THE ARCHITECTURAL FORUM

IN TWO PARTS

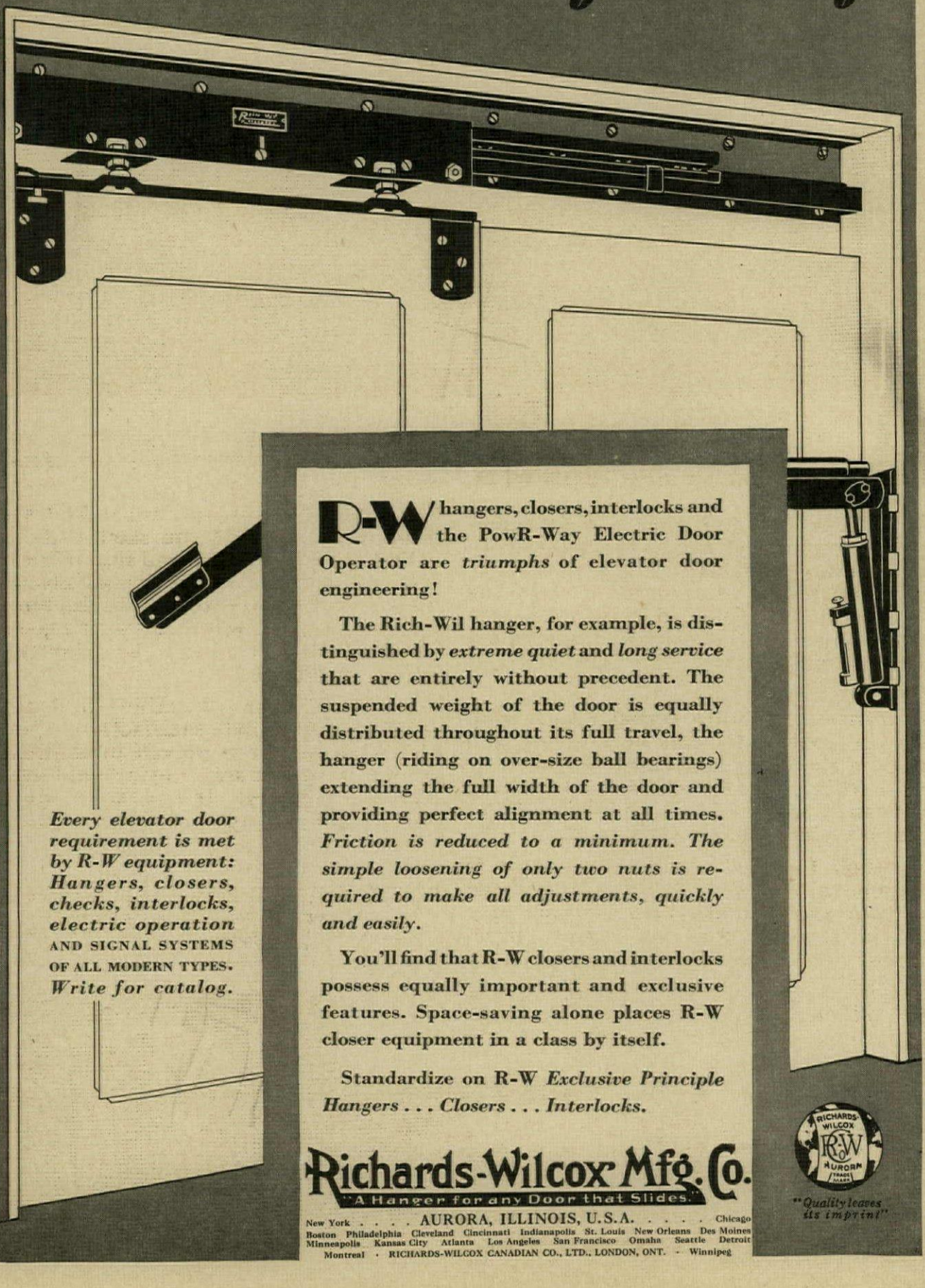
ARCHITECTURAL ENGINEERING & BUSINESS

PART TWO

AUGUST

1929

NOTEWORTHY CONTRIBUTIONS *to elevator door engineering*



R-W hangers, closers, interlocks and the PowR-Way Electric Door Operator are *triumphs* of elevator door engineering!

The Rich-Wil hanger, for example, is distinguished by *extreme quiet* and *long service* that are entirely without precedent. The suspended weight of the door is equally distributed throughout its full travel, the hanger (riding on over-size ball bearings) extending the full width of the door and providing perfect alignment at all times. *Friction is reduced to a minimum. The simple loosening of only two nuts is required to make all adjustments, quickly and easily.*

You'll find that R-W closers and interlocks possess equally important and exclusive features. Space-saving alone places R-W closer equipment in a class by itself.

Standardize on R-W *Exclusive Principle Hangers . . . Closers . . . Interlocks.*

Every elevator door requirement is met by R-W equipment: Hangers, closers, checks, interlocks, electric operation AND SIGNAL SYSTEMS OF ALL MODERN TYPES. *Write for catalog.*

Richards-Wilcox Mfg. Co.

"A Hanger for any Door that Slides."

New York . . . . AURORA, ILLINOIS, U.S.A. . . . . Chicago

Boston Philadelphia Cleveland Cincinnati Indianapolis St. Louis New Orleans Des Moines Minneapolis Kansas City Atlanta Los Angeles San Francisco Omaha Seattle Detroit

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"Quality leaves its imprint"

NATCO
FLAT ARCH FLOORS
Add Strength, Rigidity and Permanence to any Structure

NATCO Flat Arch Floors afford great strength and fire safety along with minimum weight. They insure speedy construction winter or summer. This is due to the small amount of cementing materials used in the construction, which permits rapid setting and early removal of forms.

The centering is hung, saving lumber from damage, making it easily reclaimable, and keeping the lower floors clear for work by other trades. It need remain in place only one-tenth to one-fourth as long as is required under concrete construction.

Provision for pipe work and conduit is economically made by the omission of tile units at the time of erection. Holes may be cut through the slab at any time, almost with impunity, and later easily patched.

The all-tile ceiling provides an ideal base for plaster, on which only two coats are needed, instead of the customary three. Moisture due to cement hydration is minimized.

The End Construction Natco Flat Arch (illustrated) permits the skew to be cut to fit different elevation and sizes of beams. The End and Side Construction Natco Flat Arch gives better protection to the beams, but since each skew is made to fit a specific standard size, it cannot be adapted to others on the job.

Standard for years, the strength, dependability and complete satisfaction of Natco Flat Arch has been proven in thousands of important and substantial buildings all over the country. If you want specific information on any particular application —just write.

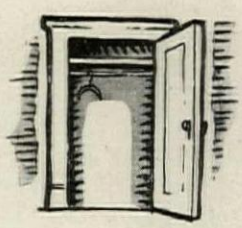
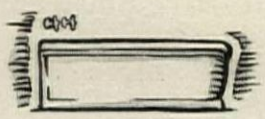
NATIONAL·FIRE·PROOFING·COMPANY
General Offices: Fulton Building, Pittsburgh, Pa.
Branch Offices: New York, Chanin Bldg; Chicago, Builders Bldg; Philadelphia, Land Title Bldg; Boston, Textile Bldg.
In Canada: National Fire Proofing Co. of Canada, Ltd., Toronto, Ontario

TURN TO "SWEET'S"

PAGE A383 – A416

NATCO
THE COMPLETE LINE OF STRUCTURAL CLAY TILE

Closet space, bathtubs, *and* floor lamps

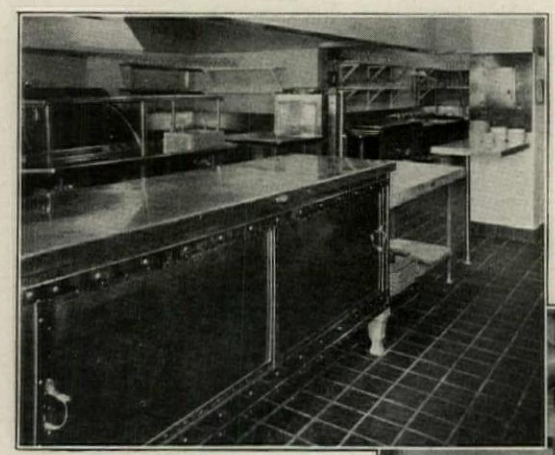

No mere man will ever be able to chart the mind of a woman when she is buying a home.  **Price, size and location are of major importance, but extra closet space, modern bathroom equipment, or electrical outlets placed where they will be most useful for a toaster,**  **a**

SHEATHED

DETAILS

Show the Superiority of

VAN KITCHEN EQUIPMENT



A corner of this fine modern kitchen in which Van Engineers have made every provision for rapid and uninterrupted service.

Chicago Woman's Club
HOLABIRD & ROOT, *Architects*

In such famous kitchens as those of the new Chicago Woman's Club (illustrated here), Van Equipment performs a type of service unsurpassed anywhere. Simple, sturdy and unfailingly dependable, Van Equipment meets every demand made upon it with outstanding success.

The gleaming service counter and dish-warmer, where everything is within easy reach of the operating staff, and efficient food service can be maintained without any chance of confusion or delay.

See SWEETS, pages C4040 to C4045 for important architectural information.

The superb performance of every piece of Van Kitchen Equipment . . . its unfailing dependability under the most extreme service conditions . . . are the logical result of a faithful attention to a multitude of unseen details. Every rivet must hold securely year after year. Every joint and weld must be made with the utmost precision. Each minute detail of Van construction must contribute its full share to the successful operation of the entire unit. This is the basis of Van superiority, of Van popularity and of Van trouble-free reliability. Upkeep and replacement costs are eliminated when Van equipment is *built* . . . and wherever it is used.

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The John Van Range Co.
EQUIPMENT FOR THE PREPARATION AND SERVING OF FOOD
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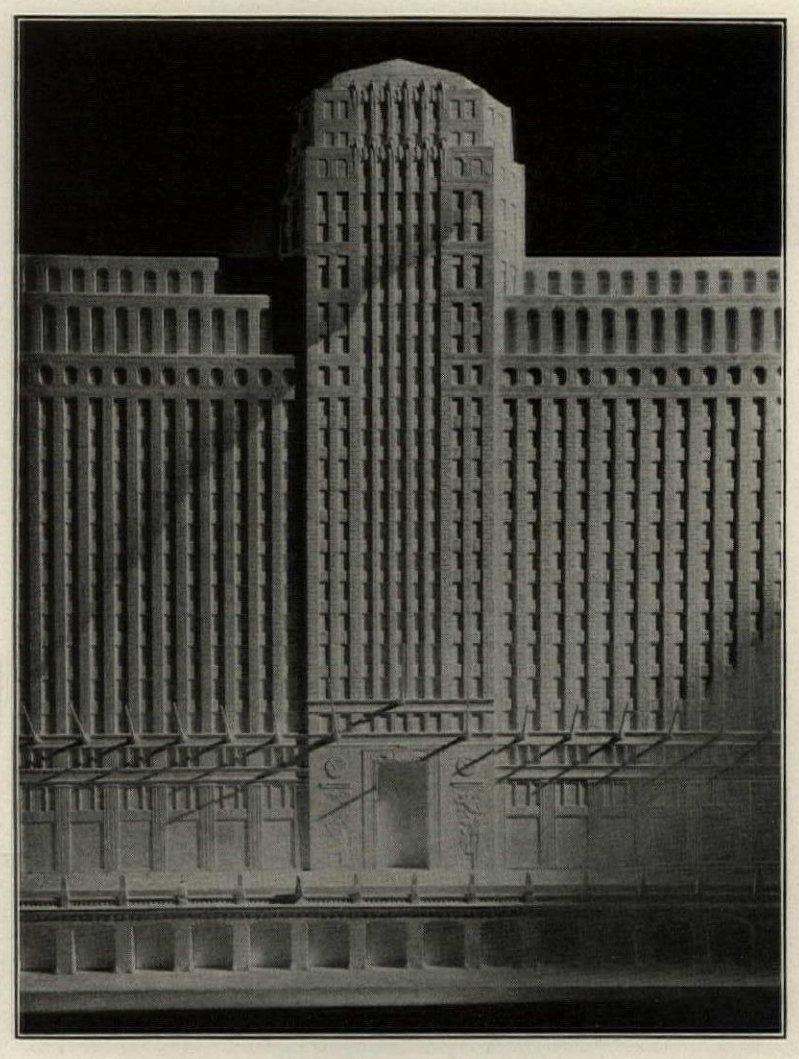


THE MERCHANDISE MART
Chicago

Graham, Anderson, Probst and White—*Architects*

John Griffiths and Son Company
Contractors

The Merchandise Mart, when finished, will be the world's largest building—approximately 92 acres of floor area will be devoted to the display of merchandise of all kinds

"Plus Omicron" Concrete Floors for World's Largest Building . . .

FIVE MILLION SQUARE FEET of Masterbuilt hardened concrete floors are being installed in the world's largest building, The Merchandise Mart, Chicago.

All heavy duty areas are being integrally hardened with METALICRON.

Commercial areas are being integrally hardened with MASTERMIX.

Metalicron and Mastermix are "Plus Omicron" products. Each has as a basic ingredient this latest discovery of Master Builders Research Laboratory, Omicron, which combines with and reduces the soluble elements in concrete, changing them from weak factors to strength-adding factors in the structure, and so checking disintegration or "corrosive wear" at its source.

In the heavy duty floors Metalicron replaces brittle sand in the wearing finish with tough, ductile metal. No plain cement floor, no matter how well laid, can have the resistance to abrasive wear or to disintegration that Masterbuilt Floors, thus armored, possess.

THE MASTER BUILDERS COMPANY, *Cleveland, Ohio*

Sales Offices in 110 Cities

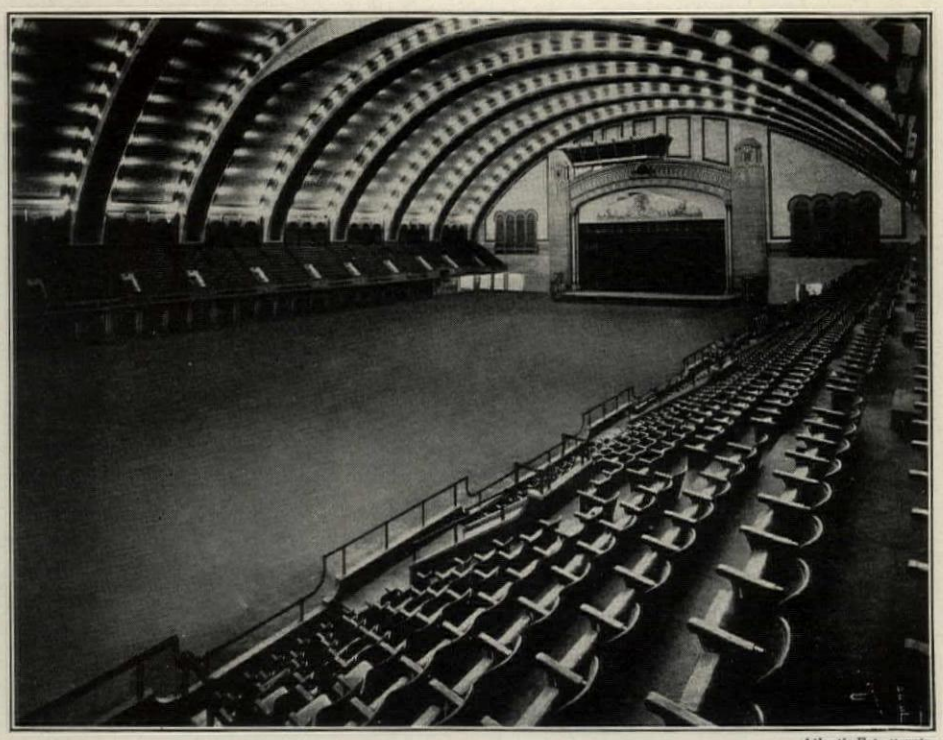
Factories at Cleveland. Ohio, Buffalo, N.Y. and Irvington, N.J.

World's Largest

CONVENTION HALL

protected against sudden darkness

Dependable Exide Emergency Lighting Batteries chosen to guard mammoth structure against current failure



Atlantic Foto Service

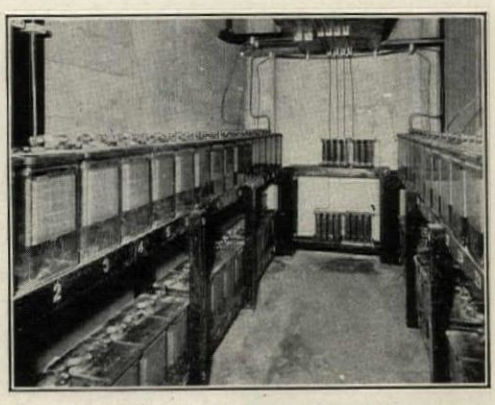
Main Auditorium of the Largest Convention Hall in the World. Seating capacity 41,000. Lights are protected by dependable Exide Batteries. Lockwood, Green & Company, Boston, architects and engineers with Alex. H. Nelson, C. E., Atlantic City, Associate Engineer.

ACCOMMODATIONS for 66,000 people . . . a hall that could hold a thirteen-story building with space to spare . . . many rooms, the smallest of which can seat 150 persons . . . a building covering seven acres of ground . . . the Atlantic City Convention Hall is the greatest in the world.

Consider the consequences of sudden darkness in this immense building. Confusion and danger might be the result. That's why the architects and engineers chose *reliable* Exide Emergency Lighting Batteries to guard against power failure.

Should the normal current supply fail, for any reason, lights are switched to Exides . . . *instantly and automatically* . . . without a hand touching a switch. And, the devices necessary to control and keep these batteries in a charged condition are simple and foolproof . . . no expert electrical knowledge is required to attend them.

A letter will bring an experienced Exide representative to consult with you on any phase of emergency lighting. This service entails no obligations. Write today.



This reliable 60-cell Exide Battery protects general lights and exit lights to the extent of 28000 watts in new Atlantic City Convention Hall. The small Exide Battery in the background operates the fire alarm system.

Exide

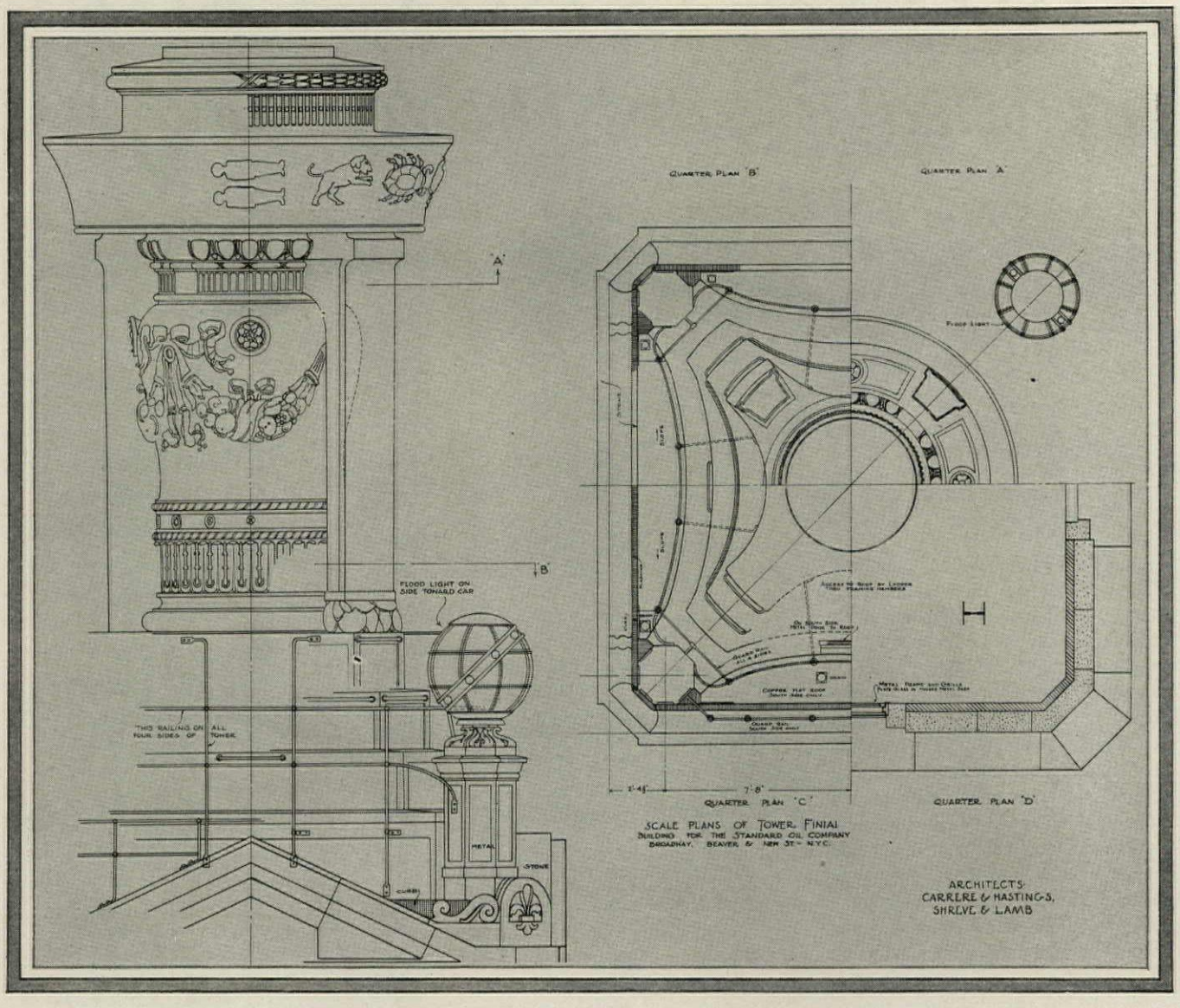
EMERGENCY LIGHTING BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

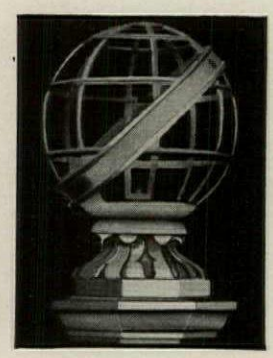
Exide Batteries of Canada, Limited, Toronto

PLAN AND ELEVATION DETAILS OF ALUMINUM TOWER FINIAL

[This tower finial is described on pages 22, 23 of this issue]



SPECIFICATIONS



THIS material shall be made of No. 43 Alloy. The average tensile strength shall be not less than 19,000 lbs. per square inch, and the weight shall not exceed .097 per cubic inch. It shall not be less than ⅛" thick except for the surfaces of the steps to be walked on—where it shall be not less than ¼" thick. The surface shall be free from imperfections, and in all respects equal to sample submitted.

* * * * *

Further details of this job, and of all others described in the booklet "Architectural Aluminum", will be gladly furnished by

ALUMINUM COMPANY OF AMERICA
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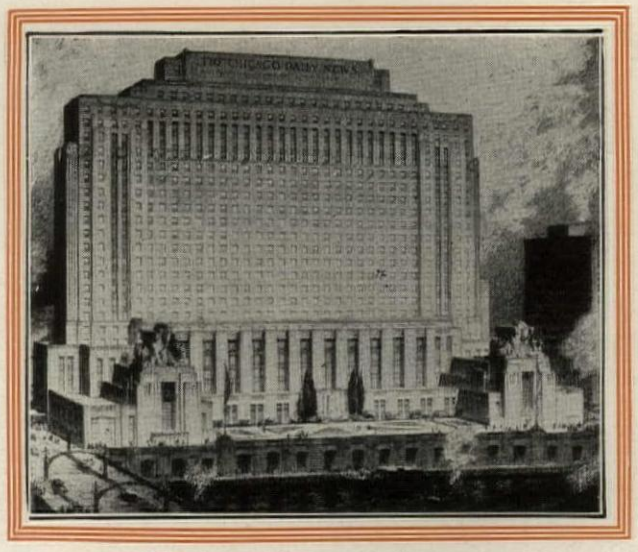
Offices in 19 Principal American Cities

ARCHITECTURAL ALUMINUM

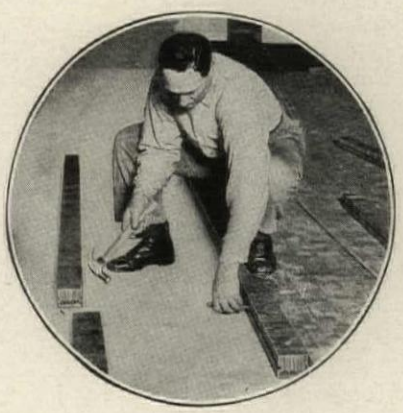


HOLABIRD & ROOT, *Architects*

Chicago *Daily News*

INSTALLS

BLOXONEND FLOORING



By our lateral nailing method, Bloxonend is laid directly over wood-floated concrete slab, eliminating sleepers and fill and effecting a saving in ceiling height.

Where *durability* plus lasting *smoothness* was important in *floors,* the Chicago Daily News used BLOXONEND—a composite wood block floor laid in 8 ft. strips and splined together. The vast composing room and other mechanical departments equipped with 22,000 square feet of BLOXONEND.

This flooring stays smooth, prevents pieing of forms, speeds up traffic, saves power (man or electric), eliminates vibration damage to equipment and reduces floor upkeep.

The Kansas City Star, Hearst Publications, Cleveland News, Chicago Evening Post, Conde Nast and numerous other prominent publishers and printers have standardized on BLOXONEND for heavy duty floors. Also widely used by leading industrials and in gymnasiums and shops of finer type schools.

Write for Sample and Descriptive Literature

Carter Bloxonend Flooring Co.

Kansas City, Missouri

Branch Offices in Leading Cities—See Sweet's

BLOX-ON-END FLOORING

Bloxonend is made of Southern Pine with the tough end grain up. It comes in 8 ft. lengths with the blocks dovetailed endwise onto baseboards.

Lays Smooth
Stays Smooth

YES, IT LOOKS O. K.....BUT

How much does it cost to operate?

AND our answer is, don't take our word for it. Let us see what unbiased engineers have to say on this point.

26 Cans raised and lowered for ONE CENT

Engineers of the Sprague Electric Works conducted a series of comprehensive tests to determine current consumption of G&G Electric Ash Removal Equipment operating under varying conditions. At the Mergenthaler Linotype Co., Brooklyn, N. Y., a Model D, similar to illustration, handled 78 tons of ashes in one k.w.h. with current costing 3 cents.

15½ Tons Ashes moved in ONE k.w.h.

At a New York Telephone Co. building (one of 169 Bell Telephone buildings) where a Model E (no overhead crane) Hoist was tested, 85 round trips were made for one cent current cost. Another test (at a Public School) showed 33 cans handled for one cent. Still another test (at a Telephone Building) showed 15½ tons of ashes handled in one k.w.h. In every case, distance of lift and rate per k.w.h. must be considered.

Complete Test Data Available

This test data is in our files. We shall be glad to furnish complete figures on request.

Merited Popularity

It is performance like this that has led to the outstanding popularity of G&G Electric Ash Removal Equipment in all types of buildings where a volume of ashes must be removed.

1798 Schools use G&G equipment
581 Bank buildings
554 Office buildings
Churches, Hospitals, Theatres, etc.

You will find the services of our Engineering Department of considerable value in determining how various ash removal problems shall be met and in determining which Hoist and what equipment best suits the specific condition—so that the completed installation may give the building owner the utmost satisfaction throughout the years.

23rd Arch't. Ed. pp. C3729-37

15th Engr. Ed. pp. 1200-01

GILLIS & GEOGHEGAN

63 Years of Service

544 West Broadway, New York, N.Y.

The Only JACKETED BOILER OF *CRACKPROOF* STEEL CONSTRUCTION

THE new Heggie-Simplex jacketed steel boiler—the most modern of residence heating units—has all of the qualities home owners are seeking.

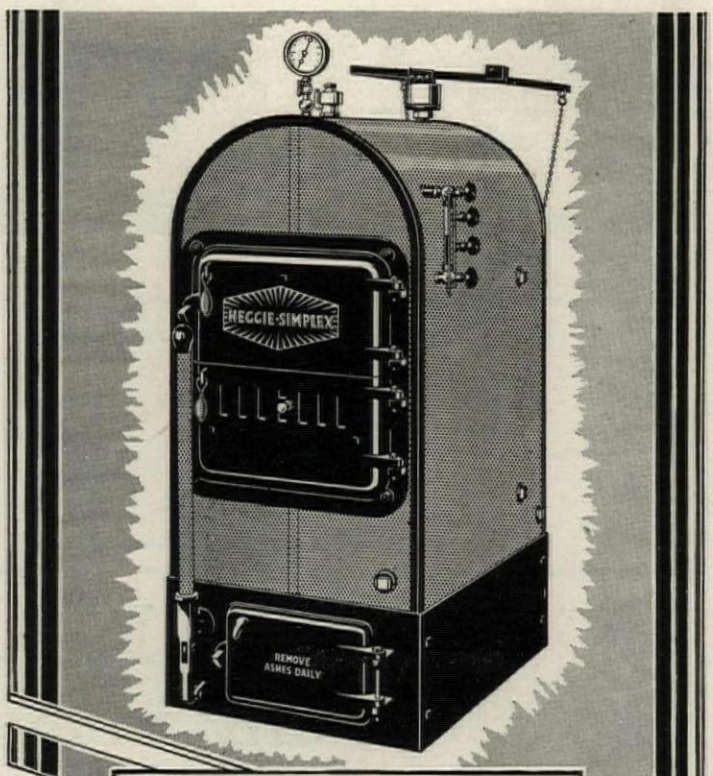
The smart coloring of its durable lacquered jacket—French grey with black trim—is what women want.*

Built of steel, fused by electric welding into one seamless unit, it is crackproof and leakproof.

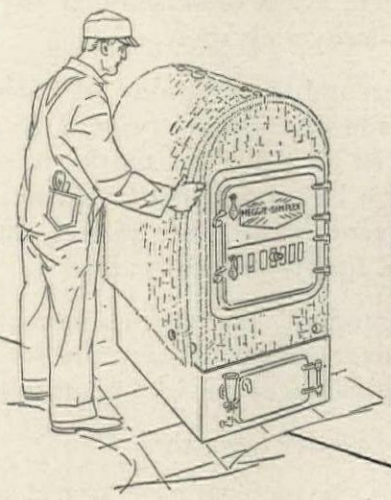
Its spacious firebox, large heating surface, tubular flues, and unrestricted water circulation make such heating efficiency, as heretofore has been enjoyed only in large buildings, available for the smallest house.

Its large fuel capacity minimizes care. Its extra wide doors and waist-high shaker make attention easy. Its unit construction minimizes installation cost. It is adaptable to any fuel —coal, coke, gas, oil.

Heggie-Simplex Boiler Co., Joliet, Ill. Representatives in principal cities—telephone and address listed under "Heggie-Simplex Boilers."

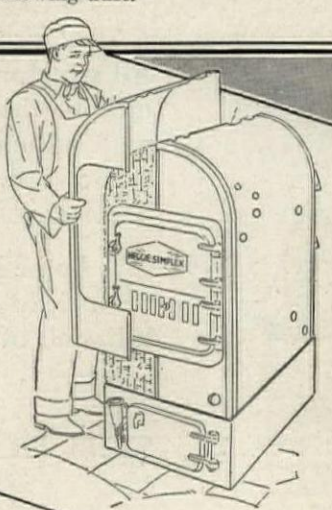


***92%** of the women who saw this boiler displayed in a variety of colors at a recent exhibit, chose the French grey and black combination. They like its dignified, unobtrusive beauty. They appreciate its practical value in not showing dust.



Rock Wool Insulation

Ready-cut blankets of Rock Wool that only have to be laid in place, are supplied for all sides of this Heggie-Simplex Boiler. This material the Bureau of Standards has shown is twice as valuable as that ordinarily furnished with jackets.



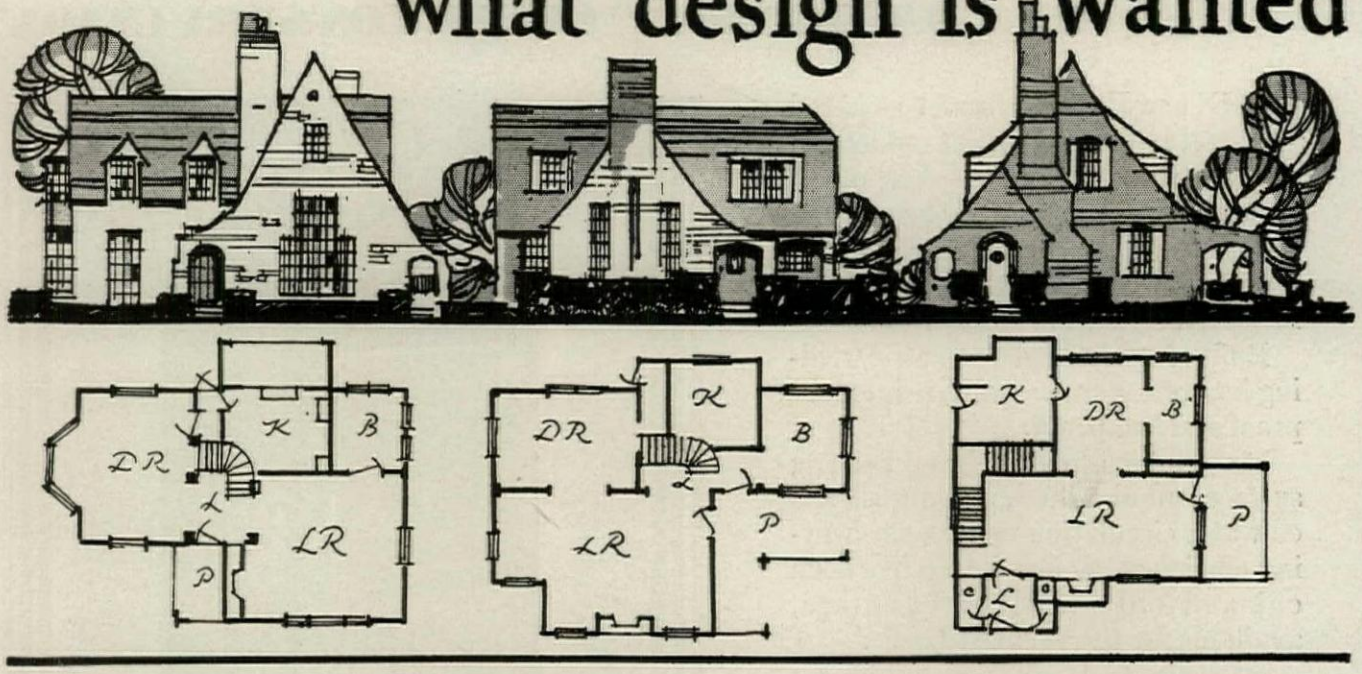
Two-Piece Jacket

Easy and simple to assemble. Two halves form the entire jacket, clamping together without screws or bolts.

HEGGIE-SIMPLEX

STEEL HEATING BOILERS

.....No matter what design is wanted



Steel Framing is adaptable to any individual requirement..

DON'T get the idea that "Steel Framing" means only standardized designs in home building. For it doesn't. This modern method of erecting homes of skyscraper construction is just as flexible, just as obedient to the architect's pencil, as the old-fashioned way of using ordinary material. But, the similarity ends there.

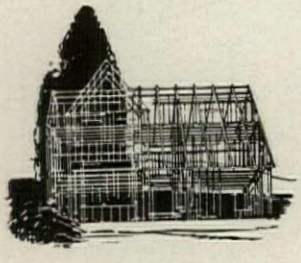
Steel provides the great strength and rigidity of "Steel Framing." All structural members are made up from the original plans and delivered to the building site cut to fit, ready for quick and easy erection with ordinary tools. There can be no warping or shrinking in such a framework. No sagging or settling to cause plaster cracks. This is permanent home construction, fireproof and windproof.

A home built with "Steel Framing"—and built exactly as the owner wants it in design and room arrangement—is far more valuable because it has all of the construction advantages put into giant skyscrapers.

Write for complete information.

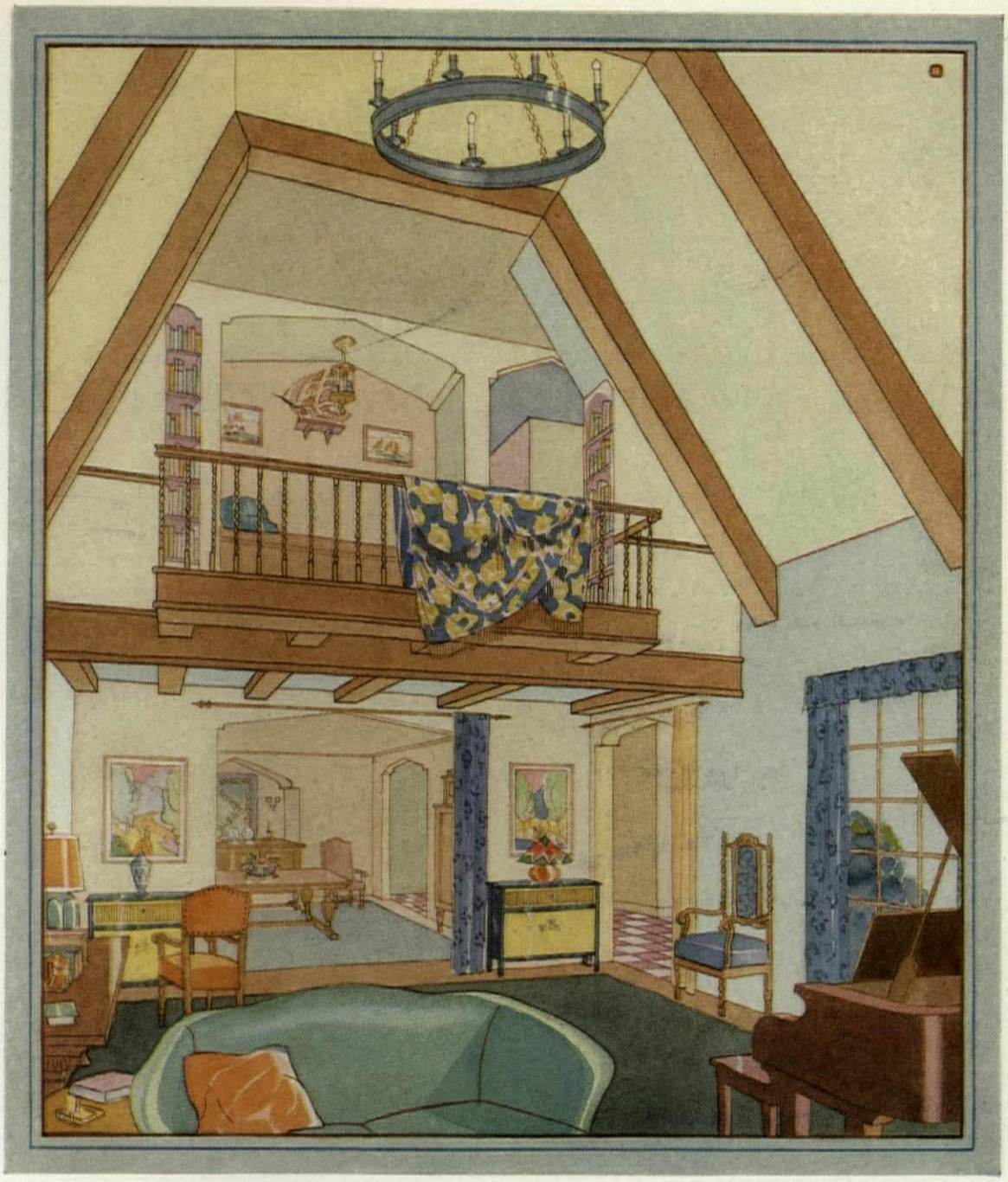
STEEL FRAME HOUSE CO., OLIVER BLDG., PITTSBURGH, PA.

