

THE INLAND ARCHITECT AND NEWS RECORD

Vol. XXI.

MAY, 1893.

No. 4



A Monthly Journal Devoted to
ARCHITECTURE,
CONSTRUCTION, DECORATION AND FURNISHING
IN THE WEST.

PUBLISHED BY THE INLAND PUBLISHING CO.,
19 Tribune Building, Chicago, Ill.

L. MULLER, Jr., Manager. ROBERT CRAIK McLEAN, Editor.
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TERMS: Regular number, \$5 a year; Photogravure edition, \$10 a year. Single copies, Regular number, 50c.; Photogravure edition (including 7 photogravures), \$1. Advance payment required.

The columns and illustration pages of THE INLAND ARCHITECT are open to all alike, merit and availability only determining what shall be published. Contributions appropriate to its pages are always desired.

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Place of next Convention, Chicago, August, 1893.

R. M. Hunt
Receives
the Royal
Gold Medal.

Mr. Richard M. Hunt, of New York, who has been awarded the Royal Gold Medal of Queen Victoria by the Royal Institute of British Architects, will be in London on June 19 to receive the medal from the hands of the president of the Royal Institute, of which Mr. Hunt has long been an honorary corresponding member. That this honor has been conferred upon an American architect is a compliment that should be appreciated by every citizen, as it is by every member of the profession, and the conferring of this honor upon Mr. Hunt coincides with the wish and judgment of every architect, as he is the representative exponent of American architectural ability and acquirement.

Twenty-seventh
Convention
A. I. A.
Announced.

In fixing the date for the twenty-seventh annual convention of the American Institute of Architects for the week beginning July 31, so that the convention may be held in conjunction with that of the World's Congress of Architects, the executive committee of the American Institute has issued the following circular:

ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS, AND INTERNATIONAL CONGRESS OF ARCHITECTS.

CIRCULAR OF INFORMATION NO. 1.

The date fixed upon for the annual meeting of the American Institute of Architects is the week beginning July 31, 1893, in conjunction with the International Congress of Architects, which is to be held in the World's Congress Art Palace, situated on the shore of Lake Michigan, in the heart of the city of Chicago.

This International Congress of Architects is one of a series of international congresses to be held by invitation of the World's Congress Auxiliary, an organization authorized by the Directory of the World's Columbian Exposition and recognized by the government of the United States as the appropriate agency for the conduct of the several congresses, and they have designated as their committee Daniel H. Burnham, chairman; William Le Baron Jenney, vice-chairman; and Solon S. Beman. This committee have elected Robert Craik McLean as their secretary.

We are informed that the following list of subjects have been recommended for consideration:

Workingmen's houses;
Modern apartment houses;
Ancient apartment houses;
Laundries in houses, health effect;
Kitchens in houses, health effect;
Modern stables, large and small;
Responsibility of architects in constructional matters;
Responsibility of architects as to plans;
Responsibility of architects in decorative matters;
Sculpture and architecture;
Painting and architecture;
The client's right to service, as to drawings, ownership of same, specifications and details, as to supervision, etc.;
Mechanical engineering in architecture, and the Architect's responsibility therefor;
Modern steel construction;
Fireproofing of buildings to date, etc.;
and that persons specially fitted to treat upon them are to be invited to prepare papers to be read at the Congress.

It is also proposed by the American Institute of Architects to have a series of papers read by the master artists who have been engaged upon the work at Jackson Park, and at this time we are promised papers by Daniel H. Burnham, chief of construction; Frederick Law Olmsted, landscape architect; E. C. Shankland, chief of constructing engineers; and W. H. Holcomb, general manager, and expect favorable replies from several others.

A full attendance of the members of the Institute, as well as of the architects throughout the country, is expected, and this notice is issued at this time to enable all intending to attend the congress and the convention to arrange their plans with reference thereto. ALFRED STONE, Secretary A. I. A.

Similar action should be taken by every foreign society in regard to the appointment of representatives to the congress who will present papers upon the subject proposed or others which will be of interest to an international gathering of the profession. The new Art building in which the congress and the convention of the American Institute of Architects will be held is admirably

adapted for the purpose. Space upon the walls will be reserved for the hanging of drawings illustrating the different papers, a curtain and lime light with operator will be provided for those who wish to illustrate their papers by lantern slides, and every other facility for making the meetings interesting and the work done notable will be provided. It is requested by the secretary of the congress that those who have not received the official invitation will feel that their professional identification will make them welcome, and that those who have decided to present papers would at once notify the president of his local association of the fact so that the official programme may be prepared as early as possible. This programme will include a carefully prepared list of the architectural exhibits and illustrations displayed in the different sections of the Fair and their location, so that visitors may be able to inspect them all without inconvenience. The papers which will be read before the convention of the American Institute will be exceedingly interesting, as they are presented by the first among American architects and engineers, and all architects attending the congress, especially those from foreign countries, will doubtless be welcomed to the convention.

A "Business" Advertisement It is surprising in the highest degree to find the following advertisement in the columns by the N. Y. of the New York *Herald*:
"Herald."

TO ARCHITECTS AND BUILDERS.

Sealed proposals will be received until July 1, 1893, for the plans of construction (with estimated cost) of a steel office building of from twelve to twenty stories, on the site of the present *Herald* building, at Broadway and Ann street.

A prize of \$500 will be paid for the plans selected as combining the greatest advantages, and \$250 for the second best. G. G. HOWLAND,
General Manager New York *Herald*.

The commissioners of Podunk county, Arkansas, would not be expected to know much more of architectural practice, perhaps, but to find that the business managers of a newspaper that has so long stood at the head of the list of American daily journals, demanding the keenest business judgment for its continued success, are so ignorant of professional procedure is simply beyond the comprehension of ordinary people. We are looking at the advertisement simply from its business standpoint, as it is signed by the "general manager," and is thus cut off from the brains of the paper, which is the editorial department. We do not attempt to point out the error, for the mind that has so little conception of what it means to design a "steel office building of from twelve to twenty stories," and with all that the problem implies, could not understand the plainest exposition of the absurdity of his proposition. We simply wish to apologize for the *Herald* as a newspaper, not as a business enterprise. In all great papers there is ostensibly a distinct line of demarcation drawn between the editorial and the business office, a rule never violated except where the editorial utterances are apt to injure the financial income, and it is unjust to charge ignorance of architectural affairs upon the editorial department when the business department makes the above egregious blunder. No, the editorial department of the *Herald* was not and probably will not be consulted in this business transaction, and probably will not be allowed to defend itself against the charge of dense ignorance in which an indiscriminate judgment would involve it. Of course, no architect worthy of the name will reply to the offer made by the general manager of the *Herald*, and if any builder be

found who will attempt the erection of the proposed structure, it will be as precarious as the continued resting of the fortunes of the paper upon a business policy such as the advertisement in question would indicate.

The Art Section of the World's Congress.

In August, commencing with the thirty-first day of July, the art section of the Congress Auxiliary of the World's Columbian Exposition will hold its different congresses. The general divisions are six in number, comprising painters, sculptors, architects, engravers, photographers and decorative artists, in the order named, and it is understood that there will be added a seventh division on the organization of art, under the leadership of M. Barthelemy, who was an acting commissioner of fine arts from France to the Columbian Exposition. This latter section, according to the plan of M. Barthelemy, is intended to bring together those who without being professional artists are interested in art, such as art critics, curators of museums, directors of schools, etc., with the view to generally discuss the teaching and general government of art. As in all of the general divisions, but little attempt will be made to secure special representatives at the congress. The announcement of such important gatherings is deemed of sufficient interest to those who stand first in painting, sculpture, architecture, etc., to draw them together at a time when the world will naturally meet to compare notes and take account of the progress of the race in the line of their especial endeavor. That special programmes will be prepared and the utterances of the brightest minds and closest students in the respective professions will be sought for and brought together is of course natural, and, speaking for the architectural section, we are sure there will be no disappointment, for each great society will be represented by some of its most distinguished members. Additions are constantly being made to the programme in the way of papers upon special subjects, and notification of the appointment of delegates from foreign societies and representatives of governments are being received, indicating the interest taken in architectural and art progression throughout the world.

Hand Cameras at the World's Fair.

Novices in photography will be common at the World's Fair, and they will, unless warned, be misled by the commonly seen advertisement recommending a popular small camera and the use of films. "No bulky glass plates and troublesome holders" and that most misleading and injurious statement about "pressing the button." The choice is plainly this: Go to the Fair, and with a film holder "press the button" 200 times with ease and dispatch, and afterward find, perhaps, that not a single good exposure has been made; or use the "bulky" glass plates, knowing that each is apt to be good, and by developing them each night be able, if they are not good, to retake them next day. We recommend the use of glass plates entirely and the immediate development of at least some of the negatives, in preference to the use of a film with a perfect ignorance regarding its action and a large percentage of chances that there is something wrong which is not discovered until too late. While upon the subject it might be well to state that only cameras with 4 by 5 inches exposure or under will be allowed in the Fair grounds, and these will be taxed \$2 a day unless otherwise ordered by the Bureau of Administration.

DIRECT METHODS IN ARCHITECTURAL PERSPECTIVE.

BY CHARLES E. ILLSLEY, A.M., C.E., ARCHITECT.

CHAPTER V.—OBLIQUE OR CABINET PROJECTIONS.*

THERE is a class of projections which, bearing a general resemblance to isometric views, are yet essentially different in principle and are of superior utility for certain requirements. Their origin is French. They are variously styled "military," "cavalier" or "cabinet" projections, and they belong to the general class of oblique projections, while isometric drawings are orthographic (see Section 26). Figs. 77, 78 and 79 are cabinet projections of the cube shown isometrically in Fig. 80.

58. Comparing them, we note that every line in the cabinet projections is of the same length, and that two faces, namely, $ABEF$ and $CDHG$, appear in their true size and shape. It will be shown farther that every line which may be drawn in these faces, or in any plane parallel with them, will appear in its true

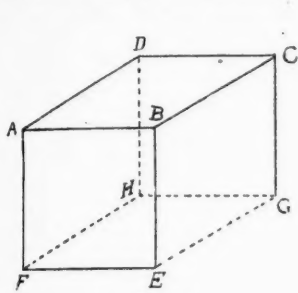


FIG. 77.

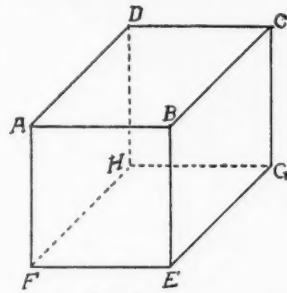


FIG. 78.

size and shape. In the cabinet projections of the cube, the distant corner H in Figs. 77 and 78 and D in Fig. 79 is distinctly shown; in the isometric cube the corner H is overlaid by the front corner B .

All the figures show three faces of the cube with considerable perspective effect. In the isometric cube, these faces are shown equally; in the others the inequality is more noticeable between the faces which are shown accurately and those which are distorted. Figs. 81 and 82, taken from the advertising pages of THE INLAND ARCHITECT, are additional illustrations of cabinet projections.

59. In Section 23, Fig. 26, the observer is represented as standing opposite the center of the plane of the picture, and when he removes to an infinite distance the visual rays become perpendicular to this plane (Section 26). Should the observer occupy any

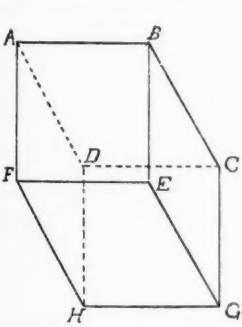


FIG. 79.

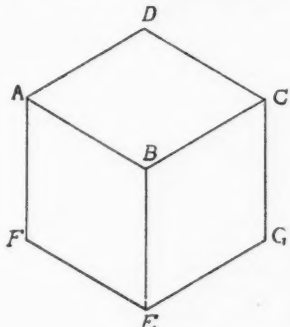


FIG. 80.

other position by removing to one side or the other of the line shown, and then withdraw to an infinite distance, the visual rays would become parallel as before, but they would be oblique to the picture plane. The perspective so obtained would then become an *oblique projection* of the object seen. When these oblique rays make an angle of forty-five degrees with the plane of the picture, the oblique projection becomes a *cabinet projection*.

60. In Fig. 83 the line AC makes an angle of forty-five degrees with the vertical AB and with the horizontal BC . The point C may therefore be considered the cabinet projection on the plane $DEFG$ of the point A , and the horizontal line BC will be the cabinet projection of the vertical line AB . It is evident that BC will always equal AB , whence the cabinet projection of a vertical

line on a horizontal plane is of the same length as the line itself.

The projecting ray AC may be conceived to revolve around the vertical AB as an axis into an infinite number of positions, always maintaining its angle of forty-five degrees, and yielding an

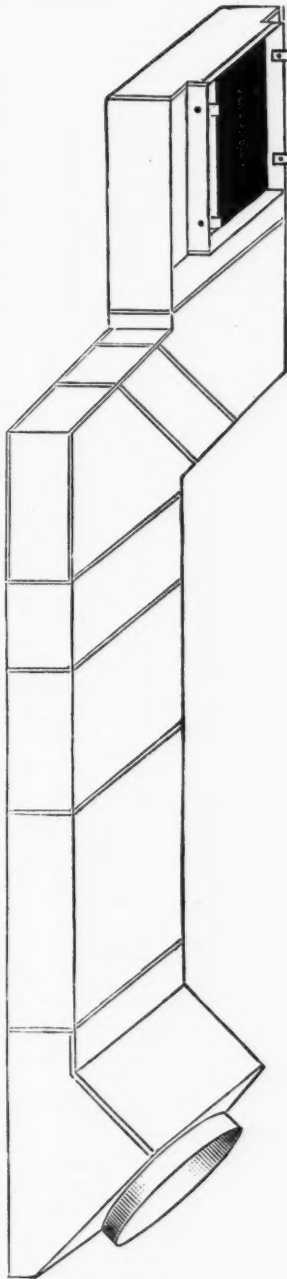


FIG. 81.

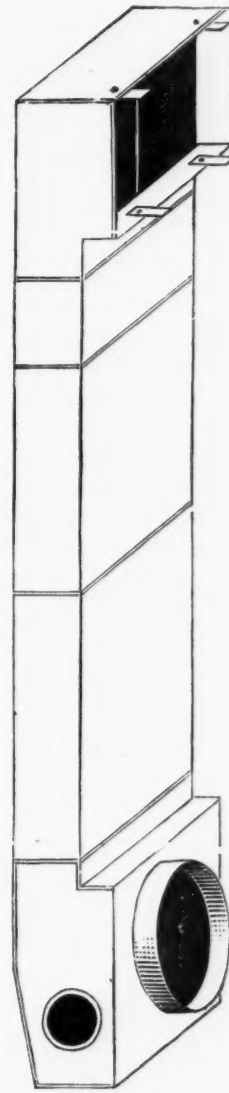


FIG. 82.

infinite number of projections of AB . This is illustrated in Fig. 84, which is an isometric drawing of the cone of rays so formed. Any radius of the base of the cone may be taken as the cabinet projection of its axis, AB .

In Fig. 85 AC represents any line parallel to the plane of projection; AD and CE are the projecting rays at forty-five degrees

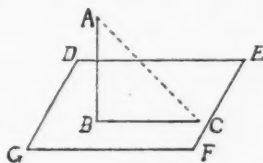


FIG. 83.

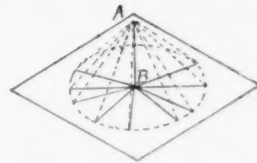


FIG. 84.

from its extremities; DE , the cabinet projection of AC , is parallel and equal to AC .

61. Hence results the following rule for drawing the cube in cabinet projection: Draw one face of the cube as $ABEF$ in Figs. 77, 78, 79 of its true size and shape. Draw one edge as AD

* For the fundamental principles of this chapter, the author takes pleasure in acknowledging his debt to the excellent text-book "Elementary Projection Drawing," by Prof. S. Edward Warren, C.E., who was his instructor and personal friend at the Rensselaer Polytechnic Institute, Troy, N. Y.

in any direction whatever. Draw BC and EG parallel with AD . Lay off on AD the depth of the cube, i. e., make $AD = AB$. Through D draw DC parallel with AB . Draw CG parallel with AF .

In Fig. 77 the line AD is at thirty degrees with AB ; in Fig. 78 the same angle is forty-five degrees, and in Fig. 79 it is sixty degrees. The application of this rule to other regular objects will be easy. Take, for example, the hexagonal prism Fig. 86. One face, $ABCDEF$, is drawn in true size and shape. From any

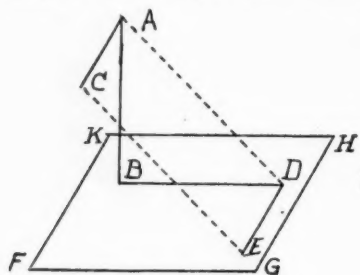


FIG. 85.

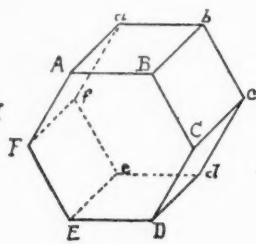


FIG. 86.

corner A draw Aa in any direction. (In Fig. 86 Aa is drawn at forty-five degrees with AB .) Lay off Aa equal in length to the depth of the prism. Through a draw the hexagon $abcdef$ parallel with the front hexagon, and join Bb , Cc , etc.

Or, having drawn Aa in the direction desired, draw Bb , Cc , Dd , etc., parallel with Aa , and lay off on each the length Aa ; then join the points so found.

Fig. 87 shows how recesses and projections are drawn substantially in the same manner as in Fig. 42. Oblique lines, as AB in Fig. 87, are located by the distance out, BC and the height AC , the same as in isometric drawing.

62. Fig. 88 is a framing detail in cabinet projection. The front part is simply an ordinary elevation, and the same dimensions

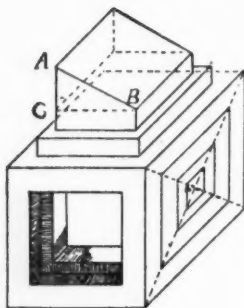


FIG. 87.

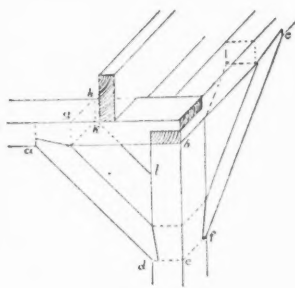


FIG. 88.

are laid off on the receding lines, which are drawn at forty-five degrees. Thus, bc , the distance out of the brace on the receding side, is equal to ab . The foot of the brace at d is transferred to the receding edge of the post by drawing de horizontally and ef at forty-five degrees. The distant edge of the slanting brace is located by drawing $ghik$, the section of the horizontal beam or plate, to obtain the point k , whence kl is parallel with ad . The same construction is shown on the receding side.

63. Fig. 89 is a detail of a cast-iron stool with square base and top, to support a column. The method of construction is shown

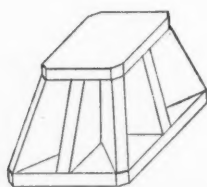


FIG. 89.

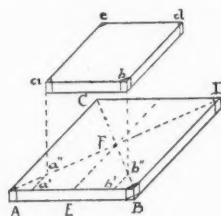


FIG. 90.

in Fig. 90. Draw $ABCD$ to scale for the base with square corners. Draw diagonals AD , BC , and through their intersection F draw EF parallel with AC . Lay off each way from E , which is the center of AB , one half the width $a'b'$ of the top of the stool. Through the points thus located draw $a'a''$, and $b'b''$ parallel with AC , to meet the diagonals AD , BC . Erect verticals $a''a'$ and $b''b'$, and lay off $a'a''$ equal to the height of the stool above

its base. This gives the point a , from which draw $abcd$, the square of the upper base.

Find the beveled corners by laying off on AB , and on a the point where the bevel begins, and drawing lines parallel with the diagonals AD or BC .

In all other respects the construction will be self-evident.

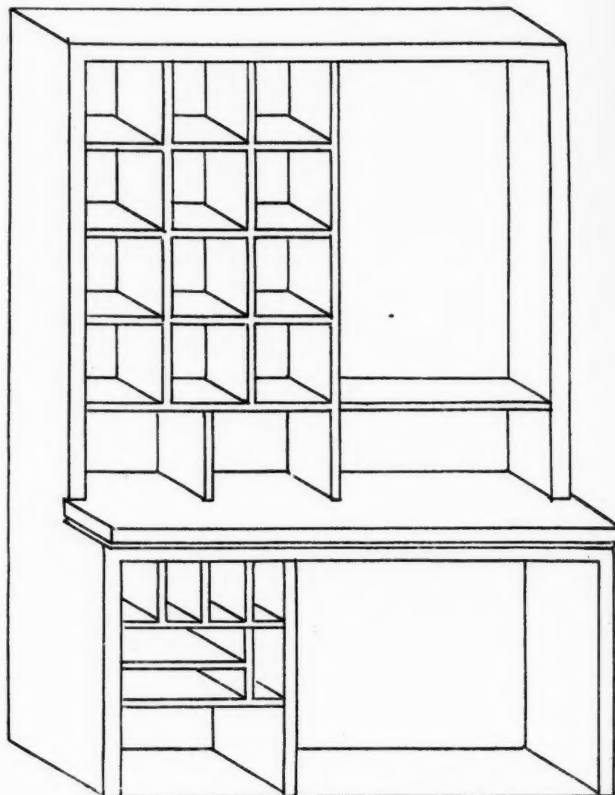


FIG. 91.

Fig. 91 illustrates the great serviceability and the picturesque effect of cabinet projection when applied to pantry fittings and other cabinet work.

64. The circle in cabinet projection is not quite as readily and satisfactorily drawn as in isometric work. The front face, Fig. 92, presents no difficulties, since the square with its inscribed circle is in its true size and shape.

On $ADGF$, the receding side of the cube, a number of points may be located thus: Four points of tangency are at a , b , c , d , the middles of their respective sides. Draw the front diagonal BF , and the receding diagonals FD , AG , and EG . The front circle cuts BF in e . Find the corresponding point f on DF by drawing ef parallel with the diagonal EG . To find the three corresponding points on the other diagonals draw fh parallel with FG , and draw fg and hi parallel with AF . Having now four tangent points and four points on diagonals, the rest of the curve may be drawn in free hand.

Any number of intermediate points may be located accurately by the abscissæ and ordinates (Section 56), as shown by dotted lines at A . The distances spaced off on AB , are repeated on AD and verticals drawn through each point. From the foot of the first vertical in the face $ABEF$ draw a horizontal line to AF , thence a line parallel with AD to meet the corresponding vertical in the face $ADGF$.

65. This method is shown to a larger scale in Fig. 93, where a quarter circle in the front face of the cabinet projection of a cube is transferred to the adjacent receding face. Lay off on Ag and Ag' the equal distances ab , bd , de , ef , fg , and Ab' , $b'd'$, $d'e'$, $e'f'$, $f'g'$. Also mark points a , c , a' , c' , at the middles of the first two divisions. Through all these points draw verticals, as shown by dotted lines.

The quarter circle Bg , being in the front face of our cabinet projection of a cube, appears in real size and shape (see Sec. 64). From the points 1, 2, 3, 4, 5, 6, where the verticals through a , b , c , d , e , f , meet this arc, draw horizontals meeting AB in h , i , k , l , m , n . Thence draw lines $h1'$, $i2'$, $k3'$, etc., parallel with Ag' to meet the verticals through a' , b' , c' , d' , e' , f' . The intersection

1' of the first line h1' with the first vertical a' 1' on the receding face of our cube is the cabinet projection on the receding face of the point 1 on the circle Bg in the front face. Similarly the line i2' on the receding face cuts the second vertical in 2', which is the projection on that face of the point 2 on the front face. The other points are found in like manner. It is obvious that the remaining three-quarters of the circle may be drawn by repeating these operations.

66. Approximate curves composed of circular arcs may be drawn as follows (see Fig. 94). Since the curve must be tangent to the sides at their middles, a b c d e f g, the radii must be perpendicular to these sides at these points. Therefore draw a k at right angles to C D, and c k at right angles to B C. The point k where these lines meet is the center for the arc a c. At the middle of A B erect the perpendicular d l, making the length d l = a k. The point l is the center for the arc b d. The points where the radii l b, l d,

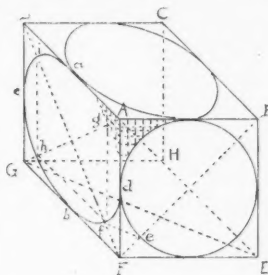


FIG. 92.

