THE BRICKBVILDER

AN ILLUSTRATED ARCHITECTURAL MONTHLY DEVOTED TO THE ART, SCIENCE, AND BUSINESS OF BUILDING

NEW YORK — ROGERS AND MANSON COMPANY, Publishers — BOSTON

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THE BRICKBVILDER AN ARCHITECTVRAL MONTHLY

VOL. 24

JANUARY 1915

NO. 1

PVBLISHED BY
ROGERS AND MANSON COMPANY
BOSTON MASS.

MANUFACTURERS' CATALOGUES AND SAMPLES WANTED.

Fred L. Pease, Architect and Engineer, has opened offices for the practice of his profession in the New Commerce Building, Erie, Pa.

Emmens & Abbott, Architects, have opened offices for the practice of their profession at Stamford, Conn.

Carl F. White, Architect, will continue the practice of the firm of White & Shupe, Architects, with offices in the Citizens Building, Cleveland, Ohio.

Sylvain Schaittacher, Architect, has moved his office to 233 Post street, San Francisco, Cal.

John T. Kerr and E. T. Root, Architects, Portland, Ore., have formed a partnership under the firm name of Root & Kerr, Inc., and will maintain offices at 405 Henry Building, Portland, Ore.

W. C. Owen, Architect, has moved from Room 1005, Mahoning Bank Building, Youngstown, Ohio, to Room 419, Leader News Building, Cleveland, Ohio.

Garrett L. de Grange, Jr., Architect, has opened office in the Central Trust Company Building, Frederick, Md., for the practice of his profession.

T. E. Mitchell, Architect, has opened offices for the practice of his profession at 303½ Main street, Jonesboro, Ark.

Haeussler & Huff, Architects, of St. Louis, have dissolved partnership. August F. Haeussler will continue the business at the same quarters, 514 Roe Building. C. E. Huff has been taken into the firm of Cann, Carrubia & Huff, which has opened offices at 1322 Central Bank Building, St. Louis, Mo.

Harry E. Reimer and George W. Herlin have formed a partnership for the practice of architecture under the firm name of Reimer & Herlin, with offices in the First National Bank, Marshalltown, Iowa.

C. F. J. Barnes, Architect, has moved his office to 713 Kresge Building, Detroit, Mich.

Charles Herbert McClare, A.I.A., Architect, of Cambridge, Mass., and Frederick S. Boyd, S.B., Architect, of Cambridge, announce the formation of a partnership for the practice of architecture, under the name of McClare & Boyd, Architects, with offices at 649 Massachusetts avenue, Cambridge, Mass. Mr. McClare will continue his practice at Lakelands, Mount Uniacke, Nova Scotia, Canada, for the present. Mr. Boyd will conduct the Cambridge office.

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A FACE BRICK OF HIGH QUALITY THAT WE CONFIDENTLY RECOMMEND TO EVERY ARCHITECT

HALLENBECK HUNGERFORD BUILDING, LAFAYETTE AND WHITE STS., NEW YORK
WM. F. AUSTIN, Architect — GEO. A. FULLER CO., Builders

THIS new building shows an important use of our TURKESTAN BRICK, rough textured, in mixed shades, 50, 59 and 58L. It is used for the principal portions of the facades, embellished with architectural terra cotta in the upper and lower stories. In combination with this material, and also considered alone, TURKESTAN BRICK has been pronounced satisfactory in color and texture, and eminently suitable for facing large surfaces.

Architects interested in this brick may have samples and further information upon request

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ARCHITECTURAL TERRA COTTA WORKS AT CRUM LYNNE, PENNSYLVANIA

INDEX OF ADVERTISING ANNOVNCEMENTS

Bradford, Pa Post Office, Oscar Wenderoth, Supervising Architect.

Competition for a Small Brick Church and Parish House

TO BE FACED WITH HY-TEX BRICK

First Prize, $500
Second Prize, $250
Mentions
Third Prize, $150
Fourth Prize, $100

Competition Closes March 31, 1915

THIS COMPETITION IS OPEN TO ALL ARCHITECTS AND ARCHITECTURAL DRAFTSMEN

PROGRAM

THE problem is a small brick church, designed to be faced with Hy-tex brick and where consistent with the design treated with brick in the interior wall surfaces. It is especially desired that the design should show generous appreciation of good brickwork, and in this connection originality in the treatment of the facing possibilities of the material is courted.

While the church may be meant for any ecclesiastical body, the design should avoid mere slavish adherence to traditional types and reveal the serious attempt at an originality that is characteristic of the free American spirit. It, therefore, may be adapted to any part of the United States and take on any form expressive of the Christian faith. The parish house must be an integral part of the composition. Its location on the lot, however, is to be at the discretion of the designer. The church group shall be at least 10 feet from party lines. The lot is at the intersection of two streets, having a frontage on one of 150 feet and on the other of 100 feet. The grade is level.

REQUIREMENTS

For the Church. An auditorium to seat 400, an unobstructed view of the pulpit platform to be had from every seat. Provision for a portion of the seats may be made in balconies if the designer so wishes. A pulpit platform with space for communion table; an organ chamber and space for chorus choir not to exceed 20 in number. Ample vestibules are necessary. There shall be also a minister's room convenient to the pulpit.

For the Parish House. The parish house, which is meant to provide for the Sunday school and institutional — or social — activities of the church, may be one or two stories. If of one story only, part of the accommodations required may be provided for in a basement naturally lighted. There shall be a Sunday-school room with six or eight small class rooms opening off the main area and separated from each other by partitions so arranged that all may have a fairly good view of the platform in the Sunday-school room. This room, including the class rooms, should provide a seating capacity for about 350. All the class rooms may be provided for on the main floor or part on a mezzanine floor. There should be rooms provided for the infant class and a Bible class, a Sunday-school library, a suite including ladies' parlors, dining room and kitchen, coat and toilet rooms for men and women.

Each competitor shall specify the section of the United States in which the church is to be located.

The jury will give consideration to the quality of the design and its fitness for execution in brick and excellence of plan.

No cubic contents are fixed and no limit of cost imposed.

An additional value will be given to the work if the style and color of brick chosen are indicated on the drawing, either by a key or a series of notes printed on the sheet at a size which will permit of two-thirds reduction. Hy-tex brick are manufactured by the Hydraulic-Press Brick Company, and contestants will be helped by referring to the catalogues and booklets issued by this company, which may be had upon application to any one of their branch offices or the home office at St. Louis (see addresses on preceding page).

CONSTRUCTION

Methods of bonding, anchorage, etc., as usually employed in the construction of brick walls, may be followed. The exterior walls are to be faced with brick and also the interior walls if consistent with the design.

DRAWING REQUIRED (there is to be but one)

On one sheet a pen and ink perspective, without wash or color, drawn at a scale of 4 feet to the inch. The brickwork should be indicated liberally enough on this perspective to show adequately the use of materials. A longitudinal section through the church building only drawn at a scale of 8 feet to the inch. Main floor plan of church and parish house, with additional plan of the latter showing arrangement of features not provided for on main floor, all drawn at a scale of 16 feet to the inch. Key plan showing treatment of the lot. Detail elevation of the principal feature of the design at a scale of 4 feet to the inch. The plans are to be blocked in solid. All lettering should be clear and free from scroll so as to reduce with distinctness. Graphic scales must accompany section, details, and plans. The size of the sheet is to be exactly 22 inches by 30 inches. Plain rules must be drawn on the sheet enclosing a space measuring exactly 20 inches by 26½ inches. The sheet is to be of white paper and is not to be mounted. Very thin paper or cardboard is prohibited.

The drawing is to be signed by a *nom-de-plume* or device, and accompanying same is to be a sealed envelope with the ***nom-de-plume*** on the exterior and containing the true name and address of the contestant.

The drawing is to be delivered flat or rolled (packaged so as to prevent creasing or crushing) at the office of THE BRICKBVILDER, 85 Water street, Boston, Mass., on or before March 31, 1915.

The Post Office Department now requires that drawings sent by mail shall be at the letter — or first class — postage rate. Those who wish their drawings returned, except the prize drawings, may have them by enclosing in the sealed envelopes containing their names twenty-five cents in stamps.

Drawings submitted in this competition are at owners' risk from time they are sent until returned, although reasonable care will be exercised in their handling and keeping.

The prize drawings are to become the property of THE BRICKBUILDER and the right is reserved by THE BRICKBUILDER to publish or exhibit any or all of the others.

Drawings submitted in this competition will be returned direct from the office of THE BRICKBUILDER to the contestants.

The designs will be judged by five members of the architectural profession representing different sections of the country.

For the design placed first there will be given a prize of $500
For the design placed second a prize of $250
For the design placed third a prize of $150
For the design placed fourth a prize of $100
The next six designs in order of merit will be given Mentions

The prize and mention drawings will be published in THE BRICKBUILDER.

This competition is conducted under the patronage of the Hydraulic-Press Brick Company.

THE BRICKBVILDER

VOLUME XXIV NUMBER 1

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LETTERPRESS

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THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

TUCKER-RICE PORCH, SALEM, MASS.

SAMUEL McINTIRE, ARCHITECT

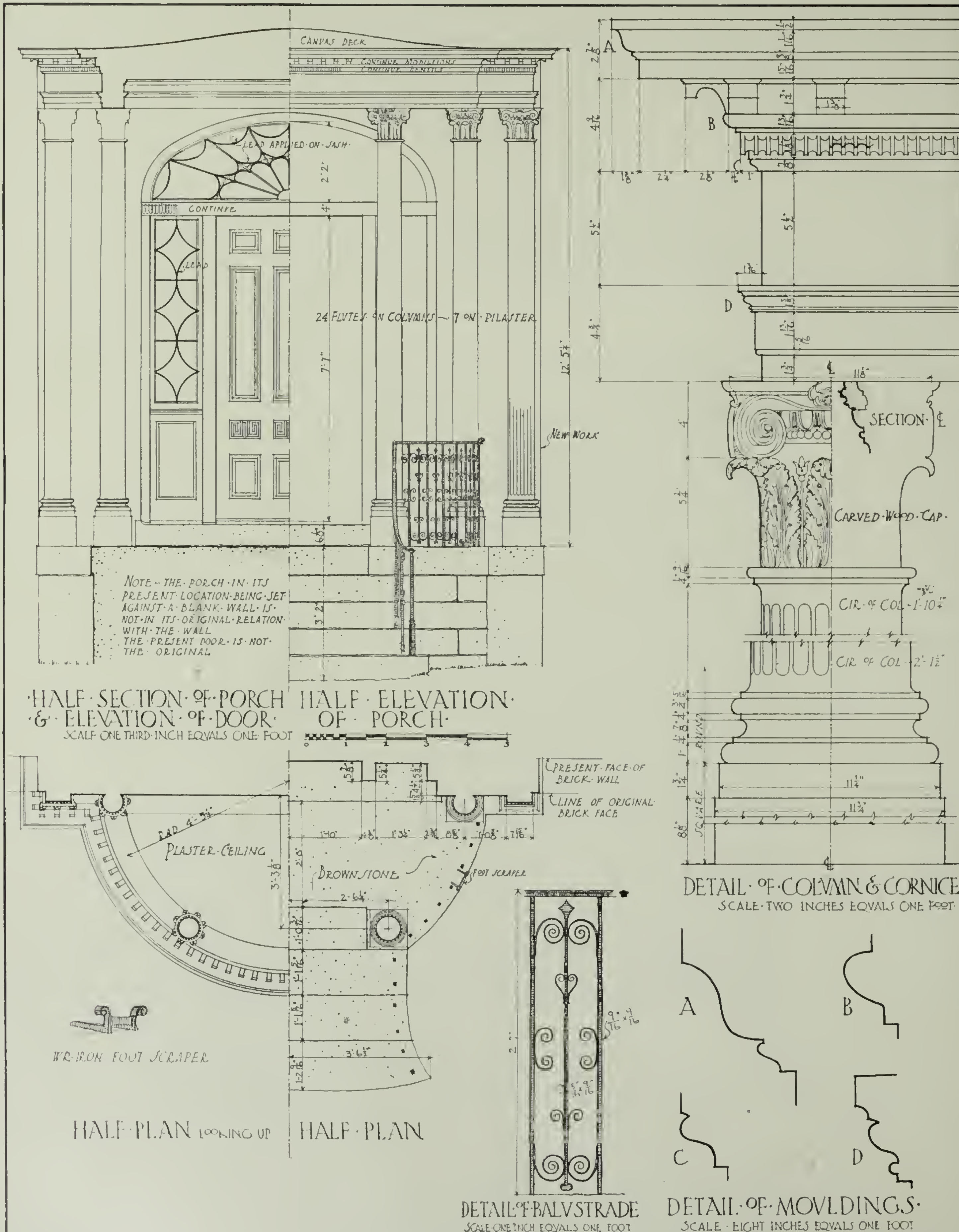
BUILT ABOUT 1800

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate One

(over)



·PLATE· 1 ·JANUARY· 1915·	·THE·TUCKER-RICE·PORCH· ·SAMUEL·McINTIRE - ARCHITECT· ·BUILT·ABOUT·1800·	·MEASURED·&· ·DRAWN·BY· ·GORDON·ROBB ·& M A DYER·

PALACE OF MARIA LA BRAVA, SALAMANCA, SPAIN

DATE ABOUT 1350

THE BRICKBVILDER

VOLUME XXIV JANUARY, 1915 NUMBER 1

The Modern Schoolhouse.

I. THE CLASS ROOM.

By WALTER H. KILHAM.

SCHOOLHOUSE architecture stands to-day at the parting of the ways. While millions of dollars are expended each year on splendid school buildings throughout the country, almost no form of modern building has made so little real progress in the last twenty years as the public school. From a diffuse method of designing, which used to subordinate the plan to the external requirements of "American Romanesque," the pendulum swung towards excessive standardization of the plan, merciless reduction of the cube, and suppression of all originality in design. Now there is evidence of a movement towards "humanizing" the school building while retaining the advantages of standardization, and the introduction of various sorts of civic conveniences into the buildings to increase their value to the community at large. Meantime, the cost of schoolhouses is advancing by leaps and bounds, and it is a real question whether the municipalities should be expected to make such large investments in buildings when educational ideas are still in a state of development.

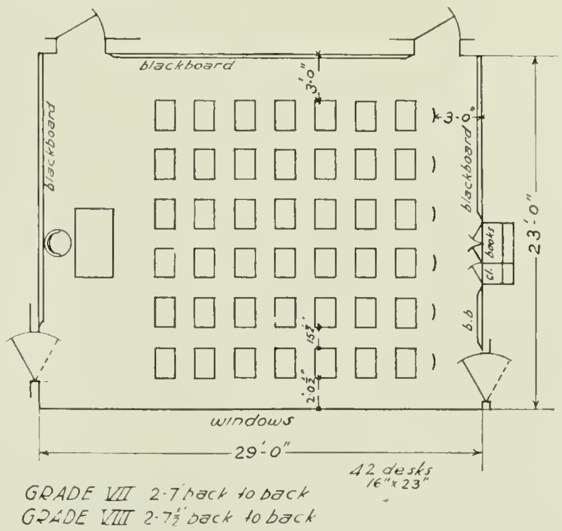


Fig. 1. Seating Plan for 23 by 29 Class Room

During all this period little advance has been made in the science of heating and ventilating, of disposition of wardrobes, of the question of recreation space, or in the general features of the schoolroom itself beyond a tendency to narrow its form and to hold down its seating capacity.

These papers will attempt to deal with the problems of the school architect in this period, which, in many ways, the writer believes will be the most interesting one for many years, and to discuss matters of school planning and details of construction as they arise in the course of the planning and erection of a modern school building.

Size of the Room. The first point to be decided is the number of desks to be accommodated. The practice of seating fifty or more pupils in an ordinary class room under one teacher is now only followed in congested cities where it has been impossible to keep the school accommodation up to the needs of a growing population. The general practice is to reduce the number of desks to forty-two, and some towns are even adopting thirty-six as the standard number. It is therefore possible to somewhat reduce the standard size of a room from that formerly adopted. Practical school men also dislike a room which is so large as to tempt the installation of additional seats with the pressure of increased population in the district. In general, the length ought not to much exceed thirty feet, as it is difficult for a pupil in the rear to easily see figures on a blackboard at a greater distance, and there is danger of difficulty in hearing a teacher unless she speaks very distinctly from this distance.

In a class room lighted unilaterally the width from the windows to the corridor wall has been diminished, until the general practice is now to make it about twenty-four feet. Twenty-three feet has been used to a considerable extent and is perfectly practicable for primary schools, but hardly wide enough to take six rows of grammar grade desks with aisles between each row. (See seating plans reproduced herewith.) Where forty pupils are accommodated in five rows of eight desks, the room may even be narrowed to twenty feet.

Professor Dresslar ("American Schoolhouses," 1911) states that the width of the schoolroom where unilateral lighting is used should never exceed twice the distance from the floor to the top of the windows where external conditions are favorable, and where they are unfavorable even this distance is too great, and he cites German authorities who insist on a factor of only one and one-half times the height. He concludes that in our climate, which is brighter than that of Prussia, a standard classroom should be 24 by 32 feet by 12½ feet high from floor to ceiling.

The Boston report for 1914 gives 23 by 29 feet as the standard size for upper and lower elementary grades, and not less than 12 feet 0 inches high in the clear. High school rooms are 26 by 32 feet for forty-two desks. This is not, however, always followed, the department stating that they regard it as an ideal size, and indeed have no objections to an aisle as narrow as 15 to 16 inches. Their aim is rather to obtain a room area of approximately 15 square feet per pupil. The new Massachusetts state law, however, prescribes widths of aisles as follows:

	Wall Aisles.	Center Aisles.
Primary schools	2′ 4″	1′-5″
Grammar schools	2′ 8″	1′ 7″
High schools	3′ 0″	1′ 9″

Taking the case of a grammar school class room with six rows of twenty-four-inch desks, it is evident that with a three-foot blackboard aisle the room would have to be at least 25 feet 7 inches wide, or else have only five rows. In this case the room might be 21 feet 0 inches by say 32 feet 0 inches or, perhaps, a little more, the tendency being to lengthen the room beyond the accepted standard. It remains to be seen, therefore, whether the new law will have beneficial results. If the additional width in the aisle is merely a matter of easy egress, it hardly seems to be necessary and not worth the injury done to the shape of the room from the point of view of lighting as well as hearing and seeing. The state authorities claim that their object in holding to the wider aisle is to limit the seating capacity of the room. In this case it would seem that the desired object might be more directly attained by prescribing a certain amount of floor area or of cubic air content for each pupil. The Massachusetts state law, applying to other cities and towns than Boston, prescribes a schoolroom width of not more than two and one-third times the height. New Jersey requires a ceiling height of at least twelve feet. Fifteen square feet and two hundred cubic feet of space per pupil is another rule which fits conditions well and is adopted by the State of New York. New Jersey uses eighteen square feet. It is obvious that a building standing free in an open lot will receive better light than one in a city where it is likely to be darkened by adjacent buildings. A good many buildings have been constructed with rooms 13½ and even 15 feet high, but the long stairways and additional cost of construction are not offset by any advantage in lighting.

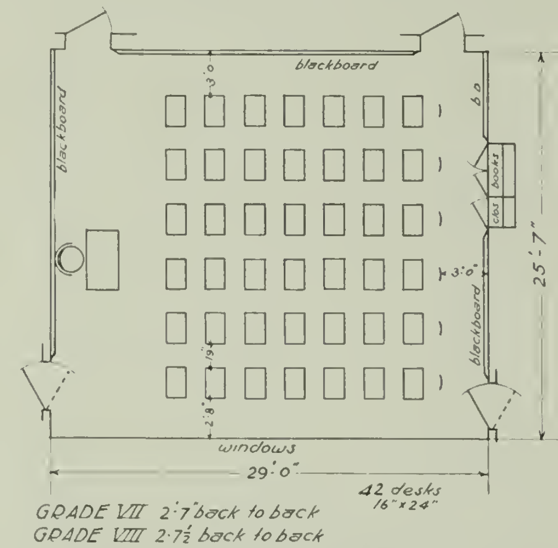


Fig. 2. Illustration of Application of Massachusetts Law for Grammar Grades

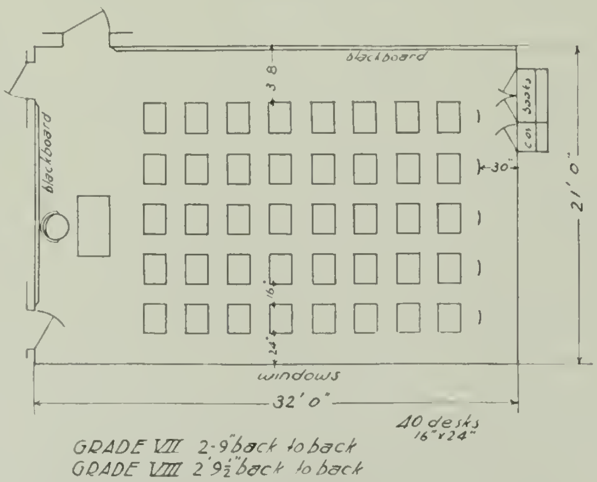


Fig. 3. Illustration of Seating the Pupils in Five Rows

Windows. It is a time-honored rule that the glass area of class-room windows, measured inside the sash, must be at least one-fifth of the floor area of the room. This is required by the City of Boston and the State of Massachusetts, the former stating that the window head shall be square and close to the ceiling, the latter not specifying whether it shall be square, but requiring it to be not more than eight inches below the ceiling. New Jersey allows a ten per cent deficieney in required glass area to be corrected by the use of prism glass in the upper sash. When this is employed it should be especially calculated to throw the light to the inside of the room.

The Inspection Department of the New York State Education Department rules as follows:

"The windows in all study rooms and recitation rooms should be so arranged that the main light will come from the pupils' left. If necessary to have more window space, the supplemental light should come from the rear; but no window should be placed in the rear directly opposite the teacher's desk. The windows should be grouped together as nearly as possible on the pupils' left, so that the light may be massed, thereby furnishing a comparatively even distribution of light and minimizing areas of light and shadow. The windows should extend as near to the ceiling as the principles of construction will admit, and should be without transoms or unnecessary framework. In study and recitation rooms, one pane of glass to a sash is recommended; under no circumstances should there be more than four. Any considerable area on the side to the left of the pupils that is without window surface should be opposite the space in front or in the rear of the pupils' desks. The ratio of window surface to floor surface should, as a rule, be one to five. If the main light comes from the north or from a side of the building which is much shaded, the ratio should be one to four."

It is not a bad plan to use factory glass in the upper sash of windows on the south side of a building to soften the glare of sunlight and obviate the constant adjustment of window shades.

Large sheets of glass are more easily washed, but unless plate glass is used they present a poor appearance, and in either case are costly to replace when broken. Boston forbids large sheets of glass, and architects in general seem to feel that better scale is given to the building by the smaller panes. The glass area should always be figured exclusive of the muntins. The sills should be kept as near the floor as is possible in order to get good light on the first rows of desks. This height will be controlled to some extent by the direct radiators under the windows, and should be from 2 feet 6 inches to 2 feet 11 inches from floor to top of window stool.

Double hung windows, in two sashes, upper and lower, are ordinarily employed; but with the growing demand for fresh air forms of windows which allow the opening of the entire window aperture are coming more and more into demand. This subject will be treated more at length later on. Transoms are objectionable, as they are expensive, cut off light, and are hard to clean. Double run of sash is sometimes employed, but with the advent of the metal weather strip its use has become infrequent. It is, of course, very expensive, is difficult to build in a 12-inch wall, costly to clean, and is rather a confession of an inadequate heating plant than a part of the equipment of a modern building.

Much attention should be paid to the arrangement of windows and piers so that no large piers or solid wall surfaces shall be placed so as to cast a shadow on the desks. If necessary to have such a pier, it should come in the part of the wall forward of the area occupied by the pupils. A good point to remember in planning a school is that in these days of high prices the only article whose cost has not increased is daylight. When possible, mullions and heads should be beveled or splayed so as to increase as much as possible the amount of light entering the room.

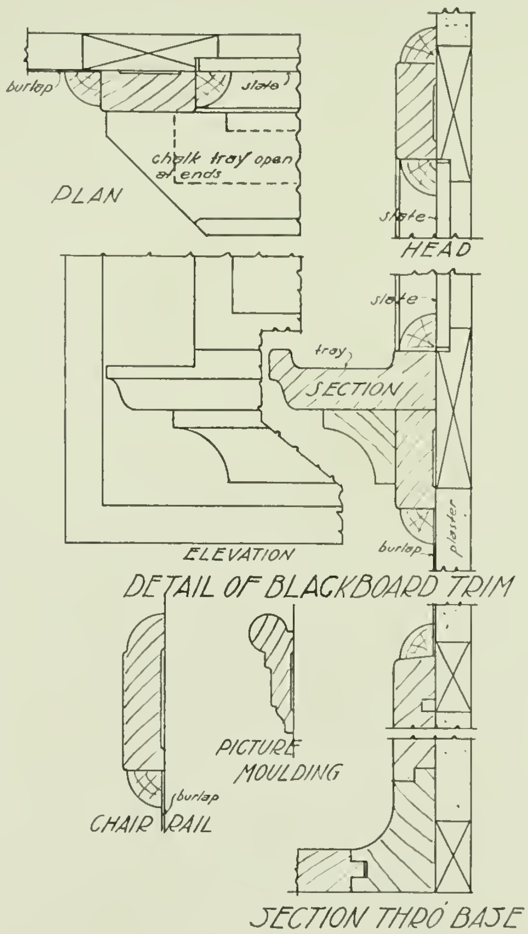


Fig. 4. Detail of Schoolroom Finish

Blackboards. No other material used in this country is as satisfactory for the blackboards as slate. This should be of the best quality, ¼ inch thick, with joints accurately fitted, cemented, and cleaned off to give a perfect surface. This is not difficult to obtain and no other result should be accepted. Boston requires the blackboards to be 4 feet wide, 22 inches from the floor in kindergartens, 2 feet 4 inches to 2 feet 6 inches up to grade IV, and 2 feet 8 inches in grades V to VIII. In high schools they should be 3 feet 0 inches from the floor. They are placed only behind the teacher and on the long side opposite the windows, the "tack board" occupying the end opposite the teacher.

The requirement of a 4-foot width for the blackboard meets with criticism from some authorities as being excessive. It is evident, for example, that in the upper grade or high schools the top of the blackboard will be 6 feet 8 inches to 7 feet from the floor, so that the upper part is too high to be written on without standing on a chair, and even in a primary school no pupil could reach to a height of 6 feet 2 inches or 6 feet 4 inches. Blackboards are costly and absorb much light, hence it is the writer's practice to reduce their width to 3 feet or 3 feet 6 inches, which is ample and even excessive according to Professor Dresslar's view. He recommends a blackboard width of only 28 inches for the first, second, and third grades, 32 inches for the fourth and fifth, 36 inches for sixth to eighth grades, and 40 inches for high schools. As it is often desirable to have a portion of the blackboard rather high so that matter written on it may be easily seen from a distance, a compromise can be made by having the chalk rail and entire blackboard higher at the teacher's end. This is the board that the teacher naturally uses, and the lower portion, being obscured by desks and tables, is less easily seen by the pupils.

Blackboards, for obvious reasons, should never be placed on the wall piers between the windows. The strain of eye adjustment is very injurious to the pupils.

Ground glass blackboards have not come into general use in the United States. A profitable field for invention would seem to be a material which would give a white or light colored surface on which a black crayon could be used, which, if possible, should be of a sort which would not produce the clouds of dust which come from the ordinary chalk.

Various artificial blackboard preparations are in more or less common use, some of which are much cheaper but are not as good as slate. Of these, the sort that consists of a liquid preparation applied to the plaster is probably the least satisfactory. There are, however, satisfactory substances which are sometimes useful to employ in "battery" or sliding blackboards, on account of being lighter in weight.

"Battery" blackboards are not in common use except in high schools. They consist of one or two frames containing blackboards hung with chains and weights like a window to slide up and down in front of the wall blackboard. They are frequently useful in laboratories and rooms where a large amount of blackboard work is done by the teacher and it becomes necessary to leave it for several days. Care should be taken in their erection, especially when they are to be attached to masonry walls, as their weight is considerable.

Class Room Doors. Boston requires that each class room shall have one door to the corridor, 3 feet 6 inches wide by 7 feet 0 inches high placed near the teacher's end. Under certain conditions two doors may be required. The door must be partly glazed, open out, and be hung on brass plated, ball-bearing butts (number not specified, but three butts should be used, even if the center one is not of the ball-bearing kind). The door must have a four-lever mortise lock, master keyed, cast brass knobs (not lacquered), 2-inch plain brass numbers, card holders 3½ by 5 inches, and hooks to hold open. Raised thresholds are not allowed. As the wardrobes are entered only from the schoolroom and not from the corridor, this affords only one means of egress from the room. The Massachusetts state law (Form B, 1914) requires that "class, recitation, domestic science, and manual training rooms and laboratories, if so directed, shall have at least two ways of egress, one of which may be through an adjoining room." The Boston claim, which is also the writer's view, is that more than one route of egress from a room is liable to cause confusion and doubt in an emergency which might lead to unfortunate results, and that only doubtful good could ensue from having two doors leading to the same corridor, while serious confusion might be occasioned by classes using the adjoining room as a way of egress, particularly when the adjoining room is served by the same corridor. A real objection to the two-door plan is the space that is wasted in the best blackboard (*i.e.*, the blackboard opposite the windows) by making another door as well as the additional expense. A point also might well be raised against the use of locks on schoolroom doors. Except for book and apparatus rooms, storerooms, etc., the writer can see no valid reason for having any interior locks in a school building, and the objections, as a possible source of danger, are obvious. If used at all, they should be of the type that is always free on the inside.

The best type of door is clearly one that is absolutely flush, without mouldings of any sort, like the doors used in the best hospitals. When this for any reason is not feasible, the paneling should be arranged vertically so as to reduce the number of horizontal ledges to hold dust.

Objections are sometimes made to the glass panel in the door on the ground that it destroys the privacy of the room. It has been the writer's experience that a great majority of schools are operated with the doors open anyway, and the light coming through the glass panel has great value in lighting the corridor. The disadvantages of the glass panel have not been apparent. In case of objection to transparent glass, a rippled or frosted glass could be used which would ensure privacy without impairing its lighting value. The size of the panel is a matter of preference. In some places it extends the entire length of the door.

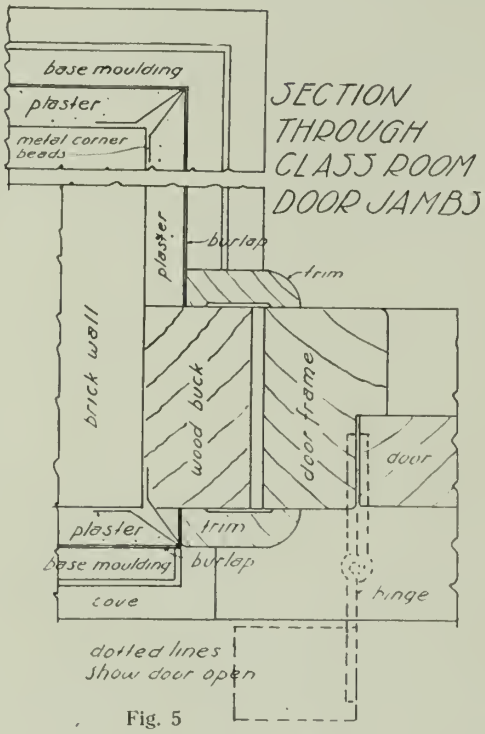


Fig. 5

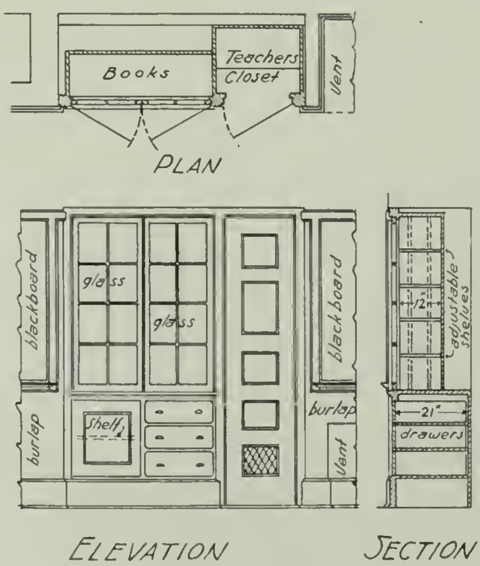


Fig. 6. Detail of Teacher's Closet and Bookcase

Transoms are useless and expensive, collect dust, are difficult to clean, and should not be employed.

High fixed sash above the blackboard on the corridor wall are used to obtain additional light for interior corridors. They introduce another surface to be kept clean, and are no addition to the class rooms. Their value in helping light the corridor, however, makes it desirable on the whole to include them in the plans. When used, the sills or ledges should always be splayed down, both to admit more light and to avoid making a horizontal ledge to collect dust above the eye line, and consequently unseen. What dust collects on the splayed down surface is visible and hence likely to be removed.

Tack Boards. For pinning up drawings or pictures, a soft surface into which thumb tacks can be pushed is necessary. This is accomplished in Boston schools by substituting for the blackboard at the rear end of the room soft wood sheathing with burlap stretched over it, with sewed seams extending from the base to the moulding at the top of the blackboards. A picture moulding is included at the top of the burlap. Instead of burlap the use of cork tile is suggested as being more cleanly and better adapted to the purpose. In the lower grades the tack board is omitted and a card rack at the top of the blackboards is substituted.

Bookcases. A bookcase with glass doors which will lock, together with some drawers and a cupboard below, is a necessary part of a class room. Space for this can generally be found in the thickness of the ventilating stacks without projecting into the room. Where this is not practicable, they may be built in any convenient corner. Boston specifies that these bookcases shall be about 5 feet 9 inches wide and the upper doors be fitted with cylinder, master-keyed locks, latch, and knob. The drawers and cupboard are to have ordinary locks. The drawers and cupboards may be 15 or 20 inches deep, but a depth of 9 or 10 inches is all that is necessary for the bookcase. The book shelves should be adjustable. Where the building is to be used for both day and night sessions, an arrangement of pigeon holes for holding the books of the day scholars when the night school is occupying the desks is desirable.

Teacher's Closet. Preferably in connection with the class room, but allowably from the wardrobe, there should be a small closet for the teacher's coat and hat. This may frequently be managed in connection with the bookcase. (See drawing.) A wire grille panel at the bottom and top of the door gives ventilation. The closet should have a shelf and five or six hooks.

Walls. Up to the level of the top of the blackboards it has been common to cover the walls with a good quality of burlap, which is free from projecting knots and loose ends, hung vertically and pasted to the plaster in wall paper style. This is then painted with a glazed surface which renders it non-absorbent, and it forms a splendid protection to the plaster. A great many schoolhouses have been thus treated, but it is more and more the writer's observation that with the good discipline obtaining in modern schools any special protection of plaster is unnecessary, especially if hard plaster is used. The burlap is, in many ways, an improvement on the old style of wood sheathing wainscot, with its many dust-holding joints and its high combustibility. It is, however, difficult to get a good job of burlap in places where the workmen are not accustomed to the process, and it has a way of sometimes coming off after a few years' use. It is also quite expensive, and the cost of burlapping a building would pay for any plaster repairs required for a long term of years. When burlap is not used, ordinary wooden corner guards from the base to about 6 feet 0 inches high form a sufficient protection for exposed angles. Where all the walls are of brick or other fireproof material, glazed brick or tile are sometimes used for dadoes, and, aside from their cost, are excellent. In England, where a wider variety of this sort of products is available than with us, they are extensively used in the rooms and corridors.

Above the top of the blackboard the wall is painted in oil to the picture moulding, which is placed one-half an inch below the ceiling.

Fireplaces. A fireplace in a class room is such an anomaly in America that the mere mention of it here may cause a smile. They are universally used in England, however, and when a fire is kept in them they add enormously to the cheerfulness of the schoolroom. The writer has already introduced them in one or two instances and ventures the opinion that with the irresistible growth of the new notions of ventilation their use will become common.

Ceilings. The ceiling is generally tinted in water color a light cream or buff, but reasons of economy sometimes require the plastering to be merely left white and clean. The angle with the walls is square, no coves being introduced, and when possible it is better to have the ceiling free from drop beams. When these occur, however, as in fireproof construction, running at right angles to the outside wall, it is better to let the window heads run up between the beams, thus gaining additional light, than to fur across the bottoms for the sake of a level ceiling.

Floors. The best wood wearing surface for a class room floor is undoubtedly maple, which should be of the best commercial grade, with sides and ends matched, about 2½ inches wide and blind nailed. Beech and birch are used to some extent and also rift Georgia pine, which makes a good-looking floor but has a tendency to splinter. "Heart rift" is the quality which should be used, but owing to the tendency of contractors to try to substitute inferior grades it is safer to specify maple. A two-inch cove base into which the baseboard is rebated is much in favor as an aid to cleanliness, although in practice it is apt to shrink and form a dust-holding crack. An under floor should always be laid when the floor is framed with wooden joists and it is better to provide it even in fireproof construction. This should be of boards not over eight or nine inches wide and laid diagonally so as to allow the upper flooring to run lengthwise of the rooms without being affected by the shrinkage in the boards of the under floor. Between the upper and lower floors a layer of incombustible building paper should be laid in all second or third class construction. Raised thresholds should be eliminated as useless and apt to hold dust.

The upper flooring should always be laid lengthwise of the rooms, in order that when the boards in the aisles between the desks which take the most wear become worn out, new ones may be easily substituted. The same remark applies to the flooring of the corridors and wardrobes. Only the best materials should be used for schoolhouse floors, as it is the part of the building which receives the greatest wear and is the first to need repairs.

Deafeners are not used to any great extent in schoolroom floors, aside from the layer of paper or felting between the upper and lower boards. For special places such materials as mineral wool, a "quilt" of seaweed and paper, or even mortar are sometimes employed.

After laying, the floors should be traversed and planed to a smooth and even surface and then oiled.

Platforms for the teacher's desks are no longer used.

Battleship linoleum has not proved to be a satisfactory material for class room floors on account of its property of showing all footprints and dust marks, making constant cleaning necessary, and also on account of the difficulty of fastening down desks and chairs without ruining its appearance in case a different seating arrangement is used. Difficulty has also been experienced in Boston in overcoming the tendency of the edges to turn up. It has also been found to wear out rapidly under the scuffling of a pupil's feet constantly in the same place, as under a chair. It may find a place in rooms not having fixed furniture, or possibly for offices.

Details. The various details of woodwork, etc., in the class room need to be studied with the greatest care. In these days, which mark the passing of wood as a building material and the widening use of actually unburnable material, an effort should be made to reduce the amount of wood used to its lowest terms. In particular, every effort should be made to eliminate grooved mouldings and ledges which form lodging places for dust. This seems like a totally unnecessary remark ; but the writer has recently seen a large new school built with widely projecting, finely detailed cap mouldings around the tops of the blackboards and extra wide wooden mouldings around all the fixtures. Projecting architraves with a ⅞ inch ledge on top should be eliminated. Wooden trim of any sort should have the top rounded or beveled so that any dust settling there can be seen and cleaned off, especially when it comes above the eye line. The chalk trough should have the groove run to the ends so as to be easily cleaned out. Removable wire nettings for holding the eraser clear of the trough are sometimes used, but are gradually being discontinued as being merely a useless source of expense. Mouldings around heating inlets are unnecessary, as the frames containing the deflectors are now made with flanges, which should fit tightly to the wall so as not to make dust pockets. The grille is omitted at the outlet opening, and the floor and base run directly in and around it, forming no place which is not directly in plain view. All corners of wood trim should be rounded. Many schools are finished in North Carolina pine and some in chestnut, but the best woods are undoubtedly ash or plain oak, with preference for the latter. These woods are strong, hard, durable, of agreeable appearance, and suited for this use.

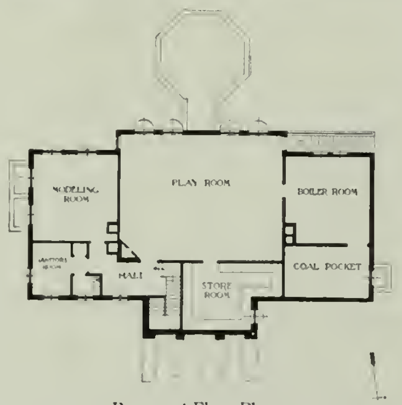
THE KINDERGARTEN.

THE Boston requirements for a kindergarten require at least the space of an ordinary class room and wardrobe, but preferably a space of 800 or 900 square feet. They comprise a large room, a small room, a supply closet, a wardrobe, and a water closet. The large room should have a 16-foot circle, regulation lines painted on the floor with at least 4 feet around it. The small room requires about 200 square feet, with wide doors or "Flexifold" curtain opening into the larger room. In addition there should be a supply closet, a wardrobe, and a toilet room connected and separate from the main toilet rooms. This should have a low water closet and a bowl or sink.

The room should be in a sunny corner of the building and should have windows on two sides. A linoleum floor is desirable as the furniture is not fastened down. It is also much warmer than wood, a good point, as the small children are on the floor more or less of the time. The blackboard heights are the same as for primary grades. The usual bookcase should be provided, but the teacher's closet should accommodate clothing for two or three teachers. The wardrobe must accommodate sixty hooks.

In places where the kindergarten has been less standardized, the accommodations provided are much more liberal. The open fireplace is frequently found and especial care is taken to introduce an artistic and pleasing decorative scheme. Attractive sun rooms are provided for winter play, and the rooms are larger and better equipped.

An interesting type of kindergarten is that recently built at Wellesley, Mass., on the grounds of Wellesley College. This is a one-story building constructed of hollow tile with stucco covering, and designed to resemble the regulation school as little as possible. The main floor contains a large central room, a smaller room for Montessori work, and another small room for special work, all three arranged on the south side of the building, assuring both sunshine and seclusion from the highway. This floor also contains the toilet rooms with miniature fixtures for the pupils and regulation size for the teachers, also wardrobes supplied with low benches for the easy putting on of little leggings and rubbers. The standard pole fixtures are used for the garments.



Basement Floor Plan

First Floor Plan

Anne L. Page Memorial Kindergarten, Wellesley, Mass.
Kilham & Hopkins, Architects

The schoolrooms have large French casement windows so as to admit all the air possible. The floors are covered with cork matting, an improvement over linoleum in that it obviates the danger of the child's slipping during the games, is noiseless, and not cold—a very important feature of a kindergarten.

Indirect lighting fixtures are installed for use on dark days. Special cases are provided for materials used in carrying on kindergarten work. Blackboards are provided and also tack boards over the cases. The large class room contains a fireplace where the children can gather for stories around a cheery fire, and the walls are tinted a soft brown, which harmonizes with the woodwork of fumed oak.

At the rear and not interfering with the light is projected a conservatory with masonry walls to the window-sill height and special greenhouse construction above. Shelves and plant boxes are placed around the windows. The floor is of brick and tile. This may not only be used as a sort of play room, but also as a place for the study of plant life and the care of flowers.

The basement contains in the southeast corner — which, owing to the slope of the land, is well above ground — a room for clay modeling, a janitor's bedroom and bath, and the usual heating and ventilating plant, etc.

All the plumbing fixtures for the children are carefully selected and of special low height. Toilet rooms have terrazzo floors and sanitary bases.

The details of the casement windows are of interest, being made according to actual French practice instead of the usual American type. The advantages of having the kindergarten in a separate building away from the older pupils are obvious, but it is naturally an arrangement difficult of general adoption.

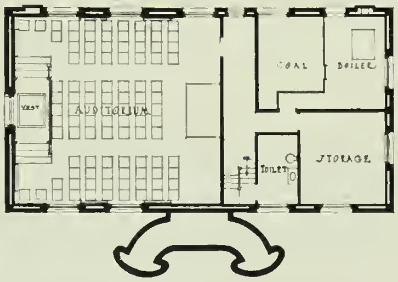
(*To be continued.*)

Monographs Upon Types of Buildings Met in Everyday Practice.

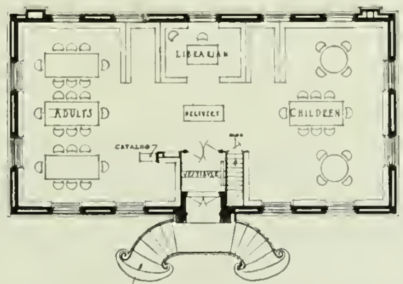
THE SMALL TOWN LIBRARY AND THE MODERN PRINTING HOUSE.

THE public in general is apt to consider that for a small outlay of money nothing but a work of mediocre merit can be achieved. This supposition has again and again been proved false, and yet again and again people will say in an apologetic way when referring to a building that was built for a small sum, "Well, you know it isn't very satisfactory either from a practical or an artistic point of view, but what can one expect for the amount that it cost?" Such a statement is really nothing more than either a reflection on the amount of study given the building by the architect, or a reflection on the intelligence of the speaker, who very probably wanted fifty thousand dollars' worth of building materials erected and donated to him for half what they cost the contractor.

The point which it is wished to emphasize here is that no matter how small an amount of capital is to be invested in a building operation, the expenditure can bring, with proper study by the architect in co-operation with his client, a result that is as practical and æsthetic as the size of the building and character of the materials attainable at the designated price will permit.



BASEMENT- PLAN



- FIRST - FLOOR -

An example which will demonstrate this is the small Carnegie library which has just been completed for the town of Sharon, from the design of C. Howard Walker, architect. There undoubtedly have been many libraries built that are similar and equally good. There is nothing unique about this library building except that it has been carefully thought out and built with good materials at the low contract price of $9,703 by a first class builder.

Care was exercised in choosing a site suitable to the type of building contemplated. A site for a public library in a small town should be in the center of the town. The building committee was fortunate in securing such a location. The architect, finding a basement auditorium was required, avoided so far as possible a high basement front façade by placing the building in such a way as to take advantage of the slight slope towards the rear of the lot.

It was decided by both the building committee and the architect that the building should be in design architecturally harmonious with the traditions of the town. The town was essentially

Carnegie Public Library, Sharon, Mass.
C. Howard Walker, Architect

of New England traditions, and the Colonial style was therefore adopted.

Naturally before considering the exterior of the building, the plan was carefully studied. The library was to be controlled by one person, which naturally suggested one room. Librarians, however, like to have their own private quarters; children and adults cannot be indiscriminately poured into a reading room, and a number of people, often thoughtless in disturbing readers, come to a small library simply to return or take out books for home use. One room, therefore, carelessly planned, would obviously create turmoil. The solution of the problem, to be sure, is simple, and yet it is the simplest solutions that are sometimes the ones never put into execution. People coming to the library merely for a moment's visit find the librarian directly opposite the entrance, ready to take or deliver books. This free passage from the front vestibule to the librarian's desk automatically separates the two sides of the room — one side devoted to children, one to adults. The librarian is assured a certain privacy in an alcove flanked by bookcases and separated from the room by the desk, from behind which visually the room is under control, and the librarian screened behind the desk is removed far enough from the door to escape the draft while it is open.

Cold and rainy weather demand a vestibule. A main room (58 by 28 feet inside dimensions) demands as small a vestibule as possible encroaching on its area. The vestibule feature was therefore studied to be compact, and a glance at the plan will show that although ample, the arrangement of stairs, doors, newspaper rack, etc., in connection therewith, leaves no waste space whatever.

In the basement an auditorium with a capacity of one hundred persons with a separate entrance and vestibule, a boiler room, storage space large enough to ultimately allow an antiquarian room to be partitioned off from it, toilets, coal pocket, exit stairs, etc., are provided all studied for a compact and practical solution.

The mechanical equipment of the building was considered both from the point of view of comfort for the library users and for economy in upkeep. The building is thoroughly heated and ventilated; the auditorium is partially heated by indirect heat, the entire building being on an air lined, semi-vacuum system with traps installed to produce semi-vacuum, which automatically decreases the pressure on the boiler, which in turn diminishes the coal bills. The building is lighted by electricity, indirect lighting being installed in the reading room.

The exterior walls are of brick, the texture and bond being carefully selected. The wall openings were thoughtfully studied, and the one feature where the architect felt at liberty to include architectural ornament was the front entrance. This entrance gives to the building an architectural note and Colonial character at slight cost.

Detail of Entrance Doorway
Carnegie Public Library, Sharon, Mass.
C. Howard Walker, Architect

The interior is finished in North Carolina pine stained silver gray, is soft to the eye, and a most attractive way of finishing a perfectly good inexpensive material.

The building is simple throughout; it is not big enough to be anything else, but it is essentially adapted to its purpose and admirably fits its environment.

THE CHEW PRINTING HOUSE, CAMDEN, N. J.

Henry A. Macomb, Architect.

THERE is an increasing acknowledgment of the fact that no good reason exists why a printing and publishing building need resemble a foundry or a cold storage plant. The modern evolution of this type of building as illustrated by the subject chosen here seems to demonstrate the interest the architectural profession is taking in plants of this kind, and it is hoped that each successful work will stimulate further endeavor in the solution of these utilitarian problems.

As will be realized, printers in the larger cities have for a long time had to accommodate their business to floors in conventional loft buildings which were designed to accommodate any one of a number of businesses, all different in their requirements. They have had to accept minimum ceiling heights and poor light, vibrating floors, elevator service all too inadequate, insufficient heating, and bad ventilation as a standing handicap. Added to these there has been the problem of heavy insurance and excessive light charges.

The plan for the new Chew Building was studied with a view towards its specialized construction and equipment. It is a printing house caring for all branches of the printing business under one roof and designed with a nice feeling for the tradition of the printing art as practised in and around Philadelphia.

The building has a frontage of 35 feet and is 99 feet deep, divided into an office section 32 feet in depth with the manufacturing portion in the rear. The walls throughout are built of brick upon stone foundations. The columns, floor, and roof construction are reinforced concrete with the same material used for stairs and elevator enclosure. The main façade is faced with brick laid in Flemish bond. White semi-glazed architectural terra cotta has been used for the entrance doorway, window lintels, and entablature. The inside walls of the office are faced with hollow tile and plastered. The office portion of the building has been excavated and contains a basement for storage, boiler room, coal bins, etc. This gives all the necessary space required in the basement and effects a considerable saving in the total cost of the building. It will be noted on the plan of the first floor that the office is 2 feet higher than the press room floor in the rear. The story height of the front section is 11 feet 8 inches top to top, and 13 feet 8 inches in the press room. Both sections of the second and third floors have been kept on the same level. The high ceilings, together with the large window openings, ensure the natural light which is so necessary in the press and composing rooms.

Much time and money is lost to the printer when the heating is inadequate, it being essential that the temperature of the shop be kept uniform at all times to even a greater extent than in private dwellings, not primarily for the comfort of workers, but because of the serious effects that changing temperatures have on paper and printing presses. Varying humidity is also the enemy of the printer because of its effect on the register of the printed sheets. In both the heating and ventilation of the Chew Building care has been taken to meet the most exacting requirements in this respect.

Freight handling demands important consideration. It is ideal when the freight entrances are large and on a level slightly below the floor of a truck so that its load may be placed on hand trucks, which are pushed on to elevators and then distributed to the places where stock is needed. It will be seen that large doors have been provided on each floor of this building so that both freight and large machinery can be transported by outside pulley hoist if necessary.

The press room is directly on the ground, paved with concrete and a hardened dustless cement surface, thereby doing away absolutely with the vibrating floor evil and providing an excellent foundation for the presses.

The building contains 47,320 cubic feet in the administrative section, built at a cost of 15 cents per cubic foot. The factory section contains 97,020 cubic feet and cost at the rate of 13½ cents per cubic foot. The total amount of the contract cost was $20,250.

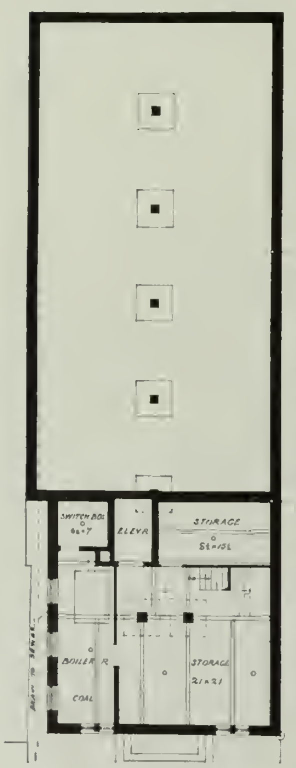
Printing House of Sinnickson Chew & Sons Co., Camden, N. J.
Henry A. Macomb, Architect

Composing Room

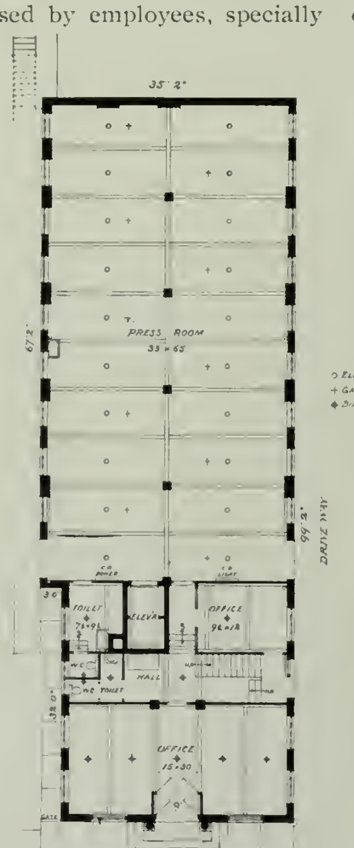
The evolution of the so-called "loft-building" type of structure, the sort used by one type of printing plant, from fire traps to fire-safe buildings, marks a forward step in the progress of the fight to conserve life and property by combating fire dangers. When the building is to be occupied by one concern, however, and built for the specific purpose of manufacturing a certain product, there is generally enough data at hand to produce a well designed and constructed building, protected against general fire hazards and the special hazards of the particular branch of manufacturing housed. The Chew Printing House is as fireproof as it can be made, both in the structure itself and its equipment. It is provided with an automatic sprinkler system, fire alarm system, and other similar appliances for the protection of the occupants and contents. The automatic sprinkler, as we have called attention to before, is almost the only absolutely dependable means of preventing the spread of fire, and this device as installed to-day practically never fails to accomplish its purpose, and at the same time materially reduces the cost of carrying fire insurance. Chemical extinguishers have been placed in convenient places where they may be used by employees, specially drilled, in case an incipient blaze is discovered. Their value has been demonstrated in saving stock from damage by water.

To aid in maintaining higher standards of safety, every floor has two exits remote from each other, leading to a passage which in turn ends on the street. Outside fire-escapes have been provided with balanced stairway (*i. e.*, a stairway which drops automatically when it is stepped upon) at the lower level, and this outside stairway is extended to the roof.

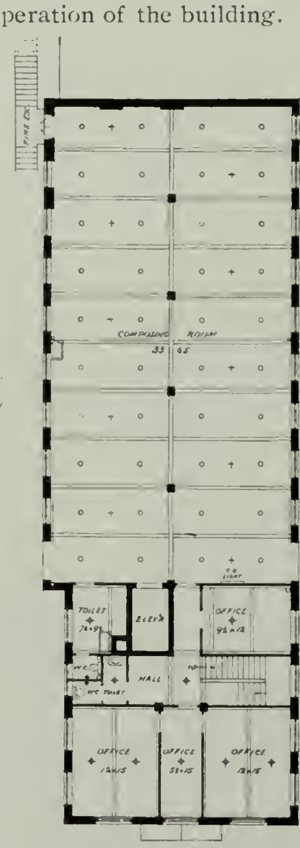
Good ventilation has a direct effect on the efficiency of those employed within the printing house, as well as in all classes of factories. When oxygen is replaced by other gases or consumed, the air becomes unfit for respiration and almost incapable of supporting life. It has been estimated that from forty to fifty per cent of the deaths which occur are attributable to the morbific influence of foul air. Realizing the importance of good ventilation for their employees, the owners of the Camden, N. J., plant we are discussing have installed a process of diluting the confined foul air with pure, fresh air properly warmed and properly humid. This has been accomplished without the production of drafts and is a factor in the successful operation of the building.



Basement Plan



First Floor Plan



Second Floor Plan

Third Floor Plan

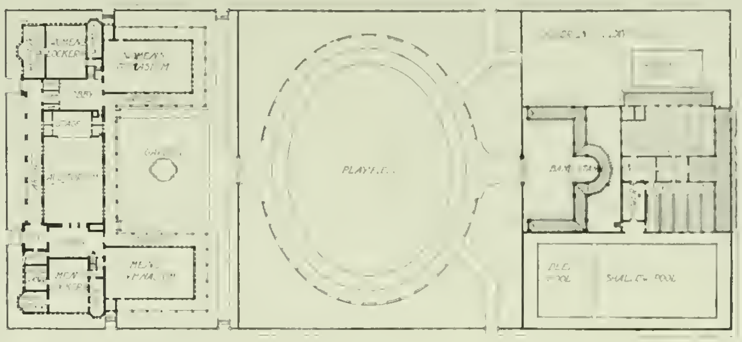
Printing House of Sinnickson Chew & Sons Co., Camden, N. J.

Henry A. Macomb, Architect

Public Bathing Establishments.

ILLUSTRATING RECENT WORK IN REPRESENTATIVE AMERICAN CITIES.

BATHING has been considered a necessary and enjoyable practice by civilized people of all times, even among those of the earliest days of which we have any record. The ruins of the great public baths endowed by the Roman emperors, and made the center of the Roman citizens' activities, are to this day a source of marvel and pleasure to antiquarians and students of history.



Ground Floor Plan of Field House and Plot Plan

Second Floor Plan of Field House

The same demand for bathing facilities for the citizens of large centers of population has continued to make large, public bathing establishments a feature of European life. In America, on the other hand, we have always had different ideals of living from those of the European and, consequently, our development in many respects has differed widely from theirs. Thus, contrary to European conditions, where only the homes of the richer people have bathrooms, even small and unpretentious American city and suburban houses have a bathtub supplied with hot and cold water. American hotels, likewise, have always furnished excellent bathing facilities for travelers, and with the present high standard of hotel operation in this country, the patrons of metropolitan hotels have come to expect a private bathroom with each suite, or single sleeping room. For these reasons the public bathing establishment has not been an important or, in fact, a necessary feature of our lives, and consequently public baths are not well known to us, save for such as the Russian and Turkish baths operated in the larger cities as private undertakings.

In the large American cities, however, with the influx of a constantly increasing foreign-born population, the conditions that obtain in European cities are beginning to be felt here, and measures must naturally be taken to afford these people ample bathing and recreation facilities to safeguard public health. It is also evident upon investigating the living conditions of large masses of people employed in mechanical and industrial pursuits that their bathing facilities are

General View of Bathing Pool and Field House, Pulaski Park, Chicago, Ill.
W. Carbys Zimmerman, Architect

Shower Room in Locker Building, Pulaski Park

not of the best, in many cases being limited to the use of a pail and sponge. Such handicaps are not conducive to bodily cleanliness, especially when it is remembered that the majority of these laboring people are of European extraction among whom private bathing is not adhered to so rigorously as among American people.

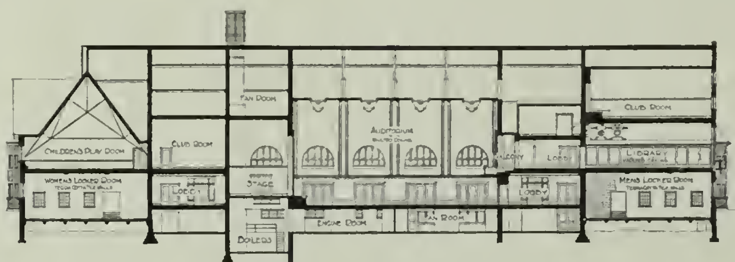
These conditions, gradually asserting themselves, are not passing unnoticed by the public mind and we are now seriously thinking of means to raise the standard of living of the working masses and to supply them with facilities which will make clean living attractive and easy for them to accomplish.

The architect, to whose attention this problem will naturally be brought for solution, is interested in the precedent which any existing baths may establish to influence the design and construction of those which will be built to suit American conditions, in knowing how nearly the conditions fulfilled by the European baths agree with those in America, and what has already been done in this country in a serious endeavor to create an accepted type for these structures.

A great number of baths have been erected in the larger cities of the Continent and England, which embrace the various kinds of bathing arrangements such as single tub and spray baths, plunge baths, and swimming pools, as well as hot air and vapor baths. Principal among these may be mentioned the Luebecker Thor People's Baths in Hamburg, the Guentzbad in Dresden, and the Mueller Volksbad in Munich. These are all large establishments provided for the accommodation of the people and the traveling public. They are all larger and of a more monumental character than present American needs would seem to demand, inasmuch as the practice which has been established in cities like New York, of dividing the population into a number of geographical units and serving them with smaller buildings, has worked out to good advantage.

The need in America, however, is not confined to indoor bathing accommodations, our extended heated term making outdoor pools desirable, especially in centers removed from the ocean or unpolluted rivers. In the three establishments illustrated in this paper there are seen three different types that have recently been erected in representative American cities, to meet varying demands.

The development of Pulaski Park in Chicago has been effected with the intention of serving many more interests of the people in its vicinity than bathing, but for the great majority of its patrons perhaps this will be its chief service.



Longitudinal Section of Field House

It is located on a site of 3.8 acres bounded by Noble, Blackhawk, Cleaver, and Bradley streets, in one of the most densely populated districts of the city, the predominating nationalities being Polish and Bohemian. The devel-

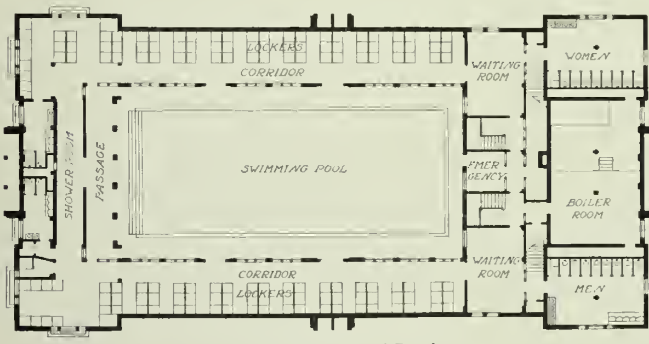
View of Field House from Play Field, Pulaski Park, Chicago, Ill.
W. Carbys Zimmerman, Architect

opment comprises a field house, playground, locker building, and swimming pools, and represents an expenditure of \$695,000 exclusive of grading and planting, distributed as follows: land, \$450,000; field house, \$175,000; locker building and swimming pools, \$70,000.

The play field is situated between the field house and locker building and provides a running track, baseball diamond, etc., for boys, while in the corresponding space to that occupied by the swimming pool, on the other side of the locker building, is arranged a playground for girls and young children, with the customary apparatus, wading pool, sand court, etc., served by a large space in the locker building, divided into small compartments for dressing.

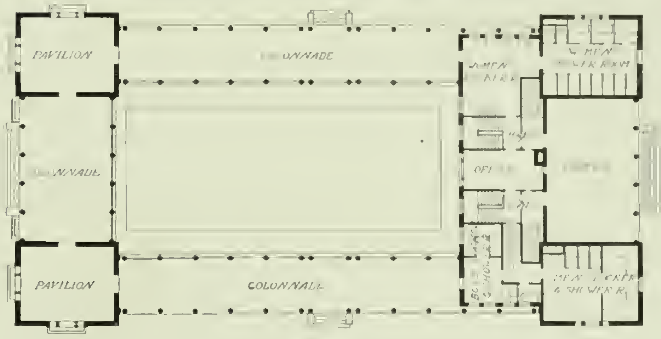
The outdoor pool and locker building is restricted to the uses of men and boys and provides accommodations for five hundred per hour. The pool is divided into two parts to meet the demands of the bathers, whether they desire shallow or deep water. The deep pool is 40 feet wide and 60 feet long, while the shallow one is 60 feet wide and 180 feet long.

The field house, as may be seen from a study of the plans reproduced herewith, is devoted mainly to gymnasia for men and women with the attendant locker, shower, and toilet rooms. The respective gymnasia are located at opposite ends of the building in wings with separate entrances from the street so that the men and women may enter and leave the building independent of each other.



Plan at Level of Pool

Public Bath in the Grove, Kansas City, Mo.



First Floor Plan

The space devoted to showers is divided into two rooms, one containing individual compartments, formed by thin partitions, the other being left entirely open. The locker and shower rooms are 16 feet high with enameled tile walls and ceilings. The showers are overhead fixtures, supported from the side walls and individually controlled by the bather to obtain any desired temperature.

The remainder or central portion of the field house is occupied by a large auditorium, reached by way of an ample lobby from the main entrance in the tower. It occupies two stories in height and has grouped around it on the second floor a library, children's play room, and small club rooms, making the building one of great service in a crowded city district as a community center.

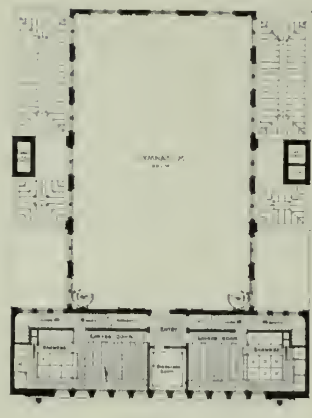
The building is heated by a two-pipe vacuum system for direct radiation in all rooms, fresh tempered air being admitted to the auditorium and stage, library, children's play room, club rooms, and locker and shower rooms. Exhaust is affected from the shower and locker rooms by mechanical means, but natural vents are relied upon for the exhaust of the other rooms.

The Bath in the Grove, Kansas City, similarly furnishes a center of recreation in a park, but is intended primarily for use only in the summer months. It consists of a large pool, constructed below the level of the natural grade and surrounded on three sides by open pavilions which make it specially

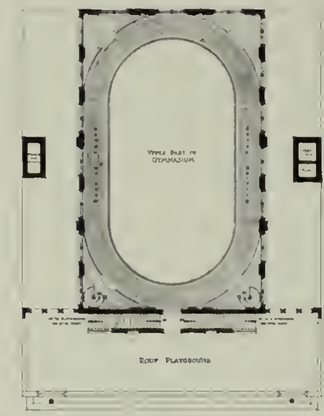
View of Pool, Public Bath in the Grove, Kansas City, Mo.
Wilder & Wight, Architects

desirable for aquatic sports because of the ease with which a large number of spectators can be accommodated. The pool is built with a sloping bottom, ranging from a depth of 2 feet at the shallow end to 9 feet at the deep end to suit the needs of both swimmers and non-swimmers. In the long passageways located at either side of the pool under the colonnades, lockers for men and women respectively are provided. These are lighted by windows facing the pool and vault lights set in the pavement of the colonnades. The floor plans reproduced herewith show the comparative areas devoted to showers for men and women, waiting rooms, attendants' rooms, and the general scheme of operation.

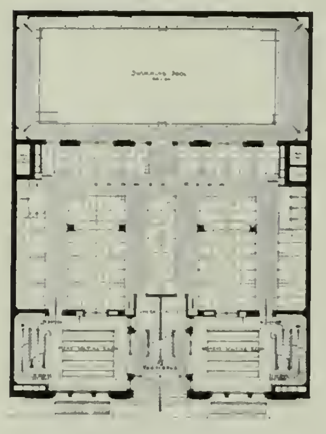
Above the base course, which is stone, the entire building is constructed of glazed terra cotta. The roofs are covered with tile and finished with an Italian detailed cornice showing open rafters. A modeled frieze to suggest the purposes of the building occurs directly beneath the cornice and furnishes an attractive piece of decoration.



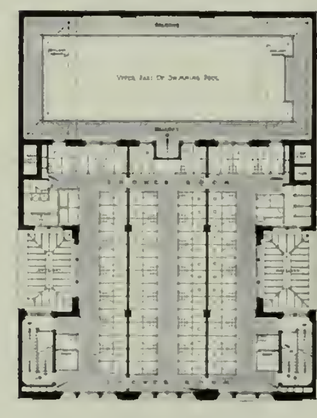
Third Floor Plan



Fourth Floor Plan



First Floor Plan



Second Floor Plan

The third example, the Public Bath and Gymnasium for the City of New York, more nearly corresponds in service with the European baths previously referred to, although it is much smaller than any of those mentioned. It is intended for use throughout the year and means to provide bathing accommodations of a cleansing nature to the inhabitants in the part of the city in which it is located, perhaps more than to provide a place for people to enjoy swimming. It is operated in connection with a gymnasium, where under experienced instructors those desiring to do so may embrace the means of building up their physique to counteract the dangerous and confining circumstances of the tenement districts in which they live.

Shower and Dressing Rooms

Swimming Pool

Public Bath and Gymnasium for the City of New York, West 28th Street, New York

William Emerson, Architect

DETAIL OF TOWER AND CLOISTER

WEBB HORTON MEMORIAL PRESBYTERIAN CHURCH, MIDDLETOWN, N. Y.
CARRÈRE & HASTINGS, ARCHITECTS

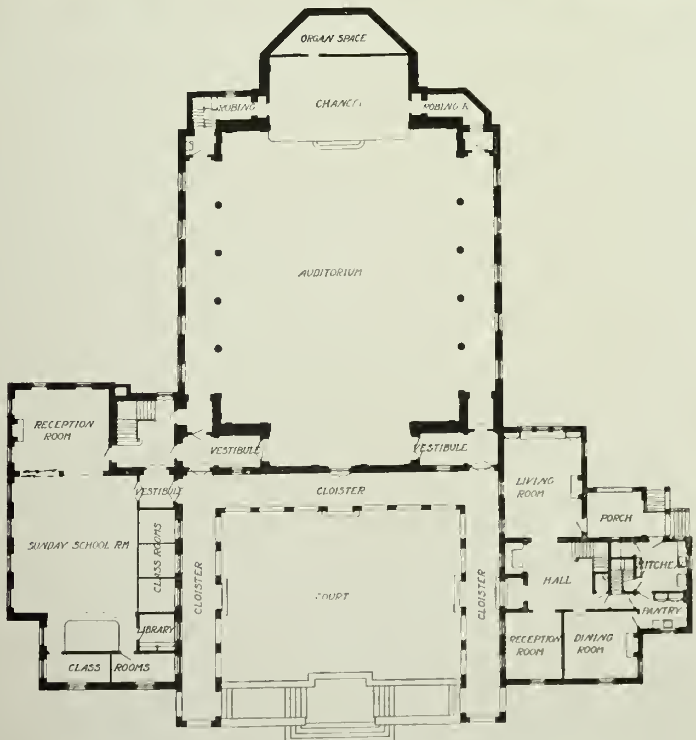
STREET FACADE

REAR FACADE

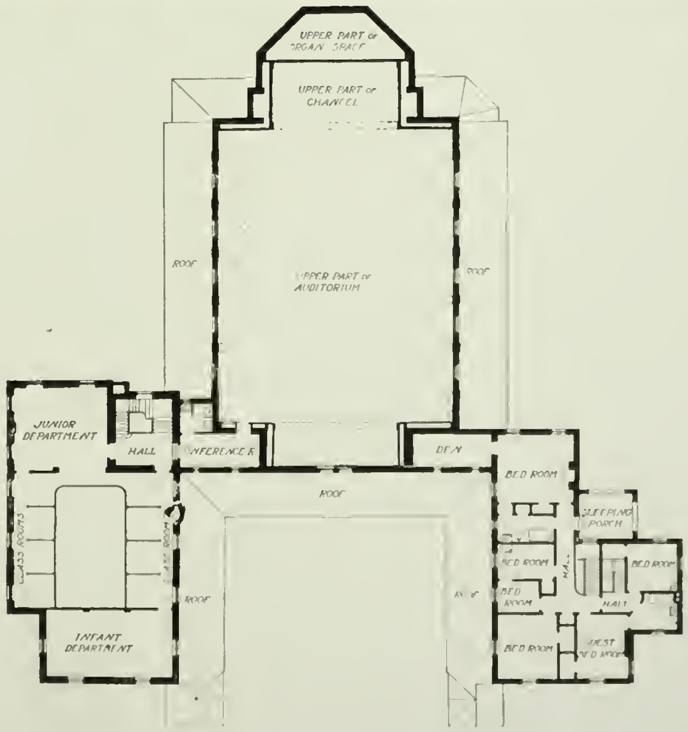
WEBB HORTON MEMORIAL PRESBYTERIAN CHURCH, MIDDLETOWN, N. Y.

CARRÈRE & HASTINGS, ARCHITECTS

AUDITORIUM



FIRST FLOOR PLAN



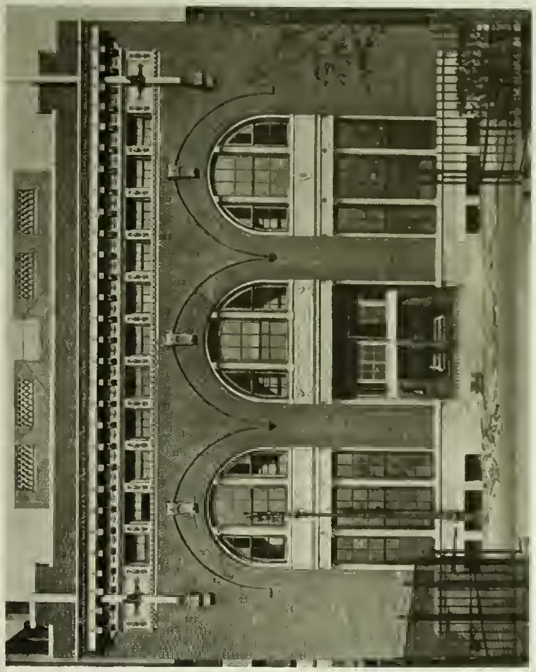
SECOND FLOOR PLAN

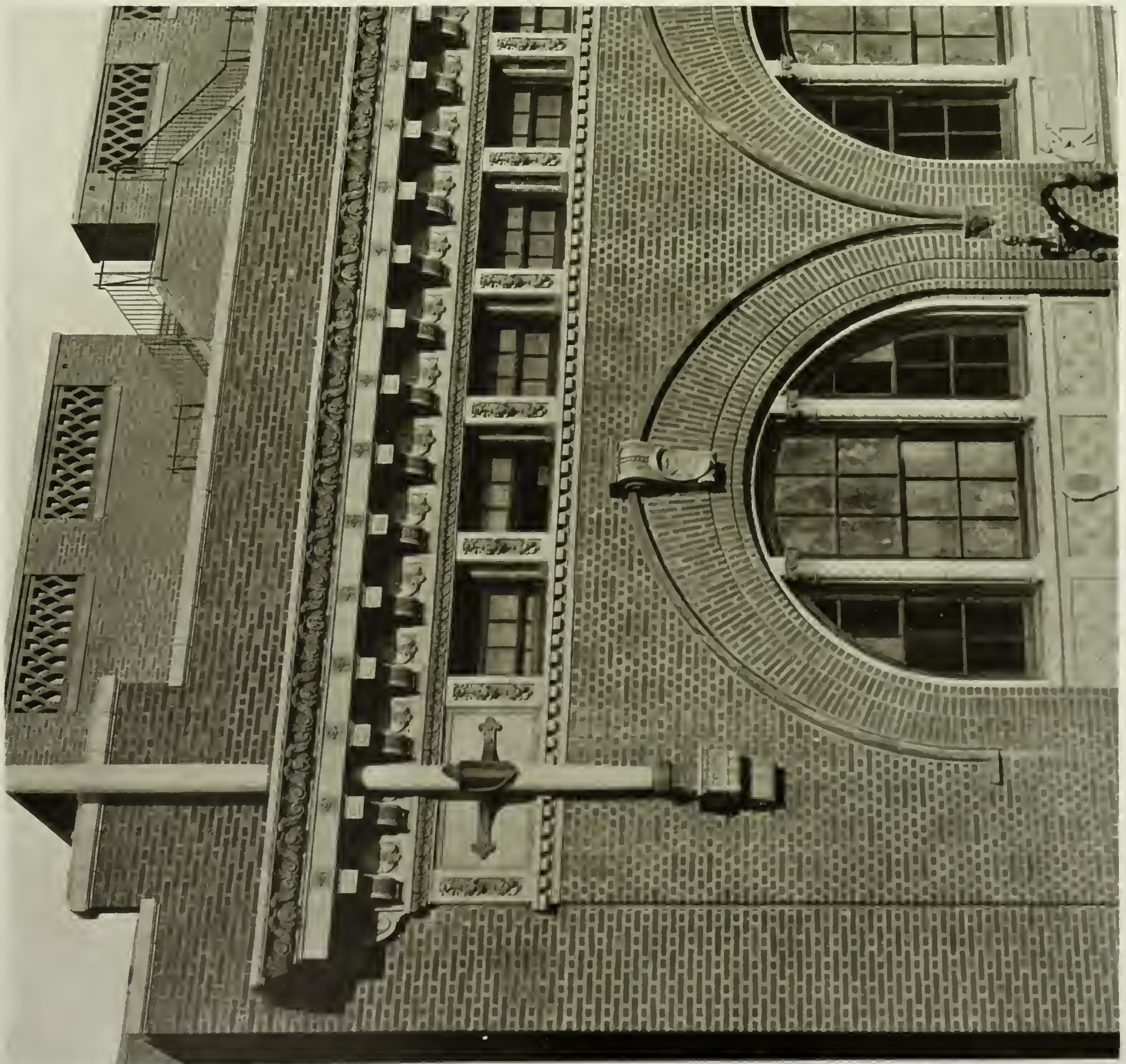
WEBB HORTON MEMORIAL PRESBYTERIAN CHURCH, MIDDLETOWN, N. Y

CARRÈRE & HASTINGS, ARCHITECTS

PUBLIC BATH IN THE GROVE, KANSAS CITY, MO.
WILDER & WIGHT, ARCHITECTS

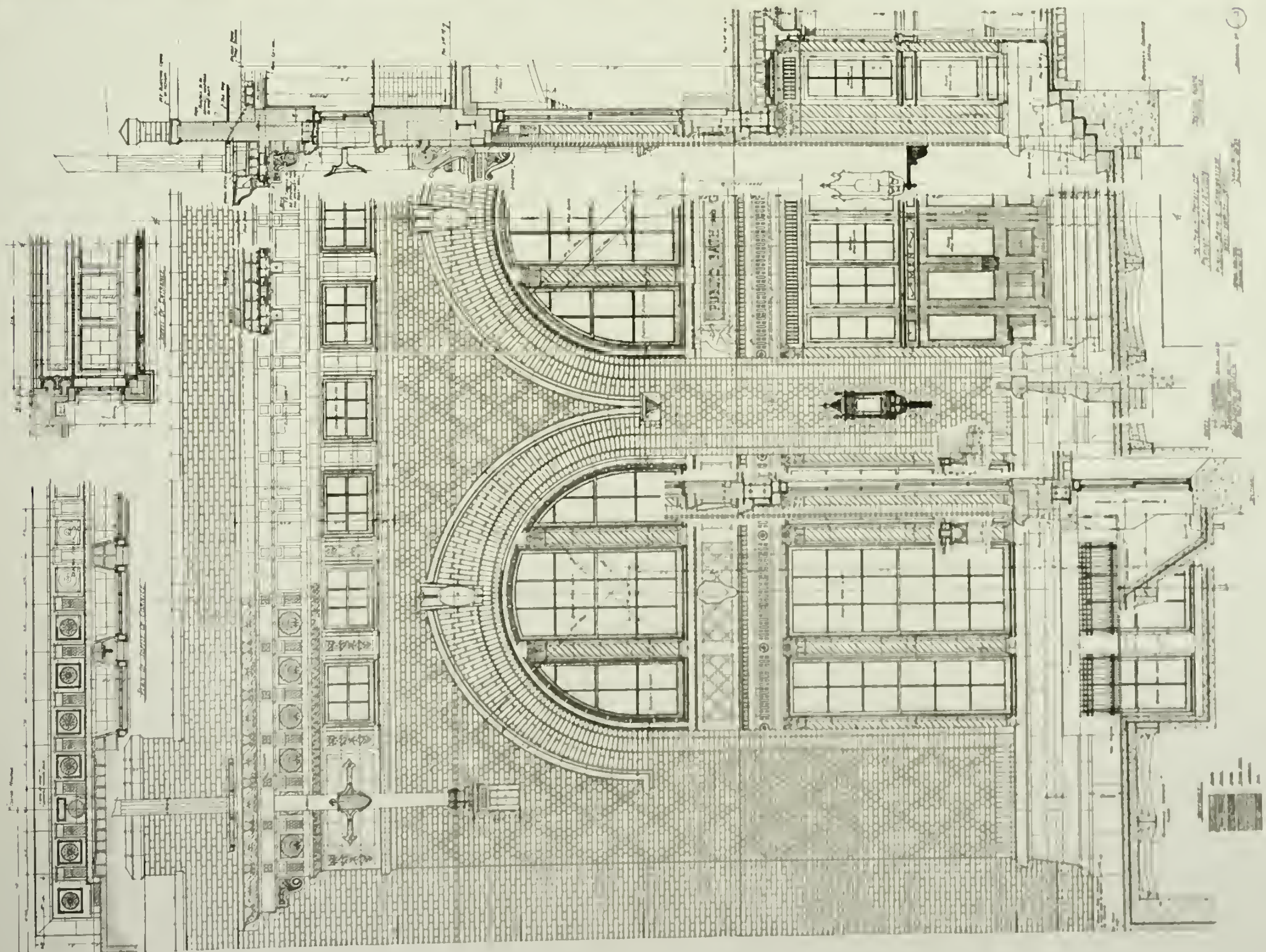
PULASKI PARK FIELD HOUSE, CHICAGO, ILL.
W. CARBYS ZIMMERMAN, ARCHITECT





PUBLIC BATH AND GYMNASIUM, FOR THE CITY OF NEW YORK, WEST 28TH STREET, NEW YORK, N. Y.

WILLIAM EMERSON, ARCHITECT



PUBLIC BATH AND GYMNASIUM, FOR THE CITY OF NEW YORK, WEST 28TH STREET, NEW YORK, N. Y.

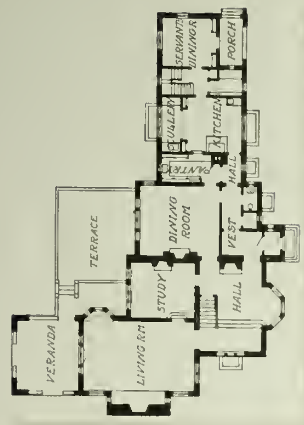
WILLIAM EMERSON, ARCHITECT

HOUSE OF CHARLES A. CASS, ESQ., ARDSLEY PARK, N. Y.

WILSON EYRE & McILVAINE, ARCHITECTS

HOUSE OF CHARLES A. CASS, ESQ., ARDSLEY PARK, N. Y.

WILSON EYRE & McILVAINE, ARCHITECTS



GARDEN SIDE AND PORCH

DETAIL OF HALL BAY AND ENTRANCE

HOUSE OF CHARLES A. CASS, ESQ., ARDSLEY PARK, N. Y.

WILSON EYRE & McILVAINE, ARCHITECTS

GARDEN FRONT

ENTRANCE FRONT

HOUSE OF GEORGE S. MANDELL, ESQ., HAMILTON, MASS.

WILLIAM G. RANTOUL, ARCHITECT

DOORWAY ON GARDEN SIDE

DOORWAY ON ENTRANCE SIDE

HOUSE OF GEORGE S. MANDELL, ESQ., HAMILTON, MASS.

WILLIAM G. RANTOUL, ARCHITECT

DINING ROOM

LIVING ROOM

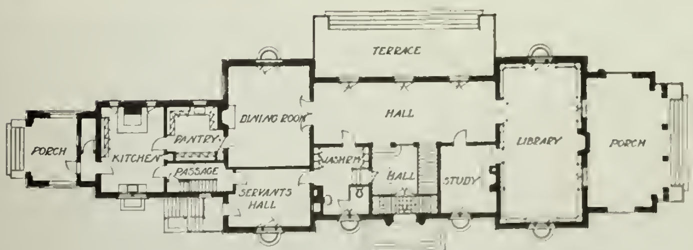
HOUSE OF GEORGE S. MANDELL, ESQ., HAMILTON, MASS.
WILLIAM G. RANTOUL, ARCHITECT

GARDEN FRONT

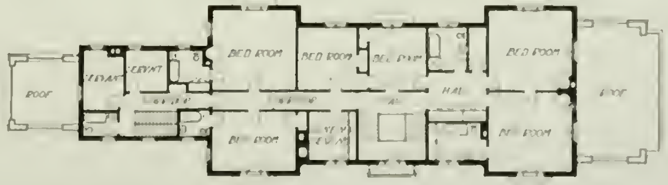
ENTRANCE FRONT

HOUSE OF R. LANCASTER WILLIAMS, ESQ., ECCLESTON, GREEN SPRING VALLEY, MD.
LAURENCE HALL FOWLER, ARCHITECT

DETAIL OF ENTRANCE DOORWAY



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF R. LANCASTER WILLIAMS, ESQ., ECCLESTON, GREEN SPRING VALLEY, MD.

LAURENCE HALL FOWLER, ARCHITECT

The American Theater.

ITS ANTECEDENTS AND CHARACTERISTICS.

By HUGH TALLANT.

PART I. THE THEATERS OF GREECE, ROME, AND THE RENAISSANCE — (Continued).

THE old wooden theater of Dionysus seems to have served every purpose for upwards of a hundred years. At all events, it was not replaced by a stone building until towards the middle of the fourth century B.C.,* and even then its reconstruction seems to have been due to sociological rather than to technical demands. The Greek drama was not yet so changed in character as to require a *different* setting from that of the Age of Pericles, and it certainly did not merit a *nobler* setting. On the contrary, the new plays were so far inferior to the old that their presentation at the annual contests was beginning to be interspersed with reproductions of the earlier masterpieces — a confession of weakness previously unknown. Under such conditions the stone theater at Athens and those which shortly followed it in other Hellenic cities were merely a glorified expression of the same dramatic requirements which had led to the erection of their wooden prototypes. They were the natural result of increasing prosperity and facilities, combined with civic pride and artistic emulation. They represented a great advance in material splendor, but added little to the practical convenience of either actors or spectators.

The new theater was erected upon the same site as the old, in spite of the fact that the dimensions, shape, and orientation of the property were anything but ideal. Immediately to the south stood the ancient temple of Dionysus, dating back almost to the Heroic Age,† and far too venerable a monument to be either removed or dismantled, although it formed an inconvenient barrier to the extension of the theater in this direction. However, the architects took advantage of every inch. In order to obtain increased space for the new skené, which was to be wider than the old, they crowded its southern wall against the very corner of the temple, and at the same time shifted the orchestra a few yards to the northwest. To offset this last change, which cramped the auditorium on the south, they terraced out the ikria to the west by means of double retaining walls with cross buttresses, and also cut down into the rock of the Acropolis on the north in order to add a few rows of seats at the rear. Even so, the auditorium remained irregular and unsymmetrical, and afforded no greater seating capacity than before, if we can believe the half of what we are told.‡ Worst of all, it faced towards the south — a most undesirable orientation, because the spectators thus had the light in their eyes, besides being oppressed by the fierce heat of the midday glare in the bowl.§

* This estimate by Dörpfeld is accepted by Haigh. See "The Attic Theater," Chapter III, page 86.

† It is assigned by Dörpfeld to the sixth century B.C.

‡ Plato (Symph. 175. E) states that the wooden theater of his day seated over 30,000 people. The stone theater seated about 17,000.

§ Vitruvius (V. 3. 2) expressly warns architects against this danger.

Yet with all its defects the Dionysiac Theater still remains the oldest, the most historic, and the most interesting building of its kind. Its original arrangement, according to the restoration of Messrs. Dörpfeld and Reisch, is shown in Fig. 4 (THE BRICKBUILDER, December, 1914). The general irregularity of the layout is only too painfully apparent, but even more striking is the apparent defectiveness of the sight lines. As will be seen, the sweep of the concentric seats was in the form of a semicircle with the ends prolonged by straight lines, so that the spectators at the two sides of the auditorium faced not towards the proskenion, but parallel to it. In fact, they must have found a considerable portion of the proskenion wholly cut off from their view by the projecting wings of the stage-building. Various explanations have been suggested to account for this seeming defect. It has been pointed out that "in Greek theaters, where the choral and musical contests outnumbered the dramatic, the orchestra was always the most important part of the building";* also that "the theater in antiquity was by no means reserved for scenic representations, but was used for public gatherings of the most varied character."† These are, however, merely excuses, which might palliate, but certainly would not condone, so obtrusive a defect. Moreover, the architects of other Greek theaters, far from trying to minimize the difficulty, seem to have been determined to aggravate it. They usually constructed their tiers of seats in the shape of a semicircle prolonged, not by straight lines, but by *a continuance of the same curve*, so that the inside boundary of the auditorium formed about two-thirds of a circle. This formation obliged the unlucky occupants of the side seats to face actually away from the proskenion. So pronounced an arrangement must have been dictated by good and sufficient reasons; for the Greeks were above all things a people of logic and sound common sense. The most plausible explanation seems to be that at the time when the earliest stone hemicycles were erected very little even of the play was presented upon the proskenion. It will be remembered that the Greek drama originated in a dialogue between actor and chorus, to which was subsequently added the representation of personages and events. The performance thus came to consist of three features; namely, singing and dancing by the chorus, dialogue between the chorus and the players, and dramatic action on the part of the players alone. The theory is that at the time under consideration — that is towards the close of the fifth century B.C. and the beginning of the fourth — the players were in the habit of descending to

* "The Attic Theater," Chapter III, page 93.

† "Pompeii and its Remains," by August Mau, Chapter XV, page 142. It will be remembered that when the Ephesians had become angered against Paul and his companions, "they rushed with one accord into the theater." Acts 19: 29.

Fig. 8. Present Condition of Side Chairs, Dionysiac Theater

the intrinsic requirements of the drama. It was dictated wholly by social and economic conditions. The Athenian was essentially a man of intellectual capacity and aspirations. Books were scarce and were accessible only to a favored class. The average citizen was obliged to depend upon the annual dramatic performances for the satisfaction of his literary tastes. His anticipation and interest were correspondingly great. Moreover, as has already been described, he could obtain the price of admission for the asking, the annual deficit being successively apportioned among the wealthy men of the town. Under such conditions more than 17,000 places would doubtless have been filled could they have been provided. As it was, the auditorium covered the area of a modern city block, and imposed extraordinary demands alike upon the presentation and character of the play. Both actor and playwright were at their wits' end to make their production "carry" to the limits of the house. The actor built up his apparent stature by means of high-heeled buskins and a huge mask under whose conventional leer he could conceal a speaking trumpet. The playwright selected themes so trite that the spectators could supply the thread of the story from memory, if they now and then missed a word or a gesture of the play. Too often he went further and based his plot upon situations so crude that they could have been aired in the atmosphere of the police court without losing their propriety of flavor. Murder, revenge, matricide, parricide, suicide, and other assorted and unmentionable abominations enliven the famous tragedies of Orestes and Œdipus. Perhaps it is going too far to ascribe quite so heavy a responsibility to the fact that the Theater of Dionysus had a large seating capacity. The Athenian public must have liked this sort of stuff; otherwise they would not have applauded it, and the committee of five, who judged the contests, would not have premiated it. The fact is that Grecian drama was adapted to Grecian taste and Grecian morals, as well as to Grecian theaters. Four centuries were yet to elapse before the Christian Era.

The Theater of Dionysus has been so often and so fully described that a scant enumeration of details is all that is required in the present connection. The skené consisted of a main building, probably two stories high, with wings at each end projecting towards the auditorium. At first the exterior was plain, the decorative colonnade shown on the plan (Fig. 4) having been added some thirty years later. Beyond these general facts very little is known concerning the architectural effect, as subsequent changes, together with the wear and tear of centuries, have obliterated all definite indications. Even less is known with regard to the construction of the original orchestra, as it has been entirely destroyed in order to make way for the existing stone pavement. It probably consisted of a ring of flat stones filled in with well tamped earth, as at Epidaurus (Fig. 5), although this is wholly a matter of conjecture.

The main entrance was by way of the parodoi,* two openings to the right and left of the skené, which led to a horizontal walk-way carried around between the orchestra and the seats. This passage broadened out towards the ends, owing to the fact that the curvature of the auditorium was not concentric with that of the orchestra — an excellent arrangement which allowed for crowding towards the exits, and which was obviously intentional, as it occurs

* παροδοι.

Fig. 9. Present Condition of Carving on Arm of Central Throne, Dionysiac Theater

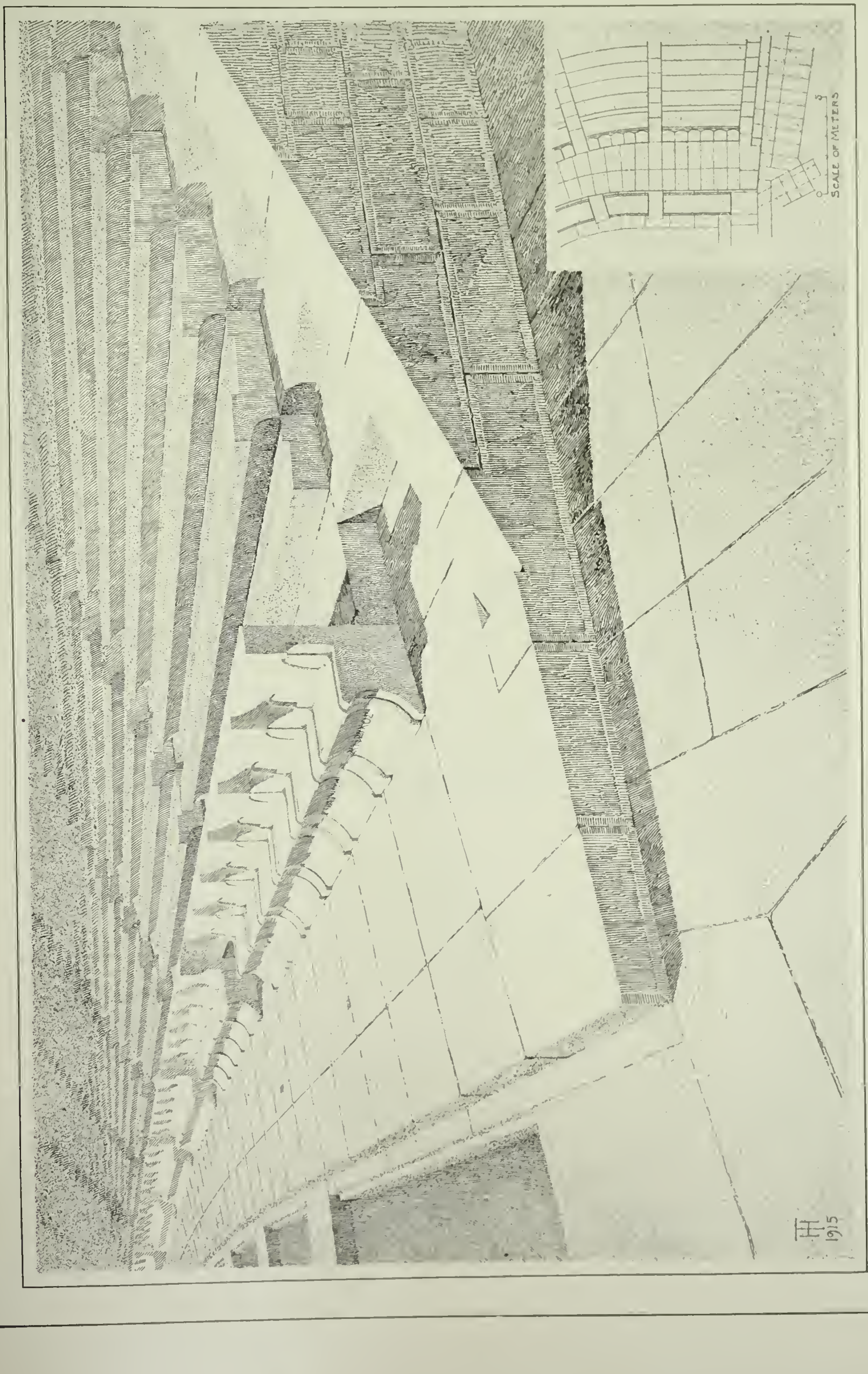


FIG. 10. RESTORATION DRAWING OF IKRIA, THRONES, AND ORCHESTRA OF THE DIONYSIAC THEATER, ATHENS, GREECE

BY HUGH TALLANT

also in the theater at the Piræeus. The radiating aisles running up the slope were extremely narrow (only 2 feet 3 inches in the clear) and must have obliged the audience to mount in single file. About halfway up they were intercepted by a horizontal passage known as the diazoma,* or girdle, which may have led to a special exit at its eastern end. The triangular shaped blocks of seats included between the diazoma and the aisles were known as kerkides, from the kerkis, a tapering rod used for weaving. As has already been mentioned, they were apparently designated by letters corresponding to those on the admission checks. The small temple adjoining the rear wall is of later date, having been constructed about B.C. 319 by Thrasyllus to commemorate his victory with a chorus of men.

The first row of seats consisted of individual thrones for the priests and other dignitaries, whose names are inscribed upon them. The excellence of the workmanship suggests that these chairs were part of the original construction, although the lettering is of a later date. The center throne was by far the finest. It was decorated on the arms by bas-reliefs representing boys engaged in a cocking-main — not an altogether sacerdotal subject according to modern ideas — and was protected by a baldachin carried on wooden posts, for which the holes are still in evidence. A similar awning was apparently stretched over the other chairs at a later date. The present condition of the center throne is shown in Fig. 6, a general restoration† of it and the flanking chairs in Fig. 7, the present condition of these chairs and the decoration on the arm of the central throne in Figs. 8 and 9, respectively.

* διάζωμα.

† This drawing is reproduced from the restoration by A. Defrasse in D'Espouy's "Details of Ancient Architecture."

The ikria were made of Peiraic limestone. The top of each step was divided into three parts: a front surface or seat 13 inches wide, a recess 2 inches deep and 16 inches wide for the feet of the spectator next above, and a further horizontal surface 6 inches wide. The steppings were 13 inches high, which, with the 2-inch recess for the feet, made a total of 15 inches — possibly a trifle low for a comfortable seat; but the Greeks were not a giant race, and, moreover, they came to the show provided with cushions to sit on. Apparently, too, they crowded into a width of 16 inches apiece, to judge from certain vertical marks on the face of the ikria, although the modern theater-goer considers himself abused if he is allowed less than 20 inches.

The steps in the radiating aisles were only 8 inches high on the vertical face, the extra 5 inches being taken up in the slope of the tread, which was well roughened to prevent slipping. A perspective view of the ikria, the thrones, and the edge of the orchestra is given in Fig. 10, and a section through the same,* which also shows the drain by which the rain water from the slope was carried off to the rear of the stage buildings and the construction of the steps in the radiating aisles in Fig. 11. This drain was open except for slabs of stones which bridged it opposite the ends of the radiating aisles, but the rebate in the rim suggests that it may have been protected by a grating. As will be seen, the first stepping behind the row of thrones was later cut away so as to accommodate a second row of temporary wooden chairs.

* The data for these drawings were obtained partly from "Das griechische Theater," by Dörpfeld and Reisch, partly from "Zeitschrift fur bildende Kunst," Vol. XIII, page 197, and partly from photographs which will be reproduced in the present connection.

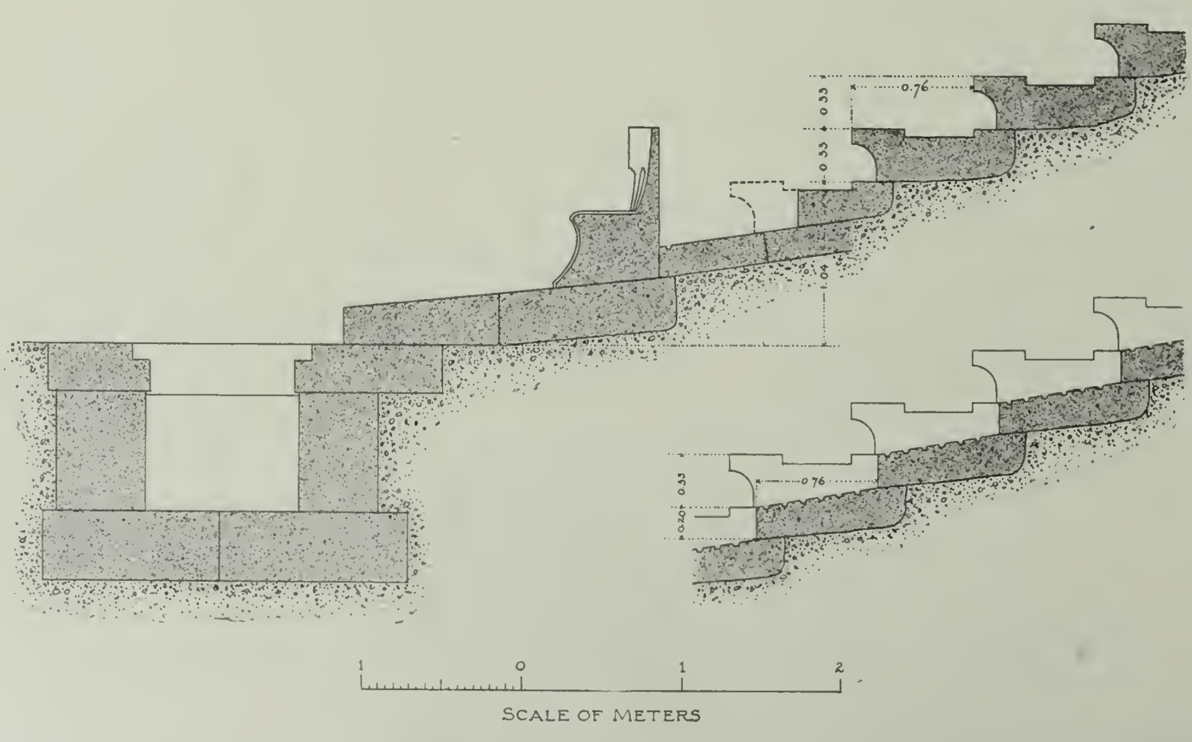


FIG. 11. SECTION THROUGH IKRIA AND RADIATING AISLE OF DIONYSIAC THEATER, ATHENS, GREECE

The Nomenclature of the Styles.

A HUMOROUS THEORY ILLUSTRATING IN CARICATURE FAMILIAR SCHOOLS AND PHASES OF ARCHITECTURE.

DRAWINGS BY ROCKWELL KENT. TEXT BY GEORGE S. CHAPPELL.

THE ADAM STYLE.

THIS style, the first known, may be called the Parent Style of all architectural schools. Little is definitely known concerning it, but ingenuity clears up several important points. We know that the site was first carefully prepared, an elaborate garden laid out and an orchard planted, one tree of which was of sufficient age to produce a luscious pippin before the foundations of the main house were actually begun. We read that "Adam delved and Eve span" — in other words, the man was the contractor and the lady her own architect, a span being the primitive unit of measure. It may be seen by consulting the elevation that the architect actually forgot the stairs! This is known as the Original Sin; all others are imitations. In detail this style is distinguished by great purity of ornament, expressed chiefly in forms derived from natural surroundings, leaves (notably of the fig and grape, in assorted sizes), and, in later periods, by a serpentine motive which eventually ran amuck, so to speak, and ruined the original conception. There has lately been an interesting revival of the Adam style in Ritz-Carlton hotels and Broadway playhouses.

THE GREEK FREEZE.

THE well-known observation, that "architecture is frozen music," was doubtless made in reference to the early Greek article, an example of which is portrayed herewith. The columns are built of cheesi-form sections called "drums," which, with the "flutes" that accompanied them, probably furnished the music before the Big Wind of 46 B.C. silenced them forever. This type persists in cold storage form and shows amazing vitality considering the various uses to which it is put, as it serves equally well for temples, D. A. R. convention halls, court houses, railway stations, and bungalows. A rubber stamp of the Temple of Pæstum is the *sine qua non* of the successful architect. It is interesting to note the persistence of the Greek idea through the ages in the three exclamations: Greek, "O Hellas"; Latin, "Helas"; modern American, "O Hell." Rarely does one architect look upon the work of another without the modern form of this art-felt expression springing to and from his lips. The style is a favorite one for bank buildings on account of its appearance of stability, combined with an indefinite number of openings for income or outgo, though in this respect it is less subtly symbolic than its Egyptian prototype, the Pyramid. Owing to the absence of circular openings, it suggests squareness and never suffers from the Roman complaint of fallen arches.

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

R. CLIPSTON STURGIS

MR. STURGIS was born in Boston the day before Christmas in 1860. As he had relatives and connections in England, he apprenticed himself for three years to an architect in London, and later, returning to America, entered the office of his uncle, John H. Sturgis, where he succeeded to a considerable portion of his work. Since then he has practised successfully and well in Boston, has been for a number of years chairman of the School Commission, developing and controlling the city schools, and is now president of the American Institute of Architects. These data, however, do not explain a number of existing facts, for instance : why, being born in 1860, he should still be an exponent of perennial youth ; why, being apprenticed to a very inferior British architect, he should have done admirable work ; why, with a very broad catholicity of taste, he should be so thorough in refinement of detail ; and why, in an environment of intensities, he should have kept an urbane attitude of mind associated with very definite opinions. All these apparent contradictions most have been the result of what is known as the personal equation, made up of a delicate sense of humor regulating the development of facts to a normal, not to an extravagant, condition, and playing upon the background of a very sincere mind. For sincerity of purpose, without the slightest ostentation, and equally devoid of casuistry, is the foundation of Mr. Sturgis' character. It appears in his work, whether devoted to his profession or to public or private interests. It was evident in the standardization of schoolhouse plans and equipment ; it has been equally evident in his work in the American Institute of Architects and in his careful attention to details in his designs. He says he gained rapidity of draftsmanship in the London office. He certainly has, with his skilful and delicate touch in pencil and water color, outdone anything that ever came out of that office. Associated with his sincerity is a very just sense of relative proportions in facts and in fancies, for his facts and his fancies are felicitously interwoven in act and speech. At times there is a touch of Robin Goodfellow about him, which none the less accords well with a strenuous intention. It is not easy to give the impression in "mere words" of a personality with so many phases, all of them so co-operative with the sincere underlying idea ; but the result is a man perpetually young performing the wise service of middle age. —*C. H. W.*

JOHN LAWRENCE MAURAN

JOHN LAWRENCE MAURAN was born in Providence, R. I., in 1866, and received his early professional training at the Massachusetts Institute of Technology, graduating with the class of 1889. After some time spent in travel and study abroad, he entered the Boston office of Shepley, Rutan & Coolidge. Later the work of this firm took him to Chicago, from which city he went to St. Louis as chief of the local office which his employers had established there. Shortly after he became a partner in the St. Louis office, but in 1900 withdrew from his connection with Shepley, Rutan & Coolidge and formed a partnership with E. J. Russell and E. G. Garden to practise under the firm title of Mauran, Russell & Garden. The success of the new firm was immediate and has been continuous. Mr. Garden's retirement in 1909 made way for the admission of Mr. W. D. Crowell to the partnership. The firm, both under its earlier and its present caption, has executed a large volume of work, various in character but always appropriate to its purpose. It is, however, the wide range of "Lawrie" Mauran's personal tastes and the adaptability of his talents which impresses and which tends sometimes even to depress the innocent bystander. His interests extend themselves far afield and touch many phases of the life and activities of his adopted city. He has been called upon to render much service in the public welfare and has contributed freely of his time, energy, and talents in many causes. By his example he has given the public a clearer idea of the proper practice of architecture and a renewed respect for the character of the architect. As is natural, he has been active in the councils of his local chapter of the Institute, and also in the affairs of the national body, as treasurer of which he is now serving his second term. He has brought to this office the same qualities of clear vision, high purpose, and tireless industry which have marked him in other relations. Whatever he has been called upon to do, he has done well ; and yet it would be unfair to picture him as some forbidding monster of efficiency. Those who know him intimately value his loyalty, his easy companionship, and his genial outlook on life. He honors his profession, and that it has borne him just rewards is as fitting as it was inevitable. He has all the human qualities that appeal to the sense of fellowship, enjoys the interests of his fellow-workers, and possesses a fine feeling of sportsmanship. —*L. L.*

IRVING K. POND

IRVING KANE POND was born at Ann Arbor, Mich., on May 1, 1857. His ancestry on both sides traces back to English settlers in New England. It is, perhaps, justifiable to credit to this fact the vigorous independence of mind which is one of his marked characteristics in matters intellectual, political, social, and professional. His formal education was received in the Ann Arbor public schools and the University of Michigan, from which latter he was graduated in 1879 with the degree of Civil Engineer (hon. degree A.M. in 1911). Of far greater value, however, was the education he derived from his daily life in a home which afforded a steadily stimulating atmosphere of clear and forceful thinking.

Immediately after leaving the University Mr. Pond went to Chicago and entered the office of Solon S. Beman, just then come to Chicago to undertake the building of the town of Pullman. He became head draftsman for Mr. Beman and continued in this capacity until, in the spring of 1887, he struck out for himself in partnership with his brother, Allen B. Pond. His sojourn with Mr. Beman was broken by a year of travel in Europe.

Mr. Pond was one of the founders (now honorary member) of the Architectural Sketch Club (now the Architectural Club). He has always been generous of his time in efforts to raise and broaden the status of the draftsman and of the architectural profession. He is a Fellow of the American Institute of Architects, which he has served as director, vice-president, and president; and he is an active member of the Institute Chapter in Illinois, which he has served as president. The work of the firm of Pond & Pond covers the range that usually falls to an architect who does not purposely limit his field. For the Training School for the Baptist Home Missionary Society his firm received the first gold medal awarded by the Illinois Chapter (1909).

The architectural style — if one may use the word "style" of the work of an individual — that has come to be recognized as characteristic of the work of Mr. Pond has been of slow growth. Its roots can hardly be traced to the influence of any one country or period. The rather does it represent the sincere and thoughtful expression of a man who lives deeply and who feels that true art must be the sincere expression of the artist's living thought.

Mr. Pond is a member of the Chicago Literary Club; a charter member of the City Club of Chicago; a charter member of the Little Room and of the Cliff Dwellers; a member of the University Club and of the National Academy of Arts and Letters. — *A. B. P.*

HENRY HORNBOSTEL

HENRY HORNBOSTEL was born in Brooklyn, N. Y., on Aug. 15, 1867. He prepared for college at Deghuees School. He graduated from Columbia in the class of 1891, and continued his studies in Paris for several years. Upon his return to New York he entered partnership with Mr. Raymond and practised under the firm name of Raymond & Hornbostel. After Mr. Raymond's death Mr. Hornbostel worked as an associate with Howells & Stokes (1899) on the Phœbe Hearst competition for the buildings of California University. Later he became a member of the firm of Wood & Palmer, which later became Palmer & Hornbostel, and still later Palmer, Hornbostel & Jones.

Mr. Hornbostel sees, as perhaps no other man in this country does, the comparative values of the elements which make up a competition program. He knows how to emphasize those of importance until they fairly shriek their presence.

He never permits himself to be confused or hampered or limited by masses of detailed requirements; the salient features of the scheme leap into a coherent whole in his mind, and are readily translated by him into drawings which are after all found to have places for details as well, as for the main elements of the scheme.

The clause in many specifications, "Time is the essence of the contract," seems to have sunk deeply into his mind, and speed has become his dominant characteristic; he never leaves himself quite time enough to do a thing leisurely. Coupled with this vast physical energy is a mind of equal activity; he is interested in most everything and has opinions worth while about anything that comes up, although he may, perhaps, never have heard of the subject before; he has a most restless, active, enterprising, and inquiring mind and an imagination of surprising fertility.

He is a man who can in a brief time accomplish an enormous amount of work, and there are probably few in his profession who can draw so rapidly once he has set himself to the task. To fully appreciate his enthusiasm one should see him make a drawing; half his office waits upon him, while the other half admires; the board is tilted slightly towards him, a fine clean stretch of white tracing paper awaits his pencil and many more freshly sharpened are placed at the top of the board; loaves of bread await the time when it may be necessary to erase; his coat is off and his hands and arms move rapidly over the drawing. The picture is a great spirit of energy bent over a drawing table. — *A. E.*

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THERE is at present a propaganda advocating that investors "Build Now." The reasons for this advice are as follows:

First. Materials are cheaper than they were and, therefore, buildings cost less to build.

Second. The contractors in order to keep their plants busy, and to avoid dismissing men, are ready to do work for less profit than they were.

Third. Because of less building, there is a constantly increasing number of unemployed, creating an unfortunate condition of public welfare, and increased building would normally put back these unemployed into the position of wage earners, thereby increasing the circulation of money and general prosperity.

Therefore, fire, fire, burn stick; stick, stick, beat dog, etc.

Now all these reasons given are true of the condition as far as the cash cost of buildings is concerned. The broad, general statement can be made and proved, that less cash is required for erecting a building now than twelve months ago. All minor detailed statements, such as to the cost of brick and cement, are unnecessary. Materials have decreased in value. Labor has not decreased in value, but stocks have. Recent investments are being made largely in bonds. Mortgage rates have increased. Additional deposits of collateral to cover loans have been demanded by the banks. All bills, including rents, are harder to collect promptly. Credits are extended, and the public generally is economizing, as the value of individual sales everywhere indicates. Therefore, despite the fact that it requires less cash to build, it is harder to get the cash, and the fire will not burn the stick. The investor does not see as ready a return for his investment as he did, and doubts whether proportionally he will get as good a return even on a less expenditure for value received. The cheapness of building is a result; it has not yet become a cause. What sane basis of advocacy of "Build Now" can be made, simply because it costs less cash to build now? There is only the basis of the natural growth of cities and towns. To cite an instance which is typical of the country at large: if the city of Boston has not overbuilt in the last ten years, — and it apparently has not, — it is certainly under building now. To an optimistic mind, the investor who builds upon the present market will have his building completed, ready for occupancy, at the very time that conditions become again more prosperous, and prices therefore increase. He will be the early bird and will catch the worm, provided there is one; but at all events he will have discounted the demand for location of the city's normal increase, and when all is said, this seems to be a wise act for the investor to consider, always providing he does not have to pay so dearly for his money that he wipes out the difference between the cost of building a year ago and the cost of building to-day.

Park Street Church, Boston, as Recently Restored

A FEW years ago a group of Boston architects started the movement of restoring the Colonial buildings in Boston, which had for many years been covered with paint, to their original appearance, which showed red brick exteriors and white painted trim. First among these restorations was the Old State House, then in order, — Christ Church, or, as it is more commonly known, the Old North Church, the Old South Meeting House, and the present instance, the Park Street Church, which has been a landmark of downtown Boston for a full century.

The results in each case have been most satisfactory, and in the last example, under the supervision of Putnam

& Cox, architects, in spite of several handicapping circumstances, the result is extremely pleasing. In addition to restoring to the walls their original red brick color which was effected by the sand blasting process of removing paint, two exterior fire-escape stairways and shop windows for the establishments which were to occupy the basement were additions necessitating careful handling to obviate doing violence to the design.

How well these features have been incorporated may be seen in the illustration herewith. The ironwork of the fire-escapes follows closely that of the period during which the church was built, and the intrusion of the shop windows in a church edifice is skilfully hidden by means of the small panes of glass set in bowed sashes.

The principal feature of the restoration, however, has been the vividness with which the return of the walls to their original brick red has thrown into prominence the fine detail of the building. When it was all painted uniform in color, one missed the cleverness with which the windows were placed in slightly recessed arches, and the way the engaged columns and entablatures were made to outline the two bays to right and left of the tower. Now these parts of the design are restored to their original values and the building seems to have a grace and dignity which are entirely new to beholders of this generation.

PLATE DESCRIPTION.

Webb Horton Memorial Presbyterian Church, Middletown, N. Y., Plates 1, 2, and 3. This church is located near the center of Middletown, N. Y., on a site large enough to permit a successful grouping of the buildings, though its proportions compelled careful study to secure the plan permitting the best and most effective use of the space. The grouping and the architectural character of the buildings are in the spirit of a modernized adaptation of the Italian Romanesque.

The buildings are placed on three sides of a court which faces on the street and occupy a space approximately 155 by 160 feet. At the rear of this court, set well back, is the main building containing the church auditorium, about 70 by 77 feet, and entered at the grade of the court. Beneath this in a story opening at a lower grade is a completely equipped gymnasium with a tile lined swimming pool about 18 by 40 feet and a bowling alley.

Extending forward to the street from the main building on either side of the court are the parsonage and the Sunday-school buildings, the latter containing the rooms for the social as well as the religious work of the church. The heating plant is in the cellar of this wing.

The basement walls are concrete with rubble facing. The upper walls are brick faced with a gray buff brick laid in common bond with raked joints. All steps are bluestone and sills limestone. The inserts in the brickwork are of terra cotta. The roofs are red Spanish tile with copper gutters and leaders. All the tower floors and the auditorium floor are of fireproof construction.

The cost of all the buildings was about $150,000.

Public Bath in the Grove, Kansas City, Mo., Plate 4, — Pulaski Park Field House, Chicago, Ill., Plate 5, — Public Bath and Gymnasium for the City of New York, N. Y., Plates 6 and 7. See article on page 13.

House of Charles A. Cass, Esq., Ardsley Park, N. Y., Plates 8, 9, and 10. The house is situated rather close to the road on a plot which contains four acres. It is derived from the simple type of English country house, as found in the Cotswold district. It is built of a rough textured brick, ranging in color from light red to the darkest brown — in fact, some are almost black. The joints in the brickwork, as may be seen in the illustrations, are rather wide and very deeply raked, so that the edge of each brick is exposed clean. Gables, eaves, and projections are all formed in the brick courses, as little wood being used in exterior construction as was consistent. All timbers which are exposed on the exterior, such as rafter heels, porch posts, lintels, etc., are hand-hewn chestnut or oak and are structural in every sense.

The roof is of stones of varying thicknesses, being one inch or more at the starting course and gradually decreasing towards the ridge. They have also a slight variation in color, consisting of gray, green, and the lighter of the purple tones, this latter being used to carry a little of the general wall tone into the roof.

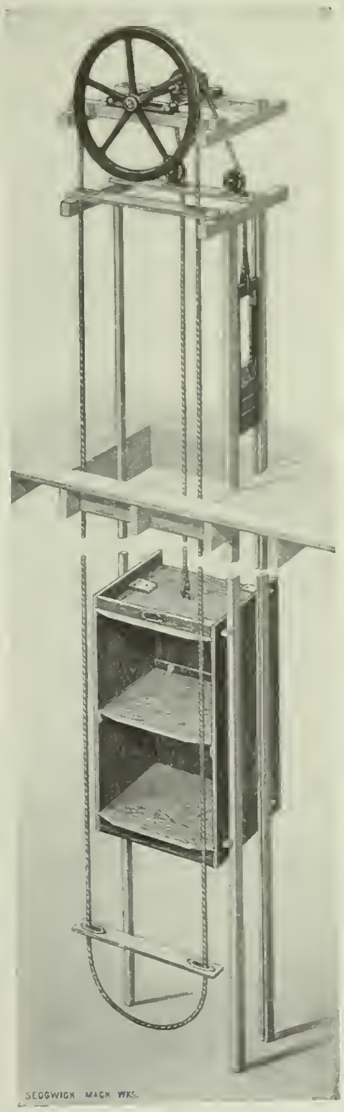
House of George S. Mandell, Esq., Hamilton, Mass., Plates 11, 12, and 13. This is a comparatively large country house, situated on a rolling country side near the north shore of Boston. It is typical, especially on the entrance front, in its informal handling of brickwork, of the character which pervades much of the country house work in the vicinity of Boston. It is designed in a free adaptation of Colonial forms as they are found in the early New England farmhouses, some of which were built of brick. The detail of dormers, cornices, belt courses, etc., follows the very simple lines of the early prototypes. On the garden side the house assumes a more formal character, suggesting English Georgian work, and shows an unusual grouping of a three-story central mass with a gambrel roof which combines agreeably through the agency of the large chimneys which come through the roof at the points of intersection.

House of R. Lancaster Williams, Esq., Eccleston, Green Spring Valley, Md., Plates 14 and 15. The house is situated on the top of one of the hills which form the southern border of Green Spring Valley. The nature of the site, as well as the preference of the owner, suggested an oblong plan, the long axis parallel with the ridge of the hill, with the principal rooms overlooking the valley, although this is the northern exposure.

The requirements, in general, called for a rather large house of moderate cost, suitable for occupancy during the entire year. The arrangement of the first and second stories is shown by the plans. There is a basement story under the entire house, except the porches and terraces. In the basement are placed the laundry, the boiler room, cold storage, the pressure water storage tank, etc.

The house walls are of terra cotta hollow tile faced with brick. The floors, roof, and partition are frame. A local brick was used, varying in color from a purple red to a salmon red, and laid in Flemish bond with slightly raked out ⅝-inch thick gray mortar joints, giving a wall moderately rough in texture and a soft neutral red in color. The cornices, columns, frames, and sash are painted a cream white; the shutters, lattice, and flower boxes a bluish green, and the ironwork a very dark blue. The roof is covered with an unfading green slate.

Architects as Efficiency Engineers



Skeleton elevation of a complete **Sedgwick** Automatic Brake Dumbwaiter Outfit. The Automatic Brake does not lock fast, but is applied and regulated by the load itself, requiring no manipulation by the operator, but giving absolute security. These outfits, like all **Sedgwick** productions, are built in quantities by special machines on the interchangeable part system. This explains the exceptional value which is represented by the moderate **Sedgwick** prices. Complete plans and working drawings are furnished with each dumbwaiter. Our Service Department gladly co-operates with architects on all dumbwaiter and elevator problems.

In days of old, architects planned houses. The twentieth century architect is a designer of homes — and a true home is simply a house in which internal friction is minimized. Architects of **homes,** therefore, must be household efficiency engineers.

Now, efficiency is simply doing things better, or more quickly, or more easily. And a home builder looks to his architect to provide the means thereof in the home design.

Consider the dumbwaiter, for instance.

A **good** dumbwaiter is a tremendous factor in household efficiency because it lightens household burdens — hastens household tasks — simplifies household duties — lessens household effort.

A **good** dumbwaiter is a convenience and an economy — just in proportion to its goodness. And the professional designer of homes of convenience and economy **must** be responsible for the installation of a **good** dumbwaiter.

For, be it known, a length of rope over a pulley, with a box at one end and a weight at the other, is **not** a **good** dumbwaiter, though it is called a dumbwaiter.

A **good** dumbwaiter is one designed for a specific purpose — made by dumbwaiter specialists — built of the best materials by the best methods. Sold at a price perhaps just that little higher which marks the difference between a permanent household economy and an ever present source of trouble and disappointment.

A **good** dumbwaiter is an essential part of a modern home, just as is good plumbing, good lighting, good ventilation, a good heating system.

Your clients will **always** get a **good** dumbwaiter when you specify as below and permit no substitution.

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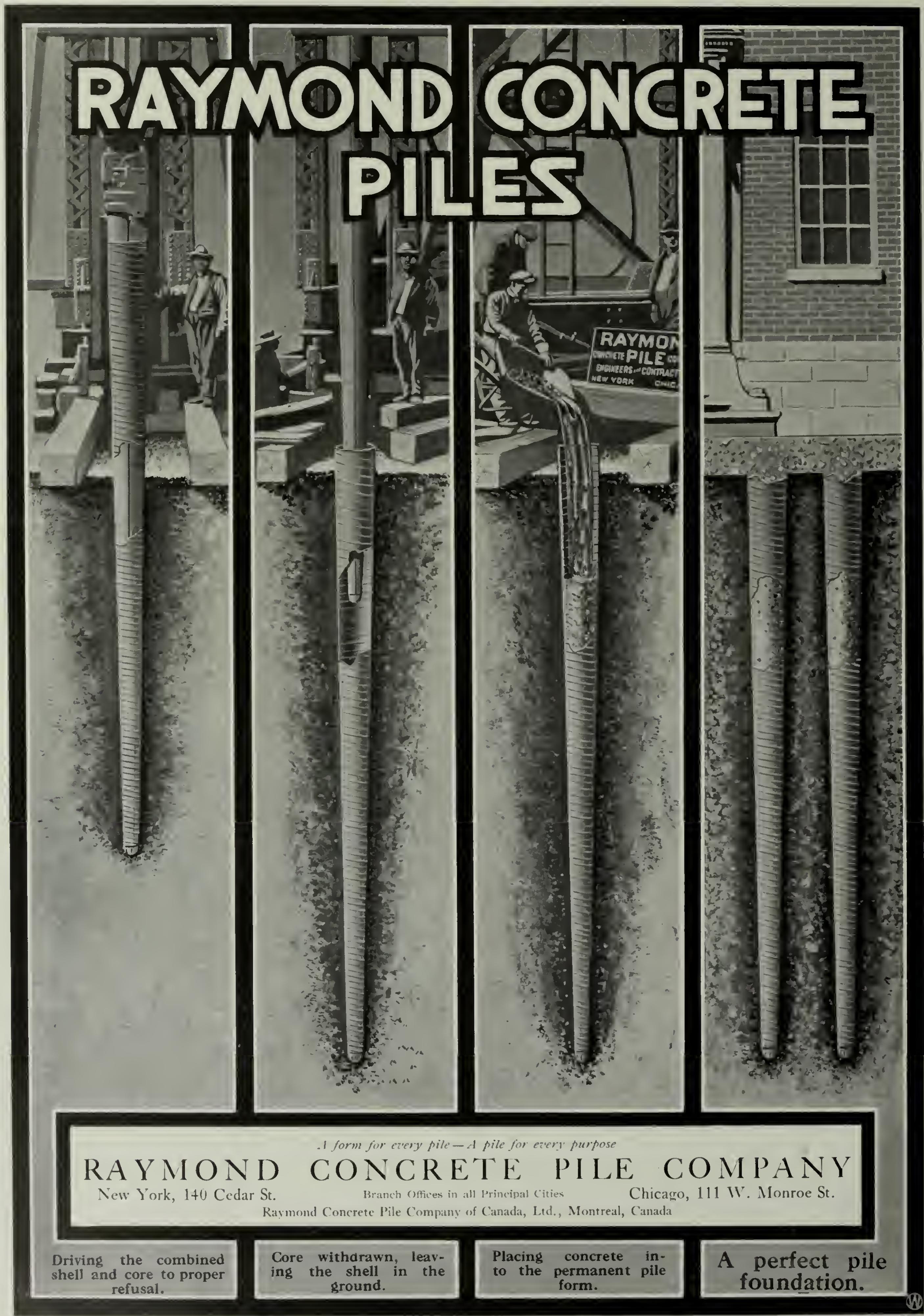
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Howard Chapman, Architect
Turner Construction Co., Contractor

Warehouse and Factory, Great Atlantic and Pacific Tea Co., Jersey City, N. J.; 9 stories, 183 x 121 feet; 300 lb. floor loads; structural concrete with brick panel walls. This building took first prize in the 1910 national competition for the best designed and executed concrete factory. It was the first of four buildings erected by us for this Company, without competition, the others being: an 8-story warehouse 60 x 90 feet; a 9-story addition, 120 x 100 feet, to the main warehouse; and an 8-story factory, 80 x 140 feet, occupied by the Hartford Suspension Co., an allied concern.

R. J. Reidpath & Son, Architects
Turner Construction Co., Contractor

Paper Warehouse of Alling & Cory, Buffalo, N. Y.; 6 stories and basement, 183 x 54 feet, with wing 100 x 65 feet; floor load, 300 lbs. per square foot. A beautiful example of the artistic effects to be had by using brick panel walls with structural steel frame and reinforced concrete interior construction.

STRUCTURAL CONCRETE

THE two buildings shown above refute the idea that concrete is a material in which pleasing effects cannot be realized. Even were brick panel walls not used, these buildings would be architecturally attractive. And the brick panels add the touch of color needed to soften the white of the concrete. The use of structural concrete instead of structural steel not only reduced the cost of these buildings, but also hastened their completion — besides resulting in a more durable, fire-proof construction.

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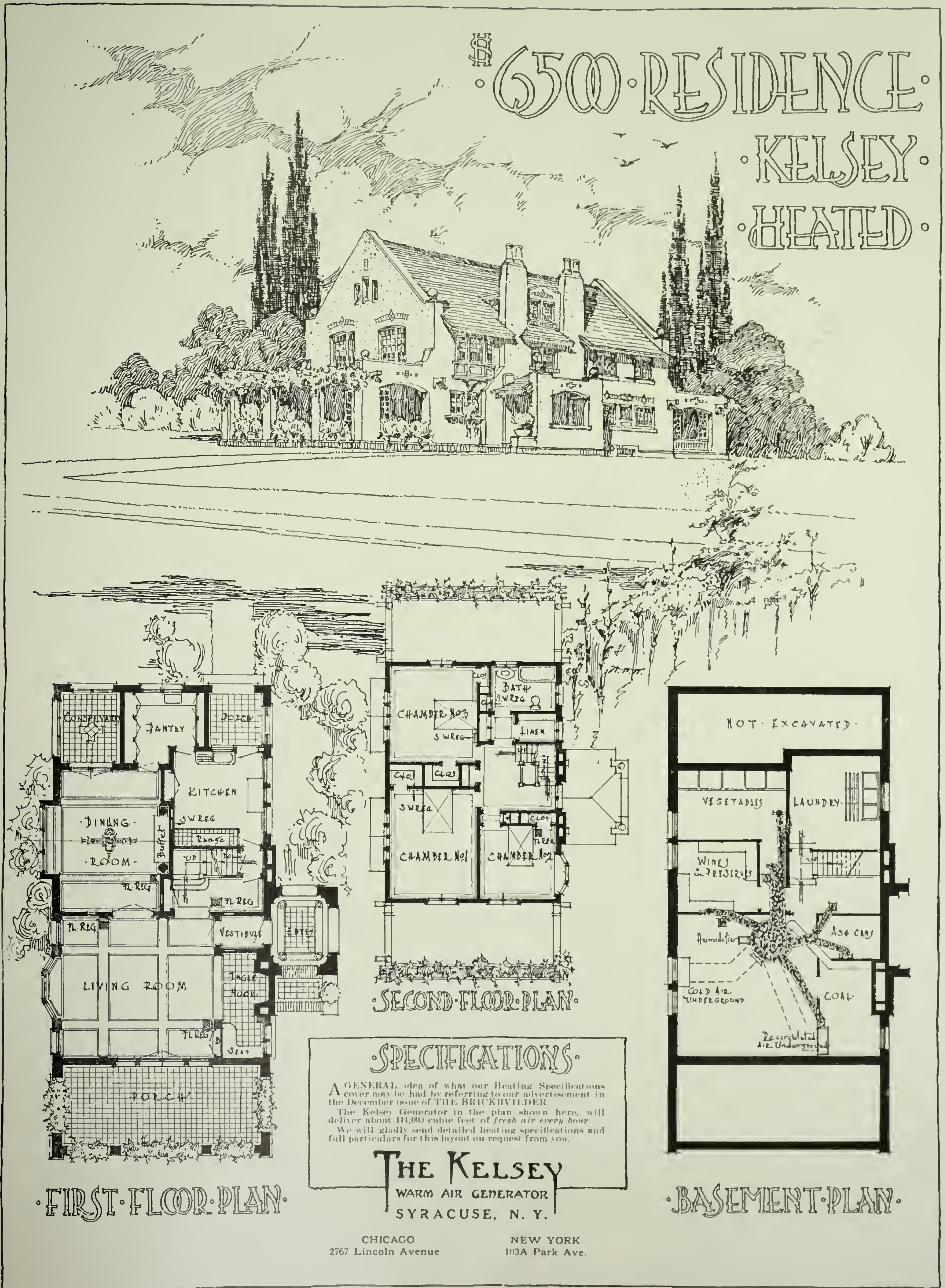
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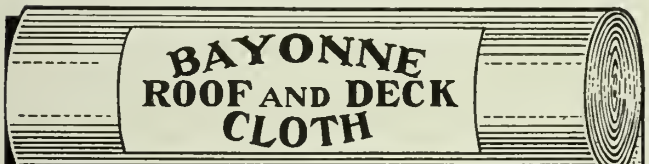

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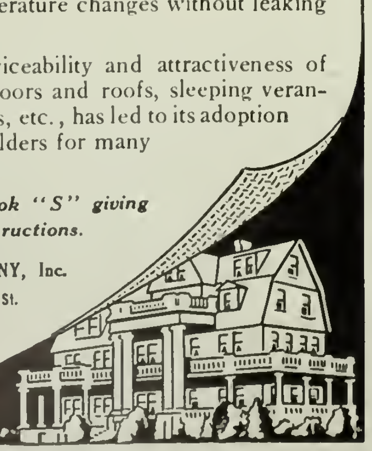

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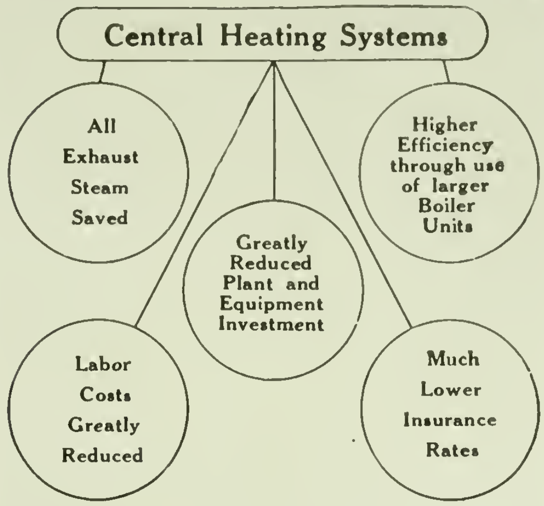

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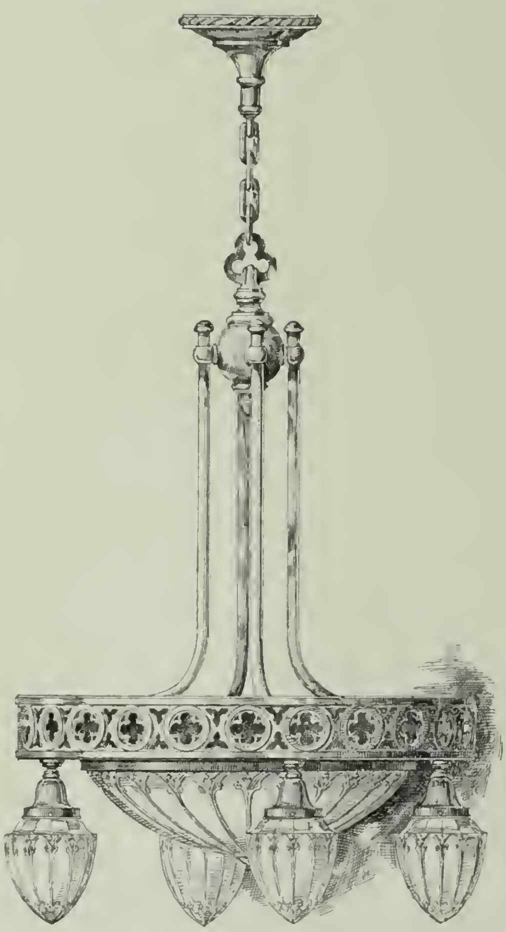

Architect, Chas. B. Dunham

Architect, Homer E. Bartlett

Two Prominent Panama Buildings

The offices of the United Fruit Company at Cristobal, Canal Zone, and the Depot of the Panama Railroad Company at Panama City, Panama, have exterior bearing walls and interior partitions of

NATCO·HOLLOW·TILE

The United Fruit Company's building is 87 feet long and 64 feet wide, the Depot 166 feet long and 50 feet wide with a wing in the rear to the train shed 105 feet long and 40 feet wide.

In the Depots the columns of the main facade are of 4-inch NATCO Tile filled up solid with concrete.

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It bears witness to NATCO'S superiority, this expansion of NATCO construction to such far-distant territory as the Canal Zone.

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Competition for a Small Brick Church and Parish House

TO BE FACED WITH HY-TEX BRICK

First Prize, $500
Second Prize, $250

Mentions

Third Prize, $150
Fourth Prize, $100

Competition Closes March 31, 1915

THIS COMPETITION IS OPEN TO ALL ARCHITECTS AND ARCHITECTURAL DRAFTSMEN

PROGRAM

THE problem is a small brick church, designed to be faced with Hy-tex brick and where consistent with the design treated with brick in the interior wall surfaces. It is especially desired that the design should show generous appreciation of good brickwork, and in this connection originality in the treatment of the facing possibilities of the material is courted.

While the church may be meant for any ecclesiastical body, the design should avoid mere slavish adherence to traditional types and reveal the serious attempt at an originality that is characteristic of the free American spirit. It, therefore, may be adapted to any part of the United States and take on any form expressive of the Christian faith. The parish house must be an integral part of the composition. Its location on the lot, however, is to be at the discretion of the designer. The church group shall be at least 10 feet from party lines. The lot is at the intersection of two streets, having a frontage on one of 150 feet and on the other of 100 feet. The grade is level.

REQUIREMENTS

For the Church. An auditorium to seat 400, an unobstructed view of the pulpit platform to be had from every seat. Provision for a portion of the seats may be made in balconies if the designer so wishes. A pulpit platform with space for communion table; an organ chamber and space for chorus choir not to exceed 20 in number. Ample vestibules are necessary. There shall be also a minister's room convenient to the pulpit.

For the Parish House. The parish house, which is meant to provide for the Sunday school and institutional — or social — activities of the church, may be one or two stories. If of one story only, part of the accommodations required may be provided for in a basement naturally lighted. There shall be a Sunday-school room with six or eight small class rooms opening off the main area and separated from each other by partitions so arranged that all may have a fairly good view of the platform in the Sunday-school room. This room, including the class rooms, should provide a seating capacity for about 350. All the class rooms may be provided for on the main floor or part on a mezzanine floor. There should be rooms provided for the infant class and a Bible class, a Sunday-school library, a suite including ladies' parlors, dining room and kitchen, coat and toilet rooms for men and women.

Each competitor shall specify the section of the United States in which the church is to be located.

The jury will give consideration to the quality of the design and its fitness for execution in brick and excellence of plan.

No cubic contents are fixed and no limit of cost imposed.

An additional value will be given to the work if the style and color of brick chosen are indicated on the drawing, either by a key or a series of notes printed on the sheet at a size which will permit of two-thirds reduction. Hy-tex brick are manufactured by the Hydraulic-Press Brick Company, and contestants will be helped by referring to the catalogues and booklets issued by this company, which may be had upon application to any one of their branch offices or the home office at St. Louis (see addresses on preceding page).

CONSTRUCTION

Methods of bonding, anchorage, etc., as usually employed in the construction of brick walls, may be followed. The exterior walls are to be faced with brick and also the interior walls if consistent with the design.

DRAWING REQUIRED (there is to be but one)

On one sheet a pen and ink perspective, without wash or color, drawn at a scale of 4 feet to the inch. The brickwork should be indicated liberally enough on this perspective to show adequately the use of materials. A longitudinal section through the church building only drawn at a scale of 8 feet to the inch. Main floor plan of church and parish house, with additional plan of the latter showing arrangement of features not provided for on main floor, all drawn at a scale of 16 feet to the inch. Key plan showing treatment of the lot. Detail elevation of the principal feature of the design at a scale of 4 feet to the inch. The plans are to be blocked in solid. All lettering should be clear and free from scroll so as to reduce with distinctness. Graphic scales must accompany section, details, and plans. The size of the sheet is to be exactly 22 inches by 30 inches. Plain rules must be drawn on the sheet enclosing a space measuring exactly 20 inches by 26½ inches. The sheet is to be of white paper and is not to be mounted. Very thin paper or cardboard is prohibited.

The drawing is to be signed by a *nom-de-plume* or device, and accompanying same is to be a sealed envelope with the *nom-de-plume* on the exterior and containing the true name and address of the contestant.

The drawing is to be delivered flat or rolled (packaged so as to prevent creasing or crushing) at the office of THE BRICKBVILDER, 85 Water street, Boston, Mass., on or before March 31, 1915.

The Post Office Department now requires that drawings sent by mail shall be at the letter — or first class — postage rate. Those who wish their drawings returned, except the prize drawings, may have them by enclosing in the sealed envelopes containing their names twenty-five cents in stamps.

Drawings submitted in this competition are at owners' risk from time they are sent until returned, although reasonable care will be exercised in their handling and keeping.

The prize drawings are to become the property of THE BRICKBVILDER and the right is reserved by THE BRICKBVILDER to publish or exhibit any or all of the others.

Drawings submitted in this competition will be returned direct from the office of THE BRICKBVILDER to the contestants.

The designs will be judged by five members of the architectural profession representing different sections of the country.

For the design placed first there will be given a prize of $500
For the design placed second a prize of $250
For the design placed third a prize of $150
For the design placed fourth a prize of $100
The next six designs in order of merit will be given Mentions

The prize and mention drawings will be published in THE BRICKBVILDER.

This competition is conducted under the patronage of the Hydraulic-Press Brick Company.

THE BRICKBUILDER

VOLUME XXIV NUMBER 2

CONTENTS for FEBRUARY 1915

PLATE ILLUSTRATIONS

LETTERPRESS

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THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

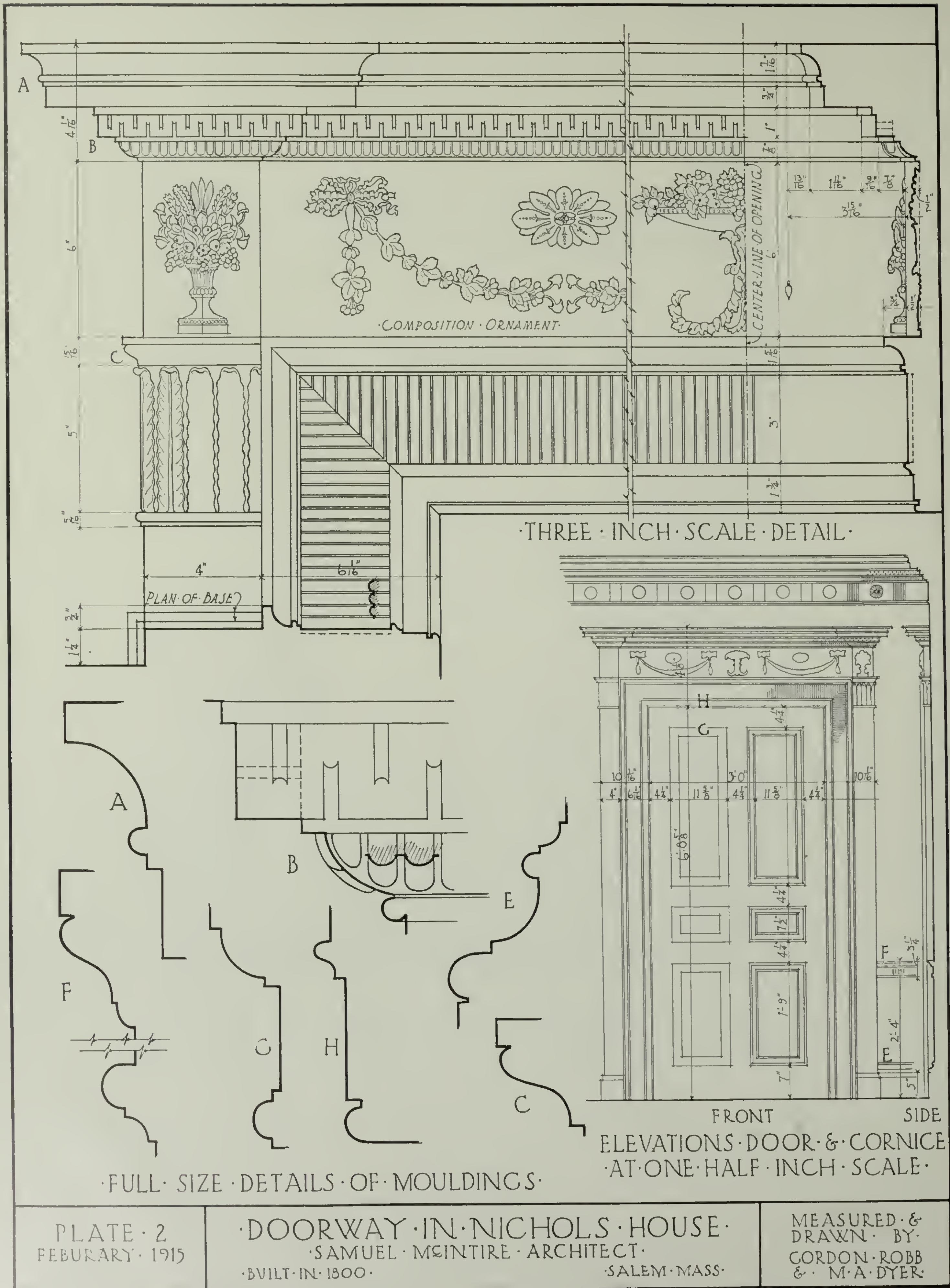
DOORWAY IN THE NICHOLS HOUSE, SALEM, MASS.
SAMUEL McINTIRE, ARCHITECT BUILT IN 1800

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate Two

(over)



·COMPOSITION · ORNAMENT·
CENTER·LINE OF OPENING
PLAN·OF·BASE
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·FULL· SIZE ·DETAILS · OF· MOULDINGS·
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·AT·ONE·HALF·INCH·SCALE·
PLATE · 2
FEBURARY · 1915
·DOORWAY·IN·NICHOLS·HOUSE·
·SAMUEL·McINTIRE·ARCHITECT·
·BUILT·IN·1800·
·SALEM·MASS·
MEASURED·&
DRAWN·BY·
GORDON·ROBB
&·M·A·DYER·

PALACE OF SUAREZ SOLÍS DE CAÑADA, SALAMANCA, SPAIN
ERECTED IN THE XVITH CENTURY

THE BRICKBVILDER

VOLUME XXIV FEBRUARY, 1915 NUMBER 2

Architectural Acoustics.

THE INSULATION OF SOUND.

By WALLACE C. SABINE.
Harvard University.

THE insulation of sound as an unsolved problem in architectural acoustics was first brought to the writer's attention by the New England Conservatory of Music, immediately after its completion in 1904, and almost simultaneously in connection with a private house which had just been completed in New York. A few years later it was renewed by the Institute of Musical Art in New York. In the construction of all three buildings it had been regarded as particularly important that communication of sound from room to room should be avoided, and methods to that end had been employed which were in every way reasonable. The results showed that in this phase of architectural acoustics also there had not been a sufficiently searching and practical investigation and that there was no experimental data on which an architect could rely. As these buildings were the occasion for beginning this investigation. and were both instructive and suggestive, they are, with the consent of the architects, discussed here at some length.

The special method of construction employed in the New England Conservatory of Music was suggested to the architects by the Trustees of the Conservatory. The floor of each room was of semi-fireproof construction, cement between iron girders, on this a layer of plank, on this paper lining, and on top of this a floor of hard pine. Between each room for violin, piano, or vocal lessons was a compound wall, constructed of two partitions with an unobstructed air space between them. Each partition was of two-inch plaster block set upright, with the finishing plaster applied directly to the block. The walls surrounding the organ rooms were of three such partitions separated by two-inch air spaces. In each air space was a continuous layer of deadening cloth. The scheme was carried out consistently and with full regard to details, yet lessons conducted in adjacent rooms were disturbing to each other.

It is always easier to explain why a method does not work than to know in advance whether it will or will not. It is especially easy to explain why it does not work when not under the immediate necessity of correcting it or of supplying a better. This lighter rôle of the irresponsible critic was alone invited in the case of the New England Conservatory of Music, nor will more be ventured at the present moment.

There is no question whatever that the fundamental consideration on which the device hinged was a sound one. Any discontinuity diminishes the transmission of sound; and the transition from masonry to air is a discontinuity of an extreme degree. Two solid masonry walls entirely separated by an air space furnish a vastly better sound insulation than either wall alone. On the other hand, the problem takes on new aspects if a masonry wall be replaced by a series of screen walls, each light and flexible, even though they aggregate in massiveness the solid wall which they replace. Moreover, such screen walls can rarely be regarded as entirely insulated from each other. Granting that accidental communication has nowhere been established, through, for example, the extrusion of plaster, the walls are of necessity in communication at the floor, at the ceiling, at the sides, or at the door jambs; and the connection at the floor, at least, is almost certain to be good. Further, and of extreme importance, given any connection at all, the thinness of the screen walls renders them like drumheads and capable of large response to small excitation.

It may seem a remote parallel, but assume for discussion two buildings a quarter of a mile apart. With the windows closed, no ordinary sound in one building could be heard in the other. If, however, the buildings were connected by a single metal wire fastened to the centers of window panes, it would be possible not merely to hear from within one building to within the other, but with care to talk. On the other hand, had the wires been connected to the heavy masonry walls of the two buildings, such communication would have been impossible. This hypothetical case, though extreme, indeed perhaps the better because of its exaggeration, will serve to analyze the problem. Here, as in every case, the transmission of sound involves three steps, — the taking up of the vibration, the function of the nearer window pane, its transmission by the wire, and its communication to the air of the receiving room by the remote window. The three functions may be combined into one when a solid wall separates the two rooms, the taking up, transmitting, and emitting of the sound being scarcely separable processes. On the other hand, they are often clearly separable, as in the case of multiple screen walls.

In the case of a solid masonry wall, the transmission from surface to surface is almost perfect; but because of the great mass and rigidity of the wall, it takes up but little of the vibration of the incident sound. It is entirely possible to express by a not very complicated analytical equation the amount of sound which a wall of simple dimensions will take up and transmit in terms of the mass of the wall, its elasticity, and its viscosity, and the frequency of vibration of the sound. But such an equation, while of possible interest to physicists as an exercise, is of no interest whatever to architects because of the difficulty of determining the necessary coefficients.

In the case of multiple screen walls, the communication from wall to wall, through the intermediate air space or around the edges, is poor compared with the face to face communication of a solid wall. But the vibration of the screen wall exposed to the sound, the initial step in the process of transmission, is greatly enhanced by its light and flexible character. Similarly its counterpart, the screen wall, which by its vibration communicates the sound to the receiving room, is light, flexible, and responsive to relatively small forces. That this responsiveness of the walls compensates or more than compensates for the poor communication between them, is the probable explanation of the transmission between the rooms in the New England Conservatory.

The Institute of Musical Art in New York presented interesting variations of the problem. Here also the rooms on the second and third floors were intended for private instruction and were designed to be sound proof from each other, from the corridor, and from the rooms above and below. The walls separating the rooms from the corridors were double, having connection only at the door jambs and at the floor. The screen wall next the corridor was of terra cotta block, finished on the corridor side with plaster applied directly to the terra cotta. The wall next the room was of gypsum block, plastered and finished in burlap. In the air space between the two walls, deadening sheet was hung. The walls separating the rooms were of gypsum block and finished in hard plaster and burlap. As shown on the adjacent diagram (Fig. 1), these walls were cellular, one of these cells being entirely enclosed in gypsum block, the others being closets opening the one to one room, the other to the other. The closets were lined with wood sheathing which was separated from the enclosing wall by a narrow space in which deadening sheet was hung in double thickness with overlapping joints. In the entirely enclosed cell, deadening sheet was also hung in double thickness.

It is not difficult to see, at least after the fact, why the deadening sheet in such positions was entirely without effect. The transverse masonry webs afforded a direct transmission from side to side of the compound wall that entirely overwhelmed the transmission through the air spaces. Had there been no necessity of closets, and therefore no necessity of transverse webs, and had the two screen walls been truly insulated the one from the other, not merely over their area, but at the floor, at the ceiling, and at the edges, the insulation would have been much more nearly perfect.

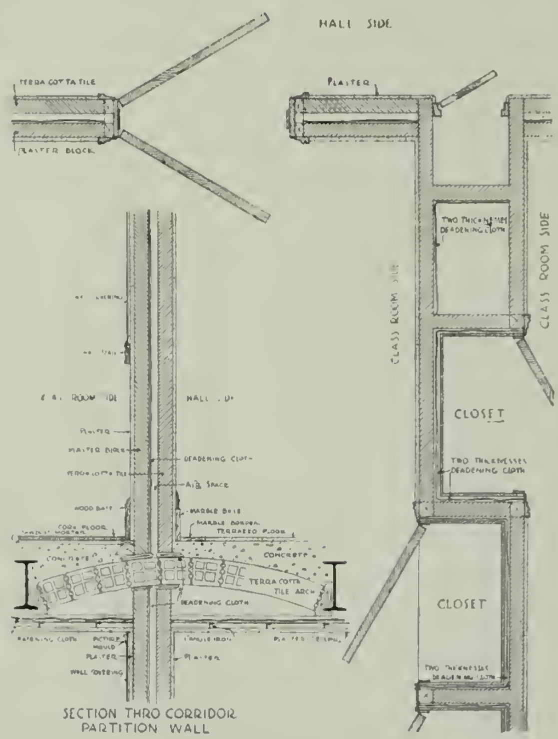


Fig. 1. Details of Construction, Institute of Musical Art, New York, N. Y.

The means which were taken to secure insulation at the base of the screen walls and to prevent the transmission of sound from floor to floor are exceedingly interesting. The floor construction consisted in hollow terra cotta tile arches, on top of this cinder concrete, on this sawdust mortar, and on the top of this cork flooring. Below the reinforced concrete arches were hung ceilings of plaster on wire lath. This hung ceiling was supported by crossed angle bars which were themselves supported by the I beams which supported the hollow terra cotta tile arches. In the air spaces between the tile arches and the hung ceilings, and resting on the latter, was deadening sheet. This compound floor of cork, sawdust mortar, cinder concrete, terra cotta tile, air space, and hung ceiling, with deadening sheet in the air spaces, has the air of finality, but was not successful in securing the desired insulation.

It is interesting to note also that the screen walls were separated from the floor arches on which they rested below and on which they abutted above by deadening sheet. It is possible that this afforded some insulation at the top of the wall, for the arch was not sustained by the wall, and the pressure at that point not great. At the bottom, however, it is improbable that the deadening sheet carried under the base offered an insulation of practical value. Under the weight of the wall it was probably compressed into a compact mass, whose rigidity was still further increased by the percolation through it of the cement from the surrounding concrete.

Finally, after the completion of the building, Mr. Damrosch, the director, had tried the experiment of covering the walls of one of the rooms to a depth of two inches with standard hair felt, with some, but almost negligible, effect on the transmission of sound.

Deadening sheet has been mentioned frequently. All indication of the special kind employed has been purposely omitted, for the discussion is concerned with the larger question of the manner of its use and not with the relative merits of the different makes.

The house in New York presented a problem even more interesting. It was practically a double house, one of the most imperative conditions of the building being the exclusion of sounds in the main part of the house from the part to the left of a great partition wall. This wall of solid masonry supported only one beam of the main house, was pierced by as few doors as possible, — two, — and by no steam or water pipes. The rooms were heated by independent fireplaces. The water pipes connected independently to the main. It had been regarded as of particular importance to exclude sounds from the two bedrooms on the second floor. The ceilings of the rooms below were therefore made of concrete arch; on top of this was spread three inches of sand, and on top of this three inches of lignolith blocks; on this was laid a hardwood floor; and finally, when the room was occupied, this floor was covered by very heavy and heavily padded carpets. From the complex floor thus constructed arose interior walls of plaster on wire lath on independent studding, supported only at the top where they were held from the masonry walls by iron brackets set in lignolith blocks. Each room was therefore practically a room within a room, separated below by three inches of sand and three inches of lignolith and on all sides and above by an air space. Notwithstanding this, the shutting of a door in any part of the main house could be heard, though faintly, in either bedroom. In the rear bedroom, from which the best results were expected, one could hear not merely the shutting of doors in the main part of the house, but the working of the feed pump, the raking of the furnace, and the coaling of the kitchen range. In the basement of the main dwelling was the servants' dining room. Rapping with the knuckles on the wall of this room produced in the bedroom, two stories up and on the other side of the great partition wall, a sound which, although hardly, as the architect expressed it, magnified, yet of astonishing loudness and clearness. In this case, the telephone-like nature of the process was even more clearly defined than in the other cases, for the distances concerned were much greater. The problem had many interesting aspects, but will best serve the present purpose if for the sake of simplicity and clearness it be held to but one, — the transmission of sound from the servants' dining room in the basement along the great eighteen-inch partition wall up two stories to the insulated bedroom above and opposite.

It is a fairly safe hazard that the sound on reaching the bedroom did not enter by way of the floor, for the combination of reinforced concrete, three inches of sand, three inches of lignolith block, and the wood flooring and carpet above, presented a combination of massive rigidity in the concrete arch, inertness in the sand and lignolith block, imperviousness in the hardwood floor, and absorption in the padded carpet which rendered insulation perfect, if perfect insulation be possible. No air ducts or steam or water pipes entered the room. The only conceivable communication, therefore, was through the walls or ceiling. The communication to the inner walls and ceiling from the surrounding structural walls was either through the air space or through the iron angle bars, which, set in lignolith blocks in the structural wall, retained erect and at proper distance the inner walls. Of the two means of communication, the air and the angle bars, the latter was probably the more important. It is interesting and pertinent to follow this line of communication, the masonry wall, the angle bars, and the screen walls, and to endeavor to discover if possible, or at least to speculate on the reason for its exceptional though unwelcome efficiency.

From the outset it is necessary to distinguish the transverse and the longitudinal transmission of sound in a building member, that is, to distinguish as somewhat different processes the transmission of sound from one room to an adjacent room through a separating wall or ceiling, from the transmission of sound along the floors from room to room, or along the vertical walls from floor to floor. Broadly, although the two are not entirely separable phenomena, one is largely concerned in the transmission of the sound of the voice, or the violin, or of other sources free from solid contact with the floor, and the other in the transmission of the sound of a piano or cello, — instruments in direct communication with the building structure, — or of noises involved in the operation of the building, dynamos, elevators, or the opening and closing of doors. In the building under consideration, the disturbing sounds were in every case communicated directly to the structure at a considerable distance and transmitted along the walls until ultimately communicated through the angle bars, if the angle bars were the means of communication, to the thin plaster walls which constituted the inner room. The special features thus emphasized were the longitudinal transmission of vibration by walls, floors, and structural beams, and the transformation of these longitudinal vibrations into the sound-producing transverse vibrations of walls and ceilings bounding the disturbed room. Many questions were raised which at the time could be only tentatively answered.

What manner of walls conduct the sound with the greater readiness? Is it true, as so often stated, that modern concrete construction has contributed to the recent prevalence of these difficulties? If so, is there a difference in this respect between stone, sand, and cinder concrete? In this particular building, the partition wall was of brick. Is there a difference due to the kind of brick employed, whether hard or soft? Or does the conduction of sound depend on the kind of mortar with which the masonry is set? If this seems trivial, consider the number of joints in even a moderate distance. Again, is it possible that sound may be transmitted along a wall without producing a transverse vibration, thus not entering the adjacent room? Is it possible that in the case of this private house had there been no interior screen wall the sound communicated to the room would have been less? We know that if the string of a string telephone passes through a room without touching, a conversation held over the line will be entirely inaudible in the room. Is it possible that something like this, but on a grand scale, may happen in a building? Or, again, is it possible that the iron brackets which connected the great partition wall to the screen wall magnified the motion and so the sound, as the lever on a phonograph magnifies its motion? These are not unworthy questions, even if ultimately the answer be negative.

The investigation divides itself into two parts, — the one dealing with partition walls especially constructed for the test, the other with existing structures wherever found in interesting form. The experiments of the former type were conducted in a special room, mentioned in some of the earlier papers (THE BRICKBVILDER, January, 1914), and having peculiar merits for the work. For an understanding of these experiments and an appreciation of the conditions that make for their accuracy, it is necessary that the construction of this room be explained at some length. The west wing of the Jefferson Physical Laboratory is in plan a large square in the center of which rises a tower, which, for the sake of steadiness and insulation from all external vibration, is not merely of independent walls but has an entirely separate foundation, and above is spanned without touching by the roof of the main building. The sub-basement room of this tower is below the basement of the main building, but the walls of the latter are carried down to enclose it. The floor of the room is of concrete, the ceiling a masonry arch. There is but one door which leads through a small anteroom to the stairs mounting to the level of the basement of the main building. Through the ceiling there are two small openings for which special means of closing are provided. The larger of these openings barely permits the passage of an observer when raised or lowered by a block and tackle. It is necessary that there be some such entrance in order that observations may be taken in the room when the door is closed by the wall construction undergoing test.

Of prime importance, critical to the whole investigation, was the insulation between the rooms, otherwise than through the partition to be tested. The latter closed the doorway. Other than that the two rooms were separated by two eighteen-inch walls of brick, separated by a one-inch air space, not touching through a five-story height and carried down to separate foundations. Around the outer wall and around the antechamber was solid ground. It is difficult to conceive of two adjacent rooms better insulated, the one from the other, in all directions, except in that of their immediate connection.

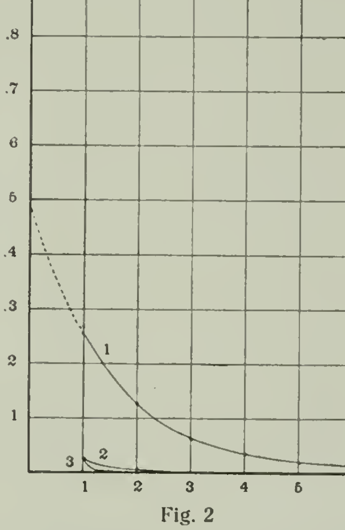


Fig. 2

The arrangement of apparatus, changed somewhat in later experiments, consisted primarily, as shown in the diagram, of a set of organ pipes, winded from a bellows reservoir in the room above, this in turn being charged from an air pump in a remote part of the building — remote to avoid the noise of operation. In the center of the room two reflectors revolved slowly and noiselessly on roller bearings, turned continuously by a weight, under governor control, in the room above. The chair of the observer was in a box whose folding lids fitted over his shoulders. In the box was the small organ console and the key of the chronograph. The organ and chronograph had also console and key connection with the antechamber. The details of the apparatus are not of moment in a paper written primarily for architects.

Broadly, the method of measuring the transmission of sound through the partitions consisted in producing in the larger room a sound whose intensity in terms of threshold audibility was known, and reducing this intensity at a determinable rate until the sound ceased to be audible on the other side of the partition. The intensity of the sound at this instant was numerically equal to the reciprocal of the coefficient of transmission. This process involved several considerations which should be at least mentioned.

The sound of known intensity was produced by organ pipes of known powers of emission, allowance being made for the volume of the room and the absorbing power of the walls. The method was fully explained in earlier papers.* It is to be borne in mind that there was thus determined merely the average of intensity. The intensity varied greatly in different parts of the room because of interference. In order that the average intensity of sound against the partition in a series of observations should equal the average intensity in the room, it was necessary to continuously shift the interference system. This was accomplished by means of revolving reflectors. This also rendered it possible to obtain a measure of average conditions in the room from observations taken in one position. Finally the observations in the room were always made by the observer seated in the box, as this rendered his clothing a negligible factor, and the condition of the room the same with or without his presence. Consideration was also given to the acoustical condition of the antechamber.

Two methods of reducing the sound have been employed. In the one the sound was allowed to die away naturally, the source being stopped suddenly, and the rate at which it decreased determined from the constants of the room. In another type of experiment the source, electrically maintained, was reduced by the addition of electrical resistance to the circuit. One method was suitable to one set of conditions, the other to another. The first was employed in the experiments whose results are given in this paper.

The first measurements were on felt, partly suggested by the experiments of Dr. Damrosch with felt on the walls of the Institute of Musical Art, partly because it offered the dynamically simplest problem on which to

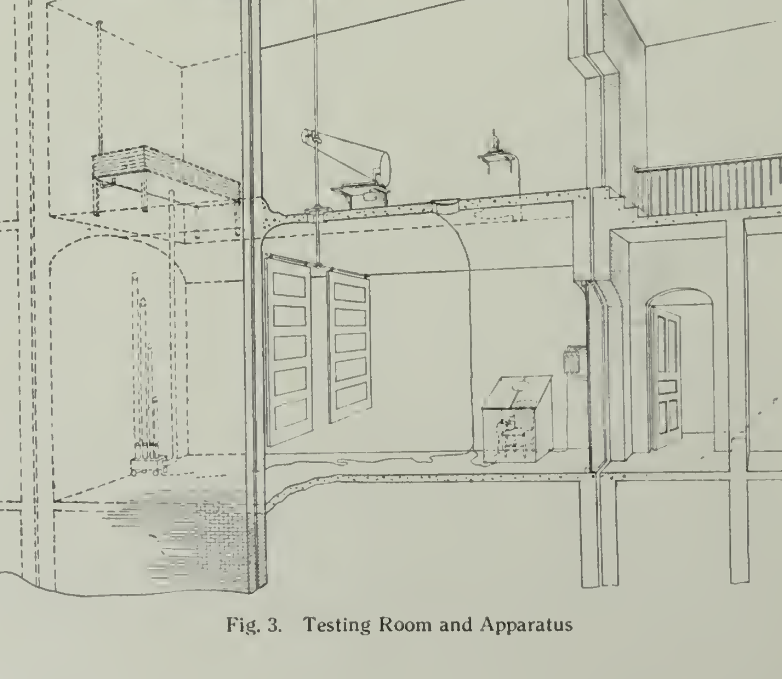


Fig. 3. Testing Room and Apparatus

* *The American Architect* for 1909.

test the accuracy of the method by the concurrence of its results. The felt used was that so thoroughly studied in other acoustical aspects in the paper published in the Proceedings of the American Academy of Arts and Sciences in 1906. The door separating the two rooms was covered with a one-half inch thickness of this felt. The intensity of sound in the main room just audible through the felt was 3.7 times threshold audibility. Another layer of felt of equal thickness was added to the first, and the reduction in the intensity of sound in passing through the two was 7.8 fold. Through three-thickness, each one-half, the reduction was 15.4 fold, through four 30.4, five 47.5, and six 88.0. This test was for sounds having the pitch of violin c, first c above middle c, 512 vibrations per second.

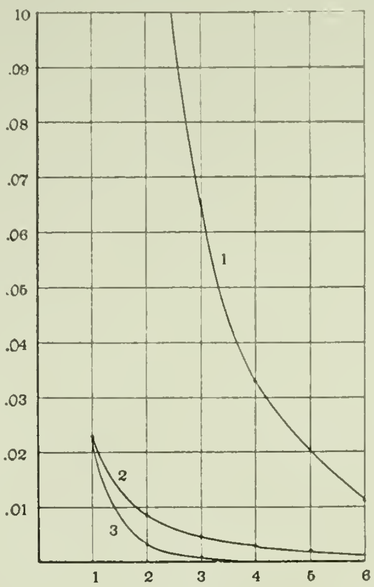


Fig. 4

There is another way of stating the above results which is perhaps of more service to architects. The ordinary speaking intensity of the voice is, — not exactly, of course, for it varies greatly, — but of the order of magnitude of 1,000,000 times minimum audible intensity. Assume that there is a sound of that intensity, and of the pitch investigated, in a room in one side of a partition of half-inch felt. Its intensity on the other side of the partition would be 270,000 times minimum audible intensity. Through an inch of felt its intensity would be 128,000. Through six layers of such felt, that is, through three inches, its intensity would be 11,400 times minimum audible intensity — very audible, indeed. The diminishing intensity of the sound as it proceeds through layer after layer of felt is plotted in the adjacent diagram, (Curve 1, Fig. 2), in which all the points recorded are the direct results of observations. The intensity inside the room is the full ordinate of the diagram. The curve drawn is the nearest rectangular hyperbola fitting the observed and calculated points. The significance of this will be discussed later. It is sufficient for the present purpose to say that it is the theoretical curve for these conditions, and the close agreement between it and the observed points is a matter for considerable satisfaction.

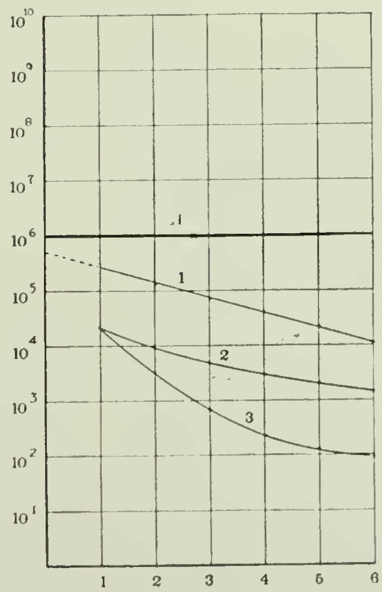


Fig. 5

The next partition tested was of sheet iron. This, of course, is not a normal building material and it may therefore seem disappointing and without interest to architects. But it is necessary to remember that these were preliminary investigations establishing methods and principles rather than practical data. Moreover, the material is not wholly impractical. The writer has used it in recommendations to an architect in one of the most interesting and successful cases of sound insulation so far undertaken — that in an after-theater restaurant extending underneath the sidewalk of Broadway and 42d street in New York.

The successive layers of sheet iron were held at a distance, each from the preceding, of one inch, spaced at the edges by a narrow strip of wood and felt, and pressed home by washers of felt. After the practical cases cited at the beginning of the paper, it requires courage and some hardihood to say that any insulation is good. It can only be said that every care was taken to this end. The results of the experiments can alone measure the efficiency of the method employed, and later they will be discussed with this in view.

The third series of experiments were with layers of sheet iron with one-half inch felt occupying part of the air space between them. The iron was that used in the second series, the felt that used in the first. The air space was unfortunately slightly greater than in the second series, being an inch and a quarter instead of an inch. The magnitude of the effect of this difference in distance was not realized at the time, but it was sufficient to prevent a direct comparison of the second and third series, and an attempt to deduce the latter from the former with the aid of the first. When this was realized, other conditions were so different as to make a repetition of the series difficult.

In the following table is given the results of these three series of experiments in such form as to admit of easy comparison. To this end they are all reduced to the values which they would have had with an intensity of sound in the inner room of 1,000,000. In the first column each succeeding figure is the intensity outside an additional half inch of felt. In the second column, similarly, each succeeding figure is the intensity outside an additional sheet of iron. In the third column, the second figure is the intensity outside a single sheet of iron, and after that each succeeding figure is the intensity outside of an additional felt and iron doublet with air space.

1,000,000	1,000,000	1,000,000
270,000	22,700	23,000
128,000	8,700	3,300
65,000	4,880	700
33,000	3,150	220
21,500	2,060	150
11,400	1,520	88

The sound transmitted in the second and third series is so much less than in the first that when an attempt is made to plot it on the same diagram (Curves 2 and 3, Fig. 2) it results in lines so low as to be scarcely distinguishable from the base line. Magnifying the scale tenfold (Fig. 4) throws the first series off the diagram for the earlier values, but renders visible the second and third.

The method of representing the results of an investigation graphically has several ends in view: it gives a visual impression of the phenomenon; it shows by the nearness with which the plotted values* lie to a smooth curve the accuracy of the method and of the work ; it serves to interpolate for intermediate values and to extrapolate for points which lie beyond the observed region, forward or backward; finally, it reveals significant relations and leads to a more effective discussion. It is worth while thus examining the three curves.

Attention has already been called to the curve for felt, to its extrapolation, and to the close approximation of the observed points to an hyperbola. The latter fact indicates the simplest possible law of absorption. It proves that all layers absorb the same proportion of the sound; that each succeeding layer absorbs less actual sound than the preceding, but less merely because less sound reaches it to be absorbed. In the case in hand the sound in passing through the felt was reduced in the ratio 1.88 in each layer, 3.53 in each inch. It is customary to test such curves by plotting them on a special kind of co-ordinate paper — one on which, while horizontal distances are uniformly scaled as before, vertical distances are scaled with greater and greater reduction, tenfold for each unit rise. On such co-ordinate paper the vertical distances are the power to which 10 must be raised to equal the number plotted — in other words, it is the logarithm of the number. Plotted on such paper the curve for felt will result in a straight line, if the curve in the other diagram was an hyperbola, and if the law of absorption was as inferred. How accurately it does so is shown in Curve 1, Fig. 5.

When the observations for iron, and for felt and iron, are similarly plotted (Curves 2 and 3, Fig. 5), the lines are not straight, but strongly curved upward, indicating that the corresponding curves in the preceding diagram were not hyberbolas, and that the law of constant coefficient did not hold. This must be explained in one or the other of two ways. Either there was some by-pass for the sound, or the efficiency of each succeeding unit of construction was less.

The by-pass as a possible explanation can be quickly disposed of. Take, for example, the extreme case, that for felt and iron, and make the extreme assumption that with the completed series of six screens all the sound has come by some by-pass, the surrounding walls, the foundations, the ceiling, or by some solid connection from the innermost to the outermost sheet. A calculation based on these assumptions gives a plot whose curvature is entirely at the lower end and bears no relationship to the observed values. In the other case, that of the iron only, a similar calculation gives a similar result; moreover, the much lower limit to which the felt and iron screens reduced the sound wholly eliminates any by-pass action as a vital factor in the iron-only experiment.

The other explanation is not merely necessary by elimination, but is dynamically rational. The screen walls such as here tested, as well as the screen walls in the actual construction described by way of introduction, do not act by absorption, as in the case of the felt; do not act by a process which is complete at the point, but rather by a process which in the first screen may be likened to reflection, and in the second and subsequent screens by a process which may be more or less likened to reflection, but which being in a confined space reacts on the screen or screens which have preceded it. In fact, the process must be regarded not as a sequence of independent steps or a progress of an independent action, but as that of a structure which must be considered dynamically as a whole.

When the phenomenon is one of pure absorption, as in felt, it is possible to express by a simple formula the intensity of the sound I, at any distance x, in terms of the initial intensity I_0,

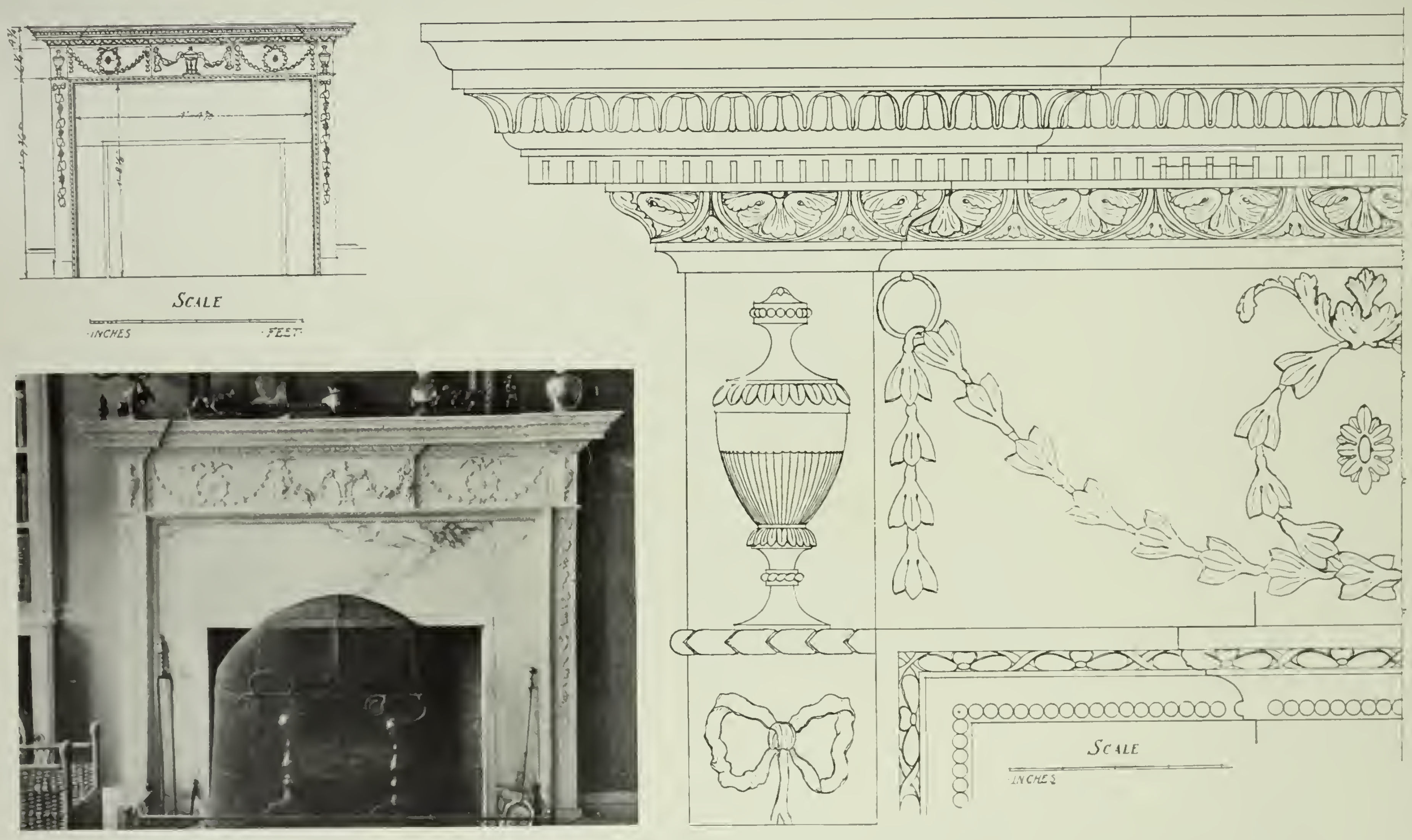
$$I = I_0 R k^{-x},$$

where R represents the factor of surface discontinuity, and k the ratio in which the intensity is reduced in a unit distance. In the case of the felt tested, R is .485 and k is 3.53, the distance into the felt being measured in inches. As an application of this formula, one may compute the thickness of felt which would entirely extinguish a sound of the intensity of ordinary speech 10.4 inches. It is not possible to express by such a formula the transmission of sound through either of the more complex structures. However, it is possible to extrapolate empirically and show that 10.4 inches of neither would accomplish this ideal result, although they are both far superior to felt for thicknesses up to three inches in one case and five and one-half inches in the other.

A number of other experiments were tried during this preliminary stage of the investigation, such, for example, as increasing the distance between the screen walls, but it is not necessary to recount them here. Enough has already been given to show that a method had been developed for accurately measuring the insulating value of structures; more would but confuse the purpose. At this point the apparatus was improved, the method recast, and the investigation begun anew, thenceforward to deal only with standard forms of construction, and for sounds, not of one pitch only, but for the whole range of the musical scale.

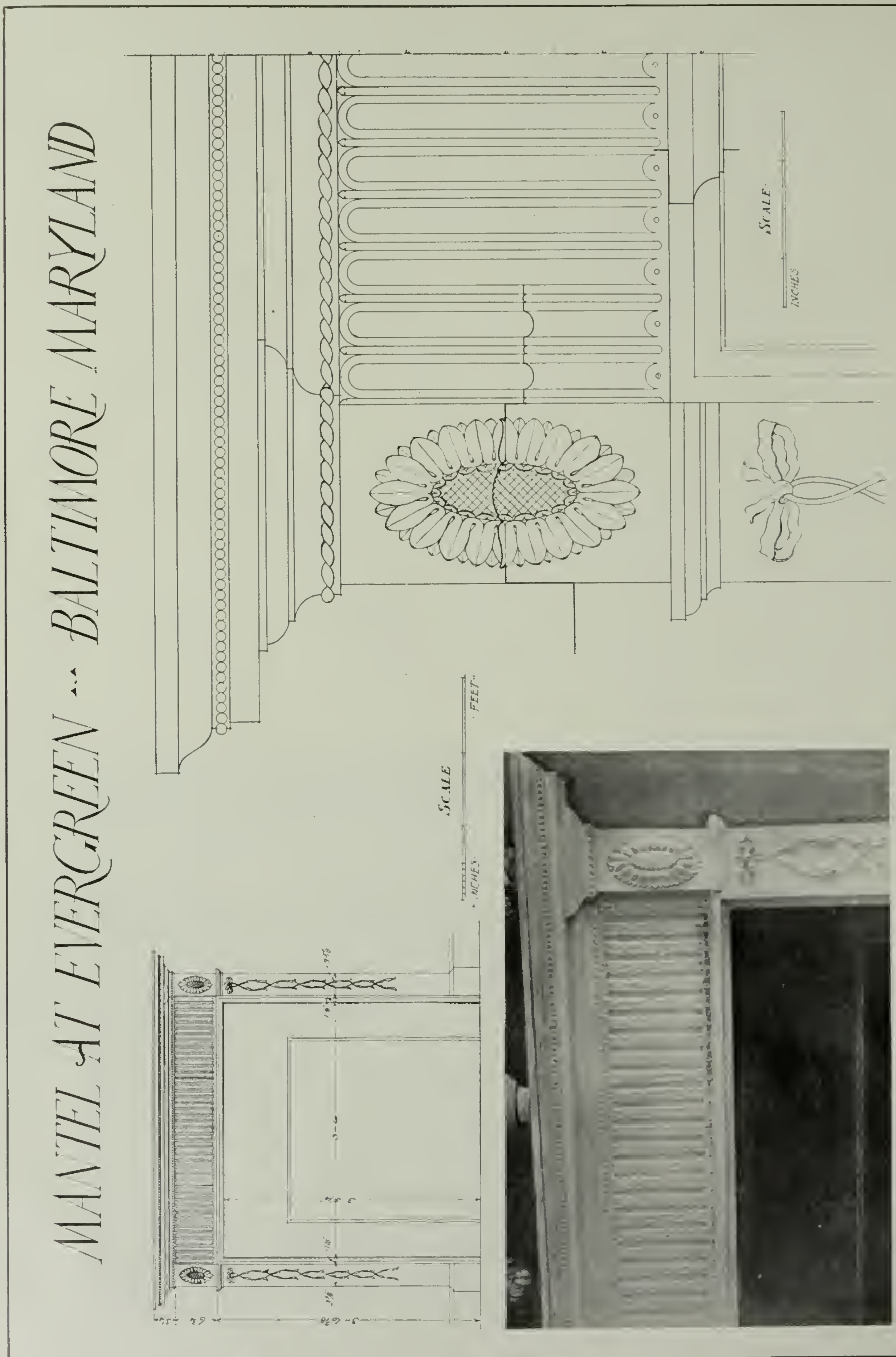
* *In reproducing from the plotted diagrams for Figs. 2, 4, and 5, the dots, in some cases, which indicated the plotted values of the observed points, do not clearly appear in distinction on the lines. The greatest divergence, in any case, from the line drawn was not more than twice the breadth of the line itself.*

MANTEL AT EVERGREEN -- BALTIMORE MARYLAND



DETAIL OF OLD MANTEL AT "EVERGREEN," BALTIMORE, MD.

MEASURED DRAWING BY RIGGIN BUCKLER



DETAIL OF OLD MANTEL AT "EVERGREEN," BALTIMORE, MD.
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The Modern Schoolhouse.

II. CORRIDORS AND STAIRWAYS.

By WALTER H. KILHAM.

THE ideal place for the corridor is, of course, along the outer wall of the building, so that it may have windows in the side opposite the class room doors. The air of cheerfulness and space which the architect can thus obtain, will go farther towards making the schoolhouse a really attractive place, which the pupils in later years will pleasantly recall, than almost any other single thing within the power of the architect to accomplish. Considerations of economy usually dictate in a large building that the main corridor shall become merely a sort of street, serving rooms on both sides; but such a corridor is almost inevitably dark and monotonous, even when furnished with casts and pictures, in inverse proportion to the amount of outside light that it receives. In small school buildings of eight or ten rooms, however, there is often no real obstacle to the longitudinal corridor with rooms along one side, and if the corridor can be broken by a sunny bay window, or some such feature, the pupils will enjoy the building more, even if constructional standards are violated. In any event outside light, if only at the ends, is essential, and the corridor should, when possible, run to the light.

Second Floor Corridor
The Michael Driscoll School, Brookline, Mass.
Kilham & Hopkins, Architects

Width of Corridor. Massachusetts law requires that corridors shall be well lighted and, if so directed, shall terminate on an egress; that they shall not be less than 10 feet wide in the clear for buildings with eight class rooms, and shall increase at least 1 foot in width for every two additional class rooms. They may decrease 1 foot in width for every two class rooms less than that number, and shall be free from sharp turns where circumstances will permit.

The Boston law requires corridors not less than 8 feet wide for four class rooms on a floor and not less than 10 feet for over four rooms, governed by length, access to stairs, etc. When the stairs are placed at the ends of the corridor, against a window, their width usually governs the width of the corridor. A corridor width of 10 feet 6 inches will take two runs of stairs each 5 feet wide with a 6-inch well-way, and this will be found to be a convenient width for the corridor when it is not used as the main exit from a large assembly hall. A greater width is a rather useless expense, except in corridors of great length, and tends to give an impression of loose planning, although it is often advocated by building committees.

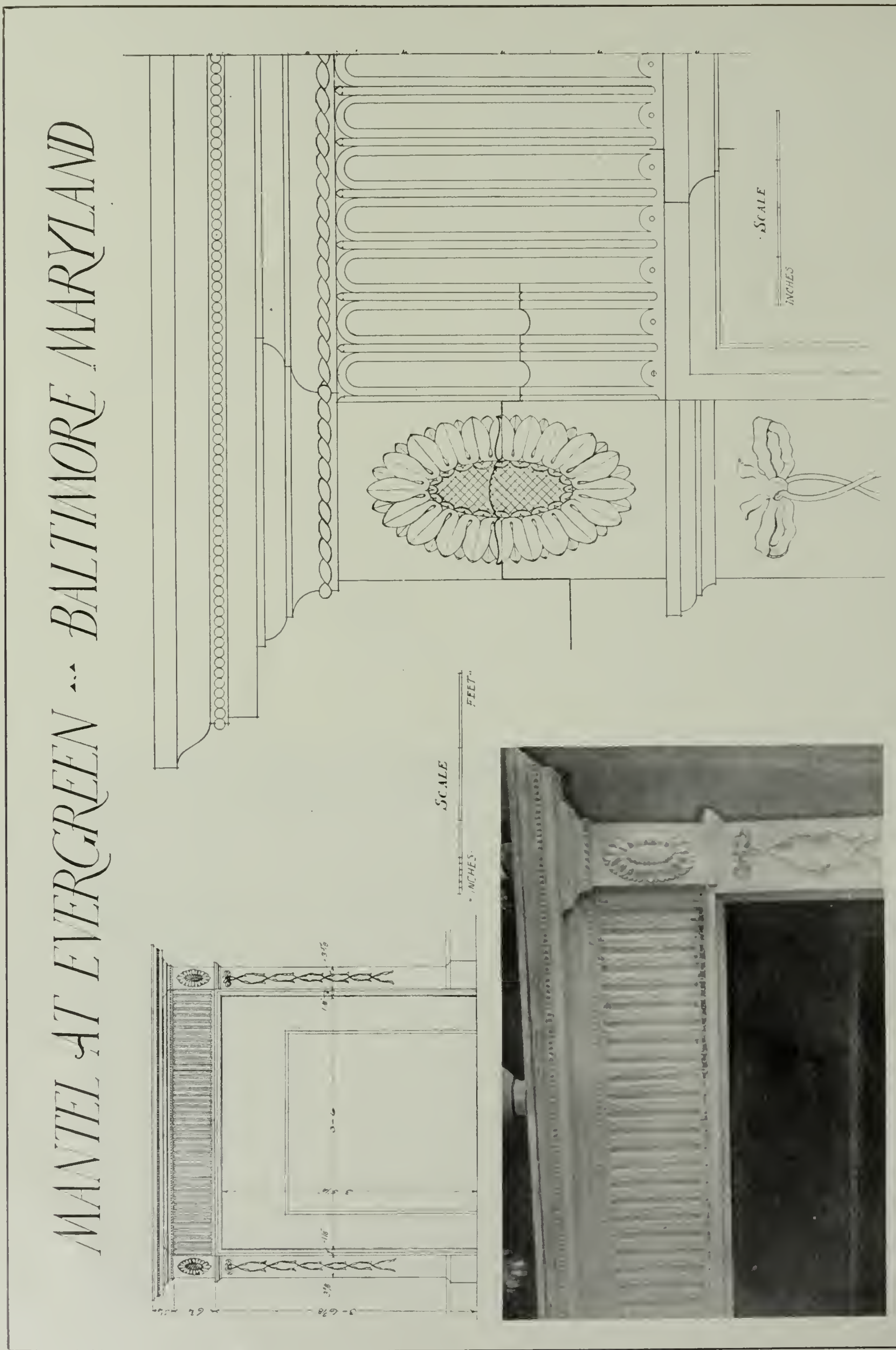
Corridor Floors. The best material for these is probably terrazzo, hard and well polished. To avoid contraction cracks, it should be divided into areas of about 80 to 100 square feet by strips of slate or marble. A terrazzo floor is not as good when used upon wooden joists in second class construction on account of the shrinkage of the timbers, but it is by no means impracticable. It is not very much more costly, however, to span the corridors with reinforced concrete slabs or terra cotta tile arches, on which the terrazzo with its base of concrete can be laid easily and a permanently satisfactory result obtained.

Cement floors in general give trouble from "dusting" unless they are treated with some reliable concrete hardener or preservative. Sanford E. Thompson* recommends a granolithic floor made of cement, Plum Island sand, and crushed granite in a fairly stiff mixture, and then grinding off a thin layer, so as to show the grains of sand and the pieces of coarser aggregate. This gives a varied texture to the surface, showing the numerous colored grains and permits of pleasing effects by using aggregates of different colors. The surface becomes more glossy and dense, so that it is readily cleaned. Mr. Thompson's book gives definite specifications for the process.

Other suitable floor surfaces are tile, marble mosaic, and the various magnesium compositions. The latter in particular, when laid by good workmen, are more resilient and somewhat less noisy than terrazzo. It is difficult, however, to find this material in a satisfactory color. Tile and mosaic are ordinarily considered too expensive to be employed in school buildings. Some institutions have made use of a red granolithic floor grooved to imitate tile, complete with border of a different color, etc., but in regard to cleanliness a floor with an absolutely flush surface will be more satisfactory. Battleship linoleum may also be employed and in general, is more useful for corridors than for class rooms.

If the floor has to be of wood, maple is probably the best material; but the use of too much water in scrubbing should be discouraged, as it causes the wood to shrink and opens up cracks. The best treatment for a wooden floor, is oil and then more oil, which can be sprayed on

* "Floor Surfaces in Fireproof Buildings" by Sanford E. Thompson reprinted from the *Journal of the American Society of Civil Engineers*.



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cheaply, holds down the dust, and keeps the floor in excellent condition. There are also many patent preparations which have their advocates.

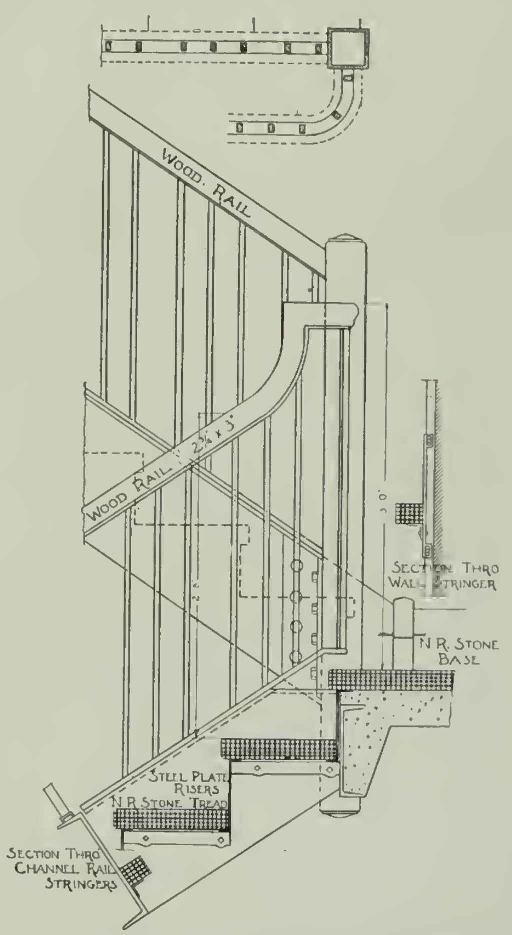
Corridor Walls. Light glazed or salt glazed bricks make probably the best wall surfacing for the lower portions, but many places employ burlap to a height of about 7 feet, or to the tops of the doors. A picture moulding at the ceiling is necessary.

Lights. The corridor will require ceiling or short pendant electric lighting fixtures of 32 candle power each and also emergency gas outlets. The stairways and vestibules should be similarly equipped.

Stairways. Any building of two or more stories should always be provided with more than one stairway, having outside light and leading directly to an egress doorway. The first requisite as to location of these stairs is to have them as widely separated as possible and at the terminations of the corridors, so that there will be no lengths of corridor or dead ends beyond the staircase from which there would be no egress. A single stairway in the center of a building is forbidden in most localities and should not be tolerated anywhere.

Much has been written as to the proper width for schoolhouse stairs. Boston forbids over 5 feet. Professor Dresslar recommends 5½ to 6 feet. It is evident that if pupils are to pass over the stairs more than three abreast, there will be need of a center rail. Three pupils can be perfectly well accommodated on a tread in a width of 5 feet, and a wider stair than this seems unnecessary. Professor Dresslar says that one hundred students in double file can easily descend a broad, well lighted stairway in thirty-five seconds, which time can be reduced by fire drills. Observation in the Chelsea, Mass., schools, shows that under ordinary conditions, a class of forty pupils, marching two abreast, completely descends one story in forty seconds. At the fire drill the same group of buildings containing two thousand pupils is emptied in two minutes, using seven exits — a rough average of three hundred pupils per exit. New York City requires each building to have a sufficient number of fireproof stairways and exits to permit of its occupants vacating the same in not over three minutes in fireproof and three and a half minutes in non-fireproof structures.

The rise and tread should be easy, 6½ or 7 inch rise by about 10½-inch tread. The handrail should be about 2 feet 8 inches high on the runs, and 3 feet 0 inches on landings. An additional low handrail is sometimes provided for small children. To avoid lodgment of dust and prevent injury, the balustrade should be of a simple pattern mainly in vertical lines, and the newels should be without projecting cap mouldings. Massachusetts law requires the steps of stairs to have a rise of not less than 6 inches nor more than 7 inches, and a run of more than 10 inches. There shall be not more than 15 nor less than three risers between landings. When returning on walls or directly upon themselves, the landings shall be the full width of both flights, and no winding steps shall be used and no closets shall be placed under any stairs. The last provision is extremely practical, for there is no place in a school building more likely to invite rubbish than the space under the short run of stairs from the vestibule to the first floor. In the event of a fire starting there, egress from that end of the building would be at once impossible. It is important, therefore, to make this flight fireproof even if the rest of the stairs have to be of wood and to close the whole space up solidly so that no closet of sheathing can ever be built there.



