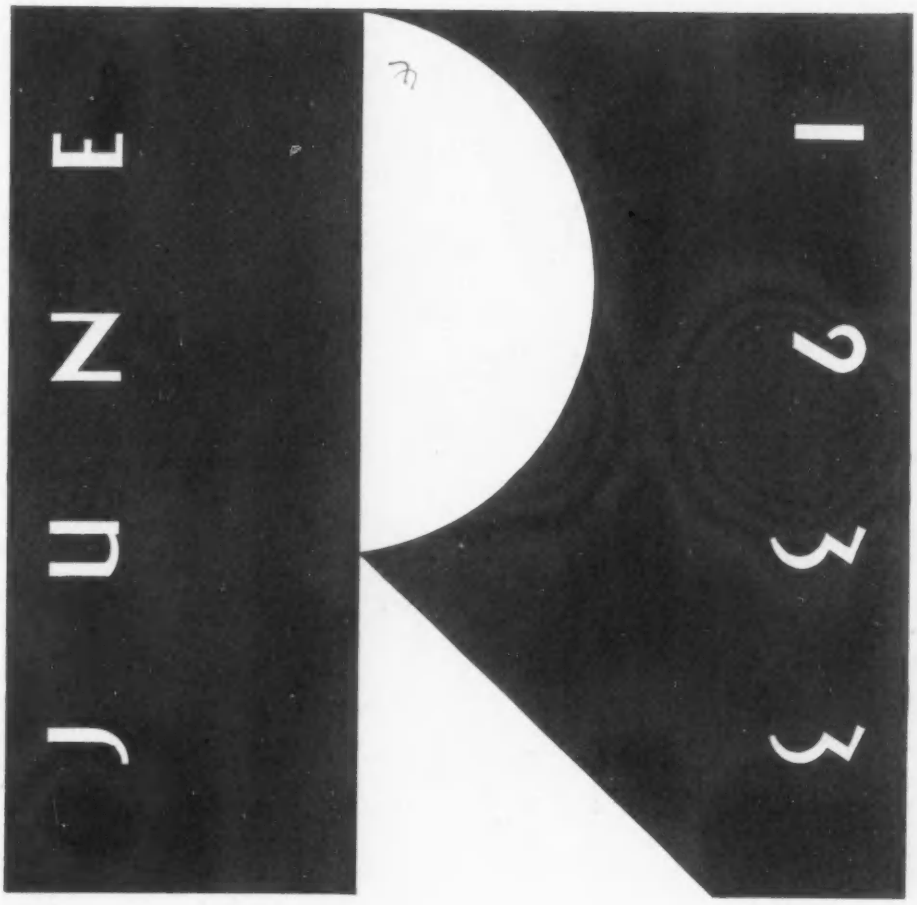

GIRARD COLLEGE CHAPEL • STEEL • QUEENS BOULEVARD

THE ARCHITECTURAL RECORD

In the Girard College Chapel described in this issue of The Architectural Record, the twenty-six polychrome leaded windows were designed and executed by

G. Owen Bonawit, Inc.
22 West 15th St., New York, N. Y.

THE ARCHITECTURAL RECORD

F.W. DODGE CORPORATION

Published monthly by

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New York

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VOL. 73 NO. 6 JUNE, 1933

Yearly subscription: United States and Possessions, $3.00; Canada and Foreign, $5.00; Single Copy, 50c. Member Audit Bureau of Circulations and Associated Business Papers, Incorporated.

Entered as second class matter May 22, 1902, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

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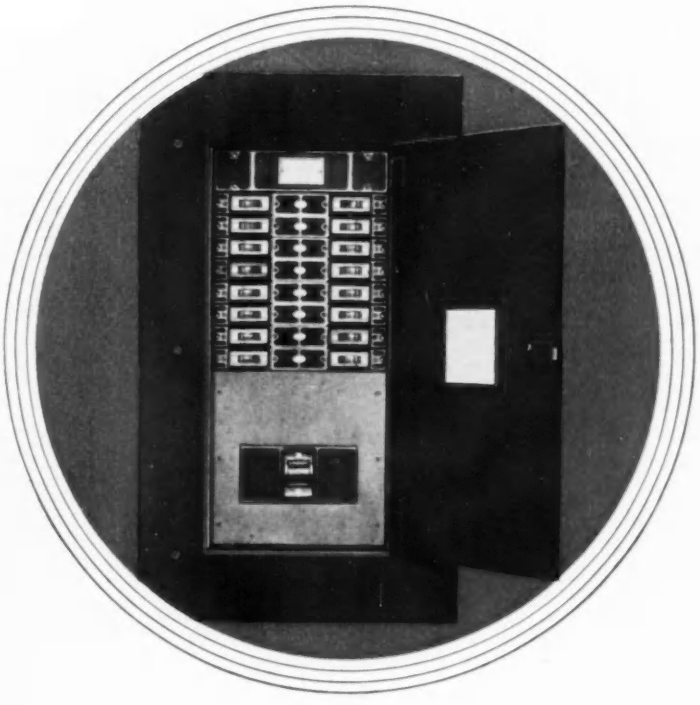

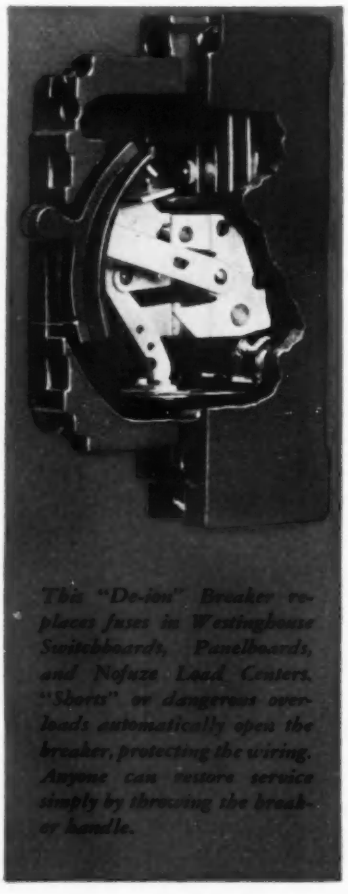

This "De-ion" Breaker replaces fuses in Westinghouse Switchboards, Panelboards, and Nofuze Load Centers. "Shorts" or dangerous overloads automatically open the breaker, protecting the wiring. Anyone can restore service simply by throwing the breaker handle.

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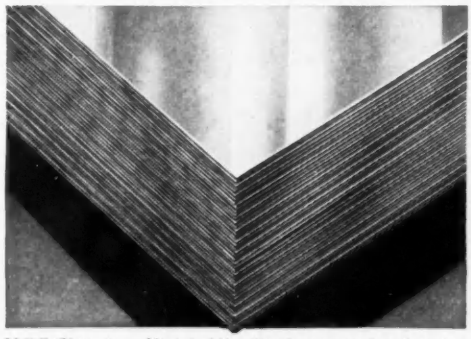

USS Chromium-Nickel Alloy Steels are produced under licenses of Chemical Foundation, Inc., New York; and of Fried. Krupp A. G. of Germany.

Below are illustrated the attractive entrance, doorways, and the escalators of the Philadelphia Saving Fund Society Building, Philadelphia, Pa. USS 18-8 STAINLESS Sheets were used in the construction.

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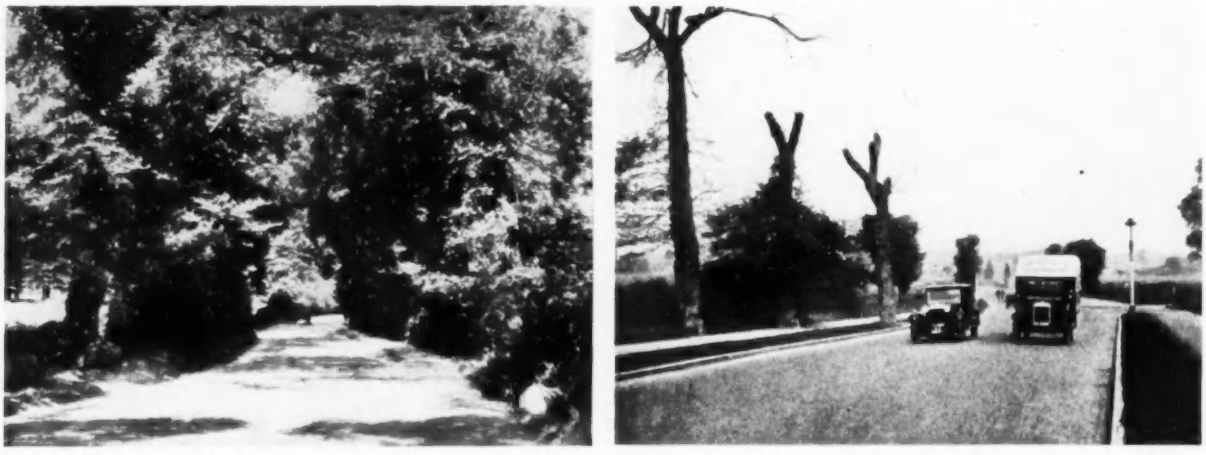

From TOWN AND COUNTRYSIDE

(Left) An English country road in 1928 before widening. (Right) The same road in 1931 after widening.

TOWN AND COUNTRYSIDE. SOME ASPECTS OF URBAN AND RURAL DEVELOPMENT. By Thomas Sharp. Oxford University Press, 114 Fifth Avenue, New York City. $4.50.

What has happened to towns that have grown to heaps of ugliness brings into prominence the yet unspoiled rural areas and countryside. This book is, in a sense, the afterthought of town growth with a promise to do better with virginal areas by starting all over. It is also a warning to control and protect our countryside before it is ruined by population overflowing from cities and by motor transport and decentralization that has thrown back increasing percentages to the land.

The author points out that in the matter of town planning tradition has broken down. "The town long since degraded is now being annihilated by a flabby, shoddy, romantic, nature-worship, which is destroying, also, the object of its adoration, the countryside. The crying need of the moment is the re-establishment of the ancient antithesis. The town should be town and the country, the country." Basing his argument upon this primary point, Mr. Sharp devotes his book to claiming urbanity for our cities and accessibility for our countryside.

Housing requirements have had a part in the spoilation of the country. Most developments, laid out primarily for profit, have accepted crowding as necessary for profits. Natural woods with fence rows have been completely obliterated by the spawning of street systems with lots at so-much per twenty feet.

The "week-end-and-fine-evening" population has changed the highways in America where the number of persons per private car is between four and five. It is one in thirty for Great Britain. The increased road traffic, with its vast moving population, will require increased services in further refreshment places, roadside houses, beer gardens, garages, gas stations and parking places. The trend will lead to increasing demands for more and wider roadways. The answer can only be obtained by study and analysis of those principles of planning, both architectural and landscape, that will lead to preservation of natural beauty and further control of man-made architecture.

From TOWN AND COUNTRYSIDE

The English Ancient Monuments Act of 1931 prevents the alteration or destruction of domestic buildings and other structures, such as this windmill, at their owners' inclination.

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Los Angeles Architect Writes:

"I find in Solka a very high percentage of asphalt material which is really the life of the roofing."

Atlanta Architect Comments:

"That is the toughest roofing I have ever seen, and it certainly appears to be a good product."

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"From tests we made on this material, it seems not liable to be punctured while being applied and looks as if it would wear well."

New Orleans Architect Remarks:

"Solka is as tough as any roofing that I have had occasion to examine and I believe that it is an excellent addition to the roofing field."

Cleveland Architect Writes:

"The tests that I have made prove to me that SOLKA Base contributes something new and very well worth while in dealing with roofing problems."

St. Louis Architect States:

"This shingle seems to be more tough than the average asphalt shingle. From the standpoint of flexibility it is above the average and should allow short bending for Boston style ridge, hips and valleys. The shingles are easily moulded and structurally speaking, a base such as Solka is of the same importance as a good foundation for a house."

Pittsburgh Architect States:

"You can say for us that SOLKA is the best material of the sort that we have ever seen. We would like to use it."

Philadelphia Architect Remarks:

"It won't crack and it is much more pliable than ordinary types of roll roofing. I use these roofings for flashing quite frequently, and I am sure that this Solka Fibre product would be much more satisfactory."

New York Architect States:

"We are very cautious about endorsing new products but I will say that this Solka Fibre does give it greater strength. One of the difficulties we experience nowadays is in the workmanship in laying roofings. This material would have a tendency to overcome careless or poor workmanship because of its flexibility."

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Solka is highly purified cellulose fibres, the same remarkable ingredient as used in the manufacture of textiles shoes, roofing and a host of products that require resistance to deterioration from age or exposure. Solka fibres have tremendous strength, flexibility and toughness and yet are so absorbent that they are preferred for use in the manufacture of products which require the maximum impregnation. Solka fibres when felted together as a base for Asphalt Roofings are permitted to carry the inspection label of the Underwriter's Laboratories.

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Address.....

City.....State.....

Business building in Kansas City, Missouri, required to have a rear yard because it is adjacent to a residential district.

From TRANSITION ZONING

TRANSITION ZONING. By Arthur C. Comey. Harvard University Press, Cambridge, Mass. 150 pages, illustrated. $2.50.

This volume, the fifth in the series of Harvard City Planning Studies, is devoted to a hitherto neglected phase of zoning practice—the specialized treatment of the *borders* of zoning districts. The author, assistant professor of city planning at Harvard, has compiled and classified instances of transition zoning clauses found in zoning ordinances already adopted in this country, and has added a few model clauses covering certain features not now found in effect. Numerous diagrams and photographs illustrate actual experience in various cities. The book describes suitable ways of regulating buildings and the use of land so as to mitigate detrimental effects to property on the edge of one zoning district resulting from actual or prospective use of adjacent property in a less restricted district. Transition zoning is analyzed according to three phases—zoning of use, zoning of height, and zoning of area. The information presented should be of value to municipal officials, realtors, city planners and others interested in the development of cities.

ARCHITECTURAL PLANNING OF THE AMERICAN COLLEGE. By Jens Frederick Larson and Archie MacInnes Palmer. McGraw-Hill Book Company, Inc., N. Y.

This volume was published as a part of the fine arts program of the Association of American Colleges. It follows the very excellent book on the same subject by Charles Z. Klauder and Herbert C. Wise published in 1929.

This volume discusses such subjects as "Character in College Architecture" and "Planning the Campus and Buildings" but it does not go far enough in offering basic principles of planning or of design that should make for better architecture. There are many plans and views of recent college buildings.

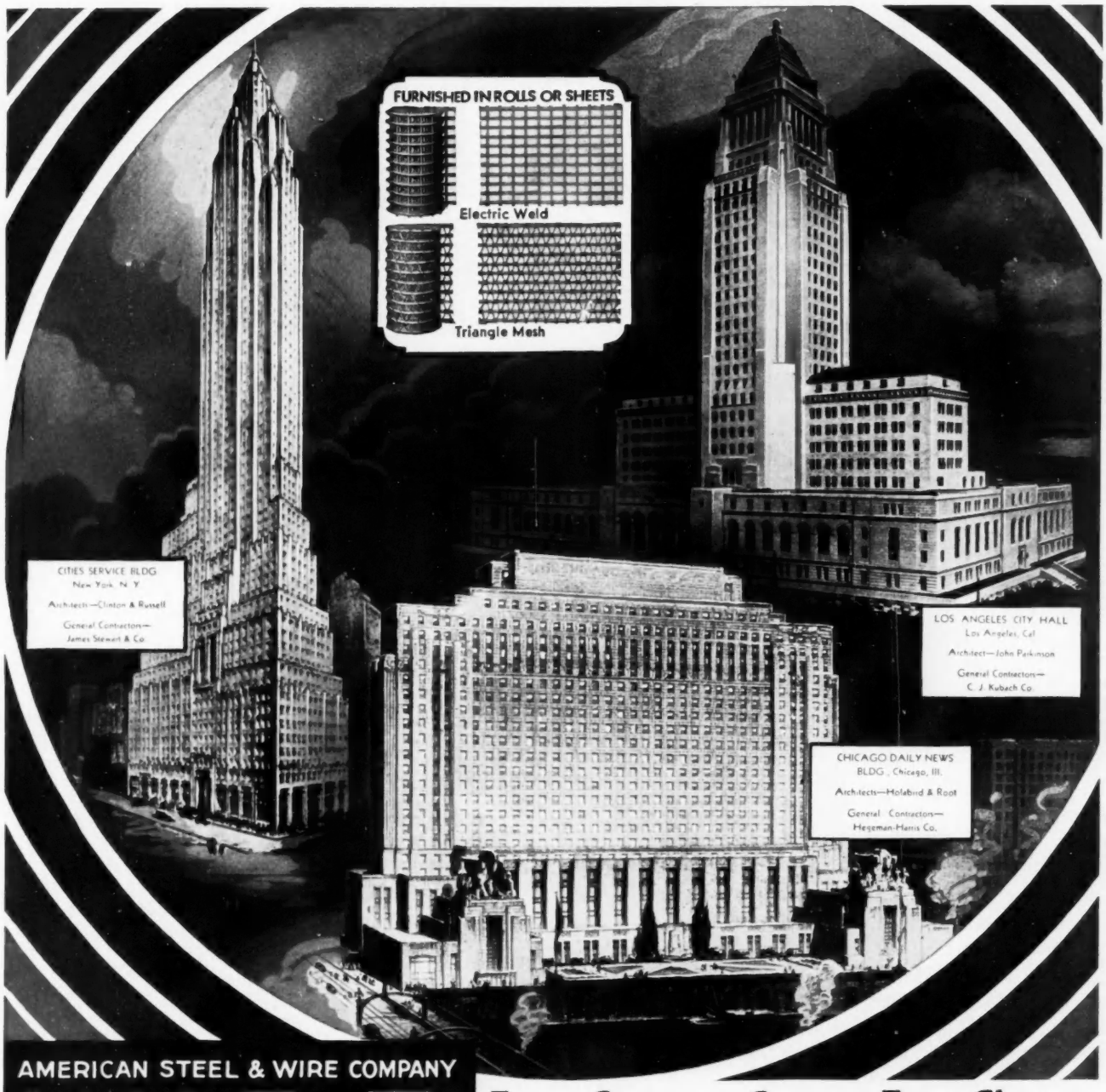
RECOMMENDED MINIMUM REQUIREMENTS FOR FIRE RESISTANCE IN BUILDINGS. Report of the Department of Commerce Building Code Committee. Obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. 58 pages. Price 10 cents.

This report has been prepared by the Building Code Committee which was appointed to determine basic requirements that could be recommended to insure public safety and at the same time promote economy in construction. Recommendations are stated in terms of minimum requirements. Buildings are classified by occupancy into five groups: public, institutional, residential, business, garages and barns.

DESIGN OF STEEL BUILDINGS. By Harold Dana Hauf, Instructor in Architectural Engineering, Yale University. John Wiley & Sons, Inc., New York. 222 pages, with diagrams and tables. $2.75.

According to the preface, this book has as its purpose the presentation of the general principles of structural steel design as applied to the more common types of buildings such as apartment houses, schools, office and institutional buildings. The text is based on classroom notes and exemplary problems given in the third year course in architectural engineering at Yale University. The material is presented in a form which also meets the requirements of engineers and architects entering professional practice and serves satisfactorily as a reference volume.

A knowledge of elementary statics is assumed, although a brief review of principles is included. Tables giving the technical functions of structural shapes are not complete but sufficient to solve most of the illustrative examples; the author recommends the use of *Steel Construction*, published by The American Institute of Steel Construction, in conjunction. The text includes discussion of beams, riveted and welded connections, plate girders, columns and struts, roof trusses and wind stresses in tall buildings.



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ARCHITECTS' ANNOUNCEMENTS

A friendly discontinuance of partnership is announced by the members of the firm of Sukert and Cordner, architects, whose former offices were located at 415 Brainard St., Detroit. Their new addresses are as follows: Lancelot Sukert, 79 Westminster Ave., Detroit; G. Frank Cordner, 5063 Spokane Avenue, Detroit.

Paul W. Hefferbert, architect, formerly of Gadsden, Alabama, has opened offices at Florence, Alabama; Post Office Box 343.

W. G. Knoebel and S. P. Pabst have opened offices for the practice of architecture in Suite 336, Langan-Taylor Building, 4908 Delmar Boulevard, St. Louis, Missouri.

Robert S. Everitt, architect, announces the opening of his office at 1014 West 63rd Street, Kansas City, Missouri, for the practice of architecture; and requests manufacturers' catalogs.

Philip Scott Tyre, architect and engineer, announces the removal of his offices from 1520 Locust Street to 2200 Architects Building, Seventeenth and Samson Streets, Philadelphia.

Samuel Marvin Smith, architect, has moved his offices from the Shoreham Building to 1707 Eye Street, N. W., Washington, D. C.

The Summer Session of the College of Architecture of the University of Michigan will continue from June 23 to August 18. Courses will be offered in undergraduate and graduate architectural design, in outdoor drawing, and in office practice.

BETTER HOMES AND BUILDINGS EXHIBIT

A permanent exhibition, demonstrating the use of building materials, furniture and utilities, has been developed in the Gulf Building in Pittsburgh. The exhibits are displayed in a series of full-scale architectural features—an English court, a French court, a garden and Colonial courts, etc.—designed by Schwab and Palmgreen, architects.

CHICAGO ARCHITECTURAL EXHIBITION LEAGUE SHOW

The Chicago Architectural Exhibition League, with the cooperation of the Architects Club of Chicago, announces the annual exhibition for 1933 to be held from June 1 to August 1 at the Architects Club, 1801 South Prairie Avenue, Chicago. Sketches, etchings, lithographs, cuts, watercolors, paintings and other examples of art may be presented but all exhibits must be in an orderly and suitable fashion ready to exhibit. Address all correspondence to Louis Pirola, 4717 Beacon Street, Chicago; forward exhibits to the Club.

CALENDAR OF EXHIBITIONS AND EVENTS

June-September	"A Century of Progress." International Exposition at Chicago.
June 1-August 1	Chicago Architectural Exhibition League Show at the Architects Club, 1801 South Prairie Avenue, Chicago.
June 10	Annual meeting of the Garden Cities Association of France and of the International Linear Cities Association, to be held at the Institut Oceanographique in Paris.
June 14-17	Annual Convention of the National Association of Real Estate Boards to be held in Chicago.
June 22-24	Semi-annual meeting of the American Society of Heating and Ventilating Engineering to be held at Hotel Statler, Detroit, Michigan.
June 25-30	"Engineering Week" in Chicago.
June 26-30	Thirty-sixth annual meeting, A.S.T.M., Chicago.
June 27, 28	Annual meeting of The Producers' Council, Inc., in Chicago.
July 29-August 14	International Congress for New Building, Marseilles-Athens.

CRANBROOK ACADEMY COMPETITION

The terms of the competition for scholarships to the Cranbrook Academy of Art, Cranbrook, Michigan, (described on pages 430 and 431 of this issue):

1. Those who wish to enter into the competition for these scholarships must register and signify their intention of so doing on or before July 15, 1933. They must submit a complete personal history giving information as to both educational and business experience, and must submit the names and addresses of five references. A small photograph of the applicant is required. Application blanks may be obtained from the Secretary.

2. Each competitor shall submit as his entry for these scholarships any architectural project which is the applicant's own solution of a real and actual problem. Evidence must be submitted to show the reality of the problem, which must be based upon actual conditions, places, environment and people. The thesis problem of the competitor done during the senior year at an accredited architectural school may be submitted, if the thesis meets the requirements as outlined above.

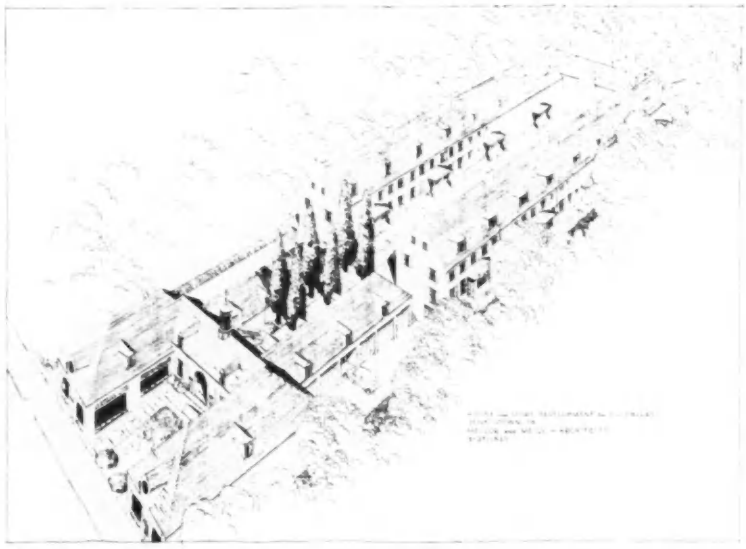
3. The material which the competitor submits may consist of drawings or models, or both, with photographs and a written explanation describing the solution of the problem.

4. The decision of the jury of award will be based upon (a) excellence of the solution from an organic, rather than a stylistic point of view; (b) personal record of the applicant.

5. All entries must be sent to Cranbrook not later than August 18, 1933, with all transportation expenses prepaid by the applicant.

6. The competitors will be notified of the decision of the jury of award on or before September 1.

Address all letters of inquiry for further information to Richard P. Raseman, Secretary, Cranbrook Academy of Art, Bloomfield Hills, Michigan.



A SUBURBAN HOUSING DEVELOPMENT AT JENKINTOWN, PA. MELLOR AND MEIGS, ARCHITECTS

NEXT MONTH

A SUBURBAN HOUSING DEVELOPMENT AT JENKINTOWN, PA. The firm of Mellor and Meigs are the architects of this housing development which provides eighteen houses, a group of stores and garage accommodation for the row houses. The solution is of extreme interest because of the efficient use of land. The site is not a corner plot but an intermediate part of a block area. The project is illustrated with plans, a perspective and working drawings.

PORTLAND ART MUSEUM, PORTLAND, OREGON. A. E. DOYLE AND ASSOCIATES, ARCHITECTS

PORTLAND ART MUSEUM. The architects, A. E. Doyle and Associates of Portland, Oregon, made an addition to an old building to serve as the first unit of an art museum. A museum art school occupies the old part of the group. Special attention is paid to equipment, lighting and ventilation.

OPERATING ROOM, INSTITUTE OF OPHTHALMOLOGY, COLUMBIA-PRESBYTERIAN MEDICAL CENTER, NEW YORK CITY. JAMES GAMBLE ROGERS, INC., ARCHITECTS

THE NEW EYE HOSPITAL AT THE COLUMBIA-PRESBYTERIAN MEDICAL CENTER, New York; James Gamble Rogers, Inc., architects. This latest addition to "The Medical Center" is part of a gradual expansion of its general hospital and medical school facilities. Of particular interest are the drawings and photographs of an operating room with a glazed dome over the operating space. There will be three articles: DESIGN AND PLANNING FEATURES, by George Nichols of James Gamble Rogers, Inc.; OPERATING ROOM LIGHTING, by Henry L. Logan, consulting engineer of the Holophane Company; and VOICE TRANSMITTERS IN THE INSTITUTE OF OPHTHALMOLOGY by James O. Oliver.

OTHER FEATURES

—Article on WINDOWS FOR RESIDENTIAL AND COMMERCIAL BUILDINGS by E. E. R. Tratman.

—THE DEVELOPMENT OF CANBERRA, The Federal City of Australia.

—CONVALESCENT HOME FOR BABIES, SEA CLIFF, LONG ISLAND: Peabody, Wilson and Brown, architects.

—SMALL HOUSES.

NIGHT VIEW OF THE MAIN ENTRANCE
GIRARD COLLEGE CHAPEL IN PHILADELPHIA
WALTER H. THOMAS AND SYDNEY E. MARTIN, ARCHITECTS

THE ARCHITECTURAL RECORD

JUNE, 1933 VOLUME 73 — NUMBER 6

THE GIRARD COLLEGE CHAPEL, PHILADELPHIA

By WALTER H. THOMAS and SYDNEY E. MARTIN, Architects*

Designing a Chapel for Girard College, Philadelphia, involved four dominant considerations. The first, distinctly a plan problem, was that of placing the building on an irregular plot of ground and of unifying the various peculiarities of "plan form" existent in the surrounding buildings on the campus. The second factor was the creation of a place for daily worship that would convey, as it was believed Stephen Girard desired, a distinct religious and moral impress and yet avoid identification with any existing sect. The third factor was the proper placing of the grand and echo organs. The fourth was the opportunity to apply the latest developments in the sciences of architectural acoustics and electro-acoustics (or sound transmission and control), the latter of which has advanced so astonishingly within the past year and which has been used at Girard College in several hitherto untried ways.

The Plan

The site was unusually restricted in area to accommodate an auditorium of the required capacity of 2,400 seats. Encroaching buildings are located at many odd angles both as to themselves and as to the site. The chapel plan therefore had not only to harmonize with these eccentricities but also to recognize the directional emphasis of the main Campus artery on which its longitudinal side faces. It was obviously undesirable to have the building assume a distinctive or isolated shape; rather it should take its place in an orderly and unobtrusive way amid the Campus buildings. Circular, oval, octagonal and rectangular forms were tried in our studies but all violated one or more of the salient characteristics that the building seemed to demand. A wedge shape with slightly curved ends was found to meet all requirements best, as it produced a plan practically equidistant from and parallel to the surrounding buildings and also was most economical in occupied area. In addition the wedge shape was considered to be fundamentally closely allied with good auditorium acoustics.

*Succeeding Thomas, Martin and Kirkpatrick, Architects

The Architectural Characteristics

Many of Girard's ideas concerning religion have been misunderstood and carried to extremes. He was a man of unusually strong Christian character but he carefully decreed in his will that all sectarian influences should forever be barred from the College. This viewpoint was contested by his heirs as being "derogatory and hostile to the Christian religion" and therefore contrary to the Common Law of Pennsylvania, but although their counsel was Daniel Webster, the Supreme Court of the United States in an unanimous opinion supported the will.

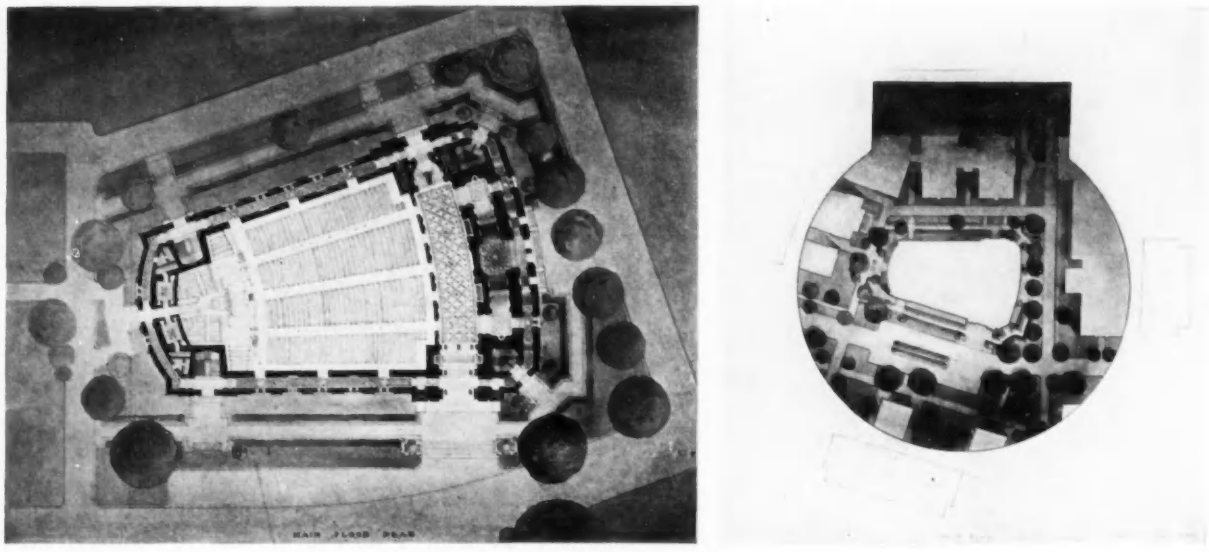
The problem, therefore, as stated in the program of the competition*, was to erect a Chapel which should conform in style with the other buildings on the Campus, which are chiefly of the Greek Revival, and yet be in no sense reminiscent of an architectural style associated with any existing religious faith—a Chapel nonsectarian throughout, welcoming all creeds and giving offense to none, a Chapel that without benefit of reredos, baldachin, altar, pulpit or other outstanding expression of any sect should devise its own dramatic climax.

In the endeavor to meet these requirements we note several factors that were considered contributory:

The double colonnade on the exterior and the interior gave, we felt, a play of light and shade, the chiaroscuro which lends a sense of mysticism that is so essential in any place of meditation.

The pitched roof of limestone seemed aesthetically to contribute individuality and a frank expres-

*The competition for the design of the Girard College Chapel was conducted under the rules of the American Institute of Architects.



PRELIMINARY PLANS OF THE GIRARD COLLEGE CHAPEL
WALTER H. THOMAS AND SYDNEY E. MARTIN, ARCHITECTS

sion of the large auditorium. From a practical standpoint it provided ample space for the great and echo organs which, if placed in the usual position, would have occupied the space of nearly 500 seats and thereby prohibitively increased the dimensions of the auditorium.

Visibility within the auditorium was considered another paramount factor: a clear space with every seat in full view of the rostrum desk.

Perhaps nothing gave more concern than proper glazing. Twenty-six windows completely girdling the auditorium became indeed a dominant factor both externally and internally, and nothing would have been more discordant and unsatisfactory than the usual "ecclesiastical" glass that is effective only when seen by day from within. We do not admit that church glass is different from any other art that is a handmaid of architecture; it assuredly fails to function properly when it does not at all times and in all places contribute a full decorative value. Our aim therefore was to reverse the usual procedure of fabrication by modeling and gold-leafing the leadwork and leaving the glass unpainted, thus obtaining by day a flood of golden light from the glass and by night, both externally and internally, a highly decorative value from the gold-leaded conventional Greek motifs which repeat with only sufficient change to break the monotony. We express to Mr. Owen Bonawit our admiration for the masterful way in which he has fulfilled this task.

The interior color scheme throughout the auditorium has been kept almost entirely in black and gold leaf, with only slight touches of color in the marble inlaid floors; it was felt that the windows gave such a dominant note of gold not only in themselves but also by diffusion of light that it was far better to emphasize this characteristic rather than to resort to a more vivid palette. The dark tones of the central perforated portion of the main ceiling are repeated in the scagliola columns and again in the wood seats and marble floors of the central part of the auditorium, which is encircled in turn by the elevated seats and balcony, finished in the lighter stone values of the walls. The gold accents are picked up in the five border bands of the ceiling, in the column caps, the drapes and minor notes. The focal point, the rostrum desk, is of ebony and gold.

The lobby and entrance rotundas are of cooler tone values than the auditorium since silver has been added to the gold, black and flashes of red, thus blending into harmony with the main entrance doorways which are of aluminum, glazed with a black-purple semi-translucent glass.

The interior decorative effects are the work of The Chapman Decorative Company.

The Allied Arts

Craftsmanship in stone, metal, wood, fabrics and glass has been very freely used, chiefly through the introduction of symbols and portrayals.

In glass, the craftsmanship has already been noted.

In stone, flanking each side of the main entrances are conventionalized sculptures of the Winged Man, Eagle, Winged Ox and Winged Lion, symbols of the four Evangelists. These successful heroic figures are the work of Walker Hancock. In the pediments of the main doorways are Kneeling Angels and an Agnus Dei, designed in the architects' office and modeled and executed by Louis Milione, who also modeled and executed most of the other sculptural work throughout the Chapel including the figures of the four Major Prophets in the rotundas.

In metal, the chief craftsmanship is on the ex-

terior doors. These were cast in aluminum to give the desired tone value; the light metal is extremely sensitive to the reproduction of detail inasmuch as its melting point is considerably lower than that of the bronzes. The main entrance doors portray with male figures in the central panels certain of the virtues and in the border panels symbols of the life of Christ. The entrance doors open hydraulically and automatically under all wind pressure conditions; the small boys of the College, as low as seven years in age, simply depress the lever handles but exert no pull. We believe that this is the first time such a device has been similarly applied. The aluminum work was developed under the direction of the Gorham Company.

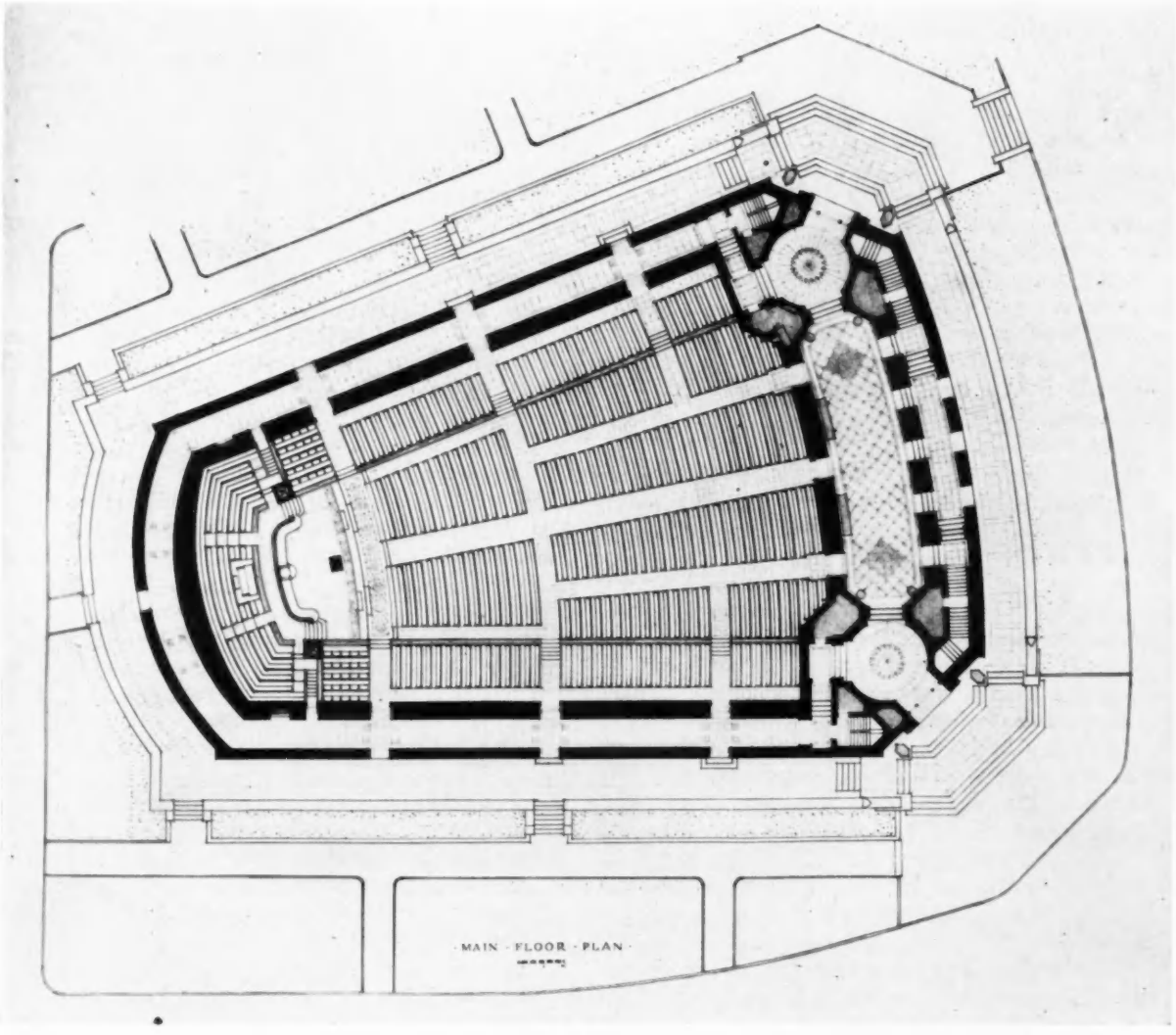
Other craftsmanship in metal are the bronze floor grilles in the rotundas and lobby, the former symbolizing the Creation and the latter several of the Parables of Christ. These are modeled in very low relief, with beveled planes to cast the shadows.