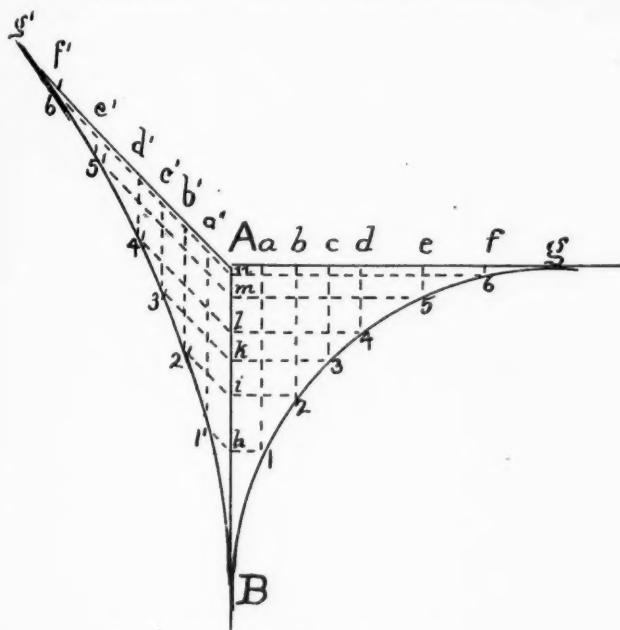


FIG. 93.

cross the diagonal B D are centers for the remaining arcs which complete the curve.

For the circle in the face A D G F continue the radius l b to meet the horizontal f m through the middle of the edge A F. The point m is the center for the curve b f. The center for the curve e g is at n, where the horizontal e n from the middle of D G meets g n which is perpendicular to F G at its middle.

The error in this compound circular curve is chiefly along its major axis D F. The true curve, as shown by dotted lines copied from Fig. 92, is slightly the longer.

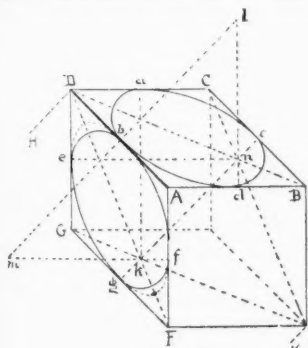


FIG. 94.

their intersection, also that the center n falls on the intersection of diagonals $B D$ and $C E$. Hence these centers may be found directly by drawing the diagonals named.

The reason may be found in the fact that the sides $E B$, $B C$, etc., being equal and the angle $A B C$ being forty-five degrees, while $A B E$ is ninety degrees, the three sides $E B$, $B C$, $C D$ form a part of a regular octagon, which, if continued, would follow the directions indicated by $E K$ and $D H$. In a regular octagon

all lines which bisect the angles meet in its center, as also do lines perpendicular to the sides at their middles. Now the diagonals above noted make angles of sixty-seven and one-half degrees with their adjacent sides, which is exactly half of the angle of an octagon at each corner, and the radii drawn are perpendicular to their respective sides and bisect them.

(To be continued.)

HEATING AND VENTILATION OF RESIDENCES.

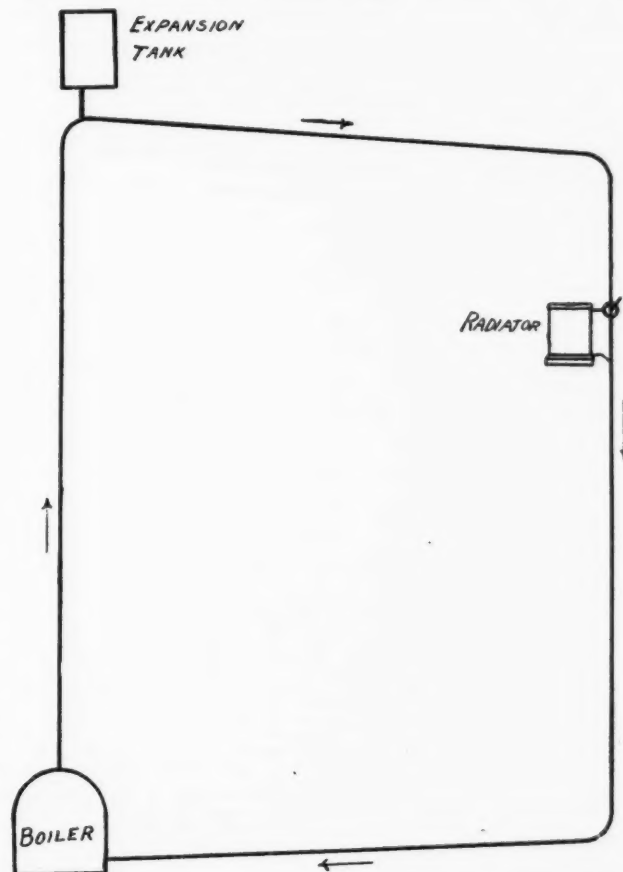
BY JAMES R. WILLETT.

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HOT-WATER HEATING.

A HOT-WATER heating apparatus may be likened to a circle, or rather, to two vertical columns of pipe, which columns are connected both at top and bottom so as to form a continuous conduit. If these columns are filled with water and one of them is heated, especially at or near its lowest point, the water in the heated column will ascend, while that in the cold column will descend. The heated water is the lightest. The motive power being the difference in the weights of these columns. The difference in the weights of water at different temperatures below the boiling point is quite small, and therefore it is desirable for the apparatus to be adjusted so the water in passing through it shall have as little friction as is practicable.

The boiler may be said to be placed at the lowest point of the heated column, and the heated column is the supply or feed-pipe to the radiators, while the colder column is the return from the radiators to the boiler. The greater the difference between the temperatures of these columns the greater the motive force, and therefore the more rapid the circulation.



The foregoing figure illustrates the circulation of water in hot-water heating apparatus.

If you will examine the accompanying drawings of hot-water heating apparatus you will perceive that, however complicated they may at first appear, yet they are all resolvable into the foregoing simple figure.

The radiators may be placed at any points of the circuit. The higher they are above the boiler the more rapid will be the circulation of the water.

Separate vertical sections or loops forming a hot-water radiator should be connected at both top and bottom so as to allow water and air to pass. The larger these connections the better.

Globe valves should not be used on hot-water pipes as they obstruct the flow of water. Angle valves, straight-way valves and deflecting valves may be used.

Elbows, tees and other fittings should be long-sweep water fittings. Ordinary (short) fittings, such as will do for steam, should not be used.

All waste pipes should discharge in open view, otherwise they may be leaking water constantly without it being known, and thus wasting fuel and perhaps leading to a dangerous condition of the apparatus.

When water is heated it expands, and there should be an expansion tank provided to receive the amount of such expansion, otherwise, when the water contracts by cooling, it might occur that the water column would be broken, that is, would not connect at the top. The expansion tank contains, so to speak, surplus water, so that no matter whether it be cold or hot there can be no breaking of the water column. It should be the highest point of the whole apparatus, and should connect with the highest point of the circulation.

The necessary dimensions of an expansion tank to contain the increase in volume of the water in the apparatus, arising from the heating thereof, can be ascertained by adding the volume in the boiler, the volume in the pipes, etc., and the volume in the radiators.

Divide the sum of these volumes by 20, and the quotient will give the necessary volume that should be in the expansion tank.

The volume of pipes can be taken from table given by Baldwin, Thurston and others.

It is not, however, necessary to find the separate volumes of boiler, pipes, distributors and radiators. It will be sufficiently accurate for all practical purposes to divide the total radiation in square feet by 300 and the quotient will be the requisite volume in cubic feet of the expansion tank.

Or, if the total square feet of radiation is multiplied by 5.76, the product will be the requisite volume of the expansion tank in cubic inches.

The connections from bottom of expansion tank to apparatus differ in the different methods of heating and will be described hereafter.

The supply pipe to expansion tank should be one inch, and should pass through the boiler room where it should connect with a hand-lift and force pump, usually about a two-inch brass barrel and seven-inch stroke, which must draw its supply from water works, cistern or other source. It should then pass upward, and should enter near the top of the expansion tank.

There is another one-inch pipe to be taken from the expansion tank, an overflow pipe. This pipe should pass out from expansion tank at the same level as the supply pipe and run to boiler room, there to discharge the water into a trap, but always so that the discharge of water can be seen. This pipe also acts as an air pipe. By the above arrangement it can be told if the apparatus is full of water; for by pumping a few moments, if the apparatus is full, the water will overflow and its discharge can be seen. If it does not thus overflow, then it needs pumping until it does.

Hot-water boilers need not differ from steam boilers, except that they should not have "steam space," that is, there should not be any large interior spaces in them. The smaller spaces should not be less than two inches in the narrowest way, and need not be much more, except at pipe entrances or exits, where it should be enlarged to accommodate all the water from or to the smaller spaces. A boiler of very large cubical contents is not desirable for hot-water heating, but it is desirable not to have the water passages narrow and rough and with square elbows. The less opportunities for friction there are the better.

If your boiler is not a "sectional" one (that is, one that can be taken into the building in small parts and there put together) see that you provide some way of getting it into the building and into its place.

It is desirable to put an altitude gauge on a hot-water boiler, but it is not indispensable.

It is also desirable to put a pop safety valve on a hot-water boiler, though if the "open" method is used it is not indispensable. If the closed method is to be used, or if the means of changing an open method to the closed method are provided, then a pop safety valve must be put on the boiler—a one-inch valve is usually sufficient.

One great advantage the hot-water system has is that by keeping a small, low fire the heat is graduated and the amount made suitable to mild weather. In fact, hot-water heating apparatus, to be perfectly run, should be governed by the firing at the boiler, keeping a low fire in mild weather and a strong, lively fire in cold weather. If this were done it would not be necessary to have any valves on the radiators; but it never is and never will be done, at least in any thorough manner.

OVERHEAD METHOD.

The overhead method of hot-water heating, sometimes called the "Mills" system, from the name of the writer who described it, is to be preferred. In this overhead method the feed-pipe is run from top of boiler directly upward as nearly as is practicable to the attic. There branches are taken from this main feed-pipe to points directly over the radiators in the stories below; thence, these branches descend, communicating with the radiators as they pass by means of two connections to each radiator: one from the branch pipe to the top of the radiator, and another from the bottom of the radiator to the same branch pipe. The upper, or feed connection should have a valve upon it. The lower, or return connection should not have a valve.

By this arrangement, when the radiator valve is open the water passes out from the branch pipe to the top of the radiator, thence, passes through the radiator, and passes out through the lower, or return connection to the branch pipe again; thence, it passes downward and goes through any other radiator that may be on a

lower story. In this manner it may pass through several radiators in different stories. Finally it passes through into the basement and returns to the boiler.

Since the greater the difference of temperature between the hot water column and the colder column, the greater the motive force is; therefore, the less heat the ascending column gives off, and the more the descending column, the more rapid is the circulation. It is therefore best to clothe the heated column with pipe covering and leave the colder column uncovered.

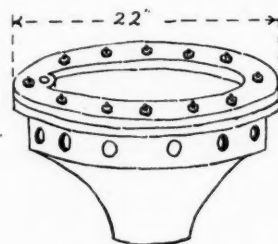
Now the water, after it leaves a radiator in an upper story, is of course at a less temperature than it was before it entered that radiator; therefore, the water enters the radiator in a lower story at a less temperature than it entered the upper radiator; usually, however, the difference does not exceed ten degrees. It is therefore necessary to increase the surface of the lower radiators to make up for the difference in the temperature of the water.

In the overhead method of hot-water heating the whole apparatus is graded and arranged so that while the apparatus is being filled with water all the air therein can, and naturally does, ascend to the expansion tank and escapes therefrom through the overflow pipe. Consequently air cocks are not needed on the radiators.

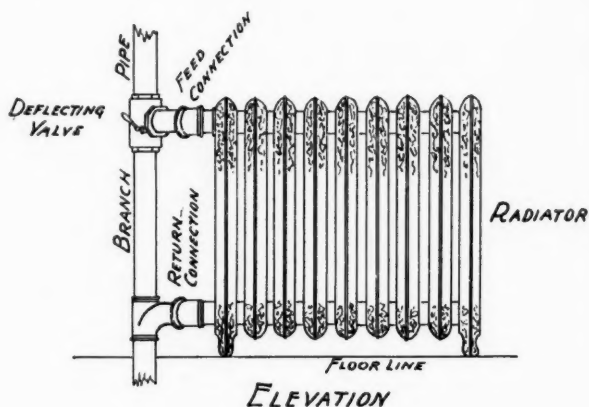
The lowest point of expansion tank should be connected with highest point of circulation, that is with the highest point of main feed in attic, or with top of distributor, by a one-inch pipe.

After reaching the attic the main feed-pipe may run horizontally around attic to supply the branches, and similarly a return main may run around basement, as shown in Plates I, II and III.

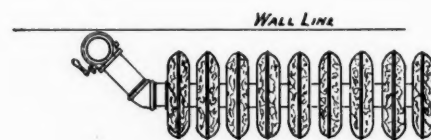
It has, however, been found cheaper, more convenient and as efficient to substitute for these horizontal mains a casting called a "distributor," shown in accompanying sketch and in Plates IV, V and VI.



DISTRIBUTER



ELEVATION



PLAN.

THE BRANCH PIPE MUST BE KEPT CLOSE TO WALL AND THE CONNECTIONS MADE AT RADIATOR BY ELBOWS AS SHOWN.

The main feed enters the bottom of this "distributor" and the branches pass out from the upper portions thereof, as shown in the drawing. The top of this distributor is connected with the bottom of the expansion tank so that air can escape into the tank, and, through the overflow, from the tank.

The advantages of the overhead method are:

As the water which passes downward through an upper story radiator also may pass downward through a radiator in lower story, therefore both of the radiators are working together and one does not rob, but assists, the other.

The main feed to attic is a comparatively large pipe, but it can be run up in an out-of-the-way place, and be readily clothed, so as to retain the heat.

The descending pipes to radiators are relatively small and can and should be left uncovered. They pass through the rooms. There need be no air cocks on the radiators, which cocks are apt to leak.

The valve that is upon the feed connection at top of radiator may be an ordinary gate valve, but it is better to use what may be termed a deflecting valve. This is a valve which goes on a branch at the junction of the branch with the feed at the top of the radiator and is a flap valve. By turning the flap in one direction the water, if it moves at all, must pass into and through the radiator, whereas by turning the flap in the other direction the water must pass straight down the branch pipe without entering the radiator.

In order to retain the heat in the main feed-pipe and other feeding portions of the apparatus, the main feed from top of boiler should be entirely covered with pipe covering. The whole of the portion of the apparatus that is in the attic should also be covered. If the boiler is not bricked in it should also be covered.

The branches, after leaving the attic, should not be covered. It is much the best that they should not be put in the walls, but, if the owner insists upon it, it may be done.

The more such pipes are exposed the more heat they give off, and, therefore, the greater will be the difference between their temperature and that of the feed-pipe with a resulting increase of the efficiency of both; besides, any pipes at times are liable to leak, and if they are inclosed in the wall they are difficult to get at; also, the pipe itself acts as a radiator, and if you need any heat at all you need at least as much heat as the pipe will throw off.

The foregoing is a description of an "open" method of hot-water heating. That is, a method in which the water can expand, overflow and escape, therefore, no pressure can come upon the apparatus except the weight of the water.

This can be readily changed to a closed system by putting valves on the water supply and on the overflow pipes. The shutting of these valves would make a "closed" method. Leaving them open makes an "open" method.

In a closed method a pop safety valve should be put on the boiler. It is also well to make the expansion tank air tight and twice the volume of that needed for the open method, the supply and overflow pipes to enter the expansion tank at one-half of its height. The upper half of the expansion tank will then act as an air cushion.

It is intended, however, to use the "open" method exclusively, which means that the valves on water supply and overflow pipes

will be left open. These valves are intended to give facility for testing the apparatus and are not for constant use. It is best before leaving the apparatus to screw the packing nuts up tight and to wire the handles of these valves so that they cannot be turned. To ascertain the direct radiator surface take the formula heretofore given:

$$Q = R F J = \text{requisite square feet of direct radiator surface in a room.}$$

The value of "R" can be calculated by the rule already given. "F" is to be taken from Table III. This value varies with the different stories. Thus in a two-story house and for the first-story rooms "F" is to be taken as 1.2, while for the second-story rooms it is to be taken as 0.8. In a three-story house, for the first-story rooms "F" = 1.25, for the second-story room F = 1, and for the third-story rooms F = 0.75.

The value of the factor "J" will depend upon the exposure of the room. Rooms which are exposed to prevailing cold winds (north and west sides) will usually require more than those on south and east sides, depending on surroundings. If the house is in a sheltered position little increase need be made. For north and west sides "J" is usually taken as 1.4, and on south and east sides, J = 1.

For bathrooms J = 2.

For kitchens J = 0.5 to 0.7.

Direct radiators in entrance halls or near exterior doors should be largely increased, here J may be taken as 2, or instead twenty to fifty feet may be added to the radiator. It is a good custom to increase the direct radiation wherever there are entrance doors or other opportunities for the admission of cold air.

The quantity of air necessary to ventilate the house can be determined by the rules already given under the heading of "Ventilation." The air should be introduced through the stair halls and thence to the different rooms.

The air required for the ventilation of the building must be heated by indirect radiators, preferably by the direct-indirect radiators heretofore spoken of. As the hot water never gives off a high temperature, it is necessary that the quantity of surface in the indirect radiator should bear a large proportion to the air admitted. This is true whether the radiator is an ordinary, indirect radiator hung to the basement ceiling or the direct-indirect heretofore spoken of.

It is well to make the indirect radiation as much as one-fourth of the direct radiation in the building—indeed it cannot be too much.

HEATING QUANTITIES—HOT-WATER, OVERHEAD METHOD.

BUILDING :
Frank Hamilton's Residence.

LOCATION :
Mokence, Illinois.

DATE :
October, 1892.

FIRST STORY.		Room No. 22, Stair Hall.	Room No. 23, Toilet.	Room No. 24, Parlor.	Room No. 25, Sitting.	Room No. 26, Dining.	Room No. 28, Butler's Pantry.	Room No. 32, Kitchen.	Total.
Volume } Actual	2,234	160	2,000	2,300	2,100	750	1,570		
Cu. Ft. } Effective	6	0	5	6	5	2	4		
Ext. Wall } Actual	138	36	250	230	200	38	352		
Sq. Ft. } Effective	14	4	25	23	20	4	35		
Ext. Doors and } Actual	28	4	48	62	47	7	86		
Windows } Effective	14	2	24	31	24	4	43		
" R "	Bro't from 2d story	6	54	60	49	10	82		
" F "	83								
	1.2	1.2	1.2	1.2	1.2	1.2	1.2		
RF=	99.6	7.2	64.8	72.0	58.8	12.0	98.4		
J=					1.2	1.2	0.5		
Q = RFJ=					70.56	14.4	49.20		
Direct Radiation Adopted, sq. ft....	100	9	70	70	70	14	48	381	

SECOND STORY.		Room No. 40, Chamber.	Room No. 41, Stair Hall.	Room No. 42, Chamber.	Room No. 45, Chamber.	Room No. 47, Chamber.	Room No. 50, Bath.	Room No. 54, Servant's Chamber.	Total.
Volume } Actual	506	2,300	1,850	1,870	1,770	480	1,400		
Cu. Ft. } Effective	1	6	5	5	4	1	4		
Ext. Wall } Actual	135	160	250	198	188	134	330		
Sq. Ft. } Effective	14	16	25	20	19	13	33		
Ext. Doors and } Actual	10	54	31	35	30	10	16		
Windows } Effective	5	27	16	18	15	5	8		
R =	20	49	46	43	38	19	45		
F =	0.8	Transferred to 1st story.	0.8	0.8	0.8	0.8	0.8		
RF =	16.0		36.8	34.4	30.4	15.2	36.0		
J =					1.2	2.	1.2		
Q = RFJ =					36.48	30.4	43.20		
Direct Radiation Adopted, sq. ft....	16		37	35	40	30	42	200	

DIRECT RADIATION ADOPTED.

First story	381
Second story	200
Total	581
Indirect radiation	200
Total radiation	781 square feet.

By table of grate areas, Table II, 800 square feet radiation gives 630 square inches grate, adopted.

Area of brick smoke flue, $\frac{630}{5} = 126$ square inches.

Adopt 12 by 16 inch smoke flue—192 square inches.

FIVE BEDROOMS.

Area of fresh-air duct, square inches, = 40 by 5 = 200 square inches.

Adopt 18-inch diameter fresh-air duct, = 254 square inches.

Indirect radiation, $\frac{2}{3}$ by 200 = 168 square feet.

Adopt 200 square feet indirect radiation.

EXPANSION TANK.

781 by 5.76 = 4,500 cubic inches.

For closed system, in this case, 9,000 cubic inches.

A 15-inch pipe, 51 inches long, will answer for closed system.

Adopt 5 feet, = 60 inches, long.

There should be at least two-thirds of a square foot of surface in the indirect radiator to each square inch of cross-sectional area in the fresh-air duct, and it would be better if the indirect radiator could be from 50 to 100 per cent greater. It is usually troublesome to find room for the desired amount.

For desired cross-sectional area of the fresh-air duct, see "Ventilation."

It would take too long here to go into the proportions of boilers. For residences it is unnecessary, as you usually must take some ready-made pattern.

To the amount of surface, in square feet, required in the direct radiators, add that for the indirect radiators, and the sum is the total amount required. The corresponding grate area of boiler can be taken from Table II hereinafter given. Select a boiler having not less than the calculated area.

Plate IX is a drawing of a wrought-iron "saddle" boiler which has been found satisfactory. When desired the rear of it can be arranged so that the heat in smoke flue can be imparted to incoming fresh air through an iron plate, as shown.

The diameters of the pipe necessary to supply the radiators depends upon the total amount of the square feet of radiating surface supplied by the pipe. In the overhead method of hot-water heating, the branch pipe should be of the same size throughout.

The requisite sizes of pipes can be taken from Table IV. If one size pipe is sufficient by the table, but is more than 100 feet long, then a size larger should be taken. The radiator connections should each be the same size as the branch pipe.

The following is a copy of the calculation for a heating apparatus actually in course of erection. The factor $0.9 \left(\frac{1-E}{I} \right)$, in this case, equals unity and therefore does not appear.

[For table see page 49.]

(To be continued.)

STAINED GLASS AS AN ARCHITECTURAL ADJUNCT.*

BY W. A. HAZEL.

"TRUTH," some one has said, "never can be confirmed enough," and nowhere does this statement apply with greater force than in matters of art.

When a truth has once found acceptance the wonder is that there should be any temptation to depart from it, yet history shows that whenever art has flourished or declined its rise or fall has been the result of its adherence to, or departure from, the laws which govern it.

All the arts cluster around that of architecture as the source from which they derived their being. "Men built houses before carving them, and carved before painting them," says Viollet-Leduc. Sculpture and painting are, therefore, but helpmeets of architecture, sustaining interdependent and harmonious relations each to each when justly balanced. We have so long lost sight of this truth and are so accustomed to regard sculpture and painting as independent arts, each sufficient unto itself, that it requires an effort to realize that in the beginning both arts were evolved as accessories to architecture, and that there was no sculpture nor painting except as decorative adjuncts.

The evolution of the stained-glass window may be traced step by step to this fountain-head of all the arts, for the stained window is only an offshoot of the earlier art of painting, which had at first only a decorative function. Painting at the very outset was of the nature of symbolic representation, and was one of the earliest arts in which the creative faculty of primitive man was brought into play. It was this symbolic art which the early Christians appropriated to their use, for various reasons: First. Because of its suggestiveness and power of appealing to the imagination of the illiterate, who were to be instructed in the faith. Second. Because, while having a peculiar significance to the initiated, it guarded the mysteries of the brotherhood from hostile scrutiny; also because there was at that time a dislike of direct representation of Deity. These were the practical ends which religious symbolism was designed to serve. But, as the church grew in wealth and power, it began to feel that one of the ways of glorifying God was in beautifying His temple; so beauty and utility conspired and caused to exist some of the sublimest creations the human mind could conceive. By degrees this symbolism grew into a more literal portrayal of church history and tradition, so that the walls of Roman and Byzantine interiors were decorated with frescos representing scriptural scenes, the apostles, saints and martyrs. These interiors, owing to the small window openings, were lighted for the sacred service by artificial means, tapestries often being hung over the windows. But when stained glass made its appearance in the twelfth century, probably from some oriental source, churchmen were quick to transfer their decorations from the opaque and poorly-lighted walls to the translucent surfaces of the windows.

In effecting this change, however, they did not lose sight of the fact that their window ornament as well as their wall decoration was to be kept subordinate to and in harmony with the architectural surrounding. All antique work is distinguished by this strict adherence to decorative principles, which does not permit either sculptured or painted ornament to transcend certain limits.

Stained-glass design, particularly of the earlier Romanesque period, had generally the effect of tapestry. The figure and all natural forms, when used as motifs, were severely conventionalized

and in one plane, consequently without perspective or chiaroscuro. We may be able to determine exactly what constitutes the essentials of good stained glass and what its proper treatment should be by noting the properties of the antique art when at its best, and if we can rightly understand the cause of the decline of the stained window in the sixteenth century we may save from a similar fate that of the nineteenth century.

