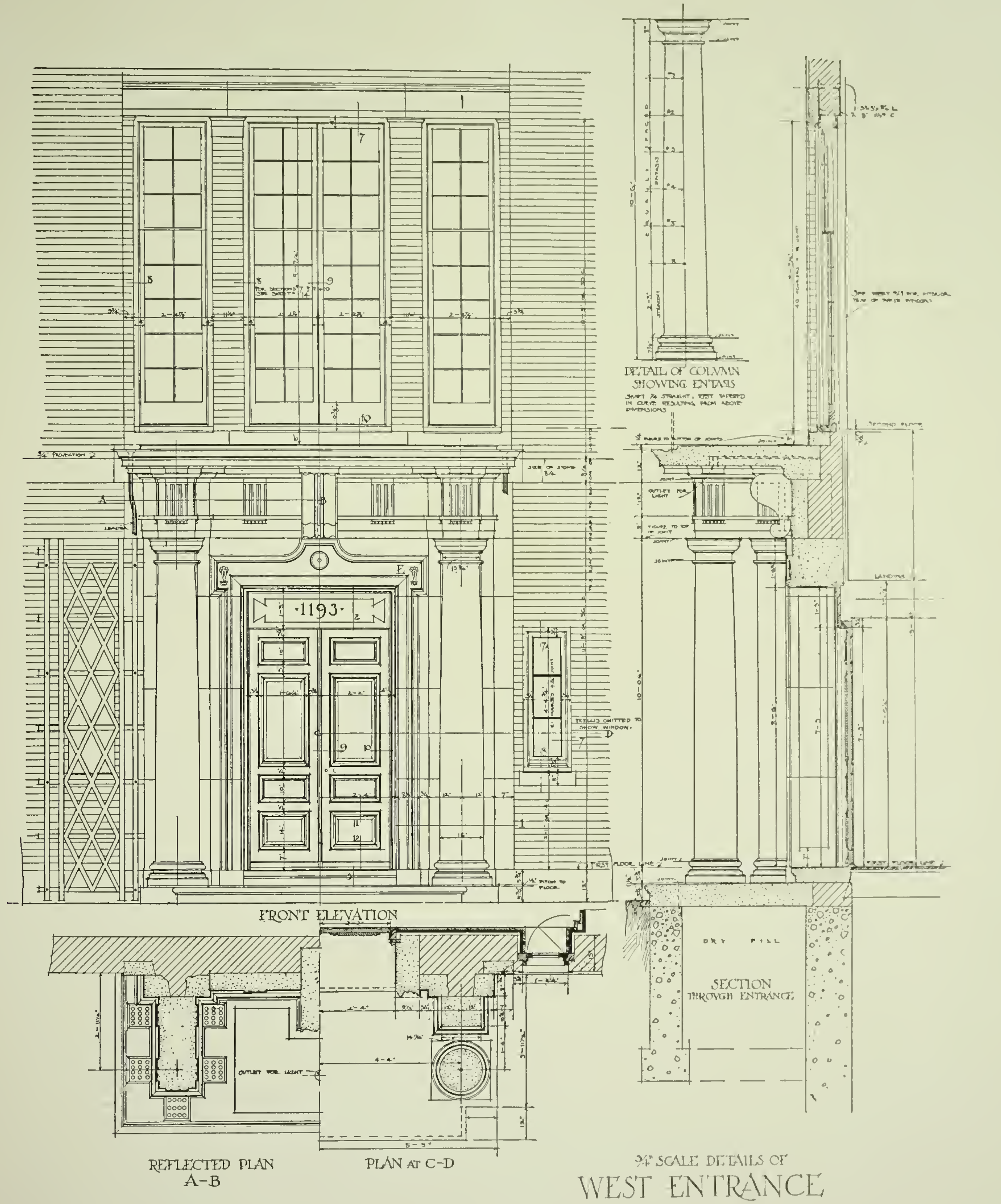

STAIRCASE HALL

HOUSE AT MILTON, MASSACHUSETTS

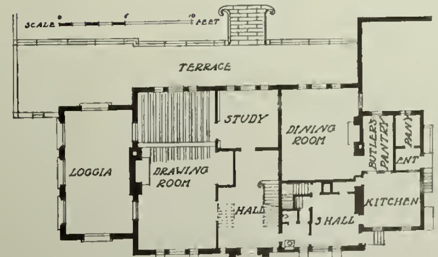
BIGELOW & WADSWORTH, ARCHITECTS



HOUSE AT BUFFALO, N.Y.
CHARLES A. PLATT, ARCHITECT



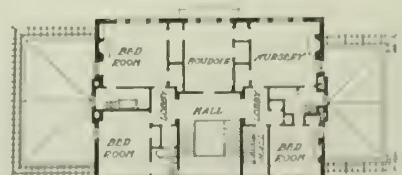
DETAIL OF MAIN ENTRANCE



FIRST FLOOR PLAN

HOUSE AT BUFFALO, N. Y

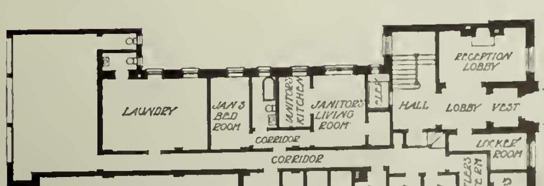
CHARLES A. PLATT
ARCHITECT



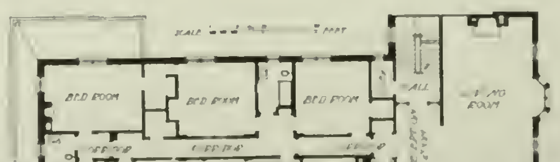
SECOND FLOOR PLAN

APARTMENT
AT
CHICAGO, ILL.

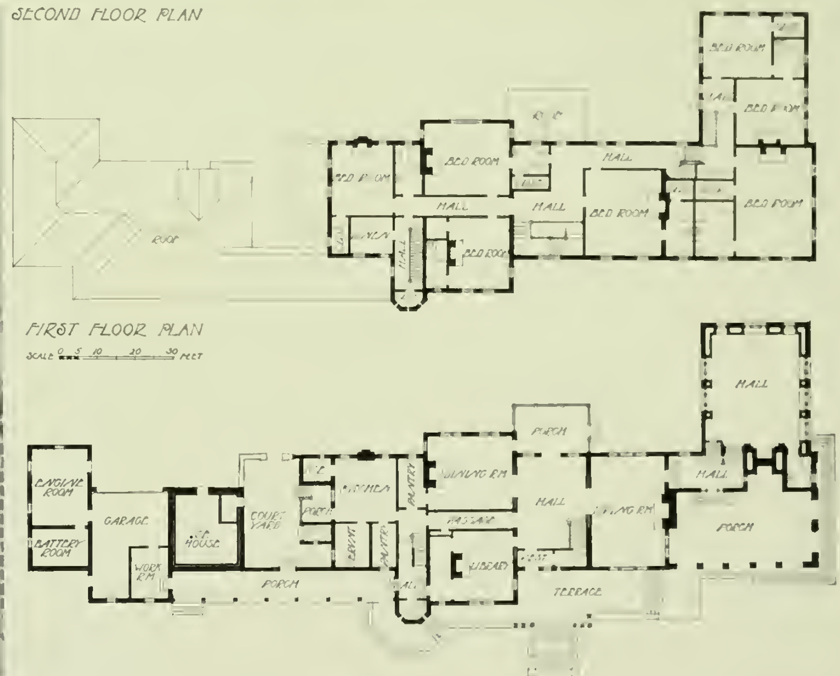
POND & POND
ARCHITECTS



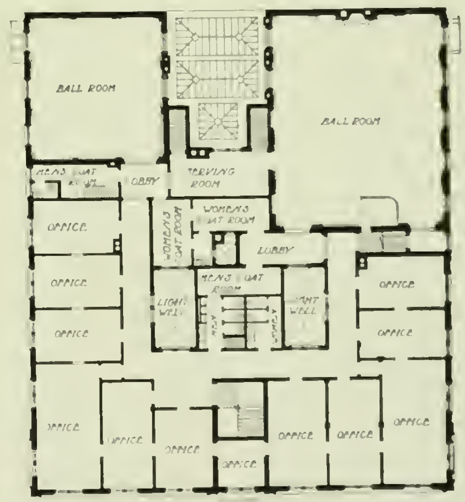
BASEMENT PLAN



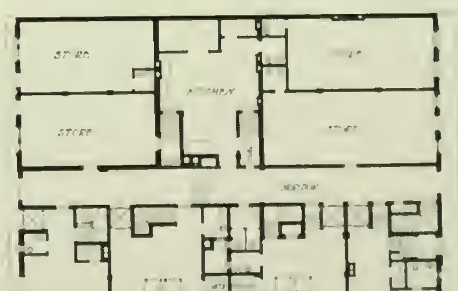
FIRST FLOOR PLAN



HOUSE AT CLEVELAND, OHIO
ABRAM GARFIELD, ARCHITECT



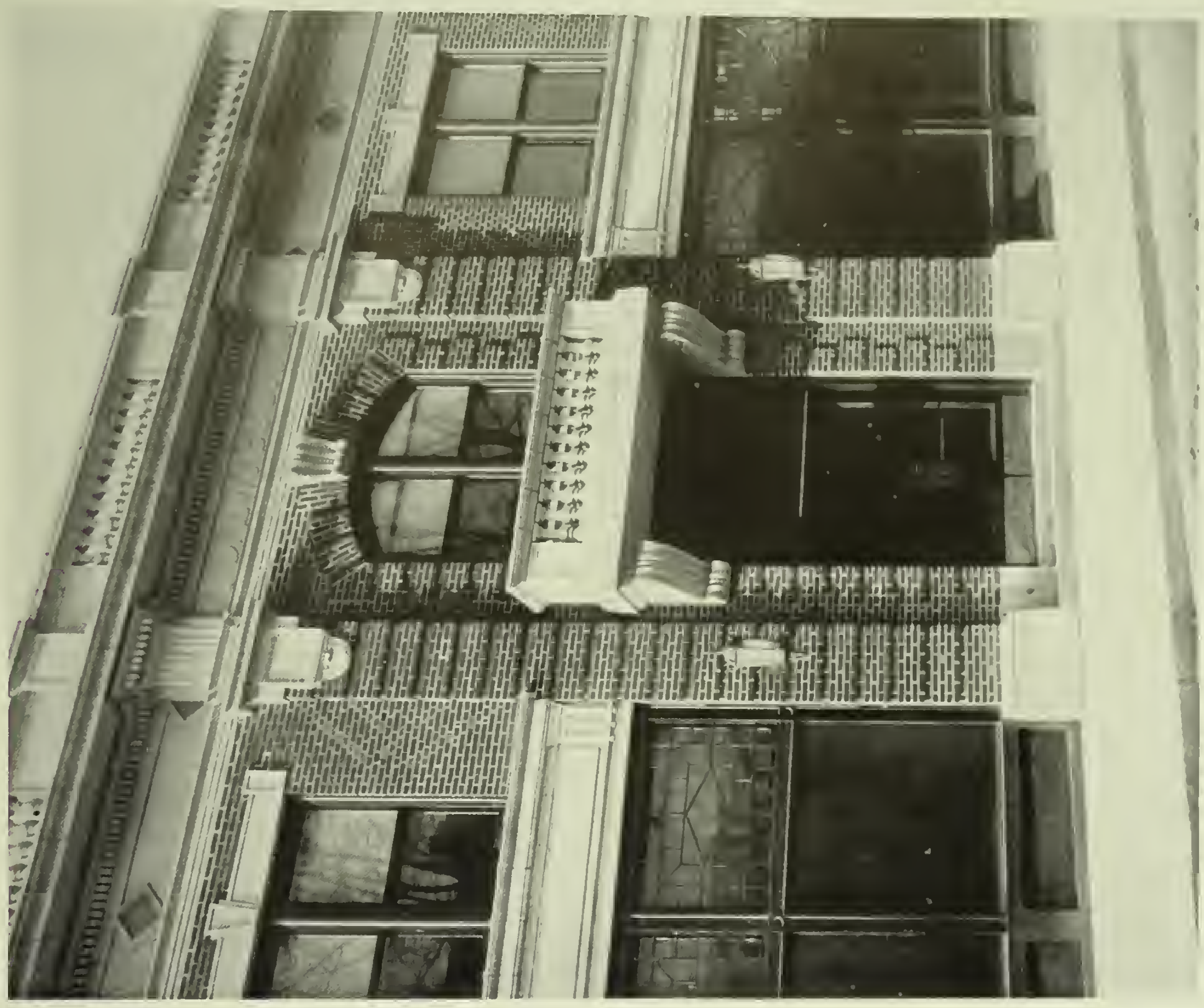
SECOND FLOOR PLAN



FIRST FLOOR PLAN

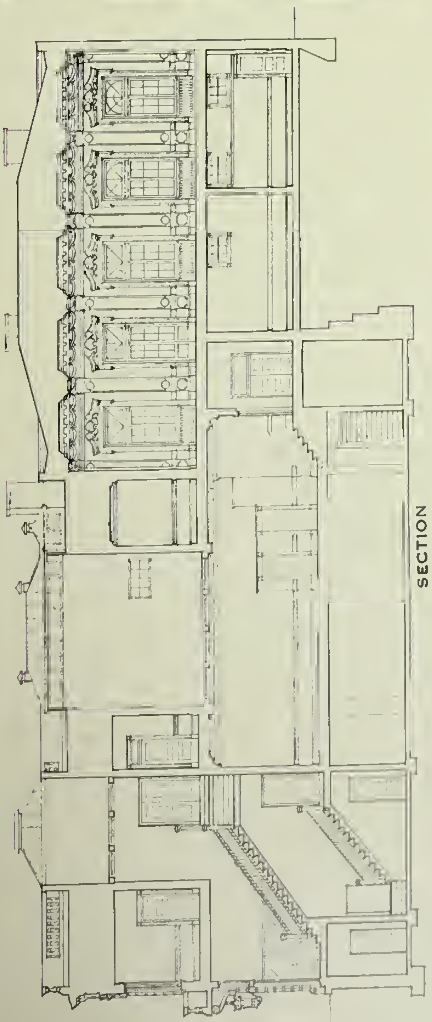
THE ANDREWS BUILDING, PROVIDENCE, RHODE ISLAND

JOHN HUTCHINS CADY, ARCHITECT

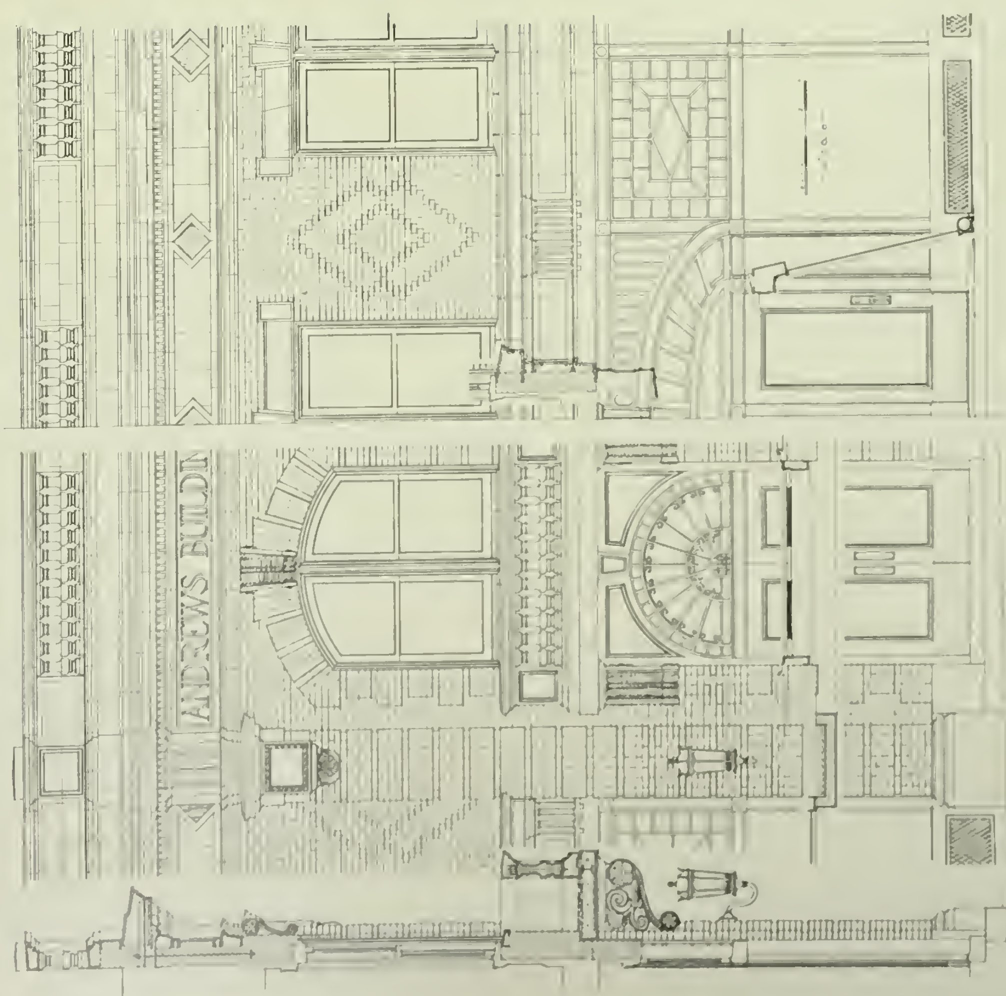


ENTRANCE DETAIL

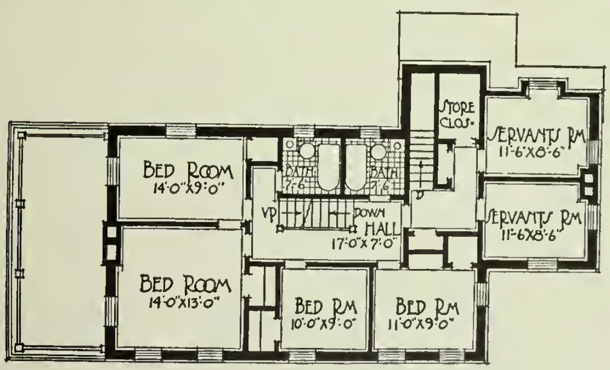
THE ANDREWS BUILDING, PROVIDENCE, RHODE ISLAND
JOHN HUTCHINS CADY ARCHITECT



SECTION



SCALE DETAIL



HOUSE AT ORANGE, N. J.

MANN & McNEILLE, ARCHITECTS

An Old English House—The Vyne.

BY R. RANDAL PHILLIPS.

A FEW miles from the town of Basingstoke, in Hampshire, is an old brick house which takes us back through different periods to Tudor days, a house interesting alike for its architecture and its historical associations. Henry VIII and his great Cardinal are commemorated on the panels of its Oak Gallery; Anne Boleyn and Elizabeth were among its royal guests; while in Stuart times it was the meeting-place of many notabilities, brought together by its then owner, Chaloner Chute, Speaker of the House of Commons, under Richard Cromwell. This triple historical connection is displayed in the house itself, which offers us successive periods of building. First in order is the Tudor work of the early sixteenth century, then comes the Elizabethan and Jacobean, followed by the later Renaissance, and finally the early Georgian.

Having been altered extensively over so long a period, it is difficult now to say exactly what was the original disposition of The Vyne, but it would seem to have been roughly ⊓ shaped. Early Tudor work is seen on the garden front — more especially on the chapel which juts out from one end of the house — and later Tudor work on the entrance front, with its diaper in the brickwork. On the entrance front the alterations made in successive years are clearly apparent, as in the sash windows which have taken the place of the original mullioned windows, and on this front, too, we see the doorways, which are among the chief work that was carried out by John Webb — who was Inigo Jones's nephew, and his right-hand man. The latest work of all is the imposing hall which Chute, as one of the dilettanti of the mid-eighteenth century, is credited with.

The original house was built for Lord Sandys, who lived during the reigns of Henry VII and Henry VIII, and of this the Oak Gallery is a delightful relic. It is particularly interesting as being a very early example of what became so familiar a feature of the old English house. In length about 82 feet, it is lined with linen-fold paneling enriched with carved monograms, mottoes, and badges. Altogether there are more than four hundred panels, including one, of exceptional interest, with two amorini supporting the arms of England. On another are the arms of Wolsey, with his cardinal's hat, and on another the arms of Catharine of Aragon: all showing the new Italian influence, which was then making its way into England. The date of this gallery would appear to be about 1520, so that it ranks among the earliest of its kind. Of about the same date is the work in the chapel.

A large chimney-piece in the Tapestry Room brings us to the Elizabethan period, and there are other similar relics about the house, while in the dining-room we see Jacobean work: in which connection it may be noted that the architecture of the hundred years from 1520 to 1620 was tentative in character. As Professor Blomfield remarks, the builders were losing their old tradition and had not yet replaced it by a new one, and on the other hand a certain sense of expansion and intellectual enfranchisement in the air at the time tempted them to bold experiments for which they were ill-equipped.

THE PILLARED STAIRCASE HALL.

Webb, as already pointed out, made extensive alterations to the interior of The Vyne, but its most prominent feature belongs to a later date: the pillared staircase hall having been added in the middle years of the eighteenth century. It is very typical of its period — a time when the nobleman was taking up architecture as a polite part of his education, a time also of unreality and theatrical effect. Nevertheless, there is no denying the impressiveness of this staircase hall which John Chute added about 1760. Whether he was the actual designer cannot now be stated, but we know that he was a man of parts, and, with the help of some practical hand, it is very probable that he did produce this design. The Corinthian columns are very elegant, and the enrichment on the frieze and the coffered ceiling displays a nice taste in ornament; but, bearing in mind that The Vyne is not a very pretentious house, one feels that the staircase hall is too stately, and Horace Walpole's criticism of it, as being too "theatric," has much to warrant it.

Here then we have an old house of much interest, a mellow piece of brick building over-grown in part with ivy and creeper, a house which has lasted out the pageant of nearly four hundred years, yet still offers us its ancient record as a lasting testimony to the work of men's hands.

THE OAK GALLERY.

As it stands to-day the main part of The Vyne belongs to the period of John Webb, by whom the interior was extensively remodeled. He also added the large portico which rather overpowers the garden front of the house, and designed the elegant brick pigeon-cote and the lodge. Webb having based his work so much on his master's, it is now impossible to determine precisely the authorship of many designs, and, as a consequence, great confusion exists as to whether it was Webb or Inigo Jones who made them; but in the case of The Vyne there is little doubt that Webb was solely responsible for the work. In some of its details there is noticeable a lack of refinement which Inigo Jones would not have been guilty of, and the great portico on the garden front could never be attributed to "the father of English architecture." Webb was a conscientious architect, intelligent, but not profoundly original. He worked in the manner he had learned from Inigo Jones, a manner admirable in itself, but most difficult to handle, and there is little trace in his work of the learning and consummate reticence of his master. Yet he came of a splendid school, and nowhere is the saving influence of tradition more clearly seen than in the work of pupils of great exponents of architectural design.

DINING ROOM.

GARDEN FRONT

DETAIL OF ENTRANCE FRONT

AN OLD ENGLISH HOUSE—THE VYNE, BASINGSTOKE, HAMPSHIRE

PIGEON COTE.

THE LODGE.

THE VYNE, BASINGSTOKE, HAMPSHIRE, ENGLAND.

Architectural Jurisprudence.—Part I.

AN ARCHITECT'S COMPENSATION AND LIABILITIES.

BY WILLIAM L. BOWMAN, C.E., LL.B.

Error of opinion may be tolerated where reason is left free to combat it.—*Jefferson*.

UNLIKE the laws of Nature and of her forces which are constant and concurring, the statute and common laws of man, as made and applied in the various States of our Union, are as diverse as the points of the compass, and they are often interpreted directly contrary in adjoining jurisdictions. It is for this reason that it is unwise and unsatisfactory to attempt to make general statements concerning our laws or to give general advice as to personal conduct and procedure. Added to this difficulty, arising from such diversity of laws and its applications, is the fact that almost no differences between men arise but have their distinctions from similar situations that have previously arisen; hence one can realize that the best of general opinions will be of little use for application to any specific case. However, a study of the laws and of the decisions under various circumstances furnishes certain landmarks, as it were, which are helpful in guiding the layman. It is the object of this article to point out to the architect some of these "landmarks" pertaining to his demands for compensation, the statutory protection of his compensation, and his probable liability to the owner and others. It is hoped that by the use of these suggestions some disputes and consequent law-suits may be avoided, especially as such troubles are destructive of that peace of mind and mental condition which permit a proper artistic atmosphere and truly expressive conceptions.

The contract between the architect and an owner should always be in writing and complete in all its details. If the writing is complete in itself it is important to remember that there is a rule of evidence which in such cases rejects all consideration of what was talked about or agreed upon previous to the making of the writing. In determining what the writing means it is considered as a whole, but at the same time each phrase or word is given its proper attention and significance. A good example showing the way a contract will be interpreted involved the following facts. In a letter the architect proposed to prepare plans, specifications, and supervise certain construction work for a three per cent commission. To the letter was added as a postscript, "Payments to be made on monthly estimates." When the plans and specifications were completed, the architect demanded two per cent as then due him under the usual custom of payments to architects. The court decided that he was not entitled to any pay until monthly estimates were made; hence the suit was dismissed with costs against the architect.

There was no question but that the architect had meant to make the contract so that he would get the usual compensation for the plans and specifications and then his percentage for the supervision on each monthly estimate; but he did not state it clearly, and consequently did not receive his pay for the plans and specifications at the time expected.

Full consideration of this simple case teaches us three fundamental lessons: first, that a contract is strictly construed as it reads; second, that no custom of architects can change or modify a definite agreement; and third, that legal action to try and get a partial payment is poor business policy, often resulting, as it did in this case, in the loss of the supervision work, and in having to pay attorney's fees and court costs out of the "reasonable value" which the architect later received for the work done.

Throughout this discussion we shall assume that the architect has a contract for employment and that he has faithfully complied with his part of such agreement.

Where the contract is merely for preliminary sketches and specifications or even for detailed plans and specifications, it is customary to state that the compensation of the architect shall be a certain percentage upon the "estimated cost" of the work. These important words were considered as follows in an architect's case: "The estimated cost we understand in this case to mean the reasonable cost of buildings erected in accordance with the plans and specifications referred to and not necessarily the amount of some actual estimate made by a builder, nor an estimate agreed upon by the parties, nor yet an estimate or bid accepted by the defendant (owner)."

This opinion then shows that under certain circumstances, and especially if technical objections are not made, builders' estimates are some evidence of reasonable value. There are so many conditions and motives that enter into builders' estimates that, as a matter of fact, these estimates rarely represent what they should, namely, the cost as determined by a reasonable man who is capable of making such determination. It is recommended, therefore, that when an architect renders his bill for such services under such a contract the "estimated cost" be a "reasonable cost" which can easily be supported and approved by impartial experts having no interest in either the architect or the owner.

Where there is a limit of expense fixed by the owner, and where as is usual the lowest bid to do the work is higher than the cost limit, there are two questions involved: Can the architect recover anything for his work, and if so, how much? The first question depends on whether the lowest bid is the "reasonable cost" as just discussed, and also whether there has been a "substantial performance," or such performance by the architect of his agreement with the owner as should require the owner in justice and equity to pay for the work. No general rule can be given as to what will be considered a substantial performance by the architect in such cases, but as a working rule it is suggested that for cost limits less than $5,000 the excess of the "reasonable cost" should be kept under fifteen per cent; while for cost limits above $5,000 such excess should be kept under seven and one half per cent. Where these percentages are exceeded it is questionable whether the architect can ever recover anything for his work unless the owner accepts the work and waives his contract right to keep the architect within the cost limit imposed. Architects doing public work are all familiar with the rule that public contracts must be kept within the appropriation for the work; otherwise there may be no pay for work done in excess of the appropriation. In private work the same rule should govern the action of the architect in making his plans and specifications, thus leaving the excess cost allowed in such work to become available in cases where there are increases in the cost of materials and of labor between the time of drawing the plans and the letting of the building contract. Naturally, if the cost limit is materially exceeded the architect should at once offer to make the changes necessary to bring the plans and specifications within the limit. In rendering his bill the architect is always safe if he only demands his percentage on the cost limit, and that should be the practice where there is not much difference to him. Some courts, and especially in competitive work, restrict the compensation to a percentage on just that figure. This suggestion would seem to be good also in the case where the architect intended to supervise, because many an architect has lost his supervision by demanding his percentage on some builder's bid which may or may not have been a reasonable estimate.

In cases where there is no contract or agreement either written or oral as to the amount to be paid for the architect's services, the law implies that the owner shall pay the reasonable value of the work done. In such cases it is usual for the architect to charge in accordance with the schedule of the American Institute of Architects. Those charges, however, are not binding upon the owner unless it can be shown that he was familiar with them or with the usual and customary practice of architects to make such charges where there is nothing said as to compensation. In defense, the owner can show and is entitled to know the amount of time spent on the work by the architect and his assistants, his expenses, etc., so as to see whether the charges made are reasonable. It is therefore advisable before rendering bills under these circumstances to consider what hourly or daily charge is being made, and if found excessive it is good legal as well as business policy to make a reasonable bill for the services actually rendered.

In cases where orders for plans and specifications are countermanded soon after being ordered, or in fact at any time prior to the completion of the work, there is great difference of opinion as to what compensation the architect is entitled to. Some states seem to hold, contrary to their usual rule in ordinary breaches of contracts, that the architect can only recover for the work done prior to the receipt of the countermanding order. Of course no architect should do any work after receiving such an order. The usual rule of law applicable to a breach of contract of this kind states that the architect is entitled to his full contract price less what it would have cost him to fully perform and also less what he might in the meantime have earned elsewhere. The changing and shortening of the manner of expressing this rule is probably largely due to the fact that it is seldom that the architect can show that he was unable to get other work to take the place of that countermanded, and since he cannot show any damage suffered by such countermand he is left with only his claim and right to receive and recover the reasonable value of the work actually done with the outlay of expenses made. This same rule of law is also applicable where the architect supervises as well as draws the plans. Under these conditions a bill rendered reasonable in its demand and solely for the work actually done will often save time and trouble for all concerned.

The chief difficulty which is likely to arise in such a contract comes from the common expression "actual cost."

What does it mean? Strange to say, judicial definitions are rare, but in one case it was decided to mean the total cost of the completed buildings including permanent appliances and fixtures. In another case it was held not to include damages given in a law-suit to the contractors for delay caused by the owner even though the damages were measured by extra expense in the construction caused by increase in cost of materials and in the cost of labor. Under the Revenue Laws, "actual cost" is defined as the actual price paid in a bona fide purchase and not the market value. Again it is defined in another similar case as "money actually paid out." These definitions applied to a building operation would exclude from the "actual cost" those materials which the owner does not actually pay for in money. By the schedule of the American Institute of Architects they use the term "total cost" instead of "actual cost" and then state that "the total cost is to be interpreted as the cost of materials and labor necessary to complete the work, plus contractors' profits and expenses, as such cost would be if all materials were new and all labor fully paid at market prices current when the work was ordered." Where this schedule is called to the attention of the owner, then it becomes applicable and solves this opportunity for great difference of opinion. The term "total cost" does not seem to have as yet received wide and common usage and no judicial definition has been made of it.

Suppose the owner by advice of the architect gives the construction work to several parties and thus dispenses with the services of a general contractor; after starting work one of these contractors quits the job and a new contract for the same work has to be made at a much higher price on account of new conditions discovered underground; the financial irresponsibility of the defaulting contractor prevents the owner recovering the excess cost from him: is the architect entitled to charge his percentage on the "actual cost" which includes this excess cost caused by this combination of circumstances? There seem to be no decisions on such a case, but from analogy to somewhat similar conditions passed upon by some courts an architect's fee should not be based upon such excess cost. It is only fair to say that slight modification of the facts given for this suppositive case would probably require the contrary decision and it is practically impossible to say, what a court would find if required to pass directly upon that question or modifications of it.

Strange to say, there is one state where there seems to be no definition for "actual cost," although there are numerous decisions that the architect's compensation must be paid upon that basis. They also hold that such "actual cost" must be proven and therefore reject any evidence as to statements of the estimated cost, amounts of probable cost filed with a building department, or expert opinions by architects or builders.

In this condition of the law on this subject, the only advice that can be given is that only those items or elements of the construction as are set forth and specified in the plans and specifications should be considered, and their actual cost should be taken unless it is excessive, due to some unexpected and uncontrollable circumstances as heretofore mentioned, or due to mistakes of the architect himself. Hence it is very evident that some judgment has to be used in determining just what items the architect will take when making up the "actual cost" upon which to base his compensation. It often becomes more a matter of business policy than of technical legality.

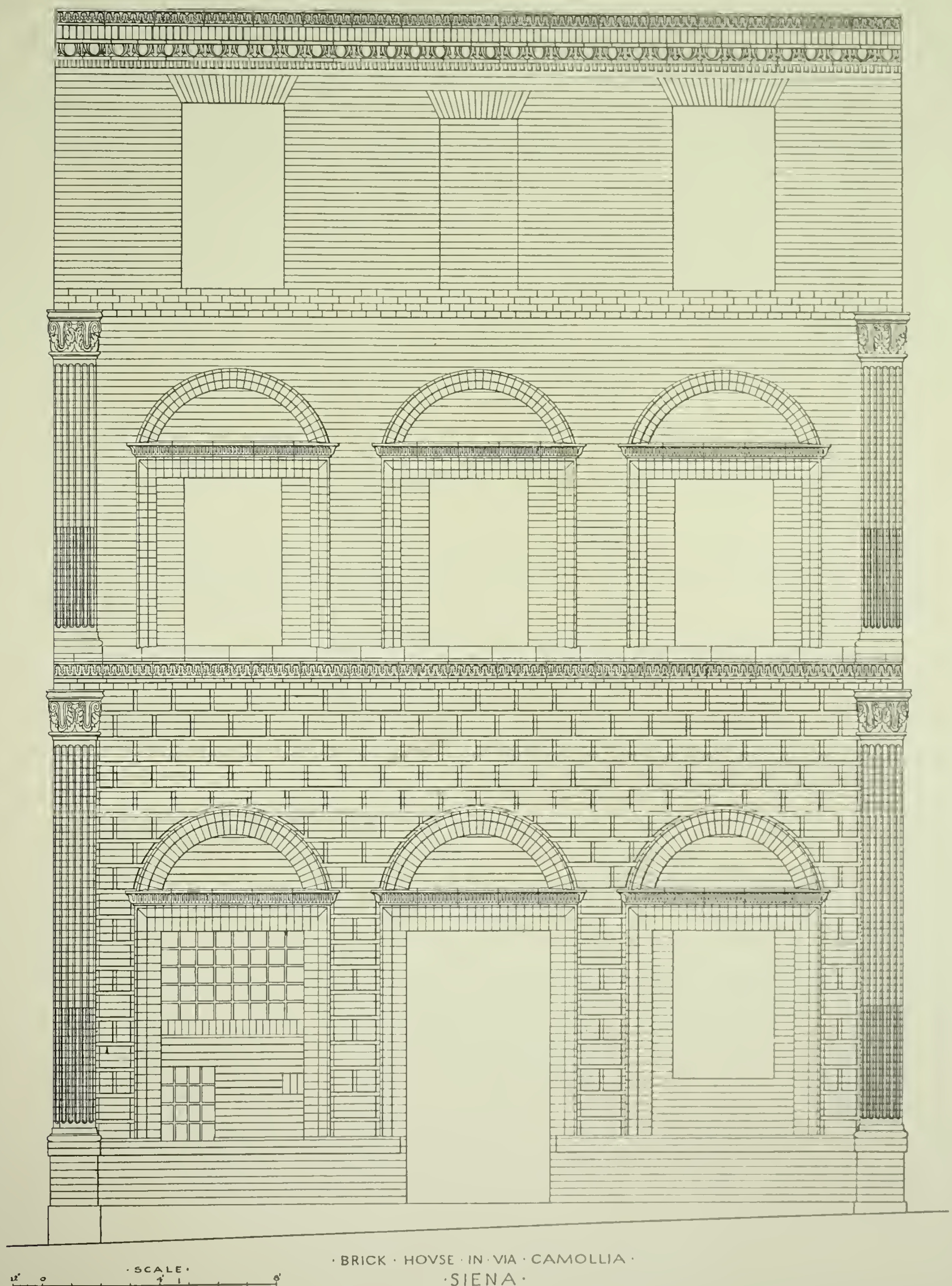
Since the architect deals with the owner of real estate, he does not ordinarily have the same difficulties as other people in collecting his pay for his services. In the every-day business life the first inquiry of a seller is as to the financial condition of the purchaser. The architect usually foregoes that inquiry. Still there are many chances taken to-day by an architect with the numerous notoriously crooked and insolvent real estate companies, corporations, etc., seeking his services for the improvement of heavily mortgaged lands. Then it is that the architect appreciates whatever statutory protection is given him. The best protection, when it is granted, is given by the right to put a lien on the property improved, or about to be improved. Another protection is sometimes afforded by the means of legal processes called "attachment" and "garnishment."

Most of us are familiar with the protection given contractors, sub-contractors, material men, and laborers by statutes which are commonly called lien laws. By them the property which is increased in value by buildings, etc., is itself held by the law to pay for such increase of value, at least to the extent of the owner's contract with the contractor. Is an architect entitled to that protection for his services in preparing the plans and specifications and in superintending the construction of the work? No general answer can be given to this question as the different statutes are differently worded, and often when similarly worded are interpreted differently. All such statutes can usually be divided into two general classes: one which protects "any person performing labor" upon building construction, and the other which specifies, for protection, certain persons as "mechanics, laborers, etc." This classification is helpful in our inquiry since, under the first class, architects are protected, and under the second they are not. Thus it would seem from the recorded cases that at present where the architect has an entire contract both for preparation of plans and specifications and also for superintendence, and fulfils both of these services, he is entitled to a mechanics lien in fifteen states. On the other hand, Iowa, Kentucky, Massachusetts, Missouri, North Carolina, and Tennessee deny an architect the help of the lien law under such circumstances.

Suppose the architect merely prepares plans and specifications, is he protected by the lien law for such services? It would be expected that if the buildings are not erected there should be no lien, but Wisconsin seems to allow a lien even then. Where the construction work is completed according to the plans and specifications there is about an equal difference of opinion in the reported cases.

Where the architect merely superintends the construction work it is certain that he would be protected in those states where he is benefited when he draws the plans and superintends. New York, Rhode Island, and Oregon seem to help the architect in such a case, upon the theory that such services are actually performed upon the construction work in contradistinction to the work done in making the plans and specifications which is all performed in his office.

These considerations of the various lien laws show that for definite and safe advice concerning one's rights thereunder the architect must consult local counsel.



· BRICK · HOVSE · IN · VIA · CAMOLLIA ·
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MEASURED DRAWINGS · ITALIAN SERIES

WILL S ALDRICH. DEL

CHAPEL OF THE PLAZZO DEL DIAVOLO, SIENA.
MEASURED DRAWINGS—ITALIAN SERIES
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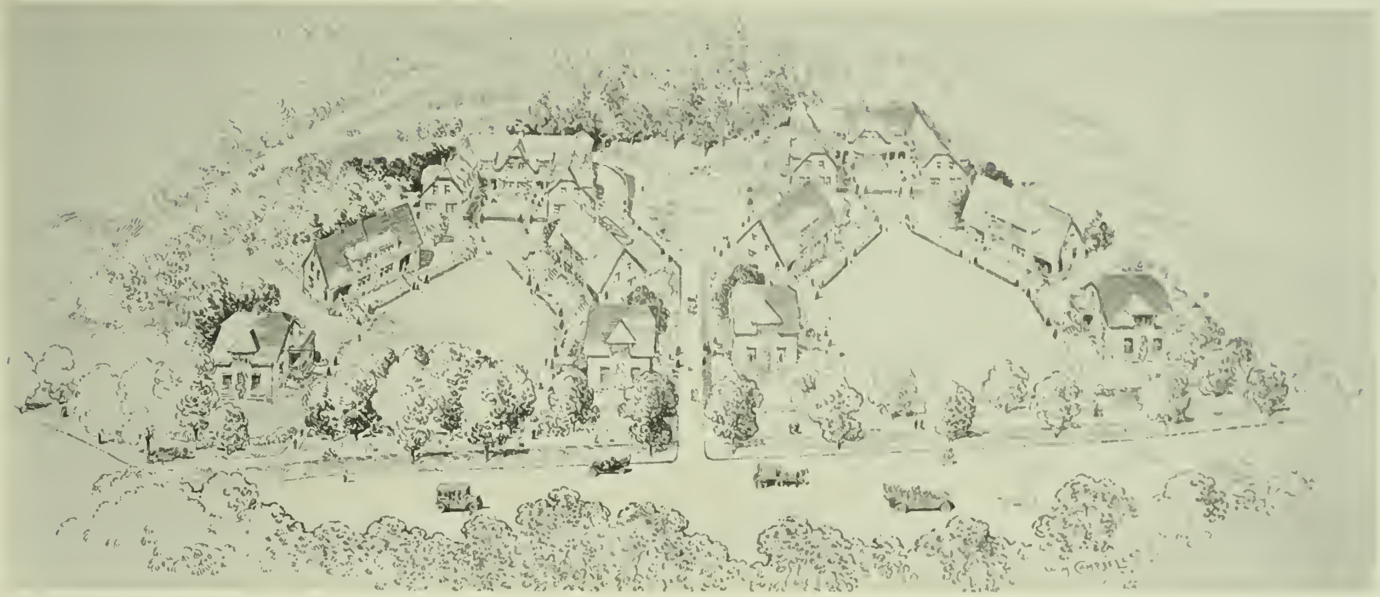
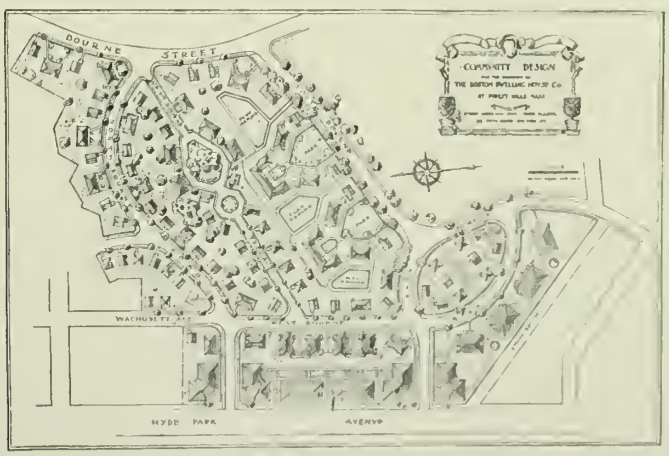


Two Groups of Houses Built for the Boston Dwelling House Company.

KILHAM & HOPKINS, ARCHITECTS.

THE shabby and neglected appearance of the outlying parts of our large cities always causes wondering comment from foreigners whose eyes, accustomed to the thrift and neatness of the Continent, are shocked by the ugly architecture and general lack of neatness which characterize too many of our suburbs. Even what is considered one of the best of Boston's industrial suburbs drew forth the exclamation "*Ah, que c'est triste*," from a Frenchman whose perceptions had not been dulled by too long residence in America.

Since last year, however, the suburbs of Boston have witnessed the inauguration of an intelligently directed attempt to create an addition to their number which shall, while providing attractive habitations for a respectable class of citizens, prove an object lesson to the real estate promoters whose slovenly developments have, by their cheap and meretricious appearance and early deterioration, ruined so much of the charming country which originally surrounded the city. In common with many other American cities, Boston has suffered from thoughtless and ill-ordered expansion of its cheaper residential districts, but in one way its experience has been peculiarly painful, for instead of housing its people in individually owned cottages, its suburbs have been built up with miles on miles of wooden three-story apartment houses, containing one apartment on each floor. These buildings, which are generally of the flimsiest construction, are known locally as "three-deckers" and are permitted by the local ordinances to be built as near as 6 feet apart and, by juggling the lot line, have in some cases approached each other even nearer. When new they are sometimes convenient and comfortable, but are subject to early depreciation, soon grow shabby and form vast areas of construction as combustible as a Philippine village. Their insidious march, like a fell disease, has ruined most of the real estate around the city.



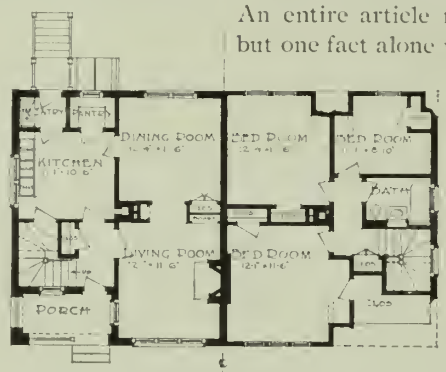
PLAN SHOWING ENTIRE DEVELOPMENT.

To combat this unhealthy state of affairs and to provide, as an example for investors, a suburb which should be charming, picturesque, practical, and a real asset to the city, improving and holding up values in its vicinity instead of depreciating them, a company of some of the most far-seeing and public-spirited men and women of Boston organized last year a strong corporation known as the Boston Dwelling House Company and acquired a property of some thirty acres near the Forest Hills Terminal of the Elevated system, which had been known as the Minot Estate. This property is high, with gravelly soil, well drained, and was largely covered with a splendid growth of old pines and other ornamental trees, as many as possible of which have been preserved.

Prettily winding roads were laid out and the "lotissement" was designed in such a way as to provide for groups of cottages — single, double, and in blocks, each having its own garden plot of rather limited size but with rights in large open squares or playgrounds which assure

GENERAL VIEW, BRICK HOUSE GROUP, FOREST HILLS, MASS.

not only plenty of air and sunlight but ample playing space for children. The site for each house was carefully gone over in advance, not only by the architects and engineers, but by real estate experts as well, and the orientation of each separate house received thoughtful and expert study.



HALF FIRST FLOOR PLAN HALF SECOND FLOOR PLAN
TYPE C

The ends of the company would not be attained if philanthropy were its only object. Unless a reasonable return were shown on the investment, the promoters could not hope for imitation. This has been fully provided for, and its financial success is assured.

A portion of the property abuts on Hyde Park avenue, one of the main thoroughfares leading south from Boston, and as the front land here was considered unsuitable for cottage development it was utilized for the erection of a new type of low-priced apartment houses which have met and conquered the three-decker on its own ground, both in cost, convenience, and appearance. An entire article might be written on this subject alone, but one fact alone will be of interest here. A little intelligent study showed that instead of crowding the buildings together with only 6 feet between, exactly the same number of suites could be gotten on the same land with 25-foot intervals between the buildings if a new type of plan were used. Although the new type conflicted with the building law, to the credit of Boston's Board of Appeal, be it said that it was warmly approved and its success was shown by the fact that every one of the seventy-two suites was applied for before they could be finished.

Back of the apartments, on rising ground sheltered among the great trees, a considerable number of cottages,

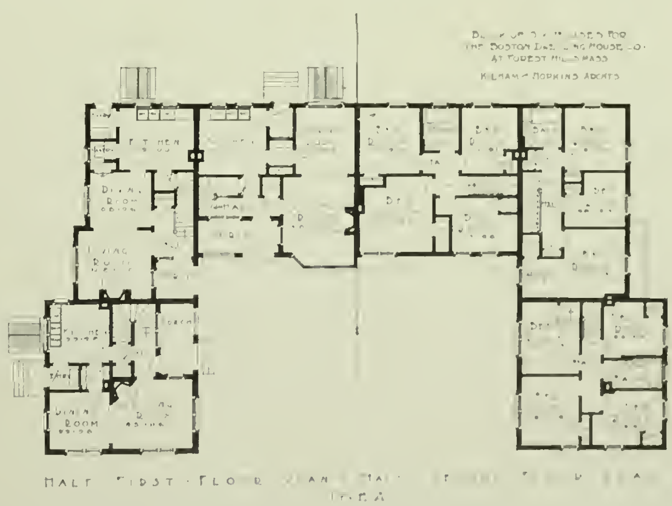
SEMI-DETACHED HOUSES, FOREST HILLS, MASS. TYPE "C".
Kilham & Hopkins, Architects.

both of brick and of hollow tile construction, have been built, of which the two groups herewith illustrated form the subject of this article. An interesting fact in connection with their construction was the investigation of plans and costs in England, where so many model villages have been built. It was found that a Letchworth house without cellar, hallway, closets, bath room, electricity, or furnace cost 7½*d.* or 15 cents per cubic foot, while the Boston houses, also built of brick and with slated roof, containing all these things, cost no more and were better.

These twenty-four brick houses are built in two groups around separate courts; both groups, however, are tied together and related by a common service driveway. The houses are so placed that the views from any side of the houses clear the next adjoining house, giving an uninterrupted view of the trees and planting around the courts, and, in fact, throughout the rest of the property, as the houses are situated on one of the highest terraces and over look the surrounding country for miles. The view obtained by the special placing of the houses, while very satisfactory, also is very important as to the question of the uninterrupted sunlight and air.

BLOCK OF SIX HOUSES, FOREST HILLS, MASS. TYPE "A".
Kilham & Hopkins, Architects.

Each group of twelve houses is made up of two single houses and two double houses and one six-family semi-detached house. All these houses are built with 8-inch brick walls, laid up in wide white joints. The roofs are covered with a light sea-green slate, and the outside flashings are of copper, and the finish is the best obtainable. Porches to each house are provided both at the front and in connection with the kitchen.



The single houses, as shown by the views accompanying this article, consist on the first floor of a good-sized parlor and a somewhat smaller dining room which are joined together by a large doorway, each one helping the other to give the appearance of an ample suite of rooms. The dining room has a high batten dado with plate rail and ornamental glass buffets. Opening from the dining room, with pantries between, is the kitchen with its own pantry and back entry for refrigerator, etc. In front of the kitchen is the front hall which contains the staircase to second floor, an ample coat closet, and opens directly into the living room. The second story consists of three chambers with large closets opening off each one, a bath room fitted up with a wood dado and up-to-date white steel medicine closet with mirror. Off the corridor is a well-equipped linen closet consisting of shelves, drawers, and cupboards. Above in the garret is a space for storage. The living room is provided with a fireplace, the facing of which is built of brick.

The double houses have an ample porch which is included under the main roof of the house. On entering the house from the porch, the front hall contains the staircase, coat closets, and opens directly into the living room. The general layout of kitchen and dining room is similar to that of the single house with the exception of the kitchen, which is somewhat larger. The second story of these houses also contains three chambers and bath rooms with fittings similar to the single houses. The living room in these houses also contains a fireplace similar to that in the single house. The six house block is laid around a small court very much in the form of those built in England to-day, and consist in general of the same arrangement as those in the previous mentioned single and double house type, with the exception that on two of the second floors four chambers are provided instead of three as in the other houses.

All of these houses are provided with light, ample cellars, with a hot air furnace and store closets and bulkheads leading out to the back yard.

The courts are provided with brick walks running around and connected with each separate dwelling, while in the center is a large open space 150 feet square for light and air, benefiting all the houses, giving them the same outlook that a much larger piece of land would give if owned separately. These courts are already planted with a variety of hardy shrubs and trees which, together with the vines now planted against the brick walls of all the houses, will next spring undoubtedly give as pleasing an effect as can be seen in any high-class residential suburb in America.

Between the groups of houses and at the opposite ends of same are driveways, over which all the teaming and delivery of supplies will pass. In the middle of these driveways are open spaces which are used for playgrounds for the children, and may be used in common by all of them.

The service and clothes yards are all located along these service driveways, and will not spoil in any way the effect of the fronts of any of the houses. Also, as these groups of houses are built on rising terraces, even the windows on the service driveways will look over and beyond the houses next below.

In locating these houses, the greatest care has been taken to preserve the wonderful old trees that occupied the ground before the buildings were started. Most of these trees have been preserved and give the whole community the age and dignity which is only obtained after years of patient waiting on most tracts of lands used for similar houses.

All the houses are connected with underground electric and telephone service in conduits. The gas, sewerage, and water supply are an integral part of the carefully developed sanitation of the entire estate.

The cost of the buildings is one of the most interesting and instructive parts of the whole proposition. It was found that these substantial brick houses which, with their slate roofs, are practically fireproof, can be built under proper up-to-date business management on the part of the contractor — where a large number are built at the same time — for no more per unit than the isolated single or double wooden houses of the same capacity which have been built on the nearby properties.

These attractive houses with from 2,300 to 3,300 square feet of land, all graded and with shrubbery and lawns complete, with the added value of rights in the ample restricted areas all around them, can be bought for the small cost of from $4,800 to $5,400. And not only that, but an easy form of payment has been drawn up by the company, whereby a purchaser can buy his house with very small first payment and successive small yearly payments, which are applied annually towards the final complete ownership of the building. Moreover, properties in the settlement are not subjected to depreciation of values owing to deterioration of the character of the neighborhood, for the estate is so large that it automatically guarantees itself against injury by the possible lowering of the character of the outside surroundings.

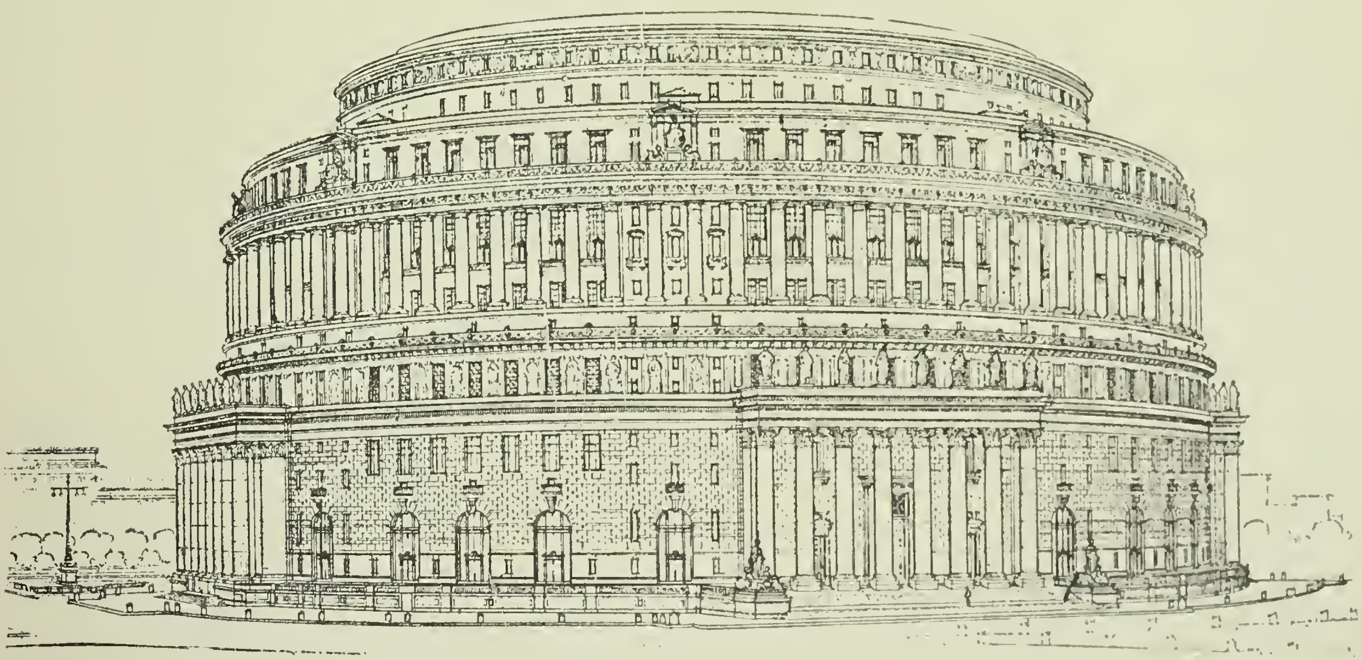
SINGLE HOUSE, FOREST HILLS, MASS. Kilham & Hopkins, Architects.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE NEW YORK COURT HOUSE.

MR. GUY LOWELL, in his competitive plans for the New York Court House, has undoubtedly surprised the public by choosing a round form. He makes no attempt to justify his choice on grounds of beauty alone. He modestly rests his work on use and convenience; on imperative demands for light and air and inner quiet and easy passage from apartment to apartment. Herein he follows good precedent. For the ancients, to whom he frankly says he owes his inspiration, seem not to have used the circular ground plan instead of the rectangular unless they found it much better suited to heighten the unity of the space inclosed. But these were not the reasons for Mr. Lowell's choice. His plan differs from the earlier instances in one essential respect: while mausoleum, pantheon, and amphitheater enclose an openly continuous interior, the new court house packs within itself, tier on tier, a myriad of economically dovetailed rooms, offices, and passageways. Viewed from without, the vast building will be impressive for its mass; but viewed from within it will be impressive for its ingeniously complicated contents.

Having chosen the round plan, Mr. Lowell had but little chance of making his court house appeal to popular tastes. The circle is a curve so rigorous and so simple in its law



ACCEPTED DESIGN FOR THE NEW YORK COURT HOUSE.
Guy Lowell, Architect.

the building's main purpose. The Greeks, except for hillside theaters and for tombs, did not use the rotunda; they had not developed the allied arch and dome; the Romans used the round plan as means to an end, rarely if ever as an end in itself. So, too, the older Italians, for church and baptistry, adopted the eight-sided, the ten-sided, or the smooth circular plan for reasons like those that led the Druids to set the gray monoliths of Stonehenge in concentric circles, or that led the French to choose the round plan for their Pantheon at Paris and for Napoleon's tomb. For circles, whether of rude stone or of polished columns, and the unbroken wall recurving into itself, give a strong central emphasis on altar or font or memorial. The radial arrangement also, and the simple lighting, as to harden any form into which it enters. Avoided by the Greek architects, it was taken up uncritically by the Roman engineers. But even the Romans, fond as they were of stiffly-rounded arch and vault, would not wall their noble colosseum with a hard circle; they softened the outline into an ellipse. Moreover, the mechanically drawn circle is not only uninteresting in itself, it is intolerant of other forms. There never yet stood a circular building that could make a straight-lined portico a true part of itself.

We have no right to ask Mr. Lowell to regard the beauty of his elevations as more important than the convenience of his floor plans. And we must all applaud the high skill with which he has made his own the uncommonly severe conditions of the competition.

THE time was, when the ordinary civilities of life would have made it a pleasant duty for one publisher or one publication in a given field to extend the hand of good-fellowship and a cordial greeting to a newcomer in that field. Lest we forget altogether this honored custom we take this opportunity, belated though it is, to welcome to the architectural publishing field, *The Journal of the American Institute of Architects*. Undoubtedly there exists in this field a lofty and vacant niche which needs to be filled, and it is our hope that the new Journal of the Institute will fully meet its oportunity. Judged by the three numbers at hand, it will.

If in commending we may be permitted to counsel; if in bespeaking success for the new enterprise we may wish to point out briefly some of the pitfalls, we shall do it with malice toward no one, but rather with the hope that an uplifting influence in our midst may be helpful to all.

While certain existing publications have striven to obtain a high standard of ethics that would give an inspiration to the architectural profession, there are those that have lamentably failed, either because of their wilful disregard of the best interests of the profession they claim to serve, or else because of an inherent weakness in their editorial policy. It is better always that scolding should give way to wholesome criticism, criticism that is honest and intelligent. It is not enough that a publication which, is presumed to be laboring in behalf of a dignified profession, should put forth repeatedly, as apparently its only claim for right of recognition, the hackneyed and inconsequential claim that "we published it first." If they must hitch their existence to one single declaration of purpose, let it be, rather, "we published it best."

That *The Journal of The American Institute of Architects* under its present editorial management will ably serve the best interests of the architectural profession along lines that have been too long neglected by those who have been blind to their opportunities, we feel assured. That it will bring a new dignity to the architectural publishing field is beyond doubt. It is for these reasons, particularly, that we bid it welcome.

MR. MORGAN'S RELATION TO ART.

MR. ROBERT W. DE FOREST, in speaking at the Morgan Memorial Meeting of the New York Chamber of Commerce, said, among other things:

To those who only looked at Mr. Morgan from a single angle, whatever that angle might be, he bulked so large that they thought they saw his whole stature. But from whatever point he was viewed there could only be seen a small fraction of his great personality.

To the world of business he seemed the embodiment of some Titanic force, whether it operated to save the credit of a nation or to re-create a great enterprise.

To such a world it must have seemed inconceivable that this same person could halt his great business projects to admire some small work of art, and could lay aside both business and art to play with his grandchildren, or to caress his favorite dog.

But such was the real Mr. Morgan. To him it was not incongruous to assemble the forces which stayed the panic of 1907 for that famous all-night session at his library in the company of a placid Madonna of Raphael and a delicate statuette by Donatello. There were two of Donatello's statuettes in his favorite corner. He loved them and was wont to say they reminded him of his own children.

Mr. Morgan was easily the greatest art collector of his time. Was it the mere pleasure of possession, the ambition to have and be known to have the choicest objects of art, which attracted him? No, not primarily, though such pleasure and such ambition there must have been. He loved art for art's sake. His taste was highly cultivated and rarely erred. He trusted his own judgment in selection, and his mental operation was as intuitive and instantaneous when applied to the purchase of a picture as to a business transaction.

For a long time past Mr. Morgan has been a great help and inspiration in matters architectural. His patronage and material financial help have aided in building up the American Academy in Rome.

IN an address just given by Dudley McGrath, architect of Brooklyn, before the Architectural Department of Pratt Institute, being one of a series of lectures arranged by the Brooklyn Chapter, A. I. A. on subjects pertinent to architecture and building, he added this to his practical remarks concerning superintendence:

"In performing your work, whenever it is possible to do so, compliment the workman or contractor upon the work being done. We all like to hear nice things said about ourselves, and one who only finds fault and never anything to commend is much disliked. You will find that by kind words, when it is possible to give them, you will, in the long run, obtain much the better results."

THE Twenty-sixth Annual Exhibition of the Chicago Architectural Club will be held in the galleries of the Art Institute from May 6 to June 11, inclusive, and will contain works of architecture, sculpture, decoration, and interior furnishings.

THE Illinois Chapter of the American Institute of Architects has re-established a gold medal of honor for award to designers of buildings represented in the Annual Exhibition of the Chicago Architectural Club, the conditions accompanying the proposed award being as follows:

That any architectural work in the State of Illinois, if completed within five years previous to the date of exhibition, may be offered for consideration.

That the architect or architects who design the work, in order to be eligible to award must present for exhibition one or more photographs of the executed work, also one or more drawings, including a small scale plan, and shall submit to the jury such work in drawings of the structure as they may desire to examine. Any work represented in the exhibit may be eligible for consideration by the jury, provided that at least a plan and also a photograph of the executed work shall be brought before the jury on their request. Only architects or firms of architects maintaining offices in the State of Illinois will be eligible to the award.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

VOLVME XXII MAY 1913 NVMBER 5

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PLATE ILLVSTRATIONS

LETTERPRESS

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CHURCH OF PORTA PANHAGIA,
THESSALY, GREECE

Thirteenth Century. Unusually wide joints. Brick in panels and symbolic designs.

THE BRICKBVILDER

MAY, 1913

VOLVME XXII. NVMBER 5.

Some Suggestions as to the Making of Working Drawings.

BY H. VAN BUREN MAGONIGLE.

THE practice of building has become so complicated that the working drawing is of vastly more importance than it used to be. Moreover, more and more, owing to the complexity and magnitude of present-day building operations, the architect is forced out of the old intimate contact with the work he had in earlier times — a general plan with a few important dimensions, elevations and section of a summary character, and the rest of the time spent on the job itself, laying out the work, making templates or drawing profiles on the stone. Plumbing, heating, ventilating, refrigerating or electrical installations were unknown.

Even within the present writer's experience, it was the custom to make a set of working drawings on cloth-backed Whatman or eggshell, inked in with black ink ground in a china saucer, and colored — crimson lake for brick, yellow ochre or lemon yellow for wood, prussian blue for stone. One copy of these was made on cloth and given to the contractor — I cannot remember a blue print in that first office nor, until a couple of years later, in another. And the typewriter not having been invented, all specifications were written and copied in long-hand. Droll legends of one's infancy.

But the invention of sun printing effected a revolution in the whole physical process. The tracing-cloth or paper drawing has come to to be the original drawing. And this article is to describe some of these physical processes as they are managed in the writer's office. After a pretty long experience in a number of offices, as well as in my own, I have arrived at some definite conclusions and state them for what they may be worth.

To many architects the word "system" is anathema; most offices are run without it; and it is a common experience that elaborate systems go to pieces on the rock of temperament. The moment any system is burdensome or troublesome or costs more to maintain than the labor it is supposed to save, it is time to dispense with that system, or to modify it. The object of any system is to increase efficiency, to save time, money, and annoyance. When a drawing is lost it loses time, which costs money, and both breed annoyance. And so I have gradually evolved a system of making and filing drawings which works satisfactorily and discounts temperament as far as I have found it possible to reckon with that element.

The first point to consider is not what goes on the drawing, but what is to be done with it after it is made. How is it to be filed for daily reference? How is it to be instantly found? How, when the job is done, is it to be filed? How, when so filed, is one to lay hands on it at once?

The answers to these questions I find in the following procedure:

First. All drawings, small- and large-scale and full sizes, are made on sheets uniform in size for each job.

Second. All cloth originals as soon as printed, and the office set of prints, are bound up in numerical order in a binder consisting of two maple slats with three brass thumb-screws. The slats are notched at the ends and the notches rest on two gas-pipe bars running lengthwise of the filing closet. The job number and name is on a label on the outer end of the binder. Hence, the drawing is bound in a set in numerical order, and cannot be lost, and the set itself has its own numerical order on the rack.

Third and Fourth. When the job is completed, the drawings for that job are merely transferred to an upper rack, out of the way for the present but precisely as accessible fifty years hence.

This is the best and most compact method of filing drawings I have yet discovered. It is the practice in many offices to roll old drawings up and store them in tin or cardboard tubes. This wastes a great deal of room and makes the drawings hard to handle after they have been rolled up for a year or more. In theory I never permit a drawing to be rolled up and put away; in practice it sometimes happens.

And I prefer this way to the "clothes dryer" system, among other reasons because a clear space equal to the depth of the drying rack must be maintained so that the racks may be pulled out, and this again wastes room, besides that wasted in the rack itself.

I have eliminated drawers for filing, or keeping drawings in, except for cloth and paper originals of general drawings while they are being worked upon. As soon as the prints are issued to bidders, the originals are taken out of the drawer, bound up and put in the rack to wait till the cuts begin.

When the contract is signed there is always one office copy printed, usually on cloth, and the draftsmen use this set for reference. Behind each man, in his alcove, are two hooks placed so as to take the notches at the ends of the binders, and the office set of the job he is in charge of is hung on these hooks every morning and put away in a fireproof vault every night. They are thus available for reference for other men working on the same job and are where the man in charge may be consulted most readily. They are also kept off of the tables which are left free for work. The old way is to take an individual drawing out of a drawer and leave it kicking around in the way indefinitely. I have seen a mound of such drawings on a draftsman's table, with the drawing some one else needed at the bottom of the heap.

When drawings are kept loose in a drawer, the last drawing put away is put on top and the process repeated until they are all thoroughly shuffled and no one knows where any one of them is. They also slip down behind — familiar phrase.

Another point in favor of binding current drawings in a set is, that frequently more than one drawing has to be referred to, to settle some given point, and the advantage of having them all together is obvious.

So much for what happens to them after they are made. But in order to get the full benefit of this very simple system the drawings must be made uniform in size for each job. This is done very simply. It is easy to determine from the sketches, by a very little pains and forethought, the size the largest general drawing should be, and this establishes the size for the set. I have found it to work out that the sheet space required for scale and full size details is in a very direct ratio to the size of a building at quarter scale. For small buildings, such as small country houses, two or more plans and elevations can go on a sheet and thus establish a size that will be adequate for the large scales and full sizes.

The size of the sheet being established, the size is laid out on manila, with border line, cut-off line, binding space and spaces for titles; these are traced by a junior draftsman on sheets of cloth or tough bond paper, the manila sheet always being traced from to ensure accuracy. Whenever possible one dimension of a sheet is made that of a standard width of tracing cloth (30, 36, 42 or 48 inches) with the selvage torn off, to avoid wastage. A number of these sheets (similar to the two illustrations) are always kept on hand so that when a man starts a drawing he has only to go to the drawer and get one.

The small blocks of lettering in the bottom margin, and for a large job the main title as well, are printed in the office from zinc cuts in printer's ink, on a simple but ingenious frame (devised by Mr. Frank M. Snyder, who is responsible for many of the methods I use). This not only ensures uniformity and a ship-shape appearance to each sheet, but saves a stupendous amount of time in the course of a year in general lettering.

As to what goes inside the border lines and how it is put there, it is of course very simple as regards general drawings at quarter scale. The principal plan and elevation are made on stretched paper and the other plans, elevations and sections worked over them on tough bond paper and are not traced till they are nearly complete with everything essential shown. It is folly to rush drawings on to the cloth too soon. Changes are bound to be made which are tiresome and expensive to make on cloth. It pays to hold off until the chief is about through changing his mind. And when they are traced, they are traced in diluted ink, the thicknesses of lines being varied to bring out salient facts or keep subordinate facts in their proper subordinate relation; diluted ink is almost as easy to rub out as pencil. All notes and lettering, piping and steel, in plan, etc., and a silhouette representing the plaster thickness are drawn in pure black ink, but not until everything is supposed to be settled; this black line on the cloth and the corresponding strong white line on the print clears up a plan or section and makes it easily read.

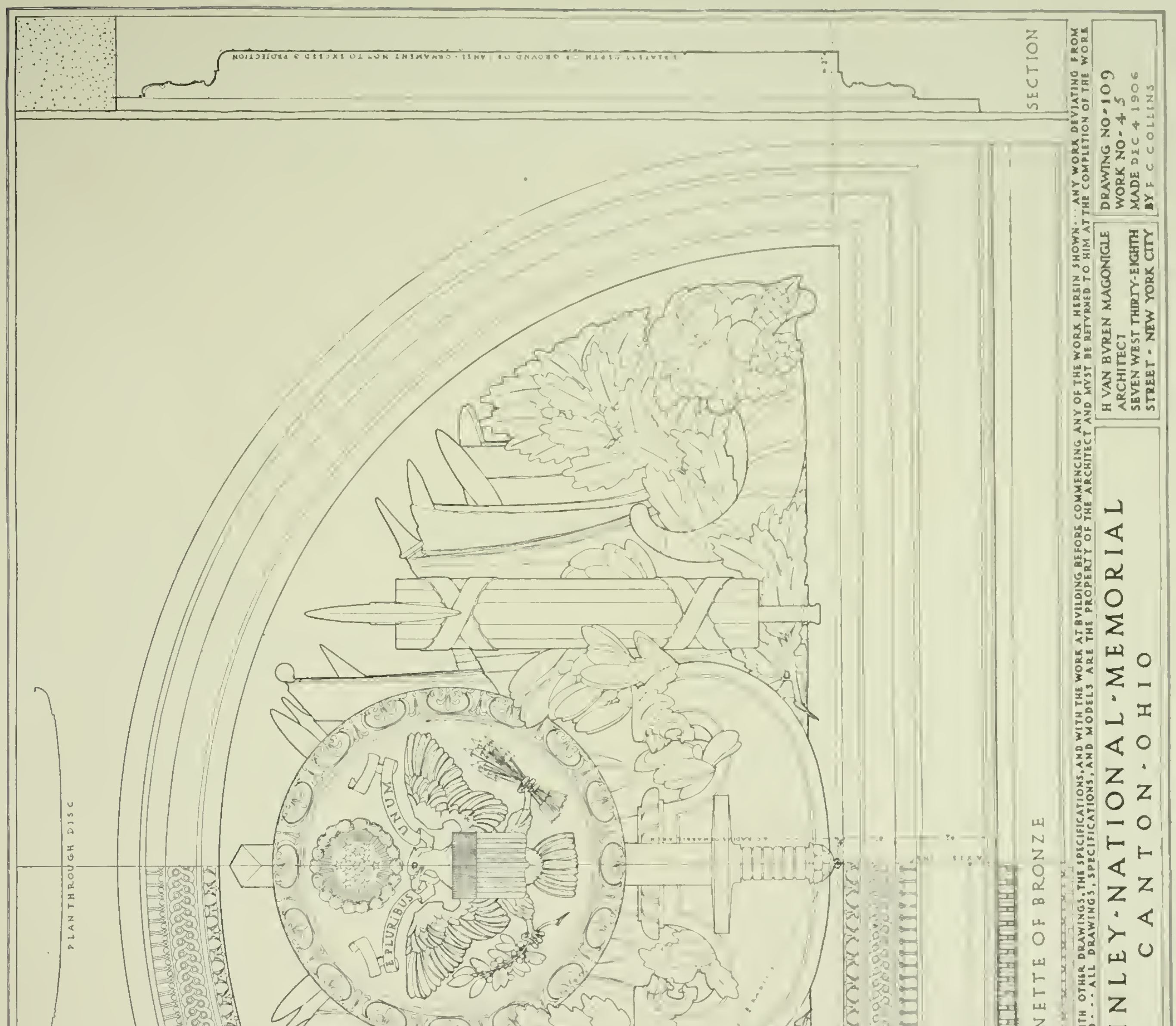
The indication of material in plan or section is always drawn in a thinner line than, for instance, the lines indicating the wall itself. Originally, we used two grades of diluted ink; but we find that the variation in the thickness of the line gives the difference in value and makes a better print, especially for black or cloth prints. It is well to have the ink pretty dark, for the lines always get worn off a bit on a large drawing, and they lose something when the dirt and pencil marks are washed off with gasoline — a far better way to clean cloth tracings than with a rubber.

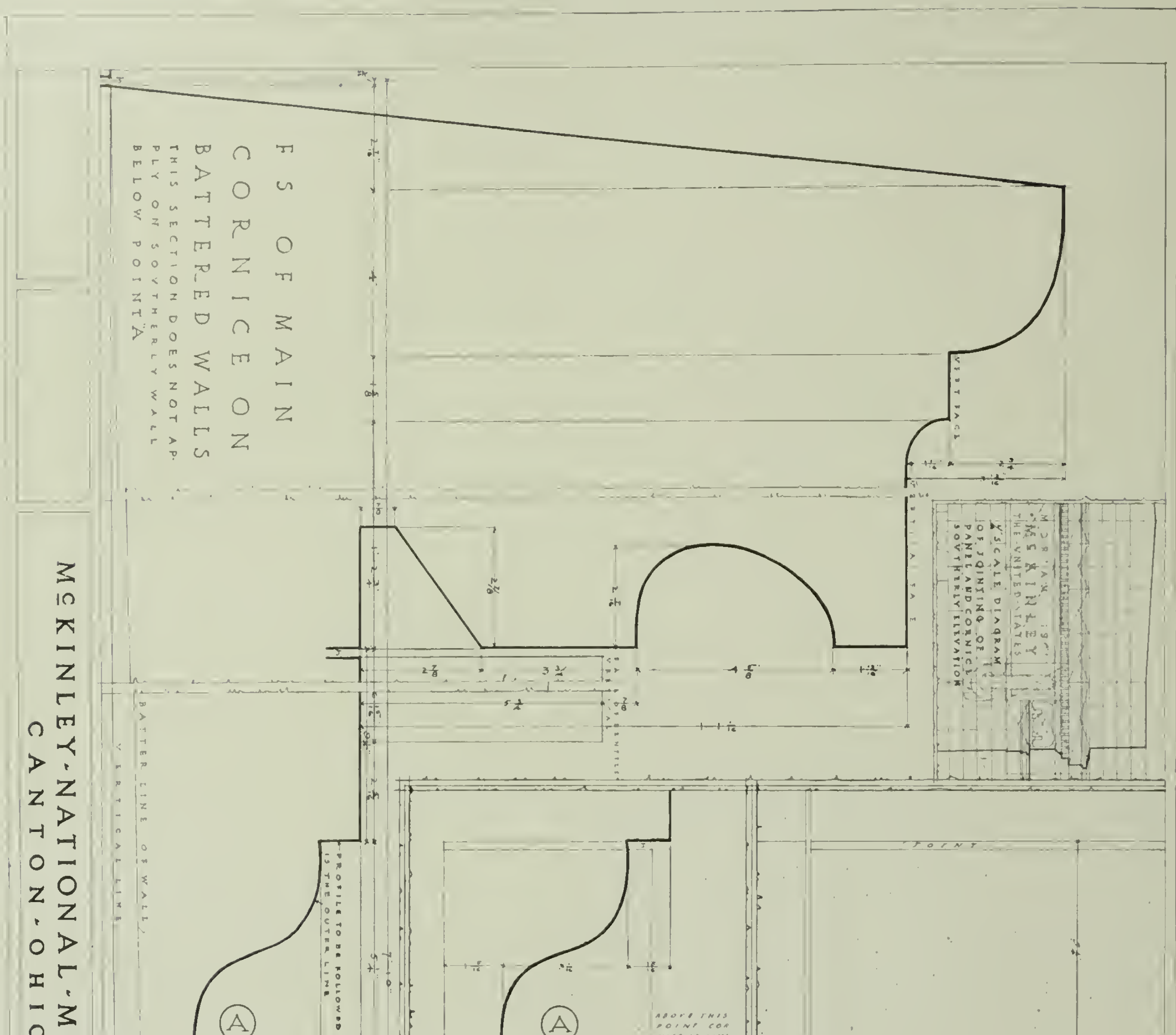
It used to be the custom in my office to run a wash over interior partitions, using alcohol instead of water to avoid puckering and shrinking the cloth. This has to be done carefully and run pretty dry and even then it blisters slightly. Recently we have been using yellow pencil, which prints very well, avoids shrinkage, is easily rubbed out and leaves no mark. It is far from handsome on the cloth, but looks perfectly well on the print. And just here I would emphasize the importance of that. It must be remembered that the print is what the contractor gets and what the building is built by; so that at every step in the process of making the cloth original, one must bear in mind the effect on the print.

In the case of large scale drawings, these are usually studied on tracing paper, and almost always the various parts such as plans or sections to explain a detail elevation are made on separate pieces of tracing paper, it being much quicker and easier to study them in this way. They are then assembled on a standard sheet in an orderly and readable manner. I find this takes less time and the final result is clearer — for it is difficult to plan out the sheet when the drawing is begun on the final cloth or paper so that everything will fall into a proper relation. And it is possible to condense the final drawing materially without losing clearness, and give the builder only what he needs. For purposes of study it is essential of course to draw out a doorway or window, for example, complete. But the builder only needs half of it. It is studied in full on tracing paper, and only half of it traced for him.

A good working drawing of any kind is that one which gives the builder all that he needs — no more and no less. And an immense amount of paper, time, and money is wasted every day in this one particular. The ideal drawing is one which is so condensed, yet so clear and readable that it is only necessary to hand it over to the contractor and tell him to build it. If it is a perfect drawing he should not have to ask one question; especially if explanatory notes are copious and really explain. I like to be able to look at a drawing either in the office or in the field and find everything I want to know on it without the necessity of referring to the specifications; I will go so far as to say that the chief uses of specifications are, to enable the bidders to submit a figure before the detail drawings are begun, as a subsequent guide to the draftsman who must know what has been contracted for, and that the contractor may order certain materials in bulk, such as brick and plaster, beforehand. But beyond this the drawings should render reference to the specifications unnecessary.

Very much of what has been said about large scale


SECTION
PLAN THROUGH DISC
E PLURIBUS UNUM
THREE INCH SCALE DETAILS OF INTERIOR LUNETTE OF BRONZE
THE CONTRACTOR SHALL VERIFY ALL FIGURES DIMENSIONS MATERIALS ETC ON THIS DRAWING WITH OTHER DRAWINGS, THE SPECIFICATIONS, AND WITH THE WORK AT BVILDING BEFORE COMMENCING ANY OF THE WORK HEREIN SHOWN · · ANY WORK DEVIATING FROM THIS DRAWING OR THE SPECIFICATIONS WILL BE REJECTED VNLESS CHANGE IS DVLY AVTHORIZED · · ALL DRAWINGS, SPECIFICATIONS, AND MODELS ARE THE PROPERTY OF THE ARCHITECT AND MVST BE RETVRNED TO HIM AT THE COMPLETION OF THE WORK
McKINLEY · NATIONAL · MEMORIAL
CANTON · OHIO
H VAN BVREN MAGONIGLE
ARCHITECT
SEVEN WEST THIRTY-EIGHTH
STREET · NEW YORK CITY
DRAWING NO · 109
WORK NO · 45
MADE DEC 4 1906
BY F C COLLINS


F S OF MAIN
CORNICE ON
BATTERED WALLS
THIS SECTION DOES NOT APPLY ON SOVTHERLY WALL BELOW POINT A
PROFILE TO BE FOLLOWED IS THE OUTER LINE
NOTE THAT NECESSARY AMOUNT OF STOCK FOR FESTOONS IS TO BE DETERMINED FROM MODEL ONLY
McKINLEY-NATIONAL-MEMORIAL
CANTON-OHIO
H VAN BVREN MAGONIGLE
ARCHITECT
SEVEN WEST THIRTY-EIGHTH
STREET - NEW YORK CITY
DRAWING No 44
WORK No 45
MADE OCTOBER 19, 1905
BY FRANK C COLLINS
F S OF CORNICE
SOVTHERLY WALL
THIS WALL HAS NO
BATTER
ELEVATION OF
PANEL IN COR-
NICE. SOVTHER-
LY WALL

drawings applies to full size details. In fact, more time and paper are wasted on full sizes than for any other class of drawings. In my office, full sizes of a large cornice, let us say, are roughed out in full on manila for purposes of study. When completely studied it is broken up, large plain surfaces such as fascias and large projections reduced and the correct dimensions figured. Bearing in mind that the drawing will be printed and will therefore shrink, it is essential to figure it completely — but since this should be done anyway it is no extra labor. The illustration shows a full size detail of a cornice, 7 feet 10 inches high, condensed for the builder on a sheet 29 x 42 inches, and far easier to handle and work from than if shown *in extenso*.

Usually full size details are carried on simultaneously with the scale details, so that the ¾-inch scale drawings agree absolutely with the full sizes. There are many cases where it is essential to rough out full sizes to see that some corner works out properly, and I prefer to carry this principle out fully. Working back from the full size to ¾-inch scale has the further advantage of assuring one that he is getting things in scale. And by the time the ¾-inch scale detail is done the full sizes are ready to assemble and give out.

Of course all this doesn't do for those offices where all general drawings are made by one set of men, all scale details by another, and all full sizes by a third. I am addressing artists, not manufacturers.

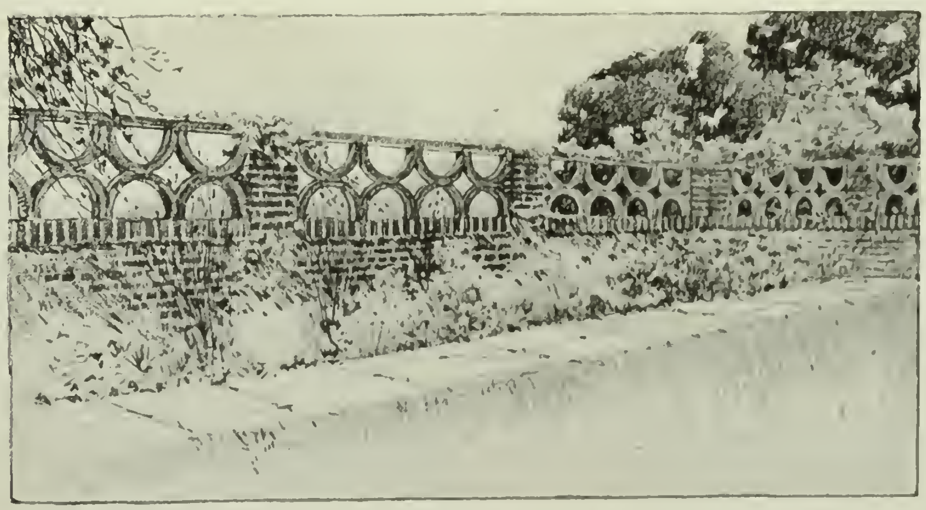
Another practice I have found convenient is to make most drawings of ornament at one-quarter full size, especially if it is a large composition. To illustrate I give the inner lunette of a bronze doorway, which is 12 feet across. It would have been out of the question to draw it in full size and entirely unnecessary. At three inches to the foot the drawing can be scaled to a very small fraction of an inch. I know that it is not considered essential in many offices to study ornamental detail so carefully; a small rough sketch, a note "ornament here," and the modeler does the rest. I have tried that method — that is why I never did it but once.

There are two pitfalls to guard against in this method of working. One is that some men are prone to go too far in their tracing paper studies and finish them up to too great an extent and then trace them all over again on the final sheet; at least a third and often half of the drawing can be done once and for all on the final. The other is that some men miss the point about condensation and condense to such an extent that the devil himself wouldn't know what the drawing represented and how the parts fit together.

There are a few maxims current in my office that help to keep things straight; they are:

1. Be thorough.
2. Take nothing for granted; look it up.
3. When in doubt don't leave out anything; too much information is better than not enough.
4. Every drawing must be finished complete before it leaves the office.
5. It takes less time to do a thing right in the first place than to correct mistakes.
6. A working drawing is not a picture.
7. Don't be sloppy.
8. Use your head.

And in this last is the whole secret.



BRICK TERRACE WALL — AN OLD EXAMPLE ADOPTED IN NEW GARDEN.

STORE—PHILADELPHIA, PA.
ARCHITECT NOT KNOWN

STORE FAÇADE—WASHINGTON, D. C.
UNGLAZED TILE ON CEMENT. ARCHITECT NOT KNOWN

STORE BUILDING—PHILADELPHIA, PA.
CHAS. BARTON KEEN, ARCHITECT

RESTAURANT—NEW YORK CITY
WALTER D. BLAIR, ARCHITECT

LUNCH ROOM—ALBANY, N. Y.
GLAZED TILE ON EXTERIOR ARCHITECT NOT KNOWN

GROUP OF SMALL MERCANTILE BUILDINGS

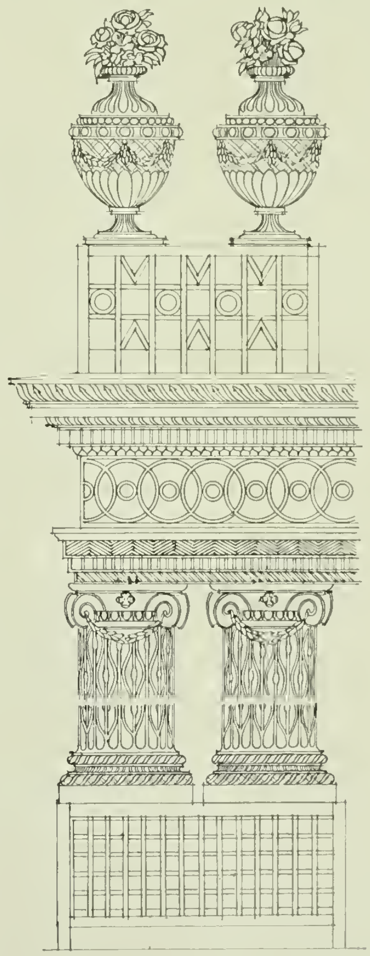
Lattice—Its Use as an Architectural Embellishment.—Part I.

BY GEORGE S. CHAPPELL.

WE are returning to the country. The snug city-dweller no longer points the finger of scorn at Mr. Suburbanite, bundle-laden. The newspaper humorist and magazine wit less and less often shoots his darts at the painful joys of grass-cutting, snow-shoveling and other bucolic pastimes. He probably lives in some green-embowered village himself and gets up early these spring mornings to see if the sweet peas have sprouted yet. Lettuce leaves are of deadly import to him and ambition germinates with the growing garden. The proud proprietor of the one-bath-power bungalow will some day graduate into the twelve-room-two-bath-parquet-floor-thirty-minutes-from-Broadway dwelling with lawn in front, vegetables at the back, and a whirligig to hang the clothes on, while the former owner of such magnificences flies farther afield, chug-chugging in his miniature motor three or four miles to the station which is nearest his real farm! Back to the land! is the cry of the younger generations. Thus we have come to take an interest in gardens and their products. We pass beyond the simple axiomatic knowledge conveyed by that priceless volume and first aid to naturalists, "How to Tell the Birds from the Wild Flowers." We actually grow things, and boast about them and match cabbage-heads with our neighbors.

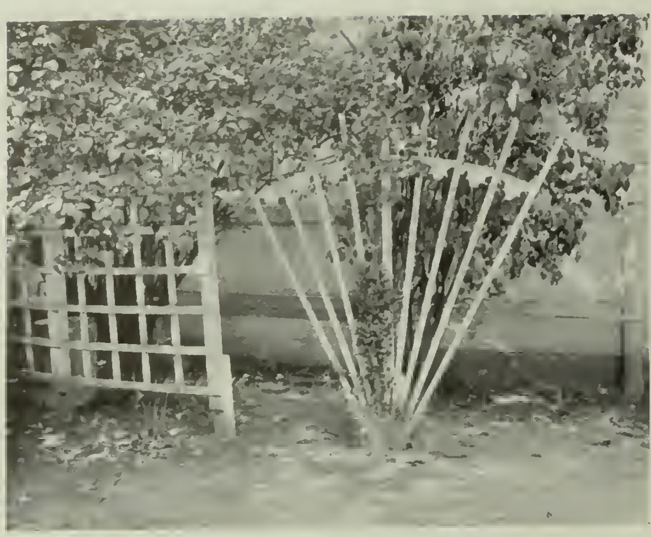
This turning of the present generation to green fields and pastures both new and old has resulted in a remarkable renaissance in the country architecture of America. Happily too, as the life has been more real and answered to a distinct economic impulse the result in design has been both happy and interesting. It is the connection with this big wave impulse that I should like at the outset to emphasize in this article. The observation of any particular detail of a general scheme can never be possessed of the slightest interest unless it is carefully and logically correlated to the great whole of which it is a part. So with the subject of lattice and garden furniture, the charm of such an out-of-door field for speculation and discussion should never lead us into the pernicious habit of forgetting the real object of these delightful adjuncts to country house design.

We have been misled from the start. One has only to turn the pages of Schoy's *Epoque Louis XVI* to see to what extreme ends cleverness may be carried by a mistaken basic idea as to the functions of a method and a material. In the illustrated annuals of this period of highly developed artificiality how clearly are reflected the unreasoning quest of pleasure, the half rational, half freakish outbursts of spoiled children always hungering for a new toy. The classic outlines of the garden pavilions so popular in the latter eighteenth century underwent little or no change in their translation from stone to the delicate Fracerr of "Treillage." In this lamentable lack of imagination we see the mind wearied by excess, an artistic sensitiveness unaroused by any real need turning to the latticed arbor, not as a moral necessity but as one more adjunct to a life of gaiety and pleasure. The round column becomes a tall wicker basket, the more formal details of cornice and capital yield not at all to the particular expression of the new material. The total result seems to me to be one of elaborate hardness sadly lacking in originality. Formal architecture will always have its reason for being as long as it represents real formality of mental life, a logical spirit of mind and a reasonableness which is to-day and always has been distinctively characteristic of the Latin mind. It may be, therefore, that these sophisticated bouquets of the old court gardeners are of historical value and not without charm in the prim setting of Versailles and Compiègne. However, one can not but be thankful that the turn of American mind, in country architecture at least, has been away from the hard-and-fast rules which governed the great masters of the classic period.



"The round column becomes a wicker basket—"

Nowhere, indeed, do we find the use of lattice developed with the simple directness and success which characterizes it in American country architecture from its earliest days. It was a need, not a luxury. The latticed porches and arbors of our New England forefathers touch the highwater mark in this particular branch of design, and, as with greater problems, seem to conform to the universal standards of simplicity and beauty. How true it is, the so obvious remark, that a material must be used suitably. Of nothing is this more true than of lattice, and yet how often we find it distorted and strained to express shapes and forms entirely foreign to its nature. In the beginning we have, if you please, a collection of small flat sticks and the simple problem to construct from them a support for vines. It was this plain need and these plain materials which were at the hand of the colonial carpenter. He went at the task with refreshing directness. One of the famous examples of the simplest kind of lattice work is the old Germantown house known as "Wyck." This old mansion was built in 1690. Two separate buildings between which passed a wagon-road were joined, making a single structure of unusual length. It is an interesting link with the past to know that the wagon-road itself followed the line of an original Indian trail, and surely nothing could be further removed from the savagery of Indians than the dim quiet of the old hallway to-day, with the spacious rooms on



THE OSGOOD GARDEN, SALEM, MASS.

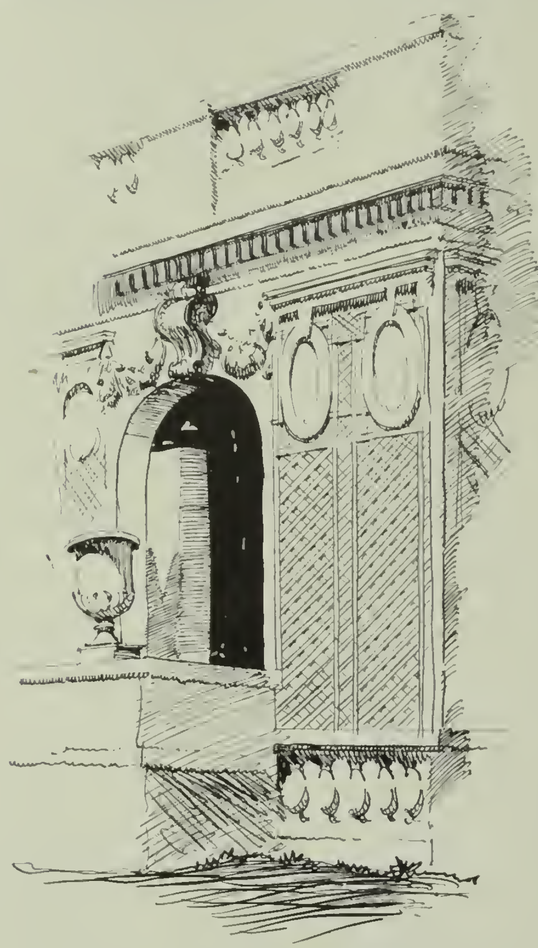
either side where the graceful shapes of Chippendale furniture and the dull luster of old silver voice the refinement of years of culture. Both long sides of the house are covered as to wall surfaces with ladder-like arrangements of lattice. It is lapped at all joints, the horizontal members projecting usually about four inches beyond the vertical supports. Here perhaps it would be well to say that almost invariably the early work is put together in the easiest way, that is, by simply crossing the pieces of material and nailing them at the joint. It is only in later and less honest work that one finds the habit growing to halve the joints and to build up a sort of grillage which is expensive to build and troublesome to maintain, as the close joint, exposed to the rigor of our changing seasons, almost invariably splits or opens. Yet the average carpenter will admire the halved joint because of the additional workmanship necessary. It is a pretty safe rule to follow in building — that the best way is the simplest and *vice versa*. The lapped joint touching at only one surface allows of an almost free passage of rain-water around the assembled parts. At Wyck the material used measures one by two inches and is laid the flat way. It is beaded at the edges and this has resulted in part of the charm of the treatment, for the woodwork, in common with the masonry back of it, has been so frequently whitewashed that a wonderful scale encrusts its surface, through which the fine line of beading counts with subtle delicacy. This result, as with that of the whitewashed texture, is undoubtedly entirely accidental, one of those happy results of time which are the despair of the designers of to-day, but does it not suggest that there may be some simpler method of finishing our lattice material, some less mechanical and smooth process than our regular mill finish? In the old Logan homestead "Stenton," which is also in Germantown, we find a treatment similar to Wyck with interesting variations and the same lovely simplicity. Here the horizontal members are considerably lighter than the vertical lines, and the whole effect is remarkably graceful contrasted with the solid masonry background and heavy masses of foliage. Attractive variations in the use of lattice are found in both early and later examples. Again, the best type of colonial work seems to come most near perfection in the innocent frankness with which various problems are solved, as for instance, in the two bits of detail shown of isolated vine and shrubbery supports from the wonderful old Osgood garden in Salem, Mass. Nothing could be more graceful than the fan-shaped design with the amusing links of scroll work which show that the designer was not wholly absorbed in the strictly utilitarian. In connection with porches alone we find a surprising variety in the early colonial work, frequently in the simple squares or diamonds, but often combined with flanking seats or ingeniously arranged to frame generous openings which serve as windows through the vines. In many instances the entire porch is of lattice with round or elliptical arched supports over which the rose and honeysuckle form the only roof.

It has remained for our architects of to-day to extend the field which the colonists hardly explored. Here of course lay the danger line. We have gone beyond the use of a combination of small flat pieces of wood for definite ends to the employment of such bits of carpentry as an inherent part of the design itself aside from their practical reason for being. Along formal lines this has been done with conspicuous success in the Gambrill house at Newport. Here the architects, Carrère and Hastings, frankly went to the old French models, which in this instance are peculiarly appropriate. The house itself and its dependencies, pergolas, arbors and wall-lattices, are formal and decorative. But such a purely decorative aim is infrequently so well carried out and the result is apt to look affected and illogical. A few years ago there was a craze for lattice decoration. Every country householder, every architect, every draftsman working on competition drawings cross-hatched every available bit of interior wall space with amazing gridirons, bare prison gates nailed against stucco and brickwork often at an altitude high enough to discourage even the most hardy vine. In my

SOUTH DOOR OF "STENTON," GERMANTOWN, PA.

"WYCK" HOUSE, GERMANTOWN, PA

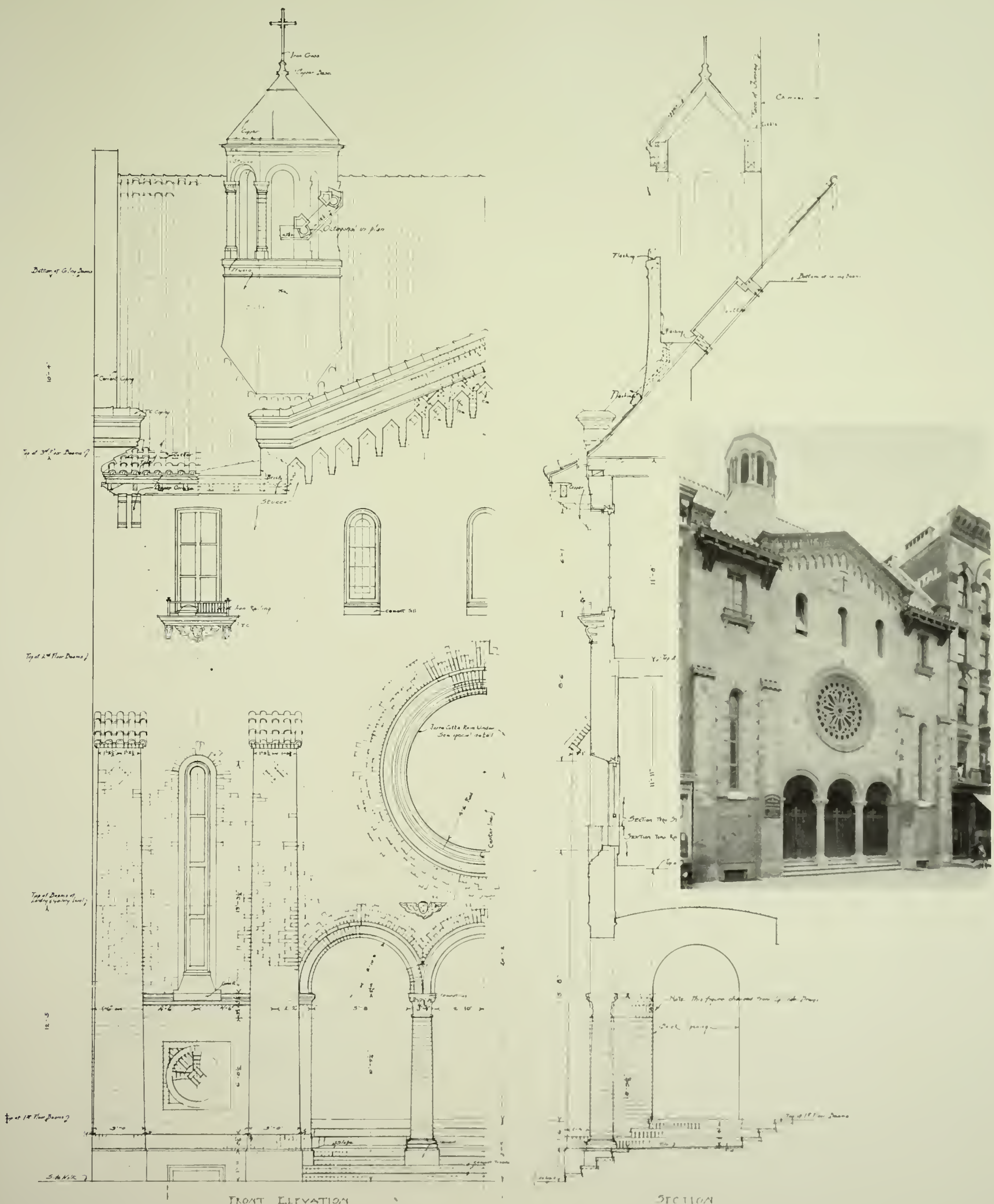
AN EXAMPLE OF THE SIMPLEST KIND OF LATTICE WORK BUILT 1690 early youth I used to be shown, for my artistic education, oil paintings from the hand of a well-known character in my native New England town. She was the wife of an old sea captain and the lonely vigils of this patient Penelope turned to the artistic portrayal of polar scenes painted, naturally, entirely from data derived from winter-night descriptions furnished by her husband during his infrequent sojourns at home. They were rare visions of the Northland, glittering in all the bravery that powdered mica and gilt paper stars could bestow. But the crowning flight of fancy was in the icebergs, which were gorgeous towering affairs studded with most comfortable looking balconies upon which sat or reclined entire families of polar bears, like box parties at the opera. The sides of the bergs were sheer and smooth, indeed smoothness of finish was one of the old lady's canons of excellence in painting, and I could never gaze upon one of those cozy bear gatherings without wondering with all my young soul how in the world they all got up there and how in the world they would ever get down. So with these isolated barnyard gates flung upon the outer wall —the only reasonable explanation of their presence is a cyclone which may have plucked them from their natural surroundings and left them as a matter of record.



DETAIL OF GAMBRILL HOUSE, NEWPORT, R. I.
Carrère & Hastings, Architects.

Happily, the first outburst of ill-directed enthusiasm has been short-lived and we now find in the work of many of our younger men extremely attractive arrangements in a wide range of uses, both in the closer relations of porches, piazzas, sun-rooms, and laundry enclosures and the more detached designs of summer houses, arbors, and pergolas. I almost hesitate to mention pergolas, this poetic word has been so much taken in vain. The pergola disease was even more virulent than the lattice fever and even infected some of our best city buildings. Most of them have recovered but still show the scars in the shape of moldering beam ends projecting above some two hundred feet of masonry. If anything can be more depressing than the aspect of one of these city-bred pergolas during a February snow-storm I have yet to see it. After gazing at some of these aberrations it is refreshing to turn to the old colonial houses where the lattice was used because it was a real need, and to some of the work being done to-day along the same lines. If I might quote a single name as pre-eminently typical of great artistic sensitiveness in the modern uses of this graceful garden accompaniment, I should name Mr. Howard Shaw of Chicago, whose work in all departments of country house architecture has made him an authority never to be neglected. The forms employed by Mr. Shaw are almost invariably extremely simple; the use he makes of them is uniformly exquisite and appropriate. He is one of the men who is using lattice as it should be used —as an adjunct and an element, not as an end in itself.

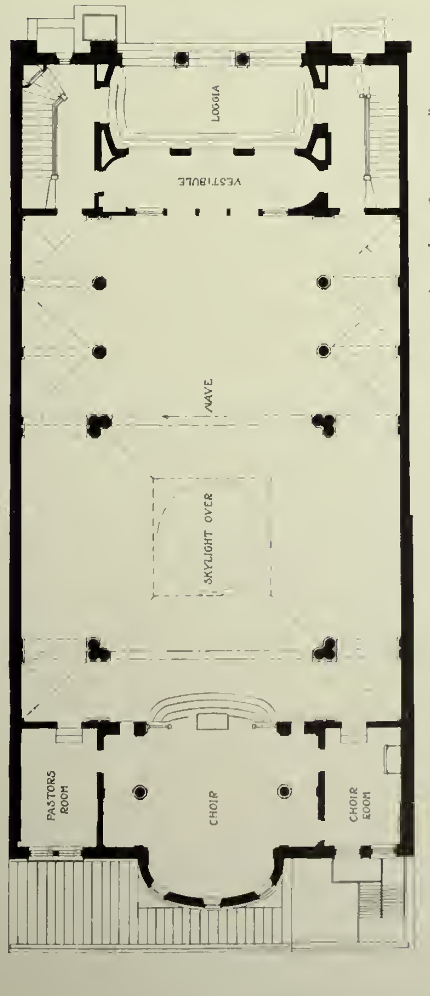
THE CHURCH OF THE ASCENSION, NEW YORK CITY
LUDLOW & PEABODY, ARCHITECTS



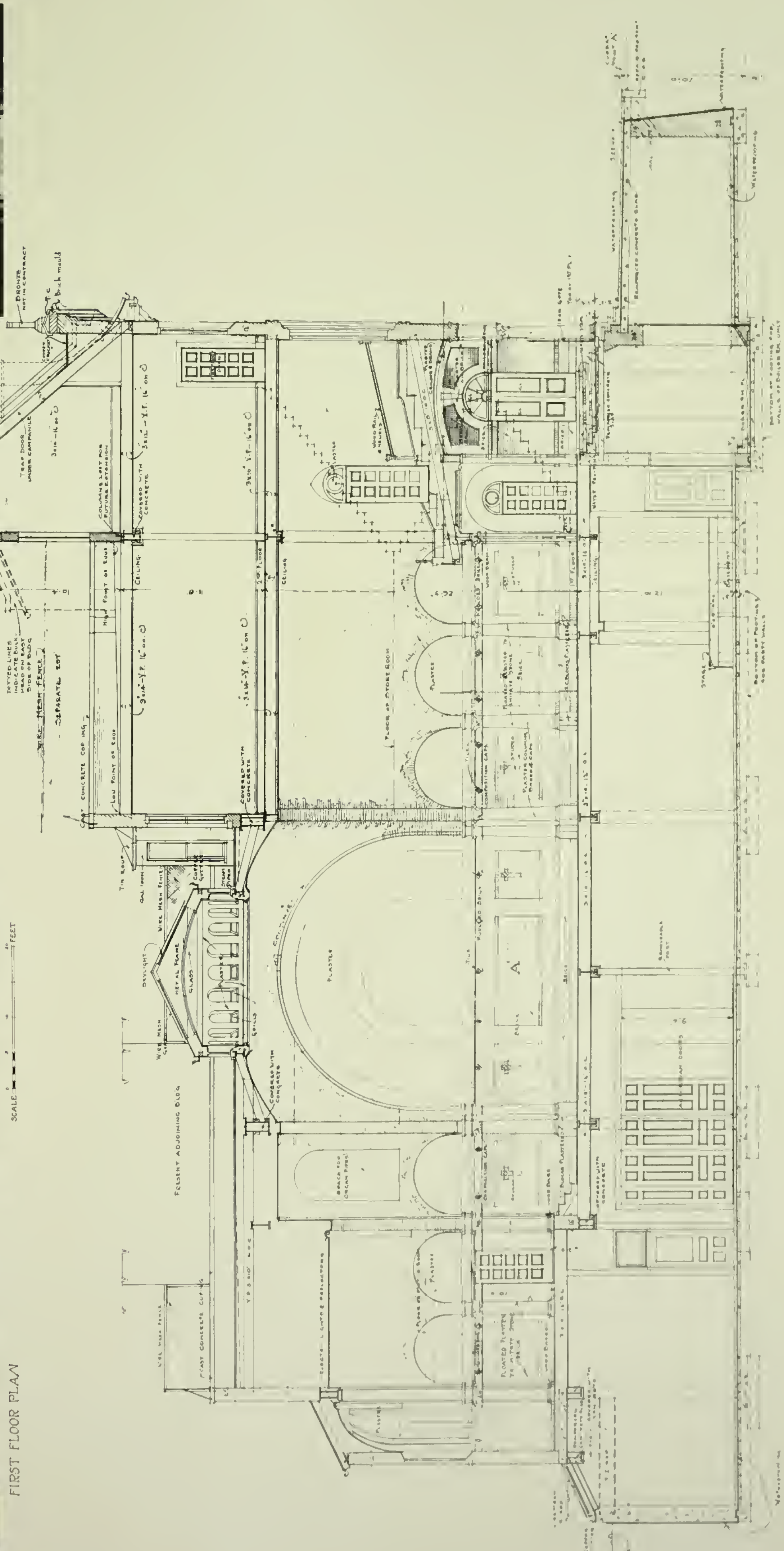
THE CHURCH OF THE ASCENSION, NEW YORK CITY

LUDLOW & PEABODY, ARCHITECTS

THE CHURCH OF THE ASCENSION, NEW YORK CITY
LUDLOW & PEABODY, ARCHITECTS

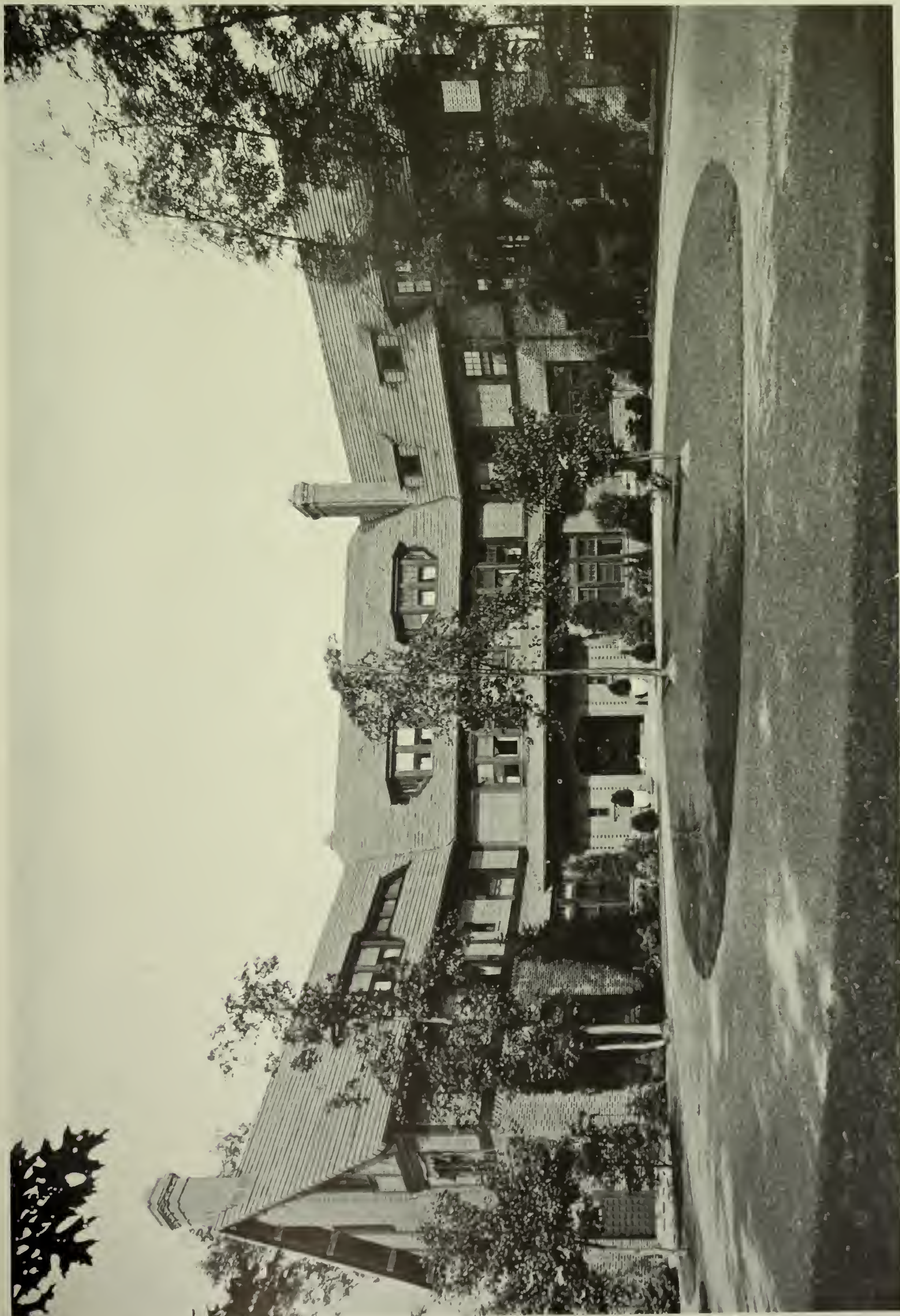


FIRST FLOOR PLAN



THE CHURCH OF THE ASCENSION, NEW YORK CITY

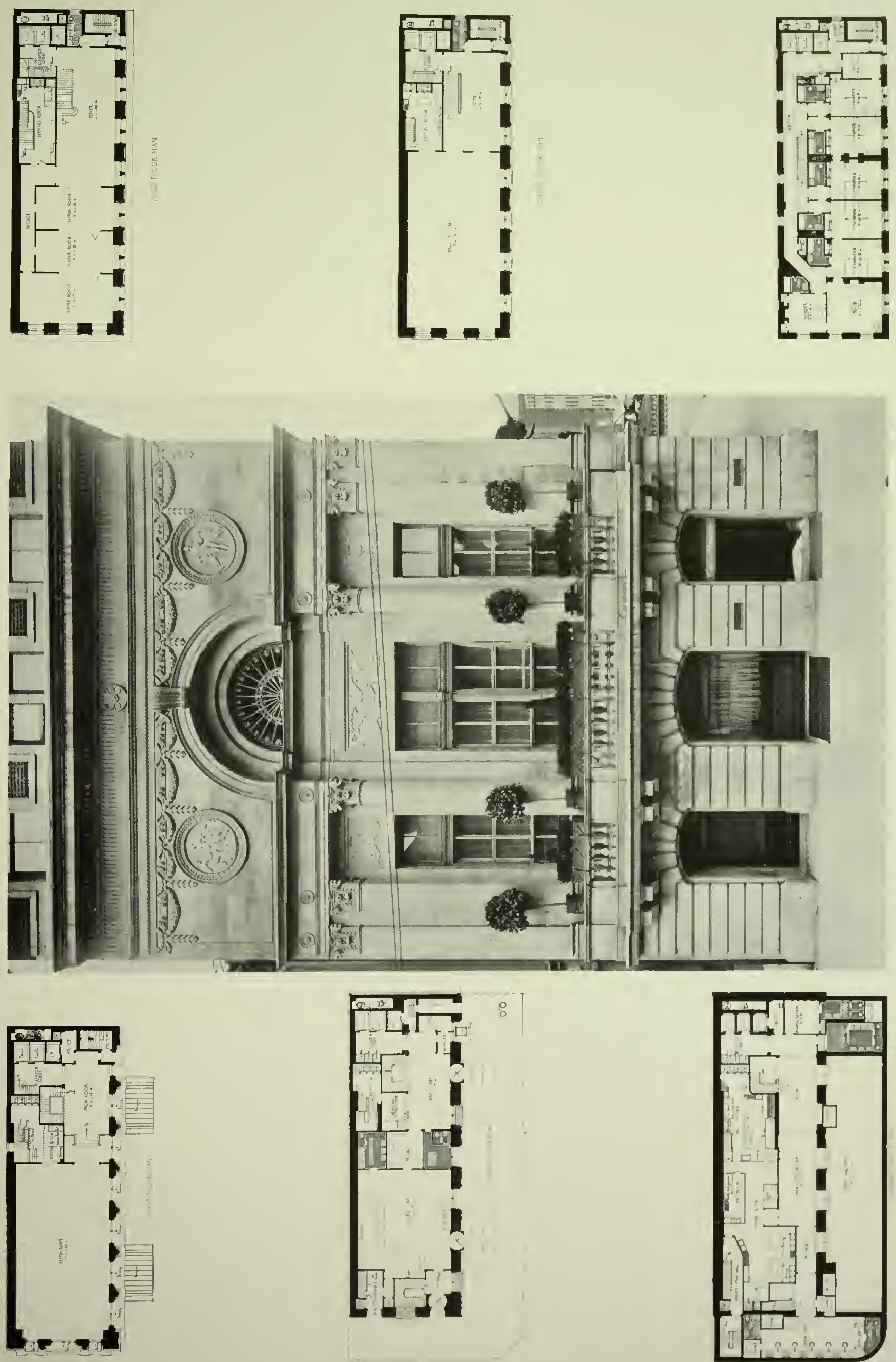
LUDLOW & PEABODY, ARCHITECTS



HOUSE AT COLD SPRING HARBOR, LONG ISLAND, N. Y.
GROSVENOR ATTERBURY, ARCHITECT

HOUSE AT COLD SPRING HARBOR, LONG ISLAND, N. Y.
GROSVENOR ATTERBURY, ARCHITECT

THE RITZ-CARLTON HOTEL, PHILADELPHIA, PA.
HORACE TRUMBAUER, } ASSOCIATE
WARREN & WETMORE, } ARCHITECTS



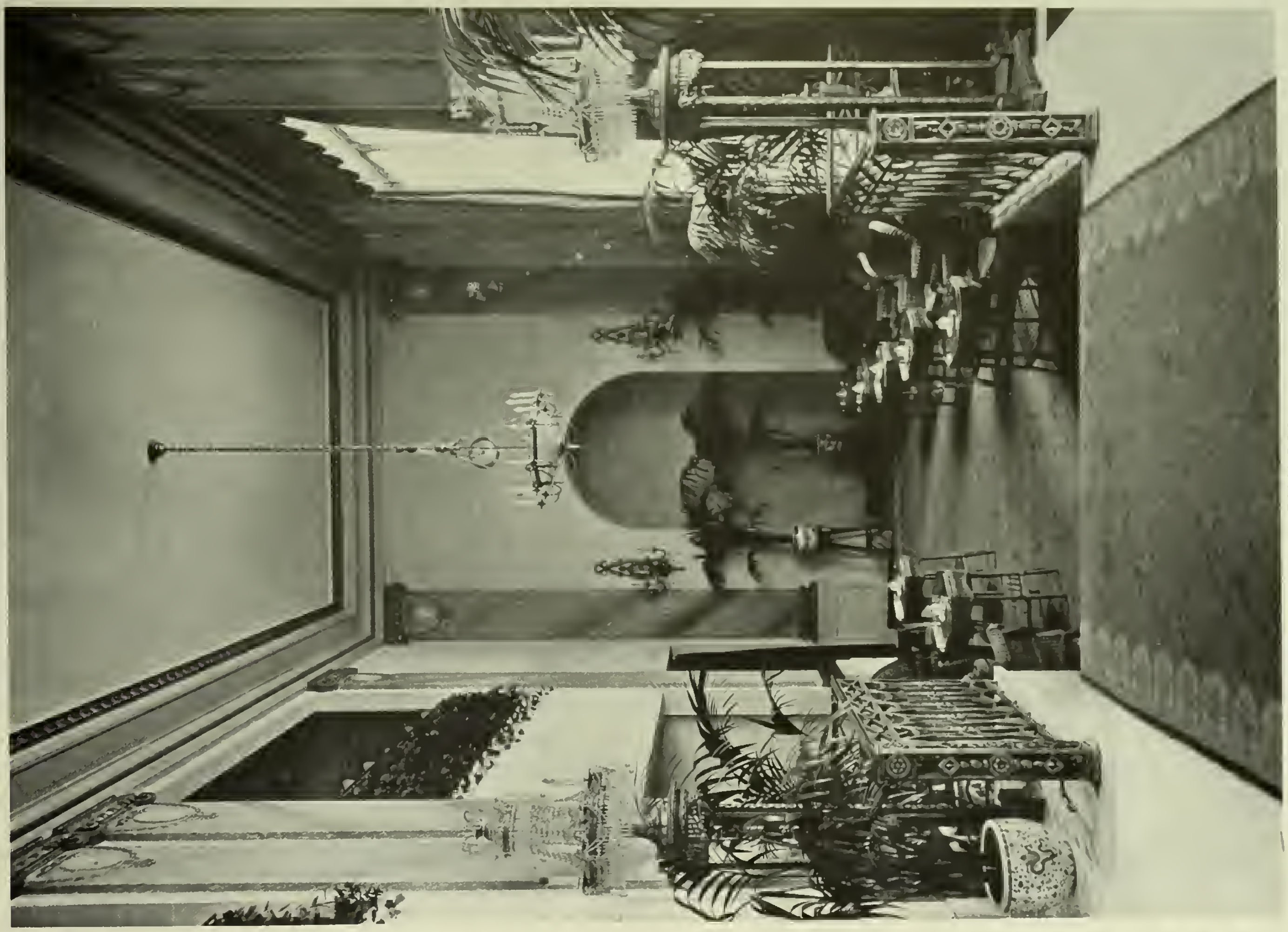
DETAIL WALNUT STREET ELEVATION

THE RITZ-CARLTON HOTEL, PHILADELPHIA, PA.

HORACE TRUMBAUER, } ASSOCIATE
WARREN & WETMORE, } ARCHITECTS

BALL ROOM

ENTRANCE FOYER



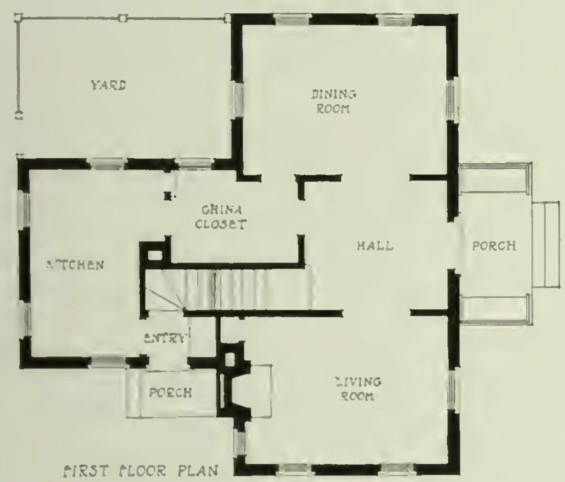
PALM ROOM

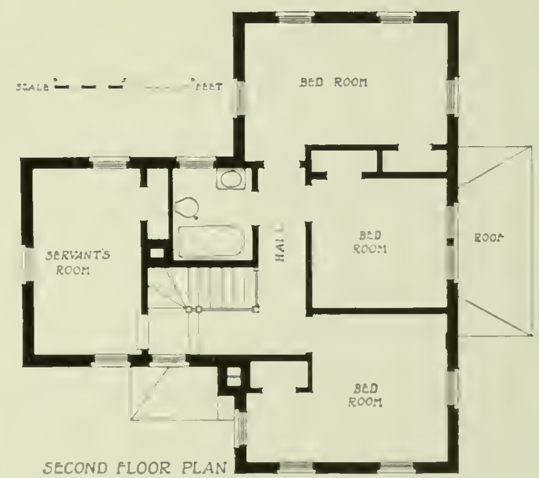
THE RITZ-CARLTON HOTEL, PHILADELPHIA, PA.

HORACE TRUMBAUER, } ASSOCIATE
WARREN & WETMORE, } ARCHITECTS

THE RITZ-CARLTON HOTEL, PHILADELPHIA, PA.

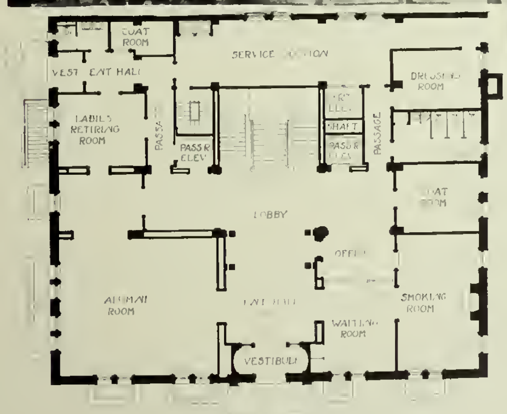
HORACE TRUMBAUER, } ASSOCIATE
WARREN & WETMORE, } ARCHITECTS



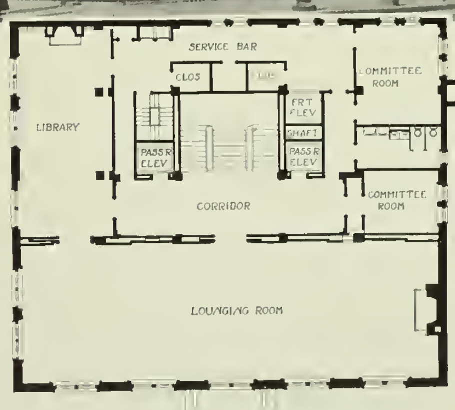


COTTAGE ON LARGE ESTATE,
LINCOLN, MASS.

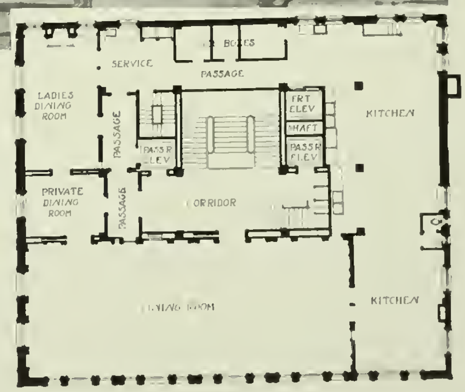
FRANK CHOUTEAU BROWN,
ARCHITECT



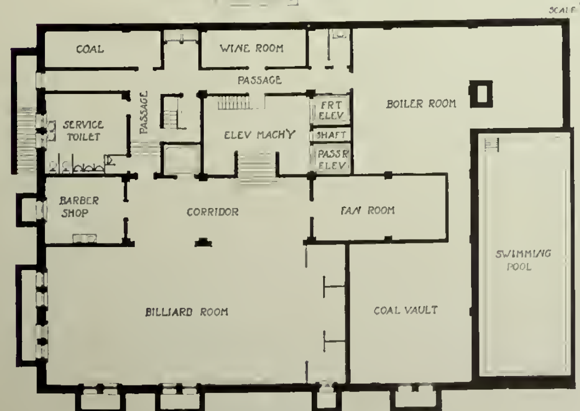
FIRST FLOOR PLAN



SECOND FLOOR PLAN



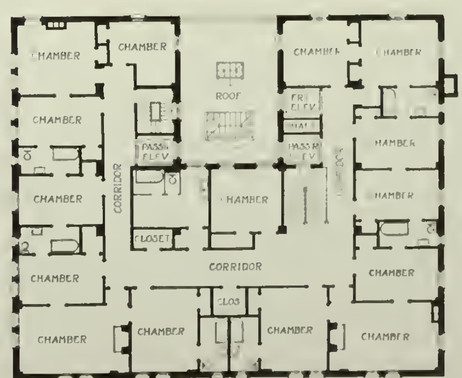
THIRD FLOOR PLAN



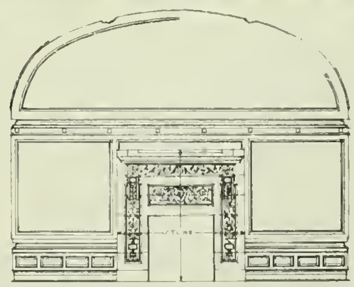
BASEMENT PLAN

THE UNIVERSITY CLUB,
WASHINGTON, D. C.

GEO. OAKLEY TOTTEN,
ARCHITECT

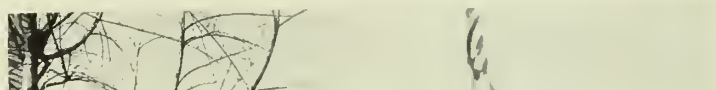


TYPICAL BED ROOM FLOOR PLAN



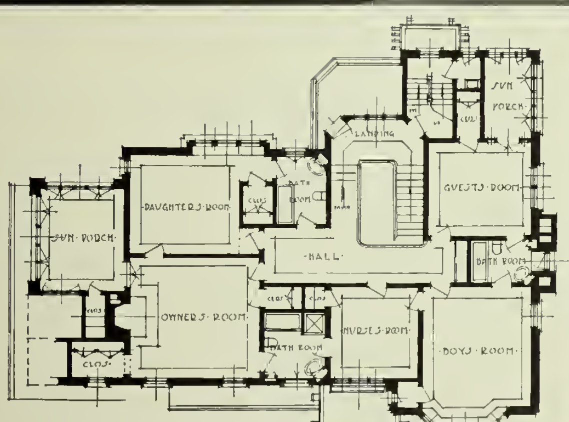
THE UNIVERSITY CLUB, WASHINGTON, D. C.

GEO. OAKLEY TOTTEN, ARCHITECT

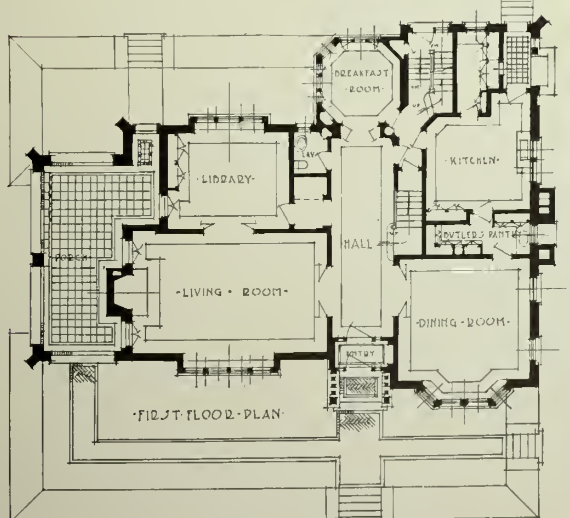


SMALL OFFICE BUILDING, PHILADELPHIA, PA.

MELLOR AND MEIGS, ARCHITECTS



·SECOND·FLOOR·PLAN·



·FIRST·FLOOR·PLAN·

HOUSE AT CLEVELAND, OHIO
FRANK B. MEADE AND
JAMES HAMILTON, ARCHITECTS

The Unit Power Plant for Isolated Buildings and Small Groups.— Part IV.

WATER SUPPLY BY MECHANICAL MEANS.

BY CHARLES L. HUBBARD.

THIS article deals principally with systems of water supply requiring mechanical means in some form, for bringing the water from its source to the point where it is to be utilized. In addition to this, certain other matters relating to water supply, although not strictly mechanical, will be touched upon briefly in order to make the article more complete.

Quantity of Water Required. The quantity of water required will of course depend entirely upon the type and size of building or plant to be supplied. In approximating this, we will take up a few specific cases, such as dwellings, stock farms, hotels, power plants, and general fire protection.

In the case of dwelling houses and similar buildings it is customary to provide a tank or cistern holding perhaps a day's supply, and making the mechanical equipment of such capacity that it will only have to be operated a comparatively short time, say two or three hours, for providing a supply for the entire day. This gives ample leeway for any special demand, such as laundry work, etc., when the plant may be run for a longer period. In the case of an ordinary dwelling the supply may be based upon an average of about 30 gallons per day per occupant. Laundry work, lawn sprinkling, etc., must be provided for in addition to this, and may usually be cared for as noted above.

For country estates and stock farms, the above will apply to house requirements, while about 10 or 12 gallons additional should be provided for each head of stock kept upon the place. In cases of this kind, the quantity of water required for sprinkling lawns and gardens is quite an important item, and must be estimated in each particular instance according to local conditions.

This may be estimated roughly by assuming that a ¼-inch hose nozzle will discharge about 120 to 150 gallons per hour under a pressure of 30 pounds per square inch at the hydrant or sill cock. The heavy demands for water in a hotel are for baths and laundry purposes. The first of these occurs largely between the hours of seven and nine, while the requirements for domestic and laundry purposes are likely to come later in the day, to a considerable extent, and to be more evenly distributed.

In estimating for baths it is customary to count on 20 to 30 gallons per bath, and from 2 to 3 per hour during the rising period. Buildings of this kind are usually provided with storage tanks both for hot and cold water, especially when supplied from a private source, so that here, as in case of a dwelling house, the capacity of the pumping outfit will depend both upon the size of the storage tank and the proportion of the time it is desired to run the pump. As a general thing, it may be operated for a greater length of time, because there will be other machinery to care for and the same attendant may look after the pumping equipment also. If the pump has sufficient capacity to furnish the entire day's supply by six or eight hours' work, any extra demand may usually be cared for by the storage tank. If the water is supplied by a hydraulic ram, working continuously, then larger tanks should be provided, as the ram cannot be speeded up to meet any sudden demand.

In case of power plants, water is required for boiler feeding and, in some cases, condenser service also. For ordinary conditions 4 gallons per hour per boiler horsepower will be sufficient when the steam is exhausted outboard by the engines. If the steam is condensed in a heating system or surface condenser, and pumped back to the boilers, only ten per cent of the above will be required.

In case a condensing outfit is used in the summer time, in connection with reciprocating engines, 30 and 35 pounds of cooling water will be required per pound of steam condensed for jet and surface condensers, respectively. The amount of steam to be condensed per hour may be obtained from Table III given in a previous article.

In systems of fire protection, allow 250 gallons per minute for each 1⅛ inch standard fire stream, and the same amount for each fifty sprinkler heads. For industrial plants of various kinds the water requirements will vary so widely that they must be estimated from data furnished by the owners or engineers in charge.

Sources of Supply. The source of supply will depend upon the quantity required and the purpose for which it is to be used; also upon the available sources in the vicinity of the building.

For dwelling houses and country estates, natural springs, mountain brooks, deep wells, and artesian wells give the best quality of water for domestic purposes. Where the water is to be used for laundry purposes and in power and industrial plants, rivers and ponds may be added to the above sources. When large quantities are required, natural ponds and lakes, of such size as not to be seriously affected by the dry seasons, form a valuable source of supply. Running streams which never fall below the maximum requirements are also a desirable source of supply, provided they are conveniently located and the water is of fairly good quality.

The value of artificial reservoirs fed by springs and brooks depends largely upon the stability of supply, and can only be determined by looking carefully into their past history for several seasons back. By *deep wells*, are meant those which are excavated to a depth of 20 to 40 feet, with diameters ranging from 6 to 10 feet, and which serve as storage reservoirs as well as sources of supply.

When none of the above sources are available, artesian wells are often resorted to, being quite common in some parts of the country.

The capacity of a well of this kind depends largely upon various local conditions and cannot well be predicted. Data based on a 6-inch well, sunk into a water-bearing stratum 10 feet in thickness, and having the water level lowered 1 foot by continuous pumping, gives the following capacities in gallons per hour, according to the porosity of the soil. Fine sand, 170; medium sand, 1,200; coarse gravel, 3,000; fine gravel, without sand, 20,000.

These figures are much higher than are commonly obtained in New England or other localities where the soil is more or less rocky.

There is very little to be gained by increasing the diameter of an artesian well, as the flow depends largely upon the depth which the natural water level is lowered by pumping. If more than one well is sunk, they should not be placed too near together, the distance ranging from 100 to 400 feet, according to the lowering of the water level by pumping.

Methods of Bringing Water to Building. When the source is at a sufficient elevation above the building to give the required pressure it may be best to provide the reservoir at this point and simply connect with the various fixtures by means of a gravity pipe line; the arrangement being practically the same as when connecting with a street main.

Table XI gives the gallons of water discharged per minute through pipes of different diameters for various friction heads, in pounds per square inch. To change pounds per square inch into feet head, multiply by 2.3; and to change feet head into pounds per square inch, multiply by 0.43. The friction heads in the table are for 100 feet length of run; for other distances, multiply by $\frac{D}{100}$, in which D is the total distance in feet.

TABLE XI.

Gal. per min.	Friction head in pounds per square inch for 100 feet length of run, for different sizes of pipe.									
	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"
5	3.3	0.84	0.31	0.12	----	----	----	----	----	----
10	13.0	3.16	1.05	0.47	----	----	----	----	----	----
15	28.7	7.00	2.38	0.97	----	----	----	----	----	----
20	----	12.30	4.07	1.66	0.42	----	----	----	----	----
30	----	27.50	9.15	3.75	0.91	----	----	----	----	----
40	----	48.00	16.10	7.26	1.60	----	----	----	----	----
50	----	----	----	10.00	2.44	0 81	0.35	----	----	----
75	----	----	----	22.40	5.32	1.80	0.74	----	----	----
100	----	----	----	----	9.46	3.20	1.31	0.33	----	----
150	----	----	----	----	----	7.00	2.85	0.69	0.10	----
200	----	----	----	----	----	12.48	5.02	1.22	0.17	----
250	----	----	----	----	----	----	7.76	1.89	0.26	0.07
300	----	----	----	----	----	----	11.20	2.66	0.37	0.09
400	----	----	----	----	----	----	19.50	4.73	0.65	0.16
500	----	----	----	----	----	----	30.80	7.43	0.96	0.25

Example. The surface of a reservoir is 23 feet higher than a house tank, and the distance is 1,000 feet; how large a pipe will be required to discharge 15 gallons per minute? The friction head in pounds per square inch per 100 feet is $23 \times 0.43 \times \frac{1,000}{100} = 0.99$. Looking in Table XI, along the line for 15 gallons, we find that a 1½-inch pipe has a friction head of 0.97, which is slightly less than the available head, and is therefore of ample size. If the water contains suspended matter, the pipe should be made of such size that the velocity of flow will not fall below 2 or 3 feet per second, else sediment will collect at the low points. Galvanized steel pipe is commonly used for sizes up to 2½ or 3 inches, and cast-iron pipe for the larger sizes, the latter material being more durable for underground work. When the source of supply is at a lower elevation than the point where it is to be used, the water must be forced into the storage tank by means of a pump, hydraulic ram, or air-lift. If a pump is used, its location will depend upon the elevation to which the water is to be raised. The height from the surface of the supply to the pump, plus the friction head in the suction pipe, reduced to feet, should not exceed 20 feet at the most, and 15 feet is safer. If the total elevation is more than this, the pump should be located near the source of supply, and the water lifted by force instead of suction. In general, a short suction pipe is better than a long one, because there is less danger of the inleakage of air; and for the same reason, wrought iron is better than cast iron on account of tighter joints.

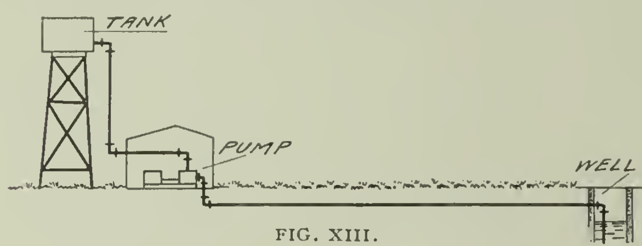


FIG. XIII.