Subsidiary of McClintic-Marshall Corporation



If you are near Philadelphia, Lancaster, Toledo, Columbus, Indianapolis, Syracuse or Rochester, see the Steel Frame Homes now being erected. Newspaper announcements in these cities give complete details.

STEEL FRAMING
THE MODERN METHOD OF HOUSE CONSTRUCTION



THE MODINE CABINET HEATER

in the modern Studio Living Room

THE modern heating equipment for modern rooms . . . harmonious, decorative and above all, wonderfully efficient . . . The fact that the Modine Cabinet Heater insures complete heating comfort in rooms that are recognized as hard to heat, recommends it to you for all rooms . . . Built in two models . . . Floor Type above equipped with efficient built-in humidifier . . . . Wall Type, only 5½ inches in depth and recommended where space is a most important factor as in apartments, offices, shops, etc.

Write today for our latest catalog in full color giving complete facts about Modine Cabinet Heaters.

Originators of
COPPER RADIATION

USED IN PLACE OF CAST IRON RADIATION SINCE 1922

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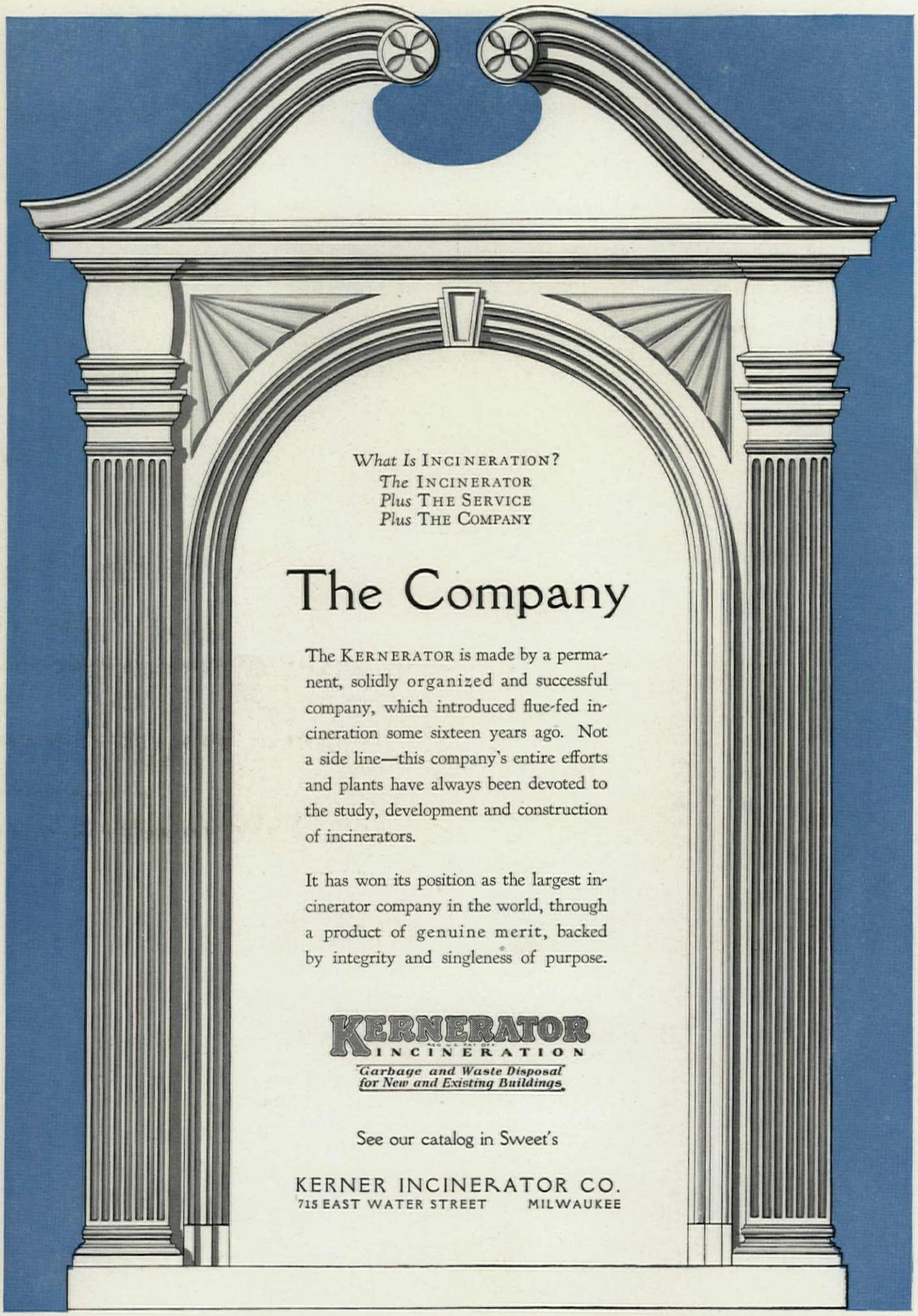
MODINE MANUFACTURING CO., (Heating Division) 1718 Racine Street, RACINE, WIS.
Branch Offices in all Large Cities . . . . . London Office: S. G. LEACH & CO. Ltd., 26-30 Artillery Lane.



What Is INCINERATION?
The INCINERATOR
Plus THE SERVICE
Plus THE COMPANY

The Company

The KERNERATOR is made by a permanent, solidly organized and successful company, which introduced flue-fed incineration some sixteen years ago. Not a side line—this company's entire efforts and plants have always been devoted to the study, development and construction of incinerators.

It has won its position as the largest incinerator company in the world, through a product of genuine merit, backed by integrity and singleness of purpose.

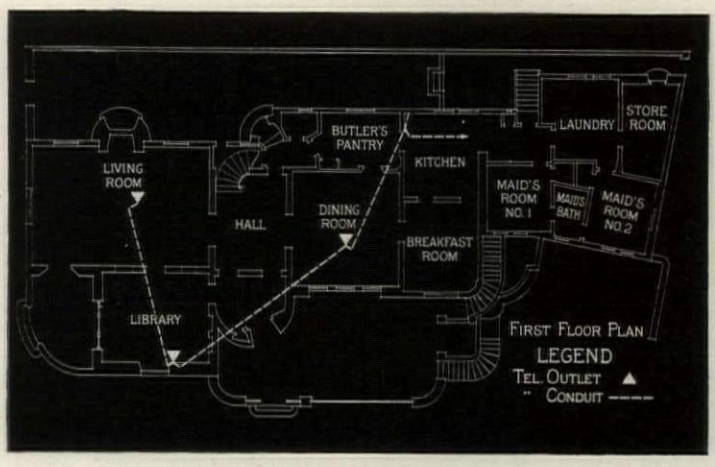
KERNERATOR
INCINERATION
Garbage and Waste Disposal for New and Existing Buildings

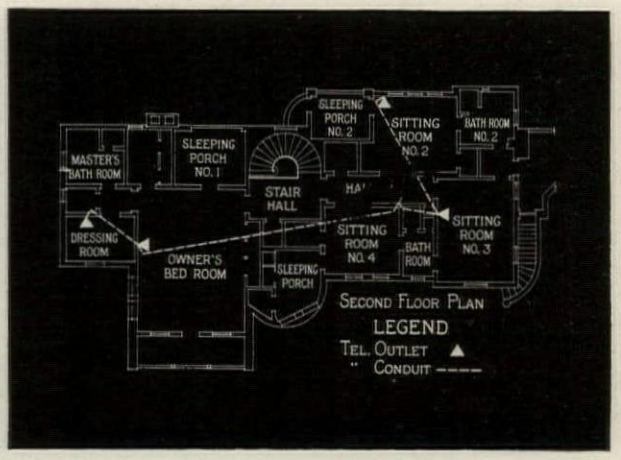
See our catalog in Sweet's

KERNER INCINERATOR CO.
715 EAST WATER STREET MILWAUKEE

The Telephone needs of the Nation are Changing

The Piedmont, California residence of Mr. R. J. McMullen, with accompanying floor plans, showing the telephone outlets and conduit layout which provide for modern telephone convenience.—FREDERICK H. REIMERS, Architect.



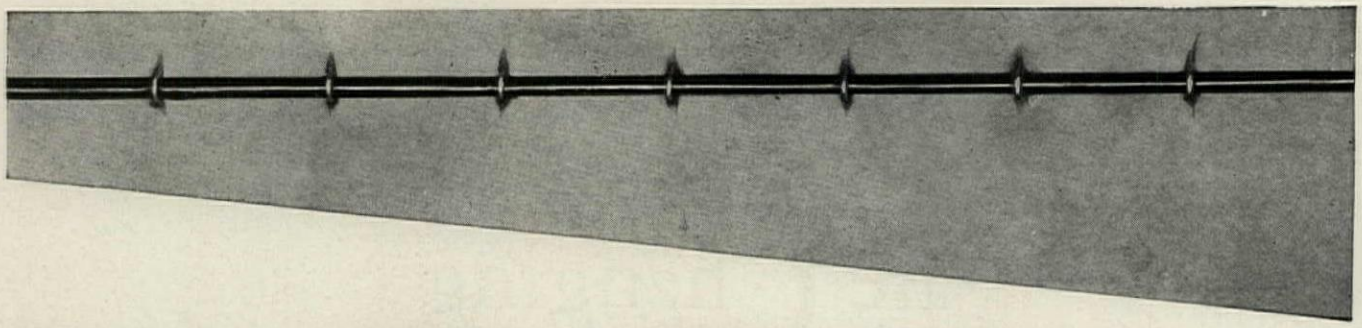


WITH the growing appreciation of the important part communication plays in every-day life, there is coming a radical change in the telephone needs of the nation. Especially is this true as to the number and location of telephones within the home. Where previously one, or possibly two telephones were considered sufficient, people today want telephones throughout the house. . . . Particularly in those rooms most frequently used, so that calls may be made and answered without waste of time or effort.

Many architects are providing for this modern convenience in their plans for new and remodeled residences. By consulting with their clients, and with representatives of the local telephone company, they can determine not only what rooms are desirable for telephone locations, but also what places in those rooms are most suitable. In addition, planning in advance for the telephone arrangements makes it possible to lay conduit for wires within the walls, thus affording protection to the wires, and resulting in improved appearance.

Many other things contribute to modern telephone convenience. Your Bell Company will be glad to explain them to you—and to help you plan the telephone arrangements for your new building projects. Just call the Business Office.

AMERICAN TELEPHONE & TELEGRAPH CO. BELL SYSTEM AND ASSOCIATED COMPANIES



The New *Ribbed STEELTEX* takes plaster out of the replacement group

FURNISHINGS
WALL PAPER
PAINT
ORDINARY PLASTER

THE reinforcing principle of STEELTEX is well known to architects, contractors, and builders through over a quarter of a million installations. It has won definite approval from building experts, because it puts plaster walls and ceilings in the class

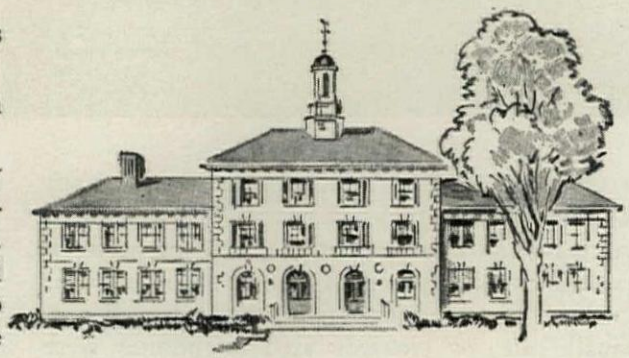
of one-cost building items, wherever it is used.

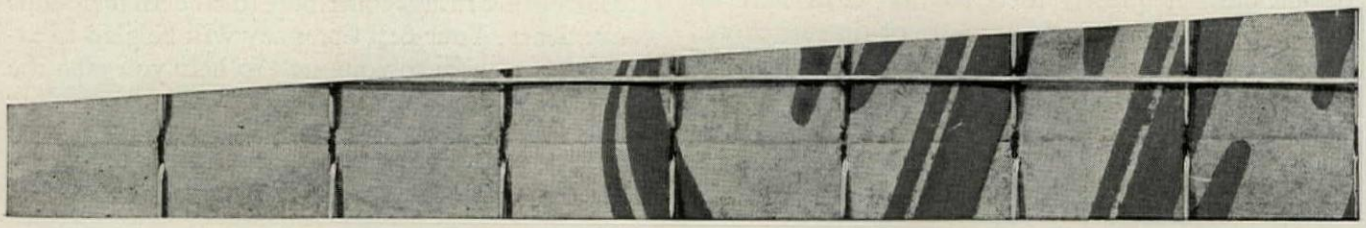
Now we announce a new, perfected form of this tried and tested material.

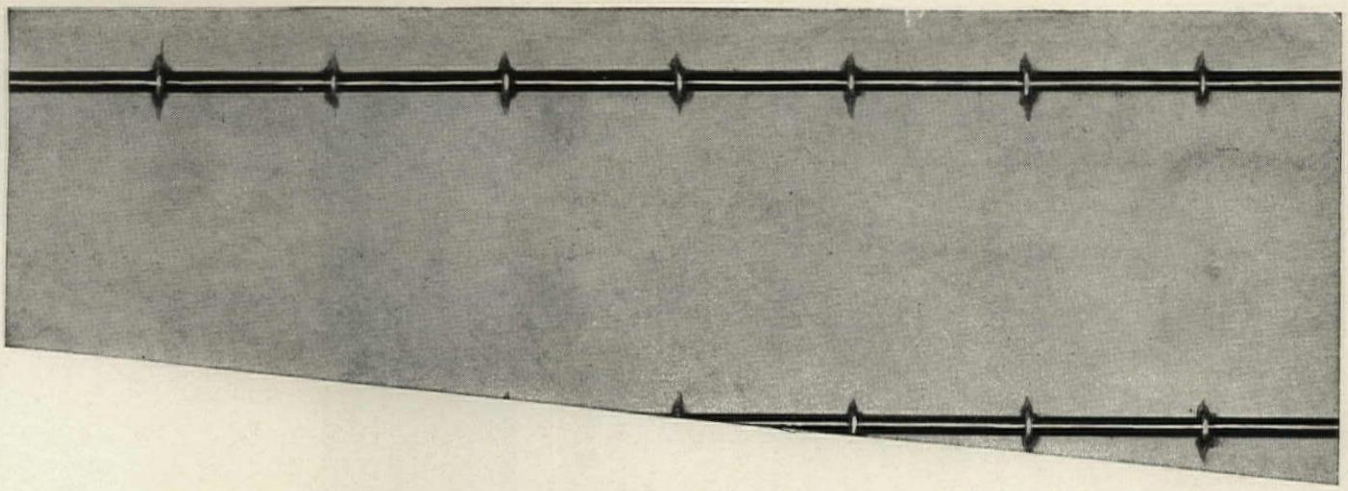
The rigidity and workability of the NEW RIBBED STEELTEX is due to its new stiffening rib, an exclusive STEELTEX feature. This rib makes the sheets straight, flat and rigid. For this reason the NEW RIBBED STEELTEX is easy to install by the average lather, giving the plasterer a level, rigid, trouble-free job on which to work, and assuring uniform, good results.

The NEW RIBBED STEELTEX consists of a 2″ x 2″, 16-gauge reinforcing fabric of cold-drawn steel attached to a tough fibrous backing. The entire sheet is trussed and stiffened by 26-gauge V-shaped channel ribs on 3¾" centers, running at 90° to the studding.

The reinforcing fabric of the NEW RIBBED STEELTEX is galvanized, electrically welded at the intersections, and automatically furred out from the backing. The application of plaster to it in the ordinary way produces a plaster slab of







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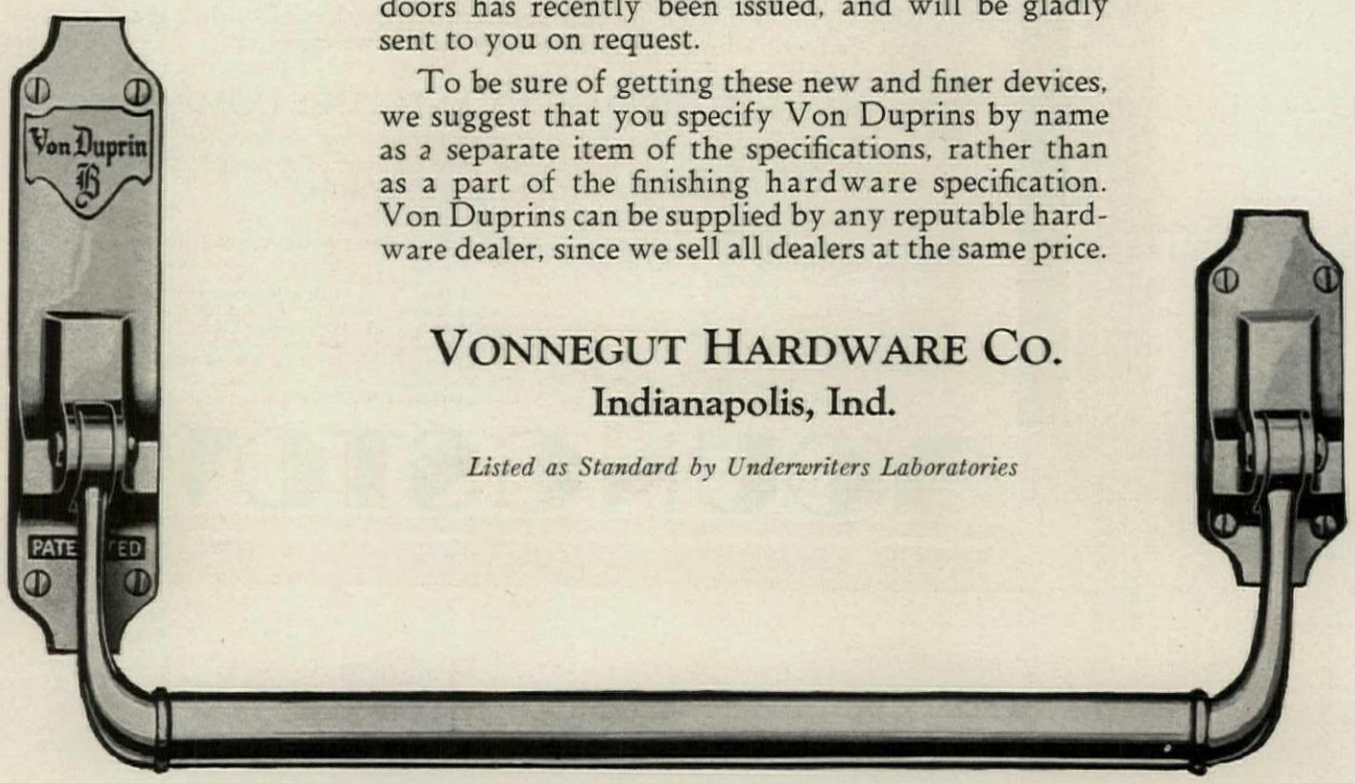

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BOOK DEPARTMENT

AMERICAN ARCHITECTURE OF THE TWENTIETH CENTURY

A REVIEW BY

DOUGLAS WILLIAMS

ALTHOUGH the outstanding examples of recent architecture have been made familiar through the pages of the architectural journals, members of the profession will be able to appreciate the value of a publication made up of large loose leaf plates showing illustrations and measured drawings of these great buildings in a compact and well organized manner. The collection of plates which is the subject of this review is one of the first important attempts on the part of an architectural publisher to cover the important subject of American architecture of the twentieth century in anything like a complete, compact and usable form. Certainly material of this sort should be greatly in demand by the architectural profession, since it presents clearly the form, proportions, and detail of the best examples of buildings which go to make up the outstanding achievement of twentieth century architecture and of the American people for all time.

The skyscraper form of building is a distinctly American type and is the product of a great industrial people. The so-called classical styles were undoubtedly beautiful and filled the needs of the people by whom they were developed, but in the present era of frenzied activity and intense concentration of business industry within limited areas, these classical types have been found to be quite inadequate, and it became necessary to develop an entirely new order of construction and new forms of building materials so that greater freedom might be had in building vertically to great heights. At first, attempts were made to support buildings on masonry walls, but when the structures exceeded six or seven stories in height the lower walls were of necessity so massive as to occupy the greater part of the lower floor space. The problem of verticality was solved by the use of steel or ferro-concrete framework supporting curtain walls of masonry. The height to which such structures may be carried now seems to be almost unlimited, and as we look at the Chanin Building and realize that on the opposite corner will be a still taller structure, we wonder where the thing will end. It early became apparent that the construction of so many enormous structures along the edges of comparatively narrow thoroughfares would result in the streets becoming dim and narrow canyons such as are found in the lower part of Manhattan today. In providing for the elimination of this condition, the city planners unwittingly invented a type of structure which in the hands of our best architects has resulted in the beautiful "set-back" style and has brought to the world an entirely new architectural type. Inspired by the greater possibilities latent in the new building materials, designers have developed a new form of design which, in its better manifestations, is characterized by a dignified simplicity and appropriateness to the spirit of modern times. New freedom in design naturally is not restricted to structures of the skyscraper type but has resulted in many beautiful edifices among other classes of buildings, such as churches and smaller buildings where the need for height was not so pressing as in other buildings.

Alabama Power Building, Birmingham
Warren, Knight & Davis, Architects

As we continue to develop, it is difficult to foresee what the future may have in store, and it would be impossible at this time to predict anything in the nature of a final work on twentieth century architecture. It therefore seems very fitting that the publishers and editor of the present series of illustrations and drawings have chosen to issue it in the form of a progressive publication of separate volumes and parts, each of which may be purchased separately. In this way the development and trends of building design may be followed and a splendid collection of reference on the new architecture be built up as rapidly as further

progress is made. The size of the plates, 14 by 20 inches, together with the fact that they are loose leaf, makes them extremely usable, and their collection into portfolios of 20 plates also adds to their utility. The work is carefully edited by Oliver Reagan, A.I.A., and the paper, printing and general make-up of the work resembles the well known monograph of the work of Mc Kim, Mead & White, published likewise by the Architectural Book Publishing Co., Inc. The choice of buildings to be shown is left to the readers, and subscribers are invited to write suggesting the names of buildings they would like to have shown. The publishers agree that when a sufficient number of such requests have been received for a given building, that structure will be presented in a forthcoming issue.

Six parts of this series have already been issued and include a notable selection of important American buildings including the Bowery Savings Bank, New York; Ford Engineering Laboratory, Dearborn, Mich.; U. S. Army Supply Base, Brooklyn; Indianapolis Public Library; Grauman's Metropolitan Theater, Los Angeles; Panhellenic House, New York; Irvine Auditorium, U. of P., Philadelphia; Los Angeles Mail Order House of Sears, Roebuck & Co.; and many other outstanding buildings of the same class representing the work of many of the foremost American architects of the day.

Of course no work on our modern architectural design would be complete without examples of the work of Bertram Grosvenor Goodhue, who played such an important part in the origination and development of the new type of design. A complete portfolio of 30 plates is devoted to some of the best specimens of his work, including the Nebraska State Capitol; the Church of St. Vincent Ferrer, New York; the National Academy of Science, Washington; and the Los Angeles Public Library. Of the buildings published thus far, from two to four plates of illustrations and from one to four plates of drawings are shown for each, the photography being done in the best architectural manner so as to show the proper proportions and as much detail as possible, and the choice of subjects is representative of all classes and types.

AMERICAN ARCHITECTURE OF THE 20TH CENTURY. A Series of Illustrations and Measured Drawings of Commercial and Industrial Buildings. Edited by Oliver Reagan, A. I. A. Complete in 4 Volumes or 12 Parts, each Part containing 20 plates, 14 x 20 ins. Price per Part in Portfolio, $8.50; Price per Bound Volume, $30. Architectural Book Publishing Co., Inc., 108 West 46th Street, New York.

THE AMERICAN SCHOOL AND UNIVERSITY, 1929-1930. 462 pp., 7 x 10 ins. Price $5. American School Publishing Corporation. 443 Fourth Avenue, New York.

IN no department of architecture has there been made more striking progress than in its application to schools. The entire subject of schools in fact, from first to last, seems to have been so well and thoroughly studied that there is little if anything which has not been examined and re-examined, analyzed and classified at the hands of educators, architects and the designers and manufacturers of school equipment. When a school is to be established today the scope of its activities is made the subject of an exhaustive and critical survey, first to determine the need of a school, and then to discover just what type of school it should be. With the results of

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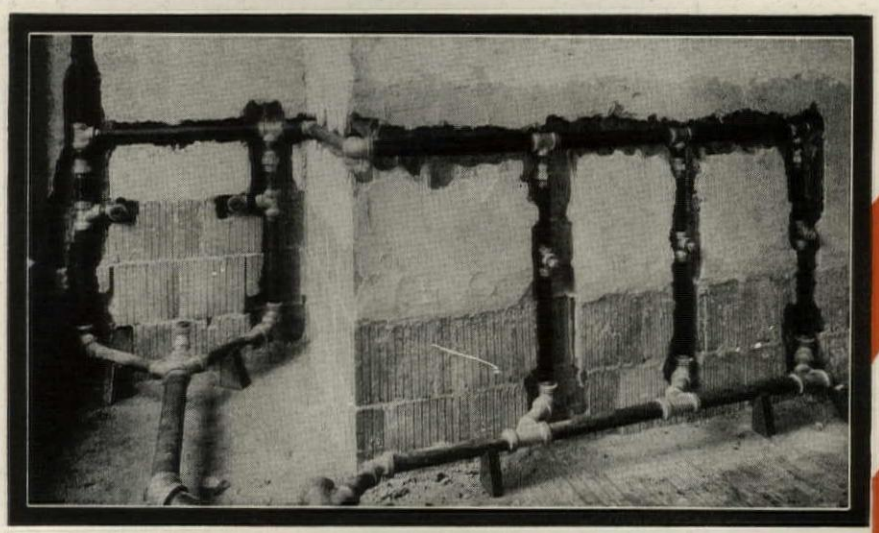

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such a survey as a foundation, there comes consideration of a site with reference to its accessibility, its being near the center of the district to be served, the character of its surroundings, the nature of its soil, etc., and all this before there comes more than slight consideration of its architecture. With extensive data thus at his command, the school architect approaches its actual planning and designing, aided constantly by highly trained and experienced educators and by the designers and makers of every possible detail of school equipment, the school when finally completed and turned over to the school board and teachers being probably the last word in completeness and in architectural and mechanical excellence and well fitted to perform the work for which it was built. All this now forms the subject matter of many publications,—weekly, monthly or annual,—and recently there have been published a number of excellent works dealing with different aspects of the school problem.

This volume is the second annual edition of "a year book devoted to the design, construction, equipment, utilization and maintenance of educational buildings and grounds," and among the names of the many contributors who have collaborated in the preparation of the work one notes those of leaders in all the fields which are concerned,—widely known educators, architects, landscape architects and others. The completeness of the work and the thoroughness with which it deals with the subject might be indicated by an enumeration of its chapter headings: I, Selecting the Site and Planning the Budget. II, Design and Construction of Buildings. III, Modernization, Maintenance and Insurance. IV, Landscaping and Upkeep of School Grounds. V, Buildings and Equipment for Physical Education and Play. VI, Classroom, Office, Library and Auditorium. VII, Home Economics,—Cafeteria,—Laundry. VIII, Laboratory and Shop. IX, Chemical Index. X, Distributors of Equipment. XI, Architects for Educational Buildings. XII, School Superintendents in Cities of 10,000 and over. XIII, State Departments of Public Instruction. XIV, Alphabetical and Classified Lists of Manufacturers. School boards today depend upon their architects for far more than mere architectural service. The architect is expected to be fully informed regarding a host of subjects not even remotely concerned with architecture, and often in proportion to his knowledge and resourcefulness is the value of his service gauged. The excellence of this work entitles it to circulation among architects interested in any type of school architecture.

OLD WORLD MASTERS IN NEW WORLD COLLECTIONS. By Esther Singleton. 441 pp., 7½ x 11 ins. Price $10. The Macmillan Company, 60 Fifth Avenue, New York.

EVEN before the beginning of the World War period, vast changes were taking place in the world. Countries which for ages had been leaders in commerce, in industry, in art, and in every other form of activity found their power gradually waning as the Republic of the West increased in strength and power and moved ever more and more toward the center of the world's stage. The Great War, which left the greater part of Europe impoverished if not actually ruined, meant the unconditional surrender of the Old World to the New, and gain to America in possibly more ways than one in

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perhaps a ratio out of all proportion to Europe's loss.

In every age conquerors have taken toll of the art treasures which circumstances have placed at their disposal. The practical Romans laid heavy hands upon the riches of cultured Greece; persecuted Christianity emerged triumphant from the catacombs to plunder the temples of pagan antiquity for material of which to build the Christian fanes which presently arose; St. Mark's, that treasure house of splendor, meant much pilfering from the East; Napoleon dealt with ruthless hands with many of Europe's museums, and in fact many a museum has been enriched at the cost of those in other countries, the balance having been sometimes restored when later wars and other victories made restoration necessary. Long before the Great War the world's art treasures began coming to America's shores,—the result not of victory in battle, unless economic and commercial rivalry be so considered, but due to America's lavish and constantly increasing wealth. Paintings, marbles, tapestries, statuary and other works of art which for centuries had been among the ancestral possessions of great families were suddenly found to be in American museums or private collections. Even some cathedrals and ancient monastic foundations found themselves unable to resist the lure of gold offered them by the resourceful art dealers who constitute the link connecting owners old with owners new, and today one has ceased to express surprise at hearing that some priceless treasure has passed from the possession of an Italian prince or an English duke into that of some American manufacturer or banker. The transfer of ownership, it might be observed, is much more than likely to be eventually to the advantage of the world, taking the world as a whole. Americans as a rule bequeath their collections to public museums where they enrich the facilities for public culture, while in Europe the same treasures served merely to give pleasure to their owners and their owners' friends.

In this volume an author widely known as holding accurate and conservative views on art has made a survey of the paintings by the great masters of Europe which at present are in American private collections. The work deals with rather more than 100 paintings, and to facilitate the preparation of the volume she has had the enthusiastic coöperation of the collections' owners. The work, be it understood, deals with portraits, mythological and *genre* subjects and with some subjects which are religious, but leaving out subjects which portray suffering; here there are no pietas, crucifixions, or paintings of saints undergoing martyrdom. Under the general heading of Italian painting the author considers work of various schools,—Siena, Florentine, Umbrian, north Italian, and Venetian, and then in their turn she deals with painting of the Flemish, Dutch, German and Spanish masters and with the work of France and England during the eighteenth century. The author, as has been already suggested, approaches dealing with a subject so important with extensive background. She is already widely known for her writings on various departments of art, and the volume's illustrations as well as its text have been prepared with all the thought and care which one would look for in a work from her study.

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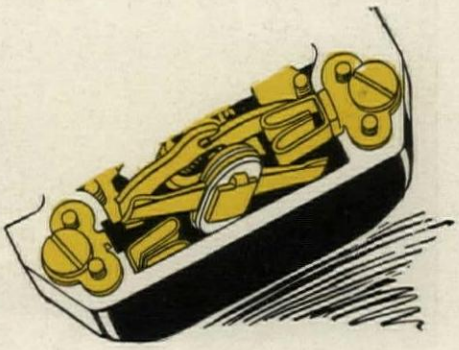

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AUGUST 1929

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Vertical Perspective

VIEW OF THE FULLER BUILDING, NEW YORK

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The Architectural Forum

THE
ARCHITECTURAL
FORUM

VOLUME LI NUMBER TWO

AUGUST 1929

THE CONSTRUCTION AND EQUIPMENT OF THE FIDELITY-PHILADELPHIA TRUST BUILDING

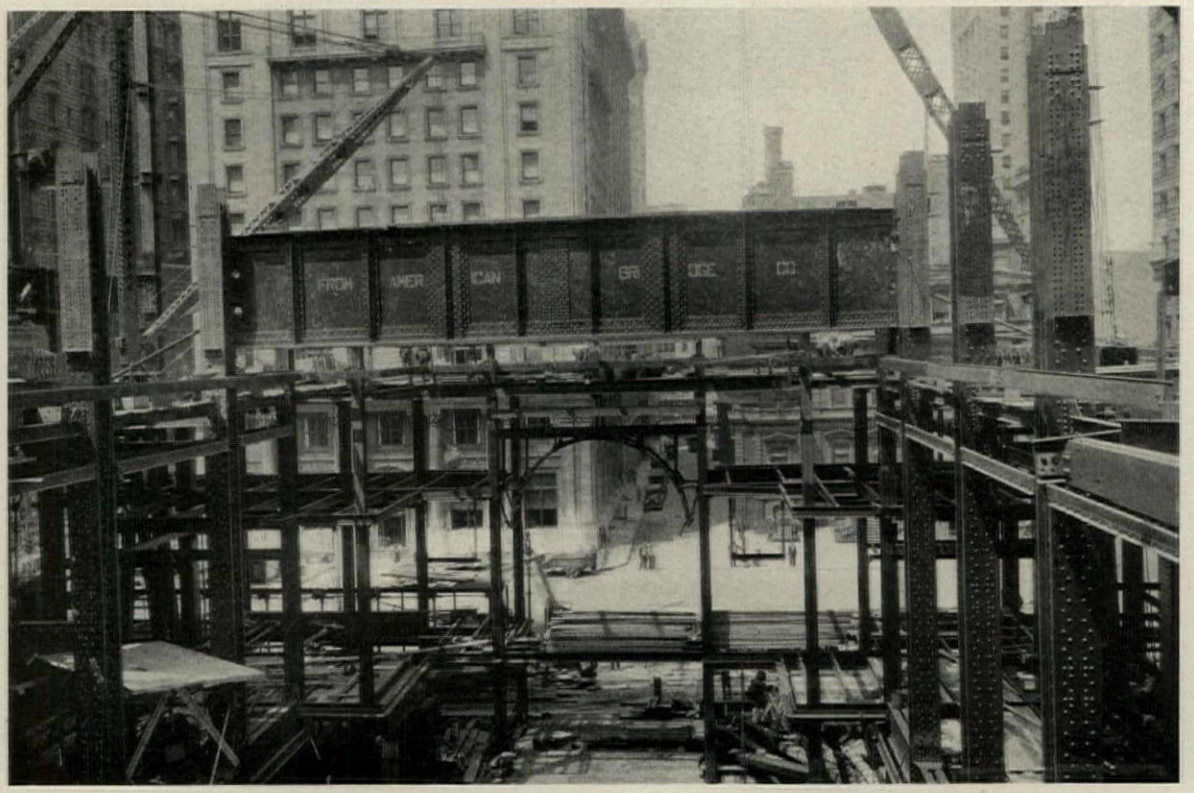
SIMON & SIMON
ARCHITECTS AND ENGINEERS

IN the construction of the Fidelity-Philadelphia Trust Building, Philadelphia's largest office structure, within 16 months from the time wreckers went on the site until the completed structure was turned over to the new tenants, emphasis was placed on the time element, important in large building enterprises. In Part One of this issue of THE FORUM there is a description of the architectural features of this building. In this article it is proposed to extend this description to cover the constructional, structural, mechanical and electrical features of the building.

Demolition. On January 24, 1927, a contract was awarded to Irwin & Leighton of Philadelphia. On March 1, 1927, work began on the demolition of the existing buildings. This work was an important factor in the limit of time allowed for the completion of the structure and affected the entire building program. One of the old buildings was a large theater, the foundations of which were of rubble, mass concrete and brick. The structural frame of this building was of steel, and the floors, balconies, proscenium arch, box fronts, lobbies, etc., were of reinforced concrete with slabs from 8 to 12 inches thick. In fact, this applies also to the reinforced concrete in the theater building, all of which was extraordinarily heavy in keeping with the building practice of the day when concrete construction had not been sufficiently developed to permit the use of light slabs and modern reinforcement. Because the use of dynamite might have inconvenienced neighbors or have endangered wheel and pedestrian traffic, skull crackers were employed to reduce these large masses of concrete to fragments which could be conveniently removed.

Foundations. An elaborate system of core borings was made, and the location of the ledge rock was definitely determined prior to the preparation of the foundation design. Calculations were made of a number of kinds of foundations, and the final decision was for the open caisson type which accomplished the required purpose in the least time and with the minimum expenditure. The large tonnage of the column loads required that the foundations be carried to the solid rock, and accordingly a foundation was build for each column. There are 138 caisson foundations varying in size from 3 feet, 8 inches square to 8 feet, 4 inches square at the top. The caissons are of concrete, cast in place, unreinforced except at the tops immediately below the points of application of the column loads. Considerable difficulty was experienced in sinking these caissons, as the level of the ground water is approximately 45 feet below the curb. Owing to the density of the soil overlying the rock, it was found after experiment that the only way to expeditiously construct these foundations was by pumping the ground water from each caisson pit. The same type of foundations, although entirely apart from those of the building, was used for the safe deposit vault which measures approximately 38 feet wide, 91 feet deep, and is two stories in height. There was nothing extraordinary about the character of the foundations, except that record speed was made in building them, considering the fact that it was necessary to begin work on many before the demolition of the buildings overhead had been begun.

Underpinning. It was necessary to underpin the westerly wall of the Witherspoon Building, adjoining the Fidelity-Philadelphia Trust Building on the east. The Witherspoon Building is 15 stories in height; several of these stories are unusually high due to there being an auditorium, thus making extraordinarily heavy concentrated loads. Several different methods of underpin-



View of Steel Construction Showing the Girder Over the Banking Space

ning were considered, but that which would cost the least money and which could moreover be the most rapidly performed was the erection in individual sections of a concrete wall of adequate thickness supporting the foundations of this building to the depth of the lowest excavation of the Fidelity-Philadelphia Trust Building. This wall was supported on concrete-filled steel-shell piles 16 inches in diameter, the steel shells being ⅜ inch in thickness and designed to carry the entire load to bed rock. Each individual pile supported not more than 60 tons and was tested to 90 tons without producing settlement. The Fidelity-Philadelphia Trust Building stands on gneiss rock at a depth of about 60 feet below curb.