The advent of the Gothic style, with its reduced wall spaces and larger window openings, was the opportunity of the glass-worker of the twelfth century. To fill these vast openings with some material which should at once exclude the weather and admit the light was his task, and, as the antique glass could be made only in pieces of limited size, it became necessary to build up a mosaic of numerous pieces, joined by strips of lead, in order to make panes of area equal to the windows.

Throughout the mediæval period this mosaic method was strictly adhered to. The artists recognized the limitations laid upon them by the nature of their material, their designs being mostly confined to the arrangement of pieces of colored glass in geometrical and other fanciful patterns. They made no effort to conceal the unavoidable lead lines, but rather forced these to perform certain functions in the artistic as well as mechanical economy of their windows. But they refrained from attempting to make pictures out of them, and during this period of more than three hundred years there is no instance of an attempt at realistic portraiture. The antique workman was content to get the most out of his material in the way of gorgeous coloring. Design was of secondary importance and restricted in range.

The peculiar virtues of mediæval windows were due to the quality of the glass they had at hand. In its manufacture their knowledge as well as facilities were extremely meager, and their small knowledge of chemistry gave them a very limited palette. But this handicap was itself the cause of much of the beauty of their raw material. Being obliged to make it in small pieces, they were necessarily forced to retain the mosaic process; this was well for the art. Then, too, their glass was heavy, of unequal thickness, full of bubbles, coarse grained and of uneven texture. All these mechanical defects made the antique glass the ideal material for mosaic windows; they made it scintillating and luminous, full of deep, mysterious colorings, making thinness and monotony impossible. Such was the best estate of the glorious old mediæval window, "casting a dim religious light," of which the poet sings.

Now, what was the cause of the decline? With the fifteenth century came the Renaissance, and with it the new form of art—oil painting. Just at this juncture, certain mechanical improvements were made in the fabrication of glass. Vitrifiable or enamel colors for glass painting were also discovered, and a yellow stain made from silver. These conspired to overthrow the old art of mosaic. In the first place the improved method of glass manufacture produced a more mechanically perfect material. It gave larger panes, uniform in thickness, smoother in texture, and more homogeneous—i. e., more compact, without the air bubbles which gave the gem-like effect. These changes alone meant loss of vitality in the material itself. It became thin, weak and monotonous. Then, the invention of enamel colors led the artist to attempt the imitation of the effects of oil-painting. This was particularly harmful. The craftsman threw away his fine old glass, and took the new smooth material upon which he could paint, loading it with the opaque enamel and still further deadening the glass which had already lost its vitality.

Of course it proved impossible to make a realistic picture in glass. The hard lead lines bounding the different planes of the perspective, destroyed all pictorial illusion, so, like the dog in the fable who saw his reflection in the water, the old artist dropped a choice morsel to seize a shadow, and—lost all. For three hundred years he had followed Truth. When he forsook her, his art disappeared.

From the beginning of the sixteenth century to the middle of the nineteenth, is a long leap, but during the interim the art left no record worth noting. There was the so-called revival in the eighteenth century, during which some restorations and repairs of old windows were made, and some new ones in imitation of the old. But it was not a revival in any true sense. A real revival is a reversion to principles and not a mere resurrection of old forms without the spirit which formerly animated them. No such revival occurred until the last quarter of the present century, when American artists inaugurated a new era in the history of stained glass, and placed the art upon a plane it had never before occupied. Returning to the antique mosaic method, American artists have made glass equal in every respect to that of the olden time. With the added virtue of almost limitless range of color, thereby furnishing an illustration of old principles taking root in new soil, springing into vigorous life, and bearing fruit before unknown. We not only abandoned the use of paint, which deadened the luster of the glass, but we reaffirmed the old truth—that stained glass is an accessory art, an architectural adjunct, designed to enrich that of which it is but an integral part; the architectural unit.

Mr. Van Brunt, speaking of the effect upon architecture of our geographical isolation, says: "We occupy a new country, having no inheritance of ruins, and no embarrassment of tradition; in matters of architecture we are absolutely free from historical prejudice," or—he might have added—historical example. This condition, however, was suddenly changed in 1876. In that year, the centennial exposition brought great numbers of European artists to America; and their work supplied the lack of example, not only with regard to architecture, but all the decorative arts as well. Our manufactures were given a needed stimulus, and then began that

*Paper read before the Minnesota Chapter American Institute of Architects.

wave of aestheticism which swept over the country, and has not yet subsided.

In the centennial year two great men and two great opportunities met and shook hands. Henry Hodgson Richardson and John La Farge were the men. The building of Trinity church and its decoration were the opportunities.

But for Mr. Richardson Trinity church would have had no existence, and had Trinity church not been built Mr. La Farge, one of the foremost living colorists, would not have been called upon to decorate it at a time when the air was full of these new influences, and he might have remained to the end of his days a painter of easel pictures only.

But, Mr. Richardson having built the church and Mr. La Farge having undertaken its decoration, it became evident that the "priceless glass" in vogue in Europe would prove inadequate for such an interior. So, spurred on by necessity, Mr. La Farge began making investigations and experiments in colored glass, with results which revolutionized the process of glass-making. Previous to this time we had gone so rapidly to the bad in the production of machine-made stuffs that we had about reached the point where the workman "pressed the button and the machine did the rest."

Now came the transformation. Manual dexterity, backed by intelligence, was substituted for senseless machinery. Improvement in the artistic quality of glass was at once manifest. The worthless stuff, which had supplanted the antique material, in its turn gave place to a new fabric having the same qualities possessed by the glass of the mediæval craftsman. Material, which had been previously discarded as imperfect and worthless by reason of accidents and miscalculations, was found to have just the variety of tone and color most desirable, so that the worst failure often included the greatest success. In the *new* we had rediscovered the *old* and in opalescent glass contributed a purely American product to art.

Now the question which concerns us as artists, whether architects or glassworkers, is this: After having seen this rejuvenated art occupy the high place which La Farge gave it—for he alone has held steadfastly to the fundamental decorative principle—shall we tempt the fate which blighted the art in the sixteenth century? We stand today as to the modern art in the same relation as did the fifteenth century artist to the antique. The next step may be forward or backward; which shall it be?

There is no such thing as remaining stationary; that is contrary to the universal law; there must either be progress or retrogression, growth or decay.

Art can never realize absolute perfection, but it is on the road to it so long as it holds to rock-bed principles. The art of the ancient Greeks is proof that the highest excellence is attainable and maintainable only by the observance of this law. Without desiring to take a pessimistic view of the situation, I do not hesitate to say that for stained glass in particular and the decorative arts in general I see "breakers ahead." The tendency to overstep the prescribed bounds of accessory arts is noticeable in some of our most prominent work, and the cause is not far to seek.

We produce our art, as we do everything else, on a large scale. Our art establishments are huge institutions. It is necessary to their maintenance that the public should buy. If it will not buy *art* we must sell what it wants; and if it doesn't see what it wants all it has to do is to ask for it. And we have scriptural warrant that "those who ask shall receive."

We are inventive and admire a "clever" thing more than we do an artistic thing. Consequently our bump of inventiveness is abnormally developed. The man who produces the *newest* thing, or the *biggest* thing, or the most *ingenious* thing is the artist par excellence—for the multitude. The *multitude* has the money and must be gratified if the artist has to violate every principle upon which his art is based. We have the national fault of letting our cleverness carry us beyond legitimate bounds, partly in mere exuberance of cleverness, partly for mere display, or a desire to win vulgar applause by being thought more clever than our fellows. It requires considerable moral stamina to stop short when the artistic conscience says, "thus far and no farther."

The greatest sinners in this respect are those who ought to and do know better, but cannot withstand the craving for popular favor. To be an artist and hold with one's conscience one must be peculiarly independent and indifferent to popularity or he is liable to go begging, both for dollars and fame. As an illustration of this tendency, one instance will suffice: One of the most ambitious, recent stained-glass windows, and one which is often cited as a "splendid work of art" was made by a well-known firm of reputed artists. In this window is reproduced Doré's picture, "Christ Leaving the Prætorium," in which, in my opinion, every law which should govern true decorative work is transgressed; not through ignorance, but knowingly and wilfully, for the sake of dollars and the applause of the multitude.

I am aware that the criticism I shall make involves a point debated among artists respecting the limit to which naturalistic treatment in glass may be successfully carried. It seems to me that the question should be, not what may or may not be successfully done, but what ought or ought not to be done, whether successfully or not. In stained-glass windows *pictures* should be rigidly excluded, because, upon principle, they are wrong. The aim of a picture is to create an illusion by a simulation of nature. In *decorative* work any treatment which admits a doubt as to the actuality of the thing decorated is *wrong*. A picture is an entity. Its values are intact within its own extent, and it is unrelated to anything beyond. But designs which are suitable for wall decorations or windows should make the surfaces of both self-evident. A

painting which transmutes a solid wall into thin air is wrong in principle; its proper function is to *beautify* the wall, but not to make it a less substantial fact. The plane of the window is a continuation of the wall plane; therefore, to make a picture out of a window is *wrong*, because it resolves the window into other planes than that of the wall in which it lies, and for the stronger reason that it sets itself up as an independent entity when it should be but an integral part of an architectural unit. Consequently the transference of a large canvas painting to a window, as in the "Christ Leaving the Prætorium," banishes the window plane and leaves in its place a vista of palaces and multitudes and all the illusion of sky and air which perspective and chiaroscuro can accomplish. This is as obviously wrong as the "New Jerusalem" in Trinity church and the Ames memorial at North Eaton are right. The last conform to decorative principles; the first contravenes them.

From this it may be seen that the signs are not lacking which tell that the newly-recovered art is yielding to hurtful tendencies; is starting, or about to start, down hill again. It is the architects to whom we must look to check it by their influence. The public must be educated to the point of ability to know good from bad, or there is no future for architecture or its dependent arts. People should be taught that there is an absolute right and wrong in the realm of aesthetics; they must learn that art is not governed by caprice or arbitrary formulæ, but by well-known laws, easily ascertained, if one will but take the trouble.

In the hurry and impatience of this electric age we cannot hope perhaps ever to command the leisure of the ancient Greeks for the cultivation of the arts; neither will we come under such a dominating influence as were the Florentines of the fifteenth century, when "every new structure became a school of the eye and the taste." But it is not impossible for us to reach that condition when, by education, the judgment of the people will have become so good that artists will not hesitate to appeal to it. The assurance that merit can safely appeal to such a tribunal will stimulate each to his best endeavor. The artist and the public will react each upon the other; the artist educating the public by constantly keeping before it the highest ideals of his inspiration; he, in his turn, kept to the true path by the exactions of an educated and fastidious public, quick to recognize the powers exerted in its behalf and to commend and reward if also to criticize; each capable of appealing or being appealed to, confident of intelligent and sympathetic appreciation.

CHICAGO CHAPTER, AMERICAN INSTITUTE OF ARCHITECTS.

THE regular monthly meeting of the Chicago Chapter of the American Institute of Architects, on April 17, was largely occupied in listening to a paper by Mr. R. Guastavino, upon the development of tile fireproof construction.

After referring to a large experience in construction since his course of study in the School of Architecture in 1864, and the well-known constructive knowledge of Chicago architects, Mr. Guastavino said that, to give a concise description of the tile arches, or the timbrel arches, as they are more properly called in Spain, in consequence of the lightness and small thickness, and in order to fix principles, the speaker began by saying that this system belongs to the cohesive construction.

Divided in two classes, the first we shall call "Mechanical Construction," or by gravity. The second we shall call "Cohesive Construction," or by assimilation.

The first is found in the resistance of any solid to the action of gravity, when opposed by any other solid. From these conjunctive forces, more or less opposed to one another, results the equilibrium of the total mass, *without taking into consideration the cohesive power of the material set between the solids.*

The second has for base the property of cohesiveness and assimilation of several materials, which by a transformation more or less rapid, resembles nature's work in making conglomerates.

We can give another definition more precise and comprehensive for both systems, in saying that the first or mechanical system is, that all the pieces can be separated one by one and then rebuilt in the same or similar manner. To this class belong the Pyramids of Egypt and the Greek temples, etc. In "Cohesive Construction," on the contrary, the components cannot be separated without destroying the integral mass. To these belong the Babylonian walls of brick with hydraulic mortar; the vaults and cupolas of the Assyrian, Persian, Arabian, Roman and Byzantine; the antique and Middle Age conglomerate construction.

The structures built by the "gravity system" can be at any time taken down, in the pieces out of which they were formed. Thus, the stone or brick that yesterday formed part of a temple or monument dedicated to the memory of a hero can tomorrow belong to or form part of the walls of a stable; while, on the other hand, though man cannot again use the parts of cohesive construction for modern buildings, their ruins inspire respect and veneration, and only nature, with its slow but sure work of disintegration can take from this style of building its materials for her immense laboratory.

The materials employed in the construction by gravity, only require the physical quality of hardness; for the "cohesive construction," the materials must not only have proper physical conditions, but it is absolutely necessary to take into consideration the chemical properties of the substance employed. The use of the "cohesive system" was rendered impossible to many nations that

had neither the material nor the knowledge of its use at their disposal, while on the other hand all the civilizations and all nations could make use of the gravity system.

The base of these materials are mortars that do not require exposure to the air for their transformation or setting qualities, that is, hydraulic limes and cements, but for our specialty we must have cements of the quality of Portlands.

The way in which this kind of arch works is as follows: A "timbrel vault" of a single thickness of brick or tile has no more resistance than an arch or vault built in the "gravity system," because no matter how good the mortar may be there is only one verticle joint, and the bricks or tiles are working as voussoirs, consequently this form of arch belongs to the "gravity system"; but if we put another course over the first, breaking joints, and laid with hydraulic material, we will have the action of the cohesive force; in this way the mortar laid over the first course, or extrados, takes bond with it, and also with the course laid on top. As soon as the cement sets we will have shearing resistance represented by 17,820 pounds per square foot. In this manner we introduce a new additional strength to the arch, which is a peculiarity of the "timbrel arch system." In the "gravity system," the strength of gravity alone is the only force keeping the voussoirs in place by pressure against each other in the joints. These joints are not protected, and any reduction in the width of the joints, in consequence of pressure, or weight on the arch, compromises the setting of the mortar. For this reason in the "gravity system" the mortar serves only as a cushion, also, if cement mortar, because of bad setting, and adds no strength to the arch. But, in our "cohesive system," with horizontal broken joints, with 17,820 pounds per square foot shearing strength, the reduction in the verticle joints is protected absolutely, as can be proved by the following facts: First, we can build barrel arches of twenty feet span, and dome of sixty, seventy, or more, only three inches thick, using a center of one inch thick, and moving it along, as soon as a row of tiles are laid, which usually requires about fifteen minutes; second, it is common to see the workmen walking over the arch, free from centers of any kind, some hours after it is built; and third, we can run the center under the arch again when it is completed, which is the most practical illustration that the arch has had the absolute repose necessary for its settlement.

These three remarkable circumstances are of great value to architects, as they can be put in the specifications and can be depended upon as absolute proof of the safety of the construction.

So we have for the "cohesive construction," the following advantages over the brick arch or any arch built by mechanical construction:

First—The protection of the verticle joints by introducing the new strength coming from the horizontal breaking joints.

Second—The less number of verticle joints, amounting to only five per cent of the full span, while the brick arch has ten per cent.

Third—The resistance to deflection (bending movement).

The result of these advantages is the surprising strength of the "timbrel arches," so that no one can at first understand how fifteen or twenty-foot beams, arches and domes of seventy and more foot span, three inches thick, and ten per cent rise, as we before said, can be laid, taking away the centers and giving them over to the uses of the building in a few hours, when an arch of brick, six-foot span, four inches thick, and ten per cent rise, requires for constructing it, strong and heavy centers, with repose for several days, and then is not a safe construction, as this span requires eight inches of thickness, as all architects and builders know.

We can consider as a safe relation between the brick and "timbrel arches," four feet six inches span, ten per cent rise, four inches thick, with cement mortar as is usual in buildings, as equivalent to a ten or twelve-foot span, "timbrel arch" three inches thick, eight to ten per cent rise.

The impossibility of having a flat arch built with voussoirs, principle strictly tight, in consequence of the imperfections and impossibilities of having a tight and well-set joint, because this joint is only worked as a cushion, is one of the main objections that the Catalonia and Valencian architects have against the use of flat hollow block arch for fireproofing buildings. The slightest settlement in the center, so common in these kinds of arches, opens the joints, and in case of fire you will see at once the smoke passing through and in consequence showing that air and gases pass from one habitation to the other; and although the cheapness of iron and the facilities that we have for manufacturing any kind of claywork gave a great impulse about twenty-five years ago to the system now in use—that is, hollow block, I iron beams, and so on—the said inconveniences soon became noticed, and it was found to be unfitted for our conception of fireproof buildings; but in places where we had never considered that system and never used it under any circumstances, in cellars, ceilings, and very few in the first floors, because the places where it is most necessary to have a homogenous, tight and solid material as a general base for the building are the ceilings of cellars, because that is where the emanations, moistures, fires and complications of pipes, wires and conduits make it more necessary to have a perfect masonry construction.

But I do not say that the tile system is the only one adjustable for everything. The flat block ceiling has its advantages. Progress and new necessities and the manner in which we consider buildings today has somewhat changed their character, and many of them are not well adapted for full masonry construction. For instance: an office building cannot be so well adapted as a church, or hall, or library, and other public buildings of that character, but in each case the principle can be adapted with modifica-

tions always beneficial. With the tile method of construction the desirable forms are as follows: First, Walls: the most desirable ones should be hollow—I do not mean walls built with hollow materials, but walls built hollow, or tubular columns of clay, cement, or stone combined with iron.

Second, In ceilings it is preferable to use domes instead of barrels with solid or cohesive materials. The barrel arches are an exceptional construction and good under some circumstances, but they are not the best for cohesive construction, the right one being, as already stated, domes, and the spans should be 12 by 15 feet, or 14 by 17 feet.

Third, As a principle for the conception of any building inside of the system, the following conditions must be taken into consideration as guides: First, Floors must be perfectly tight between so as to have an absolute intercommunication, and to be as near as possible air-tight. Second, No wooden flooring, wooden wainscotings or wooden casings should be used. Third, Doors, windows and any openings should be prepared in such a manner, that any fire in one or more rooms could be isolated by stopping the alimentation of combustion, that is, combating the fire by direct asphyxia or want of air, which is a very easy matter, if well prepared for; but for this purpose, buildings must be divided into three different groups, which would require three different treatments.

First Group.—Private houses, office buildings, hotels and public buildings.

Second Group.—Department stores, factories.

Third Group.—Storage buildings.

For the first, tile construction has the advantage that each room can have its special dome supported by double tile partitions, and main walls all around. The partitions should be placed as much as possible one above the other, which practice is one of the recommendations of good classic construction. The same should be the case in office buildings. Each room could have a dome supported by double partitions. The same also in hotels.

For the second and third groups the precautions that should be taken are the same as in the first group, but in addition all windows and doors must be provided with double doors or shutters, one of them of sheet iron, so that all joints can be rejoined from outside in case of necessity.

I will remark, by the way, that to develop this system a Spanish architect, and especially a Catalanian, one in his own country, has an advantage: First, There, the architect who is inclined to the constructive parts of his profession has an opportunity at any time to be not only the architect of a building, but also the contractor of the same, so he is able to do as he pleases in regard to construction, and he feels safer. Of course, everybody knows that the architect is directly responsible before the owner, the public and the authorities, so it is hardly strange that practical and intelligent owners in Catalonia do not object to this, but, on the contrary, they prefer to give to the architect the contract, asking him to give bonds and guarantees. It is also easier, because by law the architect is directly responsible for any trouble on a building. The building department also compels the owner to have a responsible architect on the building, and if the architect is the contractor, the ordinances leave him free to do as he pleases in regard to construction, restricting only the hygienic part, and urban lines.

The speaker concluded by saying that the cost of the system referred to was not greater than others in vogue.

OUR ILLUSTRATIONS.

View in residence of Alma Tadema.

So-called house of Henry IV, at Ne'rac. Rendering by E. C. Jensen, Chicago, from photograph.

Remodeled residence for Elisha Gray, Highland Park, Illinois. Paul Starrett and Jules F. Wegman, architects, Chicago. Exterior view and view in hall are shown.

Cross-section of the Manufactures and Liberal Arts Building, World's Columbian Exposition, Chicago. Comparing truss of Machinery Hall, Paris Exposition, 1889.

Designs submitted in Detroit Chamber of Commerce Competition. Accepted designs by Spier & Rohms, architects, Detroit. The designs submitted by the following also received honorable mention: Mason & Rice, John Scott & Co., William S. Joy, Malcombson & Higginbotham. The designs published include the above and those submitted by the following: Rogers & Macfarlane, Mortimer L. Smith & Son, E. T. MacDonald. Prof. William R. Ware of New York was engaged as professional adviser. The invitation to architects was as follows:

The Chamber of Commerce of the City of Detroit are proposing to erect a building for their use and other tenants at a cost of not to exceed the sum of \$400,000, and have appointed a building committee with full power to select an architect to carry on the work.

The building committee have invited John Scott & Co., Mason & Rice, Gordon W. Lloyd, Donaldson & Meier, Rogers & Macfarlane, Mortimer L. Smith & Son, E. E. Myers, R. E. Raseman, Julius Hess, Frederick H. Spier and Henry Ives Cobb to prepare a sketch or preliminary design for the proposed structure, for which they will be paid \$150 each, and will receive and entertain designs from other architects of Detroit not so invited and will give these drawings equal consideration but no remuneration will be paid. Any of the competitors may, if they so desire, send in a second set of drawings.

All designs must be made in conformity with the following instructions: The building is to be constructed of fireproof materials and will be of first-class modern construction throughout and the total cost must not exceed the sum of \$400,000 ready for tenants, including commissions and all other expenses of the building. The first story shall be on a level with the grade and the building shall be twelve stories high. The assembly hall shall be of not less than 4,000 square feet floor space.

The lot on which the building is to be erected is on the northeast corner of Griswold and State streets, with a frontage of 100 feet on State street and 88 feet

on Griswold and a frontage of 88 feet on alley 20 feet wide, parallel with Griswold street. The angles of corners being ninety degrees.

The following drawings and these only will be furnished by each competitor. They will be accompanied by a memorandum, copied by typewriting machine, explaining fully any characters of materials, any points in the design not obvious from an inspection of the drawings.

Plans of basement and different stories; two elevations; two sections; a perspective.

These will all be drawn to a uniform scale of one-eighth of an inch to the foot, finished in line with India ink with drawing pen. No shadows are to be shown on the drawings. There is to be no brushwork except blacking in the windows and the sections of the walls and floors. The lettering is to be plain and simple, like ordinary printing type, and is to be confined to the names and dimensions of the rooms written on the middle of each.

The perspective also is to be drawn in line only, with one figure, with background and foreground, and with line shading. The scale of the perspective is to be the same as the drawings and is to be correctly drawn, with the southwest corner on the plane of the picture and the main fronts forty-five degrees with it and the point of vision five feet above the horizon and 250 feet distant. These drawings are to be made on white paper; the sheets of drawings are to be alike in size, surrounded with single line for a border.

Each drawing and also the accompanying memorandum is to be distinguished by a motto or cipher and no handwriting of any sort is to be put on either.

A sealed envelope bearing the same motto or cipher is to contain the name and address of the architects.

Before making a final choice, the committee and their professional advisor will open the envelopes, containing the names of the authors of the most approved designs in order that other things having been first considered, purely business considerations may have their weight. These drawings are to be framed, glazed or even mounted on cardboard, but are to be sent flat in a portfolio, expressage paid, to A. A. Boutell, secretary, Chamber of Commerce, Detroit, Michigan, on or before February 25, 1893, 3 P.M.

The committee will employ the services of a professional advisor, who will be an architect, or competent person, a non-resident of Detroit, to assist them in making a decision.

The committee will appoint the selected competitor as architect of the building, if they find that in their judgment they are warranted in doing so. But if, as may happen, they find themselves unable to choose, upon the evidence before them, between two or more of these candidates, they will invite the competitors among whom their choice then lies, to present under the instructions of the committee such further explanations as the nature of the questions at issue may require, and if they find it necessary to do so, will institute a second competition among them, for which a sufficient time will be allowed. The committee will then, after consultation with their professional adviser, select one of the competitors so invited to be the architect of the building, and will execute an agreement with him for the customary professional compensation for such services as declared by the American Institute of Architects. Each of the architects invited to take part in the second competition, should such a competition be instituted, will receive from the committee the sum of \$500 each as compensation in full for their additional services. In the case of the successful competitor these payments will be considered as payments on account of his commissions as architect of the building. All drawings will be returned to the competitors, and as soon as the committee has made its selection, and they will not be shown to the other competitors, nor to the public, without the consent of their several authors previously obtained in writing. Nor shall anything shown in any of the rejected designs, or otherwise suggested by the unsuccessful competitors, which is original as to this competition, be adopted and made use of in the building, without the consent of its author, and proper remuneration being made him, the amount thereof to be agreed upon between him and the committee.