Detail of North River Stone Stairs on Steel Strings

In case there is an assembly hall above the second floor, a stairway width of 1 foot for every hundred persons which the hall is capable of seating is required, but no such stairway may be less than 4 feet 0 inches in width.

New York prescribes 4 feet 0 inches as a standard width of stair, but in that city many of the duplex stairways are in use, enclosed in wired glass and metal frame partitions. These have not come into general use in other cities, as a somewhat greater story height is implied and school buildings of the size and height of those in New York City are not common elsewhere.

In all cases "winders" should be prohibited and no door should open immediately on a flight of stairs, but a landing of at least the width of the door should be provided between such stairs and such doorway.

The New Jersey code requires the following: All stairways (except cellar stairs) must not be less than 4 feet in width and have intermediate landings. The stair risers must not exceed 7 inches in height and the treads must not be less than 12 inches in width, including the projecting nosings. A uniform width must be maintained in all stairways and platforms, and the rise and tread for each run must be uniform. Handrails are to be placed on both sides of all stairways used by pupils and the inside rail must be continuous. Winding stairs are not allowed and stairways constructed of reinforced concrete are required to have an approved non-slippable tread embedded in concrete.

All stairs must be constructed of fireproof materials except stairs in one-story buildings leading to the cellar or basement, which may be of slow-burning construction, with no open risers, and must be enclosed by fireproof walls and without open well holes.

All stairways in buildings of more than one story in height must be separated from the corridors by thick wooden, iron, or kalamein partitions. Doors shall swing towards the exits only and be glazed with polished wired glass. All such doors shall have door springs and checks, but no floor stops or other device to hold the door open will be allowed.

Buildings having more than two rooms and less than nine rooms on the second floor shall have two stairways, one at each end of the building, and each leading direct to an exit from the first floor to the ground. Every school building having nine or more class rooms on the second floor shall have at least three flights of stairs, one near each end of the building and each leading direct to an exit from the first floor to the ground.

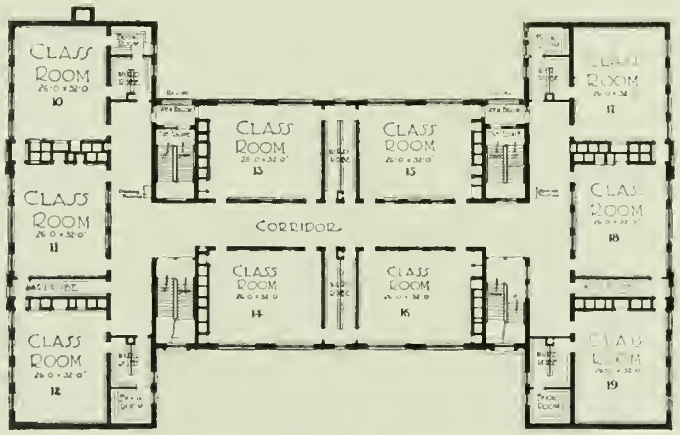
Construction of Stairways. To require all stairways to be fireproof would seem like a hardship to many building committees in small communities who are accustomed to the cheapness in first cost of wooden stairs; but after the disasters of recent years it seems incredible that any other construction should be considered. The time may arrive when all school buildings will be only one story high, but until then we must endeavor to guarantee our buildings as far as possible against loss of life by fire. Either reinforced concrete or steel is a suitable material for stair construction; the main point of interest is the wearing surface which should be specified for the treads. The most satisfactory substance which the writer has used is North River stone in slabs about 2 inches thick, with smooth surface, which gives a most agreeable feeling of security and comfort to the feet, and seems to wear almost indefinitely. Slate has also been used to a considerable extent. It is hard and clean but does not wear as well as the North River stone. Slate treads examined recently which have had five years' use in a school running double sessions constantly, and hence receiving double wear, show an erosion at the end nearest the handrail of about one-quarter of an inch at the edge of the tread, diminishing towards the back. North River stone treads five years old in a school having single sessions show no appreciable wear at all. Concrete treads are subject to "dusting," and do not have as agreeable an appearance, nor do they "feel" as comfortable as either of the above.

The landings may be of slate or North River stone on a steel frame, but a better way is to make them of reinforced concrete with terrazzo surface. The stairways may be rendered much lighter by painting the soffits white.

If the stairs have to be of wood, the treads should be protected by some form of "safety" or non-slipping tread, which is generally of iron with a filling of lead or carborundum, which renders them fairly safe against slipping and protects the wooden tread from wear.

The walls surrounding a staircase should always be of masonry. Brick nogging and wire lath are frequently passed by complaisant inspectors and committees who wish to make a "record" for cheap construction; but this practice means taking a chance.

It ought to be constantly kept in mind that the principal fire risk in any well constructed building lies in the vertical openings in the floors. If there were no open stair wells,



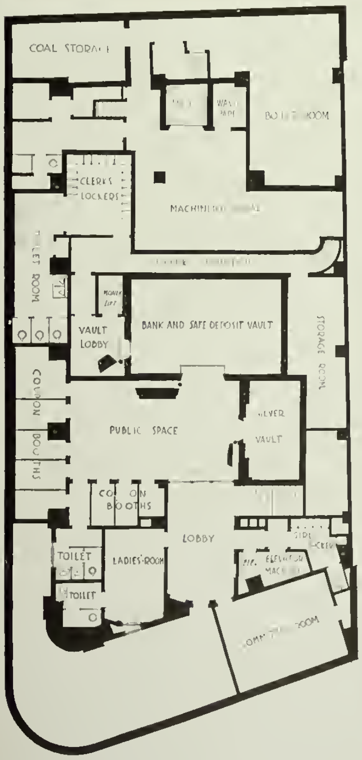
Second Floor Plan — Shurtleff School, Chelsea, Mass.

Shurtleff School, Chelsea, Mass., before Construction of North Wing Showing Open Balconies for Fire Stairs
Kilham & Hopkins, Architects

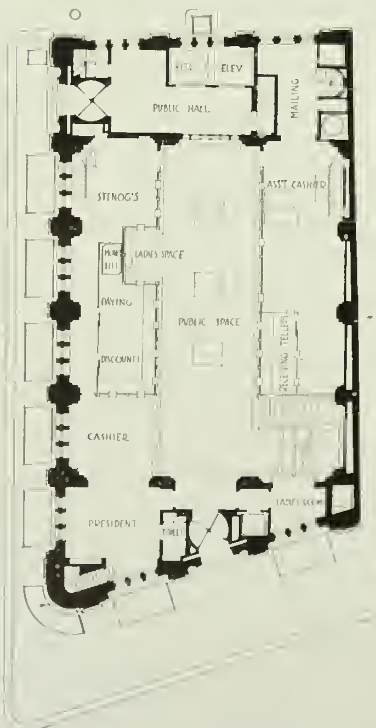
BANKING ROOM

HARTFORD NATIONAL BANK, HARTFORD, CONNECTICUT
DONN BARBER, ARCHITECT

DIRECTORS' ROOM

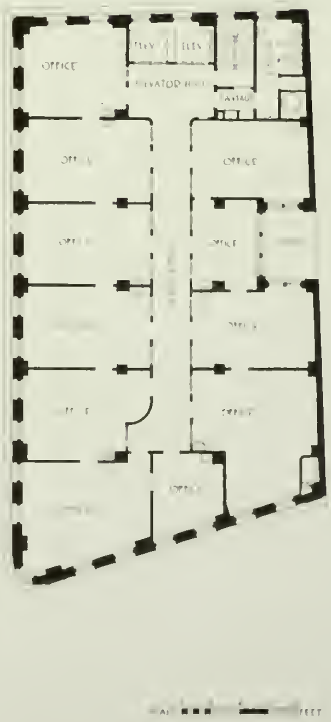


BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

MEZZANINE FLOOR PLAN



FIRST OFFICE FLOOR PLAN

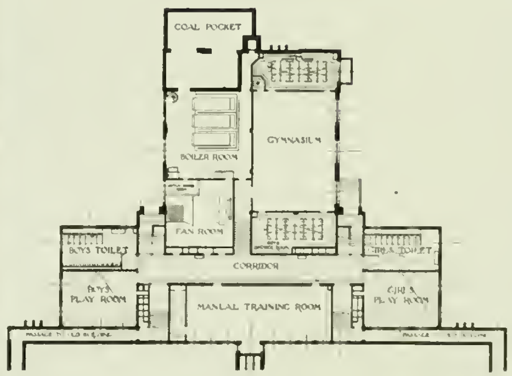
HARTFORD NATIONAL BANK, HARTFORD, CONNECTICUT

DONN BARBER, ARCHITECT

EDWARD DEVOTION SCHOOL, BROOKLINE, MASS.
KILHAM & HOPKINS, ARCHITECTS

ENTRANCE DETAIL

ASSEMBLY HALL



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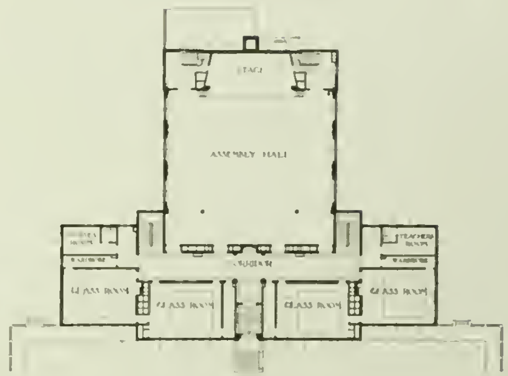
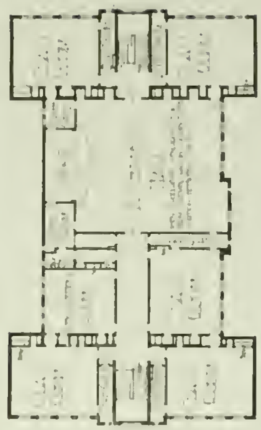


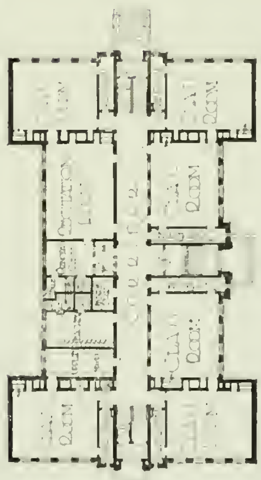
FIRST FLOOR PLAN

EDWARD DEVOTION SCHOOL, BROOKLINE, MASS.

KILHAM & HOPKINS, ARCHITECTS



SECOND FLOOR PLAN



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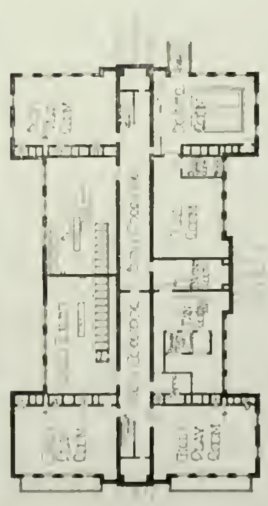
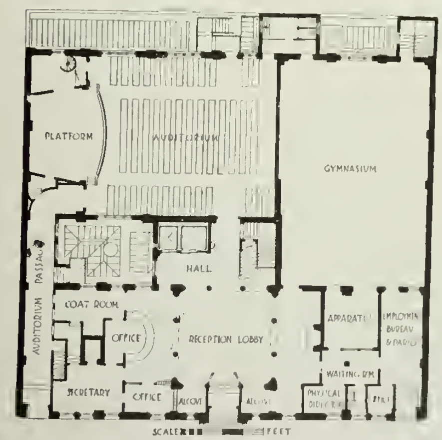


BASEMENT FLOOR PLAN

VOSE SCHOOL, MILTON, MASS.

KILHAM & HOPKINS, ARCHITECTS



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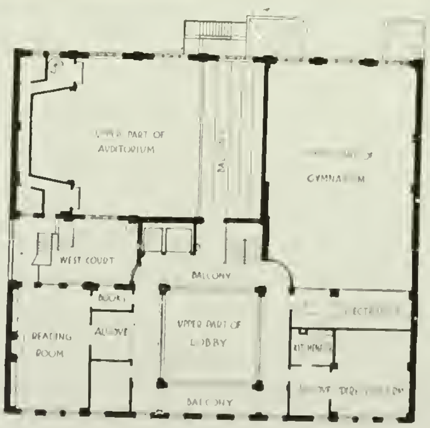
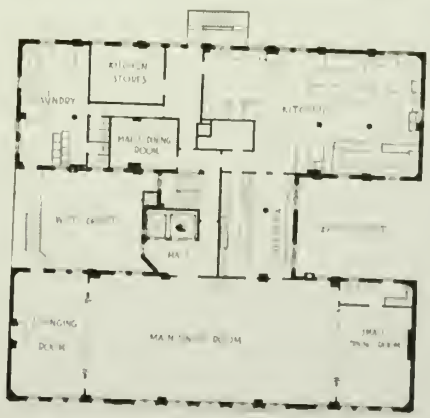


MEZZANINE FLOOR PLAN



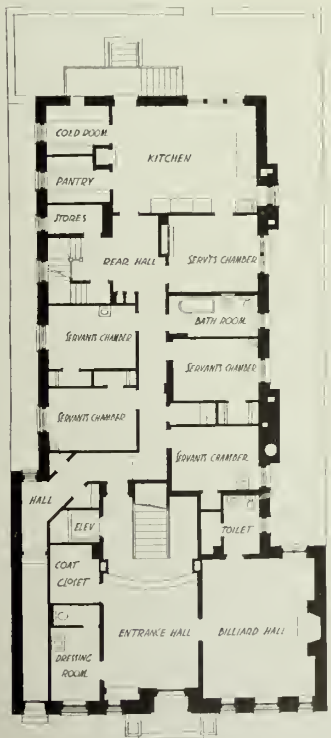
SEVENTH FLOOR PLAN

YOUNG WOMEN'S HEBREW ASSOCIATION BUILDING, NEW YORK, N. Y.

LOUIS ALLEN ABRAMSON, ARCHITECT

HOUSE OF THOMAS C. DENNEHY, ESQ., ASTOR ST., CHICAGO, ILL.
FREDERICK W. PERKINS, ARCHITECT

DINING ROOM



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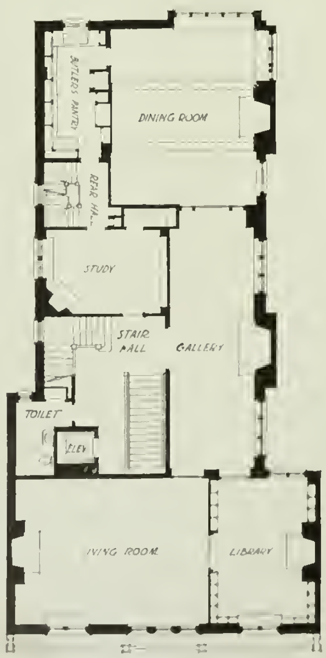
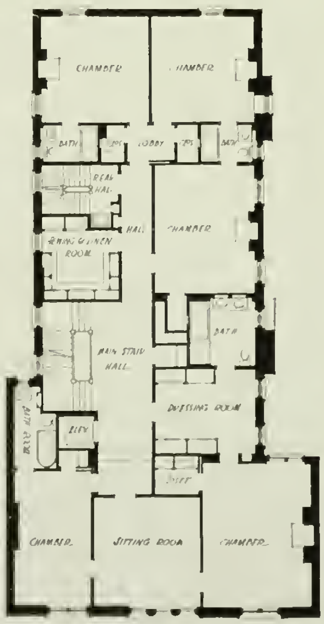


SECOND FLOOR PLAN



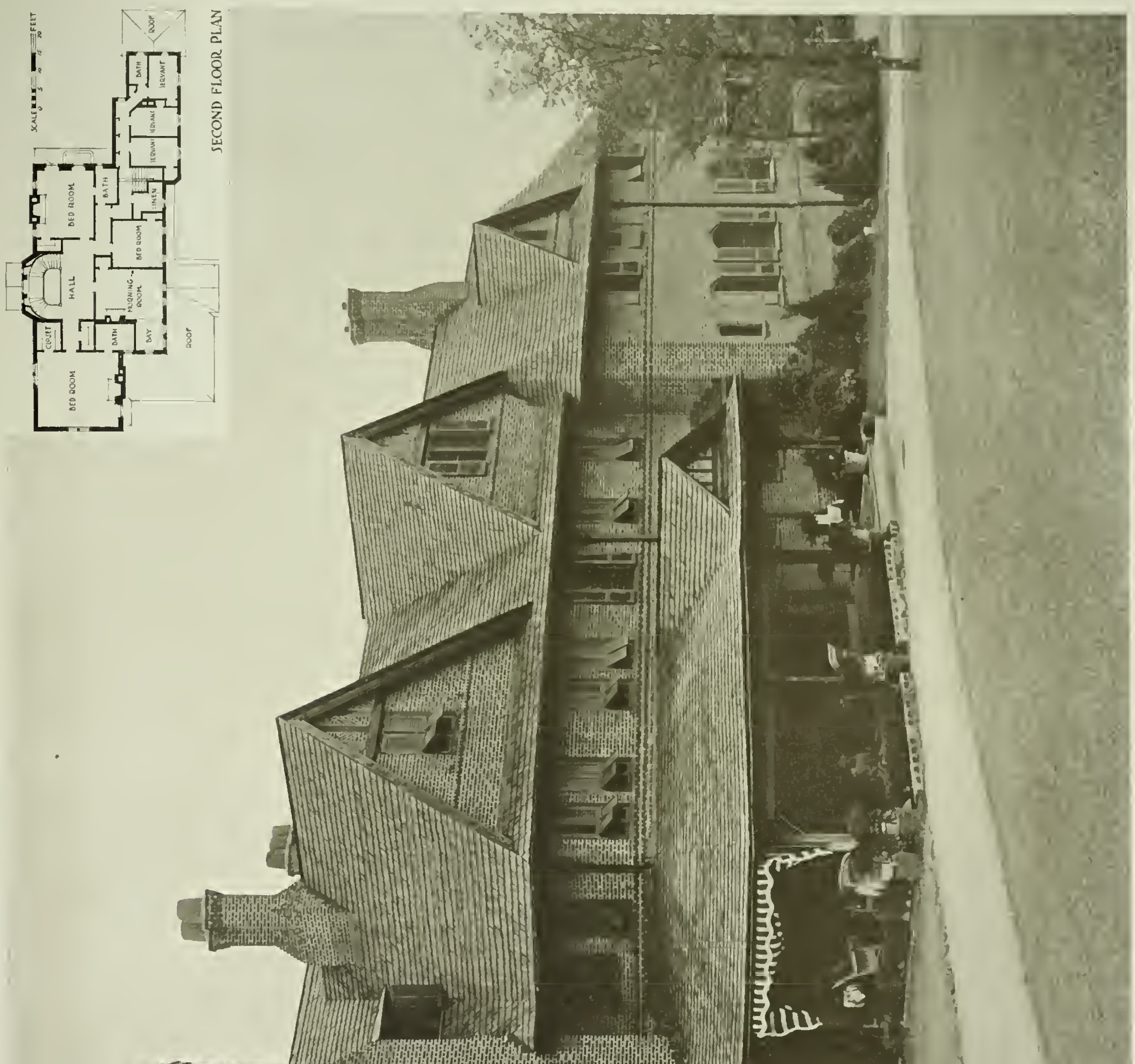
THIRD FLOOR PLAN

FOURTH FLOOR PLAN

HOUSE OF THOMAS C. DENNEHY, ESQ., ASTOR ST., CHICAGO, ILL.

FREDERICK W. PERKINS, ARCHITECT

HOUSE OF MRS. E. G. HOOD, CHESTNUT HILL, PA.
STEWARDSON & PAGE, ARCHITECTS



HOUSE OF MRS. E. G. HOOD, CHESTNUT HILL, PA.
STEWARDSON & PAGE, ARCHITECTS

HOUSE OF AUGUSTUS N. RANTOUL, ESQ., IPSWICH, MASS.
ANDREWS, JAQUES & RANTOUL, ARCHITECTS

VIEW ALONG TERRACE

FIRST FLOOR PLAN

SECOND FLOOR PLAN

DETAIL OF ENTRANCE

HOUSE OF AUGUSTUS N. RANTOUL, ESQ., IPSWICH, MASS.

ANDREWS, JAQUES & RANTOUL, ARCHITECTS

ENTRANCE HALL

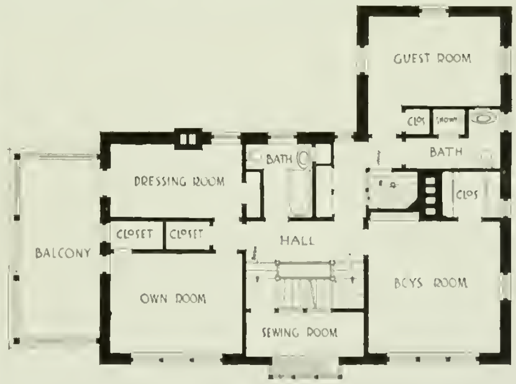
DINING ROOM

HOUSE OF AUGUSTUS N. RANTOUL, ESQ., IPSWICH, MASS.

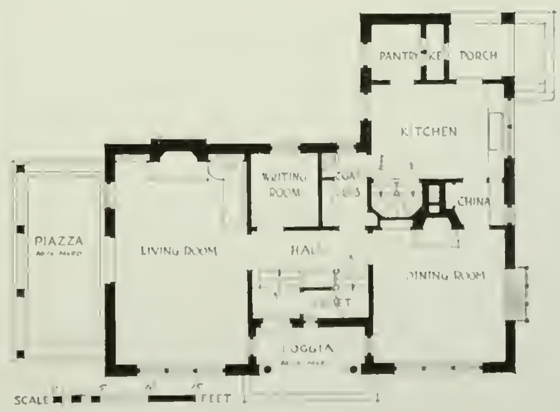
ANDREWS, JAQUES & RANTOUL, ARCHITECTS

VIEW FROM STREET

DETAIL OF ENTRANCE



SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE ON SOMERSET ROAD, LEXINGTON, MASSACHUSETTS

W. R. GREELEY, ARCHITECT AND OWNER

Some Old and Unfamiliar Spanish Buildings.

PART V. THE COURT HOUSE AND PRISON, BAEZA; CASA DE MIRANDA, BURGOS; COLEGIO DEL ARZOBISPO, SALAMANCA.

By ARTHUR G. BYNE.

Illustrated from Photographs Specially Taken by the Author.

BAEZA and Ubeda, two little-known towns close together in northern Andalusia, richly repay an architect's visit, having fine civic buildings as well as interesting churches. Beyond the fact that each was the home of prosperous nobility (until the unfortunate day when all the provincial noblemen aspired to live in Madrid) no local historian has shown any reason why such excellent architecture should be found in these remote and never important places. It is known that Pedro de Valdelvira, who started the cathedral of Jaen, in 1532, came up to them to build a church or two; but no one who has seen his perfect but soulless Renaissance work at Jaen, could attribute to him the charming spontaneous façades of the Casa Consistorial, or the Carcel (prison) of Baeza — the latter being the subject illustrated here.

This example shows to a preëminent degree the masterly way Spanish architects had of concentrating their ornament in doors and windows — a scheme helped by the patio plan which permitted the first floor to go practically unfenestrated towards the street. Another Spanish feature that invited to rich spotting was the lavish use of heraldic *motifs*; noble blood being the most important consideration to the occupants of a mansion, they never failed to announce their claims to it.

The windows in this example are Palladian but with the substitution, for the regular Palladian column, of the slender Moorish one that figures in *ajimez* (three-light) windows. Convention is again thrown to the winds in the cornice; for its crowning moulds instead of being the expected cyma and facia, are merely a large scale egg-and-dart. This is so overshadowed by the projecting tiles above, which in a measure play the part of the crown moulds, that it ceases to be unobtrusive or ungainly and becomes instead a highly interesting departure.

Casa de Miranda, Burgos. Nothing more melancholy than the present abuse of this ancient palace could be imagined. The beautiful patio, of which a corner is shown, is now bricked-in in the upper story and each bay rented out as a room; while the lower floor is so stained and bespattered by the wine-makers who inhabit it that it resembles an abattoir.

Delapidated though it all is, its richness and good taste announce themselves at first glance. The charming *amorini* frieze of soft Spanish granite is very delicately executed; the columns are decidedly Spanish, being a stone adaptation of the wooden bracketed column essential in the light wooden construction of the Moors. Spanish architects saw the decorative value of this member and combined it interestingly with the Corinthian capital. In this instance the corner member, so often slighted and treated haphazardly, is well studied, with its one volute retained between the two Moorish corbels.

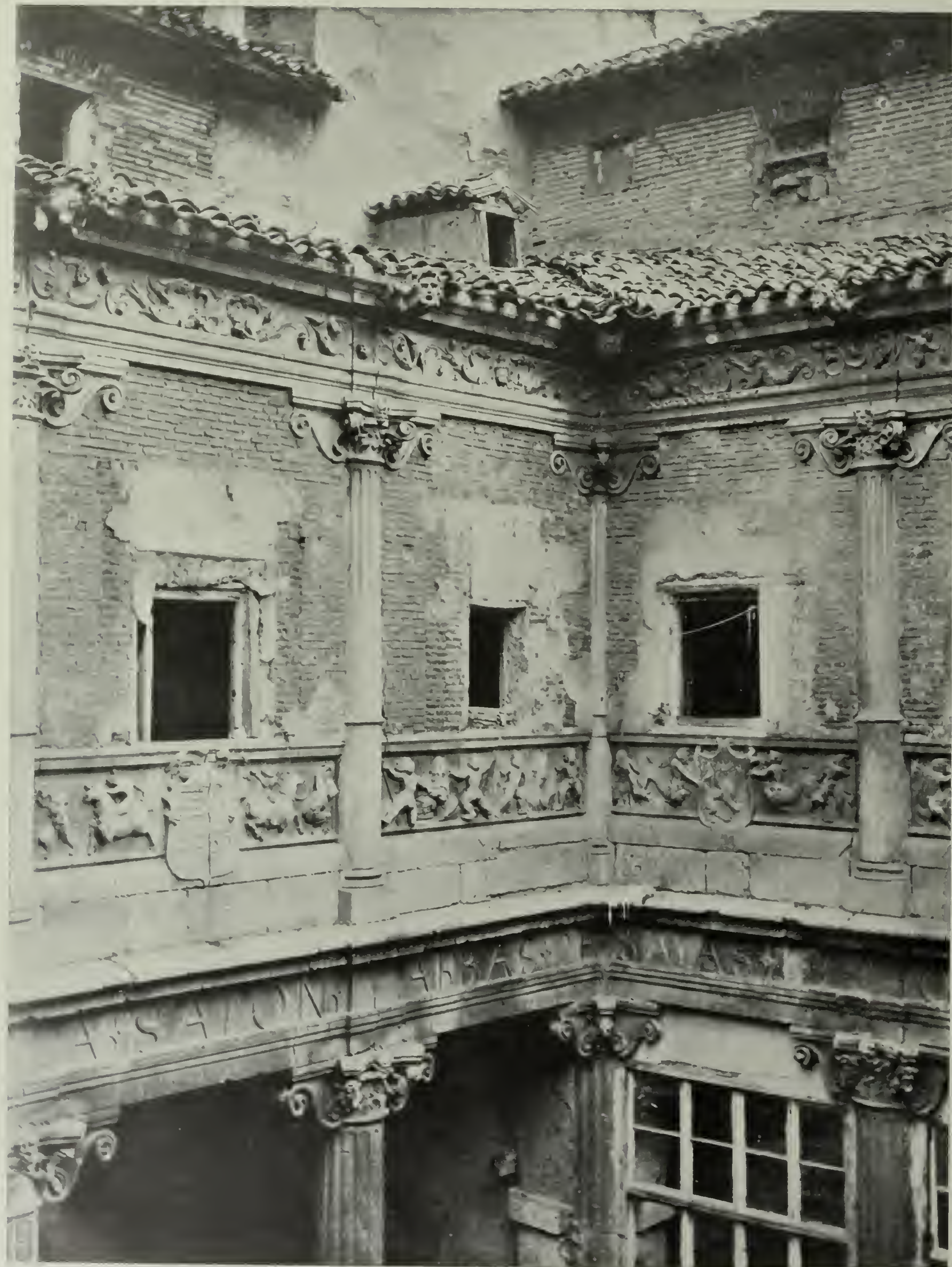
Besides the patio there are several other fine apartments equally suggestive of plastic material, particularly the handsome portal to the now crumbling staircase with its sculptured columns and armorial bearings.

The Casa de Miranda is dated 1543, but there is no record of its builder. There is a story told of an American millionaire trying to buy it to remove and rebuild in his own land, and being frustrated by a noted Spanish architect. The latter, noting with grief how many works of art leave the country, has been trying for some time past to collect enough money to reclaim the Miranda, but money is not abundant in Spain. On hearing of its pending removal, he personally visited every mason in Burgos and got him to pledge himself not to be hired out for the purpose of demolishing it. When, therefore, the American's representative came to inquire the cost of demolition he could not find a contractor to undertake the job, and the whole scheme was abandoned. I give the story as illustrative of a fine unmercenary spirit.

Colegio del Arzobispo, Salamanca. The Colegio Arzobispal was founded in the early XVIth century by the Archbishop of Toledo, Don Alfonso de Fonseca y Ulloa, whose father had built the beautiful Casa de las Muertes already illustrated in THE BRICKBVILDER. The Colegio was commenced in 1527 after plans by Pedro de Ibarra; two other Spanish architects likewise strongly influenced by Michelangelo worked towards its excellence — Alonzo de Covarrubias and Alonzo Berruguete. The result is the best building in Salamanca; and the best part of the building is the patio (accredited to Ibarra alone) which, according to some authorities, stands untouched in Spain for simplicity and purity of line.

Here, as in most patios, the floors instead of being supported by masonry vaults, as would be the case in Italy, are tiles resting on wooden beams; this permits of a light and slender architectural treatment often extending several stories high. Convents and Colegios (priests' seminaries) were so numerous and so vast in Spain that economy had to be considered in their structure. Street and patio façades were of stone, while inner patio walls were of stucco, relieved only by a finely designed door or stairway, as has been shown in the Alcalá example. The result was highly effective as well as economical. There is nothing quite like this patio in Italy; its colonnettes, its capitals, its portrait medallions, its cornices, are all distinctly Spanish — less exuberant and, therefore, in better taste, than earlier patios. Seen through the arches is the distant stair hall always emphasized, and legitimately, by considerable ornamentation, for it is often the only interior feature that departs from conventual plainness.

The old Colegio is now known as the "Nobles Irlandeses," or seminary for Irish priests. The number in training is generally about twenty.



CORNER OF THE PATIO
CASA DE MIRANDA, BURGOS, SPAIN

DETAIL OF THE PATIO
COLEGIO DEL ARZOBISPO, SALAMANCA, SPAIN

STREET FACADE

COURT HOUSE AND PRISON, BAEZA, SPAIN

The Aquarium and Winter House for Birds for the City of Boston.

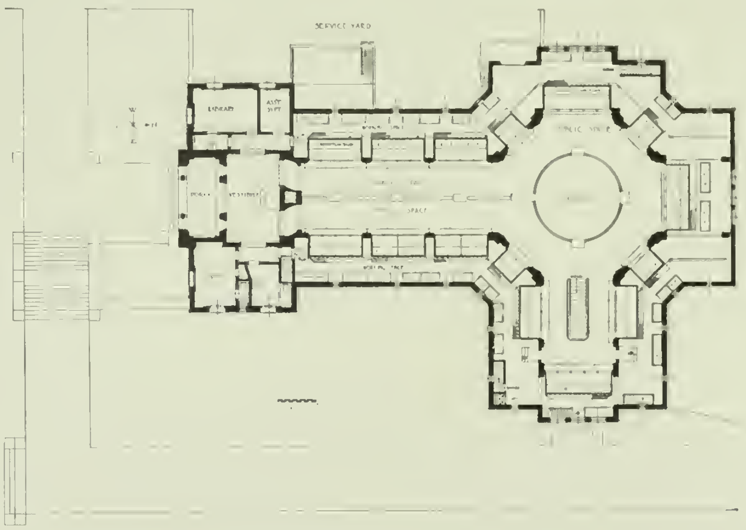
By WILLIAM DOWNES AUSTIN.

THE Boston Aquarium is located in Marine Park, at South Boston. It was built by the City of Boston and paid for out of an income from the Parkman fund — a bequest of George Parkman to the city for the improvement and maintenance of the city parks.

The building is primarily and principally to provide facilities for the exhibition of fishes and only very secondarily for the promotion of scientific study.

The exhibition tanks, each about 5 feet high and 3 feet 6 inches deep, are built of cypress planks and are of such varying lengths that they can be subdivided into two, three, four, and five compartments, each with a front 4 feet 6 inches high and 3 feet 1¼ inches wide of polished English plate glass 1⅛ inches thick. The partitions are of similar glass, but unpolished and only ⅞ of an inch thick. There are fifty-five of these compartments.

The tanks stand in the working spaces on concrete floors raised about 2 feet above the main floor of the public portions of the building. They are lighted by skylights in the low roofs of these working spaces. The public portion is lighted in the daytime by sunlight and in the evening by electric light diffused through the water in the tanks behind the glass fronts. Provision is made for the exhibition of local salt water fishes, for specimens from warm southern salt water, for local fresh water fish, and for trout which require refrigerated water in warm weather. An underground reservoir with a



Ground Floor Plan

Aquarium, Marine Park, South Boston, Mass.
William Downes Austin, Architect

Interior of Aquarium Looking Towards Rotunda

capacity of 100,000 gallons is provided for the storage of salt water which is brought from the harbor near by into the reservoir through a pipe line. From the reservoir the water is pumped to distributing tanks in the attic, from which the exhibition tanks are supplied by gravity. One distributing tank is fitted with a steam coil for warming the salt water for the tanks containing the southern fishes.

The fresh water tanks are supplied from the city service. Water in all the tanks is in constant circulation, and the salt water returns through filter beds into the underground reservoir. The refrigerated fresh water is also filtered and used again. The ordinary fresh water wastes into the city sewer.

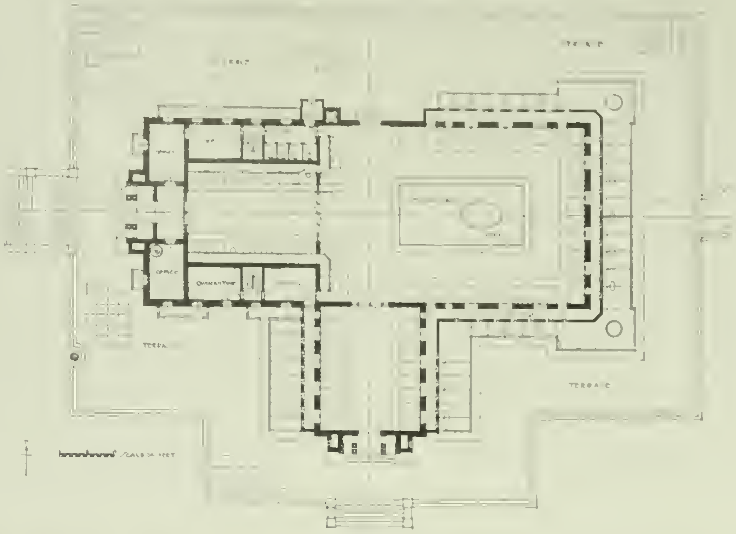
The building has brick exterior walls covered on the outside with rough cast plaster. The foundation walls are concrete. The underpinning courses and exterior steps and retaining walls are of cut granite composite. The roofs are wooden construction covered with red shingle tiles. Except the roofs, the building is entirely first class construction. The interior floors and walls of the public portions are terrazzo in different colors. The frames enclosing the glass fronts of tanks are painted cast iron. The ceilings are rough plaster. The details in the entrance porch are clear white marble and the walls of the porch are paneled with different colored polished foreign marbles. The building covers about 8,000 square feet. The total cost, including all equipment and architect's and engineer's commissions, was $135,778. The building was first opened to the public in November, 1912.

Detail of Entrance to Aquarium

The Winter House for Birds is located in Franklin Park and is the pioneer building of the Zoo. It was built by the City of Boston and paid for by funds from the same source that provided the Aquarium. Its purpose is what its name implies, plus the provision for exhibiting the birds.

The principal requirements of such a building are: plenty of light and warm fresh air for the birds; cages of different sizes suitable to the various kinds of birds; sufficient space for the public; a large flying cage in the center of the room; provision for feeding the birds from the rear of the cages through small doorways opening into keeper's passages; outside cages against the walls of the building, with tiny doorways connecting each exterior cage with an interior one to enable birds to enjoy indoor or outdoor life at their pleasure or that of the keeper; roosts or shelters in the exterior cages, protected by narrow glass roofs; facilities for a bird bath in each cage; kitchen in basement for preparation of bird food; storerooms in basement; heating and ventilating apparatus; a bird hospital; a quarantine room; the usual offices, and bed and bath rooms for keepers.

The exterior walls are brick and vaulted with rough cast plaster on the exterior. The windows in the frieze and elsewhere are enclosed in frames of glazed terra cotta in patterns of green and cream. The main roof is principally glass, the balance being copper on boarding. The entrance porches have cast iron columns, wooden superstructure, and ornamental copper



Ground Floor Plan

roofing. The columns and superstructure are elaborately modeled and carved, and the porches are painted and lacquered throughout in vermilion, and dull gold with minor tones of blues, grays, yellows, browns, and greens.

The terraces around the building are paved with roughish granolithic in squares of 3 feet, in slightly different colors, giving a faint checkerboard effect. All stone trimmings and

Detail of Principal Entrance

Winter House for Birds, Franklin Park, Boston, Mass.
William Downes Austin, Architect

steps are of cut granite composite. The interior walls are plastered directly on the brickwork and are tinted a soft gray-green color. All cages are painted black. Floors of cages are concrete and about 2 feet 6 inches above the main floor of public portion. Finished floors of public portions and the walls under the fronts of cages are terrazzo. The two narrow exhibition rooms are separated from the main room by plate glass screens and glass doors.

The building was completed in October, 1913. Its total cost, including all equipment and architect's commission, was $116,116. Exclusive of the terraces the building covers 9,280 square feet. The terraces average 30 feet in width.

Its style of architecture is quite a departure from the usual but the ideal setting in an oak grove, adjacent to a lawn for displaying peacocks, and a great outdoor flying cage where brilliant plumage attracts the eye suggested an unusual treatment, and the Japanese style which would permit of lively color seemed a fortunate one to emphasize the building in its setting.

Winter House for Birds, Franklin Park, Boston, Mass.
William Downes Austin, Architect

PLATE DESCRIPTION.

Edward Devotion School, Brookline, Mass. Plates 19, 20. This school forms the central and dominating structure of a complete group of three buildings. It is connected to the other buildings by tunnels and terraces and contains the heating plant for the group.

The assembly hall seats one thousand persons. It is finished with fumed oak and French gray plaster. The gymnasium is sunny and well lighted and is equipped with showers and dressing compartments of Tennessee marble. Two observation galleries are provided. The stairs are of steel and North River stone, and the construction of the assembly hall and boiler room portion is fireproof, the balance being second class construction with brick walls, partitions and stacks, the ceilings and minor partitions being wire lathed. The exterior walls are buff brick to match the existing buildings and the trimmings of gray terra cotta, with a green slate roof and copper lantern.

A new type of window used in the class rooms admits a large amount of outside air when open. The building is splendidly and thoroughly finished in every part and cost about $130,000, or approximately 19 cents per cubic foot, including general contract, plumbing, heating and ventilating, and electric work.

Vose School, Milton, Mass. Plate 21. The exterior is of red water-struck brick, laid in Flemish bond, with gray terra cotta trimmings. Heat and vent ducks and practically all interior walls are brick. The floor and roof frames are steel girders and trusses and Georgia pine joists. The staircases are all fireproof, made of iron and slate enclosed in brick walls. The roof is of asphalt composition, with copper flashings. The ventilation is by fan driven by electric motor, forcing the fresh air through concrete tunnels under the basement floor to the brick up-takes with automatic temperature control.

The interior finish is in ash with burlap dadoes. The intention was to secure not extreme cheapness but the most durable and attractive results. While not strictly "fireproof" in every sense of the word, the building is nearly so in fact and is fully as secure from fire danger as a building of the first class.

The cost, including the general contract, plumbing, heating, ventilating, and power plants, lighting fixtures, granolithic outside walks and steps, and grading, seeding, and curbing the grounds, and a playground 720 feet by 300 feet, was $84,377, or about 17 cents per cubic foot.

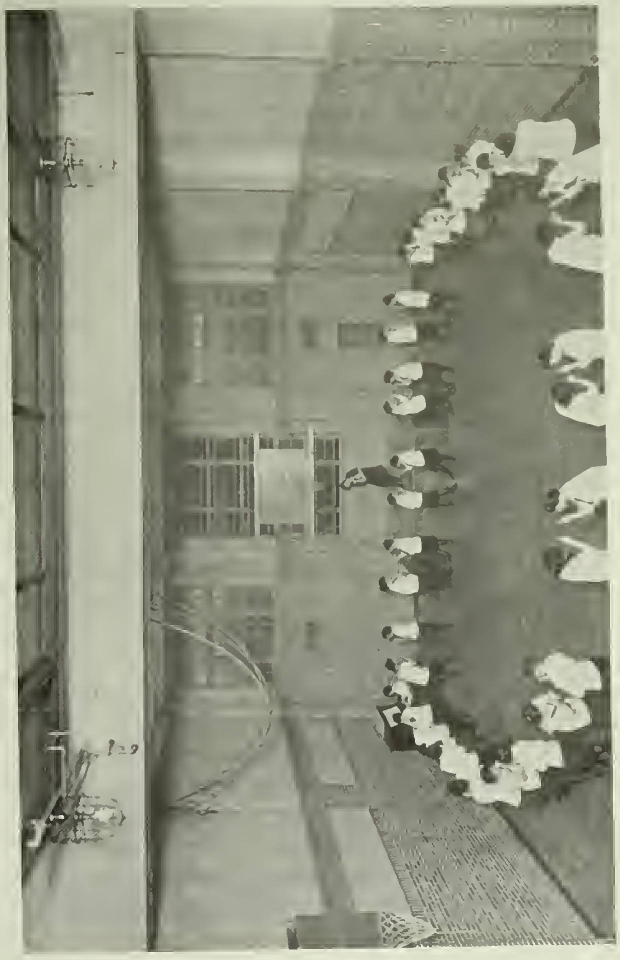
Young Women's Hebrew Association Building, New York City. Plate 22. This building is located on a plot 100 feet by 100 feet, facing south, overlooking Central Park north and is the first of its type of any magnitude to be designed.

One of the most difficult problems to solve was that of providing a sufficiently large building for the amount of money available. This was accomplished by the development of a "dual plan," that is, making possible the usage of one room for two or more purposes. Thus, the auditorium, by means of concealed doors and removable appurtenances, is transformed from auditorium to synagogue; the gymnasium is likewise transformed into a spacious dance room, the spectator's gallery of the former being used as a musician's gallery for the latter. The physical director's office and lavatory is a rest and dressing room for the dancers. The room used as an employment office, with outside entrance at night, is a Penny Provident Fund Department for children by day.

Another problem was arranging the different rooms so that the activity of one would not interfere with the use of any of the others. Thus, all of the noise creating departments, such as the power sewing machine, typewriting, and domestic science rooms, are placed on one side of the building; whereas the classes in stenography, languages, and arts are on the opposite side.

The building contains dormitories of one, two, and three beds each. The ceiling heights in these stories are low, but not unpleasant, namely, 9½ feet from floor to floor.

AUDITORIUM



GYMNASIUM

MAIN DINING ROOM

LOBBY

THE YOUNG WOMEN'S HEBREW ASSOCIATION BUILDING

LOUIS ALLEN ABRAMSON, ARCHITECT

(See Plate 22)

Editorial Comment.

THAT architect is rare who can succeed, under present conditions, solely because of his talent for design. At his best he is rivaled by the man proficient in promotion, and is crowded by the good office organizer. Not only this, but he sees many commissions entrusted to practitioners whose nominal presence in the profession is to its continual detriment. It is unnecessary to expand upon the difficulties of the general situation. Remedial action has included state legislation for the licensing of architects and professional society legislation fixing a schedule of minimum charges. State legislation can never assist the æsthetic or essential side of architecture, and people will pay any price for something that they understand and want. To secure for the profession recognition and respect, the first effort should be to establish standards for minimum service ; and, the second, to unite to get the chores done in such a manner that the individual can devote himself to the essence of his profession ; so that he can, in other words, have time to exercise those particular talents which have made his profession peculiarly valuable.

Standards of æsthetic production are indefinable and unnecessary. The layman who can appreciate the definition of a work of art appreciates the work itself still better. But, on the other hand, standards for the accumulation on drawings and in the specifications of the data necessary for the construction of a building and for the direction of the work are very much needed ; and a knowledge of high standards on the part of the public, which purchases services in these forms, will discourage or do away with dealings with those incapable of providing service conforming to high standards. When architectural societies are as jealous of standards as legal societies, they will be entrusted by the state with their enforcement. A good many offices have carefully studied the arrangement of drawings, the lettering, dimensioning, indication of materials, and details of heating, lighting, and so on. Let these be taken by the local society and extended into a complete scheme, setting forth, for various types of building, the minimum amount of description of plan, elevation, section, construction and engineering of various kinds, and of supervision and direction, that shall constitute service according to the views of the local society. Any attempt to establish æsthetic standards is unlikely to result appreciably in this generation or the next ; but clear distinctions between one kind of service and another on the basis of this suggested discrimination will be comprehensible to the layman at once.

The other suggestion has for its purpose the liberation of the artistic temperament. It contemplates strong local societies with very heavy dues, $200 to $300 or more per year, for members in active practice, and perhaps varying in proportion to the gross earnings of each practitioner ; for it will be the function of these societies to do a great deal of that work of its members which is not distinctly architecture. Every office must now do, besides design, some engineering, a lot of bookkeeping, and must acquire some experience in and knowledge of law. The society will, to relieve each office of part of this work, have offices of its own and will retain, for the common benefit and use, engineers for surveying, steel and concrete work, heating and ventilation, electric work, plumbing, and so on, and all the work done along these lines will be done according to standards established by the society, and the experience gained will be to the advantage of all its members. Among the duties of this staff will be the scientific investigation of all materials and apparatus which enter into buildings and the establishment of standards for all materials, comparable to those set up by the National Board of Fire Underwriters, and others. This department could also make lists of quantities and prepare preliminary estimates.

The accounting department will establish standards for office bookkeeping, so that after a while an architect can form some idea in advance as to how much a drawing or a set of drawings ought to cost, and how long it ought to take to make it. It will work out the best forms for orders and certificates and audit the office account of the owner's expenditures, and payments to contractors, and will be of assistance in many other ways which are sure to develop.

The legal department will, in the first place, keep up to date on building law, maintaining copies of all important laws and, as far as possible, having duplicates for the use of members. It will be its duty to study proposed laws, inform the society of action necessary, and notify members of enactments. This department can maintain service in the registries to inform members of attachments and liens on the properties for which they are responsible.

The possibilities of these departments have been sketched not completely or because this outline represents more than a small part of the scope of such architectural societies, but because, in even so brief a view, the possibilities seem so great.

If it is admitted that the ability to comprehend all of the elements of a building and arrange them in an orderly and, if possible, a beautiful way is the job of the architect as against any other, then all the other things are less peculiarly his to do ; and when he does them thoroughly, he is only exhausting himself as far as his real ability goes. The other things must be done. When they are slouched by an artist, they hurt the profession as badly as if the neglect were on the part of an untrained man.

If, now, the chores are done by a commission under the direction of an intelligent artist, with the accumulated experience of the society, they can be well done.

The gist of the matter would seem to be that the harassed architectural profession will succeed best by ceasing to talk about compensation until people know completely what its members do to earn it ; and then to arrange so scientifically what there is to do so that the part which is peculiarly architecture can be done to the very best advantage.

In selecting representative renderings to illustrate the article on "Monographs on Architectural Renderers," Part XI, published in the December, 1914, issue of THE BRICKBUILDER, five of the drawings were chosen from *Moderne Bauformen*, and reproduced from that journal. These included renderings by H. Wilson, Edgar Wood, H. Billing, Benirschke, and Hirchmann. We acknowledge with thanks the courtesy extended by *Moderne Bauformen*.

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LETTERPRESS

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THE BRICKBVILDER COLLECTION

EARLY AMERICAN ARCHITECTURAL DETAILS

MAIN STAIRWAY IN THE NICHOLS HOUSE, SALEM, MASS.

SAMUEL McINTIRE, ARCHITECT — BUILT IN 1800

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate Three

(over)

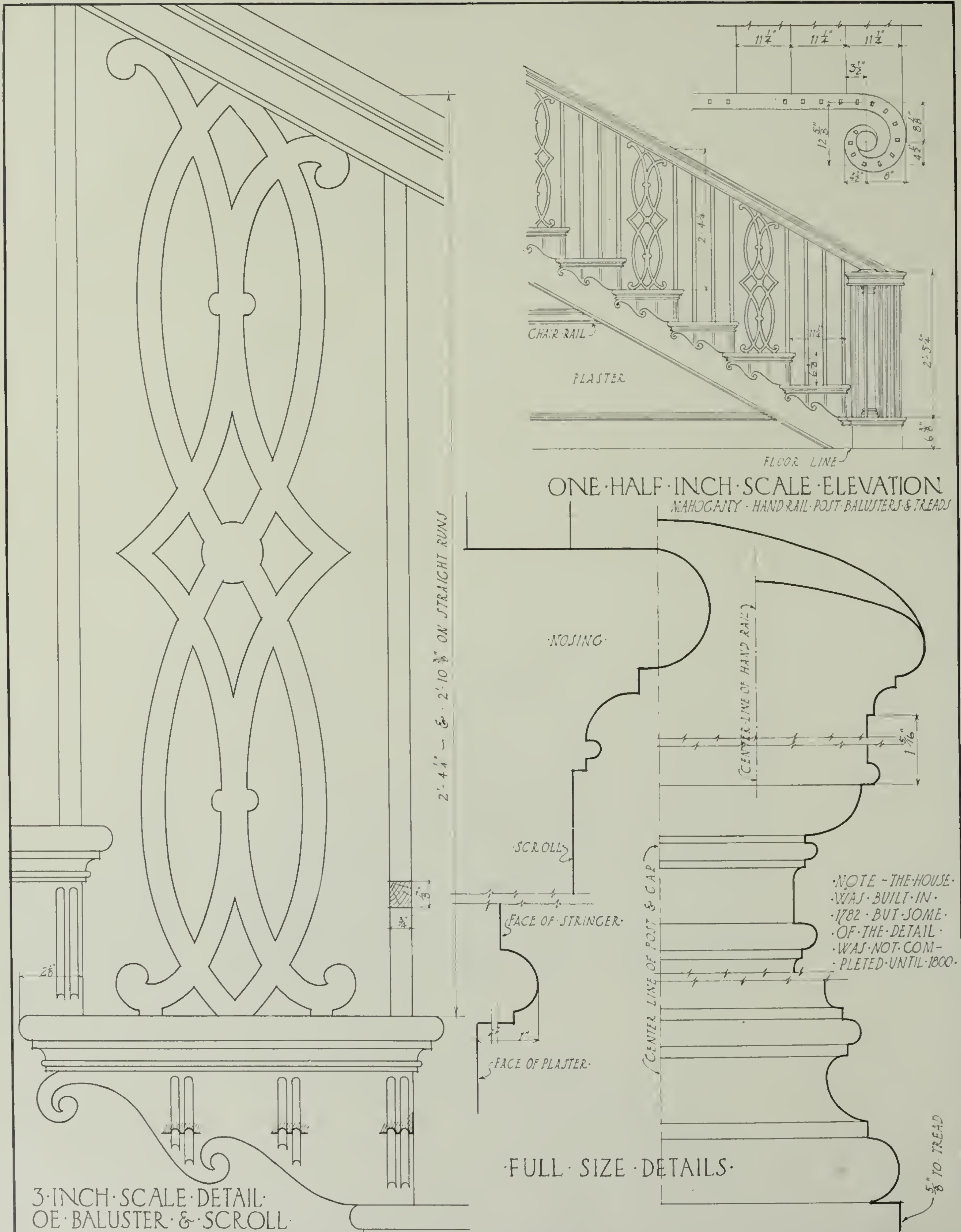


PLATE 3 MARCH · 1915	·STAIRWAY · IN · NICHOLS · HOUSE· SAMUEL · McINTIRE – ARCHITECT ·SALEM·MASS·	MEASURED – & ·DRAWN · BY· ·GORDON · ROBB· ·&· M·A·DYER·

CONSULADO DEL MAR, PALMA DE MALLORCA, SPAIN
ERECTED IN THE XVIITH CENTURY

THE BRICKBVILDER
VOLUME XXIV MARCH, 1915 NUMBER 3

Design and Construction of Roof and Wall Trusses.

PART I. TYPES OF WOODEN AND ORDINARY STEEL ROOF TRUSSES.

By MALVERD A. HOWE, C.E.
Director Architectural and Civil Engineering Departments, Rose Polytechnic Institute.

A TRUSS is defined as a framework, having members composed of wood, wrought iron, steel, reinforced concrete, or other suitable materials, so arranged as to form a series of triangles and having for its purpose the transference of its loading to one or more supports.

In buildings, trusses are used over large rooms, assembly halls, etc., which have finished ceilings, where the walls are so far apart that simple beams cannot be employed economically, and also over rooms where the ceilings are omitted and the trusses are exposed.

The loads imposed upon trusses, in addition to their own weights, require careful consideration. Ordinary roof trusses usually support the roof covering and all roof framing above the truss, any snow which may be expected to remain on the roof, and the pressure produced by the wind blowing against the roof. In addition to the above loads there may be imposed the weight of a ceiling and an attic floor with any loading which may be placed upon the floor. Occasionally an entire floor is suspended by rods from the roof trusses as in the North German Lloyd Pier Shed at Hoboken, N. J.

Trusses entirely concealed in partitions are used over large rooms which occupy one or more intermediate stories in a building. An example of the use of very heavy concealed trusses is in the La Salle Hotel, Chicago. Each of the steel trusses over the foyer has a span of nearly 77 feet and weighs 221,000 pounds. Other examples are found in the Guaranty Trust Building, New York; Astor Hotel, New York; Bankers' Trust Building, New York; New York Stock Exchange; Union Central Life Insurance Building, Cincinnati, and the National Shawmut Bank, Boston.

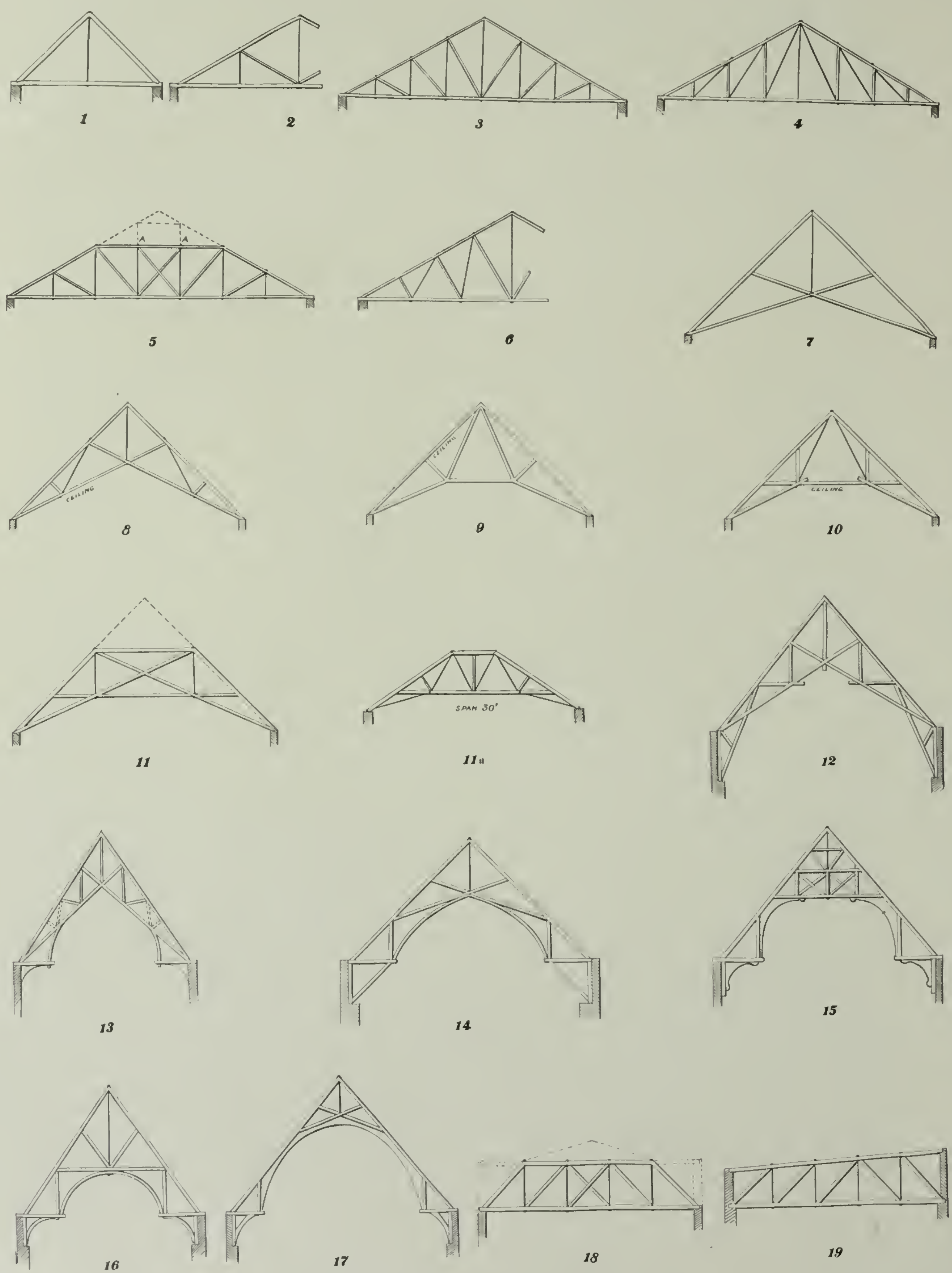
Concealed cantilever trusses are used to support walls and columns. A notable example of the use of trusses in this manner is in the People's Gas Company's Building, Chicago, where sixteen stories of the front of the building are supported by cantilevered trusses with projections of 4½ feet. Cantilever trusses are also used to support balcony floors in theaters, stores, etc., and in grand-stands to support roofs and floors. There are a few examples of cantilevered trusses used in the bottom stories of buildings to carry the side walls where it is not possible to place suitable foundations immediately underneath the walls. In such cases masonry piers are built well within the property lines. Each pier makes one support for a truss which extends to the property line. If the building is narrow, each truss extends from property line to property line; but if the building is wide, the cantilevered trusses extend inward towards the center of the building only to the first row of interior columns.

Types of Wooden Trusses.

The form of a truss is governed by the length of span and the purpose for which it is to be used. Ordinary roof trusses usually have horizontal bottom chords and the top chords of the shape of the roof. Long span trusses and exposed ornamental trusses may have their bottom chords broken instead of straight.

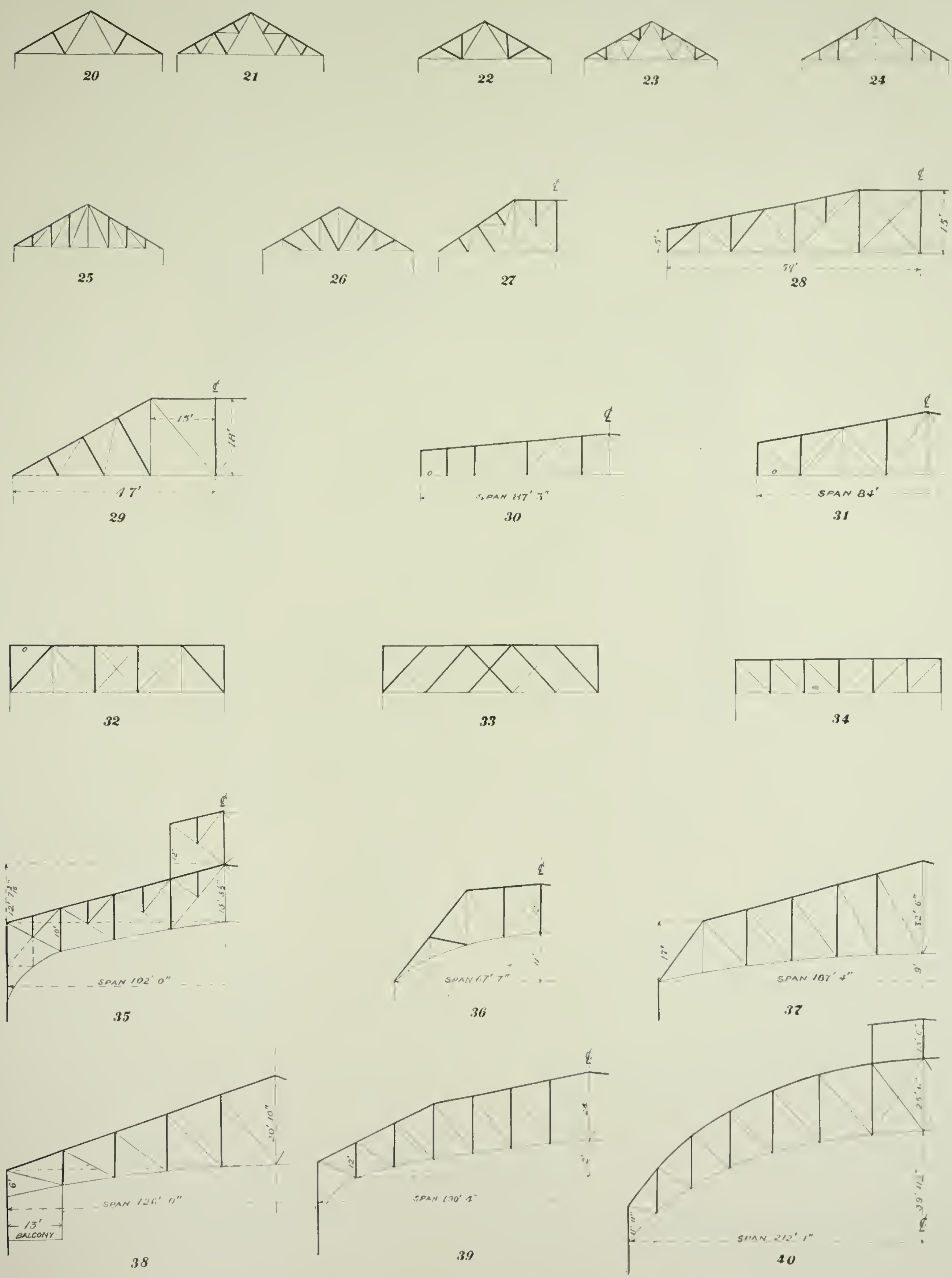
The forms of trusses shown in Figs. 1–18 are suitable for pitched roofs. The form shown in Fig. 1 is used for spans not exceeding 20 feet. The center tie is introduced to support the bottom chord and any loading which may come upon it. Fig. 2 is a combination of three trusses, each having the shape shown in Fig. 1, and is suitable for spans not exceeding 40 feet. These trusses can be built entirely of wood, but usually the vertical members are made of metal rods. For spans between 40 and 80 feet, the forms shown in Figs. 3, 4, 5, and 6 may be used. The truss shown in Fig. 3 has all members of wood excepting the verticals, which are metal rods. When the pitch of the roof or the span is so large that the length of any diagonal member becomes over thirty times its least dimension, then the form shown in Fig. 4 should be used. The type shown in Fig. 4 has all members of wood excepting the diagonals, which are of metal, and is preferable to the form shown in Fig. 3 for long spans. The truss shown in Fig. 5 avoids the use of long compression members in the web and can be used for spans exceeding 80 feet by increasing the number of panels. When this truss is used, provision must be made for lateral bracing between trusses if purlins are not used at the apexes, marked A in the figure. The Belgian truss shown in Fig. 6 has one set of web members normal to the rafters. The light lines in the figure show members made of metal rods.

For steep roofs where the trusses are exposed or when broken ceilings are desired, the forms of trusses shown in Figs. 7–17 are suitable. Fig. 7 shows a simple form of scissors truss which can be used for spans not exceeding 30 feet. If the truss is exposed, the center rod can be boxed to give the appearance of a wooden member. The scissors trusses shown in Figs. 8 and 10 are not intended to be exposed and therefore metal rods are used, as indi-



TYPICAL FORMS FOR WOODEN ROOF TRUSSES

For their use and description see text



TYPICAL FORMS FOR ORDINARY STEEL ROOF TRUSSES

For their use and description see text cated by light lines. The truss shown in Fig. 9 is constructed entirely of wood when the span is short. For spans of 30 to 40 feet, the tension members should be of metal. These can be boxed to give the appearance of wooden members. The form of truss shown in Fig. 11a is used over the Museum, Hanover College, Hanover, Ind. The light lines indicate the members made of metal rods. Fig. A is a perspective drawing showing the final appearance of the trusses as finished by boxing the metal members. The scissors truss shown in Fig. 12 can be constructed entirely of planks and has the advantage over other forms in having its supports well below the tops of the walls which decreases the outward push. The truss shown in Fig. 13 is really a scissors truss, although it has the appearance of a hammer beam truss. The curved members are inconsistent unless other bracing is used in the truss as indicated by dotted lines.

The hammer beam trusses shown in Figs. 14 and 16 may be used for spans not exceeding about 60 feet. The horizontal member at the top of the wall may extend over the wall as shown in Fig. 16, to make an easy connection for the rafter, but it should bear upon the vertical member underneath and not upon the wall. These trusses are usually built entirely of wood, excepting the single rod in the center, which is boxed. The truss shown in Fig. 15, while having the general appearance of a hammer beam truss, is, in reality, an "A truss," and should be so considered in the determination of stresses. Fig. 17 shows a truss which lies between the hammer beam truss and the "A truss."

The scissors truss, "A truss," and the hammer beam truss require careful designing, as each form produces thrusts against the supporting walls. The wall may be strengthened by pilasters or buttresses to resist the thrusts, or the trusses may be made so heavy and stiff that the thrust is very small.

For flat roofs the Howe truss is suitable. All members excepting the verticals are made of wood. Figs. 18 and 19 show the usual forms. The Howe truss can be used for spans up to 130 feet. The depth of the truss should not be less than one-tenth the span, and the length of the panels should not be greater than the depth of the truss.

Perspective View of Truss in Museum, Hanover College, Hanover, Ind.
Herbert Foltz, Architect

Wooden roof trusses should be spaced from 10 to 15 feet apart. The shorter spacing is usually the more economical.

For concealed trusses in partitions, the Howe truss is the most suitable, as the top and bottom chords can be made a part of the floor framing and the web members arranged to provide for necessary openings in the partitions.

Ordinary Steel Roof Trusses.

Any of the forms outlined for construction of wood can be used when rolled steel shapes are employed. For pitched roofs the forms shown in Figs. 20–26 are types in common use. The form shown in Fig. 20 is used for spans less than 40 feet. The fan truss shown in Fig. 22 can be used for spans up to 50 feet, and the forms shown in Figs. 21, 23, 24, 25, and 26 may be used for spans up to 80 or 90 feet. The forms shown in Figs. 27, 28, and 29 can be used for spans up to 200 feet by increasing the number of panels in the central segments. For spans much exceeding 200 feet some form of arch or arch truss should be employed.

For flat roofs, trusses in partitions, cantilevered trusses, and similar structural features, the forms shown in Figs. 30–34 are suitable.

Examples of trusses having broken or curved chords are shown in Figs. 35–40. The curved knee brace in Fig. 35 should be braced as shown by the dotted lines. Fig. 38 shows the method of hanging a balcony to the truss. With the exception of the truss shown in Fig. 36 these trusses are supported by steel columns and are exposed.

Roof trusses of steel are spaced from 20 to 25 feet apart. In school buildings, churches, dwellings, etc., the trusses are usually concealed. In gymnasiums, train sheds, mills, etc., they are exposed. For pitched roofs the forms shown in Figs. 20–23 appear to give the best satisfaction.

In some cases good results are obtained by constructing trusses of steel and then boxing the members with wood or encasing them with concrete. This method is employed when the loads are very heavy and it is desired to have the trusses show in wood or concrete.

The Modern Schoolhouse.

III. WARDROBES, TOILETS, AND SPECIAL ROOMS.

By WALTER H. KILHAM.

ON the question of wardrobes, a difference of opinion among school men is quickly manifested. Questions addressed to a number of teachers on this subject elicited a variety of answers. Eliminating for the moment the old style of placing racks for clothing in the corridors, the main question arises between the method of building a separate closed room for the garments or adopting the more compact plan of arranging hanging space in the thickness of the ventilating stacks and opening directly into the class room. In case separate wardrobe rooms are used, as is very generally the case, and is recommended by most teachers, they should be at least from 4½ to 5 feet wide and ought to run to the outside wall, so as to have a window. Even with this width they are cramped and disagreeable, and facilities for sitting down to put on rubbers, etc., cannot be provided. To make them 6 feet wide or more, as desired by some authorities, would entail too heavy an expense in a large building. They should be separately heated and ventilated, or the foul air from the schoolroom may be drawn out through them. They therefore add roughly 125 square feet of floor, or say 1,700 cubic feet of contents each, which in a large building adds materially to the cost. They are supplied with devices for hanging clothes of which the pole system, with hooks and hatpins, as illustrated in Fig. 7, is one of the best. The heights of the lower poles are for the kindergarten, 30 inches from floor; lower grades 36 to 40 inches; upper grades 44, 48, and 52 inches; distance between poles 8 inches for elementary, 12 inches for high schools. Pins and hooks, 8 to 12 inches on centers for elementary, and 16 to 18 inches for high schools. Each hook has a painted number 1¼ inches high. A copper drip gutter is often placed in the floor under the umbrella clips, or is formed in the floor when terrazzo or composition is used and does not need to be drained. Another rather elaborate arrangement for clothing is the "stall" system shown in Fig. 8. These compartments are made of wire mesh, without doors. A wire shelf at the bottom is provided for rubbers and a wooden shelf at the top for hats. They are invaluable for keeping children's clothing separate, but are too costly for general adoption.

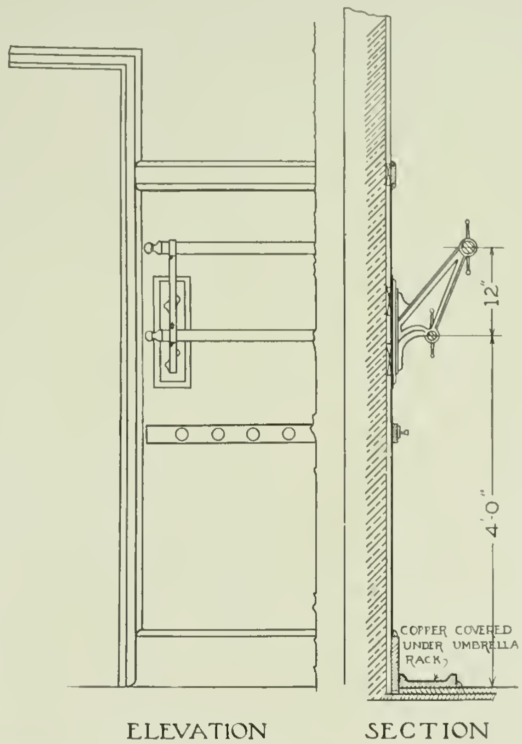
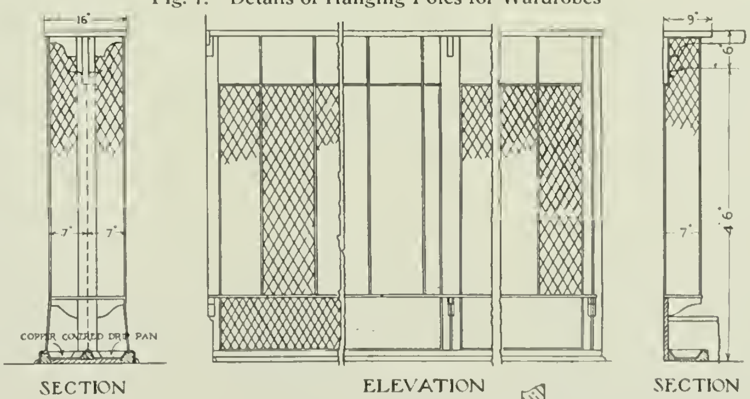


Fig. 7. Details of Hanging Poles for Wardrobes

If the interior walls are treated with burlap, the wardrobe walls should be similarly treated to above the height of the clothes poles, but hard plaster painted in oil is more hygienic and sufficiently durable and, of course, glazed or salt glazed bricks are still better.

Opinions continue to vary as to whether these wardrobes should open directly to the corridor or be entered only from the schoolroom. In either case they offer the possibility of a dangerous trap in case of fire. At the Collingwood School fire, it is said that although the teachers stood at the class room doors, the panic stricken children bolted through the dressing rooms to the stairs, thereby escaping from their control. Had these rooms been accessible only from the class rooms, this danger would have been averted, but a series of *culs-de-sac* would have been built which might have proved even more dangerous.



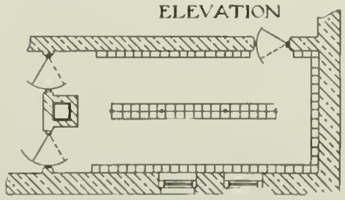


Fig. 8. Plan of Wardrobe and Details of Individual Wire Stalls

Another objection to separate wardrobes is the opportunity they offer for petty pilfering. The doors to the corridor must be kept locked; but many authorities think that these locks should be free on the inside, so that while exit is always possible, entrance for the thief is prevented.

It is not of much importance whether the wardrobe is at the same end of the room as the teacher or not. If it can be arranged at the teacher's end, her control over it is naturally more efficient; but some of the front blackboard space, the most valuable in the room, will be lost by the doors necessary for entrance to the wardrobe.

Most of these troubles are obviated, and the cubic contents (and hence the cost) of the building is reduced by the adoption of the so-called "Chicago" type of wardrobe, which is built in the thickness of the ventilating stack or wall and opens directly into the class room for its entire length. By this plan no space is lost, the entire wardrobe is constantly under the eye of the teacher, and the children can use their own seats for putting on overshoes. These closets should be well ventilated, and it is perfectly practicable to draw the exhaust air from the class room through them to the outlet duct. The fronts slide up as shown in Fig. 10, and the doors may be utilized for blackboards or "tack" boards, so that no wall space is lost.

These wardrobes have not yet come into general use outside of large cities, but the writer ventures the suggestion that the tax payer's turn is coming in school construction and that the time honored separate wardrobe will not be generally used. The old corridor clothing racks seem to have entirely disappeared, but some cities still place clothing lockers along the corridor walls, a practice which has little to recommend it.

Sanitaries. The toilet rooms in any school building are properly subjects for the most careful attention. They should first of all be well lighted and receive as much sunlight as possible. In grade schools these rooms are generally placed in the basement, but in upper grade and high schools when it is possible they should be located on each floor in order to save long trips to the basement by pupils whose time is increasingly valuable.

The temptation to take any dark corner of the basement for toilet room space is always present because it seems as if the best portions ought to be utilized for manual training or play rooms; but ample light, air, and sunshine are invaluable aids to hygienic conditions in the toilet rooms. The walls are generally left with the masonry exposed and whitened, but when possible they should be lined with white enameled or salt glazed brick. The more attractive the room appears, the better care will be taken of it. Floors are often of granolithic, but are better of asphalt, sloping to the urinal in the boys' room and to a floor drain in the girls'.

Fixtures. Different rules exist for the number of fixtures to be provided. For a mixed or co-educational building the following schedule is required by Massachusetts law, being based upon the assumption of an equal number of pupils of each sex:

	Water Closets.			Urinal Slabs.	
Pupils.	Girls.	Boys.	Urinals.	Feet.	Inches.
50	3	2	2	2	8
100	4	3	4	5	4
200	6	4	6	8	0
300	9	6	8	10	8
400	12	8	10	13	4
500	14	9	12	16	0
600	16	10	14	18	8
700	18	11	16	21	4
800	20	12	18	24	0
900	22	13	20	26	8
1000	24	14	22	29	4

For buildings having a greater number, or majority fraction of a hundred pupils, or occupied by either sex exclusively, the same ratio respectively is to be observed.

Boston requires water closet accommodation at the rate of $1\frac{7}{8}$ per schoolroom (40 pupils), being $\frac{5}{8}$ per room for boys and $1\frac{1}{4}$ for girls and 33 inches of slab urinal per schoolroom. Other authorities give slightly varying rules. Professor Dresslar recommends that the requisite number of seats for girls be obtained by dividing one-half of the total number of pupils (if co-educational) that the building is designed to accommodate by 15, *i.e.*, if the school is built for 600 pupils, there should be 20 seats for the girls. For boys, the number of seats needed can be approximated by dividing by 25, with about 10 urinals. Hence, for the accommodation of 300 boys, 12 seats are generally ample. Mr. Wm. George Bruce, in his useful Manual, recommends one seat for every 15 girls and one urinal and closet for every 25 boys, slightly increasing the number for kindergarten and primary schools.

It will be seen by the above that the tendency is for educators to request a larger number of plumbing fixtures than the boards which are more directly concerned with the expenditure of the public money are apt to recommend. The Boston rule given above, for example, is the result of several years' careful study of the question by officials charged with the duty of obtaining the best practical results in schoolhouse construction possible under the appropriations and eliminating all unnecessary expense. Although this rule cuts down the number of fixtures in some cases about 20 per cent, it has been found to work well and no complaint has come to the attention of the writer. A schoolhouse by all means should be comfortable and convenient; but there is no good reason why the taxpayers' money should be used for providing school children with luxuries of this sort such as few city hotels possess.

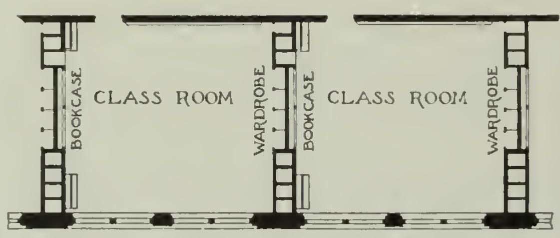


Fig. 9. Plan of Class Rooms Showing Wardrobes in Ventilating Stacks

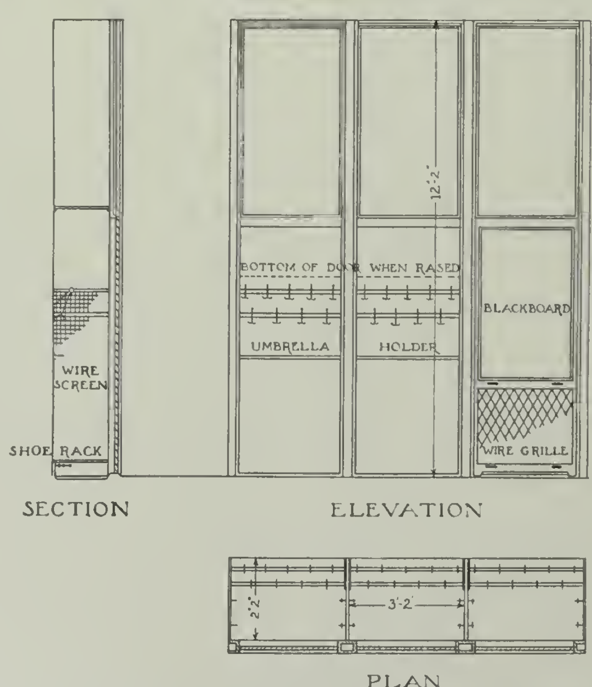
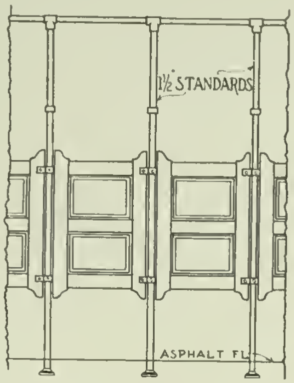


Fig. 10. Details of Class Room Wardrobes in Ventilating Stacks

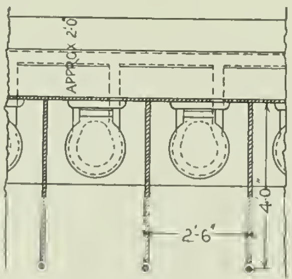
The water closet compartments are 2 feet 6 inches wide on centers and 4 feet deep, and behind them a space is arranged for pipes and vents which should be wide enough, say 2 feet, to admit a man to make repairs.

Only substantial and well made fixtures should be considered. Wash down or siphonic action closets are suitable with a raised rear vent of about 11 square inches area, connected to a duct leading to the special exhaust fan provided for the toilet rooms. Short hoppers on heavy iron traps with the same raised local vents are also in common use, although the siphon closets are superior. These closets are 16½ inches high for the upper classes and 13½ inches for the lower classes. The type of water closet seat that is open in front is preferable to that which forms a complete ring. The tanks may be of plain wood and are best kept behind the partition. The chains should also be here because they can be easily operated by a lever coming through the partition. This prevents the children from playing with the pulls and perhaps injuring the tanks.

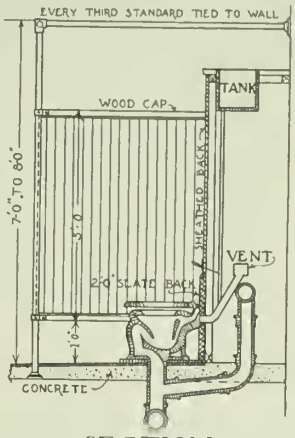
The so-called "seat-action" valves which operate by the pressure of the body on the seat are held in favor by some as is also the "before and after" flush, but for general purposes the hand operated flush is simpler and will be found adequate with a little attention from the janitor. Simplicity is a very important factor in connection with any appliance designed for schoolhouse use; and while the question of flushing the fixtures is an important one it is doubtful if any real benefit is obtained by the installation of complicated automatic mechanism. Some authorities hold that children cannot be trusted to use hand pulls, and the automatic flush is indispensable; but large city schools designed by the writer and fitted with hand pulls show good results, perhaps due partially to the fact that the children are trained and instructed to use the fixtures properly.



ELEVATION



PLAN



SECTION

Fig. 11. Details of Installation of Toilet Fixtures and Enclosing Partitions.

Automatic flush tanks are, however, in common use for urinals and when properly regulated give good results, and the principle must now be applied also to the water closets in Massachusetts.

The closet enclosures in Boston are generally of $\frac{7}{8}$-inch V-grooved hard wood sheathing applied vertically to top and bottom rails of same wood, supported at the ends with iron pipe about 8 feet high to which doors are hung. Iron pipe also ties the compartments together and to the wall. The wood is kept about one foot above the floor and the back partition has a 2-foot slate base. This represents a certain amount of retrenchment in expenditure, as formerly slate was used for the entire partitions. Slate is suitable and cleanly, but is dark and gloomy in color and very much more expensive than wood. The crevices in the sheathing partitions are theoretically abhorred by sanitarians, but it is extremely doubtful if they are actually harmful. Marble is not commonly employed on account of expense, otherwise it is, of course, a desirable material.

The ventilated slab urinal (illustrated in Fig. 12), with or without partitions, is still commonly employed. Partitions should be used when possible and should be so designed as to reduce the contact with the back and bottom slabs to the lowest possible amount so as to avoid corners which are difficult to clean. The slab urinals are flushed automatically from a special tank through a $\frac{7}{8}$-inch perforated pipe, to receive which a groove is made in the back slab. They are vented through apertures at the bottom into the space behind. Individual porcelain urinals of the pear shaped type are unsuitable for schools on account of the difficulty met with in cleaning them, but the modern vertical ones are highly satisfactory and are worth their additional cost which is not great, as separating partitions are not necessary with this type.

A black slate sink is generally provided in the basement, sometimes in the toilet room, but perhaps preferably in the play room, with self-closing cocks for hot and cold water. With the increasing respect in which modern school buildings and their fixtures are held by the pupils, it seems as if the more attractive porcelain or enameled wash basins might be substituted for the slate sinks. The drinking fountains are sometimes placed in this sink, but are better kept separate and located in the corridor or play room, outside the toilet room, and, of course, should be of the "bubbling stream" type. Similar drinking fountains should be also installed in the upper corridors, in porcelain or enameled iron sinks. Provision should always be made in the corridors for a faucet for the purpose of drawing water for flower vases, water-color drawings, etc. A slop sink is often installed in a closet off the corridor, supplied with hot and cold water; but when the toilets can be located on each floor instead of the basement, it is much better to locate the slop sinks in them and avoid an extra closet to keep clean.

Windows of toilet rooms should have ribbed glass where exposed to view from outside and wire guards. Doors to toilet should be arranged "in" and "out," and if necessary screens should be constructed inside in co-educational buildings.

Ventilation is effected through the local vents of the water closets and the ventilated urinals into vent-ducts equipped with a special exhaust fan, and fresh air should be supplied to the room from the main system.

All the above applies, of course, to schools in comparatively large places. In rural districts many of the conveniences afforded by an adequate water supply are unobtainable, and the sanitation of buildings of this class may well form the subject of a separate chapter.

Such contrivances as range closets, trough urinals, and "dry" systems of any sort form no part of a modern schoolhouse and will not be considered here. It may sometimes, of course, be impracticable to provide an electrically driven fan for the toilet room ventilation, and in such cases recourse may be had to a flue which may be heated by steam coils or by an independent fire, so as to avoid the necessity of operating the furnace or boiler in mild weather.

Baths. Baths are introduced to some extent in large buildings, but are hardly an essential portion of the plant. Shower baths are used more particularly in connection with the gymnasiums, but in the poorer districts of cities it is sometimes worth while to provide a bathtub for the immediate cleansing of some particularly untidy pupil and, if desired, this may be provided in connection with the toilet room. A shower is not necessary in this case, but both hot and cold water should be provided.

Principal's and Teachers' Rooms. It is customary to provide the principal of an ordinary grade school with an office of 200 to 250 square feet, in which center the clock and telephone systems of the building. This room should have its own toilet room, containing water closet and bowl, and should also be provided with book storage in the shape either of a book closet or a bookcase. In large schools where a clerk is employed, an outer and larger office should be provided which may contain the master clock and telephone center, with an inner private office for the principal. Where there is no outer office, a place with a seat should be arranged for parents and pupils who are waiting to see the principal. These offices are best arranged on the first floor in a central location, conveniently near the main entrance and so as to command it if possible. Some recommend placing this office on the second floor if the building has three stories. In addition, there should be a room for teachers of about the same size, or a little larger, with separate toilet facilities. Boston allows a room of 300 square feet for 10 teachers. If there are both men and women teachers, separate rooms should be provided. The teachers' room should include an arrangement for warming lunches, either by gas or electricity. A slate shelf, about 20 by 36 inches with slate back which will carry the little gas or electric stove, makes a neat arrangement. In view of the desire of the teachers to give the room a homelike appearance and air of privacy, this should be located in the room so as not to be seen from the corridor. Those who still further wish to pamper the teaching force may provide a cupboard with glazed doors for holding cups, saucers, and utensils.

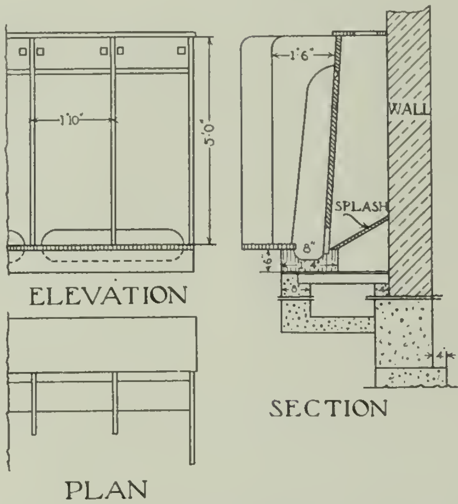


Fig. 12. Details of the Ventilated Slab Urinal

Nurse's Room. The nurse's room should have from 200 to 400 square feet of area, according to the size of the school, with good outside light. The window shades should be set to roll from the window sill upwards. A white tile dado and rounded sanitary coves at the corners give the room a professional air, but are not essential. The floor may be of terrazzo, like the corridors. An electric receptacle should be provided for a hand portable light. In connection with this room, a nurse's closet for supplies is convenient; it may be about 3 by 4 feet in size, with a shelf and half a dozen hooks for clothing.

An enameled iron or porcelain surgical lavatory with hot and cold combination shampoo cock operated both by hand and foot valves is required, and in addition a 5-foot enameled iron bath tub and a water closet are desirable additions, though they are not always supplied. Provision ought to be made for a gas or electric stove, as in the teachers' room, and a secondary clock. The nurse's room is not regarded as an essential part of an ordinary building, but will be found useful for the eye, throat, and nose examinations now customary in most cities.

Storerooms. Many schoolhouses fall short in the matter of storage space. The mere matter of storage of text books not actually in use does not require a great amount of space when the shelving is arranged in library fashion. A room 8 by 10 feet on each floor, which need not necessarily have outside light, will be amply sufficient, but for unpacking cases and storage of bulky articles more space is required. A fair sized room in the basement, somewhere near the boiler room, which should have extra wide doors to the corridor so that a large case can be taken in, will be found a very great convenience.


Views of Wardrobe, Open and Closed, in Thickness of Ventilating Stacks

Leonardo High School, Leonardo, N. J.
Brazer & Robb, Architects

Some Ironwork from Rome and Tuscany.

By JOHN S. SCARFF.

Accompanied by Measured Drawings by the Author.

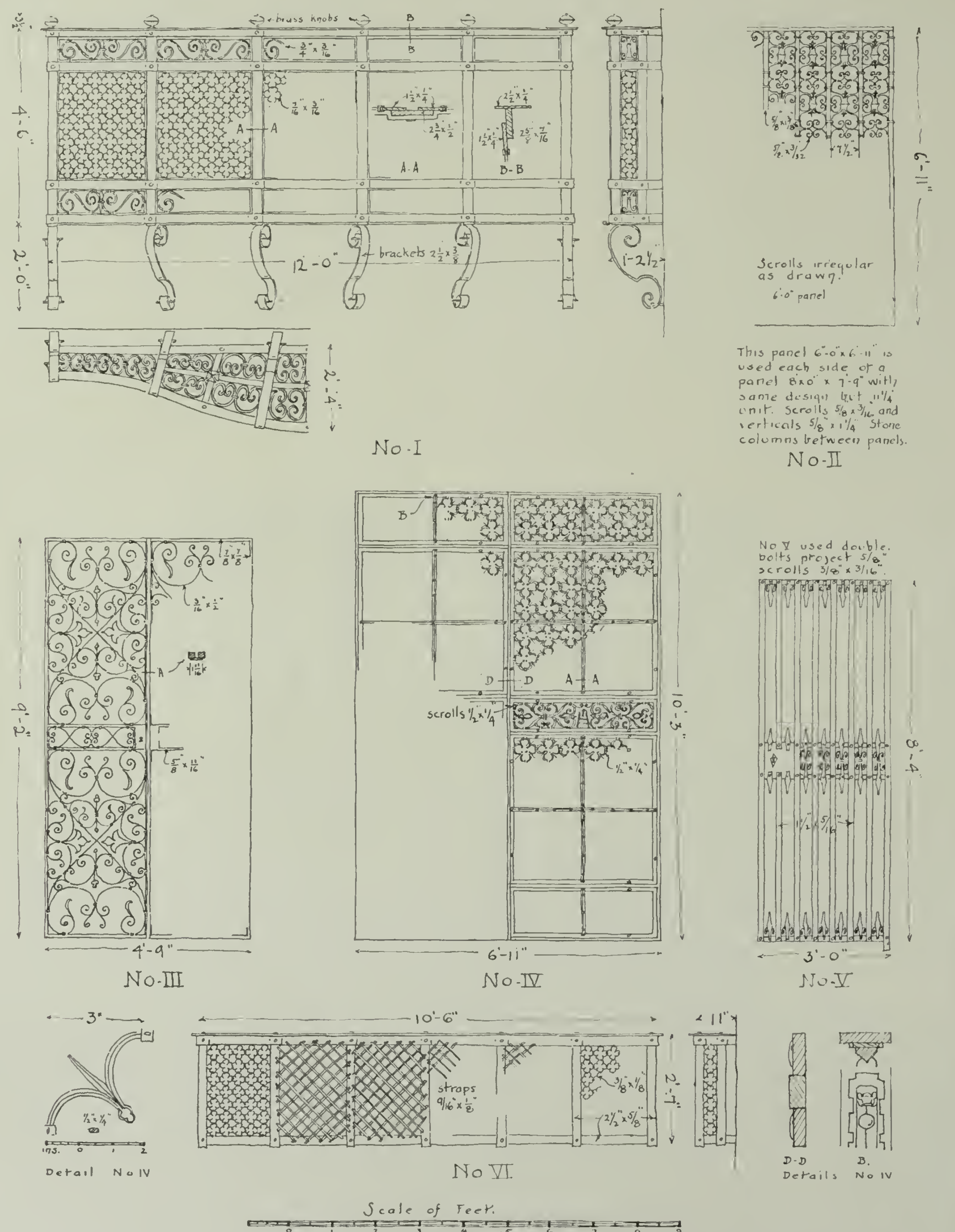
THE advent of machinery at the beginning of the nineteenth century marks a new era in the history of the arts and crafts. Unlike former times when individual effort and skill counted as the most important factors in accomplishment, the emphasis now was placed upon speed and the facility of production. The worker left his workshop for the factory and in so doing lost his individuality, and art became subservient to commercialism. Brought to the realization of the artistic poverty of our lives, we grant to-day the importance of the man and his individual efforts as being equally vital with that of the factory and its production.

The worker in iron has but few constructional details to use as elements of design, and the interest and charm that lies in the earlier work is due to the strict observance of structural requirements and that every hammer stroke reflects personality. The metal was used at a red or white heat and there was no time for copying or measuring a design, except by the eye, and so we get a freshness and spontaneity that the more carefully labored and complex designs do not show.

The medieval smith took great delight in the simplicity of his work. To-day where the architect designs the detail and insists upon accuracy in the reproduction, the result is an uninteresting sameness, lacking in charm. An examination of the accompanying illustrations of old ironwork will show some of the few and simple methods employed in its execution. Two pieces are welded together, or bored and riveted, or joined by short strap-like pieces of iron known as collars. The quality and charm of the design depends upon the degree of fidelity to the structural requirements. Welding is used to suggest branching growths. Rivets, first used as simple spots, later, more developed and complex, became centers of floriated forms. The collar is used when the design is a variation of the c and s scrolls and in more conventional and geometric forms to give greater richness. In these methods of construction the structural details are an integral part of the design. The accompanying examples of this period of workmanship from Rome and Tuscany show the same difference of quality that exists between all the life and arts of the two greatest centers of the Italian Renaissance. While Rome is more splendid with a magnificent voluptuous beauty, Tuscany attains the finer spirit and higher level.

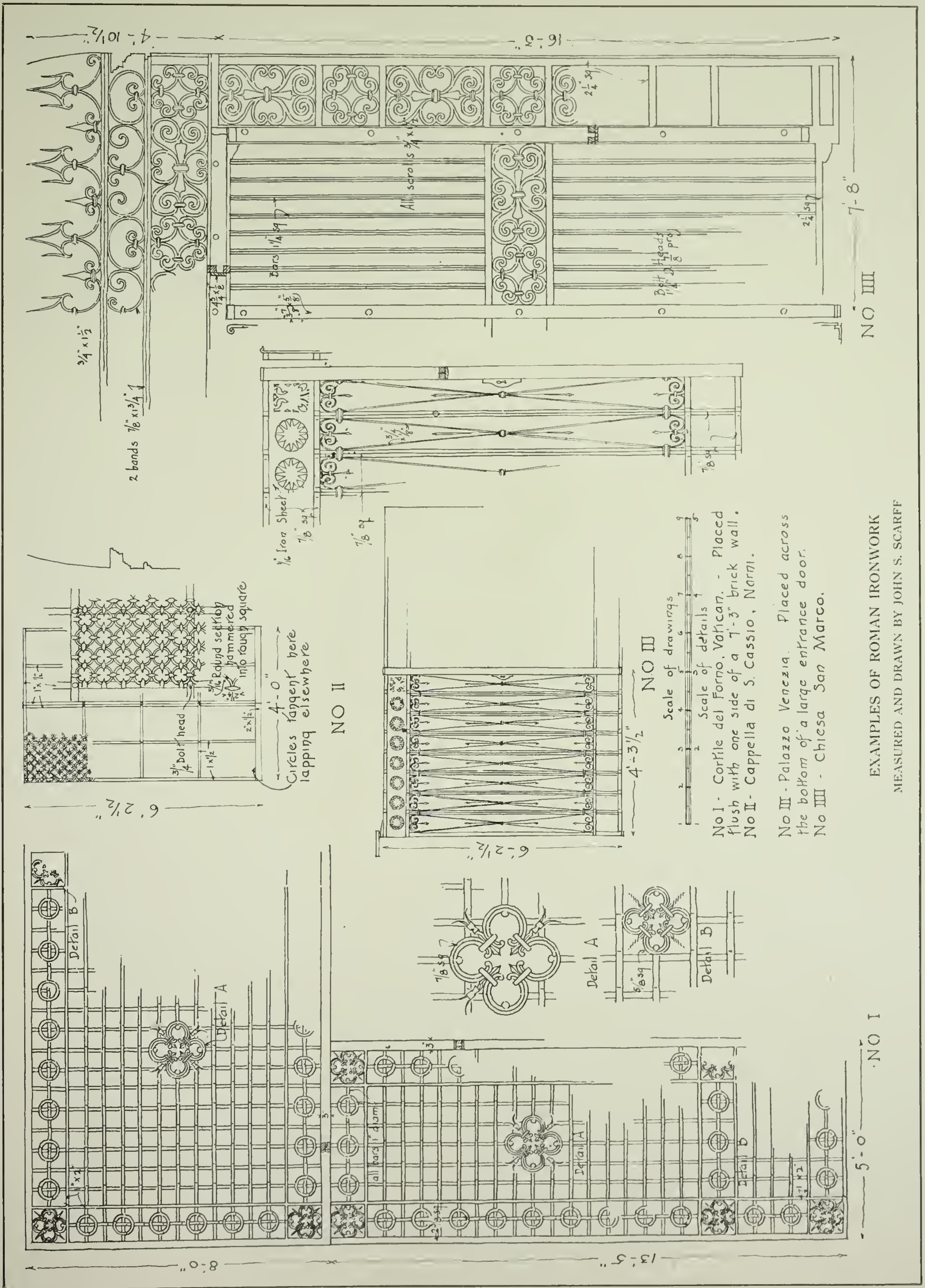
Of the Tuscan work that shown in No. I, occurring at the second story on the main façade of the Palazzo Publico at Pistoja, for the grace and refinement of its simplicity, cannot be excelled. No. VI illustrates a flanking balcony on the same façade. No. III is an excellent and exceedingly graceful design where heaviness in the section would be disastrous. No. IV shows a variation of the well-known Siena quatrefoil that gives so rich a texture. The close and solid effect of No. V is obtained by wide straps bolted to a heavier framework.

Iron Entrance Grille, Chiesa San Marco, Rome, Italy



No-I Palazzo Comunale, Pistoia. No-II Church of Santa Chira, Assisi.
No-III Palazzo Vechio, Florence. No-IV Palazzo Comunale, Siena.
No-V Convent San Marco, Florence. No-VI Palazzo Comunale, Pistoia

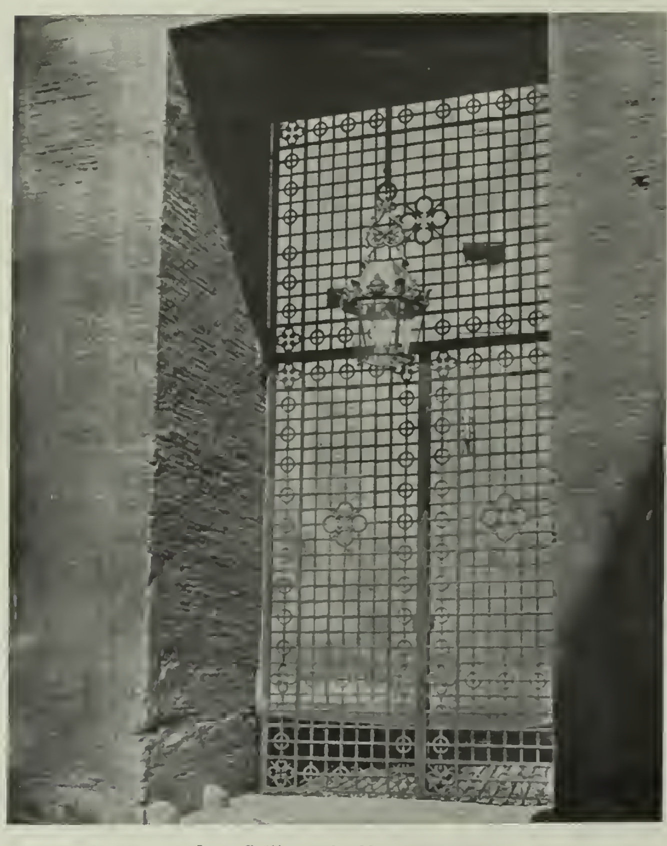
EXAMPLES OF TUSCAN IRONWORK
MEASURED AND DRAWN BY JOHN S. SCARFF



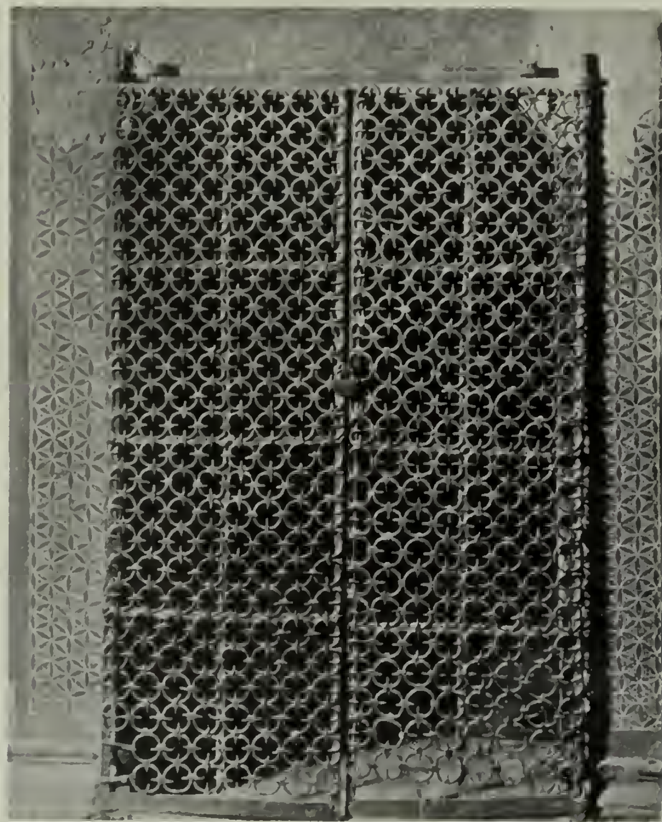
EXAMPLES OF ROMAN IRONWORK

MEASURED AND DRAWN BY JOHN S. SCARFF

Among the Roman examples No. I, between two of the courtyards of the Vatican, is a variation of the common bar design that the disturbed condition of Italy during the fifteenth century developed as a protection. Here in the main field the vertical bars are threaded through the horizontal ones, and in the borders the horizontal through the vertical. No. III, besides the nice proportioning of members, depends for its charm upon its fine contrast of border to open field. No. IV, more magnificent and dignified, has served as inspiration for the entrance grilles of the Boston Public Library, and shows a developed scroll border and plain barred panels where square bars are placed diagonally for greater richness.



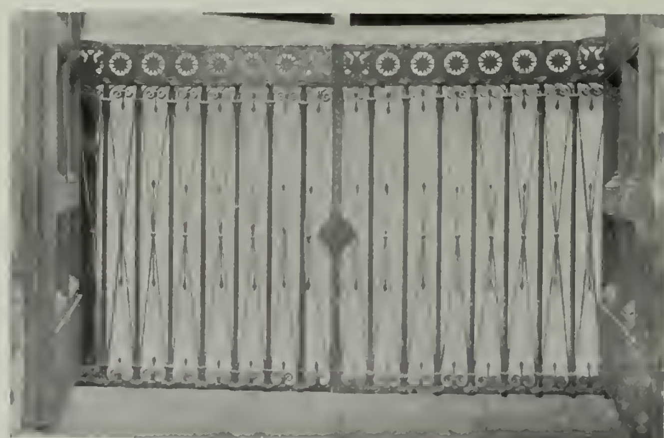
Iron Grille at the Vatican, Rome



Old Iron Gateway in Rome

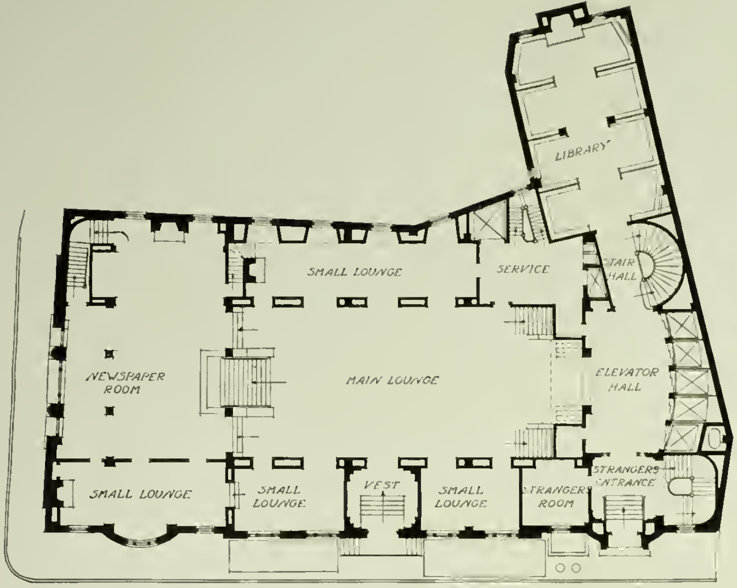
Although iron has a great initial strength, because of the effect of moisture and weather, it is even more perishable than wood. This, combined with the early difficulty of smelting and use of the old material for later work, accounts for the scarcity of examples of an early date in Italy. In Rome, where throughout the Renaissance bronze was the accepted metal, examples are to-day noticeably rare.

Up to the fifteenth century the artisan had been content to perfect his constructional details and was satisfied with simplicity, but with the perfection of methods came the inevitable love of the display of skill and later the imitation of other materials. To-day we may consciously place our craftsman in a position analogous to the early worker desirous of the perfection of his methods within structural limitations and be content with a dignified simplicity, or, armed with the apparatus of a more complete technical knowledge, seek to impress our personality upon structural excellence and gain greater complexity and elaboration.

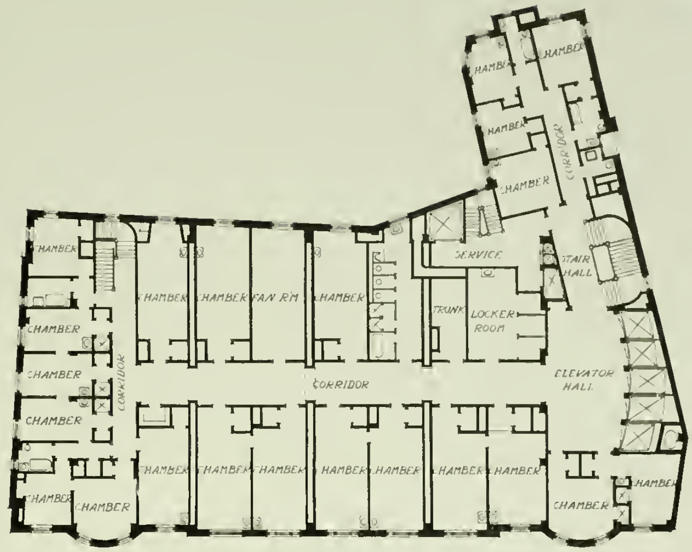


Iron Gate Across Bottom of Large Doorway, Rome, Italy

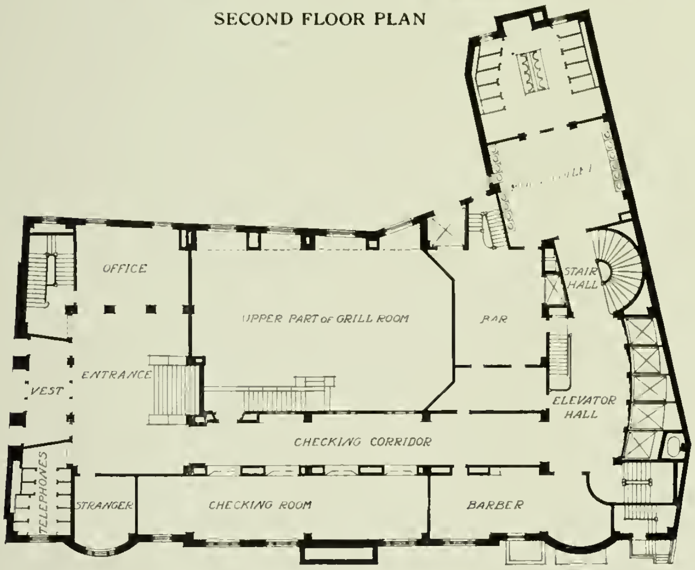
BOSTON CITY CLUB, SOMERSET STREET, BOSTON, MASS.
NEWHALL & BLEVINS, ARCHITECTS



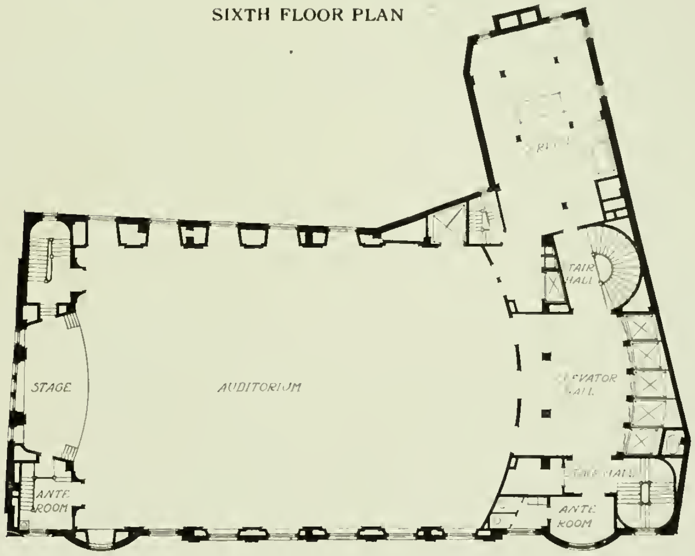
SECOND FLOOR PLAN



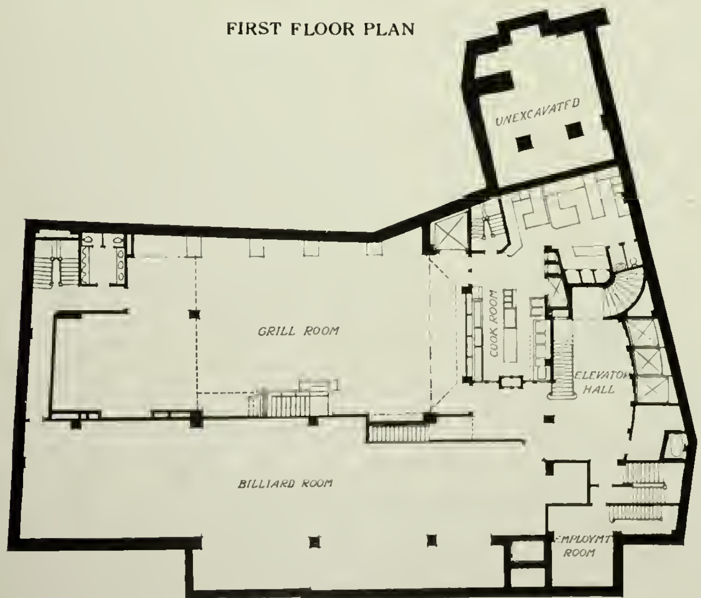
SIXTH FLOOR PLAN



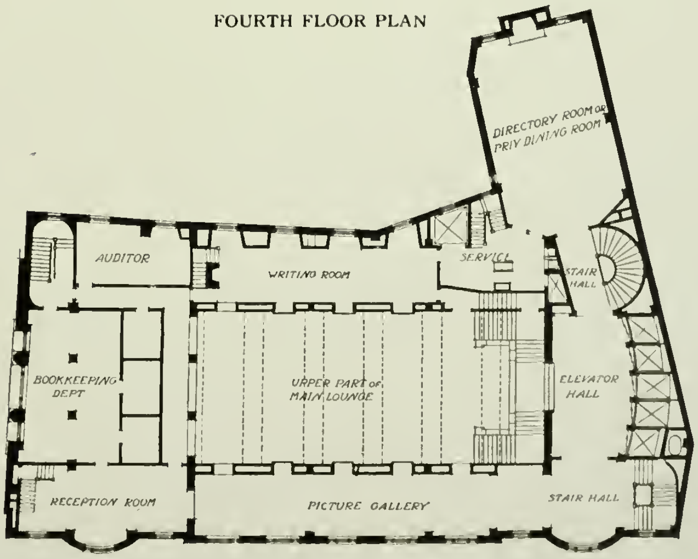
FIRST FLOOR PLAN



FOURTH FLOOR PLAN



BASEMENT FLOOR PLAN

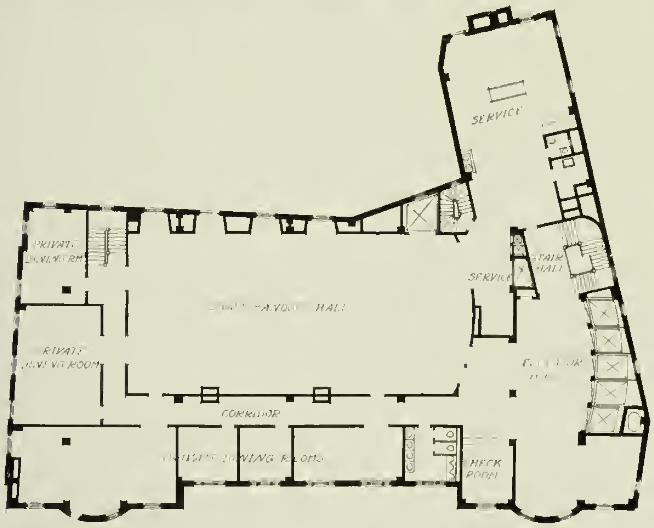


THIRD FLOOR PLAN

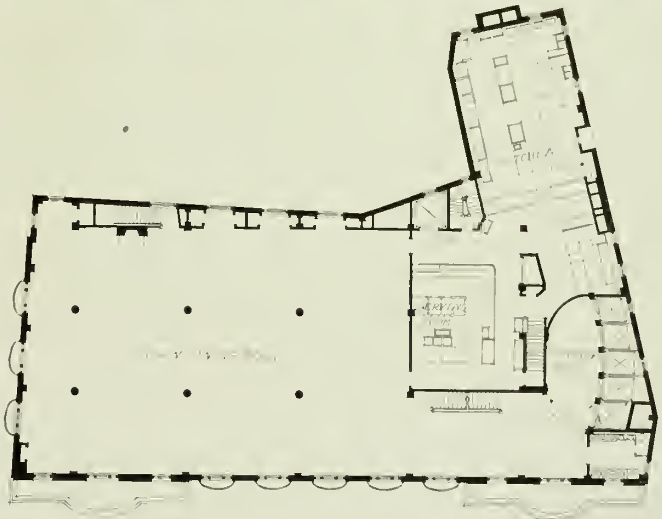
BOSTON CITY CLUB, SOMERSET STREET, BOSTON, MASS.

NEWHALL & BLEVINS, ARCHITECTS

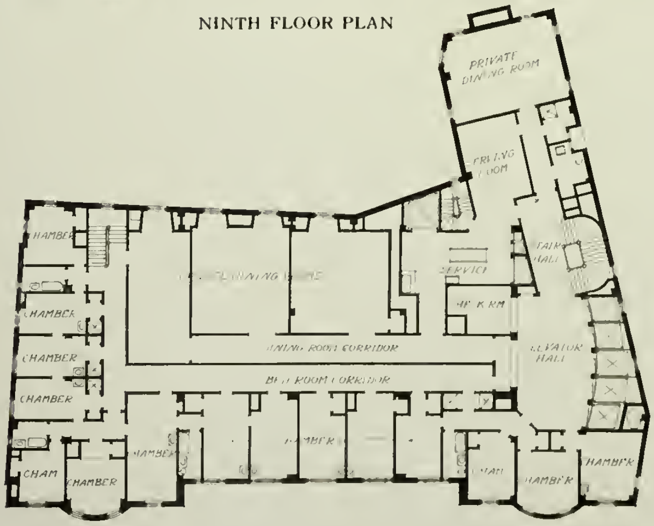
DETAIL OF UPPER STORY, SOMERSET STREET



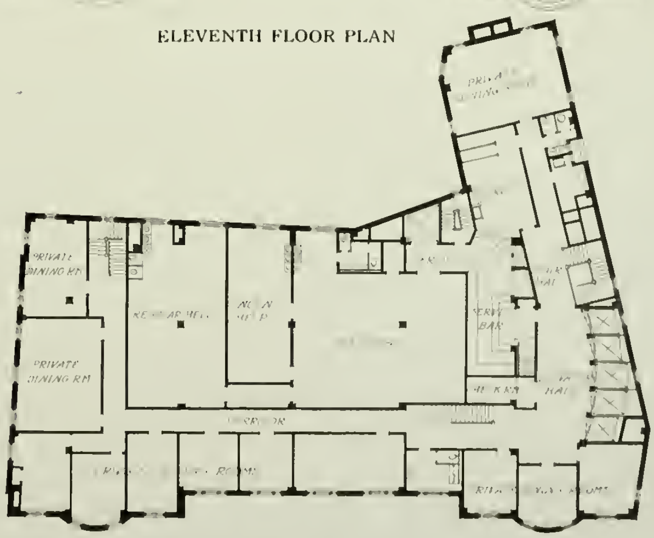
NINTH FLOOR PLAN



ELEVENTH FLOOR PLAN



EIGHTH FLOOR PLAN



TENTH FLOOR PLAN

BOSTON CITY CLUB, SOMERSET STREET, BOSTON, MASS.

NEWHALL & BLEVINS, ARCHITECTS

ENTRANCE TO LOUNGE, ASHBURTON PLACE

MEMBERS' ENTRANCE, SOMERSET STREET

BOSTON CITY CLUB, SOMERSET STREET, BOSTON, MASS.

NEWHALL & BLEVINS, ARCHITECTS

AUDITORIUM

GRILL ROOM

BOSTON CITY CLUB, SOMERSET STREET, BOSTON, MASS.

NEWHALL & BLEVINS, ARCHITECTS

MAIN LOUNGE

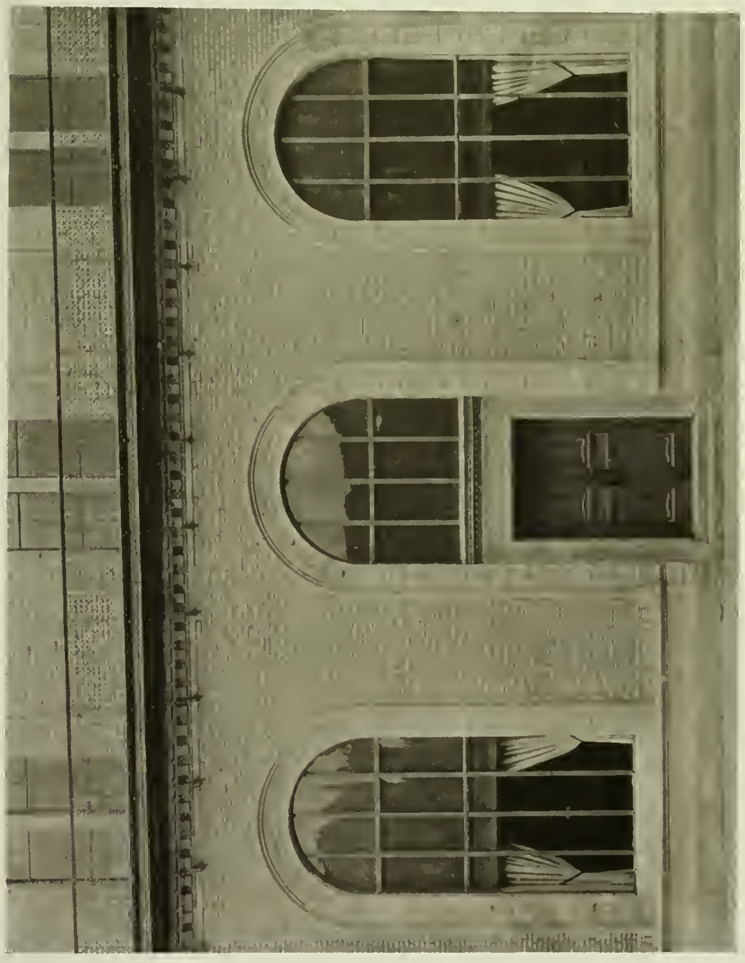
MAIN DINING ROOM

DETAIL OF MAIN LOUNGE

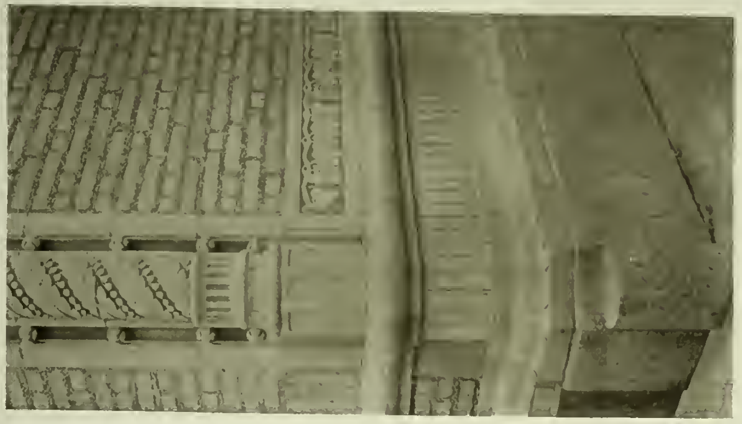
BOSTON CITY CLUB, SOMERSET STREET, BOSTON, MASS.
NEWHALL & BLEVINS, ARCHITECTS

ELKS' CLUB HOUSE, BROOKLYN, N. Y.
H. VAN BUREN MAGONIGLE, A. W. ROSS, ARCHITECTS

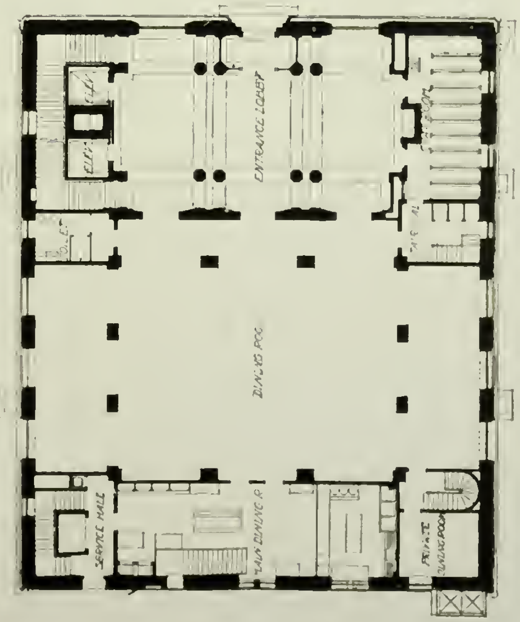
DETAIL OF CORNER AT UPPER STORY



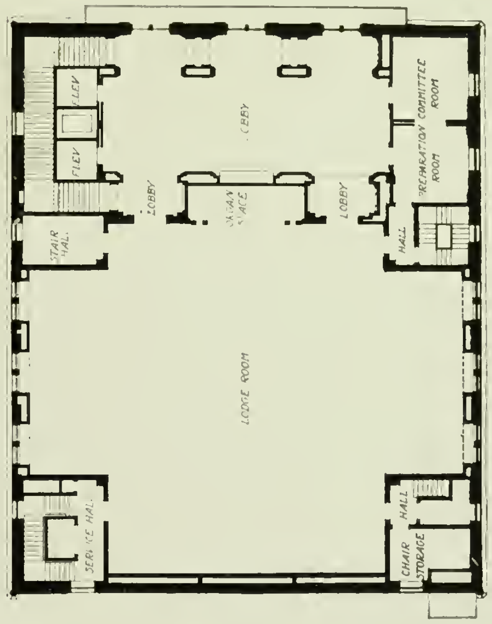
DETAIL OF LOWER STORY



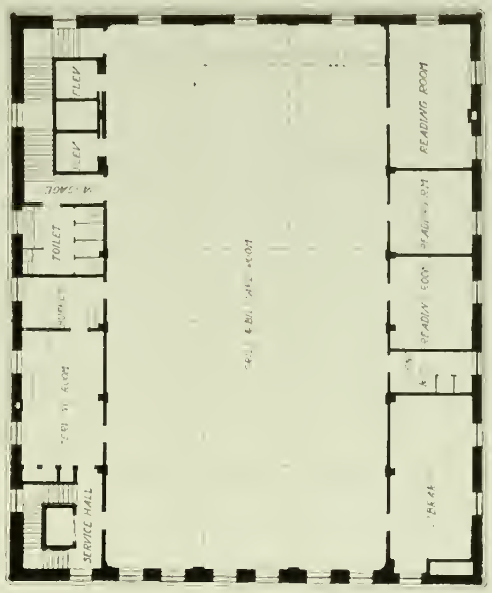
DETAIL OF CORNER AT LOWER STORY



FIRST FLOOR PLAN



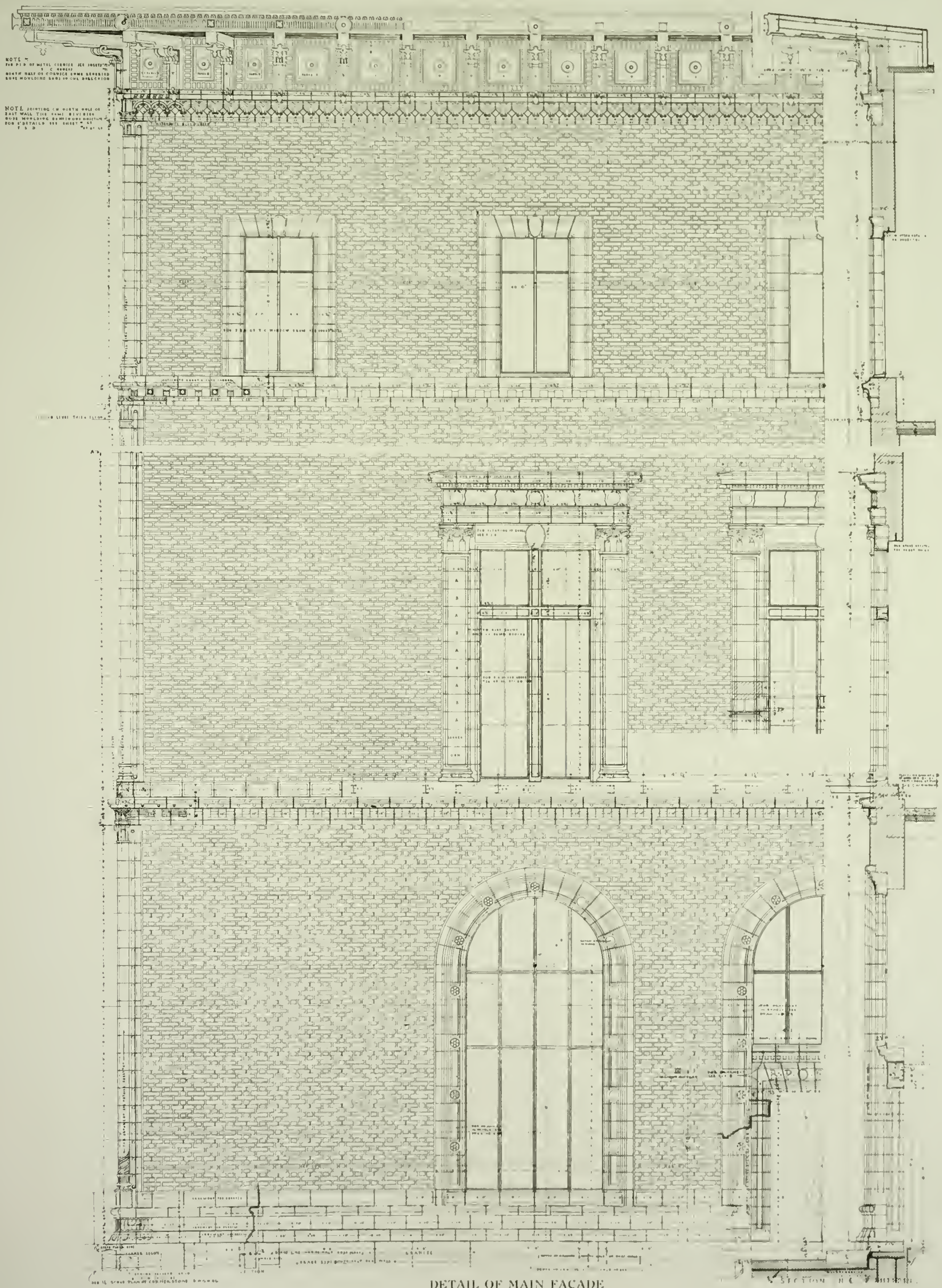
SECOND FLOOR PLAN



THIRD FLOOR PLAN

ELKS' CLUB HOUSE, BROOKLYN, N. Y.

H. VAN BUREN MAGONIGLE, A. W. ROSS, ARCHITECTS

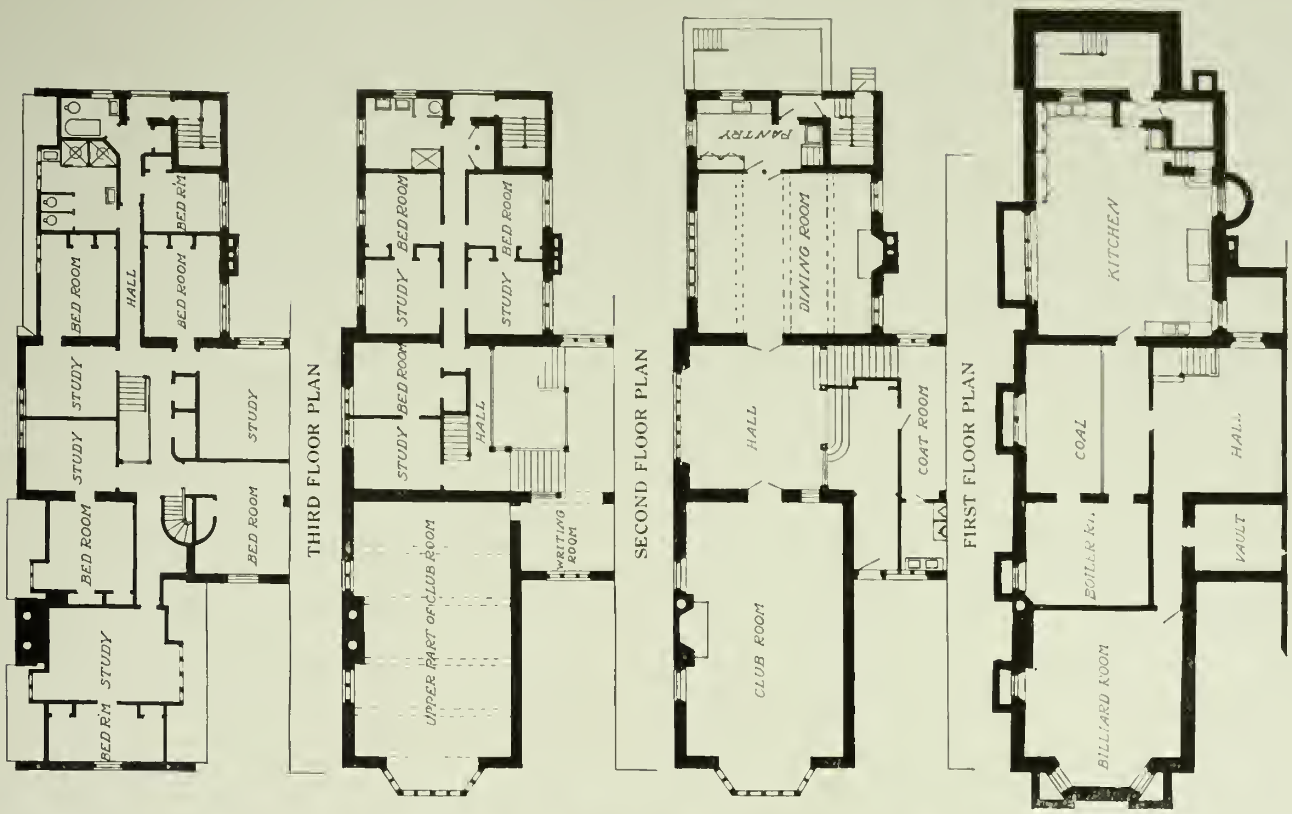


DETAIL OF MAIN FAÇADE

ELKS' CLUB HOUSE, BROOKLYN, N. Y.

H. VAN BUREN MAGONIGLE, A. W. ROSS, ARCHITECTS

PHI GAMMA DELTA FRATERNITY HOUSE, PHILADELPHIA, PA.
MELLOR & MEIGS, ARCHITECTS



THIRD FLOOR PLAN

SECOND FLOOR PLAN

FIRST FLOOR PLAN

BASEMENT FLOOR PLAN

DETAIL OF ENTRANCE

PHI GAMMA DELTA FRATERNITY HOUSE, PHILADELPHIA, PA.

MELLOR & MEIGS, ARCHITECTS

STAIRWAY

ENTRANCE LOBBY

PHI GAMMA DELTA FRATERNITY HOUSE, PHILADELPHIA, PA.

MELLOR & MEIGS, ARCHITECTS

HALL

DINING ROOM

PHI GAMMA DELTA FRATERNITY HOUSE, PHILADELPHIA, PA.

MELLOR & MEIGS, ARCHITECTS

GENERAL VIEW

SIDE VIEW

NORWOOD HIGH SCHOOL, NORWOOD, OHIO

BAUSMITH & DRAINIE, ARCHITECTS

DETAIL OF CENTRAL BAY

NORWOOD HIGH SCHOOL, NORWOOD, OHIO

BAUSMITH & DRAINIE, ARCHITECTS

Practical Suggestions for Planning and Equipment of Hospitals.

By M. E. McCALMONT, R.N.

THERE are so many problems of hospital management intimately connected with problems of planning and arrangement that the progressive architect will insist upon having these things determined before he even attempts the preliminary plans of a hospital.

By way of illustration, there are two distinct methods of distributing linen: the old way of having large linen rooms connected with each ward and a liberal supply kept there regardless of the number of patients; or the more modern method of a large and convenient central linen room where the entire hospital stock is kept, and from which each ward gets its daily allowance on written requisition. The latter method is by far the most economical and satisfactory, but the planning for such a feature of management is obviously different from that required by the first method.

So, too, the serving of food. If a dietitian is to be employed, it should at once be determined how much cooking is to be done in the special diet kitchen. If all the private room trays are to be served from this kitchen, and all the food for the private patients prepared there, obviously the arrangements should be very different than if the food is to be sent in bulk from the main kitchen to the ward diet kitchens and only a few delicacies prepared in the special diet kitchen. In other words, if a large amount of cooking has to be done in the special diet kitchen, it is only fair that this department should be conveniently arranged and placed in close proximity to the storerooms, cold storage, etc. A large hospital at present in course of construction and recently visited has its diet kitchen at so great a distance from the storerooms, and with so little available storage capacity in the room itself, that the poor dietitian who will have to work there can only have the heartfelt sympathy of those who realize how extreme but needless the inconveniences are, and how a little consideration of the ultimate management would have saved a vast amount of human energy throughout the years the hospital will live.

Added to this waste of human energy is the slightly less important waste of equipment. Another new hospital recently visited shows a half dozen expensive steam tables installed but never used because it was found more practical to send the food from the main kitchen on food trucks fitted with hot water containers and which successfully took the place of the steam tables. And so there stands, unutilized, this expensive and unnecessary installation of equipment, while the hospital is crying out for common, everyday needs for which there are no funds.

In this same hospital a large percentage of the plumbing fixtures cannot be used because they were installed without a thought of what the rooms in which they are placed were to be used for. Unenclosed toilets in utility rooms where nurses have to come and go constantly; bath tubs not partitioned off in rooms which have to be used for many purposes — these are but a few of the features which complicate and make difficult the management of a hospital to a degree quite past the comprehension of those who have never worked in one.

A dietitian has many accounts and records to keep, yet seldom has she desk room or office accommodations. If a matron is to have jurisdiction over the laundry, her sewing and mending room should be in close proximity, else there are miles of needless steps each day.

In brief, the personnel of a hospital should be outlined and the duties of employees defined, if one would have a hospital that is practical from a working standpoint.

If a hospital is to include a social service department, adequate preliminary provision should be made for the same. If the Board of Trustees believe in the educational functions of a hospital, and wish to have mothers instructed in the care and feeding of infants, the preparation of milk, etc., it can just as well be determined in advance and a portion of the dispensary be properly planned and equipped for this purpose. If communicable diseases, delirium tremens, etc., are to be admitted, the architect should know it before he begins his plans. Otherwise he may have a beautiful hospital to look at, but it will not be intelligent as far as results are concerned, and the workers and the patients will be the victims.

Some of the Things an Architect Should Know Before Planning a Hospital.

There is a certain field of inquiry which should be covered before an architect begins his hospital plans. Sometimes it is very difficult to ascertain the facts, for seldom can they be obtained from the hospital committees; but as many of the points bear directly upon the future management and the ultimate maintenance of the hospital, and as the maintenance is directly affected by the initial construction, the progressive architect will realize that it is worth his while to make an effort to ascertain the following:

Study of local conditions: Population census for the last three decades, rate of increase.

Topography and situation of the hospital.

Nature of the community, nationalities, religions, industries, wealth, and poverty.

Manufactures, kind, size of plants, number of employees, how cared for medically.

Health statistics (a guide as to the relative proportion of diseases which will have to be cared for).

Bureau of charities: scope of activities, philanthropies, civic movements, district nursing, or social service.

Contemplated organization, management, and personnel of the hospital.

History of the hospital (if already in existence): inception, growth, activities, sources of income, cost of maintenance.

Future construction: blueprints of all existing buildings (showing all underground piping, etc.).

Plans for future expansion (looking ahead at least ten years).

Many an architect who may chance to read the foregoing will doubtless feel an impatience with such detail and possibly fail to see wherein it concerns his work. If so, it is because he has not yet attained the proper viewpoint.

Hospitals are philanthropic institutions, very few of which are self-supporting. Most of them are built and maintained by funds secured through endless days of labor, effort, and anxiety on the part of relatively small groups of individuals. Occasionally we find those which are heavily enough endowed to make the problems of maintenance a matter of small moment. But as a rule the future upkeep is a question of almost constant effort on the part of boards, and ceaseless vigilance and economy on the part of the conscientious superintendent.

If architects could but realize what a part their intelligent or stupid planning means in the future cost of maintenance in the hospitals for which they are responsible, it is certain they would make a greater effort to study hospital needs and functions.

To build a beautiful hospital is a gratifying proposition, but to build a beautiful hospital which is too expensive for the community to maintain and which is therefore abandoned, is a disgraceful fact of which there is more than one instance in this country. Or to build one so extravagant in its administrative features that it carries a burden of constant indebtedness, is almost equally lamentable.

There are two hospitals in the same section of the country, one with a per capita cost of \$1.34 per day, the other with a per capita cost of \$4.56, a difference of \$3.22 per day. Both average about twenty-seven patients per day, making a difference of over \$30,000 per year in cost of maintenance. This is extreme, but it is a fact, and while some of it might be explained by the comparative extravagance and economy in the management of the two institutions, yet without doubt most of it is due to the relative inconveniences which necessitate a larger personnel, increased equipment, and expensive administration.

Is it surprising that we beseech our architects to become sufficiently altruistic to either make a study of this many-sided problem or else not attempt the work?

We realize, to be sure, that building committees are also greatly at fault, as is typified by a striking example which may be of value: The citizens of a medium sized town decided to build a hospital. A committee was formed, and it was agreed that they should secure their plans through a competitive contest advertised among architects. The following letter was accordingly sent forth:

Dear Sir: The —— Hospital Association would like to have you submit them preliminary plans for a sixty-two-bed hospital as follows:

	Rooms	Beds	Total Beds
Private rooms	22	1	22
Surgical ward (men's)	1	8	8
Medical ward (men's)	1	8	8
Surgical ward (women's)	1	6	6
Medical ward (women's)	1	6	6
Children's ward	1	4	4
Private ward	4	2	8

To be fireproof. Plans to be arranged so that they can be added to if necessary, to cost about \$60,000, your terms and estimate of cost to be submitted with plans.

Yours very truly,

The results may be imagined. As the plans submitted did not meet the requirements of the community and lacked many of the provisions most important to the ultimate management, an outside person conversant with hospital needs was at last consulted and the architects interested were invited to again make plans according to the following specifications:

Dear Sir: Enclosed herewith is a blueprint showing the plot of ground upon which the hospital is to be built — elevations, grades, points of the compass, etc.

It is desired to have a fireproof hospital of about fifty beds, with accommodations for from twenty to twenty-five nurses and from fifteen to eighteen employees. Total cost not to exceed \$60,000.

The distribution of rooms, wards, etc., to be approximately as follows:

Male medical ward	about	6 beds
Female medical ward	,,	6 ,,
Male surgical ward	,,	6 ,,
Female surgical ward	,,	6 ,,
Children's ward	,,	6 ,,
Maternity ward	,,	4 ,,
Nursery	,,	6 or 8 bassinets
Private rooms, maternity	,,	2 or 3 ,,
Private rooms (one floor)	,,	8 or 10 ,,

A second floor of private rooms, similar to first, to be used for nurses at present, but so arranged as to be easily converted into use for private patients without any great expense, at such time as a nurses' home may be possible.

Each private room to have a clothes closet and stationary washstand with hot and cold water.

Floors used for patients should have the following utility or service rooms: diet kitchen, chart room or nurses' station, toilet, bath, and utensil rooms, treatment rooms, isolation rooms, clothes lockers, linen closet, house maid's closet.

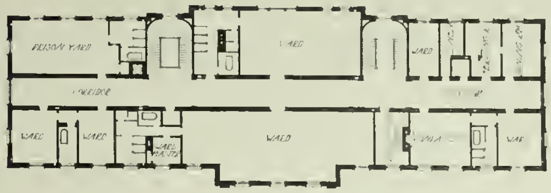
Rest room for special nurses on private floors.

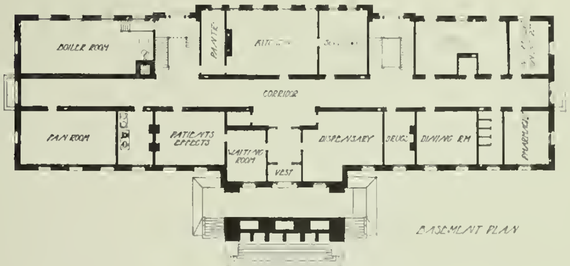
Provisions should be made for offices (and vault), reception rooms, pharmacy, accident rooms or dispensary, observation ward (one or two beds), laboratory, morgue, X-Ray department, nurses' class room.

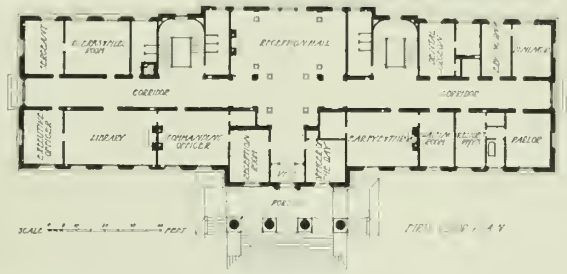
Room specially sound proofed with barred windows, removed from wards, for noisy and delirious patients.

Operating suite: two operating rooms, sterilizing room, rooms for dressings, supplies, and instruments, closet for surgical appliances, wash and locker room for nurses, wash and locker room for doctors, kitchenette for doctors, recovery room.

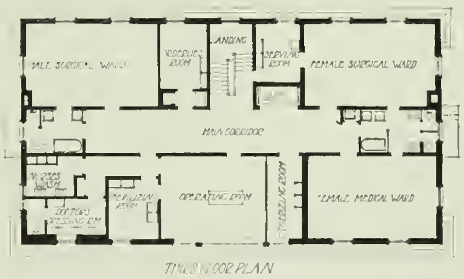
Service building: power plant, laundry (sorting room for soiled linen, distributing room for clean linen, mending or sewing room), kitchen and main diet kitchen, dining and serving rooms for officers, nurses, employees, cold storage, receiving station for all supplies, supply rooms for vegetables, commissaries and household supplies, hospital supplies, linen supplies and blankets, drugs (stock), furniture and equipment not in use, screens, etc., trunk room, small carpenter and repair shop, disinfecting room, incinerating room.

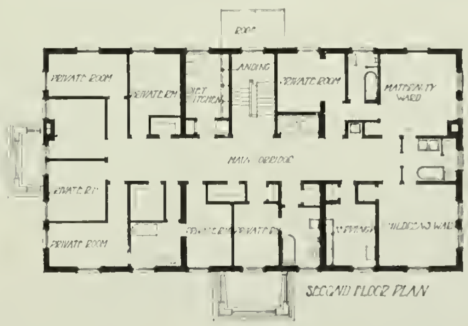


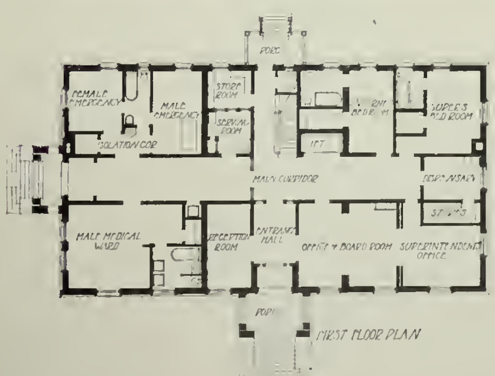




WALTER REED ARMY GENERAL HOSPITAL, WASHINGTON, D. C.
MARSH & PETER, ARCHITECTS

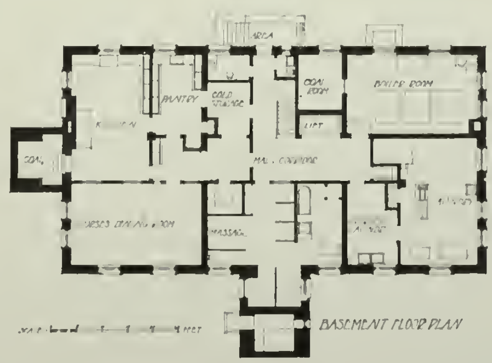






HOSPITAL AT
WHITE PLAINS, N. Y.

DONN BARBER,
ARCHITECT



Living quarters for the following personnel: suites for superintendent, housekeeper, and dietitian one bath, operating room nurse and night superintendent one bath, resident physician (two beds, one bath).

Accommodations for (eight) male employees: engineer, fireman, two orderlies, elevator boy, gardener or yard man, general utility man, laundry man.

Accommodations for (eight) female employees: cook, two cooks' assistants, two laundry women, three maids.

Also for eighteen or twenty nurses.

Roofs to be utilized as far as funds will permit.

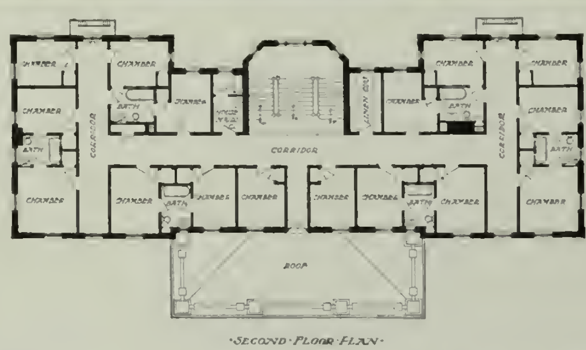
Future construction and expansion to be tentatively planned for now: additional ward capacity, hydrotherapy department, social service department, expansion of out-patient dispensary (all in basement of hospital), garage and ambulance quarters, contagious building, nurses' home.

The foregoing specifications are intended to be suggestive rather than arbitrary. If too extensive for the funds available, the architect shall use his best judgment in eliminating or curtailing such features as may seem to him logical, or shall state definitely how reductions may be made, and the financial saving therefrom.

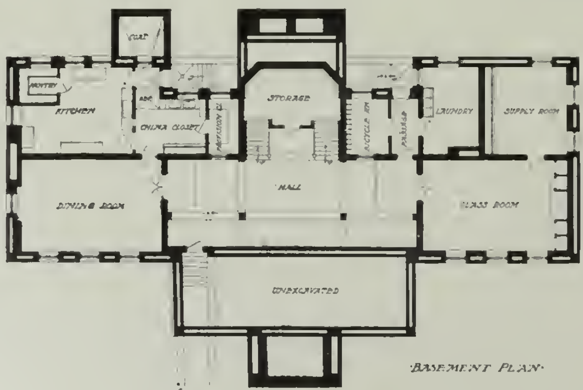
It must be admitted that the foregoing represents "some of the things an architect should know," if we are to have efficient hospitals. In fact, they are points which he should *insist* upon knowing if he is to attempt such a proposition. It would seem as though the difference were worth the insistence.

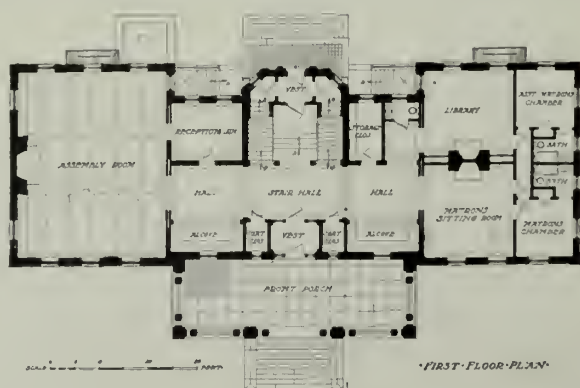
EXTERIOR VIEW, BASEMENT, FIRST, AND SECOND FLOOR PLANS

NURSES' HOME, ST. LUKE'S HOSPITAL, NEW BEDFORD, MASS.



GEORGE HUNT INGRAHAM
ARCHITECT

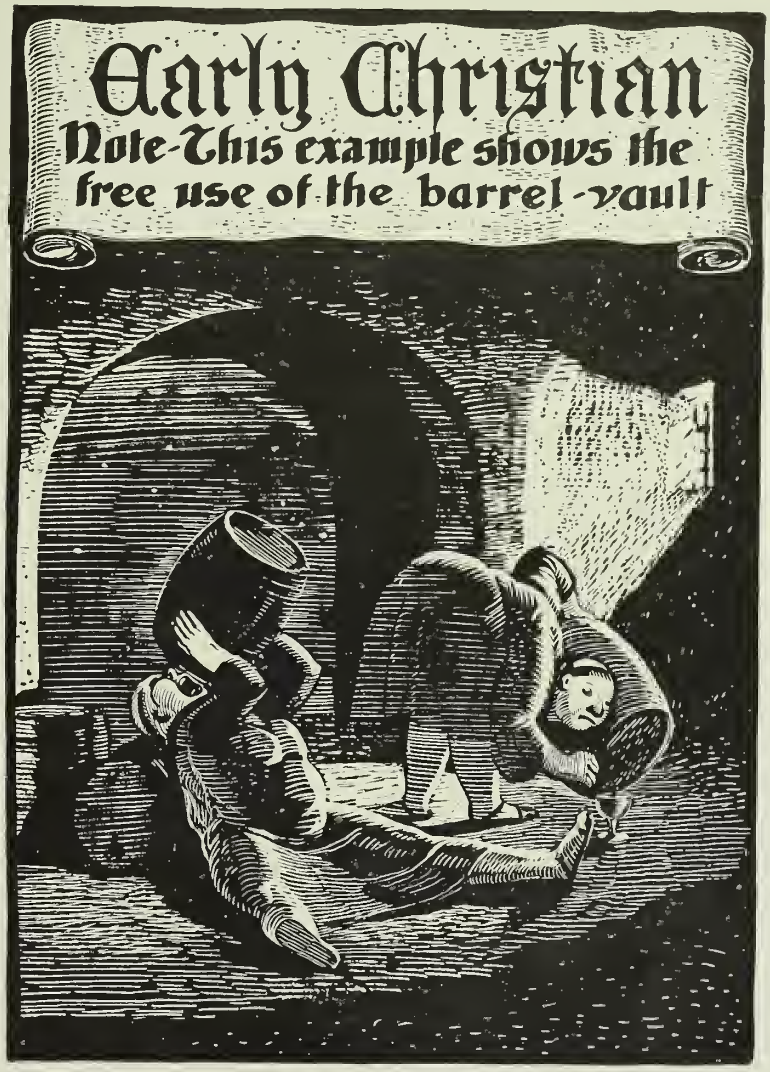




The Nomenclature of the Styles.

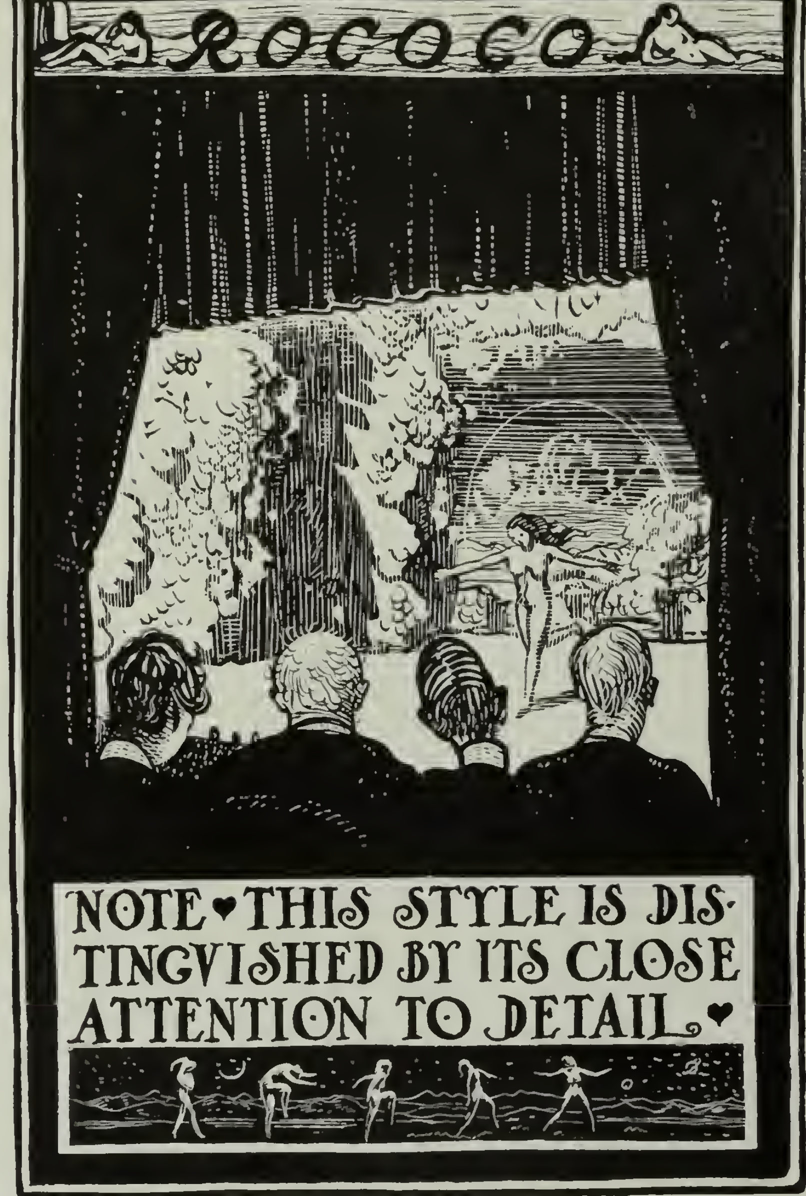
A HUMOROUS THEORY ILLUSTRATING IN CARICATURE FAMILIAR SCHOOLS AND PHASES OF ARCHITECTURE.

DRAWINGS BY ROCKWELL KENT. TEXT BY GEORGE S. CHAPPELL.



EARLY CHRISTAIN.

In the emancipation of the early Goths from classic forms it is to be noted that they attained a robust beauty all their own. Far from lacking what has been termed the Roman "punch," such significant details as the famous apse of St. Eloi de Rière (here represented) prove conclusively that these first artists of the Christian Era knew very well what satisfied their cravings, and went to it forthwith. Façades were generally neglected in favor of interiors, all surfaces of which were treated with lavish care and richness. Certain exterior features, however, are worthy of mention, one among them being the artfully concealed ribs of the vaulting. Damp-proofing being unknown, rudimentary methods were adopted in the removal of fluid contents from basilica basements, a favorite system being shown in the accompanying illustration, which also suggests that the early fathers had a definite knowledge of illumination-processes applied not alone to missals and holy books, but also to problems of human life of a universal nature touching more intimately the home and fireside.



ROCOCO.

THIS fanciful style was a late development of the Renaissance, or Great Awakening, when, wearied by the formulæ of Vignola, the old masters began to sit up and take notice. A general freedom of form began to be displayed and, though old motives were employed, they were given a new twist which resulted in an effect of bad taste and GREAT charm. The example shown in the illustration is peculiarly interesting in that it shows the two main divisions of this style. The row of domes in the foreground, with their somewhat florid ornamentation, belong clearly to the earlier period, which seems almost serious compared to the dainty bit of interior decoration shown in the middle distance. It is a matter of much regret that a too eager pursuit of novelty resulted, as it inevitably must, in a final disintegration of the school, to say nothing of the scholars. This period is reminiscent of the old Adam style, but lacks the vigor and restraint of the parent school.

A Small Office Building.

REMODELED FROM A GROUP OF OLD BRICK HOUSES.

ANDREW HEPBURN, *Architect*, GUY LOWELL, *Associate Architect.*

A SOMEWHAT unpromising row of three old brick houses, party-colored as to façade, distinctly shopworn as to interior — in fact, a very dilapidated group of buildings, but with the possibility of better things suggested by the general mass, brickwork, and grouping of windows — was the problem confronting the architects when it was decided to renovate the buildings at 120 Water street, Boston.

Sketch of Buildings Before Alteration

The original buildings were four low stories in height, with the usual irregularly spaced granite posts on the street floor front, subdividing this story into a conglomeration of stairs and small stores.

Starting with the idea that the exterior suggested a red brick building with white woodwork and small panes of glass, the façade was developed along the lines of least resistance.

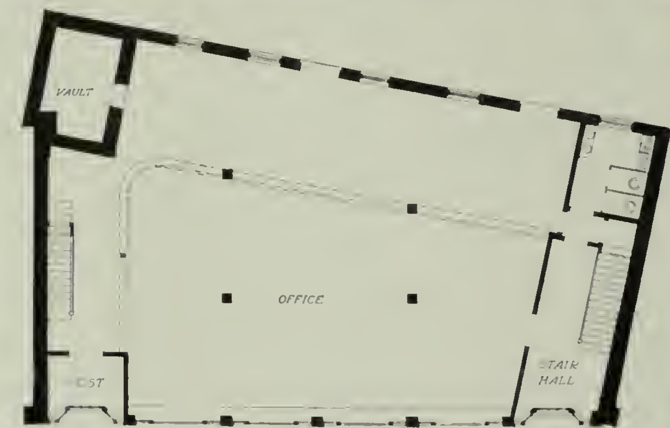
The owners were quick to see the possibilities of the building, and they and the tenants took the architect's suggestions with "sweet reasonableness"; and under such unusual conditions the

Small Office Building at 120 Water Street, Boston, Mass. Andrew Hepburn, Architect, Guy Lowell, Associate Architect road to a solution was well paved.

It was decided to have two stories and an attic in the altered building, each story high enough for a mezzanine gallery should such be desirable. In fact, a mezzanine gallery was immediately decided upon for the street floor; but there are at present no such galleries on the second floor, although there is height and light enough for them.

On the exterior the changes above the first story consisted of adding cornice and balustrade, removing the old paint on brick with acid and sand blast, and the use of white paint for everything but the brickwork. The first story façade is of cast iron with wood sashes, which are divided in small panes to accord with the style of the building.

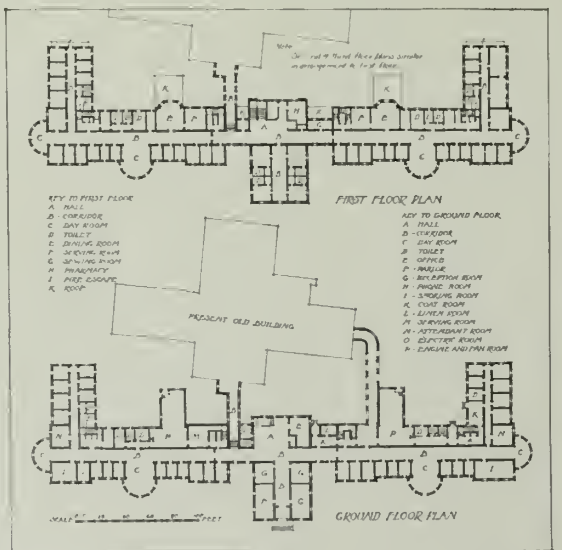
Interior of First Floor Office



First Floor Plan

The left hand entrance with vestibule is the main entrance to the general office of the insurance company which occupies the building. This general office is well lighted by the glass front on the street and by the windows on the rear alley. The private office of the president is readily accessible from the public space. The right hand entrance admits to a stairway which leads to the board room and clerk space on the first mezzanine floor and to offices on the second floor. The corridor of the floor connects directly with a corridor in an adjoining building for convenience and is of course fitted with fire-doors. A men's toilet is on the first floor, and a women's on the mezzanine, above which is additional piping for future toilet accommodation.

The interior of the building is as simple and inexpensive as it could be made. All standing finish is of North Carolina pine, stained and varnished, and all floors of rift hard pine oiled. The plaster walls are painted with oil paint.



Providence Retreat Hospital, Buffalo, N. Y.
Esenwein & Johnson, Architects

THE Providence Retreat Hospital is situated three miles from the business section of the city upon a lot 2,000 by 750 feet, setting back 400 feet from the street line. The exterior is treated in dark red brick trimmed with matt white terra cotta. The roof is of red tile. Upon the interior all flooring is of maple excepting in the bathrooms and water sections, where tile is used. The stairs are of iron with slate treads. Patent plaster has been used throughout, with the exception of the bathrooms, toilets, etc.

The building is equipped with a fan system of heating and ventilation.

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

SAMUEL STANHOPE LABOUISSE

SAMUEL STANHOPE LABOUISSE was born in New Orleans, La., in 1879. After graduating from Tulane University he entered the School of Architecture of Columbia University, receiving his degree with the last class to finish the course under that well beloved teacher, Prof. William R. Ware. Coming back to New York after a year spent in travel and study in Europe, he was employed in the office of Mr. Thomas Nash, and in 1906 returned to his native city and began the practice of architecture as a partner in the firm of DeBuys, Churchill & Labouisse. This partnership has recently been dissolved by mutual consent, and Mr. Labouisse is practising alone.

Although he is a nephew of H. H. Richardson, it would be doing Mr. Labouisse's own energetic personality scant justice to say that he owes his early prominence and success to inherited characteristics. His style has nothing in common with that of Richardson except in so far as it is an expression of a cultivated and sensitive taste. His preference in design is for the early Italian Renaissance and the Colonial; for styles reminiscent of the classic rather than the medieval, and it is in these styles and in some charming modern interpretations of the old architecture of Louisiana that his most successful work has been done. For the picturesque streets of the old city—the "*vieux carre*," as it is called, with its filagree balconies and delightful courtyards—he has an almost parental affection. This has shown itself many times in his championship of the beauties of the old style and in his effective efforts to preserve its charms from wanton injury. Largely through his collaboration with the local Committee on Preservation of Historic Monuments the threatened destruction of the balconies on Canal street and the demolition of some of the buildings of the ancient Barracks has recently been averted. In many other matters touching the public welfare he has found time to give unstinted service, and he has worked untiringly for the cause of better government in his native city. Through his efforts the course in architecture was established in Tulane University and to this department he has freely given his services. He was instrumental in establishing the Louisiana Chapter of the American Institute of Architects and has served his Chapter as president, besides serving on many Institute committees. He is a Fellow of the Institute and also a member of the Association of the Alumni of the American Academy in Rome. —*N. C. C.*

WILLIAM B. FAVILLE

WILLIAM B. FAVILLE is of American lineage and might be fifteen or fifty, so uncertain is the age of the enthusiast. He gained his first schooling in his chosen profession at the Massachusetts Institute of Technology and his first practical experience in the offices of McKim, Mead & White; still one could hardly claim him as a true exponent of either influence. An intense love of color for its own sake, coupled with an innate sense of the decorative, quite naturally has led him into a freer exercise of architectural possibilities than the fixed lines of "classicism" would permit. With one having less of the truly architectural inspiration this strong bent towards that which is purely subsidiary in the art would lead to an excess of the ingenious in detail and in planning; but in Mr. Faville's work it is quite absent. Although, perhaps, not always successful in linking a very well considered and formed plan to an equally well studied and reserved elevation, it can be truly said that the source of the failure to do so can be found in the contradictory elements of the art, as we know it, rather than in the attitude of the architect himself towards the same. Given that freedom of choice in selection, something due every architect, Mr. Faville rarely misses a right solution of a building problem and giving it a telling architectural expression. The new Masonic Temple, the Flood residence, the Oakland Free Library, the California and Union Savings Banks, and the Columbia Theatre—all of San Francisco—each in its way bespeak the same architectural point of view—the love of color and the purely decorative are ever there; but, these purely casual things in this art are never thought sufficient if they merely cover an insufficient architectural body, so to speak. He never enters into the trivialities of personal conceits; his originality is displayed in choosing from well known traditional examples and in using these in a trite and agreeable manner. This in itself is a valuable quality in an architect, as it places him in easy communication with not only his patrons, but also with workers who, without losing their identity, have to be entrusted with details in execution. Mr. Faville is a member of the firm of Bliss & Faville, San Francisco, Cal., who are responsible for the main features of the plan of the Panama-Pacific Exposition buildings. The development of the great enclosing walls was especially delegated to them, as was the Palace of Education and the Palace of Varied Industries. —*A. F. M.*

ROBERT CLOSSON SPENCER, JR.

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The architectural style adopted is transitional between Italian Gothic and Renaissance. The materials are a light yellowish gray brick similar to that used in the Madison Square Presbyterian Church in New York, designed some years ago by McKim, Mead & White. It is laid up with a wide flush joint. All ornament is executed in terra cotta, much of which is in polychrome. The cornice follows Italian precedent and is decorated in color.

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EDITORIAL COMMENT AND NOTES FOR THE MONTH

Circumstances compel us to request that subscribers do not send to us material for publication — photographs, drawings, etc. — unless arrangements have been previously made for its acceptance. During the past three months we have had enough material sent us to supply the plate forms of THE BRICKBUILDER *for at least three years. To hold this material until it can be published or to turn it back is annoying to the sender and distressing to us, hence this request.— The Editors.*

IT IS interesting to note the change that is taking place in the mental attitude of some architects towards the builder. There comes to our table frequently manifestations of this change, an instance of which we give below in the substance of a letter received recently from a well known architect. He has devoted much time to perfecting the details of office administration as well as to the preparation of plans and specifications which will obviate as far as human contrivance can the ambiguities and difficulties of interpretation which so frequently arise in these documents while in the hands of the contractor. His observations on the relation of architect to builder are of value because they are based upon actual, personal experience.

The creations of the architect are by no means his alone. However spontaneous or studied is the composition on paper, there is no future for it in the eye of the beholder, unless it is built in somewhat the spirit in which it is first imagined. That this process is so much more difficult than, for instance, the methods by which the painter gets his results, is not sufficiently realized. He, with all his troubles, can paint out and paint in again until he has got what he is after; but woe betide the architect who wishes to paint out. Steel and bricks and things, once put, must stay put. Many an architect goes about with a smile that conceals what he really thinks about his own work, which he could set right if he could only have a chance to re-arrange and try again.

The errors in building are by no means all those of the architect. The bricks were not like the sample — but there was no time to change; it was necessary to proceed with those that were on the job. The contractor placed the rafters wrong and, all things considered, could not be asked to take them off again. So the architect tore up the carefully considered full size detail and drew a new one on the smooth boards of the side of the house and now tries to pretend that the best that he could get was just what he wanted anyway.

The architect must not only foresee the finished result, but the steps by which it is to be reached, and a large part of this duty is accomplished finding the right contractor. A contract with a good contractor is unnecessary; a contract with a bad contractor is no good. The bad contractor can usually be avoided, certainly if the owner has had one experience with a man whose bid was too low and whose organization throughout was as incomplete and inaccurate as his estimating department.

The good contractor is of varying kinds. If he is just a business man and knows only whether certain methods are profitable or unprofitable, knows only how to hustle a job, the architect cannot reach his highest success. He can at best get a business result, and he cannot get that without co-operation; but there are a good many worse things than just a business result. Many owners are praying devoutly for the advent of an architect who knows enough to get a dollar's worth for a dollar and get it quickly.

One trouble is that the builder is not encouraged to make suggestions. He really knows more about the mechanics of building than many architects; but the architect resents being told. If the builders would speak out as they think, they would say in one voice that needless expenditures of money are being locked up every year in buildings to gratify whims on the part of architects. The direct, simple, natural, mechanic's, or builder's way of putting a structure together is not only just as apt, but much more apt, to be arranged in a beautiful way than a complicated, difficult, and expensive construction which many architects advance. The builder hesitates to talk to the owner about such things, and the architect ignores him.

The architect who wishes to succeed must work as closely as possible with the manufacturers of materials and the practical builder. Costs play an increasingly important part in the choice of every piece of material that goes into the building. Nothing stamps a structure more firmly as in error than an elaborate limestone first story and a galvanized iron cornice, unless it is a hospital with hundreds of thousands of dollars irrecoverably buried in architecture that ought to be drawing interest to support beds. Because the designer does not know what a thing costs, he does not know whether to use it or not. When a building costs too much, he does not know where to cut it.

Co-operation between the architect and the builder is absolutely essential to the success of the architect. The builder seldom wishes to get along without him, nor will any one of sound judgment hesitate to believe that even with many architectural draftsmen a builder cannot arrange a building as well, or make it appear as well as the architect of experience; but the owner will not pay for the architect's delays and additional and unnecessary expenses which unfortunately are becoming to be believed a procedure of many architects' offices.

The change which has started in the direction of co-operation between architect and builder cannot develop too rapidly. It is yet a new idea to the boy who has been trained to consider a pretty drawing as the end of his endeavors, that the building is the thing; or that pencils, pens, and brushes will never produce buildings that he will wish to point out to his children. Men are the tools with which he must work; and he must be eager to find the man to supply the right material, and the man to buy it and put it in place. When he finds him, he must treat him and his opinions and abilities with the respect due a fellow-worker with whom the credit of the result must be generously spared.

THE preliminary examinations for the Rotch Traveling Scholarship will be held at the office of the secretary, C. H. Blackall, 20 Beacon street, Boston, on Monday and Tuesday, April 12 and 13, 1915, at 9 A.M., to be followed by the sketch for competition in design on Saturday, April 17, at the Boston Architectural Club. The successful candidate receives $2,000 to be expended in foreign travel and study during two years. Candidates must be under thirty years of age and must have been engaged in professional work during two years in the employ of a practising architect resident in Massachusetts. Candidates are requested to register at the office of the secretary as soon before the examination as practicable.

Competition for a Two Apartment House

On a Lot Having a Frontage of 30 Feet and Depth of 100 Feet

TO BE BUILT OF NATCO XXX HOLLOW TILE. Cost Not to Exceed $7,200

First Prize, $500 | Mentions | Third Prize, $150
Second Prize, $250 | Competition Closes at 5 P.M., Monday, June 21, 1915 | Fourth Prize, $100

PROGRAM

THE problem calls for a Two Apartment House, the walls and foundations of which are to be built of Natco XXX Hollow Tile. The lot has a frontage of 30 feet and a depth of 100 feet. The land is level. The location may be assumed in the residential section of any city. The house should be so designed that it may be located within a block with access to rear entrance from street since there is no alley at rear of lot. The architectural type and plan arrangement and the exact location of the house upon the lot are left to the designer. There is to be a basement and two floors. The treatment of the roof is optional with the designer. The basement is to be equally divided between the two families that are to occupy the house. Provision should be made for separate heating plants, laundries, etc. Each family is to be provided with five rooms and a bath on one floor, although if space permits an additional small room may be added to the second floor. At the rear entrance separate stairs should lead to the divisions of the basement and another stairway to the second floor.

Invention in relation to plan is desirable in this competition. It would be especially interesting if the contestants would frankly acknowledge the need of clothes' drying porches and make provision for them. Also the designer may give consideration to the demand on the part of tenants for porches — open or enclosed — on the front, provided they can be successfully incorporated in a design for a house of this class. These features are submitted only for consideration and are in no sense mandatory. Designs in which they are successfully combined will be given special consideration by the jurors. The total cubage of the house and porches must not exceed 40,000 feet. For the purpose of this competition the price per cubic foot is set at 18 cents, this being the estimated cost at which houses of the type specified can be built of Natco Hollow Tile in almost every part of the country.

Measurements of the house 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 and other additions are to be figured separately at one-fourth (.25 per cent) of their total cubage, except the clothes' drying porches. The latter need not be included in the cubage.

The jury will give consideration: *First*, to the excellence of the design and its fitness to the materials employed. *Second*, to the excellence of plans.

It is hoped that the designs submitted in this competition will show a careful study of the problem and that the contestants will think of the house as one to be actually built. While originality in design is desired, attention is particularly called to the fact that these houses are presumed to meet a practical need in every American city, and that they should in all respects be a distinct improvement over the average house of this class which is put up by the speculative builder.

The employment of Natco Hollow Tile for the walls of apartment houses is in harmony with the spirit of the present time, which is to eliminate inflammable construction within city limits. The material itself, as is well known, meets successfully the most exacting architectural requirements that may be imposed upon it. The walls are fireproof and the entire house can be made fireproof by the use of tile for partitions and floors, at a moderate additional expense. Each drawing must bear the following title: "Design for a Two Apartment House to be Built of Natco XXX Hollow Tile."

On the drawing in a space measuring 4 by 5 inches — enclosed within rules — is to be given at a size which will permit of three-fourths reduction, a calculation of the total cubage. The cubage will be carefully checked before the designs are submitted to the jury. *The jury will positively not consider those designs which exceed the prescribed cubage.*

CONSTRUCTION

On the back of this page will be found details of construction which are recommended.

Natco Hollow Tiles being heavily scored on all sides permit of stucco being used as an outside finish, and plaster applied direct to the tile for interior finish. The floors and roof need not be of fireproof construction.

DRAWING REQUIRED (there is to be but one)

On one sheet a pen and ink perspective, without wash or color, shown at a good sized scale — the character of the exterior finish must be clearly indicated on the perspective and detail. Plans of the basement, first and second floors, at a scale of 8 feet to the inch; the size of each room must be given on the plan at a size to permit two-thirds reduction and be clearly read. A section showing construction of exterior walls through roof; height of floors to be given on section. A key cross section at the same scale as plans showing height from cellar floor through all roofs. Enough detail sketches to fill out sheet. In connection with plan of the first floor give the plot plan. The plans are to be blocked in solid. A graphic scale must accompany the plans.

The size of the sheet is to be exactly 22 by 30 inches. Plain black border lines are to be drawn on the sheet 1 inch from edges of the long dimension and ½ inch from edges of the short dimension, giving a space inside the border lines, 21 by 28 inches. The sheet is to be of white paper and is not to be mounted. Very thin paper or cardboard is prohibited.

The drawing is to be signed by a *nom-de-plume* or device, and accompanying same is to be a sealed envelope with the *nom-de-plume* on the exterior and containing the true name and address of the contestant. The drawing is to be delivered flat or rolled (packaged so as to prevent creasing or crushing) at the office of THE BRICKBVILDER, 85 Water street, Boston, Mass., on or before June 21, 1915.

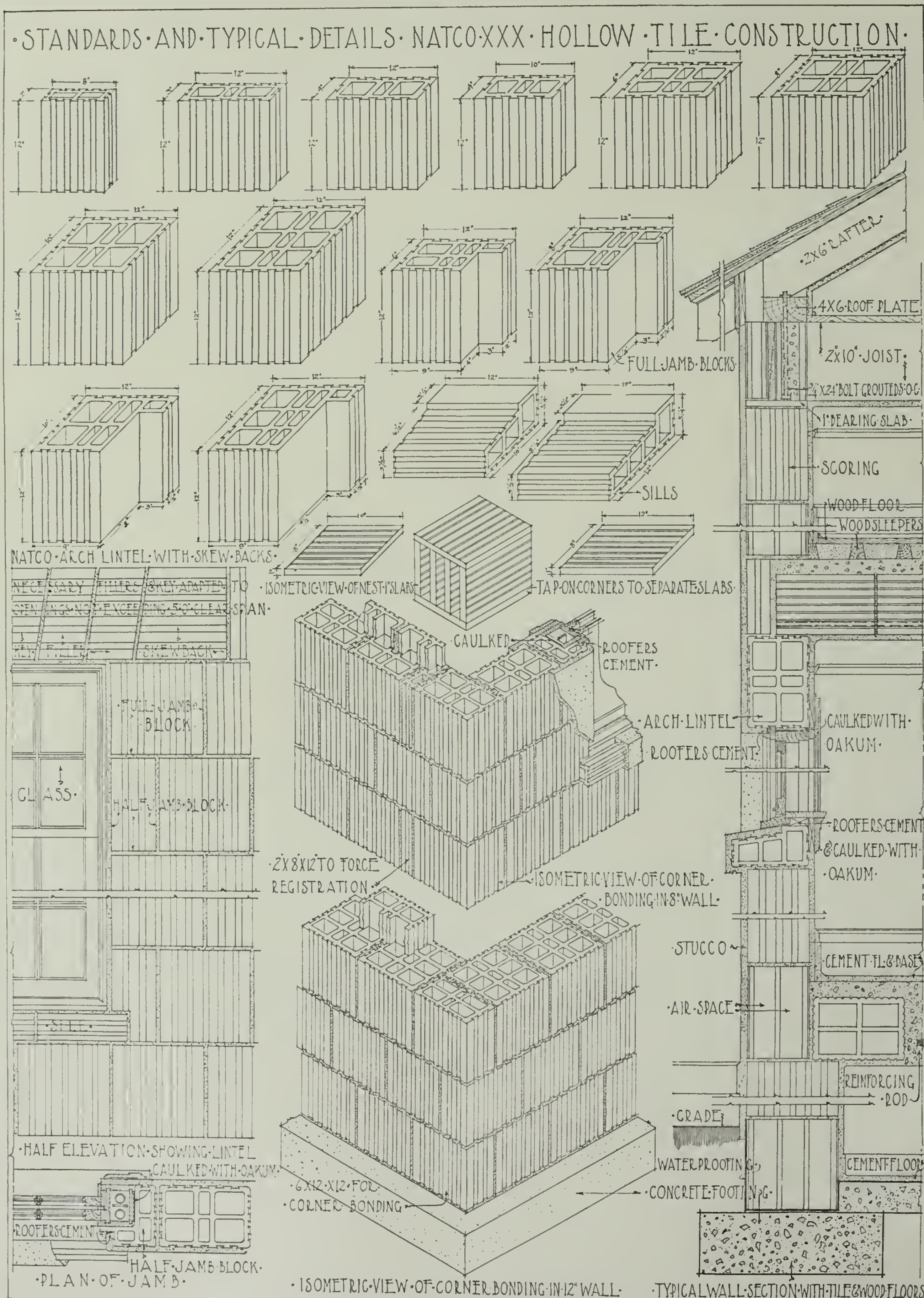
The Post Office Department now requires that drawings sent by mail shall be at the letter — or first class — postage rate.

Drawings submitted in this competition are at owner's risk from the time they are sent until returned, although reasonable care will be exercised in their handling and keeping. The designs will be judged by four members of the architectural profession, representing different sections of the country and a builder of practical experience in hollow tile construction.

The prize designs are to become the property of THE BRICKBVILDER and the right is reserved by THE BRICKBVILDER to publish or exhibit any or all of the others. The full name and address of the designer will be given in connection with each design published. Those who wish their drawings returned, except the prize drawings, may have them by enclosing in the sealed envelope containing their names, 25 cents in stamps. Drawings submitted in this competition will be returned direct from the office of THE BRICKBVILDER to the contestants.

For the design placed first there will be given a prize of $500 | **For the design placed third a prize of $150**
For the design placed second a prize of $250 | **For the design placed fourth a prize of $100**

This competition is open to all architects and architectural draftsmen. The prize and mention drawings will be published in THE BRICKBVILDER. This competition is conducted under the patronage of the National Fire Proofing Company, Pittsburgh, Pa.



Typical Details of Natco XXX Hollow Tile for Small Apartment House Construction.

THE BRICKBVILDER

VOLUME XXIV NUMBER 4

CONTENTS for APRIL 1915

PLATE ILLUSTRATIONS

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PAVILION OF GRAY MATT-ENAMEL ARCHITECTURAL TERRA COTTA, ERECTED BY THE NATIONAL TERRA COTTA SOCIETY, PANAMA-PACIFIC INTERNATIONAL EXPOSITION, SAN FRANCISCO, CAL.
GEO. W. KELHAM, ARCHITECT

THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

MANTEL IN CROWNINSHIELD-DEVEREUX HOUSE, SALEM, MASS.
SAMUEL McINTIRE, ARCHITECT
BUILT IN 1805

MEASURED AND DRAWN BY
GORDON ROBB & M. A. DYER

Plate
Four

(over)

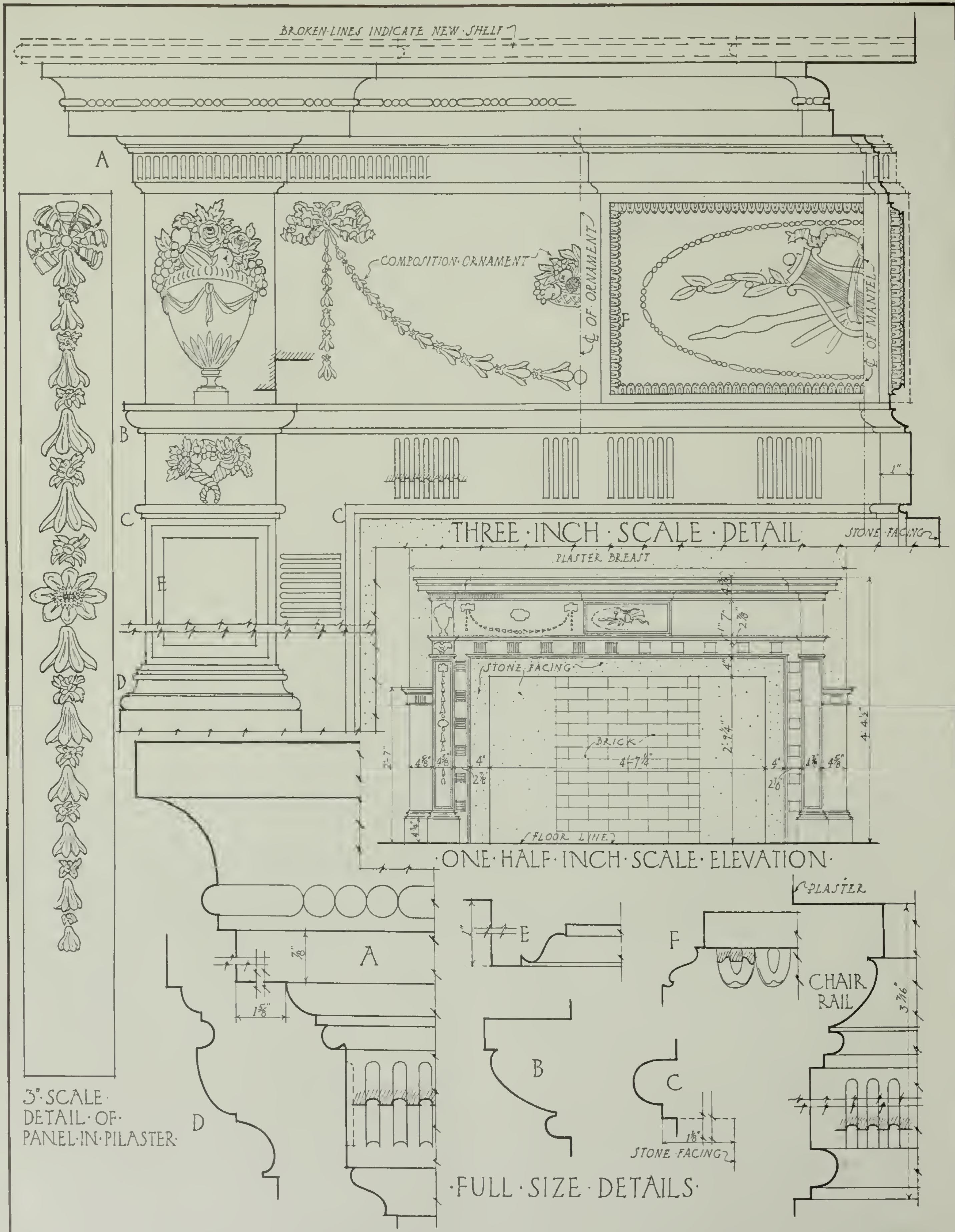

PLATE 4 APRIL - 1915	MANTEL·IN·CROWNINSHIELD·DEVEREUX·HOUSE ·SAMUEL·McINTIRE·ARCHITECT· BUILT·IN 1805 SALEM·MASS·	MEASURED· & ·DRAWN·BY· ·GORDON·ROBB· ·&·M·A·DYER·

ARCHIEPISCOPAL PALACE, PLASENICIA, ESTREMADURA, SPAIN
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THE BRICKBVILDER

VOLUME XXIV APRIL, 1915 NUMBER 4

Plumbing Installation and Sewage Disposal.

I. SOIL, WASTE, AND VENT PIPES AND TRAPS.

By CHARLES A. WHITTEMORE.

MANY problems in plumbing and sewage disposal are so comprehensive in scope that the service of an expert on these subjects is mandatory. Many of the problems are also of such a nature as to demand the attention of a trained biologist. With these the architect seldom comes in contact except to arrange the features of disposal plants along architectural lines. The object of this article is to present some of the principal facts in connection with the everyday plumbing problems which are met in every architect's office. Too many times plans for buildings are drawn, contracts let, and construction commenced without proper regard for such vital factors as the arrangement of pipes, proper spacing, and means of concealing the rough work. This statement may seem trite, but evidences of such facts may easily be seen in many of our best buildings.

The ideal plumbing installation is one in which the sanitary conditions are perfect, where all noise of water action is eliminated, where the piping is concealed, and where all the exposed parts of the system are so arranged as to have the minimum number of dirt catching places which may be breeding spots for germs. Seldom is it possible to obtain all the requisites of such an installation in one building; but by giving a little more thought to details which may seem unimportant it is possible more frequently to approach the standard of perfection about which much has been written.

Every architect has probably had the experience of advancing ideas in regard to the practical installation of plumbing work, only to be met by the plumber's statement, "It can't be done that way." Many times the plumber may be correct, but all too frequently his decision is based on the fact that to carry out the architect's ideas would involve a little more labor, even though it would give better results. A familiarity with the plumbing laws, and a little study into the practical requirements, would enable the architect to controvert statements not of fact and demonstrate the practicability of his requests.

In many cases it is wiser, no doubt, to leave matters of detail of installation to the judgment of the plumber contractor; but it is imperative that in matters of arrangement of pipes and fixtures the architect should have sufficient knowledge to be able to insist that work should be installed as best adapted to the general scheme of the project in hand. A little knowledge in some cases may be dangerous, but a little more knowledge may be the means of adapting the plumbing to the building rather than building around a plumbing installation.

The number of times that a partition has been changed, a door shifted, or a room rearranged because the architect had laid out his work contrary to the laws governing the installation of plumbing, is far too great to indicate that architects in general have given the requisite amount of consideration to this important part of a building operation. There are but few architects who are not familiar in a general way with the building requirements of strength and stability and general construction under which they work, and but few who are conversant with the plumbing requirements which are so vital a part of the same laws.

Too frequently plumbing questions are left to be worked out at the building. It is just as important that the course of a conductor pipe or soil or vent should be traced from the roof to the sewer, and the various traps and fixtures located when the plans are being drawn, as it is that the loads from the roof should be traced through the construction to the foundations. This may seem debatable, but in a harmonious, complete, and well built building the fact is obvious.

General knowledge of the various divisions of a plumbing system is so universal that a table of definitions would be superfluous in an article of this character. The process of manufacture is also a portion of specialized study which need not now be considered. It is, however, important to consider the practical side of placing pipes of various kinds, their functions, limitations, and general arrangements, and also to consider advantages or disadvantages of the different types of plumbing material and fixtures which now are in general use.

Soil pipes, which are those pipes carrying the discharge from closets or into which waste pipes are connected, if of iron, should be of the grade known as extra heavy. The "standard" or lighter weight pipe is never used in the best work. The "extra heavy" is usually cast with a raised "XH" on each length and should weigh not less than 2¾ pounds per inch of diameter for 2-inch pipe; not less than 3¼ pounds per inch of diameter up to 7 inches, and for larger sizes up to 12 inches, not less than 4¼ to 4½ pounds per inch of diameter. Tables giving the exact weight for various sizes may be found in any good handbook. These pipes come in two forms,— coated or uncoated. Coated pipe is treated with hot asphalt or pitch both inside and out and offers more resistance to corrosive action than the plain pipe. Some plumbing regulations, however, will not allow coated pipe to be used, but insist on plain pipe. The object of using uncoated pipe is that tests may be made to determine whether or not flaws in the nature of sand holes exist, which may be more readily tested in the uncoated than in the coated pipe, and also that imperfections may not be covered over and later develop a serious defect. The uncoated pipe should, however, never be used without being painted both inside and out with red lead or some equally good protective paint, after being thoroughly tested with oil.

In connection with the use of cast iron pipe, all the fittings should be of the same grade; that is, with the extra heavy cast iron pipe extra heavy fittings should be used, and where uncoated pipe is specified or required by law — as in New York and some other cities — the fittings should be uncoated also. These fittings, as well as the pipe itself, should be examined to ascertain if the pipes are cylindrical and smooth inside and also be examined for cracks, sand holes, presence of slag, and other detrimental features. It is advisable in using cast iron pipe to specify the maker's name and see that each length of pipe and all fittings used are stamped with the same marks of the manufacturers.

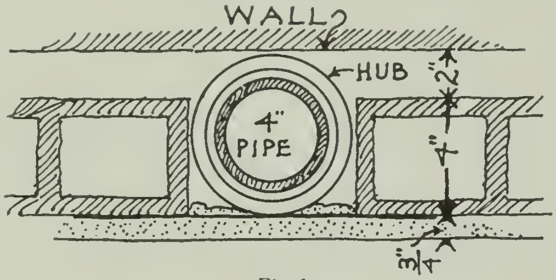


Fig. 1
Plan Showing Minimum Furring to Conceal 4-Inch Soil Pipe

Next in importance to perfect pipe in making a plumbing system gas tight is the method of connecting the various sections. Joints between lead pipe and iron pipe should be made with heavy brass ferrules; between lead and lead, or lead and brass, the joints should be wiped joints; joints between outlets of trap waste or vent pipes should be all screw joints. Cup joints, slip joints, or union joints should never be allowed, nor should leather packing or putty be allowed in connection with any air, vent, soil, or waste pipes.

In making up joints in cast iron pipes the spaces between the hub and spigot end should first be filled with a ring of picked oakum which should be well pounded in place. Molten lead should then be poured in and well hammered with calking tools to expand the lead and ensure tight contact with the iron. In the best practice a second layer of picked oakum and a second layer of lead is insisted upon in order to make positive that the joint is thoroughly gas and water tight. In making connections with cast iron pipe where two pipes come together at an angle, the connections should be made with the proper T-Y or Y branches, and no branches at an angle less than 45 degrees with the main line should ever be allowed. All changes in direction of a soil line should be made with curved pipe, Y branches in which one leg of the Y affords an opportunity for a cleanout, or $\frac{1}{4}$, $\frac{1}{8}$, or $\frac{1}{16}$ bends.

Tile drain pipe should never be used in a building as a part of the main soil system, but is frequently used from a point 10 feet beyond the wall to the sewer. In residential work it should never be used in a position where the contents of the pipe might contaminate a water supply, or where it is likely to be subjected to the action of frost. The joints of this kind of pipe are so difficult to make permanently tight that its use is restricted to unimportant parts of an installation. In forming drains around walls to carry off surface water it is valuable, and also to form part of a general ground drainage system. In such cases the pipe is either vitrified or glazed and laid with open joints, or a porous tile is used.

The tile pipe used for sewer connections is made in two grades, — salt glazed and "slip glazed" or coated. Salt glazed pipe is composed of a clay which vitrifies on both outside and inside when it is fired, and is preferable in all sewer or soil work because the glazing is not subject to the imperfections so frequently found in coated tile pipe. When the salt glazed pipe is used, however, the inside of the hub and the outside of the spigot end, if left unglazed, form a good surface to bond the cement used in making the joint. When the pipe is glazed on both hub and spigot, the joint should be filled with a layer of picked oakum well calked in place and the remainder of the space filled with a good cement or hot asphalt. The asphalt is more elastic and in places where there is possibility of the pipe moving, as in case of settlement of the earth around it, should be used in preference to the cement.

The slip glazed or coated tile pipe is formed of a soft clay with a coating of vitrifying clay applied to the surfaces before firing. The principal objection to this kind of pipe is due to the fact that the coating does not become an integral part of the pipe and in use is likely to become damaged, leaving the unvitrified, porous pipe exposed.