In wood, craftsmanship on the auditorium doors is observable in the isolated carved figures of the Sibyls who, by tradition, prophesied the Messiah. The rostrum desk carved in solid ebony and portraying the history of religion is, as noted, the focal emphasis of the entire building. This emphasis is accentuated by a flood ray from the ceiling, 75 feet above.

In fabrics, craftsmanship is shown in the drapes which occur on the walls of the balcony and rotundas and serve also as desirable sound-absorbing surfaces. The drapes on the two pylons flanking the rostrum conceal the horns for sound amplification from the rostrum.

The Organs—Great and Echo

These organs form one of the most completely equipped instruments in the world. The great organ of four manuals, 102 stops and 6,587 pipes, is of course surpassed by many others as to size, but it is one of great magnitude, embodying in its



FINAL REVISED PLAN OF THE GIRARD COLLEGE CHAPEL, PHILADELPHIA
WALTER H. THOMAS AND SYDNEY E. MARTIN, ARCHITECTS

composition a traditional foundation and in addition the tonal developments that have been contributed to the art of organ building within the last thirty years. The placing of the organs above the auditorium ceiling obtains massive and brilliant tone.

We believe that a departure from other overhead organ installations consists in building the organ completely around the four sides of a huge wedge-shaped mixing chamber, from which the music is in turn discharged through the perforated ceiling into the auditorium. The mixing chamber contains approximately 15,000 cubic feet of space and is treated acoustically in order to produce resonance which assists in the development and transmission of the tone. No baffles or other deflecting surfaces have been used in this Skinner installation.

The need of installing the usual choir organ to give the pitch and hold the processional on key is obviated by microphones placed in the mixing chamber which transmit the full volume of the organ to horns placed in the main lobby where the processional forms.

Architectural Acoustics

In studying the acoustics from an architectural standpoint there was the ever present problem, where an organ is introduced, of not destroying the brilliancy of the organ by excessive sound-absorbing surfaces and yet sufficiently correcting any echo or other indistinctness of the spoken voice. It was kept in mind, however, that a certain resonance of the voice is desirable. Under the guidance of Mr. Clifford M. Swan the interior walls from the base of the columns to the slope of the ceiling have been faced with sound-absorbing materials. This treatment, aided by the perforated ceiling and to a limited degree by seat cushions and wall fabrics, has provided the sound absorption sufficient to accomplish the desired end.

Electro-Acoustics

Two inventions of the past year have, by their development of wide frequency and dynamic range, taken the new science of electro-acoustics (sound transmission and control) out of the experimental stage and placed it very close to perfection. These inventions are the new dynamic type of microphone, supplanting the old carbon and condenser types and the new methods of making sound transcriptions, replacing the conventional phonograph records. These sound transcriptions, used with a diamond or sapphire needle, will record practically indefinitely without deterioration. Full advantage has been taken at Girard College of these two inventions.

Within the Chapel any sound, vocal or instrumental, emanating from the rostrum, is picked up by one of four concealed microphones and discharged through the two large flanking pylons. Another microphone in the great organ mixing chamber picks up and discharges the full volume of the organ into the lobby for the benefit of the processional choir and also to the choir proper of 200 boys.

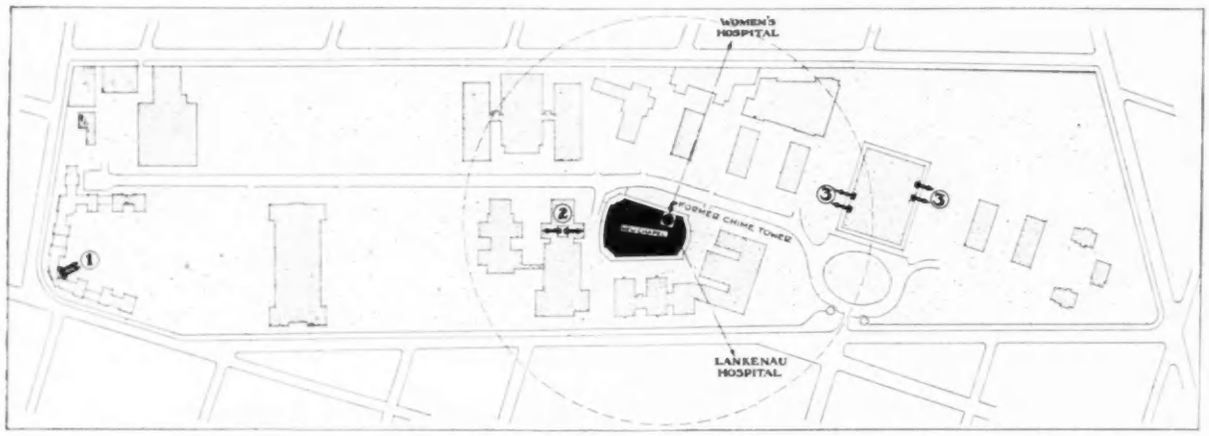
For the use of radio, records or the above described sound transcriptions, two horns of unusual size are placed above the perforated ceiling, thus flooding sound throughout the auditorium without making any one conscious of the source. These horns can also amplify the organ, thus assisting to increase its dynamic range, if the need should arise.

It is on the Campus, however, that we consider the electro-acoustical developments to be more unusual and in one respect unique.

The boys of the College, to whom watches are not issued, are therefore largely dependent upon the College hour bell and quarter hour chimes for every time period from rising to retiring. The old Chapel, which was demolished to make way for the new one, had such a chime and hour bell in its tower; but the sound did not carry to the extreme ends of the unusually long and narrow rectangular Campus and were sometimes possibly annoying to the two hospitals that are nearby and on opposite sides of the narrow dimension of the Campus. A new method was therefore devised. Three existing elevated points on the Campus were selected, one centrally located and adjoining the Chapel and one towards each end of the Campus, and in each of these locations horns were then so placed and baffled that the sound is discharged adequately up and down but not across the Campus.

The so-called "Chime Room" is in the Chapel basement and here is installed the outstanding development of the system—the method of producing bell tones from transcriptions of actual bells. Thus are rung automatically the hour bell, the quarter-hour chimes, and the rising bell; special Chapel calls are rung manually. We feel sure that Girard College is happy in the possession of this first attempt to sound throughout any Campus those true bell tones that can only be obtained from bells and not by any other method. These bell tones, through the courtesy of the Riverside Church, New York, have been taken from the carillon which is the largest assembly of tuned bells existent, with Kamiel Lefevere, the noted Belgian carilloneur at the clavier. It is further interesting to note that, in order to obtain a low rich note for the hour bell, this transcription has been taken from "low C" of the carillon. This bell, weighing over twenty tons, is the lowest-tone tuned bell in the world.

The three "Chime Towers" can be used for other broadcasting than that of the bells, as there is a complete hook-up between them and the Chapel. Any service or program within the building, whether of the voice, organ, radio or otherwise, can be broadcast simultaneously throughout the Campus. Recently on Founder's Day, when the hundreds of returning "grads" and their families could not all crowd within the Chapel, the entire service was spread over the Campus for the benefit of those unfortunately outside.



Chimes from the College Chapel are electro-acoustically controlled so that the sound is discharged from three points and distributed up and down the Campus without disturbing neighboring buildings.

THE ELECTRO-ACOUSTICAL SYSTEM IN THE GIRARD COLLEGE CHAPEL

By T. F. BLUDWORTH, Engineer

The term "electro-acoustical" is used to differentiate between microphone, amplifier and sound projector combinations commonly known as public address systems, which are employed to amplify voices or other sound so that they may be heard at greater distances, and a type of equipment which is designed specially as a part of the general acoustical provisions. Electro-acoustical apparatus must reinforce and distribute speech and music with uniform sound intensity over the areas to be covered without appreciable amplification or distortion in order that a perfect illusion may be developed. To the listeners the source of sound must be natural.

The system is employed in the Girard College Chapel to reinforce speech and music, to transfer the voice of the organ from the organ chamber directly to a sound chamber under the choir to aid in keeping the choir on key, to transfer the organ to the narthex for the start of processionals, to reproduce speech or music at various points outdoors on the campus, and to sound the conventional Westminster or Parsifal quarter hour chimes and hour strikes.

The Girard College electro-acoustical system is based on a careful analysis from experience with similar problems in inclosed spaces in the Riverside Church, Cathedral of St. John the Divine, Princeton University Chapel, Duke University Chapel and outdoor distribution of sound at Duke University and on the estate of H. F. duPont. The inclosed space study was made from the plans and a very good sculptured model of the Chapel, supported by tests during the advanced stages of construction.

The Chapel is fan-shaped in plan with the rostrum at the narrow end. The ceiling is high and sound reflection is controlled by carefully placed absorption material and a perforated ceiling. The architectural acoustical control was designed by Clifford M. Swan. All speaking is from the rostrum in the center front space. The choir is made up of boys and is seated across the chancel wall in the rear of the speaker's platform and the organ console. The organ is located above the ceiling at the chancel end of the Chapel and the echo organ above the ceiling at the lobby end.

The acoustical control room is located in a room of ample size at the rear of the Chapel on the main floor level and a small window is provided for easy observation of the service by the acoustician or operator. The amplifier room is underneath the control room and is accessible by means of a hatch and a steel vertical ladder as well as a door into the basement. Both rooms are thoroughly ventilated and very satisfactorily placed from an engineering standpoint.

Seven dynamic microphones are used for speech and music pick-up; two in the reading desk or pulpit, and two in the pew rail for speech pick-up; one in the rear of each of the pylons for choir pick-up; one in the main organ chamber for organ transfer. Several additional outlets are provided for reinforcing individual sections of the choir, solo voices, echo organ and special sound effects.

Other input sources are a special laboratory quality radio receiver located immediately under the roof and remote-controlled from the control room by the thyratron system; a double turntable, synchronous, motor-driven talking machine, 78 and 33⅓ r.p.m., with the reduction effected by means of multiple belts. Pick-ups are provided for both lateral and vertically engraved records; a special automatic device for reproducing the quarter-hour

chimes and hour strikes as well as the morning rising bell and carillon selections. This machine is designed for and employs vertical or hill and dale transcriptions.

The main control board is divided into three sections—input, output and control. The input panel is fitted with combination keys which facilitate handling of input sources in groups, similar to the arrangement made in organ consoles for combinations of stops. The conventional type of constant impedance faders is employed for both hand and remote control. The output panel carries the terminals of each sound projector on keys. Differential variations of level are effected by means of rheostats in the field circuits. The thyratron system of remote control permits very accurate adjustment from two points in the Chapel, one at the rear of the main floor and one in the gallery. Input, output and control panels are in one steel cabinet with the input and output panels vertically mounted on either side of the observer's window and the control on a slanting vertical panel.

Two amplifiers of 48-watts output capacity each are mounted on the conventional steel frames in the amplifier room. They are set 4 feet out from the wall and communicate with the wall terminal boxes through square underfloor aluminum ducts. The amplifiers are resistance-coupled throughout with two tubes per stage, giving them an over-all gain of approximately 112 decibels and a flat characteristic from 17 to 17,000 cycles. Special hand-wound audio transformers are used. Uni-potential cathode type tubes are used in all voltage amplification stages and filament type tubes in the output stages but all filaments are heated with direct current supplied by special argon-filled rectifiers. Plate current is supplied by mercury rectifiers and the field current by argon-filled tubes. All rectifier equipment, including the thyratron control tubes, is mounted on an individual rack located several feet from the amplifiers. This power supply rack communicates with the amplifiers and the terminal boxes in the wall through an underfloor duct system.

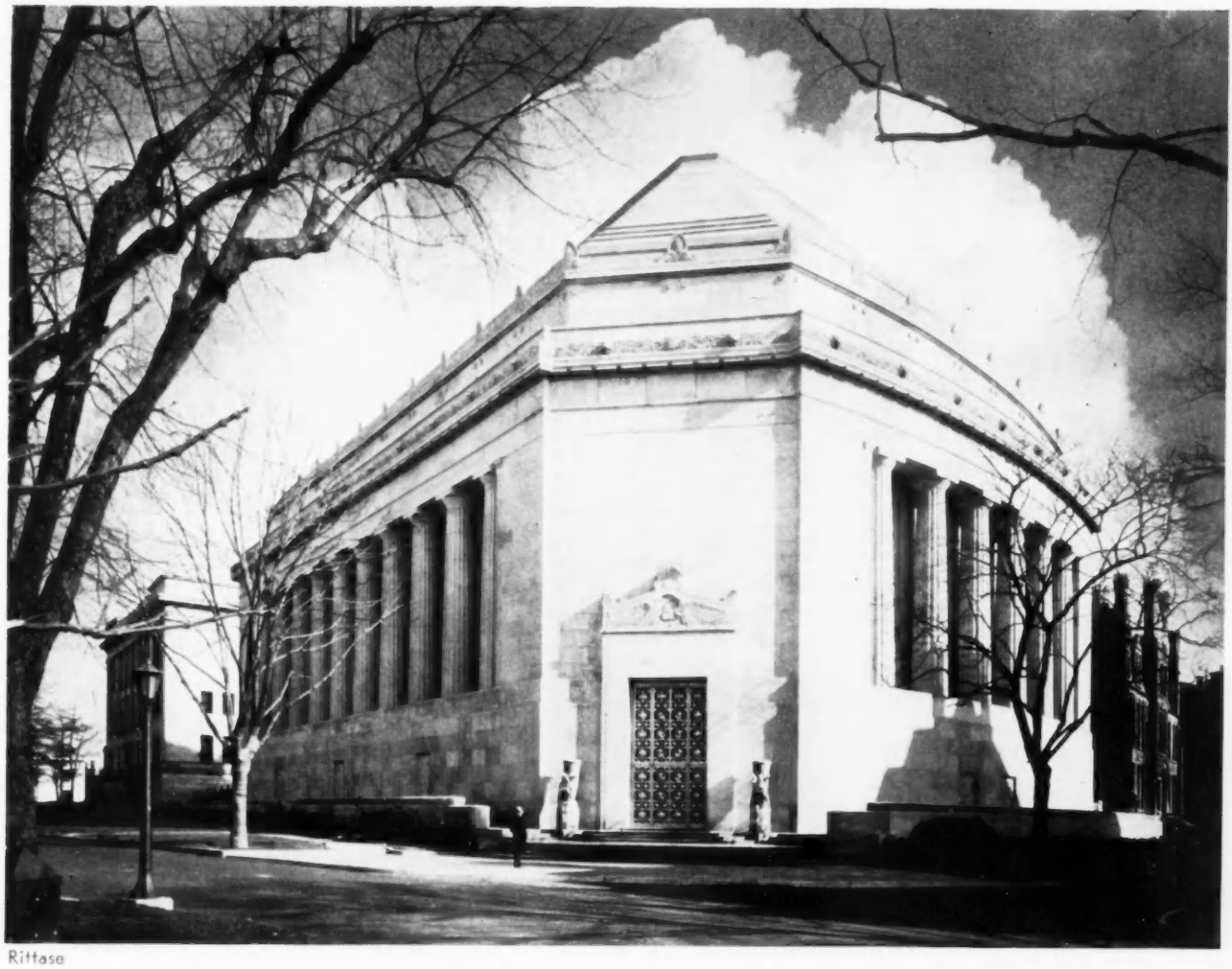
The speech sound projectors are mounted in two pylons situated 39 feet apart and 12 feet 3 inches above the floor of the rostrum and on a center line 8 feet 3 inches in the rear of the speaker's desk. This places the speaker's desk not immediately between the pylons but centered 8 feet 3 inches in front of them. Architectural conditions fixed this arrangement but no difficulty with feedback has been experienced.

Cone type units with aluminum voice coils, special cones and high flux density pot magnets are mounted on 30-inch square expanding baffles or couplers in each of the pylons. The baffles are designed purely as reflectors and are focused at certain definite points so that every seat in the auditorium beyond a 40-foot radius centering on the speaker's desk is within the area covered by the maximum intelligibility beam of the pylon sound projectors. Solo voices are also reinforced through the pylon sound projectors.

Two principal music sound projectors are located above the perforated ceiling in the center. Eight dynamic units are mounted on two expanding couplers, 8′ 0″ by 10′ 6″, which in turn are mounted on a wood baffle of 2,500 square feet. The low frequency units are 20-inch cones and weigh approximately 300 pounds each. The high frequency units are mounted directly on the baffle board and speak through small horn openings.

Two couplers, 5 feet square, are mounted near the echo organ tone opening for reinforcement of that section of the organ. No reinforcement of the organ so far has been necessary. For organ transfer to the sound chamber under the floor, two 8-inch and one 20-inch cone units are mounted on a vertical wood baffle.

For outdoor transfer and bells two six-unit expanding baffles, 6′ 6″ by 7′ 5″, are mounted in opposite sides of a tower on another building. Four couplers, 2′ 0″ by 5′ 2″, with two units each are mounted in the side walls near the portico ceiling of Founder's Hall and two two-unit couplers, 2′ 6″ by 4′ 1″, are mounted in two window openings in an L-shaped building on the opposite end of the campus. These sound projectors give excellent distribution with ample intensity for the campus and are so focused as to confine the sound almost entirely within the inclosing stone wall. Hospitals and dwellings adjacent to the College made this restriction of sound desirable.



Rittase

General View of Main Entrance at Northwest Corner.

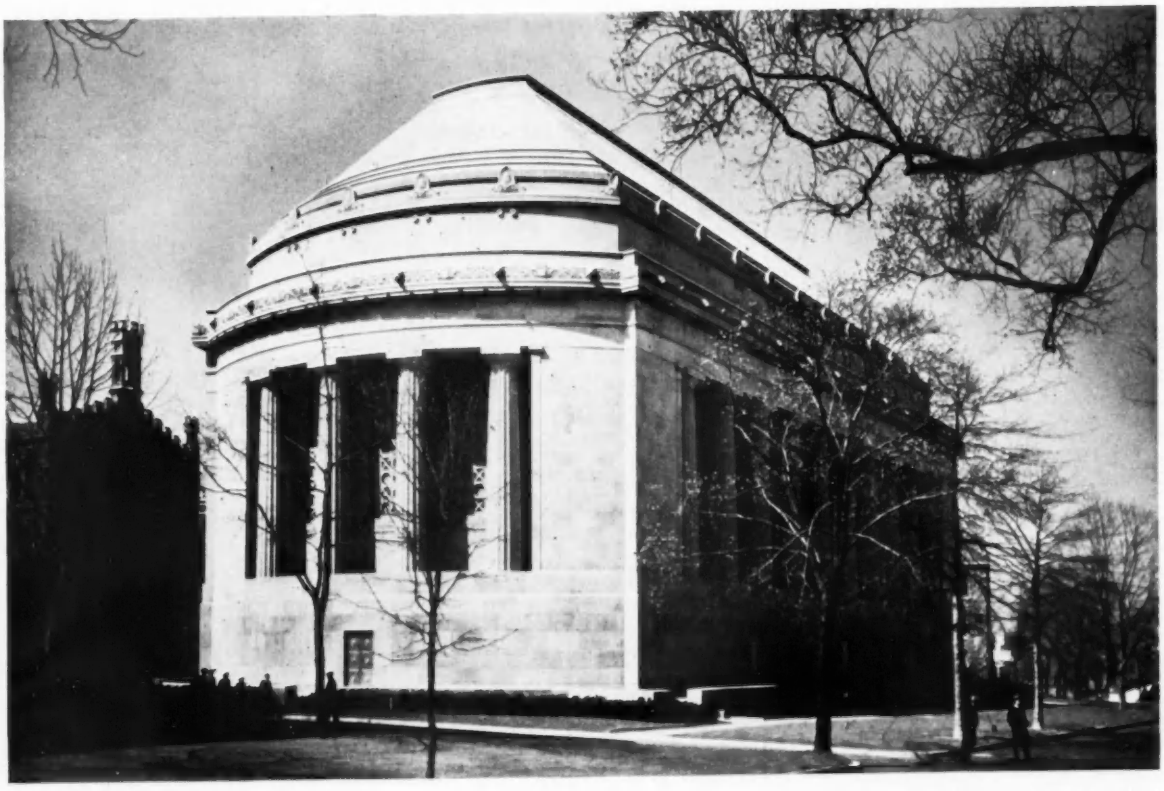
GIRARD COLLEGE CHAPEL

PHILADELPHIA

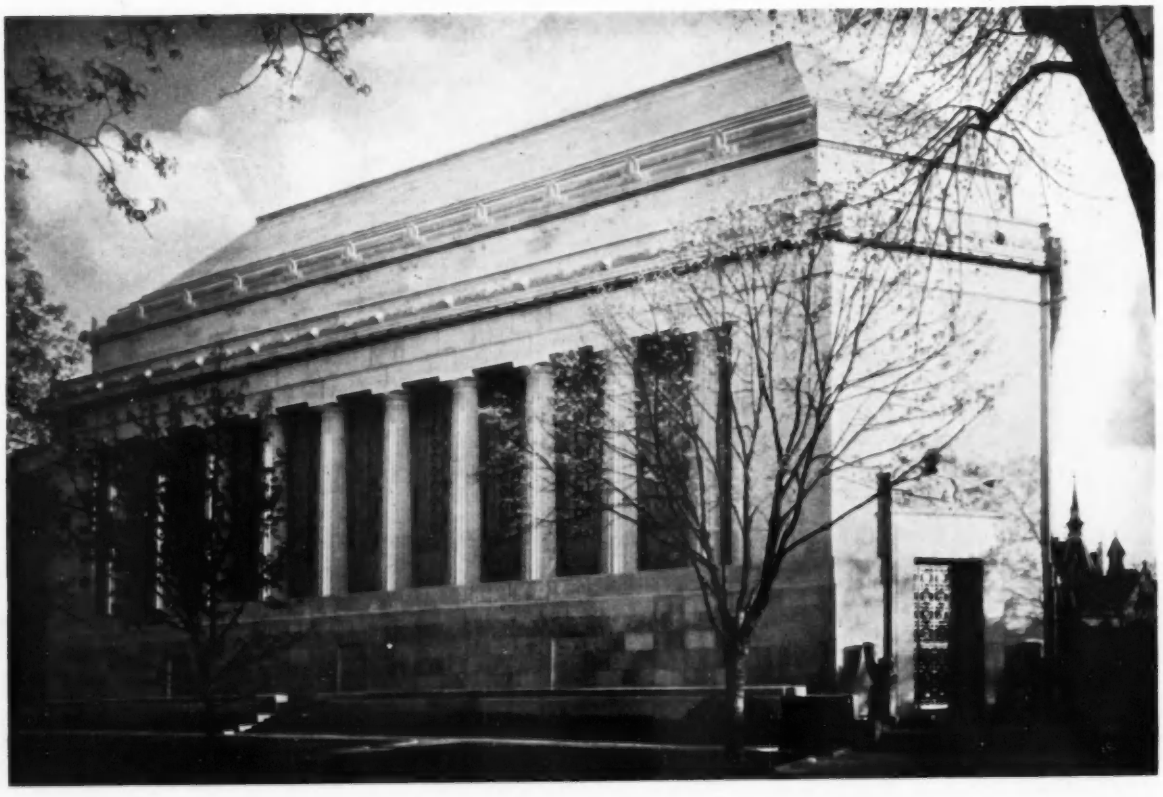
WALTER H. THOMAS and SYDNEY E. MARTIN
ARCHITECTS

The design of this Chapel was selected in a competition conducted under the rules of the American Institute of Architects. The building was erected by the Turner Construction Company.

William A. Rittase is the photographer of all views of the Chapel, both exterior and interior, appearing in this Portfolio.

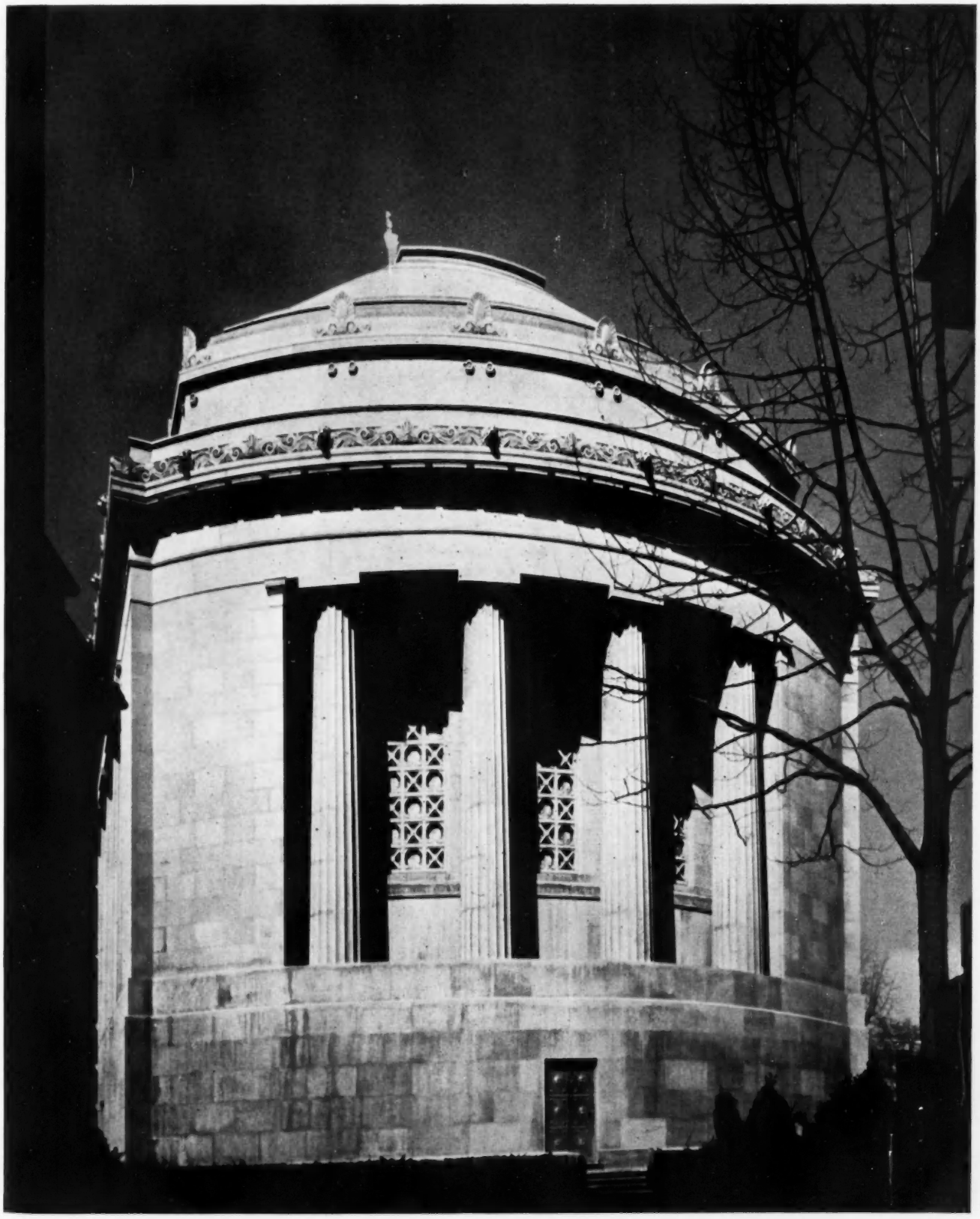


General View of Choir End.



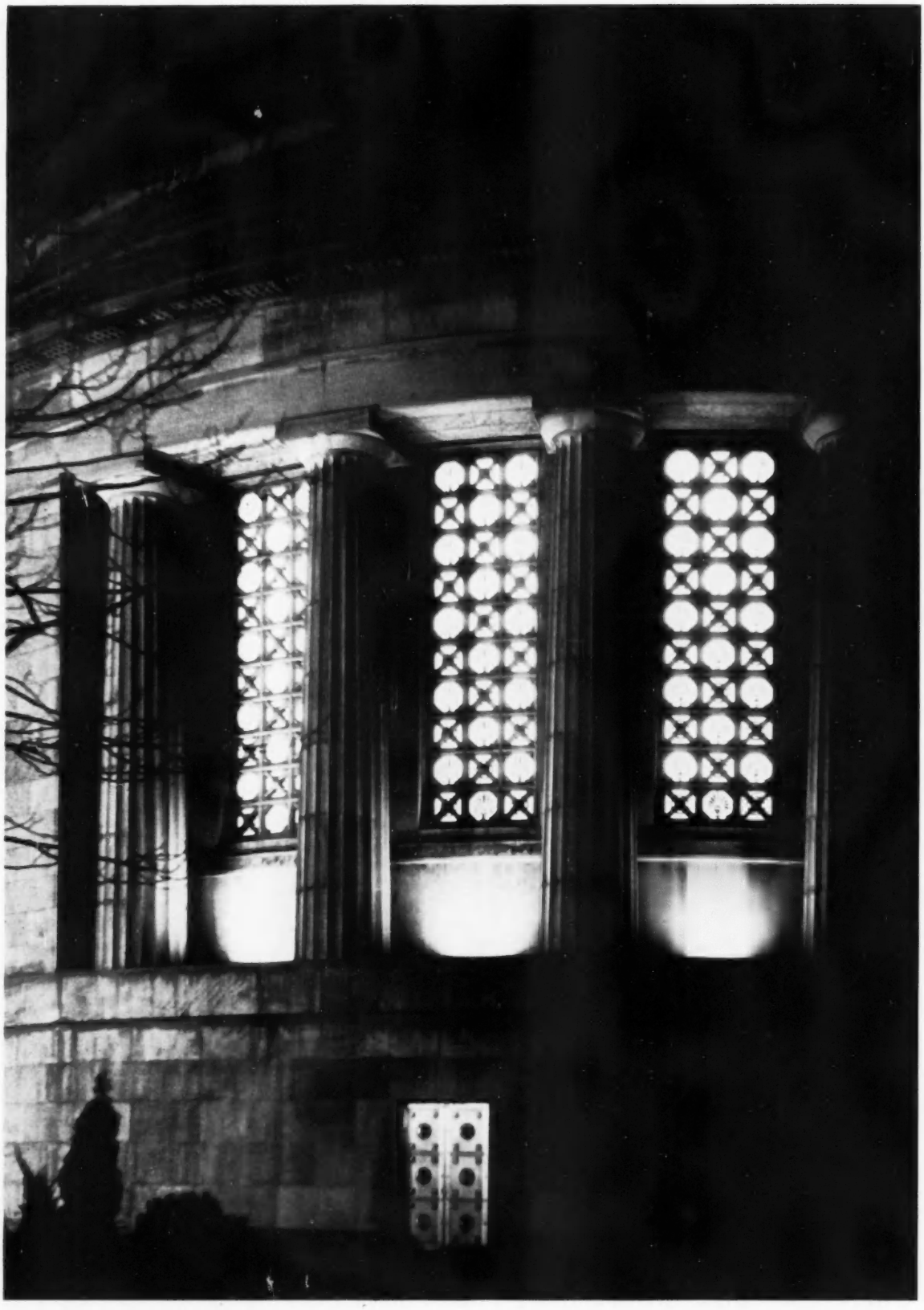
General View from Main Thoroughfare of the Campus.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



Exterior View of Choir End.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

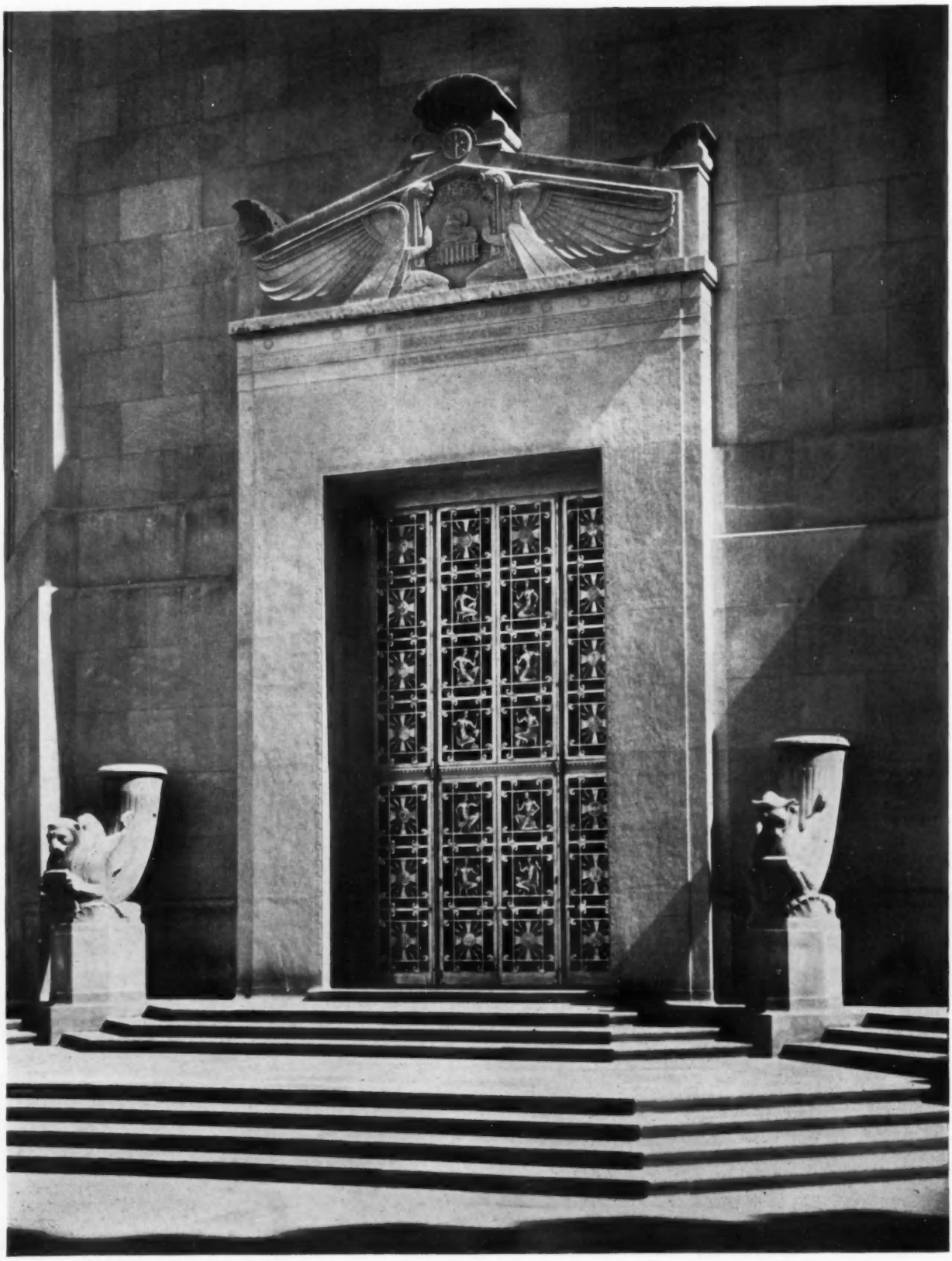


Exterior Floodlighting.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

Upper Part of Main Façade.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



Main Entrance at Southwest Corner.