Photogravure Plate: Front view, cottage for M. E. Ingalls, Hot Springs, Virginia. G. W. E. Field, architect, Richmond, Virginia. Bowling alley, Hot Springs, Virginia. G. W. E. Field, architect.

PHOTOGRAVURE PLATES.

(Issued only to subscribers to the Photogravure edition.)

St. Louis Medical School. Eames & Young, architects.
Studio Building, St. Louis, Missouri. Eames & Young, architects.

Chapel, Graceland Cemetery, Chicago. Holabird & Roche, architects.

Entrance Gate to Portland Place, St. Louis, Missouri. T. C. Link, architect.

Residence, No. 3671 Lindell avenue, St. Louis, Missouri. Eames & Young, architects.

Dormitory, Lake Forest University, Lake Forest, Illinois. Pond & Pond, architects, Chicago.

Annie Durant Cottage, Lake Forest University, Lake Forest, Illinois. Pond & Pond, architects, Chicago.

MOSAICS.

MESSRS. ORR & LOCKETT, of Chicago, the representative hardware firm, have removed from 184 and 186 Clark street to more extensive quarters at 50 Randolph street and 71 State street.

GOULD & ANGELL, architects, of Providence, Rhode Island, announce the change in the firm name to Gould, Angell & Swift, by the admission of Mr. Frank H. Swift, with offices at 87 Swartz building, Providence, and in the Boudoin building, Boston.

THE "Union syndicate des Architectes Françaises" has decided to be represented as a society collectively at the Universal Exposition at Chicago. The works, which will be represented by photographs, will be divided into four classes, as follows: First, Public buildings—Schools, colleges, city halls, etc. Second—Churches. Third, Private buildings—Country mansions, apartment buildings, city residences, etc. Fourth—Factory and other commercial or industrial buildings.

A MOVEMENT, which had been agitated in Kansas City for several weeks, to bring the architects of that city into closer relations with other building trades and professions, was got fairly under way May 3, when the names of thirteen leading architects and firms were posted for membership in the Builders' and Traders' Exchange. This exchange boasts a very large membership, which has been materially added to at every meeting this spring, and it is in a decidedly flourishing condition. The introduction of the architects will doubtless prove an element of strength and value, while the architects themselves should reap no little benefit from the forming of closer ties with men for whom they have much to do and the material enlargement of a circle of acquaintances.

SYNOPSIS OF BUILDING NEWS.

Architects are invited to furnish for publication in this department monthly or occasional reports of their new work before the letting of contracts. Reports of buildings costing less than \$5,000 are not published.

Atlanta, Ga.—Architect G. L. Norman: For W. A. Gregg, a stone and brick residence; to cost \$10,000.

Chicago, Ill.—It is one of the architectural signs of the times in Chicago not without a certain degree of significance, that many of the largest offices are comparatively resting; waiting for something to turn up. It is an exception, in fact, at the present writing, to find an architect who says he is busy. Most of these architects have let all but contract draftsmen go or those whose places it is hard to fill. As one architect expressed it: "We have about three million dollars' worth of work in sight. It all might come in in a week, or we may never do any of it. In order to meet such a demand the best men must be held." One prominent architect has decided to close or rent his office for six months. This semi-stagnation is due, according to the best judges, first to the rise in building materials last fall, next to the threatened and actual strikes, the effect of both causes being to postpone projected building. Work will probably be largely resumed by July or August, at which time it is supposed that labor and materials will be cheaper. It is not in any way indicative of a lessening demand or of over-production, but an answer to those material dealers who shopped up the prices of common brick and other materials last fall, and the combination of labor unions and their consequent control of the price of labor. As soon as capitalists see that they will be allowed to have some voice in the matter and can feel that a building can be completed upon the first estimate of cost, building in Chicago will become brisk again, but meanwhile higher rents will be obtained by landlords and workmen will have to seek elsewhere for the employment they cannot obtain in Chicago upon their own terms.

Architects Turnbull & Postle have prepared plans for G. C. Fetter, corner of Leavitt street and Campbell Park, for a three-story and basement apartment house, 24 by 90 feet in size, to be of Anderson pressed brick and stone front; have hardwood finish, sanitary plumbing, etc.

Architects Crowen & Richards: Made drawings for two two-story and basement flat buildings, to be erected near the World's Fair for Dr. Strickland. They will be of frame with brick basements; have all the sanitary improvements, etc.; size 35 by 120 feet each.

Architects Miller & Burns: For Adolph Berger, on Burling street near Wrightwood avenue, a two-story and basement house, 22 by 46 feet in size, to be of stone front; have all sanitary conveniences, furnace, etc.

Architect Arthur W. Cole: For John M. Whitehead at Hillsboro, Illinois, a two-story residence, size 30 by 46 feet, to be of frame construction with brick basement; have all the best of plumbing, gas fixtures, furnace, etc.

Architect C. H. McAfee: For B. Cavanaugh in Lake View, a two-story residence, 32 by 49 feet in size, to be of stone basement and first story with pressed brick and frame above; have hardwood mantels and interior finish, the best of sanitary plumbing, and cost about \$10,000. For J. J. Gash, at La Grange, a two-story and cellar frame residence, to have a stone basement; hardwood finish and the sanitary plumbing. For P. T. Heintz, on Fourteenth street, a three-story flat building, 42 by 46 feet in size, to be of pressed brick and stone front; have bathrooms, closets, mantels, etc.

Architects McMurray & Davis: For N. T. Van Pelt, at Cheltenham Beach, a two-story residence, 24 by 48 feet in size, to be of stone basement and frame above; have hardwood finish, all the sanitary arrangements, furnace, etc. For E. F. Parr, on Seventy-ninth street, a two-story residence, size 25 by 64 feet, to be of frame construction with stone basement; have the best of plumbing, furnace, mantels, etc. Also have been appointed architects by the syndicate which has purchased the "Vincennes" apartment house to rearrange and complete this structure. The building will be six stories in height and will front 66 feet on Vincennes avenue, and 86 feet on Thirty-sixth street. It will be bluff Bedford stone to the second story window sills, and above this will be of buff pressed brick and copper cornice; the interior will be finished in hardwood, and the best of sanitary plumbing will be put in; electric light, steam heating, etc., will be put in and the cost of the complete structure will be \$150,000.

Architect George W. Maher: Preparing drawings for addition to the power house at Edgewater for the Chicago & North Shore Street Railway Company. It will be constructed of pressed brick and terra cotta, and be 50 by 217 feet in size. Also, making plans for ten two-story, basement and attic residences, to be erected at Edgewater, for J. L. Cochran. Some will be of frame and others of brick veneer—colored and Roman brick; hardwood finish, the best of sanitary improvements, electric light, furnaces, etc.

Architect D. A. Lapointe: Making plans for a two-story dining hall, 66 by 130 feet in size, to be added to the Mecca hotel, Thirty-fourth and State streets; it will be constructed of iron, copper, stone and glass, and be of novel and handsome design; it will be of fireproof construction, have marble entrance, steam heating, electric light, etc.

Architects Fry & Cunningham: For J. B. Moulton, corner of Trumbull avenue and Twenty-third street, a two-story flat building, 22 by 42 feet in size; to be of pressed brick and stone front, have all the sanitary plumbing, furnace, etc. Also, making plans for a four-story store and apartment building; size 50 by 100 feet; to be erected on Forty-sixth street; to be of stone for the first story, and above this will be of pressed and ornamental brick. Also, making plans for three-story flat building, 25 by 70 feet in size, to be erected on Fulton street near Kedzie avenue; to be of mottled Roman pressed brick and stone front, have hardwood finish, bathrooms, closets, mantels, wash-bowls, heating, etc.

Architect Irving W. Kelley: Made plans for a two-story, basement and attic parsonage, to be built at Chicago Heights, for the Presbyterian Church. It will be two stories and 30 by 50 feet in size, have all the sanitary plumbing, mantels, furnace, etc.

Architect August Maritzen: For Milwaukee Brewing Company, a complete brewing plant of fifty-five thousand barrels capacity, to be erected at Milwaukee, Wisconsin. The main building will be five stories in height, and 120 by 120 feet in size, of brick and steel construction. Also, two-story and basement bottling house, 100 by 200 feet in size; to be of pressed brick and stone; to be built on Burling street, Chicago. Also, for Whirlpool Brewing Company, at Niagara Falls, New York, a brewery of 20,000 barrel capacity; main building to be four stories in height, of pressed brick and stone. For Theodor Harn's Excelsior Brewing Company, at St. Paul, Minnesota, a 24,000-barrel storage warehouse; also, new wash house, racking house, etc.; cost about \$70,000. For R. Heger, at Jefferson, Wisconsin, a 100,000-bushel elevator; also, new kiln house and addition to malt house. To be of pressed brick and stone, steel, etc.

Architects Marshall & Ryder: For P. L. Clark, at River Forest, a two-story, basement and attic residence, 48 by 65 feet in size, to be of frame construction, with stone basement, hardwood finish and mantels, electric light, hot-water heating, the best of sanitary plumbing and laundry tubs; to cost about \$10,000. For Lang & Carleton, on State street, near Van Buren, a three-story flat building, 25 by 60 feet in size, to be of pressed brick and stone front, have sanitary arrangements, etc. For H. R. King and James McGee, at Milwaukee, two two-story, basement and attic residences, 33 by 45 feet each, to be of tile construction; they will have hardwood finish, electric light, furnaces, mantels, laundry tubs, the best of sanitary plumbing, and cost about \$16,000.

Architects Huehl & Schmid: For M. Kavanaugh, at Utica, Illinois, a two-story store and flat building, 38 by 95 feet in size, to be of pressed brick and stone front, with galvanized iron bays, bathrooms, closets, mantels, electric light, furnaces, etc. For N. M. Peters, on Racine and Noble avenues, a three-story store and flat building, 50 by 76 feet in size, to be of pressed brick, stone and terra cotta on two sides, have bathrooms, closets, washbowls, mantels, etc.

Architects Faber & Pagels: For the La Salle Turners, at La Salle, Illinois, a three-story and basement Turn-hall, 65 by 112 feet in size, to be of pressed brick and stone, with truss roof; it will be a handsome building in the Romanesque style of architecture. On the first story will be stores and dining

rooms and above a first-class opera house with opera chairs to seat about fifteen hundred people. There will also be full-sized gymnasium, billiard room, card rooms, club rooms, toilet and dressing rooms, offices, etc. The building will be lighted by electricity, have steam-heating and all improvements. Also making plans for a two-story flat building, to be erected on Laurel avenue, Maplewood, for D. Carlson.

Architect John Hendricks: For H. Davis, at Sheldon Heights, three frame cottages, to have brick foundations, bathrooms, closets, mantels, etc. For A. Bloom, on DeKoven street, a three-story addition, 20 by 25 feet.

Architect J. G. Rogers: For R. A. Waller and H. J. Peet, eleven two-story residences, 35 by 50 feet in size, to be erected at Buena Park; they will be of stone basements and frame superstructures, in various handsome designs; the best of sanitary and modern improvements will be put in and they will cost from \$8,000 to \$10,000 each. For E. S. James, at Buena Park, a handsome two-story, basement and attic residence, size 40 by 70 feet; it will be constructed of mottled Roman pressed brick with trimmings of buff Amherst stone; the interior will be finished in hard woods and have electric light, hot-water heating, carved stone mantels, etc.

Architect Albert Lang: For Dr. E. Kargan, on Winchester avenue between Taylor and Twelfth streets, a two-story and basement residence, 25 by 67 feet in size; to have a stone front, hardwood finish, sanitary plumbing, mantels, furnace, etc. Also making sketches for a three-story and basement apartment house, size 109 by 124 feet; to be of pressed brick and stone front; cost about \$40,000.

Architects E. Barrath & Co.: For Fowler Bros., a four-story lard refinery, size 264 by 104 feet; to be erected in New York; cost about \$65,000. For the Swedish Ceramic Manufacturing Company, corner of Fifty-ninth and Throop streets, a two and one-half story brick factory 85 by 129 feet in size; to be of pressed brick and stone front; cost, \$40,000.

Architect K. L. Lehman: For Lehman & Devold, a three-story store and flat building, 90 by 25 feet in size; to be of buff pressed brick front with stone trimmings; it will be erected corner of Seymour and Division streets. Also for the World's Fair Tower Company, a two-story restaurant, 140 by 140 feet in size, to be of frame construction, have plumbing, electric light, etc.; cost about \$40,000.

Architect F. Foehringer: For William McCain, at 439 La Salle avenue, a three-story flat building, 25 by 60 feet in size, to be of stone front, have steam heating, gas fixtures, bathrooms, closets, mantels, etc.

Architect C. L. Tuthill: For H. Freund, at Rogers Park, a two-story residence; to be of frame with brick basement; have plumbing, mantels, furnace, etc.; cost \$7,000.

Architect J. E. O. Pridmore: For W. A. Pridmore, at Windsor Park, a three-story store and flat building, 100 by 50 feet in size; to be of frame with brick foundation; have bathrooms, closets, etc.

Architect R. Rosenstock: For L. B. Montonya, a four-story and basement apartment house, size 60 by 121 feet; to be of stone front, have all improvements and cost about \$40,000.

Architects Shipley & Jones: Made plans for a two-story frame church and Sunday-school, size 48 by 59 feet; to be erected at Elsemere. Also made plans for a summer home for the Epworth League, to be erected at Lake Bluff; it will be two stories, 50 by 58 feet in size; to be of frame construction, have stone foundation, plumbing, electric light, etc.

Architect James Burns: For Lelivelt Brothers, on Twelfth street, near Sawyer avenue, a two-story store and flat building; size 24 by 84 feet; to be of stone front, have sanitary plumbing, mantels, etc.

Architect George Grussing: For Neils Junl, at 432 Potomac avenue, a two-story and basement flat building; size 30 by 52 feet; to be of stone front, have all the sanitary improvements, hardwood trimmings; cost \$10,000.

Architects Treat & Foltz: For H. Vollme, on the southwest corner of Ellis avenue and Forty-third street, a four-story apartment house; size 150 by 125 feet; to be of pressed brick, stone and terra cotta, have all improvements. For H. C. Hullinger, on the northwest corner of Indiana and Rush streets, a five-story apartment house; size 100 by 100 feet; to be of pressed brick, stone and terra cotta on two sides.

Architect W. M. Walter: For James T. Hair, on Adams street and Center avenue, a four-story store and flat building; size 75 by 32 feet; to be of pressed brick and stone front.

Architect H. T. Park: For A. J. Park, on Forty-third street and Monroe avenue, a two-story flat building; size 22 by 50 feet; to be of pressed brick and stone.

Architects Snyder & Nothnagel: For E. C. Minas, at Hammond, Indiana, a three-story store and flat building; size 50 by 100 feet; to be of stone front, have bathrooms, closets, wash bowls, mantels, gas fixtures, laundry tubs, etc.; cost about \$20,000.

Architects Toennigs & Hardung: For N. M. Cronholm, corner of Fifty-seventh street and Drexel avenue, a three-story flat building; size 150 feet front and 45 feet deep; to be of pressed brick and stone, have all sanitary improvements, and cost about \$30,000. For T. O. Lett, at Southport avenue, near Grace, a three-story and basement flat building; size 44 by 60 feet; to be first story of stone and above of pressed brick and stone; cost about \$20,000. Also made drawings for synagogue for Abrahams congregation; to be erected at Marshfield avenue and Twelfth street; size 125 by 63 feet; have handsome stone front, the interior being finished in Georgia pine; will put in steam heating, electric light, stained glass windows, modern conveniences, pews to accommodate a congregation of 1,100; cost \$40,000.

Architect E. M. Newman: For Parker Grace, on Sheridan and Grace avenues, a two-story, basement and attic residence; to be of frame construction with stone basement, have all the modern improvements, heating, etc.

Architect J. E. Schiller: For the Colored People's Relief Union, on Twenty-third and State streets, a two-story building; size 50 by 100 feet; to be of pressed brick and stone front, have bathrooms, closets, washbowls, heating, etc.

For Prof. J. N. McCunn, at Green Bay, Wisconsin, a three-story business college; size 54 by 82 feet; to be of pressed brick and stone front, hardwood interior, steam heat, electric light, bathrooms, closets, washbowls, mantels, etc.

Architect J. C. Brompton: For Marpole Willis, on Sheffield avenue near Addison street, a three-story apartment house, size 44 by 70 feet; to be of stone and pressed brick, have hardwood finish and mantels, bathrooms, closets, washbowls, electric light, steam heating, etc. For J. L. Cochran, at Edgewater, four handsome two-story, basement and attic residences; to be of frame construction with stone basements, have the best of sanitary improvements, electric light, etc.

Architect Robert Rae: For M. Tillotson, on Thirty-ninth street east of Cottage Grove avenue, a four-story and basement livery stable; size 50 by 135 feet, to be of stone front, have steam heating, electric light, carriage room in basement, office and store in front; cost \$30,000. For George Smith, at Valparaiso, Indiana, a two-story residence; to be of frame with stone basement, have hardwood finish and mantels, electric light, bathrooms, closets, washbowls, furnace, etc.; size 35 by 50 feet. For Hygeia Water Company, on the South Side, a three-story warehouse; size 75 by 150 feet, of common brick. For Chicago Fly-Casting Club, a one-story clubhouse, facsimile of Sir Izaak Walton's fishing house which was erected in England in 1674. It will be for the accommodation of the anglers of the country visiting the World's Fair.

Architect William Griesser: For Valentine Mueller, at 502 and 504 Larrabee street, a three-story building and a two-story building; to be of pressed brick and stone front; and cost about \$40,000. For Jacob Kuebler, at Sandusky, Ohio, a five-story brewhouse; to be of pressed brick and stone front. For Carl Coerper Brewing Company, at Thirty-ninth and Union avenue, a two-story office building; to be of pressed brick and stone front.

Architect J. N. Emmons: For Rockwell, Taylor & Co., on Cottage Grove avenue near the World's Fair, a two-story store and apartment building; 100 by 125 feet in size; to be of frame construction, have bathrooms, closets, washbowls, electric light, etc. For M. Ellington, a series of sheds for horses about 90 by 400 feet in size; to contain offices, waiting rooms, etc.

Architect Franklin P. Burnham: For G. W. Rice, at 1375 Washington boulevard, a three-story residence, 24 by 88 feet in size; to have a stone front, hardwood finish, steam heating, electric light, etc.

Architect C. F. Hermann: For J. Kuoll, on the southwest corner of Clifton and Belmont avenues, a three-story and basement store and flat building; 26 by 80 feet in size; to be of pressed brick and stone front, have bathrooms, closets, washbowls, mantels, brick bay windows. For John Hufmeyer, at

Lane Park, a two-story residence, 30 by 42 feet in size; to be of frame with brick basement, have bathrooms, closets, mantels, hot-water heating, etc.

Architect J. A. Bongard: For Paul Sauber, on Stony Island avenue and Sixty-seventh street, a two-story hotel and pavilion; size 40 by 70 feet; to be of frame; will put in washbowls, closets, gas fixtures, etc.

Architect Oscar Lievendahl: For E. A. Enders, on Warren avenue near California avenue, a three-story and basement flat building, 37 by 82 feet in size; to be of cement stone front, have bathrooms, closets, washbowls, laundry tubs, hardwood finish and mantels, electric wiring, bells, speaking tubes, steam heating; cost about \$25,000.

Cincinnati, Ohio.—Reported by Lawrence Mendenhall. The building situation has not changed materially since last report, but, if any, for the better. The wet weather has been decidedly bad for a painters' strike, and long before this journal appears all will be settled. The journeymen have had their ardor and prospects decidedly dampened. Our new city hall will be dedicated May 13, and its dedication will be the event of many years.

Architect W. W. Franklin has drawn plans for a large flat building for Charles H. Domhoff (M. Addy & Co., Cincinnati); materials: pressed brick, tin roof, mantels, grates, gas, plumbing, iron fronts, etc.; cost \$10,000. Also, dwelling for W. F. Thorne, Cincinnati; materials: buff pressed brick, slate roof, gas, plumbing, stained glass, grates, mantels, electric bells, etc.; cost \$13,000. Also, for Dr. W. L. Davis, Price Hill, Cincinnati; materials: pressed brick, stone, slate roof, stained glass, gas, plumbing, grates, mantels, furnace, etc.; cost \$10,000.

Architects Des Jardins & Hayward report: For the Avondale M. E. Church, Cincinnati, a parsonage; materials: pressed brick, stone trimmings, furnace, slate roof, gas, plumbing, blinds, etc.; cost \$7,500. Also, for George W. Law, a residence; materials: brick, slate roof, hardwood finish, grates, mantels, gas, plumbing, etc.; cost \$12,000.

Architect James W. McLaughlin has drawn plans for a residence for R. H. Shoemaker; materials: buff brick, terra cotta, tin roof, furnace, grates, mantels, mosaic, gas, plumbing, etc.; cost not given. Also plans for a large store or office building for Joseph and Warren Rawson; materials: iron and pressed brick, terra cotta, elevators, plate glass, fireproofing, etc.; cost not given.

Architect Henry E. Siter reports: For Mr. James Heckin a residence; materials: frame, slate roof, hardwood finish, grates, mantels, gas, plumbing, blinds, etc.; cost \$13,000. Also for Merrill Chemical Company, Cincinnati, a manufacturing plant; materials: brick, tin roof, steam heat, elevator, gas, machinery, etc.; size, 207 by 137 feet, four stories; cost not given.

Architects Daniel Hannaford & Sons report: For Frank J. Jones, Cincinnati, a store building; materials: pressed brick, tin roof, iron front, elevators, grates, mantels, gas, plumbing, etc.; size, about 75 by 75 feet, eight stories; cost not given. Also plans for a large store building for the George H. Dean, Kite Brothers' Company; materials: iron, pressed brick, iron roof, elevators, etc.; cost not given. Also for the German Methodist Church, Micken avenue and Locust street, Cincinnati, a church edifice; materials: pressed brick, slate roof, pews, organ, stained glass, etc.; cost \$20,000.

Architect Emil G. Reuckert has prepared new plans for Market House; size, 383 by 33 feet, two stories high; materials: pressed brick, slate roof, iron, cement floors, refrigerators, etc.; cost \$35,000.

Architect G. W. Drach reports: For William Woods (Chatfield & Woods), a warehouse; materials: brick, tin roof, elevator, etc.; size, 53 by 57 feet, four stories high; cost not given.

Architects Nash & Plympton report: A church at Blanchester, Ohio; materials: brick, stone trimmings, slate roof, hardwood, pews, organ, etc.; cost \$8,000. Address Mr. E. D. Smith, care Blanchester, Ohio, Bank. Also remodeling an Episcopal church at Hamilton, Ohio; this will cost, with additional building, \$15,000.

Architect W. C. Lawrence has drawn plans for a store and flat building for Reuben B. Brooks (care architect). Materials: pressed brick, tin roof, iron, pine finish, grates, mantels, gas, plumbing, etc.; cost \$15,000.

Architects Ditto & Wisnall report as follows: For the Amos Shinkle estate, Covington, Kentucky, a block of six three-story buildings; materials: pressed brick, tin roof, grates, mantels, blinds; cost \$20,000. Also dwelling for J. W. Clendenning, Covington, Kentucky; materials: pressed brick, slate roof, grates, mantels, furnace, blinds, stained glass, etc.; cost \$4,500. Also for James McDonald (care architects) a residence; materials: pressed brick, slate roof, grates, mantels, blinds, gas, plumbing, etc.; cost \$5,000.

Architect Edward Schlochtermeyer reports: For St. Agnes' Catholic Congregation, at Bond Hill, a church; materials: pressed brick, slate roof, stained glass, pews, altar, organ, etc.; cost \$10,000.

Architects Sweeney & Robinson report: For James Murdock, Jr., a residence; materials: frame, slate roof, hardwood finish, furnace, stained glass, gas, plumbing, grates, mantels, etc.; cost not given.

Cleveland, Ohio.—Architects Williams and Cole report a colonial residence for H. L. Hebebrand on Kensington street, cost \$7,000; residence for W. P. Johnson, Amesbury avenue, style colonial, cost \$10,000. By C. E. Cole, before partnership was formed: additions to warehouse of the Gibson & Price Lead Company, St. Clair street, cost \$10,000; alterations in residence for John Lersch, Elyria, Ohio; office building for Mr. Saxton, West side; alterations in two houses at Rocky River, Ohio, for Charles Fries, Esq.

Architects French and Chapman report a stone church for the Second German Reform congregation, at the corner of Woodland avenue and Putnam street; 48 by 80 feet in size; slate roof, gas, wired for electricity, furnace heat; cost \$10,000.