An important problem in the installation of soil pipe, wastes, vents, etc., is to so arrange these pipes as to be economically spaced and still be concealed from view. Many architects, in laying out their work, overlook the fact that 4-inch pipe is $5\frac{3}{4}$ to 6 inches over the hubs, and that while 4 inches of furring with an inch of plaster against a brick wall would thoroughly cover the larger portion of pipe, the hubs and fittings will all project through the finished plaster surface unless precautions are taken to ensure their concealment. Fig. 1 shows the closest possible arrangement where pipes come in contact with a furred brick wall, under which conditions a 4-inch soil pipe may be concealed. Provision should always be made so that joints may be calked when the pipes are in position, as frequently it is impracticable to make up long lengths of pipe and thus eliminate the calking of joints after the pipes have been erected.

Aside from the difficulty of concealing vertical lines of the pipe, the horizontal run-outs require the most attention. In arranging to avoid skeleton construction or beams, or to come within the thickness of the floor construction, particular care must be taken.

Where concrete construction is used, the main difficulty in installing the horizontal branches comes in connection with the calking of the joints. The pipes cannot be made up and cast into the floor slab on account of the necessity of removing the wood forms and the extra difficulty attendant upon this process if pipes or other construction materials are in the way. In order to gain the greatest amount of space, the bends, or fittings which extend from a main soil branch to take the various fixtures, should be arranged so that the joint in the hub of the fitting which comes in contact with the length of pipe passing through the floor should never be closer than 4 inches to the under side of the concrete slab, and even in this case a special bent calking tool will be required, or the joint should be calked from above. It should always be borne in mind that wherever a soil pipe passes through a floor and a branch main is taken off for fixtures on this floor, the extension of the branch main, if there are more than one or two fixtures on it, requires a vent of the same size as the pipe itself. This pipe must extend full size from the lowest branch up through the building to a point above the highest fixture, and there either be connected with the extension of the original soil pipe or be carried independently through the roof as a vent.

The waste pipes are known in practice as the pipes carrying the waste water from fixtures such as lavatories and sinks. These pipes are usually of galvanized wrought iron or iron size brass, although in many instances a small size cast iron pipe is used. Lead pipe should never be allowed for waste, vent, or soil pipes.

Wherever the cast iron waste or vent pipe is used, the same considerations as noted above apply in making up the joints. Wherever galvanized or wrought iron pipe is used, the joints are made up with threaded couplings, in which case the thread should be cut so that the ends of the pipe, when finally assembled and placed in position, will be in contact inside of the fittings, or else special recessed fittings should be used. These joints should be made up with red lead or white lead in order to ensure their being gas and water tight, and care should be exercised to see that all burrs are reamed out.

There are special fixtures which may be used on a waste pipe in order to take branches coming from opposite sides, as, for instance, in office buildings where bowls are located on opposite sides of a partition. For such places a double T-Y or a special vent fitting is used, and the wastes and vents are taken from the same connection. Where waste lines extend through several floors with bowls on opposite sides of the same partition, as in an office building with various floors divided in the same manner, the fixture wastes occasionally are connected to the soil stack on one floor, to the vent stack on another floor, and so on. This construction is somewhat simpler and more readily ensures the cleansing of rust or scales or anything that might lodge in the vent stack. The conditions from a sanitary standpoint are as good as though separate soil and vent lines were run and connected in the usual manner.

In installing waste pipes, soil pipes, and also vent pipes in very high buildings, the vertical pipes should not be rigidly connected to the construction. A slip support should be used to permit a slight movement in the connection, in a vertical direction, if any settlement should occur in the building or if any undue expansion should take place in the pipes themselves.

The vent pipes are pipes installed to relieve the air pressure from the main soil stacks and to prevent siphoning of traps and also to allow the free passage to the open air of any gases that may originate in or enter the system. The sizes of the vent pipes follow regular defined laws, and where soil branches are used should be the same size as the soil branch pipes. In other words, a continuation of the soil line forms the vent. The vents from smaller fixtures such as sinks, lavatories, etc., are smaller in size and are most frequently galvanized or wrought iron, with the fittings of the same material. The vent pipes should enter the main vent stack at a point not less than 3 feet above the seal of the trap, and the vent should be taken from the high point of the trap. According to the best practice, vent connections for closet and slop sinks should be made from the branch soil or waste pipes just below the trap of the fixture and in such a manner as to prevent obstruction. No other waste pipe should be connected between this vent and the fixture.

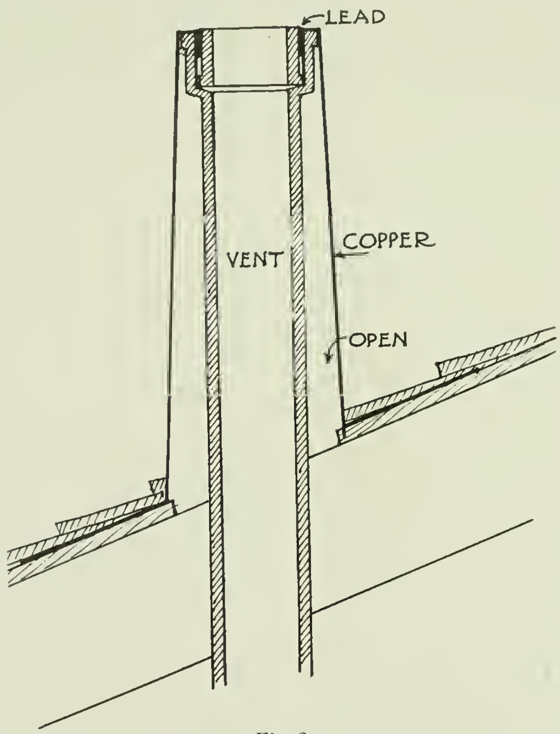


Fig. 2

Section Showing Copper Collar to Prevent Leakage Around Soil Pipe

The end of vent pipes should never be connected to a chimney, as the evaporation of the seal of traps is much more readily accelerated and thus allows gases more easily to enter the building. The vent pipes should always extend through the roof and should be made 1 inch larger in size than the main vent stack, but never less than 4 inches in diameter. The fittings for all vent lines should be of the same material as the vent pipe lines, and no offsets should be made on an angle less than 45 degrees to the horizontal. Every vent line should be connected at the bottom with a soil or waste pipe, or a drain in such a manner as to preclude the possibility of an accumulation of dirt or rust scale. Accumulations of this character are never to be encountered in pipes through which water is continuously flowing. Vent pipes are subject to corrosions due to the moisture and gases which they themselves carry off, and this increases the likelihood of rust scales forming which would fill the pipe unless proper precautions are taken to prevent it.

No vent pipes less than 1½ inches should be allowed; and up to 3 inches in diameter should be galvanized wrought iron pipe, plain wrought iron pipe being subject to deterioration through rust. All vent pipes 3 inches and larger in size should be extra heavy cast iron.

Where the vent pipes pass through the roof, the joint and flashing must be made with special care to prevent leakage. There are various methods of constructing this connection. The more common and less expensive method is that in which a copper or lead sheet is secured to the roof below the finished surface. To this is soldered a collar which extends about 6 inches above the roof. A counterflashing of the same material is secured to the vent pipe by a soldered joint or by a joint formed with a tight gasket of lead and secured by means of an iron clamp. This counterflashing prevents leakage and moves with the expansion and contraction of the pipe.

Another method shown in Fig. 2, which is more perfect but more expensive, is to extend the pipe above the roof 2 or 3 feet with a copper collar carried the full height of the pipe and leaded into the hub at the top. A still better construction is to use a "double hub" shown in Fig. 3. The hub is slipped over the pipe and secured about 6 inches above the roof, the lower hub being set over the copper collar referred to in the first method. The upper hub is then calked in place in the same manner as in making up a joint in cast iron pipe. This ensures a thorough, lasting joint in which the possibility of leakage is very remote.

The traps used in connection with plumbing fixtures are from the standpoint of sanitation a most important part of the installation. If the remainder of a plumbing system is perfect, the value of the good work may be completely nullified by the use or improper installation of the fixture traps. The standards by which the merit of a trap may be judged are: first, the resistance offered to the breaking of the seal and thus allowing the sewer gas to pass into the building; second, the volume of water forming the seal; third, the ability of the trap to cleanse itself at each flush of water passing through.

There are two general types of traps, — the siphoning and non-siphoning. These terms do not apply to the method of installation alone, although a siphon trap may be installed in such a manner as to be non-siphoning to a certain degree. The difference between them lies principally in the manner in which they are constructed. Ordinary or siphon traps have a perfectly smooth bore their entire length, while the non-siphoning traps are usually arranged with a large water capacity or of a special shape so as to prevent the air pressure from becoming great enough to force or draw the water out of the trap.

The simplest form of trap is the U-trap. In this the seal is that part of the U which lies below the bottom of the straight pipe and is at all times full of water, thus preventing the gases in the drain from entering the building through the fixtures. It is not a satisfactory type for general use, because the seal is easily broken and because the volume of water will not be sufficient protection against loss of seal from evaporation.

The seal of a trap may be broken in three ways: by evaporation, by siphoning from the mass of water passing through the main soil stack, and by self-siphoning from the mass of water passing through the trap itself.

Evaporation may be overcome by providing a sufficient body of water in the trap to protect the trap if not in use for a considerable period. The rate of evaporation may easily be estimated so that the length of time the seal will remain intact if no water is passed through it may be accurately determined. It is far better in cases where traps are likely to be in disuse for some time to have the water taken out and a non-volatile fluid put in. For example, where summer residences are left without attendance during the winter, the trap should be cleaned out and petroleum, kerosene, or a similar non-volatile and non-freezing oil should be put in to keep the seal intact. In planning work this point is frequently overlooked and consequently no adequate provisions are made so that easy access may be had to the traps. In one such case the plumber was forced to tear up a considerable portion of a finished floor in order to get at the traps to fill them with oil. Such occurrences would not take place if a little more thought were given to the practical requirements.

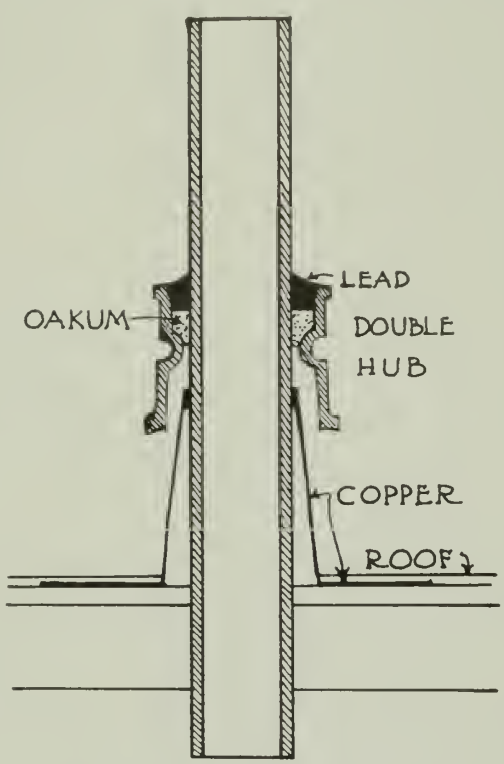


Fig. 3

Section Showing Arrangement of Double Hub to Prevent Leakage Around Soil Pipe

If traps are installed so that the outlet from the trap connects with a waste pipe at an angle less than 45 degrees, the possibility of self-siphoning is great, particularly if there is a long run to the soil pipe. The flow of water through the trap forms a suction which is greater than the resistance offered, and the seal is broken. To obviate this, vents are installed and connected to the crown of the trap or to the waste pipe just below the trap outlet. The vent at the crown is objectionable because it facilitates the evaporation of the seal, but this objection is not great when the trap is in frequent use.

If ordinary traps are installed without vents and only a short distance from a soil stack, there is a possibility that the volume of water in the stack may exert sufficient force on the branch pipe to pull the water from the trap. This possibility is very remote when vents are installed.

Some Old and Unfamiliar Spanish Buildings.

VI. PALACIO ARZOBISPAL, NOW ARCHIVO HISTORICO, ALCALÁ DE HENARES.

By ARTHUR G. BYNE.

Illustrated from Photographs Specially Taken by the Author.

THIS palace was the Alcalá residence of the archbishops of Toledo, who were primates of all Spain. The two who, in the middle sixteenth century, commissioned the architect Covarrubias to build it were Fonseca and Tavera. The former was the son of that bishop Fonseca who had left several fine buildings in Salamanca. The architect was son-in-law to the great transitionalist in Spanish architecture, Enrique de Egas. Covarrubias gave Spain its finest Renaissance buildings.

His plan for the Archiepiscopal palace at Alcalá called for four great patios, but only the one illustrated was ever completed. Each patio was to have a monumental staircase, but only one — the one shown — was finished. Even incomplete, this edifice, with its splendid carving and rich Mudéjar ceilings, comes nearer to the best architecture of Italy than any other building in Spain. It is, nevertheless, unmistakably Spanish because of that subtle freedom, almost carelessness, which imparts a distinctly *un*Italian charm to the best Renaissance ornament in Spain. In the carving this carelessness is paradoxical, for it shows an unerring precision of touch, such as a skilful impressionist working in clay gives at the last moment.

It is interesting that Covarrubias, with his obvious familiarity with Italian Renaissance, should have been content to forego the façade and concentrate all his ingenuity on beautiful interior courts and galleries. Nothing on the exterior of this Alcalá palace suggests even remotely the magnificence of the interior; and this because the architect could not, or did not care to, break away from the Mussulman tradition that still prevailed in domestic architecture — a simple exterior with gradual increase of luxury, surprise, even mystery, on entering. This adherence by Spanish builders to the Moorish idea is one reason why much of their Renaissance is adaptable for terra cotta — it is an enclosed architecture where richness of modeling in ornament can be appropriately practised.

The doorway reproduced here is under the patio arcade between the main entrance and the grand stairway. It leads to a small antechamber and is surmounted by the arms of Cardinal Tavera. Few architects are aware that such pure Renaissance as this doorway with its artistic reserve could be found outside of Italy; least of all in Spain, where Renaissance is so seldom sober and restrained. As for the patience that went into the ornamental rustication, it is doubtful whether an equal exhibition of perseverance could be found even in Italy. If all the workmen who executed it were not painstaking Moriscos, there were enough of these at any rate to set the example.

These blocks are carved with consummate skill and show an infinite variety of design, with mythological winged figures predominating. If any two blocks are alike in detail, they are placed too far apart to be easily detected.

Rustication was never as popular in Spain as in Italy, and when used it was not in the structural way of the Italians, but merely to ornament a stone surface. This is undoubtedly why the whole motif makes one think of terra cotta. Not a very large area has been carried out, however, for hard times came upon Spain before Covarrubias' entire scheme for a sumptuous palace could be realized.

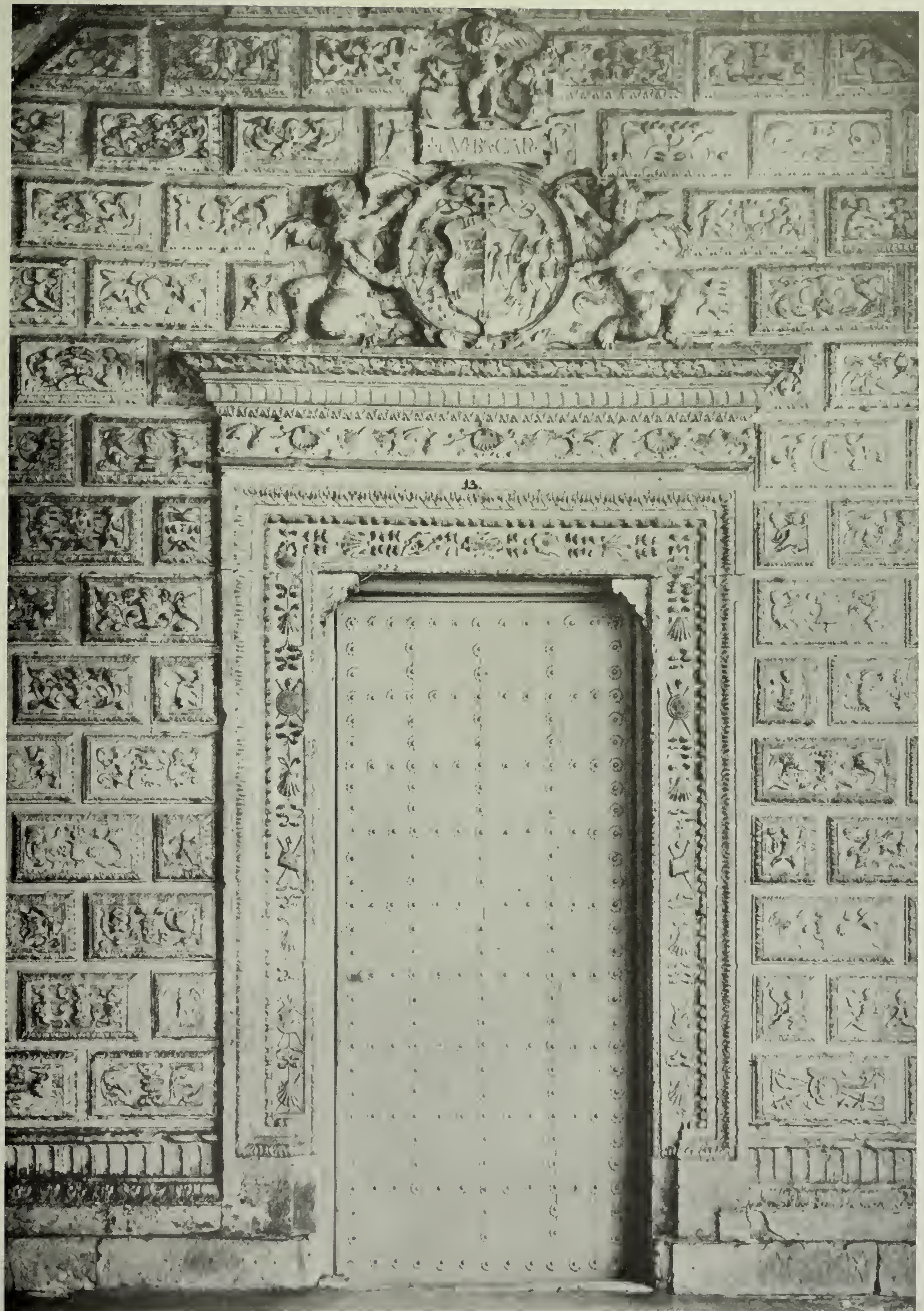
The staircase, of which the upper part is illustrated, shows besides unmistakably plateresque ornament, certain eccentricities of construction that could never be found in the native land of Renaissance, since they arise from an amusing misunderstanding of her motifs. The balusters, for instance, instead of being individually turned and carved, are carved in groups of three from a single block with a central piece left to connect them; in other words, it is a Gothic method of arriving at a Renaissance form by means of perforation. Covarrubias grasped the decorative value of the spindle, but never dreamed of treating each one as a unit; he constructed his stair balustrade exactly as his Gothic father-in-law had done at Toledo. Oddly enough, this construction that seems so strange in stone would be the most logical method were the material terra cotta.

One regrets the Moorish influence that allowed the architect to break his arch in three; fortunately, the pure arch only is used in the lower arcade of the patio. This arcade is beautifully built, not with a masonry vault, but with a light wooden ceiling of the Moorish, or rather Mudéjar, type, Mudéjar being the term applied by the Spanish to the work done for them by those Moorish artisans who remained in the country after the fall of Granada.

The upper colonnade and cornice are a very typical bit of Spanish Renaissance. The double corbel over the column traces its pedigree straight back to the extra wooden beam with carved ends which was used as a support by all Moorish builders. The whole treatment of the upper gallery, in fact, is a stone interpretation of a wooden loggia, as seen in the best preserved Moorish palaces. The walls here are merely of plaster, but with a dozen or so of fine doorways inserted. These are cut in stone and are as effective as the one given. All vary in detail.

An architect who could put up with the meager accommodations of the Alcalá inn could busy himself for a week in this old *Archivo* — not over the many precious documents it contains, but in studying the vast wealth of suggestions in the small completed portion of the Bishops' palace.

UPPER PART OF STAIRCASE
PALACIO ARZOBISPAL, ALCALÁ DE HENARES, SPAIN



DOORWAY IN PATIO

PALACIO ARZOBISPAL, ALCALÁ DE HENARES, SPAIN

DETAIL OF LOGGIA

PALACIO ARZOBISPAL, ALCALÁ DE HENARES, SPAIN

Design and Construction of Roof and Wall Trusses.

II. LOADS AND THEIR APPLICATION, STRESSES, AND DIMENSIONS OF MEMBERS AND DESIGN OF CONNECTIONS.

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ALL trusses should be so designed that the loads imposed upon them shall be concentrated at their apexes, that is, at the points where the members of the truss meet. This arrangement produces only direct tension or compression in the truss members. If loads are applied between the apexes directly to the truss members, such members must be designed for cross-bending stresses as well as for direct stresses. For light roofs, however, it is customary to support purlins between the apexes of the top chords of trusses. Usually this practice should not be followed.

The actual weights of roof covering, roof framing, etc., as well as of ceilings and floors, are readily determined, and the proper amounts to be placed at the truss apexes decided upon. The weight of material in a single truss is found either from tables of weights or by means of an empirical formula. For spans between 40 and 125 feet, wooden trusses weigh from 3 to 10 pounds per square foot of roof surface, and steel trusses weigh from 5 to 14 pounds per square foot of roof surface supported. The smaller weights are for trusses supporting roofs of half pitch, and the larger weights for trusses supporting flat roofs.

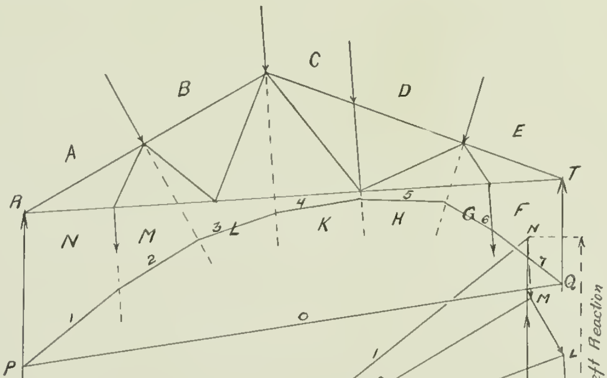

Fig. 41

The weight of snow which is likely to remain on the roof depends upon the pitch of the roof and local climatic conditions. Roofs of half pitch will not retain snow unless snow guards are used. It is seldom that a snow load exceeding 30 pounds per horizontal square foot of roof is assumed, even in New England and the Northern States. In Chicago 20 pounds is assumed as snow load and in St. Louis, 10 pounds.

The actual effect of wind upon a roof truss is almost an unknown quantity. The general practice is to assume a wind pressure of 30 or 40 pounds against a vertical surface and then reduce this force to a force normal to the roof by an empirical formula. Using 30 pounds as the normal pressure against a vertical plane surface, the normal pressure on a roof of one-sixth pitch is 13 pounds; one-fourth pitch, 18 pounds; one-third pitch, 22 pounds, and on a roof of one-half pitch, 27 pounds. These values are per square foot.

Mr. C. C. Schneider, in his "General Specifications for Structural Work of Buildings," states: "In climates corresponding to that of New York, ordinary roofs, up to 80 feet span, shall be proportioned to carry the minimum loads in Table VI per square foot of exposed surface, applied vertically, to provide for dead, wind, and snow loads combined.

TABLE VI.

MINIMUM LOADS ON ROOFS.

Gravel or Composition Roofing	
On boards, flat slope, 1 : 6 or less	50 pounds
On boards, steep slope, more than 1 : 6	45 ,,
On 3-inch flat tile or cinder concrete	60 ,,
Corrugated sheathing on boards or purlins	40 ,,
Slate on boards or purlins	50 ,,
Slate on 3-inch flat tile or cinder concrete	65 ,,
Tile on steel purlins	55 ,,
Glass	45 ,,

"For roofs in climates where no snow is likely to occur, reduce the foregoing loads by 10 pounds per square foot, but no roof or any part thereof shall be designed for less than 40 pounds per square foot."

The stresses found by using the loading specified above are usually larger than those obtained by combining the stresses produced by the various loadings considered separately.

STRESSES IN TRUSS MEMBERS.

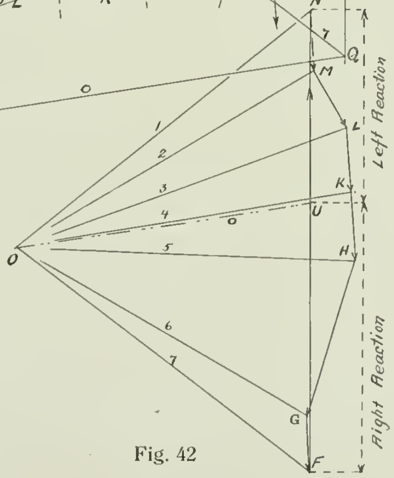

Fig. 42

The determination of the stresses in the truss members is not difficult, even when the trusses are not symmetrically shaped about the center of the span, and when the loads are not parallel and equal. Many text books and pocket books explain graphical and algebraic methods for the determination of stresses. Nevertheless, the following routine method, on account of its general application, may not be out of place here.

In Fig. 41 is shown an unsymmetrical truss with unsymmetrical loading. The first step towards finding the stresses produced by the loads is the determination of the reactions at the supports. Between the supports draw a horizontal line RT (in this case the line follows the bottom chord of the truss) and prolong the directions of the load forces as shown by the dotted lines, and then place the letters N, M, L, etc., in the spaces between these lines as shown. In Fig. 42 lay off to scale the forces in their proper magnitudes and directions as shown by the broken line NML ----- F and draw FN. This line gives the direction of the reactions at R and T, as shown by the lines PR and QT, Fig. 41. In Fig. 42, from any convenient point O draw the lines numbered 1, 2, 3, 4, etc., and then in Fig. 41, beginning at P, any point on PR, draw the lines 1, 2, 3, 4, etc., parallel to the corresponding lines in Fig. 42. Join P and Q in Fig. 41, and draw OU in Fig. 42 parallel to this line; then FU represents the reaction or supporting force at T, and UN that at R.

The forces acting upon the truss may now be represented as shown in Fig. 43. Beginning with the force AB, lay the forces off in order as shown in Fig. 44, and then construct the stress diagram in the usual manner by drawing lines parallel to the truss members so that the lines meeting at a point in Fig. 43 shall, with the external forces at that point, form a closed polygon in Fig. 44. The lines in Fig. 44 represent the stresses or forces acting at the apexes of the truss. For example, AK in Fig. 44 represents the stress in the truss member between the letters A and K in Fig. 43. The character of the stress is found as follows: separating the stress polygon NAK from Fig. 44, as shown in Fig. 44a, the direction of NA is known, and, in order that the figure may be a closed polygon, AK and KN act as shown by the arrowheads. Transferring the directions to Fig. 43, the kind of stress is at once evident, AK is in compression and KN in tension. Figs. 44b and 44c are similar stress polygons separated from Fig. 44.

In case there is a set of rollers at one support, the reaction or supporting force is vertical in direction, and its magnitude equals the vertical component of the corresponding reaction as found in Fig. 44.

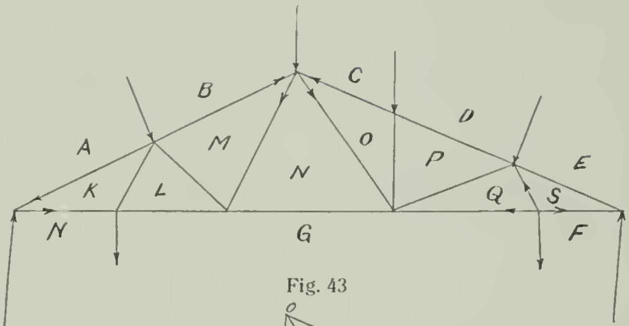
Fig. 43

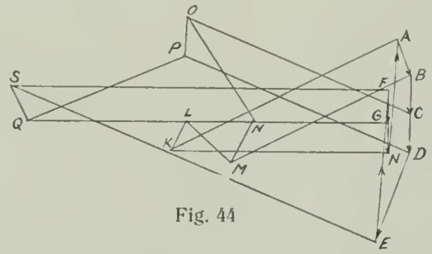
Fig. 44

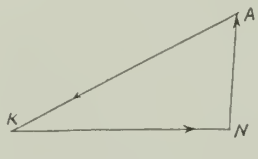
Fig. 44a

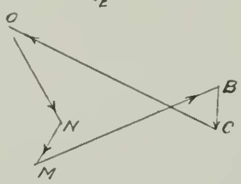
Fig. 44b


Fig. 44c

Dimensions of Truss Members and Design of Connections for Wooden Trusses.

Compression Members. The safe stress which a compression member can transmit depends upon the shape of its cross-section, its unsupported length, and its area. Timbers of the same area and length have quite different carrying capacities. For example, a piece 1 by 4 inches, 6 feet long, will not support as great a load as a piece 2 by 2 inches which has the same length. The piece having the *least dimension* is the weaker. Again, if the sticks are of the same section, the longer piece will not support as great a load as the shorter piece. A 1 by 4 inch piece, 12 feet long, is not nearly as strong as a piece 1 by 4 inches, which is 6 feet long.

It is customary to proportion compression members by the application of an empirical formula which gives in a particular case the load *per square inch* for given values of *unsupported lengths* and *least dimensions*. The unsupported length is usually the distance between the apexes at the ends of the piece, but this is not the case where there is no framing to prevent deflection sidewise. Trusses should be braced in pairs at each apex of the compression chords; the neglect of so doing has been the cause of a number of accidents. The *least dimension* is the smaller of the two dimensions of the cross-section of the piece, and the *actual size* of the stick should be used. There are numerous tables published which give the total loads for timbers of market sizes and of various lengths. Such tables should not be used unless they are based upon the *actual sizes* of the timbers and not upon the nominal sizes as is generally the case.

In case the compression member is made up of several pieces as, say, six planks 2 by 12 inches to form a member 12 by 12 inches, the pieces must be securely fastened together by bolts spaced not more than *fifteen* times the smallest dimension of a piece. That is, a 2-inch piece must have bolts spaced not over 30 inches apart.

Good practice limits the maximum *unsupported length* of compression members to 30 times the least dimension. Portland, Ore., specifies 20 in place of 30.

There is no universal formula for wood in compression, which is somewhat remarkable when one remembers that wood has been used in structures from earliest times. Looking over the building laws of about thirty-one cities, sixteen different formulæ are found. The American Railway Engineers Association has adopted the following formula as a standard: The strength per square inch of a column, strut, or any piece in compression equals $B(1 - L/60D)$, where B is the compressive strength per square inch on the end fibers of a piece not over 15D long, L the unsupported length of the piece, and D the least dimension of the strut. B is expressed in pounds per square inch and L and D are expressed in the same unit, usually inches. The safe values of B are given in the building laws of several cities, and when used in the above formula the results are conservative.

Tension Members of Wood. The tension members of wood cannot be proportioned independently of their connections, as the connections at the joints or apexes require considerable cutting in the way of notches and holes. This will be considered in conjunction with the design of splices and other connections.

Tension Members of Wrought Iron or Steel Rods are commonly employed for certain web members of wooden trusses. They are usually made of round rods having threads for nuts at both ends. There must be sufficient area at the root of the threads to safely carry the tensile stress imposed. The customary unit stresses are 12,000 pounds per square inch for wrought iron and 16,000 pounds for steel. A considerable saving in weight is made by upsetting, or enlarging, the ends of the rods, so that the area at the root of the threads is a little in excess of that of the body of the rod. If upsets are used on steel rods, they must be very carefully made, or the rod will be considerably weaker than the net area indicates. This is due to the fact that steel is injured in the process of upsetting. If the *entire rod after being upset* is properly annealed, there can be no objections raised against its use. Upsets on wrought iron rods are much more reliable than those on steel rods.

Splices for Wood in Tension are of many forms, of which only a limited number can be critically considered.

One of the older forms of splice is shown in Fig. 45, and is made, practically, entirely of wood, as the bolts shown have little to do other than to keep the pieces in place. This splice may fail in direct tension at the smallest section of the main member, or the splice plates, or in compression on the end fibers at the notches bf, or by longitudinal shear along the planes ab or fg. To design this splice, let

T = the permissible tension with the grain of the wood,

C = the permissible direct compression with the grain of the wood,

C_x = the permissible compression across the grain of the wood,

S = the permissible shear with the grain of the wood, and d = the diameter of the bolt holes.

All stresses are expressed in pounds per square inch and all dimensions in inches.

If the depth D of the member is assumed, then the proper values of w, t, and l are found from the relations:

(D — 2d)Tw = total tensile stress, (1)
2(tD)C = total tensile stress, (2)
and 2(lD)S = total tensile stress. (3)

In the building laws of Chicago, 1913, for short-leaf yellow pine, T = 1,000, C = 800, and S = 120. Assume the total stress as 24,000 pounds and D as 7½ inches, then if ¾-inch bolts are used with a driving fit,

(7.5 — 1.5) 1,000w = 24,000, or w = 4 inches;
2(t 7.5) 800 = 24,000, or t = 2 inches,
and w + 2t = 4 + 4 = 8 inches.

This fixes the minimum size of the main member as 8 by 10 inches nominal size, or 7½ by 9½ inches actual size. In this particular case the same size piece is required if D is assumed 9½ inches.

The distance fg is found from equation (3). 2(l7.5)120 = 24,000, or l = 13.3, say 14 inches. This expression ignores the surface lost through the bolt holes and also the additional strength due to the bolts. If the splice bars are of the same kind of wood as the main member, ab = fg and e is a half of w, approximately.

This design assumes that there are no other connections. If, as is often the case, the splice is located at a joint, then allowance must be made for any cutting which reduces any of the areas found above.

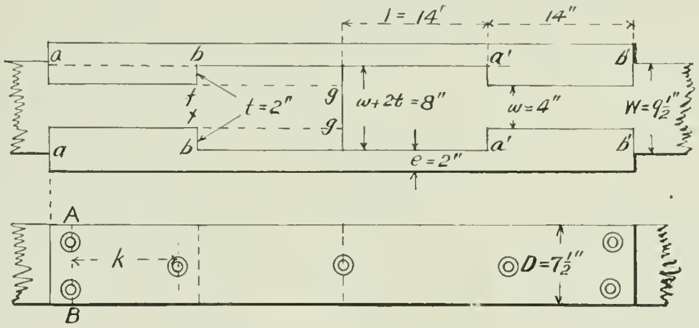

Fig. 45

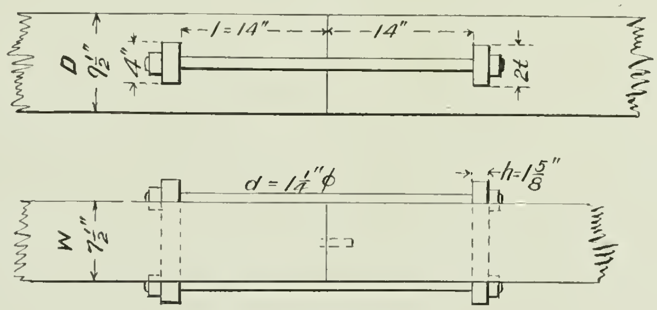

Fig. 46

Fig. 46 shows a very efficient splice. The two rods and cross bars are made of rolled steel. If the permissible tension for steel is 16,000 pounds per square inch, each of the rods is 1¼ inches in diameter if the total stress is 24,000 pounds. The total area of wood in end bearing for one cross bar is found from the equality 7.5(2t)800 = 24,000, or 2t = 4 inches. The thickness of a cross bar is determined by its cross-bending strength and can be found from the expression, (2d + W) (total stress) / 8 = 16,000 (2t) (h^2)/6, where the permissible fiber stress for steel is 16,000 pounds per square inch. For the splice shown in Fig. 46, (2.5 + 7.5) (24,000)/8 = 16,000 (4) (h^2)/6, or h = 1⅝ inches.

The distance of each bar from the end of the piece it is in is 14 inches, corresponding to the distance l in Fig. 45.

The splice shown in Fig. 47 is suitable for exposed trusses. The steel plates are each ¼ inch thick and the bearing bars 1 by 3 by 7½ inches, the total stress being 24,000 pounds. These are attached to the side plates by two ¾-inch rivets in each bar. The ¾-inch bolts or lag screws hold the pieces in place and counteract the tendency of the bearing bars to rotate. This type of splice was used for the main trusses, 90-foot span, of the Forestry Building, Pan-American Exposition.

This splice (Fig. 47), requires facilities for countersinking holes and driving rivets. If bolts are used in place of the rivets, their size can be found as follows: Bolts ¾ inch in diameter will be safe in shearing and bearing on a ¼-inch plate, but to resist a bending movement 3,000 (½ + ⅛) = 1,875-inch pounds, for each end of each bolt 1-inch bolts are required. The use of bolts is not as satisfactory as the use of rivets. The rivets fill the holes in the plates and bars and are not considered as being subjected to bending stresses, while the bolts may or may not fit tightly in the holes and, consequently, must be considered as being subject to bending stresses.

When bolts are used as just explained, care must be exercised to have all threads well outside the plates. This necessitates the use of washers under the nuts.

If no bearing bars are used and the strength of the splice is made to depend upon the bolts and side plates, more bolts will be required, or the bolts must be larger. If only four bolts are used, the total stress and size of timber being the same as for Fig. 45, each bolt carries one-fourth of the entire stress, or 6,000 pounds. The bearing of a round bar against the ends of wood fibers may be taken as one-half that for a flat bar, or in this case 400 pounds per square inch. The diameter of each bolt is 6,000/(7.5)(400), or 2 inches for bearing. The total bending moment which must be taken by the four bolts is

24,000 (2t + W)/8 =
24,000 (0.5 + 7.5)/8
= 24,000-inch pounds, or 6,000-inch pounds for each bolt. This is considerably less than the capacity of a 2-inch bolt in bending.

The use of four 2-inch bolts makes a clumsy joint (Fig. 49) as the bolts must be spaced about five diameters apart and require large nuts, even when recess nuts or thin nuts with washers are used.

Nine 1⅛-inch bolts have a bending capacity of 25,200-inch pounds, and a bearing capacity against wood of 30,400 pounds, and against the ¼-inch plates a bearing value of 25,300 pounds. These bolts may be spaced 5½ inches apart as shown in Fig. 48. Washers must be used under all nuts in this type of splice in order that the threads on the bolts may be outside of the side plates.

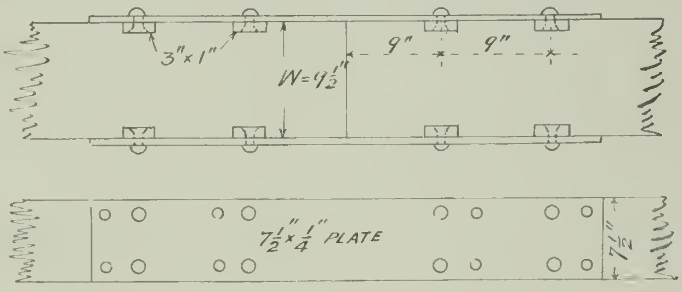

Fig. 47

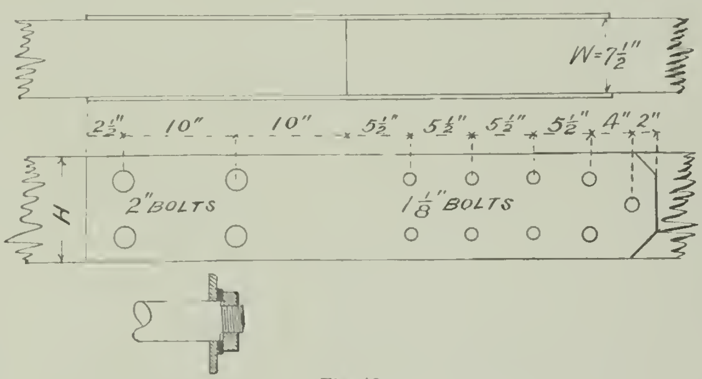

Fig. 48

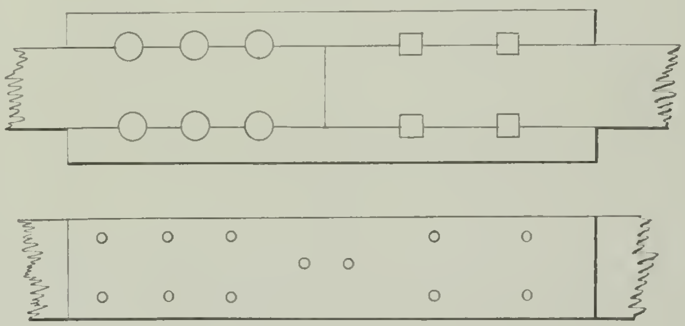
Fig. 49

A form of splice sometimes used for connecting tension and also compression members is shown in Fig. 49. Round pins made of very hard wood or metal are used as shown. The bearing against the end fibers of the wood is the same as for Fig. 48, if metal pins are used. If wooden pins are used, the bearing value across the grain of the wood of the pins governs. In order that the pins may be effective, the side bars are securely bolted through the main member and enough bolts used to resist in tension at least one-half the total stress in the main member. The square bars shown in Fig. 49 are much more efficient but require careful work in fitting them in place.

This splice is efficient as long as the bolts remain tight, but the round pins are especially inefficient if the bolts become loose due to the shrinkage of the wood.

Since the round bars have a tendency to roll and the square bars a tendency to rotate, small unit stresses should be used in designing this type of splice.

All of the splices described above are suitable for solid timbers. In case the tension members are made up of planks, the splicing is accomplished by arranging the planks so that the breaks in continuity of the strands do not occur at sections which are near together. Usually the equivalent of one strand of plank is required to splice the remaining strands. The use of spikes to fasten the strands together is preferable to bolts, as the tightness of the spikes does not appear to be affected by the shrinkage of the wood.

Splices for Wood in Compression. Members in compression composed of solid timbers are spliced by butting the squared ends and holding them in place by planks spiked or bolted to the sides of the timbers. Generally compression members are obtained full length, so that no splicing is necessary. If a splice is required, it should be located as near as possible to a truss apex or joint. Built-up compression members require no special treatment other than having the squared ends of the planks in each strand closely in contact and all thoroughly spiked.

MAIN ENTRANCE

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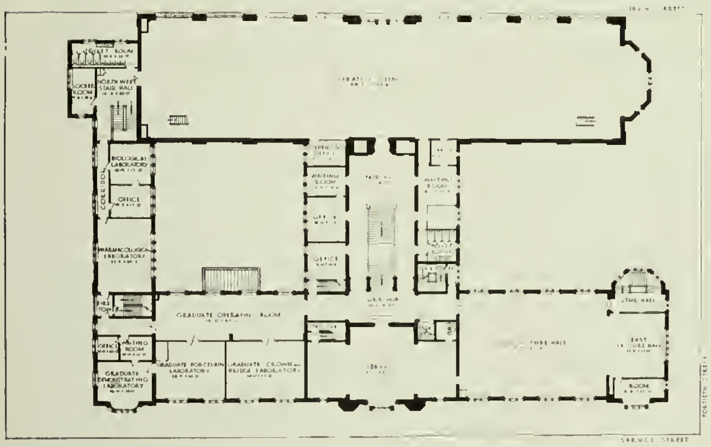
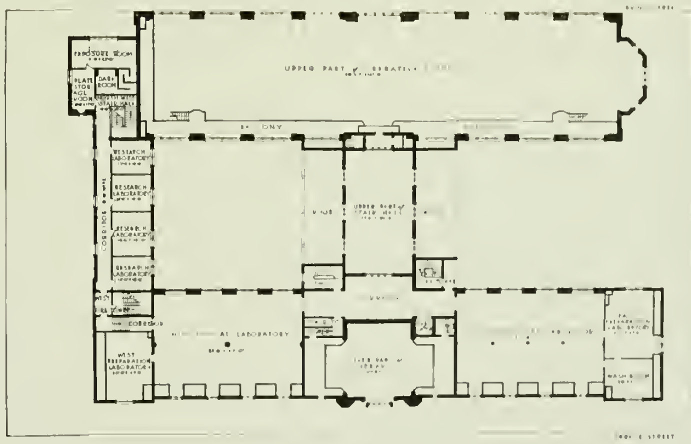
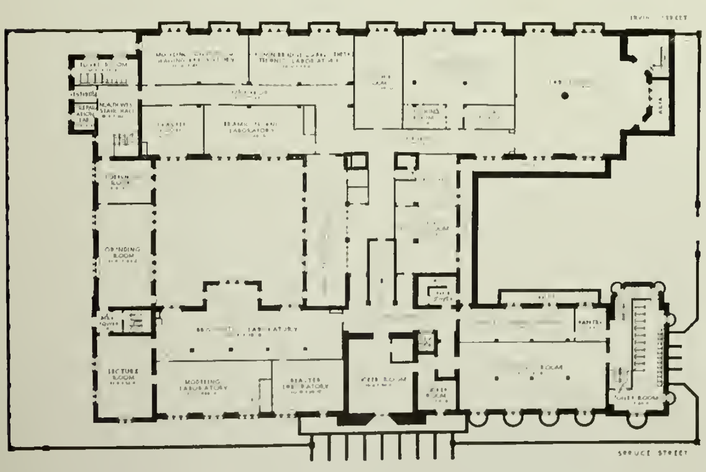
GENERAL VIEW



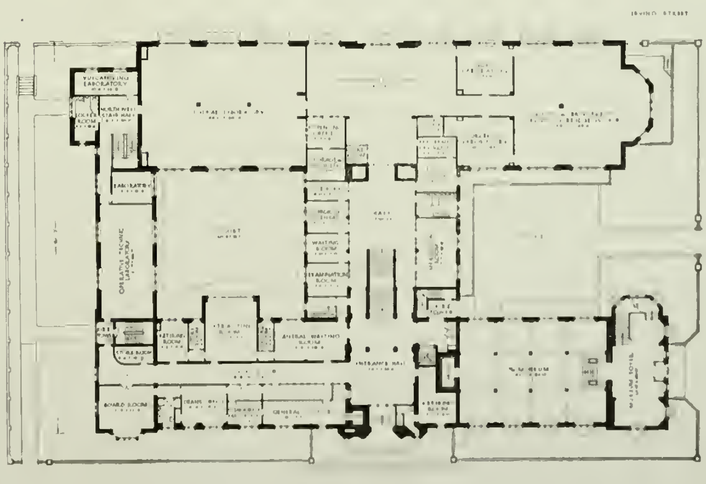
SECOND FLOOR PLAN



THIRD FLOOR PLAN



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

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SOUTH AND NORTH WINGS ON FORTIETH STREET

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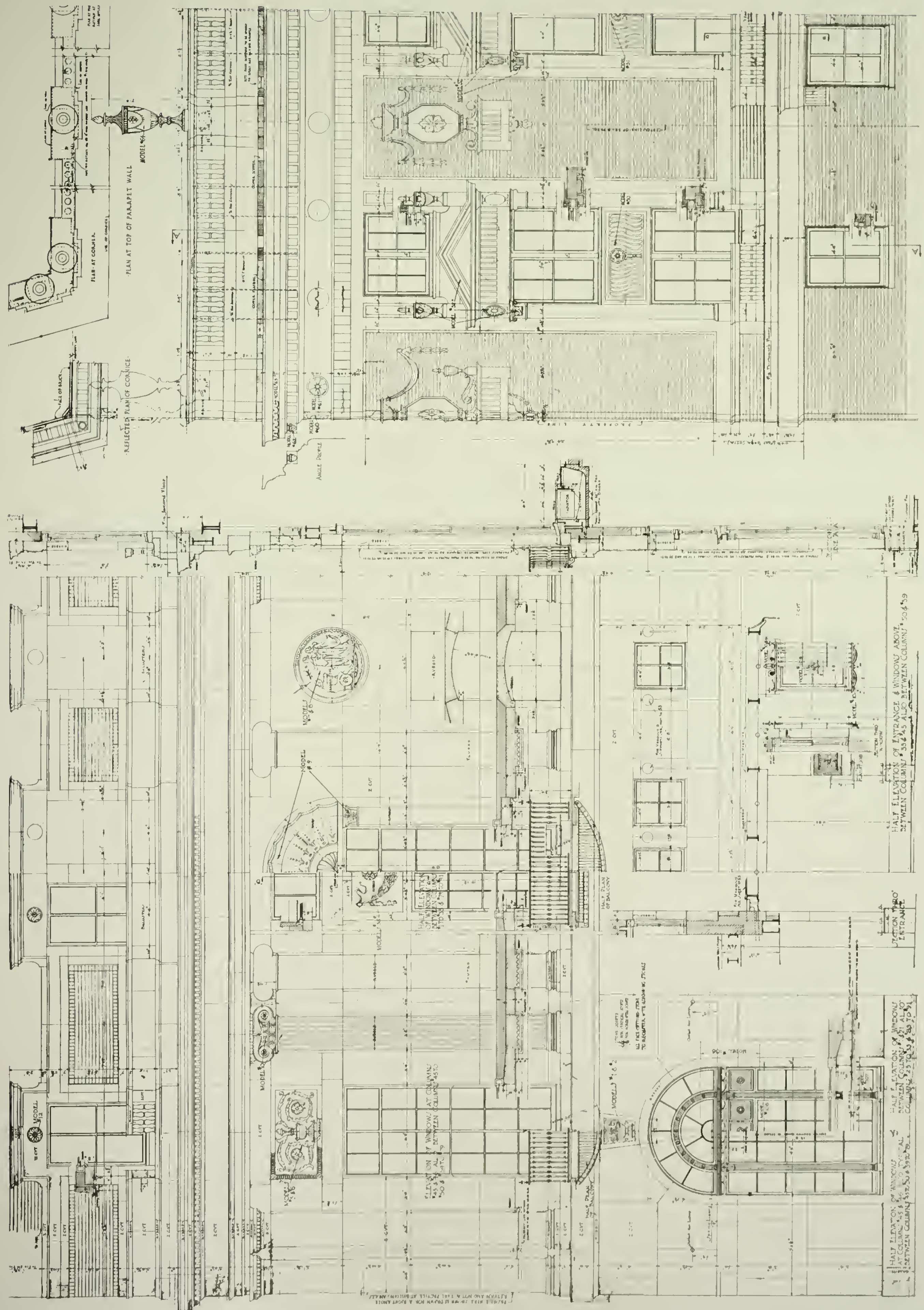

DETAIL OF UPPER STORIES

DETAIL OF LOWER STORIES

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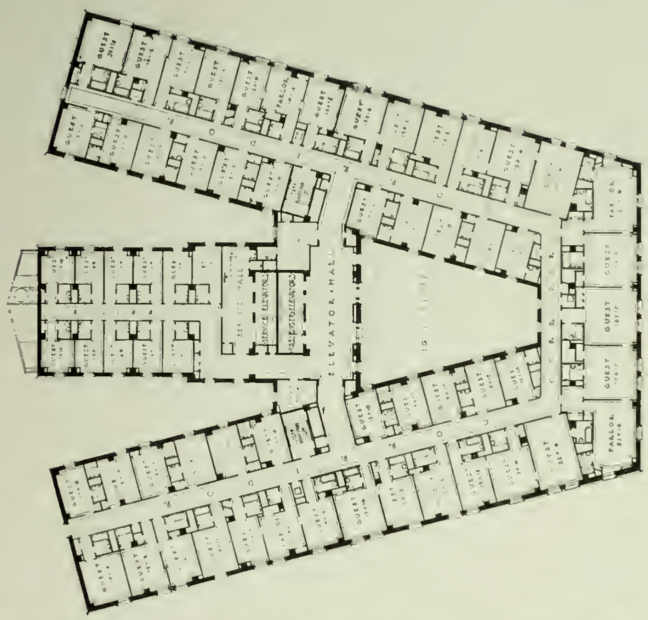
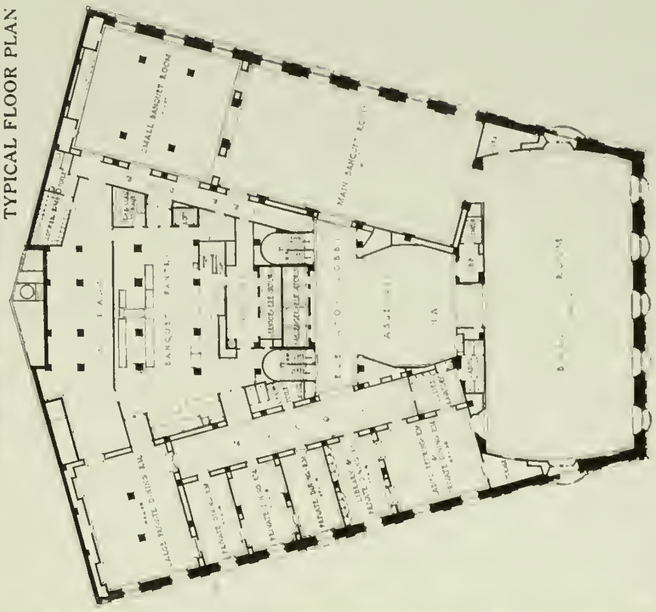


TYPICAL FLOOR PLAN



SECOND FLOOR PLAN

MEN'S CAFÉ

GRILL ROOM

MEZZANINE FLOOR PLAN

FIRST FLOOR PLAN

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BALL ROOM

MAIN LOBBY

MAIN DINING ROOM

MAIN BANQUET ROOM

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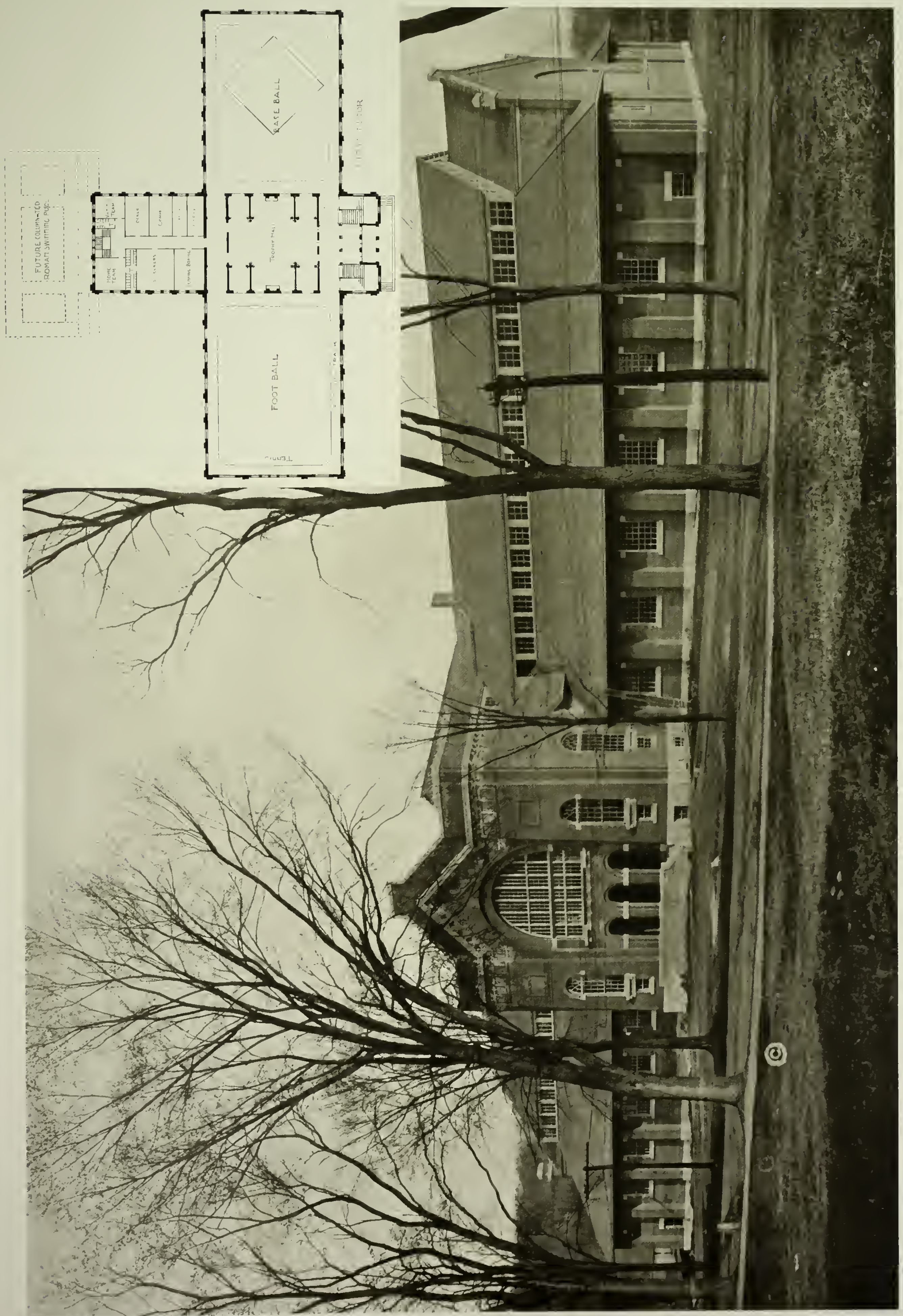
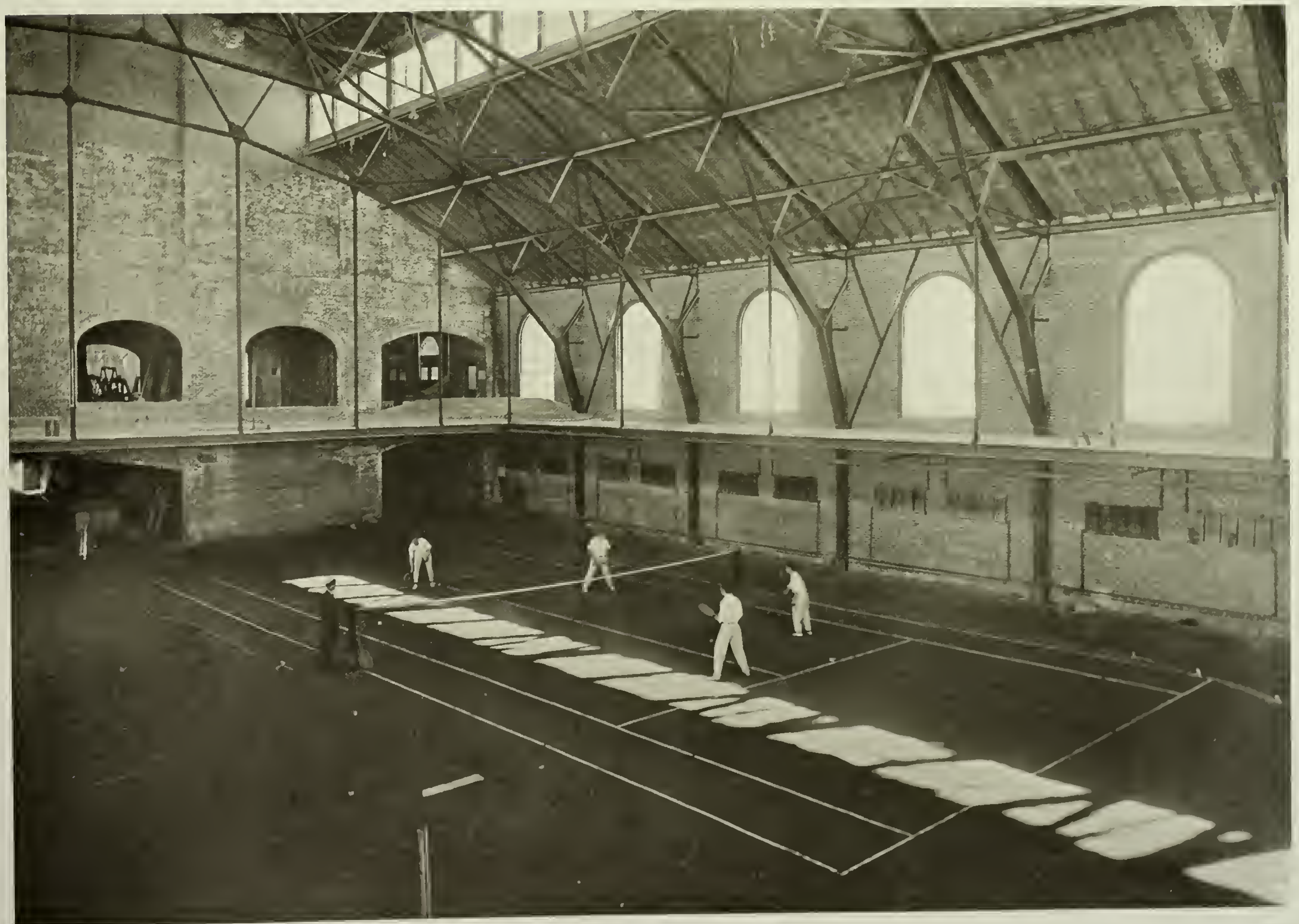


GYMNASIUM, DARTMOUTH COLLEGE, HANOVER, N. H.
CHARLES A. RICH, ARCHITECT

TROPHY HALL



TENNIS AND FOOTBALL COURT

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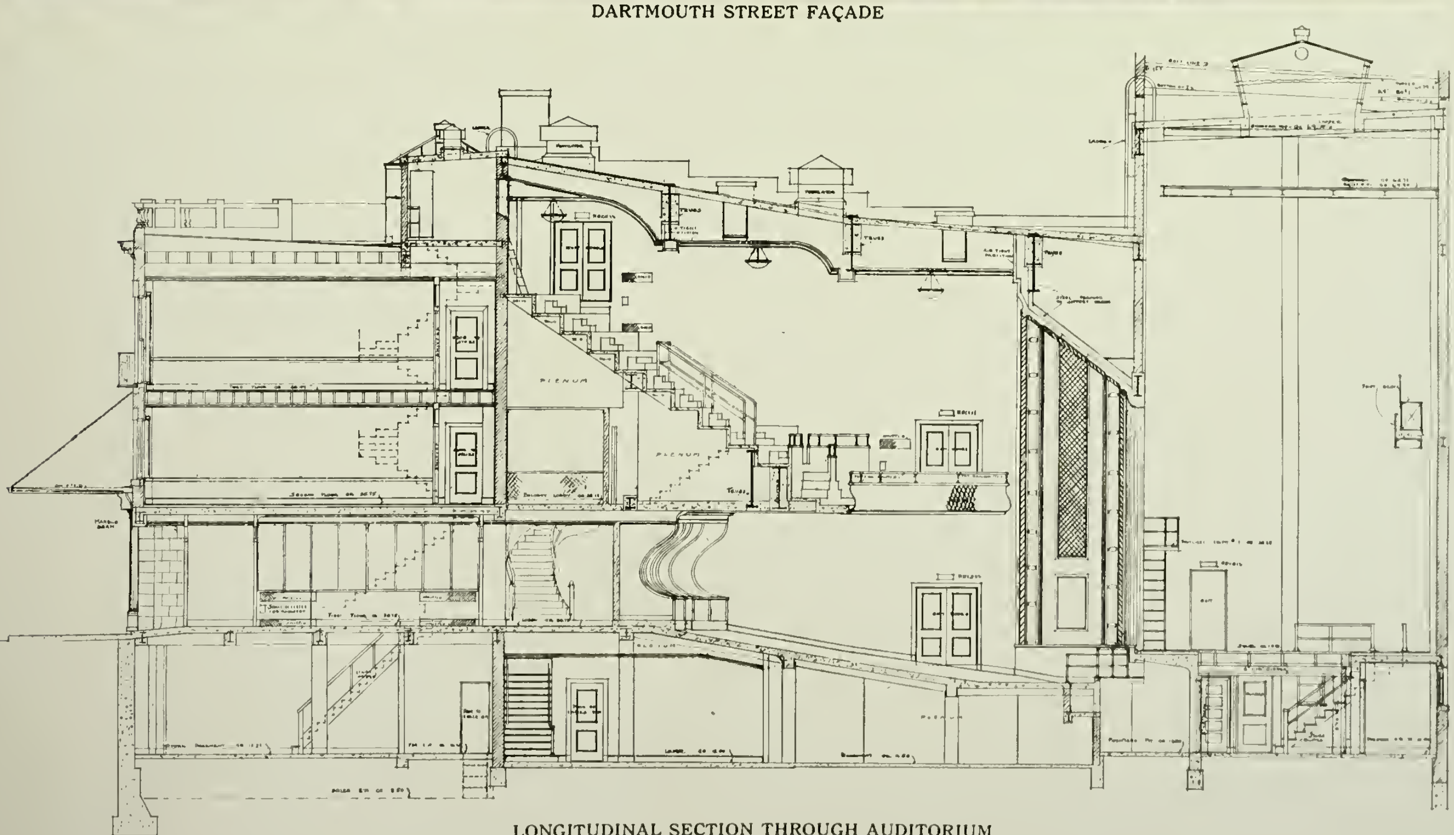
DARTMOUTH STREET FAÇADE

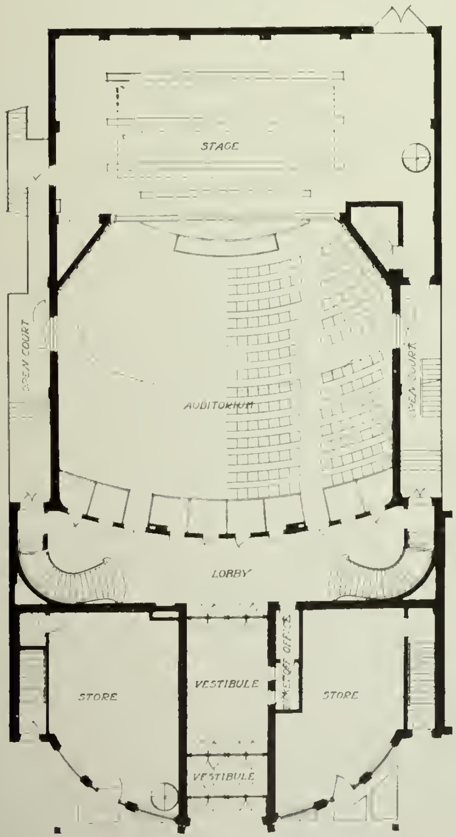


LONGITUDINAL SECTION THROUGH AUDITORIUM

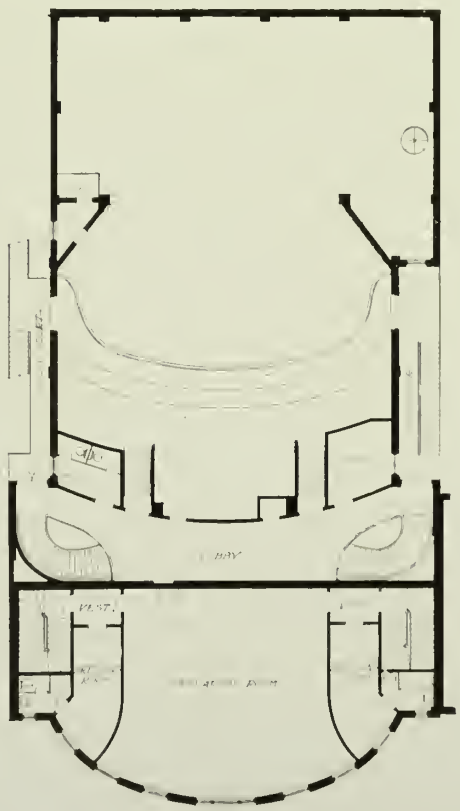
TOY THEATRE, DARTMOUTH STREET, BOSTON, MASS.

PUTNAM & COX, ARCHITECTS

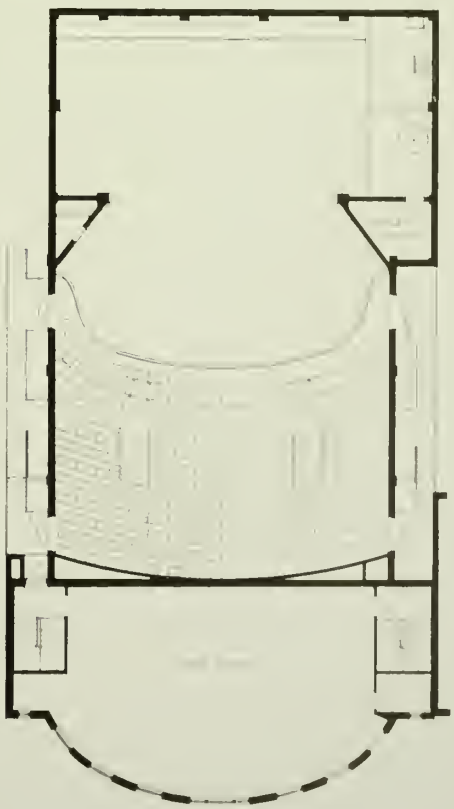
DARTMOUTH STREET ELEVATION AS ORIGINALLY DESIGNED



FIRST FLOOR PLAN



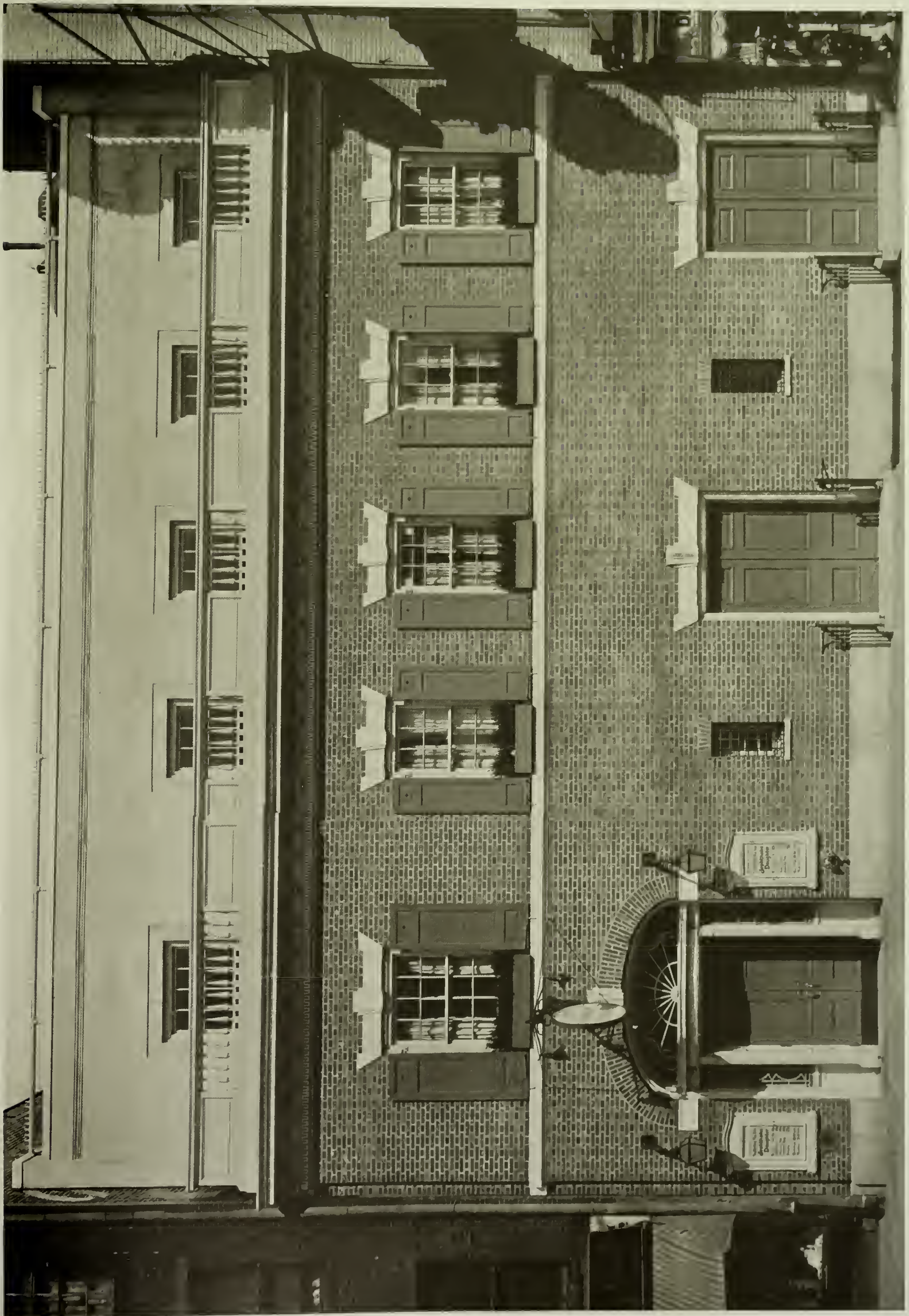
MEZZANINE AND SECOND FLOOR PLAN



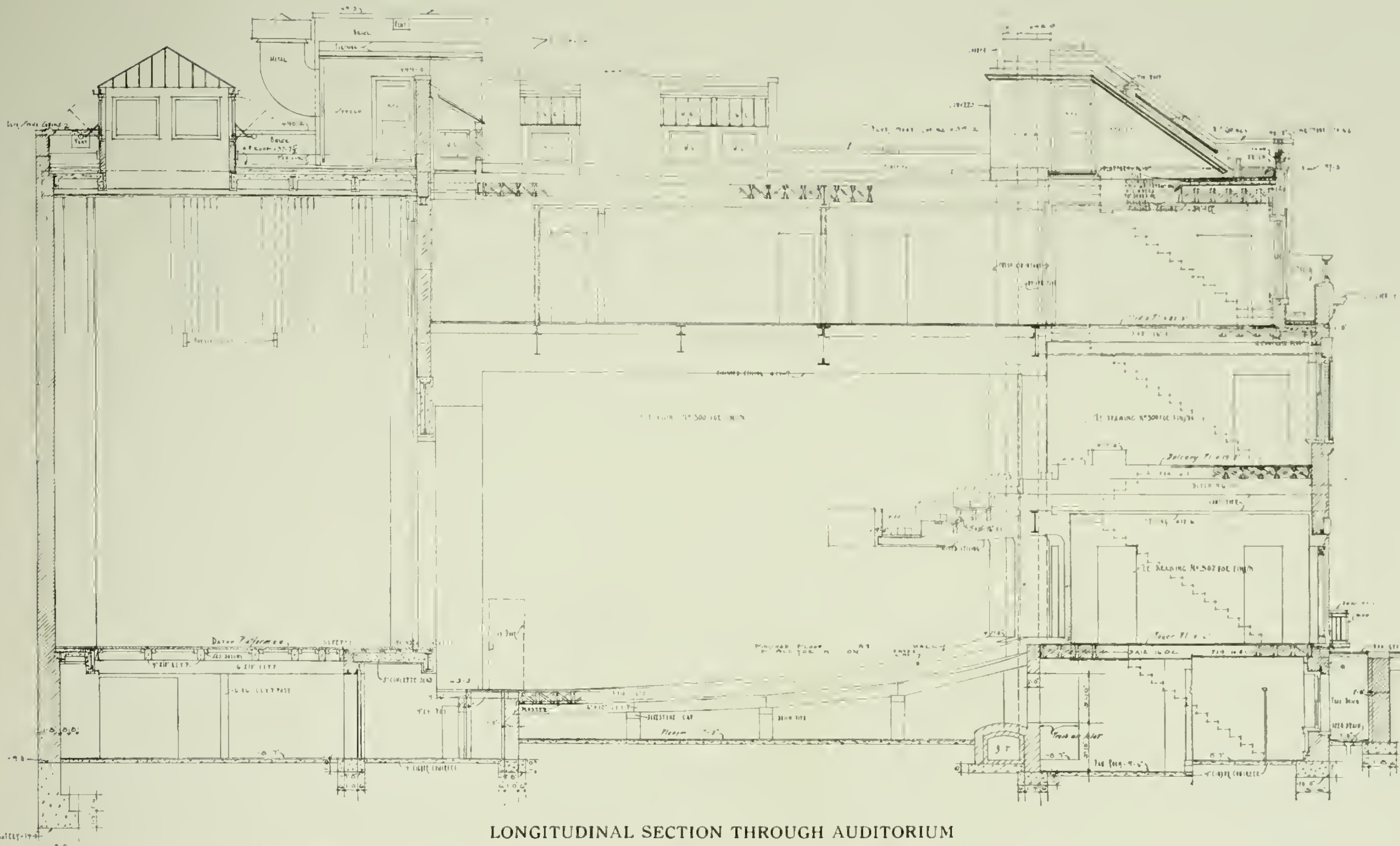
THIRD FLOOR PLAN

TOY THEATRE, DARTMOUTH STREET, BOSTON, MASS.

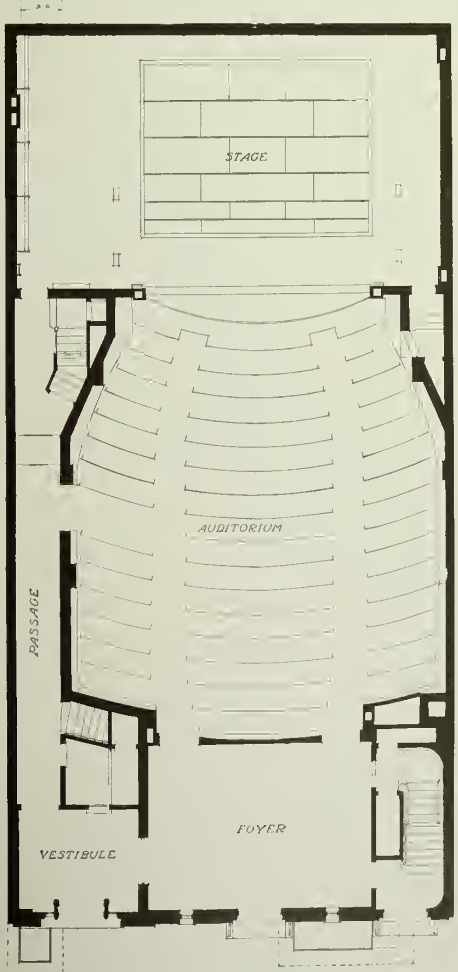
PUTNAM & COX, ARCHITECTS



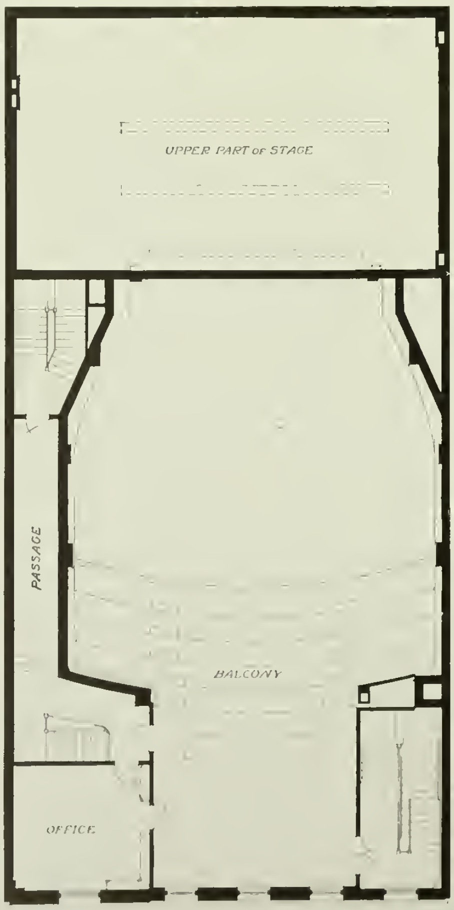
NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK, N Y
HARRY CREIGHTON INGALLS, F BURRALL HOFFMAN, JR., ASSOCIATE ARCHITECTS



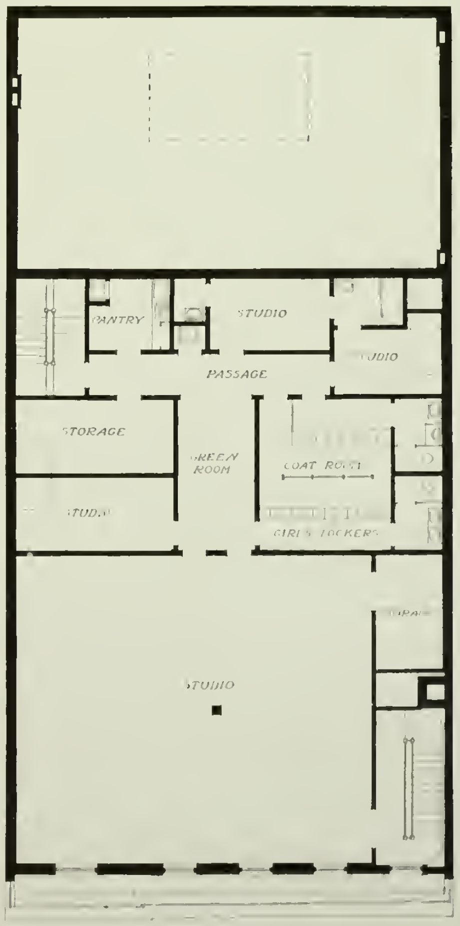
LONGITUDINAL SECTION THROUGH AUDITORIUM



FIRST FLOOR PLAN



BALCONY FLOOR PLAN



THIRD FLOOR PLAN

NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK, N. Y.

HARRY CREIGHTON INGALLS, F. BURRALL HOFFMAN, JR., ASSOCIATE ARCHITECTS

LOBBY

AUDITORIUM TOWARDS STAGE

DETAIL OF AUDITORIUM

NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK, N. Y.

HARRY CREIGHTON INGALLS, F. BURRALL HOFFMAN, JR., ASSOCIATE ARCHITECTS

The Modern Schoolhouse.

IV. EXPOSURE AND PLAN.

By WALTER H. KILHAM.

IT rarely happens that the architect is seriously consulted about the selection of a site for the schoolhouse, so that in designing the building he is obliged to adjust the plan to conditions as he finds them. In laying out the sketches a variety of questions present themselves, which in the case of a competition become poignant with anxiety. Shall the class rooms be so planned as to face south for the sun or north for the steady light? Shall the roof be flat or pitched? What will be the material of walls and trimmings? What type of window opening and sash will be adopted? Is the building to be of "fireproof" or "second-class" construction? Shall the pupils enter the building through the basement or not? and, after all, is the structure to be a monument or merely a utilitarian shelter? All these and many more questions will have to be answered before the architect finds himself in a position to appear with his sketches before the officials in charge, and a short consideration of some of them at this juncture is appropriate.

Exposure. Proper orientation is one of the points that first requires attention, and until it is settled not much progress can be made in laying out the plans. The question lies between the relative advantages of northern or southern, eastern or western lights for the class room, and considerable differences of opinion will be found to exist on these points. The writer has endeavored to obtain from each of several practical school men an expression of opinion on the question of exposure, together with their views as to the actual effect on the health, attendance, and mental condition or temper of teachers and pupils. Most of the answers favored as much sunlight in the rooms as possible; but some very decided opinions to the contrary were received, supported by effective and convincing arguments.

It seems to be generally admitted that the direct rays of the sun have a very important germicidal and purifying effect, and that a room which does not receive direct sunlight is for this reason not a suitable place for young children to spend a considerable portion of their time. Attempts to obtain any definite information as to relative conditions of morbidity in north and south rooms failed to elicit any exact replies; but the "cheerful, brightening, healthful, and wholesome" influence of a sunny exposure was dwelt upon by nearly all who responded. These teachers also thought that the trouble of adjusting the shades was not of great importance compared with the benefits derived from sunlight in the rooms.

The cheerful and healthful effect of sunshine is offset to some extent, however, by the injury to the eyes resulting from the glare of sunlight on the printed page. In an ordinary room a person reading or working can move about and adjust himself so as not to be annoyed by the heat and glare of the sun; but in a class room the pupil must sit at his desk in one position and is powerless to avoid its effects. The master of one of the largest schools in the country, whose buildings contain rooms facing in all four directions, writes as follows: "I would recommend, as far as possible, a steady north light, free from sun. If any other exposure is required by conditions, I should recommend an eastern exposure, thereby getting the sun in the morning. The most objectionable of all is a full south exposure. In the buildings under my control, the north exposure rooms have to my mind the least of what the teachers call 'wriggling' among the pupils. That may be due to the fact that the light does not make them nervous. I have one teacher whose eyes were nearly ruined by continued service in a south exposure room and who has had no trouble since changing to a north exposure room. In the fresh air room it is necessary to my mind to have east or south exposure." Another school man of long experience writes: "This matter seems to involve two considerations generally regarded as conflicting of necessity. A steady north light free from the sun is the ideal light for the schoolroom so far as light in its relation to vision is concerned. It is, however, a general impression among the teachers that direct sunlight is essential to the highest degree of healthfulness. Sunny rooms are more cheerful, and some believe that sunlight exercises an undefined influence on the child's general physical condition, imparting vigor and robustness; while a north light has a tendency towards pallor and anæmic conditions. Teachers, as a rule, prefer a sunny room. However, in twenty-five years of observation I have found that rooms of southern exposure invariably have bad conditions of lighting. Pupils cannot tolerate direct sunlight while they are studying, however beneficial it may be under other conditions. The result is that shades are drawn, almost invariably darkening the room too much and producing eye strain and other evils. I have never made any scientific investigation in order to secure data on the results obtained in different conditions of light. It would be a very valuable and important study well worth making."

In the planning of a city building it is sometimes almost impossible to avoid having some rooms with north exposure, nevertheless it seems only fair to state that no complaints have ever reached the writer from north rooms in buildings of which he has knowledge.

The question of sunlight in its dual relations to health and to vision seems to raise a serious obstacle to a definite solution of the problem of schoolroom lighting. A plan which distorts itself in a vain effort to provide a south exposure for all of its rooms is as bad as one all of whose rooms face north; but if the rooms as far as possible can face east and west, very satisfactory conditions will have been attained. The eastern exposure is preferable, because the sun will have been in the rooms in the early morning hours, helping to start the day cheerfully and to warm the rooms on chilly winter mornings. The afternoon sun comes at a time when the rooms are overheated and the glare of its level rays is fatiguing, but many schools are not used in the afternoon. Two points still

General View, Fairmount School, West Orange, N. J.

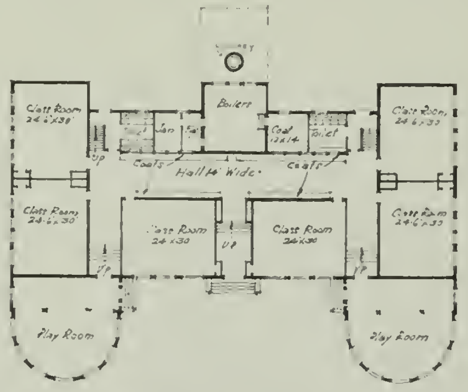
have been met, which is ordinarily equipped with a cement floor, whitewashed walls, and nothing else. It is always hot and generally either dark, damp, or dusty — frequently all three. As the architects of the Fairmount School point out, one would naturally expect the recreation rooms of a school, where the children, fatigued with indoor study, go to recuperate from the work of the class rooms, would be the pleasantest and most healthful portions of the building. If the children were at home, no one would think of sending them to the cellar for exercise and play; but that is just what is done in hundreds of school buildings. In France, schoolhouses universally have an outdoor playground, secluded from the road and enclosed by walls, along the sides of which is a roof, forming a sort of open shed known in that country as a *preau couvert*, which gives shelter when it is required and admits fresh air at all times. These walls are often decorated with the pretty green chestnut lattices so common in that country, which give a little touch of intimacy and removes the institutional appearance.

In the Fairmount School the play rooms occupy the two one-story wings on the front. These have wooden floors and are more in the nature of glass enclosed porches than rooms. In fair weather they can be completely opened up to the air, and being exactly like sheds or piazzas, they provide the ideal open air play rooms just as does the French arrangement.

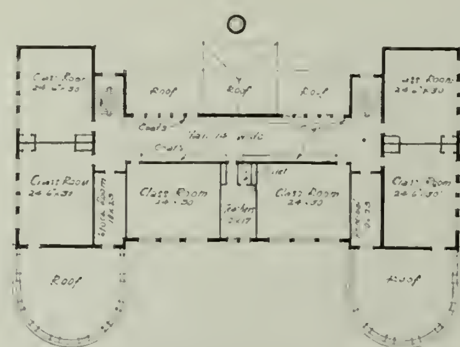
Inquiries among a number of school principals failed to find a single voice raised in defense of the basement play room, and nearly all said that if the weather was too severe for the outdoor play, they would shorten the recess and dismiss the children earlier.

Another version of the above ground, glazed-in play room is that at the Gregory School, also at West Orange, N. J., and designed by Messrs. Dillon, McLellan & Beadel. It is similarly constructed of wood, as plaster or masonry is a detriment. Only enough heating is required to take the chill out of the air in the coldest weather. It will be noticed that one of the rooms of this school (intended as a kindergarten) has a fireplace and is separated from the next by a removable partition so as to throw two rooms together for neighborhood meetings, etc.

Yards. In suburban districts not much trouble will be encountered in finding sufficient space around the building, but in congested cities the school yard becomes a real problem and needs careful consideration. Fencing, or



First Floor Plan



Second Floor Plan

Detail of Play Room, Fairmount School, West Orange, N. J.
Dillon, McLellan & Beadel, Architects

even curbing, is not required in most small cities, and even paved walks are optional. Large cities, however, generally enclose the grounds with a plain iron fence having gates which can be locked at night and are furnished with a standard yard padlock which is generally furnished by the School Department of the city. The play yard ought to be located on the sunny side of the building and be as large as the appropriation will allow. Boston requires a minimum of 30 square feet per pupil and paves the yards with brick sloped to drains. Colored bricks are set in the paving to indicate positions of the classes for forming in line and for certain games. Separate entrances are provided for boys and girls from their respective yards to the play rooms. Areas, steps, and inclines are avoided as much as possible. Driveways for ash and coal teams are laid with vitrified pavers on a heavy concrete base.

A grass treatment around a building is apt to prove difficult to keep in order and grass banks in particular are to be avoided. In most cases the yards are graveled or covered with stone-crusher screenings. Cinders should not be used as they are ruinous to children's clothes on account of dirt. Shrubbery around school yards ought to be encouraged, and if well cared for by those in charge is not likely to be injured by the pupils.

The Exterior of the Building. As brick is the exterior material of the majority of modern schools, the only material that needs discussion is that which will be used for trimmings. Hollow tile with cement finish is, it is true, used to an appreciable extent and is suitable, but brick at present is favored by most building committees. The question of materials for the cornice, sills, belts, and other trimmings is involved with the type of building proposed. If the building is to be a "monument," it will be quite likely to have a pitched roof which probably implies overhanging eaves and copper rain gutters ; but if a plainer building is intended, a flat roof is likely to be called for with inside rain water disposal and no structural need of eaves. In this case the architectural style may require a classical cornice, with considerable projection or merely a Tudor string course with flat parapet walls. Whichever is employed, the young architect (and the older one as well) should see that every precaution is taken to prevent the entrance of moisture into the walls from above. The tops of all parapets should be protected by copper, turning down outside and entirely covering the back of the wall above the roof. Any masonry cornices having a flat wash over 6 inches wide should have a copper covering, no matter what their material. Any lack of care in thoroughly flashing all horizontally exposed portions is sure to result in unsightly staining and efflorescence of the brickwork and which goes on until in a few years repointing or relaying of the brickwork becomes necessary. So true is this, that any one who watches the construction of a brick building can usually predict with certainty the location of any efflorescence that will appear upon the walls.

In case the building is constructed of hollow tile, especial care needs to be taken with window sills and projecting belts. The common method of making window sills of tiles laid horizontally on a slope and finishing with an inch of cement is poor, as it is difficult to get a cement finish which will stand such exposure without crazing, cracking, and finally spalling off. A sill of granite, limestone, or marble should be used, and a copper "pan" under it is not to be despised and is well worth its cost.

Many recommend placing wire grilles over the basement windows as a protection against damage from ball playing, etc. Their cost is considerable and their utility somewhat doubtful. If used, they should be hinged to allow for cleaning the windows. To prevent their being tampered with by children, they are then provided with padlocks, which add to the security of the building from burglars, but are objected to by some who think that egress from the basement by means of the windows in

Grade Schoolhouse, Framingham, Mass.
Charles M. Baker and Stanley B. Parker, Associate Architects

case of fire should not be prevented. The writer believes that in most cases their use can be safely discontinued and an item of cost eliminated.

Monumental Treatment of Schools. The exterior treatment of a modern elementary school should always be dignified, but never showy or ostentatious. In the smaller cities a spirit of civic pride often impels the authorities to select a conspicuous site and give the building an unduly important character, but the practice of placing schoolhouses of any sort upon main thoroughfares is unwise. Not only is there an ever present danger to small children from swiftly passing automobiles and trolley cars, but the noise and dust is extremely objectionable, as well as the exposure of the children to miscellaneous traffic on their way to and from school. It is far better to locate the school on a quiet side street, where land is cheaper and a commodious playground can be easily provided.

Much of the current American school architecture seems to ignore the fact that a schoolhouse is an educational institution and not a political monument. I grant that a great city school of twenty to forty rooms or more must necessarily be imposing from the mere fact of its enormous bulk; but why do buildings of such hulking proportions have to be constructed in residential districts when they are out of scale with everything in the vicinity? The city school is surrounded by large and high buildings which bring it into some sort of proper relation to the neighborhood, but no such excuse exists in the suburb.

Schoolroom story heights are necessarily greater than those of dwellings, and a high basement seems to be everywhere accepted as essential; add to this the theory that a three-story building is cheaper in proportion than one of the two stories and that land must be economized, and the building rises into the air far above the roofs of the surrounding dwellings. Just why the basement has to remain is not clear to me; if it could be eliminated as was done in the Fairmount School, the building would at once settle down into a harmonious relation to its surroundings.

The old, high pitched roofs and towers which crowned the Romanesque school buildings of the '80's and '90's have gone by; but one may well wish that a quiet Collegiate or Georgian type of brick architecture with some vestige of a visible roof might replace the current flat roofed, boxlike designs which, while appropriate to urban surroundings, absolutely fail to correlate themselves with a suburban landscape. The flat roof possesses some advantages of economy and ease of construction and eliminates the great garrets which seem so wasteful of space; but when one takes into account the easier treatment of eaves and cornices, the low sloping roof is not much more expensive.

The same line of thought may apply to the ornamental details of the exterior. The comparative cheapness of elaborate detail when executed in terra cotta or cast stone is a temptation to the young architect to show off what he knows, "*epater les bourgeois*," and bestow on the entrances and façades the results of cursory examination of plates of Beaux Arts designs, which detract from the quiet dignity which ought to characterize a building devoted to education. The fault is one which is by no means confined to schoolhouses; unfortunately there are a good many of the higher institutions of learning which rejoice in over elaborated buildings whose *parvenu* vulgarity will become a source of regret to their occupants after the lapse of a few years.

The accompanying illustrations of school buildings at Framingham, Mass., by Mr. Charles M. Baker, architect, are most agreeable examples of the scholarly adaptation of the grade school to suburban surroundings in such a way that it forms an organic and harmonious part of the village architecture, with a total absence of any exotic effect.

Grade Schoolhouse, Framingham, Mass.
Charles M. Baker, Architect

A Garden on an English Estate.

By EDWARD W. GREGORY.

WOOLLEY HALL is an old English estate which came into the possession of the present owner, Mr. Walter Cottingham of Cleveland, Ohio, two years ago. It is situated in the Thames valley near Maidenhead, one of the most popular riverside resorts between London and Oxford. It is close to Windsor and, like other estates thereabout, is surrounded by much forest land. For the past two years continuous development of the property has been carried on under the direction of Mr. Thomas Mawson, England's celebrated garden architect, who has probably planned and carried out more public and private estates than any other living English designer. Mr. Mawson is to English architecture of to-day what "Capability" Brown was to the architecture of about a century and a quarter ago; but he has achieved a very much wider celebrity. Brown approached the layout of a plan from the gardener's point of view; Mawson from the architect's. Brown and his many followers showed their admiration of pastoral effects by copying them. Mawson is more concerned with using natural features as accents in a conventional scheme. Where Brown's idea was to have the house *in* a garden, Mawson's is to have a house *and* a garden. The former saw architecture and gardening as things apart; the latter sees them in combination. This is, indeed, the great distinction between late Georgian garden planning and that of our own day.

Garden House from the Lawn

The old garden at Woolley Hall, as found in existence by the present owner, had many desirable features and they have considerably influenced the design of the subsequent development. One of the principal and most interesting features which have been retained is a kitchen garden with an old brick enclosing wall together with a block of gardeners' cottages and glass houses. The part of the garden which is completed lies to the north of the house and has been designed on a scale which will

View of Pergolas and Garden House Across Panel Garden

Thomas Mawson, Architect

Side Entrance in Garden Wall

accord with the complete development which is contemplated in the future. It comprises the double pergolas, two panel gardens and garden house, tennis and croquet lawns, bowling green, and an extended walk which leads into the park. The illustrations reproduced herewith show the principal features of this portion of the estate and as the foliage and vines have not had time to make much headway, the constructional details of the design can be more clearly perceived than will be possible in the future when the planting has come to maturity.

Perhaps the most interesting vista is that which is to be seen from the north end of the carriage court where the three arches shown in the illustration give access to the double pergolas leading through to the domed garden house and beyond to the oval bowling green. The structure of the piers and walls is easily realized from a study of the picture. Red brick has been used for the major portion of the work, the bonding being varied by horizontal courses of thin tiles. Another illustration shows the central grass glade with pergolas on either side as seen from the garden house looking towards the south. The length of the pergolas extending from the garden house can be realized from the view taken across the panel rose garden. The texture of the enclosing walls and the general character of the architectural detail may be seen in the illustration of the small side entrance.

The owner's ideal was to attain a garden of distinctly English type, in which nature should be the predominant partner, but in which art and architecture should have recognized places. It will take another year before the pergolas and walls are sufficiently clothed with foliage for his ideal to be consummated; but a large measure of success is assured by the dignified and sympathetic character of the architectural accessories already constructed which will provide the foundation.

View of Arches in Garden Wall Looking Toward Garden House

Thomas Mawson, Architect

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

J. HARLESTON PARKER

HARLESTON PARKER was born in Boston in November, 1872. A graduate of Harvard in the class of 1893, he studied architecture for two years at the Massachusetts Institute of Technology. Then came a year in the office of Winslow & Wetherell, a year in Italy, and two years in Paris, where he studied at the École des Beaux Arts in the Atelier Laloux.

In the spring of 1899 he returned to Boston, and the partnership of Parker & Thomas was formed, with offices in Boston and Baltimore—an association which lasted until 1907, when the firm name was changed to Parker, Thomas & Rice.

In fifteen years of spirited and successful practice, Mr. Parker's varied enthusiasms and effective vitality have found a natural outlet. No one of our time has better appreciated the universal nature of the demands on the profession, and no one has proved himself better qualified satisfactorily to answer more of these varied calls. His commercial structures are paying investments; his clubs breathe comfort and dignity, and his private houses are worthy frames for cultivated and successful lives.

Mr. Parker's zeal for his clients' interests does not end with the signing of the contract, but from that moment seems to take on renewed vigor. Indeed, long after one of his buildings has been accepted by the owner, his vigilance and invention remain at the service of the client, with a wealth of fertile suggestion and experienced discrimination.

No account of Mr. Parker's personality can be complete which does not call attention to his peculiar talents as a draftsman. With him objective visualization has been developed to a state of rare precision. In his Harvard days, his sketches in the Lampoon were filled with amazingly lifelike representations of his contemporaries, and this happy faculty is still a source of exquisite delight to his friends. In the preparation of rapid perspective sketches for clients and subordinates, this ability is of real service, and many puzzling difficulties have been quickly solved by a quick transition to the third dimension, with its resulting clear, analytical viewpoint.

The superficial student of the Renaissance is amazed at the multiple activities of the great artists of that epoch; but a maturer examination convinces one that the artist of every time has never concerned himself with merely one side of life. — *E. S. D.*

WILLIAM B. ITTNER

WILLIAM B. ITTNER was born in St. Louis, September 4, 1864. He acquired his education in the public schools of his native city and was graduated from the Manual Training School, which is a department of Washington University, in 1884. His architectural studies were pursued at Cornell University, from which he was graduated in 1887. He engaged in the practice of his chosen profession in the following year and very successfully demonstrated his ability as a designer with a facility for expressing the refinement and charm which are characteristic of his work in many buildings of a domestic, as well as commercial character. A deep student, a painstaking investigator, and a resourceful designer, the happy opportunity came to him through his selection as Commissioner of School Buildings for the Board of Education of St. Louis in 1897 to bring into full play all these latent attributes. The result has not only placed its deep impress on the city of St. Louis, the happy possessor of these model buildings, but his influence and the high standard which he has set in the planning and designing of educational buildings has made him an eminent authority abroad, as well as throughout the length and breadth of his own country. As an architect he has made his field of activity particularly and peculiarly his own. As a man, he has commanded and received the respect and sincere liking of his fellow-citizens and co-workers in the profession.

Mr. Ittner is a Fellow of the American Institute of Architects and has been president of the St. Louis Chapter. His standing among his fellows is further indicated by the fact that he has been president of the St. Louis Architectural Club and of the Architectural League of America, and his popularity among the alumni of his Alma Mater, as attested by his elevation to the presidency of the Cornell Club. The dearest distinction and highest honor in Mr. Ittner's eyes must ever be his possession of the first medal awarded to him by the St. Louis Chapter of the American Institute of Architects for his conspicuously meritorious work in his chosen field. No tribute could better evidence his acknowledged supremacy in that field, coupled with an appreciation of all that makes the life of man worth living, than this spontaneous expression of appreciation of these qualities by men with whom he has worked for so many years shoulder to shoulder.

— *J. L. M.*

WILLIAM WELLES BOSWORTH

WILLIAM WELLES BOSWORTH was born in Marietta, Ohio, on May 8, 1869, and received his early education at the Marietta Academy. At the age of sixteen he entered the Massachusetts Institute of Technology and was affiliated with the Class of 1889. Upon completing his course at Technology, he took up work with Shepley, Rutan & Coolidge, and spent a season with Frederick Law Olmstead in landscape design, assisting in the development of the group plans for the Leland Stanford Jr. University. Following an extensive tour of Europe with William Rotch Ware, he established a practice of his own, designing several charming country cottages at Mt. Desert and Long Island, and completed a group of buildings for the Hampton Normal and Agricultural Institute.

Due to the persuasion of Thomas Hastings and John Galen Howard, he decided to resume his architectural studies at the École des Beaux Arts, but went first to London, where he enjoyed the opportunity and inspiration of studying under Alma Tadema. Then Paris claimed him and he entered the atelier of Godefroy & Freynet, and later the École des Beaux Arts and the atelier of Gaston Redon. He also spent considerable time working under Chaussemiche. After further travel in Europe, he returned to New York to enter the office of Carrère & Hastings, and was given charge of the plans for the Pan American Exposition at Buffalo, later going to the Exposition as resident architect. A little later he was retained by the Group Plan Commission of the city of Cleveland to develop working plans for the improvement of that city. In the competition for the West Point Military Academy Buildings he was associated with Messrs. Cram, Goodhue & Ferguson, who were the successful competitors.

He has built up a large practice in New York, and among the most notable examples of his work are the beautiful gardens for Mr. John D. Rockefeller at Pocantico Hills, the town house for Mr. Rockefeller, Jr., and the great white granite building which is now nearing completion for the Western Union Telegraph Company.

In February, 1913, he was appointed architect for the new buildings of his Alma Mater, the Massachusetts Institute of Technology, which are now well under way, and give proof that he has nobly solved the diverse requirements of a group of educational buildings of this magnitude, and that he has preserved an architectural dignity and simplicity compatible with the highest ideals of his profession.

Mr. Bosworth has ever cherished the best traditions of Greek art, and instils in everything that he does a classic sense of simplicity and refinement of detail. To this appreciation for the classical, he brings a highly developed quality of sensitive selection. It is this perfection of taste that distinguishes all that he creates, and the recognition of which is a vital principle of all enduring art. — *H. E. K.*

BERTRAM GROSVENOR GOODHUE

TEN or more years ago Mr. Goodhue was thought of chiefly as an accomplished artist in pen and ink, and his admirable drawings are too well known to need more than a mention. Now his pen and ink have been almost entirely laid aside, and he is accepted by all as one of our leading architects.

This change in Mr. Goodhue's medium from pen and ink and shiny Bristol board to bricks and mortar and graduated slate has, of course, been due to the steadily increasing demands on his time in conducting his practice.

To any one very familiar with Mr. Goodhue's work and his methods of working, several points cannot fail to attract notice. One of these is his unerring eye for picturesque composition. In his drawings and also in his executed buildings one usually finds an interesting grouping of parts. Nowhere is this better exemplified than in the buildings of the San Diego Exposition and in the preliminary drawings for the same.

In addition to this capacity for arranging the various parts of his problem into a picturesque and well-balanced whole, his work also shows the joy he takes in perfecting and making interesting the very smallest details. In fact, it is not unlikely that he delights more in the finish of his hand-wrought, half-polished, iron hardware than in some of the bigger things of the profession.

It is this personal attention that he so willingly gives to the small things that makes his buildings so full of interest.

Mr. Goodhue's personality is evident everywhere in his work to those who know him and his work intimately. Everything that comes from his busy office is unmistakably his and is characterized by a certain cleverness and freshness of expression. To Mr. Goodhue an architectural "bromidism" is almost an unpardonable sin. It is his continual searching for new and interesting forms, coupled with a thorough knowledge of the work of the Middle Ages, that has caused him to be regarded as an authority on contemporary Gothic art.

Mr. Goodhue's early and indeed only professional training was received in the office of James Renwick in New York. Mr. Renwick was the designer of Grace Church and St. Patrick's Cathedral; therefore, Mr. Goodhue's architectural instruction from the beginning had a strong Gothic tendency.

Before entering the office of Cram & Wentworth in Boston he had proved his ability as a designer by winning the competition for a cathedral at Dallas, Tex., and, after a year spent with Cram & Wentworth as chief draftsman, he was given a full partnership in their practice.

In 1903, after the firm had won the West Point Competition, Mr. Goodhue assumed the responsibilities of the New York office of Cram, Goodhue & Ferguson.

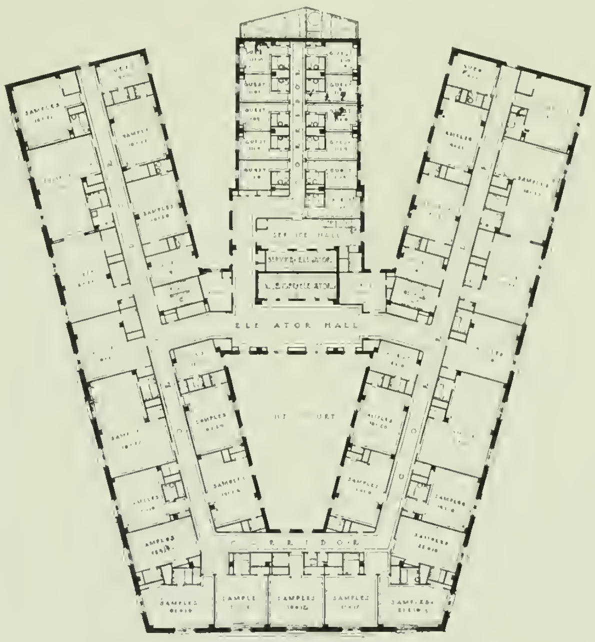
In January of last year the partnership was dissolved, and Mr. Goodhue is now conducting an independent practice in New York. — *E. D. R.*

PLATE DESCRIPTION.

The Evans Museum and Dental Institute, University of Pennsylvania, Philadelphia, Pa. Plates 46–49. This building was built from funds left by the late Dr. Thomas W. Evans, an eminent scientist and dentist. Its architectural style may be described as Collegiate Gothic. The Evans Museum occupies the east half of the Spruce street wing, and is as nearly fire and burglar proof as modern science can make it.

A feature of the building is the large operative clinic in the north wing on the second floor. This occupies the entire wing on Irving street and is 200 feet long and 48 feet wide. It is 30 feet high and is flooded with daylight from the north side, and a skylight 10 feet wide running the length of the ceiling. The room is furnished with 136 chairs, equipped with electric service for power and light, also gas, compressed air, and water service. A power house furnishing power for the lighting and heating, as well as for the service of the laboratories and the clinic, adjoins the building on the north.

Hotel Statler, Detroit, Mich. Plates 50–53. The Hotel Statler follows in its design the style known as Adam, or the type of architecture derived from the classical and Italian Renaissance. The two lower stories are of buff Indiana limestone laid in wide horizontal courses with a granite base. The shaft of the building is constructed of brick, laid up with a gray mortar joint in English cross bond, which gives a slight diaper pattern to the walls. The three upper stories are of brick and terra cotta.



Sample Room Floor Plan
Hotel Statler, Detroit, Mich.
Geo. B. Post & Sons, Architects

The building is sixteen stories high. The first two floors, each of which has a mezzanine floor, are devoted to public rooms with the necessary service quarters. Above are eleven guest room floors with a total of eight hundred rooms and two floors devoted to sample rooms. A servants' dormitory floor is located immediately under the roof. Below grade, the laundries, mechanical plant, store rooms, etc., are arranged in a basement and subbasement. There are no public rooms below the ground floor, the barber shop, toilet rooms, etc., being located on the first mezzanine.

The private bathrooms which are provided with each bedroom are ventilated by a system of forced ventilation, and between every two bathrooms is a shaft containing all of the supply, waste, and other pipes, which are accessible from within each bath through an opening large enough to admit a workman.

Gymnasium, Dartmouth College, Hanover, N. H. Plates 54, 55. Dartmouth College Gymnasium is unique in that it gives facilities for thorough practice for both baseball and football in very large inside courts. Through the center of the building, one story above the ground floor, is a large Trophy Hall, 80 feet square. There is a gymnasium floor space 360 feet long through the center of the building for 100-yard straightway runs. The Drill Hall, 85 by 280 feet, with an open truss roof ceiling, is located above the Trophy Hall, at the end of which are staircases and across the front an observation balcony.

Toy Theatre, Boston, Mass. Plates 56, 57. The Toy Theatre is the outcome of a desire to create a small and distinctive playhouse in which plays of the highest order could be presented. Restrictions on the property required the front of the building to set back 14 feet from the street line, but as bays were allowed to extend over this line, and their size was not specified, the front of the building took the form of one large bay, which finally became the most distinguishing exterior feature of the building. The first of the three stories is of marble with delicate Corinthian columns of cast iron. The second and third stories are of water-struck brick with white marble trimmings and wrought iron balconies at the third story windows.

In the auditorium only enough ornament is used around the proscenium opening to draw the eye to it and make it act as a frame for the scenes which are being enacted on the stage. The walls and ceiling are plain surfaces of gray white relieved by a small amount of plaster decoration and spots of warm color and black in strong contrast discreetly used. A row of boxes forms the rear of the auditorium. Together with these, the main floor comfortably seats 400. The balcony capacity is 300, making a total seating capacity of 700.

Neighborhood Playhouse, Grand Street, New York. Plates 58–60. The building is arranged to be used by a semi-public philanthropic organization for its own activities, primarily as a theater, secondarily for social purposes of various kinds. The façade is of light red brick with white marble trimmings, the third story, which sets back from the street, being of stucco. The auditorium is 40 feet wide and 46 feet deep and accommodates about three hundred people on the floor in seventeen rows. It is about 22 feet high and has a flat ceiling, treated very simply with plain moldings. There is a small balcony of seven rows which accommodates about one hundred people. The orchestra pit will accommodate, at least, eighteen musicians. The large panels on the wall above the wainscot have been treated with acoustic felt. While the vestibule, lobby, and other principal rooms are painted in an old ivory tone, the auditorium has a body color like old parchment, and on this certain parts of the decorative features are brought out in black and a grayish yellow, making a very striking contrast and giving the room a distinctive character.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IN his address at the annual banquet of the American Institute of Architects on Dec. 4, 1914, Mr. C. Grant La Farge spoke of the highest duties of the architect, those of "forwarding our civilization." His appeal is to men already competent in all the technical requirements of his profession, and in all the skill of professional relations, and he distinctly and justifiably states that these accomplishments are but the weapons to be used for still greater achievement, and that they carry with them, the more they are possessed, higher and greater responsibilities and duties for the "forwarding of our civilization" — the civilization of mankind, not alone of individuals, of communities, of nations, but of humanity. *Noblesse oblige.* Capacity, skill, must impel to ideals or they forfeit the birthright. All that may be obtained by study, all that may accrue by natural or acquired advantages, should be at the service of a still greater endeavor, that of the "forwarding of civilization." And to the architect is given almost a unique opportunity. In his hands rests the materialization of dreams. His creations are the least evanescent of the material works of man; his work alone is that of man's creation, demanding nothing of nature but her materials and her accord. If, therefore, he places in the material pageant of man's environment forms which he alone creates, his responsibility is great indeed, and demands forethought, preparation, and persistent idealism.

There are many spheres of action for which the architect is especially well adapted. He is closer in relation to the business world than is any other artist, and his advice can be of not only æsthetic but of material value. The vast means of legislatures and of corporations have constantly been ignorantly expended in matters of which the architect has expert knowledge. The prevalent idea that he is a spendthrift is one of a lack of perception that he has knowledge which conserves the greatest values of his work, which should be that of the highest utilitarian efficiency plus distinguished expression. He should apply his knowledge to the conception and promotion of great enterprises.

It is the architect who should foresee the demands of the public in the future, not merely satisfy them in the present and thereby lay an intolerable burden upon future development. He should accept the dicta of opportunism only after all means to secure his ideal had been exhausted, and then merely as a progressive step in the right direction. The field of his endeavors is not confined to actual work, it is devoted to the conception of achievement beyond his own span of life. He should be a dreamer whose dreams may be often realized by his successors.

An appreciation by the public of the benefits of attractive environment is created by the object lessons which architecture provides. Standards of taste can be inculcated, but must be accompanied by excellent examples. In imagining and creating these examples lies the justification of the architect in its best sense. He must make his dreams come true. Whether it be in coördinating fancies with facts, in establishing canons of action, in stimulating endeavor, the motive should be sincere, high minded, and direct. It is not merely his expert knowledge of planning and development, his appreciation of proportion, of color and detail, — an appreciation that evades the untrained, but wisdom of perception and clarity of advice and sincerity of action that is demanded of him. Nothing less is worthy of his profession. It is this attitude of mind which is more and more becoming evident, which is making the Institute of Architects a power in the community, which is slowly but surely impressing itself upon the public. It is only in recent years that the architects have been requested for their opinion upon large federal and municipal expenditures, since the initiative in many subjects of national interest has been taken by them. It is only a few years since the intention of their professional ethics, no matter what the tentative details may have been, has been recognized as being upon a plane which at one time would have been thought Quixotic, but now is felt to be progressive. The profession of medicine has for centuries, from the time of its patron saint Cosimo, been considered to be one of altruism, in which the element of public service was one of its highest attributes. Now appears the same code in the profession of architecture, elevating the accomplished artist, the capable administrator, the imaginative dreamer into a citizen who is deserving well of his fellowmen, who frankly takes the stand that his ability and achievements are but means to an end — that mentioned by Mr. La Farge, the "forwarding of our civilization."

The architect, therefore, has an evangel to preach, and he is qualified to speak. When he states that the destruction of works of art of the past is far more than a temporary evil; when he claims that the apologies for such destruction are of little value; when he asks that at least protest should be put on record, he is "forwarding our civilization." When he states that ignorance of art is stultifying, that appreciation of art is elevating, and that apathy towards it produces an atrophy of some of the finest qualities of man's mind, he is "forwarding our civilization." When he states that the approval of matters of art, if allowed to remain in the hands of the ignorant, is imbecile; that control and expenditure of public moneys for art in the hands of the venal is criminal, and should be so considered, he is "forwarding our civilization." When he offers, as he does, the best that is in him, in suggestion, advice, and achievement, and finds it ignored and offers it again and again, knowing that in the end, beyond his time, the record of his action will help that best to prevail, he is "forwarding our civilization." These are the duties of the architect beyond his skill in his profession.

THE BRICKBUILDER

VOLUME XXIV NUMBER 5

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PLATE ILLUSTRATIONS

LETTERPRESS

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THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

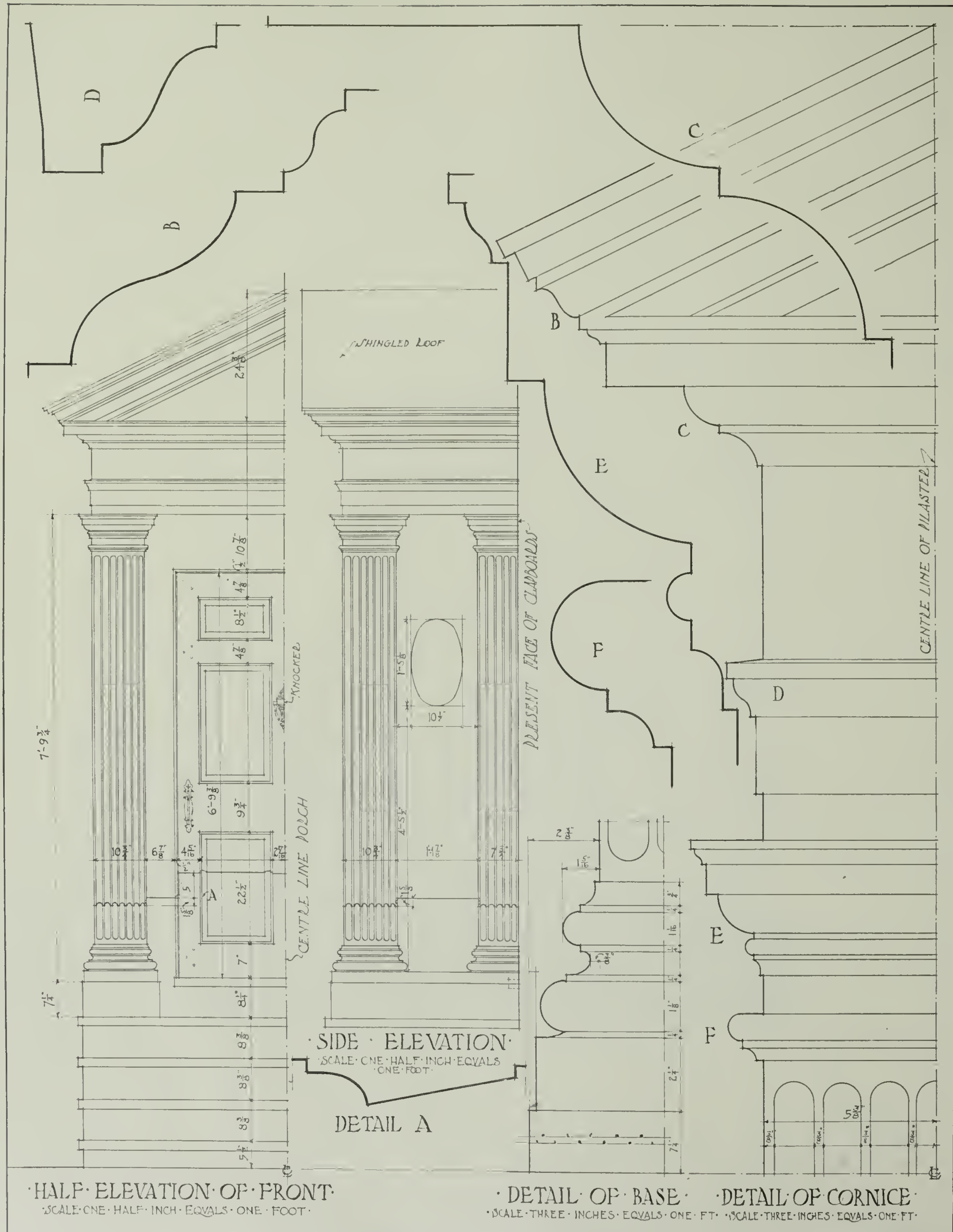
PORCH ON THE HOSMER-WATERS HOUSE, SALEM, MASS.
SAMUEL McINTIRE, ARCHITECT — BUILT IN 1795

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate
Five

(over)



· PLATE · 5 · · MAY · 1915 ·	· PORCH · ON · HOSMER ~ WATERS · HOUSE · SAMUEL · McINTIRE · ARCHITECT · BUILT IN 1795 — SALEM · MASS ·	MEASURED · & · DRAWN · BY · GORDON · ROBB & · M · A · DYER ·

CASA DE LOS MALDONADOS, SALAMANCA, SPAIN
EARLY XVITH CENTURY

THE BRICKBVILDER
VOLUME XXIV MAY, 1915 NUMBER 5

The Modern Schoolhouse.

V. CUBAGE AND COST.

By WALTER H. KILHAM.

IN computing the probable cost of a schoolhouse project the apparent simplicity of the type of building should not delude the architect into the belief that a general rule for offhand estimating can be given and adhered to.

The Boston Schoolhouse Commission some years ago adopted a rule by which it could judge of the efficiency of any floor plan laid before it for consideration. It was that the total area of the building on each floor should not exceed twice the total area of the class rooms on that floor measured inside the walls. In case an assembly hall existed, it could be counted as two class rooms in a "small" building and four in a "large" one, the actual meanings of "small" and "large" not being clearly defined, except that a building of over sixteen class rooms was "large." 28,000 cubic feet was allowed per class room for the lower elementary and 30,000 cubic feet for upper elementary, with allowances for assembly halls as above. The scheme worked fairly well for the Boston type of school, having separate wardrobes and small room sizes, and it had a distinct value in standardizing the prevailing diffuse methods of schoolhouse design. It was not applicable to high schools or to many suburban buildings where especially large halls were desired for civic or neighborhood uses.

In connection with any scheme of comparing costs, the method of cubing naturally plays a very important part. It is generally customary to take the cube from the basement floor level to the mean level of the various roofs; but this apparently simple proposition is susceptible of many forms of manipulation, according to whether the figures are intended for public or private use. In a recent competition the program limited the cube of the proposed building to a certain figure. This was easily fulfilled in the winning design by not indicating any cellar under the large assembly hall and counting the cube from that floor. The cost of filling to support this floor had to be assumed by the city after the work was started. In another competition the cubage was limited and stipulated to be counted from the cellar bottom to the outside of the roof. The plans conformed to this requirement, but the imposing exterior effect was gained by carrying up the walls 12 feet above the roof, involving a cost above that contemplated.

The regular practising architect who does not concern himself with the flummery of competitions, whether or not of the "approved" variety, fails to be interested in such manipulations of the cubage of the building, and equally he will avoid making himself a slave of cubic feet. The general public frequently becomes hopelessly confused between cost per cubic foot and cost per pupil, and it is evident that the relation between these two factors may vary widely; for a building on account of having, for example, a very high roof with a large amount of attic space, may show a low cost per cubic foot and at the same time a high cost per pupil. As stated above, the customary way is to calculate cubage from cellar floor to mean height of the roofs, and this certainly represents the contractor's view of how much building he has to construct. The Germans, however, regard the cost of a building as the cost of the utilizable space that the occupant really gets, that is, the cost of the contents included between the cellar floor and the ceiling of the topmost story. An elaborate form for compiling statistics of cost was formulated by a convention of city building officials of the German Empire, and all German

School	Borough	Year	
Total Accom.	Cu. Contents Cu. ft.	Area Typ. fl. sq. ft.	No. C. R. Units

Various Contracts	Contract Price	Per Cent. Total Cost	Cost per Cu. ft.	Cost per Pupil	Cost per Unit
Building,					
Sanitary,					
Heating { Item 1, Item 2,					
Electric,					
Furniture, exclusive of Gymnasium,					
Furniture of Gymnasium,					
Lab. Equipment,					
Mech. Equipment,					
Organ,					
Elevators,					
	$		$	$	$

REMARKS:

Record Cost Card in use by the Superintendent of School Buildings, New York City. Size of Card Is 5 by 8 Inches cities were requested to use the uniform method of computation in figuring school building costs. This system is too lengthy for reproduction here, and it is evident that it is not exactly applicable to American uses.

A more interesting method of standardizing schoolhouse cost has been devised by Mr. C. J. B. Snyder of New York * and is reproduced herewith by his permission :

(A) *Cubic Content.* This shall be understood to be the product of the following:

1. The area of the ground space occupied by various portions of the building measured to the outside of foundation walls, by
2. The height of these portions measured from the lowest floor level to the average roof level of same.
3. This shall include all covered or enclosed stoops, steps, or entrances; chimneys to roof level, etc. There shall be excluded areas; vaults; coal slides; underground ducts; open stoops, steps, or entrances, etc.

(B) *Total Building Cost.* This shall include :

1. Construction, including excavation, fill, grading sidewalk and yard pavements, planting, seeding, retaining walls, fences, curbs, in fact, all items not otherwise specified, provided for or logically belonging with items in (2) plumbing; (3) heating and ventilation; (4) mechanical equipment; (5) electric work; (6) furniture; (7) gymnasium equipment, as a completed structure.
2. Plumbing, gas, and drainage, including connections with street mains (where sewers and mains occur in the streets upon which the property is located).
3. Heating and ventilation, including all automatic control, air conditioning apparatus, and electric drive, when used for any purpose in connection with the plant.
4. Mechanical equipment for shops, also freight and passenger elevators.
5. Electric work, including all bell and gong control and interior telephones; lighting fixtures; generating plant and all motors or appliances not included in (3).
6. Furniture, including everything for the operation of the school, except (7).
7. Gymnasium equipment.

NOTE. — The cost of site and of architect's and engineer's services are not to be included in any of the factors.

(C) *Abnormal Cost.* This shall include:

1. All earth or rock excavation, piling, concreting mason work, grillage, waterproofing, drains, etc., in excess of that required for the building under normal conditions, *i.e.*, resting upon firm, dry earth.
2. Areas, open or covered.
3. Vaults and coal slides.
4. Underground ducts or passages.
5. Excavation, fill, grading, or retaining walls, in excess of that required for the building on a site where the surface of ground is practically level and even with the street grades.
6. Roof playgrounds.
7. Additional cost of plumbing, gas and water work due to absence of sewers and mains in the streets adjoining property.
8. Swimming pool and accessories.

(D) *Normal Cost.* This shall mean the theoretical cost of the building, supposing all conditions of site, soil, and surroundings to be normal. This will be found by

$$B - C = D,$$

and will afford the basis for comparison of cost, one building with another.

(E) *Area Typical Floor.* This shall be computed at the level of the floor above the auditorium and shall include the outside walls.

(F) *Total Class Room Area.* This shall be understood to mean the sum of the floor areas of all schoolrooms to be occupied by what are considered pure classes, *i.e.*, all rooms in which teachers are stationed for purposes of instructing pupils who may be assigned thereto. These shall be measured within the walls.

(G) *Auxiliary Room Area.* This shall be understood to mean the sum of all the floor areas within the building for the use of the principal, teachers, and pupils, including all floor areas of intermediate stories or parts thereof, exclusive of those provided for in (F).

(H) *Class Room Area, Typical Floor.* This shall mean the sum of the floor areas of the pure class rooms on the floor above the auditorium, from which floor (E) is computed.

(I) *Number of Class Rooms.* This shall mean the total number of rooms to be occupied by pure classes, as defined in (F).

(K) *Pupil Capacity.* This shall mean the total number of pupils accommodated when all pure class rooms are fully equipped.

(L) *Cost per Class Room* (Pure) will be :

$$L = \frac{B \text{ (total building cost)},}{I \text{ (number of class rooms)},}$$

(M) *Per Capita Cost* (Total).

$$M = \frac{B \text{ (total building cost)},}{K \text{ (pupil capacity)},}$$

(N) *Per Capita Cost* (Normal).

$$N = \frac{D \text{ (normal building cost)},}{K \text{ (pupil capacity)},}$$

being the real basis for comparison of per capita costs, one building with another.

(O) *Per Capita Cost* (Abnormal).

$$O = \frac{C \text{ (abnormal cost)},}{K \text{ (pupil capacity)},}$$

being the *per capita* cost due to abnormal conditions of site, surroundings, soil, etc.

(P) *Cost per Cubic Foot* (Total).

$$P = \frac{B \text{ (total cost)},}{A \text{ (cubic contents)},}$$

(Q) *Cost per Cubic Foot* (Normal).

$$Q = \frac{D \text{ (normal cost)},}{A \text{ (cubic contents)},}$$

* Report of Superintendent of School Buildings, New York, 1913.

being the real basis for comparison of cubic foot costs, one building with another, when costs of labor and materials; the type of building, whether frame, brick, fireproof, etc.; kind of materials used, etc., are substantially the same.

(R) *Cost per Cubic Foot* (Abnormal).

$$R = \frac{C \text{ (abnormal cost)},}{A \text{ (cubic contents)},}$$

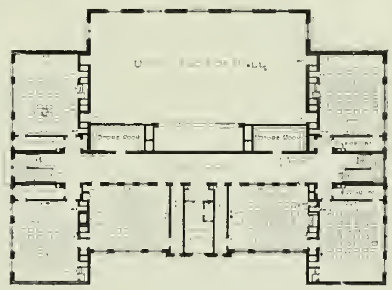
being the cubic foot cost due to abnormal conditions of site, surrounding, soil, etc.

(S) *Ratio of Effective Teaching Space to Total Floor Area.*

$$S = \frac{H \text{ (classroom area, typical floor)},}{E \text{ (total areas, typical floor)},}$$

being the real basis of comparison as to economy of planning one building with another.

Ground Floor Plan



First Floor Plan

Hopewell School, Taunton, Mass.

Kilham & Hopkins, Architects

Cost — 18½ cents per cubic foot; $129 per pupil. Second class construction, stairways and all walls and partitions fireproof

Other information could be obtained, but it is thought that sufficient has been given to cover the essentials in obtaining true comparative data, exclusive of the consideration which must be given to materials and local conditions.

In calculating the probable cost of a building from a set of plans, the cubic foot route is the most reliable, but as a committee man recently said to the writer, "Pupils are your product, and a factory ought to know what its overhead cost of production is." In elementary schools the cost per pupil is comparatively easy to estimate; but in high schools reliable statistics are difficult to compile on account of variation in program, variation in number of departments and accessory rooms, and different ideas in various cities regarding laboratories, gymnasiums, wardrobes, and fixed equipment in general. For example, one city may regard a high school as incomplete unless equipped with a swimming pool and a $10,000.00 organ; while another regards any gymnasium at all as a luxury and cuts down the assembly hall to accommodate half the enrolment of the school.

An elementary school consists practically entirely of "home" rooms, excluding perhaps the two departments of domestic science and manual training; a high school may have a certain number of so-called "home" rooms, some additional "recitation" rooms, and a large number of laboratories and special departments, varying according to the ideas of the local Board of Education. It seems fair, therefore, to figure the cost per pupil of any building on the actual total number of seats or places in all class, study rooms, and laboratories, but not counting the assembly hall. Mr. C. J. B. Snyder writes as follows regarding this: "The difficulty I have experienced in obtaining actual figures as the accommodation to be afforded by a high school building is due entirely to

(a) Variation in programs,

(b) Number and grade of students with relation to

(c) Number of class rooms, study rooms, laboratories, libraries, and other special rooms, and

(d) A rule which will apply to a classical high school will not, in any sense, apply to one devoted to manual training or any special purpose.

"As a business proposition there should be such a relation between (a) the program, (b) the number of students, and (c) the number of class rooms, that they shall be all occupied for each period of the day on the single session plan."

The high cost per pupil of many high schools is due to the practice of maintaining "home rooms" where each pupil has his headquarters, leaving his seat empty when he goes to special work in the laboratory or elsewhere. If, on the contrary, every room is made to do duty continuously for recitation purposes, a considerable saving can be made in the cost of the building. Some cities, Philadelphia for example, utilize the assembly hall as a study hall. On every third seat there is arranged an arm table made to hinge down when not in use. The division assigned to the hall for its study hour takes its place in the chairs having these tables which are sufficiently separated to avoid interference.

Figured on the above basis, the DeWitt Clinton High School in New York cost about $300.00 per pupil; the Washington Irving High School, about $375.00 to $400.00; the Boston High School of Commerce, about $292.00; the Haverhill (Mass.) High School, $225.00; the Salem (Mass.) High School, about $230.00, and so on. Elementary schools in the city of Boston of fireproof construction should theoretically cost about $140.00 per pupil; those of second-class construction in the suburbs from $110.00

to $130.00, with of course a wide range of variations for local conditions which vary from the standard.

While it is true that calculations of the costs of elementary schools are much simpler to compile than those of high schools, there is still room for wide variation in figures on the question of what the actual capacity of the school is; for the rooms may be under occupied in some cases and overcrowded in others. Mr. H. L. Patterson, of the Boston Schoolhouse Department, considers that the only fair way to estimate the capacity of an elementary school is to figure the total number of square feet in all pure class rooms and divide by fifteen, the result being the pupil capacity of the building. The following table of costs of Boston schools was compiled by Mr. Patterson on the above basis and is reproduced herewith by permission. It will be seen that the figures vary from those in previous reports.

FIRST CLASS.

Name.	No. of Rooms.	No. of Pupils.	Cost of Building.	Cost Per Pupil.	Cost Per Cu. Ft.
Wm. E. Russell	18	976	$188,524.56	$192 14	$0.21
Jefferson	19	1,038	210,890.49	203.17	.24
Washington	30	1,560	325,541.60	208.68	.25
O. H. Perry	14	770	146,145.63	189.80	.24
Mather	30	1,650	289,332.99	175.36	.21
Thomas Gardner	14	770	140,267.57	182.17	.19
Oliver W. Holmes	24	1,224	195,648.02	159.84	.20
Dearborn	21	1,110	217,131.32	195.61	.22
Patrick A. Collins	17	904	176,663.79	195.42	.23
Edward Everett	14	614	107,515.43	175.17	.21
John Cheverus	16	704	102,706.35	145.89	.19
Abraham Lincoln	40	1,820	280,088.43	153.89	.24
Samuel Adams	14	632	107,518.34	170.12	.22

SECOND CLASS.

Name.	No. of Rooms.	No. of Pupils.	Cost of Building.	Cost Per Pupil.	Cost Per Cu. Ft.
John Winthrop	16	724	$110,673.54	$152.86	$0.18
E. P. Tileston	16	724	132,506.39	183.02	.26
U. S. Grant	18	822	116,509.09	141.74	.19
Lewis	17	778	108,090.29	138.93	.17

Average on the above thirteen buildings first class, cost per pupil, $180.56; cost per cubic foot, 22 cents. On the four buildings of the second-class construction the cost per pupil, $154.14; cost per cubic foot, 20 cents. Percentage saved on second-class buildings over first-class in cost per pupil, 14.06 per cent; percentage saved on second-class buildings over first in cost per cubic foot, 9 per cent.

In the above comparison four second-class buildings, have been compared with thirteen first-class buildings, which is hardly fair. The following table shows four first- and four second-class buildings for comparison:

FIRST CLASS.

Name.	No. of Rooms.	No. of Pupils.	Cost of Building.	Cost Per Pupil.	Cost Per Cu. Ft.
Edward Everett	14	614	$107,515.43	$175.17	$0.21
John Cheverus	16	704	102,706.35	145.89	.19
Abraham Lincoln	40	1,820	280,088.43	153.89	.24
Samuel Adams	14	632	107,518.34	170.12	.22

SECOND CLASS.

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E. P. Tileston	16	724	132,506.39	183.02	.26
U. S. Grant	18	822	116,509.09	141.74	.19
Lewis	17	778	108,090.29	138.93	.17

Percentage saved on second-class buildings over first in cost per pupil, 4 per cent; percentage saved on second-class buildings over first in cost per cubic foot, 7 per cent.

Following is a comparison of lower elementary school of the first- and second-class construction:

FIRST CLASS.

Name.	No. of Rooms.	No. of Pupils.	Cost of Building.	Cost Per Pupil.	Cost Per Cu. Ft.
Marshall	12	758	$124,467.65	$164.20	$0.24
Farragut	14	714	150,526.43	210.82	.23
Paul Jones	11	643	114,370.33	177 87	.22
Ellis Mendell	12	612	122,267.20	199.78	.24
Christopher Columbus	24	1,110	173,512.08	156.32	.23
J. B. O'Reilly	14	672	112,839.00	167.91	.25
Samuel W. Mason	14	644	118,324.64	183.73	.27
John G Whittier	10	478	74,736.15	156.35	.23
James Otis	12	612	107,818.00	174.54	.26
Joseph Tuckerman	10	480	77,423.25	161.30	.23
Sarah J. Baker	24	1,152	161,194.23	139.92	.23
Wm. E. Endicott	10	476	79,057.77	166.09	.23
Nathaniel Hawthorne	9	447	67,912.07	151.93	.24
Nathan Hale	12	480	67,231.82	140.08	.20
Peter Faneuil	17	760	108,079.50	142.21	.25
Wm. L. Garrison	10	460	66,151.48	143.81	.24
Lafayette	8	352	62,804.25	178.42	.28

SECOND CLASS.

Name.	No. of Rooms.	No. of Pupils.	Cost of Building.	Cost Per Pupil.	Cost Per Cu. Ft.
John L. Motley	4	172	$22,510.25	$130.87	$0.23
Charles Bulfinch	10	538	78,925.73	146.59	.22
George T. Angell	8	352	55,154.50	156.69	.26
Benedict Fenwick	12	547	62,881.45	114.96	.19
Wm. Bradford	8	372	42,714.04	114.82	.17
Ellen H. Richards	8	366	44,589.76	121.83	.19
Mozart	4	148	22,891.00	154.67	.21
Martha Baker	4	160	24,557.91	153.49	.19
John J. Williams	12	495	69,138.44	139.67	.23
John D. Philbrick	8	333	59,663.75	179.17	.19
Philip Sheridan	12	495	70,735.20	142.89	.21
Florence Nightingale	10	391	60,414.14	154.51	.22

Percentage saved on second-class buildings over first-class in cost per pupil, 3.09 per cent. Percentage saved in second-class buildings over first-class in cost per cubic foot, 8.333 per cent.

It is difficult to explain the high cost of some of these buildings of second-class construction, particularly as many attempts at economy were introduced. A building of second-class construction in the vicinity of Boston can generally be produced of the highest type of material throughout for from 18½ to 19 cents per cubic foot, and these figures can be reduced in most other localities.

Mr. Ernest F. Guilbert of Newark (Report for 1913-14) gives the average cost of twenty elementary schools in that city, all of fireproof construction and all having an auditorium and gymnasium, except three, where a combination room serves both purposes, at $147.00 per pupil, based on the New Jersey law of 18 square feet per pupil. This result would be lower still if based on the ordinary rule of 15 square feet. These buildings are all well appointed and of unusually attractive exterior appearance.

While the cost per cubic foot remains the safest method for the architect to use in estimating from the plans the probable cost of a new building, there is always danger that he will, in his desire to reduce cubage, so cut down and restrict the accommodations as to seriously hamper the use of the building without any corresponding gain in cost, and great care should always be taken in the designing stage to see that no advantage is thrown away in the desire to keep down to a limit of cubature.

Stairways in Houses of Moderate Cost.

I. THE HISTORY OF THE DOMESTIC STAIR.

Accompanied by Examples Selected from Recent Domestic Work.

By JOHN T. FALLON.

DURING all the vicissitudes of developing growth through which the planning of the house has passed, the prime importance of the stairs has remained comparatively unchanged. We are accustomed to think of domestic planning in its modern sense to have commenced somewhere in the eleventh century and to have settled down to a steady and consistent growth after the life of society was freed of the necessity for protection and was able to consider its habitations from the standpoint of ease of living. The persistence of tradition in architecture long after actual causes or necessities are removed, a phenomenon that has been pointed out by Viollet-le-Duc in his dictionary of architecture, acted to postpone the realization of conditions of comparative comfort until at least four centuries later. This tendency to cling to obsolete ideas in art becomes the means of explanation of many otherwise unsolvable questions in the history of house planning and one that shall be referred to later on.

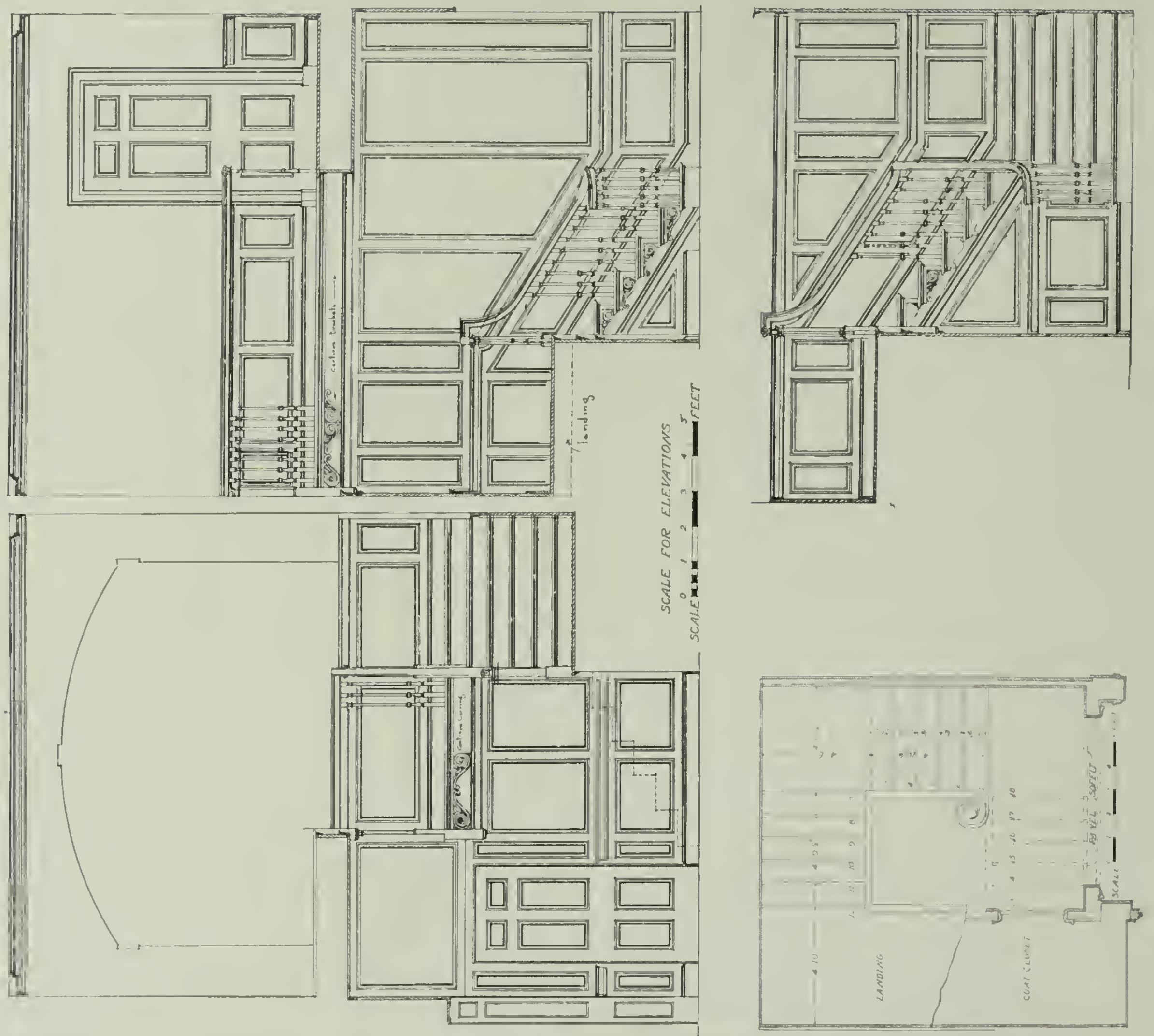
The stairway, performing a continuous and important function and being the key to the planning of the house, plays a most prominent part in domestic architecture. The problems of affording an easy ascent, of being conveniently related to the body of the house, and of receiving a dignified and suitable treatment have been constant and unchanged. The variety of solutions has depended upon the growth and development of social life and upon differences in the customs and climate of the respective countries. No little importance attaches itself to the various materials most accessible to the builders.

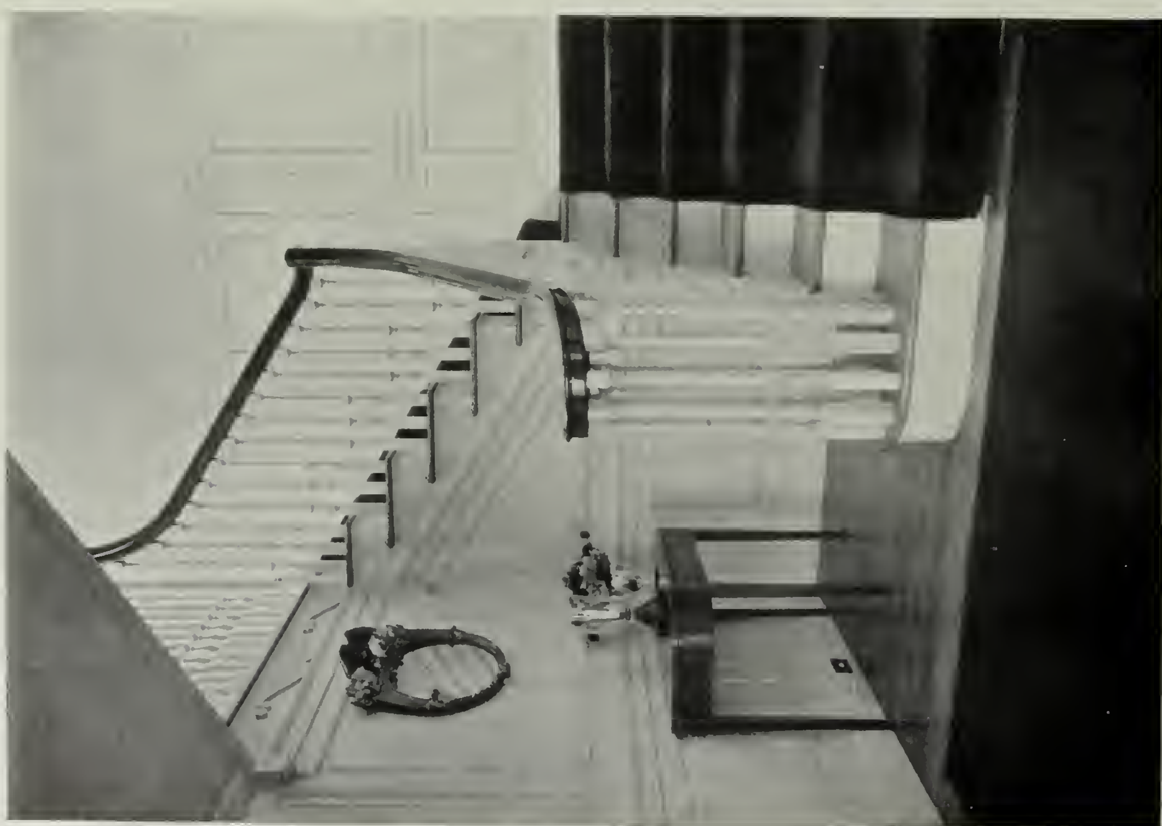
In Gwilt's "Encyclopedia of Architecture" the staircase is defined as "that part or subdivision of a building containing the stairs which enable people to ascend or descend from one floor to another." Accepting this technical description, it is evident that the staircase is distinct from the hall, commonly known as the entrance hall from its position nearest the entrance, and this difference continued to be preserved in all continental planning until the beginning of the past century. A lax nomenclature has crept into the English language and these two distinctive features have been confused, so that we continually speak of the staircase as the hall or even of the staircase hall. Modern planning has ceased to preserve this distinction, but for the purposes of historical discussion it must be kept in mind.

Stairway in an Old House, Philadelphia, Pa.

It was in Italy that the staircase first received attention as a feature in the general composition of the house. The domestic life of the upper classes having developed in the security of the towns enclosed with walls, house planning became naturally less irregular and more regard was given to comfort and dignity. In Italian palaces, until the end of the fifteenth century, the usual way of building the stairs was to start them near the vaulted entrance way and to carry them up in straight flights between walls. With the advent of Palladian ideas, the staircase assumed more imposing proportions, although it was not until much later that the monumental staircase as one of the chief features of the Italian Renaissance began to be built. Indeed, until late in the seventeenth century, intra-mural stairs were considered grand enough for the most splendid palace.

The spiral staircase, soon discarded by the Italian architects, was left for the French to develop, and as Wharton and Codman have suggested in their admirable book, its structural difficulties must have had an especial fascination for the ingenuity of the Gallic mind. No doubt, it was one of the motives of Gothic house planning so tenaciously clung to by the French aristocracy long after they became familiar with the simpler and more logical Italian methods. After their full assimilation, the





STAIRWAY IN THE HOUSE OF HARRY W. HARRISON, ESQ., DEVON, PA.
DUHRING, OKIE & ZIEGLER, ARCHITECTS

French stairway came in line with the national art development and in the various periods was interpreted in the most elegant and graceful manner. In Italy, stairs were usually of stone, wood being little used in interior architecture; as we have observed, the stairs instead of being placed between walls were often carried up in an open staircase. In contrast to the French custom, the balustrades were usually stone or marble. The medieval French stair was usually of wood — a material that was soon abandoned for stone. Beginning with Louis XIV, the stone stair with decorative iron railing becomes a distinctive feature of French houses. Since the eighteenth century, French architects have spent their talents upon the beautiful wrought iron stair rails which decorate almost every domestic interior in France.

The distinction between hall and staircase was never observed as clearly in England as it was on the continent. The Tudor hall with its screened end separating it from the staircase was followed by the Renaissance hall, in which an open arcade was substituted for the screen. Different habits of living tended also to unite the two features; for, unlike the continental dwelling, the Englishman's home is his castle and the stairs become more intimately associated with the family life, with less need to shut them off from the other rooms. The vestibule never formed part of the English house and the hall, in medieval days the center of feudal life, refused to shake off entirely this function.

The natural tendency in the architecture of the American colonies was to borrow its ideas of planning from the modest houses of the middle class where the confusion of the two features was apt to be most prevalent, and all our later traditions have helped rather than hindered this development. Privacy in domestic planning is not nearly as sought for here as it is in Europe; in our house planning, little attempt is made to separate the life of the occupants from the intrusion of strangers. We show this in our entrance doors of plate glass, in our abhorrence of fences, and in many other ways, preferring to invite rather than to repel attention. That there will soon be a reactionary swing of the pendulum is certain, if one may deduce the general tendency from specific and isolated examples.

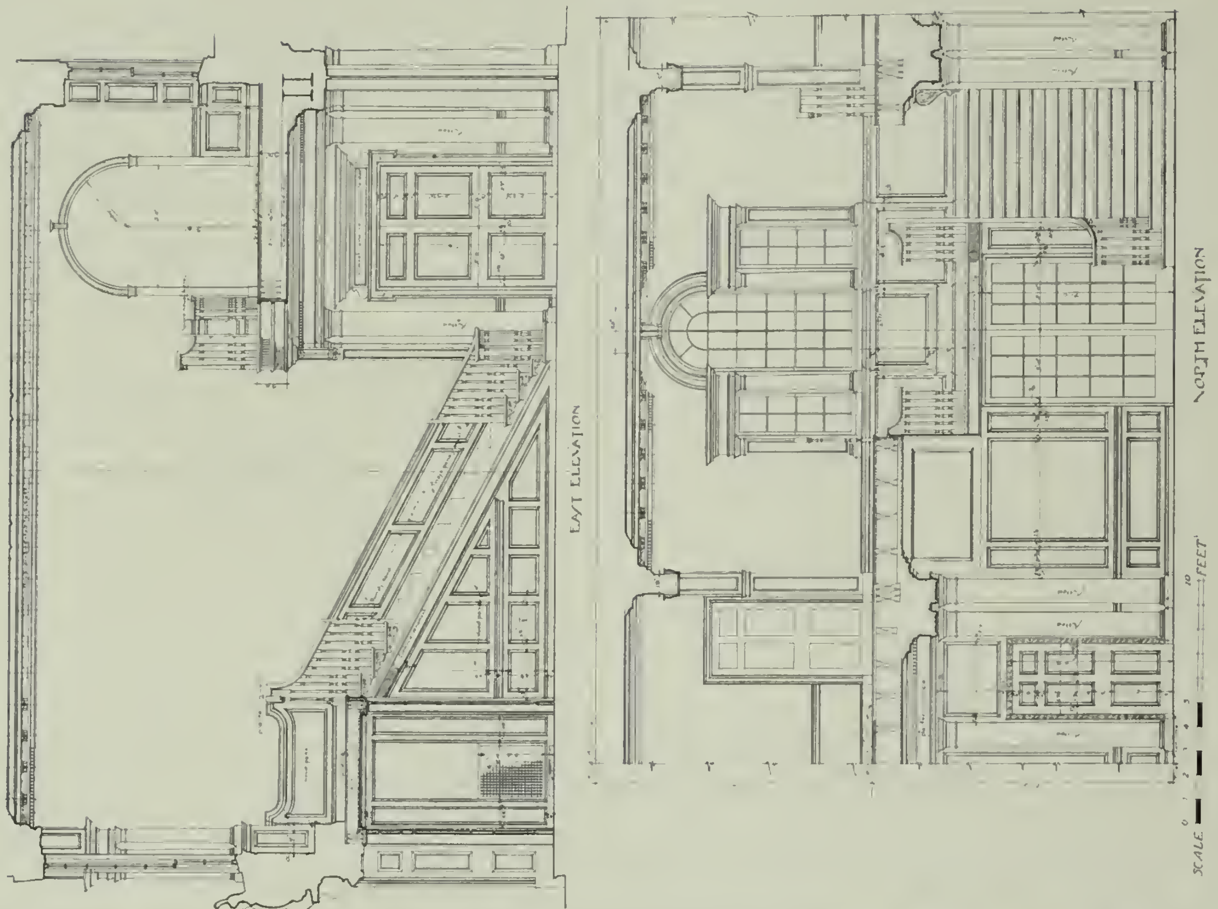
In England, wooden stair rails were greatly used during the Tudor period, marked by elaborate detail rather than by great merit of design. Their charm for us probably lies as much or more in their quaintness and patina of age as in their intrinsic worth. The introduction of Italian motives brought the classic stair of stone, which was copied in smaller houses in wood. Iron rails were little used in England, where the influence of the joiner and carver was so strong towards the use of the more tractable material. The Anglo-Saxon skill and ingenuity in wood working is perhaps more of a factor in our Colonial architecture than is generally realized. It is certainly one of our important inheritances from the mother country, since not only were the traditions bodily transplanted, but the actual workmen themselves must have been here at most but a generation or two.

Let us now have a more detailed glance at the English stair during the early part of the eighteenth century, — the pre-Revolutionary period when intercourse between America and England was at its height and when the style was in the real process of transfusion. Godfrey, in "The English Staircase," says, "The extreme and somewhat constrained intellectuality of the Georgian era, mirrored so faithfully in the quality of its furniture, made chiefly for that elusive quality known as elegance. We have already seen the exuberance of the early Renaissance restrained by the desire for the correct classic forms which obtained from Charles II to Queen Anne. But the very essence of the staircase was now to be materialized and expressed in the simplest lines. It was to be a flight of steps in one continuous curve from floor to floor and to effect this the covering string must be abolished, the heavy handrail must give place to a light and polished roll, and the newel — in order that it may not obstruct the essential line — must become little more than a slightly accentuated baluster. This ideal was not completely reached until the finest examples of iron balustrades were introduced in the later years of the century; but every alteration that occurred was with this object in view."

The first step in this development was the suppression of the closed string, the stairs being brought out over a small constructional string. The stair ends were then decorated with consoles, which became in their richly carved forms the great feature of the Georgian stair. The balusters became slighter and great ingenuity was spent upon their design. From two to three balusters were used to each tread, usually with alternate designs, the favorite type being one with a hollow groove worked spirally around the shaft, another with vertical flutings, and a third the ordinary turned type. A distinctive Georgian feature was the small, square block introduced just below the shaft. The start of the stairs began with a sweeping curve around which the handrail and baluster swept to meet a small, central newel.

In a later article the Colonial type of stairs will be discussed and its points of similarity with the Georgian designs of England shown. We are chiefly concerned here with indicating the English development during this period as a basis for showing how much more closely this feature followed its prototypes than other parts of the Colonial house. One index of the effect of the Revolution in lessening our connection with England is illustrated by the fact that iron stair rails, which start to appear in England in the last quarter of the eighteenth century, were practically unknown in America.

The Colonial stairway has naturally had a lasting influence in America, due both to the patriotic support of our one national style and also to its practical and simple elements. It is fortunate in many ways that the type was adopted at one of the high-water marks of English architecture, since no forms have since been developed in England which approach the Georgian type in grace and ease. Even with the modern taste for eclecticism, the Colonial stair is so strongly embedded in the minds of American architects that it not only has a national application, but it colors and modifies every other European type that is imported. While the French and Italian designs have a restricted use in our domestic architecture, they are drawing the attention of designers towards a more elegant and classical form of expression. It is safe to say that the house of moderate cost will never depart very far from the lines of Colonial development; but it is certain that continental influences will more largely enter into and influence its growth as time goes on.



STAIRWAY IN THE PRINCETON CHARTER CLUB, PRINCETON, N. J.

MELLOR & MEIGS, ARCHITECTS

Plumbing Installation and Sewage Disposal.

II. TRAPS, FIXTURES, AND WATER SUPPLY.

By CHARLES A. WHITTEMORE.

THE reasons for installing vents in connection with traps is sufficiently obvious. Occasions will arise, however, when the vent installation is inadvisable because of difficulties in prearranging a definite location. For example, many times in large office buildings the floor space is left undivided until such time as the tenancy is determined. Frequently it may not be decided until the floors have been set in place and the "roughing-in" of the plumbing system already installed. In order to accommodate tenants who may wish special office arrangements or different provisions from the typical lay-out, and in order to meet their requirements as to lavatory service, it is necessary to provide wastes and supplies in such a manner as to be suitable for any demand. These may be placed near a column, or built in with the floor and left flush with the same, or with the finished plaster surface of the wall. If the fixtures are not connected at once, the wastes and supplies may be capped and be ready for future connections. The only feasible way in which a system of this kind may be made elastic is by the use of non-siphoning traps. It is not impossible, however, to provide a vent system which could be capped in the same manner as the wastes, but this would mean complications and additional difficulty in concealing the pipes, all of which may be eliminated by the use of non-siphoning traps.

Non-siphoning traps may be divided, in a general way, into three classes: one in which the waterway is so large as to preclude the possibility of siphonage; another in which the interior construction of the trap is such as to give a special motion to the water flowing into and through the trap, which many claim will prevent siphonage; the third by constructing the interior of the trap in such a manner as to form sufficient resistance so as to prevent the water being drawn out. Of the first type there are many examples among that class of traps called "pot traps" in which a portion of the water seal can be siphoned out and still leave sufficient water to prevent escape of sewer gas through the trap.

The second type is represented by traps, such as the centrifugal trap, in which the water enters the trap at an angle, or by an inlet of a special form, which gives the inflowing water a circular motion so as to make the trap, in addition to being non-siphoning, a self-cleaning trap.

The third type is represented by certain patented traps, in which the interior construction is such as to offer special resistance to the flow of the water by means of projections from the periphery towards the center, in the nature of cup plates or baffle plates.

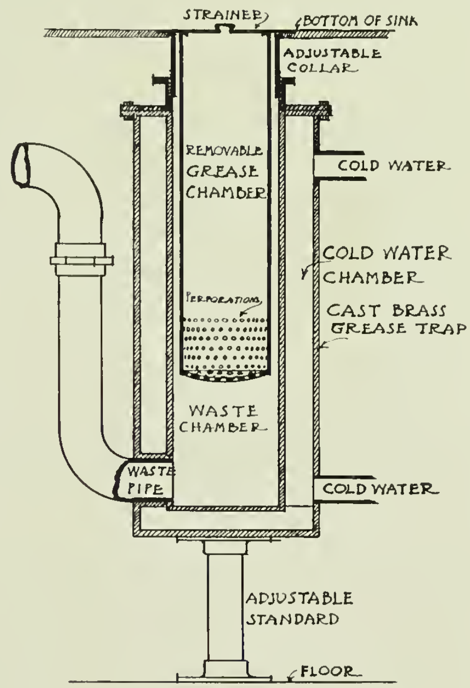


Fig. 1

Section Showing Arrangement of Grease Trap Installed with Sink

A non-siphoning trap should not be used until thorough tests have been made under pressures which would exceed the normal pressures of a system, and under conditions which duplicate as nearly as possible the exact features of the installation in connection with which they are to be used. Non-siphoning traps should be used only in connection with outlets from lavatories or similar fixtures. A too general use of this type of trap should not be permitted, as it lets down the bars which guard the health. Satisfactory installations of non-siphoning traps would be more difficult to obtain if their use were allowed without reservation.

No one questions that from a standpoint of sanitation non-siphoning traps properly used are quite as perfect as any trap in a full vented system. The special conditions which must be considered in the construction of such a trap, the importance of restricting their use to installations that can be readily supervised, and the growing demand for this type of trap make it all the more necessary that strict adherence to the sanitary laws be required, and that the installations be made only by competent mechanics.

The problem of intercepting the grease from kitchen and pantry sinks before it enters the drain is often overlooked in laying out plumbing work in residences. Every residence should have a trap either located outside the house or near the kitchen sink for this purpose.

The outside grease trap should be built of brick and cement 12 feet deep and 4 feet wide, with an iron ladder on each side to afford facility for cleaning and also an iron cover flush with the ground. All the waste water from all sinks in kitchens and pantries should pass into this trap before entering the main drain.

The main waste pipe should be 3 inches in diameter with 2-inch branches to sinks.

All changes in direction in the grease trap system should be made with a Y branch and ⅛ bend with a brass cleanout in the end of the Y branch.

The outlet of grease trap should be 4-inch Ex. Hy. C. I. pipe and should turn down into the grease trap not less than 5 feet, with a brass cleanout at heel of the bend where it goes out of the grease trap, and should run 5 feet outside of main house trap.

In some residences an outside grease trap is not practical. In such cases a special grease trap should be installed flush with the inside of the bottom of the sink, constructed with an inner cage which may be readily taken out and emptied. (Fig. 1.)

The most important part of such a trap is its installation. All the cold water used in the house should first pass through the cold water chamber of the grease trap. To accomplish this, the cold water main from the foundation wall should first be connected with the grease trap and no branches should be taken from the main until after it has left the trap.

This may cause a little additional expense, but it is the only effective way to properly install a trap of this kind, and it is so easily cleaned that the services of a plumber are seldom necessary.

As a rule, the main house trap is set inside of the foundation wall; but the proper and sanitary place to set the main house trap for residences is in an outside manhole, with an indirect fresh air supply with iron cover flush with the ground.

The water test is always made from the main house trap, and frequently a leak develops outside and allows the water to come through the foundation wall. When the drain is clogged, it is most frequently at the main house trap; if the trap is inside the wall, the removal of the cover allows the soil in the pipe to go over the cellar floor, creating a very unsanitary condition.

Fig. 2 shows a method of installing this type of trap outside the wall. Under these conditions the trap is protected from freezing, and a fresh air circulation through the entire sanitary system is assured.

Plumbing Fixtures. Aside from the ordinary iron fixtures which are used only in inexpensive work or in places where they will be required to withstand rough usage, such as sinks in boiler rooms, etc., plumbing fixtures are usually either enameled iron, porcelain, or vitreous china.

The enameled iron fixtures are those made of iron on the surfaces of which an enamel preparation has been baked.

Porcelain fixtures are of earthenware, which are covered both inside and out with the porcelain enamel and then "fired" in the kiln at a high temperature. Vitreous china fixtures are made from a fine grade of china clay which vitrifies when baked and produces a hard, non-crazing surface.

A fixture to be perfectly sanitary must be of a non-absorbent substance; it must not be subject to discoloration through acids or alkalies and must not easily break, crack, or craze. The surfaces should be smooth so as to be readily washed off and kept clean by each flow of water.

The applicability of various types of fixtures to the location in which they are intended to be placed must be left to a great extent to the owner or user. The majority of manufacturers at the present time produce fixtures of a high standard and of relatively equal merit. There are, however, one or two makers of fixtures in a class by themselves whose output is of an exceptionally rare quality. The catalogues give such excellent reproductions of the fixtures that a list may be formed and fixtures chosen without much trouble.

In the final selection of fixtures it is advisable, in every case where possible, to see the fixtures "under water," that is, with the water turned on the various parts of the fixture so that the action of the faucets, wastes, traps, tanks, etc., may easily be examined.

Fixtures are of three classes: "A," "B," and "C." "Class A" refers to a specially selected product of the kiln and these fixtures are supposed to be perfect. "Class B," as may be readily understood, are "seconds" and subject to slight imperfections; while "Class C" refers to the ordinary kiln run and are adapted only to the least expensive installations. Architects in specifying "Class A" should insist that imperfections in surface, color, etc., will be sufficient cause for rejection, and no reputable supply house will hesitate to replace on demand any goods which do not come up to the standard of their class.

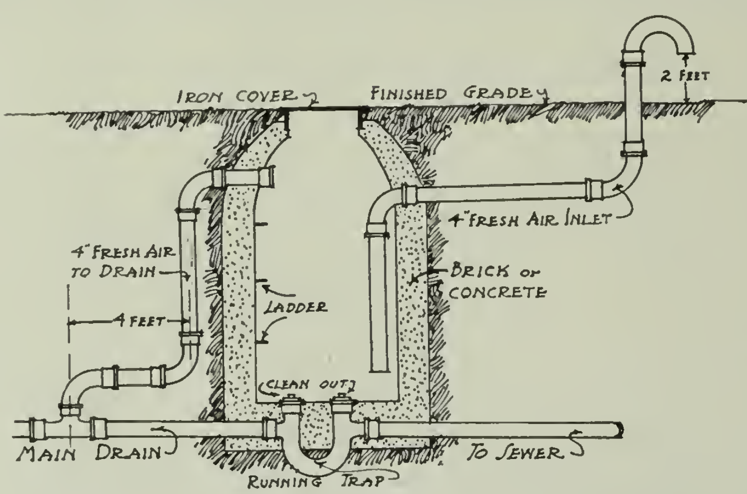


Fig. 2
Section Showing Arrangement of Main House Trap Outside of Foundation Wall

Frequently plumbers buy the pottery from the manufacturer or jobber specified, but supply their own brass work, as the trimmings are called. This should not be permitted. An architect should specify the make of faucets, valves, etc., as carefully as the fixtures themselves and frequently assumes that he does. In order to be sure that the manufacturer's responsibility covers all parts of the fixtures, the specifications should mention that "the fixtures are to be complete in accordance with plate number blank" or "complete as per sample approved."

The fixtures should be set either entirely open, that is, without any wood work or other enclosure which would form a receptacle for dirt or be subject to decay, or they should be entirely enclosed by means of a non-absorbent substance, such as tile or hard finished cement.

Closets are known as "wash down," "siphon action," or "siphon jet," according to their construction. The "wash down" type has a large waterway through the trap, but only a small water surface in the body of the closet. The water from the flush tank enters through the rim and space at back of the closet and flushes the pan. This type is objectionable because of the noise due to the large volume of water necessary to complete the flush and the difficulty of making the fixture self-cleansing.

Siphon action closets are more frequently used to-day than any other type of closet. They are so constructed that the flush from the tank forces the water, forming the seal of the trap over the bend and fills the soil pipe. The effect of this action is to pull the contents of the closet through the trap and into the main soil. Enough water flows from the tank to keep the seal intact. If well designed, they are self-cleansing, sanitary, have good water body and waterway, although somewhat noisy in action.

The highest type of closet is the siphon jet. This closet is the acme of perfection in that it is sanitary, self-cleansing, noiseless, and durable. More care must be taken in the manufacture of a closet of this kind on account of the difference in design, and as a result the fixtures are of a better quality. These closets in addition to being siphonic in action have a jet at the bottom of the bend which increases the effect of the flush and aids materially in the cleansing process. The water comes into the closet through the flushing rim and through the jet and forces the contents of the closet through the trap, and by the siphonic action of the mass of water draws out all the impure matter in the bowl. The jet also cleanses portions of the fixture which might become soiled.

The types of urinals in general use are the flat back lipped urinal and the porcelain enameled stall. Thanks to the advance in sanitation, the old trough types are passing away and the old non-vented open urinals are becoming things of the past. The flat backed urinal is made in two types,—one in which the trap is beyond the fixture, and the other in which the bottom of the fixture contains a water body somewhat like that in a water closet.

The porcelain stalls are more sanitary than the wall type of urinal. They are readily flushed in all parts, the surface is impervious, and there should be no crevices which may afford lodgment for germs. In using urinals of this type it is well to note that the bottom of the urinal extends below the floor, and provisions should be made for the trap, etc., at this point. A space 4 inches deep, and of the same area as the urinal will occupy, should be left in the floor construction and the "roughing-in" laid out accordingly. Another method of installing these fixtures is to raise the body of the urinal above the floor, in which case it is necessary to form a step in front of the base. This is objectionable because of the greater difficulty in maintaining a sanitary condition at the floor than when all the material is flush, and also presents the possibility of injury in case of a misstep.

In addition to the fixtures mentioned above, the ordinary sinks and slop sinks should be carefully considered in laying out plumbing work. These, however, are not of sufficient importance to require detailed explanation. In every case where possible, however, slop sinks should be of porcelain or vitreous china rather than enameled iron, in order to preclude the possibility of damage to the surface.

In connection with the installation of closets, an important feature is the floor connection. This should be an approved type of joint, consisting of a heavy brass floor plate properly secured to the branch soil pipe and bolted to the trap flange and the joint made gas tight. No rubber washers should be allowed in making up this connection, and all floor flanges should be set in place and tested before any closets are finally connected.

The wastes for lavatories are arranged in three general classes, — the so-called "pop-up waste"; the combination waste and overflow, and the ordinary "plug and chain." In the "pop-up waste" a movement of the handle controlling the waste raises a metal disk from its seat in the outlet and allows the water to flow through. The combination overflow and waste is in the form of a hollow pipe and is controlled by a handle similar to the "pop-up waste," but has no disk at the outlet, the end of the pipe being ground to fit a seat in the valve. Of these types the "standing" or combination is the most satisfactory in operation and maintenance. The "plug and chain" is objectionable because the plug is subject to damage from abrasion or cutting and the metal work of the chain is difficult to keep properly clean and sanitary.

Faucets are divided broadly into two general types, — self-closing and compression. The compression type is one in which the water is shut off by forcing a washer down to the seat of the valve and closing the port through which the water passes. The self-closing type, as the name implies, shuts off the water automatically when the pressure used to turn the water on has been released. The advantage of the compression type lies in the fact that the water may be turned on and left running without attention as long as desired, but where meters are installed and the water is paid for by the amount which passes through the meter, the compression faucets are a source of waste. The self-closing faucets on the other hand are used almost exclusively with the idea of their greater economy in water consumption, and also that they in a measure insure against damage due to water left on without attention, and a possible overflowing of fixtures.

In connection with the subject of faucets, the tanks and valves used in connection with intermittent flush, or an ordinary flush for closets or similar fixtures, might well be considered. An intermittent flush is obtained through a form of tank in which the amount of water running into the tank is regulated so as to open the valve at predetermined intervals and flush the fixtures. This form of flush is particularly valuable in public toilet rooms, and these types of valves have been so perfected that they seldom get out of order.

The regular flush valves which are used in connection with flush tanks operate either by a chain or button or handle. The float or ball cock is installed in connection with these tanks in such a manner that as the water leaves the tank the ball cock opens the supply valve. The inrushing water raises the ball cock to a point at which the water is automatically shut off, when the tank is filled. This form of tank in its ordinary construction is a source of great annoyance. It is difficult to eliminate the noise from the flush and from the inrushing water; the valves and ball cocks frequently stick and allow a continuous flow of water through the tank and fixture and require considerable attention.

The elimination of the noise from these tanks and valves has been a great problem to the manufacturer of good plumbing fixtures. To a large degree the noise may be eliminated by the use of reducing pressure valves which cut down the pressure of the water entering the tank and prevent the hissing of the valve. A form of siphon from the supply pipe into the overflow has been adopted by some makers to prevent the "gurgling," as the water leaves the tank in the flushing process. A tank that is absolutely noiseless is difficult to obtain and in a practical installation it can be counted on only when the governing conditions are most favorable.

There is one method of flushing closets, and fixtures of a like character, which is comparatively noiseless, that is, by the use of flushometers. These specially constructed valves are placed on the supply line to the fixture and so arranged that a stated amount of water will pass through the valve under pressure and the valve automatically close after this amount of water has passed through. In many cities flushometers may not be installed except where tanks are arranged for their supply.

The majority of flushometers operate at a pressure as low as 3 pounds. This latter feature is particularly desirable where fixtures are installed in an upper story, and unless connected directly to the street pressure, a sufficient head of water is not possible on account of the lack of space from the fixture to the roof. In such cases a large pipe should be installed of sufficient capacity to hold enough water, if possible, to produce the required pressure.

Cold Water Supply System. The cold water supply system for the average building or residence consists merely of the supply from the street main through the wall of the house branching from this main to the various fixtures and requires no circulation. It is essential, however, in any installation of a cold water system to extend the cold water pipes for a distance of not less than 2 inches beyond each faucet in order to provide an air chamber or air cushion, against which the water pressure may be forced, and thus prevent what is known as water hammer in the piping. The length of this air cushion depends entirely on the water pressure and must be varied to suit such conditions.

A cold water supply system for a large office building, or commercial or manufacturing establishment, consists of the supply from the street through the walls, the connection of this supply direct to a water drum, or tightly closed tank, from which the various rising lines are taken to supply the fixtures in various portions of the building. This tank maintains the same pressure at all times as in the street main, and forms a storage so that if all the faucets in the building should be open at the same time, there still would be a sufficient supply of water under pressure so that the supply from any one faucet would not be appreciably diminished.

In an installation of water supply to fixtures no pipe should be allowed under any conditions less than ¾ of an inch in internal diameter except the branches to the fixtures themselves from the supply line. When small pipes are used, the possibility of the noise from the water rushing through the pipes is very much increased.

Various kinds of pipe for water systems are used, such as lead, iron, galvanized iron, lead lined iron, tin lined iron, brass tubing, and iron sized brass pipe. The lead pipe is not allowed in the best practice because of the possibility of damage to the pipe and subsequent leakage, and also because of the action of the acids and alkalies on the lead. The iron pipe is objectionable on account of being subject to corrosion. Galvanized iron pipe is better than either of these, but is not so permanent as other forms of piping. Lead lined pipe and tin lined pipe as the names imply are iron shells with a lead or tin lining in the pipe.

The best kind of lead lined pipe is that in which the lining is well united with the iron pipe itself, other forms of lead lined piping being open to the objection that a defect in the lining would permit of the passage of water between the lead and iron and the gradual closing of the bore of the pipe until the pipe itself should be rendered practically useless. The lead lined pipe requires lead lined fittings, and in the use of pipe of this character the architect should be particularly careful to see that all fittings and all pipes are properly installed. Tin lined pipes can be easily determined by a slight crackling in the pipe when the pipe is bent, and also by cutting the end of the pipe square and clean and breathing on this cut end. The breath will make the surface of the lead turn blue, while the tin will remain bright, and in this manner the thickness of the tin lining may easily be determined.

Brass tubing is a drawn tubing and should be examined to see that the thickness is the same in all parts. It should be slightly annealed or re-heated in order that it may not be too brittle for use, the harder pipes being more likely to develop defects in the nature of split pipes. Brass tubing is thinner than the iron sized pipe and is frequently called fine thread pipe. The threads for connections on this piping must be carefully cut in order not to perforate the pipe itself and make a weak joint.

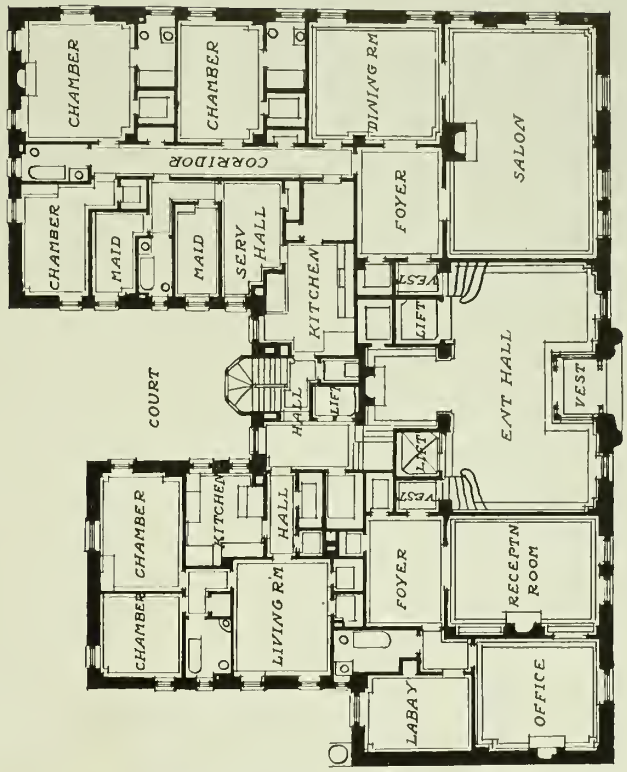
Iron sized brass pipe is a brass pipe made on the same standards of dimensions, etc., as iron or galvanized iron pipe and commercially is known as I. S. pipe. This is the best of the various kinds of piping on the market and while slightly more expensive than galvanized iron pipe or tubing, repays the increased investment by its permanence and security against defects.

In the large cities there are two varieties of service in the street mains, — the high pressure and low pressure. High pressure is service on which the static pressure usually supplied to the various buildings is approximately 100 pounds per square inch. This service is used in connection with high buildings where a lower pressure would not force water to the highest fixtures and is used exclusively for standard sprinkler equipments, fire lines, and standpipes. The low pressure service varies from 40 to 60, 65 or 70 pounds, and is the service most generally supplied for the cold water system in buildings not over 10 stories in height.

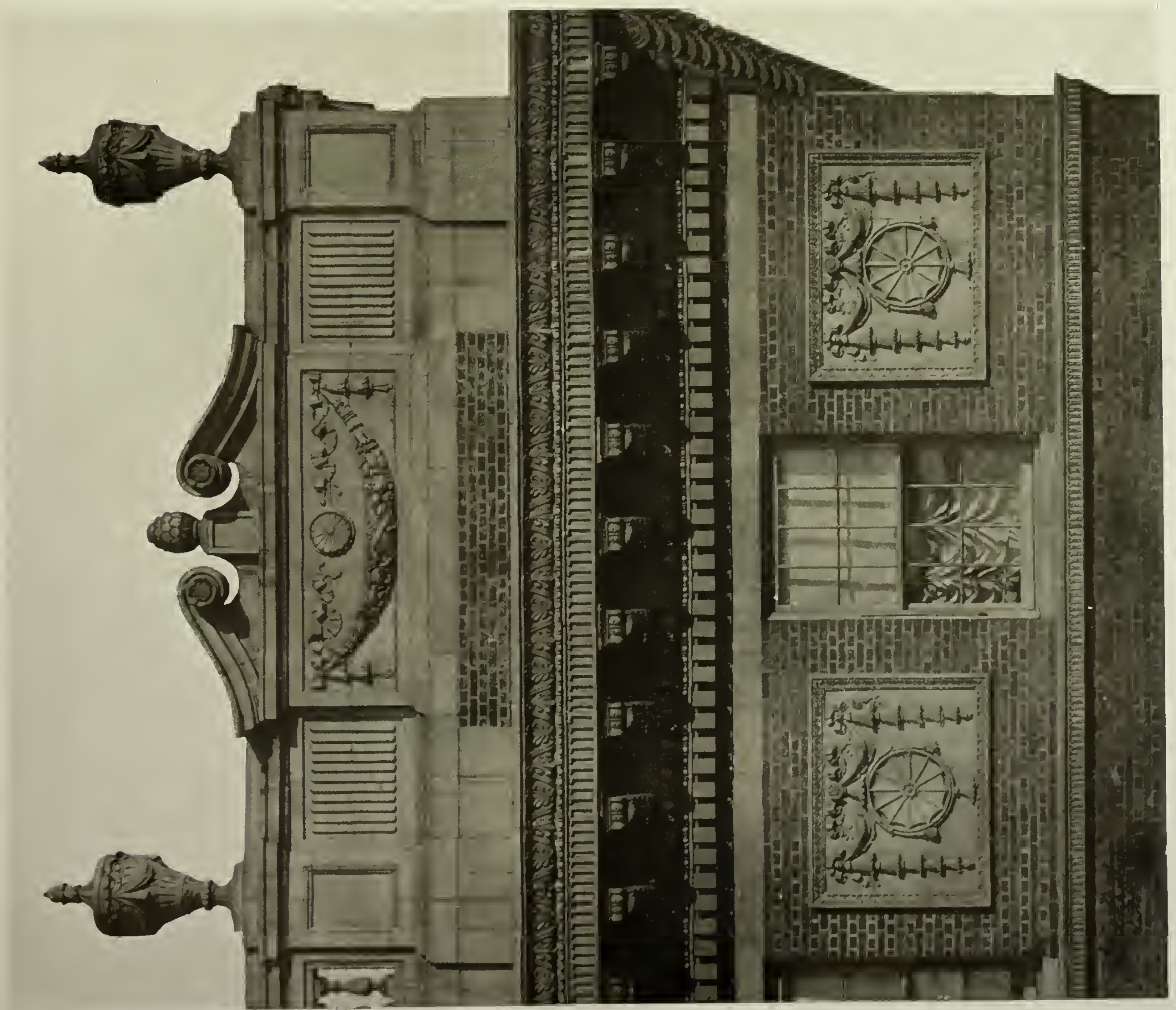
Where high pressure service is used in connection with plumbing installations of the ordinary character, additional care must be exercised in the character of the pipes, the cutting of threads, make-up of joints and fittings, and special tests should be put on to determine the efficiency of the system before any pipes are covered up. Frequently in the larger buildings the high pressure service is extended to a certain point in the building, and reducing pressure valves are installed in order to supply the plumbing equipment with water at a more workable pressure. With low pressure service these precautions are unnecessary. Sometimes the high pressure service is extended to a tank above the highest fixtures, which tank has a sufficient capacity to supply the building, and the fixture lines or supply lines are taken directly from this tank. In such cases the necessity of a reducing pressure valve is eliminated.

APARTMENT HOUSE, 405 PARK AVE., NEW YORK, N. Y.
CROSS & CROSS, ARCHITECTS

TYPICAL FLOOR PLAN



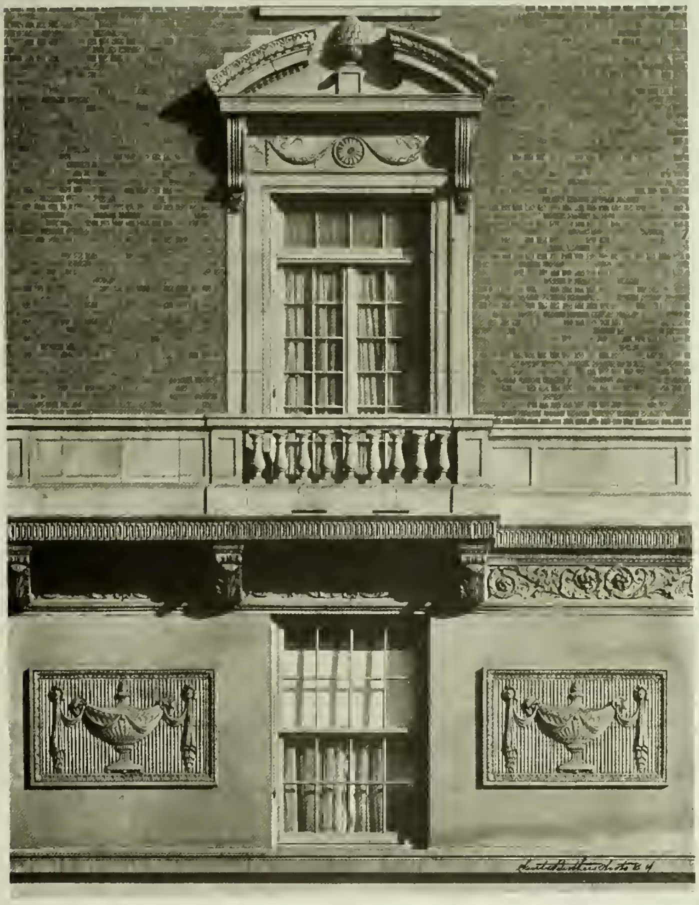
FIRST FLOOR PLAN



DETAIL OF CORNICE AND BALUSTRADE

APARTMENT HOUSE, 405 PARK AVE., NEW YORK, N. Y.

CROSS & CROSS, ARCHITECTS



DETAIL OF WINDOW AT FOURTH STORY

DETAIL OF ENTRANCE

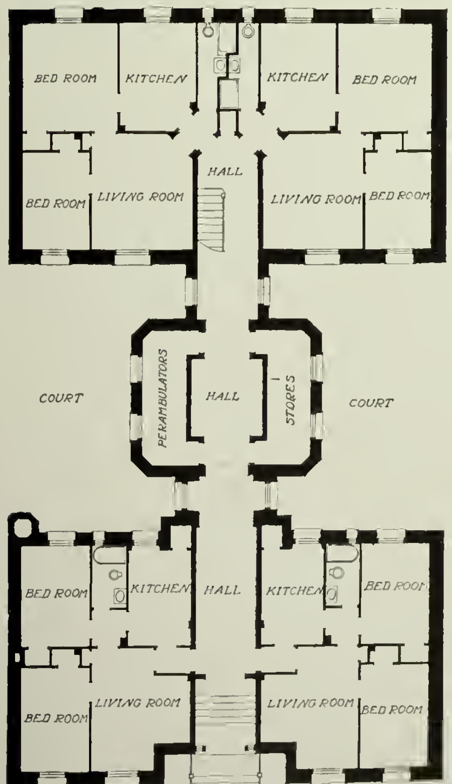
ENTRANCE HALL

APARTMENT HOUSE, 405 PARK AVE., NEW YORK, N. Y.

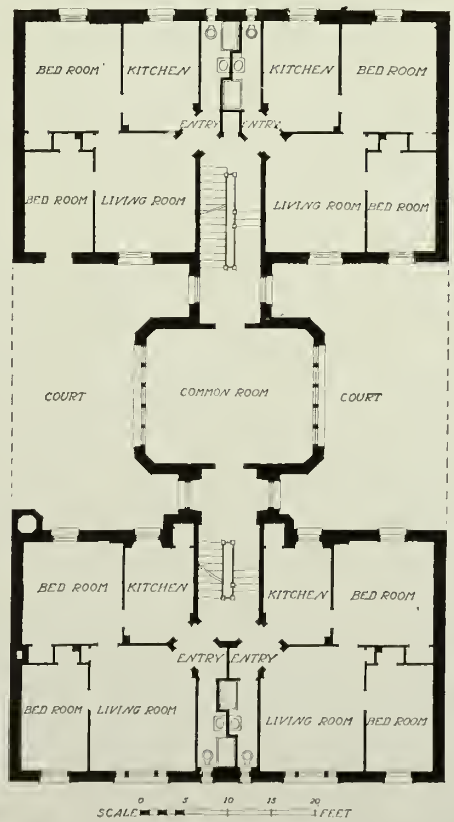
CROSS & CROSS, ARCHITECTS

THE ROGERS TENEMENTS, WEST 44TH STREET, NEW YORK, N. Y.
GROSVENOR ATTERBURY, ARCHITECT

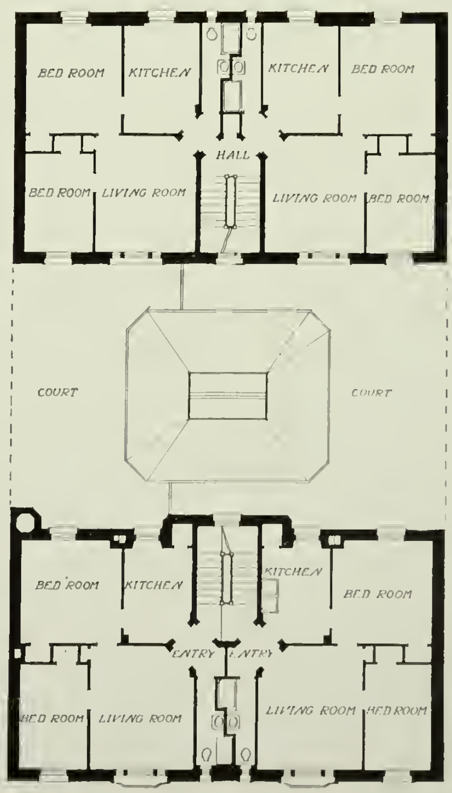
DETAIL OF ENTRANCE



FIRST FLOOR PLAN



SECOND FLOOR PLAN



TYPICAL FLOOR PLAN

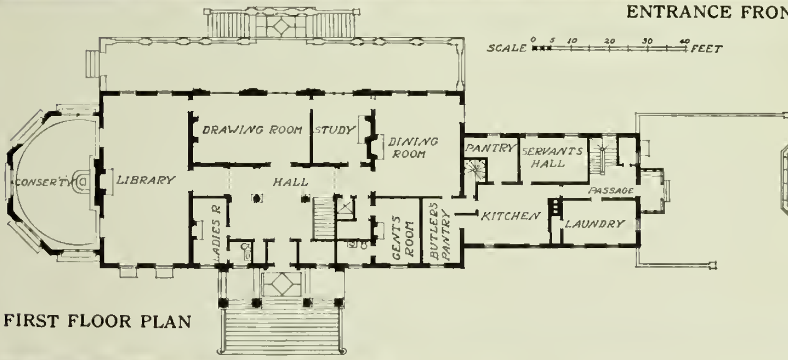
THE ROGERS TENEMENTS, WEST 44TH STREET, NEW YORK, N. Y.

GROSVENOR ATTERBURY, ARCHITECT

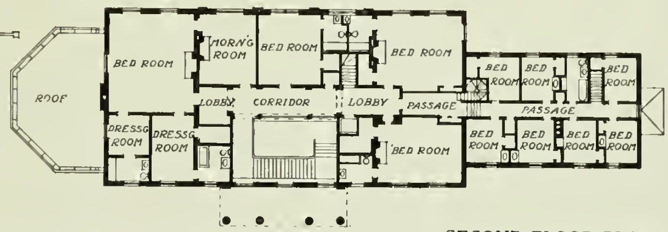
ENTRANCE PORTICO

HOUSE OF JAMES PARMELEE, ESQ., WASHINGTON, D. C.
CHARLES A. PLATT, ARCHITECT

ENTRANCE FRONT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

GARDEN FRONT

HOUSE OF JAMES PARMELEE, ESQ., WASHINGTON, D. C.

CHARLES A. PLATT, ARCHITECT

DETAIL OF HALL AND STAIRCASE

DINING ROOM MANTEL

HOUSE OF JAMES PARMELEE, ESQ., WASHINGTON, D. C.

CHARLES A. PLATT, ARCHITECT

VIEW LOOKING TOWARD MUSIC ROOM BAY

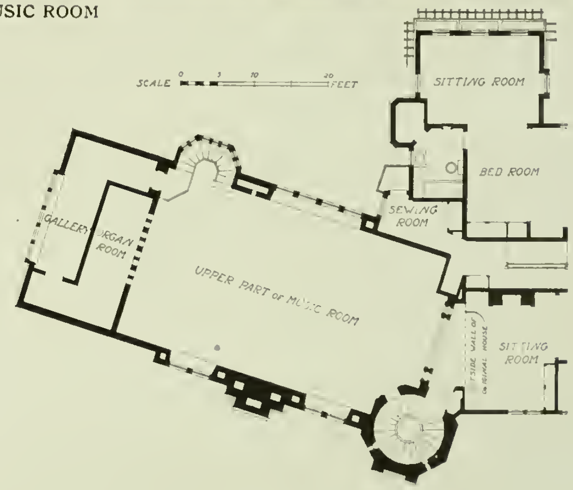
ADDITIONS TO HOUSE OF ABRAM GARFIELD, ESQ., CLEVELAND, OHIO

ABRAM GARFIELD, ARCHITECT

ENTRANCE PORCH

MUSIC ROOM

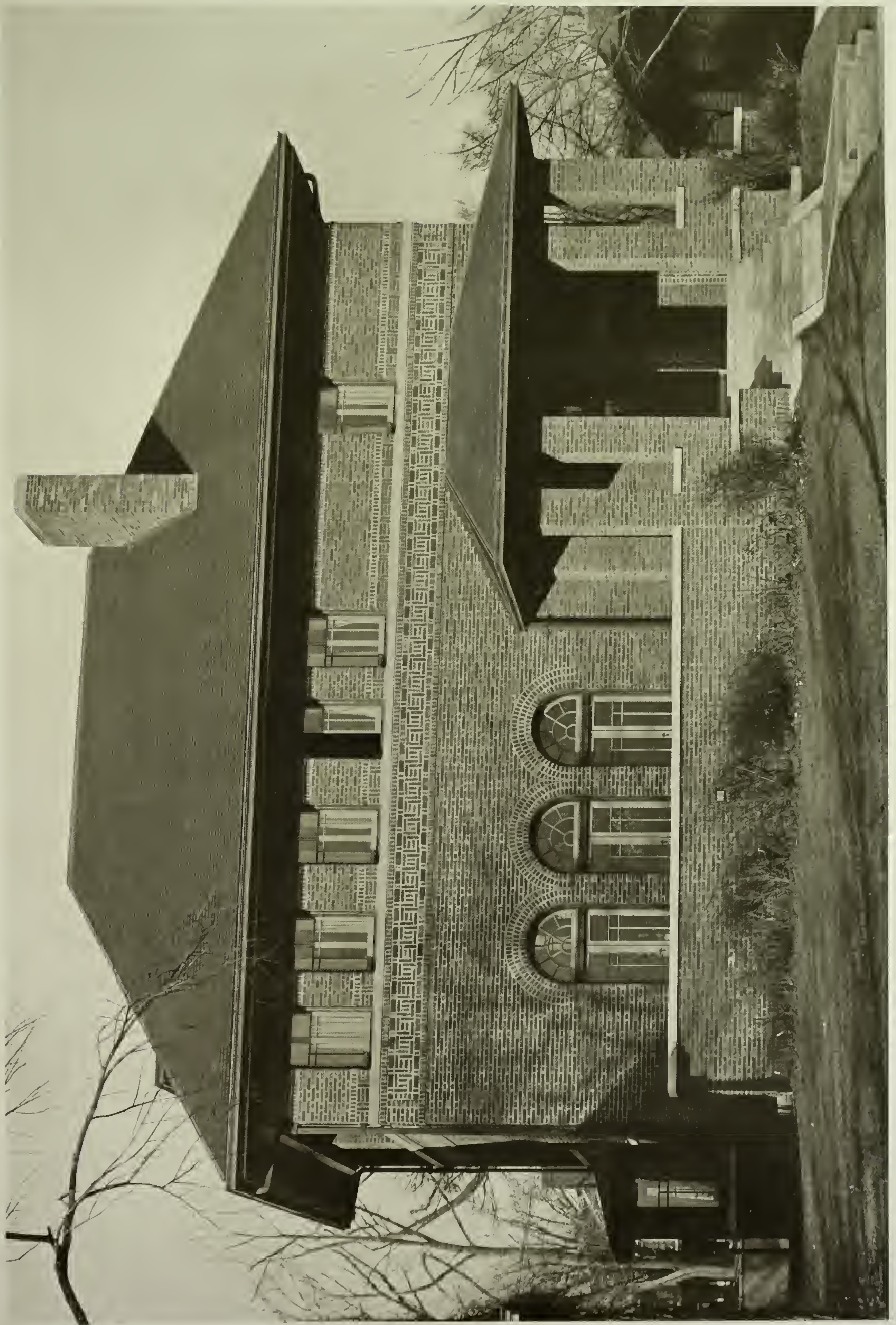
FIRST FLOOR PLAN



SECOND FLOOR PLAN

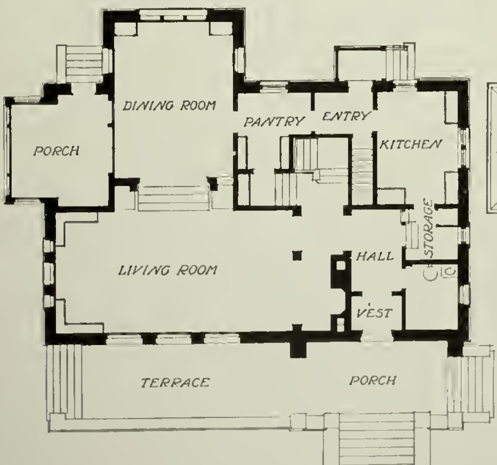
ADDITIONS TO HOUSE OF ABRAM GARFIELD, ESQ., CLEVELAND, OHIO

ABRAM GARFIELD, ARCHITECT

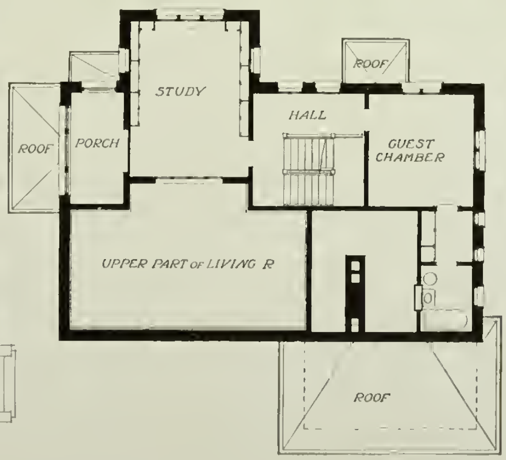


HOUSE OF MRS. A. C. D. RILEY, EVANSTON, ILL.
PERKINS, FELLOWS & HAMILTON, ARCHITECTS

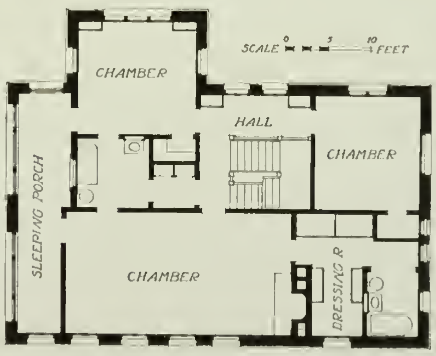
DETAIL OF FRONT ELEVATION



FIRST FLOOR PLAN



MEZZANINE FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF MRS. A. C. D. RILEY, EVANSTON, ILL.