GIRARD COLLEGE CHAPEL
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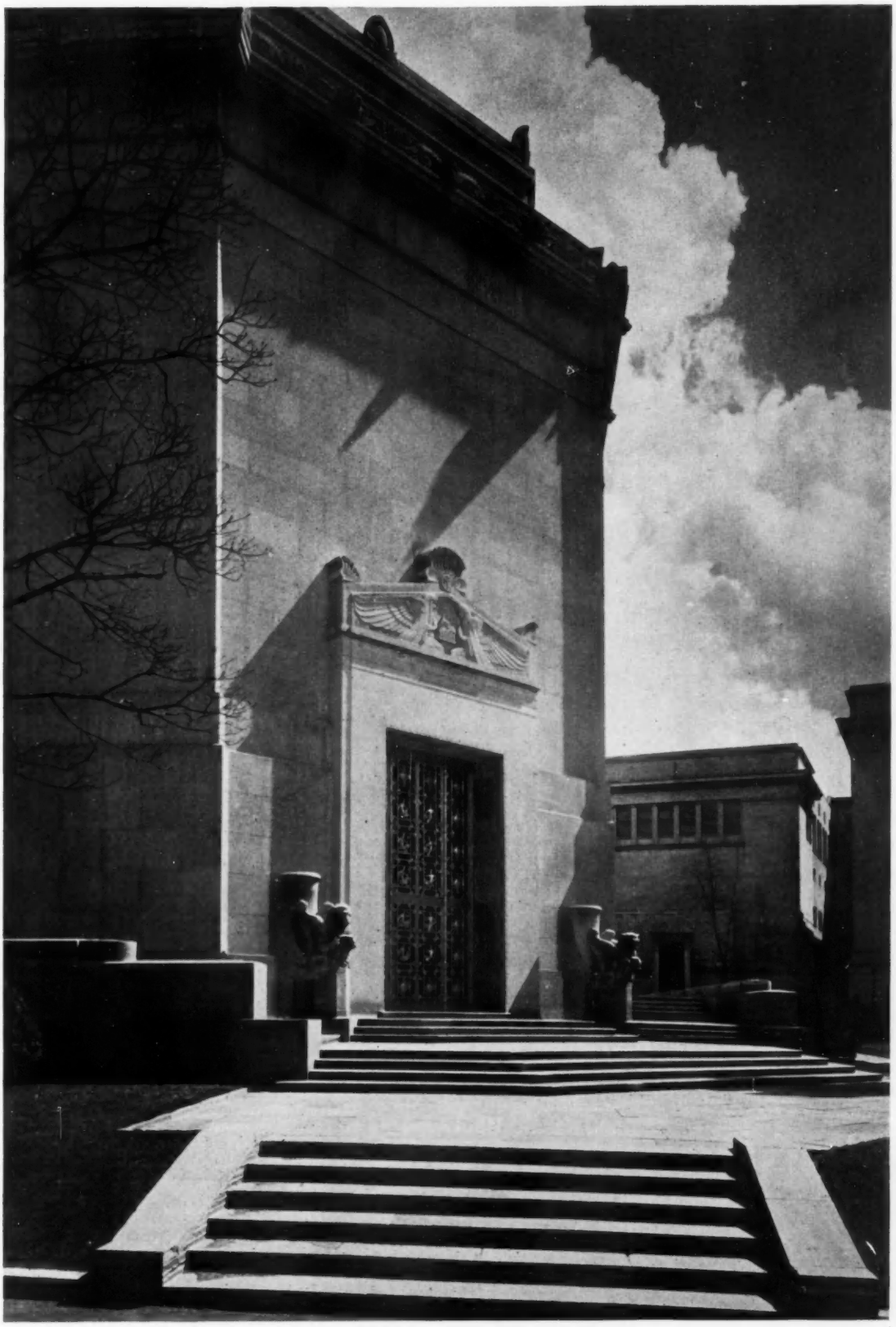
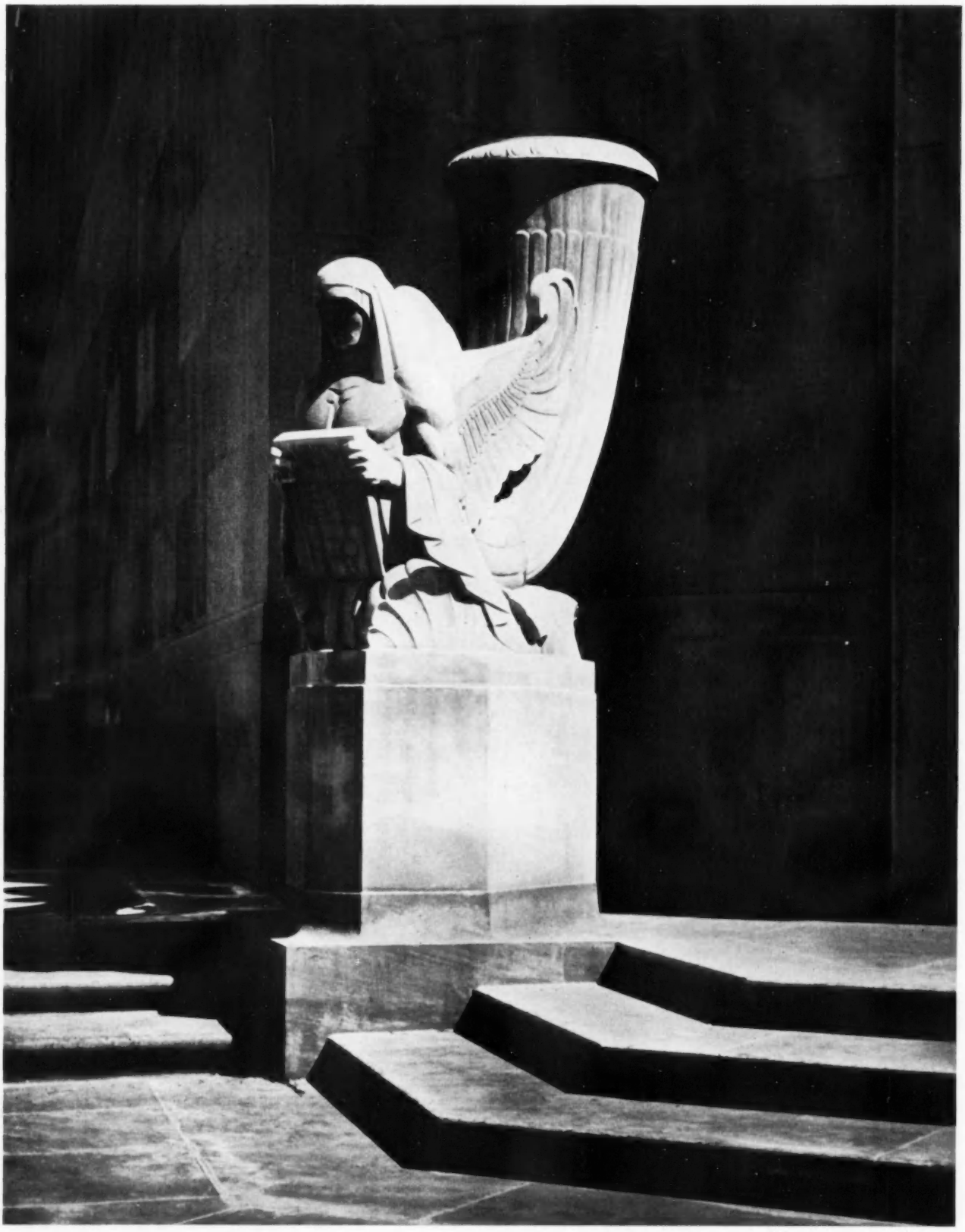
THOMAS AND MARTIN, ARCHITECTS



Main Entrance at Southwest Corner.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



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PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

Rhyton: "The Winged Man of St. Matthew," Flanking Main Entrance at Northwest Corner.

Rhyton: "The Eagle of St. John," Flanking Main Entrance at Northwest Corner.

GIRARD COLLEGE CHAPEL
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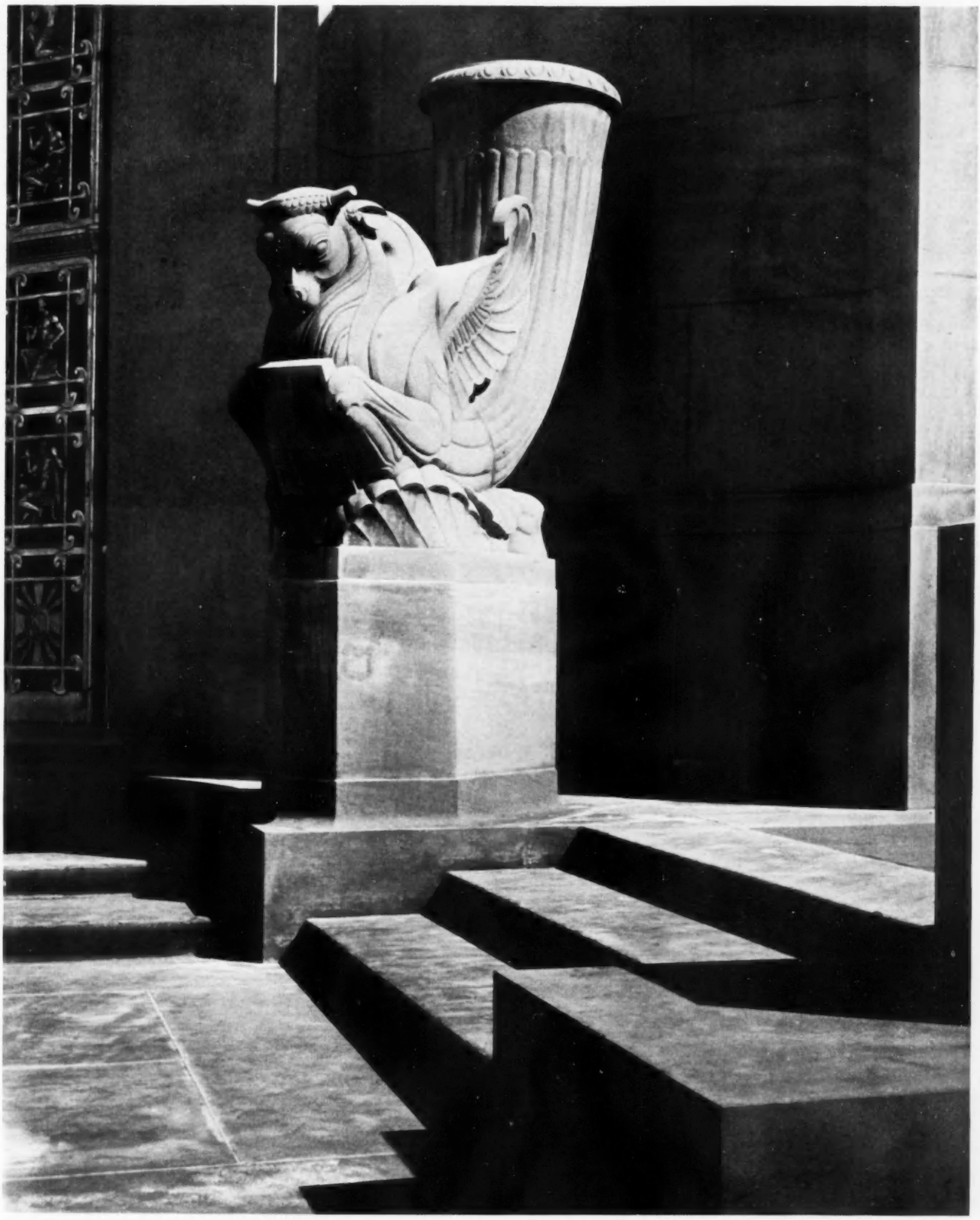
THOMAS AND MARTIN, ARCHITECTS

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

Rhyton: "The Winged Lion of St. Mark," Flanking Main Entrance at Southwest Corner.



Rhyton: "The Winged Ox of St. Luke," Flanking Main Entrance at Southwest Corner.

GIRARD COLLEGE CHAPEL
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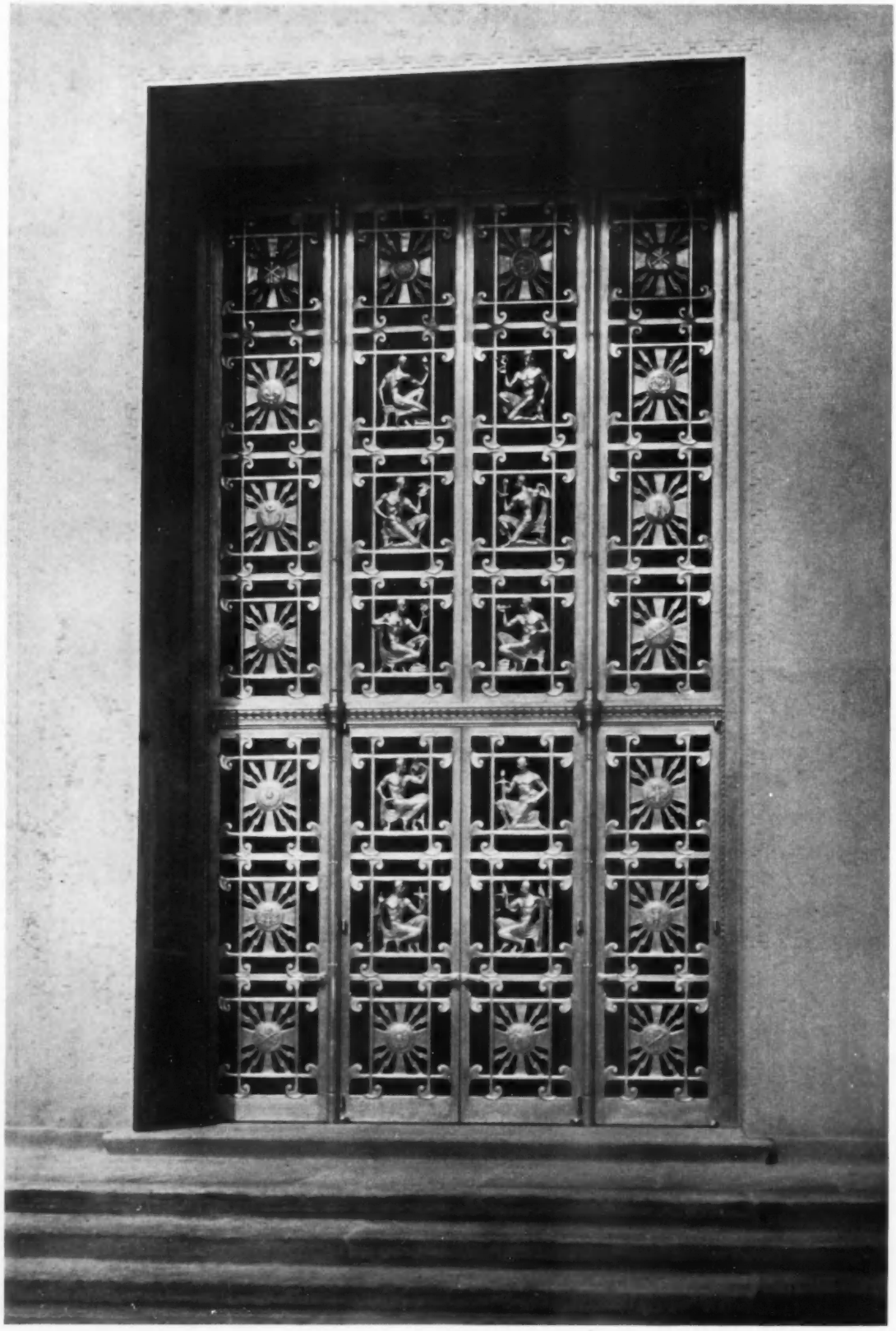
THOMAS AND MARTIN, ARCHITECTS



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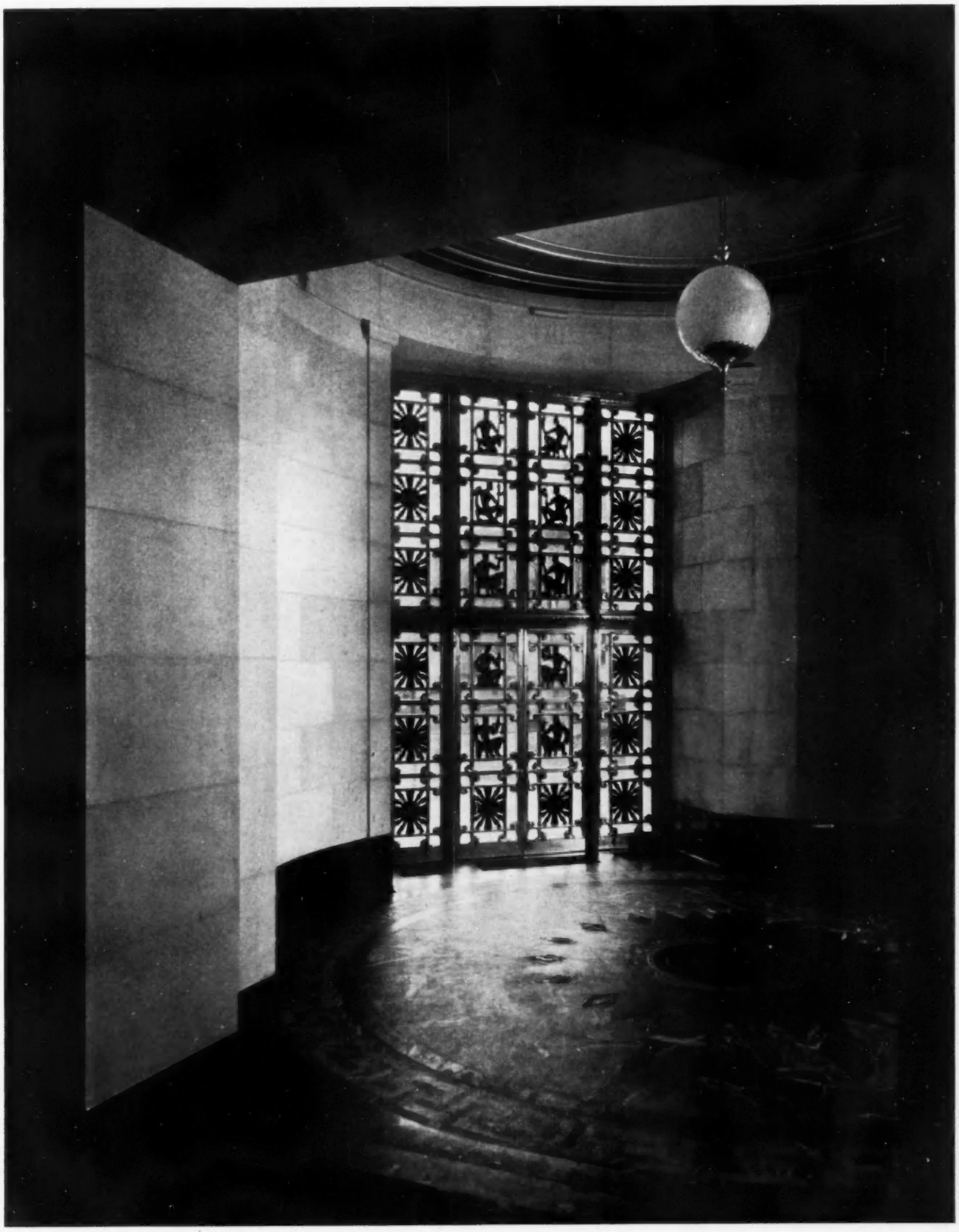
Main Entrance Doors.



Entrance Rotunda.

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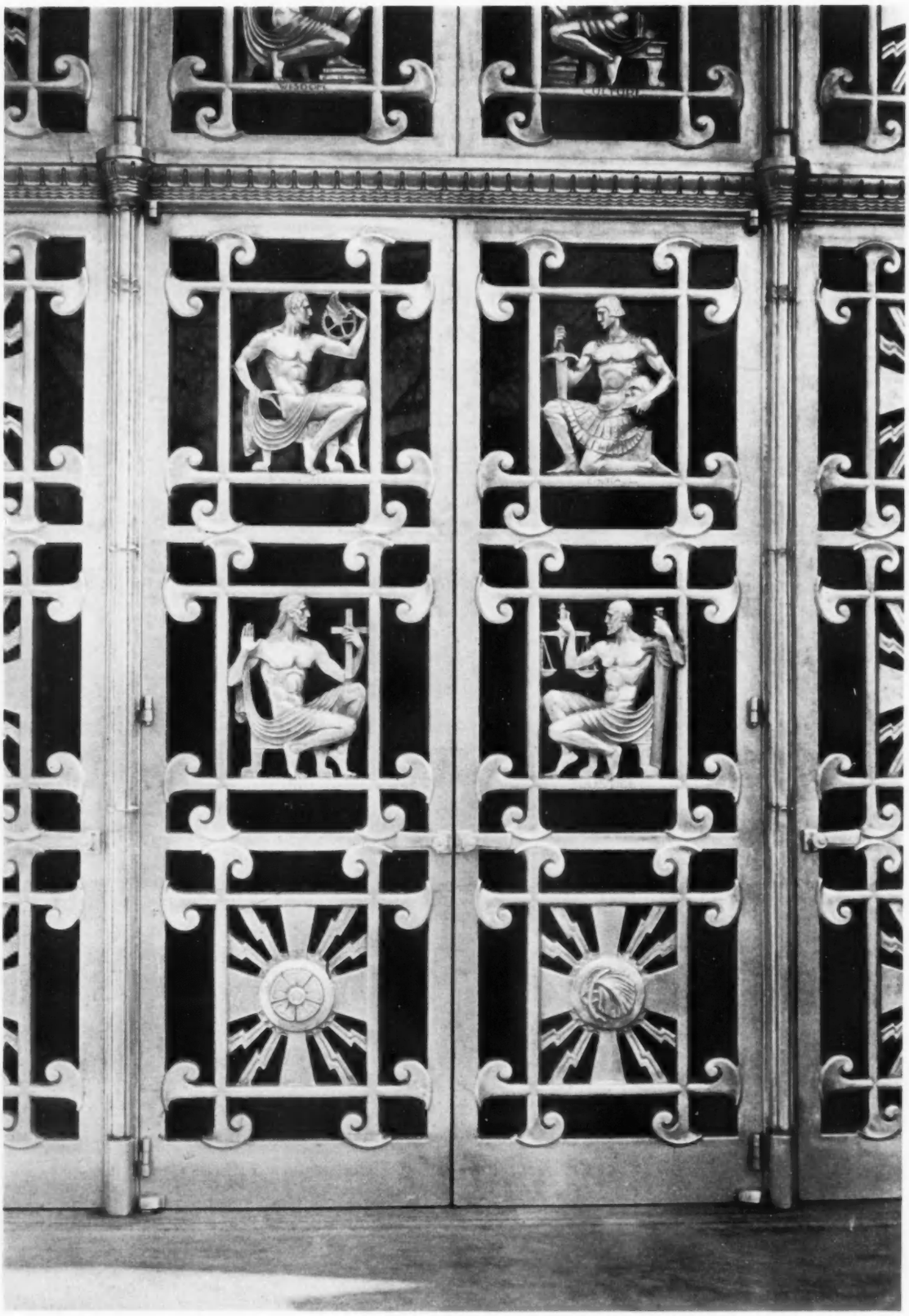

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PHILADELPHIA
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Detail of Main Entrance Doors, Operated Hydraulically and Automatically.

Detail of Entrance Door, Fabricated in Aluminum.

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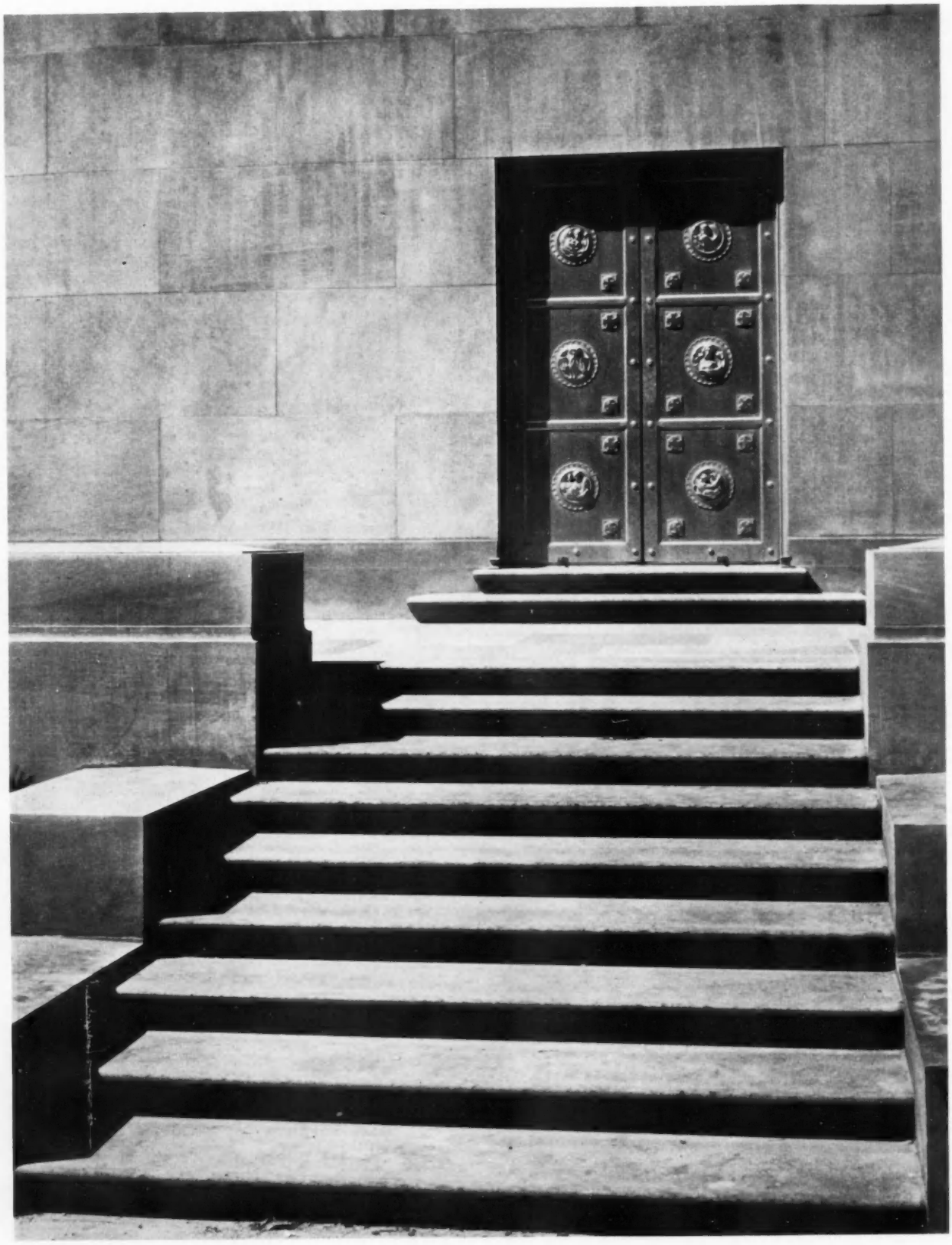
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



GIRARD COLLEGE CHAPEL
PHILADELPHIA
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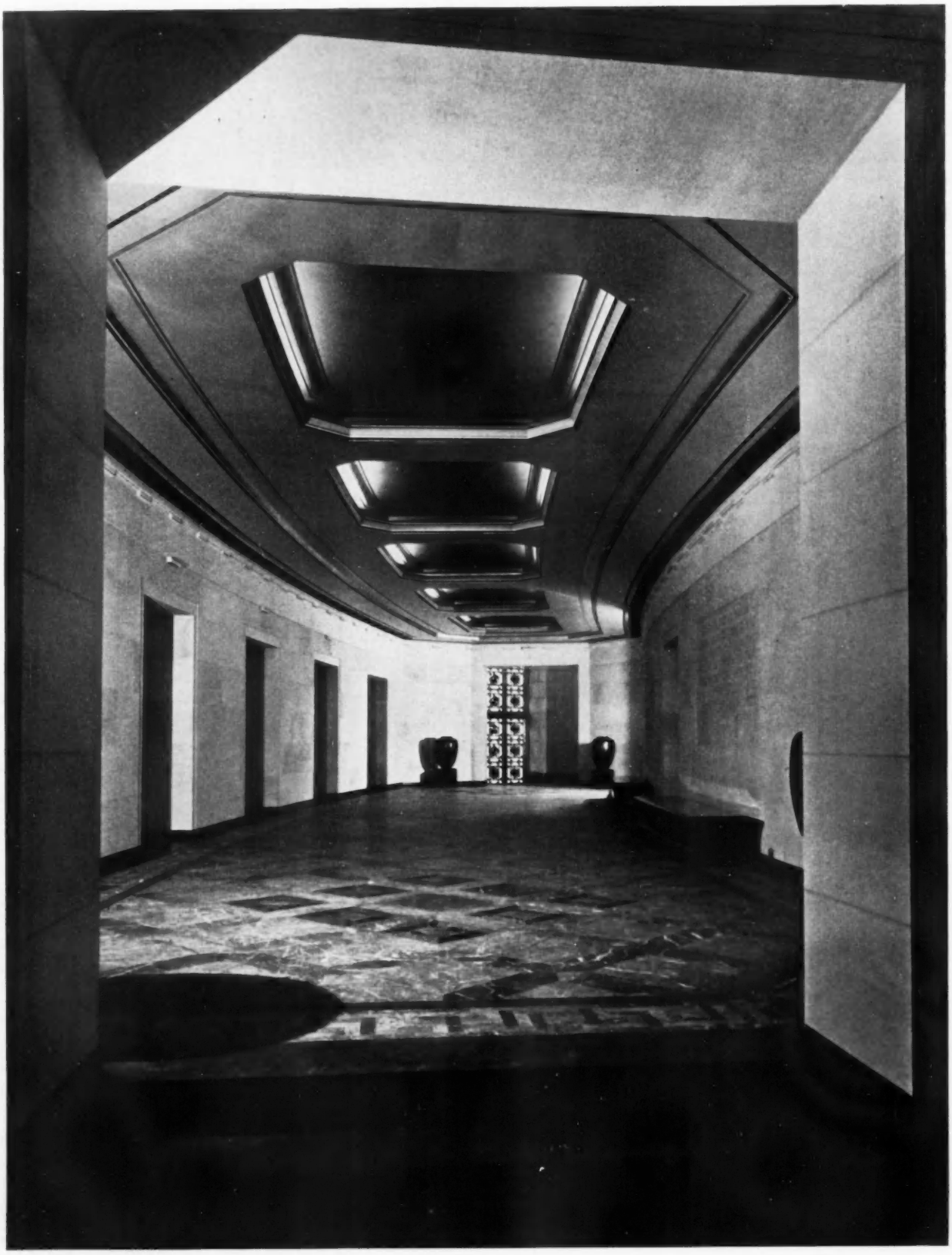
Exit Doors.

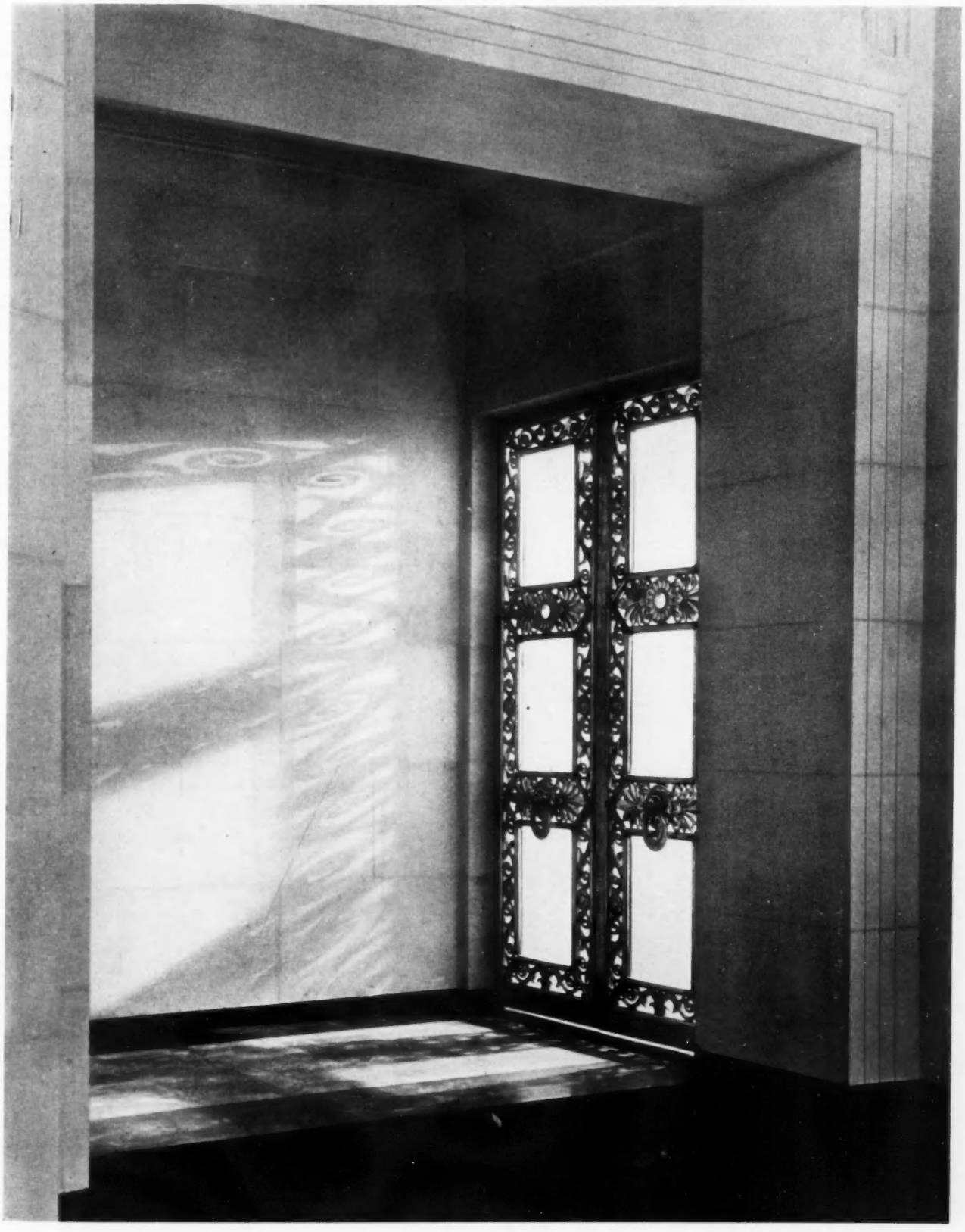
Detail of Exit Door.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



The Main Lobby.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS.



Minor Doors of Rotunda.

GIRARD COLLEGE CHAPEL
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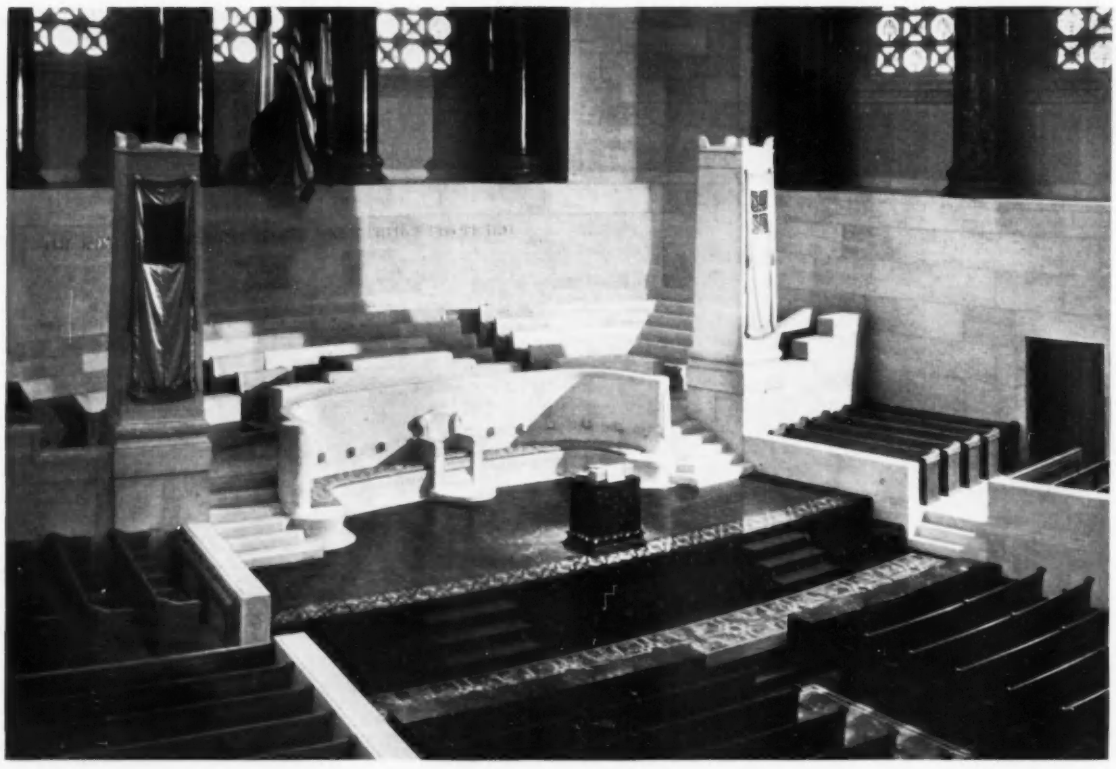
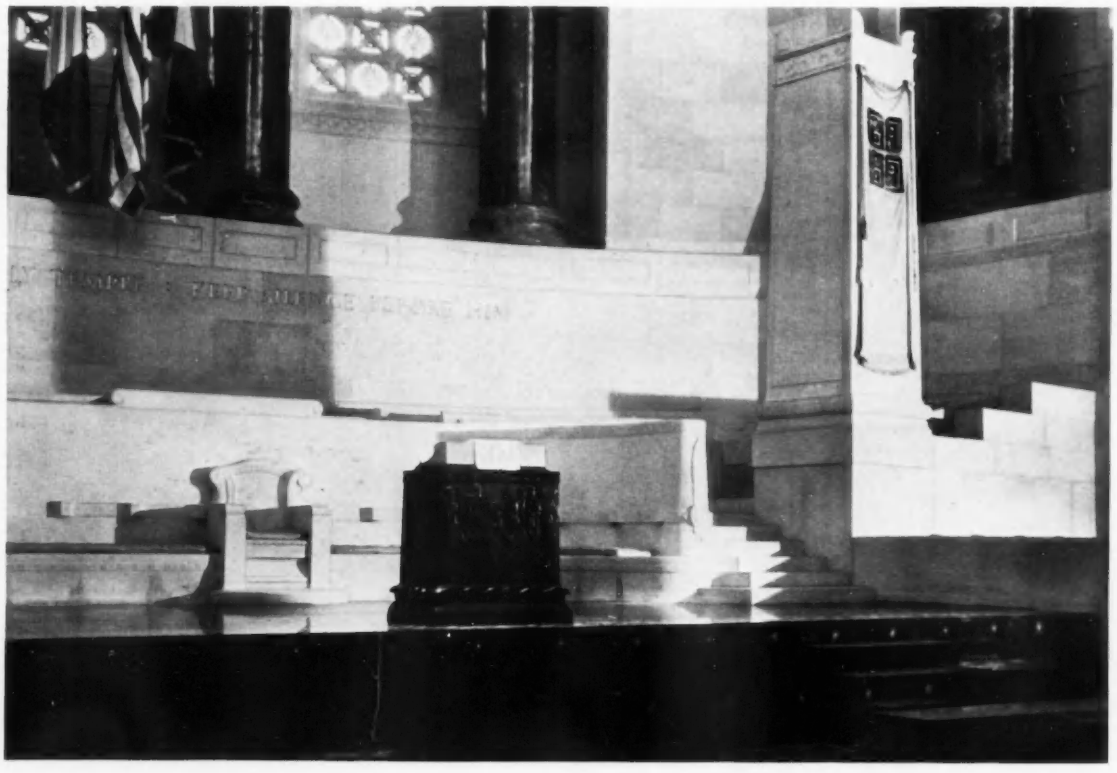
THOMAS AND MARTIN, ARCHITECTS



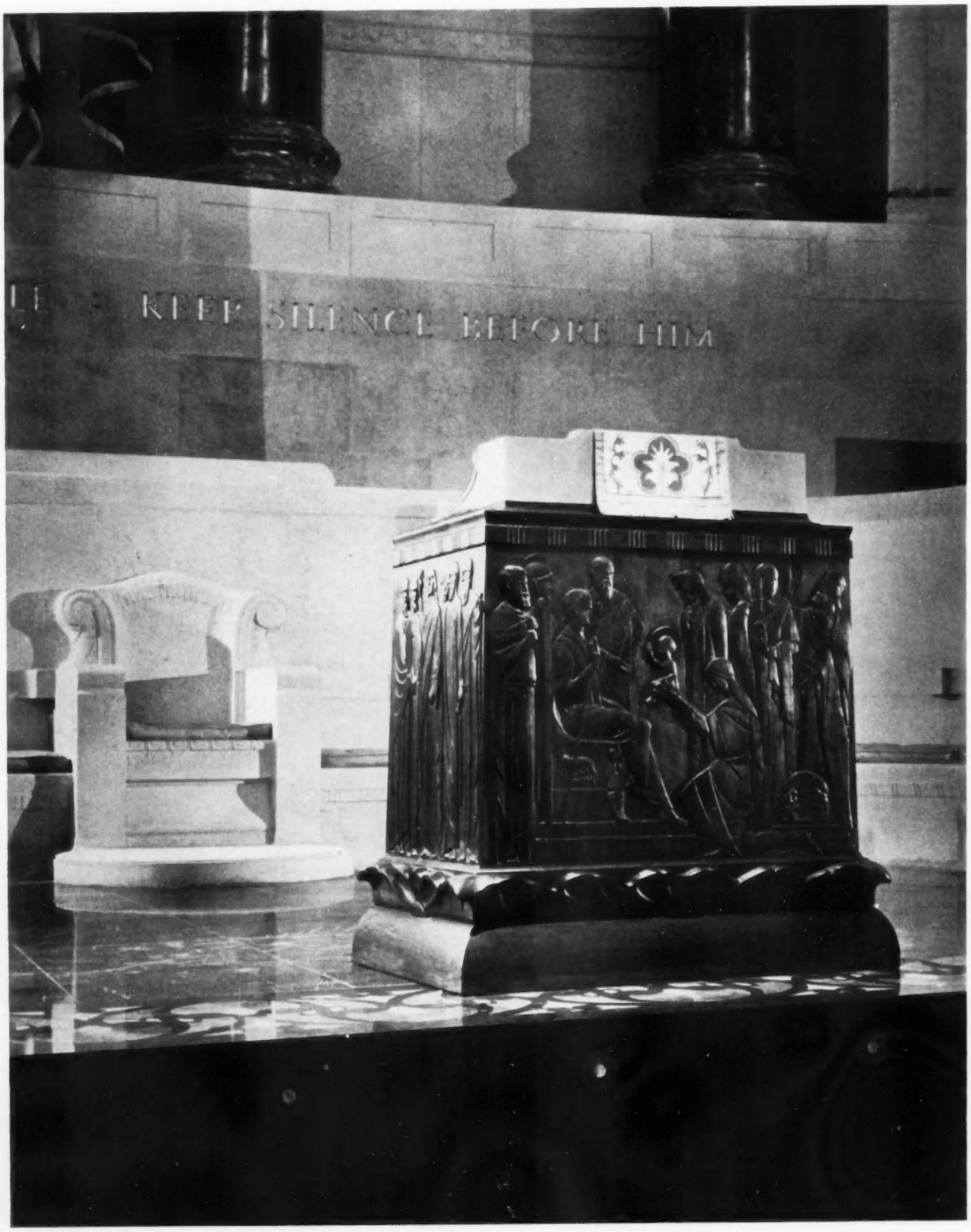


General View of Rostrum and Choir.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

General View of Interior Looking Toward Rostrum and Choir.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



Reading Desk of Carved Ivory.