Architect S. R. Badgley reports: Pilgrim Congregational Church, corner of Jennings and Starkweather avenues; a brownstone structure; 130 by 140 feet in size, slate roof, lighted by gas and electricity and heated by the hot-blast system; cost \$75,000; it will be a thoroughly modern institutional church, with reading rooms, reception rooms, gymnasium, dressing rooms, bathrooms, parlors, dining-room, kitchen and pantries in the basement, with auditorium, galleries, Sunday-school and class-rooms above. A frame and shingle residence for George A. Rudd, with all modern improvements, including hot-water heat; cost \$6,000. Baptist church, at Gouverneur, New York, 72 by 90 feet in size; marble, tin tile and shingles; cost \$15,000. Foundry and manufacturing building at Chagrin Falls, Ohio, for the Dippo Manufacturing Company, 130 by 150 feet, one and two stories; cost \$10,000. Business block, on Euclid avenue, near Erie street, 36 by 82 feet, three stories; pressed brick and stone trimmings, steam heat; cost \$8,000. Frame and shingle residence for Frank A. Rogers; 32 by 50 feet; cost \$4,000. Gordon avenue Methodist Episcopal church, brick and stone, 44 by 80 feet; cost \$7,000.

Denver, Colo.—Architects Baerresen & Brothers: For S. P. Large, a two-story brick dwelling; size 28 by 46 feet; cost \$7,000. For Leonard & Montgomery, a four-story business block; size 62 by 125 feet; brick and stone; cost \$40,000.

Architect F. C. Kidder: For the Third Congregational Church Society, a one-story church building; size 45 by 51 feet; brick and stone; cost \$6,000.

Architect James Murdock: For F. A. Birchard, a two-story dwelling; brick and stone; size 28 by 46 feet; cost \$9,000.

Architects Varian & Sterner: For R. A. Cutter, a two-story brick dwelling; size 36 by 51 feet; cost \$10,000.

Architects Edbrooke & Co.: For the Denver Packing Company, a five-story store building; brick and stone; size 50 by 120 feet; cost \$35,000. For S. S. Badger, a two-story dwelling; brick and stone; size 30 by 50 feet; cost \$8,000.

Architect Frank Goodnow: For Mrs. Barbara E. Kettle, a two-story brick house; size 35 by 60 feet; cost \$18,000.

Architect F. J. Sterner: For self, a two-story brick residence; size 37 by 47 feet; cost \$10,000.

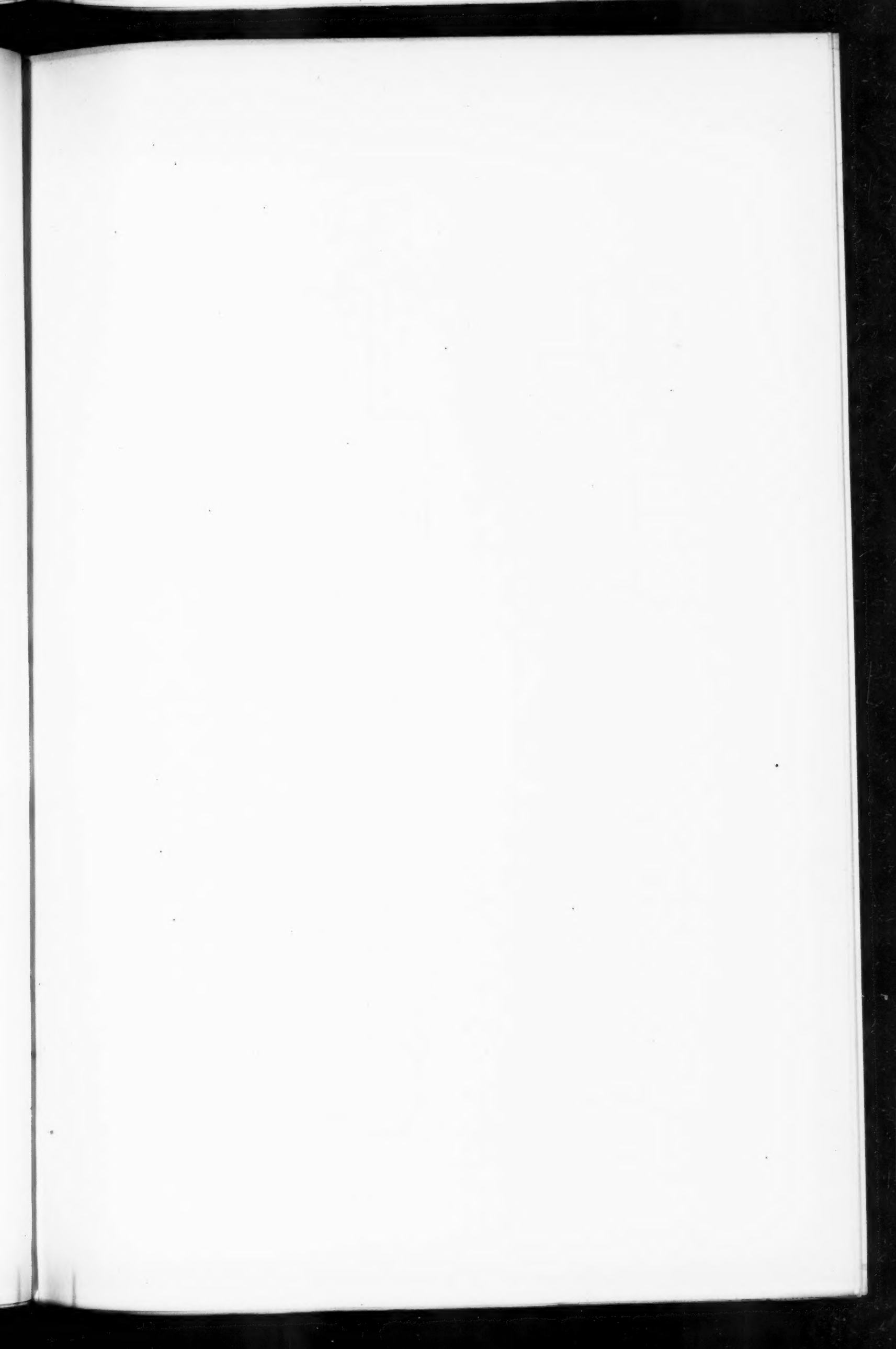
Architect H. S. Bailey: For O. C. Lehow, a two-story stone dwelling; size 36 by 50 feet; cost \$10,000.

Architect A. M. Gove: For Dr. W. W. Grant, a two and one-half story brick dwelling; size 44 by 47 feet; cost \$12,000.

Pittsburgh, Pa.—Architect T. D. Evans: For the South Side Hospital, a brick and stone building; to cost \$40,000.

Architects Neal & Hopkins: For the First Unitarian church; the building will cost \$8,000.

Architects Wood & Lovell, of Chicago: For E. Wilt, a theater and hotel building, size 73 by 212 feet; to cost \$100,000.



HOT-WATER HEATING—OVERHEAD METHOD.

PLATE IV.

RESIDENCE
FOR
FRANK HAMILTON
SW COR. 2ND AND PINE STREETS
MONTGOMERY ILL.
SHEET NO 15

BASEMENT AND ATTIC
PLANS SHOWING
HOT-WATER HEATING

SCALE, 1/4" = 1'-0"

WILLET & BUSHLEY
ARCHITECTS
CHICAGO ILL.

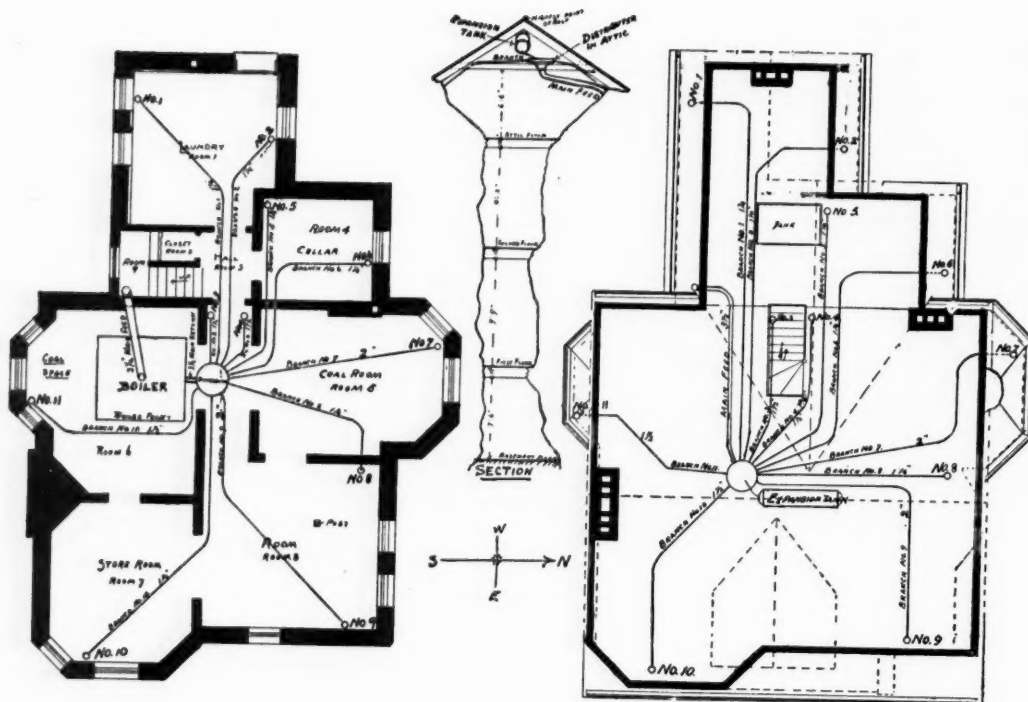


PLATE V.

RESIDENCE
FOR
MR. FRANK HAMILTON
SW COR. 2ND AND PINE STREETS
MONTGOMERY ILL.
SHEET NO 16

FIRST AND SECOND STORY
PLANS
SHOWING HOT-WATER HEATING

SCALE, 1/4" = 1'-0"

WILLET & BUSHLEY
ARCHITECTS
CHICAGO ILL.

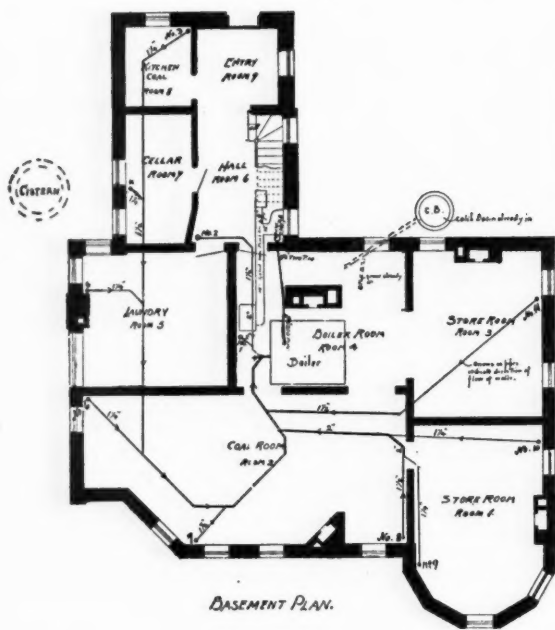


HOT-WATER HEATING—OVERHEAD METHOD.

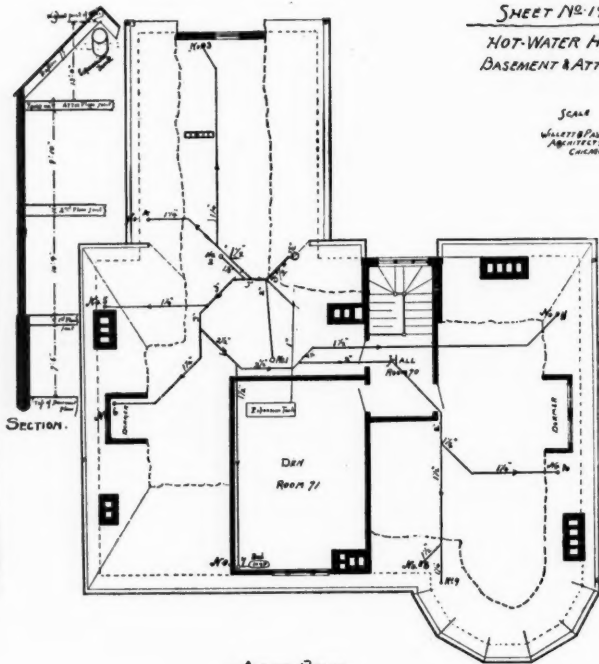
PLATE I.

RESIDENCE
for
E. A. WIKSTROM
MONTICELLO
SHEET No. 12
HOT-WATER HEATING
BASEMENT & ATTIC PLAN

SCALE
WILLETTE & PALMER
ARCHITECTS
CHICAGO, ILL.



BASEMENT PLAN.



- ATTIC PLAN -

PLATE II.

RESIDENCE
for
E. A. WIKSTROM
MONTICELLO
SHEET No. 25
HOT-WATER HEATING
FIRST & SECOND STORY PLANS

SCALE 1/8" = 1'-0"

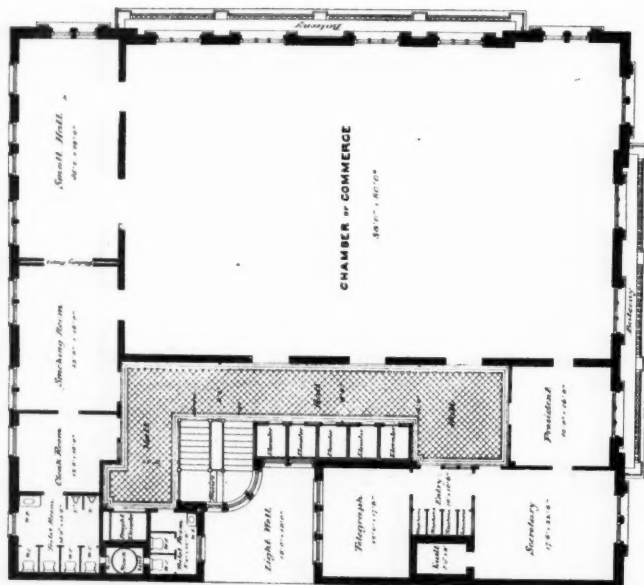
WILLETTE & PALMER
ARCHITECTS
CHICAGO, ILL.



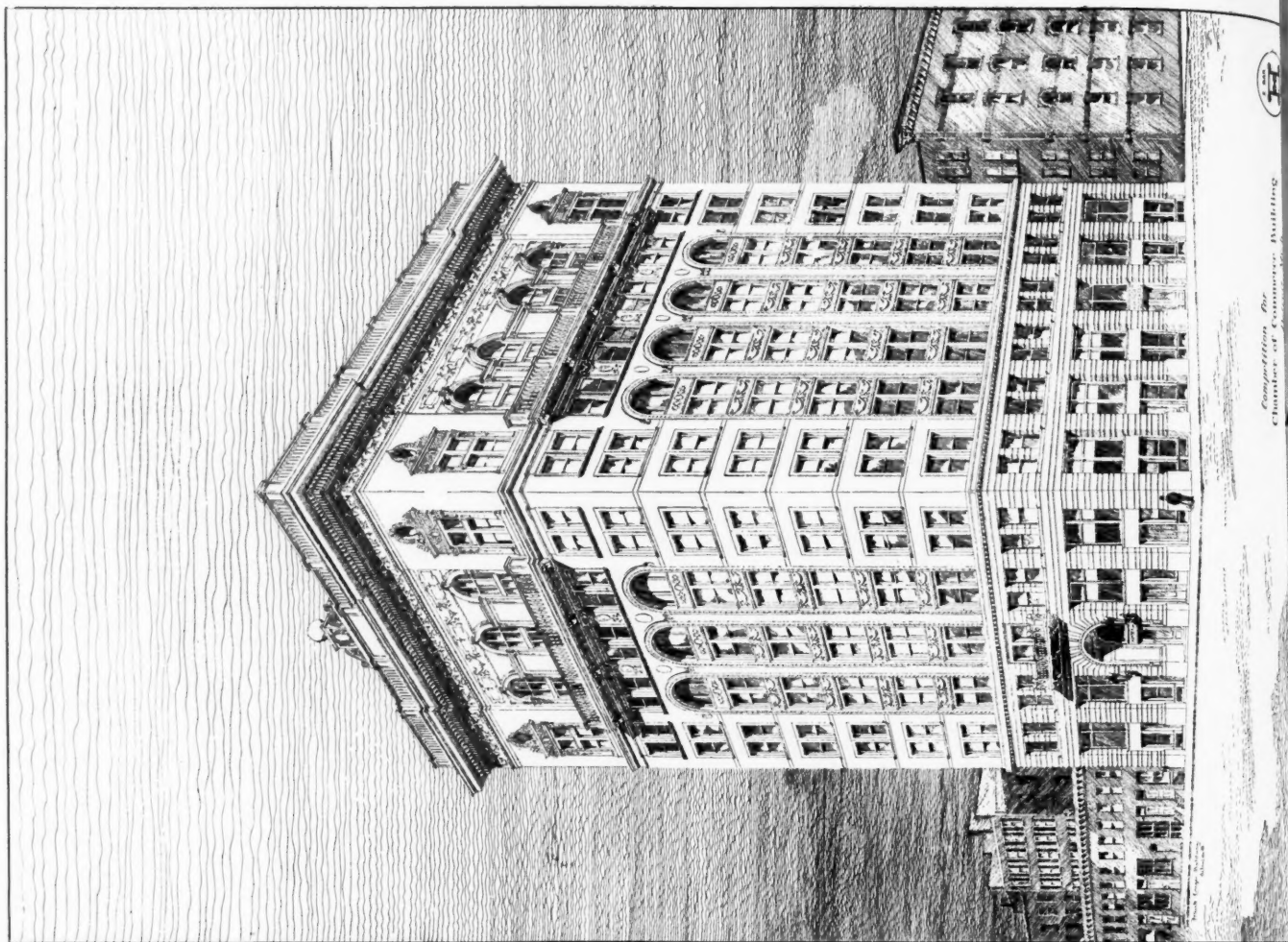
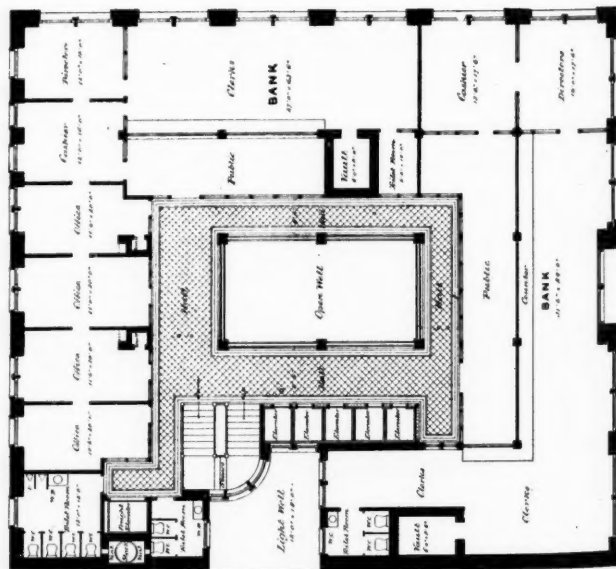
FIRST STORY PLAN.



SECOND STORY PLAN



PLAN OF TENTH STORY.

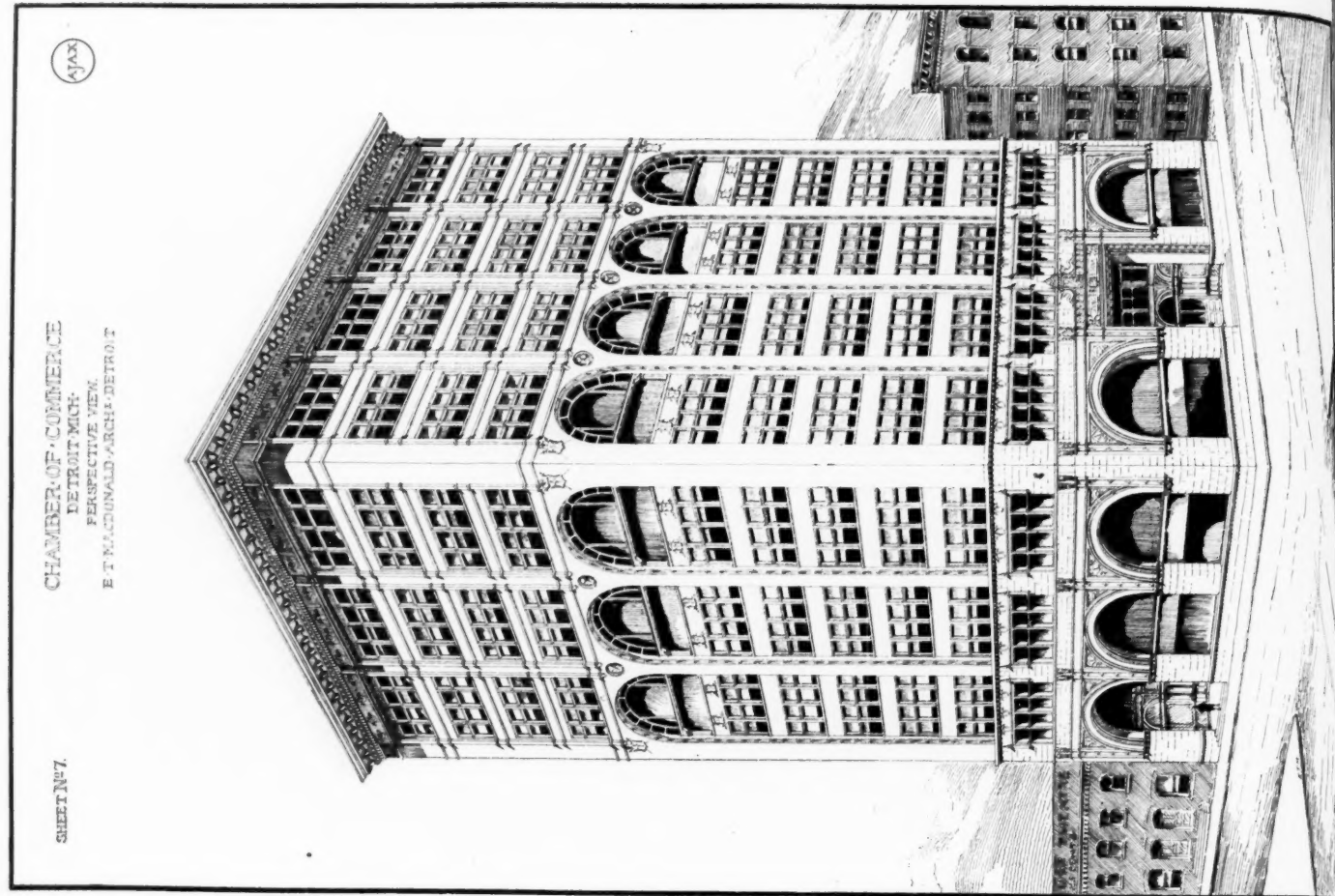
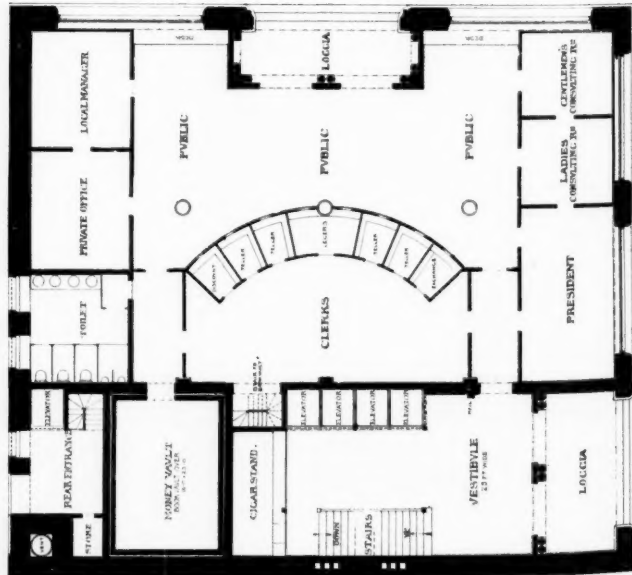