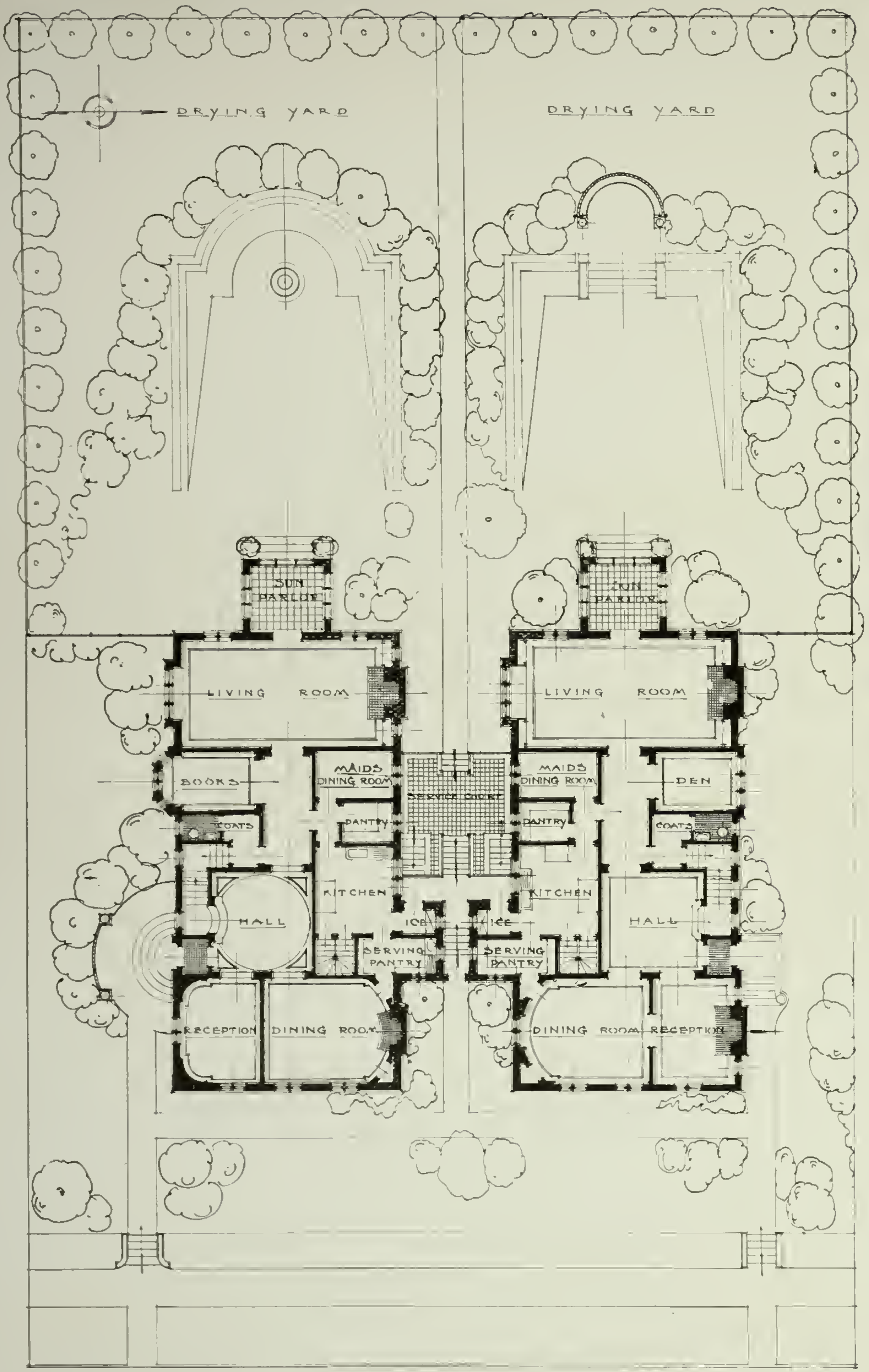
PERKINS, FELLOWS & HAMILTON, ARCHITECTS

VIEW FROM STREET

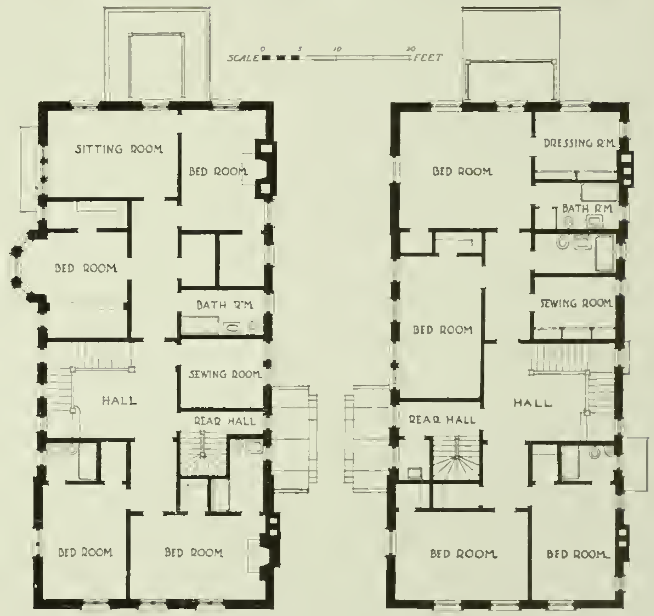
VIEW FROM GARDEN

TWO HOUSES ON WOODLAWN AVENUE, CHICAGO, ILL.

RIDDLE & RIDDLE, ARCHITECTS



VIEW FROM NORTHEAST



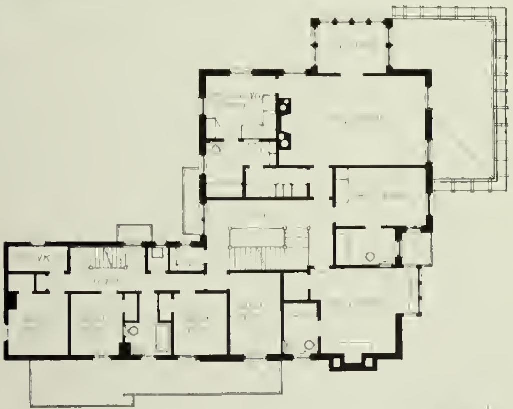
TWO HOUSES
ON
WOODLAWN AVENUE,
CHICAGO, ILL.

FIRST FLOOR PLANS
AT LEFT

SECOND FLOOR PLANS
AT RIGHT

RIDDLE & RIDDLE,
ARCHITECTS

VIEW FROM NORTHEAST



SECOND FLOOR PLAN

FIRST FLOOR PLAN

VIEW FROM SOUTHEAST

HOUSE OF HIRAM WALKER, ESQ., WALKERVILLE, ONTARIO, CANADA

BURROWES & WELLES, ARCHITECTS

Design and Construction of Roof and Wall Trusses.

III. DESIGN OF CONNECTIONS IN WOOD AND STEEL TRUSSES.

By MALVERD A. HOWE, C.E.

Director Architectural and Civil Engineering Departments, Rose Polytechnic Institute.

AT the intermediate top chord joints there are usually two members to be connected to the chord at each joint. In the ordinary construction one of these is composed of one or more round rods and the other of wood. Fig. 50 shows a very common detail. The connection shown for the rod is objectionable as, unless the rod is small as shown, the standard cast iron washers do not provide sufficient bearing area on the wood to transmit the full strength of the rod. The same criticism often holds good for the wooden strut. Resolving the stress into the two components M and N as shown, the area of the *rafter* along ab must be sufficient to carry the stress N, and the area along ac on the *strut* must be sufficient to carry the stress M. The cut ac is somtimes made normal to ab, and occasionally the cut in the rafter is made as shown by the dotted lines cdb. If the strut is considerably larger than is required to take its stress, any of the cuts answer very well.

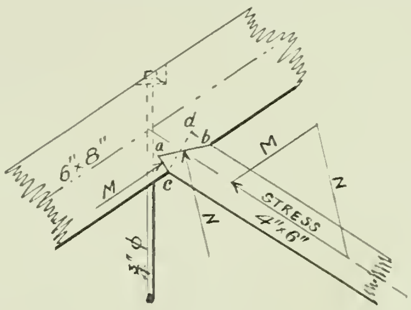


Fig. 50

The detail shown in Fig. 51 is so designed that there are no excessive stresses. The cast iron angle washer has sufficient area in bearing across the grain along ef, and with the grain along de, of the wood, to carry the corresponding components of the rod stress. The white oak angle block is more than sufficient in bearing areas to care for the strut stress. This block is preferably made of cast iron, as shown in Fig. 52. The wooden angle block shown in Fig. 51 is made with the grain running parallel to the rafter. This arrangement makes the pressure from the strut act on a diagonal surface of the wood, and the allowable pressure on this surface is given by the expression $r = q + (p - q)(\theta/90)^2$*, where q is the permissible pressure across the grain and p that with the grain. Taking $q = 500$, $p = 1{,}400$, and $\theta = 30°$, $r = 600$ pounds per square inch.

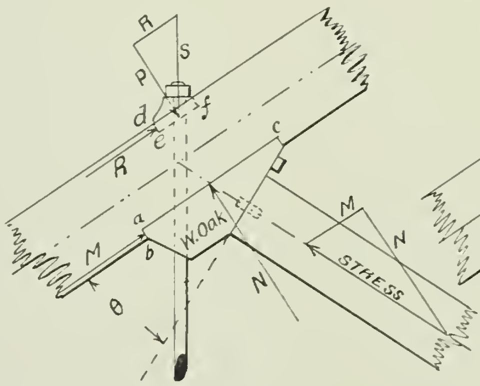


Fig. 51

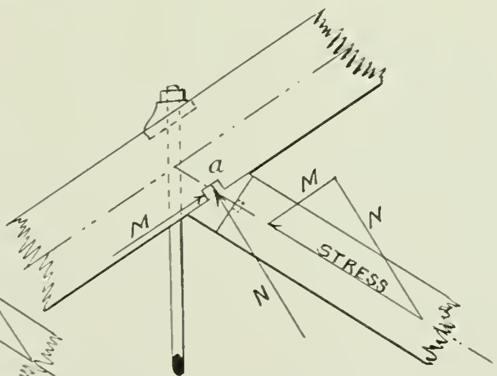


Fig. 52

Then a stress of 9,000 pounds requires a bearing area of 15 square inches.

If the block is made with the grain normal to the page, the bearing across the grain for the same kind of wood is 500 pounds per square inch, and 18 square inches are required for a stress of 9,000 pounds. When the strut is normal or nearly normal to the rafter, the bearing is practically across the grain of the rafter. Taking a stress of 9,000 pounds and a $5\frac{1}{2}$ by $5\frac{1}{2}$ inch strut, it is evident that there is not sufficient bearing area if the rafter is made of short-leaf yellow pine. This is best provided for by a rectangular steel plate as shown in Fig. 53. The net area of this plate is $9{,}000/250 = 36$ square inches. If the breadth is $5\frac{1}{2}$ inches, the length is about $6\frac{1}{2}$ inches, say 7 inches, since a part of the bearing area is lost in providing for the passage of the vertical rod. The thickness may be roughly taken as $\frac{1}{3}$ the overhang, which is $\frac{3}{4}$ inch in this case, and therefore the thickness of the plate is $\frac{1}{4}$ inch. This is the minimum thickness of plate which should be used under any circumstances. The use of a plate can be avoided in this case by making the strut 6 by 8 inches ($5\frac{1}{2}$ by $7\frac{1}{2}$), which gives sufficient bearing area on the rafter.

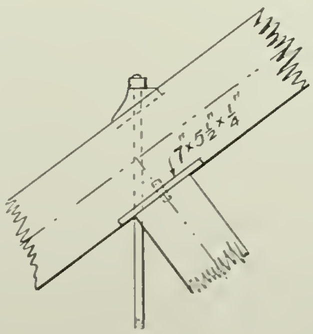


Fig. 53

The detail shown in Fig. 54 occurs when the Pratt system of bracing is used. The cast iron angle washer is proportioned in the manner outlined for Fig. 51. The vertical strut is connected by mortise and tenon to the rafter. The end of the tenon in the plane ef must have sufficient area to give the required bearing on the inclined cut in the rafter. If the rafter is very steep, this detail will not answer, as too much of the rafter will be cut away in making the mortise. The details shown in Figs. 55 and 56 can be used to advantage in some cases. The cast iron angle block shown in Fig. 55 can always be so designed that no excessive cutting of the rafter is necessary. The

* Design of Simple Roof Trusses in Wood and Steel, by Malverd A. Howe. John Wiley and Sons, Inc. New York City.

two lugs shown on the angle washer reduce the work of cutting, but necessitate rather long castings in order that there may be sufficient wood between the lugs to resist in longitudinal shear the stress transferred to the ends of the wood fibers by one lug of the angle washer.

When the top chord of a truss is horizontal or nearly so, the vertical members of the web are usually round rods and the diagonal members rectangular timbers. Such trusses are commonly built with a counter brace in each panel. The detail of a top chord joint is shown in Fig. 57. The washer under the nut of the vertical rod is made of rolled steel or of cast iron (Fig. 58), and for very heavy trusses a rolled channel reinforced by a flat plate is employed (Fig. 59). Whatever type of washer is employed, it must have sufficient bearing area against the wood to safely transfer the rod stress. The main brace and counter brace have square bearings against an angle block. If this is made of wood, the grain should run parallel to the top chord unless the chord is very broad, and then the grain runs perpendicular to the chord. In determining the depth of the notch for the angle block, the effect of the counter brace is neglected. When the fibers of the angle block are perpendicular to the chord, the notch will be over twice as deep as when they run parallel to the chord.

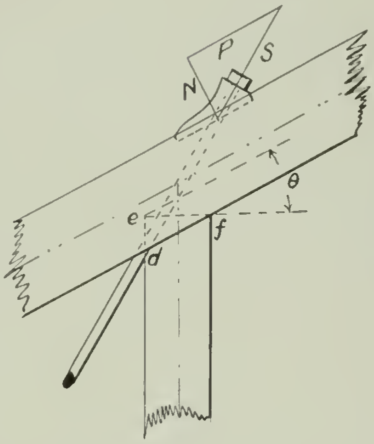


Fig. 54

Center Top Chord Joints of Wooden Trusses. This joint is best made by using a cast iron angle block as shown in Fig. 60. The wooden members have square bearings and the vertical rod transmits its stress directly to the casting without the use of a washer. The detail shown in Fig. 61 is often employed. The bent plate holds the wooden members in place. Care must be exercised to see that the distance ab is sufficient to safely transfer the rod stress to the inclined fibers of the wood. The connection shown in Fig. 62 is designed in the manner outlined for the splice shown in Fig. 47. (See preceding paper, April, 1915.) The connection consists of two side plates to which are riveted bearing bars. The plates are fastened to the chords by lag screws or bolts, the former being preferable. When the Pratt system of web bracing is used, the detail shown in Fig. 63 may be employed, provided the wooden members are of sufficient size to permit of the necessary cutting for the rods. The diagonal rods should be in pairs and arranged symmetrically about a longitudinal plane passing through the center of the top chord. A cast iron angle block is more expensive than the detail shown, but it makes a much better connection. Fig. 64 shows a connection used in the truss shown in Fig. 11a. (See first paper, March, 1915.) The chord members are made up of two pieces, 4 by 12 inches each, separated by packing blocks 4 inches thick.

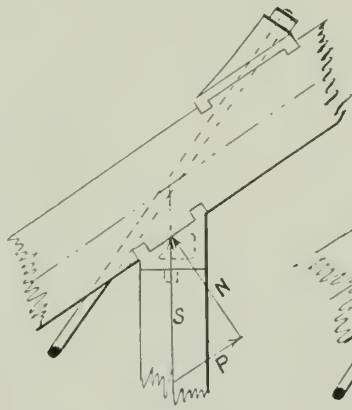


Fig. 55

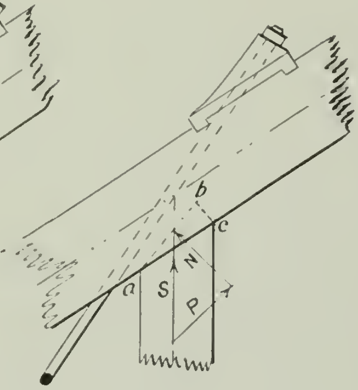


Fig. 56

Intermediate Bottom Chord Joints of Wooden Trusses. For the present it will be assumed that the bottom chord is horizontal, or nearly so. Practically the details of the connections are the same as shown for the top chord joints. Figs. 65–70 show details in use. The two first shown are suitable for light trusses. The center joint is usually made as shown in Fig. 70, when the Howe type of bracing is used. When rods are used for diagonals, the center joint has but one web member, which is a vertical. Very often the chord is spliced at this joint, and, when this is done, the splice must be designed considering the effect of the notch for the angle block when diagonals meet at this point.

Joints at the Supports of Wooden Trusses. The joint at the support of a wooden truss is not easy to design unless there is a great surplus of material in the truss members meeting at this point. The detail shown in Fig. 71 is composed entirely of wood, the bolts A and B being used solely to keep the members in place. The entire stress in the top chord member is transferred to the inclined surface ab of the bottom chord member, and the horizontal component of the stress is resisted by the longitudinal shear of a T-shaped piece as shown by the dotted lines cbb'c'. To provide sufficient bearing area on the support and to counteract the effect of bending due to the eccentric action of the forces at the joint, a white oak bolster is used which is thoroughly bolted to the bottom chord. To anchor the truss to the supports, two angles or bent plates are sufficient.

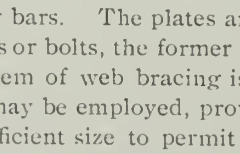


Fig. 57

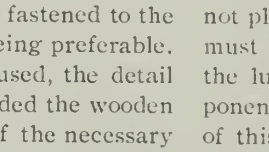


Fig. 58

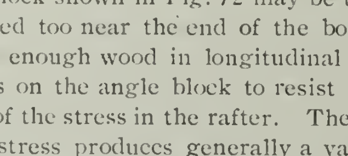


Fig. 59

The cast iron angle block shown in Fig. 72 may be used to advantage if not placed too near the end of the bottom chord. There must be enough wood in longitudinal shear on the left of the lugs on the angle block to resist the horizontal component of the stress in the rafter. The vertical component of this stress produces generally a variable stress across the wood fibers of the bottom chord member. This stress is a maximum at the left end of the block. The bolts probably take some stress at times, but should be neglected in designing the angle block, as the bolts and lugs cannot be made to act at the same time.

The detail shown in Fig. 73 was used in the trusses of a blacksmith shop of the Boston & Maine Railroad at Concord, N. H.

The arrangement shown in Fig. 74 was used in a round house roof at Urbana, Ill. Here the total component B is taken by two bolts. The principal difficulty in designing this form of joint is in getting sufficient bearing area for the bolt stress at D. When steel plate is available, the detail shown in Fig. 75 may be used. The four or more vertical bolts and the hook at A carry the horizontal component of the rafter stress to the bottom chord.

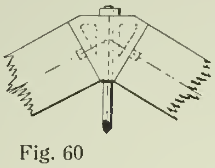


Fig. 60

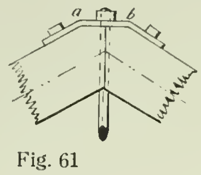


Fig. 61

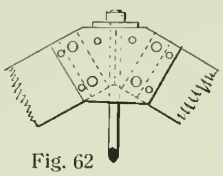


Fig. 62

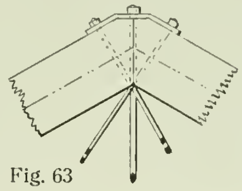


Fig. 63

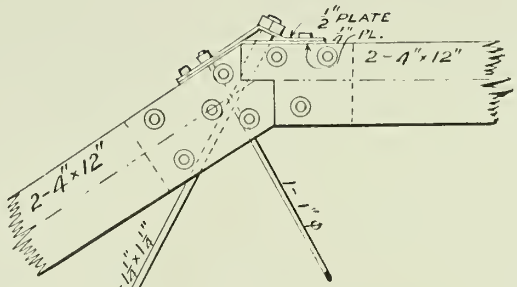


Fig. 64

Hook bolts are used at A to prevent the bent plate from drawing out of the notch in the timber.

The *effective depth* of the notch is about twice the thickness of the plate used. The inclined bolts have an unknown stress. Their function is to prevent the plate from bending at B, when possible, the depth CB should be sufficient to ensure that the stress on the inclined cut on the rafter is not excessive. This stress is, of course, modified by the inclined bolts. The bolster is bolted and keyed to the bottom chord member as shown.

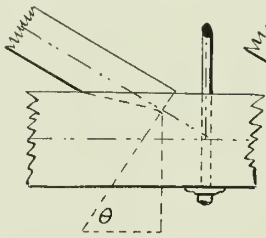


Fig. 65

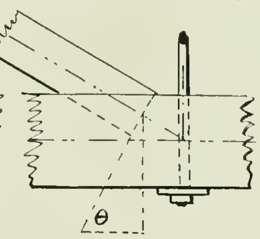


Fig. 66

The detail shown in Fig. 76 is preferable to that shown in Fig. 75, but is more expensive.

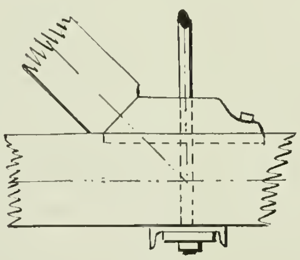


Fig. 67

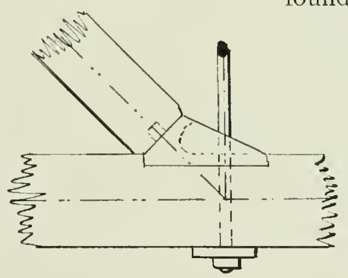


Fig. 68

The connection shown in Fig. 77 is composed of two side plates and sufficient bearing bars to take the stresses in the top and bottom chord members. The bars are riveted to the side plates and these are fastened to the wooden members by lag screws. The lag screws in the compression member must be spaced on centers not over thirty times the thickness of the side plate in order that the plate may not buckle.

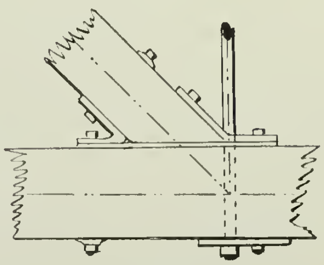


Fig. 69

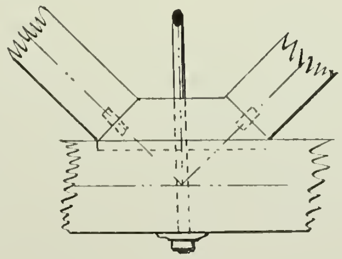


Fig. 70

The detail which is shown in Fig. 78 is very compact and can be easily adjusted. Fig. 79 shows a similar detail which was used in an auditorium in the city of Seattle, Washington.

DESIGN OF CONNECTIONS FOR STEEL TRUSS MEMBERS.

The members of steel roof trusses are generally composed of two rolled angles which are placed back to back and separated by the thickness of the gusset plates which connect the several members meeting at a joint. For spans exceeding 80 feet, the top chord is often made of two angles and a plate as shown in Fig. 80b. For very heavy trusses the top chord is made of two channels as shown in Fig. 80c. Sometimes the channels are latticed top and bottom and sometimes a cover plate is used on top and lattice bars on the bottom. The H section shown in Fig. 80d is also used for heavy truss members. Channels and I beams are sometimes used for the web members. The greater percentage of roof trusses have their members composed of two angles as stated at the beginning of the paragraph.

In selecting angles only those marked *standard* should be considered, as the selection of other angles may cause delay and expense.

Considering the stresses alone, it is usually the case that numerous members of roof trusses are found which require but one angle, and a very light one at that, to resist the stress. To avoid as much as possible eccentric stresses, two angles should always be used. The thickness of the metal should not be less than 1/4 inch and the angle legs through which rivets pass should not be less than 2 1/4 inches. This provides sufficient metal to allow for some deterioration through rusting, and also permits the use of 3/4-inch rivets throughout the structure.

Regardless of the smallness of the stress to be transmitted, the angles carrying the stress should have at least *two* rivets connecting them to the gusset plate, and in the best designing three rivets are used.

The extra metal and rivets provided by the above requirements add greatly to the rigidity of a truss, without any serious addition to the cost.

In selecting the particular form of truss to be used, the question of transportation should be considered. Trusses, or parts of trusses, which have one dimension not exceeding 10 feet, can be transported by rail. By keeping this in mind, the number of field connections to be made can often be greatly reduced. Of course, if the trusses must be transported any distance on wagons, the size of the fractional parts will be governed by this portion of the transportation. As a general rule, field connections should be reduced to a minimum. It is seldom that the weight of an ordinary roof truss is so great that it cannot be raised as a whole and put in the place it is to occupy; therefore the field connections should be made before the truss is put in place. In some instances local conditions will prevent this, and the various parts will have to be raised separately and then assembled.

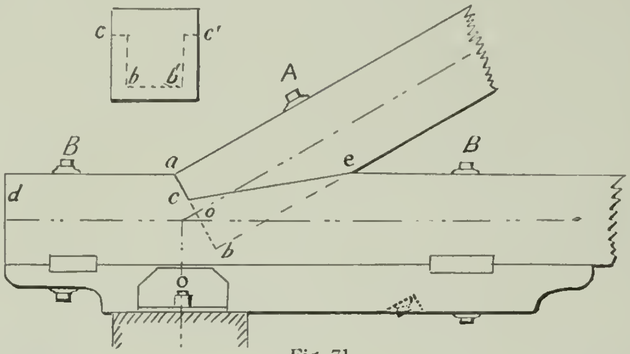


Fig. 71

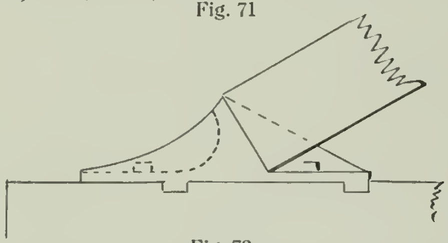


Fig. 72

Compression Members in Steel Trusses are designed with the aid of empirical formulæ which contain a governing factor called the slenderness ratio. This ratio equals the unsupported length of the member divided by the least radius of gyration of the cross-section of the member. The least radius of gyration is usually designated by the letter r. Tables are easily obtained which give the values of r for the sections shown in Fig. 80. The approximate values shown in the figure can be used for preliminary calculations.

All compression members are made full length where it is possible. Even the rafter of a truss for a pitched roof is made continuous and of the section necessary to carry the maximum stress. This statement is, of course, dependent upon the transportation facilities. Making the rafter full length increases the amount of steel in the rafters, but reduces the size of gusset plates and the number of rivets, and, moreover, adds to the stiffness of the truss.

The two angles composing a compression member must be fastened together at intervals, so that the slenderness ratio for a single angle does not exceed that of the two angles used. A stay rivet every two or three feet of the unsupported length of the member is generally sufficient to fulfil the above condition.

Each pair of angles forming a compression member of a truss should have the line passing through the centers of gravity of its cross-sections coincident with the line of stress, to avoid as much as possible eccentric distribution of stress. Since it is impossible to rivet angles to the gusset plates without having eccentric stresses, it is common practice to assume the rivet lines as coincident with the line of stress.

Unless the truss is very heavy, each angle is attached to the gusset plates by rivets passing through but one leg, which apparently introduces large bending stresses. Tests in tension show that over 80 per cent of the net strength of the angles is developed when but one leg is connected, and that this percentage is not greatly increased by the use of hitch angles in attempting to connect the other or outstanding legs to the gussets. Using the low unit stresses commonly specified for roof truss work, it is quite permissible to connect one or both legs of the angles as is most convenient.

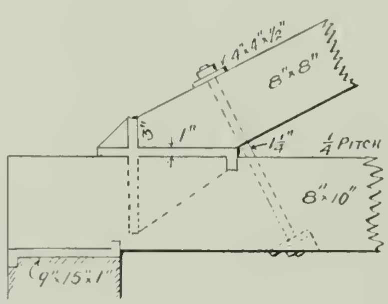


Fig. 73

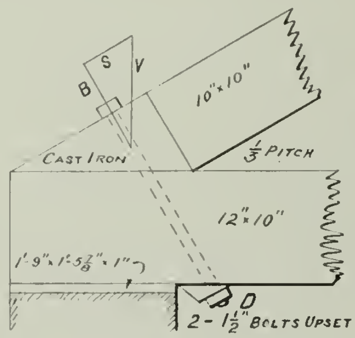


Fig. 74

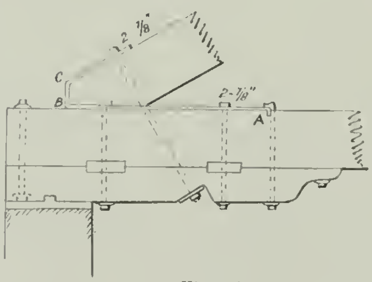


Fig. 75

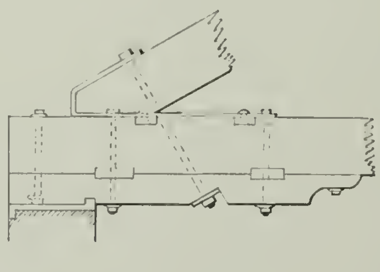


Fig. 76

Design of Tension Members in Steel Roof Trusses. The design of tension members for steel trusses requires but little

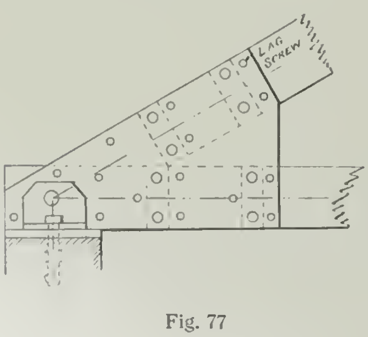


Fig. 77

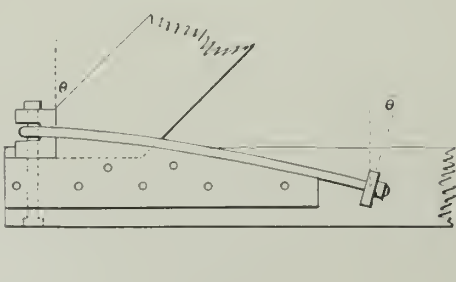


Fig. 78

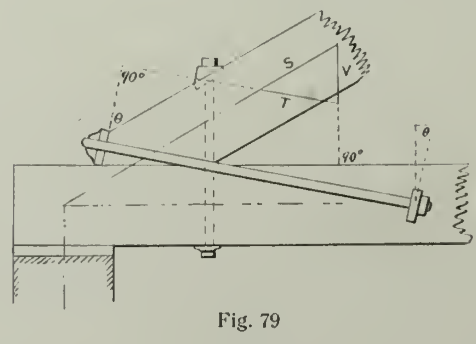


Fig. 79

explanation. The area available of any pair of angles for resisting tension is the difference between the gross area of the angles and the area destroyed by rivet holes. When each angle is connected to the gusset plate by rivets through one leg, it is customary to deduct the area destroyed by one rivet hole from the area of each angle (the diameter of the hole being taken 1/8 inch larger than the nominal size of the rivet). When hitch angles are used (see Fig. 91), practice is not uniform; some deduct two holes and some but one. In case the rivets attaching the hitch angles to the angles are in the same cross-section as those in the other legs, allowance must be for two holes. If the rivets are staggered, but one hole for each angle may be deducted.

Design of Joints in Steel Trusses. At the apexes of the truss the various members are connected through gusset plates. These plates are never less than 1/4 inch thick and seldom thicker than 7/16 inch. For all ordinary trusses the gusset plates may be made 3/8 inch thick.

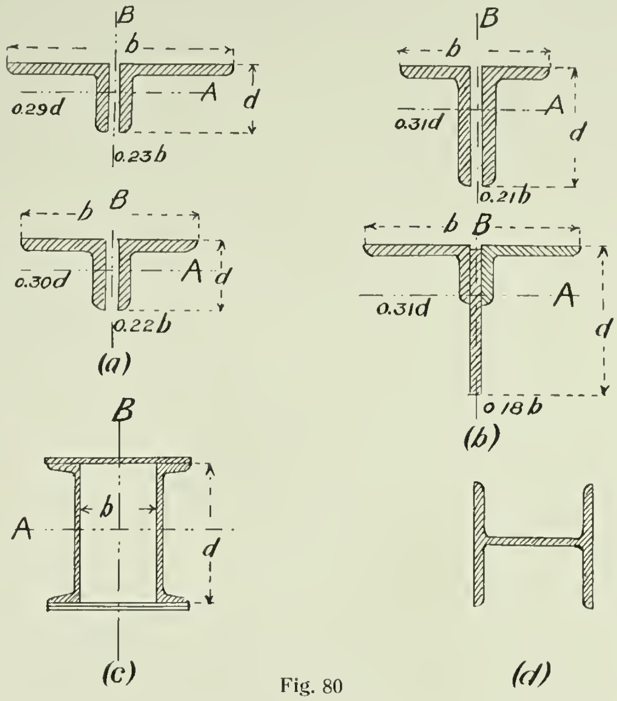


Fig. 80

Except for very light trusses, the rivets are either 3/4 inch or 7/8 inch in diameter. Since the minimum thickness of the angles is 1/4 inch and that of the gusset plates not over 1/2 inch, the capacity of the rivets is governed by their bearing on the gusset plates, this value being less than the capacity of the rivets in double shear. The number of rivets required to connect any member to a gusset plate is found by simply dividing the stress in the member by the capacity of one rivet. As previously stated, not less than two rivets should be used in making any connection.

Top Chord Joints in Steel Roof Trusses. Two joints are shown in Figs. 81 and 82. The top chord is not broken at the joints, and consequently no rivets are required to connect it to the gusset plates considering the stresses in the chord members only. However,

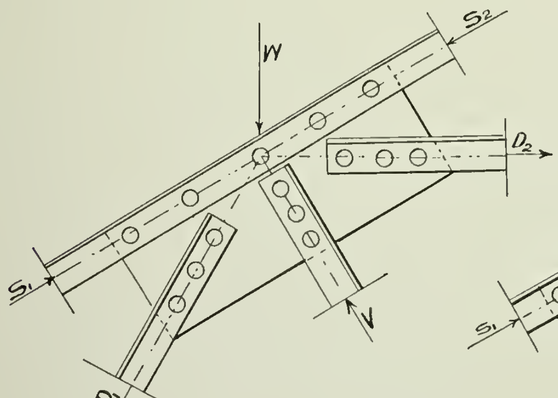


Fig. 81

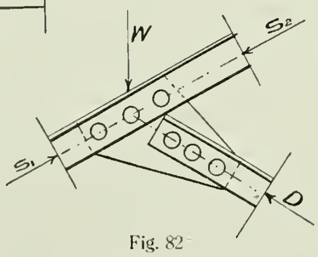


Fig. 82

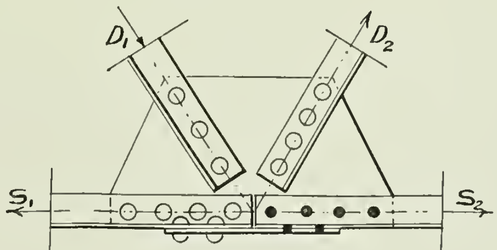


Fig. 83

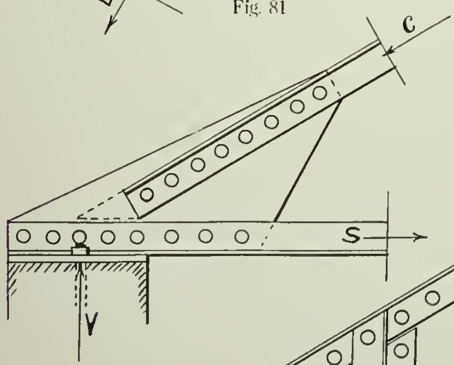


Fig. 84

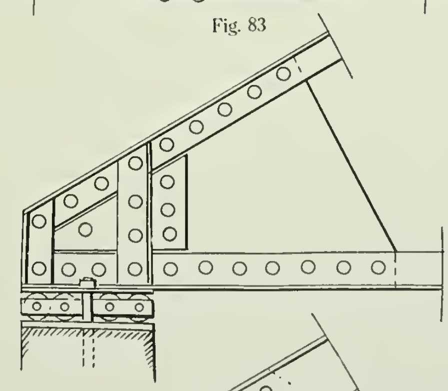


Fig. 85

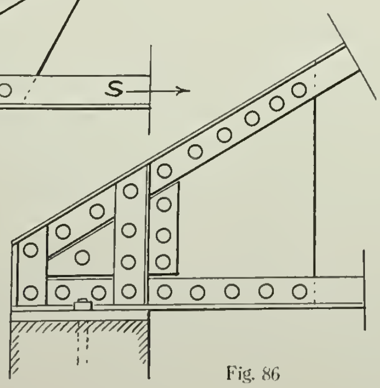


Fig. 86

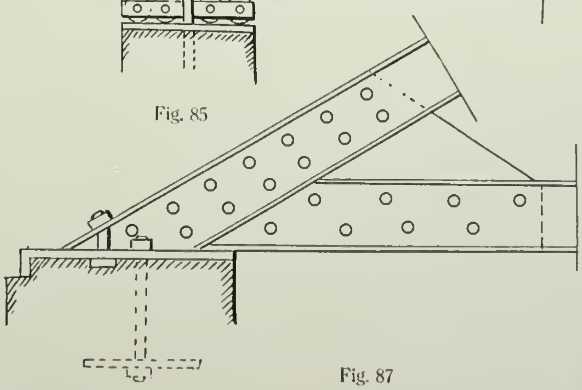


Fig. 87

there is an unbalanced stress in each case due to the other members at the joints which requires attention. Considering the joint shown in Fig. 82, and assuming that the stresses in the members occur at the same time, the number of rivets required in the chord member will be the same as in the diagonal web member, since the stress in this member is the resultant of the purlin load, W, and the two chord stresses, all of which act upon an unbroken piece. For the connection shown in Fig. 81 the number of rivets through the chord member must be sufficient to transmit the resultant of the purlin load, W, and the two chord stresses, S_1 and S_2. In case the maximum stresses in all of the members at a joint do not occur at the same time, then W, S_1, and S_2 must be considered for the different cases, and the maximum number of rivets found in any case will be the number required.

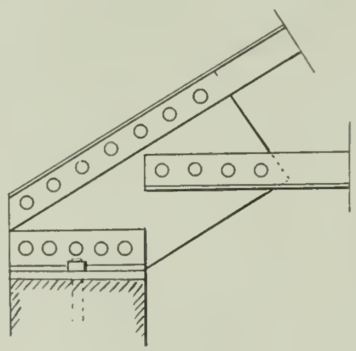


Fig. 88

If the top chord is not continuous as shown, but is cut at the center of the gusset plate, then the number of rivets required for transmitting the stresses, S_1 and S_2, to the gusset plate is found in the usual manner. The purlin load, W, will be transmitted through one of the chord members. If the purlin rests upon the chord member upon the left, then the number of rivets in this member will be governed by the resultant of W and S_1. Practically the number of rivets required for S_1 and S_2 can be found in the usual manner and then enough added to carry the purlin load W. This provides an excess of rivets.

Bottom Chord Intermediate Joints for Steel Roof Trusses. These do not differ essentially from those just considered. Fig. 83 shows a joint where the chord is not continuous, and also the proper method of connecting the two members. The use of the gusset plate to splice chord members is not permitted by some specifications. An independent splice relieves the gusset plate of severe stresses and also permits the use of a smaller plate and fewer rivets. All things considered, the independent splice is preferable. The method shown in Fig. 83 is common practice, however.

Joints at the Supports of Steel Roof Trusses. The form of this joint is governed by many conditions. Fig. 84 shows a common type for trusses of short span which are supported on masonry walls. If the top chord angles are cut square at the ends as shown in the figure, the gusset plate under a compressive stress is unsupported laterally for a considerable distance, and, therefore, it is better practice to make the cut as shown by the dotted lines. The size of the bearing plate must be sufficient to safely transmit the vertical reaction to the masonry, and also provide room for two anchor bolts outside of the bottom chord angles. The number of rivets in the bottom chord angle is governed by the resultant of V and S.

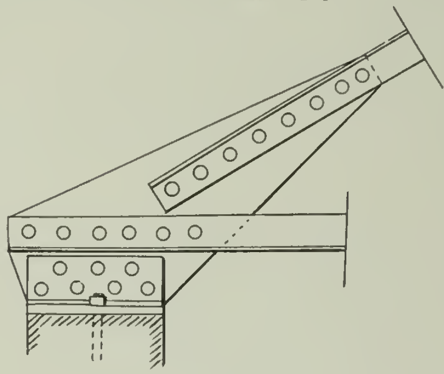


Fig. 89

At the fixed end of the truss but one plate on the masonry is required, but at the other end two plates are needed. The upper plate is given freedom to slide by elongating the holes for the anchor bolts to provide for small longitudinal movements of the truss.

For trusses having spans exceeding 70 feet, some form of roller bearing is provided at one end. Fig. 85 shows one type of roller bearing and Fig. 86 a detail of the fixed end of a very heavy truss of long span.

The detail shown in Fig. 87 is expensive if proper bearing is provided for between the truss members and the cast iron wall plate. The details shown in Figs. 88 and 89 are good practice. They provide a definite bearing on the wall which is independent of the truss members.

When it is necessary to support trusses on steel columns, the connections are best made by means of gusset plates as shown in Figs. 90 and 91. If it is not possible to use gusset plates, then connection angles are employed as shown in Fig. 92. In these forms of connections no special provision is made for expansion or contraction due to changes of temperature.

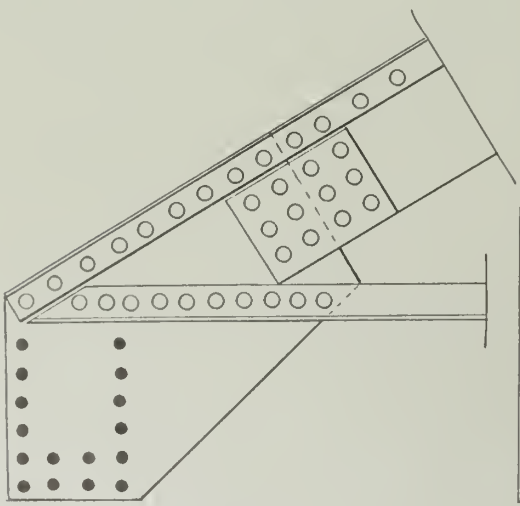


Fig. 90

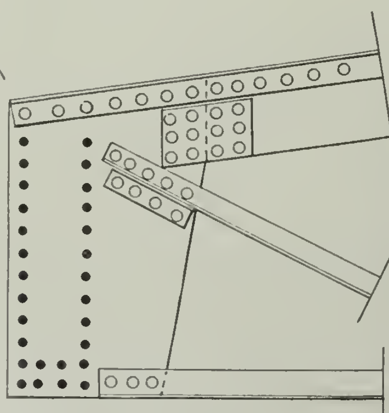


Fig. 91

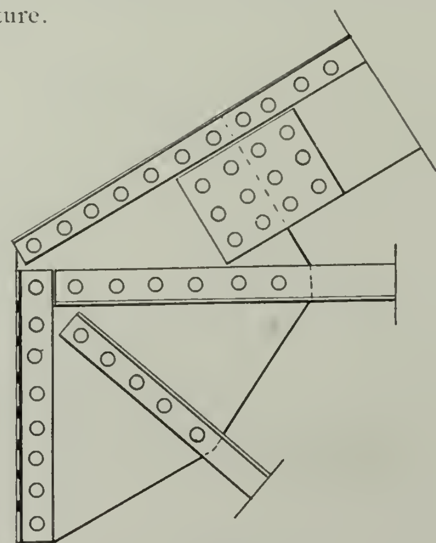


Fig. 92

The Musicians' Mutual Relief Society Building, Boston.

MAHER & WINCHESTER, ARCHITECTS.

THIS building was designed to accommodate the Musicians' Mutual Relief Society and the Boston Musicians' Protective Association. It is unique in its character and one of the first of its type to be erected in this country. Its main purpose is to provide a club house or meeting place for the musical societies mentioned above and to provide offices where the business affairs of the organizations can be carried on. The large ballroom with the necessary accessories is used for conventions and large meetings and also provides a source of income, for the building has been so arranged that the ballroom as well as the banquet room in the basement can be rented without encroaching upon the privileges of the members of the musical societies who use the building as a club.

The building has a frontage of 100 feet on St. Botolph street and 80 feet on Garrison street, and is of fireproof construction. The exterior is of dark red brick and limestone, the brickwork being laid with a wide joint in various bonds and the cornices ornamented with carved lyres and the names of famous musicians.

The first floor is occupied by a large assembly room, with entrances from both streets, for carrying on the general business of the associate members. It has a terrazzo floor and alcoves for reading, games and billiards, and telephone booths, also offices for each society, a ladies' room; and a directors' room. The remainder of this floor is given to the ballroom lobby.

In the basement is a kitchen and restaurant, toilets, showers, barber shop, and a large locker room with metal lockers of sizes to accommodate the various instruments of the members. The remainder of the basement is occupied by the boiler room, a large storeroom, and a banquet room with serving room and toilets adjacent which can be let separately or in conjunction with the ballroom.

The ballroom lobby on the first floor has entrances from St. Botolph street and the passageway at the rear of the building. Two staircases ascend from this lobby to a mezzanine floor containing the checking rooms, etc., and from thence to the ballroom floor. This room is especially fitted to serve the purposes of either an auditorium or a ballroom. It has a large stage at one end and seats on a raised platform running around the other three sides. A gallery seating two hundred people is on the Garrison street side. The floor of the ballroom when used as an auditorium is covered with a canvas, and by the use of portable chairs an audience of eleven hundred is accommodated.

The use of the space at the left side of the ballroom in which the staircases are located has been ingeniously made to serve several purposes by a full use of mezzanine

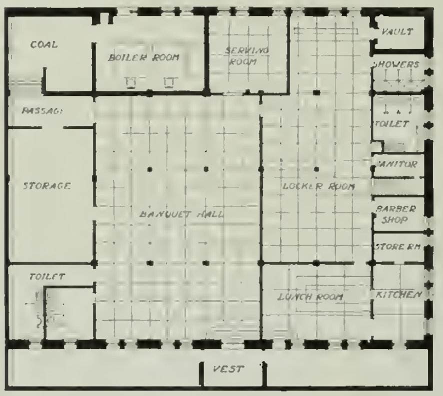
Building for the Musicians' Mutual Relief Society, Boston, Mass.
Maher & Winchester, Architects

floors, the level below the ballroom floor providing ample and conveniently located checking rooms, and that above the ballroom floor, on either side of the stage, retiring rooms for men and women. The disposition of these floors is not shown on the plans reproduced herewith, but their position is shown in the general view of the exterior, as well as the way in which the ballroom entrance has been made a separate feature in the composition of the main façade to make a distinction between the uses of the building.

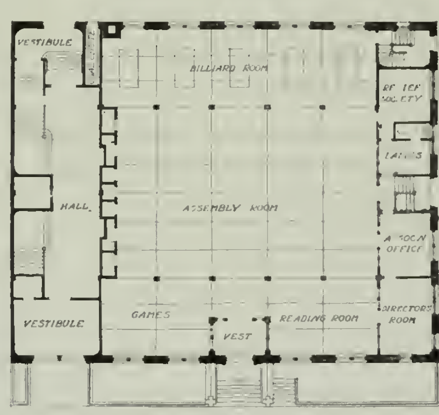
Stage in Ballroom

The proscenium arch is decorated in modeled stucco with trophies of the various musical instruments. The soffits of the ceiling beams are similarly decorated with little figures playing instruments and illustrating the various dances.

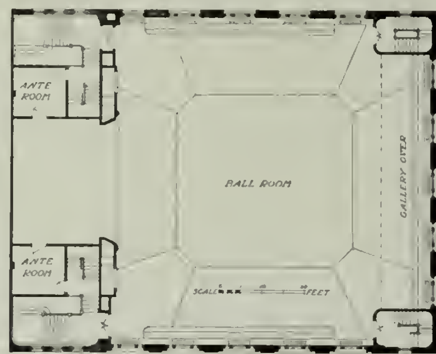
The cost of the building was 25 cents per cubic foot. This includes construction, heating, plumbing, wiring, vacuum-cleaning system, ballroom draperies, cushions, portable and gallery chairs, canvas-floor covering, window shades and screens, metal lockers and checkroom cubicals, lighting, kitchen and serving-room fixtures, blackboards, and telephone booths.



Basement Floor Plan



First Floor Plan



Second Floor Plan

Detail of Main Entrance

Detail of Upper Stories

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

ALBERT KAHN

ALBERT KAHN was born in Rhaunen, Germany, in 1869. His early years were spent in the German public schools and gymnasia until at the age of twelve years he came with his family to America. He started his architectural training in the office of John Scott & Co., in Detroit, where he remained about a year, following which he entered the office of Mason & Rice. He was with them for the next fourteen years, during the latter part of which he had charge of the designing. While with Mason & Rice he received the American Architect traveling scholarship, which furnished him the welcome opportunity for a little less than one year's travel and study in Europe.

In 1895 Mr. Kahn with George W. Nettleton and A. B. Trowbridge, who were fellow draftsmen in Mason & Rice's office, formed a partnership under the name of Nettleton, Kahn & Trowbridge. Mr. Trowbridge severed his connection with his associates two years later to become Professor of Architecture at Cornell University, and shortly after Mr. Kahn was left to continue the business alone, owing to the death of Mr. Nettleton.

Mr. Kahn was among the first to perceive the importance of improving the design of factory and industrial buildings, and it is in this field that a great deal of his important work has been done. His efforts as seen in many of the largest automobile plants in this country and in the recently completed Detroit Athletic Club Building and the Hill Memorial Building at Ann Arbor, Mich., testify to his solutions of many difficult problems in plan and equipment and to the measure of success which has been accorded his work.

In a study of his work it will be noted that he has never deviated from the true purpose of an architect — he has always subordinated his love of what is beautiful to the utilitarian requirements of the structure, creating a building appropriate to its purpose and satisfying to the eye.

Mr. Kahn is not alone endowed with a very keen sense of what is best in art, in the broader meaning of the word, but has combined with this rare gift, in an unusual degree, commercial ability of a very high order. Even without this unusual combination of gifts his unswerving integrity, concentration of purpose, and industry would have carried him far towards the important position he now holds in his profession. — *M. R. B.*

J. MILTON DYER

IT IS always a matter for congratulation when personal magnetism has been fortunate enough to be held in check by good education. The first is almost sure to "get along," and when it lacks the restraint imposed by the second, we suffer by the presence of more or less permanent monuments to this quality. Milton Dyer would find work to do even if he had to make his brick without straws; but, for the peace of the community in which he lives, he has not had to do without straws. His education has been more two-sided than that of most architects. In addition to four years in the École des Beaux Arts he took a complete course in engineering and mechanics at the Case School of Applied Science before leaving this country.

He returned to Cleveland about seventeen years ago and startled the entire local profession by at once acquiring large and important commissions. Every one considered, and of course properly, that this was very unwise on the part of the owners; but, for some reason, the things were good and Dyer continued to proceed. Success is a somewhat complicated affair and depends upon a great many, and often opposed, characteristics; but it is customary to look for, and find, one particular thing and charge everything to that account.

Therefore it is our duty to determine this one predominant thing, even if it is only a part of the story. Genius has been called, among many other things, "an infinite capacity for taking pains," or, in other words, giving attention to detail. This is almost exactly not the case with Mr. Dyer. Please do not misunderstand. His capacity is to never lose sight of the main big feature of the problem and to not be confused by its details or allow them to get into a false perspective. The one most important thing that he has done for Cleveland — and it needed the lesson — is teaching scale. You may like or not like some individual building, but you will see that its scale is good. Milton Dyer is a good friend. It is often said of a man that he will do anything for any of his acquaintances and other similar characterizations which are true, but insufficient. My recollection of him, covering his professional life, is only one of good nature and tolerance in regard to almost everybody. This is a pleasant trait and one that can hardly be assumed or acquired, and I take pleasure in mentioning it as something more desirable than Mr. Dyer's well recognized success as an architect. — *A. G.*

BENNO JANSSEN

BENNO JANSSEN was born in St. Louis, March 12, 1874. He was educated in a private school and later entered the University of Kansas. After receiving his early architectural training in St. Louis he entered the Boston office of Shepley, Rutan & Coolidge, and later that of Parker & Thomas.

After grounding himself thoroughly in the practical side of the work, through office experience, he finished his artistic and theoretic education in Paris. During this period he availed himself of the opportunity to study the various styles of the countries adjacent to France. A short time after his return to this country he became associated with McClure & Spahr of Pittsburgh, and in 1907 entered into partnership with Franklin Abbott, under the firm name of Janssen & Abbott. Success followed this union.

Always admired by his associates in his student days for his remarkable ability of architectural expression, no less than for his personal charm, he, nevertheless, was misunderstood by many, due to the fact that he unconsciously was an exponent of the "New School," which teaches that the final result of an architectural attempt is the "building itself" and not the effect produced on paper, the latter being the vogue at that particular time. His rapidly made drawings were especially interesting to those who understood and left an indelible impression upon them. His seeking for truth of expression, the reasonable use of architectural forms, and for the understanding of the fundamental principles which govern architectural designs, portrayed only the dominating characteristics of the man as he is. Mr. Janssen's work shows not only individuality, but a comprehension of his problem, a forceful composition and yet an understanding of the value of detail and the selection of material. Add to this executive ability, tireless energy, and one has little reason not to understand his success. One has only to look at the Pittsburgh Athletic Club to appreciate the influence of this personality. For this firm to have the force to impress upon a committee the necessity and importance of producing a building of this character is no less an achievement than the design itself. The residences his firm has executed show not only individuality, but an indigenous quality which is so essential for a good, architectural result.

Although Mr. Janssen has devoted the larger part of his life to competitions, he, nevertheless, has shown the rare capacity to devote himself as energetically to the production of a beautifully finished building as to the production of the drawings which have won the commission.

One might assume from the foregoing that Mr. Janssen is some sort of a super-genius. He is not, however, but merely a talented young man, whose human quality can be vouched for by those who know him. — *W. D. C.*

AYMAR EMBURY II

WIDESPREAD recognition of Mr. Embury's ability has come early in his career. He was born June 15, 1880. He studied at the Drisler School, New York, and continued his education at Franklin College, Dresden, Germany. His architectural training did not begin until after his graduation from Princeton University in the class of 1900, followed by a Master's Degree in 1901.

As a newcomer into the architectural profession, Mr. Embury found the kindness and helpfulness of his fellow draftsmen invaluable. He is always ready to give them full credit and freely acknowledges that everything that he has learned of architecture was taught him while a draftsman by fellow draftsmen. His experience was gained in the office of George B. Post and successively in the offices of Cass Guilbert, Howells & Stokes, Palmer & Hornbostel, and Herbert D. Hale. It may be interesting to note that among his contemporaries during this period were E. F. Guilbert, Alfred M. Githens, James O. Bettelle, and the late T. R. Johnson.

Mr. Embury has become, as he jokingly expresses it, a forced specialist in country house work. He has devoted much sympathetic study to this type of architecture which is frequently scorned because of the inadequacy of its material returns, and has utilized the large number of problems which it offers to prove his ability and genius as a designer. He has fostered a most sincere *esprit de corps* in his office, which can be no stronger attested than by quoting from his introduction to a book in which his work has been published: "I look to them not only to carry out my schemes but to advise about them, and I receive no criticism so valuable, so constructive, and so trenchant as that given me by the men who work for me. From them I expect to receive sympathetic comprehension of my aims and frank and full expressions of opinion of the way I am trying to realize them. Artists themselves, they do not substitute flattery for criticism and, sincerely anxious that our joint work may be as creditable as possible, they never hesitate to point out defects or faults. There is no appreciation of successful work so pleasant as that of the men who have assisted towards its success."

Mr. Embury has contributed widely to the literature on architectural subjects. His books have been a great aid to the better appreciation by the layman of the architect's aim and purpose, and his articles in the professional journals are instructive and much appreciated. As a member of the New York Chapter of the American Institute of Architects and the Architectural League of New York he is an enthusiastic and active worker, always ready to wholeheartedly further their plans for development or entertainment. — *R. F. W.*

PLATE DESCRIPTION.

Apartment House, 405 Park Ave., New York, N. Y. Plates 61–63. This building is of steel skeleton construction, resting on concrete piers carried down to bed rock considerably below the level of the tracks of the New York Central Railroad which are located immediately outside the building line on Park avenue underground.

The enclosing walls are of brick, 12 and 16 inches thick, with 2-inch terra-cotta tile furring. The building is 144 feet high from the curb level to the top tier of beams.

There are twenty four apartments, the rental of the south and larger apartments ranging from $5,500 to $6,500, and the north apartments from $3,500 to $4,500 yearly.

The passenger elevators do not open on public halls, but connect directly with the private vestibules of each apartment. Each apartment is provided with refrigerators supplied with an ice coil from the refrigerating plant in the basement. Vacuum cleaners and interior telephone systems are also installed. All fireplaces are equipped with large flues for the burning of wood.

The Rogers Tenements, West 44th Street, New York, N. Y. Plates 64, 65. To the passerby in the street the façade presents a spirit of repose and comfort beyond that of the average apartment in the neighborhood. The term "model" is decidedly applicable to the arrangement of the rooms and the amount of light and air provided for each apartment when the size of the plot, 50 by 100 feet, is considered in comparison with the usual provision made in the average apartment house.

The total cost of the building averaged 32.3 cents per cubic foot. To keep down the cost and yet to erect the building fireproof throughout, it became necessary to omit all ornamentation of the façade, except that which was possible in the use of the structural material itself.

The street front, above a low base course of concrete finish, is built of a dark red wire cut brick, laid in dark mortar, with almost black headers in patterns. The window sills and the main roof coping are of cast concrete. All exposed faces of these concrete sections are of broken tile and crushed gravel, brushed with wire brushes.

The walls of the inner courts are faced with a light gray pressed brick. To further reflect the light, the side walls of the adjacent buildings were painted. The courts are much larger than required by the Building Code.

The connecting link between the two units of the building contains on the second floor a reading room or meeting place for the free use of all the tenants—a pleasant innovation to find in an apartment dwelling. The large windows and center skylight give ample sunshine.

Other features of interest to the tenants are the individual storage lockers in the well lighted basement, a storage room on the entrance floor for baby carriages, and playgrounds on the roof for the children. These are protected by high fences of heavy woven wire and are also separated from the clothes-drying yards.

Structurally, the building is modern in every respect and in keeping with the best work of its class in fireproof construction. Exterior walls above the basement are of brick and furred with 2-inch terra cotta blocks.

The floors are of reinforced concrete built in general by the low arch method and supported by steel beams. On this are bedded the wood sleepers, to which the finished floors of comb grained North Carolina pine are nailed. In the hallways and the bathrooms the floors are of tile.

Partitions around the halls and stairs throughout are of terra cotta blocks, and all other non-bearing partitions are of solid plaster, finishing 2 inches thick, built of light iron bars fastened at top and bottom to the concrete construction and covered with metal lath.

Each apartment is kept an independent unit, separated from the public hall by a kalamein iron door, jamb, and casing, and the fire hazard reduced to the minimum. The stairs are of pressed steel, finished with white marble treads, iron railing, and wood capping.

All hot water for the building is supplied from a large tank in the cellar to which is connected a garbage burner. This consumes all the garbage handled daily by the janitor and the one fire serves a double purpose.

Copper is used exclusively for exterior sheet metal work. The roofs are paved with vitrified promenade tile.

The heating plant consists of a low pressure, sectional boiler, with abundant radiation in each apartment.

Additions to House of Abram Garfield, Esq., Cleveland, Ohio. Plates 69, 70. The portion of the house illustrated shows chiefly the music room, which occupies an entire wing, the upper portion of which extends over a covered drive to provide space for an organ chamber and a gallery which are reached by a winding staircase located in a bay. The room is 25 feet wide, 42 feet long, and 16 feet high. The tracery through which the organ sound enters the room occupies one end and the organ console is located at the opposite end.

The woodwork of the room is oak. The mantel is limestone and the ceiling is of cast ornamental plaster. The predominant color of the room is blue, because of that color appearing frequently in the furnishings. The walls above the paneling are tan color, and most of the large pieces of furniture are in colors approaching tan. The restful effect of the room is due in great measure to a discriminating use of very pale tan and green glass in the leaded glass windows, which modify the daylight in a pleasing way, although the tones are so pale that they are hardly noticeable.

Two Houses on Woodlawn Avenue, Chicago, Ill. Plates 73, 74. These houses were designed together for location on narrow city lots. It was the aim of the architects to utilize the land to the fullest extent, and their solution makes the space at the rear the most desirable and important part. The service has been confined to a court between the houses with direct entrance from the front. The rooms which are used but a portion of the day, and which are least disturbed by the noises of the street, are placed at the front of the houses.

House of Hiram Walker, Esq., Walkerville, Ontario, Can. Plate 75. The exterior walls are built of a rough textured brick of mixed shades. The woodwork on the exterior is white oak stained to harmonize with the walls. The interior is finished on both floors in white enamel paint, and all the floors are oak with the exception of the bathrooms, kitchen, and laundry, which are tiled. The house is heated with hot water and is provided with thermostat heat control. A garbage incinerator is also provided. The cost was about 25 cents per cubic foot.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE LICENSING OF ARCHITECTS.

IT IS required by statute that before practising their professions lawyers be admitted to the Bar, and that engineers, clergymen, and doctors should have received a degree. Architects can, however, practise at will, without having qualified for their work, excepting in their own estimation. Why has the profession been left unguarded to unqualified invaders? Has it inherent qualities of so high a character that it needs no protective barriers? Are the difficulties of its practice so great as to discourage any attempts to practise it by untrained persons? Does it owe any duties to the public to guide them in the choice of its practitioners? There are unscrupulous men and inefficient men in all professions, and a Nemesis of sorts always awaits them, though it sometimes takes a long time for them to receive their deserts; but in all cases, excepting that of the architect, at least some qualifications are demanded. Why are architects an exception? Possibly because an architect is primarily an artist, and art cannot be controlled by statute beneficially. Possibly because the architect is a business man, a promoter, and statutes that apply to such persons become active only when procedure is criminal. It may be that as with poets — it is not advisable to nip "mute, inglorious Miltons" in the bud. But taking it for granted that any coercive act requiring a certain amount of training may be inimical to a very occasional genius who might have succeeded if he had not been suppressed, cannot it be claimed that there might be requirements demanded which even a genius could overcome, and that the act of overcoming them might be of benefit to him? To eliminate bad elements need not endanger good ones. An act licensing architects need not be an antitoxin which might destroy the subject for whose welfare it is to be used; it may be merely an antiseptic preventing contagion. Another plausible claim can be made that an acknowledged stamp of qualification, if it is based upon so low a degree of merit as it must be in dealing with prospective and not actual practitioners, belittles the profession generally and reduces all to a lower level. This seems specious, especially as in every profession degrees of attainment are recognized by special indications of merit.

The qualifications necessary to practise a profession should be those which would imply criminal ignorance if unknown to the applicant. Afterwards, progress can be rewarded by honors, one of those honors being election to the American Institute of Architects. And, incidentally, the neglect to place the letters A. I. A. or F. A. I. A. after an architect's name, is not praiseworthy as modesty. These letters represent an honorable distinction, a reward of merit, and an indication to the public of the esteem in which the man is held by the members of his own profession, who are better fitted to judge of his qualifications than are any other people to whom this might be delegated.

But to return to the subject of the licensing of architects — the principal argument in opposition seems to be based upon the anticipation that men who deserve little will receive formal acceptance in the professional ranks, while at present they are outlaws; that they will be endowed with a mantle of respectability which they do not now possess. This would seem to depend entirely upon the requirements of the licensing act and the character of its administrators. At first the public would concern itself little about the matter; in time they would come to recognize the fact that advocacy of the licensing of architects by the architects would be an act of altruism, much more caused by a desire to protect the public from inefficiency than to clear the skirts of the profession. It would bring the outlaw within the law and make him subject to censure and expulsion, and therefore tend to make the profession unattractive to him. It would force him to overcome his limitations due to his neglect, and the standard of required attainment could be gradually increased if found desirable. It matters very little to the architect of acknowledged reputation that there are camp stragglers. It matters a good deal to the public whether they are pillaged by those individuals. The personnel of the licensing board naturally requires careful consideration; but as the duties of such a board would require but little time, for which there would be no monetary return, it would not be attractive to the professional politician. Even a bad government does not object to posing as a friend and protector of the people when it costs nothing to do so, and the appointees to the licensing board for architects would probably be men of ability. But even if they were not, the statute could be so drawn that it would be practically self-acting, and it very probably would be committed to the hands of the architects themselves.

W. H. C.

THE Hy-tex Church Competition was judged at Washington, May 10, by a jury selected from the officials of the American Institute of Architects. The members of the jury were: R. Clipston Sturgis, president; Thomas R. Kimball, vice-president; Burt L. Fenner, secretary; John Lawrence Mauran, treasurer; C. Grant La Farge, director.

The jury made the following awards, — First Prize: Maurice Feather, Watertown, Mass.; Second Prize: Frederick H. Kennedy, Boston, Mass.; Third Prize: Antonio di Nardo and Charles L. Bolton, Philadelphia; Fourth Prize: H. J. Voss and A. F. Law, Boston. Mentions: Robert Wesley Maust, Wyoming, N. J.; E. Donald Robb, Boston; Jerauld Dahler, New York; Davis, McGrath, and Kiessling, New York; Francis P. Smith and J. Herbert Gailey, Atlanta, Ga.; M. A. McClenahan, Salt Lake City, Utah.

THE BRICKBUILDER

VOLUME XXIV NUMBER 6

CONTENTS for JUNE 1915

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Notice to Architects

Attention is called to decree in suit in United States Court of the Hocking Valley Products Company *vs.* McArthur Brick Company in regard to Rug Brick patents.

In the District Court of the United States

SOUTHERN DISTRICT OF OHIO EASTERN DIVISION

IN EQUITY. No. 33

HOCKING VALLEY PRODUCTS COMPANY, *Plaintiff*

vs.

THE McARTHUR BRICK COMPANY, *Defendant*

ENTRY

This day came the plaintiff by T. P. Linn, its solicitor, and the defendant by O. E. Vollenweider and Finckel & Finckel, its solicitors, and thereupon, on motion of the plaintiff, the defendant by its said solicitors consenting thereto, it is ordered, adjudged and decreed that a perpetual injunction issue out of and under the seal of this Honorable Court against the defendant as follows: that the defendant, The McArthur Brick Company, its agents, clerks, servants, workmen, employes and attorneys and all persons claiming or holding under or through said defendant, be and they are hereby perpetually enjoined from directly or indirectly making, using, selling or practicing the patented inventions made by Daniel E. Reagan, as set out in the Bill herein, and more particularly contained in and described as Letters Patent of the United States to Daniel E. Reagan, assignor, to the Hocking Valley Products Company, No. 1,100,989, dated June 23, 1914, for brick machine, and No. 1,101,093, dated June 23, 1914, for method of ornamenting bricks, and from infringing said Letters Patent, or either of them, directly or indirectly, in any manner whatsoever.

It further appearing to the Court that the parties hereto have settled and adjusted the question of profits and damages, no order with respect thereto is made.

It is further ordered, adjudged and decreed that plaintiff have and recover of and from said defendant the costs of this suit taxes at $..............., and that it have execution therefor.

Entered May twenty-sixth, Nineteen Hundred Fifteen.

In the next issue of THE BRICKBVILDER *we will publish the names of those licensed to manufacture Rug Brick*

FOR DISTINCTIVENESS AND INDIVIDUALITY OF EXTERIOR

Greendale Rug Brick

Manufactured by

Hocking Valley Products Company

Columbus, Ohio

THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

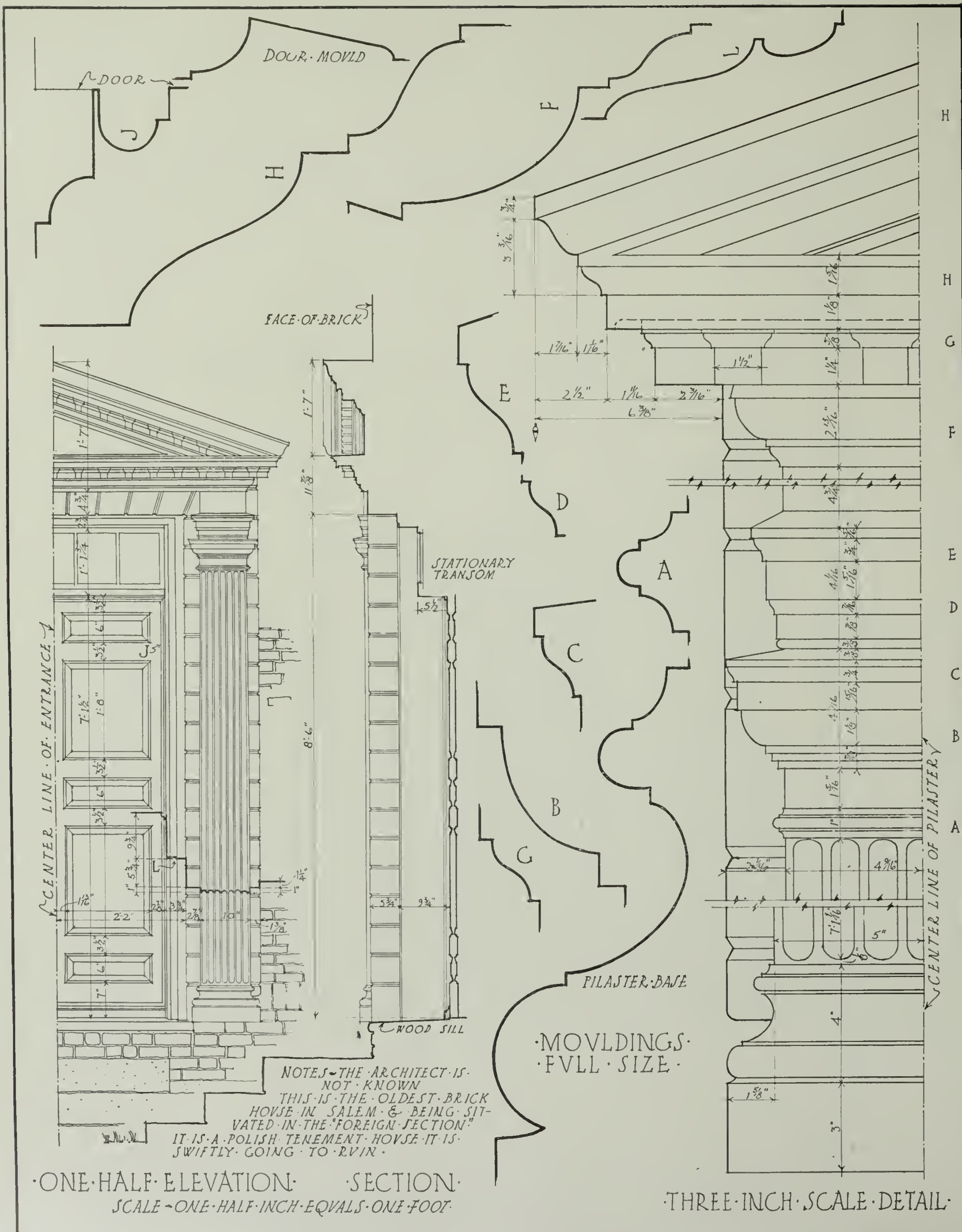
DOORWAY, RICHARD DERBY HOUSE, DERBY STREET, SALEM, MASS.
BUILT IN 1761 AND THE OLDEST BRICK HOUSE NOW STANDING IN SALEM

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate Six

(over)



·PLATE·6· ·JVNE·1915·	·ENTRANCE~RICHARD·DERBY·HOVSE· ·BVILT·IN·1761· ·SALEM·MASS·	·MEASVRED·&· ·DRAWN·BY· ·GORDON·ROBB· ·&·M·A·DYER·

SMALL PALACE IN SALAMANCA, SPAIN
ERECTED IN THE XVIITH CENTURY

THE BRICKBVILDER

VOLUME XXIV JUNE, 1915 NUMBER 6

Design and Construction of Roof and Wall Trusses.

IV. THE "A" TYPE OF TRUSS.

By MALVERD A. HOWE, C.E.

Director Architectural and Civil Engineering Departments, Rose Polytechnic Institute.

THE simplest form of the "A" truss is the combination of two rafters and a collar beam as shown in Fig. 93. If the supports A and B are immovable, the stresses in the members of the truss, which are produced by symmetrical vertical loading, are readily found by the usual methods. The graphical determination of the stresses is illustrated in Figs. 94 and 94a. All members are in compression and there are no bending stresses other than the secondary stresses, which are common to all trusses having more or less rigid connections at the joints.

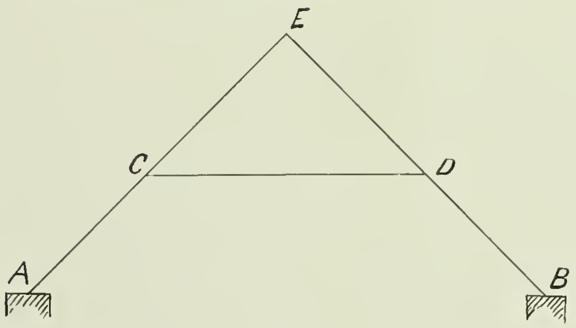


Fig. 93

In case the loading is not symmetrical, the problem is not as simple. Assuming that the connections at A and B (Fig. 93) are pins (fixed connections, usually, are not feasible in buildings), it is evident that the connections at joints C and D (Fig. 93) cannot be made with pins, since the four-sided figure ACDB would collapse under an unsymmetrical load. If, however, the rafters are made continuous from A to E, and from B to E, a pin may be used at E and the collar beam connected by pins at C and D. The structure is now stable and, strictly, is a two-hinged arch if the relative positions of A and B remain unchanged. While the elastic theory of the two-hinged arch can be readily applied in this case, it is probable that the following method will be found to be easier and sufficiently exact for practical purposes.

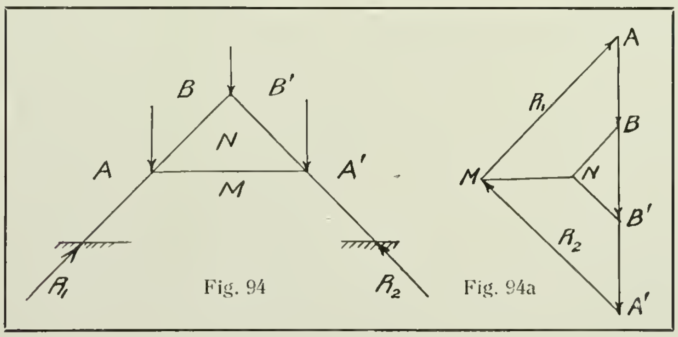


Fig. 94 Fig. 94a

The case of unsymmetrical loading is usually due to the action of the wind on the roof. Such loads can always be represented by vertical and horizontal components, as indicated in Fig. 95.

Two equal and symmetrically placed loads on a symmetrical two-hinged arch produce a horizontal thrust at each support which is twice that produced by either one of the loads alone. Then it may be assumed for the vertical components V_1 and V_2 (Fig. 95) that the thrust at each support is

(1)
$$H_1 = H_2 = \frac{1}{2}\left(V_1 \frac{a}{b} + V_2 \frac{L}{2f}\right).$$

Owing to the symmetry of the frame in every particular, the thrusts due to the horizontal components may be considered as equal and each having the magnitude of one-half the total horizontal loading.

Then,

(2)
$$h_1 = -h_2 = \frac{1}{2}\left(Q_1 + Q_2\right).$$

The vertical reactions are precisely the same as for a simple truss on two supports. Therefore, the following is derived:

(3)
$$R_1 = \frac{1}{L}\left(V_1(L-a) + V_2 \frac{L}{2}\right)$$

(4)
$$R_2 = \frac{1}{L}\left(V_1 a + V_2 \frac{L}{2}\right)$$

(5)
$$-r_1 = +r_2 = \frac{1}{L}\left(Q_1 b + Q_2 f\right).$$

To illustrate the application of this method, take the truss shown in Fig. 96, and, for convenience, assume the normal wind loads to be 1,414 and 707 pounds, as indicated in the figure by their vertical and horizontal components.

The horizontal thrusts are

$$H_A = H_1 - h_1 =$$
$$\frac{1}{2}\left\{1{,}000\,(10)/(10) + 500\,(40)/(40) - (1{,}000 + 500)\right\} = 0,$$

$$H_B = H_2 + h_2 =$$
$$\frac{1}{2}\left\{1{,}000(10)/(10) + 500(40)/(40) + (1{,}000 + 500)\right\} = 1{,}500.$$

The vertical reactions are

$$R_A = R_1 + r_1 = 1{,}000 - 500 = +500,$$

$$R_B = R_2 + r_2 = 500 + 500 = 1{,}000.$$

The stresses in the members are best found by moments and the resolution of forces.

At A the reaction 500 is resolved into two components, one parallel to AC, and the other normal to AC, as indicated by the dotted lines. The direct stress in AC equals 500 cos θ, or 354 pounds compression.

In a like manner the two forces at B are resolved and the stress in BD found to be 1,767 pounds compression.

The stress in CD is found by cutting the frame through CE and CD and taking E as a center of moments. (See Fig. 96a.)

Stress CD (10) = — 1,000 (10) — 1,000 (10) + 708 (14.14) or the stress in CD is 1,000 pounds compression.

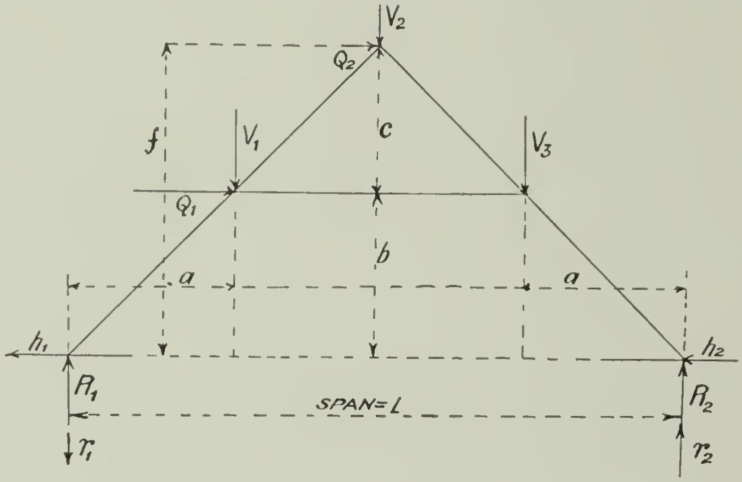


Fig. 95

Using the same section and taking D as a center of moments, the stress in CE is found to be 354 pounds tension. In a similar manner the stress in DE is found to be 1,060 pounds compression. This disposes of all of the *direct* stresses in the truss members.

The rafters AE and BE are each subjected to bending moments produced by the normal components of the reactions. These moments are zero at A, E and B and maximums at C and D. The moments at C and D are each equal to

500 (10) (12) = 60,000 inch-pounds,

or — 1,000 (10) (12) + 1,500 (10) (12) = 60,000 inch-pounds.

To further illustrate the determination of the stresses and bending moments in the "A" truss when the supporting walls are assumed to be capable of resisting the horizontal thrusts at A and B (Fig. 97), assume that the trusses are spaced 10 feet on centers and have the dimensions shown in Fig. 97. Let the roof covering be slate on heavy sheathing and the rafters, purlins, and truss members be of long-leaf southern pine. The apex loads, due to the weight of material and snow retained by snow guards, will be about 4,000 pounds at each apex. The normal wind load* is assumed to be about 1,900 pounds at C and 950 pounds at E.

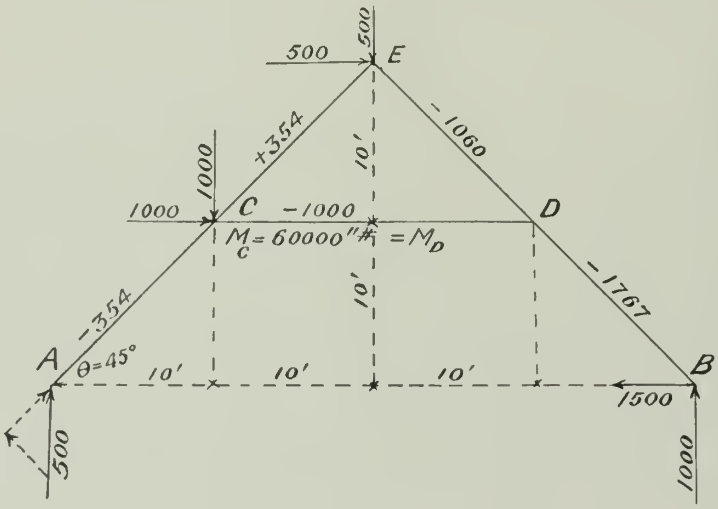


Fig. 96

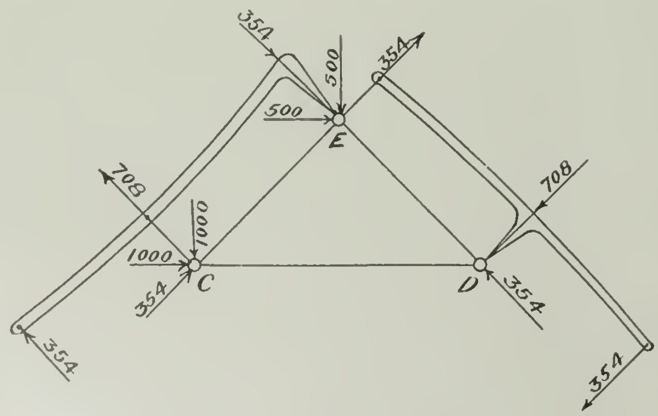


Fig. 96a

The stresses produced by the vertical loads of 4,000 pounds at each apex are found from a stress diagram similar to that shown in Fig. 94a, and the stresses due to the wind forces are found in the manner just given. All of these stresses are shown in Fig. 98.

Inspection shows that the maximum stress in the rafters is 10,875 pounds compression, and that the bending moment is 56,448 inch-pounds. It is sufficiently exact to design the rafter so that the sum of the unit stress in compression and that for cross bending does not exceed the *allowable* unit stress in compression.

If the least dimension of BD is 7½ inches, L/d = (9.9) (12)/(7.5) = 16 (nearly), a slenderness ratio which corresponds to an allowable unit stress in compression of about 1,000 pounds per square inch.

Assuming the depth of the rafter to be 7½ inches, the extreme fiber stress due to the bending moment is

(6)

(56,448)/(7.5) (7.5) (7.5) = 803 pounds per square inch.

The stress per square inch due to the direct stress is

10,875/(7.5) (7.5) = 193 pounds.

* Two valuable articles by R. Fleming, American Bridge Company on Wind Pressure Formulæ and their application to roof trusses, are published in *The Engineering News*, Jan. 28, 1915, and Feb. 4, 1915.

The sum of these two unit stresses is $803 + 193 = 996$ pounds, which does not exceed the allowable unit stress found above.

As far as the direct stresses and bending moments are concerned, the rafters can be made of timbers 7½ by 7½ inches, but this allows nothing for the necessary cutting to make the collar beam connections. Therefore the rafters should be 7½ by 9½ inches (8 by 10 inches nominal).

The collar beam, on account of its length, should be at least 7½ by 7½ inches.

If the connections at C and D are reinforced above and below by solid knee braces, the bending stresses in the rafters proper will be reduced, but the collar beam will be subjected to bending stresses.

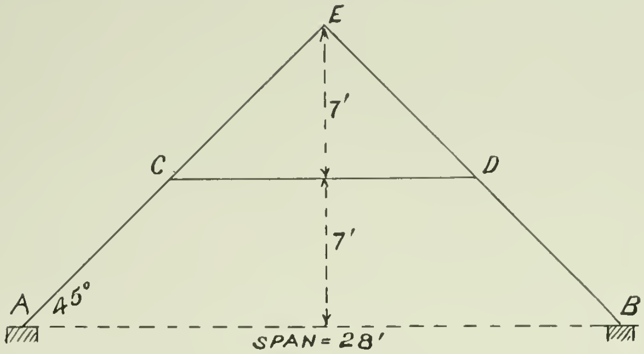


Fig. 97

If in addition to the knee braces the connection at E is made as rigid as possible, and the collar beam made at least as large as the rafters, the truss will have ample strength and stiffness.

In case it is desired to relieve the supporting walls as much as possible from horizontal forces, some means must be provided for taking care of the horizontal forces.

The horizontal thrust due to the wind must, of course, be taken by one or both walls.

The horizontal thrusts produced by the dead load (4,000 pounds at each apex) can be provided for by making the rafters sufficiently strong and stiff so as to prevent the points A and B from separating any great amount due to the changes of length of the truss members and the bending of the rafters.

The simplest way to consider this case is to assume a hinge at A and rollers at B as shown in Fig. 99.

The reactions at B are vertical and have the same magnitudes as found for Fig. 98 at B. The vertical reactions at A are the same as in Fig. 98,. but the entire horizontal component of the wind is resisted here. Owing to the shape of this particular truss and the disposition of the wind loads, the horizontal thrust in this case happens to be the same as given in Fig. 98.

Fig. 99 shows the loading, reactions and stresses to be considered. The direct stresses in the rafters may be neglected, as the bending moment at C is so large. This moment is,

$$8{,}687\ (7)\ (12) = 729{,}700 \text{ inch-pounds.}$$

A timber 11½ by 17½ inches is required with a fiber stress of about 1,300 pounds per square inch.

The collar beam is now in tension and its stress is about 10,700 pounds.

Assuming that the collar beam is made so heavy that its change in length can be neglected, and that the rafters are free to bend throughout their length, the change of span between A and B produced by the bending of the rafters can be found from the expression (see Fig. 99),

$$d = \frac{M_C + M_D}{3EI \sin\theta}\,(b^2 + bc),$$

where M_C is the bending moment at C and M_D that at D, E Young's modulus of elasticity, and I the moment of inertia of the cross-section of the rafter, with reference to an axis normal to the plane of bending.

Inserting numerical values in the above expression,

$$d = \frac{1{,}346{,}600}{3(1{,}500{,}000)(5{,}136)(.707)}\left(84^2 + (84)\,(84)\right) = 1.16 \text{ inches.}$$

Under a full load the change in span will probably be larger than the above quantity, owing to the stretching of the collar beam and the give in the connections at C, D and E.

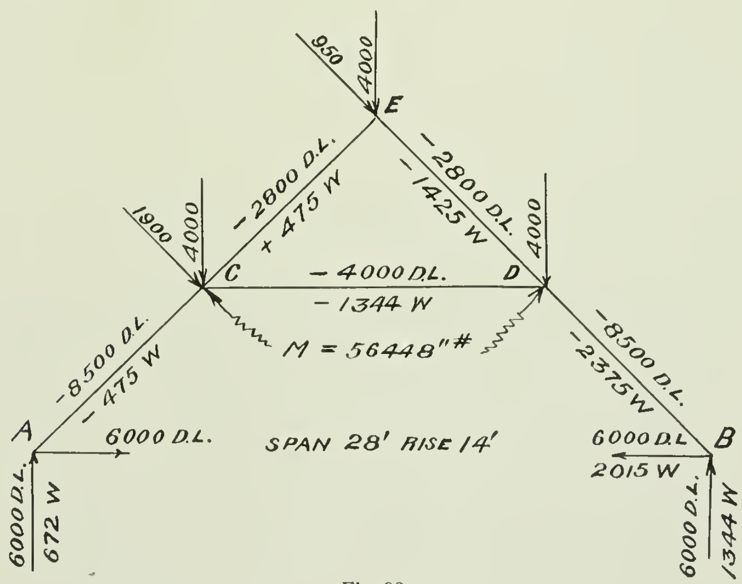


Fig. 98

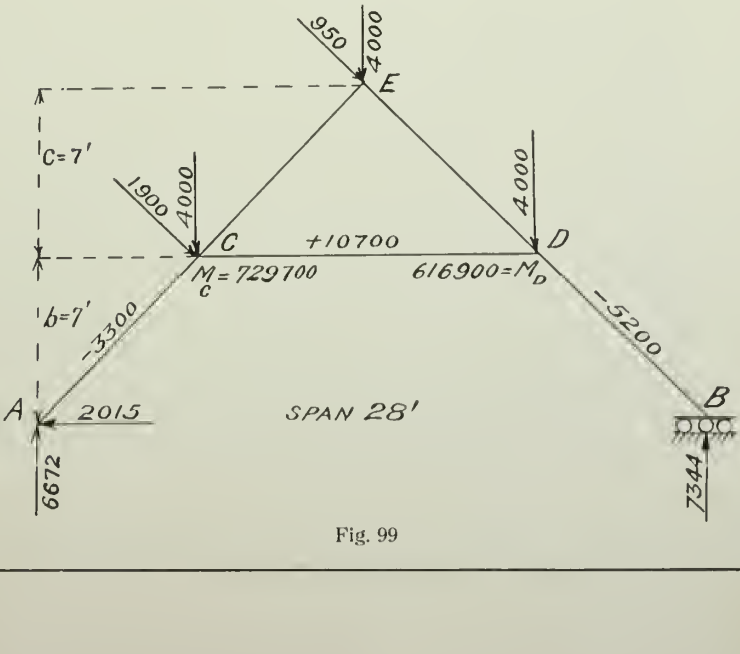


Fig. 99

The "A" truss should be framed with the span a little short to allow for the horizontal deflection of the supporting ends. One end of the truss can be placed in its proper position on its supporting wall, but the other end should be given freedom to slide outward on its support as the roof loading is applied. Another method is to force the ends apart the amount of the horizontal deflection by a temporary strut. As the load comes on the truss, the stress in this strut will be relieved until finally it can be removed.

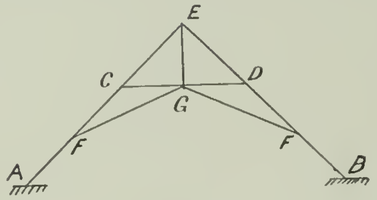


Fig. 100

The sizes of the rafters can be materially reduced by the introduction of bracing as shown in Fig. 100. As the points F approach A and B, the bending in the rafter grows smaller and smaller until finally, when the points F coincide with A and B, there is no bending in the rafters. There is, however, a horizontal thrust due to the wind forces and a change in span due to the changes of length of the individual members of the frame. A common form of this type of truss is called the scissors truss, which will be considered later.

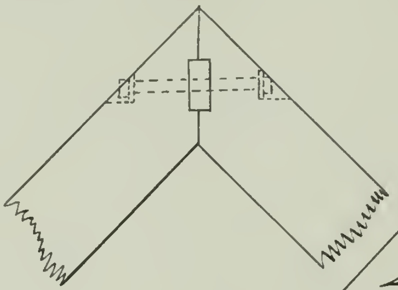


Fig. 101

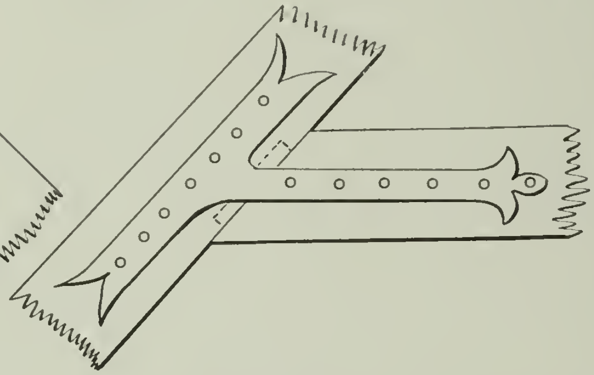
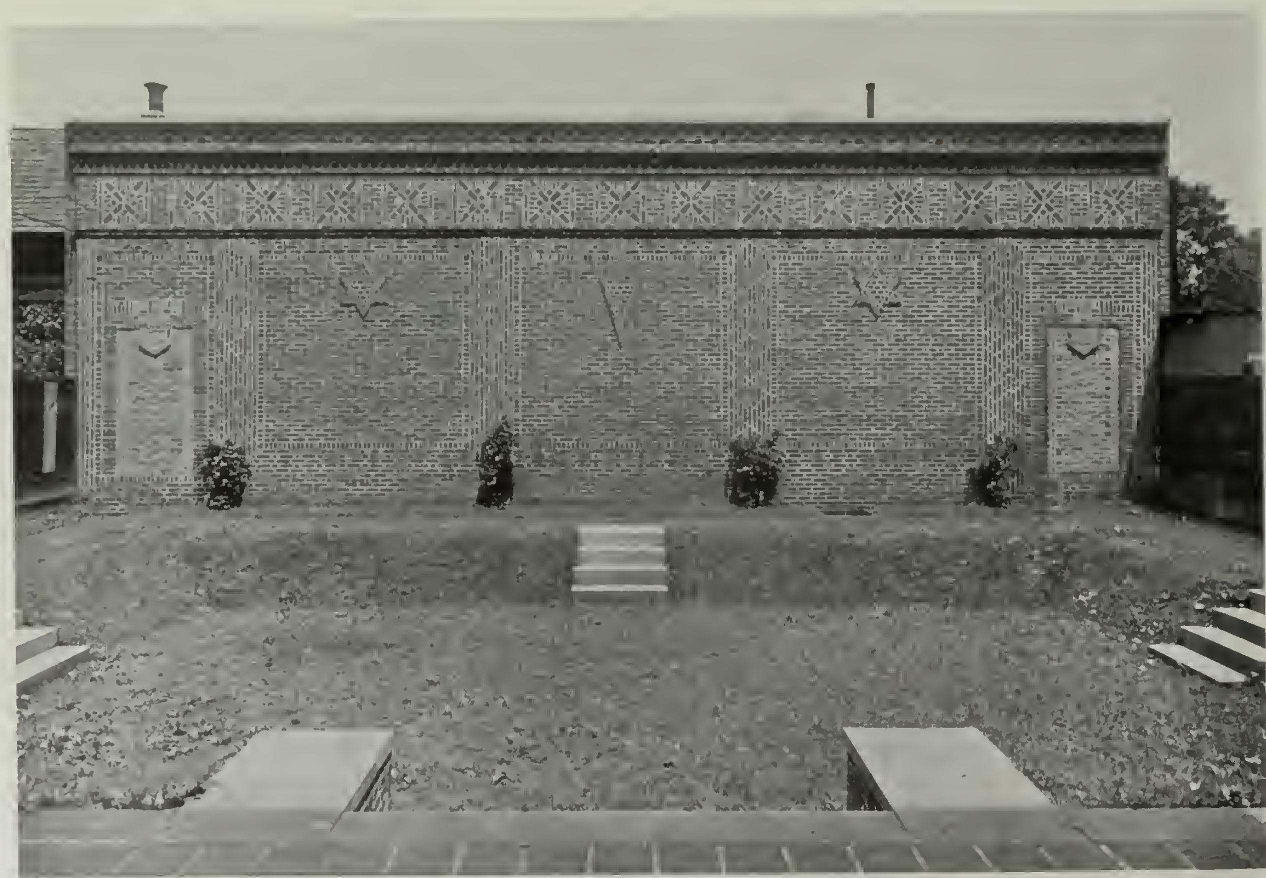


Fig. 102

Joint Connections for the "A" Truss. Where the rafters meet, the simplest connection is that shown in Fig. 101, which consists of a hardwood key and one or more bolts.

The collar beam connection can be made in several ways, but the detail shown in Fig. 102 has the advantage of being simple and does not require any excessive cutting of the rafter. The collar beam has a tenon entering a *shallow* mortise in the rafter to keep it in place vertically. The wrought iron straps are attached with lag screws which are placed along the *center lines* of the pieces connected.



ORNAMENTAL BRICK GARDEN WALL

DELTA PSI FRATERNITY HOUSE, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA

COPE & STEWARDSON, ARCHITECTS

Plumbing Installation and Sewage Disposal.

III. WATER SERVICE AND HOT WATER SUPPLY SYSTEM.

By CHARLES A. WHITTEMORE.

IN arranging for the water service pipes to be brought into a building, after the usual formalities of filing applications and other papers with the water department of the city or town, a deposit is usually required to cover the expense of the connection to the main in the street; the laying of the pipe from the street main through the wall of the building; and the installation, outside the wall of the building, of the necessary gate valves, or "cut-offs," by means of which the water supply to the building is controlled. It has been found from experience that in order to facilitate the service installation, the plumbers should be required to make the application in the name of the owner of the building, to make the deposit required by the city water department, and to be responsible to the owner and to the city for the proper installation of this work.

The city authorities, upon receiving an application, have the engineering department look over the conditions of the ground and the building, and determine the distance of their pipes from the building line. An estimate of the probable expense of installing this work, together with the probable expense of the material used, is then made, and this amount represents the deposit which the owner, or for him the plumber, is required to make. Upon the completion of the work, if the expense involved has not amounted to the estimated deposit, the balance is returned to the depositor. In case peculiar difficulties are encountered and the expense is more than the estimate, the owner or plumber is required to pay the amount in excess of the original deposit.

The general contractors should be required to do the digging in the street, obtaining the necessary permits for opening the street, and arrange for the preliminary work of the water department. This has been found to save considerable time and avoid delays in having the water brought into the building when desired.

The street connection with sewers and mains, etc., can be done only by licensed drain layers and men who are under a bond for opening the street. It is, therefore, of importance in arranging for any such work to be sure that the proper man is caring for this portion of the installation.

After the water pipes have been brought through the building wall, connections are left for the meters. These meters are the property of the city or town controlling the water supply and are installed by the water department unless special meters are used or special arrangements are made with the water department. In some of the smaller cities and towns where there is a large water supply, meters are not required; but in the main it is always advisable in writing specifications to note that the plumber is to arrange with the city for the meter installation, and that the plumber is to be responsible for all these connections.

There are two general types of meters used to indicate water consumption: one in which the amount of water is determined by the velocity of the water flowing through an orifice of a fixed size; the other by the amount of water contained in a chamber in the meter. In the former type the velocity per foot determines the amount of water used, the aperture being constant, and the amount of water passing through is automatically registered on a dial. In the other type the water chamber is continually filled and refilled, and thus the volume of water consumed is mechanically registered. There are several standard makes of meters on the market, but inasmuch as this particular phase of the plumbing installation is so seldom encountered it is hardly necessary to discuss these types.

When it is desirable to ascertain the exact amount of water consumed in connection with a mechanical plant so as to determine the cost of maintenance, meters of either of the above types are used.

As has been previously noted, the water in a large installation after having passed through the supply main and the meter is conducted to the cold water supply drum. From this drum the various rising lines are taken to supply different parts of the building. Each rising line should be tapped separately into the drum, and at the base of each rising line there should be a separate gate valve or other approved form of shut-off. All of these rising lines and valves should be tagged, and the number on the tag should be noted on an index which should be framed or attached to the wall near the drum, so that trouble in any portion of the building may be immediately localized and damage prevented by closing off the proper valve without depriving the remaining portion of the building of its normal supply of water.

At the base of each rising line branching from a main line in the basement a "draw-off" cock should be placed and either connected with the sewer or extended to a sink or drain so that it may be possible at any time to draw off the cold water from any portion of the building without inconvenience to any other portion.

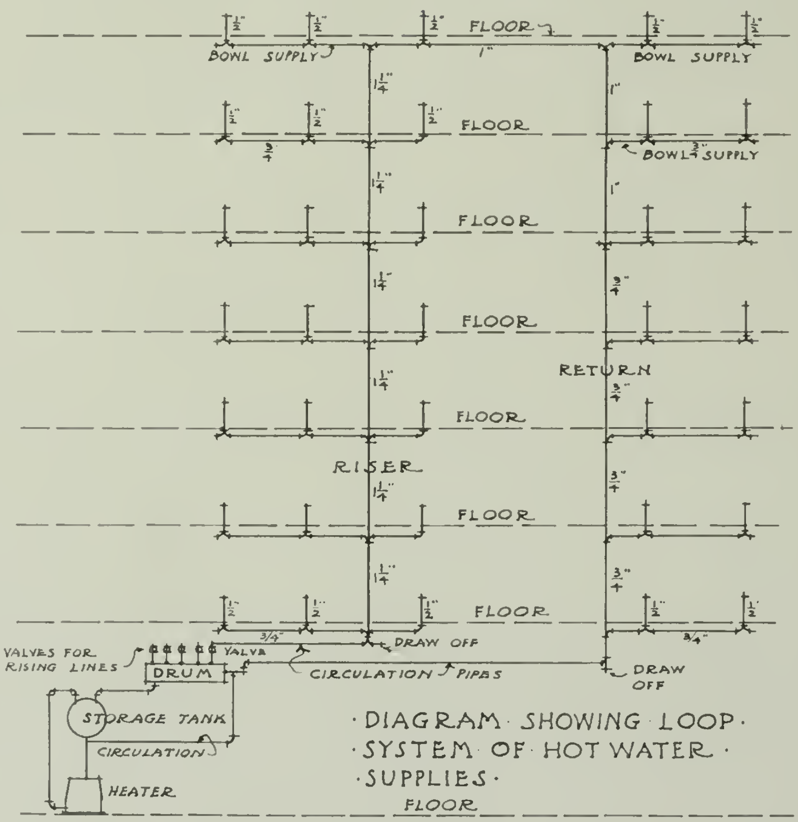
Hot Water Supply System. The hot water supply system is a problem by itself, and much discussion has been aroused over the most perfect method of installation, so as to give hot water at all points without delay. An ideal system is one in which the temperature of the water at all points varies but slightly; in which the circulation is continuous and unobstructed; and in which the hot water is conducted directly to each faucet, so that hot water may be drawn as soon as the faucet is opened.

There are two general types of hot water installation, — one in which the circulation pipes are carried on the basement ceiling and from this circulation loops, forming the continuous circulation to the individual fixtures, are carried up through the building. From the rising side of the loop supplies to the various fixtures are taken, the size of the pipe being undiminished throughout its length. After reaching the highest point at which a relief valve should be installed to relieve the system of any air, vapor, or steam that might force its way in through the water, the pipes are carried down to the main circulation pipe, gradually reducing in size, thus maintaining a constant circulation in this portion of the system by retarding the flow due to the head of water descending in the pipe.

In a building several stories in height, the circular loops are usually carried to the under side of the top floor, and the supply for the fixtures in the top floor are taken from the top of the loop. This supply acts as a relief valve, as whenever the faucets in the fixtures on the top story are open an opportunity for air to escape is easily afforded.

In the other system the main hot water supply lines are carried to a point preferably above the highest fixtures, circulating at this level around the building so as to supply the lines in various sections and returning by a similar pipe to the tank or heater or general storage supply. The various supply lines, which are taken from the circulation system at the high point, are extended through to the lowest point of the system and are there connected to the return from the circulation system.

Advantages are claimed for each system, but the consensus of opinion would seem to indicate that the former system may be depended upon to give the best results.



·DIAGRAM·SHOWING·LOOP·
·SYSTEM·OF·HOT WATER·
·SUPPLIES·

The determination of sizes for hot water circulation pipe is a problem which requires careful consideration. It is difficult to lay down hard and fast rules for sizes of pipes for different installations, but in general it might be stated that the return circulation pipe in a loop should not be less than one-half the size of the supply line. For example, if the supply riser of the loop is one and one-half inches in diameter, the return line should not be less than three-quarters of an inch for installations where many fixtures are to be supplied from both rising and return sides. The sizes can be best determined by practical experience rather than by an arbitrary rule.

The hot water supply system should be installed throughout in brass pipe, preferably iron sized brass, as the expansion and contraction of tubing if used might develop defects not visible under the preliminary pressure tests. Lead lined or tin lined iron pipes are used in some cases for hot water systems, as well as for cold water pipes. Plain iron or galvanized iron pipes should not be used for hot water except in the cheapest installations, as the "rusting" and "scaling" take place even more freely than when the same kind of pipes are used for cold water.

Hot Water Drum. In office buildings or buildings where there is a considerable demand for hot water, and where the various rising lines throughout the building are supplied from one source, a hot water drum, similar to the drum mentioned for the cold water system, is advisable. The different rising lines or circulating lines should be taken off in the same manner as for cold water. Near the drum shut-off valves should be installed and properly tagged, so as to control various parts of the building independently.

In many instances in large buildings the rising lines are so scattered that it would be exceedingly difficult to supply all of them from one drum. In such cases it is advisable to supply separate drums for a group of rising lines in different parts of the basement and connect these drums with a circulation system.

This would give the same results as if all the rising lines were conducted to one central point and connected into a single drum.

There is a variety of devices on the market at the present time for heating hot water for office and commercial buildings as well as for domestic purposes. These vary from the ordinary heating devices used in residences to the instantaneous heaters used in hotels and large buildings. The most common of all the known devices for residence work in the past has been the water back, water front, or circulating coil installed in connection with a wood or coal range or furnace. For residence work, where a coal fire is used in connection with the kitchen range, a cast brass water front or water back is undoubtedly the best, the difference between these being that the heating surface is placed either at the front or at the back of the fire box. The position with reference to the fire makes but little difference so long as a large amount of surface comes in contact with the heated portion of the fire box. In less expensive installations the water chamber is made of cast iron, but this material is not nearly so satisfactory on account of the great corrosive effect of the alkaline waters on the interior of the water chamber producing what is known as "rusty water." With cast brass this objectionable feature is entirely removed.

The advantage of the cast brass chamber over the circulating coil consists in the fact that a larger surface of water comes into immediate contact with the heated portion of the fire. Unless the fire is banked around the pipe when a coil is used, only a small portion of the water surface is in actual contact with the heated coals.

A more modern device for heating hot water for smaller installations is the small gas heater which is, as a rule, attached in close proximity to the storage boiler. There are on the market many good types of water heaters which are inexpensive to operate, and which do not readily get out of order. In selecting one of these devices the principal considerations should be: first, to see that as large a surface of the water as possible is presented to the direct effect of the heat; second, the possibility of cleaning deposits, which are products of gas combustion and which eventually cover the exposed surface, forming an insulating medium which prevents the most effective action of the heat on the water.

The next step in the nature of refinement in the mechanical appliances for heating water is the automatic, instantaneous heater in which a small pilot light is kept burning at all times. By the motion of water in the pipe, due to an open faucet, the pilot light ignites the larger flame and produces the hot water almost instantly. The instantaneous heaters of this type are frequently equipped with an automatic thermostatic device for maintaining an equal temperature at all times. By this means if the temperature of the water drops below the fixed point, the flame is automatically ignited and the water rises to a fixed temperature, at which point the flame is again automatically extinguished.

The capacities of these heaters vary from a small size of one and one-half to two gallons per minute to larger sizes, which will produce six to eight gallons of hot water per minute. Care should be taken in selecting a heater of this nature to see that the pilot light is so protected that it will not be extinguished accidentally, allowing the gas to escape in the chamber.

Every form of gas heater should have a vent pipe connected directly to a flue of a chimney or to the outer air, so as to carry off the combustion gases and any leakage of fuel gas which might occur in the apparatus.

There are various forms of combination laundry stoves with a hot water jacket which are in common use in some classes of residences and which give very satisfactory results. These are of cast iron throughout or have a brass water jacket in a cast iron frame. In either case a double service is effected, heating water and affording an opportunity for heating irons in connection with the laundry work.

When the demand for hot water is multiplied to the extent in which it is usually found in office or commercial buildings, the simplest and best installation, where steam cannot be used as a heating medium, is a large storage tank with a small, independent coal heater. The water, continually circulating between the storage tank and the heater, maintains the temperature of the water at almost any desired point. These heaters require but little attention and consume so small a quantity of coal that their cost in the average heating plant is negligible.

Where high pressure steam is used in a building, a type of hot water heater which is instantaneous, and in which no storage tank is required, is made by installing in a large wrought iron pipe a section of brass pipe usually not less than two inches in diameter. The live steam is supplied at one end of the iron pipe, completely filling the space around the outside of the brass pipe, and is returned to the steam plant from the opposite end. The water continually flowing through this superheated steam is raised to a high temperature. The amount of water produced in a heater of this type depends entirely on the length of the pipe around which steam is allowed to circulate, and heaters of this variety are installed in many hotels where the demand for hot water is enormous. One of these heaters used in a Boston installation produces over 100 gallons of hot water per minute. The hot water from the heater is maintained at a temperature of approximately 160 degrees, and at the return end of the circulation loop the temperature is seldom lower than 100 to 120 degrees.

The storage tank should be carefully estimated to give the proper volume of water to supply all of the fixtures at hand without a perceptible diminution of supply.

In ordinary work for a small house a 40-gallon boiler should be sufficient where there is but a single bathroom. Where there are two bathrooms, a boiler of not less than 50 gallons should be installed. In many of the better classes of residences storage tanks as large as 100 gallons capacity are frequently used. In office buildings the capacity of the storage tank is usually estimated at about one and one-half gallons per office and should be never less than 200 gallons except where the demand is small.

These storage tanks are constructed of galvanized iron, black iron, or copper. The copper tanks are superior in durability to the galvanized or plain iron, and where high pressures are to be used, the tanks must be well reinforced.

Every storage tank should be tested or guaranteed by the makers to withstand a certain pressure. Small kitchen range boilers are usually tested to 100 to 150 pounds per square inch and guaranteed for a working pressure of 80 to 125 pounds. The larger boilers should be tested to 250 pounds per square inch and guaranteed for working pressure of 200 to 225 pounds.

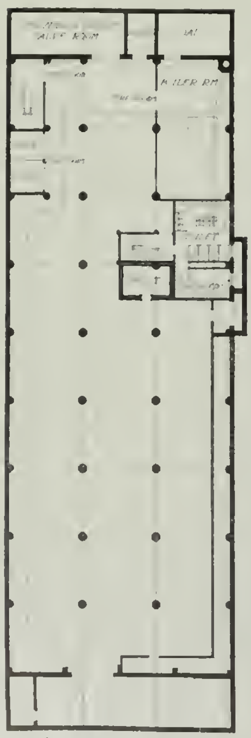
In case a storage tank is used, the water in which is to be heated by steam, a system of coils in the boiler through which the steam is allowed to circulate is usually provided. This is not advisable in the case of a low pressure, steam heating apparatus unless there is a large amount of surplus capacity in the boilers. The rapid condensation of the steam, due to the radiating effect of the piping, is too much of a drain on the boiler and robs the rest of the heating system of its proper supply of steam.

In some residences brass coils are installed around the inside of the fire pot of furnaces, steam boilers, and occasionally in hot water boilers.

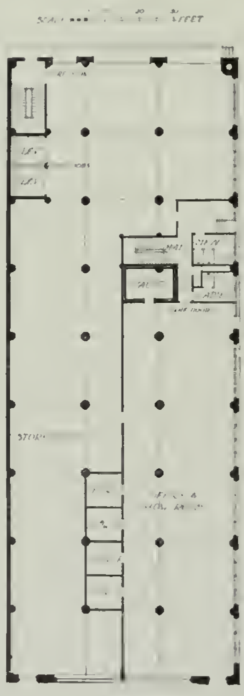
These coils are economical in operation and take but little space around the fire pot. Some other method of heating the water must, of course, be provided where they are used in the summer.

The water from a hot water heating system should never be drawn off for domestic purposes unless it is first filtered, because it is likely to be rusty and also likely to contain more or less grease and oils from the piping itself.

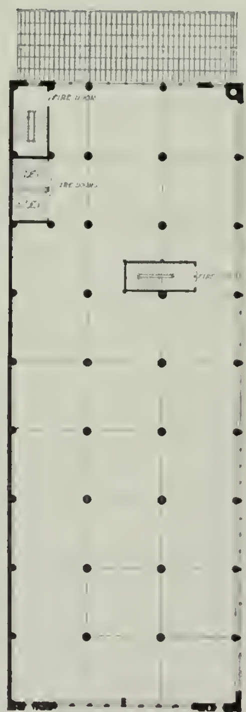
It is advisable in installing a hot water system in a large building to have thermometers placed at the base of the rising lines and also at the base of the return line. In this way a difference in temperature may easily be noticed and by valve adjustment the temperatures throughout the whole system may be readily equalized.



BASEMENT PLAN



FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

THE problem presented in planning this building was that of providing a showroom and offices, together with a large storage space to accommodate the stock of a manufacturer of plumbing supplies. The first floor showroom, together with the sample bathrooms for the display and demonstration of fixtures, are finished in tile, the side walls being blue and the floors buff. The basement showroom is similarly floored with tile, the wall finish, however, being fumed oak. The general offices which adjoin the first floor showroom and have direct access to the storage portion of the building are also finished with fumed oak. There is an additional showroom on the Euclid avenue frontage devoted to the display of rougher materials used in plumbing installation.

The concrete, flat slab type of construction was followed in the erection of the building, the exterior being faced with terra cotta, portions of which are in low toned polychrome to afford ornament. The design is typical of the advancing standards in modern American commercial architecture. The cost complete was slightly under 18 cents per cubic foot.

MERCANTILE BUILDING, EUCLID AVENUE, CLEVELAND, OHIO

J. MILTON DYER, ARCHITECT

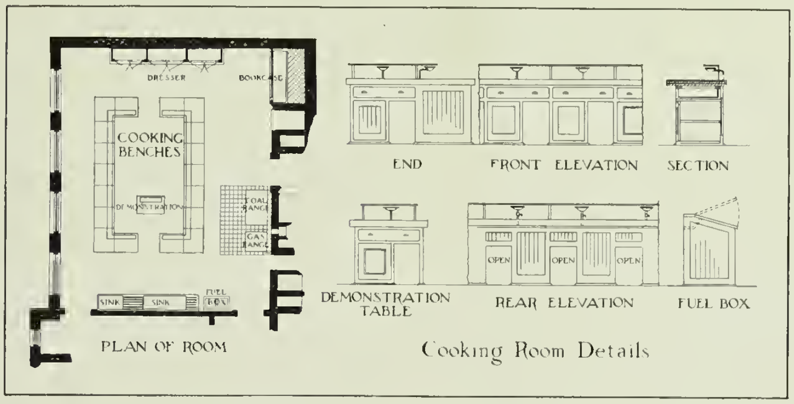
The Modern Schoolhouse.

VI. SPECIAL FEATURES. (Concluding paper.)

By WALTER H. KILHAM.

UPPER elementary school buildings are generally provided with a cooking room, manual training room, and assembly hall, and frequently with a gymnasium and sewing room. In many cities provision is also made for one or more "fresh air" rooms, sometimes to accommodate regular classes and sometimes only for a special class of defective or anæmic children.

The Cooking Room. This may be located in the basement if necessary for reasons of economy, but should be at least half above outside grade. A room of 900 to 1,000 square feet is desirable, preferably located at a corner of the building so as to obtain light on two sides. The walls are treated as in class rooms, but less blackboard space is required — about 10 running feet is sufficient. The floor should be of wood or linoleum, with an ample tiled hearth in front of the ranges. The ventilation should be the same as for a class room, but less heat is required. An additional vent should be provided for the hood over the ranges and a smoke flue for the coal range. A separate wardrobe is not obligatory, but accommodation should be provided for the teacher's street clothing.



Plan and Details of a Typical Cooking Room

The work benches are generally arranged in the form of an oblong or ellipse for a class of about 24 pupils. Each section contains two drawers for utensils, a bread-board arranged to pull out, and a Bunsen burner with a hinged iron grill over it, set on an aluminum plate at each station. Access should be provided to the center from one or two sides. The tops are 24 inches wide, made of pine, and with the bread-boards should not have painter's finish. The benches are open underneath and may be supported on pipe standards. A demonstration bench similar to one section is located in the center.

A dresser for dishes, etc., should be included in the room, to be about 10 feet long in three sections; the upper portion should have four adjustable shelves and glazed sliding or hinged doors. The lower portion contains a set of three drawers and two cupboards with shelves. A fuel box is needed for the coal range; this should have two compartments each, about 24 inches square and 30 inches deep, with hinged lids and with a small shelf in one section. Accommodations should also be provided in the main coal room for a supply of range coal and kindling wood. A bookcase similar to those in other class rooms should be provided.

Near the ranges should be installed a soapstone sink 4 feet long, with two cold and two hot water cocks and soapstone drip shelves 24 inches long at each end, and provided with a grease trap. The coal and gas ranges should have six holes each and be provided with tile hearths and hoods. Space should be allowed for a refrigerator with drain. In connection with the cooking room a pantry is useful but is not always included, and similarly a space large enough for a dining table for use in demonstrations. This is sometimes located in the space enclosed by the work benches. The above represents what might be considered as minimum requirements for a cooking class. Some prefer modifications or improvements on this arrangement, such as finishing the work benches in white tile and rather elaborate cupboards and dressers, and others recommend placing a white porcelain sink between every two sections; but it would seem as if the most appropriate equipment would be that which would most closely approximate the ordinary kitchen of the pupils' homes.

The Manual Training Room. The size, location, and general description of this room are similar to those of the cooking room. A small demonstration stand may be built in one corner, if desired, with two or three raised steps, but this is sometimes omitted. About 15 feet of blackboard is included, with a bookcase and teacher's closet. The small stock room adjoining may be of about 80 square feet in area, with 18-inch shelving running around it, 5 feet 6 inches and 6 feet 6 inches from the floor. There should also be a storeroom with all the shelving possible for finished work and hardware; an area of 40 square feet is adequate. The work rack in Boston schools is made about 28 feet long, in sections 6 feet 6 inches high and 2 feet deep. The length is made to take twenty-four compartments, or as many compartments as there are benches in the room, and the height equal to the number of divisions that use the room (two each day, five days, outside limit). These compartments have numbers and letters painted. A soapstone sink 3 feet long, with hot and cold water and drinking fountain, is installed; also electric or gas connection for the glue pot. Four display frames of burlap over a soft wood, with a 2-inch moulding around, are included in the equipment.

The Assembly Hall. Upper elementary schools are usually provided with an assembly hall large enough to accommodate 400 to 800 pupils. If the school is a large one, of 20 to 40 rooms, it is rarely considered necessary to build a hall capable of containing the entire enrolment of the school at one time, although the teaching staff frequently asks for it. In New York City the seating capacity of high school assembly halls is generally about 50 per cent, and in elementary schools 33 per cent of the entire enrolment. While a great deal is claimed for the inspiriting effect of a convocation of the entire school at one sitting, the investment of capital for a great auditorium which in the nature of things can be utilized for only a small portion of the time is so heavy as to generally preclude its being undertaken except under the pretext of providing a gathering place for the outside public of the neighborhood. A hall which will seat 800 or 1,000 people, moreover, presents acoustic problems which unless very carefully treated, in a way frequently hard to obtain in a school building, make it very difficult for addresses by any but experienced speakers. Moreover, in so large a hall it is necessary to build an inclined floor and curved galleries to provide anything like proper sight lines, all of which add to the complication and consequent expense of the building. These difficulties disappear in the halls of 400 to 600 seats, which only require the treatment of any ordinary lecture room.

Assembly halls are to-day rarely constructed anywhere but on the first or ground floor, and a marked demand has arisen for special entrances direct from the outside to facilitate use of the hall by the public without disturbing or interfering with the school. These are generally easily provided and supply the additional exits required by modern ideas of safety. In some quarters an idea seems to prevail that the hall should be a sort of detached building, connected with the main school only by a cloister or corridor, but it is difficult to see how such an arrangement bears on schoolhouse planning. The school has the first claim to the hall and use by the public would seem to be a secondary matter.

Differences of opinion will arise as to arrangement of the stage with reference to the main corridor. If the stage backs against the corridor wall, it is more easily accessible from the main building, but the audience faces those entering; if the stage is at the far end, it will be necessary to provide some secondary means of reaching it, but the general appearance is perhaps better. A hall entered from the side is less desirable from the point of view of seating, but the lighting is better, because of the daylight coming from the side, with neither the stage nor the auditorium facing windows. In some halls where the stage adjoins the corridor the back of the stage is made to be removable, so that when an especially large amount of stage area is desired, a portion of the corridor may be thrown in.

In Boston, assembly halls for elementary schools accommodate from 400 to 800 as the school board may direct. It is not considered necessary to seat the full number of pupils in schools of greater capacity. Floors are level and of wood or linoleum, like the class rooms. Windows are fitted with rebated mouldings to take black shades and are so designed as to make the operation of shades practical and simple. The platform is of a size to accommodate one or, in the larger schools, two classes, and has removable stepped platforms of wood to take the seats. Galleries may be used where the hall is two stories in height. Anterooms near the platform are desirable as well as a connection from adjoining class rooms to the anterooms or directly to the platform. A dignified architectural treatment of the walls and a studied color scheme for walls and ceiling is expected. The lighting, acoustics, and exits are such as belong to a small lecture hall. Artificial lighting must be under control from at least two points, one of which must be near an exit. An electric outlet for a 30-ampere projection lantern is installed 25 feet from the curtain. In the ceiling over the platform a recess is provided for a spring rolled curtain 13 feet long. Moving-picture booths are now being provided for the larger halls.

The state of Massachusetts imposes certain further provisions in the line of safety on school halls whose operation and construction is not controlled by the Boston city ordinances. These are in general as follows:

"When not above the second story of the building these assembly halls may have a stage or recessed platform, on which such fireproofed scenery and other stage appliances as the inspector shall approve may be used, and with such proscenium protection as the inspector shall, in each case, direct. If the assembly hall is above the second story of the building, it may be used for such entertainments not requiring the use of scenery and other stage appliances as the inspector may approve, and for public gatherings: *provided, however*, that an assembly hall in the third story of a building of exceptional construction and egresses, having a stage with approved fire-resisting proscenium wall of partition and an asbestos proscenium curtain operated by approved mechanism, with an approved automatic ventilator over the stage equal in area to one-tenth that of the stage floor, and with such permanent fireproof scenery and other stage appliances as the inspector shall approve and set forth in detail on the certificate issued for such hall, may be used."

Seats must not be less than 2 feet 6 inches from back to back, measured horizontally, and no seat shall have more than seven seats between it and the aisle. The inspector may prescribe the width of the aisles. For an assembly hall having portable seats, floor cleats or other approved devices for securing the seats in place must be used. For estimating the seating capacity of an assembly hall, 6 square feet of floor space shall be taken as equaling one seat. Each egress from the hall and galleries shall be provided with a sign carrying the word "EXIT" in letters at least 5 inches high. Emergency lights must also be provided, to be controlled near the main entrance and supplied from a separate circuit. Footlights are generally supplied for the stage in a trough, with sections to raise when the sections of the floor forming the covers are turned back.

The assembly hall is usually by far the most important room in the building, and the architectural treatment ought to be such as will impress upon the pupils the effect of good proportions, simplicity, and dignity. All trivial or inappropriate ornament ought to be eliminated. It is difficult to understand the appropriateness of the practice in vogue in many American cities of interpreting the expression "Collegiate Gothic" to mean encumbering the ceilings of the auditoriums with imitations of English hammer beam trusses laboriously carried out in white plaster, and even the up-to-date method of lining off the plaster walls with white "joints" to imitate a Caen stone interior is somewhat open to question from the architectonic point of view.

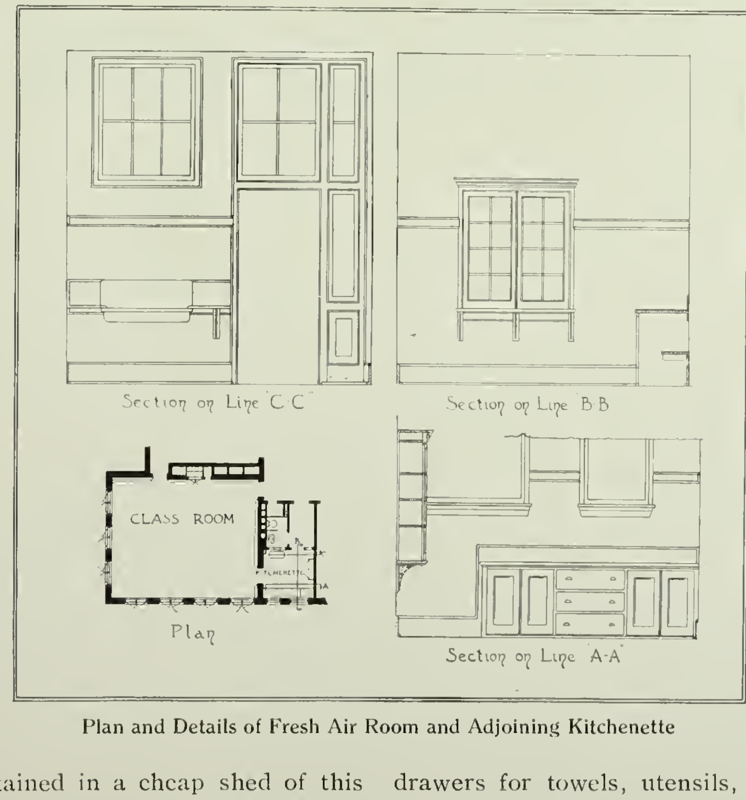
In very large schools, where the auditorium is surrounded by corridors at the gallery level, it may be well to provide windows which can be opened to enlarge the possible gallery space for an unusually large gathering.

The Gymnasium. The subject of the school gymnasium is treated here only in relation to elementary schools. For this type of school a medium sized gymnasium of approximately 35 by 50 to 60 feet will be found sufficient, with a clear height of 16 to 18 feet. The walls may be of brick and the floor of maple, laid diagonally. An observation gallery, preferably on the long side, is desirable, and an outfit of showers and lockers. Running tracks are rarely included. There is a growing demand to combine the gymnasium and assembly hall in one for reasons of economy. When this is done, provision has to be made for storage of seats in some manner.

Exterior Appearance of Wing Containing Fresh Air Room on Upper Story

Gymnasiums are too often tucked away in the basement under the assembly hall or wherever there is a large enough space free from supporting walls and flues. To obtain the necessary height, the floor is carried down into the ground. Where the gymnasium adjoins the outside wall on the east or south side of the building, a fairly healthful and cheerful arrangement may sometimes be obtained; but as was remarked in a previous article on the subject of play rooms, the idea of sending children into a cellar for exercise and recreation seems anomalous on its face. A gymnasium should rather be above ground, with windows in four walls admitting air and sunshine from all directions, and perhaps connected with the main building by a corridor. Better results will be obtained in a cheap shed of this description than in the most elaborate cellar exercise hall ever constructed. As a matter of fact, as much of this work as possible should be done in the fresh air and out of doors. In spite of the severe climate, a great deal more could be done out of doors than is now the practice.

Fresh Air Rooms. It is becoming more and more the custom to provide school buildings with rooms made so as to admit as much outside air as possible. When used for defective or anæmic children who are warmly dressed and provided with a hot mid-forenoon lunch, amazing results are obtained. Children who are dull, lifeless, and sickly ordinarily gain weight, and sometimes develop surprising intelligence under fresh air treatment. The fresh air class room may have the same general finish and treatment as an ordinary room, but when possible ought to be located at the corner of the building so as to admit windows on two sides, and provided with a type of window which when open admits fresh air through the entire area of the opening. Casements have been quite generally used but have to be hooked back and are apt to rattle and occasion trouble. Windows of the balanced sash type are suitable for the purpose and have some advantages over casements. To prevent rain beating in, Mr. E. F. Guilbert in his Newark schools introduces a sort of sloping canopy or shield of wired glass just above and outside of the windows which deflects the rain and protects the interior. Some direct heat is generally provided, but there is no need of an interior fresh air supply — except to satisfy the inspector. In Massachusetts fresh air rooms cannot be constructed unless they are equipped with complete interior heating and ventilating the same as other class rooms.



Plan and Details of Fresh Air Room and Adjoining Kitchenette

In connection with the fresh air room a small kitchenette is provided for the preparation and serving of the morning lunch of hot chocolate, jam sandwiches, milk, etc. A china sink with a cupboard for cups and saucers, plates, etc., a small refrigerator with drain, a gas stove and drawers for towels, utensils, etc., completes the equipment. A special toilet is useful if the room is to be used for defectives, and a good sized closet for sitting-out bags, etc., may be required. The present tendency, which is entirely towards more fresh outside air in all the rooms, is bound to greatly modify the prevailing ideas of heating and ventilation.

Vault. Every large school building should have a fireproof vault in connection with the principal's room for the storage of records, savings accounts, etc. This vault should be approximately 6 feet square to allow the card ledger to be wheeled into it.

Fire Prevention. Prevention of fire in a school building is one of the primary objects to be considered in its construction. Facility of egress and the means to promptly extinguish any fire that might occur are also matters of extreme importance and should be kept constantly in the mind of the architect. Fires in schoolhouses may be prevented first by using a fire-resisting construction, and second, by insisting upon order and cleanliness in all closets, storerooms, boiler rooms, and coal pockets. Absolutely fireproof construction cannot always be accomplished within the appropriation, but a second-class building can be so put together as to be reasonably safe. In such a building the plastering will be done directly on the masonry without furring, a perfectly feasible process if the walls are properly constructed; all interior or division walls will be carried up to the roof; ceilings will be plastered on metal lath. Although joists are used which make hollow floors, the extent of concealed spaces is so much limited by the walls that there is only a rather small area in which fire may run. The basements are cut off absolutely from the other floors, any passages through being guarded by fire doors. Stairways are in brick towers (which may be contained within the building), with good doors at the outlets glazed with wired glass. This provides a type of construction which affords only limited lurking places for fire, and no continuous flues through which fire can pass from story to story or go very far horizontally.

George Frisbie Hoar School, South Boston, Mass.
Herbert L. Wardner, Architect
This building shows the use of two different types of windows in the class rooms on the first and second floors for the admission of fresh air through the full area of the opening

The only point which has not been well covered in such a building is the treatment of the space between the upper story ceiling and the roof. Here a space 4 or 5 feet high is sometimes requested by the heating engineers to give access to the dampers. As ordinarily built, the rough ceiling and roof joists supply a large amount of exposed wooden surface split up into rather narrow pieces of wood which would take fire easily and burn rapidly. Even if the division walls run to the roof, it is necessary to provide openings in them, and if provided with tinned doors there is no guarantee that they will be kept closed. A prominent fire protection engineer advises building the roof of plank in mill construction form and making the upper story ceiling of metal lath on channel irons which would somewhat reduce the fire hazard. If this space is to be used for storage, it ought to be sprinkled; but on account of the danger from freezing sprinklers are not desirable there.

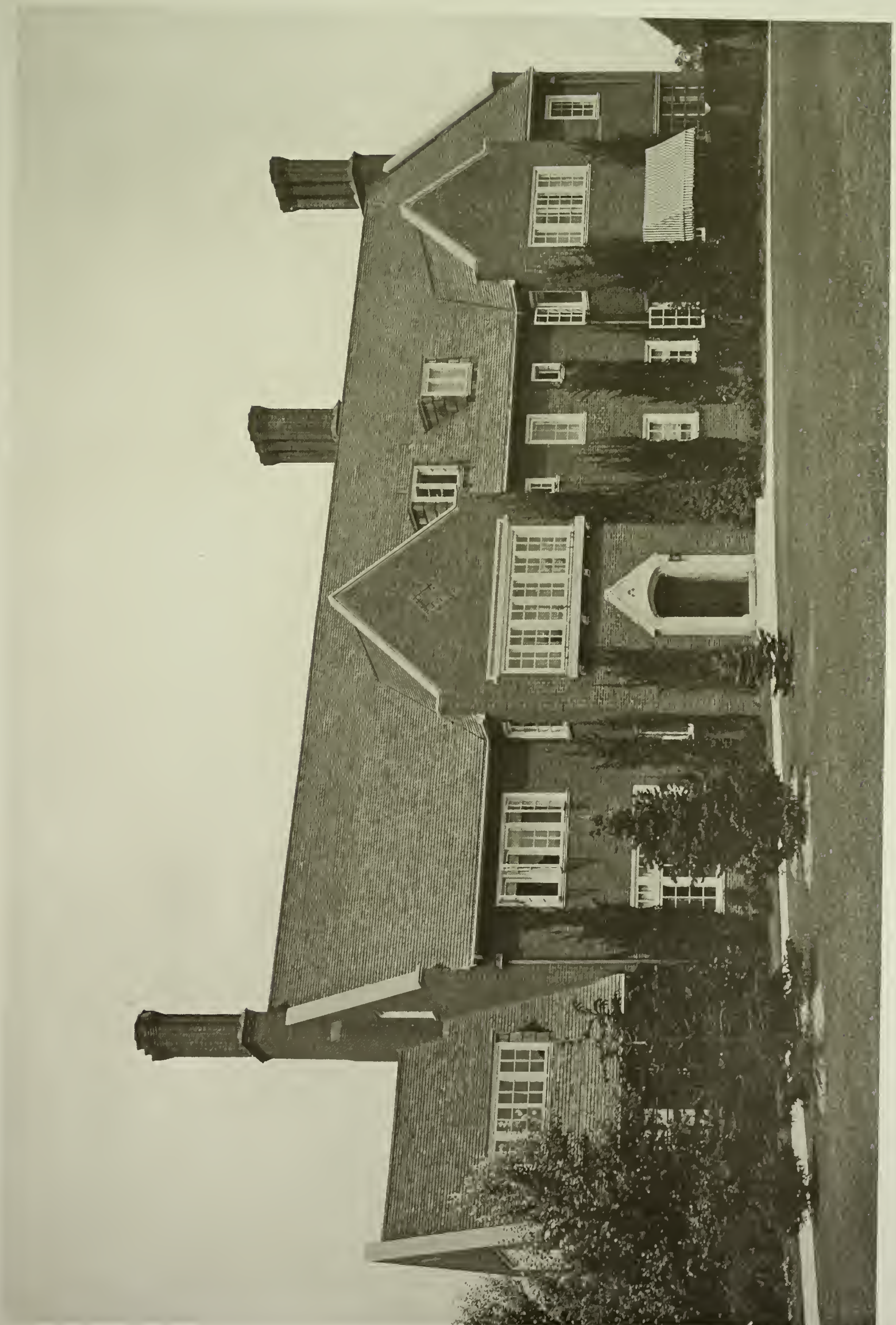
The question of standpipes *versus* extinguishers is still argued with some show of reason for both sides. Fire protection engineers seem to favor standpipes on the theory that extinguishers are portable and may be carried away, or not kept in proper working condition. The underwriters' standard is 1¼-inch linen hose and ¼-inch or ⅜-inch smooth bore nozzles. Each line of hose is supplied by a 1-inch line of pipe and valve, and a riser supplying several lines should be proportionately larger.

Smaller linen hose is not used on account of kinking, and rubber-lined hose is not advised because the rubber perishes in warm buildings rather rapidly.

Massachusetts requires that the basement and each story of a building shall have some means for extinguishing fire, consisting of standpipe and hose or approved fire extinguishers, or both, as the inspector shall direct and locate, and such appliances shall be kept at all times in good condition and ready for use. Where standpipes and hose are installed, approved hose racks and test cocks are to be provided. Sprinklers for boiler room, coal pockets, etc., are a desirable safeguard.

In some buildings a stationary chemical tank and apparatus is located in the basement with pipes leading to hose reels in the different stories. Provision is made for operating the apparatus from any station in the building. Such an apparatus if installed should be placed under the care of the Fire Department, as the janitors usually fail to be impressed with the necessity of keeping it in condition.

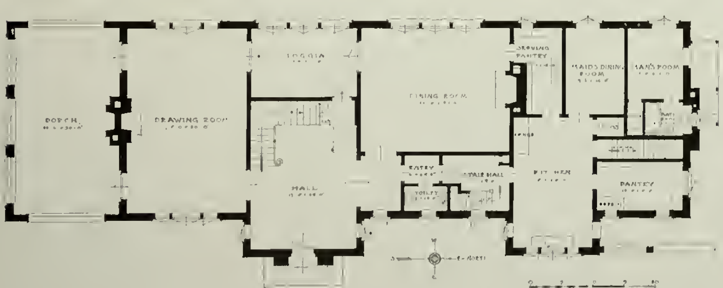
Probably the greatest safeguard is that of so cutting off drafts as to divide the building into numerous fire-tight compartments. This naturally involves cutting off corridors by various wired glass partitions, so that each section would have its own properly protected stairway. Such an arrangement is objected to on account of cutting off the view of the monitors appointed to watch the corridors, and as a matter of fact, considering the small number of fires in really properly constructed buildings, they hardly seem necessary. Fire engineers recommend their being held open by a fusible link and chain, which is also attached to an electric catch which is released by the same current that sounds the fire gongs and allows the doors to close.



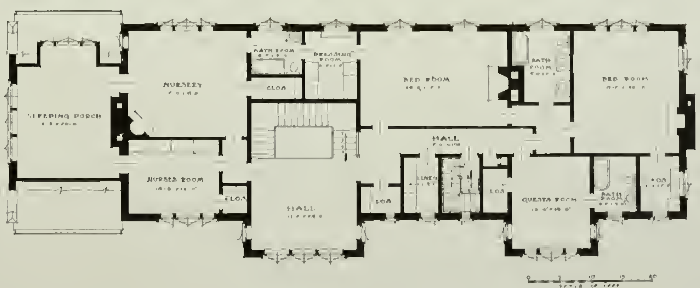
HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

DETAIL OF ENTRANCE FRONT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

GARDEN SIDE.

ENTRANCE SIDE

HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

VIEW ALONG TERRACE

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH.

ALBERT H. SPAHR, ARCHITECT

VIEW OF TERRACE FRONT

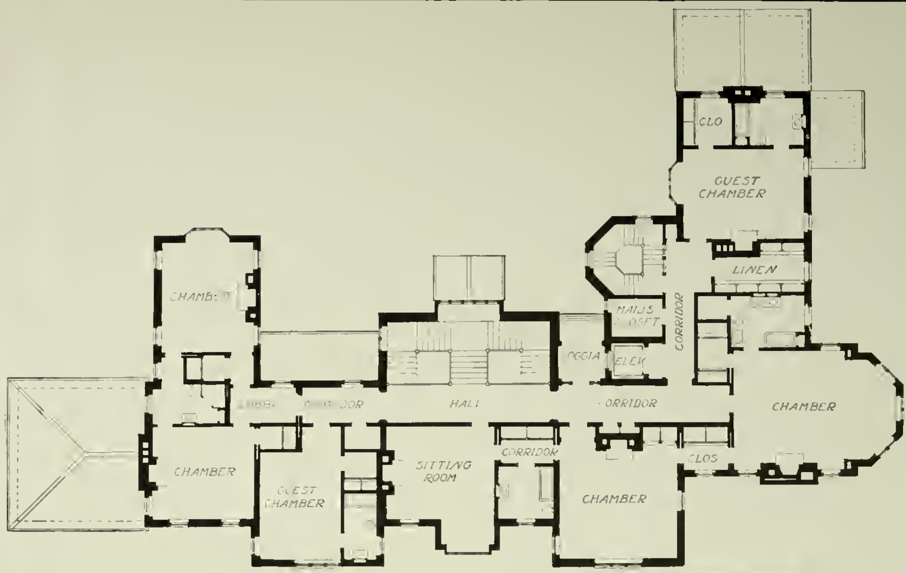
VIEW FROM ENTRANCE DRIVE

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH

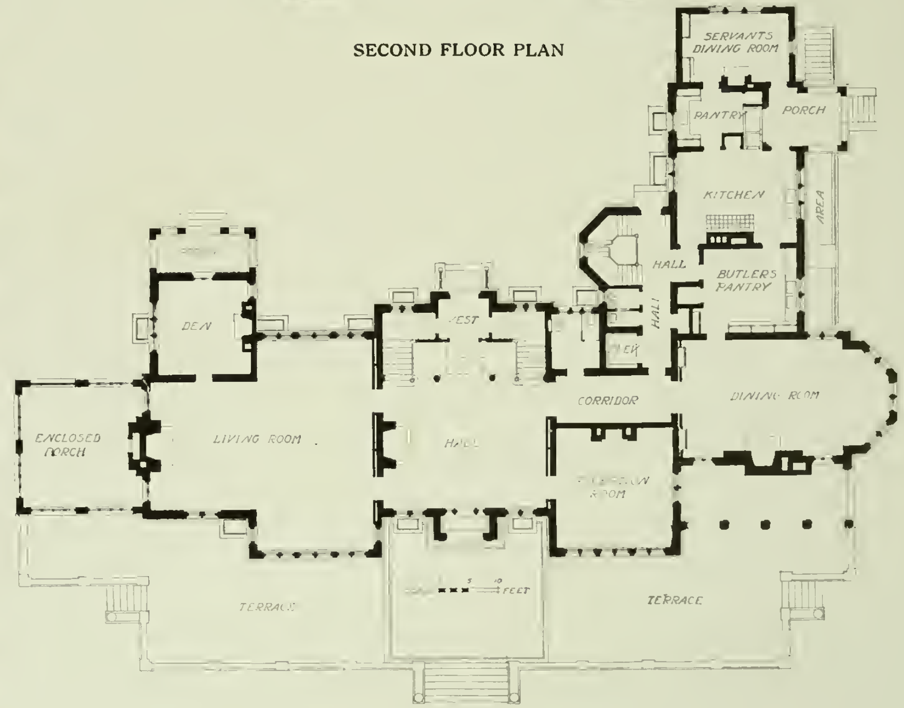
ALBERT H. SPAHR, ARCHITECT

DINING ROOM

MAIN HALL



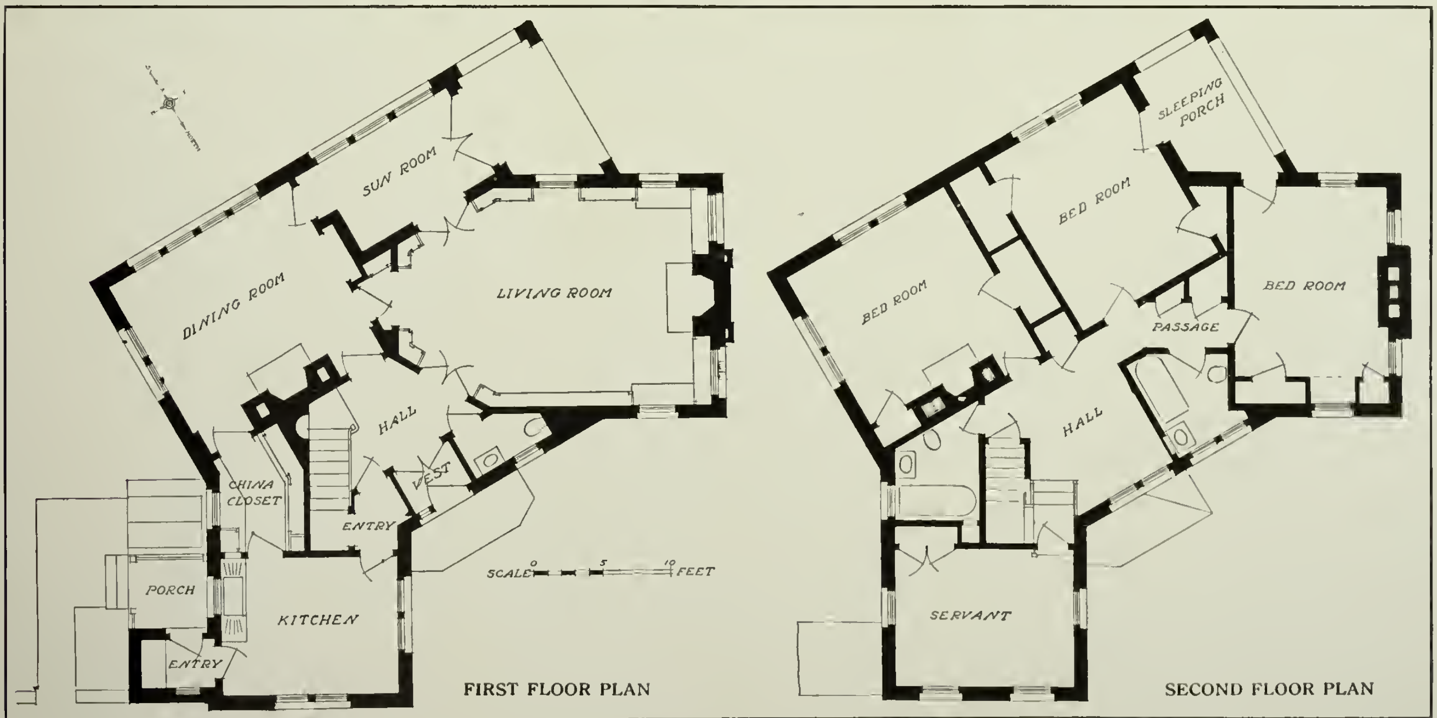
SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH.
ALBERT H. SPAHR, ARCHITECT

VIEW OF ENTRANCE SIDE

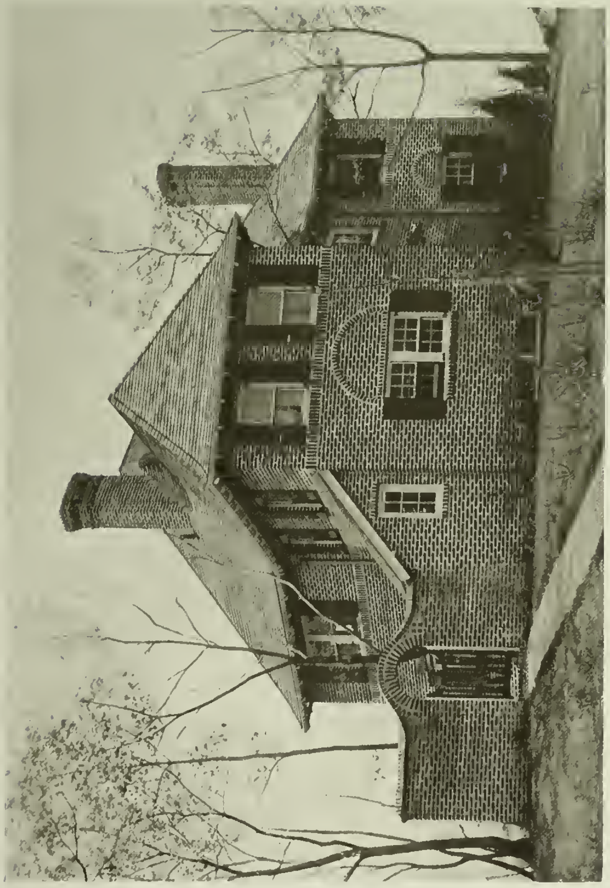


FIRST FLOOR PLAN

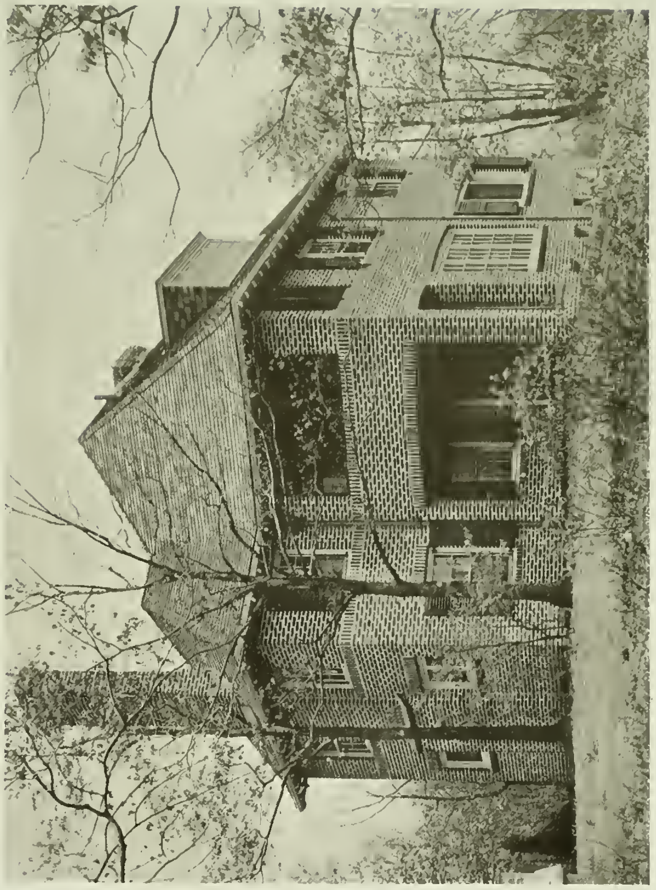
SECOND FLOOR PLAN

HOUSE AT NEWTONVILLE, MASS.

FRANK CHOUTEAU BROWN, ARCHITECT



VIEW FROM SOUTHEAST



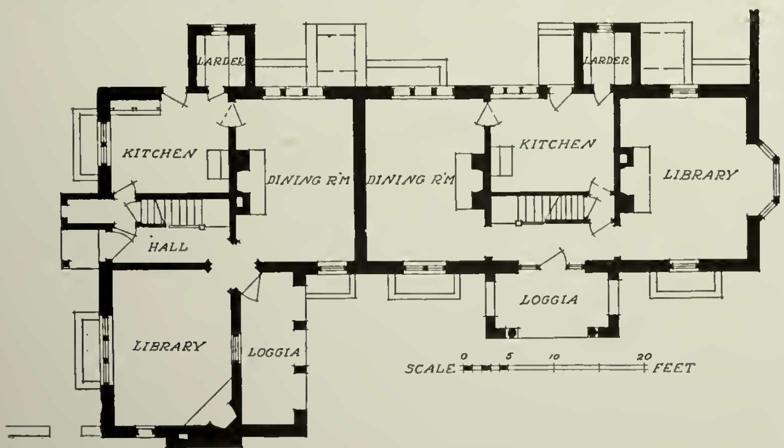
VIEW FROM SOUTHWEST

DETAIL OF ENTRANCE

HOUSE AT NEWTONVILLE, MASS.

FRANK CHOUTEAU BROWN, ARCHITECT

DOUBLE HOUSE AT ST. MARTINS, PA.
EDMUND B. GILCHRIST, ARCHITECT



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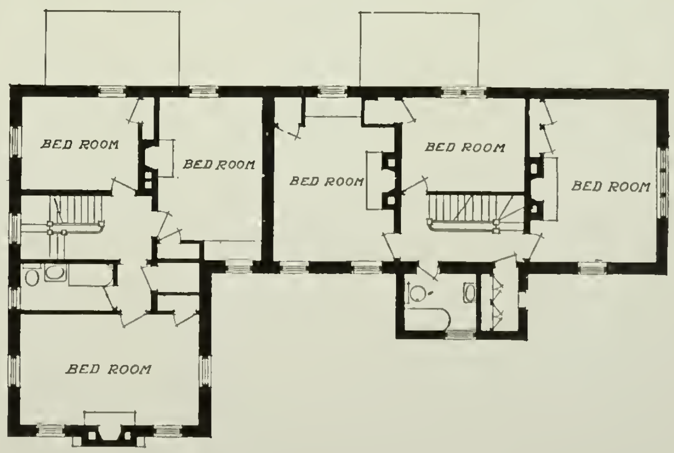
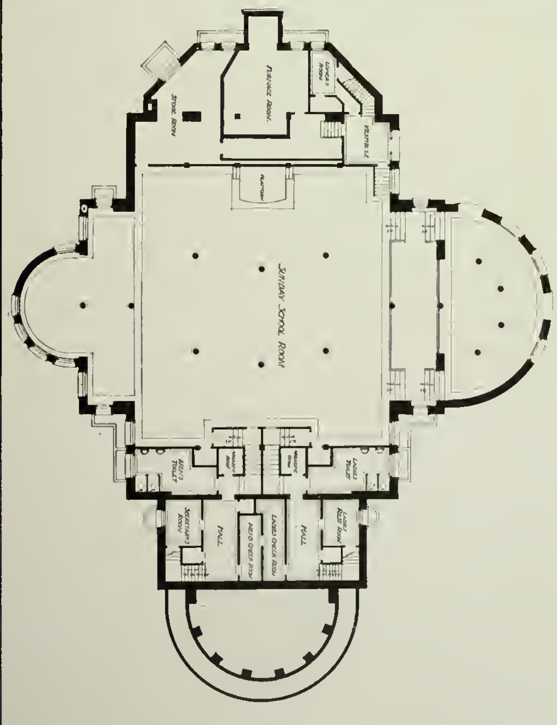


SECOND FLOOR PLAN

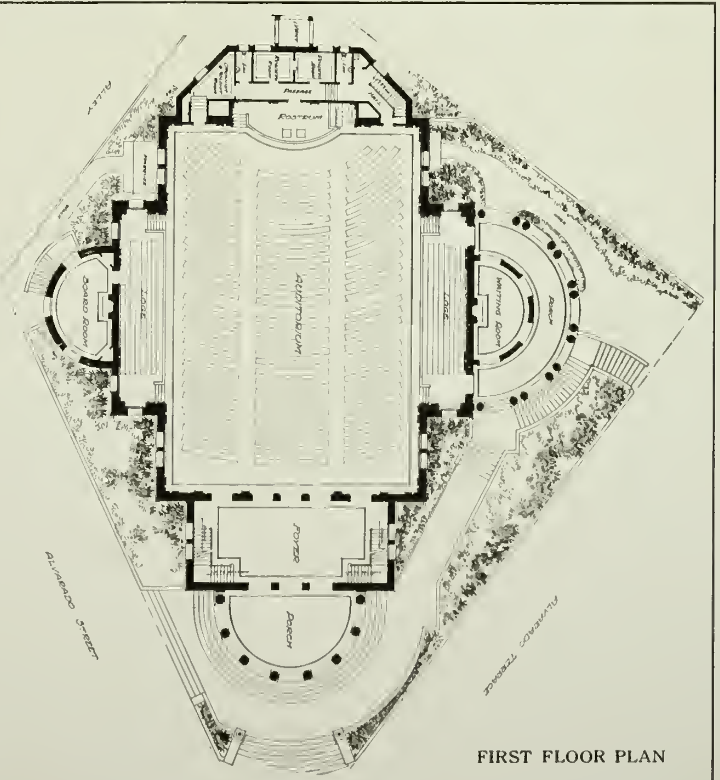
DOUBLE HOUSE AT ST. MARTINS, PA.

EDMUND B. GILCHRIST, ARCHITECT

GENERAL VIEW OF ENTRANCE FRONT



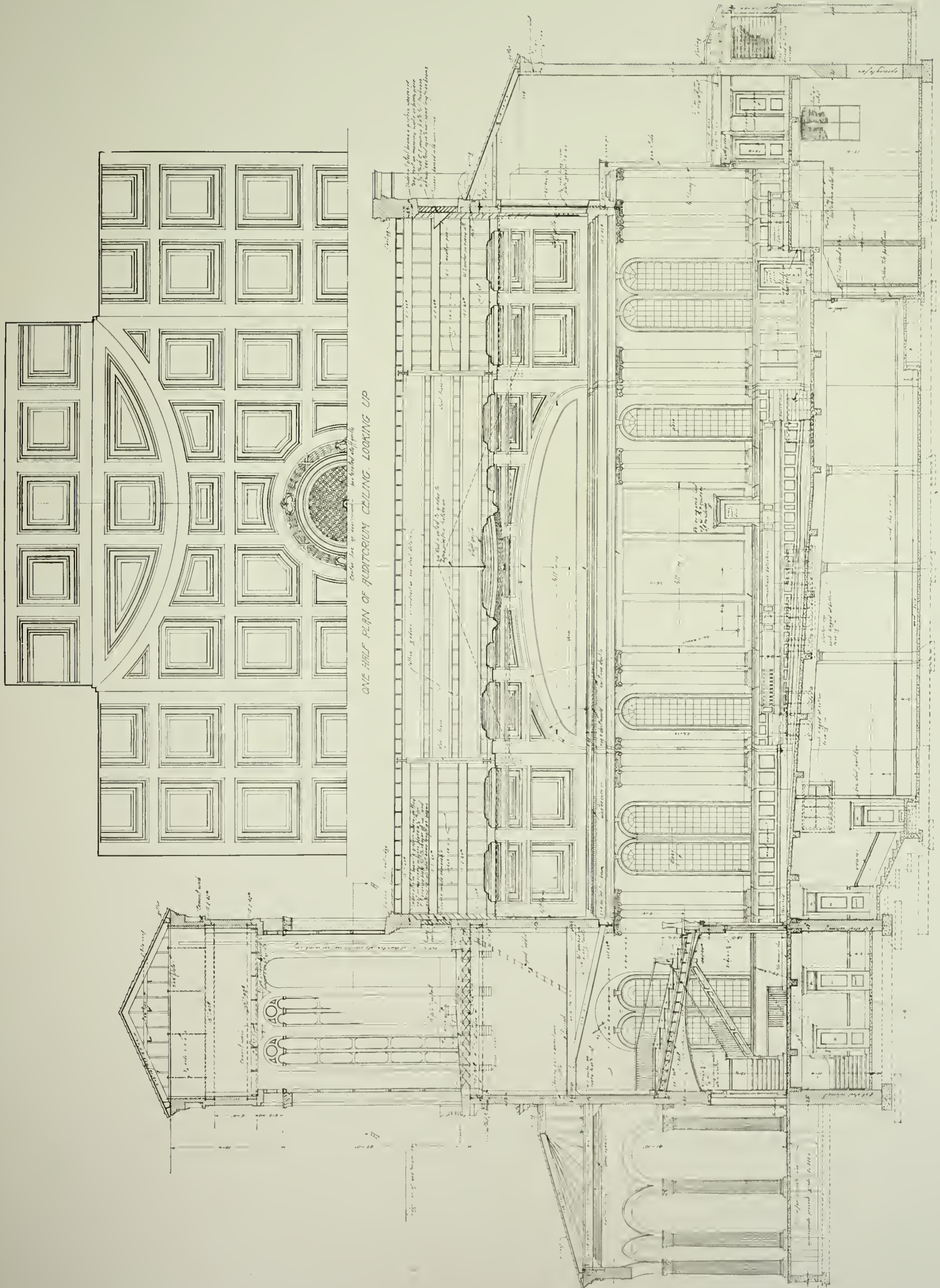
BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

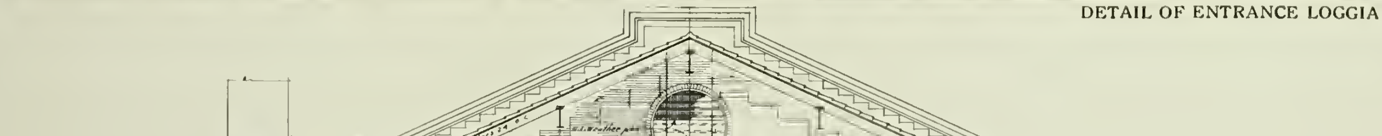
FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL.

ELMER GREY, ARCHITECT



LONGITUDINAL SECTION THROUGH AUDITORIUM
FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL.
ELMER GREY, ARCHITECT

DETAIL OF ENTRANCE LOGGIA

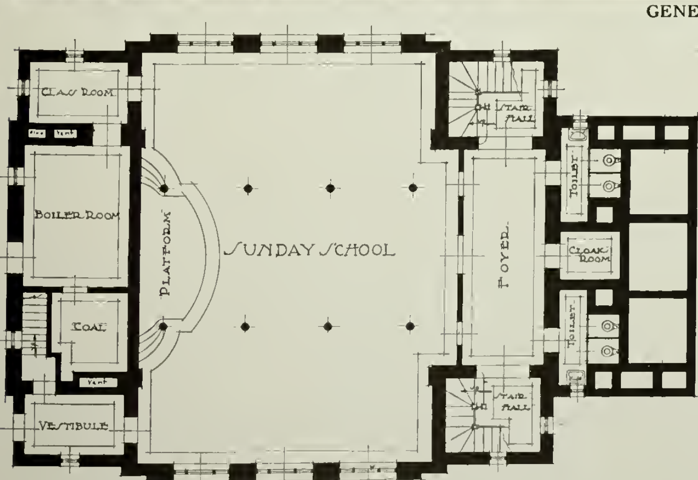


TRANSVERSE SECTION THROUGH AUDITORIUM LOOKING TOWARDS ROSTRUM

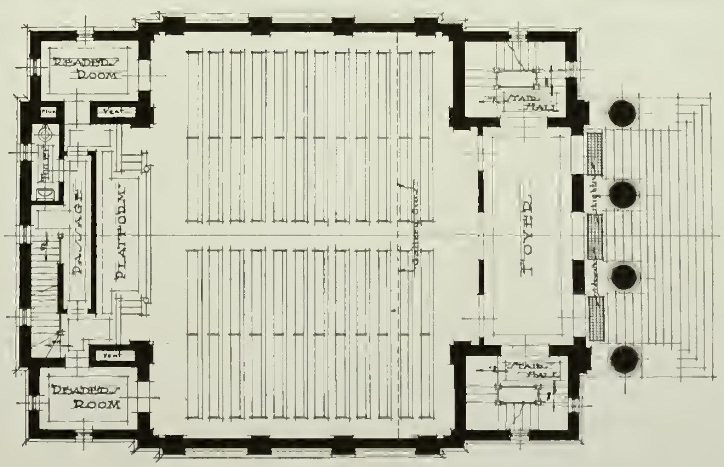
FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL.

ELMER GREY, ARCHITECT

GENERAL VIEW



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

FIRST CHURCH OF CHRIST, SCIENTIST, WORCESTER, MASS.

O. C. S. ZIROLI, ARCHITECT

DETAIL OF ENTRANCE PORTICO

INTERIOR LOOKING TOWARDS ROSTRUM

INTERIOR LOOKING TOWARDS GALLERY

FIRST CHURCH OF CHRIST, SCIENTIST, WORCESTER, MASS.

O. C. S. ZIROLI, ARCHITECT

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

GEORGE STRAFFORD MILLS

GEORGE STRAFFORD MILLS was born in London, England, Dec. 5, 1866. However, few if any of his intimates are aware of his English origin, for if there be a quality of alertness and perspicuity typically American, Mr. Mills is an excellent representative of that type. He was but four years of age when, with his parents, he came to this country, and while he is essentially American, he is fortunate in having been endowed by birth and environment with the best qualities of the two great nations. His boyhood was spent in St. Louis, where he received his early education. He was graduated from the Manual Training School of Washington University, following which he entered the office of George I. Barnett, the pioneer architect of the West.

In 1885 he accepted the position of instructor of drawing in the Scott Manual Training School in Toledo, and in less than three years became the superintendent of that institution. The manual training movement was then in its infancy; but the Toledo school under the direction of Mr. Mills soon became one of the foremost institutions of the kind, not only of the country, but of the world.

In 1893 Mr. Mills returned to the practice of architecture, in which he has ever since been an indefatigable worker. In 1900 he was admitted to membership in the American Institute of Architects. In 1912 he formed a partnership with George V. Rhines, Lawrence S. Bellman, and Charles M. Nordhoff, who had been associated with him.

At the beginning of his career Mr. Mills set up for himself a high ideal and throughout his subsequent practice has assiduously striven to achieve it. By so doing he has won for the architectural profession of his community and state a greater respect and has given to the public a clearer conception of the proper practice of architecture.

From his father, who was well known as art critic of the St. Louis Republican, he seems to have inherited the ability of keen, impartial, and well balanced criticism. This balanced judgment, his knowledge of men, and his easy companionship have made his advice sought in many phases of activity outside his own profession. The Great Chemist of the Universe seems in George Strafford Mills to have given us a happy combination of the real and ideal, the business judgment, and the artistic ability, so that he contributes much to his profession, much to the community, and much to the hosts who delight to call him friend. — *G. W. S.*

ALBERT H. SPAHR

ALBERT H. SPAHR was born at Dillsburg, Pa., on June 19, 1873. He entered the office of Harry W. Jones, of Minneapolis, in 1889, and after spending five years in this office went to the Massachusetts Institute of Technology in Boston, taking the two-year special course in architecture. In 1896 he spent the summer in England and France. On returning to this country he entered the office of Peabody & Stearns, of Boston, remaining there until 1901 when he went to Pittsburgh and formed a partnership with C. D. MacClure, under the firm name of MacClure & Spahr. Mr. MacClure died in 1912, since which time Mr. Spahr has carried on the business alone.

It seems to be the aim of many young architects to crowd as much *architecture* as possible in their public or private projects without regard to the feelings of their clients or the public that has to look at their work. They pile orders above each other, and their use of them is so frequent that one often wonders what they would do if Greek frets and Ionic caps were taken from them. We all know the architect that tries to do the Farnese Cornice somewhere up in the clouds, while a column order on the sidewalk darkens the main rooms. Mr. Spahr approaches the subject from a different point of view. Whether in a twenty-story office building or a country house, a set of plans from his office will have every detail studied from the utilitarian as well as the artistic side. Along with a picturesque or monumental treatment of exteriors, the things that count for human comfort and sensible use inside will be carefully thought out. Doors will swing the right way, wall spaces will be left for furniture, light outlets will come where most needed, and radiators slink out of sight. His whole work is marked by a close and particular attention to detail, yet this useful quality does not narrow his conception of architecture as an art, nor does it prevent him giving the full measure of his designing ability to the creation of satisfying architectural compositions as the many large country houses, in which field he has been particularly successful, can testify.

Mr. Spahr is fond of music, as all good architects should be, and when living in Boston often delighted the front rows, from the stage at many of the Cadet performances. In the intervals of absence from smoky Pittsburgh he now leads a nice little family in a dance over his farm in the Berkshire Hills. — *F. H. B.*

ELMER GREY

ELMER GREY received his early architectural training with the firm of Ferry & Clas, of Milwaukee, Wis., during which time he did much of the work in connection with the planning of the Wisconsin State Historical Societies' Library and the Milwaukee Public Library. He was associated with this firm for a period of twelve years, in the meantime crossing to Europe at intervals for the intimate observation and study that go with a bicycle and sketch book. In the early days of his work as a draftsman Mr. Grey came into notice architecturally through his design for a water tower and pumping station which won first prize over mature competitors in a competition inaugurated by the *Engineering News and Building Record* of New York. He practised for three years in Milwaukee and is responsible for the design of the First Church of Christ, Scientist, and many interesting residences in that city. In 1904 he came to California and entered into partnership with Myron Hunt, under the firm name of Myron Hunt and Elmer Grey. For the past four years, since the dissolution of that partnership, Mr. Grey has been practising alone in Los Angeles.

The decade just passed has given California an enviable place in the record of American architecture. The Southland, in particular, has become familiar to all who read for the peculiar charm of its residence work. There is something inspiring in the ample hills, the blue sky, the bigness of the out-of-doors that calls forth latent forces. During this period of development the influence of Mr. Grey's work has been notable, invariably for good, always on the side of sanity and permanence. A man's personality expressed through his handiwork is a very subtle and undefinable thing. It is the intimate quality that remains after all else has been analyzed, classified, and properly accounted for. It may be said with emphasis that all of his works speak of California, they grow out of our soil, they offer just the right mass against the sky, or find position among the eucalyptus and oak in such a way that one has no doubt they have always been there — they have the rare quality of being inevitable. On the other hand, Mr. Grey possesses, in a measure vouchsafed to few in practice, an intuitive feeling for the first great fundamental æsthetic principle which many, alas! stumble over and pass on to prospect in other fields without recognizing an outcropping of gold — that principle which establishes the big proportions of space and mass, solid and void, light and shadow. Even a small cottage may rise to distinction with no other claim. Combining with this perception of good proportions a sense of restrained enrichment, a sympathetic use of materials and choice of colors, we may find a definition of the qualities that attract us most of all in the ensemble of Mr. Grey's work.

— *E. A. B.*

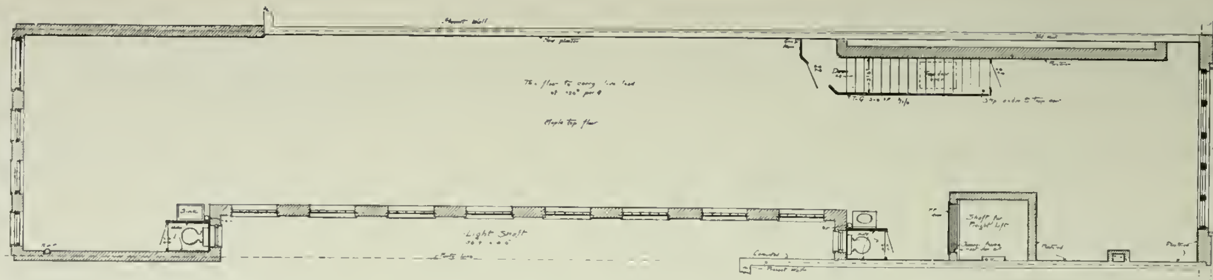
DWIGHT HEALD PERKINS

HERE in Chicago when we think of Dwight Perkins — as we often do — we think of him as a citizen and a patriot almost before we think of him as an architect; and if we wish thoroughly to appreciate his work, we must regard it in the light of his high ideals of the responsibility and opportunities of citizenship. In fact, I am inclined to think that he would unhesitatingly state that the laws and obligations which the commonwealth impose on him are more weighty than those imposed by his profession. This, of course, has resulted in a part of his time and ability always being at the disposal of the community.

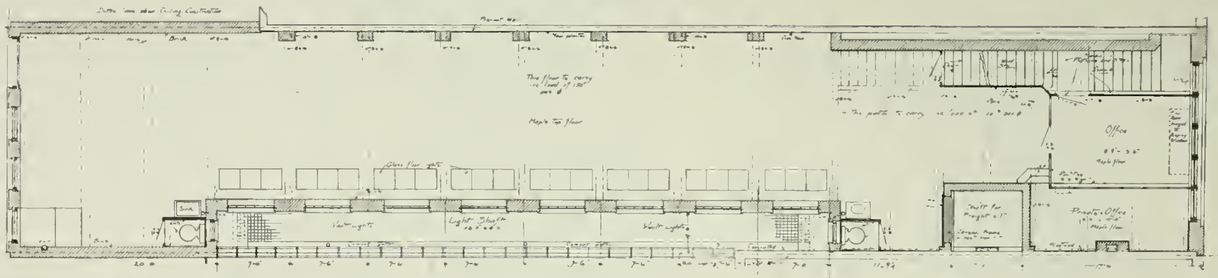
Very naturally Mr. Perkins' altruism has led him into two great fields of service: first, the development of city planning, especially in its relationship to park systems and playgrounds; and, second, the design and building of schools. Chicago owes him a large debt of gratitude for his work through many years as a member of its special Park Commission and as the author of the original Metropolitan Park report recommending the creation of the Forest Reserve district. His work has been equally valuable in initiating and fostering the movement which has resulted in the splendid system of small parks and playgrounds of which Chicago is so proud. His work in connection with school building is readily divided into two phases: first, that done as architect for the Board of Education from 1905 to 1910; and, secondly, the work done by Perkins & Hamilton from 1905 to 1911, and by Perkins, Fellows & Hamilton from that date to the present. As architect for the board he was the author of forty school buildings of all kinds. Mr. Perkins injected into the designing of the schools of Cook County, science of a high order and a certain amount of idealism and originality, a combination be it said in passing which, while highly applauded by his confrères, was not entirely appreciated by the board. Of the work done since 1910, and in which John Hamilton and William K. Fellows share the credit, might be mentioned the new Trier High School, the Lion House in Lincoln Park, the Hamm Building, and many institutional buildings and residences.

Plunging as we did into Mr. Perkins' mature activities we had almost forgotten his beginnings, which are as follows: born in Memphis, Tenn., 1867, student and instructor in the Massachusetts Institute of Technology; draftsman in various offices, culminating in five years with Burnham & Root from 1888 to 1894 (the heroic days of the World's Fair). Since then he has been in independent practice. So much for his deeds, in style — always a delicate subject, I might say he belongs to the party of the Architectural "Young Turks," that he is the sturdy opponent of reactionary design, and that dust has long accumulated on his Vignola and Motifs Historiques.

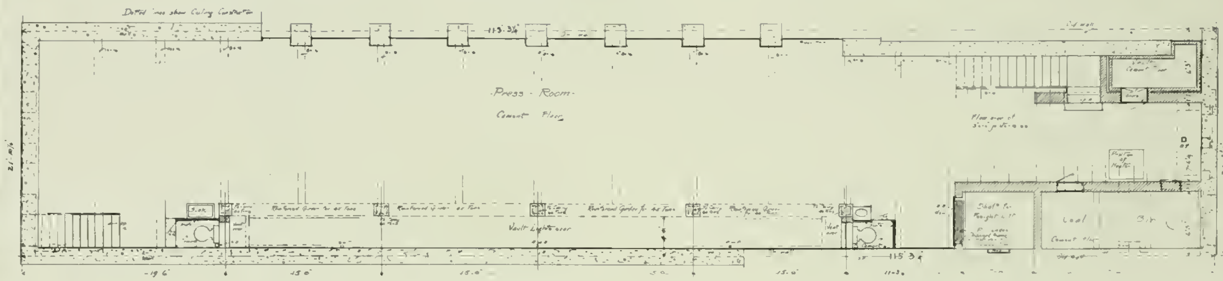
— *T. E. T.*



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

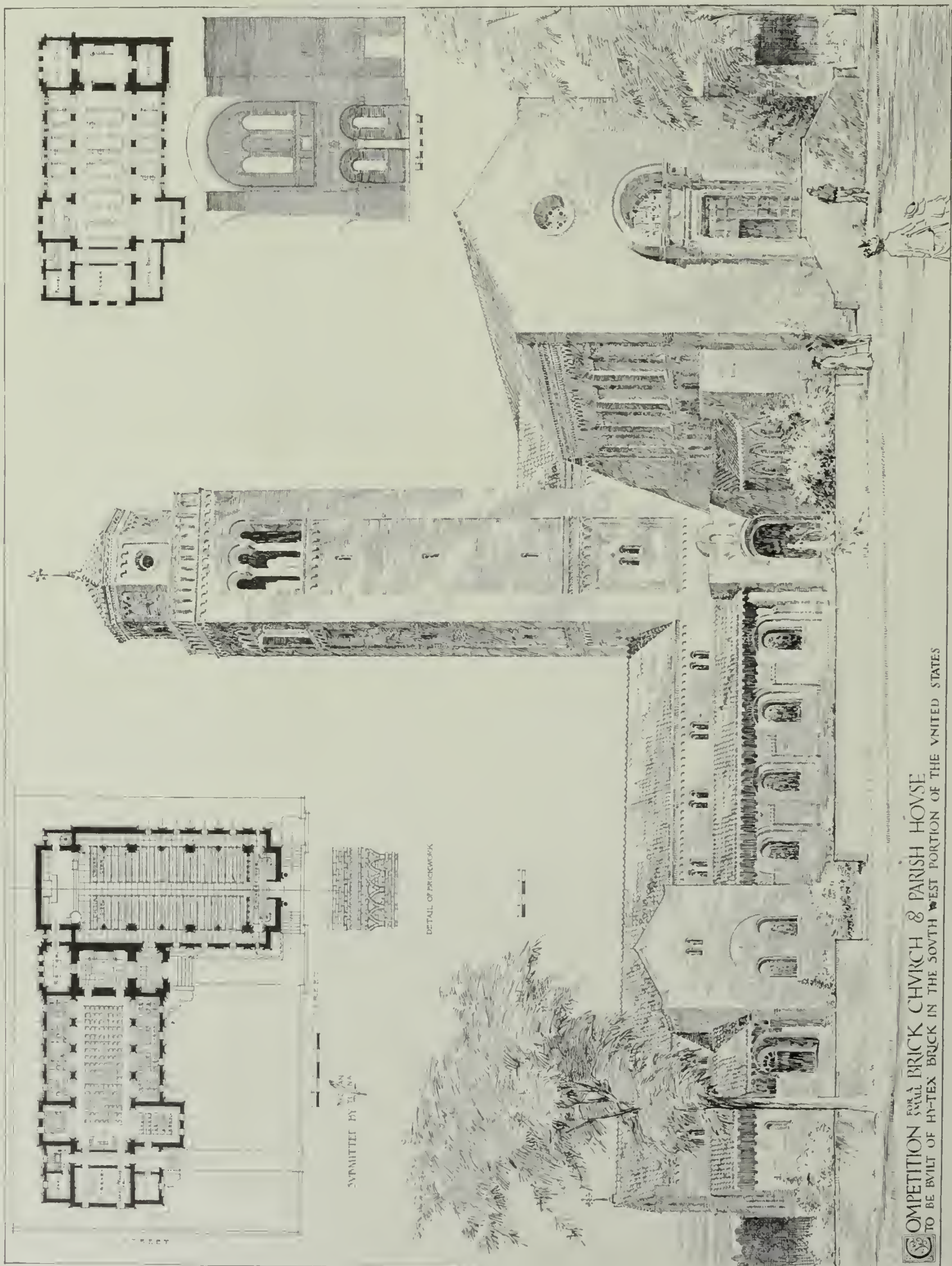
THIS building occupies a lot having a frontage of only 22 feet, yet the architectural treatment of the façade has secured for it a distinctive appearance and one that is entirely appropriate to the use to which the building is devoted. Beneath the iron balcony the wall surface separating the two groups of windows has been decorated by reproducing a series of printer's marks in colored tiles which harmonize with the red brick piers.

The pressroom is located in the basement below the street level, the presses thereby resting on a firm bed which reduces the vibration to the minimum. The bank of presses is well lighted from the light court skylight and from glass floor lights arranged before the windows in the story above.

The entrance at the right gives access to the office which is on the first floor level about nine steps above the curb. The entrance at the left is on a level with the sidewalk and gives on to a short corridor leading to the freight elevator. This arrangement provides a direct and convenient means of handling freight. The wall space between the entrances is used for a small display window, which is accessible from the office above through a trap door. The building is of slow burning construction and cost complete 12⅘ cents per cubic foot.

BIDDLE PRESS BUILDING, SOUTH SEVENTH STREET, PHILADELPHIA, PA.

BUNTING & SHRIGLEY, ARCHITECTS



FIRST PRIZE DESIGN

SUBMITTED BY MAURICE FEATHER, WATERTOWN, MASS.

Competition for a Small Brick Church and Parish House.

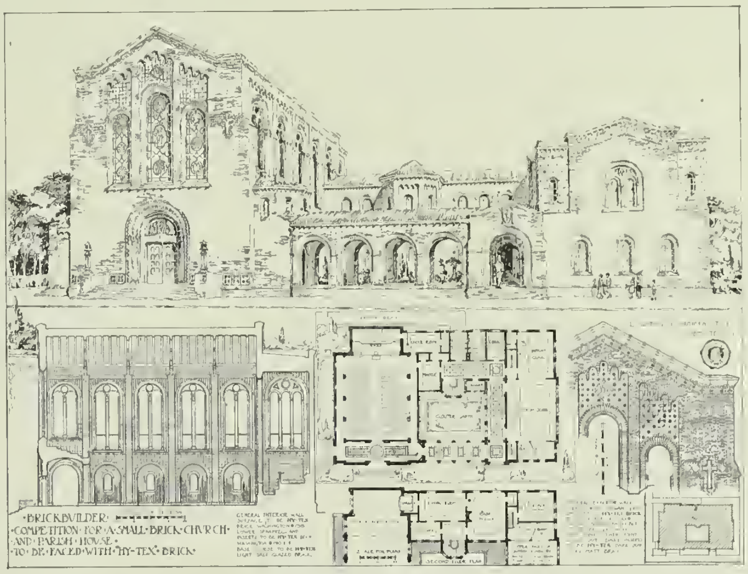
REPORT OF THE JURY OF AWARD.

THERE is nothing more promising for the future of architecture in this country than the results of such competitions as these. The prizes offered for designs for a small country church and parish house in brick brought a very large number of drawings (over 150), and among these over 50 which had the merit that one would expect to find only in the work of men of considerable experience. Yet most of them were submitted by young men. It is therefore encouraging for the future.

The most conspicuous quality in the four prize winners is not that they are well planned, nor that the design is pleasing and well rendered, but that they would build well, and in execution, would look probably better than as presented by the drawings.

That placed first is good in plan, well balanced and arranged, good in section, with a nice sense of proportion. The exterior is likewise good, quiet, and restrained. The whole is straightforward and churchly. The only adverse criticism might be that it does not seem the small country church of the program, but rather an important suburban one.

The second prize is awarded to a design which would certainly look better in execution than it does as presented. Indeed, if one grants the author the ability to detail well and oversee his modeling or sculpture, it would be an exceptionally interesting building. Moreover, it is distinctly the small church. The plan is one of somewhat imaginary balance, there being really but slight relation between the two masses. As the exterior shows a good eye for mass and ornament, so the section shows a good eye for proportion.

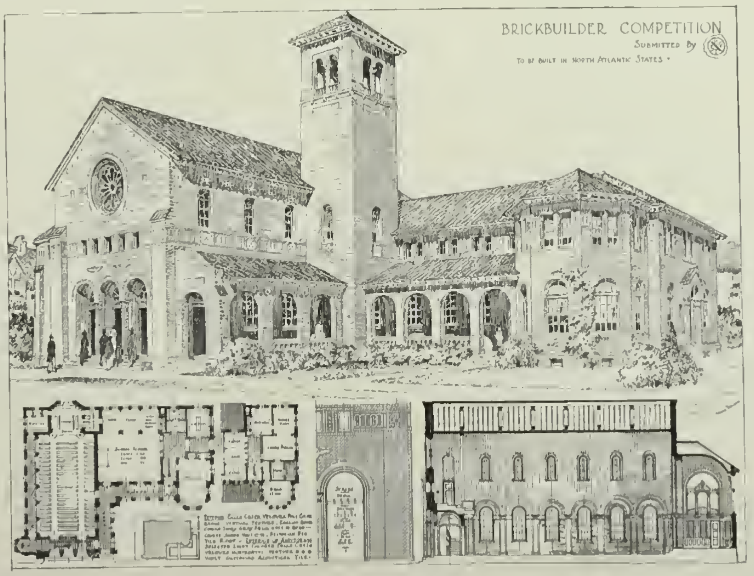


Mention Design
Submitted by Francis P. Smith and J. Herbert Gailey, Atlanta, Ga.

The third prize, like the first, is North Italian and is handled in a quiet and sure way that indicates good knowledge of the value of contrast in plain surface and ornament and of the accent of *chiaroscuro*. It is even less a small country church than number one, but it is a convincing piece of architecture.

The fourth prize, like the second, has distinct individuality. The designers had a vision of familiar motives and composed and used them in a way to produce a charming originality. In the plan there is a balance between church and parish house equally apparent in plan and elevation, the whole making a delightful composition.

These four designs represent excellent and thoughtful work and are fully entitled to the prizes, and yet it is hard to draw the line sharply between these and the plans given mention, and between those mentioned and many of those not placed in the honor list. The six mention designs are presented as of equal merit.

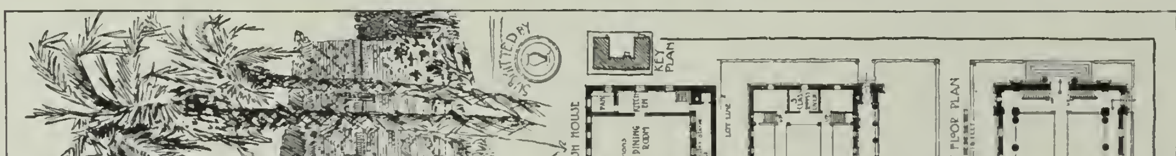


Mention Design
Submitted by Robert Wesley Maust, Wyoming, N. J.

The design by F. P. Smith and J. H. Gailey is quiet, strong, and dignified, and the church, if it had been twice as long, would have had a very impressive interior.

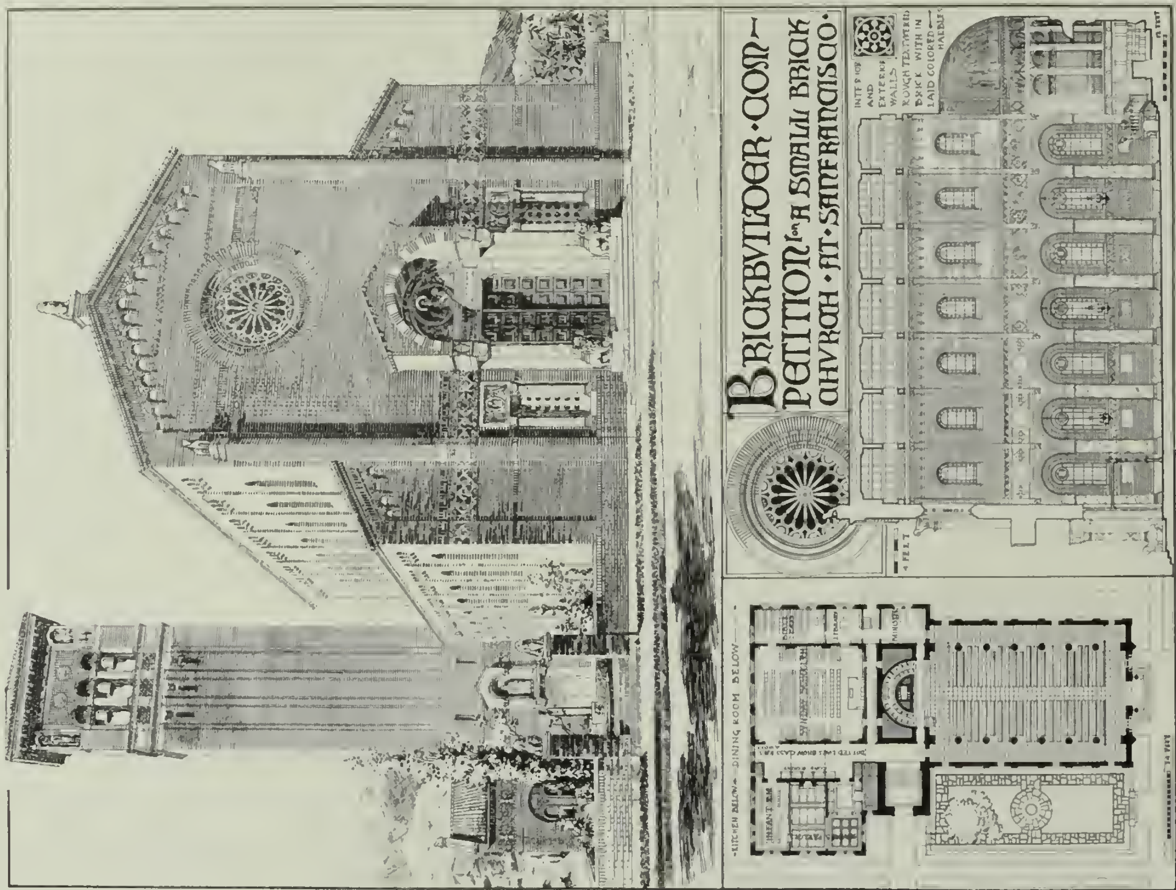
The design submitted by R. W. Maust is really a small country church, and so simple and restrained as to appeal very strongly. It would look well in execution.

The design by Jerauld



SECOND PRIZE DESIGN

SUBMITTED BY FREDERICK H. KENNEDY, BOSTON, MASS.



THIRD PRIZE DESIGN

SUBMITTED BY ANTONIO DI NARDO AND CHARLES L. BOLTON, PHILADELPHIA, PA.

Dahler is simple and restrained, very distinctly the small church as far as its exterior is concerned; but the plan is somewhat pretentious for so small a scale, and the same thing applies to the great coffered vault of the interior.

The church by Davis, McGrath & Kiessling is full of good design within and without and indicates everything accomplished in a simple way with plain materials.

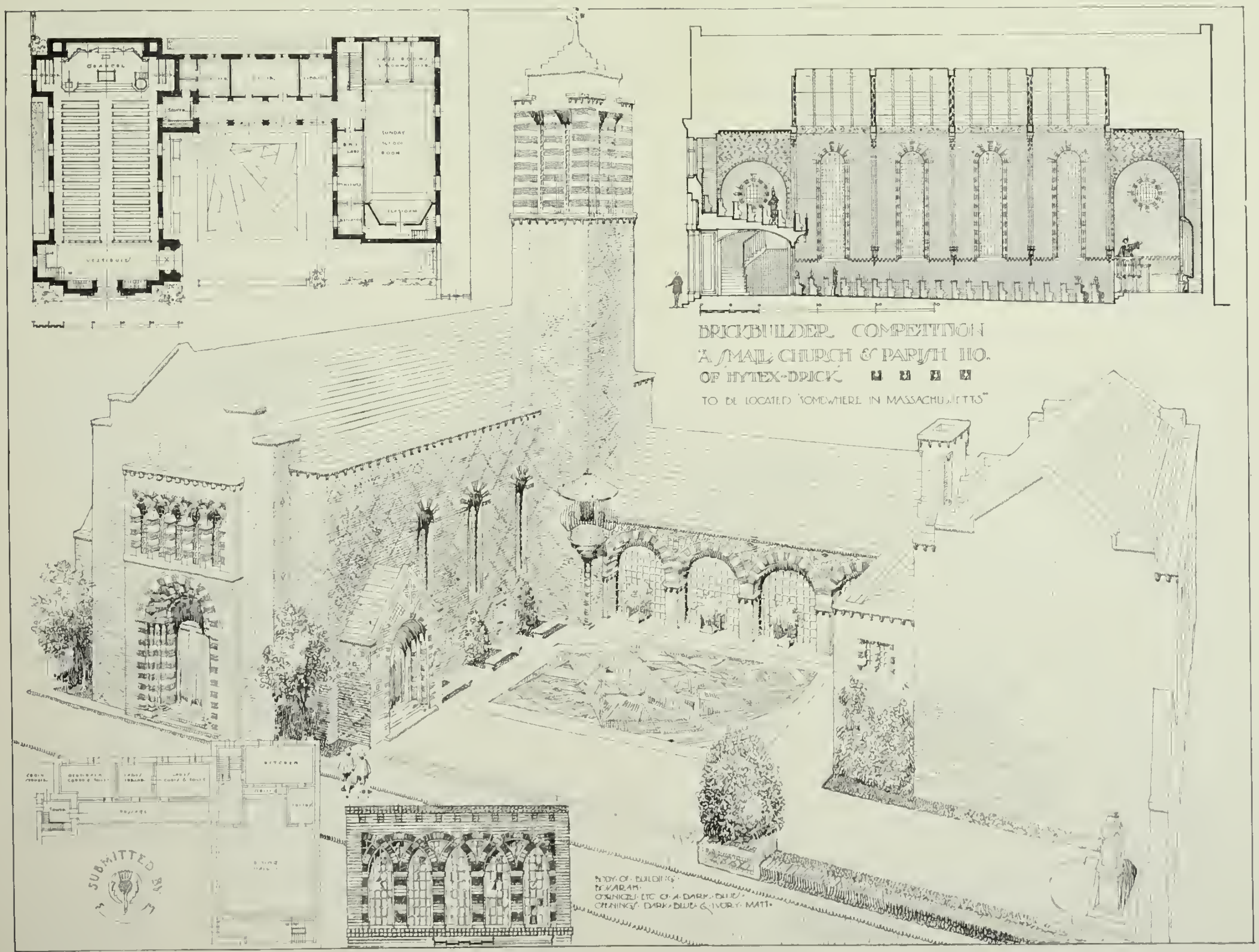
The design submitted by E. Donald Robb is one of the very few with a Gothic motive. Gothic and brick are not very closely associated in the minds of most of us, although Holland abounds in examples. The adaptation of brick to Gothic forms is well understood here.