GIRARD COLLEGE CHAPEL
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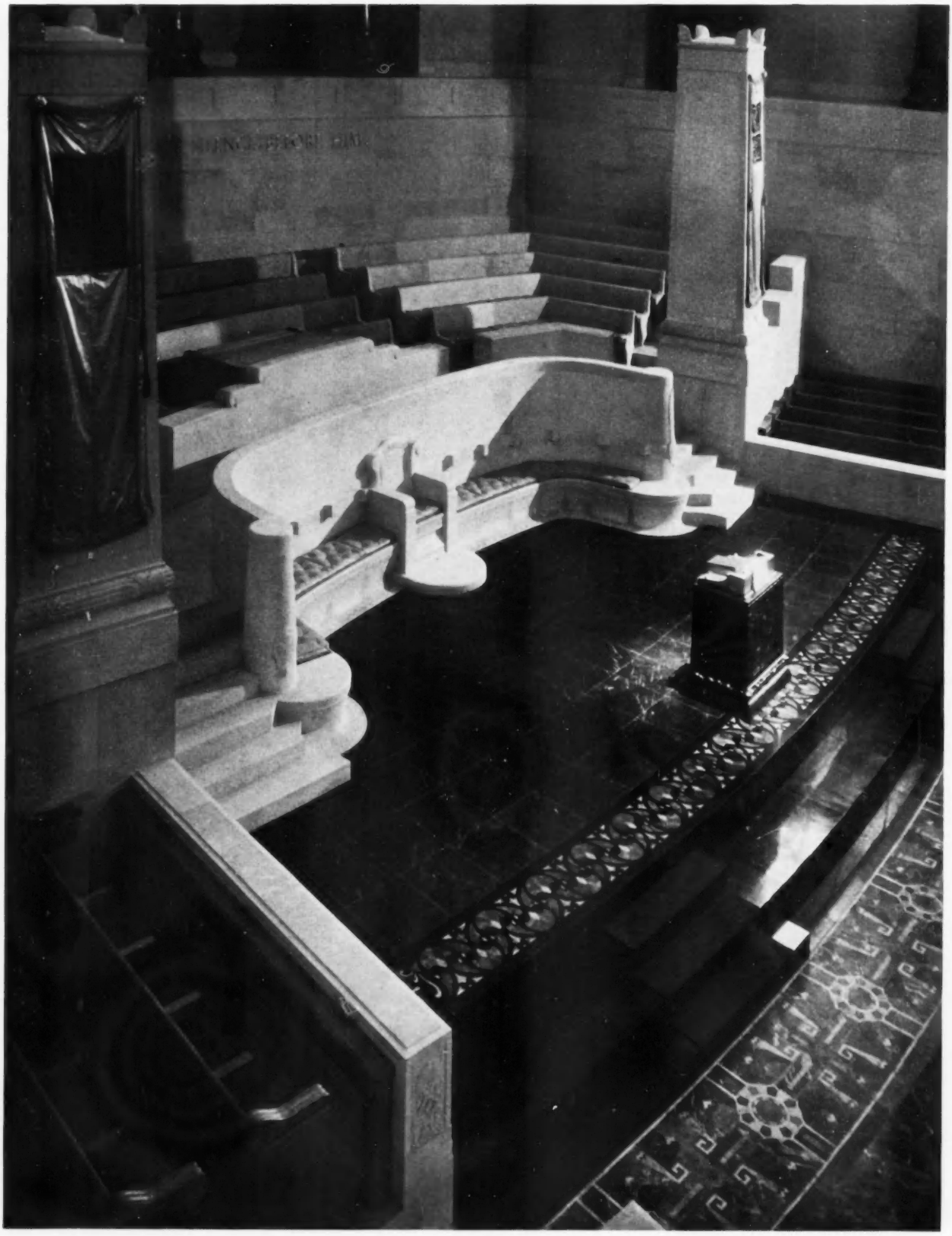
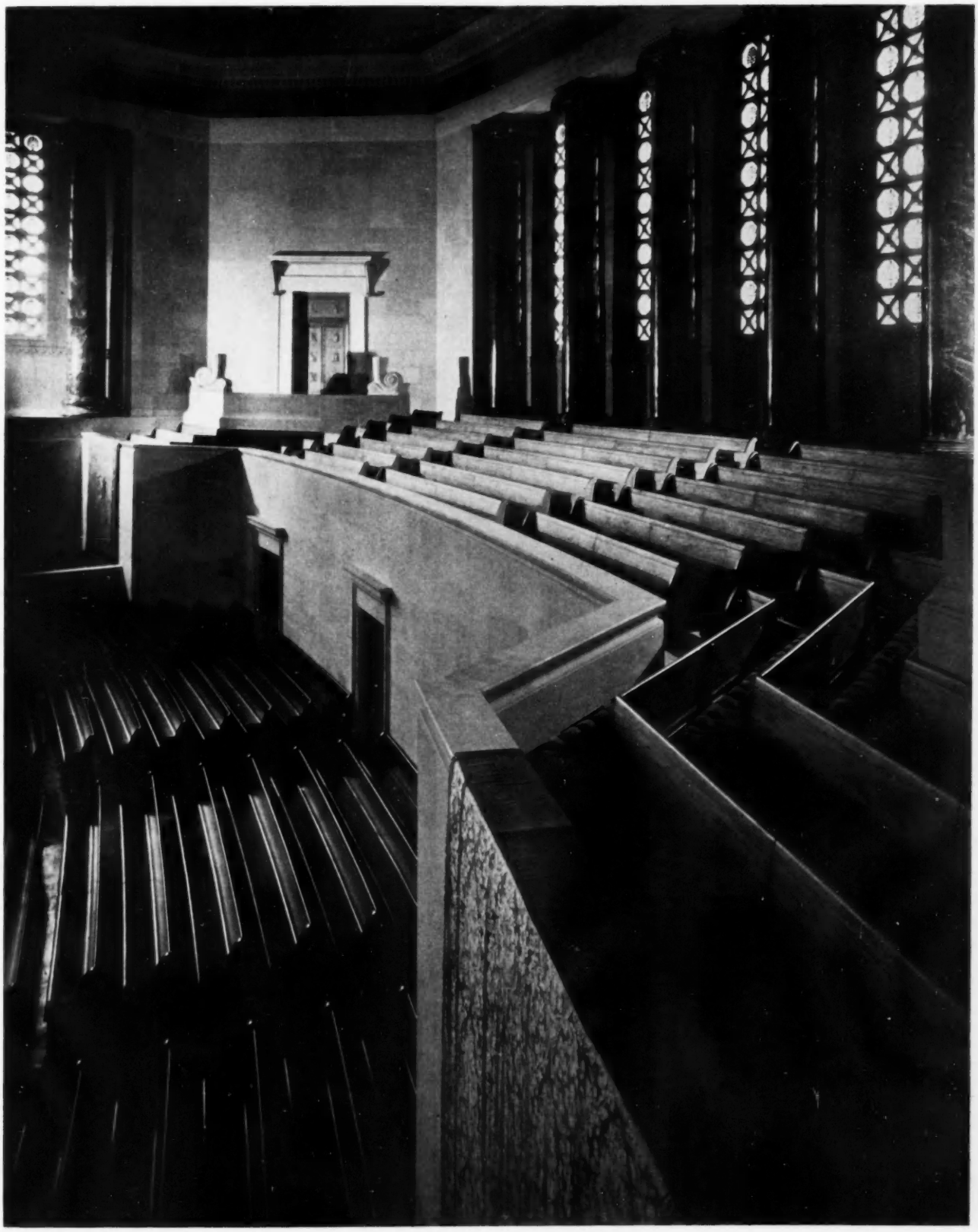
Steps from Rostrum to Choir.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



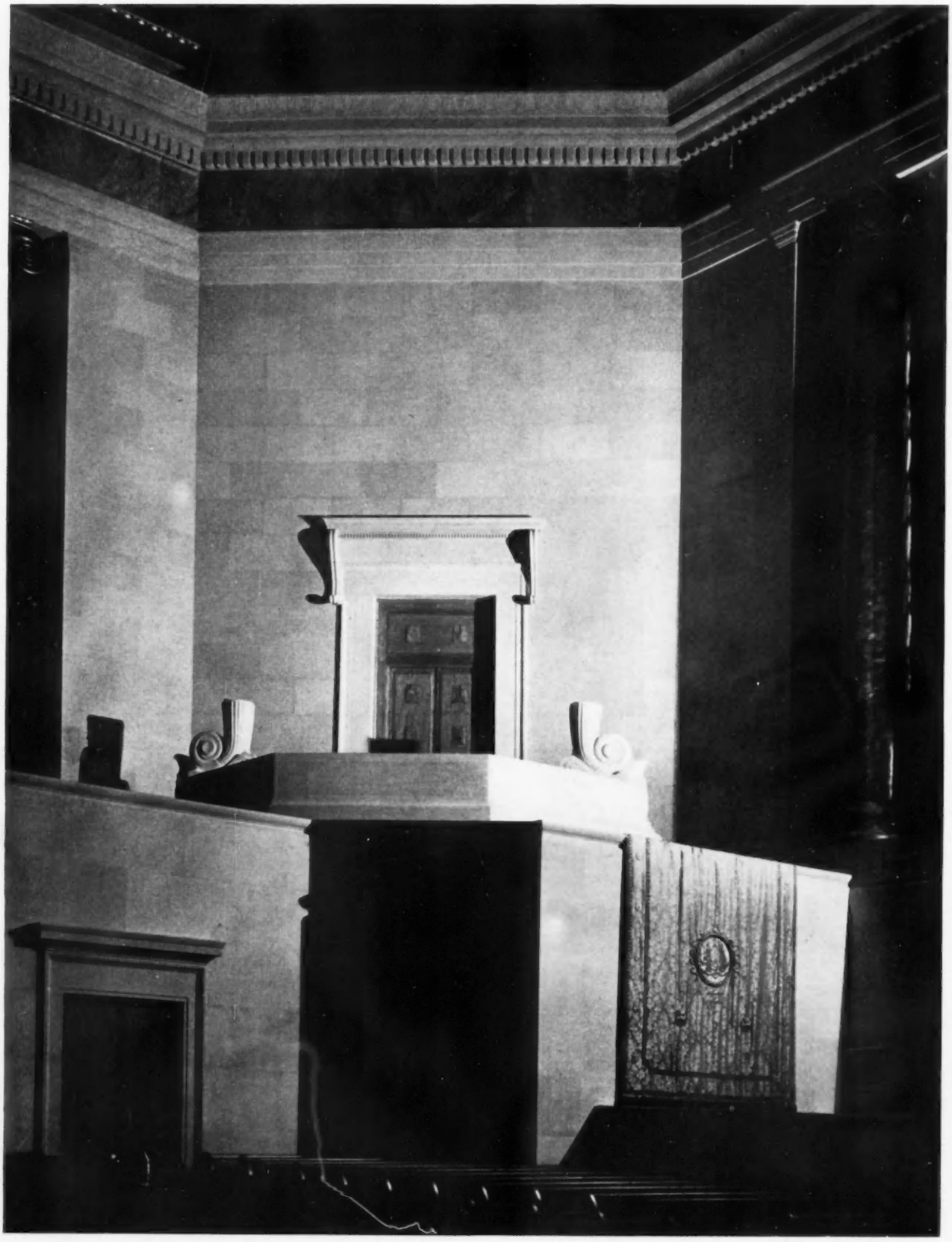
Rostrum and Amplifying Pylons.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



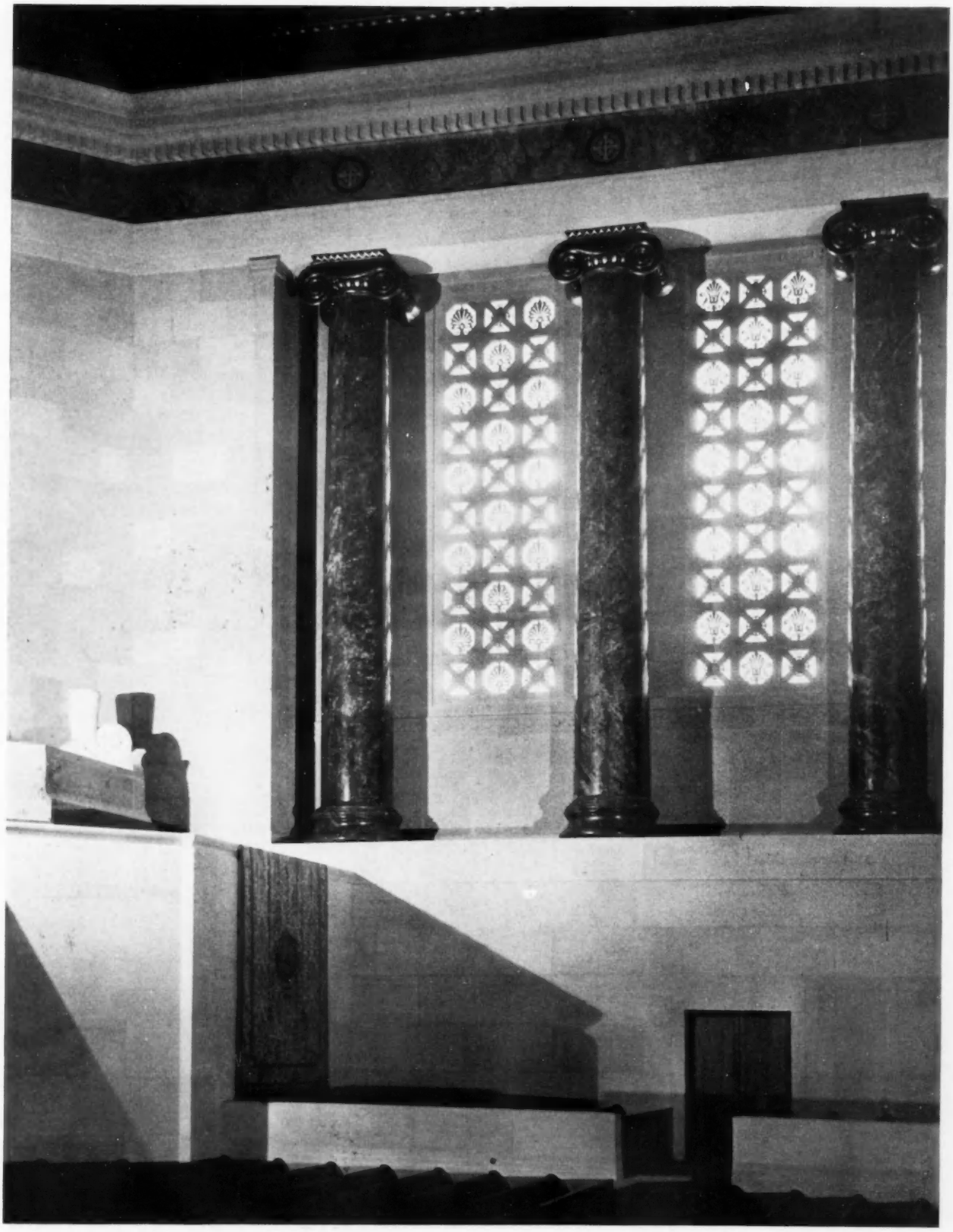
The Balcony.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



Balcony Entrance.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

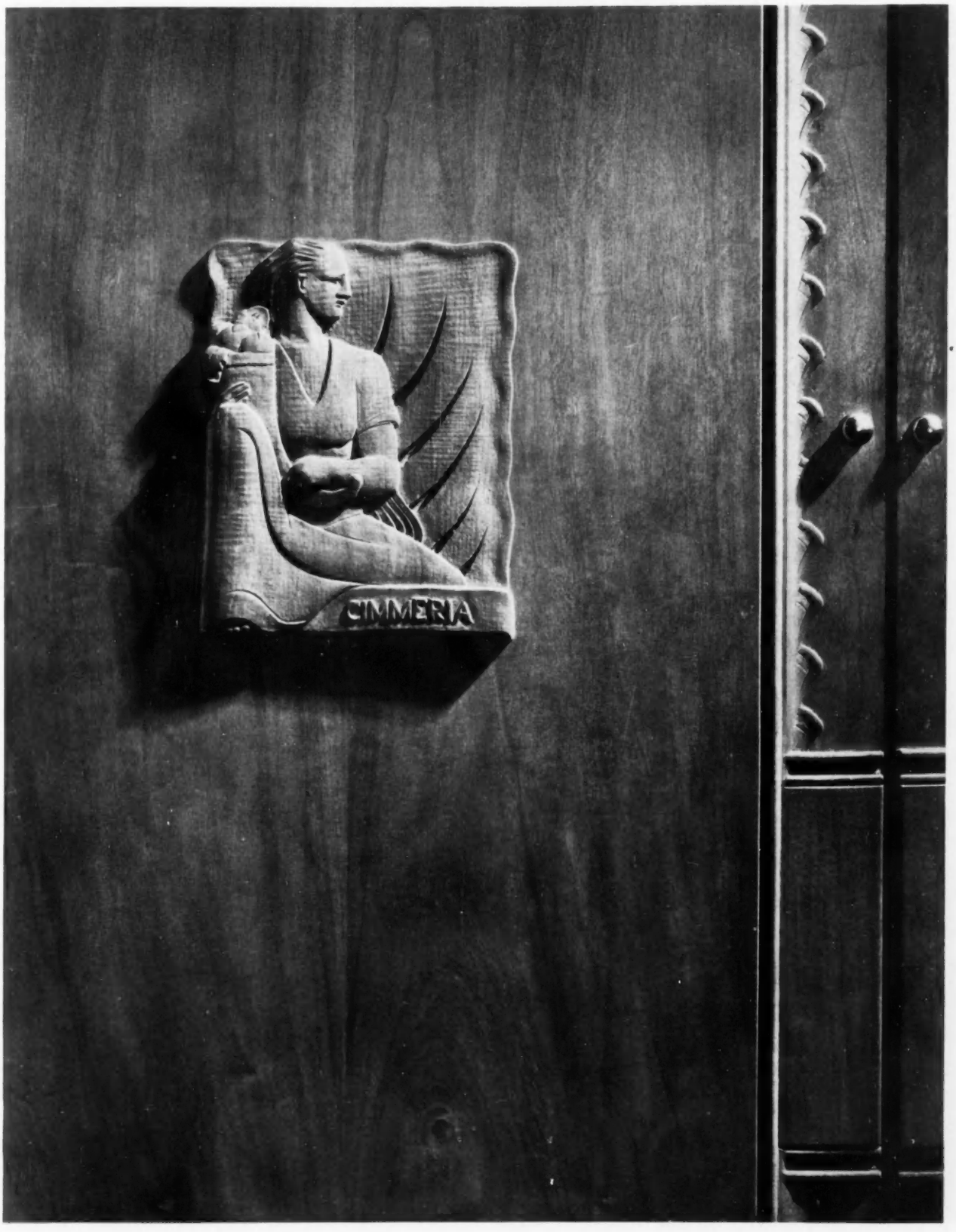


Rear of Chapel and Balcony.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

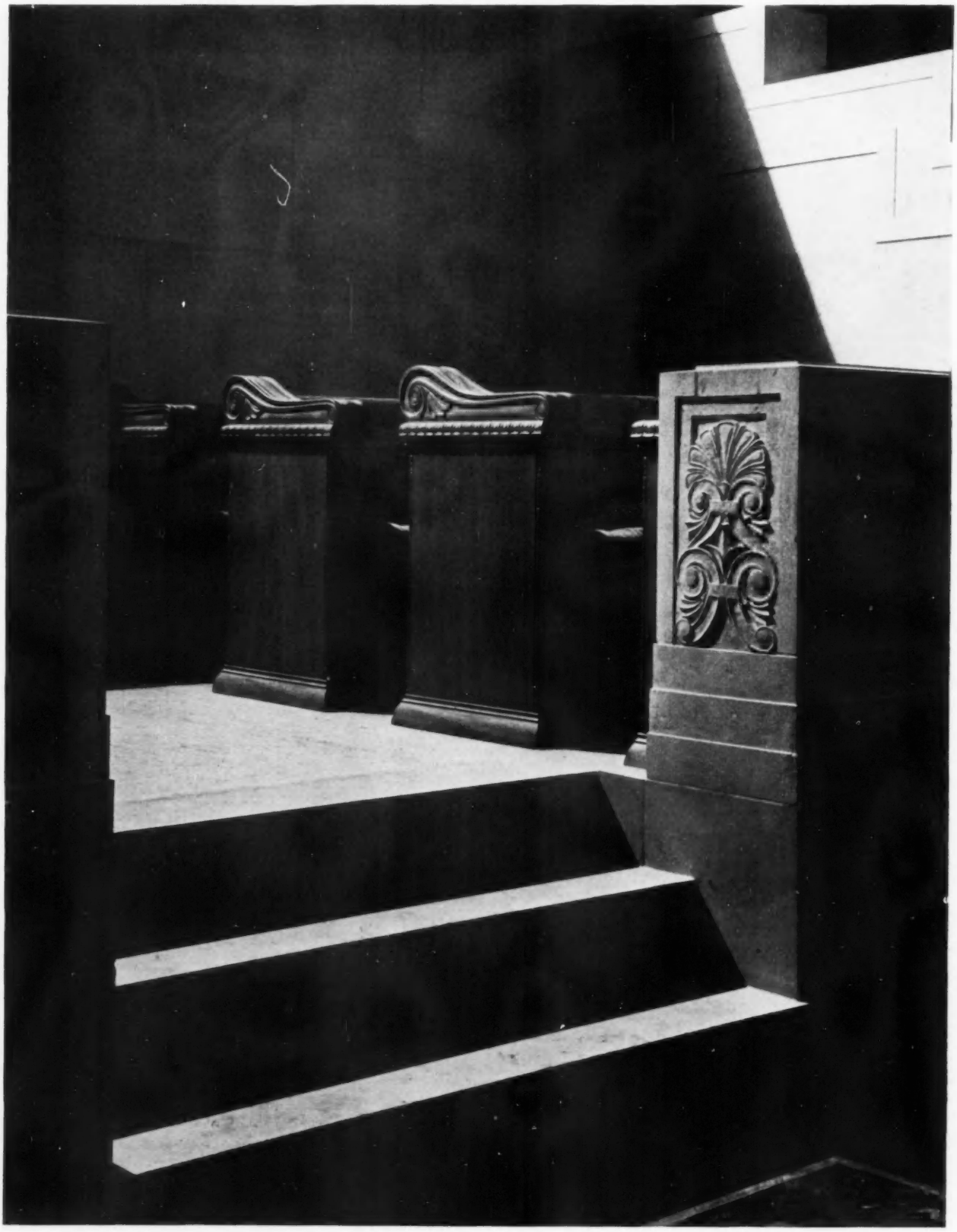
Doors from Auditorium to Lobby.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



Detail of Auditorium Door.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

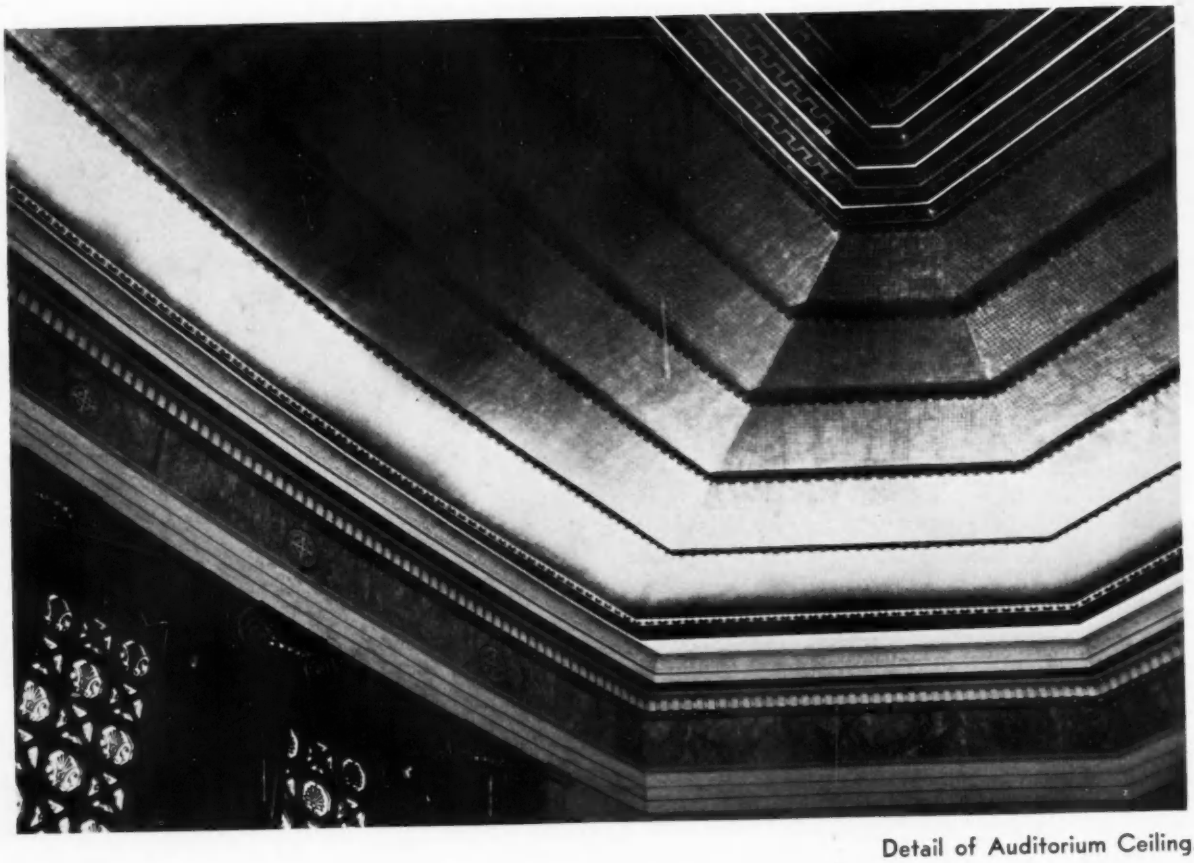


GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

The Faculty Seats.

Balcony Detail.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS



Detail of Auditorium Ceiling.

The Lobby: Detail of Inscription from Will of Stephen Girard.

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

Rotunda Heating Grille: "Earth, Sky and Sea."

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

Lobby Heating Grille: "The Unmerciful Servant."

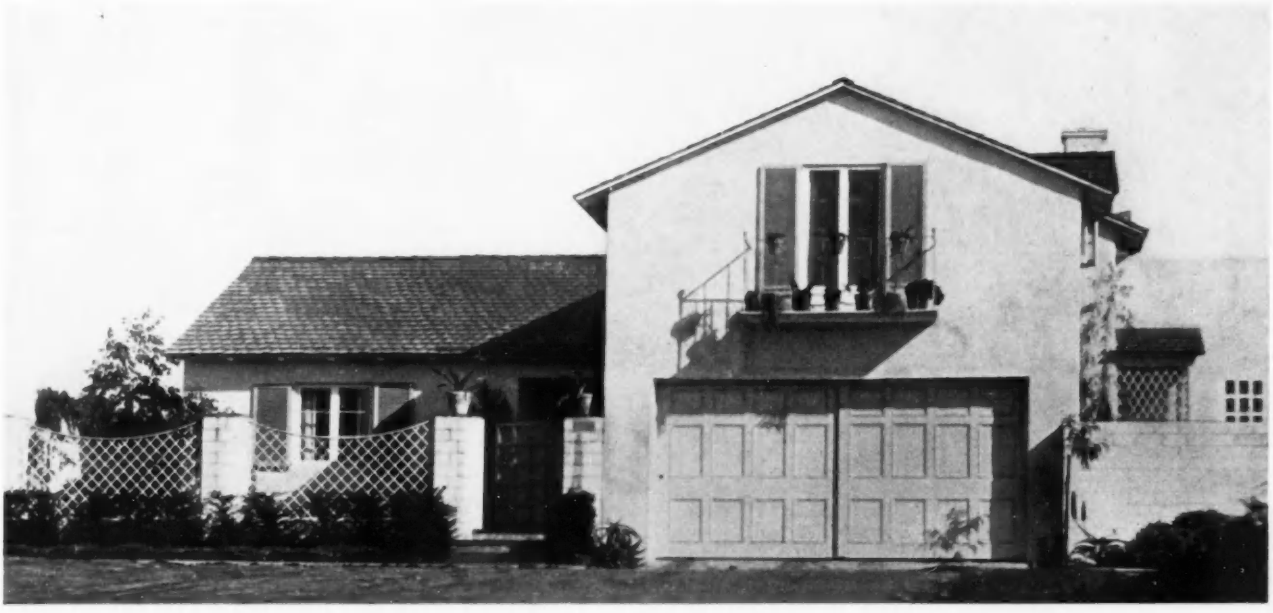
GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

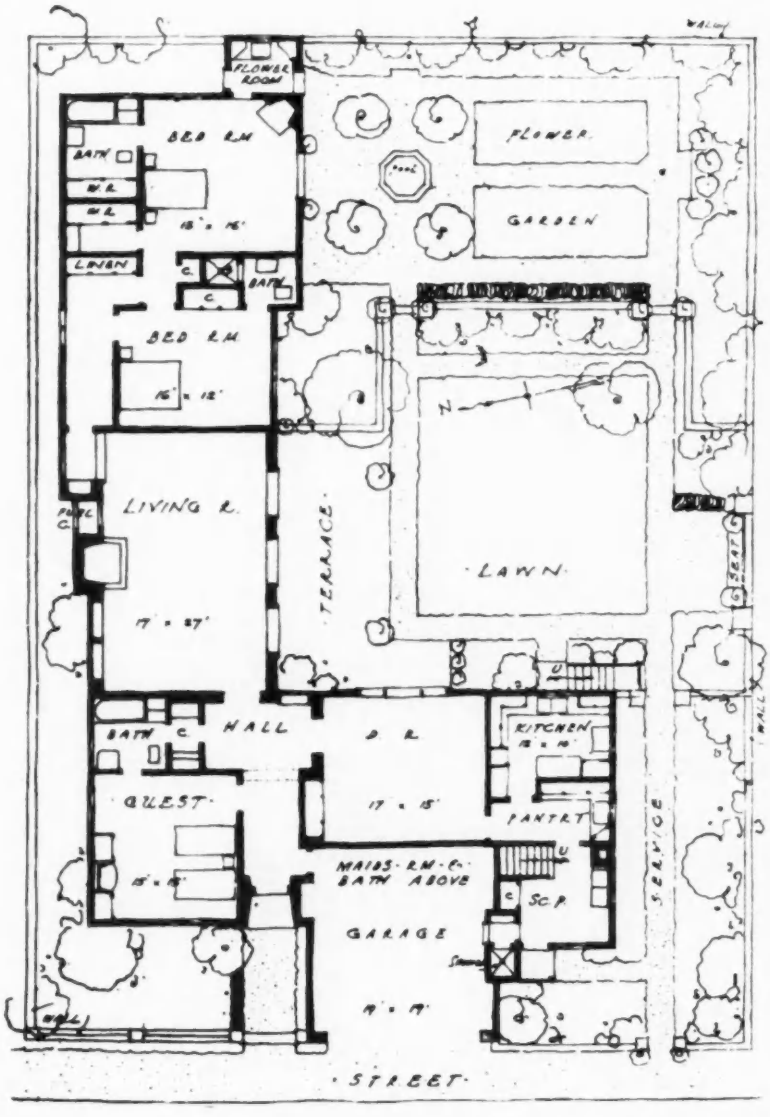
Lobby Heating Grille: "The Prodigal Son."

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS

Lobby Heating Grille: "The Good Shepherd."

GIRARD COLLEGE CHAPEL
PHILADELPHIA
THOMAS AND MARTIN, ARCHITECTS





HOUSE OF REMSEN McGINNIS
LA JOLLA, CALIFORNIA

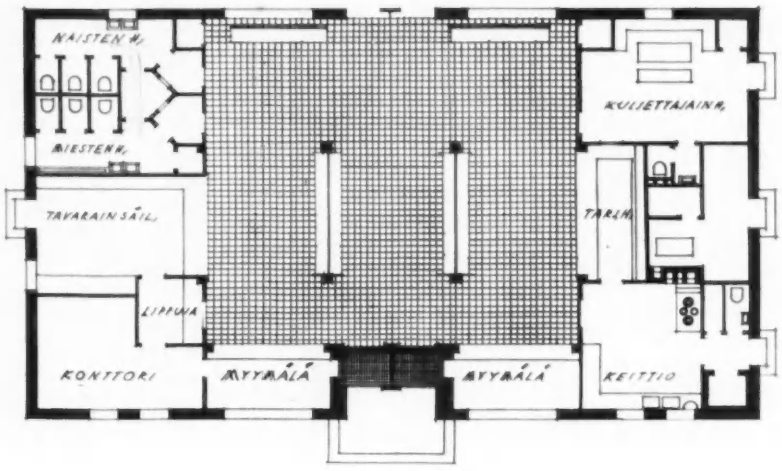
WINCHTON LEAMON RISLEY
ARCHITECT

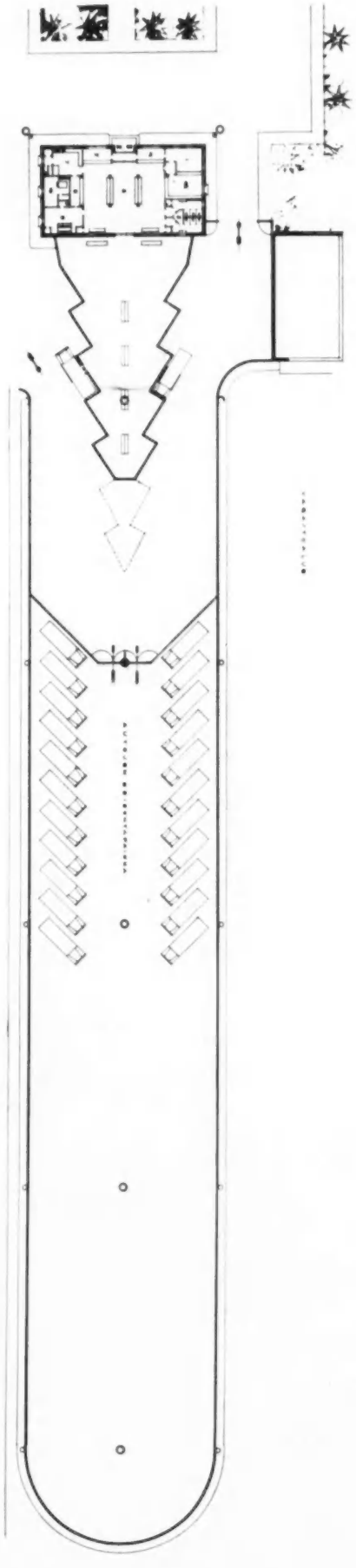
Padilla Studios

DORR RESIDENCE
PALOS VERDES, CALIFORNIA
W. L. RISLEY, ARCHITECT

Martikainen

BUS STATION
VIBORG, FINLAND
W. KEINÄNEN, ARCHITECT





BUS STATION AT VIBORG, FINLAND
W. KEINÄNEN, ARCHITECT

This bus station, which connects with a railroad, was completed in January. It contains a general waiting room, with a buffet dining service, a small kitchen, a small lounge for bus drivers, receiving and storage space for freight, a ticket booth, administration quarters, and public conveniences. In connection with the building is a platform with spaces allotted for 5 buses on each side; one side serves incoming cars, the other outgoing cars. Another platform, inclosed by a fence, is used for general parking of automobiles.