Fig. XIII shows location of pump for lifts of less than 20 feet (including friction), and Figs. XIV and XV where the total lift is more than this. In one case (Fig. XIV), the contour is such that it is necessary to place the pump close to the source of supply, while in the other, it may be located nearer the building on account of convenience. Where a

FIG. XIV.

pump is used for forcing water through a pipe line, the proper size of pipe will be fixed by the relation between the saving in cost of pipe and the increased cost of pumping against a greater head. Under average conditions a velocity of 2 feet per second in the pipe gives about the best results.

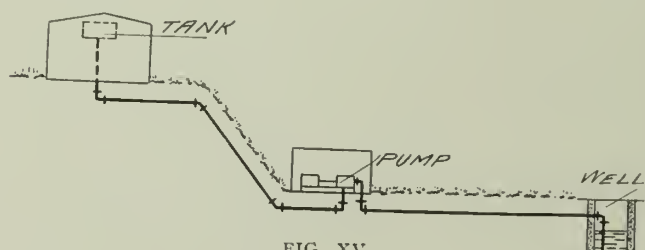


FIG. XV.

Capacity and Power of Pumps. The capacity of a piston or plunger pump is given by the formula *(d)*

$$G = \frac{A \times L \times N \times S}{230}, \text{ in which}$$

G = gallons per minute.
A = area of piston, in square inches.
L = length of stroke, in inches.
N = number of strokes per minute.
S = a factor, depending upon the leakage around piston and valves, and which may be taken as .8 for small and medium sized pumps in good condition.

When taking capacities from a catalogue, care should be taken to learn if this leakage, called "slippage," has been taken into account.

The power required for driving a pump is given by the formula, (*e*) $H.P. = \frac{G \times H}{4,000 \times E}$, in which

H. P. = actual horse power required.

G = gallons pumped per minute.

H = total head, in feet, including height of lift and friction head in pipe.

E = efficiency of pump, which may be taken as follows :

Triplex Power Pumps	0.6 to 0.7
Small and Medium-Sized Centrifugal Pumps	0.5 to 0.6
Deep Well Pumps	0.4 to 0.5

When computing the cost of power for small and medium-sized direct-acting steam pumps, count on 100 to 120 pounds of steam per delivered horse power.

Types of Pumps and Method of Driving. The three classes of pumps commonly used under the conditions noted above are the direct-acting steam pump ; the power pump, of the simple, duplex, or triplex type, according to the number of cylinders ; and the turbine or centrifugal pump.

The first of these, as its name implies, is driven by a direct-connected steam engine, the steam and water pistons being attached to the same rod. This pump is simple in construction, but wasteful in the use of steam. It has the advantage of being easily regulated, requires but little care, and is adapted to cases like that shown in Fig. XIII where it may be located in or near the boiler room. It is made in all sizes, both with single and duplex cylinders, and may be arranged to start and stop automatically by means of a float and balanced valve.

The power plunger pump is made in different forms and sizes and is driven by an independent motor of some form.

This may be a steam, gasoline, or hot-air engine, an electric motor, or it may be belt-driven from a convenient counter-shaft, if one is available. This type of pump may be used under any of the conditions shown in Figs. XIII, XIV and XV. In the last two cases it might be driven either by a gasoline engine or electric motor, as most convenient. If electric current were available, the latter would probably be preferable, as the pump could be started and stopped from a distance without visiting the pump house. As a matter of fact, both motor and pump should be inspected, oiled, and cleaned every day when starting up, but may be shut down by means of a switch located in the main building.

The centrifugal pump is a type which has come into quite general use of late years and is particularly adapted to this class of work, being free from valves and requiring practically no attention. It may be driven by a steam or gasoline engine, turbine, or electric motor, as best adapted to the location and conditions under which it is operated.

Comparative Cost of Operation. The writer recently worked out in considerable detail a series of six problems to determine the comparative cost of pumping water by different methods. These problems, however, relate to a large power plant, requiring a total of 1,800 gallons per minute, for sixteen hours a day the year round. Where steam and electricity are required in these cases they are taken from the main plant and charged up at cost. The figures representing the cost of operation are for a year, and include fuel charges and interest and depreciation on first cost of plant. This, of course, calls for a much larger equipment than is included within the scope of the present article, and the figures will only hold for the conditions actually assumed, but the *relative* costs of the different methods would probably not vary greatly if worked out on a smaller scale. The equipment and costs are as follows :

1. Simple direct-acting duplex pump	$5,000
2. Compound direct-acting duplex pump	3,800
3. Engine driven triplex pump	3,800
4. Motor driven triplex pump	2,500
5. Motor driven centrifugal pump	2,000
6. Steam turbine driven centrifugal pump	3,300

In comparing these results it should be borne in mind that the low cost of pumping by electricity is due to the fact that the current is generated on the premises. If it were purchased at usual rates from a central station, it would, in most cases, be considerably more.

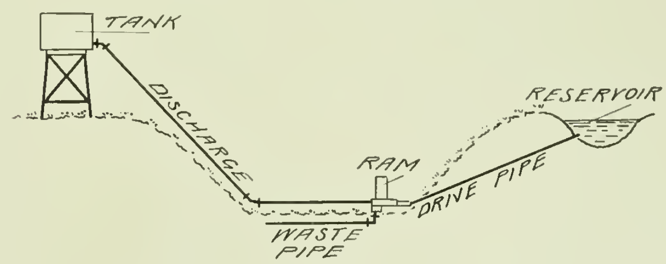


FIG. XVI.

Hydraulic Rams. Hydraulic rams are used where there is a sufficient water supply and suitable grades. It is the cheapest method of pumping water, as there is practically no expense for power. They require a minimum of attention and will last for years. The usual method of connecting a ram is shown in Fig. XVI. In practice it is customary to make the length of the drive pipe equal approximately the height of lift from the ram to tank or reservoir. When it is necessary to locate the ram at a greater distance from the source of supply, a standpipe is introduced to shorten the length of the drive pipe. For large quantities of water the fall from source to ram should not be less than 2 feet, and should not, in general, exceed 12 or 15 feet.

The working formulas for the hydraulic ram are given below.

$$(f)\quad g = \frac{2 \times G \times H}{3 \times h},\quad (g)\quad G = \frac{3 \times h \times g}{2 \times H},$$

$$(h)\quad H = \frac{3 \times h \times g}{2 \times G},\quad (i)\quad h = \frac{2 \times G \times H}{3 \times g},$$

in which

g = gallons discharged by ram.

G = gallons required for operating ram, including g.

H = fall from source of supply to ram.

h = height to which water is lifted above ram, including friction head.

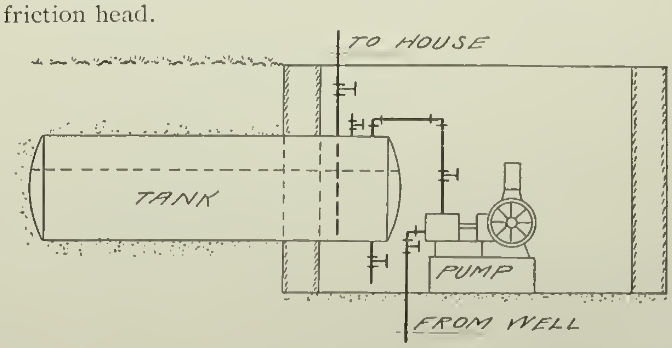


FIG. XVII.

Hydraulic rams are built in all sizes, from those adapted to dwelling house work up to plants for supplying large towns.

Pneumatic Systems. As commonly spoken of, a pneumatic system of water supply means the substitution of a closed tank, either sunken or located in the basement, for the elevated tank or reservoir. A common arrangement is that shown in Fig. XVII, the storage tank being buried in the ground beside the building, with the end projecting into the basement in order to give easy access. In small plants the entire equipment is usually placed in the basement.

The pressure pump for filling the tank may be operated by hand, or by an electric motor or gasoline engine in case of the larger sizes. In using this arrangement, the tank is first allowed to fill with air under atmospheric pressure. The vent is then closed, and the water pumped in, which, as the tank fills, compresses the air and causes a pressure. Table XII shows the pressure in the tank with different quantities of water when filled in this way.

TABLE XII.

Volume of Water in Tank.	Pressure per Square Inch.	Volume of Water in Tank.	Pressure per Square Inch.
$\frac{1}{4}$ full	5 lbs.	$\frac{2}{3}$ full	25 lbs.
$\frac{2}{5}$,,	10 ,,	$\frac{7}{10}$,,	30 ,,
$\frac{1}{2}$,,	15 ,,	$\frac{3}{4}$,,	45 ,,
$\frac{3}{5}$,,	20 ,,	$\frac{4}{5}$,,	60 ,,

When it is desirable to carry a higher pressure for a given volume of water, a certain amount of air may be forced in when filling the tank by means of a special valve attached to the pump. The principal advantage of a system of this kind is its compactness and the ability to place the tank under ground or in a basement where there is no danger of freezing. Another pneumatic system, adapted to deep wells, is shown in Fig. XVIII. This consists of an engine or motor, compressor, air reservoir, and pneumatic pump which is placed at the bottom of the well.

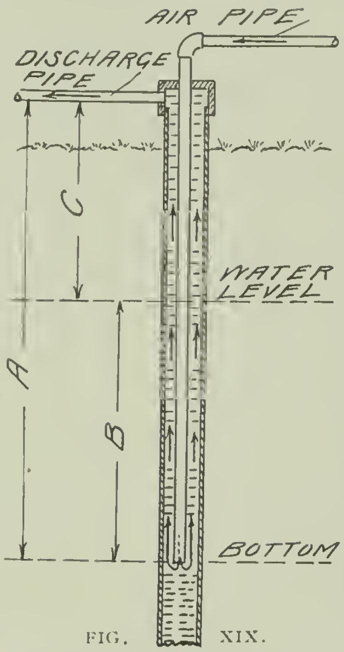


FIG. XIX.

In operation, the reservoir is charged with compressed air, which operates the pump, and is only used when water is drawn from the faucets. An even pressure is maintained on the system by means of a regulating valve, and the compressor need only be used when recharging the reservoir.

The *air-lift*, so called, is a pneumatic pump especially adapted to raising water from artesian wells. The compressing outfit is practically the same as in the system just described, while the lifting device is shown in Fig. XIX, and consists simply of a pipe carried down inside the well tubing for delivering compressed air near the bottom. The effect of this is to force successive "slugs" of water up the tube and into the discharge pipe leading to the tank.

The height "A" is called the total head, "B" the distance from the bottom of the air pipe to the water level in the well, and "C" the distance from the water level to the discharge outlet. In practice the ratio $\frac{B}{C}$ runs from 1.5 to 2.5 and should never be less than 1.5 if possible. For the best results, the area of the air pipe should be about one-sixth that of the water pipe under average conditions.

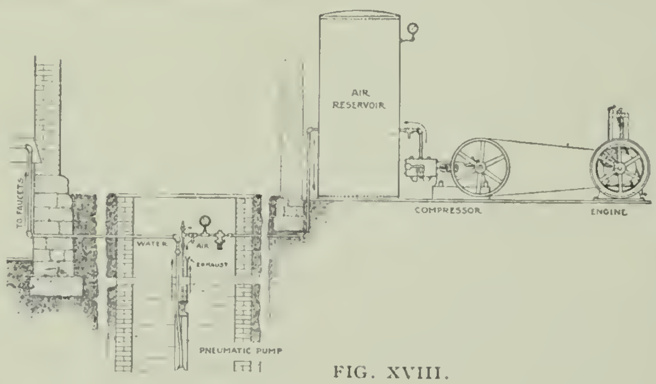
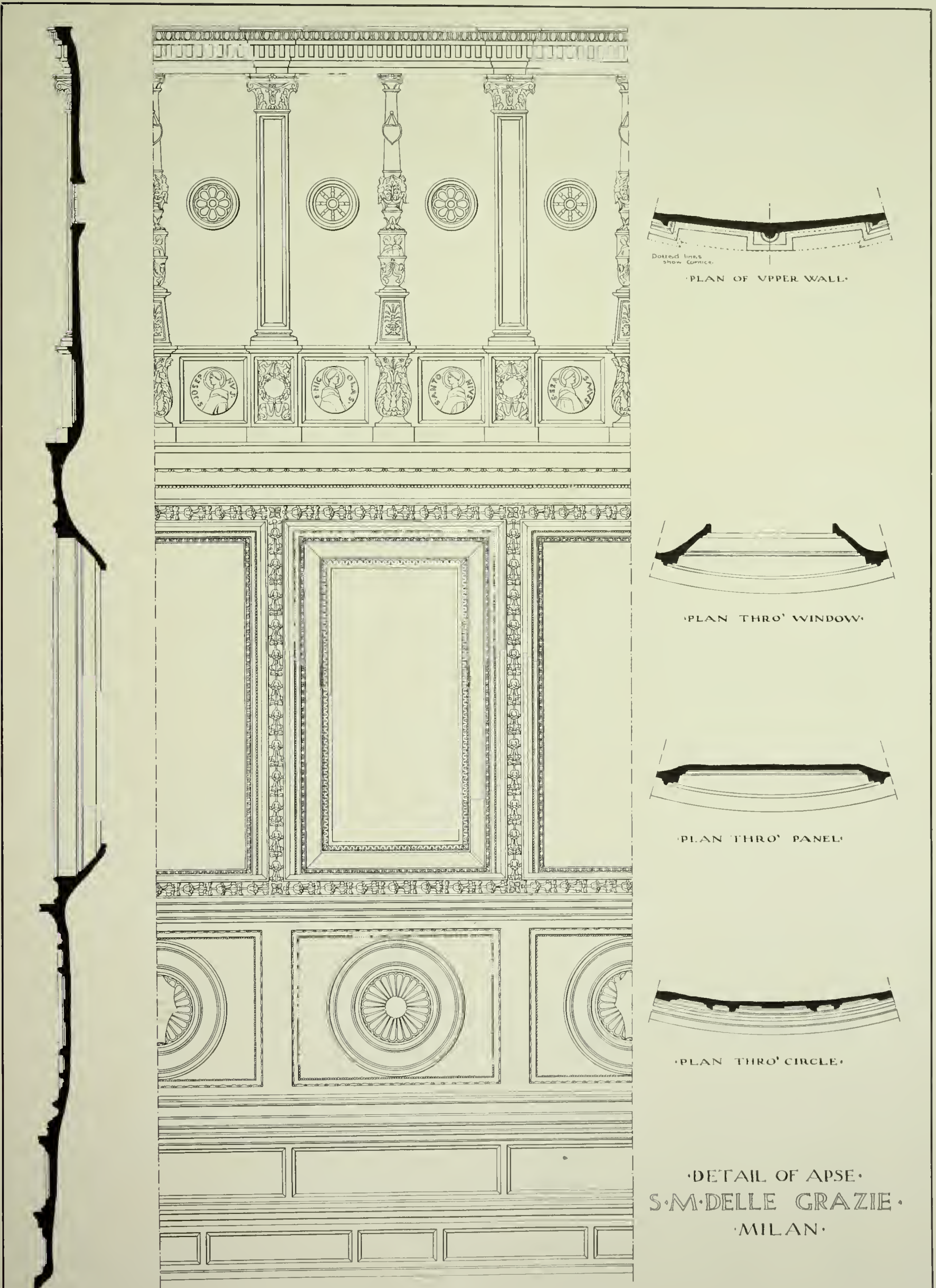
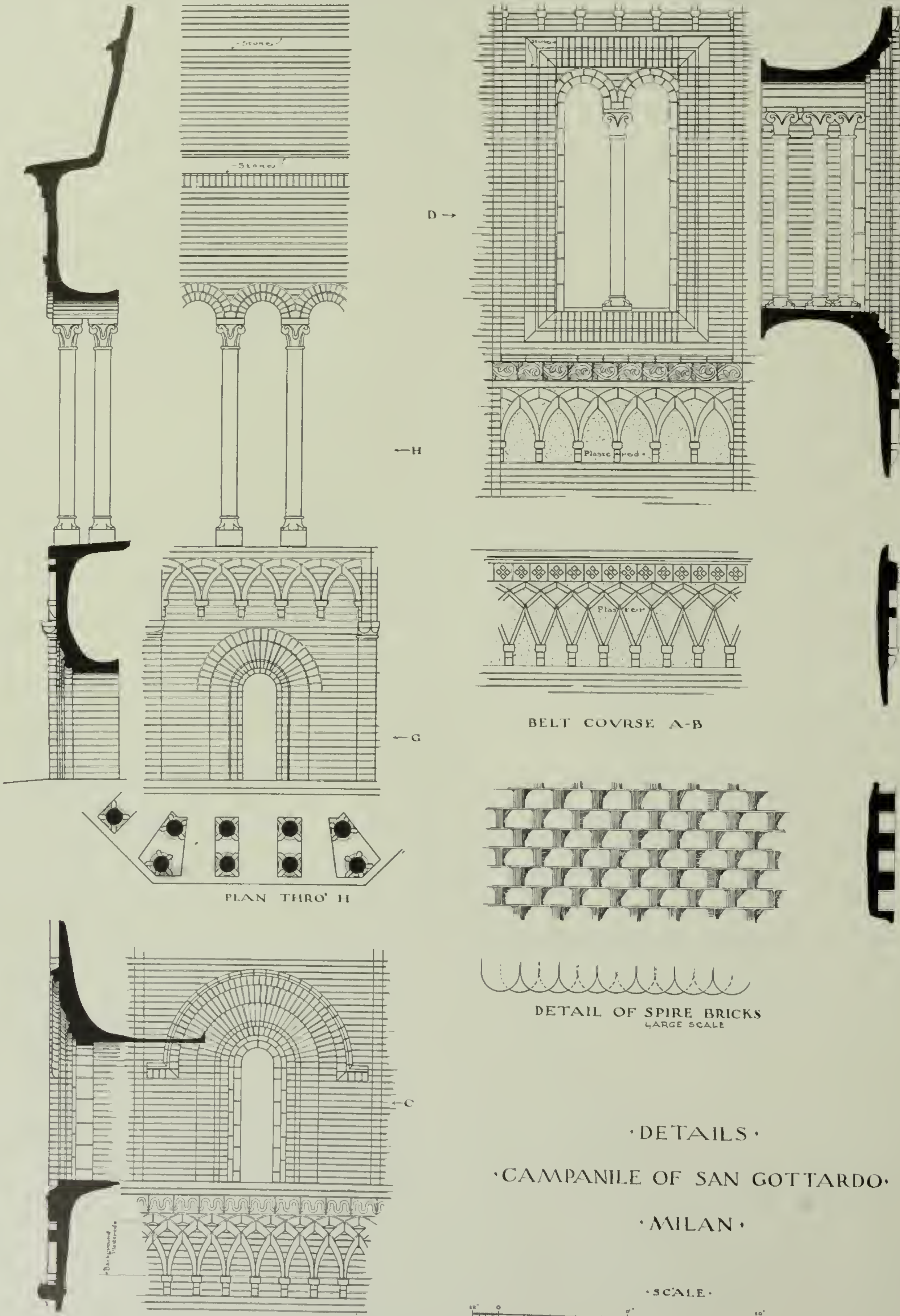


FIG. XVIII.

While this is a very simple method of raising water from artesian wells, it is more expensive than using the regular form of plunger pump on account of the cost of compressing the air for operating it.



MEASURED DRAWINGS – ITALIAN SERIES
WILL S. ALDRICH, DEL



·DETAILS·

·CAMPANILE OF SAN GOTTARDO·

·MILAN·

MEASURED DRAWINGS—ITALIAN SERIES

WILL S. ALDRICH, DEL.

The Croisic Building, New York City.

FIFTH AVENUE AND TWENTY-SIXTH STREET.

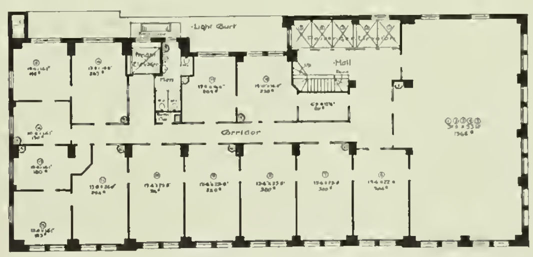
BROWNE & ALMIROTY, ARCHITECTS.

This building is one of the late additions to the tremendous number of tall loft buildings in New York City. It constitutes an excellent evidence of the general improvement in commercial architectural design, and demonstrates that owners of this type of building feel it necessary to build so well designed a building to attract the best class of clients. It is not of course such a notable contribution to tall building architecture as the Bankers Trust Building and other down-town structures, but of its type and for its purposes is excellent.

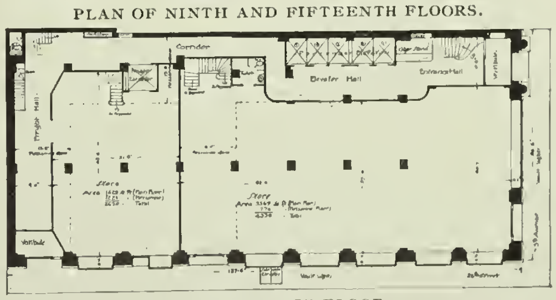
The biggest feature of New York construction for the past few years has been the erection of a really great number of loft buildings, ranging from twelve to twenty-five stories in height, constructed mostly on the side streets within a block on either side of Fifth avenue, and in many cases upon Fifth avenue itself.

This particular building, which occupies the corner of 26th street and Fifth avenue, is in a most excellent location, suited only to a high grade of tenants who are coming more and more to demand a suitable architectural expression of the needs and purposes of the buildings which they occupy.

With the increasing number of these loft buildings, especially in narrow streets, their designers are learning to exercise a little restraint in the matter of design out of consideration for their neighbors, and are endeavoring as far as possible to suppress heavy projections which tend materially to decrease the light area. This suppression of the cornices naturally involves the exclusion of Classic detail and the omission of Classic orders, and since horizontal treatment of the building is eliminated from the possibilities, the vertical design which we associate with Gothic has oftentimes taken its place.



PLAN OF NINTH AND FIFTEENTH FLOORS.



PLAN OF FIRST FLOOR.

THE CROISIC BUILDING, NEW YORK CITY.
Browne & Almiroty, Architects.

The greatest difficulty with the use of a Gothic or semi-Gothic treament of the vertical lines is the upper termination of the building in a manner which shall be reasonably economical, both of cost and space, and perhaps a genuine solution of this problem has not yet been found; certainly none of the loft buildings with flat roofs have been entirely successful. The attempt to justify the strong vertical lines by means of finials rising above the coping wall has not been satisfactorily dealt with in any case that comes to mind. Where a treatment which is from an artistic point of view successful, that of a rather steep roof forming a background to the terminations of these lines, has been used, as in the West street Building, the Woolworth Building, and this Croisic Building, among others, it can be imagined that the rental value of the stories in this roof is comparatively small. A similar type of roof in the Bankers Trust Building was very happily utilized for storage purposes, and, as in most tall buildings, basements are so terrifically expensive, it would seem that the storage space in the upper floors may be in the end more economical than in any story below the street. On the other hand, rental values of top floors, especially when fully lighted by skylight, are far in excess of any other floor (except the street floor), and economically the peaked roof cannot be justified, although artistically it appears to be the only satisfactory method yet devised.

The Croisic Building presents very few features of marked difference from the typical loft building, except that it is for the most part rather better designed, and is exceedingly well executed. It is a satisfaction to note that the owners were willing to give space enough to piers on the ground floor so that some reasonable amount of stability in appearance is possible. While the designers of this building have not attempted to carry their vertical lines distinctly to the ground, the difference in material between the two lower floors and the shaft of the building is not so great that the feeling that the vertical lines spring from the ground has been lost. The base is of granite, the shaft of a good quality of rough brick, and the crowning motives of well designed terra cotta, with the large openings filled in with iron.

The growing use of terra cotta for structures of this character is interesting and noteworthy, and with the development of the vertical line has constantly increased. Cornices of wide projection, such as that of the Gorham Building, New York City, could not of course be sensibly constructed in the small pieces possible to this material, and for a good many years, especially in the cheaper buildings, galvanized iron or copper cornices were almost universal. With the tendency to omit the cornices, or to reduce them to mere bands at the termination of the structures, the amount of terra cotta used naturally increased. This is true especially in such a structure as the Croisic Building where the details of the ornament are frankly copied from old Gothic work and a great number of repetitions of the same motive are required. Terra cotta is almost the inevitable material, especially since the Gothic ornament is rather complex and difficult to cut.

The old question as to whether terra cotta used to imitate stone forms is a justifiable expedient has been raised

ELEVATOR GRILLS.

in the case of this building as in others, but when the uses of all building materials from the earliest days to the present time have been so frankly imitated from each other, until we begin to criticize the Egyptians for cutting and painting their stone columns to imitate bundles of reeds tied together, this question might better be left unsettled.

THE CROISIC BUILDING,

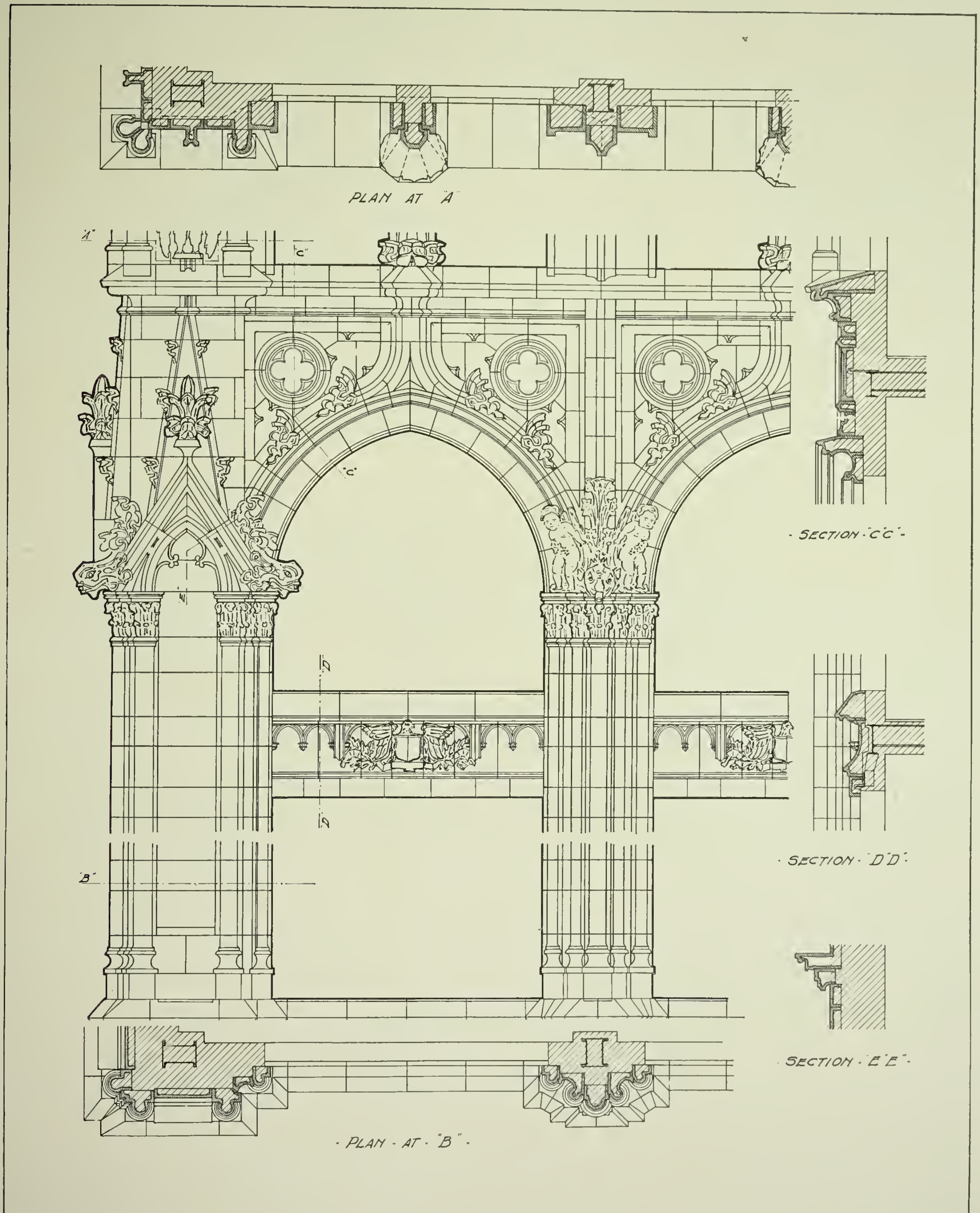
NEW YORK CITY.

Browne & Almiroty, Architects.

Architecture of to-day in the high building has been resolved almost into a question of an applied decorative treatment of a fireproofing covering to a steel structure, and it seems that any material, or combination of materials, which satisfies the eye as to the inherent beauty of the design, and has besides a certain comforting sense of

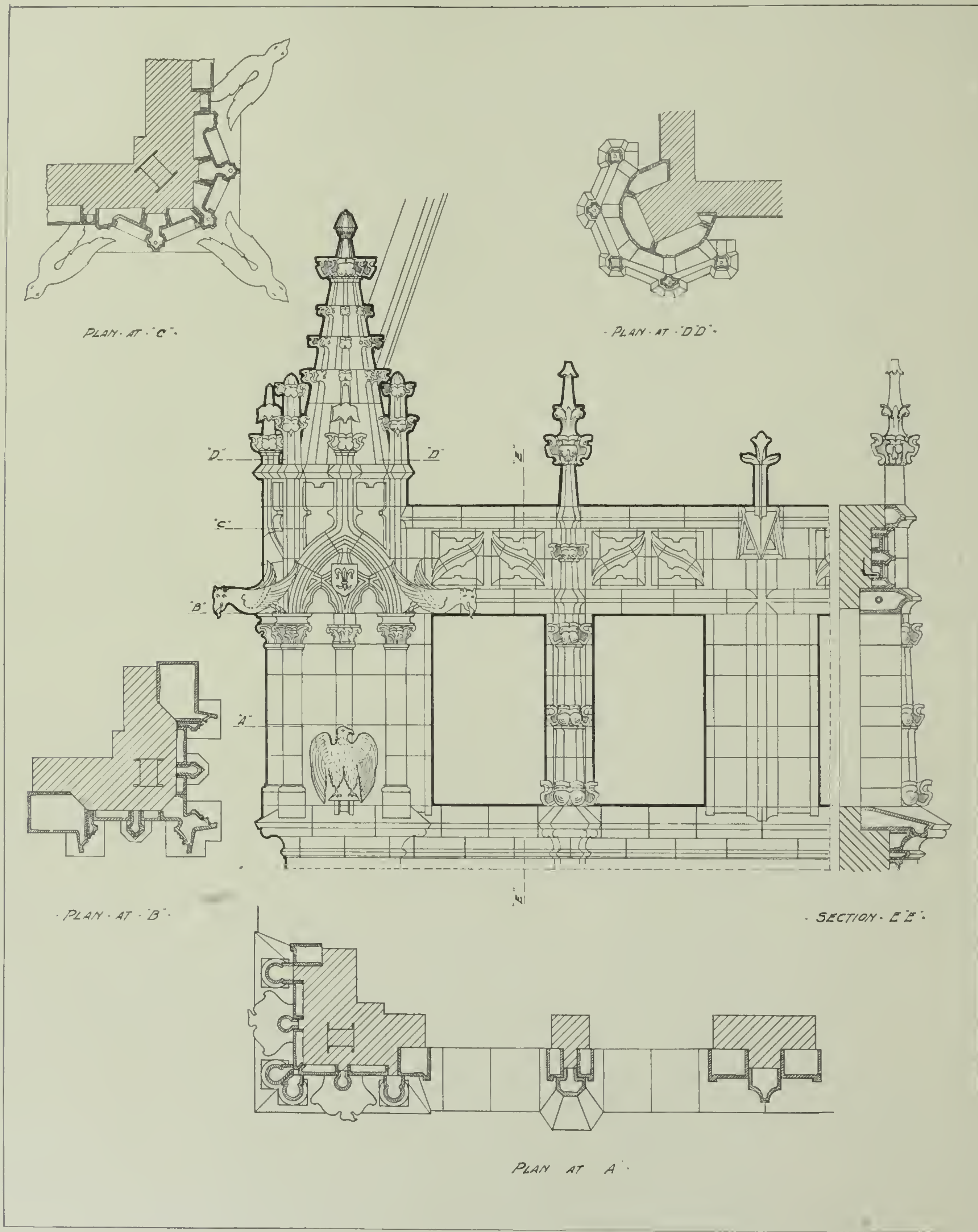
STAIRWAY DETAIL.

stability, is good legitimate work. It is impossible to forget that any tall building is a steel structure, veneered with a mighty thin shell of masonry, and it is only when an architect consciously attempts to make this veneering heavy enough so that if it were solid it would take the place of the steel which it encloses, that we feel an incongruity.



TERRA COTTA DETAILS

THE CROISIC BUILDING, NEW YORK CITY
BROWNE & ALMIROTY, ARCHITECTS



TERRA COTTA DETAILS

THE CROISIC BUILDING, NEW YORK CITY

BROWNE & ALMIROTY, ARCHITECTS

An Architects' Fees.

A LETTER FROM R. CLIPSTON STURGIS.

Editor of THE BRICKBUILDER:

I have been much interested in your editorials on the subject of various methods of charging for professional services by architects. As I have had no work which I have charged for on a percentage basis for over five years, but have used successfully a scheme of charging a professional fee plus twice the cost of drafting, which is one of the methods discussed in your editorials, I feel that perhaps my actual experience may help to make clear, and perhaps establish, a system which appears fair, businesslike, and professional. The editorials in your January, February, and March issues refer to four different schemes:

1. Percentage basis — being a fixed percentage of the final cost of the building.
2. A method by which the charge is made a multiple of the total cost of drafting.
3. A method by which a specific charge is made for a professional fee, to which is added a certain multiple of the cost of drafting.
4. A method by which a specific charge is made for professional fee, a specific charge made for the general office expense, with the actual cost of drafting added.

Of these four the first is the traditional method, and so far as I know everybody agrees that it is an entirely illogical method, its use being justified solely by the fact that it approximates a reasonable charge, and averages up a fair return to the architect in the long run. It is a method which makes the good client, who ought to get bargain rates, give the architect a larger professional fee, in the matter of net profit, in order to even up on the architect's books for clients who, by the nature of their work, and the nature of their own personal exactions, cost the architect more, and so reduce the balance that is left for his profit.

The second scheme makes the architect's professional fee dependent upon the amount of drafting which is entailed in the work, and there is no relation between these two factors which makes such a charge logical.

The fourth method charges a fixed sum for general office expenses, to be based, according to the article, upon the cost of the work. This appears to me to be probably the outcome of theory rather than experience. It seems to me that the amount of general office expense, apart from drafting, that should be charged to any particular job depends more on the length of time that the work is in the office and the amount of draftsmen's services required, than on the cost of the building. It represents the cost of maintaining the draftsman at his table, and it will continue as a charge against the particular work as long as the draftsman is engaged upon it. If the suggested system were applied to the three examples given below, I think that it would be clear that it is not a logical arrangement.

The third method is the one I have employed for several years, and on which I think some further information will be of interest. This method, then, to repeat, is one involving the charging of a professional fee for the architect's personal, professional service, to which is added a charge covering the personal expenses of the architect in carrying the work through in his office; this being determined to be twice the actual cost of the drafting entailed in the work.

In the articles under consideration it is stated that the fee is "determined in proportion to the cost." This, as far as my office is concerned, is but a half-truth, a quarter-truth one might say. The cost of the work is one determining factor, its character another, the length of time to complete the work a third, and, in some ways, the most important. To take an example: Three pieces of work, each to cost $100,000; one a private house, one an office building, one a factory. The first will require the personal service of the architect throughout, the plans, the exterior, the interior, shop and studio superintendence, and oversight on the building; the second will require similar service for the plan, the exterior, and a small amount of the other personal service; the third will require the study of plan requirements and some suggestions to a good draftsman and little more. Roughly speaking, the first will take two years, the second will take a year and a half, the third a year. The professional fee would be in the form of an annual salary; a proportion, not the full proportion, payable monthly, the balance on completion. If $3,000 is a reasonable fee for the year's service on the factory, $6,000 is not unreasonable for the two years' service on the house. Perhaps both these are unreasonable, but my point is that the fee should be fixed after consideration of cost and character of the work and length of the service required. It is a very simple thing to fix this at a sum that the owner will accept as reasonable, for he is used to salaries and is used to professional fees. The agreement between architect and owner should define the service contemplated, and as time is an essential part of this agreement it will run for a definite time and therefore involve a fixed sum with provision for extension if the work is prolonged. So much for the fee.

The charge for drafting, that is, the actual cost of draftsmen's salaries engaged on the work, is doubled to cover other miscellaneous expenses, such as rent, heat, light, stenography, etc. This is done largely because of its convenience in book-keeping, as experience has shown that, roughly speaking, the total of draftsmen's salaries represents very closely the total of the other office expenses.

Another method which is perhaps in some ways more logical is to pro-rate the other office expenses among the clients in proportion to the *time* of the draftsmen spent on the work, instead of to the *cost* of the salaries of the draftsmen engaged on the work. The $10 man occupies the same space, uses about the same amount of material, and costs the architect to maintain in rent, light, etc., as much as the $60 man. On this basis, if a client has occupied forty-five per cent of the time of a draftsman during a month he would bear forty-five per cent of the office expense of that month. This means more calculation, is perhaps no more absolutely accurate than the other method, and I believe that the owner prefers the simpler method of doubling the drafting charge. The above does not of course cover such miscellaneous additional charges as travel, telegrams, long distance telephone calls, models, and other incidentals, representing definite outlay for a particular work, which are charged in addition to the above.

In the last article a point was made that is significant to my mind of a very general error. Much is often said of the large amounts paid in commissions to the architects. In this article stress is laid on the fact that a fault in the system I have endorsed above is that the owner must rely on the architect not to employ overpaid or needlessly expensive draftsmen in the work so as to increase the amount obtained to cover the office expense. How much does an owner know of how the architect spends the large amounts of money involved in the building itself; of the desirability of one material or type of construction over another; of whether the roof could be made exactly as efficient with a much cheaper construction which would also involve less repair charges in the future; of the relative costs of interior marbles selected, to others of similar effect; of the saving that could be made on his building by changing from eight cut granite to four cut, or from honed limestone to machine planed. How often does it occur to an owner to question on these points and determine in his own mind where he prefers to spend his money. Does he not generally rely on his architect for proper advice on such points? He generally does and certainly should. With all these opportunities, therefore, of making the work cost more or less by an amount that may easily exceed the architects' total commissions, any lack of confidence in the architects' judgment and good faith in the relatively small matter of draftsman's wages and share of office expense seem almost absurd. It is enough to start with the frank statement that "twice the drafting" is a *reasonably close approximation* to a fair charge for all office expenses, not including of course incidentals of travel, telegraph, etc., and any error there may be, is too small to worry about whichever side of the ledger it may be on. This slight question can well be overlooked after we have eliminated the vastly greater factor of uneasiness to all concerned, and that is the dependence of the architect's commission on the cost of material he decides to advise the owner to use, as in the case of the established percentage basis. An owner who has trusted his architect on that basis can surely have no objections to trusting him on the basis of a fixed professional fee plus twice the drafting.

A practical example may perhaps be of service to show just how the system works, and how readily it adjusts itself to and takes care of this vexed question of expert service. As the architect is paid for his own service as a thing by itself and the owner pays the cost of everything else, it is evident that he pays for any and all expert service; the civil engineer sends in his bill for surveys or borings, the structural and domestic engineers are employed if their services are to the advantage of the owner and he pays just the cost. There is then no question as to whether or no the owner is paying two commissions on the heating, as there is when he pays six per cent to the architect, and again six per cent to the domestic engineer. The agreement between the architect and the owner rehearses all that the architect undertakes, what he is to receive for it, and what the other charges which the owner must pay will approximately amount to. As some factors in the agreement may be doubtful, the agreement may contain provision for extension of time and increase in the sum named; but if the owner desires a fixed outside limit and the work is straightforward, it is possible, but always hazardous, to make a fixed agreement. In this case it would naturally be a somewhat higher figure to cover just that risk.

The following is an outline form of agreement which I am now using and which I suggest as covering the various items necessary in an agreement between architect and owner for work done on this basis.

R. Clipston Sturgis.

Form of Agreement

BETWEEN ARCHITECT AND OWNER.

Agreement made____________between________________ __________owner on the one part and___________architect of__________________on the other part.

______________________(date)_____

(1) The Work Contemplated. The work for which the architect is to render professional services under this agreement consists of the planning and construction of a ______________________________at_____________, estimated by the architect at this time to cost about______ _________________________________($), with an additional_______________________($) for furniture. This agreement, however, will not be affected by any change in these amounts.

(2) Scope of Professional Service to be Rendered.

(*a*) The architect shall render complete professional services; consisting of such conferences, preliminary studies, working drawings, specifications, large scale and full size detail drawings as may be necessary, together with the supervision of the letting of all contracts and the general direction and supervision of the work, including purchase of furniture. The charges noted below under "Architect's Salary" are for the personal professional service of____________(the architect)____________. The expense of drafting, engineers, incidentals, and superintendence will be paid by the owner in addition to such salary, as noted below under "Additional Charges."

(*b*) The architect shall provide five blue prints of each scale drawing and the original of each full size drawing.

Any additional blue prints needed for the purpose of bidding on the work shall be charged at cost under "Incidentals" noted below. Any further additional copies needed on the work will be charged to the contractor. The architect shall provide one set of copies of the contract drawings for the owner when the contract is let, and another set mounted on cloth corrected to embody all changes made during construction, at the completion of the work.

The architect will furnish ten typewritten copies of the specifications, or copy for the printer, if printed.

(c) The architect shall in person and by representatives give such superintendence to the work during construction as may be required to insure the work being executed in general conformity with the plans and specifications, and such further instructions as may be given from time to time. This superintendence cannot prevent poor workmanship or the use of poor materials, but can require the making good of such defects as appear in the work, so far as practicable. Complete supervision can be obtained only by the employment of a clerk of the works, which is provided for as noted below (4) *(d)*.

(3) Architect's Salary. *(a)* If the work as contemplated at this time is carried on steadily to completion it is estimated that the architect's services will terminate in ____ ____________months. On this basis the architect shall receive a total salary of__________________dollars ($). This amount shall be paid as follows, $________ a month for ________ months, with the final balance of $________ to be paid on the issuance of the final certificate to the contractor.

(b) If for reasons beyond the control of the architect the work is delayed so as to extend over a period materially in excess of that contemplated as noted above, and so as to entail additional service on his part, then the total amount of the architect's salary shall be increased by an amount to be mutually agreed upon by the owner and architect.

(c) The owner may at any time abandon or suspend the work and the employment of the architect shall thereupon terminate if the work is abandoned, and be suspended if the work is suspended.

(d) If the undertaking is abandoned and the employment of the architect consequently terminated, he shall be paid in addition to his salary to the date of such termination such proportion of the unpaid balance due at completion as shall be mutually agreed upon by the owner and architect.

(e) If the work is suspended at any time so as to suspend also the work of the architect, the owner shall be at liberty to suspend payments on the architect's salary until his work is resumed, without affecting otherwise the terms of this agreement.

(4) Additional Charges. In addition to the architect's salary determined above, there will be the following additional items of expense to be paid by the owner through the architect:

(a) Drafting. Strict account shall be kept by the architect of the cost of the drafting, such cost to be the total of the salaries paid to draftsmen engaged on the drawings, including time spent in writing specifications, but no charge is to be made for time so spent by the architect, and all expenses of stenographic work on specifications or otherwise, done in the architect's office, are to be considered as "a regular office expense." No charge shall be made for superintendence on the part of the architect.

The total amount of such drafting expense shall be multiplied by two to cover the proportionate share of "regular office expenses," and this resulting amount shall be paid monthly on statements in detail from the architect. The total expense under this item is estimated at $_________.

(b) Engineers. The services of structural, domestic, and sanitary engineers shall be paid for through the architect at cost. The total expense under this item is estimated at $________.

(c) Incidentals. Incidental expenses in connection with the work, such as additional blue-printing, traveling expenses, models, long distance telephone, telegraph, express and other miscellaneous charges, including printing of specifications, shall be paid at cost on monthly statements from the architect. The total expense under this item is estimated at $________.

(d) Clerk of the Works. The service of a clerk of the works will be required, and will be paid for by the owner through the architect at cost. The total expense under this item is estimated at $______. He shall represent the interests of the owner and shall report each week to the owner through the architect.

The above charges shall be paid monthly as they are incurred on detailed statements from the architect.

(5) Payments. The above estimates are summarized as follows:

(a) Salary ______________________		$______
(b) Additional Charges —		
Drafting	$________	
Engineers	$________	
Incidentals	$________	
Clerk of the works	$________	$________
		$________

(6) Note. The estimated costs of the items under section (4), "Additional Charges," are understood to be approximate estimates and the final costs under these items will vary from the amounts given, depending upon conditions developing during the progress of the work, and the architect does not guarantee the accuracy of these estimates.

____

____

EDITORIAL COMMENT AND NOTES FOR THE MONTH

PLATE DESCRIPTION.

THE CHURCH OF THE ASCENSION, ITALIAN, NEW YORK CITY. PLATES 65, 66, 67, and 68. The Presbyterian Church in New York City for some years has taken into its membership and work the Italian element as found on the upper east side of New York City. In order to interest and hold these people it seemed necessary to provide places of worship that would at once be suitable for the practical requirements of a semi-settlement work and appeal to the esthetic taste and religious impulse of the Italian people.

In the Church of the Ascension the endeavor has been made to give the building architecturally a distinct idiomatic Italian feeling, — to design a building such as these people might find in their own home towns. The architectural problem further involved the placing of a parish house above an auditorium and providing abundance of light for both, and also preserving to the façade of the building a dominance of the ecclesiastical note inherited by these warm, emotional people from their Roman traditions derived from their old Basilicas.

Both the façade and the interior of the auditorium have been treated in stucco overlaying brick and in such fashion as to give the feeling in many places of the stucco having worn off of the underbrick surface in spots. The brick used is deep red, of fairly rough texture, and with stucco and tile inserts forms a wainscot around the entire interior of the auditorium. The stucco is colored to a soft light reddish tone to harmonize with the general feeling of the brickwork.

The auditorium is entirely lighted by day through the skylight over the dome and is ventilated by louvre windows in this dome and by a very complete system of artificial air exhaust and supply.

Meetings other than the regular religious services are provided for in the large basement room, special care having been taken in the artificial ventilation of this room.

Kindergarten work is carried on in the second story directly over the front of the auditorium by the Kindergarten Association of New York City, and for the present the roof over the remainder of the auditorium is used as a roof garden, being paved with tile and guarded by high wire fences.

Three means of escape in case of fire have been provided for the kindergarten children in two interior fireproof stairways and exterior iron stairways leading to the adjacent roof.

The cost of the building, exclusive of decoration, furnishings, etc., was approximately \$42,000, or a cubic cost of \$18 9/10; — the vertical heights for the cube being taken from the basement floor to the mean height of the roofs.

THE RITZ-CARLTON HOTEL, PHILADELPHIA, PA. PLATES 72, 73, 74, and 75. A fourteen-story structure with basement and two sub-basements. Built of pink granite and limestone up to the third story. The shaft of the building is constructed of red brick laid up in Flemish bond. Terra-cotta ornamentations crown the upper stories.

The building is fireproof throughout. All doors and trim are built of non-burnable materials. A fire tower is provided at the southwest corner running the entire height of building and opening directly upon the street.

The café and entrance foyer occupy the ground floor. The second floor, a double story, is occupied by the restaurant. The kitchen is located on the floor above. The position of the kitchen floor between the main restaurant and supper floors is intended to facilitate service and to combine a light and well-ventilated workroom.

There are three supper rooms with an anteroom on the fourth floor. The ball room is on the next level. This room also extends through two stories.

There are forty-nine suites located in the stories above. Each bedroom has an adjoining bath. Two parlors are provided for each floor.

UNIVERSITY CLUB, WASHINGTON, D. C. PLATES 77, 78. Designed in the early Italian Renaissance style, at once simple and dignified. The building is 86 by 72 feet, with an 18-foot garden along the entire northern side to provide for light and air. The first two stories of the exterior are of gray limestone, heavily rusticated, while the upper stories are constructed of brick, matching in color as nearly as possible the stonework of the lower stories. A heavy projecting cornice, richly painted in colors, crowns the building.

The main entrance hall has a tiled floor, with the walls treated in ornamental Caen stone. The ladies' entrance has adjacent to it a ladies' reception room and coat room, together with a private elevator to the ladies' dining room on the floor above. In the rear of the first floor is a service entrance.

The main staircase leads to the second or main club floor. On this floor is the principal lounging room, extending across the entire front of the building, two stories in height. The ceiling is richly vaulted, the walls paneled and decorated in colors. The library, the bar, committee rooms and toilet rooms are also on this floor.

The main dining room is on the third floor. It is paneled in chestnut with ceiling beams and cornice in plaster. A unique feature of this room is the long row of windows, making the side one line of light. The main staircase extends up to this floor, but above this point a secondary staircase leads to the two bedroom floors.

There are fifteen bedrooms, six private baths, and one general bath and toilet room on each floor. On each of these floors is also a trunk room.

Ample provision is made in the basement for billiards and a barber shop, ventilating apparatus, boiler rooms, etc.

THE BRICKBVILDER

AN ARCHITECTVRAL MONTHLY

VOLVME XXII JVNE 1913 NVMBER 6

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PLATE ILLVSTRATIONS

LETTERPRESS

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CHURCH OF THE HOLY APOSTLES, ATHENS

Alternating courses of brick and stone, with panels of cut brick flush with mortar. Built about the fourteenth century.

THE BRICKBVILDER

JUNE, 1913

VOLVME XXII. NVMBER 6.

Practical Details in Hospital Planning and Equipment. — Part I.

BY M. E. McCALMONT, R.N.*

FOREWORD.

THE purpose of this series of articles, already announced by the editors of THE BRICKBUILDER, is to put before architects and others interested in hospital construction, not so much the technical details which can be found in abundance elsewhere, but the practical facts and ideas of which it is necessary to have an understanding if our hospitals are to be something more than delightful examples of architecture.

Allusions to problems and details of organization and management may seem, at first thought, extraneous or irrelevant, but the close relationship of such subjects to successful hospital planning can best be determined by the results obtained in those institutions where such factors have been duly considered and those wherein they have not.

We learn by error as well as by good example, consequently the unhappy mistakes of the past have been used by way of illustration, though just as great an effort has been made to exemplify the happier trend of the present.

There is little virtue and less sense in clinging to the traditions and customs of the past, if we cannot, by so doing, satisfy the needs of the present. It is quite universally acknowledged that our existing hospitals typify many glaring evidences of ignorance of actual hospital needs, viewed from the standpoint of patient and worker.

Just as unmistakably as our hospital administrators are arriving at the conclusion that their duty to the patient is not fully discharged the moment he leaves the hospital roof, convalescent, just so surely are we coming to the conclusion that hospitals are not successfully planned and built until due consideration has been given to the physical comfort of the patient as well as to the convenience of the employee ; that an institution has not been economically or satisfactorily built unless it can be economically administered.

The future test of successful hospital planning will be, we believe, simple, artistic architecture ; sanitary and sound-proof construction ; but quite as important as these, practical planning which ensures the maximum of comfort and efficiency with the minimum of effort and waste.

*Hospital specialist and consultant, former superintendent Civil Hospital, Manila, P. I., Chief, Division of Hospital Construction and Equipment, Bureau of Health, Philippine Islands.

HOSPITAL PLANNING. GENERAL CONSIDERATIONS.

To successfully plan a hospital in these exacting days, when cost is no longer computed solely in dollars and cents, but more and more in terms of human efficiency, with conservation of human energy as a measuring test, is a very different matter than in the easy days of not so long ago when hospital committees were content with a group of beautiful buildings not exceeding in cost the original sum specified, bothering their heads but little with cost of future maintenance, convenience of management, comfort of patients, or any of the other perplexities that to-day make hospital planning a science in itself far more complex than any other field in the architect's world.

We know that for years to come hospitals will be constructed as in the past, but we rejoice to see that there is an increasing number of persons in the field who are conscientiously making a study of this work. We note with pleasure that the young architect, tackling his first hospital commission, no longer goes at it with the assurance of inexperience, devoting his chief energies to covering up his ignorance of hospital matters, but is more and more inclined to confess his inexperience and welcome consultation with, and assistance from, those who have made, or are making it, their life work and study.

The architect with his first hospital commission has a rough way to travel. Generally his building committee is as ignorant of hospital needs as he. The doctors will have fifty-seven different varieties of opinions on as many different problems, many of them conflicting, most of them impractical, not a few unduly extravagant, yet to all he must lend a patient ear and acquiescent mind, — or lose his clients.

There are two courses open — one, to please as many as possible, build as fine an architectural monument as is financially within reach, trusting to luck that it will "work"; the other, to proceed intelligently, studying conscientiously the past history of the hospital, the present needs and the *future expansion ;* insisting that as much as possible of the organization be determined before the plans are begun, that a definite personnel be provided for ; asking that a tentative budget be considered, taking stock, as it were, of available maintenance funds, that a building or group of buildings be not erected so costly from the standpoint of operation and management that the future could not possibly be other than a weary struggle with debts and annual deficits.

To which the architect may answer, "That is no concern of ours. We have troubles enough. It is our business only to give the committee and doctors what they want, to build them as good a looking structure as is possible for the money available, one that is fireproof and sanitary, one that is (if this be not his first experience) sound-proof, and one that is (this, if he has planned several or more) easy to keep clean."

With such an attitude, we can only expect the usual result, an institution with a wonderful operating suite, but with inadequate eating and living quarters for the employees; with enough plumbing to take care of twice the number of patients, but with no sink closets for the proper care and accommodation of ordinary mops and brooms; with an expensive ventilating system that makes a good talking point for the hospital, but fails to ventilate; vacuum cleaning systems that are not used; miles of needless steps to be traversed which could have been avoided by a little study of hospital management, and a consequent concentration of administrative area; beautiful sun parlors for the patients, but not a spot in which to air and sun a mattress; wonderfully equipped laundries, but without a facility for the proper washing and drying of blankets, and so on, and so on. These are the things that make a hospital worker heart-sick because of their needlessness. To be sure it is "the easiest way" for the architect, and he may be able to repeat it indefinitely, but the man who is out for lasting reputation, particularly for him who expects to specialize in this sorely neglected field, the other way is preferable.

A preliminary study of the situation is a necessity: The size and character of the community; its rate of increase for the past two or three decades; its probable future growth; its industries and manufactures, wealth and poverty; other hospitals in the community, their growth and patronage; the political situation, how related, if at all.

The foregoing are all-important factors in the subsequent administration; the connection between the planning and future management of an institution is too close to be ignored by the architect, provided he be working for an intelligent result.

Other considerations are not only the funds available for building, but the funds available for maintenance, whether from endowments, donations, State aid, or from fees.

The initial construction, future expansion, cost of maintenance, and earning capacity, are all so interdependent that to consider them separately, *or not at all*, can only spell future trouble for the hospital administrators.

Did we not know it to be done so frequently we would think it impossible to plan such an institution without a fairly exact knowledge of the organization and personnel for which it is supposed to provide; the nature of the cases to be cared for, and many other obviously pertinent factors.

To illustrate the first point, a new hospital known to the writer had been planned and built for three times the capacity of the old one which was to be abandoned. Yet provision had not been made for other than the existing personnel. It would seem incredible that a committee could plan for an increase of three times the capacity of the hospital with no increase in staff, yet these, and like mistakes, are constantly being encountered in our new hospitals.

In another recent construction, before the installation of plumbing fixtures, it was noted that no provision had been made for typhoid sterilizers. The architect had been told that typhoid cases were not to be admitted. The matter was at once referred to the directors, and after much vehement discussion it was decided that the hospital could not consistently refuse to accept typhoid, and, therefore, provision must be made for its proper care.

There are few general hospitals which are not required, sooner or later, to care for typhoid, venereal diseases, delirium tremens, mental cases, etc. Every hospital pretending to be general in character should be prepared to care for such. The actual cost of not being so prepared, and the serious menace involved to patients, nurses, and employees, is far out of proportion to the initial cost of construction and equipment. Adequate facilities for sterilization and disinfection in typhoid cases; roof or open air accommodations for pneumonia; sound-proof rooms with guarded windows for violent delirium or mental cases; special wards and rooms for venereal diseases, with linen and china distinctly marked and all utensils kept apart from other patients. It is folly for hospitals to say that they will not accept such cases. In many instances, admittance is imperative; in many others, these cases develop while in the hospital, though admitted for widely different reasons. It is obviously the duty of general hospitals to be so constructed and equipped, and wise is the architect who advocates such provision.

In the building of every hospital there are three groups of persons who should be particularly considered: the patients, the official staff, and the doctors. It is believed that these groups are named in the proper, though perhaps unusual, order of precedence. Generally we find it reversed, and it is seldom that there is more than one group represented on the building committee. Therefore, it behooves the architect to study the question independently; first from the viewpoint of the patient. This can well be done by consultation with some of his friends who have one time or another been hospital patients. He will be surprised at the ideas which will be given him, probably in the way of complaints of unnecessary hardships previously encountered, possibly in the way of praise of various excellent features which particularly appeal. Certain it is that no thinking person can leave a hospital as a convalescent patient without some ideas that would be of value to the architect. From one he may learn that patients would greatly appreciate having the windows built low enough to enable them to see out when reclining in a chair during their first days of convalescence. From another he may learn that it is quite possible and altogether desirable to so arrange corridor lights that they will not shine directly through a transom into the patients' eyes. Yet another may call his attention to the great comfort of the so-called bar-room door which makes possible perfect ventilation in the summer time, or at night, yet screens the private room from the curious gaze of those passing through the corridor. Another will warn him that elevators should be built into sound-proofed shafts, — another that the kitchen must be so located as to absolutely keep the odors from the hospital proper. Some of the suggestions may be irritatingly obvious, yet he will doubtless find most of them based upon actual and distressing experience.

Every one has his or her viewpoint, and it is the business of the architect to study and analyze the ideas of all those ultimately concerned in the institution which he may be planning.

As we have put the comfort of the patient as the most important consideration in the hospital plan, so have we made second the convenience of the hospital staff, the *workers* of the hospital, those who live day in and day out in the midst of its trials and exasperations, its joys and its griefs, its comedies and its tragedies. I sometimes wonder whether they should not be made first.

Certainly everything should be done to facilitate the work of the busy superintendent. Living quarters cannot be made too livable for one whose life work is in the hospital field; whose years are spent within hospital walls. And quite as true should this be of that terribly overworked, self-sacrificing woman, the superintendent of nurses. It is curious and somewhat discouraging to note how often her comfort and convenience is overlooked. It is not yet the rule that she has a sitting room and bath of her own, while her office is, more often than not, a mere makeshift. Not long ago the writer was in one of the largest and most lauded of our Eastern hospitals and found the superintendent of nurses without a telephone in her office. Quite a considerable distance had to be traversed to the nearest available one. The installation had been "promised" for over a year, but not accomplished.

Of all hospital officials, there is no one whose convenience or comfort should be more carefully considered than hers. There is perhaps no one from whom the architect should be able to get more practical ideas concerning almost every phase of hospital planning; how comfort can be secured; how human energy can be saved; how general efficiency can be attained. Wise is he who avails himself of this "working" knowledge.

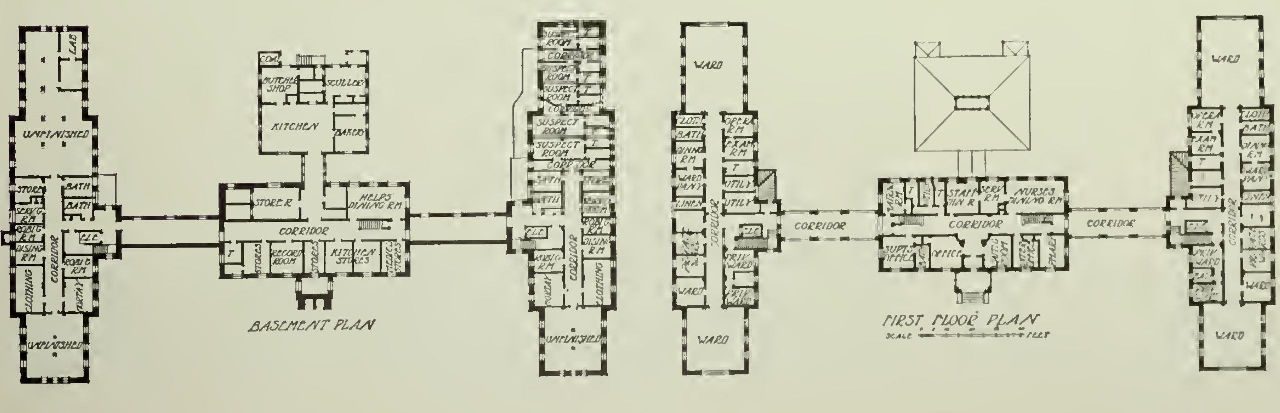
So also the heads of each department. Their comfort and convenience means efficiency and economy for the hospital. It is therefore a matter of moment that the dietitian should have desk room near her diet kitchen and storeroom; that the matron should have the sewing and mending room in the closest proximity to the laundry; that the pharmacist should have his supply room adjoining his drug room, or directly beneath it, communicating with a circular staircase.

These and similar details are of major importance to the individual heads of departments, but ultimately of equally as great importance to the hospital administrators.

(*To be continued in* THE BRICKBUILDER *for July.*)

WEST DEPARTMENT OF THE MASSACHUSETTS HOMEOPATHIC HOSPITAL, BRIGHTON, MASS.

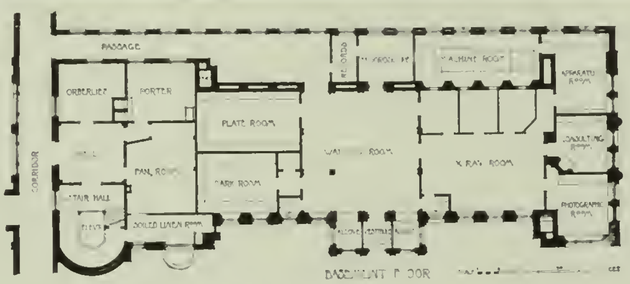
KENDALL, TAYLOR & CO., ARCHITECTS

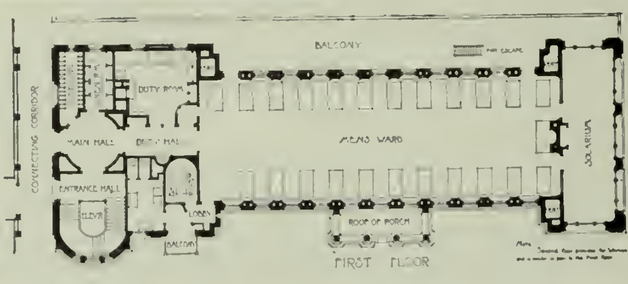


BURNHAM
MEMORIAL WARD
OF THE
BOSTON CITY HOSPITAL.

BOSTON, MASS.

MAGINNIS & WALSH
ARCHITECTS





NURSES' HOME FOR THE
MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY, BOSTON
PAGE & FROTHINGHAM, ARCHITECTS

The Planning of a Young Men's Christian Association Building.— Part III.

BY LOUIS ALLEN ABRAMSON.

THE activity that is being manifested in educational and social circles to combine means for the physical with that for the mental development can be properly accredited to the Young Men's Christian Association, for it realized, at its inception, the potency of exercise under wholesome environment, as a necessary accomplice to its religious and educational endeavors. And so, the physical department of the Y. M. C. A. has within the past decade undergone a complete revolution. As more and more serious analytical study is given by those to whom the work is entrusted, orthodox and trite theories are being discarded, and more radical and efficient forms are observed. All this has come about since the leaders in the association work have made the architects cognizant of the fact that the ostensible purpose of the physical department, that is, the gymnasium and auxiliary rooms, natatorium, shower and locker rooms is not solely to give physical training, but must serve as an efficient instrument for moral, educational, and physical culture.

Standards have been adopted, and undoubtedly time and further thought will develop and perfect details, but the relative placement of the rooms as now adopted will remain until such times as the present system of administration will be altered.

Unfortunately, however, we find comparatively too many recently completed association buildings of the type and magnitude of which these papers are treating in which the relationship of the different rooms comprising the physical department have been devised, but with absolute disregard to the primary elements of association architecture. Such dereliction upon the part of the architect is unpardonable, for good examples are abundant and are accessible to all.

In the planning of the physical department the factor of "*direct circulation*" becomes the major consideration, and failure to take cognizance of this fundamental principle has been the pitfall of the architect and the failing of too numerous structures. Elsewhere within the building direct circulation is desirable only as a convenience and to avoid trespassing. But here it means altogether something more serious, as will be seen. To better understand, let us digress from the "*ideal*" and consider the altogether too "*common*." Fig. I diagrammatically represents the physical relationship and indicates the line of circulation that frequently exists in otherwise commendable buildings. Member A (whether junior or senior) enters his locker room, dons his gymnasium suit and immediately goes to the gymnasium. After his exercising he returns, undresses, has his "soap up" and the compulsory shower, and crosses the hall to the pool. In his circulation from the shower to the pool his dripping body leaves a trail behind him. He emerges from the pool, again enters the hall, water running from his body, not having taken care to dry himself, and makes for the locker room, and after dressing goes elsewhere in the building. Member B immediately follows and from his locker room retraces the line of circulation of Member A into the hall, the floor of which is quite naturally wet, and, in passing, the soles of his gymnasium shoes add dirt to the accumulation. And in reaching the gymnasium, unavoidably, and with damaging results, draggles mud with him onto the floor. Finally, in crossing from the shower room to the pool, the soil is brought into the natatorium and carried on the soles of his feet into the swimming pool. Multiply the circulation of and effects caused by Members A and B by the attendance per day, and the cause of the damaged gymnasium floor, untidy basement, and constantly dirty swimming pool, and the general dilapidated appearance of many buildings, is manifest. The remedy is a most simple one and, if study is given so as to make "*cross circulation*" impossible and not elective, the problem is solved. Note circulation in Fig. II.

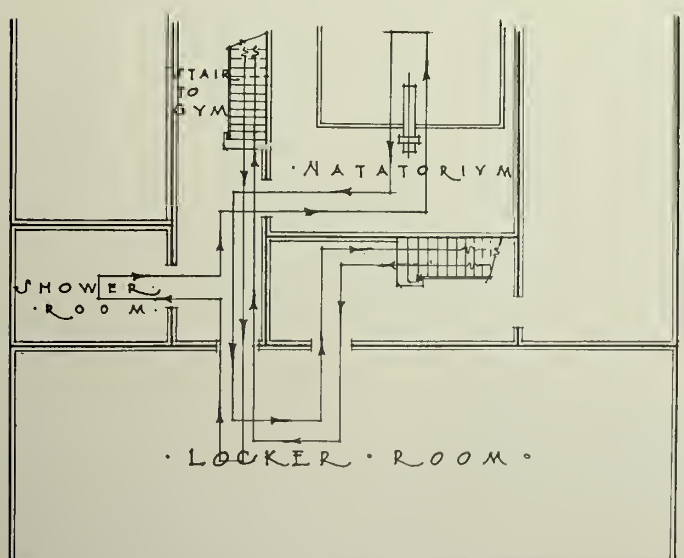


FIG. I.

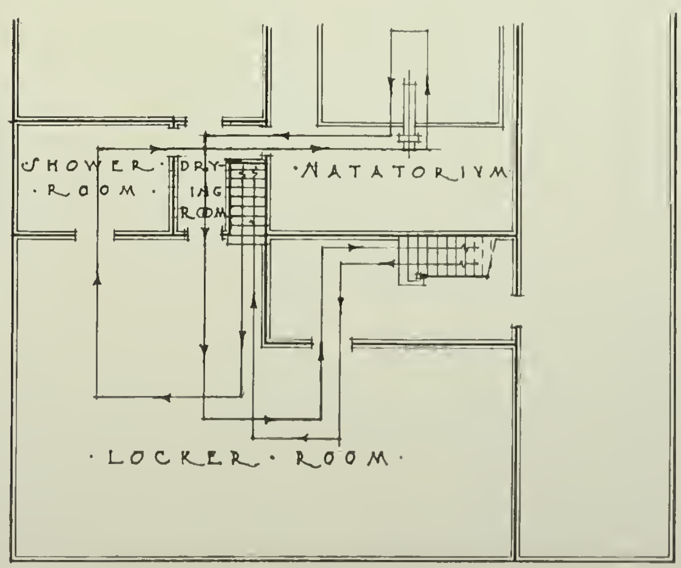
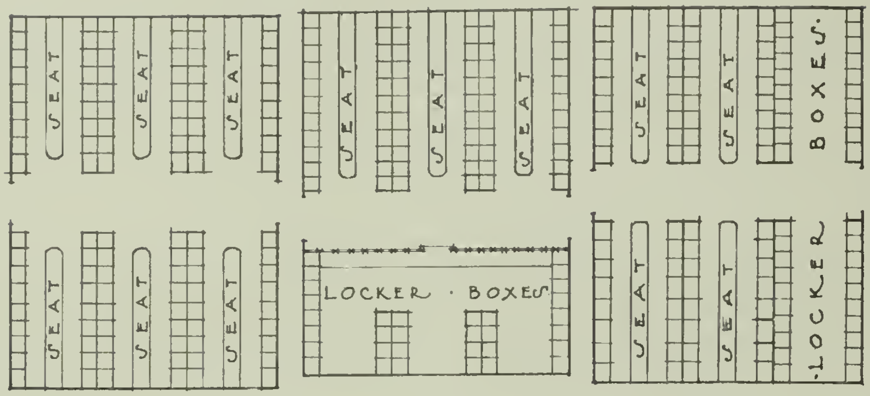


FIG. II.



A. B. C.

FIG. III.

The foregoing analysis is equally important for both junior and senior departments and is as necessary in one as it is vital to the other.

In the moderately sized building, it is seldom possible to assemble the entire physical department on any one story; obviously the ideal arrangement, from the view-point of supervision and direct circulation. Assuming then that the rooms of the department must be divided among several stories, the distribution and relationship of the rooms should be such that the circulation will be direct and the distance traversed reduced to a minimum. This should be especially so in the circulation from the locker room to the pool, via the shower room, at which time the member exposes his overheated body and makes himself susceptible to cold.

The relationship of the units having been tentatively established, we shall consider them separately.

Locker Rooms. The direct accessibility of the locker rooms is a matter of serious consideration. Especially is this so in the case of juniors. For them, if it can be so planned, their locker room should be but a step from the point at which they leave the supervision of their secretary.

Juniors and seniors should be segregated and it is advisable to further subdivide the senior locker room so that the older men, whom we shall hereafter refer to as the business men, shall not be compelled to mingle with the less serious minded and at times mischievous youths, at the moment when the latter are most capricious. The entrance to the junior locker room should be from within their own department, but it is advantageous to compel the business men to pass through the senior locker room. In this manner the senior, aware of the possible presence of his elder, will keep within stricter bounds of propriety. The locker room in reality should be but one room divided into sections ; the actual division being a row of lockers of the usual height and wire mesh or wired glass arranged in removable panels above. Such an arrangement will most readily permit of a reapportionment of the capacity of the sections as the several memberships fluctuate from time to time. It is advisable to locate the seniors in the middle section so that the frolics of the boys will least disturb the older men. When determining the capacity of the locker space, it is incumbent to allow for a twenty-five per cent expansion in membership.

Provide for an abundance of natural light and ventilation as these are vitally necessary. If lacking, whatsoever other virtues the room might possess, its usefulness will be hindered and its influence negative.

There are several systems of locker storage in operation. (Fig. III.)

(A) The simple straightforward "*ordinary*" long passed the speculative and theoretical stage. (B) The more modern "*Kansas City Plan*" and the most recent (C) "*Modified Kansas City Plan.*" Data as to the different methods of operation of the several systems, some of which are controlled by patent rights, can best be procured through the manufacturers. Concisely, they may be described as follows. In (A) a locker is provided for each member holding membership entitling him to the locker privileges. The member has absolute right of occupancy and keeps his gymnasium clothes and accessories in it at all times except when he is using the physical department. Then his locker serves as a storage for his street apparel. In system (B) a membership carries with it possession of a box or wire basket, approximately 8 x 12 x 8 inches deep, which serves as a receptacle for his gymnasium suit, toilet articles, etc. In operation the member applies to the attendant in charge of the locker room for his basket and is assigned to a locker, the key of which is given to him. He disrobes and places his clothing and emptied basket in the locker and passes to the gymnasium. *Comparison.* In system (A), if the membership is one thousand, it is necessary to install as many lockers albeit the maximum attendance at any one time may be but one hundred. If system (B) were to be employed, one thousand baskets need be provided and but one hundred lockers, a sufficiency to accommodate the maximum single attendance.

In system (C) the same proportion of lockers and baskets are required, but instead of having the baskets under the charge of an attendant, they are filed in racks of compartments each large enough to hold the baskets and each under lock. In operation the member removes the padlock (which can be of the keyless type) from the compartment containing his basket and possessions and carries them to any locker which he finds not in use. He disrobes, placing his street apparel and basket in the locker, and secures it with the same padlock. *Comparison.* System (C) eliminates the necessity of employing an attendant; is most economical in space ; the carrying of keys and the possibility of their loss is eliminated and it makes each member personally responsible for his own effects.

The following is the ratio of floor area in square feet per member required respectively by the several systems. The figures are based upon an average attendance in proportion to a fixed membership.

	Junior	Senior	Business Man*
A	1.5	3.0	4.5
B	0.66	1.0	1.33
C	0.63	0.87	1.0

The above figures are based on the following dimensions: All lockers 144 square inches, in sectional area. In the junior locker room they are arranged in double

* Dressing booths in the proportion of six to every one hundred members are provided for the business man. The advisability of providing this feature is dependent upon the type of membership.

tiers, all others single tier with the aisles between lockers 3 feet 6 inches in width.

Ignoring all other factors, pro and con, it would appear that system (C), for economic reasons, should be adopted unqualifiedly; but still, under certain environment, the other systems possess superior attributes. What would serve splendidly in the North might be decidedly bad in Florida, and a perfectly serviceable plant for a wealthy residential community would be doomed to failure if attempted in an industrial center. For example, in a manufacturing community, where the membership would be composed of men and boys, a large percentage of whom would be proletarian and who would not possess the propensity towards cleanliness, the installation of system (C) would be absolutely absurd. One can imagine the perspired gymnasium suit, crumpled and locked in a repository and used perhaps but once a week and laundered not too often. It is obvious that system (A) is by far superior here, as the members' clothes would at least be hung and permitted to air. But system (B) would have its incontestable advantages, for, as the members' baskets are returned to the attendant, he can at a glance see if the member's suit is in condition to be again worn, or if the association maintains its own laundry service, the garments can be washed and sterilized and returned to their respective baskets between sessions.

In designing any building in which the plan of the floor containing the locker rooms is such that there are other activities, which require supervision and control, namely, bowling alleys, billiard room, etc., then an attendant should be provided at a focal point, who can distribute the baskets and operate system (B). In addition he should collect fees for the use of the different privileges, distribute towels and soap, and thus relieve the main desk of these inconveniences. He also should supervise and control the locker room and swimming pool.

When determining upon the locker system to be employed, the following factors should govern the choice: (*a*) type of membership, (*b*) climatic conditions, (*c*) plan of floor, (*d*) area available.

Gymnasium. The gymnasium, when active, is one hundred per cent noise of the piercing variety, and so its location in the plan should not be such that it will become necessary to curb its activity to spare other departments. The room being enclosed in brick walls, or walls of other sound-resisting material, it is manifest that the transmission of sound (not vibration due to impact) is greatest through windows, roof openings, and doors. The gymnasium, consequently, should never be planned for at the base of a court and neither should the windows open upon a court or shaft facing the main building proper. The doors leading to the gymnasium generally are those from the locker rooms, the physical director's offices and spectators' galleries, and these must be so arranged that any possible reverberation will not be communicated directly to any room where it will constitute a disturbing element.

The gymnasium and its related rooms should be planned so that they will lend themselves for diverse usages; for recreative games, for gymnastics, and finally for large assembly purposes. As a gymnasium pure and simple the room need not have any particular form, granted, of course, that its dimensions are ample. As a room in which the prevailing popular games, such as indoor baseball, basket ball, and track sports may be efficiently and sufficiently accommodated, it need be of certain proportions, 42 feet in width and 60 feet in length being the minimum dimensions, while 50 feet by 75 feet is considered ideal. Variations, when made, should not alter the proportion. In height the room should not be less than 22 feet to the lowest point of the roof trusses and not less than 9 feet and preferably 11 feet to the under side of the running track gallery.

Running Track. The width of the running track should be about 6 feet from the center of the outer rail to the wall. This width makes the passing of runners possible with little fear of interference. As a spectators' gallery, it will allow a row of seats against the rail and leave ample passage. If it is contemplated to frequently adapt the gymnasium as a place of assemblage, then the means of ingress should be at the side rather than at the ends where the incline is most steep and dangerous. Sliding poles and ladders should lead from the track to the gymnasium floors, but it is advisable to recess and so place them where their presence will not be dangerous. The wells should be devised so that they can be closed to prevent trespassing at public occasions. Radiators should be placed out of reach and, where additional radiation is placed under the track, the latter should have narrow registers or chases in the floor close to the wall, so that the warmed air will not rise at the front of the gallery to the discomfort of the spectators at the rail.

The windows in the gymnasium should be well distributed on all available walls extending down to not less than within six feet of the floor on the side walls and to the track level on the

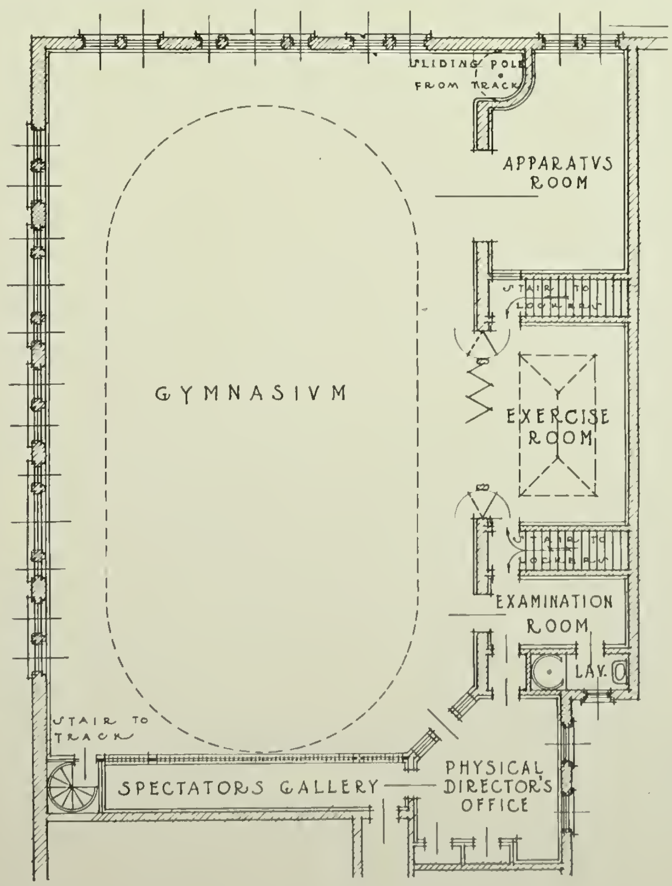


FIG. IV.

ends; leaving these walls for hand ball play. All windows and as a matter of fact all sash opening into the gymnasium must be provided with wire screens fastened to each sash where they are movable.

Exercise Room. A valuable and necessary auxiliary of the gymnasium is the exercise room, to be used when the gymnasium is assigned for class work, tournaments, etc., and consequently inaccessible for individual exercise. Here will be found the punching bags, pulley weights, equipment for calisthenics, etc. A room 15 feet by 25 feet with a ceiling not less than 13 feet in height is serviceable.

Apparatus Room. A room about 12 feet by 15 feet should be placed immediately adjacent and central to the gymnasium as a storage room to accommodate the gymnasium equipment. Here will be kept all possible movable apparatus, including mats, at occasions when the gymnasium is to be used as an auditorium or when games occupy it. It should be connected with the gymnasium by an opening not less than 10 feet and wide enough so that the handling apparatus can be easily accomplished.

The entrances to the gymnasium should be as indicated in Fig. IV, that is, through the exercise room. The advantage of such an arrangement is significant, as it eliminates a condition that is extremely annoying to the physical director, for should the entrance be directly into the gymnasium, it will be found that members will rush pell-mell into the room unconscious of the fact that a class is being instructed or that a game is in progress. A rolling shutter or the folding doors, indicated, separating the rooms, when closed will permit of conscientious class work by eliminating the sources of distraction in the exercise room.

Physical Director's Offices. The physical director's offices should command a clear survey of the gymnasium and as much of the running track as is possible. Not so much is this arrangement necessary for the detection of misconduct as it is to allow the director to casually see from his office that his leaders are properly directing their charges. His offices should be composed of an examining room not less than 8 feet by 10 feet with a shower room containing a lavatory opening from it, and his working office facing and with entrance from the gymnasium. This room should contain a fairly large closet in which will be kept such gymnasium appurtenances as basket and medicine balls. There should also be an additional closet for the use of the instructor as his wardrobe.

The ostensible function of the physical director is, as his title implies, to properly direct physical development. His office should be situated as indicated in Fig. IV, for with a positive command of the spectators' space, he can espy the frequent and interested looker-on and can advise with him when necessary. The spectators' space, sufficiently large to accommodate twenty to thirty, should be within convenient distance of the lobby.

Shower Rooms. To guard against the possible contamination and consequent spread of disease, the association compels each member to bathe himself preliminary to his entering the swimming pool. For this must be provided shower rooms leading from each locker room and immediately adjacent to the natatorium. The showers should never be within the natatorium itself as the resulting presence of steam and noxious odors becomes disagreeable. Concentrating the shower rooms as indicated in Fig. V presents an arrangement that is most economical, flexible, and simple of administration. It achieves equal results with a lesser number of showers than if the junior and senior shower rooms were disconnected and located at a distance from each other. In the operation of the physical department each class of membership has access to the swimming pool and gymnasium only during definite hours, though the locker and shower rooms may be available to all during these same times. And so by locking the door between rooms B and C during the senior session the showers in rooms A and B are at their disposal and the showers in room C (an ample number for other than class times) are accessible to the juniors. Similarly, by closing the door between rooms A and B during the junior session, then they can use the showers in rooms B and C while the seniors have access to room A. After special events in the gymnasium, at which time the members of one department only are admitted and then in extreme numbers, the usual allotment of showers for that department is always inadequate; but with the arrangement indicated it is possible to press into service the bath rooms of both departments without necessitating or permitting circulation through any other than the one locker room.

In the senior shower room, each shower bath should be within a separately enclosed stall, with the controlling valves and soap receptacles on the sides rather than at the back, as is common. In the junior shower room, seventy-five per cent of the showers should be within one large compartment, with one controlling valve to be operated by an attendant who will regulate the quantity of water supplied and its temperature. The shower rooms should be wide and sufficient in area so as to allow freedom to its occupants while standing around after their baths — of course, a separate drying room is more desirable, but not necessary. Natural light and ventilation must be had and in abundance, and no plan should be at all considered that will not make ample provision for it. Avoid windows at the back of the showers as they are sources of cold drafts, and consequently dangerous.

For the business men there should be provided special bath accommodations adjoining their locker room. Their room should be more commodious than the other bath rooms, as only a percentage of the older men will use the swimming pool and the others will leisurely take their shower bath and subsequent rub-down. A hot room about 6 feet square is sometimes provided to advantage in the business men's shower room. Its desirability is dependent entirely upon local environment. If it is installed, its walls should be of clear glass to eliminate the possibility of undetected accident.

The bathers must have access to toilet accommodations other than that provided for the general membership. Inasmuch as the toilet room will be used before and after disrobing, it should not be necessary to pass through the shower room to reach it, as otherwise the members would carry dirt across the wet floor, which matter will ultimately find its way into the swimming pool. It is further objectionable to compel the members to pass through the shower room and chance the wetting of their clothing.

Natatoriums. In determining upon the disposition of the natatorium, the major consideration should be natural light and ventilation, with the sources so distributed that the sunshine will be directly admitted during the longest part of the day. It should be borne in mind that the need of privacy may nullify the value of some windows as means of ventilation. A skylight over the swimming pool is of indubitable value, and if necessary, the plan should be warped to make this provision possible. Constructional means should be incorporated to guard against excess chilling of warmed air.

The pool should be either 18 feet or 21 feet in width and its length a factor of yards, and usually 45 feet or 60 feet. A pool 21 feet in width by 60 feet in length is considered standard and records made therein are recognized by athletic bodies as being official. The depths vary as indicated in Fig. VI, with a level section at the shallow end for the non-swimmers and with the deepest point in advance of the spring board.

The difference in initial cost between the standard pool and one of lesser dimension is not proportionately large, and other factors should be considered in concluding as to its size — the cost of water, cost of refiltration, and cost of heating and reheating. In a residential community, where the membership would be composed of high school students and others deeply interested in aquatics, the standard pool would certainly be a necessity, and its increased cost of maintenance can be defrayed by the income derived from paid attendances at exhibition games.

A spectators' gallery or bleacher should invariably be provided. It will assist in stimulating greater interest in water sports and ultimately in increasing membership.

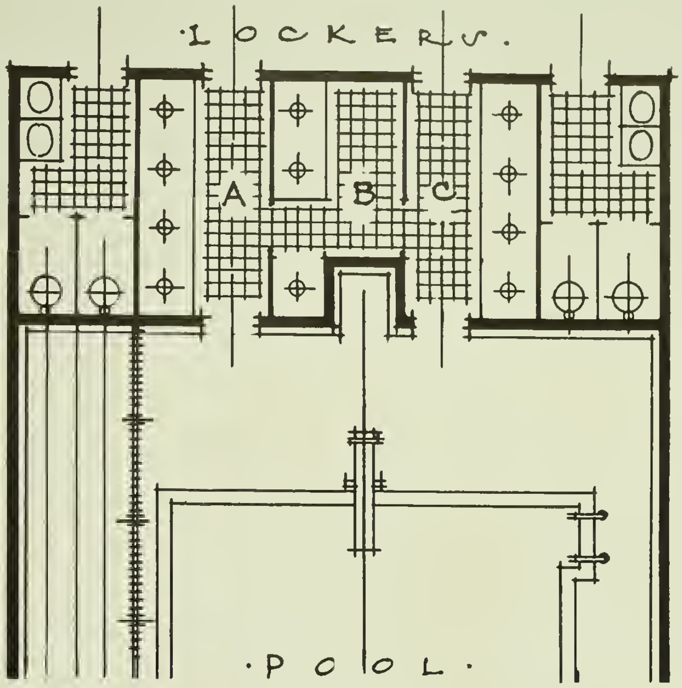


FIG. V.

Its position, whether at the end or along the side of the pool, should be elevated so that the spectators can readily see the water line. It is far better placed at the end or ends of the natatorium rather than at the sides where it becomes uncomfortable to keep turning one's head in following the swimmers. In any event there should not be any walking space between the pool and the spectators' gallery in which the bathers can stand and obstruct the view of the spectators. The pool should be in no case free standing, that is, at least one side should be close to a wall so as to prevent the bathers from running around the pool and causing injury to one another.

In the construction of the ceiling over the pool care should be exercised that no ceiling beams or girders project down so as to prohibit the use of a spring board. The ladders into the pool should be recessed so that no part will obstruct the clear swimming space and on which no member can cause himself injury. The ladders should be on the sides rather than at the ends, which, must be flush and without any projections or depressions, so that the swimmers can use the walls in negotiating turns in races. An unevenness would give an advantage to one man over the others. The rim of the pool should be provided with a sanitary gutter on sides and ends. The construction of this rim and other parts of the natatorium, together with a discussion as to the construction and choice of materials from a utilitarian standpoint, will be discussed in the following and concluding article of this series.

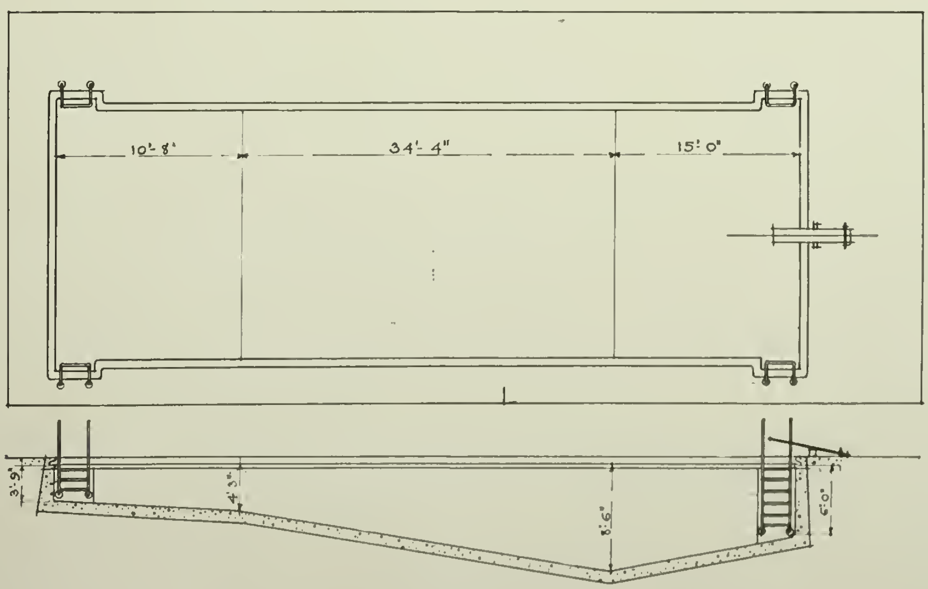


FIG. VI.

Architectural Jurisprudence.—Part II.

AN ARCHITECT'S COMPENSATION AND LIABILITIES.

BY WILLIAM L. BOWMAN, C.E., LL.B., OF THE NEW YORK BAR.

SINCE a proper understanding of the duties of an architect is essential as a basis for the full appreciation of his liabilities, the readers are referred to articles on "Legal Hints for Architects," published in THE BRICKBUILDER, issues of July to November, 1911. In our present consideration we will discuss the architect's liabilities under the following headings: (1) Liability to the State or Municipality, (2) Liability to the Employer, and (3) Liability to the Contractor and Other Persons. It is of course understood that we shall treat only of the liabilities which an architect incurs professionally. This will, however, include those cases where he loses his remuneration for services performed.

LIABILITY TO THE STATE OR MUNICIPALITY

The States of Illinois, California, and New Jersey have passed statutes which restrict the practice of architecture to those who comply with the requirements set forth. New York is about to pass such a law. Many attacks have been made upon these statutes as being contrary to the Fourteenth Amendment of the Constitution of the United States, but to date they have been unsuccessful and it seems now well settled that the State has the right to make and enforce such restrictive laws regulating the professions. Failure to comply with these statutes may involve the architect in the following difficulties: Firstly, he is powerless to recover compensation for work done or services rendered. In one case, in order to help the architect as much as possible, the Court decided that the architect might take a contract for architectural services before he had complied with the statute requirements, and that the law was satisfied if he had followed its regulations before starting work. This distinction does not seem sound and should not be relied upon. Secondly, non-compliance with such statutes is a misdemeanor which is a criminal offense. The punishment for this offense is sometimes mentioned in the statute or may be set forth in the criminal code and ordinarily carries an arrest with fine or imprisonment for a short period or both.

Then, in addition to the state statutes, many of the municipalities such as cities, counties, towns, and villages have local regulations requiring an architect to take out a license to do business or to pay a tax on his profession. Failure of the architect to attend to these ordinances usually permits the authorities to compel him to pay not only the stated license fee or tax with a high rate of interest, but also a fine for non-payment. Should the proposed National Income Tax Law become effective, architects earning large professional incomes will have to observe its requirements and pay their proper tax thereunder or be liable for the stated punishment.

As these practices and taxing statutes are becoming popular not only as a protection to the profession but also as a source of revenue, it behooves all architects to make frequent inquiries regarding such laws from responsible and competent parties and thus avoid the embarrassment and financial losses which are sure to result from failure so to do.

LIABILITY TO THE EMPLOYER.

The duties of an architect towards his employer, whom we will call the owner, may be summed up in the following items:

1. Reasonable skill, ability, and taste in planning, designing, and superintending construction work in the light of present knowledge.
2. Reasonable and honest judgment in such planning, designing, and superintending, and in advising the owner in regard to anything connected therewith.
3. Employment of competent and careful assistants.

A lack of ability or failure to comply with these duties renders an architect liable to the owner therefor. The damages or loss to the architect may be either the loss of his remuneration, should the owner choose to relieve the architect from his contract of service, or the damages actually suffered by the owner on account of the architect's failures or negligence, in which case the owner claims and stands upon the breach of the contract of service by the architect. In this latter case the architect is entitled to his compensation or credit for it should the damages prove to be more than such compensation. Since the ordinary case of trouble culminates in an action by the architect against the owner for his compensation or the balance of it, many are unaware of any damages other than the loss of such compensation when the owner is successful in his defenses of unskilfulness, non-performance, negligent superintendence, etc. Among the reported cases of such actions the following defenses were held good and the architect refused the compensation he sued for:

1. Where the contractor's estimates were substantially in excess of the limit of authorized cost.
2. Where the actual cost greatly exceeded the limit of authorized cost.
3. In public contracts where either the contractor's estimates or the actual cost exceeded the appropriation for the construction including the architect's fees.
4. In public construction work, where there was no appropriation or where the contracting officials had no power to contract; or where the charter requirements were not fully complied with; or where the appropriation was void because of failure to comply with charter requirements, etc.; or where the architect was not qualified or was disqualified to accept such public contract.
5. Where the plans and specifications are not delivered within a specified time and also are not complete according to contract or custom.
6. Where the plans had no dimensions or figures on them and the scales did not correspond, and the plans and specifications were full of omissions and inaccuracies.
7. Where the plans and specifications or the buildings constructed therefrom did not fulfill the purpose for which they were designed or were defective in other than minor details.
8. Where there is wilful omission or departure by the architect from the terms of his employment or from the directions and instructions of the owner, or from the approved plans and specifications.

9. Where the plans and specifications or either were prepared in violation of the law, either state statutes, or city ordinances, or building codes, etc.

10. Where the superintendence is negligent, the defects being such as were discoverable by the exercise of reasonable care and skill on the architect's part.

There are suggestions in the opinions deciding these cases that, if the action brought is to recover a balance due the architect, the owner could, under these circumstances, ask and secure the return to him of payments already made to the architect. In many of these cases the question as to whether the owner waived or excused the architect's proper performance is raised, but it is usually not given much consideration by the ordinary jury

Let us now consider some of the cases where the owner, instead of being satisfied with preventing the architect from getting any compensation for his work, demands his damages for unskilful service or negligence. The measure of damages appears to vary somewhat, but seems generally to come down to a recoupment by the owner of his loss from the architect.

In one case where the chimney flues were not large enough for the purposes for which they were designed, the owner was permitted to retain from the architect's compensation an amount equal to the cost of correcting this defect not discovered until after construction. In another case the general plans showed a different roof projection and construction on the front elevation than on the other three elevations. There was but one detail drawing and that corresponded with the two side and back elevations. The owner wanted the building as shown on the front elevation, but the builder, under orders from the architect, constructed in accordance with the single detail drawing. The architect later had to sue to try and recover the balance due him for his services and the owner defended on the ground of non-performance and claimed $500 because the architect had caused material departures from the plans without any authority and against his protest. The architect claimed that the front elevation was structurally and architecturally imperfect and that he had the right and the duty to correct it. The evidence showed that the building could easily be changed to suit the front elevation at an expense of $400. The decision held that the principal drawings formed the basis of the contract and also formed the test of what was required for the performance; that since there was a substantial performance on the part of the architect, and there being no bad faith on his part, he could recover his full fee less the cost to the owner to change the house as shown by the front elevation. Thus the owner was allowed $400 for the work to be done. This case and others indicate that generally speaking the architect is governed by the same rule of damages as contractors. This rule may be stated, "The party damaged is entitled to recover a sum which would leave him as well off as he would have been had the other party fully performed the contract." In further explanation of this rule of damages another case is interesting. The architects were only employed to superintend and supervise certain alterations and repairs. The architects and their inspector or clerk of the work allowed floor timbering to be insecurely and carelessly laid and also contrary to the building code. The work was completed and the architects and builders fully paid. For several years the work caused trouble with the plastering and decorations which were repaired, but finally the floor settled so badly that it had to be taken out and extensive repairs made. The owners then sued the architects for their negligent supervision, and upon the jury finding that they had not exercised reasonable care and diligence in supervising the work, although one of the architects testified that either he or his partner was there daily, the owner was permitted to recover a sum which would leave him as well off as he would have been had the architect properly supervised the original repair work.

In a late case the architect was held liable for the damages caused by dry rot in flooring improperly laid in concrete, notwithstanding his excuse that it was the result of the incompetency of the clerk of works appointed by the owner. In another case it was suggested that if the architect should negligently or unskilfully overestimate the amount of progress certificates and the employer should have to complete the work at his own expense, the builder becoming bankrupt, that any loss from the fact of the overpayment to the builder could be charged against the architect. Probably the most serious decision respecting an architect's liability holds that if the architect guarantees or warrants that a building will only cost a fixed sum, the owner can recover any excess cost above that amount from the architect. The same case also decided that if an architect locates a building so that it violates restrictions against the property imposed by a municipality, the owner being without knowledge of the same, that the architect is responsible for all damages accruing thereby, including attorney's fees in defending such violations.

When we consider defective or improper building construction there are two people, the architect and the contractor, who may have caused the injury although they may not have acted in concert, and in such cases they are each liable for the damage. Should the owner choose to hold the architect liable, he may do so and recover his damages from him. Strange as it may seem, the architect then does not have any recourse against the builder even though the latter was partially or equally or primarily responsible for such condition of the work. On the other hand, if the owner collects from the builder he loses his right of action against the architect and for this reason many architects have escaped in such cases. That is also the reason why many architects are not aware of their liability under such circumstances.

Whether the architect in his work is considered as an independent contractor or as an agent or servant of the owner, his employer, may make some difference in his responsibility to his employer. For example, if the architect is the agent of the owner and during the superintendence he refuses to let the contractor control the work and takes charge and control in matters of method, procedure, and detail, he may make the owner responsible for the negligence of the contractor and his employees. Should the owner then be compelled to pay the damages for such negligence, it would seem that he could reimburse himself from the architect. The owner has recourse also against the contractor, and he usually takes that means since it is easier and cheaper. We have a general rule of law applicable here, that an employee is directly liable to his employer for any damage occasioned by his negligence or misconduct in connection with his work, whether such damage is direct to the property of the employer or arises from compensation the employer has been compelled to make to third persons for injuries sustained by them.

In the matter of inspection and superintendence there are cases holding that unless improper materials or poor workmanship are seasonably and reasonably objected to, rejected, and condemned, that after incorporation and partial payment therefor, it is then too late for the owner or architect to object to such materials and workmanship, and the owner will be considered to have waived his rights under the contract in that regard on account of the architect's failure to perform his duty. As the owner then has no recourse against the builder he should be able to recover his loss from the architect who is responsible for such a condition.

There are times when the architect takes compensation from the contractor on a job for various reasons, some proper and others improper. Under the usual rule of the law of agency, the agent must account to his employer for any secret profit or compensation he has taken for doing what he was under contract with his employer to do, or the amount paid him for doing something which would presumably be against his employer's interests. This does not apply where the employer knows of or approves of such outside employment, hence it is a safe rule for an architect to advise the owner when he desires to do anything for the contractor for which he intends to demand or receive pay.

A somewhat analogous but more serious situation arises when the architect requests or receives a gift, gratuity, commission, discount or bonus from a contractor, material man, or employer of labor for giving them the work or with an understanding that he shall act in a particular manner in the business entrusted by the owner to him. In many states this is a crime. For example, in New York it is called a misdemeanor and carries a punishment of not to exceed $500 fine or not more than one year imprisonment, or both. A word to the wise is sufficient.

Liability to the Contractor and Other Persons.

Under this topic we will discuss very briefly the architect's liability to the contractor and to persons injured either physically or financially by reason of his lack of skill or failure to properly perform his duties. An architect's duty to a contractor consists chiefly in giving honest and fair estimates of work done or certificates for payment at the proper time; reasonable, honest, and timely decisions on all matters within his scope, either as agent of the owner or as an arbitrator; and written orders for alterations, additions, extras, or omissions only when he is authorized by the owner to give such orders. A failure on the part of an architect to perform these duties, except perhaps his failure as an arbitrator, creates a liability to the contractor.

For a general statement it may be said that for a nonfeasance, which is the neglect of an architect to do some act which he was bound to do under his employment, the architect is not responsible to others than his employer. When, however, the architect does a lawful act or his duty in an unlawful or improper manner, he is always responsible to the employer and often to the injured party. While there are not many reported cases directly in point, yet those few are important. In one of the rather old cases an architect employed by a church ordered some stone from a material man on account of and for the Church Building Committee. Later the church refused to pay for the stone and was sued by the material man. Up to the time of the trial the architect contended that he had authority to order for the church, but on cross-examination he admitted receiving a letter from the Church Committee expressly stating that no stone must be ordered in the name of the church. This lost the case for the material man, who then sued the architect not only for the value of the stone, but for his costs and lawyer's fees in the defeated action. In defense, the architect offered to pay for the stone alone. The jury were told that if they believed the architect represented that he had authority to order the stone from the church authorities and that that representation was untrue, then the material man was entitled to recover all he asked. Their verdict was against the architect. This was a pretty severe lesson for him, since he had to pay about $325, costs of the action lost to the church, about $500, the fees of the attorneys in that case, and about $150, the cost of the stone itself, besides the costs taxed against him personally.

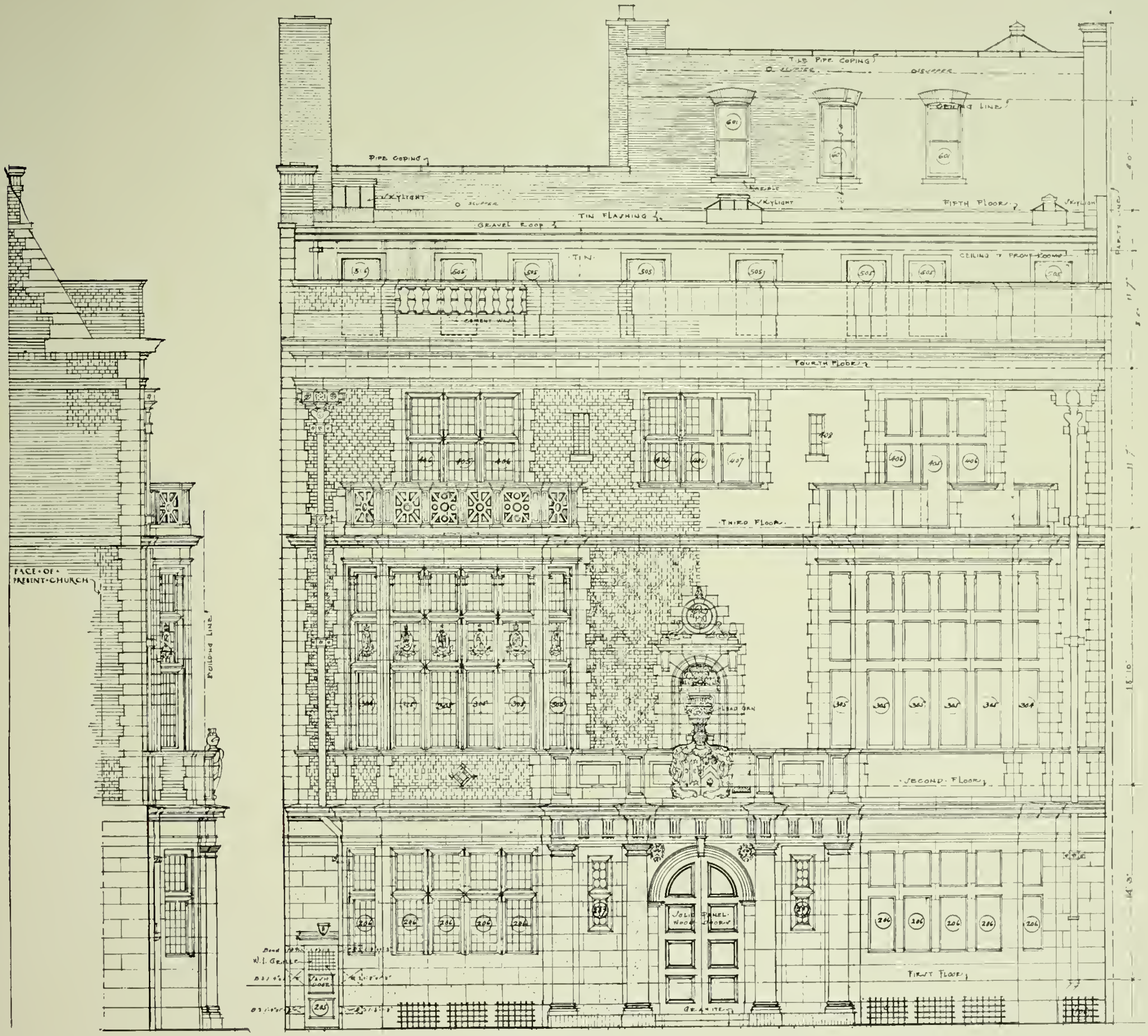
In a very late case where the contractor refused to go ahead with the work and the architect said that he would see that he was paid for the work requested, the opinion of a well-known judge intimated that where an architect knowingly and wrongfully made changes and ordered materials and work that were not embraced in the contract between the owner and the contractor, the architect was responsible therefor.

Probably the leading case discussing an architect's liability for causing physical injury or death discloses the following facts. A central column of a large building was planned to be placed on a cut stone block with 18 inches of concrete thereunder and upon undisturbed earth. In the construction work, unknown to the architect, this column was placed over an old cistern, the earth around which was disturbed and only 12 inches of concrete were placed. Later the column collapsed, killing several people. In an action against the owner he was not held responsible. The opinion holds that in the exercise of the superintendence the architect was an independent contractor, and hence he and the contractor were each responsible for the damages caused by this disaster. The decision also stated that if the trouble had been a result of following improper plans and specifications, the architect would have been responsible for all damages suffered therefrom.

In another death case the opinion of the court shows that they would hold the architect responsible for any negligence in failing to exercise the ordinary skill of his profession which results in the erection of an unsafe structure whereby any one lawfully on the premises is injured. They also were of the opinion that an architect who knowingly permitted a departure from the plans and specifications, or failed to condemn any improper work which he discovered, would be responsible to any party injured thereby.

These cases and the opinions expressed in them are serious. It is hoped that architects will give more time and attention to personal supervision, or by the employment of able assistants to whom they entrust their supervision. The fact that architects have been lucky in the past in these matters has lulled many into the idea that they have no such financial liability as herein set forth, and it is feared that some are going to have a rude awakening unless they take heed and appreciate this warning.

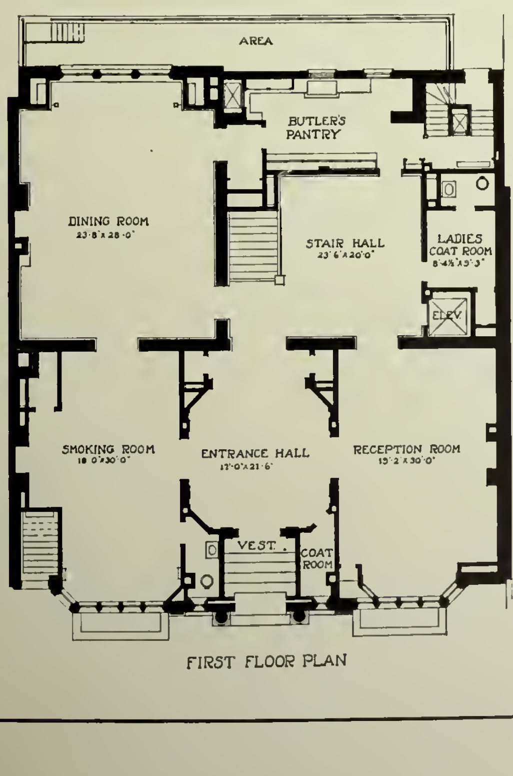
HOUSE, PARK AVENUE, NEW YORK CITY
JOHN RUSSELL POPE, ARCHITECT



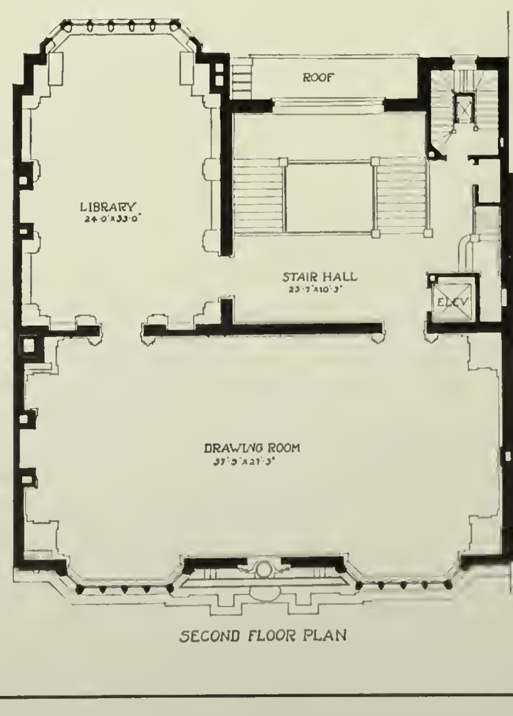
FRONT ELEVATION

HOUSE,
PARK AVENUE,
NEW YORK CITY

JOHN RUSSELL POPE,
ARCHITECT

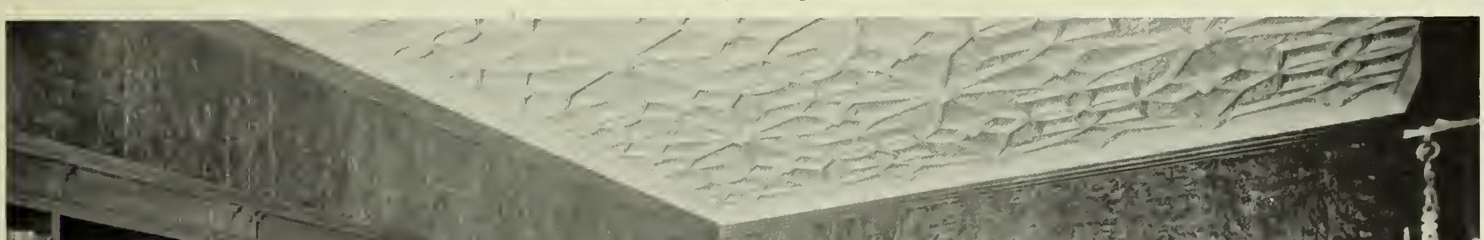


FIRST FLOOR PLAN



SECOND FLOOR PLAN

DRAWING ROOM



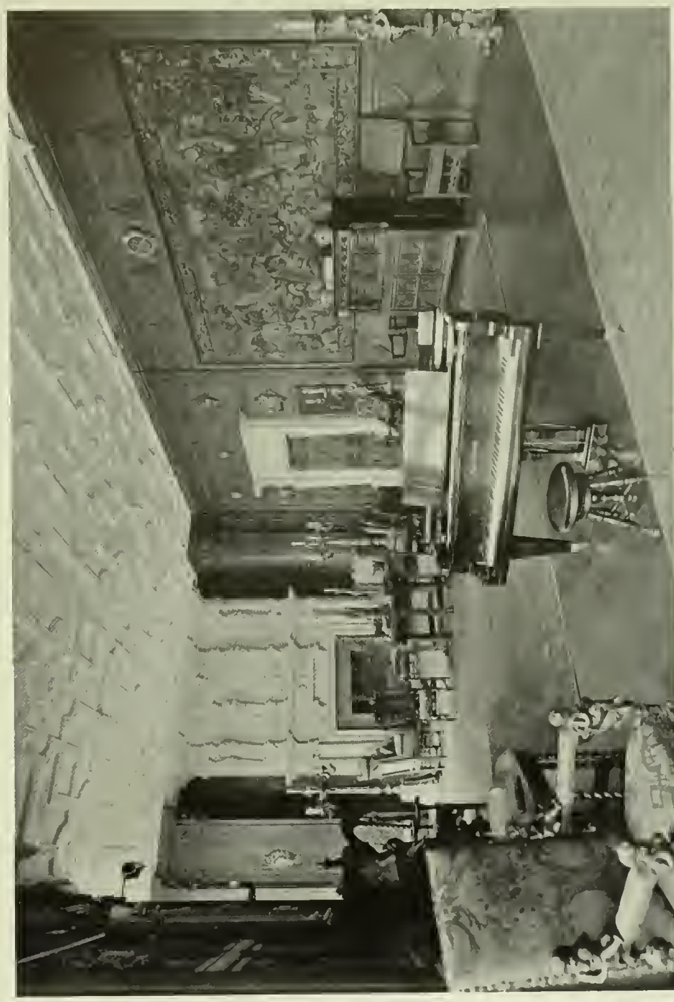
LIBRARY

HOUSE, PARK AVENUE, NEW YORK CITY

JOHN RUSSELL POPE, ARCHITECT

LIBRARY

BEDROOM

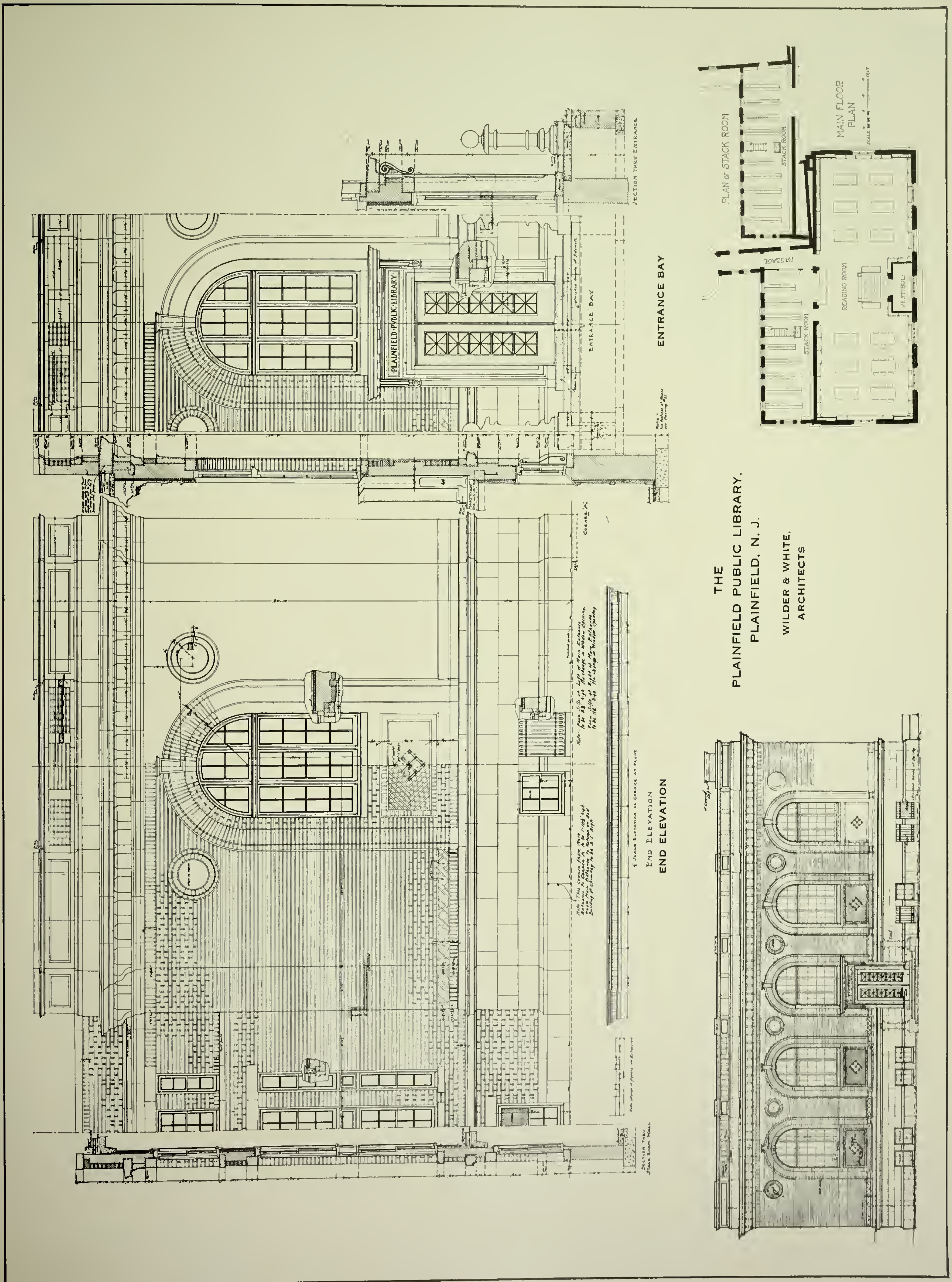


DRAWING ROOM

DINING ROOM

HOUSE, PARK AVENUE, NEW YORK CITY
JOHN RUSSELL POPE, ARCHITECT

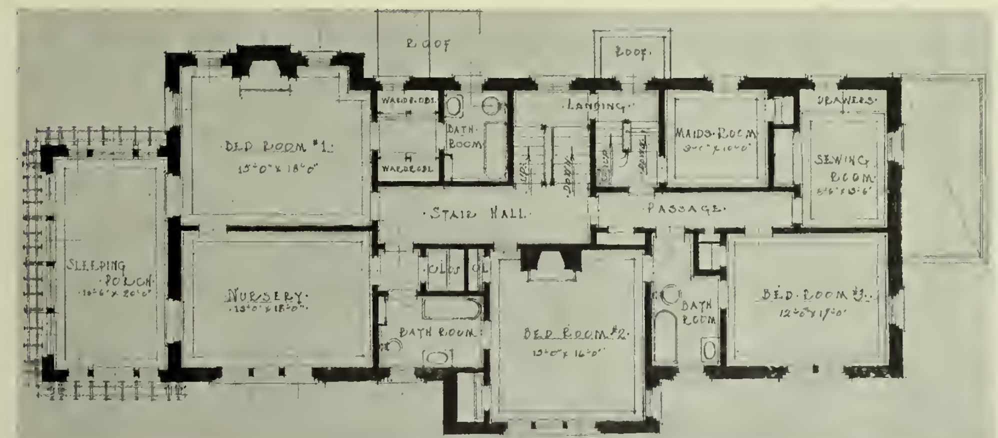
THE PLAINFIELD PUBLIC LIBRARY, PLAINFIELD, N. J.
WILDER & WHITE, ARCHITECTS



THE
PLAINFIELD PUBLIC LIBRARY,
PLAINFIELD, N. J.

WILDER & WHITE,
ARCHITECTS

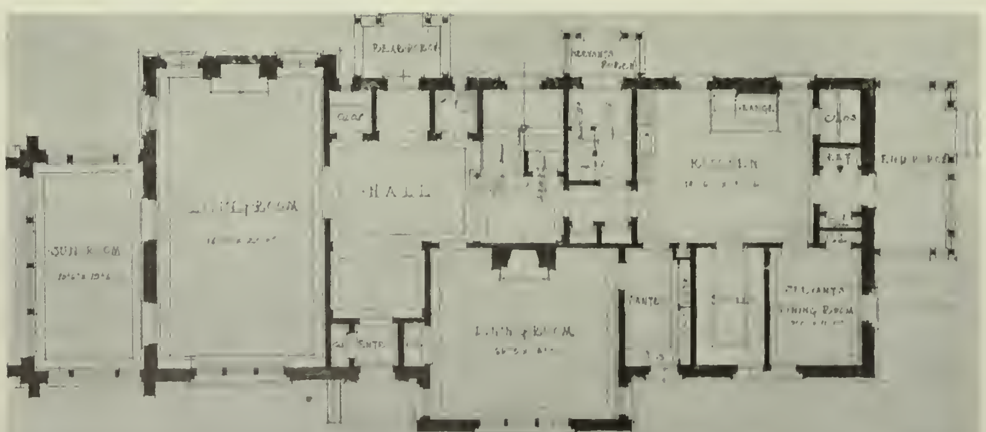
HOUSE AT SHORT HILLS, N. J.
ALFRED BUSSELLE, ARCHITECT



SECOND FLOOR PLAN

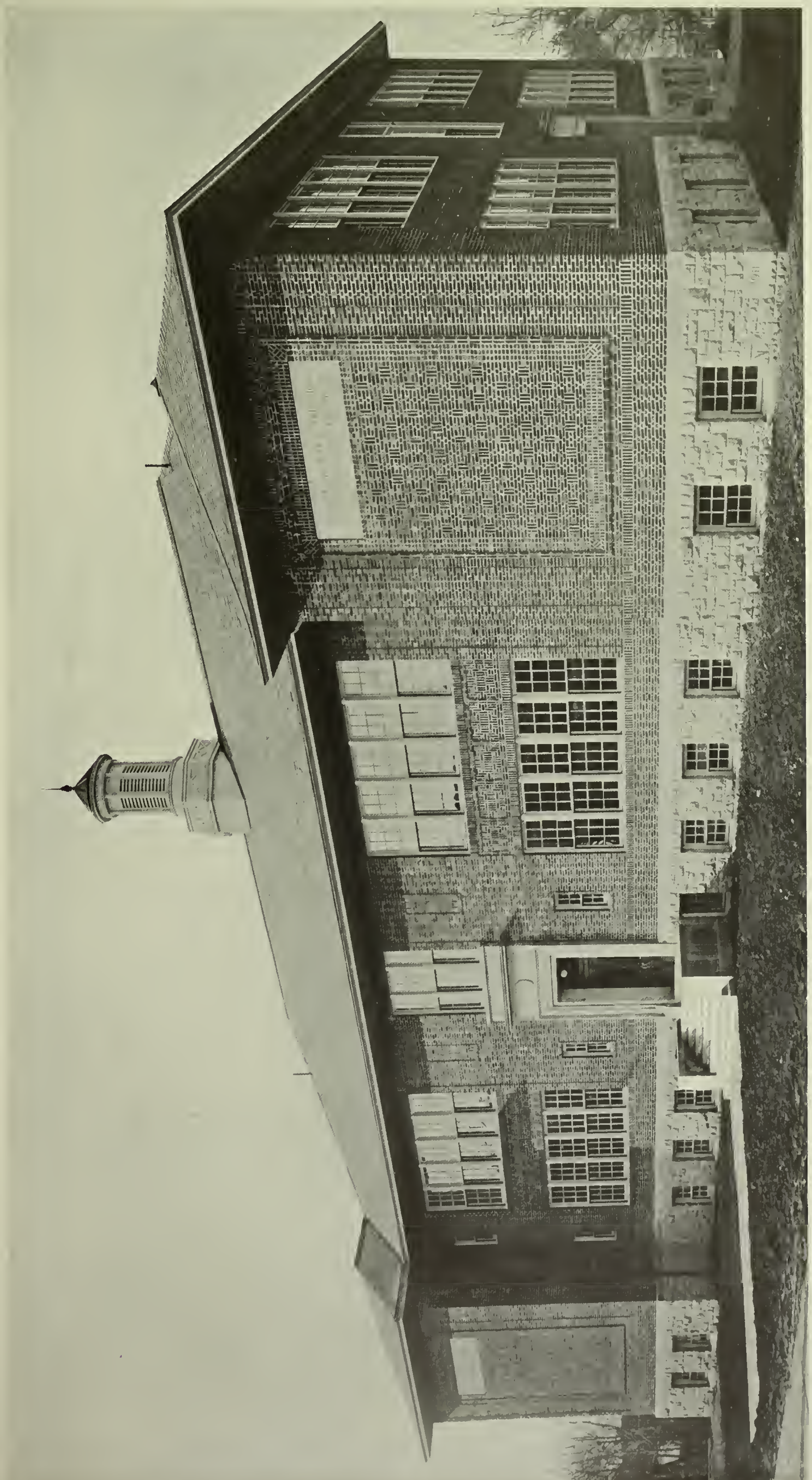
HOUSE
AT
SHORT HILLS,
NEW JERSEY

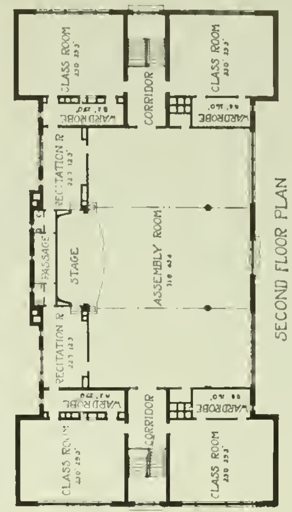
ALFRED BUSSELLE,
ARCHITECT



FIRST FLOOR PLAN

VOL. 22, NO. 6. PLATE 89.

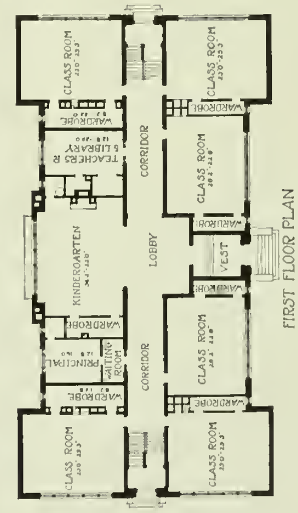




SECOND FLOOR PLAN

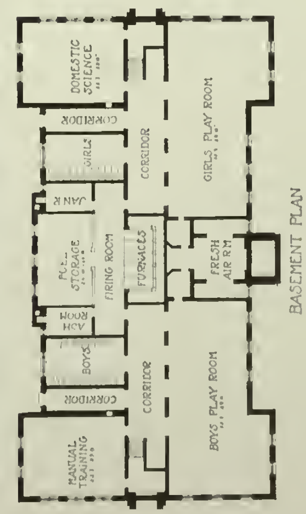
WM. W. RASMUSSEN
AND
ERNEST SIBLEY

ASSOCIATED
ARCHITECTS

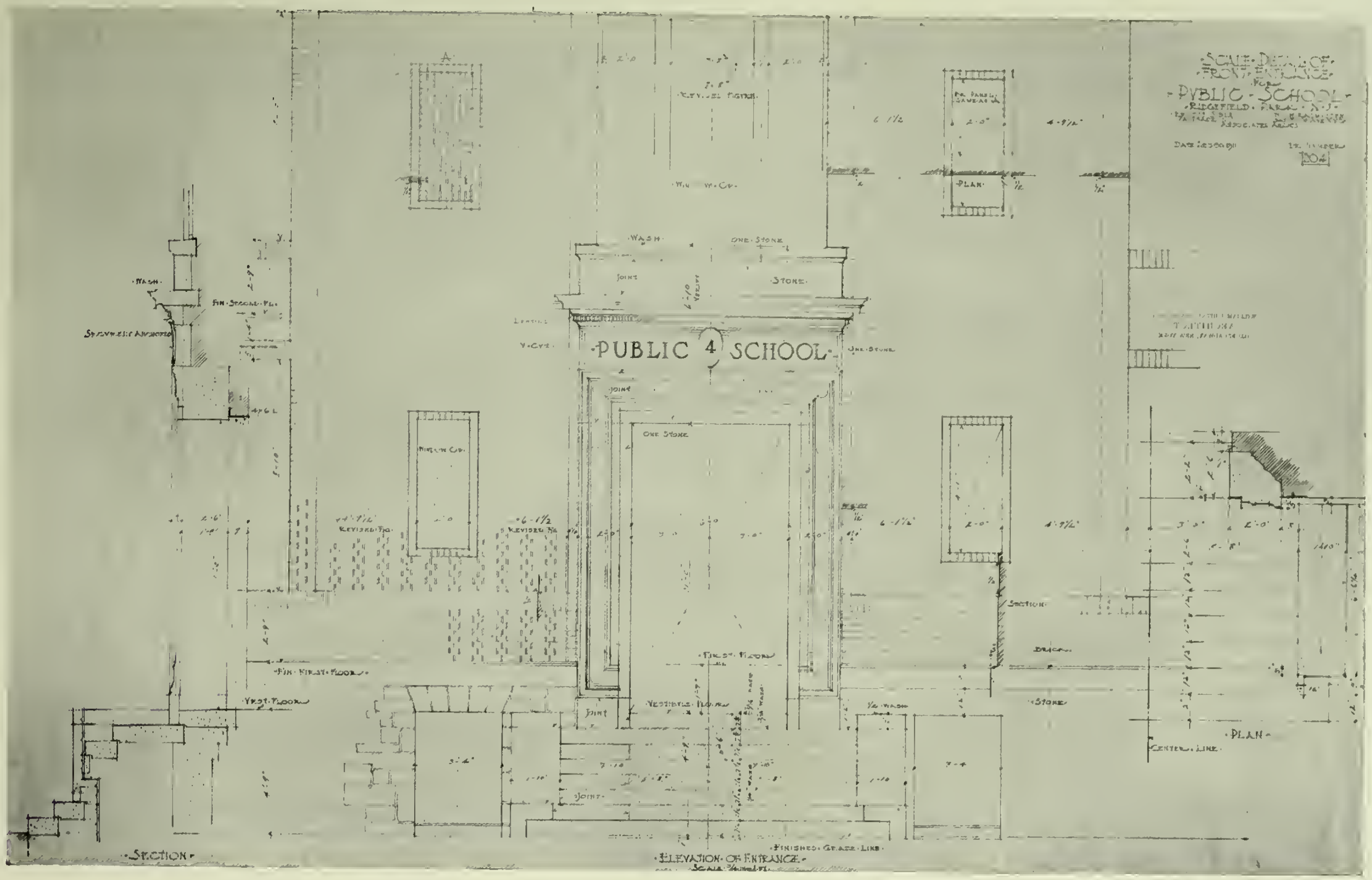


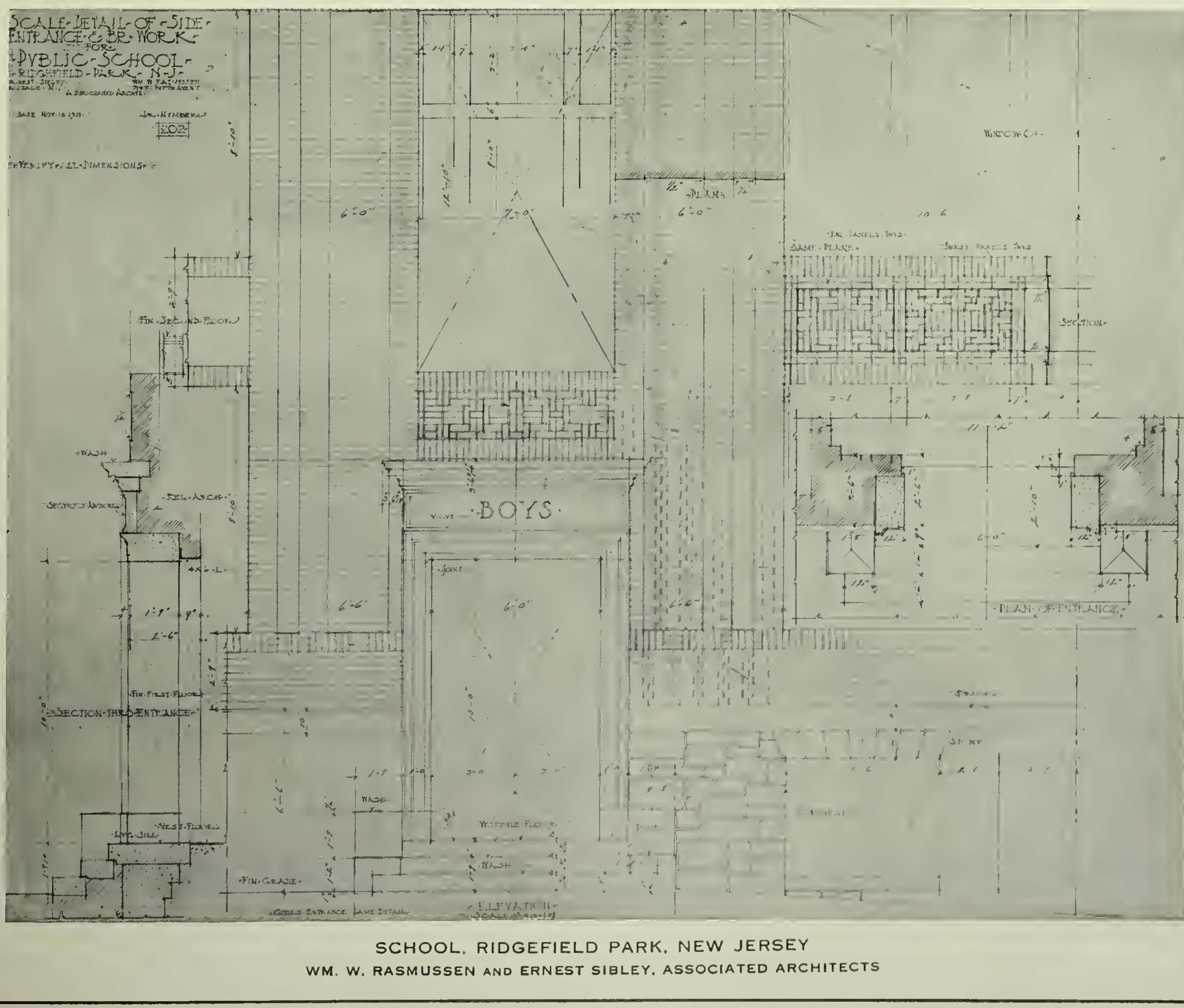
FIRST FLOOR PLAN

SCHOOL,
RIDGEFIELD PARK,
NEW JERSEY



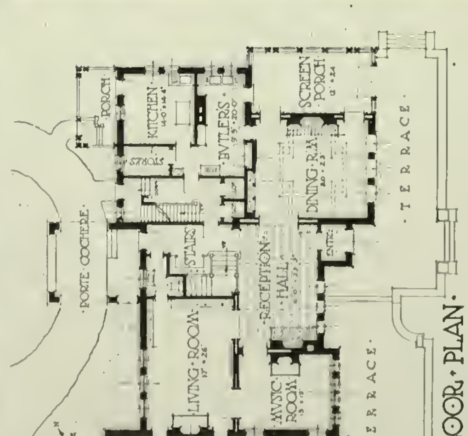
BASEMENT PLAN



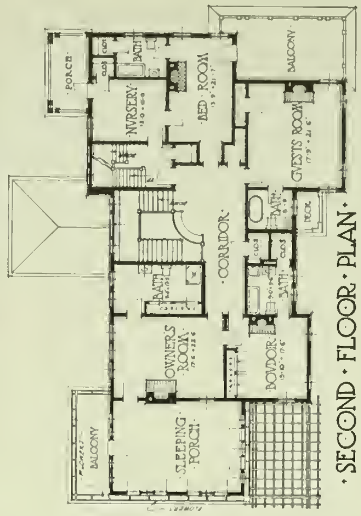


SCHOOL, RIDGEFIELD PARK, NEW JERSEY
WM. W. RASMUSSEN AND ERNEST SIBLEY, ASSOCIATED ARCHITECTS

HOUSE AT ATLANTA, GEORGIA
EDWARD EMMETT DOUGHERTY, ARCHITECT



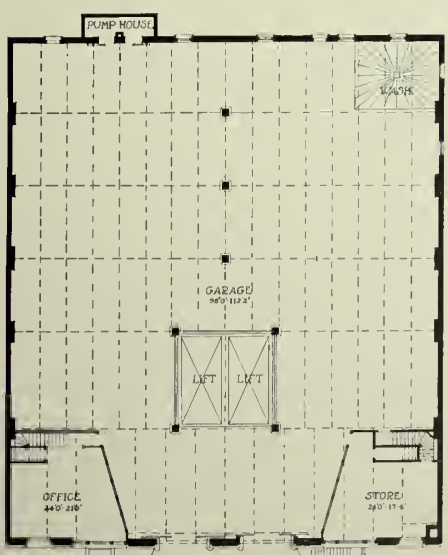
·FIRST·FLOOR·PLAN·



·SECOND·FLOOR·PLAN·

HOUSE AT
ATLANTA, GA.