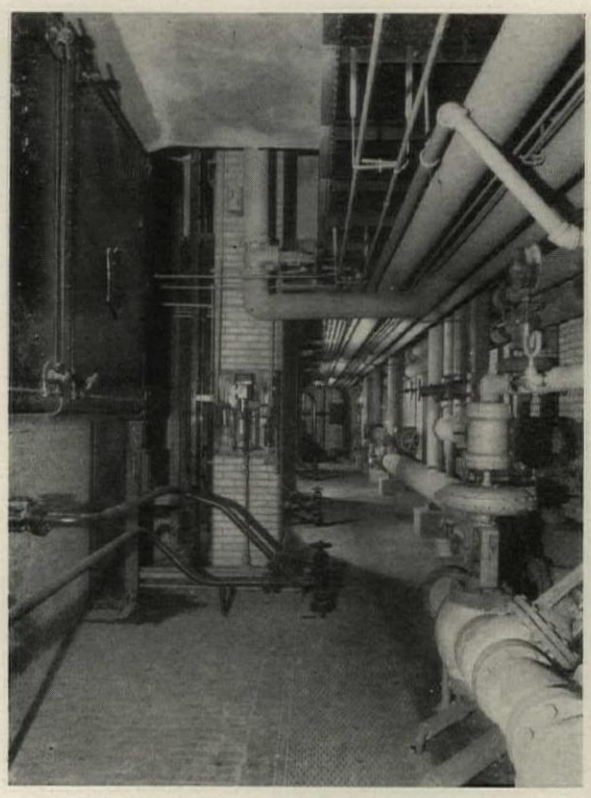
Less than two months after the contractors began work, the first caisson was sunk. Four months later, in the presence of officials of the Fidelity-Philadelphia Trust Company and their guests, the cornerstone was laid. Progress was rapid, and seven weeks later the topmost structural steel member was swung into position. More than 14,200 tons of steel and 350,000 rivets were used in framing the structure. Six large girders span the top of the banking room and carry the center portion of the building. These are 60 feet long, 9 feet, 6 inches deep, and weigh approximately 58 tons each. They are among the largest girders in any office building in the city. The movement of materials was so planned that encroachment upon traffic was exceedingly small.

Steel Design. Let us consider the problem presented by the steel skeleton of the building. The heaviest dead loads for floors are those on the first floor. Those assumed for beams for this floor in pounds per square foot are:—

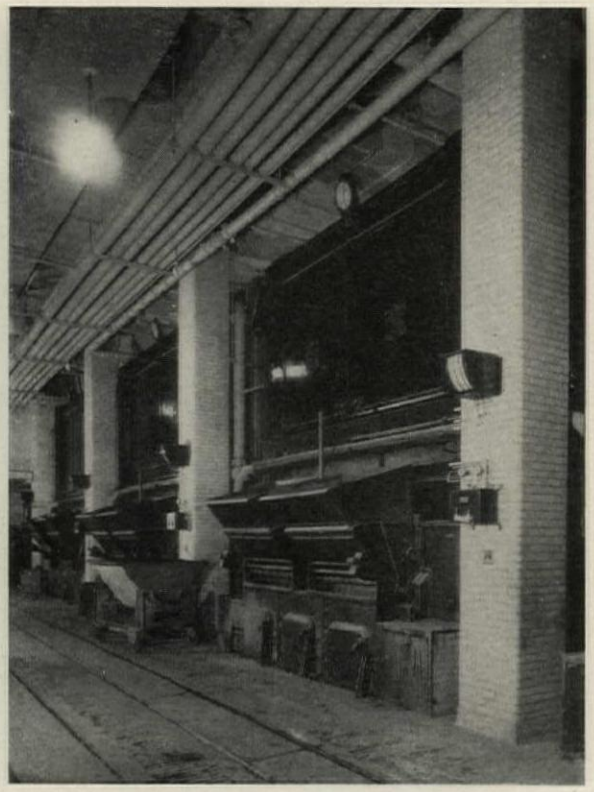
Marble	15
Cement	12
3-inch fill	20
4-inch stone concrete slab	48
Ceiling (of first basement)	15
Partitions	35
Fireproofing	22
Steel	10
Total	177

For girders into which these beams frame, an additional dead load of 7 pounds steel and 15 pounds fireproofing or a total of 199 pounds is assumed. Another heavy floor is that of the first basement with a dead load of 145 pounds for beams and 165 pounds for girders. For the typical office floor the dead loads for beams are:—

Cement finish	12
3-inch fill	20
4-inch cinder concrete slab	38
Ceiling or plaster	7
Partitions	15
Fireproofing	15
Steel	6
Total	113



Rear of Boiler Room, High-pressure Steam Header



View of Boilers Showing Semi-automatic Stokers

For the girders into which these floor beams frame, an additional dead load of 4 pounds steel and 8 pounds fireproofing, or 125 pounds, is assumed. The roof loads vary according to type of material used and the location of the steel member. Over the 29th and 29th mezzanine, the dead loads are, for purlins:—

Slag	6
Cement	5
4-inch cinder concrete slab	38
Fill (average 6-inch)	33
Fireproofing	12
Future ceiling	16
Steel	7
Total	117

An average of 9 pounds was added for the girders and trusses. The roof over the board room is assumed as weighing:—

Copper	6
4-inch cinder concrete slab	38
Ceiling	20
Fireproofing	12
Steel	9
Total	89

In assuming dead loads for columns, the weight of the column, fireproofing with plaster around the shaft and reactions of the weights of heavy girders are all included. The dead load of a typical wall section is assumed at these weights in pounds per superficial foot:—

Limestone 6 inches thick	80
8-inch hollow brick	60
Plaster	5
	145
Deduction of 20 per cent for windows	29
Total	116

In each wall panel, 11 feet, 6 inches by 17 feet, 4 inches, are two windows, 4 feet, 4 inches wide by 7 feet high, permitting an allowance of about 30 per cent reduction in weight; the calculated reduction of 20 per cent is conservative. Heavier loads are assumed for walls below the fifth floor.

Other figures may throw an interesting sidelight on some of the phases of construction. At the labor peak there were 1,300 men employed on the site. Bricks of all kinds to the number of 4,180,000 were used. The cubic footage of limestone required was 100,000; 342,000 yards of plastering were done; 960,000 square feet of hollow tile partitions and 160,000 square feet of gypsum partition were erected; 116,000 square feet of Tennessee marble floor and wainscot were laid. By the terms of the original contract, September 1, 1928 was stipulated as the completion date, allowing 18 months' time. Marked coöperation between the subcontractors, contractors, architects, and the building committee made it possible for the time for construction to be shortened. In September, 1927, the date of comple-

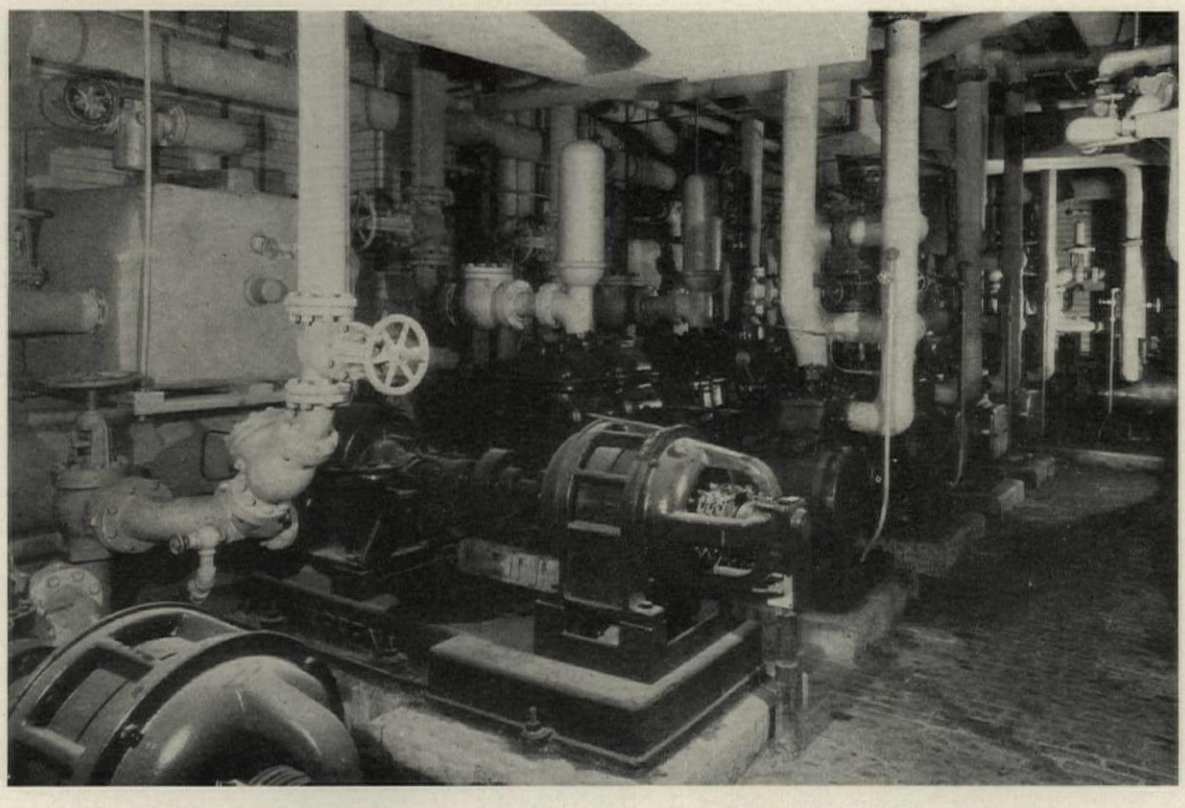
View of Main Switchboard Showing Trunk Panels and Low Tension Switchboard

tion was stipulated as June 1, 1928, three months earlier than required in the original contract. On March 1, 1928, 12 months after work had been begun, the Baltimore & Ohio Railroad occupied its space at the corner of Broad and Walnut Streets, and on June 1, 1928, in accordance with the new schedule, the office building portion was opened for occupancy, with but 15 months elapsed working time.

Elevators. The passenger elevators are arranged in two banks of ten each. One section of ten cars cares for the local passenger traffic and operates from the first to the 17th floor, at a speed of 700 feet per minute. These are of the gearless traction type with signal control and automatic floor-finding devices. The other section of ten cars serves express passenger traffic, with 800 feet per minute elevators of similar type and control to those of the other system. Two of these express shafts have openings to every floor throughout the building, and eight of them are enclosed shafts from the second to the 16th floor inclusive. In the banking house there are installed for operation between the second basement and the fifth floor, six elevators operated at a speed of 450 feet per minute. Two service elevators with a speed of 600 feet per minute open from the lowest or third basement to the 29th floor inclusive, and are used for freight and general building service.

The power plant in the lowest basement has five water tube boilers, semi-automatically stoked and built for a safe working pressure of 160 pounds per square inch. Three of these develop a horse power of 413½ each, and two 185 each, giving a combined normal horse power total of 1,610. From this plant are furnished the heat of the building, high pressure steam for pumps, and medium pressure steam for the kitchens. Three 6,000-gallon capacity oil tanks have been installed to be ready should the necessity for using this fuel ever arise.

The heating system is of the two-pipe vacuum return type with steam feeder main in the pipe loft of the 23rd floor. The office and bank portions have separate feeder mains, and the banking room is provided with a system of temperature control with automatic thermostat arrangement. Automatic control has been installed in the offices to shut off heat from radiators only. An elaborate system of ventilation assures an adequate supply of fresh air for all units of the building. The entire banking area has both supply and exhaust ventilation. In the main banking room four complete changes of air are accomplished every hour. This air is introduced to the system at the sixth floor level above the point where street dust contaminates, where it is filtered and then distributed. An independent supply of air is provided for the bank vaults.



Boiler Room Mezzanine Showing Steam- and Motor-driven Pump and Condensate Meter

Electrical System. The entire electrical requirements of the building can be carried on either of two 13,200-volt feeders, which enter the building from the Philadelphia Electric Company's service. In case one feeder should fail, a bus tie oil circuit breaker is automatically closed, which energizes the entire main truck board from one feeder, since the main high tension truck switchboard is arranged in two sections, one 13,200-volt feeder going to each section. When the feeder that fails is again placed in service, the incoming line oil switch on that feeder is automatically closed, and the bus tie switch is automatically opened, thus restoring the normal service. In case of trouble on a regulator, it is automatically shunted out of the circuit. There are two feeder regulators, each of sufficient capacity to carry the entire load, controlled by a six-board high voltage truck switchboard.

A bank of 13,200-volt primary to 230 volts secondary is of sufficient capacity to furnish all of the power requirements, excepting the elevators. A similar bank of transformers, except 115 volts secondary, furnishes the lighting requirements. A third bank of high voltage transformers, with 2,300 volts secondary, furnishes the electric elevators with power, and in an emergency will operate the fire pump. Although these nine transformers will meet the total requirements, there is installed a duplicate bank of nine other transformers, which will be automatically thrown in circuit should trouble be encountered in any other bank of transformers, so that continuity of service is assured.

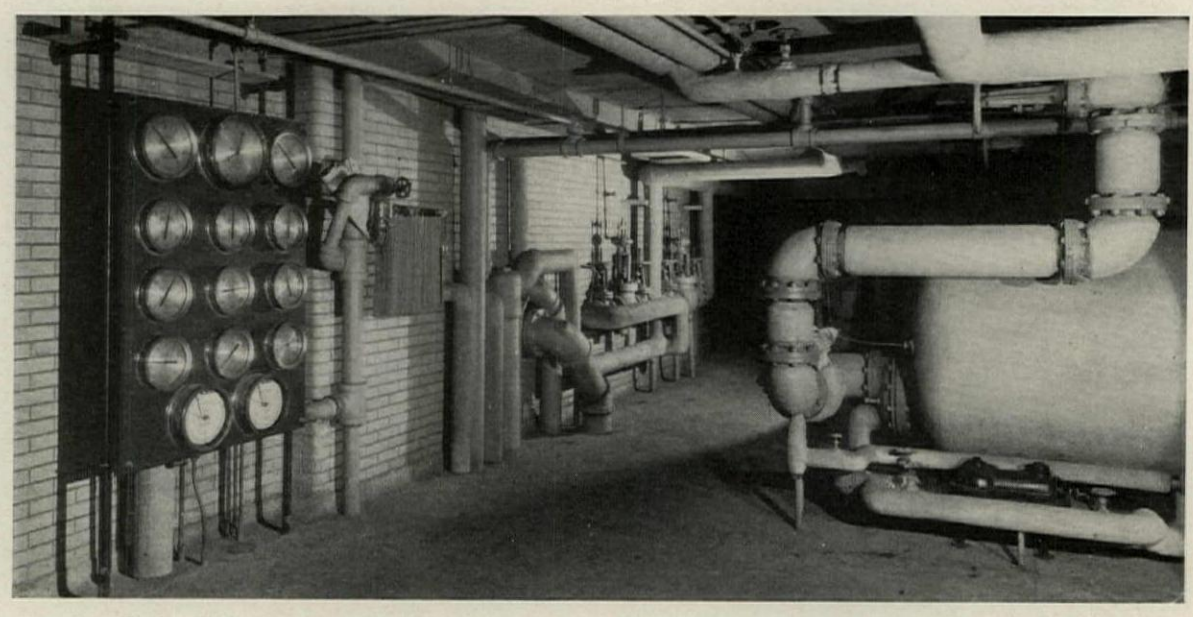
The power for the elevators at 2,300 volts is fed through steel armored cable to the elevator substations located on the 18th and 28th floors. In each of these elevator substations there is located a four-panel truck type switchboard, together with transformer equipment. Two sets of transformers are used, each of sufficient capacity, so that it might, if required, meet the total demand. The switching is so arranged that one bank of transformers is normally in operation. If the load goes above a predetermined value, the other bank of transformers is automatically cut in in parallel to take care of this excess demand. As soon as the load decreases, this second bank is automatically cut out. Should trouble develop in one bank of transformers, that bank will automatically be switched out of service, and the other bank will take care of the load. By interchanging the truck panels in the elevator substations, approximately the same amount of power can be taken from each bank of transformers during certain periods of time. Also located in the elevator substations, but in separate rooms, are four-panel low tension switchboards, containing metering equipment, feeder lines, etc., for each bank of elevators.

Portion of Kitchen for Bank Employes' Dining Room

A 15-panel low tension switchboard in the basement distributes all of the power and lighting requirements. By means of connections on this board, the entire lighting load of the building may be instantly changed to secure its current from either of the duplicate banks of lighting transformers, or in case both of these have failed, an auto transformer may be immediately switched into service, which will then supply the lighting from either of the duplicate banks of power transformers. By means of this same switching equipment and auto transformers, should both of the banks of power transformers fail, such power as must be maintained may be secured from either of the lighting transformers. In addition, a large storage battery has been installed, which furnishes emergency exit lighting and power for the automatic operation of switching equipment. On the same floor, but located in a different room, are four battery charging motor generator sets and control equipment.

Two static condenser equipments are installed in the same room with the elevator transformers, located in the elevator transformer station. The purpose of these is to improve the power factor of the load imposed by the elevator equipment. Between 60 and 70 motors and controls are installed throughout the building for operating ventilating fans and circulating pumps. Lighting and power distribution cabinets of the most up-to-date type are placed throughout the building. There are installed in this building approximately 740,000 feet, or 140 miles, of No. 12 and No. 14 code wire. On each wing of each floor is located a meter bar cabinet type panel of unique design. The design of these panels is such that it is a simple matter to readily arrange for the metering of the electric service furnished to one or more offices through a single meter.

Bank Vaults. The vaults of the bank are in the first and second basements. These two vaults are each 86 feet long and 33 feet, 4 inches wide. The safe deposit vault in the first basement is entered from an ample public lobby accessible

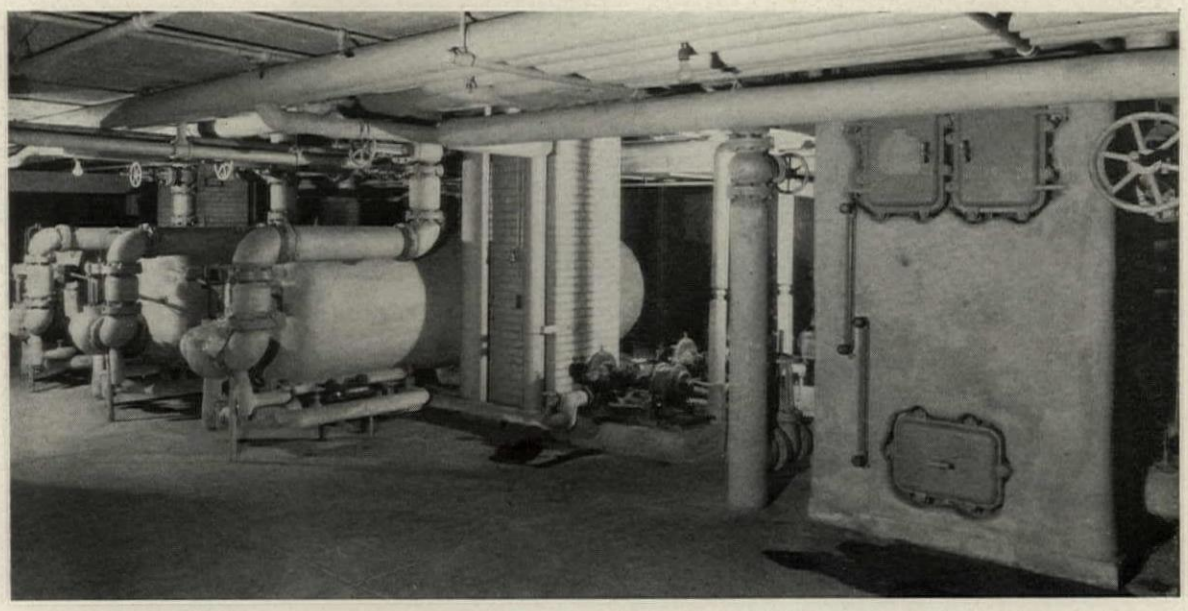


Boiler Room Mezzanine Showing Steam and Water Gauge Board, Recording Gauges and Water Pressure Reducing Valves

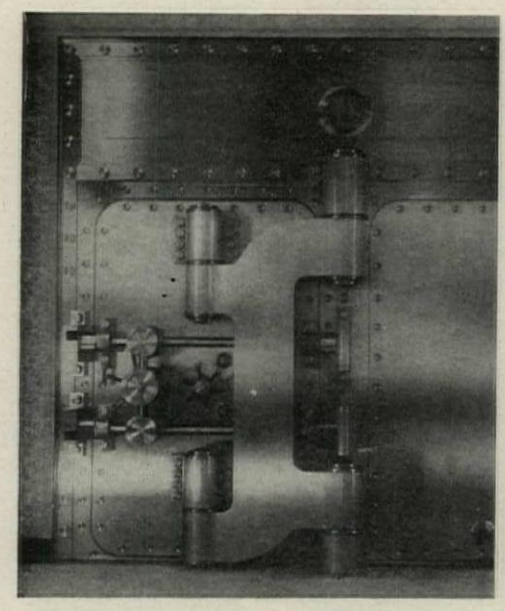
Another View Showing Kitchen for Bank Employes' Dining Room

View of Kitchen with Steam Kettle in Foreground

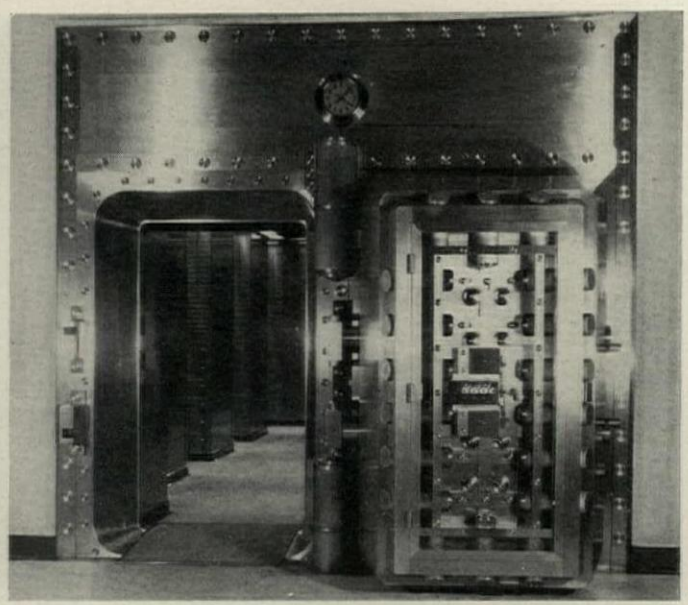
from the first floor by stairways and elevators. The vault is 12 feet, 5 inches high. Lacking only a few feet, eight full sized Philadelphia Rapid Transit trolley cars could be stored in the space occupied by the upper vault. These vaults are in reality separate structures within the building. No beams, girders or columns of the main structure pass through the vaults' walls or ceilings. Their walls and roofs are 24 inches thick. More than 200 tons of high grade steel make up the lining and equipment. Nearly 40 tons of special formula stainless steel renders the handling of the safe deposit boxes a cleanly process. The grease which has been the usual safeguard against rust is eliminated, and untarnished surfaces are maintained without inconvenience to patrons. Two electrical systems protect the vaults, while a sound accumulating system provides a third mode of safeguarding against attack. The individual booths of the safe deposit department



Hot Water Storage Heaters in Background. Boiler Feed Water Heater in Foreground

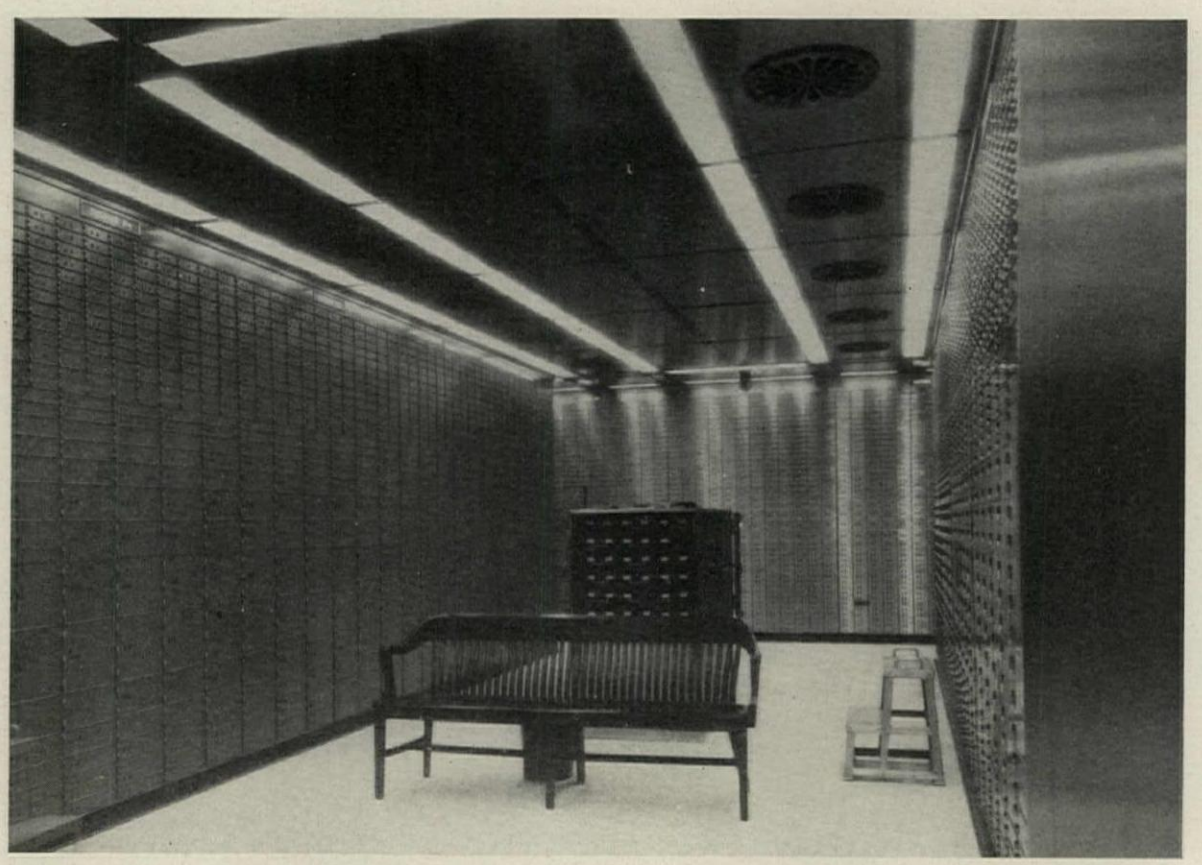


Safe Deposit Vault Door Closed



Safe Deposit Vault Door in Open Position

are so equipped that a record of each booth's tenancy and an inspection after every occupancy insure the safety of valuable papers overlooked by patrons. The vault for the bank's own cash and securities is on the second basement level. In this vault are held also those securities entrusted to the safekeeping of the bank and those in the custody of the corporate trust department.



Safe Deposit Vault. Note Special Lighting and Ventilating

CONSTRUCTION AND EQUIPMENT OF THE ATLANTIC CITY CONVENTION HALL

BY

SAMUEL L. WARE AND D. D. EAMES

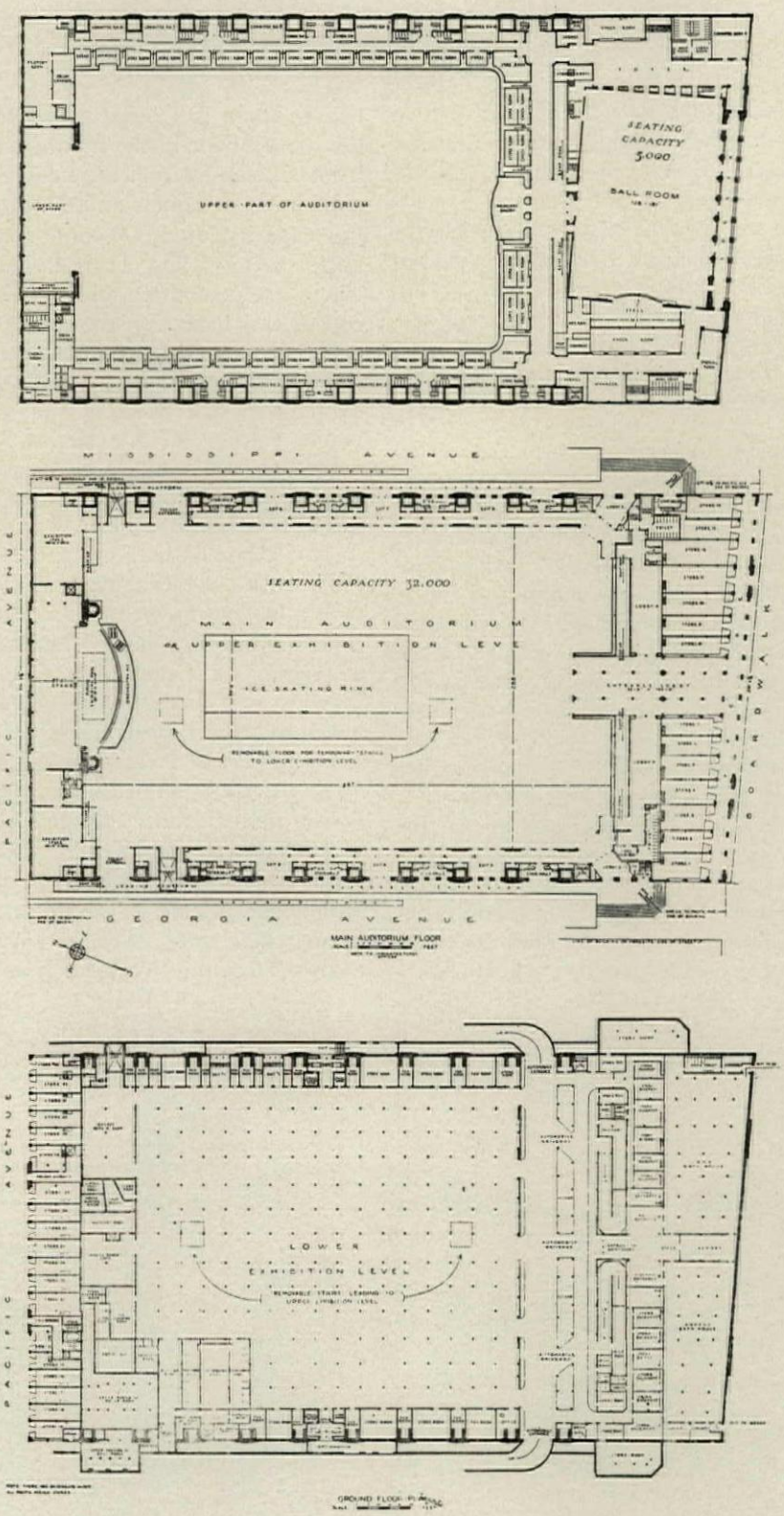
Editor's Note. The portion of this article which deals with construction is taken from the paper by Samuel L. Ware, who was formerly in charge of engineering in the architectural department of Lockwood, Greene & Co., Boston, presented before the Designers' Section, Boston Society of Civil Engineers. The portions of the article treating of the heating and ventilating systems, boiler plant, fire protection, etc., were written by D. D. Eames, engineer with Lockwood Greene Engineers, Inc.

IN order to maintain her prestige as one of the foremost convention cities of the country, Atlantic City is building the largest auditorium in the world. This municipal project will have cost when finished about $10,000,000 and will accommodate 40,000 people. The building occupies a block fronting on the Boardwalk. It is located midway between the two principal groups of the largest and newest hotels. The structure is 350 feet wide and has an average depth of 662½ feet, occupying the entire block.

Design and Construction. The main auditorium floor is 350 feet wide and 450 feet long. It has balconies on three sides and a stage on the fourth. These balconies project 38 feet into the auditorium, and are so planned that there will be 15 feet clear height underneath them, thereby affording ample space for exhibition over the entire auditorium floor. In addition to the main auditorium there is a large hall, 130 by 185 feet, on the second floor in the headhouse of the building. This hall can be used for smaller conventions, art exhibitions, banquets and dancing. It has a seating capacity of 5,000, and includes a stage, a large balcony, and a small musicians' balcony. There are committee and retiring rooms at each end of this hall. On the Boardwalk side of this hall there are full height bronze doors and windows opening out to a loggia 12 feet in width overlooking the ocean. The outer side of the loggia consists of a series of arched openings.

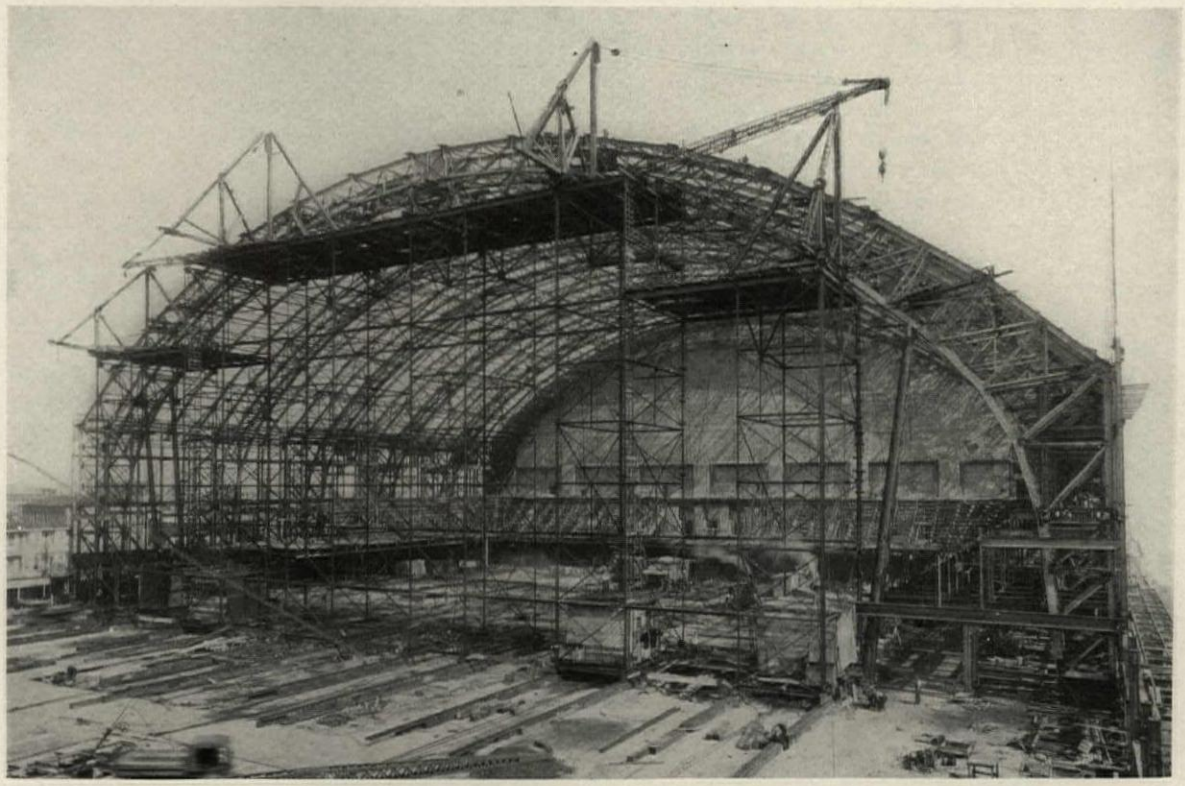
On the Boardwalk level an arcade has been arranged across the front of the building. Along this arcade are located 14 shops faced with marble and trimmed with ornamental bronze. In the center is a large ornamental entrance, 50 feet in width, leading to the main auditorium. This entrance lobby has walls of limestone with a vaulted ceiling of Guastavino tile. Corridors lead from it and connect with ramps leading to the lower and upper levels of the balcony of the auditorium. There is a basement under the entire area. At the front of the building there are bathhouses with entrances under the Boardwalk leading directly to the beach. Space has been provided on the ground floor to accommodate 400 automobiles. One-way traffic is provided for by means of a ramp entrance on Georgia Avenue leading from the street down to the ground floor,

Boardwalk Front of the Atlantic City Convention Hall
Lockwood Greene Engineers, Inc., Architects; Cook & Blount, Associated Architects



DIAGRAMMATIC FLOOR PLANS OF THE ATLANTIC CITY CONVENTION HALL

Lockwood Greene Engineers, Inc., Architects; Cook & Blount, Associated Architects



Erecting the Huge Trusses of the Main Auditorium

with a similar exit opposite, on Mississippi Avenue. This will allow guests at conventions to arrive and depart without confusion of traffic. Platforms ramping up from the Boardwalk grade extend the full length of the two sides of the building, and serve as exit areas to the auditorium.

The exterior walls of the headhouse are of Indiana limestone backed up with 8 inches of solid brick and 4 inches of hollow brick supported on a steel frame. The remaining portion of the building is faced with a buff brick. The exterior design is a modern adaptation of the Romanesque, incorporating therein the spirit of Atlantic City. The building is of first class construction throughout, short span concrete slabs with steel frame. The basement floor is built at the level of the ground water, grade +2.0. The grade of the ocean adjacent to this site is zero for mean low water and +3.5 for mean high water. The maximum grade of the ocean recorded in the most severe storms has been +10.0. The construction of the basement and the boiler room, which is 15 feet below the basement, was designed for a full hydrostatic pressure, with water at +5.0.

The character of the soil is a fine sand extending to an unknown depth. The foundation was built on 20,000 piles 30 feet long with a minimum butt of 12 inches. The capacity of the piles was taken as 15 tons. This capacity was not derived from any formula, since in this soil it is impossible to drive piles to resistance; 15 tons per pile was established by previous load tests. There have been many buildings built in this vicinity on spread footings, but it was considered advisable in this case that piles be used, as the beach at this particular locality is building up from year to year, and the level of the ground water is likely to change. In order to eliminate hazard of settlement by the lowering of the ground water grade from any cause, it was deemed wise to use piles. Piles were driven by water-jetting to within 2 feet of their final position. A day or more was allowed for the sand to settle around the piles, and then they were driven the last 2 feet by steam hammers. This eliminated the possibility of there being water or air pockets at the tips of the piles. In order to lower the ground water for the excavation of the basement and for pile driving work, a wellpoint system of piping was installed over the entire site. The natural grade of the site was +10.0. Two thousand feet of main 6-inch pipe were laid on the four sides of the site, with 20,000 feet of secondary lines of 3-inch pipe.