HOW SHALL WE TEACH ARCHITECTURE?

By ROY CHILDS JONES

Professor Jones is member of the faculty of the College of Engineering and Architecture, University of Minnesota. He is also co-author with Professor F. H. Bosworth, Jr., of "A Study of Architectural Schools" (published by Charles Scribner's Sons, New York, 1932), a report prepared for the Association of Collegiate Schools of Architecture on the basis of information gathered in 1930-31 from a survey of American and Canadian schools.

One question the practicing architect often asks the teaching architect these days: "Aren't you training too many students?" As an architect I share the feeling that underlies that question. To most of the profession, themselves actually if not officially in the ranks of the unemployed, the spectacle of several hundred newcomers pouring out each year from the schools is disturbing. And as a teacher I sympathize with those who are poured out. The sense of frustration, the lowered morale, that comes to the youngster who finds that his years of highly enthusiastic effort in school lead only to caddying on a golf course or tending a filling station (if he's that lucky) is a tragedy every teacher knows.

But does this signify that the schools should take a vacation every time a depression comes along? Should the difficulties of this generation bar a qualified student from preparing to take his rightful and necessary place in the next? If we are to judge by the present, the time to cut down on the number of students was five or ten years ago.

Take also another question oft repeated these days: "Aren't students being trained the wrong way?" I shouldn't like to imply that this question is entirely new. So far as my own memory goes, architectural training has always been wrong. But of late years it seems to be increasingly so. Twenty years ago there was involved mainly the single question of Beaux Arts method versus English apprenticeship. To that has been added Art versus Business; and to that again Modernism versus Tradition. This last has put the schools in wrong all round. The Traditionalist bewails the utter inability of the student to draw an entasis with classic subtlety. The Modernist damns him for his total failure to comprehend the glorious possibilities of an I-beam. On top of everything came the depression, to prove that all training is sterile, since there are neither Doric columns nor Bethlehem sections to be designed.

Most discussion of architectural training, whether by teacher or practitioner, appears to turn on questions of detail. Should there be a course in this, that, or the other subject? The architect who is suddenly made conscious of the part he must play as a practitioner in the promotion and financing of building projects asks, "Why not some courses in salesmanship and accounting?" Another bases all hopes of architectural salvation on studying buildings *in situ*, rather than on paper. This one wants architectural students gathered into the Fine Arts fold, the better to establish their kinship with the painter and sculptor. The other would turn them out to absorb realism in the clear light of calculus and mechanics.

I can't help wishing that some at least of all this discussion could be directed toward a few general considerations that underlie the details. We all like to tinker with the parts of the architectural training machinery, but we don't seem to give much attention to the machine as a whole. If the nature of that machine and of the teaching philosophy which is its motive power were more commonly understood, perhaps we could set about making it adequately responsive to the needs of this or any other time with a greater chance of success. There are certain characteristics which are peculiar to American schools as they now exist, and which, it seems to me, must be reckoned with when we try to appraise them.

Architectural schools in the United States are a compound of three different elements. These elements might be generalized with rough though not complete accuracy into three phrases: French method, English academic tradition, and America's peculiar brand of democracy.

By French method I mean, of course, the problem system of training—the method of learning architecture by doing it, so far as doing it can be approximated in school. The method implies many subsidiary devices such as competition, criticism, prizes, a whole set of traditions that constitute the rules of the game, so to speak. The devices are not specially important. What is important is the method itself, whereby emphasis is placed on what the student does himself, in his own way and in his own time. He learns from what he does and from what he sees his fellows do. Theoretically and practically the method can, I believe, be demonstrated to have indicated itself as the greatest single source of whatever strength our schools have.

By English academic tradition I mean simply this, we teach architecture in universities. We are so accustomed to this fact that we merely take it

for granted. But neither the Frenchman from whom we borrowed the method nor the Englishman from whom we borrowed the tradition of a university would think it natural. The Englishman, to be sure, has recently been partially converted to schools, but I gather he still clings generally to his notion of professional responsibility for the training of apprentices. The Frenchman's single official government school, wholly devoted to technique, is worlds removed from academic shades. It has remained for us to try the experiment of delegating architectural training to the university. For the sake of simplicity I am classing with the universities our several technical institutes which have schools of architecture, since their organization is not essentially different.

This has produced a mixture historically strange, and one wherein we must try to harmonize certain traditional incompatibilities. Architecture, in the French method, is a creative art. The university, in the English tradition—and certainly we cling at least to the letter of the tradition—is a place for the pursuit of knowledge. In effect we have tried to set down the creative turbulence of a Rue Bonaparte atelier in the scholarly calm of an Oxford cloister.

And now for the point about democracy, or rather what goes under that name in this country—I hope nobody will expect me to define the word. I use it to indicate a condition that our educational system has had to meet. Both the architectural training method and the university tradition with which we are dealing originated in an environment where education has become a right that may be and is claimed by the many, qualified or unqualified. This is not the place to argue which is the more really democratic. The fact, despite certain exceptions which some schools are beginning to exemplify, is still with us.

This has meant that architectural schools have had the same sudden expansion in the last thirty years that the universities have had. In 1900 there were thirteen schools of architecture in which were enrolled probably not more than six hundred students. In 1930 there were fifty-two schools with a little over six thousand students. A fourfold increase of schools in thirty years coupled with a tenfold increase of students is something to think about. And the statement brings home a point not often realized, but necessary to the complete picture, namely, how young the schools really are. Three-fifths of them are less than twenty-five years old, and of the older minority, only five can boast of more than fifty years.

What does all this mean in terms of the present? To my thinking, it explains a good deal about the present situation in which the schools find themselves. In that situation certain elements of strength and certain elements of weakness stand out pretty clearly.

To begin with, I doubt if any one who knows the schools would deny the inherent strength of the problem system of teaching which we have inherited from the French. However distorted and misapplied the method may be in some cases, there can be no question that it has developed in the schools of architecture a student body whose characteristics are unique in American universities. Architectural students work. They work enthusiastically and independently. They have a power of individual accomplishment, a habit of learning for themselves that few other groups of students possess. What university departments other than architecture must struggle with shocked academic authorities for post-midnight lights in the drafting rooms? There is more than amusing irony in the situation. The *charette* has become a symbol of independence. The peculiar virtue of our teaching method in architecture is that whatever the limitations of a faculty, the individual power of the student can come through in some fashion at least.

The faults and virtues of turning over architectural training to the universities are by no means so clear cut. To strike a just balance involves many complicated issues. But there is one thing which it seems to me can be placed on the credit side of the account at once. The university connection offers a grand chance for the mutual education of the architect and the layman. Surely there is here a source of great potential strength to both the architectural school and the university. I say potential, because it has by no means as yet been fully realized or exploited by either group. On the architects' side there is the feeling that the academic mold deadens creative impulse. The scholar on his part distrusts the existence of any intellectual or cultural values in a craft beyond whose surface of archaeological frills he has never penetrated. But is there anyone in these times to claim that architects are so burdened with wisdom that they can afford to disdain whatever the university has to offer in the way of an intelligent knowledge of motivating world forces? Similarly, isn't it possible that the academic world might learn something from us about architecture as one interpreter of civilization—surely as vital a one as poetry or drama? And what, pray, is economics without building? Or sociology without shelter? Here is fertile ground for the development of that intelligent mutual understanding between architect and general public about which so much is talked and so little done.

On the debit side of the accounting between architecture and the universities must be set down certain particular weaknesses which I believe architects in general should recognize.

There are probably too many schools. At least we know that a great many schools duplicate one another in limited areas. A great many were established without any reasonable assurance of adequate support. And looked at broadly, it is a fair question if the 115 students we had in 1930 for each of the 52 schools might not have been as well trained at less expense or better trained at the same expense, with 230 students in 26 schools.

There may be too many students. Can the profession tell us how many there should be? Certainly every teacher knows there are too many of the wrong kind. More than half of the six thousand students of 1930, according to past statistics, will never graduate. Only seven hundred did graduate that year. Only a few schools can, or at any rate do, admit students on the basis of demonstrated aptitude. Consequently, they must spend a goodly share of their available resources carrying along the unfit until these latter eliminate themselves.

No generally accepted standards have yet been set up in architecture as there have been in law and medicine, to limit the number of schools and students according to probable necessities, available resources, or student aptitudes. A few schools do select and limit their students, but only as a matter of individual policy possible in a university unhampered by political or financial considerations.

The schools are generally poor. I hasten to add that they were poor even in 1930. They had directly appropriated to their uses in that year a million and a half dollars. This looks like a large sum, but spread over their six thousand students, it made only $253 per student. When we find that it took nearly twice that sum to train each student in a dozen or so schools of better established reputation, it is obvious that many schools had to get along with even less than the inadequate general average.

Nearly all architectural training is financed by student fees, general university endowment funds, and state appropriations. The special endowments common in other fields are notably lacking in architecture. Perhaps that is one reason why schools of architecture have never developed as centers of research and only to a limited extent as centers for advanced study. School resources are almost wholly absorbed by teaching, especially by teaching in its more elementary stages. The conception of a school as an institution that could take the lead in studying the common problems of the profession—like housing, for example—is nonexistent.

Only eight schools have an independent autonomy of their own as professional schools. Perhaps six others have an actual, if not official independence. The rest are parts of engineering and other divisions. This latter status is not necessarily bad, but it is apt to be, since the machinery of most university divisions is not flexible enough to meet the special needs of architectural training.

All schools point their students toward the ultimate goal of practice. Being in universities they can hardly do otherwise than try at least to live up to the professional as distinguished from vocational standards. But while professional schools for embryo architects have been vastly expanded, vocational schools for draftsmen, nonarchitectural designers, and craftsmen have not. Since there are roughly three times as many draftsmen as there are practitioners, it is just possible that some of the effort spent on professional schools should be spent on developing good vocational schools such, for example, as Pratt Institute in Brooklyn. The net result at present seems to be that the professional schools are often having to turn good draftsmen or artisans into poor architects.

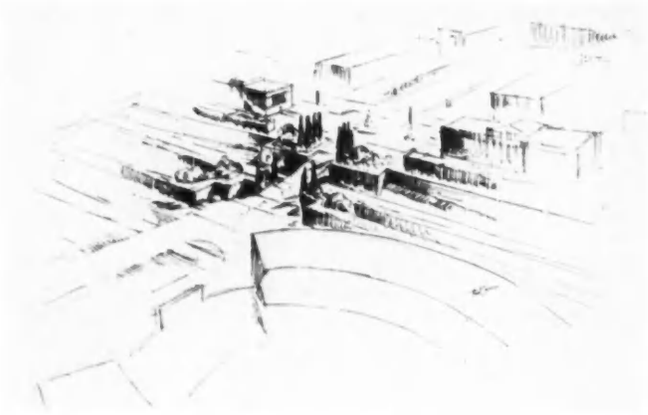
No plan has yet been devised to bridge the inevitable gap between school and practice. Medicine has its interneship in accredited hospitals. Architecture has no such arrangement. The old theory that the school graduate got his experience as an office apprentice no longer works under the conditions of modern practice. That is a problem which the schools and the profession must work together to solve.

It may look as if I am trying to prove that the future of architectural schools depends on their running off from the university stepmother. I doubt if the case is as bad as all that. For one thing a mother who gets you a million and a half a year is not to be despised. And for another thing, she gives signs of reforming. In a number of instances school and university together have worked their way through to mutual understandings that work to the advantage of both.

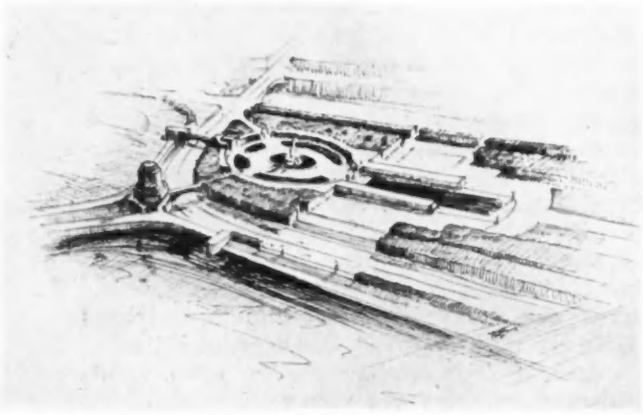
There is one thing that will hasten the process very much, and that is the help of architects generally. Effective help implies interest, understanding of the real situation, and practical, unified support in getting done whatever should be done. The interest I think exists. But the other two things may be questioned. In effect the profession has turned over the job of training its future members to the universities. And then, despite individual exceptions which must not be forgotten, it has abdicated any collective responsibility about the matter.

The example of medical education irresistibly arises. Its present effectiveness is directly traceable to the active part played by the profession in laying out an orderly line of training procedure through school to practice. All this has been based on definite study and information carefully gathered by agencies which the profession itself set up. Something of the same sort many of us see as necessary in architecture. If setting the house of the schools in good order involves some long-range planning which the universities have not been able to provide, architects ought above all to be able to do so. Even such drastic things as the consolidation of schools, and elimination of unfit students, might be faced with composure in a time like this when such sacrosanct things as bank independence and veterans' pensions must go by the board.

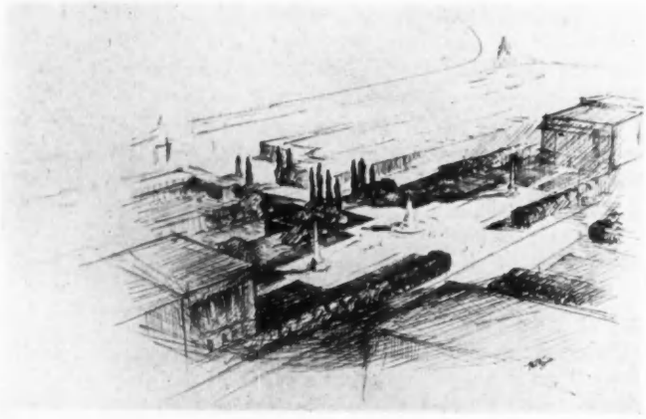
I've purposely kept this discussion to questions of what many will call only the mechanism of training. This is not to deny that a spirit of training is the end and aim of the whole matter. But that after all is something which must be left to the teachers and students. The first job is to provide a clear field for them, and that job can be done best by profession and schools together.



Preliminary sketch of Cleveland Civic Group, showing pedestrian approach over new underground Exhibition Hall and railroad tracks to the Municipal Stadium. Carl L. Feiss, designer, Cleveland.



Sketch of a Municipal Airport Group on the lakefront, Cleveland, developed on axis with Municipal Stadium. Control tower operates in connection with amphibian and land-plane landing areas. Carl L. Feiss, designer.



Preliminary sketch of plaza over new underground Exhibition Hall in Cleveland Civic Group. Carl L. Feiss, designer. Studies conducted at the Cranbrook Academy of Art.

CRANBROOK ACADEMY

The Cranbrook Academy of Art announces that the third year of its Post Graduate Architectural Department, under the personal direction of Eliel Saarinen, will begin in the fall of 1933. The past two years have been the development period for the formulation of the future policies of the students. These policies as adopted make it possible for the serious and ambitious student to continue and broaden his training.

The Cranbrook Academy of Art is a part of the Cranbrook development and is located twenty miles north of Detroit in the environs of the Village of Bloomfield Hills. It was established in 1928 by Mr. G. G. Booth for the purpose of advancing the artistic development and culture in America. Leading artists and designers from wherever they may be found are selected to live and work at Cranbrook. The work produced by these men and women, through their association and cooperation with each other and their students, will tend to influence the quality of design in art and industry. The Architectural Department is the nucleus of this group of the Academy and the students under Mr. Saarinen are not limited to architecture, but have opportunities in all phases of design.

The Cranbrook Academy of Art includes in its facilities a well-developed Museum and Library building housing a collection of both ancient and modern art and a very complete art library. Other buildings provide for the various craft shops, artists studios, drafting and classrooms. The craft shops are fully equipped with all necessary facilities for the use of the students where they can work and produce objects in ceramics, silver, metal, wood and other materials. The use of these facilities by the students is dependent upon their ability. In this way it is possible for a student to develop his cultural interests in the crafts.

The Academy can be considered as a laboratory for research work in architecture where the advanced and talented student can supplement the formal education he has received in the university. Mr. Saarinen's philosophy of architectural education includes the premise that all work done by the student must be based upon reality, and therefore be a part of life itself, and not upon artificial conditions about which the student can only theorize. Architecture, according to Mr. Saarinen, is not necessarily building, but includes everything which man has created as a practical organic solution of his relation to his environment. The student at Cranbrook must think, feel and understand architecture not as a fine art, but as something with which man has constant contact. Each student at Cranbrook chooses his own problem which he develops to a solution. These problems as chosen are those in which the student has a vital interest and thorough knowledge of the surroundings and conditions of life which may have an influence on

OF ART PROGRAM

the solution. These may be the plan of his home city, a development project for a specific location, or even a commission for a residence for a client. They are individual problems and are developed as actual jobs. In this the student has the advantage of learning from the problems of his associates and by their mutual criticism. There is no assembling of stylistic forms for the solution of a problem, but a dependence upon common sense.

The limitation of the number of students of the Architectural Department to a small group makes more intimate contact between the students and the staff possible. As each student is working on his individual problem, every other student can gain considerable benefit through the understanding and knowledge from the work of his associates. The open discussions which are held of each problem are mutually of great value. As each student is expected to have cultural and intellectual interests apart from those pertaining to architecture, a great variety of argumentative material is present for the round table discussion meetings which are periodically held with the staff of the Department.

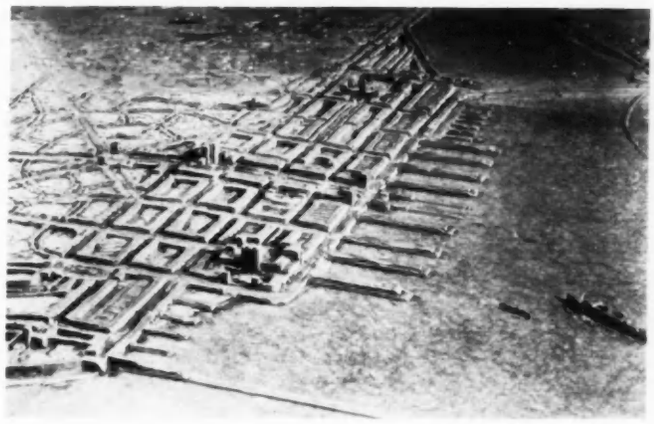
The Architectural Department is strictly a post graduate or advanced school only. The enrollment is limited to thirty-five students who are selected by competition. Each competitor must be either the holder of an architectural degree from a recognized university or a practicing architect or draftsman who can submit the necessary qualifications showing special ability, aptitude and ambition. As there is no tuition or any charge for instruction, each student accepted by the Academy is actually the recipient of a scholarship. These scholarships are available to both men and women with no restrictions as to age or nationality.

There is a registration fee of $100 for all students who are accepted; it is payable to the Academy in advance. This fee is payable only once and is for any period of continued residence. It does not include expenses for room and board, materials or miscellaneous items.

The Art Club of the Academy is the home of the resident students where room and board may be obtained at a reasonable cost. The Club has excellent accommodations for both men and women and has well-furnished rooms for the convenience and enjoyment of the students. Residence at the Art Club is optional, and should any student desire to live elsewhere, accommodations are to be had in the neighborhood.

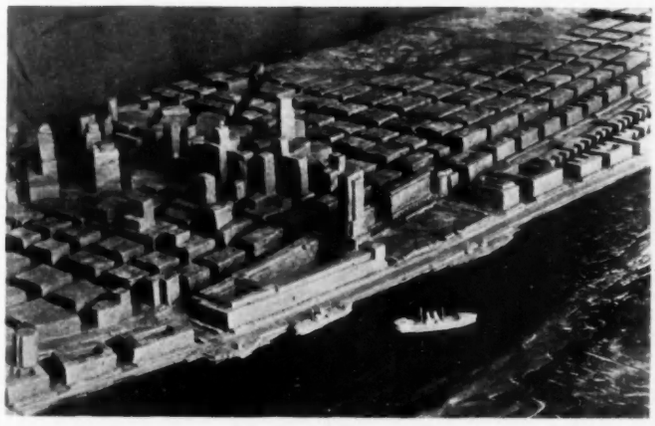
There is no regular scholastic year at the Academy. The selected students may enter at any time and stay until they have completed their work. There are no scheduled vacations, the students being free to devote as much of their time to their work as they desire.

The terms of the competition are given on page 17, advertising section, of this issue.

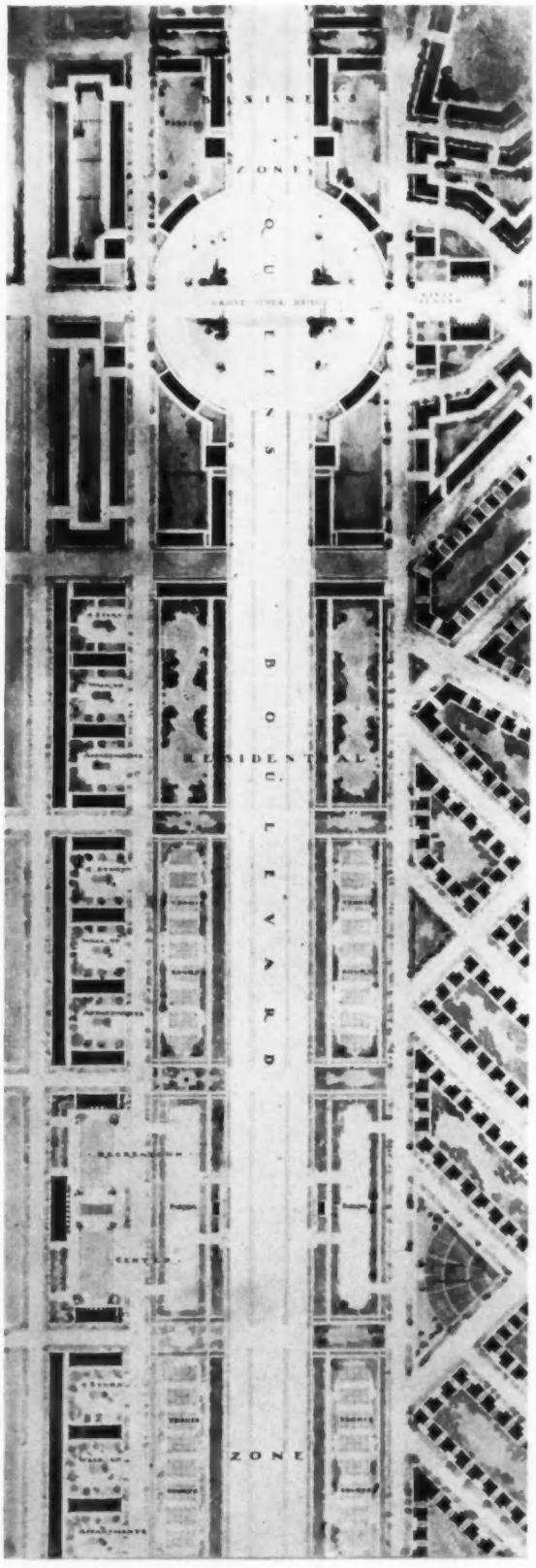


Model of proposed development for eastern tip of Long Island at Montauk Point, planned as a chief American terminus for trans-Atlantic passenger liners. J. R. Bailey, designer, Long Island.

A city plan for Panama City at the Pacific end of the Panama Canal, developed from data furnished by local authorities of the Canal. Floyd R. Johnson, designer, Panama.



Proposed riverfront development for Detroit, including a Civic Center, a district for new apartments, and a high-speed underground traffic highway. Walter Hickey, designer, Detroit.



Proposed Development.

FIRST PRIZE: PHILIP G. BARTLETT
QUEENS BOULEVARD COMPETITION

QUEENS BOULEVARD

Winners of the national competition* for proposals to bring about the ordered and beautiful development of Queens Boulevard are announced by the Queensboro Chamber of Commerce, New York:

First Prize, $200—Philip G. Bartlett, Manhattan.

Second Prize, $75 plus special award of $30—Albert Sturr, Manhattan.

Special Prize, $30—John W. Ingle, Jr., Bronxville, N. Y.

Special Prize, $30—Timpson & Turnbull, Manhattan.

Special Prize, $30—Harry B. Brainerd and Richard Smythe, Manhattan.

The Queensboro Chamber of Commerce, under whose auspices the contest was held, also announced that it would request the earnest cooperation of property owners, industrial and business organizations, loaning institutions and banks to make the plan a practical success.

Queens Boulevard, it was pointed out, is the central transportation artery of the Borough of Queens, the fastest growing section of the city. Retarded because of difficult grading and construction of a new subway, the Boulevard is now practically completed. Economic conditions in recent years have forced property owners to make the most out of temporary revenues from billboards, storage yards and other unsightly places. Under expert guidance received through the competition these conditions are expected to give way to an ordered development in which all property owners may participate in increased revenues.

Statement by the Jury

The Jury desires to express its appreciation of the distinguished contribution which has been made toward development of Queens Boulevard by the competitors whose thought and labor has produced so many interesting proposals. The drawings submitted offer a hopeful prospect of what may be accomplished by the cooperation of the many different interests involved. It is an encouraging prospect because it reveals that Queens Boulevard is as yet unspoiled. A wide swathe of properties lying on either side of the Boulevard offer a virgin field where the experience of other cities and the recent great advances in technical knowledge may be utilized to make this great arterial street an example of what is possible in a modern city.

"It should be clearly understood that the Jury does not expect any single one of the proposals to be executed as submitted; that was not the purpose of the competition. What was sought was to bring ideas to the attention of the public which might divert the course of development away from ruthless competition, wasteful speculation, and ultimate blight. Furthermore it was desired to demonstrate

*Competition program was published in the January, 1933, issue of THE ARCHITECTURAL RECORD.

COMPETITION PRIZES

that professional talent existed which was competent to cope with the very perplexing problems which confront the owners of real estate bordering on the Boulevard, as well as the investors in mortgages and the city of New York itself."

Jury of Award:

Leslie G. Baker, Regional Plan Association of New York.

Theobald G. Engelhardt, American Institute of Architects.

Arthur C. Holden, American Institute of Architects.

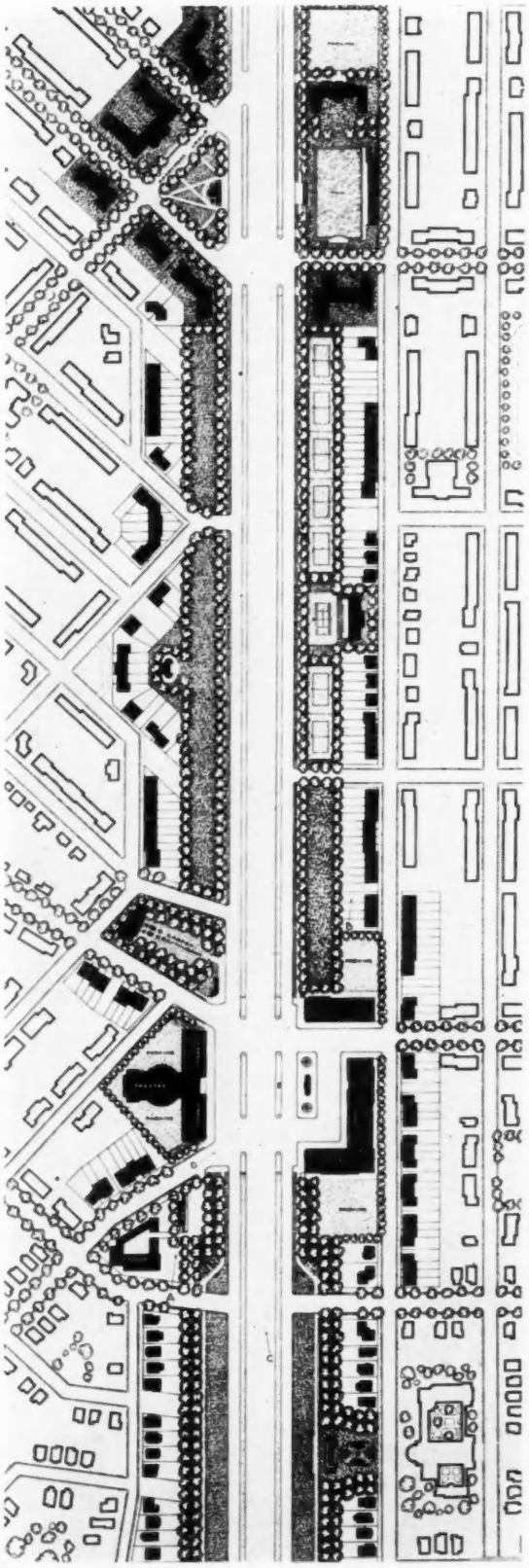
William W. Knowles, Society of Beaux Arts Architects.

George C. Meyer, Cord Meyer Development Co., Real Estate.

The Awards

The Jury awarded first prize of $200 to Philip G. Bartlett of Manhattan: "Mr. Bartlett's proposal calls for the setting aside of a border park strip approximately 200 feet wide on either side of the Boulevard. This strip is developed with park and recreation facilities such as will add immediately to the attractiveness of the Boulevard and yet will permit the conversion at a future date, if required by economic pressure, into sites for buildings of high income-earning capacity. The border park strip is broken at intervals by the grouping of buildings immediately upon the Boulevard around open spaces, which will become centers for stores, business enterprises, or amusement or educational centers. The Jury believes that the introduction of the additional border street paralleling the Boulevard on the north is warranted because of the improved frontage afforded upon the Boulevard. Adjoining the park strip there is suggested the development of apartments and single homes for the medium-income groups. Primary building development will thus be kept back from the Boulevard and a wide area of adjacent property will be developed with a population that can ultimately justify higher values for Boulevard frontage. The statement submitted follows the assumption laid down in the program that the entire tract of property under consideration will be administered as a unit for purposes of development. Mr. Bartlett is to be especially commended for the beauty of the perspective sketches depicting the types of buildings recommended."

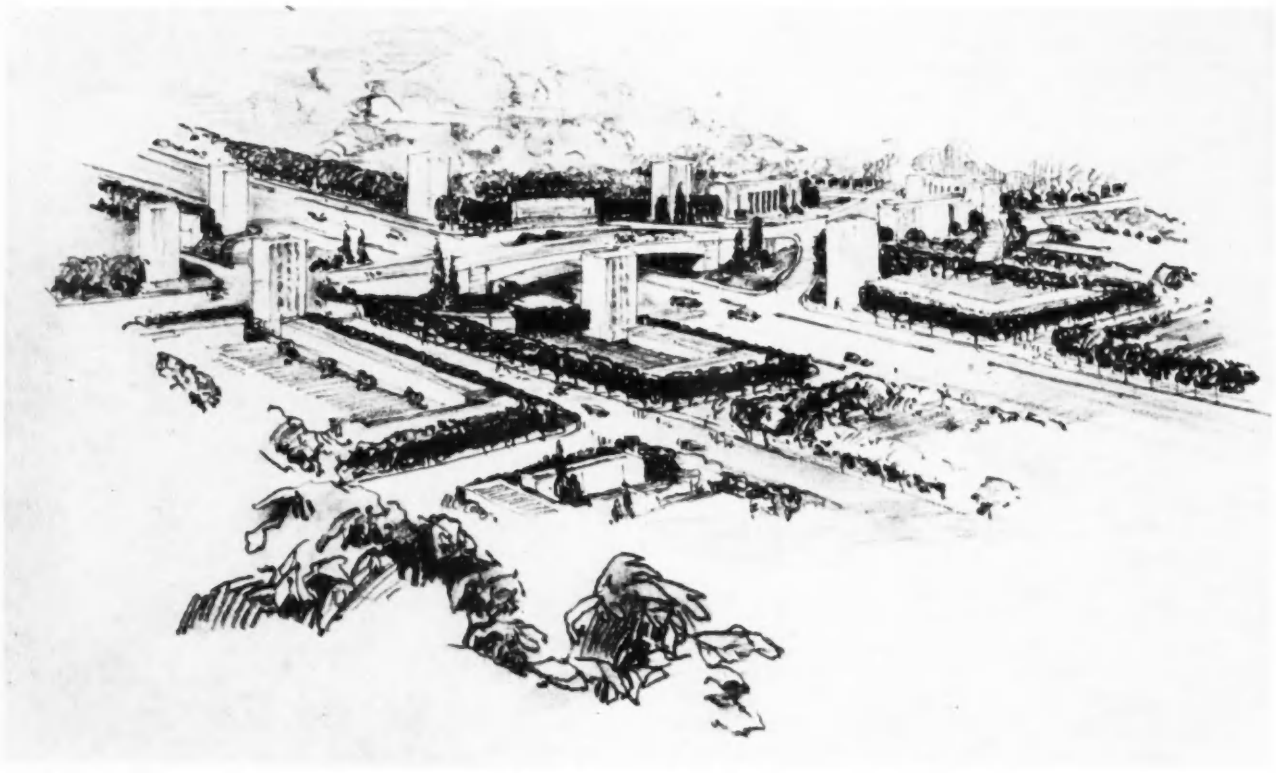
The Jury awarded second prize of $75 plus a Special Award of $30 to Albert Sturr of Manhattan: "Mr. Sturr's proposal is very similar in scheme to the proposal submitted by Mr. Bartlett, the winner of the first prize. It differs in that Mr. Sturr proposes to introduce row houses and other small residential units into the 200-foot border zone strip. The second 100 feet is brought into harmony with the 100-foot park strip by a sug-



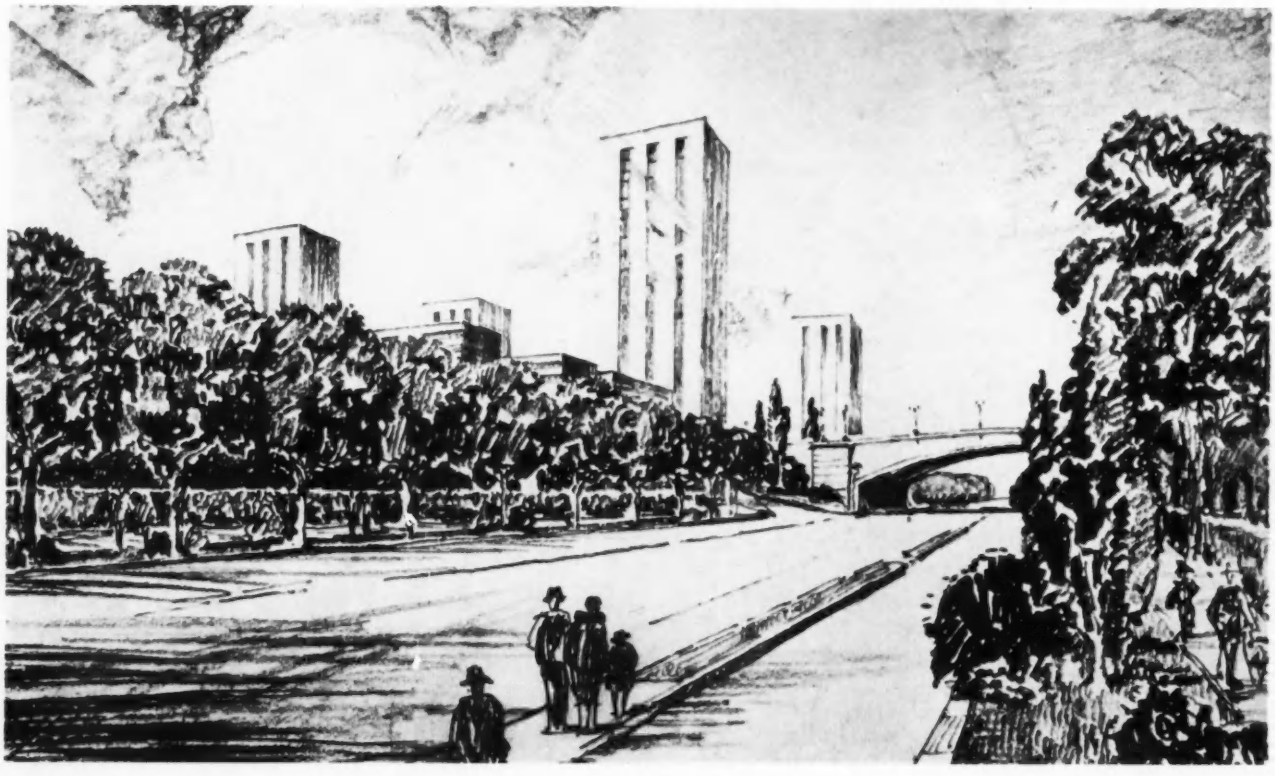
Proposed Development.