EDWARD EMMETT DOUGHERTY.
ARCHITECT



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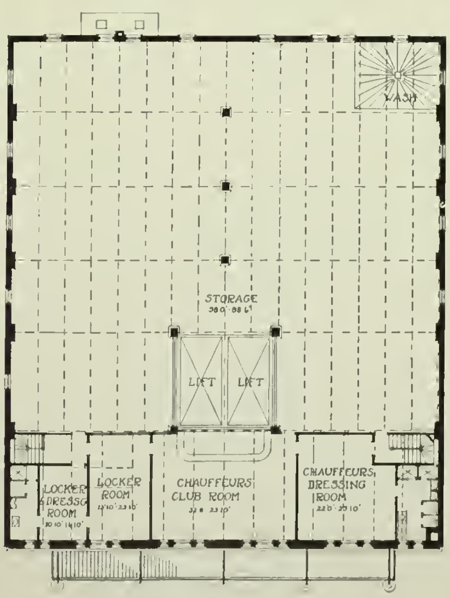
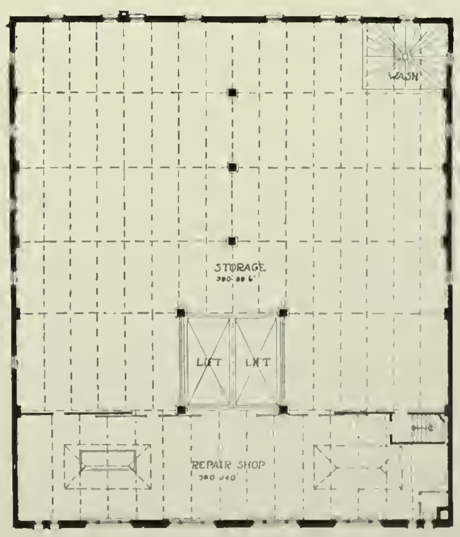


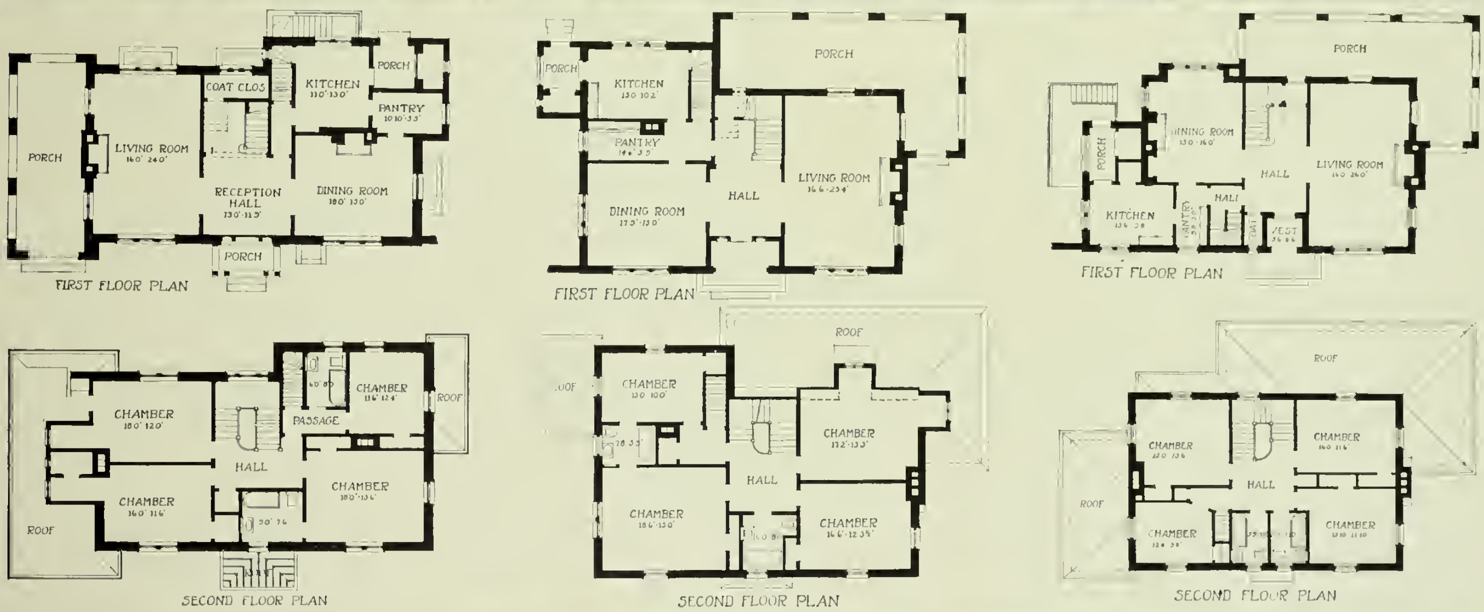
SECOND FLOOR PLAN



THIRD FLOOR PLAN

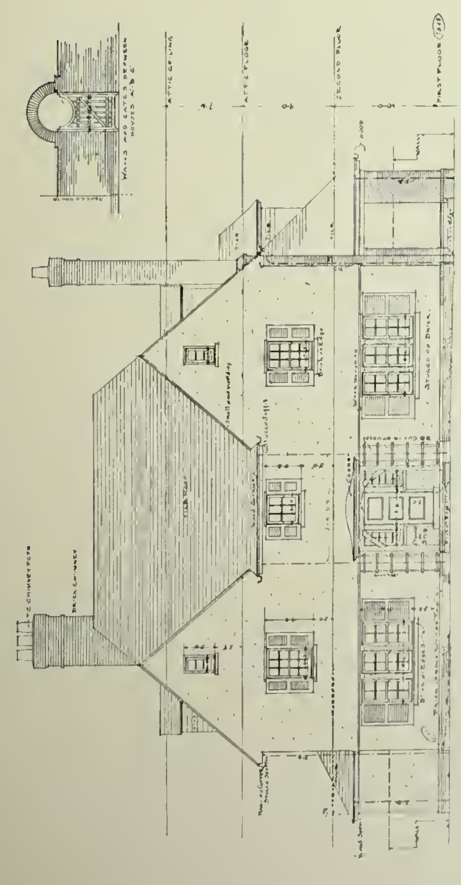
GARAGE AT BROOKLYN, N. Y.

WM. A. BORING, ARCHITECT

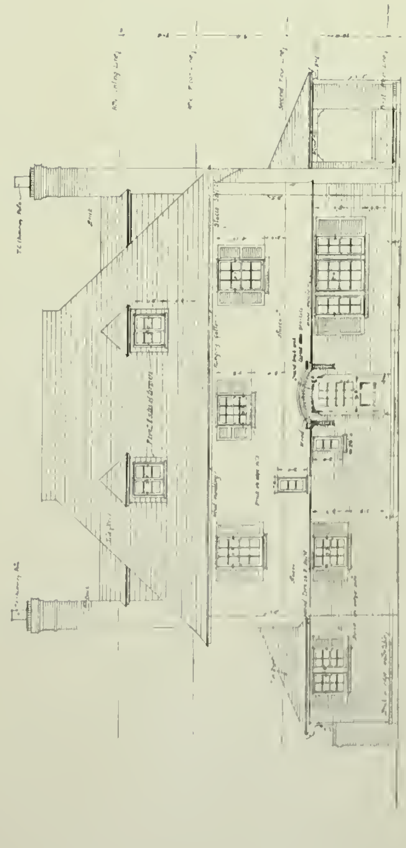


GROUP OF HOUSES, ROLAND PARK, MD.
EDWARD L. PALMER, JR., ARCHITECT

GROUP OF HOUSES, ROLAND PARK, MD.
EDWARD L. PALMER, JR., ARCHITECT



ELEVATION NO. 1



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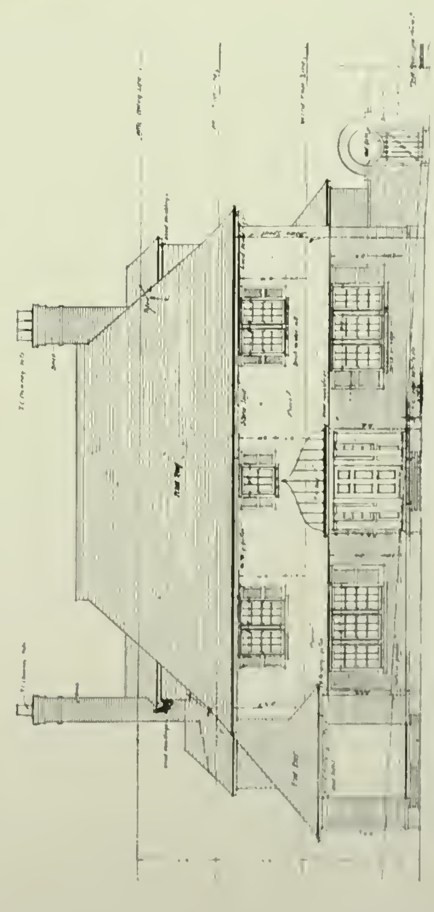

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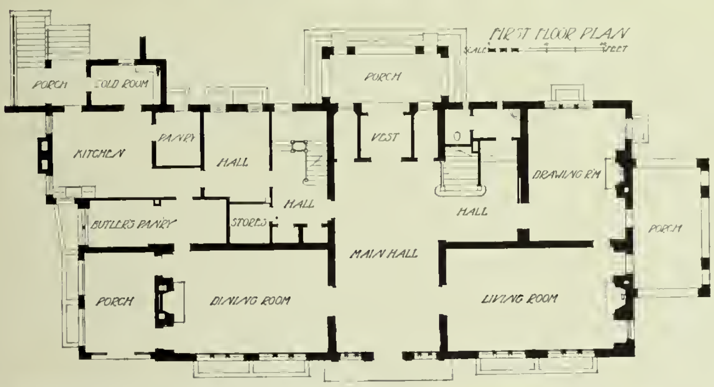
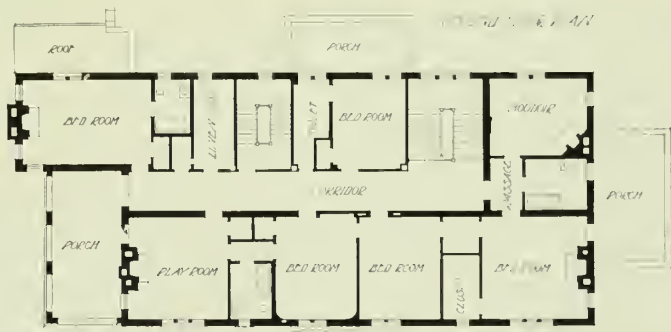




HOUSE AT KANSAS CITY, MISSOURI

WILDER & WIGHT, ARCHITECTS

Brick Manor-Houses of France.— Part II.

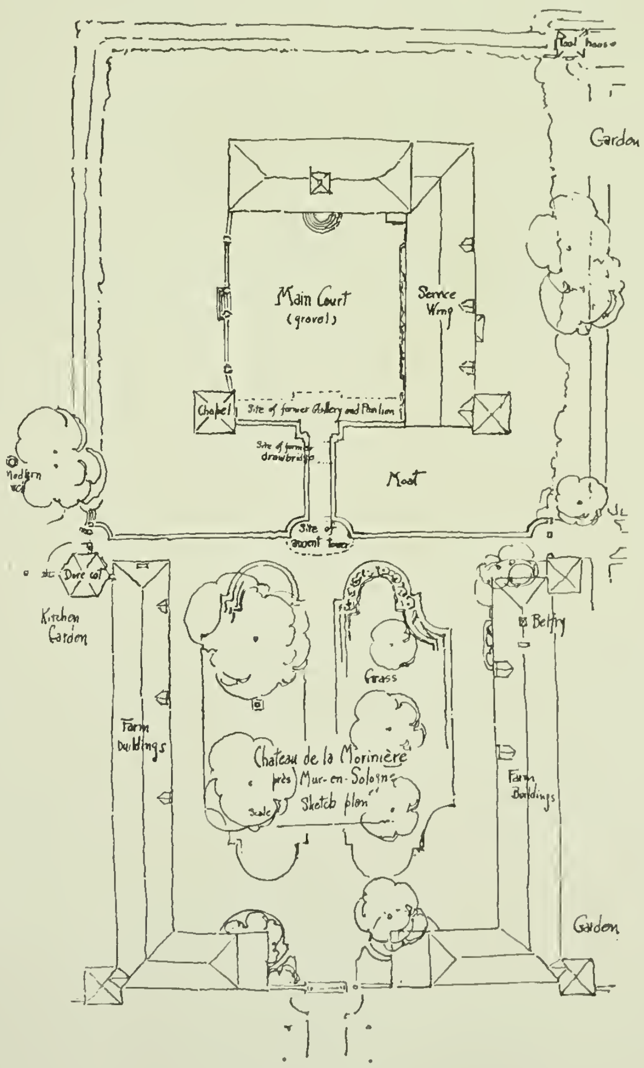
THE CHATEAU OF LA MORINIÈRE.

BY SIDNEY FISKE KIMBALL.

THE visitor to the Loire Valley who merely goes the well-established round of the historic chateaux is very likely to find himself disappointed. This is perhaps largely due to their vaunting by artists and writers to a point which it is almost impossible for the reality — pinchbeck or frigidly restored as it often is — to sustain, and partly perhaps to the feeling that their grandiose and florid style, in spite of its beauty, has little of direct suggestive value for any of our really vital problems of the present. There is hidden away in the region, however, a wealth of minor chateaux, off the traveled routes and unblazoned by literature or history, which, if he can but find them, cannot fail to turn an architect's impression into one of enthusiasm and delight. Baedeker, and even the chateaux guide of Joanne, ignore La Morinière, La Ravinière, Ferté-Imbault, and Herbault-en-Sologne; to locate them one must use the most detailed maps; to reach them, motors, *voitures particulieres*, or cycles at least. Yet when one has found them, or others like them, one realizes, possibly for the first time, the existence and the charm of a little known genre of French country residence, not castle, palace, nor yet fortified grange exactly, but akin somewhat in nature and handling to the smaller manors which make so much of the interest and beauty of England.

Owing to the long insecurity of the Hundred Years War and the civil wars, and to the subsequent centralization of the nobility at the court, these are much less common in France than in England, but at the beginning of the sixteenth century and again to a less degree in the reign of Henry IV, there occurred moments favorable to their erection. Though not intended to sustain a siege, such houses were generally protected against casual marauders by a wall and a moat, which sometimes included the farm buildings as well. As the great castles likewise ceased to be fortified, the term "chateau" lost any implication of military strength and came to be applied indiscriminately to any country residence of some importance. At the same time brick, which in the Middle Ages had been generally abandoned in favor of stone, except in some provinces in the south, once more became popular, apparently for esthetic reasons, since it is often used where stone was easily obtainable. It was now frequently employed with stone trim, a practice previously little known.

Among these unhackneyed minor chateaux few are more masterly in design or more lovely in present effect than La Morinière, situated about twenty miles distant from Blois, a mile from the high road to Ramorantin, and two or three from the occasional trains to the sleepy village of Mur-en-Sologne. Local tradition has it that it was constructed, like Chambord, as a hunting lodge by Francis I; but in size it certainly little resembles its great neighbor, even if the absence of the initial and the salamander did not belie completely any attribution to the royal egoist. The present chateau was in truth — so the owner tells — built for the most part by one Guillaume des Roches, who had been surveyor of the works at Chambord. Upon the death of Francis in 1547, and the consequent relaxing of work on his favorite project, it is said that des Roches brought a few of the hundreds of craftsmen thrown out of employment to build La Morinière. It is probable, moreover, that he was not the first occupant of the site, but that he demolished an earlier medieval castle and based many of his walls on the old foundations. It is even related that the north wing, which is the oldest portion that now exists, was thus built forty years earlier than the rest, in the reign of Louis XII, but it is such an integral part of the whole design, its classic pilasters show so little difference from those of the main building and so much from Louis' work at Blois, that it seems more probable that the demolition and rebuilding all took place within a relatively short time and under a single presiding mind.



SKETCH PLAN.
CHATEAU DE LA MORINIÈRE.
Near Mur-en-Sologne.

Surely the subtle hand of a true master was never more evident than in the composition of the ensemble. The chateau proper is disposed about a court, nearly square, in such a way that from each point of view, above all from the front, there is a certain balance, yet this never becomes exact symmetry. The four sides of the court, originally

THE CHATEAU OF LA MORINIÈRE, FROM THE PARK.

axial gate of the chateau, but to the west the view is entirely open to the principal group, just across the moat. This is the more true because the forecourt is enough wider than the main court to bring the inner face of its buildings about in line with the outer walls of the chateau, so that the north tower and the chapel are included in the perspective. It results also that the outline of the whole group, stables and moat, is brought to a simple rectangle, and attractive vistas from the west are secured along either side of the moat to the ends of the farm buildings. Added interest is given to these vistas as well as a necessary accent and finish to the farm buildings as seen from other points of view, by four towers, partly disengaged, at the outer corners. Three of these are simply square, but the fourth, the southwestern, is given a hexagonal shape, and serves as the inevitable dove-cot. Within it one may still see the ladder turning on its central pintle, and the tiers of nests, the original "pigeon-holes," formed in the masonry by tile shelves between vertical ranges of brick, from which the birds, feeding on the corn of neighboring peasants, did their share to help on the Revolution.

at least, were all of unequal height. On the west rises the principal mass, containing the more important rooms, crowned by a pyramidal cupola which is the focus of the entire composition. Along the northern side runs a lower wing for the service, with a small square tower engaged at the outer corner of its eastern gable. The mass thus formed is balanced in the view from the forecourt by the towerlike bulk of the chapel, also square, which occupies the southeastern corner. Connecting these two formerly ran a low gallery of carved wood, with a pavilion in the center, the form of which is still traceable at the end of the bridge. For good or for ill, in 1825, when the chateau came into the hands of the present family, this gallery was removed, leaving only a low parapet such as has always formed the fourth or southerly side. Taken simply by themselves, surrounded as they are by their wide moat, these buildings form a most successful group, which, when the ancient gallery existed to give still further variety to the sides of the court, and, in spite of the easterly entrance, to lend a sense of opening toward the south, must have been still more interesting.

The forecourt and its buildings, for a clearer view of which the gallery was sacrificed, however, supply a perspective and an enclosure which would otherwise be lacking, and render the whole rarely unified and beautiful. Along either side, each returning for some distance across the eastern end, are L-shaped masses of one story, occupied by the stables and farm buildings, with simple hip roofs little broken by dormers or chimneys. At the east, the court so made is closed by a wall pierced only by the main

The slightly asymmetrical balance which characterizes the general disposition is carried through into the minor membering of the chateau. A close examination will show, for instance, that the forecourt, the bridge, the main doorway, the central dormer, and the cupola are none of them in precisely the same line; and that consequently the main axis is given a freehand character which we to-day confine to our sketches alone, but which we are just being taught to realize the medieval architects consciously strove to

THE CHAPEL AND THE FORECOURT, FROM THE CHATEAU.

preserve in their executed buildings. Again — but little influenced, it seems, by the interior — the designer took care to throw the weight of interest and detail of his façade to the left, where it is needed to assist the mass of the chapel to hold its own against the somewhat heavier wing on the other side. The same subtle principle, which has been happily called *occult* balance, might be traced throughout the buildings of the chateau.

THE MOAT, LOOKING TOWARD THE CHAPEL AND THE DOVE-COT.

Unlike the profuse and inventive carving of the royal works, the detail of the chateau has not in itself particular interest. To be sure there is a doorway, and a few pilasters and dormers in carved stone, but they serve, like the stone quoining at the angles, rather to give an emphasis and enlivenment to the general design than to attract individual attention. The most characteristic touch is given by the *meurtrieres* of the outer walls and towers, which show that the necessity of defense, at least against casual marauders, had not wholly passed away.

It is not here the sculptured detail that gives the chateau its delightfully intimate and domestic character, but more than anything else the material of the simple walls — brick which from the first must have had a variety of color and a richness of texture which we are but just now once more attaining. To-day, untouched save in a few places where complete decay has forced the reluctant and tender hand of the owner, to whose forbearance many great fissures continue to testify, it has a mellow beauty of patina for which we must still wait on time. In the forecourt the tone of the walls is a rich red orange, gained by the absence of arch-brick, here very sparingly used in the chimneys only, and harmonizing completely with the moss-bronzed tile of the roofs and the red trunks of the Norway pines, which, by a stroke of genius, have been planted where bark and

THE CHATEAU OF LA MORINIÈRE FROM THE FORECOURT.

fired clay alike are flecked with the same atmospheric light and shadow. In the buildings within the moat, on the contrary, there is everywhere a diagonal pattern of darker headers, sometimes almost vanishing and never too evident, which gives just enough tinge of violet-red to prevent the least jar with the purple slates of the roofs — here, like the freer use of stone and carving, indispensable for contrast and accent, and crowning, picturesquely enough, an exterior of the greatest charm.

THE CHATEAU AND THE CHAPEL.

In the interior, although one may enjoy most the little *cabinet de travail*, littered with works in progress in music, sculpture, painting, and verse, the architectural interest is, however, confined mainly to the salon and the *salle a manger*.

The original furniture has long been scattered, and there is little attempt to reproduce its effect exactly, but the complete success of the result, in spite of this, enforces the oft repeated lesson that consistency of period matters little when the pieces are chosen with taste and combined with skill.

Altogether one may well envy the owner his country seat, surrounded as it is by charming landscape and the best coverts in France, and possessing itself the rare artistry — the poet's poetry — that make above all the delight of an architect.

THE SALON — CHATEAU OF LA MORINIÈRE.

FIG. I. AUDITORIUM — THE UNIVERSITY OF ILLINOIS. C. H. Blackall, Architect.

The Use of Sounding-Boards in an Auditorium.

BY F. R. WATSON,
Assistant Professor of Physics, University of Illinois.

SOUNDING-BOARDS are well known because of their use in audience halls where the acoustical properties are unsatisfactory. Thus many churches are found equipped with this device with the expectation that the acoustics will be made better. Because of this common use the author has been led to test sounding-boards of different forms, to determine, if possible, their value in bettering the acoustics of an auditorium.

The experiments were carried out as a part of a more complete investigation of the acoustical properties of the auditorium of the University of Illinois. This auditorium is shaped nearly like a hemisphere with several large arches and recesses to break the regularity of the inner surface. (See Figs. I and IV.) The original plans of the architect were curtailed because the amount of money appropriated for the construction of the building was insufficient for the purpose. The interior of the hall was built absolutely plain with no breaking up of the smooth wall surfaces, and no furnishings were provided in the shape of carpets or curtains. The acoustical properties proved to be unsatisfactory. A reverberation, or undue prolongation of the sound, existed. In addition, echoes are set up because of the large size of the room and because of the position and form of the walls.

A diagnosis of the acoustics was made. The time of reverberation was determined by Sabine's method* to be a little more than six seconds. The echoes were located by tracing out the paths taken by the sound. This was done by means of an arc-light backed by a parabolic reflector.† The arc gave out sound waves in addition to the light; the two sets of waves traveling together, so that by noting where the light struck a wall, an observer could "see" where the sound traveled. The echoes were finally eliminated by placing canvas curtains so as to break up the sound waves that produced the trouble.

It occurred to the author during the course of the investigation that sounding-boards might be helpful in curing the echoes. Several forms of boards were used. A flat board, about 5 feet square, inclined at an angle above the head of the speaker, produced but little effect. A canvas sheet, about 12 by 20 feet, similarly placed, was also unsatisfactory, although speakers said they could talk better under it than out in the open. Sounding-boards were then used of a parabolic shape, and these produced a pronounced effect.

The sounding-board, or more properly, the reflecting board, was set up at one side of the platform, after the manner of the pulpits in Episcopal churches. (Fig. II.) The shape of the reflector was a quarter section of a paraboloid of revolution with the axis nearly horizontal. The frame was made of wood, and faced on the under side with hard plaster on wire lath. The finished reflector is shown in Fig. III. The results obtained were pronounced. Previous calculations showed that the sound would be directed in such a way as to confine the echoes to a small section of

* W. C. Sabine, "Architectural Acoustics," *American Architect*, 1900.
† F. R. Watson, "Echoes in an Auditorium," *Physical Review*, Vol. 32, page 231, 1911.

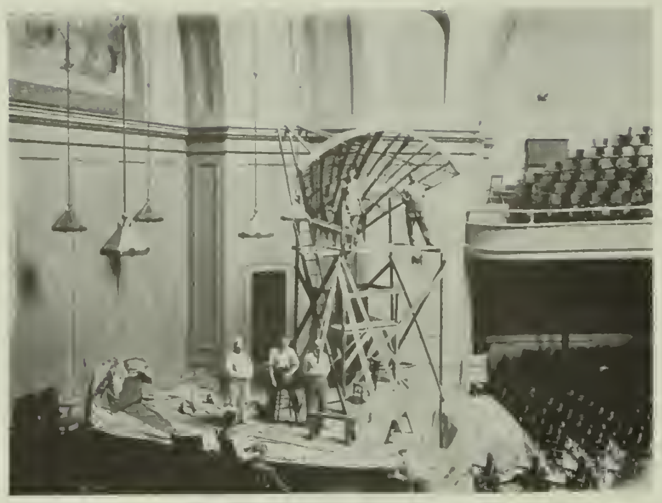


FIG. II. CONSTRUCTION OF REFLECTOR.

FIG. III. COMPLETED REFLECTOR.

the audience. A canvas of the auditors showed this to be the case. Echoes were reported in the section expected, but the remainder of the audience had no such trouble.

Some time later another reflector of the same shape and size was made and mounted over the center of the stage. This was done because speakers regarded the raised pulpit arrangement on the side of the stage as rather formidable. This second frame was much lighter in weight. It was constructed of small wooden rods in a most ingenious way by one of the University carpenters. (See Fig. V.) It was faced with white oilcloth (see Fig. VI) instead of plaster, since it had been found that the oil cloth was a good reflector of sound and was much lighter in weight. The result obtained by its use confirmed the expectations as in the previous experiment.

Reflectors of this kind have certain objectionable features. Thus, if the mouth of the speaker is at the focus of a paraboloid, the reflected sound goes out in a parallel bundle and only a small portion of the audience gets the reenforced sound. This was found to be so in the two

FIG. IV. INTERIOR OF AUDITORIUM — THE UNIVERSITY OF ILLINOIS.
C. H. Blackall, Architect.

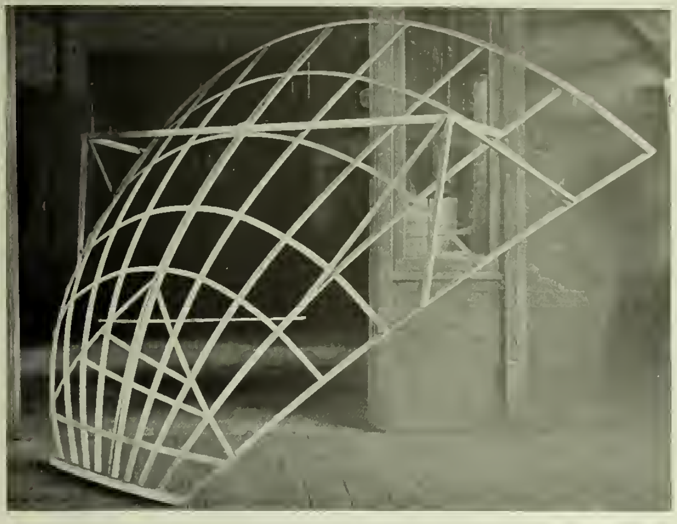


FIG. V. FRAME WORK FOR REFLECTOR.

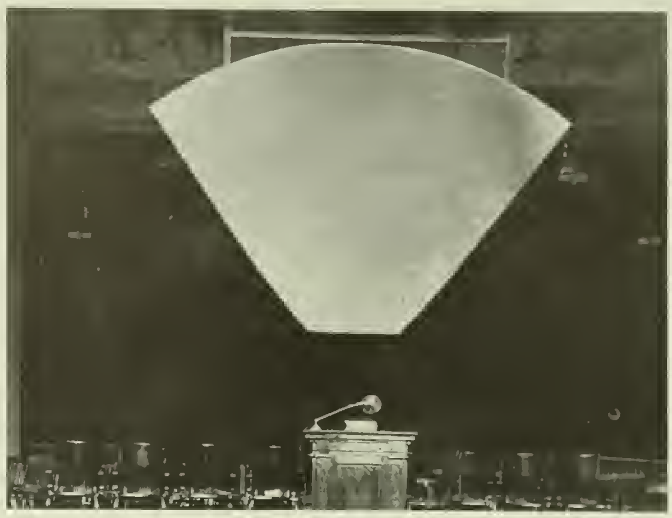


FIG. VI. REFLECTOR OVER PULPIT.

cases cited. Experiments showed the sound to be confined to the region calculated. Auditors in this region reported an increased sound, while others outside this zone had no such reenforcement. To remedy this shortcoming and direct the sound to all the auditors would require a reflector of different form. The results obtained indicate that this could be done by making up a modified parabolic reflector to suit the conditions of the particular case.

One other defect is the annoyance to the speaker. Thus, if his head is near the focus (Fig. VII), he is in a position to get concentrated sound from the audience; i.e., coughing, sneezing, rustling of papers, etc. With the reflectors used, no such annoyance occurred. The two gentlemen who spoke — the Right Reverend Bishop Osborne, who used the reflector at the side of the stage, and Reverend Hugh Black, who used the reflector in the center of the stage — each expressed his satisfaction with the reflector and reported no annoyance in speaking. The steep slope of the reflector eliminated any feeling of being "shut in." A speaker standing at the focus is not conscious of the presence of the reflector unless he turns around and looks at it.

The advantages possessed by such a suitably designed reflector are perhaps two in number. First, it serves to cut off the sound which passes to walls that may produce acoustical disturbances, and second, to direct this sound usefully to auditors at a distance from the speaker. Both of these effects were obtained in the auditorium at the University of Illinois. It is not planned to use the reflector at the latter place, since, as already indicated, the echoes can be eliminated by the installation of false walls in the dome. It seems likely that such a reflector would be useful in a hall where the walls could not conveniently be modified. It would be especially adapted for use in churches or halls where the position of the speaker is confined to a small space. *

* See *Architectural Review*, Vol. I., Plate LVIII., December, 1912.

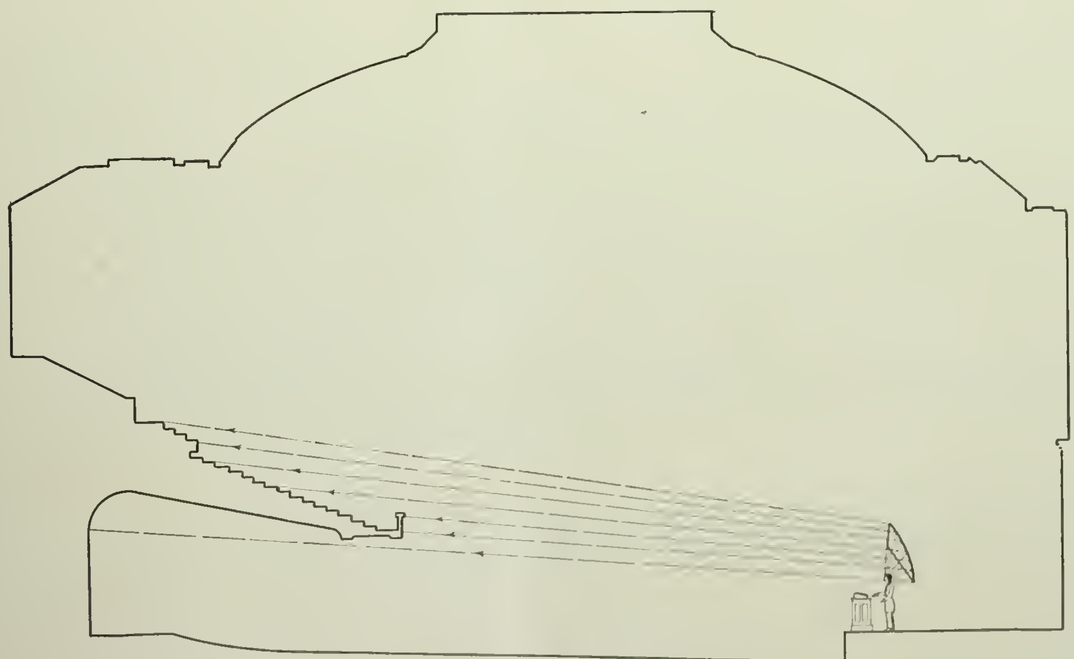


FIG. VII.

BUILDINGS AT SPRING LAKE, N. J.
BRAZER AND ROBB, ARCHITECTS

BUILDING AT CHICAGO, ILL.

BUILDING AT CHICAGO, ILL.

CHATTEN AND HAMMOND, ARCHITECTS

BUILDINGS AT WASHINGTON, D.C. MARSH AND PETER, ARCHITECTS

GROUP OF SMALL MERCANTILE BUILDINGS

EDITORIAL COMMENT AND NOTES FOR THE MONTH

MODERN ARCHITECTURE.

A TERSE and forcible expression of the problem of to-day was read by Mr. Thomas Hastings before the Royal Institute of British Architects. His paper was entitled "Modern Architecture," in the course of which he said: "We American architects are ofttimes confronted with the question as to why we have not an architecture of our own, one which is essentially American; and why it is that so many of us who have studied in Paris seem inclined to inculcate the principles of the École des Beaux-Arts into our American architecture. The majority of people do not seem to realize that in solving problems of modern life the essential is not so much to be national or American as it is to be modern and of our own period.

"The question of supreme interest is: What influence life in its different phases has upon the development of architectural style? Style in architecture is that method of expression in the art which has varied in different periods, almost simultaneously throughout the civilized world, without reference to the different countries, beyond slight differences of national character mostly influenced by climate and temperament. Surely modern architecture should not be the deplorable creation of the would-be style-inventor, or that of the illogical architect living in one age and choosing a style from another.

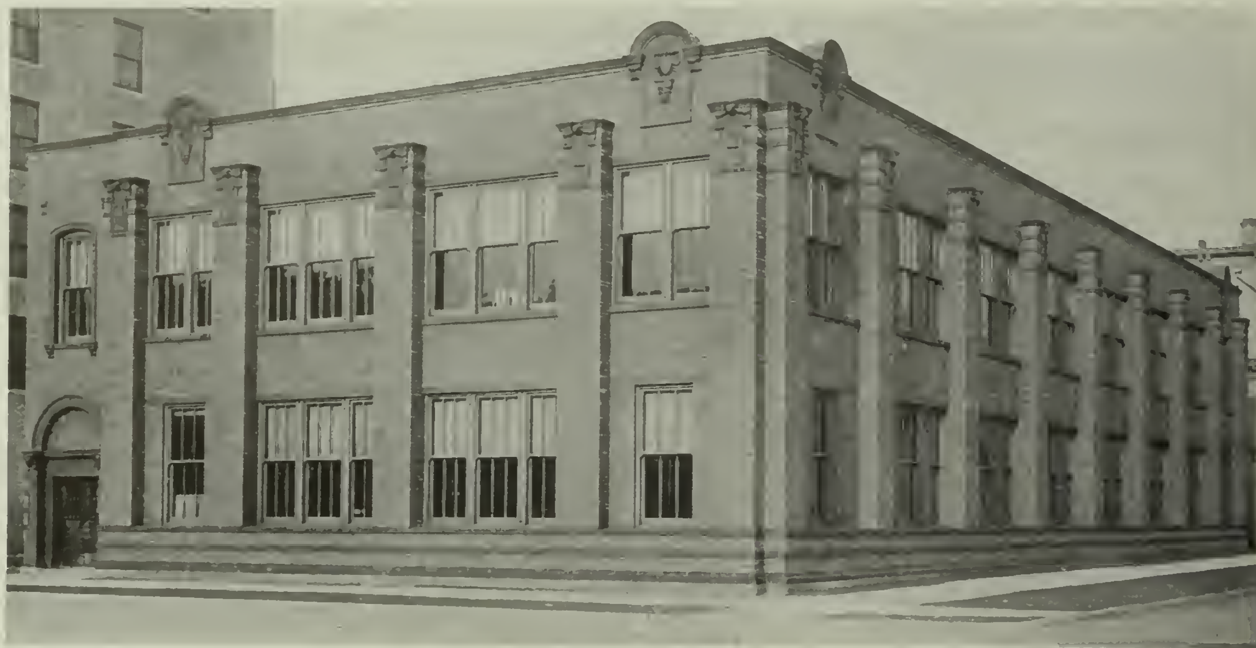
"The important and indisputable fact is not generally realized that from prehistoric times until now each age has built in one, and only one, style. Since the mound-builders and cave-dwellers, no people, until modern times, ever attempted to adapt a style of a past epoch to the solution of a modern problem; in such attempts is the root of all modern evils. In each successive style there has always been a distinctive spirit of contemporaneous life from which its root drew nourishment. But in our time, contrary to all historic precedents, there is a confusing selection from the past of every variety of style. Why should we not be modern and have one characteristic style expressing the spirit of our own life? History and the law of development alike demand that we build as we live.

"One might consider the history and development of costumes to illustrate the principle involved. In our dress to-day we are modern but sufficiently related to the past, which we realize when we look upon the portraits of our ancestors of only a generation ago. We should not think of dressing as they did, or of wearing a Gothic robe or a Roman toga; but, as individual as we might wish to be, we should still be inclined, with good taste, to dress according to the dictates of the day.

"Style in its growth has always been governed by the universal and eternal law of development. If from the early times, when painting, sculpture, and architecture were closely combined, we trace their progress through their gradual development and consequent differentiation, we cannot fail to be impressed by the way in which one style has been evolved from another. This evolution has always kept pace with the progress of the political, religious, and economic spirit of each successive age. It has manifested itself unconsciously in the architect's designs, under the imperatives of new practical problems and of new requirements and conditions imposed upon him. This continuity in the history of architecture is universal. As in nature the types and species of life have kept pace with the successive modifications of lands and seas and other physical conditions imposed upon them, so has architectural style, in its growth and development, until now kept pace with the successive modifications of civilization. For the principles of development should be as dominant in art as they are in nature. The laws of natural selection and of the survival of the fittest have shaped the history of architectural style just as truly as they have the different successive forms of life. Hence the necessity that we keep and cultivate the historic spirit, and that we respect our historic position and relations, and that we more and more realize in our designs the fresh demands of our time, more important even than the demands of our environment.

"Were it necessary, we could trace two distinctly parallel lines — one the history of civilization and the other the history of style in art. In each case we should find a gradual development, a quick succession of events, a revival, perhaps almost a revolution and a consequent reaction, always together like cause and effect, showing that architecture and life must correspond. In order to build a living architecture we must build as we live. Compare the Roman Orders with the Greek and with previous work. When Rome was at its zenith in civilization the life of the people demanded of the architect that he should not only build temples, theaters, and tombs, but baths, palaces, basilicas, triumphal arches, commemorative pillars, aqueducts, and bridges. As each of these new problems came to the architect it was simply a new demand from the new life of the people — a new work to be done. When the Roman architect was given such varied work to do, there was no reason for his casting aside all precedent. While original in conception, he was called upon to meet these exigencies only with modifications of the old forms. These modifications very gradually gave us Roman architecture.

"Compare a workman of to-day, building a Gothic church, slavishly following his detail drawings, with a workman of the fourteenth century doing such detail work as was directed by the architect, but with as much interest, freedom, and devotion in making a small capital as the architect had in the entire structure. Perhaps doing penance for his sins, he praises God with every chisel-stroke. His life interest is in that small capital; for him work is worship, and his life is one continuous psalm of praise. The details of the capital, while beautiful, may be gro-



MAIN ELEVATIONS

DETAIL

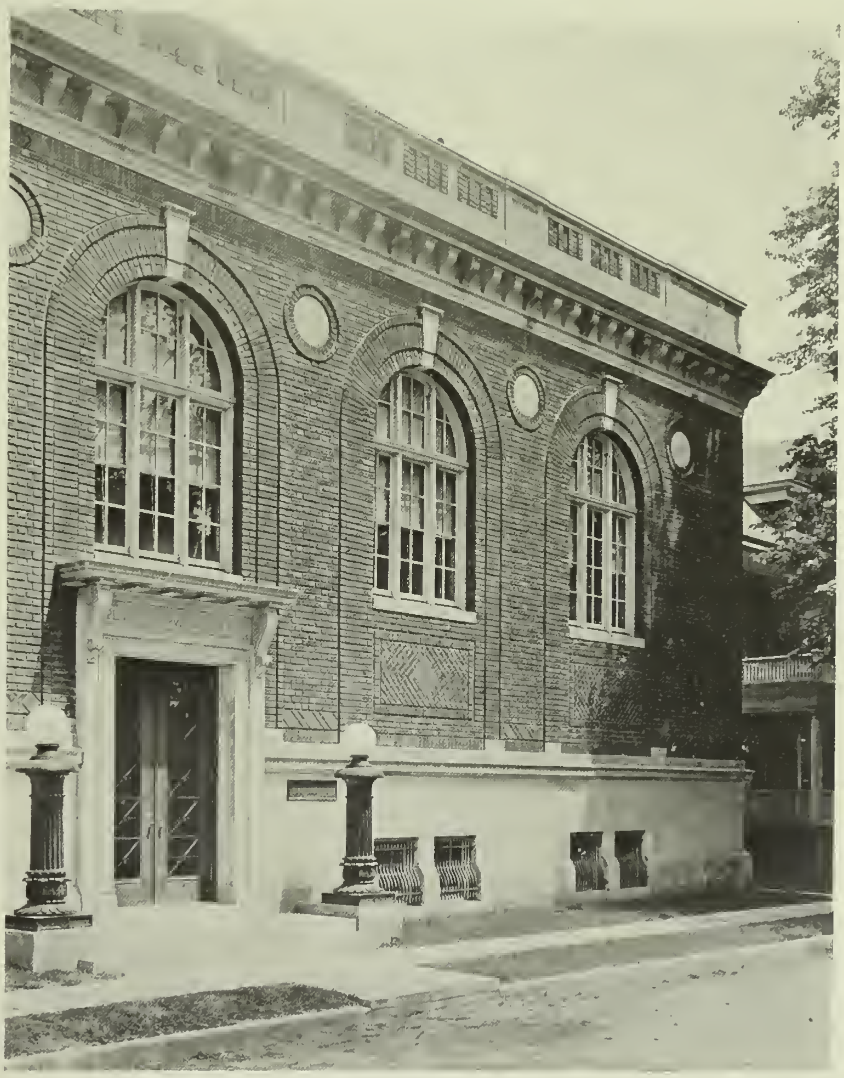
ENTRANCE DETAIL

COMMERCIAL BUILDING, CHICAGO, ILL.

PERKINS, FELLOWS AND HAMILTON, ARCHITECTS.

tesque; but there is honest life in them. To imitate such a capital to-day without that life would be affectation. Now a Gothic church is built by laborers whose one interest is to increase their wages and diminish their working hours. The best Gothic work has been done, and cannot be repeated. When attempted it will always lack that kind of medieval spirit of devotion which is the life of medieval architecture.

"So great were the changes in thought and life during the Renaissance period that the forms of architecture which had prevailed for a thousand years were inadequate to the needs of the new civilization; to its demands for greater refinement of thought; for larger truthfulness to nature; for less mystery in form of expression, and for greater convenience in practical living. Out of these necessities of the times of the Renaissance style was evolved — taking about three generations to make the transition — and around no other style have been accumulated such vast stores of knowledge under the lead of the great masters of Europe. Therefore whatever we now build, whether church or dwelling, the law of historic development requires that it be Renaissance; and if we encourage the true principles of composition it will involuntarily be a modern Renaissance; and with a view to continuity we should take the eighteenth century as our starting-point, because here practically ended the historic progression and entered the modern confusion.



THE PLAINFIELD PUBLIC LIBRARY, PLAINFIELD, N. J.
Wilder & White, Architects.

"In every case where the medieval style has been attempted in modern times the result has shown a want of life and spirit, simply because it was an anachronism. The result has always been dull, lifeless, and uninteresting. It is without sympathy with the present or a germ of hope for the future — only the skeleton of what once was. We should study and develop the Renaissance and adapt it to our modern conditions and wants so that future generations can see that it has truly interpreted our life. We can interest those who come after us only as we thus accept our true historic position and develop what has come to us. We must accept and respect the traditions of our fathers and grandfathers and be, as it were, apprenticed by their influence. Without this we shall be only copyists or be making poor adaptations of what was never really ours.

"The time must come, and I believe in the near future, when architects of necessity will be educated in one style, and that will be the style of their own time. They will be so familiar with what will have become a settled conviction, and so loyal to it, that the entire question of style, which at present seems to be determined by fashion, fancy, or ignorance, will be kept subservient to the great principles of composition, which are now more or less smothered in the general confusion.

"Whoever demands of an architect a style not in keeping with the spirit of his time is responsible for retarding the normal progress of the art. We must have a language if we would talk. If there be no common language for a people there can be no communication of ideas either architectural or literary. I am convinced that the multiplicity of printed books and periodicals written by literary critics and essayists who have not even been apprenticed, but are writing with authority about art, has perhaps been more instrumental than anything else in bringing about this modern confusion. I believe that we shall one day rejoice in the dawn of a modern Renaissance, and, as always has been the case, we shall be guided by the fundamental principles of the classic. It will be a modern Renaissance, because it will be characterized by the conditions of modern life. It will be the work of the Renaissance architect solving new problems, adapting his art to an honest and natural treatment of new materials and conditions. Will he not also be unconsciously influenced by the twentieth-century spirit of economy and by the application of his art to all modern industries and speculations?

"We must logically interpret the practical conditions before us, no matter what they are. No work to be done is ever so arbitrary in its practical demands, but that the art is elastic and broad enough to give these demands thorough satisfaction in more than a score of different ways. If only the artist will accept such practical imperatives as are reasonable, if only he will welcome them, one and all, as friendly opportunities for loyal and honest expression in his architecture, he will find that these very conditions will do more than all else besides for his real progress and for the development of contemporaneous art in composition.

"The architects in the early history of America were distinctly modern and closely related in their work to their contemporaries in Europe. They seem not only to have inherited traditions, but to have religiously adhered to them. I believe that it is because of this that the genuine and naïve character of their work, which was of its period, still has a charm for us which cannot be imitated. McComb, Bulfinch, Thornton, Latrobe, L'Enfant, Andrew Hamilton, Strickland, and Walters were sufficiently American and distinctly modern, working in the right direction, unquestionably influenced by the English architecture of Inigo Jones, Sir Christopher Wren, James Gibbs, Sir William Chambers. Upjohn and Renwick, men of talent, were misled, alas, by the confusion of their times, the beginning of this modern chaos, the so-called Victorian-Gothic period.

"Gifted as Richardson was, and great as his personality was, his work is always easily distinguished, because of its excellent quality, from the so-called Romanesque of his followers. But I fear the good he did was largely undone because of the bad influence of his work upon his profession. Stumpy columns, squat arches, and rounded corners, without Richardson, form a disease from which we in America are only just recovering. McComb and Bulfinch would probably have frowned upon Hunt for attempting to graft the transitional Loire architecture of the fifteenth century upon American soil, and I believe all will agree that the principal good he accomplished was due to the great distinction of his art and the moral character of the man himself, rather than to the general influence and direction of his work.

"Whether we agree with Charles F. McKim or not in wanting to revive in the nineteenth century the art of Bramante, St. Galo, and Peruzzi, he had perhaps more of the true sense of beauty than any of his predecessors, in American art. His work was always refined, personal, and with a distinctly more classic tendency in his most recent buildings.

"It is, I believe, a law of the universe that the forms of life which are fittest to survive — nay, the very universe itself — are beautiful in form and color. Natural selection is beautifully expressed, ugliness and deformity are synonymous; and so in the economy of life what would survive must be beautifully expressed.

"When we think of what the past ages have done for us, should we not be more considerate of those that are yet to come? A great tide of historic information has constantly flowed through the channel of monuments erected by successive civilizations, each age expressing its own life, and we can almost live in the past through its monuments.

The recently-discovered buried cities of Assyria give us a vivid idea of a civilization lost to history. The Pyramid of Cheops and the Temples of Karnak and Luxor tell us more of that ingenuity which we cannot fathom, and the grandeur of the life and history of the Egyptian people, than the scattered and withered documents or fragments of inscriptions that have chanced to survive the crumbling influences of time. The Parthenon and the Erectheum bespeak the intellectual refinement of the Greeks as much as their epic poems or their philosophy. The triumphal arches, the aqueducts, the Pantheon, and the basilicas of Rome tell us more of the great constructive genius of the early republic and the empire of the Cæsars than the fragmentary and contradictory annals of wars and political intrigues.

"The unsurpassed and inspiring beauty of the Gothic cathedrals which bewilder us, and the cloisters which enchant us, impress on our minds a living picture of the feverish and morbid aspiration of medieval times — a civilization that must have mingled with its mysticism an intellectual and spiritual grandeur which the so-called Dark Ages of the historian have failed adequately to record; and in America, even amid the absorbing work of constructing a new government, our people found time to speak to us to-day in the silent language of their simple architecture of the temperament and character of our forefathers.

"Will our monuments of to-day adequately record the splendid achievements of our contemporaneous life — the spirit of modern justice and liberty, the progress of modern science, the genius of modern invention and discovery, the elevated character of our institutions? Will disorder and confusion in our modern architecture express the intelligence of this twentieth century? Would that we might learn a lesson from the past — that modern architecture, wherever undertaken, might more worthily tell the story of the dignity of this great epoch and be more expressive of this wonderful contemporaneous life."

AN ARCHITECT AS PRESIDENT.

FOR the first time since the organization, in 1896, of the National Fire Protection Association, its president is not identified with the fire insurance business. This innovation signifies the intent to broaden the influence of the association. The new president, Robert D. Kohn, is an architect of prominence in his profession and president of the New York Chapter of the American Institution of Architects. The architect can be a powerful agent for good in the movement for fire prevention, but at present he is an undeveloped force, says the Insurance Press.

THE Supreme Court of Illinois has upheld the legality of the architects' license law of Illinois in a test suit brought by David Saul Klafter.

CHINESE scholars have formulated a new alphabet, after a study of all the alphabets of the world, which will supersede, it is said, the cumbersome ideograms which were the pride of the ancient Chinese, as well as the puzzle of the modern world. Five vowels have been taken from the Latin, four from the Greek, four from the Russian, one from the Chinese, and two are elongated signs and seven are reversed ideograms. Fourteen consonants are Latin, three Russian, and two Greek. With these it is declared to be possible to write all the words used in any part of China. An effort is to be made at once to introduce the new alphabet into official circles.

THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

VOLVME XXII JVLY 1913 NVMBER 7

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PLATE ILLVSTRATIONS

LETTERPRESS

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Photo by The Royal Prussian Photometric Institute.

CHURCH OF ST. THEODORE, MISTRA, LACONIA, GREECE.

Built about 1400. Bands of rubble alternating with brick and stone.

THE BRICKBVILDER

JULY, 1913

VOLVME XXII. NVMBER 7.

Some Suggestions as to the Making of Working Drawings.

THE SECOND PAPER.

BY H. VAN BUREN MAGONIGLE.

IT will interest the reader to know what methods are used in other offices than that of the writer, and I am indebted to Messrs. McKim, Mead & White and York & Sawyer, to Mr. C. B. J. Snyder, architect of the New York Board of Education, and to Mr. Oscar Wenderoth, Supervising Architect of the Treasury Department, for the loan of drawings, and statements as to their practices.

Taking these in their order, Messrs. McKim, Mead & White have loaned some of their drawings for the Municipal Office Building in New York City, a structure so large and in some respects so complicated that it was of the highest importance to systematize the process of making the drawings to avoid utter confusion.

Including shop-drawings, setting-diagrams and the like, made outside of the office, the total number of drawings for the job was between seven and eight thousand. Of these a comparatively small percentage were made in the office, but they nevertheless ran into many hundreds.

The job was divided into two contracts, one being for the structure proper and the other for the interior finish. The drawings necessary for the contract sets, that is to say, those upon which the bidders estimated and upon the basis of which the contracts were signed, were all made on cloth in ink, so that they could be reproduced by lithography for the great number of copies required. For the first contract the lithograph copies were 27 inches wide and 40 inches long. General plans and elevations were drawn at ⅛-inch scale and reduced photographically for lithographic reproduction to 1/16-inch scale. Scale details were made at ¾-inch and reduced to ⅜-inch scale and full sizes reduced one-half. For the second contract the size of these lithographed contract sets was 16 inches wide by 30¾ inches long, the reductions being similar to the above.

This method produced contract sets of a size easily handled, and the photographic reduction made it possible to indicate vastly more than would have been possible at so small a final scale. There were one hundred and twelve drawings in the first and ninety-six in the second contract set, so that compactness was essential.

The further drawings required for the execution of the work were made, some on cloth, but principally on white tracing paper, and of these sun prints were made. A width of 4 feet was established for these supplementary drawings to allow for large full sizes, but no attempt was made to keep a standard length, this dimension being regulated by the capacity of solar printing machines. After prints for the contractors and for an office set had been made, the originals were rolled on tubes about 10 inches longer than the width of the sheets, about ten drawings in each roll, and kept fresh for such further prints as might be required from them; the office set of prints was used entirely for reference (see THE BRICKBUILDER for May, 1913, first page) and were kept up to date with notes and references to correspondence where modifications were of a nature that would have required too lengthy a note.

Details of ornament were made at full size on manila detail paper and the originals sent to the modeler; but a careful tracing was first made and prints of this issued to superintendents and general and sub-contractors.

Mr. Nims, under whose direction this work was produced, agrees with the writer that the drawing from which the print is made should be made by a competent man and be an original drawing whether on cloth or tracing paper. In too many offices, I gather, the original is made by a good man on paper and traced by a junior; the contractor then gets a print from a junior's tracing; or the paper original is handed out and the junior's tracing retained to make trouble, while the contractor's draftsmen make copies of the fine original and pass them along to sub-contractors to make more trouble. A fantastic practice.

Some minor points about these drawings are of interest. The number of each drawing is marked at all of its four corners and this is said to save time and trouble in reference, and probably does in the field where drawings are not likely to be kept systematically and when wanted have to be hauled out of a heap or extracted from a roll.

Owing to the fact that there was much work below the surface, the foundations being very deep and the rapid transit subway running under the building, involving many drawings, the first floor plan was numbered 1001 to positively avoid any possible confusion, scale details beginning at 2001 and full sizes at 3001. Shop drawings are bound in the office set next to the architects' original for ready reference.

The building being of irregular shape, on all elevations of its many faces, a miniature block plan in outline was given, with the portion covered by the drawing indicated with a heavy line (see illustration).

The record of drawings was kept by card index, each drawing having its own card with the number, etc., at the top. The trade for which the drawing is primarily intended is indicated by a letter and the number of copies and their destination recorded. No attempt is made to send out receipts for drawings; the experience of every one is about alike in this; contractors rarely return these receipts and it is really postage and extra work wasted at both ends, except in the thousandth case.

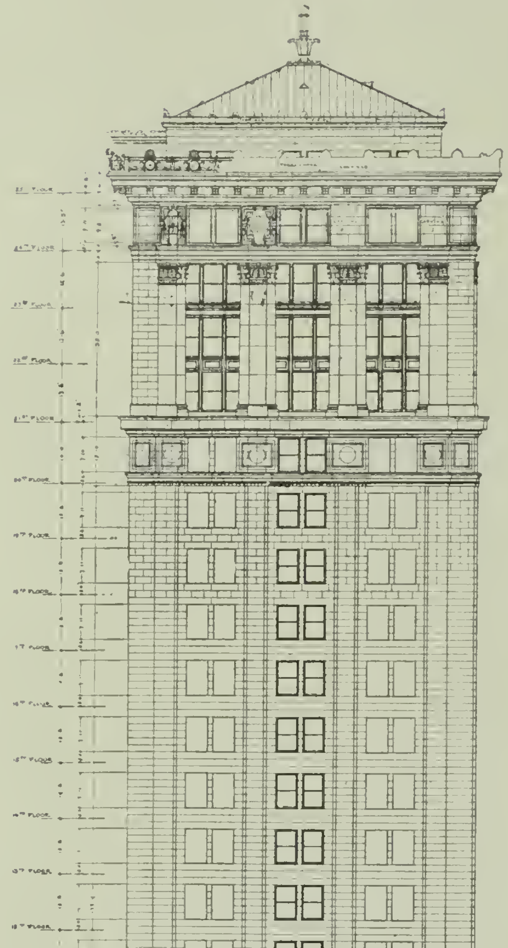
My own practice as to providing copies for contractors is to issue as many prints of a drawing as there are trades represented by it, plus a copy for the contractor's office, a copy for his office at the job, and a copy for my own superintendent, which he keeps at the job; I can control the way my own man keeps his drawings and thus be reasonably sure that when I want a drawing on the job it can be found; it is useless to expect a contractor to maintain order in the shanty and I have given up trying. In the case of a one-trade drawing, such as a piece of cabinet work or carpentry, a copy is made for the contractor's office, one for his job-office, one for his mill man and one for my superintendent. For stonework the same, except that the copy for the contractors at the job is omitted, the setters always using the setting diagrams made by the contractor; but the clerk of the works gets one to keep his records complete and to check up by in case of mistakes or discrepancies. Mr. Nims used practically the same system on the Municipal Building.

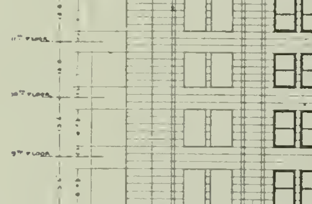
The drawings which Messrs. York & Sawyer consider fairly typical of their method are also reproduced herewith. They generally use a sheet of a standard size and if this is too small for any given job they simply increase it — which is the sensible thing to do. Whenever possible, details are made on tracing paper, otherwise on cloth, and printed. They have been trying a white tracing cloth, 36 inches wide, 24 yards to the roll, at $5.45 per roll, instead of heavy tracing paper, for details; this cloth will not take ink and the details are made upon it in pencil; it will bear more handling than any tracing paper. A little figuring (in which I have not yet personally indulged) would no doubt settle, for any one interested, the point of expense involved by the use of this cloth as against a bond paper or thin white tracing paper original kept fresh for future prints and a paper or cloth print of it for an office reference set.

Originals and prints are kept flat in drawers during the progress of a job and rolled and placed in tubes when it is completed. The admirable clearness and completeness of the drawings are so obvious as to make comment unnecessary were it not that all working drawings are not so good as these; they have a way which has always excited my admiration of giving explanatory details and sections, frequently at the same scale as a plan, on the plan to which that particular section relates, and especially where some intricate or intimate relation between two floors occurs. These are sometimes quite elaborate and they are nearly always, if not quite, elucidations of parts impossible to cover in a general section, and they make a workmanlike and complete set of working drawings. General drawings are numbered from 1 to 100, scale details from 101 to 200, full sizes from 201 to 300. This would naturally vary somewhat with the size or degree of elaboration of the job.

They still adhere to lettering firm name and titles by hand, as will be observed; perhaps they may be converted. Just here I may speak of one of the methods in vogue in my office. I spoke in the May article of having certain general lettering carefully drawn, zinc cuts made of it and this general matter printed from them in printer's ink. After these zinc cuts were made, Mr. Frank Snyder had reverse casts made of them and then cast in rubber and mounted. These rubber stamps are generally used on bond paper or thin tracing paper originals instead of printing in printer's ink, for the obvious reason that dampening the paper to properly take the ink cockles it. It is not necessary to dampen tracing cloth. We also use the name stamp, reduced to one or two smaller sizes, as rubber stamps for various office purposes. The rubber stamp man's lettering would do just as well, I suppose, but I like uniformity in such things.

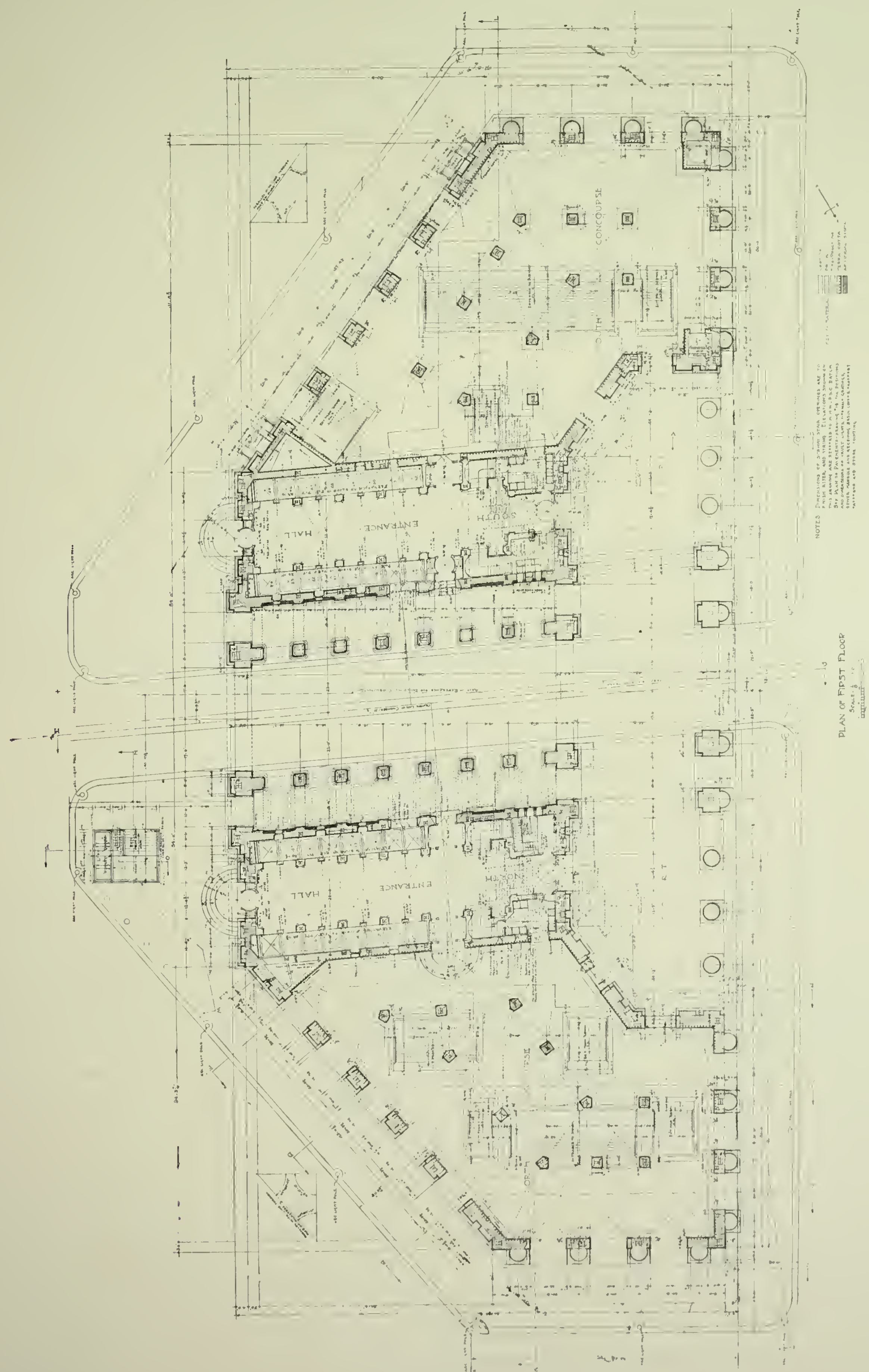
It is very interesting to compare these various ways of arriving at a result in private practice with those in the office of Mr. C. B. J. Synder. (To be published in THE





THE MUNICIPAL BUILDING, NEW YORK CITY.

McKim, Mead & White, Architects.



PLAN OF FIRST FLOOR — THE MUNICIPAL BUILDING, NEW YORK CITY

McKIM, MEAD & WHITE, ARCHITECTS

BRICKBUILDER for August.) Naturally the problems in private practice vary so widely as a rule that standardization is difficult except in minor particulars. But Mr. Snyder is building millions of dollars' worth of schools every year and has standardized much of the work. He has standardized certain types of plans, and these are traced over and over for new buildings of the type with such minor changes as may be advisable. The elevations and some special features are changed or entirely restudied. But when it comes to details of staircases, details of construction and equipment and the like, these are thoroughly standardized, given an identifying signature such as A2 or B6, and are referred to as such on the general plan at the point where such standard detail applies. It is, then, when a new school of a certain type is to be built, necessary only to make such minor changes in the general type plan as are necessary, re-study the elevations, alter sections to fit the elevations, make new details of the exterior, and for all the rest merely bind into the set copies of the standard details A2, B6, etc. These include staircases, handrails, standing trim, blackboards, etc.

This is of suggestive value for the private practitioner. Standardization cannot be carried so far; but there are very many things such as window frames, butler's pantry details, and service trim that can be standardized. It does seem silly to start fresh on such things for every new job. If we once work out the essential details of a butler's pantry satisfactorily, there is no reason for not doing precisely the same thing in another job; the drawing room is another matter. I tried it once some time ago, but somehow it fell into disuse and I am strongly inclined to revive it.

In Mr. Snyder's Department, blue prints are made in the office and the width of the blue print paper controls the widths of sheets; the extreme length is 6 feet, the largest print the office can make.

Sheets for general plans, elevations, and sections are made uniform in size, but the detail sheets are not necessarily uniform in size with them. Eighth scale general drawings are the rule, with ¾ inch for scale details.

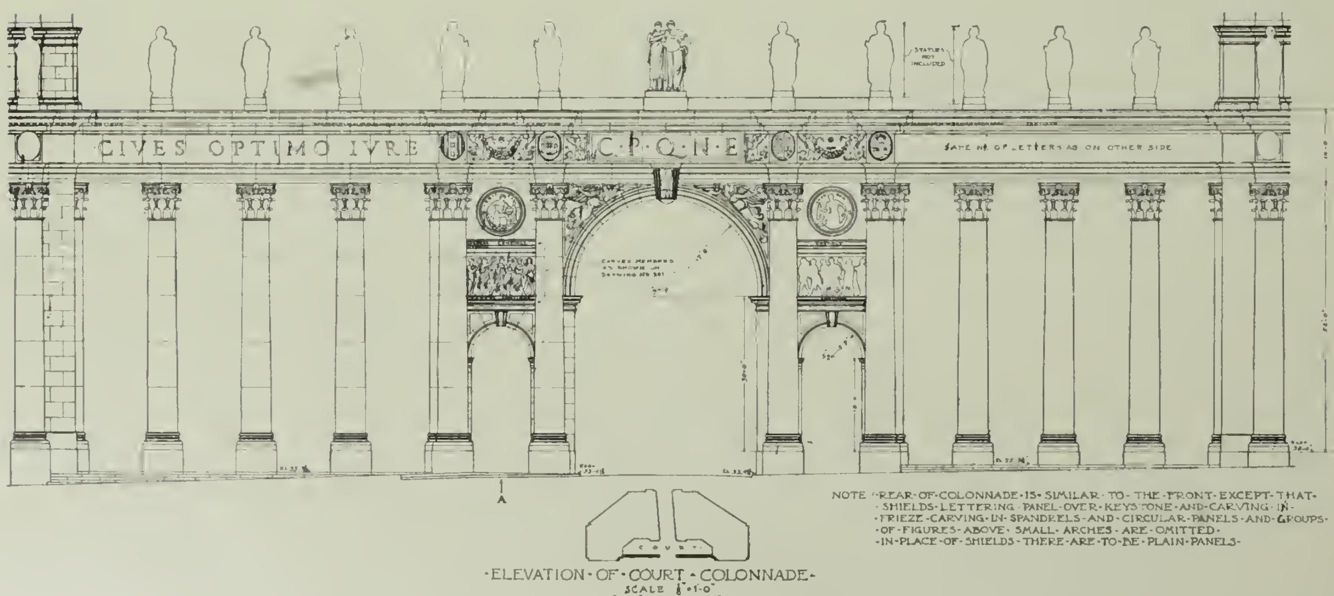
The issue book is a large double page affair giving date, number of prints, number of drawings received, etc., and is signed by the contractor when he gets his copies.

The figures as to cost of production are impressive, although it is only fair to say that such low cost can only be expected where a high degree of standardization, as in a constant procession of school buildings, is possible.

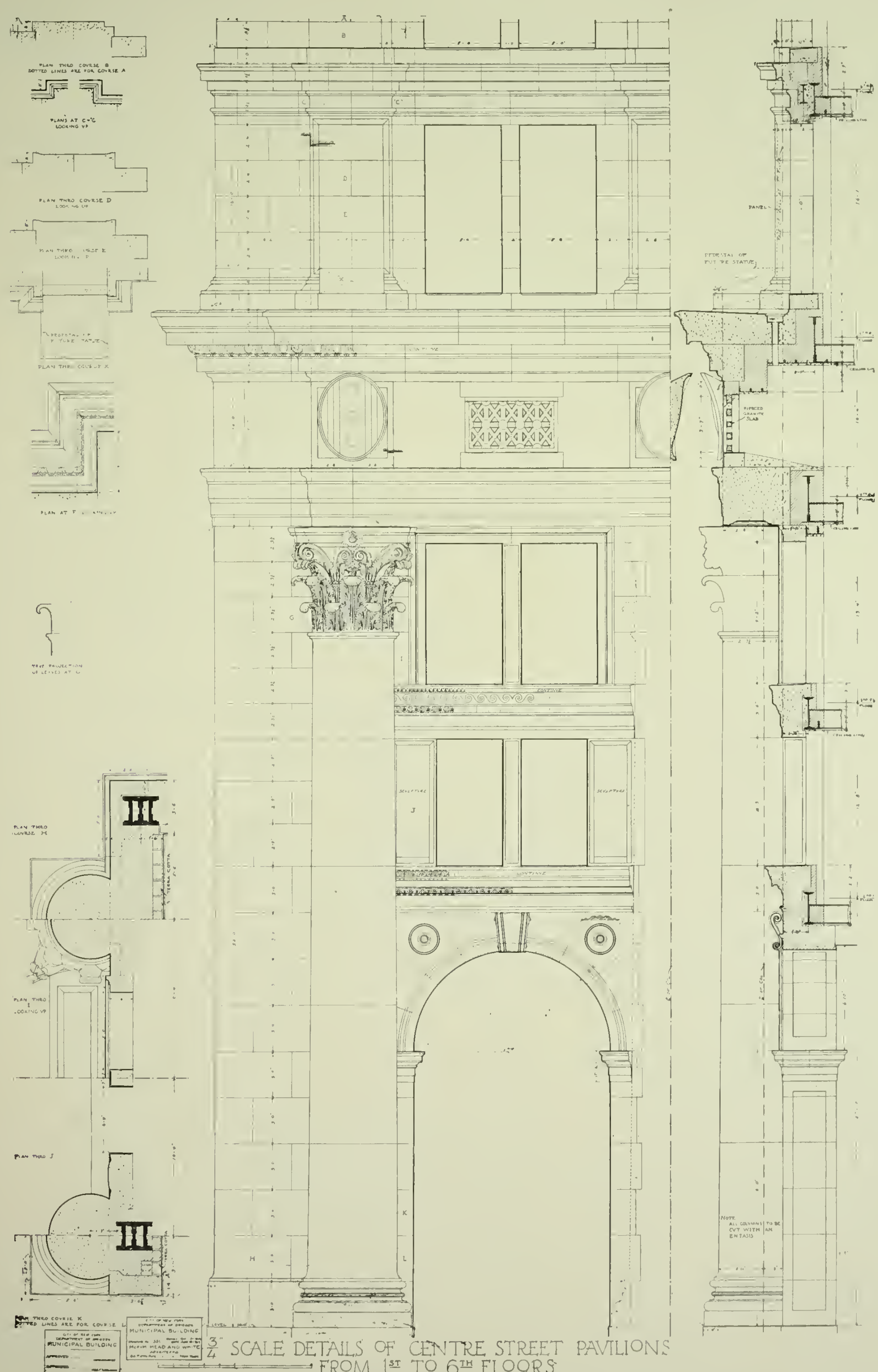
But we are all interested in the eternal question of cost of production, and it would seem reasonable for the profession to adopt methods of manufacture that will bring down the cost of production without turning the offices into factories.

In most architects the artistic temperament predominates and it is an uphill fight against that rather disorderly quality. Most of us want to do decent work with a personal touch; how to do that and have something left over to meet our personal obligations is one of our biggest problems. But if we are artists first, we must, in these ultimate days, be also business men. We have grave responsibilities in the expenditure, to the best advantage, of our clients' money, the safeguarding of their interests in a hundred ways, and if we are too artistic to be business-like we can hardly hope to retain the respect and confidence of the business public that builds. It seems to me that a little simple systematization of our work will help us to serve it better.

The series of working drawings will be completed in the August issue with reproductions of several interesting drawings from the offices of the Supervising Architect of the Treasury Department and C. B. J. Snyder.

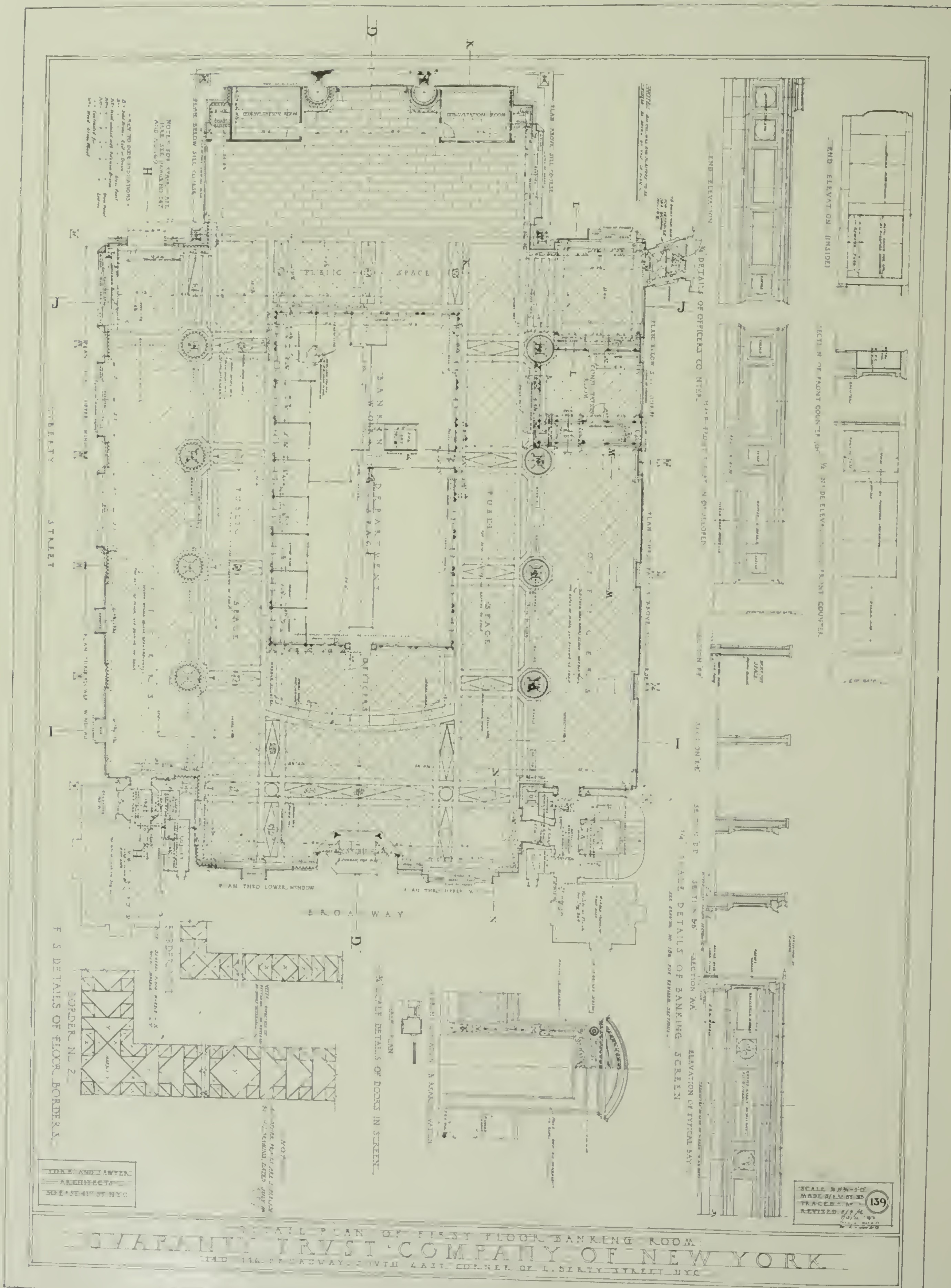


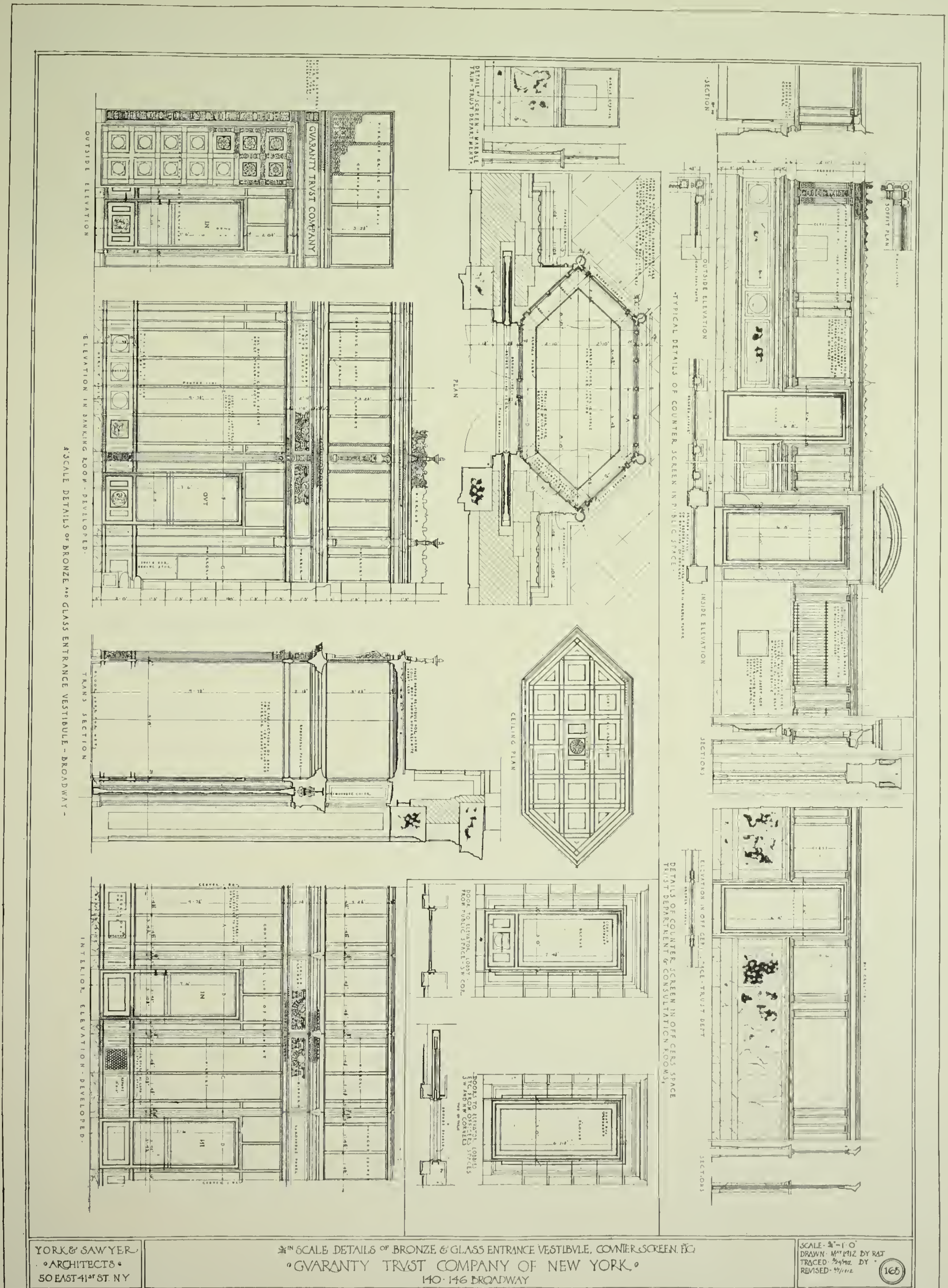
THE MUNICIPAL BUILDING, NEW YORK CITY.
McKim, Mead & White, Architects.



DETAIL—THE MUNICIPAL BUILDING, NEW YORK CITY

MCKIM, MEAD & WHITE, ARCHITECTS


DETAIL PLAN OF FIRST FLOOR BANKING ROOM
GUARANTY TRUST COMPANY OF NEW YORK
BROADWAY
PUBLIC SPACE
BANKING DEPARTMENT
OFFICERS
CONSULTATION ROOM
END ELEVATION
DETAILS OF BANKING SCREEN
DETAILS OF FLOOR BORDERS
BORDER No. 2
DETAILS OF DOORS IN SCREEN
139


OUTSIDE ELEVATION
GUARANTY TRUST COMPANY
ELEVATION IN BANKING ROOM - DEVELOPED
¾" SCALE DETAILS OF BRONZE AND GLASS ENTRANCE VESTIBULE - BROADWAY -
TRANS SECTION
INTERIOR ELEVATION - DEVELOPED
PLAN
CEILING PLAN
TYPICAL DETAILS OF COUNTER SCREEN IN P. BLDG SPACE
SOFFIT PLAN
SECTIONS
INSIDE ELEVATION
DETAILS OF COUNTER SCREEN IN OFFICERS SPACE TRUST DEPARTMENT & CONSULTATION ROOMS
YORK & SAWYER
ARCHITECTS
50 EAST 41ST ST. N Y
¾ IN SCALE DETAILS OF BRONZE & GLASS ENTRANCE VESTIBULE, COUNTER SCREEN, ETC.
GUARANTY TRUST COMPANY OF NEW YORK
140 - 146 BROADWAY
SCALE - ¾" = 1' 0"
DRAWN - MAY 1912 BY RAT
TRACED -
REVISED -
165

The Perkins Institution and Massachusetts School for the Blind at Watertown, Massachusetts.

R. Clipston Sturgis, Architect.

THE problem presented to the architect was a complete group of new buildings for the two departments of the Institution previously housed in two separate groups, one in South Boston and one in Jamaica Plain. There were three main divisions of the problem: first, the upper school; second, the lower school; and third, the buildings common to both. The upper school required accommodation for about one hundred and sixty pupils demanding three separate units: first, the school and administration building; second, the living quarters for the girls; and third, the living quarters for the boys. The lower school required accommodation for about one hundred and twenty children, with the living quarters and school rooms in close relation to each other and with two general meeting rooms in addition. The buildings to serve both these branches of the Institution were to consist of a Director's House, a small hospital and dispensary building, and the power plant.

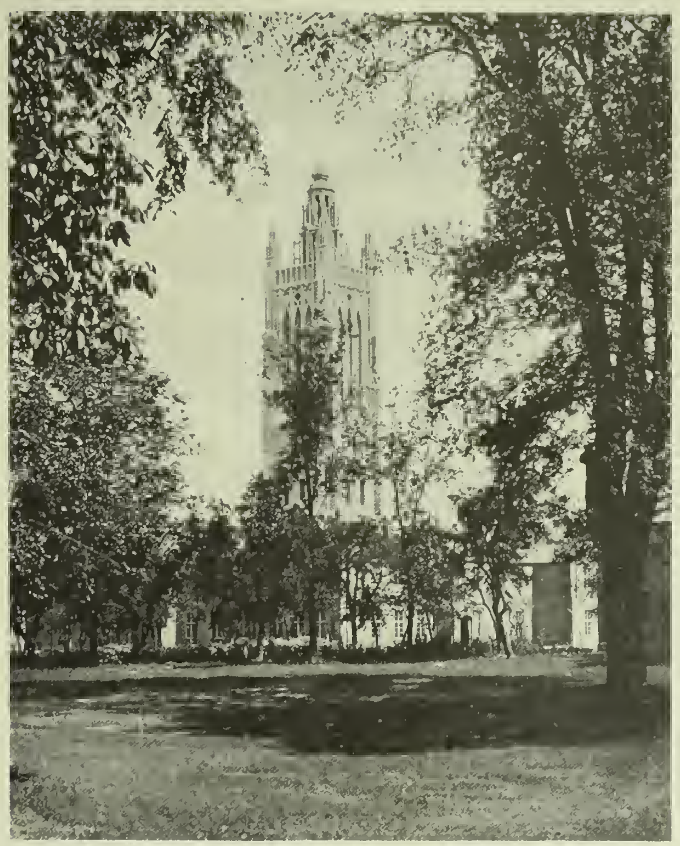
GROUP PLAN.

The principle governing the housing of the children was a very important factor in determining the scheme of the plan. In other institutions of the kind, as for instance at Overbrook, Pa., the dormitory plan was adopted and there the school departments as well as the living quarters were grouped under a single roof. Here the cottage system was adopted as the underlying principle and this involved subdividing the children into relatively small groups, giving to each group an independent, complete cottage with its bedrooms, living rooms, dining room, and service, and tending to create as much as possible the quality of the home. In the upper school there are four cottages for the girls and four cottages for the boys, each containing about twenty pupils with a matron, three or four teachers, and the necessary servants, the latter reduced to a minimum since the children are called upon to do a considerable amount of the daily work for themselves, such as keeping their rooms in order, helping at the table and in the serving rooms, and in keeping their cottage clean. The lower school consists of four cottages with about thirty younger children in each cottage, with their attendant teachers and a larger complement of servants since the younger children do less of the housework. In the upper school these cottages are entirely separated from the school building, while, as noted above, in the lower school the living quarters are more closely allied to the school rooms.

Another fundamental principle underlying the plan was the necessity for the segregation of the sexes. In the lower school the two cottages for the boys and the two for girls are practically independent. In the upper school, the girls and boys each have direct access from their cottages to their respective portions of the school building. Further than this, within the school building itself, the school rooms for the boys and girls are kept completely separated, and the common rooms, such as the museum, the main assembly room, the smaller morning assembly room, and the swimming pool and gymnasium, so located as to give access for the boys and girls without any crossing of the line of approach. Separate playgrounds have been provided for the boys and the girls adjacent to their respective cottages in both the upper and the lower schools; and again the Hospital with its dispensary is so located as to give independent approaches for the boys and girls to their two entrances to the dispensary, as well as independent entrances to the four isolation wards.

The Director's House had of necessity to be in close contact with the various units, and still give him some degree of isolation for his family life. The power house, housing all the domestic services for the complete Institution so far as main supplies are concerned, had to be so located as to serve readily, through a tunnel system, all the independent cottages with their daily needs, and also fulfil the requirements of the domestic engineering services. The power house contains a refrigerating plant and cold storage rooms; opportunity for the receipt, storage, and distribution of all supplies; boiler and engine rooms, carpenter shop, laundry rooms, bake shop, and living accommodations for about fourteen men. It also houses the "Howe Memorial" printing plant, which serves not alone this Institution, but other institutions throughout the country, and indeed the world to a certain extent as well.

The site of the Institution comprises a forty-acre lot in Watertown, bordering on the Charles River. It is very largely level, sloping off towards the river, with steep banks and terraces which swing back to form a small valley near the middle of the boundary line. An existing driveway, bordered by splendid trees for half its length, has been used as an approach from the west. Along the west boundary a fine row of lindens screen the lot from the adjacent dwellings, and there are as well several small orchards. An attractive feature is a small natural pond near the middle of the property.

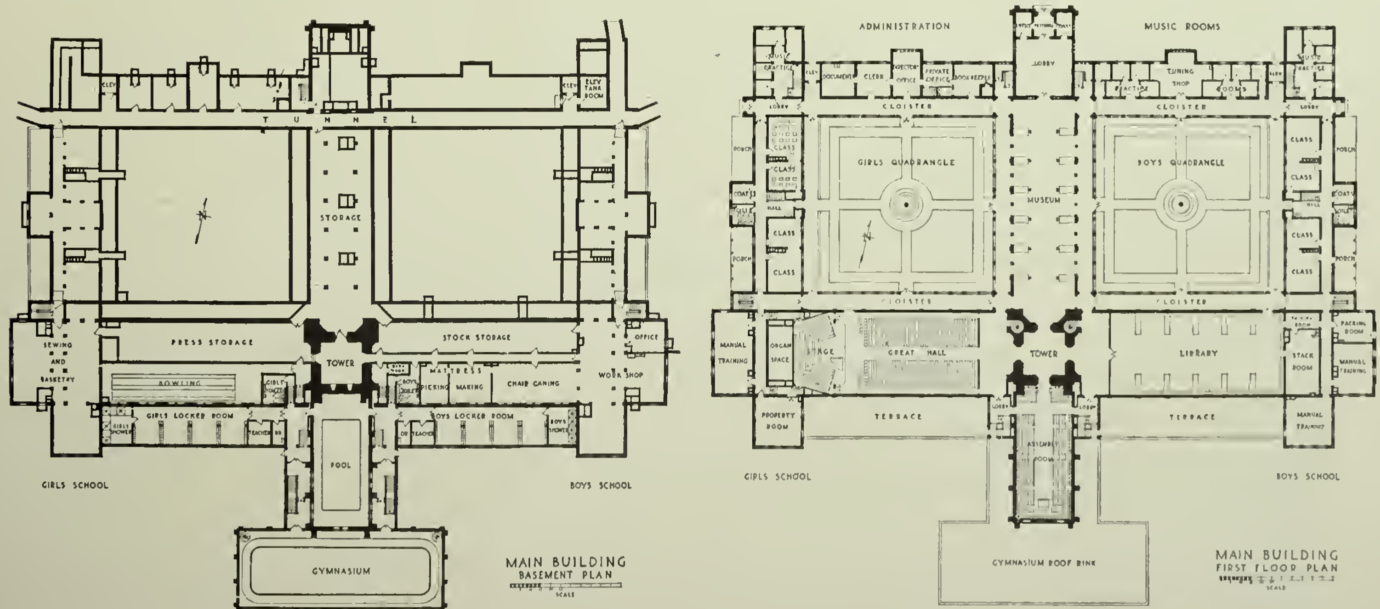


THE CENTRAL TOWER.

The general plot plan of the group of buildings as developed shows how the upper school building and cottages form a long group parallel to the river frontage, with the existing driveway leading directly to the main entrance of the school and administration building. The Director's House was placed at one end of the group of girls' cottages, and so that the Institutional buildings would not interrupt the view of the river. Beyond this, in the southwest corner of the lot, is the power house. A service tunnel extends under the long axis of this group of buildings, with a branch tunnel from the end of the Girls' Close northward to the Kindergarten or lower school building.

The Hospital occupies a position on the curve of the driveway near the main school building, and is fairly centrally located in reference to the Boys' Close, the Girls' Close, and the Kindergarten.

The cottages for the boys and the girls of the upper school developed into two groups which, for purposes of illustration, might be compared to the Vicars' Close at Wells in England. On each side of a central walk two cottages, stretched into a long building, run more or less east and west, admitting of southern exposure for all the living and sleeping rooms, with the toilets and wash rooms, stairs and corridors on the northerly side. Each pair of cottages on each side of the Close meets in a party wall,



BASEMENT AND FIRST FLOOR PLANS OF MAIN BUILDING.

THE HOSPITAL

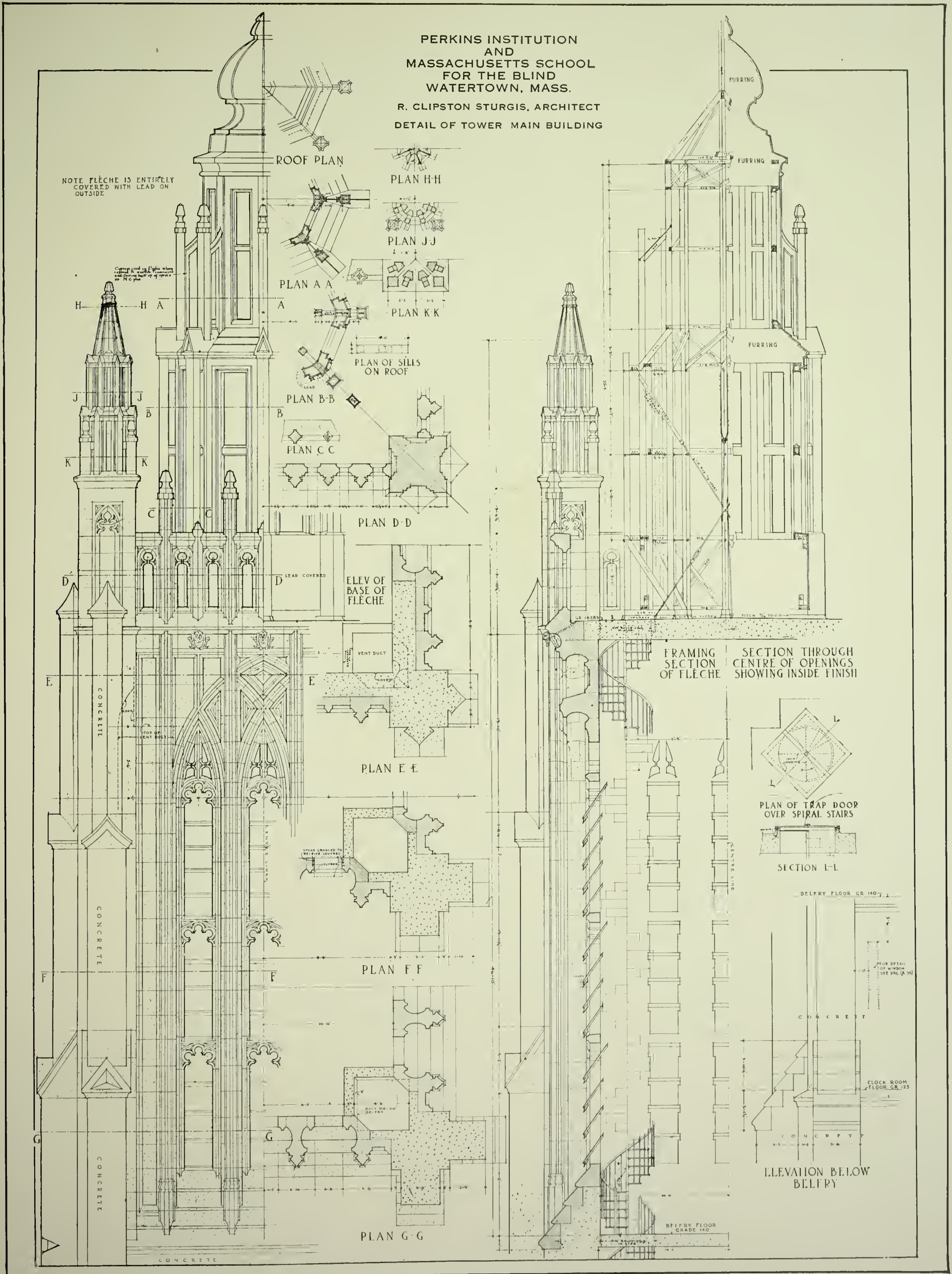
THE DIRECTOR'S HOUSE

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.

R. CLIPSTON STURGIS, ARCHITECT

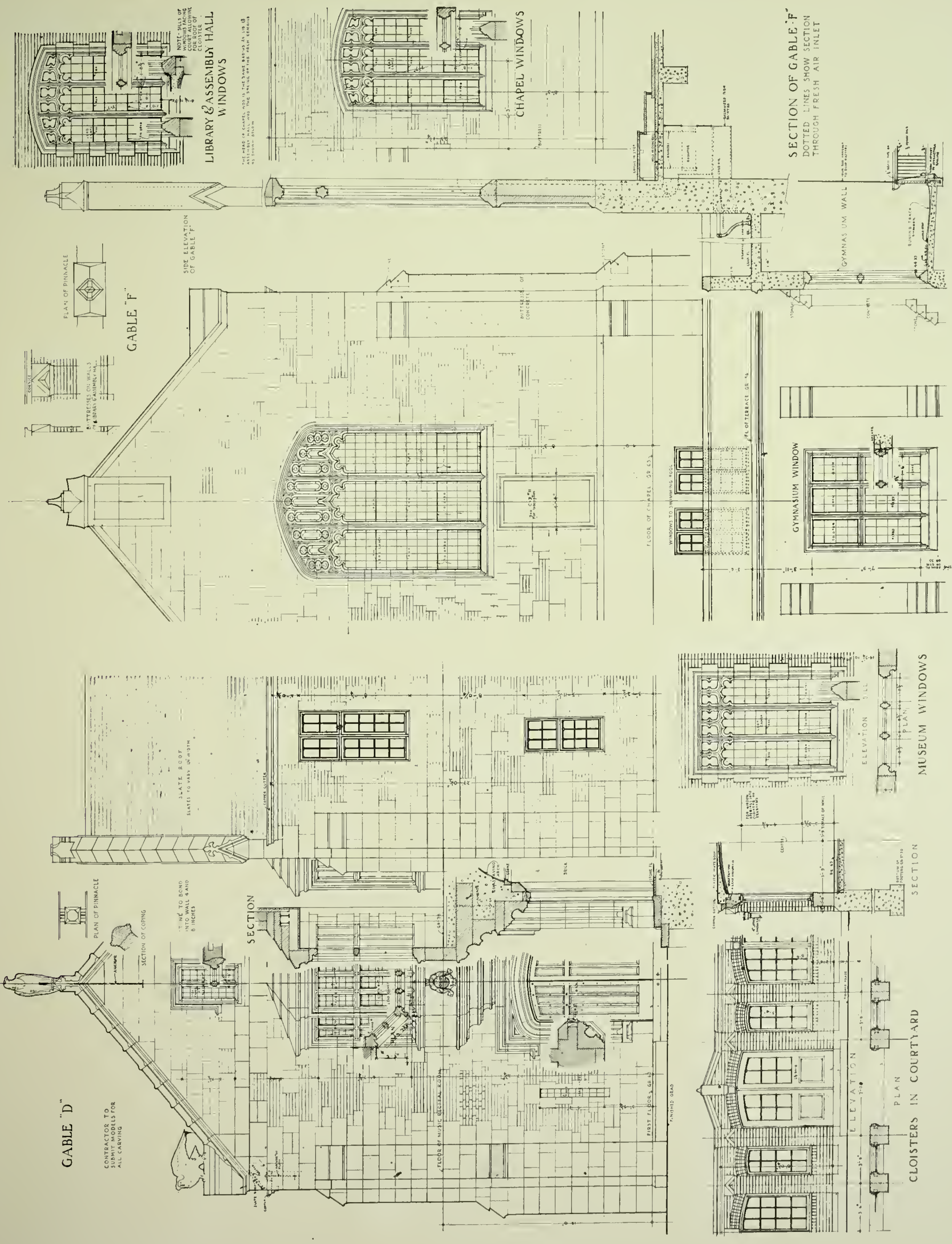
TOWER, MAIN BUILDING

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.
R. CLIPSTON STURGIS, ARCHITECT


PERKINS INSTITUTION
AND
MASSACHUSETTS SCHOOL
FOR THE BLIND
WATERTOWN, MASS.
R. CLIPSTON STURGIS, ARCHITECT
DETAIL OF TOWER MAIN BUILDING
NOTE FLÈCHE IS ENTIRELY COVERED WITH LEAD ON OUTSIDE
ROOF PLAN
PLAN H-H
PLAN J-J
PLAN A A
PLAN K K
PLAN OF SILLS ON ROOF
PLAN B-B
PLAN C C
PLAN D-D
LEAD COVERED
ELEV OF BASE OF FLÈCHE
VENT DUCT
PLAN E E
PLAN F F
PLAN G-G
CONCRETE
CENTRE LINE
FURRING
FRAMING SECTION OF FLÈCHE
SECTION THROUGH CENTRE OF OPENINGS SHOWING INSIDE FINISH
PLAN OF TRAP DOOR OVER SPIRAL STAIRS
SECTION L-L
BELFRY FLOOR GR 140
CLOCK ROOM FLOOR GR 125
BELFRY FLOOR GRADE 140
ELEVATION BELOW BELFRY

DETAIL OF MAIN BUILDING

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.
R CLIPSTON STURGIS, ARCHITECT



MAIN BUILDING — EXTERIOR DETAILS

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.

R. CLIPSTON STURGIS, ARCHITECT

CORNER OF MAIN BUILDING

EXTERIOR OF GYMNASIUM AND ASSEMBLY ROOM, MAIN BUILDING

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.

R. CLIPSTON STURGIS, ARCHITECT

ASSEMBLY ROOM, MAIN BUILDING

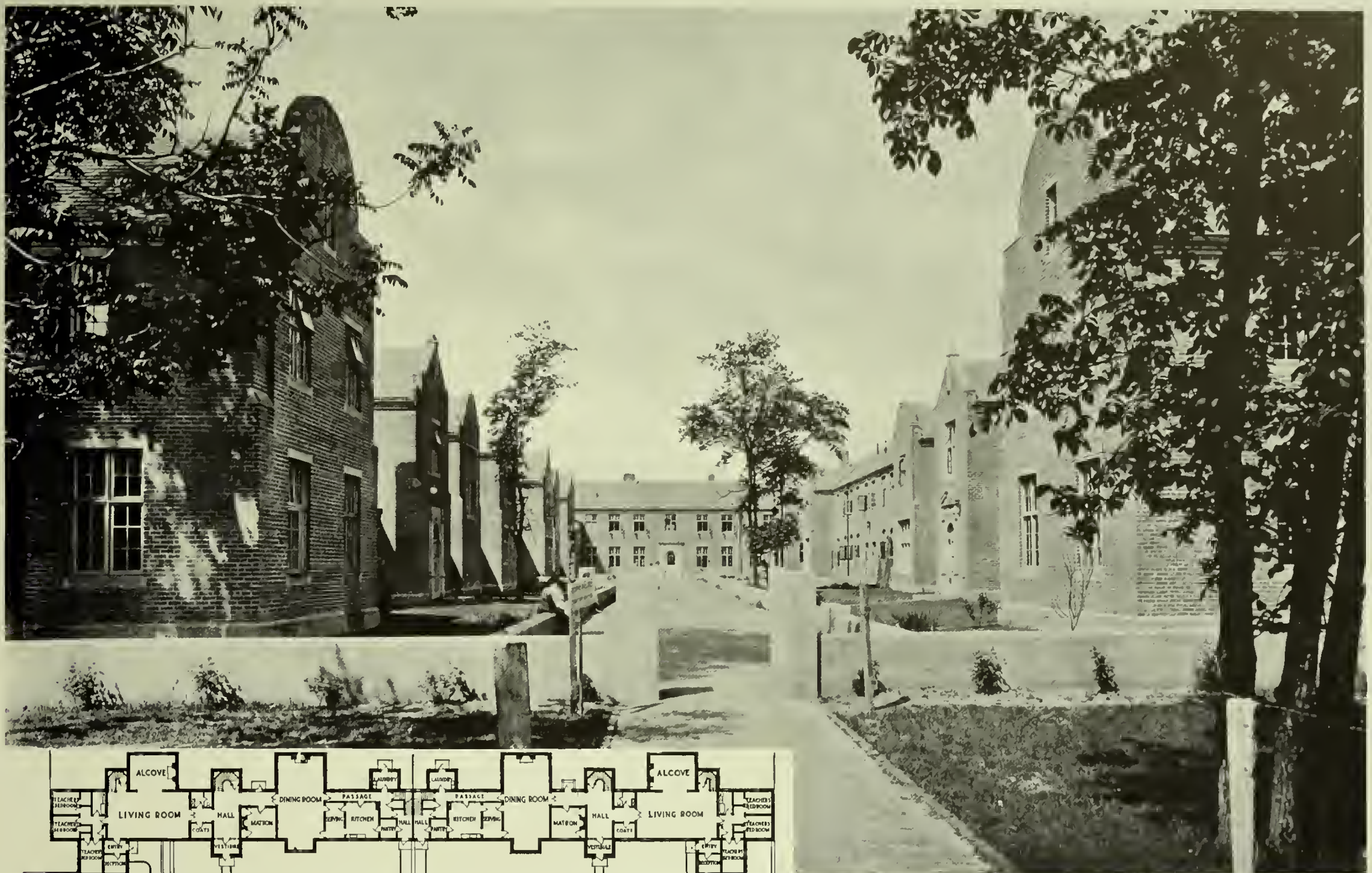
MUSEUM, MAIN BUILDING

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.

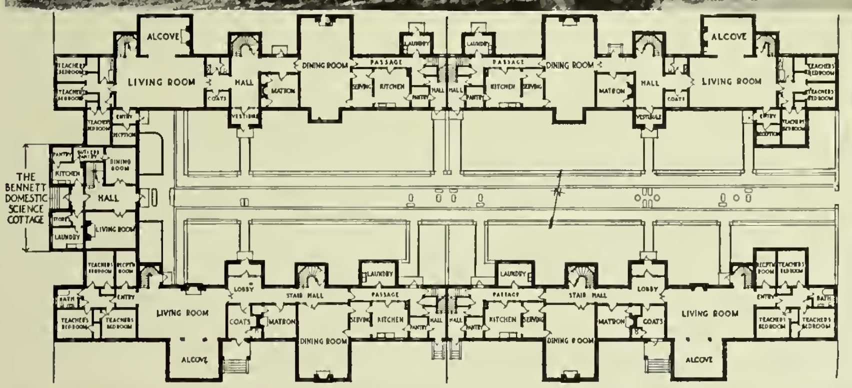
R. CLIPSTON STURGIS, ARCHITECT

DETAIL OF KINDERGARTEN BUILDING

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.
R. CLIPSTON STURGIS, ARCHITECT



GIRLS' CLOSE

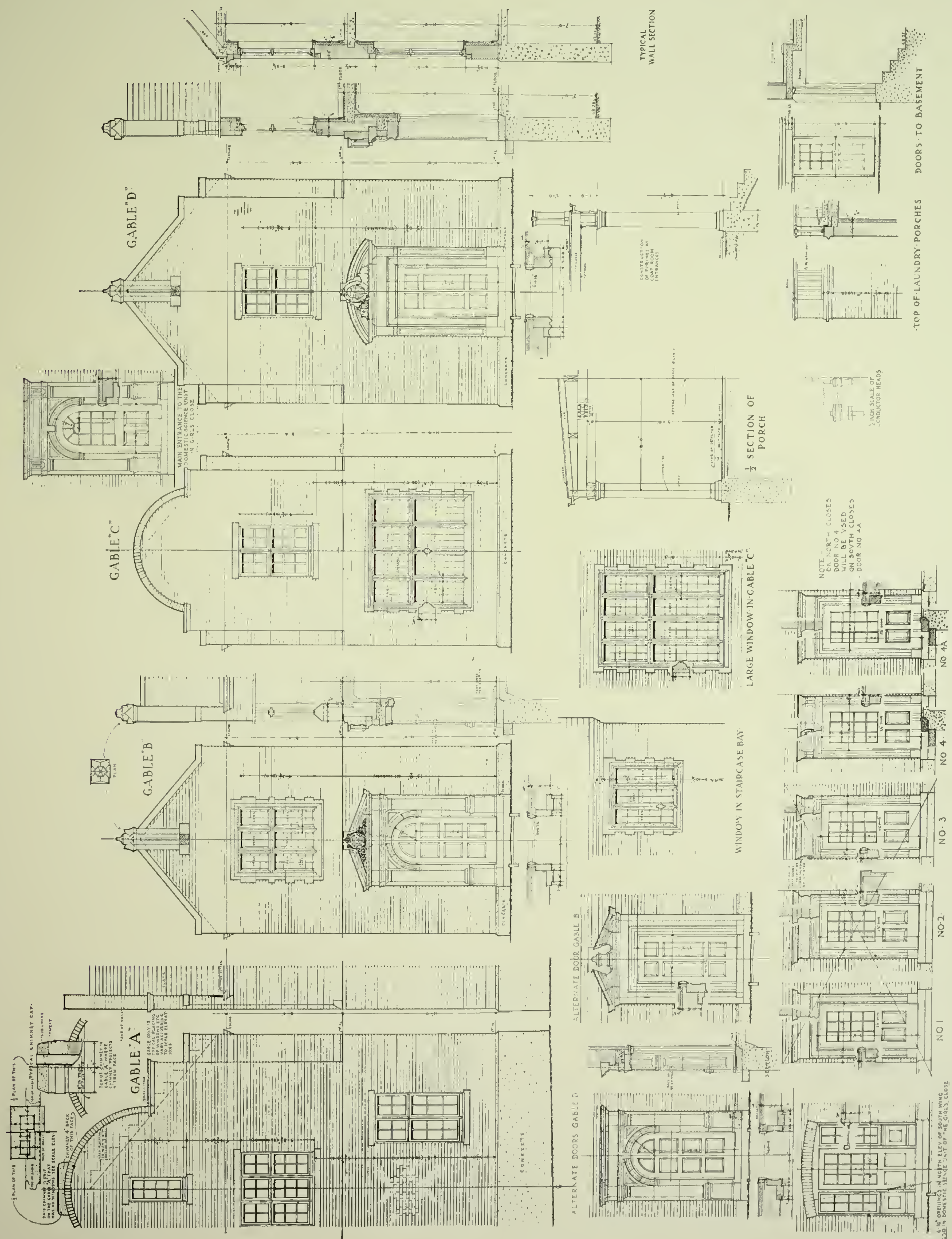


FIRST FLOOR PLAN, GIRLS' CLOSE

DETAIL OF COTTAGES, GIRLS' CLOSE

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.

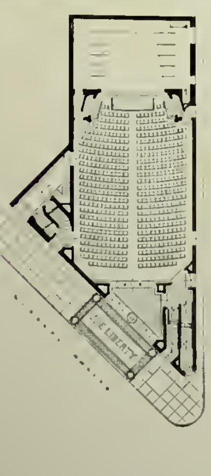
R CLIPSTON STURGIS, ARCHITECT



BOYS' AND GIRLS' CLOSE — EXTERIOR DETAILS

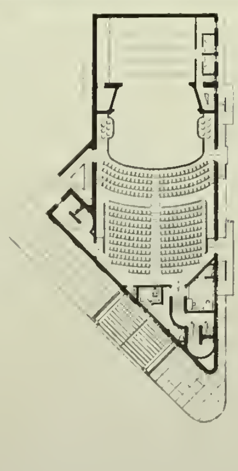
PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, WATERTOWN, MASS.

R. CLIPSTON STURGIS, ARCHITECT



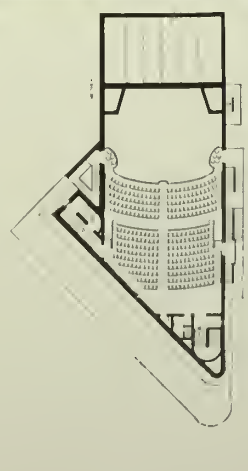
THE LIBERTY THEATRE

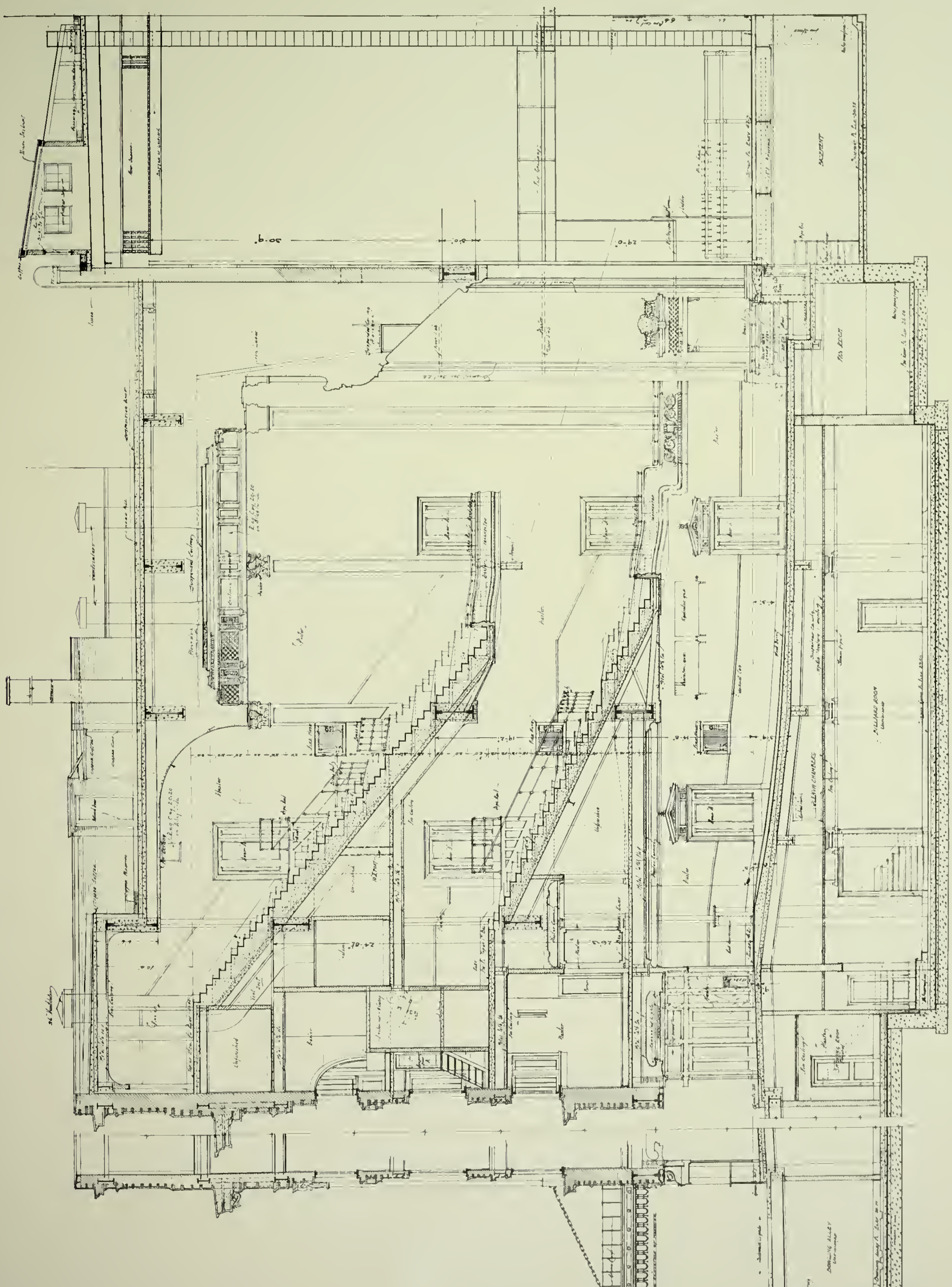
PITTSBURGH PA.



EDWARD B LEE.

ARCHITECT



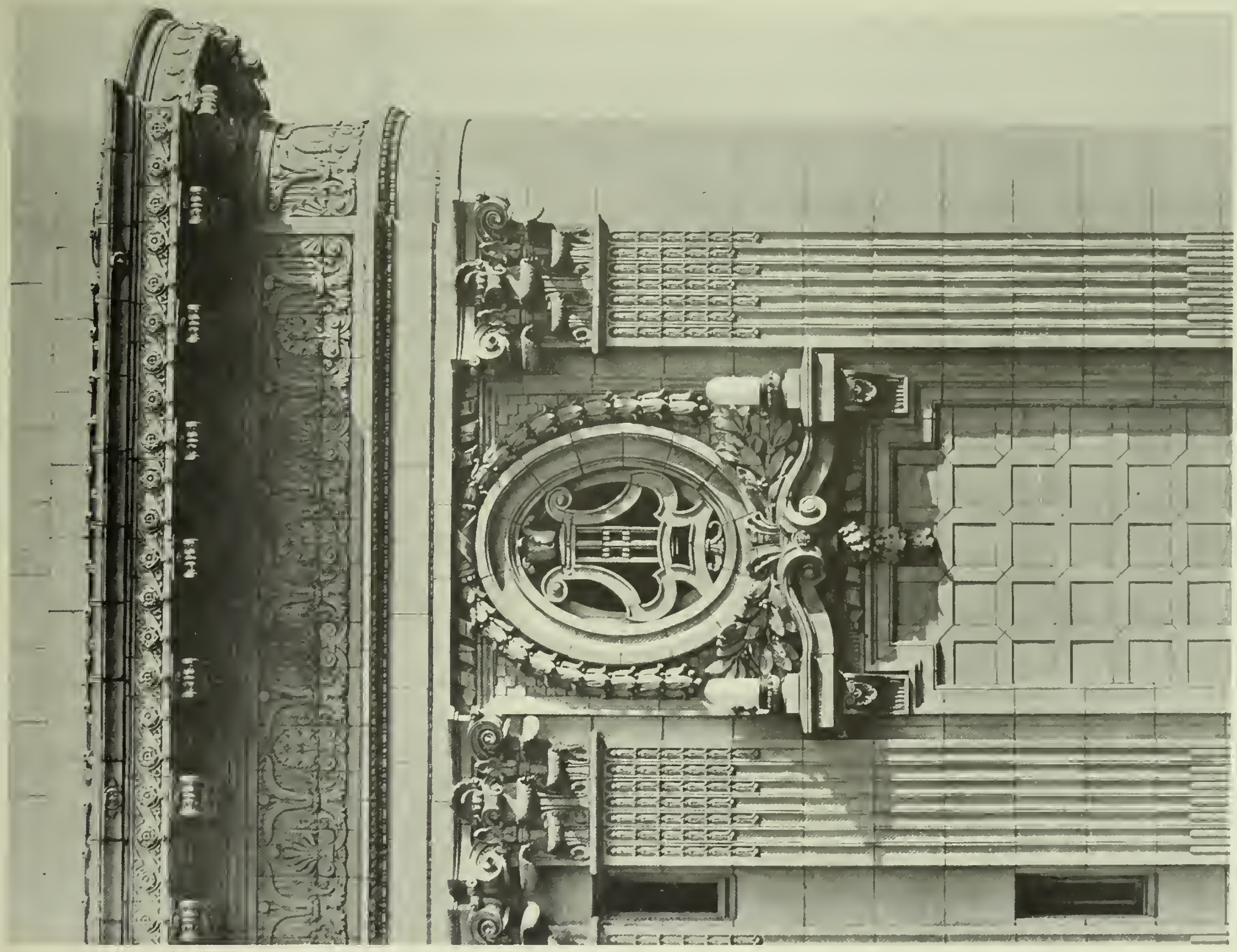


LONGITUDINAL SECTION

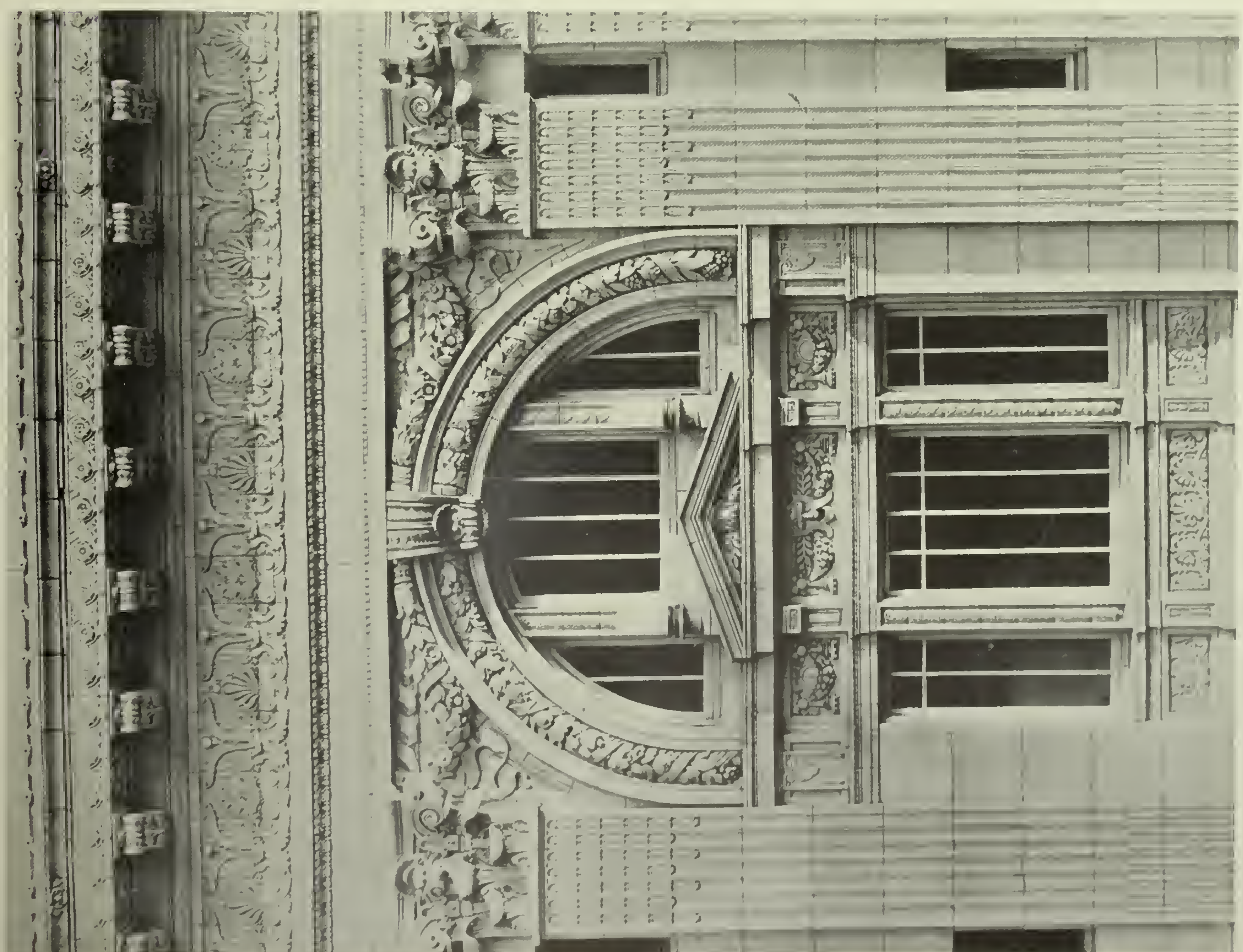
LIBERTY THEATRE BUILDING, PITTSBURGH, PA.

EDWARD B LEE, ARCHITECT

VOL. 22, NO. 7. PLATE 108.



CORNER DETAIL

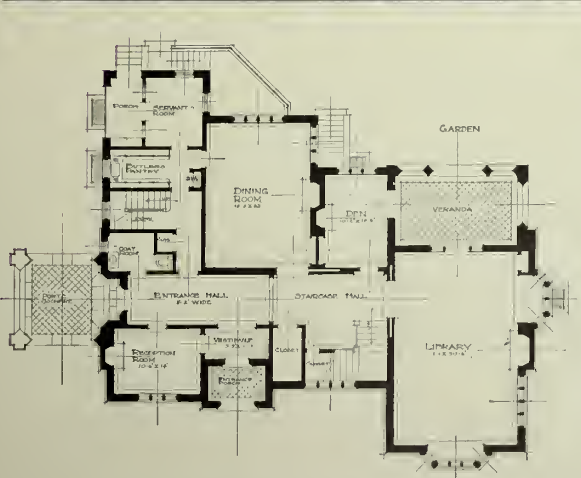


DETAIL OVER ENTRANCE

LIBERTY THEATRE BUILDING, PITTSBURGH, PA.

EDWARD B. LEE, ARCHITECT

HOUSE AT NEW HAVEN, CONN.
MURPHY & DANA, ARCHITECTS

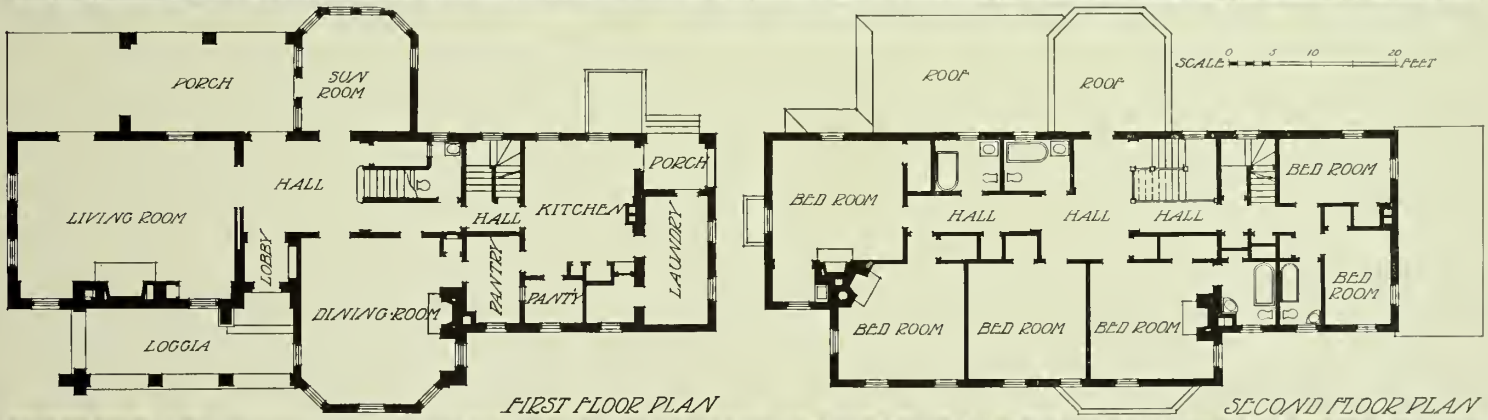


FIRST FLOOR PLAN

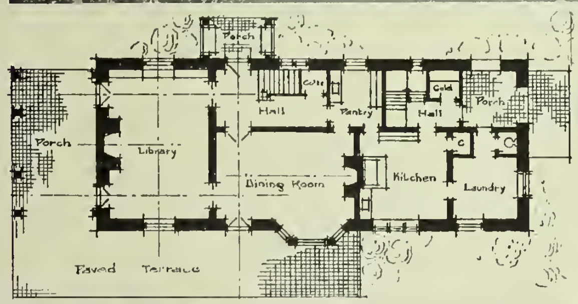
· SECOND FLOOR PLAN ·

HOUSE AT NEW HAVEN, CONN.
MURPHY & DANA, ARCHITECTS

THE BRICKBUILDER.
VOL. 22, NO. 7. PLATE 111.



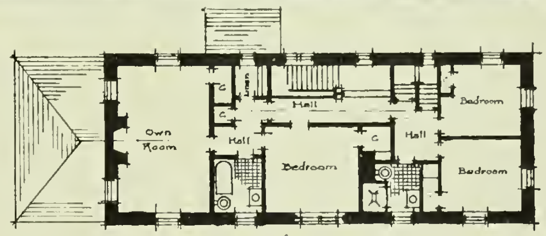
HOUSE AT CHESTNUT HILL, MASS.
F. MANTON WAKEFIELD, ARCHITECT



HOUSE AT
ST. MARTINS, PA.

(EXTERIOR WALLS OF TERRA COTTA HOLLOW TILE)

EDMUND B. GILCHRIST, ARCHITECT



Second Floor Plan

Practical Details in Hospital Planning and Equipment.

PART II. — GENERAL CONSIDERATIONS — *Continued.*

BY M. E. McCALMONT, R.N.

THE due and proper consideration of the staff is undoubtedly the architect's greatest difficulty and a little analysis of the situation may not come amiss.

It must be acknowledged at the start that doctors are not as a professional class good business men or executives ; and very fortunately not, for if they were they would probably not be good doctors, and the world has a great need of them as such. The few and brilliant exceptions but prove the rule. Generally speaking, however, it is psychologically true that the practical temperament which impels a man to a business career is widely different from the temperament which impels a man to the medical profession. Their modus operandi is diametrically opposed. The business of the one is commercial, in brief, to "get" ; the business of the other is more or less altruistic, in short, to "give." The success of the first depends upon method and system, the life of the other by its very nature precludes all system and regularity. We, therefore, very naturally find the majority of doctors unbusiness-like, impractical and with not a very keen sense of the utilitarian ; that they are gullible and easily persuaded into a championship of impracticable propositions, finds ample testimony from the army of agents, promoters, etc., who single them out, in company with our worthy ministers, as their first and easiest victims !

This, however, is the architect's opportunity. They *are* easily persuaded. Let the architect do the persuading. Usually he approaches the staff with the outward appearance, if not the inward spirit, of humility, and a modest assumption of ignorance on all the special problems of operating rooms and kindred departments. Let him change his procedure. Armed with real facts, let him approach the staff with an air of great knowledge and greater conviction, and when a surgeon wishes to have installed an antiquated sink because it is the kind he has always used, let the architect put before him the most modern thing with every argument pro and con, and such an array of authority that discussion would seem absurd. Recently the writer knew of an instance where a surgeon refused to have a table with a modern hydraulic base, because it was so constructed that he could not wind his leg around it while operating ! In a western hospital built and equipped solely by doctors, in addition to exclusive furnishings of wicker (!) chairs, the beds in the private rooms had hand-painted roses on them ! It is difficult to imagine such enormities, yet they are facts.

In another very beautiful hospital, the private room furnished by the medical staff contained the only *low* bed in the hospital, — an impossibility to work over.

These impractical tendencies are not so apt to creep into the actual hospital construction, but frequently are allowed to spoil the hospital planning. Undoubtedly the doctors must be consulted in regard to the special departments, operating room, laboratory, x-Ray, morgue, etc., but wise is the architect who enters the fray armed with facts.

With utility rooms and housekeeping departments, it is folly to consult the majority of physicians. Possibly nine-tenths of the workers of our hospital are women. It is the intelligent worker who should have the best knowledge of what is required for his or her work, to which may be answered, "Is not the surgeon the *worker* in the operating room?" Yes and no. His work is all *prepared* for him. It centers about one table. He has absolutely no idea of how many needless steps have been taken because of the inconvenient arrangement or planning. If his operations go smoothly, he thinks he has an ideal operating room and advises all his friends to build one just like it, without at all realizing that perhaps a difference of planning, a better arrangement of plumbing fixtures, etc., might lessen the working force in that department by one or more persons, as well as make the work less exhausting for all.

Practically every bit of work that is related to or is dependent upon the proper planning of a hospital is done by the women workers — yet that same planning is generally dominated by a group of impractical men. And so we find, as in a recent most costly and beautiful hospital containing hundreds of dollars worth of unnecessary fixtures, not a porter's closet in the entire building ! Throughout the day the beautiful marble-lined bath rooms were disfigured by a motley array of brooms, pails, and mops — actually not a place to get them out of sight, much less economically care for them.

Dozens of other similar oversights could be enumerated, but the point is certainly sufficiently illustrated.

Location, Orientation, and Type.

It is an amazing fact that many of our most recent hospitals are built in the noisiest and dirtiest sections of the town or city.

It is natural for sick or wounded animals to go off to a shady and quiet place to recover. This is also the natural instinct of man. Yet with a horrible disregard for such natural tendencies, we build our hospitals in the noisiest possible sections, — street cars clanging past at all hours of the day and night ; teams rattling over cobblestones ; dust blowing in the windows ; the noise of playing children in the street.

Surely one of the first duties of the architect, if he is truly interested in sane and humane hospital construction (and he should not have the temerity to plan a hospital if he is but commercially rather than humanly interested), should be to insist upon a reasonably suitable occasion.

Under no consideration should it be on a street where trolley cars pass. Special city or town ordinances should protect the patients from the noise of heavy drays, etc. The most noiseless form of pavement should be used in the street, cobblestones or similar noisy materials should be absolutely eliminated. The surrounding streets should be known and respected as "hospital streets."

The noise without is supplemented by noise within. To be sure, it is a matter of common agreement that a normal amount of noise is not undesirable. Whispering attendants, going about on tiptoe, would quickly produce an atmosphere as inimical to recovery as excessive noise. But the hospital is yet to be found where there is anything approaching a "deadly quiet." On the contrary, helpless and acutely sick patients are obliged to hear the distressing sounds of childbirth, delirium tremens, nausea from anesthetics, crying babies, etc., to a truly brutal degree. No architect is doing his duty unless he insists that at least the nursery, delivery room, isolation rooms, and a reasonable number of recovery rooms are made absolutely sound-proof. Also that elevators, dumb waiters, etc., should be enclosed in sound-proof shafts. But it seems absurd to make a plea for a few rooms only, when the entire hospital should be sound-proofed.

The architect who is the first to construct a modern hospital that is truly sound-proof deserves and will probably obtain a national reputation!

Were you ever acutely sick? If so, did you not want to be in a quiet and darkened room? What are we doing with the acutely sick in hospitals? We put them in wards flooded with sunlight and full of cases of all descriptions; frequent visitors; and all manner of noises within and without. It is only when we are convalescent that we want floods of sunshine and can feel tolerant of many people. Yet, in our present fad for orientation, we have almost forgotten that sunlight is most undesirable for many cases, and that quiet and a moderated light are at times essential factors in recovery.

So, too, have we rather blindly followed the European idea of scattering the various one, two, and three-story pavilions of the hospital all over the landscape.

The excessive cost and exhausting labor of administering such institutions has been entirely lost sight of. There are many more arguments against than for. Certainly we have a better view, better air, less dust and less noise as we build up. The most forcible argument against building up, rather than spreading out in the low pavilion style, is the danger in case of fire; but our modern construction, particularly in hospitals, is so nearly fireproof as to weigh lightly as an argument against the many advantages gained from higher buildings.

Ventilation and Lighting.

Both of these subjects are sufficiently important for special articles. Here they can only receive general comment, though special lighting fixtures for hospitals will be considered at length in a later article.

It is believed that the partial and, in many cases, the complete failure of the various ventilating systems tried out in our poor exploited hospitals are gradually but surely forcing architects and hospital workers to the conclusion that natural methods of ventilation are, after all, the safest and best. The writer has been in so many hospitals where these systems are found out of order, and has so frequently emerged with a racking headache and almost gasping for air from inspections of hospitals where such systems were supposed to be in working order, that with the utmost earnestness it is urged that the natural methods be not disregarded, even if an artificial ventilating system is contemplated.

In a recent visit to a new hospital occupied but a few months, the ventilation was noticeably bad, and inquiry made regarding it, to which one of the members of the building committee replied with evident chagrin that the electric fans operating the system made so much noise that the patients could not stand it!

In another and very large hospital where no expense had been spared for construction and equipment, a most elaborate ventilating system was installed, with "water-washed air" and many other wonderful "talking points." On minute questioning, however, even the engineer confessed that when the wind shifted in a certain direction the system failed utterly.

On the day of the writer's visit the air was so noticeably bad in one section of the hospital that inquiry was made as to why the windows were all closed; to which the nurse replied that all the windows were equipped with key-locks, the keys of which were carried by the Sisters (this was a Catholic institution) and that the windows could only be opened by going to the Sister for a key and obtaining permission to open the window. With such regulations it is easy to imagine how much really fresh air entered that hospital. Yet, in many other respects, it was most excellent and very modern.

As a matter of fact, to have windows equipped with lock and key is rather a good idea for hospitals, but it should be so arranged that the upper sash at least could be opened readily.

Lighting.

There is a no more neglected subject in hospital construction than the problem of lighting. The A. B. C. of the subject has scarcely been formulated. The nervous irritation, conscious or unconscious, which results from a well person being obliged to face directly for any length of time a glare of light, must become at least a subconscious agony in the case of sick persons. Yet for years we have placed glaring ceiling lights in our hospital wards, unshaded center and wall lights in the private rooms, sublimely unconscious or cruelly indifferent to the acute discomfort of and pernicious effect upon the patient.

The comparatively new system of indirect lighting is a cause for thankfulness in many quarters; certainly it is an unmitigated blessing to the hospital patient. Various details and description of fixtures thus far worked out as a partial solution of this vital problem will be discussed in a later article.

Planning and Equipment.

As we have stated previously in this article, the problem of organization, management, and equipment are too closely related to the planning and construction to be disassociated.

We have talked, read, discussed, and *practised* rounded corners and angles, flush surfaces and absence of unnecessary projections until we now feel that it is almost a personal affront to mention the subject. The most poorly planned hospital of recent construction can brag of these features which were radical ten years ago, while the most ignorant architect, to-day, would scarcely dare install paneled walls or doors. And yet, though years of time and effort have been spent in arriving at this stage of education, we to-day see hospitals where thousands of

For example, in a contract which was properly entered into by a city commissioner, there was a clause requiring the architect to be subject to the orders and directions of the commissioner or his engineer, and that if any orders or directions be given the architect and they were not carried out, then the city should have the power to terminate the contract by written notice. There was also a contract clause specifying that all changes or modifications of the drawings, etc., must be in writing. After the architect had completed his working drawings and specifications ready for bidding purposes, but before bids were received, the commissioner, upon the advice of his engineer, decided to make some very radical changes both in the design of the steel construction and in the inside finish. This decision was given to the architect in a conference and he made new working drawings and new specifications to cover these changes. At the trial there was no serious question but what the architect had done this extra work and that he was entitled to pay for it, but the trial justice in charging the jury stated that since the contract required all changes, etc., to be ordered in writing, which was neglected in this instance, there could be no recovery by the architect. This instruction to the jury was given also in face of the fact that the commissioner had the power to enter into contracts orally with any architect, and there was no question but what he had an appropriation to pay for this extra work. As there was a partial recovery on another part of the case, no appeal was ever taken, so it cannot be stated what the appellate court would have done. However, this is an example of the protection afforded municipal corporations when they are sued, and there is no question in my mind but what the result would have been different had the defendant been any one else.

Changes in the working drawings or details made during the progress of the work may or may not be extra work, depending largely upon the circumstances. It has been a custom for most architects to do a certain amount of such changing work without making extra charges, although they know they are entitled to an additional fee based upon the cost of the labor involved in such changes. What might be considered the leading case on this matter involved the following facts: An owner contemplated changes in a building at a cost of $5,400. After some conversations the architects offered to do the work for a flat sum of $500. The work had progressed and, in connection with other improvements and changes, cost $50,000. The architects sent in their bill based on ten per cent of the total cost, and the owner refused to pay, claiming the fee was $500, and that there was no contract or agreement for any other work or compensation. The decision was that the owner must pay the architects' bill as rendered and proven at the trial. The grounds of the decision were that the owner had let the architects go ahead with the work, that he had practically agreed to a ten per cent commission for the work originally contemplated and ordered, and there was expert testimony that such percentage was the reasonable value of the work. In another case, where extra plans were required and the architect was allowed to recover for such extra work, it was suggested, in stating the fact that the recovery should be the reasonable value, that the architect must not make the cost more than necessary.

Other Extra Work. The reported cases show that an architect has been allowed extra compensation for such services as making up a lumber bill, settling accounts between employees on the work, acting as an arbitrator, qualifying as a witness, attending in court as a witness or expert, etc. On the other hand, in one case it was held that time used consulting an expert during the preparation of insulation plans, and also that time used in the actual preparation of such plans, was not extra; also that where the architect's brother was put on the job as superintendent or clerk of the works, there could be no extra recovery for his services; that these were all part of the contract work and were paid for in the percentage payments. Just lately I saw an architect's opinion on this question of extra work wherein he stated that all necessary traveling expenses were usually billed against the owner, and that in all out-of-town work the architect was entitled to extra remuneration for the extra time involved in the superintendence of the work by reason of its distant location. These suggestions do not seem to be sustained by any legal decisions and do not seem to be sound, unless made a matter of contract right. This same opinion also claimed that under the usual statement that all drawings and specifications should remain the property of the architect, an owner should pay for a set of plans if he wanted them. That does not seem a safe suggestion in view of the present law on the subject, which holds that as between the employer and the architect the plans and specifications belong to the owner, unless there is something in their contract to the contrary. In a late case, upon a question of this sort, it was held that an owner could be permitted to prove a general custom of the architect to furnish copies of plans and specifications for use by bidding contractors. It is therefore not advisable for an architect to refuse an owner a set of plans and specifications unless he will pay extra for them.

Recommendations. It is important to remember that there are many ways in which an architect may waive his rights in this matter of extra work and preclude his recovery of payment for it. The employment contract may specify that the architect shall do any and all architectural work required or demanded by the employer in connection with a specified piece of property; it may require work to the satisfaction of the employer in jurisdictions where honest dissatisfaction precludes recovery; it may require extra work to be subject to conditions of written order, of fixed cost, etc., or it may even provide that no extra work will be paid for unless there is a new contract entered into therefor.

In the matter of payment, the architect should know and remember that if he accepts a certain sum in full for his services, or a check which shows on its face or back or by the accompanying letter that it is meant and sent as full compensation to date, or if he signs a release or other paper to the same effect, — all such actions may be disastrous to any later attempt to recover for extra work.