Completion of Chamber of Commerce Building



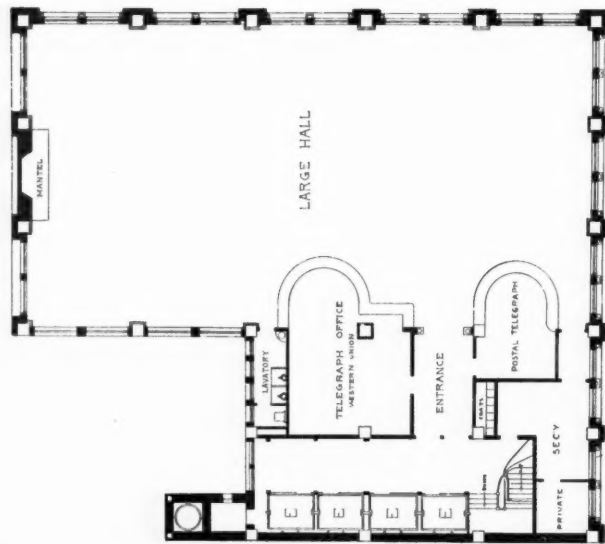


EIGHTH FLOOR PLAN





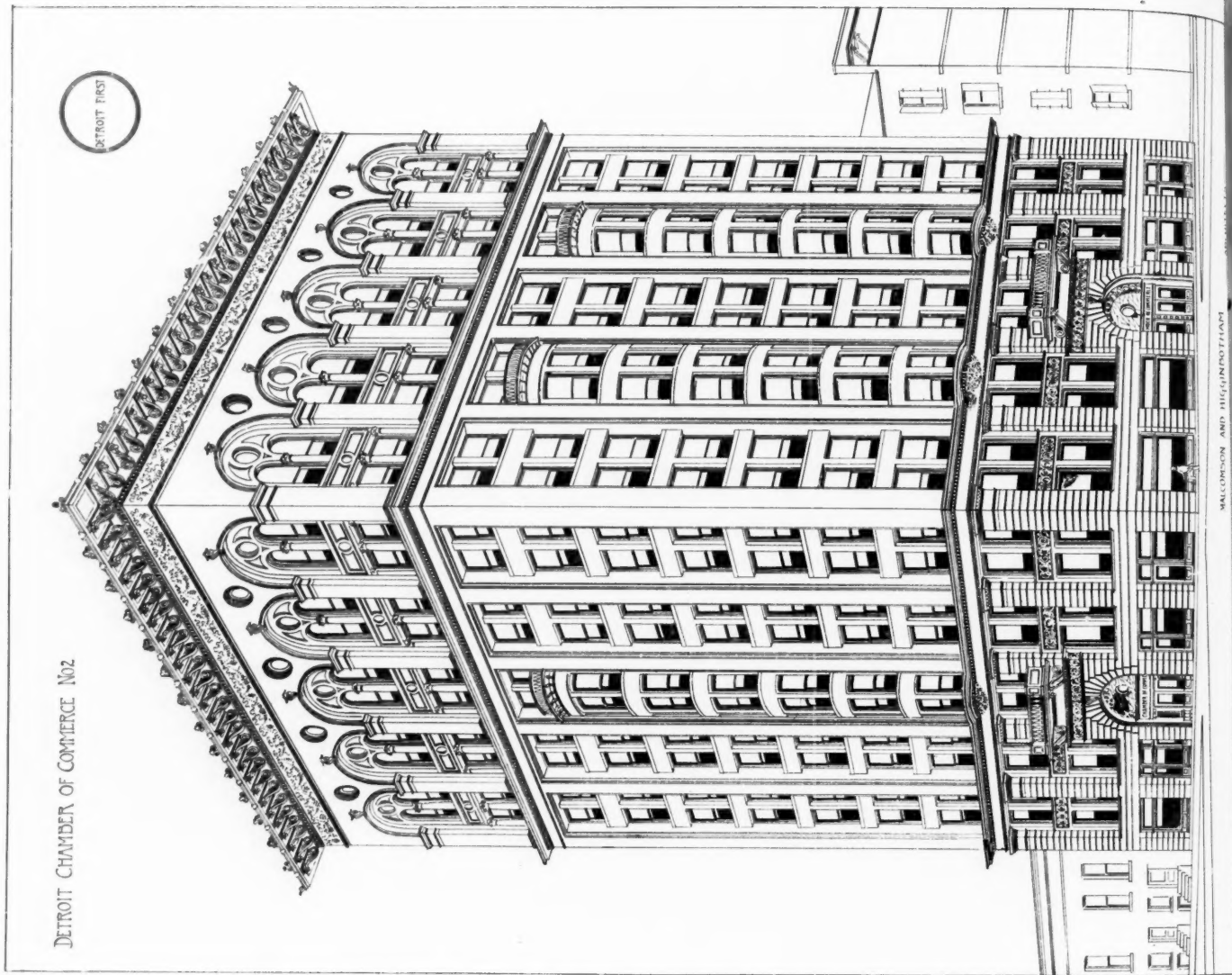
UNRECORDED STREET



TWELFTH STORY PLAN



SECOND STORY — UNDIVIDED

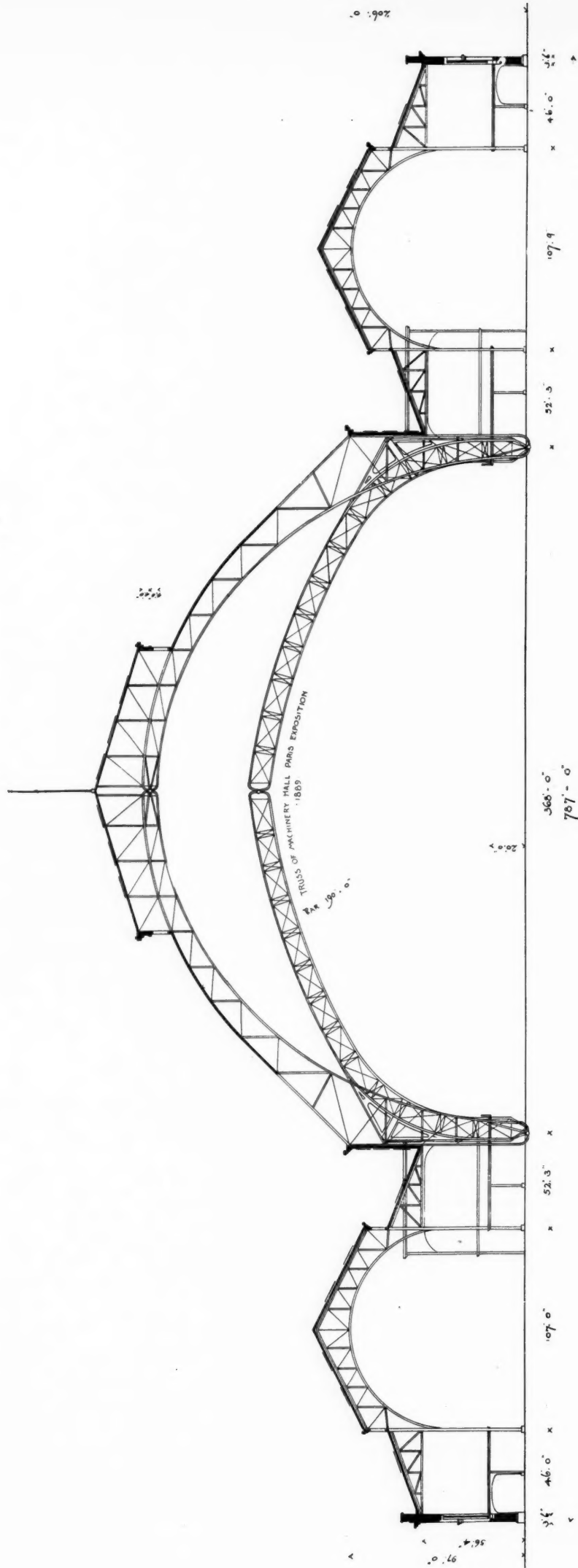




MALDEN AND HINGHAM



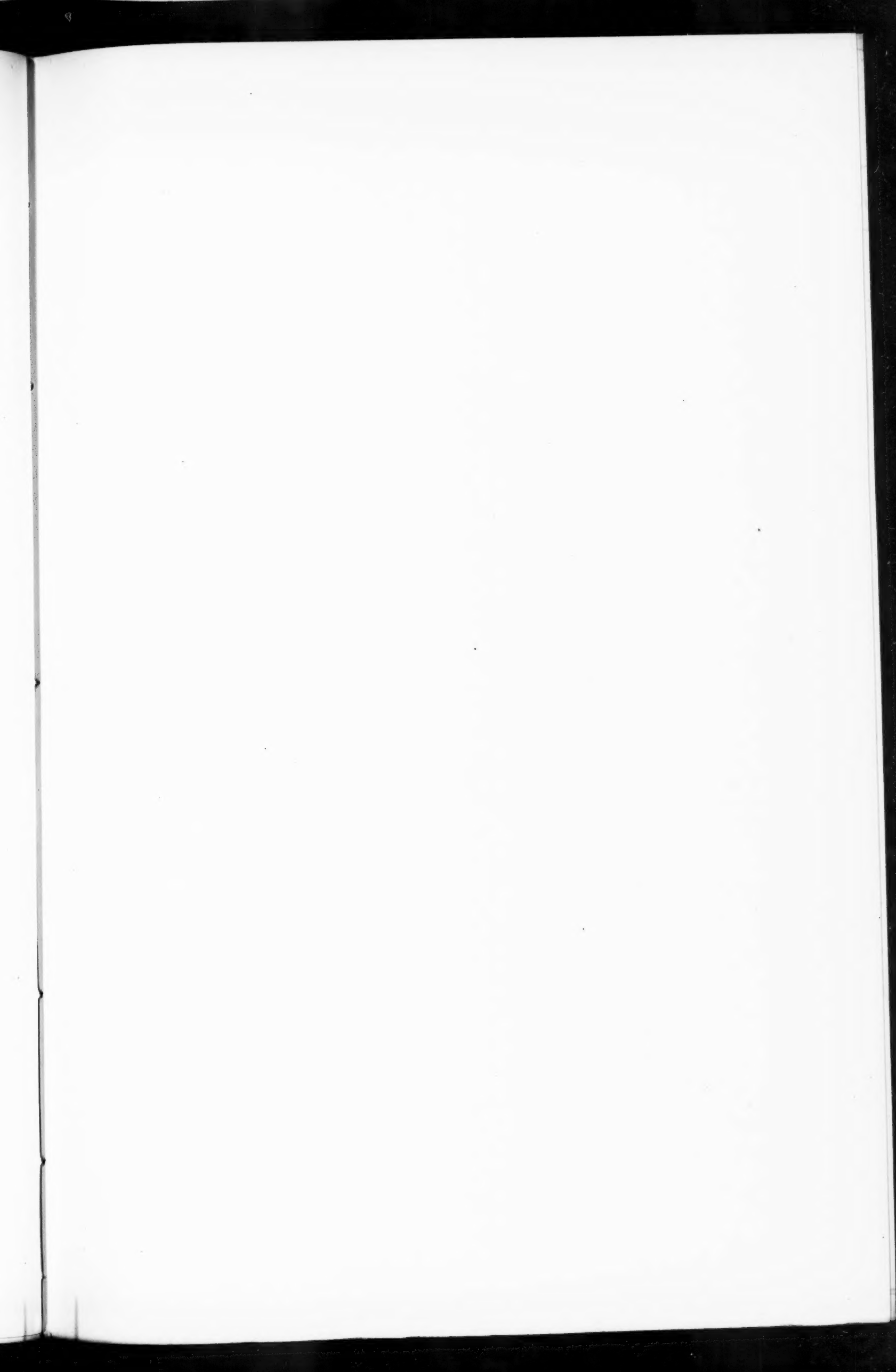
SECOND STORY — UNDIVIDED



CROSS SECTION OF THE
MANUFACTURES AND LIBERAL ARTS BUILDING

WORLD'S COLUMBIAN EXPOSITION
CHICAGO 1893

COMPARING TRUSS OF MACHINERY HALL
PARIS EXPOSITION 1889



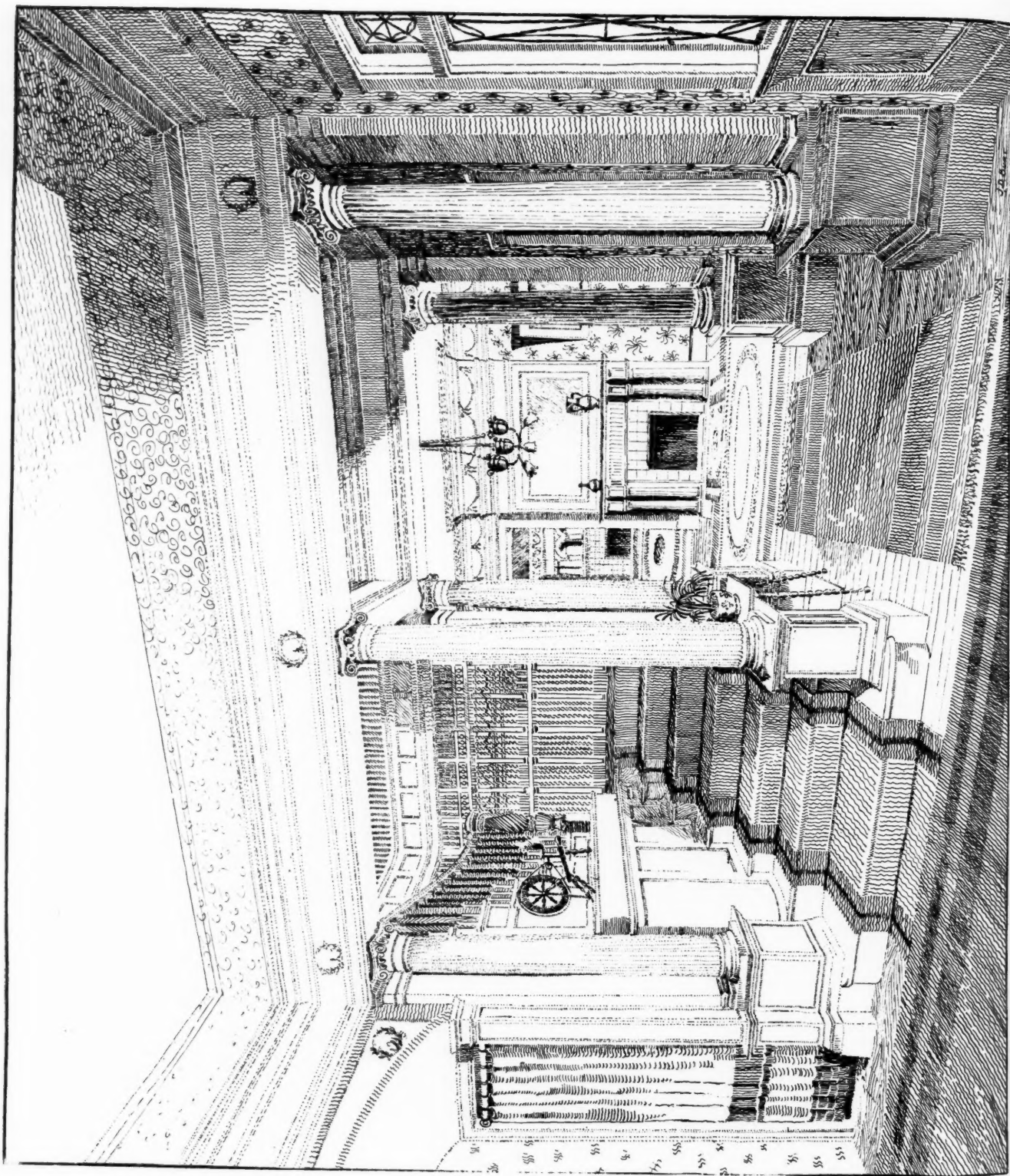


ACCEPTED DESIGN FOR CHAMBER OF COMMERCE

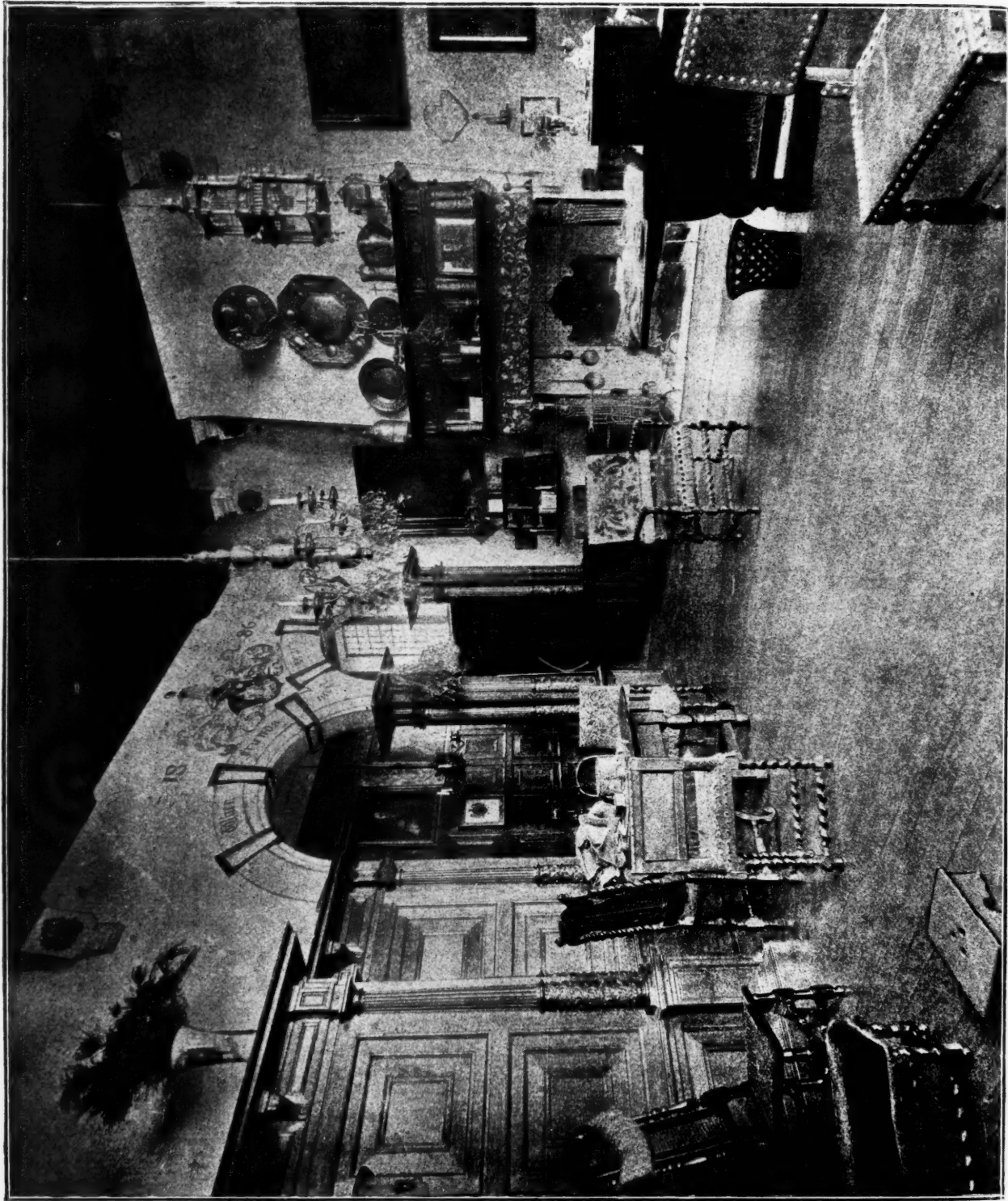
SPIER & ROBERTSON

ARCHIT

R OF C
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VIEW IN RESIDENCE OF ALMA TADEMA.

HEADQUARTERS ENGINE HOUSE
COLUMBUS FIRE DEPARTMENT
COLUMBUS, OHIO,
JOHN FLYNN, ARCHITECT.





FRONT VIEW, COTTAGE FOR M. E. INGALLS, HOT SPRINGS, VIRGINIA.

G. W. E. FIELD, ARCHITECT, RICHMOND, VIRGINIA.



INLAND ARCHITECT PRESS.

BOWLING ALLEY, HOT SPRINGS, VIRGINIA.

G. W. E. FIELD, ARCHITECT, RICHMOND, VIRGINIA.

HEADQUARTERS ENGINE HOUSE
COLUMBUS FIRE DEPARTMENT
COLUMBUS, OHIO,
JOHN FLYNN, ARCHITECT.





FRONT VIEW, COTTAGE FOR M. E. INGALLS, HOT SPRINGS, VIRGINIA.

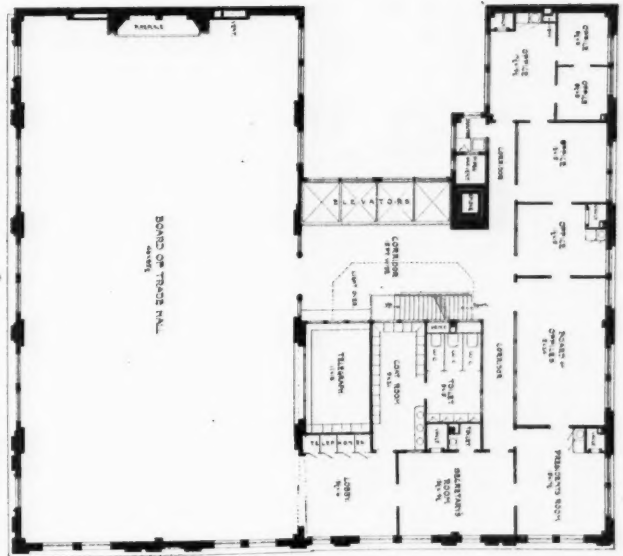
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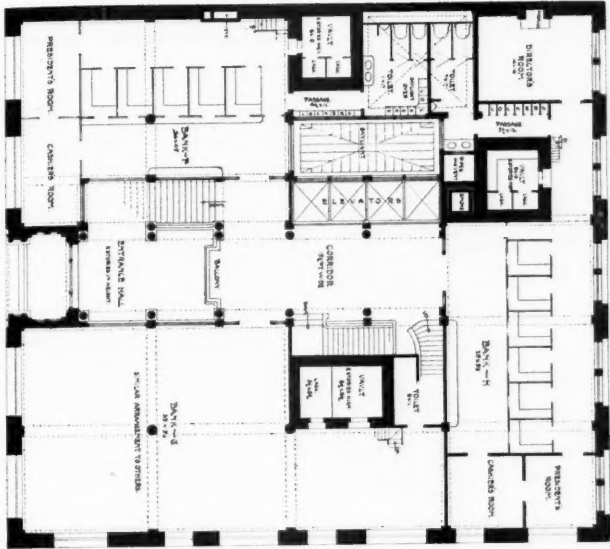
INLAND ARCHITECT PRESS.

BOWLING ALLEY, HOT SPRINGS, VIRGINIA.

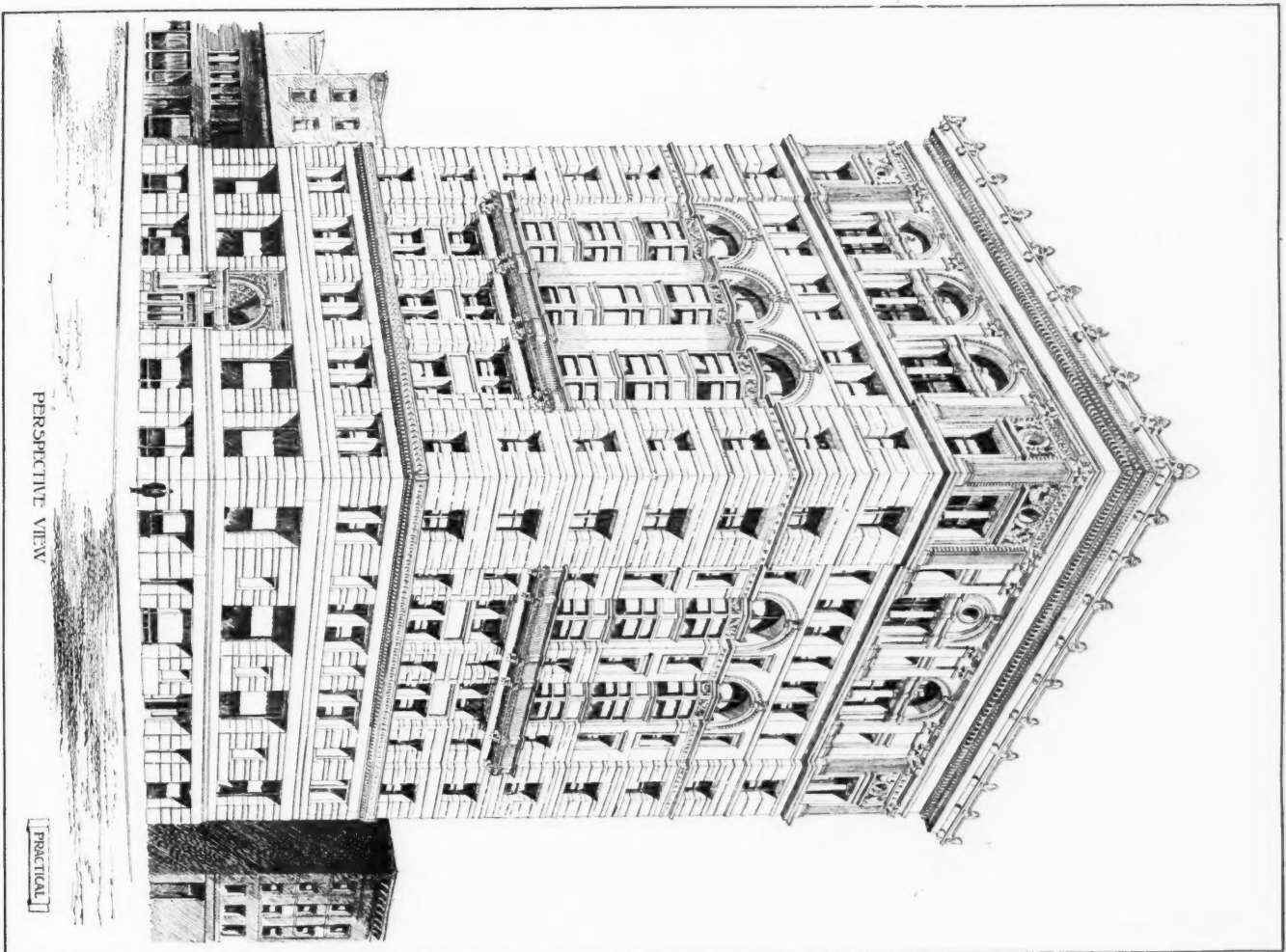
G. W. E. FIELD, ARCHITECT, RICHMOND, VIRGINIA.