The design by M. A. McClenahan is a freak, but a good freak; and if we could not play about at times and forget to be serious, none of us would do good work. A man who can design this is an able man.

It seems strange that hardly any one chose to follow simple New England, Philadelphia, or Virginia brick churches, and those who did handled the style with far less skill than those competitors who followed foreign types.

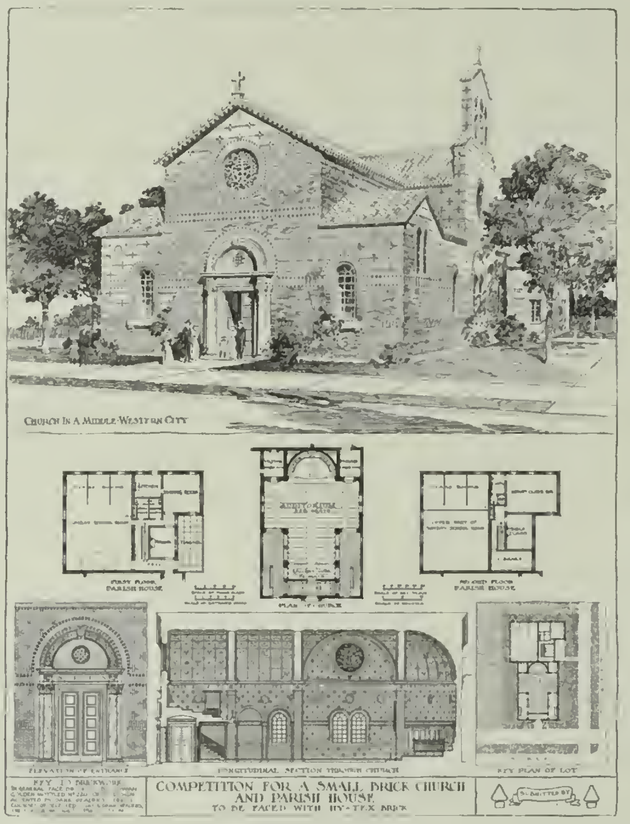
There were numerous others interesting for their idea, rendering, or other features, and one hates to pass them by without a word. Perhaps the best general word is that over and over again the jury said it wished it could detail and execute some of the designs; they were so good and needed only a little knowledge about execution to be fine. Those not mentioned may believe the jury said this about their design.

R. CLIPSTON STURGIS, *Chairman*, Boston.
THOMAS R. KIMBALL, Omaha.
BURT L. FENNER, New York.
JOHN LAWRENCE MAURAN, St. Louis.
C. GRANT LA FARGE, New York.
Jury of Award.

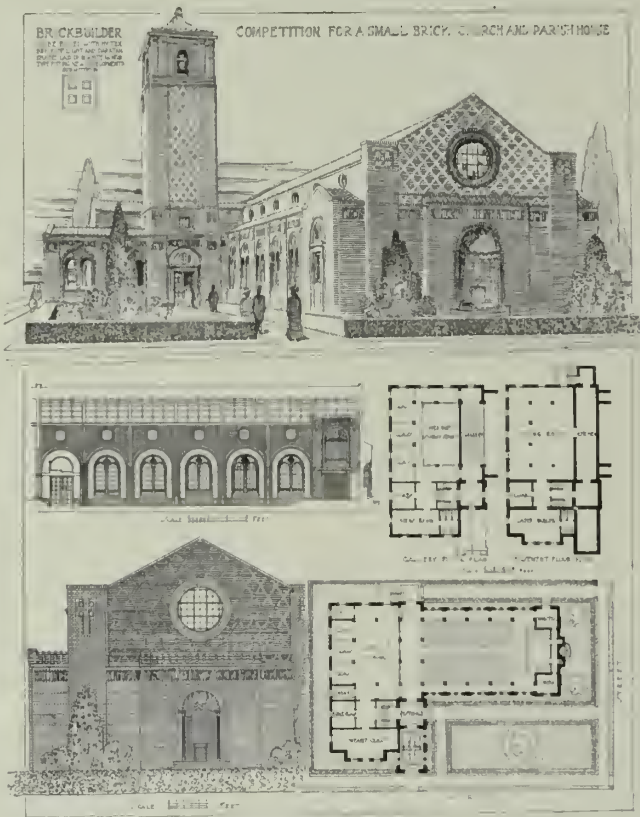


FOURTH PRIZE DESIGN

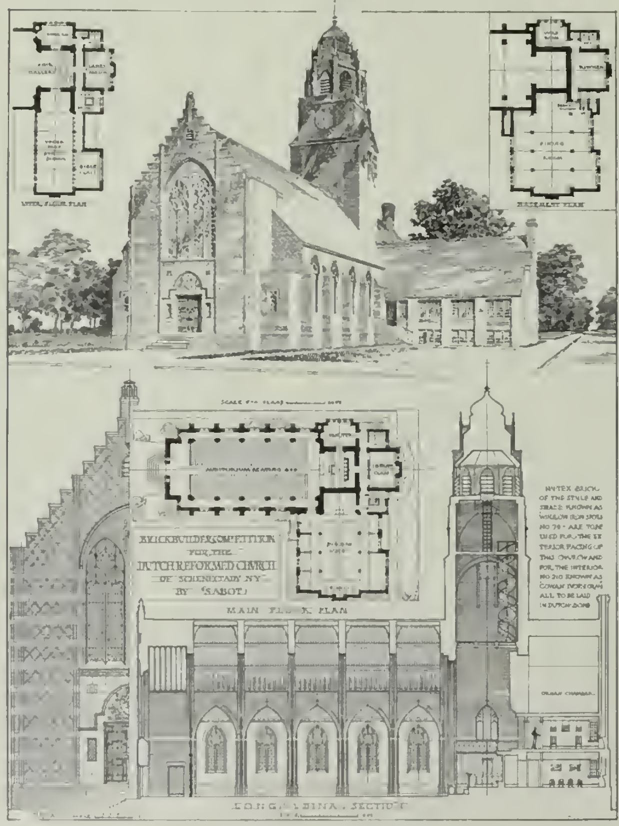
SUBMITTED BY H. J. VOSS AND A. F. LAW, BOSTON, MASS.



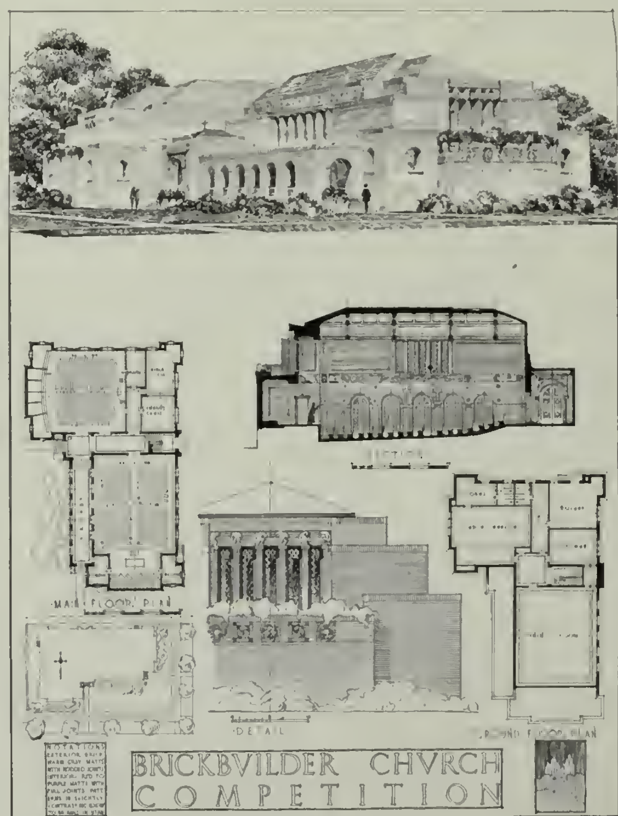
MENTION DESIGN
SUBMITTED BY JERAULD DAHLER, NEW YORK, N. Y.



MENTION DESIGN
SUBMITTED BY DAVIS, McGRATH & KIESSLING, NEW YORK, N. Y.



MENTION DESIGN
SUBMITTED BY E. DONALD ROBB, BOSTON, MASS.



MENTION DESIGN
SUBMITTED BY M. A. McCLENAHAN, SALT LAKE CITY, UTAH

EDITORIAL COMMENT AND NOTES FOR THE MONTH

A MIDDLE COURSE.

The following article is an expatiation upon the paper written by Mr. Claude Bragdon, entitled, "The Dead Hand in Architecture," which was published in THE BRICKBVILDER, *July, 1914. Although delayed in publication, it is hoped that its appearance now will recall Mr. Bragdon's paper and that it may elicit an equal degree of attention.* — EDITORS.

THE "dead hand" is clawing at our vitals! Mr. Claude Bragdon, through the agency of THE BRICKBVILDER for July, 1914, leaps into our sedate midst in a bold attempt to administer the strongest kind of castigation to a taoistic profession. Mr. Bragdon lays at the professional door the blame for greater sins of artistic omission than have ever appeared in the category of the most æsthetic saint. If there were a Universal Index of "unbuildable" buildings, we should all be homeless (and officeless) directly, for the pen would hesitate to write *ædificetur* upon the majority of modern designs.

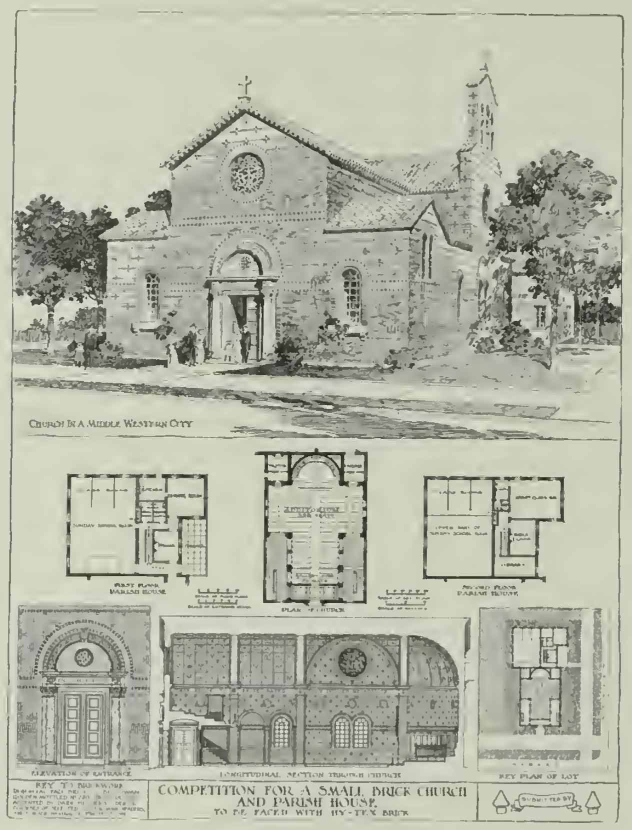
Before the complacent practitioner has read one page of this rending attack by the author of the "Beautiful Necessity," he will hunt his cyclone cellar, wait in his benighted condition of retarded development, and — probably come up smiling. And there is the chief of his sins. If only he would come up in a chastened frame of mind, open to ambitions of growth; if only he would spread his wings and soar like a kite with well balanced tail. But his metaphoric tail is too heavy; it consists of the whole weight of unaltered and — so far as he is able to determine — unalterable tradition. He has looked so long upon one set of forms that he has come to regard them as his grandfather's clock, that must needs stand in his hallway because it has always stood there. In other words, he has stagnated his inventive faculty and is content to ride in the rut of irresponsible repetition, disregarding the many hands stretched out to aid him. Before Mr. Bragdon gets through, the modern architect has not a leg to stand on — in fact, he ought to be so contrite and humbly submissive as to be completely satisfied to sit down. But although Mr. Bragdon uses a sharp pen, he means merely to goad the architect, not to stab him. He does not consider his victim a good-for-nothing, but simply an amiable shirker of his high, moral duty. Let us follow the argument, expatiate upon its virtues, and, if we may be forgiven, attempt to rehabilitate somewhat the poor architect's blasted reputation.

We have man at the outset diligently working at the most apt expression of his day and age, producing ultimately what we choose to call a style, an imperceptible, unconscious growth sprung from an elemental human need, the product of careful hands under the guidance of conservative minds. Conservatism has nurtured this product until it becomes a hothouse plant, whose fruit is forced and rapidly decays. So finally the virtue becomes subject to the relativity which controls all things; it negates its own good effect. We have the algebraic process of the addition of a negative. But, it is alleged, the great number of architects are blindfolded by this conservatism and fully persuaded that they yet practise it as did Phidias of Athens. They do not see that they have been marooned; the current of life is fast sweeping by and their ship of progress is not of twentieth-century model. Instead of regarding precedent in the light of a handy tool, they consider it rather the food for their architectural souls. We would counsel them to cast away all forms that are old and that the world has called good in the past. On the contrary, we invite them to analyze all the past styles, select the fundamentals, imbibe the transcending or, in the broad sense of the word, *classic* elements, and eliminate those features which are distinctly personal to the individual period or age. That is the salvation of the modern style. As some one has aptly said, not to wear last year's hat again, not even to remodel it, but (gods of millinery protect us!) to dismantle last year's hat and to make a new one of the same materials. And it is in the materials that the whole secret lies.

The purpose of the past is to teach the present, and we candidly hope that our present will be tutor to an unsuspecting future. Pupils sometimes learn in spite of the teacher, but the lesson is not correctly presented; the maximum of benefit is not attained. How are we presenting ours? Have we a moral right to prepare for future generations a text-book of architectural practice that is but a regurgitation of centuries of improvement? The question is a broad one. If we have no right to profit by what others have done before us, if we must begin anew with tent and igloo and long-house, then the millennium will come too soon. On the other hand, if we draw reasonable inspiration from the past, if we carefully glean the secret of impersonal beauty and truth out of the works of our forbears, surely we will but carry along the torch. Is it not the noblest purpose of every time and style to carry along the torch? The flame, to be sure, is uniform, consisting of the sum of beauty and human good; but the fuel may, indeed must, be different with each hand that keeps it burning.

As in literature one manner gives place to another, Fielding to Dickens, Dickens to Locke; as in music a mode of tone arrangement supersedes its predecessor, even with the wide distinction of Wagner and Strauss, so it is in every field of human expression. The mental attitude is the basis, and by its very definition that basis must contain the roots of growth, it must be able to germinate. And, to put the question again, does our modern method in architecture give such promise?

We have advanced along every line; in response to the cry of the century, specialization has produced experts in every detail of building, appliances to meet even the remotest requirement, short methods, apparatus, time



MENTION DESIGN
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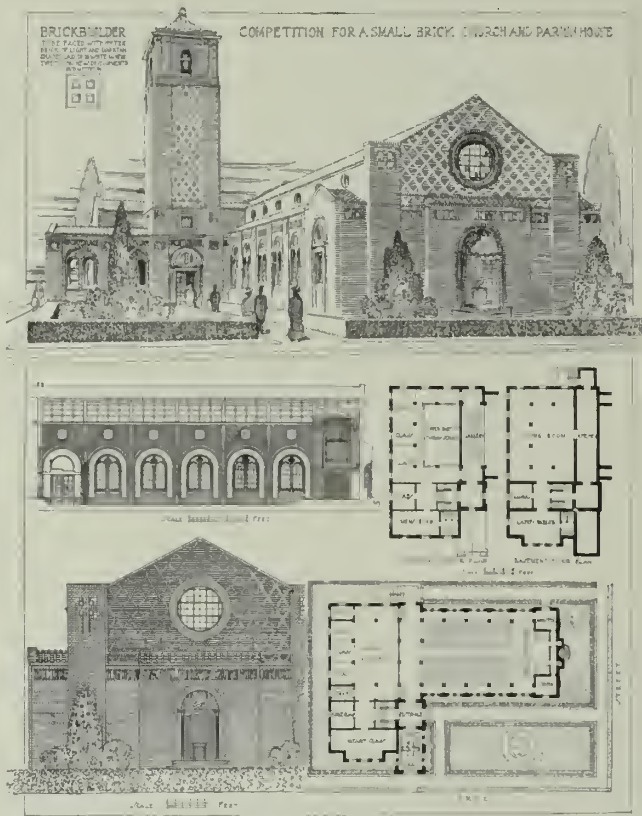

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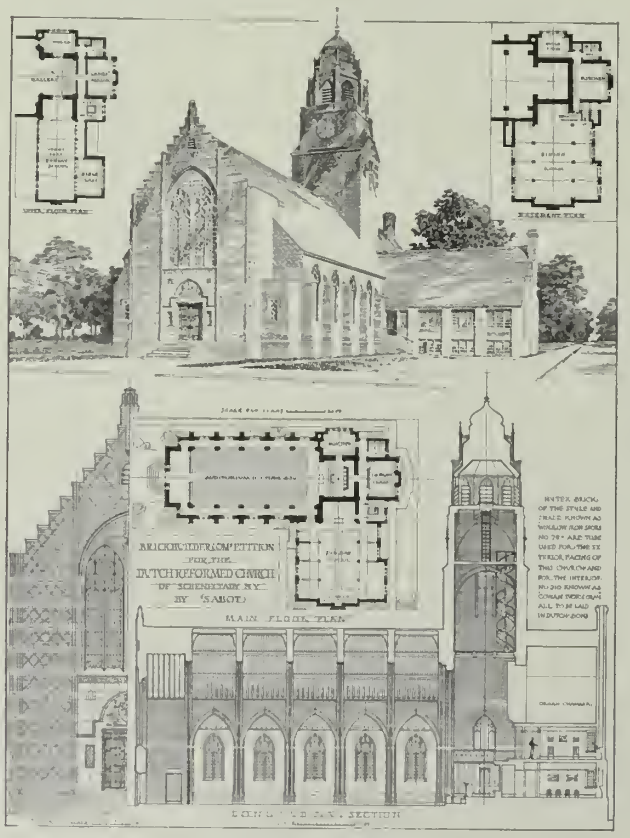

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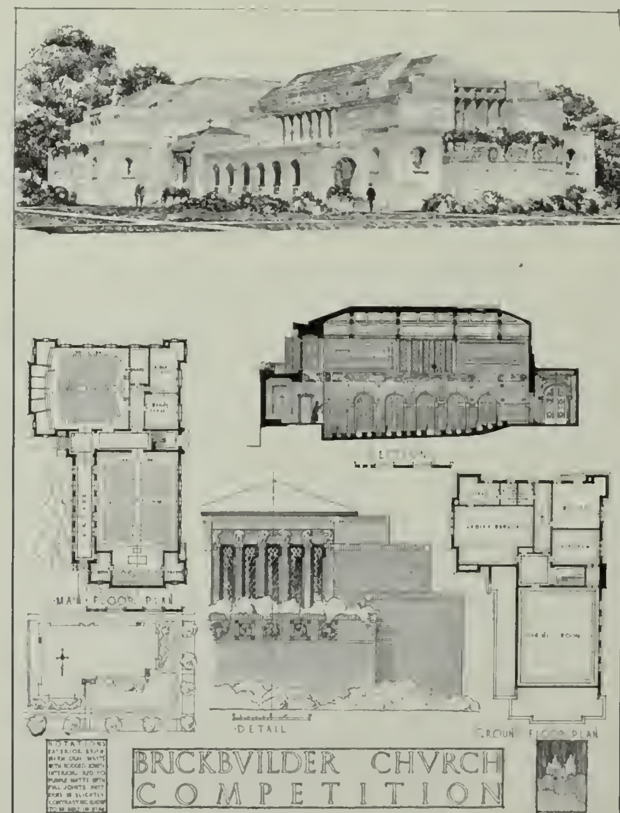

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We have advanced along every line; in response to the cry of the century, specialization has produced experts in every detail of building, appliances to meet even the remotest requirement, short methods, apparatus, time savers, and efficiency to make building easy. What benefit has accrued to design as the architectural language of the time? Imitation, mimicry, masquerade, are weak words to define our lack of backbone. One age builds of stone and *builds* its design; we build of stern, structural material and put over it a mantle of design; nay, we even debase that mantle by wilfully imitating one material in another. Where is our courage and our conviction? We decry false jewels, but we make our buildings — the permanent record of our artistic sentiments — wear false façades, shells hiding the substance and strength which should rightly express our life.

Yes, the architect faces stupendous obstacles. His ideals are there, to be sure, but they must be relegated while the serious business of life receives attention. And what is this insistent business? It consists of the faultless calculation of a number of personal, firm, and dealer's profits, blighting hurry (the formal mode of progress of the day) and an obviously and helplessly ignorant public. But who has not such obstacles to surmount? And are they not so many gems in the final crown of success?

But to return to Mr. Bragdon. The "glamour of Paris and of precedent" has provided a graceful mode of evasion of one's responsibilities. The public was dumfounded by the momentous display of the great groups at Chicago in '93, the apotheosis of Paris, and has not yet recovered. But we believe it has recovered; and, what is more, we believe it is dissatisfied with the peddling of old trinkets. Let us enjoy Europe and profit by her success, it is our privilege; but let us have done with Europe as a present source of examples.

It will be admitted that most originality is half-brother to ignorance, volitional or crude, of historic precedent. Originality seeks freedom and, having once loosed its shackles, does not know what to do with its hands. Hence the many amorphous intrusions upon the dignified process of stylistic evolution. Of these we wash our hands, for they represent the opposite extreme to which the pendulum may swing.

The extreme has its greatest antidote in restraint, stylistic restraint, personal restraint. This, Mr. Bragdon believes, should be inculcated by the schools of the country. He at once accuses the schools of failing signally in their duty. But we can say with conviction that the teaching of architectural history must inexorably remain one of the fundamentals of the teaching of architecture. We further maintain that history is a vast storehouse of ideals, and that the teaching of architectural history brings out restraint as the dominant quality of the noble sequence of styles. The teaching of such history is lifeless unless this restraint is everywhere emphasized. Restraint is the measure of art, especially of the Mistress Art, as Mr. Blomfield has christened it. The "sedulous aping of the mere externals" is a salutary form of architectural play; it is likewise a necessary part of architectural training; without it there is no beginning except that of the aborigines. Unfortunately in most modern schools the teaching of history and the teaching of design are two alien departments. Were the actual precept ably elucidated, more frequently brought before the student over his board, the field of design would have a saner interpretation. Indeed, we see no wiser course for the tyro than the study of conventions. Your *nouveau* must not blow himself up like the frog in the story, feeling within him the incontinent spark that will set the river of art afire and convinced that he is the maker of the new style that shall express the twentieth century. He should not be permitted to quote Michelangelo as he stood before Brunelleschi's dome at Florence: "Like you I will not build," unless the apostrophe be edited to read: "Like you I *will* build, until I know better." That is what Michelangelo meant. That is what the schools teach; that is what they must teach under present conditions or cease to be schools. As student, the embryonic architect will never "know better"; but as a man among men in the harvest field of life he will have his opportunity. Let us not require of the schools that they teach any more than the simple history, theory, and principles. Let the individual himself temper his education with experience, for the value of maturity is in its corrective influence. Shades of Vignola forefend, if the schools begin to teach us "not to remember, but only to forget." Better far to sign over our artistic souls to the blackest arch-fiend of the *Art Nouveau* at once.

No, Mr. Bragdon, the schools are on the right track; the practitioners are on the wrong one. The schools give instruction in the professions on the basis of supply and demand, and seek to add to this a quantum of scholarliness and breadth and humanity. When the architects have made a beginning — the gray heads alone are eligible for the first — then the schools will leap to their assistance. But until then they must remain the stabilizing influence.

But wherein does the man in practice fail? Mr. Bragdon's scathing indictment covers the whole field of architectural morality. The architect fails to think in terms of his materials, of his place, of his time. Mr. Bragdon is frank in assuming the rôle of the iconoclast in his arraignment; but it is the virtue of the iconoclast that he turns the bright spotlight of observation upon the ikon he seeks to break, and so shows us how nearly it is hidden in the cobwebs of carelessness and neglect.

In the first count is included the unscrupulous substitution and interchange of materials, one doing duty for and openly simulating another. All materials have individual modes of asserting themselves. Let the architect but study them and handle them in terms of themselves. He cannot err. What is more, if he conscientiously persists in this course his clients' taste will rapidly improve and soon of itself require that the truth be told. If there are differences in the prices of materials, such honesty would have its own reward, for the cheaper material need not necessarily be inimical to good design. Notre Dame in terra cotta would be as edifying as the Woolworth Tower in wood. And so each material has its beauty, its grace, its color and texture, not to mention its varied practical advantages in durability and lightness, ease of manufacture, or constructive feasibility.

In the second count comes the accusation that climatic and environmental requirements are not squarely met. This truth is palpable. Yet how many are aware of it; how many have even seen the ludicrous features that characterize sun shaded structures in sunless places, buildings bedecked with ornamental appliqué that is out of sight because of distance or of the concealing blanket of city dirt; or, worse yet, gorgeous edifices resplendent with commercial "mosaic" and composed of cubby-holes intended for the unwholesome habitat of *genus homo?*

It is in the third accusation that we must again ask Mr. Bragdon to go more slowly. The substance of it is that the architect uses forms too readily on the suggestion of the pattern-book, gathers them from the antique or the medieval, as may be required, without regard for significance or contemporary value, and that he has not the courage to develop forms expressing his own time. Mr. Bragdon has advised us in his book to "go to nature — the source of every kind of formal beauty." He will admit, we believe, that nature forms have not often appeared in the history of ornament without an inherent meaning, an allegoric or symbolic connection. This is the real reason for their continuance in many cases. The process of simplification, call it conventionalization, if you will, refines out types, and succeeding generations use types apart from their significance. It is recognized that in modern times, with plentiful libraries, newspapers, architectural periodicals and means of communication, motives no longer need such intimate significance to imbue them with life. They do not need to be dry and uninteresting as a consequence, and where necessary a proper meaning may yet be given them. The fact that a lion's head was used in the past does not render invalid the use of a lion's head in the architecture of the present. That point of view seems to indicate more of an iconoclastic tendency than Mr. Bragdon himself would confess. Let us go to nature, then, and avoid the lion now under the ban and choose the head of the buffalo. It will not be difficult to concede this step; it is reasonable, national, and modern. But we cannot yet see other thoroughly modern and national items, such as compressed air riveters, taking their places as duly representative motives in design. We feel assured that certain type forms will persist; it is a phenomenon of ornament that this should be so. Perhaps, also, they are a gentle reminder of the greatness that has gone before, and may even serve to teach us that the germ cannot sprout entirely apart from all external influences, for the seed needs water.

And here we end our species of counter-reformation. We are heartily on the side of Mr. Bragdon in his missionary work — would that every member of the profession had his courage. And the great army of American builders of the beautiful needs something more than a curtain lecture. Yet we honestly feel that the "dead hand" is harmless; that it is, indeed, dead, and that it dwells among us as a valued relic. Architects will get rid of it soon enough, but not until they have a better substitute. At any rate, let us hope that, though the hand be dead, the arm is yet alive and sinewy; that the body is in tune with the time, full of strength, ambition, and promise. —

RICHARD FRANZ BACH,

Curator, School of Architecture, Columbia University.

THE month of May presents a comparatively favorable showing in the building industry. Permits were issued in 71 cities during the month for construction work aggregating over $70,000,000. This exceeds the total for April, which was $64,652,631. As compared with the corresponding months of 1914, both April and May are almost on an even basis. There was in April a decrease of 1 per cent; in May of 2 per cent; but during the first three months of the year there was a much more marked shrinkage as compared with the first quarter of 1914. New York makes a better showing in May than it made in April, its May gains amounting to 50 per cent. Chicago also, in spite of its labor complications, shows a comparative gain of 14 per cent.

The official building permits issued by the 71 cities during May, as received by the American Contractor, New York, total $70,273,533, as compared with $72,057,-666 for May, 1914. Of these 71 cities 22 make gains, the more notable instances of activity including, in addition to New York and Chicago, the following; Cleveland, a gain of 134 per cent; Denver, 99 per cent; Harrisburg, 152; Lincoln, 224; Hartford, 61; New Orleans, 46; Oklahoma, 49; St. Joseph, 76; Sioux City, 59; and Wilkes-Barre, 177.

MANY architects will undoubtedly be interested in the meeting of the American School Hygiene Association, which is to be held in San Francisco, June 25 and 26, under the patronage of the Panama-Pacific International Exposition. The educational exhibit of the exposition is itself very comprehensive and it is planned to supplement this with an exhibit of the most progressive and hygienic types among the schools of California.

This will be the eighth congress of the National Association, last year's meeting having been postponed on account of the war. The Congress of 1913, it will be recalled, was merged into the Fourth International Congress on School Hygiene, very successfully held at Buffalo, and it is to be expected that the papers in this present meeting will have the same great practical value as those that appear in the proceedings of former congresses.

It is hoped to place the importance of the hygiene movement as represented in this Congress of the American School Hygiene Association strongly before all those who are responsible for health conditions in our public schools. Among these responsible people there are perhaps none that are more influential than the architects of the country. Any architect who has even the remotest interest in schools can derive substantial benefit from membership in this Congress and in studying its proceedings, whether expecting to attend or not. The membership fee is $3, which should be sent to Dr. Wm. Palmer Lucas, Secretary-Treasurer, University Hospital, San Francisco. This gives full membership in the Association for one year, including a copy of the printed proceedings.

PLATE DESCRIPTION.

House of Charles Paxton, Esq., Lake Forest, Ill. Plates 76 78. This house is veneered with a medium textured brick laid up with gray mortar joints and trimmed with Bedford stone. The roofs are covered with stained cedar shingles. The outside finish is white pine, painted, with the exception of entrance doors and frames, which are of white oak.

The interior is finished in whitewood enameled throughout except the main hall and stairs, which are of white oak, stained and varnished rubbed, and the service portion, which is finished natural.

All plumbing is of modern type with vitreous china lavatories, enameled iron tubs, and sinks and syphon jet closets. The house is heated with steam and the boiler is provided with an auxiliary coil for heating water for the domestic supply in addition to the small hot water heater. A vacuum-cleaning system is also installed.

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH. PLATES 79-81. This house is located at Grosse Point Shores, about twelve miles from the center of Detroit. The property has a frontage on Lake St. Clair of 600 feet and a depth of 8,000 feet. The place was planted about twenty-five years ago by the older Olmstead and has beautiful trees and shrubbery. The approach to the house is from the northwest and the carriage entrance is on that side. The terrace front faces southeast.

The first story of the house is built of brick laid with wide flush joints with buff stone trimmings. The second floor timber work is of oak of rather a grayish brown color, with rough plaster panels, colored grayish cream. The roof is of red tile laid random edge and not selected for color. The main hall, which extends through the house, is finished in English oak of a grayish brown color, paneled from floor to ceiling. The hangings are tuscan red with a Sharistan rug in the same predominating color. The drawing room is paneled in French gray and has a decorated ceiling. Hangings and rugs are a light mauve color. The dining room is paneled in English oak of a grayish brown color, the ceiling is decorated in cream white, and the hangings and rugs are gray-blue and gold. The living room is also finished in English oak with the walls above the wainscot covered with gray-green plush, the hangings being of a darker green velour trimmed with old gold. Adjoining the living room is the den finished in gum wood, gray-brown in color. A small loggia opens from this room, which gives a vista of the rose garden to the northwest. To the southwest of the living room is the sun room finished with brick walls, timbered ceiling, and a tile floor. This room leads to the sunken garden to the southwest with its pergola and pools.

The construction is fireproof throughout, and all modern equipments have been provided, including refrigerating, sweeping, and water softening plants, indirect hot water heating with thermostat control, and a push button electric elevator.

The second floor is finished in ivory white with mahogany doors and trim. The service portion is entirely in the wing of the third floor.

FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL. PLATES 86-88. An unusually shaped lot is partly responsible for the unique plan and unusual exterior of this church. The sloping condition of the site has been taken advantage of by placing the Sunday-school room with its entrance at the low end.

The main entrance to the auditorium is at the point of intersection of the streets. This plan enabled the foyer and auditorium to be placed on the same level and but a few steps above the grade of Alvarado street. The main auditorium is 95 by 91 feet in size and seats 1,125 persons. Over the foyer is a balcony easily reached by two flights of stairs, seating 175 additional persons, making a total seating capacity of 1,300 people. One of the features of the auditorium are two large alcoves on either side raised about 3 feet above the level of the auditorium floor, like the loges of a theater. One of these loges has two sets of entrance doors opening on a spacious arcaded porch on the south side of the building, which with its adjoining waiting room provides a pleasant place for persons who have brought children to Sunday-school to wait while it is in session. The ceiling of the auditorium is coffered to increase its acoustic properties, and for the same reason the side walls were lined with felt instead of being plastered and a high wooden wainscoting placed around the auditorium. The rostrum and readers' desks are arranged in the way usual to Christian Science churches. The organ console has been sunk into the floor of the auditorium immediately in front of the rostrum so that the organist would hear the sounds from the organ in approximately the same way that the congregation would.

The entire basement of the building below the main auditorium floor has been excavated. The major portion of the basement has been taken up with a large Sunday-school room which receives an abundance of light and air and comfortably seats 900 people.

The building has solid brick walls with a gray brick facing laid up in Flemish bond with darker headers. The roof is covered with red mission tile.

FIRST CHURCH OF CHRIST, SCIENTIST, WORCESTER, MASS. PLATES 89, 90. This church is constructed of brick, faced with golden bricks in three light shades, laid at random as to color. The bonding is done with flush headers every fourth course. The pediment and columns and other trimmings are terra cotta of a light buff color, which blends in pleasing effect with the brick.

The heating system is low pressure steam, with direct-indirect and direct radiation. The ventilation of the auditorium is effected with a gravity system during the winter months and in summer through an open dentil course in the ceiling light, fresh air being admitted through the ventilating box bases of the direct-indirect radiators. A steam coil is installed in a space above the ceiling light to keep the sunlight above clear from snow and ice. A sufficient velocity is secured by the heat from this coil to ventilate the upper part of the auditorium. The auditorium, which seats 450 people, was designed without windows, the lighting arrangement being an adaptation of a principle of the ancient temples to modern usage. Light is admitted through the ceiling and has proved to be a very successful method, as may be judged from the illustrations of the interior. The ceiling light is glazed with acid treated rippled glass, and the skylight with wired hammered glass. The diffusion of light is very good. Artificial light also is admitted to the auditorium through this ceiling light, there being installed between the ceiling light and skylight fifty-four 100-watt tungsten lamps, with a 12-inch cone-shaped mirror reflector over each lamp. The ceiling pans shown under the balcony are installed to relieve the shadows caused by the projections and not for necessary illumination.

While the omission of windows was primarily a matter of design, it also fulfilled a requirement of the building committee that the congregation in the auditorium should not be disturbed by noises caused by traffic in the streets. The omission of windows might be thought to give the auditorium an oppressive atmosphere which would react upon the imagination of the congregation ; but, to the contrary, it has made the building more comfortable and, in addition, ensures it being cool during the hottest summer months.

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LETTERPRESS

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THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

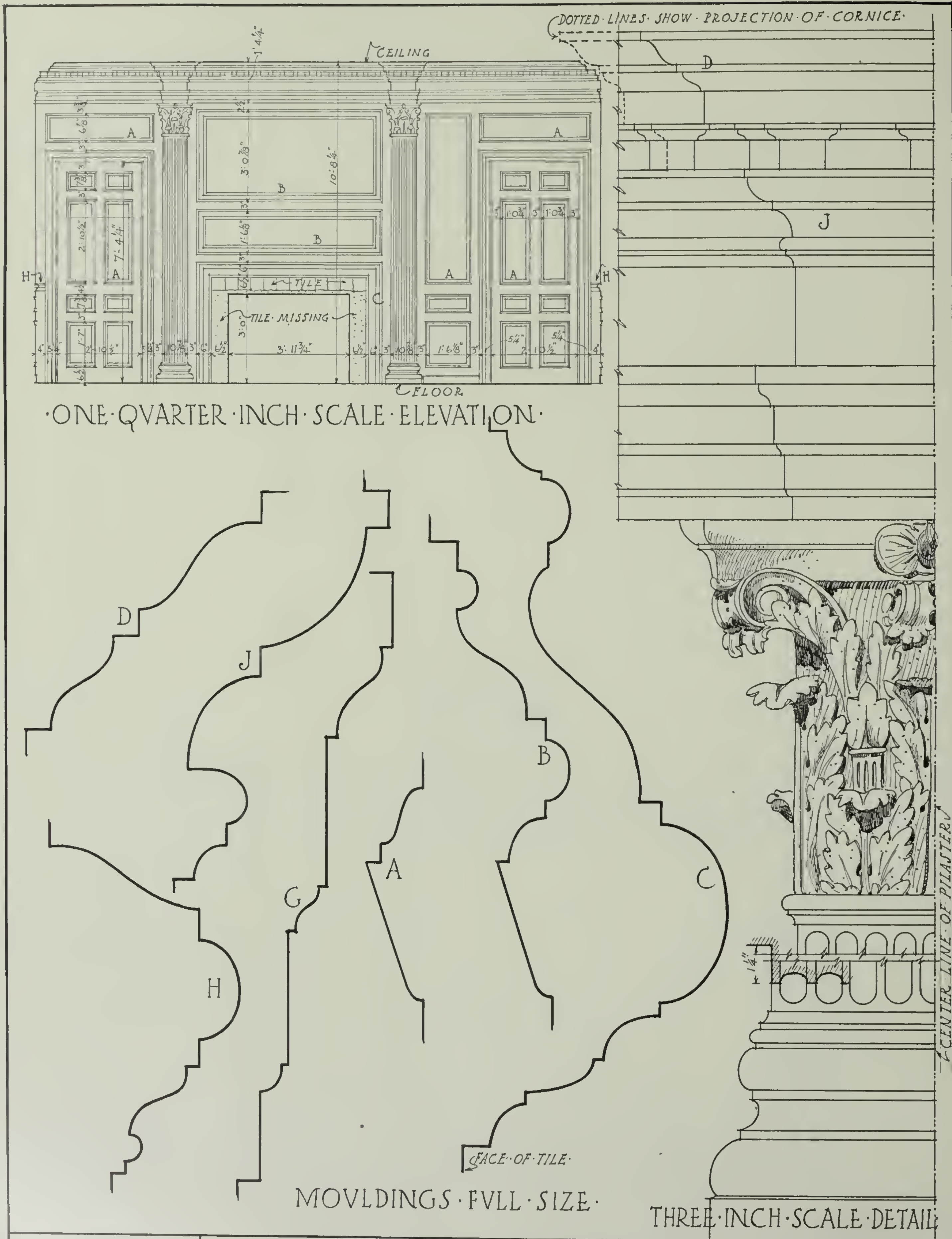
THIS is a most interesting example of the eighteenth century type of drawing room in which the fireplace end is paneled to the ceiling. The pilasters, with a slight entasis and beautifully carved capitals, frame the heavily moulded panels, which are made of single pieces of wood in an effective manner. It is claimed that the interior woodwork in this house was made in England. The fireplace facing is of Dutch pictorial titles in black and white.

MANTEL END OF PARLOR, "THE LEE MANSION," MARBLEHEAD, MASS.
BUILT IN 1768

MEASURED AND DRAWN BY
GORDON ROBB & M. A. DYER

Plate Seven

(over)



PLATE· 7 JVLY· 1915	·WOODWORK·IN·PARLOR·OF· ·LEE·MANSION·AT·MARBLEHEAD· BVILT·IN·1768· ·MASS·	·MEASVRED· & ·DRAWN·BY· ·GORDON·ROBB· ·&·M·A·DYER·

PALACE OF THE MAYORALGO FAMILY, ESTREMADURA, SPAIN

ERECTED ABOUT 1400

THE BRICKBVILDER

VOLUME XXIV JULY, 1915 NUMBER 7

Stairways in Houses of Moderate Cost.

II. THE COLONIAL TYPE OF STAIRWAY.

By JOHN T. FALLON.

THE predominance of tradition in the history of a nation's architecture is more or less axiomatic. Even with the access to all that has been done in the past which modern artists possess, it is impossible to transplant a style racially different from our own and to cause it to grow and take root. It will inevitably die a natural death, as has been proven by Richardson's experiment with French Romanesque, or, if it becomes a vital element of our own work, it will take on a recognizably different aspect.

Now, from the early days of the colonies, up to the decline of taste in the Mid-Victorian Era, our main outside artistic impulse came from England, from which source we inherited our habits of living and in a restricted sense our ideas of domestic planning. The great accessibility in this country of wood as a building material changed substantially the forms and details of the Colonial house from those of Georgian England, but the stairway is one of the exceptions from this statement. We have seen in a previous article that the English stairs were built of wood, and consequently little or no adaptation was necessary to the importation of this feature.

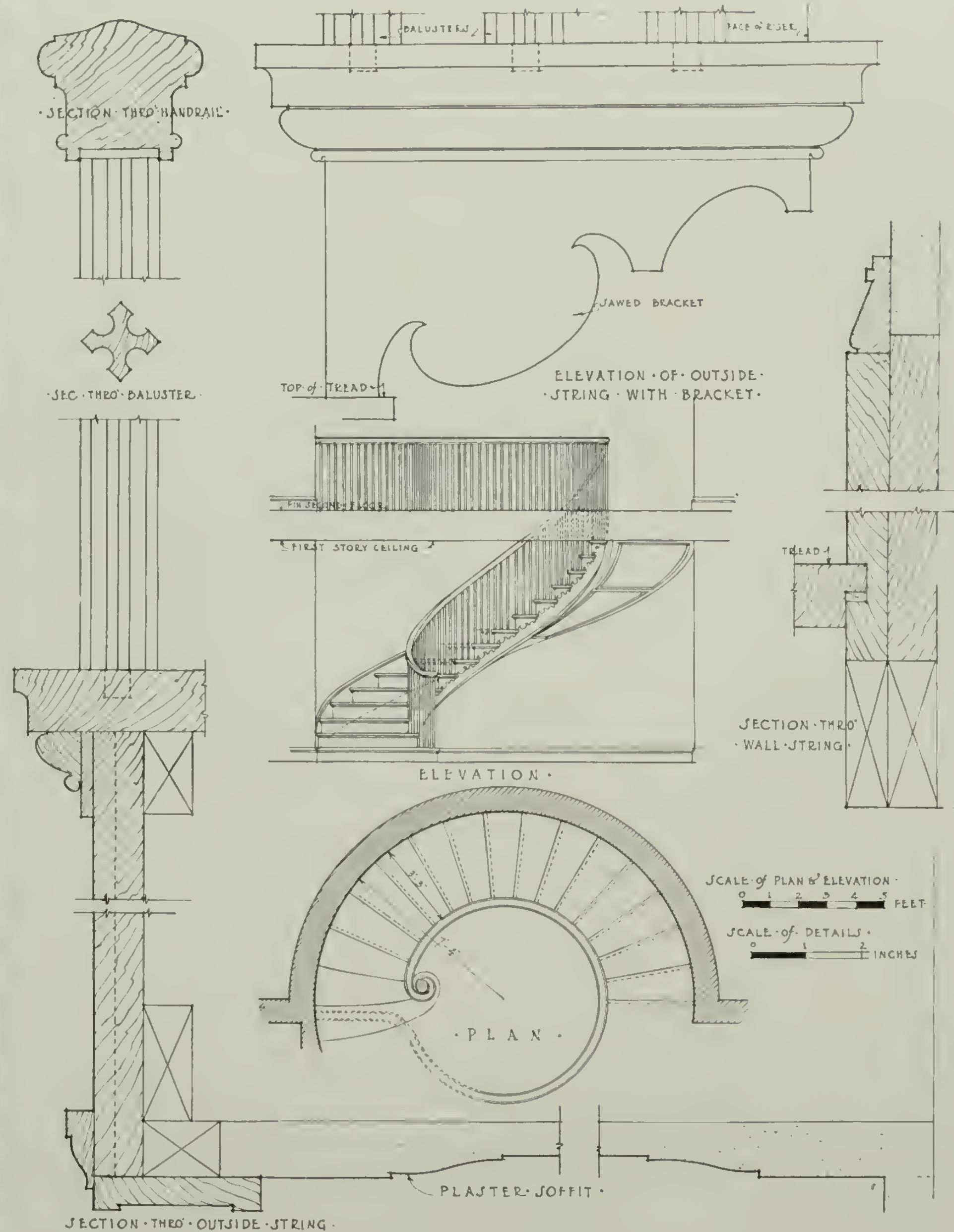
Stairway in the House of Rev. Joseph Hutcheson, Warren, R. I.
Charles A. Platt, Architect

The hall invariably extending through the width of the house, with the stairs at one end, is distinctly Colonial, as was the same tendency repeated in the simple rectangular planning of the living rooms. However, the Jacobean arcade, shutting off the staircase from the hall, persists in Colonial work. This division takes now the form of an elliptical arch, now the form of a beam supported by columns with varied spacing or even without support.

In both English and American houses, the stairs usually run in short straight flights, then a quarter landing, then another flight at right angles. The Colonial type of house usually demanded a door under the landing, which influenced their designers to make the first flight of sufficient length to bring the first landing to the proper level to allow for this door height. The width of the hall sometimes operated to suppress the intermediate flight and to make necessary only one landing.

A recent writer has thus summarized the typical Colonial plan: "The first flight rising from the first floor contained roughly two-thirds the total number of steps needed to reach the second. At the top of the flight was a level landing crossing the hall. Thence continuing to the floor above was a second flight containing the remaining one-third of steps. By this means head room was obtained under the landing for a rear entrance to the hall. The scheme adopted in some modern Colonial houses of having a flight on each side of the hall ascend to the landing, with a shorter flight continuing to the second floor from the center of the landing, has no counterpart in Colonial work. But it is not an unreasonable elaboration of the style; and that we have no example in old houses is perhaps only because the arrangement calls for a larger scale of building than the means of the Colonists afforded. The introduction of steps in the landing, causing a break in its level, is only to be seen in a few houses built towards the end of the eighteenth century."

This introduction was not a space-saving compromise, as he has pointed out, but a distinct step towards the elliptical stair that rose in one flight from floor to floor, as may be deduced from the absolute elimination of the newel, already suppressed in importance, and the rounding of the landing corners, carrying rail and string up in one warped line. The full elliptical stair is a development that was reserved for a few late Colonial examples of the early nineteenth century. The increasing technical skill of the stair builder was shown in this last phase, which is comparable in the mastery over materials with



STAIRWAY IN HOUSE OF WILLIAM M. IMBRIE, ESQ., ENGLEWOOD, N. J.

MANN & MacNEILLE, ARCHITECTS

Stairway in House at Kensington, N. Y.
Aymar Embury II, Architect

the finest efforts of contemporary French stone masons.

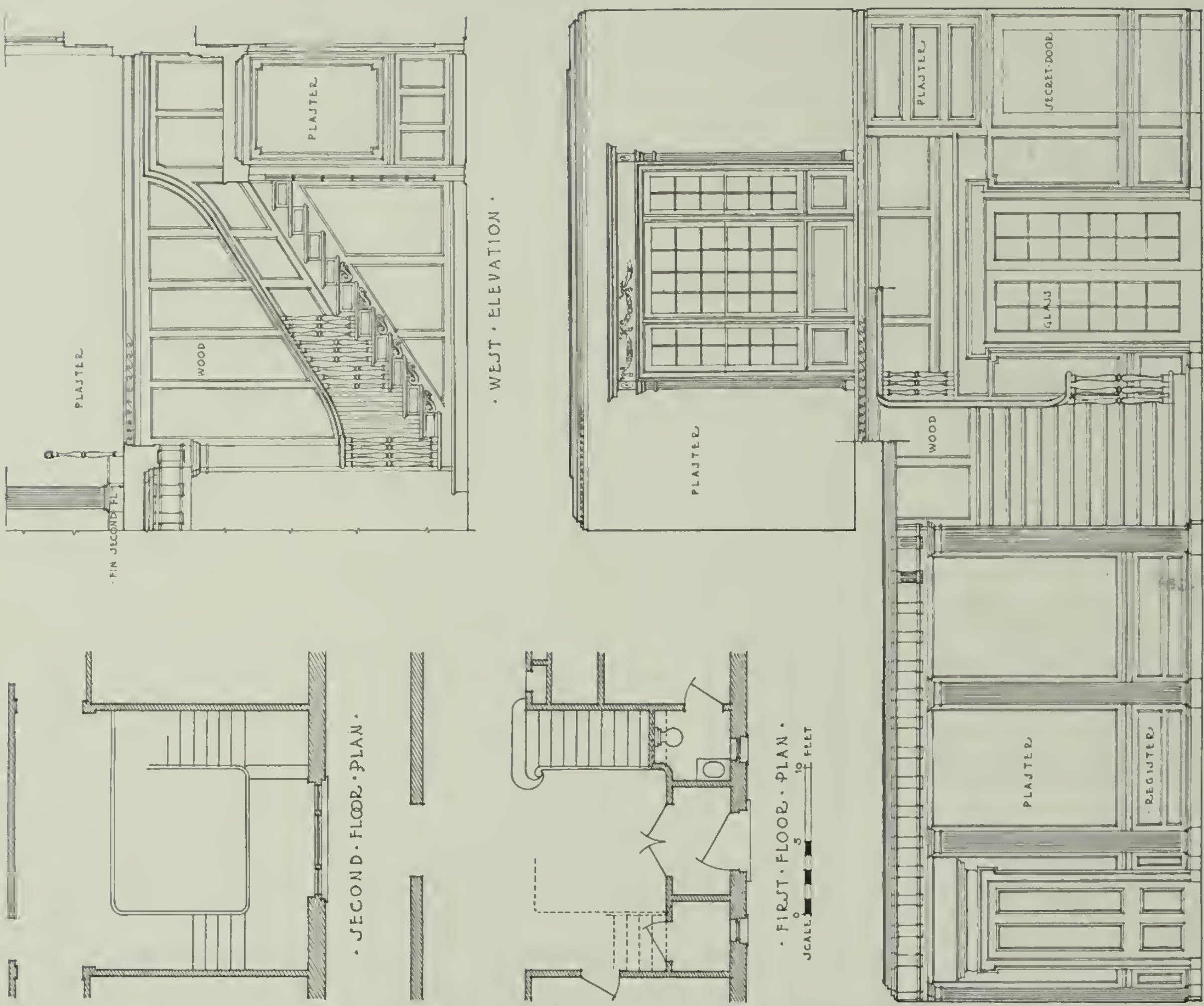
Before discussing more fully the details of the Colonial stair, it might be well to call attention to the association of Georgian work with the use of mahogany, and to review the causes that led up to it. This wonderfully colored wood, with its inimitable grain, is indigenous to Central America and the West Indies. Its beauties were first discovered in 1595 by one of the members of an expedition of Sir Walter Raleigh, but it was not until the opening of the eighteenth century that its suitability for cabinet work and furniture began to attract attention. It came rapidly into vogue, primarily through the efforts of Dr. Gibbons, who influenced a wood carver named Wollaston to bring it to the notice of the British public. It was originally imported from Jamaica, where the bulk of the eighteenth century supply was obtained, the exports from this island being 521,300 feet in the year 1753.

The use of mahogany for the hand rails of Colonial stairs was general. This part of the stair is naturally subjected to great wear, and a wood of hard texture and handsome grain is demanded. Mahogany fulfils these conditions admirably. Its use was seldom extended to the spindles and treads, as considerations both of cost and of taste prevented a wider employment. The hand rail became more delicate as the development went on; its profile was generally classic and refined, although occasionally a simple round section was used. It was carried continuously from floor to floor, a suppressed baluster newel being used to turn the corners. A favorite modification was the sweeping rise of the rail at the landings, as if to surmount the newel. A half section of the hand rail was often repeated along the top of the wainscot. This stair wainscot, which is so often omitted entirely in modern houses of the inexpensive type, was inevitable in the old work; in the cheaper houses it was usually preserved in line by a simple wall moulding carried up at the height of the rail. These wood wainscots were never elaborate affairs; generally, they consisted of simple panels with occasionally a balancing of the newels by a flat pilaster treatment.

As mentioned in the previous article, the Georgian development of the baluster led to attenuation and delicacy. A usual treatment was the use of two or three different designs to a tread, although this is not inevitable. Indeed, a favorite variation from the turned types was a square spindle, sometimes with groovings on the face and sometimes without. The start of the rail was made from a small, unobtrusive newel surrounded by a circle of balusters. The other variant, a start from a prominent and projecting newel, although frequently used, was never particularly happy.

The string was always an open one with step ends in console form, sometimes beautifully carved, but more usually with a simple design cut in the flat and applied. The infinite variation in these designs adds great fascination to the study of these old stairways. It was not until the end of the period that the landing newels were entirely done away with and the string continued in one line; in most of the examples, the newel projected down to receive the string and to be ornamented below by some simple drop.

Stairway in House of C. D. Gibson, Esq., New York, N. Y.
McKim, Mead & White, Architects



STAIRWAY IN THE HOUSE OF J. P. GRACE, ESQ., LAKEVILLE, LONG ISLAND, N. Y.

JAMES W. O'CONNOR, ARCHITECT

The soffit of the stairs demands some attention. In the older work the first flight was usually supported by a base of paneling, and the soffit so concealed. The soffit of the top flight was filled in flat with plaster on a line with the bottom of the string, sometimes paneled and sometimes left plain. The practice of showing the soffits of the individual steps as if they were solid blocks, common in the late English stairs, was used in very few instances, one being that of Shirley in Virginia.

The painting of Colonial stairways was always white, and any other color now seen on the woodwork of an old building may be safely assumed to be of a later date. The only contrasting notes to this monotone color scheme was the rich tone of the mahogany hand rail and wainscot cap. The wall of the staircase was whitewashed, if a simple house, or papered with imported wall paper in the larger houses. Here may be said to be another Georgian innovation. Although there were examples before this time, wall paper first came into general use in this century. The early wall papers used in Colonial days were printed by hand on square pieces of hand-made paper from wood blocks, and it was not until 1800 that roller presses began to be introduced. The designs were first copied from figured velvets and brocades, but soon landscape and architectural subjects replaced these and continued in vogue through the period of the Empire.

The problem of the stairs in modern houses of moderate cost can hardly be said to have received the study that our ancestors gave to it. When the traditional types of Colonial stairs are faithfully copied, not merely in detail but in the essentials of planning, we produce examples that are, at least, comparable with the antecedents; but generally in the more inexpensive houses the problem is slighted and neglected.

The illustrations show how eminently suited to our modern life are these Colonial types, and how even in a literal transcript the selective faculty may be exercised to produce not a finer model, but stairways that bear comparison with the high water marks of the eighteenth century. Occasionally, French or Italian detail is introduced into the design to give a modern flavor or to produce an air of sophistication that our forefathers' work lacked. But, on the whole, it may be said that for practical utility and as an æsthetic inheritance, the Georgian stair is one of the most important influences in American interior architecture. Tastes may veer in one direction or another, but the basic elements of our stairway designs will waver little from the Colonial stair.

The art of the stair builder was in earlier days an important component of the building trades. It is certain that the present day artisans are not less skilled, but, since the architect has laid less stress on the design of the stairway, the artisan has come to have less training in its construction. Discussion has recently centered upon the training of the individual workman as a means towards the elimination of the stereotyped and conventional in architecture. Stair building as a trade has been only imperfectly transmitted to the present generation of workmen, but by a conscious effort on the part of the architect to keep this feature on the high plane to which it once rose, its structural possibilities could be once more easily realized and its design thereby improved.

Stairway in House of Robert J. Collier, Esq., Wickatunk, N. J.
John Russell Pope, Architect

GARDENER'S COTTAGE,
THE LANE ESTATE

ST. JAMES, LONG ISLAND, N. Y.

FORD, BUTLER & OLIVER,
ARCHITECTS

The Heating and Ventilation of Schoolhouses.

By HAROLD L. ALT.

THE subject of heating and ventilating the schoolhouse has undoubtedly been given as much attention and thought as any other one particular type of building, and it is quite possible that, owing to the constant recurrence of this problem in all portions of the country, it might be said that it has been met by a greater variety of solutions than can be found in any other form of building. Yet, with all of the thought, time, and money which has been put into this problem, it is a peculiar fact that it is not yet possible to assert that the perfect ventilating system has been devised.

In the first place, — what *is* a perfect ventilating system? We cannot by any possibility maintain air inside of a building at the standard of purity possessed by the air before entering, owing to the fact that impurities are constantly added to the air within an occupied room. The only exception to this is when the outside air is so bad that mechanical or physical methods of cleaning may remove a quantity of undesirable exterior elements which might be accounted more deadly than those which the air would pick up within the room before being expelled through the vent openings.

It is not within the province of this article to enter into the theory of ventilation so much in regard to the scientific or medical side as it is to point out to the conservative architect the methods which are giving the greatest satisfaction today according to the standards based upon well recognized and generally accepted theories. Yet, in passing over this point of the discussion, it is hard to omit the mention of an actual test in a regular schoolroom operating under normal conditions. It was demonstrated that it is possible to re-use the air of the fully occupied room for continuous periods of three hours with the usual recess interval and without the use of any of the outside air whatsoever, except that which leaked in through crevices and occasionally opened doors, it being impossible, of course, to keep the class rooms absolutely air tight. It is also interesting to note that this test was carried on for five hours a day for three weeks without perceptible effect on the school children, who were carefully observed by experts making psychological and physiological tests; these tests were compared with a corresponding class in another room which was ventilated according to the best standard methods and practices of to-day, with no apparent difference between the two.

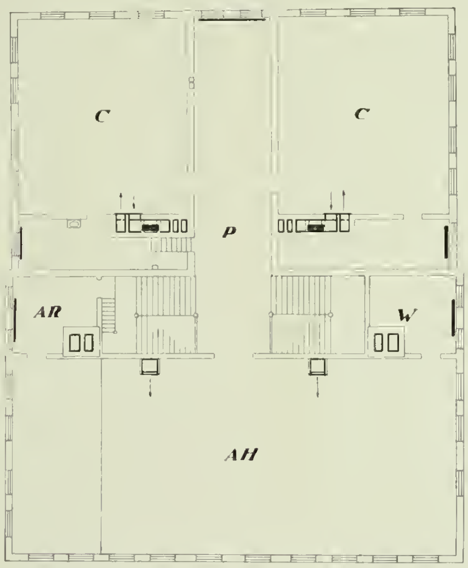


Fig. 1

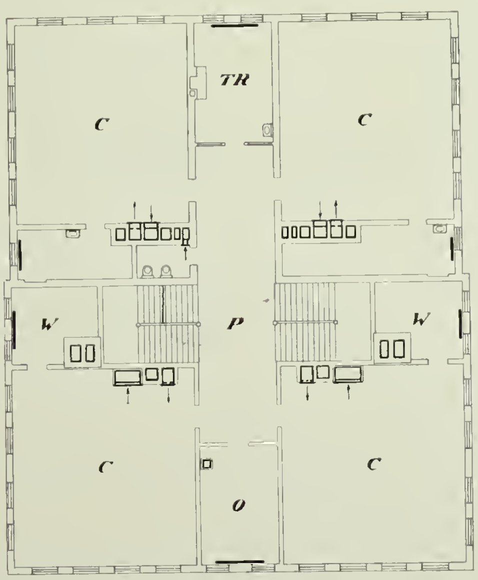


Fig. 2

In the plans accompanying this article the rooms have been indicated by letters as follows:

A	*Auditorium*	*GL*	*Girls' Locker*
AH	*Assembly Hall*	*GP*	*Girls' Playroom*
AR	*Anteroom*	*L*	*Lavatory*
BP	*Boys' Playroom*	*LY*	*Library*
BL	*Boys' Locker*	*P*	*Passage*
BR	*Boiler Room*	*RR*	*Recitation Room*
C	*Class Room*	*TR*	*Teachers' Room*
CR	*Coal Room*	*V*	*Vestibule*
G	*Gymnasium*	*VR*	*Voting Room*
		W	*Wardrobe*

The apparatus has been indicated as follows:

AW	*Air Washer*	*H*	*Heater*
B	*Boiler*	*R*	*Re-heater*
D	*Damper*	*S*	*Screen*
F	*Fan*	*T*	*Tempering Heater*

In spite of this experiment, however, there are few who are yet ready to admit that fresh air is not required or that the condition of the air in a room can artificially be made as desirable for human beings without a fresh air supply as with it. Until experiments demonstrating this fact have been made in multiple, with results of an invariably successful nature, the engineer and architect are not justified in departing from the old standards of the required amount of fresh air per pupil per minute.

It is a question if the average architect in designing a schoolhouse takes into proper consideration on his preliminary sketches the requirements of the ventilation system. While the modern trend is towards the elimination of this trouble, there are still many architects who cause themselves much needless work and later revising of plans by not making proper allowances in the preliminary drawings for the necessary ducts and flues.

In schoolhouse ventilation work there are three systems of piping which are in common use. These may be termed the trunk line, or single duct system, the double duct system, and the individual duct system.

The trunk line system is the one which is most familiar, a large percentage of the air blast duct work being laid out by this method. The double duct system, which consists of a warm air duct supplying two-thirds of hot air and the cold-air duct supplying one-third of cold air to the base of the flues, the air becoming mixed in the flues and entering the room at a desired tempered degree, is also fairly well known.

The individual duct system, however, has advantages over the other two. This system gives every room its own duct and flue continuously from the fan to the room outlet and regulates the temperature of the air to suit the requirements of each individual room. It has been found by experience that rooms situated on the north and south sides, or on the windward and leeward sides, of a building will not require air at the same temperature, the difference being several degrees. The main objection to the common trunk line system ordinarily used is that this variation of requirement cannot be satisfied.

Another advantage possessed by the individual ducts is the matter of head room in the basement. The argument is often advanced, however, that the double ducts, with the air mixing in the vertical flue, give the same temperature control as the individual duct in which the air mixes back at the heater, and at the same time they permit the use of the trunk line system. This is true, but between the heater and the base of the flue not only must two ducts be carried, but they must have a cross-sectional area of approximately 50 per cent more than actually required. This is clearly understood when it is noted that on a very cold day the cold air duct may be almost entirely shut off at the base of each flue, thus requiring *all* the ventilation for the building to come through the hot air duct, while on a warmer day the warm air duct may be 50 per cent closed and the cold air duct utilized to its full capacity. Therefore, where these ducts are extended along the basement ceiling, as is usually the case (or any place where head room is an object), the individual duct will make an appreciable saving in the height.

The first form of heating which was applied to schoolhouses was that of the fireplace and the stove. Later, however, as advancement in the art of heating became more pronounced and ventilation was required, furnaces were substituted and are still in use at the present time in some of the older schools, although generally with more or less dissatisfaction.

In order to show the progress of modern heating and ventilation, let us first take Figs. 1, 2, 3, and 4, which show the third, second, first, and basement floor plans respectively of one of the older schools of moderate size in which furnaces had been in use. These furnaces required maintaining four separate fires, and at their best were subject to back drafts on days of high winds and to other gravity hot air heating troubles as well. This school was recently remodeled as shown, so as to eliminate these troubles and to give a ventilation system furnished by gravity at times when outside conditions made such operation feasible, and at the same time to avoid the troubles usually experienced with the plain gravity system.

To accomplish this a fan F was installed which would force the air into the heating chambers, across the heaters and up the flues, thus assisting gravity enough to counteract adverse outside conditions.

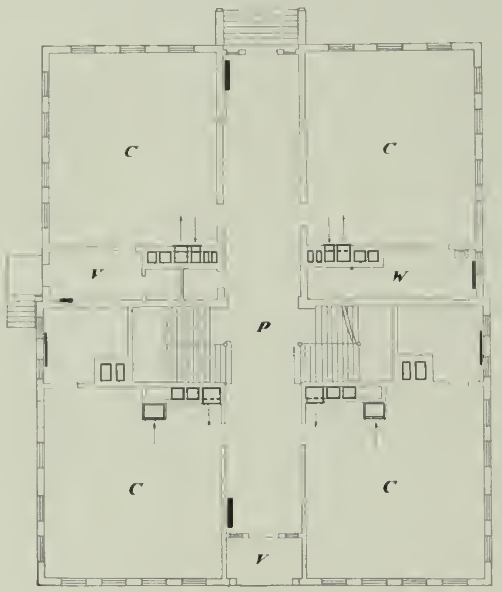


Fig. 3

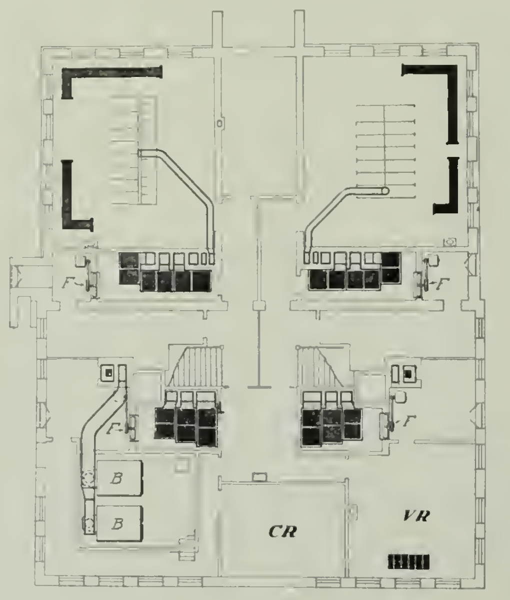


Fig. 4

It is not intended to hold up this school to the architect as an ideal installation, but rather to employ it as a means of showing what can be done to improve the existing unsatisfactory furnace systems. Owing to this being a remodeled system, some of the flues were installed by necessity in places where, architecturally speaking, they have no business being located; but this could, of course, readily be overcome in a new building properly designed to accommodate the ventilating system.

The exhaust flues are heated with vertical aspirating pipes, assisted by radiators located in the flues at the third floor, as shown in Fig. 1.

Some time after this school was remodeled another school building was erected a short distance away and connected to the old building by means of a pipe tunnel. The plans for the new building are shown in Figs. 5 to 8, inclusive, which are the attic floor, second floor, first floor, and basement plans respectively. In this later school, as shown in Fig. 8, an air filter screen S was installed, together with a fan F, which forces the air over the heating coils H. The system is arranged so that either the gymnasium, the auditorium, or the class rooms may be used at different times, all supplied from the same fan F, the flues being opened and closed as desired through a system of switch dampers.

In the attic plan, Fig. 5, it will be seen that the exhaust flues are connected together and carried through the roof, circulation being assisted by the heaters H, which make aspirating flues out of these vents.

This arrangement is a step in advance of the arrangement in the older buildings, having a more positive air supply movement, a certain amount of temperature control, filtered fresh air, and a concentration of apparatus.

Of course a fan system on the vents is also most desirable, as this produces an almost constant pull on the rooms, rendering it possible to regulate the quantity of fresh air much more closely than when aspirating flues are in use. It is quite remarkable the amount of differ-

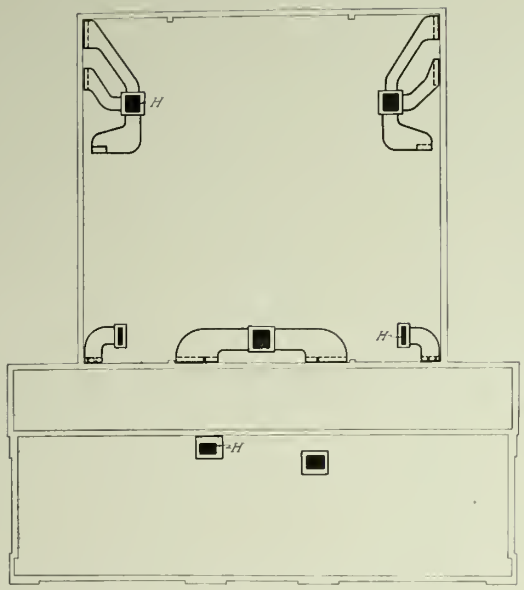


Fig. 5

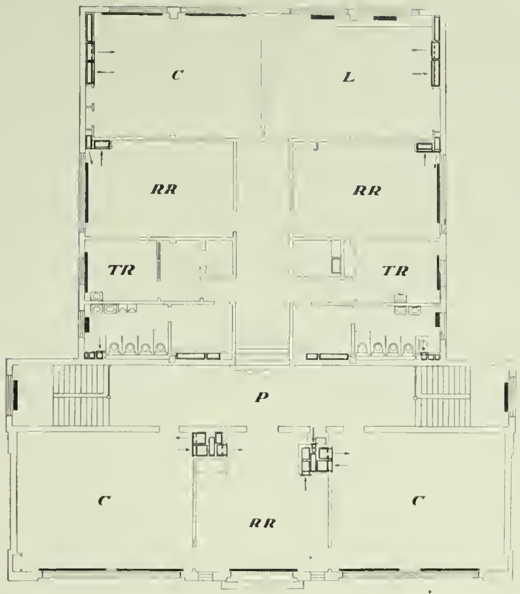


Fig. 6

ence made in the amount of incoming air by the assistance given through the exhaust outlets.

Still further progress is indicated in Fig. 10, where the individual duct system is used and individual temperature regulation thus secured for the various rooms. For the purpose of this discussion the upper floors of this building may be assumed to be treated in a manner similar to the floor plans already shown. The small additional plan of the boilers shows the smoke connection and method of running the flue into the chimney.

The basement plan, shown in Fig. 10, is an especially good typical duct, illustration showing as it does the use of the individual ducts for the class rooms located with varying exposures, combined with a large trunk line duct supplying the auditorium above. A system of switch dampers is installed, throwing either the class room (*i.e.*, the small individual ducts) or the auditorium (*i.e.*, the large trunk duct) into service as desired.

The chief weakness in this installation consists of the lack of facilities for cleaning and purifying the air, it being absolutely impossible to install either an air washer or a filter screen in the space allotted to the ventilating plant. This is, perhaps, not quite as serious a consideration in this particular case as it might be under other conditions, owing to the fact that this school is in a suburban location where the air is of unusually clear character.

The ideal layout of a ventilating system to which it is desired to call the reader's attention is shown in plan and elevation in Fig. 9, this being one of two sets of apparatus of identical nature now being installed in a new high school in process of construction. In this particular school the apparatus shown is purely a class room proposition, taking care of all rooms on the left side of the building. The other apparatus is situated across the corridor and furnishes air for all the class rooms on the other side of the building. The auditorium and gymnasium are supplied by a third apparatus situated in the rear, thus making it possible to operate all sections of the entire school at one and the same time instead of in parts alone as was necessary in the other layouts.

In Fig. 9 the air enters through the window screen and passes in front of the tempering heater T, from which it is drawn through the air washer AW and heater H by the fan F. This fan is set in an enclosure which is made as air tight as possible, owing to the fact that the fan takes its suction directly from the room, thus making a plenum chamber out of it. The discharge from the fan is blown partially through the re-heater R, and partially through a by-pass beneath the re-heater, as indicated in elevation in Fig. 9. Here it is forced into the pipes P, which pick up the air and carry it to the various room outlets, the horizontal runs in this particular case being carried in a tunnel beneath the floor of the basement corridor. This is an ideal arrangement, which, however, requires all heat

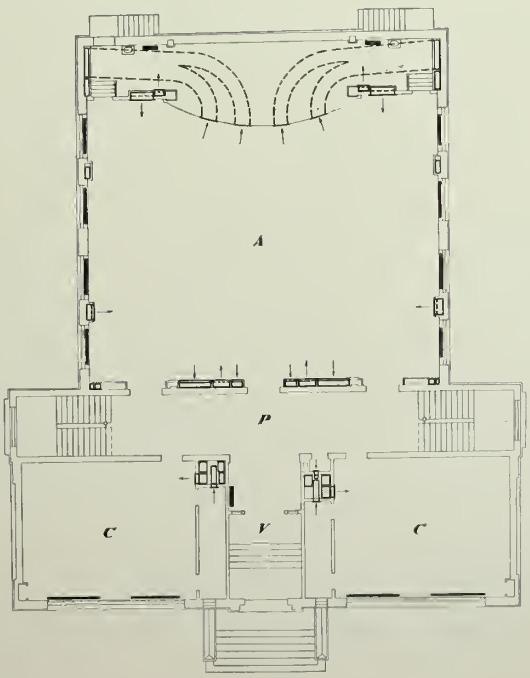


Fig. 7

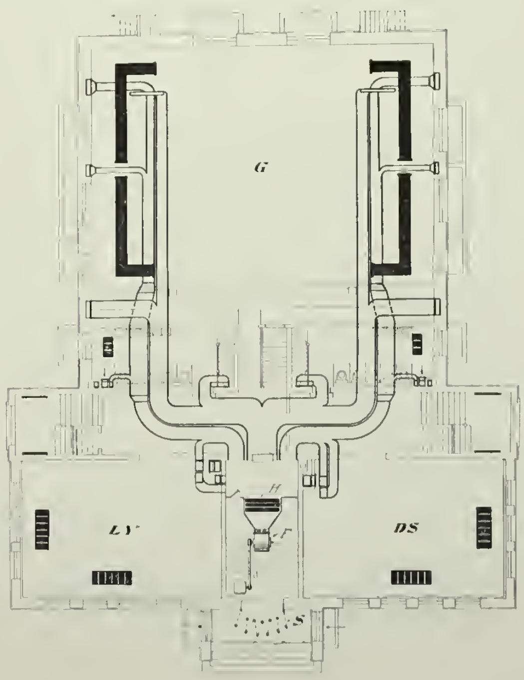


Fig. 8

flues to be carried down to the basement floor instead of stopping off at the basement ceiling as is customary.

The respective ducts obtain individual temperatures by the amount of hot and tempered air admitted by the dampers D. These dampers are governed by a thermostat located in the room which the duct supplies, and thereby determining the temperature of the air entering the room.

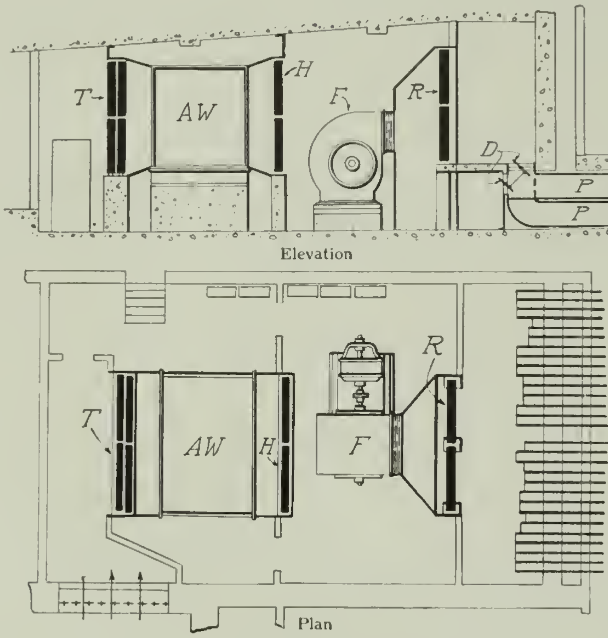


Fig. 9

The architect will undoubtedly at once question the cost factor on these more or less ideal systems of heating and ventilation. The most approved system — including air washers, heaters, and fans of sufficient capacity to supply every pupil in every class room with 30 cubic feet of air per minute, and to give every seat in the auditorium 20 cubic feet per minute, besides supplying anywhere from four to ten changes of air per hour, as may be required in the various other rooms throughout the building — will cost from 2.1 cents to 2.8 cents per cubic foot, according to the amount of horizontal run and other variable factors, the average for a large number of schools approximating 2.4 cents per cubic foot.

It is often considered advantageous to install an auxiliary system of direct radiation, but many architects are opposed to the use of direct radiation in a building where air is supplied for ventilation, arguing that it is much cheaper to increase the temperature of the entering air by adding a few more sections on the heater than it is to carry steam pipes throughout the building and to install anywhere from two to six or eight radiators per room.

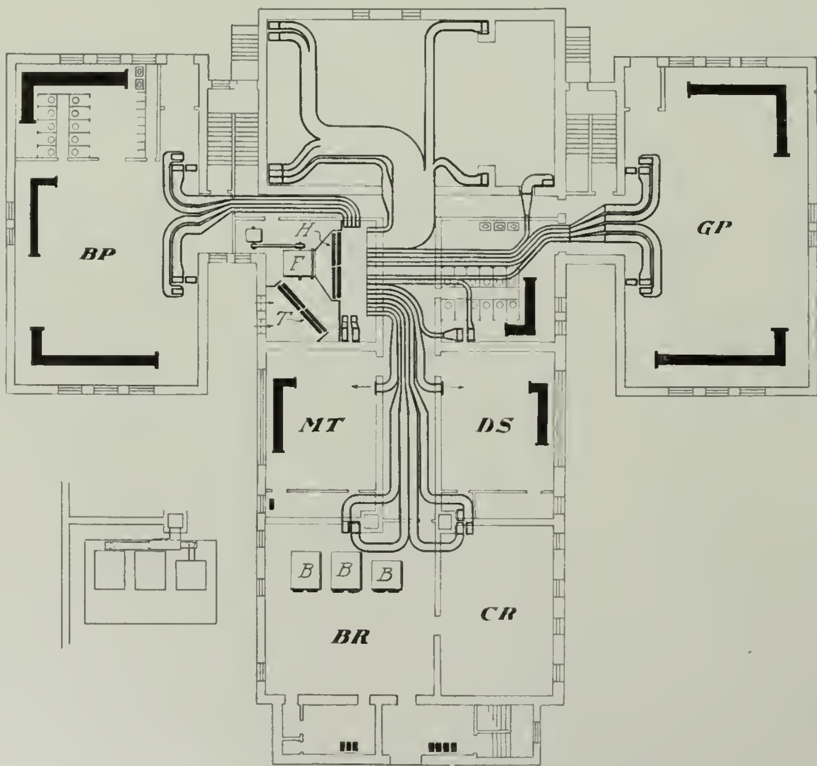


Fig. 10. Showing Arrangement in Basement of an Individual Duct System

As far as first cost is concerned this is entirely correct, but the operating cost is excessive, owing to the large power bills which are incurred during the periods when the school is not in use, during which periods, however, heat is necessary to afford protection against the danger of freezing.

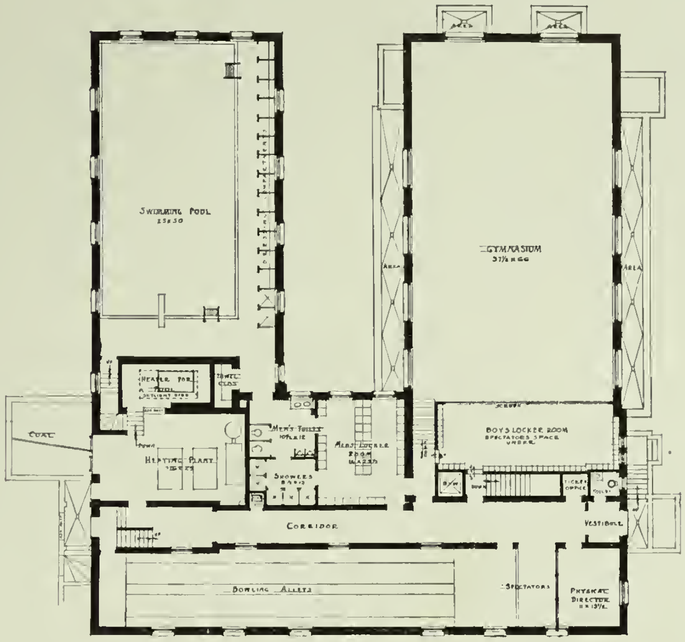
With direct radiation installed in the rooms no electric power need be expended from Friday afternoon until the following Monday morning, the temperature in the building in the meantime being maintained by the direct radiators without ventilation. When the hot blast system is used alone, either cold outside air must be heated and driven within the building in order to maintain the required temperature, or a by-pass must be arranged from the vent fan into the supply fan so as to revolve the air without the use of an outside connection during this period. This by-pass is sometimes not only difficult to obtain, but where the vent fans are located on the roof, or in the attic space, is absolutely impossible.

It is, moreover, very undesirable to use the hot blast system for heating such rooms as toilets, vestibules, kitchens, lunch rooms, and, in fact, any rooms from which there is a possibility of odors being spread throughout the building.

Since it is necessary, therefore, to install *some* direct radiation and to run steam supply and return mains for the heating of these particular rooms, it does not require an excessive amount of additional piping to locate the risers so that they may feed radiators in every room. It is certain that the interest on the additional expenditure involved by this installation would not be as great as the expense incurred in using power to run the hot blast system when it is being operated for the purpose of maintaining a satisfactory temperature during the period intervening between sessions.

Church Club House, St. Paul, Minn.

FREDERICK H. BROOKE, *Architect.*



Basement Plan

THE Church Club House, which is illustrated here and which has recently been completed in St. Paul, is the outgrowth of a demand for a building to serve the social needs of the very large number of young people in that section of the city commonly known as the "Hill District." Although there were enough good homes, churches, and schools in this district, there was not one public building equipped to offer a place for legitimate amusement and needful recreation. This building was planned to provide such equipment in the community, and thus keep the young people in the wholesome environment of their own neighborhood.

Athletic activities are given their due importance, the space devoted to them occupying the entire basement, in addition to a special wing one story in height. This wing is occupied by the swimming pool, which is 25 by 50 feet, and has a depth of water ranging from 4 to 8 feet. Along one of the side walls are private dressing compartments and a few showers. The other wing of the basement is taken up by the gymnasium, while between the two wings are the lockers and showers. In order to get the necessary height to the "gym" ceiling, the floor of that part is lower than in the rest of the basement. At one end is a space for spectators and above this are the boys' lockers. Across the front of the building are the bowling alleys and the office for the physical director. The heating plant and its accessories are also on this floor. A dumb waiter connects the gymnasium with the kitchen above so that large banquets are possible, while direct access to the outside

Church Club House, St. Paul, Minn.
Frederick H. Brooke, Architect

by a separate vestibule and stairway makes it possible to use this part of the building independently of the rest.

The principal part of the main floor is given to the auditorium, which, with the gallery, seats about 550 persons. At the end is a good sized stage and four complete dressing rooms, through which are the necessary emergency exits. The kitchen is on this floor and is directly connected to the auditorium by the serving room. Here again the plan has been so arranged that this particular part may be used without interfering in any way with the other activities of the building, and for this purpose a special lobby is provided with ticket office and coat room.

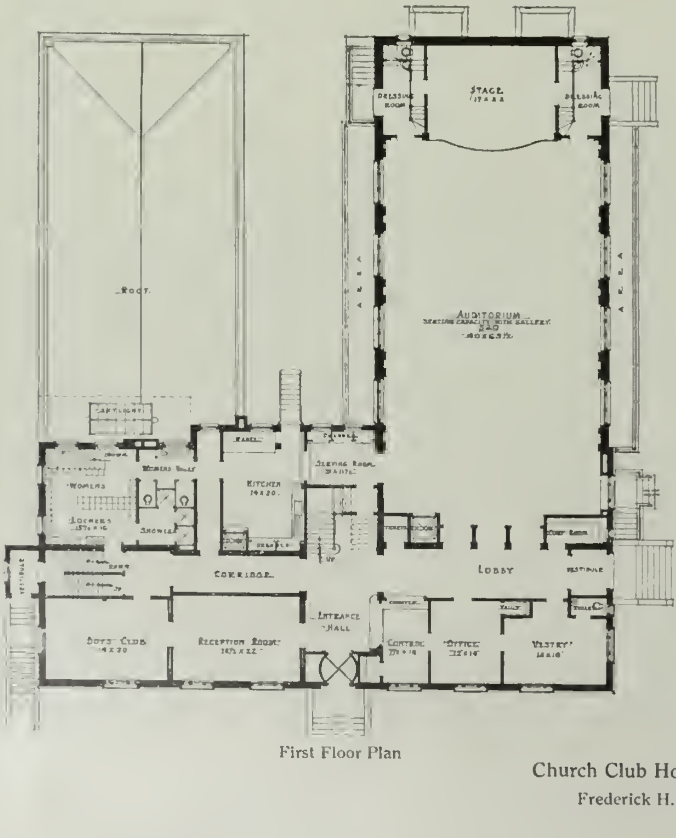
Auditorium, Looking Towards the Stage

From the front of the building one comes through the main entrance into the main corridor, which gives easy access to the offices, reception room, and boys' club room. The women's lockers are on this floor and are connected by a stairway with the swimming pool below, thus making it possible to use the pool for men or women independently as desired.

The second floor is taken up largely with the upper part of the auditorium and the gallery. Several rooms are provided for the use of committees and organizations and a special room for the men's club. Again a dumb waiter connects this floor with the kitchen and makes it possible for the women's or girls' organizations to use their own rooms for gatherings where refreshments can be served.

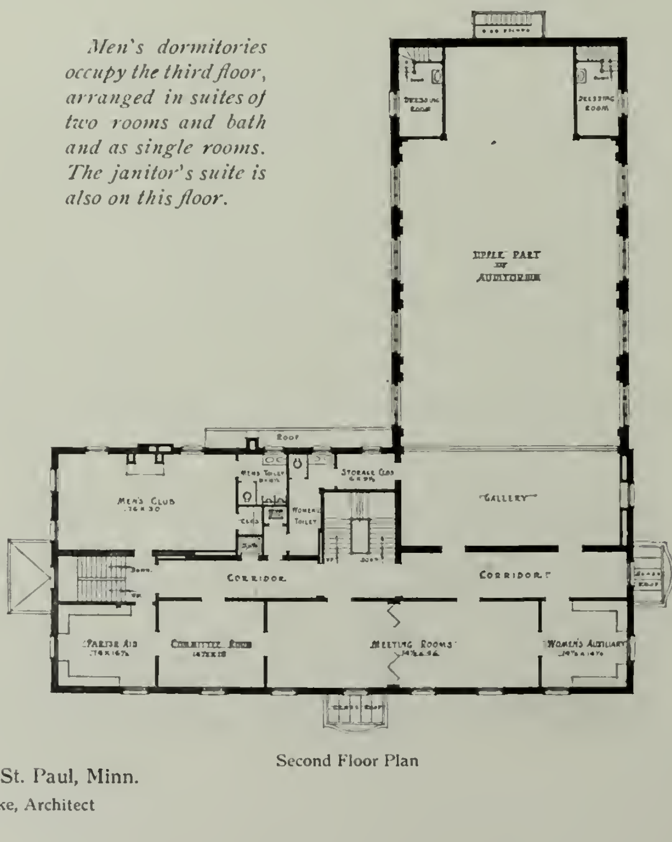
The interior is simple and direct in its general finish. A good deal of character has been given to the auditorium by a simple use of plaster pilasters and paneled ceiling and a wainscoting of fumed oak, which is carried around the room at the height of the bases of the pilasters.

The exterior is of brick with granite basement story and marble trimmings. Considerable interest is given to the brickwork by the use of panels of patterns and spots of marble inserts. Iron marquises mark the principal entrances. The façades express the plans in a logical manner. The large windows of the auditorium form a unit of composition which is differentiated from the rest of the building by a slight break in the wall. The importance of the first floor is echoed in the window treatment of brick arches filled with brick patterns. By treating the wall surfaces between the windows of the third floor with brick patterns, and by projecting a brick belt course just below the sill line, a frieze has been formed which caps the other two stories and at the same time expresses the different character of the dormitory floor. The widely projecting cornice and tile roof add to this subordination of the third floor and complete the composition in a satisfying manner.



First Floor Plan

Men's dormitories occupy the third floor, arranged in suites of two rooms and bath and as single rooms. The janitor's suite is also on this floor.



Second Floor Plan

Church Club House, St. Paul, Minn.

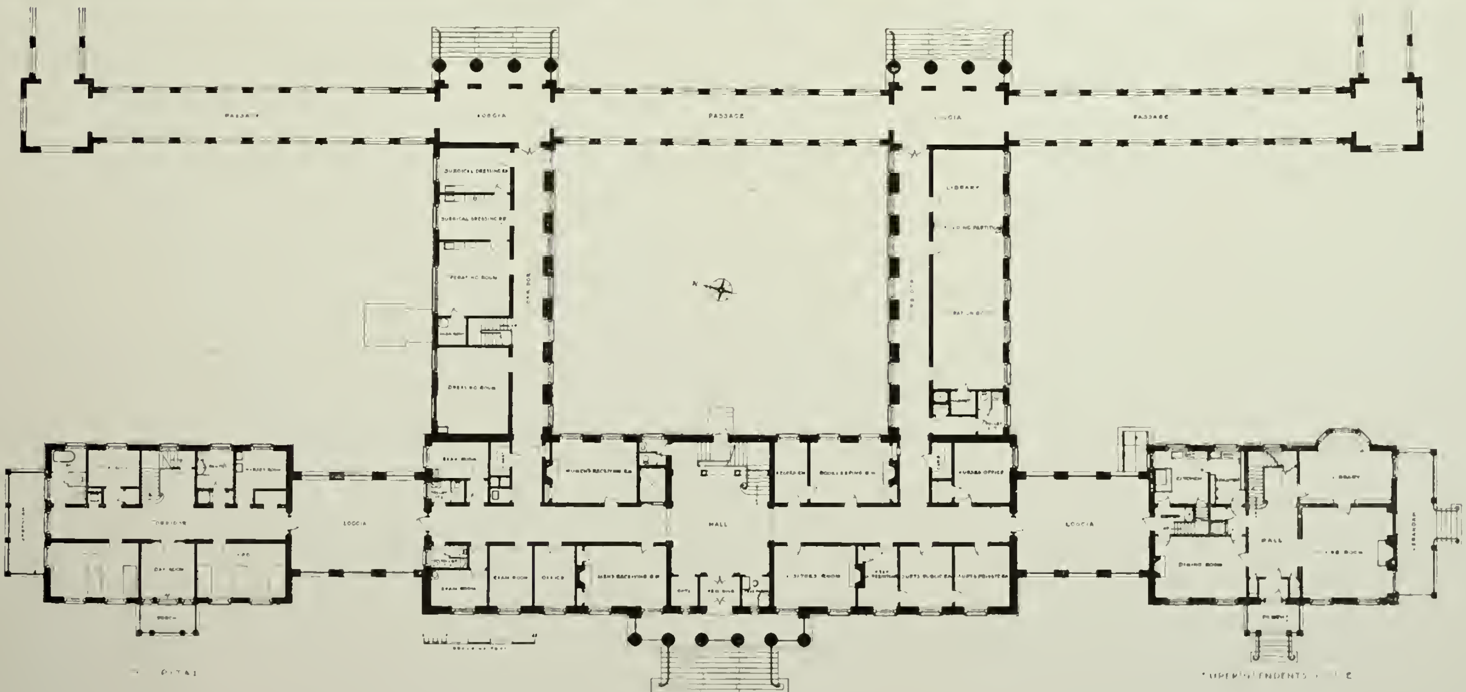
Frederick H. Brooke, Architect

ADMINISTRATION BUILDING FROM THE SOUTHWEST

WINIFRED MASTERSON BURKE RELIEF FOUNDATION, WHITE PLAINS, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS

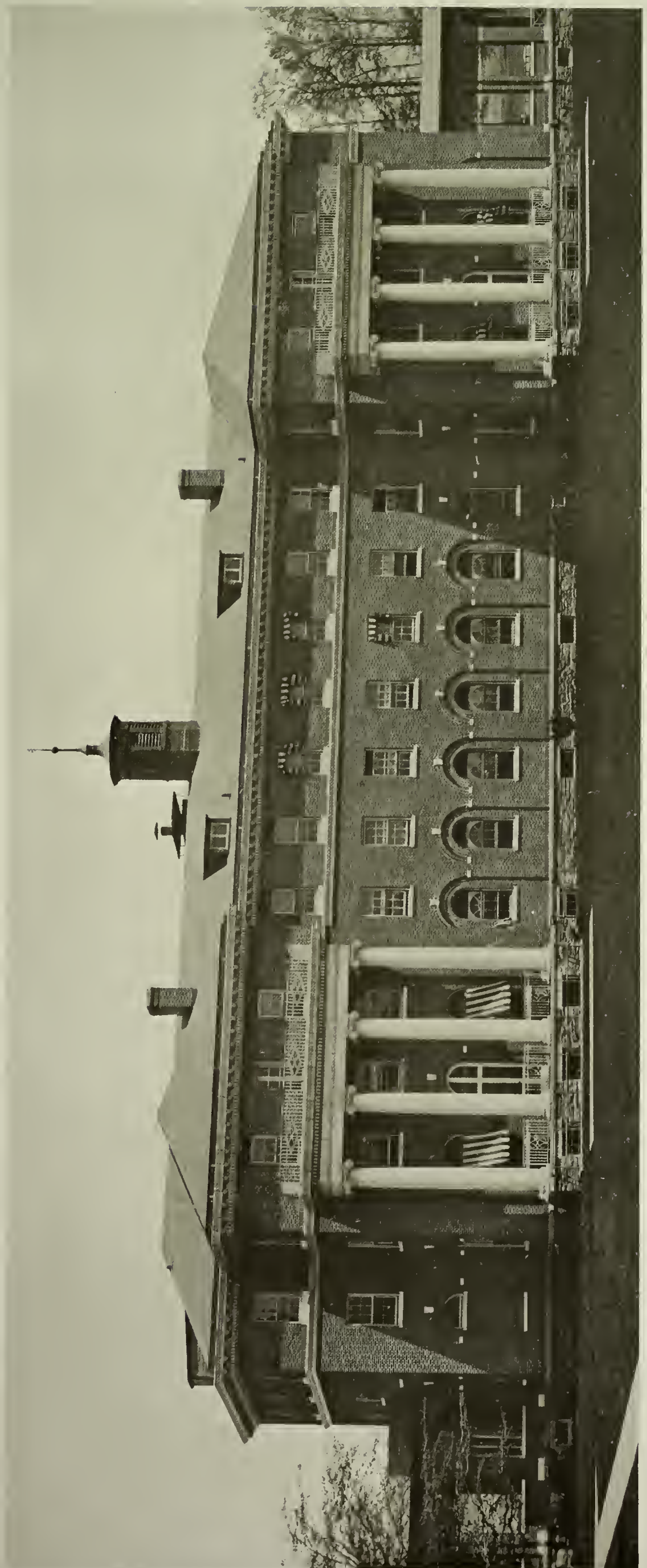
QUADRANGLE FACADE OF ADMINISTRATION BUILDING



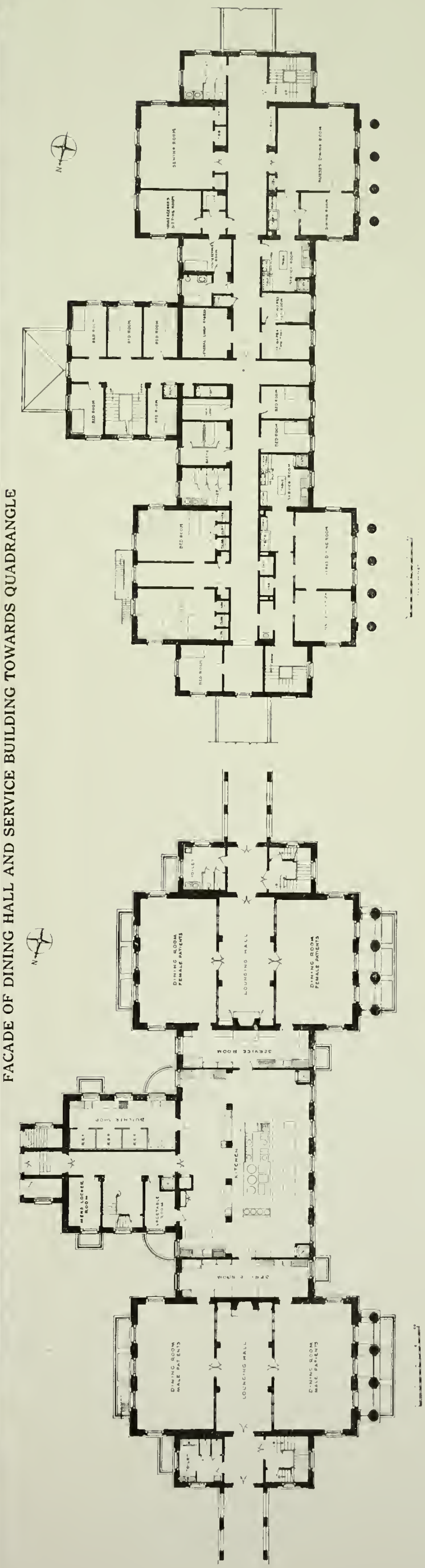
FIRST FLOOR PLAN OF ADMINISTRATION GROUP

WINIFRED MASTERSON BURKE RELIEF FOUNDATION, WHITE PLAINS, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS



FACADE OF DINING HALL AND SERVICE BUILDING TOWARDS QUADRANGLE



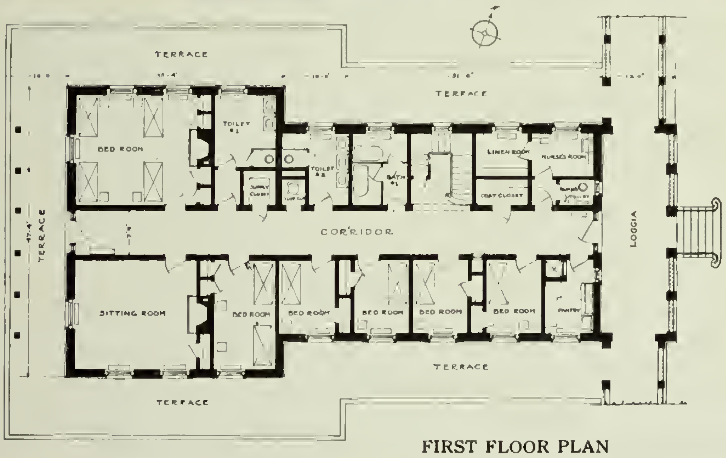
FIRST FLOOR PLAN

SECOND FLOOR PLAN

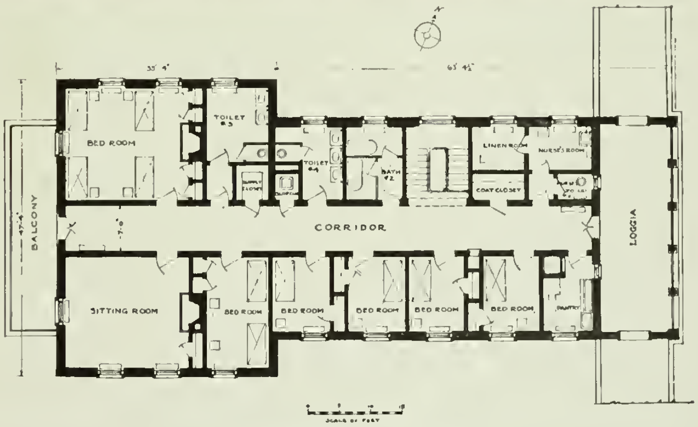
WINIFRED MASTERSON BURKE RELIEF FOUNDATION, WHITE PLAINS, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS

VIEW FROM THE SOUTHWEST



FIRST FLOOR PLAN



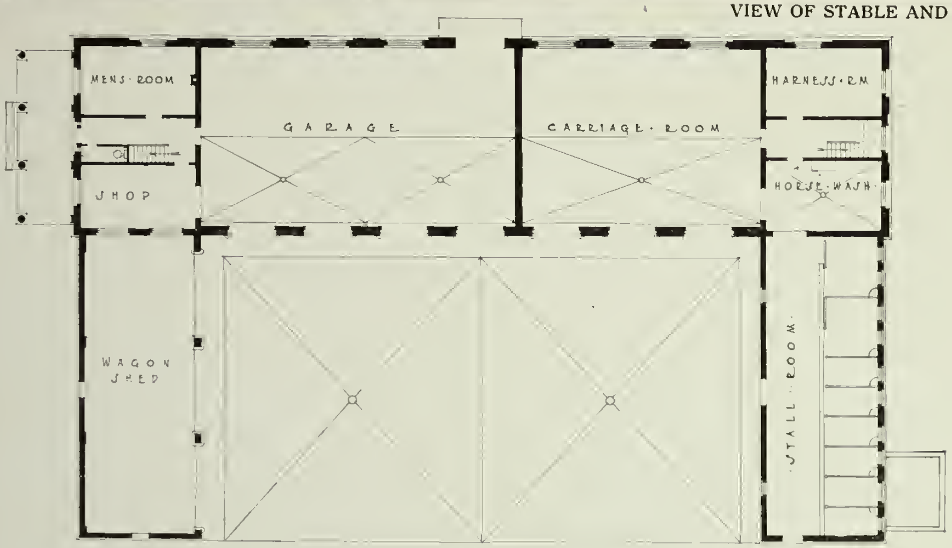
SECOND FLOOR PLAN

GROUP OF TYPICAL PATIENTS COTTAGES FROM QUADRANGLE

WINIFRED MASTERSON BURKE RELIEF FOUNDATION, WHITE PLAINS, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS

VIEW OF STABLE AND GARAGE FROM THE SOUTH

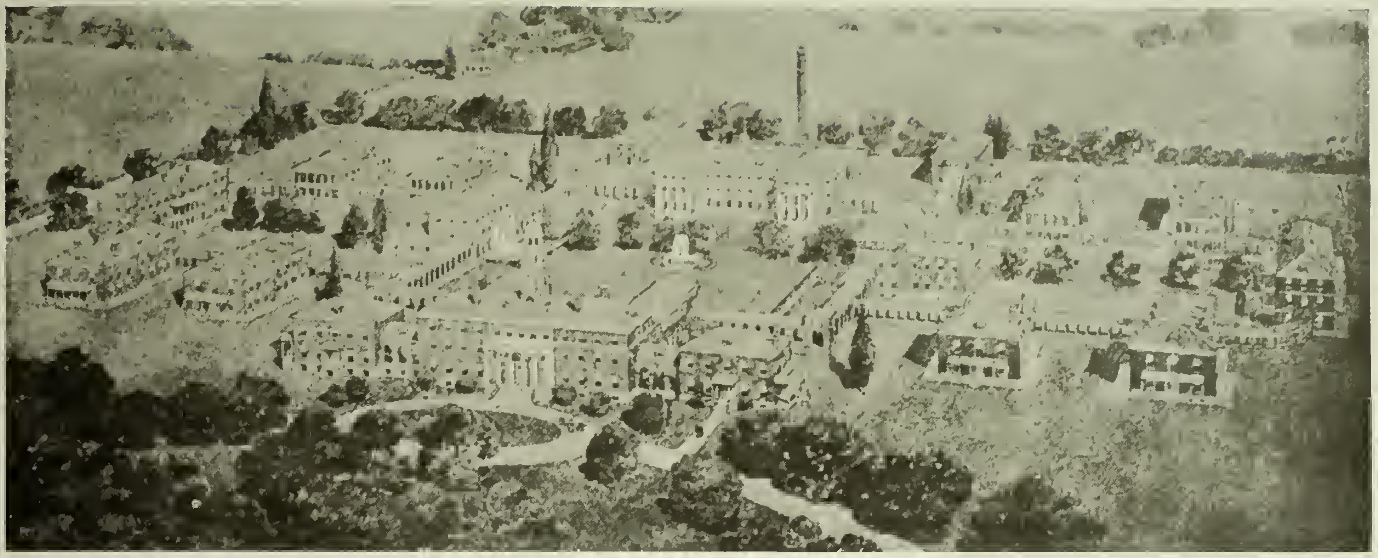


FIRST FLOOR PLAN

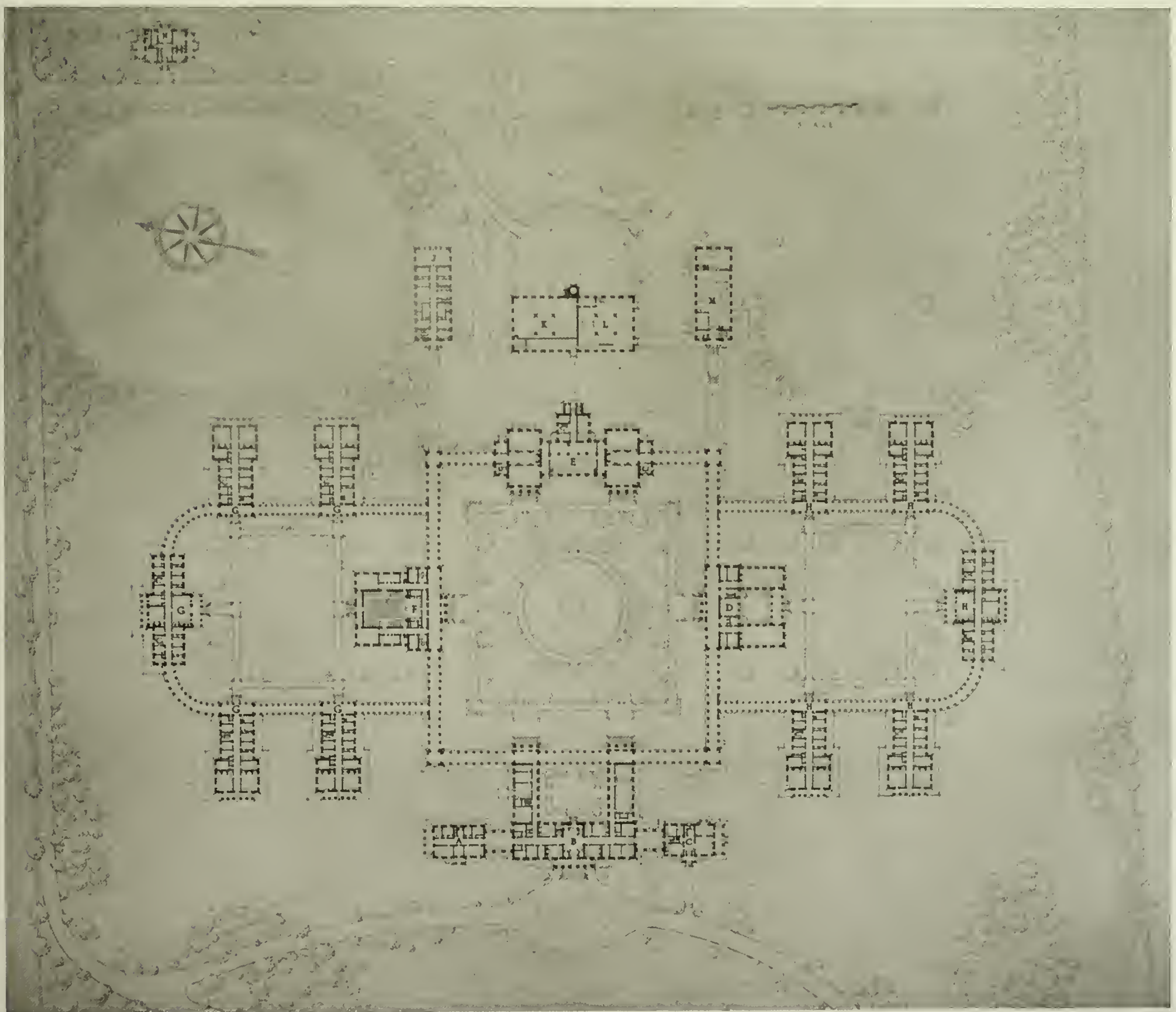
SECOND FLOOR PLAN

WINIFRED MASTERSON BURKE RELIEF FOUNDATION, WHITE PLAINS, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS



BIRD'S-EYE PERSPECTIVE VIEW



GROUP PLAN

A HOSPITAL
B ADMINISTRATION BUILDING
C SUPERINTENDENT'S HOUSE
D NURSES' HOME
E DINING HALL AND SERVICE BUILDING
F ASSEMBLY HALL
G MALE PATIENTS' COTTAGES
H FEMALE PATIENTS' COTTAGES
J ISOLATION BUILDING
K BOILER ROOM
L ENGINE ROOM
M LAUNDRY
N OVERSEERS' HOUSE

WINIFRED MASTERSON BURKE RELIEF FOUNDATION, WHITE PLAINS, N. Y.

McKIM, MEAD & WHITE, ARCHITECTS

DETAIL OF PRINCIPAL FACADE

CRAIG APARTMENTS, 58TH STREET AND MONROE AVENUE, CHICAGO, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

GENERAL VIEW OF THE PRINCIPAL FACADE

BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

CRAIG APARTMENTS, 58TH STREET AND MONROE AVENUE, CHICAGO, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

GENERAL VIEW

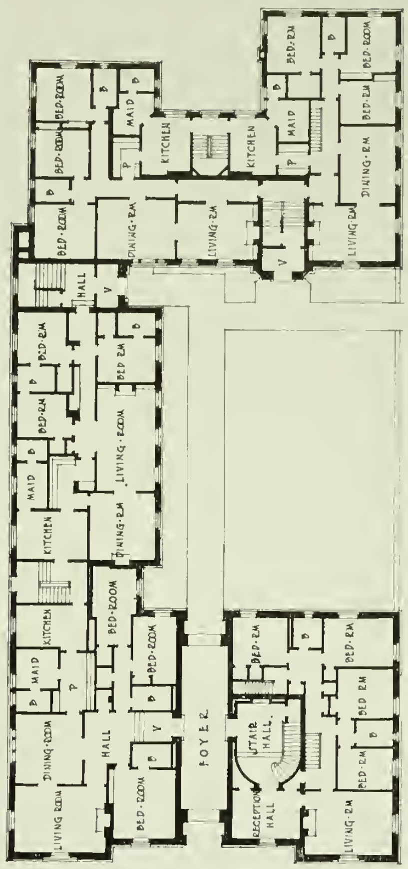
VIEW OF OPEN COURT

APARTMENT HOUSE, NORTH STREET, BUFFALO, N. Y.

GREEN & WICKS, ARCHITECTS

THIRD FLOOR PLAN

SECOND FLOOR PLAN

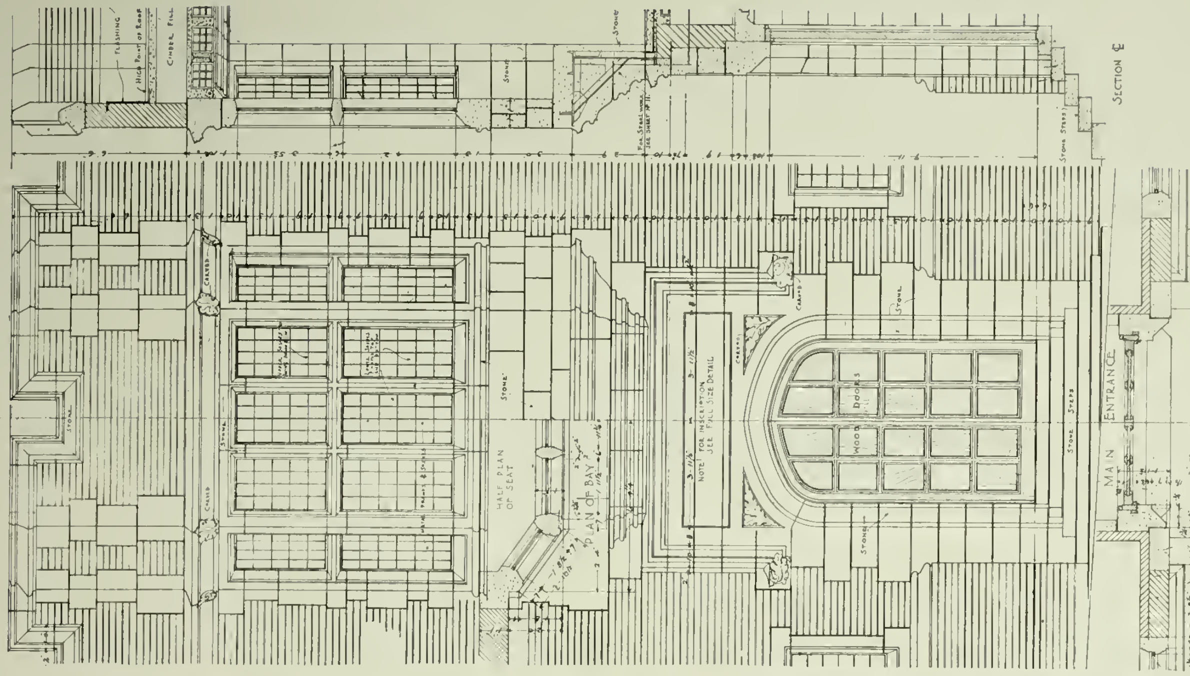


FIRST FLOOR PLAN

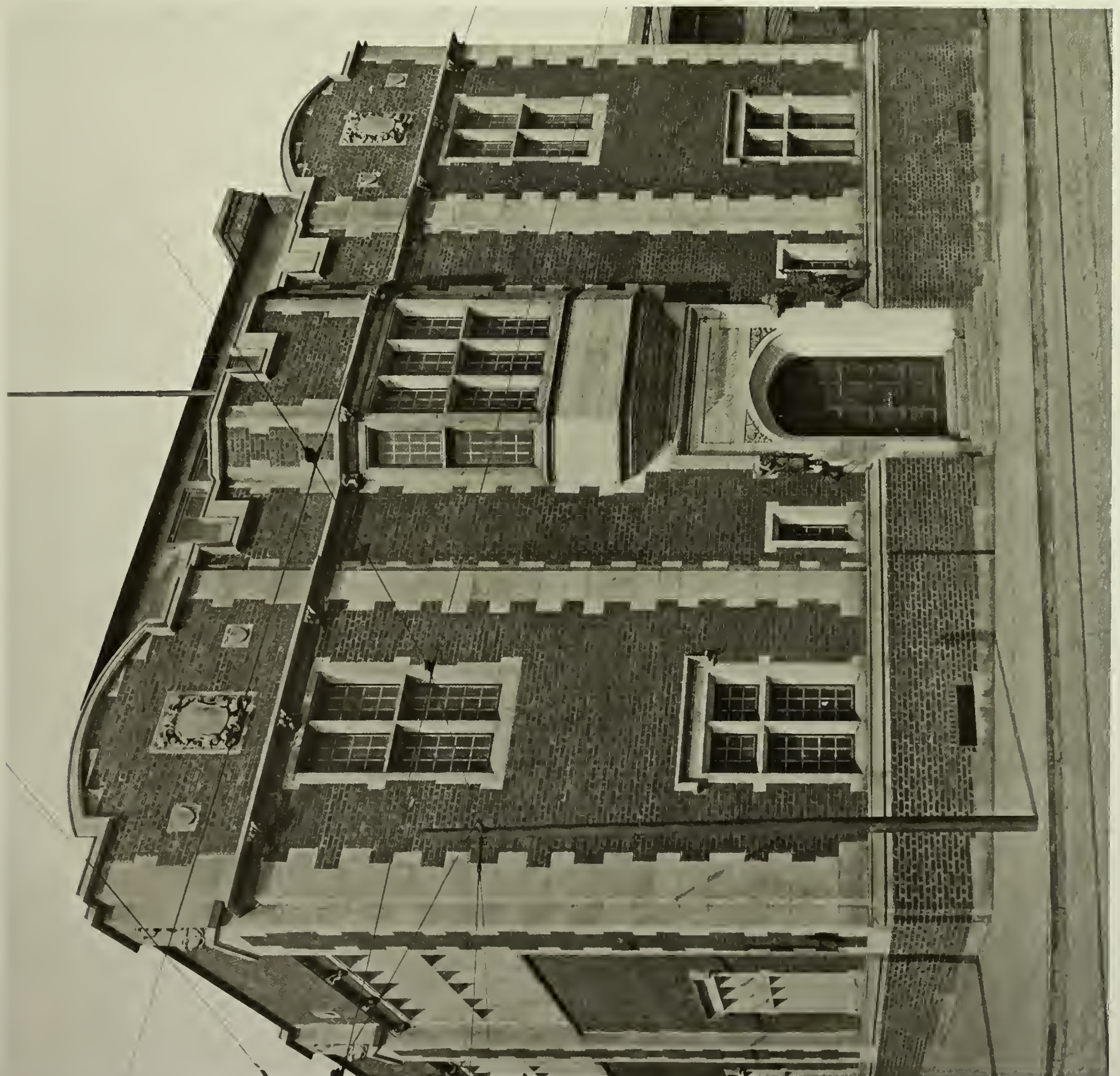
DETAIL OF NORTH STREET ENTRANCE

APARTMENT HOUSE, NORTH STREET, BUFFALO, N. Y.

GREEN & WICKS, ARCHITECTS



DETAIL OF ENTRANCE AND BAY

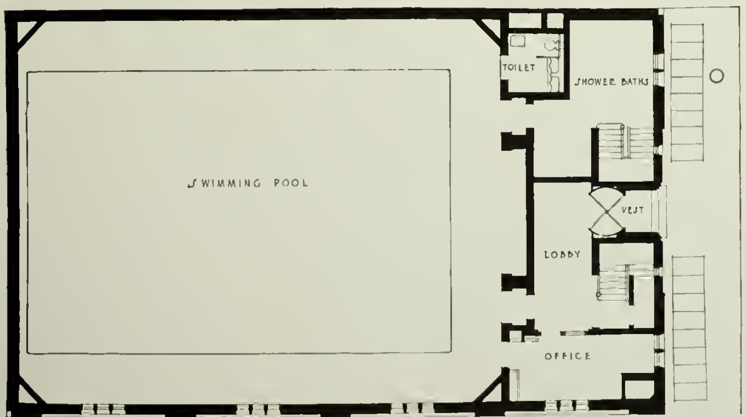


PRINCIPAL FACADE

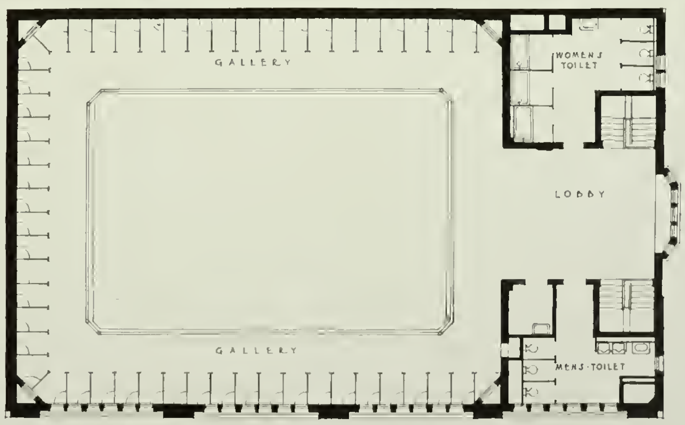
SOUTH SIDE BATH HOUSE, PITTSBURGH, PA.

MacCLURE & SPAHR, ARCHITECTS

SWIMMING POOL



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SOUTH SIDE BATH HOUSE, PITTSBURGH, PA.

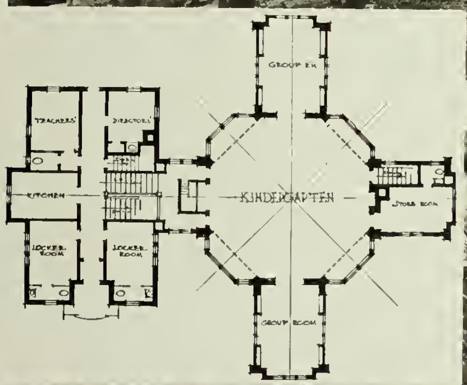
MacCLURE & SPAHR, ARCHITECTS

DETAIL OF GROUP ROOM WING

DOWNERS GROVE KINDERGARTEN, DOWNERS GROVE, ILL.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS

VIEW SHOWING ENTRANCE



GENERAL VIEW

DOWNERS GROVE KINDERGARTEN, DOWNERS GROVE, ILL.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS

TWO VIEWS IN CENTRAL KINDERGARTEN ROOM

VIEW OF A GROUP ROOM

DOWNERS GROVE KINDERGARTEN, DOWNERS GROVE, ILL.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS

Plumbing Installation and Sewage Disposal.

IV. MECHANICAL APPLIANCES USED IN PLUMBING SYSTEMS AND THE GENERAL PRINCIPLES OF SEWAGE DISPOSAL.

By CHARLES A. WHITTEMORE.

IT IS sometimes necessary in the case of high buildings, when the city water pressure is quite low, to establish a forced circulation of either hot or cold water. To accomplish this end, pumps of various types are installed in the system so that the water coming from the service mains is either forced directly through the plumbing system or lifted to a suitable tank and from this point distributed by gravity to the various fixtures. The latter method is usually preferable in that it maintains an ample reservoir and supply of water in case of accident to the pumping plant. The water is kept at a constant pressure and the pulsations of pump action are not so noticeable.

Recently the opposition to maintain large volumes of water in tanks above the roof has assumed proportions demanding consideration. It is obviously a potential menace, and for this reason a pumping system which can do away with the overhead tanks is desirable.

The type of pump is determined largely by the duty imposed upon it and ranges from the steam turbines or electrically driven pumps to the smaller inspirator types. In the steam turbines a capacity of many thousand gallons a minute can be obtained and pressure made to suit the conditions.

It is hard, therefore, to lay down an established rule to determine the character of a pump for a special condition. The architect should decide this matter by making a personal investigation into the individual requirements of each case. In some cases an electrically driven pump of a smaller size would be perfectly suitable. In other cases a small, water force pump will give the requisite service. In large buildings where a power plant is operated, a steam driven pump can be operated at a low cost. Obviously it would be impossible to operate a steam pump from a low pressure system unless the demand on the pump is small. Electrically driven pumps in the majority of cases are operated at less expense and at a lower repair and maintenance cost.

In the handling of sewage the conditions are of such a different character that the problem of pump installation becomes almost a special study. Many of the large buildings, — hotels, theaters, etc.,— in order to develop suitable space below the street level, require plumbing equipment installed at a point below the normal grade of the sewer in the street. In such cases pumps of a special nature must be installed to raise the sewage from the low point of the system to the main sewer. This is usually accomplished by an arrangement of pumping or lifting devices known as an "ejector."

In connecting ejectors of any type into a system, particular care should be taken that the soil and plumbing lines, on which the ejector is connected, should be vented separately through the roof, and also that the connection from the ejector should be made on the sewer side of the house trap, if a house trap is installed.

Ejectors may be divided into two types, — the air compressor type and the centrifugal pump type. In the type in which an air compressor is used, the drains and soil pipes all deliver into a tight iron tank from which the outlet extends to the level of the sewer. In this tank is installed a float which, upon reaching a certain fixed point, due to the rise of material in the tank, opens a relief valve and allows the compressed air to enter the tank compartment. The force of this air pressure blows out all of the material from this compartment into the sewer. Check valves are installed on the various inlet pipes to prevent the air pressure from forcing the contents of the tank backward into the main soil pipes in the building, and a check valve also is placed on the discharge pipe to prevent any return flow from the discharge pipe into the tank after the air pressure has been stopped. In connection with this type of installation, it is necessary to install an air tank, in which the air may be maintained at a constant pressure; the pumps to maintain this pressure and to supply compressed air after each discharge of the apparatus. In this particular type a stage of perfection has been reached which is highly desirable in mechanical appliances of this kind, and after an installation has been completed it requires very little care and attention.

The centrifugal type of sewage ejector consists of a tank, or receptor, into which the sewage is discharged from the fixtures. A float, rising under the influence of the water in the tank, operates a starting switch which, in turn, actuates the motor; this motor, driving a centrifugal pump, raises the water from the tank level to the level of the street. These pumps are designed in various sizes to suit the lift of the water — that is, the distance from the tank to the street sewer — and are made in single and duplex units.

The simplest form of centrifugal pump is frequently called a bilge pump and consists merely of the motor, the centrifugal pump itself, and the tank cover. In an installation of this kind the tank is frequently a cement pit over which a tight cover is placed and a motor mounted upon it.

In the duplex unit, in which there are two pumps and two motors, the motors themselves are placed above the cover in the same manner as in a single unit, but the pumps are mounted outside of the iron casing in an open space which is accessible and available for use to carry off surface water or to act as a cellar drainer. This type is far superior to the single unit type and is more easily cleaned and operates at a low cost.

In either the compressed air or the centrifugal type the time consumed in discharging the normal tank is about 50 seconds, and represents a capacity of approximately 100 gallons.

Cellar drainers are devices usually installed in connection with a boiler room or a particularly low portion of the

FLOOR PLANS OF HOUSE SHOWN BELOW

GENERAL VIEW

FLOOR PLANS OF HOUSE SHOWN BELOW

TWO SMALL HOUSES AT ERIE, PA.
FRANK B. MEADE, ARCHITECT

Design and Construction of Roof and Wall Trusses.

V. THE HAMMER BEAM AND SCISSORS TYPES OF TRUSSES. (Concluding paper.)

By MALVERD A. HOWE, C.E.

Director Architectural and Civil Engineering Departments, Rose Polytechnic Institute.

THE skeleton frame of a typical hammer beam truss is shown in Fig. 103. The introduction of other pieces in the frame merely adds to the stiffness of the structure, the principal work of carrying stresses being performed by the members shown.

The behavior of this truss under loading is very similar to that of the "A" truss, and therefore for spans for which it is generally used it is not feasible to construct the truss on supports which are unable to take care of the horizontal thrusts.

In the following analysis of the stresses it will be assumed that the supporting points A and B remain unchanged in their relative positions and that there are no bending moments at these points. If now the assumption is made that there are no bending moments at the joints E and F, the directions of the reactions at A and B become fixed. The left reaction will pass through A and E, and the right reaction through B and F. Any loading below E and F is assumed to be transferred by rafters to the wall and the purlins resting at E and F. *These assumptions can be used only for symmetrical loading.* Fig. 104a shows the stress diagram for the truss and loading shown in Fig. 104. The horizontal thrust at A and B (Fig. 104) equals MK as scaled from Fig. 104a. It is evident that this thrust becomes smaller and smaller as the vertical distance between A and E increases.

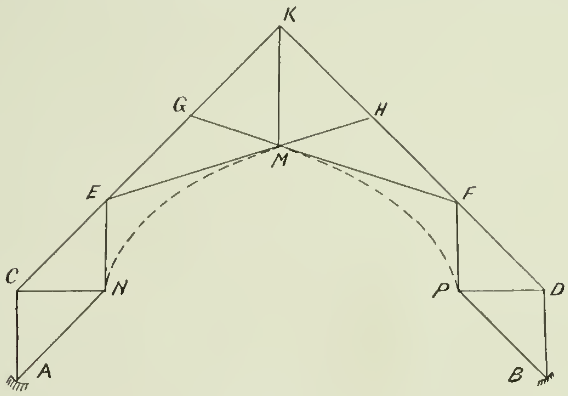


Fig. 103

For unsymmetrical loading the connections at E and F cannot be assumed as pinned. Following the method pursued in the consideration of the "A" truss, the horizontal thrust for an unsymmetrical vertical loading is assumed to be one-half that for twice the loading symmetrically placed. The magnitude of this thrust is found by constructing a figure similar to Fig. 104a and taking one-half of MK as found.

For an unsymmetrical horizontal loading the horizontal thrust at each support is assumed to be one-half the total horizontal loading.

The vertical reactions for an unsymmetrical loading are the same as for any simple truss on two supports.

The outside forces acting on the truss are now fully determined. The direct stresses in the truss members can be found by the method of moments.

The maximum bending moments in the rafters occur at E and F, and, if the rafters are not sufficiently strong to carry these moments and such direct stresses as may occur, they must be reinforced by extra timbers, or by knee braces, which are usually curved. It is better practice not to place any dependence upon knee braces or curved struts.

To illustrate the method by an example, take the truss shown in Fig. 105. The truss has a span of 60 feet, a rise of 40 feet, and supports purlins at E, G, K, H, and F. If the trusses are spaced about 15 feet on centers, the

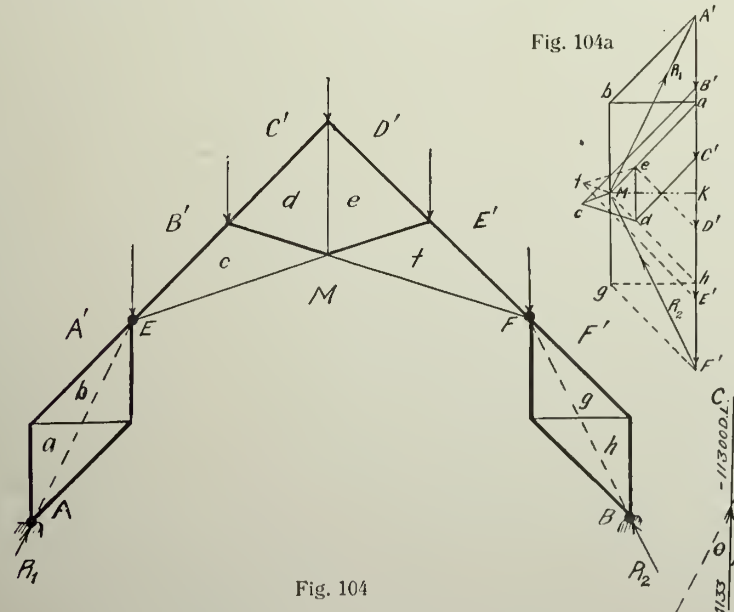


Fig. 104

Fig. 104a

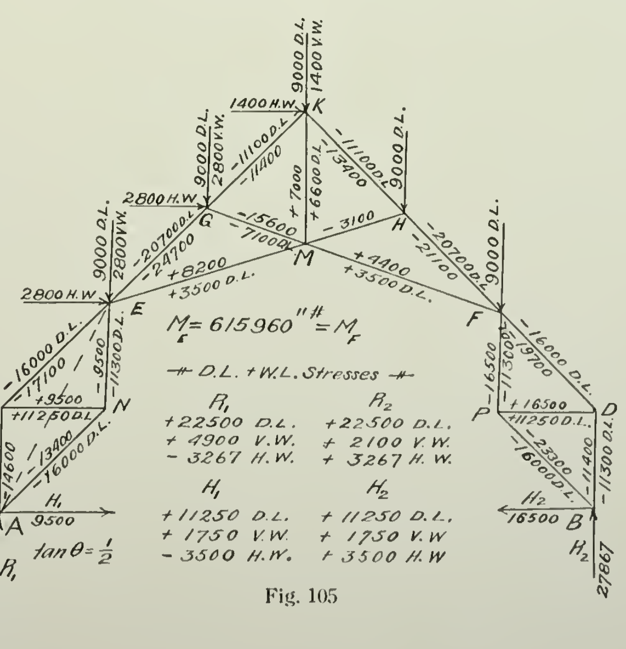


Fig. 105

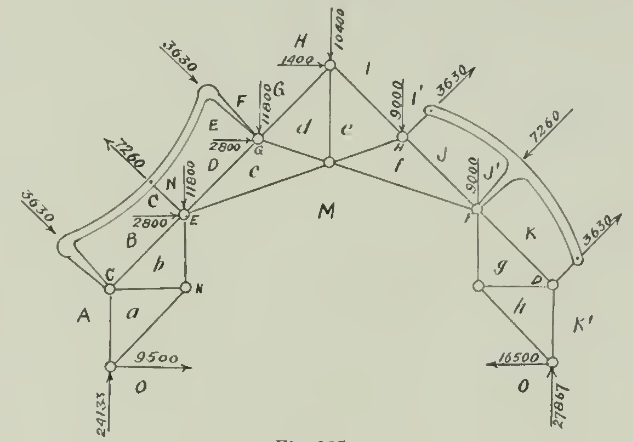


Fig. 105a

dead load at each apex will be about 9,000 pounds and the wind load about 4,000 pounds. For the wind load, 2,800 pounds will be taken for both the vertical and horizontal components.

Considering the dead load alone, the vertical reaction at each support is equal to one-half the total load, or 22,500 pounds. Under the assumption that the directions of the reactions shall pass through A and E on the left and B and F on the right, the horizontal thrust at each support equals 22,500 tan $\theta = 11,250$ pounds.

For the vertical components of the wind forces, the vertical reactions are quickly found by moments,

$$R_1\,(60) = 2,800\,(50 + 40) + 1,400\,(30)$$

or $R_1 = 4,900$ pounds and $R_2 = 7,000 - 4,900 = 2,100$ pounds.

To determine the horizontal thrusts due to the vertical components of the wind forces, place an equal number of equal and symmetrical loads on the truss. Then the vertical reaction at each support is 7,000 pounds and the corresponding horizontal thrust is 7,000 tan $\theta = 3,500$ pounds. Since one-half of the loading produces one-half the thrust, the true horizontal thrust produced by the vertical components of the wind forces is 1,750 pounds at each support. These act in the same directions as the thrusts produced by the dead load.

The vertical reactions produced by the horizontal components of the wind loads are found by moments,

$$R_1\,(60) = 2,800\,(20 + 30) + 1,400\,(40),$$

or $R_1 = 3,267$ pounds acting *downward* and $R_2 = 3,267$ pounds acting *upward.*

According to assumption, the horizontal thrusts are each equal to one-half the total horizontal load, or 3,500 pounds, and both act from the right towards the left.

The final reactions at each support are shown in Fig. 105.

The bending moments at E and F are produced by the wind forces alone, and each equals

$$1,633\,(10) + 1,750\,(20) = 51,330 \text{ foot-pounds,}$$

or 616,000 inch-pounds.

The direct stresses in the truss members can be found by graphical methods or by moments. In either method, however, the effect of the bending moments in the rafters must be considered. This can be done by assuming that all joints of the truss are pin connected and that the bending moments are taken by auxiliary beams, as shown in Fig. 105a.

Taking the auxiliary beam on the left, let it be supported at joints C and G and from its center assume a cable running to the joint E. Now assume that the cable is shortened until the center of the auxiliary beam is subjected to a bending moment of 51,330 foot-pounds, the rafter bending moment. Then, evidently, the effect of this bending moment upon the truss is equivalent to applying a force of 3,630 pounds acting downward at joints C and G, and a force of 7,260 pounds acting upward at E, as indicated in Fig. 105a. In a like manner the effect of the rafter moment on the right is found as indicated in the figure. The auxiliary beams can now be removed, leaving the forces just found acting upon the truss, and the stresses found in the various members of the truss by drawing the usual stress diagram as shown in Fig. 105b.

If the method of moments is used, the stresses are found in the manner illustrated below.

The stress in CE is found by taking a section cutting the pieces CE and EN (Fig. 105c) and using the point N as a center of moments. The moment force 3,630 pounds found from Fig. 105a must be introduced at joint C.

From Fig. 105c, stress CE (7.07) = 24,133 (10) — 9,500 (10) — 3,630 (7.07), or stress CE = 17,100 pounds com-

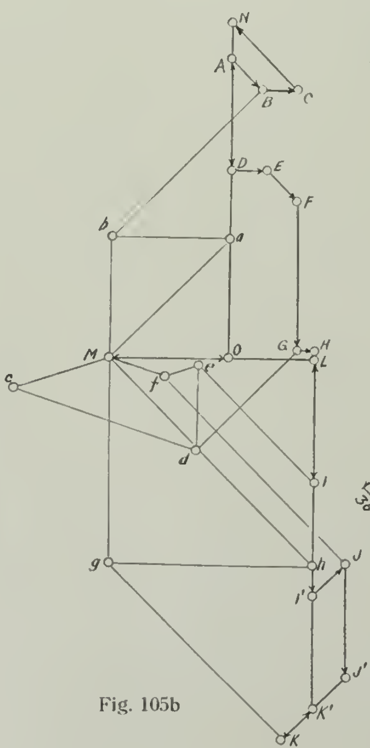


Fig. 105b

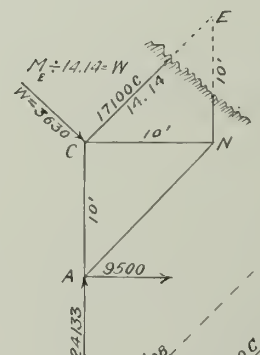


Fig. 105c

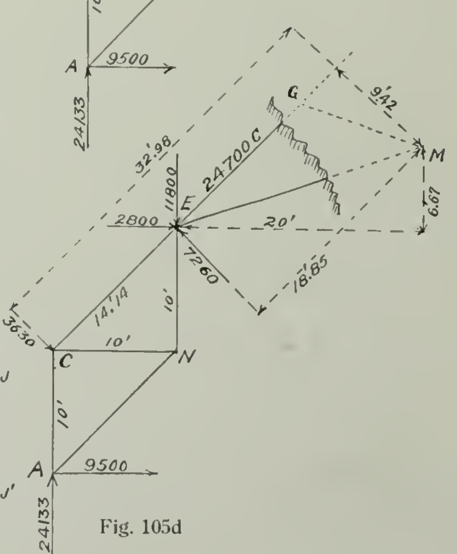


Fig. 105d

pression. In a similar manner the compression in FD is found to be 19,700 pounds.

From Fig. 105d, stress GE (9.42) = 24,133 (30) — 9,500 (26.67) — 2,800 (6.67) — 11,800 (20) — 3,630 (32.98) + 7,260 (18.85), or stress GE = 24,700 pounds compression. In a similar manner the compression in HF is found to be 21,100 pounds.

The magnitudes of these stresses show that the direct stresses may be neglected in proportioning the rafters at points E and F, and only the bending moments considered.

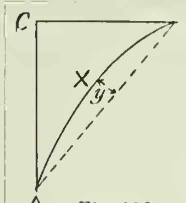


Fig. 106

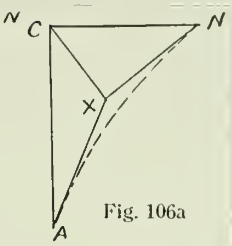


Fig. 106a

Since the bending moments are produced by the wind loads alone, and since these will have a maximum effect only at long intervals, it is permissible to use a fiber stress of at least 1,800 or 2,000 pounds per square inch. Using 1,800 pounds, the section modulus required at E is

$$616{,}000/1{,}800 = 342.2.$$

The nearest commercial size which can be used is a timber 12 by 14 inches (actual size 11½ by 13½ inches). Including a direct compression of 22,900 pounds, the maximum unit stress at E is about 1,900 pounds per square inch. Since some cutting of the rafter will be necessary in connecting the members NE and EM, it will be advisable to use a timber 12 by 16 inches for the rafter, which should be continuous from C to G.

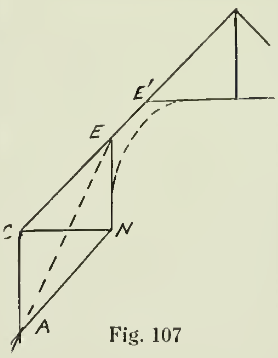


Fig. 107

The member AN is usually curved, and, therefore, must resist not only the direct stress as found when it is straight, but in addition it must be capable of resisting the cross-bending stresses due to its shape. For all practical purposes the following method is sufficiently exact for dimensioning such members.

In Fig. 106, let y represent the middle ordinate of the center line of the curved member and R the stress along the line AN. Then the maximum unit stress in the curved piece must not exceed the allowable unit stress in the piece if assumed as straight. If f is the allowable unit stress, b the breadth of the piece, and d the depth measured in the direction of y, then

$$f = R(d + 6y)/bd^2,$$

or

$$d = \left\{ R + \sqrt{24Rybf + R^2} \right\} \Big/ 2bf.$$

For example, if b = 12 inches, y = 24 inches, f = 1,000 pounds per square inch, and R = 24,000 pounds, d = 18 inches.

This shows that curved members are not economical to say the least. A better arrangement is shown in Fig. 106a, where all of the pieces are straight and can be boxed to give the appearance of a curved brace.

When a curved member is used between N and M (Fig. 105) it is better to ignore it in the determination of stresses.

If the truss has the form shown in Fig. 107, the reactions may be found in the manner explained for Fig. 105, and then the stresses in the various members found by the method of moments.

The methods of analysis for the "A" truss and the hammer beam truss given above are not theoretically exact, but they permit the use of ordinary methods of calculation and lead to results which can be safely relied upon.

THE SCISSORS TRUSS.

The scissors truss, like the hammer beam truss, when on supports which are immovable, has a tendency to push the walls outward when vertical loads are placed upon it. Unlike the hammer beam truss, the members are not subjected to cross-bending stresses. Fig. 108 shows a typical form of this truss. As this truss is often used where the supporting walls are unable to resist horizontal thrusts, the truss must be so designed that the change in the length of the span, due to the changes of length of the individual members, is small. If the change in the length of the span is known, the truss can be framed this amount short of the span desired, and the truss allowed to slip on one support as the loading is placed on the truss until finally the proper span is reached. A better way, however, is to so design the truss that this horizontal deflection is very small — so small, in fact, that it can be neglected. The method of doing this will be illustrated by an example.

Let p = the stress per square inch in any member of the truss produced by a full load;

u = the stress in any member of the truss produced by a load of one pound acting at the left support, which will be assumed to be on rollers and parallel to the plane of the support, usually horizontal;

l = the length center to center of connections of any member of the truss, expressed in inches;

E = Young's modulus of elasticity for the material employed in any member of the truss;

D = the total change in length of span produced by a full load, expressed in inches;

a = the area of the cross-section of any member of the truss, expressed in square inches;

and H = the horizontal force applied at the support necessary to make D = zero, expressed in pounds.

Then $$D = \Sigma(pul/E)$$

and $$H = D/\Sigma(u^2l/aE).$$

Let the truss shown in Fig. 108 have a span of 20 feet and a rise of 10 feet, and, for convenience, let the apex loads be 1,000 pounds, as shown. Assume all members excepting the vertical to be made of white pine timbers, 6 by 6 inches, and the vertical rod to be 1 inch in diameter, upset at the ends. Young's modulus for white pine is about 1,000,000 and for steel 30,000,000. The calculations for D and H are given in tabular form on page 178. From the results of these computations it appears that apex loads of 1,000 pounds produce a horizontal thrust of about 2,000 pounds, if the supports are immovable, or a change in length of span of 5/100 inch if one end of the truss is free to move. These results are true for very small unit stresses, as shown by the values of p in the table.

If the truss in Fig. 108 is assumed to be distant each way from other trusses, 10 feet, the actual apex loads may approach 2,500 pounds each. These will cause a horizontal thrust of about 5,000 pounds, or a change of span of about 13/100 inch. This change of span length is of no importance if the truss is permitted to slip on one support. If the truss cannot slip, then the supports must be capable of taking the horizontal thrust of 5,000 pounds.

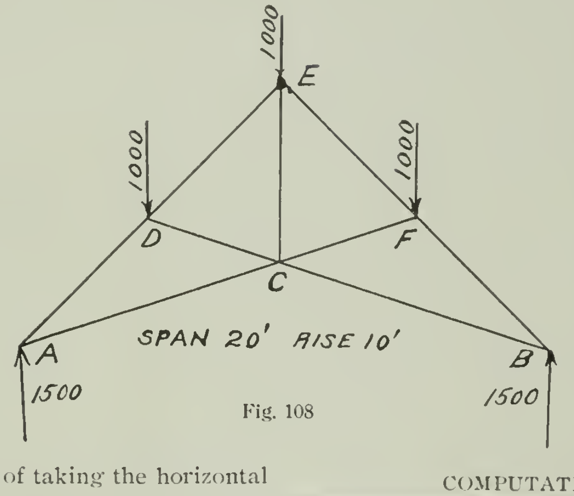


Fig. 108

The members AC and CB are responsible for over 50 per cent of the horizontal deflection and the piece CE for over 13 per cent.

If the small truss used in the example can produce such a large horizontal thrust when the unit stresses in the members are so small, it is quite evident why walls lean outward and roofs sag when scissors trusses are treated as simple trusses on two supports.

In case the span is assumed not to change and the supports resist the horizontal thrusts, the actual stresses in the truss members can be found by the usual graphical methods after the magnitudes of the thrusts have been found as explained above. These stresses are generally quite small and do not call for heavy details at the joints. However, it is best to make the connections relatively as heavy as the members connected.

When the truss is supposed to simply rest on the supports, then the details must be made heavy to avoid yielding in the connections.

With the exception of the connections over the supports, the ideas conveyed by the numerous details given for simple trusses can be used in designing the other connections.

Figs. 109, 110, and 111 show details of connections at the supports which are suitable.

COMPUTATIONS FOR D AND H.

Piece.	Stress Produced by 1,000 Lb. Loads.	a Sq. In.	p Lbs.	u Lbs.	l Ins.	$\frac{pul}{E}$	$\frac{u^2l}{aE}$
AD	— 3,160	36	87.8	— 0.71	84.8	.00528	.00000118
DE	— 2,100	36	58.3	— 0.71	84.8	.00351	.00000118
EF	— 2,100	36	58.3	— 0.71	84.8	.00351	.00000118
FB	— 3,160	36	87.8	— 0.71	84.8	.00528	.00000118
DC	— 800	36	22.2	0	63.2	0	0
AC	+ 2,360	36	65.5	+ 1.58	126.5	.01316	.00000875
CE	+ 1,980	0.785	2522	+ 1.00	80.0	.00672	.00000340
BC	+ 2,360	36	65.5	+ 1.58	126.5	.01316	.00000875
CF	— 800	36	22.2	0	63.2	0	0
						.05062	.00002562
						D	$\Sigma \frac{u^2l}{aE}$

$$H = \frac{.05062}{.00002562} = 1{,}975 \text{ pounds.}$$

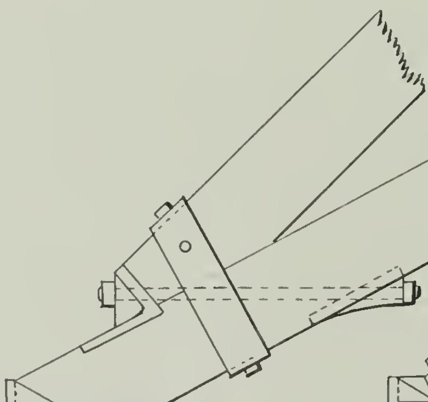


Fig. 109

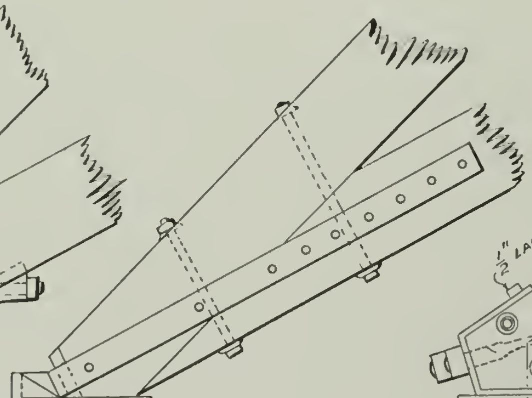


Fig. 110

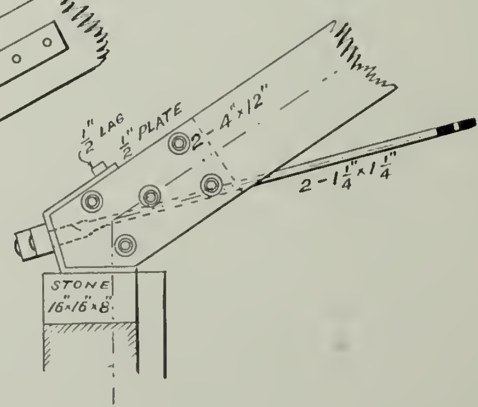


Fig. 111

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

EDWIN HAWLEY HEWITT

EDWIN HAWLEY HEWITT was born in Red Wing, Minn., in March, 1874. After a partial course at Hobart College he entered the University of Minnesota in the sophomore class in 1893, graduating with the degree of A.B. in 1896. He then went to the Massachusetts Institute of Technology, where he studied during the winter of 1896–1897. The next three years were spent in the offices of Shepley, Rutan & Coolidge; Wheelwright & Haven, and others. He was married in 1900 and went at once to Paris, where he entered the École des Beaux Arts in May, 1901. He stood at the head of all the foreigners in the entering class, becoming a member of the Atelier Pascal. In October, 1904, for private reasons, he was forced to return to the United States, but he had completed his work at the École and expected to return there for his diploma. Arriving in Minneapolis, he was almost immediately offered a commission and at once started in on private practice, not having an opportunity to return to Paris for over eight years.

As time went on he realized the importance in architectural work of the allied science of engineering in all its branches, and in September, 1910, he formed a partnership under the name of Hewitt & Brown, architects and engineers.

Mr. Hewitt has always taken the highest interest in all things pertaining to architecture and art, and was most instrumental in the hard work which culminated in the completion of the Minneapolis Institute of Fine Arts. He has also taken a most active part in all things pertaining to the state in artistic lines and is president of the Minnesota State Art Society. He became a member of the American Institute of Architects in 1913, and for the past two years has been the active president of the Minnesota Chapter of the American Institute of Architects.

Mr. Hewitt has taken a leading part in the advancement of all things architectural in the Northwest, and it is largely due to his efforts that the architects of the Northwest are all in close touch and harmony with one another. It is also due to his efforts that the Architectural School of the University of Minnesota has been brought into close touch with the profession and that the architects of the Northwest are taking an active interest in the school work.

He has the rare gift of visualizing a project in its entirety and seeing what is the appropriate and the proper thing for the specific case. —*E. H. B.*

LOUIS CHRISTIAN MULLGARDT

"LOUIS CHRISTIAN MULLGARDT is emphatically an original designer. The freshness of his vision and the novelty of many of his technical expedients will be manifest to the most superficial observer, while at the same time it is equally obvious that his innovations have not been conceived in any perversity of spirit. He is a man who goes his own way, because he has to go his own way."

This, in part, is what Herbert D. Croly, author and editor, wrote of Mr. Mullgardt after he had made a critical study of his work. Mr. Croly's analysis accounts for the originality and beauty of Mr. Mullgardt's "Court of the Ages," and other structures designed by him at the Panama-Pacific International Exposition. The Court of the Ages has commanded such universal expressions of approval by architectural critics and the public in respect to distinctive composition, style, and infinite detail as to ensure its permanency in the annals of architecture.

The work of Mr. Mullgardt consistently divulges its creator's wide versatility. It cannot be classified as belonging to any previous style, but there is something about it, perhaps its very quality, that betrays its authorship.

Mr. Mullgardt came from London to San Francisco in 1905. He is a native of Missouri. His earlier years were spent in St. Louis, where he began the study of architecture. Subsequently he continued his studies in Boston and at Harvard. Following this, he went to Chicago, where he first became engaged as designer of important work. In 1893 Mr. Mullgardt entered private practice in St. Louis. In 1895 he made an extended trip to Europe for further study. In 1902 he was commissioned to go to Manchester, England, and in 1903, to London to execute important work there and in Scotland. The results of his labors for the next two years before coming to San Francisco, could they be noted here in detail, would be most complimentary testimonials of his genius.

To his accomplishments as an architect and sculptor should be added those of artist and writer, he having contributed liberally to magazines, particularly those relating to architecture.

Mr. Mullgardt is president of the California Society of Etchers, vice-president of the San Francisco Society of Artists, director of the San Francisco Art Association, ex-president of the San Francisco Society of Architects, and member of the International Fine Arts Jury of Award of the Panama-Pacific International Exposition. —*W. F. B.*

ALBERT KELSEY

ALBERT KELSEY'S manifold and useful activities would seem to belong to a life begun much earlier than 1870. Born on April 26 of that year, in St. Louis, and resident since boyhood in Philadelphia, he entered upon his architectural apprenticeship when scarcely more than a lad and speedily became active in the community interests of his new world, seizing with avidity upon the opportunities offered by the T Square Club, then newly organized for the benefit of draftsmen. Its atmosphere of enthusiasm undoubtedly gave stimulus and direction to his eager and forceful nature, while the comradeship of older men in the work of the study classes, competitions, and sketching trips became to him an effective course of training in architecture. From this he naturally became a club leader, giving indefatigable service in and out of office. He suggested and was first president of the Architectural League of America, whose work, until the growth of the Beaux Arts Society's atelier system rendered it no longer necessary, was an effective agency for good among younger members of the profession. From this training school to active work in the Institute was a natural transition and to the older organization, especially in its local chapter, Mr. Kelsey has also given unselfish and effective service.

In 1896, as a foreign traveling scholarship holder, he studied town planning while abroad, and returned an ardent propagandist of civic improvement, carrying its doctrines, as a lecturer, far and wide through the country. In 1903 he devised the exhibit on municipal improvement at the St. Louis Fair, after foreign study of the subject as chief of that division, while in Philadelphia the first of the plan schemes for the epoch-making parkway was proposed by him. These manifestations of public spirit find their natural reflex in his private practice, which is marked by a total absence of commercial spirit and a mental attitude of painstaking care, perhaps best illustrated in his Olmsted Monument at Harrisburg and the Philadelphia branch library at 65th street and Girard avenue. In the latter, also, the "thematic" character of the decoration is an index of his conviction that a building should be brought into relationship with its place and people and given root in the soil of their traditions in order that it may tell its story in a living tongue.

Mr. Kelsey's association with Paul Cret upon the Pan-American Building at Washington brought into his life not only its most notable architectural success, — with credit enough to its authors for any three architects, but also its most potent influence in the contacts afforded with Charles F. McKim and Elihu Root, for to these men, he will tell you, he owes his chief inspiration to thoroughness and high idealism. To his intimates "Bert" Kelsey, in spite of his long and strenuous career, is still a boy at heart, with a boy's capacity for fresh enthusiasm and ardent partizanship in every good cause. — *W. P. L.*

HAROLD VAN BUREN MAGONIGLE

THERE used to be a comfortable tradition among biographers that ancestors were not only worthy of being asked to grace the occasion, but that they were entitled to a respectful prominence and a due modicum of credit. Of late, this ancient custom seems to be more honored in the breach than in the observance. And yet, in the present instance, it seems interesting to know that the great-great-grandfather of him whose portrait is here sketched was an Irish poet whose revolutionary proclivities were too ardent even for the little island, which is generally thought to be not ill disposed to belligerent natures. From it he was exiled, in due course. It also seems of more than passing moment to know that Mr. Magonigle's immediate forebears came from Scotland and Holland, at which point the traditional biographer would take occasion to point out that no ancestral tree could possibly offer a better combination of the qualities essential to the making of an architect than one which had been nourished by the brilliant imaginative and poetic qualities of the Celt, the not less brilliant keenness of the Scotch, and the modest patience of the Dutch. I do not know what part these ancestral influences may play nor how much they have contributed to what seems to me to be the admirable sincerity of Mr. Magonigle's work.

Possessing a facility with pen and pencil which have won him renown as a draftsman, Mr. Magonigle resists all the artful temptations which lure less able men into the wiles of architectural trickery, and though his renderings sing with the beauty of line and color, they also speak truth. It ought not to be forgotten that the same admirable sincerity guides Mr. Magonigle in his relations to the profession and in his labors for its welfare. Of these latter, he gives generously to the Institute and his Chapter.

Mr. Magonigle began his association with architecture in the office of Vaux & Radford, but later, stimulated by the influence of gothicism in the office of Mr. Charles C. Haight, and by that of classicism in the office of McKim, Mead & White, where he remained for several years, Mr. Magonigle went to Boston, and, entering the office of Rotch & Tilden, tried for the Rotch Traveling Scholarship, which he won in 1894. The two following years were spent in Italy, France, Greece, and England. Returning to America he reëntered the office of McKim, Mead & White, and began practice in 1897. For two years he was associated with Mr. Evarts Tracy, and for two more years he was at the head of the office of Schickel & Ditmars. Since 1901, except for a brief partnership with Mr. Henry W. Wilkinson, he has been in practice under his own name. During these years of study and development, Mr. Magonigle learned the inestimable value to an architect of touching life at many points. Few architects have so wide a range of interest and so many avenues of contact with the broad heritage of art. They are, I opine, the sources of his sincerity. — *C. H. W.*

PLATE DESCRIPTION.

Winifred Masterson Burke Relief Foundation, White Plains, N. Y. Plates 91–96. Of this proposed group there have been completed at present the administration building, the superintendent's house, the hospital, the dining hall and servants' building, the boiler and power plant, the laundry, four cottages and the arcaded passages forming the central quadrangle.

The institution is not a hospital but a home for convalescents, and considerable attention has been given to produce buildings where the patients may be as free as possible from the institutional atmosphere so characteristic of hospitals.

The administration building has the usual receiving rooms, examination rooms, and offices on the first floor, while above are quarters for the staff and nurses and dormitories for some of the help. To the south is the superintendent's house, a complete residence sufficiently isolated but with direct access to the administration building. On the opposite side is the small hospital. Balancing the administration building, on the opposite side of the quadrangle, is the dining hall, with the large kitchen and several dining rooms for various groups of patients and employees. The remaining sides of the quadrangle will be closed in the future by the assembly building and the nurses' home.

The four cottages now built are those on either side of the administration building. It is these small units holding only twenty patients each, and planned with a comfortable sitting room and spacious loggia on each floor, which assist so materially in defying the character inherent to most medical institutions.

Craig Apartments, Chicago, Ill. Plates 97, 98. The particular interest of this building lies in the adaptation of the plan to a corner lot. It is so arranged that the space usually given to a courtyard in the rear is here used as a fore-court over which the various living rooms have their exposure.

The construction is of ordinary brick bearing walls with all interior structure of wood. Bedford stone is used for trimmings, while brick quoins accent the corners. The roof over the central part is covered with gray slate.

The English basement is divided into main entrance lobby and the usual janitor's quarters, boiler room, laundries and store rooms. The entrance lobby has a black and white cement tile floor, with black marble base, plaster cornice, and wall panels. Above the basement are three stories with four apartments on each floor. The living rooms and dining rooms are trimmed in birch with walnut and mahogany finish, while the kitchen is of natural finished birch. All the other rooms are finished in enamel.

Apartment House, Buffalo, N. Y. Plates 99, 100. In this building there are thirteen apartments, four of them being duplex. The apartments average 1,600 square feet each, except those which are duplex and average 3,000 square feet.

Steel framing has been used with concrete and hollow tile floor arches and brick exterior walls. The front stair halls are finished in Caen stone cement lined off in joints, with oak entrance doors and casings to all apartments. The finish of the apartments is simple: the plasterwork has been painted gray and the woodwork white with French walnut doors, all dull finish, except in the service portion, where there is a washable gloss finish.

A part of the basement is used as tenant space because of variations in the grades. The rest is occupied by janitor's quarters, boiler room, laundries and ironing rooms, and individual storerooms for each apartment.

South Side Bath House, Pittsburgh, Pa. Plates 101, 102. This building was erected from funds left by the will of a Pittsburgh citizen and was recently officially given to the city. It is located in the congested mill district of Pittsburgh on a lot with a frontage of 58 feet and a depth of 93 feet, and accommodates about two hundred.

The construction is fireproof throughout. The exterior walls are of brick laid with wide raked joints and buff Bedford stone trimmings, with granite steps and base course. The roof of the flat portion is vitrified tile, while the pitch roof is covered with mottled purple and green roofing slate. The windows throughout are hinged at the bottom with the top coming in, so that there can be no view of the interior from the outside at any time.

In the basement are located gas fired boilers to heat the building and the water for the pool, a pump to circulate the water and fans for ventilating the building. A fully equipped laundry is also in the basement. In addition to the space occupied by the pool, the first floor has a vestibule, office and shower room. In the front part of the second floor are a large toilet and a tub bathroom, while on a balcony running along two sides of the pool room are the dressing rooms, consisting of marble partitions, with fine grille work overhead. The pool room, which extends through the entire height of the building, is finished in brick and terra cotta, the pool itself being lined with enameled brick. The entire building is lighted by electricity to allow night bathing.

Kindergarten, Downers Grove, Ill. Plates 103–105. The plan of this building is the outcome of the theory of its builders that kindergarten groups should be small. There are two complete units which are identical in arrangement, one on each floor. Each unit is devoted to a class of thirty children and three teachers. In the work which is done in a large class the three teachers cooperate in the central room, but for the greater part of the time the children are divided into three groups of ten each, one group remaining in the large room and each of the other two going to one of the group rooms to the north or south.

The administration and service part of the building is at a level halfway between the two kindergarten floors and serves as an entrance through which all persons must pass to enter the other portions of the building. In this part are the director's room, the teachers' room, the kitchen, the heating apparatus and the toilet and locker rooms for each class.

The construction is of brick, with paneled frame second story and slate roof. The floors are of wood construction and are covered with cork tile, giving a most agreeable color and texture. The stairs have been so planned that access and escape are easy and in opposite portions of the building, minimizing the risk from fire.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

CITY-PLANNING in its broadest phase and in particular detail is fortunately now receiving a great deal of attention and study. The first national city-planning conference was held in Washington in 1909, and since then there has been one each year in various parts of the country. This year the conference was in Detroit on June 7, 8, 9, and is reported to have been the most successful held thus far. It is gratifying to note that the attendance included real estate men and property owners who took a prominent part in the discussions.

The subject of city-planning is a very comprehensive one, including, as it does, every branch of a city's growth. While an æsthetic result is always dreamed of as the ultimate, there will be no value in such a result unless it be attained after a study of many less ideal considerations. The first step, therefore, in any city-planning undertaking is to make a careful investigation of the conditions existing in the community. In case a new section or area is to be planned these conditions are purely physical, but their importance must be thoroughly understood. When the planning is in relation to an existing city, a survey of the actual conditions of that city must be made, particularly of the working and living conditions. This study should lead to a forecast of the future growth of the city and its resultant requirements, for in order to plan comprehensively the vision must be of the probable city, even a hundred years hence.

This economic and social aspect of city-planning is not the only phase, but it constitutes the first step to be taken. A plan based on such study and survey will create opportunities for landscape developments and architectural embellishments which, in turn, should receive the same careful study. In the early days of city-planning all the emphasis was laid on the æsthetic consideration, but with the inception of the city-planning conferences a tendency developed to lay the stress on the social and economic considerations. There has been evidence of this lack of balance in schemes where real economic value has been accompanied by absolutely inadequate architectural treatment. Active co-operation of the architect must be obtained if serious and far-reaching mistakes are to be avoided in this matter.

The professional training of the architect particularly fits him for effective activity in city-planning. He has had to face questions of economics; he has been handicapped by mechanical and physical considerations in his æsthetic achievements; he has been through the experiences that are to be met by the city planner, and consequently his power in this connection is not limited to the æsthetic problems that may be created, but is of great value in the earlier work of survey and study.

The development of city-planning in America has taken place so far principally through the medium of city-planning boards or commissions in the various cities. Few of these commissions have any power to act, but are purely advisory boards, acting with the other city departments which are endowed with the necessary powers. A commission of this kind has great value, not alone as a body which may give advice on any particular question, but it has an indispensable purpose, in that through it as a clearing house may be attained a unity of conception which is the primary condition of good city-planning.

In most cases these commissions are composed of private citizens serving without pay. Here lies a field of work which is open to the architect — a place where he may exert his influence and help maintain the lead of the profession in the creative work of his community. Some few may have an opportunity to direct a real estate development, and by careful study produce an æsthetic result and at the same time a judicious investment; some others may have the exceptional opportunity of laying out a comprehensive scheme for a new city or for the re-planning of an existing city. These individual opportunities are distinctly limited, but to all is open an opportunity at all times to advise, to stimulate, and to direct the activities of the community in this work which holds such great hope for the future of architecture.

YALE UNIVERSITY honored Ralph Adams Cram at the recent commencement by conferring on him the honorary degree of Doctor of Laws. In granting the degree the following comment was made: "By teaching and by practice, to revive Gothic forms and adapt them to modern uses — this has been Mr. Cram's labor, this is his distinction. The soul of man requires the pointed arch, and as such works of past genius disappear, modern genius must give us its substitute."

At Harvard, Horace Trumbauer was given the honorary degree of Master of Arts with the statement: "Architect of the Harry Elkins Widener Memorial Library; they who enter its doors will ever admire the design and the adaptation to the use of a company of scholars."

THE Natco Two-Apartment House Competition was judged at Boston, July 12. The members of the jury were: H. J. Carlson, Boston; H. L. Duhring, Jr., Philadelphia; Arthur W. Joslin, Boston; Edward L. Palmer, Jr., Baltimore; Thomas E. Tallmadge, Chicago, Ill. The following awards were made: first prize, Olaf William Shelgren, Buffalo, N. Y.; second prize, Hugh Macomber Ferriss, New York City; third prize, J. Ivan Dise, New York City; fourth prize, Maurice Feather, Watertown, Mass. The mentions: William H. Flanigen, Woodbury, N. J.; Frederick J. Feirer, Ridgefield Park, N. J.; Emil F. Hasenbalg, Chicago; R. F. Walker, Melrose, Mass.; Cleon M. Hannaford, Boston, Mass.; Arthur J. Pohle, Albany, N. Y.

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THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS

DOORWAY, FRENCH-MUNROE HOUSE, BRISTOL, R. I.
BUILT IN 1800

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate Eight

(over)

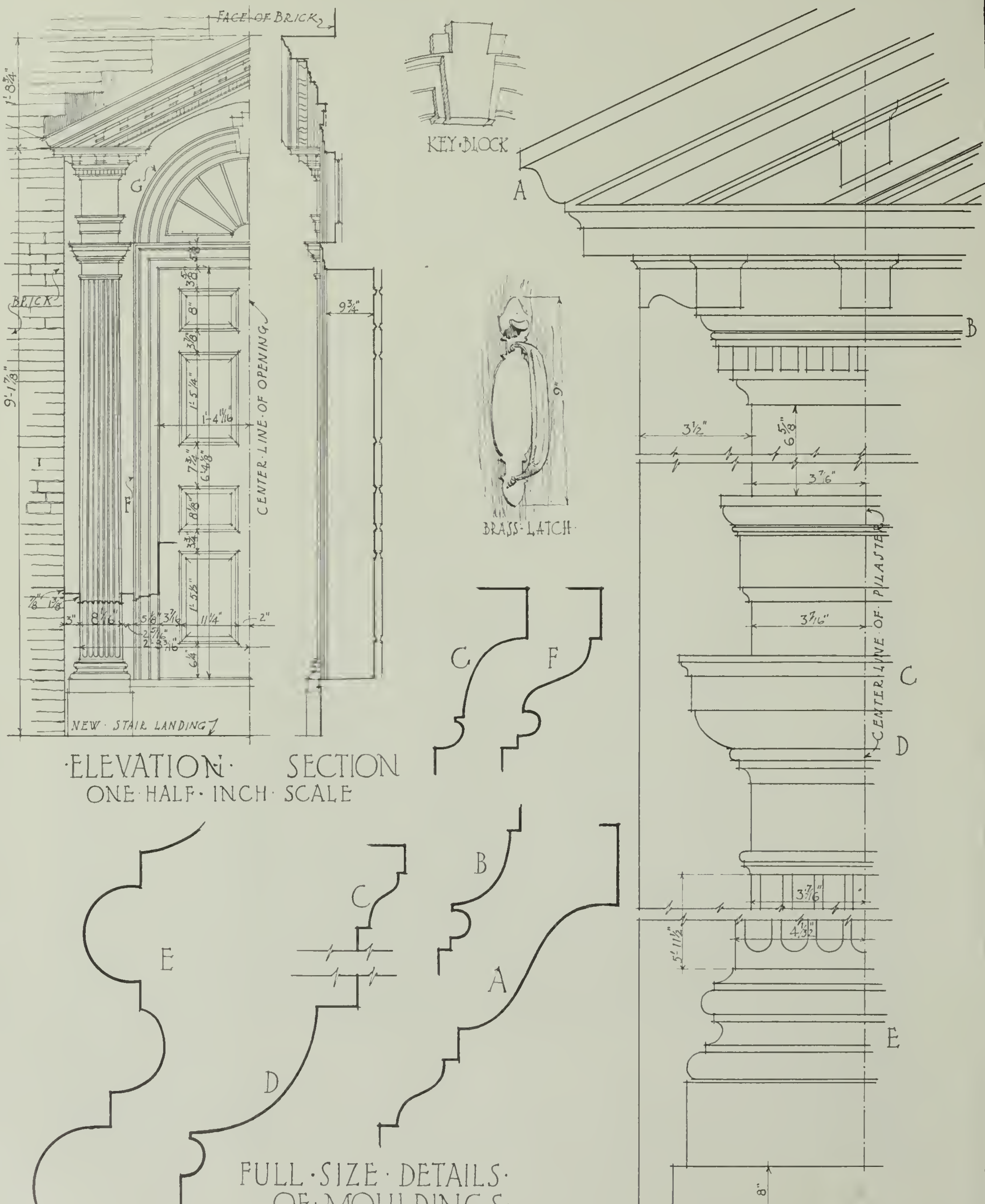

PLATE 8 AUGUST 1915	DOORWAY·FRENCH-MUNROE·HOUSE· BUILT·IN·1800 BRISTOL·R·I·	MEASURED·& DRAWN·BY· GORDON·ROBB· &·M·A·DYER

A COMPOSITION OF WREN'S BUILDINGS
BY C. R. COCKERELL, R.A.

THE BRICKBVILDER

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The Church Towers, Steeples, and Spires of Sir Christopher Wren.

PART I.

By R. RANDAL PHILLIPS.

BEFORE proceeding to consider in detail the wonderful series of church towers, steeples, and spires which Wren built in London after the Great Fire of 1666, a few observations may be made on their general character and the circumstances which gave occasion for them. The clarity of Wren's genius is displayed very remarkably in his city churches. If there be anything in the assumption that a man's character must surely find expression in his work, then it is amply illustrated in Wren's city churches, for these churches bear the impress of a great constructive mind and reflect the stately, ordered life of the Grand Old Man of English architecture. It is well always to remember that Wren gained fame first as a mathematician and a scientist, and when in later years he took up the study of buildings, he evinced the same spirit of adventure and followed the same principles of logical thought which had distinguished him as Gresham Professor of Astronomy and as one of the leading founders of the Royal Society.

The historic fire of London, two centuries and a half ago, burned not only the great Cathedral, the Guildhall, and the Royal Exchange, but also eighty parish churches, fifty of the City Company halls, and thirteen thousand houses. Fifty of the churches were rebuilt by Wren, and, though circumscribed by conditions of cost and of necessity, — most of them having had to follow the old foundations, — they present a variety of planning and a resource in design which constitute a unique tribute to a single great mind. As regards the religious quality of the interiors, there may be differing opinions. Some, the writer among them, would echo the words of Miss Milman: "There is no suggestion of mystery in these City churches: no dim aisles lure the soul to speculate upon things unseen, no majestic altar elevation typifies arduous access to the Most High; the mood indeed is rather calm than ecstasy. Devotion here would scarcely disturb a prosperous trader's conception of the world as a pleasant place in which an honest man can await without fretful impatience the summons to another." But however this may be, there is no question as to the splendid merit of the steeples and spires which dominate the exteriors of these churches. These steeples and spires, moreover, are unique as Renaissance equivalents of a Gothic feature. Wren was the first architect to conceive a Renaissance spire, and no one since has excelled his achievement. The variety in design is astounding; no two are alike; yet they have this in common — *the tower is brought visibly down to the ground in every case.* Wren never erected a church with a tower rising from the roof; he never attempted to combine a portico with a tower and spire. Later architects did so, like Gibbs in the Church of St. Martin-in-the-Fields, and Hawksmoor in St. George's, Bloomsbury, but the effect of their work is not nearly so satisfying to the eye as Wren's invariable practice.

Westminster Abbey, Western Towers

With such a feature as a steeple or spire, support, real and apparent, is essential; and nothing meets the case so well as a design which starts directly from the ground and is built up with forms that express support, that rise from stage to stage without apparent effort, offering no check to the eye or to the understanding. When, on the other hand, the tower is set


St. Michael's, Cornhill


St. Andrew's, Holborn

in between the octagonal angle turrets, and the boldness of these latter is a little overpowering. This tower is 25 feet square at base and 130 feet high to the top of the pinnacles. A somewhat similar treatment was adopted for St. Mary's, Aldermary. Only the upper part of the tower, however, is Wren's work, the remainder having survived the fire. St. Mary's, Warwick, also bears some resemblance to St. Michael's, Cornhill, but is a far more commonplace design. Nor can St. Alban's, Wood street, be considered other than dull. By contrast the western towers of Westminster Abbey claim our admiration. The upper parts were carried out, so far as can be ascertained, by John James, the architect of St. George's, Hanover square, but, as Wren was in charge of the work of restoration at the Abbey for many years, and drew up a report in 1713 in which he specifically refers to the designs he had prepared for the towers, these may reasonably be attributed to him. In his report he says : "The two western towers ought certainly to be carried to an equal height, one story above the ridge of the roof, still continuing the Gothic manner in the stonework and tracery. . . . I have prepared perfect drafts and models (drawings), such as I conceive may agree with the original scheme of the old architect, without any modern mixtures to show my own inventions." In this same report Wren also outlines his scheme for the completion of the central tower of the Abbey. He says : "The original intention was plainly to have had a spire. . . . In

within the church and rises through the roof, not only is the effect of solidity at the base lost, but the scale of the tower itself is destroyed. Wren was fully aware of the value of the plain square base, which he adopted in every instance, but it is probable that another reason for his concentration of ornament in the upper parts of his towers and steeples was due to the fact that the sites were so enclosed. It is an unfortunate fact that there is not a single church designed and carried out entirely by Wren of which a complete and open view can be had. St. Clement Danes, in the Strand, is the sole exception, and this is not wholly Wren's work, the steeple having been added by Gibbs.

Towers. Of the ten church towers by Wren which carry neither steeple nor spire, five are Gothic in style. These are St. Alban's, Wood street; St. Mary's, Warwick; St. Mary's, Aldermary; the twin western towers of Westminster Abbey, and St. Michael's, Cornhill. It is customary to deplore Wren's essays in the Gothic style, to point out how the spirit of his own times was totally out of touch with the spirit that animated the Gothic builders, but when all has been said the fact remains that Wren's Gothic towers, at least, are quite pleasing compositions, and if the detail is hard the general proportions are satisfactory. St. Michael's, Cornhill, follows Magdalen College Tower very closely, but a comparison of the two will show at once the far greater merit of the Oxford example. The belfry openings in Wren's tower have the appearance of being pinched


St. Mary's, Somerset
Thames Street


St. Andrew's-by-the-Wardrobe
Queen Victoria Street

my opinion the tower should be continued to, at least, as much in height above the roof as it is in breadth ; and, if a spire be added to it, it will give a proper grace to the whole fabric, and the west end of the city, which seems to want it. I have made a design which will not be very expensive, but light, and still in the Gothic form, and of a style with the rest of the structure. . . . I have varied a little from the usual form, in giving twelve sides to the spire instead of eight, for reasons to be discerned in the model. . . ." Whether this spire would have been a desirable addition to the Abbey, some have questioned, but the western towers are, at least, good evidence that Wren might well have been trusted with the addition.

The Renaissance towers of Wren's churches have a strong family likeness one to another. The two best are the towers of St. Mary's, Somerset, and St. Andrew's-by-the-Wardrobe. The former is all that remains of the church, which was pulled down in 1872. The tower was saved by the intervention of the late Mr. Ewan Christian, and its preservation was well merited, for it is a graceful design, marred only by the fantastic and redundant group of pedestals and finials at the top. It measures 20 feet square at base and rises to a height of 120 feet.

St. Andrew's-by-the-Wardrobe is a brick tower with stone quoins and dressings. Halfway up it bears a well designed clock case, and above is the belfry, the whole being crowned by an open balustrade. This church, like many another, has suffered at the hands of the restorer, and one cannot think that the awkward hood-moulds to the belfry openings are Wren's ; they are quite out of scale with the rest of his work. At St. Andrew's, Holborn, the tower was not destroyed in the fire, so, in 1704, it was repaired and refaced with stone by Wren. It is of good outline, but the double-arch treatment of the belfry stage calls for criticism. The effect of a segmental arch within a semicircular one is never satisfactory, and Wren did not overcome the defect here any more than he did in the similar arrangement adopted by him in the Fountain Court at Hampton Court and the arcade of Trinity College Library.


St. Mary's, Aldermary


St. Mary-le-Bow, Cheapside

St. Bride's, Fleet Street

Towers with Steeples. It is when we come to consider the towers with steeples that the wonderful talent of Wren is made fully manifest. Half a dozen claim attention by reason of their striking composition, and it is difficult to place them in any order of merit. St. Mary-le-Bow, however, extremely beautiful from every point of view, is generally accorded the first place. It is fitting that to the originator of such a feature as the Renaissance steeple should be accorded the honor of producing the most perfect example of its kind. Looking at the tower and steeple of Bow Church one is conscious of no check, no abrupt change, from base to summit. From the base, the walls rise plain and square to the belfry stage, where a pilaster treatment is adopted with the usual entablature and balustrading. Here the abrupt change in form is made, for, rising from within the tower, and masked by inverted scroll ornaments, appears a circular stylobate supporting the delightful open peristyle with its circular entablature and balustrading. Within the peristyle is a stone cylinder 11 feet in diameter, buttressed by consoles of beautiful form and carrying in turn a columnar lantern with pyramidal termination. As an example of scientific construction the design is no less arresting. The walls of the tower are exceedingly thick, the upper part of the belfry stage being brought to the octagon by massive moulded corbels. From the top of the octagon springs a dome having an eye in the crown, the joints being non-radiating, whilst the upper surface is finished flat, forming the floor of the peristyle. The circular stone core rests on the dome and is buttressed up by the circular peristyle of columns and consoles, the weight from the lantern and spire being in this manner carefully distributed. The steeple was repaired by George Gwilt in 1820, when red granite was substituted for the worn Portland stone in the columns and entablatures of the lantern stage. The height is 225 feet to the dragon on the top.

Another very noteworthy design is St. Bride's. Early in the nineteenth century a scheme for opening out the view of the church from Fleet street was carried out by J. B. Papworth, but modern rebuildings have entirely supplanted this, with the result that no complete view of the tower and steeple is now possible. The square base rises plainly to the belfry stage, where a somewhat unusual order treatment is to be seen, inasmuch as columns are used at the angles instead of pilasters. The deep blocking course with its solid balustrade is returned over the pilasters instead of over the angle columns, thus cleverly curtailing the diagonals, and with the further aid of urns the eye is gradually carried over the complete change of plan which is made at this point. Rising from within the deep blocking course is a circular drum, which acts as a base for the steeple proper. This comprises four stages practically identical with one another, being simply erected on a graduated diminishing scale. The plan for each stage is an octagon, with a pilaster at the intersection of adjacent faces. The entablatures are broken over each pilaster, thus overcoming what would otherwise have been a number of very severe horizontal divisions. The avoidance of too marked a diminution in diameter between consecutive stages has resulted in a steeple of great height — 226 feet, making it easily the highest in London.


St. Clement Danes, Strand

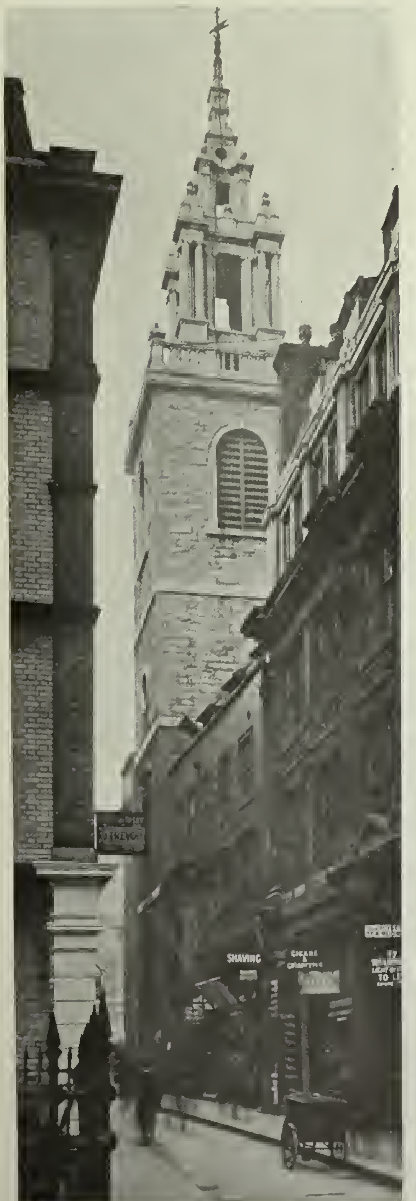
Although designed on severely classic lines, the whole composition is original, and the succession of dark, open spaces rising one over the other, diminishing in size as they approach the top, forces the eye to follow them as they soar upwards, in spite of the entablatures marking each story. Thus the "motif" justifies itself, and the monotony at first apparent is lost. Usually so free in his works, the severity of design would make one think that Wren's imagination and extraordinary inventive capacities were, for some reason, not exercised in this instance. Was it owing to his having matured in his art, as Mr. Blomfield suggests, with the resultant adoption of a rigid and severe classic style, thereby throwing off the lightness of touch which characterizes St. Mary-le-Bow; or was it because he sought to achieve a constructive triumph? One might be led to the latter conclusion quite readily, for the construction of this steeple differs from anything attempted either before or since. Up to the crown of the belfry windows the walls are extremely massive and square on plan, but at this level flat faced pendentives are formed, the octagon being brought to the circle by a heavy ring of stone. From this ring springs a conical dome which has non-radiating or flat joints to within a short distance of the crown. This dome is exceedingly thick, the masonry (showing as the circular drum which rises from within the blocking course) forming the base of the steeple proper. Built up on the platform of the drum is the core of the central staircase, from the outer shell of which buttress walls radiate to each angle of the octagon, and are vaulted over one to the other, so as to form the ceiling above. This construction is repeated throughout all the stages. The only cause for wonder is that all this stonework is standing on a dome, which, in spite of its flat joints and steep pitch, must exert enormous pressure outwards on the walls below; it has, in fact, been found necessary to connect the opposite walls of the tower just below the springing of the belfry windows by means of large iron tie-rods. Whatever was Wren's dominating idea in evolving the design, St. Bride's is, both from the point of view of architecture and of construction, clearly the work of a master.

St. Stephen's, Walbrook, and St. Michael Royal, College Hill, may be taken together, as they are very much alike. While the towers are practically identical, in the steeples a wonderful variety of design is displayed, for, although the proportions of the three stages in elevation are very similar in each case, yet the plans of the stages are quite dissimilar. In each case, moreover, owing possibly to lack of ready money, Wren was obliged to make the tower a complete feature in itself and to finish the steeple as funds permitted.

In St. Stephen's, Walbrook, a square plan has been adopted for the stages, the angles being brought forward and developed with a columnar and pilaster treatment. Urns are freely used to mask the breaks, but, as in the case of Christ Church, Newgate street, there is a certain disjointedness in the whole effect. Here, however, the entablatures are broken back into the main faces of the square, thus avoiding what otherwise would be very severe horizontal checks to the eye.

St. Michael Royal, College Hill, the later of the two, was one of Wren's last steeples, having been built in 1713. The octagonal plan is used in each stage. In the first the angles of the octagon are marked by columns, the entablature being broken out over each. In the middle stage curved ramps carry the lines up to terminate in the lantern stage. The western towers of St. Paul's Cathedral show another variation in this same scheme of steeple which Wren developed. They rise to a height of 220 feet and are divided into five stages. The lower two are embodied in the fabric of the Cathedral, and are treated with coupled pilasters and a complete entablature. Above is the clock stage, square on plan, with sculpture groups at the angles. In the next stage a change is made to the circular form of plan, the architectural treatment consisting of an open colonnade around a hollow cylindrical drum. Groups of coupled columns are projected from the rest of the colonnade on the diagonals of the square stage below and carry an entablature which breaks out over them with vases, ramps leading up to the crowning octagonal stage and the lead covered cap. The southwest tower contained, in addition to the clock and great bell, the famous geometrical staircase, while in the northwest tower is a small carillon.

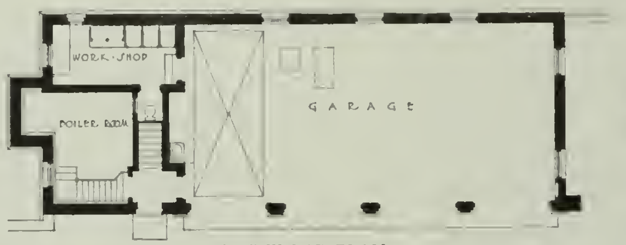
In the case of St. Clement Danes, Wren modified and recased an existing tower up to the level of the present clock story only, the steeple having been added thirty-four years later by James Gibbs. There are many points of interest about this steeple, more particularly in regard to the plans adopted for the various stages, but as it is not the work of Wren it must be passed with no more than bare mention. Attention, however, should be drawn to the characteristic treatment of the tower, which, with its classical buttresses and flanking domes, is in Wren's happiest manner, and though surmounted by the work of another must have a place in a consideration of his designs.



St. Stephen's, Walbrook

St. Paul's Cathedral, Southwest Tower

St. Michael Royal, College Hill



FIRST FLOOR PLAN

SECOND FLOOR PLAN

GARAGE ON ESTATE OF EDWARD C. SCHAEFER, ESQ., NEW ROCHELLE, N. Y.

REILEY & STEINBACK, ARCHITECTS

A Large Market Building

AT WORCESTER, MASS.

O. C. S. ZIROLI, *Architect.*

THE building for the Worcester market, which was recently completed and occupied, is a gratifying indication of the study and care which is now being given to the solution of the very practical, everyday problems which for so long have been passed over as barely worthy of serious architectural consideration. The housing of a general provision store has been worked out here with considerable thought, so that a very convenient and efficient scheme has been combined with a pleasing, architectural treatment, both on the exterior and interior.

The building has a frontage of 108 feet on the principal street and extends back on an unimportant street to a depth of 227 feet. The exterior is of glazed terra cotta and is particularly interesting because of the modeled ornament showing forms which relate to the purpose of the building. Fireproofing has been obtained by the use of concrete with steel reinforcing for the structural parts throughout.

The main floor plan is characterized principally by the simple and commodious arrangement which makes for the greatest convenience and comfort of the shoppers. The aisles are 10 and 12 feet wide, five of them running the length of the building and three running across. They are lined on either side with glass covered counters where the store's goods are displayed in the best possible manner, and yet are absolutely protected from handling by the public. All of the aisles are covered with a cork flooring, which is laid over a rather deep layer of prepared sawdust, which, in turn, is directly on the fireproof floor construction. This padding gives a slight resilience which is hardly noticeable in the step, but which is really very comfortable and restful. The lighting of this floor is by indirect fixtures, which give an evenly distributed illumination over the whole area.

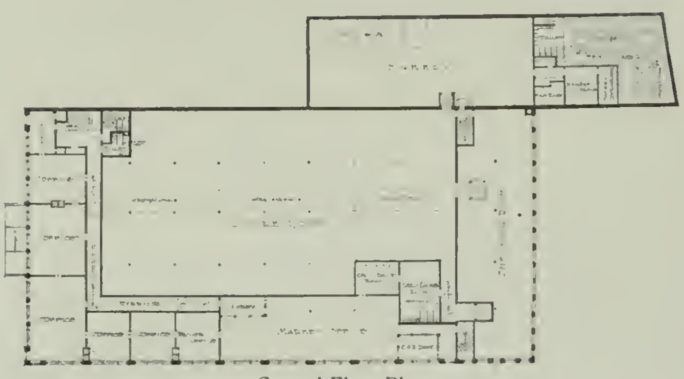
Perhaps the most interesting feature of the building is the arrangement whereby the display counters are kept constantly supplied with goods. For this purpose there are two stock rooms, one above the main store floor and one in the basement below. Each of these rooms is divided into sections which carry different kinds of goods, each counter in the store having above or below it a section where only the goods sold at that particular counter are stored. These sections and their corresponding counters are connected by elevators so that as goods are sold and the counters emptied new stock can be supplied immediately and without any of the confusion and filling of the aisles by trucks which is necessary in the usual arrangement.

Belt conveyors have been used throughout, so that from the time a sale is made all of the handling of the goods is done by mechanical means, whether the package must simply be wrapped or is to be shipped or stored as the case may be. This makes for the greatest speed and

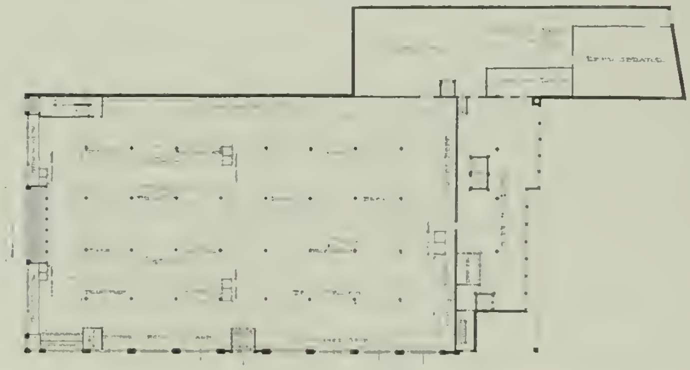
General View of Worcester Market

efficiency in the operation of the store. In connection with the shipping room there are cold storage chests where perishable goods awaiting delivery may be placed. The market has its own kitchen for the cooking of delicatessen goods and also its own bakery with six ovens. A unique feature in the stock room is a large roaster where 200 pounds of coffee may be roasted in twenty minutes. After roasting, the coffee is cooled by a blast of air and when separated by suction from all foreign matter is ready for sale. The market also has its own carpenter shop, electrical plant, and a pumping system for the cold storage rooms. A fan placed on the roof provides ventilation for the whole building.

Men's locker rooms and toilets are on the first floor, while space on the second floor is given to the girls' locker room and a rest room. For some of its storage and stock room the market still uses a section of the old building, 140 by 40 feet. The receiving department, where incoming goods are received, is also in the old building. The offices both for the general business and for the particular business of the store sales are on the upper floor. They extend along both street façades and are reached by a special entrance which is on the principal street.



Second Floor Plan



First Floor Plan

General View of Interior, Worcester Market

Stairways in Houses of Moderate Cost.

III. ENGLISH AND FRENCH INFLUENCES.
(Concluding Paper.)

By JOHN T. FALLON.

ALTHOUGH the influence of the Georgian stair is predominant in our modern domestic architecture, other English types are not without their importance. With the accessibility which we possess to the entire range of English house design, the best of all periods have been appropriated and made our own.

The houses of the Jacobean period are full of compelling charm. Built during the age when the middle class was springing into its real importance in modern society, they unite picturesque and naïve design with a close relation to our present-day modes of living. Their size and scale so nearly approach in many instances the demands of the great American middle class — if such a term can be used — that they serve admirably as models for many of our modern country houses.

Stairway in House at Cornwall, N. Y.
Parker Morse Hooper, Architect

The English stairway of the early seventeenth century was one of many flights. The confined spaces allotted to the staircase in the early planning made it impossible to arrange the steps in long flights, and to the many landings thus occasioned is due the impressive character which the designers were able to effect by means of the elaborate newels and the carved ornamentation of their finials. The earliest finials were of simple form, a circular or acorn shaped ball being used with a moulded base and with several incised lines around its surface. The best finials approach the shape of vases, and that this motive was the underlying idea of the joiners is shown by the later general use of elaborately carved vases. From the round top to an octagonal shape and then to a "square turned" were short steps, and this latter soon became a standard type.

The finial on top presupposes a pendant below, a feature which followed much the same line of development. The closed strings were generally plain and heavy with a simple moulded capping to receive the balusters, and were often painted on the flat face with ornamental designs. The balusters were heavy and rather widely spaced, being either turned or square in section. An important variant was the fashion of filling up the space between the hand rail and the string by thin boarding pierced to show the outline of a strapwork pattern or design. This was soon developed by the introduction of carving into great panels of interlacing ornament, and became the forerunner of the continuous balustrades of flowing foliage made famous by Grinling Gibbons.

The elaboration of the finial and the balustrade is the most interesting feature of this period. The finial, starting from the simple turned form, as we have observed, developed quickly, in the more elaborate examples, into vase shaped forms surmounted by heraldic figures; and, reaching this culmination, sank again in importance, first to the basket of flowers and fruit, and later to entire elimination. The balustrade, at first of simple and heavy balusters, was replaced by intricate strapwork patterns until in the days of the Renaissance it was once more reinstated, and from then its reign has been supreme.

It will be seen from this slight historical *résumé* of the Jacobean stair that its elements are based rather upon the art of the "joiner" than upon the essentials of classic design. When simplified it lacks the interest of carving and ornamentation that gave the old examples their picturesque charm, and it is apt to appear heavy and complicated. While its adaptation to the requirements of houses of moderate cost is naturally limited because of these reasons, the illustrations are suggestive of intelligent handlings of the style. In this type of stairway the questions of materials and craftsmanship are paramount. English oak with its wonderful graining and color has no equal and, when united to the hand-wrought workmanship of the seventeenth century artisans, transformed commonplace designs into works of beauty.

A logical development of interest in the Georgian Era brings one to a study of the work of the brothers Adam and their disciples, who spoke the last word on the eighteenth century stairway. Although they introduced many innovations into other features of house design, in the stairway they found one subject which had already attained a form equal to their own delicacy and refinement. As has been previously indicated, the ultimate goal of the Georgian designer was the subservience of every part to the upward gliding of the stair. Triumphing over every difficulty of wood construction, these Adam stairways swept up gracefully in one circular or elliptical flight, the steps not held in place by any apparent construction, but building up from one to another like a pile of blocks.

Interest of detail was focused upon the iron railing and balustrade. The balusters were of wrought or cast iron, intended to be seen in relief, for their silhouettes were delicately suggestive of Greek and Pompeian motives and were of the utmost lightness. Some of Robert Adam's designs might have been copied from the decorations on a Greek vase, so full are they of the then recently discovered Hellenistic spirit.

We are now passing through a phase of taste in which the slender attenuations and extreme delicacy of scale of the Adam style have had a distinct influence upon modern design. It can hardly be said that the design of the stairs has followed as closely this impulse as other features. Whether it is the austerity of the Adam stair type that fails to make an appeal to American designers, or whether the questions of cost have limited its use, is a matter for debate. A few years of further development may, however, produce examples to equal the originals, although at present the advance is slow.