Our considerations then give us the following summary of recommendations: First — have a definite written contract and if possible have the institute or a local society schedule made part of the contract or at least make such document a matter of notice to the employer; second — comply with the contract conditions regarding extra work or, if there are none, then give notice to the employer of such extra work when ordered, with an approximate estimate of the cost; and third — in accepting payment on the contract do not blindly accept contract payments and sign away your rights to compensation for your extra work.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

MR. WARREN PERRY, instructor in Architecture, University of California, in an address upon the "Teaching of Architecture on the Pacific Coast," says: "First — a purely selfish observation — he who teaches learns ten times as much as does he who is taught; therefore, let us one and all start 'ateliers.' I think that this is more true of architecture than of almost any other subject, for it invites to a sublime degree not only a study of the 'Five Orders according to Vignola' — God forbid! — but of humanity — of as many individualists as one has disciples — each one a living bundle of enthusiastic tendencies, good, bad, and indifferent.

"If architecture be not the study of humanity, whatever is it? It means the being prepared (for a stated period each day, in my case) to face a thousand searching questions on the history, theory, and practice of this vast subject, which are being constantly concocted by an interactive group of unfettered and exceedingly restless imaginations. Happy is he who has left a row of conveniently disposed loopholes along the pedagogic path, through which he may slip, on occasion, with small loss of dignity; and, I may add, thorny is the way of him who has been wont to say with firmness, 'Never do this!' 'Always do that!' for he will be tripped headlong over his own foolish phrases, again and again. Also this: A class may forget the name of the architect of the Parthenon, or the principles of Gothic construction, but never will it fail to call to mind a famous building which flaunts itself in the face of one of your 'dont's' or 'always's,' however obscure that one may have been."

THE form of agreement with clients used by Mr. R. Clipston Sturgis and suggested to our readers in the May issue of THE BRICKBUILDER has inspired one of our readers to suggest two points which seem to him incompatible with the form of agreement. We print these with the hope that others will be prompted to discuss this important phase of architectural practice.

The first is that most architects like to do considerable drafting themselves, and some of the practical ones write their own specifications, and unless such an architect places himself upon a salary the cost of the work is not properly computed; and if the architect does draw a draftsman's salary for such services, how can this be explained to the client in the form of agreement suggested by Mr. Sturgis.

In regard to valuing office space in proportion to the time of the draftsman, rather than as to the cost of their services, it is our experience that the least lighted portions of the office are usually assigned to the cheaper men, and that in order to proportion the administrative expense to the time, rather than to the salary, would necessitate valuation of the floor space according to its proximity to the light, etc. Expert accountants inform us that mainly for this reason the proportion is usually made according to the cost of the salary rather than to the time.

ARTISTIC works are not a luxury, they are necessary for the satisfaction of human requirements for culture and enlightenment. Yet all paintings in oil or water colors, pastels, and sculpture that have been produced within the last twenty years are subject to a tariff tax. We know of no American artists who wish to be "protected" from the free interchange of art works between this country and Europe. Section 654 of the Underwood bill, as the House passed it, cuts off the absurd duty. The members of the Senate committee would restore it, and would extend its scope to works produced in the last fifty years. We hope there are no other Senators narrow-minded enough to wish its restoration.

Why a tariff on paintings and sculpture? If there is a great living church of art, this tariff wall serves only to obstruct the view of its services. Let it be utterly removed.

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THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

VOLVME XXII AVGVST 1913 NVMBER 8

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CHURCH OF HAGIA THEODORA.
ARTA, EPIRUS, GREECE.

Herringbone diaper and other patterns, embedded in thick mortar. Fourteenth Century.

THE BRICKBVILDER

AVGVST, 1913

VOLVME XXII. NVMBER 8.

Acoustic Design in the Hill Memorial Auditorium, University of Michigan.

BY HUGH TALLANT.

DURING the summer and fall of 1910 there appeared in THE BRICKBUILDER a series of articles entitled "Hints on Architectural Acoustics." These articles explained that good hearing depends upon the loudness, the distinctness, and the quality of the effect produced by sound; gave methods for obtaining satisfactory acoustic qualities in an auditorium by means of modifications in its shape, arrangement, equipment, materials, and method of construction; and illustrated the procedure in the case of several interiors laid out along the lines suggested. Since that time, thanks to the courtesy of Mr. Albert Kahn, there has been presented an opportunity for corroborating these principles on a much larger scale, and with much greater accuracy and thoroughness, than ever before. The acoustic results thus obtained in the Hill Memorial Hall, of which Mr. Kahn was the architect, have more than justified the study and attention devoted to them, and may, therefore, be of sufficient general interest to warrant an outline of the principles and methods by which they were obtained.

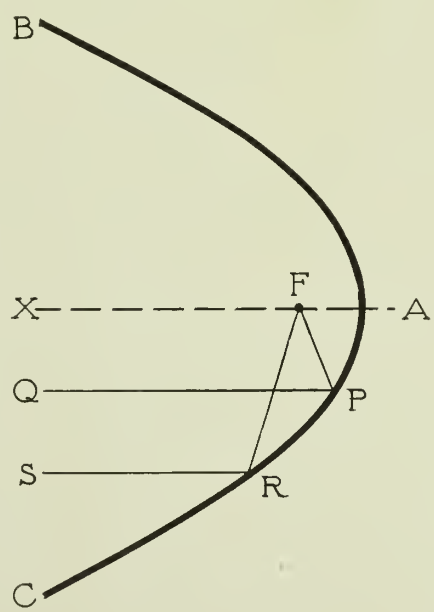


FIG. I.

The problem was to construct an enclosure in which five thousand people might enjoy the graduating exercises of our largest university. As the student speakers at a college commencement are not necessarily of unusual vocal capacity, they obviously require conditions of hearing specially well adapted to the purposes of public speaking. Ample loudness combined with distinctness was, therefore, the fundamental acoustic requisite in the case of the Hill Memorial Hall, but quality of tone was a matter of only less importance, as the building was to be used for musical productions of all kinds and for choral singing in particular.

It may be stated that, as a general principle, there is always plenty of sound in any auditorium. The difficulty, so far as loudness is concerned, arises from the fact that the effect is usually much too loud near the speaker and correspondingly too faint elsewhere. If, on the contrary, conditions could be averaged — if, in other words, the sound could be equally distributed throughout the entire audience — the result would be ample loudness at all points. With this end in view, it occurred to the writer that, as sound is reflected in exactly the same manner as light (the angle of incidence being equal to the angle of reflection), the principle of the ordinary search-light reflector might be utilized to advantage on a much larger scale for the reflection of sound. As every one knows, the search-light reflector prevents the light rays from spreading, with the result that the illumination retains its brilliancy to a very great distance. It seemed reasonable to infer that an auditorium laid out along these lines would reflect the sound in such a way as to maintain its intensity in all parts of the enclosure. The principle of the seach-light reflector was, therefore, adopted as the basis of the acoustic design of the Hill Memorial Hall.

The particular shape to which the search-light owes its efficiency is, of course, the surface known in geometry as the paraboloid of revolution. It is the surface obtained by revolving a parabola about its axis. In the diagrams accompanying the present article this surface will be represented by the parabola resulting from its intersection by a plane passing through its axis. Thus in Fig. I the paraboloid is represented by the parabola B A C, although the real surface would be obtained by spinning the parabola about its axis A X.

The property upon which the search-light is based is the fact that every ray of light emanating from the focus F, Fig. I, is reflected in a direction parallel to the axis A X. Thus rays such as F P and F R are reflected in the directions P Q and R S, parallel to A X. Applying the same principle to the reflection of a sound-wave, it follows that any small part of the wave (which, for convenience, will be called a *single sound*) will be similarly reflected in a direction parallel to the axis. In this way the natural tendency of the sound-wave to expand as it recedes from the starting point is entirely checked so far as the reflected portion of the wave is concerned, and this portion will, therefore, produce an effect at Q just as loud as at P and an effect at S just as loud as at R.* This fact very much simplifies all the calculations for loudness. Its bearing will be better understood by considering the shape assumed by a sound-wave starting from the focus of the paraboloid and subsequently reflected from the enclosing surface.

In Fig. II the paraboloid is again represented by the parabola B A C. For the present purpose it may be assumed that the sound-wave originates in the form of a spherical surface of compressed air of which the focus F is the center.† This spherical surface is represented by the circle P Q R.

the flat portion of the wave reaches him less than one-fifteenth of a second after the spherical portion — if, in other words, the distance Q L is 75 feet or less ‡— he will perceive the two portions of the wave in the form of a single sensation of hearing each louder than the effect which either part of the wave would have produced alone.

In applying this principle to the Hill Memorial Hall the first problem was to adjust the parabolic surface to the requirements of architectural design and decorative effect. As a matter of geometry the paraboloid was first limited by surfaces corresponding to the side and rear walls, the ceiling and the floor. The resulting shape which the auditorium thus assumed is shown in plan in Fig. V and in vertical section in Fig. VI. In Fig. V the side walls are

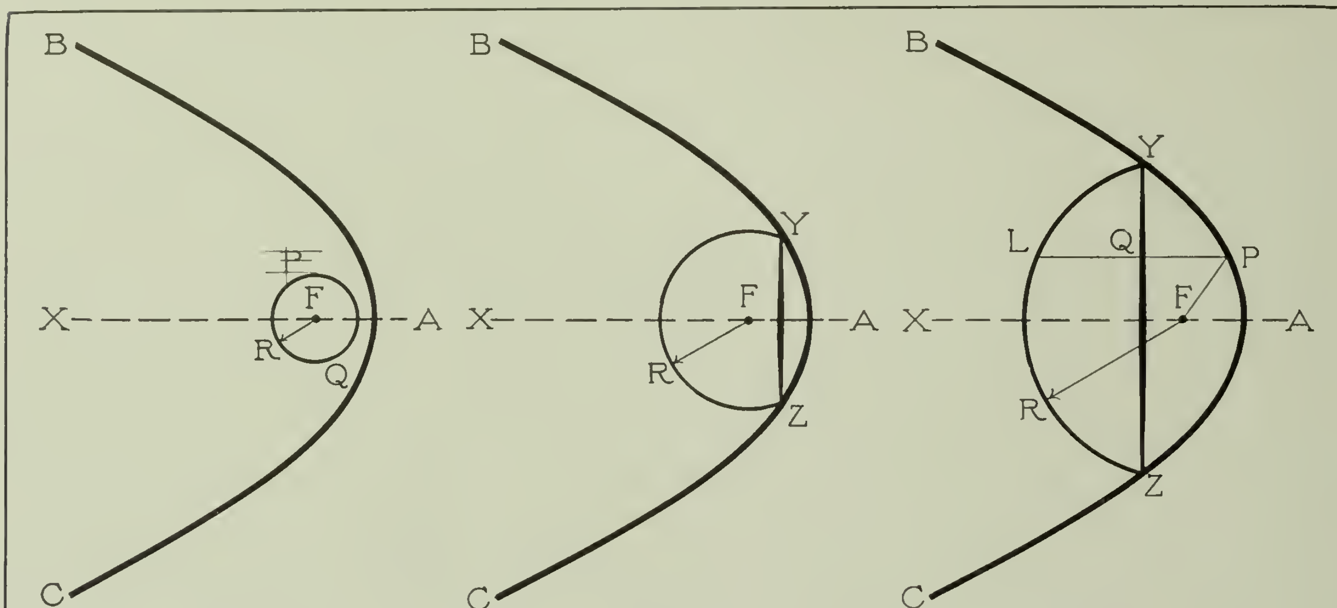


FIG. II. FIG. III. FIG. IV.

Fig. III shows what happens when the wave has spread far enough from its starting point to strike against the inner surface of the paraboloid. The part of the wave which has struck the paraboloid is reflected in the form of a plane surface represented by the line Y Z. The remainder of the wave still continues to expand in the form of a spherical surface as represented by the arc Y R Z of which F is the center and F R the radius. The relative intensity of the sound at different points of the wave is indicated by the thickness of the lines which represent the wave front on the diagram. Thus the flat part of the wave is shown thickest at its center because the sound is more intense at this point. On the other hand the spherical portion of the wave is represented by a uniform line because the intensity of the sound is the same at all points on the spherical surface.

Fig. IV shows the shape of the wave a little later on, when the reflected portion has passed beyond the focus F. Under these circumstances a man standing at the point L will hear first the direct or spherical portion of the wave Y L R Z and next the reflected or flat portion Y Q Z. If

indicated in plan by the lines E B and D C and in Fig. VI their intersection with the paraboloid is indicated by the parabola H I J. The intersection of the ceiling with the paraboloid is similarly represented in Fig. V by the parabola E G D and in Fig. VI by the horizontal line O H K. The rear wall is represented in Fig. V by the curve E M D and in Fig. VI by the vertical line O P. Finally the main floor is represented in Fig. VI by the line P N J L. Photographs of the completed building reproduced on another page in the present issue of THE BRICKBUILDER show how this geometric layout was subsequently developed in architectural scheme and detail.

The influence of the wall and ceiling surfaces upon the shape of the sound-wave is shown in Fig. VII. If there had been no side walls the wave would have taken the form of the spherical surface Y R L Z and the plane surface Y Q Z. The wall D C, however, intercepts and reflects the portion of the wave represented by the dotted line S Z G, with the result that this portion assumes the form of the spherical surface S N, of which the center is at F′ symmetrical to F with reference to the line D H. The loose end N of this wave also spreads out still further by diffraction as shown by the arc N O of which C is the center. Under these circumstances a man standing at L will hear in suc-

* An unimportant modification of these conditions results from the sideways movement or diffraction of the sound-wave.

† The precise shape of the sound-wave produced by a speaker's voice will be discussed in a subsequent article.

‡ See THE BRICKBUILDER for May, 1910, pages 113 and 114.

cession three sound-waves, namely: the direct spherical wave R L S, the flat reflected wave I Q G, and the reflected spherical wave S N O, and if these three waves reach him within the same sixteenth of a second he will perceive all three as a single sensation of hearing. In exactly the same way a still further portion of the wave is reflected down from the ceiling so that people in the extreme rear of the auditorium hear this fourth portion in addition to the other three. As a result the audience in what are apparently the worst parts of the hall hear quite as loudly as anywhere else. Indeed tests in the completed building have shown that the effect in the extreme rear corners is actually louder than at corresponding points in the center of the hall, and the carrying power is so intense that the noise of a dime dropped upon the floor of the stage from a height of a quarter of an inch can be readily perceived at the extreme rear of the second balcony over 150 feet away.

The actual acoustics diagram used in laying out the interior of this building is reproduced in Fig. VIII. It is the culmination of a long series of studies laid out successively in true architectural fashion upon superimposed sheets of tracing paper. The final study was ultimately drawn up on detail paper with extreme care and with sufficient accuracy and delicacy of line to permit of scaling the dimensions to within less than an inch. For convenience of reference the essential data were traced from this drawing upon the acoustics diagram as given.

Certain points in connection with this diagram require special mention. In the first place, as the speaker was likely to move a little from the exact center of the platform, the paths of certain important sounds were separately laid out from two points corresponding to this possible variation in the starting point of the sound. The two locations of the speaker will be readily seen on the acoustics diagram together with the corresponding sound-paths. To avoid confusion the paths corresponding to one position are indicated by continuous lines, while the paths corresponding to the other position are indicated by dotted lines. In this way the conditions of hearing under the overhang of the balconies and at other critical parts of the hall were separately checked for the extreme variations which were likely to occur.

The next difficulty was due to the fact that an organ was to be installed in a large archway directly behind the speaker, and that consequently this portion of the paraboloid could not be counted upon as a reflector. To overcome this difficulty the speaker was assigned to a location somewhat in front of the focus of the paraboloid so that the reflected sounds should have a tendency to converge. As a result the gap in the reflected sound-wave closes itself up within 53 feet, at most, of the speaker. At less than this distance from the speaker the direct wave is strong enough to furnish all the loudness necessary. Beyond the 53 feet the direct wave has the support of the reflected wave.

Another point which received special attention was the reflection of the sound to the extreme rear seats under the balconies. This was a very important consideration because without the help of the reflected sound the effect under the balconies was likely to be much too faint. When the paths of the reflected sounds

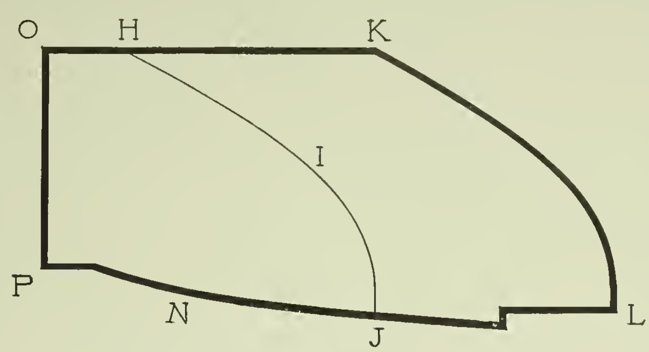


FIG. VI.

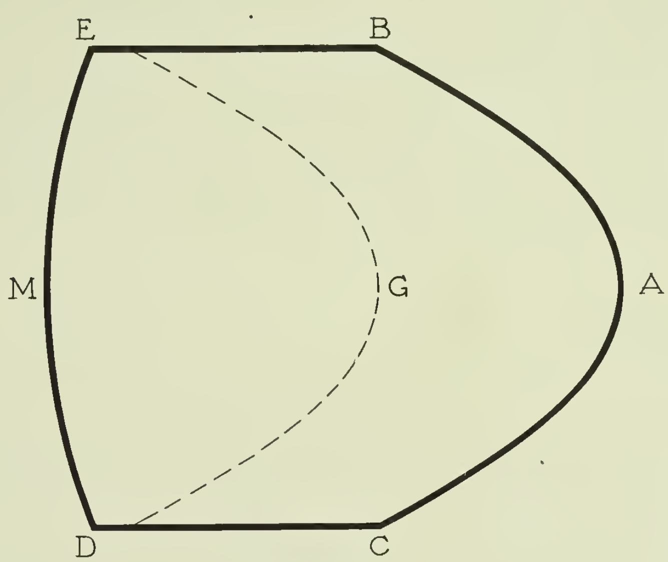


FIG. V.

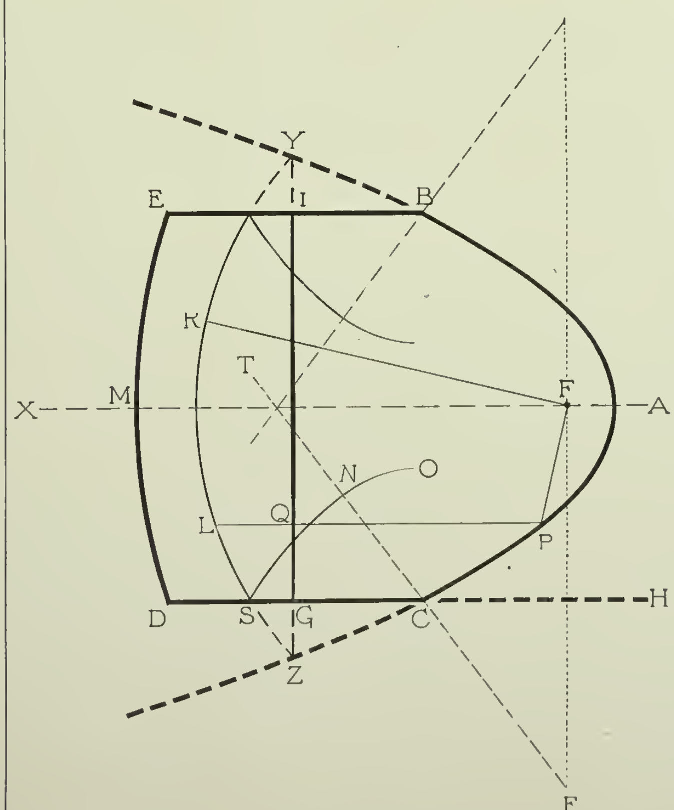


FIG. VII.

were first accurately plotted it was found that owing to their convergence (on account of the organ) they slanted downwards toward the back of the auditorium, and were intercepted by the balcony-fronts before they could reach the rear seats below. To overcome this difficulty the axis of the paraboloid was inclined slightly upwards so that the downward slope of the reflected sound-paths might be correspondingly lessened. The inclination of the axis was made just sufficient to enable the reflected sounds to pass under the lower edge of the balcony-fronts to the rear seats below. As a result of this precaution the reflected sound reaches all points under the balconies and the effect is everywhere amply loud, although in the case of three extra rows of seats recently added at the back of the main floor there is a perceptible diminution in loudness. The paths by which the reflected sounds reach the rear seats will be seen on the diagram passing just under the balcony-fronts. The angle at which the axis of the paraboloid was inclined is also indicated in the lower left-hand corner of the drawing.

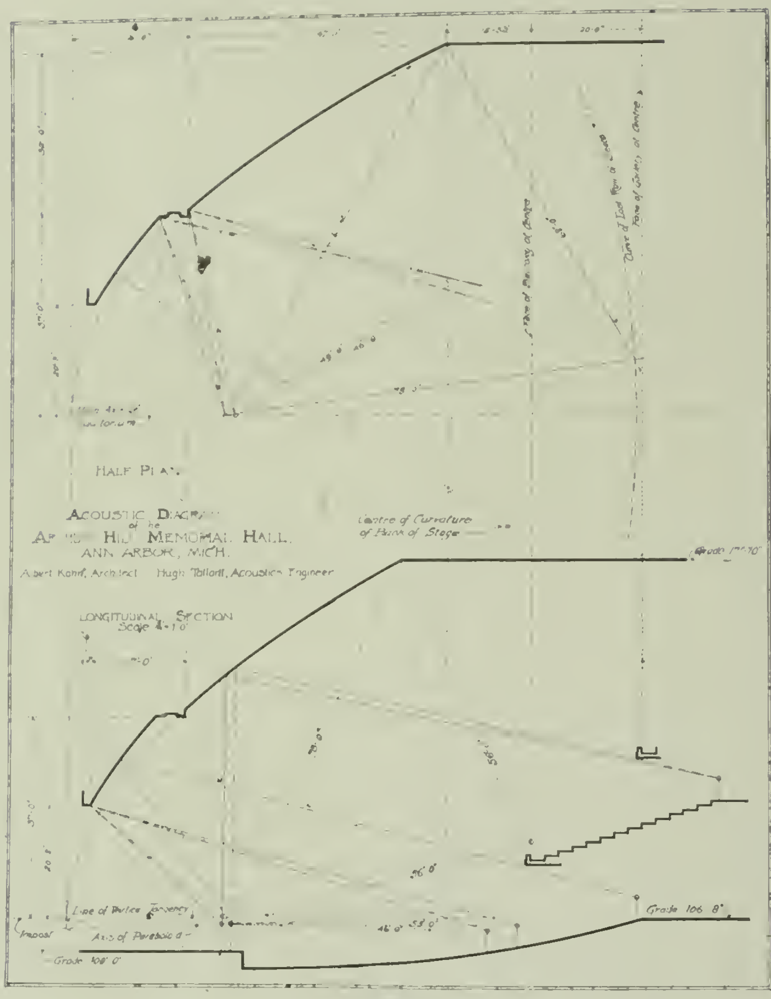


FIG. VIII.
ACOUSTIC DIAGRAM OF THE HILL MEMORIAL HALL.

Still another point which will be found worked out on the plan is the length of time which elapses between the first arrival of the direct portion of the wave and the subsequent arrival of the portion reflected from the side walls. As has already been mentioned, it was essential that the path by which the reflected sound reaches any given hearer should not be more than 75 feet longer than the path by which the direct sound reaches him. These paths are shown and figured on the plans. As will be seen, the sound reflected to the critical point moves through a distance of 80 feet before reflection and 68 feet after reflection, or a total of 148 feet. The direct sound moves through a distance of 75 feet to reach the same point, or only 73 feet less than the reflected sound. Both direct and reflected sounds, therefore, reach the hearer at this point within one-sixteenth of a second of one another and combine to produce a single initial sensation of hearing. The reflection of the sound from the ceiling to the front of the first balcony will be found similarly checked on the section. In this case the sound reflected to the critical point moves through a distance of 73 feet before reflection and 56 feet after reflection, or a total of 129 feet. The direct sound moves through a distance of 56 feet to reach the same point, or only 73 feet less than the reflected sound.

The question of loudness having thus been met in a satisfactory manner, the next question was that of distinctness. As was explained in "Hints on Architectural Acoustics,"* indistinctness arises from three causes, namely: interrupted reverberation, excessive reverberation, and sound-interference. Interrupted reverberation is a perceptible interruption or break in the early part of a reverberation. It occurs whenever there is a fifteenth of a second or more during which no sound is reflected to the hearer, and produces the effect of a very quick echo or repetition of the sound. In the case of the Hill Memorial Hall there seemed reason to believe that such an interruption would occur in certain parts of the auditorium. On the other hand, careful calculation indicated that the initial loudness obtained by the methods already described would be so great as practically to drown out the tendency to echo. In point of fact this is exactly what occurs, and no echo or sound-repetition is noticeable under normal conditions. At the same time the difficulty was very narrowly averted, for it has been found by experiment that if the speaker turns his back to the audience at certain critical points (thereby reducing the initial loudness to a minimum), an echo is distinctly perceptible.

Just how long a reverberation may last without becoming excessive is a problem which has not yet been authoritatively solved. From such data as the writer had been able to collect † it appeared that in an auditorium of the size of the Hill Memorial Hall — about 800,000 cubic feet — a reverberation lasting two seconds would not be excessive for purposes of speaking, and would be better than a shorter reverberation for purposes of music. Unfortunately, however, the cement floors of the Hill Memorial were to be uncarpeted and there was to be little upholstery on the seats, so that the amount of reverberation was likely to be much greater when the hall was empty than when

*See THE BRICKBUILDER for October, 1910.

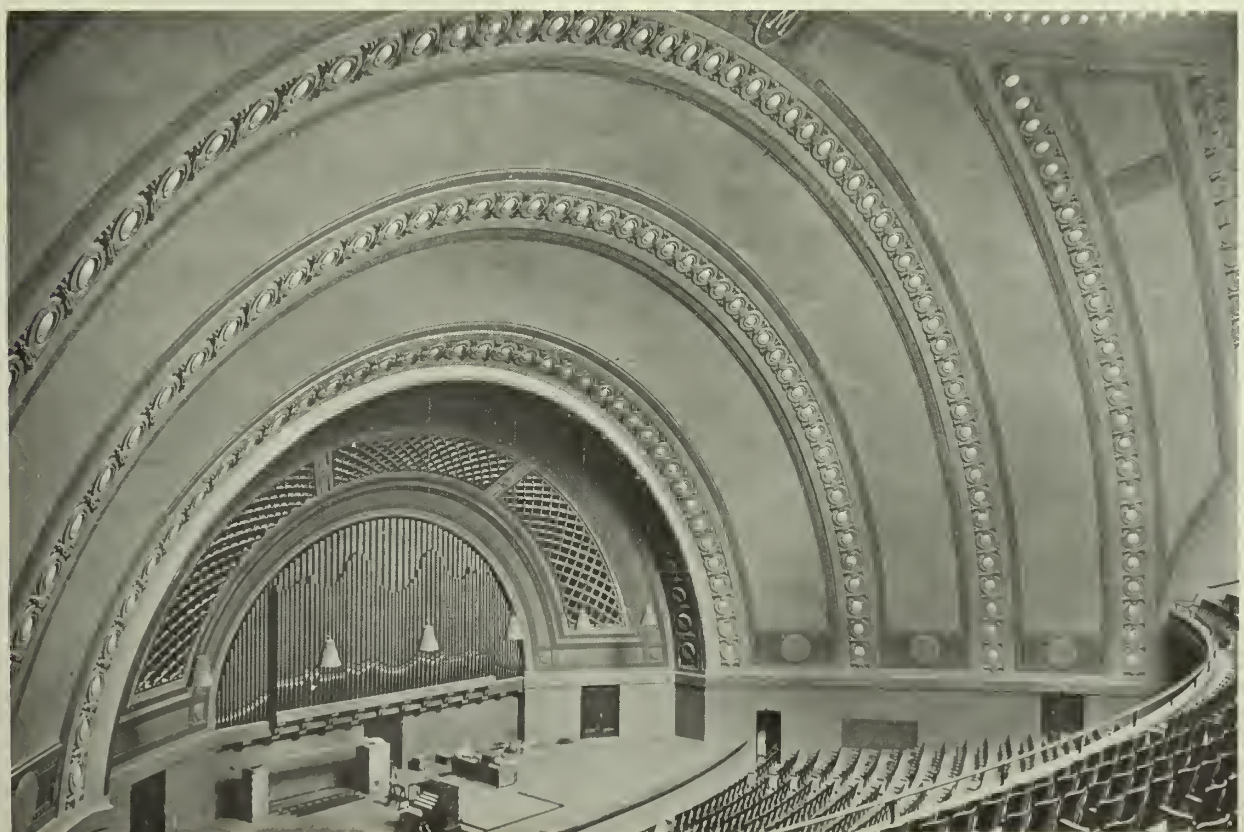
† See THE BRICKBUILDER for November, 1910, page 245.

there was an audience present. Under these circumstances the various wall, floor, and ceiling surfaces were adjusted to a calculated reverberation of 1.7 seconds when all seats were filled. This gave a reverberation of 2.4 seconds when only half the seats were filled and of 4.0 seconds when the hall was empty. In actual practice the reverberation is not excessive for speaking purposes when only half the seats are filled. When the hall is empty—except for the experimenters—a speaker can still be heard clearly if he restricts himself to a conversational tone of voice, but he is apt to evoke a little too much reverberation if he raises his voice in true oratorical style.

Sound-interference is produced mainly by sounds reflected from the rear wall of an auditorium. As there was no carpeting or other natural sound-absorbing surface to which such disturbing sounds could be reflected and destroyed, an artificial absorbent consisting of camp cloth over felting was applied to the rear walls. The coefficient of absorption of this combination is about 0.62, which proved adequate to the purpose in hand. The material was disposed in panels enclosed by a heavy raised moulding, and the cloth, being of the same shade as the painted plaster, harmonizes satisfactorily with the general decorative scheme.

EXTERIOR.

As there is practically no woodwork in the building, the quality of tone is wholly dependent upon the reverberation above mentioned. It is obvious that with such a possible variation in the length of the reverberation — from 1.7 seconds to 4.0 seconds — the conditions cannot be equally satisfactory at all times. To the writer the reverberation of 1.7 seconds seemed obviously insufficient for the choral singing at the dedication exercises. On the other hand such musical opinion as has hitherto been obtained has been extremely favorable, not to say enthusiastic; but it must be admitted that such expressions are apt to be biased by courtesy. Moreover, as explained in "Hints on Architectural Acoustics," the ear has apparently a tendency to accept volume of sound as a substitute for quality. In the Hill Memorial Hall there is no question concerning the volume, but a categorical statement with regard to the intrinsic quality would probably be premature.



INTERIOR — HILL MEMORIAL AUDITORIUM, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.
Albert Kahn, Architect.

Some Suggestions as to the Making of Working Drawings.

CONCLUSION OF SECOND PAPER.

BY H. VAN BUREN MAGONIGLE.

ATTENTION was called in the first part of this paper (THE BRICKBUILDER for July, page 148) to the interesting comparison between the ways of arriving at a result in private practice with those in the office of the architect of the New York Board of Education, Mr. C. B. J. Snyder, and of Mr. Oscar Wenderoth, Supervising Architect of the Treasury Department. It was shown that standardization for private practice was very difficult except in minor particulars, while in work where millions of dollars are spent every year for one type of building alone it becomes practical to standardize certain types of plans, details of staircases, details of construction and equipment, etc. Three working drawings from Mr. Snyder's office are illustrated in this number, and show the methods referred to in the last issue.

In the office of the Supervising Architect of the Treasury Department, where again a vast quantity of work is done every year, the general practice is to adopt a standard size of 24½ inches by 37 inches for working drawings and 40 inches by 10 feet for full size details. At the present time a rubber stamp is used for the titles, which has a place in it for the insertion of the number by hand, and the numbering is systematized as follows :

1 to 99 ....Scale plans.
100 to 199 ....Scale elevations and sections.
200 to 299 ....Scale details.
300 to 399 ....Miscellaneous (standard) scale details.
400 to 499 ....Structural drawings.
500 to 599 ....Full size details.
600 to 699 ....Mechanical drawings.

Adding the letters "P," "H," "L," etc., to designate Plumbing, Heating, Lighting, etc.

700 to 799 ....Repairs.

Adding the letters "P," "H," "L," etc., for the mechanical repair drawings.

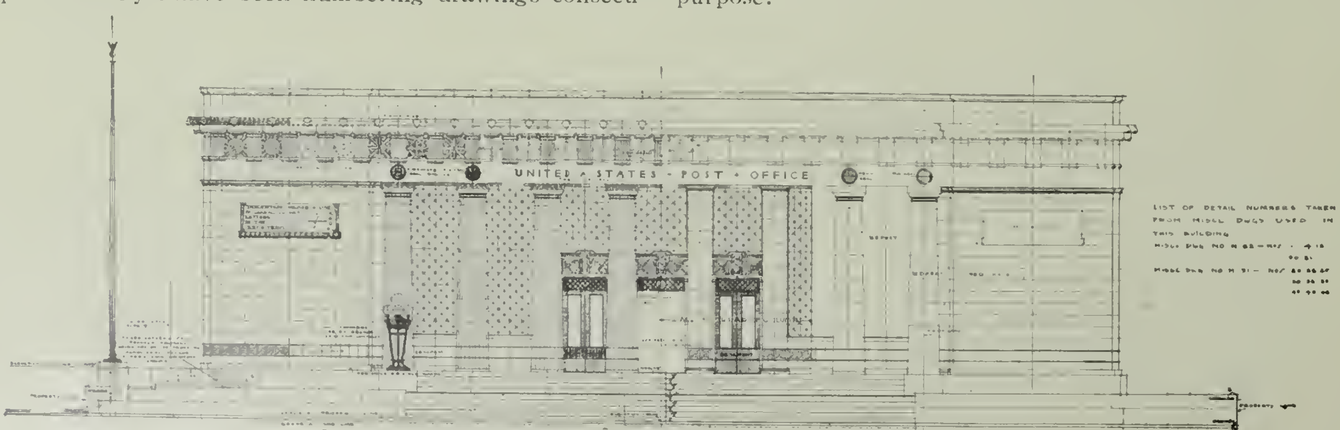
800 ....Architectural shop drawings.
900 ....Structural shop drawings.
1000 ....Mechanical shop drawings.

Where a sheet represents work to be done by more than one trade, the number given to it is governed by the predominating trade.

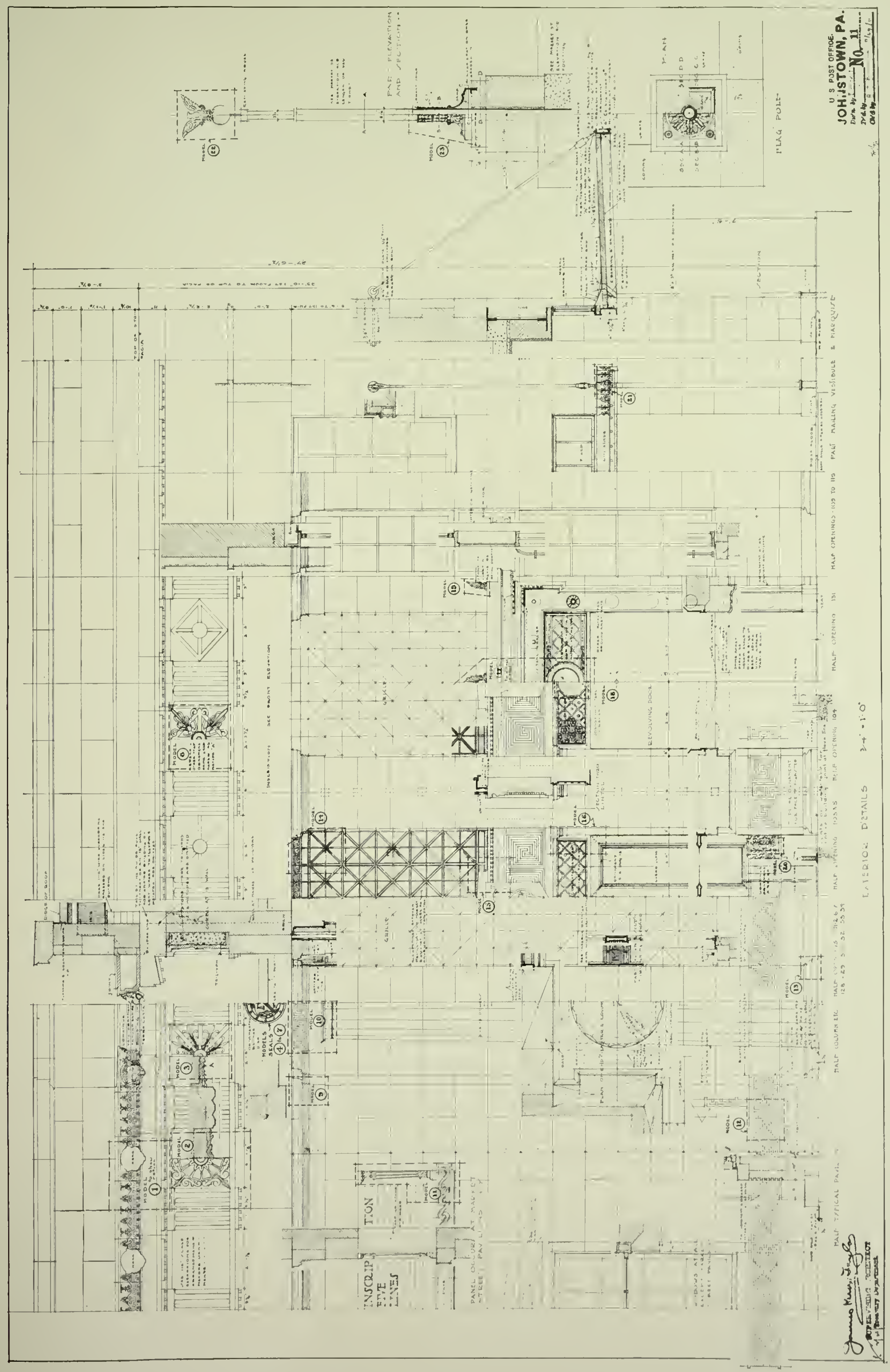
This system of numbering has many advantages; up to quite recently I have been numbering drawings consecutively as made, whatever their class or character; but I find certain drawbacks to this. The original idea was, that the full sizes (let us say) relating to a certain scale drawing would be finished up at about the same time as the latter, and if not, very soon thereafter, and numbers could be reserved for these full sizes so that they could be bound in consecutively and follow, in the set, the scale drawings, and cross reference be made easy. But it is not always convenient, advisable, or desirable to make the full sizes (or to assemble them on the final sheet — see BRICKBUILDER for May, 1913) at once, and the original idea cannot be carried out and so becomes practically worthless. Moreover, for any large job, the set should be subdivided or it becomes unwieldy and troublesome to handle. I am going to adopt the principle of numbering given above.

The method of placing the drawings on a sheet is not subject to a fixed rule in the Supervising Architect's office. When tracings are printed to be issued to bidders, a set of the prints is bound together and placed in a drawer in the custody of the draftsman in charge of that particular building. The theory is that any change made as the execution of the work proceeds at the site is noted on the drawing, so that when the building is completed this set shows exactly the work as in place. After the building is occupied the drawings are forwarded to a general file. In issuing plans and specifications to bidders a multiple form is used which gives a complete record of the transaction from beginning to end, and reduces the correspondence. As a general rule, each contractor is allowed fifteen sets of scale drawings and specifications, and one copy each of full size drawings, except in the case of standard details, when three copies are sent. The contract drawings contain a fair proportion of ¾ scale details to illustrate the work, and after a contract is awarded the full size details furnished the contractor are quite complete; possibly more so than in a private office, as the work of the Supervising Architect's office is often done at long range.

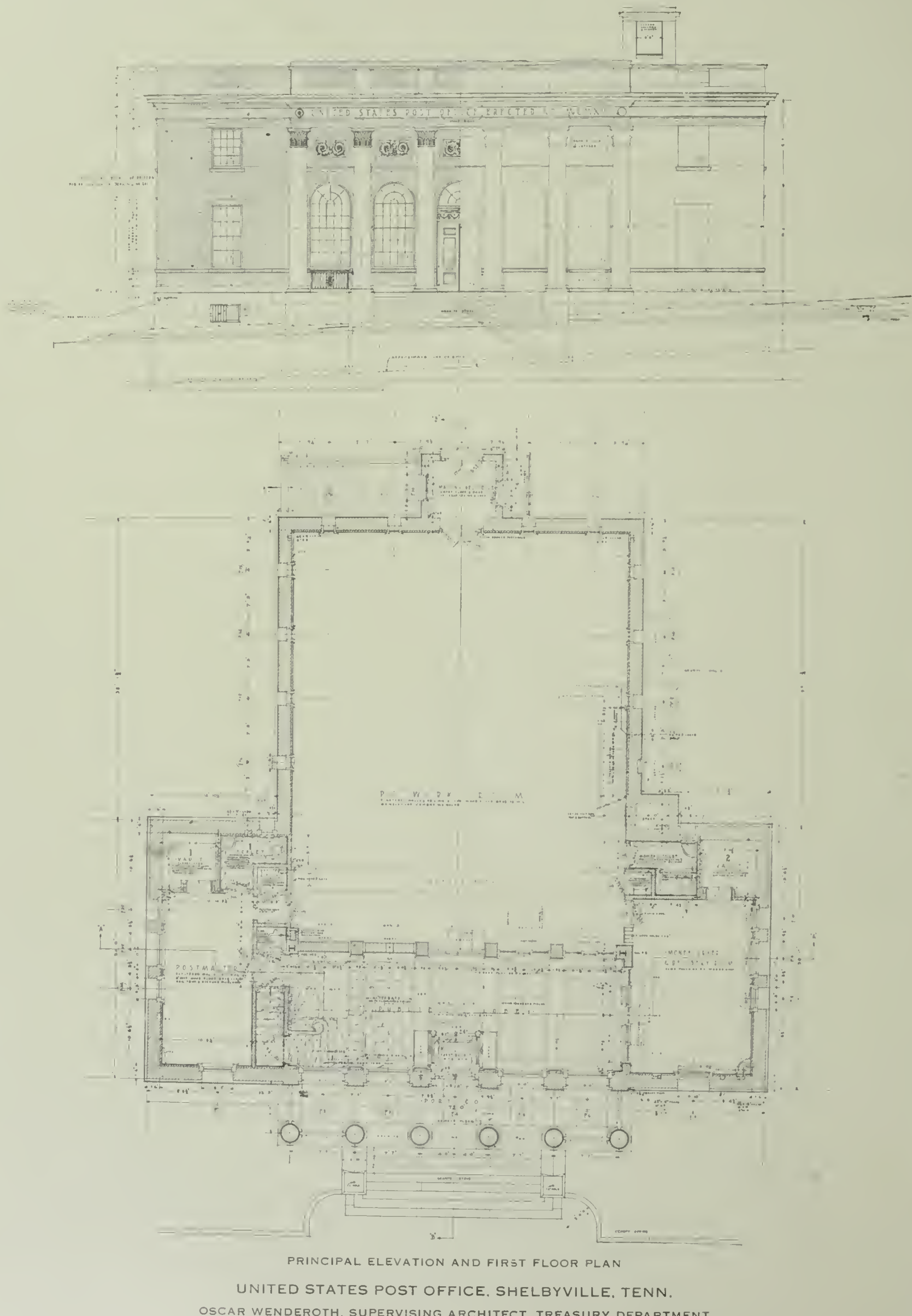
In these papers I have of course only scratched the surface; they are intended to be suggestive, not didactic, and if they will have really suggested something of interest to some one, they will have served their modest purpose.



UNITED STATES POST OFFICE, JOHNSTOWN, PA.
JAMES KNOX TAYLOR, FORMER SUPERVISING ARCHITECT, TREASURY DEPARTMENT



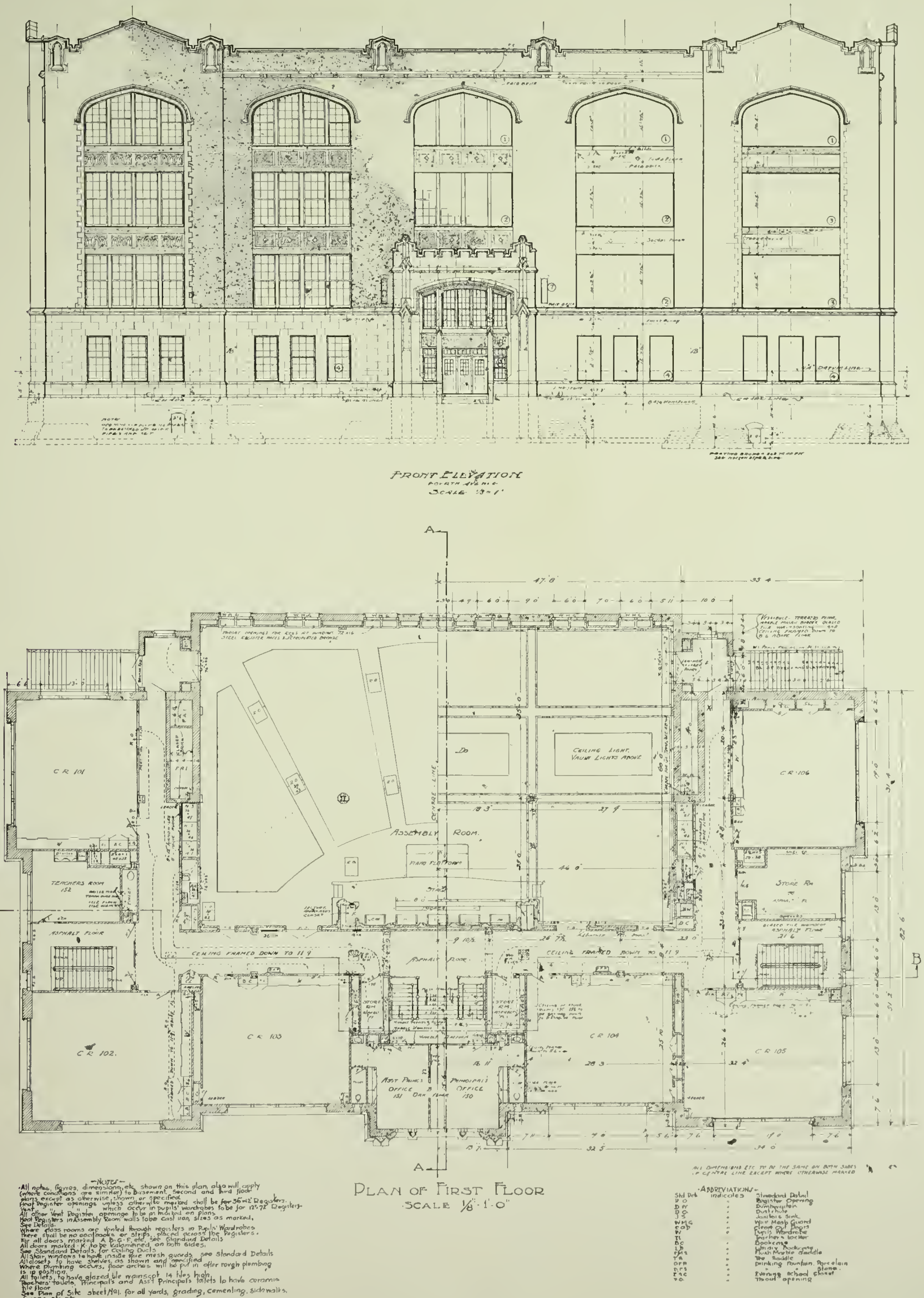
DETAIL OF PRINCIPAL ELEVATION
UNITED STATES POST OFFICE, JOHNSTOWN, PA.
JAMES KNOX TAYLOR, FORMER SUPERVISING ARCHITECT, TREASURY DEPARTMENT



PRINCIPAL ELEVATION AND FIRST FLOOR PLAN

UNITED STATES POST OFFICE, SHELBYVILLE, TENN.

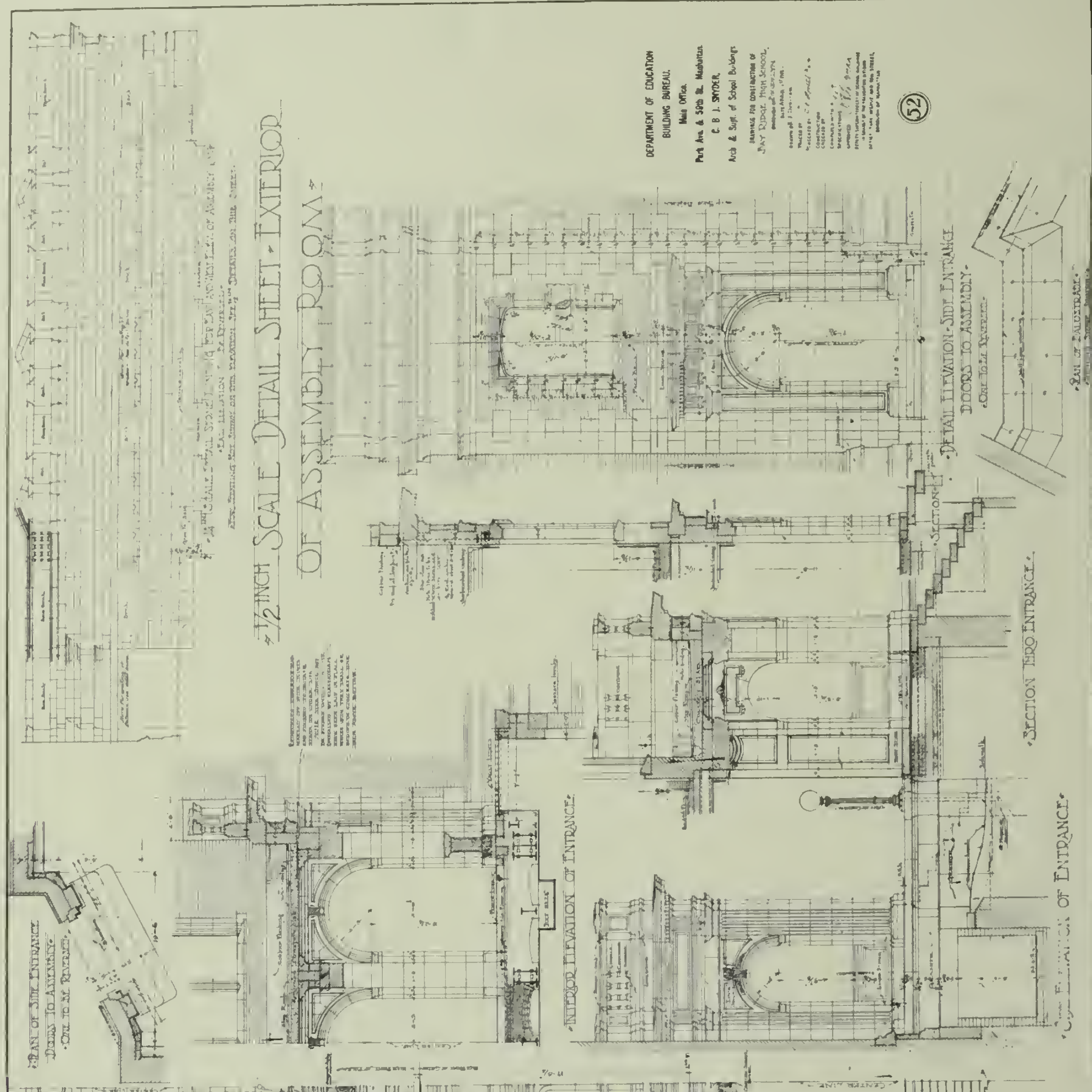
OSCAR WENDEROTH, SUPERVISING ARCHITECT, TREASURY DEPARTMENT



PRINCIPAL ELEVATION AND FIRST FLOOR PLAN

PUBLIC SCHOOL 172, BROOKLYN, N.Y.

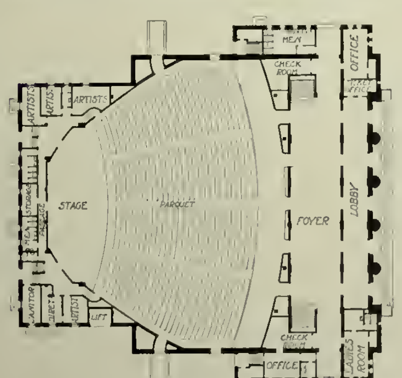
C. B J. SNYDER, ARCHITECT



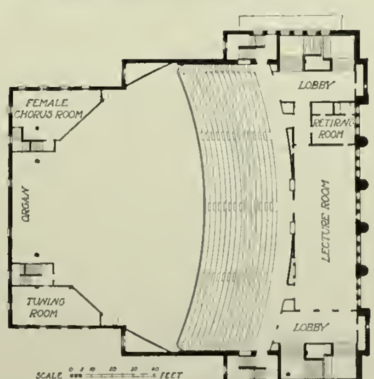
DETAIL OF ASSEMBLY ROOM ELEVATION

BAY RIDGE HIGH SCHOOL, BROOKLYN, N. Y.

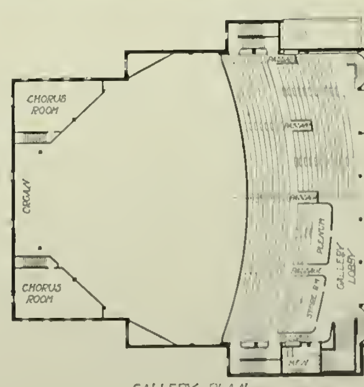
C. B. J. SNYDER, ARCHITECT



MAIN FLOOR PLAN



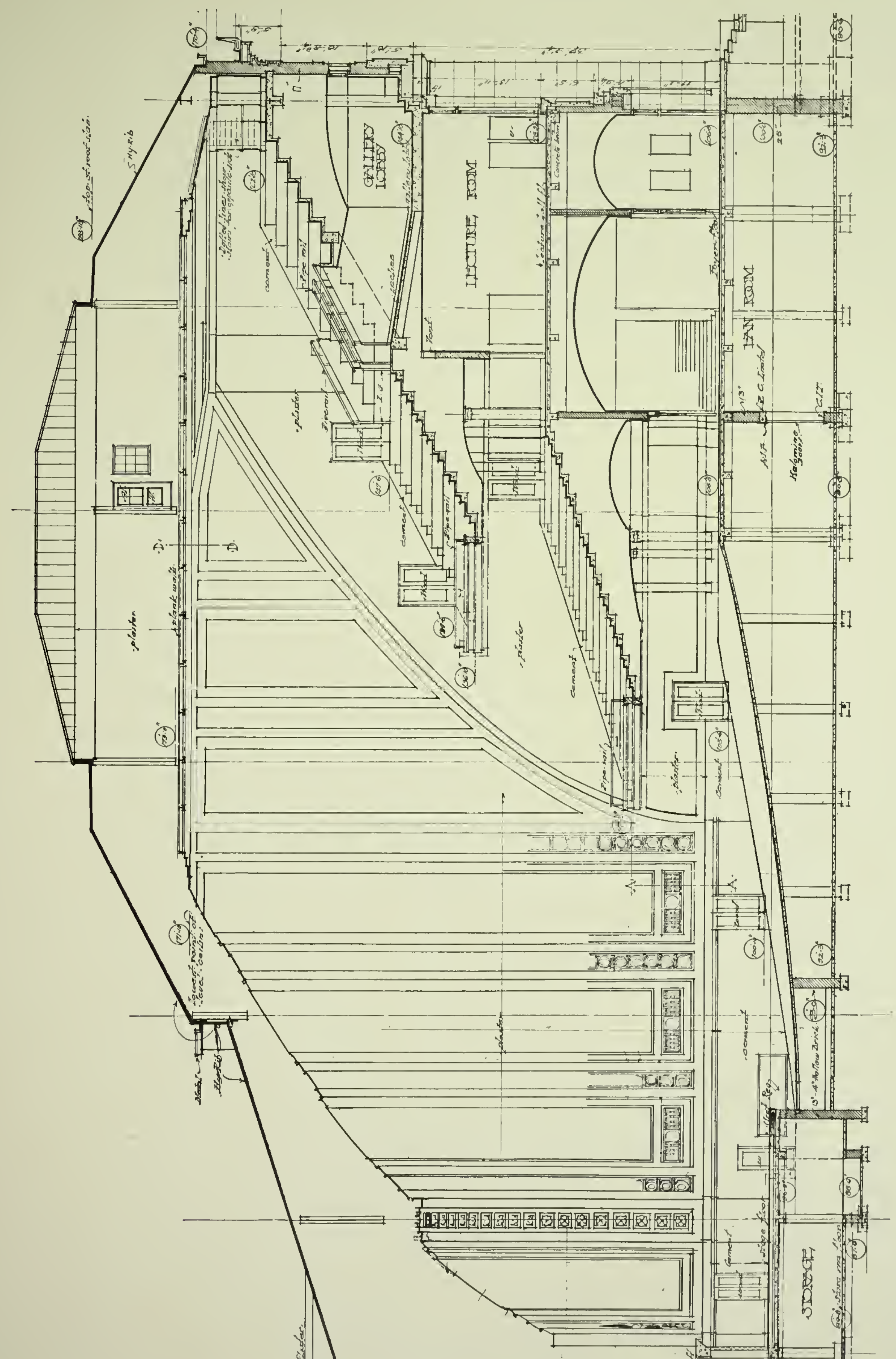
BALCONY FLOOR PLAN



GALLERY PLAN

THE HILL MEMORIAL AUDITORIUM, ANN ARBOR, MICH.
ALBERT KAHN, ARCHITECT; ERNEST WILBY, ASSOCIATE

VOL. 22, NO. 8. PLATE 115.

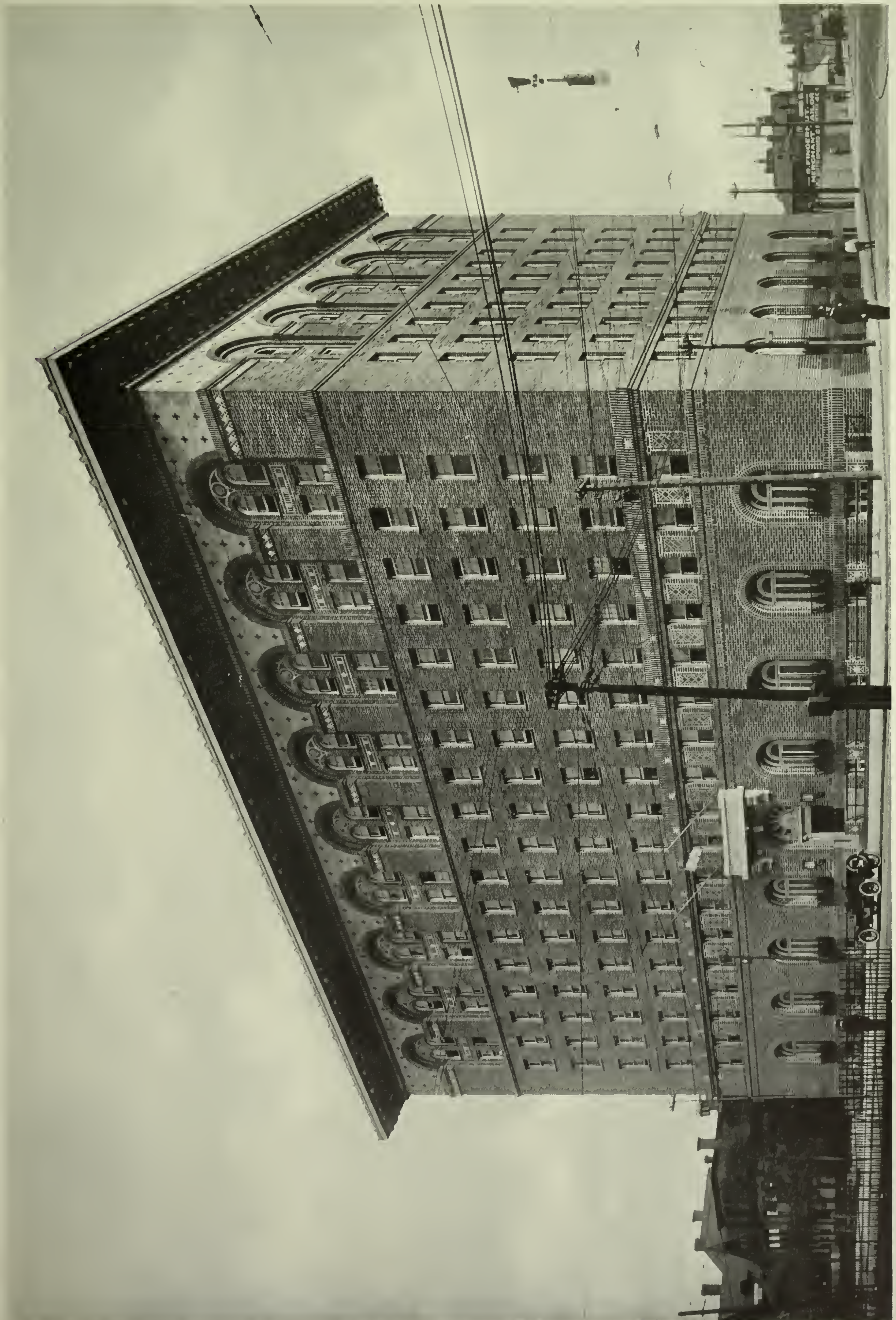


LONGITUDINAL SECTION ON LINE A-A

SCALE 1/8" = 1'-0"

THE HILL MEMORIAL AUDITORIUM, ANN ARBOR, MICH.

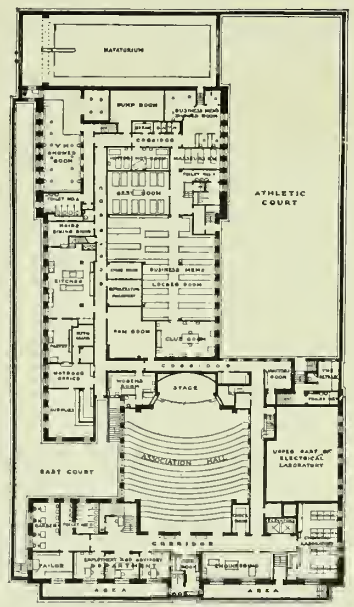
ALBERT KAHN, ARCHITECT; ERNEST WILBY, ASSOCIATE



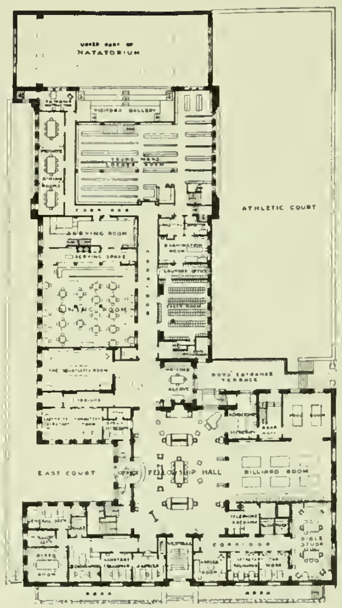
Y. M. C. A. BUILDING, CLEVELAND, OHIO
HUBBELL & BENES ARCHITECTS

ENTRANCE DETAIL

REAR AND GYMNASIUM



BASEMENT



FIRST FLOOR

SECOND FLOOR

Y. M. C. A. BUILDING, CLEVELAND, OHIO
HUBBELL & BENES, ARCHITECTS

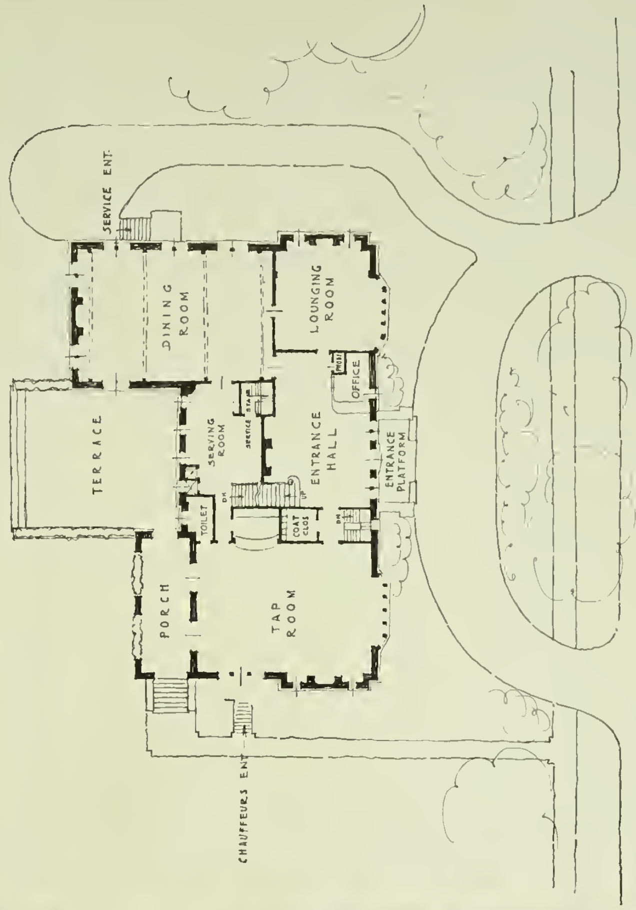
GENERAL VIEW FROM RACE TRACK

VIEW FROM DRIVE

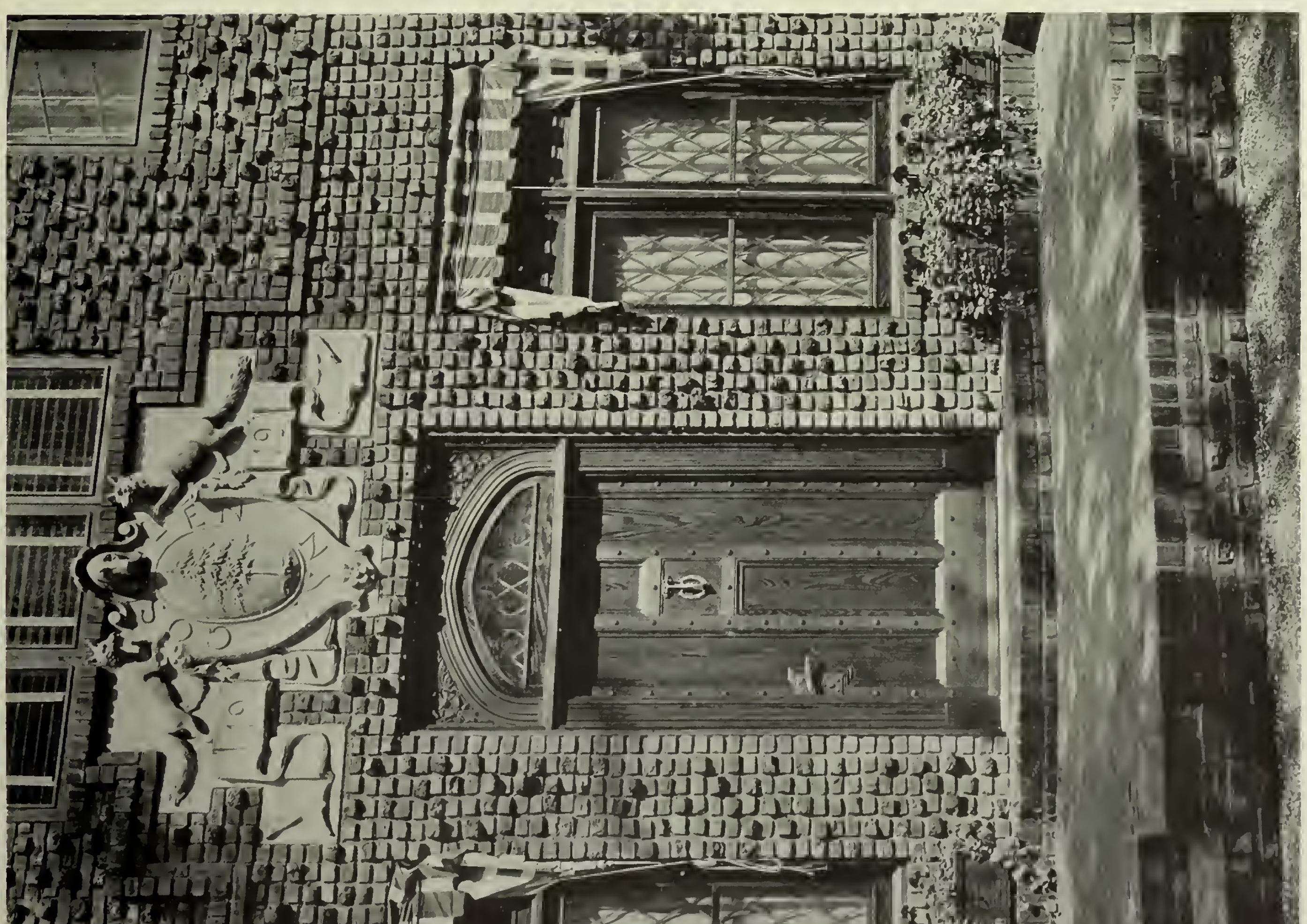
THE GOSHEN INN, GOSHEN, N. Y.
WALKER & GILLETTE, ARCHITECTS

VOL. 22, NO. 8. PLATE 119.

GENERAL VIEW FROM STREET



PLAN



ENTRANCE DETAIL

THE GOSHEN INN, GOSHEN, N. Y.

WALKER & GILLETTE, ARCHITECTS

DINING ROOM

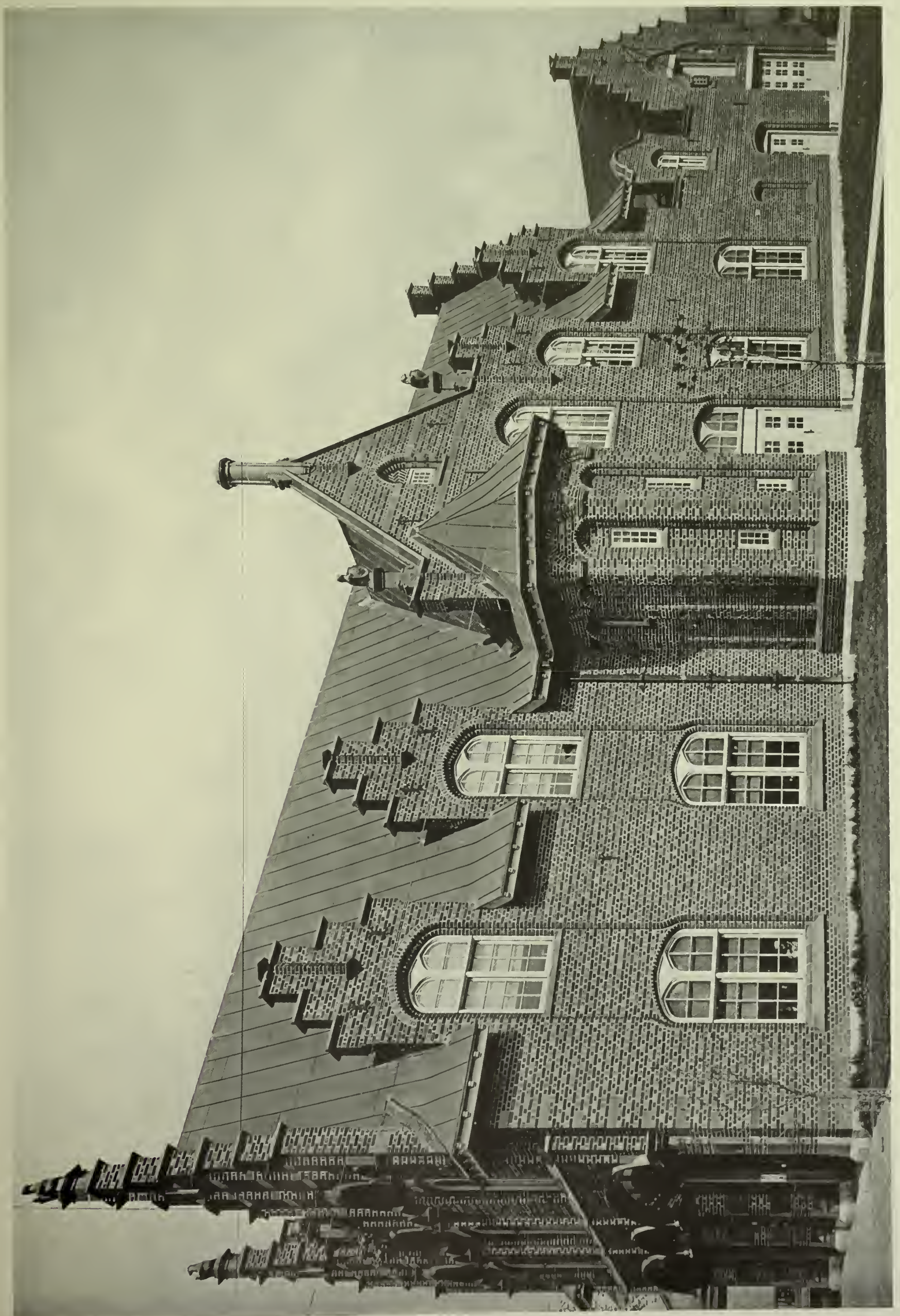
ENTRANCE HALL

THE GOSHEN INN, GOSHEN, N. Y.
WALKER & GILLETTE, ARCHITECTS

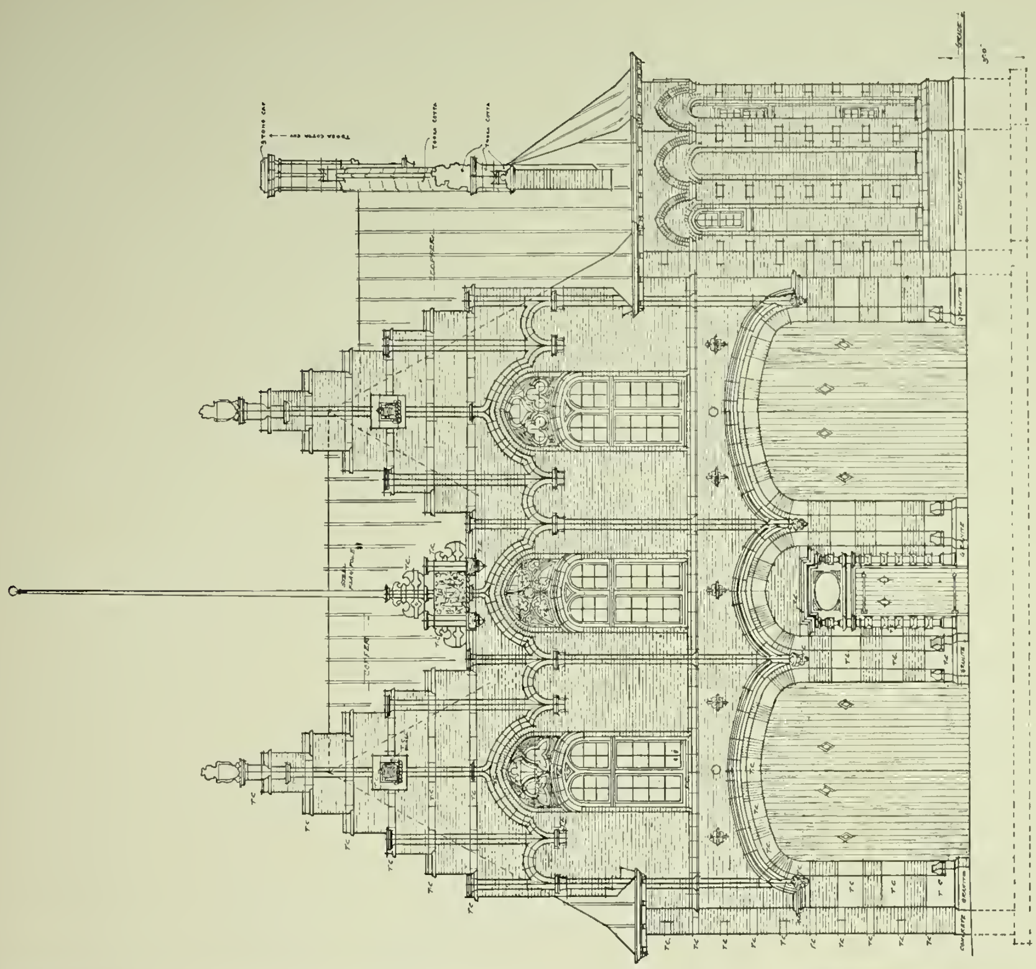
TAP ROOM

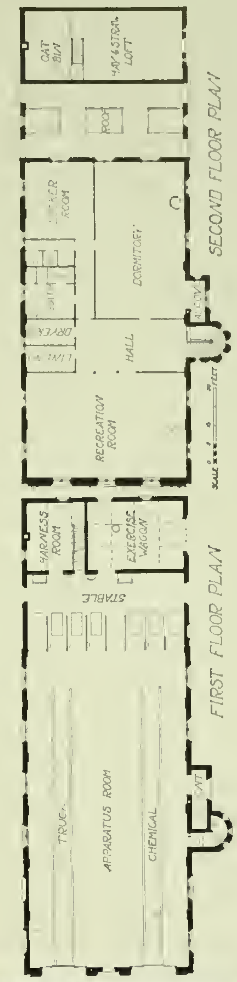
NOOK IN TAP ROOM

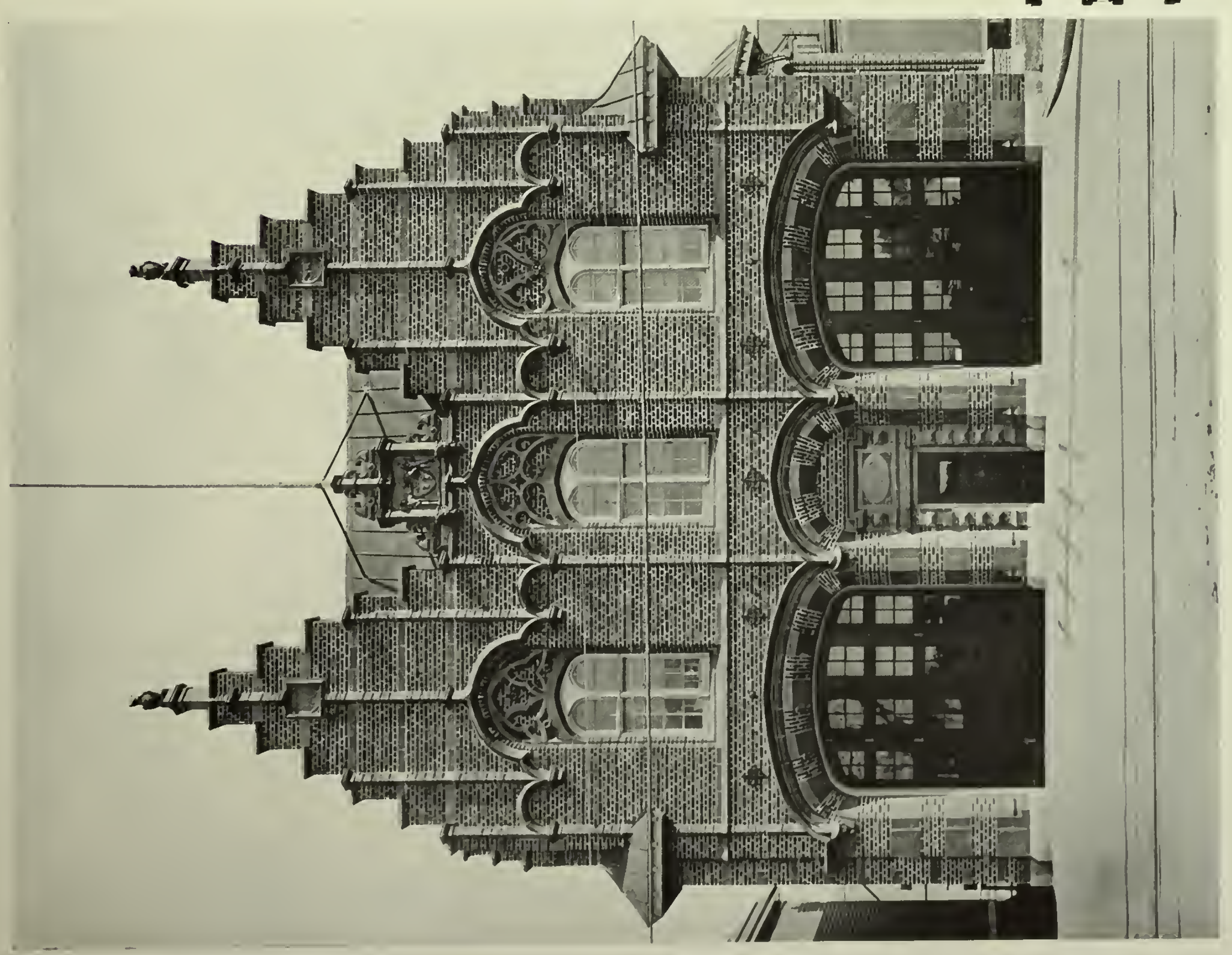
THE GOSHEN INN, GOSHEN, N. Y.
WALKER & GILLETTE, ARCHITECTS



FIRE HOUSE, ALBANY, NEW YORK
MARCUS T. REYNOLDS, ARCHITECT

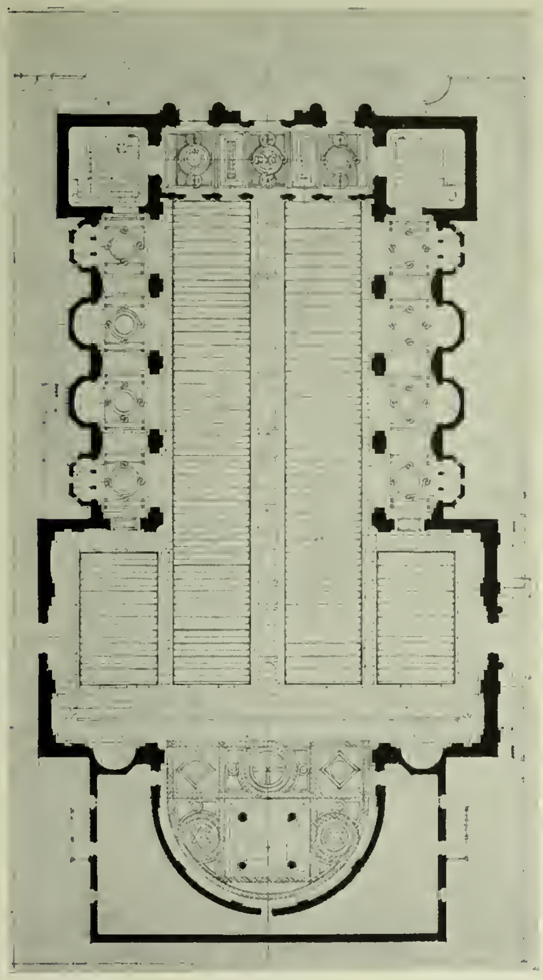


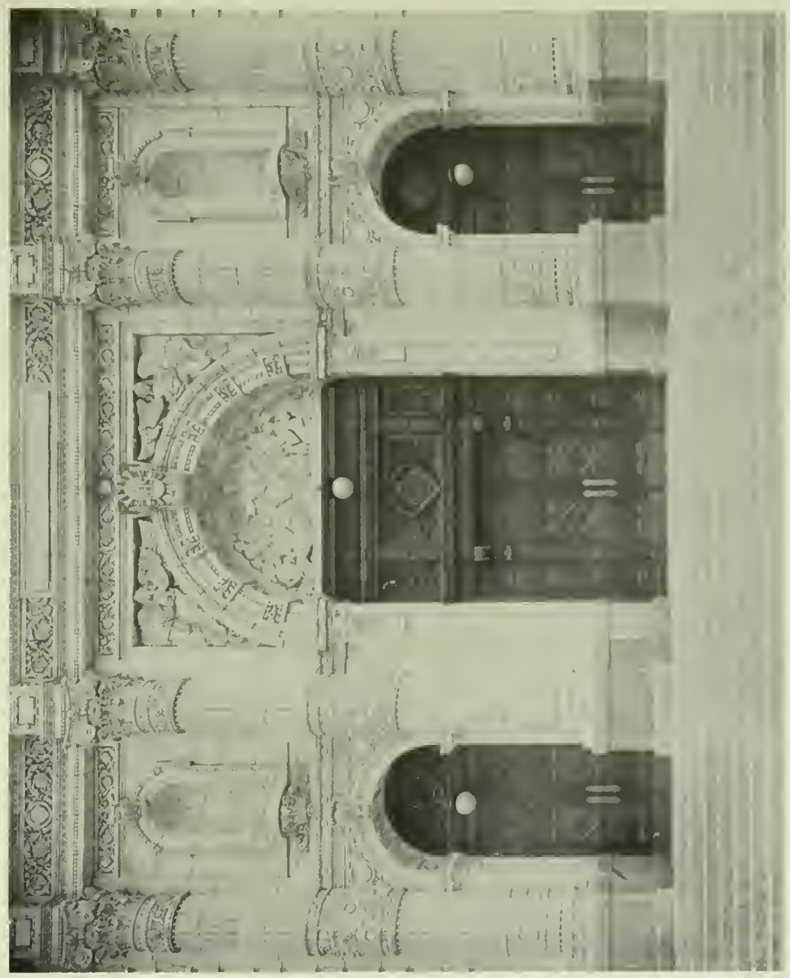




FIRE HOUSE, ALBANY, NEW YORK
MARCUS T REYNOLDS, ARCHITECT

VOL. 22. NO. 8. PLATE 124.





ST. BARBARA'S CHURCH, BROOKLYN, N. Y.
HELME & HUBERTY, ARCHITECTS

HOUSE AT BALTIMORE, MARYLAND
LAURENCE HALL FOWLER, ARCHITECT

REAR VIEW

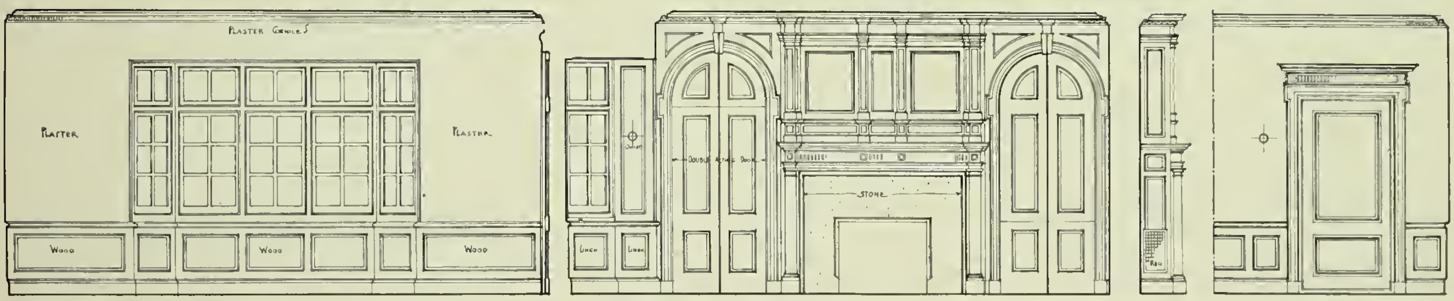
SECOND FLOOR PLAN

FIRST FLOOR PLAN

DETAIL OF END GABLE

HOUSE AT BALTIMORE, MARYLAND
LAURENCE HALL FOWLER, ARCHITECT

DINING ROOM



DETAILS OF DINING ROOM

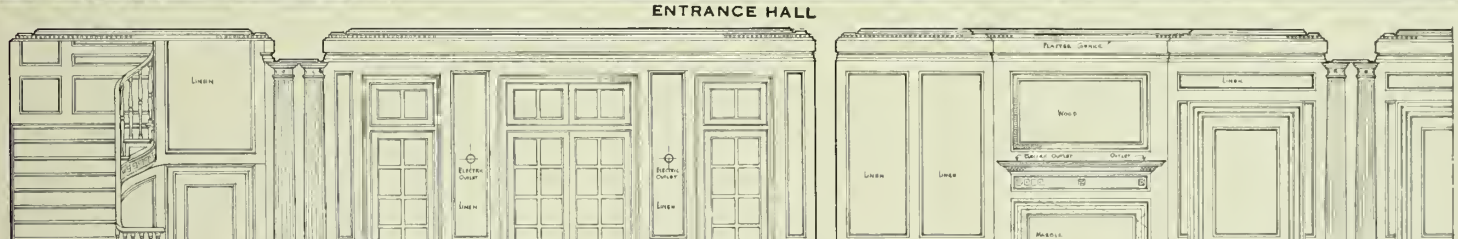
GARDEN

LIBRARY

HOUSE AT BALTIMORE, MARYLAND

LAURENCE HALL FOWLER, ARCHITECT

ENTRANCE HALL



DETAILS OF ENTRANCE HALL

HOUSE AT BALTIMORE, MARYLAND

LAURENCE HALL FOWLER, ARCHITECT

The Business Side of an Architect's Office.

WITH A DESCRIPTION OF THE ARCHITECTS' BUILDING, NEW YORK.

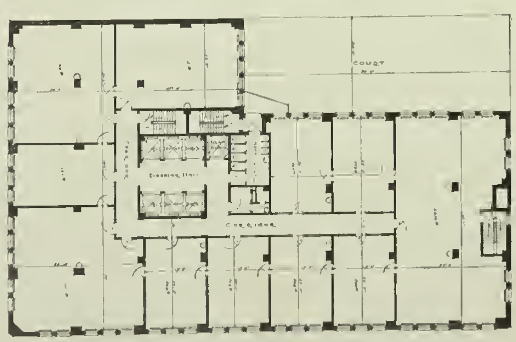
BY D. EVERETT WAID.

We propose to illustrate in this series of articles the offices of a number of noted architects. Plans and photographs will be presented and also descriptions of salient features of each. Architects are invited to write to Mr. D. E. Waid, 1 Madison Avenue, New York, who will be interested to learn of any office devices, methods, or printed forms which they have found valuable in their office management and which might be of general interest to the profession.

One Hundred and One Park Avenue, New York City, has been christened "The Architects' Building." It is one of the buildings completed this year which most assuredly has an unique interest to every one in the architectural profession. The attention of the building world has been attracted because it was built as the home of a large group of T square and triangle men; it was designed by them and is owned by them. Already some twenty-five architects and engineers have collected under this one roof. One Hundred and One Park Avenue is theirs, and it will be interesting to follow the method by which the scheme of co-operative offices was handled among so many and in a city where there is so much competition and such great activity in building. The fact that the building has accommodations for general and sub-contractors, decorators, material men, etc., would indicate a greater efficiency in handling the working forces of those who are fortunate enough to be numbered as tenants. One's office boy, with a tracing, can disappear into an elevator and in ten minutes bring back a blueprint hot and dry from an electrically lighted cylinder. Sets of drawings can be most conveniently delivered to contractors, and that contractor, called General, can quietly tap at the door and delicately insinuate that if F. S. details are not ready by such a date, the time of completion of the building will have to be extended. It seems quite ideal to be able to go next door for a criticism, or to borrow a draftsman, or to admire a set of competition drawings.

One Hundred and One Park Avenue is interesting to the architectural profession because here its members can see the offices of several distinguished architects designed by themselves and undoubtedly expressive to a large degree of the taste and character of each. The building is interesting to the building world in general, because here the architects were their own clients and presumably handled the whole enterprise in an ideal way from the architects' point of view — from the purchase of the ground to the solution of the office building problem, and finally, in the letting of contracts and execution of the work.

PARK AVENUE FAÇADE.



TYPICAL FLOOR PLAN.

THE ARCHITECTS' BUILDING, NEW YORK CITY.
Ewing & Chappell, La Farge & Morris,
Associated Architects.

The real history of the enterprise is quite as interesting as one's fancy could wish. The scheme of co-operative offices for architects had been suggested by Charles Ewing seven years before, and, at that time, with the encouragement of John M. Carrère and others, had almost been realized. Now all signs seemed propitious. Mr. Mead gave strong support to the idea, and, with Ewing & Chappell and La Farge & Morris as the active leaders, it quickly assumed definite form. Mr. Burt L. Fenner, as president, headed a stock company composed of fifteen architects and seven engineers.

After a long search for a site one was finally selected, excellent as to its proximity to a great transportation center, the lot chosen being on the corner of Park Avenue and Fortieth Street, two short blocks from the new Grand Central Terminal. The building obtains a south and west frontage. This we may label surprise number one. In the outcome, however, considering the north court light for those who wish it, the long, sunny, breezy south front is voted altogether fortunate.

The financing scheme having been worked out, several general contractors were called upon for estimates. But they couldn't bring the cost down to fit the finances. Speculative builders have constructed the larger part of New York, and they came to the rescue in this case — surprise number two. A firm of builders who had begun with modest tenements and crowned their success as expert buyers of ground and labor and building materials for great hotels and commercial buildings, agreed to furnish our group of architects with both land and building ready for use. A two million dollar bargain was struck over sketch plans and outline specifications. It was agreed by preliminary contract, June, 1912, that working drawings and specifications were to be developed by a certain date, and then, if minds shouldn't meet in design upon one side against price on the other, either party to the contract could withdraw. The preliminaries proved true and the contract was confirmed July 10, 1912, for the completion of the building May 1, 1913. As a matter of fact, the first tenant moved in April 3, 1913, and the building was *really* completed May 1, 1913 — surprise number three. The builders furnished ground and building and procured a first mortgage cash loan and gave a second purchase money mortgage. The architects paid cash for their stock and thus completed the financial deed which made the property theirs. The amount of stock allotted to each bore no absolute relation to the office space desired by each, although the limit of subscription ranged from three to five dollars per foot. But the largest subscriber had first choice of space, and so on. Each subscriber takes a lease like any other tenant at the average price, $1.75 per square foot. His advantage is expected to accrue in the form of dividends which may cover his capital at the rate of five per cent the first year, and, if all goes well, may reduce his rent one-half later on. A special sinking fund is provided to pay off the second mortgage in ten years and a substantial sum, $20,000, in addition, goes annually into a general sinking fund.

PLAN.
OFFICE OF LA FARGE & MORRIS.

The structure has a basement and sixteen stories, with provision for four additional stories. It complies with the law for "loft" or light manufacturing buildings as to floor loads (one hundred and twenty pounds) and as to exits. The three stairways afford evenly distributed fire-protected exits from each story, and are in fact equal in value to five stairways placed in the ordinary fashion. Other ingenuities of plan also are evident and are accomplished in a simple way which gives flexibility as to subdivision highly commendable both from commercial and fire protection standpoints. The typical stories are 12 feet high in the clear instead of the usual 10 feet, and windows placed close to the ceiling give good light even to the rear of 29-foot rooms. In this connection it may be well for architects to recall that drafting tables 32 inches high are better illuminated under the same daylight conditions than tables 42 inches high.

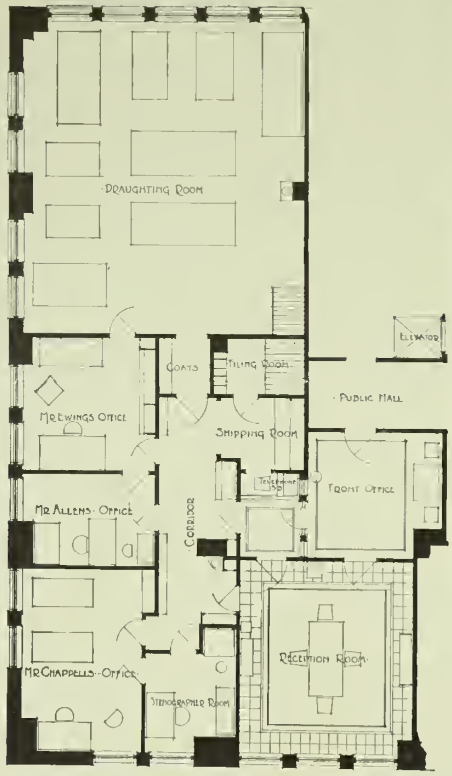
The frame of the building is steel, carrying all walls story by story and reinforced concrete floor slabs with a span of about five feet. The finished floors are concrete with surfaces hardened by the oxidized iron filings process. Each tenant, however, is likely to have a part, at least, of his floors covered with linoleum or some plastic composition. The regular base is of slate, five inches high, and there is a wide border of slate to support radiators and cover their branches. Window frames and sashes are of hollow sheet steel with no inside trim save plaster jambs and slate stools.

The corridor floors are of terrazzo. This material, objectionable because of the tendency of shedding its feather-edged chips of marble and leaving a pitted surface and because of its future zigzag shrinkage cracks, is yet attractive in appearance. It is laid in panels with mosaic borders on the beam lines. The corridor base is Tennessee marble, eight inches high. The critical visitor should know that the owners fully and regretfully realized that, in economizing on plaster wainscot in corridors and omitting marble, they were incurring an increased maintenance cost.

The material used for the first two stories of the building is limestone. The entire shaft of the building is built of brick. Brick lintels have been used without any embellishment, the only break in the plain surfaces being at the fourteenth floor, where a terra cotta sill course runs around the two street façades. A terra cotta cornice with slight projection crowns the upper stories. The building expresses frankly that it is to be used for offices where maximum light is the chief requirement. The design does not conceal the fact that the framework is steel. The corner piers, however, express a certain amount of strength which adds to the pleasingness of the composition.

RECEPTION ROOM.
OFFICE OF LA FARGE & MORRIS.

DRAFTING ROOM.



PLAN.
OFFICE OF EWING & CHAPPELL.

MR. EWING'S PRIVATE OFFICE.

We illustrate herewith plans and several photographs showing the individual offices of the two firms who promoted and designed the building. The plans show the possibilities of layout where the conditions are absolutely favorable. The architects in each case subdivided the space allotted them, always keeping in mind relative importance of space for drafting room, reception room, library, filing, etc., as to insure efficient administration.

It will be noted that special attention has been given in both the offices shown to the matter of office entrances and the control of these. The operator of the telephone switchboard is in a position to direct all visitors to the proper department, quickly sending clients one way and contractors another and, at the same time, can issue and receive drawings and is the better able to do all the useful things which are expected of that functionary.

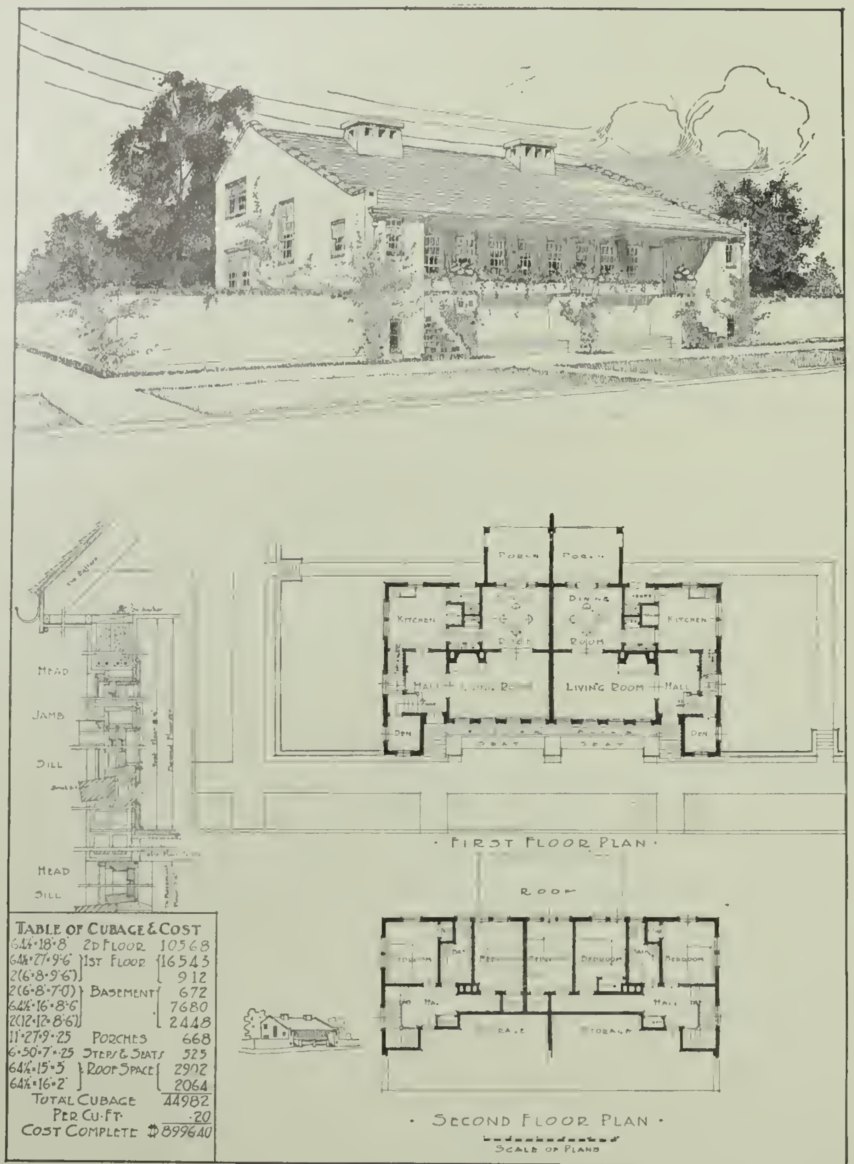
Messrs. La Farge & Morris have collected and placed in their reception room several bits of interesting oriental carving, rugs, etc., the rich coloring of which is suggested by our photograph. The walls are covered with burlap painted a dark green. The color scheme in all other portions of the office is in a light cream or buff. Besides the private offices for the members of the firm it will be noted that provision has been made for an office manager and superintendent. A vault large enough to serve as a filing room is a feature of this office. It is accessible from the main office and drafting room.

The lobby and reception rooms of Ewing & Chappell are light gray and white in a simple and pleasing treatment. The panels of the wainscot are nearly white canvas applied to the walls, overlaid with stiles and rails of plain gray wood. The coat room has hangers on metal rods set at right angles to the wall with individual hat pigeon holes above. In the drafting room, a horizontal bar is hung on curtain pulleys and travels from floor to ceiling in hoisting detail drawings for judgment.

One device which Mr. Ewing recommends to his interested visitor is a bunch of blank cards which are kept within reach for a memorandum record of first interviews with clients. These cards are larger than a letter sheet and have printed down the left margin a list of items suggesting questions which always need to be asked at the outset of any commission to give a clear understanding of the problem in hand.

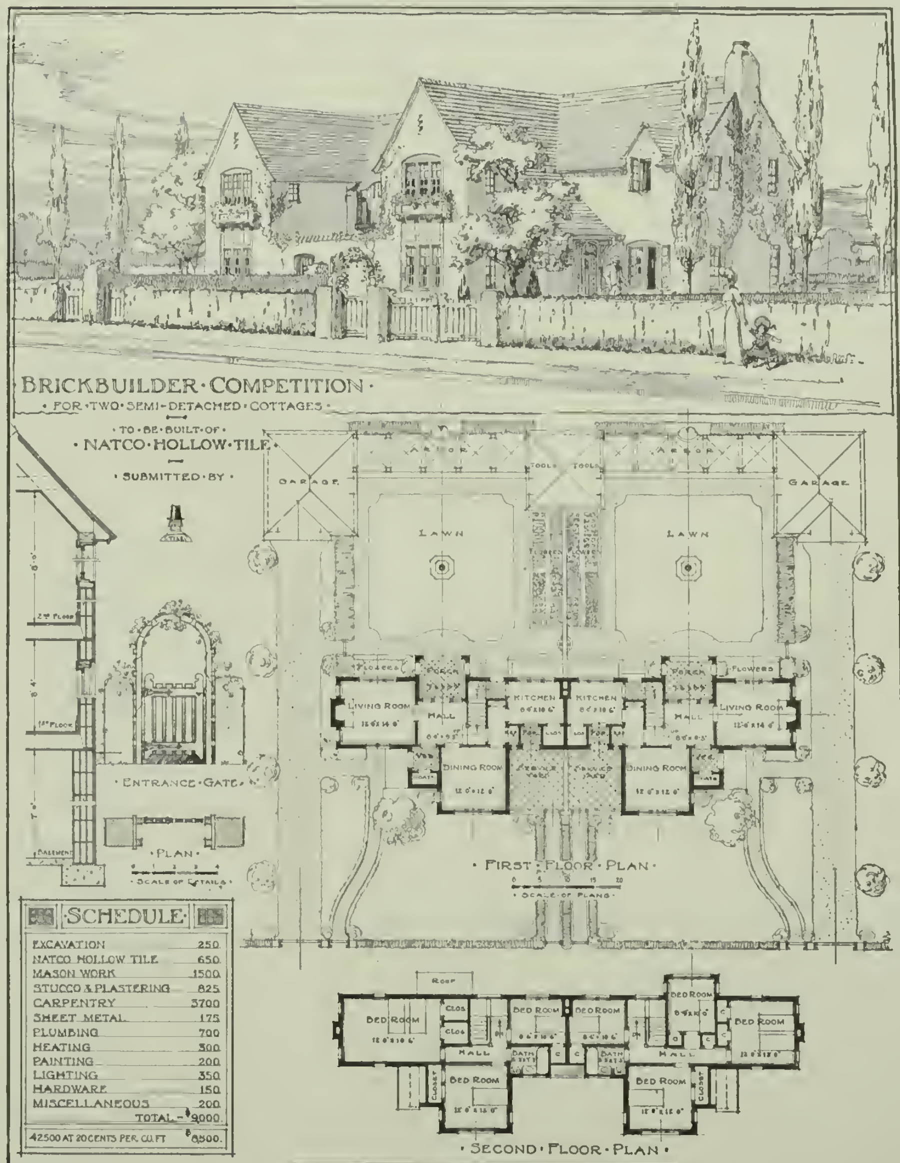
RECEPTION ROOM.
OFFICE OF EWING & CHAPPELL.

These two offices which we have considered are an interesting study, not because they are larger than those occupied by the average architect, but because being newly planned by their owners after a long experience in building up and organizing a successful professional practice, they represent what has been found to be the most economical and efficient arrangement of the various parts making up the business side of an architect's office.



FIRST PRIZE DESIGN

SUBMITTED BY HERBERT A. SULLWOLD
ST. PAUL, MINN



SECOND PRIZE DESIGN

SUBMITTED BY JOHN ALMY TOMPKINS, 2D, AND HARRY BRODSKY
NEW YORK, N. Y.

Competition for Two Semi-Detached Cottages.

TO BE BUILT OF HOLLOW TILE.

Program Governing the Competition.

THE problem calls for Two Small Semi-Detached Cottages — two dwellings under a single roof, separated by a party wall — the walls and foundations of which are to be built of Hollow Tile. Competitors may group the two cottages in any manner they see fit — originality in this respect is sought after.

The location may be assumed in a town, small city, or suburb of a large city. Size and shape of plot to be established arbitrarily by the designer — the land is level.

Each cottage may have two or three floors — above foundation.

One cottage is to provide living accommodations for a family of two adults and two children, and the other, accommodations for a family of three adults and two children.

The cost of these two semi-detached cottages — exclusive of the land — shall not exceed $9,000. The method of heating and plumbing, other fixtures and finish, to be governed by the limit of cost.

The cost of these cottages must be figured at $.20 per cubic foot. Measurements of the cottages must be taken from the outside face of exterior walls and from the level of basement floor to the average height of all roofs. Porches, verandas, and other additions are to be figured separately at one-fourth (25%) of their total cubage. The cost of porches, etc., is to be included in the total cost of the two cottages ($9,000).

All cubage and other dimensions will be carefully checked before the drawings are submitted to the jury.

The jury will not consider those designs which exceed the limit of cost.

The jury will give first consideration to the fitness of the design, in an æsthetic sense, to the material employed; second — the adaptability of the design, as shown by the details, to the practical constructive requirements of the material; third — excellence of plans.

Drawings which do not meet the requirements of the program will not be considered.

On the drawing in a space measuring 6 inches by 5 inches — enclosed in rules — is to be given, at a size which will permit of three-quarters reduction, the cubage of the cottages multiplied by the cost per cubic foot, and the various items with costs which go to make up the total cost of the cottages.

Report of the Jury of Award.

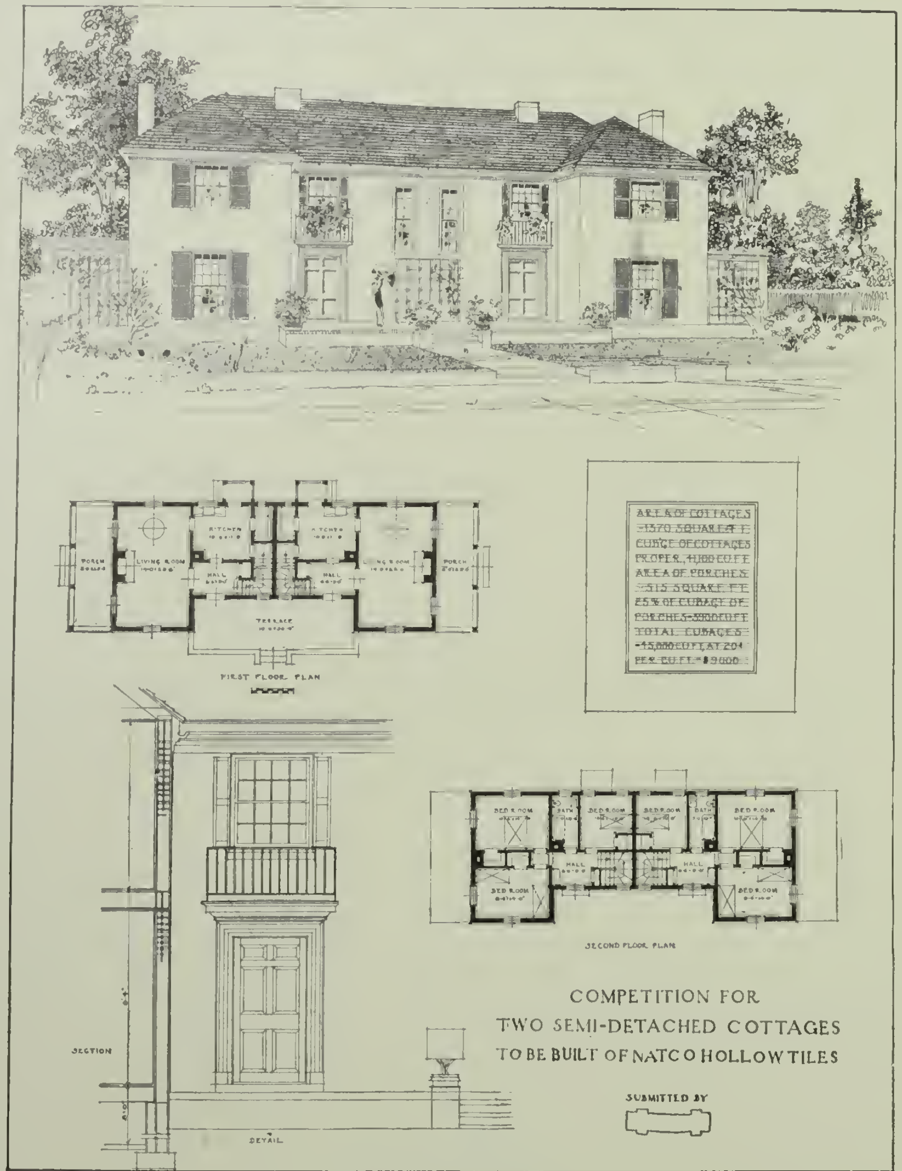
THE problem of a small two-family house is one which has been so often treated as to render anything new extremely difficult of attainment. Moreover, the necessity of basing these particular designs upon the use of stuccoed surfaces of largely uniform character had a tendency to restrict the designs to three general types, namely, the Old Colonial, the English country house, and the Spanish. Under these circumstances the variety of solutions submitted and the general high order of merit was a matter of both surprise and satisfaction to the jury. The results of this competition are an excellent indication of the general advance in design and composition to which the younger generation of American architects are so largely contributing, and, in particular, testify to a very high average of good taste and a strong feeling for simplicity. These facts rendered the duty of selecting the ten best designs one of particular difficulty, as many of the drawings submitted were of almost equal excellence with those premiated.

First Prize. Was awarded for exceptional imagination and originality in the use of the material, this being the primary requisite upon which the judgment was based, according to the terms of the program. This drawing also showed a command of composition and grouping which extended even to the arrangement of the accessories in connection with the rendering, which is particularly to be commended.

In plan, this project is less practical than some of the others. In particular, the rooms marked " Den " are too small to be used for this purpose and might better have been denominated " Coat Rooms," as their real use seems to have been dependent upon the requirements of the exterior effect. On the other hand, this plan shows staircases with square landings, a feature largely neglected in many of the other plans, where winders were the rule. Certain other features, such as the recessing of a space for the kitchen stove, are also to be commended.

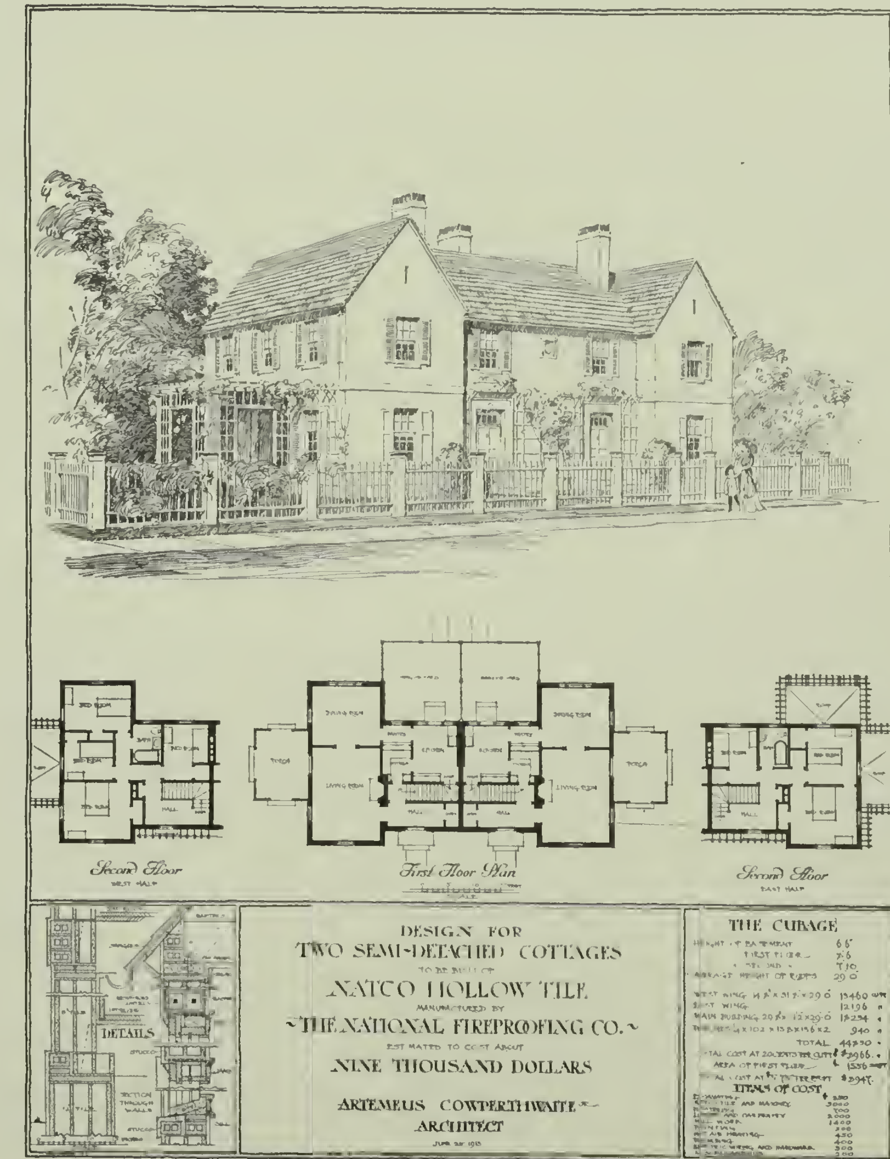
Second Prize. Was awarded to a scheme less interesting in design than the one already mentioned, but showing more careful study in the arrangement of the plan and better knowledge of livable conditions. In particular the grouping of the service in such a way as to be convenient to the street and as not to interfere with the use of the garden, is a point of particular value. This arrangement concentrates the plumbing while keeping the main entrance entirely separate and in direct communication with the garden at the rear. It also carries out the intentions of the program with reference to bedroom facilities. There is no doubt that this would give greater practical satisfaction to an owner than the first prize, although doing less for the advancement of architectural design. The exterior is, however, better than it appears, as its effect is marred by the rendering.

Third Prize. Was given to a simple and attractive design. It would be improved in plan by dividing the living room from the dining room, and as the cubage was well within the requirements, both living and dining rooms, together with the bedrooms above, might have been enlarged to advantage. While this design is well adapted to the use of tile, the actual detail of the construction was



THIRD PRIZE DESIGN

SUBMITTED BY LOUIS SCHALK AND FRANCIS D. BULMAN
SAN FRANCISCO, CAL.



FOURTH PRIZE DESIGN

SUBMITTED BY ALFRED COOKMAN CASS
NEW YORK, N. Y

poorly indicated and showed a lack of knowledge of the material to be employed. The perpendicularity of the two center windows is also disagreeable, but there is a nice feeling in the detail of the door.

Fourth Prize. Was awarded to a design which, although simple and well considered, was somewhat lacking in originality. In plan the entrance halls are narrow and unsatisfactory, owing to the service arrangement which necessitated a closing off of the staircase. This drawing is commended for good general composition and excellent presentation.

The six drawings following the prizes have been given equally honorable mention and the order in which they are discussed bears no relation to their respective merits.

The mention drawing shown at the left, on this page, shows a simple and attractive exterior with a distinctly homelike charm. It is also very agreeably presented and in particular the free-hand rendering of the plan eliminates much of the stiffness which characterizes the presentation of other drawings.

The mention drawing shown at the right of the same page shows a good livable plan with proper separation of service yard from garden. Certain practical points are, however, forgotten. In particular, no kitchen chimney is shown and this design would, therefore, be unsatisfactory in parts of the country where the gas stove and fireless cooker are not in general use.

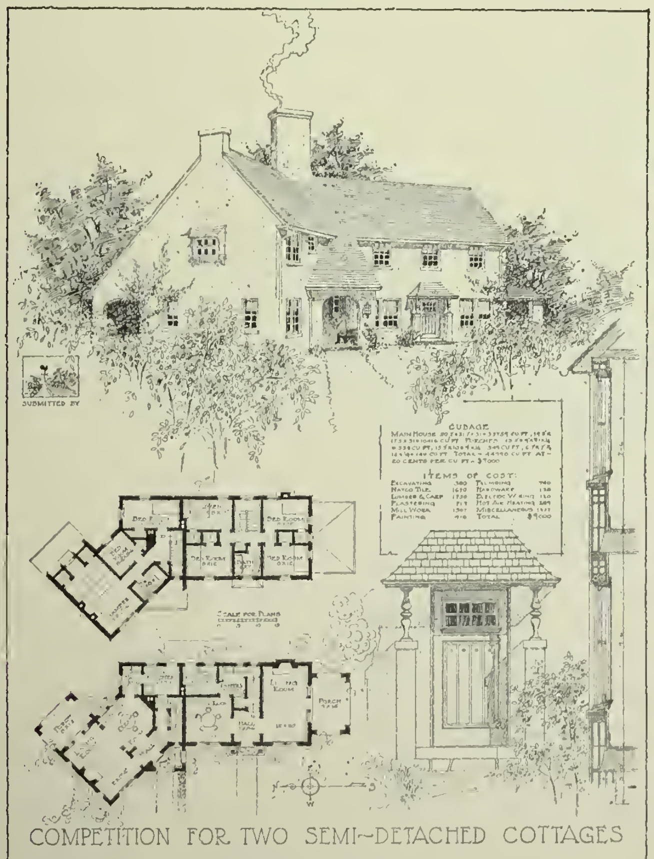
The mention drawing shown in the upper right-hand corner of page 186 while attractive is to be criticized for the treatment of the tops of the walls of the bay windows, which in actual construction would result in staining and disintegrating the stucco surface. The difference in the two doorways is out of keeping with the otherwise symmetrical treatment of the elevation. The bay windows also appear to be incorrectly shown in perspective, as they give the effect of rectangular projections which, in point of fact, would have been much better than the sloping bays shown in plan.

The mention drawing shown in the upper left-hand corner of page 186 shows a simple, straightforward plan, but commonplace and lacking in originality of design. The presentation is also unfortunately complicated.

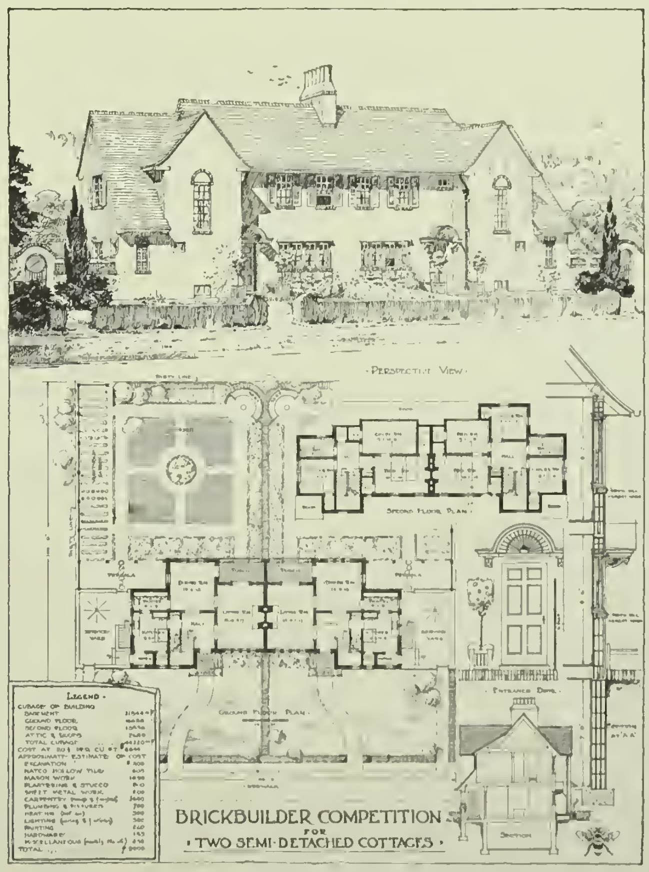
The mention drawing shown in the lower left-hand corner of page 186 is interesting in general character, but has the disadvantage in plan that it is necessary to pass through either the dining room or living room in order to go from the kitchen to the front door.

The mention drawing shown in the lower right-hand corner of page 186 is simple in plan and beautiful in rendering, but the exterior would be hard and uninteresting in actual execution.

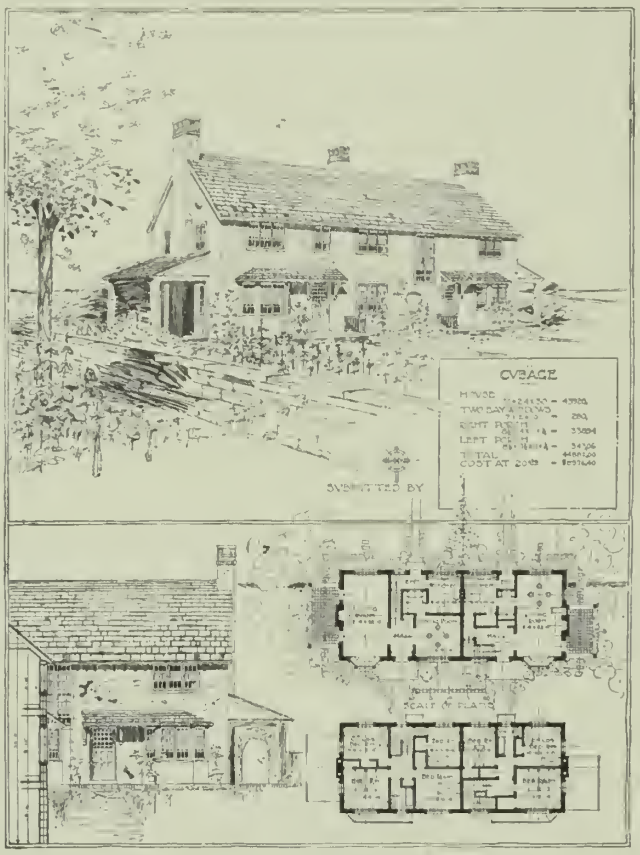
Frank Chouteau Brown, Boston,
Abram Garfield, Cleveland,
William H. Schuchardt, Milwaukee,
Hugh Tallant, New York,
Waddy B. Wood, Washington,
Jury of Award.



MENTION DESIGN
SUBMITTED BY PAUL C. DUNHAM, Brooklyn, N. Y.

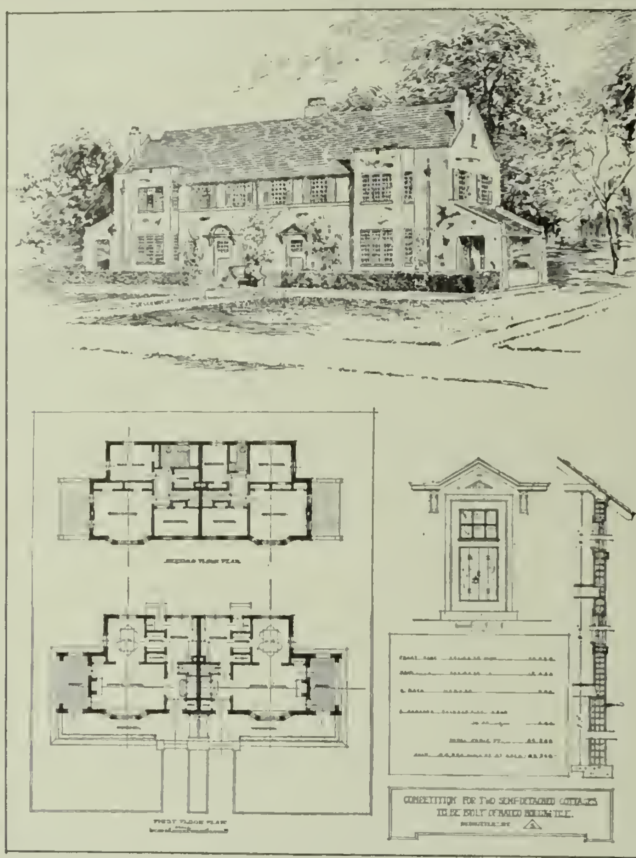


MENTION DESIGN
SUBMITTED BY ROGER H. BULLARD, New York, N. Y.



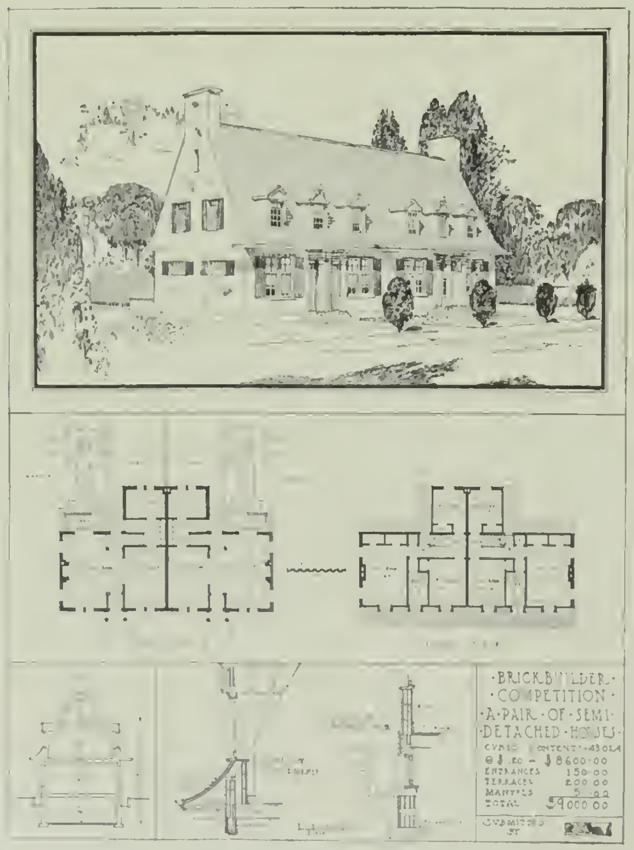
MENTION DESIGN

SUBMITTED BY LESTER E VARIAN, DENVER, COLO.



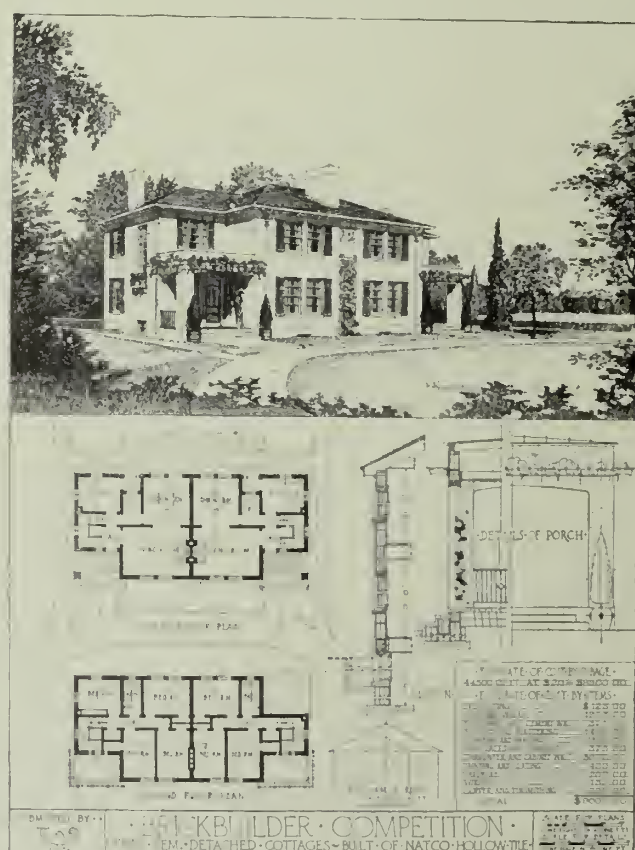
MENTION DESIGN

SUBMITTED BY ROBERT L STEVENSON, NEW YORK N Y.



MENTION DESIGN

SUBMITTED BY S DOUGLAS RITCHIE, MONTREAL, QUE., CAN



MENTION DESIGN

SUBMITTED BY H. K. CULVER, NEW YORK, N. Y.

Architectural Jurisprudence.—Part IV.

THE ARCHITECT AS ARBITRATOR.

BY WILLIAM L. BOWMAN, C.E., LL.B., OF THE NEW YORK BAR.

IN his ordinary professional employment the architect assumes the unique and exceptional legal combination of an employee or agent for the owner and at the same time arbitrator between the owner and the contractor. Under the usual rules governing the qualifications of an arbitrator, an architect would be ineligible to act or would be disqualified on account of his interest created by his employment by the owner. That the architect and also the engineer should be the only ones to occupy such an exceptionally difficult and supremely honored position may seem strange, but it is nevertheless true. In a late opinion commenting upon this fact one of the judges wrote as follows: "True it confides much to the judgment, impartiality and integrity of the architect; but it has long been a feature in building contracts, and that it obtains to-day as largely as ever shows that experience has approved it." Nor has the architect been given or retained this position without serious legal conflicts. As each new clause of building contracts was put into practice, calling upon the architect to act as arbitrator, it has been questioned whether or not the law should sanction a reference to the agent of one party of such matters as might already be matters of judgment of the architect or which might even cover disputes involving the question as to whether he has himself acted with due skill and competence in advising his employer in respect to the carrying out of the building contract. Now, however, most of our common contract clauses under which the architect acts as arbitrator have been passed upon and held valid by the highest courts.

In this paper we will take up only the positions of arbitrator as set forth in the usual building contract between the owner and the contractor. Hence this does not go into the statutory arbitrations which are now possible under different state statutes and which method is becoming more common as a means of settling disputes that would otherwise call for the delays and expense of a court trial.

Competency of Arbitrator. Generally speaking, any architect may be named or selected as an arbitrator notwithstanding his natural incapacity, or legal disability as infancy or even lunacy; or his disqualification on account of interest, provided such interest be known to both parties at the time of the signing of the contract. There may be circumstances unknown either to the owner or the contractor and calculated to bias the mind of the architect where the court would interfere if called upon so to do. In one case, unknown relationship of the architect to the owner was held a disqualification; in another, relationship and owing the owner a large sum of money. To be indebted to one of the parties in a small way probably does not disqualify, but it should be avoided. That the architect was a stockholder of the building employer has been held to make him incompetent to act. Since the relation between the owner and the architect is such as would ordinarily disqualify the architect from acting as arbitrator where the owner is concerned, the courts are quick to note the existence of any other facts which would further influence the judgment of the architect favorably to the owner. On this account the architect should always be sure and disclose such matters to the contracting parties when he is named in the building contract.

Where the relationship, etc., which would ordinarily tend to create a bias arises after his selection as an arbitrator, the architect is not prevented from acting in this capacity, nor does it revoke the submission. It has been held that where the architect angrily sues and pushes an action at law against one of the parties that such conduct would revoke the arbitration. The contrary has been decided where one of the parties sues the architect. It is hard to see why this distinction just mentioned should exist, and it can be best explained by the fact that the decisions are not in the same jurisdiction or court.

As to whether or not the submission of matters to the architect as an arbitrator can be recalled at any time by either parties, it would seem that the usual rule would apply, namely, that either party could withdraw at any time prior to the rendering of a decision by the arbitrator. There seems to be a tendency in this class of arbitration, however, to make a distinction and as far as possible to sustain the submission. Thus one state has held that if the naming of the architect as an arbitrator has been made in a sealed instrument, it would require a sealed instrument for revocation. In the same case there is also an intimation that the court would consider the revocating of such an important contract clause, such a breach of the contract as would enable the contractor to take advantage of, either by rescinding, or by enabling him to continue the work and to collect whatever damages he might be able to show were sustained by the refusal to arbitrate.

Authority of Arbitrator. Strange as it may seem the architect never knows his full duties until the building contract is signed by the owner with the general contractor or the various contractors who are to do the work of the different trades. He becomes an arbitrator solely under the clauses of the building contract. Thus it would seem that if there is no written contract he would probably have no such powers as we are now about to discuss. Of course in such a situation it is probable that the owner and contractor might, when the emergency arose, call upon the architect to decide, but the architect should be sure that he has received such joint request for his action before taking a hand in the matter. An arbitrator has been defined as "a private extraordinary judge to whose decisions matters in controversy are referred by consent of the parties." His power has been very aptly stated by one judge in these words: "So long as the arbitrator acts uprightly and impartially, and keeps within his authority as designated by the submission, his judgments are unimpeachable and irreversible; he may do what no other judge has a right to do — he may intentionally decide contrary to the law and still have his judgment stand." With this as a text and motto no architect should ever be at a loss what to do or how to decide in such matters. The honor and dignity of his position and profession should prevent his acting other than justly and equitably.

Whether, under certain circumstances or pursuant to certain contract clauses, the architect is an arbitrator or an agent of the owner, is often difficult to decide. No simple rule of determination can be given. For a general statement of little practical help we say that the intention of the parties would govern. Probably in all "dispute" clauses the architect is arbitrator, also in "construction of drawings and specifications," "extra work," and "payment" clauses except where the architect is definitely stated in a preceding part of the contract to be "the agent of the owner."

Before we consider some of the most common clauses under which the architect acts as arbitrator, one important fact must be kept in mind which will be emphasized throughout, — that an arbitrator must be governed by a strict and literal meaning of the words used to express the submission of the parties.

I. The architect's decision "as to the true construction and meaning of the drawings and specifications shall be final."

This clause has just lately been held valid by the United States Supreme Court. Another court which decided the same way added that there was implied a condition that the decision should be honest. Pursuant to this clause the architect becomes an arbitrator whose decision is conclusive of the matter passed upon in the absence of fraud, or such gross mistake as would necessarily imply bad faith or a failure to exercise an honest judgment.

The decisions considering this clause have held that the architect was not authorized to make a change in the contract; nor to order the work stopped — no question having arisen as to the plans or drawings or the manner of doing the work; nor to determine the rights of the parties as to other matters; nor to determine whether work done by a subcontractor has been performed in accordance with the contract. In one state it has been held that this clause necessarily gives the architect the power to pass upon the question as to whether certain work is extra or not. A summary of the decisions considering this clause deeply impresses one with the fact that the architect's authority is restricted to the literal meaning of the words used.

II. As arbitrator of extra work.

In some states, and especially where the building contract speaks of the architect as agent of the owner, it is held that when the architect passes upon the question of extra work he does so as agent of the owner and not as arbitrator, and hence his decision is not binding upon the contractor. The determination of extra work, its value, etc., must be specially provided for if the architect is to act as an arbitrator, since such extra work being outside the contract would not otherwise be governed by the contract provisions. The architect must find express authority to act before doing so in this regard. This has been decided in cases where excavations are required to be carried below grade; where the work was rendered more difficult at actual increased cost; or where there were losses for materials wrought or supplied. Where the architect was to decide in case of disputes as to the true value of extra work, a court has decided that that did not include the questions whether certain work was extra or not, or whether extra work done at an agreed price was properly done.

Where a contract made the architect "an umpire to determine all questions growing out of the contract" and making him the sole judge of the quality and quantity of work done and material furnished, it was held that his powers did not extend to extra work done outside the contract. Power to pass upon the quantity and quality of work as it progresses does not make the architect arbiter to pass upon the meaning of the contract as to an ambiguous clause. In cases where the architect was to decide all disputes relating to the contract that does not apply to differences as to claims for extras.

III. As arbitrator of disputes.

There are many and diverse expressions covering the matter of disputes. It is impossible to consider but a few of the most important here. Probably the most common forms for such clauses start "if any disputes arise," etc., or "any and all disputes," etc., shall be decided by the architect. They have been held to limit the authority of the architect to cases in which disputes have actually arisen. In these numerous clauses used we also find what seems identical wording held to have contrary meanings in different states. Where the architect was to decide controversies growing out of work specified in the contract, and such contentions or differences as might arise in the premises, it was held that he had no power to annul the contract; on the other hand, where he was to decide "all disputes relating to and touching" the contract, it was held that the question of the dismissal of the contractor must be submitted to the architect for final decision.