ELEVENTH OR BOARD FLOOR PLAN



SECOND FLOOR PLAN

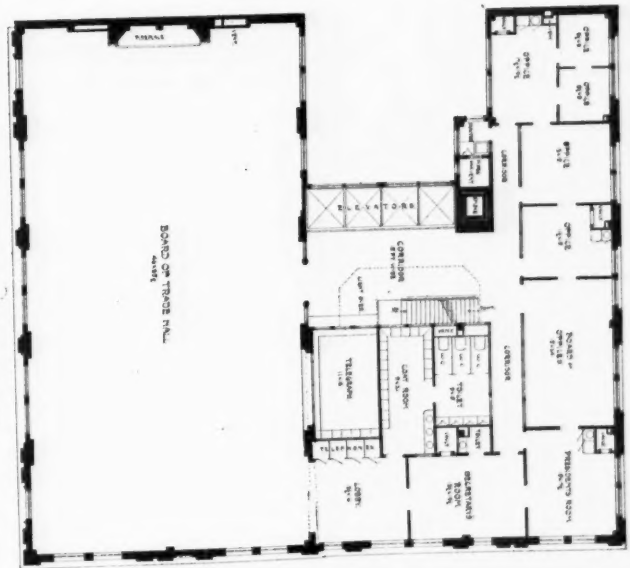


PERSPECTIVE VIEW

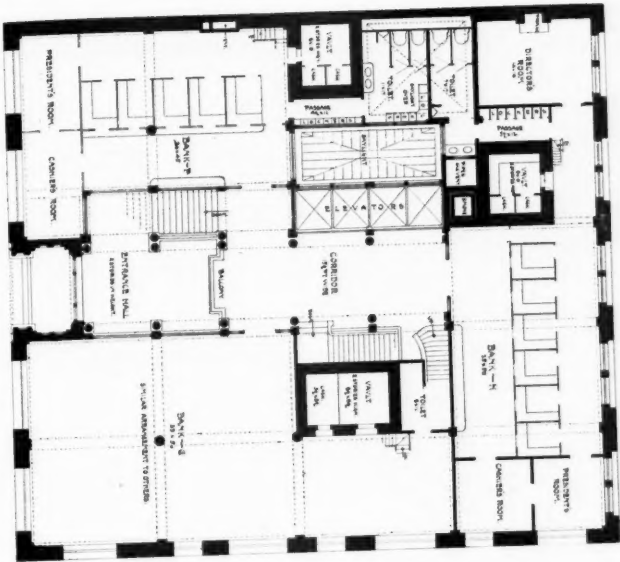
PRACTICAL

COMPETITIVE DESIGN FOR DETROIT CHAMBER OF COMMERCE.

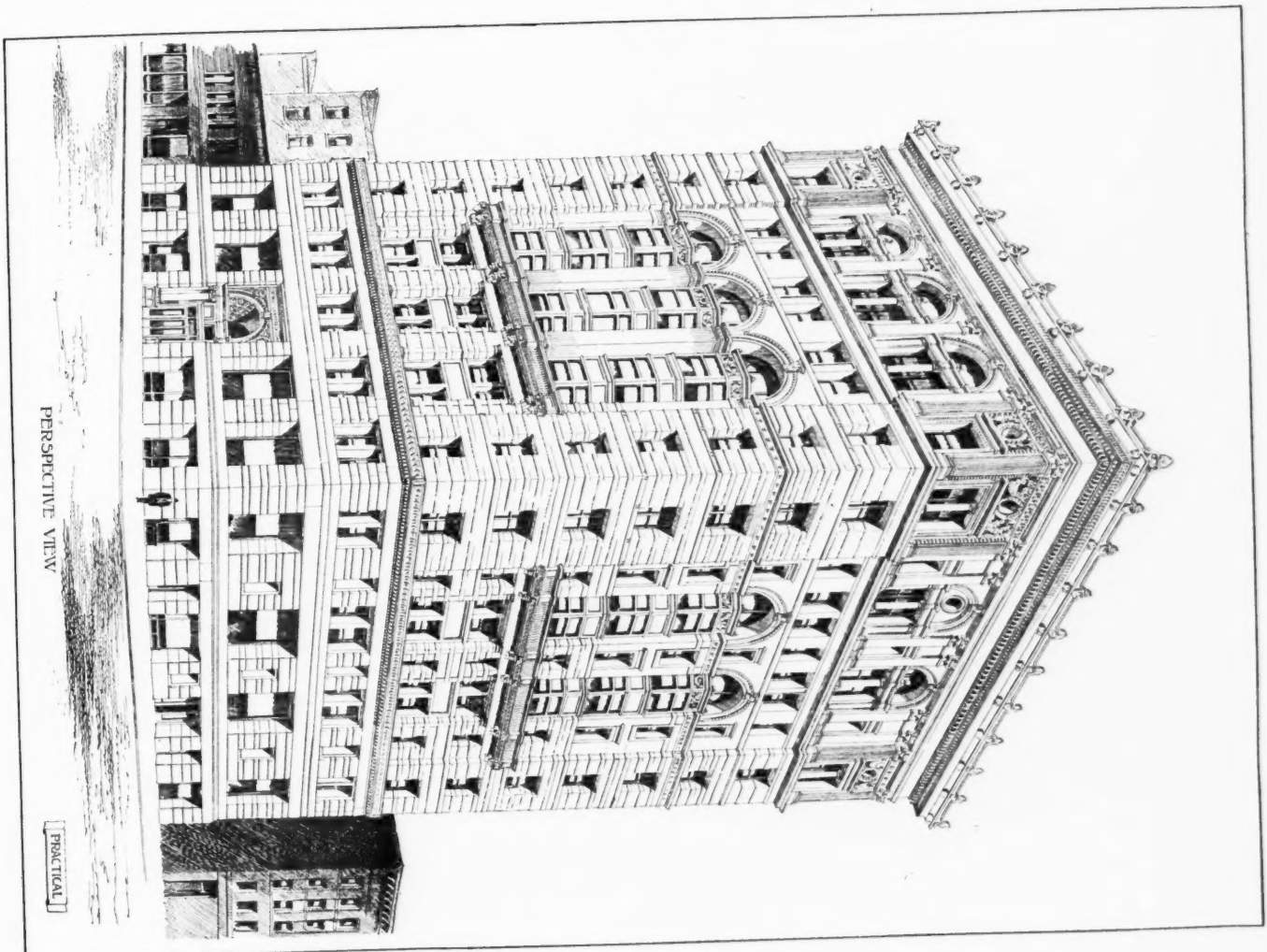
SUBMITTED BY MASON & RICE, ARCHITECTS, DETROIT, MICHIGAN.



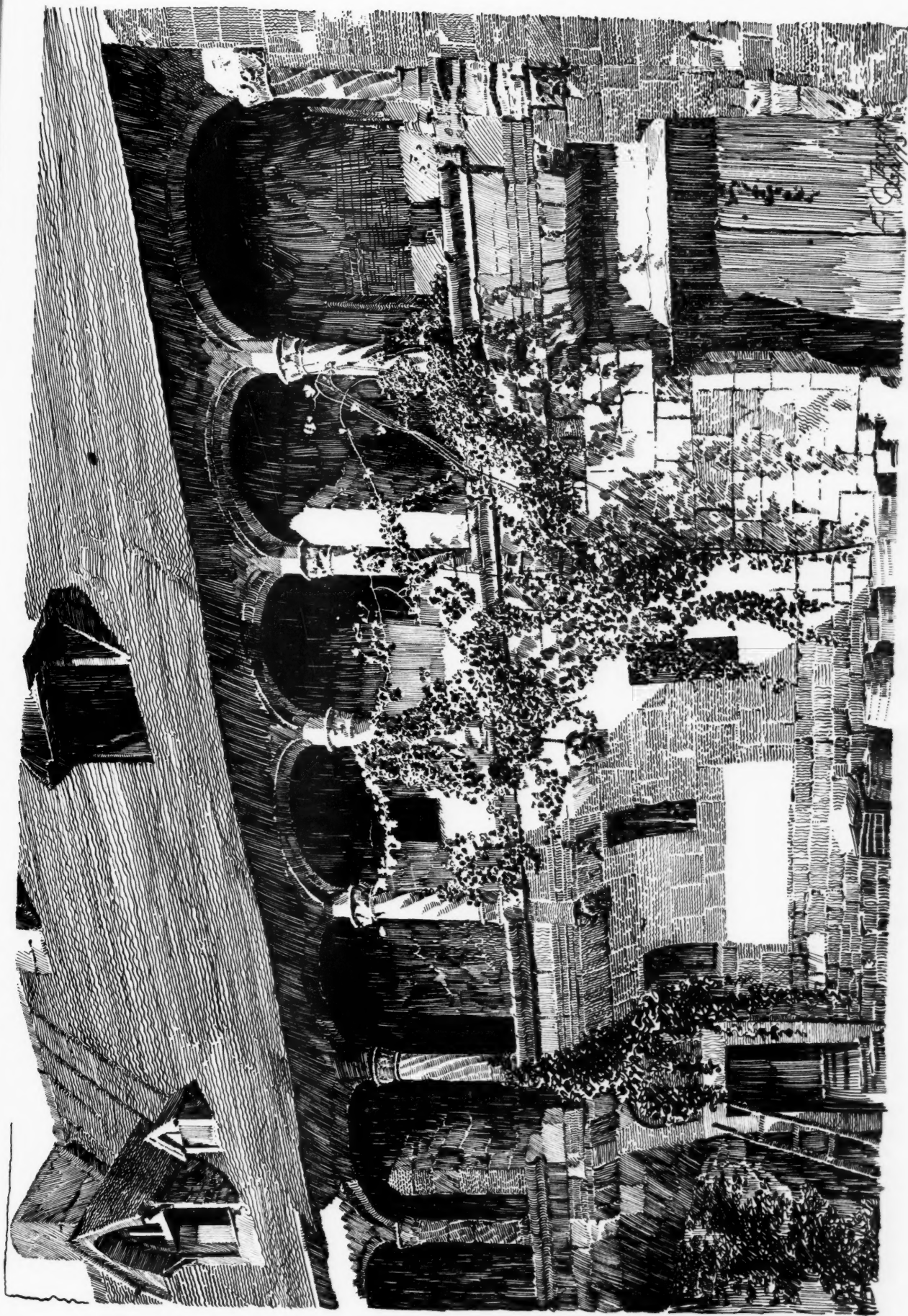
ELEVENTH OR BOARD FLOOR PLAN



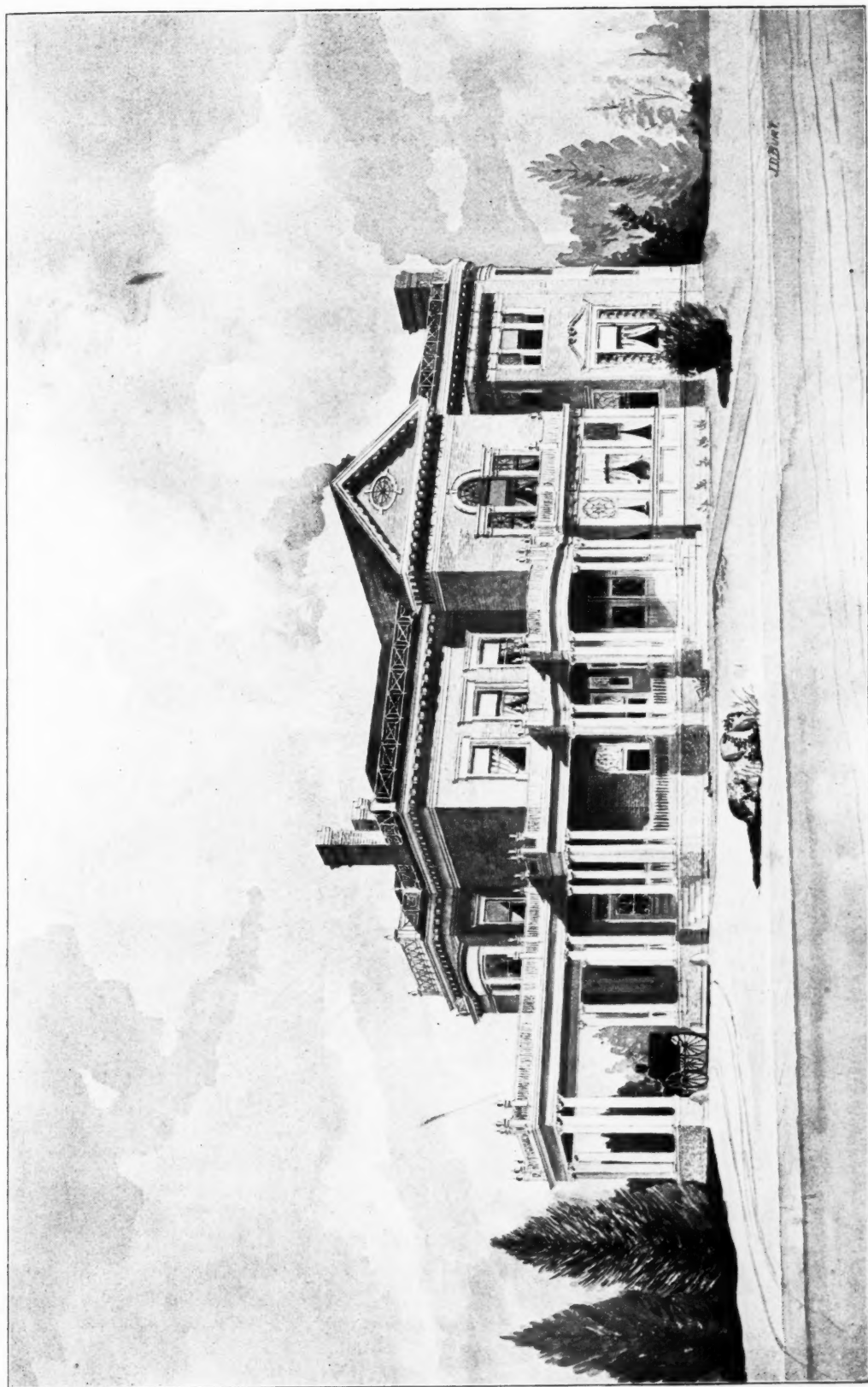
SECOND FLOOR PLAN



COMPETITIVE DESIGN FOR DETROIT CHAMBER OF COMMERCE.
SUBMITTED BY MASON & RICE, ARCHITECTS, DETROIT, MICHIGAN.

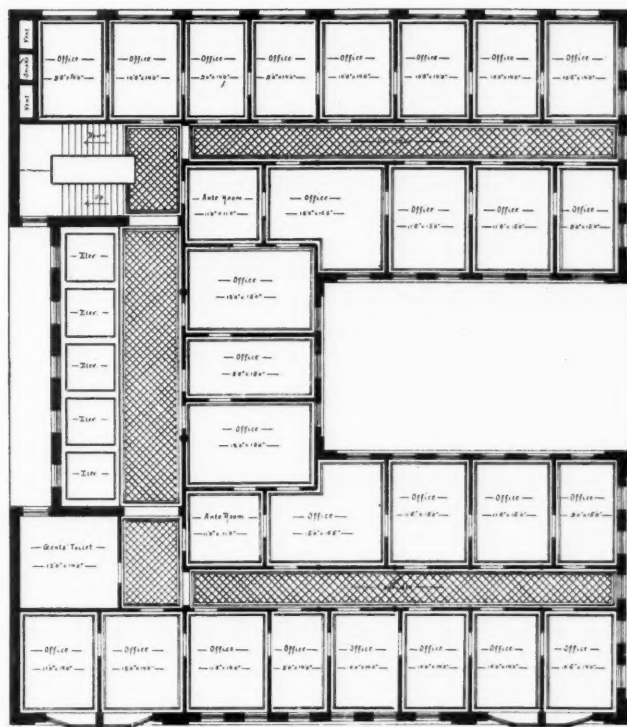


SO-CALLED HOUSE OF HENRY IV, AT NE'RAC.
RENDERING BY E. C. JENSEN, CHICAGO, FROM PHOTOGRAPH.

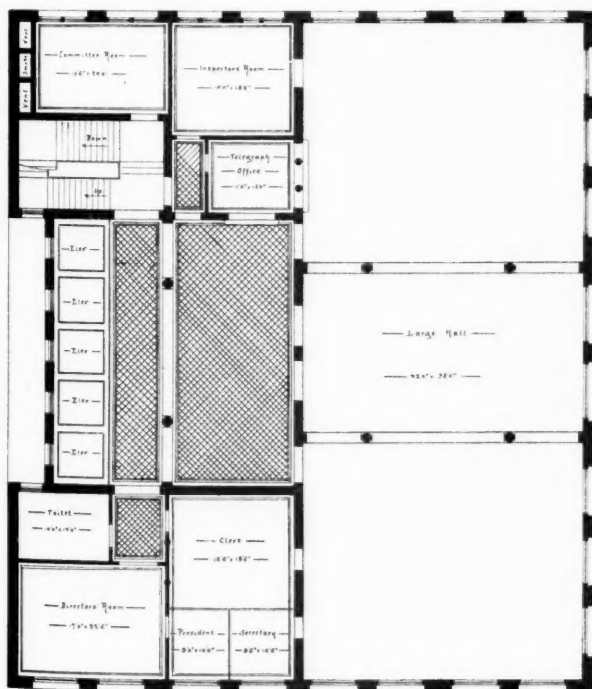


REMODELED RESIDENCE FOR ELISHA GRAY, HIGHLAND PARK, ILLINOIS.

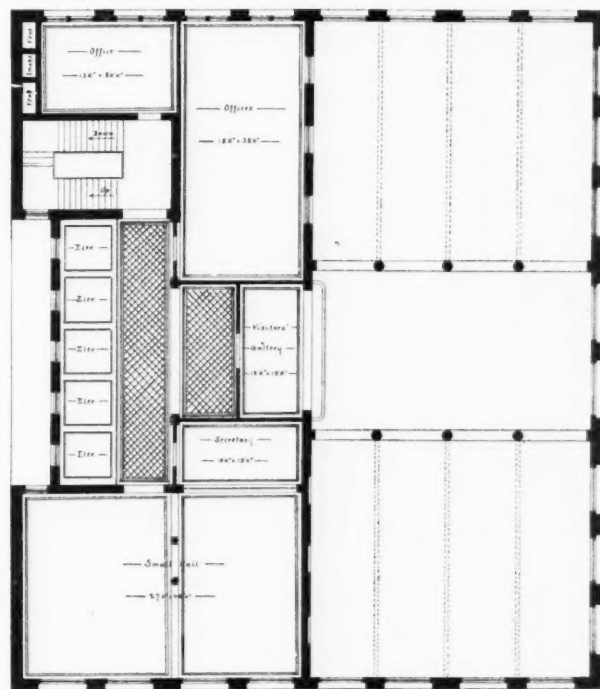
PAUL STARRETT AND JULES F. WEGMAN, ARCHITECTS, CHICAGO.



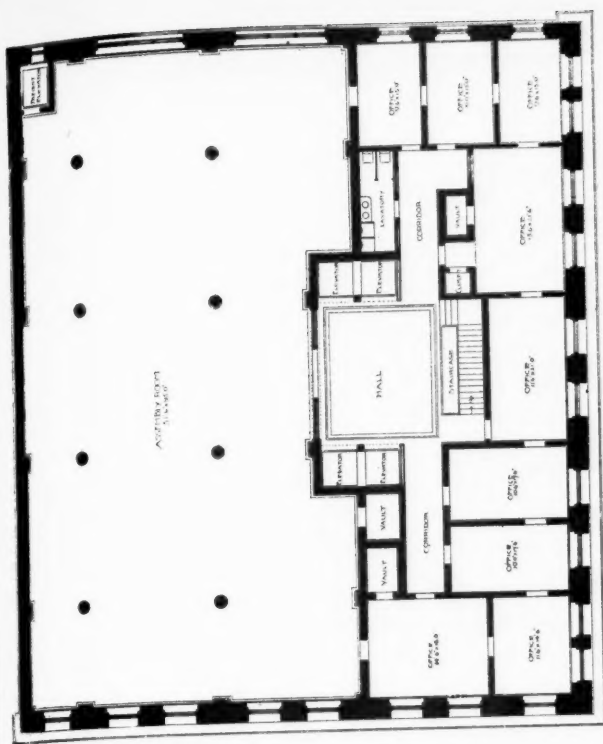
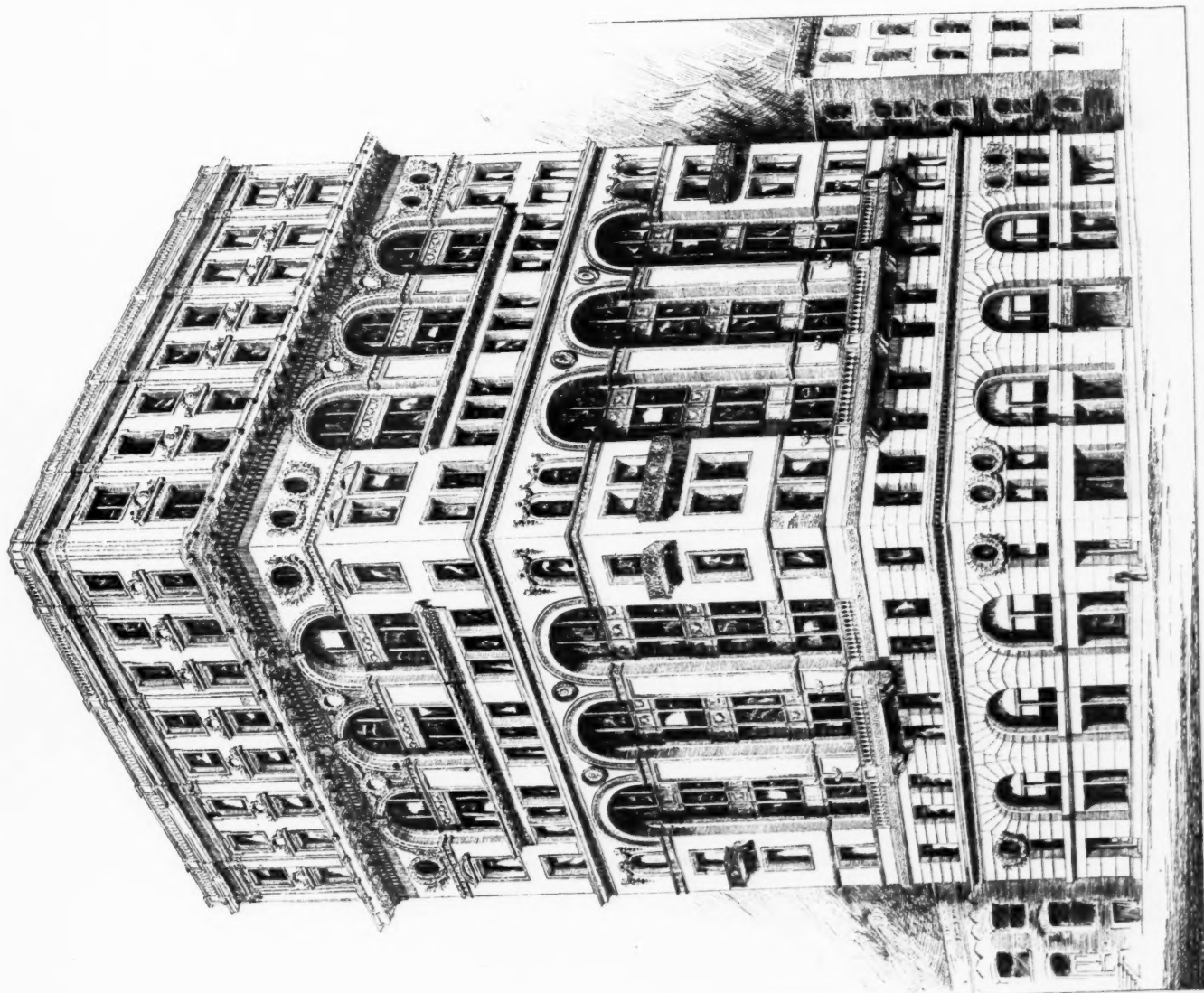
FIFTH TO ELEVENTH STORIES.