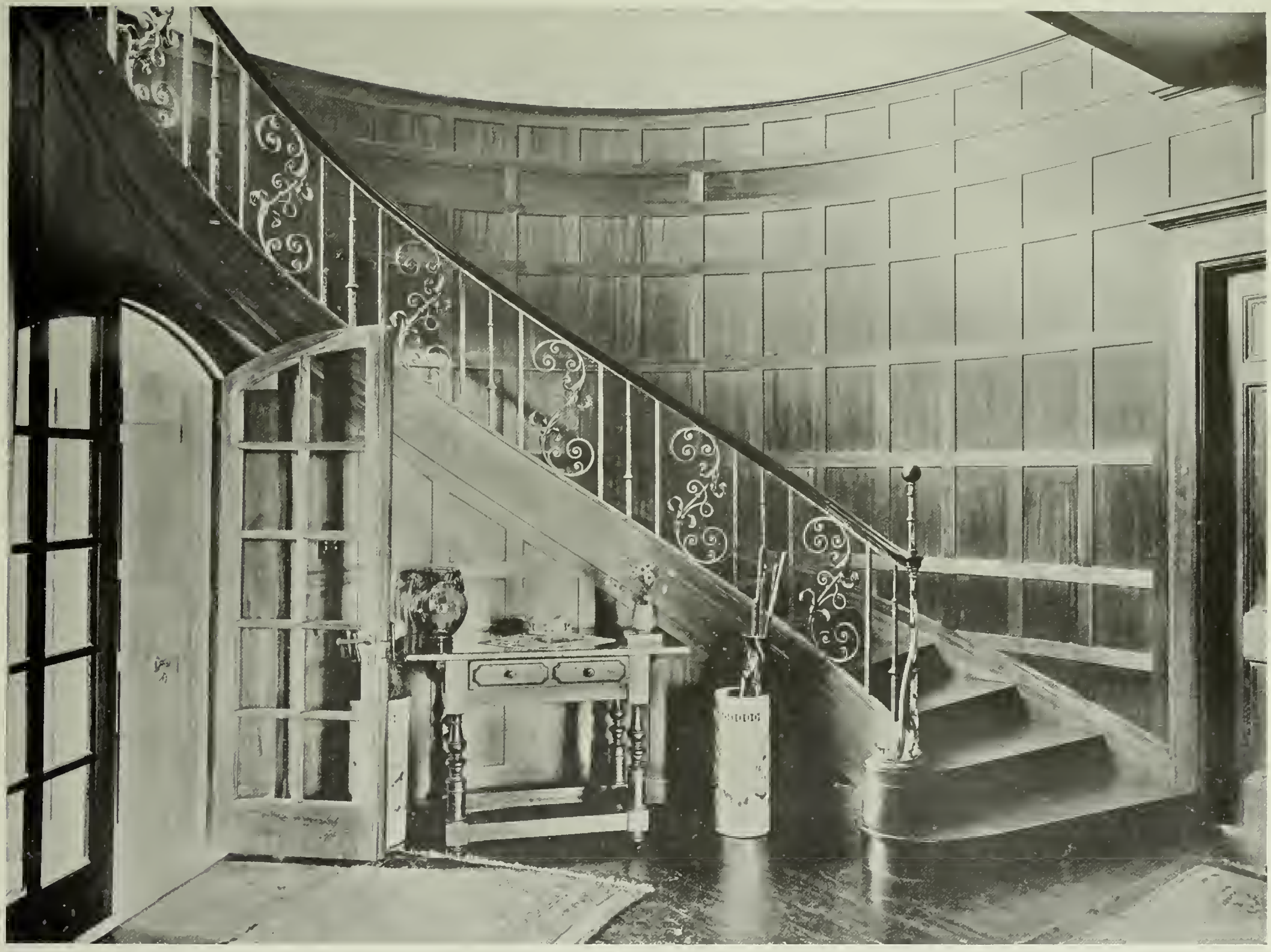
During the best periods of design the Anglo-Saxon art has always been open to Gallic influence, and the unerring good taste of French domestic design has helped to solve many of the problems of the English house. American students who went to Paris in the eighties were quick to appreciate how sure and true French taste was in even the most debased periods of art, and were as quick to seize upon the French ideas of interior work and to come back full of their inspiration. From then on the styles of many elaborate houses were modeled after the French manner, and even houses of the more moderate size were greatly affected by the foreign training of the designers.

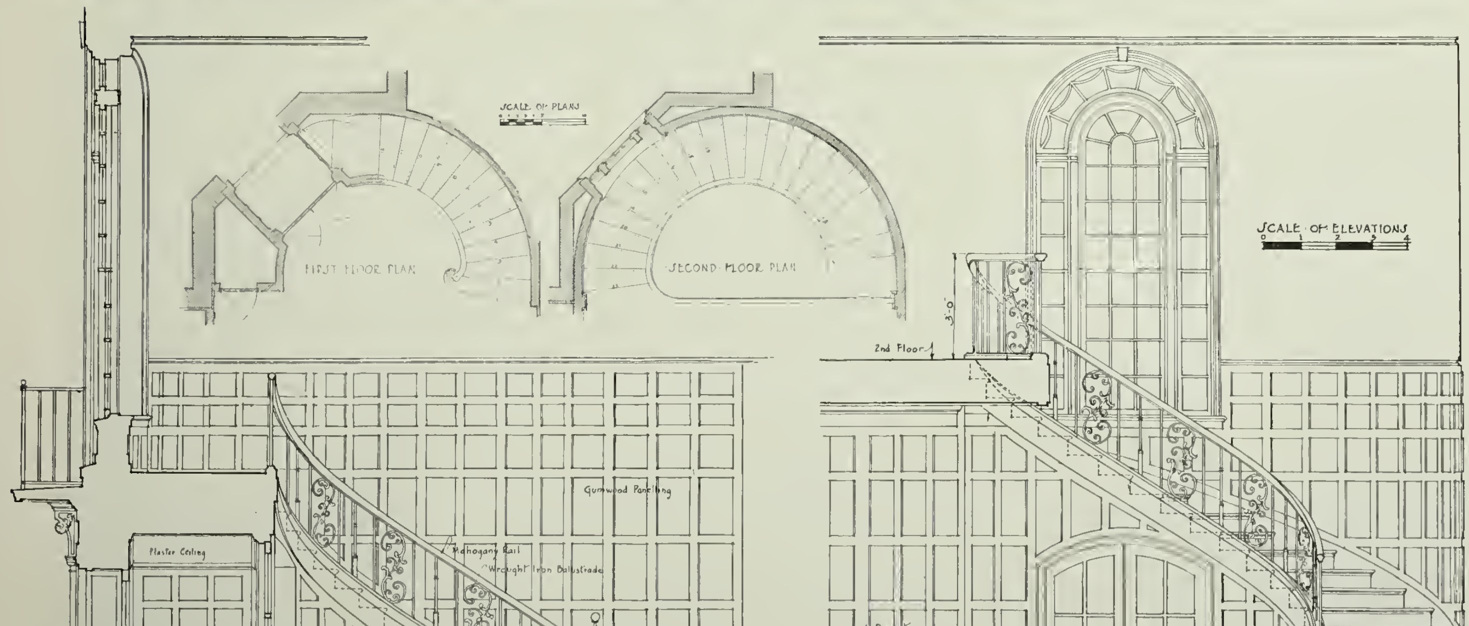
Stairway in the House of G. B. Penniman, Quogue, L. I.
Edward S. Hewitt, Architect

The French stairway was never as intimate in character as the English. An indication has already been given of its more public place in planning. To add to this, it was and still is almost invariably built of stone or stucco, at least in houses of any pretensions whatever; and as these materials lend themselves to varied or elaborate treatment only in the more costly examples, there is little to be said about the simpler French stairways in this discussion.

Stairway in Phi Gamma Delta Fraternity House, Philadelphia, Pa.
Mellor & Meigs, Architects

Forsaking the intramural type of Italian stairs, the French examples from the days of Louis XIV were enclosed in "staircase halls." They were generally square in plan, but sometimes round or elliptical. The stair rose in one continuous flight from floor to floor, the winders being worked out with consummate ingenuity to preserve the sinuous lines of the string and, at the same time, to afford an easy ascent. The string, always a closed one, was a strong band of mouldings that swept continuously from floor to floor. Except in the more monumental stairways of the days of Louis XIV, stone or marble balustrades were

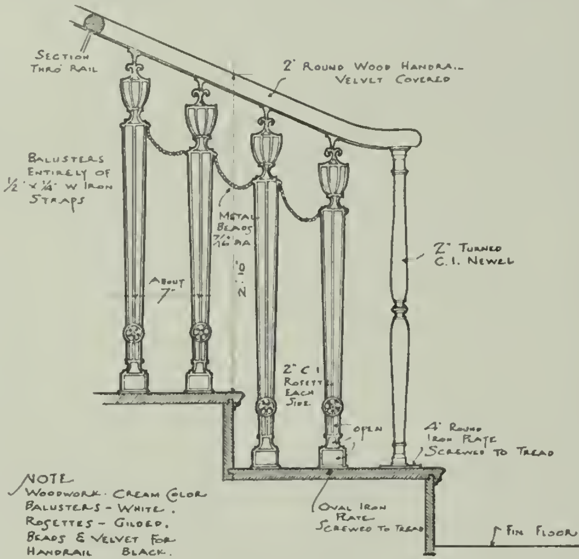




STAIRWAY IN HOUSE OF RALPH B. WILLIAMS, ESQ., DOVER, MASS.

WINSLOW, BIGELOW & WADSWORTH, ARCHITECTS never in great favor, and with the reign of Louis XV wrought iron, so adapted to the soft, graceful lines of the period, came to usurp the field entirely. The French genius has never been more at home than when solving the design of the stair balustrade in the flowing curves of this epoch, and the severity of Louis XVI never quite satisfied the taste in this feature or quite supplanted the former types in popular favor. The modern designer, seeking for inspiration among the French styles, invariably returns to these felicitous types as the highest expression of the French stair rail.

Much might be written of the genius of French stone masons, but at least in the problems of the stairway they found a suitable outlet for all their energies and skill. And even in the smaller houses they delighted to show how complete was their conquest over this material, while in the grander examples they performed many real *tours de force*. The stereotomy of some of these old stairways is unsurpassed by the triumphs even of Gothic vaulting of the thirteenth century.



Detail of Stairway in Showrooms, New York, N. Y.
Mott B. Schmidt, Architect

But this is a digression from our subject, for this work has little in common with the unpretentious American house. Setting aside the questions of prohibitive expense, there is a grandiose quality about all of it that is really foreign to our tastes. The illustrations will show that only a detail here and there has left its mark upon our modern work.

Modern stair design is being greatly influenced by the work of Mr. Charles A. Platt, who has probably given more of an impetus to the study of this problem than any other American designer. In matters of detail he has managed to extract from apparently exhausted motives a fresh vitality, and to adapt a wide variety of ideas that give new blood to this old problem. Among other architects who have made notable contributions to this phase of house design may be mentioned Messrs. Delano & Aldrich and Mr. John Russell Pope. The former have taken as inspiration for many of their designs the European types produced towards the end of the eighteenth century and have borne firmly in mind the primary essentials of the elegance and ease of these examples. Mr. Pope's work has embraced a wide field and in each stairway has fully expressed not only the details, but also the underlying principles of the styles in which he works.

The future of the domestic stair is not easy to forecast, but there is bound to come a still wider appreciation of classic design for this feature.

Stairway in House at New York, N. Y.
Delano & Aldrich, Architects

Stairway in Showrooms, New York, N. Y.
Mott B. Schmidt, Architect

HARVARD YARD FACADE

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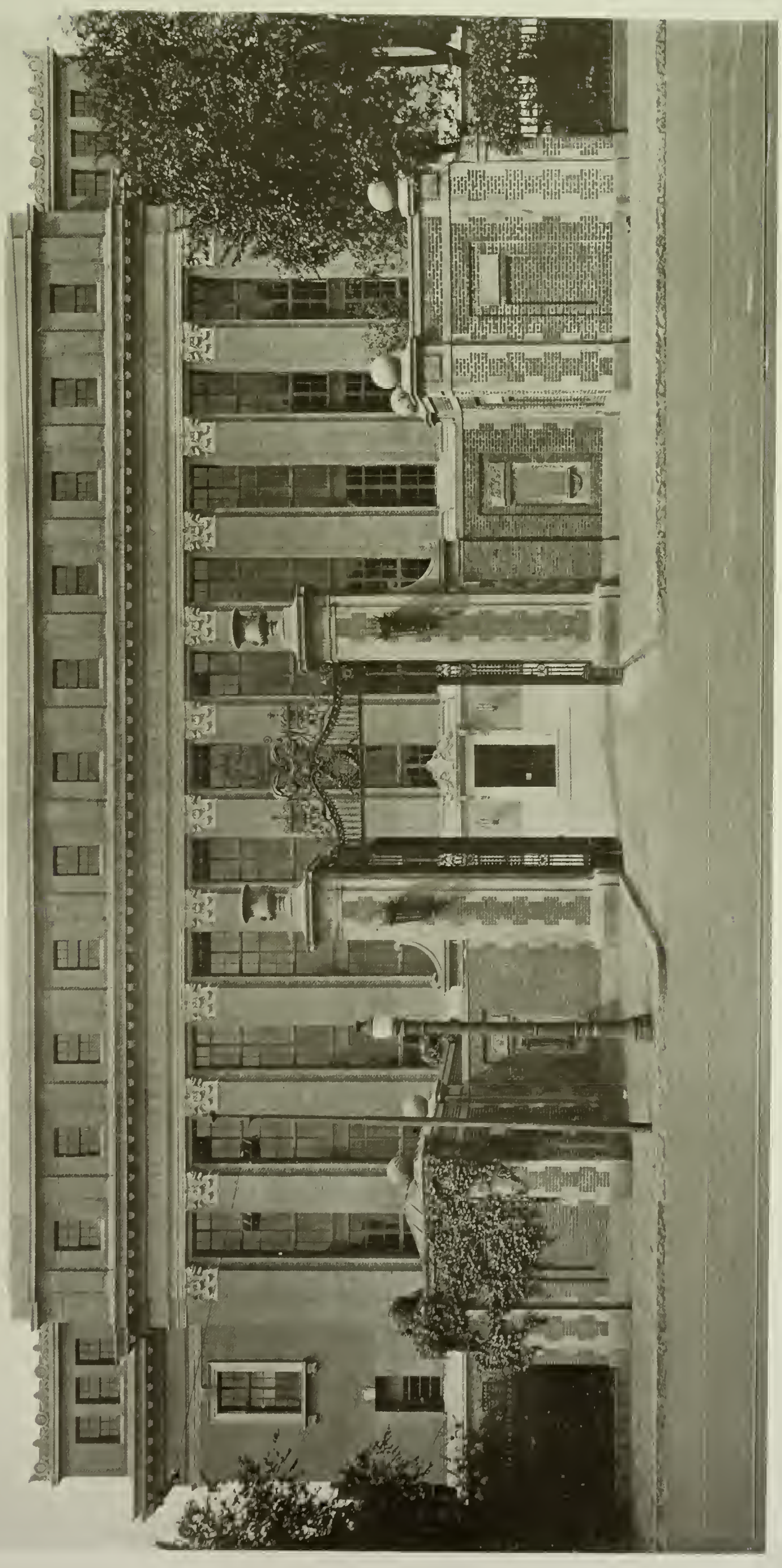
HORACE TRUMBAUER, ARCHITECT



MASSACHUSETTS AVENUE FACADE

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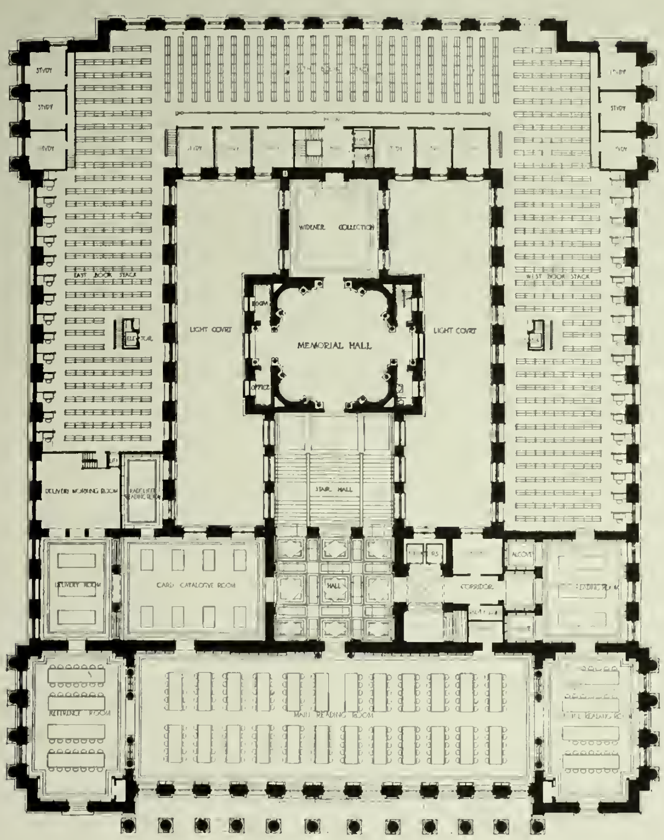
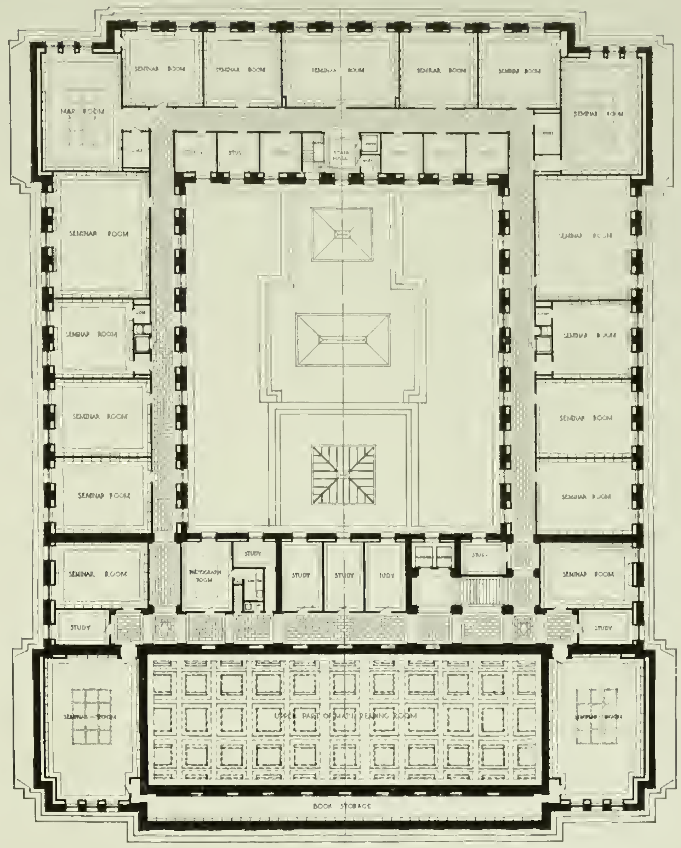
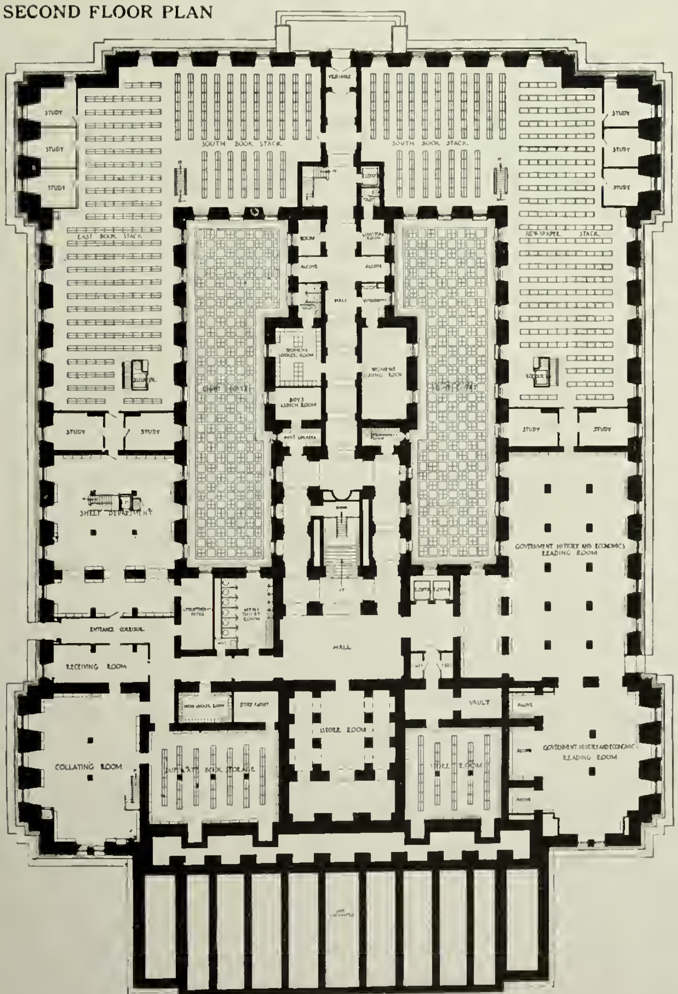
HORACE TRUMBAUER, ARCHITECT



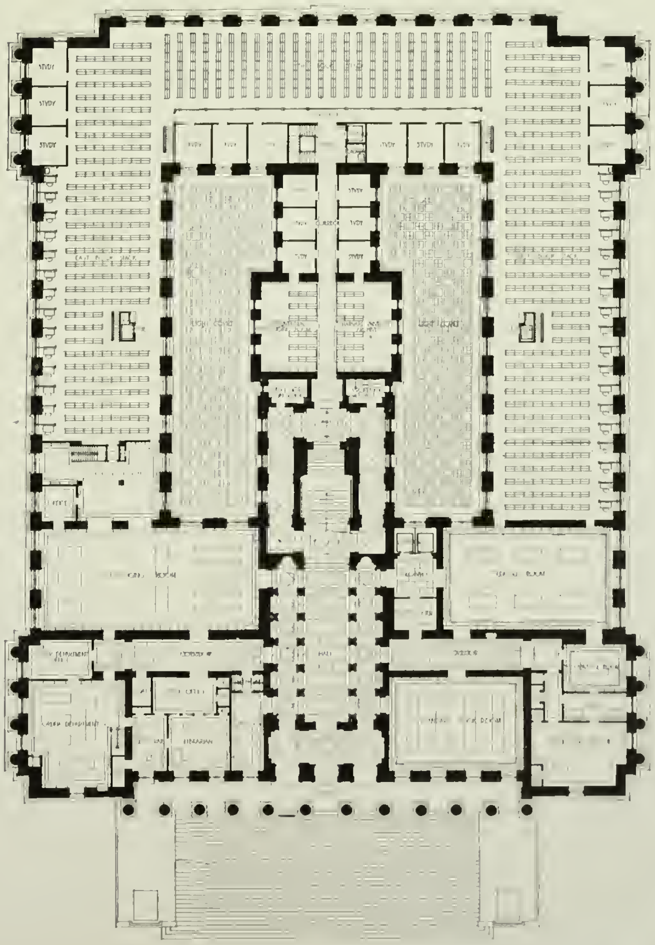
SECOND FLOOR PLAN



THIRD FLOOR PLAN



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

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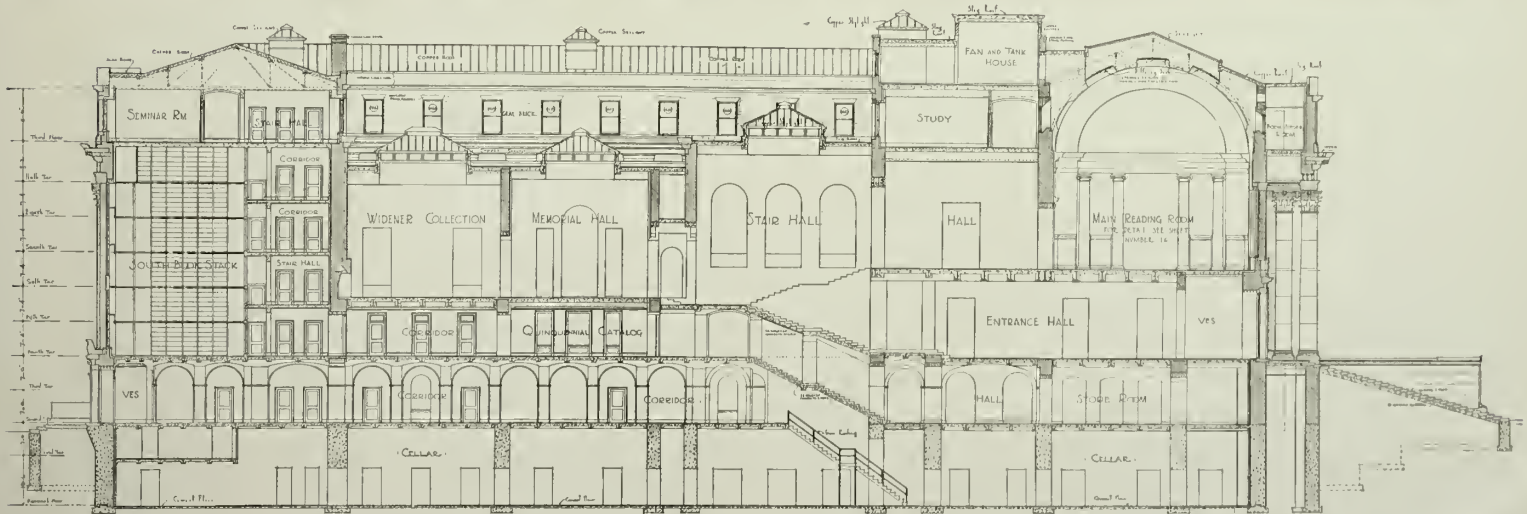
HORACE TRUMBAUER, ARCHITECT

READING ROOM



LONGITUDINAL SECTION

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HORACE TRUMBAUER, ARCHITECT

STAIRWAY TOWARDS READING ROOM

VESTIBULE AT MAIN ENTRANCE

DOORWAY TO MEMORIAL HALL

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HORACE TRUMBAUER, ARCHITECT

MANTELPIECE IN WIDENER MEMORIAL ROOM

DOORWAY IN READING ROOM

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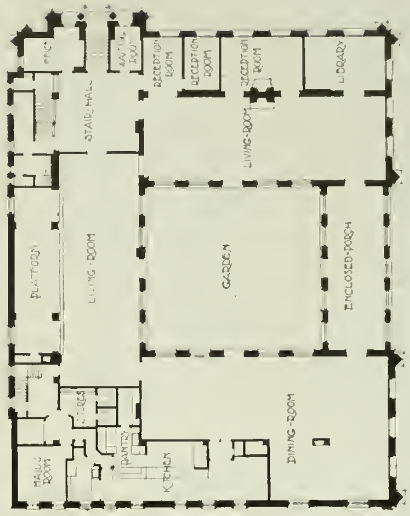
HORACE TRUMBAUER, ARCHITECT

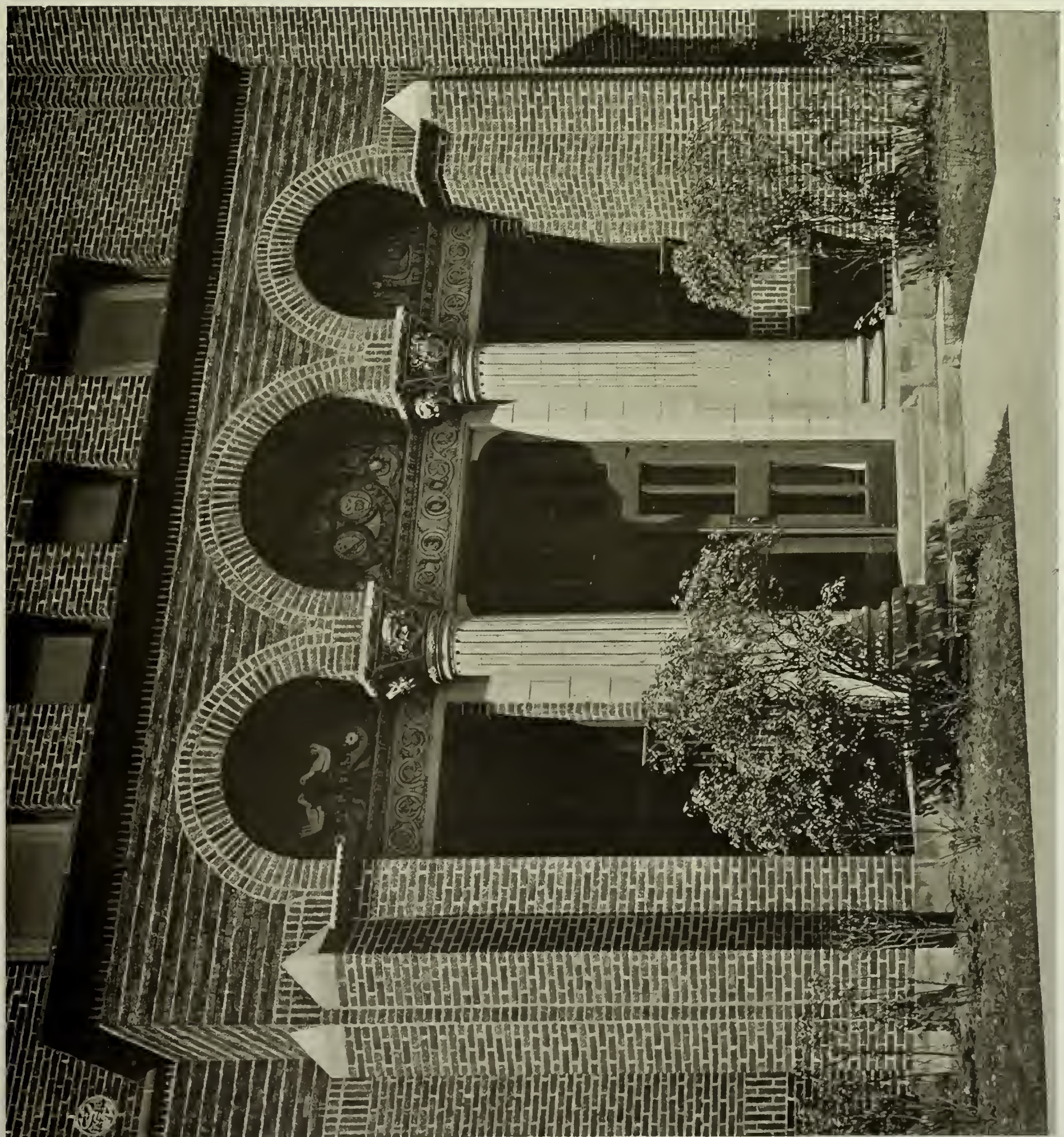
THREE ARTS CLUB, CHICAGO, ILL.
HOLABIRD & ROCHE, ARCHITECTS

FOURTH FLOOR PLAN

SECOND FLOOR PLAN



FIRST FLOOR PLAN



MAIN ENTRANCE

THREE ARTS CLUB, CHICAGO, ILL.

HOLABIRD & ROCHE, ARCHITECTS

DETAIL OF MAIN ENTRANCE

TEA ROOM

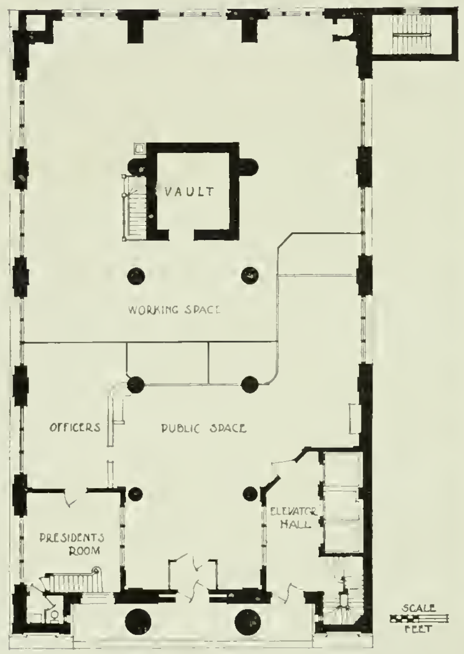
VIEW OF COURT

THREE ARTS CLUB, CHICAGO, ILL.

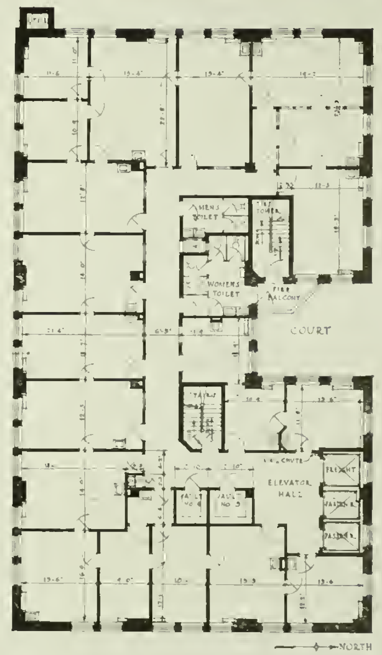
HOLABIRD & ROCHE, ARCHITECTS

GENERAL VIEW

BANKING ROOM



FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

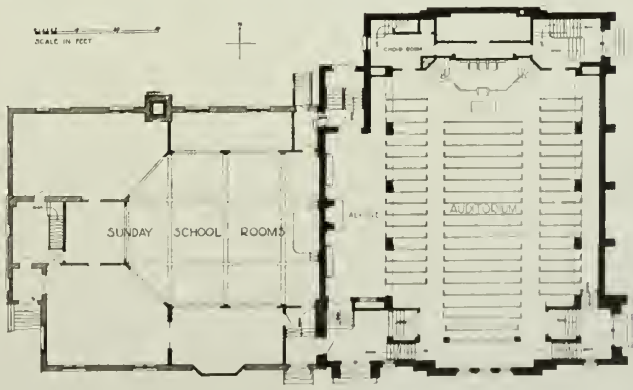
MURCHISON NATIONAL BANK, WILMINGTON, N. C.

KENNETH M. MURCHISON, ARCHITECT

NATIONAL BANK AT FAR ROCKAWAY, L. I.
JOS. L. STEINAM, ARCHITECT

GENERAL VIEW

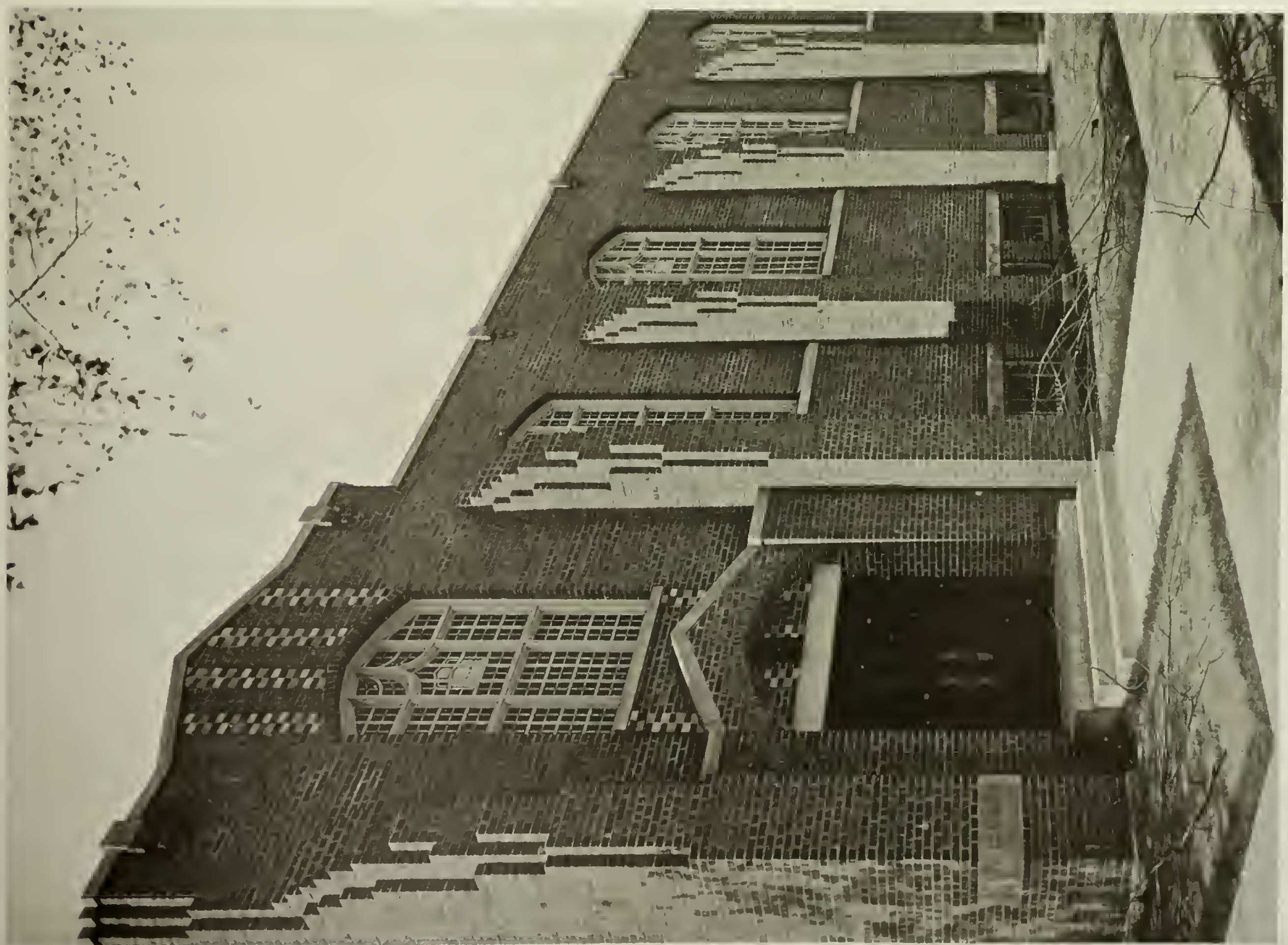
BASEMENT FLOOR PLAN



MAIN FLOOR PLAN

RAVENSWOOD PRESBYTERIAN CHURCH, CHICAGO, ILL.

POND & POND, ARCHITECTS



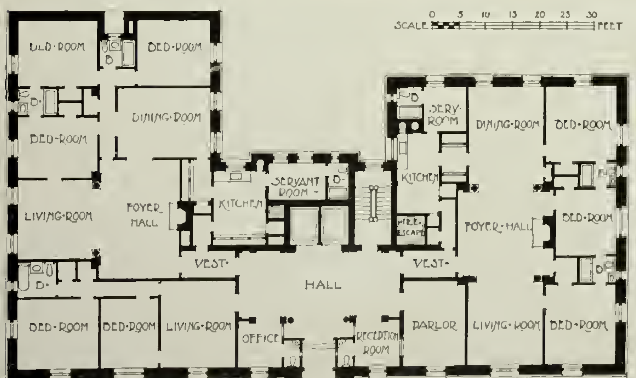
DETAIL OF EXTERIOR

AUDITORIUM TOWARDS PULPIT

RAVENSWOOD PRESBYTERIAN CHURCH, CHICAGO, ILL.

POND & POND, ARCHITECTS

CARROLLTON M. E. CHURCH, NEW ORLEANS, LA.
SAM STONE, JR., ARCHITECT



FIRST FLOOR PLAN

TYPICAL FLOOR PLAN

APARTMENT HOUSE, 11 EAST CHASE ST., BALTIMORE, MD.

WYATT & NOLTING, ARCHITECTS

Plumbing Installation and Sewage Disposal.

V. RÉSUMÉ OF PLUMBING REQUIREMENTS OF NEW YORK, CHICAGO, PHILADELPHIA, AND BOSTON.

(Concluding Paper.)

By CHARLES A. WHITTEMORE.

THE Building Laws of New York, Chicago, Philadelphia, and Boston represent characteristic requirements of the various localities and form the basis of the general building laws in regard to plumbing installation which are accepted as a standard throughout the whole country. Some localities, however, have special requirements, which differ from any of these standard laws; but in the main a knowledge of the laws of any of these cities would be a sufficient guide to enable one to lay out a plumbing installation in any portion of the country and be reasonably sure that the general scheme would be accepted by the authorities under whose direction the work would be inspected.

In Boston the Plumbing Department is a branch of the Building Department. In New York the inspection of plumbing comes under the Department of Buildings of the Borough of Manhattan. In Philadelphia it is entirely under the control of the Board of Health and completely dissociated from any connection with the Building Department. In Chicago the plumbing installations are entirely under the control of the Commissioner of Health.

In some ways this latter arrangement is advisable in that those cities which consolidate the Plumbing and Building Departments under one head still have definite requirements established by the various Boards of Health, and these requirements are occasionally quite different from the requirements of the plumbing installation.

For example, the Building Department of Boston requires that all buildings must have toilet rooms provided with "adequate ventilation to the outer air either by window or by suitable light shaft." In some cases where installations in strict accordance with these requirements have been made, the Board of Health has required additional provisions for ventilation of such rooms, the point being that the Building Department upon approving a building presumably establishes the fact that the ventilation provided is adequate. It seems highly desirable, therefore, that building laws should be so divided in responsibility that all of the plumbing work and regulations in connection with plumbing should be under one head: either entirely under the head of the Building Department, with no intervening authority from the Board of Health, or entirely under the control of the Board of Health, without additional inspection or requirements from the Building Department.

In New York and Philadelphia distinct provisions are made as to the method and manner in which additional work ordered by the Board of Health, either in existing building or buildings under construction, must be executed. New York requires that a layout of the work ordered shall be submitted to and approved by the Superintendent of the Bureau of Buildings. Philadelphia requires that the work shall be done in a manner specified within the time fixed. In Boston the Board of Health makes requirements that plans and sketches must be submitted to them for their approval and the work executed accordingly, without reference to the Building Department, except where structural changes are necessary.

Where repairs or alterations are ordered by the Board of Health in New York, particularly if new vertical and horizontal lines of pipe are to be used, drawings and descriptions must be filed with and approved by the Superintendent of Buildings before the repairs or alterations shall be commenced. These repairs need not necessarily comply strictly with the requirements of the law in case of old buildings except when a soil or vent line has been damaged by fire so as to constitute more than 50 per cent loss, in which case all of the work must be made to comply with the new requirements.

In Chicago repairs may be made on existing plumbing provided that all the horizontal and vertical lines are exposed so as to be ready for inspection and made to conform with the requirements of the Plumbing Department.

In Boston the same regulations are in force, that is, an alteration to a present installation must conform with the requirements for new work except in cases where a special permit may be issued.

Building laws of all the larger cities are almost unanimous in their requirements as regards the general divisions of installations, such as pipes, traps, valves, etc. All of these different products are standardized by various manufacturers so that the standard weights of pipe are practically the same in every case; the sizes of traps are the same, the only difference being in the method of construction.

The plumbers before commencing any operation are required in the cities under consideration to secure a license, pass the examination by the examining board, and having secured a license, file an application for each separate plumbing installation. In New York in addition to the usual method of procedure, the plumber is required to sign an affidavit that he is the person duly authorized to execute the contract. In Philadelphia the affidavit is not required, nor is it required in Boston or Chicago.

New York and Philadelphia also require that the registration of master plumbers shall be renewed annually.

Plans showing the plumbing installation of each building are required in all of the larger cities before a permit is issued. These plans may be merely a sketch indicating a general outline, or, as required by New York and Philadelphia, must be complete plans with specifications.

Where the plumbing work is under the control of the Building Department it seems hardly necessary to file an additional set of plans, which are practically duplicates

Comparison of Plumbing Requirements

SUBJECT	NEW YORK	PHILADELPHIA	CHICAGO	BOSTON
Registration	Annually	Annually	Certificate after Examination	License after Examination
Filing of Drawings and Specifications.	Plans and Section, 3 Sets Spec.	Separate for Each Building	Plans in Duplicate	Plans and Description
Begin Work	After Plans Approved	...	...	After Permit is Issued
Repairs and Alterations	No Plan Required	Must Conform with Law	System Made as per Law	Plans Except for Leaks
Notice of Beginning Work	Written to Supt. of Bldgs.	Written to Board of Health	...	...
Definitions of Drain, Soil, etc.	There is no	difference in the meaning of	the definitions but only a slight	change in the wording
Cast Iron Pipe	Extra Heavy (XH)	XH Uncoated	XH Coated	XH Plain (coated below ground)
Name of Manufacturer	Must be on Each Length	$\frac{1}{2}''$ Letters Each Length	...	...
Joints	Picked Oakum, 12oz. Lead per In.	Same as New York	Same as New York	Oakum and Lead Full Joint
Fittings	Same as Pipe	Same as Pipe	Same as Pipe	Same as Pipe
Wrought Iron Pipe and Fittings	Lap Welded, Coated	Must be Galvanized Lap Welded	Coated or Galvanized	Must be Galvanized
Fittings for Soil, etc.	XH Recessed	Heavy Cast Iron Recessed	XH Coated	Galvanized Cast Iron Recessed
Brass Pipe	All Iron Size	Soil, Waste, Vent to be I. S.	Drawn Tubing No. 18 B. and S.	Tubing not less than No. 13 Gauge
Connections	Threaded, Tapered	Same as New York	As Approved	Same as New York
Ferrules	XH Cast Brass	Same as New York	Heavy	Same as New York
Short Nipples	XH Brass up to $1\frac{1}{2}''$ long	Extra Heavy	Extra Heavy	Heavy Cast Brass or I. S.
Screw Caps	XH Brass not less than $\frac{1}{8}''$	Brass $\frac{1}{8}''$ Thick	...	Same as New York
Lead Pipe	Short Branches only	Short Branches up to 2″ Diameter	Strong	Branches not over 5′ 0″ Long
Bends	Same as Pipe	Same as Pipe	Equal to Extra Light	See Table in Law
Sewer Connections	Separate for Each Building	Same as New York	One for Each Lot	Same as New York
Cesspools and Vaults	15′ 0″ from Building	Not Allowed if Sewer Exists	...	50 Cu. Ft. Capacity
Location	On Same Lot	2′ 0″ from Line, 20′ from Building	...	...
Soil and Waste Pipes	Iron, Steel, or Brass	G. Iron, G. Steel, or Brass	Iron or Brass	Iron, Steel, or Brass
Size	Soil not less than 4″	See Table in Law	Same as New York	Same as New York
House Drain	XH Cast Iron	XH Cast Iron Plain	XH Cast Iron Coated	XH Cast Iron
Pitch	$\frac{1}{4}''$ to the Foot	Same as New York	Same as New York	Same as New York
Size	Not less than 4″	From 4″ to 10″	6″ if Leaders Connected	Same as New York
Sewer Connections	2′ beyond Wall	10′ beyond Wall	Outside Building Wall	10′ beyond Wall
Supports	Piers or Hangers 10′ O. C.	Not over 7′ Apart	Piers not over 20′ Apart	Hangers or Piers
Leader Connections	To Sewer or Gutter	Same as New York	May Connect to Catch Basin	To Surface Drain or Sewer
Inside	Cast Iron	Cast Iron, Wrought Iron, or Steel	XH Cast Iron or Coated Wt. Iron	XH Cast Iron
Outside	Sheet Metal to 5′ from Grade	Same as New York	Sheet Metal 4′ from Grade	...
Traps	Cast Iron	Cast Iron 5″ Seal	Special Conditions	Deep Seal, Back Water Valve
Vent	Separate Vent	...	Not Required	...
Vent Pipes	All Traps	Same as New York	All Traps except Non-Siphon	Same as Chicago
Material	Iron, Steel, or Brass	Plain C.I., Galv. W.I., Steel, Brass	Iron or Brass	Iron, Steel, or Brass
Connect with Soil	All Cases	Same as New York	Same as New York	Same as New York

Connect with Trap	Within 2′ 0″	As near as Practicable	Within 2′ of Fixture Outlet	Within 18″ of Trap
Extension	Above All Adjacent Windows	2′ above Roof or Adj. Building	At least 8″ above Roof	2′ above Roof
In Roof Gardens	7′ 0″ High	......	......	8′ 0″ High
Flue	Sheet Metal or Brick Prohibited	Same as New York	Same as New York	......
Caps	Not Allowed	......	Not Allowed	......
Pitch of Branches	$\frac{1}{4}$″ to the Foot	Same as New York	Same as New York	Same as New York
Offsets	45 Degrees	Same as New York	Same as New York	Same as New York
Traps	Approved by Supt. of Bldgs.	Approved by Board of Health	Must be Approved	Satisfactory to Bldg. Com.
Running	All Cases	Inside Building	Not Allowed	......
Fresh Air Pipe	Inside of House Trap	Inside Seal of Trap	......	Inside Seal of Trap
Yard Drain	3″ Connect to Sewer	Not less than 3″	......	......
Floor Drain	Water Seal	Seal and Vent	Deep Seal and Check Valve	Back Water Valve
Cellar Drain	No Vent Connect Back of Leader	Back Pressure Valve	As Approved	......
Vacuum Cleaner	Discharge to Sewer	Discharge to Open Sink	......	May Connect to Sewer
Sewage Ejector	Sewer Side of Main Trap	As Approved	As Approved	......
Sewage Ejector Vent	Separate	Separate	4″ Separate	......
Oil Separator	Connect behind House Trap	......	......	Approved by Supt. of Sewers
Acid Wastes	Lead or Earthenware	......	......	As Approved
Refrigerator Wastes	Galvanized Iron 1$\frac{1}{4}$″	Properly Trapped	Kept 4″ from Refrigerator	Not Connected to Drain
Refrigerator Discharge	To Sink not over 4′ above Floor	To Open Water Supplied Fixture	To Open Sink or Deep Seal Trap	To Sink in Open Sight
Cleanouts	On Horizontal Run	As Required	As Required	......
Vents	Above Roof	......	Not Required	Required for 2 or More Stories
Fixture Traps	Each Fixture	Every Fixture	Each Fixture	Each Fixture except as Permitted
Trap Screws	Brass below Seal	Same as New York	Below Seal	Water Sealed
Cleanouts	Same Size as Trap	Fixture Side of Trap	Same Size as Trap	XH Brass Size of Trap
Floor Flanges	Gas Tight, no Rubber Washers	Rubber or Lead Paste	No Putty or Rubber	Heavy Brass, no Rubber
Water Closets, Number	1 to every 15 People of Each Sex	Same as New York	1 to 20 Women; 1 to 25 Men	1 to every 20 People of Each Sex
Public Compartments	Waterproof 6″ above Floor	Waterproof 16″ above Floor	......	......
Enclosure	Air Tight to Ceiling	Same as New York	To Ceiling	......
Ventilation	Window or Vent Shaft	Same as New York	Mechanical or to Outer Air	Window or Light Shaft
Ventilation Duct	G. I. 1 Sq. Ft. to Each W. C.	4 Sq. Ft. to Each Closet	......	......
Water Closets (not allowed)	Pan, Plunger, or Washout	Same as New York	Same as New York	......
Flush Tank	Separate Each W. C. or Urinal	One may Serve Group	1 for Each W.C., Automatic for Ur.	One may Serve Group
Flushometers	Tank Supply or Street Pressure	Street Pressure Prohibited	As Approved	Not on Street Pressure
Capacity of Tanks	8 Gals. W. C., 5 gals. Urinals	......	4 Gals. W. C., 1 Gal. every 7 Minutes for Urinals	......
Latrines, Troughs	Special Permit Required	Not Allowed	Metal not Allowed	......
Tests, Inspection	In Presence of Inspector	Must be Approved by Inspector	Same as New York	Same as New York
Plugs	No Wood Plugs Allowed	Expansion, Screw, or Cap	......	......
Water	6′ 0″ Head	6′ 0″ Head	10′ 0″ Head	Water or Air
Smoke	For All Buildings over 6 Stories	May be Required	May be Required	......
Peppermint	Only on Bldgs. less than 6 Stories	May be Required	May be Required	......

of those under which the building is to be constructed; but as in the case of Philadelphia and Chicago, where the plumbing installation is entirely under the control of the Board of Health or of a separate department from the Building Department, the duplication above referred to is not encountered, and it is advisable to have a complete set of plans rather than a sketch.

Where complete plans or specifications are not required of the plumbers, the resulting sketches illustrating the work that they proprose to do are frequently so ambiguous and noncommittal that anything from the installation of a single fixture to a complete installation of the building might easily come under the head of repairs. In the case of new buildings there is no doubt but that a complete and comprehensive set of plans should be filed so that future trouble may be obviated by having drawings to which reference can be made showing exact installation.

An additional requirement which does not occur in any of the laws under consideration, but which might well be made a part of the plumbing laws, is that upon the completion of the work, plans should be filed showing any changes made in the process of construction and installation from the plans originally approved, thus making the plans on file with the Building Department or the Board of Health an absolute record.

Another point of difference between the various laws regarding plumbing installation is in the methods of testing the system. In Boston water or air tests are to be made satisfactory to the inspector. In New York the tests are distinctly noted: a water test must be put on first, and after the work is all completed, a smoke test must be applied, all to the satisfaction of the inspector.

Philadelphia requires first an air test of not less than three pounds to the square inch applied to the entire drainage system; but if this is impracticable and special permission is obtained from the Board of Health, a water test may be substituted for the air test. At the completion of the work when all of the fixtures are connected, the smoke or peppermint test shall be applied in the presence of the inspector if deemed necessary. This gives the Board of Health the option of requiring four different tests on the plumbing installation, if in their judgment it is deemed necessary.

In Chicago the tests prescribed are, first, general inspection test in the presence of the inspector, either a water test of 10-foot head or an air test, and in addition either a smoke or peppermint test as may be directed.

In New York and Chicago it is possible upon obtaining approval from the plumbing authorities to connect flushometer valves directly to the street pressure. This is not allowed in Boston or Philadelphia, and all flushometer installations must be made on a tank-supply system. Where a low pressure is used, flushometers may easily be connected to the street pressure without serious difficulty. Where the high-pressure service is supplied there is a chance for debate as to whether or not flushometers should be connected directly to this service. In any event, it is much safer to have flushometers supplied from the tank as is required in Boston.

The use of non-syphoning traps is not received with much favor in Boston, while in the other cities installations of this character are quite common, the installation of non-syphoning traps being recognized as a commercial condition. The traps, however, must in every case be approved by the head of the department having control.

In New York, Philadelphia, and Chicago special traps are required for each fixture. Not more than three wash trays may be connected to one trap; but in no case may wash trays and sinks be connected through the same trap, while in Boston it is possible to connect three wash trays and one sink to a trap, or a battery of fixtures may, under certain conditions, be provided with only one trap.

All the cities under consideration except Chicago require running traps on the house drain. Chicago, however, stipulates that no trap shall be placed on the house drain or on the house sewer.

Another requirement, which is distinctive of Chicago regulation, is that no steam boiler may be supplied from the street pressure, the supply coming from the tank which must be of sufficient capacity to maintain six hours supply for the boilers. In the other cities the boilers may be supplied directly from the street pressure.

This requirement in regard to the supplying of steam boilers from storage tanks is in some cases of considerable value. As a rule, however, the street mains are so arranged that it is possible to make repairs without the necessity of shutting off the water supply from the building for an extended period. Another point of installation which, in the judgment of many, is better than the supply tank, is to have for each building a double service from the street main coming from opposite sides of a gate valve so that one section of the street main may be shut off without affecting the supply of the building.

In Chicago there is also a requirement that the plumbers must file a bond before commencing the work, whether it be for alteration or repairs or any change which necessitates a change in any part of the city water-works system or the sewer connection. In the other cities the connections may be made only by licensed drainage layers, who are under bond to the city for a proper connection to the water or sewer system, and the general contractor who does the excavation is under bond for opening the street and must properly repair the paving.

In Chicago also the plumbing plans must be approved by the Commissioner of Health before the general permit for the building will be issued by the Building Department. This is a requirement peculiar to Chicago alone.

In comparing the laws of New York, Chicago, Philadelphia, and Boston it is at once obvious that there are two distinct classes: one in which the desideratum is a complete scientific, workmanlike installation in accordance with the law; another class in which the protection of the individual from defective plumbing is the principal consideration. These two divisions will exist so long as the Plumbing Department regulations are under the control of the Building Department of the city, which is composed of trained mechanics, or under the control of the Board of Health, which is composed principally of trained biologists.

The appended table of comparison between the laws of the various cities will show at a glance points of difference more readily than a written description. In the table wherever spaces are crossed out, it does not necessarily mean that no requirement is made in regard to the particular item, but does refer to the fact that the laws governing the plumbing installation do not specifically mention the conditions noted.

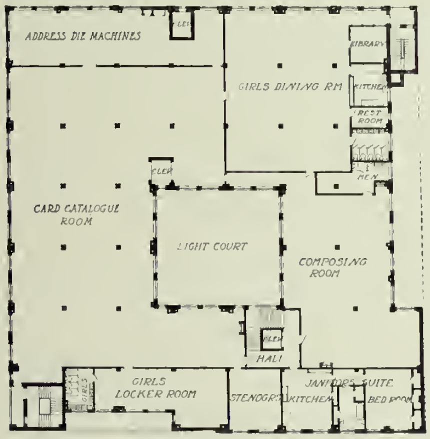
A Philadelphia Publishing House.

BUNTING & SHRIGLEY, *Architects.*

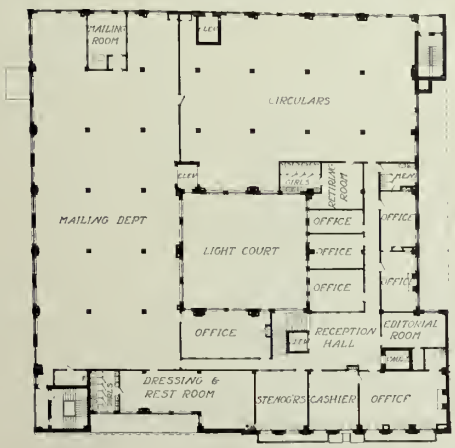
THIS building is devoted to the publishing and printing of the *Farm Journal*, and has been planned to accomplish its purpose as efficiently and economically as possible. The principal façade is that on Washington square illustrated below; but a reference to the plans will show that this does not indicate the true size of the structure, for the reason that the lot on which it is placed has a frontage of but half its width on an important thoroughfare. This condition has, of course, affected the plan to the extent of locating the general business and editorial offices on the Washington square side, leaving the parts fronting on the unimportant streets for the space devoted to the printing and mailing of the magazine, and the delivery and receipt of freight.

The paper rolls are received at the rear of the basement, the printing is done on the first floor, and the addressing and wrapping on the second floor, from whence the magazines pass through a chute to the mail wagons. The remainder of the building is used for editorial rooms, general offices, the subscription department, and rooms for the employees comprising rest and recreation rooms, dining room, and kitchen, as well as a janitor's suite on the third floor.

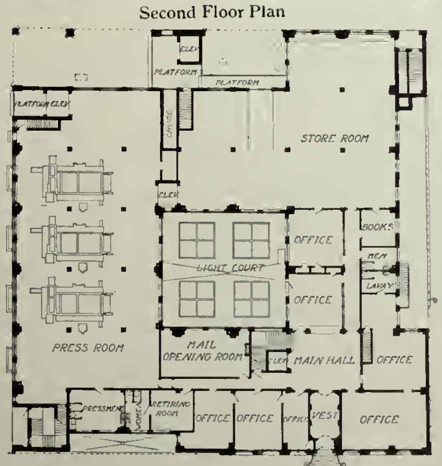
The exterior is of red brick, stone, and terra cotta, on a structure of reinforced concrete. The power, heat, and light for the building are generated by its own plant. A plenum system of ventilation is used throughout; ice water is piped to all rooms; a sprinkler system is installed and also a central vacuum-cleaning plant. The cubic cost of the building, exclusive of the mechanical plant, was 12 cents, and 15 cents with the mechanical plant included.



Third Floor Plan



Second Floor Plan

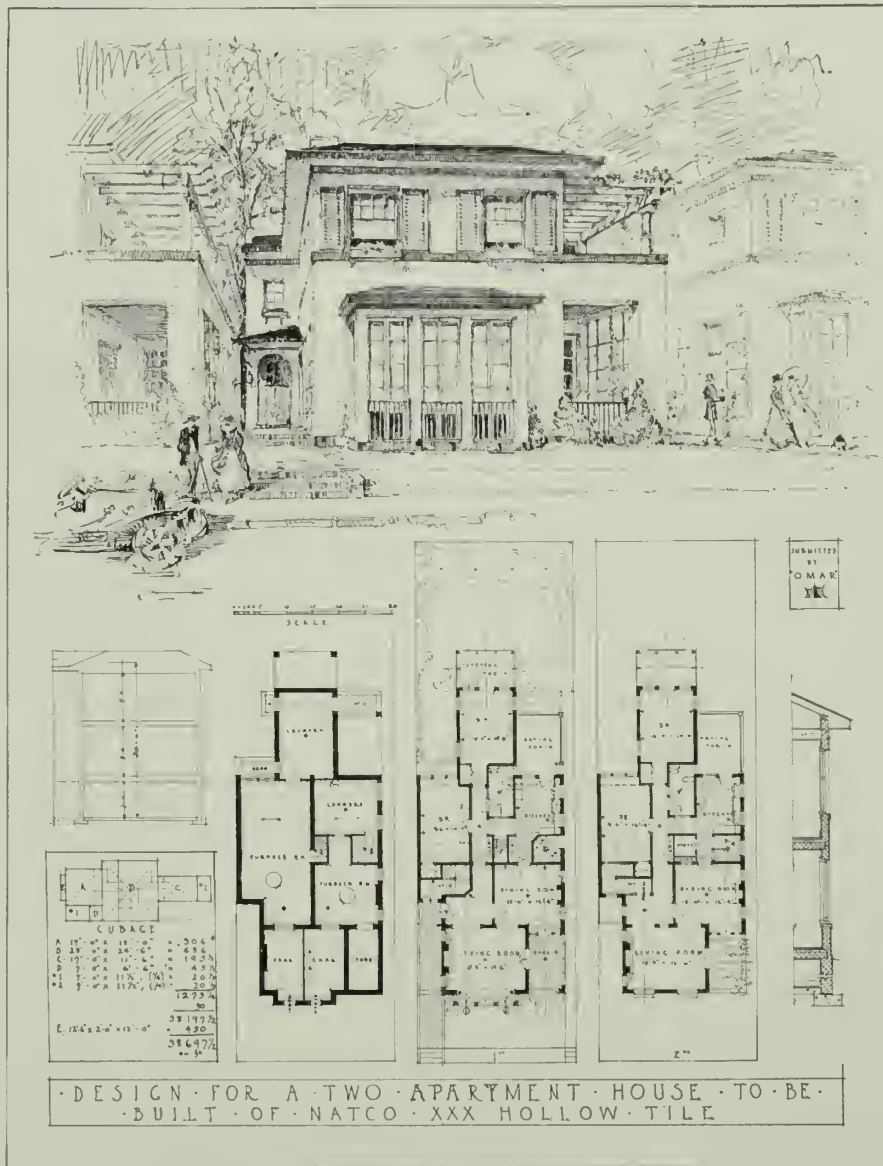


First Floor Plan

"Farm Journal" Building, Washington Square, Philadelphia, Pa.

FIRST PRIZE DESIGN

SUBMITTED BY OLAF WILLIAM SHELGREN, BUFFALO, N. Y.



SECOND PRIZE DESIGN

SUBMITTED BY HUGH MACOMBER FERRISS, NEW YORK, N. Y.

Competition for a Two-Apartment House.

REPORT OF JURY OF AWARD AND PRESENTATION OF PRIZE AND MENTION DESIGNS.

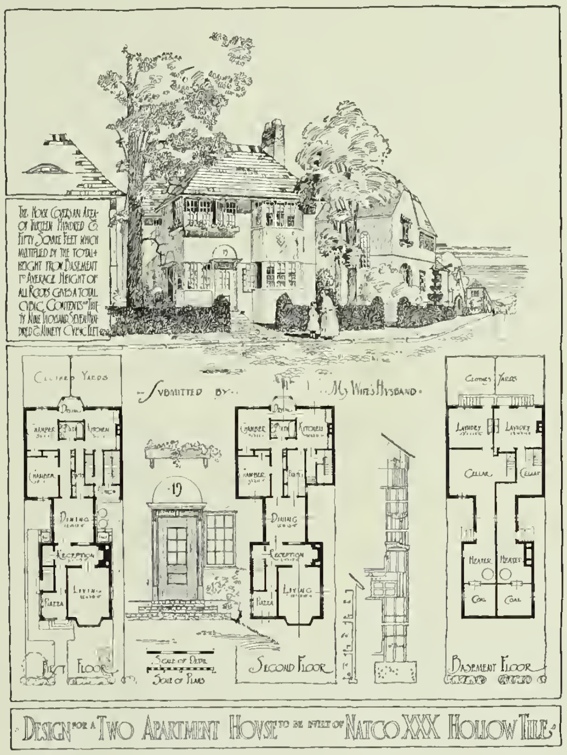
THE program for this competition was intended to bring forth solutions of the difficult problem of designing a two-apartment house. This is a constantly recurring problem in the smaller practice of to-day, and the results thus far have not always been quite satisfactory.

A very large number of drawings, over two hundred, were submitted, a gratifying response to the rather difficult and circumscribed program of the competition.

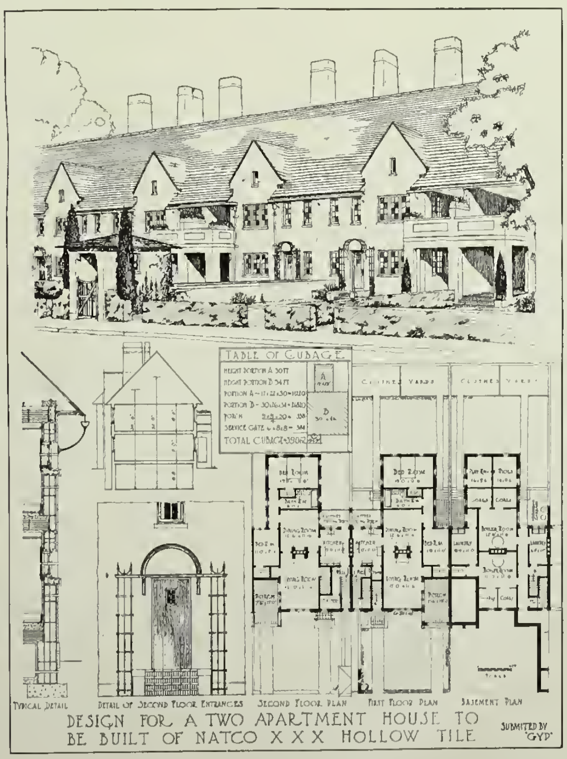
One of the principal considerations to be taken into account in a competition of this nature is the suitability of the design to the material. The jury was somewhat disappointed, therefore, not to find more designs where these limitations had been considered and where the building would not have looked as well built in brick or wood. Tile and stucco will permit of quite a different architectural treatment than will any other materials, and the designer is not making the most of his work when he does not take advantage of these characteristics.

The program was interpreted differently by the various competitors in the question of whether the building should be carried to the party walls or should stand independently. This difference was not considered by the jury in making the awards except in the cases of some drawings where the designs depended largely for their effect on the adjacent owner using the same or a reversed design, and these were considered as being no solutions of the problem.

The design which was awarded first prize was given its place largely because of the perspective which shows a real knowledge of material, shows its use in proper masses and with an excellent opportunity for color contrasts. Its weaknesses are obvious; the enclosed porches are scarcely more than rooms, and the detached house — so attractively shown in perspective — would be very much hurt if the adjoining neighbor built up to his party line. If this be true on the party wall side, it is equally true on the entrance side, where one would be obliged to go down a narrow passage to the front door. These faults, however, are overbalanced by the general excellence of the design.



Design Submitted by Richard J. Shaw, Boston, Mass.

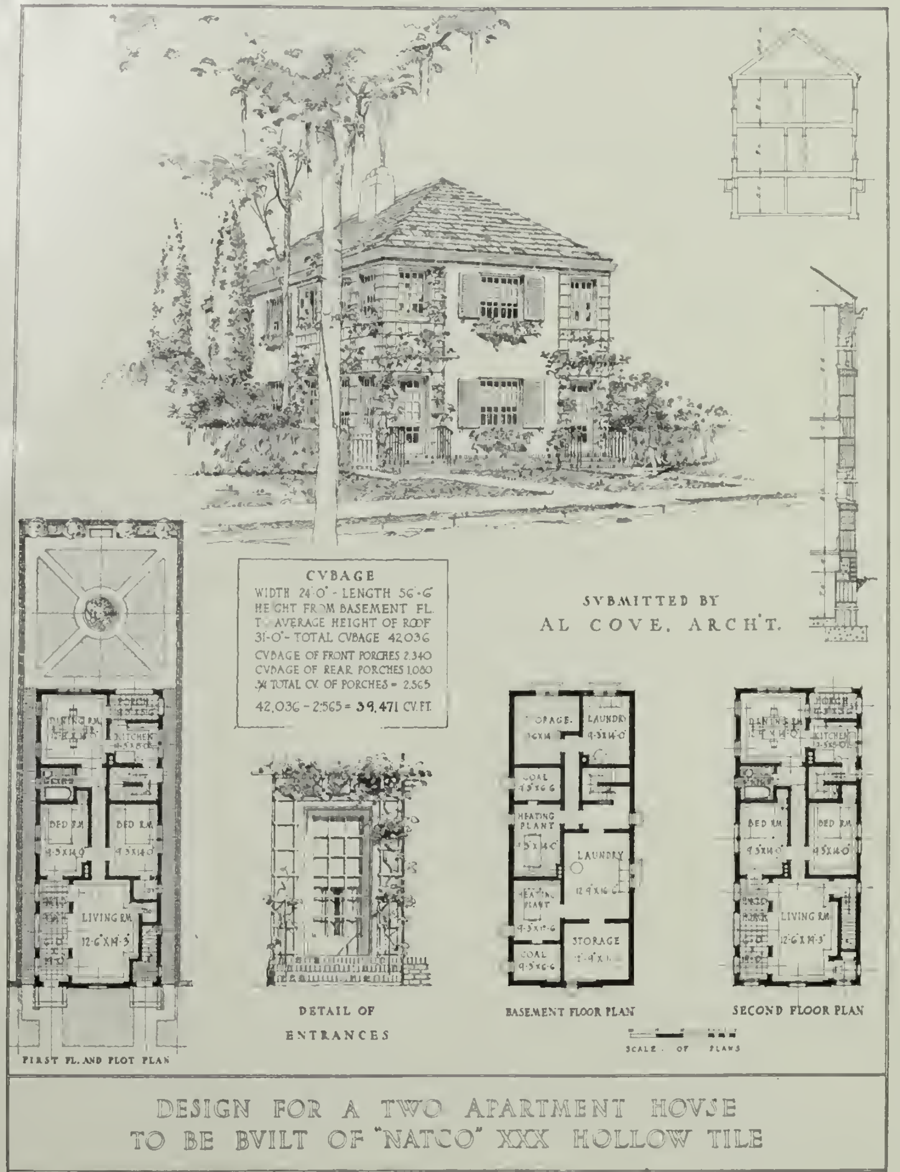


Design Submitted by Harold Thorp Carswell, New York

The second prize design was very favorably considered by the jury, particularly on account of its very excellent plan and its well lighted porches. The perspective is handled by a clever draftsman who was not, however, careful enough of the materials to be used. The bay window is perhaps of wood, the belt course is perhaps of brick, and the house itself, with the exception of the porch to the right, might well be of wood also. But the handling of the plan with certain qualities in the perspective, and especially the fact that the porches are arranged one house after the other to give the proper exposure, appealed to the jury.

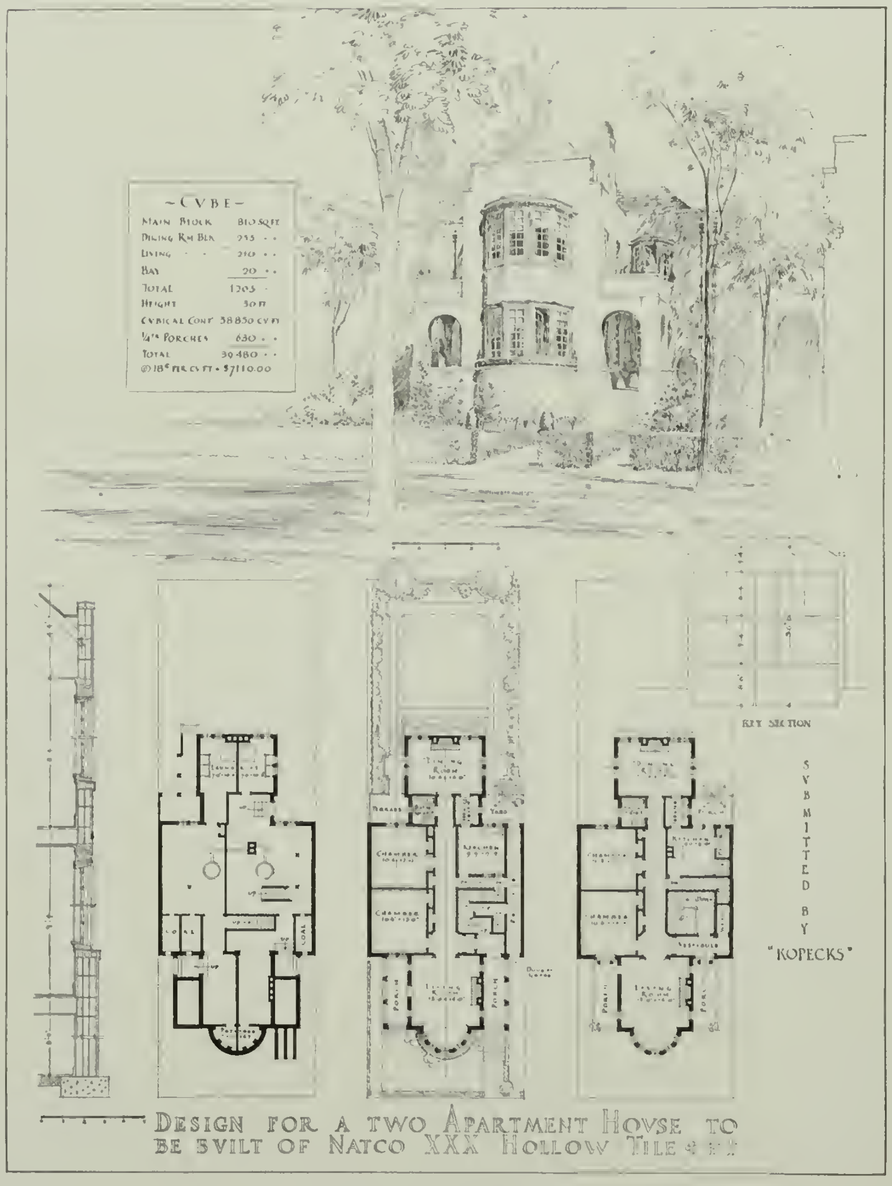
There is a charm about the third prize drawing, both in rendering and in design, that leaves little to be desired. The front door, for example, is placed just where it should be. Perhaps one is not sure that the material is hollow tile, for it might equally well be wood or brick; and surely one wishes for more room at the sides than this narrow city lot would give. In fact, the worst that can be said about this house is that it would be much better adapted to a wider lot.

The fourth prize design has a most interesting perspective, charming in its outline and excellent in rendering. The jury found fault because the second floor had only an open balcony, for they felt that soon this balcony would have, perhaps, a



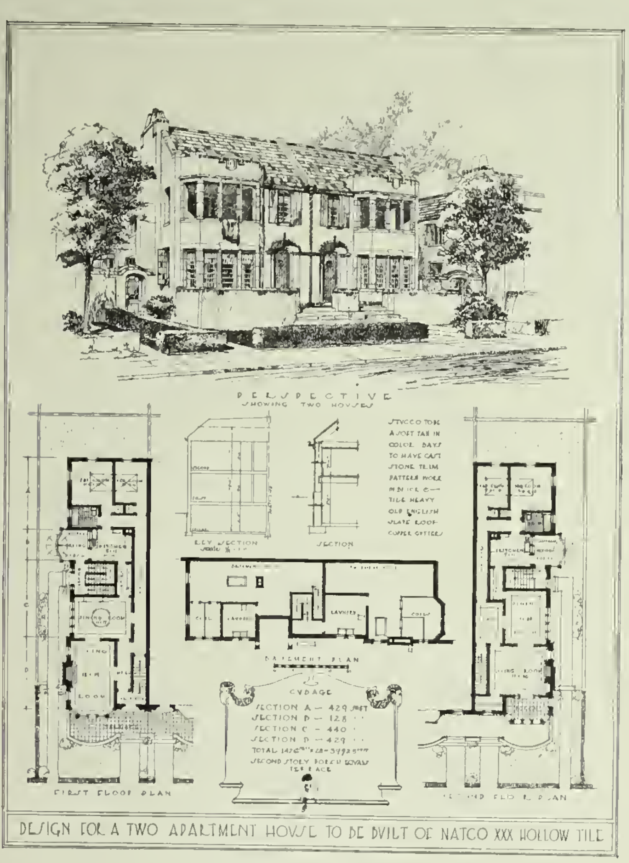
THIRD PRIZE DESIGN

SUBMITTED BY J. IVAN DISE, NEW YORK, N. Y.



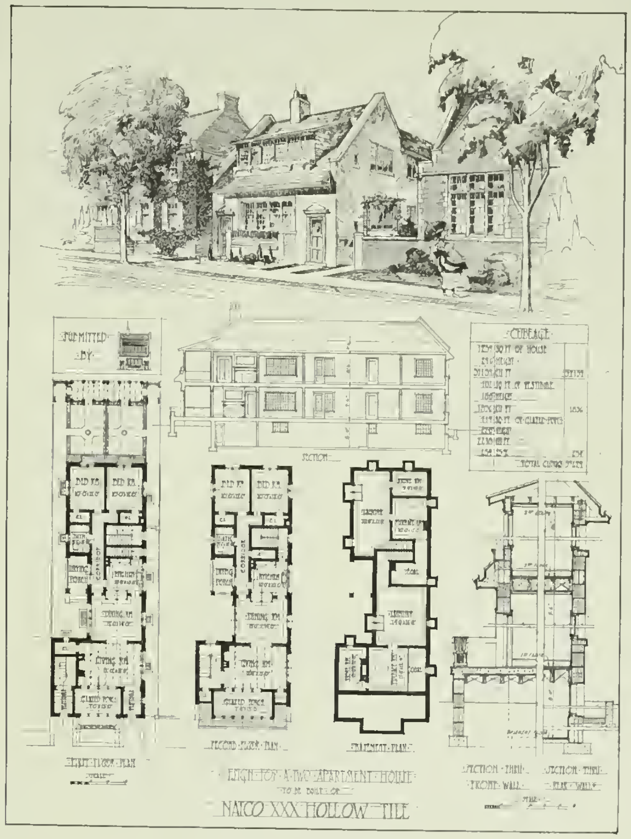
FOURTH PRIZE DESIGN

SUBMITTED BY MAURICE FEATHER, WATERTOWN, MASS.



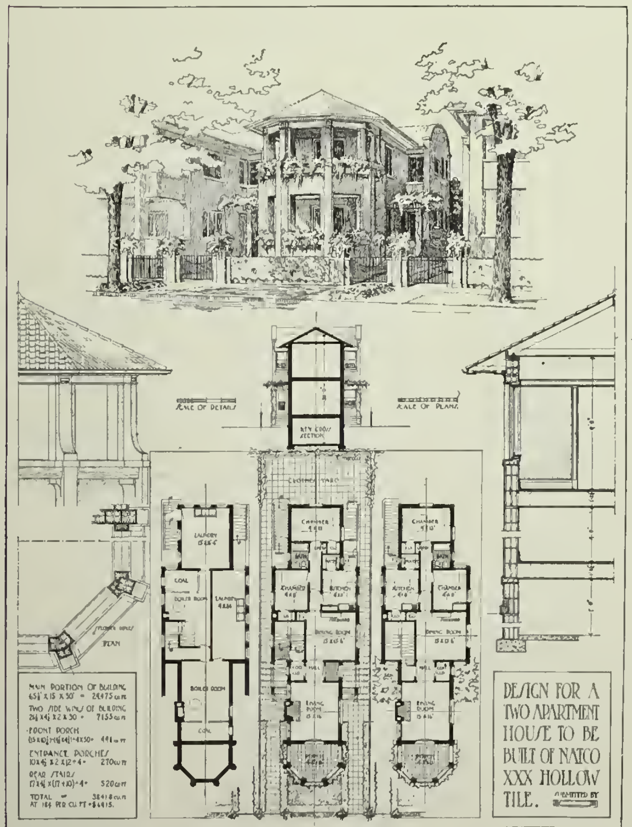
MENTION DESIGN

SUBMITTED BY R. F. WALKER, MELROSE HIGHLANDS, MASS.



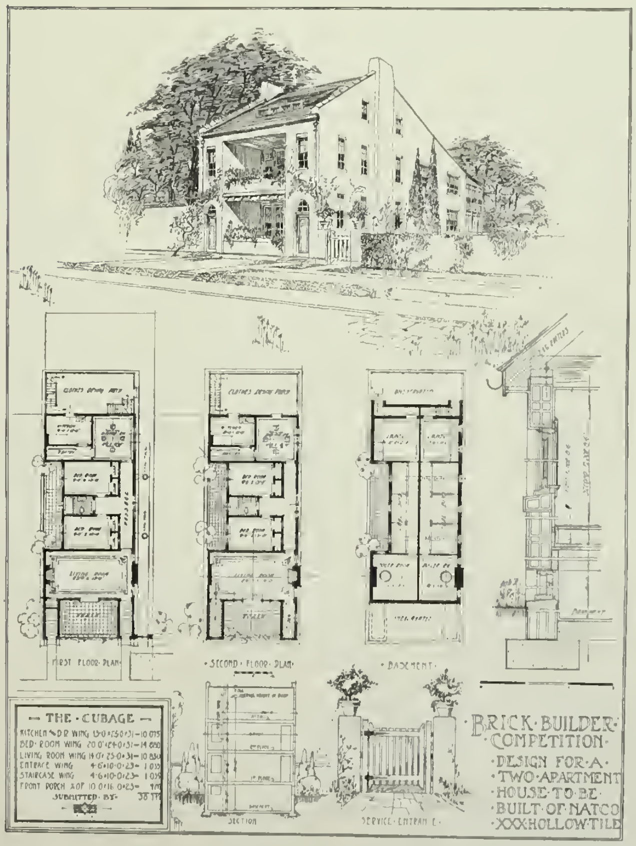
MENTION DESIGN

SUBMITTED BY WILLIAM H. FLANIGAN, WOODBURY, N. J.



MENTION DESIGN

SUBMITTED BY EMIL F. HASENBALG, CHICAGO, ILL.



MENTION DESIGN

SUBMITTED BY FREDERICK J. FEIRER, RIDGEFIELD PARK, N. J.

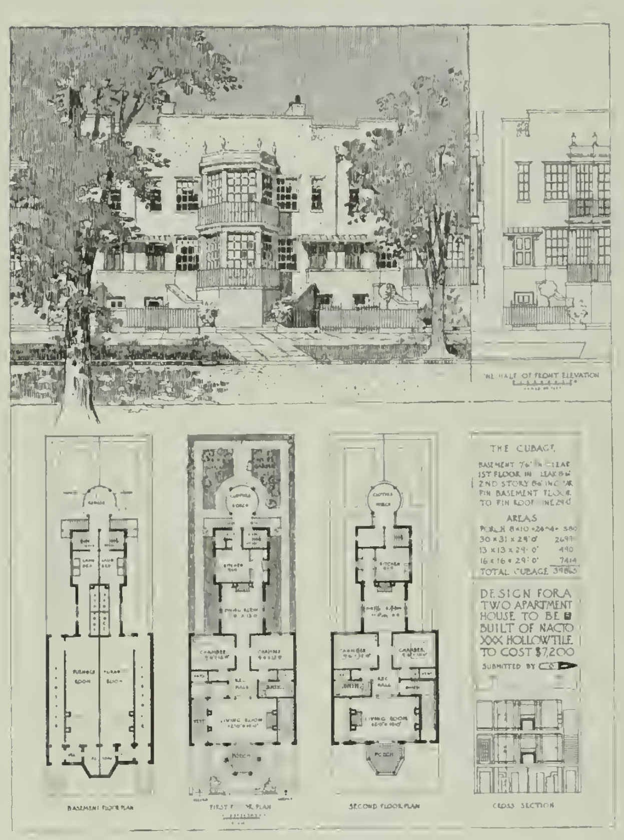
canvas roof which would very much hurt thê lines of the design. The plan is interesting and the house is livable.

The mentions are not presented in any order, but all as of equal merit.

The design by R. F. Walker has a beautifully rendered perspective which unfortunately gets part of its charm from showing two houses instead of one. The plan is good, particularly in the handling of the drying porches.

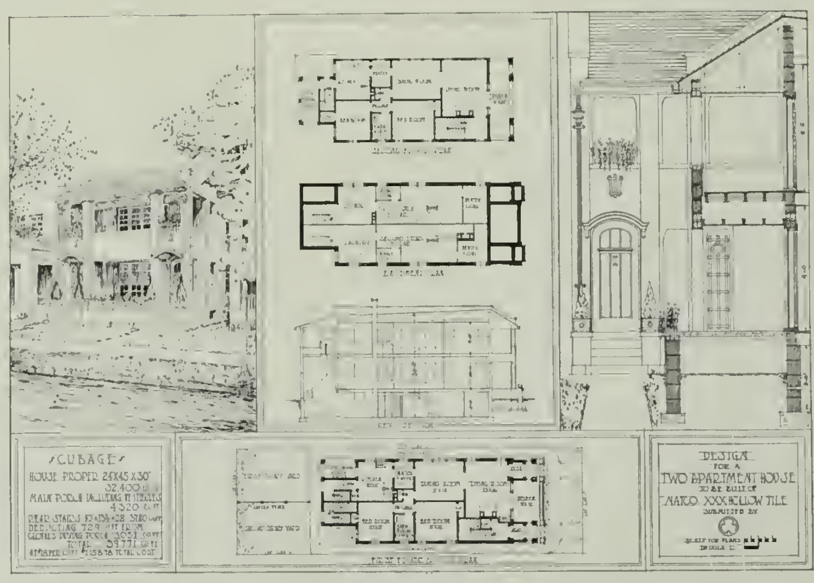
The house by Wm. H. Flanigan is good in general design, but would look equally well in brick. The glazed porches are hardly a good solution of that part of the program.

The design submitted by Frederick J. Feiner is chiefly interesting on account of the deep front porch — a feature, however, which was obtained at too great an expense in the planning.



Mention Design
Submitted by Cleon M. Hannaford, Boston, Mass.

The design of Emil F. Hasenbalg is a very interesting, practical plan with an excellent arrangement, the porch in the correct location and still not cutting off all the light from the living room. The perspective is not nearly so interesting as the plan, the round gable at the side being particularly unhappy.



Mention Design
Submitted by Arthur J. Pohle, Albany, N. Y.

There is a real charm about the perspective of the design by Cleon M. Hannaford, and the house would build particularly well in rows. The urns on the porch roof are rather trivial, and the porches themselves are rather too small; but the building has a character all its own — a character which the jury would like to see built into our city blocks. The plans, too, are well studied.

The perspective of the design by Arthur J. Pohle shows a good treatment of open air porches which is eminently suited to a city lot, but the rest of the plan needs a much wider frontage.

The two drawings which are also published with this report, by Richard J. Shaw and Harold Thorp Carswell, although not receiving prizes or mentions, are presented as good examples of well arranged sheets and of good draftsmanship. That by Richard J. Shaw is particularly interesting in the perspective in showing the surroundings and the particular location of the house.

Many other drawings, not shown here, are interesting in one way or another, and some of them would easily have been among either the prize or the mention drawings had it not been for some unfortunate feature which the jury felt was too vital to be graciously overlooked.

Considerable emphasis was laid on the practical "buildable" qualities of the designs, and for this reason alone several were eliminated. Competitors must not overlook the fact that in submitting designs they should not consider them as mere pictures, nor even as "first sketches," but rather as working plans which have not been worked out in detail.

The jury feels gratified at the response to the competition and at the energy and thought which evidently were expended upon solving the problem. No one who submitted a drawing can feel entirely unrecompensed for the thought devoted to the consideration of the program must have been of some personal benefit.

The general character of the work is a fair indication of the healthy condition of the younger architectural thought of the country and promises well for future standards.

Harry J. Carlson, Boston.
Herman L. Duhring, Jr., Philadelphia.
Arthur W. Joslin, Boston.
Edward L. Palmer, Jr., Baltimore.
Thomas E. Tallmadge, Chicago.
Jury of Award.

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

LOUIS LA BEAUME

LOUIS LA BEAUME was born on July 31, 1873, in St. Louis, and there received the preliminary part of his education. In 1895 and 1896 he was at Columbia University, where he took the special course in architecture. The next four or five years were spent in getting office experience; during this time he worked in the offices of Parish & Schroeder; Andrews, Jacques & Rantoul; Peabody & Stearns, and C. Howard Walker.

The experience gained in these various offices was of great and immediate value to him, for after spending a year abroad in study, sketching and measuring the masterpieces of architecture, he was in a position to qualify as assistant to the Chief of Design on the work for the Louisiana Purchase Exposition held in 1904. From 1904 to 1912 he was in active practice in St. Louis, in partnership with G. C. Mariner, and in 1913 formed with Eugene S. Klein the present firm of La Beaume & Klein. The work during these periods has been extensive both in and around St. Louis and in neighboring states. The influence of Mr. La Beaume in the work is most apparent because of its direct simplicity, which is evidenced in the selection of material as well as in the straightforward solution of the problem which was in hand. His ability to get at the root of the requirements of his clients, to analyze them, and to solve them simply is perhaps the greatest factor in the success of his practice.

Five years ago Mr. La Beaume visited Mexico and studied examples of the notable old work which may be found there. This architecture of Mexico in its picturesque yet classic beauty made a very strong appeal to him, an appeal which finally has found public expression in a recently published book on the "Picturesque Architecture of Mexico."

His public spirit in things worth while and his keen appreciation of the best there is in architecture, literature, and drama, and his scintillating wit, as well as his delightful personality, make him the man that attracts and retains clients and friends.

While his membership in the American Institute of Architects dates only from 1913, his interests in the organization and its activities make him a valuable member and good timber for the real work in furthering the best interests of the profession, and its members, to which the Institute is pledged. — *E. J. R.*

WADDY BUTLER WOOD

ONE day, some years ago, — no matter how many, — there came to my office a pleasant-faced, eager young man in search of work. With "no training and no experience," as he frankly put it, he was ready for a try at almost anything. He was given the elevation of a small house to trace as a test of his possible usefulness. What he promptly brought back was a tracing to remember. Dashed off in a bold, flamboyant manner and lettered largely in a sort of Hispano-Mooresque character, that tracing was worthy of a castle in Spain! Well, sordid, practical considerations let him go — and it was regretted later. So he had to become an architect, at once, as he says himself, "going into the practice of architecture from necessity, as no one would hire me."

Waddy Butler Wood was born in 1870 in Virginia. After the usual schooling he had two years at the Virginia Polytechnic Institute, followed by some field work in engineering. That was his technical training. Practically self taught in architecture, poring at night over shades and shadows and perspective and the history of architecture, drawing from casts a short while at the Corcoran School of Art, developing ideas, forming an individual taste, acquiring a facile technique with his brush, and a sense of color in materials which now and then has given value to his work, thus he has guided his own artistic growth.

After working alone for some years, Mr. Wood formed the partnership of Wood, Donn & Deming, from which he retired at the end of six years, and has again for the last three years practised alone.

Of his early work, done before the partnership days, the most decided success, in a combination of right planning and agreeable design, is Providence Hospital. The Union Trust Company's building, the Masonic Temple, and the Naval Hospital at Portsmouth are, perhaps, the most important works by Wood, Donn & Deming. While these buildings are stately and dignified in a somewhat more academic treatment, the Providence Hospital is charming in its own way. Yet in such a façade as that of the Story & Cobb office in Washington, Mr. Wood proves that he can hold himself to a classical handling of his subject.

Only a few of his important works, and none of the many residences in which one finds distinction and originality, have been alluded to here from the goodly list of things done during his vigorous professional life. — *A. B. B.*

WALTER MELLOR

WALTER MELLOR was born in Philadelphia, April 25, 1880, prepared for college at the Haverford School, and graduated from Haverford College with the class of 1901. The following year he entered the Architectural Department of the University of Pennsylvania, graduated with the class of 1904, and after about a year in the office of Mr. Theo. P. Chandler he formed the partnership for the practice of architecture with Arthur I. Meigs, under the firm name of Mellor & Meigs.

These are the facts, as devoid of sentiment as a reference from "Who's Who," and, as might be supposed, are the least important considerations when we are thinking of Mr. Mellor's work. It is an important fact to note in passing that the firm is not one of those firms made up of two individuals, differing in their artistic convictions, for the work is an intimate association of work with Mr. Meigs, hence the firm.

Here is work of a peculiar sort and with a peculiar kind of charm — work which it is doubtful could be developed far outside Philadelphia. There is a great architectural influence ever present in Philadelphia, and whether its effects are expressed literally or only in intangible phases of feeling (as in the case of Mellor & Meigs' work), that influence is subtly felt. Its name is Wilson Eyre.

I do not mean to suggest that any of Mr. Mellor's work could be traced to anything as definite as what a student would call a "Wilson Eyre influence," because it is very individual and personal with the younger firm, and full of a great deal of architectural sanity and spirit all its own.

The keynote of the work we are discussing is more difficult to define than to feel in the presence of the work itself. It is informal, it is free of academic tendencies, but always sane and not at all bizarre. It is frank, sincere, and straightforward. One does not feel the presence of any architectural tricks or mannerisms, and at the same time there is that quiet absence of "period style" which comes only from easy familiarity with all styles.

Without impairing the real originality of the firm's work, Mr. Mellor has been able to find worthy inspiration in the work of the modern English architects, and with this there is also a subtle suggestion or echo of the same medievalism that constitutes much of the romance of Wilson Eyre's work.

Certainly the character of an architect's own office must reflect with more intimate exactness than the run of his work — that architect's personal tastes and convictions. This would be borne out in the case of the office of Mellor & Meigs, — picturesque, practical and straightforward, and rendered with an agreeable dash of personal individuality, and with that peculiar *friendliness* towards the materials used that characterizes the works of the modern English architects. — *C. M. P.*

ALFRED HOYT GRANGER

IN surveying the work of Alfred Hoyt Granger, one must pass beyond the confines of the material and seek in the ideals and convictions of his strong personality the reflection of a sympathetic mind. The architecture of Mr. Granger has not sprung from the drafting board, neither is it a concoction of academic rule and theory, but rather a reflection of the great human efforts of the day. His is a mind that dwells upon the amalgamation of the modern forces of thought; his ideas, those moulded from the conceptions of poet, of engineer, and of philosopher, whose works he studies and loves. He speaks the language of the art philosopher, who interprets the thought of the generation. It is a delight to discover such understanding combined with such certainty and independence, and he who would place the gauge of fleeting architectural fancies upon the buildings constructed by him, will be at a loss to take their measure by our bandied conventionalities. The truth is, these are the works of a thinker, unharassed by "movements in art." It is the very isolation from contemporary work that makes their true worth more difficult of understanding, yet more distinctive, and bold. His devotion to his patron, H. H. Richardson, has influenced his views and conception of his problems; and earnestness, deep consideration, and independent thought have held him close to the truth. Mr. Granger is a Massachusetts Institute of Technology man, but his training has never been forced into the narrow channels of atelier idiosyncrasies. At Pascal's atelier in Paris, this manifestation of broad visions left him free from the "company march, shoulder arms" spirit, and he was always an advance scout for the wider fields of thought. In England he later found a charm that appealed to his spirit; he drew, sketched, and measured, and, more than all, retained the sense of simplicity which he found. This influence of English architecture blended with the New England traditions which he held, and we find the delightful combination in one of his earlier works, the Rice house in Cleveland. His subsequent work all rings true in this fundamental understanding of cultured demands, and there remains in and near Chicago a lasting expression of honest, beautiful buildings, homelike, individual, and substantial, true to these first acquired principles. His larger work in railway stations, office buildings, college groups, and sturdy warehouses are redolent of earnestness and honesty. His encouragement to younger men lies in his love for his profession, which he has always supported with sacrifice and the ardent labors of the enthusiast. A lover of books, human nature, and his art, he has accomplished much in welding them together to make up his environment. — *J. B. B.*

PLATE DESCRIPTION.

HARRY ELKINS WIDENER LIBRARY, HARVARD UNIVERSITY. PLATES 106-111. This building, which is located on the south side of the Harvard Yard, is exceeded in capacity, in this country, only by the New York Public Library and the Congressional Library. It is about 250 feet in length by 200 feet in width. The rear and two sides are occupied mainly by book stacks, while on the front are the offices of administration on the first floor, the main reading room on the second floor, and special reading rooms on the third or attic floor.

The stacks extend through eight low stories and there is room for expansion by adding two more floors of stacks in the basement. The total capacity at present is about 1,900,000 volumes. In the attic story are a number of rooms for special collections and departmental libraries, a photograph room, and a map room. An unusual feature is the private studies for the professors and some 300 reading stalls for research students, which are located among the stacks.

The traditions of the older Harvard buildings are carried out in the selection of materials; the exterior is brick with limestone trimmings. The vestibule is of Rossato marble. The entrance hall and the outer memorial room are also marble, while the main reading room is of travertine. The Widener room is finished entirely in oak.

Interior of Living Room, Three Arts Club, Chicago, Ill.
Holabird & Roche, Architects

In the basement are the various machines for the passenger elevators, the pneumatic tubes, the vacuum-cleaning apparatus, and ventilating system. Heat is furnished from outside the building.

THE THREE ARTS CLUB, CHICAGO, ILL. PLATES 112-114. This club building was designed for the use of girl students of Music, Drama, and the Pictorial Arts. On the first floor are the club features, the living room, music room, dining room, and tea room, all opening on a court which faces south. The basement has been left as clear as possible so that a gymnasium and a recreation room may be arranged there. The second and third floors contain bedrooms with baths. The studios and servants' quarters are on the fourth floor. Each studio is provided with running water, so that with a general bath and toilet they may be occupied also as bedrooms.

The interior treatment is of the simplest. The walls are of sand finished plaster with no tint or further treatment and the ceilings are calcimined.

The exterior is of brick laid in varied patterns with red and gray terra cotta trimmings. The top cornice moulding, band course, sills, and lintels are of brick colored terra cotta. The panels in the arches above the entrance doorway are mosaics with yellows and greens as predominating colors.

MURCHISON NATIONAL BANK, WILMINGTON, N. C. PLATE 115. In the first floor of this bank building are the usual requirements for a bank, while the directors' room is in the mezzanine floor over the entrance. On the upper floors are various arrangements of offices.

The lower part of the exterior is of white marble, the central part is brick, and the upper part terra cotta. The cost was approximately 32 cents a cubic foot.

NATIONAL BANK AT FAR ROCKAWAY, L. I. PLATE 116. The exterior of this bank building is entirely of glazed terra cotta. The interior of the banking floor is finished in marble with bronze screens separating the public from the clerking space. There are the usual bank vaults and also vaults for safe deposit and silver storage. The upper floor is devoted entirely to offices. The cost per cubic foot, including equipment, was 45 cents.

RAVENSWOOD PRESBYTERIAN CHURCH, CHICAGO, ILL. PLATES 117, 118. The exterior of this church is rough red brick with a slight play of color in the material itself; the vertical stripes in the gables and over the entrance are of brick of gray, buff, red, and purple brown. The visible roofs are of Vermont green slates. The interior walls are of rough creamy white plaster above a high wood wainscot; the ceiling, including the trusses and purlins, are similarly plastered.

The seating capacity of the auditorium and gallery is 571 while the alcove or side lobby will seat 70 more. The heating is by direct steam radiation; the ventilation is by forced draft fan system. The cost, including pews and carpets and a new heating plant, was approximately 19 cents per cubic foot.

CARROLLTON M. E. CHURCH, NEW ORLEANS. PLATE 119. The walls of this church are of hollow tile, the lower part being veneered with red brick and the upper part finished with stucco of a light cream color. The roof is red tile. The interior is plastered and the finish throughout is cypress. The cost, including new pews and furniture and a gas-heating system, was approximately 19 cents per cubic foot.

APARTMENT HOUSE, NO. 11 E. CHASE STREET, BALTIMORE, MD. PLATE 120. The exterior of this apartment house is of a soft grayish brown brick, with the basement of marble and all ornamental features above the first floor line of matt glazed, nearly white, terra cotta. The construction is reinforced concrete floors and columns while the partitions are plaster block.

The heating is by vacuum steam system. There is a refrigerating plant, a vacuum-cleaning system, electric lifts in the housekeeping apartments, and electric elevators. The cost complete, including the mechanical plant, was about 32 cents a cubic foot.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE New Standard Documents of the American Institute of Architects, which were authorized by the Annual Convention last December, are now available and may be obtained on application to the Secretary of the Institute at the Octagon, Washington, D. C. These documents constitute a Second Edition, the First Edition having been published in 1911.

Prior to the publication of the First Edition the only standard contract form available for purchase was the Uniform Contract, issued by the American Institute of Architects and the National Association of Builders. This document has been used to a very considerable extent throughout the country, but principally in building contracts of relatively small size. Its principal defect lay in the fact that it did not cover a large number of general conditions that are usually needed.

The First Edition of the Standard Documents of the Institute was developed to meet this lack in the Uniform Contract and to furnish a standard document adequate for large as well as small contracts. It failed to acquire any very general use, however, perhaps mainly on account of its length; but many of its provisions seemed unnecessarily complicated and contractors considered a few inequitable.

The Standing Committee on Contracts undertook last year a revision of the documents, in the hope of meeting the objections raised against the First Edition, and developing a document that would commend itself for general use and which would take the place of the Uniform Contract. The work of revision was carried on in close cooperation with contractors' organizations, both by the Standing Committee and by its sub-committees in the various Chapters. Every clause was frankly discussed in joint conferences and the phraseology carefully adjusted so as to establish most equitably the rights and duties of each party to the contract. Many clauses that in the past have given a too arbitrary power to the architect have been modified so as to afford the contractor reasonable protection against unfairness or bad judgment; and, on the other hand, the clauses defining the responsibilities of the contractor have been in many cases revised to make more definite his duty and the scope of his responsibility.

Two radical changes from the previous documents have been incorporated in the new Second Edition: first, arbitration of all disputes on demand of either party; and second, definition of the relations between the general contractor and his sub-contractors.

Some architects feel that general arbitration is undesirable; that in certain matters the architect should have autocratic power over the contractor, as in the interpretation of the contract documents, and the approval of materials and workmanship. Contractors almost unanimously object to the giving of this autocratic power to the architect and find in it the source of many a hardship and injustice. There is a growing sentiment among architects that the acknowledgment of the principle of general arbitration puts the relations of the contractor, the owner, and the architect on a much sounder basis and by its new Standard Documents the Institute gives this sentiment the stamp of its approval.

In buildings built under the general contract system, sub-contractors are becoming more and more important, since the general contractor himself is coming to do less and less of the work. Theoretically, the owner, having a contract with the general contractor, is uninterested in the relations that exist between the contractor and his sub-contractors. Practically, this is not so. It is directly to his interest that responsible and capable sub-contractors be employed, and that they be properly paid for their work. The proper object of a sub-contract is to transfer to the sub-contractor certain work which by the main contract has been assumed by the general contractor. This transfer must be complete, including all the various incidental duties and responsibilities. The sub-contract must, therefore, closely conform to the terms of the general contract, not only in the details of the work but in the General Conditions under which the operations are carried on. In a Standard Document it is possible to ensure this by inserting an Article that shall standardize the fundamental relations and make such adjustments as are necessary in certain of the General Conditions to make them fit the relations between the contractor and sub-contractor. With such an Article embodied in the general contract, all sub-contractors can be put under identical working conditions, and complete sub-contracts effected, even if the contractor sends nothing but the simplest sort of acceptance of the sub-bids, merely referring to the general contract for the terms under which the work is to be done. Such an Article is embodied in the New Standard Documents and, to the extent that the new documents are used, will help to standardize sub-contract conditions and so remove the cause of many disputes and much loss.

To assist contractors in their operations under the new documents, a brief standard form of sub-contract is also issued, as well as a standard letter-of-acceptance for use in less formal undertakings. As in the First Edition, a standard form of surety bond is also issued.

The new documents have already received the approval of several national organizations among the building trades, and undoubtedly others will follow. They are already in use in contracts for public service corporations as well as for private individuals. They represent a distinct step in advance of previous documents, and architects will find them worthy of careful study as a foundation for private office forms. The value of a standard form is measured by the extent of its use, and architects can help to standardize building conditions, and develop the full value of the new documents, by adopting them intact as their own standard office forms.

THE BRICKBUILDER

VOLUME XXIV NUMBER 9

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LETTERPRESS

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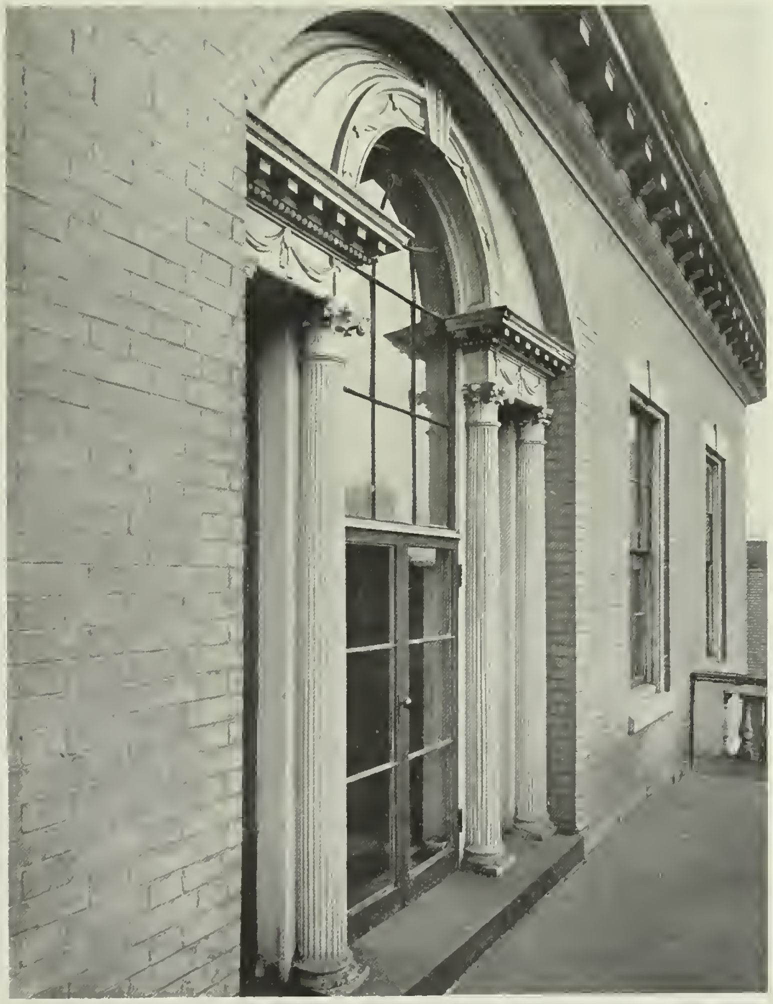
THE BRICKBVILDER COLLECTION

EARLY AMERICAN ARCHITECTURAL DETAILS



WINDOW OVER ENTRANCE, CUSTOM HOUSE, SALEM, MASS.
BUILT IN 1819

MEASURED AND DRAWN BY GORDON ROBB

Plate Nine

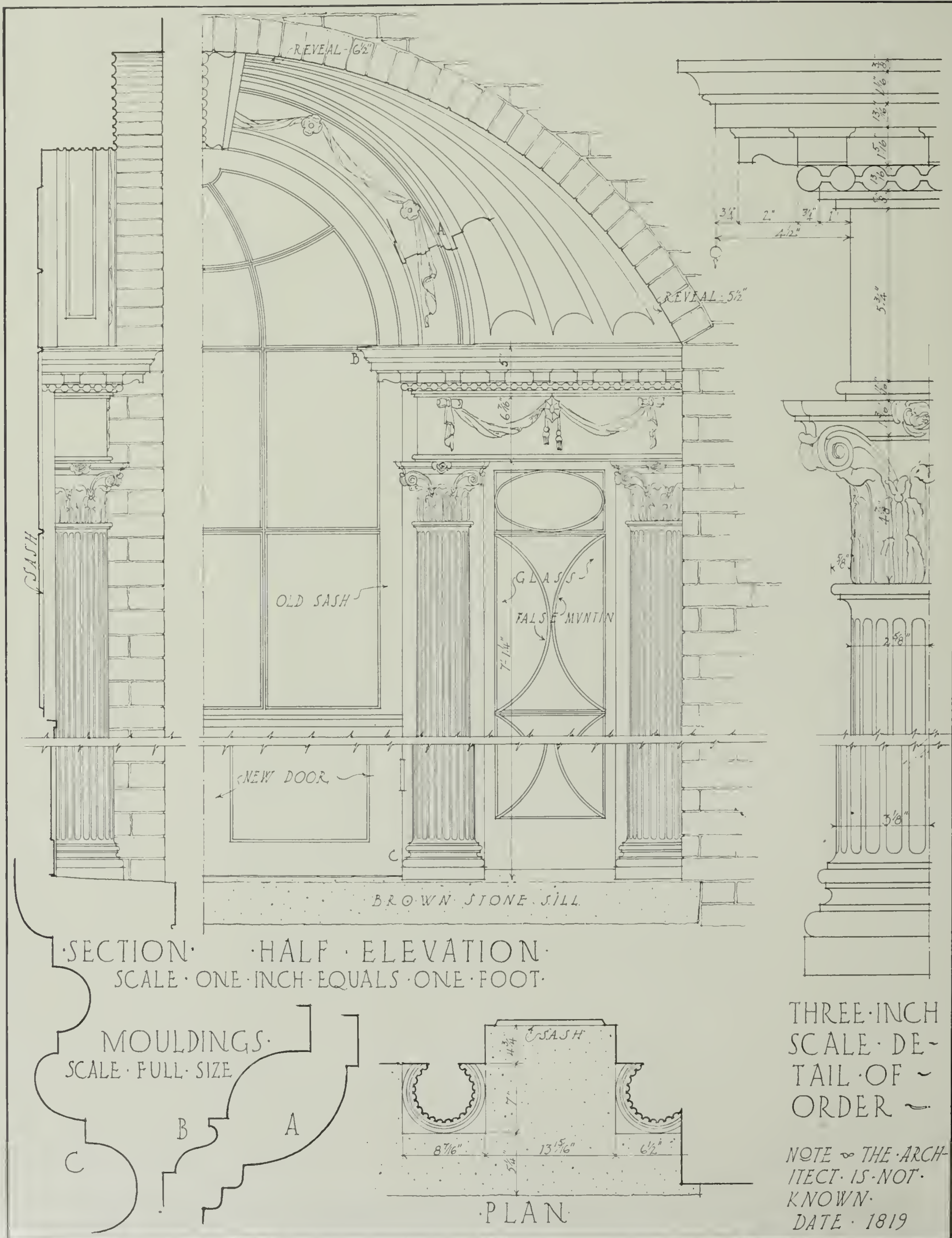


PLATE · 9 SEP'T - 1915·	WINDOW · OVER · ENTRANCE· CUSTOM · HOUSE · SALEM · MASS·	MEASURED · & · DRAWN · BY GORDON · ROBB·

PALACE OF JUAN BRAVO, SEGOVIA, SPAIN
ERECTED ABOUT 1400

THE BRICKBVILDER

VOLUME XXIV SEPTEMBER, 1915 NUMBER 9

Modern German Architecture.*

PART I.

By IRVING K. POND.

DID I not believe that in modern German architecture there lies more than a hint of helpful suggestion for us here in America, where we are just beginning "to find ourselves" in the arts; and did I not believe that underneath our powers of mimicry and our demonstrated capacity for adaptation there lie deep wellsprings of idealism and fonts of real power and feeling which may be brought to the surface to the healing and enrichment of ourselves individually and communally — did I not believe this, I should neither care nor dare to write of German architecture at the present time. One thing must be borne in upon us as we study any markedly characteristic phase of a great national expression: that we can have no great art, no art in any sense, until we have a conscious definite idealism and a conscious will and power to give that idealism expression in the work of our hand and brain. All the activities of life are avenues of self-expression. Art directs endeavor into paths of consistent order, harmony, and unity, that is, into paths of beauty. We are bound whether or no to express ourselves; we are not bound, except morally, to express ourselves consistently, and in so doing achieve art. We are morally bound to express the best that is in us for the delectation and advancement of the individual and the race, and we are morally bound to repress that within us which cannot beneficially affect our fellows. What will so affect our fellows is a matter for conscious and serious study.

A Bridge in the Shoneberg City Park at Berlin
Emil Schaudt, Architect

Of all the arts — of all art — architecture is the highest and most potent medium of self-expression — the most polished mirror for self-reflection. On the surface of architecture may readily be seen what lies deep in the race which produces it. Whether they will or no, architecture for those who practise it and for the public which tolerates it is a subtle and ruthless agency for self-revelation. That those most deeply concerned do not always define clearly the image which stands revealed does not change the facts. It means that an interpreter is needed. In our own imitations and adaptations can we not read the general inability or fearfulness of our people individually and collectively to act firmly and as a unit in moral crises — read the dread of the unpleasantness which must accompany the meeting of a moral issue; or do we see only a careless or happy-go-lucky attitude towards such issues? Is a certain big simplicity which is apparent in our design as in no other to-day except may be here and there in the German and among the out-of-the-way Finns to the north — apparent in our national as also in the advanced as well as in the conventional phases of our individual architecture — to be taken as an expression of careless optimism, of an accepted or altogether acceptable belief that everything is all right anyway, or is it the as yet undefined conviction of the growing unity and mission of our country? It may be well for our philosophers to inquire into that manifestation of a bigness of spirit and conception which is appearing in our own architecture great or small; appearing in communal as in individual work and so indicating the carrying on of personality and individuality over into governmental activities and official expression. Our philosophers may be able to clarify the atmosphere and present to the inner vision of the artist real objects in their correct relationships; and then perhaps the artist may be able to present some definite, ennobling, soul-penetrating image to the outer vision of his fellows.

In spite of the bigness of conception which marks much of our architecture, — governmental, municipal, and domestic, — we find dominating in all three fields forms which

*Note. The illustrations accompanying these papers are reproduced from *Moderne Bauformen*, published in Stuttgart. I offer my sincere thanks to the publishers of that valuable journal. — *I. K. P.*

are not altogether expressive of our national and individual ideals, which do not denote us truly, which are more in the nature of affectation or pretense — forms expressive of Roman pomp and power rather than of the altruistic democracy of our own time and place. We should not be surprised to find these forms dominating German Imperial architecture. In that superimposed architecture we do find them, notably in the new Dom at Berlin; in the new library and museum. But that architecture was superimposed and did not express the then will of the people. That expression is found in minor churches, in commercial, mercantile, and industrial structures, in domestic work and markedly in the schools and town halls — in all the avenues, in fact, in which the people were acting independent of bureaucracy. But is there something in the people which makes them, perhaps contrary to their better natures, effective tools in bureaucratic and Imperial hands? If so, we should expect to find that something in the art of so self-expressive a race as is the German; and we are not disappointed.

House at Blasewitz
G. Hanichen and H. Tscharmann, Architects

In the first place, to judge German art fairly, we must realize that Germany is expressing what is in her, not necessarily what is in us. She professes to think some of it is in us, but that our hypocrisy and our puritanism prevent us from obtruding it. Be that as it may, a certain childish frankness permits the German, in common with certain of his neighbors, to display in his art a primitive coarseness which we conceive to be vulgarity when not worse. This is notably so in the art of the illustrator and not wanting in the art of the sculptor. There is refinement too in both these as in the other arts. The fact that both elements appear is clearly indicative that German art is the expression of the German self. From that standpoint we must view it. There is red blood coursing through the German veins. It flows from primitive sources charged with primitive passions, and is not so attenuated as to appear blue of itself or by reflection. Did the Bismarck monument at Hamburg or the commemorative pile at Leipsic come from a race unconscious of its power, uncertain of its ambitions, or confused as to its designs? It was we, looking on from without, who did not understand the full meaning of these monuments. We were not wrong in seeing in the former monument an appreciation on the part of a united people of the strength and vigor of character in him who did so much to effect that unity. But we were far afield, some of us, who, in spite of the hints given out by certain of the militaristic moderns, saw in the great Leipsic pile only a monument to a fearsome past now dead. We seem in the light of recent events to see in these crude and brutal forms, wonderfully combined and unified as they are, a glorification of the spirit of war, an appeal to the lower instincts in man rather than to his higher nature. Others claim so always to have interpreted this monument; for my own part I had not. In spite of crudities and a certain coarseness which sometimes manifested itself, and which I attributed, and still in a measure do attribute, to the workings of a powerful spirit striving to give itself articulate expression, I saw the hopeful and helpful signs of a dawning social consciousness, of an industrial and social altruism, not to say democracy, which held a promise and an inspiration for some of us who were striving to find ourselves, and a warning and rebuke to many of us who were not so striving, but who were content to keep on with our dilettanteism and endless futile expressions of mental inertia. In spite of the attitude of military Germany, I cannot bring myself to believe that I entirely misinterpreted the expression, and the self-revelation of social, commercial, and civic Germany as presented in the characteristic forms of its modern architecture.

Apartment House at Munich
Max Neumann, Architect

In proceeding

with this sketch of modern German architecture I shall ignore the superimposed forms of Imperial expression which holds nothing of value for us except a warning, and confine myself to the architecture of the people. And I shall not dwell upon what I conceive to be the failures, for as I should like to be judged, if judged at all, by my best, I concede the same privilege to those whose work I am discussing. I shall frankly state wherein I feel that the expression falls short of the ideal and wherein it approaches; for I have an ideal and conceive that to labor without an ideal were worse than useless — it were vicious. I do not have to love and take to my bosom and make a part of myself an object or a form because I hold it in admiration; nor do I have to confine my admiration to matters which are merely part and parcel of myself. However, when I see another doing in his own manner and for himself what I feel that I should be doing in my own manner for my own self, a certain sympathy leads me to offer a meed of praise, and possibly it widens my powers of comprehension.

Modern German architecture is an awakening, not a Renaissance, and as an awakening it holds its lesson for us. It has been criticized because it employs classic forms without knowledge. I wonder from what pinnacle of knowledge the critics speak. It is criticized because it harks back to the Romanesque. Why should it not in principle so long as it does not misuse the forms? The Romanesque was a style welded into form in the white heat of dawning social consciousness and national unification. The Romanesque was an unsuccessful experiment with us, not because it was not right for us in principle, but because we could only handle it in terms of an alien and expired life. We, in other words, were impressed only with forms without and not by any sense of self-consciousness or self-need within.

May not a clear vision of the content of modern German architecture help us here? We are great as a people, we acknowledge it, but did not natural resources and a peculiar environment make us so? When we will to be great and achieve greatness consciously our attitude towards art will experience a change. Comparisons are odious, and likenesses irritate and annoy, yet despite the latter I must say that for all our sophistication

Interior — The "Stoclethaus" at Brussels

View from Street — The "Stoclethaus" at Brussels

View from Garden

Detail of Garden Facade

The "Stoclethaus" at Brussels
Josef Hoffmann, Architect

in some matters we are, so far as concerns art, a primitive people, and I doubt if we are ever to attain to any real self-expression by continually bedecking ourselves in the garbs of other, even though great civilizations. To be ourselves we may have to come out naked and make mistakes and sometimes make ourselves hideous as the Germans did. Whether or no one likes the garb the Germans have woven for themselves, he must acknowledge the skill of the craftsmen who fabricated it. And this brings me to the other and more technical side of the subject.

Villa on the "Hohen Warte" at Vienna
Josef Hoffmann, Architect

The people of the United States were introduced to German architecture, more especially as affecting interiors of various classes, at the exposition in St. Louis in 1904. There and then our eyes were first opened to the beauty and perfection of German craftsmanship as well as to the freshness and virility of modern German design. It devolved upon me, as it happened, to write of that particular exhibit at that time for an architectural magazine,* and if I spoke then with appreciation bordering on enthusiasm, I have had no valid reason to modify that attitude since. I did not then and do not now urge an adoption of the style in this country; but I did then and do now urge an analysis of the spirit. While we have no reason to employ the forms except in those rare instances in which they naturally function and respond to a real call, I do urge on our part a careful study of their use and application in their native environment. Only so shall we perceive their real merit and recognize their suggestive value to us in the solution of our own problem.

*_Architectural Record_, February, 1905.

Town Hall at Rudolstadt
Theodor Veil and Gerhard Herms, Architects

The Use of Native Woods for Interior Finish.

PART I.

Introductory.

By C. MATLACK PRICE.

WHAT kind of wood shall we use for interior trim? This is a question which should not be difficult to answer in a country which possesses as many suitable and beautiful native woods as this country. The question resolves itself rather into one of suitability, into consideration of the finish which is desired. That locality should govern choice is not necessary on account of generally direct shipping facilities and the fact that stock for the entire interior finish of the average house would not make more than one car load.

Generally speaking, however, it is desirable to use local materials, both inside and out, for reasons either of economy or appropriateness, or both.

In taking up any subject so specific as wood there are necessarily encountered certain special terms used to designate various properties or peculiarities of woods, and it is obviously convenient, whether for information or reminder, to define these terms, giving in definition their accepted and general application.

Lobby, City Club, Chicago, Ill.
Pond & Pond, Architects

Paneling and wainscot on piers is of cypress, stained a greenish gray and waxed. Ornament at upper part of piers is in various colors.

"*Hard" and "Soft" Woods.* The timber of commerce has been placed in two broad and rather arbitrary divisions, — "hardwoods" and "softwoods." This division is rather a matter of convenience than a designation of the actual hardness or softness of the woods in the two divisions. Actual hardness or softness is established by obvious physical tests, by which it will be found that some woods listed in the "hardwood" class are softer than some woods listed in the "softwood" class. Commercially speaking, the pines, hemlocks, firs, cedars, cypresses, and spruces are called "softwoods." These may further be classed as "needleleaf" trees, while the "broadleaf" class embraces all other kinds, such as oaks, maples, birches, ash, gum, etc.

Both "hardwoods" and "softwoods" have certain characteristics and properties in common, certain facts of their growth and structure common to all trees and essential to recognize in any consideration of woods for finish.

"*Sapwood" and "Heartwood.*" All lumber, whether "soft" or "hard," is made up of two kinds of wood, — "sapwood" and "heartwood." The former is the new, living wood of the tree, the portion bearing the sap, the outer portion of the trunk. The "heartwood" is the core of the tree, the old wood, in some species quite dead, and usually quite different in its nature from the "sapwood" of the same tree.

Annual Rings. The "sapwood" is of different depth in different kinds of trees, the inner layers gradually turning into "heartwood," as each year adds a new ring of wood around the tree. The yearly growth, which shows like a ring in the cross-section of a tree trunk, is called the "annual ring," and is composed of the two growths, — "springwood" and "summerwood," — of which the different colors make the ring. Trees enjoy two periods of growth each year: first in the spring, usually a quick growth, and later, a slower growth in the summer; and these two seasons give their names to the two kinds of wood in each annual ring.

The different proportions of spring and summer woods and the depth of the complete annual ring give a different appearance to different woods; but there are also other structural details in wood which determine what is often called its "grain."

"*Grain" and "Figure.*" "Grain" in wood is a very indefinite term, meaning a great many different things to different users of wood. It may be used in speaking of appearance, or again in speaking of the physical properties of wood which are encountered by the mill man or the carpenter. What might better be called "figure," as in bird's-eye birch or maple, burl ash, or red gum, is often called "grain," and the figures apparent in quarter sawed oak, also wrongly called grain, are due to the presence in woods of narrow, light colored lines called "medullary rays."

"*Medullary Rays.*" These are usually no wider than a pencil line, and in some woods are invisible. Most of the appearance and character differentiating one wood from another are due to the nature of the medullary rays. Oak is quarter sawed to expose the conspicuous flat sides of the rays, which in cross-section would show only their line-like ends. The variety in the prominence of these medullary rays makes some woods more adaptable to quarter-sawing than others, while the appearance of many woods is not aided at all in this way.

The consideration of "grain" recalls the old and once popular art of "graining" common woods with a paint-brush. This particular kind of artistic knavery enjoyed high popularity in the days when brickwork was painted green, and cast-iron and wood were "sanded" to resemble stone. That was a period when the ideal of architecture was "to seem rather than to be," and though it is doubtful if a revival of such debased and debasing devices will ever occur, one is sometimes impelled (with due mental reservations) to admire the technical dexterity of some of the artisans of those times. Cheap and inferior woods were painted to resemble quarter sawed oak, and masters of the "art" were able even to effect actually deceptive imitations of such elaborate woods as mahogany and Circassian walnut. The immorality of all such deception is fortunately recognized to-day, and the growth of appreciation of the intrinsic beauty of materials put a stop to the activities of the expert "graining" painters, and public as well as architects began to demand the natural beauty of the actual wood, revealed by a transparent stain instead of concealed under some masquerade of paint. It is apparent, then, that distinction between "grain" and "figure" is important, as well as acquaintance with what produces them. One does not hear of quarter sawed cedar or white pine, because the medullary rays in these woods are too fine to contribute in any degree to the appearance or character of the woods.

The lumber trade is concerned in general with the comparative *weights* and *strengths* of different woods, but these properties need form no part of a consideration of woods used for interior finish. More important properties are the ease with which a given wood may be worked, its appearance in doors or paneling, its cost, and the finishes which it is best adapted to take.

Before taking up individually those native woods best adapted for use as interior finish, there should be recognized also the importance of "seasoning," what makes it necessary, and to what extent "seasoned" wood may be relied on.

"*Seasoned*" *Timber*. All "green" or standing timber contains more or less water, and "seasoned" lumber is lumber from which, to greater or less extent, the water has been expelled. Water begins to dry out of any lumber as soon as that lumber is exposed to the air, and the longer the exposure the more water leaves the wood. No mere exposure in ordinary temperatures, however, will drive out enough moisture from lumber to fit it for finished carpentry.

To further season lumber there is the dry kiln, the dry heat of which expels more water from the wood, though not all. A little more may be dried out in the greater heat of an oven, but a point is reached where no more moisture can be expelled without reducing the wood to a substance resembling charcoal, no longer wood. It will therefore be seen that the term "thoroughly kiln dried" can only be taken in a comparative way, since it is not possible to drive out *all* moisture from wood without destroying the wood.

There can be no fixed rules governing the length of time required to kiln-dry lumber, because much depends upon the conditions of the lumber before going to the kiln. Perhaps it has been air dried for some time before shipment to the kiln, or perhaps it is fresh cut. Obviously it is best to dry wood gradually and slowly, first in dry air, then in the kiln. No lumber is placed in a dry kiln until it has been air dried at least six months, and experienced users of lumber allow the wood to "come back" to normal temperature conditions by allowing it to stand in a dry shed ten days after it has been taken from the kiln before putting it in work.

Warping and Checking. That wood tends to warp or curl in the process of seasoning is the natural result of its cellular structure, and care is therefore taken in seasoning, whether by air or kiln, that the wood is uniformly exposed to temperature changes on all sides. The dry cells in wood, those from which the moisture has been drawn, naturally contract while the cells containing moisture remain as they are, so that a board will curl or warp forward the side which dries more rapidly. Since *all* the moisture in wood cannot be expelled, even in "thoroughly seasoned" stock, even such stock may warp if exposed to dampness on one side, because the cells of that side gradually become refilled with new moisture. Wood so exposed, and not protected, will gradually but inevitably curl towards the dryer side.

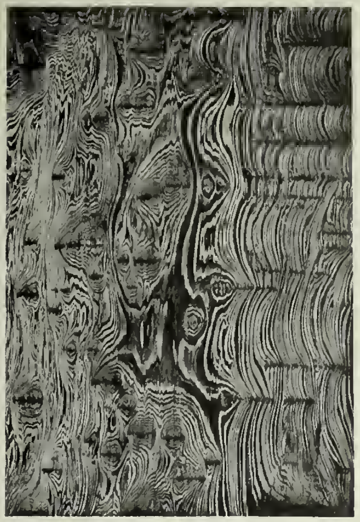
Ordinarily dry wood, or "seasoned" wood, is stronger than green wood, but green or unseasoned wood, naturally, does not concern the architect, because it could not be used in finish, and would not take paint or stain. Every architect and builder should carefully study the seasoning of lumber, and should, if possible, visit mills and talk with experienced men who do the actual work — the kilnmen and others who have the wood under close personal observation from its arrival in the log, or squared, until it is turned out in seasoned lumber ready for use. It is then time to go into the study of wood preservatives, fillers, paints, stains, and varnishes, of which more later. The question of the decay of wood and its prevention is an interesting one, but is a consideration which does not enter into interior trim, which is not exposed to decaying or erosive agents.

"Checking" is unlike warping or twisting, but is also to be reckoned with in seasoning wood. Some woods are more likely to "check" than others, unless great care is exercised in the seasoning process, the "checking" taking the form of many small splits, or even large cracks, due to uneven drying.

Wood Preservation. Trouble experienced with woodwork is usually due to lack of care in protecting it before the final finishing coats are applied. Because all woods are porous, and when dry the pores are open to absorb moisture, unfinished doors or trim placed in a damp room quickly absorb the moisture in the air, which causes them to swell up. When the moisture in their surroundings is removed, when the building is heated and dried out, all the joined woodwork naturally tends to warp and open at the joints, and it is very difficult and expensive and sometimes impossible to repair the damage.

If the architect were not aware of the cause of the trouble, he might make a mental note that he would never use that kind of wood again, and his client would (with apparent justification) accuse him of ignorance of his business. Or the fault might lie with the client, who, impatient to move in, refused his architect the time necessary to set the woodwork in dry interiors.

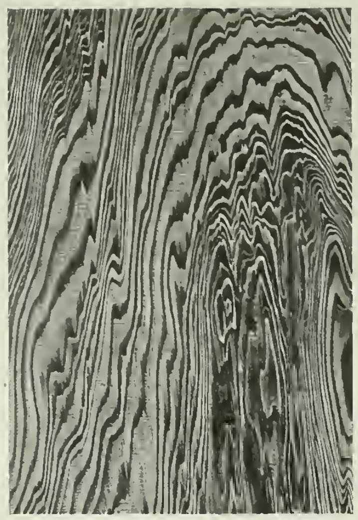
To prevent such unfortunate adventures with woodwork, all interior trim, which is usually shipped from the mill "in the white," or natural condition, should immediately receive one coat of filler, shellac, or stain, as the



Curly Cypress Grain

Carved Cypress Panel

The carved panel above and those at either side show appearance of cypress when given the "Sugi" finish after the ancient Japanese manner of treating wood. This is accomplished by searing the surface with flame and then brushing out the charred parts which exposes the harder portions.



Natural Cypress Grain

case might require. Certainly doors should not be hung, or trim and paneling installed in a building where the plastering is still damp. All finish which is set against plaster, brick, or other backing should be "back painted" with at least one heavy coat of asphaltum stain, or lead and oil, to prevent absorption of moisture. Obviously, wood that is not back painted is protected only on one side, and neither the mill man nor the wood itself should be condemned if proper care is not taken in handling it when it arrives "on the job."

Careful architects insist, and embrace in their specifications, a clause to the effect that no wood trim shall be set or doors hung until heat has been turned on in the building.

The foregoing notes are offered in connection with the following articles on native woods for interior finish because they are applicable to all such woods, and because constant reference will be made to these several points.

The most important and widely used woods, by reason of their natural variety and their wide natural distribution, are the pines and the oaks. Of these there are twelve distinct species of soft pines, twenty-two hard pines, and fifty oaks.

Other woods to be considered are red cedar, and other cedars, the spruces, cypress, the firs, and redwood of the so-called softwoods; and of the so-called hardwoods, white ash, the maples, the birches, sycamore, chestnut, walnut, red gum, sap gum, tupelo, mesquite, basswood, cottonwood, and whitewood.

Of these, some are not obtainable in large quantities, and consequently are not very widely used. Architects, however, may add great local interest to a piece of work by employing some seldom used but suitable wood characteristic of a given locality, and should be thoroughly familiar with the properties and possibilities of all native woods.

Cypress Door and Dresser in the Dining Room of James A. Green, Architect, Greenwich, Conn.

An example of "Sugi" finish on cypress, the Japanese character of which has been accented by the decorative painting on the door and the pierced carving over the dresser.

CYPRESS.

CYPRESS is given, botanically, as existing in two genera, or principal kinds, of which one has two species, or varieties, and the other six, as recognized by the United States Forest Service.

In discussing this or any other wood, in the light of its uses for interior finish, there are two distinct considerations to reckon with, — its inherent *physical properties* and its superficial *appearance*. Under the first head fall such properties as durability, workability, action under paints and stains; while under the second fall such characteristics as grain, figure, and general appearance when finished.

Cypress possesses certain reliable physical characteristics which adapt it naturally to use for interior trim and doors. It is worked easily, does not split or splinter, and

Chamber in the House of Wm. L. McKee, Esq., Bristol, R. I.
Kilham & Hopkins, Architects

This room shows the use of large cypress boards with a wide channel at the joints for the entire facing of the walls. They are finished with a dark stain and waxed. The mantel is decorated with strap-work.

forms a good base for paint, stain, oil, varnish, or enamel. Since the question of decay does not enter very seriously into the use of woods for interior finish, there is no occasion to speak of the peculiarly lasting qualities of cypress when exposed to the elements, though its well-known durability in this connection recommends it for use in kitchen trim, where the woodwork is often subjected to steam and other forms of moisture.

The slightness of its tendency to warp, or to shrink or swell, makes it a distinctly suitable wood for doors or paneling, and further suitability lies in its availability in large, clear widths, and is evidenced in its appearance, which is discussed presently.

Since there is little or no pitch in cypress, it forms an excellent base for the application of paint or enamel, while the interesting and decorative nature of its grain makes a transparent stain an even more popular method of finish.

The above notes briefly comprise the principal physical characteristics of cypress, which brings us to a consideration of its superficial appearance.

The natural wood varies in color from almost white, as found in cypress from Arkansas, Tennessee, and Missouri, to almost black, as found in southern Louisiana and Florida. The usual natural color is yellowish, with the sapwood considerably lighter in color than the heartwood, which is often of a rich orange color.

As a base for paint or enamel, cypress, being a close grained wood, does not require filling if the stock is in a properly dry condition.

The natural grain of cypress has a wide range and diverse beauty — is, in fact, singularly varied. The "edge" grain has a quiet simplicity, the "slash" grain a broad, sweeping freedom, while the "sugi" finish brings out strange and involved figuring, as rich as Oriental decoration.

The finishing of cypress is by no means difficult, as it takes stains readily, and its grain is thereby brought out to more striking advantage. A transparent stain, wiped off, is the nearest approach, of course, to the natural wood; while a penetrating stain colors it more deeply and produces a richer and more substantial effect. The wood may be stained in effects very closely approximating mahogany, cherry, black walnut, or any of the oaks, or the so-called "mission" tones — grays, browns, greens, or tans — for conformity with modern "art craft" color schemes.

A finish peculiar to cypress is the recently discovered "sugi" finish. The name is taken from a Japanese wood (which cypress closely resembles) and from which the Japanese have for years fashioned intricate panels which have been known as "Japanese driftwood." The effect of this Japanese wood, however, is not the result of long exposure to salt sea waves, but the result of a clever burning process. The winter growth and summer growth of Japanese sugi wood possess such relative hardness and softness that quick exposure to a flame chars the soft portion, leaving the harder portion untouched. The charred portion is then scored out with a wire brush and rubbed clean of any trace of the fire, causing the hard portions to stand out in a remarkably decorative manner. This treatment has been found to

Stairway in House at Locust Valley, L. I.
Grosvenor Atterbury, Architect

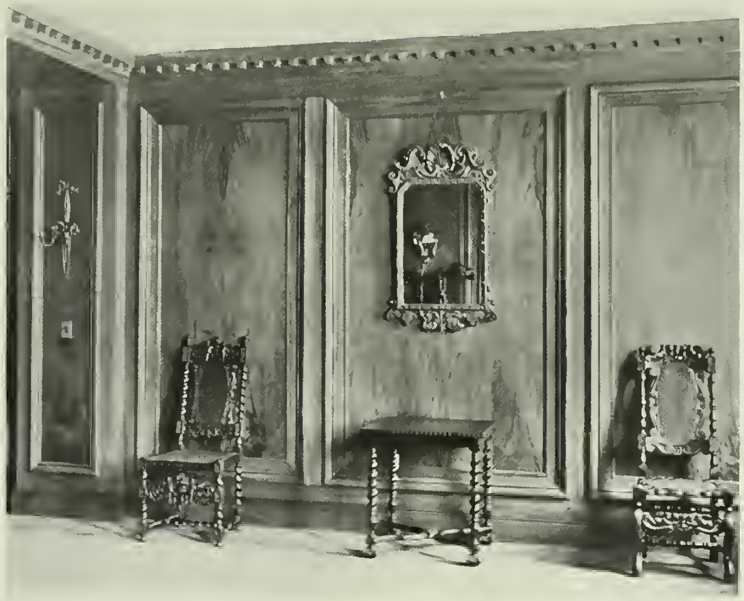
An interesting use of cypress for stair balustrade, paneling, and ceiling beams, in which the wood has been simply treated to preserve the natural appearance of its figure and grain.

apply as well to our native cypress as to the Japanese sugi wood, and hence the term "sugi finished cypress."

The uses of cypress for interior finish are obviously not prescribed by any detrimental features of the wood itself, in points either of its physical properties or its appearance, and it is, as well, generally available and not regarded as by any means an expensive wood.

RED GUM.

RED gum is an interesting wood which has found wide use only in comparatively recent years. This is because it used to be considered so difficult to "season" properly that the mills did not care to handle it. The designation "red" in its name must be supposed to have been applied on account of the color of the leaves in autumn rather than the color of the wood itself, though this is a rather reddish brown.



Paneling in the Showrooms of Irving & Casson, Boston, Mass.
The stiles, rails, and all mouldings are of selected gum wood, with panels of Circassian walnut. The wood has been treated with a very light water stain and finished with a light coat of wax to preserve its natural beauty and original color.

One often hears of "sap gum" in connection with "red gum," and allusions frequently imply that the former is another kind of gum tree, whereas "sap gum" is the "sapwood" growth of the red gum tree, and "red gum" is the "heartwood" growth of the same tree. These two varieties cut from the same trunk are now being distinguished in architects' specifications.

Consequently, the color of the wood will depend upon whether or not it has been cut from the heartwood or the sapwood, and it is advisable to specify, in spite of the fact that the two growths from the same log are now being regarded virtually as different woods.

In texture red gum presents a close, interlocked grain, and hence requires no "filler" as a base for paint, stain, or enamel, its smooth surface making it also adaptable in this regard. It is easily worked and of a grain sufficiently fine and compact to take carving well.

Commercially, the term "red gum" applies to the heartwood of the red gum tree. In Europe this wood is known as red gum, satin walnut, and hazelwood. Unselected gum, or sap gum, may be partly heartwood and partly sapwood, or all sapwood. Red gum is furnished in either plain or quarter sawed lumber and veneer. The veneer is usually rotary cut, and is now being used in a proportion four times the quantity of any other species. Two of the most important uses of red gum are for doors and interior finish. It is essential, of course, that the wood be properly seasoned, in which case veneer-built doors of red gum are rigid and free from warp, and possess desirable qualities of stability and appearance.

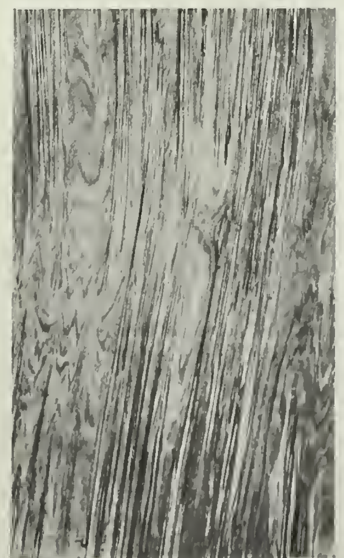
Red gum has been found of peculiar adaptability for use as interior trim and doors in hospitals, for the reason that it is odorless and has a grain so closely interlocked that it is practically impossible to force any foreign matter into its structure. Being free from resinous properties, both red and sap gum form excellent bases for white enamel, which sets with a hard and brilliant surface.

In the matter of appearance red gum is unique — in fact, a kind of mockingbird among woods. It is doubtful if the natural grain of any wood may be converted merely by a stain finish to so closely resemble as great a variety

Plain Red Gum

Quarter Sawed Red Gum

Selected Figured Red Gum



Rotary Cut Red Gum

of other woods. Red gum, selected for figure, is the only wood which successfully imitates Circassian walnut, while the straight grain stains to an excellent imitation of mahogany, walnut, cherry, or even maple.

All red gum lumber does not possess the figure. This must be selected. But where figure does exist, it runs so deeply through a plank that matched quartered panels may be obtained with greater perfection than in any other wood excepting Circassian walnut.

The increasing use of red gum for interior trim is naturally creating a demand for furniture to match, and the manufacturers are proceeding accordingly.

Red gum is especially adapted to dull finishes, taking on a satin-like sheen, which, even in a "natural" finish, does not show finger marks.

Certain specific recommendations have been found advisable in connection with finishes. By reason of its rich natural color, red gum is better without a pigment stain, but finished as near "natural" as possible. To obtain a clear and attractive finish, it is recommended to apply a coat of bleached shellac for a surfacer, bodied up with a very pale varnish. Pale, thin, quick-drying varnishes are better than those of heavy body, because they stand oil rubbing better. It has been found from general experience that a heavy varnish is apt to "pull out" of red gum.

Among woods for interior finish distinctively native, red gum, like cypress, seems destined to occupy a unique and prominent place.

Living Room, Elizabeth Peabody House, Boston, Mass.
R. Clipston Sturgis, Architect

All woodwork is red gum, with only a light coat of wax for a finish. By accident the wood was covered with a heavy coat of orange shellac when set in place, and although removed later, some entered the pores of the wood, which acts as a preserver without altering the effect desired. The paneling is finished by a carved cornice.

Chamber in House at Dedham, Mass.
James Purdon, Architect

The walls are paneled with selected gum wood, treated with wax to leave the wood in its natural color. The furniture is of the same wood and the fireplace facing of dull blue tiles.

Library in House at Lake Forest, Ill.
Howard Shaw, Architect

The walls of this room are given a distinctive appearance by the use of large panels of gum wood which have been stained and given a dull finish. The stiles are chamfered.

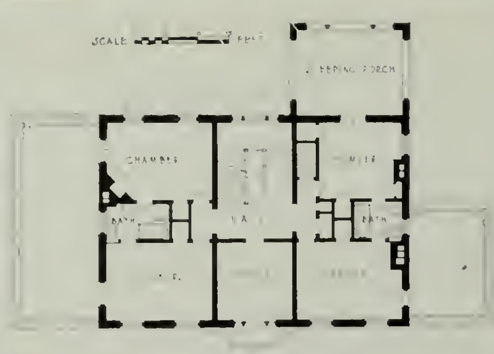
VIEW OF FRONT

VIEW OF REAR

HOUSE OF EUGENE L. NORTON, GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT

VIEW OF FRONT



SECOND FLOOR PLAN

ENTRANCE DETAIL

FIRST FLOOR PLAN

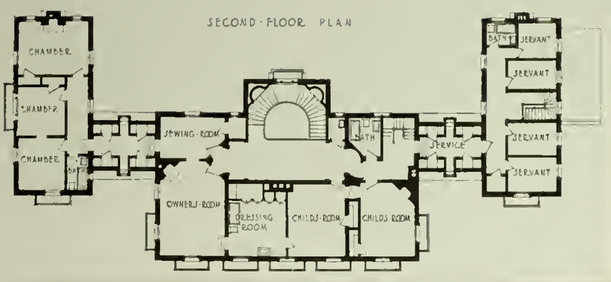
HOUSE OF MRS. GEORGE W. GAIL, GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT

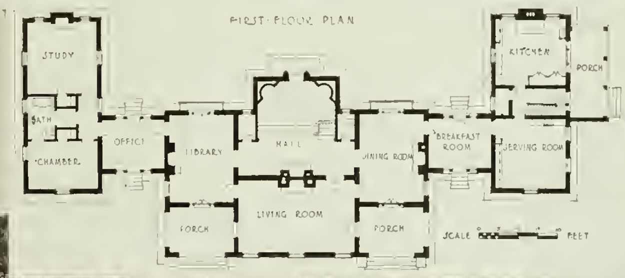
GENERAL VIEW OF WATER FRONT

HOUSE OF S. W. LABROT, ESQ., ANNAPOLIS, MD.

PARKER, THOMAS & RICE, ARCHITECTS



VIEW OF WATER FRONT



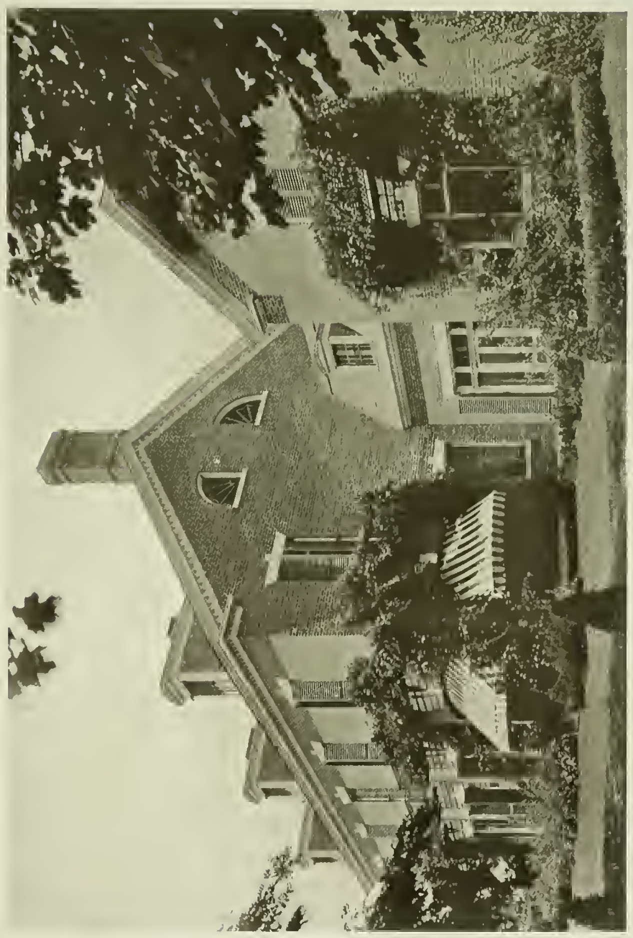
VIEW SHOWING MAIN ENTRANCE

HOUSE OF S. W. LABROT, ESQ., ANNAPOLIS, MD.

PARKER, THOMAS & RICE, ARCHITECTS

DETAIL OF MAIN ENTRANCE

VIEW OF STUDY WING

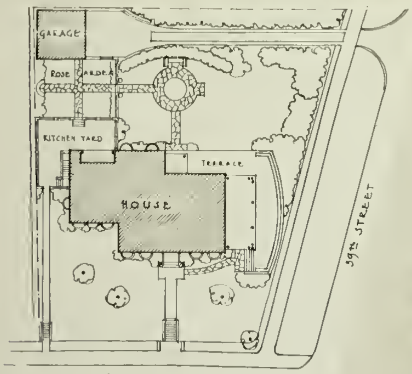


VIEW SHOWING SERVICE WING

HOUSE OF S. W. LABROT, ESQ., ANNAPOLIS, MD.

PARKER, THOMAS & RICE, ARCHITECTS

VIEW FROM STREET



PLOT PLAN

VIEW FROM REAR

HOUSE AT GUILFORD, BALTIMORE, MD.

HOWARD SILL, ARCHITECT

VIEW FROM SOUTHEAST

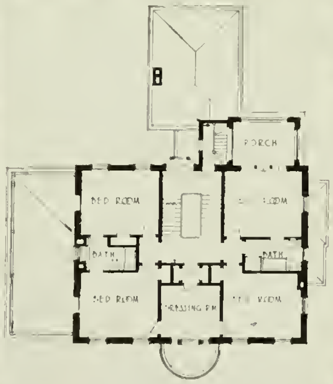
VIEW FROM NORTHWEST

HOUSE AT GUILFORD, BALTIMORE, MD.

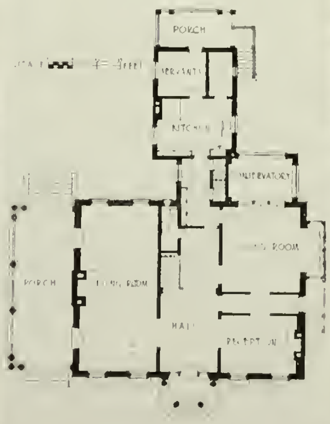
HOWARD SILL, ARCHITECT

VIEW FROM STREET

DETAIL OF SIDE ENTRANCE



SECOND FLOOR PLAN



FIRST FLOOR PLAN

DETAIL OF MAIN ENTRANCE

HOUSE OF MRS. C. L. APPLEGARTH, GUILFORD, BALTIMORE, MD.

HOWARD SILL, ARCHITECT

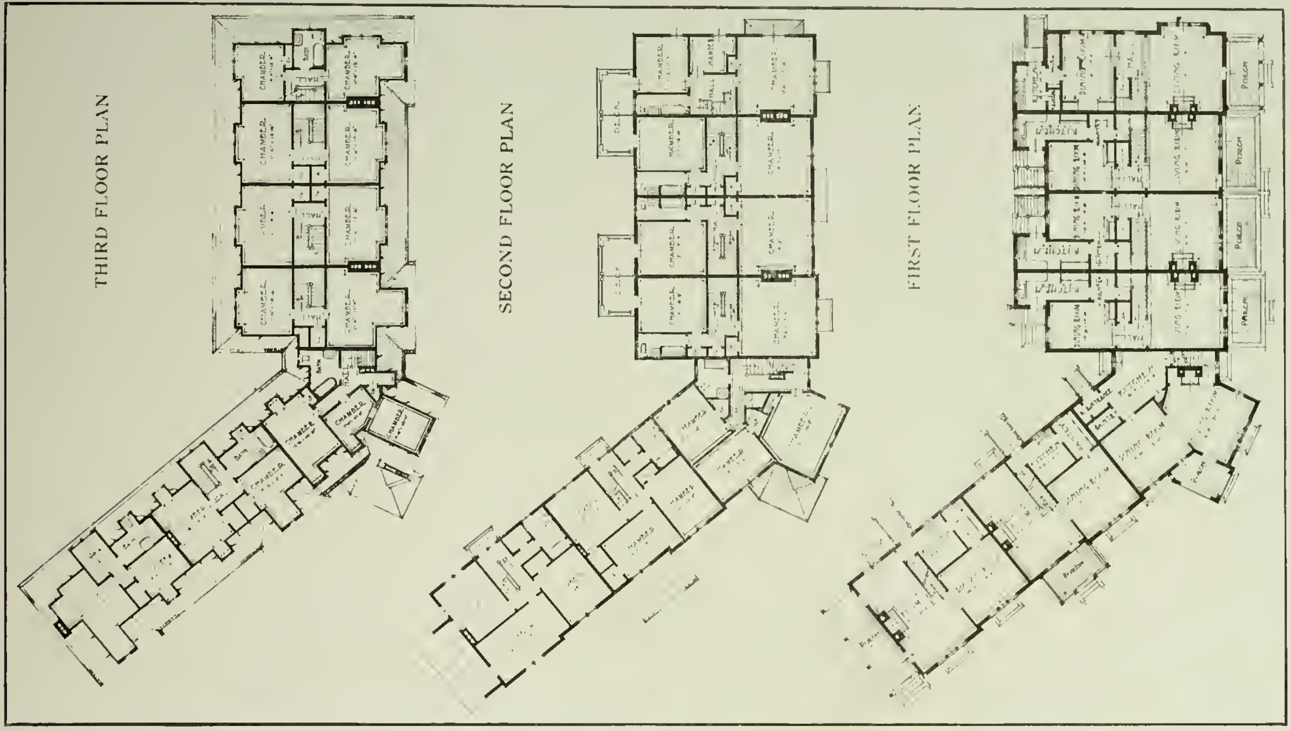
VIEWS FROM DEVON STREET

GROUP OF HOUSES AT GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT

HOUSES ON DEVON STREET AND BRETTON PLACE, GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT



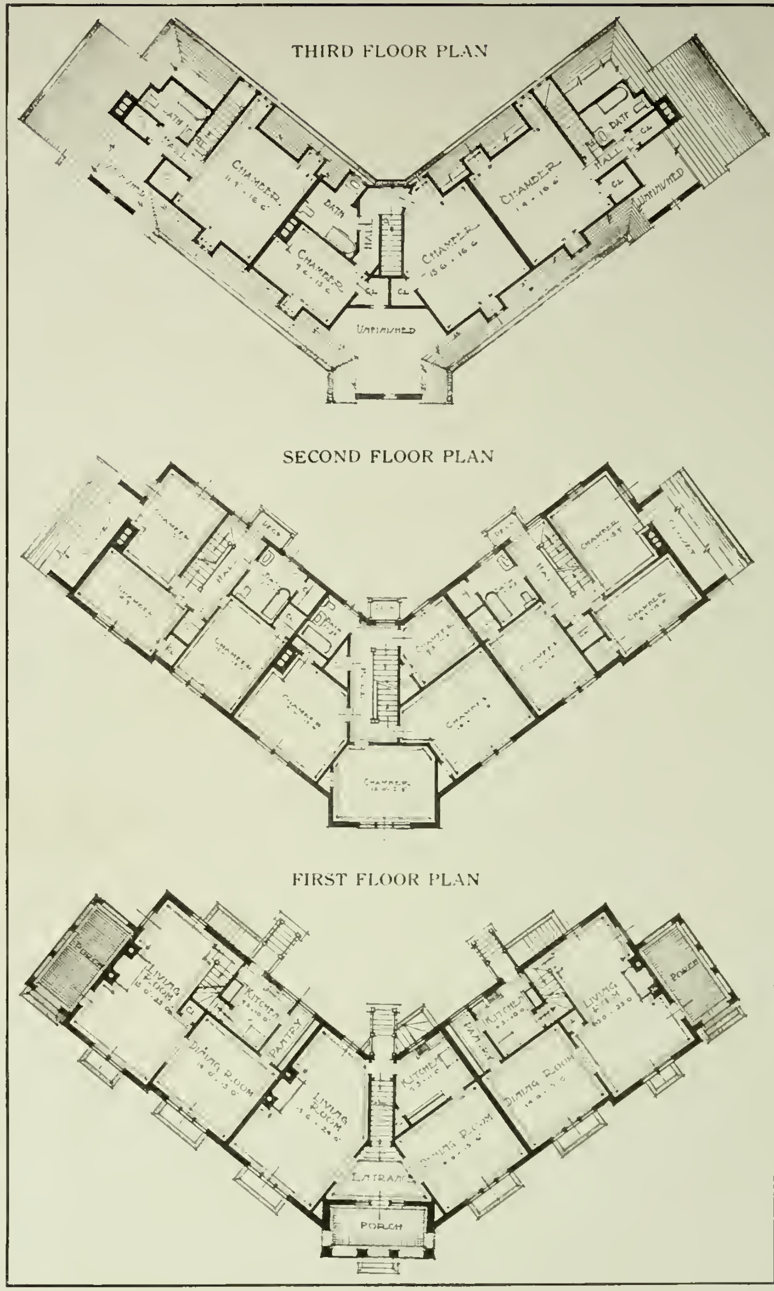
ENTRANCE DETAIL

HOUSES ON DEVON STREET AND BRETTON PLACE, GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT

HOUSES ON DEVON AND SUFFOLK STREETS, GUILFORD, BALTIMORE, MD.
EDWARD L. PALMER, JR., ARCHITECT

ENTRANCE DETAIL



HOUSES ON DEVON AND SUFFOLK STREETS, GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT

VIEW OF GARDEN FRONT

HOUSE OF JAMES McEVOY, ESQ., GUILFORD, BALTIMORE, MD.

THOMAS BOND OWINGS, ARCHITECT

SECOND FLOOR PLAN

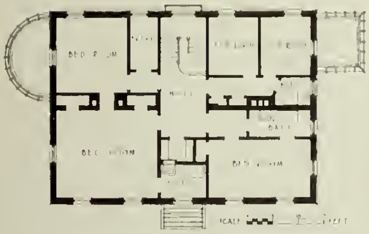
FIRST FLOOR PLAN

HOUSE OF JAMES McEVOY, ESQ., GUILFORD, BALTIMORE, MD.

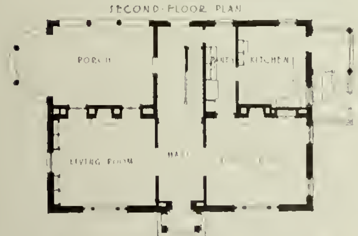
THOMAS BOND OWINGS, ARCHITECT

ENTRANCE FRONT

VIEW FROM STREET



SECOND·FLOOR·PLAN



FIRST·FLOOR·PLAN

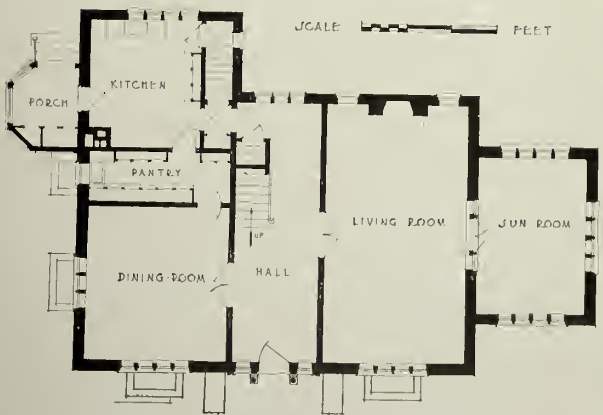
VIEW FROM GARDEN

HOUSE AT GUILFORD, BALTIMORE, MD

JOSEPH EVANS SPERRY, ARCHITECT

VIEW FROM STREET

SECOND FLOOR PLAN



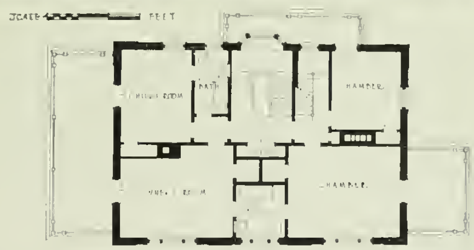
FIRST FLOOR PLAN

DETAIL OF ENTRANCE

HOUSE OF JAMES C FENHAGEN, ESQ., GUILFORD, BALTIMORE, MD.

LAURENCE HALL FOWLER, ARCHITECT

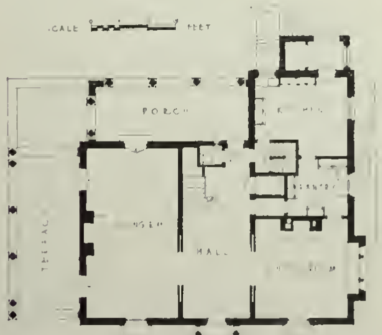
FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF WILLIAM FUSSELBAUGH, ESQ.

SECOND FLOOR PLAN



FIRST FLOOR PLAN

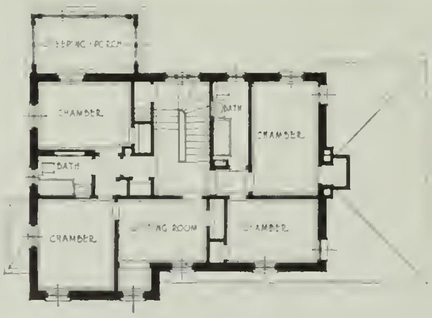
HOUSE OF DR. JOSEPH S. AMES

TWO HOUSES AT GUILFORD, BALTIMORE, MD.
EDWARD L. PALMER, JR., ARCHITECT

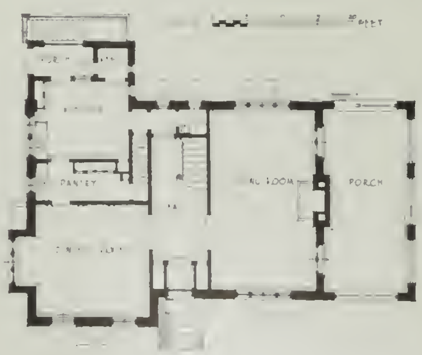
SECOND FLOOR PLAN

HOUSE OF A. MORRIS TYSON, ESQ.

FIRST FLOOR PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF JOHN DANIELS, ESQ.

TWO HOUSES AT GUILFORD, BALTIMORE, MD.

EDWARD L. PALMER, JR., ARCHITECT

VIEW FROM STREET

SECOND FLOOR PLAN

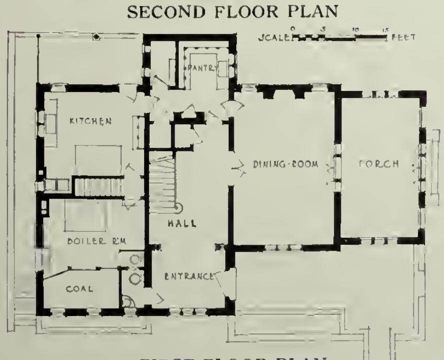
FIRST FLOOR PLAN

HOUSE OF CHARLES W. HENDLEY, ESQ., GUILFORD, BALTIMORE, MD.

E. H. GLIDDEN, ARCHITECT

THIRD FLOOR PLAN

SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF JOHN E. SEMMES, JR., ESQ., GUILFORD, BALTIMORE, MD.

LAURENCE HALL FOWLER, ARCHITECT

The Church Towers, Steeples, and Spires of Sir Christopher Wren.

PART II.

By R. RANDAL PHILLIPS.

IN a letter written to a friend in 1708 on the subject of the further rebuilding of churches in London, Wren gives some details in connection with materials which may here be quoted as prefatory to a further consideration of his church towers and spires. He says: "It is true the mighty demand for the hasty works of thousands of houses at once, after the fire of London, and the frauds of those who built by the great, have so debased the value of materials, that good bricks are not to be now had, without greater prices than formerly, and indeed, if rightly made, will deserve them; but brick-makers spoil the earth in the mixing and hasty burning, till the bricks will hardly bear weight; though the earth about London, rightly managed, will yield as good brick as were the Roman bricks, (which I have often found in the old ruins of the city) and will endure, in our air, beyond any stone our island affords; which, unless the quarries lie near the sea, are too dear for general use; the best is Portland, or Roch-abbey stone; but these are not without their faults. The next material is the lime; chalk-lime is the constant practice, which, well mixed with good sand, is not amiss, though much worse than hard stone-lime. The vaulting of St. Paul's is a rendering as hard as stone; it is composed of cockle-shell-lime well beaten with sand; the more labour in the beating, the better and stronger the mortar. I shall say nothing of marble, (though England, Scotland, and Ireland, afford good, and of beautiful colours) but this will prove too costly for our purpose, unless for altar-pieces. In windows and doors Portland-stone may be used, with good bricks, and stone quoyns. As to roofs, good oak is certainly the best; because it will bear some negligence. The churchwardens' care may be defective in speedy mending drips; they usually whitewash the church, and set up their names, but neglect to preserve the roof over their heads. It must be allowed, that the roof being more out of sight, is still more unminded. Next to oak is good yellow deal, which is a timber of length, and light, and makes excellent work at first, but if neglected will speedily perish, especially if gutters (which is a general fault in builders) be made to run upon the principal rafters, the ruin may be sudden. Our sea-service for oak, and the wars in the North-sea, make timber at present of excessive price. I suppose 'ere long we must have recourse to the West-Indies, where most excellent timber may be had for cutting and fetching. Our tiles are illmade, and our slate not good; lead is certainly the best and lightest covering, and being of our own growth and manufacture, and lasting, if properly laid, for many hundred years, is without question, the most preferable; though I will not deny but an excellent tile may be made to be very durable; our artisans are not yet instructed in it, and it is not soon done to inform them."

St. Vedast's, Foster Lane

Christ Church, Newgate Street

Of the wonderful use which Wren made of lead for the spires of his city churches we shall speak later, but before doing so it is necessary to deal with the remainder of his steeples.

St. Vedast's, Foster lane, presents in many respects marked contrasts. It is a composition in which the square, the convex, and the concave occur, arranged with buttress-like angles, resulting in a strong, pleasing, and distinctly original achievement. The tower is, as usual, square to the top of the belfry stage. Above, instead of the angles being curtailed, they are preserved and developed by the aid of pilasters into buttress shapes, the main faces of the square being set back in the form of a concave curve. This is repeated in the next stage, except that the four main faces are made convex, but at the same time are kept well behind the angles. Above the cornice of this stage is a small base from which rises the pyramidal terminal. The main effects of such a treatment are, that the difficulties usually experienced in curtailing the diagonals without undue abruptness are largely decreased ; the necessity for urns is avoided ; the angles are strongly defined and of good contour, the ascent being graduated ; while the curved and broken entablatures afford the minimum check to the eye ; at the same time the sharp lines and curved faces throw shadows both hard and soft, and the whole scheme thus tends to a very successful result. The construction of the tower differs, necessarily, from the usual methods employed by Wren. Flat faced corbeling pendentives are formed in the upper part of the belfry, from the top of which segmental arches are thrown one to the other, thus forming a platform pierced at the center. On this platform stands the first of the upper stages, which is perfectly square internally, all the masonry being massed at the angles. Near the top of this stage true pendentives are formed to carry the upper portion, which is circular internally and is corbeled over at the top to support the superstructure, liberal recourse being made to iron bands at this point. Once above the belfry stage the steeple is entirely open to the weather, and consists really of four big, inclining angle buttresses held in position by the comparatively shell-like walls.


St. Margaret, Pattens, Road Lane

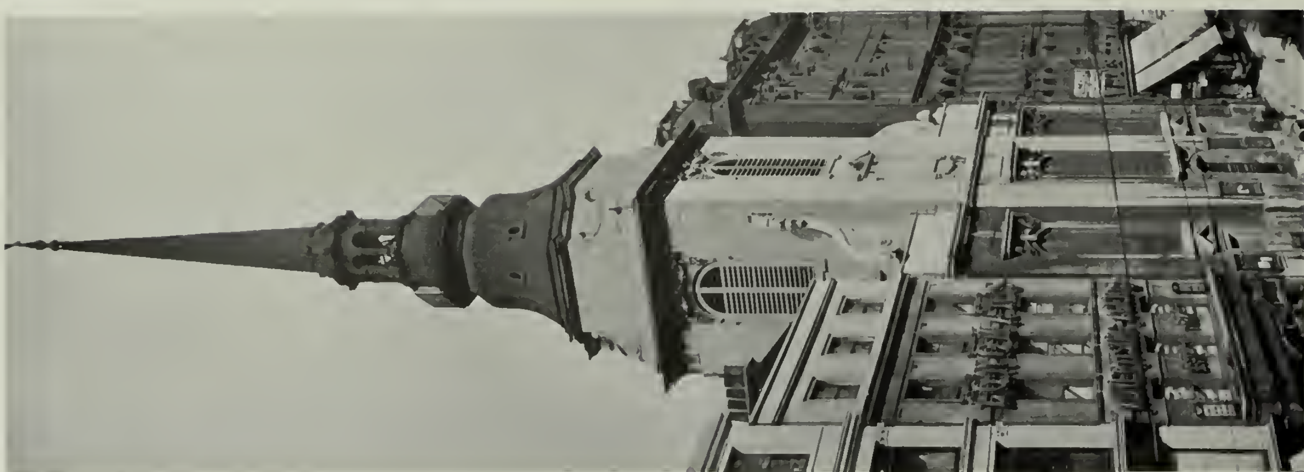
Christ Church, Newgate street, is perhaps the least successful of Wren's stone steeples, serving to show the fatality of adhering to a square plan throughout all the stages. Unless one is prepared to go on building up indefinitely, extravagant breaks at the various stage levels must be made in order to terminate the steeple, thus giving rise to a most disjointed appearance as a whole. In fairness to the architect, however, it should be stated that the steeple of Christ Church was robbed of its corner vases about 1828. The belfry stage is unusually squat, and in spite of its rows of pilasters appears unable to support the massive attic and balustrade. Rising from behind the balustrade is the square stylobate that carries the open colonnade, through which can be seen the square core that appears above as the miserably thin lantern with its colossal and glorified baluster terminal. At St. Mary-le-Bow, where the corresponding stages are circular, the inverted consoles are used with telling effect, and their equivalent want is most grievously felt in this example. No attempt has been made to minimize the horizontal effect of the entablatures, as is usually done by breaking them in certain positions, with the result that not only are the breaks from stage to stage great, but the horizontal lines are most pronounced. Constructively the whole is naturally square throughout. Big squinch arches in the belfry support massive arches running parallel with the walls, the upper surface forming a platform on which stands the square stylobate under the colonnade. This stylobate is triangular in section, the inner shell converging to the lines of the square core above, the base of the triangle being formed by the peristyle floor. The weight of the topmost stage, buttressed up by the peristyle, passes down through the square core and inclined wall of the triangle on to the massive walls of the tower.

Towers with Spires. Although one naturally looks for Wren's masterpieces among his steeples, he was really none the less successful in his spires. His genius in moulding stonework to most beautiful shapes has already been alluded to ; but with lead, owing to the nature of the material, he had a freer hand, and consequently indulged in some most fantastic shapes, just as his fancy thought fit or the conditions suggested.

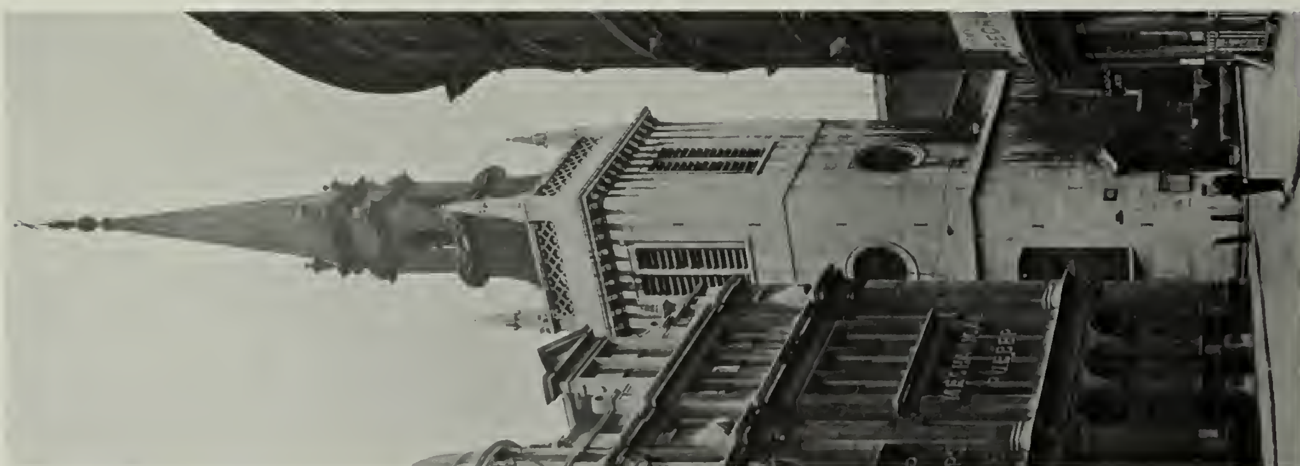
St. Martin's, Ludgate Hill, may, perhaps, be considered his best design for a lead spire, being in fact, a work of singular interest and charm, not only in itself, but also in its relation to the cathedral beyond. As in all his designs, the base of the tower is visible from the ground, and the flanking aisle walls are brought up to the sides of the tower by gigantic stone scrolls. From the stone octagonal base with its consoles there rises above the tower cornice the graceful lead shape, leading up to the open balcony with the crowning turret and spire, the whole producing a most beautiful and delicate result.

St. Nicholas Cole Abbey is among his least successful

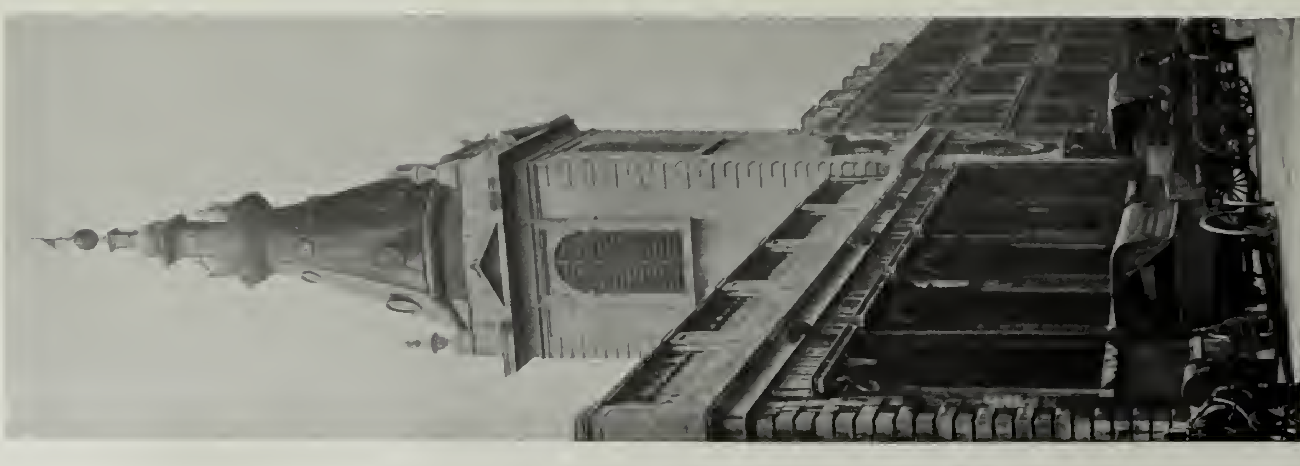
ST. SWITHIN'S
CANNON STREET



ST. MARTIN'S
LUDGATE HILL



ST. AUGUSTINE AND ST. FAITH
WATLING STREET



ST. NICHOLAS COLE ABBEY
KNIGHTRIDER STREET

designs, being lacking in elegance and scale. Rising from a stone octagonal base on top of the tower, the big lead sweep with its numerous "eyes" carries one up to the capping supporting the balcony railing above, from within which rises the terminal, built up with its various shapes. The balcony, however, is a blemish, as it cuts the line of the spire most unfortunately at this point.

The treatment adopted for the spire of St. Augustine and St. Faith reminds one somewhat of St. James's, Garlick Hill, and St. Vedast's, Foster lane, inasmuch as the angles of the spire are throughout its height likewise strongly accentuated, first by lead sweeps, then by pilasters, and finally by scrolls and vases leading up to the spire proper. The effect is one of considerable originality and grace.

St. Margaret, Pattens is remarkable for its great octagonal spire, rising to a height of 200 feet, the highest of all Wren's spires. The tower itself is fine in scale, a massive piece of stonework relieved by horizontal mouldings and by shallow pilasters at the angles. There is a well designed balustrade with corner piers carrying obelisk pinnacles, and from within this balustrade the spire rises. It is paneled on each face, pierced by small openings at three levels, and terminated by a ball and vane. Altogether it is a very noteworthy achievement as a classical rendering of a Gothic spire.

St. Mildred's, Bread Street

Similar in treatment is the spire of St. Swithin's, Cannon street, where a lead covered octagon emerges again from within a stone balustrade; but in this example the chamfering of the corners of the tower in order to change the form from the square to the octagon cannot be regarded as a pleasing expedient. The height of the spire is 150 feet.

Though St. Mildred's, Bread street, has been almost swallowed up by modern buildings, and is lost to sight at street level, it possesses a very beautiful little spire, as will be seen from the accompanying photograph taken at roof level. The tower itself is of brick, crowned by a strong cornice and blocking course, from which a graceful sweep leads to a lantern whose corners are marked by ramps and pilasters carrying an entablature. Above rises the spire proper, resting on balls at the four angles, and tapering away gently, a ball and vane completing the design.

Wren used all kinds of forms for his spires, and among them the cupola frequently figures as a base for a lantern and terminal. His most successful result in this manner is unquestionably St. Benet's, Paul's Wharf, a brick church, with a tower and spire that are quite perfect. The tower itself, 17 feet square on plan, is in three stages, with stone quoins alternating with brick at the corners. The cupola is set upon a deep blocking course; it has eight small oval windows, around which the lead is dressed completely, and is finished with a corona as a base for the open octagonal lantern. For this latter, Wren has adopted his favored treatment of ramps and pilasters carrying an entablature, the latter being broken out over each pilaster.

St. Mary, Abchurch has a brick tower surmounted by an ogee cupola supporting an open lantern and spire. This is one of the least successful of Wren's spires, the outline being very awkward.

A cupola supporting a spire is used again in St. Margaret's, Lothbury, the spire of which is in some respects very similar to St. Mildred's. It is not, however, equal in design to the fine tower below it, which is of excellent proportions, and possesses, moreover, a noble entrance doorway.

St. Benet's, Paul's Wharf

St. Mary, Abchurch, Abchurch Lane

The examples illustrated are remarkable for their variety in the treatment of the Renaissance spire, but they do not exhaust Wren's achievements in this direction, for there were some further very striking examples among the churches that have been demolished, — St. Benet's, Gracechurch street; St. Michael's, Queenhithe; and St. Michael's, Crooked lane, being the most notable; while with the demolition of St. Antholin's, Watling street, went the only stone spire, pure and simple, which Wren carried out.

St. Edmund, King and Martyr, in Lombard street, has on its tower a sort of large lantern, rather than a spire, and this serves to remind us that though Wren in the University chapels which he built at Oxford and Cambridge did not include any tower or spire, Emmanuel College Chapel and Pembroke College Chapel have lanterns of particularly elegant design.

St. Philip Magnus, London Bridge, must be regarded in a class apart, for it is a strange mixture of a steeple, a cupola, and a spire. The tower is not equal in design to some of the other towers by Wren. The stages are too numerous, and the balustrade over the belfry is extremely crude. Better work is seen in the octagonal stone lantern above, carrying a cupola, a smaller lantern, and a spire. But regarded as a whole, one feels that too many features are crowded upon one another in this design.

There remains only to mention the tower of St. Dunstan's-in-the-East. This is in the perpendicular style which appealed to Wren when he was required to work in the Gothic manner, the crowning feature being a stone spire carried on four flying buttresses. It is interesting as a classical essay in the Gothic, but does not call forth much admiration, the form of the spire being essentially unsatisfactory.

Thus we have passed in review the unique series of church towers, steeples, and spires designed by Sir Christopher Wren. The versatility of this great man was astonishing, and no less remarkable was his capacity for work. Though he did not take up the study of architecture until he was thirty, he designed no fewer than fifty churches in the city of London and Westminster, in addition to a great cathedral, three palaces, two large hospitals, several important university buildings, numerous city company halls and civic buildings, and many works of domestic character. Truly the labors of an architectural Hercules! Of his city churches sixteen have already been demolished, and there is always danger of others having to make way for improvements. Let us hope, however, that the hand of the spoiler will be kept from them for Wren's churches are among the architectural treasures of London.

St. Margaret's, Lothbury

St. Philip Magnus, London Bridge

St. Dunstan's-in-the-East

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

THOMAS C. YOUNG.

TO sketch the life of Thomas Crane Young is indeed to sketch an outline of the architectural development of the Middle West during the last two decades.

Born at Sheboygan, Wis., in 1858, his early education was obtained at the Grand Rapids High School, where he graduated; after which he studied for one year at the Art Academy in Cincinnati. Coming to St. Louis as a student of the St. Louis School of Fine Arts, Mr. Young entered upon a field in whose future development he was destined to play an important role.

Upon completing his studies at the Art School, four years were spent in the offices of E. M. Wheelwright, and of Ware & Van Brunt of Boston; and two more years in European travel, including work at l'École des Beaux Arts and the University of Heidelberg. In 1885, he returned to St. Louis to form a partnership with William S. Eames, under the firm name of Eames & Young. This partnership continued until 1914, when the firm was incorporated under the old name, with Mr. Young as president.

It would scarcely be possible to over-estimate the influence that the firm of Eames & Young has had upon the architecture of St. Louis. Although starting when the wave of Richardson was at its height, Mr. Young was ever sensitive to the moods of the day and when the time came reluctantly gave up the Romanesque to embrace the Classic, working either in the Italian, French, or Roman style. The large and important work that has come from the office of Eames & Young, includes a long list of many of the largest and most important buildings in the United States. To mention only a few: the Federal Prison at Leavenworth, Kan.; the Customs House in San Francisco; the Educational Building at the Louisiana Purchase Exposition, and the Boatman's Bank Building in St. Louis, are sufficient to recall the wide field that this firm has covered. In all of the work, from the largest to the smallest building, the hand of a versatile designer and a serious student of the Classic, is strongly evident.

By nature ever reserved and composed, never stooping to gain passing popularity, Mr. Young has been a prominent and outspoken factor in every question pertaining to art and civic development in his adopted city. He has been a leading and faithful member of the local Chapter, where his advice has ever been valued; and though still in the prime of life he can already look back upon a career full of wonderful activity and success. — *G. S.*

WILLIAM A. BORING.

IN the early years of the writer's connection with Columbia University there came to the school of architecture a young man from California — our first student from the Pacific Coast — who, though he only remained with us a year, both made and received a lasting impression. He was not only the oldest of our students, being at that time (1866) twenty-seven years of age, but by far the maturest in mind and experience. He had already had a remarkably successful practice in Los Angeles, designing large and important hotels, university buildings, and public edifices, following a two years' course in the University of Illinois, and his broad-minded intellectual alertness, and keen, clear way of working delighted Professor Ware, who was the head of the school at that time. After three years in Paris and several months in the inspiring office of McKim, Mead and White, he entered into partnership with Mr. E. L. Tilton in 1890. The reputation of the firm of Boring & Tilton for sound, thoroughly-studied and artistic design is too widely known to need more than brief mention. Their work includes such important groups and buildings as the Immigrant Station at Ellis Island, the entire lay-out of Bogalusa, La., the Jacob Tome Institute group at Port Deposit, Md., St. Agatha's School in New York, and many schools, hospitals, clubs, and large houses, besides the usual run of minor work.

But the office routine did not absorb all of Mr. Boring's energies. From my first acquaintance with him I noted a quiet, clear-headed efficiency, a habit of straight thinking and positive convictions, which marked him as destined for great usefulness in civic and professional organizations. Moreover, the suavity and geniality of his temperament and his sympathetic breadth of view, have made him *persona gratissima* in many circles. He was the organizer and first president of the Beaux Arts Society, and has served as president of the New York Architectural League, Vice-President of the American Institute of Architects, Secretary and now treasurer of the American Academy at Rome and member of the Municipal Art Commission of New York and of the National Commission of Fine Arts. He is an Associate of the National Academy of Design. A thinker, a reasoner in art, as well as a capital fellow, he has been called now to serve the Columbia School of Architecture as Associate in charge of Design. The staff of the school thereby gains a congenial colleague and the students a "guide, philosopher, and friend." — *A. D. F. H.*

WALTER R. B. WILLCOX.

THE life of Walter R. B. Willcox presents an example of a personality led by an innate force toward its most congenial and effective field of activity, enlisting therein for devoted service all subsequent efforts. Well established in a business career, he forsook it for the uncertain life of an architect and began at the bottom of the ladder in an architect's office in Boston, solving with unfamiliar drawing implements the mysteries of the orders, eager to grasp every phase of architectural art. His age, with like unimportant details, deserves no mention; it is sufficient to say that he brought to architecture unimpaired enthusiasm and devotion which have constantly been with him. Beginning with the rudiments in the Boston office, he continued his studies in the School of Architecture of the University of Pennsylvania. A visit to Burlington, Vt., disclosing an attractive field, he began there an active practice; residences, schoolhouses, university buildings, hospitals, and commercial structures throughout that section of the country, several won in competition, marked the extent and character of his work.

By nature devoted to the highest ideals of his profession, it was natural that he should early affiliate himself with the American Institute of Architects, and in 1907 was enrolled as a member. With difficulties largely overcome and a secure position gained, an attractive home, reflecting as did also his business quarters, his own architectural tastes, it might have been supposed that his goal had been reached. This was not to know the man. The same quality that impelled him toward architecture made him now seek a wider field for his efforts where he perhaps could have what he so much desired, more association with his fellow workers. Terminating his business in the East, he made a tour abroad; then, with an earlier associate, Mr. William J. Sayward, he began, unheralded and unknown, a new practice in Seattle, Washington. In this field he displayed his customary energy in professional and also in public affairs. He was active in the establishment of the Seattle Architectural Club and served devotedly the Washington State Chapter of the American Institute of Architects as its secretary and president. Sensitive to the high importance of a city plan, he became its earnest advocate and was active in securing for the city a Municipal Plan Commission. As a member of this Commission, representing his Chapter of the Institute, he became the Commission's architectural vital force and the right hand man of the distinguished engineer employed as expert. Mr. Willcox became a Fellow of the Institute in 1910; has served on important committees, and in 1913 was elected to the Board of Directors.

A striving to realize the highest ideals of his profession and of community life, freedom from restricting precedent in design, with admiration for the best that had gone before, these may characterize the most significant traits of his life and work. — *C. H. A.*

WILLIAM EMERSON.

MR. EMERSON once told me that when his father was casting about for the best method of fitting his son for the profession of architecture, he sought the good offices and counsel of his friend, the late Professor Ware. "What should an architect know?" was his straightforward inquiry. "More than any one else about everything," was the equally straightforward reply. Not too terrifying, perhaps, for the brother of a great American philosopher and man of letters, but the genial professor promptly resolved his great truth into something compassable within a lifetime and a little more promising of an eventual practice.

Of course Mr. Emerson would be the first to admit his failure to attain the happy (?) state prescribed by Professor Ware. He probably would not even be willing to admit that he knew as much about any one thing as did someone else (he is far too modest), but I think that a number of his friends would immediately protest that it would not be easy to excel him in the use of brick, for which simple, ancient, and honest material he has a great affection and appreciation. (It is, of course, a pleasure to record such a fact in THE BRICKBVILDER.) Its variation of texture, color, and bond appeal to him and his mastery of the material is shown in many city dwellings and tenements, and in a recently completed public bath for the city of New York.

He has also just completed the North River Homes, in New York City. To this undertaking he has brought much patient study and a keen sympathy with the effort to improve the housing conditions in our large cities. The result of his labors will contribute greatly to the betterment of the living conditions of low salaried workers, while other housing problems which are already engaging his attention will add largely to the knowledge of this important subject.

He was graduated from Harvard University, with honors, in 1895. Then to Columbia University for two years under Professor Ware and so to the Beaux Arts, which he entered in 1898, and where he remained, with one absence, until 1901. Returning to New York City, he entered the office of William B. Tubby, and later, that of York and Sawyer. For six months he was chief designer for the Board of Education of New York City, finally entering business for himself in 1905.

To the profession of architecture he is a loyal and devoted servant, giving of himself with a generosity and an enthusiasm which seem to flow from inexhaustible sources. The Society of Beaux Arts Architects counts him as one of its most active workers. For two years he was Chairman of the Committee on Education and was later Chairman of the Paris Prize Committee. The New York Chapter and the Institute are both the richer for his labors. No task seems too large or too small to enlist his effort to set a higher standard. Happy the profession which can claim such practitioners. — *C. H. W.*

PLATE DESCRIPTION.

House of S. W. Labrot, Esq., Annapolis, Md., Plates 121–123. This house has a very interesting plan in its modern adaptation of a scheme quite common in the Colonial Manor Houses. Many of the old houses had a central building with two small flanking wings connected by a narrow corridor, one of these being used as an "office" and the other as a guest house. While this general scheme has been used there has of course been a change of requirements.

The walls are of very dark red brick with white trimmings, and the roof is of slate. The interior woodwork is of delicate Colonial detail and is finished in mahogany and white. The construction is fireproof, all the floors being concrete. In the service quarters glazed brick has been used to face the walls.

Houses at Guilford, Baltimore, Md., Plates 124–125. The remaining plates of this issue are devoted to the recent work at Guilford, near Baltimore, Md. Guilford is the later development in that very interesting suburban scheme which the Roland Park Company has been carrying out during the past few years. Roland Park was the first district to be opened and has grown into a beautiful suburb famous for its interesting streets and the architectural merit of its individual houses. These results were attained largely by restrictions included in the deeds and by very close supervision over all plans for proposed buildings. The deeds for sale, from the beginning, had provisions which reserved to the company the right to approve or reject plans for the houses to be erected; and it is interesting to note that as new tracts have been opened, the demand from the community has been not for less restrictions but for more detailed and comprehensive ones. None has realized the advantages of the scheme more thoroughly than those living in the development and enjoying its privileges.

The success of the scheme, both esthetically and commercially, has been so marked that the company a few years ago bought the large estate of Guilford adjoining Roland Park and has developed it along lines similar to the earlier work.

The architectural department of the company is headed by Mr. Edward L. Palmer and while a great deal of the work has been done under his direction, yet a large proportion has been done by Baltimore architects not connected with the company in any way. This arrangement has tended to give a certain variety of expression without disturbing the unity, for each designer has been careful to avoid any bizarre note which would be out of harmony with the surrounding work.

The Two Houses by Howard Sill, Plates 124–126, are very similar in construction and in the materials used. They are both built of Colonial brick; the joints were struck and then slightly cut at top, a treatment between the roughly struck joints and those more elaborately treated. The bricks vary in color so that when seen in the wall they have a tone closely approaching that of old work.

The interior woodwork in each is yellow poplar finished in old ivory enamel; the doors are of mahogany with small brass knobs. The service portions are of yellow pine with waterproof varnish. The cost of the house for Mrs. C. L. Applegarth was about 27½ cents a cubic foot, while the cost of the "House at Guilford" was approximately 32½ cents a cubic foot. These figures do not include grading or sidewalks, but do include the architect's fees.

The Group on Bretton Place, Plates 127–131, was designed primarily as an architectural spot at this particular point which is one of the entrances to Guilford. The group consists of seventeen houses, built under three separate roofs. They are of brick with brick party walls isolating each house; the roofs are slate. To offer certain spots of relief some half timber work with brick fill has been introduced and also some simple brick patterns in other places. The brick is rather rough in texture and varying in color, and is laid in a simple "struck" joint. The woodwork is of oak, and was covered with a light coat of stain containing bitumen, giving a soft brown color which has weathered nicely.

The cubic cost of the houses, exclusive of grading and street developments, was about 19 cents. They are small but are well finished and are well provided with plumbing conveniences and arrangements for cooking.

In the planning of the group careful consideration was given to the vistas which would be opened as one looked into the group. Some interesting feature, such as a gable or a doorway, has been placed approximately on the axis of each approaching street. To assist the effect further, gate posts were placed on either side of the street in order to give depth of perspective and something of a frame to the picture. Considerable care also was given to the roofs and chimneys; the long, unbroken roofs giving considerable scale and making the whole group count for a good deal when seen from a distance.

The House for James McEvoy, Esq., Plates 132, 133, is of brick with limestone cornice and front entrance. The roof is green slate. The living room is paneled in gumwood with the fireplace trimmed in verde antique marble. The hall, dining-room, and reception room are paneled. The heat is by a vapor system with concealed radiation. The cost of the house was about 26 cents a cubic foot.

The "House at Guilford," Plate 134, by Joseph Evans Sperry has solid brick walls and is trimmed with marble. The entrance motive is wood. The roof is of Spanish tile, the overhang being supported by wooden brackets which rest on marble corbels.

The House for James C. Fenhagen, Esq., Plate 135, is on a lot adjoining the house for John E. Semmes, Jr., and the construction of both is similar. The exterior walls and the interior bearing walls are of hollow tile. The facing brick is red with a wide variation in color; the cornice and string course are of brick. The roof is green slate and the trim is all painted a brownish ivory color.

The interior finish is poplar painted white and is very simple. The cost, including all heating and plumbing, and the rough grading and brick walks and steps, was about 25 cents per cubic foot.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE relation in an architect's practice which the two elements, construction and design, shall bear to one another has always been somewhat confusing. It has not been an infrequent occurrence to find men who were extremely clever at designing, and yet who could not carry out their designs without the greatest assistance from others specializing in construction. While the scheme of our business life to-day requires a certain amount of specialization in any work, it is unfortunate if this specialization in architecture is carried to the extreme of ignorance of allied subjects, — the designer knowing only how to design.

Such narrowness must work against the development of sound architectural forms and motives. Steel, to name the modern material of the widest use, has created opportunities for great originality in design, but what designer can make the most of these opportunities if he doesn't know the material, its strength, and peculiarities? Such a one must continue the use of old forms in a manner that is now illogical.

A better knowledge of structural material than is now possessed by the average will also increase the opportunities for architectural design. It is most unfortunate that subjects which are crying out for esthetic handling, subjects such as bridges, factories, and warehouses, are so often handled by engineers alone. In this way many latent possibilities where our everyday surroundings might be improved are totally lost. These problems are not confided to the architect, largely because the public's opinion of him and of his ability to handle them is not very high. It, therefore, behooves the profession to correct this condition and bring within the scope of its work these problems now largely given to the engineer.

While architecture has been defined as "the art of building beautifully," it ought to be amplified by the phrase "and constructing soundly," for though the esthetic effect resulting from a design is of great importance the client is interested primarily in the actual structure, and its permanence and soundness will be the most important considerations to him. And, from a business point of view, the pleasing of the client is an important factor in a practice. The architect is employed not merely to prepare drawings (except in very unusual cases), but he is to produce a building of a thoroughly sound character and, unfortunately, in many cases the necessary knowledge is lacking. Of course, on large work consulting engineers may be called in to work in conjunction with the architect; but even then the best results cannot be obtained unless the latter can grasp the engineer's point of view and discuss with him the problems that arise.

In the smaller work very often the special structural knowledge is supplied by the manufacturers of building materials, and here again the result cannot be the best unless the architect possesses enough knowledge to check the work. Otherwise he is unable to know whether too much or too little material has been used; there may be a gross and expensive waste or the amount used may be dangerously small. Yet the responsibility of the result lies with the architect.

To be sure it cannot be expected that the architect shall have the special education that is necessary for great engineering feats. The variety of subjects his profession requires him to understand and the scope of his activities preclude any highly cultivated knowledge along that special line.

Perhaps the most nearly ideal substitute for the architect-engineer is a partnership including an architectural engineer. With this scheme the constant contact with the work of the office will result in a sympathy and understanding of purpose which is essential to the best solution of problems, and which is not possible when outside assistance is called upon for special cases. However, such a specialized partnership is not practicable in the small practice and so we again face the fact that the architect should have a better knowledge of building construction than is generally the case to-day.

When it is clearly understood that the construction of all classes of building lies within the sphere of architects, and must be taken up by them instead of being relegated to others, we will not confront reactions in state laws making toward the supervision of architecture by engineers.

THE Fourth National Housing Conference is to be held in Minneapolis on October 6-9. The program includes more than usual concerning practical matters relating to the subject of dwellings and should be of interest to a large number of architects. There are to be papers and discussions by city officials, lawyers, and real estate men as well as by architects prominent in city planning, landscape architecture, and the planning of houses.

One of the most interesting days for the architect will be the 9th, when the Housing Institute will be held. The question to be dealt with chiefly is the practicability of developing garden suburbs in America for wage earners, including types of small houses for workmen, construction and maintenance, and management, both financial and social. Minneapolis, while being with its lakes and gardens a very beautiful city, has been shown by housing investigations to have every type of housing evil known to older and larger cities, and delegates should find these problems thoroughly typical of the average American city. A feature of the conference will be an exhibition showing what has been done in various cities toward developing a modern dwelling.