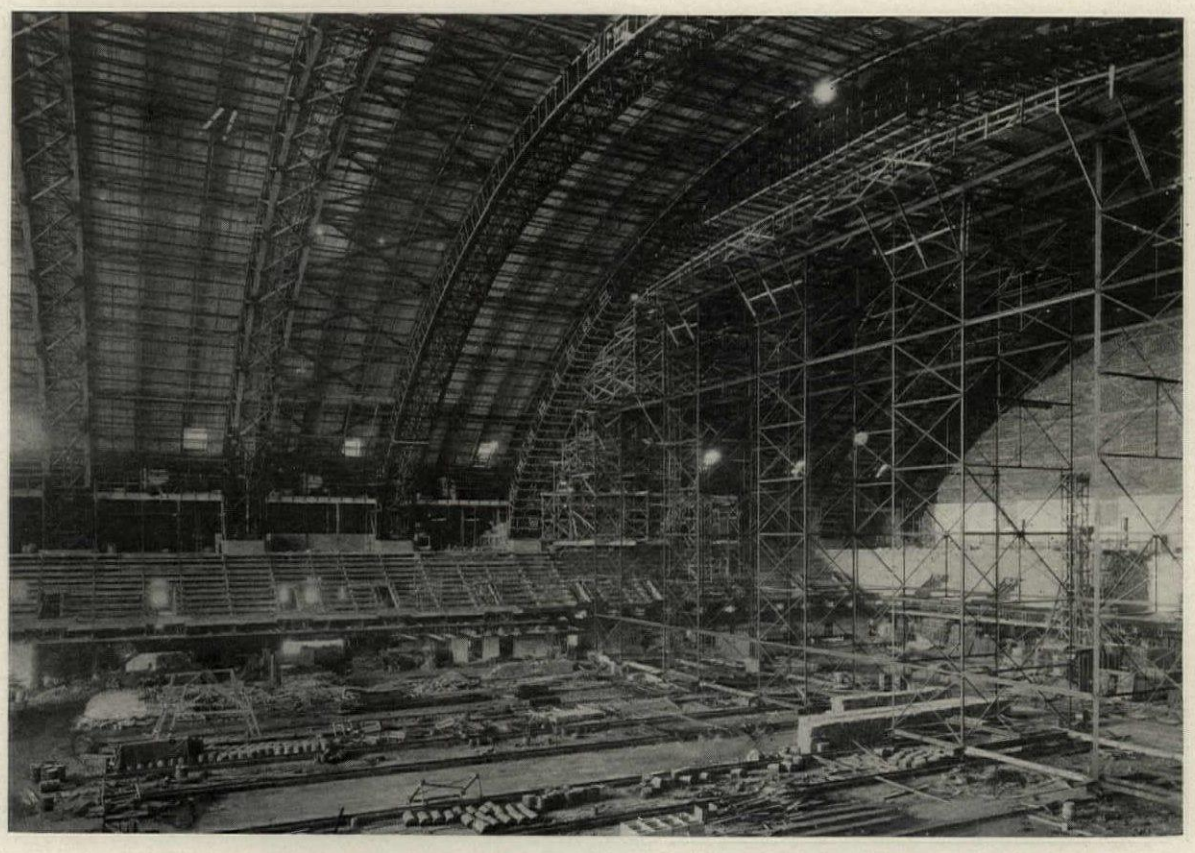
During the excavation of the boiler room, which is 25 feet below the street, two levels and in some cases three of wellpointing were necessary in order to efficiently operate the pumps. Piles were spaced 2 feet, 6 inches on centers. No trouble was experienced in accurately spacing the piles and driving them straight by the water-

jetting method in the type of soil encountered. The basement or ground floor was designed for a 125-pound live load and a hydrostatic pressure of 3 feet at the level of the floor. The construction consists of concrete beams and slabs. The beams were tied to the concrete mats of the pile foundations by hairpin dowels in order to help resist the hydrostatic pressure. Wood forms were used for the beams. The sand was properly graded between beams and acted as a form for the concrete slabs. Beams and slabs were poured in one operation. Hydrolithic waterproofing was applied over the entire basement. No expansion joints were used. Special care was employed at pouring joints to insure good bonding of concrete. The floor was heavily reinforced for temperature, and has thus far shown no visible cracks. The boiler room was one of the most difficult parts of design and construction in the entire project. The boiler room floor grade is —15.5, with a calculated hydrostatic head of 20 feet, 6 inches. The action of the fine sand saturated with water proved to be of such instability that the boiler room might as well have been built in the ocean, except for the use of the wellpoint system. When the water was lowered to a sufficient depth by use of the wellpoint system, the sand was easily handled and would stand without shoring to a height of from 15 to 20 feet. The boiler room was large, and there were few interior points of support available to resist the hydrostatic pressure. It was necessary to build a 7-foot slab to resist most of this pressure by its own dead weight. It was found by tests that the piles exerted an appreciable resistance to uplift. This resistance was not figured in the calculations and was considered only as a factor of safety. Here again no expansion joints are made, and large percentages of temperature steel were used. Steel reinforcement for the basement, the walls and the boiler room amounts to 1,500 tons.

Concrete walls are used up to the level of the main auditorium floor, grade 18.0, and in the headhouse portion to the Boardwalk grade. The superstructure consists of the first, second, third floors and roof of the headhouse, grades 18.0, 36.0, 48.0 and 62.0, respectively, the main auditorium floor, grade 18.0, with side balconies. All curtain side walls are supported by steel columns and spandrels, and the main roof of the auditorium is supported by ten pairs of three-hinged arches. The floors of the headhouse have no special features except for a few trusses which support the main ramps and upper and lower levels of the end balcony of the main auditorium. These trusses were built up of "C. B." sections (Carnegie beams), and this is probably one of the first instances of their use in trusses.

The cast steel pedestals supporting the main auditorium roof trusses rest on 4 x 8-foot concrete piers which are 20 feet high, the tops being 2 feet below the auditorium floor. The ties for the bottom pins of the auditorium trusses form a part of the first floor framing. The truss ties were designed for a 270,000-pound tension plus the bending stress from the dead and live loads of the floor. Particular study of the splices was made by the fabricators of the ties of the trusses because of their excessive length. They furnished sub-punched tie plates at the third points so that they could be adjusted in the field and drilled to fit. These ties in all cases run over the tops of one-story columns to avoid tension in rivet heads. They also furnished ⅛-inch filler plates for connection angles for adjustment in erection in other places. The ties were designed for a low combined stress in order to obtain a low strain. It so happened in the process of construction that the floor steel was completely riveted and the concrete poured before the load of the truss was imposed on the ties. It was found that when the ties assumed the stress of the truss load, movement was experienced at the roller end of the truss; ¼ inch was found to be the maximum.

Leaving the construction of the auditorium for a moment, attention is called to the end walls of the auditorium. The tremendous wind pressure of these end walls was a special problem to meet. On the front walls the vertical columns were supported at the bottom at the grade of the headhouse roof, and the top at the bottom chord of the main auditorium trusses. The bottom reaction of the wall columns was transferred to the row of columns at each end of the ball room of the headhouse by a flat truss in the plane of the headhouse roof, and in turn transmitted by portal bracing to the foundation. The wind pressure of the Pacific Avenue wall of the auditorium was taken care of in a similar manner. Cross bracing instead of portal bracing was used in the row of columns each side of the stage to carry the wind loads down to the foundation. The main auditorium trusses were of a three-hinged type, 334 feet, 3¼ inches pin to pin with a rise of 136 feet, 4½ inches. They had a 7-inch diameter crown pin and an 8½-inch bottom pin. The chord members were of a tee section with an 18-inch stem plate, two 8 x 8 angles, and one or more 18-inch flange plates. The compression web members at alternate panel points where purlins occurred consisted of four angles and two angles at intermediate panel points. Tension web members consisted of two angles. The tee section type of chord worked out very satisfactorily. The use of large gussets was eliminated, and use of secondary stresses was minimized. The general shape of the truss is a curve, and it is made up of a series of straight members chang-



Interior During Construction Showing Movable Scaffolding

ing direction at alternate panel points where splices occur. No abutting compression members were employed, the transmission of stress at all points being done entirely by rivets. One-inch rivets were used at the truss joints and ⅞-inch rivets for bracing connections. Here again particular care was taken by the fabricators in the manufacture of these trusses. All materials of the trusses were sub-punched ¼ inch smaller. Half of each truss was laid on the assembly racks to ordinates of the curvature, bolted together and properly reamed to size. For ten pairs of trusses it is realized that this work involved the setting up and assembly of 40 units.

Referring to the former mention of the end walls of the auditorium, the top support of the wall columns was provided with a sliding connection to the bottom chord of the end trusses. These sliding joints allowed horizontal and vertical movement between the tops of the columns, which were embedded in the brick wall, and the truss chords, which are free to move under varying temperatures. It is to be realized that the trusses, wind bracing and cross bracing between pairs of trusses are independent of all other steel framing and brick walls. At the intersection of the walls and the ceiling soffit of the trusses, joints of copper sheets were installed to allow for movement at these points. The trusses were designed in pairs 10 feet on centers and the pairs 49 feet, 2 inches on centers. Purlin trusses 39 feet, 2 inches long and 3 feet, 6 inches deep are spaced 24 feet on centers and come at every other panel point. Jack rafters, 15-inch I-beams, are framed to the purlins at the third points. Secondary 7-inch channels, 6 feet on centers receive the 3-inch solid gypsum roof slab.

In order to provide lateral support for wind pressure at the upper ends of the columns in the end walls of the auditorium, where the sliding joints occur, two sets of cross bracing in the plane of the upper chords of the trusses were employed in the first and fourth bays at each end of the roof. Each set is destined to take half the wind load of the upper portion of the end wall. It was afterwards deemed advisable to install for erection purposes additional cross bracing in the second bay from each end of the roof, thus obtaining a system of bracing approximately 100 feet in depth for the first three pairs of trusses erected. Wire guys were used and maintained until these first three pairs of trusses were erected and riveted, and the cross bracing 50 per cent riveted. This bracing consists of 6 x 4 angles flush with the plane of the roof and spliced with gussets at the intersections of the jack rafters and the truss chords. The interior bracing in the pairs of trusses consists of one 5 x 3½ x ⅜

angle for tension and two 5 x 3½ x ⅜ angles for compression members. This cross bracing occurred in the horizontal planes of top and bottom chords of the trusses and in vertical planes at every panel point. Six towers were used for the erection of the trusses. Trusses were assembled in place in 24-foot lengths and bracing connected as the work progressed. They were completely riveted to within eight panel points of the crown pin, the remainder being half bolted and half pinned and all the bracing bolted before the erection towers were removed.

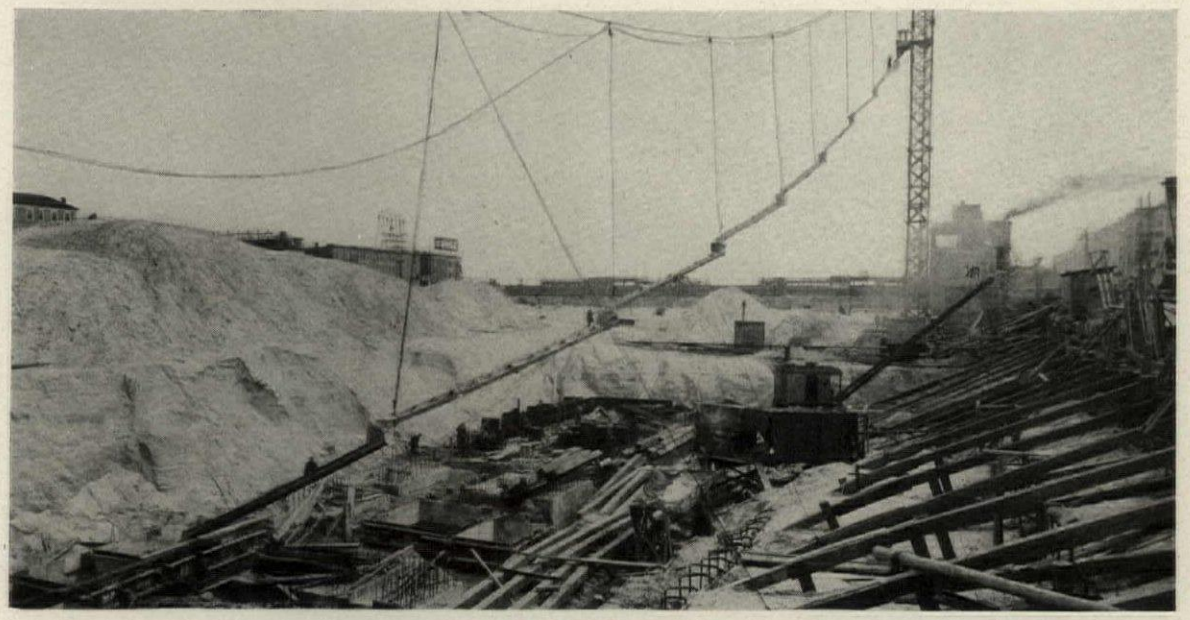
The only point of deflection necessary to observe was at the haunch of the truss, at which point there was allowed a clearance between the auditorium wall and the trusses. The deflection of the trusses at the haunch point for the dead load was figured to be, by the method of internal work of distortion, 2 inches. Careful tests were made during the erection of the trusses. Three measurements were taken, first with the weight of the trusses alone, second with the filling-in framing of the roof, and third with the roof covering of 3-inch gypsum. These measurements averaged 1½, 1¾ and 2 inches, respectively, thus indicating that the theoretical deflection checked with the actual.

The heating and ventilating systems, particularly the ventilating of the main auditorium, furnished a problem of unprecedented size. This is indicated by the number and capacity of the fans which it was considered necessary to install, —106 fans supplying a minimum of 746,000 cubic feet of fresh air and exhausting 1,140,000 cubic feet of vitiated air. All the fresh air is heated by indirect heaters having an aggregate surface of about 44,000 square feet. In addition to the indirect heaters, there are 16 window type unit heaters and ventilators for entrance vestibules, and a total of 30,000 square feet of direct radiation.

The ventilation of the auditorium was designed on the basis of upward air movement. In order to understand the arrangement of the apparatus to give this circulation, some features of the design of the building should be known. The roof of the auditorium is supported on ten double trusses spaced 49 feet on centers, each truss consisting of two members on 8-foot centers. These trusses are in the form of three-hinged arches spanning 350 feet and weighing 220 tons to each pair. The trusses rise vertically for about 70 feet before curving toward the center of the building. At this elevation, space was available for fan rooms, and the main supply and vent fans are located here. There is accordingly at each truss on both sides of the building, 70 feet above the street, a double fan room, one part containing a fresh air fan and heaters, and the other an exhaust fan. The fresh air supply is drawn through a circular opening in the outside wall about 75 feet above the street, passing through the indirect heater and into the fan. The fan stands directly over the space between the truss members and discharges vertically downward, utilizing the space in the truss as a duct. At the level of the balcony floor the truss is baffled off and the air diverted into ducts terminating in grilles along the edge of the balcony and along the side wall of the auditorium below the balcony. The supply fans, 16 in number, are of 31,000-c.f.m. capacity, double-width, double-inlet, silentvane type, operating at 382 r.p.m. with 10 h.p. variable speed, remote-control motors and texrope drives. The vent fan in the other part of the truss fan room draws its air from the truss space as does the supply fan, but it extends above the fan room level, in the ceiling of the auditorium.

In the sides of the beams formed by the trusses there are openings, some of which are used for lighting apparatus and others for inlets from the auditorium to the vent duct. The vent fans, 18 in number, are of 40,000-c.f.m. capacity, double-width, double-inlet, multivane type, operating at 162 r.p.m. with 7½ h.p. variable speed, remote-control motors and texrope drives. The vent fans discharge through pent houses on the roof behind the parapet wall. In addition to the main vent fans there are two 5,000-foot propeller fans at the peak of each truss exhausting directly from the top of the room. These fans have constant speed, remote-control motors and are considered an important feature in the proper ventilation of the auditorium, particularly for the summer. Recirculating arrangements are provided for the fresh air fans so that ordinary heating operations will be on an economical basis. These main auditorium supply and vent fans, as here described, constitute the major part of the heating and ventilating equipment. It is of great importance that the ventilation and temperature be properly controlled, because the success of a convention is largely dependent on physical comfort.

The ventilation of the exhibition and garage space in the first story below the main auditorium, presented a considerable problem on account of the large amount of automobile engine exhaust and the relatively low headroom. The data obtained during experiments for the Holland Tunnel were used as the basis for determining suitable quantities of air supply and exhaust. The fan rooms are adjacent to the outside walls. There are two fresh air supply fans with heaters, each fan being of 40,000-c.f.m. capacity, multivane type, double inlet, double width, 206 r.p.m. with 15 h.p. variable speed motor. These two fans are on opposite sides of the room, draw their air from above the marquise, and discharge into



Pouring Concrete Footings over Piles

transverse ceiling ducts connecting in the center of the room to a longitudinal duct which is 40 feet wide by 2 feet deep. It could not be made deeper on account of restrictions of headroom. Outlets into the room are in the bottom of this duct at regular intervals. The exhaust fans are 11 in number, 6 in fan rooms along Mississippi Avenue, and 5 along Georgia Avenue. Each of these fans is a single-inlet, single-width multivane of 12,000-c.f.m. capacity, drawing direct from the side of the exhibition room, through grilles near the floor.

The ball room supply fans are three in number, located in the space above the loggia and discharging into the room through grilles along the edge of the balcony, in the columns along the loggia side, and under the stage. One of these fans is of 25,000-c.f.m. capacity, and the others are of 28,500-c.f.m. each. There are five vent fans each of 15,000-c.f.m. capacity exhausting through 50 small arched openings around the upper part of the room, these openings being provided with pneumatic dampers with remote control. There are also in the ball room about 2,700 square feet of concealed direct radiation.

The boiler plant is located near the Pacific and Georgia Avenue corner, occupying a depressed section of floor, with the pump room and the electrical equipment room. Atlantic City datum is El. 0.0 for mean low water. Mean high water is El. +4.83. The ground floor of the convention hall is El. +2.0, the auditorium floor El. +18.0, and the boiler room El. —15.0. The boiler room extends up through the ground floor to the auditorium floor level, thus having a total height of 33 feet. The excavation for the boiler room is the largest and deepest of any building in Atlantic City, and was protected and kept dry during excavation by a wellpoint system. All concrete below high water level has been waterproofed, and every precaution was taken to prevent any puncturing of the membrane by equipment supports or anchors. Under the boilers, the waterproofing is protected against the heat of the furnaces by hollow tile floor construction, through which air will circulate when the boilers are operating. The anticipated maximum load on the boiler plant is about 3,500 boiler h.p. This load will be reached only a few times a year, and it is planned to carry it as a high overload on the boilers, thus conserving the investment for boilers and boiler equipment. Three water tube boilers have been installed, one of 270 h.p. size and two of 610 h.p. each. The smaller boiler is intended to carry the summer load, providing steam for heating water and other building services. All three boilers at about 225 per cent of rating will carry the winter peak.

Fuel oil is received in tank cars and unloaded by gravity into the storage tanks buried under the platform on the Georgia Avenue side. An excavation has also been made for coal storage in case oil should at any time cease to be available. Oil was chosen as fuel for this building after thorough consideration of its relative costs and advantages as compared to small size anthracite, which is the fuel generally used in Atlantic City. The oil burners are of the steam atomizing type, two burners for the small boiler, and six for each large boiler. They have full automatic control for oil, steam and air flow. The boilers operate at 100 pounds pressure. Feed pumps are duplex,

piston pattern, two size 12 x 8 x 12 and one size 7½ x 5 x 6. The feed water heater is a combination open heater and receiver, having storage capacity for 1,800 gallons of water. The fuel oil pumps are duplex steam pumps with exhaust steam oil heaters. As a starting-up unit an electric pump and electric oil heater are provided. Feed water controllers have been furnished for each boiler, and excess pressure governors for each feed pump. Instruments in the boiler room include fuel oil meters, recording and integrating flow meters, and 2-point draft gauges on each boiler, and feed water thermometer.

Steam Distribution and Control. The steam distribution from the boiler room to the building is accomplished by an 8-inch high pressure steam loop, making the circuit of the entire first story. Each indirect heater for the auditorium has a steam supply connection to this loop, with reducing valve at the heater for 15 pounds' pressure. The unit heater and direct radiator systems are divided into three main groups, each with its reducing valves and low pressure mains. Returns are collected in three pump rooms located as nearly centrally as possible to the group of radiators served. Each pump room contains two motor-driven vacuum pumps and two condensation return pumps. The vacuum pumps discharge into the receivers of the return pumps, which are vented, and these discharge back to the feed water heater at the boiler room.

Temperature Control. A very complete system of temperature control has been provided applying to both the direct and indirect heating systems. Use is made of a method for controlling the main auditorium temperature and for keeping alternate blasts of cold and warm air from the fresh air fans. Eight compound thermostats are provided, two on each side wall, two under the musicians' balcony, and one at each side of the stage. These thermostats control individual and in some cases groups of heaters. In addition to the room thermostats there are provided two-point intermediate acting pilot duct thermostats acting on the diaphragm valves of the fan heaters. During the warming-up period the room thermostats are in control and the duct thermostats inactive. When the hall reaches the desired temperature, the room thermostats act to close the diaphragm valves on the heaters. The control is then automatically referred to the duct thermostats, which by controlling the diaphragm valves prevent the air from dropping below a predetermined air temperature.

Control of the heating and ventilating systems is centralized at two points,—first, the engineers' room, adjacent to the boiler room, controlling the auditorium, garage and other departments in this end of the building, and second, the utility room near the Boardwalk end, controlling the ball room and front portion of the building. The remote control switches on supply and vent fans and the pneumatically controlled dampers are centralized in these rooms. An electrically operated temperature indicating system enables the operator to determine instantly and at any time the temperatures at 117 locations within the building, thus making possible an intelligent manipulation of the control features.

Fire protection equipment consists of automatic sprinklers with hose standpipes and roof nozzles. The primary water supply is the city water system, and the secondary supply a 150,000-gallon reservoir adjacent to pump room and 12,000- and 20,000-gallon elevated sprinkler tanks in the Boardwalk and Pacific Avenue ends of the building. Automatic sprinklers are provided for the entire first story, for all store basements, storerooms, auditorium and ball room, stages, proscenium arches, and dressing and chorus rooms. The static pressure on the city water system is 40 pounds, but the residual pressure is only 15 pounds. Neither of these pressures is sufficient to supply water to the sprinklers in the higher parts of the building, and consequently the automatic fire pump now to be described is necessary to make the primary supply available at these heads. A cast iron main, of partly 8 inches and partly 10 inches, was laid in the streets forming a loop around three sides of the building, and connected to the city mains through check valves at three points.

Two 1,000-gallon Underwriter pumps are located in the pump room near the boiler room and adjacent to the reservoir to which their suction pipes are connected. One pump is a motor-driven, centrifugal unit, and the other a duplex reciprocating pump size 18 x 10 x 12 with an auxiliary pump size 4½ x 2¾ x 4, both with automatic governors. The auxiliary pump operates under control of its governor to maintain full pressure on the system up to the highest sprinklers. If a sprinkler head should open or any flow of water occur beyond the capacity of the auxiliary pump, the main pump will immediately start up, and its 1,000 gallons per minute capacity would be available. The fire pump supply reservoir is kept full by a 6-inch pipe with float valve direct from the city water mains.

The Convention Hall with its equipment was designed by the Architectural and Engineering Departments of Lockwood, Greene & Co., Inc., Walter W. Cook, Chief Architect, and Alexander H. Nelson, of Atlantic City, Associated Engineer.

WALL STREET ENTERS THE BUILDING FIELD

BY

JOHN TAYLOR BOYD, JR.

PART III

IN the new type of building finance, stocks constitute an important feature. Stocks, particularly common stocks, are a much more variable and difficult factor to deal with than bonds, and in order to sell stocks effectively,—and bonds too for that matter,—to the public, a quick, active, and free market, such as only a securities exchange can provide, is necessary. This is one of several reasons that have prompted the Real Estate Board of New York to establish a special exchange for dealing in real estate securities of all types. The term "real estate security" will be broadly interpreted, and will include real estate stocks and bonds of various classes and other securities based on real estate properties or on real estate business, or on the financing of real estate transactions. It is expected that the new exchange will be open for business by October 1, 1929, and earlier if possible. The exchange will be located in the New York Real Estate Board building at 12 East 41st Street, just off Fifth Avenue, where the executive offices of the Real Estate Board are located. There will be 250 seats sold at $5,000 each, with yearly dues of $300 per seat, and it is expected that all seats will be sold before the exchange opens.

These seats have been taken up largely by associates of most of the large real estate offices, and a number have been bought by associates of houses represented on both the New York Stock Exchange and the New York Curb Market, and by individuals connected with various financial, construction, promotion and other interests allied to real estate. A constitution has been drawn up modeled closely on that of the New York Stock Exchange, and the same high standards which that body has established to insure the financial responsibility of brokers and strict honesty in trading, will prevail. A schedule of commissions on sales of securities has been established, of which these charges to non-members are samples: (1) On bonds,—not less than $2 per $1000 par value. (2) On stocks,—a sliding scale, including not less than 7½ cents for stocks selling between $1 and $10; stocks selling between $25 and $50, not less than 15 cents; and not less than 20 cents for stocks selling between $75 and $100, etc.

To the company whose securities are listed, a charge will be made of $100 for each $1,000,000 or portion thereof of each class of security including stock of the par value of $100 per share, or where stock is of a par value less than $100 per share or shares without nominal or par value, $100 for each 10,000 shares or portion thereof. There will be no ticker service. A price board will be maintained on the floor of the exchange, on which will be shown quotations of previous closing prices on securities, last sale, and also the number of the post at which the security is traded in. The brokers' offices will obtain these price quotations by telephoning in to the exchange. The New York Stock Exchange has generously placed at the disposal of the new exchange full information as to its own workings and policies.

Among all these innovations of new finance the establishment of this real estate exchange is the most unusual. Its sponsors feel that not only will it benefit real estate generally, but that in several respects it will become an essential part of real estate and construction finance. It should aid in keeping real estate up to date and in making the necessary adjustments to financial developments since the war. No effort is being spared to make the project a success; it has the backing and good will of powerful real estate and construction interests of New York, and influential men in the New York Real Estate Board are making themselves personally responsible for the success of the undertaking. Architects who are interested in construction finance may find it advisable to watch the success of the real estate exchange. A full understanding of its success requires more than a knowledge of its mechanical function in real estate finance. One should grasp the economic function of a securities exchange in the industry of today.

But why, it may be asked, is a new exchange necessary in New York, where there are already three great general securities markets? Why not use these exchanges in some such manner as was illustrated in the case of the U. S. Realty & Improvement Company and the other real estate companies? The answer is that the exchanges dealing with general securities of New York now deal in such large issues that the average real estate issue, placed on a single building, and of less than $1,000,000 in amount, is too small to be handled by them to the best advantage. There are few companies left on the "big board" with common stock issues of less than 1,000,000 shares. Only a huge corporation, such as the U. S. Realty

& Improvement, which is developing a chain of properties for which it needs constantly millions of fresh capital, can make the best use of the New York Stock Exchange. And we have seen how U. S. Realty, in conjunction with the National City Bank, employed the over-the-counter market to float the issue of approximately $4,000,000 on the Beaux-Arts Apartments building. On the "big board," the common shares of the gigantic Equitable Building on lower Broadway, Manhattan, and the bonds of the similarly large Drake Hotel, of Chicago, stand almost alone.

The Curb Market, likewise, deals chiefly in large issues of expanding companies, generally new issues, many of which, after a process of "seasoning," find their way eventually to the Stock Exchange. We have seen how most of the group of newer real estate development companies herein described, and their construction subsidiaries, have used the Curb Market for their shares. As regards the over-the-counter market, it is true that a rather small number of the largest mortgage bond issues, based on well known huge buildings, have a market there, but even these large issues,—large from the point of view of the building industry,—seem insignificant in size and are easily overlooked by the public. Also, another drawback is that the big Wall Street investment houses are not much interested in an issue of less than $1,000,000. They are organized to handle larger issues, preferably of $10,000,000 or more. The smaller Wall Street houses which will accept the small real estate issue lack the widespread distribution of their large rivals, and their selling costs are likely to be comparatively high. Real estate, therefore, needs its own securities exchange where its smaller issues of $1,000,000 or less will not be dwarfed.

Architects outside New York might consider the possible value to the building industry of the stock exchanges in the other large cities of the country,—Chicago, San Francisco, Los Angeles, Boston, Detroit, Philadelphia, etc. For marketing comparatively small security issues based on local or regional real estate enterprises, these regional securities exchanges might be much more effective than the huge New York general securities markets. They follow the same strict standards as the New York Stock Exchange, and like it, are constantly growing in importance. Though I am not familiar with these exchanges outside New York, it would seem reasonable to suppose that their governing boards would be only too glad to coöperate with the local building industry in encouraging the listing of its securities. Individual building organizations might seek a listing for their issues, or the leaders of the local building industry might consider an approach modeled somewhat on the action of the Real Estate Board of New York in establishing its own exchange. In localities where this does not seem practicable, the leaders of real estate and construction interests, including the architects, might actively sponsor a special section of real estate securities in their local stock exchange.

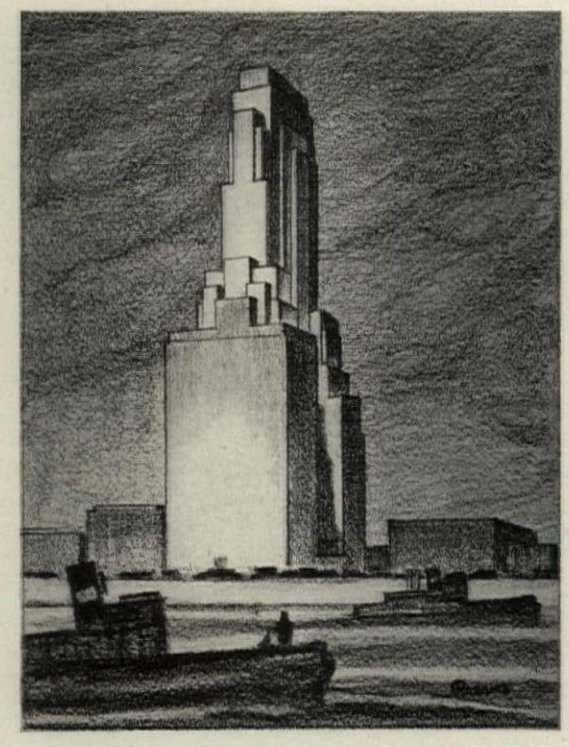
For it is important to bear in mind that there are grave dangers in introducing to the public a large group of new "unseasoned" securities. A wild speculation, such as took place recently in the new aviation and amusement securities and in various "specialties," is something to avoid if possible. In real estate we have had quite enough of that sort of thing already. Anyone can think of certain nimble gentlemen who would be quick to seize the opportunity offered in the new finance, to unload bushels of worthless paper on the public. The building industry does not want a repetition of the mortgage bond failures of a few years ago. In fact, the sponsors of the New York Real Estate Exchange had just this condition in mind when they decided to create a special real estate exchange. The fullest publicity will be given to the finances of the companies whose securities are traded in, to aid the careful investor in picking out sound securities.

We have seen how the New York Stock Exchange enforces a high standard of publicity as to the finances of the companies whose issues are listed. This is the only means so far devised of protecting the individual investor and of reducing the evils of manipulation of security prices as far as is possible without interfering with a free market. The new real estate exchange will carry this principle even further in one respect,—by subjecting, as a requirement for listing, the real estate properties on which a security is issued to the independent appraisal of the exchange's official appraisal committee. This novel proposal has excited much interest. It does not mean that the exchange will endeavor to fix the price of a security by making public an estimate of the value of the property. That would interfere with a free market, and besides, since appraisal must be in some degree a matter of opinion, there could be no assurance that the exchange's appraisal, however expert, would be 100 per cent correct. What it means is that the exchange will not publish the appraisal but instead will make public the financial statement of the company applying for listing, and will announce that the properties of the company have been appraised by the exchange's committee on appraisal and have been judged suitable for listing. Annual statements of the company's condition will be required, and the company is further obligated to report to the exchange any changes in its financial affairs which will modify the official appraisal. These arrangements will aid the public

to establish fair prices for securities in trading.

Such a standard of complete, periodic and responsible publicity of finances may be painful to certain elements of the building industry, but it is in line with modern financial policy which recognizes that the investor has a right to know what he is buying. Organizations which wish privacy for one or another reason are at liberty to avoid this real estate (or any other) exchange; but it is possible that they will find it increasingly difficult to raise capital in other directions.

The new exchange will follow precedent in taking full precautions to ensure the financial responsibility of the brokers. Its committee on business conduct has the right to investigate the dealings, transactions and financial conditions of members and to examine their books and papers at any time. This right the New York Stock Exchange exercises with greatest severity. Recently it expelled a member because its auditors discovered that he had defrauded the government in filing his income tax return. It was argued that such a man could not be trusted with customers' money. Where transactions are closed by word of mouth,—although "comparisons" of the records are made afterward to ensure accuracy,—the standard of honesty must be absolute for the protection of both brokers and the public. One clear case of crooked dealing or failure to live up to an agreement, and a man is done. As a result of this discipline, the New York Stock Exchange has not had a financial failure among its members in a couple of years,—a record that is not approached even by the banking systems of the country.



A Real Estate Exchange Might Market the Securities for a Huge Combination Store, Office Building and Apartment House Such as this Proposed Battery Tower, New York

Thompson & Churchill, Architects

Such, in general, are the plans for the new real estate securities exchange, designed to serve the needs of the building industry. Its backers have been considering the project for 14 years, when the idea originated in the desire to free the industry from the grave abuses resulting from extravagant appraisals, this being the chief cause of foreclosures resulting in heavy losses to the public, particularly to those in the "widow and orphan" class, whose patronage the building industry has always sought. These influential New York realtors were alarmed at the disclosure of the conditions attendant upon the crash of a large nationally known mortgage bond house not many years ago, and they resented bitterly the very recent collapse of certain huge buildings,—the financial collapse, of course, because the properties were of the finest architectural standard and were excellently located,—but they could not stand up under the overload of inflated issues.

All finance today places great emphasis on the collateral value of a security. In this connection the promoters of the New York Real Estate Board Exchange were somewhat surprised at receiving hundreds of letters from all sections of the country approving their project soon after its announcement. They looked into this aspect and discovered that both bankers and investors were impressed with the need for collateral value in real estate securities, such as only a securities exchange can supply and approve. Suppose, for example, that a man in Tulsa approaches his banker for a loan of $10,000 to build himself a home. He offers as security $15,000 par value of mortgage bonds issued on a big New York office building on Fifth Avenue. But the banker is embarrassed to inform him that the bonds won't do because there is no quick, sure market to sell them in the event the loan turned "sour," and in fact that there is no information available on which to form an opinion as to what the bonds are actually worth. So the bank cannot accept a good business deal, the man can't build a home, and the building industry loses a desirable customer,—all because the real estate bonds have no standing as collateral. This is an illustration of the advantage of establishing collateral value in a security. Today loans made on good stock exchange collateral are coming into favor for financing all sorts of business transactions. Banks favor this type of loan because it is by far the safest,—one of the easiest to make, and one that is satisfactory to the cus-

tomer. This is one reason why many investors favor stock exchange securities.

It may also be said that the sponsors of the real estate exchange are alive to the implications of the new method of construction finance, and the radical changes in economic conditions on which it is based. "The day of the small real estate holding is passed," is a statement they have made on several occasions. "We must take the public into the ownership of real estate. These buildings are getting so large that there is no other way to finance them." A block building proposition becomes a public affair because no one man or syndicate can swing it. Since there are always uses for the small building, the chain principle of ownership may find opportunity in that field, and create another demand for large-scale financing.

This brings us to a brief consideration of the economic function of a stock exchange and its peculiar relationship to common stock issues. Especially is it necessary to form a clear idea of the difference between speculation and investment which will be considered later. This is essential in working out any specific plan of building finance. It is well to avoid becoming involved in the present controversy over the unprecedented speculation on the security exchanges of the nation. The situation seems much too involved for an architect to understand, since some of the greatest financial authorities of the world are at odds over it. For this reason, architects should be on their guard against accepting uncritically the opinion that is now being expressed by some of the financial experts in the building industry to the effect that the money which the building industry needs for mortgages and equities is being diverted to speculation in Wall Street. This diversion, it is argued, will injure the industry.

Without attempting to solve such a knotty problem, it may be worth while to point out that the situation in building finance discussed in these articles throws a different light on the problem. Briefly, we have seen how these new financial-construction organizations, like the Beaux-Arts Development Corporation-U. S. Realty-National City combination have gone into Wall Street, to the Stock Exchange, Curb and over-the-counter markets, and have there obtained their junior mortgage and equity financing much more easily, and what is even more important, they got all the money they wanted and got it on much more economical terms than were offered in the conventional method of building finance. I have not heard any of them complain that Wall Street speculation was strangling their business!

It is apparent that there are many reasons besides the alleged reason of get-rich-quick speculators which makes Wall Street attractive to the public. As previously pointed out, the question of the investor, "What do I get out of it?" gives him control of the situation today. But the matter goes even deeper. The claim is made that one of the controlling factors in the situation is the change of the American nation from a debtor to a creditor nation since the war. We now pile up surplus capital so fast that we must have a new and larger channel to conduct the flow of capital away from the many money tanks which might otherwise clog up and burst. The securities exchange provides a needed safety valve, without which the surplus money might be employed in speculation in commodities, in both urban and farm lands, and in the over-expansion of industries, with disastrous effects to general business. This is about as far as an architect can go. Whatever be the truth to economic theory, there is a very practical point for architects to take note of in the situation. They should note carefully the growth of the security exchanges as a primary source of long-term capital, for no one can deny that long-term capital is what the building industry sorely needs. Nor can one deny the fact that the building industry generally has enjoyed the benefit of low-cost, long-term capital only on first mortgages. It has practically never enjoyed that advantage for junior mortgages and equity financing that other industries have.

This brings us to the distinction between investment and speculation. A delightfully amusing incident took place a few months ago when a prominent New York realtor, long noted for his promotion of sub-divisions, publicly attacked Wall Street for having diverted money from real estate investment into stock speculation! This is the view of a clever salesman, and the man who represents his own goods to be "investments" and the other fellow's goods as "speculations!" But this emotional distinction is not of practical use in working out plans of building finance based on stock issues

Without splitting hairs on economic theory, one may accept, as a good workable definition, the theory that investment means solely the purpose of conserving one's principal, neither adding to it nor subtracting from it, but merely drawing interest thereon by lending it to someone else. Examples of investments are life insurance endowment policies or savings bank accounts or very conservative first mortgages. Only on that basis can one be a pure investor. But the moment that one listens to that little devil Appreciation whispering in one's ear, one becomes corrupted by speculation, and to the extent that one acts on his suggestions, one passes from the 100 per cent of security investment toward the opposite pole of 100 per cent of speculation, which is in the nature of gambling.