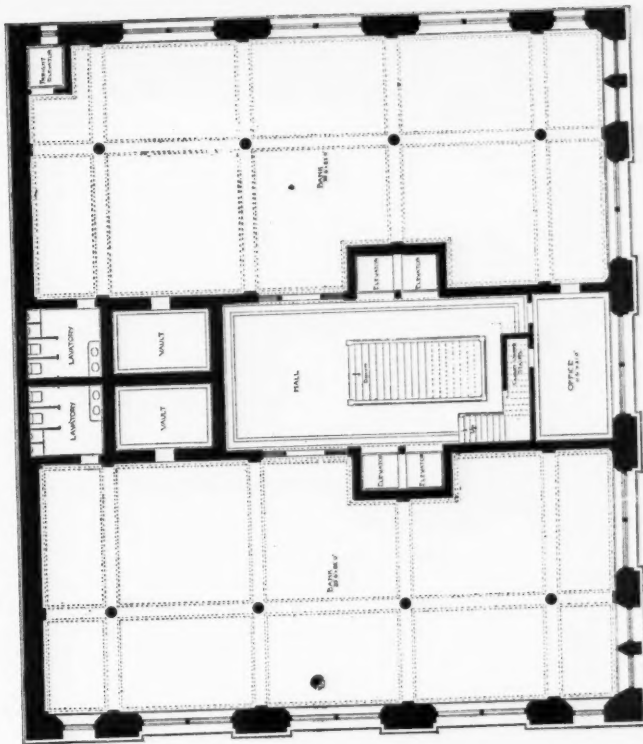
PLAN OF SECOND STORY.



PLAN OF FOURTH STORY.



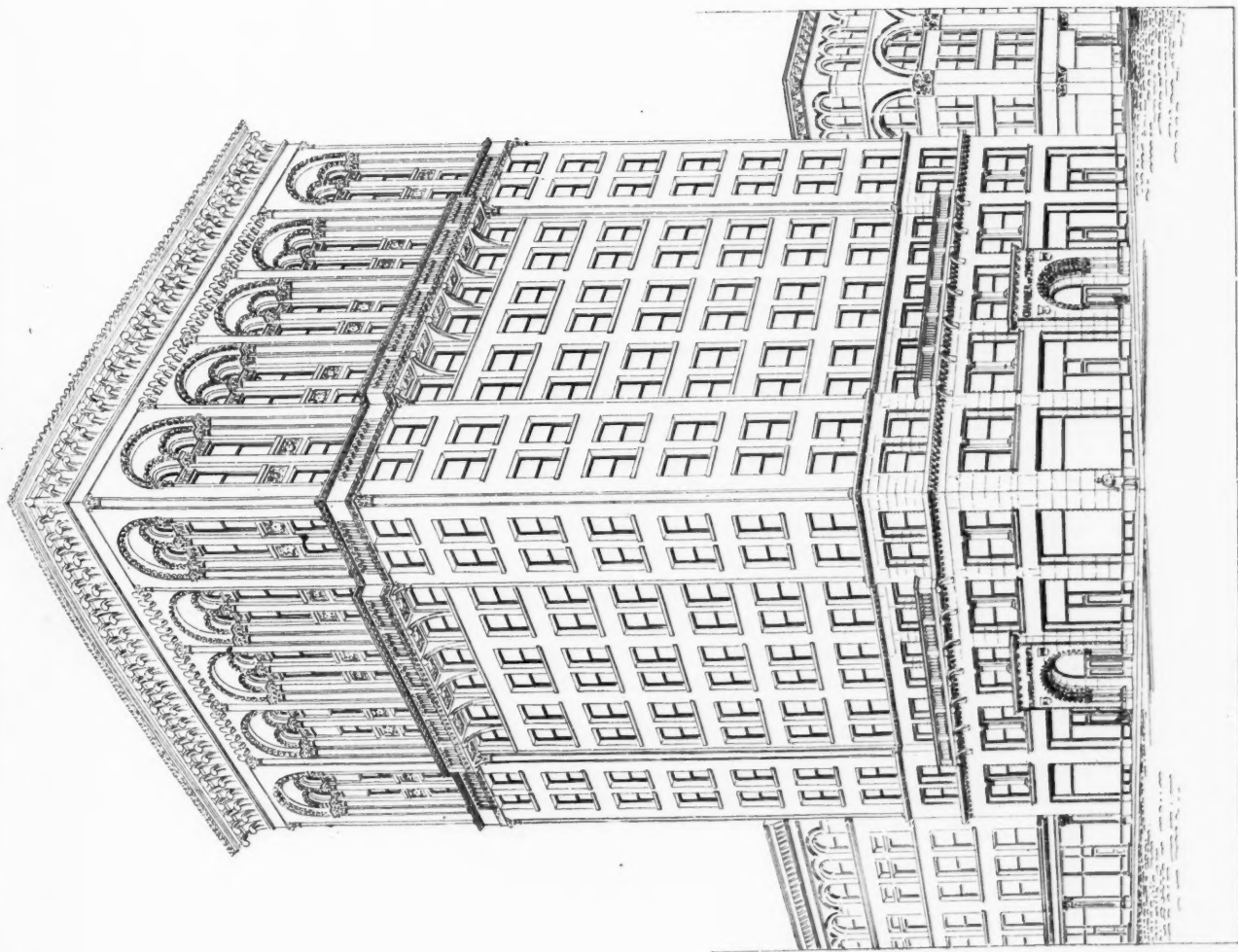
THIRD FLOOR



SECOND FLOOR

COMPETITIVE DESIGN, DETROIT CHAMBER OF COMMERCE COMPETITION.

SUBMITTED BY ROGERS & MCFARLANE, DETROIT.

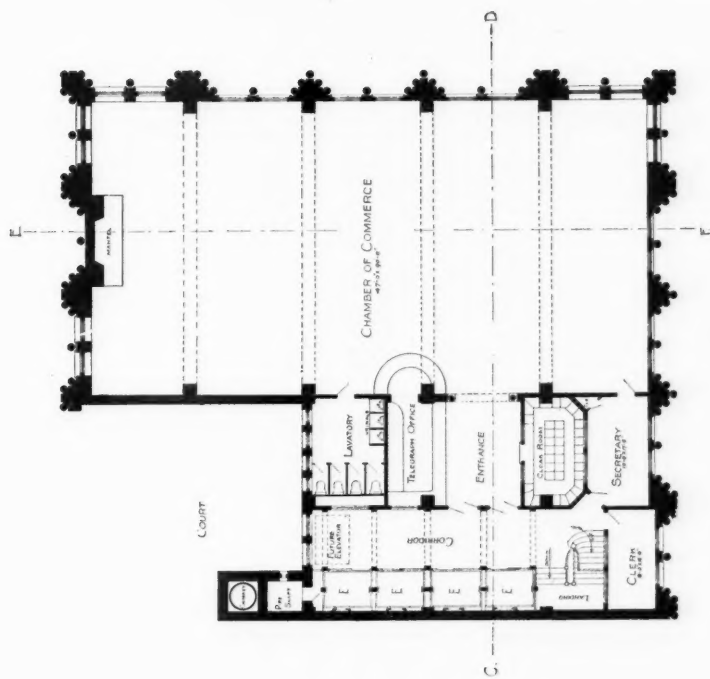


CHAMBER OF COMMERCE
DETROIT MICH.

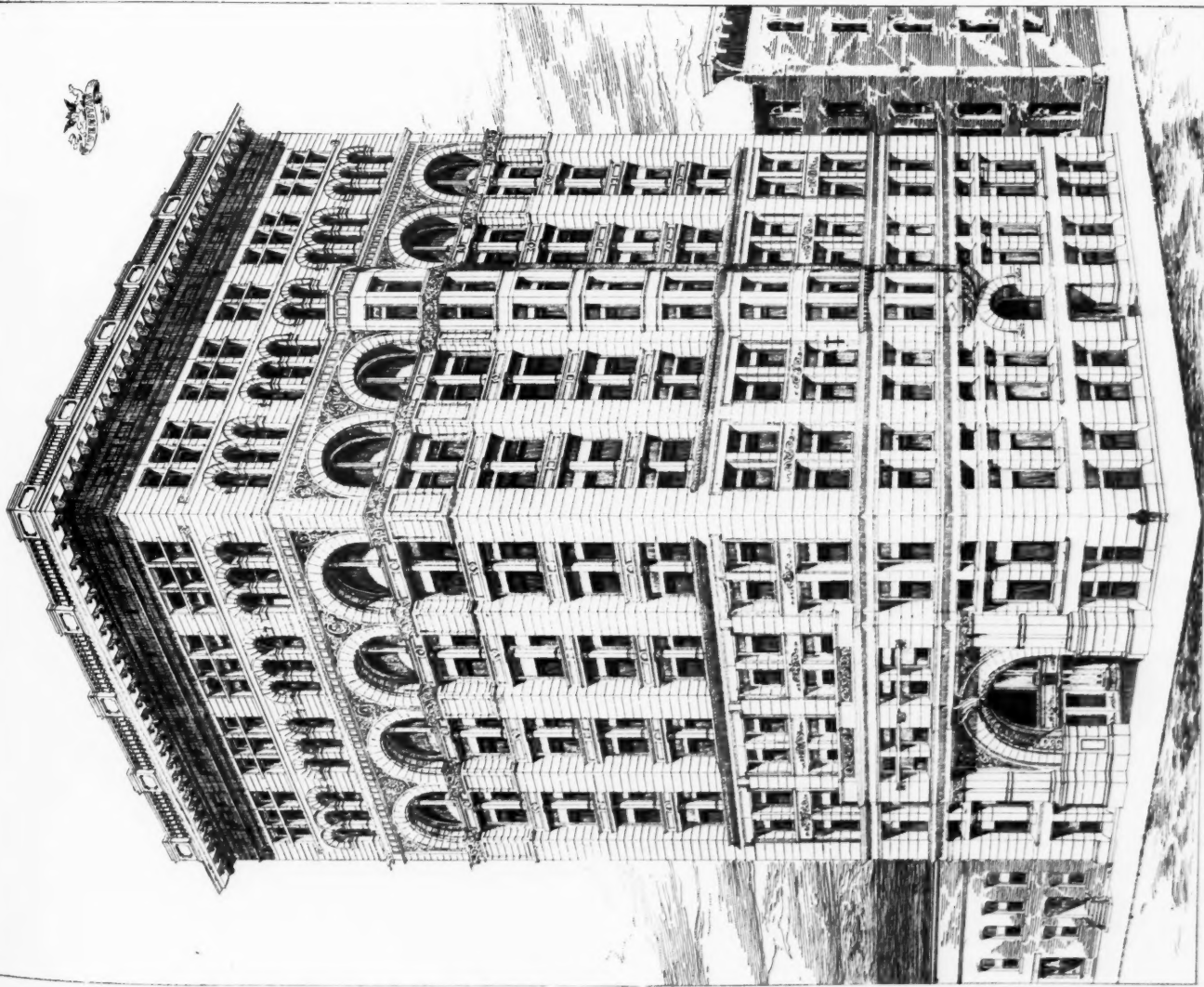
DESIGN
NO. 1

SUBMITTED BY —DETROIT FIRST

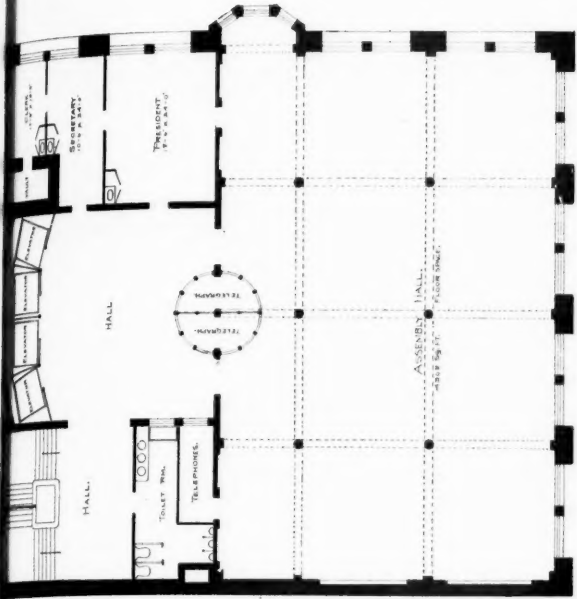
—MALCOMSON AND HIGGINSDOTHAM—
—ARCHITECTS—



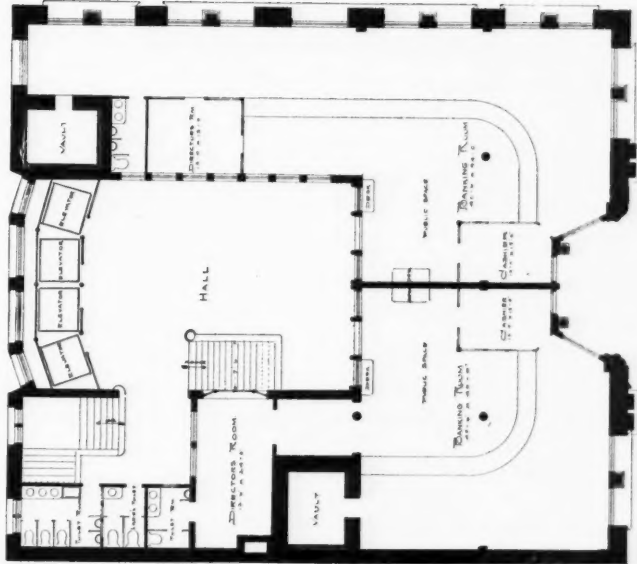
TWELFTH FLOOR PLAN.



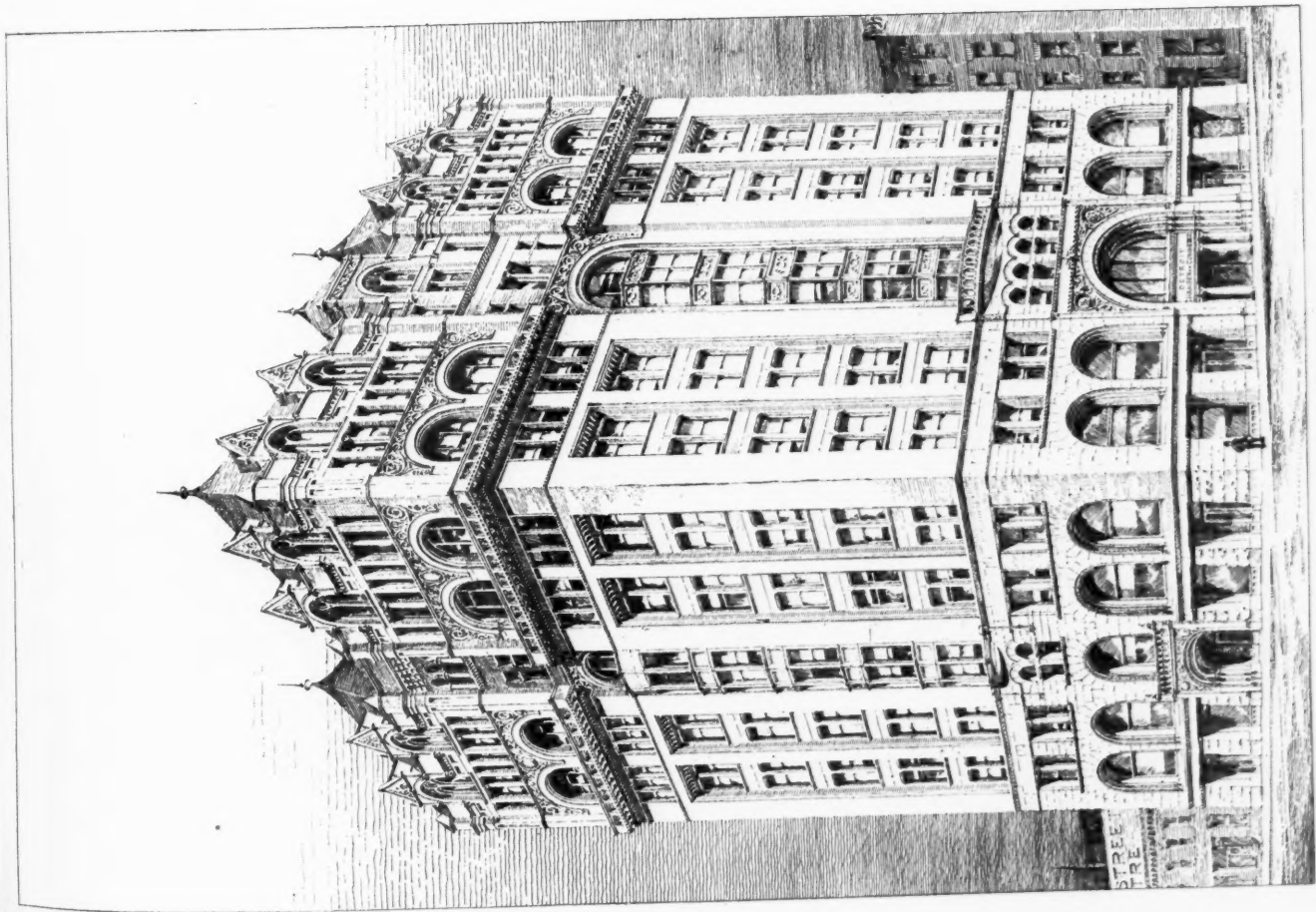
COMPETITIVE DESIGN
 FOR THE DETROIT CHAMBER OF COMMERCE
 HONORABLE MENTION
 W. S. JOY ARCHITECT



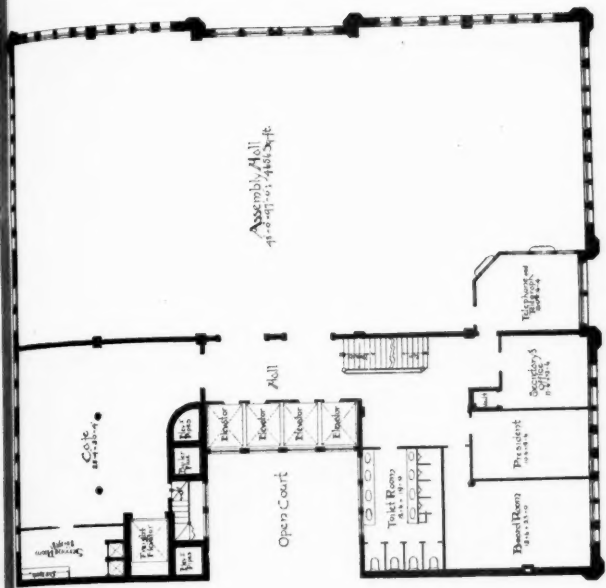
PLAN OF NINTH FLOOR



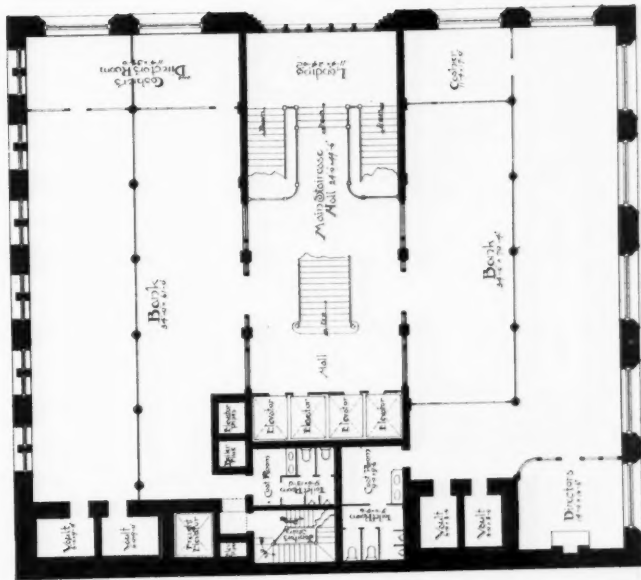
SECOND FLOOR PLAN



MORTIMER L. SMITH, SON,
ARCHITECTS
DETROIT, MICH.
COMPETITIVE DESIGN
DETROIT CHAMBER OF COMMERCE



TENTH FLOOR PLAN



FIRST - BANK FLOOR

PLATE III.

HOT-WATER HEATING—OVERHEAD METHOD.

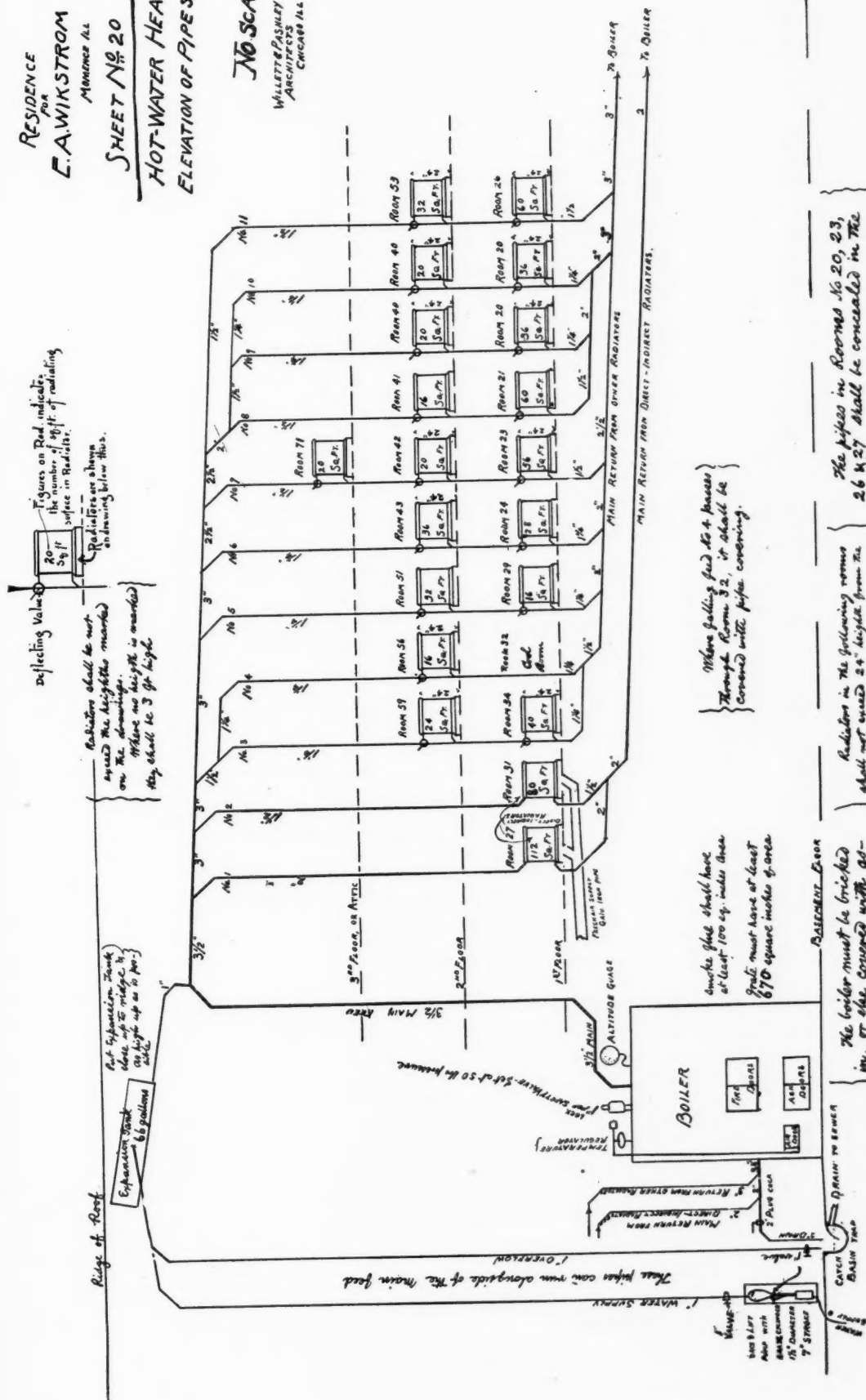
RESIDENCE
FOR
C.A. WIKSTROM
MUNICIPALITY

SHEET NO. 20

HOT-WATER HEATING
ELEVATION OF PIPES, ETC.

NO SCALE.

WILLETTE-PASLEY
ARCHITECTS
CHICAGO, ILL.



The pipes in Rooms No 20, 23, 26 & 27 shall be concealed in the walls.

Radiators in the following rooms shall not exceed 24\"/>

When no heights are given the radiators shall be 3 feet high.

The boiler must be bricked in, or else covered with asbestos covering 1\"/>

PLATE VI.

RESIDENCE
FOR
FRANK HAMILTON
5 WILSON 250 AND PINE STREET
MONTGOMERY ILL.
SHEET No. 14.

ELEVATION OF
HOT-WATER HEATING
APPARATUS
NO SCALE.

WILLYETT & PALMER
ARCHITECTS
CHICAGO ILL.

HOT-WATER HEATING—OVERHEAD METHOD.