A late case involved this wording: "should any disagreement or difference arise as to the true meaning of the drawings and upon any point concerning the character of the work the decision of the architect shall be final and conclusive and binding upon the parties to the contract." The court decided that this limited his power to disputes arising as to the true meaning of the matters mentioned, and he could do nothing with regard to disputes as to delay or liquidated damages for the same.

It would hardly seem necessary to point out that the power of the architect to act under these clauses ceases when the contract is broken or completed. Yet the following incident will show that the contrary opinion has been held by an architect who should have known better. A building had been completed and was apparently satisfactory to both architect and owner and the final certificate had been issued. A payment was delayed because of financial troubles of the owner. Later complaints were made that the building became damp and even that water seemed to penetrate the walls after a heavy storm. The trouble was probably due to the character of the patent blocks which were used and also to poor design as to the method of waterproofing. The owner asked the architect for advice and was told that he could compel the contractor to do the work under Clause V. of the so-called uniform contract. The architect then wrote the contractor that under said clause he demanded that he start at once to perfect the work and make the building watertight, or that the owner would do the work and charge the expense against the contractor. Luckily for the architect the matter was settled out of court. As a legal proposition the action of the architect was indefensible and if it was a bluff it put him in an unfortunate position had he been compelled to take the witness stand.

In this connection the architect should know that in certifying to the default of a contractor when it is in his opinion sufficient reason to permit the owner to terminate the contractor's employment, he occupies his judicial position, and is bound to act impartially and in due form. Thus where an architect merely wrote the owner a private letter expressing an opinion that the contractor had defaulted so that the owner could discontinue his employment, which opinion was not communicated to the contractor, it was held that the owner was not justified in rescinding the contract. This example then gives us another rule, namely, that in his decisions as arbitrator the architect must act formally and with due notice to both parties concerned.

IV. Arbitration as to payments.

In many jurisdictions the architect is considered as an arbitrator in his making of monthly partial payment or final estimates and in issuing the respective certificates. Such estimates and certificates even if incorrect often give the contractor no cause of action. They are not binding, however, if the architect misinterprets the contract provisions. In other words, the architect cannot oust the court of jurisdiction to construe the terms of the contract or decide the contract rights of the parties. The power to make estimates does not permit the architect to fix another or different price or measurement of compensation. For example, where a contract specifies that the owner shall pay thirty-five cents per cubic yard for earth excavation and seventy-five cents for rock, the architect cannot make a new classification of loose rock at fifty cents. Loose rock is *rock* in that contract and must be paid for at the full price. Nor can the architect refuse compensation for frozen excavation as such for the reason that the contractor might have done the work before cold weather.

Where the architect was required to certify to "all payments" and the contractor, claiming to have completed, quit so that the owner claimed to complete as agent of the contractor, it was held proper for the architect to charge for supervision but not for the rental value from the date of contractor's alleged completion to the date of actual completion, that not being within the submission. Where the architect is made the judge as to when the contract is completed, it has been held that it does not give him the right to pass upon claims for damages for nonfulfilment.

There are many serious questions for the architect regarding the form of wording of his certificates, but it is impossible to go into detail in this paper. Except for the fact that the question has actually arisen, it would seem hardly necessary to state that where an architect is only employed to prepare plans and not to supervise he does not have to make estimates or issue certificates even though he is mentioned in the building contract as an arbitrator in that respect. Consequently, in such case the contractor does not have to have a certificate before he can get his payment from the owner. Certificates, of course, should be signed only by the architect who is the arbitrator, although the data need not to have been personally collected by him. Above all, the certificates should in wording conform to the submission wording in the contract.

V. Negligence of the architect.

Suppose the architect is himself partially or wholly responsible for the conditions which require his action as arbitrator, can he act? The better opinions say no. As a matter of common decency no architect should act under such circumstances. One opinion says: "Nothing short of the most positive and definite agreement of the parties could justify the architect in passing upon the question of whether his own negligence was the cause of the damage. The idea of one acting as an arbitrator where his own conduct is one of the elements to be passed in review is repellent to sound instincts." In a very late case the following is found: "Certainly it could not have been the intention of the parties to deliberately enter into a covenant providing that the arbiter should have the right to pass upon and finally determine questions involving their own failure in the performance of duties." Hence in cases where the disputes arise from delays in furnishing plans or details — delays due to changes; mistakes in plans and specifications necessitating work to be changed and done a second time; delays in decisions — the question is always proper for the architect to ask himself: "Can I or should I in this case act as an arbitrator? Have I the right and if I have can I control my personal feelings sufficient to give an honest and unbiased decision?" The answers depend upon the strict wording of the clause in question and also upon the moral fiber of the architect.

It might not be out of place here to suggest that an estimate is not a certificate, a distinction which is sometimes overlooked. Whether or not a certificate when issued ousts the court of jurisdiction to pass upon the questions involved in such certificate, depends upon whether the architect had the power to act and whether his decision was free from fraud or collusion.

Summary. Our considerations have made clear to us that the most important matter for consideration as to whether the architect is or is not an arbitrator is the wording of the particular clause of the building contract. Since legally such contract may consist of the contract proper and the general conditions attached to the specifications, it is well to see that there is no conflict between these two documents. All such clauses will be strictly construed and no implied powers will be given the architect.

If you are made arbitrator by a clause, remember that you have greater powers than the judges on the bench, hence your decisions should be beyond reproach. The fact that in the exercise of your duties as arbitrator you cannot be held legally responsible for lack of skill, carelessness, or even negligence should create an ambition to merit the honor bestowed. Never forget you are taking the place of the court, and your action may close the door to either party to appeal from your decision. Professional honor and reputation often depend more upon the architect's action in such matters than his pure architectural knowledge, and let him once be guilty of fraud or try as a witness to sustain a dishonest or collusive decision made by him as arbitrator, and he might as well give up further practice of his profession — he is an outcast with whom clients will not deal, with whom reputable architects will not associate, and for whom contractors will not work.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IT IS interesting to compare the results which have been achieved by our larger cities in regard to the regulation of the height of buildings. There seems to be no uniform method of regulation, and the following statement of building heights is valuable for comparison as well as indicating the conditions which governed the adoption of the respective ordinances.

Baltimore. — Fireproof buildings limited to 175 feet, and non-fireproof buildings to 85 feet.

Boston. — Two and a half times the width of the street; maximum 125 feet.

Buffalo, N. Y. — No height greater than four times the average of least horizontal dimensions of the building.

Chicago. — Absolute limit of 200 feet.

Cleveland. — Two and a half times the width of street, with maximum of 200 feet. Recesses or set-backs to be counted as added to width of street.

Denver. — Buildings not to exceed 12 stories. Those more than 125 feet to be fireproof.

Indianapolis. — No regulations as to height of fireproof buildings, except on Monument Place, which is regulated by State law, where no building shall be over 86 feet.

Jersey City. — No building or structure, except a church spire, shall exceed in height two and one-half times the width of the widest street upon which it stands.

Los Angeles. — Limit of 150 feet is fixed by city charter. This applies to Class A steel frame buildings. City ordinance fixes the limit of height at 133 feet for reinforced concrete Class A structures.

New Orleans. — The height at the street line shall not exceed two and a half times the width of the widest street which the building faces, but any portion of the building setting back from the street may be increased in height up to two and a half times the distance from the face of such offset to the property line at the opposite side of the nearest street.

Newark, N. J. — No building shall exceed 200 feet, but if to be used as warehouses or stores for storage or sale of merchandise, shall not exceed 150 feet.

Paterson, N. J. — Warehouses and stores must not exceed 100 feet in height.

Portland, Ore. — Code of 1911: "No building or other structure hereafter erected, except church spire, shot tower, water tower or smokestack, shall be of a height exceeding 160 feet.

Providence, R. I. — Has height limitation ordinance before council, representing the persistent effort of the local chapter, A. I. A., and Cincinnati, Ohio, is proposing to present ordinance of limitation.

St. Louis. — On streets less than 60 feet, two and a half times the width — maximum 150 feet — except hotels, which are limited arbitrarily to 206 feet. Office buildings may be erected to a height of 250 feet, under special conditions.

St. Paul, Minn. — Not more than 20 stories; 250 feet maximum limit.

Tacoma, Wash. — Class A buildings shall not exceed 12 stories or 152 feet; if all interior as well as exterior is of fireproof construction, same can be 16 stories, or 200 feet.

Washington, D. C. — In the main the limit is the width of the street plus 20 feet; maximum 130 feet on business streets (160 feet on north side of Pennsylvania Avenue), and 85 feet on residence streets.

FELLOWSHIPS OF THE AMERICAN ACADEMY IN ROME.

(PRIZE OF ROME.)

THE following fellowships are *awarded annually* by the Academy, viz.:

A fellowship in Architecture, of the value of $1,000 a year for three years;

A fellowship in Sculpture, of the value of $1,000 a year for three years;

A fellowship in Painting, of the value of $1,000 a year for three years;

Two fellowships in Classical Studies, each of the value of $1,000 a year, which may be renewed for a period not exceeding three years.

The awards are made on competitions which are open to unmarried men who are citizens of the United States; if in the fine arts, to men only; if in classical studies, to men and women, who comply with the regulations of the Academy.

Information as to the terms and conditions of the competitions may be obtained from the Secretary of the Academy, 101 Park Avenue, New York City.

The advantages, which the Academy offers, place the American student, who is successful in obtaining one of its fellowships, on a par with the holder of the Grand Prix de Rome, and it should exert an influence upon art in America, no less important than that which the French Academy has exercised upon the art of France, and in a broader field, for it stands for the art of expression in every form and offers as great an opportunity to the student of history as to the artist.

COMPETITION DRAWINGS.

WE have in our possession many drawings which have been submitted in THE BRICKBUILDER competitions. In every instance these drawings are being held because the return postage has not been sent us, although we have advised every owner of the drawings of this fact two or more times.

We hereby give notice that unless postage ($.25 in stamps) is sent to us between now and October 1, 1913, all these drawings will be destroyed. Upon receipt of postage the drawings will be immediately returned.

ROGERS AND MANSON COMPANY,
85 Water Street, Boston, Mass.

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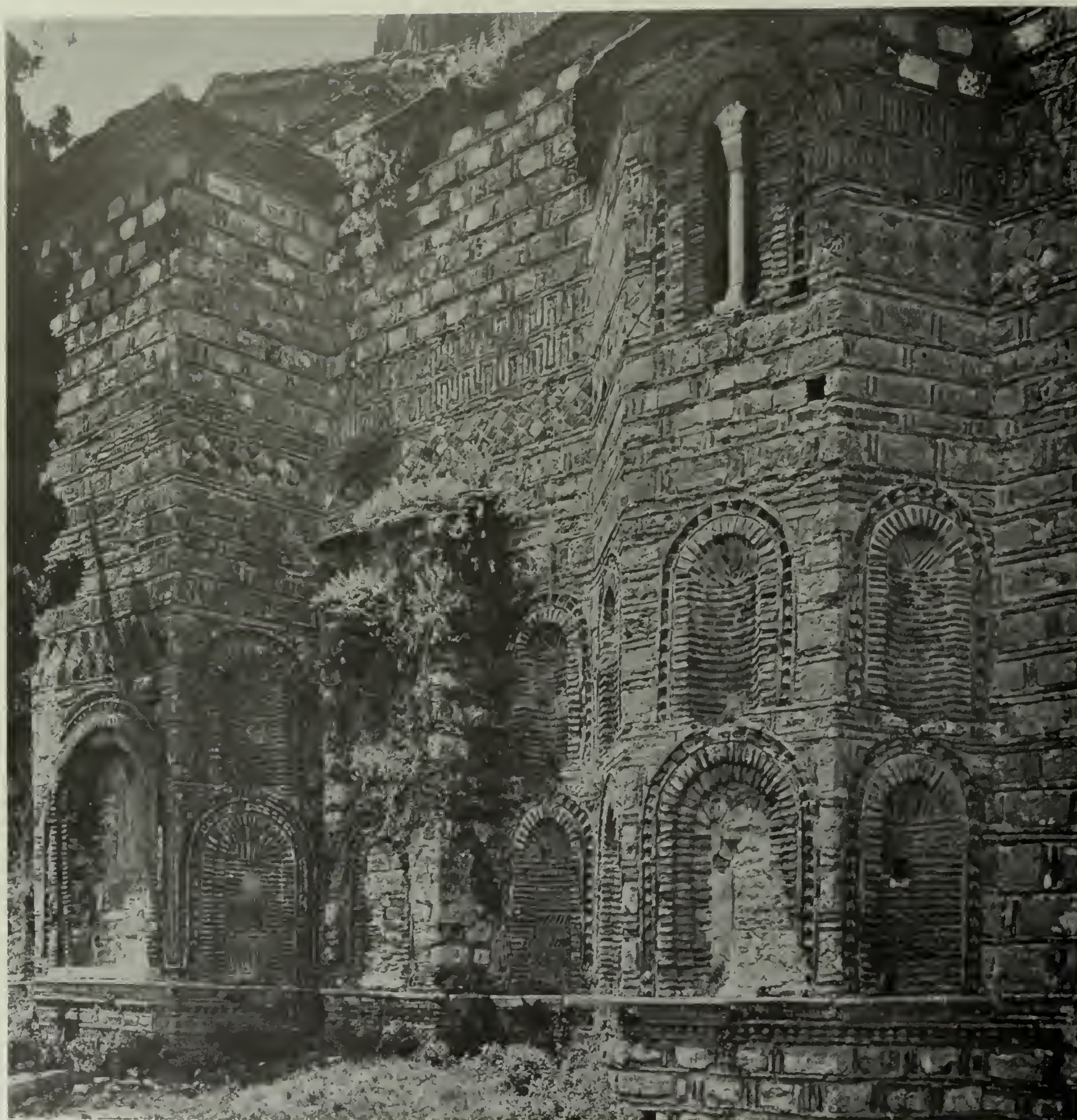


Photo by the Royal Prussian Photometric Institute.

CHURCH OF PANHAGIA PAREGORITISSA
(THE VIRGIN OF CONSOLATION) DETAIL OF EAST END
ARTA, EPIRUS, GREECE

End of Thirteenth Century. Typical of the last flowering of Byzantine art. All the patterns are formed of simple combinations of common brick, squared stone, and colored tile.

THE BRICKBVILDER

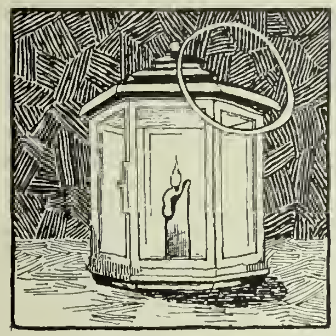
SEPTEMBER, 1913

VOLVME XXII. NVMBER 9.

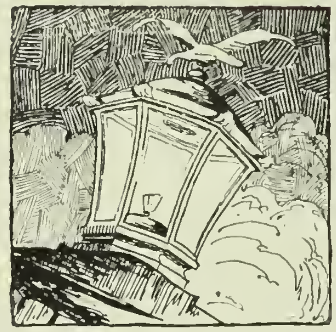
THE LIGHTING OF PUBLIC AND SEMI-PUBLIC BUILDINGS

By L. B. MARKS

Consulting Illuminating Engineer, New York City.



THIS is the first of a series of articles by Mr. Marks to treat of the artificial lighting of public and semi-public buildings. So much of the architectural effect of the interior depends upon its illumination that the study of this problem is well worth the serious attention of the architect. The first of the series sets forth the basic principles underlying good lighting, and in subsequent issues a study of specific installations will be made, accompanied by illustrations of many fine examples. The classes of buildings to be discussed are grouped under the following general headings: 1. Court Houses, Custom Houses, Post Offices, City Halls, etc. 2. Museums, Art Galleries, etc. 3. Libraries, Schools, etc. 4. Theaters, Music Halls, etc. 5. Auditoriums, Assembly Halls, Armories, etc. 6. Churches, etc. 7. Hospitals, etc. 8. Railway Terminals, etc. 9. Hotels, Clubs, etc. 10. Offices, Exhibition Rooms, and Miscellaneous.



THE GENERAL PROBLEM OF ARTIFICIAL ILLUMINATION COMPARED WITH THAT OF DAYLIGHT. Natural light has always been the criterion of that which is most desirable to obtain by artificial lighting. The broad problem in artificial lighting is how to obtain, with the comparatively feeble flux of light we have at our command from artificial sources, as close an approach as possible to the character of lighting obtained from the enormous flux of daylight. With the well-known limitations of artificial light it would, at first sight, appear impossible to reproduce in effect the conditions which obtain in daylight illumination.

The development of the science of illuminating engineering has, however, demonstrated that step by step we are changing our methods of artificial lighting and approaching more nearly the ideal conditions. The handicap of artificial light is not nearly so great as would appear.

Contrast the problem of daylight illumination with that of artificial lighting. We have, on the one hand, a tremendous flux of light and an enormous area from which the light comes, and, on the other, an extremely limited flux and, usually, a comparatively small area from which the light comes. Fortunately, the eye is so constituted that we are capable of good vision between an extremely wide range of luminous intensities. We may see well, and without visual fatigue, in daylight at an intensity of 500 foot-candles (about 5,000 meter-candles) and more, and at 1 foot-candle (about 10 meter-candles) and less. Under good conditions of artificial lighting we may see well, and without visual fatigue, at several hundred foot-candles intensity and at less than 1 foot-candle intensity. The unit in which illumination is measured is called the foot-candle and is the intensity of light at a point on a surface 1 foot distant from a light source of 1 candle power, when the surface is perpendicular to the direction of the light rays.

The ability of the eye to adjust itself to very low-working intensities of illumination makes it possible to simulate daylight conditions in the design of the artificial lighting of interiors. While we recognize this possibility, we realize that before the eventuality of an ideal design there remains to be performed a mass of experimental work, investigation, and research, involving a close analysis of conditions of illumination of which we have practically no data at present, and, in general, a complete study of the problem from the physical, physiological, and psychological standpoints.

Up to the present time, lighting by artificial sources has, for the most part, been carried on by illumination from substantially point sources. These are the sources with which we have to do for the most part at present, and which will continue to occupy our attention in the immediate future.

FUNDAMENTAL PRINCIPLES OF THE ARTIFICIAL ILLUMINATION OF INTERIORS.

The general principles underlying good lighting are the same whether the light be used for the illumination of a public building or of a private house, and whether the source of light be an electric lamp, a gas lamp, or an oil lamp. A discussion of these principles follows, abstracted, in the main, from the writer's lectures on "Principles and Design of Interior Illumination," delivered at the Johns Hopkins University lecture course on illuminating engineering.

In public buildings the question of lighting often assumes a more important aspect than in other classes of buildings, by virtue of the use of the former by the public. The consideration of light as a factor of safety must be given great weight in planning the lighting of public buildings. The design of the lighting layout with reference to the hygienic use of light is also of paramount importance. The scheme of lighting should be in keeping with and aim to bring out the beauty of the architecture and decoration and at the same time provide sufficient intensity of light to meet the demands of young and old, strong sighted and weak sighted. In public buildings as a rule the lights must be located out of reach of the public to prevent tampering or interference with the fixtures and lamps; the same restriction holds for location of switches which latter must be inaccessible to the public. The arrangement of circuits should be such as to make for the best economy in the operation of the lights; that is to say, careful provision should be made for the independent control of such lights or groups of lights as are likely to be used separately at times. However, too great refinement in control should be guarded against, as one of the important objects of the lighting, namely, to make the building cheerful in appearance and attractive at night, may thus be defeated. Above all, the lamps should be well shaded to minimize glare from the light source and consequent brilliant reflection from polished surfaces of glass, furniture, paintings, woodwork, paper, etc.

In studying the principles underlying the application of artificial light to the illumination of interiors, we must consider, broadly, the following:

I. Flux of Light.
II. Diffusion and Direction of Light.
III. Quality or Color of Light.

The study of the above involves the consideration of:

A. Selection of Illuminant.
B. Intensity of Illumination.
C. System of Illumination.
D. Location of Lighting Sources.
E. Lighting Fixtures: Globes, Shades, and Reflectors.
F. Glare and Intrinsic Brightness.
G. Regular or Specular Reflection.
H. Contrast.
I. Shadows.
J. Esthetic Considerations.
K. Economy and Efficiency.

The above headings are not arranged in the order of their importance. In fact, it would be difficult, if not impossible, to name any one item in the list which could be said to be less important than another. The violation of a single principle of illumination, no matter how seemingly trivial the violation may be, may make the difference between success and failure in the accomplishment of the desired result.

I. FLUX OF LIGHT.

The flux of light required for the adequate and suitable illumination of the interior will depend upon a variety of conditions. The governing consideration in all cases is, of course, the ability to see well, but coupled with this must be visual comfort while occupying the interior, whether for a short or a prolonged period of time. Unless all of the conditions of usage of the light and of equipment of the interior are definitely defined, it is impossible to state in advance, with any degree of precision, what flux of light will be required to supply adequate and suitable illumination.

The flux of light required for the illumination of a given interior will depend (*a*) upon the actual intensity necessary on the work or on the objects viewed, and this in turn will depend upon (*b*) the system of lighting employed; (*c*) the location of lighting sources with reference to the field of view; (*d*) the intrinsic brightness of the lighting sources; (*e*) the contrast in the degree of illumination in different parts of the interior; (*f*) the extent of regular or specular reflection from the objects viewed; (*g*) the color of the light and the color of the ceilings, walls, floor and room furnishings, and (*h*) upon the personal equation of the user.

In determining the flux of light required for the illumination of an interior, it is customary to assume a definite intensity on a reference plane, usually a horizontal working plane 2 feet 6 inches (0.76 m.) above the floor. Based on experience in existing lighting installations, we know that the flux of light required to give the needed intensity may vary between very wide limits, depending upon conditions which have been named above.

In determining the total flux needed, the method employed at present is to assume certain intensities that have been found in practice to be nearest the desideratum under well-defined conditions that have been established in a parallel case.

II. DIFFUSION AND DIRECTION OF LIGHT.

In daylight illumination of interiors, we have a natural diffusion of light, as well as definite direction. In illumination by artificial light, however, we find it very difficult to reproduce these conditions, and are often compelled in practice to sacrifice diffusion for direction or *vice versa*.

The layman in considering the illumination of an interior by artificial light sees little more in the problem than hanging a sufficiently powerful light in the center of the room, and possibly supplementing this by a number of side lights around the room. His idea usually is that if a sufficiently large flux of light is provided, all that remains to be done is to select lighting fixtures that suit his taste, and it is no uncommon experience to find that the owner of a building, be it a residence, a store, or an auditorium, selects his lighting fixtures from a stock in the open market, having regard mainly, if not only, for the cost of the fixture equipment and its general appearance. He is not apt to take cognizance of the question of suitable diffusion and direction of the light.

The lighting design should provide for such a diffusion and direction of light as to avoid jarring contrasts in different parts of an interior. This result can be accomplished by providing for the emission of a suitable proportion of the light rays in an upward and sideward direction to illuminate the ceiling and walls to a moderate intensity, and directing a suitable proportion of the light downward and sideward to illuminate more brightly the "working" portions of the room.

III. QUALITY OR COLOR OF LIGHT.

The quality or color of the light, and the color of ceilings, walls and furnishings of an interior, have an important bearing not only on the flux of light required to give a definite intensity of illumination on the objects viewed, but also on the ability to see well with this intensity. Our conception of true color values of surfaces is based upon the values which obtain in daylight illumination. Correct color values cannot be obtained from light which is deficient in rays which a surface must reflect in order to be seen in its natural color.

From the standpoint of securing true color values our choice of artificial illuminants is extremely limited. In practice, however, even with this limitation, we can secure results from artificial light fairly comparable with those obtained in daylight, by adapting the illuminant so far as possible to the conditions to be met in each individual case.

A. Selection of Illuminant. As between illuminating gas, electric light, acetylene, oil, and candles, we find in practice conditions which make some one of these illuminants better suited to the needs of the user than any of the others. Generally speaking, however, the question is, what type of gas or electric lamp is best adapted for the lighting of a specific interior?

The quality or color of the light for the purposes in hand may likewise be a determining factor in the choice of the type of lamp. Thus, for example, in the home, the choice may be limited to illuminants capable of producing a mellow light.

The divisibility of the lighting unit, that is, the sizes in which the unit may be procured, may be the deciding factor in the selection of the type of lamp best suited for the conditions in hand. The suitable divisibility of the unit would depend upon the size of the interior, architectural, esthetic, and other considerations. It may be very important to select an illuminant that will be capable of such division that the lighting will not be seriously impaired if one or more of the lamps accidentally go out of commission.

The ability to direct or redirect the light of the lamp by suitable reflectors or diffusers may be a governing condition in selecting the type of lamp best suited to meet the needs in a given case.

Aside from the question of maintenance cost, the long life *per se* of a lamp may be a governing condition in cases where freedom from care of trimming or replacing the lamp is of paramount importance.

A primal consideration in the selection of a lighting source is, of course, that the light should be perfectly steady under all conditions of operation. The eye-strain which results from an unsteady or flickering light need not be dwelt upon here.

Where the eye is taxed continuously with the discrimination or discernment of fine details, as, for example, in the work of engraving, or where the task is that of reading a book or newspaper, the importance of having a steady light is naturally very considerably greater than where only casual observations of illuminated objects are necessary, or where the eye is not called upon to discern the details, as, for example, in foundries where the work is bulky and the only operation is that of casting large ingots which require no detailed inspection.

The choice of the kind of lamp to be used will often depend upon the system of lighting employed. The flexibility of the system and the ease of control of the lamps may also be a deciding factor in the selection of an illuminant.

B. Intensity of Illumination. The intensity of illumination required for good vision will depend not only upon the character of the work to be performed, but upon a number of conditions which have already been named. Tables have been published from time to time stating the intensity of illumination required for special classes of service. According to some of these tables, the intensity of illumination required for different classes of buildings and different kinds of work are as follows:

Residences, from 1 to 2 foot-candles (about 10 to 20 meter-candles).

Schoolrooms, from 2 to 3 foot-candles (about 20 to 30 meter-candles).

Libraries, from 1 to 2 foot-candles in general, and 3 to 4 foot-candles on the reading tables.

Factories, from 4 to 5 foot-candles, where no individual local lamps are used, and from 2 to 3 foot-candles, general lighting, where individual lamps supplement the general lighting.

Figures are also given for the illumination intensity required for different kinds of work, as, for example:

For drafting, from 5 to 10 foot-candles.

For engraving, 5 to 15 foot-candles.

For postal service, 2 to 5 foot-candles.

Where such figures are given they should be interpreted only in the light of the specific conditions under which the lamps were used, otherwise they may lead to entirely erroneous conclusions. It is difficult, if not impossible, to state definitely what illumination intensity is required in any instance without limiting the statement by a long list of conditions, some of which, with our present imperfect knowledge of the art, could not even be definitely set forth. Hence, while it is stated, for example, that the intensity of illumination required on the reading table of a library is from 3 to 4 foot-candles, the specific conditions attending the use of the light must all be known before it would be safe to so assume that substantially the same results would be achieved if an intensity of from 3 to 4 foot-candles were provided on the reading table of another library which it was desired to illuminate. Under changed conditions it might easily be that 1 or 2 foot-candles would be sufficient, or that 4 foot-candles would be insufficient.

It may be noted also that the required intensity will depend upon the "personal equation" of the user. An intensity that is satisfactory to one user may not be satisfactory to another.

INTENSITY OF ARTIFICIAL ILLUMINATION COMPARED WITH DAYLIGHT.

It was found in one instance that the intensity of daylight required for a certain class of work, under the specific conditions that obtained in the interior alluded to, was 3.2 foot-candles, whereas with one system of artificial illumination in this interior the intensity required was from 4 to 6 foot-candles and with another about 20 foot-candles.

In the case of an office which was illuminated by a cluster of lamps at the ceiling, it was found that an intensity of 2.1 foot-candles artificial light was ample for reading fine print with ease in any part of the room. On a very dark, cloudy day, in the same office, it was found

that the minimum intensity of daylight on the working spaces was 29 foot-candles.

In still another case it was found that with well-diffused artificial light approximately 6 foot-candles intensity on a vertical plane was required under the conditions that obtained for the particular class of work in hand, whereas in daylight, on a bright day, the actual intensity of natural light on the work was 400 foot-candles.*

In another case in the postal service it was found that an intensity of 1.6 foot-candles daylight illumination was sufficient for the work, and that artificial light was required when the intensity of daylight fell below this value. In this installation an intensity of approximately 1.5 foot-candles artificial light was sufficient.

In a public library it was found that an intensity of daylight of from 100 foot-candles down to 5 foot-candles satisfied the readers, and that 1 foot-candle intensity of artificial light satisfied some of the readers, whereas 6 foot-candles intensity was not sufficient for others.

Under actual practical conditions in daylight illumination we are able to see well throughout a very wide range of illumination intensities, provided the conditions under which the illumination is carried out are suitable. The actual intensity of illumination *per se* really plays a comparatively small part in the problem of securing good lighting.

In artificial lighting a "dim religious light" is often sufficient even for reading purposes, though the intensity of illumination on the book may fall considerably below 1 foot-candle. On the other hand, if artificial light is properly diffused and directed, the eye readily adapts itself to illumination intensities within extremely wide limits, and we can read with comfort in an interior in which the actual intensity on the pages of a book exceeds 500 foot-candles.

In daylight, under usual conditions, the eye works with a comparatively small pupillary aperture, because of the enormous flux of light. In artificial lighting, under good conditions of diffusion, direction, and contrast, the eye works with a comparatively large pupillary aperture, because of the relatively insignificant flux of light. Under these conditions we can therefore see well, and without visual fatigue, by artificial light at illumination intensities that are only a very small fraction of those which ordinarily obtain in daylight.

In daylight the eye is rarely exposed to the primary source of light, whereas in artificial light the primary source is often within the ordinary field of view. Hence the effect of contrast in intensity of the source and intensity of light on objects viewed, enters to a far greater extent in artificial lighting than in daylight.

C. System of Illumination. The various systems of illumination may be broadly classified as follows :

(*a*) General illumination by direct lighting.
(*b*) General illumination by indirect or semi-indirect lighting.
(*c*) Combination of (*a*) and (*b*).
(*d*) Local illumination.
(*e*) Combinations of (*d*) with (*a*), (*b*), and (*c*).

*See "Factory Lighting," L. B. Marks, Transactions Illuminating Engineering Society, November, 1909, p. 828.

Each of the above groups may be subdivided into two or more typical arrangements, as, for example, general illumination by direct lighting may be accomplished by (1) lamps exposed to view or (2) enclosed in globes or shades which diffuse and direct the light, or (3) mounted behind a transmitting screen or septum, such as a diffusing skylight or art-glass panel. General illumination by indirect lighting may be accomplished by (1) lamps concealed in opaque reflectors suspended from, and pointed toward, the ceiling, or (2) concealed in coves located on the side walls near the ceiling, or (3) concealed in high standards placed on the floor, etc. Illustrations of the various systems of lighting as carried out in practical lighting installations will be given later.

D. Location of Lighting Sources. Man has been accustomed from time immemorial to daylight illumination from side windows. In locating artificial lighting sources for the illumination of an interior, it would therefore seem logical to reproduce, as nearly as possible, the conditions that obtain in daylight illumination, and to locate the lighting units at or near the windows. If we could obtain a sufficiently large flux of artificial light without undue expenditure of power, and could distribute this flux in a manner analogous to that of daylight, the problem of locating the lighting units would be a comparatively simple one. With the restrictions with which we now have to contend, and with which we will probably have to contend for all time in supplying a substitute for the sun, we are compelled to so locate our lighting units that the comparatively meager flux of light we are able to obtain from them can be utilized to the best advantage to meet the special requirements of the interior with which we have to deal.

In artificial lighting the location of the lighting units will depend upon

(*a*) the use to which the interior is to be put,
(*b*) the system of lighting employed,
(*c*) the character of the illuminant used,
(*d*) the ability to diffuse and direct the light,
(*e*) the removal of the light from the field of view,
(*f*) the avoidance of strong contrasts in illumination,
(*g*) the structural conditions in the building,
(*h*) esthetic considerations,
(*i*) accessibility,
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Before deciding on the location of outlets, it is necessary to know the character of the illuminant to be used. If the vacuum tube, for example, is to be employed for lighting a large room, a single outlet on the ceiling or on the wall might be sufficient, whereas, if tungsten lamps are to be used, several ceiling outlets may be required to suitably distribute the light. If gas is to be used, the limitations in location due to necessary placement at some distance below the ceiling must be taken into consideration.

To determine the position of the lighting units it is necessary to decide on the system of illumination that will be best employed to meet the conditions of usage of the light. If general illumination only is to be used, only ceiling outlets need usually be considered. If local illumination is to be used, or a combination of local and general, the location of outlets for such illumination must be determined.

In a large room in which a moderate degree of illumination meets all the requirements, a lighting fixture centrally located on the ceiling may answer the purpose; whereas, if a very high degree of illumination is needed in some parts of the room, the central lighting fixture might have to be supplemented by local lamps placed more or less close to the objects to be lighted.

The location of the lighting sources will be governed in a material degree by the extent to which it is possible to direct or redirect the light of the particular illuminant, by reflectors and diffusers. They should be so located also as to keep the lamp as far as practicable out of the ordinary field of view, and to avoid violent contrasts in illumination.

Due cognizance must be taken of the structural conditions of a building in locating lighting sources. Sometimes the limitations are such that it is impracticable to place a lamp in any location other than in the center of a bay. Frequently, both from the standpoint of distribution of illumination and from the architectural standpoint, the location of the lighting unit in the center of the room, or in the center of a bay, works out to best advantage.

In deciding on the location of outlets cognizance must be taken of esthetic considerations. The placement of the lights must be such that the ensemble will look well. In other words, the arrangement of the lighting units must be esthetically as well as scientifically good. Where it is planned to carry out a certain style of lighting, as with fixtures of the Louis XIV period, for instance, the location of the outlets for the lighting units must be arranged accordingly. Often the need of accessibility for replacement or for local lighting or extinguishing of lamps is a governing factor in their location.

The broad question of economy, not only in the cost of the lighting installation but also in the cost of its maintenance, is another frequent deciding factor in the location of lighting sources. Although far better results in illumination may be obtained with one system of illumination than with another, the better system may be proscribed because of too great cost of installation and too great cost of operation. In such a case, the location of the lighting units must conform to the needs of the less expensive installation.

E. Lighting Fixtures: Globes, Shades, and Reflectors. It is not uncommon for architects to provide a certain number of outlets for the lighting of an interior, and to leave the matter of design or selection of the lighting fixtures in abeyance until the building is so far along in construction that the problem of lighting is not one of designing the most suitable lighting arrangements for the interior, but one of designing the most suitable fixtures to fit the limitations which have been imposed in the location of the outlets. In other words, the design of the lighting fixtures is left for an after-consideration.

To secure definite predetermined results, it is necessary to know in advance the general decorative scheme and wall coloring of an interior in order that the location of lighting units and the design of the lighting fixtures may be planned with reference to the required illumination of the finished interior. Without a knowledge of these conditions, the design of the lighting fixtures must be at best a compromise, and the lighting result must depend upon a "cut and try" method. Without the data referred to, the selection of globes, shades, and reflectors becomes a matter of guesswork rather than of scientific procedure.

F. Glare and Intrinsic Brightness. As a general principle of illumination, the specific brightness of the lighting sources within the field of view should be kept within certain limits. These limits have been variously placed by different authorities at from 4 to 5 candle-power per square inch (0.62 to 0.78 candle-power per square centimeter) of the lighting sources down to from 0.2 to 0.1 candle-power per square inch (0.031 to 0.016 candle-power per square centimeter) of actual surface. This refers to primary lighting sources. The figure for maximum intrinsic brightness per square inch of lighting source cannot, however, be taken as a criterion, unless the dimensions of the source itself be coupled with this figure. The area of the lighting sources within the field of view, as well as its specific brightness, must be kept within definite limits under given conditions to avoid eye-strain. No exact data are available as to the safe maximum limits in specific cases, and, indeed, such data, even if secured, would be of little practical value unless all the conditions of usage of the light were stated in connection therewith. For example, unless the conditions of contrast in illumination are known, the numerical value of the safe limit of intrinsic brightness would mean very little. Thus a specific brightness of 5 candle-power per square inch may not produce material eye-strain or visual fatigue if there is not excessive contrast; whereas, on the other hand, a specific brightness of 0.1 candle-power per square inch may produce considerable eye-strain and visual fatigue if there is excessive contrast.

Referring to the secondary lighting sources, such as the ceiling or walls, as the case may be, the specific brightness, even though numerically very small, becomes a serious matter if a large area of the illuminated surface is continuously within the field of view, as it often must of necessity be. There is need of complete and accurate data along these lines. We have been guided in the past by experience, but little has been done in this connection to formulate a scientific basis for correct illumination design. For example, exact knowledge of this phase of the subject is needed to give us a better insight into the question of the relative merits of direct and indirect lighting.

In connection with lighting installations we must consider, first, the glare of the primary and secondary lighting sources, and, second, the glare of the objects illuminated. In minimizing glare, the location of the lighting sources and their specific brightness and area must be taken into account. This involves the consideration of the diffusion and direction of the light, the contrast in illumination, and the regular or specular reflection.

G. Regular or Specular Reflection. The general problem of arranging the lighting sources with reference to the avoidance of regular reflection was considered in discussing the location of lighting units.

When light strikes an object, some of the rays are absorbed by the object, some pass through (in the case of a transparent or translucent object), some are reflected diffusely, and some are reflected regularly. The regularly reflected rays are those we are now considering.

The regular reflection from calendered paper of a book

that the minimum intensity of daylight on the working spaces was 29 foot-candles.

In still another case it was found that with well-diffused artificial light approximately 6 foot-candles intensity on a vertical plane was required under the conditions that obtained for the particular class of work in hand, whereas in daylight, on a bright day, the actual intensity of natural light on the work was 400 foot-candles.*

In another case in the postal service it was found that an intensity of 1.6 foot-candles daylight illumination was sufficient for the work, and that artificial light was required when the intensity of daylight fell below this value. In this installation an intensity of approximately 1.5 foot-candles artificial light was sufficient.

In a public library it was found that an intensity of daylight of from 100 foot-candles down to 5 foot-candles satisfied the readers, and that 1 foot-candle intensity of artificial light satisfied some of the readers, whereas 6 foot-candles intensity was not sufficient for others.

Under actual practical conditions in daylight illumination we are able to see well throughout a very wide range of illumination intensities, provided the conditions under which the illumination is carried out are suitable. The actual intensity of illumination *per se* really plays a comparatively small part in the problem of securing good lighting.

In artificial lighting a "dim religious light" is often sufficient even for reading purposes, though the intensity of illumination on the book may fall considerably below 1 foot-candle. On the other hand, if artificial light is properly diffused and directed, the eye readily adapts itself to illumination intensities within extremely wide limits, and we can read with comfort in an interior in which the actual intensity on the pages of a book exceeds 500 foot-candles.

In daylight, under usual conditions, the eye works with a comparatively small pupillary aperture, because of the enormous flux of light. In artificial lighting, under good conditions of diffusion, direction, and contrast, the eye works with a comparatively large pupillary aperture, because of the relatively insignificant flux of light. Under these conditions we can therefore see well, and without visual fatigue, by artificial light at illumination intensities that are only a very small fraction of those which ordinarily obtain in daylight.

In daylight the eye is rarely exposed to the primary source of light, whereas in artificial light the primary source is often within the ordinary field of view. Hence the effect of contrast in intensity of the source and intensity of light on objects viewed, enters to a far greater extent in artificial lighting than in daylight.

C. System of Illumination. The various systems of illumination may be broadly classified as follows :

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Each of the above groups may be subdivided into two or more typical arrangements, as, for example, general illumination by direct lighting may be accomplished by (1) lamps exposed to view or (2) enclosed in globes or shades which diffuse and direct the light, or (3) mounted behind a transmitting screen or septum, such as a diffusing skylight or art-glass panel. General illumination by indirect lighting may be accomplished by (1) lamps concealed in opaque reflectors suspended from, and pointed toward, the ceiling, or (2) concealed in coves located on the side walls near the ceiling, or (3) concealed in high standards placed on the floor, etc. Illustrations of the various systems of lighting as carried out in practical lighting installations will be given later.

D. Location of Lighting Sources. Man has been accustomed from time immemorial to daylight illumination from side windows. In locating artificial lighting sources for the illumination of an interior, it would therefore seem logical to reproduce, as nearly as possible, the conditions that obtain in daylight illumination, and to locate the lighting units at or near the windows. If we could obtain a sufficiently large flux of artificial light without undue expenditure of power, and could distribute this flux in a manner analogous to that of daylight, the problem of locating the lighting units would be a comparatively simple one. With the restrictions with which we now have to contend, and with which we will probably have to contend for all time in supplying a substitute for the sun, we are compelled to so locate our lighting units that the comparatively meager flux of light we are able to obtain from them can be utilized to the best advantage to meet the special requirements of the interior with which we have to deal.

In artificial lighting the location of the lighting units will depend upon

(*a*) the use to which the interior is to be put,
(*b*) the system of lighting employed,
(*c*) the character of the illuminant used,
(*d*) the ability to diffuse and direct the light,
(*e*) the removal of the light from the field of view,
(*f*) the avoidance of strong contrasts in illumination,
(*g*) the structural conditions in the building,
(*h*) esthetic considerations,
(*i*) accessibility,
(*j*) economy.

Before deciding on the location of outlets, it is necessary to know the character of the illuminant to be used. If the vacuum tube, for example, is to be employed for lighting a large room, a single outlet on the ceiling or on the wall might be sufficient, whereas, if tungsten lamps are to be used, several ceiling outlets may be required to suitably distribute the light. If gas is to be used, the limitations in location due to necessary placement at some distance below the ceiling must be taken into consideration.

To determine the position of the lighting units it is necessary to decide on the system of illumination that will be best employed to meet the conditions of usage of the light. If general illumination only is to be used, only ceiling outlets need usually be considered. If local illumination is to be used, or a combination of local and general, the location of outlets for such illumination must be determined.

* See "Factory Lighting," L. B. Marks, Transactions Illuminating Engineering Society, November, 1909, p. 828.

In a large room in which a moderate degree of illumination meets all the requirements, a lighting fixture centrally located on the ceiling may answer the purpose; whereas, if a very high degree of illumination is needed in some parts of the room, the central lighting fixture might have to be supplemented by local lamps placed more or less close to the objects to be lighted.

The location of the lighting sources will be governed in a material degree by the extent to which it is possible to direct or redirect the light of the particular illuminant, by reflectors and diffusers. They should be so located also as to keep the lamp as far as practicable out of the ordinary field of view, and to avoid violent contrasts in illumination.

Due cognizance must be taken of the structural conditions of a building in locating lighting sources. Sometimes the limitations are such that it is impracticable to place a lamp in any location other than in the center of a bay. Frequently, both from the standpoint of distribution of illumination and from the architectural standpoint, the location of the lighting unit in the center of the room, or in the center of a bay, works out to best advantage.

In deciding on the location of outlets cognizance must be taken of esthetic considerations. The placement of the lights must be such that the ensemble will look well. In other words, the arrangement of the lighting units must be esthetically as well as scientifically good. Where it is planned to carry out a certain style of lighting, as with fixtures of the Louis XIV period, for instance, the location of the outlets for the lighting units must be arranged accordingly. Often the need of accessibility for replacement or for local lighting or extinguishing of lamps is a governing factor in their location.

The broad question of economy, not only in the cost of the lighting installation but also in the cost of its maintenance, is another frequent deciding factor in the location of lighting sources. Although far better results in illumination may be obtained with one system of illumination than with another, the better system may be proscribed because of too great cost of installation and too great cost of operation. In such a case, the location of the lighting units must conform to the needs of the less expensive installation.

E. Lighting Fixtures: Globes, Shades, and Reflectors. It is not uncommon for architects to provide a certain number of outlets for the lighting of an interior, and to leave the matter of design or selection of the lighting fixtures in abeyance until the building is so far along in construction that the problem of lighting is not one of designing the most suitable lighting arrangements for the interior, but one of designing the most suitable fixtures to fit the limitations which have been imposed in the location of the outlets. In other words, the design of the lighting fixtures is left for an after-consideration.

To secure definite predetermined results, it is necessary to know in advance the general decorative scheme and wall coloring of an interior in order that the location of lighting units and the design of the lighting fixtures may be planned with reference to the required illumination of the finished interior. Without a knowledge of these conditions, the design of the lighting fixtures must be at best a compromise, and the lighting result must depend upon a "cut and try" method. Without the data referred to, the selection of globes, shades, and reflectors becomes a matter of guesswork rather than of scientific procedure.

F. Glare and Intrinsic Brightness. As a general principle of illumination, the specific brightness of the lighting sources within the field of view should be kept within certain limits. These limits have been variously placed by different authorities at from 4 to 5 candle-power per square inch (0.62 to 0.78 candle-power per square centimeter) of the lighting sources down to from 0.2 to 0.1 candle-power per square inch (0.031 to 0.016 candle-power per square centimeter) of actual surface. This refers to primary lighting sources. The figure for maximum intrinsic brightness per square inch of lighting source cannot, however, be taken as a criterion, unless the dimensions of the source itself be coupled with this figure. The area of the lighting sources within the field of view, as well as its specific brightness, must be kept within definite limits under given conditions to avoid eye-strain. No exact data are available as to the safe maximum limits in specific cases, and, indeed, such data, even if secured, would be of little practical value unless all the conditions of usage of the light were stated in connection therewith. For example, unless the conditions of contrast in illumination are known, the numerical value of the safe limit of intrinsic brightness would mean very little. Thus a specific brightness of 5 candle-power per square inch may not produce material eye-strain or visual fatigue if there is not excessive contrast; whereas, on the other hand, a specific brightness of 0.1 candle-power per square inch may produce considerable eye-strain and visual fatigue if there is excessive contrast.

Referring to the secondary lighting sources, such as the ceiling or walls, as the case may be, the specific brightness, even though numerically very small, becomes a serious matter if a large area of the illuminated surface is continuously within the field of view, as it often must of necessity be. There is need of complete and accurate data along these lines. We have been guided in the past by experience, but little has been done in this connection to formulate a scientific basis for correct illumination design. For example, exact knowledge of this phase of the subject is needed to give us a better insight into the question of the relative merits of direct and indirect lighting.

In connection with lighting installations we must consider, first, the glare of the primary and secondary lighting sources, and, second, the glare of the objects illuminated. In minimizing glare, the location of the lighting sources and their specific brightness and area must be taken into account. This involves the consideration of the diffusion and direction of the light, the contrast in illumination, and the regular or specular reflection.

G. Regular or Specular Reflection. The general problem of arranging the lighting sources with reference to the avoidance of regular reflection was considered in discussing the location of lighting units.

When light strikes an object, some of the rays are absorbed by the object, some pass through (in the case of a transparent or translucent object), some are reflected diffusely, and some are reflected regularly. The regularly reflected rays are those we are now considering.

The regular reflection from calendered paper of a book

that the minimum intensity of daylight on the working spaces was 29 foot-candles.

In still another case it was found that with well-diffused artificial light approximately 6 foot-candles intensity on a vertical plane was required under the conditions that obtained for the particular class of work in hand, whereas in daylight, on a bright day, the actual intensity of natural light on the work was 400 foot-candles.*

In another case in the postal service it was found that an intensity of 1.6 foot-candles daylight illumination was sufficient for the work, and that artificial light was required when the intensity of daylight fell below this value. In this installation an intensity of approximately 1.5 foot-candles artificial light was sufficient.

In a public library it was found that an intensity of daylight of from 100 foot-candles down to 5 foot-candles satisfied the readers, and that 1 foot-candle intensity of artificial light satisfied some of the readers, whereas 6 foot-candles intensity was not sufficient for others.

Under actual practical conditions in daylight illumination we are able to see well throughout a very wide range of illumination intensities, provided the conditions under which the illumination is carried out are suitable. The actual intensity of illumination *per se* really plays a comparatively small part in the problem of securing good lighting.

In artificial lighting a "dim religious light" is often sufficient even for reading purposes, though the intensity of illumination on the book may fall considerably below 1 foot-candle. On the other hand, if artificial light is properly diffused and directed, the eye readily adapts itself to illumination intensities within extremely wide limits, and we can read with comfort in an interior in which the actual intensity on the pages of a book exceeds 500 foot-candles.

In daylight, under usual conditions, the eye works with a comparatively small pupillary aperture, because of the enormous flux of light. In artificial lighting, under good conditions of diffusion, direction, and contrast, the eye works with a comparatively large pupillary aperture, because of the relatively insignificant flux of light. Under these conditions we can therefore see well, and without visual fatigue, by artificial light at illumination intensities that are only a very small fraction of those which ordinarily obtain in daylight.

In daylight the eye is rarely exposed to the primary source of light, whereas in artificial light the primary source is often within the ordinary field of view. Hence the effect of contrast in intensity of the source and intensity of light on objects viewed, enters to a far greater extent in artificial lighting than in daylight.

C. System of Illumination. The various systems of illumination may be broadly classified as follows:

(*a*) General illumination by direct lighting.
(*b*) General illumination by indirect or semi-indirect lighting.
(*c*) Combination of (*a*) and (*b*).
(*d*) Local illumination.
(*e*) Combinations of (*d*) with (*a*), (*b*), and (*c*).

Each of the above groups may be subdivided into two or more typical arrangements, as, for example, general illumination by direct lighting may be accomplished by (1) lamps exposed to view or (2) enclosed in globes or shades which diffuse and direct the light, or (3) mounted behind a transmitting screen or septum, such as a diffusing skylight or art-glass panel. General illumination by indirect lighting may be accomplished by (1) lamps concealed in opaque reflectors suspended from, and pointed toward, the ceiling, or (2) concealed in coves located on the side walls near the ceiling, or (3) concealed in high standards placed on the floor, etc. Illustrations of the various systems of lighting as carried out in practical lighting installations will be given later.

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In connection with lighting installations we must consider, first, the glare of the primary and secondary lighting sources, and, second, the glare of the objects illuminated. In minimizing glare, the location of the lighting sources and their specific brightness and area must be taken into account. This involves the consideration of the diffusion and direction of the light, the contrast in illumination, and the regular or specular reflection.

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When light strikes an object, some of the rays are absorbed by the object, some pass through (in the case of a transparent or translucent object), some are reflected diffusely, and some are reflected regularly. The regularly reflected rays are those we are now considering.

The regular reflection from calendered paper of a book

may be so trying as to prevent good vision and cause severe eye-strain. Hence, if the position of the eye with respect to the lighting source and the object viewed is necessarily such that the rays that strike the object are directly reflected into the eye, the lighting is defective. If work is done at an ordinary polished oak table located in the center of a room, illuminated by a lamp directly above at the ceiling, the specular reflection from the surface of the table will be very trying to the eye unless the observer is seated in such a position that the direct reflected rays do not strike the eye. Unless the table is a long one, it will be impossible to escape a considerable percentage of the regular reflected rays. In such a case, under practical conditions, the use of an exposed lamp at the ceiling, even if the lamp be frosted and backed by a diffusing reflector, is almost prohibitive. To reduce the amount of regular reflection to a tolerable degree the lamp must be screened by a diffusing globe of considerable area and low specific brightness.

In practice, we find on all sides serious results from the direct reflection of light from objects viewed; be it in the library of a palatial residence in which the library table is fitted with a polished plate-glass top, or in a factory in which the workmen handle highly polished pieces in the assembling of apparatus or face highly polished portions of machines, the baneful influence of regular reflection may be noted. In many cases the excessive regular reflection is due to faulty illuminating engineering.

In one instance in actual practice it was found in a factory that the direct reflected light which reached the eyes of an operator who was at work on polished material was almost forty per cent of the light which reached the object viewed. When this direct reflection was cut down by a change in the installation, the operator could see the work much better and with much less visual fatigue.

H. Contrast. It has been stated that in planning the artificial illumination of an interior, the diffusion and direction of light should be such as to avoid jarring contrasts in illumination in different parts of the interior. There is, perhaps, no single item that comes up in the consideration of a lighting scheme that is of more importance, from a physiological standpoint, than that of contrast. This factor has already been considered in discussing the different systems of carrying out illumination and the requisite intensity of illumination for specific kinds of work. We may consider the subject of contrast under two divisions:

(*a*) Contrast in intensity or character of illumination in different parts of the same room or space.

(*b*) Contrast in the illumination of two contiguous rooms or spaces.

If an observer passes directly from one interior in which the illumination is of a high order to a contiguous interior in which the illumination is of a low order, the intensity of illumination in the second interior may strike him as being insufficient. Had the order of the illumination in the one interior been the same as that in the other, even though the illumination in both interiors were less than that of the less brightly lighted one, the observer might have found this reduced intensity of illumination quite sufficient. If, after spending some time in the less brightly lighted interior, the observer passes to the more brilliantly lighted adjoining room, he may deem the latter over-illuminated. These effects are due to contrast in illumination.

An isolated show window, having a moderate intensity of illumination, may admirably set forth the wares displayed therein, but when a neighboring window, having eight or ten times the intensity of illumination of the first, is lighted, the first will appear but dimly lighted, and the owner to give due prominence to his display will be compelled, because of contrast with the neighboring window, to raise the plane of his illumination.

Actual measurements show that largely because of this principle of contrast the plane of illumination in stores, public buildings, places of amusement, and even residences, has been carried much higher in some cities than in others, and abnormally high in some sections of the same city. For example, the plane of illumination in the leading stores, especially the department stores in New York City, has gradually been raised from 1 to 2 foot-candles to 4 to 6 foot-candles. A part of this rise may be accounted for by the comparatively recent introduction of high efficiency lamps, such as the tungsten, gas mantle burner, and other types; but the most potent factor underlying this increase in intensity is undoubtedly the principle of contrast. When your neighbors' stores are brightly lighted, you are compelled in self-defense to light your own place brightly because of the contrast. When your streets and public spaces are more brightly lighted, you are compelled to light your homes more brightly because of the contrast.

Considering now the question of contrast in different parts of the same room, we have an analogous condition to that just discussed. If one part of a room is extremely bright and another part extremely dark, the bright part appears brighter by contrast, and the dark part, darker. If these contrasts are extreme, the eye receives a shock more or less violent in glancing from one part of the room to another; and if, as may happen when several people in conversation are seated around a room illuminated in this way, one frequently looks alternately from a dark section to a light section of the room, the eye is soon severely taxed. If, however, the conditions of contrast are only very moderate, the eye may actually be rested by glancing from the brighter objects to the darker objects in a room.

If brightly lighted walls or ceiling be within the ordinary field of view, the discernment of objects in the room or of the printed matter on the page of a book on which the illumination intensity is less than that of the walls and ceiling, will be far more difficult than if the illumination intensity on the objects viewed were greater than that of the walls and ceiling within the field of view.

A common example of lighting, in which the evil effects of violent contrast are strikingly exhibited, is the illumination of a moderately large dining room in which the walls are very dark in color, and the illumination carried out exclusively by a central dome fixture, approximately 2 feet (61 centimeters) above the table, the fixture being equipped with two or three 16 candle-power incandescent lamps within the dome, which latter is constructed of slightly translucent art glass. The table is brilliantly illuminated, the intensity on the tablecloth being not infrequently from 8 to 10 foot-candles (80 to 100 meter-candles). In looking across the table to the person seated opposite, one looks through a field of great brightness at the table into one of almost dense blackness at the walls. It need hardly be stated that this violent contrast is conducive to eye-strain.

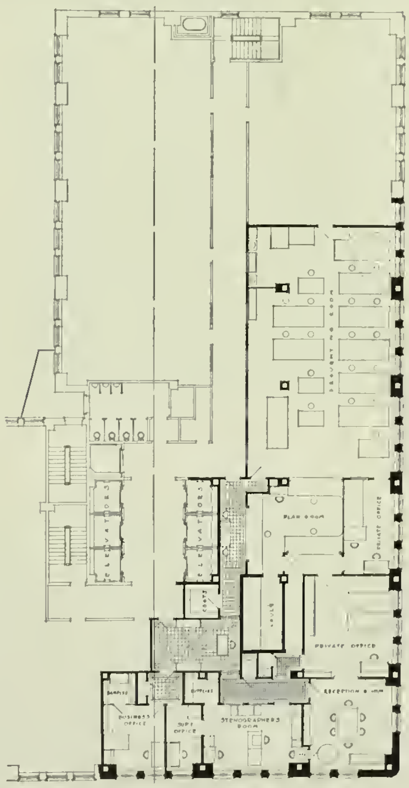
The Business Side of an Architect's Office.

THE OFFICE OF MR. DONN BARBER.

BY D. EVERETT WAID.

MR. BARBER'S PRIVATE OFFICE.

THE architect who is about to establish himself in a new office may wisely study the arrangement worked out by Donn Barber in the new Architects' Building. It is an arrangement which is a model in that it illustrates the virtues of many other architects' offices. Some time ago THE BRICKBUILDER published a description of the suite occupied at that time by Mr. Barber, but in order to keep up to date we must now show the office in which he has still further developed his ideas as to what an architect's workshop ought to be. Find on the diagram the "Plan Room" and you will see the heart of the old office which was moved bodily to the new quarters, where, in the geographical center of the new office, it is known to the office force as the "conning tower." The plan clerk in command there looks out in every direction over ample counters: toward the "boss" and the clerical force on one side, toward the head draftsman and the specification writer on a second, toward the drafting room on a third side, and toward the contractors or their messengers on a fourth. One can picture to himself the orderly and systematic way in which drawings and specifications slide back and forth over those counters and are constantly kept track of while they are being developed or are on their way to the performance of their various functions. At night all tables are cleared (except of drawings tacked down) and covered, and the "conning tower," closed with counterweighted glass sashes, is locked up tight. The location of the main control of everything pertaining to drawings, catalogues, supplies, keys, etc., is all under the plan clerk.



PLAN.
OFFICE OF DONN BARBER.

There is a well thought out system applied to the various details controlled in this department which makes the proper care of drawings and specifications a simple matter. All scale drawings are filed away flat, in folios, in a fireproof vault, in drawers 58 inches wide, 38 inches deep, and 2¾ inches high. For large works the folios are separated in special sections such as plans, elevations and sections, details, sketches, plumbing, heating, etc., with headings on the right-hand end of the folios. All drawings are stamped on the bottom right-hand corner with a special stamp, similar to that for the Hartford National Bank job, which is shown herewith. When a drawing has changes made upon it, a stamp of revision showing the date is stamped near the title. On each revision a special note is made of each change, under the date, so that the revisions of a drawing can be easily found. These notes are placed in the lower right-hand corner, above the stamps, and sketches are similarly marked, but with smaller stamps. All full-size details and shop drawings are folded to a uniform size, 8 inches by 21 inches, on one of the counters, which is ruled in rectangles, 8 inches by 21 inches, for this purpose. Prints for mailing are of the same size and are simply folded in half and mailed in envelopes 9 inches by 21 inches. Shop drawings, on receipt, are stamped "Received — (date)" on the back in the right-hand corner by the plan clerk and then entered on a shop drawing card. They pass in turn to the head draftsman and the checker. After being checked, both drawing card and prints are stamped "Returned for Correction" or "Approved," with date, as the case may be, and to whom issued; then the clerk makes out a receipt, ready for delivery of prints by messenger or mail. Full-size details and shop drawings are filed in steel drawers 23 inches wide, 30 inches deep, and 9½ inches high, with special guides to separate the different works and with a subdivision for classification of trades numbering from 1 to 31.

Miscellaneous sketches are filed in drawers 24 inches wide, 30 inches deep, and 16 inches high in special combination guide folios. This is very important as it makes a place for all of the little odds and ends and special notes, which are given to the draftsmen by Mr. Barber or other heads, as the case may be, and are therefore kept on file for verification, instead of being put in the usual way on hooks for the littering of the drafting room and eventually being forgotten and thrown away.

DRAFTING ROOM.

Specifications are filed vertically in drawers 12 inches wide, 30 inches deep, and 9½ inches high, with guides separating the different buildings, and with metal followers to keep them vertical.

Samples of all finishes and materials for approval of work in hand are kept in separate drawers and are all stamped the day they are received and approved, with the name of the job, and filed in drawers 24 inches wide, 30 inches deep, and 3 inches high, each drawer being labeled with the name of the building to which the material refers.

All catalogues are filed vertically in drawers 15 inches wide, 30 inches deep, and 13 inches high, special section guides separating the classification of all trades, thereby providing a most efficient method of getting any catalogue immediately, and also having the advantage of keeping all catalogues on one subject together.

The numbering of drawings, plans, elevations, and sections is as follows:

00. — Location Plan.
02. — Sub-Basement.
01. — Basement.
1. — 1st Floor.
2. — 2d Floor.

Scale details start from 25 or 50, as may be determined by the size of the building; full size details are from 500 on; steel plans from 100; plumbing from 200; heating from 300; electric from 400.

The illustrations shown on page 200 with explanatory notes reproduce various printed forms. Mr. Barber believes in a generous use of rubber stamps as labor-savers, and the examples shown forestall any facetious remarks about rubber stamp designing.

Specifications are written on sheets 8½ inches by 11 inches, with 1 inch binding margin on the left side of the page and 1½ inch margin on the right side for paragraph headings. This is an unusual but excellent arrangement. Specifications are bound in cloth-lined white paper covers with the architect's name printed and the title rubber-stamped on the outside.

The patient reader, impatient though he be with details of "blanks" and "system," will be interested to see other features of this office. The drafting room is a well lighted, rectangular room free and clear of alcoves and capable of one hundred per cent enlargement by inclusion of space now sublet to others. The ceiling is white and the walls, finished in "oatmeal" texture, are chrome-cream in strength of color. Semi indirect artificial lighting, in the form of suspended hemispheres of white glass, was tried as an experiment with fair results, but individual drop cord lights (see illustration) have been installed recently. The concrete floor is covered with linoleum cut into tiles, about 9 inches square. This kind of flooring, by the way, is used in a number of architects' offices — sometimes successfully cemented down, and sometimes not. In his private office Mr. Barber has used cork tiling — a most satisfactory flooring surface.

CORNER OF DRAFTING ROOM.

The visitor will note the presence of a convenient row of porcelain lavatories and a sink in the drafting room, the sink being a long one just right for washing off a color drawing; also a drawing board case holding several boards glue-mounted with drafting paper ready for use, each board on edge in its own compartment. He will see, too, a bulletin board on which is posted, among other items intended for general information to the office force, a list of

STENOGRAPHERS' ROOM.

employees with the dates of vacations. This brings to mind the fact that Saturday is an all-day holiday, the time being made up by fixing regular office hours on other days at 9 to 6 o'clock. It is arranged, however, in alternation that at least some one responsible member of the office shall be on duty Saturday to take care of pressing business.

A glance at the plan reveals the workably convenient relation of the different parts of this office: the easily maintained privacy of Mr. Barber's personal desk and drafting table, which is yet equally accessible to the draftsmen, to the clients, and to the executive end of the office. Note the facility with which an usher on guard in the entrance hall can put a caller in touch with the plan room, the business office, the inner sanctum, or the reception room, as the case may require, without needless interruption of those who are not concerned.

The reception room is furnished quite elaborately, yet not in the manner of a drawing room or monumental library. It contains some very fine furniture, tapestries, and rugs which the owner has collected, and which, in their fine grouping, supply visible examples to illustrate points in discussion with clients. The ceiling is a distinguished example of monumental treatment in plaster — a feature which characterizes many of the interiors designed by Mr. Barber. Such furnishing of the parts of the office in which clients are received as will exemplify the characteristic note of an architect's work has a great missionary value, for it enables one easily to impress a client with the force of his convictions or the merits of the scheme he advocates.

THE "CONNING TOWER."

CORNER OF MR. BARBER'S PRIVATE OFFICE.

RECEPTION ROOM.

(*Editor's Note.*) — The time expended in studying the problem of arranging the various parts of this office has been well invested, for it has resulted in an efficiency in the working force which could not be had by mere accident or by any implicit faith in the interests of the individual members of the organization toward the general work of the office.

The business world in the last decade was greatly occupied in the pursuit of system, and now that its value has been conclusively demonstrated, it has turned to the cultivation of efficiency. This is, of course, the logical outcome of systematizing work, office methods, etc.

In many architects' offices, however, business methods have not kept pace with the growth of their general practice, and therefore much valuable time is lost and the running expenses are greatly increased because of this fact. This situation reacts on the various heads and employees to the detriment of their personal efficiency, whereas in the office where each individual knows his work and is surrounded by the proper means for carrying out this work no such loss of time and money is experienced.

This brings up the old contention that creative art and business system do not travel together in harmonious relation, but it takes only a hasty consideration of the architects of this country, whose efforts have brought them success, not only in a business sense, but also in the creation of beautiful buildings, to entirely refute this long nurtured opinion.

Architecture for the average person is not as remunerative a profession as many others where less special training and intellect are required, so it behooves an architect to look to his business methods to check the extravagances of time and money which will surely eat into his profits.

Even with a most competent and efficient working organization, success in architectural practice is dependent to a great extent upon the intimate relation of the architect himself to the work going on in his office, and the experience of many offices clearly indicates that serious mistakes can be avoided if the details of office practice are so arranged that the architect can keep constantly in touch with all stages of the work.

It is comparatively easy to bring about this result in the small office, where the architect is his own specification writer, where he himself visits buildings during their construction, etc., but in the large office it becomes a serious tax on his energy to constantly keep these matters in mind, so that a system of written reports from superintendents and others having executive powers becomes necessary. This furnishes accurate data, which the head of the office can at any time refer to and thereby ascertain the progress of any given phase of the work.

FULL SIZE DETAIL SCALE DETAIL

BUILDING NO.	BUILDING	DRAWING NO.
117	HARTFORD NATIONAL BANK, Hartford, Conn.	3
TITLE PLAN OF THIRD FLOOR		
MADE BY A.L. SCALE ¼"=1'-0"	DONN BARBER ARCHITECT 101 PARK AVENUE, NEW YORK CITY	DATE MADE AUG 1 1913

Typical title for use on scale and full size detail drawings.

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Stamp used on shop drawings.

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DONN BARBER
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PER C.B.P. AUG 4 1913

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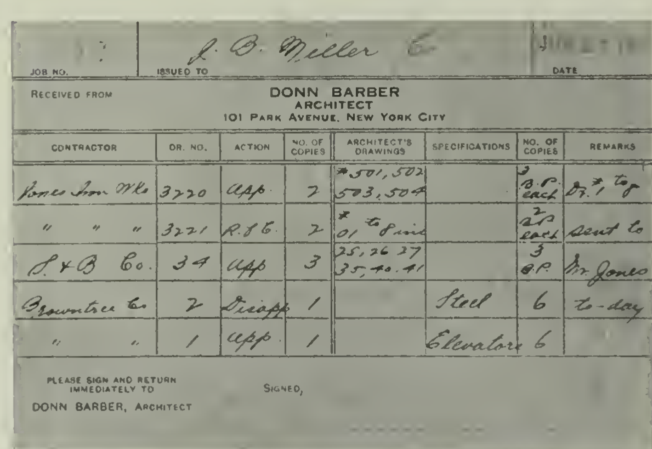
52nd St. & Lexington Ave.

DONN BARBER
101
PARK AVENUE
N. Y.
ARCHITECT
AUG 4 1913

Stamp for sketches.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" " "	3221	R.&C.	2	*01 to 8 incl		2 B.P. each	sent to
S.&B. Co.	34	app	3	25, 26 27 35, 40. 41		3 B.P.	Mr. Jones
Browntree Co	2	Disapp	1		Steel	6	to-day
" "	1	app	1		Elevators	6	

PLEASE SIGN AND RETURN IMMEDIATELY TO
DONN BARBER, ARCHITECT
SIGNED,

Receipts for drawings printed on mailing cards, 4 x 6 inches. This sample lists several drawings and specifications issued on one building at one time.

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OFFICE COPY

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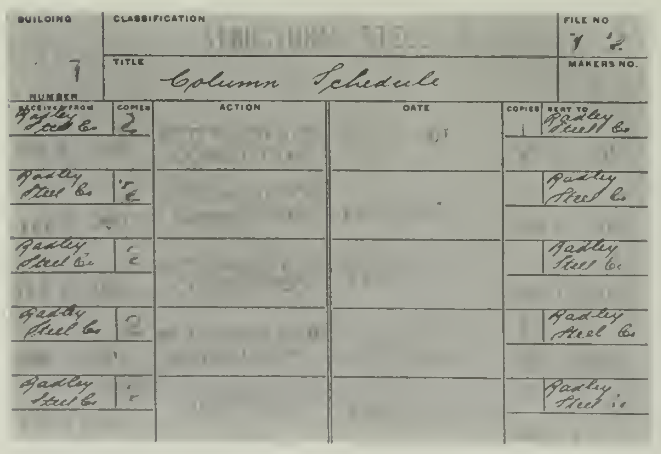
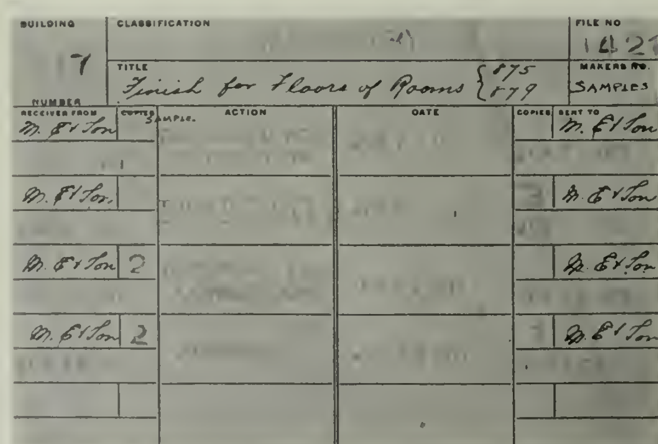
Miscellaneous office stamps.

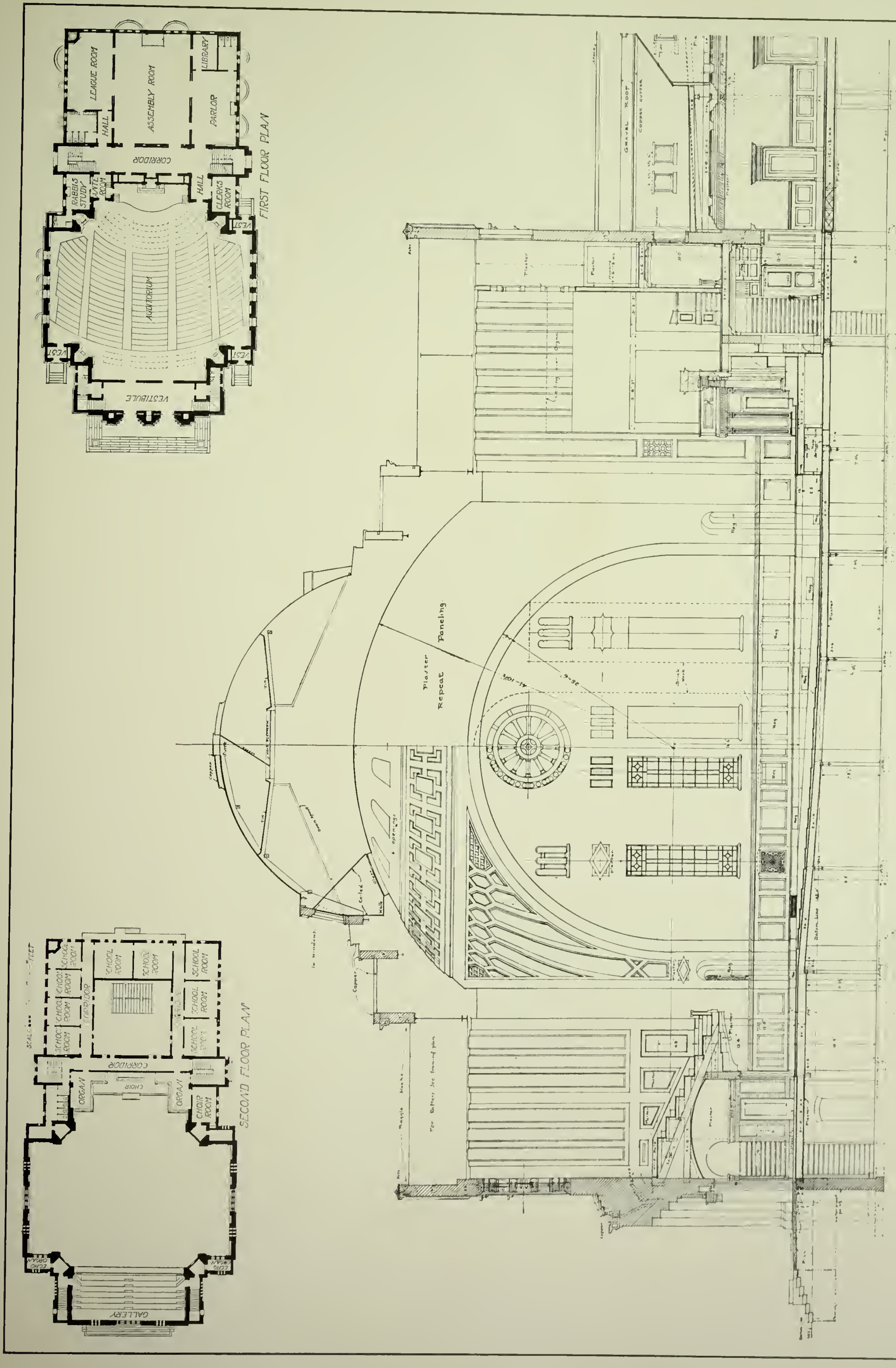


A filing card, 4 x 6 inches, is made for each drawing in the office, including each shop drawing. This card has eleven spaces, front and back, in which to record eleven phases of the history of one drawing.



A similar filing card is made for all samples of material for work in hand. This card gives the history of samples of floor finish, submitted for approval on one building.

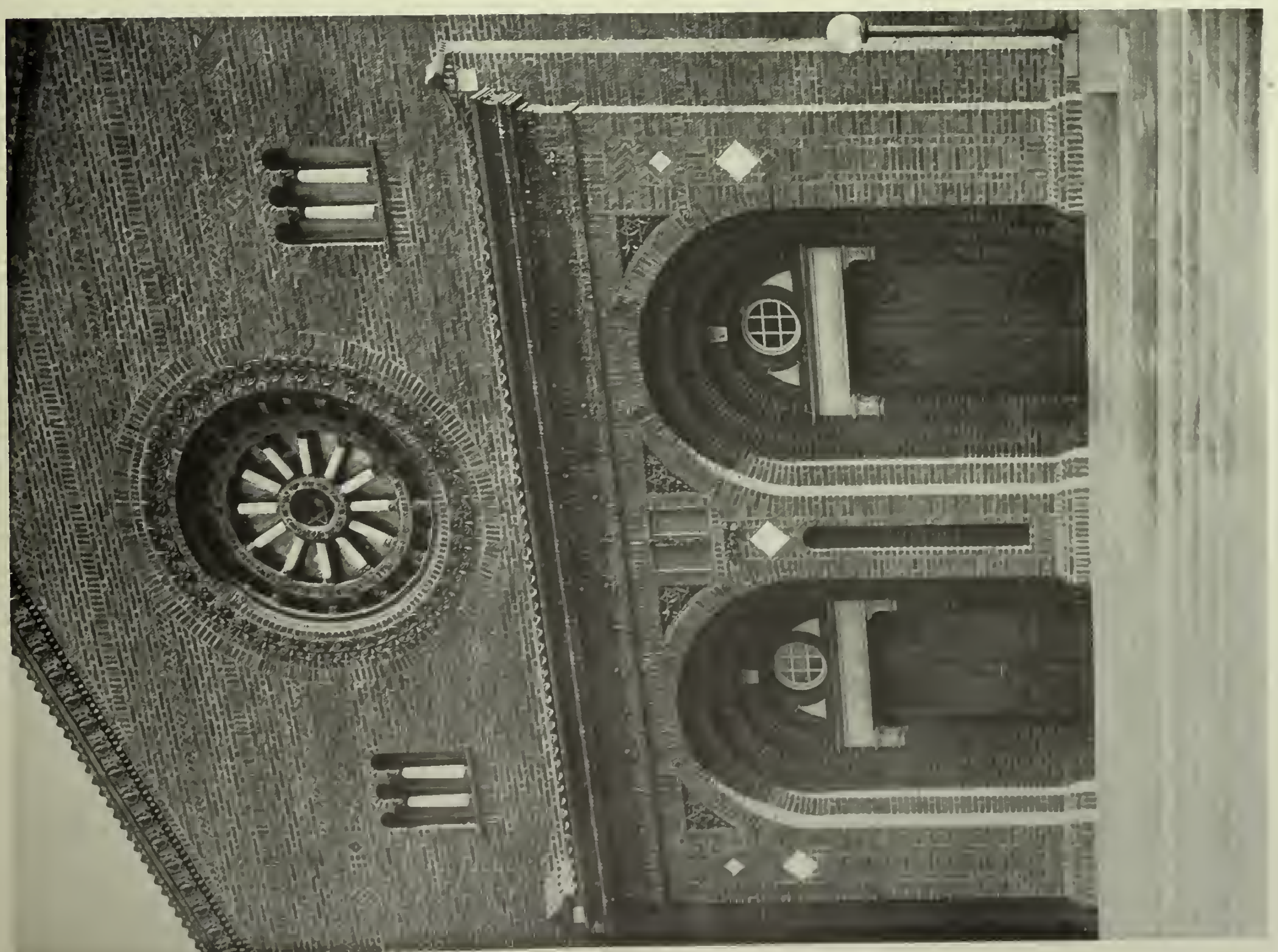
THE EUCLID AVENUE TEMPLE, CLEVELAND, OHIO
LEHMAN & SCHMITT, ARCHITECTS



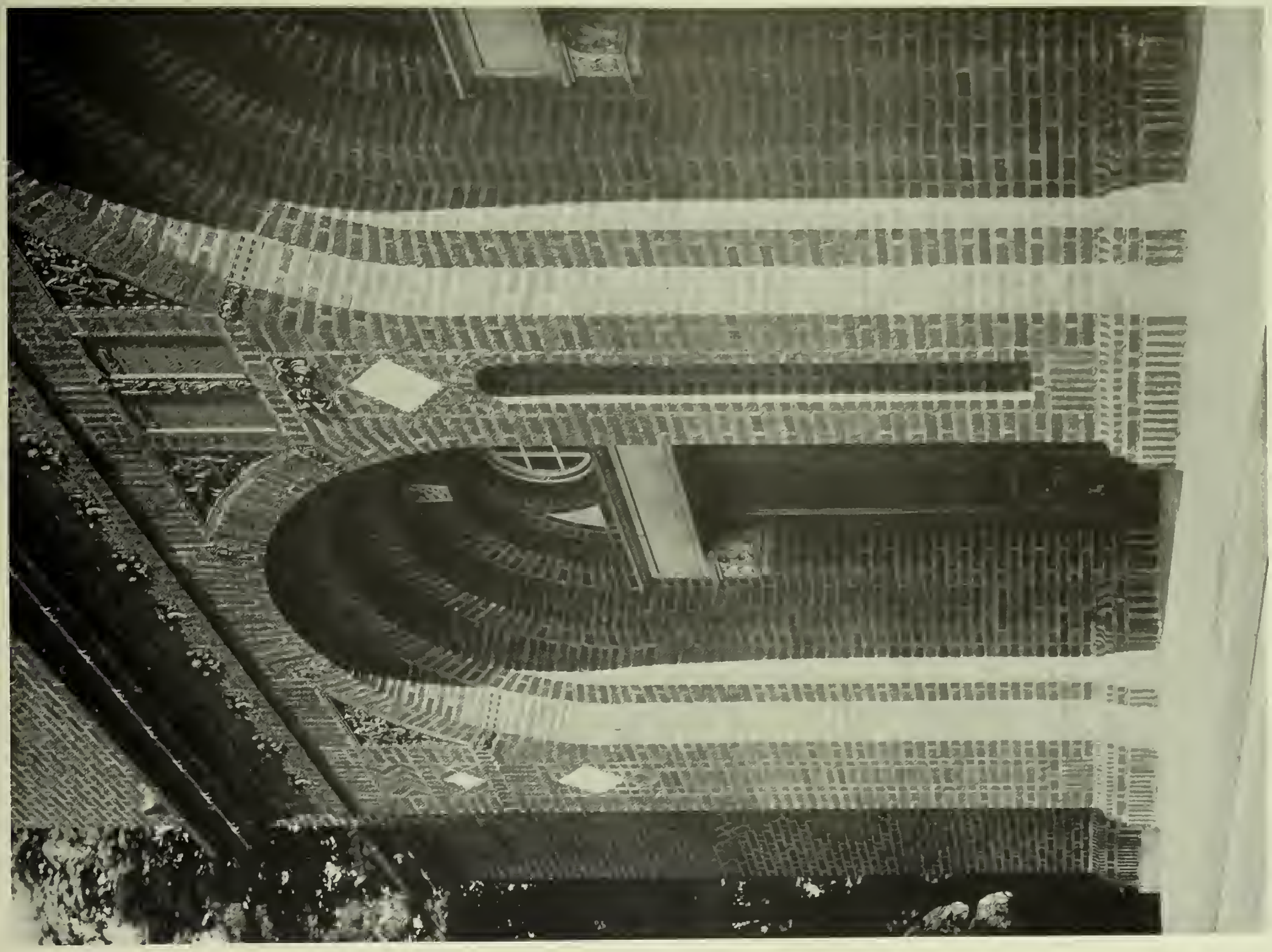
LONGITUDINAL SECTION.

THE EUCLID AVENUE TEMPLE, CLEVELAND, OHIO
LEHMAN & SCHMITT, ARCHITECTS

VOL. 22, NO. 9. PLATE 131.



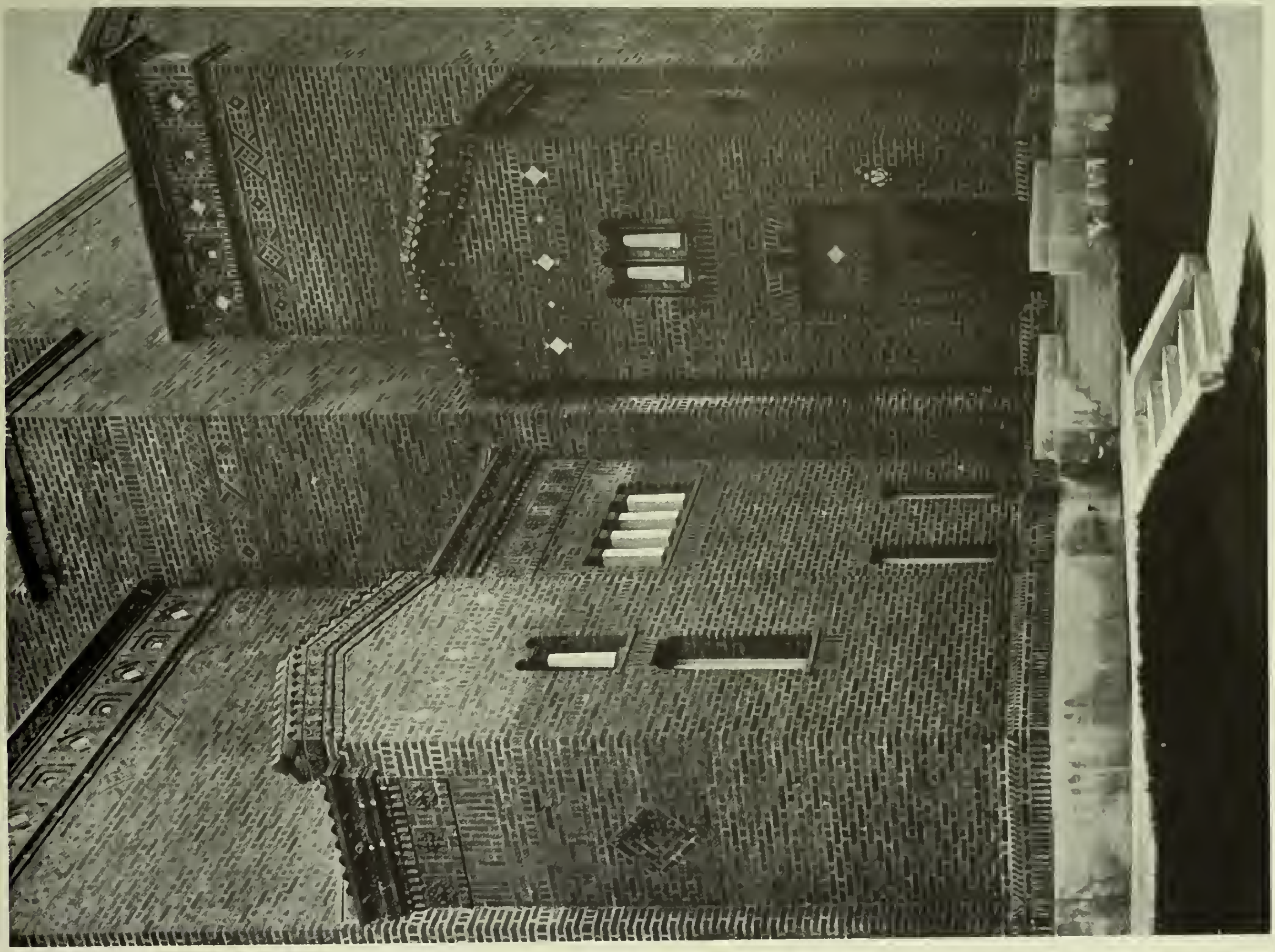
PRINCIPAL FACADE



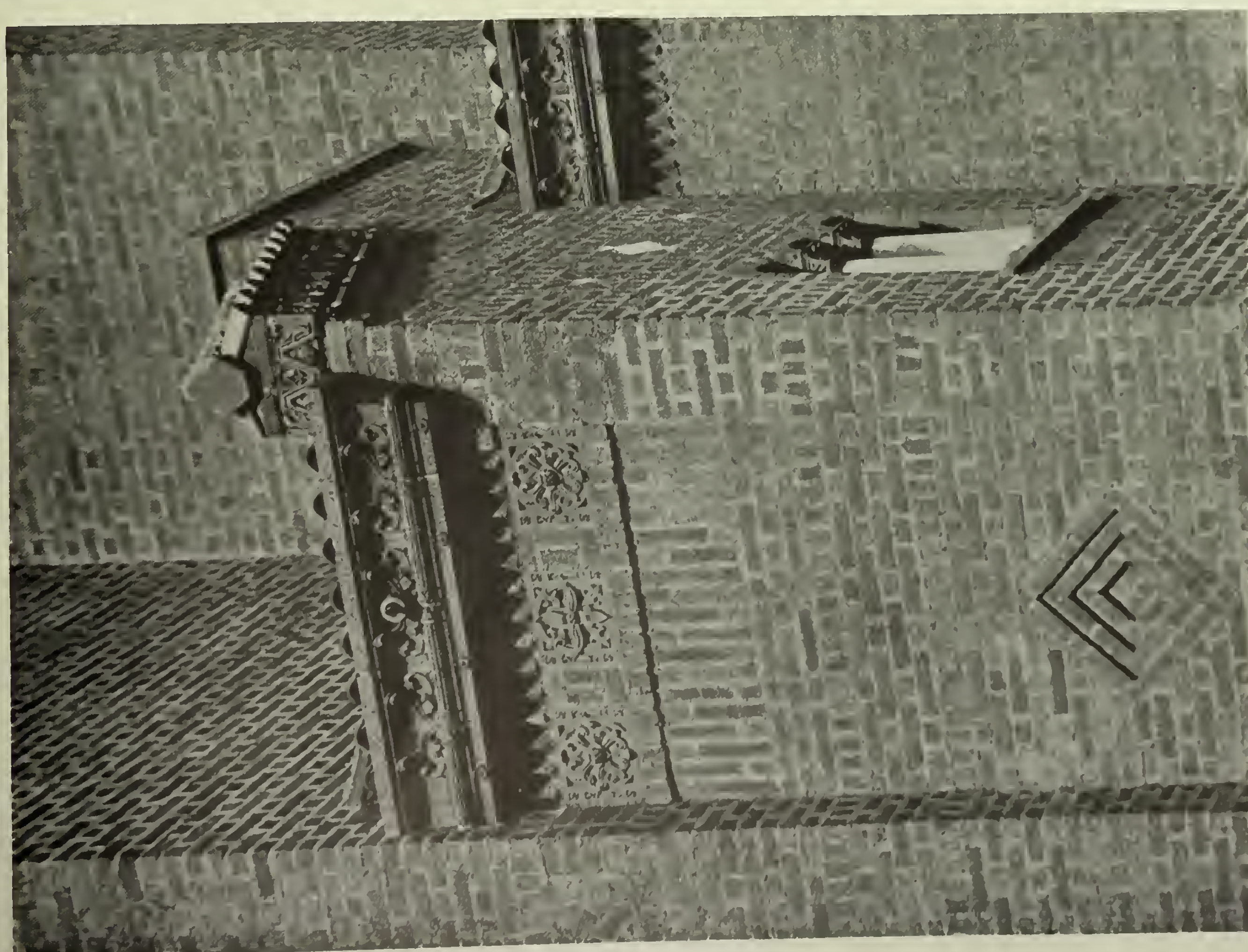
DETAIL OF ENTRANCE

THE EUCLID AVENUE TEMPLE, CLEVELAND, OHIO

LEHMAN & SCHMITT, ARCHITECTS



DETAIL OF SOUTHWEST ENTRANCE

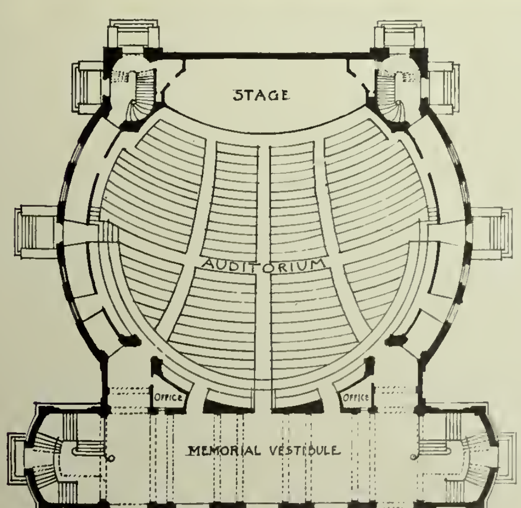


DETAIL OF CORNICES AND BRICKWORK

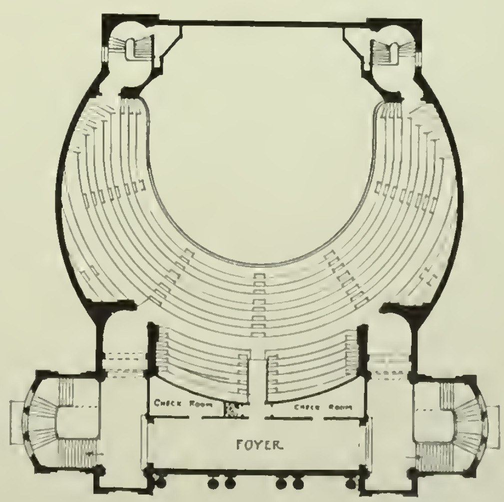
THE EUCLID AVENUE TEMPLE, CLEVELAND, OHIO

LEHMAN & SCHMITT, ARCHITECTS

PRINCIPAL ELEVATION



FIRST FLOOR PLAN



BALCONY FLOOR PLAN

AUDITORIUM, UNIVERSITY OF ILLINOIS, CHAMPAIGN, ILL.

C. H. BLACKALL, ARCHITECT

SIDE ELEVATION

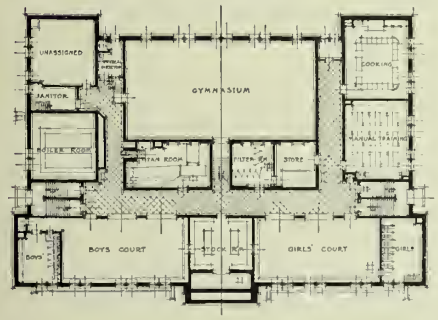
REAR ELEVATION

AUDITORIUM, UNIVERSITY OF ILLINOIS, CHAMPAIGN, ILL.
C. H. BLACKALL, ARCHITECT

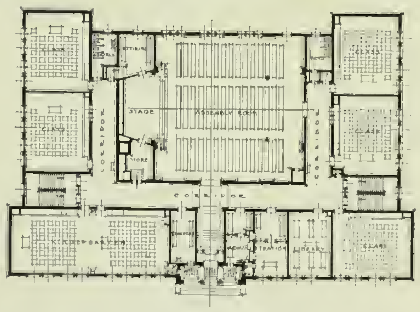
DETAIL OF CENTRAL PAVILION

RIDGE SCHOOL, NEWARK, NEW JERSEY
E. F. GUILBERT, ARCHITECT

ENTRANCE FRONT



BASEMENT PLAN



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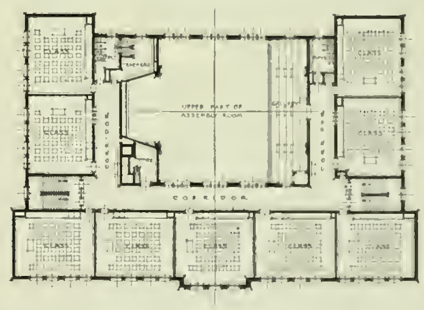
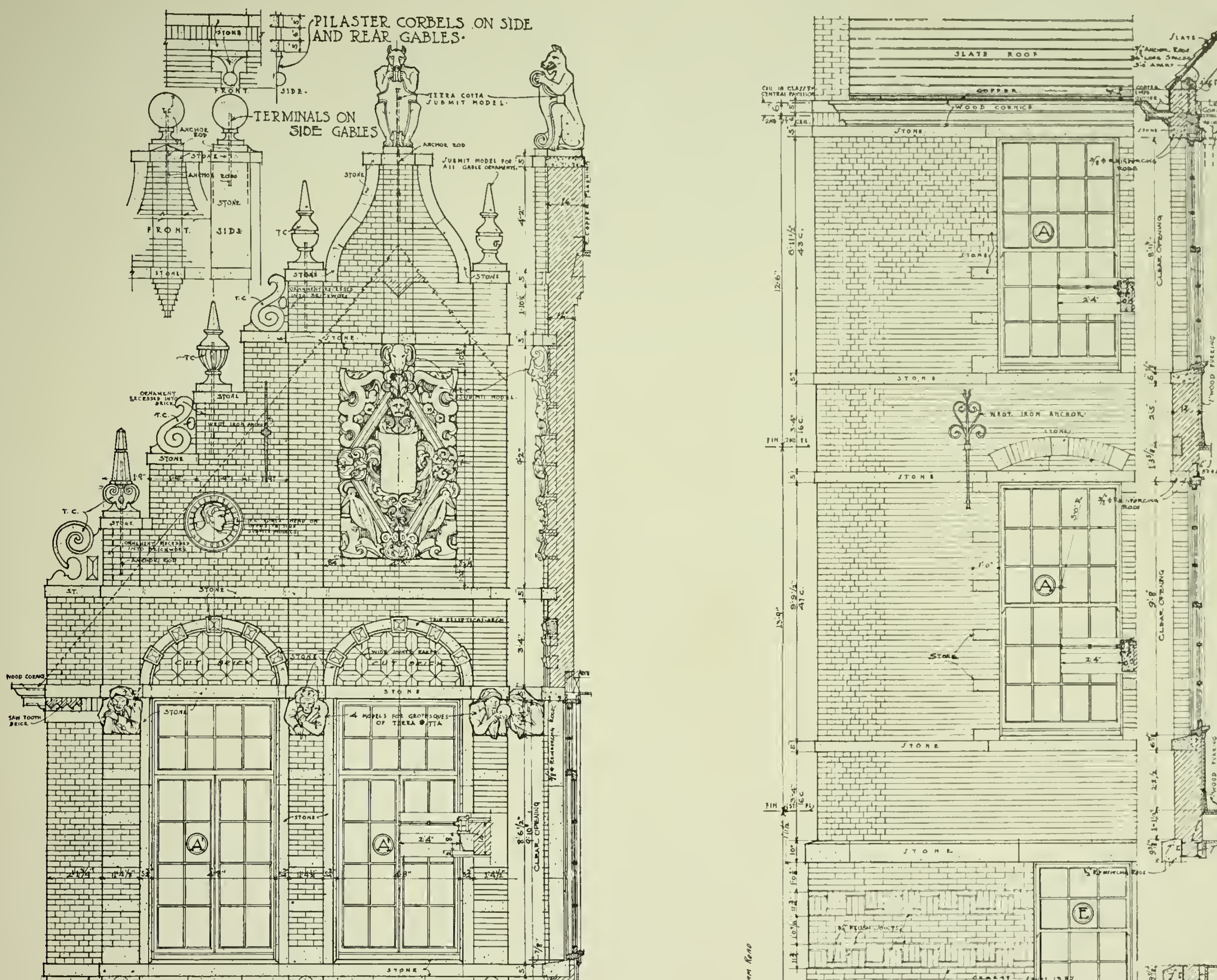


SECOND FLOOR PLAN

REAR ELEVATION

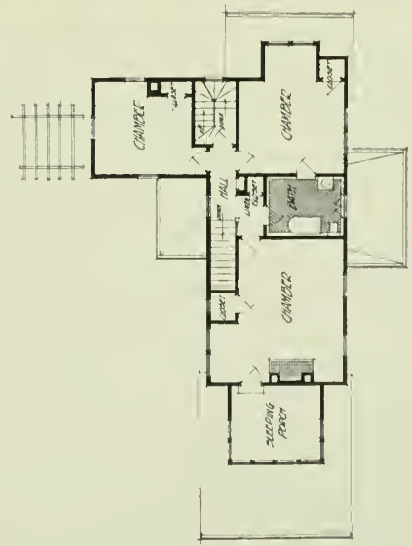
RIDGE SCHOOL, NEWARK, NEW JERSEY

E. F. GUILBERT, ARCHITECT

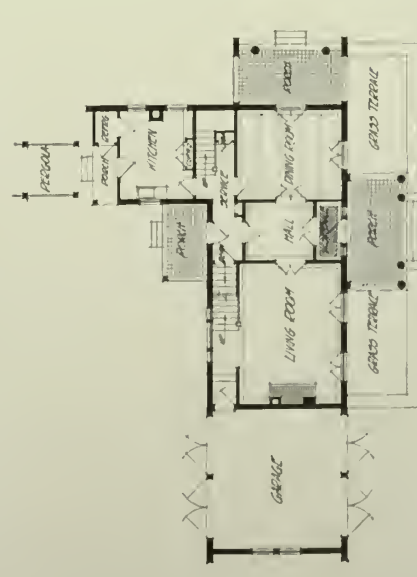


DETAILS OF CENTRAL PAVILION AND MAIN WALL

RIDGE SCHOOL, NEWARK, NEW JERSEY
E. F. GUILBERT, ARCHITECT

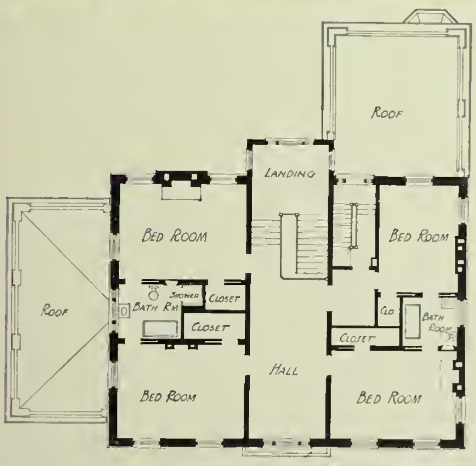


SECOND STORY PLAN



FIRST STORY PLAN

HOUSE AT CLEVELAND, OHIO
FOUNTAIN & MORATZ, ARCHITECTS



SECOND FLOOR PLAN

FIRST FLOOR PLAN

HOUSE AT COLUMBUS, OHIO
RICHARDS, McCARTY & BULFORD, ARCHITECTS

HOUSE AT HARTFORD, CONN.

LA FARGE & MORRIS, ARCHITECTS

ARTHUR A. SHURTLEFF, LANDSCAPE ARCHITECT

STREET FRONT

GARDEN

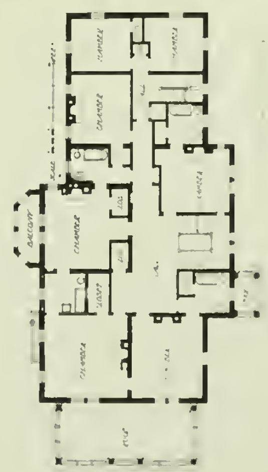
HOUSE AT HARTFORD, CONN.

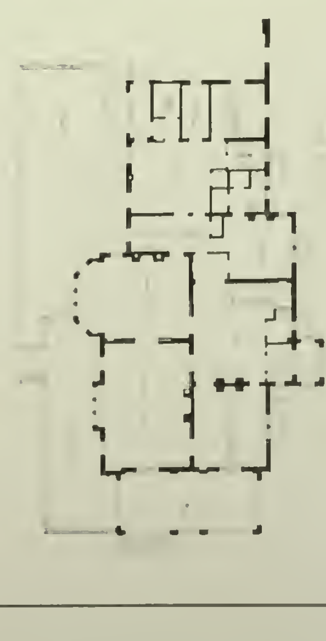
LA FARGE & MORRIS, ARCHITECTS

ARTHUR A. SHURTLEFF, LANDSCAPE ARCHITECT

ENTRANCE HALL

INTERIOR OF PORCH





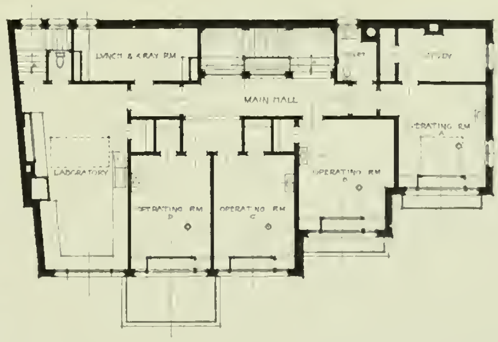
HOUSE AT HARTFORD, CONN.

LA FARGE & MORRIS, ARCHITECTS

ARTHUR A. SHURTLEFF, LANDSCAPE ARCHITECT

GENERAL VIEW

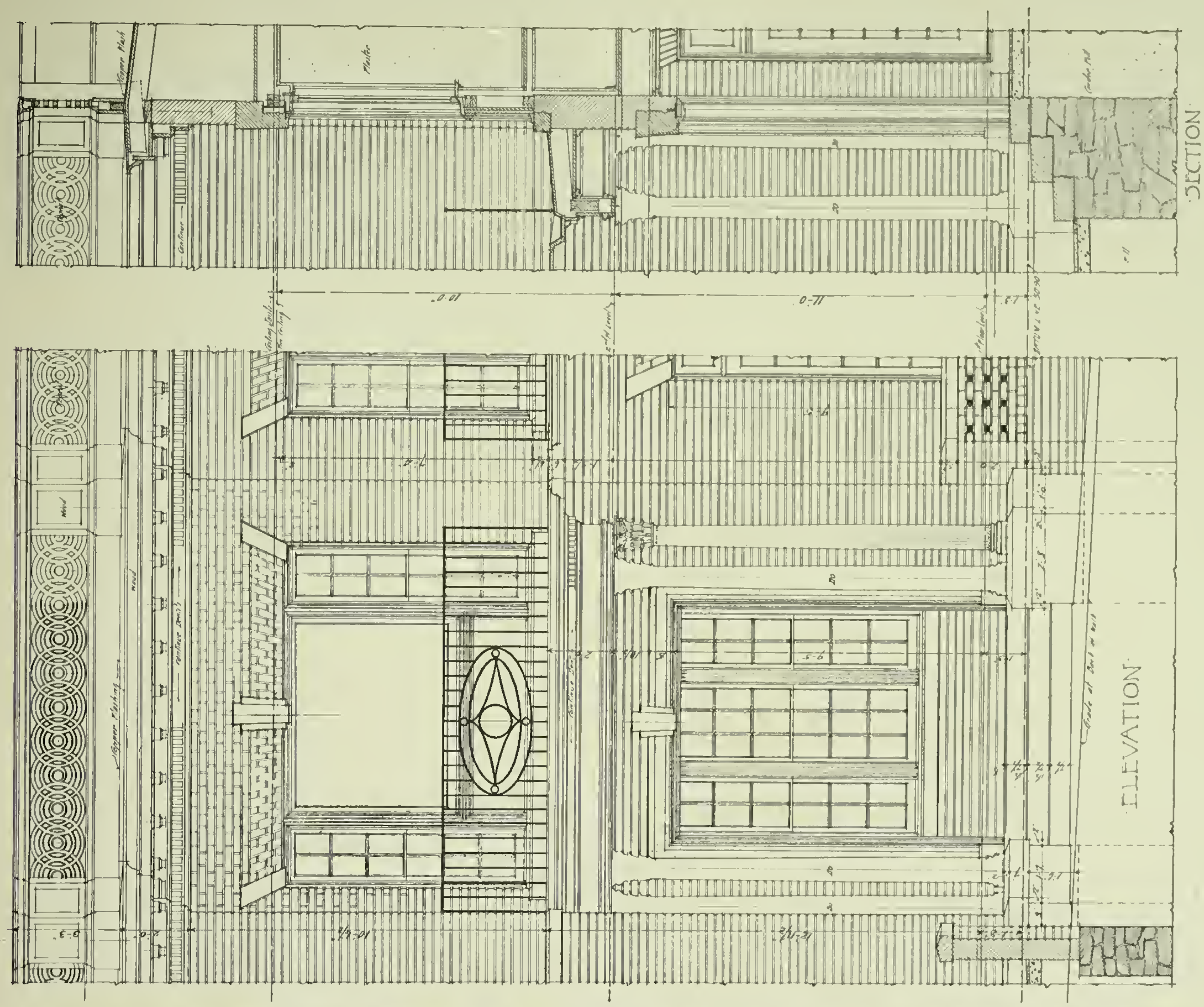
GARAGE ENTRANCE

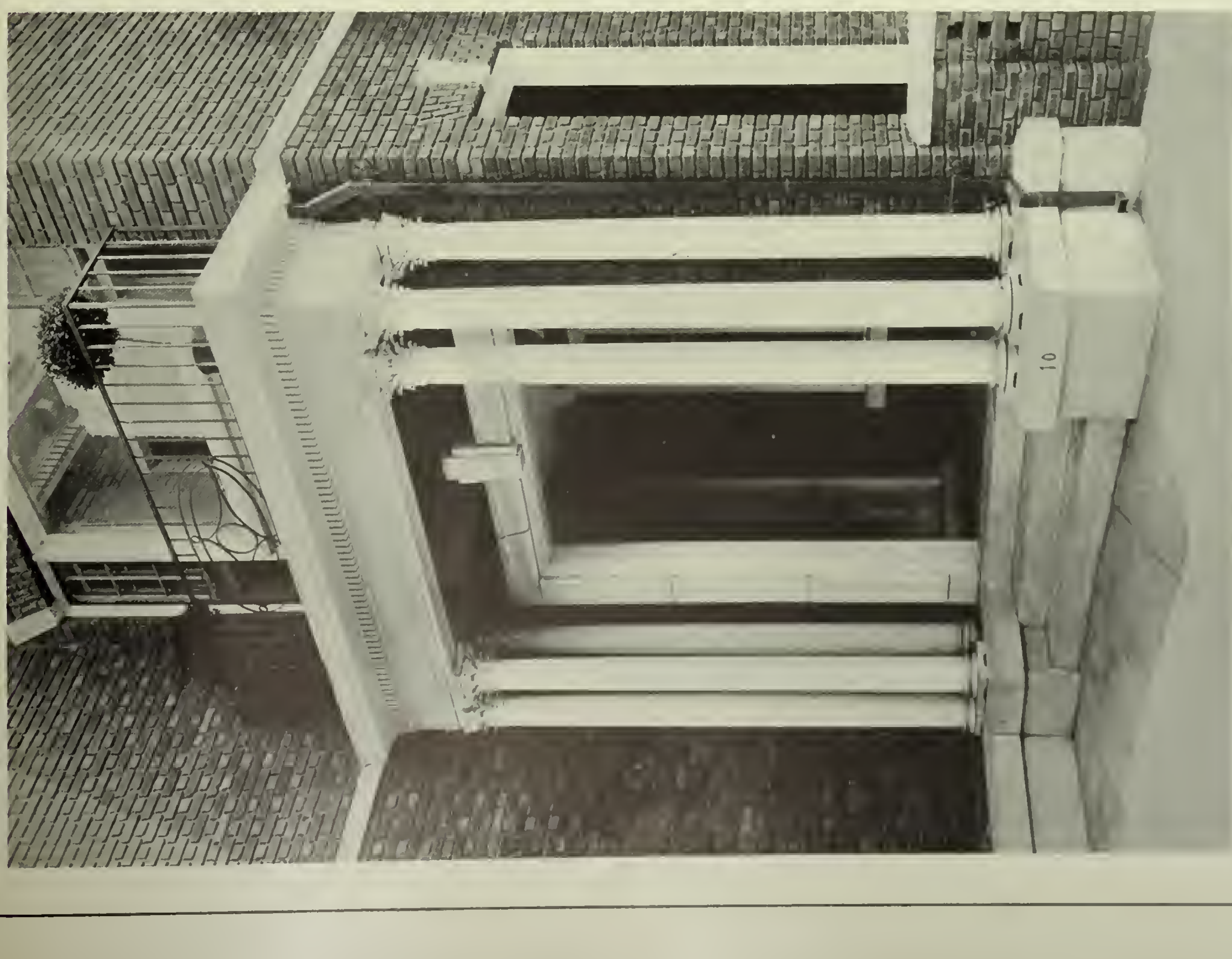


SECOND STORY PLAN

FIRST STORY PLAN

DENTAL OFFICE BUILDING, BRIDGEPORT, CONN.
SKINNER & WALKER, ARCHITECTS





DETAILS OF MAIN ENTRANCE

DENTAL OFFICE BUILDING, BRIDGEPORT, CONN.

SKINNER & WALKER, ARCHITECTS

Lattice–Its Use as an Architectural Embellishment.–Part II.

DETACHED ARBOR STRUCTURES.

BY GEORGE S. CHAPPELL.

A NATURAL subdivision of that part of the field of design which the user of lattice has made his own is formed by detached structures such as arbors, summer-houses, well-coverings, etc., which decorate our gardens, both old and new, and by the more utilitarian and modern contrivances by which the architect of to-day masks the presence of the laundry-yard, service-court, or plain old fashioned "back-yard." It is, perhaps, in this department that the happiest results have been attained. In direct connection with the house, as in the case of porches or vine supports applied directly on the walls of a building, the designer is restricted both as to space he may occupy and style he may employ. In the case of these detached structures, however, there is an almost unlimited freedom for the play of fancy. The influence of surrounding wall surfaces or strictly architectural detail is hardly a factor, granted, of course, that a general propriety of treatment be observed.

AN OLD WELL-COVERING.

The architect, or more commonly the carpenter, of Colonial days, felt the freedom which the playful pursuits of the garden offered him, but with his ingrained chastity of artistic impulse stopped short of the fantastic or freakish. He did not thoroughly cover the field into which he might have strayed, probably because he was too busy with the realities of wringing a living from the stern fields of his adoption. In the matter of entrance gateways, for instance, there is a singular paucity of material. Here was a problem which should have given rise to many lovely solutions. The actually executed results are few and far between. One may travel a day's journey through the coast towns of Massachusetts or under the elm-shaded streets of Connecticut river villages without finding more than a handful of instances where the builder has attempted anything more than a pair of severely simple gateposts flanked by a fence of the most uncompromising spikiness. There are beautiful gateposts, too, but very few with lattice treatment — at least so it would seem to me, and I have looked long and patiently for them. The arched trellis, double, perhaps, with shallow seats on either side, the gate itself with the contrast of upper and lower panel, the treatment of the abutting fence — these are the elements in one of the smaller problems of architecture which should inspire and receive more attention than it has been accorded as yet. In our Southern cities, notably Charleston, S. C., we find more serious attempts to make gateways attractive, but unfortunately the entire development of Southern Colonial architecture was opposed to anything as simple and naïve as lattice work. In its lowest and most natural state the early Southern architecture found its expression in the shacks of the negro — straightforward, simple buildings without ornament. These were habitations built by one race for another, homes without the informing instinct which shows itself so clearly in the work of men building for themselves, for their own personal wants. It is a selfish law, but as fundamental as human nature, that man will not, because he cannot, put his deepest, strongest efforts into aught but what is to be his own. At the other end of the scale in the South stood the wealthy slave-owner. What an interesting comparison it is between the stately homes of the well-to-do merchants of Salem and Portsmouth and the equally stately but far less personal dwellings of the corresponding class along our Southern shore. Something in the warmer climate, in the enervating, lazy atmosphere of a life where the master had a hundred hands to serve him, seems to have sapped the vitality of even the most successful of the "big" houses of the South. They are dignified, they have style and "the grand air," but it is a borrowed dignity, a lifeless style, a languid beauty. In the severe adaptations of Bulfinch and Latrobe, there is not the slightest trace of playfulness or amusement. We find practically no examples of lattice work; there is no place for it in an architecture of wood pompously proclaiming to all the world that it is stone. The nearest approach to a lattice treatment which one finds is in this very matter of gateways, which has suffered from Northern neglect. The Southern entrance was more an affair, the old gardens were more closely walled, and ingress and egress, particularly of "carriage folk," were masked with a certain splendor reflected in the high-posted gateways of old Charleston. But even here the architectural forms are but a borrowed application of the familiar English iron work, which went with the stone forms of the great manor house itself.

TREE LOOKOUT.

We have again to turn to the master-builders of New England to find the flower of our garden art expressed with raciness and native originality. It is in the old gardens of Salem, Portsmouth, and Danvers that we find the most charming conceptions, — quaint, logical, personal, unaffected — all that a real garden adjunct should be. Take, for example, the fine tree "lookout" suggested in the drawing herewith. What a charming idea it is to build up a human nest into the embracing branches of some friendly tree — what possibilities it suggests! Hardly a country place of any size but boasts some accommodating growth about which, at a ridiculously small expense, can be built a veritable palace of delight, — a wandering maze of substantial open-tread stairs leading to specially designed landings, where the girl may have her dolls, the boy his secret treasures, and the *pater familias* his book and pipe among the apple blossoms of May. Should a tree of fairly large spread — an oak, a low-growing elm, or even a big apple tree — be available, it is certainly to be hoped that a common meeting-ground will be included in the arborial architecture. I remember no luncheon to compare in its environment to that enjoyed years ago in the top of an old tree in Concord, Mass. While the memories of Paillard's and Durand's have paled or merged in the common remembrance of good things gone by, the memory of that hour among the branches remains clear and distinct. Try it, you epicures, who happen also to be lovers of nature. It is worth while! It seems hardly necessary to suggest that of course any woodwork used in this way should be either painted a neutral tone or allowed to weather to the silver gray of the tree-trunk itself. From the tree-house to the more formal summer-house we descend from the heights of the highly poetic to the plane of middling sentimentality so cherished by our elders: a plane of substantial firmness, upon which could be founded with perfect safety the light structures of their imagination. These

LATTICE SHELTER AND SCREEN SURROUNDING TENNIS COURT.
Bigelow & Wadsworth, Architects.

were to be the theatre of that safe and sane romanticism by which our grandmothers were won — victories usually preceded by a serious hour with the fair one's stern father and severe mother, where at divers practical matters of dower and maintenance were, likely enough, shrewdly discussed in the old gentleman's study, whence the keen old eyes, later peering through drawn blinds, watched the duly certified suitor crunching amorously down the garden path. Was it for this, I wonder, that the old-time shelters were so often set at intersections of main axes, or on the main line of observation, as in the example shown from the Robinson Garden in Salem. Personally, from both logical and sentimental considerations, at least from the younger man's point of view, I conceive an ideal location for the summer-house to be not at "the focal point of a congested civic center" — phrase dear to our professors of theory — but in the isolated bosquet at the end of a winding walk — the further away the better, a terminal, not a way station. In this phase of garden architecture, too, it seems as if we had stood still, if not actually retrograded. There is little or no movement in the summer-house market at present. Perhaps now that most of our millionaires really live in the country, there will be a renaissance of the little Chalet-de-Bois, which gives the cool, after-tennis drink so delicious a flavor. But the summer-house has only been developed as far as the simple rendezvous. Beyond lie visions of delightful possibilities, — game rooms, lattice mazes, and the like. It is one of the dreams of my life to find a client who will commission me to build a tiny open-air ball room with a stage and the dependencies of capsule drama.

LATTICE GATE.
Carrère & Hastings, Architects.

Try as I will, I cannot avoid saying a word about the pergola — a name which has been made to stand for so many crimes that it has become to me a hissing and a reproach. So terrible, indeed, did this pest become that one of my architectural confrères exclaimed that he had actually taken out pergola insurance against it; and surely we must admit that the gravity of the situation condones the cry of distress. There was a time, happily past, when no home was complete without a pergola. Every age has its architectural hall-mark. We have passed through the successive periods of wooden battlements, curved mansards, neo-grec columns (so near and, yet, alas, so far!) baronial towers — who of us now in our middle age does not recall yearning for a home with a tower? — down to the yesterday of the Italian pergola. The carved beam-ends and the fat columns of this delightful shade and shelter were applied with unsparing hand to houses and gardens of the most diverse character, regardless of appropriateness and beauty. The details of its construction have crept insidiously into the very

LATTICE TREATMENT OF THE INTERIOR OF A PORCH.
Bigelow & Wadsworth, Architects.

architecture of the house itself, and it is no uncommon thing to see these same projecting beam-ends used with a solid roof to form the cover of a piazza, or even hoisted hundreds of feet in the air, on the roof of a club or restaurant, to carry a thrilling burden of artificial wistaria or dusty, city-bred ivy. It is with such deceptions as these that architects fool themselves and befuddle the public, creating a taste for a meretricious and imitative art which is fundamentally wrong. If we look once more to the older models, we will find in the arbors of our New England gardens the perfect simplicity and appropriateness which shine like white light through the years, coming long after the over-educated and fruitless attempts of the French court gardeners to introduce the world of play-gardens into that of real architecture and equally long before this later attempt to graft the simple expression of a vineyard necessity upon an entirely foreign architectural life. It is difficult at close range to say just what the predominate feature of a period is — just what distinguishes us or will distinguish us from the periods just before or after us. If one may hazard a guess, however, I should say that whatever the particular detail may prove to be, it will be found to be closely related to the general return to the older and simpler forms of architectural expression which is undoubtedly at present in full swing. And of the details of this return to simplicity I can think of no more uniting link, no factor more common to all the subdivisions of the subject, than the use of lattice, which finds its application not alone in connection with the severe wooden houses, but also with brick, stone, stucco, or what you will, so long as it is honest and straightforward and intimately connected with the out-of-doors. I have no patience with the modern and very smart attempts to use lattice for interior purposes, to make it do things for which it was never intended. No matter how successful the result may appear to be — and we can all call to mind instances where it would seem to be the last word in chic — I cannot help feeling that the same, no, not the same, a better, result could have been secured in another way and by more legitimate means. If these slight considerations of the subject will make for its honest use, they will have a real excuse for existence.

OLD COLONIAL GARDEN HOUSE.

The Masonic Temple, Camden, N. J.

HEACOCK & HOKANSON, ARCHITECTS.

THE sympathetic use of architectural terra cotta and brick used in happy combination is again demonstrated in the recently erected Masonic Temple, Camden, N. J. Here the architects have frankly used terra cotta in place of other materials because it seemed to them best to express the needs of this particular problem.

Temples should be dignified and imposing structures, no matter how small, and examples of good, sound construction, no matter how inexpensively they must be built. There is no type of building whose traditions hold for it a better right to the employment of the Classic styles, or even seem to demand it, than the Masonic Temple, and this is even further encouraged by the extent to which we are to-day using Greek and Roman precedents generally in architecture. There should also be a certain air of exclusiveness, massiveness, and strength without sacrificing refinement and beauty. The Greek temple is the one type of building which embodies all these characteristics. However, in using it as the best expression of what we desire in our Masonic Temples, it is necessary to make a plan which satisfies the demands of modern requirements and to use the structural material which will bring the total cost of the building within the amount appropriated for its erection. The selection of architectural terra cotta and brick was the logical choice. These materials were economical in cost and filled all the requirements of architectural character and structural stability. With the plastic quality of architectural terra cotta it is possible to get a great richness and beauty of detail, which, except in very few instances, would be quite prohibitive even if stone could be used. While architectural terra cotta has a distinctly individual character, it can be made to express, in its own way, the dignity and simplicity we so desire in buildings of this character. The fact that architectural terra cotta is so much more fireproof than stone is again no small factor in determining its employment. It may also be well to say here that in this special instance the building committee objected very strongly to the use of stone on account of the darkening effect the atmosphere has upon it in that vicinity, this objection being caused by the appearance of stone buildings in the neighborhood of the proposed site for the new temple. By the use of architectural terra cotta and an impervious brick it was satisfactorily proved to the members of the committee that they could have a material which would be impervious and which could be easily cleaned.

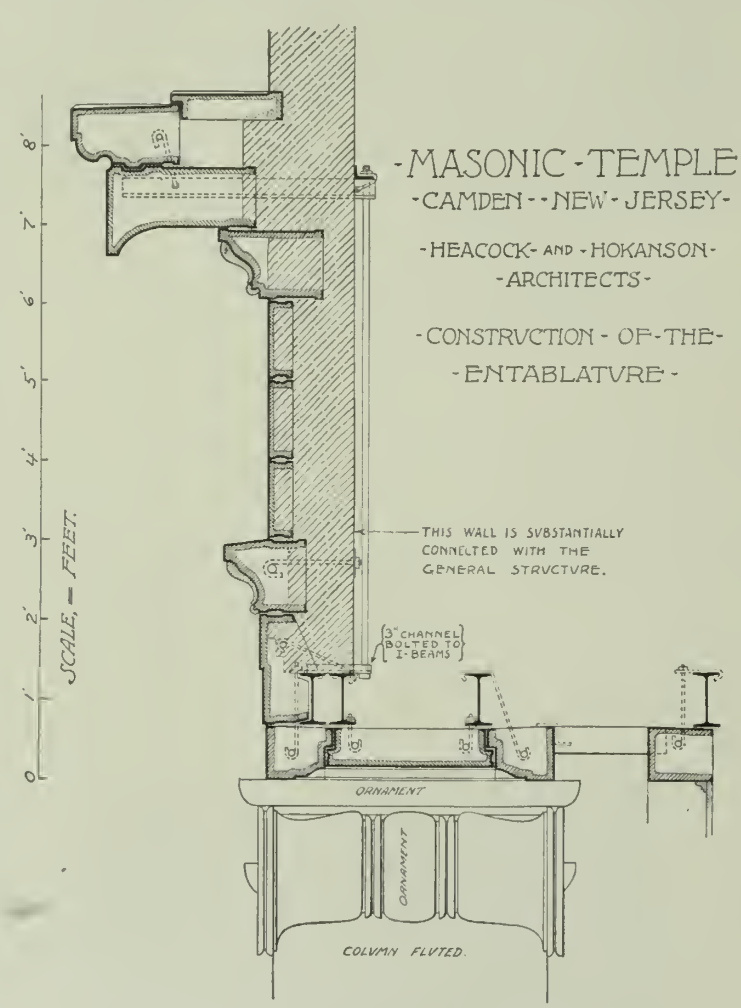
ENTRANCE DETAIL.

In the case of the new Camden Masonic Temple a light buff unglazed terra cotta with surface tooling was used. It was found that with the tooled surface a certain texture was obtained, which brought it more in harmony with the brickwork and which prevented the appearance of any unevenness in the flat surfaces. While in most instances this is not objectionable, here, where the effect of strength was desired, the tooling was resorted to with success.

One feature in handling the architectural terra cotta was the elimination of visible vertical joints in the columns. The size of the columns required that the drum be built up in eight pieces, but, by making a double break in the fillets and placing the joint in the internal angle of one of these breaks, each drum has the appearance of being a single piece, so that the horizontal joints only are visible. The columns, which are thirty-four feet high, rest upon a granite base nine feet in height. This high base gives a desired feeling of privacy and seclusion, and with the spacing of the columns and the fenestration completely obviates the danger of its having a bank character. The intercolumniation is quite successful, the columns being placed close together, with the central bay made wider to accommodate the wide entrance demanded. Set close to the curtain wall in back, they give a most satisfying feeling of strength and repose. The wide flanking piers contrast well with the light and shade of the colonnade and add to the simplicity and massiveness of the whole.

Besides the fluting of the columns and the Ionic caps, the architectural terra cotta is enriched with decorated mouldings in the cornice and architrave and wreaths encircling Masonic emblems in the frieze. The latter, with the symbol over the main entrance, are the only external evidences of the purpose of the building. The cornice is extremely simple and effective and is carried around the sides of the building past the first bay. The high parapet receiving the roof in back gives the right proportion of wall surface above the columns. A sense of protection is given to the entrance by the break in the high granite base, while the wide architectural terra cotta trim gives it importance in the composition. Small windows above the entrance light the committee rooms in the second story mezzanine, while the screened windows directly under the entablature, lighting the second story hall, add richness and character to the building.

The brick selected for the body of the building was a light impervious brick to match the terra cotta and laid up with thin joints to give an evenness of surface and tone, thereby gaining in massiveness and solidity.



DETAIL SHOWING CONSTRUCTION OF ENTABLATURE.

The same brick is used throughout the exterior of the building.

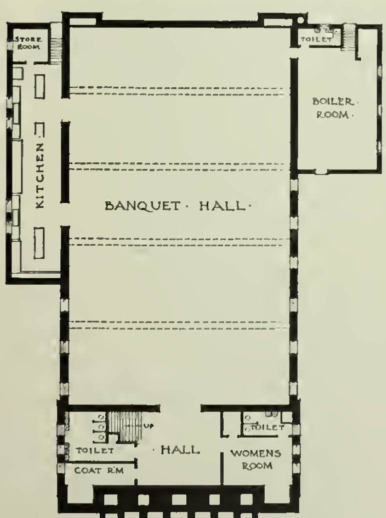
In plan, the building consists of a high basement, two main or lodge room floors, and two mezzanines for committee rooms, armory, lantern rooms, etc. The entrance hall is placed three and one-half feet below the level of the first floor, to make fewer steps on the exterior and to give a higher ceiling. The large room in the basement, measuring approximately 60 x 100 feet, will be used for banqueting and drilling purposes. Two wings made possible by the shape of the lot take care of the kitchen and heating plant.

The first floor is to be used by the higher Masonic bodies, both because it is more convenient to the basement for drilling, and because it required more floor area than the second floor. This additional area was obtained by building the platform of the large lodge room out over the kitchen wing. In the mezzanine of the first story are two committee rooms reached by the main staircase, a large armory, galleries, and lantern room. The second floor is given up entirely to one large Blue Lodge Room and its accessories. The lobby on this floor is especially fortunate in its size and proportions.

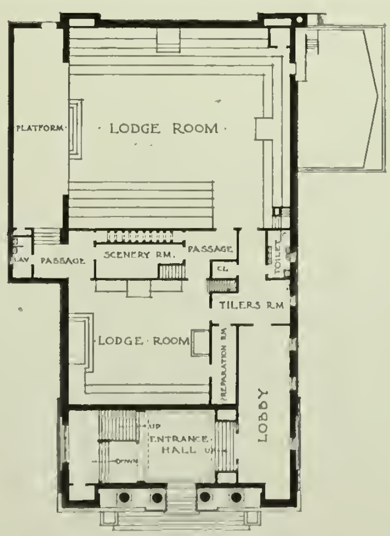
At present the interior walls are left in white plaster finish with very simple plaster cornices and bands, the woodwork being a light brown fumed oak except in the upper part of the lodge rooms, where it is painted white.

Set well back from the curb, and somewhat further back than the adjoining buildings, one comes upon the Temple quite suddenly. The first impression is one of massiveness and strength, a much larger scale being obtained than it is possible to realize from the accompanying illustrations.

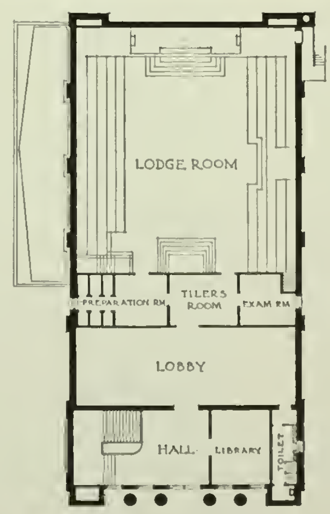
This building, although simple in design and appointments, possesses that character which we naturally associate with a building intended for the home of any mystic order. It is also a visible proof that a structure with a feeling of dignity and reserve can be obtained by the use of less pretentious materials than those which have long been associated with buildings of monumental design, and it augurs well for the future of design in this country that imposing architectural effects can be obtained at less expense and with materials which are more capable of expressing the ideals of modern American life.



BASEMENT · PLAN



FIRST · FLOOR · PLAN ·



SECOND FLOOR · PLAN ·

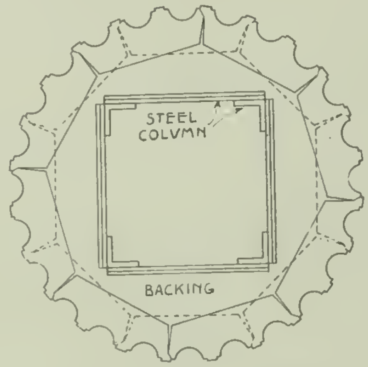
MASONIC TEMPLE, CAMDEN, NEW JERSEY

HEACOCK & HOKANSON, ARCHITECTS

Only by attempting new things is progress to be had, and the saying, "Nothing ventured, nothing gained," is as true in architecture as in other instances.

If we are to preserve the beauty of classic forms to future generations it is evident that much thought must be given to the use of new materials, which will retain faithfully all the pristine glory of the early examples, for in this age of excessive building costs, the opportunities for constructing monumental buildings with the materials in which they were first conceived are becoming less and less numerous.

It is equally certain, with our present architectural limitations in design, that the classic building must continue to furnish inspiration for the design of our more important buildings, for an architectural style has yet to be developed which can more completely express the functions of a public building.



CONSTRUCTION OF COLUMNS.

There are many instances where classic forms have been expressed in materials other than stone or marble, and the progressive architect seeing the need of new forms and materials is not entering a barren field nor attempting an impossible task, for the many illustrious examples which can be readily called to mind should provide ample precedent.

The successful buildings point clearly to terra cotta as the promising material and one in which are latent possibilities that are only waiting further development. The great possibilities in the use of color, which is only one of the many striking advantages of the material, should provide a fascinating enough reward to stimulate large efforts.

If the examples already in existence will be taken for models to be further developed, and if each successful design will encourage further endeavor, then architecture will indeed be a living art.


DETAIL OF FACADE
MASONIC TEMPLE, CAMDEN, NEW JERSEY
HEACOCK & HOKANSON, ARCHITECTS

Architectural Jurisprudence.— Part V.

THE ARCHITECT IN MUNICIPAL WORK.

BY WILLIAM L. BOWMAN, C.E., LL.B., OF THE NEW YORK BAR.

IT IS natural that municipal work should have a charm and fascination for the ambitious architect. There fame and fortune seem to be combined. For what more could one ask? Yet those attracted by such work must not forget that the larger the rewards the greater the dangers. With that fact admitted, let us ascertain and know the dangers of this class of employment and if possible ascertain how best to cope with them. Our considerations will not, of course, be applicable to those salaried architects who are usually protected by civil service.

Although, strictly defined, municipal work would not include government or state work or their boards or commissions, yet we will briefly consider such employments. However, let us first take up the strict municipal work for cities, counties, boroughs, villages, school districts, etc.

BEFORE CONTRACTING. A municipal corporation is a legal body created by an act of legislature and as such its powers and actions are governed by the United States and state constitutions and by its charter or the act creating it. For example, where a city is authorized to act only by ordinance, and where an architect was employed pursuant to a resolution, it was decided that the architect could not recover from the city even after the services were performed. From this we can formulate our first rule for procedure: *Know that the municipal corporation is acting pursuant to the law creating it.*

Probably every state constitution, or at least every act creating a municipal corporation, fixes a limit for its indebtedness. Such limits are strictly adhered to, and attempts to evade them are not ordinarily successful. In a late case a city tried to contract for a public improvement by providing for payment in yearly instalments after yearly levies. It was held that once the contract was signed that created an indebtedness, and if the contract price added to other indebtednesses exceeded the constitutional limit, such contract was null and void, and no recovery could be had even for work done or services rendered beyond the limit. Hence our second rule reads: *Know that your contract does not cause the indebtedness of the municipality to exceed its constitutional or statutory limit.*

Some states and most municipalities have statutes requiring that all public work above certain small amounts shall be contracted for with the lowest bidder, etc., after due advertisement. Generally speaking, such requirements are not considered applicable to contracts for architects' services, but such is not a universal rule as is shown by the fact that a county used this defense a few years ago to prevent an architect from collecting his compensation for services rendered and accepted. How can any municipality expect to get satisfactory and first class architectural services by advertising and awarding to the lowest bidder? Undoubtedly the trend of opinion is against such a method of employing professional services. Past experience, at least, then gives us the third rule: *Know that your contract does not exceed a limit above which advertisement and acceptance of the lowest bidder is required.*

Many of the acts incorporating municipal bodies and many of the statutes governing their actions provide that as a part of the expense of the "construction" of a public improvement must be considered compensation for architects, engineers, inspectors, etc. There are some cases holding that as a matter of law such compensation is a part of the cost of a public improvement which must be considered to determine the amount of money to be appropriated. This fact causes the architect at times to be interested in matters of taxation, assessments, etc., since if the tax or assessment is invalid, then there is no money to pay him. A school board has been held not to have power to contract for the remodeling of a schoolhouse on money voted and taxed to provide for an addition. Where public work is to be paid for by assessments which require the previous assent of the voters, there can be no recovery upon any contracts for such public work or for services in connection therewith if there has been no voting on the subject. Our fourth rule to prevent losses is: *Know that assessments or taxes to pay for public improvement work which include your compensation are valid.*

A municipal corporation must act through its properly constituted boards or officials. Every one is supposed to know their powers and govern themselves accordingly. Officials often act when they have no authority, and especially is this true in the employment of professional men such as architects, engineers, and experts. Boards must act formally at proper meetings to bind the municipality. Let us see what has happened by failures to consider this danger. In the city of New York the Board of Health is composed of three persons — the Commissioner of Health, the Police Commissioner, and the Health Officer of the Port. The Commissioner of Health is always planning new hospitals, new buildings of all kinds for his work, and additions, etc., to present buildings. As each of these men is very busy with his separate work, it has been found, at least in the past, that little attention has been paid to having resolutions passed by them at a board meeting authorizing the employment of architects for the Commissioner of Health's work. That particular Commissioner would order an architect to present sketch plans, etc. While the architect was in favor he usually got his pay, since the employment would later be ratified by the board; but if his work did not suit or if he fell from grace, there was no way for him to recover from the city. Instances of such losses by architects are numerous.

In another instance a professional man employed by a mayor of a city where the charter required employment by ordinance of the common council, was held not to be entitled to any recovery of compensation against the city. In this connection it might be pertinent to suggest that a city council or board cannot create an office for a professional man where the charter makes no such provision.

In the smaller communities the one man who usually dominates the board, council, or governing body, and acts as the spokesman, often neglects the proper steps to a legal employment, especially of a professional man. These considerations give us one of our most important rules: *Know that the board or official employing you does so in the proper legal method required by the act incorporating the body or by the charter or by the local rules governing such body.*

Most of the statute laws controlling municipal corporations contain provisions that no contract shall be valid and binding unless there are funds at hand or an appropriation specifically made to pay for the contract work. It is the general rule of law that the architect who performs services under a contract, there being no funds or appropriation, cannot recover his compensation therefor. This rule in some instances has been somewhat tempered in cases of insufficient funds, and a recovery allowed to the extent of the money on hand. Therefore: *Know that funds are available or a specific appropriation made by the proper authorities to pay you before proceeding with your contract work.*

CONTRACTS AND PERFORMANCE. Municipal contracts are usually required to be in writing and signed by certain officials. There are many decisions under the New York City charter holding that a writing is not necessary for the employment of an architect. However, no architect should take such employment without confirming the important terms in writing, even though no formal contract is signed. Municipal contracts are very strictly construed and usually against the architect. While there are times when the architect must sign the regular city form of contract, yet the architect can often control or at least regulate the wording of his contract. Just lately an architect had a contract for court-house plans where he was to receive $1,000 if the building did not go ahead, but if it did then the $1,000 was to be applied as a part payment. The architect received the $1,000 for his plans. Other plans were then ordered and accepted from another party and the court house built. Action was brought by the architect against the county for breach of contract, but the court decided that since the building was not constructed according to his plans, the $1,000 he had received was all he was entitled to. A little care in the wording of the contract would have avoided such a result. Our seventh rule then becomes: *Have your contract in writing and know that it is worded properly.*

The architect who has never done municipal work can hardly appreciate the restrictions and barriers which bind him in his performance as differentiated from private work. In one case the court said that an architect employed to design a court house was required to exercise a high degree of skill and care, or in other words that ordinary average skill and care was not sufficient for such employment. In the preparation of his drawings and specifications the architect should act upon the theory that he cannot be paid for his work unless the lowest bid plus his compensation are equal to or less than the appropriation for the building. Those who comply with this theory can be assured of their pay; those who do not may or may not receive compensation for their work. This creates a serious situation because the architect must follow the directions and suggestions of the official having the work in charge. He also usually has no definite knowledge as to how soon the work will be advertised, and yet he is bound to anticipate contractor's bids. In one case, speaking of this determining of performance or non-performance of the architect by contractor's bids, the court spoke of the "moral impossibility of an architect being able to fix precisely the cost of any building if the cost is to be measured in any such capricious way as by the bids of contractors." How much more is that statement true on municipal buildings when the bids may vary several hundred thousand dollars. However, this is a condition which the architect must reckon with and its solution must necessarily rest with him.

Where there is no appropriation for the proposed building, but a cost limit is given the architect, then he does not have to exercise the same care, since a substantial performance on his part will entitle him to compensation. However, the limit of a substantial performance in this regard in municipal work is not as high as for private work. In one New York City case $52,500 estimated cost was held good where $50,000 was the limit. Another decision in that state which gives the general rule holds that if the bids are largely in excess of the cost limit, the municipality may abandon the work with no obligation to pay the architect.