On the other hand, it is only too evident that speculation can be excessive, particularly in the highly complex, delicately adjusted economic system of today. One may say that speculation becomes excessive when the evil it works overbalances the good it does as an incentive to business activity. In that case speculation does become harmful, although the problem of how to deal with it practically seems almost insoluble.

Understanding these principles is essential in determining the proper proportions of investment and speculation in working up plans for stock issues. The question is of course one of the amount of risk that seems reasonable in each case. Here one may accept the principle that the value of common stocks in the financial practice of today is likely to rest chiefly on intangibles. Common shares values are based chiefly on earning power and on public confidence in the management and in the competitive strength of the enterprise. For example, General Motors has great earning power and strength, but its "book value" is very low. U. S. Steel is also strong in earning power, but has high book value. On the other hand, most of U. S. Steel's surplus is tied up in highly specialized plants and equipment, and it is likely that, if the management failed to make a success of the steel business, no one could be found who would be willing to take over these plants at 100 cents on the dollar. But with real estate stocks, we have seen that they can have great real liquid book value behind them in the form of fine real estate properties, and this should be a valuable investment advantage in this class of security. The "bonus" stocks, which were discussed in the last article, are very interesting in this connection. When issued they represented nothing but expected appreciation in specific real estate properties; hopes of earning power, and of increasing equity value as mortgages or preferred stock were paid back. On the other hand, as an offset to their speculative character, those bonus shares cost nothing, and are a fairer type of investment than "watered" stocks for which real money is paid.

Now, the point of this intangible nature of common stock is that a security exchange provides the only practical yardstick for appraising its values. The prices fixed in the trading represent the consensus of the many different opinions of both public and experts as to the merits of any stock, or in other words, as to the future prospects of the real estate properties on which the stock is issued. Thus in its trading a securities exchange sets a flexible standard for appraising individual stocks and classes of stocks.

This discussion of securities exchanges concludes the account of the new financial developments in the building industry in New York. How different is all this maze of ideas and methods from the good old fashioned plans of building finance! Actually, for years there has been only one plan in building finance. Set the equity and, that done, the choice of two or three possible mortgage alternatives became almost automatic! Such has been the formula for 50 years.

But, from a historical point of view, the placing of junior and equity financing on the basis of long-term security issues seems plausible. It merely completes the transition begun 40 or 50 years ago when the existing elaborate system of first mortgage loans replaced the ancient practices of "private" finance. Up to that time the mortgage and title business rested chiefly in the hands of small individual capitalists, executors of estates, and brokers and lawyers acting for clients. It was costly, inefficient, none too responsible, and was not without its abuses. The needs of the building industry had grown beyond this small scale, uncertain traffic, and accordingly the first mortgage business was organized into a system of public large scale finance, operated by large mortgage and title companies, insurance companies, savings banks and building loan associations, all of which drew funds from the general public for first mortgages in almost unlimited amounts. But since that time nothing has been done for junior and equity financing. Now, after 50 years, that final step may at last be taken. If the movement continues, we may witness further changes in the first mortgage system itself,—possibly greater flexibility and a tendency to obliterate the sharp lines of cleavage which now separate mortgages from equity financing. This latter change was made in the Beaux-Arts financing, as has been described.

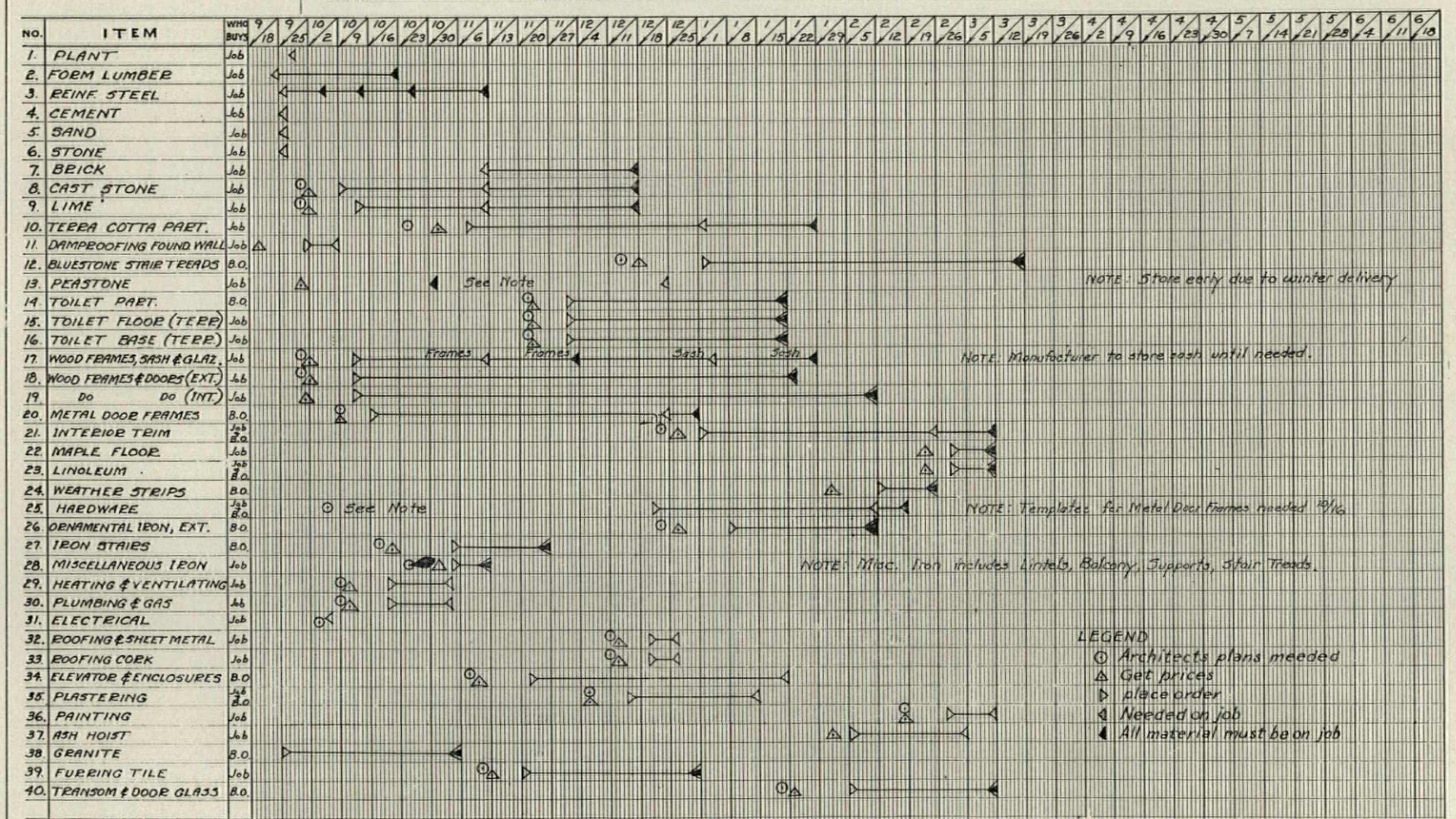
The use of security exchanges may become of greater importance in finance. The trend of general finance today is to seek capital from the public as a principal source. Real estate, which has existed more or less as a world apart, with its own peculiar system and customs of finance, may not be able much longer to avoid the change. It may be obliged increasingly to compete with other industries for its share of the surplus capital of the American public in the public securities markets. The Real Estate Board of New York Exchange may prove a valuable aid in making the change.

Such are the possibilities of an interesting and important situation, new and amazingly complex. One sure fact, however, stands out strongly in the uncertainty, like a tower. That is, the crying need of the building industry for the economy of long-term financing of junior mortgages and equities of buildings.

MORTON C. TUTTLE COMPANY,
BOSTON, MASS.

PURCHASE SCHEDULE

JOB NO. 54 STRUCTURE FIREPROOF OFFICE BLDG. OWNER LOCATION



This Controlling Purchase Schedule Is Explained on Page 253

CONSTRUCTION CONTROL BY SERVICE CONTRACT

BY

L. M. RICHARDSON

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THERE are three chief points of interest to the man investing in construction,—first, the efficiency of the work as indicated by organization and method of construction; second, the progress in time; and third, the cost of the work. In the case of a contract placed on the basis of price competition, once an award has been made, the method of operation is entirely in the contractor's hands; the matter of time has been specified and is presumed not to concern the owner until the work is completed, and the cost is, as a matter of choice, entirely in the builder's hands. On this latter point an owner buying a building in competition never knows what the work actually costs. On the other hand, where a contract is placed on a service basis and the builder is selected for his particular ability, while the control of the work and responsibility for it are necessarily in the hands of the builder, it is the owner's privilege to interest himself at all times as far as he may wish in following any phase of the construction.

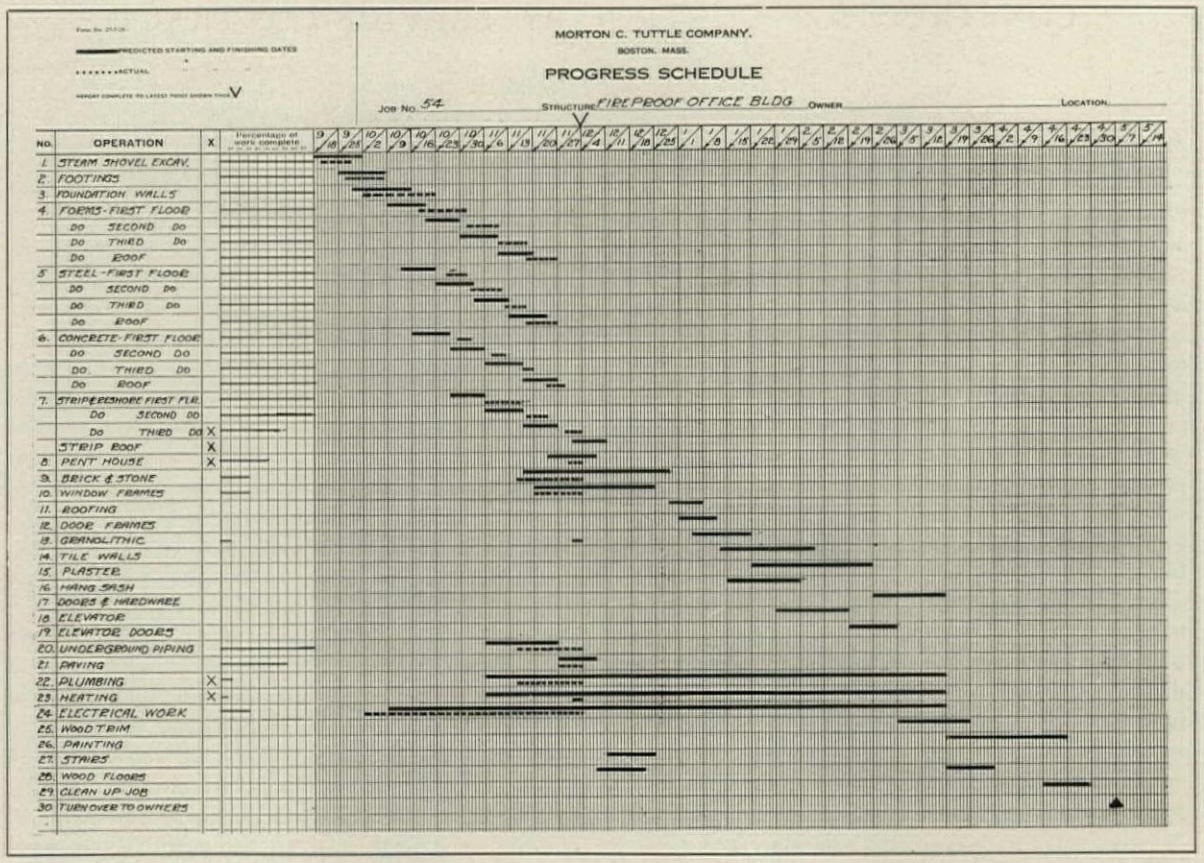
The contractor operating on a service basis naturally counts as his chief asset the good will of his clients, and accordingly he must make every effort to so handle his work that the owner will always find the work proceeding efficiently, with time and cost systematically controlled and periodically recorded. To attain this result, the service builder must pay unusual attention to the selection of his field forces and to the organization of each contract; he must carefully plan the progress of his work to coördinate the various trades, and record progress in such a manner that the time status of the work will at all times be apparent; and, what is of the greatest importance, he must systematically record and follow the cost aspect of the work from every angle to show at all times the actual cost as compared with the original estimate. Because the interests of the owner are paramount in fact as well as in theory, the coöperative aspects of the relation must be carried out in every phase of the operation. The owner's viewpoint must never be lost sight of. Construction procedure, including the systematic recording of cost and progress, must be viewed through his eyes, all records be carried in such manner as to be clear to him rather than in the language of the builder, and a full record in clear, understandable shape always be available to him and to the architect who represents him.

The application of these principles is illustrated in the description here of a construction operation carried out on a service basis. The structure is that referred to in previous articles in THE FORUM, by Morton C. Tuttle (January, 1929), and Clayton W. Mayers of the Morton C. Tuttle Company, Boston (April, 1928), discussing respectively the advantages of collaboration of designer and cost expert and the application of this service in the preliminary stages of a development and prior to starting construction.

The building taken as an example is a fireproof office building, three stories in height, of modified Georgian architecture, with a brick exterior. The entire structural frame of the building is of reinforced concrete with no transverse beams. Reinforced concrete slabs span across the building from side walls to longitudinal beams running lengthwise and located on the lines of the main corridor walls.

Progress Schedule. The basic secret of successful construction may be given almost in a word; it is that of getting the right men and the right materials, in right quantities, at the right place at the right time. *And the essence of all this rightness is time.* Only systematic planning of a building operation before the work starts, including a thorough analysis and careful consideration of each operation involved, can assure completion on a definite, pre-arranged date and guarantee a smoothly coördinated procedure from start to finish. Such planning in the case of the building under discussion is illustrated by the progress schedule produced herewith, showing the time status of the work on November 27, after it had been under way for eleven weeks. This schedule is prepared under the direction of the Manager of Construction from comprehensive records of past experience and is one of the first steps in starting the work, being preceded only by a preliminary survey of local conditions. The schedule is laid out on a printed form with as many columns as there are weeks in the course of the work, each column being headed by the month and day. The original schedule serves as a master sheet and is held in the Company's home office. When completed and finally approved, a number of blue prints are made from it and sent to the field office. Each week the field engineer, whose duty it is to record progress, fills in the schedule up to the current date, and after approval by the field superintendent it is forwarded to the Manager of Construction at the main office. He in turn scrutinizes the schedule and makes such suggestions as field conditions indicate.

Every schedule is based on some one key point, which in this instance was an occupancy date of June 1, desired by the owner. This required the



delivery of the building approximately one month earlier than the final date, to allow the owner sufficient time to install furnishings and make such preliminary preparations as were necessary to assure full occupancy at the desired time. The secondary point in this schedule is November 20, on which date it was desirable to have the concrete frame of the building completed in order to avoid severe weather conditions, with consequent expense, that would undoubtedly be experienced after that date, as the structure is located in northern New England. The schedule was accordingly worked back from November 20, and subsequent operations laid out to show completion on May 1.

It will be noted that this progress schedule lists the various main divisions of the work in the order of construction. These operations are numbered, for convenience of reference, in the first column. Any scheduled item departing more than a day or two from schedule is indicated by a cross in the third column opposite the item. The fourth column is divided to show the percentage of completion of each item and is of particular value as showing at a glance those items which are completed and accordingly require no further attention, and the status of each uncompleted item.

Excavation, the first item in the schedule, was started approximately on time and was completed in slightly less time than had been anticipated. Footings also were completed about as planned. In the case of foundation walls, however, excavation uncovered a more difficult condition than was anticipated, with the result that this item was started three days late, and its completion extended one week beyond the planned time. This naturally delayed the erection of floor forms which, in the case of each floor, were completed about one week later than had been planned. However, because of the desirability of completing the concrete frame as planned, the placing of concrete was accelerated to show completion of each floor in five days rather than the ten days shown, with the result that the concrete roof was in place only two days later than planned.

It is particularly noteworthy that up to this point the progress schedule has served its purpose in indicating each week the exact status of each major operation, and in this case it has shown the steps necessary to bring the work up to time. The removal of forms, covered by Item No. 7, was delayed by the later starting of concrete, but the final removal was not of particular importance once the first story was clear to permit the starting of the brickwork. This brickwork was started on time and was immediately followed by the erection of window frames in order to close in the building as the work progressed. The schedule at

this point shows granolithic work just starting, five weeks ahead of schedule. A reconsideration of this item showed the desirability of making an earlier start, since the completion of this item with the paving would also complete all the concrete work of the building.

This schedule, taken at a later point in the work, would usually show more variation than in the earlier stages, due to the fact that it is more difficult to predict the exact progress of the work of equipment installation, which is usually sub-let, and of interior construction. It is accordingly necessary to pay much closer attention to time during the latter half of an operation than in the earlier stages. A copy of this schedule is sent each week to the owner and to the architect. It is also posted at the field office in order that the full field organization may know the rate of accomplishment.

Purchase Schedule. (See page 250). Progress is directly dependent on delivery of material on definite dates, and accordingly the time of delivery of each major item of material must be pre-determined. To accomplish this a purchase schedule, in form similar to the progress chart on which it is based, is prepared immediately after progress is laid out. The purchase schedule on this particular project is reproduced herewith and is generally self-explanatory. In fixing dates for the delivery of various materials consideration is given to sources of supply and, in the case of subcontractors, to the time required for manufacture or fabrication,—this consideration applying to such items as elevators and enclosures, stairs, doors and windows, etc., which show the dates of placing orders somewhat early as compared with other items. In the third column, after each item, will be noted either the letters "B. O." or the word "Job." This column indicates whether purchase of the particular item is to be made by the Boston office of the Company or by the field office on the job. Where both are shown opposite an item, this indicates that local prices will be taken by the job and figures taken by the Boston office as well. In this particular instance the owner wished all orders placed through his own purchasing department, which accounts for practically all purchases being noted as handled by the job. Regardless of the actual placing of the order, all major purchases are made under the supervision of the general purchasing agent at the main office. This purchase schedule shows the date on which plans must be available if purchases are to be completed as required. Therefore, this schedule, in preliminary form, is presented to the architect for his criticism and suggestion and particularly for his assurance that the dates shown for completion of various plans and detail drawings can be met.

Changes in Estimate. The purpose of an estimate on a building operation is not only to show the probable final cost of the work but to serve as a basis for the recording of costs as the work progresses and the comparison of unit costs with estimated cost as the work proceeds. Although the estimate on which the award of this particular building was made was a close approximation and sufficient to show the amount of the investment involved, it had been based only on preliminary sketches and was not sufficiently accurate to serve as a basis for the field accountant. Accordingly, as soon as plans were sufficiently developed, a revised estimate was prepared and submitted to the architect for his approval, and when approved a copy sent to the owner for his information. In developing this estimate the units used are not general assumptions based on past experience but rather exact unit costs taken from work of a similar character. This is made possible by the operation of the cost accounting system, described here, which makes available in usable form the detailed costs obtained on each contract carried out. Tabulated in simple form, these costs are always available as an up-to-date source of accurate estimating data.

Job Budget. In order that the field forces may be fully informed as to the expected cost accomplishment on the work, the job office is furnished with a budget taken directly from the estimate, but unlike the estimate it is split up into two sections,—labor cost and materials' cost. This budget in preliminary form was made up immediately following the completion of the estimate in order to give a basis for the field cost accounting. As soon as plans were finally completed and the purchases made, a revised budget was prepared which showed numerous changes in various details but little change in the total amount. The total amount shown in labor and material budget is somewhat less than the total of the estimate, since the estimate carries a 5 per cent contingent item which is not shown in the budget. The first column in the labor budget shows the code classification for each item.

JOB BUDGET
for
A FIREPROOF OFFICE BUILDING
IN NEW ENGLAND

LABOR

Excavation		Quantity	@	Total
Das	Clear site (cut trees and dig roots)			$150
Dass	Steam shovel excavation	1,800 c. y.	$0.22	396
Dass-T	Team excavation	1,800 c. y.	.50	900
Dah	General hand excavation behind steam shovel	150 c. y.	.80	120
Dad	Hand excavation for footings, walls and pits	300 c. y.	1.75	525
Ded	Backfill footings and walls	500 c. y.	.75	375
Dap	Level and tamp for paving	6,700 s. f.	.02	134
Deg	General grading 10' from building			200

(JOB BUDGET, CONTINUED)

		Quantity	@	Total
Plant				
Peu	Unload and reload all plant	(Teams separate)		$1,800
Pen	Temporary buildings			
Pes	Sawmill			
Pew	Temporary water, heat and fuel			
Pem	Mixer and motor			
Pel	Tower, boom hoist and motors			
Per	Stagings and runways			
Pess	Steam shovel			
Pe	Misc. other plant			
Pe-T	Team plant			
Forms				
Fed	Footings (M. E. & S.)	22 sqs.	12.00	264
Fadw	Foundation walls M	80 sqs.	3.50	280
Fedw	and pilasters E	180 sqs.	13.00	2,340
Fidw	and pilasters S	180 sqs.	3.50	630
Feh	Frames at basement windows	No. 52	3.50	182
Facx	Interior and exterior M	46 sqs.	5.30	244
Fecx	columns E	93 sqs.	18.00	1,675
Ficx	S	93 sqs.	2.50	233
Feci	Interior round columns	No. 6	6.00	36
Fafb	Beams and girders M	200 sqs.	3.50	700
Fefb	slab E	348 sqs.	12.00	4,180
Fifb	S	348 sqs.	1.50	522
Fep	Concrete platform MES	2½ sqs.	18.00	45
Fes	Stairs and landings and steps	68 l. f.	.50	34
Ful	Unload and handle lumber	100 M	2.00	200
Steel Reinforcement				
Ref	Cut, bend and place all slab and beam steel	62 tons	25.00	1,550
Rec	Cut, bend and place all column steel	10 tons	26.00	260
Rez	Cut, bend and place all foundation wall, footing and misc. steel	22 tons	35.00	770
Ru	Steel reinforcement unloading and sorting	94 tons	2.00	188
Ru-T	Team all steel reinforcement	94 tons	....	75
Concrete				
Med	Footings	78 c. y.	1.80	141
Medw	Foundation walls, pilasters and areaways	244 c. y.	2.25	548
Mep	Paving	84 c. y.	1.80	151
Mez	Platform	5 c. y.	2.50	13
Mes	Steps, landings	68 l. f.	.30	20
Mef	Slabs, beams, girders and columns	700 c. y.	2.00	1,400
Kuaf	Granolithic finish (laid after)	258 sqs.	8.00	2,070
Kub	Sanitary base in toilet rooms	482 l. f.	30	145
Kof	Float finish	12 sqs.	3.00	36
Kiw 1	Patch and rub exterior concrete	19 sqs.	....	300
Kiw 2	Sundry carbo. rub in parts of basement left unplastered	.....	....	300
Mo	Cut fins and fill voids on concrete ceilings painted	.....	....	400
Mux	Unload and handle cement	2,450 bbls.	.14	343
Mux-T	Team cement	2,450 bbls.	.14	343
Muyz	Trim sand and gravel pile	2,570 tons	.06	155
Mecc	Cinder concrete fill	18 c. y.	5.00	90
Mu	Upload peastone and team to job	98 tons	.75	74
Masonry				
Bew	Stage, tend and lay all brickwork	8,090 c. f.	.90	7,280
Bet	Terra cotta tile partitions, 4" and 6"	17,895 s. f.	.12	2,150
Bewc	Clean down brick and stone	130 sqs.	4.00	520
Bec	Set all granite (imitation)	3,135 c. f.	1.00	3,135
Bef	Flue, etc., including fire brick and panels at front entrance of brick	....	....	400
Bu-T	Team brick, tile, lime and stone	....	....	400
Bu	Unload and handle all brick, tile, lime and imitation granite	....	....	450
Beg	Set granite at front entrance and other door sills	300 c. f.	....	300
Steel and Iron				
Sedf	Set door frames Single	No. 83	5.00	415
	Double (Hollow metal)	No. 5	7.00	35
Sedfm	Set steel channel frames	No. 2	5.00	10
Sed	Set metal covered and steel doors	No. 2	....	50
Sel	Set steel lintels and column cores	....	....	300
Sez	Miscellaneous iron and steel, including steel sash	40 sqs.	....	300
Su	Handle all miscellaneous iron	40 sqs.		
Carpentry				
Cedf	Set wood door frames	No. 8	7.00	56
Ced	Set all wood doors, Front Entrance	No. 1	....	1,140
	Double	No. 12	20.00	1,140
	Single	No. 85	10.00	1,140
	W. C. doors	No. 20	2.00	1,140
Cewf	Set window frames	No. 215	4.00	860
Cet	All interior trim and exterior millwork	.....	....	2,000
Ces	Set wood sash and glass	4,437 s. f.	....	2,000
Cet	Maple top floor	20 sqs.	8.00	160
Cesc	2x4 screeds, treated, set in concrete	1,500 l. f.	....	160
Cesf	⅞" sub-floor and paper	2½ M		
Cez	Miscellaneous carpentry work including louvers and ceiling over portico	....	....	200

		Quantity	@	Total
Other Trades				
Gewp	Waterproof labor on foundation walls and other exterior walls	....	....	$150
Sch	Scheduling and job expediting	....	....	200
Zor	Clean up job, team away rubbish and clean glass at completion	....	....	500
Zarp	Engineering on lot and building lines	....	....	150
Zsc	Attendance on sub-contractors	....	....	400
M	Cold weather expense	....	....	2,500
W	Watchman	....	....	750
O	Overhead	....	....	4,200
	TOTAL LABOR AND TEAMS			$56,748

MATERIALS AND SUB-CONTRACTS

Plant			
	Small tools (less salvage)		
	Supplies (used up no salvage)		
	Power, fuel, water, light and temporary connections		
	Teaming and freight charge on small tools, supplies and large plant		$5,000
	Rental and repairs of large plant		
	1. Excavation		
	2. Concrete		
	3. Forms and carpentry		
	4. Masonry		
	5. Reinforcement		
	6. Miscellaneous		
Carpentry Materials			
	Form lumber 100 M at 40.00	4,000	
	Salvage	300	 3,700
	Nails, oils, bolts and hangers for form lumber and sheeting	....	 600
	Sheeting lumber	3 M	$40.00 120
	Screeds	1,600 l. f.	 175
	⅞" sub-floor	3 M	40.00 120
	Top floor	3 M	100.00 300
	All interior trim and millwork	....	 3,000
	Wood sash and glass and frames	4,337 s. f.	.85 3,680
	Wood doors (Single)	No. 85	 1,100
	Wood doors (Double)	No. 12	
	Wood door frames	No. 8	 50
Steel and Iron			
	Metal column forms	No. 6	 225
	Steel reinforcement	94 tons	56.00 5,270
	Wire sundries for reinforcement	....	 300
	Structural steel lintels	905 l. f.	 500
	Door frames (metal) (Single)	No. 83	 1,050
	Door frames (metal) (Double)	No. 7	
	Miscellaneous iron and steel	....	 500
	Hardware for entire job	....	 1,800
	Column cores and base plates and caps	No. 6	 450
	Metal doors tin clad and steel	No. 2	 100
Concrete and Masonry Materials			
	Cement 2,450 bbls. at 3.05	7,480	....
	Credit on bags returned 2,450 bbls. .40	980	 6,500
	Cement tests	2,450 bbls.	.03 74
	Loss on empties	2,450 bbls.	.05 123
	Sand	1,050 tons	1.25 1,315
	Gravel	1,420 tons	2.25 3,190
	Peastone	98 tons	6.00 588
	Lime for mortar	25 tons	20.00 500
	Common brick	154 M	17.50 2,700
	Fire brick and flue lining	....	 250
	Imitation granite	3,135 c. f.	 10,000
	Terra cotta tile 4"	17,895 s. f.	.09 1,610
	Granite steps and thresholds	....	 1,600
General and Miscellaneous Materials			
	Test boring	....	 535
	Brick anchors and ties	....	 200
	Building paper for floors and miscellaneous	....	 300
	Waterproofing	....	 320
Sub-Contracts			
	1. (a) Roofing, flashing, conductor heads	1,400	 2,500
	(b) Cork insulation	1,100	
	2. W. C. partitions, marble and doors	No. 19	 1,700
	3. Ceramic floors in toilets and bases	....	 1,200
	4. Linoleum ⅜" in special offices	....	 400
	5. Metal lath and plaster for entire job, including hung ceilings and cement base (approximately 7,800 s. y.)	....	 9,200
	6. Painting for entire job	....	 5,200
	7. Weather strips for sash	....	 700
	8. City connections to sewers, for gas, water, etc	.....	 250
	9. Ash hoist in place	....	 250
	10. Iron stairs and W. I. rail and ornamental iron	....	 3,000
	11. Bluestone treads for stairs	....	 500
	12. Elevator doors and frame	No. 4	 700
	13. Travertine floor and base at main entrance	63 l. f.	 400
	Cold weather expense	....	 3,000
	Expediting expenses	....	 350
	Liability insurance (fire insurance by owner)	....	 2,000
	Superintendence, travel, office, stationery, telephone	....	 6,000
	TOTAL MATERIALS AND SUB-CONTRACTS		$95,195

(JOB BUDGET, CONTINUED)

Equipment	Quant'ty	Total
1. Heating, boilers and stack	15,000	
2. Plumbing, conductors, drains and sewers	7,500	
3. Gas piping	350	
4. Elevator (freight of 2 tons, slow speed)	2,300	
5. Electric work and wiring (no fixtures included) elevator wiring	4,500	$29,650
LABOR		56,748
TOTAL LABOR, MATERIALS AND SUB-CONTRACTS AND EQUIPMENT		$179,593

Items not included:

1. Roads, sidewalks, general planting, auto space, landscape work.
2. Removing old buildings.
3. Wood top floors except in Assembly Hall.
4. Color for granolithic floors.
5. Screens for windows and doors.
6. Rock, ledge or quicksand or running water in excavation.
7. Lighting fixtures, telephones, furniture or rugs.
8. Window shades.
9. Fireplaces.

Timekeeping. The timekeeping code in use by this Company is based on the "mnemonic" system. The first letter of the code item is a consonant indicating the general classification; D for excavation or digging, P for plant, F for forms, B for brickwork, etc. The second letter is a vowel indicating the kind of labor; that is, a for making, e for placing, i for removing, etc. The third letter or combinations of third and fourth letters are consonants indicating the part of the building to which the item applies. These last letters have different meanings in some different classifications, but as far as possible are confined to one kind of work; that is, d would apply to footings whether in connection with excavation, forms, concrete or reinforcement; c would apply to columns in every case; and f would always mean floors, etc.

This code is used primarily for recording at definite times through each day the exact work on which each man on the job is engaged. The time sheet on which this record is made is divided into columns, each representing one hour of the day, while a vertical column at the left shows the number by which each individual on the job is known. In recording the time the timekeeper simply notes opposite a man's number and in the proper hourly column the code classification of the work on which the man is engaged. This time sheet is summarized each day by collecting all of the charges under each code classification. Incidentally, the total number of hours of each man's labor is transferred to the payroll sheet.

Although the various labor charges are summarized in finished form only once each week, it will be obvious that it is a simple matter to check up, whenever desired, what a single day's costs are on a given item. For instance, it is frequently desired to know what the day's cost is on concrete or brickwork, the quantity measurement of which is a simple matter. Accordingly, an hour's work on the time sheet will summarize the particular item so that the actual cost of a day's work is easily shown the early part of the following day, and opportunity is given to correct any irregularity that may be shown by the figures.

Labor Statement. Daily labor costs are transferred to a summary sheet which is completed once each week and transferred to a form called the labor statement. This form follows exactly the items as laid out in the labor budget. The labor statement reproduced herewith is taken at the end of the eleventh week of the work. It will be noted that it shows the week's cost, that it compares the actual cost with estimated cost in both total expense and units and, what is of the greatest importance, it indicates what the final cost of each item will be if completed at the going rate of accomplishment. Too much emphasis cannot be placed on the value of this particular point. It will be obvious that a cost system which shows costs only at the completion of a contract is of value only to the contractor in estimating future work and is of no use whatever during construction as offering an opportunity to correct unsatisfactory conditions. It will also be obvious that if, in the labor statement shown, the expenditure on each item were given without reference to the uncompleted remainder, it might well indicate a false condition. For instance, certain items involving a limited amount of work might show a saving totaling some hundreds of dollars, whereas one of the larger items, of which only a small part of the total had been completed, might show an over-run in actual expenditure far less than the total of savings on other items. Therefore, considered as an independent statement, the weekly report would show the job to have saved money, yet on the large item which is over-running (if the rate of over-run were to continue through the life of the job), the final extra expense might far more than offset any savings on smaller items.

This labor statement is forwarded each week by the field superintendent to the Manager of Construction at the main office, who immediately interests himself in any items which may be out of proportion, and in consultation with the field superintendent he gives particular attention to the items in question with a view to correcting them *while the work is still under way.*

Material Statement. A material statement similar in form to the labor statement is also based on the job budget. Because this material statement is largely a record of purchases and does not offer the opportunity for correcting conditions as does the labor portion of the work, it is compiled only once each month. It does, however, carry out the same idea as the labor statement in showing in its final columns the probable standing of the cost of material *at the end of the work.* It will be noted that actual quantities vary in many cases from estimated quantities, and that there is also frequent variation between both esti-

Form 5-9-28

Morton C. Tuttle Company

Job 54 For Fire Proof Office Bldg. At Sheet No. 1

LABOR STATEMENT THRU November 27 1926 11th WEEK, OF 33 SCHEDULED

Symbol	ITEM	Week's Cost	Week's Unit	Quantity: Unit of Meas.	Quantity: Estimated Total	Quantity: Actual Total To Date	Unit: Estimated	Unit: Actual	Cost: Estimated Total	Cost: Actual To Date	Probable Final	To Date: Saving	To Date: Overrun	Probable Final: Saving	Probable Final: Overrun
	-EXCAVATION-														
Das	Clear Site			$	150				150		35			115	
Dass	Steam shovel excavation			cy	1800	1800	.22	.191	396		345			51	
" T	Team above			"	1800	1800	.50	.284	900		510			390	
Dah	General hand excavation			"	150	$79	.80		120		120				
Dad	Footings,walls and pits			"	300	150	1.75	1.69	525		254			271	
Ded	Backfill ftgs. and walls			"	500	265	.75	.735	375		366			9	
Dap	Level and tamp for paving	39.31		sf	6700	2000	.02	.019	134		127			7	
									2600		1757			843	
	-PLANT-														
Peu	Unload and reload plant		)			$265									
Pen	Temporary buildings	5.29	)			$261									
Pes	Sawmill		)			$ 29									
Pew	Temp. water,heat, fuel		)	$	1800	$ 11			1800		1800				
Pem	Mixer and motor	5.35	)			$109									
Pel	Tower, hoist and boom	17.50	)			$410									
Per	Stagings and runways	15.48	)			$ 52									
Pess	Steam shovel		)			$ 14									
Pe	Misc. plant		)			$ 22									
									1800		1800				
	-FORMS-														
Fed	Footings	M.E.S.		sqs	22	15	12.	7.02	264		105			159	
Fadw	Fdtn walls,pilasters	Make		$	280				280		63			217	
Fedw	" " "	Erect		sqs	180	110	13.	11.19	2340		1500			840	
Fidw	" " "	Strip	12.01	"	180	106	3.50	2.40	630		432			198	
Feh	Frames at bs'm't windows			#	52	52	3.50	2.60	182		135			47	
Facx	Int. and Ext. columns	Make		$	244	$286			244		350				106
Fecx	" " " "	Erect	297.72	sqs	93	85	18.	16.19	1675		1506			169	
Ficx	" " " "	Strip	23.37	"	93	61	2.50	2.53	233		235			2	
Fafb	Slab,beams,girders	Make	24.87	"	200	153	3.50	4.40	700		880			180	
Fefb	" " "	Erect	595.65	"	348	337	12.	8.47	4180		3000			1180	
Fifb	" " "	Strip	97.42	"	348	160	1.50	2.92	522		1016				494
Feci	Interior round columns			#	6	6	6.	7.64	36		46				10
											100			100	
Ful	Unload form lumber			M	100	102	2.00	.921	200		9362			2916	792
									11486						

Form 5-9-28

Morton C. Tuttle Company

Job 54 For Fire Proof Office Bldg. At Sheet No. 2

LABOR STATEMENT THRU November 27 1926 11th WEEK, OF 33 SCHEDULED

Symbol	ITEM	Week's Cost	Week's Unit	Quantity: Unit of Meas.	Quantity: Estimated Total	Quantity: Actual Total To Date	Unit: Estimated	Unit: Actual	Cost: Estimated Total	Cost: Actual To Date	Probable Final	To Date: Saving	To Date: Overrun	Probable Final: Saving	Probable Final: Overrun
	-REINFORCEMENT-														
Ref	Slab and beam steel	145.45		T	62	54.5	25.	14.14	1550		877			673	
Rec	Column steel	54.77		T	10	15.33	26.	14.64	260		225			35	
Rez	Fdtn.walls,ftgs,misc.			T	22	12.9	35.	18.88	770		415			355	
Ru	Unload steel			T	94	85.123	2.	1.26	188		108			80	
" T	Team above			$	75				75					75	
									2843		1625			1218	
	-CONCRETE-														
Med	Footings			cy	78	83	1.80	1.89	141		157				16
Medw	Fdtn.walls,pilasters,etc.	23.14		"	244	243	2.25	2.11	548		515			33	
Mep	Paving	44.97		"	84	24	1.80	1.87	151		157				6
Mef	Slab,beams,cols,girders	125.58		"	700	643	2.00	1.48	1400		1036			364	
Kuaf	Grano.finish(laid after)	4.75		sqs	258	$39	8.00		2070		2070				
Kiwl	Patch&rub ext. concrete	26.05		$	300	$189			300		300				
Kiw2	Rub parts of bmst unplastered			$	300	$ 42			300		300				
Mux	Unload and hdle. cement	8.62		bbls	2450	2170	.14	.099	343		245			98	
Muyz	Trim sand and stone pile	61.38		$	155	$276			155		400				245
Mu	Unload pea stone			T	98	97.15	.75	1.38	74		135				61
									5482		5315			495	329
	-MASONRY-														
Bew	Stage,tend, lay brick work	431.85		cf	8090	656	.90	.80	7280		6472			808	
Bec	Set imitation granite	208.96		cf	3135	295	1.	1.21	3135		3793				658
Bu	Unload brick tile,lime,etc.	16.50		$	450	$109			450		450				
Beg	Set granite	71.14		cf	300	66	1.	1.08	300		308				8
									11165		11023			808	666
	-MISC. IRON-														
Sedf	Set door frames,sgle & dble			$	450	$ 4			450		450				
Sel	Set steel lintels			$	300	$40			300		300				
Sez	Misc. iron & unload			$	300	$ 6			300		300				
									1050		1050				
	-CARPENTRY-														
Cewf	Set window frames	61. 4.06		#	215	15	4.	4.06	860						
Cesf	7/8" Sub floor & paper)	7.43		$	160	$ 7			160		873				13
Ces_c	2x4 Screed treated)										160				
									1020		1033				13

Facsimiles of Labor Statement Sheets, Omitting the Ruling, in Light Blue and Red, of the Originals

Form 5-9-28

Morton C. Tuttle Company

Job 54 For Fire Proof Office Bldg. At Sheet No. 3

LABOR STATEMENT THRU November 27 19 26 11th WEEK, OF 33 SCHEDULED

Symbol	ITEM	Week's Cost	Week's Unit	Quantity Unit of Meas.	Quantity Estimated Total	Quantity Actual Total To Date	Unit Estimated	Unit Actual	Cost Estimated Total	Cost Actual To Date	Cost Probable Final	To Date Saving	To Date Overrun	Probable Final Saving	Probable Final Overrun
Gewp	Water proofing			$	150	$19			150		150				
Sch	Scheduling & job expediting			$	200	57			200		100			100	
Zarp	Engineering on lot & bldg lines			$	150				150		55			95	
Z sc	Attend sub contractors	13.44		$	400	$32			400		400				
Mh	Cold weather expense	196.62		$	2500	$799			2500		3000				500
W	Watchman	24.		$	750	$272			750		750				
O	Overhead	92.50		$	4200	$820			4200		3700			500	
	SAVING $4676.00								45796		41120			5189	513
	-EXTRAS-														
X 1	Labor to bring sewer, water gas, electric lights and telephone from Green St. to new building	1.00				$266									
X 5	Labor necessary to construct retaining wall along driveway at north side of building	$16.09				$ 16									
X 6	Labor necessary to form additional concrete slab on roof to pitch roof	36.92				$ 37									
	-CONTRA CHARGES-														
	Work for Owner					$ 12									

-COST TO DATE-

Labor	Truck	Total
$17498.82	$510	$18008.82

Labor Statement, Continued

mated and actual unit costs and between estimated and actual total costs. The last columns, however, show that various savings more than offset over-runs, and that on the material side of the work there is at this point a substantial margin.