SECOND PRIZE: ALBERT STURR

QUEENS BOULEVARD COMPETITION

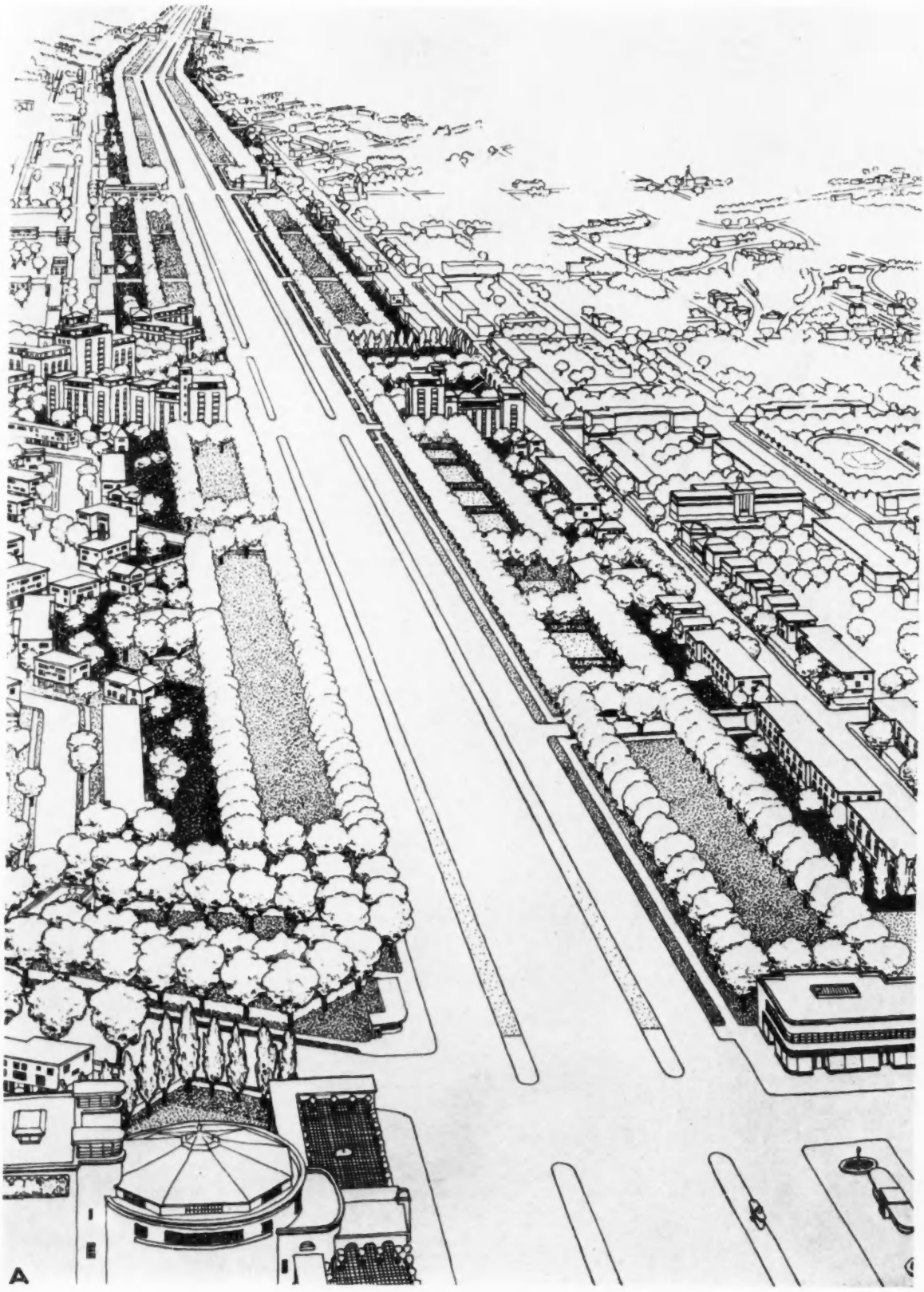


Proposed Business Zone.



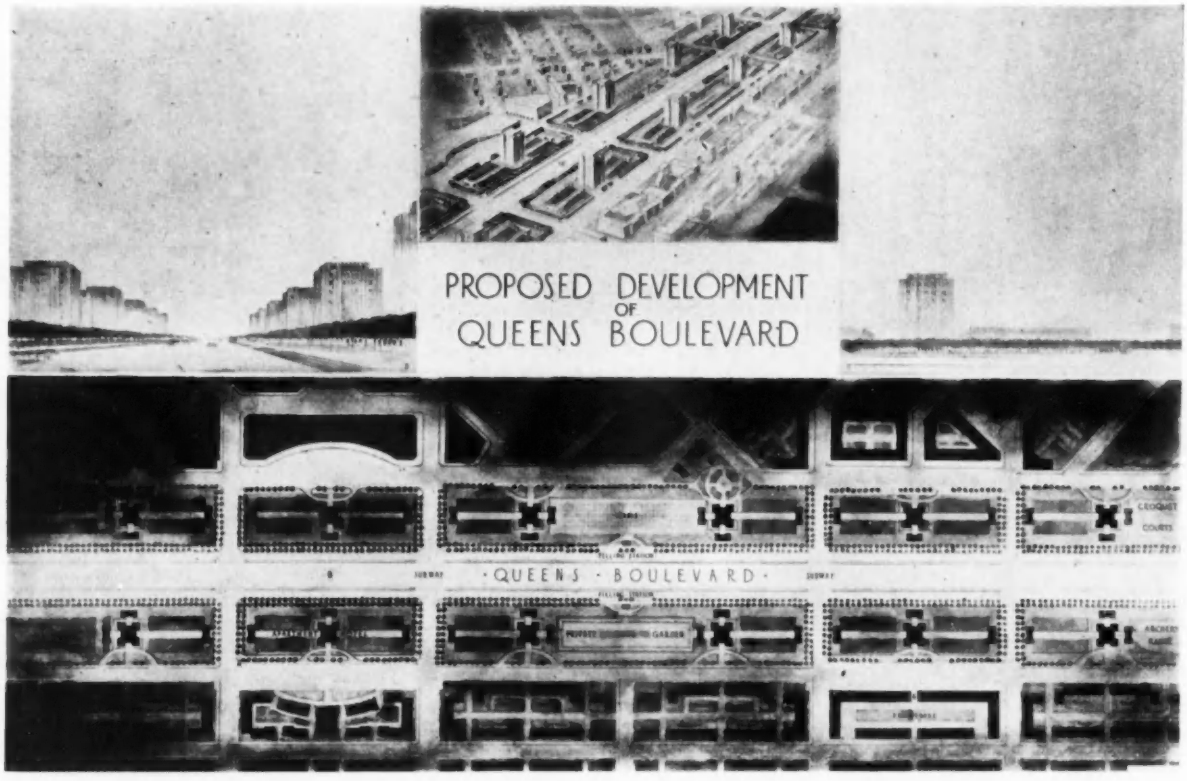
Proposed Boulevard Development.

FIRST PRIZE: PHILIP G. BARTLETT
QUEENS BOULEVARD COMPETITION

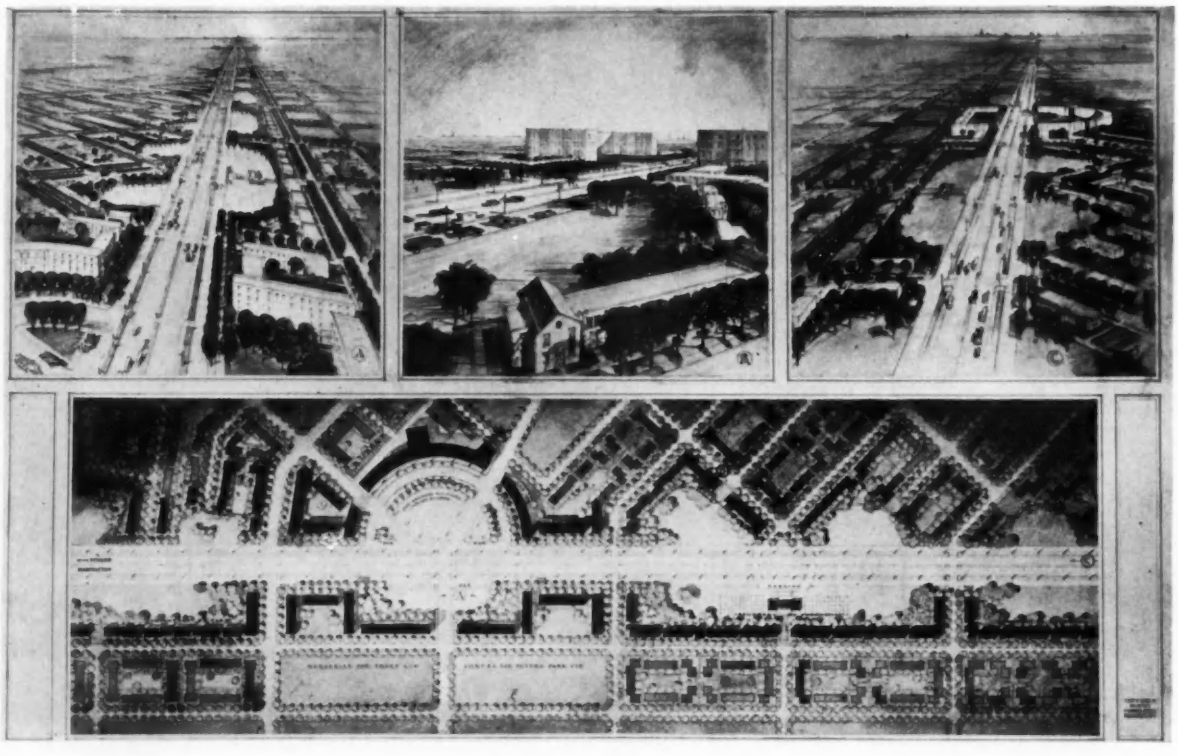


Proposed Boulevard Development.

SECOND PRIZE: ALBERT STURR
QUEENS BOULEVARD COMPETITION



SPECIAL AWARD: HARRY BRAINERD AND RICHARD SMYTHE



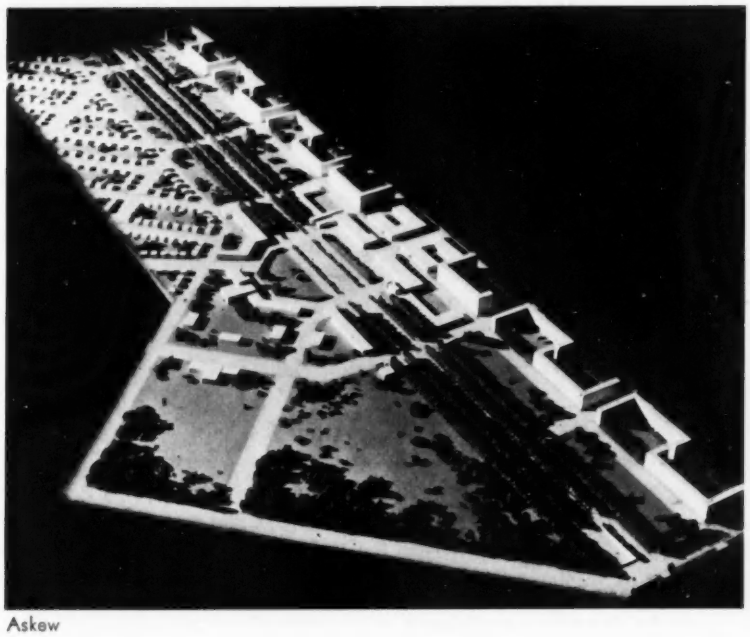
SPECIAL AWARD: JOHN W. INGLE, JR.
QUEENS BOULEVARD COMPETITION

SPECIAL AWARD:

JAMES TIMPSON & WILLIAM TURNBULL

QUEENS BOULEVARD COMPETITION

(Drawings and models were prepared at the Cranbrook Academy of Art, Cranbrook, Michigan.)



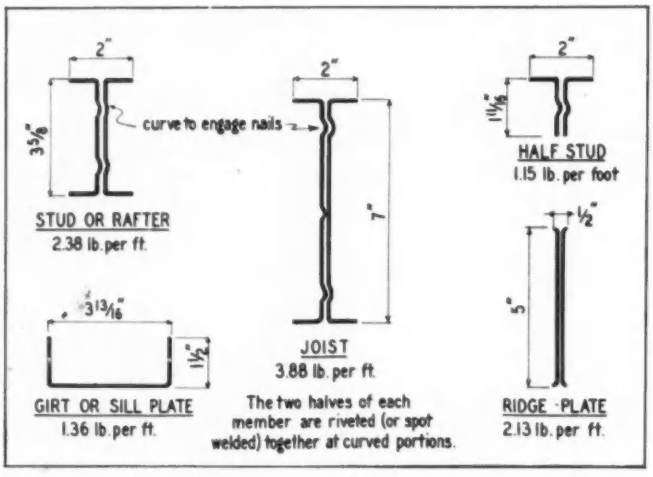
Askew

gestion for rear gardens backing up on the Boulevard, which are caused by the row houses fronting on the secondary parallel street. The question of course is raised as to whether the types of temporary buildings selected are adequate to carry the property. It is open to question whether or not these buildings may not be too valuable to give place easily to permanent, more intensively planned structures. The business centers spaced at periodic intervals are well designed. They suggest building at an economic scale possible of execution within a reasonable period. The Jury especially commends Mr. Sturr for the very distinguished bird's-eye perspective view looking down the Boulevard. It is an aesthetic conception which is thoroughly satisfactory, and in addition represents perhaps the most beautiful piece of draftsmanship in the competition."

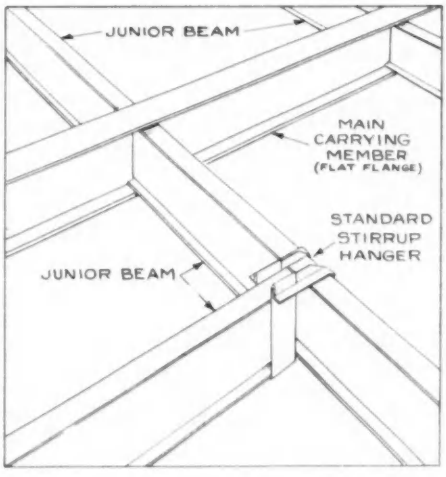
The Jury awarded a special prize of $30 to John W. Ingle, Jr., of Bronxville, New York: "Mr. Ingle submitted a proposal which, though in harmony with the suggestions of Mr. Bartlett and Mr. Sturr, offers an entirely different treatment of the border park strip. Instead of introducing a parallel secondary street on the north side of the Boulevard, he has reclaimed the usefulness of the irregularly-shaped gore blocks by increasing their size and utilizing them for immediate park purposes. He has recalled this same treatment on the regular blocks on the south side by varying the width of the park strip. The result is a series of alternate widening and narrowing of the space between the buildings which form the walks of the Boulevard. The Jury is of the opinion that the entire length of the Boulevard should not be treated with absolute uniformity. The Jury believes that the treatment suggested by Mr. Ingle's design would offer an excellent method for introducing variety into the development of the Boulevard. It commends Mr. Ingle's work as particularly worthy of further study."

The Jury awarded a special prize of $30 to Timpson and Turnbull of Manhattan: "With special commendation for the painstaking presentation submitted. Messrs. Timpson and Turnbull have prepared a series of models of their proposals and have accompanied their drawings by photographs of these models. The Jury believes that this method of study, and the skill with which it has been used may effectively assist in developing sentiment and understanding for the improvement of the Queens Boulevard and its adjacent properties."

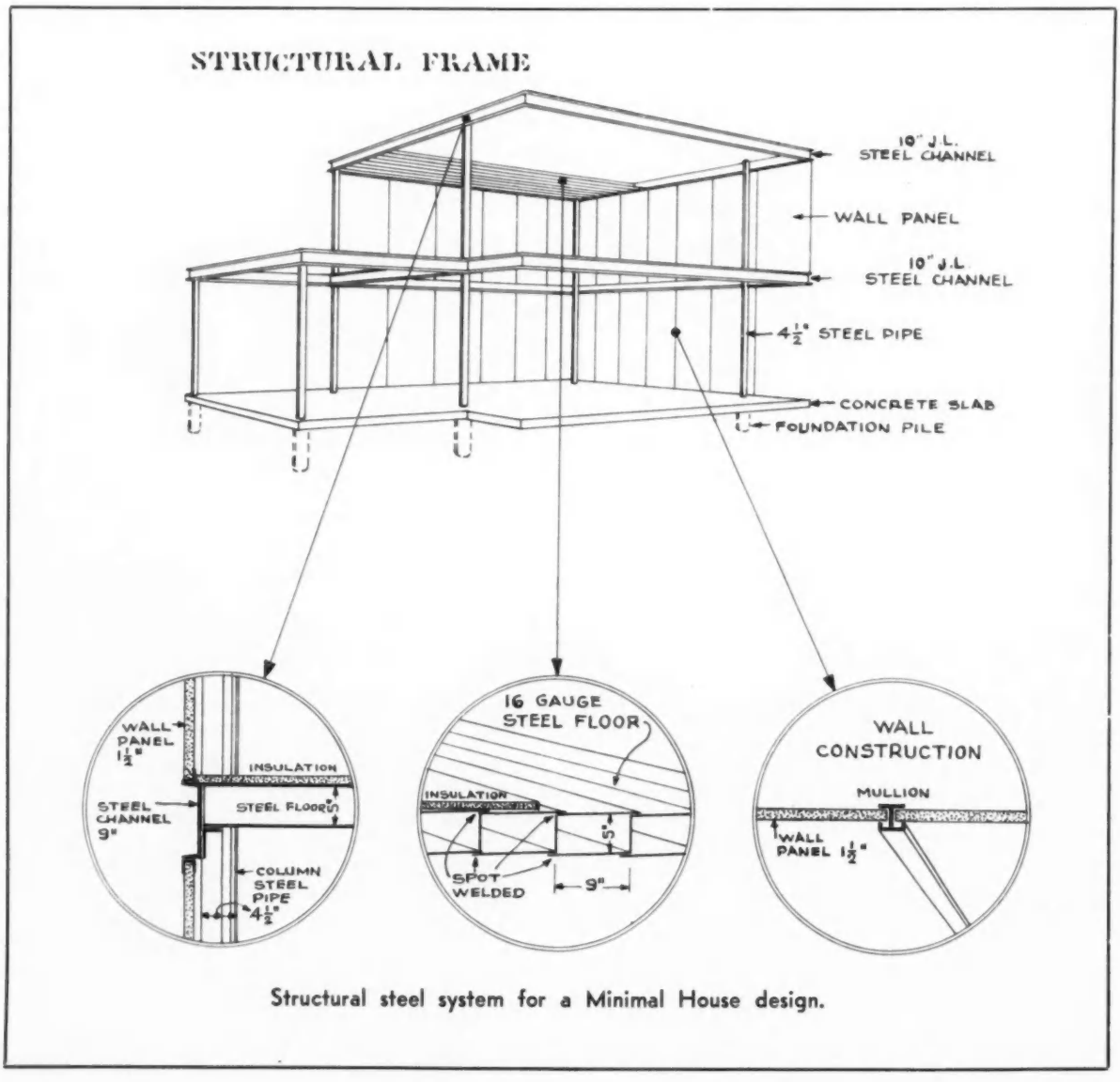
The Jury awarded a special prize of $30 to Harry B. Brainerd and Richard Smythe of Manhattan: "Messrs. Brainerd and Smythe have assumed that temporary buildings closely adjacent to the park strip may retard the ultimate development, and apparently for this reason have come forward with one of the unique suggestions of the competition. They advocate the creation of a border strip of park of virtually uniform width. They suggest placing directly in this park, spaced at wide intervals, tall apartment towers. As the demands of population increase they suggest the introduction of additional towers or intensively planned buildings in the intervening open areas. The Jury believes this suggestion is worthy of further investigation and study. No stores are shown fronting upon the Boulevard. The shopping zones are placed well back from the line of travel. The Jury believes that this treatment sacrifices potential commercial value and makes approach to stores and business centers unnecessarily difficult. While appreciating the merits of the suggestion offered, the Jury questions the advisability of depending entirely upon residential incomes on the Boulevard frontage."



Stran-Steel structural members of metal lumber type formed from long lengths of 16-gauge (1/16" thick) strip steel. Some sections reinforced by bending back metal to form two-ply flanges.



J. & L. junior beam residence floor construction. One end rests on bottom flange of main member, the other on foundation wall. Stirrup hanger is not fixed and requires no fabrication.



Structural steel system for a Minimal House design.

STEEL IN RESIDENCE CONSTRUCTION

By F. T. LLEWELLYN and F. N. SPELLER

In the construction of residences, steel is being used to an increasing extent for many purposes. Its employment as framing provides a material that will not shrink, is inherently noncombustible, sanitary and rigid, resists the destructive attack of insects, and can readily be made permanent. More than one hundred different systems of steel framing have been recently developed, many of which have been incorporated in actual dwellings. These systems utilize material of varying kinds, such as rolled steel shapes, steel pipe and sheet or strip steel. Steel has long been employed for such collateral uses as roofing, lathing, trim, window sash, tinsmithing, piping, wiring and fencing. More recently applications of stainless steel have found a promising field in kitchen and bathroom equipment.

It is impossible to attempt in a single article a description of all the many ways in which steel enters into residence construction, hence this article is confined to certain special and less well-known aspects of the subject, principally in connection with the use of thin steel members, such as sheet or strip steel, in the framing and wall covering of residences.

When used for framing purposes members of thin steel should satisfy three principal requirements:

(1) Structural strength.
(2) Connectibility.
(3) Durability.

Structural Strength

It is to be noted that some systems of steel frame construction utilize members, popularly called metal lumber, made of thin steel supplied in the form of flat sheets or rolled strip, the sections subsequently being shaped by cold bending or rolling, with or without the aid of welding. The use of such members as joists is covered by the standard specification of the Steel Joist Institute. The employment of sheet steel for other types of framing, such as studs, girts and panels, is quite recent and the probable behavior of untested sections, whether employed alone as framing or combined with covering, is not known sufficiently well to warrant the formation at this time of definite rules for their use.

Up to the present very little information has been made available that will permit architects or engineers to prepare even a preliminary design that contemplates the use of new forms of sheet steel as structural members. It is well recognized that large unbraced areas of thin gauge material will buckle when subjected to bending and compressive stresses. The strength of such sections can be substantially increased if stiffened by flanging their edges.

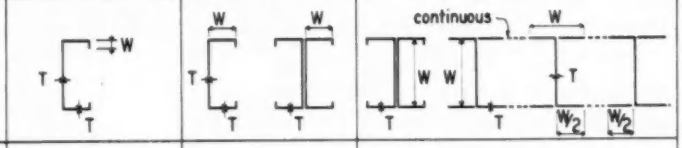
One of the most important questions concerns the width of the elements of the section which can be considered effective to resist bending or compressive stress. As a result of a study of representative American and European practice, the table on page 440 is offered as a tentative basis on which metal lumber designs may be computed for preliminary purposes. In each case the design should be checked by full-size tests before it is adopted for use.

Connectibility

The question of connectibility involves two features. The members must be connectible to each other, and they must be suited to the attachment of other enveloping material by means of nails, lath or masonry anchors. A number of methods for connecting sheet steel members to each other by welding or otherwise have been employed with a reasonable degree of success, but practice in this regard has not developed to a point where standardization of detail is indicated.

Sheet steel is readily weldable by either of the modern fusion processes—the electric arc or the oxyacetylene torch. In many cases the deposition of added filler metal from a welding rod or electrode is obviated by drawing metal from the sheets themselves. The electric resistance process is also very well suited to the welding of steel sheets by means of either spot or seam welds. For multiple shop work the resistance process is most efficient. For use in the field the resistance welding equipment is not usually so convenient on account of its weight and the inaccessibility of the parts to be joined. For this reason one of the fusion processes has been more popular for use in the assembly of sheet steel parts at the residence site.

The connection of sheet steel members to each other by means other than welding differs from practice in the case of rolled shapes in that with the former the thinness of the material greatly reduces the bearing efficiency of such mediums as bolts or rivets. Several ingenious methods have been devised with the aim of providing for the attachment of other material to sheet steel framing members. In the Stran-Steel system, which has been used in several residences in Detroit, and which is depicted on page 438, each member has two webs containing lengthwise corrugations which nest together in such manner that a nail driven between the two webs is securely clinched in place and to extract it a drawing force of 500 pounds

DEGREE OF FIXITY	One Edge Free One Edge Restrained	One Edge Restrained One Edge Fixed	Both Edges Fixed
LOCATION OF EFFECTIVE ELEMENT			
RATIO W/T	10	30	100

Tentative ratio of flat width (W) to thickness (T) of element to be assumed as effective in computing the geometric properties of individual sheet metal sections.

would be required. In the Hul-lo-wen system, which was followed in the construction of several other residences in the vicinity of Detroit, the sheet steel framing members were provided with prongs, either attached to or stamped out of the steel parts, which engaged the enveloping steel lath.

Durability

The question of the durability of sheet steel framing members involves primarily their resistance to corrosion. The extent to which resistance to corrosion may be predicted is best determined by a survey of actual experience. An unpublished study by F. H. Frankland, Director of Engineering Service, American Institute of Steel Construction, whose contents the authors are privileged to utilize, reports the results of an examination of many structures that have been in service for long periods of time, including inspections of buildings recently demolished on account of obsolescence. The conclusion is indicated that when steel is used for the framing of properly built residences it may be expected to offer a high degree of resistance to corrosion.

A very complete investigation of the actual resistance of steel framing in buildings was made by the late F. W. Skinner, consulting engineer, Brooklyn, N. Y. His conclusions are presented in an article entitled "Report of Investigations to Determine the Permanence of Structural Steel in Buildings," published in the May 20, 1927, issue of *The American Architect*. He states:

"It is found that under favorable conditions structural steel may exist for an indefinite period uninjured by corrosion. It is possible in all cases, where steel is a suitable material for use, to protect it so as to prevent corrosion entirely. The material will not corrode except under the continued presence of moisture and oxygen; and in dry warm air (this condition) is negligible except when exposed to (certain) acid fumes or gases.—The steel in the interior of dry, warm and clean buildings never corrodes and scarcely needs paint as a protection."

The Royal Insurance Building, 160 West Jackson Boulevard, Chicago, was constructed about 1901, and the Firmenich Building, 184 West Washington Street, Chicago, about 1905. In both structures the floor joists were composed of 20-gauge sheet steel. Mr. Knight, Deputy Building Commissioner in Chicago for the past 25 years, has stated that he has never heard of any trouble from corrosion in either building.

In 1907 a house was built for employees of the Tuxedo Park Association in which the wall and partition studs, as well as the floor and roof joists, were composed of sheet steel sections supporting stucco and plaster. It is reported that portions of the floors, roof and walls were opened up in 1932 for the purpose of making alterations, and that the steel sections, after 25 years' service, were found to be in as good condition as when they were installed.

The City Hall, Massilon, Ohio, was erected in 1909. The floor framing consisted of sheet steel joists supporting concrete and plaster. It is reported that a section of the floor was recently opened up for inspection, and that the steel joists "appeared to be in as good condition as when installed." This behavior is notable because in 1918 a leaky soil pipe had permitted water to drip on one of the joists. An inspection hole was left open and the condition of the structure examined periodically by a number of engineers who state that the joists were not corroded, although the metal lath was affected by corrosion.

The Elks Club, Tampa, Florida, was built in 1916. The floor joists are composed of sheet steel. Most of the first-floor area is not more than three feet above the ground. It is reported that a recent inspection disclosed no signs of corrosion in the steel.

When the Madison Square Garden building was demolished in 1925, the structural iron and steel was found to be almost free from corrosion after thirty-five years' service, except in a portion of the tower where copper sheathing, which was supposed to protect the steelwork, had been perforated by corrosion. No particular care was taken to maintain the structural framework, most of which received little or no attention during the life of the building*.

Protective Coatings

An analysis of all available information indicates that when steel, at the beginning of and during its service in a structure, is subjected to warm and dry air, a thin but hard and dense oxide film is formed which affords very efficient protection against corrosion. The resistance of steel to corrosion from ordinary atmospheric exposure is considerably

*"Corrosion of Structural Steel," Speller, F. N., American Iron & Steel Institute, October 22, 1926.

increased by giving the metal a small content of copper. The use of adequate protective coatings, such as paint, is always desirable. Stainless steel, of course, requires no coating.

As indicated from experience in several steel frame buildings over 30 years old, some of which is cited above, the life of such structures has been found to be well beyond their period of usefulness without any special attention to maintenance or precautions for the protection of the metal, although a relatively small proportion of certain structures have suffered considerable damage where the metal was exposed to water or other solutions. Therefore, it is reasonable to assume that the same system of painting (three coats) that has proved successful on steel framework is all that is necessary for the protection of interior sheet metal construction; but adequate precautions should be taken to prevent access of moisture to such parts. An examination of the paint on several structures demolished after 35 years' service has shown the coating to be in good condition where not exposed to unusual corrosive conditions. The red lead paints apparently have given the best record so far. Leaks in steel or water pipe or in the roofing should be repaired without delay.

In applying paints the surface should be free from all dirt and loose scale and in a dry condition. The priming coat should contain an inhibitor, such as lead or zinc chromate, red lead, white and blue leads, or zinc oxides. Either the spray or the brush method of application will give good results in skillful hands.

Enameled Sheet Steel

The use of sheet steel to form the wall covering of permanent residences is comparatively new. Of course, galvanized corrugated steel has been used to envelop industrial buildings for many years, and the employment of this material as a covering for residential and other structures in tropical countries is common practice. In recent years vitreous enameled sheet steel has been used for the exterior surface of a number of residences in Europe. In the United States, however, the year 1932 appears to have seen the first attempt to utilize enameled sheet steel for this purpose in residences where permanence and attractive appearance are essential. The first house so covered was designed by Charles Bacon Rowley and Associates in Cleveland, Ohio. The exterior wall finish is 24-gauge ferro-enamel shingles, in two colors, backed with asphalt roofing felt made up in units 36 inches long. These units are attached to 1-inch *ferroclad* which in turn is supported by the structural steel frame of the residence.

In recent decades the ancient art of enameling on metals has been revived and a remarkable development in the application of enameled steel has resulted in the many uses that are familiar to all readers. This development is one of the few that have continued on through the depression. Enamel coatings lend themselves to many designs and colors. They offer an almost unlimited selection of color, texture of finish, and durability and are easily kept clean.

Porcelain enamel is a form of glass fused onto metal, either sheet steel or cast iron, at high temperatures. The materials consist of various silicates and borates.

These are introduced into a "smelter" and "boiled" at temperatures of approximately 3,000° F. for about eight hours. The white-hot liquid flowing from the furnace is discharged into cold water, hardening the enamel-glass and shattering it into fine pieces.

The glass is then placed in a mill and subsequently ground to the fineness of thick paint. This is sprayed under pressure onto the part that is to be finished in porcelain enamel. The piece receives first a layer of "ground coating" enamel. It is dried, placed into the burning oven, and fired at a temperature of approximately 1,500° F., which fuses the enamel. After cooling, one or two cover-coats are applied in the same way and the result is a hard, smooth lustrous surface which has the beauty of glass and strong adhesion to steel.

Ferro-enamel shingles have been found to be in excellent condition after ten years' service in Detroit. There are porcelain enameled signs in use in this country today which have been exposed out-of-doors for thirty years and are still in excellent condition. Under stress, enamel adheres firmly to the steel up to the point where the metal is distorted beyond the elastic limit.

Quite recently enameled sheets have been used to a considerable extent for the facing of interior walls and the exterior of store fronts in conjunction with bronze trimmings. Such a job is the Beck Shoe Store at 14th Street and Broadway; also the Silvers Restaurant on Chambers Street, New York City.

Newell

House of Dudley Clawson, Cleveland, designed by Charles Bacon Rowley and Associates, architects. Roofing and exterior walls of buff ferro-enamel shingles with green belt courses. Structural steel wall framing sheathed with ferro-clad panels.

Synthetic Resin Surfacings

Considerable improvement has been made in paints and lacquers during the past few years with respect to their resistance to weather conditions. During recent years many synthetic resins have been developed. Some of these are now employed extensively in the paint and varnish industry. One of the most prominent of these is glycerin phthalate. Glycerin phthalate resins, when properly modified and dissolved in suitable solvents, are pigmented with highly opaque pigments, and used for quick drying paints. These paints have exceptional durability and are widely used for special products, such as automobiles, fabricated equipment, gas stations, and the like. Their brushing properties are usually not as good as those of linseed oil paints, and their cost is somewhat higher. They have, however, an excellent field as they are considerably more durable than linseed oil paints. Clear coatings made of phenol-formaldehyde resins and modified phenolic resins are used extensively in the production of clear varnishes. These products, when pigmented, form the basis of four-hour enamels which are widely used for decorating furniture, floors and interior equipment. They are quite water-resistant and durable. Resins with a vinyl acetate base, a base of paratoluene sulfonamid, and resins of other complex characteristics are now widely employed in the making of special nitrocellulose lacquers or for other purposes.

Alloy Steels

Various stainless steels have found successful application in architectural work, but by far the most important of these is the 18-8 chrome-nickel steel alloy. When exposed to the atmosphere this metal has an almost indefinite life due to the formation on the surface of an invisible resistant film that is self-healing when injured. The original silvery luster of the metal is retained very well, but it is desirable to wipe off dust and dirt occasionally and prevent moisture from collecting in pockets. Steel of the 18-8 type has a yield point of 40,000 pounds per square inch, an ultimate strength of 90,000 pounds per square inch, and an elongation of 60 per cent in 2 inches. It can be former by all the methods commonly used in working soft steel and nonferrous metals: it can be hot forged, bent cold, spun, machined, and welded without difficulty.

This metal is now being offered in various standard forms including sheets, plates, tubes, bars, strips, wires, nails, and castings. It can also be obtained in various fabricated forms in which steel is commonly used. In fact, 18-8 is now available in all the forms in which commercial metals and alloys are used in building construction, with the exception of extruded moldings. This and other ferrous and nonferrous alloys and vitreous enameled steel lend themselves to the working out of artistic designs. In combining metals having wide differences of potential it is important to avoid access of water to the joints as this may result in local discoloration from electrolytic action.

Classification of Plates and Sheets

The curious may ask, "What is a steel sheet and how does it differ from a plate?" If classified only by dimensions, steel sheets somewhat overlap steel plates. The government ruling that for certain purposes the thickness of a sheet, to be classed as such, shall not exceed No. 10 U. S. Standard Gauge, which weighs 5.625 pounds per square foot, and is approximately 9/64 inch thick, does not always accord with the general practice of the trade. As a rule, 3/16 inch is about the least thickness that can be produced as a plate. A better basis of classification is the difference in the manner in which the material is manufactured. This difference is due in part to the different uses to which the two classes of material are put, and in part to the refinements in practice that accompany the production of thin material. In the case of steel plates strength and ductility are the chief requirements, whereas in the case of steel sheets the surface finish, for architectural and other purposes, may often be an additional controlling factor.

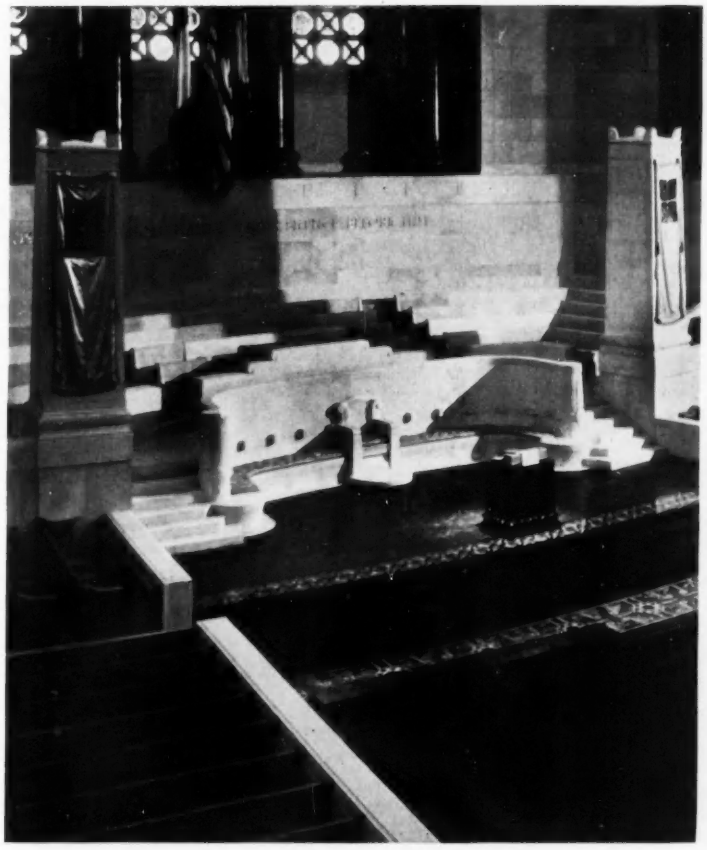
Steel sheet metal is produced either on a sheet mill or on a continuous strip mill. In a sheet mill the material is hot rolled in packs of two or more thicknesses, depending on the gauge. These packs are subsequently separated into individual sheets. In a continuous strip mill, which operates at a much higher speed, the material is rolled as a single long strip to be subsequently sheared to the required lengths.

In both methods the sheets are subjected to supplemental processes depending on the purpose for which they are to be used. The commonest finish, blue annealed, is secured by annealing in an "open furnace." This operation of course does not remove surface scale. If a cleaner surface is desired the sheets are pickled one or more times. Either normalizing or box annealing is employed, in the case of the lighter gauges, to provide proper ductility. Leveling, by either the roller or the stretcher method, is used to secure flatness. Cold rolling is employed to provide a smooth surface finish.

In order to protect the surface the metal may be galvanized, terne coated or painted at the mill. Sheet mills also do such standard forming operations as corrugating, crimping and curving. Other forming is usually done at sheet metal shops. The process of enameling is performed by concerns specializing in work requiring an enamel finish.

SPECIAL EQUIPMENT AND SERVICES EMPLOYED IN THE GIRARD COLLEGE CHAPEL

THOMAS, MARTIN & KIRKPATRICK
ARCHITECTS



ROSTRUM OF GIRARD COLLEGE CHAPEL, PHILADELPHIA

SOUND CONTROL AND VOICE REINFORCEMENT

IN THE GIRARD COLLEGE CHAPEL

FROM the rostrum of the new Girard College Chapel the speaker's voice, even in conversational tone, is clearly audible from every seat. It is so faithfully reproduced that a group of auditors intimately acquainted with the speaker are unable (1) to discern whether his voice is aided mechanically or (2) to detect any source of sound other than the speaker. This implies not only faithfulness of reproduction but clarity in transmission with no hum or other extraneous noise. All components are, moreover, completely concealed.

Equally faultless control and transmission of both organ and choir music have also been achieved. In the Girard Chapel as in each of the churches and auditoriums listed at the right, electro-acoustical engineering was planned and the necessary equipment of specific design manufactured and installed by Bludworth, Inc., no standardized apparatus being used. Complete satisfaction with the acoustical result is written into all Bludworth contracts.

Where similarly excellent results in sound control and reinforcement are desired, the electro-acoustic engineer should be engaged when *initial* plans for the building are in progress.

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PRINCETON UNIVERSITY CHAPEL
Princeton, N. J.