Many municipalities have appointed a board to pass upon and decide as to whether plans and specifications for public improvements are proper and suitable for the city or for the character of improvement. In New York City this board is called the Art Commission and consists of the Mayor, the President of the Metropolitan Museum of Art, the President of Brooklyn Institute of Arts and Sciences, one painter, one sculptor, and one architect, residents of New York City, to be nominees of the Fine Arts Federation, and three other non-professional residents of the city. They serve without compensation. The approval of the Commission is required for all structures to cost more than $1,000,000. By request they act regarding all other structures such as buildings, bridges, approaches, gates, fences, lamps, etc., and as a matter of fact they are usually so requested. Hence the architect who gets a contract from the city of New York must count on satisfying the Art Commission, although nothing is said in his contract in that regard. In the large cities this practice is now common and as a check on the purely political architect it is certainly a good idea. Also it makes for uniformity and should bring about serious planning for the future of the city, which has been sadly neglected in this country. There is a danger of course that politics or certain art cliques may control such a board, and that is one of the matters for the architect's consideration when he contemplates taking a municipal contract. There would seem to be no question but what an architect who could not satisfy such a board and thus make his plans available for use, could not recover for the services rendered in preparing rejected plans.

In most cities all structures must be passed upon by a Building Department, which is another body that must be satisfied by an architect before his plans and specifications become available for use. This is also another requirement that is not mentioned in the contract of employment.

In his superintendence of municipal work the architect must know and recognize the limitations placed upon him. He should always read the builder's contract with the municipality, for therein are set forth his powers and authority, not only as agent for the municipality, but as arbitrator between the parties. Any order or direction to the contractor should be put in writing. Alterations must be made and additional or extra work must be ordered in the specific way provided in the contract, otherwise the contractor may not be able to recover for such work. Never act in a manner which is not clearly specified. For example, the fact that work is to be done under your direction does not give you power to order extra work. The right to make such changes as may appear necessary or desirable only gives power to make changes in detail which do not alter or destroy the essential identity of the thing contracted for, and it has been also held that this right does not give him the power to increase the financial obligation of the municipality.

As an arbitrator in making estimates and issuing certificates, the architect in municipal work should be especially conscientious, honest, and capable, since his decisions usually bind the contractor absolutely and yet do not bind the municipality. That the law should permit such a condition is unusual and often unfortunate, but the architect should never take advantage of this to bulldoze a contractor. In municipal work where the amount of work is large between estimates, and where the payment of certificates is a long-drawn-out matter of red tape, the architect should make his estimates and issue his certificates promptly. Remember, though you have unprecedented powers as arbitrator, you cannot interpret the contract and conclusively decide that certain work is or is not contract work. Just a few instances where architects or engineers have caused the municipality large expense by their actions :

(*a*) Mistakes in lines, grades, elevations, plans or specifications or directions, whereby the contractor had either to do additional work or do over work already done.

(*b*) Requirement that the contractor do the work in a way not called for by the contract, entailing more expensive work than would customarily or otherwise be entailed.

(*c*) Requirement that the contractor do over work already done properly or repair or maintain the same.

(*d*) Requirement that the contractor do work not within his contract as contract work.

The time wasted by and the financial losses of the architect, contractor, and municipality in such cases should cause the architect to endeavor to be thoroughly posted as to the legal phases of these situations. These considerations recommend the rule : *Have and put everything in writing and act only upon the strict wording of all documents.*

Let us now consider briefly some of the cases wherein the architect has had to sue municipalities for his compensation. The usual rule of law regarding breached contracts permitting a recovery on the *quantum meruit* or reasonable value for work done and prospective profits for the work not done, does not seem to prevail generally in municipal cases, the tendency being to restrict the recovery solely to the reasonable value of work done.

While ordinarily an architect cannot recover on a municipal contract which is void on account of there being no appropriation, no funds, no power to contract, etc., yet there are instances where certain recovery has been allowed. A recent decision of this sort permitted the recovery of actual cost of services and of material furnished with interest at the legal rate, but excluded profits. Other cases make a distinction where there are mere irregularities in the employment of professional men and recovery of the contract value is permitted.

There are also other decisions holding that where the refusal of a municipality to pay is due to its failure to take proceedings for an assessment or to collect the same, and where the city has the benefit of performance, then the city should be liable for the contract price.

These actions against municipalities are fought bitterly and every technical defense that can be thought of is used. A common and difficult plea is that the contract is conditional ; that is, since the compensation is a percentage of the cost of a building, when the building is not constructed then there is no liability for any work done. A contract requirement for partial payments is the best means of preventing that danger.

State work is even more dangerous than municipal, because of the fact that you have no redress should the contracting official break the contract or act as he pleases. In a very few states, boards or courts of claims have been established, wherein a claimant against the state or any of its departments may present his wrongs and get a legal hearing and decision. All of the difficulties and dangers just suggested in regard to municipal work are pertinent in this class of work. Those unacquainted with such work are warned that experience has proven the value of our rule following : *Ascertain first if there is a state board or court of claims ; if not, you must depend on the official honesty and integrity of the official with whom you deal. Remember personal honesty and official honesty are contradictions in some officials.*

Government work is surrounded by many of the restrictions and red tape of municipal work, but the United States Court of Claims is open to those who feel themselves aggrieved. Its decisions as a rule are tempered with more equity than the decisions of most state courts. The government contracts, however, are models of what a contract ought not to be, with their many unfair, unreasonable, and one-sided clauses. Of course this criticism is not as applicable to the contracts for professional services as to the construction contracts. But the existence of such construction contracts, with the increased authority of the architect or engineer, often give them absolute power to make or break the contractor. These are the cases which test the ability and integrity of the architect as in almost no other situation, and conscientious, honest, and common sense actions and decisions prove the real architect.

SUMMARY. The architect who for the first time contemplates taking on municipal, state, or government work must realize that the liberties which he took either in his architectural or superintending work in private practice cannot be permitted in this public work. He is rigidly bound by state statutes, charters, or local regulations, his contract of employment, and the construction contract. Everything must be formal and must be governed by the strict wording pertaining thereto. Statutes, charters, local regulations, and the laws governing contracts are changing daily ; they may differ not only in adjoining states, but in adjacent counties and cities. What you knew of such matters five years or even six months ago may cause you serious trouble and loss. The present and its requirements are all that count. You must be up-to-date. Our rules which we have formulated as we went along may be summed up in a motto which should be a reminder and warning of the many dangers suggested : "*Never consider or do any public work without first consulting competent legal advice.*"

EDITORIAL COMMENT AND NOTES FOR THE MONTH

"A HOUSING problem may be said to exist wherever any portion of a population dwells under conditions dangerous to health, safety, or morality." The problem of housing in Newark, N. J., has been made the subject of a most instructive report by E. P. Goodrich and George B. Ford, who continue the definition of their subject by saying: "The problem is present to some degree in every American city. It is usually occasioned primarily by the lack of guidance in urban growth, by poor planning of buildings, faulty construction, and defective sanitation; it is aggravated by the greed of some landlords, the carelessness of some tenants, and ignorance of the laws of hygiene on the part of both. The result of bad housing is ill health, both physical and moral, and thereby industrial inefficiency, unemployment, and a long chain of preventable social maladies, which are very costly to the community, and which place a heavy handicap upon individual and social achievement.

"Man's dwelling exerts a marked influence upon his life and character. From one-third to one-half his time, and much more than half of the time of women and children, is spent in the home. Bad housing conditions affect health insidiously by slowly undermining the vitality and thus rendering the individual susceptible to disease."

In a chapter devoted to the best type of housing for new areas the authors ask and answer the question: "What is the most desirable dwelling place, the tenement or the cottage? In the cities of the Northeastern states we have become accustomed to the tenement house and do not ordinarily question its social utility. There is scarcely a city in the country that is attempting in any well-considered way to eliminate the tenement house, yet there can be no question but that it is an undesirable place of residence for families with children. Even for the childless family the most expensive apartment house as well as the cheapest tenement may constitute an undesirable environment because of the facility with which diseases may pass from one apartment to its neighbor through the common hall and through the mediation of vermin, which pass easily from one suite to another. Where people live in apartments also, there is concentration of population and thus much traffic in the neighboring streets, which keeps the air full of dust and noise and thus renders apartment living unhealthful and unpleasant. The sounds from neighboring apartments frequently make rest and quiet impossible. True privacy and solitude, though very important to the growth of the moral individual, are difficult to obtain. For the family with children, the apartment is still less desirable. It becomes impossible for the mother of a family to choose her children's associates, to prevent her child from coming in contact with children or adults of unwholesome character who may reside within the same building. The mother cannot supervise the play of her child when outside of the apartment, and in general the atmosphere of the tenement or apartment house is one destined to create a race of adults that are unhealthful, puny, and, socially, highly artificialized.

"In the cottage, however, it is possible to obtain all necessary privacy for true home life and personal development. The reduced dust of suburban communities and the larger penetration of sunlight make cottage homes healthier living places for infants and growing children. The mother of the family can supervise the play and the associates of her child in the garden. The adults of the family, if so inclined, can profit in health at least and sometimes in economy by cultivating a garden outside of working hours. The children gain the advantage and education that comes from daily contact with the things of nature, especially through the garden. It is probable, therefore, that at least for families with children, the suburban home is preferable to the tenement."

MR. FREDERICK L. ACKERMAN, A.I.A., explains in his paper on "Present Unfortunate Conditions of Practice and the Remedy" (*Journal of American Institute of Architects*) that the task of the architect is twofold. "As architects and as artists our duty is to formalize and to express in material form the activities and thought of our day. This we do quite unconsciously in our offices, and our achievements there are an exact measure of our individual ability and the limitation set by the people in their laws and ordinances. No amount of inspiration, no degree of talent, will carry us beyond a simple expression of the demands and desires of the people, and the limits set by them in the laws and ordinances which stand as the principal factors in our progress.

"As citizens, our duty is to provide the conditions for a better architecture. Our knowledge of the arts, the logical nature of our training, and our attitude of mind towards such problems entitle us to the position of directing the forces which are at hand. We know the nature, the importance, and the necessity of the laws needed. We also know better than the people why these laws cannot be passed, for we have tried and failed.

"Our task, therefore, if we are to spend our time and effort in other than a useless endeavor, is to explain to the people by every honorable means within our power, and in terms of logic and common sense, the simple nature of our ideals, to the end that all shall come to understand and realize that idealism of the architect and the desires of the people for a habitable city are but the same thing."

THE Forty-Seventh Annual Convention of the American Institute of Architects will be held in New Orleans on December 2, 3, and 4. There are now thirty-five chapters of the Institute, all of which will be represented at the forthcoming convention.

PLATE DESCRIPTION.

Euclid Avenue Temple, Cleveland, Ohio. Plates 129, 130, 131, 132. The architecture of this Jewish house of worship is based on a modified form of the Byzantine style. It has many characteristics, however, of the type of brick architecture familiar to Lombardy, which is suggested particularly by the entrance detail and the gable of the principal façade.

The design is full of strength and vigor and composes well in mass, but it must be confessed that there are a great many elements making up the composition which with the varying heights of cornices and subordinate projections tend to give a somewhat restless effect. It is nevertheless expressive synagogue architecture and of particular merit when considered in relation to the materials employed in its construction. The brickwork is very effective and in combination with the red tile of the roofs and the ornamented terra cotta it conveys a feeling of Oriental richness, particularly apparent in our illustration of the principal façade. The double entrance, which is the main feature of this elevation, is frequently an awkward element to handle, but in this instance it is entirely satisfying and harmonizes well in scale and form with the main gable. The small columns disposed in the window openings are pink marble, and the various light spots relieving the brick walls are of Tennessee marble. The brick is of various tones, running from a bright red to nearly blue, and is laid in gray mortar with wide flush joints.

The building is composed of two separate parts, the auditorium proper and the vestry with its Sunday-school rooms, connected by a corridor running transversely across the building. The auditorium is surmounted by a Byzantine dome admitting a flood of light from lantern windows. The floor is pitched toward the pulpit, and the seats which are arranged in semi-circular form are of the individual opera chair type with pew backs and ends, so as to provide the advantages of the individual chair and yet give the auditorium the appearance of a church.

The auditorium is entered through a large vestibule, at either end of which are toilet rooms and the stairs leading to the gallery. The woodwork of the interior throughout is quarter sawed oak finished in a silver gray tone. The carpets are red and the dominant tone of the windows is amber. The effect upon the eye is extremely soft and pleasant, and imparts to the worshiper a feeling that he is in a house of worship.

Auditorium, University of Illinois. Plates 133, 134. The auditorium was built to serve as a gathering place for congregations and meetings of the undergraduate body and for the commencement exercises. At the extreme southerly portion of the college grounds as at present laid out it occupies the central point of the prospective development of the university which is to ultimately extend far to the south, east, and west. The auditorium faces on the campus, which will ultimately be entirely devoted to buildings of the colleges for Natural Sciences and Liberal Arts, and is upon a slight rise dominating the so-called south campus.

The exterior is of brick and Indiana limestone with inlaid panels of marble mosaic. The dome is covered with tin and painted with aluminum bronze. In plan the building includes a circular auditorium preceded by a broad memorial vestibule and enclosed by a corridor running around on each side with entrances and exits at each of the four corners. There is a single balcony and the auditorium is equipped with a shallow stage intended only for public speaking. The auditorium seats about twenty-five hundred people. The construction includes a fireproof floor in the first story and balcony, the roof and the dome being of second-class construction. The dome is really a framed roof consisting of coupled columns at each corner with connecting trusses springing across to give the outline.

The funds available for this building were extremely limited, and the interior has practically no elaboration whatever. It was built at a total cost of $121,631.

Ridge School, Newark, N. J. Plates 135, 136, 137. The Ridge School is an interesting design for a grade school located on a residential street. Its chief architectural features are derived from the brick architecture of Holland and carried out in a pleasing combination of red brick, stone, and light-colored terra cotta, which imparts to it a peculiarly domestic feeling — something to be desired in a building in which young children are to begin their education. There is a singular charm about the central pavilion with its arcaded entrance and large, elliptical headed windows above. The columns of the lower story are limestone, while the walls of the loggia are cement plaster marked off in courses similar to stone.

The building contains fourteen class rooms, to accommodate about forty pupils each, a generally accepted and convenient number for securing equal advantages for every pupil. The arrangement of the class rooms follows the precedent of modern German schools in regard to lighting. Windows are placed on only one side of the room and the pupils are seated so that all the light comes from their left side. Wardrobes are provided for each class room with access to them from the rooms. The main floor contains a large assembly hall, two stories high, with a balcony at the rear. It is approached from the main entrance, so that if occasion demands it can be used for purposes other than those strictly connected with the school. The principal corridor and the location of the stairs in relation to it show a very efficient point in planning. The corridor runs parallel with the main frontage of the building with enclosed stairs occupying either end. Windows on these stairs provide cross ventilation, and access to the outside is arranged at a landing of the stairs on the grade level, making the dismissal of the pupils in case of emergency possible without any confusion and in a few minutes' time.

House at Cleveland, Ohio. Plate 138. The plan of this small suburban house shows some unusual features. The most uncommon, perhaps, is the intimate connection of the garage with the house proper, together with the position of the main stairs which are equally accessible from the garage or the main part of the house. While this may be a very convenient arrangement for an owner not employing a chauffeur, it does not seem an ideal one, and in some communities it may not be possible owing to building laws or insurance regulations. It is, however, handled successfully in the elevation and provides space for a large sleeping porch on the second floor. The materials employed in its construction are red brick of a soft texture with cream colored stucco and brown stained wood beams. The total cost was about $7,500, or about 24 cents per cubic foot.

HOUSE AT COLUMBUS, OHIO. PLATE 139. This house in design is a version of Colonial forms with a modern treatment. Its chief interest centers in the entrance doorway, which is an example of careful detailing and is entirely pleasing, with the possible exception of the cornice, which appears somewhat heavy in contrast with the columns and treatment of the door itself.

The exterior walls are of a rough textured red brick laid in gray mortar. The roof is shingled, stained a soft green, and the exterior woodwork is painted cream white.

The interior is well finished, several rooms being in oak with high wainscots and ornamental plaster ceilings. The total cost of the house was $26,250, or 25 cents per cubic foot.

HOUSE AT HARTFORD, CONN. PLATES 140, 141, 142. This type of house, as to size and general requirements, is fairly representative of what can be accomplished in cities which are not so large as to make a reasonable property area prohibitive in cost. The lot is about 250 feet front, facing east on a quiet residential street and extending westerly some 500 feet, sloping gradually to a small river with heavily wooded banks, which forms the irregular western boundary. The house is placed, broadly speaking, in the northeast corner of the property, leaving the maximum area unobstructed on the south and west. The service road is built along the northerly line, giving turn around and access to the garage, which is placed in a secluded position on low ground near the river and further concealed by planting.

The small formal garden was sympathetically carried out by Arthur A. Shurtleff with the co-operation of Miss Virginia Brown. Architectural details of the house were used as a basis of form and motif in the structural work of the garden entourage. The formal garden itself is small but quite charming, with the old apple tree prudently retained as the old friend about which the garden is established and ever reflected in the central pool. The stone hut with thatched roof and Persian tiles inserted in the walls sounds descriptively incongruous, but owing to its clever treatment is quite the reverse, giving just the unexpected element of spice that is the joy of a witty conversation.

The house is of wine-colored brick, laid in Flemish bond with wide gray joints to carry through the wall surfaces the gray of the limestone and woodwork. Convenience of plan and sound construction (steel beams and reinforced concrete floor slabs) were the primary requirements of the owner, whose sympathetic attitude in matters of design placed all responsibility, therefore, where it belongs — on the architects.

The stair hall and office are in dull gray brown oak, the remainder of the principal ground floor rooms and bedrooms are conservatively treated in painted trim of quiet and conventional design. No stunts appear, though care and discretion were not forgotten in the combination of materials where decoration could be combined with structure.

The south porch (enclosed in winter), except for the balustrade, is practically all of clay products. The floor is of 6 x 9 inch roofing tile, laid so as to form squares with hollow centers, in which are set decorative tiles. The walls on the house side are of brick with a small stone foundation, while the ceiling is a tile vault.

A reinforced concrete mattress under the concentrated load of the largest of the chimneys allowed later free use in the garden of a magnificent peat bog that was found there when the excavations were nearing completion and the footings had been elsewhere so far advanced as to make a shift in location too expensive to be considered.

The unusually robust character of the planting for so new a place is somewhat due to a water supply limited only by the activities of an electric pump, drawing from the river and free from the oversight of the city fathers who are concerned only with the house supply.

DENTAL OFFICE BUILDING, HARTFORD, CONN. PLATES 143, 144. This building presents a solution of a somewhat new problem. We are familiar with co-operative offices for lawyers and other professional men, but a building intended to provide operating rooms for a group of dentists calls for a new solution and requires obviously different treatment.

The main requirement of such a building is light, and therein lies the chief difficulty in securing a satisfactory design. The problem becomes at the outset the adoption of some scheme to combine sufficient window area with a good external effect. That the light should reach as far as possible into the room, lintel windows placed well toward the ceiling are also required. These conditions imposed by the uses of the building have been recognized in this design and have resulted, as they should, in the architectural form that gives expression to the structure.

The plan was influenced to a large extent by the peculiar shape of the lot. It provides four operating rooms with a large working laboratory on the second floor, each of which is an independent unit and equipped with a lavatory, compressed air, gas and electric outlets, and an inter-phone. The walls are plaster, tinted a blue gray, with the door and window trim enameled white.

The first floor is taken up mostly by a reception room and entrance hall with a dignified staircase to the second floor, the treads and risers of which are Tennessee marble with an iron hand rail. The entire first floor with the exception of the garage is paved with red quarry tiles.

The exterior follows Colonial motives in its detail. The porches and cornices are wood and are examples of exceedingly delicate detail. The walls are of red brick with a rough texture, laid with black mortar with a wide raked joint and are relieved by white marble trim and iron balconies at the windows. The total cost of the building, not including the dental apparatus, was $20,500.

COMPETITION DRAWINGS.

WE have in our possession many drawings which have been submitted in THE BRICKBUILDER competitions. In every instance these drawings are being held because the return postage has not been sent us, although we have advised every owner of the drawings of this fact two or more times.

We hereby give notice that unless postage ($.25 in stamps) is sent to us between now and October 1, 1913, all these drawings will be destroyed. Upon receipt of postage the drawings will be immediately returned.

ROGERS AND MANSON COMPANY,
85 Water Street, Boston, Mass.

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CHURCH AT MERBAKA, ARGOLIS, GREECE

Exterior walls of stone and common brick in alternate courses, with inset plaques of polychrome terra cotta. Twelfth century.

THE BRICKBVILDER

OCTOBER, 1913

VOLVME XXII. NVMBER 10.

An Appeal to the Architect for the Adoption of the Quantity System.

BY SULLIVAN W. JONES.
(*Palmer, Hornbostel & Jones, Architects, New York.*)

"ARCHITECTURAL temperament" seems to render its possessor immune from the effects of practical criticism of his conduct of the technical and executive ends of his profession. However, such criticism is sometimes necessary and pertinent, and in this case justified by the effort to penetrate the architect's "temperamental" shell of self-assurance and omniscience, for the purpose of directing his attention to the compelling need of radical reform in the present method of securing competitive tenders for building contracts.

Possibly such a statement is not a prudent introduction to an appeal to the architect. But if we seek to produce the spark of interest, we must strike with the cold bare steel of truth, even at the risk of creating a feeling of resentment. The truth is not always agreeable.

None of the observations here set down should be considered as suggesting, or even implying, that any of the architect's material or practical qualifications, desirable though they may be, are of sufficient importance to warrant a sacrifice of that one essential characteristic — the inherent ability to create architecture which gratifies the esthetic sense.

There is little or no evidence that the architect in his individual capacity has devoted any constructive thought to the active relationship existing between himself, the contractor, and the owner. Contracts, drawings, and specifications which continue to emanate from the architect's office would seem to indicate either a blissful unconsciousness or a total disregard on his part of a very critical and unwholesome situation in the field of building activity. It is hard to believe that the architect lacks the courage of his convictions, and yet in the light of discussions before contractors' organizations all over the country, many of which have found their way into the columns of architectural periodicals, it is strange that there is no reflex or reciprocal action on his part. The reform movement should be initiated by the architect — and promptly — otherwise the hitherto passive demand by the better element in the contracting fraternity for a square deal will become aggressive, resulting in a situation reflecting discredit on architectural practice.

The fundamental element in the building contract is the drawings and specifications, since their expressed purpose is to define and limit the amount of work to be performed. The contract, as an instrument, is of secondary importance. The first essential, therefore, of the drawings and specifications is that they should define the work with such clearness and precision that there can be no doubt in the minds of the bidders as to the exact amount and character of the work called for; and, consequently, that all bidders may compute their estimates on precisely the same basis. It is a fact that drawings and specifications issued by the vast majority of architects fail wofully in this essential requirement. The drawings in many cases are obscure, impractical, and lacking in detail; and it is not an exaggeration to say that the specifications are seldom properly explicit. The failure of the drawings and specifications to perform their essential function is due largely to a want of intelligent preliminary investigation, a lack of accurate technical knowledge, and, in specification writing, an absence of practical experience and the power of expression. Specification writing, it must be remembered, however, is a task of great difficulty requiring no little literary acumen. In the production of these important documents, the architect's present-day methods are wholly obsolete and totally inadequate to the tremendous complex contracting operations of to-day, involving as they do large amounts of capital.

The use of blanket clauses in the contract, vesting the architect with arbitrary and sweeping powers, constituting him a court of last resort on all questions arising as to the performance on the part of the contractor, indicates that the architect is conscious of his failure to fully perform his obligations to the owner and the contractor. Such conditions are subversive of all good business principles, and provoke nearly all, if not all, of the evils and mild forms of corrupt and ethically dishonest practices in the contracting business. The combination of deficient drawings and specifications with a stringent contract, placing unlimited discretion in the hands of the maker of those drawings and specifications, results in a situation where the architect holds the solvency of the contractor in his palm. Such a situation is unjust alike to the contractor, the architect, and the owner, and one from which the fair-minded architect seeks escape.

Two very obvious alternative conclusions are adduced from this arraignment of facts: first, that the form of contract generally in use should be modified to afford the bidders protection in bidding upon the basis of a reasonable interpretation of the requirements of the obscure and deficient drawings and specifications. Or second, that the present form of contract be adhered to generally, and the method of describing the work to be performed be altered so that the basis of the contract — the description of the work covered — shall be precise and shall not be capable of more than one clear and definite interpretation by the bidders. It is recognized, however, that the interpretation of words is an extremely complex and difficult subject in a country so large, where the same word means different things in different parts of the country. There are many good and sufficient reasons for retaining, at least for the present, the stringent contract. But that is a large and engrossing subject, which is not pertinent to this discussion. We therefore turn to a consideration of the second conclusion: that the description of the work to be performed must take the clearer and more precise form.

It is patent to the architect, at least, that under the present system of producing drawings and specifications for estimates, it will be well-nigh impossible to effect any material uplift in the standard. We must therefore work a change in the system of production — a change which will have the desired effect in spite of the indifferent attitude on the part of the average architect.

Let us here pause a moment to examine the conditions obtaining to the computation and submission of competitive estimates under the present system. The architect issues the drawings and specifications illustrating and describing the work to be performed. These drawings and specifications are usually prepared under high pressure, which invariably finds expression in inconsistencies between the drawings and specifications and between the several drawings, ambiguity, and omissions. The drawings and specifications are placed in the estimating departments of the various contractors' offices and bills of quantities are prepared. The quantity taking is carried on with more or less difficulty and uncertainty according to the degree of clearness and precision of the drawings and specifications, and the scope and complexity of the work; and generally also under high pressure, because the time allowed for bidding is far too short. Under such unfavorable conditions the chances for errors in the quantities are enormous. The bills of quantities are prepared and the whole bid is subjected to careful scrutiny, in connection with which consideration is given to the character of the other contractors bidding, the probability of profitable extras resulting from the deficiencies in the drawings and specifications, the chances for success in decreasing the cost through substitutions and evasions, and the stringency of the supervision. The contractor is not to be blamed for adopting such a course. It is, with him, a matter of necessity. He must first secure the work and then exert himself to the utmost to find a profit. The final result is that the contract is awarded to the unfortunate bidder who has made the most serious error. Contractors have fallen into the habit of calling these deplorable conditions "keen competition." They are deceiving themselves. There is no real competition — only reckless gambling on the precision with which quantities can be taken and on the shrewdness of the bidders in surveying their chances for recouping their probable losses in the estimate.

The "cost plus a percentage" contract and a contract based upon a bill of quantities are similar in their fundamentals. In both there is no preliminary gamble on the quantities and character of the materials required for the execution of the work. In both, the contractor's compensation bears a fixed relation to the amount of work performed. And in both, sheer efficiency, not shrewdness, means success. The contract based upon definite quantities, however, eliminates all of the questionable features of the "cost plus a percentage" contract, operating against its general adoption.

The striking contrast between the *esprit de corps* on work executed by a competent contractor on the cost basis, and the spirit of evasion and vindictiveness which pervades the work executed under a lump sum contract, awarded through competitive bidding, lends the weight of conviction to an argument for the establishing of any system of estimating, removing from the situation the factors of doubt, and producing a spirit of co-operation and fair dealing.

Believing that a solution of the problem lies in the establishment of the quantity system of estimating, now generally in vogue throughout Europe, the Association of United States Quantity Surveyors has been organized by a few architects and engineers, and a number of contractors and estimators representing many of the trades. The system proposed, contemplates estimating on bills of quantities, and not on drawings and specifications. The architect in this country has been putting "the cart before the horse." Questions as to the true intent and meaning of the drawings and specifications, and as to the exact quantities of work required under them, now arise after, instead of before, the contract is let. The same questions will arise in the mind of the quantity surveyor, in the preparation of his bills, as now arise in the minds of the bidders. The preparation of the bills of quantities will therefore constitute a check in the interest of the owner, and will, in effect, be a guarantee on the sufficiency of the drawings and specifications. With the inauguration of the quantity system, the skilled estimator will step out of the contractor's office into a field of his own with a recognized professional standing. He will be called in by the architect to prepare bills of quantities, just as the various experts are now called upon to perform their professional functions in connection with the preparation of information for bids.

There is nothing revolutionary about the quantity system of estimating. It has been practised in this country in modified and more or less ineffective forms for a number of years, chiefly by engineers. There is a statute in the state of Pennsylvania requiring the publication of bills of quantities with the drawings and specifications on all public works. The Bridge Department of the city of New York has made a practice of issuing bills of quantities with the drawings and specifications for work under the department's jurisdiction. But in both of these cases the ends sought are completely defeated because no responsibility is assumed for the accuracy of the bills. The bidders, therefore, disregard them and take their own quantities. The system is firmly established in most of the countries of Europe. The English system is probably the best known and most frequently referred to. In 1909, at a conference between the National Federation of Building Trades Employers, the Institute of Builders, and the London Master Builders' Association, all of Great Britain, a resolution was adopted recommending that the members of these powerful organizations decline to bid in competition with one another unless bills of quantities were supplied for their use at the owners' expense. It would be well if some such concerted action were taken by the many contractors' organizations in this country.

Any American system must be formulated upon the basis of present American practice in estimating, and adapted to the peculiar requirements of American methods. A brief review of the English system will, however, prove illuminating and will plant the red flag over the pitfalls to be avoided in any constructive work done in this country.

The quantity surveyor in England receives a fee based upon a fixed percentage of the cost of the work. The fee is placed at the bottom of the money column in the bill of quantities and is added to the total amount of the estimate. The successful bidder pays the surveyor's fee. If no contract is let, custom has established the right of the quantity surveyor to collect his fee from the owner. In the one case the owner pays the fee indirectly, and in the other, he pays it directly. Is there any logical reason why the fee should not in all cases be paid directly by the owner? The conditions of payment under the English system inject into the situation an element of uncertainty as to who does actually employ the quantity surveyor. The courts have held that the architect employs him with the implied authorization of the owner. Nevertheless, in many cases where the bill of quantities has proved deficient, the contractor has believed that he had the right of recovery against the quantity surveyor since he was paying for his service. The question will immediately arise in the mind of the reader: "Why should there be any dispute as to the sufficiency or deficiency of the bill of quantities?" The answer is: that the bill does not constitute the basis of the contract. Here is the most glaring inconsistency in the English system, precipitating innumerable disputes and litigations. English practice is to compute the estimates solely upon the bill of quantity. The drawings and specifications are not issued to the bidders, but are on exhibition at the quantity surveyor's office. The estimate and contract, however, place upon the contractor the obligation to complete the building in accordance with the plans and specifications for the amount of the estimate. It is obvious that if the estimate is computed upon the basis of the bill of quantities, the bill of quantities should also constitute the basis of the contract. The lump sum tender should be done away with.

As stated before, the quantity surveyor in England is employed by the architect and paid by the contractor. Payment generally signifies employment; but the English courts have, in only a very few cases, held the quantity surveyor responsible to the person paying him for his services, and in these cases only because he has been guilty of flagrant negligence or gross incompetence. Such a condition will always have the tendency to induce irresponsibility in the quantity surveyor.

As a tentative basis for working out an American quantity system, the following code of rules is proposed to govern the employment of the quantity surveyor and the adoption of the quantity system of estimating:

(1) That the quantity surveyor receive a stipulated fee to be paid in all cases by the owner.

(2) That the bill of quantities constitute the basis of the contract — a definite amount of work for a definite amount of money.

(3) That the drawings, specifications, and bill of quantities be issued for the purpose of bidding. The drawings and specifications are essential to the intelligent pricing up of the bill of quantities, since they serve to illustrate the manner in which the materials are to be worked and their character.

(4) That the owner assume responsibility to the contractor for the accuracy of the bill of quantities.

(5) That the quantity surveyor be obliged to pass a state examination and receive a certificate, as does the certified public accountant, before he be permitted to practise, thus establishing his competency.

Let us now consider the various aspects of the operation of the quantity system under the proposed code.

The owner may be expected to object to being put to the supposed additional expense of the quantity surveyor's fee. This objection is quickly disposed of by studying the economies of the present system. Sufficient statistics have been collected to indicate that in this country there is an average of ten bidders for each job put out for estimate. Following the law of averages, each bidder secures one of the ten jobs on which he submits estimates. The cost of preparing all estimates is charged to "overhead" and distributed pro rata over all of the work actually secured. Therefore, the cost of estimating the nine jobs lost is charged against the one job secured. No matter what obscure method of bookkeeping is followed, in the last analysis the fact remains that the owner of the tenth job pays the cost of estimating the other nine in which he has not the slightest interest. Through the adoption of the quantity system the bidders are relieved of the cost of preparing estimates, and the owner pays the cost of the estimate for his own job only.

One of the most certain, far-reaching, and beneficial effects of the quantity system will be the production by the architect of more accurate and intelligible drawings and specifications. The improvement must result from the full and frank co-operation between the architect and the quantity surveyor, in the preparation of drawings and specifications, and from them of the bill of quantities. As already shown, accurate quantities cannot be taken from deficient drawings and specifications. The quantity surveyor will apply to the architect for information on all points not made clear by the drawings and specifications. Is it possible to conceive of a more thorough check for accuracy and clearness? Conversely, with such co-operation, it must follow that the bill of quantities can be prepared with a far greater degree of accuracy than is now possible.

Each contract should include a clause providing that the work comprehended in the agreement consists of the quantities of the various materials comprising the bill upon which the bid is based, worked in accordance with the requirements of the accompanying drawings and specifications.

Each contract should also include a clause providing for increased or decreased compensation to the contractor resulting from additions to, or deductions from, the original bill of quantities due to any cause or by reason of subsequent changes in the work, at the rate of the unit prices set forth or deducible from the bid, plus ten per cent for additions, and at the rate of the unit prices set forth or deducible from the bid, less ten per cent for deductions; also for priced bills of quantities on extra work involving the use of materials differing in character from any of those originally billed.

In other words, the basis of the contract should be so flexible that it may be extended to cover deficiencies or contracted to cover excesses in the original bill of quantities, and so that it may automatically adjust itself to provide for changes in the work, always upon a fair and equitable basis.

If the quantities constitute the basis of the contract, and the contract prices for the various classes of materials automatically adjust themselves to the changes in the quantity and the changes in the work, there can be no dispute between the architect and the contractor over extras and deductions — and there should be none.

Nevertheless, since extra work carries with it a pro rata increase in profit, it is reasonably certain that a great number of contractors will endeavor to establish claims for extra compensation on the basis of alleged deficiencies in the original bill of quantities. If all such allegations can be reduced to questions of fact, through the establishment of standard rules and units for the measurement of executed work, there will be little chance, unless the architect is extremely negligent, for the contractor to prove a claim for excess quantities if they do not exist. The establishment of such standards as a preliminary step to the adoption of the quantity system is essential to the system's successful operation. Every thousand common brick billed must mean the same number of cubic feet of wall to each and every bidder, to the quantity surveyor, and to the architect. The work of establishing such standards will be taken up by the Association of United States Quantity Surveyors through committees in each trade. The standards so established will be based upon the best and most equitable practice in each trade, with due regard for the distinctions now made between the various classes of work. A bill of quantities drawn upon the basis of such standard rules for measurement and classification will be entirely intelligible to the bidders, because it will recognize the same distinctions and classifications in the work that now govern them in pricing the various departments of work.

Estimating on bills of quantities will reduce competition between bidders to the sound basis of efficiency. In such competition the factors that would count would be the contractor's ability to buy at the lowest cost, his credit, rating, and capital, and the efficiency of his organization and methods in construction. The material man, who stands back of the contractor, would be fully justified in selling at minimum rates where there was no financial risk involved. The "wild-cat" contractor, the contractor without financial standing, and the inexperienced contractor would soon be eliminated. Under such competition they could no longer exist, for the work secured through taking a chance would net a loss.

The quantity system will impose upon the architect the necessity of following more precise and fairer methods in the matter of making estimates for payments. All payments will be computed upon the basis of units of materials worked, times the unit price fixed by the contract or deduced from the bid. The contractor will receive the exact amount of money to which he is entitled for the amount of work performed — no more, no less. The present method of making estimates for payments upon the basis of shrewd but "safe" guessing as to the value of the work performed, would necessarily be relegated to the past.

All those to whom the proposition has been made of establishing the quantity system have hailed it as being the solution of the one great problem in the field of building in this country, but they have also been pessimistic as to the ultimate success of the movement. However, if the architects of the country will get together and decide upon some method of procedure providing for the cooperation of the intelligent contractor, all obstacles will be overcome and there will be a greater measure of contentment in the lives of all; and that alone is well worth the effort.

IT has long been a matter of wonder to those familiar with the work of the Quantity Surveyor abroad that the waste, duplication of labor, and liability to serious mistakes, incident to our haphazard methods of estimating, should be allowed to continue. It is certainly time that the babel of methods now in practice and the resultant guesswork bidding should be replaced by accurate methods generally accepted. It is our belief that a frank discussion of the general scheme proposed by Mr. Jones should result in much benefit to the entire architectural profession. Certainly it should bring to light a record of opinion on a subject which is of more than passing importance. It would appear that the advantages of the suggested system are many to all concerned, but there will be no doubt a diversity of opinion upon the subject of this appeal and we only hope that it may be our privilege of presenting in following issues of THE BRICKBUILDER *a number of contributions from other authorities which will develop a consensus of opinion to the end that something may be accomplished which will be of benefit to the profession as a whole.* — EDITORS.

The Lighting of Public and Semi-Public Buildings.

SECOND PAPER.

BY L. B. MARKS,
Consulting Illuminating Engineer, New York City.

IN this paper Mr. Marks resumes the discussion of the basic principles underlying good lighting, the following points of which were considered in our preceding issue: A. Selection of Illuminant; B. Intensity of Illumination; C. System of Illumination; D. Location of Lighting Sources; E. Types of Lighting Fixtures; F. Glare and Intrinsic Brightness; G. Regular or Specular Reflection; H. Contrast. In the present issue this is concluded with a discussion of I. Shadows; J. Esthetic Consideration; K. Economy and Efficiency. The first of the series of illustrations of specific installations, covering Court Houses, Post Offices, and City Halls, and accompanied by explanatory notes and data appears in this issue.

I. Shadows. We are so accustomed to the natural shadows that occur in daylight that we rarely notice them, yet these shadows are absolutely necessary to bring out the form and perspective of objects viewed. When we attempt, however, to imitate in artificial lighting the conditions that obtain in daylight illumination, we find that unless the character of the artificial lighting is such as to produce effects of light and shade somewhat similar to those that obtain in daylight, we are apt to fall far short of the realization of good illumination.

Steinmetz* has discussed the importance of the subject of shadow in illuminating engineering substantially as follows:

Objects are seen by differences in color and in intensity or brightness; for producing differences in intensity shadow is of great assistance, and, indeed, the differences of intensity by which objects are seen are to a large extent, those due to shadows. If the illumination were perfectly diffused and no shadows produced, then, even if the intensity of illumination were sufficient, the illumination would be unsatisfactory in most cases of lighting, because of the loss of the assistance of the shadows in distinguishing objects. Seeing under such conditions would become more difficult, and the effect of the illumination would be uncomfortable.

The use of shadows for illumination requires directed light, that is, light coming from one or a number of sources, and not merely diffused illumination coming from all directions. However, it is not sufficient to provide directed lighting only.

For satisfactory illumination it is necessary to have sufficient directed light to mark the edge of the objects by their shadow and thereby improve the distinction, but at the same time there must be sufficient diffused light to see clearly in the shadows; that is to say, a proper proportion of directed and diffused light is necessary.

In cases in which all the objects assume practically the same color, such as in flour mills or foundries, a diffused illumination without shadows would make the illumination so bad as to be practically useless. In a drafting room, on the other hand, where all of the objects requiring distinction are in one plane, and the distinction is exclusively by differences of color and intensity, but not by shadows, a perfectly diffused illumination is required and noticeable shadows would be objectionable.

The purpose of the shadow in illumination is to mark the edge of the object, and to show its height by the length of the shadow. The shadow, therefore, should not extend too far from the object to which it is related, otherwise it loses its close relation to it and becomes misleading, and therefore interferes with good illumination. Hence the directed light should come from above in a direction making a considerable angle with the horizontal, so as to limit the length of the shadow; but the light should not, however, come vertically downwards, as this direction would largely obliterate shadows and defeat their purpose.

In the use of shadows in illuminating engineering it is necessary for the outer edge of the shadow to blur or gradually to fade, and this result requires that the source of directed light should not be small, but should be sufficiently large to scatter the light at the outer edge of the shadow. This requirement necessitates the use of a diffusing globe or its equivalent so as to have the light issue from a fairly large luminous area.

J. Esthetic Considerations. Some one has stated that no design of illumination is physiologically correct unless it is esthetically good. However this may be, there is no question as to the importance of esthetic considerations in planning the artificial lighting of an interior.

The mere delivery of a definite number of foot-candles on a working plane is only a small part of the performance which the illuminating engineer must exact of his tools; indeed, this feature of the illuminating design may often be relegated to an entirely subordinate place. In purely utilitarian lighting, as in factories, the esthetic feature of the design naturally does not play as important a part in the design as in the home, the library, the theater, etc.; but even in the factory, where up to the present, esthetic considerations have been to a large extent ignored, there is reason to expect that it will actually pay to devote more attention to this phase of the subject. The eye craves the beautiful, whether it be in the salon or in the workshop.

A lighting fixture that is not in harmony with its surroundings is a fixture out of place even if it gives adequate illumination. Illumination that does not give suitable color, and suitable light and shade effects, is esthetically wrong, and therefore defective.

K. Economy and Efficiency. In planning a system of illumination, the question of economy in first cost and economy of upkeep may be a governing consideration. In fact the initial cost of the lighting equipment is commonly a limitation that is placed upon the design of the illumination. The practical problem usually is not, "What system of lighting will give the best illumination?" but "What is the best system of lighting that can be installed within the specified limit of cost?"

A mass of data has been published on the cost of illuminating interiors by different classes and types of illuminants and by different systems of illumination, but these data are very incomplete in that they do not fully set forth all of the conditions that obtain in the lighting in each case. Usually the criterion in these data is the "effect-

*C. P. Steinmetz, "Illumination and Illuminating Engineering," Transactions, I. E. S., January, 1910.

ive" lumens per watt of electric power expended or per cubic foot of gas consumed.

As has been previously stated, this value is not necessarily a criterion, and, indeed, is often far from being a criterion of the real, that is, the *ultimate* economy of lighting. No matter what the "effective" lumens on an assumed working plane may be, or whether these lumens are produced by illuminants, the first cost of which and the cost of the upkeep of which is less than that of any other, the lighting, broadly speaking, is uneconomical if the result of the illumination is physiologically bad.

The switching arrangements constitute an important feature in the economy of use of light. Economy is furthered (*a*) by the facility with which lamps may be lighted or extinguished, and (*b*) by the separate control of individual lamps or groups of lamps. Thus, for example, if the control of a lamp or lamps is conveniently located, the user will be more apt to extinguish the lamp that is periodically used during the day than he would be if the control were remote. Again, if the natural light at the further end of a room is insufficient in waning daylight, while the light near the windows is sufficient, the user may economize in lighting if the lamps at the windows are grouped under separate control, thus permitting the lighting of lamps in the darker portions independently. Similarly, in large interiors, the separate control of a pilot-lighting circuit that is intended to give only a very moderate illumination after hours of regular use, for cleaning purposes and the like, often results in considerable economy of lighting. Even in the dining room of the residence the separate control of a lamp of small candle-power, giving just sufficient light for setting the table, is a factor in the economy of lighting.

EFFICIENCY OF ILLUMINATION.

In illuminating work, starting with the illuminant, we have three technical efficiencies to consider:

(*a*) The efficiency of the lamp, that is, the lumens generated by the lamp per watt of electric power expended in the lamp or per cubic foot of gas consumed.

(*b*) The *gross* efficiency of the illuminating installation, that is, the lumens effective on a reference plane per watt of electric power expended or per cubic foot of gas consumed.

(*c*) The *net* efficiency of the illuminating installation, that is, the lumens effective on a reference plane per lumen generated. The net efficiency may be stated to be the efficiency of utilization of the light.

While the ratio of lumens delivered on the reference plane, to lumens generated, is a measure of the efficiency of utilization, this ratio is, of course, not to be taken as a complete measure of the illuminating result. The illuminating result will be affected by the specific brightness and area of the primary and secondary lighting sources within the field of view, the contrast in intensity of illumination on walls, ceiling, floor, and objects in the room, etc. As an illustration of this point it may be stated that if an indirect lighting unit, designed to throw all the light to the ceiling, were converted into a direct lighting unit by simply turning the unit upside down, the lumens delivered on the working plane might, in a specific case, be one hundred per cent greater than when the lamp and reflector are turned toward the ceiling. The efficiency of utilization in the former case may be twice that of the indirect lighting unit, but the illuminating result, if it could be expressed in terms of ability to see on the reference plane, might nevertheless be decidedly in favor of the indirect lighting unit.

In practice it is found that we may have the very worst lighting in cases in which the largest percentage of the total flux of light generated by the lamps is delivered to the working plane. Take, for example, a living room 20 feet (6 m.) long by 15 feet (4.5 m.) wide, and 10 feet (3 m.) high, with dark-colored walls, the lighting of which is carried out by a single lamp in the center of the ceiling, the lamp being housed in a deep opaque-mirrored reflector of such design as to throw the maximum light on the working plane, 2 feet 6 inches (91 cm.) above the floor. In this case no light goes directly to the ceiling or upper portions of the walls. Such a lighting design would be atrocious from the standpoint of desirable illumination, even though an extremely large percentage of the total flux of light from the lamp were delivered on the working plane. The contrast effect in illumination would be so great that under normal conditions of usage of the room the eye would quickly become fatigued.

INDIRECT AND SEMI-INDIRECT LIGHTING.

The greatly increased efficiency of lighting made possible by the introduction of improved electric and gas illuminants has led to the further development of indirect systems of illumination, both electric and gas, and has brought to the foreground the discussion of the merits and shortcomings of this method of lighting.

In the system of illumination known as "indirect lighting," the primary lighting source is concealed from view, and the illumination from it derived wholly from reflected light from the ceiling and walls, which become the secondary lighting sources. Indirect lighting may be carried out by lighting sources disposed in coves located near the ceiling, at the sides or in the central portion of a room.

Another method of indirect lighting which has come into more or less prominence within the past few years is carried out by lighting units hung from the ceiling, the lamps being concealed from view by an opaque backing. This is the system to which the following discussion, for the most part, relates. In carrying out this system the lamps are backed by powerful reflectors pointed toward the ceiling. Usually the lamp and its reflector are contained in an opaque basket or bowl. The lighting unit may consist of a single lamp and reflector or of a number of lamps and reflectors all mounted in the same housing.

The intent of the design of this system of lighting is to totally conceal the primary lighting source from view, and to throw as large a percentage of the total flux of light as possible directly to the ceiling. To make the system effective from the standpoint of illumination delivered on the working plane, light-colored ceilings are required.

Where it is desired to confine the flux of light within a small area of the ceiling, a concentrating reflector is used, and where a wider distribution is desired, a distributing reflector is used. It has been found in practice that the distance of the lighting unit from the ceiling and the distribution of flux of light may be varied within comparatively wide limits without materially altering the numerical value of the illumination intensity on the working plane.

It will be seen that the efficiency of utilization of light

FIG. I. COURT ROOM, UNITED STATES COURT HOUSE AND POST OFFICE, CHICAGO, ILL.

AT the time this installation was made tungsten lamps were not available. The court room is equipped as follows: Above the skylight 60 16 candle-power carbon filament lamps, each provided with a prismatic reflector, are evenly distributed, giving a well diffused downward light through the ground-glass skylight; 22 16 candle-power frosted lamps are located on two main transverse ceiling beams and fitted with prismatic reflectors; 36 8 candle-power frosted lamps are located on ceiling beams under the skylight, without reflectors; 71 8 candle-power bare lamps are installed in the cove about midway between the floor and the ceiling. These lamps are used without reflectors and illuminate the wall space above far from uniformly. The exposed lights below the skylight beams and the cove lights are not necessary in the illumination of the room and are rarely used. The remaining illumination is secured by 8 brackets, each with 4 8 candle-power frosted lamps and 1 32 candle-power lamp in opalescent flame-tip shade, and 4 double brackets with twice the lamp equipment mentioned. The resultant illumination from the lamps above the skylight, studded lamps on ceiling beams and from the brackets is both adequate and satisfactory. The reflection value is high, the finish being in white marble and plaster. The lighting equipment is typical of that in four similar court rooms on the same floor.*

Data:

Floor Area ....3,320 sq. ft.
Ceiling Height .. ..25 ft.
Watts per square foot (Carbon Filament Lamps) 3.25
Total Candle-Power of Lamps.
(Horizontal Rating)...................................3,192

(NOTE.—If carbon lamps are replaced by tungsten lamps of same candle-power, the watts per square foot will be reduced to about one third the value above given.)

* See Paper by J. E. Woodwell. Trans. Illum. Eng. Soc., Vol. 1, 1906.

FIG. II. CORRIDORS AND MAIN STAIRWAY, CITY HALL, PROVIDENCE, R. I.

A METHOD of lighting by suspended clusters of lamps backed by prismatic reflectors.

FIG. III. CORRIDOR, FEDERAL BUILDING, CHICAGO, ILL.

THE illumination is carried out by lamps mounted in the rosettes of the ceiling arches.

is greater when the illumination is carried out by this method of indirect lighting than would be the case in ordinary indirect lighting by coves, because with ordinary cove lighting the bulk of light from the lamps suffers at least two reflections, one from the ceiling and one from the walls, before it reaches the working plane; whereas, with the method under discussion the bulk of the light reaches the working plane after only one reflection, — from the ceiling. With a single reflection from the ceiling, the loss is estimated in the case of light ceilings not to exceed about forty per cent of the light reaching the ceiling. In the case of an additional reflection from the walls (assuming the walls to have the same coefficient of reflection as the ceiling) the light reflected from the ceiling to the walls would suffer another loss of about forty per cent. If the walls are dark in color this second loss might easily amount to eighty-five or even ninety per cent.

While it is true that in the earlier forms of cove lighting the design was such that a large part of the light from the lamps in the cove suffered multiple reflections before reaching the working plane, coves may be so designed that the bulk of the light will be directed to the ceiling at such an angle as to suffer only one reflection. Moreover, any desired angle of reflection of light from the ceiling may be secured by suitably designing the cove. A cove of this character was designed and installed in 1907, in the library and assembly room of the Edison Electric Illuminating Company, Boston, Mass. The description and performance of this lighting installation are recorded in the Transactions of the Illuminating Engineering Society.*

The most important point to consider in evaluating the claims of any system of lighting is, in the last analysis, the physiological effect of the lighting.

With respect to the relative brightness of ceiling, walls, and floor, we have, with the indirect lighting system, a partial inversion of the conditions that obtain in daylight illumination. With the indirect system, the ceiling is the brightest portion of the room; whereas, in daylight illumination, the floor receives the maximum flux of light.

In general, we have a directive side illumination in daylight; the light entering the interior through windows at the sides is diffused throughout the room. This diffusion does not mean that the illumination is shadowless. On the contrary, owing to the direction of the light, the objects in the room cast more or less shadow. This shadow is of great importance in distinguishing objects clearly and in giving proper perspective.

In the system of indirect lighting by suspended lighting units backed by opaque reflectors, the ceiling becomes the secondary lighting source from which the entire illumination of the room must be derived. The natural result of illumination by this character is, that the side-shadow is either absent or very faint. This condition is in striking contrast with that which obtains ordinarily in the daylight illumination of interiors.

In considering the physiological effect of lighting by indirect illumination, the proportions of the interior, as well as the use to which the interior is to be put, must be taken into consideration. For example, in a room with a very high ceiling, where the ceiling is not within the ordinary field of vision, a relatively high specific brightness of the ceiling may not be objectionable; while, on the other hand, in an interior in which the ceiling is either always, or for a large part of the time, within the ordinary field of vision of those occupying the room, the brightness of the ceiling and side walls have an important bearing on the ability to see well.

The visibility of objects depends upon a number of conditions which have already been discussed. Fundamentally, one of the most important conditions is to have a greater intensity of light on the object viewed than on the ceiling or other portions of the interior that do not require fine discernment.

A very high intensity of illumination on the ceiling and walls, when these are within the ordinary field of view, operates to decrease the visual sensibility for two reasons:

(1) Because a large surface of relatively great brightness within the field of view *per se* reduces the ability of the eye to discern darker objects on the working plane.

(2) Because the strong contrast in brightness of the ceiling and walls, and that of objects in the room, renders it more difficult to distinguish details of the objects viewed. Dark-colored objects in a room appear all the darker when the ceiling and upper portions of the room are brighter.

As an illustration of the points above raised, let us take the case of a library in the home. In daylight, in the average library, the intensity of illumination on the ceiling is small compared with the intensity of illumination on the pages of a book in the hands of a reader. In order that the walls may not constitute a secondary lighting source of relatively high brightness, they are usually finished in green or other moderately dark color which will absorb a large percentage of the light incident thereon. The reader is, therefore, not subjected to the visual strain which is incident to having a relatively bright secondary lighting source within the field of view, and his ability to read with comfort is not reduced by the contrast effect produced by a condition in which the ceiling and walls are brighter than the pages of the book.

In reading, it is desirable to rest the eyes occasionally. If, in glancing away from the book, the eye cannot escape the relatively bright ceiling or walls, fatigue of the eye sets in much sooner than when the specific brightness of the ceiling and walls is of a low order. In conversing with people seated on the opposite side of the room, the same holds true. If the general direction of the light is directly downward, as is the tendency in the indirect lighting system under discussion, the absence of shadow, or the unnatural position of the shadow, is trying to the eye.

In the case of a very large room with high ceiling illuminated by indirect lighting, the effect of the downward light is very noticeable. In such a case the directive value of the light reflected from the side walls is minimized. The eyebrow of a person standing in the center of such a room casts a comparatively strong shadow downward on the face, with the result that the features of a person may not be clearly distinguishable except at rather short range. This condition is in striking contrast to that which obtains in the same room in daylight, when the lighting of the room is carried out by side windows. To partially offset the downward shadows, the floor of the room might be finished in a light tint for the purpose of redirecting the light upward by reflection. Obviously,

* "Lighting of the Edison Building," by Louis Bell, L. B. Marks, and W. D'A. Ryan. Transactions I. E. S., October, 1907.

FIG. IV. COURT ROOM, UNITED STATES BUILDING, INDIANAPOLIS, IND.

THE principal illumination is here secured from 16 brackets of special design, supporting 4 6-inch and 1 10-inch ground-glass ball globes, the former with 16 and the latter with 32 candle-power carbon filament lamps. The brackets are 11 feet above the floor, but on account of the size of the room are within the line of vision. For this reason it was necessary to use diffusing globes, by means of which the intrinsic brilliancy is reduced to about one-seventh of 1 candle-power per square inch. There are 66 frosted lamps of 16 candle-power located under a skylight in the center of the ceiling for decorative effect, which aid materially in bringing out the details of the mural decoration. The resultant effect is satisfactory and agreeable to the eye.

Data:

Floor Area	*2,310 sq. ft.*
Ceiling Height	*30 ft.*
Watts per square foot (Carbon Filament Lamps)	*4.3*
Total Candle-Power of Lamps. (Horizontal Rating)	*3,104*

(NOTE.—For tungsten lamps the watts per square foot will be about one-third the value above given.)

FIG. V. COURT ROOM, ONONDAGA COUNTY COURT HOUSE, SYRACUSE, N. Y.

THE illumination is carried out by pendant fixtures, each having 1 13-inch ground-glass ball globe and 4 9-inch globes, cut on the lower portion for decorative effect. The lamps in the 13-inch globes are equipped with prismatic reflectors to secure an efficient downward distribution of the light. The lowest point of the pendant is about 12 feet above the floor, but as the intrinsic brightness of the light sources is only about 1/3 of a candle-power per square inch, there is no harmful glare. The bracket lights are principally decorative.

FIG. VI. ENTRANCE LOBBY, MULTNOMAH COUNTY COURT HOUSE, PORTLAND, ORE.

Data:

Floor Area	*2,091 sq. ft.*
Ceiling Height	*18 ft. 4 ins.*
Watts per square foot (Carbon Filament Lamps)	*2.9*

(NOTE.—For tungsten lamps the watts per square foot will be about one-third the value above given.)

FIG. VI. shows an entrance lobby lighted by lamps housed in diffusing glass spheres, suspended by chains from the ceiling, and by groups of lamps mounted in enclosing globes on ornamental standards.

however, such a procedure, even if otherwise practicable, would introduce an even more serious difficulty, as the light reflected from the floor, coming from an unnatural direction, would produce visual fatigue.

In considering the effect of light upon the eye, cognizance must be taken not only of the specific brightness of the primary or secondary lighting sources within the field of view, but also of the area of these sources. It has been demonstrated that of two lighting sources having the same specific brightness, that source which has the greater area exposed to the eye will produce the greater glare.

Absolute uniformity of illumination is desirable only in a few instances in practice. With rare exceptions, a variation in the intensity of illumination in different parts of a room is desirable. Take, as an example, an extreme case in which an object is illuminated equally in all directions; it loses form and detail when viewed.

Mr. J. R. Cravath, in a report of tests of indirect lighting,* calls attention to some essential points to be borne in mind in the application of indirect lighting from suspended chandeliers. He states that the efficiency of such a system will depend largely on the proportion of the light which is reflected directly from the ceiling to the working plane. He advocates the system of indirect lighting by central chandeliers, in which system the lamps are backed by opaque-mirrored reflectors, and the bulk of the illumination obtained by reflection from comparatively limited areas of the ceiling. Comparing the effectiveness of direct and of indirect lighting he comments as follows:

"We all recognize that illumination is more a physiological problem than a physical one. Foot-candle values are worthless unless the lighting equipment is so arranged as to enable us to see objects with the greatest comfort consistent with the wattage used. Many arguments both for and against indirect illumination have been advanced which have been based largely on opinions or prejudices not justified by investigation, experience, or scientific research. All will probably agree that a sufficiency of diffused daylight is likely to be more satisfactory than any artificial lighting system that we are likely to devise for many years to come. Where this is not true, it is usually because of the insufficiency of the daylight. The first question to be asked regarding any system of lighting is, therefore, as to how nearly it approaches daylight in its effects. The illumination produced by a system of indirect lighting like that upon which these tests were made may be compared to that received by daylight from a rather dense skylight. It differs from such daylight mainly in intensity and color. The general diffusion and shadow effects are much the same. It differs from daylight received through windows mainly in the angle at which light is received and in its intensity and color. In our so-called direct lighting systems we really have a combination of direct lighting and indirect lighting, part of the light being received direct from the source and part by reflection from ceilings and walls. Direct lighting differs from the indirect lighting scheme under discussion in that the shadows produced by the direct are much sharper. In this way the direct is somewhat like direct sunlight, but it certainly is not like diffused daylight as received through a window or skylight. Both diffused daylight and the indirect system under discussion produce shadows, but they are not marked."

Mr. Cravath reports that the specific consumption of electric power in the above tests of indirect lighting was:

	Watts per effective lumen
Light-colored ceiling and walls	0.35
Light-colored ceiling and dark walls	0.45

Comparative Data for Direct, Indirect, and Semi-Indirect Lighting.

From the data of the tests it appears that the net efficiency, that is, the ratio of the lumens effective, to the total lumens generated was approximately thirty-six per cent for light-colored walls and twenty-eight per cent for dark-colored walls. Compared with commercial systems of direct lighting employing efficient reflectors, the above values indicate that for the same type and candle-power of lamp the indirect system requires, in general, at least fifty to seventy-five per cent more power for equivalent effective illumination than the direct system. The effective illumination referred to above is taken as the mean illumination on a horizontal plane 2 feet 6 inches (91 cm.) above the floor. The figures given refer to new lighting installations, with clean lamps and reflectors. As the lamps and reflectors of the indirect lighting system point toward the ceiling, the more rapid deterioration due to dust must be considered in comparing the "working" efficiency with that of the direct system.

Practically all systems of general illumination by direct lighting may be looked upon as a combination of direct and indirect lighting, as part of the light comes directly from the primary lighting source, without any reflection, and part from the secondary lighting source, namely, the ceiling and walls, after reflection.

The distinguishing difference between the direct and the so-called indirect system of lighting is, that in the indirect system none of the light from the primary source reaches the floor until after reflection from the ceiling or walls or both.

The so-called semi-indirect system of lighting is a compromise between the indirect system and the extreme forms of direct lighting. In the semi-indirect system the lamps are placed in bowls of diffusing glass, which reflect upward part of the light as in indirect lighting and let through part as in direct lighting. Usually the glass is made dense enough to let through not more than twenty per cent to forty per cent of the light, the intent being to send the major portion of the light rays to the ceiling. In this way the intrinsic brightness of the lighting source may be kept within safe limits without reducing the net efficiency of the system to that of the indirect system. The net efficiency of some of the semi-indirect lighting installations recently installed lies about midway between that of strictly direct lighting and totally indirect lighting.

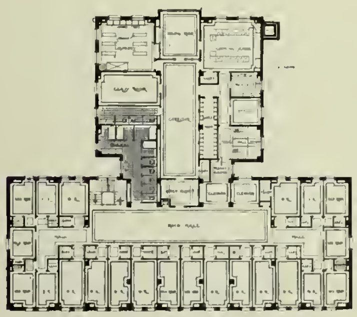
To overcome some of the objections that have been raised, on the score of appearance, against the system of totally indirect lighting by suspended chandeliers, the manufacturers of these fixtures have placed on the market luminous bowl indirect lighting units. These units are identical in design with the standard indirect lighting fixtures, except that provision is made for lighting the bowl of the fixture either by transmitted light from the main lighting unit or by light from an auxiliary lamp in the bowl.

* Some Notes and Tests on Indirect Illumination. J. R. Cravath. Trans. I. E. S., April, 1909, p. 290.

Y. W. C. A. BUILDING, ST. LOUIS, MO.
MARINER & LA BEAUME, ARCHITECTS

DETAIL OF FACADE

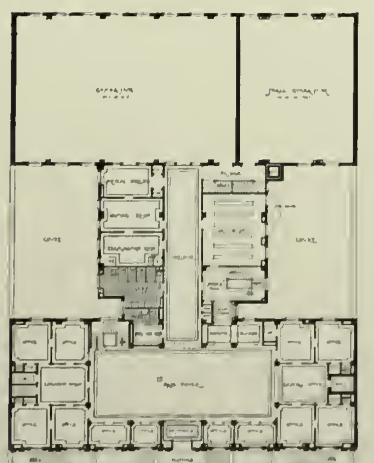
Y. W. C. A. BUILDING, ST. LOUIS, MO.
MARINER & LA BEAUME, ARCHITECTS



FOURTH FLOOR PLAN

FIFTH FLOOR PLAN

BASEMENT PLAN



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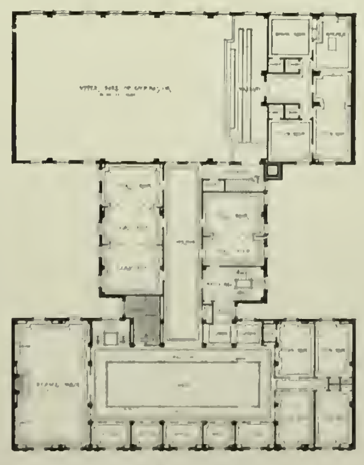
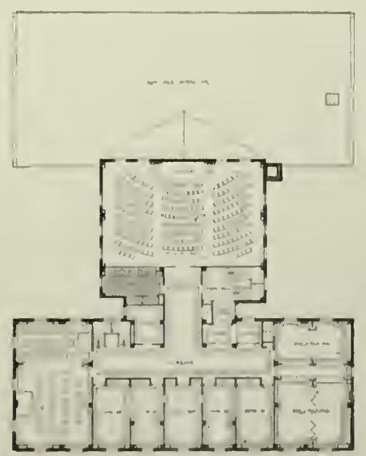


SECOND FLOOR PLAN



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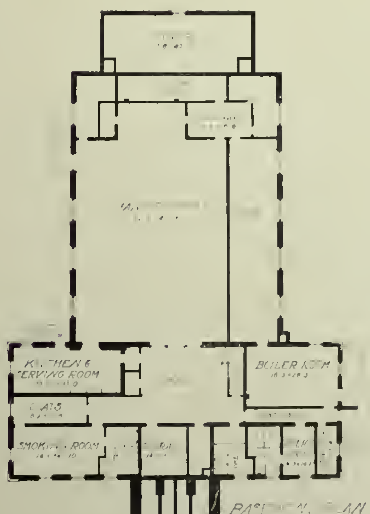
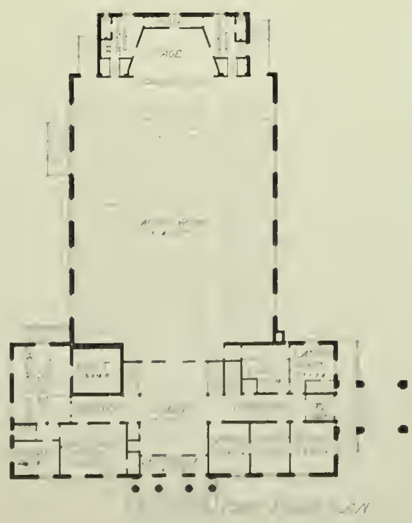
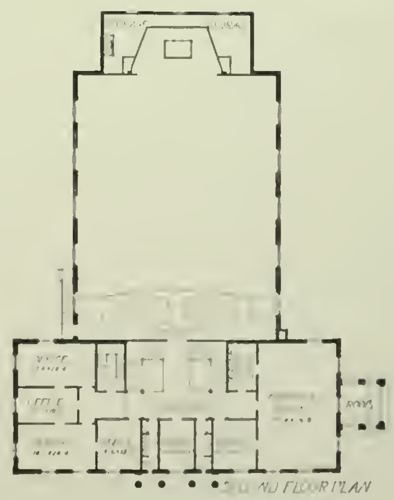
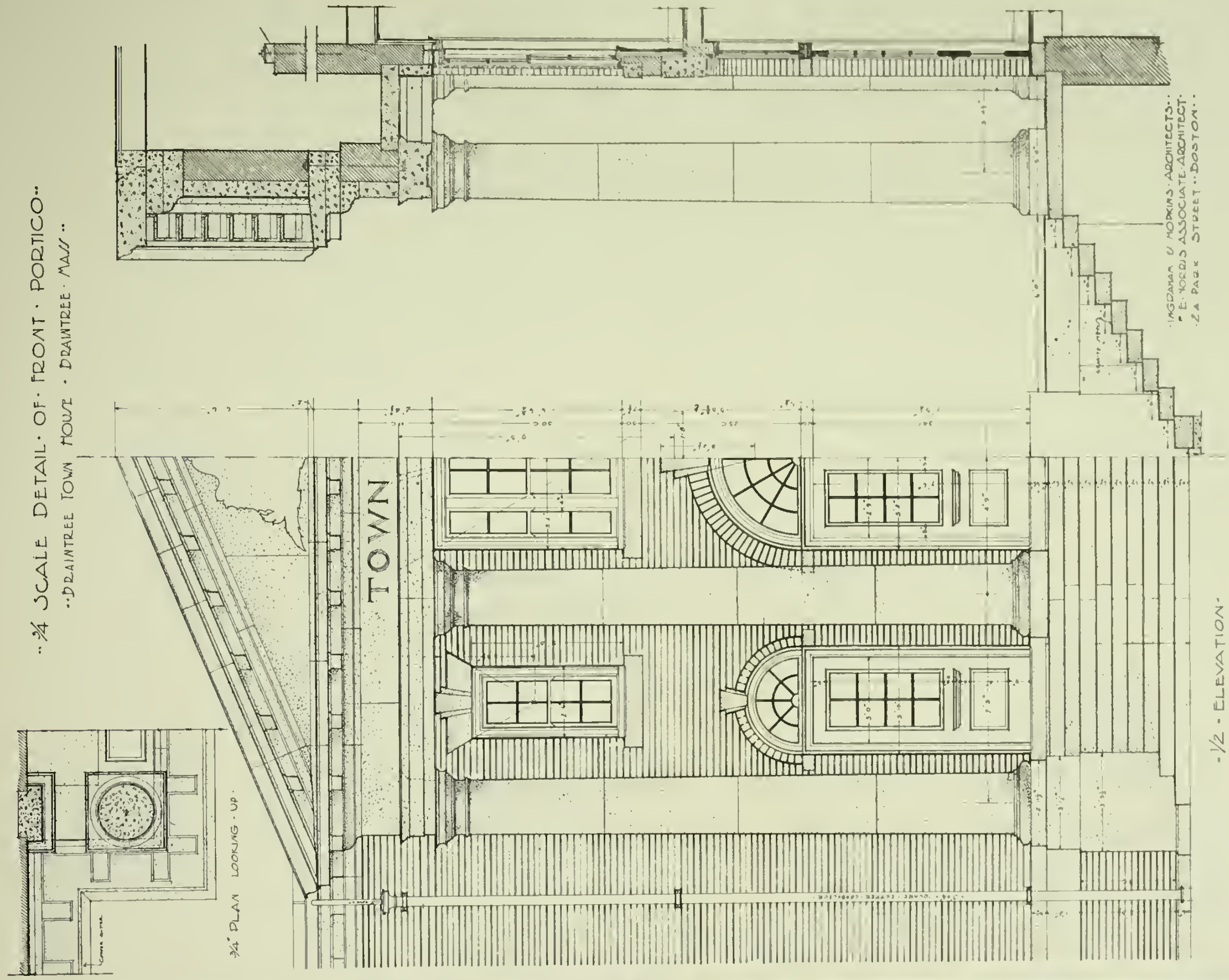






TOWN HALL, BRAINTREE, MASS.
INGRAHAM & HOPKINS, ARCHITECTS
F. E NORRIS, ASSOCIATE ARCHITECT



DETAILS OF FRONT PORTICO

TOWN HALL, BRAINTREE, MASS.

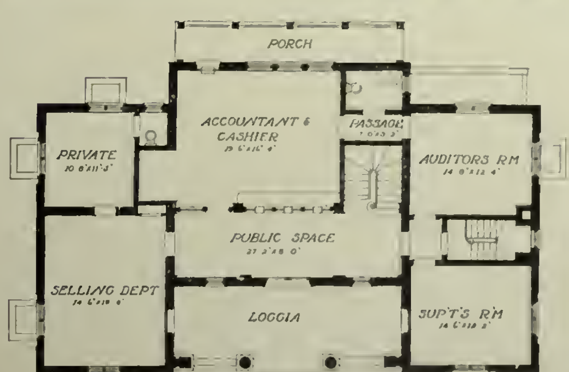
INGRAHAM & HOPKINS, ARCHITECTS

F. E. NORRIS, ASSOCIATE ARCHITECT

SMALL OFFICE BUILDING, GARDEN CITY, LONG ISLAND

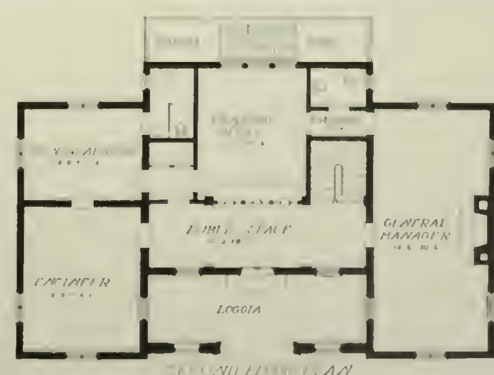
FORD, BUTLER & OLIVER, ARCHITECTS

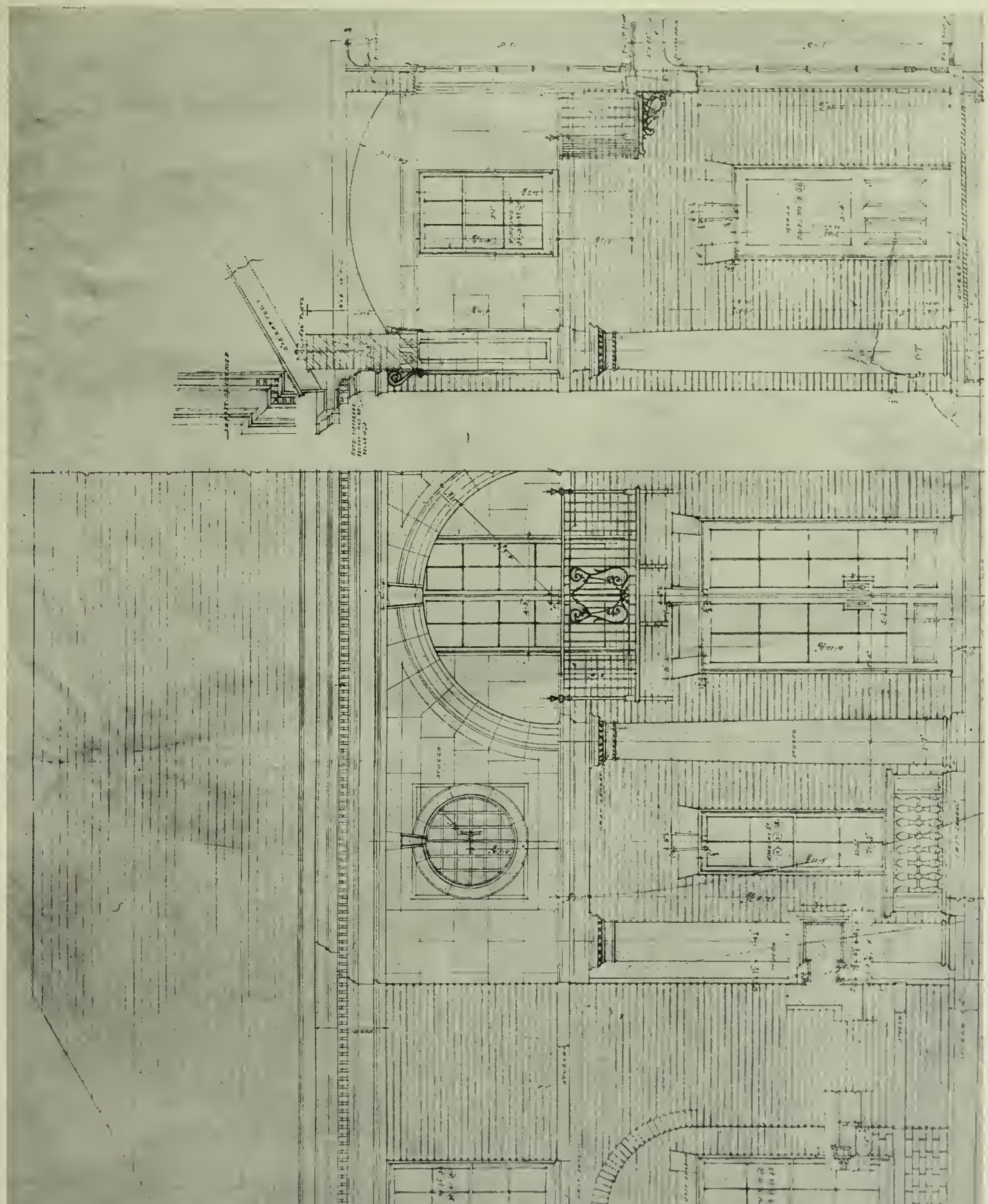
DETAIL OF LOGGIA



FIRST FLOOR PLAN

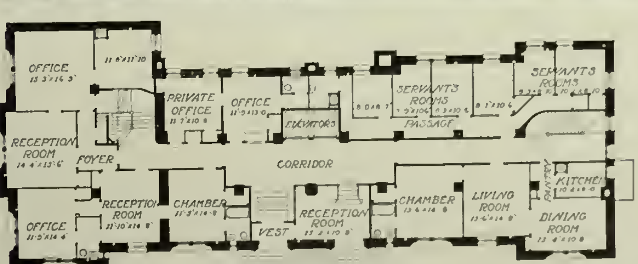
SMALL OFFICE BUILDING
GARDEN CITY, LONG ISLAND
FORD, BUTLER & OLIVER, ARCHITECTS





SMALL OFFICE BUILDING, GARDEN CITY, LONG ISLAND
FORD, BUTLER & OLIVER, ARCHITECTS

DETAILS OF PRINCIPAL ELEVATION



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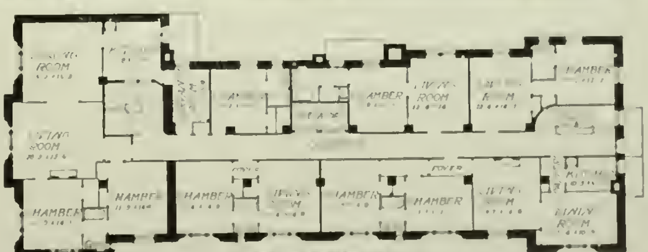
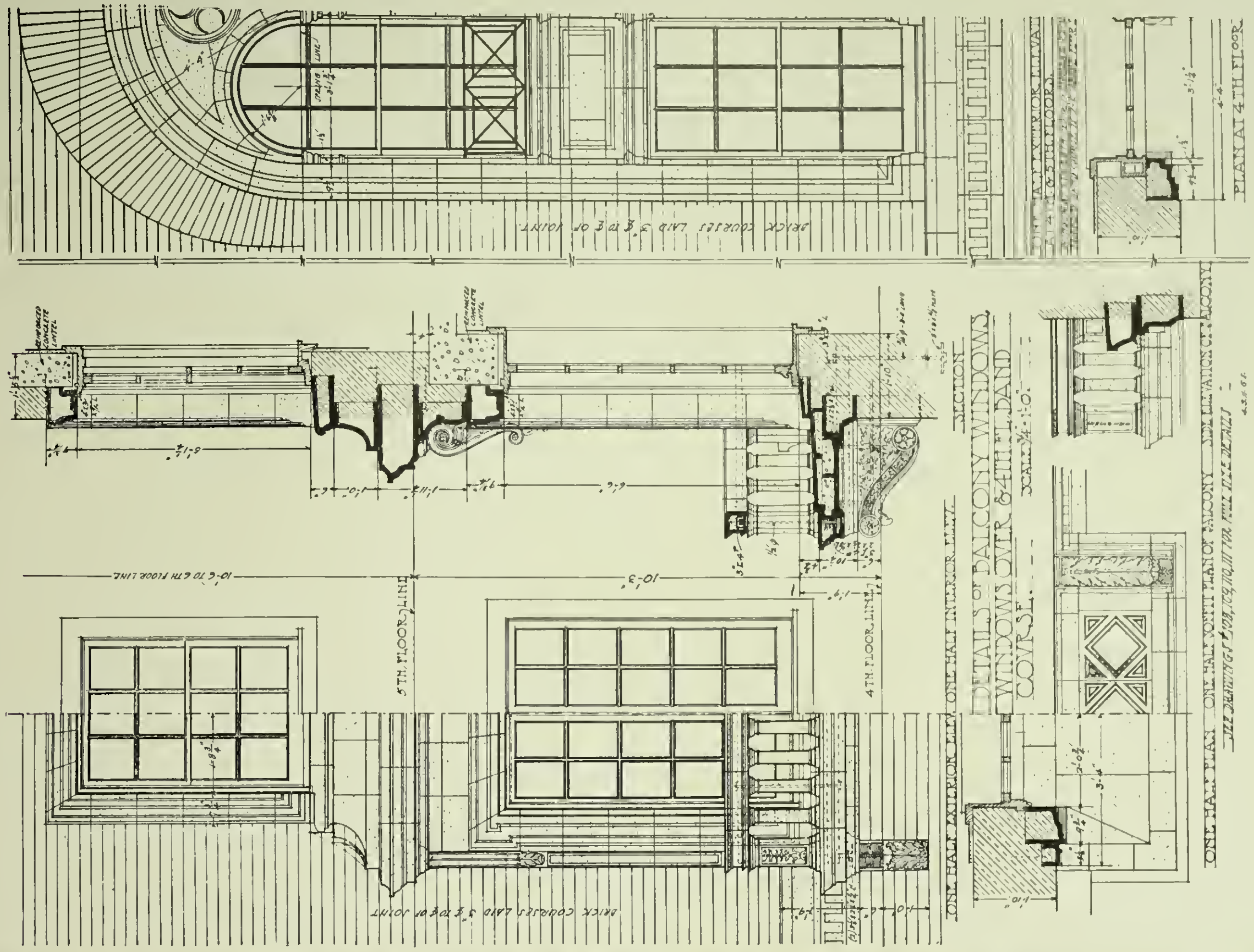


SECOND FLOOR PLAN

THE LATROBE APARTMENTS, BALTIMORE, MD.

E H GLIDDEN & C N FRIZ, ARCHITECTS



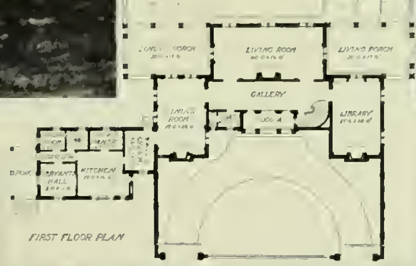
DETAILS OF WINDOW OPENINGS

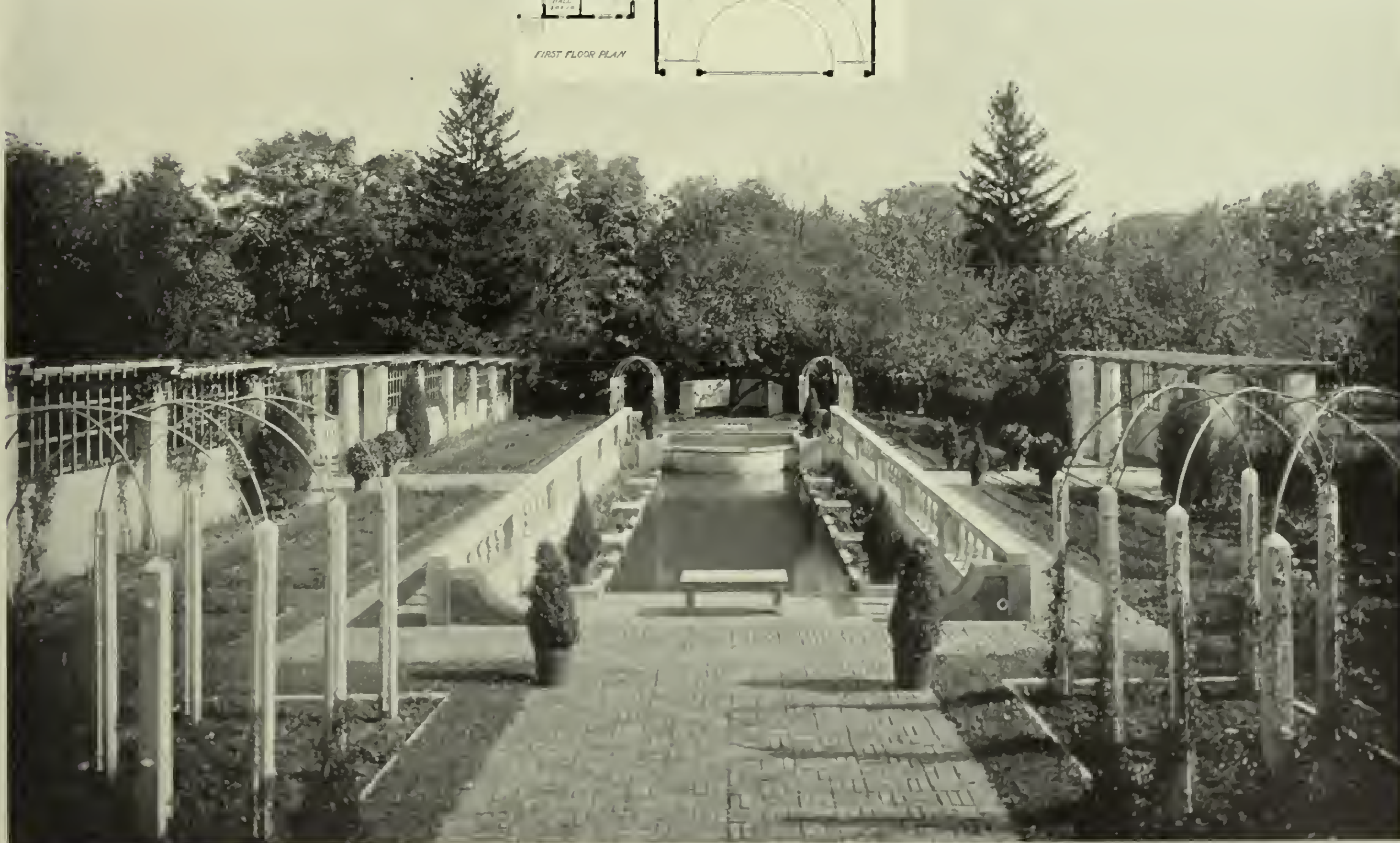
DETAIL OF ENTRANCE

THE LATROBE APARTMENTS, BALTIMORE, MD.

E H GLIDDEN & C N FRIZ ARCHITECTS

HOUSE AT LAKE FOREST, ILL.
HOWARD SHAW, ARCHITECT





HOUSE AT LAKE FOREST, ILL.

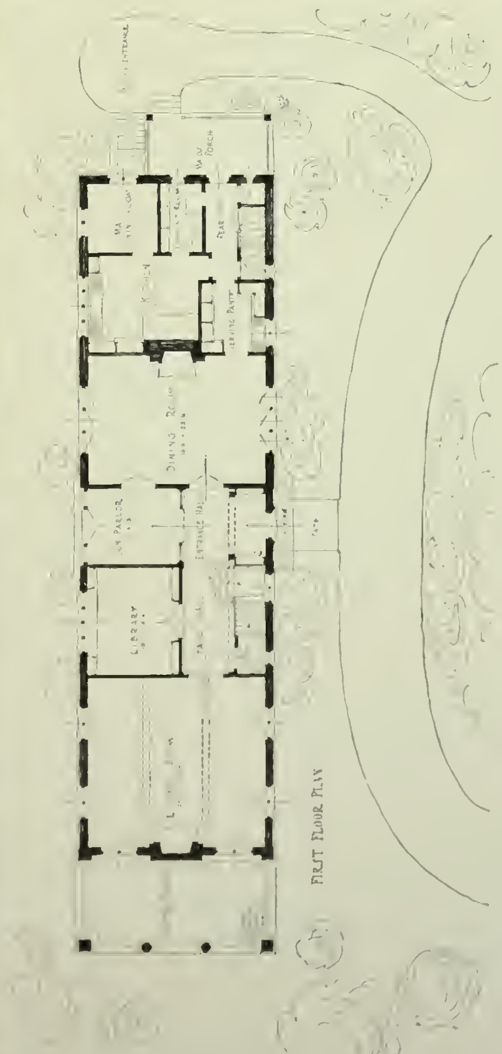
HOWARD SHAW, ARCHITECT

LIVING ROOM MANTEL

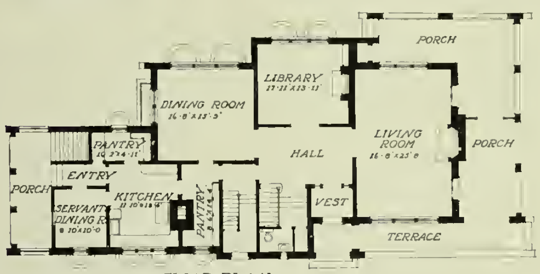
MAIN STAIRWAY

HOUSE AT LAKE FOREST, ILL.

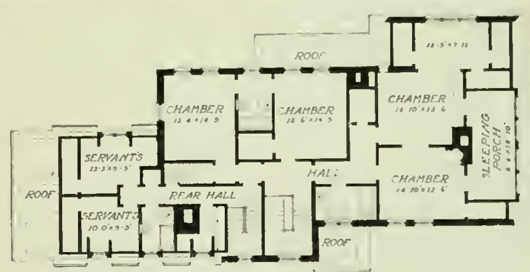
HOWARD SHAW, ARCHITECT



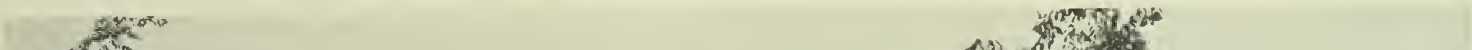
HOUSE AT BRENTMOOR, ST. LOUIS, MO.
HOWARD SHAW, ARCHITECT



FIRST FLOOR PLAN



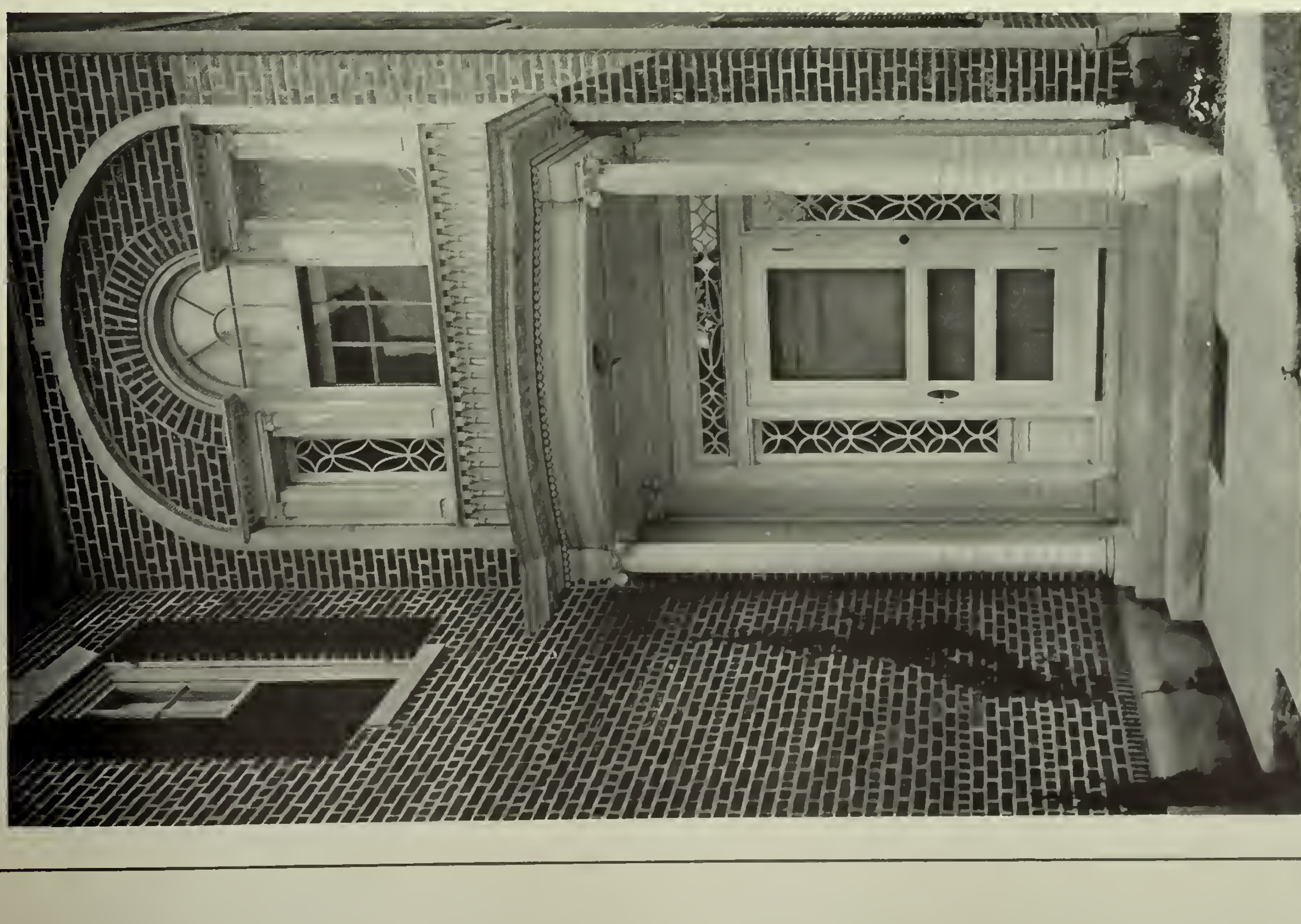
SECOND FLOOR PLAN



HOUSE AT SHAKER HEIGHTS, CLEVELAND, O.

WALKER & WEEKS, ARCHITECTS

HOUSE AT EVANSTON, ILL.
SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS



ENTRANCE DETAIL

LIVING ROOM

FIRST FLOOR PLAN

SECOND FLOOR PLAN

ATTIC FLOOR PLAN

HOUSE AT EVANSTON, ILL.

SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS

Architectural Acoustics.

THE EFFECT OF A SPEAKER'S VOICE IN DIFFERENT DIRECTIONS.

BY HUGH TALLANT.

ANY layman would probably admit that at a given distance the effect of a speaker's voice is much louder in front of him than behind him. Any baseball fan would undoubtedly assert that the shouts from the opposite bleachers always seem more vociferous than those from his own side of the field, and there is a rumor that a Harvard enthusiast was once guilty of the remark, "I always sit in the Yale stands so as to hear the Harvard cheering." Yet the average text-book on "Physics" does not even hint that the effect of speaking or music may vary with the *direction* as well as with the *distance* from which it is heard, and even such advanced treatises as Lord Rayleigh's "Theory of Sound" are scarcely more explicit."*

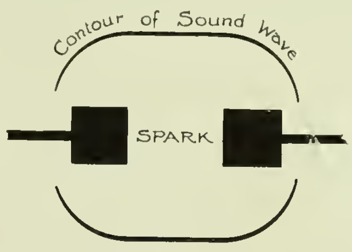


FIG. I.

Variation with direction — as it may be called to distinguish it from variation with distance — is nevertheless a matter of practical as well as theoretic interest. It has long been recognized by nautical authorities in connection with the sound of whistles, sirens, bells, and other means of communication and warning. It also has much to do with the proper relative position of the members of an orchestra or a chorus. In architectural acoustics, in particular, it has an important bearing upon the grouping of an audience, the arrangement of sound-reflecting surfaces, and the necessary precautions against indistinctness and echo. A complete discussion of these various phases of the subject would, however, far transcend the limits of the present essay, which will merely try to explain why and how the effect of a speaker's voice is apt to vary in different directions.

FIG. II.

Broadly speaking, the effect of a sound-wave depends upon four considerations: namely, the surrounding conditions; the distance from the source of the wave; the shape of the wave; and the relative intensity at different points on the wave. The present inquiry is not concerned with either the surroundings or the distance from the source, and therefore narrows itself down to a question of shape and relative intensity. With regard to the shape of the waves which constitute the human voice, no definite information or authentic statement is at present on record — at least so far as the writer is aware. Numerous diagrams and photographs of analogous waves have, however, been published by Prof. Robert W. Wood,† Prof. Arthur H. Foley,‡ Mr. William H. Souder, and others. With regard to the relative intensity at different points on a voice-wave, recent calculations by Prof. G. W. Stewart§ furnish accurate information concerning theoretic conditions closely approximating those of ordinary speech. The above data, together with certain inferences drawn from practical observation, will form the basis of the following discussion.

While, as has just been mentioned, the precise shape of voice-waves has yet to be determined, a plausible inference may be drawn from the existing photographic records. Without attempting to describe the way in which these wonderful negatives are obtained, it may be mentioned that, as sound-waves are merely irregular compressions of the air, they deflect the light passing through them and would, therefore, be visible (like hot air rising from a chimney or radiator) if they did not move too fast to be caught by the eye under ordinary conditions. They may, however, be seen under special laboratory conditions, and may readily be photographed. The waves found convenient for this purpose are produced by an electric apparatus which gives them the shape of a cylinder with rounded ends. Seen from the side, they appear as in Fig. I. From the end they appear as in Fig. II.

Four actual photographs of such sound-waves — for which the writer is indebted to Professor Wood — are reproduced in Fig. III. They illustrate the successive positions and shapes assumed by a sound-wave in moving downwards against a small, black obstacle, which will be seen in the center of each picture. The special point to be noticed is that, after the wave has passed the obstacle, its torn edges extend sideways, by the process known as diffraction, until they not only close the gap but actually overlap one another. This extension and overlapping will be clearly shown in the picture marked "D"; which, for convenience, has been redrawn in the form of a diagram, in Fig. IV. Here the source of the sound is indicated at S and the obstacle at A B. The main portion of the wave is represented by the curved lines C D and F G, which, as might be expected, are arcs of a circle with S as a center. *But the extension D E is in the form of an arc with A as a center and the extension G H is in the form of an arc with B as a center.*

This law of the extension or diffraction of sound-waves

*A theoretic discussion of the effect of a speaking trumpet in different directions is contained in Chapter XIV, Section 291, of "The Theory of Sound." The conclusions have been practically verified by Professor F. R. Watson.

† A full description of the apparatus and method by which he obtained his records is given by Professor Wood in his article on "The Photography of Sound and the Demonstration of the Evolution of Reflected Wave-Fronts with the Cinematograph," published in the Annual Report of the Smithsonian Institution for 1900, pages 359 to 369.

‡ Thirty wonderful photographs and a description of the apparatus by which they were obtained are given by Professor Foley and Mr. Souder in their article on "A New Method of Photographing Sound-Waves," published in the *Physical Review* for November, 1900.

§ These calculations are given by Professor Stewart in his article on "The Acoustic Shadow of a Rigid Sphere with Certain Applications in Architectural Acoustics and Audition," published in the *Physical Review* for December, 1911.

is of particular interest in the present connection because it suggests how a sound-wave would move on leaving the lips of a speaker. Let us imagine, first of all, what would happen in the case of a sound issuing from a small opening in the center of a flat surface. These conditions are supposed to be represented by Fig. V. Here B C is the flat surface and S the small opening. The sound-wave would naturally expand in the form of a hemisphere which is represented by the semicircle V W X. In the course of time, however, the wave will expand beyond the limits of the flat surface, as shown in Fig. VI, and the loose edges of the wave will extend by diffraction in the form of the arcs U V (of which B is the center) and X Y (of which C is the center). In course of time the diffraction might even extend so far as to cause the wave to overlap itself as shown in Fig. VII, so that a person stationed directly behind the surface at such a point as P might be able to hear the sound, although a person at the point Q, nearer the surface, would probably hear nothing.

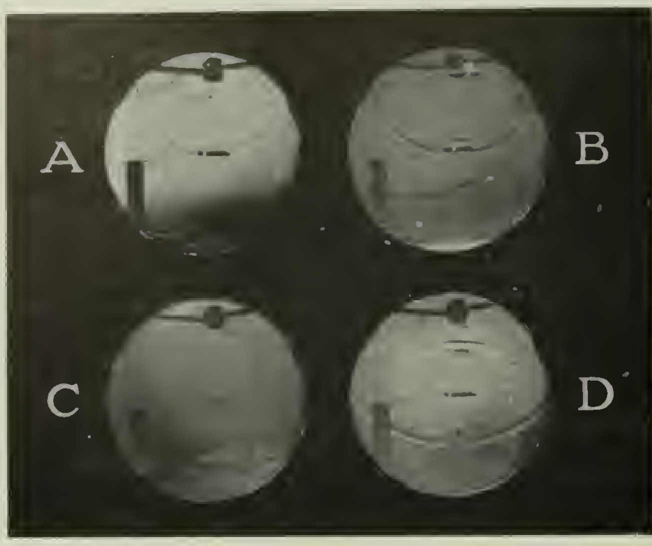


FIG. III.

A reproduction of four sound-waves actually caught by camera.

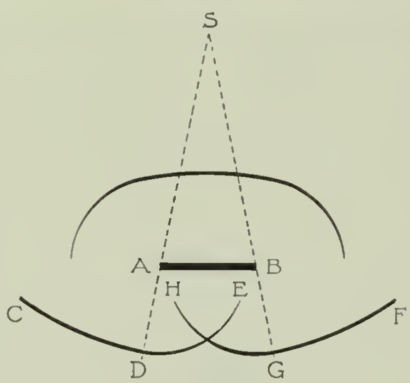


FIG. IV.

Let us now imagine that the surface, instead of being flat, had been bent as shown in Fig. VIII. The sound-wave would then have assumed the shape represented by the curve T U V W X Y Z, of which T U is an arc with A as a center, U V an arc with B as a center, V W X a semicircle with S as a center, and so on. If the surface had been bent still further as in Fig. IX the sound-wave would have again corresponded, as shown, and in the case of a cylinder, Fig. X, would have been of very similar form. Finally, if we suppose that the circle in Fig. X represents not a cylinder but a sphere, or, better yet, the contour of a man's head, and that the small opening represents the man's mouth, we shall have arrived at conditions approximating those of ordinary speech.

Under these conditions it is evident that the sound-wave would be symmetrical with reference to the line U S W. In other words, it would be the surface obtained by spinning the curve T U V W X U Z about U S W, and would be shaped very much like an apple — round in front, flattened behind, with a dent in the center corresponding to the point where the stem of the apple would have been attached. Assuming this to be approximately the form developed by the wave of a speaker's voice, we can draw some very interesting conclusions with regard to the effect which such a wave might produce upon hearers in different directions.

In the first place it is obvious that the sideways extension or diffraction of the wave must diminish the intensity in the adjacent portions of the wave. We may, therefore, infer that the intensity of the *sound* would be greatest directly in front of the speaker, at the point W, and would diminish continuously from W to X, U, and Z on one side; and from W to V, U, and T on the other. The loudness of the *effect* might, however, vary in a very different way. While it would necessarily diminish from W to X and N, it might actually increase from N to U because between these points the ears of the hearer are struck by two wave-fronts, N U and T U; and the combined effect of these two might be greater than the effect produced by the single wave-front X N. There are accordingly three possibilities. If the intensity decreases at the same rate from N to U that it does from U to T, the effect between N and U will be uniform; that is, it will be just as loud directly behind the speaker as a little to either side. If the intensity decreases faster from N to U than from U to T the effect will be fainter at U than at N. If, on the contrary, the intensity decreases more slowly from N to U than from U to T (and this would seem the most probable contingency) the effect will actually be louder directly behind the speaker than for a short distance on either side, and the direction of minimum intensity will be M N and not M U.

These generalities, while interesting, are, however, of little practical value. What the architect requires is specific facts and figures. These are provided by the series of calculations which have already been mentioned. Through the courtesy of Professor Stewart the results of these calculations are given in tabulated form in Figs. XI and XII.† In these tables the vertical distance represents the intensity, which is assumed to be 100 at the point directly in front of the speaker. The horizontal distances represent the angle at which the hearer is supposed to stand with reference to the direction in which the speaker is facing. An angle of 90 degrees would thus correspond to a position on the right or left of the speaker, while an angle of 180 degrees would correspond to a position directly behind him.

Fig. XI shows the variation in intensity of a sound of the pitch of middle C at three different distances from the speaker. The bottom curve represents the variation at a distance of 7 or 8 inches; the middle curve at a distance of about 15 feet; and the top curve at a distance of

* See the article "On Acoustics as Applied to Public Buildings," by Professor Joseph Henry, published in the Annual Report of the Regents of the Smithsonian Institution for the year 1856.

about 60 feet. All of these curves indicate a slightly smaller intensity to right and left of the speaker than behind him. They also show that while the reduction in intensity from front to rear is very great in the immediate vicinity of the speaker, amounting to over ninety per cent at a distance of a few inches, it is only about twenty per cent for distances of 15 feet and upwards.

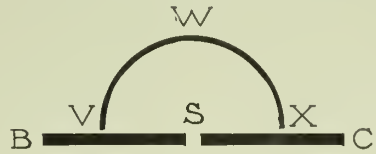


FIG. V.

It is, however, important to know how tones of different pitch may vary at a given distance. For this purpose Fig. XII shows the variation of four musical tones at a distance of 15 feet. The bottom curve represents the variation at the pitch of high C, the next above the variation at treble C, the third the variation at middle C, and the fourth the variation at bass C. The diagram, therefore, indicates that the diminution in intensity behind a speaker becomes more accentuated the higher the pitch of the tone in question.

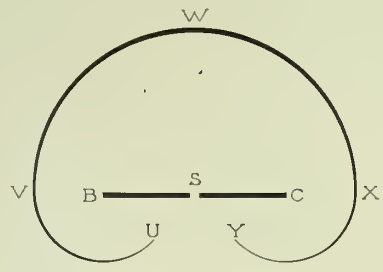


FIG. VI.

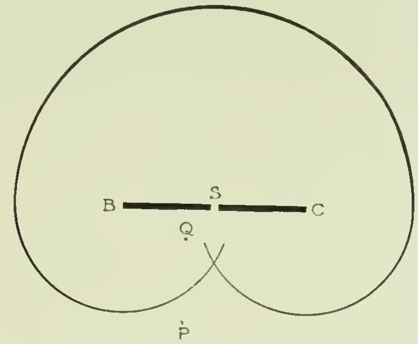


FIG. VII.

While these results are of extreme interest and value, they nevertheless cannot be considered as applying strictly to any other than the geometrical conditions upon which they are based. That is, they apply only to a sound issuing from a small opening in the side of a rigid sphere some 7 or 8 inches in diameter. In the case of a speaker they would be modified by the fact that his head would not be exactly spherical; that it would have protuberances such as nose, ears, and, usually, hair; and that it would be supported upon a neck and shoulders. These incidental obstructions might naturally be expected to interfere with the free diffraction of the sound-wave, and in this way occasion a still greater diminution in the intensity behind the speaker. It would, therefore, be desirable to compare and check the theoretic calculations with practical experiments.

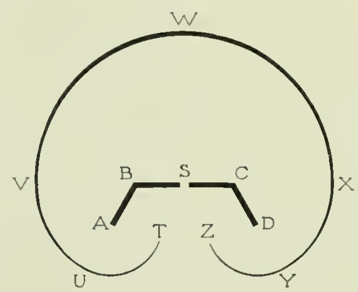


FIG. VIII.

The most authoritative record of actual observation with which the writer is familiar is given in an article written half a century ago by the then famous acoustic authority, Professor Joseph Henry.* The statement is short and may, therefore, be quoted verbatim.

"A person speaking is heard much more distinctly directly in front than at an equal distance behind. Many experiments have been made on this point, and I may mention those repeated in the open space in front of the Smithsonian Institution. In a circle 100 feet in diameter, the speaker in the center, and the hearer in succession at different points of the circumference, the voice was heard most distinctly directly in front, gradually less on either side until in the rear it was scarcely audible. The ratio of distance for distinct hearing directly in front, on the sides, and in the rear was about 100, 75, and 30."

Assuming that — as stated in any standard "Physics" — the intensity of sound varies inversely as the square of the distance from its source, the intensity of a speaker's voice, according to Professor Henry's observations, would be about half as great on either side of him as in front, and only one-fourth as great behind him. This is a very much larger reduction than the theoretic calculations would suggest, even allowing for the interference of the speaker's body. It will also be noticed that only "the *ratio* of distance for distinct hearing" is given. The *actual* distance would naturally vary with the strength of the speaker's lungs. As a matter of fact, two persons of average vocal capacity can easily call to one another across a quiet lawn up to a distance of 180 feet. Satisfactory expression or modulation is, however, impossible beyond 100 or 120 feet. Of course under special conditions, and in particular, in the mountains, the radius of communication is much greater. The writer has often made himself understood across a valley over half a mile in width. In such cases, however, we have to deal with sound-reflection, and also with the tendency of sound to adhere to concave surfaces, which Lord Rayleigh believes is responsible for the peculiar effects in the dome of St. Paul's Cathedral. Indoors, however, owing to the confusion and rustle of the audience, the direct sound of a speaker's voice will rarely carry more than 50 or 60 feet in front of him, and, if Professor Henry is correct, should carry only 35 or 40 feet on either side of him, and only 15 or 18 feet behind him. This last figure certainly seems ultra-conservative.

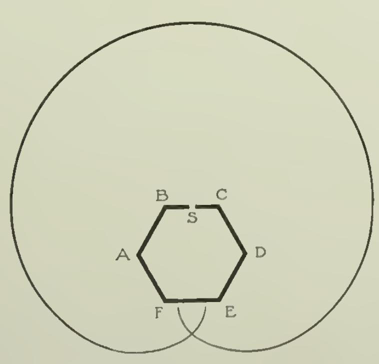


FIG. IX.

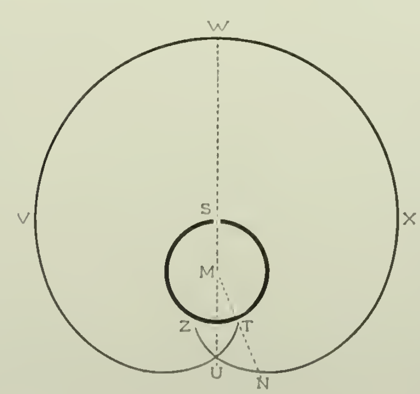


FIG. X.

These considerations have an obvious bearing upon the calculations for loudness in a

† As already mentioned, these results were published in *The Physical Review* for December, 1911.

large auditorium. If a speaker's voice is so faint behind him, its reflections from the surfaces behind him must be correspondingly faint. In the case of sounding boards, such as are often placed immediately back of a pulpit, the reduction in intensity requires special attention. For wall and ceiling surfaces a convenient assumption is that the intensity at the side of the speaker is three-quarters as great as in front, and behind him half as great. For ordinary purposes this seems to give sufficient accuracy.

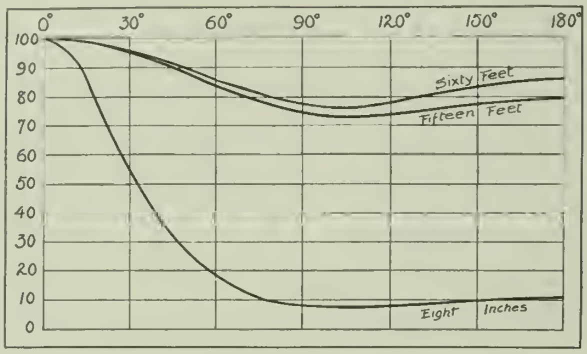


FIG. XI.

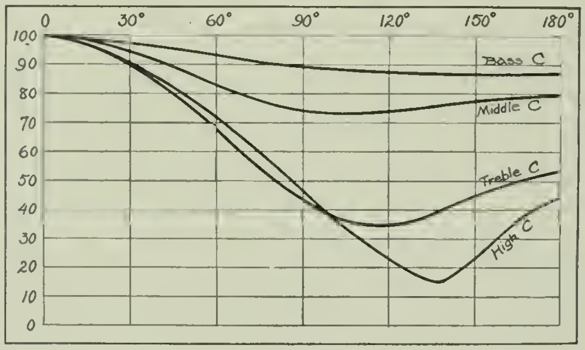


FIG. XII.

Another point requiring attention is the fact that the reduction in intensity is very much greater for tones of high pitch than for those of low pitch. As every one knows, a sound of the human voice is made up of a number of pure tones, of which the lowest, or fundamental, gives the pitch, while the others determine the timbre in the case of music, and the character of the vowel sounds in the case of speech. An irregular reduction in the intensity of the higher or overtones must naturally interfere with both the quality of singing and the distinctness of speaking. With regard to the former, only a trained musician is qualified to decide. With regard to the latter, however, it may be stated that there is a noticeable tendency to indistinctness in the seats to right and left of a speaker. For this reason, as well as many others, it is desirable to plan a large auditorium as far as possible in the shape of a fan. In this way the undesirable seats are eliminated, and moreover the speaker is not likely to turn so much toward one side to the detriment of the other.

Still another point is the interval of time which may be permitted to elapse between the arrival of the direct sound and the arrival of the first reflected sound. When the speaker faces the audience the effect of the direct sound is usually much louder than that of any reflected sound, and consequently has a tendency to continue for a brief moment, just as the effect of a bright light will continue for a very perceptible length of time after the light itself has been shut off. This after-sensation fills in the interval between the direct and the first reflected sound and causes them to appear as a continuous effect. But should the speaker happen to turn his back to the audience, conditions are reversed. The direct sound becomes the fainter, the after sensation is shortened, and the interval between the direct and the first reflected sound may become distinctly perceptible, with the result that the reflected sound is heard as an echo. Where this contingency is likely to arise, as in connection with religious services, the interval between the direct and the reflected sounds should be made much less than the sixteenth of a second which may be permitted under ordinary circumstances.

Gidea Park.

THE NEWEST ENGLISH GARDEN SUBURB.

BY R. RANDAL PHILLIPS.

THE garden suburb movement, after much preliminary discussion and many pioneer efforts, has taken a firm hold in England, and the Town Planning and Housing Act bids fair to extend it in a most astonishing fashion. Without going into the history of the movement in any detail, we may briefly recall its underlying principles. These, so far as the writer is able to perceive them, are embodied in the opinion that unrelieved streets of brick and stone houses in the midst of a town are the very antithesis of home life as it should and might be. Such streets were characteristic of English cities during the prosperous course of the nineteenth century, when agricultural employment was being increasingly supplanted by mechanical industry — a process which continues at the present day. Thus, more and more people became drawn into the city, and, housing accommodation being required for them, the speculating builder seized every available spot within the civic boundary and there erected as many houses as it is possible to set upon a given area. In this way has suburbandom been created — a place laid out in a haphazard manner, unrelated to its own parts and equally unrelated to the older civic area on the fringe of which it has sprung into being. Settling down on such an area, the custom of the speculating builder has been first to make a clean sweep of every tree and shrub which he found on the space, and thereafter to create a wilderness of bricks and mortar. The results thus achieved, however, soon began to give rise to a strong aversion on the part of the town dweller, and as time went on the latter sought relief by going outside the city boundary and there housing himself as comfortably as his means permitted. Whatever may be the tendency in other countries, the worker in England has an ingrained longing for a house amidst rural surroundings; hence, every evening thousands of city workers in London go out by tram, train, or omnibus to some suburban or rural area — as far away from the metropolis as the limits of their time and their income will allow — where they can escape from the rush and roar of a great city and can spend their leisure in following the pursuits or enjoying the delights of the semi-countryside. The same process has, of course, been going on for the past century. Time was when Islington and Chelsea were country places whither the townspeople liked to jaunt, but it is long years ago since these districts, and others far beyond them, were made part and parcel of an engulfing city, and as the area of London spreads farther and ever farther, so the workers extend their journeys outward to reach the country beyond.

PLAN OF GIDEA PARK SHOWING FUTURE EXTENSIONS.

It was under such conditions as these that the first garden city in England — Letchworth, in Hertfordshire, about thirty-five miles from London — was started about ten years ago, and the successful results there achieved were soon emulated in other districts. The idea of a garden city embraces more, however, than is contemplated in a garden suburb, for it means the creation of a


MEADWAY.


PARKWAY.

TYPICAL STREETS IN GIDEA PARK.

HOUSE IN PARKWAY, GIDEA PARK.
Reginald T. Longden, Architect.

place where work goes on side by side with residence; whereas the garden suburb is essentially a place of residence and recreation alone.

On the fringe of Hampstead Heath, on the high ground to the northwest of London, there has been built a most interesting suburb* where people of all classes are accommodated, and it was perhaps the success of this and similar undertakings that led to the development of Gidea Park, the latest of English garden suburbs.

In seeking country areas around the metropolis one is accustomed to go anywhere but to the east side, where great districts of squalid property, interspersed with factories and an unknown area of docks, constitute a formidable barrier to the seeker after country amenities. It is on this side, however, that Gidea Park has been discovered; for we may well call it a discovery, in view of the fact that, prior to its translation into a garden suburb, it was unknown, even by name, to the great majority of people in London, although it retained its natural beauties in much the same condition as when Queen Elizabeth visited the place nearly three centuries ago.

The area comprised in the estate is 450 acres. It abuts on the northern side of the great Roman road that runs from London through Essex to Colchester, and extends for a mile or more towards the wooded heights and parklands of Havering-atte-Bower. To the west is Raphael Park, an enclosure given to the public by Sir H. H. Raphael, M.P., — while to the east is the open undulating Essex country. At the south extremity of the estate a new station has been built at Squirrels Heath, whence a fast train takes one in less than half an hour to Liverpool Street.

As already indicated, the suburb is essentially residential, but as certain local requirements must inevitably be satisfied, a space has been laid out near the station where a shopping center is being formed and where, in due course, a market place will be developed.

Running right up through the estate is a beautiful piece of ground, about two hundred yards in width, which is preserved permanently as a golf course. The roads have been so laid out that there is a long frontage for houses looking onto this delightful space, and similarly, on the opposite side, the roads are so disposed as to give the utmost benefit to the houses that face Raphael Park.

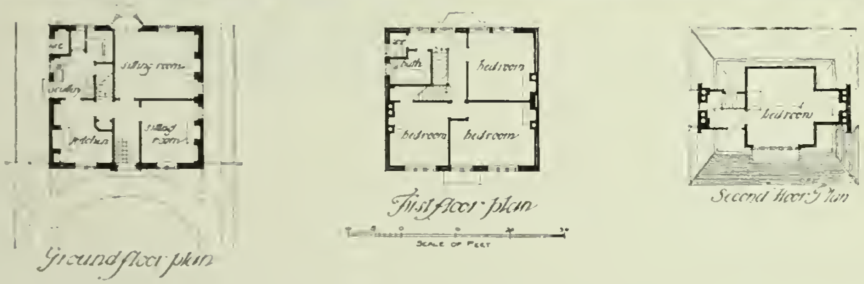
Additional attractions are afforded by the fish ponds and avenues of the old mansion of Gidea Park, which still remains a sturdy testimony to its Georgian builders, and by a large irregular green and pond around which winds Reed Pond Walk, with its bordering houses.

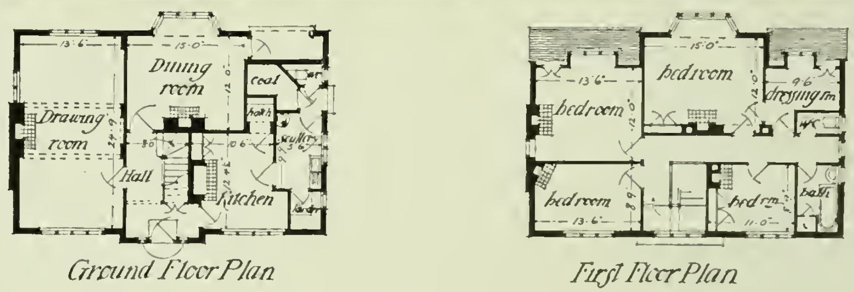
The estate was opened by the Right Hon. John Burns in July, 1910. It was eagerly taken up. Within a month of that date $60,000 worth of land in plots had been sold, and in the following spring more than one hundred architects and builders were busily engaged in erecting houses on them. In respect of these houses the estate is quite unique, for, with the object of securing the highest talent, the directors instituted a competition for the best houses.

Substantial prizes were offered, and this had the result of attracting a number of capable architects to apply themselves to the problem of designing a small house on good lines. A strict limit of expenditure was imposed, the houses in Class I being required to cost not more than $2,500, and those in Class II not more than $1,775. Previously there had been a competition for the layout of the estate, the first premium of $500 having been awarded to the plan of Messrs. Gibson & Dann, and the second premium of $250 to the plan of Mr. Geoffry Lucas. In the house competition, the first place in Class I was given to the house in Parkway, by Mr. Geoffry Lucas (shown among the accompanying illustrations), and the first place in Class II to a house in Meadway, by Mr. C. M. Crickmer. Mr. Lucas's house, it will be seen, is very conveniently planned and, while having a room in the roof, does not follow the cottage type too closely. There is, moreover, a directness about its disposition, both in plan and elevation, which is very pleasing. The house is built of brick, lime whitened, with a red tiled roof. It is set back a short distance from the roadway (as may be seen in the general view of Parkway on page 229) and the kitchen has been kept to the front, in order that the garden at the rear may not be disturbed in the usual way. Standing like senti-

HOUSE ON HEATH DRIVE, GIDEA PARK.
W. Curtis Green, Architect.

* See illustrated article in THE BRICKBUILDER, Jan., 1910.





THE FIRST PRIZE DESIGN HOUSE IN PARKWAY
GEOFFRY LUCAS, ARCHITECT

HOUSE ON HEATH DRIVE
MICHAEL BUNNEY AND CLIFFORD MAKINS, ARCHITECTS

TWO BRICK HOUSES IN GIDEA PARK

nels on either side of the garden plot are two little houses — one a tool shed, the other a garden house — which, with a modest architectural layout, add a note of formal symmetry that is most effective.

Another excellent house in Parkway is that by Mr. Reginald T. Longden. This is on a corner site, so that the entrance is contrived from one end. Both the sitting room and the dining room are of good size, and their bay windows are sufficiently large to be of real service, in contradistinction to those tiny projections which but disturb the elevation without adding any space that can be put to substantial use. This house is of red brick, with rough-cast gables and red tiled roof. The roof construction is very economical, and its shape is such that the upper rooms are not cut off at unfortunate angles.

On the opposite side of the estate, in Heath Drive, are many excellent little houses in brick. At the upper end are four in a row, by Ronald P. Jones. With these an attempt has been made to get away from the gabled type seen in English villages, and to take as model instead the plain fronts of the Georgian era. The result is not one that attracts the general public with any degree of enthusiasm, but to the writer it seems that these houses are a welcome relief to the ordinary type. They are sound square pieces of building without any attempt at pretentiousness, and their appearance will be admirable when, in the course of years, they have weathered down and a little kindly creeper has spread itself over the brickwork. Their window shutters are also of the right kind — that keep out the glare while admitting abundance of air; in which respect they differ from the solid heart-pierced type more favored by "country cottage" architects.

Close to this row of houses is a delightful corner house by Mr. Curtis Green. Here a feature has been made of the chimney stack, which is brought to the center of the roof and carried up as a sturdy piece of brickwork. Special care has been given to the garden, which has been made beautiful with a wealth of roses.

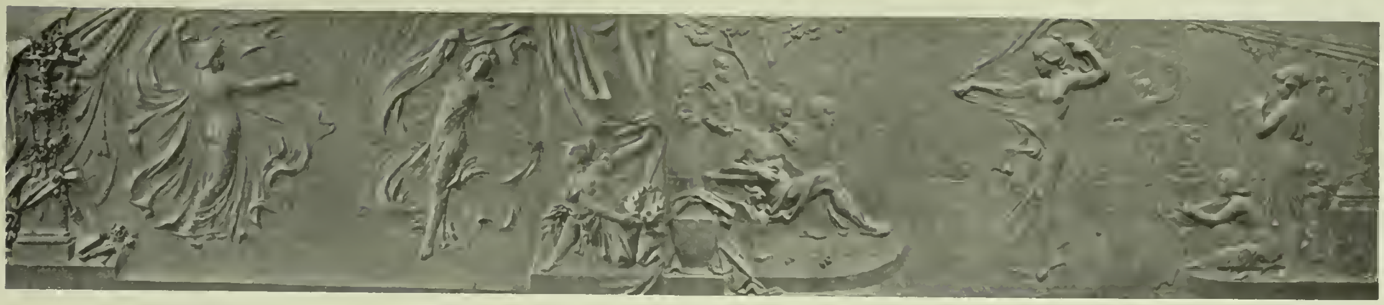
Still further along Heath Drive are several other pleasing houses in brick, among them the house by Messrs. Bunney and Makins shown among the accompanying illustrations. This, if one may say so, is between the cottage and the Georgian type, with strong leanings, however, towards the latter. There is very little outside woodwork about it, relief being obtained by herring-bone brickwork and bricks set on edge. It is not one of the competition houses, as may be judged from the plans, which include a drawing-room 24 feet 9 inches by 13 feet 6 inches, but it is a good example of the best class of work of its kind now being done.

With the numerous other houses at Gidea Park which rise far above the ordinary level (such as that by Mr. Clough Williams-Ellis seen on the left-hand side of the view in Reed Pond Walk), it is not possible now to deal, but sufficient has been said to show that this new English garden suburb reaches a high level of achievement. Though created only a few years ago, its rawness is already passing away, and after a few more years have elapsed it will have a most attractive appearance.

The suburb is being developed on sound financial lines, and the building work is thoroughly well executed. Houses are being built to suit all classes of occupants. Some are erected for rental purposes, others for purchasers' investment, others again by builders as speculation, while, occasionally, some are carried out by the estate company for clients; and in connection with the last the houses are either sold for cash or on extended payments over a period of from seven to thirty years. In all cases of extended terms the annual cost amounts to approximately the rental value of the house and includes life insurance of the purchaser. By this means a client taking an extended purchase knows that, should his life fail, the property immediately becomes the unencumbered property of his heirs — an arrangement which appeals to many.

It will thus be seen that not only has the general layout of the estate and the design of appropriate houses received full attention, but also that great consideration has been given to the means whereby people with limited incomes can secure for themselves houses in a garden suburb area not far from the metropolis, where they may enjoy the fresh air and the beauty of the countryside.

REED POND WALK, GIDEA PARK.
House on extreme left designed by Clough Williams-Ellis.
House at the end of the road designed by Reginald T. Longden.



A Moving Picture Theater.

THE ORPHEUS, CHICAGO, ILL.

ARONER & SOMERS, ARCHITECTS.

THIS moving picture theater is a noteworthy adaptation of terra cotta to surface treatment so often demanded by our modern architecture. During the last fifty years there has been no consistent construction, which would permit the development of a primary or fundamental style, such as has grown up in the past, modeled by some great national spirit and fired in the kilns of generations of time. Much of the interest has, therefore, been relegated to surfaces and façades, both in material and design. Of these the most frequent has been a façade between two walls with varied types of domestic and business buildings on either side, and the problem has been to give it the character of the building which it masks. The present example being a moving picture house, let us consider what is the architectural character of a moving picture theater and how this has been shown in the present design.

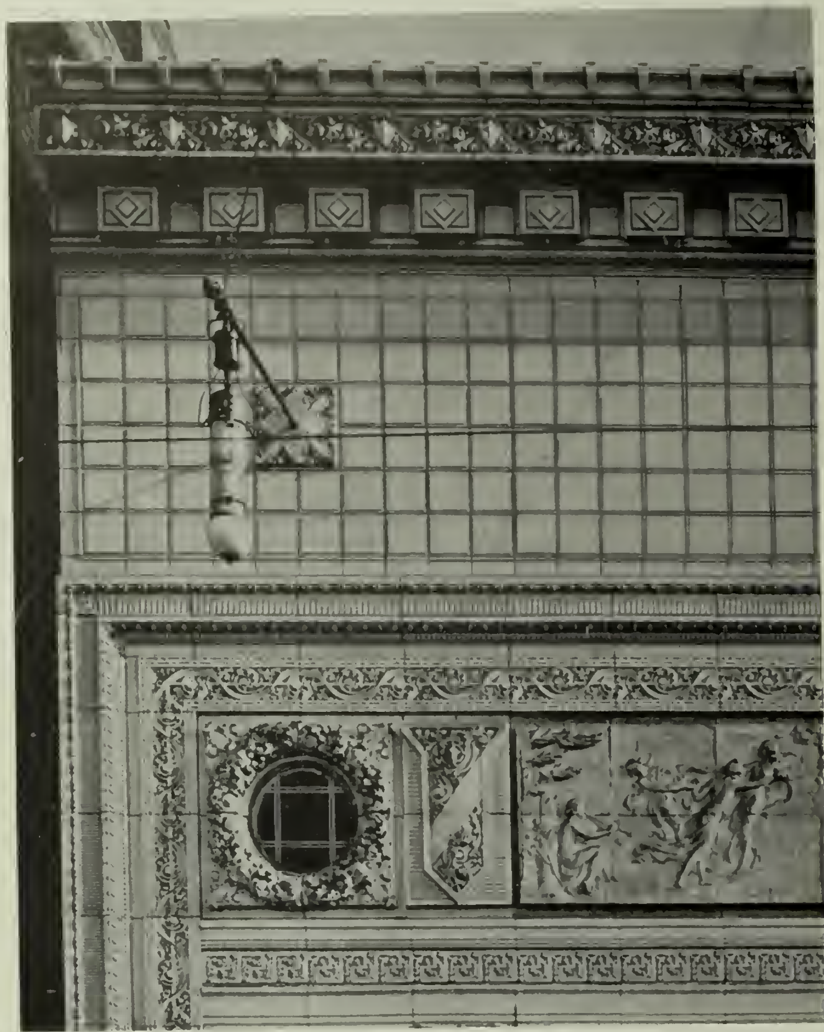
DETAIL OF ORNAMENT.

In general, moving picture theaters are dedicated to the lightest known kind of theatrical amusement — an amusement so modern and so newly invented that it was practically unheard of ten years ago. Its unabated popularity indicates that it supplies a much needed form of entertainment and that it has come to stay, or be supplanted by one still more popular. Even in this short time its design has had a history, which points to a steady advance along the gamut of theatrical expression, from the childish wonder façades of Coney Island to the impressive character of the Brooklyn Academy of Music — from meaningless frivolity towards sincerity, simplicity, and dignity. In this little theater a frank attempt has been made to reach a high form of architectural expression, with as much dignity and architectural quality in its composition as would be consistent with the spirit of the building, depending for its gaiety upon the details and general color scheme.

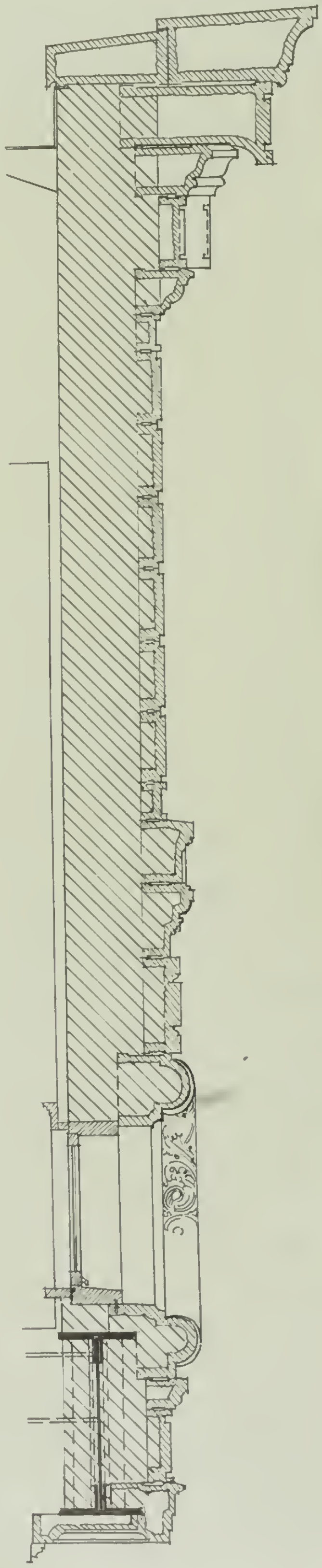
The composition of the façade has been cleverly and well managed. It has been designed as a decorative entrance, and all motifs which would tend to destroy that impression have been omitted. The entrance proper consists of a number of glass paneled doors, held in a casing of glass and steel, which covers the entire opening. This is protected from inclement weather by a light metal marquise. On the surface of the building, the opening is framed in at the sides by a monumental border of running ornaments, and at the top by a bas-relief which is accentuated at both ends by decorative openings which ventilate the toilets. The border which continues around and above the bas-relief is surmounted by a surface patterned with terra cotta tile, and above this surface is the slightly projecting cornice and coping. All architectural embellishments have been subordinated to secure a monumental effect with a simple mass unbroken by decided motifs or shadows. This treatment looks especially well at night when the blaze of light from the lamps is reflected by all portions of its glazed surface. The gaiety is indicated by the life of the ornament; the playful note of the sculptures in the bas-relief which are symbolical of the ancient, medieval, and modern dance; by the cabinet-like glass casing of the entrance opening; and most of all by the high color tone and texture of the terra cotta surface.

The fact that a large mass of masonry, held by two supports and reinforced by two columns near the two ends of the façade, is suspended over the entrance is not disturbing. Had stone or brick been used in any form, the actual length of the span would have been noticeable. In this case, with the glass casing, and the terra cotta incrustation above and around it, a light form of veneer has been obtained which leads the mind to accept the presence and sufficiency of the unseen steel supports.

Terra cotta has been ideally used in this façade, where it distinctly gives the impression of terre-cuite or faïence. In the patterned tile above the frame the joints are lost to view by a slight rustication, and the constructive appearance of brick or stone is avoided by continuous vertical joints. The columns at each side of the entrance have been made octagonal, with lines of ornament at the corners



DETAIL OF ENTABLATURE



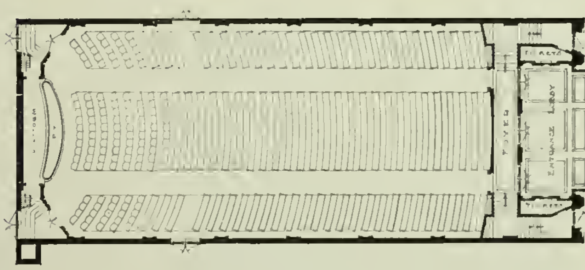
SECTION THROUGH ENTABLATURE

DETAIL OF SMALL WINDOW ARCHITRAVE

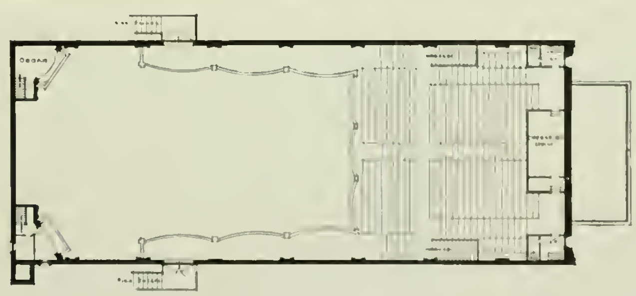
DETAIL OF CAPITAL ON PIERS

THE ORPHEUS THEATER, CHICAGO, ILL.

ARONER & SOMERS, ARCHITECTS



AUDITORIUM FLOOR PLAN



BALCONY FLOOR PLAN

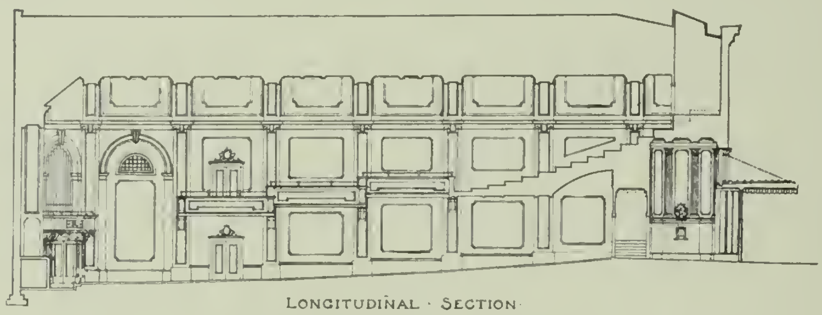
THE increasing popularity of the moving-picture theater would indicate that it supplies a needed form of entertainment and that it has come to stay. In plan it differs from the general theater, in that no stage or scenery is necessary, but in their stead a small platform, usually less than ten feet in width, is arranged in front of the screen on which the pictures are shown. Only one balcony is customary, and much less space is devoted to foyer and retiring rooms. This is a typical example of the plan as it has been developed. It fulfils all the requirements of this type of structure, both from the business management viewpoint and the legal, with the exception of the rear exits which are placed too far from the rear of the theater to facilitate a rapid exit in the case of an emergency, and the absence of an outside fireproof passageway leading to the principal street.

THE ORPHEUS THEATER, CHICAGO, ILL.

ARONER & SOMERS, ARCHITECTS

to indicate surface veneer. Precise lines and deep undercutting in the decorations — a distinctive quality of cut stonework — have not been striven for. The restrained projection of the cornice shows an attempt to avoid heavy angle iron supports, and all sculptural decoration has been wisely kept in low relief, similar to the relief on pottery.

It is unfortunate that economy forbade the use of polychrome terra cotta, except in the light warm gray of the bas-relief. What an opportunity to give warmth to the surface, similar to that of the Doge's Palace, and color to the ornament! There is a distinctive need for bright colors in southern climates where sunlight is strong and all color contrasts great; there is also a need for less intensity of color as the latitude becomes more northern, the sunlight less strong, and contrasts weaker. How successfully have McKim, Mead & White handled the terra-cotta colors in the Madison Avenue Presbyterian Church in New York City, keeping all surface colors low in tone, so as to interest the surface but not to interfere with the general color of the mass. Intense colors have been reserved for the background of projecting ornaments, as, for example, in the deep blue of the bell form, back of the acanthus leaves of the Corinthian capitals.



ORPHEUS THEATER, CHICAGO, ILL.
Aroner & Somers, Architects.

The economic feature of terra cotta in decorative work, for which the same model may be used repeatedly, is a strong reason for its use in the façades of moving picture theaters. Plaster and stucco are not durable, and stone is too expensive, whereas terra cotta can so easily be modeled, that it lends itself to theatrical expression at small cost and decorative effect. Another valuable asset in terra cotta work is the ease with which it can be cleaned. This is especially important in Chicago, where the atmosphere is so charged with dirt which settles on the exteriors of buildings that a new structure becomes dingy in a very short time. A glazed terra cotta surface, however, looks just as fresh and bright after cleaning as when new.

Just what will develop in the future architecture of the moving picture theater is an interesting question for conjecture. No doubt the type presented here will have an influence on later designs, and, like all pioneer work, may be improved upon. Its Chicago-esque decoration has not been commented upon, as this is a matter for each architect to form his own opinion.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE interest in town planning which is being made more manifest in this country each successive year, and which is brought to our particular attention by letters from interested readers in all parts of the country, makes the presentation in this issue of Gidea Park, the newest English garden suburb, of particular timeliness.

In the past year many American cities, notably Philadelphia, Boston, Newark, and Jersey City, have appointed investigating committees to study the conditions under which the poorer inhabitants are housed, and while the reports which these committees have prepared in all cases state the existing conditions at great length and with helpful criticism, there is little contained in them to suggest emphatic remedial measures or improved methods for bringing about more satisfactory conditions. It is in this respect that a study of this English suburb can be most helpful, for it provides a visible proof of the practical application of principles which are universally recognized as sound and applicable to conditions in a country having democratic ideals. Many of the reform movements such as municipal housing, co-operative ownership, etc., which have proved successful in Europe cannot be applied in America with equally effective results because of the varied nationalities and circumstances of the working people of this country. It, however, remains one of the serious problems which confront our growing cities and towns, and one in which thoughtful study and research will have a noticeable effect on the physical and moral life of our large communities.