Cost Tendency Chart. In order to more quickly and clearly indicate the condition of the work as regards labor costs, it is a practice in this Company to plot each weekly labor statement on a cost tendency or "lightning" chart. This

Morton C. Tuttle Company

Job 54 For Fire Proof Office Bldg. At Statement No. 1

MATERIAL STATEMENT TO December 11th 1926 Sheet No. 1

ITEM	Quantity Est.	Quantity Actual	Unit Est.	Unit Act.	Cost Est. Total	Cost Actual To Date	Estimated Additional Expenditure	Est. Final Cost	Saving	Overrun
-PLANT-										
Small tools					1476	300		1776		
Supplies used up					205	55		260		
Power, fuel, water, light and temp. connections					183	150		333		
Teaming and freight					764	200		964		
Lumber for runs, staging and temporary buildings	$				1024	26		1050		1355
Rentals & rep. Excav'n	Fl	5000			5000	525		525		
" " Conc.	"					360	200	560		
" " Form	"					121	80	201		
" " Masonry	"									
" " Resh.	"									
" " Misc.	"					286	800	1086		
Probable salvage on plant					400					
					5400	4944	1811	6755		
Form lumber	M	100	102.31	37	3920	3700		4012		312
Nails, oils, bolts, hangers	$	600			600	589	50	579	21	
					4300	4541	50	4591		291
Sheeting lumber	M	3		40	120				120	
Screeds kyanized	Lf	1600	1600		175		60	60	115	
7/8" sub floor	M	3		40	120		120	120		
Top floor	M	3		100	300		300	300		
All interior trim, millwork	$	3000			3000		3000	3000		
Wood sash, glass & frames	$	3680			3680		3278	3278	402	
Wood doors, sgle & dble	$	1100			1100		1100	1100		
Wood door frames	$	50			50		50	50		
Metal column forms	$	22b			225	222		222	3	
Steel reinforcement	T	94	85.113	56	5330	5070	4536	200	4536	734
Fire sundries for steel	$	300			300	110	50	160	140	
					5570	3446	250	4696	874	
Structural steel lintels	$	500			500	219		219	281	
Door frames(metrl)sgle/dble		1050			1050	33	1017	1050		
Misc. iron & steel	$	500			500	63	455	518		18
Stone for entire job	$	1800			1800		2000	2000		200
Col.cores, base plates	$	450			450	401		401	49	

Morton C. Tuttle Company

Job 54 For Fire Proof Office Bldg. At Statement No. 3

MATERIAL STATEMENT TO December 11th 1926 Sheet No. 2

ITEM	Quantity Est.	Quantity Actual	Unit Est.	Unit Act.	Cost Est. Total	Cost Actual To Date	Estimated Additional Expenditure	Est. Final Cost	Saving	Overrun
Metal doors, tin clad&steel	100				100		100	100		
Cement	bbls	2450	2762	2.65	2.66	6500	7381		7381		881
" tests	"	2450	2762	.03	.02	74	63	6	69	5	
Loss on empties	"	2450		.05		123		123	123		
						6697	7444	129	7573		876
Sand	T	1050	700cy	1.25	1.50	1315	1037	136	1173	142	
Stone	T	1420	975cy	2.25	3	3190	2868	37	2925	265	
Pea stone	T	98	9715	6	721	588	713		713		125
Lime for mortar	T	25	8.4	20	22.86	500	196		196	304	
Common brick	M	154	154	17.50	17.50	2700	1068	163z	2700		
Fire brick & flue lining	$	250				250		210	210	40	
Imitation granite granite		11600				11600	1750	8836	10586	1014	
Terra cotta tile 4"	sf	17895	17920	.09	.088	1610		1586	1586	24	
Test borings	$	535				535	535		535		
Brick anchors & ties	$	200				200	28	72	100	100	
Building paper for floors		300				300		300	300		
Waterproofing	$	320				320	312	225	537		217
Roofing, flashing, conductor heads, cork insulation	$	2500				2500	119	4181	4300		1800
W.C. partitions, marble and doors	$	1700				1700		1700	1700		
Ceramic floors in toilets and bases	$	1200				1200		1200	1200		
Linoleum o/16" in special offices	$	400				400		400	400		
Metal lath and plaster for entire job	$	9200				9200		9200	9200		
Painting for entire job	$	5200				5200		5200	5200		
Weather strips for sash	$	700				700		850	850		150
City connection to sewer for gas, water, etc.	$	250				450	120	130	250		

Material Statements for a Fireproof Office Building

Morton C. Tuttle Company

Job 54 For Fire Proof Office Bldg. At Statement No. 3

MATERIAL STATEMENT TO December 11th 19 26 Sheet No. 3

ITEM	Quantity Est.	Quantity Actual	Unit Est.	Unit Act.	Cost Est. Total	Cost Actual To Date	Estimated Additional Expenditure	Est. Final Cost	Saving	Overage
Ash hoist in place	$ 250				250		250	250		
Iron stairs & s.l.rail and ornamental iron	$ 3000				3000		2400	2400	600	
blue stone treads for stairs	$ 500				500		700	700		200
elevator doors & frame	$ 700				700		700	700		
Travertine floor and base at main entrance	$ 400				400		400	400		
Heating,boilers,stack	$ 15000				15000		13080	13080	1920	
Plumbing,conductors, drains and sewer	$ 7500				7500	1180	3954	5134	2366	
Gas piping	$ 350				350	1	349	350		
elevator	$ 2300				2300		2300	2300		
electrical work & wirings	4500				4500		4500	4500		
Cold weather expense	$ 3000				3000	2593	1107	3700		700
Expediting expenses	$ 350				350		250	250	100	
Liability insurance	$ 2000				2000		2000	2000		
Supt.salary,travel,office stationery,telephone	$ 6000				6000	2048	2952	5000	1000	
					145	36901	84457	121358	9719	9932

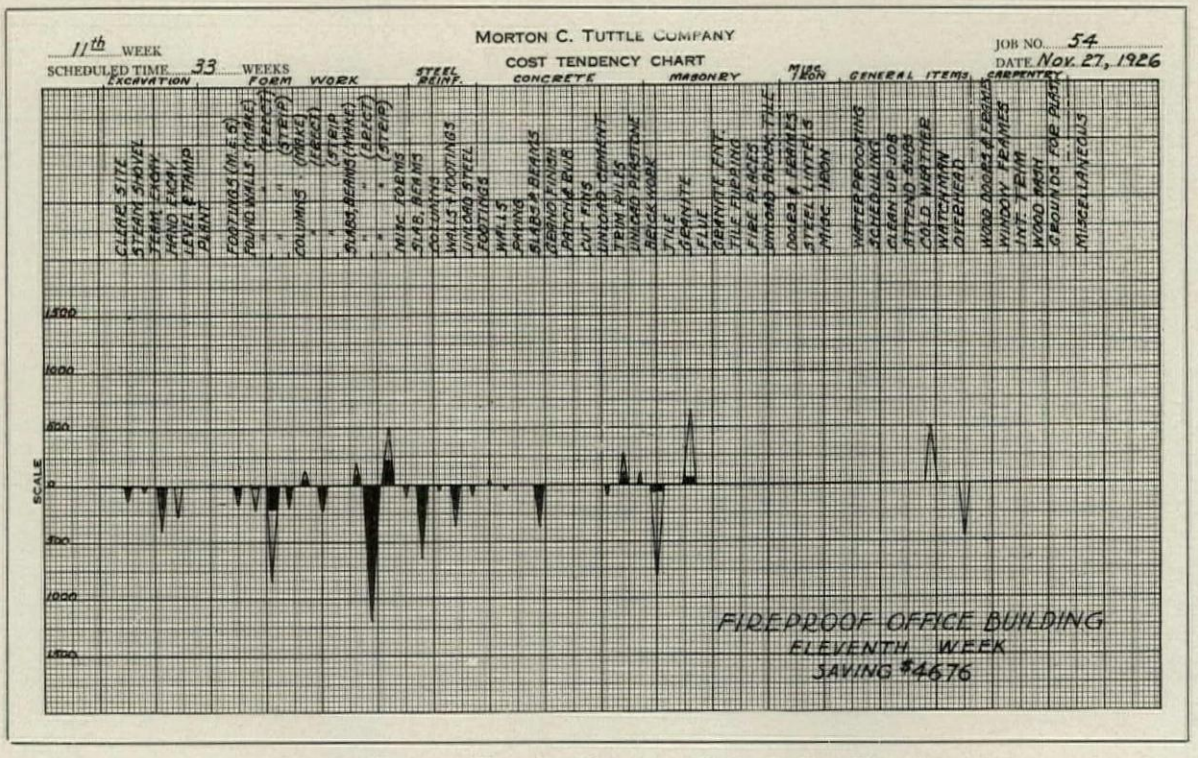
Saving * $9787.00

Saving over 354

chart, covering the work at the end of the eleventh week is reproduced herewith and will be generally self-explanatory. By reference to the chart it is immediately apparent just which items are showing greatest deviation from the budget.

Like the labor and material statements, the principal emphasis in this chart is on the *probable final cost of the work* rather than the total expenditure to date. Therefore the high points of the variations are the points which would show *at the end of the work* if the going rate of accomplishment were continued. The amount of saving is the indicated saving *at the end of the work* rather than at the time the chart is plotted. Copies of this cost tendency chart are sent each week to the architect and to the owner, thus keeping them informed in detail as the work proceeds.

Extra Work. The method of caring for additions and changes under the service type of contract as compared with the usual agreement made on the basis of competitive bids is interesting. In the latter case the contractor generally names a lump sum for each item, and there is usually little opportunity for architect or owner to question the amount. Under a service type of contract, however, the architect or owner is given an estimate in detail showing exactly what each addition or change involves. When an extra item is authorized it is simply carried along and accounted for in the same way as the rest of the work under a number assigned to it. In this way the owner pays the exact cost of labor and material plus the contractor's fee, which is usually a pre-determined percentage of cost. A periodic statement of all extras is compiled and given to architect and owner in order that these costs may be added to the weekly labor and material statements to show the total probable final cost. It is, therefore, obvious that on the service basis there is no opportunity for making arbitrary demands in connection with extra work, and that one major source of discord is in this way eliminated.



The Cost Tendency Chart is an Important Factor in Cost Control

THE SUPERVISION OF CONSTRUCTION OPERATIONS

BY

WILFRED W. BEACH

CHAPTER 8. FORM WORK

SPECIFICATIONS for form work for the school building under discussion read:

FORMS:—

"(A) IN GENERAL. The Contractor shall provide all required wood (or other) forms for the proper execution of all concrete work, plain and reinforced, and supplied in sufficient quantity so that the work can be prosecuted with despatch. Removable steel forms of No. 16 gauge metal, of approved design, may be used where appropriate for floor slabs, at option of Contractor.

"(B) STRENGTH of all forms shall be sufficient to carry the dead load of materials and construction operations without deflection or vibration. They shall be so braced as to be rigid under trucking and other action incidental to building. They shall be so designed as to be capable of needed adjustments, shall be carefully watched as work proceeds, and all faults promptly corrected.

"(C) SMOOTHNESS. Surfaces of forms in contact with concrete, intended to remain exposed, shall be of dressed lumber with tight joints, so built as to provide, after removal, a true, smooth finished concrete. Members and surfaces shall be straight and true to line; walls, columns and piers absolutely perpendicular, and all horizontal members free from the slightest sag. Perfect finish will not be required on those surfaces exposed in unfinished rooms, in basement, or in ducts, or those elsewhere which are to be concealed by subsequent construction. All surfaces shall, however, be true to planes and profiles detailed.

"(D) INSPECTION. Ample opportunity shall be given the Superintendent to examine all forms just before concrete is poured. They shall then be thoroughly clean, free from shavings, tags, dirt or other rubbish, and shall be thoroughly drenched, except in freezing weather. Forms for vertical construction shall have openings at bottom, until ready for pouring, to permit removal of rubbish and dirt.

"(E) WRECKING OF FORMS shall not be started for 7 days after pouring, and none shall be done until the Superintendent gives consent and then only at the sole risk of the Contractor. After wrecking, sufficient struts shall remain to insure rigidity and strength until final set."

So far as the interest of the architect or engineer is concerned, forms (or centering) are in the same category as other equipment of the builder's,—merely tools of his trade intended to produce certain desired results at minimum expense. It is the contractor's business to determine—

(1) Of what material the forms shall be constructed.

(2) How they shall be put together.

(3) How they shall be braced and secured.

(4) That they are clean at time of pouring, and drenched, oiled or soaped as called for.

(5) What means are to be provided for easy wrecking, with least damage.

(6) That wrecking is not done too soon and that sufficient struts are left.

The superintendent must see—

(1) That the form material is such that it will produce true surfaces of the intended texture.

(2) That forms are built to the exact dimensions of the finished work.

(3) That all bracing is adequate.

(4) That all surfaces are in proper condition at the time of pouring.

(5) That wrecking of forms is done in such manner as not to injure the concrete.

(6) That wrecking is not done too soon, and that sufficient temporary supports are left.

Form lumber is often the first material delivered, and carpenters are at once set to work to prepare it to be placed. As to this material, the superintendent's main concern is that it is of a character to produce the desired finished surfaces. Second hand material should not be used for forms for finished surfaces, owing to its lack of uniformity. There is an increasing tendency among architects to build finished concrete surfaces on which all form marks are plainly visible, and the marks of the grain of rough lumber. This is frankly monolithic concrete, without any rubbing or coating whatever. Others require the surfaces to be rubbed, treated with grout or by means of a cement gun. For the former effect, one must see that no form member is of a character to mar the intended finish. But, if the surfaces are to be rubbed, coated, plastered or veneered, then a lesser degree of perfection of form surface is necessary. In any event, form lumber should be medium dry and free from loose or large knots. Kiln-dried lumber is too absorbent, and green lumber is too likely to shrink and cause leaks and ridges.

The builder may construct his basement wall forms of separate boards or planks or of sections previously built up and intended to be interchangeable. Such sections are sometimes taken from job to job and can be used six or eight

times, whereas separate boards can seldom be used more than two or three times,—frequently only once.

By referring to Fig. 8, it is to be noted that, in this work, forms were required for the upper portions of footings, the lower portions of which were deposited within earth banks; 2 x 6-inch members were used for these footing forms, which were held in place by driven stakes and, later, easily removed. After the footings were partially set and the waterproof course in place, work on wall forms proceeded at once, progressing in both directions from the southeast corner.

The superintendent carefully verified all dimensions and saw that the form work was rigidly braced, especially at the bottom, where the weight of the fluid mass exerts greatest pressure. Weak forms are said to "constitute one of the four principal causes to which have been attributed the failures in some concrete buildings. These causes are (1) imperfect design, (2) poor materials, (3) faulty construction and (4) weak forms."* Especially must the superintendent see that forms made of ⅞-inch boards are erected with more frequent ribbing than if 1¾-inch plank is employed. For the former, the ribs or studs cannot exceed 2 feet on centers with safety, while those for plank can be double the distance, except that, where the depth of forms exceeds 12 feet, it may be found necessary to decrease the spacing in either instance, in order to prevent "bulging" and the consequent "wavy" surface in the concrete.

The experienced superintendent will be in no way officious in his inspection and criticism of form work. He is particular to impress upon the foreman the latter's full responsibility for everything pertaining to the forms. The superintendent's coöperation in this regard is advisory only, and hence he must avoid assuming any liability,—as is ever the case where he is privileged and expected to call attention to defects in working methods and implements, but he should give approval to naught but satisfactory results. This point in the performance of a superintendent or inspector cannot be too thoroughly stressed. His assumption of undue authority may at times involve him in serious trouble, as has already been explained in these articles.

Where basement wall forms extend to the under side of the first floor slab, as is frequently the case, due regard must be had for window and door openings and for pockets for beam and girder bearings, flue openings and the like. Builders of forms are accustomed to look upon it as the roughest of work, and hence often need the closest watching in the matter of dimensions and the insertion of minor built-in mouldings and other members. The foreman should be impressed with the importance of these and be compelled to work to a fraction of an inch in order that all carelessness may be eliminated at the start instead of being permitted to become a habit. He can easily be made to see how much more simple it is to correct form work than to chop out concrete. This is especially true of surfaces that are to be paneled or otherwise enriched. Members must not only conform exactly to detail but must be so secured as not to be sprung out of place by rodding. The continuity of such members forming belt courses, rustication, etc., is of the utmost importance to a design, and hence they must be aligned and secured with the greatest accuracy and rigidity.

The superintendent on our school building also impressed upon the foreman the need of his being advised well in advance of the starting of pouring at any point. It is most convenient for a foreman to assume that the inspector is as fully informed as himself regarding all job conditions; but there are dozens of things about the premises demanding attention, any of which a conscientious inspector might be watching just when pouring is about to begin somewhere else. He must be advised in time to see that forms are in final condition, as set forth in the specifications under the head of "Inspection." Such inspection should not be made a half day, nor even an hour ahead of the pouring, but immediately before the first deposit is made. A superintendent must bear in mind that everything within the forms is in "temporary suspension" until embedded, easily jarred or kicked out of place, and that "foreign substance" is possessed of peculiar attraction for place in forms; that even the forms themselves are temporary in character and are the recipients of no respect from workmen. Again is "eternal vigilance the price of safety." It is one of the many times when a superintendent feels that he cannot turn his back for a moment but must apply the closest scrutiny to everything that is to be covered. The only foreign substances allowed to remain in the forms are the ties and spreaders. The former will be built in and cut off later, but the wooden spreaders must be fished out as the rodding proceeds. Workmen are sometimes careless about removing all of these, and they must be cautioned. It is serious work to cut them out of finished concrete.

Inspection of floor forms is no different from that of wall forms, except that special attention is to be paid to measurements of beam and girder work, making sure of proper thicknesses and alignment, and overseeing the method of installing supports. If any one of the several proprie-

* Page 611 in F. E. Kidder's "Building Construction and Superintendence."

tary systems of concrete floor construction is used, the superintendent should be supplied with detailed drawings and specifications in order to make sure that the workmen know what they are doing and are performing the work correctly.

Notwithstanding that the specifications place upon the contractor the entire responsibility for premature removal of forms, it is well for the architect and superintendent to have a working knowledge of what is considered good practice in this regard. Here is an excerpt from a consensus of opinion of several contractors whose expressions on the subject were combined and published by the Atlas Portland Cement Co.: "As a guide to practice these rules are suggested: Walls in mass work: one to three days, or until the concrete will bear the pressure of the thumb without indentation. Thin walls: in summer, two days; in cold weather, five days. Slabs up to 6 feet span: in summer, six days; in cold weather, two weeks. Beams and girders and long span slabs: in summer, ten days or two weeks; in cold weather, from three weeks to one month. If shores are left without disturbing them, the time of removal of the sheeting in summer may be reduced to one week. Column forms: in summer, two days; in cold weather, four days, provided girders are shored to prevent appreciable weight weakening columns. Conduits: two or three days, provided there is not a heavy fill upon them. Arches: of small size, one week; for large arches with heavy dead load, one month. A very important exception to these rules applies to concrete which has been frozen after placing, or has been maintained at a temperature just above freezing. In such cases the forms must be left in place until after warm weather comes, and then until the concrete has thoroughly dried out and hardened."

From this it will be seen that the question of the length of time that must elapse after pouring before forms can be removed depends much upon the service they are performing, and it is likewise a matter of judgment of the experienced concrete worker, it being borne in mind always that in the desire of a contractor to hasten the work and at the same time economize on form lumber, there is a constant temptation to wreck the forms a day or so too soon. Many floor failures have resulted from shortsightedness, and hence a superintendent should see that the contractor "plays safe."

THE SUPERVISION OF CONSTRUCTION OPERATIONS

CHAPTER 9

CONCRETE WORK

SPECIFICATIONS for cement and aggregates were quoted in a preceding chapter. As is customary, the superintendent in charge of construction of the schoolhouse being considered here gave early attention to the brand of cement to be used and to the character of aggregates delivered. Strictly speaking, the passing upon these materials is presumed to be based upon laboratory reports, and hence is not a function of the superintendent. However, inasmuch as the sand and crushed stone generally used are of kinds and grades easily judged by visual inspection, laboratory tests are frequently confined to the cement, even on work of importance. For the work under discussion, the contractor proposed using pit-run gravel for his plain concrete, adding the amount of sand or coarse aggregate that might be needed to make it conform to the specifications. For reinforced work, he was to screen out all stones larger than ¾-inch.

It is not expected that a superintendent will decide what kind of concrete will be used in any location. All questions of design are predetermined. He is at the site to see that they are properly carried out, to know that what is produced is fully up to specification requirements. To be able to assert that this has been accomplished, he must know:

(1) That the aggregates are
  (a) of proper kind,
  (b) sufficiently clean,
  (c) of correct size and shape,
  (d) well graded,
  (e) of adequate hardness,
  (f) of due moisture content;
(2) that the proportions are such as to produce the maximum density of each type called for;
(3) that the cement is fresh, up to test standards, and used in correct ratio;
(4) that all ingredients are properly mixed;
(5) that the completed mixture is
  (a) deposited promptly, without separation of ingredients,
  (b) adequately agitated,
  (c) undisturbed after setting begins,
  (d) properly bonded to previous work,
  (e) deposited only against surfaces in proper condition to receive it,
  (f) properly protected until final setting is complete.

Treating of these matters in the order enumerated, the superintendent gave his attention to the aggregates, while awaiting reports on the samples sent in for testing.

(1-a) *Kinds of Aggregates.* Our specification called for broken stone or gravel for the coarse

aggregate, and sand for the fine, with a provision for the use of pit-run material. Crushed furnace slag is often specified in localities where it is procurable, and in some districts pulverized stone is used in place of sand. Crushed brick or tile may also be used for coarse aggregate, if of adequate hardness, of proper size, and free from dust. Cinders are used by many architects and engineers and are permitted in reinforced floor slab construction by certain building codes, notably that of New York. Other codes (as that of Chicago) permit the use of cinder concrete for fireproofing of steel members, but limit its workable compressive strength to 700 pounds per square inch. They also require that metal pipe embedded in cinder concrete shall first be coated with a cement grout. A typical specification for cinders for concrete reads:

"CINDERS shall be clean, hard, steam-boiler coal cinders, crushed to range in size from ¼- to ¾-inch (or 1-inch), and free from unburned coal or other substance injurious to concrete or its reinforcement."

Probably no building material is the subject of more controversy than cinders, principally because there is so much variation in them, and because it is impossible to make conditions for testing identical with those maintaining in all structures. The "personal element" in concrete construction stands out stronger with use of this aggregate than with use of any other. If cinders are specified, they must conform in general to requirements for other aggregate, the main variant being that of the substances in their composition, other than unburned coal, which would be "injurious to concrete or its reinforcement." Some writers mention sulphur in this category, but the prejudice against presence of that chemical appears to be unfounded. Perhaps the whole gist of the subject can best be summed up by quoting Professor C. L. Norton of the Massachusetts Institute of Technology: "Sulphur might (cause corrosion) if present, were it not for the presence of the strongly alkaline cement; but with that present the corrosion of steel by the sulphur of cinders in a sound Portland concrete is the veriest myth, and as a matter of fact the ordinary cinders, classed as steam cinders, contain only a very small amount of sulphur. There is one cure (for the rusting of steel in cinder concrete) and only one,—to mix wet and mix well. With this precaution, I would trust cinder concrete quite as quickly as stone concrete in the matter of corrosion."*

(1-b) *Cleanliness of Aggregates.* With the recent vast increase in the annual output of cement products, the preparation and handling of aggregates have become so commercialized that, even in rural communities, one generally finds them properly prepared for market by due grading and washing. The coarser material usually offered is crushed rock,—granite, trap rock, boulders, sandstone or limestone. Any of the first three will be clean if not in contact with earth nor stored too long. Sandstone or limestone will probably be covered by their own dust to such an extent as to need washing, and should be admitted only on that condition, assuming them to be otherwise acceptable. Sand and gravel, on the other hand, may be offered just as taken from the pit, hence must be carefully inspected. Up to a few years ago, concrete experts were accustomed to demand that sand and gravel must be close to 100 per cent clean, and one still encounters specifications containing this requirement. More recent authorities, however, have satisfied themselves that a small amount of clay, even up to 8 per cent of the volume of the sand, is not injurious and may even be beneficial.* But, in the use of both sand and gravel, one must be sure that a permissible silt content containing clay and sand doesn't also carry loam, organic matter, or oily substances.** Such material is not "clean," and will not make good concrete and should be washed. Some specifications stipulate that "the volume (of foreign substance) removed by decantation shall not exceed 3 per cent of the weight."*** While decantation means properly a laboratory test, it can also be performed in the field in a crude way by giving the aggregates a thorough washing and rinsing; pouring the dirty water into a vessel and allowing it to settle; then pouring off the clear water, and drying and weighing the residue; then comparing that weight with that of the bulk from which the dirt was removed. Some specifications stipulate that such objectionable matter shall not exceed 2 per cent, but the judgment of engineering committees permits the larger quantity. Care as to cleanliness of ingredients must be continued until they are actually incorporated in the work, and hence specifications require that all aggregates shall be deposited on plank floors or paving. If dumped on the ground, there will be "foreign substance" shoveled into the barrows or mixer in spite of all precautions. Water should also be clean, and this is generally so specified: "WATER for concrete shall be clean and free from in-

* Report No. 9 Insurance Experiment Station, Boston Manfrs. Mut. Fire Ins. Co. in Kidder s "Architects' and Builders' Pocket-Book," page 882e.

* "Reinforced Concrete and Masonry Construction," Hool & Kinne, page 4.

** These are subjects for laboratory tests; see pages 726 and 727 in Hool & Kinne's "Reinforced Concrete and Masonry Structures."

*** "Tentative Specifications for Concrete and Reinforced Concrete" by the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete of the American Society of Civil Engineers, American Society for Testing Materials, American Railway Engineering Association, American Concrete Institute and the Portland Cement Association.

jurious amounts of oil, acid, alkali, organic matter or other objectionable content." Ordinary drinking (potable) water is always fit for the purpose, as is rain water that has not picked up too much improper admixture from surfaces with which it has been in contact. Any water under suspicion should be sent to the laboratory for analysis.

(1-c). *Size and Shape of Aggregates.* Specifications for broken stone (crushed rock) and gravel call for a range in size from ¼- or ⅜-inch up to ¾- or 1-inch for reinforced work, and up to 1-inch, 1½ inches or 2 inches for plain, mass or rough concrete.* Some specifications, notably for bridge.** and railway work (and including that we are using), permit the embedding of large pebbles or stone weighing up to 100 pounds in mass concrete, under certain restrictions. The superintendent can readily adjudge the sizes of the aggregates, since minor variations are unimportant. When it was customary to specify the maximum size as that of a piece that would pass through a ring of given diameter, grading screens were perforated sheets with holes to comply. But this refinement is being abandoned, and use of the "ring" specifications is disappearing. Screens of square wire mesh are now in as common use as those with round holes.

Insistence upon sharpness or angularity of aggregate has been customary from the time when concrete was mortar with coarse aggregate added, the former made with hydraulic or other cement which adhered to angular or rough surfaces better than to those that were round or smooth. Fractures of concrete made of gravel and Portland cement, however, disclose cleavages through round pebbles, rather than around them; hence "sharpness" of aggregate is no longer demanded. The one objectionable shape of aggregate is the thin and laminated. The presence of many of these will seriously cut down efficiency, especially in reinforced work.

(1-d). *Aggregates to be Well Graded.* This is insisted upon in both sand and coarse aggregate, and is essential to density. If one were to attempt to make concrete with a single size of coarse aggregate and a single size of sand, it would take too much sand to fill the interstices for economical construction. Even "grading" means that all interstices will be filled by largest size pieces, from coarsest to finest. Graded sand for the purpose (sometimes termed "torpedo" sand) should conform to this specification: "SAND shall range in size from fine to coarse, and the percentage of weight of sand retained when passing through standard screens shall be at least 100 per cent on a No. 100 sieve, 80 per cent on a No. 50, 25 per cent on a No. 40, 10 per cent on a No. 20 and none on a No. 10."

These proportions are varied somewhat by different authorities* but will be found generally practicable as given. Finer sand will make good concrete (though quite unsuitable for mortar), but it demands an undue amount of cement.

(1-e). *Aggregates to be of Adequate Hardness.* If doubt exists as to the hardness of the aggregates, samples should be sent to the laboratory. Ordinarily, granite and gravel pebbles are safe enough; limestone and sandstone are open to doubt, but "no type of aggregate such as granite, gravel or limestone can be said to be generally superior to all other types. There are good and poor aggregates of each type."**

(1-f). *Aggregates to Have Due Moisture Content.* The ratio of water in aggregates, prior to their being put in the mixer, is of less import than that the moisture content shall be known and that the water added shall be proportioned accordingly. It is always well to use a hose on the material in the pile just before using, both to carry off the dust and, in the case of porous stone, slag, brick, tile or cinders, to prevent the later absorption of too much thin cement.

(2). *Proportions to be Such as to Produce the Maximum Density of Each Type Called For.* The ratios of concrete ingredients most commonly used are 1:1½:3 or 1:2:4 for reinforced work and 1:2½:5 or 1:3:6 for plain or non-reinforced. The workable compressive strengths of variously composed concretes (other than cinder concrete) are from 1,500 to 3,000 pounds per square inch, dependent upon the ratios of cement and fine and coarse aggregate, the moisture content, the excellence of the mix, and the thoroughness of the compacting.*** Unfortunately, the "personal element" in the making of concrete is its most outstanding characteristic. It is easy to make good concrete, but still easier to use careless methods and produce inferior work; hence one reason

* Some specifications refer by number to commercial sizes of aggregates which are rated thus:—
No. 1 crushed rock, graded up to that which passes a 3-inch sieve.
No. 2 do., graded from a 1-inch sieve up to a 2-inch sieve.
No. 3 do., graded from a No. 4 sieve up to a 1-inch sieve.
No. 4 do., graded from a No. 16 sieve up to a No. 3 sieve.
(All sizes assumed to be standard meshes.)

** "In large masses of concrete one-man stones may be employed, provided that they first be cleaned and wetted thoroughly, and provided that they be not placed any nearer than six (6) inches to each other or to the exterior of the construction." Dr. J. A. L. Waddell in "Bridge Engineering," page 1852.

* See pages 6 to 11 of "Reinforced Concrete and Masonry Construction," Hool & Kinne.

** Technology Paper 58, U. S. Bureau of Standards.

*** See the "Progress Report of the New Joint Committee on Standard Specifications for Concrete and Reinforced Concrete," Appendix F in Hool & Kinne's "Reinforced Concrete and Masonry Structures."

for the unduly large number of failures in this construction. From the ratios here given, it is seen to be a general assumption that it takes about half as much sand as coarse aggregate in order to fill the voids in the latter. Such being the case, it is apparently inconsistent to name 1:2:4 and 1:3:5 in the same specification, as is done in some localities,—notably in Chicago. Obviously, if 1:2:4 is correct for a rich concrete, then a 1.3:6 mix with similar materials will produce cheaper concrete than 1:3:5 and of equal strength.

The main task for the superintendent is to assure himself that the ratios fixed in the specifications will produce concrete of maximum density with the materials at hand. As to this, the specifications say:

"VARIATIONS. The proportions given for the various kinds of concrete are based upon the use of well graded aggregates, as specified. In case the aggregates are not so graded, the Architect may change the proportion of cement to fine aggregate, without changing the proportion of cement to coarse aggregate and without additional compensation to the Contractor. No gravel (pit-run or other) shall be used until the Architect has had opportunity to test same and to determine what additional coarse or fine aggregate is to be added to such gravel, or if any addition is necessary. The Contractor shall conform to such demands to produce concrete of maximum density and shall not permit a change in the character of aggregates delivered at the site without due notice to the Superintendent and revised instructions as to procedure."

The indeterminate feature of this, insofar as pit-run material is concerned, is that there is no positive statement as to the proportion of such aggregate that will be the equivalent of what is specified. There seldom is, in any specification, and so there exists a cause for argument that could as well be eliminated. It should be clear enough, since one purpose of using the finer material is the filling of voids in the coarser aggregate, so that, if ratios are correctly specified, the bulk of the mix will only slightly exceed that of the coarse aggregate, and hence a 1:3:6 ratio becomes 1:6, if the aggregates are delivered ready mixed. Nevertheless, a young inspector may be surprised to find the contractor and all his mechanics insisting that a 1:3:6 mix is equivalent to 1:9, with pit-run material. Being faced by more experienced men, the novice may be much embarrassed in his contention, if he finds nothing specific in the contract documents on the subject and can lay his hand on no other authority to back him up. The truth is that not enough attention is ordinarily given to obtaining precisely correct proportions of aggregates, except for very important work.*

On this subject, the Portland Cement Association, in its publication, "Concrete Data for Engineers and Architects," says: "A 1:3:5 nominal mix does not give a 1:8 true mix as sometimes assumed, but about a 1:7 true mix." This means that the "true mix" should be computed at 40 per cent more than the bulk of the coarse aggregate, whereas the author's contention is that it should be only about 10 per cent additional, that is, 1:5½. Supporting the Association's statement, their authority, Prof. D. A. Abrams, says further: "As a matter of fact, instead of filling the voids, a coarser particle in fine aggregate will actually separate the particles of coarse aggregate farther than they would be normally. This is the reason it is necessary to use a considerable portion of sand, more than the theoretical amount required to fill voids. In any section of concrete which has been cut, one will note that in general aggregate particles are floating in a cement-water mixture. It is for this reason that the cement-water ratio becomes of controlling importance. Within the usual range of quantities, the volume of mixing aggregate will be about 85 per cent of the total volume of the fine and coarse aggregate." From which it will be seen that the ideal and surest way of stating the desired amount of cement would be to give its ratio per cubic foot of finished concrete; then to use the cement-water ratio for ascertaining desirable percentages of aggregates and moisture.

Given his design and proportions, the superintendent must know that the materials to hand are such as will properly "fill the bill." He can measure the voids in the coarse aggregate by filling a vessel with a known quantity, then pouring in enough measured water to fill to the same level. The amount of sand used should be slightly in excess of the quantity of water. In other words, if half as much sand as coarse aggregate is called for, then it is assumed that the voids in the latter are about 45 or 48 per cent of its bulk. Voids in the sand can be measured the same way and should run 25 to 40 per cent. Measurements should be by weight, and the water should be weighed before being poured in, since capillarity will prevent its all being drawn off. To ascertain roughly whether or not pit-run material contains a proper grading of all the aggregates, it is necessary to separate the fine and coarse by screen with a ¼-inch mesh sieve, then measuring the quantities of the two sizes and the voids in the larger, in the manner just described here.

* For proper proportions of concrete ingredients, see "Concrete, Plain and Reinforced," Taylor & Thompson, Hool & Johnson, F. E. Kidder and other standard authorities; including "Design and Control of Concrete Mixtures," published by the Portland Cement Association, Third Edition, January, 1929.

(*To be continued*)

Waters may look alike and taste alike—YET...

.....Yet their effect on pipe may be entirely different. Depending on their sources and the treatment they undergo, some waters are but *normally* corrosive, while other waters—often those which are purest and most healthful—are *highly* corrosive.

When you write pipe specifications, the local water conditions are one of the most important factors to be considered. Brass pipe will outlast rustable pipe under *all* water conditions, but not all alloys of brass will give the same satisfactory service everywhere.