OLD TRINITY CHURCH
New York City

EAST LIBERTY PRESBYTERIAN CHURCH
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WORCESTER MUNICIPAL MEMORIAL AUDITORIUM
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CONSTRUCTION OUTLOOK IS IMPROVED

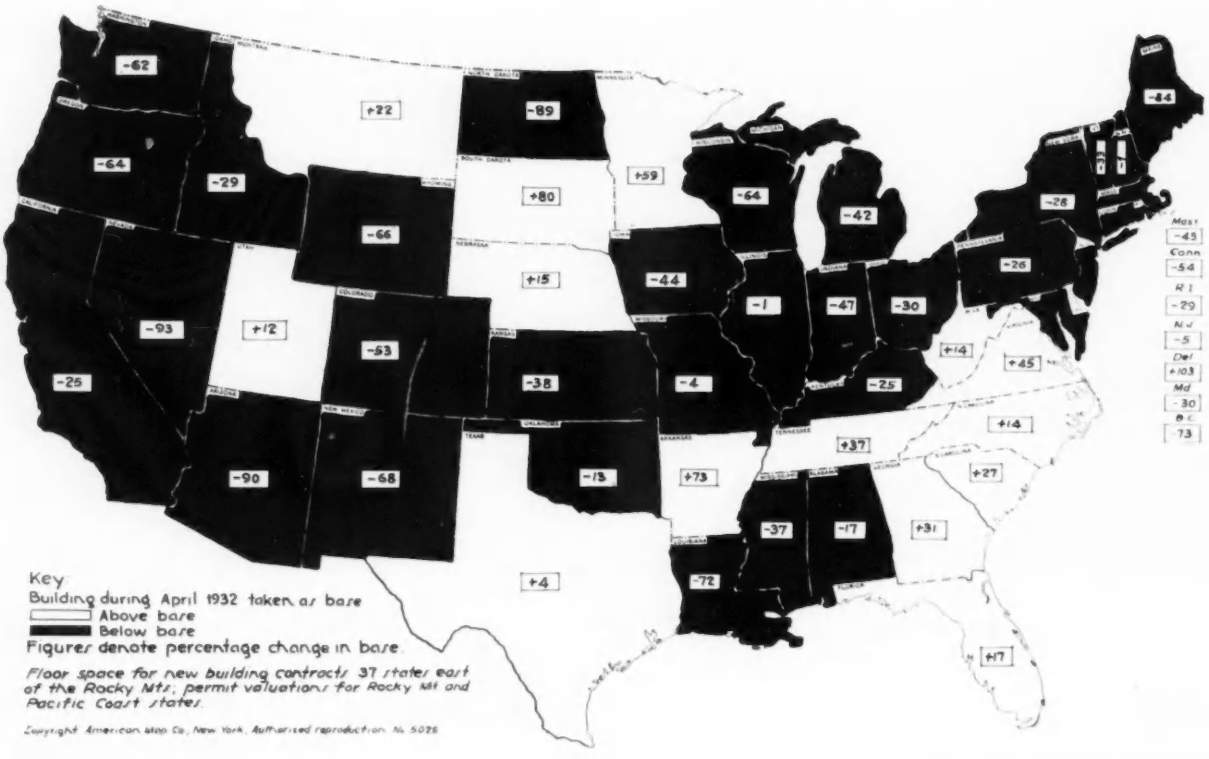
By L. SETH SCHNITMAN

While residential building at the moment is the most important single branch of all privately-financed construction, attention should be directed to the fact that all privately financed work is now showing sizable improvement. At the same time publicly-financed construction of all types has recently been moving downward as compared with the upward trend in private work, largely because of unavoidable delays in perfecting the newly-planned governmental program which is now under consideration in Congress. It appears reasonable to assume, however, that soon the trend of publicly-financed construction will be upward. This, together with a rising trend in private works that is likely to continue for the nearby months, should provide a substantial recovery in the curve on total construction contracts.

Now that the government is committed to the policy of raising prices it appears reasonable to assume that a further firming in building material prices is likely. If this occurs it will doubtless stimulate residential building in those areas where an accumulated demand has arisen which could not reasonably have been expected to be satisfied on a declining price trend. This appears especially true in the case of small houses for owner occupancy and for alterations and modernization of all descriptions.

Privately-financed construction work of all types contracted for in the 37 eastern States during 1932 totaled $583,491,300. Although the total of such work for the first five months of 1933 was about 37 per cent behind the corresponding period of 1932, it appears probable, in the light of recent improvement in industry and business, that for the full year 1933 privately-financed construction will not be nearly so far below the 1932 volume as would appear from the record to date.

Publicly-financed construction contracts of all types, i.e., work undertaken by governments—local, state and national—totaled $767,667,400 during 1932 in the 37 eastern States. There is now good reason, as indicated above, to believe that for this division the 1933 contract volume may approximate the total for 1932, even though the total for the first five months of the current year was at a rate almost 40 per cent behind the total for the corresponding period of 1932. It is thus seen that the construction outlook as a whole is substantially better than it was a few weeks ago.



BUILDING TRENDS AND OUTLOOK

By L. SETH SCHNITMAN

The April building map made a very creditable showing. Thirteen states reported a gain in floor space as contrasted with April contracts of last year. It is of significance to note, in addition, that nine of the states to show gains were contiguous: Virginia, West Virginia, the Carolinas, Georgia, Florida, Tennessee, Arkansas and Texas and that, of the remainder, three additional were contiguous: Minnesota, South Dakota, and Nebraska. This showing is by far the most favorable that has been seen since the Spring of 1930.

From the contract record for the first three weeks of May covering the 37 Eastern States it appears probable that the May map will show at least as good results as those depicted above for April. The most encouraging fact of the present improvement is to be found in the residential field where improvement in the past has signalled general betterment in construction at large. For residential building, returns on contracts for the first three weeks exceeded the full month of April and were at a rate that would indicate a moderate gain over May, 1932. This is the first increase over the corresponding month of a year earlier since the Spring of 1931 and appears as a forerunner of similar monthly advances for most of the remaining months of 1933.

MATERIAL PRICE MEASURING ROD*

The prices in this tabulation enable one to visualize at a glance the main trend of the material market. Their significance does not extend beyond that point, and the explanation below should be read carefully.

F. W. Dodge Corporation Composite Prices as Indicated in Explanation—

Material	This Month	Month Ago	Year Ago
Portland Cement	$2.08	$2.05	$2.00
Common Brick	11.72	11.68	11.93
Structural Steel	1.60	1.60	1.60
Lumber	15.51	15.50	15.85

Prices given in this comparison are composite and do not in all cases refer to one item. For instance, the price of structural steel is the composite of prices of shapes and plates f.o.b. Pittsburgh; the price of lumber is a composite of five items of Southern pine and five items of Douglas fir f.o.b. mill; the price of cement is a composite of prices in fourteen different cities per barrel, carload lots, to contractors; price of brick is composite in fourteen cities per M, delivered on the job.

*As previously published in *General Building Contractor*.

Modernize *with* Air Conditioning

Made-to-Order Climate

You may have an office building, a theatre, a store or other large structure to modernize so that it offers attractions comparable to those found in more recently constructed buildings. The usual procedure, and it is a reasonable one, is to adopt from more modern buildings whatever improvements in design or equipment can be applied to the out-moded structure. It is possible by that procedure to approach, even duplicate, the attractions of newer buildings. But never by this "copying" method can the remodeled building surpass the modernity of newer buildings.

Air conditioning oversteps that limitation. The store, the theatre, hotel, office building, that is equipped with air conditioning is more modern in atmosphere and appeal — no matter what the date of its dedication — than any similar type of building that is not equipped to control its air supply... Many so called modern buildings are equipped with imperfect air conditioning apparatus or were originally designed with no provision whatever for air conditioning. Here, then, is an opportunity for including in the *modernized* building an attraction that is available in only the newest of buildings!

There are many Sturtevant air conditioning units and types of apparatus which afford the selection of equipment which will be correct for the specific application and results. These are available for either unit or central system operation. One of our engineers will be glad to advise which unit or type of apparatus is best adapted for your particular problem.

Without obligation write and have one of our engineers come and talk with you.

Sturtevant Cooling and Air Conditioning Corp., a division of B. F. Sturtevant Co., is organized for engineering and installing complete systems in both the Comfort and Industrial fields.

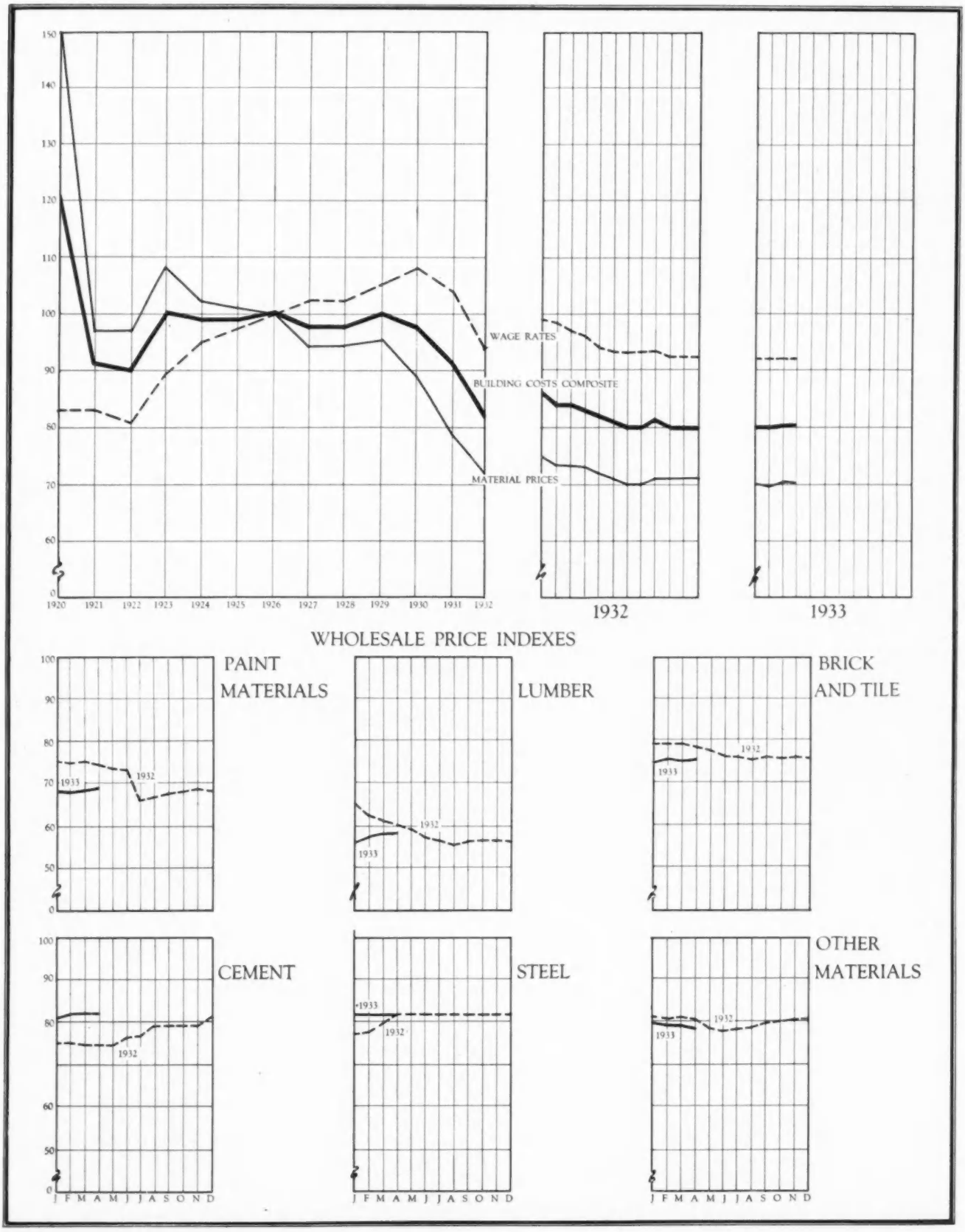
B. F. STURTEVANT COMPANY

Specialists in complete air conditioning with refrigeration since 1912

HYDE PARK BOSTON MASSACHUSETTS

MATERIAL PRICES, BUILDING WAGE RATES AND BUILDING COSTS COMPARED

1926 Monthly Average = 100



ADORNED WITH UNAGING BEAUTY

The possibility of combining airy, slender grace and beautiful, polished surfaces, with adequate strength for structural demands, is strikingly illustrated in the stairway and balcony railings of Rockefeller Center Music Hall. Here service and beauty have been made imperishable by the use of NATIONAL U S S 18-8 Stainless Tubes. The brilliant, silvery lustre of these seamless tubes of chromium-nickel alloy steel heightens the effect of other embellishments in this famed structure. To meet specific requirements, a variety of surface finishes, different shapes and a wide range of sizes and wall-thicknesses are available. NATIONAL engineers will gladly cooperate in determining the most effective application of this widely adaptable tubular material. Correspondence is invited.

[U S S Chromium-Nickel Alloy Steels are produced under the licenses of the Chemical Foundation, Inc., New York, and Fried. Krupp A. G. of Germany.]

NATIONAL TUBE COMPANY • PITTSBURGH, PENNA.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

ROCKEFELLER CENTER, New York City

Builders and Managers: Todd, Robertson, Todd Engineering Corporation and Todd & Brown, Inc., *Architects:* Reinhard & Hofmeister; Corbett, Harrison & MacMurray; Hood & Fouilhoux, *Mechanical Engineer:* Clyde R. Place. *All of New York City*

NATIONAL
USS
STAINLESS
AND HEAT-RESISTING
PIPE AND TUBES

WAGE SCALES IN THE BUILDING TRADES

Information Furnished by National Association of Builders Exchanges and Compiled by Division of Statistics and Research, F. W. Dodge Corporation, as of May 15, 1933

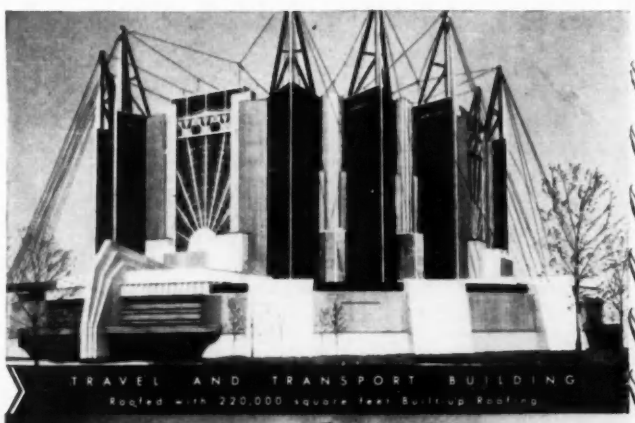
	Asbestos Workers	Bricklayers	Bricklayers' Tenders	Carpenters	Cement Finishers	Electricians	Hoisting Engineers	Iron Workers—Ornamental	Iron Workers—Structural	Laborers	Lathers	Painters	Plasterers	Plasterers' Tenders	Plumbers	Roofers—Composition	Roofers—Slate & Tile	Sheet Metal Workers	Steamfitters	Stone Masons	Tile Setters	Tile Setters' Helpers
Akron	$1.00	$1.25	$0.45	$0.70	$0.70	$0.75	$0.70	$0.60	$0.60	$0.40	*$0.87½	$0.65	*$1.00	$0.62½	$0.85	$0.80	$0.80	$0.80	$0.85	*$1.25	*$1.25	*$0.50
Atlanta	1.00	1.25 1.40	‡.30 .45	.70	1.25	.90 1.10	.60 1.00	.35 1.85	1.25	.25 .35	1.00 1.25	.75	1.25	.30 .45	1.25	.80	.80	.90 1.00	1.25	1.00 1.25	1.25	.40
Baltimore	1.00	*1.00	1.00	.65	*1.00	*1.00	*1.25	*1.37½	*1.37½	.20 .30	*1.25	.80 *.90	*1.25	1.00	*1.00	.75	.75	*1.12½	*1.00	1.00	1.25	.72
Boston	1.25	*1.30	.70	*1.17½	1.17½	*1.25	1.17½	*1.20	*1.20	.70	*1.25	*1.12½	*1.37½	*.95	*1.25	*1.17½	*1.05	1.17½	*1.25	*1.30	*1.30	*.95
Buffalo	1.12½	*1.12½		*1.00	.90	*1.00	1.00	1.12½	1.12½	.30 .40	1 0	*1.00	1.00		1.00	.40 .50	.60 1.00	.60 1.00	*1.00	*1.12½	*1 18¾	
Chicago	1.37½	*1.37½		*1.31¼	1.31¼		1.31¼			.82½	*1.37½		*1.37½		1.37½	1.37½	1.40	1.37½	1.37½	1.37¼	1.37½	1.00
Cincinnati*	1.15	1.37½	.70	1.20	1.02½	1.25	.80 1.25	1.25	1.25	.45	1.31¼	1.15	1.37½	.70	1.25	.92½	1.07½	1.07½	1.25		1.25	
Cleveland*	.80 1.17½	1.00 1.37½		.90 1.12½	.90 1.12½	1.00 1.37½	1.12½	1.00 1.25	1.00 1.25	.57½ .72	.85 1.37½	.80 1.12½	.99¾ 1.37½		1.25	.66 1.15	1.00 1.37½	.90 1.12½	.90 1.25		.80 1.25	
Columbus	1.00	1.30	.62½	.80	.80	1.00	1.15	1.25	1.25	.40	1.00	.80	1.00	.62½	1 00	.80	1.00	.80	1.00	.75	1.25	.50
Dallas††	10.50	10.00	.50	8.00	10.00	*11.00	10.00	10.00	0.00	.35	10.00	*9.00	*10.00	*.50	12.00	8.00	9.00	*10.00	12.00	10.00	*12.00	†*.75
Dayton*	1.25	1.30	.80	1.00	1.15	1.55	1.25	1.35	1.35	.35	1.10	1.00	1.25	.80	1.15½	.85	1.00	1.00	1.15½	1.30	1.50	.60
Denver††	9.00	12.00 *13.00	6.50 7.00	10.00	10.00 11.00	10.00 11.00	10.00	10.00 11.00	10.00 11.00	4.00 5.00	11.00	*10.00	12.00	7.00	11.00	7.00 8.00	7.00 8.00	9.00	9.50	12.00 13.00	10.50	†.62½
Des Moines	1.00	1.25	.65	1.00	1.00	1 00	1.00	1.00	1.00	.55	1.00	1.00	1.25	.75	1.25	1.12½	1.12½	1.12½	1.25	1.50	1.25	.80
Detroit	1.37½	1.25 max.	.55 .60	.80 1.00	.70 .90	1.25 1.40	.60 1.00	1.00 1.20	1.00 1.25	.50 .55	1.37½	.80 1.00	1.00 1.25	.70 .80	1.00 1.50	.70 .90	.80 1.00	.80 1.00	1.25 1.50	1.25 1.50	1.00 1.25	80
Duluth	.85	1.00	.35 .45	75	.75 .85	.90	.80	.80	.90	.35 .45	.85	.75	1.10	1.00	1.00	.70	.70	.75	.95	1.00	1.25	.80
Erie	.80 .90	1.31¼	.50 .60	.75 1.00	1.00	1.00 *1.15	1.12½	.60 .90	1.10 1.12½	.35	1.12½	.75 .90	1.31¼	.50 .60	1.18¾	.60 .70	1.00	1.00	*1.18¾	1.31¼	1.00	.50 .60
Grand Rapids	.65 .80	1.25	.40	.60	.65	.90	.75	.80	1 00	.35	.80	.60	.80	.40	.90	.50	.70	.70	.90	1.25	1.25	.50
Houston	1 00	1.00		1.00	1.00	.95	1.00			50	1.00	.62½	1.00		.75	60	1.00	1.00	1.00	1.00	1.00	
Indianapolis	1.32½	1.62½	.90	1.22½	1.17½	1.50	1.37½	1.45	1.45	.40 .45	1.37½	1.25	1.57½	1.00	1.00	.60 .90	1.27½	1.22½	1.50	1.62½	1.50	.60
Kansas City	.90	1.32½	.80	1.00	1.00	1.00	1.00	1.00	1.00	.60	1.00	1.00	1.06¼	.80	1.00	.92½	.92½	1.00	1.00	1.12½	1.25	.62½
Los Angeles††	10.00	8.00	6.00	7.00	8.00	7.00	8.00	9.00	10.0 0	4.00	10.00	7.00	9.00	6.00	9.00	7.00	7.00	8.00	10.00	8.00	6.00	†.75
Louisville	1.12½	1.00	.50	.80	1.00	1.00	1.00	1.00	1.00	.25 .35	1.12½	.90	1.00	.50	1.12½	.30 .50	.85	.85	1.12½	1.25	1.00	.50
Memphis	1.00	1.37½	.50	.50	.50	1.00	.75	.75	.75	.20	1.00	.75	1.25	.50	1.25	.25 .40	1.12½	1.12½	*1.25	1.37½	1.25	.50
Milwaukee	1.00	1.00	.90	.85	1.00	1.25	1.15	1.05	1.05	.50	1.00	1.00	1.00	.90	1.00	1.00	.92½	.92½	1.00	1.00	1.00	.65
Minneapolis	1.06¼	1.10	.55 .65	.75 .85	.75 .85	.90	.80	.90	.90	.45	.75 .85	.80	1.10	.70	.95	.70	.70	.80	.95	1.10	1.25	.65
Nashville	1.00	1.00		.65		1.00				.30	1.00	.80	1.00	.30	1.00	.65	.65	.65	1.00	.90	1.25	
New Haven*		1.20	.50 .60	.80 1.06¼	1.20	.80 1.00	1.16¾ 1.27½	1.37½	1.37½	.45 .60	1.27½	.80 1.00	1.20	.50 .60	1.06¼	.65	1 50	1.06¼	1.06¼	1.20	1.20	
New Orleans	.65 .80	1.25	.85	.55 .75	1.00	1.25	1.25	1.25	1.25	.35 .50	1.25	.75 .90	1.25	.75	1.00 1.25	.40	.90 1.15	.90	1.05 1.25	1.50	1 25	.35
New York City††	11.20	13.20	8.00	11.20	c11.20	11.20	13.20	11.20	13.20	6.60	11.20	11.20	12.00	8.50	c12.00	10.28	12.62	11.20	11.20	13.20	11.50	8.50
Oakland††	6.40	9.00	5 60	7.20	7.20	8.00	9 00	7.20	9.60	5.00	8.00	7.00	8.80	6.00	8.00	7.90	7.00	7.50	9.00	9.00	8.00	5.00
Oklahoma City††	8.00	8.00	4.00	6.00 8 00	8.00	6.00 8.00	8.00	8.00	8.00	3.50	.80	7.00 8.00	.80	4.00	.80	6.00	6.00	8.00			11.00	†.62½
Omaha	1.32	1.00	.45	.80	.90	1.00	1.00	.90	.90	.35	1.00	.80	1.00	.45	1.00	.72½	.87½	.87½	1.00	.90	1.00	.50 .60
Philadelphia	1.00	1.50		1.00	1.05	1.25	1.18½	1.37½	1.37½	35 .40	1.37½'	.80	*1.37½	.90	1.04	1.00	1.25	1.25	1.04	1.25	1.25	
Pittsburgh	*1.50	*1.50		*1.25		*1.56¼	1.37½ 1.43¾	*1.37½	1.37½	.10	*1.50	*1.18¾	*1.50		1.50	*1.25	*1.50	*1.31¼	*1.50	*1.40	1.33¾	88.
Portland, Ore.††	8.00	*9.60	7.20	7.20	*7.20	*8.00	6.40 9.60	8.80	8.80	7.20	*8.80	7.04	*9.60	*7.20	*8.80	7.20	7.20	*8.00	*8.80	*9.60	8.00	6.40
Reading	.70 .80	.90	.75	.75	.85	.75				.35	.75	.70	.85	.75	.90		.80	.80	.90	.75	.90	.50
Richmond	60 .65	1.25		.50	1.00	.80	1.25	1.50	1.50	.20 to .50	1.25	60	1.00		1.00	1.00	1.00	1.00	1.00	1.25	1.25	.35 to .50
Rochester	.91	1.12½	.55	*.90	*1.12½	*1.15½	.90	.70-*1.00	.70-1.00	.55	.90	*.90	*1.12½	.55	*1.06¾	*.80	*.80	.90	*1.06¾	*1.12½	1.12½	.47½
Salt Lake††	6.50 7.20	2.00	.62½	.90	1.00	1.00	1.00	1.00	1.00	1.50	8.00	7.00	1.25	.80¼	1.00	.90	1.00	1.00	1.00	1.12½	8.00	4.00
San Antonio††	6.00 10.00	6.00 10.00	2.00 3.00	2.00 7.00	3.00 8.00	3.00 7.00	4.00 7.00	1.75 4.50	5.00 10.00	1.50 2.50	4.00 7.00	3.00 7.00	4.00 8.00	2.00 3.00	5.00 8.00	5.00 6.00	4.00 6.00	3.00 7.00	5.00 8.00	3.50 8.00	4.00 10.00	2.00 3.00
San Francisco	6.40	9.00	7.00	7.20	7.20	9.00	9.00		9.60	5.00	8.00	7.00	8.80	7.50	8.00	8.00	8.00	7.20	8.00		8.00	5.00
Seattle††	8.00	9.60	5.28	7.20	7.20	*8.80	8.00	8.00	8.80	4.75	*8.80	*4.50	*9.60	*6.40	*8.80	7.20	7.20	8.00	*8.80	9.60	8.00	
Sioux City	.90	1.00		.75	.75	1.00		1.00	1.00	.35	.90	.60 .90	1.00		1.00	.60 1.00	.60 1.00	.90		1.25	.60 1.00	
St. Louis	1.25	1.50	1.00	1.25	1.31¼	1.67½	1.35- 1.47	1.47	1.47	.78¾	1.25	1.25	1.50	1.06¼	1.43¾	1.17½	1.25	1.25	1.43¾	1.25	1.25	.76½
St. Paul	1.18	1.10		.75 .85	.75 .85	.90	.80	.90	.90	.45	.75 .85	.80	1.10	.70	.95	.70	.70	.80	.95	1.10	1.25	
Washington, D.C.	*1.50	1.75	.50 .75	*1.37½	1.25	*1.65	*1.37½	*1.65	*1.65	.75	*1.62½	*1.37	*1.75	*.75	*1.50	*1.37½	*1.37½	*1.50	*1.50	*1.25	*1.50	.75
Wichita	.60	.75 1.25	.25 .40	.40 .75	.40 1.00	.50 .87½	.30 .75	.40 1.00	.40 1.00	.20 .40	.50 1.25	.50 .87½	.60 1.25	.25 .50	1.00	50 1.00	.50 1 00	.50 1.00	.75 1.12½	.75 1.25	.50 1.00	.25 .40
Youngstown††	*1.37½	12.00	6.80	10.00	9.00	11.00	10.00	12.00	12.00		12.00	10.00	12.00	6.80	11.00	10.20		10.00			10.00	.70

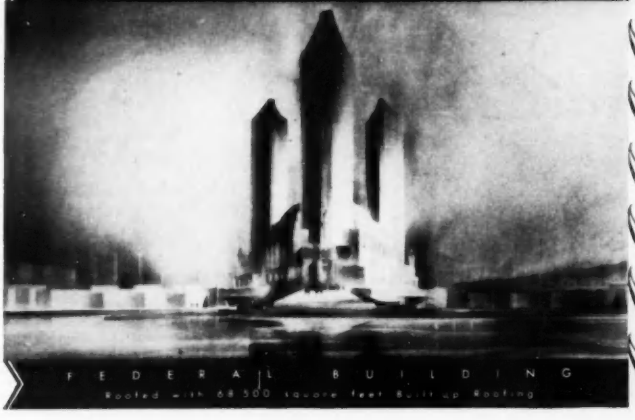
NOTE.—Where two figures are shown they are the minimum and maximum. All figures are for hour rates except as indicated. ††8-hour day. †Rate per hour. *On 5-day week basis. c Correction. Asterisk after city indicates all trades on five-day week basis.

ABOVE DATA ARE WAGE SCALES AND DO NOT NECESSARILY INDICATE ACTUAL WAGE RATES BEING PAID IN THE RESPECTIVE TRADES.

Paris . . . . . Wembley . . . . . Sesqui-Centennial, and now

"CENTURY of PROGRESS"





RU-BER-OID ROOFS

Protect Many Important Buildings

To date 10 Century of Progress Buildings totaling 653,500 square feet of roof area are RU-BER-OID Roofed • That RU-BER-OID Roofs have been chosen to cover many major buildings of the last four great international expositions is a tribute to RU-BER-OID'S many superior qualities • Regardless of where you may go, RU-BER-OID Products are recognized by exacting architects and builders as the acme of quality. Each product is the best that can be made at its price. Each fills a specific need in construction and modernizing—a line to fit the quality standards of the World's largest and finest buildings on down to temporary structures • A complete catalog of RU-BER-OID architectural products is listed in 1933 Sweets.

The RUBEROID Co.

Sales Divisions: **RUBEROID MILLS CONTINENTAL ROOFING MILLS—SAFEPACK MILLS—H. F. WATSON MILLS—ETERNIT MILLS**

Offices and Factories: **NEW YORK, N. Y.—CHICAGO, ILL.—MILLIS, MASS.—ERIE, PA. BALTIMORE, MD.—MOBILE, ALA.**

MANUFACTURERS' ANNOUNCEMENTS

ARCHITECTS ARE INVITED TO USE THE COUPON ON THIS PAGE AS A CONVENIENT WAY TO OBTAIN MANUFACTURERS' PUBLICATIONS DESCRIBING IN DETAIL THE PRODUCTS AND MATERIALS MENTIONED.

601

IDEAS FOR INTERIOR FINISH

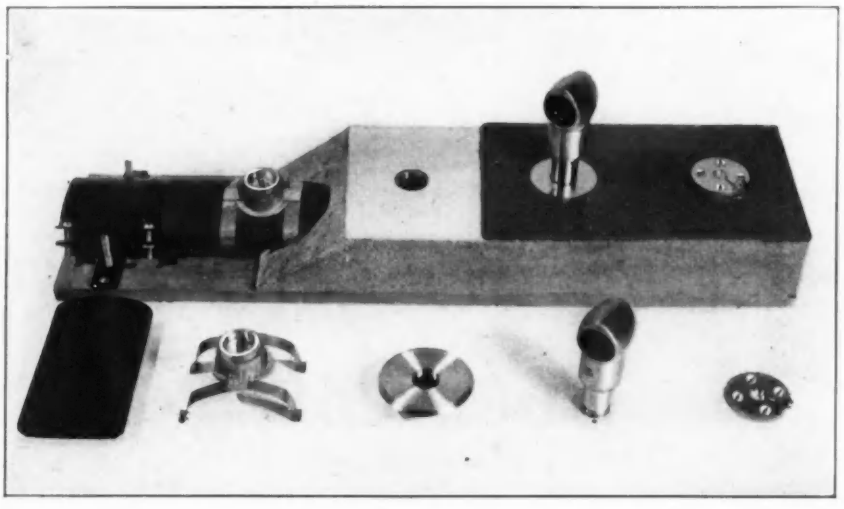
The Celotex Company offers a catalog of suggestions for wall and ceiling patterns, including designs and treatments of Celotex. The booklet, "Interiors that Speak of Charm and Comfort," is exceptionally interesting in pictorial presentation. Selected from the many examples scattered throughout the United States and various countries overseas, the pictures illustrate the wide use of Celotex in the home, the office and the factory as well as in public rooms. Most of the examples shown are applicable to various types of rooms as well as to the particular room illustrated. Since stencils, paint (both oil and water), and wall coverings are easy to apply over Celotex this illustrated booklet should prove helpful in arriving at a practical, economical solution of almost any problem of interior finish.

602

THERMOSTATICALLY PROTECTED MOTORS

A self-protecting motor which cannot burn out and yet carries overloads just as long as the motor itself is not in danger is announced by the Westinghouse Electric & Manufacturing Company. A small disc type thermostat mounted on the motor frame, opens the circuit when the motor gets too hot and connects it again after the motor has cooled. The motor is suited for automatically-controlled devices, such as refrigerators, oil burners, air conditioners, etc.

Because the thermostat is arranged to accurately gauge the temperature inside the motor, it lets the motor work as long as possible regardless of service conditions but removes it from the line when the temperature approaches a damaging value. The thermostat's operation depends upon a combination of the actual motor frame temperature and the line current through the motor. At each load up to the pullout point of the motor, there is a definite length of time required for the motor to reach the temperature which causes the thermostat to open its contacts removing the motor from the line. The higher the overload the sooner the motor disconnects itself. The motor even takes into account different ambient temperatures, carrying a given overload longer in a cold room than in a hot one.



THE GENERAL ELECTRIC "PRELOKAYLET"

This device clamps on the Duct at the factory or on the job before pouring the concrete. A magnetic finder locates the center pin of the Prelokaylet even when concealed by a floor covering. This device permits the installation of outlets for telephone or lighting circuits quickly, neatly, safely and economically.

603

RADIO DOOR

The Barcol OVERdoor, a product of Barber-Colman Company, is a sectional upward-acting garage door which opens and closes by picking up a code signal that is broadcast from a small auto-

To Obtain Further Information

about any products mentioned, indicate the number or name of product and send to THE ARCHITECTURAL RECORD, 119 West 40th Street, New York, N. Y.

.....

.....

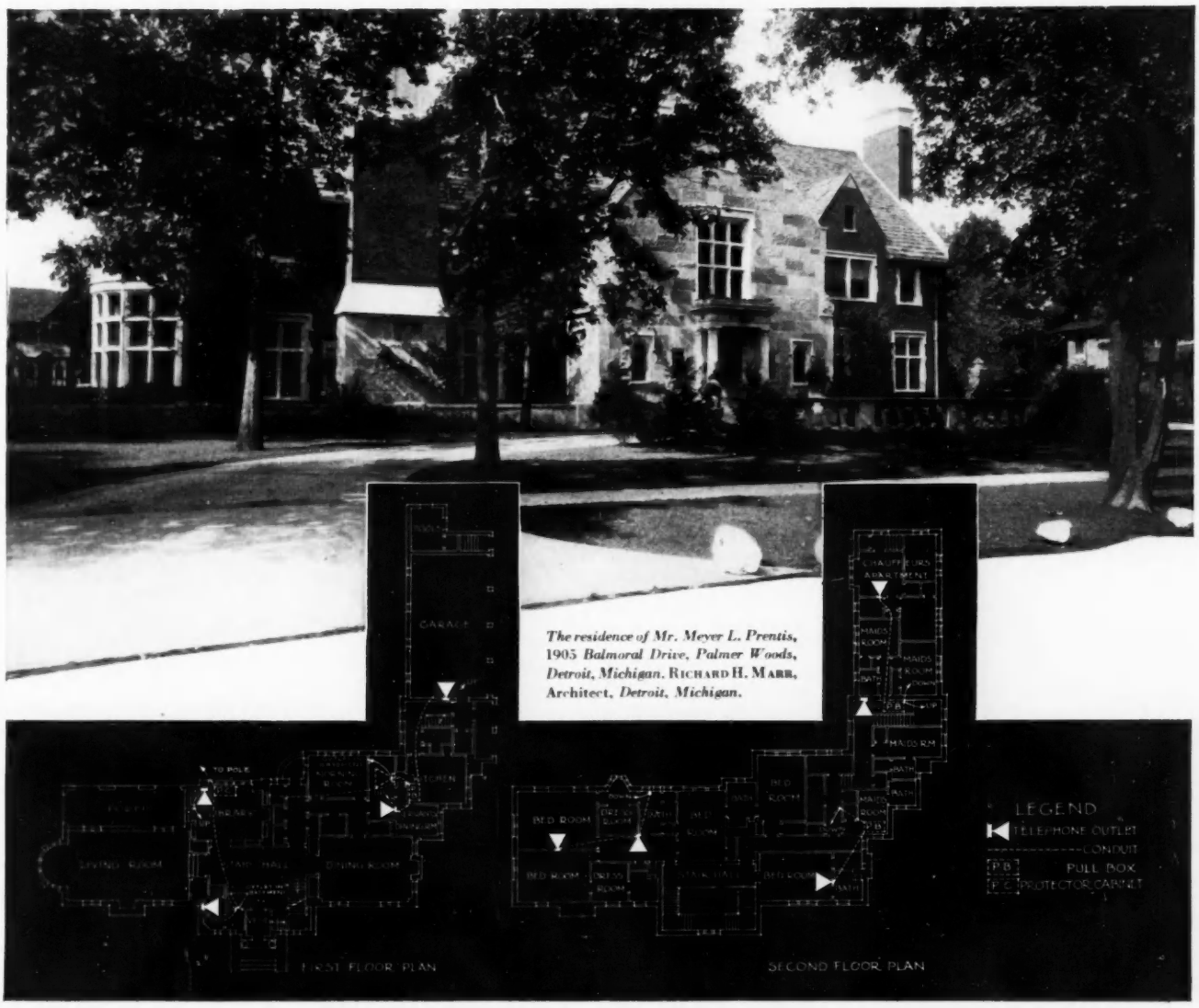
.....

Name .....

Street Address .....

City and State .....

THE TELEPHONE COMPANY HELPED PLAN THIS HOUSE



The residence of Mr. Meyer L. Prentis, 1905 Balmoral Drive, Palmer Woods, Detroit, Michigan. RICHARD H. MARR, *Architect, Detroit, Michigan.*

THE telephone arrangements for this distinctive Detroit residence were carefully worked out in advance, with the help of the local telephone company. Outlets were located at eleven strategic, step-saving points throughout the house and the necessary conduit included in walls and floors during construction. All eleven stations are linked by a Bell 750-A dial intercommunicating system, and there are two central office trunk lines.

Intercommunication makes it possible to talk from room to room, or to the outside world, over the same instrument, with equal ease. The household runs more smoothly—with less waste of time and energy. The number of outlets installed takes care of present needs, anticipates future requirements and provides a flexible convenience for which the owner is very naturally grateful to the architect.

Such pre-planning makes for economy and efficient service. Telephone engineers are always ready to assist you, without charge. Just call the Business Office and ask for "Architects' and Builders' Service."

matic radio transmitter in the automobile. Each garage has its special code so that no one can get in any one else's garage. By pulling a knob on the instrument board of the car while approaching garage the driver sends the signal and the doors open. When the knob is pulled again the doors close. If the head lights of the automobile are burning when the control knob is pulled an extra impulse in the code is made causing the garage lights to turn on in addition to opening the doors.

604

THE STURTEVANT HEATER-HUMIDIFIER

In one compact unit, the Speed Heater-Humidifier, B. F. Sturtevant Company insures both temperature and humidity regulation. The hygrostat, an accessory to the central unit, is a wall attachment having a function corresponding to the thermostat in temperature regulation. An electric motorized valve, controlled by the hygrostat, turns on or shuts off the flow of water to the humidifier, thus accelerating or decelerating humidification as existing conditions warrant.

605

PERFECTLY COUNTER-BALANCED WINDOWS

The Caldwell Manufacturing Company has just issued a catalogue showing noteworthy improvements in sash balances used with sashes of wood, steel, castings or Kalamein. These sash balances replace cords that become frayed, break or jam in the block; pulleys that bind; weights that are both noisy and cumbersome. They eliminate expensive box frames, decrease mill costs materially, and effect a substantial saving in freight, cartage and handling. They are reported to cut installation time by at least one-third. Once installed, they require little if any maintenance. They enable the architect to design attractive, narrow mullion windows, and still retain the many advantages of double hung windows.