The growth of most of our American cities is the result of real estate enterprise, which has for its motive the sale of building lots without any thought of the future of the community which its activities are establishing. The operations of the average speculative builder and real estate promoter have filled whole areas of our cities with ugly and inflammable houses which only recently, from their great number and the impending fire peril, have come to the notice of those civic officials who are sufficiently public-spirited to place the welfare of the community as a whole above the financial interests of large and politically powerful property holders, and to promote legislation which will correct this evil.

In the suburban areas the remedy for this situation is collective planning, which will permit houses to be grouped in an architectural fashion and which will remove the ugly proportions now imposed on them by the hard and fast current system of lot sizes. If real estate builders and even groups of friendly individuals who are building in the suburbs can be made to realize the more pleasing effects, as well as greater economy in building operations, to be derived from giving one architect the commission to design a group of houses, it will undoubtedly be effective in interesting more of our most able architects in this really important social problem.

IT is not so difficult, according to Mr. Collins, writing upon "Symbolism in Architecture," to determine the symbolic meaning of an animal carved by a medieval church builder as "to find out for certain what animals the carvings before us represent." This plaint casts a less denigrating reflection on the realism of the old wood and stone cutters than would at first appear. They not only had the conventionalizing genius that made it easy for them to twist ape and lion, fox and boar, into shapes suitable to the places designed for ornament, but they had the old unexacting credulity that believed in things by their names, and when no model for a dragon or a centaur was forthcoming, they created an animal in the image of their imagination. Thus on the hoary doors and arches of Winchester and Ely, of Hereford, Canterbury, Southfleet, and Ampney, are found such strange companions as hyena, camel, whale, griffin, sagittarius, dove, and unicorn, each with a message to the superstitious mind and a bit of folklore for the historian. "The early naturalists, whether Greek, Roman, or Alexandrian, were not scientific," says the author.

Much of the symbolism refers to attributes of the animals depicted which are unfamiliar to the readers of to-day. We all, for example, know the type of the salamander on the side of its fire-resisting properties and the parallel of the virtuous person who passes through the fires of temptation and is not consumed; but we hear less often of that hateful salamander habit of infecting pleasant fruits with poison so that all who eat them die. The second attribute completes the pretty picture of selfish malice, providing a type that saves itself and destroys others.

Mr. Collins considers his little book as an aid to the popularization of a pleasant study, and in his concluding chapter suggests that his readers equip themselves with the proper kind of camera, one equipped with good lenses of different focal lengths, and pursue the subject further. It is an idea to tempt the summer wanderer in the cathedral towns.

WHAT can be gained from a scientific treatment of art? It has been claimed that we have arrived at a time when some science or reasoning should be infused into architecture and into everything that we call "art." Quotations from several writers on architecture tend to show that there has been little written which is of much help in answering the question.

The history of architecture is the history of the world. — *A. W. Pugin.*

The influence of the causes which act most powerfully on the genius of the arts, after the climate, are the manners, religion, and the changes to which a nation is subject in its political state during the course of ages. — *Seroux D'Agincourt.*

Unless art is the expression of the system it should illustrate, it loses at once its greatest claim on admiration and fails to awaken any feelings of sympathy in the heart of the spectator. — *A. W. Pugin.*

Architecture is the art which so disposes and adorns the edifices raised by man, for whatsoever uses, that the sight of them contributes to his mental health, power, and pleasure.

Architecture concerns itself only with those characters of an edifice which are above and beyond its common uses. — *John Ruskin.*

Architecture depends on fitness, arrangement, and on proportion, uniformity, consistency, and economy. The perfection of all works depends on their fitness to answer the need proposed, and on principles resulting from a consideration of Nature herself; and the ancients approved only those which by strict analogy were borne out by the appearance of utility. — *Vitruvius.*

By means of design we inscribe, or ought to inscribe, upon every object of which we determine the form, all essential particulars concerning its material, its method of construction, and its uses. — *M. D. Wyatt.*

PLATE DESCRIPTION.

Plates 145, 146. The problem of designing a building suitable for the activities of the Young Women's Christian Association is comparatively new in the field of architecture, and consequently calls for special study on the part of the designer, without the aid of many examples to draw upon for precedent or inspiration. The growth of the organization has been so rapid and the various activities which it embraces have become so numerous that many of the buildings now occupied are not adapted to its needs.

The main object of the association is to provide in its buildings facilities for religious training, athletic exercises, education along practical or technical lines and social diversion. These various uses to which the building is subjected suggest a design of the character of a club, with its possibilities for comfortable life. The adapted Italian Renaissance style in which the building is designed creates this impression and lends a certain dignity to the façade, at the same time not sacrificing any appearance of domesticity which such a building should express.

The large amount of space required for athletic purposes, comprising gymnasium, swimming pool, and individual dressing rooms, makes an economical division of the floor area necessary. It is interesting to note on the basement plan the manner in which a great deal of space has been saved by the grouping of four dressing rooms about a single shower bath.

The building is thoroughly fireproof, the structural parts being of reinforced concrete and the facing material of rough mat bricks in an ash-gray color, with the architraves, belt courses, etc., in architectural terra cotta of the same shade. The floors throughout the interior are either of tile, marble mosaic, or composition. The flat roof of the main building is floored with promenade tile to provide recreation space in warm weather.

The cost of the building, including all equipment, was $246,683, or about 26 cents per cubic foot.

Plates 147, 148. This is a sturdy design in red brick and stone after the style of early Colonial buildings. It is a type of building common to all New England towns, and exceptionally capable of meeting the many different demands made upon it.

The building contains the town offices, a town hall, a banquet hall with kitchen, serving rooms, coat rooms, smoking room, etc., in connection with it; also a large room for the use of the local Grand Army Post. The main hall has a seating capacity of one thousand, with an additional hundred in the gallery, and is equipped with a stage and the necessary dressing rooms.

The exterior walls are constructed of red water-struck brick, with cast stone trimmings laid up with wide raked joints, the mortar below the water table colored red and that for the remainder of the walls white. The roof is of black slate and surmounted by a copper-covered cupola.

The cost of the building, including all equipment and furniture, was about $82,000.

Plates 152, 153. The Latrobe apartment house is situated in close proximity to a number of the fine old homes in Baltimore, and with its reserved and pleasing façades designed in an adaptation of the Florentine Renaissance it fits in well with its surroundings. It is a distinct relief to observe an apartment where fanciful ornament has been disposed on the façade with a restrained hand. The detail shows evidence of careful study in regard to scale and form, with the single exception of the entrance features, which seem to be dwarfed by the bold treatment of the first and second story windows. The exterior walls are of gray wire-cut brick, very soft and pleasing in tone, with the architraves, cornice, and decorative features in a contrasting light shade of terra cotta.

Plates 154, 155, 156. This residence is a particularly good example of the desirability of designing both house and surroundings together, so that they may appear related to each other, and that the gardens and other open-air features are in intimate connection with the living rooms.

The first floor plan is admirably thought out and makes a very interesting arrangement of rooms; the three main rooms being spacious, well proportioned, and well located, in connection with each other and with the outdoor rooms on the terrace. The servants' quarters and the kitchen are entirely confined to a separate wing — the separation between which and the living portion of the house is as complete as it is possible to conceive.

The interiors designed by Mr. Shaw are characterized by a breadth of treatment and a vigorous style that, while not following any specific period of decoration or proclaiming itself as an entirely original idea of the architect, gives them an air of decided individuality, but withal real architectural appropriateness.

The two interiors selected to illustrate this house prove this point clearly and in addition show evidence of particularly pleasing plaster work which Mr. Shaw often uses with much effect in an informal way. The pattern used on the vaulted ceiling of the hall is perhaps unfortunate in the way it works out at the ribs of the vault, but the general effect is of fine decorative value.

Plate 157. This is undoubtedly as simple an expression of residence architecture as can be had. The design can hardly be said to be derived from any established precedent, but it is a simple, straightforward expression of the plan, carried out without any special attempt at symmetry, yet having a balance that makes it a restful composition. The materials used on the exterior walls are dark red brick with cast stone trimmings. All architectural detail has been confined to the main entrance, which has an unusual charm, obtained by good use of simple materials. The living porch at the end, however, seems somewhat foreign to the house, caused possibly by the awkward relation between cornice and supports.

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PLATE ILLVSTRATIONS

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CHURCH OF THE KAPNIKAREA, ATHENS, GREECE

Typical of the scores of individual shrines built at Athens from the ninth to the thirteenth centuries. Façades of common brick and Peiraic yellow sandstone.

THE BRICKBVILDER

NOVEMBER, 1913

VOLVME XXII. NVMBER 11.

A Discussion of the Design and Purpose of Mouldings.

ACCOMPANIED BY A SELECTION OF REPRODUCTIONS FROM OLD HANDBOOKS USED BY COLONIAL BUILDERS.

BY AYMAR EMBURY, II.

FOR the purposes of this article only mouldings used in styles of architecture which employ the orders will be discussed, since the inclusion of Gothic and perhaps other styles would necessarily expand the article far beyond the limits assigned, and one might add that the variations of Classic forms of various periods of the past open a wide enough field for any one article.

At the outset one finds that those styles which we are accustomed to designate as "pure" or "simple" contain much more complicated mouldings than those of the more florid styles. I suppose this is natural enough, since a style which depends upon decoration of surfaces for its interest does not require the intelligent consideration of detail which is demanded in a building where the forms depend upon their naked proportions for effect. Thus we find unusual and interesting curves in Greek mouldings where the Romans used curves which could be formed to a radius, and we find in the American Colonial, mouldings of greatly superior interest to any of the French school. Of course a surface covered with plastic decoration presents a variety of shadows which can only be bounded and limited by the shadows cast from bold and simple mouldings; delicate play of light and shadow, and refinement of mouldings, would be more or less wasted, whereas with plain surfaces and simpler orders, the enrichment of the shadows by minute gradations and unexpected blacks is the only method of relief and of providing sympathetic interest. One other reason occurs to mind as being the possible cause of superiority of interest in the mouldings of the Greek and Colonial architects over those of the rest of the designers in Classic forms, and that is, in both cases the design was more or less spontaneous and not fixed and regulated by example.

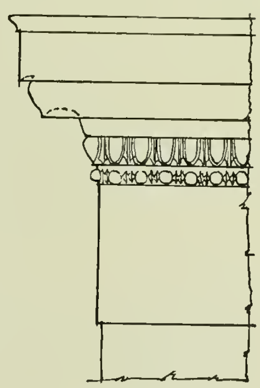


FIG. I.

Greek Pilaster Cap from the Parthenon.

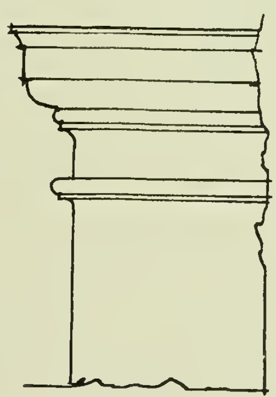


FIG. II.

Roman Pilaster Cap from Vignola, after Vitruvius.

When Vitruvius produced his work on the orders he probably did a very useful thing, but it is also largely due to the canons that he established that design came to be more or less of a formula where minute differences in proportion were accepted as evidences of originality, instead of really permitting free play to the imaginations of the designers. The Greeks, of course, had no such formulæ and we find an extremely wide variation between the orders of the various buildings; some of them, perhaps, very bad, but none commonplace, while the Roman work approaches much more nearly a standard of proportions.

From the time of the Renaissance until to-day, with some minor exceptions, including the designers of the American Colonial work, a not dissimilar condition has existed; we have Vignola's excellent book, which treats the orders in the same way that the manufacturers of office partitions advertise their products, "made by the mile, sold by the foot, suitable to all locations." During the Colonial period of this country, the freedom from tradition, or, if you like, the ignorance of the designers, compelled them to use their brains and in consequence they designed with a freshness and virility which has not been since equaled, and which, if we stick to Vignola, will not probably be equaled very soon. Let us compare some specific instances of the various schools.

The section of an impost cap in the Parthenon does not contain a moulding which could possibly be formed with a compass, and the succession of mouldings is curious and not obviously desirable; yet the play of light and shadow on the surfaces makes it as interesting as it is unusual (Fig. I). Compare this with the Roman Doric pilaster cap; this has no undercuts, and each moulding is formed to a radius. We perceive at once that this (Fig. II) is good architecture; in fact, we know it is good architecture because we were brought up on it; it is from Vignola. It is very likely that if this were the only capital of its kind in the world it might even be interesting architecture, but eleven million pilasters in all parts of the civilized world, on all sizes, shapes, and kinds of buildings and in all sorts of materials, have exactly the same succession of mouldings and the same proportion. The Parthenon cap is the more interesting, not only because it was unusual, but because it was designed to fit a particular place, under particular lighting conditions and for a particular material.

Of course it was not uncommon in Renaissance times to find series of mouldings which had strong personalities of their own, but these were usually more or less ignorant copies (not adaptations) of Classic architecture that were gotten out of books, flavored with reminiscences of Gothic. It was interesting design; but not very often of the quality likely to convince one that it pays to be different. Of such a type is the dormer window of the Choir House at Salisbury (Fig. III). It is like a good deal of English work, extremely picturesque, but perhaps not very well studied; and how much work there is that is not well studied! I believe that most draftsmen, and a good many architects, including myself, do not go about the study of mouldings in the correct manner; we have formed the habit of studying them a certain way, and we keep on in spite of a moral conviction that it is not the right way. We study them in section with the chief end of getting an agreeable succession of curves and plain surfaces, and with special tenderness for making the curves themselves beautiful. Now this method may apply very well to the design of Art Nouveau surface treatment, but it is certainly not the correct way in which to study a cornice, and if we do get good cornices it is only because either we or those from whom we copy have by experiment found that a certain projection and scale of detail will arrive at somewhere near the right result — but only somewhere near.

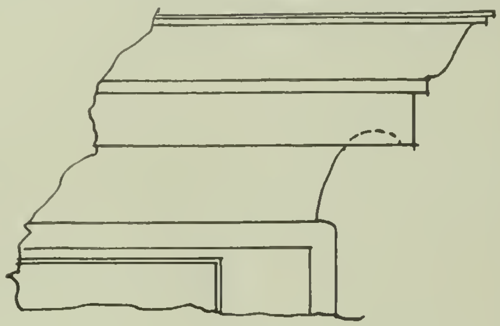


FIG. III.
English Dormer Cornice. The Choir House at Salisbury, from "The Practical Exemplar of Architecture."

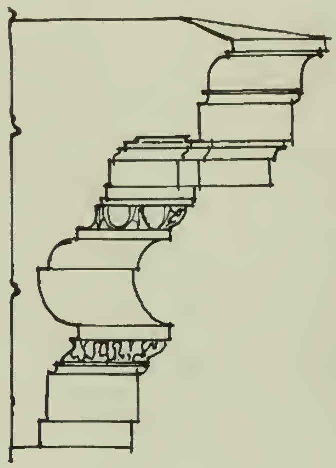


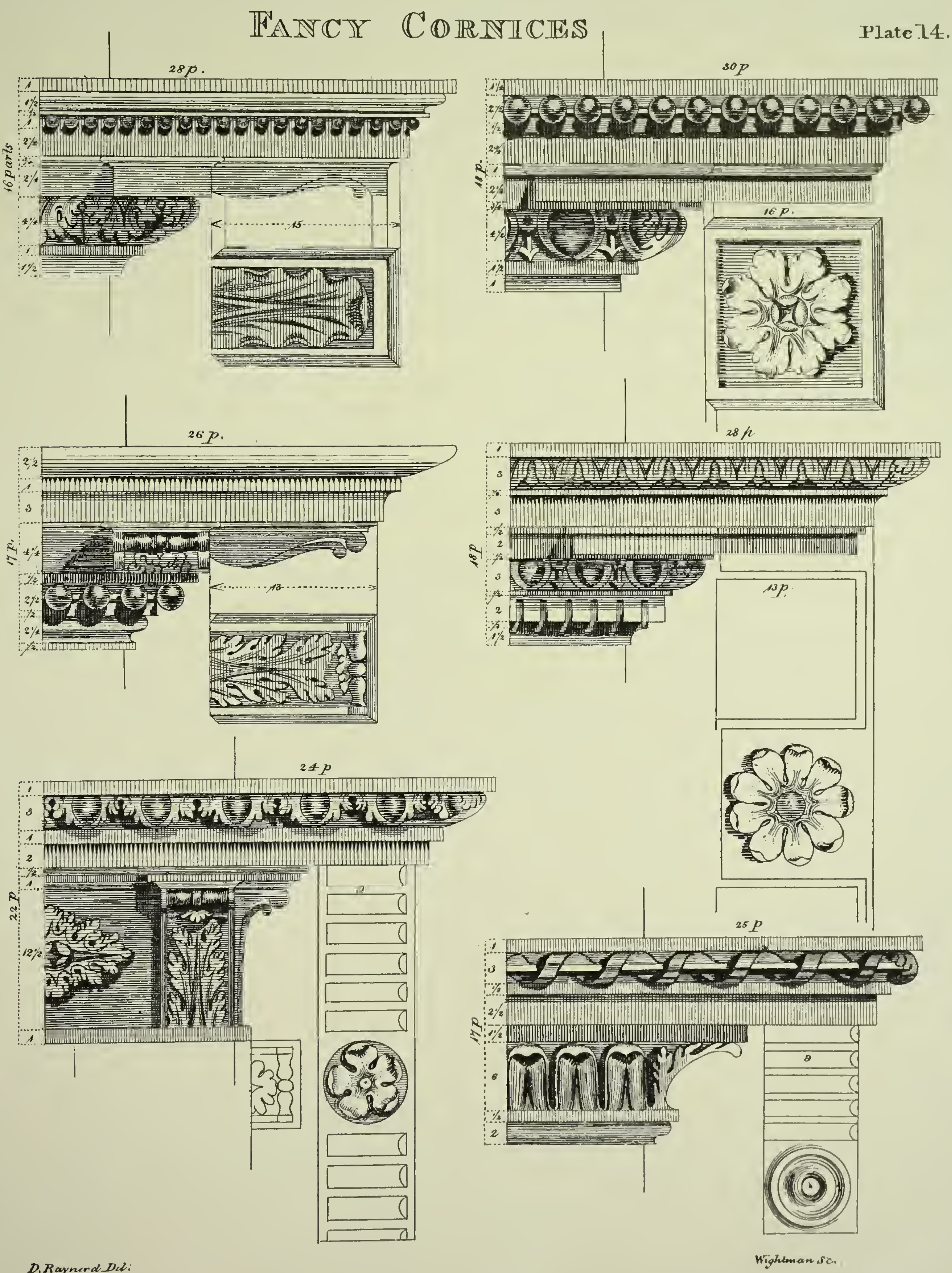
FIG. IV.
Entablature for Exterior Use. McKim, Mead & White, Architects. From Snyder's "Building Details."

Mouldings are seen in only two ways: one in which it is not the profile that counts but the shadows of the surfaces and the shades caused by their arrises; the other where they turn a corner and we see them in profile. This profile is *not* the profile we have studied with so much care, but is a diagonal of that profile and presents a very different succession of curves; and neither of these two ways of seeing a series of mouldings or a cornice is as a rule correctly considered. I have seen a draftsman, a tremendously clever and highly paid man too, spend three days in studying the cima of a cornice on one of the New York public buildings and no one of the several hundred lines that he drew was different in height or projection, differing only in the curve; and certainly two and a half days of that study was wasted. He occasionally did rub on some shadows, but he always considered these shadows as being cast on the diagonal of a cube, a condition which would, of course, on some buildings sometimes occur, but he did not take into consideration the fact that the façade he was studying faced north, and only the brief returns could ever have such shadows. This particular cornice should have been studied for its profiles, and, if for shadows at all, for those thrown by reflected light. I do not think either that this is an extreme case, but a very ordinary illustration of the way we work in design, because we are so tied up with the formulæ from Vignola we have been trained in. I have observed also that not a few men will go about the design of an interior cornice in the same manner that they would for one to be used on the exterior of a building.

FIG. V.
Interior Entablature.
McKim, Mead & White, Architects.

Now as exterior cornices in their more or less standardized form represent a sort of consensus of opinion as to the succession of curves and flat surfaces which produce agreeable shadows with the light from *above* and thereby form a pleasing termination to a motive, it is impossible that the same combination of mouldings would form an equally successful termination to the wall when lighted from below. Some of our architects have been quick to recognize this, while others have not. As good examples, compare the porch cornice for the entablature of a city house in West 54th street (Fig. IV), designed by McKim, Mead & White, with the interior cornice of the Charles Dana Gibson house (Fig. V) by the same architects, in both of which material and position have been duly considered. The exterior cornice is executed in marble so that sharp mouldings and undercuts are practicable, but as the intersections of this cornice form an exterior angle the cima is snubbed and the projection of the corona very greatly reduced; the cornice has been designed for its diagonal profile, and in place of a single deep shadow from the corona we have a variety of smaller and very interesting shadows cast by the extremely rich bed mouldings, only one of which is decorated. In the interior cornice the depth of the corona from the ceiling is reduced to the utmost limit of what is possible; the cima is extended far beyond the usual projection since it no longer casts a shadow but becomes an intermediate member between the ceiling and the cornice. The soffit is ornamented with a sort of Greek fret; it is no longer a soffit, but a decorative band around the ceiling, and certain of the mouldings are accentuated to give not shadows, but high lights.

One of the most interesting and inspiring books that I have come across in a long time is one called "The American Builders' Companion; or a New System of Architecture Particularly Adapted to the Present Style of Building," by Asher Benjamin, an architect of the days just succeeding the Revolution. He was successful, not only as a designer but as a publisher of a



FROM ASHER BENJAMIN'S "AMERICAN BUILDERS' COMPANION"
ILLUSTRATING INTERIOR CORNICES

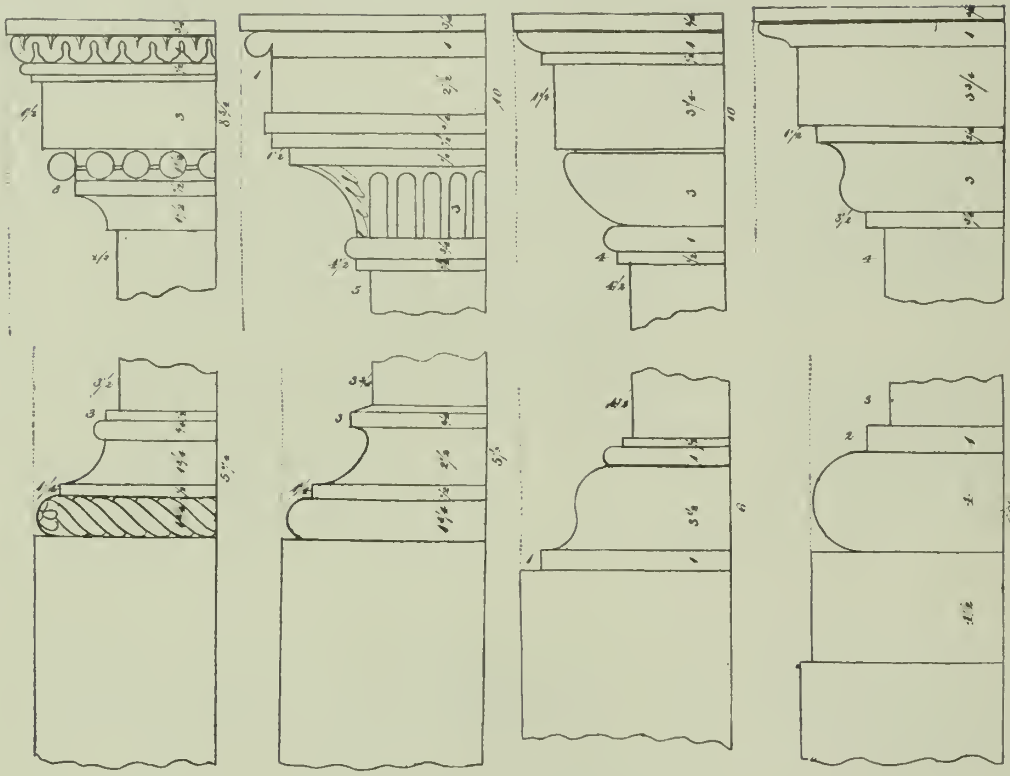


FIG. VI.
Pilaster Capitals and Bases. From Asher Benjamin's "American Builders' Companion."

series of very excellent handbooks which instructed the carpenters of that day how to go about their design, and one finds in his books many of the most interesting mouldings of what we call Colonial architecture; but what is especially useful to us to-day is the very wide departure from Classic forms which he shows, in spite of the fact that he was familiar with Palladio's orders, and includes a series of plates (Fig. VI), following them in a general way, except that he makes his columns — Doric, Ionic, and Corinthian — ten, eleven, and twelve diameters high, respectively, instead of the conventional eight, nine, and ten. The entablatures, however, follow quite closely the Classic variation of parts, but when in the body of his book he comes to illustrate series of cornices (Figs. VII and IX) or architrave mouldings (Fig. VIII) suitable for every-day use they have a very different air. One finds in his interior cornices the same theory expressed which McKim, Mead & White have used in the cornice in the Gibson house; the cima no longer appears as such, and the soffit of the cornice is widely extended and decorated to form a band around the ceiling rather than a device for casting shadows. The exterior cornices also are very far from being Classic, but those who have seen some of the lovely old buildings in Litchfield, Conn., Greenfield, Mass., and Bennington, Vt., and have recognized in them Asher Benjamin's motives, realize that one can form an agreeable termination to a building without adhering very closely to Classic formulæ.

It will be argued that these varied and light mouldings are adapted to wooden architecture only and unsuitable to monumental buildings, but this is something which can hardly be decided off-hand since, in this country at least, they have never been tried; on the other hand, the Greek is the most monumental architecture which has ever been devised, and in that we find the same freedom of treatment of cornice and moulded members that exists in the Colonial.

The question of material of which cornices are composed also will be found to have a very great effect upon the design; the terrific expense of cutting granite makes it practically impossible to use either complicated or under-

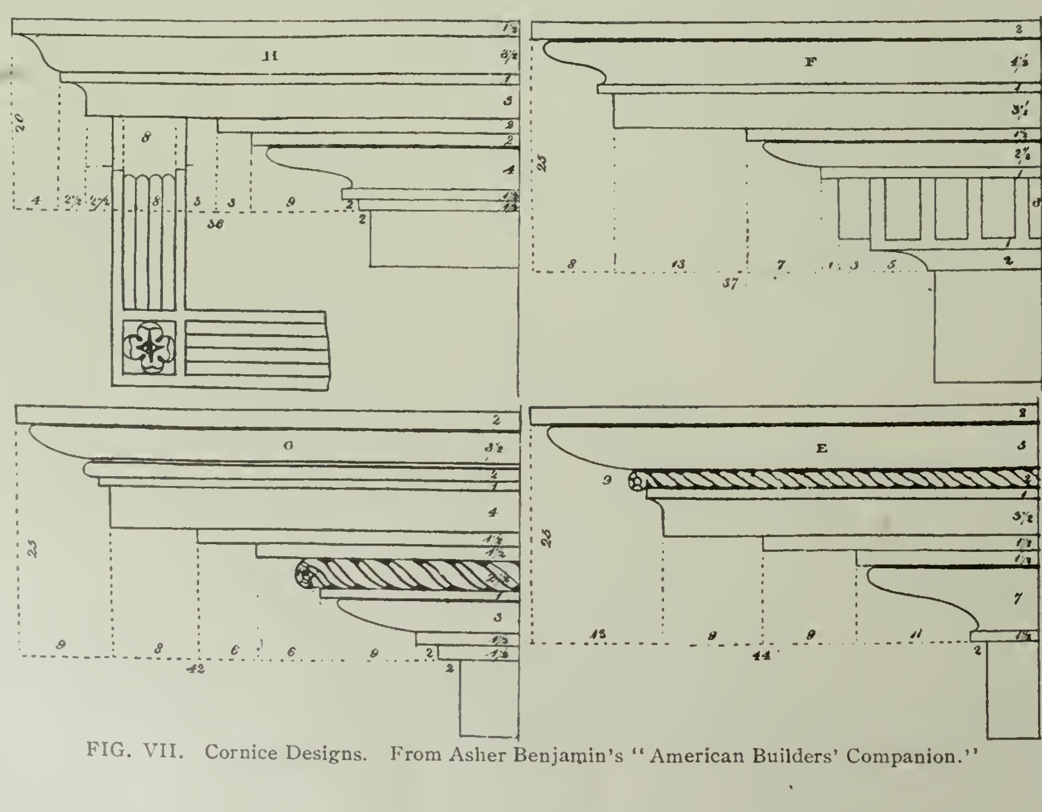


FIG. VII. Cornice Designs. From Asher Benjamin's "American Builders' Companion."

cut mouldings in this material. In marble, however, considerable variety can be obtained ; the same thing is to some extent the case in limestone, although the material is not quite as resistant as marble, but when we come to the more workable materials, such as wood and terra cotta, there seems to be no reason in the world for sticking to stereotyped architecture except a lack of courage and ability to design, and also the human instinct to follow along well-trodden paths.

Without wishing to express an opinion on the merits of either piece of design, I might say that a comparison of the two very well-known buildings, the New York Customs House, by Cass Gilbert, and the State Educational Building, by Palmer, Hornbostel & Jones, illustrates very well how the two materials should be used and that both methods will adequately crown a monumental order. Mr. Gilbert in the Customs House has a granite cornice which contains no angle of less than 90 degrees between surfaces, and in which the projections are reduced to the utmost to make cutting as simple as possible. In the State Educational Building Mr. Hornbostel, with characteristic daring, has designed what is perhaps the most original example of cornice treatment in modern times. He has certainly shown how flexible the cornice of a building is and how wide a departure may be made from traditional design without distortion of proportion.

I have spoken at some length of cornices, because of all mouldings they are the most important and the least intelligently used ; there are very few of us who are able to think otherwise than in terms of Vignola.

Of the other mouldings on the exterior of buildings,

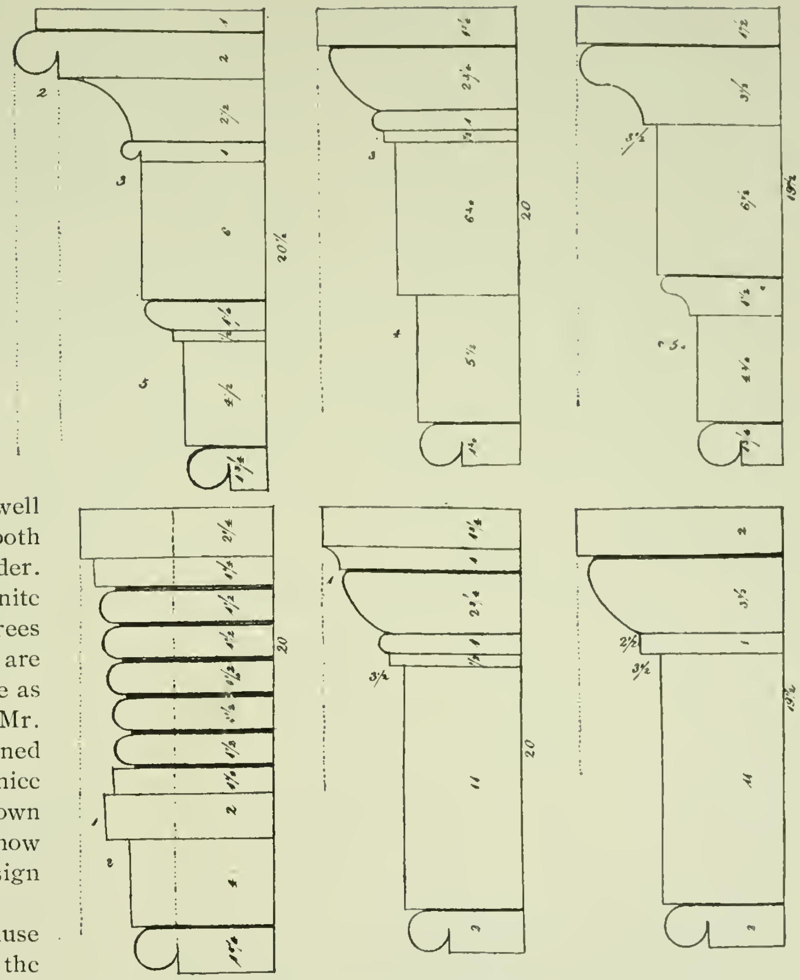


FIG. VIII.

Architrave Mouldings. From Asher Benjamin's "American Builders' Companion."

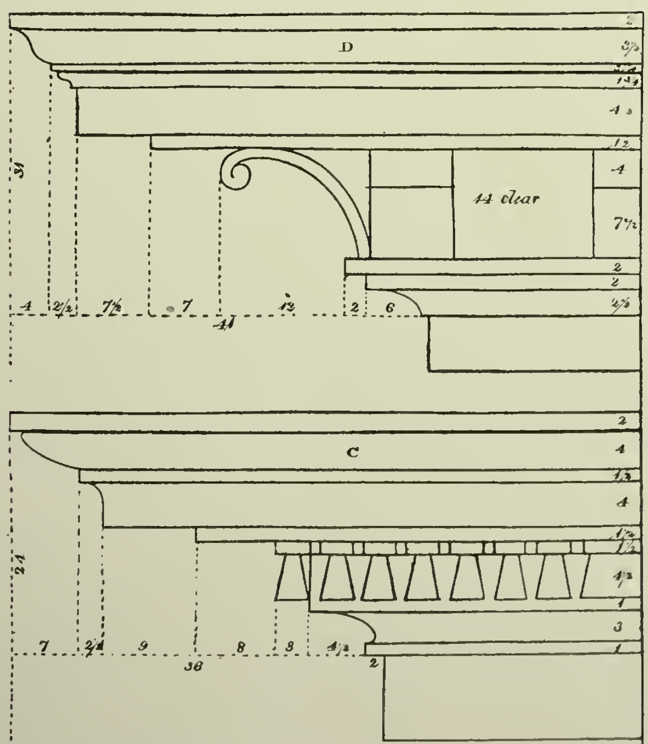
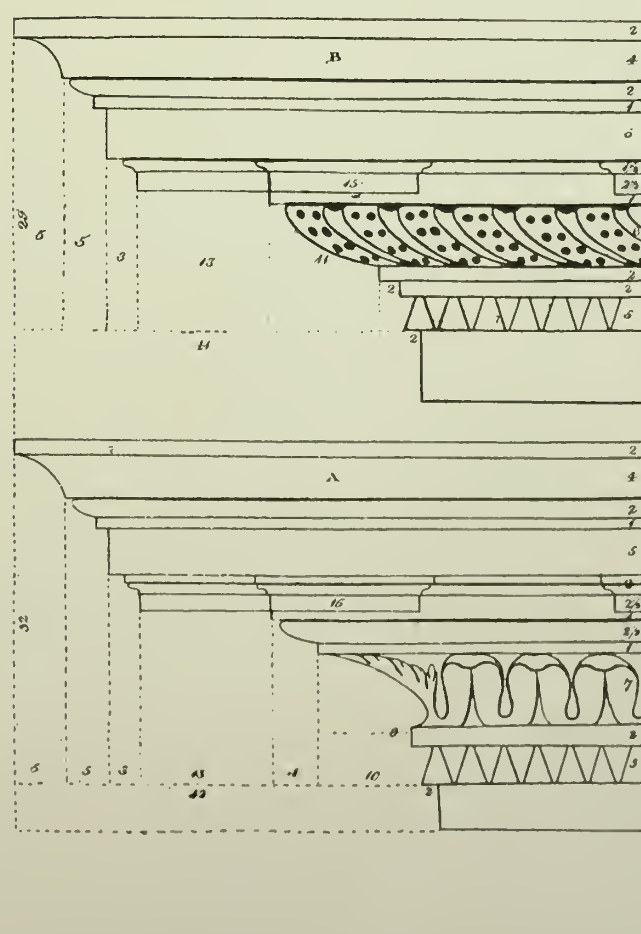


FIG. IX.

Cornice Designs. From Asher Benjamin's "American Builders' Companion."



the two most important are architrave mouldings and belt courses, and we find in most current work the same banal adaptation of the easiest thing rather than thoughtful and well-considered study. Of course if one gets a belt course approximately in scale with a façade, the result is not going to be very bad, but an approximation of correctness should not be satisfactory to a conscientious designer.

Turning again to McKim, Mead & White, we find that in the Gorham Building (Fig. XI) they have adapted a belt course, or sort of cornice, around the sixth story which is of unusually good character. Its firmness and delicacy at once strengthen and refine the lines of the building, and while the designers have manifestly made concessions to the material in which they have worked, at the same time the moulding was designed to fit its particular position and particular lighting, and was not the belt course of commerce which we find so often used, as the juxtaposition of dentil moulds and cima prove. A moulding of this kind is obviously required on a building as plain and unornamented as the Gorham Building, while, on the other hand, the very banal belt course or impost mould illustrated from Cesar Daly (Fig. X) is plenty good enough for its position, cut over by the heavily scaled console and adjoining rusticated stonework. Real refinement of moulding would be lost when contrasted with the heavy shadows and deep cuttings of the console and the sharp lines of the rustication; but here in this country even the Frenchiest of us prefer our design plainer than the French, and when we leave off the consoles and flatten the rustication, we are too apt to forget that the belt courses which were good enough under the former conditions become really stupid when the decoration is removed.

FIG. X.
Impost Mould. From "Motifs Historiques" by Cesar Daly.

In designing window and door architraves the same methods are usually applied for both interior and exterior work, whereas the conditions of use are markedly different. I have often seen a draftsman throw his section into isometric projection, black on his shadows, and assume that the result gives him something like a fair idea of the way the architrave would appear. As a matter of fact, on interior architraves in daylight the shadows are thrown exactly in the opposite direction from the one usually assumed, and he has high lights where he has placed shadows, and no shadows at all, only shades.

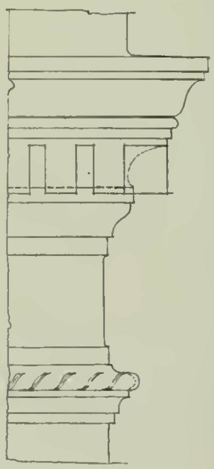


FIG. XI.
Belt Course on Gorham Building, McKim, Mead & White, Architects. From Snyder's "Building Details."

If this method of designing architraves does not more often show unhappy results it is because window curtains often cover the trim and not because the mouldings themselves are well designed. Still one other thing which must be thought of as a factor in designing, and that is the settling of dust or dirt on upper surfaces, giving a shadow where one expects a high light; and this condition of affairs (while I have often heard architects speak of it) has only been considered as a factor to be reckoned with, so far as I know, by a sculptor, Mr. Tonetti, who has for this very reason distorted real forms in order that they might appear well. One often notices that the base boards around a room, especially when painted white, show black shadows where the designer expected high lights, owing to the settlement of dust perhaps even before the paint was dry, so that the dark line is ineradicable. Of course all architectural design should be a drawing on paper, not of forms which are agreeable in two dimensions, but which will appear properly in three; and I have found that the constant tendency of draftsmen, and of the architects themselves, speaking from my own experience, both as a draftsman and as head of an office, is that the paper form in evidence before one is liable to take precedence over a form which would, when executed, be the better.

Take, for example, the well-known reversed cima so frequently used in door and window casings; the form which is more agreeable to the eye is that shown in Fig. XII, but our Colonial ancestors used that shown in Fig. XIII, which in spite of a somewhat broken and humpbacked appearance executes much better since in the first case the point of shade is thrown far down on the cima, and in the other very high up; and the reason for the non-Colonial appearance of what to the architect appears to have been a carefully-designed Colonial house is the fact that the mouldings themselves are of the usual type and not those employed by the Colonial designers.

I have chosen the Colonial school for purposes of comparison in so much of this discussion because it is a type with which I am most familiar, and also because it is a style pre-eminently of unusual and lovely mouldings; but the deductions drawn from work of this school apply with equal force to all work; the moulding itself should never be considered, but its purpose and position.

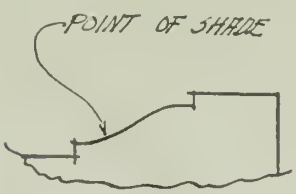


FIG. XII.
The Modern Cima.

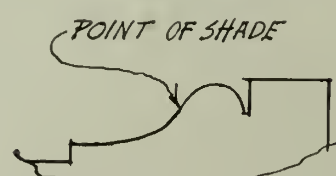


FIG. XIII.
A Colonial Cima.

The Lighting of Public and Semi-Public Buildings.

THIRD PAPER.

ACCOMPANIED BY A SERIES OF ILLUSTRATIONS SHOWING SPECIFIC LIGHTING INSTALLATIONS.

BY L. B. MARKS,
Consulting Illuminating Engineer, New York City.

MUSEUMS AND ART GALLERIES. In museums and art galleries a well diffused light, irrespective of quantity, often falls short of producing satisfactory results in illumination unless the directive feature of the lighting is carefully planned. For example, statues that are evenly illuminated from all directions lose form and detail, whereas if the illumination is planned to give suitable light and shade on the objects in space the latter are seen in the proper perspective and do not appear "flat." For this reason lighting by skylights exclusively is not desirable in such portions of a museum as are devoted to the exhibition of statuary, a side light being indispensable in such cases to give proper light and shade on the objects.

In art galleries the directive value of the light is likewise of great importance. Sufficiency and thorough diffusion of the light will not of themselves give the desired results in illumination. The light sources must be so disposed that the observer will receive a minimum of specular reflection from the paintings or pictures viewed. As a rule this result can best be accomplished by limiting the area of the lighting source to a band of light situated well above and a few feet in front of the pictures to be viewed. Such a band of light should preferably consist either of a border of diffusing glass plates behind which are located individual lamps backed by reflectors, or a ceiling band indirectly illuminated, or a combination of both these methods.

FIG. VII shows the method of lighting the galleries of the Brooklyn Museum of Arts and Sciences, by individual drop lights, each containing a 40-watt tungsten lamp, backed by a steel reflector.

FIG. VII. BROOKLYN MUSEUM OF ARTS AND SCIENCES, BROOKLYN, N. Y.

FIG. VIII shows a gas lighting installation in the Pennsylvania Museum and School of Industrial Art. Welsbach reflex burners are used in this installation, 45 degree angle shades being provided for the burners to illuminate the models at the sides of the room. For the illumination of the easels in the center of the room, reflex burners provided with steel enameled concentrating reflectors are used. By-pass individual control of the lamps is provided.

FIG. VIII. GAS LIGHTING INSTALLATION IN THE PENNSYLVANIA MUSEUM AND SCHOOL OF INDUSTRIAL ART, PHILADELPHIA, PA.

FIG. IX. NIGHT VIEW, SHOWING SEMI-INDIRECT LIGHTING IN PHILADELPHIA ART CLUB, PHILADELPHIA, PA.

THIS illustration is a night view of the Philadelphia Art Club, showing semi-indirect illumination by diffused and directed light. The lamps are enclosed in diffusing glassware and the illumination is derived from a band of light, extending around the room within a few feet of the walls. To make such an installation most effective, an opaque screen should be dropped from the inner edge of the reflectors, sufficient in depth to screen the eye of the observer from the direct illumination of the light diffusers.

LIBRARIES AND SCHOOLS.

THE design of the illumination of a public library involves considerations which are quite unlike those that ordinarily confront the illuminating engineer, and are in many respects more difficult to meet than in almost any other class of buildings. Very often economy of operation is a governing factor in the design of library illumination. In planning the lighting installations of the Carnegie branch libraries which are described herein, economy of operation was of perhaps more than usual importance as the libraries purchased electric current for lighting from the public service company at the retail rate. The aim of the design of lighting in these libraries was to secure:

(1) Sufficient illumination on the reading tables and bookshelves to meet the demands of a wide class of readers of various ages and conditions of eyesight, taking into account the fine print in some of the books and the difficulty of reading titles of books in position on the shelves. Some of the books are worn by frequent handling and the titles become more or less obscured.

(2) Low intrinsic brightness of light sources and freedom from glare, and so far as possible removal of lights from the ordinary field of vision.

(3) Sufficient illumination for the library staff to oversee the entire floor.

(4) Sufficient illumination to provide a moderate reading light in all parts of the room; to admit of the relocation or addition of furniture, such as portable magazine filing racks, etc.

(5) Moderate cost of installation.

(6) Economy of operation. This must take into account not only the system of illumination and type of lamps used, but also the switching arrangements.

(7) Simplicity in construction and convenience in operation. This must take into account the character of help in local charge of the equipment.

(8) Esthetic design of fixtures, and attractive appearance of the reading rooms at night.

FIG. X. INDIRECT LIGHTING INSTALLATION IN MILWAUKEE PUBLIC LIBRARY, MILWAUKEE, WIS.

Dimensions	*30 x 58 ft. (central area) = 1,710 sq. ft.*
Outlets	*3*
Watts, 3,600	*Watts per square foot, 2.06*
Average Foot-candles	*5.0*
Ceiling and Wall Tint	*Light Cream*

(NOTE. — Balcony area, 2,912 sq. ft., 16 fixtures. 1 400-watt lamp per fixture. Balcony lights add to central area lights, and central area lights add to balcony lights.

Central area units are wired on 2 circuits of 600 watts each. With half of the lights on the measured illumination was found to be twenty-five per cent less than with all lights on, or a little less than 4 foot candles, which is ample illumination.)

FIG. XI. CIRCULATING DEPARTMENT.

FIG. XII. ROOF READING ROOM.

CARNEGIE LIBRARY BUILDING, NEW YORK CITY.

THE above illustrations are taken from a paper on the "Design of the Illumination of the New York City Carnegie Libraries," presented by the author at a meeting of the Illuminating Engineering Society, in Philadelphia, October, 1908. In this installation, the scheme of lighting was to provide a moderate general illumination, supplemented by local lighting where required. The installation was completed before the days of the commercial tungsten lamp, but the design contemplated the future substitution of tungsten lamps for the carbon filament lamps in use.*

Fig. XI shows the circulating department and reference room of one of the Carnegie Library Buildings. In the front of the room is the circulating department, in the middle the application and delivery desk, and in the rear portion the free standing book stacks and reference room. These departments are separated from each other by low rails or low book-shelves. Along the walls of the room are bookcases about seven feet high. The walls are cream color and the ceiling white. The public has access to all of the book-shelves. In the entrance hall are located two exhibition racks of the swing frame type. The switches for controlling the lights are in charge of the librarian. The lamps for localized illumination are connected separately from those for general illumination and are switched in when necessary to supplement the general lighting. The local lamps on low book-shelves are mounted on swinging brackets and are automatically cut out of circuit when the lamps are out of use.

Illumination data for this room are as follows:

Area	*2,950 sq. ft.*
Watts, General Illumination (Carbon Filament Lamps)	*2,316*
Watts, Localized Illumination (Carbon Filament Lamps)	*1,171*
Watts per square foot (General Illum.)	*0.78*
Average Foot-candles (General Illum.) on Horizontal Working Plane	*1.1*
Average Foot-candles on Reading Tables	*5.0*
Foot-candles (Vertical) on Book-shelves	*1½ to 1*
Foot-candles (Horizontal) on Book-shelves	*1 to 8*

Fig. XII shows the roof reading room of the Carnegie Library. This space is lighted by lamps enclosed in deep diffusing reflectors. The illumination is planned not to fall below an intensity of 3 foot-candles on the reading tables.

*Trans. Illum. Eng. Soc., Vol. 3, 1908, p. 538.

FIG. XIII. AUSTIN PUBLIC LIBRARY, AUSTIN, ILL.

Data

Ceiling Height	*10 ft. 9 ins.*
Dimensions	*53 x 82*
Outlets	*28*
Watts, 1-250 per fixture	*Watts per square foot, 1.6*
Average Foot-candles	*3.9*
Distance to Ceiling	*33 ins.*

FIG. XIV. GREGG SCHOOL OF SHORTHAND, CHICAGO, ILL.

Data

Ceiling Height	*11 ft. 9 ins.*
Dimensions	*28 x 38 = 1,065 sq. ft.*
Outlets	*5 (3 100-watt lamps per fixture)*
Watts, 1,500	*Watts per square foot, 1.1*
Average Foot-candles	*3.3*
Ceiling Tint, Light Yellow	
Wall Tint, Medium Yellow	
Distance to Ceiling, 30 ins.	

FIG. XV. NIGHT VIEW, SHOWING GAS ILLUMINATION IN MERCANTILE LIBRARY, PHILADELPHIA, PA.

FIG. XV shows a night view of the Mercantile Library, Philadelphia, illuminated throughout by gas lamps. Welsbach reflex burners are used. Green cone shades are used on the desk lights and special standards for the tables. By-pass individual control of the lights is provided. For lighting the balcony and book-shelves thereon, rows of pendent gas lamps, enclosed in 6-in. opaline globes, are used.

Fig. XVI shows a direct lighting installation in a library, in which the lighting is carried out by rows of 5-light chandeliers, equipped with lamps backed by individual prismatic reflectors.

FIG. XVI. DIRECT LIGHTING IN LIBRARY.

THE main features of the design of the lighting installation in these libraries are as follows:

Freedom from glare. No unshaded lamps. Intrinsic brightness of lighting sources, 1/10 of a candlepower per square inch of actual surface.

General illumination combined with localized illumination.

General illumination 1 foot-candle on horizontal working plane.

Illumination (horizontal) on reading tables, average working conditions, 5 foot-candles.

Illumination (vertical) on book-shelves 1½ to 4 foot-candles.

Illumination (horizontal) on book-shelves 4 to 8 foot-candles.

Combination of general and localized lighting designed to secure maximum illumination on the working spaces at minimum cost of operation for the required results.

Ceiling pendants for general illumination designed for efficient use of tungsten lamps.

Flexibility. Design of switching arrangements for economical use of light. Lights near windows placed on same circuits so far as possible.

Lamps for general illumination hung high, but low enough to avoid sharp contrasts on the ceiling.

Lamps for general illumination

FIG. XVII. INDIRECT LIGHTING INSTALLATION IN READING ROOM, JOHN HAY'S MEMORIAL LIBRARY, PROVIDENCE, R. I.

Data

Ceiling Height	*29 ft.*	*Average Foot-candles*	*2.6*
Dimensions	*60 x 100 = 6,000 sq. ft.*	*Ceiling Tint*	*Light Cream*
Outlets	*11*	*Wall Tint*	*Light Cream*
Watts, 6,6[illegible]	*Watts per square foot, 1.1*	*Distance to Ceiling*	*8 ft.*

(NOTE.—No bracket or reading lamps used. Furniture and tables dark. These fixtures were first made up with direct lighting attachments, so that in case the indirect was unsatisfactory the direct light could be used. These attachments have all been removed and indirect only is used.)

enclosed in 16-inch crystal glass globes roughed on the outside.

Lamps for table lighting provided with prismatic reflectors designed to throw the maximum light sideways instead of downwards. Frosted lamps used.

Lamps for lighting low book-shelves screened from view by opaque parabolic reflectors. Lamps for lighting wall bookcases, backed by opaque trough reflectors.

Lamps for lighting free standing bookcases and reading tables screened from view by green plated glass domes.

Lamps for lighting exhibition racks screened by reflectors with green celluloid covers.

Wall bracket and column bracket lamps provided with deep enameled glass diffusing shades of sufficient depth to hide the lamp.
Frosted tip lamps.

Cheerful appearance of room.

THEATERS AND MUSIC HALLS.

In theaters and music halls, freedom from glare of bright lights in the auditorium is a prerequisite to ocular comfort. Up to within comparatively recent years little attention was paid to the physiological side of the design of lighting. That the pleasure of a good theatrical or musical performance may be marred by the glittering lighting of an auditorium is now quite generally appreciated, and fortunately

FIG. XVIII. NIGHT VIEW, LOOKING TOWARD THE BALCONY, MAJESTIC THEATER, FORT WORTH, TEX.

FIG. XIX.

FIG. XVIII shows a night view of the interior (looking towards the balcony) of the Majestic Theater, Fort Worth, Tex.

The following data apply to this installation:

Ceiling height..................50 ft.
Dimensions..65 x 78= 5,060 sq. ft.
Outlets........7 (on upper ceiling)
Watts, 7,400; Watts per sq. ft., 1.45
Average Foot-candles............3.2
Ceiling Tint...Light Fancy Stucco

NOTE.—3 front fixtures each contain 1,800 watts. 4 rear fixtures each contain 500 watts. Center fixture in front hangs 10 ft. from ceiling. Other 2 front fixtures hang 8 ft. from ceiling. The 4 rear fixtures hang 36 inches from ceiling.

Under balcony, ceiling is 13 ft. 3 ins. and 15 ft. 6 ins. Area. 43 x 78 ft. = 3,350 sq. ft.

Total watts, 4,000.

Watts per square foot = 1.2.

8 fixtures; 5 hang 36 inches and 3 hang 48 inches. Each fixture contains 500 watts.

The auditorium is in the French Renaissance style, with color scheme of ivory and old rose.

FIG. XX. GAS LIGHTING INSTALLATIONS IN THE ACADEMY OF MUSIC, PHILADELPHIA, PA. FIG. XXI.

FIGS. XIX, XX, and XXI show views of the gas lighting installation at the Academy of Music, Philadelphia. Originally ordinary opaline glass globes were used on the Welsbach reflex burners on these chandeliers, but it was found that a much more agreeable light was obtained by the substitution of the pinkish yellow glass globes now used. The fixtures shown in Figs. XIX and XX have individual control of the gas and by-pass on each light. The chandeliers shown in Fig. XXI are provided with "jump-spark" ignition and the gas is controlled by a cock on each fixture.

FIG. XXII. DIRECT LIGHTING OF THEATER BY CEILING LAMPS ENCLOSED IN PRISMATIC GLASS HEMISPHERES.

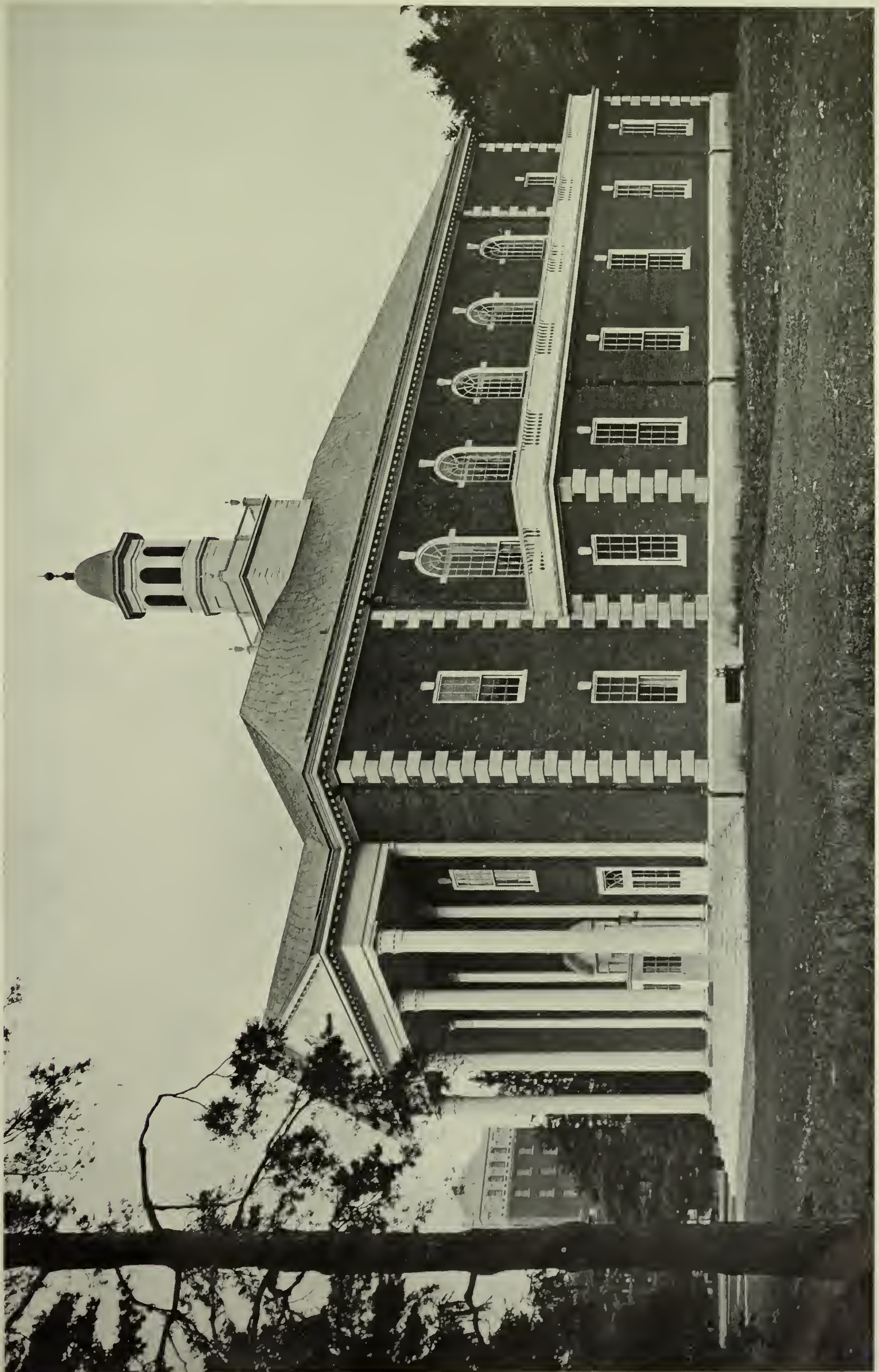
there will soon be no excuse for the frequent headaches due to improper lighting of such places of amusement. Well diffused and soft lighting is now coming to be the rule in the better class of theaters and music halls. Such lighting can be carried by direct, indirect, or semi-indirect methods or by a combination of these. The illustrations show examples of different types of lighting installations.

FIG. XXII shows a decorated ceiling, studded with prismatic glass hemispheres which house the lamps. This method of illuminating theaters and music halls by direct lighting is frequently employed.

FIG. XXIII. INDIRECT LIGHTING IN PLAZA THEATER, CHICAGO, ILL.

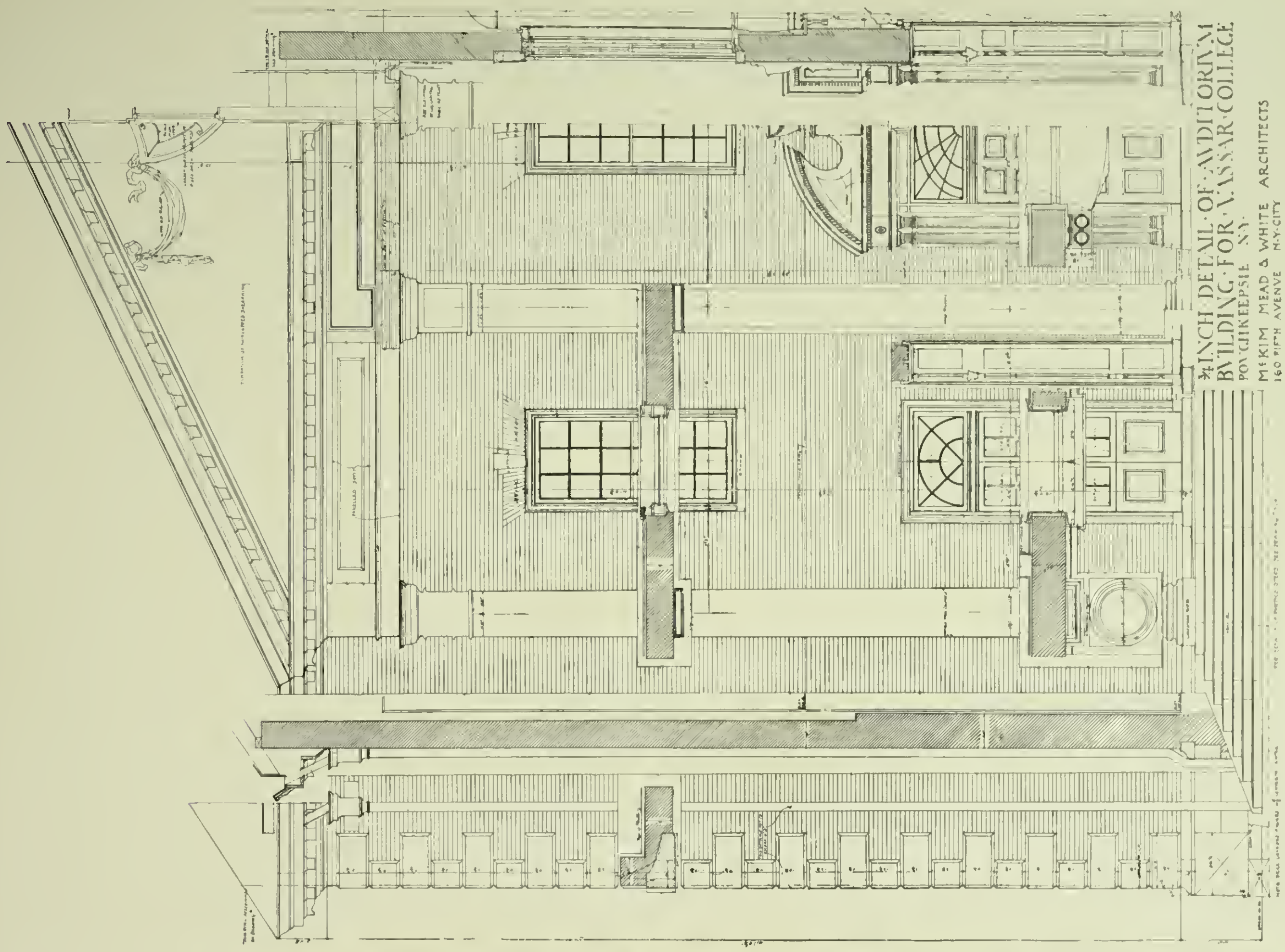
Data

Ceiling Height .... *49 ft.*
Dimensions .... *49 x 105 = 5,145 sq. ft.*
Outlets *9*
5 100-watt Lamps per fixture
Watts, 4,800 .... *Watts per square foot, 0.93*
Average Foot-candles *2.3*
Ceiling Tint .... *Light Cream*
Wall Tint .... *Light Buff*
Distance to Ceiling .... *48 ins.*



AUDITORIUM BUILDING, VASSAR COLLEGE, POUGHKEEPSIE, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS

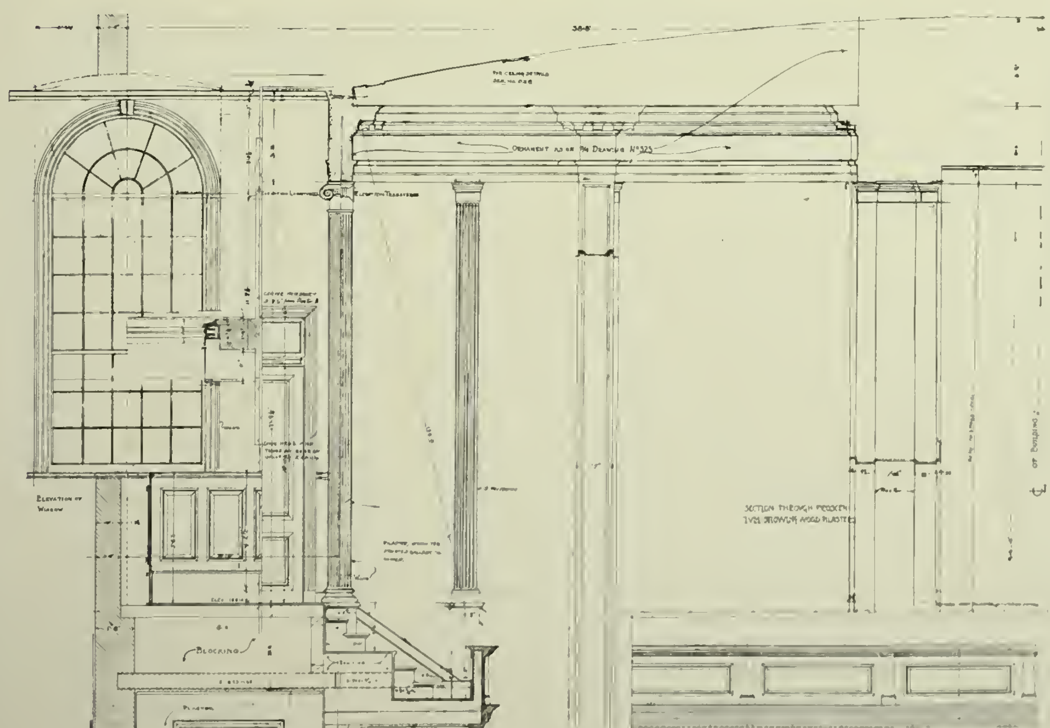


DETAILS OF FRONT PORTICO

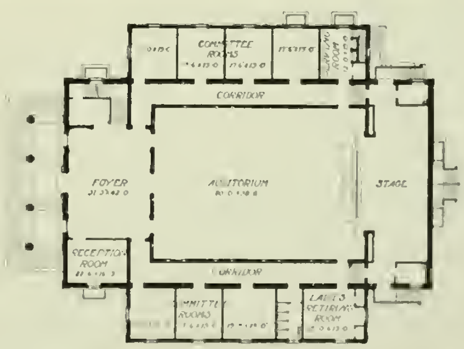
AUDITORIUM BUILDING, VASSAR COLLEGE, POUGHKEEPSIE, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS

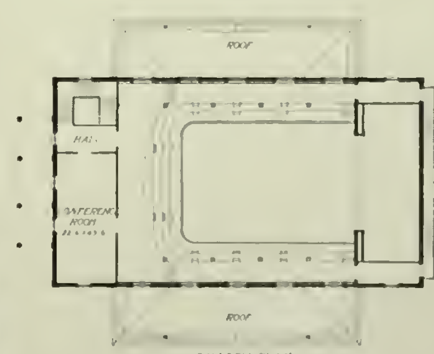
AUDITORIUM, LOOKING TOWARD THE STAGE



DETAIL OF AUDITORIUM FINISH



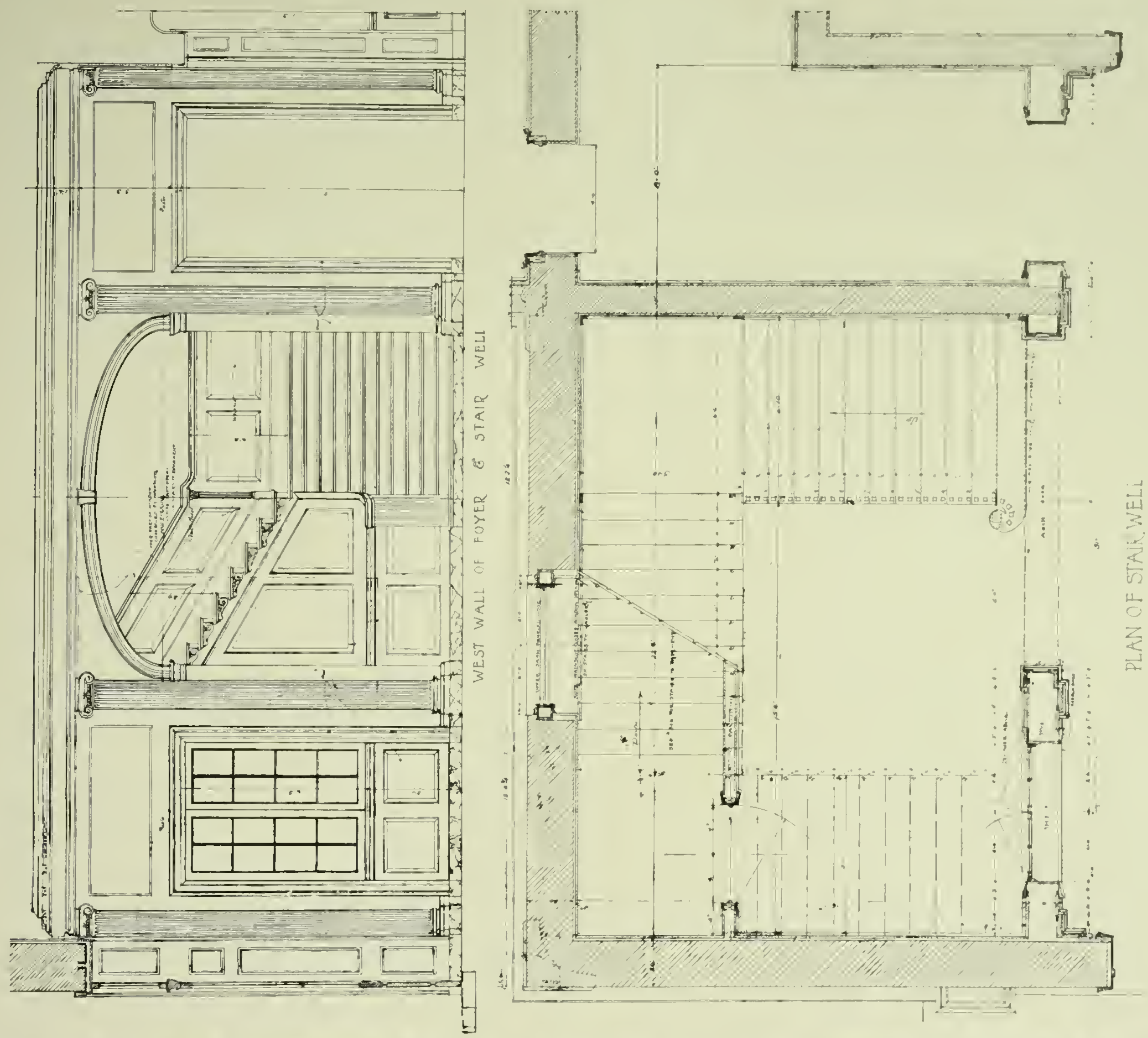
FIRST FLOOR PLAN



GALLERY PLAN

AUDITORIUM BUILDING, VASSAR COLLEGE, POUGHKEEPSIE, N. Y.
McKIM, MEAD & WHITE, ARCHITECTS

VOL. 22, NO. 11. PLATE 164.

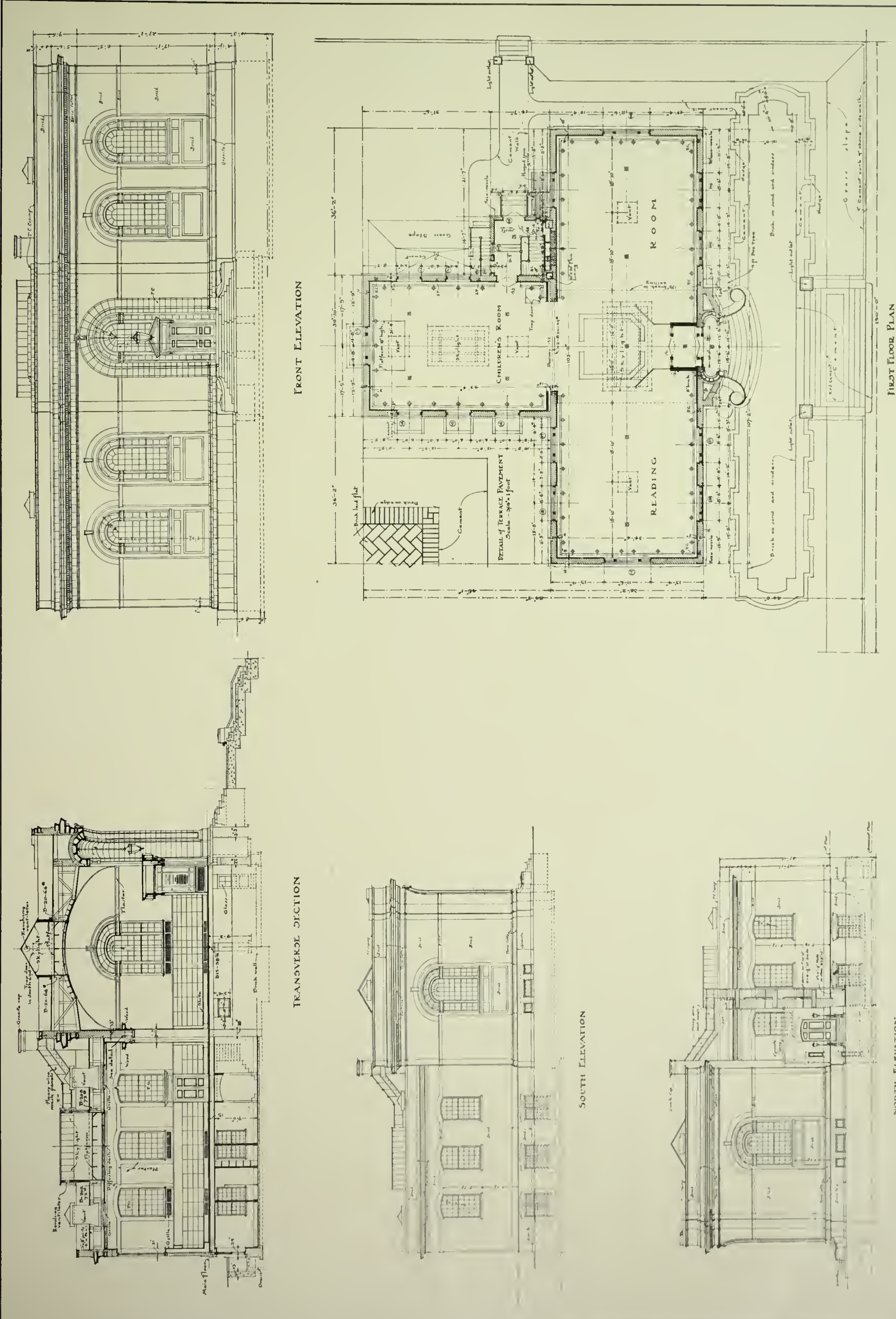


DETAILS OF FOYER AND STAIRWAY


STAIRWAY

AUDITORIUM BUILDING, VASSAR COLLEGE, POUGHKEEPSIE, N. Y.

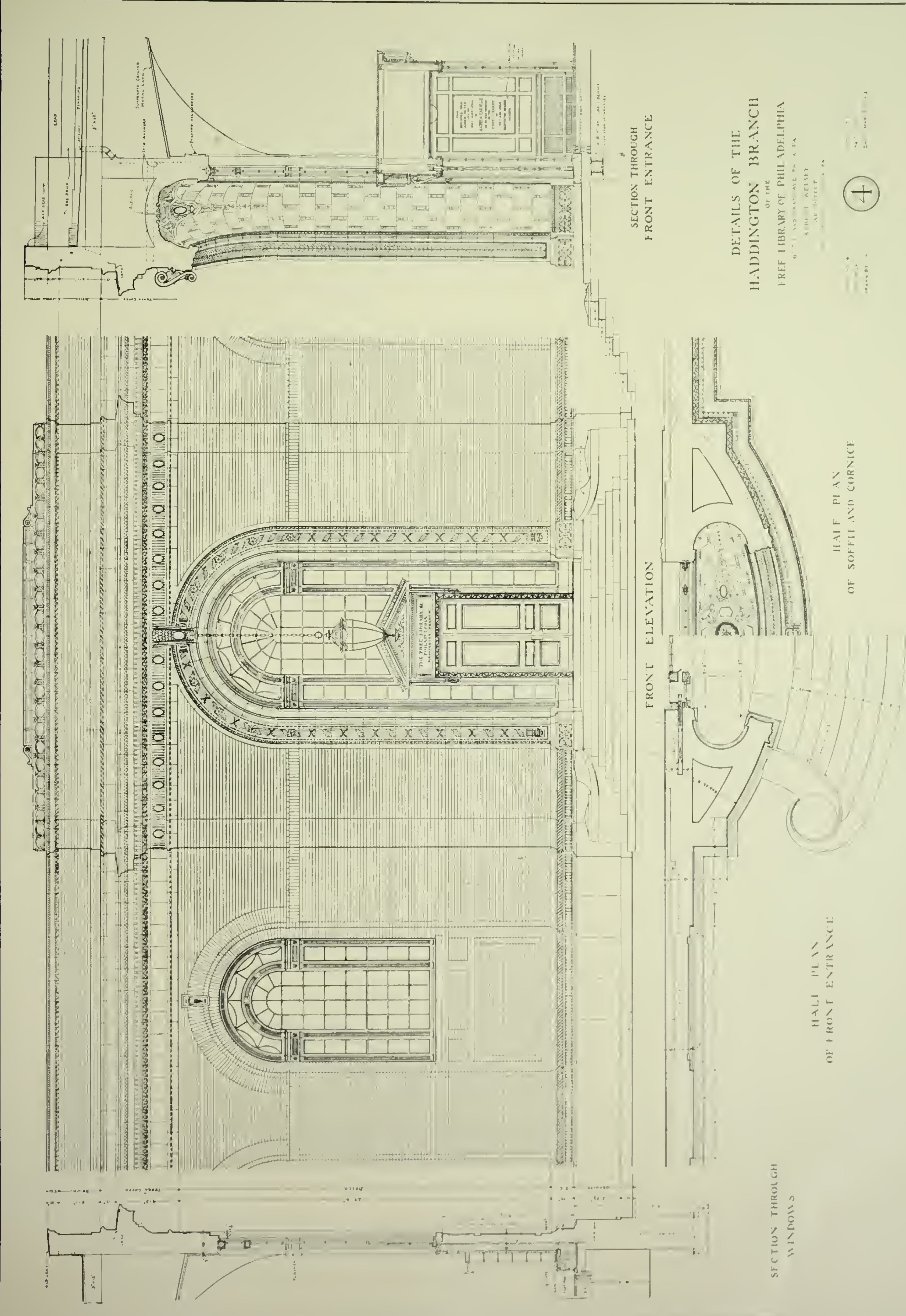
McKIM, MEAD & WHITE, ARCHITECTS



PLANS, SECTION AND ELEVATIONS

HADDINGTON BRANCH OF THE FREE LIBRARY OF PHILADELPHIA, PHILADELPHIA, PA.

ALBERT KELSEY, ARCHITECT



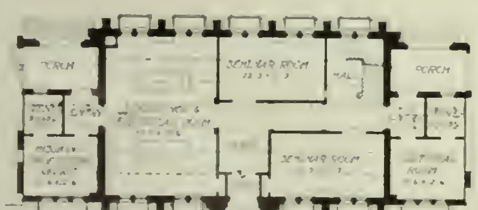
HADDINGTON BRANCH OF THE FREE LIBRARY OF PHILADELPHIA, PHILADELPHIA, PA.
ALBERT KELSEY, ARCHITECT

DAY MISSIONS LIBRARY, YALE UNIVERSITY, NEW HAVEN, CONN.

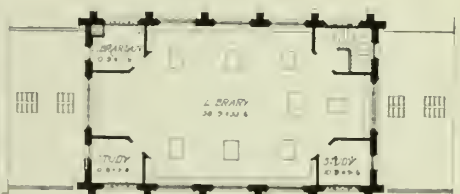
DELANO & ALDRICH, ARCHITECTS

VOL. 22, NO. 11. PLATE 168.

READING ROOM



FIRST FLOOR PLAN



SECOND FLOOR PLAN

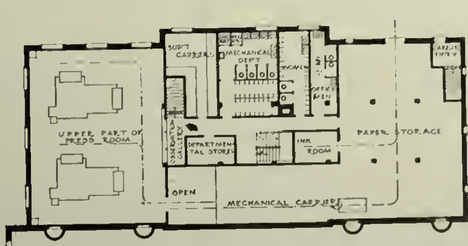
DETAIL OF ENTRANCE

DAY MISSIONS LIBRARY, YALE UNIVERSITY, NEW HAVEN, CONN.

DELANO & ALDRICH, ARCHITECTS

ST. JOSEPH NEWS PRESS BUILDING, ST. JOSEPH, MO.
ECKEL & ALDRICH, ARCHITECTS

DETAIL OF FRONT ELEVATION



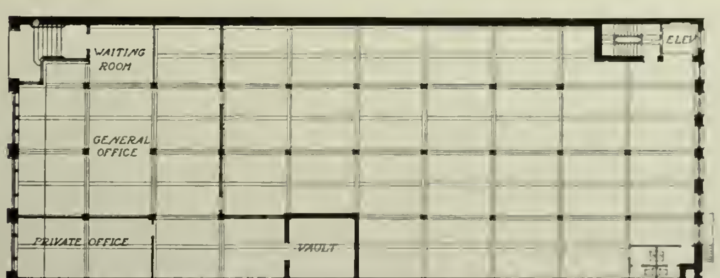
MEZZANINE FLOOR PLAN

FIRST FLOOR PLAN

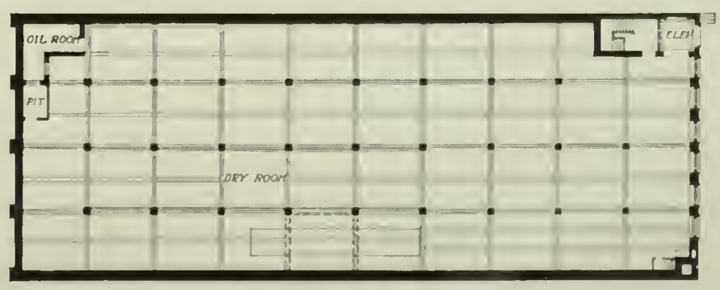
SECOND FLOOR PLAN

ST. JOSEPH NEWS PRESS BUILDING, ST. JOSEPH, MO.

ECKEL & ALDRICH, ARCHITECTS



FIRST FLOOR PLAN



BASEMENT PLAN

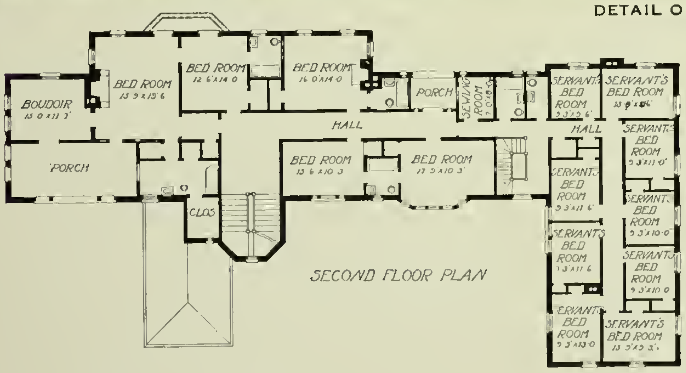
MANUFACTURING BUILDING, ST. LOUIS, MO.

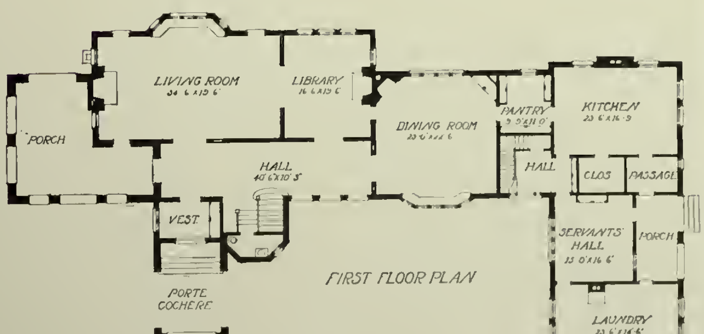
MAURAN, RUSSELL & CROWELL, ARCHITECTS

HOUSE AT SOUTHAMPTON, LONG ISLAND, N. Y.

GROSVENOR ATTERBURY, ARCHITECT

DETAIL OF FRONT ELEVATION

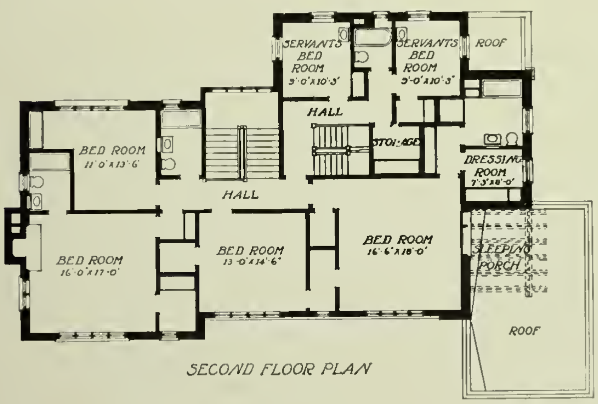




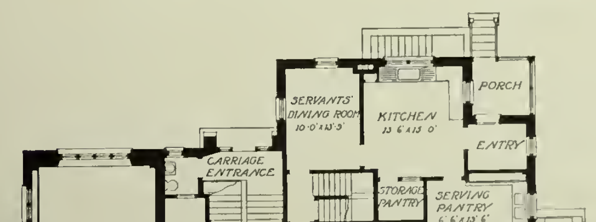
DETAIL OF GABLE

HOUSE AT SOUTHAMPTON, LONG ISLAND, N. Y.
GROSVENOR ATTERBURY, ARCHITECT

GENERAL VIEW



SECOND FLOOR PLAN



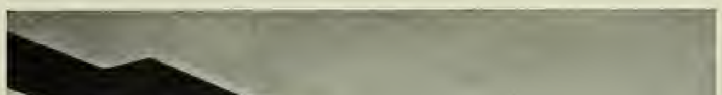
FIRST FLOOR PLAN

DETAIL OF ENTRANCE

HOUSE AT KENILWORTH, ILL.

NIMMONS & FELLOWS, ARCHITECTS

LIVING ROOM

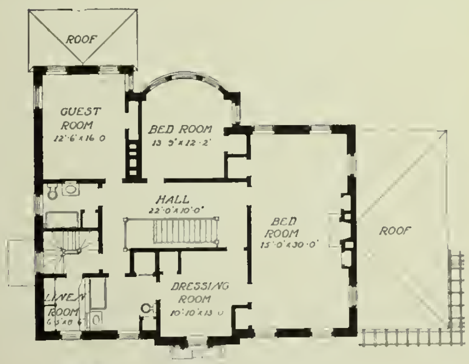


SUN ROOM

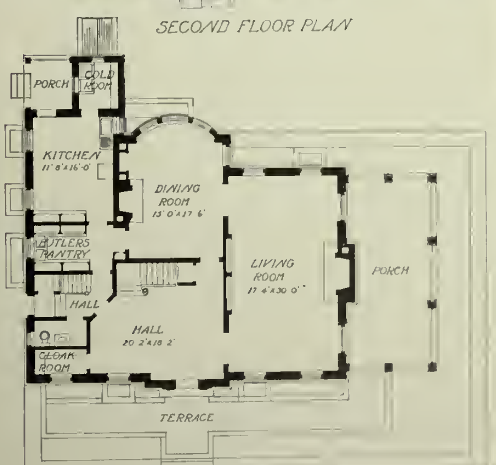
ENTRANCE HALL

HOUSE AT KENILWORTH, ILL.
NIMMONS & FELLOWS, ARCHITECTS

GENERAL VIEW



SECOND FLOOR PLAN



FIRST FLOOR PLAN

DETAIL OF GABLE

HOUSE AT WILMINGTON, DEL.
CHARLES BARTON KEEN, ARCHITECT

The Business Side of an Architect's Office.

DESCRIPTION OF THE OFFICES OF MESSRS. HENRY BACON; FORD, BUTLER & OLIVER; LUDLOW & PEABODY; H. VAN BUREN MAGONIGLE AND KENNETH MURCHISON.

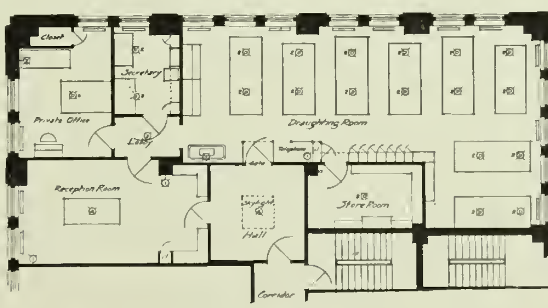
BY D. EVERETT WAID.

THE office of Henry Bacon in the new Architects' Building, at 101 Park avenue, New York, is an exemplification of our remark that architects' offices express the personality of their designers. The arrangement is straightforward and adapts itself to business requirements in the most direct way. The impression of quiet good taste made upon one as he enters the hall is retained even through the drafting room. It is consistent with the refined monumental character of the Lincoln Memorial, the restrained artistic use of fine materials in the Union Square Savings Bank, and the chaste beauty of many monuments designed by Henry Bacon.

ENTRANCE TO RECEPTION ROOM.

The walls are covered with monk's cloth, a fine open mesh material of a somewhat different texture from burlap and of a mellow yellow tone. The floors of the reception room and hall are a cloudy gray composition similar in appearance to concrete. The ceilings are kalsomined to tone in with the wall coverings and the trim is painted.

One may be pleased to note that in the amply lighted private office the drawing table dominates the desk. The drafting room is delightfully neat and well lighted. The sink, telephone booth, and wardrobe lockers are conveniently ranged along the inner wall, and the screened gate is at once a convenient access and bar to visitors consulting about work in progress. The storeroom has an unusually spacious appearance, for all drawings are folded and filed in short boxes.



PLAN.

It is worthy of note that Mr. Bacon uses no printed forms. Even his certificates are typewritten.

The office of Ford, Butler & Oliver seems *multum in parvo*, when one shakes hands with three strapping partners. But the welcome accorded to the visitor by the reception room as well as by the firm is pleasant, and that is certainly one of the first essentials if clients are expected to call and accept the advice of an architect.

The plan indicates a working arrangement which should be effective in results following the supplementing efforts of three active men. The whole office, aside from entrance and reception rooms, is one room 12 feet high, with good light and air, while a considerable degree of individual privacy is obtained by means of the 7-foot dividing partitions. Some of the partitions visible to the caller are oak sash and obscure glass, while others and the walls are covered with clouded brown-bronzed burlap to agree with the brown oak trim, and all are warmed by the red tile floor and lightened by a white ceiling. The furniture is black, of which one piece is well adapted to restricted space,—namely, a small, square telephone table with a stool sliding under.

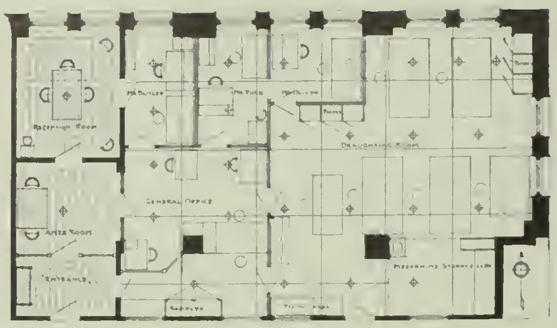
The printed forms used by Ford, Butler & Oliver are exceptionally interesting. They are the fruit of a long experience in one of the big offices where one learns the need of a system capable of caring for large affairs without becoming unduly complicated. That, in short, is the purpose of this series of articles which are in-

DRAFTING ROOM.

RECEPTION ROOM.

OFFICE OF HENRY BACON.

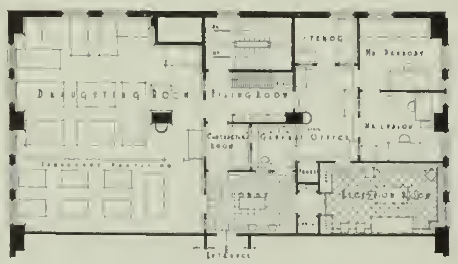
tended to show the methods of many architects, and then illustrate a system calculated to expand easily from a small practice to the needs of a large one. Mr. Lyman Ford has met the problem for his firm first of all by adopting 8 inches by 5 inches as a standard size for printed forms. Certificates, orders, superintendents' reports, office memoranda, specification reminders, time sheets, ledger, cash book, etc., all are 8 inches by 5 inches, and all fit in loose-leaf binders, with strong paper or canvas backs as severity of use may require. These binders slip into a coat pocket, and, as sheets can be added or removed with quick facility, instructions may be sent to a building, or reports received, and filed in these binders where they can be consulted. Model or typical specifications, a paragraph to each page, are bound in the same way, and it should be the easiest matter in the world to slip a needed book of specifications in one pocket, a ledger in another, and take home enough work to last all night despite the protests of one's longsuffering wife.



PLAN.
Office of Ford, Butler & Oliver.

RECEPTION ROOM.
Office of Ludlow & Peabody.

This firm uses the new set of contract papers recently standardized by the Institute. Correspondence for one building is filed by itself, letters received and copies of letters sent being kept separate in neat, quick binding vertical guide folders. One loose-leaf binder contains the list of drawings made for each building, with spaces for recording the issue and return of every blueprint of every drawing. When a building is completed, the record of drawings for that building is removed from the binder and filed away with the drawings.



PLAN.
Office of Ludlow & Peabody.

In connection with the bookkeeping accounts, the overhead charges (which include salaries of members of the firm) are figured per year and per hour of the year, so that at any time the run of drafting expense can be compared with overhead charges and an indication had as to the need of securing more work or discharging some draftsmen. In fact, Mr. Ford charts the expenses, and thus can see graphically how the ratio is varying between overhead and drafting expense.

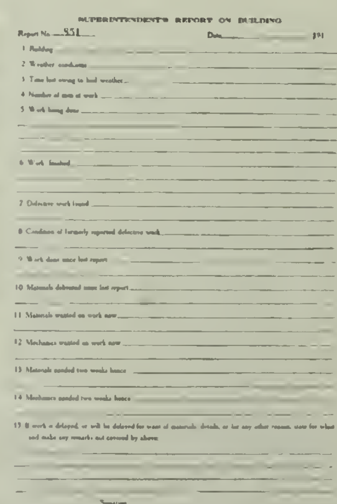
It may be added that Ford, Butler & Oliver use a printed head for rendering bills to clients. The sheet is folded once, and has within a schedule of charges together with some paragraphs on "General Practice." On the first page under the bill occurs this printed note: "This charge is based on a total commission of ------ per cent as per schedule on the inner side of this sheet."

Another of the offices which we are visiting in the Architects' Building is that of Ludlow & Peabody. The plan tells its story clearly and shows how a scheme not unlike others in its main ideas can be adapted to suit the space occupied. One of the attractive features of this suite is a generous supply of fine photographs of architectural masterpieces which cover the walls of the drafting room and afford a persistent educational influence, not to say inspiration, to

SUPERINTENDENT'S REPORT

PRINTED FORM.
Office of H. Van Buren Magonigle.

DRAFTING ROOM.
Office of Ludlow & Peabody.



SUPERINTENDENT'S REPORT ON BUILDING

Report No. 551 Date 191

1 Building
2 Weather conditions
3 Time lost owing to bad weather
4 Number of men at work
5 Work being done
6 Work finished
7 Defective work found
8 Condition of formerly reported defective work
9 Work done since last report
10 Materials delivered since last report
11 Materials wanted on work now
12 Mechanics wanted on work now
13 Materials needed two weeks hence
14 Mechanics needed two weeks hence
15 If work is delayed, or will be delayed for want of materials, details, or for any other reason, state for what and make any remarks not covered by above

Signature

PRINTED FORM.
Office of Ludlow & Peabody.

the workers there. To refer to only a few details of office administration, it may be noted that their specifications are typewritten to the limit of six copies and additional needed copies are blueprinted from the original typewritten sheets which are made fit to yield good prints by the use of double-faced carbon paper.

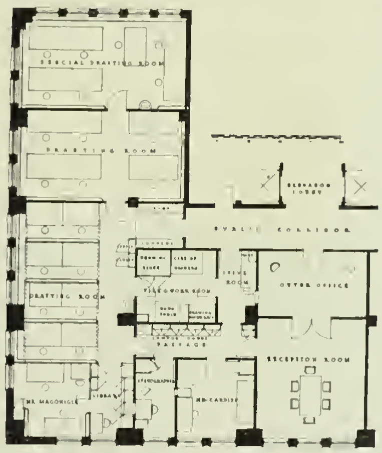
Ludlow & Peabody use a form of superintendent's report which is here reproduced. Such blanks are demanded in architects' offices, as is evident by the number who use them. But their wide variety suggests differences of opinion as to what should be recorded in superintendents' reports.

This firm uses a printed postal with which it announces to competing contractors the name of the successful bidder and expresses its thanks for the bids submitted. In addition to the customary printed forms, Ludlow & Peabody keep a registry of drawings and record of issue on colored cards, one color for each class of drawings, including even progress photographs and specifications. One card is used for each drawing — a somewhat bulky system. They have also a printed "Form of Proposal," an "Acceptance of Proposal," a slip for office record of "Disbursements" on clients' account, and an "Informal Debit and Credit Memoranda."

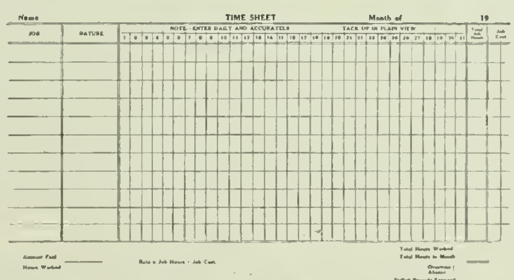
The new office of H. Van Buren Magonigle will be of special interest to those who have seen his articles on "The Preparation of Working Drawings" in THE BRICKBUILDER and who know why he is an authority on the subject.

Mr. Magonigle's conviction which governed in working out the plan of his office is that business should be kept out of sight and by means of a suitable esthetic impression make the client feel that he is visiting, not the commercial shop, but the studio of his architect.

TYPICAL ALCOVE IN DRAFTING ROOM.



PLAN.

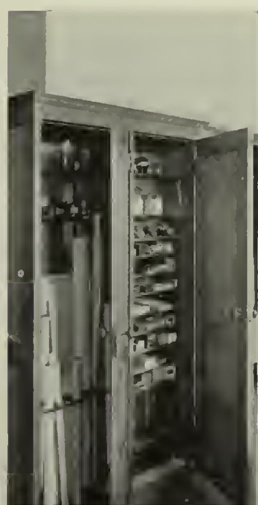


DRAFTSMAN'S TIME SHEET.

From the spacious outer office or anteroom, a visitor is ushered into a generous reception room. Business headquarters are next door to the reception room. Mr. Magonigle's private room is in reality the principal one of a series of alcoves into which the main drafting room is divided. The photograph shows a typical one of these alcoves which gives one or two men a desirable freedom from interruption and affords them much needed wall space. The drafting tables are 3 feet 6 inches wide and 2 feet 6 inches high, — the low tops giving a wide effective angle of light. Note the portable lamps for the drawing tables, hooks for support of office sets of blueprints, shelves for drawing boards or mounted drawings.

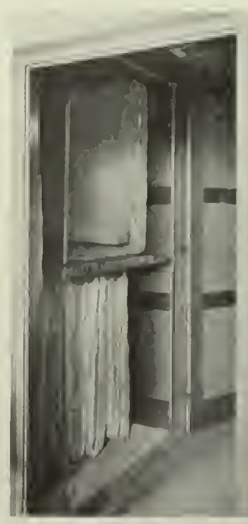
The apple-pie order of the office (and it really exists) seems only the logical result of an orderly plan. Note the photographic view into the two doors of the "Supply Closets."

All drawings are filed flat by suspending them vertically in a big cupboard. Each set of blueprints is bound between two thin flat strips of pine, and can be hung in the permanent file room or in an alcove for convenient reference. Tracings of current work drawings are kept horizontally flat in drawers and later are bound and hung in the permanent file closet. A description of this orderly and compact method of filing, which is by the



SUPPLY CLOSET IN DRAFTING ROOM.

RECEPTION ROOM.
OFFICE OF H. VAN BUREN MAGONIGLE.



FILING CLOSET FOR DRAWINGS.

way economical as it needs no expensive drawers or racks, may be found in the May, 1913, issue of THE BRICKBUILDER.

Mr. Magonigle has discarded an elaborate card system of registering drawings and keeping record of their issue, and has all of this history kept on slips permanently attached to the office copy of each set of drawings.

Pay day, as in many offices, comes once a month, and each draftsman is expected to tack his time sheet up near his table and enter time "daily and accurately."

Overhead charges in Mr. Magonigle's office are calculated in an unusual way. They include rent, supplies, and salaries not apportioned to individual jobs. All expenses directly chargeable to individual work, including specification writing, and including a salary which the architect allows to himself, are called drafting expense. The common method of figuring the real cost of architects' total expense on any given building is to add to the drafting expense such a percentage of that expense as the total overhead cost per month bears to the total drafting cost. Mr. Magonigle, however, divides his total overhead cost for the month by the total number of drafting hours for the month. The resulting fixed sum per drafting hour multiplied by the total number of hours worked on some one building would represent the total overhead cost on that particular building. Inasmuch as there is great disparity in salaries per hour, a uniform allowance per hour for overhead would appear rather disproportionate. It will be interesting to compare the two methods and see if they average up in fact as nearly parallel as "match" and "medal" scoring in golf.

PLAN.

Kenneth Murchison's new office seems to have been planned on a theory somewhat different from the scheme adopted by most architects. Here, the visitor, instead of seeing the reception rooms only, is ushered into the middle of the business activities of the office. The idea is not uncommon in offices in which one person takes care of all the secretarial duties and makes the anteroom, where his or her desk is located, a reception room beyond which most visitors are not invited. In Mr. Murchison's office, the visitor finds himself in a spacious central office, where his interview is held within sight and sound of several busy desks, unless he is invited to go into the private room of some chief assistant or into Mr. Murchison's own room, which is the only real reception room in the office. The attractive features of this office may be perceived both in the plan and in the photographs.

RECEPTION ROOM.
OFFICE OF KENNETH MURCHISON.

For conducting the routine work, Mr. Murchison has a considerable number of printed forms in various sizes; and he realizes that some of his blanks will be improved by revision of matter as well as size — the latter having more regard to uniformity. The tendency, it may be remarked here, seems to be toward adopting the regular business letter sheet as standard size for printed forms and specifications. Certificates, orders, etc., may well be just one-third size — in other words, a full sheet folded gives triplicate copies.

MAIN OFFICE.

The Quantity System In Estimating.

GENERAL DISCUSSION.

IN THE BRICKBUILDER for October there was published an article by Mr. Sullivan W. Jones, of the firm of Palmer, Hornbostel & Jones, architects, New York City, entitled "An Appeal to the Architect for the Adoption of the Quantity System." Copies of this article were sent to the Secretaries of the Chapters of the American Institute of Architects with the request that they bring the matter before their members and furnish us an expression of opinion on the merits of the system proposed by Mr. Jones and the value of the quantity system in estimating, generally considered. A number of replies have been received from Chapters and individuals and part of them are presented below. Others will be given in later issues of THE BRICKBUILDER. It is felt that this is a subject of especial interest to the architectural profession and it is the purpose of THE BRICKBUILDER to give enough of its space from month to month for a reasonable debate of its merits.— Editors.

Editors, THE BRICKBUILDER:

YOUR article brings to general attention a matter of extreme interest. It has long been a matter of wonder to those familiar with the work of the quantity surveyor abroad that the waste, duplication of labor, and liability to serious mistakes and loss incident to our haphazard methods should be allowed to continue. The excuse contractors have given for the continuance of the system of individual quantity-taking has been that no two take off quantities or figure alike. Some figure brick per thousand laid, some figure the materials and the labor as separate items. Some might cube a building and submit a straw bid based on a cost per cubic foot. It is certainly time that this babel of methods and this guesswork bidding should be replaced by accurate methods generally accepted.

The condemnation of the plans and specifications prepared by architects for bidding is unfortunately based on a considerable majority of drawings and specifications so used; but it might also be stated with truth that a large number of architects have neither the education nor experience to justify their being classed as architects. The majority of men who in their respective communities command respect as architects of good standing produce working drawings and specifications which are fairly clear, exact, and complete. Even these would, however, be benefited by the scrutiny of the quantity surveyor in taking off quantities.

Many individual architects have given "constructive thought to the active relationship existing between himself, the contractor, and the owner," and the standard documents of the American Institute of Architects were largely based on individual documents. It is not therefore quite fair to state the contrary so strongly, but one delights to hear it definitely stated that failure in a specification is due to "want of intelligent preliminary investigation," "lack of accurate knowledge," and lack of "the power of expression." These appear to be the very kernel of the matter, and it cannot be too often stated and insisted upon that writing specifications is a task of great difficulty requiring exceptional knowledge and no little literary acumen. The man who knows his subject and knows how to express himself will never take refuge behind blanket clauses.

Anything that will encourage better drawings and specifications should receive the support of all architects — even if we never attain the Utopian ideal of wording that "shall not be capable of more than one clear and definite interpretation by the bidders." The interpretation of words is an extremely complex and difficult subject in a country so large, where the same word means different things in different parts of the country.

To produce drawings and specifications such as are desired requires time, and the owner who wishes the doubtful advantage of competitive bids should be given clearly to understand that such bids are properly based on complete drawings and accurate specifications, and for this the owner must not only allow time, but must also know what he wants. In any comparison with Europe one must bear in mind that our building operations take very much less time than theirs, and that any system which requires English time for execution is out of the question here.

The introduction of making one survey of quantities for all builders would eliminate much waste of time and put all on the same basis as to data. It is not clear, however, how a builder could estimate "on bills of quantities and not on drawings and specifications."

The payment of the cost of the survey should surely come directly on the owner and not indirectly. He must pay it in the end, and as the work, like that of the architect, is done for him and in his interests, he should be paid by and be responsible to the owner. It is not clear why he should be paid on the basis of the cost of the work. It is no more laborious to take off plain marble ashlar than to take off the quantities of shingles. It would seem as if quantities rather than cost should be the basis of the charge, unless indeed it were frankly based on time.

The general scheme proposed seems excellent and should be supported.

R. CLIPSTON STURGIS.

Editors, THE BRICKBUILDER:

The very admirable article in your last issue, by Mr. Jones, on the subject of the quantity system in estimating, presents the case from the English standpoint so well that it seems only fair to consider whether or not our present system, with which so much fault has been found, may not have its good points and be quite as efficacious as the continental method. I do not believe it is quite fair to the profession to say that all of our plans are indefinite, that the drawings and specifications issued by the vast majority of architects fail wofully in any respect, and that the use of blanket clauses in the contract indicate any consciousness on the part of the architect of his failure to fully perform his obligations to the owner and contract. That may be only another way of saying that most architects don't know their business anyway, or, to put it in milder form, that only a few architects are the best architects, a proposition which of course no one would question, but measured by its results it is my belief, after having started with a different idea many years ago, that our system is preferable to that adopted abroad. I have been enabled to make repeated comparisons between results here and in England and I find quite as much uncertainty there as to what a contract includes, as great a latitude in the estimates which builders will make, and as much difference in the percentages of profits there as is the case here, notwithstanding the fact that in England the work is conducted along much surer lines, there is not as much hazard due to attempt for speed in work, and builders are not so prone to take on more work than they can properly attend to. It is my belief, based upon my personal experience, that the system of quantities to be supplied in advance to a builder is simply making it a little easier for him to go through one of the steps leading up to the preparation of a distinct bid, that it doesn't result in any closer figures, in any economy to the owner nor in any surer precision in regard to requirements, while on the other hand it distinctly does substitute a system of bookkeeping for intelligent discrimination in prices. No builder who has had any special experience would undertake to make up his prices from a bill of quantities without the most careful reference to the particular conditions under which those quantities were to be considered, and referring again to my own experience, which has included a very fair variety of work both as to character and to cost, I would place more reliance on an estimate for a building which was based upon the intelligent study of the plans and the site and a comparison with other buildings of the same type than I would upon an estimate which was based chiefly upon a bill of quantities, no matter how carefully produced. If we were to say that we all do our business in too much of a hurry, that we none of us make our drawings any too well, that incidental to the conduct of a large business carelessness in details is inevitable, there would surely be no discussion; and all these factors lead to the uncertainty in plans and specification about which your article complains; but the remedy in my judgment is not to substitute a cast iron bill of quantities, but rather for the architect to be more careful with his plans and specifications and for the builder to base his prices not upon what he thinks the building will cost but what he knows a similar building has cost, and that is by no means a question of quantities. I would deplore the introduction into this country of a quantity surveyor, and the very blanket clauses of which Mr. Jones complains are no stronger than are found in the majority of specifications the world over, and so long as we are dealing with the element of chance and the fallibility of human intelligence, such blanket clauses must be put in for the protection of all parties in interest. It works both ways, and considering the fact that builders make far more money as a rule in this country than they do abroad, that the volume of business handled by a successful architect is vastly greater than a European architect usually has to administer, I cannot see that the faults of our system lie with the absence of the quantity surveyor, but rather in the inherent haste to which we feel called upon to yield. Our architects and builders are already far ahead of their foreign competitors in matters of economy, speed, and the character of work. Give us time and I believe the difficulties of the present system which appeal so strongly to Mr. Jones would not exist in connection with a well-organized, first-class architectural office.

C. H. BLACKALL.

Editors, THE BRICKBUILDER:

Building contractors are the ones suffering most under the present method of quantity-taking from the architects' plans and specifications, and it is surprising that they have not attempted to reform the present haphazard method and for their own protection establish the office and employ a qualified quantity surveyor.

A contractor's success in lump sum contracts depends upon a correct estimate and as a matter of course his embarrassment and efforts to squirm out under a losing contract affect the equanimity of the architect and owner and necessitate close supervision.

Mr. Jones shows in many instances the evils of the present system and then misses the remedy by so distorting the excellent system employed in England as to rob it of its best and necessary features. His line of argument briefly reads thus: 1. Drawings and specifications are made in the architect's office under high pressure and there result inconsistencies, ambiguity, and omissions. 2. The time of bidding is too short and quantity-taking by the contractor is carried on with difficulty and uncertainty. 3. A stringent contract, wherein the architect is sole interpreter of the plans and arbiter in case of disputes, binds all parties to an agreement that is likely to work injustice. 4. That where one contractor among ten bidding is successful, the owner assumes the overhead charge of the successful contractor for his percentage loss on unsuccessful bidding.

Then, as a corrective measure, he proposes the English Quantity System of Estimating "with variations."

In England the architect designates the quantity surveyor, he is employed by the contractor and the contractor is responsible for the adequacy and correctness of the bill of quantities. Mr. Jones's recommendation is that the owner employ the quantity surveyor and also be responsible for the bill of quantities; further, that the contract be based on the bill of quantities together with the plans and specifications.

The dangers of Mr. Jones's proposal are manifold, and in the matter of contract it would result in endless litigation.

He would base the contract on two instruments, the plans and specifications and the bill of quantities, the two being open to conflict; as one is an interpretation, in different terms, of the other. A great injustice to the owner lies in the provision that he should assume responsibility for the bill of quantities. There are many cases where plans and specifications are adequate; here the owner and architect have performed and completed their service for bid-taking; the contractor should now perform his service, a part of which is to list the material entering into the construction. The most efficient and economical manner of doing this would be for several or all contractors to maintain a central office with an expert to perform this service, and dignify him with the title, Quantity Surveyor.

This English system is a good one and why cloud the issue and confuse the duties of owner and contractor?

If Mr. Jones would improve the standard of adequacy of the drawings and specifications issuing from the architect's office, let him but give publicity to the fact that in law the architect is responsible for the adequacy of the drawings and specifications for the proper construction of the building. The responsibility would be made more significant if the architect had a written form of contract with the owner, as was the custom of H. H. Richardson, wherein this responsibility was acknowledged.

W. A. Goldstein,
Secretary Louisiana Chapter A. I. A.

Editors, THE BRICKBUILDER:

The question of a quantity system of estimating has been thought of for some time and, as the idea has been a rather indefinite one with us, had never been given serious consideration.

It seems that if such a system were adopted, one of the most necessary things would be the licensing not only of the quantity surveyor but also the architect.

My personal observation of plans prepared by men all over the State of Pennsylvania leads me to agree thoroughly with Mr. Jones's opinion as to the woful lack of meaning in the drawings submitted for much of the work. In this connection I may say that hardly fifty per cent of the drawings and specifications submitted are really fit to be considered under any conditions.

The architects' work, in general, will certainly need to be improved very materially if such a system were adopted, although I have no doubt that with its adoption many of the faults which now exist will be corrected to some considerable degree.

It seems to me that the bill of quantities as well as plans and specifications should be the basis of the contract under all conditions. The surveyor should be held responsible for the accuracy of the quantities, with some limitations. Some slight provision, at least, should be made for unforeseen errors, but not for carelessness. I believe in the end a system of this character would be productive of good.

Miller I. Kast,
Secretary, Southern Penn. Chapter, A. I. A.

Editors, THE BRICKBUILDER:

Some six years ago an attempt was made to introduce this system in Los Angeles. A firm of quantity surveyors established offices and carried on their practice for a period of six months or so, in accordance with the so-called English system of quantity surveying. The system, however, at the end of that time was abandoned, and the surveyors left our city for good. It developed from the information that I had received from architects, as well as contractors, that the practice of these quantity surveyors had not been carried on in a strictly regular manner, with the result that neither architects nor contractors have since that time been enthusiastic to reintroduce the system.

I fully agree with Mr. Jones, and realize the unfortunate condition of affairs in the average architect's failure to properly coordinate his drawings and specifications, and his awkward attempt to establish his own infallibility by means of the wording of the contract, such a general custom making it impossible to effect any material uplift in the standard of the architect's relations to the owner and the contractor. The great difficulty that presents itself, however, seems to me to be the insurance of the honesty of a quantity surveyor. Mr. Jones suggests standard rules and units for the measurements of the executed work, but even then the possibilities of irregular conduct on the part of the quantity surveyor for the interest of some particular contractor would be difficult to avoid. The Code of Rules as a tentative basis proposed for the working out of an American quantity system is practical and feasible in so far as Rules 2, 3, 4, and 5 are concerned, but I should find Rule 1 exceedingly difficult of enforcement in California.

In giving the various aspects of the operation of the quantity system Mr. Jones presents a good illustration of the law of averages, establishing theoretically that by this system the owner would receive a more favorable bid from the successful contractor, thereby more than compensating him for the payment of the quantity surveyor's fee. In this particular, perhaps, the majority of architects will agree with Mr. Jones. However, I believe that the average owner would not entertain the same confidence in this theory, but count on the contractor's competitive efforts to secure the work to neutralize any "overhead" expenses that might be charged by him.

This question of quantity surveying was brought up for discussion before a regular meeting of our Chapter held on September 10th, 1912, and elicited little or no enthusiasm among the members at that time. Personally, I think the system of quantity surveying, as outlined by Mr. Jones, is a good one, and I should like to see it adopted by architects throughout the country.

Ferdinand Parmentier,
Secretary Southern California Chapter, A. I. A.

Editors, THE BRICKBUILDER:

It would seem to us that the quantity system, if it could be carried out, would be an ideal one, but there are two obstacles that we fear would make its adoption difficult, in this vicinity at least: the question of figuring labor and the attitude of the owner.

Not all the contractors have a system whereby the labor on a certain quantity of material is added to that quantity when it is figured — that is to say, when the labor is put down as so much per thousand bricks, or as so much per cubic yard of concrete. In the case of the contractor, and it is not an uncommon instance hereabouts, who figures a lump sum for labor in addition to his quantities, it seems to us that the element of chance is still left in control of the situation.

As to the owner, he would have to be either forced or educated into accepting the quantity system. Education would be a very long process, and it could only gradually be applied by the architect. Force could be applied only by the contractors in a body, by refusing to figure longer under the old conditions; we hardly think that any one would expect such united action on the part of contractors.

These comments are the result of only the brief study we have been able to give the matter. The objections may not be insurmountable; they may not even be logical; but they would retard in this locality the reform proposed.

Norman M. Isham, *President*,
John Hutchins Cady, *Secretary*,
Rhode Island Chapter, A. I. A.

UNION TRUST BUILDING, WINNIPEG, MANITOBA
JOHN D. ATCHISON & CO., ARCHITECTS

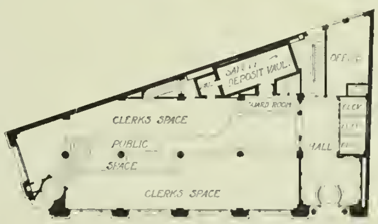
The Union Trust Building, Winnipeg, Manitoba.

JOHN D. ATCHISON & CO., ARCHITECTS.

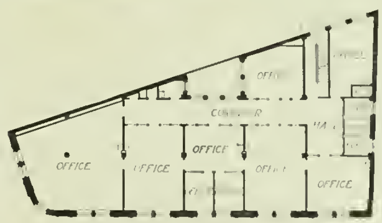
ACCEPTING the conventions for the design of the so-called skyscraper which have been established upon the analogy of the classical column, that is, with a base, a plain shaft and ornamented upper stories and cornice, the designers of the Union Trust Building have applied them to the solution of a problem upon which, from the shape and size of the lot the building was to occupy, were imposed severe and difficult conditions necessitating a wise choice in style and treatment to overcome successfully.

A tall building with a narrow façade is rarely able to command much approval, and where it is adjoined on either side by lower buildings it usually partakes of the nature of an architectural freak, like the tall man at the circus. In this instance, of course, the position on a corner lot is more favorable and the expedient of a well conceived corner treatment is employed to great advantage in that the meager width of the narrow frontage is not unduly emphasized, and viewed from most positions the round corner precludes any tendency to compare the widely differing areas of the two façades.

BANKING ROOM.



FIRST FLOOR PLAN.



TYPICAL FLOOR PLAN.

The building is representative of its type of steel frame construction. The premise that the envelope of masonry which screens the structure is in fact the structure, that the visible base really carries the superincumbent wall and therefore should be more massive, has not been considered in this design. The external indication of the metallic frame is evident and in architectural terra cotta an appropriate material has been frankly used as a facing for the body of the building and for the crowning features where its plastic properties have been properly utilized for the decorative detail.

With the growth of the steel frame building there has been an equally notable improvement in materials suitable for facing the skeleton with an architectural dress. For use under such circumstances where purely structural and load-bearing qualities are not paramount there is no more appropriate or satisfactory material than terra cotta. It is capable of infinite variety of expression from the viewpoint of architectural design, and its light weight together with its acknowledged fireproof properties make it the most logical and practical choice of materials for the modern type of city buildings where these qualities are of the greatest importance.

Progress has a giant's stride and a giant's unconscious brutal contempt for the quiet pace by which achievements of yesterday were attained. The rapid strides in commercialism are nowhere more clearly depicted than in the buildings which house our great business institutions of to-day. There is hardly a city of any size but boasts of its skyscrapers.

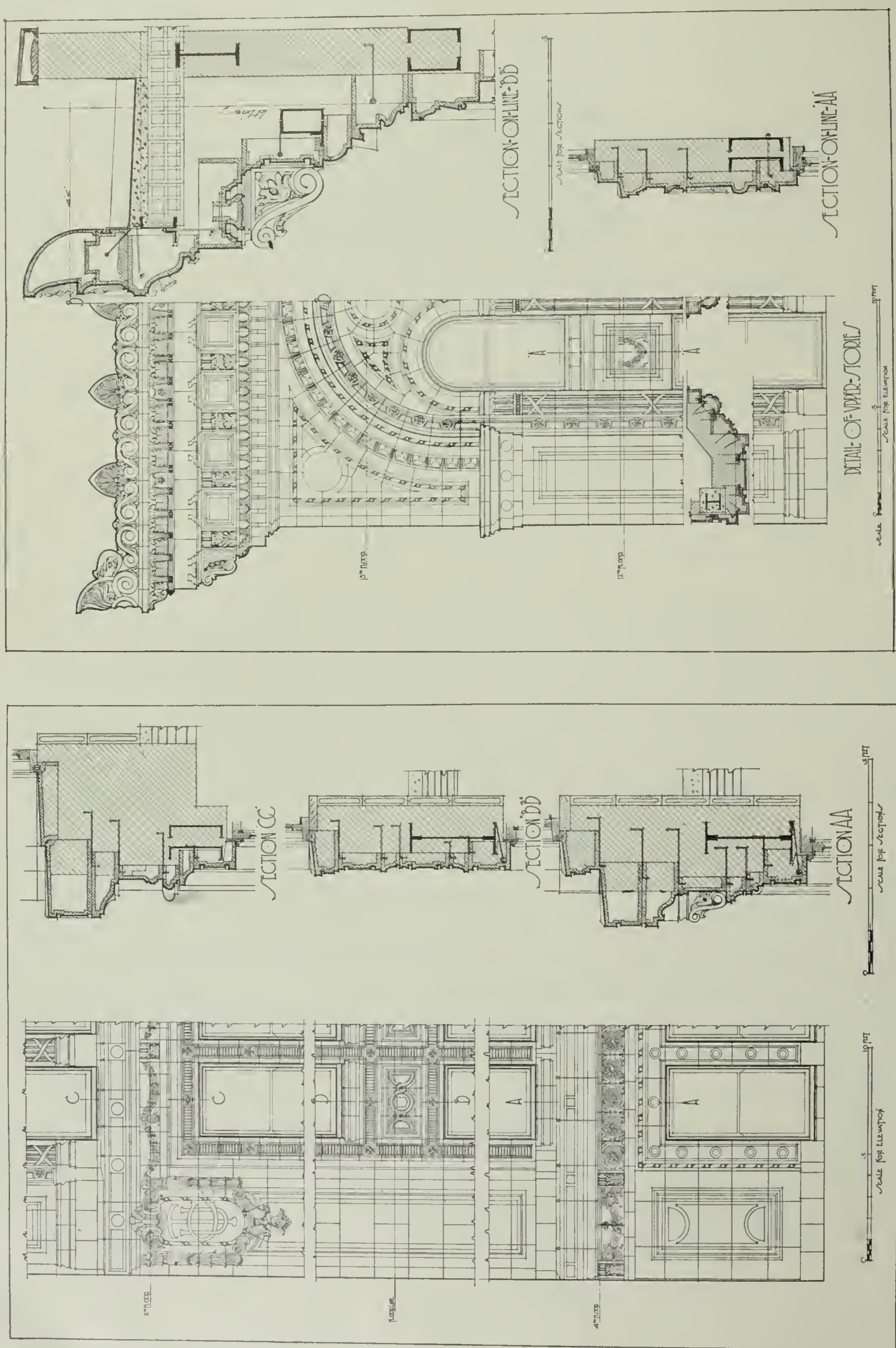
Not many years ago the directors of important banking institutions held themselves aloof from association with the skyscraper, courting dignity and distinction by occupying low buildings designed to express banking characteristics and devoted to nothing but the private business of the bank. The high priced land which they must occupy has, however, turned them from their ways and they are now erecting tall office buildings, with almost the zeal of the real estate promoter, that will pay them in real money good interest on their investment, even if by so doing they sacrifice that elusive quality of dignity which was once considered very essential to their business associations.

This bank and office building presents few features which are not typical of many others of this type of structure. The irregular shape of the lot largely controlled the division of space. The banking room occupies the entire ground floor with the exception of the space necessary at the rear for elevators and an entrance to the offices. The building is fireproof throughout, the floors being of hollow tile flat arch construction and the elevators and stairways enclosed in fireproof enclosures faced with white enamel brick. The foundations are concrete piers carried to rock with an average depth of 65 feet below grade.

The corridors above the first story are finished in marble as well as the entire banking room where Botticini is used for wainscoting, with gray Tennessee marble with a verde border and base for the floor.

The building complete cost 62½ cents per cubic foot. The high cubic price may be accounted for by the irregular shape of the lot, that the corridor on each floor supplies only one set of offices, and the installation of a safe deposit vault and complete mechanical equipment in addition to the liberal use of marble and bronze in the interior finish.

The use of terra cotta for the greater portion of the exterior effected a large saving, but it is interesting to note that although it is counted a less expensive material than stone it is equally appropriate for a building of this character where the interior finish and equipment is of the most elaborate and expensive order.



TERRA COTTA DETAILS, UNION TRUST BUILDING, WINNIPEG, MANITOBA
JOHN D. ATCHISON & CO. ARCHITECTS

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IT has been a generally accepted opinion that most of the brick buildings of the early days of the Southern colonies were built of brick which had been imported from England or Holland. One has only to turn to any of the authors who have contributed volumes on the subject of colonial architecture to see this statement freely offered.

There has recently come to our notice the report of the proceedings at a meeting of the Columbia Historical Society, held some time ago in Washington, at which Mr. George Alfred Townsend contributed a paper which fully confuted this notion. He was able to bring convincing proof to bear on the subject to which the loyal supporters of the imported brick theory had to give way, and while many expressed a natural regret that one of their cherished beliefs had been dissipated, it was generally thought that the truth of history had been served by Mr. Townsend's research and study.

There has always been a very notable tendency on the part of historical societies and many people interested in early colonial history generally, to attribute to England a share of the honor in building up the social and business interests of the early days of this country, entirely too large in proportion to what is credited the efforts of the colonists themselves. We are glad to see this spirit now giving way to one of more real patriotism; one in which we can recognize the full worth of those humble craftsmen who in their modesty have left but few records beyond the products of their hands by which they might hope to be given the credit to which they are justly due.

One has but to imagine the conditions existing at that period of the world's development to realize that the broad claim that all the bricks used in the southern part of our country before the Revolution were imported from foreign countries, could be founded on nothing but mythology. The small ships of that day were poorly equipped for the storms of the north Atlantic and it is very unlikely they would burden themselves with such a cumbersome cargo as brick, when the crying need of the colonies was for manufactured goods and from which the freight profits must have greatly exceeded any to be possibly derived from the limited cargo of bricks.

William A. Jones, representative in Congress, from the thirteen tidewater counties of Virginia, says in answer to the query:

"I do not know with certainty of any imported brick structure in the first district. The fact has been challenged there as in Maryland. The church of character beyond any colonial church in Virginia is Christ Church, in Lancaster County, built in 1732 by King Carter, the greatest landholder. His constructions were built of native brick, I know, for his descendant has shown me the brick pits. Carter was a model business planter, having his own mills, etc., and not the man to import what he could make."

Still another authority, Mr. Bruce, writing on the economical history of Virginia, declares that all brick used in Virginia in the seventeenth century were manufactured there; that bricklayers and brickmakers arrived in 1607; that in 1622 bricks formed one of the principal articles exported from Virginia to the Bermudas and that in skirmishes with the Indians they were repulsed with brickbats!

It is amusing to think that when bricks could not be purchased in England between 1650 and 1700 for less than eighteen shillings, the planters would have imported them, adding to their cost the transportation across the ocean, to put them to such use as to repulse the Indians.

It is, of course, a matter of record that some brick were imported, but the amount is very small and was in all probability a better grade of brick than could be made here and was consequently used for mantels. There is a record of three importations covering a period of eight years to the province of Maryland, but all told they amount to not over fourteen thousand bricks, and when it is recalled that a single large chimney of those old homesteads would require as many as sixteen thousand, it is clear that this matter of record alone entirely discredits the claim that all the great houses of that vicinity were built of imported brick.

AT Philadelphia on the 25th of October Congress Hall which, through the efforts of the Philadelphia Chapter of the American Institute of Architects, has been restored, was reconsecrated in a manner entirely in keeping with the historical interest which this building possesses. The occasion was honored by the presence of the President of the United States, Speaker of the House, Cabinet officers, members of the Supreme Court, Senators, Congressmen, and foreign Ambassadors. Among the speakers were John Hall Rankin, Frank Miles Day, and Charles A. Ziegler of the Philadelphia Chapter. The committee of the Chapter having this work in charge spared no effort to insure historical accuracy in this work of restoration, and they and the profession at large may well feel gratified at the recognition their work has received at the hands of the officials at Washington.

"ATLANTIC Terra Cotta" is the title of a new publication which will be issued monthly by the Atlantic Terra Cotta Company, 1170 Broadway, New York. It is the purpose of this publication, primarily, to present the interesting work which is being done by the Atlantic Company. The contents will consist largely of illustrations of the highest quality, presented at a scale which will have especial value. The publishers announce that the company will be glad to place any architect, member of an architect's office, or architectural student upon the complimentary mailing list.

FIRE PREVENTION AND FIRE PROTECTION. By Joseph Kendall Freitag, B.S., C.E. Fire protection is one of the most vital business problems of the day. If all the principles set forth so clearly by Mr. Freitag in his book were enforced by all the insurance companies, our loss instead of being $3.60 per capita, as it is in Boston, would drop to less than $1.00 per capita, as it is in many of the foreign cities, and might even go as low as the results accomplished through co-operation by the mill mutual companies; but it is not from the insurance companies that will come the reduction in fire loss. Their function is to equally and equitably distribute the money which the policy holders bet against the chance of fire and it is only by systematic and long continued education of the public that a revision of our present vicious principles of non-fireproof construction can be brought about. Surely no volume has appeared in this country which is so thorough in its presentation of theory of, and so explicit and full in its description of actual practice, as this book of Mr. Freitag's. Nor is it simply the work of one man which he has presented. He has correlated the observations and opinions of the leading experts in many lines, so that while his own investigations are very manifest, he has the backing of the best minds in architecture and engineering to support his deductions. It is a work which no one can afford to ignore. The architect and the engineer will find it indispensable. The general property owner or the tenant, who after all is the one primarily responsible for many bad conditions, should study this work thoroughly to understand how tremendous on the one hand is the annual tribute which this country pays to careless and poor construction, and on the other hand how possible it is to build a modern city so the annual fire loss shall be almost negligible. That this latter statement is not mere theory is abundantly proved by the experiences of nearly every city in other countries than our own. The United States has the distinction of burning up every year about one-half as much as the value of all new constructions; and if the principles which are so well explained in this volume could only be carried out in practice, the cost of necessary building operations could be reduced at least thirty per cent, for that proportion represents about the replacement cost of fire losses which is charged to investment.

The volume is divided into six parts, one covering the general subject of fire prevention and fire protection, another on tests and materials, two excellent parts on design and construction, a part devoted to special types of buildings, theaters, schools, residences, factories, garages, safes and special hazards, and a final chapter on the auxiliary equipment and safeguards which go such a long ways towards offsetting the deliberate carelessness of tenants and the short-sighted economy of property owners; such as sprinklers, automatic alarms, watch-clocks, etc. The meat of the volume from the standpoint of the architect and the engineer is in parts three and four, dealing entirely with fire-resisting design and fire-resisting construction, and the whole subject is worked out most carefully and with painstaking consideration of all details.

There are some points we would like to see different in subsequent editions. In dealing with special classes of risks, a little too much insistence is placed upon some matters which are not wholly questions of fire hazard, and to advantage the last two parts could be materially reduced in scope with a gain in the compactness of the volume; but to find fault with the details of this work is an invidious task which is not necessary, having in mind the extreme general excellence of the whole program and the masterly way in which it has been handled, free from the bias of either the professional engineer or the practical contractor. It is a distinct addition to our constructive literature. Price, $4.00. New York, John Wiley & Sons, Inc.

IN this issue we present four plates of two interesting library buildings which illustrate the more usual types of such a building. There is perhaps no more hackneyed problem than the small library building. Hundreds have been designed in the United States during the last few years, and they have, in consequence, resolved themselves into a type which comes pretty near to perfection, so far as the plan is concerned; and as most of them include one large room only in the main building, the expression of the interior, in the majority of cases, is indicated on the exterior by three or five openings with some sort of columnar treatment for the main entrance.

A marked departure from these generally accepted principles is strongly evident in Mr. Kelsey's design. Apparently he first designed a straight façade with five openings of equal size, then to discount the loss of light from an overhanging monumental central feature, as well as from the inclusion of a doorway there, he made the central opening wider than those on either side, and extended it to the floor level; adding a monumental portico with a warped arch larger than the opening behind — thereby concentrating all interest on this feature. The treatment of the wall surfaces and window openings on either side of the entrance feature have been purposely kept very simple and the dull drab tone of the walls and cornice was elected to make even more vivid the contrast of the open portico, finished in lustrous glazed terra cotta.

In the treatment of the frieze and under the arch he has given a touch of ornament to signify the use of the building. In the rustications at regular intervals there are conventionalized blocks ornamented with old looking volumes in low relief. Thus a sort of diaper pattern forms the field over which a rich tracery is carried with deeply coffered panels around a central rosette, all forming the vault overhead. At night the lighting will bring out the brilliance of this polychrome work to immense advantage.

The second library building illustrated is located at Yale University and serves to house its library relating to Foreign Missions, which is incidentally one of the largest, if not the largest, existing on this subject. The building was designed to form the side of the quadrangle or close made by the existing buildings of the Divinity Schools. It is connected with East and West Divinity Halls by open vaulted arcades, giving on to the quadrangle.

The exterior of the building is of local red New Haven brick. All the decorative as well as the constructive features have been made of this material, including all mouldings, window reveals and mullions, finials and copings.

It is a fine example of simple English Gothic carried out entirely in brick, and when the approaches and planting are completed it will express much of that charm which we associate with the collegiate Gothic of England.

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VOLVME XXII DECEMBER, 1913 NVMBER 12

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PLATE ILLVSTRATIONS

LETTERPRESS

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Photo. by the Royal Prussian Photometric Institute.

MONASTERY OF ST. LUKE OF STIRIS, PHOCIS, GREECE.

Built near the beginning of the eleventh century, A. D. The irregular blocks are of marble from earlier buildings; others of tufa. The colonnettes are of cipollino and bigio antico. All the brick used is common thin red brick or tile set cornerwise on the string-courses and cornices. For the patterned frieze and panels of the smaller church the edges of bricks were splayed away in portions, and the brick were then bedded flush with the mortar, showing only the shaped face.

THE BRICKBVILDER

DECEMBER, 1913

VOLVME XXII. NVMBER 12.

The New York Central Railway Station at Rochester, New York.

CLAUDE BRAGDON, ARCHITECT.
New York Central Engineering Department, Associated.

THE new railway station at Rochester occupies a triangular site one block east of the old station and fronts, as that did, on Central avenue. It is flanked on the west by Clinton avenue and on the east by Joseph avenue. The main waiting room occupies the center of the front and the expression of which on the exterior gives the building its chief architectural feature. The façade terminates at either end in wings containing three stories of offices. On the north, adjoining the tracks, is an extensive service wing accommodating the baggage, mail, and express departments.

A traveler entering the station from the principal approach finds himself on a platform six feet above the waiting room floor, to which broad and easy stairs descend at right and left. Directly opposite him are the doors which give access to the concourse and subway leading to the trains. On a balcony above these doors is the train bulletin, from which the arrival and departure of trains are easily seen by passengers in the waiting room. The ticket office is located at the east end of the waiting room and the dining and lunch room is at the west end. The men's rooms occupy the southwest and the women's rooms the southeast angles. Baggage checking, parcel checking, news, telegraph, and other similar departments are conveniently and accessibly located on the ground floor, as shown on the accompanying plans, while the station master, the station police, and the barber shop are in a mezzanine, one short flight up.

DETAIL OF MARQUISE.
CENTRAL AVENUE FRONT, ROCHESTER STATION.

Beyond the waiting room is the concourse, lighted from a large skylight above, and beyond this, in turn, a subway 30 feet wide and 280 feet long, from which stairways ascend to the twelve tracks. This subway is well lighted and heated and contains comfortable seats. It is, in point of fact, as much a waiting room as a thoroughfare.

The architecture of the exterior is of a dignified type. The color, derived from the brown stone and purple hued brick of which the building is constructed, although rich in effect, is restrained.

By reason of the railway having become the all but universal highway between cities, the railway station has become the city portal. This fact finds its architectural expression in the present instance in the three great arches, reminiscent not alone of the ancient city gate, but of the viaduct, and even — by a stretch of the imagination — the driving wheels of a locomotive. This effect has only been achieved by the rigid elimination of ornament and the insistence upon mass and proportion. While the building as a whole shows no departure from the classic tradition, any single detail which would tie it to one of the so-called "styles" has been omitted. This has been done on the theory that to employ any architectural ornament which antedated the railway itself would be an anachronism. Save for the sculptured figures above the central portal and the ornamental iron work of the marquise, the front might pass for a work of engineering.

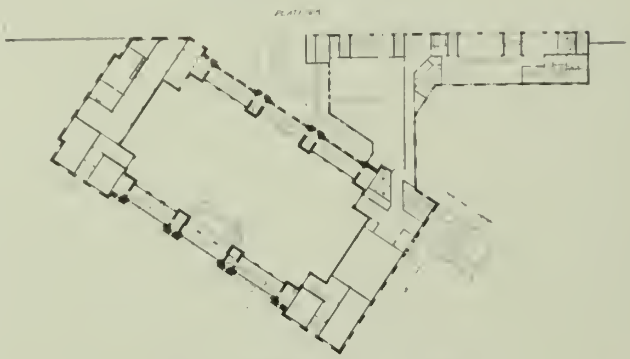
The main waiting room is one of the largest in the country. It is 60 feet high, 187 feet long, and 116 feet wide, from window to window. It contains seats for five hundred people, in addition to ample aisles and open spaces for moving and standing.

In the design of the waiting room, the architect has permitted himself a greater license than upon the exterior, particularly in the matter of color and ornament. He has, however, kept consistently in mind that decoration should emphasize form, and the distinguishing feature of the architecture of this room consists in the fact that though very much "decorated," the decoration is itself the construction. That is to say, the decoration is part and parcel of those permanent materials of which the floor, walls, and ceiling are constructed — not a superficial finish afterwards applied.

The first condition for the appreciation of a building or an interior is an instantaneous recognition of its form. This is the element which produces what we call "repose" — the most essential of the qualities that make what is admirable in architecture. But this by no means indicates that repose can be obtained through a lack of ornament, but rather that the decoration should be so disposed that the structure stands out before the ornament.

This effect has been obtained in the present instance through the harmonious combination of four different burnt clay products, used with a fine regard for their natural beauty and color values. The high wainscot is of deep yellow tiles bordered at the top by a simple repeating pattern in greens and blues; above this the greater portion of the wall is faced with a rough textured brick of a lighter yellow tone; then an entablature of faience, rich in many dif-

SECOND FLOOR PLAN.



MEZZANINE FLOOR PLAN.

GROUND FLOOR PLAN.

NORTH OR TRACK FAÇADE AND TRAIN PLATFORM.

VIEW LOOKING TOWARDS TICKET OFFICE

VIEW LOOKING THE LENGTH OF BALCONY

MAIN WAITING ROOM, NEW YORK CENTRAL PASSENGER STATION, ROCHESTER, N. Y.

CLAUDE BRAGDON, ARCHITECT

N Y CENTRAL ENGINEERING DEPARTMENT, ASSOCIATED ferent colors, though blended with admirable skill and moderation, and over all the great tile vault of a yellow, paler still than the brick. To complete the color harmony, the iron work and electric fixtures have been painted gray-blue, striped with gold, and the woodwork finished a deep brown. The whole color effect is reminiscent of the autumn woods, and the room, though large and lofty, by reason of its color and ornament, avoids seeming cold and bare.

The joints throughout have been made with great care, mortar being freely used, but they are uniform in thickness in the courses of brick and tile and also for the terra cotta. The large amount of light-colored mortar has the agreeable effect of blending the various materials together and giving the entire room a soft and restful appearance.

DETAIL OF LIGHTING FIXTURE AND TILE WAINSCOT.