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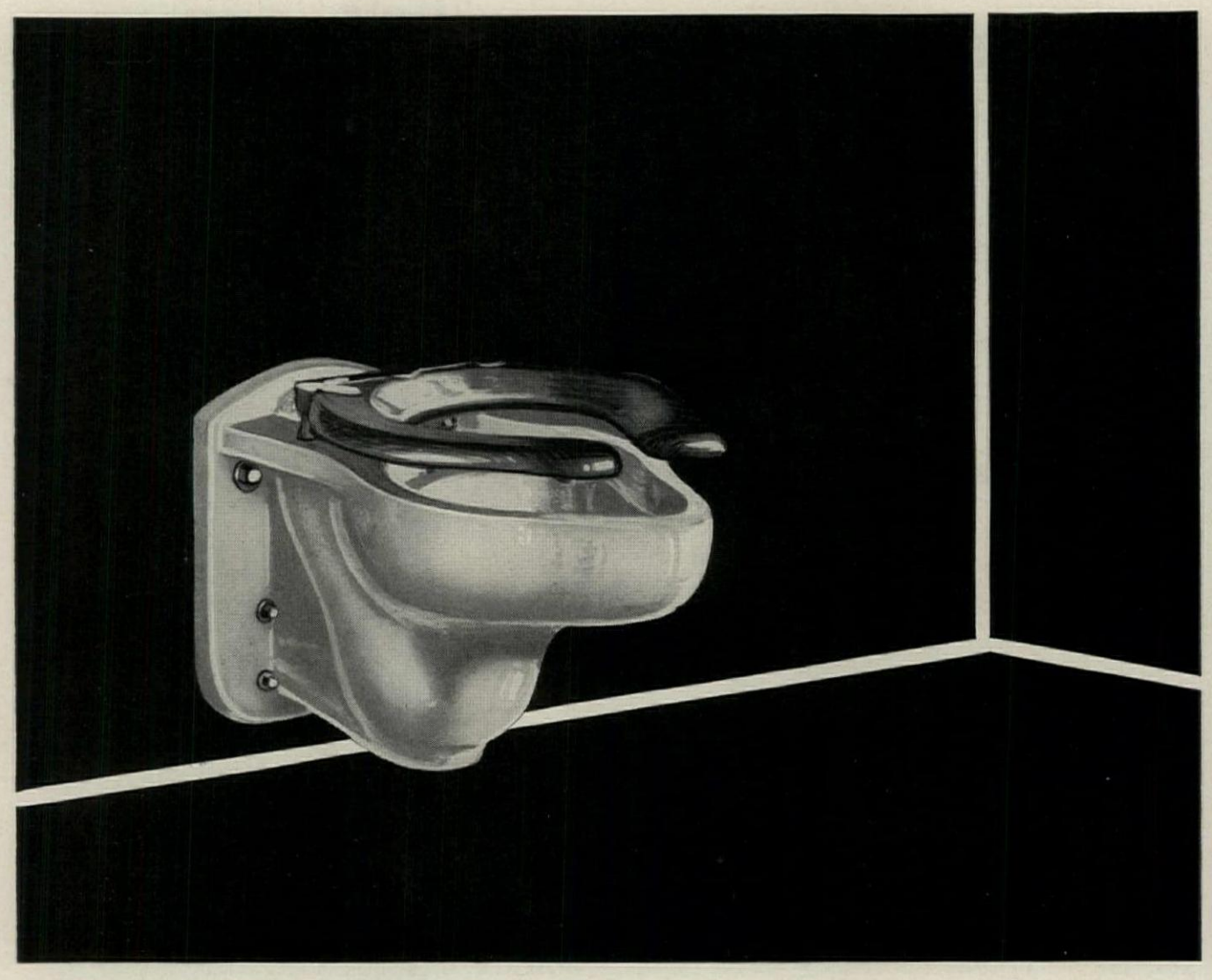
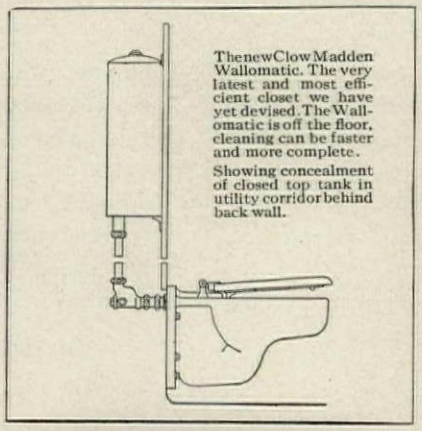


NEVER FAILED...*because someone forgot...*

Clow Madden Automatic Closets never have and *never will* . . fail to flush because someone forgot.

Automatically . . immediately . . a cleansing flood cleans the bowl, from top through trap.

Clow Madden Automatics "carry on" for the life of the building. Records prove them still "young" after 25 years' steady service.



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Showing concealment of closed top tank in utility corridor behind back wall.

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The simply-built, stout-hearted Madden Valve . . wastes no water. Cost records are small, as service records are large.

Don't let forgetfulness leave unflushed closets . . and filthy germs to hatch. Health is too precious to place in the hands of a play-thoughtful child . . a hurried workman . . a careless transient.

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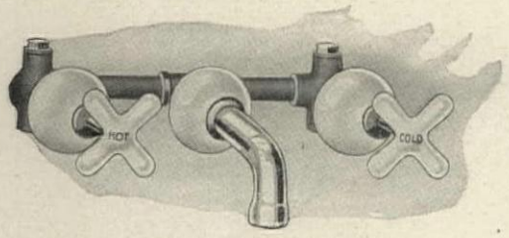
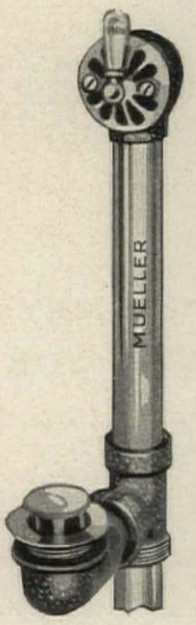


Mueller built-in equipment
as accessible as exposed plumbing



Mueller built-in equipment eliminates the old bugbear of the panel behind the tub. The vital parts are as accessible as in a job of exposed plumbing.

In the Mueller Over-Rim Tub Filler the replacement of a washer or other repairs can be quickly and easily made. There is only one packing in each valve and that is *outside the wall*. This fitting has all the well-known Mueller beauty of design and lasting construction with extra deep china escutcheons and large china cross handles.

The new Mueller Pop-up Drain for tubs is another Mueller refinement that eliminates bathroom troubles. All working parts are removable from the *inside of the tub* without breaking a joint. Positive in action and so simple there is nothing that can get out of order. Send for special information.

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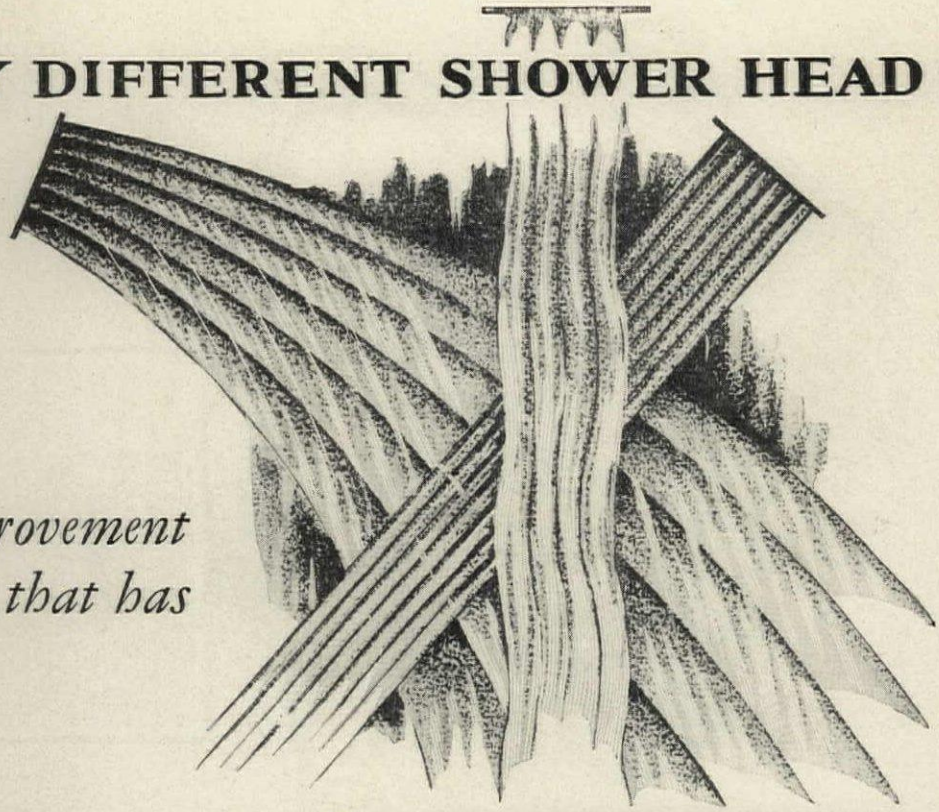
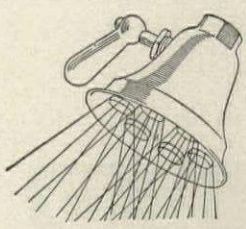
AN UTTERLY DIFFERENT SHOWER HEAD



. . . a radical improvement over everything that has gone before . . .

A turn of the lever sluices all sediment away.

Another turn of the lever gives a normal spray.



Or you can adjust to a veritable stinging needle shower.

NEVER STOPS UP!

INSTANTLY ADJUSTABLE TO ANY SPRAY!

THIS revolutionary new Speakman shower head enables the *instant* selection of any kind of spray, from a stinging needle shower to a heavy, sluicing downpour. You simply turn a convenient lever which regulates the size of the water holes!

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that it will last a lifetime, that it will never give trouble, that its finish of never-tarnishing, enduring Speakman chromium plate will add a welcome touch of life and sparkle to any bathroom.

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for a 100%-satisfactory installation

There are no weak links in an all-Kohler installation. Kohler enamel ware, vitreous china, and brass are all made *at Kohler* to one exceptionally high standard of excellence. They belong together, and when they are specified together the result is sure to be satisfactory to all concerned.

Consider the uncommon advantages that Kohler brass has to offer. It is *real red brass*, made up of a very high percentage of virgin copper—not loaded with zinc and other cheaper metals. It is remarkably free from pin holes. The castings are cleaner, the passageways free from obstructions. It machines better, takes a cleaner thread, makes a tighter joint, and produces a better-looking, better-lasting job.

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What every Architect **DOESN'T** *know*

IT takes a woman to really understand and appreciate the difficulties which stand in the way of feminine daintiness.

If men, particularly architects and engineers, could and would openly recognize the necessity of adequate hygienic facilities in the home, the problem would cease to exist.

With the ordinary toilet purged through a trapway little larger than a golf ball, the disposal of sanitary pads by the normal means is both questionable and dangerous. Stoppage, sooner or later, is inevitable.

Contrast with such a toilet the finely made, nationally advertised Improved Madera. Its trapway is very large—far larger than government specifications require. Its flushing is quiet, yet very powerful. Sanitary pads are disposed of instantly and safely.*

Add to this: a long soil-proof seat with large opening, complete water coverage below seat opening, finest fittings, dazzling Durock surface. Maddock's Improved Madera is without an equal for both beauty and faultless performance, as well as modern hygienic design. Thos. Maddock's Sons Co., Trenton, N. J.

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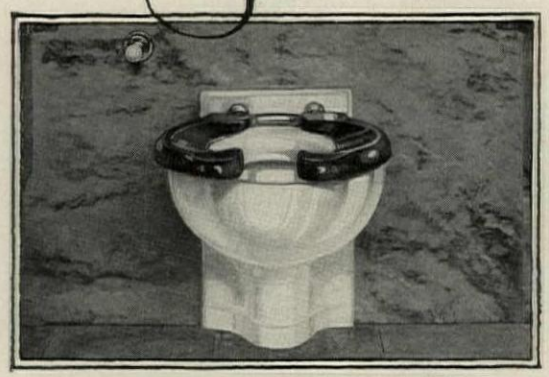
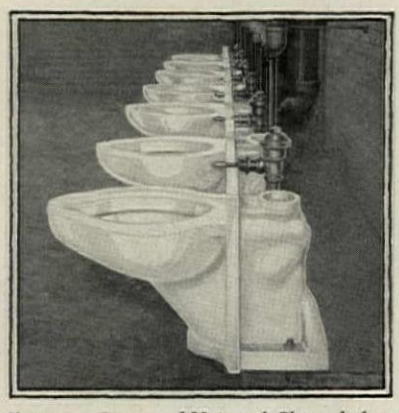
For homes and buildings in which the sanitary pad is not a problem, Maddock offers the Madbrook, with long bowl and seat, large water area. Also the dependable Maderno.



The **"UNIVERSAL"**

The plumber won't argue this specification



Showing a Battery of Universal Closets before the partition separating pipe chamber from toilet room is erected.

Note that the "Universal" projects only 19½ inches from the wall, while a syphon jet wall closet measures 25½ inches, and a blow-out type 22½ inches, thus saving 3 to 6 inches of material in width of each partition.

All supplies and wastes are back of the wall finish, which allows the use of rough material at considerable saving. "Universal" operates with either flush valve or high tank.

WHEN your plans include a pipe chamber it follows that the closet specifications will read "Universals," for they are the logical selection of architects who appreciate the advantage of a floor-free closet that requires no carrier.

Of full syphon jet construction, the "Universal" includes the extended lip feature and a large vent passage from the bowl opening vertically into the pipe chamber. All weight is on the floor—to which the "Universal" is bolted. Soil connection is made with the most sanitary of all joints—the Donovan Safety Flange. Like all other Te-pe-co fixtures, this closet is made in one quality only—the finest two-fired vitreous china. Any distributor will gladly explain the "Universal" in detail.

Our Guarantee: We make but one grade of ware—the best that can be produced—and sell it at reasonable prices. We sell no seconds or culls. Our ware is guaranteed to be equal in quality and durability to any sanitary ware made in the world. The Te-pe-co trade mark is found on all goods manufactured by us and is your guarantee that you have received that for which you have paid.

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JOSAM engineering, identified with most of the outstanding structures in every part of the country, played a major rôle in helping the architects and construction engineers to solve the extraordinary problems encountered in the gigantic engineering undertaking represented by the Union Terminals project in Cleveland.

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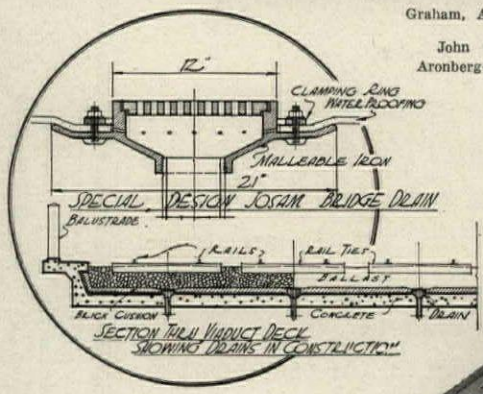

SECTION THRU VIADUCT DECK SHOWING DRAINS IN CONSTRUCTION

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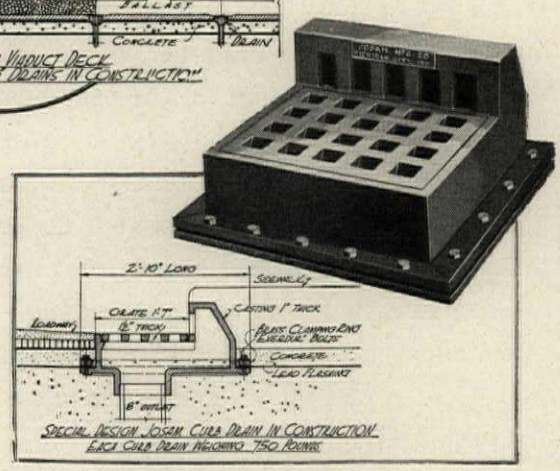
John Gill & Son, Cleveland, Ohio.
Aronberg-Fried Company, Cleveland, Ohio.
Lundoff-Bicknell Company, Cleveland, Ohio.
Hecker Moon Construction Company, Cleveland, Ohio.
American Bridge Company, Pittsburgh, Pa. Contractors
A. R. Brueggeman Company, Cleveland, Ohio. Plumbing Contractors

Josam Products are sold by all Plumbing and Heating Supply Jobbers.



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EACH CURB DRAIN WEIGHING 750 POUNDS

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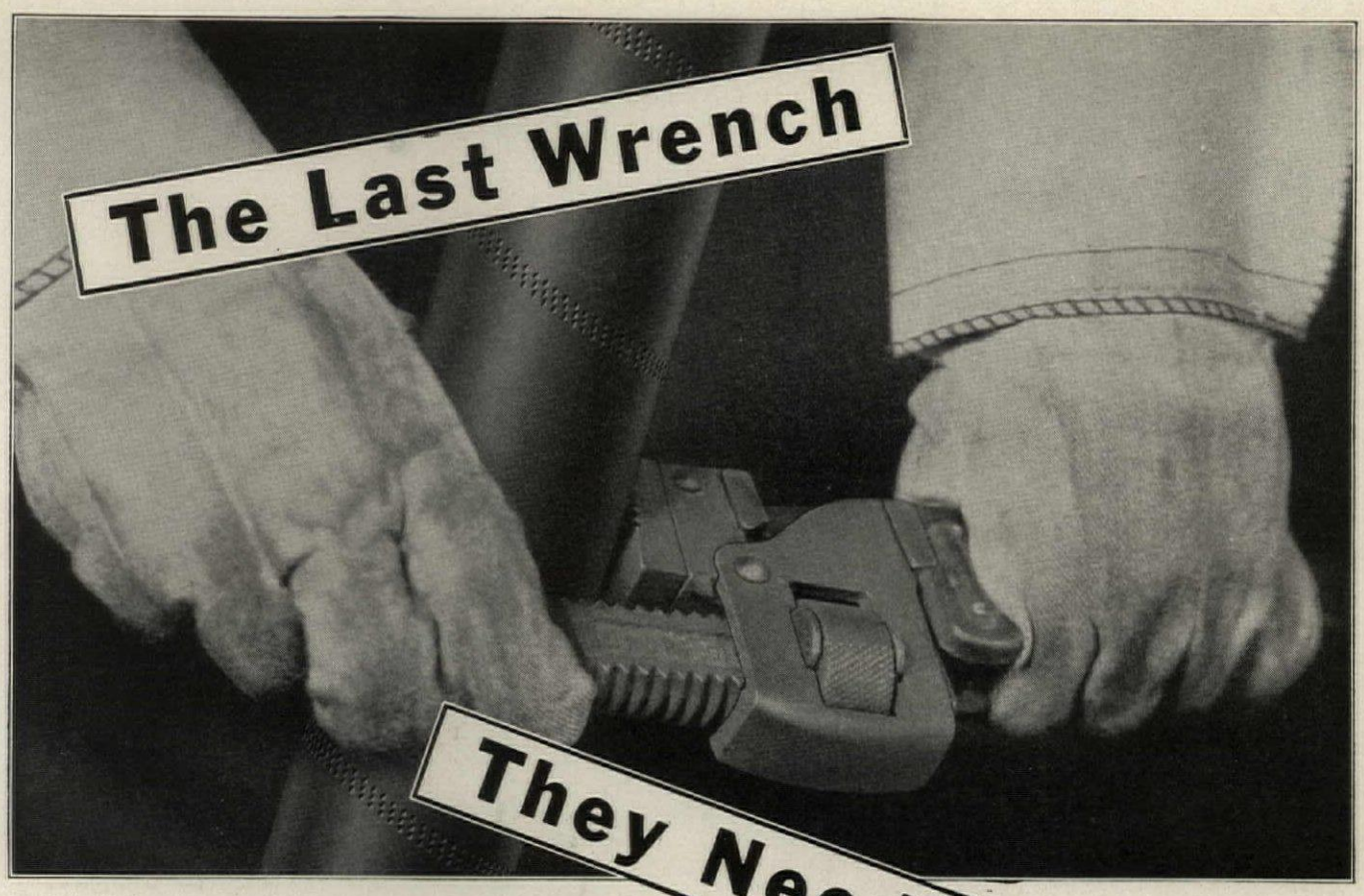
The Josam Line Includes: Josam Drains, Josam-Marsh Grease, Plaster and Hair Interceptors, Josam-Graver Floor Fed Incinerators, Josam Swimming Pool Equipment, Josam Open Seat Swing Check Valves, Josam Open Seat Back Water Sewer Valves, and Josam adjustable water and gas tight closet outlet connections.

THERE ARE NO SUBSTITUTES FOR JOSAM PRODUCTS



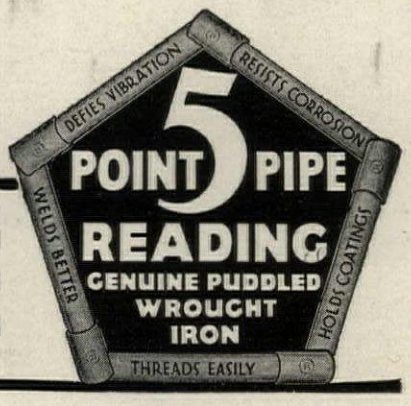
PUT Reading Genuine Puddled Wrought Iron Pipe into your buildings. As far as you are concerned, the wrench that tightens the joints is the last wrench they need ever know. For far beyond the span of human life, these sturdy pipes will resist corrosion, strain, and vibration. But if the building be torn down, other wrenches may take these pipes apart only to reinstall them elsewhere!

Be sure you get pipe with the Reading name, date of manufacture, and cut-in spiral knurl mark on it.

READING IRON COMPANY, Reading, Pennsylvania

Atlanta · Baltimore · Cleveland · New York · Philadelphia
Boston · Cincinnati · St. Louis · Chicago · New Orleans
Buffalo · Houston · Tulsa · Seattle · San Francisco
Detroit · Pittsburgh · Ft. Worth · Los Angeles · Kansas City

GENUINE PUDDLED WROUGHT IRON
READING PIPE
DIAMETERS RANGING FROM ⅛ TO 20 INCHES



BOK MEMORIAL SINGING TOWER, MOUNTAIN LAKE SANCTUARY, FLORIDA

Architect, M. B. Medary, Jr., Philadelphia,
Plumbing Contractor, P. Gormley, Phila.

Consulting Engineer, Isaac H. Francis, Philadelphia
Plumbing Supply House, H. P. Pancoast Co., Phila.

THERE'S A NATIONAL HEATING SYSTEM FOR EVERY BUILDING NEED

Playroom

Bed Rooms

Grandma's Room

Bath Room

Living Room

The National Super-Smokeless Boiler

The Standard By Which All Other Smokeless Boilers Are Judged

Distinguished for its swirling scarlet flame, this boiler is scientifically designed for the efficient and smokeless combustion of all grades of fuel. The green coal cokes on the front of the grate—the distilled gases pass back to unite with pre-heated, proportioned, finely divided, and fully distributed secondary air, and are completely consumed. Schools, hospitals, all applications where cleanliness, efficiency, and simplicity are sought, know this boiler as the acknowledged leader in its field.

Each National Boiler is guaranteed—and the guarantee is endorsed by a Surety Bond, issued by The Fidelity and Casualty Company of New York. It covers three distinct guaranteed stipulations as to manufacture, design, performance, and replacement of any defective part. It assures customer satisfaction, protects against criticism or complaint.

The National Boiler Line, reduced and standardized, offers outstanding units in all desired types and sizes. Each National product is a leader in its field, has an unimpeachable record of proved performance in all types of structures. Each yields the quality of certain and sustained service that users of heating equipment are seeking today.

A line to us will bring you complete and helpful information.

NATIONAL RADIATOR CORPORATION

Executive Offices: **55 West 42nd Street, New York, N. Y.**

NATIONAL *Made-to-Measure* HEATING SYSTEMS

In Public Buildings *everywhere*

City Hall,
Los Angeles, Calif.
—Bethlehem H-Columns were used in the framework of this building.

Cuban
National Capitol Building,
Havana, Cuba.
— Photograph, Courtesy American Photo Studios

Left: Cook County Criminal Court House, Chicago, Illinois.

Right: Public Safety Building, Toledo, Ohio.

Municipal
Office Building,
Baltimore,
Maryland.

Governmental buildings, state, county and municipal buildings, not only in this country, but throughout the world, have Bethlehem Wide-Flange Structural Shapes in their steel framework.

Bethlehem Sections have been used in the framework of industrial plants, bridges, hangars, hotels, apartments, office and bank buildings, and numerous other types of structures.

Because of their economy in weight and in cost of fabrication, Bethlehem Wide-Flange Structural Shapes have been adopted by architects, contractors and engineers everywhere.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, Seattle, San Francisco, Los Angeles, Portland, Honolulu.

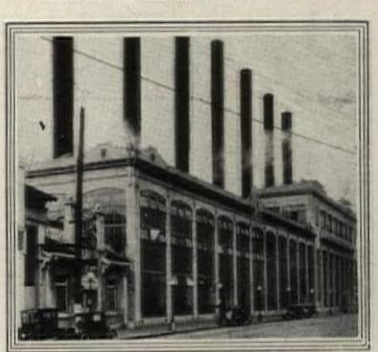
Bethlehem Steel Export Corporation, New York
Sole Exporter of our Commercial Products

BETHLEHEM
Wide Flange STRUCTURAL SHAPES

For exacting sheet metal requirements ...*pure* ARMCO Ingot Iron

Cornices made of ARMCO Ingot Iron are sharp and well-defined in detail . . . always adhere to the conceptions of their architect creators.

Heating and ventilating ducts of ARMCO Ingot Iron last the life of the buildings they serve . . . obviate expensive and troublesome replacements.



Stacks and breeching constructed of ARMCO Ingot Iron long resist the corrosive action of atmosphere, condensation and gases. ARMCO Ingot Iron is virtually free of the harmful impurities that hasten rust and corrosion.

WHATEVER the requirements, there is no sheet metal specification too exacting for pure ARMCO Ingot Iron. In fact, the more difficult the service, the more necessary to have this specially made durable sheet metal.

If the major requirement is long life, ARMCO Ingot Iron gives a full and satisfying measure of service. Its freedom from rust-promoting impurities assures many trouble-free years of service.

And where ductility is essential—cornices, marquises, and other ornamental designs—you'll find that the most intricate details are achieved easily when ARMCO Ingot Iron is the sheet metal used.

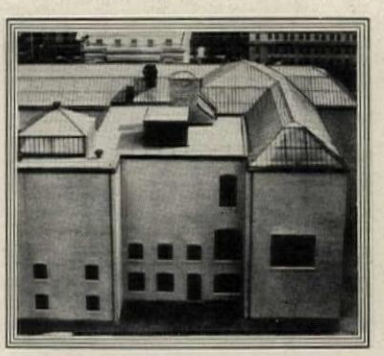
These are some of the reasons why architects everywhere are turning to ARMCO Ingot Iron for all types of sheet metal construction.

Our Architectural Consulting Service will be glad to share with you its knowledge of sheet metal and its diverse applications. Just write the office nearest you. There is no obligation involved.

[For supplementary data on ARMCO Ingot Iron see page 510, Section A, of Sweet's Architectural Catalog.]

The modern sheet metal marquise demonstrates the unusual workability of ARMCO Ingot Iron. This pure iron shapes readily and surely to the most complicated designs.

Flashing, conductor pipe and other drainage parts last longer at lower-cost-per-year-of-service when made of rust-resisting ARMCO Ingot Iron.



ARMCO Ingot Iron has long been specified for skylight frames by architects seeking exact reproduction of details. This uniform pure iron forms readily to specifications and insures long dependable service, with little or no maintenance.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices, Middletown, Ohio

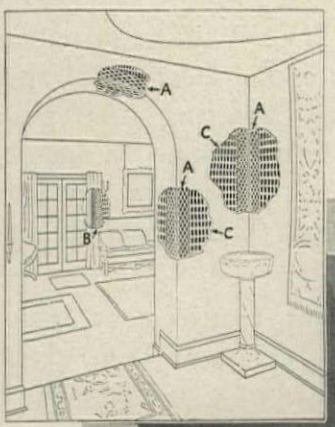
Export: The ARMCO International Corporation *Cable Address*—ARMCO, Middletown (O)

DISTRICT OFFICES
Chicago
Cincinnati
Cleveland
Detroit
New York

DISTRICT OFFICES
Philadelphia
Pittsburgh
St. Louis
San Francisco

ARMCO INGOT IRON RESISTS RUST

MILCOR Products preserve the- Charm of Graceful Interiors

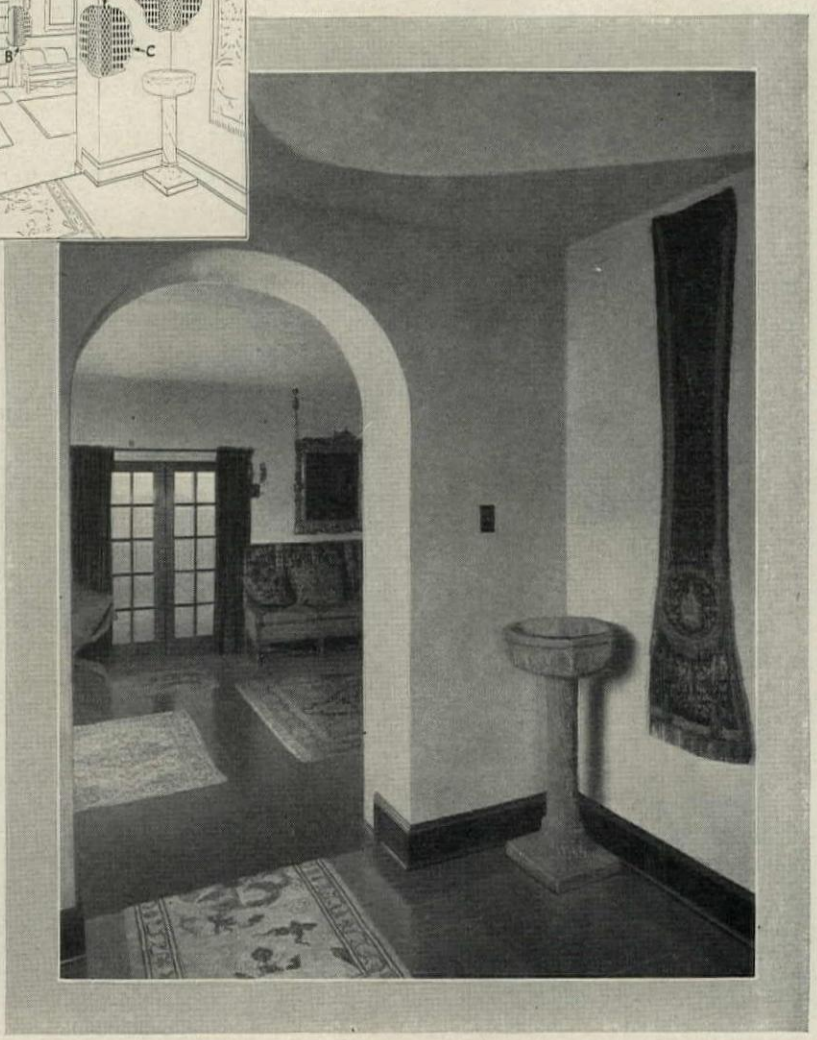


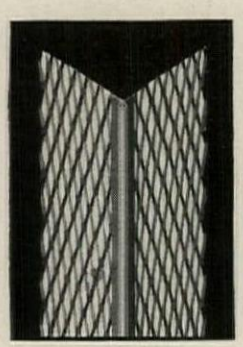
MILCOR offers three metal building materials designed especially to protect and preserve the lines of graceful interiors. They are Stay-Rib Metal Lath ... Expansion Corner Bead ... and Expansion Metal Casing. Each of these products has a definite place in modern, fire-safe construction. And each of these products has certain structural advantages which make them particularly practical.

Stay-Rib Metal Lath is a perfected plaster base ... It represents the highest development of expanded metal design. Reinforced by longitudinal ribs, Stay-Rib Metal Lath has great strength and rigidity without excess bulk and weight. Its mesh is so formed, that in plastering, slight pressure of the trowel completely imbeds it. A maximum protection against plaster cracks. Expansion Corner Bead and Casing have patented wings of expanded metal. When used over Stay-Rib Metal Lath, the plaster keys through the mesh of both the casing or corner bead and the lath... making these vulnerable points the strongest parts of the wall.

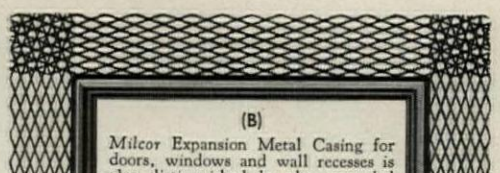
Specify *Milcor* products for permanence ... The "*Milcor* Manual" will be sent you upon request.

MILWAUKEE CORRUGATING COMPANY
1405 Burnham Street Milwaukee, Wis.



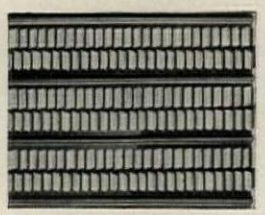


(A)
Milcor Expansion Corner Bead is distinguished by its expanded metal wings . . . This feature . . . a *Milcor* patent . . . permits a perfect grip upon the plaster and prevents chipping off from unavoidable abuse.



(B)
Milcor Expansion Metal Casing for doors, windows and wall recesses is also distinguished by the expanded metal wings. It cannot pull away during settlement and will not leave cleavage cracks.

(C)
Milcor Stay-Rib Metal Lath has unusual strength and rigidity. Its design . . . a *Milcor* patent . . . affords the maximum protection against plaster cracks.



MILCOR
Expanded Metal Building Products are Available in

ARMCO Ingot Iron

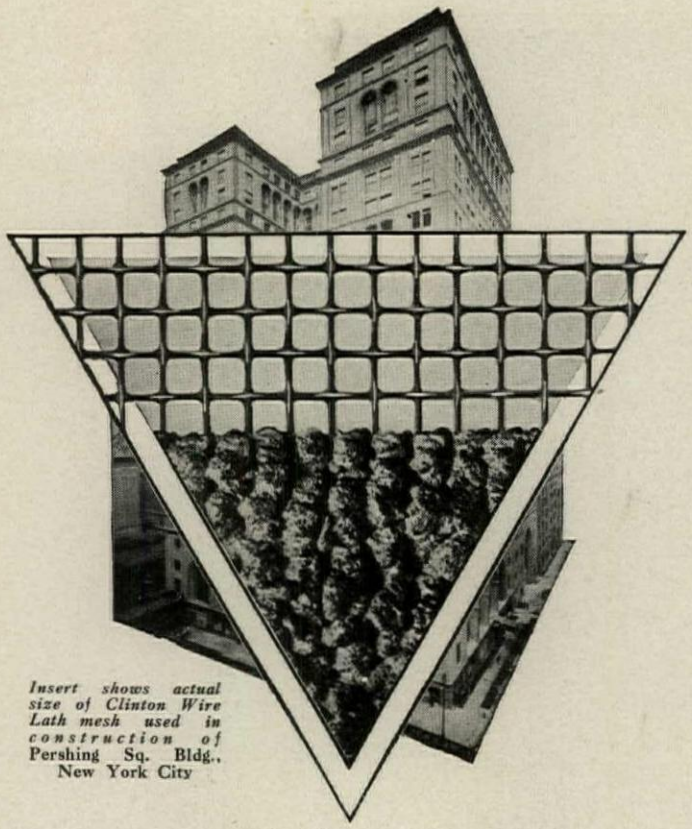
MILCOR PRODUCTS

Branches: Chicago, Ill., Kansas City, Mo., La Crosse, Wis.
Sales Offices: Boston, Mass., Detroit, Mich., Atlanta, Ga., Little Rock, Ark., Minneapolis, Minn.
Eastern Plant: **THE ELLER MANUFACTURING CO.,** ***Canton, Ohio***

Aquatint study of the new Y. W. C. A. Building, Boston, Mass. ⌒ Shepard & Stearns, Architects ⌒ Barber Company, Engineers ⌒ W. A. & H. A. Root, General Contractor ⌒ Walworth - English Flett Co., Heating Contractor ⌒ Henry J. Lyons, Plumbing Contractor . . Jenkins Valves are used for both the heating and plumbing of this building. Jenkins Bros. ⌒ New York ⌒ Boston ⌒ Philadelphia ⌒ Chicago . . . Jenkins Bros. Ltd. ⌒ Montreal ⌒ London.

Always marked with the Diamond
Jenkins Valves
SINCE 1864

"By its dignity and architectural inspiration we stimulate pride in our country." — Herbert Hoover speaking concerning Washington.



Insert shows actual size of Clinton Wire Lath mesh used in construction of Pershing Sq. Bldg., New York City

Why Clinton Wire Lath Is Preferred

Only the finest materials were used in the construction of the Pershing Square Building at the corner of 42nd Street and Park Avenue, New York City. The greatest care was taken by the architects, York & Sawyer and John Sloan, in drawing the specifications.

As in many other famous buildings throughout the country, Clinton Wire Lath was chosen because of the permanence, strength and beauty it gives to any plaster and stucco construction. Clinton Wire Lath is made out of finely-tempered steel wire, woven into a close, even mesh. A DOUBLE key (vertical and horizontal) is provided for the plaster or stucco, no matter what direction of stroke is used in troweling.

Test the strength of Clinton Wire Lath against that of any other base and you will be convinced of its superiority.

See Sweet's Architectural and Engineering Catalogs for Specifications

Wickwire Spencer Steel Co.

41 East Forty-second Street, New York

Worcester Buffalo Cleveland
San Francisco Los Angeles Seattle
Portland Chicago Atlanta

WICKWIRE SPENCER STEEL CO.
41 East 42nd Street, New York City

Please send me additional information regarding Clinton Wire Lath.

Name .....

Address .....

WICKWIRE SPENCER PRODUCTS

Save with Steel

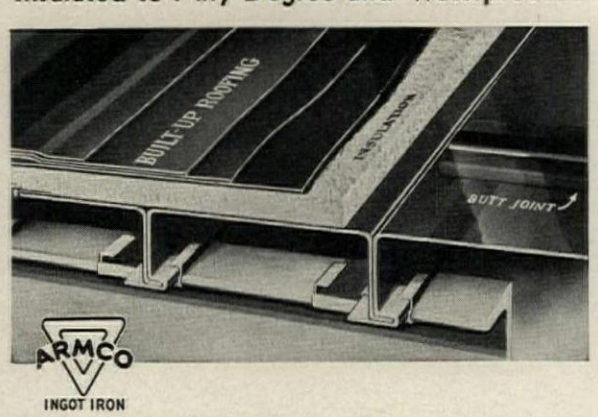
Whatever your problem let us help you

Sheet Steel Trade Extension Committee, Department AF

Terminal Tower Building
Cleveland, Ohio

RIGIDECK FOR ROOFS

Insulated to Any Degree and Waterproofed



Rigideck—the new Armco Ingot Iron Roofdeck—is as easily laid as board. Its interlocking ribs occurring every six inches are securely attached to the purlins, providing a rigid, smooth, unperforated roof deck adapted to all buildings. Weight of completed roof approximately 5 pounds per sq. ft. Fireproof and economical.

GENFIRE STEEL COMPANY

YOUNGSTOWN, OHIO

Warehouses and Offices in All Principal Cities. Dealers Everywhere

Concrete Rib Floor Construction

Cliff Towers
at Dallas, Texas
Architects:
Hecht and Williams
Dallas, Texas
Contractors:
Bellows-Maclay
Constr. Co.
Dallas, Texas

Consider the tremendous saving in concrete when Concrete Rib floors are specified. This cross section illustrates the saving in "dead weight" construction.

Dedicated to Public Service

Like the modern building, designed to serve the public, the Meyer Steelform method of concrete rib floor construction is dedicated to public service.

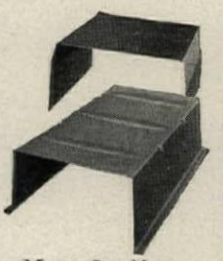
To the architect it makes possible exact adherence to ideals of beauty and requirements for strength. To the contractor it means high speed constructions and lower labor and material costs. The owner finds in it welcome economy and a finished structure perfectly adapted to his own or his tenant's needs.

Meyer Steelforms are installed and removed by an organization especially trained to render the greatest possible co-operation to both architect and contractor. Their use is based on a nominal rental charge—and warehouses located at strategic centers make possible immediate shipment to the job.