606

EXPLOSIVE-RESISTIVE CASHGARD CHESTS

At the World's Fair in Chicago, the Diebold Safe & Lock Co. will display a new line of explosive-resistive Cashgard Chests bearing the Underwriters' Laboratories "X-60" Label. Each chest is scientifically designed to make the maximum interior capacity conveniently available for the protection of money, securities and valuables. These new chests are granted the lowest mercantile (Class "F") and bank (Class "H") burglary insurance rates. To qualify for the Underwriters' "X-60" label the chests successfully passed the extreme tests imposed by Laboratory attacks with portable tools and a total of eight ounces of nitroglycerine.

GLASS

LIBBEY-OWENS-FORD GLASS COMPANY, TOLEDO, OHIO, manufacturers of Highest Quality Flat Drawn Window Glass, Polished Plate Glass and Safety Glass; also distributors of Figured and Wire Glass manufactured by the Blue Ridge Glass Corp. of Kingsport, Tenn.

Although the cost of glass constitutes but a very small fraction of the cost of construction, the quality of glass influences the appearance of a building perhaps more than any other single item . . . especially so when glass is used so profusely as it is in following the modern architectural trend. Bright, clear glass that gives even reflections emphasizes and enhances every other feature of design and creates an atmosphere that it is impossible to achieve by any other means. The fact that L·O·F Polished Plate Glass and Improved Quality Window Glass are used so generously in so many important pieces of construction is evidence of their superior quality. For details, refer to Sweet's Catalogues or to any Libbey·Owens·Ford district sales office listed therein.

LIBBEY·OWENS·FORD
QUALITY GLASS

607

AIR CONDITIONING EQUIPMENT ANNOUNCED BY AMERICAN RADIATOR & STANDARD SANITARY CORP'N

Included in a group of American Radiator & Standard Sanitary Corporation products, first shown on May 27 at the "Garden of Comfort" of the Century of Progress Exhibition in Chicago, are central indoor weather manufacturing plants for small as well as large homes. They are described as being fully automatic in operation and from a basement location will cool in summer, heat in winter, and add or reduce the amount of moisture in the air, purify and circulate the air throughout the year. Officials explained that these will be economical to operate and will be within the means of the average home owner. Similar plants for keeping the atmosphere in buildings of all types and sizes in proper condition for health and comfort also are announced.

Several developments of exceptional architectural interest are introduced: (1) A refrigerating machine uses only steam and city tap water. It is called a Decalorator and because of its low cost and mechanical simplicity is expected to play an important part in cooling buildings and homes in the future. (2) The principle of the gun silencer has been utilized to eliminate noise in a conditioning unit manufactured for use in offices, hotels, hospital rooms, bedrooms and similar locations. (3) In addition to the complete weather manufacturing plants, equipment is offered which can be added to furnaces and heating plants now in use so that these old installations can be utilized for summer cooling as well as winter heating, and for circulating tempered air throughout the year. (4) Individual units, in appearance somewhat resembling modern radiators, are designed to serve the large immediate market (offices, shops, restaurants and single rooms).

Visitors to the Chicago exposition may view these latest creations and also may witness them in operation. Subsidiary companies that have contributed to these developments include American Radiator Company, and Campbell Metal Window Corporation, of New York City, Fox Furnace Company, Elyria, Ohio, and the American Blower Corporation, Detroit, Michigan.

ONE OF SEVERAL NEW AIR CONDITIONING PRODUCTS ANNOUNCED AT THE CENTURY OF PROGRESS EXHIBITION IN CHICAGO

This unit, manufactured by Campell Metal Window Corporation, a subsidiary of American Radiator & Standard Sanitary Corporation, performs the functions of heating, cooling, silencing all outside noise, humidification in winter, dehumidification in summer and filtration and circulation of the air in a room.

WHEN YOU DESIGN A

Modern Kitchen

consider MATERIAL *as well as plan*

Monel Metal Sinks and Cabinet Tops are now available in 53 Standardized models including 19 sizes of sinks from 41" to 120", and 12 sizes of cabinet tops from 15" to 84". Cabinet tops and cabinet sinks are uniform in design and finish.

● In designing a modern, scientifically planned kitchen, working with the elements of space, layout, traffic, lighting, and service units to be installed, keep in mind the versatility of Monel Metal:

Remember its usefulness in providing uninterrupted and continuous working areas, over cupboards and cabinet tops.

Make provision for its employment as trim, for example, as framing around flush panels in ceilings.

Count on its decorative value, as well as its utility, when employed as back splashers, kick plates, push plates, range tops and refrigerator trim.

Of course, you are familiar with the inherent qualities of Monel Metal: its immunity to rust, its resistance to corrosion, its easy cleanability, and its enduring silvery beauty... qualities that have won an enviable place for Monel Metal in the modern kitchen.

Have you leafed over a late catalog of the *Standardized* INCO units—"Streamline" Sinks, "Straitline" Sinks, Cabinet Sinks—and the various other standard size tops, backs, etc.?

If you haven't studied this book, if mention of it doesn't call up a visual memory of these various items, we urge you to write today. Ask for the INCO Standardized Catalog (A. I. A. File No. 29 H 6).

• • •

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

608

FLOOR BEAUTY

A colorful booklet illustrating decorative treatments of rooms making use of an infinite variety of linoleum patterns and colors is offered by the Armstrong Cork Company. Called "Floor Beauty for New Homes and Old," the booklet contains close to a hundred reproductions of sample shades and patterns in linoleum. The multi-colored photographs and drawings of rooms depicting pleasing color combinations in floor and furnishings make this booklet a valuable source of suggestion. Also offered by this manufacturer is a specification sheet for installing floors of Armstrong's Accotile (Asphalt Type).

609

WELDING

"The Welding of Enduro Stainless Alloys" is a booklet being released for distribution by Republic Steel Corporation, Central Alloy Division, Massillon, Ohio. This booklet contains extensive information on various welding methods as applied to different types of Enduro Stainless Alloys, including Electric Arc Welding, Gas Welding, Spot and Projection Welding, Seam Welding and Flash Welding. All of the data and recommended methods are the result of research by Enduro Welding Engineers, both in the laboratory and in commercial welding shops.

610

ALL-SEASON AIR CONDITIONING SERVICE

A furnace company and a refrigeration company, widely experienced in the temperature and air conditioning problems of winter and summer respectively, have gotten together to produce an all-season air conditioning service. The L. J. Mueller Furnace Company, known for its Mueller Climator equipment furnishing heat, humidity, air filtering and air circulation where warmth is needed, announces an extension of its service to include air conditioning for all seasons of the year. Refrigerating equipment, especially designed for air conditioning by the Frigidaire Corporation will be used for temperature reduction during summer months.

611

THE XTENSIONDUCT

Xtensionduct, produced by National Electric Products Corporation of Pittsburgh, is a new material for electrical wiring. It is a metal duct for extending existing outlets neatly, reasonably, simply, in almost an invisible manner and at low cost of material and labor. It is designed for extension of a circuit only, taking the place of the trailing, kinking, foot-catching cords.

Favorable STRENGTH-TO-WEIGHT *Ratio*

THE BASIS OF ACCEPTANCE

J&L CONSTRUCTION PRODUCTS
LIGHT WEIGHT ROLLED CHANNELS
JUNIOR BEAMS — STEEL PIPE
BARS for CONCRETE REINFORCEMENT
STANDARD STRUCTURAL SHAPES
STEEL PILING — NAILS — TIE WIRE
FABRICATED STRUCTURAL WORK
including Steel Plate Construction

J&L Light Weight Channels, used extensively for stair stringers, have greater strength than formed plates of equal depth. They are rolled steel sections, similar in type and with the strength characteristics of standard structural channels. They are about one-half the weight of the lightest standard rolled channels of equal depth.

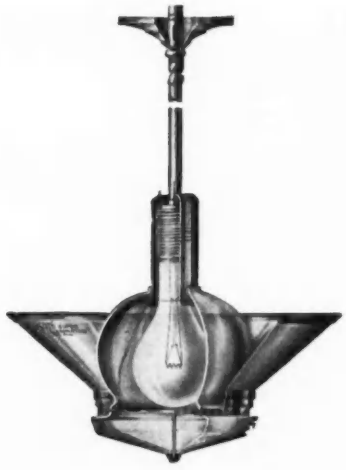
In addition to the advantage in weight, J & L Light Weight Channels have straight, true lines and sharp corners, permitting a neat, well-finished appearance to the completed job. A minimum of shop equipment is required for fabrication, and installation is rapid.

These strong, economical channel sections are in use as stair stringers in all types of buildings. They are also adaptable to many other uses. Sizes: 10", 8.4 lbs., and 12", 10.6 lbs. Write for engineering data on J & L Light Weight Channels and learn their exact characteristics.

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit Erie Los Angeles Memphis Milwaukee Minneapolis New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco
Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS PITTSBURGH
Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A., and Toronto, Ont., Canada

J&L STEEL



612

THE GUTH SUPER ILLUMINATOR

The Edwin F. Guth Company announces the Super Illuminator providing indirect lighting with luminous bowl. With oxidized aluminum finish the Super Illuminator is said to have a light output of 90% and with porcelain enameled finish, 85%. The clear crystal globe enclosure, a feature of each model that is optional with the purchaser, is designed for proper light direction and heat radiation. The manufacturer reports the results of tests by a disinterested authority proving that at various distances from the light source the new Super Illuminator produces a better illumination in terms of foot candles by 12% to 33% than the indirect lighting unit heretofore recognized as the most efficient.

613

WROUGHT IRON

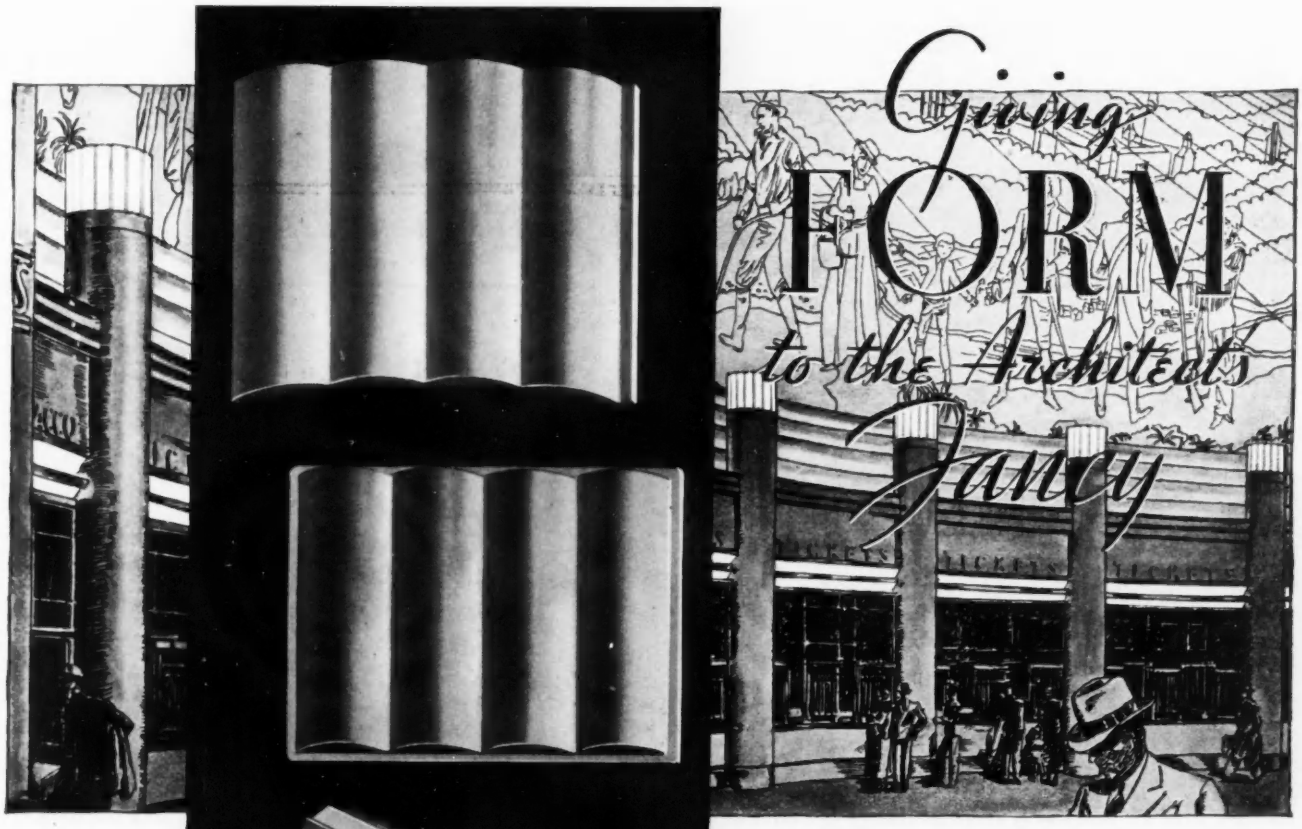
"As an illustration of wrought iron, consider an inch square bar of pure iron in the end of which two hundred and fifty thousand tiny holes are drilled. Into each hole a fibre of non-rusting slag is placed. The result in effect would be wrought iron."

This interesting observation is quoted from a booklet, "The New Story of Ancient Wrought Iron," prepared by A. M. Byers Company. The booklet is a highly informative discussion of the characteristics and process of manufacturing wrought iron.

614

CONCRETE FLOORS

The Portland Cement Association, 33 West Grand Avenue, Chicago, has issued two 4-page folders entitled "Concrete Floors for Industrial Buildings" and "Concrete Floors—How to Build Them." Cost, durability, cleanliness, safety, smoothness, solidity, comfort and maintenance are discussed and correct construction methods fully explained. A working "Specification for Bonded Concrete Floor Finish" has also been published and the Association's 24-page book "Concrete Floor Finishes," first issued in 1929, has been revised and reprinted.



Giving FORM to the Architect's Fancy

The architectural lighting glassware units in the Cincinnati Terminal are an indication of the ability of Macbeth craftsmen to co-operate with the architect in the creation of new illuminating forms and effects. The Macbeth organization welcomes the new idea. It offers the architect intelligent co-operation and unlimited facilities for the production of beautiful and efficient illuminating systems. Call our nearest branch office or address: MACBETH-EVANS GLASS COMPANY . . . Charleroi, Pa. District Offices: New York, Philadelphia, Baltimore, St. Louis, Chicago, Pittsburgh, Buffalo, San Francisco, Detroit, Cleveland, Indianapolis, Boston, Houston, Toronto.

Macbeth

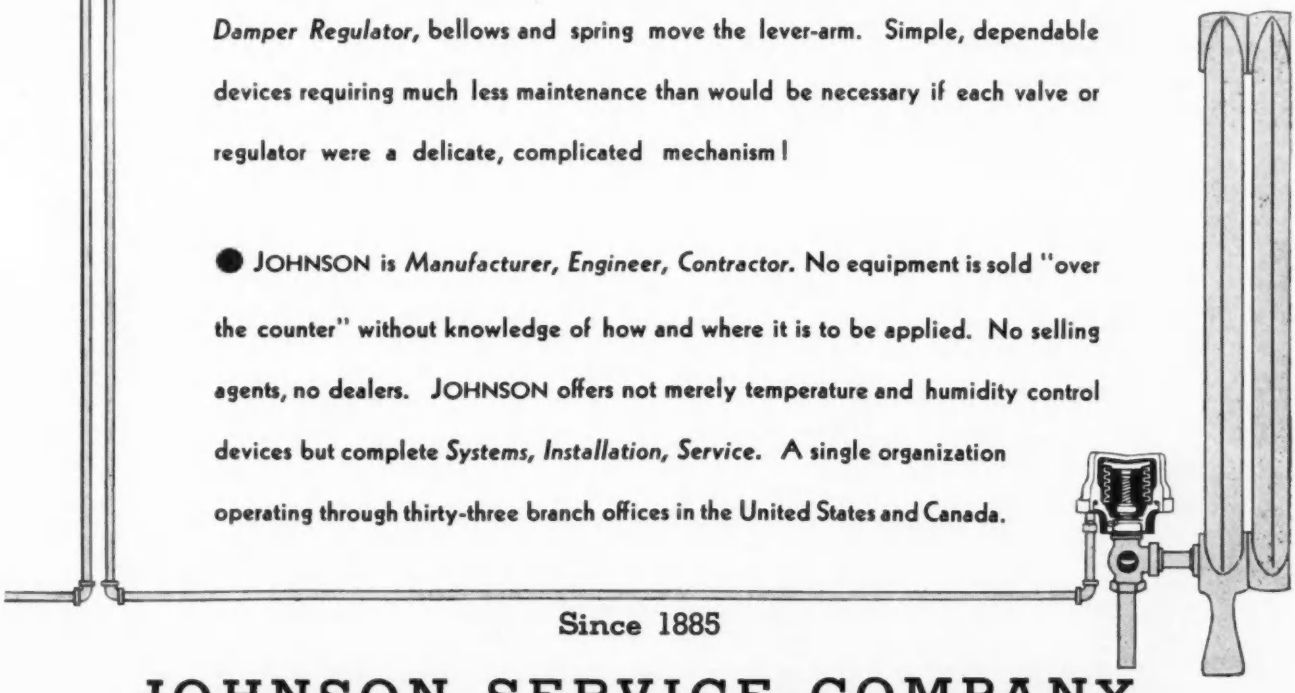
Architectural Glassware

SIMPLICITY

● The JOHNSON *gradual acting Thermostat* is simplicity itself—merely a dependable automatic reducing valve. The accurate, bi-metallic temperature element varies the air pressure on valves and damper regulators, gradually, as more or less heat is required. Jewelled bearings insure that the bi-metallic strip is always free to move as the temperature demands.

● The JOHNSON *Diaphragm Valve* is simple, fool-proof — a seamless metal bellows and heavy spring operate the valve-stem. Similarly, in the JOHNSON *Damper Regulator,* bellows and spring move the lever-arm. Simple, dependable devices requiring much less maintenance than would be necessary if each valve or regulator were a delicate, complicated mechanism!

● JOHNSON is *Manufacturer, Engineer, Contractor.* No equipment is sold "over the counter" without knowledge of how and where it is to be applied. No selling agents, no dealers. JOHNSON offers not merely temperature and humidity control devices but complete *Systems, Installation, Service.* A single organization operating through thirty-three branch offices in the United States and Canada.



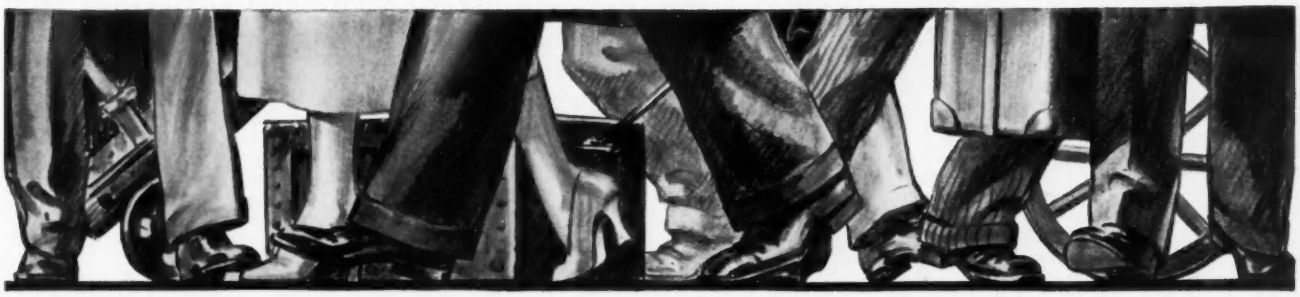
Since 1885

JOHNSON SERVICE COMPANY

Main Office and Factory: Milwaukee, Wis. .·. Branches in Principal Cities

JOHNSON HEAT CONTROL

PUNISHING TRAFFIC



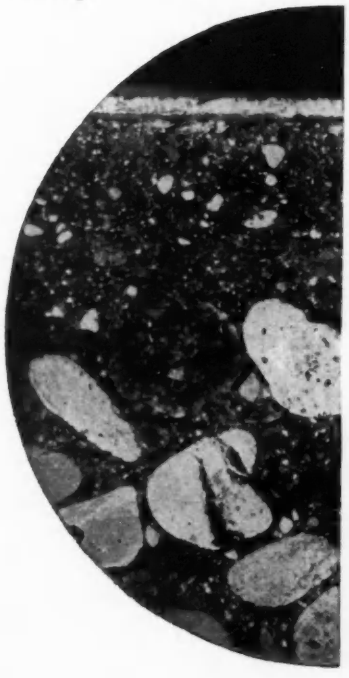
HOLDS NO TERRORS

For the Floors You Top This Modern Way

Resistance to wear depends on the way you top a concrete floor. Plenty of coarse aggregate at the surface makes a floor that won't scale . . . won't dust . . . even after years of pounding by heavy traffic.

WRONG

See that white line? It's a "dust on" type of finish, too soft, too porous to stand the gaff of wear. Picture shows a cross-section cut from a slab that crazed in ten days after finishing.



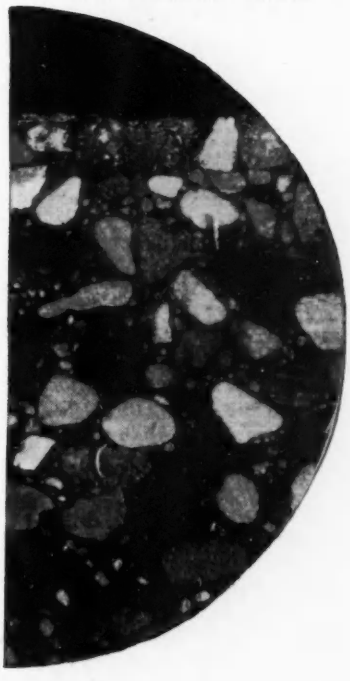
Top your floors this simple, modern way:

1. Two parts coarse aggregate (⅛ to ⅜ in. grade) to one part cement and one part coarse-grain sand for your topping mix.
2. Be a miser on mixing water—not more than five gallons per sack of cement.
3. Float at once. Then give it a rest (usually about 30 to 40 minutes) until the water sheen disappears. Then trowel to the desired smoothness. Prevent drying by curing under a wet cover.

Easy? Sure it is. Successful? Thousands of jobs have proved it so. Economical? It usually costs less than the old-fashioned sand-cement topping. More information is yours for the asking. Just write to the Portland Cement Association.

RIGHT

See the coarse material in the surface of this section? This is the kind of concrete floor that gives lasting satisfaction. Yet it is simple to lay and ordinarily costs no more than the old-fashioned method.



PORTLAND CEMENT ASSOCIATION

33 WEST GRAND AVENUE, CHICAGO ★ CONCRETE FOR PERMANENCE

Salesman: "Good morning, Mr. Wagner. I'd like to talk to you about the flooring for your new school."
Architect: "Hello, Mr. Watson. That's fine. I was just thinking about those floors."

WHEN a salesman uses a Dodge Report praise him!

Because then you will know that he has taken the trouble to find out about your requirements before calling on you.

He knows what job to talk about. He's had an opportunity to think about the application of his product to your job.

He's using a means of saving his time and your time. He's far better equipped to get down to business—to tend strictly to it—and to be of far greater service to you.

Then, too, you'll know that his firm has gone far to eliminate the costs and bothers of wasteful, useless and ill-timed sales calls which have to be paid for in every bid.

Also it is reasonable to suppose that the company which reduces its cost of unsuccessful calls to a minimum usually has a better product for the same money or the same quality for less money.

It is a matter of interest to know what goes into the making of a price—wasteful sales practice always means too little quality or too high a price.

Welcome the Dodge Reporter. Give him news of your work and in that manner time and money will be conserved by all.

F.W. DODGE CORPORATION

Dodge Construction Reports

AN ADVANCE NEWS SERVICE ISSUED DAILY ON BUILDING AND ENGINEERING PROJECTS IN THE 37 STATES EAST OF THE ROCKY MOUNTAINS

F. W. DODGE CORPORATION, 119 WEST 40th ST., NEW YORK

for Effective Illumination

● ***WITHOUT GLARE***

MAGNALUX FIXTURES

FOR distinctive interiors where adequate illumination is required but where glare is taboo—the Magnalux luminaire provides a happy solution. Smart in design and highly efficient, it delivers light over a wide ceiling area. Illumination is so evenly distributed that office workers are not conscious of its overhead sources which blend harmoniously with the ceiling.

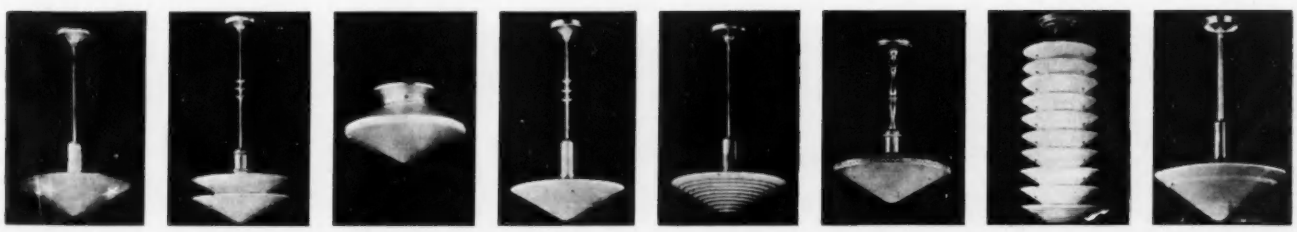
Efficiency, beauty and eye-comfort are combined in the design of the Magnalux. Its hyperbola shaped basin is made of dense galax glass. The reflecting properties of this glass contribute to the unit's efficiency which is well above 90 per cent. A slender stem connecting a small canopy and husk complete the simple lines which enhance the decorative appearance of the fixture.

Eye-comfort lighting with Magnalux fixtures is primarily the result of low surface brightness.

Your Westinghouse representative will gladly furnish complete information—or address Westinghouse, Room 2-N, East Pittsburgh, Pa. T 79560

WESTINGHOUSE
ELECTRIC & MANUFACTURING COMPANY

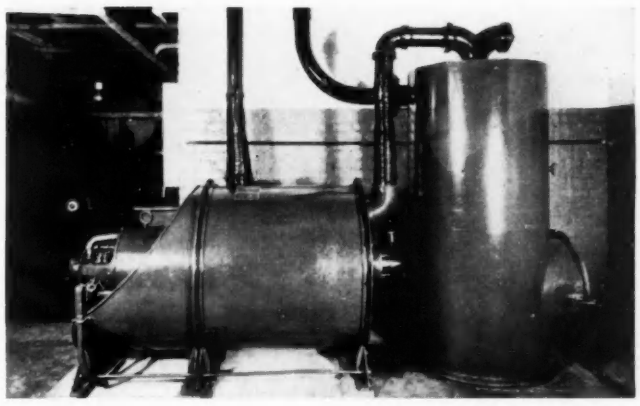
COMBINATION POSSIBILITIES OF MAGNALUX LUMINAIRES



INDEX TO ADVERTISEMENTS

The italic lines appearing under the following manufacturers' names give the volume and catalogue page numbers of their catalogues filed in the 1933 Edition of SWEET'S ARCHITECTURAL CATALOGUES

AFTER 17 YEARS



THE SPENCER VACUUM PRODUCER, after 17 years' service in the Carter Hotel, was found to be satisfactory as an important feature of the newly modernized hotel.

During these 17 years much has happened in the way of improvements in Spencer Systems. New and more complete lines of tools and lighter weight hose—big strides in the design of piping layouts—and the introduction of a practical heavy duty Portable Cleaner, have kept Spencer in the lead in all types of cleaning work.

The fact remains that the original idea of a multi-stage vacuum producer and provisions for the correct relation between vacuum and volume of air — together with unusually long life and satisfactory service have been inherent characteristics of Spencer Systems from the beginning.

The Carter Hotel
PROSPECT AVE. NEAR EAST 9TH ST.
IN THE HEART OF CLEVELAND

April 17, 1933.

EXECUTIVE OFFICE
FOLSOM B. TAYLOR
MANAGING DIRECTOR

Spencer Turbine Company,
5005 Euclid Avenue,
Cleveland, Ohio.

Attention: Mr. F. E. Warnke

Gentlemen:

I should like to call to your attention an unusual fact about your splendid equipment. We have recently completed an entire rehabilitation of The Carter Hotel at a cost in excess of one half million dollars, and, one of the very few pieces of equipment which it was not necessary to replace or rebuild, was the Spencer Turbine.

This particular unit was installed in 1917 and it has been in constant use since that time and is in first-class condition today.

This is my idea of fine equipment and you are certainly entitled to know these facts.

Very truly yours,

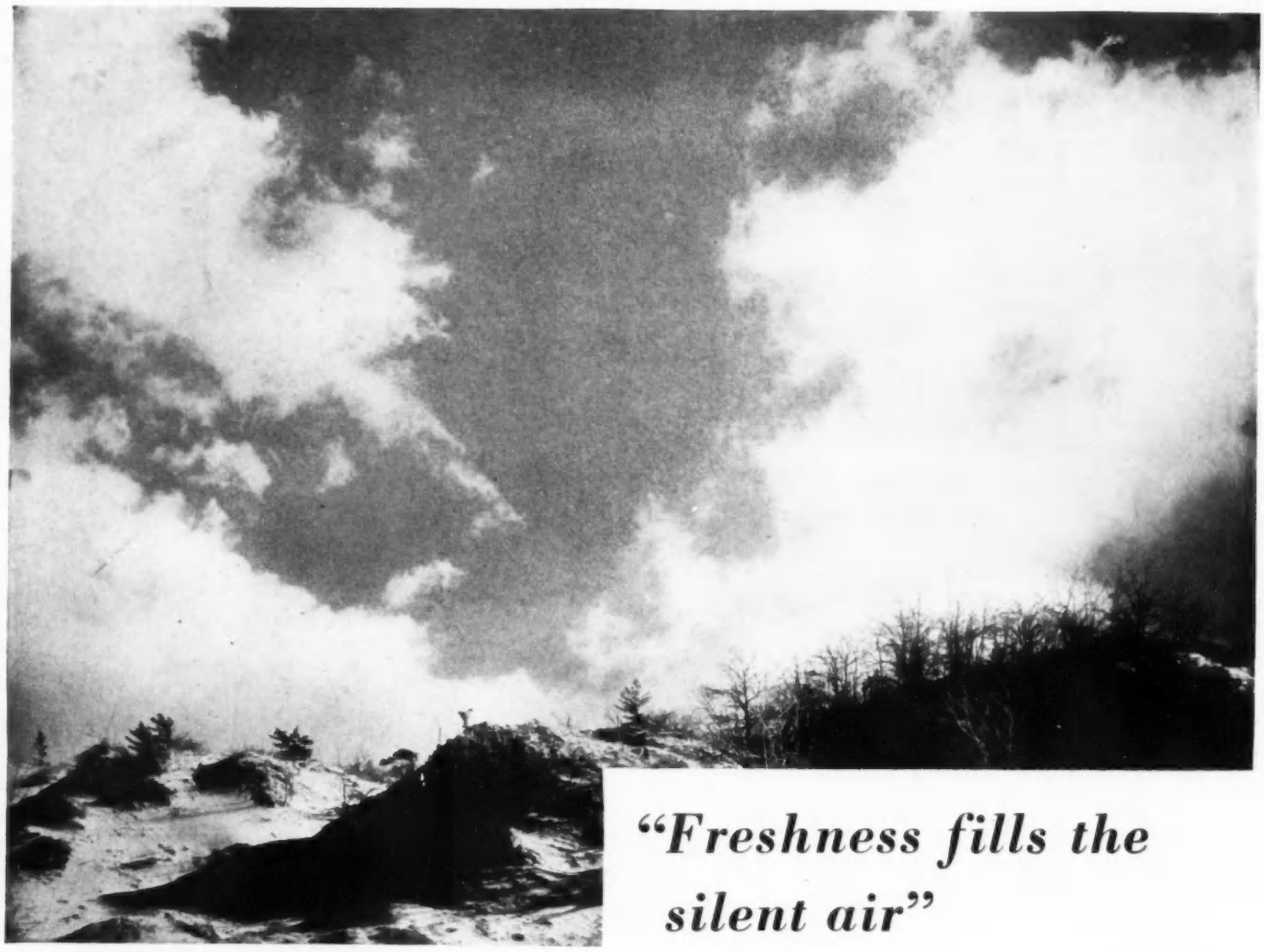
FOLSOM B. TAYLOR,
Managing Director.

FBT:EN

SPENCER

THE SPENCER TURBINE CO.
HARTFORD, CONN.

SPENCER CENTRAL AND PORTABLE CLEANING SYSTEMS



"Freshness fills the silent air"

. . . BUT manufacturers must reckon with its content of SO_2, CO_2, H_2O, NH_3

Atmospheric corrosion—enemy of many a product's beauty, destroyer of its utility. Guard against it with USS Stainless Steel. Unaffected by dampness, salt air, smoke or fumes . . . Retaining its brilliant luster indefinitely. You'll find among the several USS Stainless Steels, the one just suited to your needs—in resistance to the corrosion attack of specific chemicals, in resistance to the effect of high temperatures, in strength and other physical qualities. And you can be sure that USS Stainless Steel is of uniform quality, free from contaminating impurities. Our metallurgists will be glad to assist you in combating any corrosion problem.

USS

STAINLESS

AND HEAT RESISTING

STEELS

U S S CHROMIUM-NICKEL ALLOY STEELS ARE PRODUCED UNDER LICENSES OF THE CHEMICAL FOUNDATION, INC., NEW YORK, AND FRIED. KRUPP A. G. OF GERMANY

Illinois Steel Company
CHICAGO, ILLINOIS

CARNEGIE STEEL COMPANY
PITTSBURGH, PA.

SUBSIDIARIES OF UNITED STATES STEEL CORPORATION

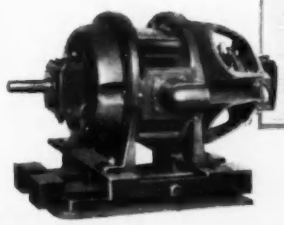
"....there's a motor under my bed!"

"THE whir is most annoying! I hear it when I lie down. When I sit up, it stops!" A puzzled room clerk recently listened to such a complaint. He investigated.

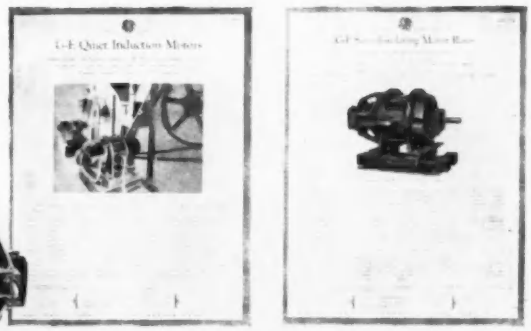
No, the motor wasn't under the bed. In fact, the offender was finally located many floors away. Vibration, inaudible at the motor, had been transmitted and amplified by the building structure. A G-E *quiet* motor replaced it, and the trouble disappeared.

Situations like this combine to place joint responsibility for noise suppression on everyone concerned with the design and application of machinery in hotels, hospitals, clubs, etc., where quietness is of paramount importance.

General Electric recognizes its part of this responsibility, and, to reduce noise, offers a complete line of *quiet* motors and sound-isolating bases. Complete information on these new developments is available through any G-E sales office.



G-E *quiet* motor mounted on G-E sound-isolating base

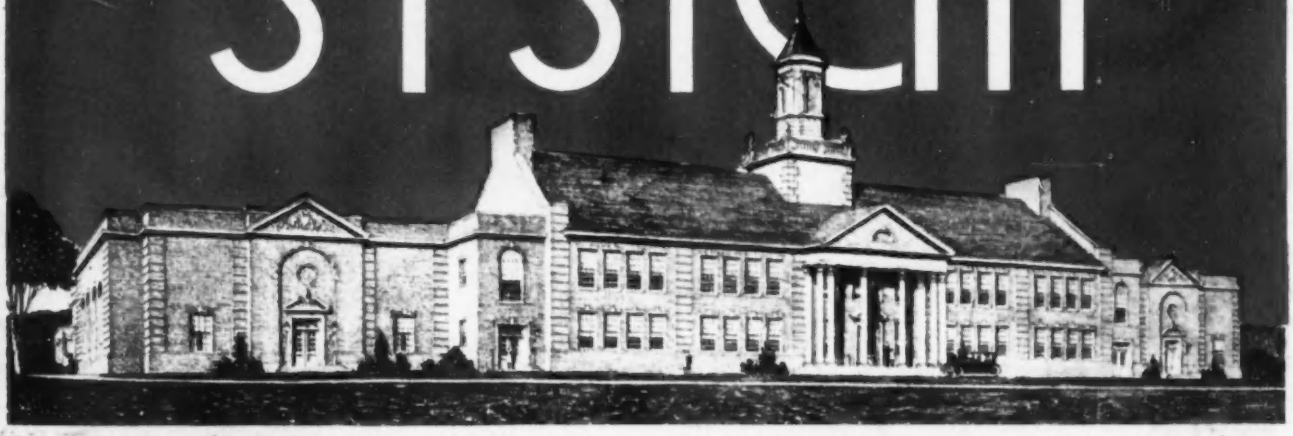


Would you like copies of these valuable new publications, GEA-1695, "G-E Quiet Induction Motors", and GEA-1714, "G-E Sound-isolating Bases"? If so, write to General Electric, Dept. 6-201, Schenectady, N. Y.

200-715

GENERAL ELECTRIC

MODUTROL SYSTEM



THE ROELIFF JANSEN CENTRAL SCHOOL, HILLSDALE, NEW YORK. TOOKER & MARSH AND SNYDER & SNYDER, ASSOCIATE ARCHITECTS

The FIRST ESSENTIAL *of* HEATING EFFICIENCY

Proper temperature control is necessary to efficient and economical operation of any heating and ventilating system. . . . The Minneapolis-Honeywell Modutrol System, with its electrical control of ventilating dampers and tempering coils, which are operated independently yet in perfect balance with Modustat individual radiator control, meets every problem. It provides true modulation by accurate proportioning of cold, warm, fresh and re-circulated air—and modulated delivery of that air—to avoid sudden changes in room control and consequent overheating and chilling. The Modutrol System is tailor made for every job, in old buildings or new, large or small, and can be economically installed in any building as its cost is in direct proportion to the number of controls used. . . . The Minneapolis-Honeywell Engineer in your city will gladly show you the many advantages of the Modutrol System of temperature control. . . . Minneapolis-Honeywell Regulator Company, 2804 Fourth Avenue South, Minneapolis, Minnesota. Branch offices and distributors in all principal cities.

MINNEAPOLIS-HONEYWELL

Control Systems