Copies of the proceedings of the Conference, as well as pamphlets issued during the year, will be sent free to all members of the National Housing Association, of which the annual membership fee is $5.00.

THE BRICKBUILDER

VOLUME XXIV NUMBER 10

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LETTERPRESS

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EARLY AMERICAN ARCHITECTURAL DETAILS

DOORWAY, BARTLET-ATKINSON HOUSE, NEWBURYPORT, MASS.
BUILT IN 1805

MEASURED AND DRAWN BY GORDON ROBB

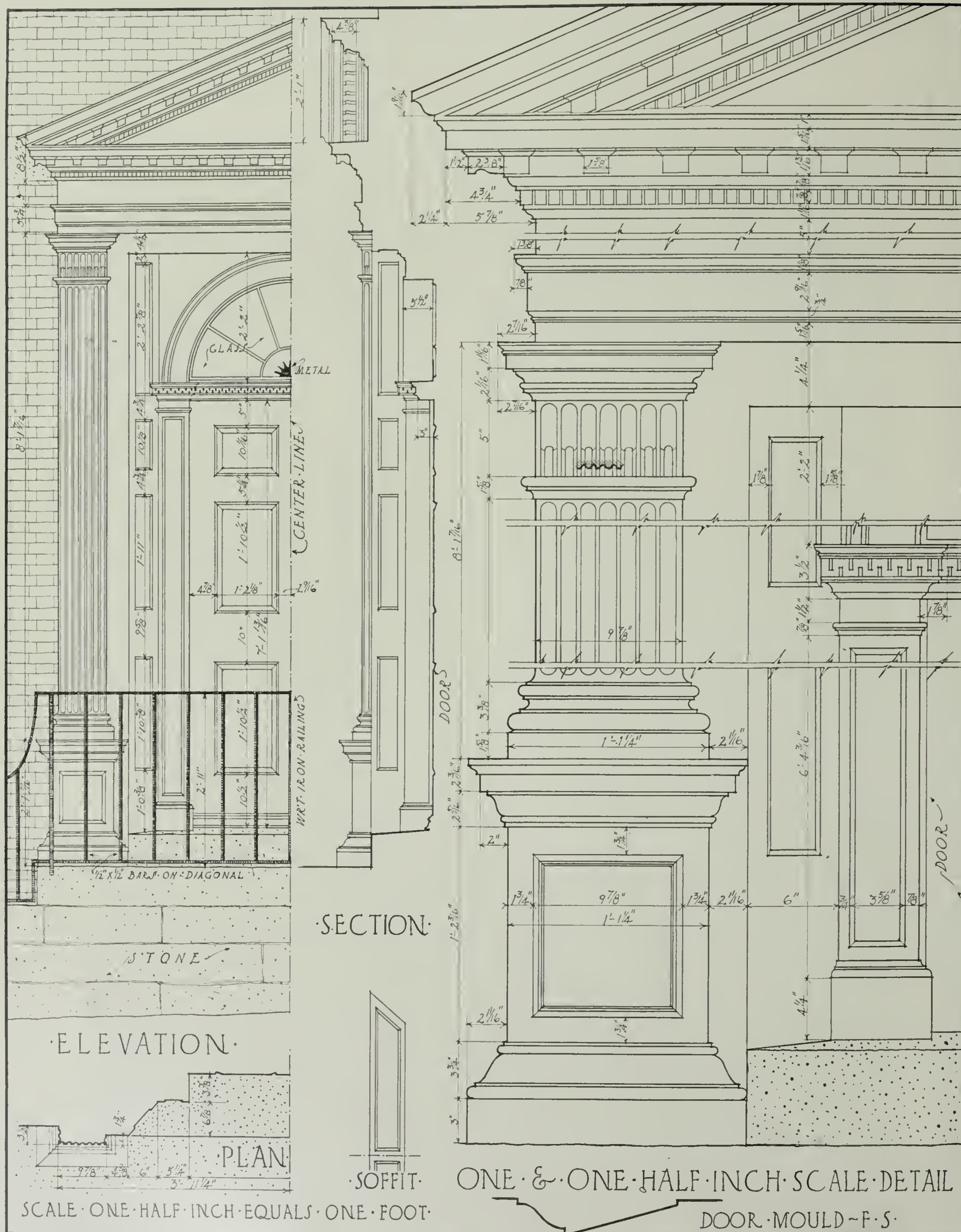


PLATE · 10 · OCTOBER · 1915 ·	DOORWAY · BARTLET~ATKINSON · HOUSE NEWBURYPORT ~ MASS · BUILT · IN · 1805 ·	· MEASURED · & · D RAWN · BY · GORDON · ROBB ·

DOORWAY OF SMALL PALACE, AVILA, SPAIN
ERECTED IN THE XVITH CENTURY

THE BRICKBVILDER

VOLUME XXIV OCTOBER, 1915 NUMBER 10

The Use of Native Woods for Interior Finish.

PART II.

By C. MATLACK PRICE.

BECAUSE of the number of woods discussed in this article, it is obviously necessary to treat of each with a minimum of data which will present a maximum of information, nor has it seemed of value to divide them into "hardwoods" and "softwoods," since these designations are largely arbitrary. In each case the points of salient interest to the architect are the physical properties of the wood, — its appearance, the finishes to which it is best suited, its uses, and its comparative cost.

Hall in House at Charles River Village, Mass.
Richardson, Barott & Richardson, Architects

BIRCH.

AN important wood, possessing structural value as well as the finished appearance necessary for interior trim, is birch. Woodsmen distinguish the two principal species of this tree as sweet birch and yellow birch, the two being distinct in the woods, but so nearly identical after they have been milled that only expert scrutiny with a microscope could tell one from the other. The marketed article, therefore, called "birch," may be either sweet or yellow birch — as often as not the manufacturer himself could not tell you, nor would it be a matter of any consequence.

Birch used to be thought difficult to season and was not much used for that reason in pioneer days. As in the case of red gum, however, this difficulty has been overcome by improved modern dry-kiln methods, and birch is now greatly in favor. It is a heavy, strong, and hard wood, its color a dark or light brown tinged with red, the sapwood light yellowish, the heart darker. In yellow birch the sapwood is often nearly white. The finished wood shows little difference between the spring wood and summer wood, and no figure is obtainable from the medullary rays, which are numerous but very fine and, appearing on the surface, give a kind of satin-like gloss. Comparatively rare specimens are wavy and curly birch, which present richly diversified figure and take fine finishes. The wood known as red birch, very beautiful and highly considered,

Plain Sawed Birch

Library in House at Charles River Village, Mass.
Richardson, Barott & Richardson, Architects

Walls, ceiling, and doors of this room and ceiling of hall shown above are of birch, stained, waxed, and rubbed.

Quarter Sawed Birch

is the heartwood of selected yellow birch lumber.

Birch is excellently adapted for finishing, taking a high, glossy polish, or a dead, "natural" effect equally well. It is a close grained wood requiring no filler, and its fine, compact surface makes it a perfect base for enamel or paint. It is readily stained to resemble walnut, and its pleasing grain makes light, transparent stains very popular. It has been successfully finished in "mission" brown, gray, dark and light green, and to imitate bog oak, fumed oak, walnut, mahogany, Circassian walnut, and cherry. When substituted for cherry and mahogany, it is sometimes called "cherry birch" or "mahogany birch."

American Black Walnut
Illustration is 1/7 Actual Width of Specimen

Carved Black Walnut Ceiling Panel, New York Public Library
Carrere & Hastings, Architects

Broadly speaking, there are three kinds of stains: spirit, oil, and water stains, and these produce different results on different woods. In the first, the pigment is held in solution in alcohol; in the second, in oil; in the third, in acid. Owing to the rapid evaporation of spirit stains while applying, they are not recommended for birch. Better results are obtained with oil stains, though these are not so clear and transparent as water or acid stains when applied to birch, for the latter may be quickly and evenly applied and allow any kind of last coat finish over them.

Mantel in House of T. H. Newberry, Esq., Grosse Point Farms, Mich.
Trowbridge & Ackerman, Architects
All woodwork and carving of butternut, finished with stain, waxed, and rubbed, producing a dull gloss

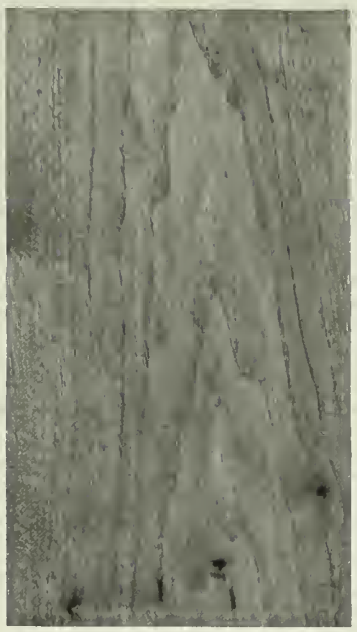
The toughness and density of birch as well as its appearance make it a good flooring material, it being considered, indeed, as serviceable as oak in this respect, for its closely interwoven fibers resist wear and do not splinter. In its wearing qualities and its hard and smooth properties, birch is as good a flooring material as maple, the latter differing only in its whiteness. Birch flooring is a strong competitor with maple, and is made into tongued-and-grooved stock and also parquet flooring, while its strength causes its frequent use in stairwork. A great many doors and much moulded and flat trim are made of birch, as well as built-up panels and veneering, and it is well adapted for built-in furniture to match trim.

With all its fitness for interior finish, both structural and ornamental, birch is a very poor wood to expose to weather, which, however, need not concern us in a study of interior finish — besides which few woods can serve every purpose well, and few, even, can serve as many interior uses as birch.

BLACK WALNUT.

THERE seems to be a generally prevalent idea that American black walnut is virtually extinct; the fact, however, being that much is still being turned out of the mills. It is nevertheless true that black walnut is certainly scarcer and more expensive than in the early days when farmers split it for rail fences and used it for firewood.

Butternut Mantel in House at Hadlyme, Conn.
Charles A. Platt, Architect



Plain Sawed Butternut
Illustration is ¼ Actual Width of Specimen

BUTTERNUT.

THIS is a wood of fairly wide use, but never appears in great quantity. The annual cut for milling is given as about a million feet. Butternut is very closely related to black walnut, both botanically and in its habitat, growing wherever black walnut is found, and sometimes called "white walnut" for distinction.

In some states it is largely used for flooring and ceiling, in others for cabinet-work, furniture, and mouldings. Being very similar to black walnut, its working is about the same, though in finishing it will not take so high a polish, and often requires a filler. A plank containing both heartwood and sapwood will show a difference in this respect, because the natural pores of the wood are larger and more numerous in the wood of older growth.

The greatest drain on stands of black walnut in the South came between 1860 and 1880, when enormous quantities were used for the construction of the massive and hideous furniture of the period.

The tree grows quickly, and since the extensive demand and cut of thirty years ago much good black walnut timber has had a chance to grow. Since only the dark colored heartwood is valuable, and this exists only in old trees, it is obviously a tree whose value increases with age.

Black walnut is esteemed for its rich color, its figure, and the high polish it will take. Its grain permits as well of intricate carving. The medullary rays in this wood are not visible without a microscope, so that the figure results from the formation of the annual rings.

Black walnut is now being used again for the manufacture of furniture, but of a very different kind of furniture from that of the 1860–1880 period. We now see "American walnut" as the wood-specification of beautiful suites of William and Mary and Cromwellian furniture — masterpieces of the designer's and cabinet-maker's art. Much of the wood is exported, much is cut for veneer, but none is ever used in these days as rough lumber.

Black walnut, having an open grain, requires a filler in finishing, and by reason of its dark, natural color requires little or no pigment — and it is not to be considered that any one would want to paint it. A paneled wainscot, or a ceiling of black walnut, would obviously be far from cheap, though peculiarly rich, especially with a touch of dull gold on the carving — it has been the intention here merely to call attention to the fact that American black walnut is by no means extinct. It is in fact to-day having a wide use apart from interior finish and furniture as gun stocks for the European armies.

A black walnut stain on *birch* is considered the closest imitation in another wood, though red gum often successfully masquerades as black walnut.

Library in House of Louis J. Pooler, Esq., Tuxedo, N. Y.
Charles A. Platt, Architect
The ceiling is of butternut, finished natural with decorative painting in colors

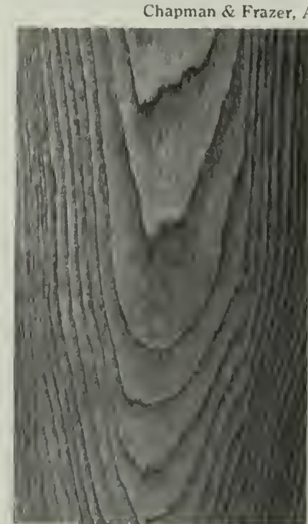
The interesting figures which it is possible to obtain in butternut are not resultant from medullary rays, but from narrow black lines which define each of the annual rings. This quality has led many architects to experiment with it, resulting in their obtaining a number of interesting effects. It readily adapts itself to carving because its grain is not too hard and is of an even quality. The mantel by Trowbridge & Ackerman and the ceiling by Charles A. Platt, illustrated herewith, show excellent uses of the wood.

White Ash Dining Room in House at Chestnut Hill, Mass.
Chapman & Frazer, Architects

WHITE ASH.

THIS wood might be better known, perhaps, as "native ash," since it is variously called "white," "brown," "black," and "southern green" ash. While it has uses far more important and peculiar than interior finish, many striking results have been obtained by its use in this connection. Physically it is an extremely hard wood to work, borings for nail holes being very advisable, and even with this aid experienced carpenters "soap" thin nails. Naturally, it is very hard on edged tools and saws, and the reward for its use lies only in its striking figure and its interesting texture when finished "natural." White ash is not quarter sawed, because its figure results not from medullary rays, like oak, but from the marked contrast between springwood and summerwood in the rings of annual growth. It is a heavy, strong, elastic, and very hard wood, which makes it peculiarly valuable as a material for wheel-spokes, ores, ax-handles, and the like.

Plain Sawed White Ash



Plain Sawed Chestnut

These Illustrations are ½ Actual Width of Specimens

A good deal of ash has been used in the manufacture of "mission" furniture, as it takes stains and fuming excellently, with enough texture of its own to require no high finishes. The finish of the ash dining room illustrated herewith was obtained by a black stain and a coat of wax rubbed down.

Chestnut Paneled Room, Tennis Court Building, Payne Whitney Estate, Manhasset, N.Y.
T. Marcoe Robertson, Architect

CHESTNUT.

THIS wood exists in three species in the United States, and is chiefly used in the manufacture of furniture and interior finish. It is a comparatively coarse grained wood, and its pronounced figure is due to the formation of the annual rings, with their disposition of springwood and summerwood. In the matter of finish its open grain requires a filler, and where stained or rubbed effects are desired, chestnut may be considerably improved by rubbing pigment into the grain. Ammonia fuming has a pronounced effect on chestnut, which has made it a wood extensively used in "mission" furniture and woodwork where such effects are desirable. Its bold figure makes it most suitable when used for large, simple surfaces without elaborate mouldings.

Modern German Architecture.*

PART II.

By IRVING K. POND.

VERY possibly a good workman can produce good work with indifferent tools, but it will be difficult to demonstrate that a fine idea can be well expressed by an indifferent workman. There is no indication on the surface that German architecture suffers from inexperienced or careless craftsmen ; there is every indication that the thought of the German architect finds sympathetic lodgment in the mind of a trained and sympathetic executioner, be he artist, artisan, or mechanic. It is easy to comprehend that the total effect will be unity when the designer and the craftsman are of the same mind, race, and temperament. And when the races, diversified once, are bound into a national unity as they now are in Germany, surely we may expect to find an unconfused national utterance as we there do. The artist *thinks* German, the craftsman *does* German—both are definitely and with design trained in that thought and act. The state sees to that. Can the mind grasp the possible wonders of an American art when the American artist *conceives* America, and the American craftsman *makes* the conception concrete for the love of an America which does not impose itself upon its citizens, but which is the ultimate and communal expression of individual life and idealism !

Savings Bank, Aarau, Switzerland
Curjel & Moser, Architects

Director's Residence, Building Trades School, Essen-Ruhr
Edmund Korner, Architect

Building Trades School, Essen-Ruhr
Edmund Korner, Architect

But as to the German craftsman: metal, wood, stone, textiles, color, all testify as to his skill and comprehension. In the seemingly slight matter of staining the wood the beauty is more than skin deep, for the color is made to penetrate the fiber throughout so that the texture and the color may be unified and harmonious when the wood is carved and otherwise worked. The frequent, almost general, use of marquetry and inlay in rich color and intricate design strikes the outsider as extraordinary. In many another country the cost would be prohibitive were designers and craftsmen forthcoming. Quite remarkably there is very little crudity of color appearing in the stained wood. Often the color is vivid, but then it is held down in area. Sometimes an intense color covers a large field, but there always is provided a relief when the effect seems about to become overpowering. Domestic interiors swim in color, while the churches and the festal chambers of the town halls and the halls given over to public recreation and refreshment are sometimes almost barbaric in the richness of their color decoration. In all this, harmony reigns. The people are speaking their primitive nature in a forceful, well understood, and finely modulated language. It matters not that forms and colors shock the eyes of the unsympathetic alien. They are for and of the Germans, expressive of the German self, and so are exemplars of vital art ; and vital art after all, if not the only real art, is the only art for men of red blood and real convictions. To bring it home, would not

* NOTE. The illustrations accompanying these papers, excepting those on page 246, are reproduced from *Moderne Bauformen*, published in Stuttgart. I offer my sincere thanks to the publishers of that valuable journal. — *I. K. P.*

Power House, Hamburg Elevated and Underground Railway
Emil Schaudt, Architect

you, neighbor, rather run the risk of having the red now and then a bit too red, and the blue now and then a bit too blue, than to fall back on the negative virtue of blameless white when your soul was thirsting for color? The use of white is more frequently than otherwise a confession of inability and mental inertia, and the weakness thus confessed is not much mitigated by the introduction of washed-out tones and neutral grays. If one's blood is really swarming with white corpuscles to the exclusion of all others, he is justified in seeking to give expression to himself in white. All the eternal verities ask is that a man or a race examine its blood under the microscope and follow to its ultimate conclusion the direction thus indicated. All this applies as well to form as to color.

German architecture like German music displays characteristic rhythm and melody; rhythm showing in the form, melody in the color. A succession of concave surfaces appeals to the German mind as embodying strength and refinement; while a similar succession of convex members carries the impression of strength and boldness. This latter is sometimes overdone to our notion; but again I must remind the critics that we are not Germans and have no desire to be (and, moreover, have no desire to make the Germans like unto us), and that instead of decrying their mode of expression, it behooves us to seek forms just as expressive of our state of mind in the presence of strength or power or boldness, and equally interpretative of these characteristics from our own standpoint. The qualities of grace and charm which can come only from long and intimate use of characteristic forms by minds imbued with those qualities I, confessing my limitations, fail to discover in much, if not all, of the modern German architecture; but I do sense the power, strength, boldness, and virility which are more necessary of recognition and embodiment when one is looking life squarely in the face and going back to first principles to make a new start in self-expression. Do not mistake the premises. German art is not a blind return to traditions, but a conscious expression of will to analyze and understand self and give that self-understanding and self-analysis concrete æsthetic embodiment in the richest terms. That is one of the lessons of German architecture for the rest of us.

Modern German architecture is in the making. It is not a finished product. Present conditions make attempts at prophecy futile; but if Germany emerges from the conflict freed from that militaristic domination which she has permitted herself to have imposed upon her, she will develop marvelously and even more rapidly along the lines which are so apparent in her modern expression. There has not been as much of feudal expression in German civil architecture during the past decade as there has been in the scholastic and religious architecture of more than one nation I could mention which has not had to bear the burden of Germany's traditions and the heavy hand of military autocracy. A strong social consciousness has made itself manifest in the arts, the spirit, as I have already said, of an awakening social democracy which was not content to express itself in the terms of feudalism or of an effete aristocracy. This manifestation has been regarded unfavorably by certain

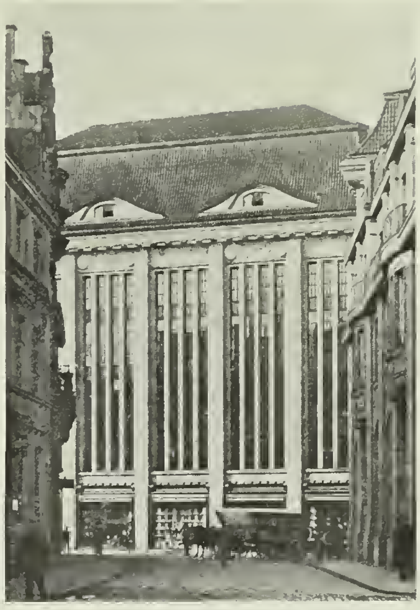
Station, Hamburg Railway
Emil Schaudt, Architect

Power House, Hamburg Elevated and Underground Railway
Emil Schaudt, Architect

shallow critics, who know nothing of architecture as an ethnic expression, but regard it merely as an academic problem in the æsthetic combination of archeological forms. The newer and characteristic forms appear in all branches of architectural design, commercial, domestic, civic, etc., showing that they respond to some definite, general impulse.

The solution of the exterior in much of the domestic work is not satisfying to one who has felt the beauty of many of the interiors. But some of the domestic exteriors have approached as near to the borders of perfection as it is given to individual expression to come; and when I contemplate our own efforts in the same direction, I am minded to temper my criticism of alien and foreign work generally. Does a lesson in commercial architecture come to us from the nation which has built up the greatest commercial and industrial system of recent years? In Germany the stores are made architecturally attractive — I may as well say beautiful, for so many of them are. One could as well be attracted by the store as by the merchandise. I hardly have need to mention by name the great department store in Düsseldorf and the Leipziger Strasse department stores in Berlin. Those who have seen them well appreciate that they function perfectly, and that the function has received expression in the architectural treatment of the exteriors. The great halls for the display of carpets and tapestries, the restaurants and rest rooms, are all differentiated and defined in the architectural composition. And the piers start from the ground, giving the building a base. There are great stores not far from where I sit which have not an æsthetic nor apparently a structural leg to stand on. A new bank building in Vienna appeals to me as everything which a bank should be — not a pseudo-Roman temple, but a strong, simple, rhythmical modern expression. The railway station in Leipzig is after the same sort.

Knopf Department Store, Karlsruhe
Wilhelm Kreis, Architect



Althoff Department Store, Dusseldorf
Wilhelm Kreis, Architect

Decoration on these buildings is sparingly and judiciously used. There is a general tendency towards the use of sculptural decoration. The sculptor has affiliated himself with the architect, has entered into the spirit of the structure, and made his work an integral part and not an extraneous thing "stuck on." The piers which shoot in unbroken line from ground to cornice are crowned with sculpture, marking the transition in rich light and shade and creating an interest far beyond any which can inhere in conventional foliage however beautifully wrought. Sometimes the figures are architectural as well as decorative, though German thought will have to go deeper before the architectural phase is worked out in its fulness. But the sculptured figures are "placed" rightly and that is something in modern art, — yes, in the art of any period. In this matter of correlating the arts of the painter, the sculptor, the designer, and drawing them into the service of architecture, modern German architecture holds another lesson for us.

Power plants and factories along with the higher types have received the closest of study and have been given architectural expression which does not belie their true nature, and which causes them to function for public edification as well as for individual satisfaction and convenience.

Wertheim Department Store, Berlin
Kayser & Von Grossheim and Ernst Rentsch, Architects

While one expects in these purely commercial and mechanical plants a strength of design, he is not altogether prepared for the unexpected appearance in functional features, such as fire-escape towers, entrances, ventilating cupolas, etc., of a quaintness and an essence almost of charm, probably which we would call charm if we could divest that word somewhat of its conventional application to the forms of the Italian Renaissance. However, quaintness and surprise are ofttimes qualities and characteristics as appropriate and agreeable as is charm. This same characteristic quaintness has always been a heritage of the German people when they were expressing themselves freed from the domination of undigested foreign forms, and this quaintness has always tended to degenerate into grotesqueness — so much so that it would be difficult to convince a critical outsider that there is not at least a slight flavor of the grotesque in the popular German mind. After all, perhaps, grotesqueness is for the most part but the expression of that something in each race and individual which other races and individuals cannot or have not yet learned to understand.

Department Store, Berlin

There is another heritage from the past against which the modern German is struggling — if I read architectural mass and detail rightly. Sentiment long ago degenerated into mere sentimentality, and for ages the love of the "dear God" has been as freely and familiarly invoked to inspire to the enjoyment of the drinking stein as to awaken tender emotions towards the child at Christmas time. God is still held sentimentally as a familiar friend in official circles. But the abstract and more masculine tendency in present-day design indicates that sentimentality is changing into real sentiment. Modern Germany commercially and socially has broken with the past.

Department Store, Berlin

Department Store, Dresden

But in spite of this one cannot sit in judgment on the Germany of to-day, on her art, on all her forms of self-expression, without taking cognizance of the part tradition is playing because that tradition came up out of the life of the people, and the people cannot change their nature in the twinkling of an eye. The spirit which brought so many free cities into existence in the Middle Ages still breathes. The power which after a time drank up those cities and relieved them of, shall we say, that especial brand of freedom, still moves. Not only does the power move, but it proclaims that it is the one thing for which other things — men, cities, and objects, animate and inanimate — exist. The state is above all. That is autocratic Germany which glorifies war and power and gives itself expression in these national monuments.

Detail of Pier, "Friedrich-August" Bridge, Dresden

The spirit of democratic Germany is breathing in the architecture of the people. It is a spirit which wills to express itself in the face of obstacles, and obstacles enough it has to contend with if only in temperament and traditions. I was led to remark earlier that comparisons are odious; but when I see what individualistic Germany is achieving under a state which proclaims itself superior to the people, I cannot dismiss from my mind America which created her own form of government, flouting political traditions, but which accepted and complaisantly bears the traditions of others in art. What ought not she to accomplish when she makes up her mind to come to herself and divest herself of that which she has borrowed and to appear in her proper person? No state which claims to be all in all dominates her; but she rests in a government of the people, for the people, by the people, which is the apotheosis of the individual and under which and in which the individual may work out his highest salvation.

"Friedrich-August" Bridge, Dresden
Wilhelm Kreis, Architect

The Illumination of the Suburban House.

THE USE OF ELECTRICITY OR ACETYLENE.

By HAROLD L. ALT.

ONE of the most puzzling problems with which the present-day architect is confronted consists of finding a satisfactory means of illumination for high-class country homes which are located within a district supplied with neither electric current nor gas by a service company. It is a fact, and one which will undoubtedly surprise many, that over one-half of the population of the country at the present time is beyond reach of service from any central electric plant, and a much larger proportion is without a gas supply.

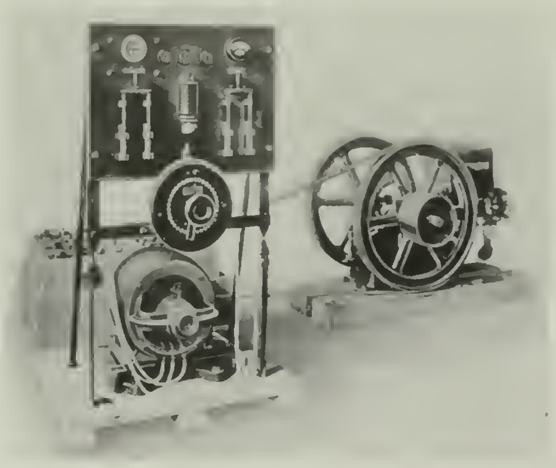


Fig. 1

Two methods of lighting seem to have given the best satisfaction of all the various expedients tried,—one method being electric lighting from a small isolated plant, and the other acetylene or gasoline gas from an automatic generator.

It is almost superfluous to recite the well known advantages of the electric light, consisting of its brilliant and steady illumination, as well as its absence of smoke, disagreeable odors, and danger from fire. It is the healthiest form of light as it does not consume the oxygen of the air, and the bulbs may be placed anywhere and burned in any position, as is often found necessary for decorative effect. The convenience with which they may be turned on or off from a distant point, if necessary, is also a great advantage, as well as the fact that they will stay lighted when burned out of doors in the heaviest storms and cannot be blown out; still another advantage of installing an electric plant is that the current is available for other purposes such as for fans, sewing and washing machines, or flatirons.

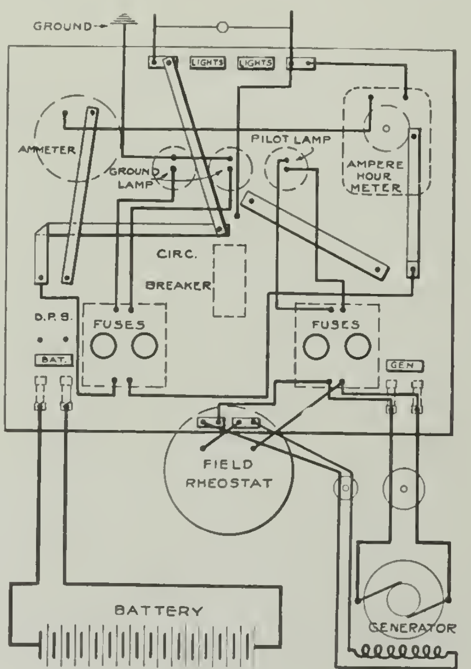


Fig. 2

In some cases it is found that current can be obtained from a central station by extending wires several miles, but the cost of the wires, poles, and insulators would be greater than the cost of a private plant; and, of course, the greater the distance such wires are run, the greater is the possibility of interruption of the service by wind, snow, or sleet breaking the lines during a storm.

The recent placing of the "Mazda" or tungsten lamp on the market with its low current consumption now permits the use of smaller dynamos and engines than were formerly necessary for the same service. With the reduction in the size and capacity of the apparatus, the cost has been correspondingly reduced so that private isolated plants can now be installed in locations which formerly could not afford the rather high initial cost.

The use of engines run by gasoline and kerosene is also growing, especially on account of the automobile, and are being used with increasing frequency on farms and in suburban places for such purposes as pumping water, grinding corn, sawing wood, and separating cream. In practically all cases an engine that is large enough for the other duties will be found more than large enough to run a dynamo for lighting purposes, so that the price of the engine in these cases should be neglected in figuring up the cost of an electric light plant.

While it is quite possible to have electric light with an engine and generator operated without a storage battery, these will supply light only while they are running, and when running they require more or less care and attention. In order that current may be available for use at all times, it is necessary to have a storage battery, and the writer does not believe that any small electric plant can be installed to give satisfaction to the owner without the use of such a battery. The battery has current fed into it when the engine and generator are operating, the lights, while running, being carried by the generator. When not running, the current is taken out of the battery, the length of time the lights will burn from the battery depending on the size and number of the lights and the comparative size of the battery.

In figuring on the size of a plant necessary for any place, the requirements of the heaviest season must be considered. This, in some cases, may call for a battery which will be so large as to be practically idle during the off season; yet this is not objectionable, since a battery which is used little or not at all does not depreciate noticeably. Often a battery will require daily charging during the heavy season and only bi-weekly charging during the light season.

An isolated electric plant may be properly regarded as composed of four parts,— the engine, the generator, the battery, and the switchboard. The gasoline and kerosene engine hardly require description in this article as they are familiar to almost every one.

Regarding the battery, there are two standard types in use for electric lighting; these are termed the "sealed-in" battery in hard rubber jars, which is shipped charged and ready for use from the factory, and the "open" battery in glass jars, which requires setting up and charging.

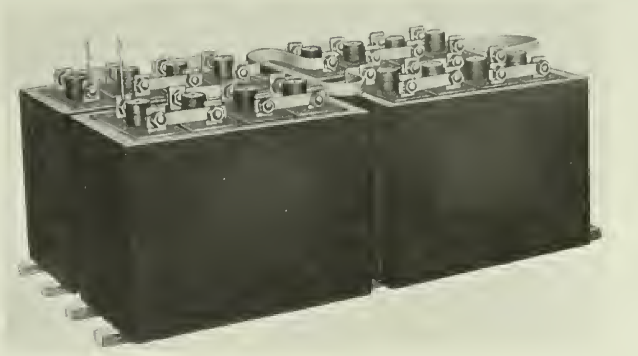


Fig. 3.

Electric lighting systems are usually installed for either of two different voltages,— low voltage plants having 32-volt lamps and high voltage plants 110-volt lamps. One advantage of the 32-volt plant is that only 16 cells of storage battery are needed, each cell giving 2 volts; this decreases somewhat the amount of attention the battery requires. Another advantage is that 32-volt tungsten lamps will stand rough handling better than 110-volt tungsten lamps of the same candle power, as the filaments are thicker and shorter. On the other hand, the 32-volt plant should not be used where most of the lights are more than about 300 feet away from the battery, for the reason that with low voltage the loss of voltage in the wiring between the battery and the lights is too great unless very heavy wire is used at increased expense, and the lamps are liable to burn below their normal brilliancy. The 32-volt plant is, all things being considered, best for small installations with short circuit runs where not more than about 50 lights are in use at any one time.

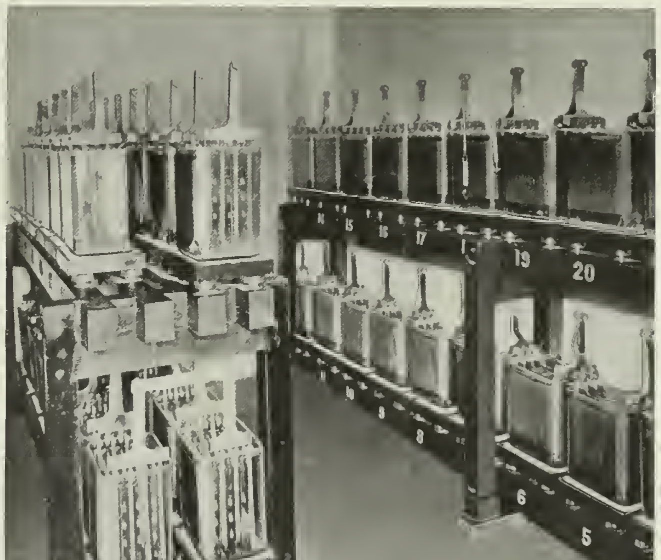


Fig. 4

In 32-volt plants three standard sizes of batteries are used which will carry respectively 9, 15, and 23 16-candle power lamps for eight hours, or a greater number for correspondingly shorter periods. The horse power of the engine required to drive the generator for charging is 3 horse power for the largest size and 2 horse power for the two smaller sizes. The battery, switchboard, and generator are shipped in a single box which is light enough to be handled on an ordinary farm wagon. This equipment is easier to install and put in operation than an ordinary engine or pump.

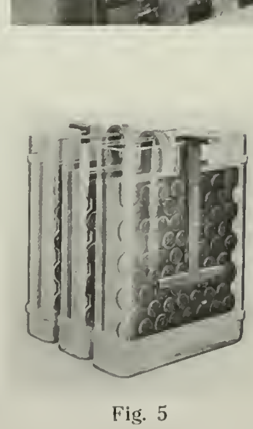


Fig. 5

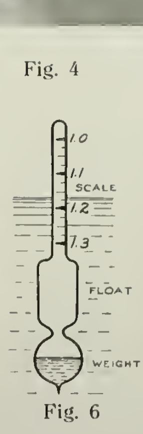


Fig. 6

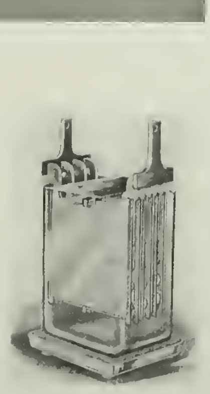


Fig. 7

Referring to Fig. 1, the engine at the left runs the dynamo through the belt, and this generates the electricity which is stored in the battery; the switches and instruments for controlling the electricity are mounted on the switchboard, and the diagram of electrical connections is given in Fig. 2. On the switchboard the meter at the top, to the left, indicates at all times the amount of current taken out of the battery and the amount remaining, thus showing whether the battery needs charging or whether there is enough electricity left in it to light the lamps for another day.

A great advantage of the ampere hour meter is that it shows at what rate charging may be done, permitting the use of relatively high charging rates, and thus shortening very materially the hours of engine operation for battery charging purposes.

The battery consists of 16 hard rubber jars in which are held the battery plates, made principally of lead and lead oxides, the jars being filled with dilute sulphuric acid. A jar complete with plates and electrolyte is called a cell. As indicated in Fig. 3, the cells are placed in wood trays, the various cells being connected to each other and connections being made between trays.

Where the number of lights burned at one time is over about 50, or where most of them are more than 300 feet away from the battery, it is best to install a 110-volt plant. Plants of this voltage include a battery of either 56 cells or 62 cells, the latter number being used where it is essential that the lights should burn at full candle power even with the battery nearly exhausted. With 56 cells only, with 110-volt "Mazda" lamps, the candle power of the lamps will be reduced somewhat towards the end of discharge of the battery. This reduction is not, in most cases, objectionable, when compared with the variable nature of common illumination afforded by sunlight and with other forms of artificial lighting.

The engine and generator are essentially the same as for the small 32-volt plant described above, except that they are larger and are usually mounted on a more solid foundation, such as a heavy block of concrete with holding-down bolts embedded in the concrete.

The dynamo may, as in the case of the small plant, be driven by a belt run over one of the engine flywheels and over a pulley on the dynamo, or it may be "direct-connected" to the engine, which arrangement is neater and takes less room. In many cases it is more practical to have a belt-driven dynamo for the reason that the engine may also do other work, and it is not desirable to have the dynamo run every time the engine is operated.

One size of battery for a 110-volt plant is shown in Fig. 4. This battery will carry 82 16-candle power lamps for eight hours and the size of room required to hold it is about 16 feet by 6 feet. The battery plates are hung in glass jars arranged in a manner similar to the hard rubber cells described and resting on sand contained in trays made of glass or wood, these trays being supported on wood racks. The electric current is passed through the cells in the same manner as in the previous case.

A single cell, containing a few more plates and somewhat larger than those of Fig. 4 is shown in Fig. 7, while a 2-plate cell is indicated in Fig. 5.

The electrolyte is a mixture of about one part of sulphuric acid (oil of vitriol) and four and one-half parts of water. When the cell discharges, that is, gives out current for lights, the plates, both positive and negative, absorb some of the sulphuric acid in chemical combination and the electrolyte becomes weaker; when the cell is being charged, that is, receiving current from the dynamo, the sulphuric acid previously taken into the plates is driven out of the plates and back into the electrolyte. Discharging and charging, therefore, weakens and strengthens the electrolyte respectively.

An instrument for measuring the strength of the electrolyte is the hydrometer, which is made of glass, hollow and weighted at the bottom with lead; it is shown in Fig. 6. This floats upright in the electrolyte; where the surface of the electrolyte meets the graduated stem a reading of the strength of the electrolyte is given. The readings of this instrument, therefore, can be used to indicate how much charge there is in the battery.

Glass jar batteries take up more room; they are intended for places where they will not have to be moved about after being set up and where there is little vibration. It is usual to prefer these when there is no objection to the labor of assembling them and giving an initial charge (lasting from 40 to 60 hours) at the time of installation.

There are several types of switchboards available for the 110-volt plant, one used where lights must be main-

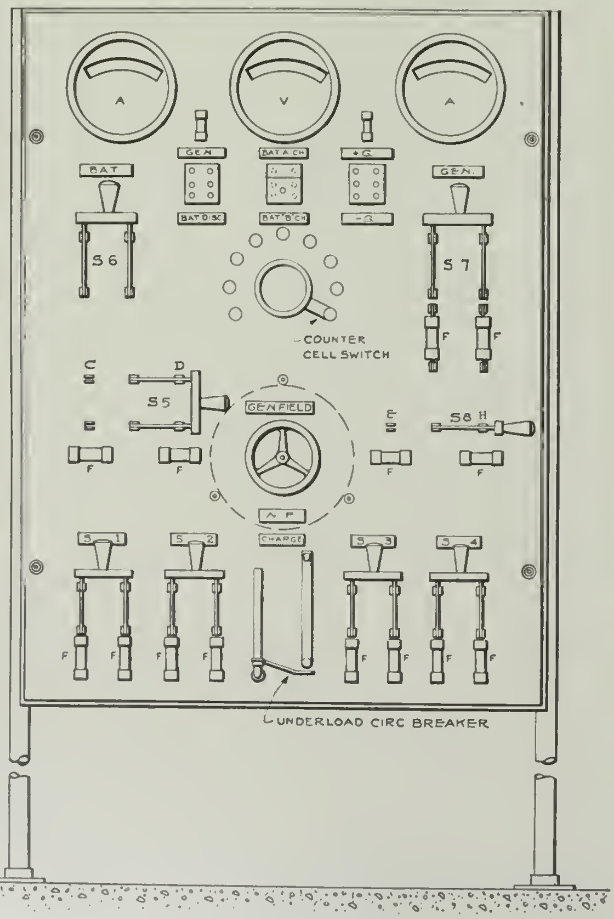


Fig. 8

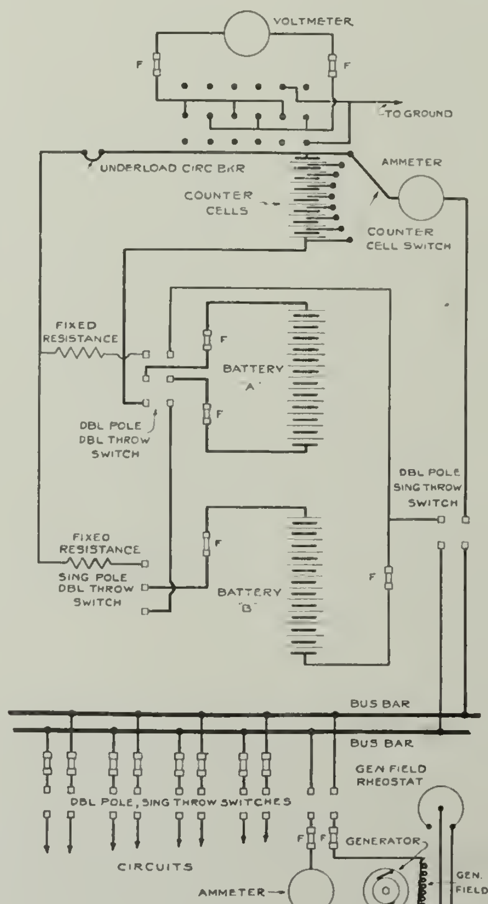


Fig. 9

tained at full candle power being shown in Fig. 8, together with its wiring diagram in Fig. 9. This includes an ammeter A for the generator (and also one for the battery) to measure the electric current and to make sure that the generator is not being overloaded or the battery charged too fast. It includes switches S7 for the generator and for the separate lighting circuits S1, S2, S3, S4, and switches S5 and S8 for shifting the battery from charge to discharge, C and E being charge, and D and H discharge positions. There is also a voltmeter V used for maintaining the current voltage on the lights so that they will not burn too bright or too dim. The voltage is controlled, in the case of the generator, by means of the field rheostat (the hand wheel at the center of the board), and in the case of the battery, by the counter cell switch (in the center of the board) which changes the number of counter cells in circuit. These counter cells are cells which look practically like the other 62 cells of the battery, but have the function of using up excess voltage. The 62 cells give too high a voltage at the beginning of discharge and give about the correct voltage at the end; therefore, most of the counter cells must be in the circuit at the beginning of discharge, and as the discharge progresses, they are disconnected, one by one, by means of the circular counter cell switch. With these connections the battery is charged in two halves, for the reason that the cells require a somewhat higher voltage for charging than they give on discharge, and it is desirable to maintain the voltage on the lamps at 110 while charging.

Batteries are much used in country places for summer homes occupied during only three or four months of the year, the batteries standing without attention during the rest of the year, and the fear is sometimes expressed that the electrolyte will freeze and if allowed to remain in the glass jars will break them. Although water will freeze at 32 degrees F., electrolyte of the strength used in batteries, although it contains over 80 per cent, by volume, of water, will not show any sign of freezing until a temperature of about 23 degrees below zero is reached, and then there will be found only a slushy mass of small ice crystals at the top. Electrolyte will not freeze solid even far below this temperature.

Regarding the cost of the fuel consumed by the engines, this is approximately proportional to the amount of power used. At full load a gasoline engine of from 1 to 4 horse power uses from 1 to $1\frac{1}{4}$ pints of gasoline per horse power per hour. With gasoline at 16 cents per gallon and a consumption of $1\frac{1}{4}$ pints per horse power per hour, the cost of fuel for electricity for burning a 16-candle power, 20-watt tungsten lamp is about one-tenth of a cent an hour. Kerosene oil engines use cheaper fuel, and the same electricity can be obtained at a cost of less than one-tenth of a cent; but as there is more work involved in starting a kerosene oil engine, the gasoline engine is usually preferred, especially for small sizes.

The cost of electric lighting plants varies with local conditions. An average cost for engine, dynamo, storage battery, and switchboard in 32-volt plants for situations where there are from 15 to 60 lights connected to the circuit, ranges from $360 to $500 for the equipment, f. o. b. maker's works.

The equipment for 110-volt lighting plants will run in cost from about $600 up for engine, dynamo, storage battery, and switchboard, depending on the number of lights to be taken care of and local conditions.

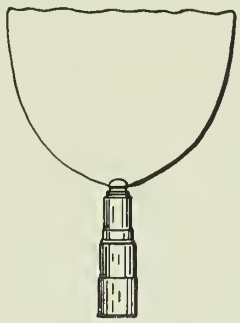


Fig. 10

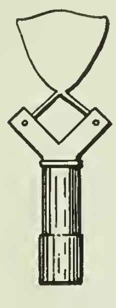


Fig. 11

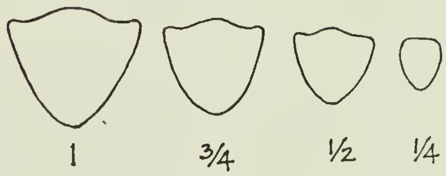


Fig. 12

In addition to the cost of the equipment for the electric lighting plant, there will be the cost for wiring the buildings, the cost of the electric fixtures and the lamps, the cost of installing the plant equipment, and the wiring between the plant and the buildings. In the 32-volt plants described above the cost of installing the plant apparatus is practically eliminated, due to the fact that it is shipped from the factory mounted on skids, ready for service.

In localities where a gas engine is impracticable, a simple solution, as far as mechanical operation is concerned, is found in acetylene gas.

There is a strong prejudice which seems to be more or less generally prevalent against the use of acetylene gas generators in the home. It is a fact to be regretted that this is so, and, worse still, that the original departures in the acetylene gas field rather lent color to the supposed dangers resulting in the attempt to utilize acetylene for domestic illumination and cooking. The day of this preliminary investigation and experimenting in the acetylene world is now past; and when we stop to consider that in the United States alone there are more than 200,000 buildings and 450 entire towns lighted by this means, it would seem that the old prejudice must be fast dying out.

Acetylene has actually fifteen times greater force of lighting power than the common municipal illuminating gas, and it is therefore a mistake to judge the amount of light received from the acetylene flame by the size of the flame itself in comparison with that supplied by any other gas. In Fig. 10 is shown at half actual size the average flame produced by ordinary city gas burning at the rate of 5 cubic feet per hour and giving a light equal to 18 candle power. In Fig. 11 is shown an acetylene flame giving 33 per cent more light; in other words, 24 candle power, and consuming only $\frac{1}{2}$ cubic foot of acetylene gas per hour.

There is absolutely no soot or smoke accompanying acetylene and it never flickers nor varies in intensity. A leak in an acetylene pipe (which, by the way, is no more likely to occur than in any other gas pipe) gives due notice by its odor, but it does *not* asphyxiate — an attribute making it in this respect much safer than ordinary illuminating gas. Besides this it consumes but little oxygen in the air and does not vitiate the atmosphere nor produce an abnormal amount of heat; in fact, the heat produced by the ordinary acetylene flame is less than by any other method of illuminating excepting only that of electricity.

Still another valuable property resulting from its high illuminating characteristics is the advantage that, should a burner be accidentally left open or blown out, the amount of acetylene escaping would be so small as not to cause either explosion or asphyxiation even in a small room. An experiment made upon animals showed, that a dog could inhale a mixture containing 20 per cent of acetylene and 80 per cent air for a period of 35 minutes without apparent discomfort, while an attempt to have the animal breathe a mixture of similar strength made with ordinary illuminating gas resulted in death after 10 minutes.

Piping for acetylene is almost identical with the ordinary lines as used for city gas. In fact, a building piped for city gas can have its supply main run to the acetylene generator and give satisfactory service without any alteration whatever, provided that the original gas piping was properly installed. An enlarged view of a typical acetylene gas generator located in the basement and the connections therefor is given in Fig. 13. The burners can be arranged to supply lights of various sizes and candle power, illustrations from actual photographs being shown in Fig. 12. The size of burner in most common use is the ½-foot burner, which gives a 24-candle power light, although for reading purposes a ¾-foot burner giving 36 candle power is preferable for the average person's comfort.

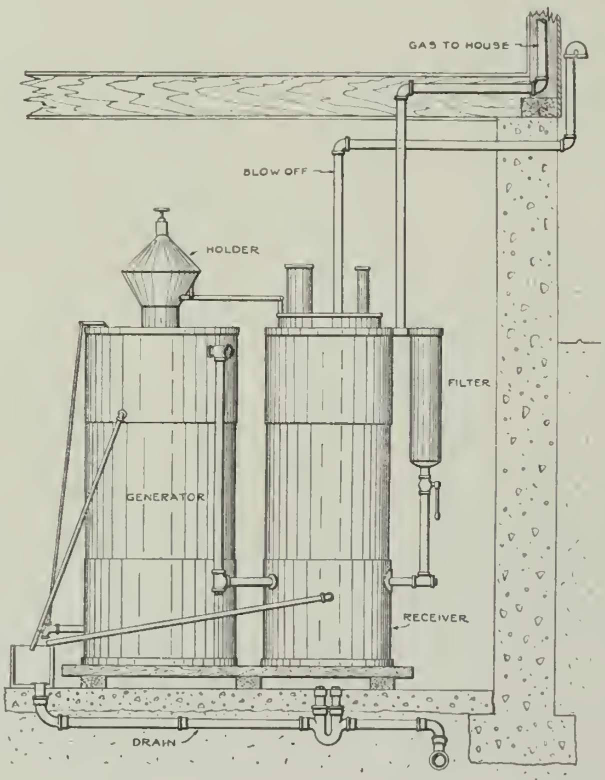


Fig. 13

All that is necessary to produce acetylene gas in a finished state ready to light at the burner is to bring calcium carbide—commonly termed "carbide"—into contact with water. The gas, as soon as this is done, is released, leaving only pure lime "whitewash" as a residue. This is not by any means an elaborate process, the difficulty being to control the feeding of the carbide and water so as to produce automatically the quantity of gas required.

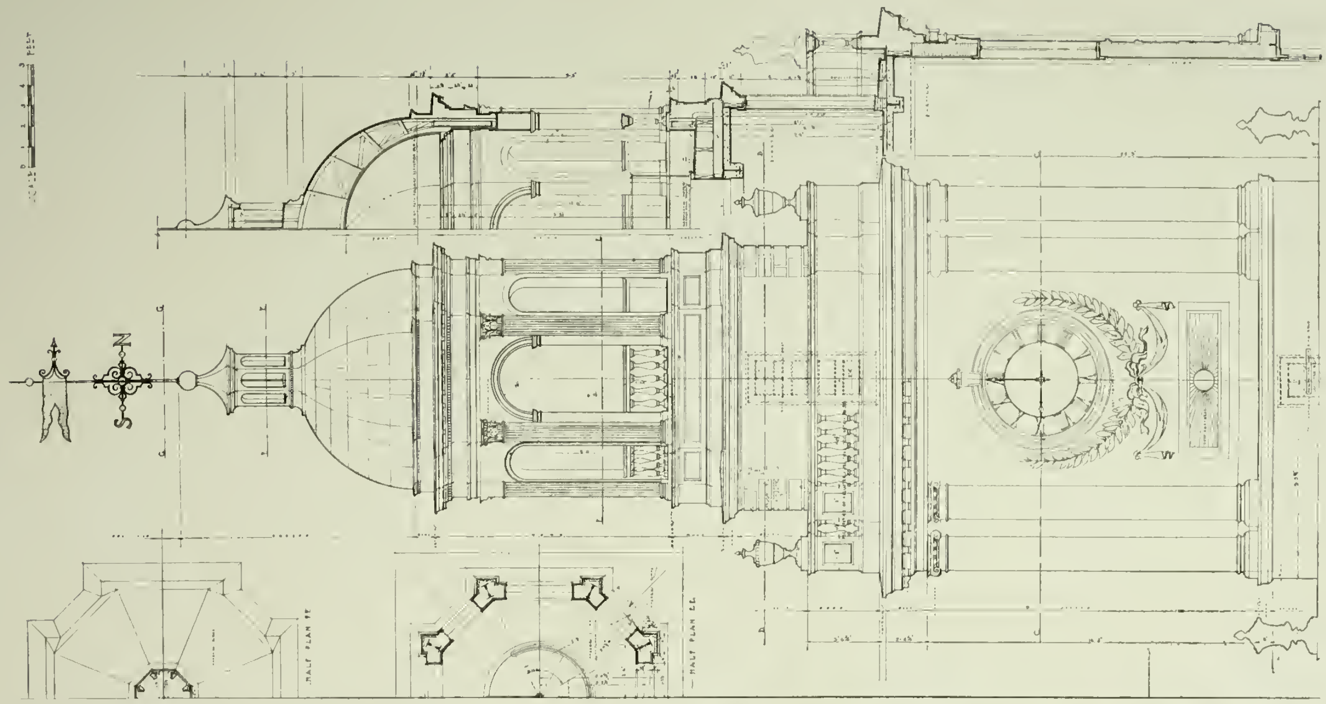
Most of the acetylene generators consist of two main parts,—the generator proper in which the gas is produced, and a gas holder which serves to carry a very slight reserve supply, this supply being so small an amount as to hardly merit the name of being a storage of gas. The carbide is placed in a feeding hopper at the top of the tank and feeds down through the neck into the water contained in the generator tank below. As soon as the piece of carbide is dropped into the water below it starts to decompose, producing acetylene gas which rises and flows out through the pipe connection into the gas holder. The gas holder consists of an inverted cylinder with a capped top sitting in another cylinder partially filled with water. The gas is conducted to the interior of the inner cylinder, expelling the water from the inner cylinder and causing it to rise by its buoyancy in much the same method as used in the large city gas tanks with which most of us are familiar. The inner cylinder, in rising, prevents the further feeding of carbide until the gas produced previously, and which is now contained in the cylinder, has been drawn off for use in some part of the house, thus allowing the inner cylinder to fall and again starting the feeding of the carbide. This is the automatic process which only manufactures gas as it is used and which makes the storage of large quantities unnecessary. In some generators the feeding of the carbide is governed by the rise and fall of the water in the cylinder. As soon as the carbide has generated sufficient gas to raise the cylinder (otherwise to lower the water) a little cap is drawn down over the carbide opening so that no more carbide can be fed until this gas has been exhausted.

There can be no question as to the safety of such a system, or the Fire Underwriters would absolutely prohibit its use.

As far as reliability goes, this gas is used by the United States government to supply the lights on the light beacons marking the channels for ships; these beacons must burn continuously and without failure day or night for 60-day periods between trips of the government tugs for re-charging. This is much harder and more exacting service than is required for house use.

There seems to be only one real disadvantage to the use of this system, and this is caused by the non-storage of gas. If by any possibility you reach the end of your carbide, say at 8.30 P.M. in the evening, the insurance regulations will not permit you to re-charge again until the next day. This results in great discomfort and is likely to occur at inopportune times. Some generators, however, have overcome this difficulty by retaining automatically a one night's charge in the carbide holder. When the rest of the carbide charge has been exhausted the gas begins to drop, but the owner is "reprieved" by going down and "putting another quarter in the slot"—that is, he turns on the reserve charge of carbide which will supply gas the rest of the evening and he then re-charges the whole apparatus next day at his leisure.

GILMAN HALL, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.
PARKER, THOMAS & RICE, ARCHITECTS



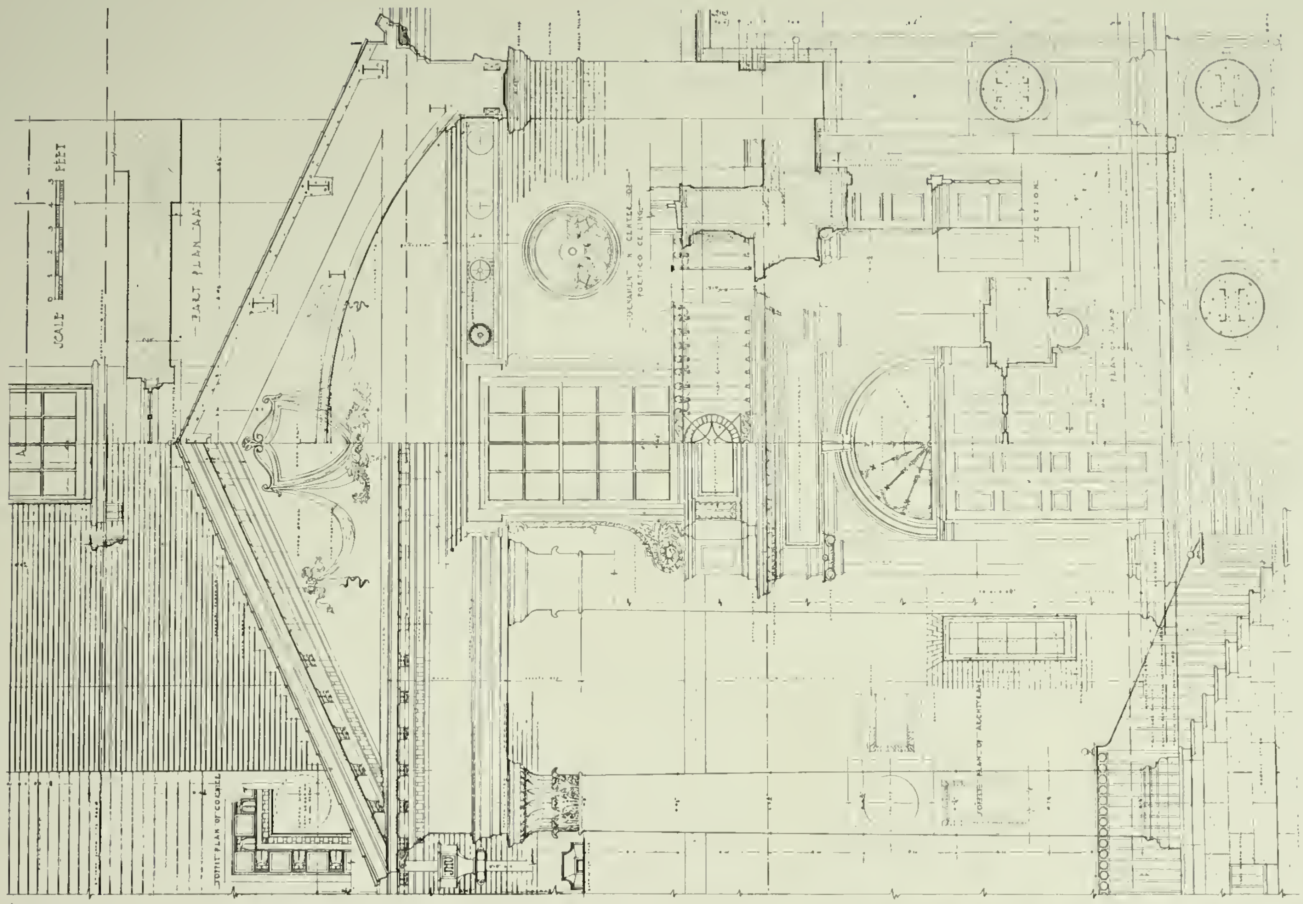
DETAIL OF TOWER

DETAIL OF FACADE AND TOWER

GILMAN HALL, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

PARKER, THOMAS & RICE, ARCHITECTS

ENTRANCE PORTICO

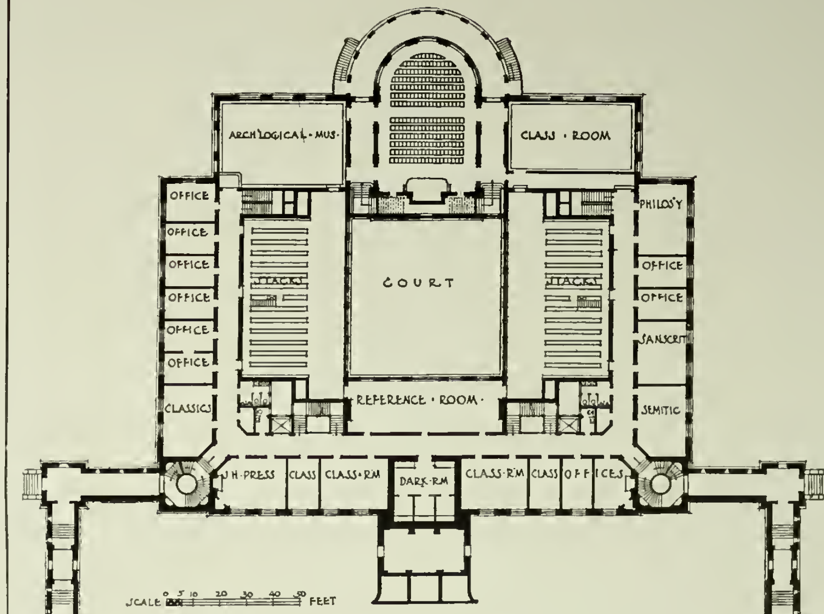


DETAIL OF PORTICO AND DOORWAY

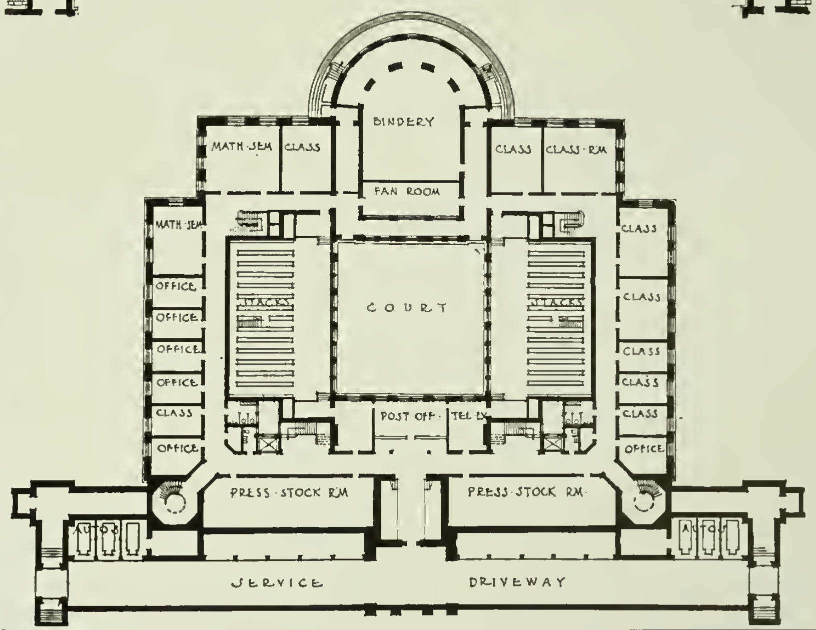
GILMAN HALL, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

PARKER, THOMAS & RICE, ARCHITECTS

DETAIL OF RIGHT WING AND ARCADE



GROUND FLOOR PLAN

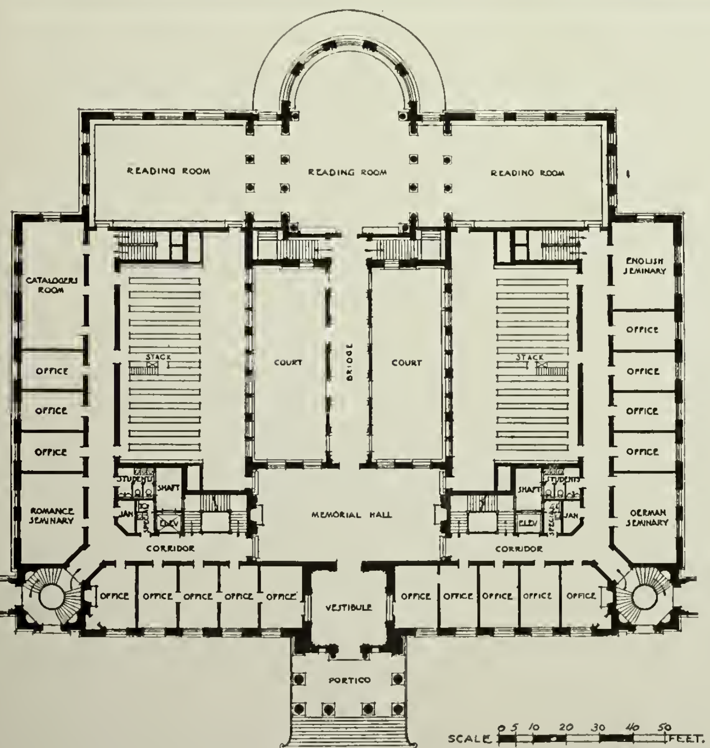


BASEMENT FLOOR PLAN

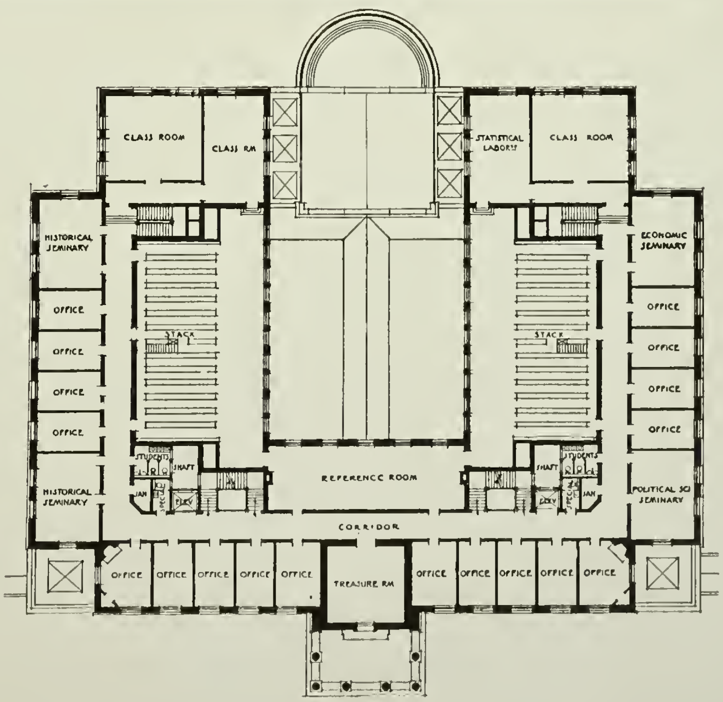
GILMAN HALL, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

PARKER, THOMAS & RICE, ARCHITECTS

VIEW FROM REAR



FIRST FLOOR PLAN



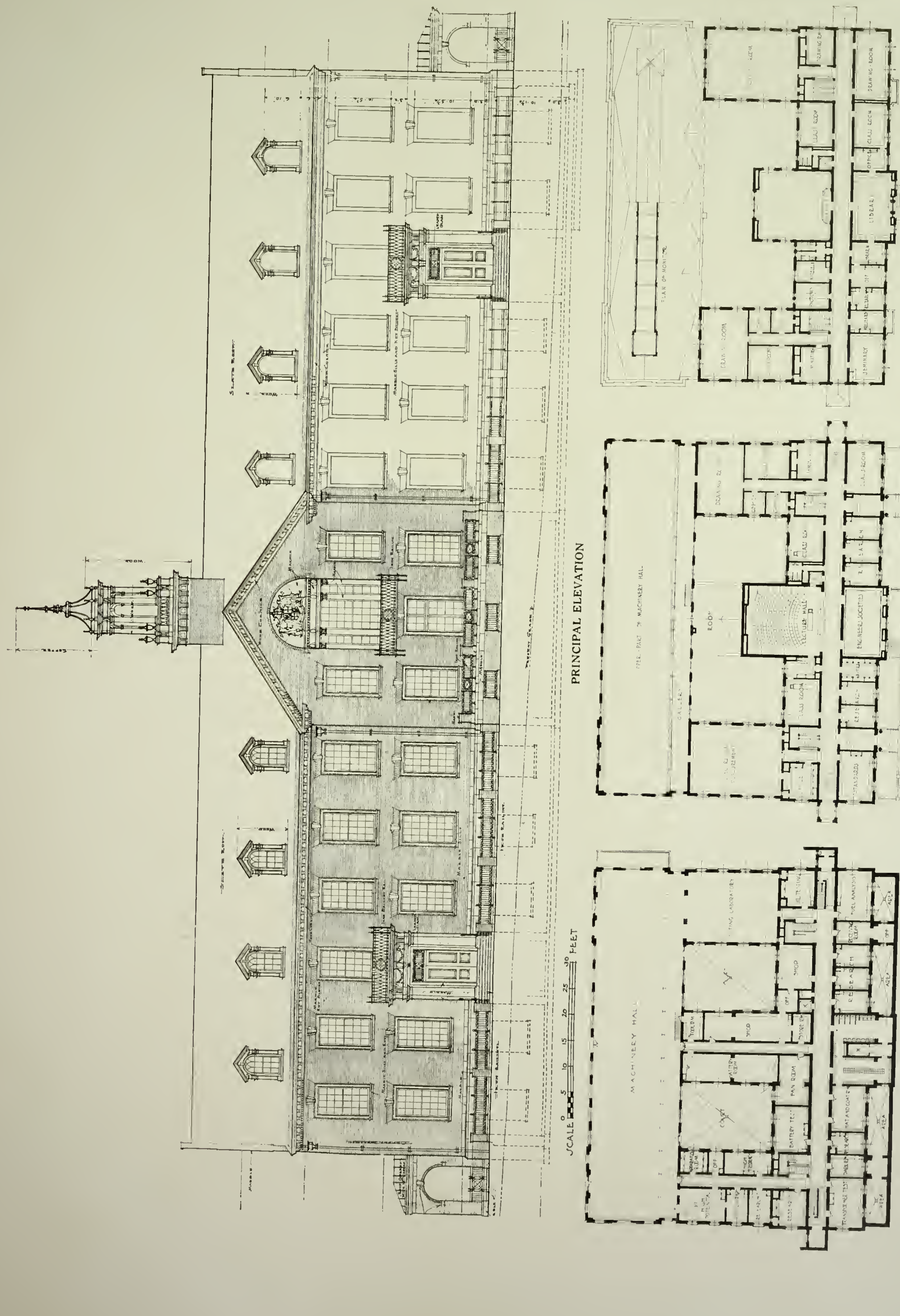
SECOND FLOOR PLAN

GILMAN HALL, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

PARKER, THOMAS & RICE, ARCHITECTS

MECHANICAL AND ELECTRICAL ENGINEERING BUILDING, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

JOSEPH EVANS SPERRY, ARCHITECT



PRINCIPAL ELEVATION

BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

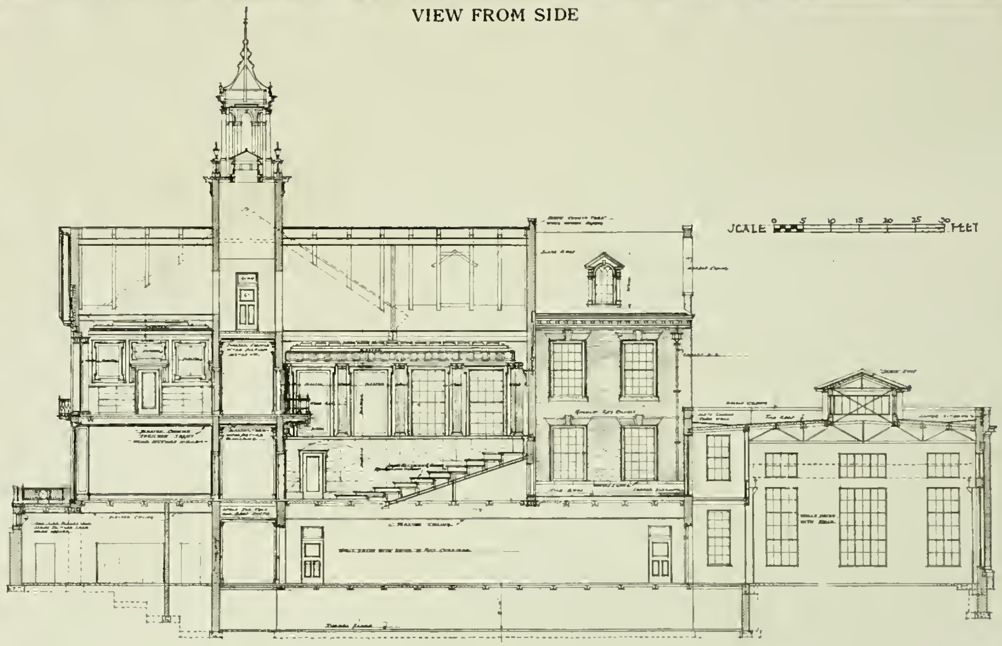
SECOND FLOOR PLAN

MECHANICAL AND ELECTRICAL ENGINEERING BUILDING, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

JOSEPH EVANS SPERRY, ARCHITECT

DETAIL OF FACADE AND LANTERN

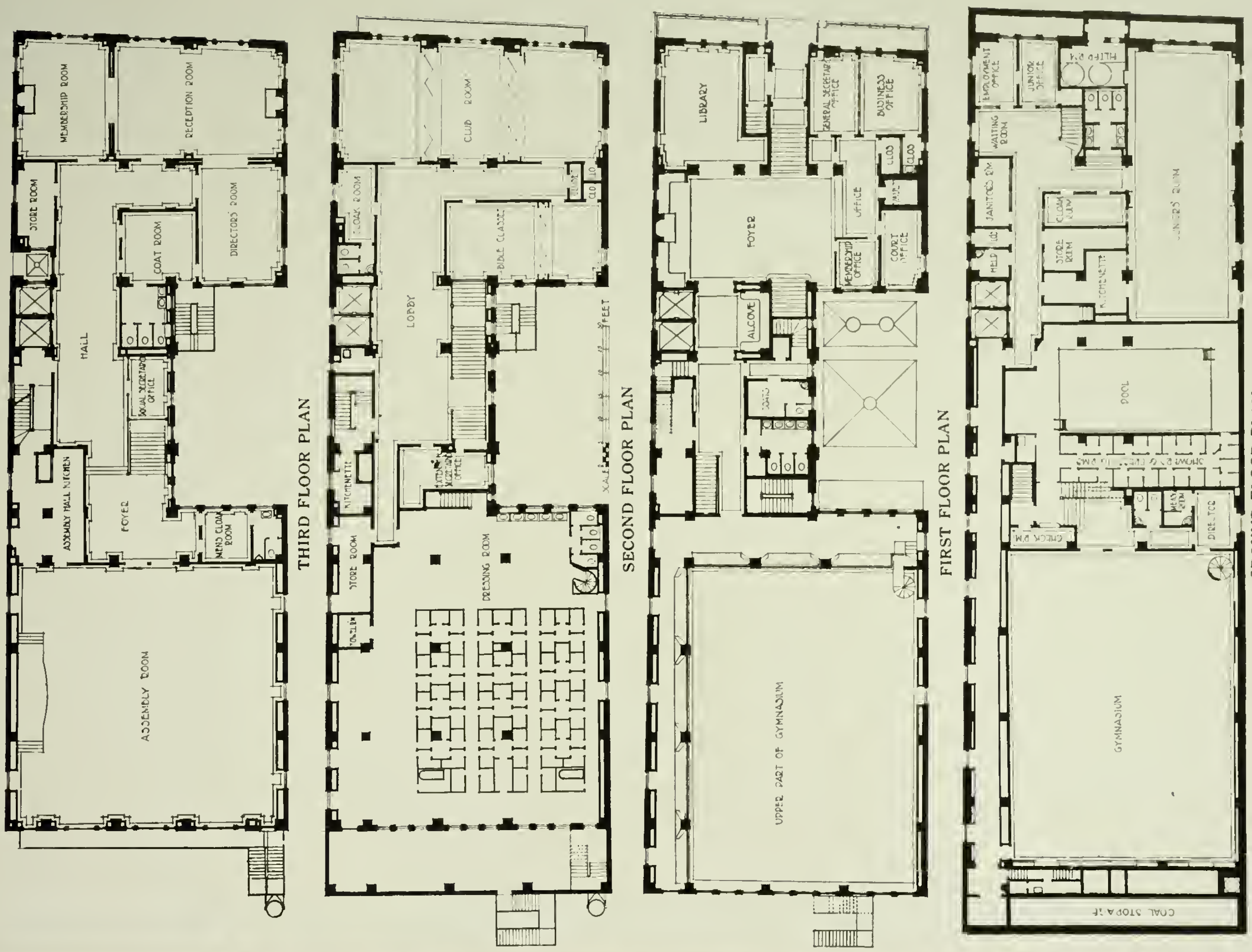
VIEW FROM SIDE



TRANSVERSE SECTION

MECHANICAL AND ELECTRICAL ENGINEERING BUILDING, JOHNS HOPKINS UNIVERSITY, HOMEWOOD, BALTIMORE, MD.

JOSEPH EVANS SPERRY, ARCHITECT



THIRD FLOOR PLAN

SECOND FLOOR PLAN

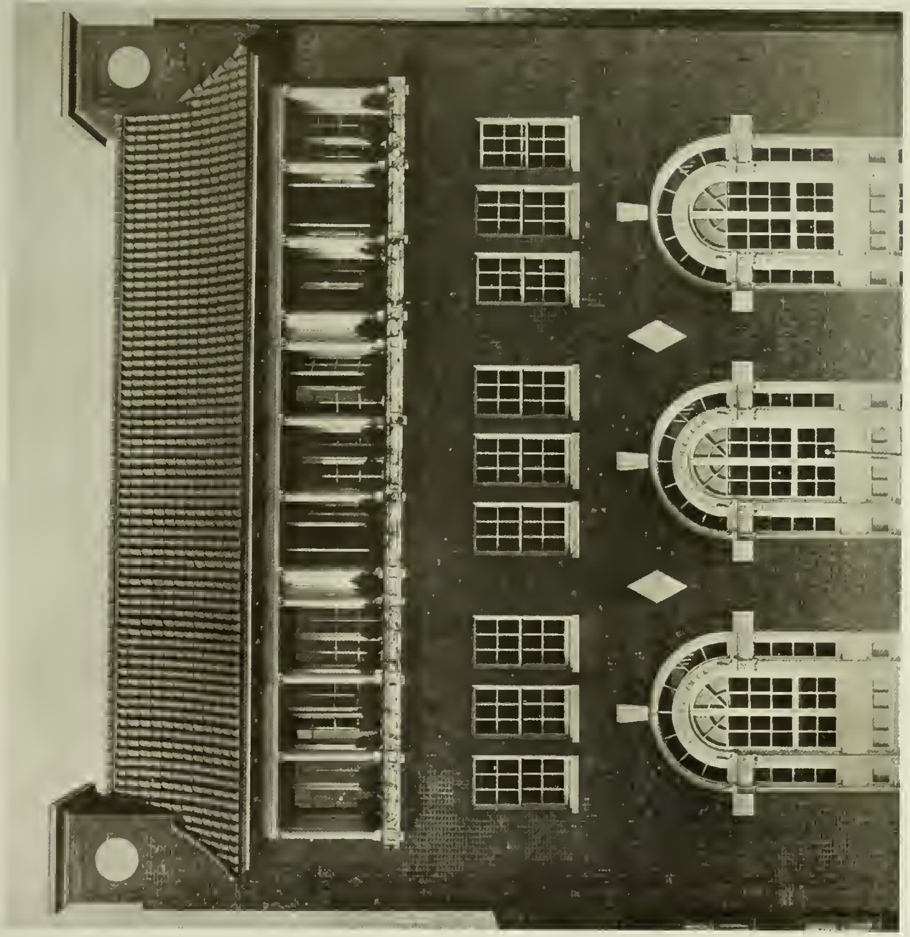
FIRST FLOOR PLAN

GROUND FLOOR PLAN

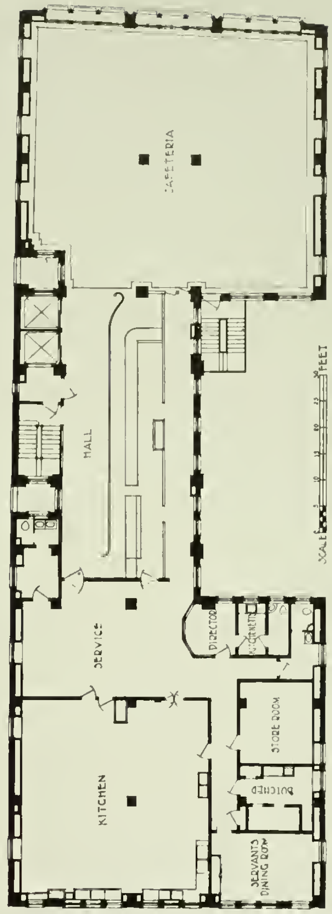
PRINCIPAL FACADE

Y. W. C. A. BUILDING, NEWARK, N. J.

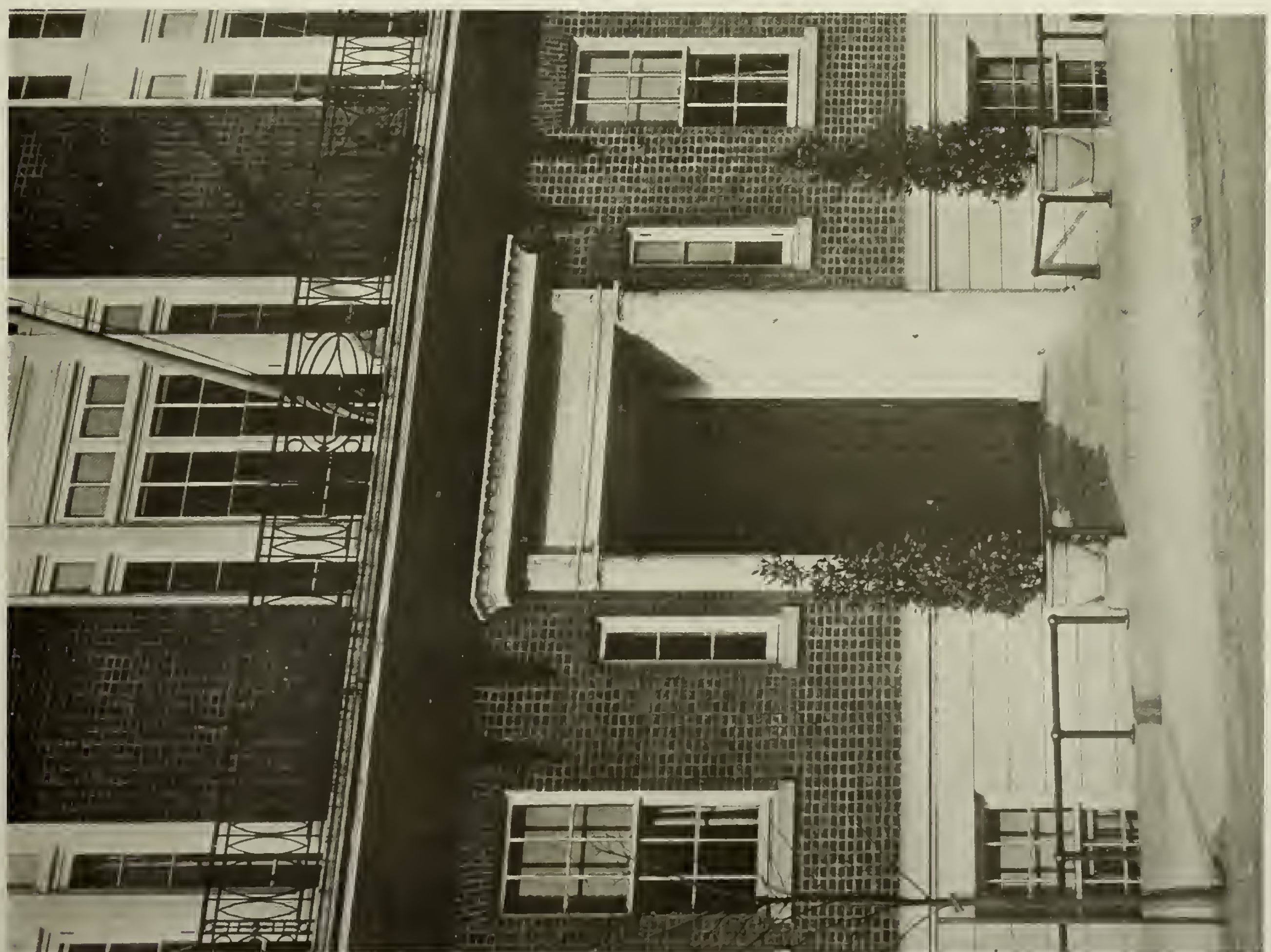
GEORGE B. POST & SONS, ARCHITECTS



DETAIL OF UPPER STORIES



FIFTH FLOOR PLAN



DETAIL OF ENTRANCE

Y. W. C. A. BUILDING, NEWARK, N. J.
GEORGE B. POST & SONS, ARCHITECTS

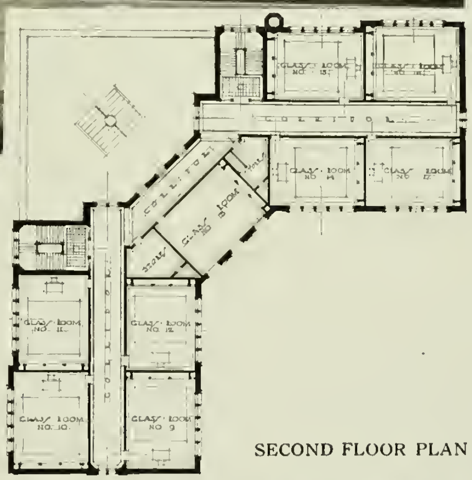
GENERAL VIEW

DETAIL OF PRINCIPAL ENTRANCE

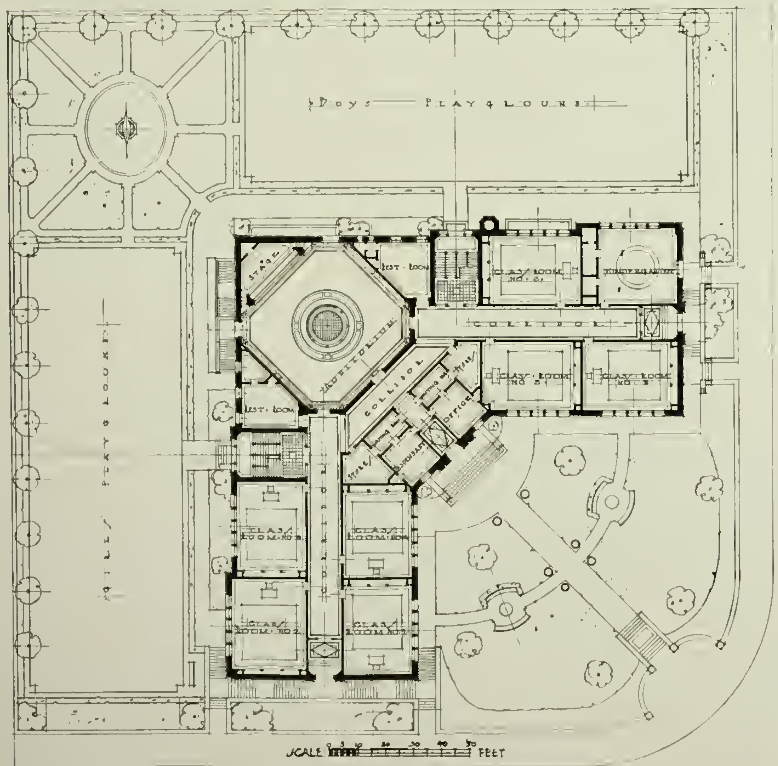
ADDISON SCHOOL, CLEVELAND, OHIO

F. S. BARNUM AND W. R. McCORNACK, ARCHITECTS

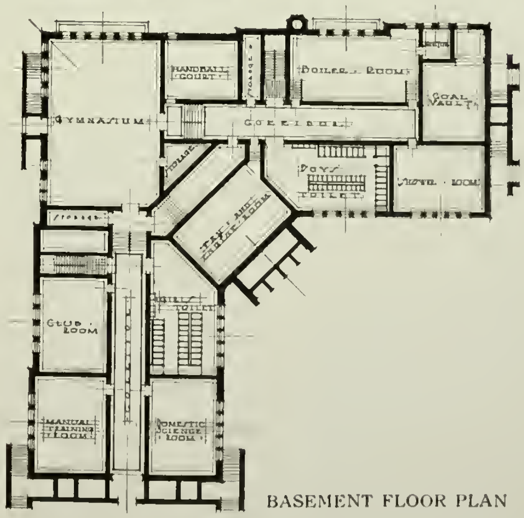
VIEW OF SIDE



SECOND FLOOR PLAN



FIRST FLOOR AND PLOT PLAN

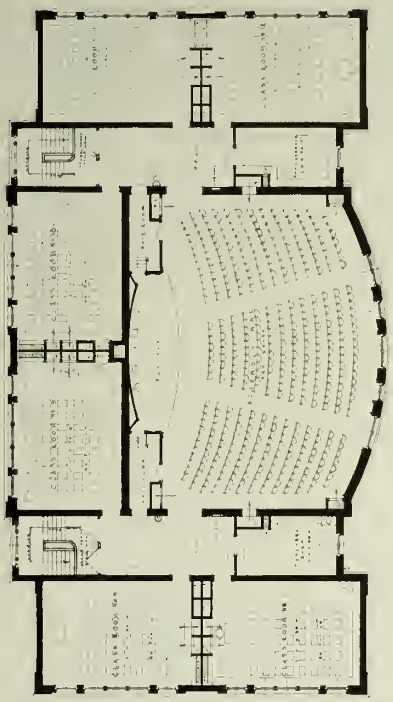


BASEMENT FLOOR PLAN

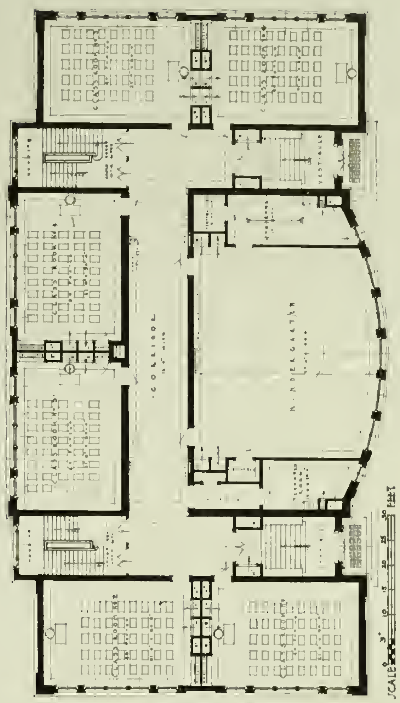
ADDISON SCHOOL, CLEVELAND, OHIO

F. S. BARNUM AND W. R. McCORNACK, ARCHITECTS

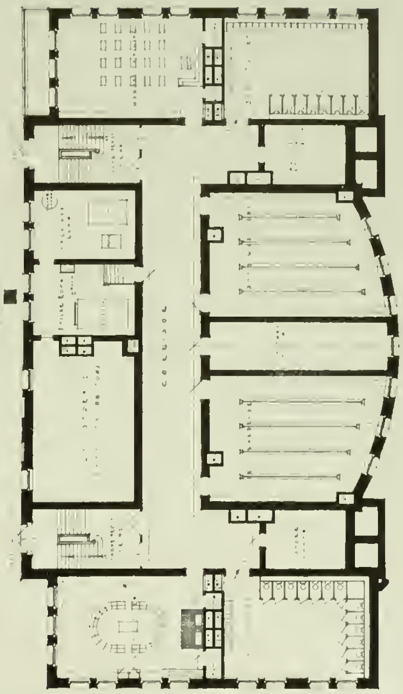
WALKER SCHOOL, CONCORD, N. H.
HUSE TEMPLETON BLANCHARD, ARCHITECT



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

DETAIL OF PRINCIPAL FACADE

WALKER SCHOOL, CONCORD, N. H.

HUSE TEMPLETON BLANCHARD, ARCHITECT

VIEW OF SIDE

ASSEMBLY HALL

DETAIL OF ENTRANCE

WALKER SCHOOL, CONCORD, N. H.

HUSE TEMPLETON BLANCHARD, ARCHITECT

New Building for the T-Square Club, Philadelphia, Pa.

WILSON EYRE & McILVAINE, *Architects.*

By JOHN F. HARBESON.

THE degree of satisfaction with which the T-Square Club entered its new building on Quince street, Philadelphia, may be gathered from the fact that a whole week of celebration was necessary to express it, comprising a dinner, a christening, a lecture, an exhibition, and a dance. For years this club — one of the oldest of the architectural clubs of our cities — has looked forward to having its own building; each year committees were appointed, and reported, but it remained for one who has left the profession and is now a contractor to work out the financing of the scheme, without increasing the annual dues. He has been so successful, indeed, that when the bond issue is paid off and the mortgage liquidated, no yearly dues will be required, as the renting of the lower floors gives revenue enough for the ordinary club expenses.

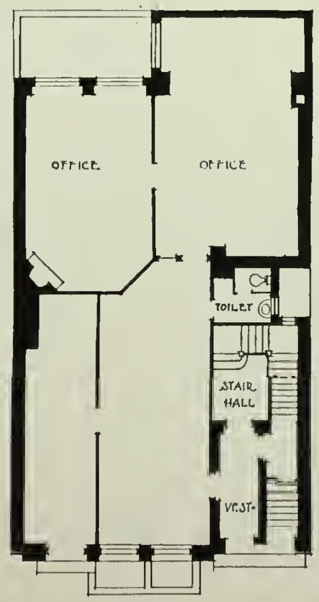
The new building is a three-story brick structure with a fire tower — I mention the fire tower as, for a long time, the "committee of the whole" that was in the habit of visiting the site during the progress of the work thought that there would be

View of Facade

room for nothing else, thanks to the requirements of the Bureau of Building Inspection. The club house was designed by Wilson Eyre, who with John Stewardson, Walter Cope, Arthur Truscott, Walter Smedley, and other lovers of pencil sketching, founded the club in 1887. Needless to say, he was constantly given the "help" of advice from the rest of the profession, who felt themselves in the strange and very comfortable position of "client." The structure as completed was an excellent example of the master-bricklayer's art, and as such could hardly have been surpassed; but this result having been achieved, and the novelty wearing off, it was decided to paint the front a battleship gray. This was fortunately spared from the tilework around the door, where the club seal has been translated into burnt clay.

From its earliest history the club has been somewhat of a school, and though the early sketch problems and "redesigning" competitions have given way to the modern atelier in design, the aim has always been "opportunity for the diligent."

Detail of Entrance



First Floor Plan

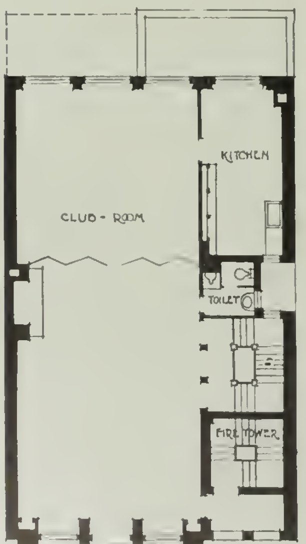
Detail of Stairway

The new, well lighted drafting room on the top floor of the building, with its sixty tables, is constantly in use in the winter months; its popularity is due to two facts, the criticism of Paul Cret and Leon Arnal (until the present war started), and that the last four winners of the Paris prize have been members of the T-Square Club, to say nothing of the fact that there is no fee for this criticism, which is given free to all members who avail themselves of this privilege.

On the second floor is the "club room," by night a meeting place or lecture hall, as the case may be, and by day a dining room, or "grub club," as it is familiarly called. The long oak tables show the friendly democratic spirit that rules here between him who has "arrived" and him who hopes to do so in the near future. The masters of the profession drop in here for lunch now and again, among them a past president of the American Institute of Architects. It is in this room, around these old tables full of memories, that the younger generation airs its radical views, and the older men with wiser heads nod indulgently. But the prevailing note is youth and enthusiasm, especially enthusiasm. Even the older men are enthusiastic, and ever since that memorable day when a former president, in his valedictory address, urged the members to "tread upon the coattails of posterity," they have been stirred to make of this City of Brotherly Love a place of civic beauty, equal to the traditions of our early architecture of the State House, Christ Church, and the old Stock Exchange.

Interior of Club Room

The new club house ends satisfactorily many years of striving for permanent quarters. When the Club was first formed, meetings were held in the offices of various members, and it was not until March, 1891, that it realized in some measure its ambition to have quarters of its own. In that month a meeting was held in the attic of an old house on Thirteenth street, fitted up in characteristic fashion, and often talked of by the older reminiscent members. The Club continued to occupy this room until 1893, when the School of Industrial Art offered it more commodious and pretentious quarters, on condition that the T-Square Club assume charge of all responsibility for the courses in Architectural Design and agree to provide for the delivery of five lectures per year, but the arrangement was found impracticable and a stable on Chancellor street was altered, to provide a home where traditions might form.



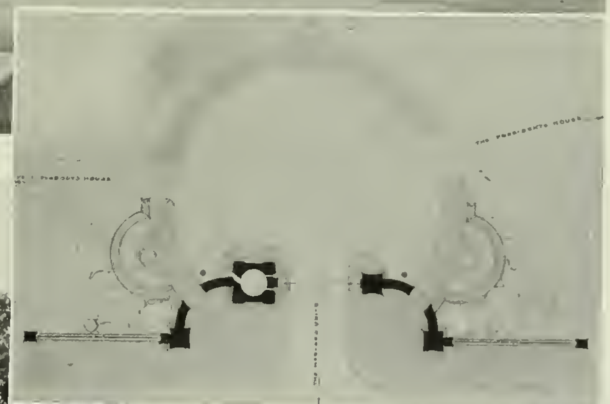
Second Floor Plan

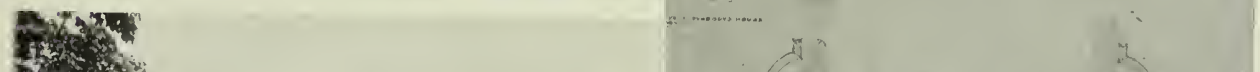
Architects' Drawing of Facade

Third Floor Plan

Dudley Memorial Gate, Harvard University.

HOWELLS & STOKES, ARCHITECTS.





BAS-RELIEF OF GOV. DUDLEY

IN MEMORY OF

THOMAS DUDLEY

GOVERNOR OF THE
COLONY OF THE MASSACHUSETTS BAY
BAPTIZED OCTOBER 12, 1576
AT YARDLEY HASTINGS, ENGLAND
MARRIED AT HARDINGSTONE, ENGLAND
DOROTHY YORKE APRIL 25, 1603
AND AT ROXBURY MASSACHUSETTS
CATHERINE HASBURNE WIDOW APRIL 14, 1624
DIED AT ROXBURY JULY 31, 1653

IN 1597 HE RECEIVED A CAPTAIN'S COMMISSION
FROM QUEEN ELIZABETH AND WAS AT THE SIEGE OF
AMIENS UNDER HENRY IV OF FRANCE
ONE OF THE TWELVE SIGNERS OF THE
CAMBRIDGE AGREEMENT AUGUST 26, 1629
SAILED FROM SOUTHAMPTON, ENGLAND
IN THE "ARBELLA" MARCH 22, 1630
CHOSEN DEPUTY GOVERNOR OF THE
COLONY OF THE MASSACHUSETTS BAY AT A COURT OF
ASSISTANTS ON BOARD THE "ARBELLA" MARCH 23, 1630
ARRIVED AT SALEM, MASSACHUSETTS JUNE 12, 1630

A FOUNDER AND THE FIRST HOUSEHOLDER OF CAMBRIDGE 1631
DEPUTY GOVERNOR OF THE
COLONY OF THE MASSACHUSETTS BAY
1630-34 1637-40 1646-50 1651-53
GOVERNOR OF THE COLONY OF THE MASSACHUSETTS BAY
1634-35 1640-41 1645-46 1650-51
ASSISTANT OF THE COLONY OF THE MASSACHUSETTS BAY
CHOSEN "ONE OF THE STANDING COUNSELL
FOR THE TEARME OF HIS LIFE" MAY 25, 1636
APPOINTED IN 1637
BY THE GENERAL COURT HELD AT NEWTOWN
ONE OF THE TWELVE MEN "TO TAKE ORDER FOR A
COLLEGE AT NEWETOWNE"
COMMISSIONER OF THE
UNITED COLONIES 1647-48 1649-50
APPOINTED SERGEANT MAJOR GENERAL
OF THE MILITARY FORCES OF THE COLONY MAY 29, 1644

SIGNED THE CHARTER MAY 31, 1650 OF HARVARD COLLEGE

BURIED IN THE OLD CEMETERY AT THE CORNER
EUSTIS AND WASHINGTON STREETS
ROXBURY, MASSACHUSETTS

BEQUEATHED TO HARVARD UNIVERSITY BY CAROLINE PHELPS STOKES
8TH IN DESCENT FROM GOVERNOR DUDLEY

H. & S. '91. ARCHTS. MCMXV.

WORDING OF INSCRIPTION ON TOWER

ONE OF THE SEMI-CIRCULAR SEATS ON YARD SIDE OF GATEWAY

DUDLEY MEMORIAL GATE, HARVARD UNIVERSITY, CAMBRIDGE, MASS.

HOWELLS & STOKES, ARCHITECTS

Acoustics of Auditoriums.

INVESTIGATION OF THE ACOUSTICAL PROPERTIES OF THE ARMORY AT THE UNIVERSITY OF ILLINOIS.

By F. R. WATSON, *Associate Professor of Physics, University of Illinois.*

THE Armory at the University of Illinois presents an unusual case of defective acoustics because of its very large volume and comparatively small absorbing power. It was built to fulfil the usual requirements of an armory in regard to military drills ; but, in addition, it has been used on several occasions for convocations and assemblies where the audiences have been very large. The acoustics proved to be impossible for speaking and music. In view of the proposed continued use of the building for such assemblies, the writer carried on an investigation to determine the possibilities of making it satisfactory in its acoustical properties.

The Armory is 400 feet long, 212 feet wide, and 93 feet to the highest point of the roof. Acoustically, it is defective because of echoes and reverberation. Echoes are set up by the distant walls, while the reverberation is caused by the undue prolongation of sound.

Fig. 1. Framework of Parabolic Reflector

Several experiments were tried to determine the value of special devices for reinforcing and directing the sound. In one case, a huge parabolic reflector of special construction was used. This was based upon the known action of parabolic reflectors in directing sound along the axis of the parabola.*

A modified paraboloid was constructed, the parabolic ribs of which were arranged so as to spread the reflected sound over the entire area occupied by the audience. The framework, pictured in Fig. 1, was covered with oilcloth and mounted over the head of the speaker so that his mouth was at the common focus of all the parabolic ribs. Preliminary tests with the reflector showed that it admirably fulfilled its purpose in directing sound ; but when used at an assembly with an audience, its action was practically drowned out by the excessive reverberation which prohibited any possibility of satisfactory acoustics.

Another experiment of like nature involved the use of a special megaphone to distribute the sound of the speaker's voice. This megaphone was more efficient than the reflector, since it utilized all the sound sent out by the speaker instead of only the portion intercepted by the reflector. This device was also of little benefit because of the excessive reverberation.

* "The Use of Sounding Boards in an Auditorium," *Physical Review*, Vol. 1 (2), p. 241, 1913, and THE BRICKBUILDER, June, 1913, and August, 1913.

Fig. 2. The Armory at the University of Illinois

Fig. 3. Interior of Armory

A third trial was made by using a number of loud-speaking telephones at different positions in the Armory. This attempt was also unsuccessful, although the telephones when used out in the open air were very effective in reinforcing and directing the sound.

These experiments showed the impossibility of using the entire Armory for speaking purposes unless the reverberation could be materially reduced. The investigation was then directed to the determination of the constants of reverberation and the possibility of correcting them. Sabine's method* was used for this purpose. His formula for reverberation is expressed as follows :

$$t = kv \div a,$$

where t is the time of reverberation, v the volume of the room, a the sound-absorbing power of all the exposed surfaces in the room, and k a constant which is determined experimentally. Applying this formula to the case of the Armory, the volume of which is 6,652,000 cubic feet, and the total absorbing power, without an audience, 13,400 units, the time of reverberation was calculated to be 24 seconds. This value is unusually large. The Auditorium at the University of Illinois, seating 2,200 people, had a reverberation before its acoustical correction of 9 seconds and was considered to be very bad.† The conditions in the Armory by comparison with this case may be inferred to be exceptionally unsatisfactory.

Calculations made to ascertain the effect of introducing sound-absorbing material showed that the installation of 50,000 square feet of hairfelt would reduce the reverberation to 4.66 seconds, a value which would still be too large for satisfactory speaking. The only alternative was to reduce the volume. Calculations were then made for the acoustical properties of a room partitioned off by canvas curtains at one end of the Armory so as to enclose a space 212 feet by 134 feet and 35 feet high. To do this it was first necessary to determine experimentally the action of the canvas in transmitting and absorbing sound. The time of reverberation for the room with an audience of 4,500 people present was then estimated to be 1.1 seconds, a value which has been found by repeated experience to be satisfactory.

On the basis of this calculation a room of the specified dimensions was enclosed at one end of the Armory and used for the University Commencement exercises. (See Fig. 4.) Auditors in all parts of this canvas-enclosed room could hear and understand the various speakers, so that the room was considered a success from the standpoint of acoustics.

A further step to be undertaken in the investigation lies in the proposed installation of some sound-absorbing materials upon the walls of the Armory itself. It is hoped that by this means the time of reverberation may be reduced to a reasonable length and make the building entirely satisfactory for military drills and band concerts. Whether or not it will also be suitable for assemblies where there is speaking, remains to be seen.

Fig. 4. Interior Arranged for Commencement Exercises

* *American Architect*, 1900.

† "Acoustics of Auditoriums." Bulletin No. 73 of the University of Illinois. Engineering Experiment Station.

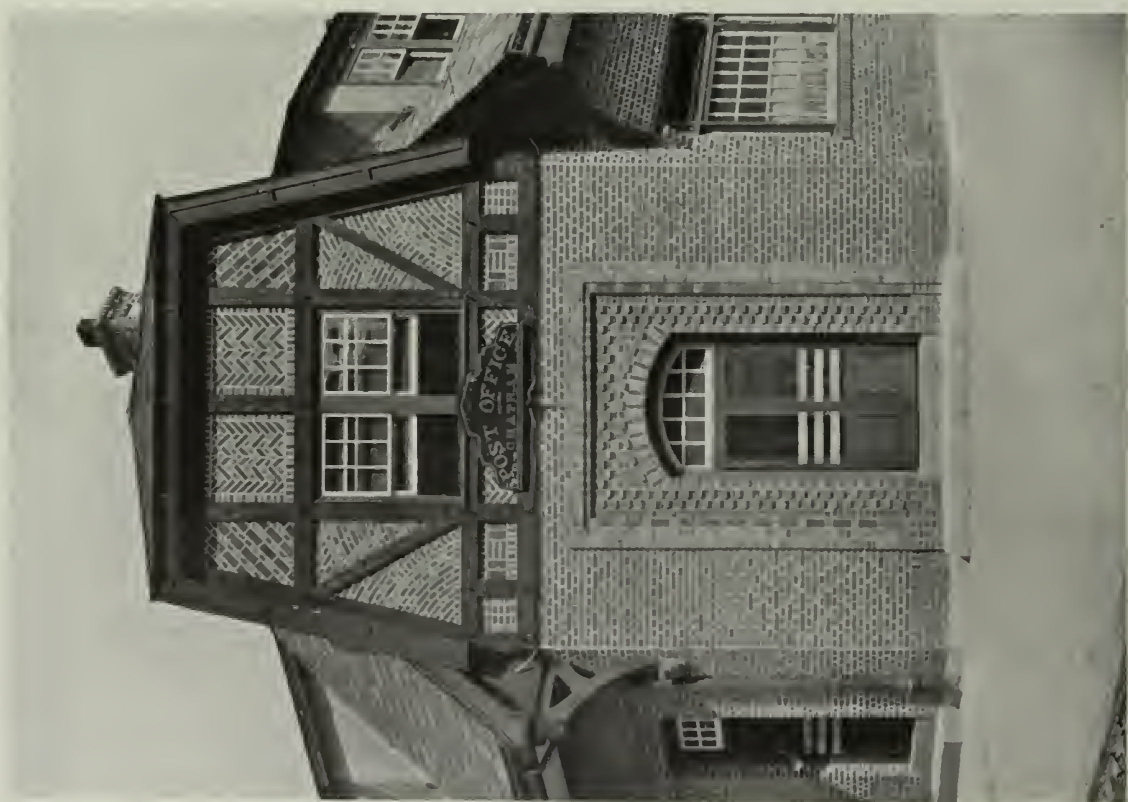
Group of Village Stores at Chatham, Mass.

HENRY BAILEY ALDEN AND WILLIAM H. COX, ASSOCIATED ARCHITECTS.

VIEW FROM CORNER OPPOSITE POST OFFICE

FIRST FLOOR PLAN

SECOND FLOOR PLAN



DETAIL OF POST OFFICE ENTRANCE

DETAIL OF END STORE

GROUP OF VILLAGE STORES AT CHATHAM, MASS.

HENRY BAILEY ALDEN AND WILLIAM H. COX, ASSOCIATED ARCHITECTS

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

ALLEN BARTLIT POND

ALLEN BARTLIT POND was born in Ann Arbor, Mich., in 1858. He was educated in the Ann Arbor schools and received his B.A. from the University of Michigan in 1880. After a period during which he taught Latin in the Ann Arbor High School and took a course in Real Estate and Contract Law, he came to Chicago and entered the office of S. S. Beman, where he remained in company with his brother, Irving K. Pond, for a year, entering then upon the partnership which has existed ever since.

In 1911 he was given an honorary M.A. at Michigan, in recognition of his many and varied services in behalf of the public, which have been continuous and arduous since his graduation. The president of the University, in conferring the degree, said, "He is commonly known as Chicago's most useful citizen." He was a founder and one time secretary of the Municipal Voter's League, a body which took and has held Chicago's City Council out of the mire, was chairman of the Political Action Committee, and vice-president of the Union League Club; was a founder and is now the president of the City Club, which devotes itself to the study of civic problems and the betterment of municipal conditions ; has for many years been secretary of the Hull House Association ; was an effective member for years of the Commercial Club Committee on Education, introducing the teaching of domestic science in the public schools, and, through the medium of the Merchants' Club, privately installed equipment and supported night classes. He was secretary of the American Institute of Architects Committee on Standard Documents, gathering and correlating the vast mass of data used by that committee.

He has made several trips abroad for the purpose of rest and study, being a delegate to the International Congress of Architects in Vienna, at one time sent by interested people to study and report on schools for subnormal children, studying foreign methods and modes of city planning and municipal government.

No problem of Chicago life from the terminal situation through council activities, housing, city planning, education, and philanthropy has escaped the illumination of his clear and concise thought and direct act. To all this he has added a critical power of high quality, a thorough knowledge, love, and understanding of all worthy forms of art. He is more than an architect. He is an ideal citizen ; giving of his time unselfishly, he is never too busy to help better the condition of those about him. — *C. H. H.*

CHRISTOPHER GRANT LA FARGE

RECENT architectural education has tended greatly to the development of ability to solve problems of design as matters of composition in plan, section, and elevation, sometimes to the neglect of the more subtle and personal qualities of the art. The highest satisfaction that can come from the practice of architecture is, I believe, reserved for those to whom the handling of the actual materials of the building possesses an interest beyond that of the formulation of the design. Grant La Farge unmistakably embodies this point of view and, in the selection and combination of elements that enter into his work, shows much of that exquisite sensitiveness in the matter of texture, combined with color, that gave distinction to the work of his father, John La Farge.

He was born in Newport, R. I., Jan. 5, 1862. His preliminary training was received at the Massachusetts Institute of Technology and in the office of H. H. Richardson.

His work in partnership with George L. Heins, 1886–1907, includes the Cathedral of St. John the Divine and many other interesting ecclesiastical buildings, — graceful, refined, and picturesque in character — although many of them were designed during the period when the heavy type of Romanesque architecture, brought into vogue by the work of Richardson, still dominated the ecclesiastical thought of the country. The firm of Heins & La Farge may justly be regarded as among the pioneers in the most recent revival of the Gothic spirit freed from the limitations of the Gothic style. The buildings for the New York Zoölogical Society at Bronx Park were designed during the later years of this partnership.

His work in partnership with B. W. Morris, 1910–1915, includes the Morgan Memorial at Hartford, a work which might well bring distinction to any architect.

No sketch of his career would be complete without some reference to his other services to the profession and the public. A speaker and writer of unusual precision, simplicity, and vigor, he has brought these abilities to bear as President of the Architectural League of New York and the New York Chapter of the American Institute of Architects, as Trustee and Secretary of the American Academy in Rome, and as a member of various commissions and committees for the improvement of his city and his profession.

His high ideals, imaginative vision, and deep sense of responsibility in all he undertakes render him one of the most useful members of the profession to-day. — *J. M. H.*

CLARENCE HOWARD JOHNSTON

CLARENCE HOWARD JOHNSTON is a native Minnesotan. He was born Aug. 26, 1859, and received his early training in St. Paul schools and offices. His collegiate training was acquired at the Massachusetts Institute of Technology with the class of 1880. At the close of his scholastic work he went abroad to study, traveling extensively in France, Italy, and Asia Minor. Returning to New York, he was employed by Herter Brothers, and there was closely associated with the late C. B. Atwood. In 1886, being tendered several important commissions, he returned to Minnesota and entered the field as a practitioner in St. Paul where he has maintained his office since that time.

Of late years Mr. Johnston's practice has been largely dominated by public work. In 1901 he was appointed architect for the Minnesota State Institutions, a position which he has retained continuously since that time. Prominent among his state commissions are the recently completed penitentiary at Stillwater, which is widely known among penologists as a model of its kind, and the development of the new campus of the University of Minnesota on which new buildings are being erected annually. During his incumbency, each institution has progressed from a state of random expansion to that of normal logical growth in accordance with carefully evolved plans providing for future development. His long tenure of office is in itself evidence that there is a state-wide appreciation of his work.

One of the things which most impresses one about Mr. Johnston is the tremendous enthusiasm with which he approaches every problem connected with his practice. This sincerity and devotion to his art, early in his student days, drew to him several of his fellow draftsmen who were striving along similar lines, and resulted in the formation of the Architectural Sketch Club, which held its early meetings in his rooms and later became the nucleus of the Architectural League of New York.

The combination of sound business judgment and artistic temperament has gained for Mr. Johnston a loyal clientele who entrust him with commissions, confident that their problems will be solved in a broad way, always strong, virile, modern, and yet never taking erratic expression. Time has demonstrated that the patient insistence with which he forces certain convictions has often caused his clients to build better than they knew.

Mr. Johnston is a fellow and ex-director of the American Institute of Architects. Always liberal with his time and energy in all matters which concern the betterment of his profession, he has served the Minnesota chapter both as president and as director.

Kind, genial, sympathetic, he is a constant encouragement to the younger members of the profession whose good fortune it has been to be associated with him in his work. — *S. H.*

JOSEPH H. FREEDLANDER

RETURNING to this country after distinguishing himself abroad as a diplômé of the École des Beaux Arts, Joseph H. Freedlander very early established a reputation by winning competitions for some of the most important architectural work in the country. Daumet, whose pupil Freedlander was in Paris, once remarked in discussing those of his *élèves* that he regarded as having futures, that whatever Freedlander would do would always be noted for the sense of color, the good taste, and especially distinguished by simplicity.

In many ways this prognostication is exemplified in the Perry Memorial, which is at present being erected at Put-in-Bay to commemorate the immortal Perry and the battle of Lake Erie. The column and terrace already completed mark the site of the historic battle, and with the addition of the colonnade and museum which are about to be undertaken, the entire scheme will be completed — as notable and as beautiful a structure as we have anywhere in America. I doubt very much whether Europe will be able to offer, when this holocaust is over, many memorials superior to it, though in magnificence and largeness the Vittorie Emmanule stands of course alone. But even comparing it with this great work, the simplicity of the Perry Memorial is to my mind appealing.

Before going to Paris, Freedlander had studied at the Massachusetts Institute of Technology. When he came back from Paris he entered at once into active practice and distinguished himself by almost immediately winning the competition for the National Home for Disabled Volunteer Soldiers at Johnson City, Tenn., one of the most important pieces of work that the United States Government had undertaken in some years.

In other and later competitions, Freedlander's name became familiar and there were very few important structures where competition was invited that it did not appear.

In the building of the new Harlem Hospital for the City of New York he embodied the most modern hospital technique in construction and finish, and in these three early works established the reputation for originality of design and beauty and simplicity of ideas.

The remodeling of Samuel Tilden's house at Graystone was another achievement that attracted considerable attention, as much because of the contribution of the architecture as because of the historic importance of this famous old home.

Mr. Freedlander is a man of broad culture and ideas and has been associated with many public movements in New York City, as well as artistic and architectural movements in France. He is president of the Société des Architectes Diplômés par le Gouvernement, a trustee of the Museum of French Art, an associate of the National Academy of Design, chevalier of the Legion of Honor, and in the Salon of 1913 received a bronze medal, which is the highest award that can be given to a foreigner. — *G. H. P.*

PLATE DESCRIPTION.

Gilman Hall, Plates 136–140, and the Mechanical and Electrical Engineering Building, Plates 141–143, Johns Hopkins University, Baltimore, Md. These two buildings are among the first to be completed of the large group which, when completed, will make up the new home of the University.

Gilman Hall, named in honor of the first president of the University, is the dominant note of the whole plan, both by reason of its location and of its design. It is given over to the study of the humanities; there are the Memorial Hall, library, seminar rooms, department offices and class rooms, and also the students' post office. The great size of the building is not apparent from the front where only two stories and the attic are to be seen; but in the rear, due to the sudden fall of the land, there are four floors besides the attic, making possible a great many additional, well lighted offices and class rooms in the basement and ground floors.

The Engineering Building marks a departure in the educational policy of the University as it is evidence of the creation, or rather the revival, of an engineering department. It is one of two buildings made possible by appropriations of the Maryland legislature.

The building is on the south quadrangle of the new development and is 204 feet long. On the first floor is the auditorium fitted for experimental demonstration and class-room work. The library, class rooms, and drafting rooms are on the second floor; while the attic provides facilities for research and experimental work. Machinery Hall extends completely across the rear, connecting the two wings of the building, and is to be the principal laboratory for experiments with large machinery.

The general plan for the University makes use of the old Homewood estate and the mansion itself, once the home of Charles Carroll, is to be a part of the scheme, probably as a faculty club house. It is this colonial inheritance that has been recognized by the architects and has set the architectural style of the new buildings throughout. The walls are of a similar red brick and the trimmings of white marble. The cornices are wood as are also the clock tower on Gilman Hall and the cupola on the Engineering Building.

Y. W. C. A., Newark, N. J. Plates 144, 145. All of this building is devoted to institutional purposes, there being no bedrooms or living quarters. In the basement are the gymnasium and swimming pool with showers and dressing rooms, and space for the Junior department. The first floor is occupied by the usual offices; while on the second floor are rooms for the meeting of organizations and dressing rooms for the gymnasium. The third floor is occupied by the assembly room and rooms for entertaining. The fourth floor is devoted entirely to rooms for the various classes in millinery, cooking, dressmaking, etc. The cafeteria and the kitchen are on the fifth floor.

The exterior is of red brick laid in an "all-headers" bond. The basement wall is faced with marble and the entrance is also marble. The treatment of the long windows and the balcony effect at the fifth floor are of wood.

Addison School, Cleveland, Ohio. Plates 146, 147. The controlling considerations in determining the type of plan for this building were the limited size and the elevation of the lot, and the location of a number of large trees. These conditions and the considerable variations in street grades gave reason for the approaches to the first floor, which permit of a basement entrance at street level, as the normal basement floor is two feet above the sidewalk at this point.

The walls are of brick laid with a wide flush cut joint, in light colored mortar, with trimmings of buff limestone.

The construction is strictly fireproof, except in case of the auditorium roof; but the auditorium is separated by heavy brick walls and metal doors. All stairs are enclosed in brick or fire-resisting walls, the glazed partitions being of hollow metal with wired glass and hollow metal doors. The stairs are of cast iron and steel, with asphalt treads. The floor construction is of combination hollow tile and reinforced concrete joists, supported upon the exterior brick walls, and interior steel beams and columns, fireproofed. The floors of all corridors are finished with cement; while those of the class rooms, auditorium, and subordinate rooms are maple.

The heating and ventilating is by a combination direct and indirect system. The corridors, toilets, etc., are heated by direct steam radiators; and the class rooms, auditorium, and other parts by a combination of direct radiation and warmed air.

The building and equipment (not including furniture) cost 17½ cents per cubic foot, or $5,840 per class room, an allowance of three class rooms being made for the auditorium.

Walker School, Concord, N. H. Plates 148–150. This building was erected on a historical site in the oldest part of the city, and it was therefore thought fitting to make the exterior as Colonial in style as the requirements of a modern school permit.

The foundations, base course, and exterior trimmings up as far as the cornices, are of local granite. The brick for the exterior is selected common local brick, similar in appearance to "Harvard" brick. The exterior cornices and the frames around the entrance doors are of wood.

The floor construction throughout and all stairs are fireproof, of the type known as the combination hollow tile and concrete. The class rooms have maple floors, and the corridors and stairs a patented red flooring. The interior bearing walls are solidly built of brick, and all partitions are of terra cotta, so that the only portion of the building not entirely fireproof is the roof construction which is of frame covered with pitch and gravel.

The finish in the Assembly Hall is whitewood painted, and elsewhere it is of chestnut stained dark. Each class room has a bookcase and a teacher's closet. The lighting in the class rooms is semi-indirect, the heating throughout by steam, and the ventilating by the gravity system.

The total cost of the building, including grading, architect's fees and disbursements, was $74,121, and the cost per cubic foot, 17 cents.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

EACH time that any one genius has taken a revolutionary step, his followers have generally destroyed its worth. Fired by the feeling of freedom which we all possess, an architectural spirit will often break forth in a vein of originality which is believed to be better than the following of tradition. The layman, too, frequently utters a plaint demanding an American style of architecture. The idea seems to be that a national style should spring forth as though at the touch of some wizard; but no new style can come in this way and continue long enough to be of a real value.

A new style will come rather as a gradual evolution and without conscious effort if a body of experts work together upon right principles. And these principles have come to be generally recognized as: a careful application of the structural principles which has governed all great architecture, with a logical application of new methods of construction; a careful regard for the laws of nature — such as the amount of sunlight, the heat of summer, or the extreme cold of the winter; an observance of the laws of æsthetics which should govern all design as mass, rhythm, balance, and proportion; and freedom from all decoration which does not express or emphasize or refine the requirements of the problem.

It has been by rigid adherence to these principles through many years, generally centuries, that masterpieces of architecture have been evolved in various countries and in various styles, and it cannot but be believed that such will be the case in this age and in this country.

In this striving to attain a truthful expression of our national consciousness it should be remembered that while a knowledge of the past is necessary, as much or even more can be learned from our contemporaries as from our predecessors. It is by keeping the mind open to reason, by viewing the work of any one, no matter how revolutionary he may be, by grasping any truth that may be found in it and joining the strife on the side of that truth; it is thus that a body of competent persons will be formed through whom can be forwarded a real nationalism in our art.

A GREAT deal of criticism has been directed against the ornament in use to-day, so that any new thought on this subject is particularly interesting. Mr. Claude Bragdon has just published a small book entitled, "Projective Ornament," which is introduced with the statement, "In contemplating the surviving relics of any period in which the soul of a people achieved æsthetic utterance through the arts of space, it is clear that . . . in their ornament they had a form language. To-day we have no such language; . . . that we shall develop a new form language, it is impossible to doubt."

The source from which Mr. Bragdon would obtain this new form language is geometry. He has been known for many years as an investigator in the realms of mathematics and his earlier booklet, called "A Primer of Higher Space," is an exceedingly clear treatise on the fourth dimension. It is largely from fourth dimensional figures that Mr. Bragdon wishes to take the elements of a new decorative language, or rather from the projections of such figures in two dimensions.

Several of the elements seem quite mechanical and uninteresting, leaving their mathematical origin too obvious; but in the application which Mr. Bragdon has made of others, we find very striking beauty. The book is filled with charming black and white designs, which because of their variety and originality demand attention. The author advises that the student who would use projective ornament should not seek to achieve results too easily or too quickly, but first to "draw them as geometrical diagrams . . . then fill in certain spaces for the purpose of achieving contrast . . . This done, the application of color is the next step."

Here is truly a new source for ornamental design, and those who would see a new spirit in architecture and architectural ornament would do well to listen to this theory. One of the greatest points in its favor is that it is not revolutionary, not a scheme evolved from the sudden idiosyncracy of one man, but is his application of that "world order which number and geometry represent."

THE Master Builders Association of Boston has recently issued an announcement to its members concerning the new "Standard Documents" published by the American Institute of Architects. After briefly surveying the origin of these revised forms and pointing to the authoritative part played by builders in their revision, the Board of Directors add a hearty commendation of the Documents thus: "This explanation is made chiefly . . . that contractors, architects, and owners generally may know that these Documents have been drawn with the greatest care and that no contractor, architect, or owner need hesitate to make agreements based on them." Such co-operation as this between builders and architects must work for the mutual benefit of both.

It is to be hoped that other building organizations throughout the country will officially endorse the "Documents," and it should be the purpose of architects to call the matter to their attention.

THE Jury of Awards for The Friends of Young Artists has announced the thirteen successful competitors in the recent competition for the design of a private mausoleum. The first prize of $200 was awarded to B. Hoyt of New York, the second prize of $150 to John F. Harbeson of Philadelphia, and the third prize to F. L. Finlayson of New York. Ten prizes of $25 each were also awarded.

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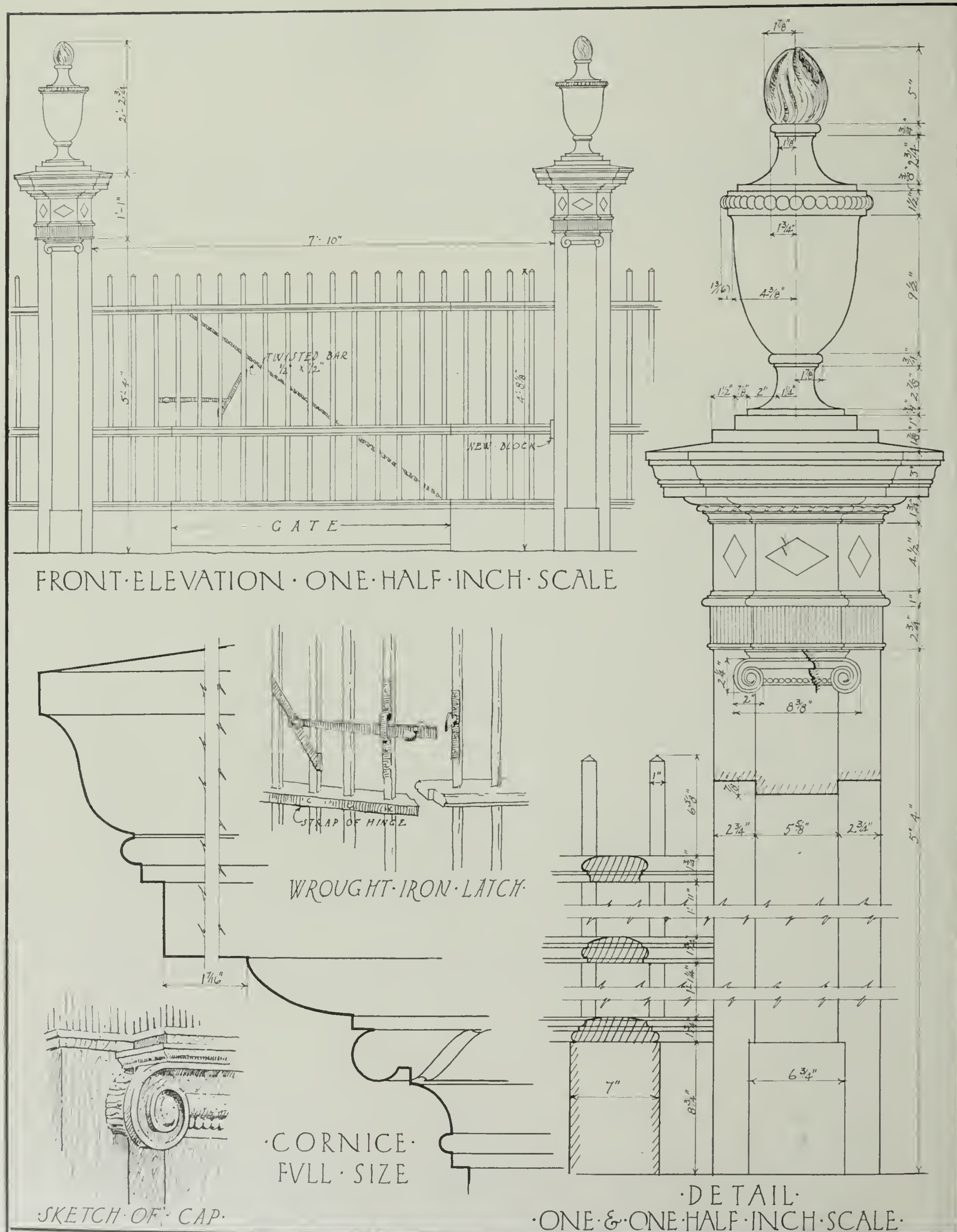
THE BRICKBVILDER COLLECTION

EARLY AMERICAN ARCHITECTURAL DETAILS

GATE AND POSTS, BALDWIN-LYMAN HOUSE, SALEM, MASS.
BUILT IN 1808

MEASURED AND DRAWN BY GORDON ROBB

Plate
Eleven



PLATE·11 NOVEMBER·1915	·GATE·BALDWIN-LYMAN·HOUSE ·DATE·1808· ·SALEM·MASS·	MEASURED·&· DRAWN·BY· GORDON·ROBB·

ENTRANCE DETAIL, ESCUELAS MENORES, SALAMANCA, SPAIN
ERECTED IN THE XVTH CENTURY

THE BRICKBVILDER

VOLUME XXIV NOVEMBER, 1915 NUMBER 11

View of Group from Nurses' Home

The Chicago Municipal Tuberculosis Sanitarium.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS.

By C. A. ERIKSON.

WE are most of us confirmed optimists, not only individually, but collectively, and it is curious how this optimism tempers our convictions. Jenner is credited with wiping out a dread disease by the discovery of the smallpox vaccine, and the discoverer of the typhoid vaccine will probably be hailed by future generations as the conqueror of typhoid. We gloss over the unpleasant fact that smallpox is a result of improper sanitation and typhoid of polluted drinking water; we forget the immense labors necessary to rectify such conditions and lay all the laurels at the feet of the discoverers of the specifics. We are all beneficiaries of the tireless workers in experimental research, but too often we consider the health departments of our various governments as interfering, niggling know-nothings, and it is rare indeed that renown awaits the leaders in preventive medicine. Prevention, however, is gradually coming into its own and we find that health departments are gaining in importance and scope; housing, sanitation, ventilation, working conditions, food, school children, all come under the watchful eye of the health departments, and how much of the comfort of our cities and towns is due to these health officers it is difficult to estimate. As we depart further from the individualistic theory of society, we shall see increased restrictions of "property rights" and "individual freedom" in order to guard the health of the community.

Considered as a part of this great movement which has as its motive the uplift of the state by means of the increased health, wealth, and happiness of the individual, the rapid decrease in the death rate from tuberculosis is extremely significant. In 1880 the death rate was 326 per 100,000 of population; in 1913 it was 146.6 — in other words, had the death rate of 1880 continued until 1913, the deaths would have been 322,000, instead of which the actual figures were 143,000, and no specific or vaccine has been discovered which has aided materially in this life saving. The rapid increase in the number of hospital and sanitaria beds accounts for some of this, but more can be attributed to the educational campaign which the National Society for the Study and Prevention of Tuberculosis has conducted with notable vigor. It has been active in the suppression of sources of infection such as the public drinking cup, promiscuous expectoration, improper ventilation, unhealthy working conditions, and insanitary housing; but its principal efforts have been directed toward the education of both physician and layman in the nature, dangers, and treatment of the disease. While the National Society no doubt recognizes that tuberculosis is a symptom of deep seated social disorders, low wages, unemployment, and low standards of living and their accompaniments, — underfeeding and long hours, — it has conserved its energies for the elimination of the greatest source of infection, the patient at home. The careless tubercular in all stages, but more particularly in the "moderately advanced" and "advanced," are a great danger to all those about them. Frequently one case infects an entire family and the dwelling, so that succeeding tenants are often infected. The surest method of removing the danger is to isolate the patient. But such isolation means a huge number of sanitaria or hospital beds; for in Chicago alone the registered cases of tuberculosis number over 10,000.

Primarily, then, we must consider the charity tuberculosis sanitaria, or hospitals, as community protective measures intended to isolate the patient and to restore him so far as is possible to a self-supporting basis. To isolate all the tubercular requires extensive additions to existing facilities and increased police power in the hands of the health authorities. With such facilities the isolation would begin in the incipient stages of the disease, and a very high percentage of the cases would soon be discharged as "cured," "apparently cured," or "disease arrested." It does not follow, as one sanitarium report claims, that the patient is restored to normal earning capacity or to a self-supporting basis.

On the contrary, the discharged patient generally goes forth with increased necessities and a stationary, if not reduced, income; and it is only the rare case where he is able to increase his income without overtaxing his strength and causing certain return of the disease.

There cannot be the slightest room for doubt as to the wisdom of providing for the tubercular as has been done, but a more intensive cultivation of existing facilities might be productive. During the convalescent stages of the disease the patient is given exercise which varies from walking to light farming, or if the institution is aiming to reduce the *per capita* costs, these patients do much of the kitchen and orderlies' work. It seems that such exercise time could easily lend itself to training, which would be of benefit to the patient upon discharge, aiding him to increase his income and meet his increased living expenses. If isolation is the sole object, mere housing is sufficient; but until some effort is put forth to educate and bring the discharged patient's income up to his expenses, the tuberculosis sanitaria are not using existing facilities to the utmost advantage either for the community or for the patient.

If some such training were offered, it would perhaps not be so difficult to keep the patient at the sanitarium until the authorities feel that he is ready to return to his work. It is not surprising that the sanitarium requirement of rest becomes irksome, in spite of good food, comfortable quarters, and fresh air, to one accustomed to the multitudinous activities and interests of a normal life. Entertainments and games of various kinds are, of course, a necessity in any institution, but hardly hold the sustained interest of the patient. Those whose attention dwells too much on their physical condition do not respond best to the treatment, but no substitute is offered them.

The tubercular can, of course, be benefited most by the early treatment of the disease, but no matter how attractive the institution may be, it is extremely difficult to induce these incipients to accept the institutional treatment. They are usually very optimistic, a "bad cold" — "No sense in going to a hospital" — is the usual plea. When they are bedridden they become sufficiently alarmed, but then the arrest of the disease is much more difficult and uncertain. Public opinion as yet will not support the forceful isolation of the incipient, especially in the case of the bread winner or the mother of a family. For the incipients, the sanitarium must invite by combining fear and comfort — fear of the future course of the disease, and comfort through attractive buildings, good treatment, and a creative interest.

During the early stages of the anti-tuberculosis propaganda it was, perhaps for strategic reasons, desirable to emphasize the cheapness with which sanitaria could be built, but this position is no longer defensible. The "shack" or "lean-to" will be "scrapped," as has its predecessor, the tent. Merely because tubercular patients as treated to-day are largely in the open air, is no excuse for building cattle shelters to house them. Many a sanitarium shack looks as if it had been built over night to care for the refugees from some stricken land. Lest the propaganda eat itself up, it would seem desirable to place more emphasis on the permanence of construction and on low maintenance costs. The enormous amounts necessary to maintain these temporary affairs until they burn down might better be expended on the maintenance of patients. The improvement in construction and appearance of these cottages will do much toward eliminating that most expensive type of sanitaria patient — the one who doesn't stay until discharged, but lives to return another day.

At the Chicago Municipal Sanitarium, the buildings are all of permanent construction, except the cottages. In these, however, precedent seems to have been overpowering as to the method of construction, but not as to detail. It is a relief after viewing the typical sanitarium with its many hovels to visit this great charity institution; others have the advantage of location, but there is none better prepared to fulfil its purpose.

There is nothing of a temporary nature to be seen; the cattle shelter primitiveness is missing and in its stead one feels the strength and seriousness of the group. The red brick buildings with the overhanging roofs of purple and red tiles, the gleaming white cottages, the gay tile panels, the winding roads, the green of the clipped lawns and of the bushes, the sparkle of gay flowers, with a soaring water tower dominating the whole and emphasizing the ease and snugness of its fellow-buildings — all this seems to smack more of the well ordered life of leisure than of the giant institution. It is probably in this phase of the designing more than in any other that the architects were most successful. They have let their fancy play over the buildings until each has its distinct individuality, the whole unified by a dominating idea. In the very free rendition of their precedent they have occasionally wandered far afield, but architecture is a living growth that responds to loving care rather than scientific archæology.

At the risk of seeming heretical, it must be said the greatest curse of an institution is to look like one. An institution of numerous buildings should have family resemblances, but there need not be twins, triplets, or even brothers — first cousins are close enough. With a family of thirty-two buildings, it is not at all surprising to find an occasional one with unbuckled shoe or "frumpled" hair. The planting of the grounds has received much attention and with proper care the group will improve immensely with the years.

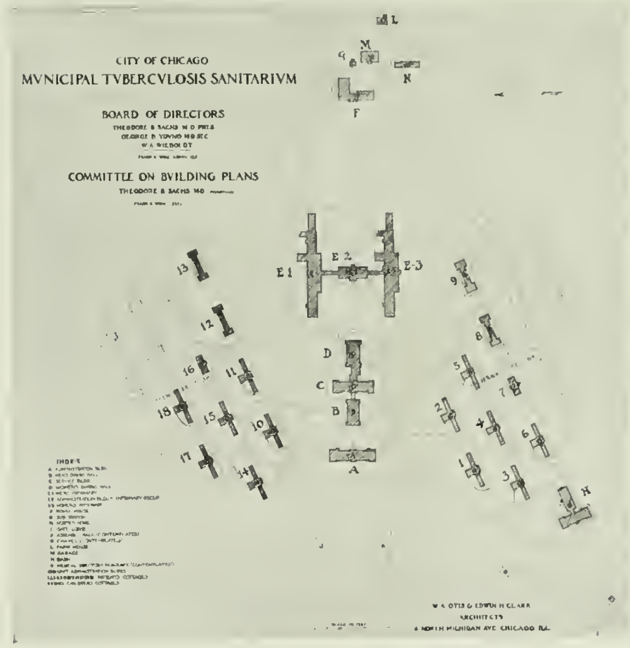
In Chicago, a rise in grade of 6 feet makes a "heights" and 3 feet a "hill" to the imagination of a "subdivider." On 160 acres of such "flap-jack" topography, on the northwest side of the city, is the Municipal Sanitarium. This is only one, although the principal one, of the activities of the Sanitarium Board. Here the Board intends to house only the "incipient" and "moderately-advanced" cases; for Cook county, covering practically the same area as the city, maintains 880 beds for all classes of patients, but mainly for those "far advanced." When the Municipal Sanitarium is completed (probably within the next year), the total number of publicly supported beds will be 1,751. Ten years ago there were but about 200 beds in the county, including 50 in private sanitaria; to-day there are 2,300.

The main approach is from the southwest corner, by the small lodge, nurses' home, and women's cottages to the administration building. Directly east of the administration building are the dining halls and service building; beyond these are the infirmary, the receiving and advanced case group; at the extreme eastern limits of the property is the power house, and beyond it the substation and farm buildings. North of this center group of buildings are the men's cottages, south of it the women's. The central portion, consisting of the administration and service buildings, thus effectually separates the sexes ; this division is emphasized by the pipe tunnel which projects about 4 feet above the ground and is surmounted by an iron rail.

A noteworthy item in the plan is the realization of magnificent distances. The cottages are 100 feet back to back, 100 feet end to end and staggered, giving each the maximum view, while from the administration building to the power house is approximately 1,600 feet.

The Sanitarium Board maintains free dispensaries at numerous points in the city. These are the feeders which supply the Sanitarium. After a dispensary examination proves the patient to be tubercular, he is sent to the Sanitarium and is admitted to the Infirmary group. This group serves a triple purpose : first, it is the receiving department, where patients are received, examined, and diagnosed ; second, a corollary of the first, they are here prepared for life in the cottages, and they are still further studied and classified ; third, it is a hospital for the few advanced cases which may develop in the institution. It is a complete hospital, needing only a few auxiliaries to make it an independent unit. There are three buildings in this group, — the men's building, the women's building, and the administration building.

Gate Lodge and Main Entrance to Grounds



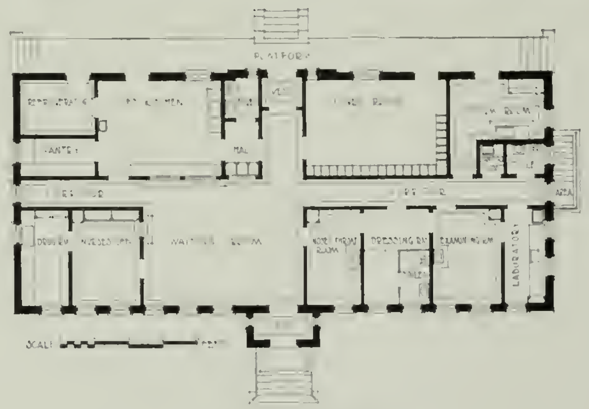
A Administration Building.
B Men's Dining Hall.
C Service Building.
D Women's Dining Hall.
E-1 Men's Infirmary.
E-2 Administration Building — Infirmary Group.
E-3 Women's Infirmary.
F Power House.
G Substation.
H Nurses' Home.
I Gate Lodge.
J Assembly Hall (Contemplated).
K Chapel (Contemplated).
L Farm House.
M Garage.
N Barn.
O Medical Doctors' Residence (Contemplated).
7, 16 Unit Administration Buildings.
1, 2, 3, 4, 5, 6, 10, 11, 14, 15, 17, 18 Patients' Cottages.
8, 9, 12, 13 Children's Cottages.

Block Plan

In the administration building the absence of the usual receiving bath is to be noted, the patient being permitted to bathe himself. There is a laboratory, nose and throat treatment room, X-ray room, drug room, and various offices for routine work, with an autopsy room and morgue in the basement. There is also a very small operating department for such minor operations as may be necessary. Adjoining the operating department there is a room for casts, which will be used in tuberculosis of the bones, and a surgical dressing room. On the second floor are the living quarters of a portion of the medical staff and a small apartment for the chief of this division.

A description of the men's building will suffice for both men's and women's buildings. There are three classes of rooms here : first, the

Bird's-Eye View from the West Showing Completed Group single rooms for the receiving of patients, for the advanced cases, for those who are annoying to other patients either by cough or other reasons, and for those whose mental condition demand it; second, the two-bed rooms for those who respond better to treatment with a companion; third, the six-bed porches which with their auxiliary rooms are the preparatory step for life in the cottages, giving the patient the advantages of the cottages but with greater protection against the elements and better nursing supervision. The one- and two-bed rooms have large windows, but in addition there is an open-air porch of the cottage type at the east end to which either ambulatory or bed patients may be brought. Each floor has the usual dependencies such as utility, toilet and nurses' rooms, and serving pantries. There is also a three-bed isolation unit in the northeast corner of the first floor. In the women's building an added feature of great experimental interest is the maternity department. The pregnant tubercular women will be cared for with all the special provisions of a maternity hospital plus those of a tuberculosis sanitarium. The adjacent nursery is provided for infants born in the institution as well as for those which are brought in with their mothers. These buildings are hospital buildings in all their details. Each room has a terrazzo floor and coved base, rounded corners, flush panel doors, and especially to be noted are the lavatories in each room. All of the windows to the rooms are casements swinging inward with a hinged transom at the top. This type of window was adopted after a great deal of study because it gives the largest opening with the greatest flexibility. On the six-bed porches a triple hung window was used. The typical cottage openings were used on the south side of the large easterly porches.



Unit Administration Building

When the patient has improved sufficiently, he is sent from the Infirmary to the cottages. Here he is hardly a hospital patient except for the strict regimen. He lives almost entirely in the open, visits the doctors in the unit administration building for his periodic examination, dines at the general dining hall, works on the farm occasionally, and roams all over the grounds when permitted.

With such patients as these the mere physical care is an easy matter; a cattle shed, with a wood floor and open to the south, and a stove-heated dressing room is sufficient to care for the actual housing of the patient; but with the duration of the treatment in mind, as was pointed out above, more than mere housing is necessary. How to make life so attractive that the patients will continue in the expert care of the institution until such time as they are discharged, is the problem. Unfortunately the cottages are of wood frame, plastered, apparently for reasons of economy in construction. In plan they do not vary a great deal from the accepted type of "shack" — a central living and locker room, flanked by sleeping porches. The sleeping porches are of the usual open type. The cottages are alike except for the living room, one-half being of the type with the bay, the other half without the bay.

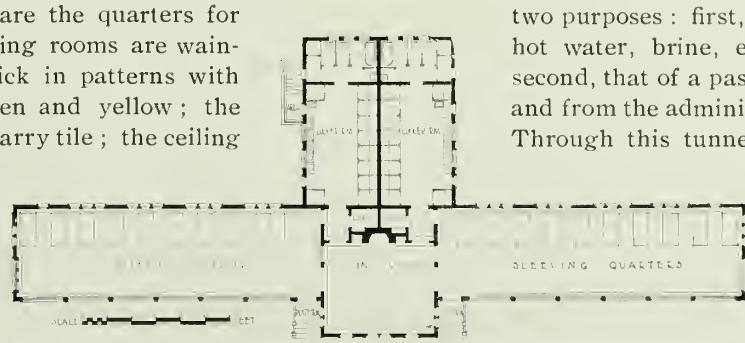
It is to be noted that the locker room can be entered both from the living room and from the porches. Between the living room and locker rooms are the linen and blanket rooms, where a large amount of extra covering is always kept on hand for immediate distribution when the temperature drops suddenly. Back of the living room are two dressing rooms for ten patients each. Here each patient has a private dressing booth, and for each two there is a lavatory, and for each ten a dental lavatory. Back of the locker rooms are the toilet rooms, each with two water closets, one bath and one shower, and one janitor's closet. Thus it will be seen that while each cottage cares for twenty, each group of ten is practically a distinct unit. These groups of ten need not intermingle except during the short interval when they are permitted the use of the common sitting room; at other times it is a matter of individual selection.

Of the total cottage population of six hundred, two hundred are children, which is an unusually large proportion. The sanitarium authorities were not timorous in dealing with this branch of the problem and have made the cottages for the children differ in plan quite materially from those for adults. The porch is for twenty-five beds and under the watchful eye of the nurse constantly. The two locker rooms are equipped with smaller lockers; the living room has been omitted and a schoolroom takes its place.

The headquarters of the medical and nursing staff for each cottage group is in the unit administration building. Here the periodic examinations and treatments occur. It is also the distributing center for the light lunches, drugs, and patients' personal linen, and there is consequently a large waiting room. In one corner of the building is the sputum preparation room. Here the sputum is treated and then carted to an incinerator in the power house, where it is burned.

Under the present system of treating tubercular patients, their food is of the utmost importance. Not only their food, but its preparation and presentation, for it hardly needs repeating that we eat with our eyes. The service building and dining halls are prepared to do both, and whether they do or not depends on the effectiveness with which they are used. From the kitchen, service extends in five directions: west to the men's dining hall; east to the women's dining hall and physicians' dining room; north to the help's dining room; south to the staff dining room, and down and east to the infirmary group. Grouped around the kitchen are the usual dependencies, while for each of the smaller dining rooms there is an adjoining service room. The supplies are brought into the building through the basement, where there are the main storerooms and the refrigerators. Under the employees' dining room is a recreation room for employees, while under each of the main dining rooms are large coat rooms — a necessity in winter for the much clothed patients. Dumb waiters convey the prepared food to the basement, where it is loaded into food carriages and brought to the infirmary buildings through the tunnels. Temporarily the dining halls are serving a double purpose — recreation and dining. In the men's building there is a balcony at one end with connections for a motion picture machine. In the second story of the kitchen wing are the quarters for the women help. The dining rooms are wainscoted with light gray brick in patterns with special tile inserts of green and yellow; the floors are of 6 by 6 inch quarry tile; the ceiling is of plaster — truly a most inviting place. The admirable location of the service building, the hub of the institution, should be noted.

Children's Open-Air Cottage



Adults' Open-Air Cottage

West of the service building is the administration building, whose purpose does not belie its name. The richness of the vestibule and lobby impresses one sufficiently even for such a great institution as this. To the south of this lobby are the business offices, board room, head nurse's office, conference room, and dentist's office. To the north is the medical administration, consisting of the medical director's office, record room, nose and throat room, X-ray rooms, pharmacy, main laboratories and doctors' offices, and examination rooms. On the second floor are the quarters for the physician and staff.

The power house at the extreme east end of the grounds seems unusually distant from the buildings. It is L-shaped with the boiler room to the south, the water tower to the north of the boiler room, and north and west of the tower, the engine room. There are three 175 horse-power boilers of the automatic stoking type. A 25-ton ice machine, pumps for various purposes, and a large generator for emergencies and hot water heater fill the engine room. South of the boiler room with a separate exterior entrance is the garbage crematory. The burner is set in the basement floor, and the garbage is brought in at grade, the intention being to dump the garbage directly into the burner from the platform. Over the engine room is a completely equipped laundry, which shows evidence of a careful study of the laundry travel. In the first floor of the tower is the chief engineer's office. The second and third floors of the tower and the second floor of the laundry house the male employees. Near by is a large garage, stables, and farmers' home.

At the southwest corner of the power house the tunnel, or, more properly speaking, connecting corridor, begins. This corridor is 7 feet wide, 9 feet high, and serves two purposes: first, that of supplying heat and hot water, brine, etc., to all buildings; and second, that of a passageway between buildings and from the administration to the power house. Through this tunnel supplies can be carried, and food is conveyed from the kitchen to the infirmary dining rooms. The tunnels are light and airy and surely cost very little more than the minimum expenditure necessary for heating pipes. From the north and south ends of the service building the cottages and nurses' home are supplied with heat and water through split tile conduits.

Some of the discharged patients will be offered positions in the institution, and considerable provision is made for this class of help. The male help is housed on the second floor of the power house; the female help on the second floor of the service building. In the male quarters there are five beds on porches; in the female there are sixteen beds on porches. The porches with the adjoining locker rooms are similar to those in the patients' cottages, except that they are divided by partitions 6 feet high into two-bed cubicles, and that the square foot allowance per bed is considerably less than for those of the patients.

Near the entrance to the grounds, and far enough away from the cottages so that merry-making will not annoy the patients, is the nurses' home. The nurses are graduates, and an absence of class rooms will be noted. The occasional lectures will be held either in the living room or in the nurses' consultation room of the administration building. The home has much that is to be commended: the ample living room and recreation room space, the open-air porches and the work room, the washstands in each room. There can be no doubt, however, but that single rooms should have been provided for each nurse, which would have appealed to a better grade of applicants and have resulted in a more contented and consequently more efficient nursing staff. The absence of a few small reception rooms for the entertainment of visitors will be felt. The usual locker rooms off of the sleeping porches are absent, as it is intended that nurses who have beds on the porches should be housed in the two-bed rooms, one nurse sleeping in the room, the other on the porch.

Interior of Men's Dining Hall

The institution as it is at present is not completed. The directors expect to proceed at once with the erection of four open-air cottages for male adults, four for female adults, two for male children and two for female children, of the type already built, and a home for the medical director. The plans also contemplate a recreation hall and a chapel, both to be developed after the needs of the institution are more fully understood. A few farm buildings are now in the course of erection.

The city of Chicago is to be congratulated on having a Tuberculosis Sanitarium Board with the courage and breadth of vision to cast aside many of the niggardly precedents of the charity tuberculosis sanitaria and give its patients accommodations equal in every respect, and superior in many, to the highest type of private sanitaria. There need be no fear that the Board which built the institution so well will permit the management of it to be on any lower plane. It was paid for from the proceeds of taxes levied for this purpose, and the continuation of these taxes will be ample for the support of its manifold activities. As an example of true economy in the erection of buildings of this type, the Chicago Municipal Tuberculosis Sanitarium merits the closest study.

TABULATION OF BED CAPACITY.

PATIENTS' BEDS.

	Male	Female	Total	Total
Infirmary Group				
1-bed rooms	35	33	68	
2-bed rooms	46	42	88	
6-bed porches	48	48	96	
1-bed rooms (isolation)	3	3	6	
1-bed wards (confinement), nursery		1	1	
Total	132	127		259
Open Air Cottages at present				
Adults' cottages, 20 beds per cottage	120	120	240	
Children's cottages, 25 beds per cottage	50	50	100	
Total	170	170		340
Open Air Cottages to be Erected in Immediate Future				
Adults' cottages, 20 beds per cottage	80	80	160	
Children's cottages, 25 beds per cottage	50	50	100	
Total	130	130		260

STAFF NURSES' AND HELP'S BEDS

Staff Beds			
Main Administration Building, Medical Director's Suite			
2 bedrooms and 1 living room	1		
Bedrooms including guest room	15		
Total		16	
Infirmary Administration Building			
1 suite of 5 rooms	1		
Bedrooms	7		
Total		8	
Total for staff			24
Nurses' Home			
Head nurse's suite		1	
1-bed rooms		15	
2-bed rooms		40	
Total			56

Of these, 18 have porch beds on 3 porches.

Female Help (Service Building)			
Housekeeper's suite		1	
2-bed rooms		22	
8-bed porches with locker rooms adjacent		16	
Total			39
Male Help (Power House)			
1-bed rooms		6	
2-bed rooms		16	
Porch with locker rooms adjacent		5	
Total			27

Total patients' beds at present	302	297	599
Total patients' beds in immediate future	432	427	859
Total beds for staff nurses and help			146
Total beds provided for all purposes			745
Total beds provided upon completion of group			1005

COST OF BUILDINGS WITHOUT ARCHITECTS' FEES.

Power House	$163,903.20	
Service Building and Substation	227,202.13	
Administration Building	89,655.80	
Nurses' Home	88,612.30	
2-Unit Administration Buildings	33,420.61	
12 Adults' Cottages	173,581.04	
4 Children's Cottages	62,185.80	
Infirmary Group	612,704.30	
General		
Water Supply Sewers, Transmission Lines, and Tunnels	162,645.51	
Total		$1,613,910.69
Cost per patients' beds (599)		$2,694.34
Cost per bed (inclusive of staff, etc.) (745 beds)		2,166.32

To complete the institution an expenditure of about $180,000 will be necessary to build eight adults' and four children's cottages, thus bringing the total up to about $1,794,000.

In *completed institution* (without recreation hall, chapel, medical director's residence, or buildings mentioned above),

The cost per patient's bed (859) would be	$2,084.63
The cost per bed (inclusive of staff, etc.) (1005) would be	1,785.07

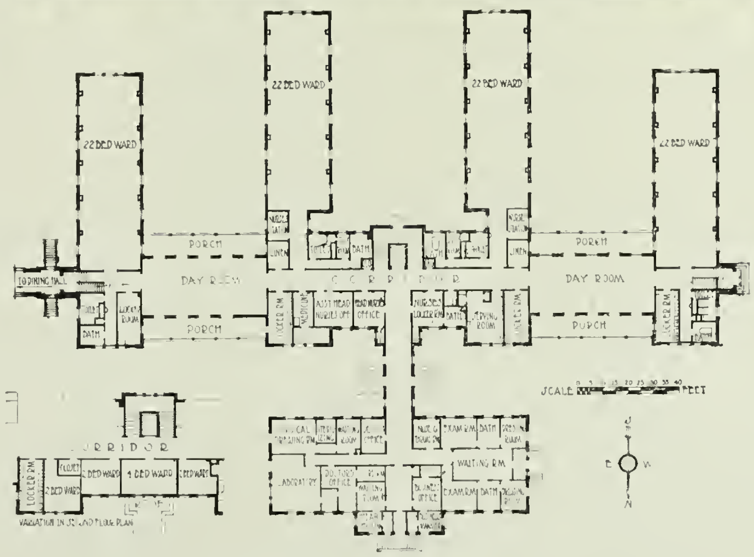
The Cook County Tuberculosis Colony at Oak Forest, Ill.

HOLABIRD & ROCHE, ARCHITECTS FOR EARLY WORK.
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS FOR LATER WORK.

By C. A. ERIKSON.

NONE but the illiterate have escaped the reams that have been written about the woful inefficiency of our governments, — national, state, county, city, town, and village. Nor could one escape the endless discussions as to how it should be improved; numerous devices for increasing efficiency, from the initiative and referendum to a strongly centralized government, have been suggested and many of them tried. Out of the entire discussion one fact rises clearly and distinctly to mind, — we have outgrown our swaddling clothes, the political forms saddled upon us by a previous generation. We have developed by adding and patching until we cannot find the original garment. The City Club of Chicago in a recent pamphlet gave a list of the independent or semi-independent taxing or governing bodies in Chicago; the number is about fifteen. Illinois has grown very rapidly, but it is nevertheless surprising to find two independent governing bodies performing similar services for the same community. Chicago and its suburbs comprise the whole of Cook county and fully 90 per cent of the residents of Cook county either live in Chicago or obtain their livelihood there. Originally the county was charged with the maintenance of all hospitals, but as the demands for increased facilities grew, the city stepped into the field. Through its Health Department it is building a large contagious disease hospital; while through a semi-independent body known as the Municipal Tuberculosis Sanitarium Board it has built a magnificent sanitarium for the tubercular. The county, however, still maintains hospitals for both of these classes. Dire necessity is the only excuse that can be offered for this duplication,— a perfect example of the patching policy.

For years before the people of the city voted to tax themselves liberally to fight tuberculosis, the county had maintained two hospitals for the care of the tubercular. The one at Oak Forest, until the fall of 1914, and its predecessor at Dunning were never much more than lodging houses. This was true not because there were inherent defects but because of the totally inadequate staff, consisting of one physician and ten nurses, no graduates, for a population which ran as high as 375. A curious spectacle this: a community building a $2,000,000 institution to fight tuberculosis with one hand, while the other withholds even the necessary personnel for an existing institution for the same purpose.



Original Hospital — View from Southeast

The Sanitarium Board is magnificently prepared to fulfil its purpose, but the County Board has no such singleness of aim. To them tuberculosis is but one of many forms of distress for which they must care. The simplest way has been to hitch the tubercular to existing institutions, and this has always been done. It is not objectionable when the original institution is a hospital of adequate staff and good repute, but when it is the poor farm, the objections are insurmountable. Statistics show quite clearly that the chances for improvement are very much greater, and the duration of treatment much shorter if the tubercular receive sanitarium treatment in the early stages of the disease — an advantage both to the community and to the afflicted. But the incipient tubercular usually will not accept treatment at the poor house, and no amount of juggling with names, or talk of "false pride," will change this basic condition. For this reason a tuberculosis sanitarium attached to a county poor house can never be anything but an advanced case hospital, valuable largely because of its effectiveness for isolation.

The Oak Forest Tuberculosis Colony is an integral part of the Oak Forest Infirmary, and it is only in a paper that we can consider it as a separate entity. The Tuberculosis Colony is complete in itself except in the fundamentals such as heating, lighting, storage, baking, and morgue service. In the plans of the original infirmary group as prepared by Holabird & Roche, no great increase in this division of the infirmary was contemplated. But with the spread of the anti-tuberculosis propaganda, the pressure finally became great enough to necessitate an increase in the number of charity tuberculosis sanitaria beds in the county, notwithstanding the prospective opening of the 600 beds at the City Sanitarium; and therefore, despite the grave objections to the combination of the poor house and the tuberculosis sanitarium, large additions were planned to the tuberculosis division.

Corridor Connecting Old Hospital and New Dining Hall

The original building, illustrating fully the usual method of caring for patients, was built in a small grove of trees on the highest part of the farm. It is of the pavilion type, with four ward wings whose axes run due north and south. At the north ends of the wards are the usual dependencies. Between each pair of wards the east and west corridor has been expanded into a day room, with a porch to the south and another to the north. To the north, in a one-story wing, was the dining room and kitchen, etc. The large wards contain twenty-two beds and there are in addition four two-bed wards and one four-bed ward. The wards allow $88\frac{1}{3}$ square feet and 1,150 cubic feet per bed. Open-air sleeping, or treatment, is impossible except by wards. The relative sizes of serving rooms and dining room would indicate that it was intended for ambulatory cases — in other words, the incipient or moderately-advanced. A tubercular patient, even when far-advanced, is often able to go to a dining room, but usually is not permitted to do so where the medical supervision is capable.

Detail of Corner Pavilion of Corridor

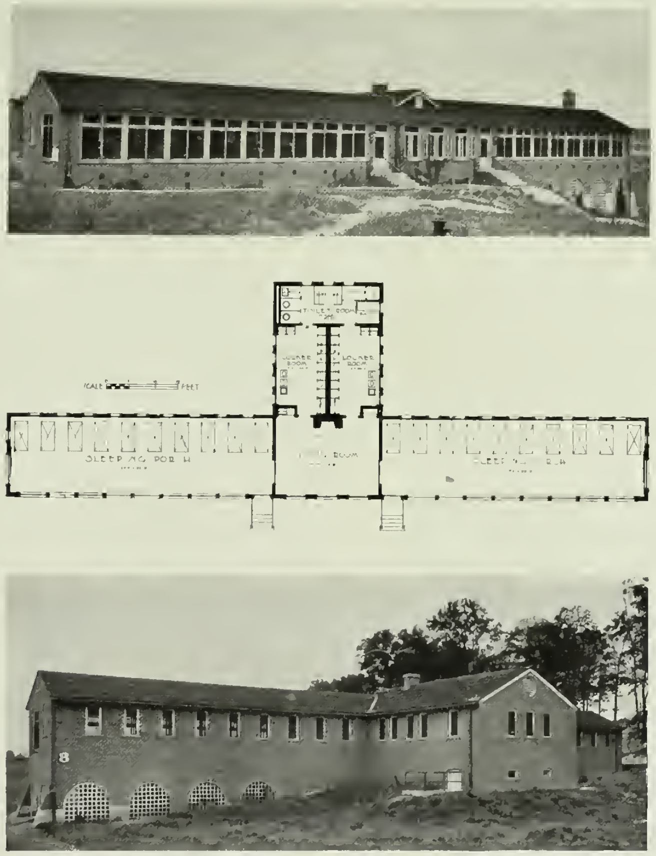
Sleeping Porch of Open-air Cottage

The building was never large enough for the demands, and misguided zealots erected eighty tents to the east of the building. These tents each housed only one patient and for that reason were very popular. The much-needed privacy afforded by the tents was of great importance in many cases, but in spite of this they were a complete failure. Such tents are, of course, only fitted for the very ablest of the patients, and then only under the most careful supervision, for the vigorous regimen of the hospital is not lightly borne.

In 1914 Richard E. Schmidt, Garden & Martin planned the Tuberculosis Colony and erected the first buildings of this new group. The colony will ultimately contain about 1,400 beds, of which 370 will be in cottages and 1,030 in hospital buildings. The original building was used as a base for the new colony and three additional hospital buildings planned: one due east, one due south, and one east of the south hospital building. These hospital buildings are to be connected by corridors, and at a central point on this corridor is the dining hall, easily accessible to hospitals as well as to cottage patients. To the south of the hospital group are the cottages, facing southeast, twelve for men and seven for women and children. No provision is made on the block plan for recreation or chapels, both of importance for the patients' mental well-being and rest. The infirmary already has two chapels, but it probably will be found desirable to build another for the tubercular patients. No attempt is made to provide facilities for vocational studies which would seem to be so necessary to the permanent arrest of the disease in many of the patients. The compact grouping of the hospital buildings around the dining hall is extremely desirable both from the standpoint of operating efficiency and of ease of access by the patients.

The kitchen wing of the original building was remodeled to act as the receiving department and as the administrative center for the group. Here, too, are to be found adequate laboratory space, a surgical dressing room, nose and throat treatment room, dentist's office, and doctors' offices. In the main building the serving pantries were considerably enlarged to be adequate for the care of the bed-ridden patients. The wards of the existing building, while too large to be the ideal observation ward, will be used for that purpose.

The new Tuberculosis Hospital is approximately 200 feet south of the old building. It is $\sqcup$-shaped, with the open side to the south. This building contrasts sharply with the older building. The treatment of tuberculosis in the advanced stages is of considerable duration and, for this reason, the size of the ward is of great importance. One of the gravest problems before the administrators of tuberculosis sanitaria is how to keep the patient until he is fit to go home. Usually when the patient fattens up a little, he begins to think of home ; or if he does not improve as rapidly as he feels he should, he wants to try another institution with the result, in the first case, that he usually returns to the institution in a more serious condition than when he entered it ; and in the second, that he usually expends his precious energies in getting adjusted. Every day and dollar spent on the care of patients who leave their sanitaria before discharged, is usually time and money wasted. The neurasthenic is not alone in objecting to the large ward; subconsciously, probably all patients object to it. In the acute disease hospitals, twenty to thirty beds in a ward are far from ideal, though the duration of treatment is comparatively short ; and even here, in crises, the patient is removed to a one-, two-, or four-bed ward. Except in the terminal stages, the tubercular patient is acutely conscious of all that goes on, and extremely sensitive to all disturbances ; coughing by one patient often creates an epidemic of coughing, and irritability is daily increased by the constant and intimate association with others. This, the psychological factor, is of the utmost importance and has received full consideration in this building. If a "lowest possible cost" is a desideratum, the small ward is out of mind ; but if the institution is to do most efficiently what it sets out to do, there can be little doubt as to the relative value of the small wards.



Typical Open-air Cottage

Of the 210 beds in this building, 40 beds, or 19½ per cent, are in 10 four-bed wards ; 64 beds, or 30½ per cent, are in 16 four-bed porches ; 18 beds, or 8½ per cent, are in 6 three-bed wards ; 56 beds, or 26½ per cent, are in 28 two-bed wards ; 32 beds, or 15 per cent, are in 32 one-bed wards. Approximately 50 per cent of the beds are in two- or one-bed wards. The two-bed ward has many evident advantages over the one-bed ward and for that reason predominates in numbers. Each wing has a large glazed porch to which bed patients may be wheeled, or where the ambulatory patients may rest. In the center of the south frontage there is a large sitting room, the local amusement center. The usual dependencies are furnished on each floor. There is a considerable difference in the level of ground between the old building and the new, so that the corridor which leaves the old building on a level with the first floor enters the new one at the second floor. The administrative offices for this unit, on the second floor, yet accessible from the first without passing into the main corridor, include doctor's office, nose and throat treatment room, examination room, small laboratory, and head nurses' office. The four-bed porches are of great interest. They are arranged so that there is a common dressing room for each pair of porches. The four beds are further subdivided by a two-inch plaster partition approximately 7 feet high and projecting 7 feet from the corridor wall forming cubicles, a feature giving desirable additional privacy. The porches have casements and transoms almost their entire width. They are not heated but are well protected from the elements. Each sleeping porch is 20′ 6″ x 14′ 0″, which gives 71¾ square feet per bed—a small allowance were it not for the method of treatment, which makes this a training course for the rigors of the cottages. The dressing rooms are quite small but sufficiently large for the purpose. Each patient has a "built-in" steel locker 1′ 6″ x 2′ 0″ and 6′ 6″ high, with a drawer and shelf; here he keeps his immediate necessities and wearing apparel. The four-bed wards allow 89 square feet per bed and 934 cubic feet. The two-bed wards are approximately 12′ x 14′, or 84 square feet per bed and 882 cubic feet. The one-bed wards are 8′ x 14′, an allowance of 112 square feet and 1,176 cubic feet per bed. In the general wash rooms there are 28 wash basins, one to 7½ patients, and six dental lavatories, six tubs, and six showers, one tub or shower to 17½. In separate rooms there are 20 water closets, one to 10½ patients.

The third group of patients is housed in the cottages to the south of the new tuberculosis hospital. Advantage was taken of the topography so that practically all have an unobstructed outlook. The women and children are to be housed in the west group, and the men in the east group, divided by a 200-foot avenue. Unfortunately no planting or terracing has been done so that the cottage surroundings bear a close resemblance to a four-day beard, unkempt and scrawny. With a few exceptions, the cottages follow the accepted type rather closely — a central living and dressing room section flanked by two ten-bed porches. In many of the details, however, these cottages are a vast improvement over the usual type. They are of masonry with a fireproof floor and wood roof. The porches are faced with brick on the inside, and instead of the open rafters, the ceilings are plastered, a point which no doubt will be of great value during the hot summer days and nights. The two dressing rooms contain ten steel lockers, one for each patient, and a linen or blanket cabinet, two wash basins, and a dental lavatory. Back of the dressing room is the toilet room, containing two water closets, one janitor's slop sink, one shower and one bathtub, and a supply room. The details are all of the most sanitary construction. The extreme simplicity and directness of the plan and elevation is much to be commended.

Medical men will often agree on the housing of patients, but on the feeding they have a merry war. Whether a patient should or should not "stuff" is of slight importance to the architects. They must be fed, and everything needed for the appetizing and cleanly service must be supplied. "Appetizing service" means more than merely providing the necessary mechanics of such service. It is not enough that the pot sink be ample in size, or that the steam kettles be properly vented, or that the food preparation be so planned that it can be done efficiently. To the "ultimate consumer," the patient, the food has but one aspect, that of its service; and yet "Ritz" service and quality in a cheap "hash house" would never equal in palatability "Ritz" service in a "Ritz" dining room. Our institutions cannot have "Ritz" dining rooms, but at least they can have light, airy, pleasant ones, with some architectural distinction. Such a dining hall is the new one in this group. Situated about midway between the old hospital and the new, it is ideally located to care for all ambulatory cases from both hospitals and for the cottage patients. The corridor connecting the two hospitals passes west of the dining hall. At the center of the building, there are toilet room facilities for both sexes and a stairway to the basement floor. The dining halls for patients are all on the first floor level of the old hospital, and on the second floor level of the new hospital. The topography permitted the use of the basement which is entirely above ground (except at the north end) for kitchens and its dependencies. The cottage patients enter the building at the extreme south end of the corridor in the ground floor and hang their wraps in coat rooms provided near the central stairway. From the kitchen food is sent up to the first floor serving room in dumb waiters and to the hospital buildings on food carts, where it is distributed from the central serving rooms. The dining rooms are unique in plan and scope. The central serving room serves a dining room to the north and one to the south. These rooms are cheerful and attractive, with large arched windows on two sides and clerestory windows on a third side. At the end of each dining hall a low partition divides the hall into three distinct parts. This should prove to be a feature of great value in aiding the administration to segregate patients into classes as their condition demands, and yet allowing each dining room to be used in its entirety if so desired.

Interior of South Dining Room

The original tuberculosis ward building follows the type of design set by the infirmary group very closely, but it is fortunate that in beginning the extensive additions to the Tuberculosis Colony it was deemed wise, from the practical as well as the æsthetic point of view, to deviate from the earlier design.

While both the old buildings and the newer ones are based on similar precedent, the later group has an individuality that is somewhat lacking in the other. The Georgian is a particularly apt style for an institutional group, for it permits of the utmost simplicity in outline, with great possibilities for naive and interesting details.

In mass the dining hall is by far the most important building, dominating the entire group with a pleasant insistence. The brickwork, with its limestone trimmings, is enlivened by the use of a diagonal English bond. The new hospital building, while very much larger in area, logically is much less important in the composition. There is in it, however, the same individuality and grace which is so evident in the dining hall. The cottages are the essence of simplicity; the red brick walls and large openings constitute the entire design, and yet due to the site they form a very picturesque group.

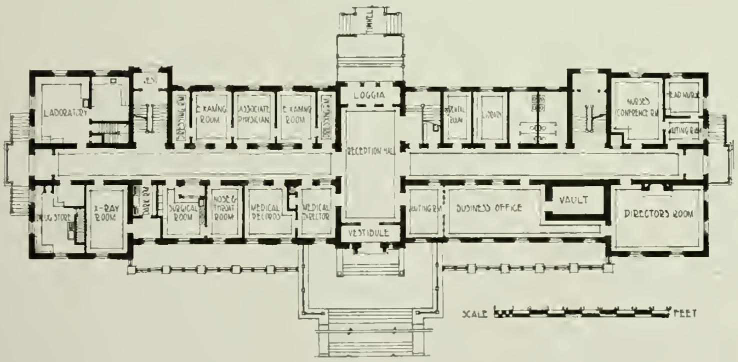
The architects for the later work have not alone added to the usefulness of the institution, but they have also accomplished that difficult task of adding to and increasing the beauty of the group without a line of demarcation between the old and the new work.

BED CAPACITY.

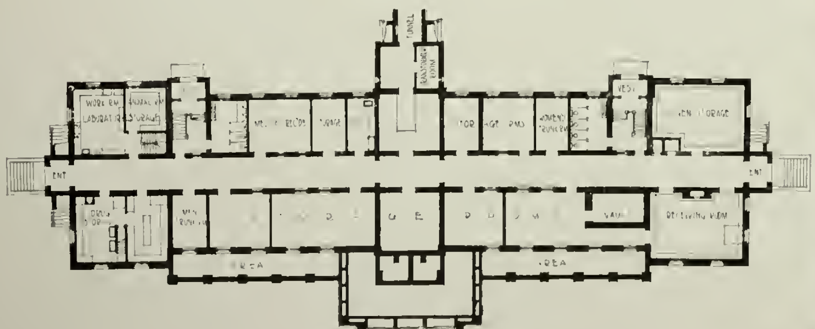
Original Building, Holabird & Roche, Architects, 1910-11			
8 22-bed wards, per bed, 88 1/3 sq. ft., 1150 cu. ft.	176		
1 4-bed ward	4		
4 2-bed wards	8		
		188	
Second Group, Schmidt, Garden & Martin, Architects, 1913-14			
8 Cottages; each has 2 10-bed porches, 59′ x 17′		160	
New Hospital			
10 4-bed wards, per bed, 89 sq. ft. 934 cu. ft.	40		
16 4-bed porches, porch 20′ x 14′	64		
6 3-bed wards	18		
28 2-bed wards, 12′ x 14′	56		
32 1-bed wards, 8′ x 14′	32		
		210	
Total			558

VIEW FROM SOUTHEAST

SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

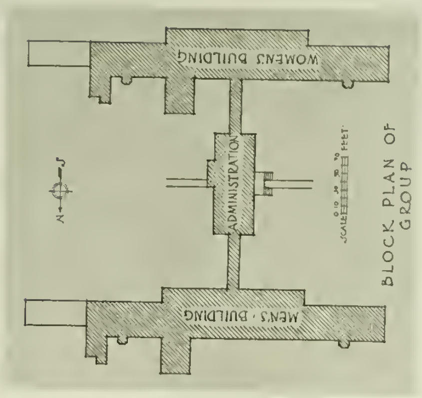
DETAIL OF LOGGIA

ADMINISTRATION BUILDING, MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

WOMEN'S BUILDING

ADMINISTRATION BUILDING



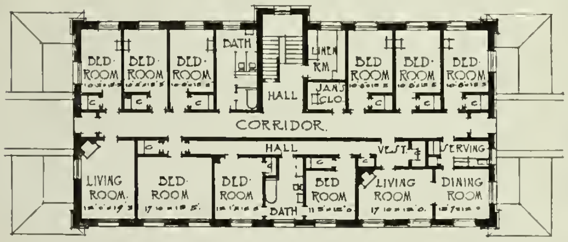
ADMINISTRATION BUILDING

MEN'S BUILDING

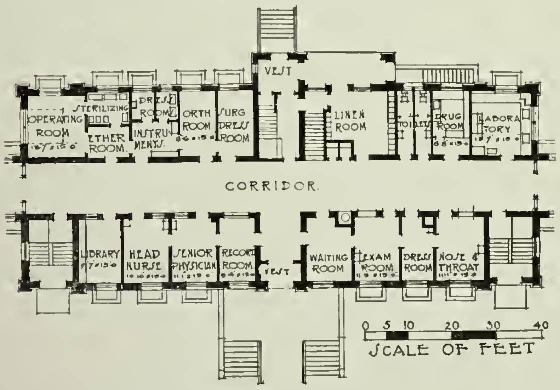
INFIRMARY GROUP, MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

VIEW OF ENTRANCE FRONT



SECOND FLOOR PLAN



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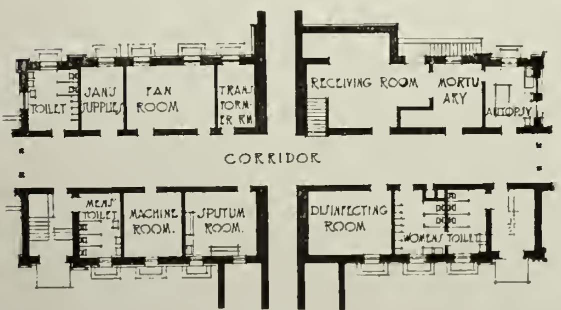


BASEMENT FLOOR PLAN

DETAIL OF DOORWAY

ADMINISTRATION BUILDING OF INFIRMARY GROUP, MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

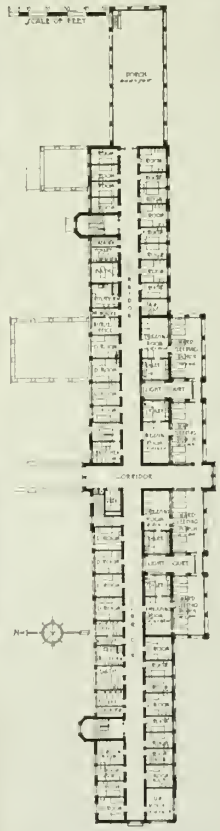
ADMINISTRATION BUILDING

MEN'S BUILDING

FIRST FLOOR PLAN
WOMEN'S BUILDING

WOMEN'S BUILDING FROM NORTHWEST

PLANS OF MEN'S BUILDING SIMILAR TO THOSE OF WOMEN'S BUILDING



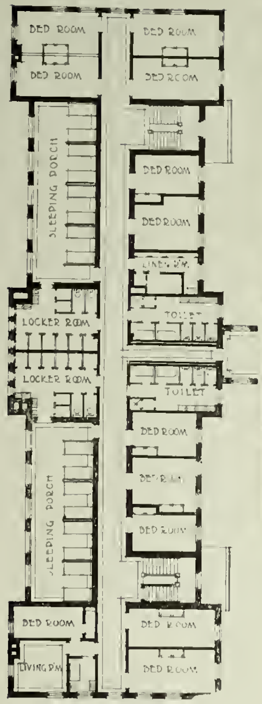
SECOND FLOOR PLAN
WOMEN'S BUILDING

WOMEN'S BUILDING FROM SOUTHEAST

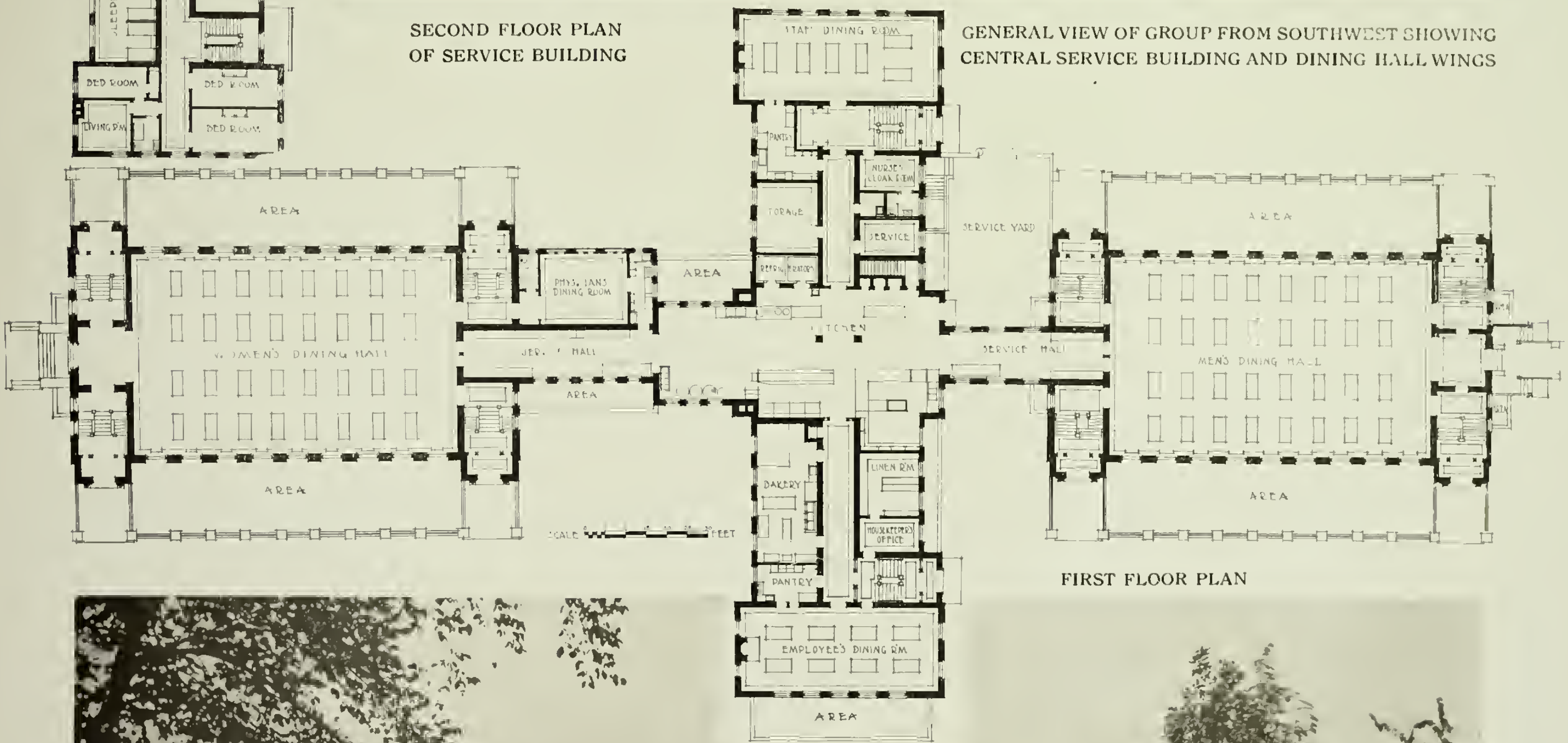
INFIRMARY GROUP, MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

GENERAL VIEW OF GROUP FROM SOUTHWEST SHOWING CENTRAL SERVICE BUILDING AND DINING HALL WINGS



SECOND FLOOR PLAN OF SERVICE BUILDING



FIRST FLOOR PLAN

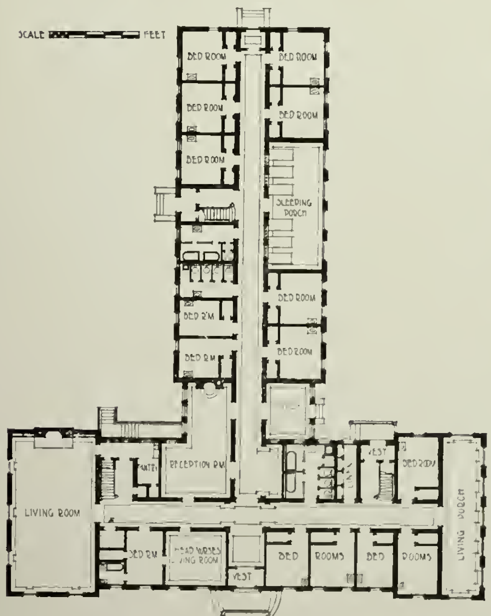
WOMEN'S DINING HALL FROM SOUTHEAST

DINING HALLS AND SERVICE BUILDING, MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

VIEW OF ENTRANCE FRONT

SECOND FLOOR PLAN



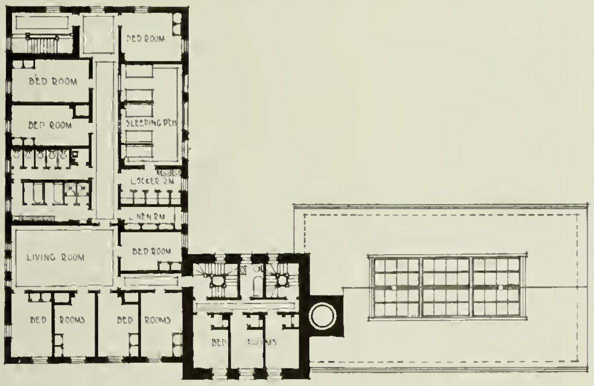
FIRST FLOOR PLAN

DETAIL OF DOORWAY

NURSES' HOME, MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

GARAGE POWER HOUSE BARN



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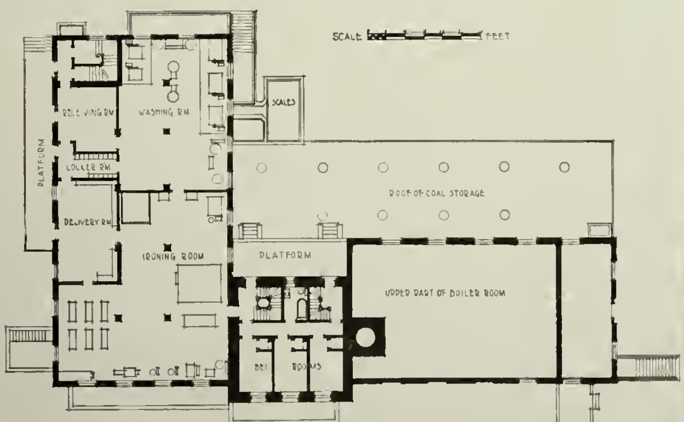


FIRST FLOOR PLAN

POWER HOUSE AND LAUNDRY

MUNICIPAL TUBERCULOSIS SANITARIUM, CHICAGO, ILL.

W. A. OTIS & EDWIN H. CLARK, ARCHITECTS

GENERAL VIEW FROM NORTHWEST

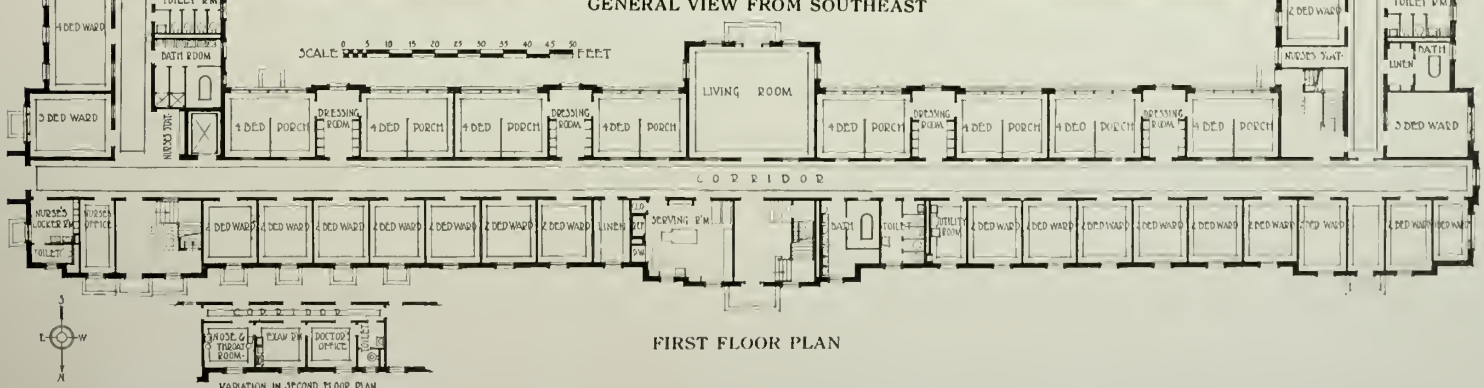
DETAIL OF CENTRAL FEATURE

HOSPITAL FOR ADVANCED CASES, COOK COUNTY TUBERCULOSIS COLONY, OAK FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

CENTRAL FEATURE IN COURT

GENERAL VIEW FROM SOUTHEAST

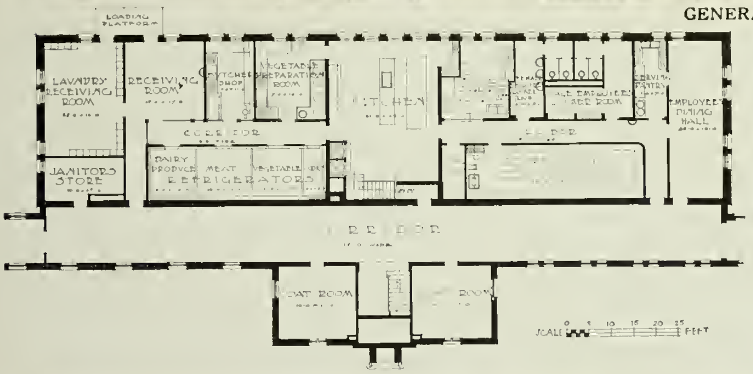


FIRST FLOOR PLAN

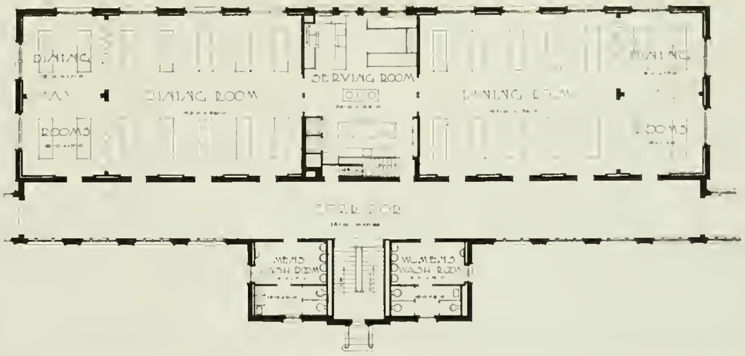
HOSPITAL FOR ADVANCED CASES, COOK COUNTY TUBERCULOSIS COLONY, OAK FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

GENERAL VIEW



BASEMENT FLOOR PLAN



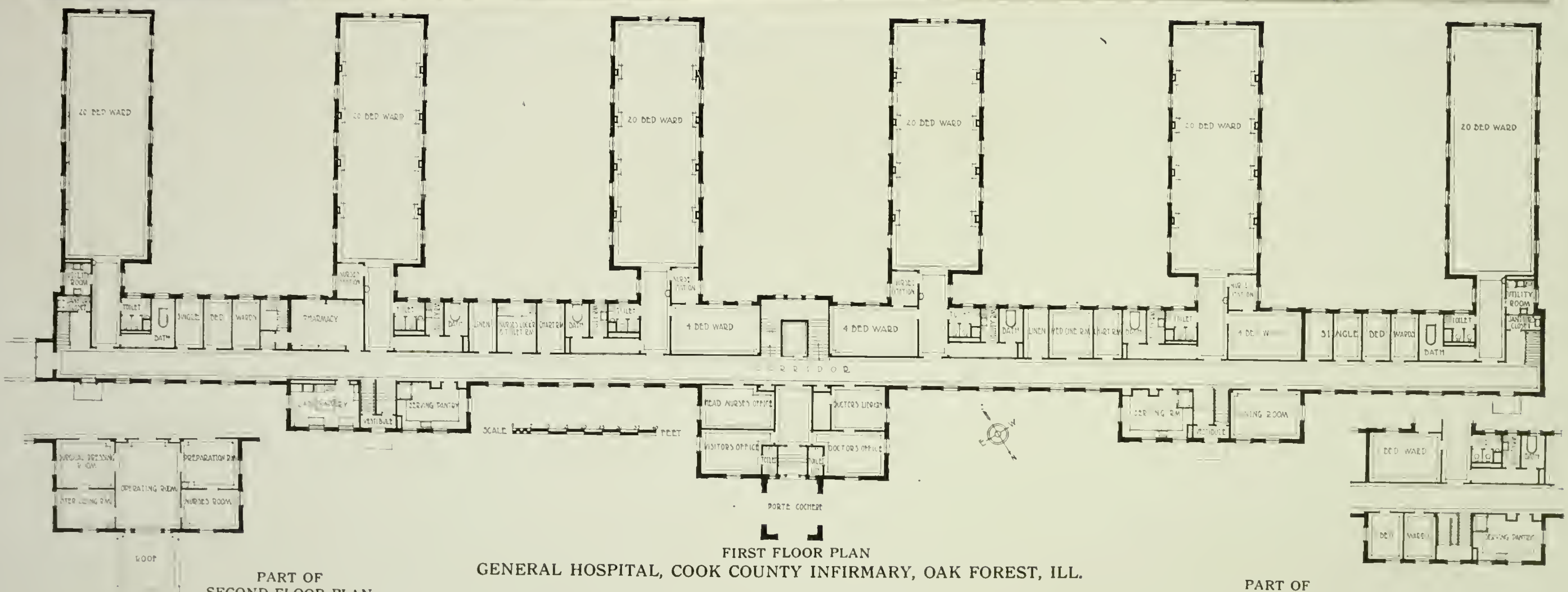
FIRST FLOOR PLAN

VIEW FROM REAR

ENTRANCE PAVILION

DINING HALL, COOK COUNTY TUBERCULOSIS COLONY, OAK FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS



PART OF
SECOND FLOOR PLAN

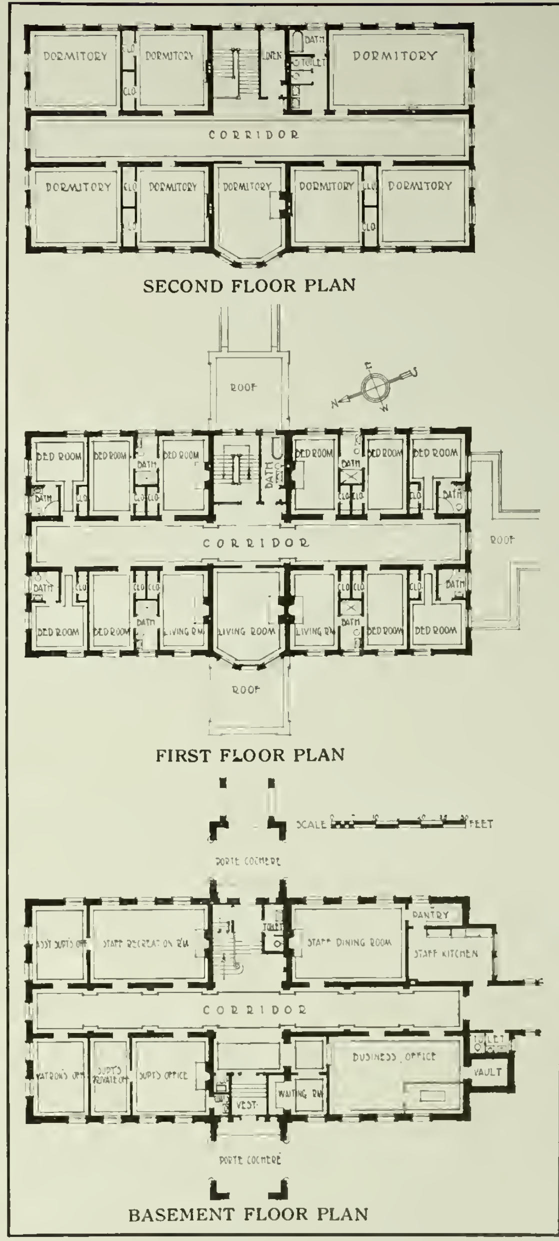
FIRST FLOOR PLAN

GENERAL HOSPITAL, COOK COUNTY INFIRMARY, OAK FOREST, ILL.