The "high note" of the entire color scheme occurs in the drinking fountain near the center of the waiting room, opposite the doors to the tracks. Here, in a tile panel, four feet square, a great white gull wheels above the river, against a background representing the Central avenue bridge, the railroad bridge, and the buildings beyond. It is one of the most picturesque and characteristic of Rochester views, symbolical both of the city and of the railroad and is portrayed in a most vigorous style in this example of the ceramic worker's art — in a manner not obtainable to a similar degree in any other medium. The treatment of the surrounding mouldings is in harmony with the ornamental border of the wainscot and is properly subordinated to the interest of the panel.

The tile used in the wainscot has a further advantage than its artistic appearance, — it presents a surface which is impervious to soot and dust and furnishes a practical covering for the lower portion of the walls. The slight variations in the individual tiles and the broad mortar joints give the wainscot a rough texture that lends a visual impression of support to the brickwork and vaulted ceiling above. The natural gradation of color from the dark tile wainscot to the lighter tones of the upper walls and ceiling was evidently studied with a fine appreciation of color values.

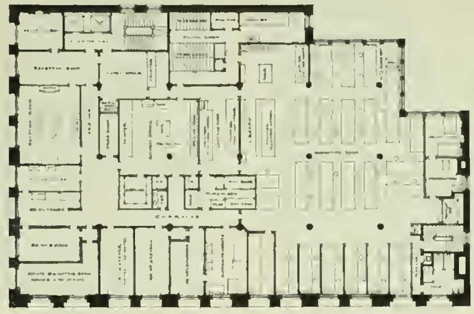
TILE DRINKING FOUNTAIN IN MAIN WAITING ROOM.

The Business Side of an Architect's Office.

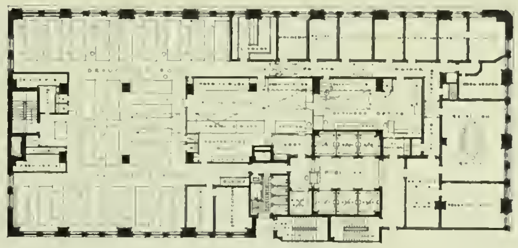
THE OFFICE OF MESSRS. McKIM, MEAD & WHITE.

BY D. EVERETT WAID.

THE office of McKim, Mead & White is a focal point of interest to architects. It is the studio and workshop of the firm whose work overtops that of any architectural office in the history of the country. It is the one office from which has come the greatest volume of architectural design and executed buildings in any age or in any country. The artistic standard of achievement has been so high and the style and quality of design so consistent that they command the respect and admiration of all the profession. Since so great a volume of work must have been the product of several minds and the handiwork of many, the genius and methods of work which could exercise such an unifying influence are naturally of interest to the profession. But Mr. Mead amazes the visitor, who may be thinking merely of the routine machinery of so great a business, by saying: "We never had any system and haven't now — have we, Fenner?"



PLAN OF FORMER OFFICE AT 160 FIFTH AVENUE.



PLAN OF NEW OFFICE IN THE ARCHITECTS' BUILDING.

As a matter of historical interest, we present a plan of the office at 160 Fifth avenue, which was occupied many years and is treasured in the memory of so large a number of the able architects of to-day who look back upon that office as the home of their youthful hopes and training. The plan indicates how the private offices were apportioned while both Mr. McKim and Mr. White were alive. An interesting comparison can be made by the reader between the old office and the new one in the Architects' Building at 101 Park avenue, New York.

The plan of the new office indicates the location of the "Information" desk, where an usher receives a caller as he arrives by the elevators and conducts him at once to any of the three reception rooms or to the lobby of the business office as the case may demand. The general scheme of the plan is quite obvious to an architect who, however, on seeing the office, will be surprised at the real extent of the place and the spaciousness of the "Business Office" and "Filing Room," which are really all one skylighted room. And a busy spot too is that center of the physical activities of the office.

The skilled man at the telephone switchboard can place an outsider in instant communication with a member of the firm or perhaps shield him by switching the inquirer to some assistant qualified to answer the call. There are four telephone booths and a dozen annunciators distributed about the drafting room. A draftsman or any one who happens to be in the drafting room can be called to some booth designated by a miniature light.

The large reception room, however, is the center of interest to the visitor and there is enough of the former office here to make one feel at home immediately. The long mahogany table, the comfortable old fiddleback chairs, and the entire simplicity of the decoration and furnishing of the room offer a lesson in the dignity and comfort of quiet good taste which is in striking contrast with some other offices where elaborate efforts have been made to design fine rooms for the effect on clients. The walls are paneled in oak with a soft grayish finish, the ceiling is tinted, and the floor inside the Istrian marble border and base is covered with a plain rug woven to tone with the oak wainscot.

The series of private offices are decorated to harmonize with the main reception room — the ceilings tinted and the walls covered with "woven paper." Mahogany furniture and soft cork tile floors complete the effect of the sort of plain luxury which is consistent with the term "office," as we ordinarily interpret it.

RECEPTION ROOM IN THE OLD OFFICE AT 160 FIFTH AVENUE.

The curious visitor walks on through the office and notes the fine "working" library invitingly accessible from the drafting room; the drawing files, which are alcoves with sets of drawings of current work bound between wood strips and hung from hooks (see illlustration of similar file closets in office of Mr. Magonigle in THE BRICKBUILDER, November, 1913); closets for storage of boards and table tops; a supply

FILING AND CONTRACTORS' ROOM LOOKING TOWARD DRAFTING ROOM.

MARBLE SAMPLES IN DRAFTING ROOM.

room from which even paper is issued from behind lock and key to prevent careless waste.

The drafting room has ceiling and frieze tinted white down to the gray picture mould, and the soft tan colored wall is reflected in the composition floor which resembles linoleum. The big room, for reasons of light, air, cleanliness, and economy of space, is clear of alcoves which were used in the old office. The firm recognizes the fact that an architect's office is a hazardous fire risk and so forbids smoking in the drafting room.

The specification room has an interesting device which in part could be useful in the corner of a small office. On each of three sides of the room there are hung from the ceiling two curtains of strong muslin as large as the side of the room will allow. One is hung some three inches in front of the other, and, being on spring rollers, they can be run up and down at will to display pinned to their surfaces a whole series of drawings. For one large building the lower halves of all six curtains could be used at once. The specification writer can walk around the room with his eyes on the drawings, dictating specifications to his stenographer. The expert who has done the work for McKim, Mead & White for many years has no need for reminders or card forms, though he occasionally follows a specification which he has written previously for a similar building. But he has one convenient memorandum in the form of a single sheet of blank paper, perhaps 24 inches wide, ruled in vertical columns headed by "Mason," "Carpenter," "Structural Steel," "Ornamental Iron," etc., one column for each trade. If he happens to be dictating specifications for mason work, he jots down in any of the other columns special items which need to be covered later in writing the other respective specifications. The single large sheet saves time which we all have wasted turning leaves to place a note aright.

A RECEPTION ROOM.

The specialist in specification writing may spend two or three days first of all in studying a set of drawings and getting instructions in the forms of answers to a series of questions. After dictation, a preliminary typewritten draft of specification is read over by a member of the firm and corrected for the final writing.

The writing of specifications for heating, electrical, and sanitary work is allotted to specialists outside the office. The same remark is true of structural engineering. Both specifications and framing plans are made by engineers in their own offices.

The so-called "filing room" contains under the extensive polished mahogany-birch counter tops steel cabinets of very large drawers in which are kept "flat" tracings, etc. Old drawings are transferred

LARGE RECEPTION ROOM.

to a room in another story of the building big enough to engulf the entire office of the average architect. Here in tubes (though all filing would be flat if started anew) are the accumulations of years, not including thousands of drawings which it was considered could safely be destroyed.

Returning now to the "Business Office," the interviewer is shown the card index, through which can be found the location in the files of all drawings. When new drawings are made, one card 6 inches by 4 inches is provided for each, on which the issue and receipt of all prints of that drawing are entered. This involves a large amount of clerical labor, as one can imagine when he sees a whole drawer full of cards for one building alone such as the New York City Post Office.

Incoming mails are opened by the chief clerk in the business office and letters sent by him to the several members of the firm. This leads us to the method of administration of the office. There is no chief draftsman, and, previous to the time of the Pennsylvania station, the firm never had a general superintendent. Each building on the boards is assigned to one of the five members of the firm. He is responsible for that piece of work throughout. He directs the draftsman in charge of that particular building, visés the working drawings before issue, deals with the client, and receives reports from the draftsman or superintendent who supervises the building. One of the secrets of the success of the firm is perhaps individual responsibility; the draftsman in charge of a particular piece of work is expected to follow it through to the completion of the building, keeping in touch even when there is, as at present, a general superintendent in charge of construction. The responsible draftsman may even conduct correspondence, always sending carbon copies of his letters to the desk of the member of the firm interested. That method has certainly been the means of giving an all-round training to many a successful architect who has swarmed as it were from the hive of McKim, Mead & White.

The general superintendent, it may be observed here, spends half his time in the office and half out. He keeps tab on the weekly reports of the several assistant superintendents and also gets verbal reports from them or the clerk of the works on the job, and takes care of extras and changes. This system of supervision is found to work well.

The general superintendent and the expert specification writer have been mentioned. The veteran accountant who is skilled in drawing contracts carries unusual responsibilities in keeping tab on estimates, extras, orders, and certificates, aside from all the office accounts which include a notable system of keeping office costs on each building. One

CORNER OF THE SPECIFICATION ROOM.

THE BUSINESS OFFICE LOOKING TOWARD FILING AND CONTRACTORS' ROOM.

A RECEPTION ROOM.

MAIN DRAFTING ROOM.

other important member of the office staff is an experienced estimator who has had training in a contractor's office. He is engaged in making carefully detailed estimates to arrive at the total cost of prospective buildings while designs are in preliminary stages. He is also kept busy checking up contractor's estimates for extras and deductions on work under construction.

Some stray items of information regarding the practice of the office may be noted thus:

Letters are filed by buildings, by subject, in order of date, in vertical files.

Letter press copy books, one for each building, are kept as a precaution lest carbon copies go astray.

Telegrams are copied in special books.

Contracts provide that the owner may carry fire insurance to the amount of payments made, and the contractor is expected to carry insurance to cover his interest.

Bonds from contractors are seldom required except on public work.

The firm has its own form of agreement for building contracts.

Orders for extras and certificates are in the usual form. A short form order is used for lesser contracts, accepting an estimate, and signed of course by architect and owner.

One excellent form used is a printed application for builders' payments.

The firm does not use printed forms for superintendents' reports, but they have kindly consented to our printing the following excerpt from a routine construction report which indicates their scope and completeness.

PENNSYLVANIA STATION—MONTHLY REPORT.

March 31, 1910.

Messrs. McKim, Mead & White,
160 Fifth avenue, New York.

Dear Sirs: — I transmit herewith my report showing the progress and general condition of the work to date:

WEATHER.

Total number of days in working month	35
,, ,, ,, Sundays and Saturdays (½ days)	7½
,, ,, ,, holidays	0
,, ,, ,, days worked	27½
,, ,, ,, working days to date	713

LABOR.

Exclusive of executive force, the George A. Fuller Company are employing an average of 476 men per working day, classified as follows: 160 masons' helpers, 15 masons, 1 stone setter, 44 carpenters, 87 carpenters' helpers, 1 engineer, 3 carpenters' apprentices, 1 mason's apprentice, 19 ironworkers, 58 painters, 4 electricians, 1 blacksmith, 1 blacksmith's helper, 28 day watchmen, 17 night watchmen, 9 wire lathers, 1 rivet boy, 3 derrickmen, 1 stonecutter, 8 plasterers, 5 helpers, and 9 cement masons.

All contractors combined employed an average of 767 men; total men employed per working day by all contractors average 1,243.

	Estimated Totals.	Received to date.	Set or Used to date.	Set Since last rep.	Per cent finished.
Granite (exterior)	480,200 cu. ft.	480,200	480,200	0	100
,, (misc. and conc.)	60,000 cu. ft.	60,000	60,000	0	100
Marble (exterior)	5,576 cu. ft.	5,576	5,576	0	100
,, (interior)	8,035 cu. ft.	8,035	7,200	370	90
Marble and Slate (misc.)	15,000 cu. ft.	14,850	14,825	25	99
Terrazzo Floors	2,452 sq. ft.	2,452	2,452	0	100
Travertine	71,533 cu. ft.	71,433	71,000	3,300	99

(The estimate of material received and used continues through ornamental iron, cement, painting, glazing, etc., etc., to include every material which has arrived at the works to the date of the report.)

GRANITE.

Exterior, Concourse, and Miscellaneous.

This stonework is completed in accordance with the original contract.

MARBLE.

Exterior.

This work was completed on July 31st, 1909.

Interior.

This work has all been set, except the flooring in the sub-waiting rooms, the setting of which has been started.

Cleaning and pointing of work in this contract is progressing and is about eighty per cent complete.

(The report continues under various headings, "Cut Limestone," "Concrete," "Brick Work," "Cork Flooring," etc., etc., to the extent of ten typewritten pages.)

Appended is a letter from Mr. H. Van Buren Magonigle, with reference to the description of his office, published in our previous issue:

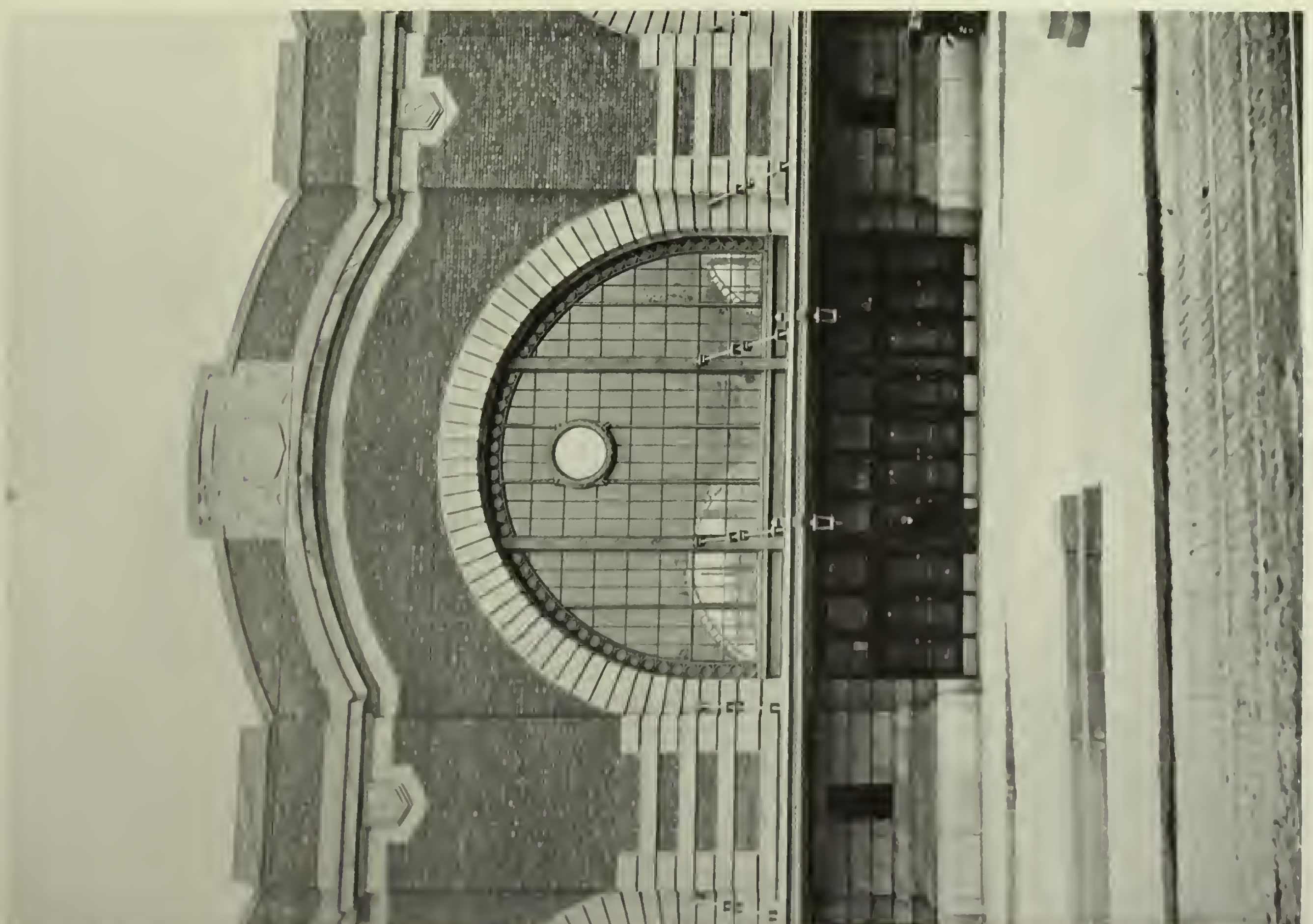
"I have read with interest your article in the November BRICKBUILDER; but there is one correction, rather vital, which I should like to see made in some way. You say 'all expenses directly chargeable to individual work, including specification writing, *and including a salary which the architect allows to himself, are called drafting expenses.*' I do not allow myself a salary — but when I work on any job as a draftsman, I keep my time, and the *hours* so spent go to make up the total drafting-room hours, and affect the 'unit of overhead charges' obtained by dividing the total overhead per month (rent, light, towels, ice, office boy, stenographers, supplies, telephone) by the total of drafting-room hours per month. But no charge for my time as a draftsman is posted against the drafting cost of any job, for I consider my salary to be the profit (if any, alas!) on the work.

"Referring to your comment, 'Inasmuch as there is a great disparity in salaries per hour, a uniform allowance per hour for overhead would appear rather disproportionate'; it is worth while pointing out that a draftsman at $100 per month occupies just as much office space, uses the same amount of light, drinks as much ice-water, uses as many towels, as much paper, as many pencils as a man at $200 per month; and that on the job he is working at there is no greater proportion of office boy's and stenographers' work or telephone service chargeable in the one case than in the other; so that the salary a man gets has no relation whatever to overhead expense.

H. Van Buren Magonigle."

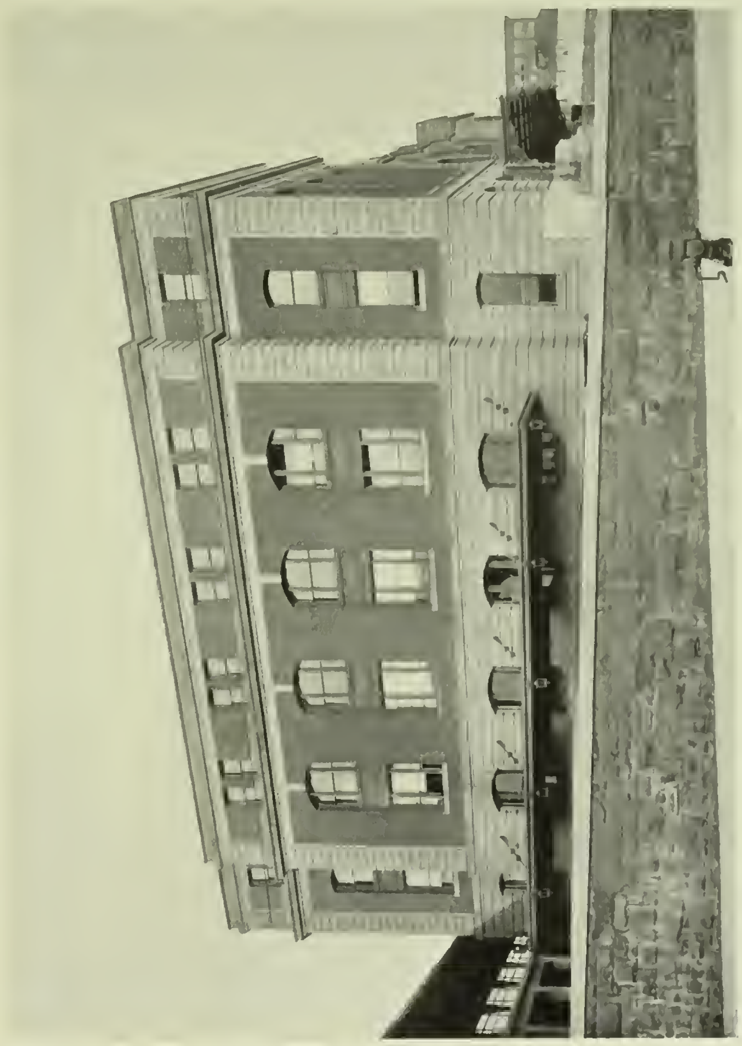
It would be interesting to theorize as to the distribution of overhead charges on work done entirely by high-salaried draftsmen as compared with another piece of work done entirely by low-salaried draftsmen, and then on a third piece of work done by both high- and low-salaried men. How would they figure out in contrast with the usual method of estimating from the year's previous experience that on any job the overhead charge will amount to a fixed percentage of the actual drafting expense charged up to that job?

Expressions of opinion and experience concerning the two methods of calculation will be welcomed by the author.



DETAIL OF MAIN ENTRANCE

GENERAL VIEW



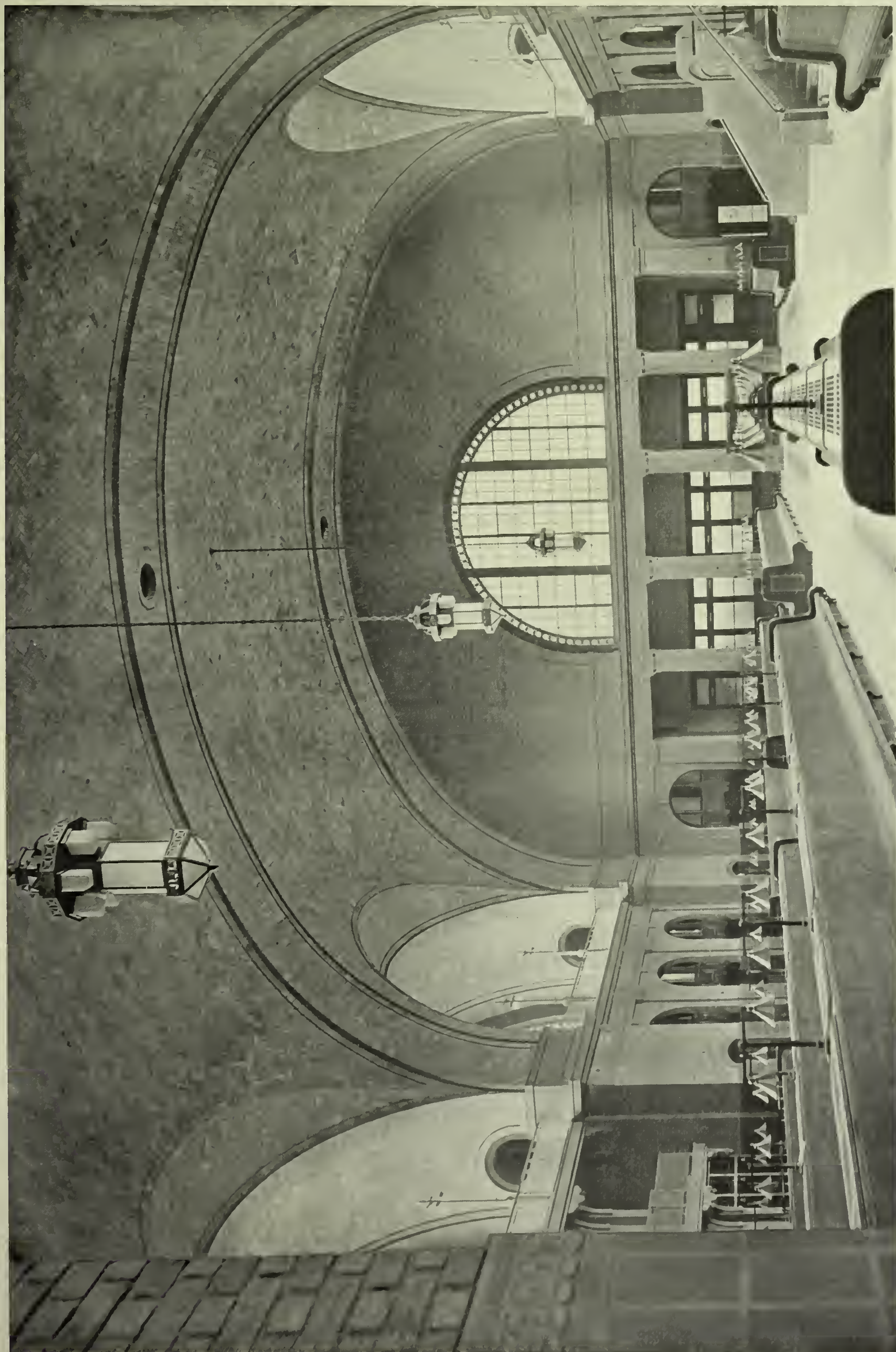
CLINTON AVENUE ELEVATION

NEW YORK CENTRAL PASSENGER STATION, ROCHESTER, N. Y.

CLAUDE BRAGDON ARCHITECT

NEW YORK CENTRAL ENGINEERING DEPARTMENT ASSOCIATED

VOL. 22, NO. 12. PLATE 178.



GENERAL VIEW OF MAIN WAITING ROOM

NEW YORK CENTRAL PASSENGER STATION, ROCHESTER, N Y

CLAUDE BRAGDON, ARCHITECT

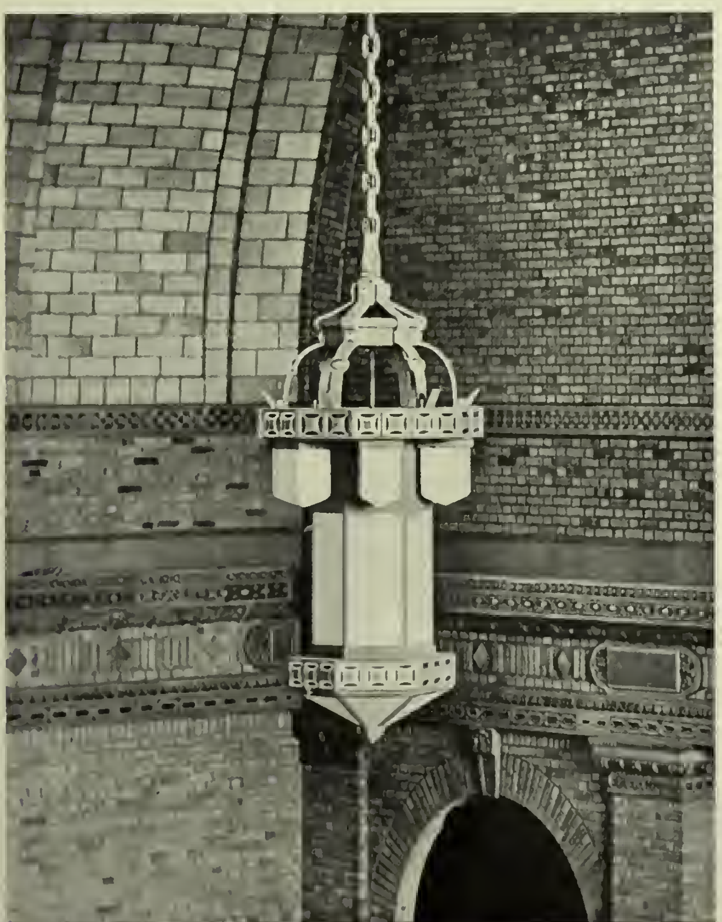
NEW YORK CENTRAL ENGINEERING DEPARTMENT ASSOCIATED

VIEW LOOKING TOWARD CONCOURSE

VIEW LOOKING TOWARD SOUTHWEST ANGLE

MAIN WAITING ROOM
NEW YORK CENTRAL PASSENGER STATION, ROCHESTER, N. Y.
CLAUDE BRAGDON, ARCHITECT
NEW YORK CENTRAL ENGINEERING DEPARTMENT ASSOCIATED

EXIT TO CONCOURSE AND TRAIN ANNOUNCER'S BALCONY



DETAIL OF BRICKWORK AND LIGHTING FIXTURE

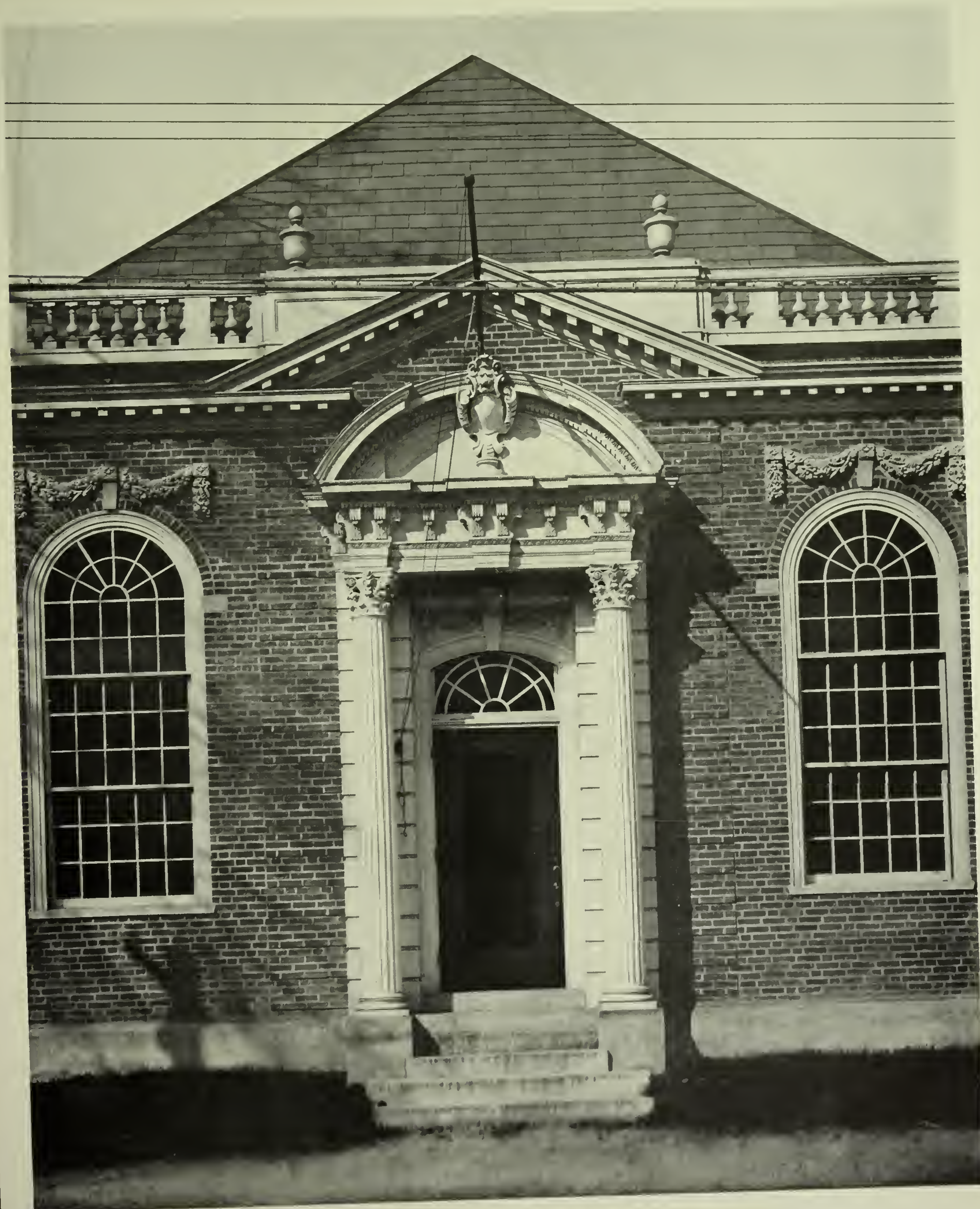
DETAIL OF COLUMN AND ENTABLATURE

MAIN WAITING ROOM

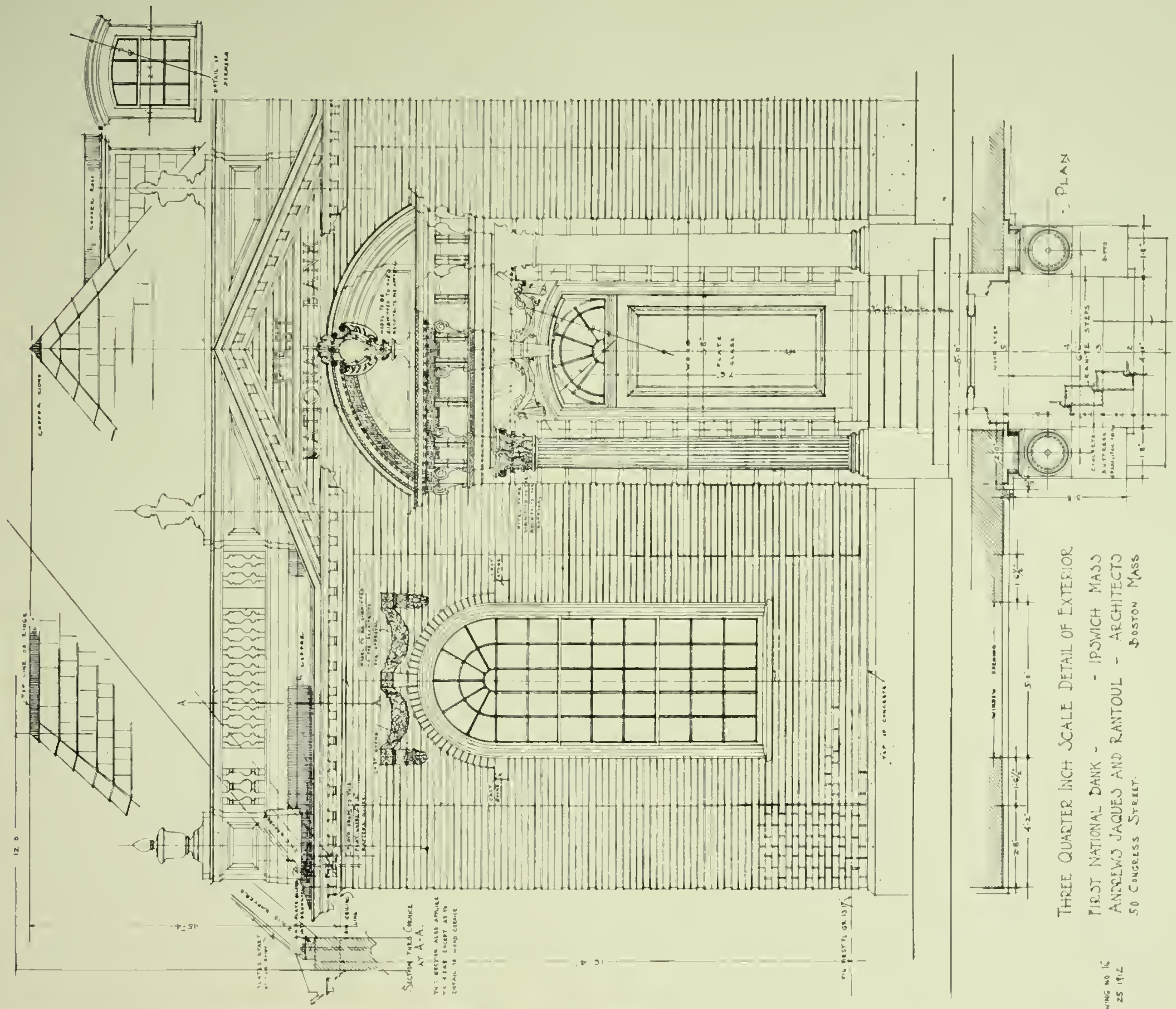
NEW YORK CENTRAL PASSENGER STATION, ROCHESTER, N. Y.

CLAUDE BRAGDON ARCHITECT

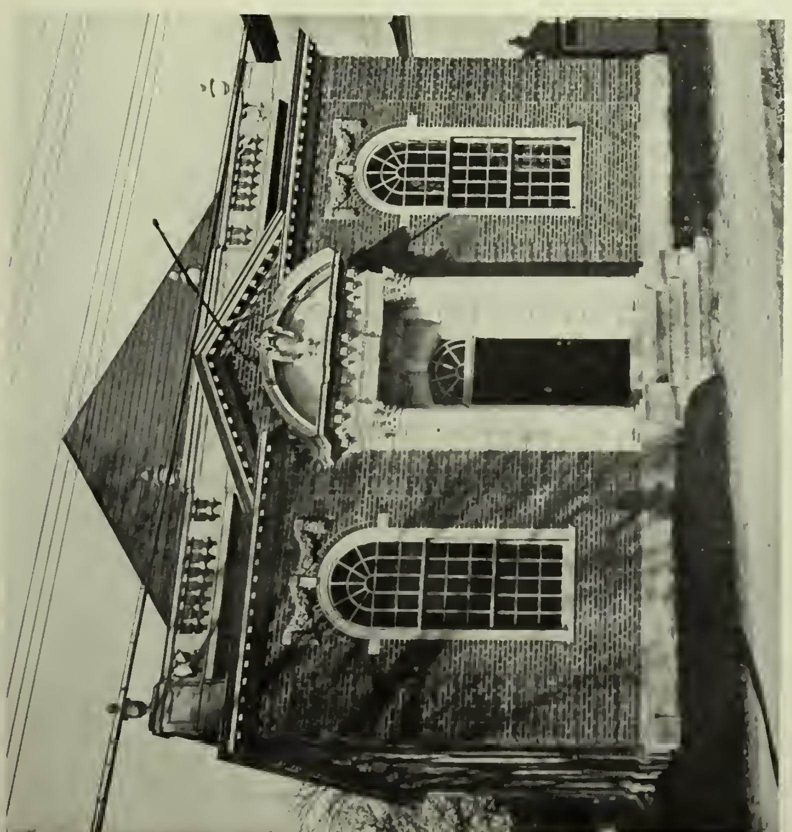
NEW YORK CENTRAL ENGINEERING DEPARTMENT ASSOCIATED



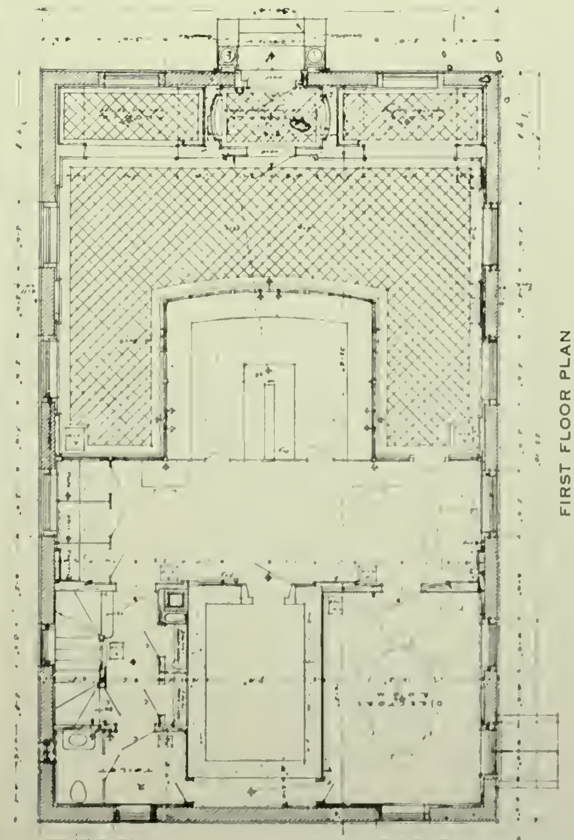
FIRST NATIONAL BANK IPSWICH, MASS
ANDREWS, JAQUES & RANTOUL ARCHITECTS



DETAIL OF FRONT ELEVATION



GENERAL VIEW



FIRST FLOOR PLAN

FIRST NATIONAL BANK, IPSWICH, MASS.

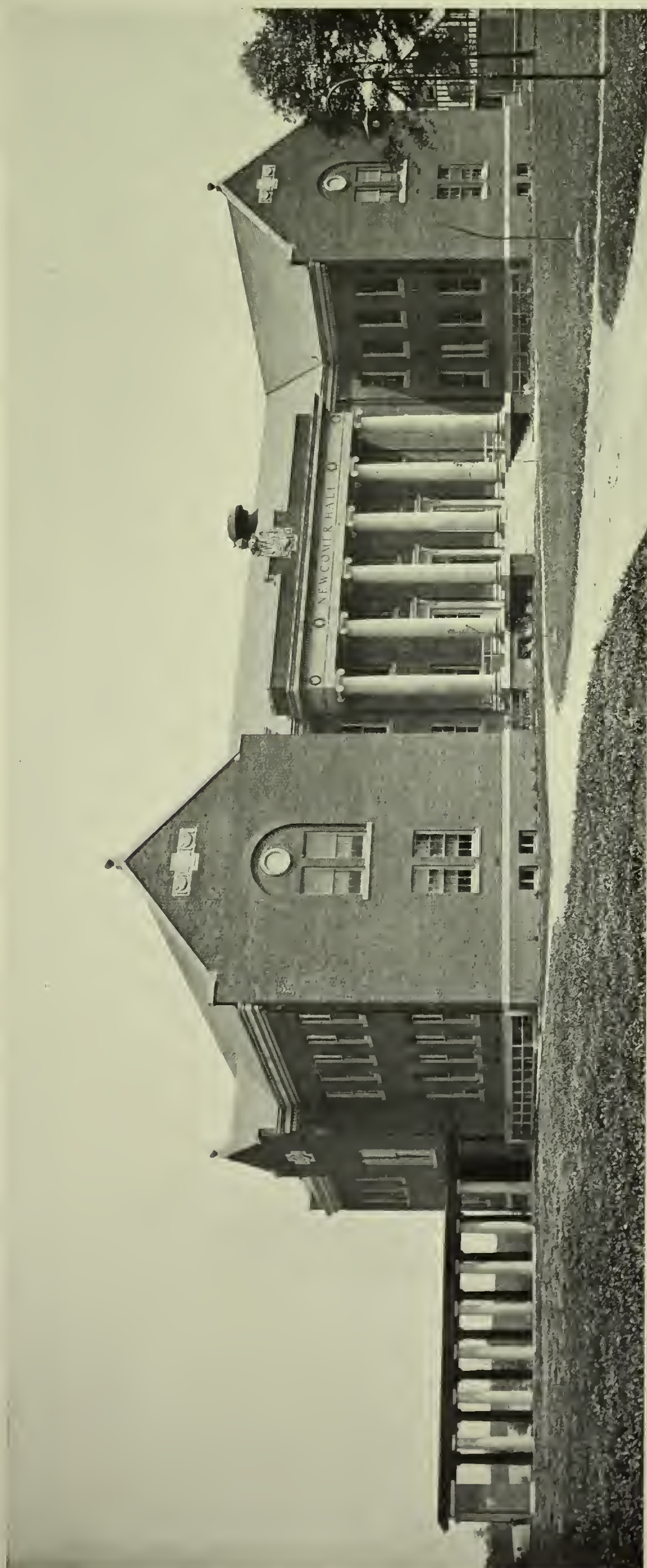
ANDREWS, JAQUES & RANTOUL, ARCHITECTS

BANKING ROOM

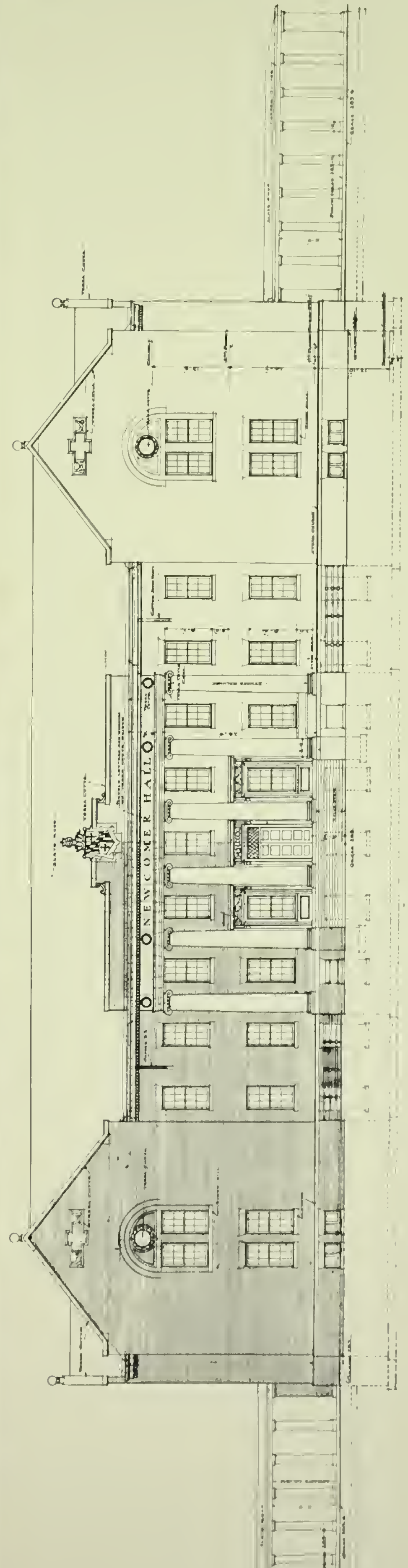
INTERIOR ELEVATIONS AND ONE QUARTER CEILING PLAN

FIRST NATIONAL BANK, IPSWICH, MASS.

ANDREWS, JAQUES & RANTOUL, ARCHITECTS



GENERAL VIEW OF NEWCOMER HALL

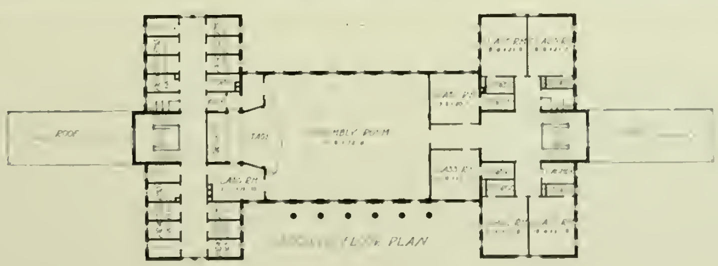


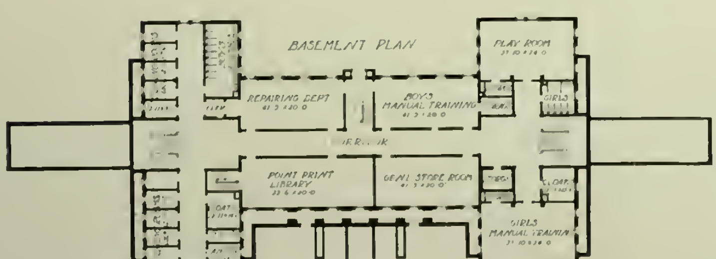
PRINCIPAL ELEVATION

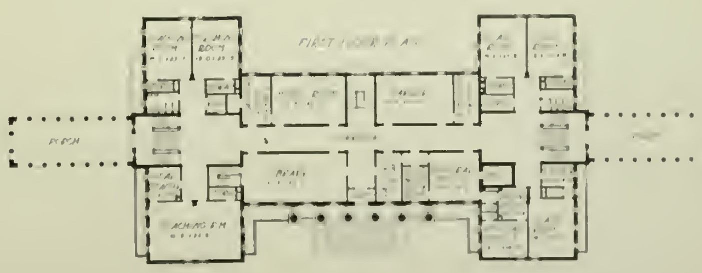
MARYLAND SCHOOL FOR THE BLIND, BALTIMORE COUNTY, MARYLAND

JOSEPH EVANS SPERRY ARCHITECT

DETAIL OF PORTICO, NEWCOMER HALL



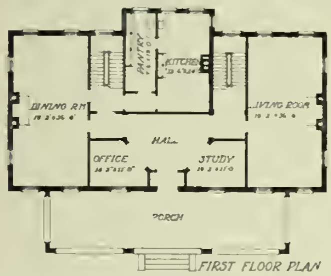




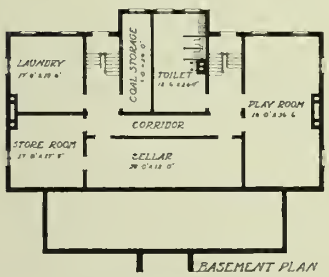
MARYLAND SCHOOL FOR THE BLIND, BALTIMORE COUNTY, MARYLAND

JOSEPH EVANS SPERRY, ARCHITECT

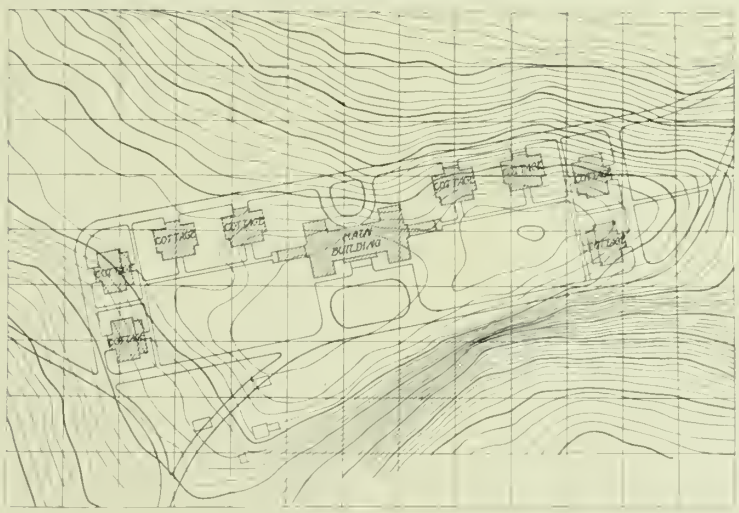
GENERAL VIEW OF GROUP



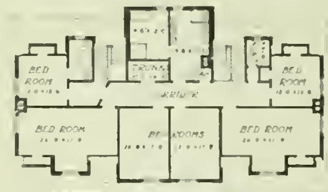
FIRST FLOOR PLAN



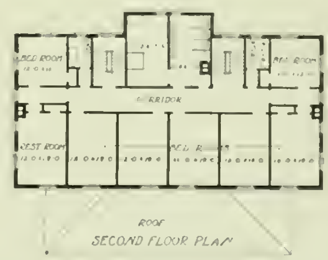
BASEMENT PLAN



GROUP PLAN



THIRD FLOOR PLAN

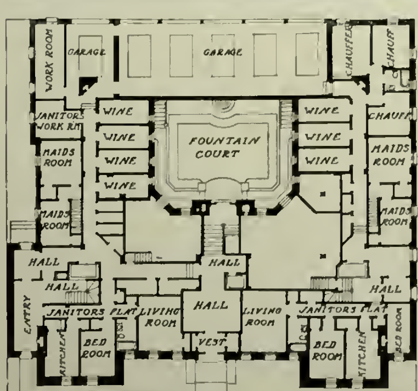


SECOND FLOOR PLAN

GENERAL VIEW OF TYPICAL COTTAGE

MARYLAND SCHOOL FOR THE BLIND, BALTIMORE COUNTY, MARYLAND

JOSEPH EVANS SPERRY, ARCHITECT

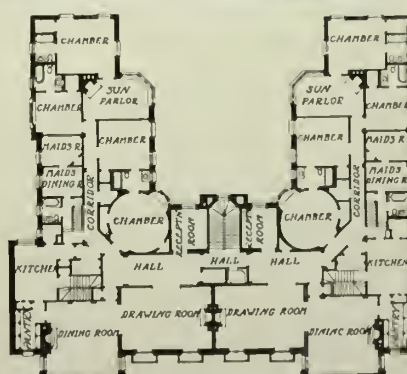


BASEMENT PLAN

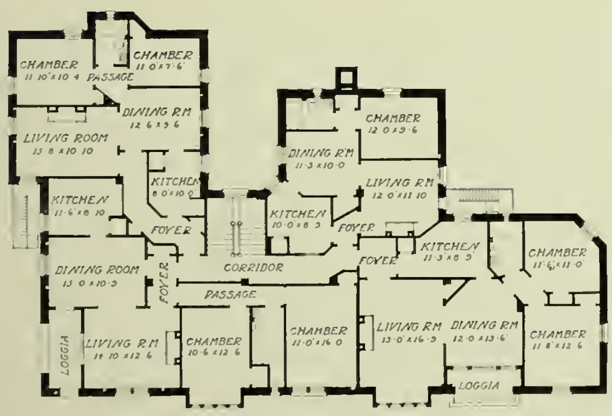
CHANDLER APARTMENTS

BELLEVUE PLACE, CHICAGO, ILL.

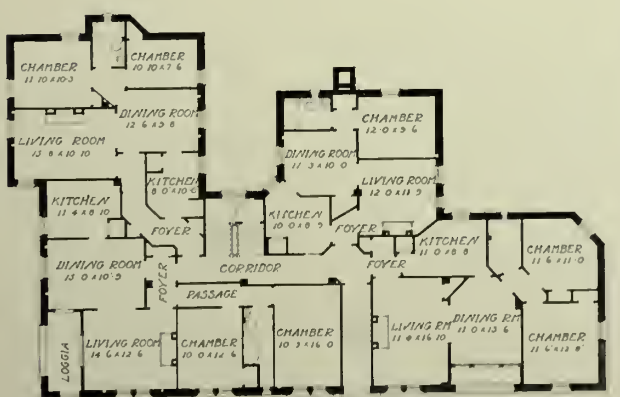
SCHMIDT GARDEN & MARTIN, ARCHITECTS



TYPICAL FLOOR PLAN



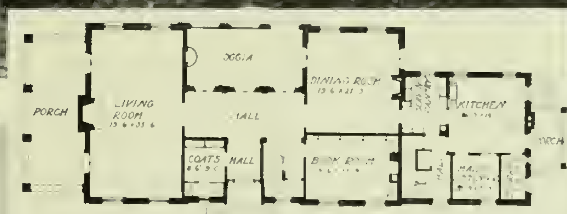
SECOND FLOOR PLAN



FIRST FLOOR PLAN

CANTERBURY HALL APARTMENTS, BALTIMORE, MARYLAND

E. H. GLIDDEN, ARCHITECT



FIRST FLOOR PLAN

HOUSE AT LAKE FOREST, ILL
HOWARD SHAW ARCHITECT

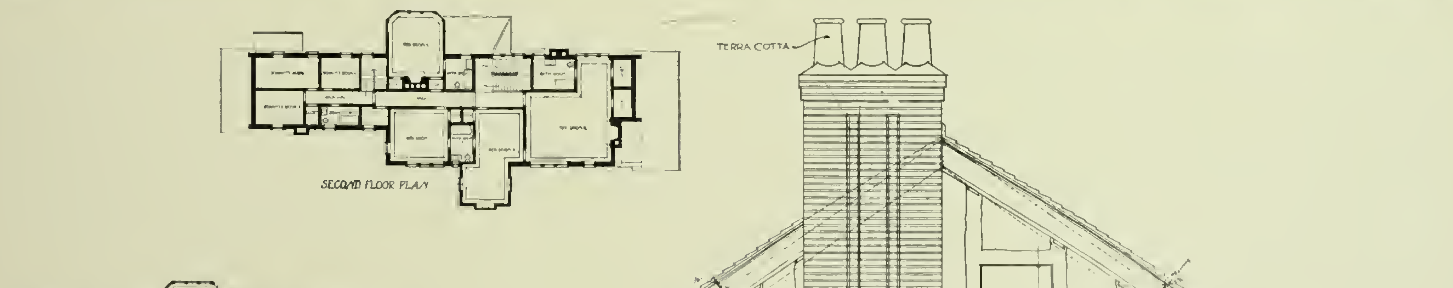
DINING ROOM

BOOK ROOM

HOUSE AT LAKE FOREST, ILL.

HOWARD SHAW, ARCHITECT

HOUSE AT GREAT NECK, LONG ISLAND, N. Y
WILLIAM ADAMS ARCHITECT



HOUSE AT GREAT NECK, LONG ISLAND, N. Y.
WILLIAM ADAMS, ARCHITECT

Architectural Jurisprudence.—Part VI.

THE ARCHITECT IN COURT.

BY WILLIAM L. BOWMAN, C.E., LL.B., OF THE NEW YORK BAR.

IN this paper we will consider some of the interesting phases of litigation over architects' services and those matters of interest to the architect in his capacity as a witness. A knowledge of the common defenses used in actions to recover for professional services is a safeguard which no architect should neglect. Those having experience are well aware of the attitude of the ordinary juryman. The public opinion that the doctor, lawyer, architect, engineer, etc., are all charging the limit, or "what the traffic will bear" is carried to the jury room with unfortunate results. In one of my own cases an architect was suing for two and one-half per cent for the preparation of working drawings of a $30,000 loft building. As a witness, the architect proved his contract of employment at the usual architectural fees; and as an expert, testified that the reasonable value of his services was the same as his contract price. The defense did not deny the contract of employment nor did they put in any evidence to the contrary as to the value of the work done, so that it became merely a question as to whether or not the architect had skilfully and properly performed his architectural duties so as to entitle him to the compensation claimed. When the jury returned from their deliberations they rendered a verdict for two hundred and fifty dollars ($250). At a loss to understand how they could arrive at such a small amount, I asked one of the jurymen whether it was a compromise verdict. I was then informed that several of the jurymen had claimed that they were familiar with the value of architects' plans; that they could get them for $50 a set; and since in the presentation of the case there had been marked as exhibits two sets of sketches, two sets of preliminary studies, and one set of working drawings, or five in all, they had allowed $50 for each set, or $250 for the services rendered. This ridiculous method of computing the value of an architect's services shows to what extremes juries may go in their deliberations.

In another case, where the architect was suing for $390 as a balance of a five per cent commission, the jury brought in a verdict of $200, having deducted $190 for damages to the owner, since the architect had permitted a plumbing system to be installed which deviated essentially from the plans and specifications. Upon this verdict the court as a matter of law then decided that such deduction showed that the architect had not substantially performed his architectural duties and, therefore, there could be no recovery by the architect, and the verdict for $200 was set aside. These examples and experience show that juries are uncertain quantities, and especially so when it comes to valuing professional services. In rural and in large manufacturing communities it is almost a rule that the value of such services will be very greatly reduced by the juries from the value set either by the professional men themselves or by experts whom they call to substantiate the reasonableness of their charges.

Having noted the eccentricities of this most important factor in litigation — the jury — and keeping this in mind, let us now consider some of the usual defenses used against an architect's action for services.

Defense of No Contract.

Where an architect sues for services and alleges a certain contract the defendant usually pleads a denial of such contract. That denial may be either because the defendant is not the real employer of the architect, or because the defendant believes the contract was different than that set forth. The question as to who is the proper party to sue often becomes of practical importance long before an action is thought of, since charges are made in the books, and bills rendered for partial payments, and these facts may tend to show the party to whom credit was given by the architect. If it should be the wrong party legally, it may cause trouble later when attempts are made to collect from another party. These difficulties especially arise in cases of agency. If the agent is financially responsible he can ordinarily be held personally liable, unless he exonerates himself by showing his authority to bind his principal or employer, or by showing that the contract made by him is binding upon such principal or employer. Thus an alleged agent for a church has been held personally liable for plans ordered for the church; again each of the signers of a church contract have been held responsible where the church legally and properly repudiated the agency. A failure to make a proper choice of whom to sue for services, while it may not be fatal, is, however, expensive in time and money. It is therefore a good business and legal policy to know authoritatively whom you are employed by and to make your book charges and render your bills against that party.

How Are You Going to Prove Your Contract?

This should be a simple matter, but experience has shown that it is often difficult where architects are concerned. An example of an architectural employment has just been reported as follows. An architect was given a chance to prepare plans and specifications for a large municipal building, his remuneration for his sketches and his employment for the preparation of the usual working plans and specifications and for superintendence depending upon the approval of his sketches by an art commission. His first sketches were disapproved, and he thereupon went to another architect for assistance. The testimony of the agreement made is reported in these words. The first architect said to the second, "If you can make me a successful plan I will do the best for you that a man can do. We are old friends. Here is your chance. . . . You say you are in your own business, you are looking for opportunities, take the risk with me. It is only three months; we must submit before election." The other replied, "What do you mean by saying that . . . you will do the best for me, etc.?" The first said, "If we win I give you a fair share of my commission." The second replied, "If I go into that you mean then to say, if we lose I get nothing and if we win I get a fair share?" Answer, "Yes." The second architect then made sketches and preliminary plans which were accepted by the art commission, and the first architect then received a contract from the city, carrying with it a fee of about $40,000. When the second architect asked for a paper confirming their agreement and specifying his share, the first architect offered him $40 a week to continue work or nothing. An action was then started by the second architect claiming one-half of the commission. The court in its opinion held that there was no contract. That since the terms of the agreement were not definite either as to the amount of commission to be divided or as to what a fair division would be it was not an enforceable agreement. This is but one of the many examples which could be given to show the loss of thousands of dollars to an architect by his failure to put his agreement in writing and have the terms definite. Those who have had experience, and it is hoped those who read this paper, will in the future always be able to prove their contract by the production of a signed written agreement, or else by letters of proposal and acceptance, concise in their language and definite in terms.

Defense of Conditional Employment.

The defense of conditional employment is the bane of the architect and his attorney when it becomes necessary to sue. Many people seem to have an idea that an architect is only too glad to prepare even complete working drawings for the chance of getting a job. This class of people often claim to act for somebody else, and are in addition either financially irresponsible or else of such political, financial or other prominence as to enable them to bluff the architect into dropping the matter. Among the numerous conditions which are used as defense are, satisfaction to the employer, a guaranteed limit of cost, employment conditional upon securing loans, or upon the employer deciding to build.

In some of the common law states satisfaction of an employer is a serious matter and an architect would probably be held similarly as an artist or a sculptor to prove that his plans actually did satisfy the employer, otherwise there could be no recovery for the services rendered. In other words, honest dissatisfaction of the employer in such states would prevent recovery by an architect. In most jurisdictions, however, it is probable that the question of satisfaction of an employer would be covered by the same rules as the satisfaction of the architect with regard to work done by a contractor.

The defense that the architect guaranteed the cost of the building to be erected in accordance with his plans and specifications is very common and at times dangerous. In a very late decision the court considered this question of guaranteed cost in an interesting way. The facts showed that a certain party incorporated himself and acted as architect and contractor. Representations were then made to the owners of a certain piece of property that a six-story hotel building could be built on the land at a cost not to exceed $300,000 and that the premises could be rented so as to make fair return upon the investment. The architect and contractor positively asserted, stated, and represented to the owner, that the maximum cost of the building, including all commissions, would not exceed $300,000. Upon these representations a contract was entered into for the architectural and contracting work and the building was commenced. During the construction the architect and contractor got the owner to assent to modifications so that the total cost, first, should not exceed $350,000, and then finally $400,000. Later, and after repeated demands for an estimate, the owner was then informed that the building would cost $510,000. At that time $460,000 had already been expended and the owner then stopped the work. Other contractors made estimates and it was shown that the building would cost $700,000 when completed. At the same time the lessee to be refused to accept a lease and pay eight per cent per annum upon this cost. The owner then started an action for damages against the architect and contractor, and the court held that there was guarantee here that the building should cost but $400,000 under the modified agreement; also, that the defendant was not, as he claimed, an expert architect; also that the architectural services for which the owner had paid $70,000 were of no value to him, and, therefore, he should recover back that sum and in addition the excess over $400,000, which would be reasonably required in completing the building according to the plans with the agreed modifications. This total recovery, amounting to about $300,000 was rather a serious lesson for the pseudo architect and contractor.

Our considerations of this particular matter recommend, then, that an architect should always make it clear to his employer that he does not guarantee a limit of cost, that he merely makes an approximate estimate, and his compensation should never be conditional upon anything save the usual professional qualifications and duties.

In the strenuous striving for business to-day the contingent fee has secured a foothold which is seriously interfering with the character of all professional work and the standards of professional men. In fact, many people now will not give a lawsuit to a lawyer, unless he will take it on a contingent basis, nor a building to an architect unless he will make his payment contingent upon his securing a building loan, or provided only the building is erected. A solution of this evil for a crowded profession is hard to find, especially if there are different camps in the profession. The outcome cannot be foreseen, but it is incumbent upon every true architect by action at law or otherwise to prevent the free graft which is being worked upon his profession by even some honest but unthinking people.

Defense of Unskilfulness or Negligence.

Under these defenses the employer usually attempts to reduce the amount of recovery of the architect for his services by the amounts which he believes he has been damaged, due to such causes. Where a recovery is allowed the architect because he substantially performs his contract, such recovery should be the contract price or the reasonable value of his services reduced by the loss caused the owner through any injurious departure from the plans and specifications or by the cost of remedying the defects in the construction which would have been discovered had the building been given proper supervision. The evidence in such cases is interesting to note. It has been held that a report by the architect showing over one hundred items in which the building as completed did not comply with the plans and specifications was admissible, as this would apparently show the lack of proper supervision. Again, where an architect certifies that defective work conforms with the contract, the presumption is either that he did not inspect, or that he was negligent in so doing.

Summary.

Our considerations have shown us the chief difficulties confronting the architect when he attempts to recover compensation. It would almost seem better that the architect do less work and always be assured of his payment in accordance with a written contract, specific in its terms. The general public will not recognize the value of his services and that prejudice is carried into court by the men who have to be chosen as jurymen. The result is, that no matter how good a case the architect may have, he should never expect to recover the amount he claims or the Institute charges in full because of the attitude of the jury and because there is sure to be a counterclaim against him for one thing or another which will generally appeal to the jury. It is therefore recommended that most disputes respecting an architect's compensation should be settled, if possible, by arbitration; or, if necessary, by having a competent attorney take it up solely with the intention of settling. In this way the architect will often secure as much compensation as he would by a long-drawn-out law suit, and save himself the enmity which such action always arouses. This advice, however, does not apply in those cases of alleged conditional employment or cases of oppression and graft.

As a Witness.

Probably there is no other class of work where there are so many controversies and lawsuits as are found in connection with construction work. In actions thereon the architect is a necessary witness, because of his intimate connection with the job. Can he be compelled to act as such a witness upon the ordinary subpœna and for the regular, small witness fee? There seems to be no question but that his employment on his percentage commission does not include such services. Yet it is well settled that an architect may be compelled to go to court, by the service upon him of a subpœna and payment of the legal witness fees. His testimony can then be demanded as to what he saw, heard or did on the job, or in connection with the matter involved with the action, but he cannot be compelled or required to prepare himself by an examination and research to give a technical opinion without increased compensation. In other words, as long as he acts merely as an ordinary witness who is supposed to supply to the jury only the "raw materials" for judgment, or, as long as he merely acts as the eye, or ear, etc., of the jury to represent to them and reproduce for them certain scenes, then he cannot refuse to testify without extra compensation. When he is asked to reason or to state his knowledge, or to give his opinion based on a hypothetical question, then he is entitled to compensation beyond the customary witness fees.

This consideration shows us that an architect who expects trouble over work being done under his supervision should always try and secure an agreement with his employer covering the extra work necessary to prepare for and testify at an arbitration or at a trial in court. An architect should always expect controversies and even litigation respecting his employment. On this account, and because he is often the sole cause of the litigation between his employer and the contractor, he must be prepared to support his professional contentions and actions, To-day in many municipal contracts all orders, directions, notices, satisfaction or dissatisfaction are required to be put in writing by the engineer or architect, which means that no consideration need be given conversations or oral directions. This is an excellent contract condition and this requirement should be adopted by the architect even in private work, as it reduces to a minimum many questions of veracity which are sure to arise when matters get into court. Daily reports by the clerk of the work, personal records made by the architect as to conditions at the times of his various visits on the job, and also personal records of all conversations made soon after such conversations are held, photographs, etc., can make an architect's testimony almost conclusive and at the same time give him a standing and reputation with the jury which is difficult to assail. Carelessness and negligence in these respects have lost owners many lawsuits and as a necessary consequence it has resulted in some disrepute being cast upon the architectural profession. An owner in his dealings with his contractor usually acts under the advice of the architect until the time comes to actually start or defend an action. Thus it is that when an attorney is engaged in the matter, the architect has already often made or ruined the owner's chances of success.

In supporting his estimates and certificates, the architect must always expect severe cross examination, since it is only by showing fraud or collusion that the other party can hope to win his case. Arbitrary and high-handed methods by the architect, either in his supervision work or in his attitude as a witness, are sure to condemn him with the jury on the case and hence it is especially desirable that the architect on the witness stand assume, if possible, the position of a disinterested professional man whose only idea is that of justice and equity between the litigants. Honesty and frankness, especially in answering questions of a cross-examiner, will often make a great difference in the credibility which the jury will give his testimony. It is remarkable how quick jurymen are to notice bias, prejudice, or an inclination to dodge; and slight discrepancies in testimony very frequently cause the entire evidence of a witness to be wholly disregarded. The cure for such evils is too obvious to need mention.

As an Expert Witness.

Not many years ago the rules of evidence were so strict that the expert was called upon on all occasions when any special knowledge was required and even to prove matters of common knowledge. There has been a tendency of late to do away with the expenses and troubles caused by calling such experts to prove matters of knowledge easily available to all. The conflict between courts as to their knowledge is amusing; for example, while the Supreme Court of the United States does not know of the dangerous nature of cigarettes, yet it is known to the Supreme Court of Tennessee. Thus it is that the various jurisdictions have widely different rules regarding the necessity for the use of experts. A judge is not required to know a particular fact judicially and he may even decline to take any cognizance whatever of an alleged fact of common knowledge. On such occasion there is necessity for proof of such matters. In this connection a judge cannot be expected or required to make computations, although he may do so if he so desires.

Until lately the name of expert was given to a witness, "first: who may contribute facts known to those in his trade or calling; second: who may submit inferences and conclusions, acts of reasoning based, more or less, complete on observation; and third: who may offer his judgment as an act of pure reasoning rested upon the assumed truth of certain facts stated to him in the form of a hypothetical question." The latest text-book on the subject distinguishes between a skilled witness, who should state facts, or, by way of inference, what he claims to know as covered by the first and second definition above; and the real expert, who should testify as to his reasoning upon facts known to others. That is, technically speaking, the expert witness should be confined to those who pass upon the questions which are to be decided by the jury as aids to the jury to enable them to reach a right conclusion from the facts before them.

Whether or not an architect can qualify as a skilled witness or as an expert is a matter for the judge, who is trying the case, to determine, the requisites being adequate knowledge and experience respecting the matter in question. Generally speaking, anybody who has had any experience is competent to act as a skilled witness as differentiated from an expert. An architect may, of course, testify as to his inferences from what he has observed regarding building matters; he may testify that sufficient shoring has been done for the protection of a specified building; he may state what is the cause of a given effect in a building which has come under his observation, or in like manner, he may assign a cause for any observed occurrence in the same connection. An architect may properly state the probable cost of a house or church, or other structure observed by him, and this has been held even in a case where the architect was refused admission into a building and could only make his estimate from seeing the outside of the building. He may, of course, also estimate the expenses of specific repairs to any structure. It has been held that an architect would be allowed to estimate after observing the services rendered by a particular workman as to what they are fairly worth. He may also state, if an expert, whether a piece of work has been well done and he may estimate its value on this basis. Whether or not a given workman is skilful in his calling, is something as to which the conclusion of an architect as an expert may be relevant. Architects who have had adequate experience may state how houses, buildings, or other erections are, or should be, constructed or repaired and in what manner operations concerning them are properly performed. He may also testify as to the durability of timber of various kinds, its strength and consequent adaptability to special uses as part of a house for the stringers, or other parts for other structures; the ability of the usual building material to resist certain strains; the effect on them of changes in temperature, or of weather condition or decay, etc.

Only an architect may properly testify as to the value of the services of another architect, although, of course, the jury are not required to acquiesce in the estimate of the witness. This rule of proof by members of the same profession, however, is not always carried out to its fullest extent. In one instance where architects were suing for compensation, they offered proof by a contractor as an expert witness of a custom that the employment to make plans for a building carried with it an employment to superintend the construction. The trial justice refused to accept such testimony, but on appeal the case was reversed on the ground that a contractor, if anybody, would be sure to know of any such custom, and hence his testimony should have been received.

When it comes to purely expert testimony or the answering of hypothetical questions, the expert witness will be found to testify in the usual case more or less immediately and exclusively from his reading, that is, from statements in modern treatises. The additional elements of proof which the experienced witness would supply are as to personal experience and as to the technical or professional standing of the treatise itself. The late decisions show a liberal attitude in receiving technical testimony based on professional reading. In the course of the cross-examination the expert witness must expect to show his reasoning supporting his judgment and opinion given on his direct examination. The latest text-book states: "Conjecture and speculation of the expert will be excluded. His judgment must be something more than a guess. The field of the expert is one of theory and hypothesis. He deals with the future, the unobservable, the remote. His task is to explain, to foresee, to reconcile things apparently in conflict. Yet the expert is no more entitled to give an absolute guess than any other witness would be. His conjecture pure and simple has no place in judicial administration. The expert can declare only what he sees in the facts detailed to him. His special knowledge, more carefully trained mental process and the like, confer upon him the ability to see more in the facts than other people do. This may make him peculiarly useful to the jury, but his usefulness ceases where his guessing begins."

The expert witness has been the subject of a great deal of discussion in late years. The fact that he is paid by the party for whom he is testifying only makes him, to a greater or less extent, a partisan of his employer. The conduct and testimony of certain experts have also given this class of witnesses little or no standing in many courts. In fact, with the policy now of most experts to accept retainers, it often becomes merely a question as to which party has the most money and can afford to retain the most prominent experts. It is commonly rumored that an expert can be paid to testify to anything, and such a reputation is not conducive to belief in the statements of any expert by either judge or jury. Many recommendations have been made to correct the present evils in this regard; the chief one being that when an expert is needed he should be employed by the court, similarly as the interpreter is to-day, and why not? What distinction is there between an interpreter of a language and a scientific interpreter of the results of certain data or facts? One text-book in upholding experts states that they did not deserve their present disrepute, as they were no worse than the ordinary everyday witness. While that may be an excuse, it is a suspicious comment on the veracity of witnesses in this country. Until some change is made in the method of employing experts, it is especially important for the architect and all other expert witnesses to live up to the honor and dignity of their profession, and in this way attempt to modify and better their present unpleasant reputation in this regard.

The Lighting of Public and Semi-Public Buildings.

FOURTH PAPER.

ACCOMPANIED BY A SERIES OF ILLUSTRATIONS SHOWING SPECIFIC LIGHTING INSTALLATIONS.

BY L. B. MARKS,
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AUDITORIUMS, ASSEMBLY HALLS, AND ARMORIES. In all places where public gatherings are held no unshaded lamp should be placed within the view of the audience. The practice of lighting public places with lamps within the field of view is unfortunately still quite common and cannot be too severely condemned, as there is no excuse for such an abuse of the eyes of the public. Well designed lighting installations, for the illumination of auditoriums, assembly halls, armories, etc., can be carried out by direct, indirect, or semi-indirect lighting, the choice of the system of illumination depending upon the particular conditions to be met. In general, a direct lighting system with proper reflectors and shades is best suited to meet extreme conditions of ceiling height.

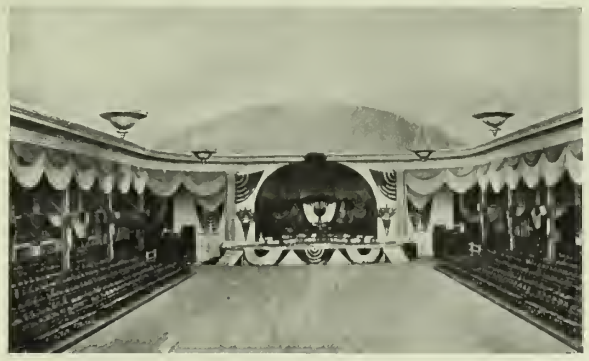


FIG. XXIV. STEEL PIER AUDITORIUM, ATLANTIC CITY, N. J.

THE above illustration shows a targe auditorium at Atlantic City, illuminated by indirect lighting. This auditorium is used for conventions, exhibitions, dancing, and musicales. The data relating to installation are as follows:

Dimensions of Auditorium ....16,100 sq. ft.
Ceiling Height: 38 ft. 8 ins. at center; 27 ft. at sides.
Outlets 7
Watts, 12,000....Watts per sq. ft. 0.75
Average Foot-candles 2
Distance, Lamp to Ceiling....72 ins.

NOTE.—Each of the six fixtures contains 20-100 watt tungsten lamps backed by silvered mirror reflectors, and housed in a composition opaque bowl 64 ins. in diameter.

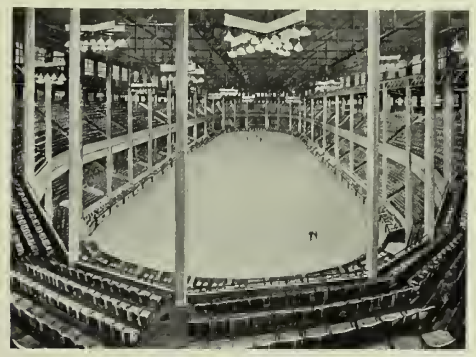


FIG. XXV. DIRECT LIGHTING IN ST. LOUIS COLISEUM.

THE auditorium shown below seats upwards of 3,000 people, and is illuminated by direct lighting fixtures. Each of the large central tighting fixtures contains eight art glass octagonal domes housing lamps backed by distributing prismatic reflectors.

FIG. XXVI. GAS ILLUMINATION IN PHILADELPHIA ARMORY.

THE floor area above illuminated by direct lighting is 250 ft. x 325 ft. and the lighting equipment consists of 1,000 lamps backed by satin finished prismatic reflectors.

THE above illustration shows the illumination of an armory by gas arcs having five burners each. The method of ignition is by pilot flame.

FIG. XXVII. DIRECT LIGHTING INSTALLATION AT GREAT HALL, COLLEGE OF THE CITY OF NEW YORK.

FIG. XXVIII. SPECIAL SEMI-INDIRECT GAS LIGHTING INSTALLATION AT TAFT HALL, AUDITORIUM ARMORY, ATLANTA, GA.

THIS illustration shows a special gas lighting installation in Taft Hall, Auditorium Armory, Atlanta, to provide special lighting for an automobile show and a gas convention held in the building. The entire installation was carried out by semi-indirect lighting from floor standards, the design contemplating a 50 per cent indirect component of the light, that is to say about half the light was directed to the ceiling to secure better diffusion. The room is approximately 75 feet square and is provided with ten lighting units, each consisting of fifteen upright standard mantle gas lamps.

FIG. XXIX shows a night view of the auditorium of the Allegheny County Soldiers' Memorial, Pittsburgh, Pa., which is illuminated by mercury-vapor lamps, nitrogen-vapor tubes, carbon and tungsten incandescent lamps. A complete description of this installation is given by Mr. Bassett Jones, Jr., in the Transactions of the Illuminating Engineering Society, Vol. 6, 1911, from which the following excerpts are taken:

The view of the ceiling, which is the principal architectural feature of this room, could not be obstructed and hence in any case the use of hanging fixtures had to be avoided. The treatment of the ceiling centers around the light centers, which are also architectural centers when the room is lighted by daylight from without. These nine centers consist of circular panels of rich pierced plaster ornament, above each of which are suspended two 18-ampere flame arc lamps,* so located and equipped as to cause the plaster lines to stand out in bold relief against a brilliant flickering background. The general effect is that of a scintillating jewel of intricate pattern. One of these circular panels forms the central feature of each of the large panels into which the entire ceiling is divided by the deep beam soffits under the steel trusses supporting the floor above.

A group of glass sashes is arranged around each of the flame arc panels and forms a design of geometrical surfaces broken up into small figures by the sash frames. A box reflector is placed over each sash.

Each of the main rectangular panels, consisting of a flame arc center and its group of sashes, is framed by a concealed nitrogen vapor tube lamp provided with a reflector that projects the light through a slot entirely surrounding the panel. Each panel is thus bordered by a band of rose-colored light.

The ornamental plaster mullions separating the sashes in each panel are provided with plaster rosettes equipped with exposed incandescent lamps employed to accent architectural features and show off the elaborate decorative treatment of the plaster work.

Glass panels are located close to the side walls, one over each window, and over each is provided a parabolic reflector containing a 400-watt mercury arc. The light from these lamps is directed against the walls of the room and through the windows and is so modified by the glass in the panels as to acquire a pale sky blue tone.

No one who has not seen this room lighted can imagine the grandeur of the effects, both from the interior and the exterior of the building. As one approaches the building from without, the glory of the ceiling is seen only through the streams of light flooding from the windows between the columns of the majestic façade. The full splendor of the interior is perfectly set off by the artificial light. The wonderful color treatment of the walls receives a new interpretation, becoming soft and rich in the flood of golden light that is thrown upon it. Each of the large panels seems to be suspended free in the space marked out for it by the beam soffits, while the entire ceiling is apparently framed by a border of soft moonlight.

The lighting of the auditorium is controlled by switching devices in a closet off the stage so that any feature of the lighting may be turned on or off at will. It is intended that either the light from the glass sashes or the light from the exposed lamps under the ceiling will be sufficient for ordinary purposes, while the entire lighting system will be used only on special occasions. As a matter of fact the illumination has proved so popular as an exhibition in itself that it has been featured on every occasion, the audience usually remaining to view the various effects.

The cost of installing the auditorium lighting was remarkably low, as the cost of fixtures appropriate for lighting this immense room would have almost equaled the cost of the present illuminating equipment of the entire building.

The nitrogen-vapor tube lamps, mercury arcs, and flame arc lamps are used solely for effect, efficiency not being considered, since the particular effects desired could not be obtained in any other way.

Frosted-tip tungsten lamps were first used in the rosettes under the ceiling, but the great intrinsic brilliancy and excessive whiteness of the light from these lamps when contrasted with the generally soft yellow tone of the rest of the illumination produced unfortunate results, and with the exception of the center lamp in each group, they were replaced with 8 candle-power frosted-bulb carbon-filament lamps.

Thirty different effects can be obtained in the lighting of this ceiling, fourteen of which are really beautiful. The most interesting series of color changes is obtained by starting with the mercury arcs alone, and adding the remainder of the illuminants in the order following: (1) Nitrogen vapor lamps; (2) flame arcs; (3) sashes; (4) exposed incandescents. The most remarkable effect is obtained by using only the nitrogen-vapor lamps and flame arc lamps. The ceiling then appears like a huge decorative grate above which great fires are burning. The maximum intensity on the floor then reaches 0.7 foot-candle. Adding the mercury-vapor lamps to this combination does not change the illumination on the floor, due

* Since this paper was written the author has been advised that the use of flame arc lamps in this building has been abandoned and tungsten incandescent lamps substituted therefor.

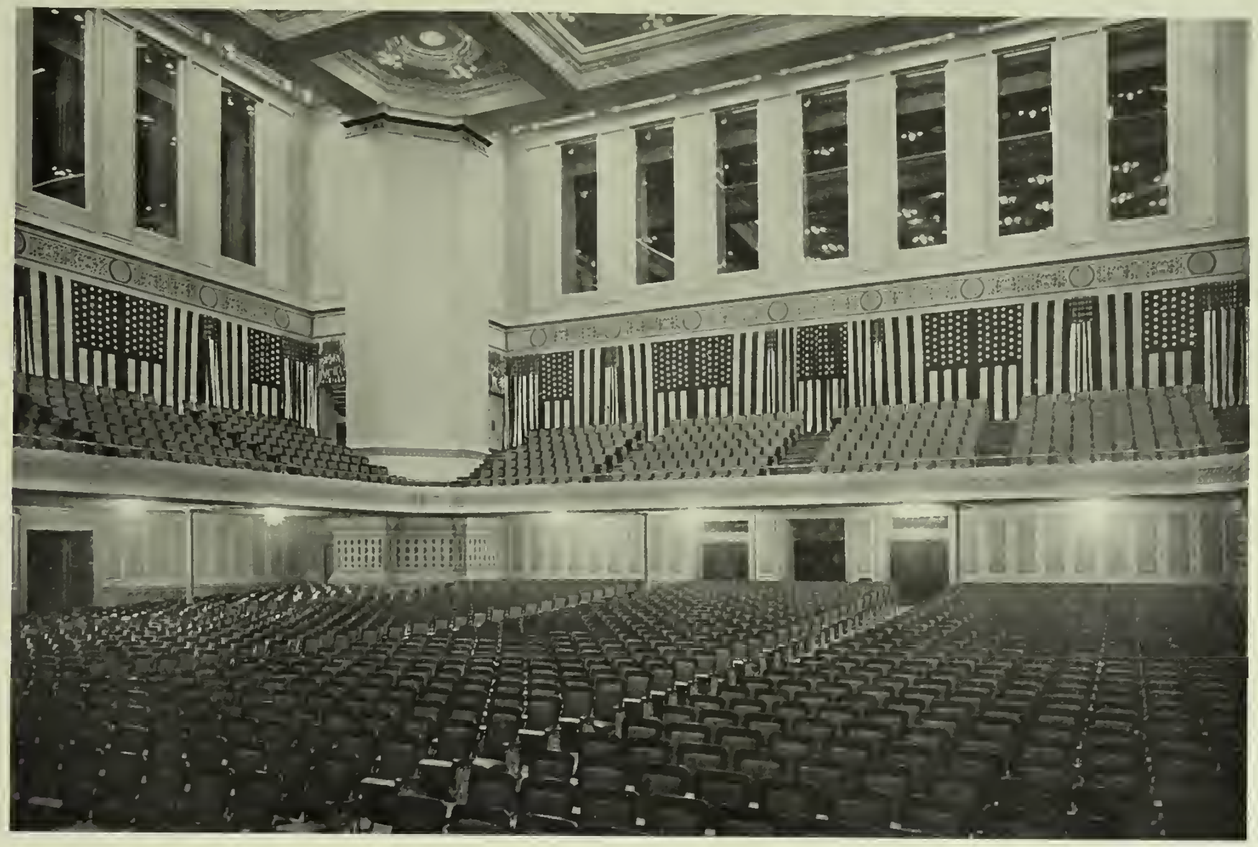


FIG. XXIX. NIGHT VIEW OF AUDITORIUM, ILLUMINATED BY MERCURY VAPOR TUBES, NITROGEN VAPOR TUBES, CARBON AND TUNGSTEN LAMPS.

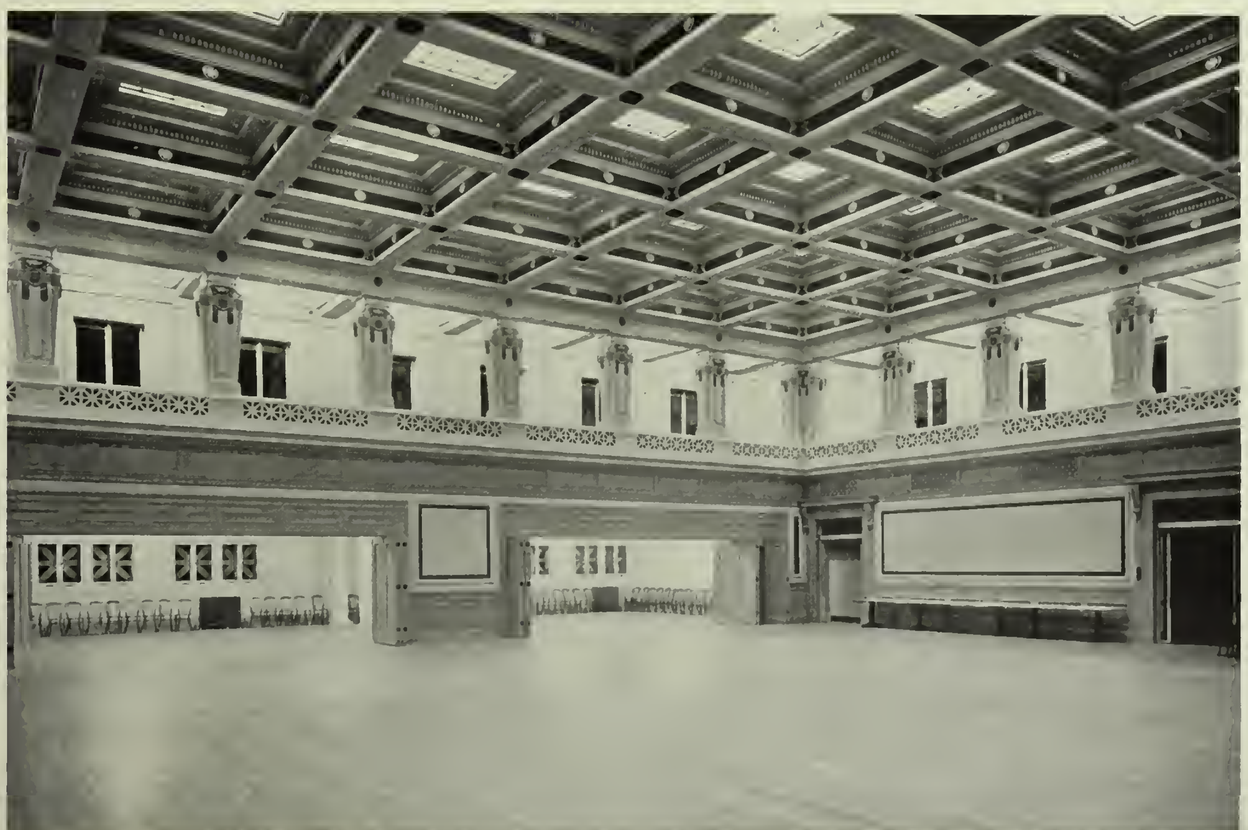


FIG. XXX. NIGHT VIEW OF BANQUET HALL AND BALLROOM, ILLUMINATED BY TUNGSTEN LAMPS, SCREENED BY AMBER SHADES.

ALLEGHENY COUNTY SOLDIERS' MEMORIAL, PITTSBURGH, PA.

to the form of the reflectors used with these lamps, but the effect produced is most weird and profoundly alters the color of the walls to a gray-blue. The light from the nitrogen-vapor lamps so completely detaches the panels from the ceiling that they appear actually to float in their frames and the slight flickering of the light that sometimes occurs, seems to set them moving.

There are two general color effects obtainable in the illumination of this room, each of which may be varied through several tones; these are rose-gold and silver-blue.

The maximum intensities of illumination on the floor for different combinations were as follows:

1. All lamps in use .... 3.82 foot-candles
2. Exposed incandescent lamps and sashes .. 3.10 ,, ,,
3. Sashes only .... 1.46 ,, ,,
4. Exposed incandescent lamps only .... 1.74 ,, ,,
5. Nitrogen tubes only .... 0.40 ,, ,,
6. Flaming arc lamps only .... 0.30 ,, ,,

The above readings were taken directly after the work was completed and with a large amount of accumulated dust and dirt on the sashes. The results are therefore the worst that can be obtained, since once the sashes are cleaned the box reflectors will prevent any serious lowering of the intensity due to a similar cause. The loss due to dirt amounted to at least 20 per cent of the lamp flux.

Fig. XXX shows a night view of the banquet hall and ballroom of the same building, illuminated by tungsten lamps screened by amber colored shades. There are forty-nine glass sashes in the banquet hall ceiling, each sash forming the top of a ceiling coffer. The area of each sash is 25 square feet, from which ten per cent should be deducted for sash bars and mullions, leaving 22.5 square feet net glass area per sash — a total glass area of 1,100 square feet. Above each sash is a box reflector similar to those used over the sashes in the auditorium ceiling. Each reflector contains eight 40-watt clear-bulb 112-volt tungsten lamps.

Mr. Henry Hornbostel, one of the architects of the Allegheny County Soldiers' Memorial, comments on the illumination features as follows:

"It is very curious to realize that illumination of buildings nowadays may be, and often should be, different from the illumination of buildings, say thirty or forty years ago. Then it was a question of merely getting light. To-day it is not so much a question of merely getting light as it is a question of getting a charming, fascinating, pretty, and useful light. Yet it is a very curious fact that the old tradition, or the spirit of imitation, or the spirit of custom, still shows itself in the work of a great number of our illuminating engineers and architects. The old-fashioned idea still clings to us and the new conception of things is taken up in a rather hesitating way.

"Illumination to-day is like painting; it is like decorating a wall. Some time ago walls were so constructed as to make them warm. To-day the walls are so decorated as to make them beautiful. The same tendency is or should be true of illumination. To-day one should illuminate his room so as to make it charming, so that the complexion looks flattering, especially the case of rooms used for festive purposes. It is noteworthy that in the homes the little standing lamp, with a little shade over it, is coming more and more into prominence. The reason is that this type of lighting device makes a person look best. It makes everybody in the home look pleasant and charming. A person does not care whether it is or is not efficient, or whether its radiance is very intense or not, or widely distributed, for if he wants to read a book he goes to the little lamp and reads there. Thus, the tendency to flood everything with light, that showed itself shortly after the cheap use of the electric light was discovered, so that every interior was a-glare with unnecessary light, that made one decidedly uncomfortable when he first entered from the dark streets, has been gradually overcome by common sense and good taste. Such over-lighted interiors can never be made to feel homelike. They have, in fact, a curious psychological effect — they produce a nervous excitement that makes a person desire to screech and dance and amuse himself in a way that will release a maximum of nervous energy. Most interiors should, in fact, appear homelike, and must be lighted so that they will so appear. On the other hand, the interior that is to be used for amusement must be considered solely from the point of view of the use to which it will be put, and lighted appropriately. One does not want to listen to fine music in a gay ballroom, nor does he feel like dancing in a church. Economy from the viewpoint of illumination can have but a very minor place in the study of such cases. The ballroom, for instance, is a place where people go to have a good time. It is a luxury, and no place for the practice of economy; it must be lighted in the best way, so as to make it cheerful and bright and joyous; and efficiency as an illuminator must be measured by such results, and not at all on the basis of cost per night to operate. The value of the installation is then solely in the fact that everybody enjoys dancing in that room. In fact, the proprietor simply says, 'Go on and spend as much as you want, as long as I can get customers.' That is modern economy. That is the spirit of the times.

"But brilliancy is not the only scale to play upon. There is also the use of colored lights to be considered, and here is a field that possesses almost unlimited possibilities. One can do with colored lights almost anything he wishes. They may be used as a painter uses his tones and tints in decorating an interior. A person can decorate a room in colored lights and make it ridiculous, and again he can make it dignified. He can use colored lights in the scheme of decoration so as to accent a religious note, or he can do exactly the opposite. It is like working different tones into a painting, and, in fact, he is doing far more than merely lighting the room, he is producing effects that will be pleasant at night time and may add decidedly to its charm and beauty."

FIG. XXXI. GAS LIGHTING INSTALLATION. EVANGELICAL CHURCH OF THE HOLY COMMUNION, PHILADELPHIA, PA.

This illustration shows a gas lighting installation in which reflex burners are used, controlled by a main cock at the rear of the church. The gas in these fixtures is ignited by torch. The pulpit is illuminated by lamps, located behind the pillars, and controlled by an independent pilot line and main cock.

The illuminating engineer should co-operate with the architect to produce the desired lighting result in the most economical and effective manner.

CHURCHES.

THE old-time feeling that the interior of a church should be illuminated by "a dim religious light" seems to be giving way in modern times to the feeling that the interior should be well lighted, that is to say, sufficiently well lighted to permit of reading a prayer book with ease. There is also a growing feeling that the lighting should be such as to display to the best advantage the architectural features of the interior and to secure such beauty as may be afforded by a suitably illuminated color scheme of decoration.

The ancient temples were sometimes placed and their windows so arranged that the sun's rays centered on the altar. The custom still survives in many modern churches, by bringing the chancel out in strong relief by means of well-planned day and artificial lighting.

Specially designed reflectors can be easily concealed behind the sanctuary piers or around the tympanum of the arch, thus flooding the altar or pulpit with light, without the source of light being visible to the congregation.

If the reflectors are not properly designed to produce an even tone of light, a very spotty and unsatisfactory illumination will result. In some cases the lighting effect can be improved by the use of electric dimmers, by which the intensity of the illumination can be regulated at will.

Where the height of the chancel warrants, the reflectors can be arranged to raise and lower, thus making it easy for an attendant to clean them and replace burned-out lamps.

Fig. XXXVI, on the next page, shows the auditorium ceiling in the Ansche Chesed Temple, New York City,

FIG. XXXII. DIRECT LIGHTING IN ST. LAWRENCE CATHOLIC CHURCH, CINCINNATI, OHIO.

THIS illustration shows the interior of a church formerly illuminated by lamps on standards mounted on the pews, but which is now lighted by a system of general illumination from lamps located near the ceiling. The following data apply to this installation:
Ceiling Height of Main Aisle, 60 ft.; of Side Aisles, 30 ft.
Dimensions .... 70 ft. x 140 ft. Outlets 22
Fixtures: 7 5-light (100-watt lamps) over center aisle; 7 4-light (60-watt lamps) over each side aisle; 1 4-light (60-watt lamps) under the gallery.
Watts, 7,100; per sq. ft., 0.73. Distance, Lamp to Ceiling, 1 ft. 6 ins.
NOTE.— Prismatic reflectors used throughout.

FIG. XXXIII. DIRECT LIGHTING INSTALLATION IN CHURCH AT SEWICKLEY, PA.

A DIFFUSED direct lighting installation where the lighting fixture consists of a single acorn shaped pendent globe which houses an electric lamp. The glassware is sufficiently dense to hide the view of the glowing lamp filament and to secure an even and soft illumination.

FIG. XXXIV. INDIRECT LIGHTING IN EBERHARDT MEMORIAL CHURCH.
Ceiling Height, 40 ft. Dimen., 5,600 sq. ft.
Outlets .... 7 Fixture ..... Gothic
Watts, 5,600 .... Watts per square foot, 1.0
Average Foot-candles 2.5
Ceiling and Wall Tint .... Flat White
Distance to Ceiling .... 78 ins.
NOTE.— Six fixtures hang 78 ins., 1 fixture hangs 52 ins.; 1 center fixture, 16 150-watts; nave 2 fixtures, 5 100-watts each; transept 2 fixtures, 4 150-watts each; rear gallery 4 100-watts; over pulpit 4 150-watts.

FIG. XXXV. NIGHT VIEW OF ST. ALOYSIUS CHURCH, SPOKANE, WASH.

A NIGHT view of a church interior, showing concealed lighting from coves combined with diffused lighting through a glazed opening in the dome.

FIG. XXXVI. ILLUMINATED COLORED SKYLIGHT, ANSCHE CHESED TEMPLE, NEW YORK CITY.

containing a skylight glazed in an harmonious combination of rich colors, the prevailing tint of which is golden amber, supplemented by several colors, mainly shades of green and red. This skylight is lighted by thirty-six 100-watt tungsten lamps backed by concentrating reflectors and mounted 5 feet above the glass between the latter and the roof. The skylight is approximately 50 feet long by 20 feet wide, and 45 feet above the auditorium floor. The interior finish of the walls is light buff, the furniture and trimmings unpolished oak, and the hangings in the chancel and choir dark red.

The underlying idea of the illumination is to appeal to the emotions and particularly the religious feeling, and to this end the decorative scheme and scriptural motives of the panels represent the majesty of the law and the spirit and strength of the Almighty. The Talmud or book of the Ten Commandments, surmounted by the six-pointed star, is seen above the griffins in the central panel. A golden light radiates from this point, merging into tints of orange, blue-green, and red, the extreme border being deep red. In another panel is seen the inscription on the scroll. The only use to which the sparkling or jewel effect is put is in the central ornament to indicate the radiance of light. The theme of the illuminated ceiling is a conception most fitting for an edifice of this character, and the general effect of the illumination is inspiring.

Fig. XXXVIII shows the interior of the Church of Christ, Scientist, Chicago. This installation is described by Mr. H. B. Wheeler * as follows :

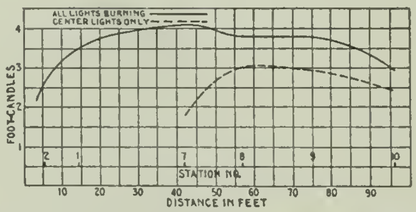
The area under the dome is 60 feet by 60 feet with the ceiling 50 feet high at the center. Each side arch is 16 feet by 60 feet ; the ceiling is 30 feet high to the center of the arch. Two rear arches, not shown in this picture, are 40 feet by 60 feet with ceilings 28 and 24 feet high.

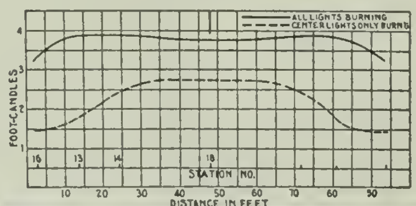
The decorations throughout the auditorium are light, the ceiling being an ivory white and the walls a cream color. The pews are of dark birch and the furnishings, rugs, etc., are dark green.

The center fixture contains twenty 250-watt tungsten lamps equipped with concentrating reflectors. The tops of the reflectors are 12 feet from the ceiling. This fixture is one of the largest indirect units that has ever been installed. It measures 7 feet 6 inches in diameter and 36 inches in depth. It weighs 800 pounds. It is lowered for cleaning by means of a windlass. Three smaller indirect fixtures hang under each side arch. Each fixture contains five 100-watt tungsten lamps equipped with concentrating reflectors. Suspended from each of the two rear arches are three other indirect fixtures. Each of these fixtures is equipped with six 100-watt tungsten lamps fitted with concentrating reflectors like those used in the side units.

The glass blanks of reflectors are of one piece, plated with pure silver.

*Trans. Illum. Eng. Soc., May, 1912.





THE results of illumination tests (readings on horizontal plane 30 ins. above floor) are shown in the curves, at the left. The curves in the upper chart show the intensity of illumination over a longitudinal section of the auditorium and the curves in the lower chart show the intensity over a transverse section. With all lamps in service, the following data apply:

Average Foot-candle Intensity 3.0
Watts per square foot 1.45

FIG. XXXVIII. INDIRECT LIGHTING IN CHURCH OF CHRIST, SCIENTIST, CHICAGO, ILL.

The Quantity Surveyor.

HIS WORK UNDER THE ENGLISH SYSTEM COMPARED WITH THE WORK OF THE CONTRACTOR'S ESTIMATOR IN AMERICA.

BY LESLIE H. ALLEN.

IN the interesting article by Mr. Jones in the October issue of THE BRICKBUILDER there are many important points dealing with the merits and demerits of the English system of quantity surveying, but in reading through these there does not seem to be a clear idea in the mind of the writer as to exactly what a quantity surveyor does, his methods and professional standing, and the advantages and disadvantages of the way in which bids are obtained in England, compared with the methods in vogue in this country. It is the purpose, therefore, of this article to set forth a concise account of the manner in which quantities are taken out and bids are made up in England, and the comparative benefits and drawbacks of the English and American systems of obtaining competitive lump sum bids for building construction contracts.

The English quantity surveyor is usually a man in independent practice who takes off quantities for a number of architects, receiving commissions from them in a similar way to that in which they receive their instructions from the owners. As soon as the architect's plans are finished he hands them over to the quantity surveyor, who proceeds to scale from the plans the quantities of material and labor in much the same way as a contractor's estimator might do here, with the difference that he is able to give his whole time to the work in hand and work more carefully and has more time to make a careful and detailed estimate. Also, being paid for his work, he is able to have all his figures carefully checked. In this country, where contractors cannot give their whole time to estimating, they have to work so quickly that there is no time for any but the most superficial checking of the quantities, and many contractors are only able to check their estimates by the square foot or cube foot price of the building, which is, as all will agree, a very unreliable method of checking.

It is the quantity surveyor's duty to take off the whole job and not confine himself to a few trades, and leave subcontractors to figure out the rest. An English bill of quantities will contain separate schedules for mason work, earthwork, concrete work, structural carpenter work, finished carpentry, hardware, plastering, plumbing, painting, ornamental ironwork, and so on, and the quantity surveyor has to be a man of sufficient technical education and training to know enough about all these trades to be able to take off quantities for them in the way in which various contractors and sub-contractors wish to have them, in order to price them correctly. It is the aim of the quantity surveyor to take off and describe the items in just the way that will be of most service to the contractor, and to give such information in the schedules as will be clear to him. Every surveyor works on the same methods, measuring all work net, deducting openings in brickwork, carpenter work and plastering, etc., measuring forms separately from concrete work, and in general giving items in detail.

The quantity surveyor gives his whole time to this work and is in consultation with the architect continually. It is much easier for him to straighten out difficulties and points not clear than it is for the estimator, and he is able to discover and point out inaccuracies in the plans which do occur even in the plans of the most careful architects, and is able to suggest amendments to the specifications where they are deficient in description or ambiguous in meaning.

Some American architects make a practice of furnishing rough quantities for the guidance of the contractor, but up to the present the writer has not found any which were of any real use to him because in the first place there is no attempt to insure absolute accuracy, and in the second place the way in which they are taken has not been a way in which he has to price them. For instance, footing excavation and trench work cost more than work which can be got out with a steam shovel, but often architects do not seem to realize this distinction and keep it separate in their schedules. Again, the cost of forms for concrete work bears no relation whatever to the number of cubic yards of concrete and needs to be taken off as a separate item in square feet, and yet no architects do this. Many other instances might be cited. The first requisite of a uniform bill of quantities is that it should set out just the items that every contractor would be figuring out himself. If not, the contractor has to do a lot of supplementary work in analyzing and subdividing the items furnished to him. Of course, in making these subdivisions, some contractors go into more detail than others, and the quantity surveyor, in order to suit all parties, has to go into as much detail as the most careful of the contractors who are working on his quantities. The items which the other contractors consider superfluous would of course be disregarded by them and the price of the larger items adjusted accordingly.

Although I think very few contractors will join with Mr. Jones in his very sweeping condemnation of the business methods of the present generation of architects, I think all will agree that even in the best plans and specifications there are sometimes ambiguities and difficulties of interpretation which arise. I find in my own work that the plans put out for bidding on most of the big office and factory construction built in the Eastern States are exceedingly good and clear, but I think that architects do not realize that in asking for a bid to be made in a week or ten days they are expecting a contractor's estimator to make himself absolutely master of the plans which it has taken three or four men in the architect's office weeks or months to prepare. Of course, by the time the plans are sent out the architect knows every line on them and can almost see the finished building in his mind's eye. But the contractor's estimator cannot in the short time given him grasp the meaning of the plans so clearly; a moment's reflection will show that this is impossible, and I think that it is really not fair to contractors to expect them to risk the large sums of money that present-day contracts amount to on the accuracy of the survey made by them in the short time that is allowed them to make up their bids. It must be remembered that they do not even have the full time for their own work that architects allow, as under present-day conditions they have to call in twenty or thirty or more sub-contractors to figure on various parts of the work and make up sub-bids to incorporate with their bids. It is often the experience of the contractor's estimator that he does not get a chance to look at the plans during the day and has to work on into the night over the plans to get his estimate done.

To return to the English quantity surveyor. When he has finished his taking off, the items of his estimate are collected and sorted and brought into schedule form. A separate schedule or bill is made out for each trade, these are bound up together and the requisite number of copies is typewritten or lithographed and sent out to the general contractors who are invited to tender. The schedules contain sufficient description for the contractor to understand fully what the items are that he has to price, and he does not need to spend much time going over plans and specifications. In the writer's practice in England he found it a rare thing for any builder to spend more than a half an hour looking over the plans, as all the information he needed was in the quantities. When a contractor receives the schedule of quantities he prices all the items in the trades that he himself proposes to execute or which he is competent to price, and the schedules of items which he intends to sublet he passes out to sub-contractors to price on the same lines that he does. When the pricing is completed and extended the totals of the various schedules are collected and profit and incidentals added, and the bid is ready to be put in.

The methods of measurement used by quantity surveyors are the same in every case and are regulated by textbooks and governing bodies. There are two professional societies having headquarters in London which regulate these matters. The contractor reading any item in a bill knows exactly what it means, as the textbooks, which all are familiar with, define exactly how the work in each trade should be measured.

Before the science of quantity surveying gets very far in this country something of the same sort will have to be done here, as at present there is an astonishing variation in the practice of the different architects, engineers, and contractors. One society, the American Concrete Institute, having realized this, has carefully studied the subject of standardization of measurements as far as it relates to their particular field, and the result of the work of a committee appointed by them, to which the writer had the honor to belong, is embodied in the report and rules adopted by them at their last convention. These appeared in the engineering papers and are probably familiar to all.

It will be seen that the operation of making up an estimate is not such a formidable matter for an English contractor as it is for an American contractor, and owing to this fact he does not feel aggrieved if he has to bid in competition against a large number of others. In this country there are not many of the higher grade of general contractors who would care to bid in competition against more than six or eight others, as, if the field is enlarged to fifteen or twenty, he feels that his chances of getting the job are diminishing in inverse ratio and he is very disinclined to put any time and trouble into the making of an estimate against a number of others. In a case where he simply has to price, he can do this more quickly and does not mind so much competing against a large field. This is an obvious advantage to the architect or owner.

The question will arise as to how much this service will cost and what guarantee there is of the accuracy of the quantity surveyor's work. In the first place, as to the cost, the quantity surveyor's fees are arranged on a sliding scale ranging from two and one half per cent on dwelling houses and buildings of an intricate nature in which a good deal of work is involved, down to one and one quarter per cent on large factory and mill construction. At first sight this may seem to be a good deal to those to whom the system is new, but a moment's reflection will show that estimates cost just as much as this in this country. An estimate for a $100,000 building will cost each general contractor at least $100 to make, and in addition to this there would be the time and expense put in by at least fifty or sixty sub-contractors, some of whom come in from outside the city to figure. Supposing there were ten general contractors figuring on a job, the total cost of the estimate on a $100,000 job to the building trades would be at least $1,500 and might run to as much as $2,500, and this has eventually to come out of the pockets of the building owners, for although he may not pay out this sum on his own building he is really paying it out in another way in the increased overhead charges which contractors have to add to their estimates to recoup them for the expense of a permanent estimating staff. If contractors were relieved of this overhead expense they could afford to reduce their gross profits and the burden of the expense of any estimate would fall where it belongs, that is, on the shoulders of the man who is paying for the building.

Now as to the accuracy of the work, this is a matter which gives very little trouble or discussion in England. Quantities are treated in one of two different ways. One is to make the quantities a part of the contract, that is to say, the contractor whose bid is accepted signs a contract to build a building as shown on the plans and specifications, having the quantities of material and labor described in the bill of quantities. Then if any item in the quantities is in excess or is less than the amount actually required in the building, the difference is measured and adjusted. The other way is to let the contract based on the plans and specifications only, and in that case the quantity surveyor has to guarantee that his work is accurate. Although at first sight it would seem that this was too much of a risk to take for such a small fee, yet in practice it does not seem to have worked any hardship as cases are extremely rare where any mistake is found that would call for the guarantee to be made good. The quantity surveyor, being in constant practice, is naturally more expert than a man who works at it intermittently, and as he is able to afford to have all his work checked carefully, the chances of error are small. It does not seem strange to contractors or engineers that they are not asked to guarantee that their buildings will not fall down, and yet there is no more risk of a quantity surveyor making a deficient estimate than there is of an engineer making a faulty design. The question of accuracy and guarantee, therefore, does not seem to be a very important one. It is one that will take care of itself. If a quantity surveyor has to depend for his professional reputation and standing on the accuracy of the work he does, there is no more chance of his doing careless and inaccurate work than there is of the architect or engineer whose standing depends on the quality or permanence of the work he designs, or there is of the contractor whose reputation depends on the quality of the workmanship he furnishes. In any case, with or without guarantee, his work is much more likely to be accurate than that of the contractor's estimator, owing to the better conditions under which he works.

Another great advantage in the use of quantities is in the settlement and adjustment of extras and variations. This is always a sore point between architects and contractors. On the one hand, there are not many architects who are familiar enough with unit prices to be able to value extra work properly and they do not realize how much changes and extras add to the cost of a building. The cost of a small change is often out of all proportion to the results gained. So the contractor's price for extra work always looks high to the architect and he often feels that the owner is being plundered. On the other hand, there is no question that sometimes contractors do charge more for extra work and variation work than they are justified in doing. The reason for these troubles is that there is no basis on which extras can be fairly adjusted. This basis is provided by the quantities, for the English contractor is required to deposit with the architect when he signs contract a copy of the quantity surveyor's complete schedule with his unit prices attached to every item therein, and then when changes are ordered the contractor simply goes ahead and makes the changes and the quantity surveyor measures the extra work afterwards and prices it at the rates which the contractor has put into his priced schedule. The suggestion of Mr. Jones that these variations should carry a differential of ten per cent is a new one to the writer and is never done in England. A better way is to measure and price the work according to the schedule and then, if the contractor suffers any hardship by reason of having bought material that he has not been able to use through work being omitted, to make him a suitable allowance for this.

Contractors sometimes object to making their unit prices public in this way, on the ground that prices are a trade secret. This old idea is rapidly passing. My own firm has never lost anything by being always ready to give information on the unit prices of their buildings, and it is my belief that it will never hurt any honest contractor to divulge his unit prices. Contractors have to do it on unit price contracts, so why shouldn't they do it at other times?

The priced schedule also furnishes a definite basis for the monthly estimate for payment, which is often in this country a source of dispute.

The question of payment by the owner or contractor, discussed with such earnestness by Mr. Jones, is not an essential feature of the quantity surveying system and need not trouble us here at all. Of course, the logical person to pay the bill is the owner, and when quantity surveying comes into operation here he will undoubtedly do so.

I should like to call attention to the formation of the American Institute of Quantity Surveyors, having offices at 571 California street, San Francisco. The president of this association, Mr. G. A. Wright, has been working on this subject for over twenty years in a preliminary way, and an association has now been established and organized with a view to pushing this movement. The secretary would welcome any correspondence on this subject.

No millennium is yet in sight, even if fully qualified quantity surveyors were to spring up at once and start work in every city. The architects' plans will be as good or as bad as at present; the inexperienced contractor and the fraudulent builder will still be with us; competition will be just as keen; architects who are unfair to contractors will still be unfair; those who are fair now will not become lenient. But what the establishment of quantity surveying will do will be to place bidders on a more equal footing when estimating and insure a square deal all round. We try to give and get this now. We want to do so all the time. I believe that quantity surveying will be a real help to this end.

Speaking from the contractor's side, I feel that our thanks are due to Mr. Jones for the thoughtful way he has dealt with the subject, even if I cannot agree with his denunciation of architects in general or his rosy view of the good times he has in store for us. Having had my early training in an English quantity surveyor's office, I am well acquainted with the English system; and I have been long enough in contracting work in the United States to know the difficulties we labor under here, and any movement toward the establishment of better estimating methods has my hearty endorsement and support.

Editors, THE BRICKBUILDER:

Your attitude upon the quantity question is recognized and appreciated. To see an American standardized system of estimating upon bills of quantities, one that will supersede our gambling methods, has been my earnest desire since 1891, when my interest in this movement commenced. It was not, however, until 1905, that any definite steps were taken towards organizing a society for circulating practical information upon this subject. By April, 1906, the foundation for such a society was ready, but earthquake and fire in that month, disturbed the arrangements temporarily. The present American Institute of Quantity Surveyors is the outcome of that earlier conception. Local committees or councils have been formed, whilst others are in course of formation and contemplated for the purpose of encouraging better methods.

The classifications of membership are Regular, Associate, Honorary, and Student. Among the leaders in this movement are several professional quantity surveyors, some with long experience as such, in Europe, where the just principle of measure and value is largely followed with advantage. Architects, engineers, and contractors, who favor the adoption of better estimating methods are affiliating as associate members and founders of the Institute.

Such a system can readily be adapted to American needs and sentiment, although it may be advisable to eliminate certain features to meet our different conditions. Any system will be better than the guesswork gambling methods practised to-day, which favor only the incompetent, and cause most of the trouble upon building contracts.

G. ALEXANDER WRIGHT, *Architect.*

TUBERCULOSIS PAVILION

ADMINISTRATION BUILDING

Photos. Copyright by Wurts Bros.

GENERAL VIEW LOOKING SOUTHEAST

THE MONTEFIORE HOME FOR CHRONIC INVALIDS

BUCHMAN & FOX AND ARNOLD W. BRUNNER, ASSOCIATE ARCHITECTS

The Montefiore Home for Chronic Invalids.

BOROUGH OF THE BRONX, NEW YORK CITY.

BUCHMAN & FOX AND ARNOLD W. BRUNNER, ASSOCIATE ARCHITECTS.

IT IS seldom that we see such effective group planning as that of The Montefiore Home for chronic invalids, where a number of very large buildings have been placed on a comparatively restricted area within the limits of New York City without a semblance of congestion apparent in any part. The site comprises about eight acres and its conformation is of a fortunate nature to lend itself admirably to the effective location of the various units. The administration building faces the north with the tuberculosis hospital on the south and the other buildings occupying positions on either side, all connected with enclosed corridors for convenient service and administration. The group consists of eight separate units, — the administration building, the home, the dining hall and service wing, the synagogue, the tuberculosis hospital, the surgical and medical departments, and the servants' home.

The entire group is designed in a free spirit of Georgian architecture with a general excellence pervading all the buildings, but if one were to be singled out as the best, the administration building would undoubtedly be considered the finest of the group. There is a singular absence of the usual cold and forbidding institutional character in the design of this building. The main façade has been conceived in a broad manner and indicates a wholesome hospitality and a welcome to the sufferer which too often lacks expression in the designs of many modern hospitals and institutional buildings.

The center of the group at intersection of the main and transverse corridor is occupied by the home or dormitory pavilion, and in convenient proximity on either side of the main corridor are the synagogue and dining hall, directly in the rear of the administration building. This is an economic and convenient arrangement and the enclosed corridors make it comfortable for the patients who are not confined to their rooms to move about during inclement weather. The deck roofs of the corridors provide exceptional opportunity for the patients' outdoor exercise in pleasant weather. Some of the most pleasant views of the buildings are to be had from these corridors.

The pavilion for the tuberculosis patients is entirely separate from the remainder of the group save for a connecting corridor for service. This building has a long southern frontage with very large windows opening on to balconies at each of the two floors extending on either side of the central pavilion to the end wings. This building completely provides for the treatment and housing of the tuberculosis patients; the first floor contains a central dining room flanked, on either side, by wings containing private rooms for two patients each and at the ends by large terminal wards. The bedrooms and wards occupy the entire southern exposure, the north being utilized by bath rooms, service rooms, and the main corridor.

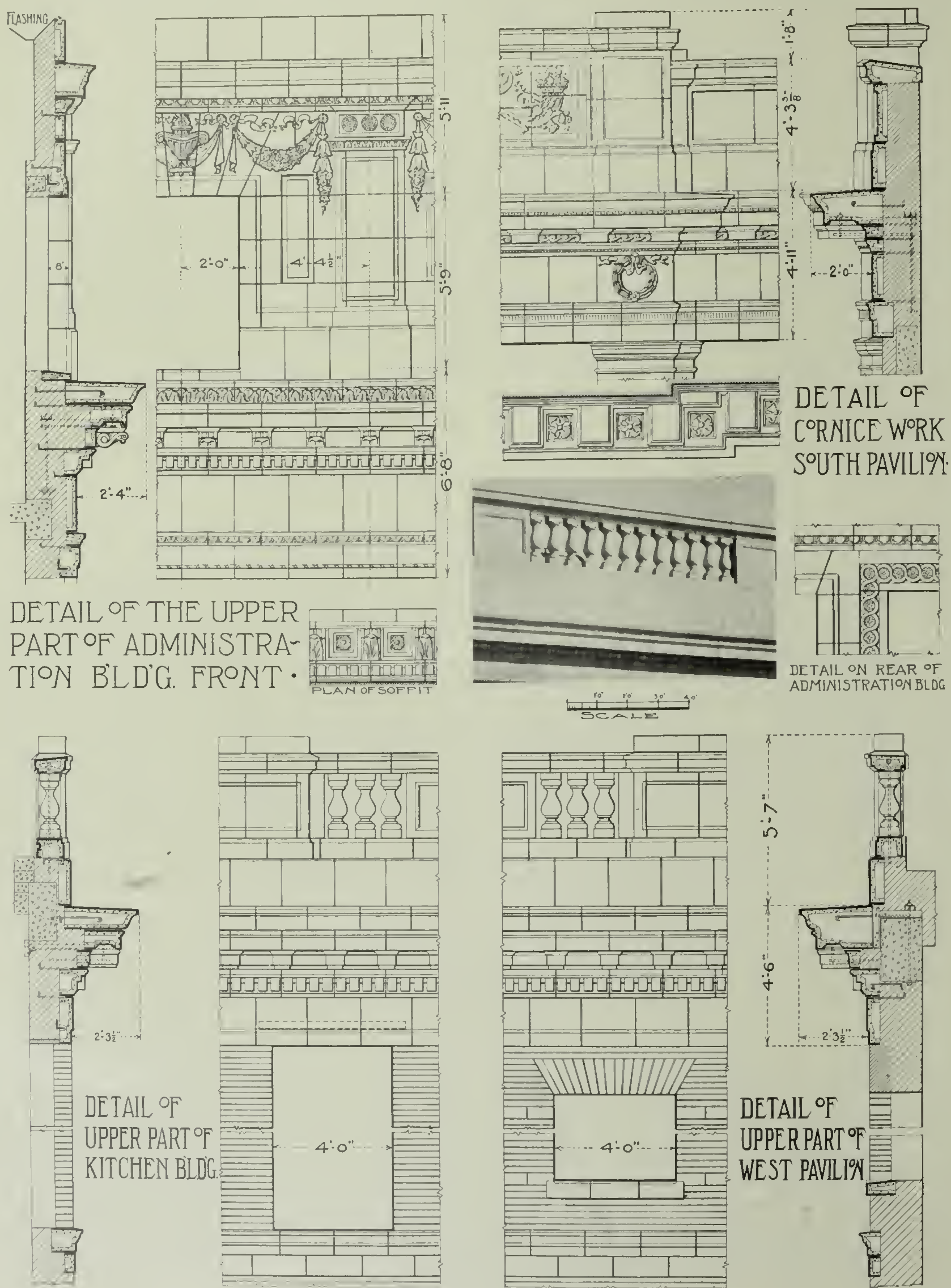
The buildings throughout are constructed of reinforced concrete columns and girders filled in with vitrified terra cotta blocks above grade. All of the façades including those fronting on the courts are faced with a rough textured brick in various shades with the trim and decorative features executed in architectural terra cotta of a pleasing gray color in perfect harmony with the brick.

The buildings are simply designed brick structures with the decorative features confined to the cornices, belt courses, and window lintels, with the exception of the administration building, which is given a very much lighter and more graceful appearance by its refined proportions and the use of finely modeled terra cotta for its decorative detail. The broad pilasters with their bold Corinthian capitals executed in this material are very effective. The lunettes over the second story windows as well as the festoons and panels in the attic story are well designed and pleasing details. They indicate in an effective manner the versatility of terra cotta for fine decorative purposes and show its special aptitude for reproducing the conceptions of the sculptor and modeler.

The entire group portrays the last word in hospital construction and equipment for the treatment of chronic diseases as well as the housing of the poor and destitute and as such it will undoubtedly prove to be a model for similar institutions for some time to come.

GROUP PLAN.

THE MONTEFIORE HOME FOR CHRONIC INVALIDS.
Buchman & Fox and Arnold W. Brunner, Associate Architects.



DETAILS OF TERRA COTTA CORNICES

THE MONTEFIORE HOME FOR CHRONIC INVALIDS

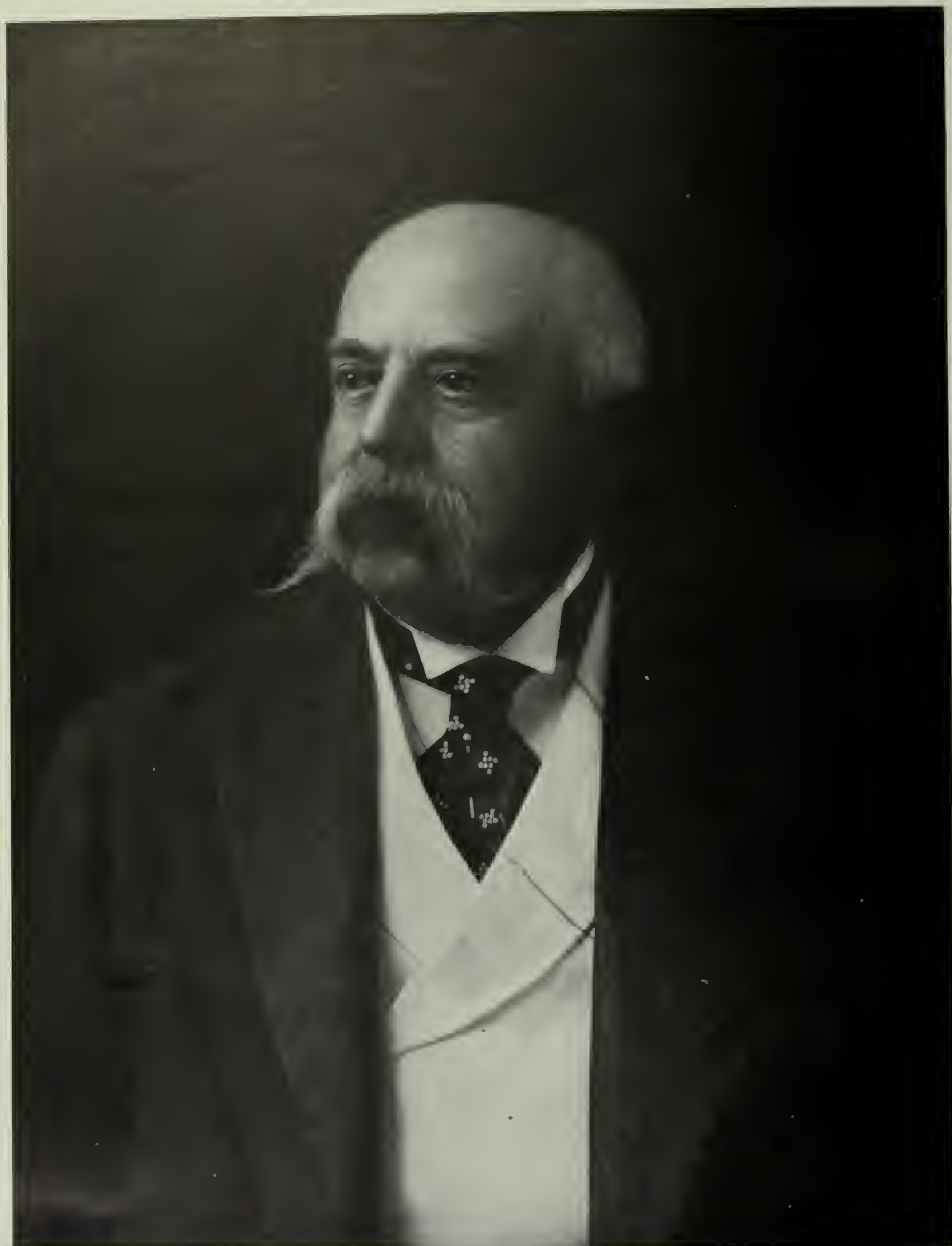
BUCHMAN & FOX AND ARNOLD W. BRUNNER, ASSOCIATE ARCHITECTS

MERCANTILE BUILDING, BALTIMORE, MD
J. HARRY AND F. J THUMAN, ARCHITECTS

WELLNER BUILDING, PHILADELPHIA, PA
HENRY L. REINHOLD, ARCHITECT

CHITTENDEN COUNTY TRUST BUILDING, BURLINGTON, VT.
W. R. B. WILLCOX ARCHITECT

GROUP OF SMALL MERCANTILE AND OFFICE BUILDINGS



THE LATE GEORGE BROWNE POST, F. A. I. A.
BORN, DECEMBER 15, 1837 — DIED, NOVEMBER 28, 1913

George Browne Post.

AN APPRECIATION OF THE MAN AND HIS WORK BY MONTGOMERY SCHUYLER.

GEORGE BROWNE POST, N.A., LL.D., architect, born in New York City, December 15, 1837, son of Joel B. and Abby M. Post. Educated in Churchill's Military School at Sing Sing, N. Y. Graduated as civil engineer from the scientific school of the New York University in the class of 1858. Studied architecture with the late Richard M. Hunt in the years 1858, 1859, 1860. Formed a partnership with a fellow student, Charles D. Gambrill, for the practice of architecture in 1860. Served for four months in 1862, and four months in 1863, as captain in the Twenty-second Regiment. Served as Volunteer Aide on the staff of General Burnside commanding the Army of the Potomac in 1862 at the first battle of Fredericksburg. Was promoted to Major, Lieutenant-Colonel, and Colonel of the Twenty-second Regiment, N.G.N.Y. After the war he resumed his professional career. The partnership with Mr. Gambrill was dissolved. In 1905 the firm of Geo. B. Post and Sons was formed consisting of Messrs Geo. B. Post, Wm. S. Post, and J. Otis Post. Married in 1863 to Miss Alice M., daughter of William W. Stone. Children — Geo. B. Jr., William S., A. Wright, James Otis, and Alice W., now Mrs. Arthur Turnbull. Member of the Architectural League of New York; president from 1893 to 1897, inclusive. Elected Honorary Life Member in 1912. Fellow of the American Institute of Architects; president from 1895 to 1898, inclusive Member of the New York Chapter, American Institute of Architects; president in 1904. Member of the Fine Arts Federation of New York; president in 1898. Charter member of the National Arts Club; president from 1898 to 1905. Member of the National Institute of Arts and Letters. Member of the American Academy of Arts and Letters. Member of the Tenement House Commission, known as the "Gilder Commission" appointed by the Legislature of New York. Member of the Province of Quebec Association of Architects. Member of Expert Committee to appoint a sculptor and select a design for the Lafayette Monument erected in the courtyard of the Louvre in Paris. Decorated a Chevalier de la Legion d'Honneur in 1901. Awarded the Gold Medal of the American Institute of Architects, 1910. Member of the Municipal Art Society; director 1901 to 1909. Appointed by the Secretary of State, a delegate to the World's Congress of Architects in London, to represent the American Institute at large. Appointed by the Secretary of Agriculture in 1906 a collaborator of the Forest Service of the United States Department of Agriculture. Appointed Honorary Corresponding Member of the Royal Institute of British Architects in 1907. Member of the National Advisory Board on Fuels and Structural Materials, appointed by President Roosevelt in 1906. Reappointed in 1907, 1908, and 1909. Elected an Associate of the National Academy of Design in 1907. Elected an Academician of the National Academy of Design in 1908. Honorary Degree of Doctor of Laws conferred by Columbia University in 1908. Member Committee of Patronage to the Eighth International Congress of Architects, 1907. Appointed in 1908 a member of the Permanent Committee of the International Congress of Architects. Appointed by President Roosevelt in 1909 a member of the Bureau of Fine Arts. Member of the National Sculptor Society. A member of the Council in 1904. Appointed by the Governor of the State of New York in 1902 a member of the Board of Commissions of the St. Louis Exposition. Member of the New York Academy of Sciences; American Geographical Society; American Society of Civil Engineers; Chamber of Commerce, New York; National Society of Craftsmen; Public Art League; Archaeological Society of America; National Geographical Society; Metropolitan Museum of Art; New Jersey State Chamber of Commerce; Century Association; Union Club; Cosmos Club, Washington; and charter member of the Lawyers' Club.

A GREAT architect in the sense of a great architectural artist nobody would think of calling the late George B. Post. He was really a great "planner." Forty years ago, or a little more, the first "elevator buildings" were in course of construction in New York. One of them was the old Tribune Building, of which Richard Morris Hunt was the architect, the other the Western Union Building, of which George B. Post was the architect. In these two buildings the pupil evidently surpassed his master. Because, in the original Tribune Building, Mr. Hunt, confronted with a novel problem, was fain to resort to a group of stories, instead of a single story, as the new architectural unit, whereas Mr. Post, in his first essay, hit upon the arrangement of a triple division into base, shaft, and capital, following Aristotle's requirement of "a beginning, a middle, and an end" for all works of art. The arrangement really imposed itself upon all subsequent architects, not only of the early stage in which the walls were real walls, but equally of the subsequent stage, when the steel frame construction had promoted the work of the passenger elevator and raised the practicable altitude of commercial buildings "to heights unknown."

With the modern skeleton skyscraper George Post had comparatively little to do. But in the era of what may be called the "transitional" buildings, in which the passenger elevator was the only new factor, the skeleton construction not yet having arrived, he had more to do than anybody else. During the decade 1880-90 he was by far the most employed and successful designer of commercial buildings in New York. It is really an impressive list. The Produce Exchange, the Cotton Exchange, the Mortimer Building, the Mills Building, the Post Building, the Pulitzer Building, the reconstruction of the Equitable Building; all these are examples of his personal force. And his preeminence was deserved in those years by reason of his strong practicality and honest meeting of the requirements of his clients, if not by reason of more strictly artistic qualities.

There was a succession of buildings in Richardsonian Romanesque that should not be passed over in recounting Mr. Post's activities. They showed a constant advance, or nearly so. The building on Park Row originally designed for the New York *Times* was the first, the Union Trust in Broadway, opposite Trinity Church, was the second, the building of the Prudential Insurance Company over in Newark was the third. Upon all these the big thumbmark of George B. Post is plain. Really, he has scored his mark deeper in the downtown business quarter than has any other architect, and this by dint of the large human qualities that were his. In this "Romanesque" series no discerning observer can fail to note the enormous advance from the north front of the old Times Building to the front of the Union Trust, doubtless the most successful of its author's efforts in that line.

And you may observe the same architect's autograph in works with the detail of which he may have had little to do, for example, in the romantic and picturesque architecture of the City College, with the bigness and simplicity of the layout of which he evidently had everything to do. Similarly with the bigness and simplicity of the architecture of the new Stock Exchange he had everything to do. And when you come to think of it, that was a fine conception, in reconverting the old classic portico into what it originally was, the actual architecture of the building. It is perhaps the crowning example of its author's genius for simplification. It is true that he missed a great chance by not letting the attic show frankly as an attic, and turning his sculptors loose on that, instead of complicating it with an irrelevant and unmeaning classical pediment, in which the sculptors were unduly hampered. All the same, there was an notable bigness about Mr. Post's work, and his confrères should delight to honor his memory.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE illustrations of the waiting room of the Rochester Railway Station in this number show in a marked degree the vast possibilities of decoration that are latent in many materials that are commonly termed constructive, and rarely considered with much thought of their own natural beauty. This satisfying expression of architecture in terms of simple burnt clay materials also points to a means for better and more artistic treatment of the many practical and commercial types of buildings which are all too seldom associated with architecture in the public mind.

The use of some of the new structural materials indicates at least that they are influencing new and distinct architectural formulæ appropriate to the materials. This is particularly noticeable in some of the newer warehouses and automobile service buildings, wherein a distinctive type has been evolved through study of the characteristics of the materials commonly used in their construction. But what has been done is only a forerunner of what can be accomplished, and only indicates the further possibilities that this field of endeavor offers. It is encouraging to note that an increasing number of representative architects are taking up the design of these utilitarian buildings with enthusiasm and vigor and their efforts cannot fail to be productive of much that is rational and dignified architecture.

Architects, moreover, are being more frequently called upon, in association with engineers, to effect practical solutions of big problems where the matter of expense is a vital factor in the conditions, and where the expenditures for architectural effects come under the cold scrutiny of the engineering fraternity. To the architect working under such circumstances, an appreciation of the natural beauty of structural materials, together with a sense of their appropriate use, is indeed a valuable asset. The possession of this knowledge will have a controlling influence on his designs, which will make them readily meet the most exacting requirements of modern engineering, and at the same time fully endow them with the distinction of being real vital architecture in the truest sense of the word.

Under modern conditions of building, it is more than imperative that there should be perfect harmony between the engineering and architectural design. Power of design and knowledge of construction should go hand in hand; the architect should have the necessary technical knowledge of building to realize in terms of sound construction the results of his imagination. Where the engineer stops at construction, the architect, as an artist, sees further possibilities of beautiful form; but he should possess the technical knowledge to see wherein his design must be dependent upon construction, and to realize that architecture to be real must be more than applied decoration — it must be part and parcel of the structure.

THE following is one of a series of short and pertinent discussions of little difficulties an architect experiences in practice, published as "Modern Fables" in *The Builder*, and not without point to the American architect.

"John Thorpe was an architect — young and very much in earnest — who, while not neglecting to render the account for his fees when they fell due or refusing to accept payment for his services when tendered, yet, on the whole, felt more interest in securing credit and reputation from his work than in the monetary results which flowed (or dribbled) therefrom.

"John Thorpe had a client who desired a dwelling-house built, and had heard that an architect was a serviceable intermediary between owner and builder — if you kept him in check and let him understand that you employ him to carry out *your* ideas.

"John Thorpe's client, as is the wont of clients, expressed himself in this wise: — 'Now, one thing I must have is good high rooms — about 13 ft. at least.'

"John Thorpe knew right well that a house costing £650, with stories 13 feet high, was an artistic impossibility. He conceived it his duty to tell his client plainly that this was so, so his client left him and bought a house from a builder, whereof the rooms were but 9 ft. high.

"Robert Smithson was also an architect — still young, though not so young as Thorpe. He also had a client (same sort), who also expressed himself in similar wise. Now, Smithson also knew right well that rooms 13 ft. high were, in the circumstances, an artistic impossibility, but he was crafty in his generation, and, saying nothing, yet proceeded with his sketch designs, making his rooms but 8 feet high. In due course these designs were received by the client, who liked them pretty well, but as to the lowness thereof he was wroth, and descended upon the architect (and his wife also with him) to the intent that they might upbraid him and obtain his promise of reform.

"But Smithson, being crafty and making no mention of artistic impossibilities, set forth reasons as follows:

"'You approve,' said he, 'of the size and disposition of the rooms. Consider now that with stories of the height I show the cubic contents of the house lie within the figure which you desire to expend. But be assured greater height means decreased size or increased cost. Take, therefore, thy choice, for a quart will not go into a pint pot.'

"Then his client was given pause, for with the size of the rooms he had been greatly pleased. Perceiving now his advantage, the architect next mentioned that stairs fewer by nine would be needed in the ascent from floor to floor. At this his client's wife perceived light which had hitherto been denied her. Following this the architect (a crafty man) spoke confusingly, and in a manner implying knowledge hid from the common herd, of warming and ventilation, how easy in low and how wasteful and difficult in high rooms, and all his reasoning and exposition was good and sound. And in the end his client agreed that the stories should be 8 ft. 6 in. (as Smithson had from the first intended), and that the cost might be enlarged £50, and he departed satisfied, as also his wife.

"Observe now that no mention of æsthetic motives did enter their discussion, yet was the æsthetic object achieved."

Moral. — Levers be of three classes. Apply thy power with whichsoever fulcrum will most readily move the weight thou hast to shift.