HOLABIRD & ROCHE, ARCHITECTS

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS FOR ADDITIONS

PART OF
SECOND FLOOR PLAN



SECOND FLOOR PLAN

FIRST FLOOR PLAN

BASEMENT FLOOR PLAN

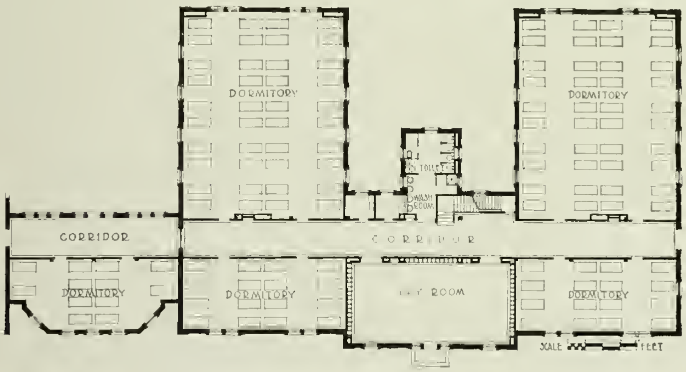
ADMINISTRATION BUILDING, COOK COUNTY INFIRMARY, OAK FOREST, ILL.

HOLABIRD & ROCHE, ARCHITECTS

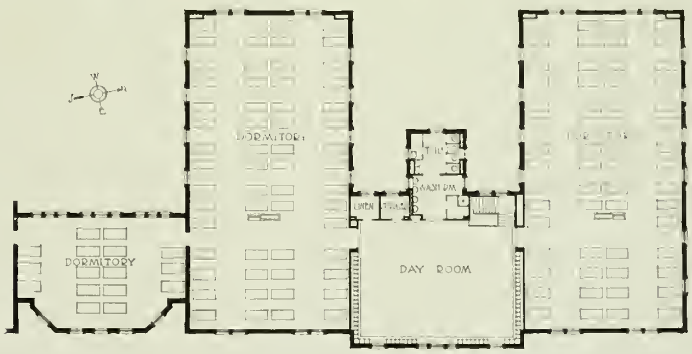
GENERAL VIEW OF MEN'S WARD BUILDINGS

HOLABIRD & ROCHE, ARCHITECTS FOR ORIGINAL BUILDINGS

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS FOR ADDITIONS



FIRST FLOOR PLAN

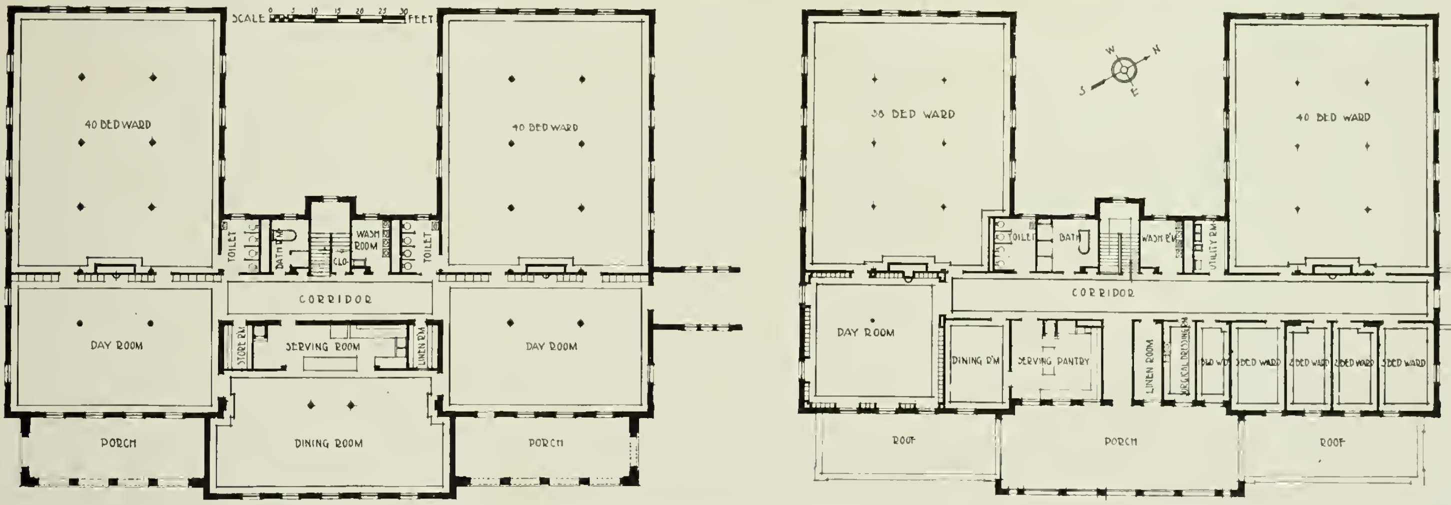


SECOND FLOOR PLAN

NEW WARD BUILDING AND CONNECTING WING, COOK COUNTY INFIRMARY, OAK FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

MALE IRRESPONSIBLES' BUILDING



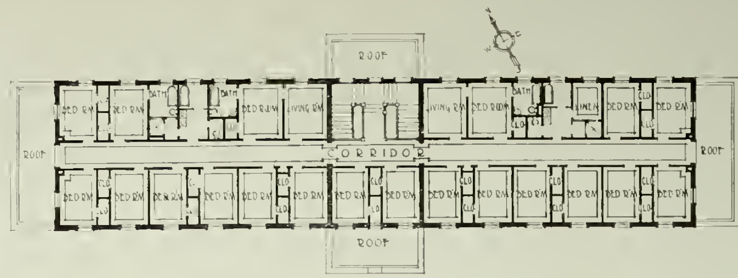
FIRST FLOOR PLAN PLANS TYPICAL FOR BOTH BUILDINGS SECOND FLOOR PLAN

FEMALE IRRESPONSIBLES' BUILDING

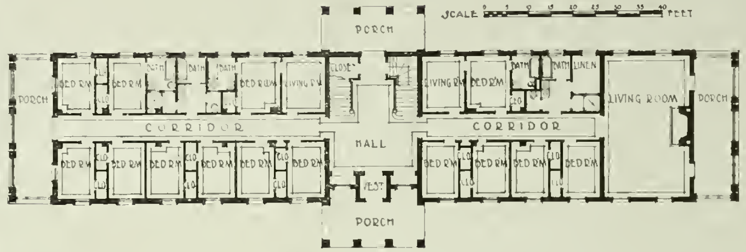
COOK COUNTY INFIRMARY, OAK FOREST, ILL.

HOLABIRD & ROCHE, ARCHITECTS FOR FIRST STORIES
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS FOR SECOND STORIES

VIEW FROM SOUTHEAST



SECOND FLOOR PLAN



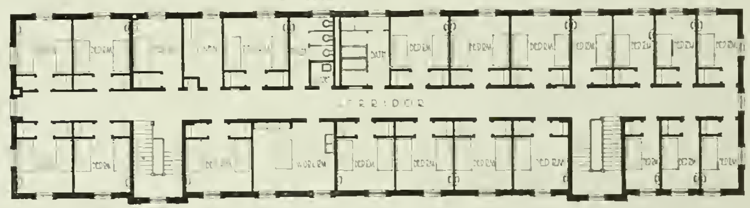
FIRST FLOOR PLAN

INFIRMARY NURSES' HOME, COOK COUNTY INFIRMARY, OAK FOREST, ILL.

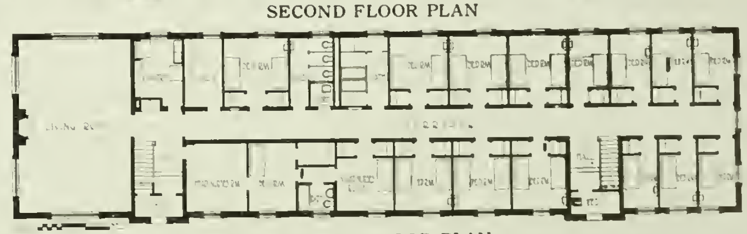
HOLABIRD & ROCHE, ARCHITECTS

VIEW FROM NORTHEAST

THIRD FLOOR PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN

TUBERCULOSIS NURSES' HOME, COOK COUNTY INFIRMARY, OAK FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

The Cook County Infirmary at Oak Forest, Ill.

HOLABIRD & ROCHE, ARCHITECTS FOR EARLY WORK.
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS FOR LATER WORK.

By C. A. ERIKSON.

WHETHER we believe poverty to be a community disease or a personal misfortune, we are all vitally affected by the steps taken to reduce its ravages. The social planks of a political party in the last presidential campaign serve to show how widespread the interest in the subject has become. Some European governments have adopted a very far-reaching system of pensions or insurance for old age, accident, sickness, and unemployment.

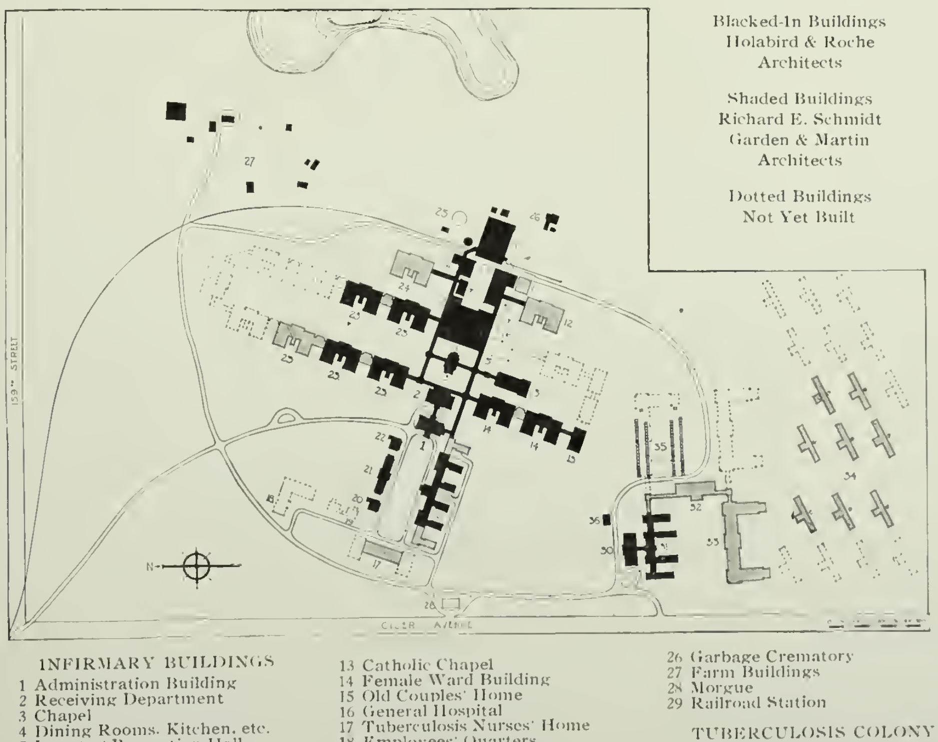
In this country we have arrived at a stage of development where every state feels the necessity of a Child Labor Law, where a few states have adopted Mothers' Pensions Laws, where one can discuss Minimum Wage Laws without being accused of anarchy, and where unemployment is being recognized as a problem. Such movements, however, are anathema to those adults who still proclaim that all "men are created free and equal," and, of course, believe that poverty is a preventable and personal misfortune. To these, such steps mean a premium on poverty by insuring the comfort and well-being of the "ne'er do well" at the expense of his thrifty, industrious, and sober brother.

These movements are closely correlated to institutional relief. When they are universally adopted, we may expect to see a rapid increase in the number of hospitals, sanitaria, and other institutions of the kind, and a vastly greater efficiency. Then it will be plain that it is economy to insure the patient's return to a self-supporting basis; we will not send convalescents to their homes which we know are incapable of caring for them; we will not send our maimed from the hospitals helpless; we will not degrade the moral and physical fiber of the chronics by no labor, or futile non-productive labor; we will not be satisfied to let the feeble-minded rest in blissful and dangerous ignorance and freedom. For then we will realize that, in dollars and cents, it doesn't pay.

One of the most certain effects of such a movement would be the house cleaning of the community "catch all" — the poor house. To most of us, poor house is but a name linked with our early memories. We thought of it as one of the auxiliaries of the Inferno; or else, we later gathered our impressions from the charming English almshouses with their mellow, picturesque quadrangles. Permanently lodged in one of the private rooms (they are all private), it would but need the solace of a pipe, a comfortable neighbor, a well filled library, and a private bath to make old age worth the attainment. But even in England such places are rare, and in the United States the best one can do is to get the comforts, minus all the charm, at some one of the palatial "homes" on the payment of a substantial entrance fee.

The poor house as at present constituted is not very far from the first picture, but at the other pole from the second. Conditions, however, are being bettered. The insane and tubercular are rapidly being eliminated; the children have entirely disappeared except in the most backward communities; and in most places the feeble minded, epileptic, and imbecile have special institutional care. It is not surprising, then, that the number of poor house residents in the United States should have decreased 3 per cent during the decade 1900–10, although the total population increased by 12 per cent.

If we eliminate those inmates who quite evidently need special institutional care, we still have a sufficiently heterogeneous group which we may divide into two classes—the permanent and



INFIRMARY BUILDINGS

1 Administration Building
2 Receiving Department
3 Chapel
4 Dining Rooms. Kitchen, etc.
5 Inmates' Recreation Hall
6 Nurses' Dining Room
7 Bath House
8 Male Help and Work Shop
9 Power House
10 Laundry
11 Storehouse
12 Female Irresponsibles' Building
13 Catholic Chapel
14 Female Ward Building
15 Old Couples' Home
16 General Hospital
17 Tuberculosis Nurses' Home
18 Employees' Quarters
19 Engineer's Cottage
20 Superintendent's Home
21 Infirmary Nurses' Home
22 Medical Officer's Home
23 Male Ward Buildings
24 Male Irresponsibles' Building
25 Reservoir
26 Garbage Crematory
27 Farm Buildings
28 Morgue
29 Railroad Station

TUBERCULOSIS COLONY

30 Receiving Department
31 Hospital
32 Dining Hall
33 Hospital for Advanced Cases
34 Cottages
35 Tents
36 School

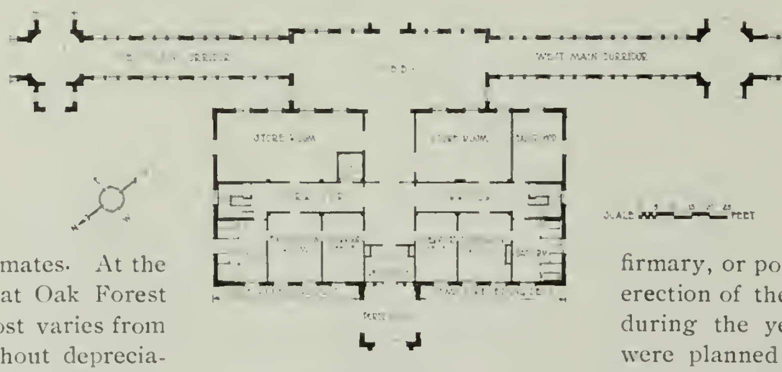
Block Plan of Infirmary and Tuberculosis Colony the temporary residents. The two classes differ from one another in degree only; the permanent resident is usually so incapacitated that even under the most favorable condition he is unable to earn his living, while the temporary resident is still able to earn a meager livelihood during periods of industrial activity. For the vagrants, of which there are many, it is extremely difficult to elicit the slightest sympathy. This class will be one of the next to receive special care in work houses. The inmates, however, are not only aged, but include chronics, cripples, alcoholics, and paralytics. Statistics for the entire United States show that on Jan. 1, 1910, only 15.4 per cent of the poor house inmates were able bodied. This would probably fall to 7 or 8 per cent on July 1 after the vagrants have left. On Jan. 1, 1910, the total population in all poor houses was 84,198; during the year 88,313 were admitted, but without any material increase in population at the end of the year.

This fluctuating, shifting, decrepit population is a very marked handicap against any utilization of the productive possibilities of the inmates. At the Cook County Infirmary at Oak Forest the *per capita per diem* cost varies from 35 cents to 45 cents (without depreciation or interest on money invested). Such a result is, of course, only possible where in a very large measure the inmates are doing the work. In view of the great number of bedridden and otherwise incapacitated inmates, it is probably true that many of the workers support themselves and contribute materially to the support of others. At Oak Forest there is no department of the institution from hospital to farm which is not manned largely by inmates, and it is only because of the opposition of the building trades unions that the skilled building mechanics among the inmates are not plying their trade within the institution.

An examination of the purpose of the poor house will show that it is based on a combination of altruism and selfishness. To many it means the caring for the poor, aged, and decrepit without further motive than acute pity for these unfortunates; but this is only part of the basis and probably the least important. Community self-interest requires that this group be segregated lest its individuals, through desperation, be driven to preying on society, or some already overburdened family be required to care for the unfortunate one, thus making three or more in need of aid where there was but one. The poor house to-day is a pest house, where the infected are carefully segregated in order to protect the community from contamination.

As recently as 1909 Cook county cared for both insane and paupers in one institution, though in distinct divisions. With the poor house population was included the otherwise unprovided for, — epileptics, imbeciles, feeble minded, etc., a few sub-normal children, a few blind, and a great number of tubercular. While the statistics for the United States show a decrease in poor house population, yet the Cook County Infirmary shows an alarming increase. In 1908 the daily average was 1,382½. In 1913 this had grown to a daily average of 2,106, an increase of 60 per cent in five years. If the statistics for 1915 were available, an even greater growth would be shown, due to the profound industrial depression of the winter. Building operations are constantly in progress at Oak Forest, but they never seem to quite catch up with the demands for bed space, and since its occupation patients have slept in corridors and been badly overcrowded in the wards. With this ever increasing demand it is not surprising to find that a great deal has been sacrificed to bed space.

Second Floor Plan



First Floor Plan
Receiving Department
Holabird & Roche, Architects

To Holabird & Roche is due the credit for the general plan of the infirmary, or poor farm division, and the erection of the first group of buildings during the years 1909–10. Additions were planned in 1914 by Richard E. Schmidt, Garden & Martin. The initial capacity was 1,431 inmates' beds, and to this the later buildings added 611, making a total of 2,042 beds. The population on Sept. 1, 1915, was 2,840, and officials estimate that by March 1, 1916, the population will reach 4,000.

The Oak Forest Infirmary is situated 22 miles southwest of Chicago, on a gently rolling, partially wooded farm of about 415 acres. The eastern quarter is high and well wooded; the balance has a rich, alluvial soil, well adapted to farming. The buildings are grouped on the crest, roughly approximating a cross in shape: — the women's division at the top, or south arm; the receiving, administration, and hospital buildings with superintendents' homes and nurses' home at the west arm; the service building, dining hall, power house, and other auxiliaries at the east arm; and the men's group to the north, or bottom. It might be said that the institution is a "cottage" group, but the cottages have a normal capacity of 160 beds. The buildings are connected by means of corridors, 10′ 0″ wide inside of the buildings and 12′ 0″ wide between them. These are the arteries of the institution: in the basement are carried all the heating and supply mains, and on the first floor circulation between the buildings is established. The nurses' home, superintendents' homes, tuberculosis colony, the morgue, and power house have only the underground connection.

The block plan indicates but four divisions of patients:

1st, the tubercular;

2d, the irresponsibles, including epileptics, imbeciles, feeble minded, and paretics;

3d, those needing hospital care;

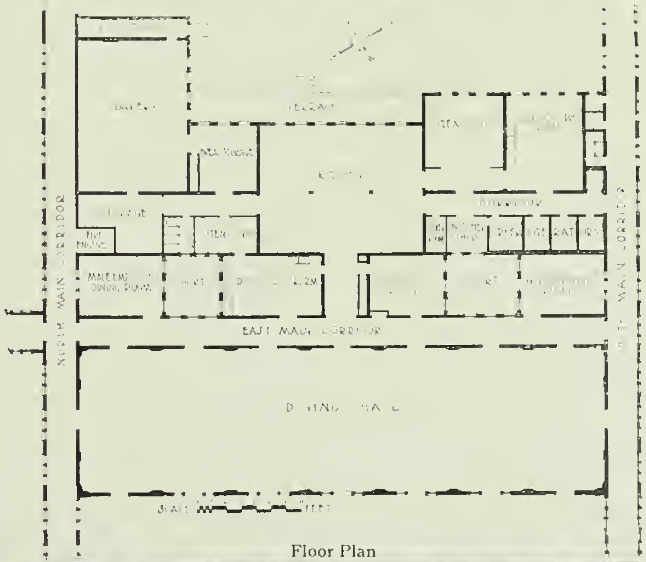
4th, the remainder.

This quite evidently dodges the problem of the proper care of the various subdivisions included under irresponsibles, and recognizes no distinction between the aged, the chronics, the cripples, and the vagrants, but is the only solution possible with the funds at the disposal of the architects. The men and women are well separated by the buildings common to both sexes, dining halls, chapel, receiving and administration. The general hospital is placed between the two units. The plan has a desirable compactness without any loss of necessary separation of parts; it is a distinctly economical plan. Holabird & Roche are to be commended for their breadth of vision in planning for such a gigantic institution, and a considerable moral strength in building the auxiliaries large enough for the completed group when the pressure to increase the number of beds at the expense of these auxiliaries was so great.

The orientation of such a group is a serious problem and presents a great number of puzzling questions. What relation should the direction of the prevailing winds have to the axis of the wards? What should be the direction of the axis of the wards to obtain the maximum sunlight in all parts of the building? What exposure should the day rooms have? In the wards for ambulatory cases the direction of the prevailing winds has been the determining factor and they have been so placed that they are flushed thoroughly by the southwest winds and yet receive ample sunlight. The day rooms are not quite so fortunate, but are well protected from the hot afternoon sun. In the wards for the bedridden (in the general and tuberculosis hospital) the axis of the wards is more nearly north and south, giving the maximum of sunlight to the large wards.

The meandering drive from the station leads to the administration building, a three-story structure containing on the first floor the general office, superintendent's and assistant superintendent's offices, the staff recreation room, dining room, and kitchen. On the second are the sleeping and recreation rooms for physicians and heads of departments, and on the third floor, four- and six-bed dormitories.

View from West



Floor Plan

Interior of Dining Hall

Dining Hall and Service Building

Holabird & Roche, Architects

The receiving building, directly east of the administration and connected with it by a covered passageway, is the one building in the group which is entirely inadequate both in function and scope. Rather than a discussion of the building as it is, a description of what experience has shown that it should be will be more interesting. The incoming patients (received once a day and usually ambulatory) should have a large, sun lighted, well ventilated room with adequate toilet facilities for both sexes immediately adjoining. There should be a small office on each side of the waiting room for the receiving clerk for each sex. In the men's department the next room should be the barber shop, beyond it the disrobing room, and then the bathroom. The barber shop should be large enough for three or four chairs, the disrobing room should be arranged so that at least four could disrobe at once in semi-privacy. The bathroom should be equipped with four high slabs with shower sprays above. From the bath the patient should be taken directly to an observation ward. There should be room for about 200 patients in wards no larger than ten and with an isolation unit of about ten single rooms for suspected cases. If the patient is ambulatory, his clothes are restored to him as soon as sterilized, cleaned, and pressed, for the only uniforms in the institution are those of the police, cooks, bakers, and nurses. If he is not ambulatory, his clothes are sent to the clothes room in the basement, which should be large enough to store in individual lockers the belongings of each inmate. The women's receiving department should be similar to the men's, but with increased privacy in the bathing and disrobing rooms. The entire receiving department should be so arranged that it could easily be closed and thoroughly disinfected.

The general ward buildings are arranged in two rows, 150 feet apart. On the men's side, two buildings in each row were built originally and one in 1914 in the west row; but on the women's side, only two on the west have been erected. Each building consists of an E-shaped building, originally connected to its neighbor by a one-story corridor 12′ 0″ wide, and is 144 feet long and 90 feet deep and 48 feet from its neighbor. The ward wings are each 48 feet wide, leaving 48 feet between them for toilet space, tower, stairs, attendants' rooms, and supply rooms. An examination of the plans shows its theoretical use clearly. No patients requiring close attention are kept in the dormitories, this being the function of the hospital. The first floor plan differs from the second in that the main corridor runs through, reducing the width of each day room by 10′ 6″. In practice, however, there are no day rooms, every square foot being used for beds, including the corridors. The porches were merely ornamental appendages, for in pleasant weather inmates who are neither ailing nor working are on the grounds, and in other kinds of weather they hug the radiators. The demand for bed space has been so great that these porches in the winter of 1914 were glazed and heated and are now used as dormitories. The toilet facilities, four water closets, three laboratories, one tub, seem few in number for the theoretical allotment of eighty to a toilet, but the condition must be much worse when the number of patients rises to two hundred per toilet room. The large dormitories are each 57′ 6″ x 46′ 0′, with a 12-foot ceiling. For forty beds this allows 67 square feet and about 804 cubic feet per bed. The building is heated by direct-indirect radiators, with an exhaust duct leading to a ventilating hood. The direct-indirect radiators are of benefit in introducing fresh air, but against this must be weighed the impossibility of cleaning such radiators. The ventilating problem in such a dormitory as this is a matter of the gravest importance to inmates and institution, but the inmates' faith in the therapeutic qualities of fresh air is very limited, and it is only by the most careful supervision that two transoms are kept open during the winter nights.

The new ward building is weaker in theory but much stronger in practice than its predecessors. The outline of the building is almost identical with that of the earlier ones, but a central day room takes the place of the porch and small rooms. Dormitories occupy the space formerly assigned to day rooms and the toilets are simplified. If it were possible to conduct this institution as it should be, there is no question but that the earlier building is preferable in so far as sizes of wards and number of day rooms are concerned. The newer building is superior in details which tend towards more certain cleanliness and sanitation; it has mechanical exhaust ventilation and the radiators are of the direct type; the lockers are ventilated and of sanitary construction, the corners all being tangent coves; the bathtub is eliminated and a shower substituted. The large wards on the second floor, in spite of their size, have many desirable features; their exposure in all directions should prove to be a great boon. As with all the buildings of the infirmary group, no change was made in the external appearance except those dictated by the plan.

The original ward buildings were connected by a one-story corridor. In building the additions a ward was created on the eastside of each of these and another on the second floor. The wisdom of this is much to be doubted, for it interferes materially with the natural ventilation of the corridors, reduces the amount of sunshine, and to a degree interferes with the ventilation of the ward buildings.

Most of the inmates are in constant need of some medical attention, but while ambulatory they are housed in the ward buildings, receiving medical attention at the dispensary in the receiving building. It is only when their ailments make them bedridden that they are sent to the hospital. The hospital is of the pavilion type, with the wards facing southeast. Each ward is planned to contain twenty beds and has the usual dependencies. The day rooms are of course unnecessary and are now used as wards. In the additions it was very necessary to provide greatly increased facilities for the pharmacy and to increase the existing serving rooms; a laboratory was provided and a number of single rooms in addition to four twenty-bed wards; also a utility room takes the place of the nurses' station. The absence of the numerous adjuncts of the hospital should be noted as this building probably presents the least that can be provided and still be rated as a hospital. The number of beds provided (about 300) is entirely too few; there should be nearer 500 for the present population.

The irresponsibles' ward buildings are for that general division of inmates which includes patients of all degrees of irresponsibility, such as epileptics, imbeciles, feebleminded, and paretics. The original buildings, one for each sex, are very similar to the dormitories in plan, with the addition of a dining room and serving pantry. The facilities for the treatment of this class of patients are noticeably lacking. An additional story was added in 1914 to each of these buildings, and an attempt was made to supplement the existing facilities with a number of small wards, surgical dressing room, adequate bathing facilities, and a utility room. The day room is reduced considerably as the second floor will be used mainly for the bedridden and the first for the ambulatory. This building is far from being adapted to its purpose.

General misfortune or disability does not seem to overtake the aged couples in great numbers, but there are a few such. For these a dormitory unit of twenty-seven two-bed rooms is provided just south of the last women's dormitory. The first floor is usually filled with aged couples, but the second is almost always filled with employees, due to the lack of other provision for them.

One of the chief interests of many of the inmates is the religious service, and for this there is no lack of facilities. The county has built a non-denominational chapel for the use of others than Roman Catholics, and the Catholic Bishop of Chicago, another and larger one for them.

To supplement the religious work the crying need of the institution is a space devoted to the amusement of the inmates. This should be provided with game rooms, but must primarily be an audience room for motion pictures, amateur theatricals, and concerts. "Movies" are now given twice a week in the dining hall without expense to the institution except for the maintenance of the lantern. With each of the building operations a recreation hall was planned and estimates received, but the demand for beds was so great that in each case it failed of realization.

Housing and recreation are important, but in the inmates' eyes the dining arrangements are of far greater importance. The food in its quality, variety, and method of preparation is of a very high grade. The service is of the simplest kind; from the central steam tables in the dining room eighty inmate assistants serve each of the 600 places with its portion, after which the inmates are admitted. To prepare the food for the inmates and employees requires extensive facilities. These are provided just west of the main dining hall and are sufficiently large for the greatest possible growth of the institution. The basement of the kitchens has been used for vegetable cellars, but this was soon found to be unsatisfactory, and a new storeroom with vegetable storage in the basement has been built. In addition to the refrigerators near the kitchen, a much larger cold storage space is provided under the laundry and near the railroad track.

View from Southeast

First Floor Plan

Second Floor Plan

Medical Officer's Home
Holabird & Roche, Architects

The dining room for the staff in the administration building is quite attractive, as is also that where the inmates eat; but the employees and nurses are not so well provided for.

The inmates are not, perforce, the cleanest of mortals, and it is necessary to provide some measure of supervision over the weekly affair of bathing. Each dormitory is assigned a definite time for bathing, at which time the inmates make their appearance at the bathhouse and bathe in groups under the watchful eye of the attendant.

Just beyond the bathhouse are three small work rooms for inmates. One of these is used as an auxiliary baggage room, one is a mattress-making room, the third is for brooms. On the other side of the service court, opposite the laundry, is a fourth, a sewing room.

The morgue, to the southeast of the general hospital, is a one-story building with a receiving room, a mortuary for twenty-four bodies, a laboratory, and a small chapel. There is a separate entrance from the main road enabling the undertakers to enter and depart without coming into the main group of buildings. The building serves both the Infirmary group and the Tuberculosis Colony, and now has too few body boxes, the average death rate being about sixty per month for the combined institutions.

There are three divisions of the service which are of great importance: laundry; light, heat and power; and maintenance. The laundry just east of the kitchens on the north corridor is at present too large, but will not be so when the ultimate growth of the institution is attained. The plan is very simple and the machinery has been reduced to its reducible limit. One sterilizer, five 36' x 54" washing machines, three extractors, one 6-roll mangle, a one-section drying room, one starch cooker, fifteen ironing boards, a few hand tubs, a heated tumbler, an apparatus for ironing staff starch goods — these would apparently be sufficient even without the inmate help, which is available.

Beyond the laundry, at the extreme eastern end of the east and west axis, is the power house. Here one probably grasps the size of the institution more readily than by mere perambulation. It approximates the power plant of a giant industrial concern. Its boilers total 2,100 horse power in 350 horse-power units, and its generators produce 750 kilowatts. There are two refrigerating machines of 50 tons and 75 tons, with an ice-making tank of 3,200 pounds capacity. The main sources of water supply are three deep wells; rain water from the roofs is collected into a pond east of the power house and used for the boilers. A force of electricians, steam fitters, plumbers, carpenters, sewer builders, painters, etc., are in constant service maintaining the institution up to its mark. There are quite large shops for each of these trades under the male employees' building and under the laundry. The physicians and staff, as we have seen, are housed in the administration building.

Superintendent's home	1	
Assistant superintendent's home	1	
		2
Administration Building:		
12 rooms with bath between	12	
1 6-bed dormitory	6	
3 4-bed dormitories	12	
3 3-bed dormitories	9	
		39
Nurses' Home:		
4 2-bed room suites with bath	8	
4 1-bed room suites with bath	4	
28 1-bed rooms	28	
		40
Farm House:		
5 2-bed rooms	10	
2 1-bed rooms	2	
		12
Male Employees' Quarters:		
Single rooms	20	
		20
Tuberculosis Nurses' Home (added in 1913-14):		
1 2-room suite with bath	1	
15 1-bed rooms	15	
42 bedrooms	42	
		58
Total bed space		171

But there is a veritable host of others to be cared for. The county budget in 1914 provided for 137 employees in the Infirmary and 83 in the Tuberculosis Colony, a total of 220 employees who were to have "lodging, meals, and laundry service." The actual provision for help is shown in the preceding table.

This leaves 47 unaccounted for, but probably this number is nearer 60, for many of the staff are married and require two rooms.

Institutional work at the best is not the most pleasant and most inspiring kind of work. The hopelessness and fruitlessness of the work among the inmates at Oak Forest is appalling to the visitor; how much more so it must be to the employee! Suffering may be alleviated and querulous patients quieted; but how shall sympathy be kept uncalloused while working among the wrecks of a city? The housing and attention of the employees is, therefore, of the utmost importance.

The nurses' home is one of the charming buildings of the group; its graceful lines and proportions and its simple roof give it a character of lovely domesticity. But it is not only in appearance that the nurses' home can lay claim to distinction, for here 100 per cent of the nurses have single rooms and 33⅓ per cent have private baths, a necessary and liberal plan; but it is lacking in the matter of rooms for the entertainment of visitors. While very few of these nurses are graduates and should more properly be called attendants, they have all had institutional experience and are not pupil nurses.

Other grades of female help are housed in the aged couples' building and in the small rooms of the ward buildings, an arrangement which is unsatisfactory from any standpoint.

Male help fares little better than the female. There are but twenty rooms in the building known as the employees' quarters, and none of these large enough for more than one bed, and room for five in the farmers' cottage. Yet there are forty-nine on the payroll who receive "lodging, meals, and laundry service." There is a billiard and a card room in the employees' quarter, but this room has yet to receive its baptism as such, for it is now a patients' dormitory and always has been. The result of such overcrowding has of course been detrimental to the welfare of the institution, the patient, and the employee. The overcrowding makes a nervous, sensitive employee who cannot give his whole attention to the work before him, and results in the loss of the best of the employees in a short time. Such a condition is certainly detrimental to the individual as well as to the efficiency of the institution.

The superintendent and assistant superintendent have attractive houses, flanking the infirmary nurses' home. There are a number of other buildings about the institution about which little need be said, such as the farm house and farm buildings, the crematory, and the sewage disposal plant.

The demand for bed space necessarily led to the elimination of all "frills" and to uniformity throughout, yet the effect of the group as one comes up the main drive is very pleasing. The buildings in general are two stories high, with a field of mottled red, purple, and brown brick laid in a diaper pattern (English cross bond) on a base of white cement blocks, bordered by grayish-yellow corners of brick and punctuated by gray brick architraved windows. The terra cotta cornice is of the same yellowish-gray tinge, with the gray brick as a frieze, and a red brick parapet. This simplicity is admirable. The diapered wall treatment gives a splendid texture, and one feels a dignity, coupled with a domesticity which expresses the character of the buildings perfectly.

We shall undoubtedly continue to have "Infirmaries" or "County Farms" or "Aged Peoples' Homes," as the poor houses are now variously called, but they will be organized differently than at present. The Oak Forest Infirmary, therefore, is a brilliant example of a rapidly passing form. Its physical equipment alone is such a vast advance over that of older institutions that for this reason it is worthy of close study.

TABULATION OF BED CAPACITY.

First Group, Holabird & Roche, Architects, 1909–10			
Receiving Building			
1 12-bed ward	12		
2 10-bed wards	20		
2 3-bed wards	6		
2 1-bed wards	2		
		40	
General Hospital			
8 20-bed wards, 74 sq. ft., 915 cu. ft.	160		
4 4-bed wards	16		
4 3-bed wards	12		
4 6-bed wards	24		
6 1-bed wards	6		
		218	
2 Irresponsible Wards			
4 40-bed wards, per bed, 65 sq. ft., 812 cu. ft.	160		
2 1-bed wards	2		
		162	
Aged Couples			
27 2-bed wards, 9′ 6″ x 18′ 7″, 176 sq. ft.		54	
6-Ward Buildings			
Each 4 wards of 40 beds, per bed, 65 sq. ft., 812 cu. ft.		960	
Grand total			1434
Second Group, Schmidt, Garden & Martin, Architects, 1913 14			
General Hospital			
4 20-bed wards, 74 sq. ft., 915 cu. ft.	80		
15 1-bed wards, 100 sq. ft., 1250 cu. ft.	15		
		95	
2 Irresponsible Wards			
Each has 1 40-bed ward, per bed, 65 sq. ft., 812 cu. ft.	40		
1 38-bed ward	38		
1 3-bed ward	3		
3 2-bed wards	6		
1 1-bed ward	1		
	2 x 88 =	176	
3 Connections between Present Wards			
Each has 1 12-bed ward	36		
1 16-bed ward	48		
		84	
Ward Building			
2 58-bed wards, per bed, 89 sq. ft. 1112 cu. ft.	116		
2 40-bed wards	80		
3 16-bed wards	48		
1 12-bed ward	12		
		256	
Grand total			611

RÉSUMÉ.

Holabird & Roche's operations	1434
Schmidt, Garden & Martin's operations	611
Grand total	2045

The Fordyce Bath House, Hot Springs, Arkansas.

GEORGE R. MANN & EUGENE J. STERN, *Architects.*

IN the Fordyce Bath House at Hot Springs, Ark., the combined efforts of experts on medical bathing and of the architects have produced a building which amply accommodates the hundreds of patrons who annually visit the baths and which furnishes all the conveniences and luxuriant appliances to enable them to derive the utmost benefit from the mineral waters.

Before describing in detail the plan of the building it is necessary to state some facts in connection with the waters of Hot Springs and the general requirements of bath houses in which the public bathe. The springs are located on the U. S. Government Reservation and all water is supplied by the government. As it comes from the springs the water varies in temperature from 135 to 150 degrees F. In this bath house, of the two springs from which it is supplied, one is located under the building, the other is about 100 yards distant and is at an elevation equal to that of the third floor.

The medical properties come from the radium emanations of the water, and one of the problems in operating a bath of this kind is to cool the water to a temperature sufficiently low to comfortably use it without losing all the radio-active gases. It takes from 50,000 to 100,000 gallons of water per day to operate a bath house of this size, depending on the number of bathers. The general temperature of the water used for bathing is about 98 degrees.

Another important consideration in planning is the matter of circulation for the bathers through the building and the provision of facilities for taking care of a large number of patrons at one time. There are sometimes as many as 600 bathers using the baths in one day, and, as the majority of them wish to bathe in the morning, it is necessary to handle them quickly.

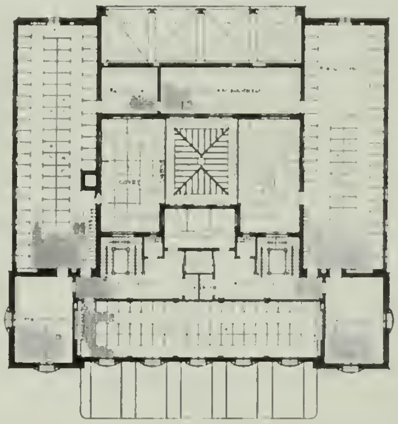
For entering the building there are two sets of steps and a ramp for wheeling roller chairs. These lead to a broad terrace covered with a glass marquise, thence to the lobby. Adjacent to this room are the clerk's office, check room, and the manager's office.

The bather registers with the clerk, is assigned to a private robe locker and one of the dressing booths on the second floor or to a private stateroom on the third floor, also to a bathing attendant, who is to treat the bather throughout the entire course, which usually consists of twenty-one baths.

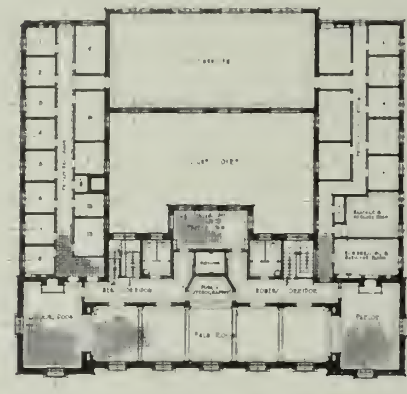
From the left side of the office one enters the men's department, using the stairs or the elevator to the dressing booths or the private staterooms, and after disrobing descends to the bath hall. This hall is about 60 feet square and is surmounted by an art glass dome, giving the room a soft, restful light. All the partitions in this room are of white Italian marble, the floor of ceramic tile, and the side walls of glazed tile. The hall is equipped with specially designed vitreous china tubs, 6 feet long and 30 inches high, built into the wall on two sides. The tubs are provided with extra large supply and waste fittings, enabling them to be filled or emptied in fifteen seconds and are fitted with registered thermometers which show practically instantaneously the temperature of the water. There are also hot water vapor cabinets enclosing the entire body, a needle shower and douche apparatus, with wall control and mixing chamber outside the shower cabinet.

Back of the bath hall is the thermotherapy department (called cabinet room on plans), where seven cabinets are arranged to give either dry or vapor bakes with the bather's head outside of cabinet. To the right of this room is the hydrotherapeutic room, where special treatment is given according to prescription.

Opposite this room is the pack room, where hot and cold packs are given the bather, and off this is the hot room kept at a temperature of about 150 degrees F. Leading from the opposite end of the pack room is the first cooling room. On the second floor is the second cooling room, also the dressing booths and robe lockers. The booths are polished mahogany and of flush sanitary construction. The robe lockers are of pressed steel, detailed free from corners and well ventilated. From this floor are reached two small roof gardens, one for men and one for women. On this floor there are also the mercury rubbing rooms for special treatment, and the department of mechanotherapeutics. The room is equipped with mechanical devices for exercising the joints and muscles.

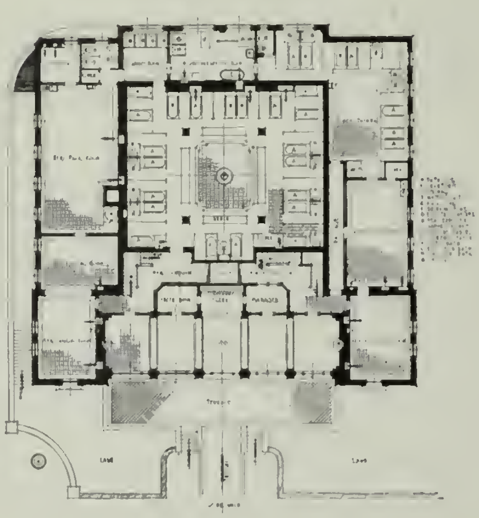


Second Floor Plan



Third Floor Plan

Basement Floor Plan



First Floor Plan

The third floor is given over to a large gymnasium in the rear, private staterooms, manicuring, hair dressing and massage rooms, and the barber shop. The entire front of this floor is devoted to rest or recreation rooms. The palm room has a ceiling of domed art glass, naturally lighted with skylights at an angle.

The first and second floors are heated by indirect radiation and the third floor by direct. The entire building is mechanically ventilated and the temperature of all rooms is thermostatically controlled. The apparatus for cooling the water consists of coils in the basement through which a fan draws air. The coils are arranged with thermostatic valves to release the water when reduced to the desired temperature, after which it rises by gravity to the storage tanks at the rear of the building. The water to be cooled is taken from the elevated spring, so as to avoid pumping. The hot water is taken from the spring in the basement, the water from which flows into a large reservoir under the bowling alleys in the front part of the basement, from which it is pumped direct to the fixtures through pressure tanks.

The arrangements for both sexes are practically alike, except that accommodations are provided for three male patrons to one female.

Lobby on First Floor

Palm Room on Third Floor

The Use of Native Woods for Interior Finish.

PART III.

By C. MATLACK PRICE.

REDWOOD is perhaps the most widely used wood on the Pacific Coast and has many qualities which make it adaptable to interior use. There are two distinct kinds of redwood, usually designated "California" and "Big Tree." Both are big trees, though the first seldom equals the second in girth, though often in height. The "California" redwood is also known as "Fog-belt" redwood, in allusion to its nearness to the coast, while the "Big Tree" is a species growing much further inland.

It is natural that tourists returning from California should exaggerate the size and age of these gigantic trees, though, as Gibson points out in his "American Forest Trees," they are big enough and old enough without any exaggeration, following which, he cites a specimen in which the great naturalist John Muir counted four thousand rings of annual growth, while a fallen trunk was found to measure three hundred and sixty-five feet from base to tip. Although the bark averages two feet in thickness, there is still a considerable bulk of wood within, when we remember that twenty feet is a frequent redwood trunk diameter, an even larger reading, of course, being possible at the base, which flares out considerably. The "Fog-belt" redwood tree is also known as "Coast" redwood, again to distinguish it from the "Big Tree."

Dining Room, House of Elmer Grey, Architect
Los Angeles, Cal.
Paneling and trim of California redwood, treated with acid to give a grayish brown cast, waxed and rubbed down

Of redwood's physical properties, it may be said to work easily, splitting readily and evenly, holds nails well, and being free from pitch does not shrink, which is in its favor either as a base for paint or as a material for panels. The fact that it is an excellently weather-proof wood for exposed work does not concern us in considering its use as interior finish. It is brittle, hence not very often used for carving, especially where such carving would be subjected to chipping or denting, and its brittleness makes it impossible for such structural finish as stairs or flooring. It does not attempt to be an "all-round" wood, and is content with certain unique properties which it possesses.

One of these is its suitability for shelving and baseboards in kitchen or pantry, because it contains a peculiar acid especially obnoxious to ants.

Though devoid of *figure*, redwood possesses a beautiful *grain*, and its esteem is based on its sameness and color, rather than on its variety of grain. The width of annual rings in redwood varies, the old wood showing narrower rings than the young wood. There are numerous but very thin medullary rays, which do not appear to sufficient advantage to make quarter-sawing attractive. Occasional pieces of redwood show a slight figure, and these examples are known as "curly" or "wavy" redwood, being, however, the exception, and not characteristic.

The beautiful grain of redwood and its rich, reddish color make possible some attractive effects of staining or natural finish, while its close grain and freedom from pitch make it an excellent base for paint or enamel. For stain finished, but three operations are necessary, no filler being required: first, to sand the wood thoroughly; second, to apply a coat of white shellac; third, to apply the stain with a brush, wiping it off immediately with a soft cloth.

Redwood is excellently adapted for wainscoting, ceiling, casing, mouldings, doors, paneling, and shelving. Exceptionally wide panels are available, and the great age of the wood, giving it a kind of natural seasoning, prevents these from the tendency to warp or split which would exist in very wide and thin panels of nearly any other wood.

In speaking of cost, one can only regard the cost of the wood itself as compared with other woods. In this respect it is classed with cypress, and is more expensive than "Douglas" fir or yellow pine. Printed costs of redwood bungalows in California are deceptive to some Eastern readers because of differences in labor and transportation, and it is obvious that an interior in redwood on the Pacific Coast would be far cheaper than the same interior in any of the Eastern states. Even allowing for transportation, however, redwood is not an expensive wood, and will probably become more popular in the Eastern states than it has been. For the most part it has been regarded as difficult to obtain, though this is not so.

"DOUGLAS" fir, the other "timber giant" of the Pacific Coast, is an enormous tree of great lumber value. Unlike redwood, "Douglas" fir is an "all-utility" wood, possessing value both for structural purposes and for finish. Its importance in the lumber field may be gauged by Gibson's statement that "no other single species in the United States or the world equals the annual sawmill cut of 'Douglas' fir," despite which there is estimated a supply for the next hundred and fifty years, not allowing for the new growth which modern forestry is slowly beginning to foster. There are other and smaller firs, but none approaching the "Douglas" fir in size, importance, or uses.

In appearance fir is a wood of much beauty and interesting character, possessing distinction in both grain and figure. The effect of the grain somewhat resembles "watered silk"; and the figure is not formed by medullary rays, but by the annual rings. Figure, therefore, is not brought out by quarter-sawing, but by tangential sawing. The United States Forest Service Bulletin makes the statement that "sawed flat, the grain has been considered as attractive as the grain of quarter-sawed oak."

Dining Room in House of E. W. Rollins, Dover, N. H.
Chapman & Frazer, Architects
Paneling and trim of California redwood, stained, waxed, and rubbed down

"Douglas" fir takes a variety of finishes, and being a close grained wood requires no filler. The natural grain and figure of the wood may be emphasized by stains, the harder portions coming out in pronounced contrast to the soft. With certain cleverly manipulated stains it has been finished to imitate oak, mahogany, walnut, and other more expensive native and foreign woods.

This wood is peculiarly adapted to paneling, because (like redwood) it is available in extraordinary widths, and is not only cut in veneer for this purpose, but used as panel core-wood as well. The structural stability makes it a good door material, while its strength is the property which has made it extensively used for flooring. It can be said to be one of the few woods, like oak, possessing general qualities of structural stability and finished appearance.

HEMLOCK, as the lumber is known in the East, is generally regarded inferior to that of the Western hemlock, and perhaps the characteristics of the former have prejudiced many against the latter. Perhaps the most concise (as well as authoritative) description of Western hemlock may be taken from a Bulletin of the United States Forestry Bureau, where it is stated that "Western hemlock is best adapted for uses which require ease of working, handsome finish, and lightness combined with considerable strength . . . taking a high polish, free from pitch, and, when properly sawed, showing a beautiful grain, it is an excellent wood for wainscoting, panels, and newels."

Dining Room of "Darlington," Ramsey, N. J.
James Brite, Architect
Woodwork and all carving of California redwood, straight burl grain, quarter-sawed

CHERRY, as used for interior finish, is a distinctly valuable wood, though it belongs to a large family. Most of the cherries, however, are trees of growth too small for lumbering, and some, again, are of greater use as bearers of fruit. Next to walnut, cherry is classed as the most expensive wood produced in the United States. Its scarcity is attributed to the waste of early pioneer days (which "hind-sight" now deplores in connection with many other fine native woods) and though there is but little on the market, it is supposed that it will always be obtainable. Cleverly finished, cherry is often substituted for mahogany, and, it is interesting to note, is in turn imitated by sweet birch, finished to resemble it. Many a "mahogany" stair-rail is cherry in disguise. Fortunately, all three are good woods for the purposes they are used for, and the deception is one of market value more than of actual fitness for service.

Edge Grain

Slash Grain

California Redwood

Cherry is a wood not at all inclined to check or warp, and this qualification, together with its rich color and the lustrous finish it will take, makes it highly valuable both in furniture and interior finish.

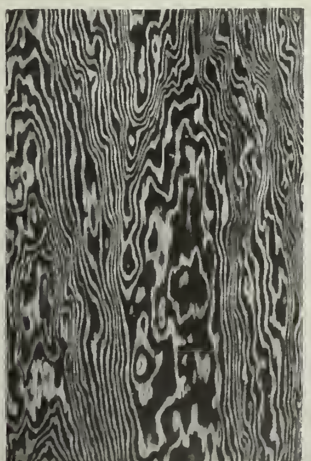
YELLOW POPLAR is seldom used as interior finish unless painted, as its general run displays little or no figure. In selected stock, quarter-sawing makes rather an attractive showing of the annual rings. Physically, yellow poplar is not regarded as a wood of great strength, and is rather brittle, though considerably used as flooring. It has always been in great demand for boxes used as containers of food products, because it is white, clean, and without odor of any kind.

It is one of the woods largely used to imitate more expensive woods — notably birch, cherry, and mahogany — and is used as much for core-wood in built-up panels as for veneers. It is said that a great many wide and handsome wood panels in railroad cars, apparently of mahogany, birch, or cherry, are, in reality, yellow poplar, skilfully finished, and the deception further hidden by a high polish, to which yellow poplar is better adapted than any other native wood.

WHITEWOOD, the wood with which we are all familiar in the form of partitions in desk drawers, does not really exist as a growing tree. It is actually the whitewood cut either from yellow poplar trees or from cottonwood trees.

Of the latter there are eleven recognized species in this country, very widely distributed and of greatest quantity and individual growth in the Mississippi valley. Cottonwood, unless very well seasoned, is a difficult wood to handle on account of its tendency to warp and check, for which reason very little was cut until the modern dry-kiln methods, which brought red gum and tupelo on the market, were perfected.

Slightly brownish heartwood is sometimes found, though the wood, for the most part, is uniformly white, with very little distinction between annual rings and with medullary rays which are so indistinguishable as to make quarter-sawing quite useless. As a wood for exposed finish, cottonwood lacks



"Douglas" Fir
Showing Typical Grain

Reading Room, Lumbermen's Building, Panama-Pacific International Exposition, San Francisco, Cal.
Bernard R. Maybeck, Architect

Wall and ceiling panels are of rotary cut, three-ply veneer, "Douglas" fir, treated with two coats of a solution composed of wax and turpentine, thoroughly rubbed after each coat. Stiles and rails and ceiling beams are of vertical grain "Douglas" fir. A room similar in size and architectural treatment in this building is finished in California redwood, without any treatment save sand-papering. The panels are in one piece of solid boards, one inch thick and forty-eight inches wide.

Western Hemlock
Illustration is ½ Width of Specimen

the character and interest necessary for exposed woodwork, and finds its greatest use in panel-cores, cabinet-work, partitions, and shelving. The wood is used to some extent in the manufacture of furniture and interior trim (especially mouldings), as it is easy to work and has an even and consistent grain.

MAPLE exists in a number of varieties and in several grades of hardness and softness. Of these, red maple is medium and is extensively used as a material for the manufacture of flooring, interior finish, and veneering. Red maple, as well as sugar maple, sometimes displays the "bird's-eye" figure considerably used in furniture, while curly and wavy grains are also found. The "bird's-eye" figure is not so likely to appear in Oregon maple. All the maples are of fine, hard, compact grain, requiring no filler and taking paint and enamel excellently. Most often they are seen finished with transparent varnishes, especially in any maple with a wavy or "bird's-eye" figure.

Quarter-Sawed Yellow Poplar
Illustration is 1/5 Width of Specimen

Maple flooring is regarded as a standard product of excellent properties for the purpose.

BEECH is a tree which the botanists and foresters have not confused by naming a dozen or so "species." It stands as the one and only of its name.

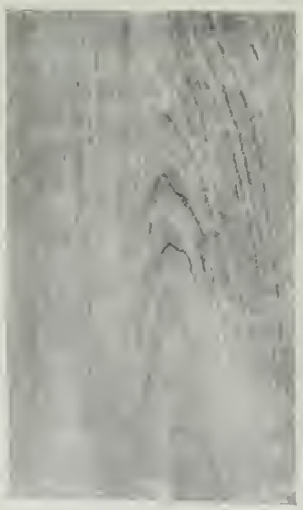
We do not hear of its extensive use as a material for interior finish, but its value as a material for floors is worth noting. It is said that in nearly all large mills where the staple output is maple flooring stock, a "side-line" of beech flooring is carried. Millions of feet of this lumber, indeed, go into flooring, which, though not so readily worked as maple, lays better. Certain selected beech, known as "pure red," is much sought after for ornamental parquet floors. Like red gum, beech was not among the earlier woods of popular use, though now it finds ready demand in many markets, though chiefly for flooring and for the manufacture of furniture.

RED CEDAR is essentially an "out-door" wood and extensively used in the manufacture of shingles, but it also has some peculiar uses in connection with interior finish.

It is a wood rapidly becoming scarce on account of the enormous quantity employed in the making of lead pencils. One lead pencil does not consume a great deal of wood, but a hundred million lead pencils consume a great deal, and we do not stop to think that, in a small way, we are whittling away our cedar forests every time we sharpen a pencil.

Red cedar has a close, straight grain, except for its many knots, is rather brittle and is very easily worked. The red color of the heartwood and the white of the sapwood often appear together in boards cut from small cedar trees, the contrast producing a unique effect, especially in stock which contains numerous knots. It takes paints and varnishes well, and seasons thoroughly, so that there is little difficulty from warping or checking, to be experienced in using it.

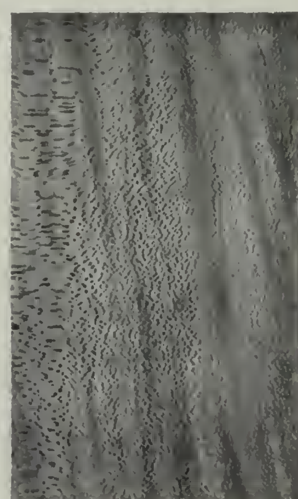
Its most important use in finish is the lining of clothes closets, because its aromatic odor which, to us, is most agreeable, is particularly offensive to moths. Red cedar is, consequently, much used in the manufacture of chests for the household storage of clothes and furs, as well as for the lining of closets.



Straight Grained Cherry
Illustration is 1/5 Width of Specimen

Paneled Room in the Arden Gallery, Fifth Avenue, New York
Hewitt & Bottomley, Architects

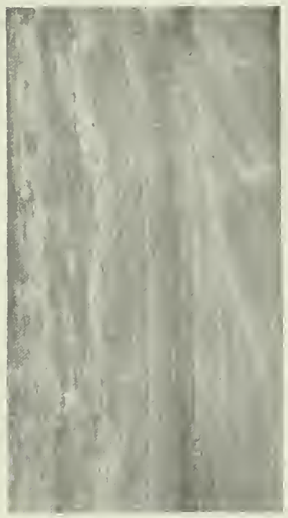
The paneling and all trim is of yellow poplar treated with transparent stain, wax, and then with powder containing blue pigment resulting in a soft, gray tone.



Quarter-Sawed Sycamore
Illustration is 1/5 Width of Specimen

BASSWOOD is not very frequently found in uses where its natural appearance would be required to play a part, as the absence of grain or figure makes it characterless. It is at its best when made into tongued-and-grooved ceiling, for it is easy to work, and its softness makes it possible for carpenters to drive the boards together, forming a tight ceiling. It is soft for flooring, compared to maple, birch, or beech, and is a better material for the cores of built-up panels, or for entire panels which are to be painted. Its freedom from warping, its fine, even grain and smooth, lustrous texture make it the principal wood used in the manufacture of rulers, in which guise one may examine it at first hand without moving from one's desk.

Straight Grained Maple
Illustration 1/7 Width of Specimen



Straight Grained Tupelo
Illustration 1/2 Width of Specimen

SYCAMORE is an interesting wood, not very extensively used, and desirable chiefly if a unique effect is desired. Contrary to general supposition, it is not growing alarmingly scarce, although large quantities are yearly consumed by furniture manufacturers. Compared to other woods, it is difficult to work, but rewards the user by a peculiarly rich appearance in the figure displayed by quarter-sawing. Being a hard, fine grained wood, it finds some use as borders and small squares in parquet flooring, and its appearance, when used in broad panels, makes it highly desirable where fine woodwork is required in interiors, yacht-cabins, and parlor-cars. Its natural color is a variegated reddish yellow, and its close grain requires no filler. Like walnut, one cannot imagine sycamore being painted because its distinctive natural appearance is the principal, if not the only, reason for its selection.

Library. Office of Hewitt & Bottomley, Architects, New York City
All paneling and trim of birch

TUPELO is a wood more often used than heard of, for the reason that it has for some time been put on the market as a substitute for poplar. It has many local names and is applied to three species of gum trees.

Like red gum, it once was not considered available for use on account of the difficulties experienced in seasoning it; and since these difficulties have been overcome, its use has increased.

It may be said to be a reasonably good substitute for yellow poplar, and often appears as such in paneling and cabinet work; considerable quantity also is cut for veneer.

MESQUITE is a peculiar wood, very little used in interior finish, though of unusually interesting, natural appearance. It is quite plentiful and is shunned by carpenters chiefly because it is so extraordinarily hard to work. In spite of this, it is rated as a high-grade furniture material.

It is said that logs of mesquite even 12 feet long are quite rare, because the tree is a gnarled, deformed one, though often 3 or 4 feet in diameter. It has a tendency to fork near the ground and to branch frequently, so that only short lengths are obtainable. Width is more readily had and mesquite wood makes panels of unique richness and interest, the same piece showing a variety of tones. Its general color is a little lighter than mahogany, though some tones are as dark as black walnut or as red as cherry.

The wood takes a fine, high polish, and is used a good deal for turned work and, since there is a natural length limit to such work, the short lengths of mesquite are no detriment. For turned spindles in railings or grilles, mesquite is not at all inferior to mahogany, cherry, or teakwood.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

AFTER every fire horror or collapse of a building, that is, each time a number of lives are lost through what seems to be the negligence of some public official, or which could have been avoided by previous legislative action, there follows a great noise of protest and consideration of means to prevent a repetition of a similar disaster. A great deal of good legislative regulation has come from these experiences, but unfortunately there is not always a full realization of the importance of the lessons to be learned. It is, in fact, a matter of record that within six months after the holocaust of the Collinwood school fire plans were filed in the state of Ohio for a new structure of exactly the same type.

It was the Collinwood fire in 1910 that really awakened the people of the country to the dangers from fire which existed in the school building, and during the last five years many states have passed laws planned to regulate against future disasters of the same character. While a great deal has been done in the right direction, no single state to-day is really well protected in this matter, although Wisconsin approaches more nearly than any other. In some states there are laws which are invalidated by lack of providing a penalty for their violation.

The recent fire in a school at Peabody, Mass., which resulted in the loss of life of many children, has again aroused public discussion, and it is natural that this discussion should be most lively near the scene of the disaster. A meeting was held in Boston on the 9th of this month at which different speakers considered the various phases of the question before an audience which, by its representative character, clearly showed the widespread interest aroused. The outcome was the appointment of a committee of fourteen, consisting of architects, fire chiefs, school superintendents, and fire prevention engineers — a committee which is to study the problem thoroughly and work for the passage by the incoming legislature of preventive laws, either of their own origination or which have been suggested by other boards of investigation.

There will, undoubtedly, come from this much helpful legislation and those throughout the country who are interested in the protection of the public would do well to observe the results in Massachusetts.

THE course of legislation, however, is slow. A great amount of the burden, therefore, lies on the architect and the way he handles his work. He has an opportunity to incorporate in his design preventive construction which is not provided for by legislation and, by holding to such features even against the opposition of authorities who seemingly fear to face the problems being raised, to do much toward eliminating loss of life.

There are two aspects of this question of prevention. One is the prevention of fire and the other the prevention of panic. In each of the two disasters, the Collinwood fire and that at Peabody, the deaths have been the result of panics, but, at the same time, the panics have been the result of fires.

While there are many suggested means of avoiding panic such as a certain number of stairways to a certain number of class rooms, the elimination of corners near exits, and the simplification of corridors, the most efficient schemes will be those which tend to eliminate fear from the minds of the pupils. For this purpose there should be provision to stop the escape of smoke from the basement. Almost all serious school fires have started there, and panics have started from the smell and sight of smoke throughout the building, and not from the sight of flames. It would seem that there should be fireproof doors with automatic springs closing both the top and bottom of all basement stairways.

The most profound suggestion we know of, however, is that made by an expert in the employ of the New York City commissioners. He has pointed out that stairways are not proper means of exit. A person descending a flight of stairs demands a vacant step between himself and the person in front of him in order to make progress; but under emergency conditions this spacing cannot be preserved and blocking completely checks all progress. The suggestion made is that school and factory buildings should be divided into two sections from cellar to roof by a fire wall with fire doors in it on each floor level. This would provide a means of "horizontal escape" by going from one section to the other to take the place of the impractical "vertical escape." The incorporation of such a dividing wall would undoubtedly do a great deal toward the total elimination of panics.

The elimination of disastrous fires is gradually coming about through the construction of so-called fireproof buildings. It is, however, frequently impossible to make the whole building fireproof, but the fireproofing of basements and stairways is a matter for the architect to insist upon. Fire-stopping of partitions and of floor spaces and the provision of sprinklers in the basement are other matters for the architects to consider.

While many communities have local regulations, there are only six states in the union that have state laws in force to-day governing the construction of school buildings. The safety from panic and fire must depend, then, not entirely upon a compliance with the laws, but upon a thoughtful consideration by the architect of the problems involved and an effort by persistent insistence to incorporate the best means of prevention possible.

THE BRICKBUILDER

VOLUME XXIV NUMBER 12

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PLATE ILLUSTRATIONS

LETTERPRESS

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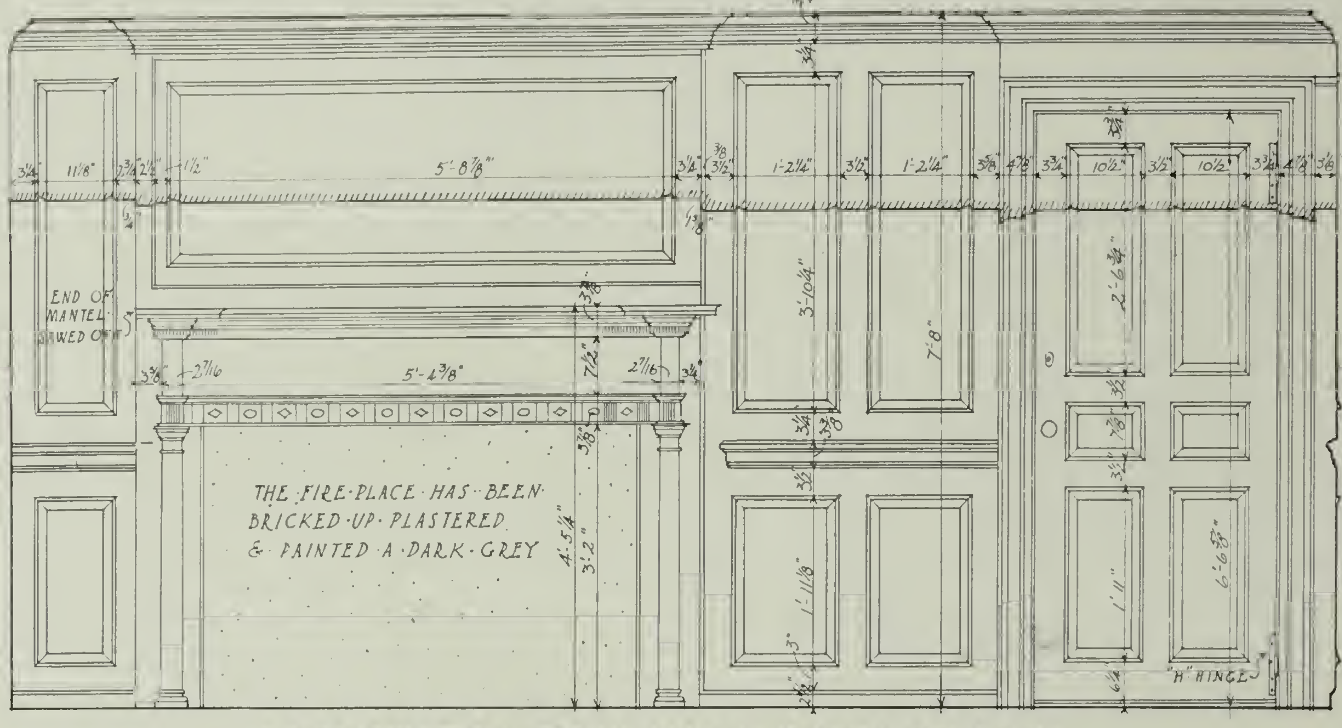
THE BRICKBVILDER COLLECTION

EARLY AMERICAN ARCHITECTURAL DETAILS

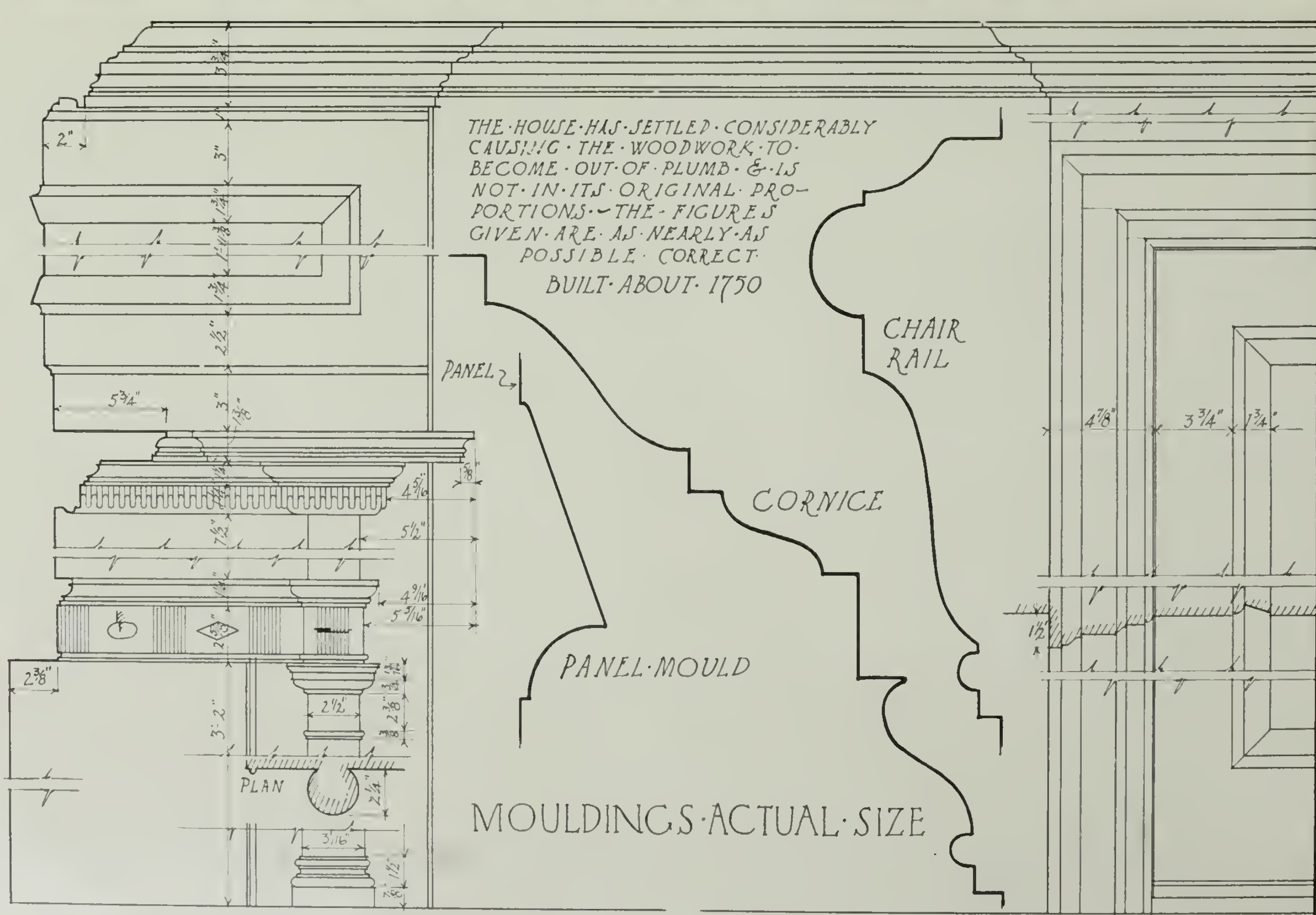
PARLOR IN HOUSE AT 94 FEDERAL STREET, SALEM, MASS.

MEASURED AND DRAWN BY GORDON ROBB

(over)



ELEVATION·ONE·HALF·INCH·SCALE·



MANTEL – ONE·&·ONE·HALF·INCH·SCALE·DETAILS – DOOR·

PLATE·12 DECEMBER 1915	·SIDE·OF·PARLOR·TOWARD·HALL· ·HOUSE·AT·94·FEDERAL·ST·SALEM·	MEASVRED·& DRAWN·BY GORDON·ROBB

FRONT OF RONDA CATHEDRAL, RONDA, SPAIN

THE BRICKBVILDER

VOLUME XXIV DECEMBER, 1915 NUMBER 12

The School Building as a Social Center.

PART I.

By DWIGHT H. PERKINS.

A LARGE number of school buildings have been erected which have been planned for adaptation as social or neighborhood centers, and the number is increasing in rapid ratio each year.

The desire to establish social centers as such is only a secondary cause, however, for the increase in the number of such schools. The primary causes are the expanding demands of education, which are multiplying the functions and increasing the requirements for something more than mere class rooms in our public schools.

A modern school problem, properly conceived and fully stated, requires the architect to plan a structure which is in itself a neighborhood or social center for daytime use by children. At the same time he automatically plans a social center building for adults to be used outside of school hours. There is no essential difference between the two; the only difference remaining relates to the size of furniture for children and for adults, and this is becoming gradually simpler as the use of fixed seats and desks is discontinued.

The problem is, therefore, when schools are properly planned as schools, principally one of administration. First throw away the key to the front door, engage extra engineers and directors, arrange and announce a program, and the result is sure to be a neighborhood center in full action.

To establish social centers a community must first engage the *man* or *woman* who shall be leader; second, make a program vitally related to local problems, and third, erect a modern school or revise the old one to provide physical facilities.

The school, by its relation to all of the people, regardless of divisions of politics, religion, or wealth, is the only institution which can be made to serve as a neighborhood or social center. It alone is possessed by all the people. It fills a need not met by any other type of building. It alone can justify the expenditure of public money for its construction, and it alone can give to the people a social center without expense, when it is properly planned as a modern school.

At the same time it gives to the architect the greatest opportunity for display of his talents of any type of modern building for which there is great and increasing demand.

It therefore follows that if we would study community centers (we may as well drop both adjectives, "social" and "neighborhood," and substitute the one inclusive word "community"), we will have to consider the latest development of the school and state, its requirements, its functions, and facilities.

We will pass by the one-room district school and give our attention first to a community where there are five hundred children under high school age. The modern educator asks for these: twenty class rooms, because he will object to more than twenty-five pupils for each teacher; he asks for a shop for manual training, a room for cooking and sewing, a central auditorium large enough to seat the whole school and having entrances and exits of its own; a gymnasium, a library, book and reading room; a sitting and rest room, with kitchenette for the teachers, which shall be large enough for neighborhood committees and mothers' conferences; a polling place with booths for the voters, administrative offices, emergency room, toilets, storerooms, bicycle space, heating and plumbing facilities, etc.; in addition, a playground of at least three acres — more, if possible.

What more could the most enthusiastic community center secretary demand?

The same modern educator, if desiring a high school, would add to the above rooms and facilities for scientific study not pursued in elementary schools, shops for metal work required in a course of four years of manual training, a large lunch room, a separate gymnasium and field for girls, a natatorium, a museum of art and natural history, and some day, not far off, a home for the principal.

The playground for such a high school should contain not less than six acres.

These statements of requirements are definitions of the modern public school. Such schools have been developing gradually for a number of years. One may trace their appearance by reference to the departure from square three-story, box-like buildings of the eighties, which consisted merely of a number of ordinary class rooms and stairways.

The response to the desire for assembly space was the first step in the design of the modern school. This first step consisted of some form of portable partition between two class rooms, then between two class rooms and the adjacent corridor, so that rooms or rooms and corridors could be thrown together for assembly use.

The separate hall with a small stage followed. All of these were in the third or top story, frequently run up into the roof with high ceilings and of increasing attractiveness.

The greater demands of the public and a few fires caused a rapid change in school building, and between 1900 and 1905 first-story assembly halls became general. Seating capacity and stage dimensions have steadily increased; rear stage access is being provided, and in many cases the whole assembly portion is being put on the ground level at one end of the building or in a separate wing; so that at the present time we find the type generally indorsed and frequently built, which provides perfect accommodations for the school and all that a neighborhood needs for community center auditorium purposes.

But community centers do not thrive on auditoriums alone — they need gymnasiums as well; and a similar survey to the above discloses the original school gymnasium as a corridor merely. Then we notice it widening, then occupying basement space under the assembly hall, and again exchanging places with the assembly hall, going in above it when the hall is located on the first story level. Sometimes the gymnasium and assembly hall are on the same level, separated by portable partitions, so that either can be expanded temporarily by spreading into the adjacent space. And better still, we are now beginning to see separate ground level gymnasiums with special entrances which make neighborhood use easy.

What is true about assembly halls and gymnasiums is also true in a lesser degree about space and equipment for manual training and domestic science. These rooms may be traced from incidental beginnings and basement unused spaces to quarters as well built, finished, lighted, ventilated, and equipped as any other parts of the school, and they also are coming to be used by the older members of the community outside of school hours.

Night schools for all the daytime subjects, as well as evening clubs for the study of neighborhood problems and the elevation of citizenship, are coming more and more to use the class rooms and facilities provided for ordinary school purposes; and the kindergarten, formerly an ordinary class room, or worse, has become a department by itself, with separate entrances, toilets, wardrobes, workroom, play space, and plenty of morning sunlight. In the evening it is a perfect club room for a hundred neighbors.

The development of the public library system in cities has gone on until now one expects to see a library station, with distributing center and reading room, in each school, and in many modern buildings he is not disappointed.

No modern school is a school if it does not have a playground, and communities are becoming intelligent enough to see that school boards and park boards are overlapping — that neither the school building and playground nor their administration should be separate. They are so closely interwoven that their successful conduct depends upon one board with a coördinated plan. The same may be said of schools and libraries, and schools and polling places, now that saloons are becoming less popular centers of citizenship control. In fact, schools, high schools, parks, playgrounds, gymnasiums, kindergartens, libraries, clubs, forums, polling places, natatoriums, bathing facilities, vocational shops, provision for music, for choruses, festivals, and pageantry — all these are a part of one educational system. There is no antagonism between them; instead, each division helps the other to attain its best results, and the architect who builds his schools upon that general proposition will insure a much longer period of serviceableness of his buildings for his clients, the parents and children, than would be the case if he narrowed down his design to provide for a few functions only.

We will be able in the next article in this series to show by illustration a number of school buildings in use, or about to be, and to mention those features which relate to the subject of this article. We shall endeavor to show wherein they are available for community use, and in a few instances we shall be able to describe not only the neighborhood use which is possible, but also the service of that kind which they are actually giving in certain localities.

A very important contribution to the development of the modern school has come from the recreation buildings and community centers erected in numerous small parks. There is no feature in such buildings which should not be incorporated in the school plant, or as is the case in Gary, Ind., the schools should be built in the parks and the management be all under one board for one community purpose.

Assembly Hall, showing Kindergarten on Upper Level, in Lincoln Wood School, Evanston, Ill.

Perkins Fellows & Hamilton, Architects

The Use of Native Woods for Interior Finish.

PART IV. (Concluding Paper.)

By C. MATLACK PRICE.

OAK is a historic wood both in this country and throughout most of continental Europe — a wood of sterling qualities and many uses. It is said, indeed, that while oak is not so suitable for certain uses as certain other woods, it is the best suited to the greatest number of uses. The term "solid oak" strikes a note in the mind as definite as "solid silver" — inquiry or speculation as to its properties proceeds no further.

Stairway of Oak in House at Haverford, Pa.
Wilson Eyre & McIlvaine, Architects

In classing the oaks it would serve no purpose, and lead only to confusion, if an enumeration were given of the twenty-seven species of "white oaks" and the twenty-five species of "black oaks." The designation "white" and "black" is, moreover, only a botanical distinction, and one rarely, if ever, taken account of by lumbermen. Of the "white oak" division, the tree known as white oak heads the list, while in the "black oaks" division the tree called "red oak" is considered the leader.

Broadly speaking, the properties of all the oaks are similar. Some may be tougher than others, some may be more resilient, some heavier, some may better withstand weather than others, some may be peculiarly adapted to staining or fuming, but good qualities pervade all.

We all know oak as a strong, tough wood, remarkable for its suitability for exposed work and for its combined structural and decorative values, as well as its adaptability to carving.

It was said above that oak is a "historic" wood — and it was intended to imply the association which is one of our legacies from the Old World. The term — "a room of oak," "oak wainscoting," or "oak paneling" — calls to mind at once the time mellowed interiors of old English mansions or the smoke blackened ceiling rafters of some venerable tavern or coffee house. Innumerable associations that are a deep rooted part of the race to which we belong cling around the very mention of "old oak."

The associations, which might almost be called "literary," are, in a way, peculiar to oak, and are a much greater factor in popularizing its use for interior work than might be supposed. But since these traditions are common property, it is not necessary to do more than remind the reader of their potency, which years have not lessened.

The greatest concern of the present generation should be the conservation of white oak timber and the planting of stands for future generations, because the best lumber (especially for quarter-sawing) comes from oak trees of one hundred and fifty years or more of growth. The impatience of the present day does not wait one hundred and fifty years for timber to reach its

Straight Sawed Oak
Illustration ¼ Width of Specimen

Oak Hall in House at Haverford, Pa.
Wilson Eyre & McIlvaine, Architects

Quarter-sawed Oak
Illustration ¼ Width of Specimen

growth, and although this country has had vast stands of oak over considerable areas, it is easily possible to foresee a time when large lumber operations in oak will be a thing of the past.

The heartwood of oak is naturally light brown in color, with only a comparatively thin ring of sapwood. Its most striking physical characteristic is its pronounced formation of medullary rays, and the use of these for "figure," as produced by quarter-sawing, is equaled by no other wood in the world. We are all familiar with the appearance of quarter-sawed oak, notably in office furniture.

The furniture makers use enormous quantities of the wood in "period" furniture, as well as in "mission," "craft," and "cottage" furniture, and oak is largely used as well for a veneer wood on "built-up" panels. Sentimentally, there are few people who would not prefer to know that the paneling of their room is "solid oak," even though practically a "built-up" panel is more likely to withstand warping and shrinking.

The adaptability of oak to carving was mentioned, and this is one of the most conspicuous properties of the wood. Not only massive and vigorous designs, such as grotesques, corbels, and brackets (indoors or out), may be hewn from oak, but carving of remarkably fine scale and detail may also be executed. One of the most splendid examples of carved oak in this country is the ceiling of the Exhibition Room, on the main floor, and between the two courts of the New York Public Library.

Private Office of Mellor & Meigs, Architects, Philadelphia, Pa.
Panels are of English oak ; remainder of woodwork is American oak

Speaking again of the different varieties of oaks, one difficulty in this connection arises from the existence, in some cases, of several popular names for the same tree, and in general from the failure of the millmen to make any distinction, even if the logs have come in from the lumberman separately and with different designations.

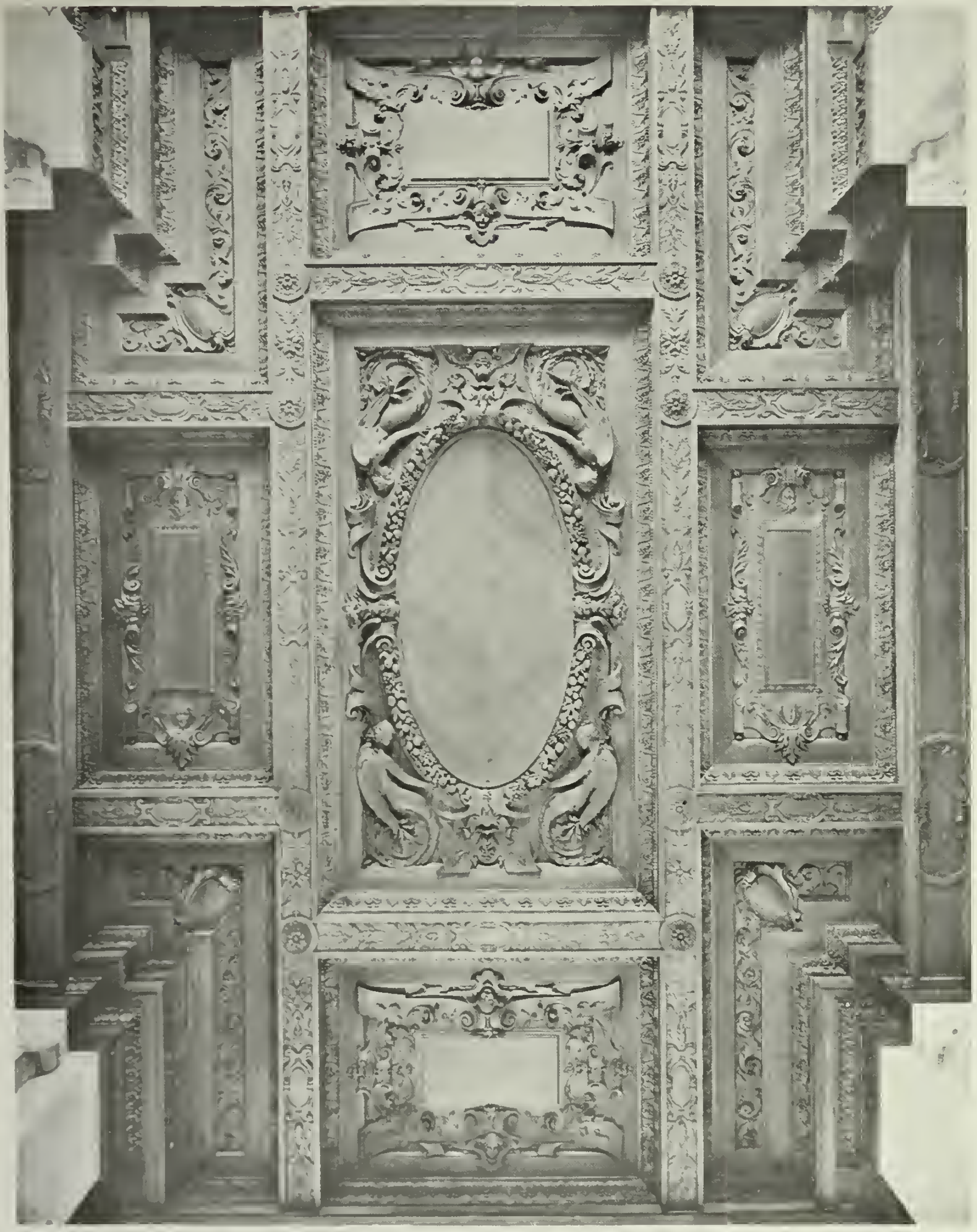
Quartered Oak Paneling in Dining Room, President's House, Columbia University, New York
McKim, Mead & White, Architects

Furthermore, the minor differences in physical properties do not greatly affect the uniform suitability of the wood for use as interior finish, though if certain specific effects are desired it is always well to buy the wood from a sample than to buy it merely by name.

Oak is a porous wood, with long pores running the length of the log. These pores, when the wood is quarter-sawed, naturally present open ends, while straight-sawing also lays open many pores longitudinally. These pores afford opportunity to force stains well into the wood and make it peculiarly susceptible, as well, to any process of fuming.

ELM is found in this country in six species, or varieties, of which white elm is the best known to the lumber trade. All the elms are of nearly similar properties, and white elm, slippery elm, and cork elm are commonly classed together as "northern elm." In early lumbering days elm was cut considerably in Michigan, while throughout New England, as well as the Middle Atlantic states, it has long been highly esteemed as a shade tree.

In its structure elm is strong and tough, and while it does not possess a great deal of character, it is possible to bring it to a fine appearance with stain and polish. Quarter-sawing of elm brings out no figures, as the medullary rays are not prominent.



OAK CEILING OF EXHIBITION ROOM CARVED FROM THE SOLID

CARVED OAK SCREEN AND DOORWAY IN READING ROOM

CARVED OAK DETAILS IN THE NEW YORK PUBLIC LIBRARY, NEW YORK, N. Y.

CARRÈRE & HASTINGS, ARCHITECTS

Although not so widely heard of as many other native woods for interior finish, it is stated in Gibson's "American Forest Trees" that the state of Michigan alone sends 50,000,000 cubic feet of elm to its factories annually, and of this total, 2,000,000 cubic feet go to the furniture factories. Furniture making, whether one considers the exposed portions or the framing, is a good criterion for the adaptability of a wood for interior work, because the same properties which are essential in one use, such as the thoroughness with which it may be seasoned, its appearance, and its manner of taking stains, are equally essential in the other.

Carved Oak Reredos with Quarter-sawed Panels

THE PINES are divided, in commercial usage as well as by foresters, into two groups, — the soft pines and the hard pines. In the first division there are listed twelve varieties, and in the second, twenty-two, and in both it is important to always bear in mind that no other wood varies so in its different "grades," and that great care must be taken first to specify exactly the grade desired, and then to see that all the stock conforms to the grade sample selected and approved. "Y. P.," for instance, meaning yellow pine, appears in many specifications; but there are widely different grades of this lumber, as with all the other pines.

While the properties of all pines, with regard to interior finish, are broadly similar, there are certain differences and peculiarities worthy of note not only as between the "hards" and "softs," but in different varieties in each division. The designation "soft pine" originated as a means of distinction from the heavier "pitch pines." Occasionally one hears the terms "pumpkin pine" and "cork pine" — these, however, only in speaking of the wood itself, and with reference to the even, homogeneous grain of perfect lumber from old and well-grown white pine trunks.

The usual "white pine" of commerce is one of the softest and most easily worked of all woods used in building. Considering its lightness, it compares reasonably well for strength with other woods, though it is valuable chiefly for characteristics not dependent upon strength. Most pines are trees of rapid growth, so that the annual rings are clearly defined in cross-section, being more pronounced in some species than in others. Medullary rays cannot be considered a conspicuous feature.

White pine has always been popular with the carpenter because it works with great ease, does not split when nailed, and holds its form better than many more expensive woods after it has been seasoned.

This property makes soft pine a much used wood for sash and doors, and for the cores of "built-up" veneered panels.

In its natural appearance soft pine, in the varieties most frequently met with, presents a considerable variety of "figure," often not at all unlike cypress. The body color of the wood, unstained, is cream; the "figure" formed by the difference in color of the two growths is a reddish brown or orange color, and is displayed in quarter-sawed or "rift-sawed" stock.

Being almost entirely free from resin, this wood is an admirable base for any kind of enamel or paint, or, if it is desired to bring out the natural interest and beauty, for the application of any kind of transparent stains.

Oak Paneling in Den of House at Chestnut Hill, Pa.
Mellor & Meigs, Architects

Ammonia Fumed Oak Finish in Goshen Inn, Goshen, N. Y.
Walker & Gillette, Architects

An important white pine is the western white pine, which is now shipped in considerable quantities as far east as Chicago to be manufactured into doors and trim. Another western soft pine is the "sugar pine," which is said to be more immune than the white pine of the East from tendency to shrink, swell, or warp. The appreciation of the former large stock of high-grade white pine has created an eastern market for the western pines, though only the higher grades are profitable to ship, which leaves the lower grades, in both the East and the West, supreme in their own markets.

The hard pines, though harder than the soft pines, are, in turn, considerably softer than most of the "hardwoods" used in interior finish. "Shortleaf" pine, for instance, though actually listed as a "hard" pine, is nearly always alluded to as "soft," to distinguish it from still harder pines in the "hard" group. The "shortleaf" is an important wood, of numerous uses which follow the various grades in which the lumber is marketed — from stock for such rough work as plaster-lath and packing-boxes to stock for use in the manufacture of furniture and interior trim. It is known, also, and perhaps more widely, as "yellow," or "southern yellow pine."

Living Room in House of James Hopkins, Esq., Brookline, Mass.
Kilham & Hopkins, Architects
Walls of wide North Carolina pine sheathing

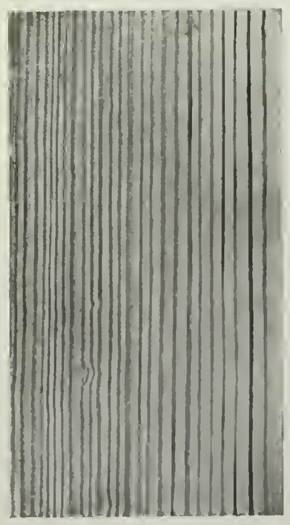
In 6-inch widths it is used for under-flooring, with 2¼-inch tongued-and-grooved stock (of better grade) for upper flooring. For single-flooring a good grade of the same width, tongued-and-grooved, but heavier, is often used. "Shortleaf" pine is an abundant wood in this country, widely available and widely distributed, which makes it a distinctly inexpensive wood. It is not a cheap wood in the sense of being inferior in its own way, nor is it a wood (except in its lower grades) for cheap work. While it does not cost as much as some lumber used for interior trim, it compares very favorably in appearance and service with many more expensive woods. Being softer than the variety known as "longleaf" pine, "shortleaf" is preferred by the manufacturers of sash and doors because it is far easier to work. It is often preferred to the "longleaf," also for interior trim, though the figures are quite similar. The wide annual rings in the heartwood when quarter-sawed display effective coloring and figure, which may be further enhanced by staining.

Very similar to the "shortleaf" pine is the "loblolly," locally known by several other names — a yellow pine and similar as well to the variety known as "Cuban" pine. There is, in fact, a great similarity in the four most prominent of the southern pines,— the shortleaf, longleaf, loblolly, and Cuban,— and it is said to be very difficult to distinguish one from the other upon mere superficial inspection of the wood.

Summarizing the properties and uses of the "shortleaf" pine, a concise and authoritative summary appears in one of the reports of the United States Forest Service: "It is the opinion of those who have studied the shortleaf pine's habit of growth and the extent of its natural

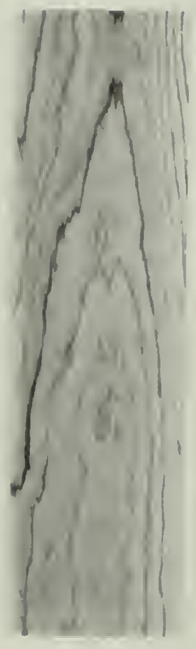
Straight Grain of Hard Pine

Committee Room, Lumbermen's Building, Panama-Pacific International Exposition, San Francisco, Cal.
Bernard R. Maybeck, Architect
The walls are of California white pine in wide panels of veneer and matched stock. The furniture is of California sugar pine



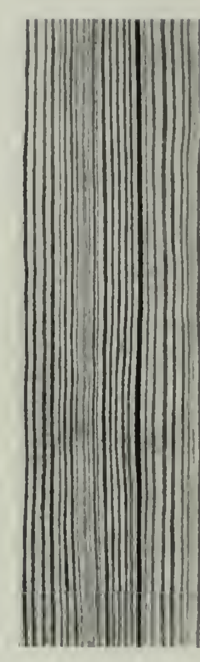
Edge Grain of Hard Pine

range that it promises to continue as one of the important timber trees of the South. . . .



Straight Grain, Soft Pine

Door and Trim of Curly Pine



Edge Grain, Soft Pine

"Furniture makers, who use yellow pine in considerable amounts, find shortleaf an admirable wood. It is worked into frames, goes into the interior of couches, tables, stands, and desks, and in the cheaper grades of similar articles may appear as the outside, visible part. The grain is handsome and shows well in natural finish or when stained.

"Inside and outside trim for houses is manufactured from shortleaf pine. It is widely used for flooring and is recommended both by appearance and because of its wearing qualities.

"It responds readily to oils, wax, and other floor finishes and dressings.

"It answers equally well as wainscoting and ceiling, for chairboards, baseboards, brackets, mouldings, cornices, roseblocks, ornaments, carved work, spindles, balusters, railings, stairs, and panels. Window frames and frames for doors, and the doors themselves, and sash are largely manufactured from this wood."

Straight Grain of Elm

The "longleaf" pine is very strong, as well as being the hardest of the pines, is tough and compact and resinous, though the resin ducts are few. The color is a light orange, sometimes reddish, with almost white sapwood.

The figures in this variety of pine, as in the others, do not result from medullary rays, which though numerous are inconspicuous, but from the marked difference in color between the spring and summer growths. The dark colored summer wood, which gives "longleaf" pine its strength, predominates in each annual ring.

Much of the value of this wood for interior finish comes from its striking figure, especially important in the manufacture of doors, and great variety and interest may be displayed by selecting the stock with care and with consideration for its figure possibility.

Norway pine is still considerably used for interior finish, though we are apt to think of it more to-day as an ornamental tree — more in the province of the landscape architect than the architect.

Pitch pine is an inclusive name applied in different localities to different varieties of pine, though usually considered as including all those of a hard, resinous nature. The quantity of resin in pitch pine naturally renders it unsuitable for many kinds of work, and the variation in hardness between the summerwood and springwood causes uneven wear, if used in a floor, as well as general difficulty of working.

The soft white pine and the hard shortleaf, or yellow (also called "soft"), and the hard longleaf pines are the most suitable for use as interior finish and are the most generally used.

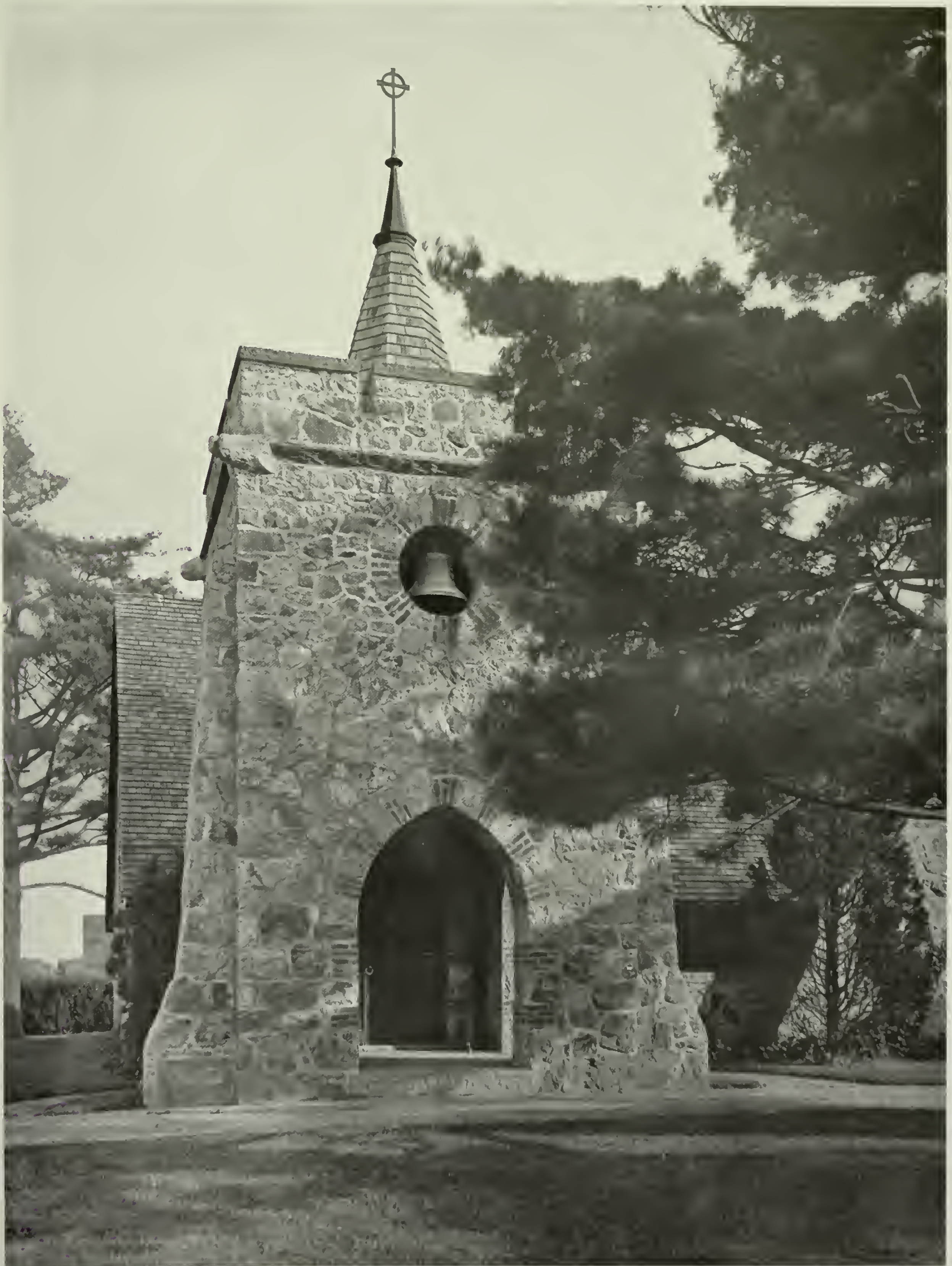
This and the previous papers cover, with necessary brevity, the woods native to America which are most adapted to use as interior finish. Much interesting data gave place to that which seemed most essential, and the intention throughout was to call to the attention of the practising architect the variety of native woods at his command — a variety in physical properties, in appearance, in adaptability, and in cost.

Club Room Finished in Gray Elm, Cadillac, Mich.
The paneled room shown through the wide opening is finished in western hemlock

It is true that among the foreign woods there are many interesting possibilities as well — at much higher cost — with such materials as mahogany, teak, French and Circassian walnut, and Hungarian ash; but the architect, however, will find profit in giving attention to the consideration of the great problem of conservation of some of the finest native woods which future generations will require.

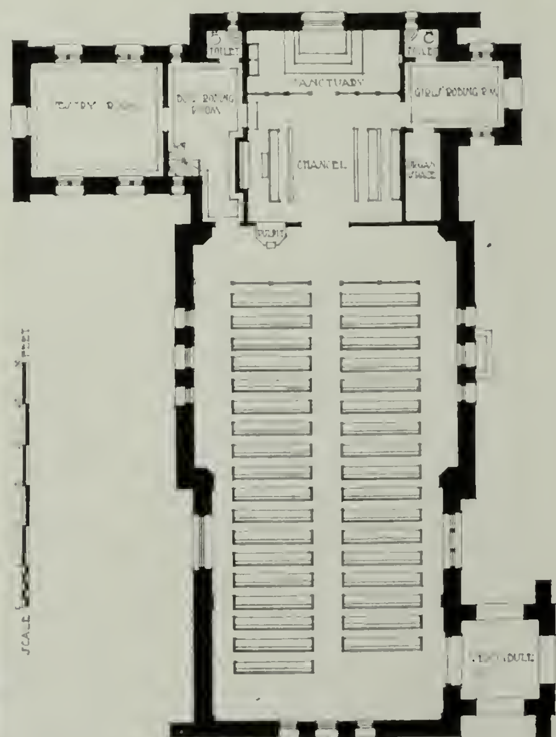
Episcopal Chapel at Westbury, Long Island.

JOHN RUSSELL POPE, ARCHITECT.



GENERAL VIEW OF EXTERIOR

ENTRANCE TO GIRLS' ROBING ROOM



GROUND FLOOR PLAN

EPISCOPAL CHAPEL AT WESTBURY, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT

EXTERIOR VIEW OF PARISH HOUSE

INTERIOR VIEW OF CHAPEL, LOOKING TOWARD CHANCEL

EPISCOPAL CHAPEL AND PARISH HOUSE AT WESTBURY, LONG ISLAND, N. Y.

JOHN RUSSELL POPE, ARCHITECT

Plymouth Congregational Church, Chicago.

RIDDLE & RIDDLE, ARCHITECTS.

B'Nai Jeshurun Temple, Newark, N. J.

ALBERT S. GOTTLIEB, ARCHITECT.

THE B'Nai Jeshurun Temple is placed on a plot approximately 100 by 225 feet, the narrow frontage being on High street and the long one on Waverly avenue, with an alley at the rear leading to Quitman street. The building sets back 25 feet on High street, but occupies the remainder of the plot. It faces east with the altar at the west end and the organ in a gallery at the east end.

The structure comprises the auditorium proper and the religious school building adjoining. The auditorium seats 1,600 people — 1,250 on the main floor and 350 in the galleries. The main entrance is from High street through three large doors leading to a main vestibule. Two smaller entrances are on Waverly avenue. There are six large openings for memorial windows, three on the Waverly avenue side and three on the opposite side of the auditorium. In the basement beneath the vestibule end are retiring rooms, lavatories, and coat rooms for men and women. Adjoining the altar are the trustee's room and a study for the rabbi.

To the west of the temple and connected with it is the religious school building on Waverly avenue of three stories and a basement. It contains twelve class rooms for thirty pupils each, teachers' room, exhibition room, library, ladies' meeting room, and an assembly hall seating 380 people, and equipped with a stage and two dressing rooms at one end. In the basement of the school building are the coat rooms and lavatories for boys and for girls, as well as a small kitchen and superintendent's office. The rear of the basement contains the heating and ventilating plant. The latter has been made a subject of special study. Fresh air is supplied to the temple auditorium through a series of ducts under the floor and withdrawn through a large duct around the base of the dome. The air passes over air washers before entering the building. All the air in the auditorium can be renewed four times in an hour. A vacuum cleaner is also installed.

View showing School Building

The base courses and steps on the exterior are of stone. The walls are faced with light brown brick of rough texture with terra cotta trimmings of the same color. All copings are Indiana limestone, and the dome and sloping roofs are covered with gray-green terra cotta tiles, the whole making a restful color scheme.

The interior walls, arches, and dome of the temple are covered with acoustic tile. The architectural ornamentation is in terra cotta of a soft brown color, and all woodwork is of a similar tone to accord with the tone of the tile which is the dominating material. The ark on the altar is of Tavernelle marble, and a red Italian marble is used for the base around the auditorium. The floors of aisles and altar are of cork tile.

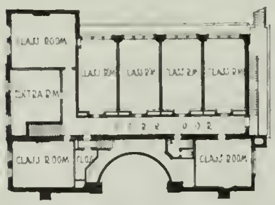
View showing Organ and Gallery at East End

Special consideration was given to the question of acoustics and the plans were submitted at an early stage to Professor Wallace C. Sabine, who has given the study of acoustics much attention and who advised the use of acoustic tile for the walls of the auditorium. The result is most satisfactory. A speaker using a normal tone of voice can be distinctly heard in any part of the auditorium and without any trace of an echo or reverberation.

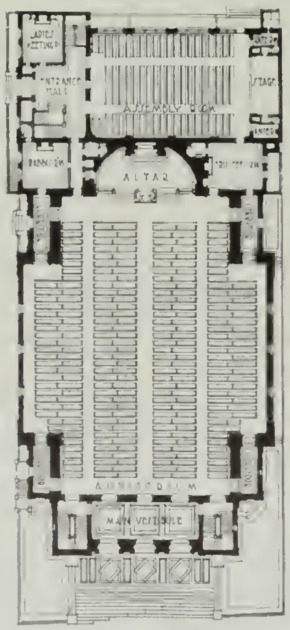
The lighting is by electricity with indirect or concealed fixtures. The main portion of the auditorium is illuminated by powerful lamps and reflectors in a six pointed, star shaped fixture suspended from the center of the dome.

The entire building is fireproof; furthermore, each floor of the school building is supplied with a standpipe and fire hose. It is said that the insurance rate is the lowest on any religious building in the country, it being about nine cents per hundred.

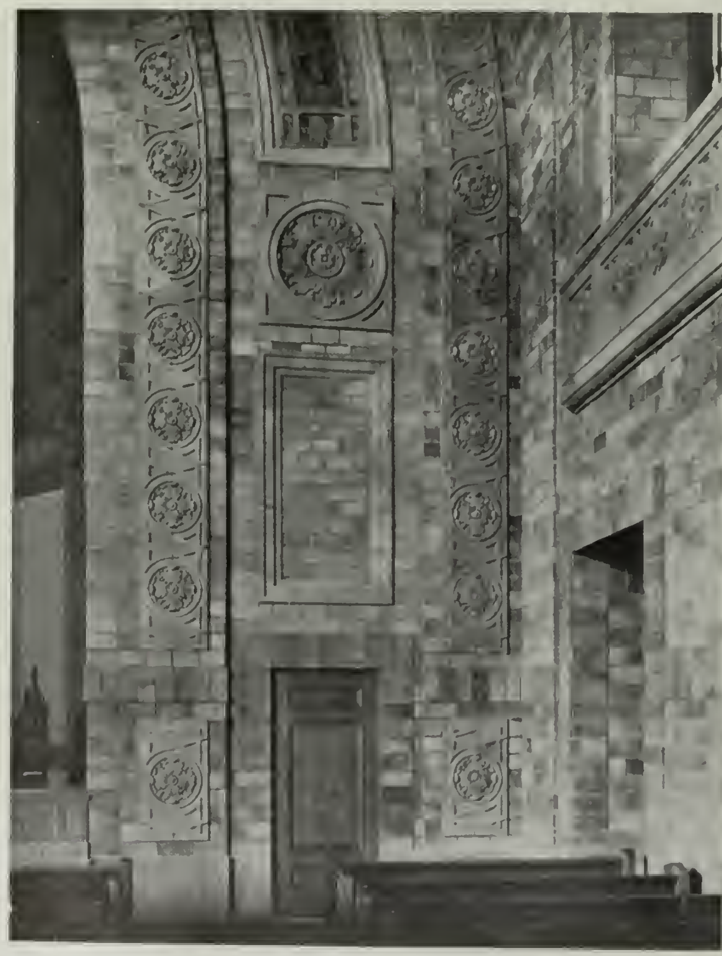
The cost of the structure including all furnishings, except those of the school building, was about $275,000. The entire group contains about 1,000,000 cubic feet. The height from the sidewalk to the top of the dome is 95 feet, and through a well developed scale, evident in both façades, the building admirably fits it site. It is an interesting expression of synagogue architecture.



Third Floor Plan

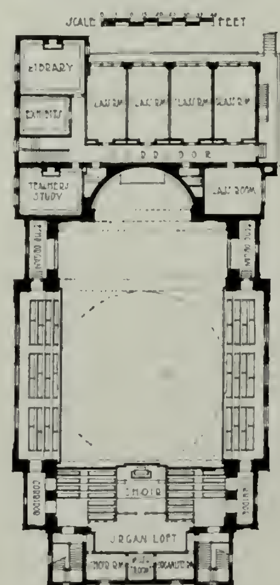


Main Floor Plan



Detail of Interior Wall at West End

Basement Floor Plan



Gallery Floor Plan

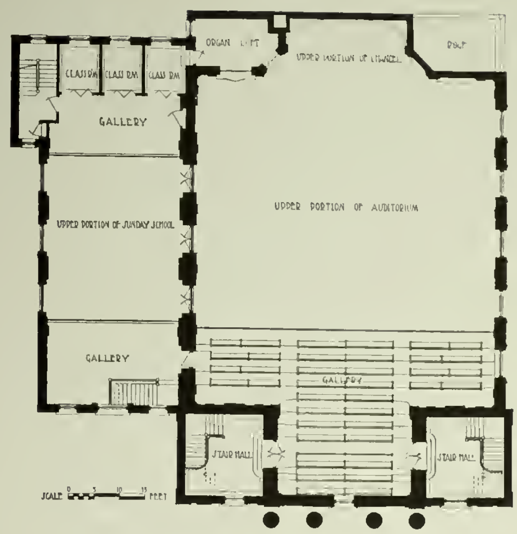
B'NAI JESHURUN TEMPLE, NEWARK, N. J.
ALBERT S GOTTLIEB, ARCHITECT

INTERIOR VIEW LOOKING TOWARD ALTAR

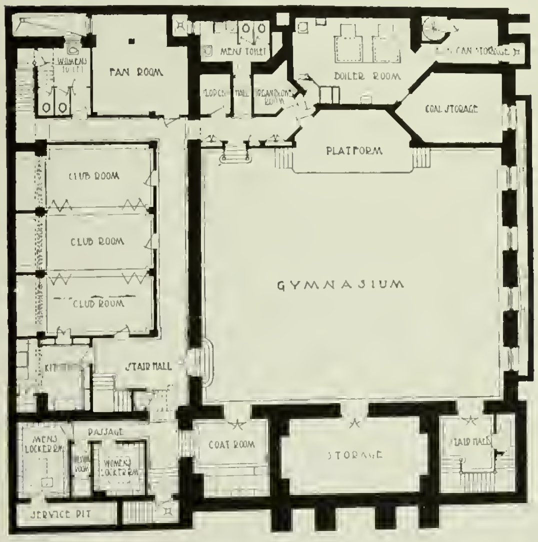
B'NAI JESHURUN TEMPLE, NEWARK, N. J.
ALBERT S. GOTTLIEB, ARCHITECT

WEST PARK PRESBYTERIAN CHURCH, WEST 174TH STREET, NEW YORK, N. Y.

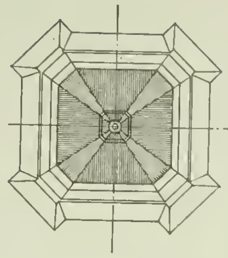
CARRERE & HASTINGS, ARCHITECTS



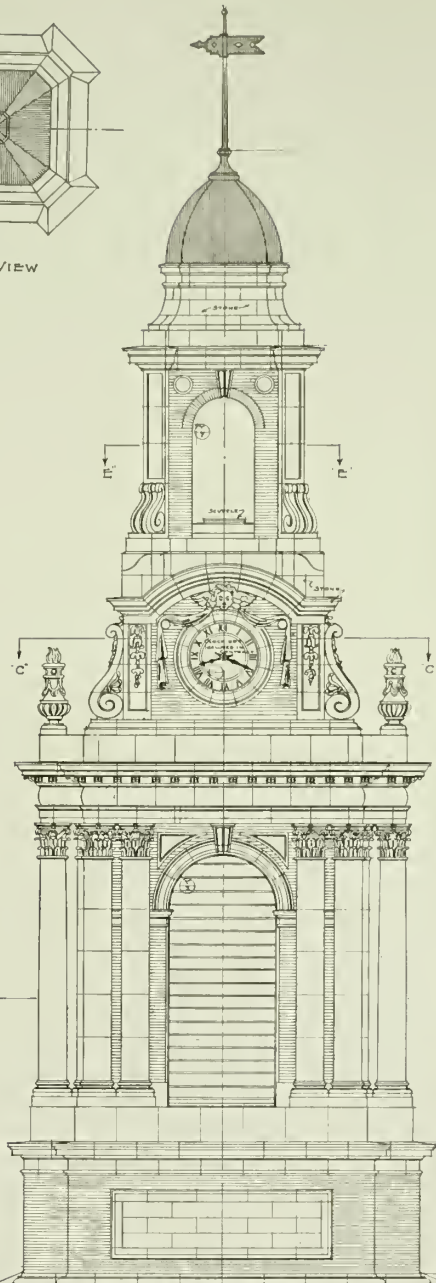
GALLERY FLOOR PLAN

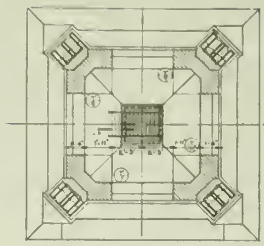


BASEMENT FLOOR PLAN

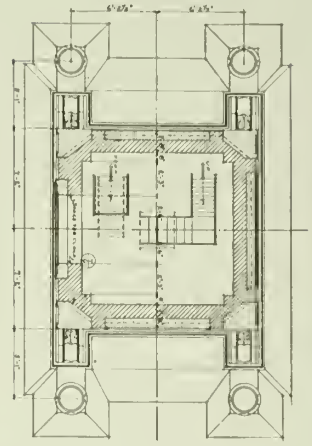


TOP VIEW

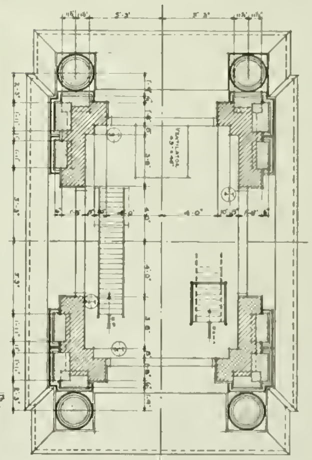




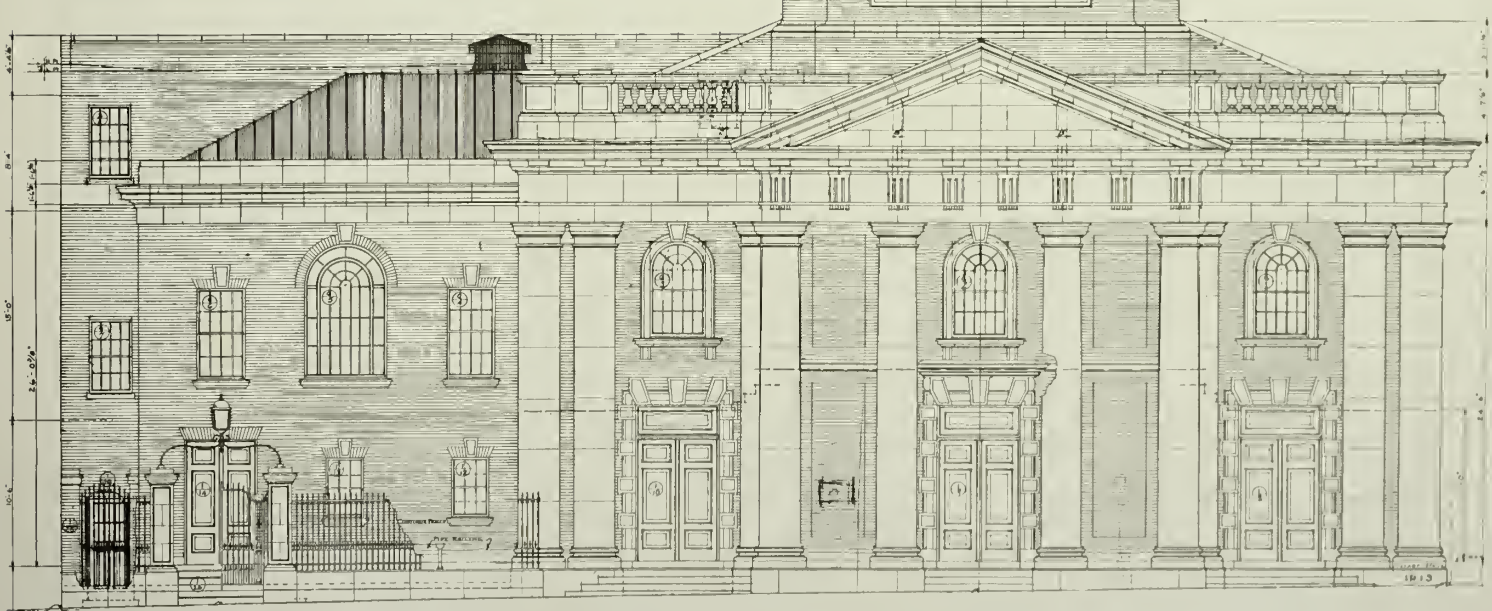
PLAN AT E — E



PLAN AT C — C



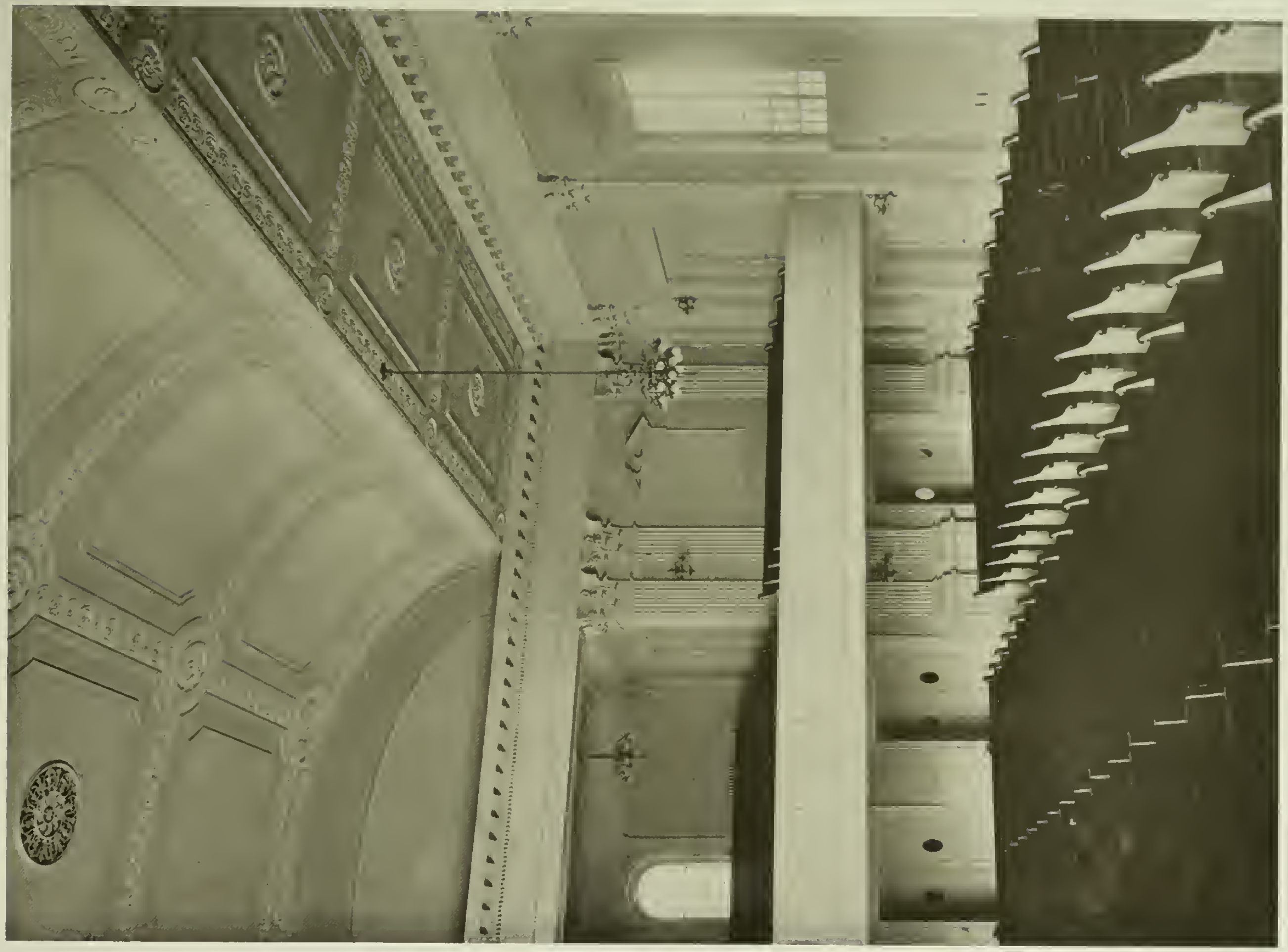
PLAN AT A — A



WEST PARK PRESBYTERIAN CHURCH, WEST 174TH STREET, NEW YORK, N. Y.

CARRERE & HASTINGS, ARCHITECTS

INTERIOR VIEW LOOKING TOWARD CHANCEL



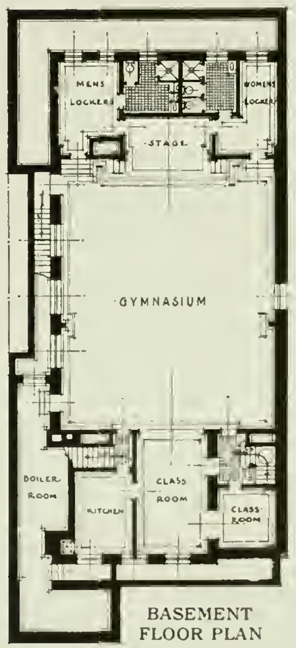
INTERIOR VIEW LOOKING TOWARD GALLERY

WEST PARK PRESBYTERIAN CHURCH, WEST 174TH STREET, NEW YORK, N. Y.

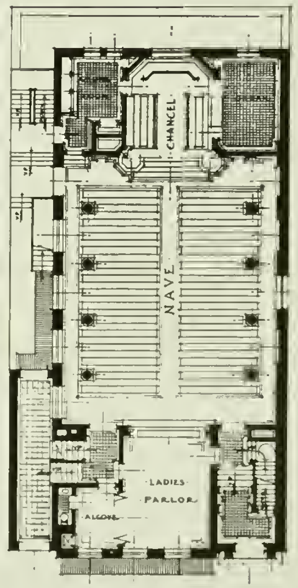
CARRERE & HASTINGS, ARCHITECTS

VIEW OF PRINCIPAL FACADE

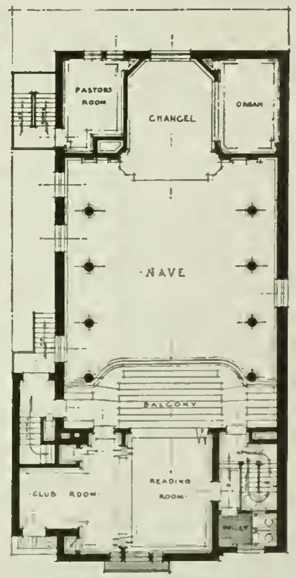
INTERIOR LOOKING TOWARD CHANCEL



BASEMENT FLOOR PLAN



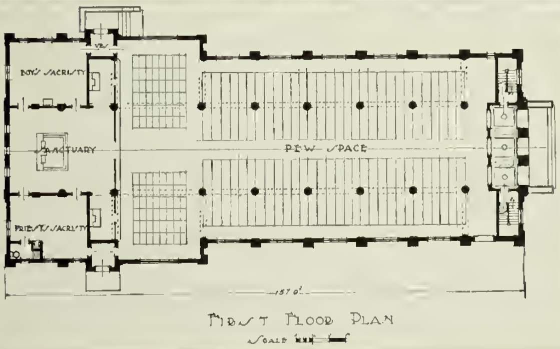
GROUND FLOOR PLAN



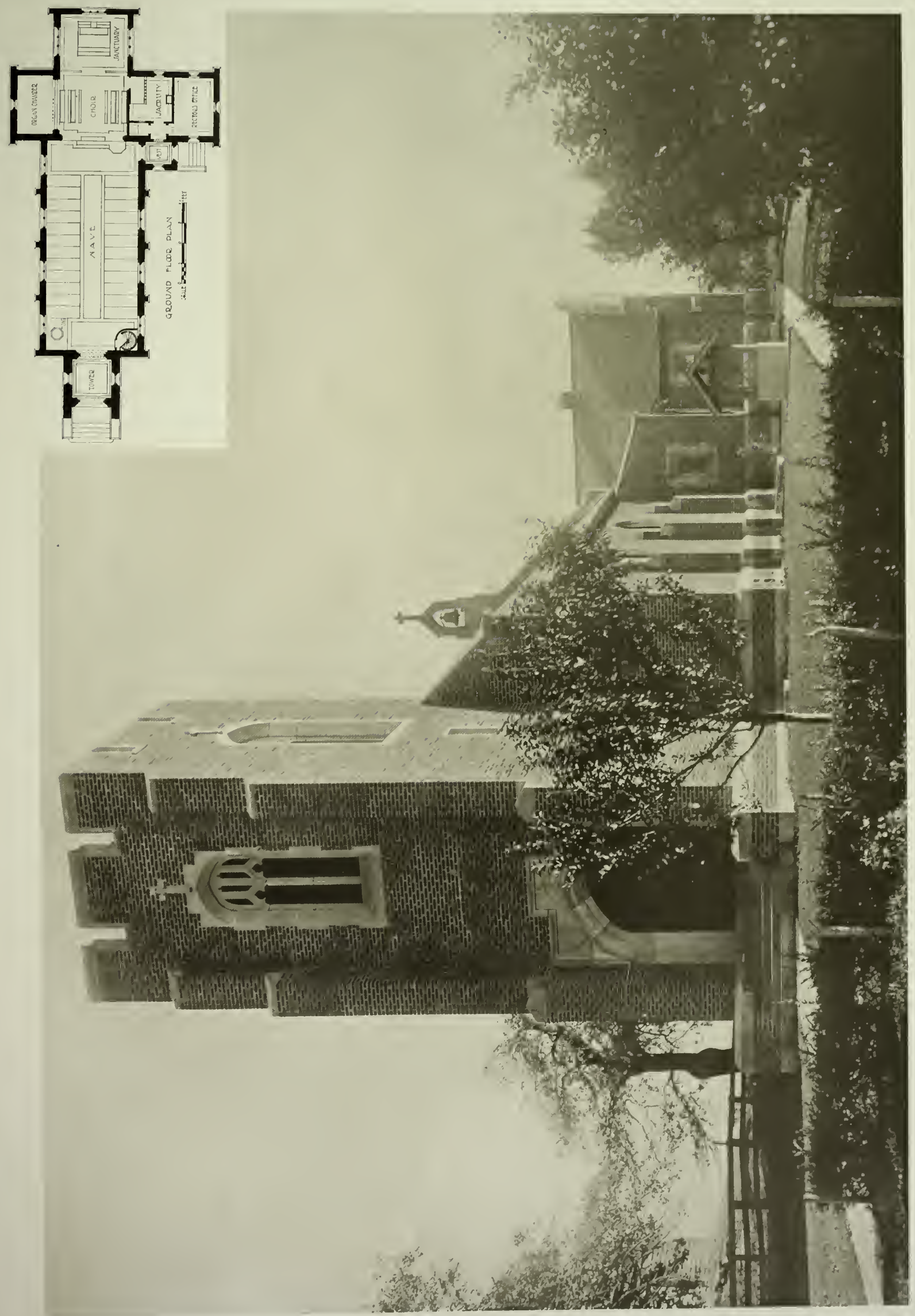
BALCONY FLOOR PLAN

ST. JAMES' PRESBYTERIAN CHURCH, WEST 137TH STREET, NEW YORK, N. Y.

LUDLOW & PEABODY, ARCHITECTS



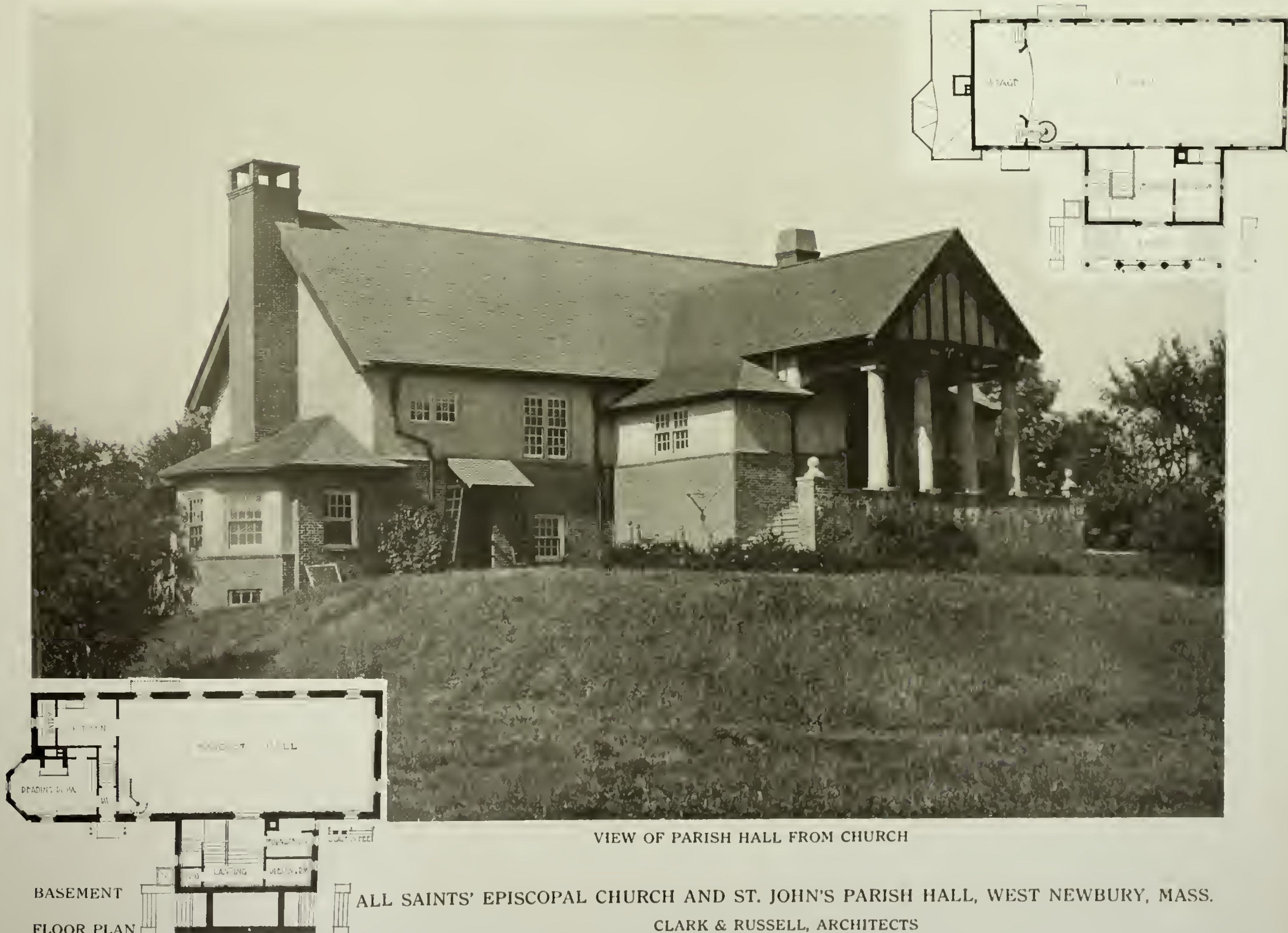
CHAPEL OF THE DOMINICAN SISTERS OF ST. AGNES, SPARKILL, N. Y.
DAVIS, McGRATH & KIESSLING, ARCHITECTS



ALL SAINTS' EPISCOPAL CHURCH, WEST NEWBURY, MASS.

CLARK & RUSSELL, ARCHITECTS

SIDE VIEW OF ALL SAINTS' CHURCH

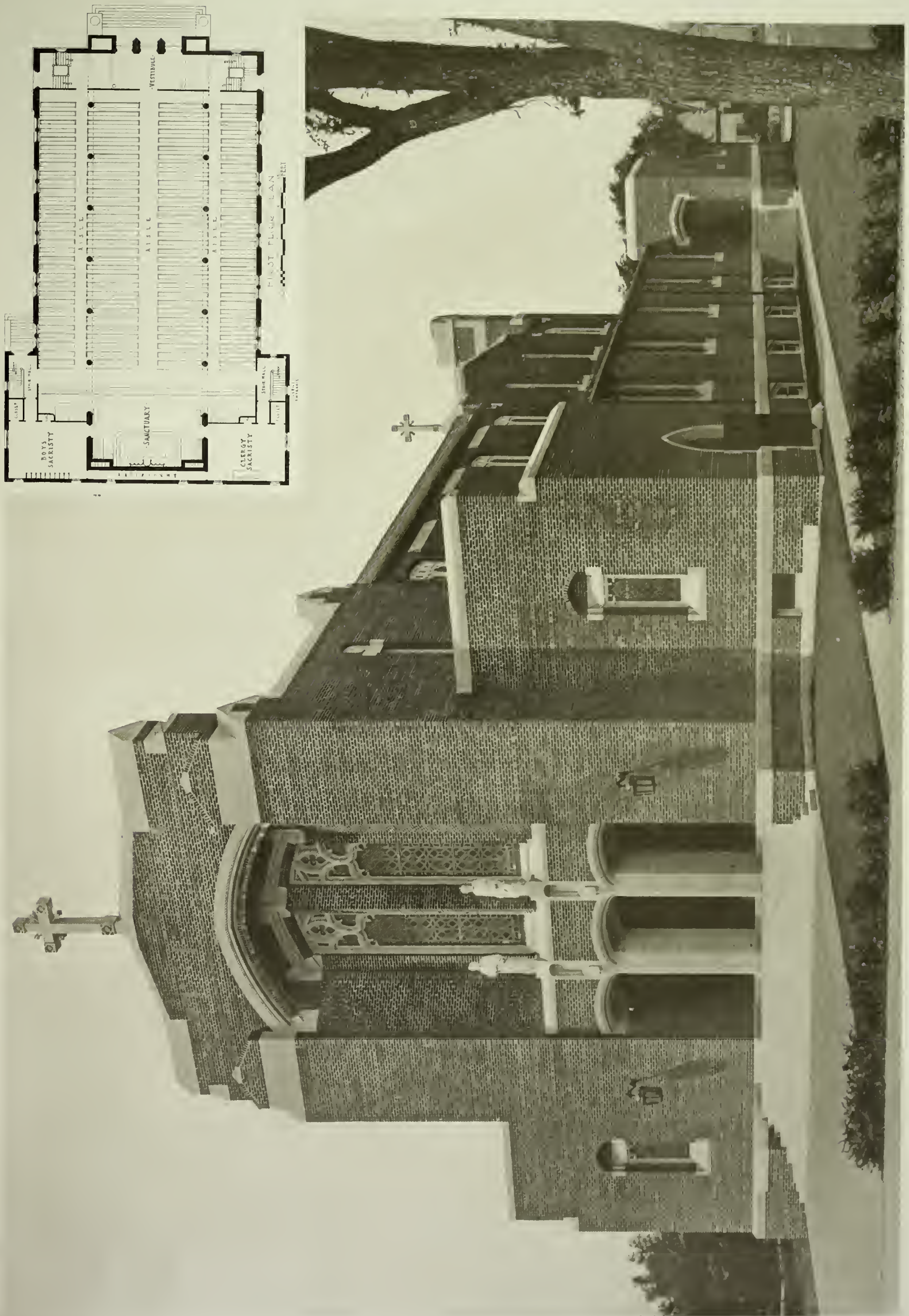


VIEW OF PARISH HALL FROM CHURCH

BASEMENT FLOOR PLAN

ALL SAINTS' EPISCOPAL CHURCH AND ST. JOHN'S PARISH HALL, WEST NEWBURY, MASS.

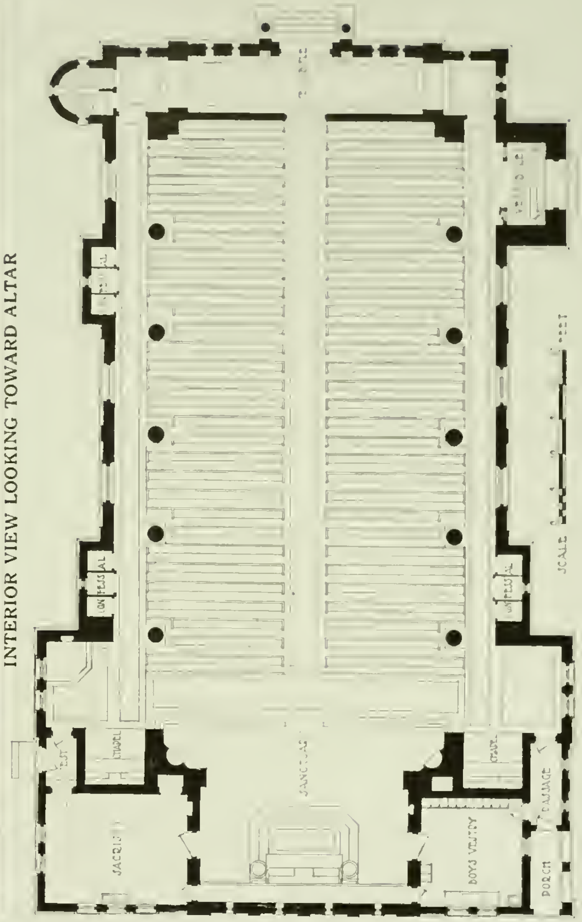
CLARK & RUSSELL, ARCHITECTS



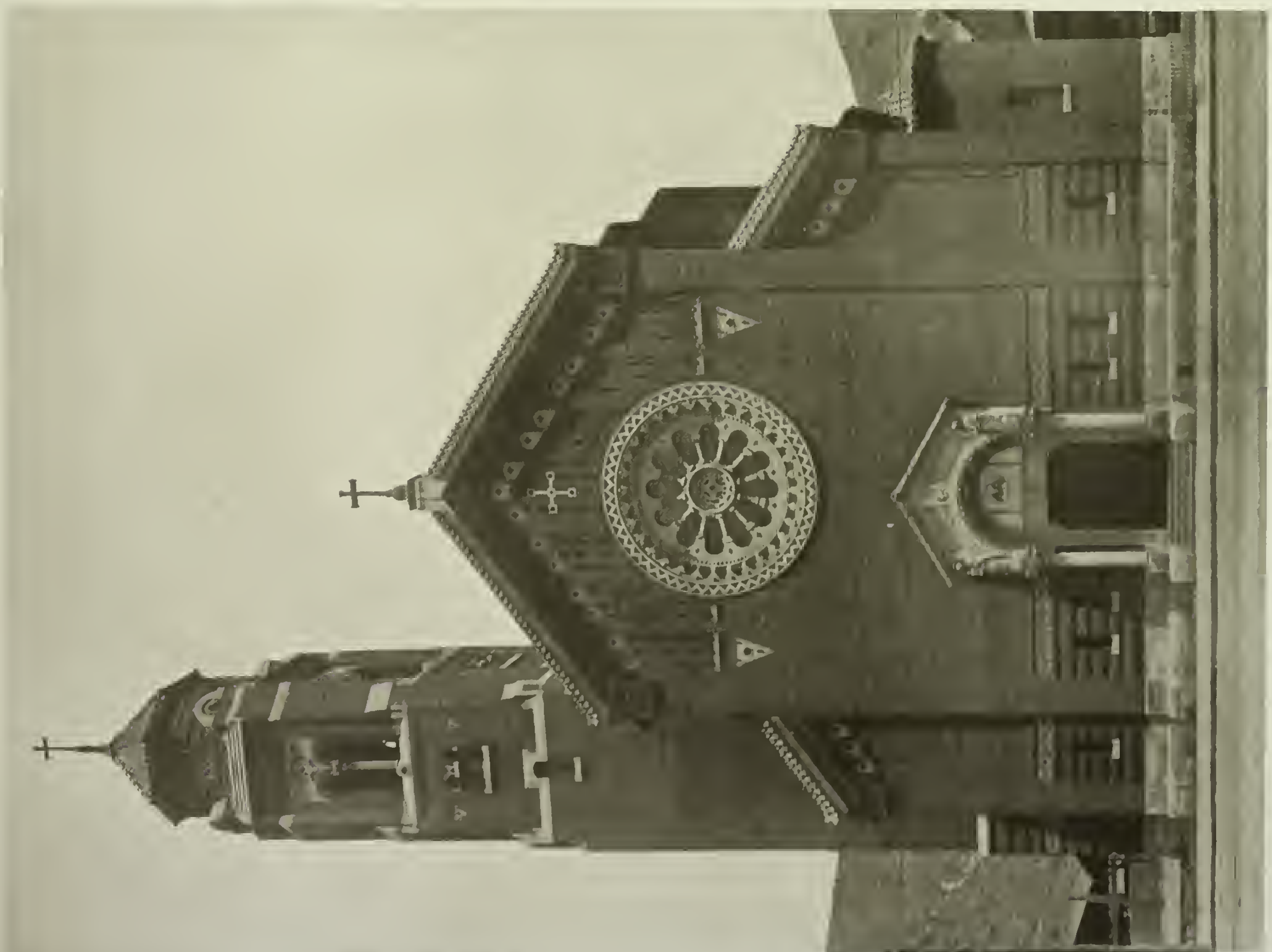
ST. MARK'S ROMAN CATHOLIC CHURCH, DORCHESTER, MASS.

BRIGHAM, COVENEY & BISBEE, ARCHITECTS

INTERIOR VIEW LOOKING TOWARD ALTAR



GROUND FLOOR PLAN



VIEW OF PRINCIPAL FACADE

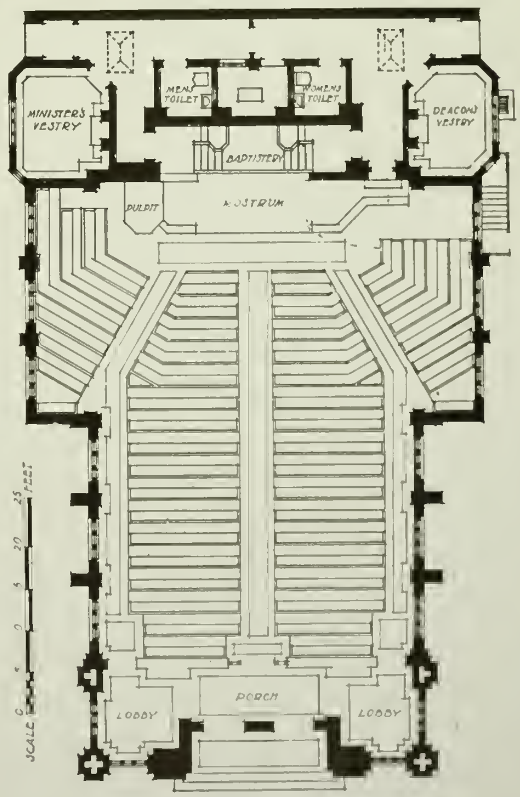
ST COLUMBA'S ROMAN CATHOLIC CHURCH, JOHNSTOWN, PA

JOHN T COMES, J E KAUZOR, ASSOCIATE ARCHITECTS

BAPTIST MEMORIAL CHURCH, TWICKENHAM, ENGLAND
INGALL, BRIDGEWATER & PORTER, ARCHITECTS

INTERIOR VIEW LOOKING TOWARD ROSTRUM

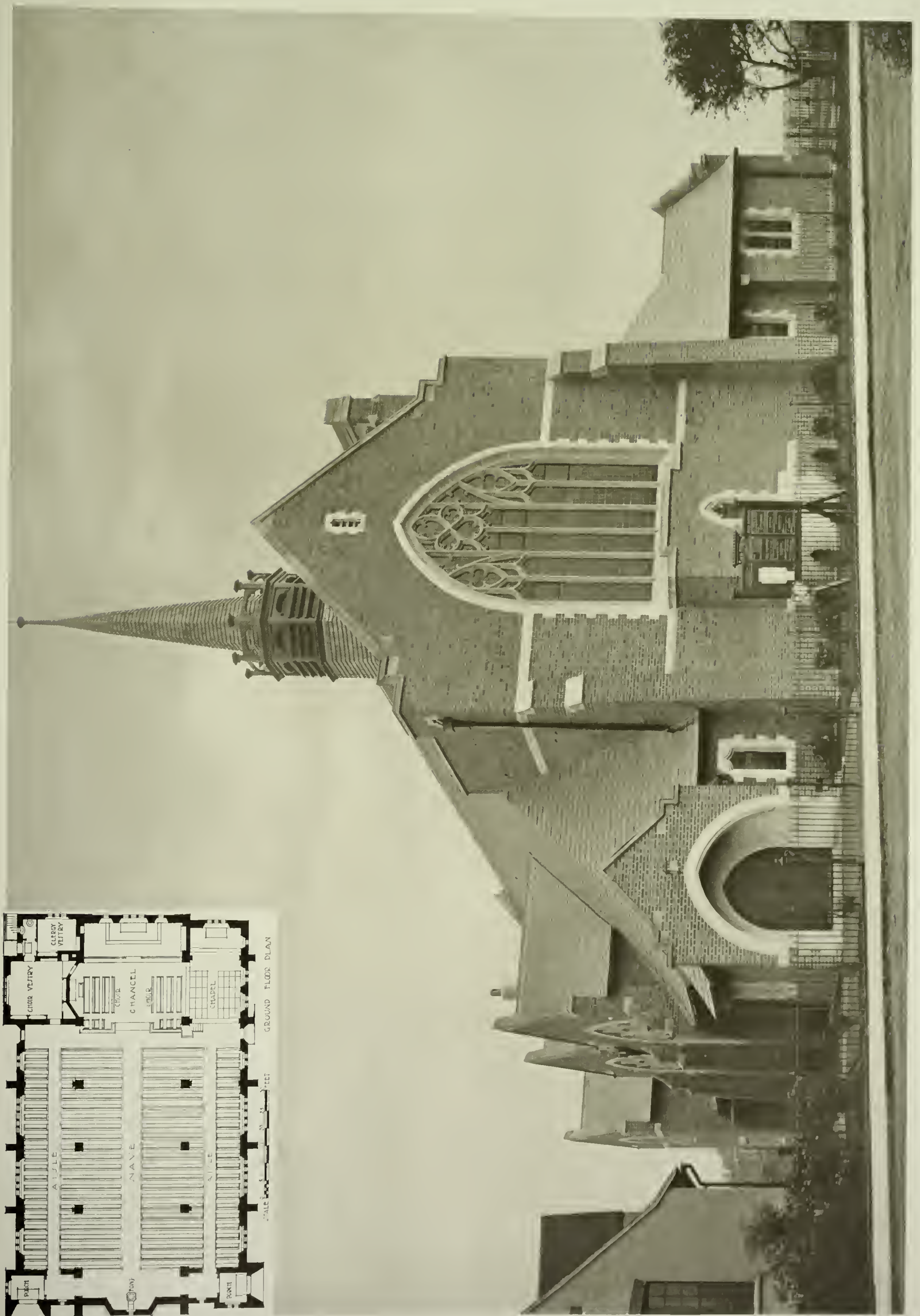
INTERIOR VIEW LOOKING TOWARD ENTRANCE



GROUND FLOOR PLAN

BAPTIST MEMORIAL CHURCH, TWICKENHAM, ENGLAND

INGALL, BRIDGEWATER & PORTER, ARCHITECTS



ALL SAINTS' CHURCH, GOODMAYES, ESSEX, ENGLAND
P. K. ALLEN, ARCHITECT

VIEW OF EXTERIOR FROM REAR

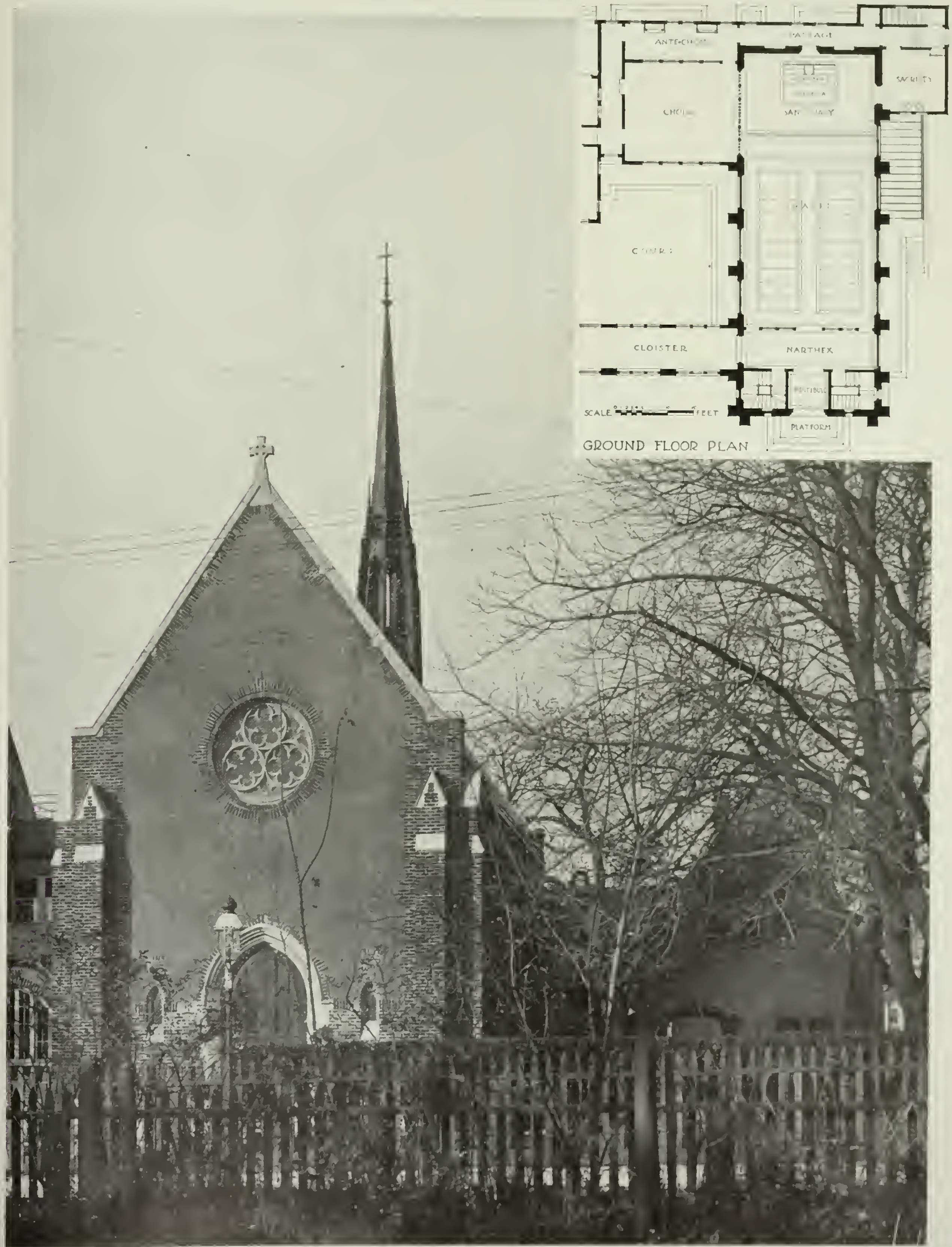
INTERIOR VIEW LOOKING TOWARD CHANCEL

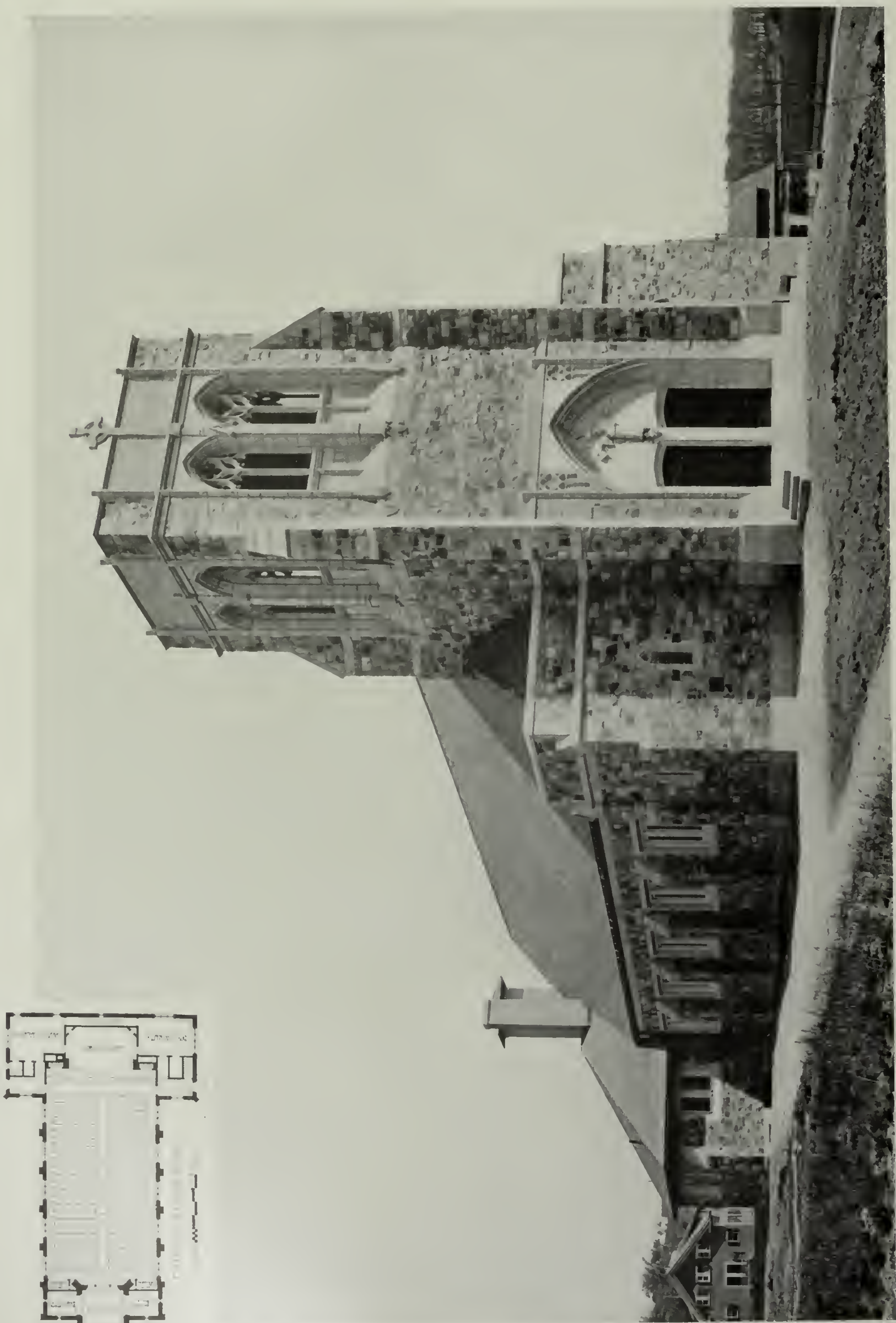
ALL SAINTS' CHURCH, GOODMAYES, ESSEX, ENGLAND

P. K. ALLEN, ARCHITECT

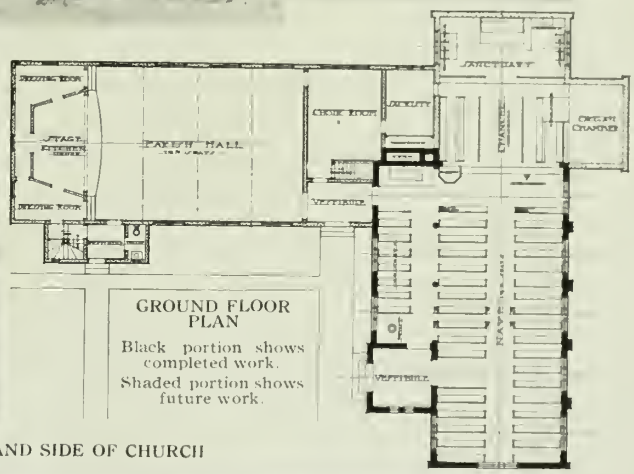
Chapel for the Ladies of the Cenacle, Newport, R. I.

MAGINNIS & WALSH, ARCHITECTS.





ROMAN CATHOLIC CHAPEL, NORTH WEYMOUTH, MASS.
CHARLES R. GRECO, ARCHITECT



PERSPECTIVE DRAWING OF COMPLETED GROUP AND SIDE OF CHURCH

VIEW OF PORTION CONSTRUCTED

CHRIST EPISCOPAL CHURCH, NEEDHAM HEIGHTS, MASS.

EDMUND Q. SYLVESTER, ARCHITECT

Bethany Reformed Church at Ephrata, Pa.

FRANK SEEBURGER AND CHAS. F. RABENOLD, ASSOCIATE ARCHITECTS.

The Heating and Ventilating of Churches.

By HAROLD L. ALT.

THE ventilation problem in the modern church presents many angles for consideration, not the least of which is the fact that numerous churches are laboring under heavy debt and are, therefore, not at all anxious to spend any larger sum on the heating and ventilation end than is absolutely necessary. Added to this is the difficulty that some churches try to economize by standing cold during the week and heating up on Sunday only — a mistaken and dangerous policy.

The masonry construction of most churches, especially edifices built some time ago, is usually much heavier than that of a corresponding theater of equal size and this results in extreme heat absorbing capacity when churches once get cooled down.

Another consideration, and a most essential one, is that of noise, many churches having given up their ventilation equipment in disgust on account of not being able to use their systems during services owing to the objectionable noise.

Therefore, a heating and ventilating system to give the utmost satisfaction possible should combine (with all the other usual desirable qualities) a low first cost, a minimum amount of noise in operation, great capability of quick heating, and still must be simple enough to be operated by more or less non-expert janitors.

Owing to the auditorium-like arrangement there is no need of the individual duct system in the ordinary church, since the air from all sides of the building intermingles almost at once and forms a fairly equal temperature at various heights above the floor; for the same reason the double duct system need not be considered. In fact, the trunk line system seems to supply every needed function, being at the same time cheaper and simpler than either the individual or double duct system.

For the small or moderate sized country and suburban church the modern furnace has much to recommend it, many manufacturers paying particular attention to this sort of work. In the first place, it is absolutely quiet in operation, does not require any expert knowledge to run, cannot freeze up during the week, and supplies enough fresh air to meet moderate ventilation requirements. A recirculation connection combined with a carefully designed furnace equipment of this sort is a very practical solution of certain church requirements.

In a large modern city church, which is the style of building with which this article particularly deals, the limitations of satisfactory furnace installations are exceeded and some form of hot blast or fan system should be substituted.

Assuming the trunk line type of system has been settled upon for a large modern city church, the next point to be taken up is the location of inlets and outlets. A hot air inlet in the aisle is objectionable on account of its being constantly walked over (thus receiving an excessive amount of dust), its poor distribution of the entering air (even when two or three such registers are used), and its unpleasant effect on the persons walking over it. Neither are hot air inlets under the pews satisfactory, since they result in discomfort to persons sitting directly over them when the temperature is high and must force more or less of their air through and around the clothing worn by the members of the congregation before this air rises to the breathing line.

Neither, on the other hand, do inlet registers in the ceiling and the use of downward ventilation entirely rid us of all our troubles, as the unusually high windows (present in most churches) result in very strong cold drafts downward, falling on those seated beneath such windows. All things considered, the most satisfactory location of inlet openings is in the window sills when the incoming warm air counteracts the cold down drafts resulting in a tempered mixture of atmosphere which is thrown outward toward the center of the congregation.

There is no objection to exhausting from outlets located beneath the pews and this avoids the exposing to view of large exhaust registers which would otherwise appear in the walls or ceiling. In fact, when the window sill inlet is used, better results are obtained with floor exhaust outlets than with openings in the ceiling. This is apparent from the fact that the natural flow of air from the window sill inlet toward the ceiling outlet would not cross the breathing line of a single member of the congregation.

A cross section showing just such a window sill inlet and pew outlet is given in Fig. 1; both the supply and exhaust ducts in this particular case are run on the ceiling of the basement below.

Some systems only deliver supply air and let it find its way out through natural leakage. It does not seem, however, that it is reasonable to expect more than one, or at the utmost two, air changes per hour to find egress by this method. If more air (as is usually the case) is being supplied than two changes per hour, some provision should be made for taking care of the additional air furnished.

Many architects object to a radiator exposed to the view of the congregation, a much simpler expedient being the installation of a few additional rows of heaters at the fan and to warm as well as ventilate. This method involves the advantages of eliminating all the radiators together with their steam and return piping, which would otherwise run promiscuously around the basement, and also cuts the first cost.

Practical trial, however, has developed several severe and radical failings in a purely hot blast system used without direct radiators. One of these is the well known fact that while a hot blast system is at best rather slow in warming up a cold building (even with recirculation), the heavy walls of a church absorb so much of the first heat delivered to the room that a hot blast system otherwise perfectly adequate will have to begin operation Saturday afternoon to bring a cold building up to 70 degrees by 10 A.M. Sunday morning. This causes a jump in the electric power bill during cold weather that is nothing less than startling.

Another disadvantage is the inability to warm any room during the week without starting up the whole system and running the large fan. To some extent this may be overcome by a more or less complicated system of dampers, but can never compare in economy with the use of direct radiators for heat alone, and the blast system solely for ventilation effect.

The drawings shown in Figs. 2 and 3 are the basement and first floor plans of a church built a few years ago in which the hot blast system is used in general without radiators.

This system was carefully designed in the extreme, flues being run to supply each class room individually so that the doors of the class rooms could be shut, if desired, and ventilation still carried on.

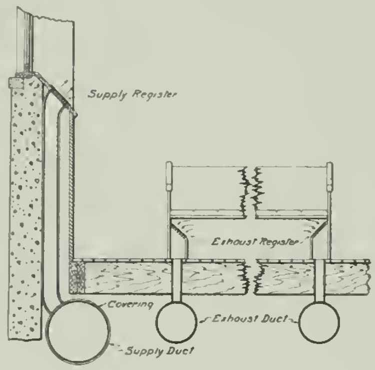


Fig. 1

The air was vented through the roof by means of two ventilators, one over the Sunday-school room and the other over the church. In the societies' room S, where the air supplied amounted to more than would be lost through natural leakage, a vent X was cut through into the church to allow a relief of the back pressure which might otherwise be created in the confined room. This hot blast system was most carefully figured and installed by engineers co-operating with the architect, and everything to make the system a success, which could be done, was done. In spite of this, as might be expected, the objections previously mentioned were found to exist in this installation. While a recirculation connection R (Fig. 3) was provided in the cold air down take from the roof so that the outside cold air could be shut off and that in the church revolved over and over again and ventilators V provided, it was found impossible to let the building get cooled down during the week and then heat it up on Sunday morning.


Fig. 2


Fig. 3

By starting Saturday afternoon and recirculating the air, the original 40-degree temperature (to which the interior of the church often fell during the week) could be raised up to about 60 degrees before shutting down for the night. During the night the temperature would drop back to somewhere around 52 degrees, and by starting up at 6 A.M. Sunday morning, it was possible to get as high as 65 degrees by 10.30 A.M. Continued operation during the day even in extreme weather shoved the thermometer up above 70 degrees before evening, showing that the apparatus was amply able to maintain a proper temperature as soon as the walls ceased absorbing large quantities of heat.

To those who might say the apparatus should be increased, I would answer that this increase must amount to at least 100 per cent over that already installed, since it would be necessary to accomplish the same heating effect (minus the drop during the night, of course) in about one-half of the time at present required.

To those claiming the building should be kept warm during the week, I would answer that this would entail a total of more hours of fan operation per week as well as additional coal, thereby increasing not only the coal expense, but the power bill as well.

Let us turn away from the combined hot blast heating and ventilating system and see what results are attained when the warm air is used solely for ventilation effect and the heating accomplished by direct radiators.

In the first place, this means that steam supply and return pipes must be run practically all over the basement as well as the galvanized iron pipes used for the ventilating system, and that these pipes must be arranged so as not to interfere with each other. It also means a slightly higher first cost, this not being as much of an increase as might be expected, owing to the fact that the fan heater can be reduced to about 50 per cent of the capacity otherwise required, besides which it is also unnecessary to provide a recirculation connection.

The advantage of heating positively all rooms regardless of direction of the wind or their isolated location, is obtained only with this system. By the simple expedient of valving each riser, and, possibly, two or three points in the mains, this heating can be accomplished without warming up the whole system and without the expenditure of any electric power whatsoever.

Moreover, no power need be used to operate the fresh air system until the congregation is fully assembled, and often in bad weather when the attendance is small there is no discomfort experienced for an hour or so without operating the fan at all. With a proper amount of direct radiation installed it is possible to warm up a building in four or five hours, and the maintaining of a small fire under the boiler during the week will generate sufficient vapor to keep the building temperature from going down to a very low point, making it much easier to heat up than without the direct radiation.

As far as gravity air systems with the air in the flues heated by indirect steam or hot water radiators are concerned, they are *naturally* unsuited for church work. They have usually no practical way of recirculation and, owing to most of the outlets being located at or near the floor level, the velocity of the heated air is very small.

With a heat stack hung on the basement ceiling it is often less than 24 inches to the outlet in the floor above, which means a great decrease in velocity; this requires of course excessive radiation and an undue number of outlets which must also be of much larger size than required with a fan.

In fact, a church in which a system of the steam heated indirect gravity kind *was* installed in connection with an old type of propeller fan is shown in Figs. 4 and 5, these being the basement and first floor plans *after* the heating was remodeled. This alteration was made, needless to say, by the unsatisfactory operation of the indirect radiator system first installed; but the desire to avoid additional expense caused the utilization as far as possible of the old registers, which accounts for some of the idiosyncrasies in register shape and location as shown; otherwise the system is good.

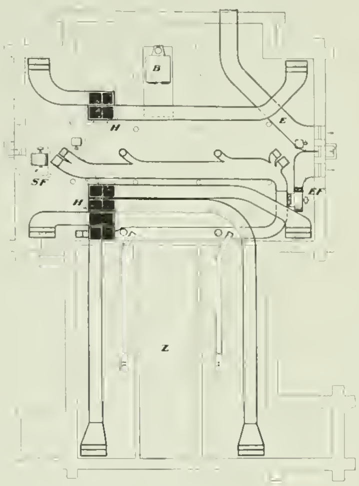


Fig. 4

Fig. 5

Some of the readers of this article may question the showing of a system which is not "ideal" in every particular. Sad to say, systems "ideal" in every particular are few and far between. It is the purpose of this article not so much to theorize and vaporize on what should be — and is not — as it is to take practical installations which serve their purpose reasonably well — and which *are installed.*

It will be seen by referring to Fig. 4 that a fresh air chamber is located on one side of the basement in which a vertical down-discharge fan SF is located, the fan drawing the air out of the chamber and discharging it into an underground duct. The duct splits into two branches, one branch going to the rear heater chamber and the other to the front heater chamber. The pressure produced by the fan drives the air upward in the heating chambers and through the indirect heaters H into the supply ducts on the ceiling, which carry the heated air to the various supply registers. This air is *not* intended to heat it, serving to *ventilate* only; the heating is accomplished by the direct radiators shown in Fig. 5. The system would have been improved had the supply registers been placed under the windows, but money was not available to permit this radical change. An elevation of the supply fan and one heater chamber is shown in Fig. 6.

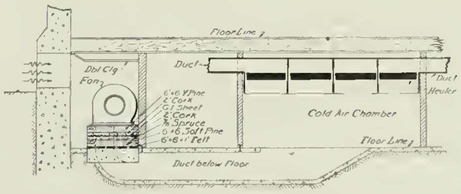


Fig. 6

The exhaust is pulled out through the various exhaust registers by a fan EF (located on the other side of the basement across from the supply fan), which discharges the air on the opposite side of the building. The discharge air from the adjacent Sunday school is carried out through the duct E, although this does not affect the church system in any way; Z indicates unexcavated cellar.

This system has the advantage of supplying fresh, *cool* air, if desired, just as efficiently as hot air and keeps the power bill at the minimum.

A most important matter in the installation of a church system is the elimination of noise to the greatest possible extent. Of course, this is *always* desirable in any system, but it must receive particular attention in churches. The average church while having massive masonry walls for some reason seems to have poorly constructed floors; a few have concrete or terra cotta floor constructions but most have only wooden floor joists with plaster below and flooring above, this construction having no more sound proof qualities than possessed by the ordinary frame house. Therefore, while noise is specially objectionable, the normal construction means of deadening such noise is unusually poor.

Noise in fan systems is generally produced by one or more of several distinct causes. These may be divided into fan noises (caused by too high speed or by improper alignment), air noises (caused by high velocities), belt noises (when belts are used), a motor hum (present to greater or less extent in all motors), and vibration noises caused by improper or unstable foundation.

In cases of improper alignment, of course, the remedy is easily applied; while maintaining air velocities of 1,200 feet per minute or less will generally prevent the sound of the air moving through the ducts. The matter of fan speed should be carefully looked into before specifying a fan; in general, a tip speed not to exceed 3,000 feet per minute will be quite conservative, but the recommendations of the manufacturers of the particular fan specified should also receive consideration.

Belt noise is always present where the motors are belt connected to the fans, but this trouble may be aggravated by looseness and improper joints.

The hum of the electric motor is a sound of apparently small moment, yet in alternating current motors it is of a peculiarly penetrating character. Many engineers regard the motor hum as deserving of more consideration than the fan which the motor drives. Let us see what means may be taken to overcome the various noise troubles.

In Fig. 9 is shown a fan and motor installed in what may be termed a "first-class standard manner." Both the fan and motor are set on substantial concrete foundations, A being a 4 by 6 inch yellow pine frame halved together at the corners and bolted to the foundation bolts, the heads of which are countersunk into the frame. The fan is lagscrewed to the frame and a 2-inch cork separator pad C is placed between the frame and the concrete foundation F; the motor is set in a similar manner. With ordinary first-class apparatus, properly installed, and masonry floor construction this arrangement is fairly satisfactory. With wooden joists, plaster ceiling, and common flooring above, the motor hum from this installation will be plainly audible in the church and other more efficient means should be adopted.

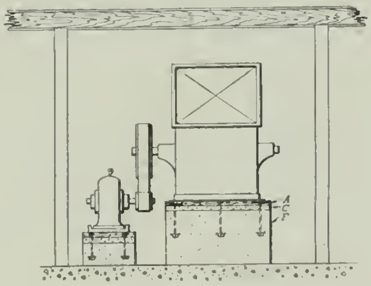


Fig. 7

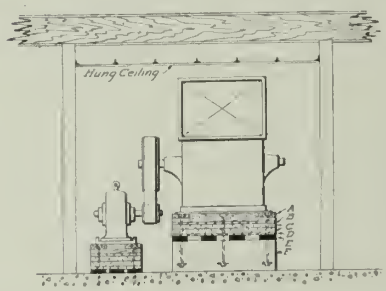


Fig. 8

In Fig. 7 is shown a method of confining the motor hum so as to render it unobjectionable, but this method does not kill the noise of the belt or the fan. A, C, and F in this figure indicate the same materials as in Fig. 9, while the canvas joint shown should be used on any and all fans wherever installed. It is impossible to operate a fan without having a certain amount of noise from the moving air and revolving parts; this is transmitted from the fan to the duct which telephones it direct to the room outlets unless the metallic connection is broken by the canvas connection, this being usually made about 8 inches long. With Fig. 7 the noise still might be heard to an objectionable extent in the church, but on the other hand again it might not, this depending largely on the fan and its peculiarities.

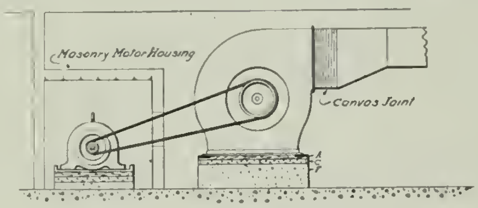


Fig. 9

In Fig. 8 a much superior method of sound deadening is shown, this having proved satisfactory in almost every case. Here A is a yellow pine frame as previously described; B is 7/8 inch tongued and grooved stock; C consists of two layers of 2-inch cork, and D is another layer of 7/8-inch boards, binding the whole together; E is piano felt 1 inch thick and in strips 6 inches wide; while F is a common concrete foundation. Sometimes lead or rubber washers are used under the foundation bolt nut heads which are recessed in the frame, the fan being lagscrewed as before, while the hung ceiling over the entire apparatus gives a double dead air space between the fan room and the church. Of course it is necessary to carry the regular basement ceiling straight through on the bottom of the joists in order to produce the double space, but after being thus treated this installation may be safely located under any portion of the church.

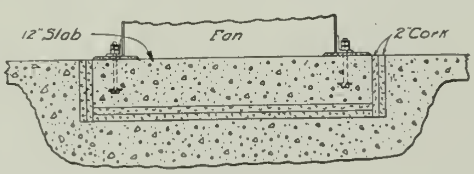


Fig. 10

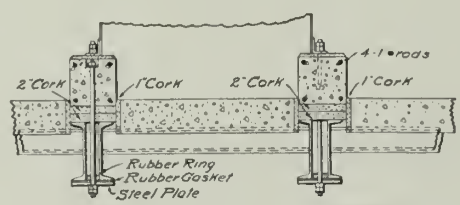


Fig. 11

Where basement head room is scanty, various expedients are adopted, the best of which lower the grade of the fan room floor until the method shown in Fig. 8 can be used. Where this is not practical, an expedient such as is shown in Fig. 10 may be used. Frankly, this will not be as efficient as the method shown in Fig. 8, but it is fairly satisfactory.

When exhaust fans are located on upper floors the problem is also best solved by the scheme shown in Fig. 8, the foundation F being carried on suitable structural steel supports. Where the head room is limited, a structural steel support arranged as shown in Fig. 11 will also give good results.

One thing that should be remembered in all fan installations carried on steel supports is "mass in the foundation." In other words, there must be sufficient weight in the foundation mass to absorb the vibration of the fan for, although small, this vibration is present just the same.

As an example of this in aggravated form it may be interesting to note the case where one of the large public service companies recently installed some blowers for forced draft purposes. These blowers were driven by direct connected steam turbines, thus eliminating all reciprocating parts, but of course they operated at a much higher speed than the ordinary fan. The blowers were located on a steel platform constructed of 15-inch I beams swung across the firing aisle between the two rows of boilers and supported on the steel building columns. The beams were designed with a factor of safety of twelve and had a 4-inch reinforced concrete slab to form a walkway around the apparatus.

In spite of all that the manufacturers' experts and the company's engineers could do, this platform shook so when the apparatus was started that it was impossible to stand on it without holding on to the handrail. Numerous suggestions for remedy were made and tried out, but none sufficed until a common wooden form was built under the bottom of the I beams and the 4 inch concrete slab torn off and a new slab 15 inches deep, extending from the top to the bottom of the beams, was poured in its place. No further trouble from vibration was experienced simply because the increased weight of the mass was sufficient to absorb the vibration.

The same effect in a lesser degree is present in every fan carried on steel members, and the presence of a 12-inch concrete slab under the entire area covered by both the fan and the motor, while a simple matter during construction, will save much annoyance that might occur.

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

WILLIAM RUTHERFORD MEAD

WILLIAM RUTHERFORD MEAD, son of Larkin Goldsmith and Mary Jane (Noyes) Mead, was born on Aug. 20, 1846, in Brattleboro, Vt. After passing through the local high school, he went to Norwich University from 1861 to 1863, and then entered Amherst College, graduating in 1867, and at once commenced the study of architecture in the office of Russell Sturgis. In 1871 he went abroad, studying in Florence for a year and then traveling for three months.

In 1872 he formed a partnership with Charles F. McKim, and in 1878 Stanford White entered the firm, which was thenceforth known as McKim, Mead & White. Mr. Kendall, Mr. Fenner, and Mr. Richardson became partners in January, 1906. Mr. White died in June, 1906, and Mr. McKim in September, 1909, leaving Mr. Mead the only survivor of the original firm. Mr. Mead is a fellow of the American Institute of Architects; was president of the New York chapter in 1907–08; is a member of the Academy of Arts and Letters; an academician of the National Academy of Design, and has been president of the American Academy in Rome since 1909. He has received the degree of Master of Sciences from the Norwich University in 1909, and the honorary degree of "LL.D." from Amherst College in 1902, and the gold Medal of Honor of the Academy of Arts and Letters "for distinguished service in the creation of original work in architecture" in 1913.

The premise that externals often conceal character does not apply to Mr. Mead. His kindness and courtesy are constantly apparent, and a very just comprehension of the relative value of things is accompanied by a charitable judgment which often softens the edge of his occasional condemnation. The cumulative refinements of design and the coruscations of genius of his former associates would have failed of their full success if deprived of the permanent background of his good sense, his talents for sound planning, and for the accommodation of facts to fancies. It is the method of attack, based on these fundamentals, which has produced the great architecture of the world, and the results he has attained are comparable with those of his predecessors.

His modesty would probably make him disclaim any eulogistic remarks made in regard to him; nevertheless it is a satisfaction to state his eminent position in the profession of architecture and to call attention to the beneficial influence he has had upon American work. — *R. A.*

THOMAS HASTINGS

THOMAS HASTINGS was born in 1860, the son of the Rev. Thomas Hastings, an eminent Presbyterian divine, who was for years the president of the Union Theological Seminary in New York. His mother was a Miss de Groot, an American of Dutch and French parentage.

He received his professional education at the Ecole des Beaux Arts, studying in the atelier of M. Jules André, and took the full course in the Department of Architecture. Mr. Hastings has had many honors conferred upon him for his eminence in his profession. He is a chevalier of the Legion of Honor, decorated by the French Government, a director of the Museum of French Art, a corresponding member of the Royal Vienna Association of Architects, an academician of the National Academy of Design, a member of the Federal Commission of Fine Arts in Washington, a member of the American Academy of Arts and Letters, chairman of the Lincoln Highway Commission, a fellow and director of the American Institute of Architects, and has been president of the Architectural League. In 1884 he formed a partnership with the late John M. Carrère.

To appreciate the varied work of Mr. Hastings, from his first burst of exuberance in the Ponce de Leon Hotel to the restraint of the Frick house in New York, there must be an understanding of the sensitive qualities of his mind to the subtleties of expression, the modulations of composition, the pleasure in delicate detail, and even the delights of fantasy. From whatever source he gleans an inspiration, whether it be from Spain or from his beloved France, he penetrates the spirit of his chosen example and saturates himself with its character before he translates it into a new creation which has become a part of himself. His choice is that of a classicist who is eclectic within a self-imposed range which seldom is sympathetic with the Gothic spirit. That this is the case is natural; for his mind, though alert in fancy, seeks expression in formulated terms, in intellectual conventions, produced from serious study. He can better endure enthusiasm controlled by precedent than exuberance breaking a path to new vistas. Therefore his work manifests not only the good taste of his appreciation, but also that of training. Whether it be broad and simple, or decorative and complex, a refinement of line and of surface, of arrangement and of light and of shade, all give evidence of the careful study it has received. — *C. H. W.*

CHARLES A. PLATT

CHARLES A. PLATT, who was born in New York in 1861, is an original figure in American architecture. The canonical practice in this country which imposes upon every young draftsman a certain amount of office training, under some senior of established repute, is contradicted by his career. He did not begin life at the drafting board and he knew no office until he organized one, for he did not need either of them in his formative period. He began, instead, by painting and etching. When he went to Paris, in 1882, to study at Julian's under Boulanger and Lefebvre, and for some years thereafter, he seemed destined to make pictures alone. They were landscapes, chiefly, and they had the merits that endure, being truthful, beautiful, and full of personality. With such traits, and an inborn faculty for acquiring almost any technique, it was a simple matter to unlock the doors of other arts. Wandering in Italy he fell under the spell of the formal garden. He wrote a book about it and proceeded to design gardens himself. By this time the impulse to design buildings also, which had long been stirring in him, came irresistibly and as a matter of course to the surface. He became an architect as he had become a painter, out of a creative inspiration, and the outstanding precious fact resulting therefrom is that his buildings have style.

This it is that fixes his rank and explains his constantly growing influence. Appreciation of his first buildings must take account of their indebtedness to the Italian villa, but even at this point the derivative factors in a design of his are of a very subtle sort, and as the chronological sequence develops it very soon discloses the artist's essential independence of his Renaissance models. The facade into which he may introduce a Florentine note is expressive of a plan based upon the daily needs of an American household. And his Italianism, in fact, is at bottom nothing more than a love of simplicity, of pure line, of rhythmic proportion. For some years these predilections were illustrated altogether in the solution of a single problem, the country house. More recently a large apartment house in New York and office buildings there and elsewhere have engaged his attention. In these fields, too, he has affirmed his salient qualities of taste and beauty. At present he is preparing the plans for the Freer Museum at Washington, a monument of unique significance inasmuch as it is to house a single collection and to express a particular idea. The drawings foreshadow a structure of rare interest. It will be perfectly adapted to the everyday working requirements of a museum and it will be a thing lovely to look upon, light and graceful in style, yet with the due reposefulness and dignity of a public building. The fusion of practical and æsthetic issues is characteristic. It supplies the key to Platt's genius as an architect.—*N. N.*

FRANK MILES DAY

THE completion of the Art Club in 1887 on Broad street, Philadelphia, was the beginning of Frank Miles Day's career as an architect. Born in Philadelphia in 1861, after graduating at the University of Pennsylvania in 1883, he studied at South Kensington and was admitted as a student at the Royal Academy, London. His chief architectural education, however, was derived from several periods of travel-study in Europe. Returning to Philadelphia in 1886, where he soon opened an office, the above named clubhouse was his initial performance. Then it was that the public noted the arrival of an able designer, while the local circle of architects and their assistants witnessed another telling personality in that of Mr. Day joined to the brilliant group of Wilson Eyre, Walter Cope, and John Stewardson, all of whom were destined to work much good for the profession in their community. In 1892 Mr. Day joined in a partnership with his brother, H. Kent Day. In 1911 Charles Z. Klauder was admitted to partnership, and with the retirement of H. Kent Day in 1912 the firm became Day & Klauder.

Mr. Day follows an unswerving path toward the best in architecture. Time and study he lavishes unstintingly upon pure design, and in this task his quick discrimination discovers the good as unfailingly as his uncommon critical faculty discards the poor and commonplace.

But Mr. Day's talents are many sided. No one has a clearer and more just perception of the proper relations that should exist between architect, owner, and contractor. His mind assumes an almost legal cast when the execution of his buildings is to be begun, and the business methods of his office have largely contributed to that standard practice which fair minded men to-day accept and are following in the business of erecting honest buildings. One of Mr. Day's absorbing interests is that of literature; and in a country such as this, where so few professional men are possessed of literary tastes and ability, it has been indeed fortunate for the important field of architectural letters that Mr. Day has lent it much willing and effective service. Nor does he excel in the effective presentation of subjects by means of writing only. He is one of the ablest public speakers that the profession in this country has ever had. In addition to his regular lecturing to students of the Pennsylvania Academy of the Fine Arts, the universities of Pennsylvania and Harvard, and the cares of his large and increasing practice, he finds time to speak often in the interest of public spirited movements and civic betterment. He is an authority on competition programs, and probably has served on more architectural juries than any other practising architect. Mr. Day has twice been president of the Institute. He is identified with numerous learned societies both here and abroad, and is now supervising architect to at least ten prominent colleges or universities in this country.—*H. C. W.*

West Park Presbyterian Church, New York, N. Y., Carrère & Hastings, Architects, Plates 168–170.

The brickwork of this church is of a buff color and laid in Flemish bond with a light colored mortar. The exterior trim is of buff Indiana limestone with a fine rubbed finish. The structural part is entirely of steel frame, fireproofed throughout; the floors and flat roofs are of concrete slabs, while the pitched roofs are of book tile covered with copper. The auditorium is decorated with ornamental plaster work painted a cream color, enameled. The ventilation is by a plenum system and the heating by an indirect system. The large windows are of metal sash with cathedral glass. The main stairs have marble treads with ornamental wrought iron rails. The cost of the building complete, including furniture and fittings, was about 40 cents a cubic foot, and the capacity of the main auditorium and gallery is 800.

St. James' Presbyterian Church, New York, N. Y., Ludlow & Peabody, Architects, Plate 171.

This church, which serves a negro parish, has a very complete equipment for social work for filling the requirements of the modern church, which must not only hold services for worship, but also classes for cultural work, lectures, social gatherings, and gymnasium classes. Besides the housing of these activities as shown on the plans, the roof of the church will also be utilized as a recreation garden for children and also for open air services during the warm weather of the summer.

The materials employed are red brick laid with wide light joints with stone and terra cotta trim. The auditorium is decorated in white and mahogany and has a seating capacity of 450 persons. The interior shows a barrel vaulted ceiling, supported on rows of Corinthian columns which form the side aisles.

Chapel of the Dominican Sisters of St. Agnes, Sparkill, N. Y., Davis, McGrath & Kiessling, Architects, Plate 172.

The exterior of this church, while simple in its design, is enhanced by the interest of the brickwork, particularly the use made of pattern in the gable of the main façade. The brick is laid with a wide, light colored flush joint and the trimmings are of stone. The seating capacity is about 650.

All Saints' Episcopal Church and St. John's Parish Hall, West Newbury, Mass., Clark & Russell, Architects, Plates 173, 174.

The brickwork of this church is laid with a light colored wide flush joint and the trimmings are entirely of manufactured cement stone. The roof is of extra heavy slate laid in graduated widths. The interior walls are plastered and the ceiling shows the open timber work which is stained a dark brown. The floors of the aisles and the vestibule are of black and white marble, while the floor of the chancel is of terrazzo. There are accommodations for about 150 persons and the cost complete, including furniture, was about $25,000.

The Parish Hall is of stucco and brick with some half-timber work in the gables. The water table is of bricks laid on a slant. The hall seats about 250 people. The total cost of the building was approximately $15,000.

St. Mark's Roman Catholic Church, Dorchester, Mass., Brigham, Coveney & Bisbee, Architects, Plate 175.

The building consists of a central nave with clerestory carried on an arcade and covered by a pitched roof with open timber construction and of side aisles covered with pent roofs.

The design is a free rendering of the last phase of Gothic in England, called Perpendicular. The treatment is in general simple with a certain amount of richness in the window treatment, especially in those in the sanctuary, and at the entrance.

The exterior walls of this church are of a dark red rough texture brick laid with wide flush joints. The trimmings and tracery are of gray artificial stone and the roofs of green slate laid in courses of graduated widths. The walls of the interior are mostly of plaster, decorated in the nave and aisles and in the sanctuary with painted decorations. The woodwork of the interior and the furniture throughout are of slashed oak, stained a deep rich brown. The seating capacity of the upper church is 1,200, including the space in the gallery, and that of the lower church is approximately the same. The cost of the building was approximately 14½ cents a cubic foot.

St. Columba's Roman Catholic Church, Johnstown, Pa., John T. Comes & J. E. Kauzor, Associate Architects, Plate 176.

Interesting use of brick pattern work with stone and terra cotta trimmings and stucco panels has been made in the design of the exterior of this church. The roofs and copings are of Spanish tile. The entrance motive with carved figures and decoration is of stone. The columns of the interior are of stone with tile inserts on the capitals and plaster walls above. A touch of color is given by the brick lining of the arches. The floors of the aisles are of tile, while the floor of the chancel is terrazzo. The reredos is of carved stone. The seating capacity is about 450.

Baptist Memorial Church, Twickenham, England, Ingall, Bridgewater & Porter, Architects, Plates 177, 178.

The free adaptation of Gothic motives in this building is typical of the modern church work of England. The brickwork, both on the exterior and the interior, is all of hand made bricks in mixed colors. The total cost of the building was approximately $19,000.

All Saints' Church, Goodmayes, Essex, England, P. K. Allen, Architect, Plates 179, 180.

On the exterior the walls are of red brick with Portland stone trimmings, the roof being covered with silver gray slates. On the interior the walls are plastered, while brick arches rest on the stone piers. The roof is of Oregon pine left to tone down naturally. The seating capacity is between 700 and 800, while the cost of the building was about $47,000.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

THE composition of the library of an architect is a matter which deserves considerable thought and attention. With the highly developed state of photography and printing has come a vast production of works dealing with architecture, picturing monuments from all parts of the world, and flooding the architect with material from which to choose.

For various reasons the average library must be limited. The very nature of architectural books which demands that they be illustrated completely often makes their cost high so that only a few may be acquired. The average architect of to-day, moreover, has little time to devote to matters other than those pertaining in some manner, more or less direct, to his practice. There is a great amount of detail in the office to be attended to, and clients of the present and future are likely to consume a large proportion of the remaining time. The tendency then of the general architect is to limit his library to those works from which the most immediate benefit may be derived, that is, to purchase principally those books pertaining to design or construction—books from which "inspiration" of a direct character may be obtained.

Too frequently the history of architecture is almost entirely slighted or forgotten. The architect as a man of general culture should have a knowledge of architectural history as a part of his special and particular information. But, apart from this view, the study of history from the aspect of cause and effect, of environment and production, the study of architectural forms as an indication of historical life becomes a source of material of immense value. Few men in the profession are really satisfied to be merely imitative, slavishly following precedent without thought concerning new conditions of living and new requirements of building. In fact, true architecture in the broadest sense of the word is the exact opposite — it is only that work in which a distinct forward step is made and in which the life of its time is reflected.

The historical monuments are such works, and they exist in memory because of this very fact. The study of architectural history then, from this point of view, will not only lead to a better and more sympathetic understanding of historical forms and monuments, but will also stimulate and offer inspiration to the man striving to-day to express himself and his period in the art of building.

IT IS from this point of view that A. L. Frothingham, late professor of archæology and the history of art at Princeton University, has written the two volumes which complete the monumental work, "A History of Architecture," started by Russell Sturgis, and of which the first two volumes were practically completed before his death. The first two volumes, however, took the survey only to the end of the period of the Romanesque, and Mr. Frothingham has finished it with a consideration of the Gothic and Renaissance. These two periods are those of closest similarity to our own modern age and from which the greatest amount of architectural inspiration has been derived.

The author calls the Gothic period a period of *dynamic* architecture as compared to the *static* architecture of the Renaissance. It was a period of development of architecture as compared with a period of the development of decoration. Because of this more subtle quality of the Gothic it cannot be doubted but that it marks the greater architectural advance. It is because of this less obvious quality of structural beauty that the Gothic is less easily copied by the modern architect, no one of which has yet fully mastered the laws governing the construction. The Renaissance is a simple matter in comparison because of its complete reliance on external beauty and proportion.

It is by realizing the conditions under which these styles were evolved that they become of value to us as architects of to-day, and it is this point which Mr. Frothingham has made the foundation of his text.

THE New York State Board for the Registration of Architects announces a competition for the purpose of securing a design for the certificate which will be issued to all persons entitled to practise architecture in the state of New York. This competition is open to all architects, draftsmen, or other designers resident or doing work in New York City. The designs submitted must be in the hands of D. Everett Waid, 1 Madison avenue, on or before Jan. 25, 1916, and will be judged by a jury composed of William R. Mead, Henry Bacon, Charles Platt, and S. B. P. Trowbridge of New York City, George Cary of Buffalo, Frank H. Quinby of Brooklyn, and J. Foster Warner of Rochester. The prizes are: $200 for the design placed first, $150 for the second, $100 for the third, and $50 for the fourth. Information concerning details of the competition may be obtained from Mr. Waid.

AT the annual meeting of the American Institute of Architects held in Washington, D. C., on December 1, 2, and 3, the following officers were elected: President, John Lawrence Mauran, St. Louis; 1st Vice-President, C. Grant La Farge, New York City; 2d Vice-President, Milton B. Medary, Jr., Philadelphia; Secretary, Burt L. Fenner, New York City; Treasurer, D. Everett Waid, New York City.

The new members of the Board of Directors elected for three years are: Edwin H. Brown of Minneapolis; Horace Wells Sellors of Philadelphia; Ben J. Lubschez of Kansas City.