You are invited to ask a representative to call and show you how Meyer Steelforms will help you to realize a construction that does full justice to your plans.

CONCRETE ENGINEERING COMPANY
General Offices: Omaha, Nebraska

Sales Offices and Warehouses: Chicago Detroit Milwaukee Minneapolis St. Paul Des Moines Kansas City St. Louis Dallas Houston San Antonio Oklahoma City Los Angeles Pittsburgh Oakland San Francisco



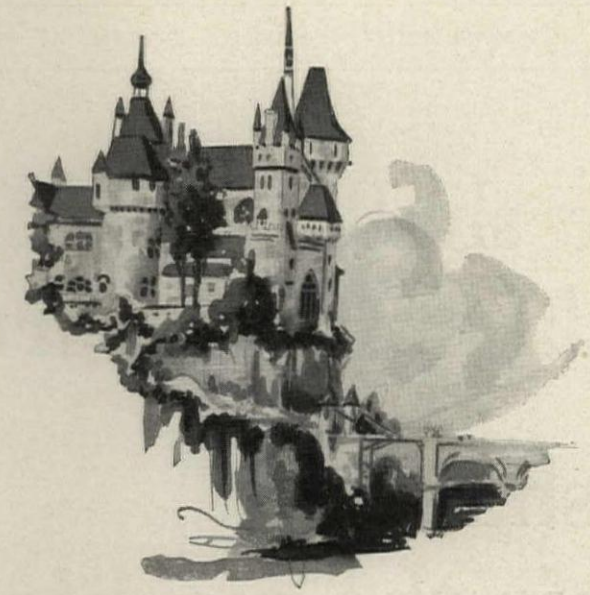
Meyer Steelforms are furnished in 1, 2 and 3 ft. lengths.

Standard widths are 20 in. and 30 in.; special widths —10 in. and 15 in.

MEYER Steelforms

THE STANDARD

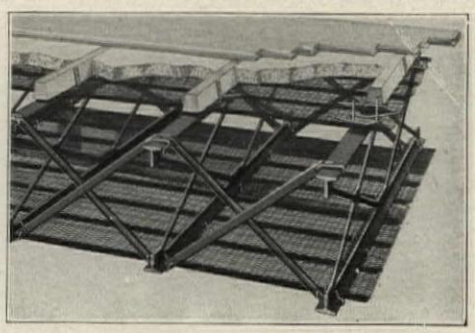
THE ORIGINAL REMOVABLE STEEL FORMS FOR CONCRETE RIB FLOOR CONSTRUCTION



Making Every Construction a Castle of Strength

IN planning modern construction, the progressive architect specifies those products that assure unvarying execution of architectural design. He specifies those products that have inherent strength and unusual quality — those that mean the least possible friction and the best understanding between himself and the contractor. In other words, with an eye on costs, he gives the contractor the "right tools" to work with. And the wide acceptance of Kalman fire-safe building products, the qualities and design of which mean greater dependability, is true recognition of their superiority. Kalman products offer the architect a modern means of making every construction a castle of strength.

KALMAN STEEL COMPANY



For Improved Floor and Roof Construction

Specifying Kalmantruss Steel Joists, Kalmantruss Rigid Bridging, Kalmanlath, is a positive way of improving fire-safe floor and roof construction. Kalmantruss Steel Joists are made by a new and different method — a rolling process. As a result, they have unusual dependability. Kalmantruss Rigid Bridging assures the rigidity of the construction and reduces vibration. The new and distinctively designed ceiling and floor lath clips are still another advantage of the advanced Kalman method of building fire-safe floors and roofs.

KALMAN STEEL

MODERN, FIRE-SAFE BUILDING PRODUCTS

Atlanta
Baltimore
Boston
Buffalo
Charlotte
Chicago
Columbus
Dayton
Detroit
Houston
Kansas City
Milwaukee
Minneapolis
Newark
New Haven
New York
(Export Office—New York)
Niles
Philadelphia
Pittsburgh
St. Paul
Syracuse
Youngstown
Washington, D. C.

No. 59 of a series of advertisements featuring prominent laundry installations

Where shall we put the laundry department?

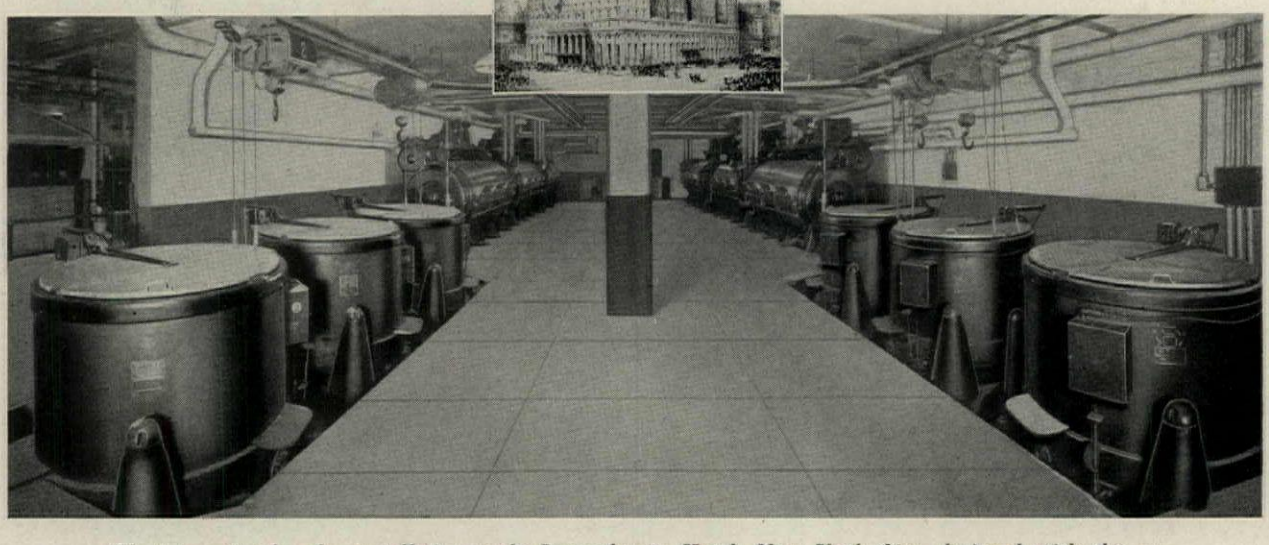
How shall we power the machines?

IN THE PLANNING of the modern laundry of any type and size—hotel, hospital, school, club, department store—the counsel of The American Laundry Machinery Company is at your disposal.

"American" engineers have collaborated in working out plans for scores of laundries — institutional and commercial. They can help you on such questions as dimensions, equipment, powering, lighting and ventilating. They can show you first-hand figures and actual photographs—aid you in reducing laundry-practise problems to the simplest terms.

An "American" representative will be glad to call at your office whenever his visit will be most convenient for you.

The Pennsylvania Hotel, New York City



The interesting laundry installation at the Pennsylvania Hotel, New York City, designed with the co-operation of American Laundry Machinery Company engineers. Note the American-Perry Automatic Washroom equipment. Goods are unloaded automatically, conveyed overhead to the unloading extractors, then to the finishing equipment.

THE AMERICAN LAUNDRY MACHINERY COMPANY
Norwood Station, CINCINNATI, OHIO
The Canadian Laundry Machinery Co., Ltd.
47-93 Sterling Road, Toronto 3, Ont., Canada
Agents: British-American Laundry Machinery Co., Ltd.
Underhill St., Camden Town, London, N.W. 1, England

Selected List of Manufacturers' Publications

FOR THE SERVICE OF ARCHITECTS, ENGINEERS, DECORATORS, AND CONTRACTORS

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge unless otherwise noted, by applying on your business stationery to *The Architectural Forum*, 521 Fifth Ave., New York, or the manufacturer direct, in which case kindly mention this publication.

ACOUSTICS

R. Guastavino Co., 40 Court St., Boston.
Akoustolith Plaster. Brochure, 6 pp., 8½ x 11 ins. Important data on a valuable material.

Johns-Manville Corporation, New York.
Sound-Absorbing Treatment in Banks and Offices. Booklet, 18 pp., 8½ x 11 ins. Illustrated.
Sound-Absorbing Treatment in Churches and Religious Institutions. Brochure. 22 pp., 8½ x 11 ins. Illustrated.

U. S. Gypsum Co., 205 W. Monroe St., Chicago, Ill.
A Scientific Solution of an Old Architectural Problem. Folder, 6 pp., 8½ x 11 ins. Describes Sabinite Acoustical Plaster.

ASPHALT

Barber Asphalt Company, New York, Philadelphia, Chicago, Pittsburgh, Kansas City, St. Louis, San Francisco.
Specifications for Applying Genasco Asphalt Mastic. Booklet, 16 pp., 8 x 9 ins.
Genasco Trinidad Lake Asphalt Mastic. Brochure, 32 pp., 6 x 9 ins.
Specifications for Applying Genasco. Booklet, 16 pp., 8 x 10½ ins.

BRICK

American Face Brick Association, 1751 Peoples Life Building, Chicago, Ill.
Brickwork in Italy. 298 pp., size 7½ x 10½ ins., an attractive and useful volume on the history and use of brick in Italy from ancient to modern times, profusely illustrated with 69 line drawings, 300 half-tones, and 20 colored plates, with a map of modern and XII century Italy. Bound in linen. Price now $3.00, postpaid (formerly $6.00). Half Morocco, $7.00.
Industrial Buildings and Housing. Bound Volume, 112 pp., 8½ x 11 ins. Profusely illustrated. Deals with the planning of factories and employes' housing in detail. Suggestions are given for interior arrangements, including restaurants and rest rooms. Price now $1.00 postpaid (formerly $2.00).

Common Brick Mfrs. Assn. of America, 2134 Guarantee Title Bldg., Cleveland.
Brick; How to Build and Estimate. Brochure, 96 pp., 8½ x 11 ins. Illustrated. Complete data on use of brick.
The Heart of the Home. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Price 25 cents. Deals with construction of fireplaces and chimneys.
Skintled Brickwork. Brochure, 16 pp., 8½ x 11 ins. Illustrated. Tells how to secure interesting effects with common brick.
Building Economy. Monthly magazine, 22 pp., 8½ x 11 ins. Illustrated. $1 per year, 10 cents a copy. For architects, builders and contractors.

Hanley Company, Bradford, Pa.
General Catalog. 16 pp. 8½ x 11 ins. Illustrated.
Bradford Reds. Folder. 8 pp., 3 x 8 ins. Illustrated.

CEMENT

Carney Company, The, Mankato, Minn.
A Remarkable Combination of Quality and Economy. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Important data on valuable material.

Kosmos Portland Cement Company, Louisville, Ky.
Kosmortar for Enduring Masonry. Folder, 6 pp., 3½ x 6½ ins. Data on strength and working qualities of Kosmortar.
Kosmortar, the Mortar for Cold Weather. Folder, 4 pp., 3⅜ x 6½ ins. Tells why Kosmortar should be used in cold weather.

Louisville Cement Co., 315 Guthrie St., Louisville, Ky.
BRIXMENT for Perfect Mortar. Self-filing handbook, 8⅜ x 11 ins. 16 pp. Illustrated. Contains complete technical description of BRIXMENT for brick, tile and stone masonry, specifications, data and tests.

Portland Cement Association, Chicago, Ill.
Concrete Masonry Construction. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Deals with various forms of construction.
Town and Country Houses of Concrete Masonry. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Facts About Concrete Building Tile. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
The Key to Firesafe Homes. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Design and Control of Concrete Mixers. Brochure, 32 pp., 8½ x 11 ins. Illustrated.
Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illustrated.

CEMENT—Continued

Concrete in Architecture. Bound Volume, 60 pp., 8½ x 11 ins. Illustrated. An excellent work, giving views of exteriors and interiors.

CONCRETE BUILDING MATERIALS

Concrete Steel Company, 42 Broadway, New York.
Modern Concrete Reinforcement. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Kosmos Portland Cement Company, Louisville, Ky.
High Early Strength Concrete, Using Standard Kosmos Portland Cement. Folder, 1 page, 8½ x 11 ins. Complete data on securing high strength concrete in short time.

CONCRETE COLORINGS

The Master Builders Co., 7016 Euclid Ave., Cleveland.
Color Mix, Colored Hardened Concrete Floors (integral). Brochure, 16 pp., 8½ x 11 ins. Illustrated. Data on coloring for floors.
Dychrome. Concrete Surface Hardener in Colors. Folder, 4 pp., 8 x 11 ins. Illustrated. Data on a new treatment.

CONSTRUCTION, FIREPROOF

Master Builders Co., Cleveland, Ohio.
Color Mix. Booklet, 18 pp., 8½ x 11 ins. Illustrated. Valuable data on concrete hardener, waterproofer and dustproofer in permanent colors.

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Fire Proofing Bulletin 171. 8½ x 11 ins., 32 pp. Illustrated. A treatise on fireproof floor construction.

North Western Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
North Western Expanded Metal Products. Booklet, 8½ x 10¾ ins. 16 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated, Plaster-Sava and Longspan lath channels, etc.
A. I. A. Sample Book. Bound volume, 8½ x 11 ins., contains actual samples of several materials and complete data regarding their use.

CONSTRUCTION, STONE AND TERRA COTTA

Cowing Pressure Relieving Joint Company, 100 North Wells St., Chicago, Ill.
Pressure Relieving Joint for Buildings of Stone, Terra Cotta or Marble. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Deals with preventing cracks, spalls and breaks.

CORNICES, METAL

Sheet Steel Trade Extension Committee. Terminal Tower, Cleveland.
This committee will send upon request full data published by its members on sheet steel cornices and specifications for their use.

DAMPPROOFING

The Master Builders Co., 7016 Euclid Ave., Cleveland.
Waterproofing and Dampproofing Specification Manual. Booklet, 18 pp., 8½ x 11 ins. Deals with methods and materials used.
Waterproofing and Dampproofing. File. 36 pp. Complete descriptions and detailed specifications for materials used in building and concrete.

Minwax Company, Inc., 11 West 42nd St., New York.
Complete Index of all Minwax Products. Folder, 6 pp., 8½ x 11 ins. Illustrated. Complete description and detailed specifications.

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York.
Specification Sheet, 8½ x 11 ins. Descriptions and specifications of compounds for dampproofing interior and exterior surfaces.

Toch Brothers, New York, Chicago, Los Angeles.
Handbook of R. I. W. Protective Products. Booklet, 40 pp., 4½ x 7½ ins.

The Vortex Mfg. Co., Cleveland, Ohio.
Par-Lock Specifications "Forms A and B" for dampproofing and plaster key over concrete and masonry surfaces.
Par-Lock Specification "Form J" for dampproofing the tile wall surfaces that are to be plastered.
Par-Lock Dampproofing. Specification Forms C, F, I, and J. Sheets 8½ x 11 ins. Data on gun-applied asphalt dampproofing for floors and walls.

DOORS AND TRIM, METAL

The American Brass Company, Waterbury, Conn.
Anaconda Architectural Bronze Extruded Shapes. Brochure, 180 pp., 8½ x 11 ins., illustrating and describing more than 2,000 standard bronze shapes of cornices, jamb casings, mouldings, etc.

REQUEST FOR CATALOGS

To get any of the catalogs described in this section, put down the title of the catalog desired, the name of the manufacturer and send coupon to THE ARCHITECTURAL FORUM, 521 Fifth Avenue, New York.

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 177*

DOORS AND TRIM, METAL—Continued

Richards-Wilcox Mfg. Co., Aurora, Ill.
Fire-Doors and Hardware. Booklet, 8½ x 11 ins., 64 pp. Illustrated. Describes entire line of tin-clad and corrugated fire doors, complete with automatic closers, track hangers and all the latest equipment—all approved and labeled by Underwriters' Laboratories.

Sheet Steel Trade Extension Committee, Terminal Tower, Cleveland.
This committee will send upon request full data published by its members on metal doors and trim and specifications for their use.

Truscon Steel Company, Youngstown, Ohio.
Copper Alloy Steel Doors. Catalog 110. Booklet, 48 pp., 8½ x 11 ins. Illustrated.

DOORS, SOUNDPROOF

Irving Hamlin, Evanston, Ill.
The Evanston Soundproof Door. Folder, 8 pp., 8½ x 11 ins. Illustrated. Deals with a valuable type of door.

DRAINAGE FITTINGS

Josam Mfg. Co., Michigan City, Ind.
Josam Products. Booklet, 73 pp., 8½ x 11 ins. Illustrated. A valuable line of accessories.
Josam-Marsh Grease, Plaster, Sediment and Hair Interceptors. Brochure. 7 pp., 8½ x 11 ins. Illustrated.
Josam New Saw Tooth-Roof Drain. Folder, 4 pp., 8½ x 11 ins. Illustrated.

DUMBWAITERS

Sedgwick Machine Works, 151 West 15th St., New York, N. Y.
Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¼ x 8¼ ins., 60 pp. Illustrated.
Catalog and pamphlets, 8½ x 11 ins. Illustrated. Valuable data on dumbwaiters.

ELECTRICAL EQUIPMENT

Baldor Electric Co., 4358 Duncan Avenue, St. Louis, Mo.
Baldor Electric Motors. Booklet, 14 pp., 8 x 10½ ins. Illustrated. Data regarding motors.

Bryant Electric Company, Bridgeport, Conn.
HooKeX Plug and Receptacle. Folder, 6 pp., 3½ x 6¼ ins. Illustrated.
KeNeX Plug and Receptacle. Folder, 6 pp., 3½ x 6¼ ins. Illustrated.
Three-wire Polarized Caps and Receptacles. Leaflet, 8½ x 10 ins. Illustrated.
Three-wire Polarized Caps and Receptacles for Heavy Duty. Leaflet, 8½ x 10 ins. Illustrated.

General Electric Co., Merchandise Dept., Bridgeport, Conn.
Wiring System Specification Data for Apartment Houses and Apartment Hotels. Booklet, 20 pp., 8 x 10 ins. Illustrated.
Electrical Specification Data for Architects. Brochure, 36 pp., 8 x 10½ ins. Illustrated. Data regarding G. E. wiring materials and their use.
The House of a Hundred Comforts. Booklet, 40 pp., 8 x 10½ ins. Illustrated. Dwells on importance of adequate wiring.

Harvey Hubbell, Inc., Bridgeport, Conn.
Electrical Specialties. Catalog No. 19. 52 pp., 8½ x 10 ins. Illustrated.

Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and Cooper Square, New York.
School Cafeterias. Booklet, 6 x 9 ins. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.
Variable-Voltage Central Systems as Applied to Electric Elevators. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
Westinghouse Panelboards and Cabinets (Catalog 42-A). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Important data on these details of equipment.
Beauty; Power; Silence; Westinghouse Fans. (Dealer Catalog 45.) Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.
Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Cooking apparatus for buildings of various types.
Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.
Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.

ELEVATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.
Otis Push Button Controlled Elevators. Descriptive leaflets, 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
Otis Geared and Gearless Traction. Elevators of All Types. Descriptive leaflets, 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
Escalators. Booklet, 8½ x 11 ins., 22 pp. Illustrated. Describes use of escalators in subways, department stores, theaters and industrial buildings. Also includes elevators and dock elevators.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Elevators. Booklet, 8½ x 11 ins., 24 pp. Illustrated. Describes complete line of "Ideal" elevator door hardware and checking devices, also automatic safety devices.

Sedgwick Machine Works, 151 West 15th St., New York, N. Y.
Catalog and descriptive pamphlets, 4¼ x 8¼ ins., 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.
Catalog and pamphlets, 8½ x 11 ins. Illustrated. Important data on different types of elevators.

ESCALATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.
Escalators. Booklet, 32 pp., 8½ x 11 ins. Illustrated. A valuable work on an important item of equipment.

FIREPLACE CONSTRUCTION

H. W. Covert Company, 243 East 44th Street, New York, N. Y.
Covert Fireplace Construction. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Valuable data on an important topic.

FIREPROOFING

Concrete Engineering Co., Omaha, Neb.
Handbook of Fireproof Construction. Booklet, 54 pp., 8½ x 11 ins. Valuable work on methods of fireproofing.

Concrete Steel Company, 42 Broadway, New York.
Economical Fireproof Floors for Suburban Buildings. Folder. 4 pp., 8½ x 11 ins. Illustrated.

North Western Expanded Metal Co., 407 South Dearborn Street, Chicago, Ill.
A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regarding their use.

FLOOR HARDENERS (CHEMICAL)

Master Builders Co., Cleveland, Ohio.
Concrete Floor Treatment. File, 50 pp. Data on securing hardened dustproof concrete.
Concrete Floor Treatments—Specification Manual. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Valuable work on an important subject.

Minwax Company, 11 West 42nd Street, New York, N. Y.
Concrete Floor Treatments. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y.
Lapidolith, the liquid chemical hardener. Complete sets of specifications for every building type in which concrete floors are used, with descriptions and results of tests.

Toch Brothers, New York, Chicago, Los Angeles.
Handbook of R.I.W. Protective Products. Booklet, 40 pp., 4½ x 7½ ins.

FLOORS—STRUCTURAL

Concrete Steel Company, 42 Broadway, New York.
Structural Economies for Concrete Floors and Roofs. Brochure, 32 pp., 8½ x 11 ins. Illustrated.

Truscon Steel Co., Youngstown, Ohio.
Truscon Floretyle Construction. Booklet, 8½ x 11 ins., 16 pp. Illustrations of actual jobs under construction. Lists of properties and information on proper construction. Proper method of handling and tables of safe loads.

Structural Gypsum Corporation, Linden, N. J.
Gypsteel Pre-cast Fireproof Floors. Booklet, 36 pp., 8½ x 11 ins. Illustrated. Data on flooring.

FLOORING

Armstrong Cork Co. (Linoleum Division), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog, 8½ x 11 ins., 44 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors. Newly revised, February, 1929.
Armstrong's Linoleum Pattern Book, 1929. Catalog, 9 x 12 ins., 44 pp. Color plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.
Linoleum Layer's Handbook. 5 x 7 ins., 36 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.
Enduring Floors of Good Taste. Booklet, 6 x 9 ins., 48 pp. Illustrated in color. Explains use of linoleum for offices, stores, etc., with reproductions in color of suitable patterns, also specifications and instructions for laying.

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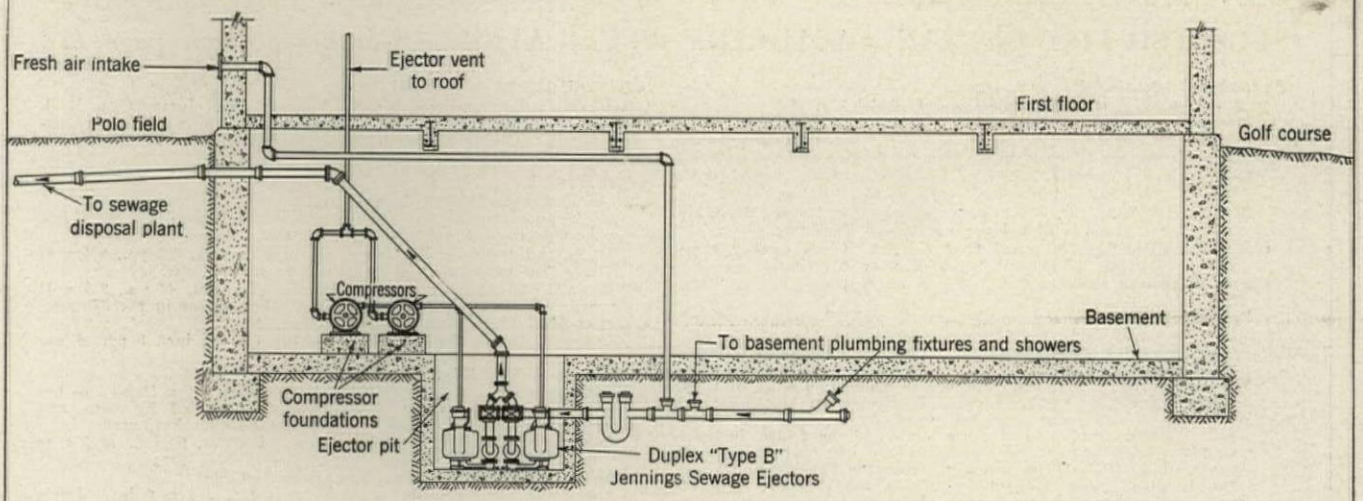


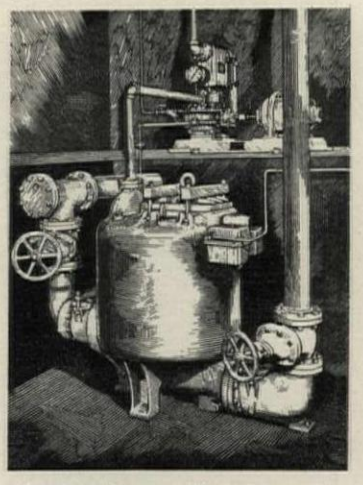
SECTIONAL DIAGRAM SHOWING METHOD OF SANITARY DRAINAGE FOR A COUNTRY CLUB WHERE THE BASEMENT FIXTURES ARE BELOW THE SEWAGE DISPOSAL FIELD

Where shower rooms are below disposal plant level

Disposal by gravity of waste from showers and other fixtures in the basement is frequently difficult to obtain in planning a country club. Situating the club house in the desired location often means that its basement floor will be at a lower level than the septic tanks or disposal plant. Or, in order to place sewer pipes and cesspools sufficiently below the floor level, a prohibitive amount of excavation would be necessary.

To such problems the "Type B" Jennings Sewage Ejector affords a ready solution. Low in cost, it operates pneumatically without employing air valves, or air storage tanks. It cannot clog because vital moving parts do not come into contact with the sewage. Screens are avoided. Anything that will pass through the four inch inlet pipe is easily handled.

The Nash Hytor Compressor operates only when sewage is being moved. A smaller motor, with less horsepower is required than is needed for a centrifugal sewage pump of the same capacity. Power consumption is small.



Jennings Sewage Ejectors are furnished in capacities ranging from 30 to 1,500 g.p.m. Heads up to 50 ft. Write for Bulletins 67 and 103.

Jennings Pumps

THE NASH ENGINEERING CO 12 WILSON ROAD, SOUTH NORWALK CONN.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 178*

FLOORING—Continued

Blabon Company, Geo. W., Nicetown, Philadelphia, Pa.
Planning the Color Schemes for Your Home. Brochure, illustrated in color; 36 pp., 7½ x 10½ ins. Gives excellent suggestions for use of color in flooring for houses and apartments.
Handy Quality Sample Folder of Linoleums. Gives actual samples of "Battleship Linoleum," cork carpet, "Feltex," etc.
Blabon's Linoleum. Booklet, illustrated in color; 128 pp., 3½ x 8½ ins. Gives patterns of a large number of linoleums.
Blabon's Plain Linoleum and Cork Carpet. Gives quality samples, 3 x 6 ins. of various types of floor coverings.

Carter Bloxonend Flooring Co., Keith & Perry Bldg., Kansas City, Missouri.
Bloxonend Flooring. Booklet, 3¼ x 6¼. ins., 20 pp. Illustrated. Describes uses and adaptability of Bloxonend Flooring to concrete, wood or steel construction, and advantages over loose wood blocks.
File Folder. 9⅜ x 11¾ ins. For use in connection with A. I. A. system of filing. Contains detailed information on Bloxonend Flooring in condensed loose-leaf form for specification writer and drafting room. Literature embodied in folder includes standard Specification Sheet covering the use of Bloxonend in general industrial service and Supplementary Specification Sheet No. 1, which gives detailed description and explanation of an approved method for installing Bloxonend in gymnasiums, armories, drill rooms and similar locations where maximum resiliency is required.

Cellized Oak Flooring, Memphis, Tenn.
Style in Oak Floors. Booklet, 16 pp., 6 x 9 ins. Illustrated.

Congoleum-Nairn, Inc., 195 Belgrove Drive, Kearny, N. J.
Facts you should know about Resilient Floors. A series of booklets on floors for (1) schools, (2) hospitals, (3) offices, (4) stores, (5) libraries, (6) churches, (7) clubs and lodges, (8) apartments and hotels. Illustrated.
Specifications for Resilient Floors. Booklet, 12 pp. A reprint from Sweet's.
A New Kind of Floor Service. Brochure, 8 pp. Data on Bonded Floors.
Sealex Battleship Linoleum. Booklet, 12 pp. Illustrated. Shows typical installations.
Sealex Treadlite Tiles. Two booklets, 8 and 16 pp. Illustrated.
Colonial Planks. Brochure, 8 pp. Illustrated.

Thomas Moulding Floor Co., 165 W. Wacker Drive, Chicago, Ill.
Better Floors. Folder, 4 pp., 11¼ x 13¾ ins. Illustrated. Floors for office, administration and municipal buildings.
Better School Floors. Folder, 4 pp., 11¼ x 13¾ ins. Illustrated.
Characteristics, Specifications and Uses. Brochure, 16 pp., 11¼ x 13¾ ins. Illustrated. Data on floors.

C. Pardee Works, 9 East 45th St., New York, N. Y., and 1600 Walnut St., Philadelphia, Pa.
Pardee Tiles. Bound Volume, 48 pp., 8½ x 11 ins. Illustrated.

Structural Gypsum Corporation, Linden, N. J.
Gypsteel Pre-cast Fireproof Floors. Booklet, 36 pp., 8½ x 11 ins. Illustrated. Data on floorings.

U. S. Gypsum Co., Chicago.
Pyrobar Floor Tile. Folder, 8½ x 11 ins. Illustrated. Data on building floors of hollow tile and tables on floor loading.

U. S. Rubber Co., 1790 Broadway, New York, N. Y.
Period Adaptations for Modern Floors. Brochure, 8 x 11 ins., 60 pp. Richly Illustrated. A valuable work on the use of rubber tile for flooring in interiors of different historic styles.

FURNITURE

American Seating Co., 14 E. Jackson Blvd., Chicago, Ill.
Art Ecclesiastical Booklet, 6 x 9 ins., 48 pp. Illustrations of church fitments in carved wood.
Theatre Chairs. Booklet, 6 x 9 ins., 48 pp. Illustrations of theatre chairs.

Kittinger Co., 1893 Elmwood Ave., Buffalo, N. Y.
Kittinger Club & Hotel Furniture. Booklet, 20 pp., 6¼ x 9½ ins. Illustrated. Deals with fine line of furniture for hotels, clubs, institutions, schools, etc.
Kittinger Club and Hotel Furniture. Booklet, 20 pp., 6 x 9 ins. Illustrated. Data on furniture for hotels and clubs.
A Catalog of Kittinger Furniture. Booklet, 78 pp., 11 x 14 ins. Illustrated. General Catalog.

McKinney Mfg. Co., Pittsburgh, Pa.
Forethought Furniture Plans. Sheets, 6¼ x 9 ins., drawn to ¼-inch scale. An ingenious device for determining furniture arrangement.

GLASS CONSTRUCTION

Adamson Flat Glass Co., Clarksburg, W. Va.
Quality and Dependability. Folder, 2 pp., 8½ x 11 ins. Illustrated. Data in the company's product.

Libbey-Owens Sheet Glass Co., Toledo, Ohio.
Flat Glass. Brochure, 12 pp., 5⅞ x 7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

GREENHOUSES

King Construction Company, North Tonawanda, N. Y.
King Greenhouses for Home or Estate. Portfolio of half-tone prints, varnishes, 8¼ x 10½ ins.

GREENHOUSES—Continued

William H. Lutton Company, 267 Kearney Ave., Jersey City, N. J.
Greenhouses of Quality. Booklet, 50 pp., 8½ x 11 ins. Illustrated. Conservatories making use of Lutton Patented Galvanized Steel V-Bar.

HARDWARE

P. & F. Corbin, New Britain, Conn.
Early English and Colonial Hardware. Brochure, 8½ x 11 ins. An important illustrated work on this type of hardware.
Locks and Builders' Hardware. Bound Volume, 486 pp., 8½ x 11 ins. An exhaustive, splendidly prepared volume.
Colonial and Early English Hardware. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Data on hardware for houses in these styles.

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet, 4 x 9¼ ins., 8 pp. Illustrated.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Distinctive Garage Door Hardware. Booklet, 8½ x 11 ins., 66 pp. Illustrated. Complete information accompanied by data and illustrations on different kinds of garage door hardware.
Distinctive Elevator Door Hardware. Booklet, 90 pp., 10½ x 16 ins. Illustrated.

Russell & Erwin Mfg. Co., New Britain, Conn.
Hardware for the Home. Booklet, 24 pp., 3½ x 6 ins. Deals with residence hardware.
Door Closer Booklet. Brochure, 16 pp., 3½ x 6 ins. Data on a valuable detail.
Garage Hardware. Booklet, 12 pp., 3½ x 6 ins. Hardware intended for garage use.
Famous Homes of New England. Series of folders on old homes and hardware in style of each.

HEATING EQUIPMENT

American Blower Co., 6004 Russell St., Detroit, Mich.
Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8½ x 11 ins., on these important subjects.

American Radiator Company, The, 40 West 40th St., N. Y. C.
Ideal Boilers for Oil Burning. Catalog 5½ x 8½ ins., 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.
Corto—The Radiator Classic. Brochure, 5½ x 8½ ins., 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
Ideal Arcola Radiator Warmth. Brochure, 6¼ x 9½ ins. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.
How Shall I Heat My Home? Brochure, 16 pp., 5¾ x 8½ ins. Illustrated. Full data on heating and hot water supply.
New American Radiator Products. Booklet, 44 pp., 5 x 7¾ ins. Illustrated. Complete line of heating products.
A New Heating Problem. Brilliantly Solved. Broadside, 4 pp., 10¾ x 15 ins. Illustrated. Data on the IN-AIRID invisible air valve.
In-Airid, the Invisible Air Valve. Folder, 8 pp., 3½ x 6 ins. Illustrated. Data on a valuable detail of heating.
The 999 ARCO Packless Radiator Valve. Folder, 8 pp., 3½ x 6 ins. Illustrated.

James B. Clow & Sons, 534 S. Franklin St., Chicago, Ill.
Clow Gasteam Vented Heating System. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Deals with a valuable form of heating equipment for using gas.

C. A. Dunham Company, 450 East Ohio St., Chicago, Ill.
Dunham Radiator Trap. Bulletin 101, 8 x 11 ins., 12 pp. Illustrated. Explains working of this detail of heating apparatus.
Dunham Packless Radiator Valves. Bulletin 104, 8 x 11 ins., 8 pp. Illustrated. A valuable brochure on valves.
Dunham Return Heating System. Bulletin 109, 8 x 11 ins. Illustrated. Covers the use of heating apparatus of this kind.
Dunham Vacuum Heating System. Bulletin 110, 8 x 11 ins., 12 pp. Illustrated.
The Dunham Differential Vacuum Heating System. Bulletin 114. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for small buildings.
The Dunham Differential Vacuum Heating System. Bulletin 115. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for large buildings.

The Fulton Sylphon Company, Knoxville, Tenn.
Sylphon Temperature Regulators. Illustrated brochures, 8½ x 11 ins., dealing with general architectural and industrial applications; also specifically with applications of special instruments.
Sylphon Heating Specialties. Catalog No. 200, 192 pp., 3½ x 6¾ ins. Important data on heating.

Hoffman Specialty Company, Inc., 25 West 45th St., New York, N. Y.
Heat Controlled With the Touch of a Finger. Booklet, 46 pp., 5¾ x 8¾ ins. Illustrated.
How to Lock Out Air, the Heat Thief. Brochure, 48 pp., 5 x 7¾ ins. Illustrated.

Janette Manufacturing Company, 556 West Monroe Street, Chicago.
More Heat from Any Hot Water System on Less Fuel. Folder. 4 pp., 8½ x 11 ins. Illustrated. Deals with use of the "Hydrolator."

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The new Y. W. C. A. Building, Cincinnati, Ohio. An interesting construction feature is the use of Carey Elastite Asphalt Plank, applied over a section of the Carey Built-up roof—an ideal roof promenade.
—Rendigs, Panzer & Martin, Architects, Cincinnati, Ohio. F. B. & A. Ware Associate Architects, New York.

It wears "*plus-quality*" *protection* overhead

The overhead covering of the new Y.W.C.A. Building, Cincinnati, is the kind of protection that architects have specified for hundreds of other splendid structures everywhere. A Carey Built-up Roof.

Multi-layered, Multi-sealed. Made of the toughest fibred felts, and asphalts carefully blended at Carey's own factory by Carey's own experts in roofing technique. Weather-tight, long-lastingly dependable. The roof that has been tested in every climate and under all conceivable conditions—the roof that asks no favors of weather and time.

Write us for full particulars—also for your copy of our Architects' Specification Book.

Carey BUILT UP ROOFS

"A ROOF FOR EVERY BUILDING"

THE PHILIP CAREY COMPANY
Lockland, CINCINNATI, OHIO

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 180*

HEATING EQUIPMENT—Continued

S. T. Johnson Co., Oakland, Calif.
Johnson Oil Burners. Booklet, 9 pp., 8½ x 11 ins. Illustrated.
Bulletin No. 4A. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Data on different kinds of oil-burning apparatus.
Bulletin No. 31. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with Johnson Rotary Burner with Full Automatic Control.

Kewanee Boiler Corporation, Kewanee, Ill.
Kewanee on the Job. Catalog, 8½ x 11 ins., 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 78, 6 x 9 ins. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.
Catalog No. 79, 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.

May Oil Burner Corp., Baltimore, Md.
Adventures in Comfort. Booklet, 24 pp., 6 x 9 ins. Illustrated. Non-technical data on oil as fuel.
Taking the Quest Out of the Question. Brochure, 16 pp., 6 x 9 ins. Illustrated. For home owners interested in oil as fuel.

McQuay Radiator Corporation, 35 East Wacker Drive, Chicago, Ill.
McQuay Visible Type Cabinet Heater. Booklet, 4 pp., 8½ x 11 ins. Illustrated. Cabinets and radiators adaptable to decorative schemes.
McQuay Concealed Radiators. Brochure, 4 pp., 8½ x 11 ins. Illustrated.
McQuay Unit Heater. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Gives specifications and radiator capacities.

Modine Mfg. Co., Racine, Wisc.
Modine Copper Radiation. Booklet, 28 pp. 8½ x 11 ins. Illustrated. Deals with industrial, commercial and domestic heating.
A Few Short Years. Folder. 4 pp. 8½ x 11 ins. Illustrated. Heating for garages.
Dairy Plant Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.

Nash Engineering Company, South Norwalk, Conn.
No. 37. Devoted to Jennings Hytor Return Line Vacuum Heating Pumps, electrically driven, and supplied in standard sizes up to 300,000 square feet equivalent direct radiation.
No. 16. Dealing with Jennings Hytor Air Line Heating Pumps.
No. 17. Describing Jennings Hytor Condensation Pumps, sizes up to 70,000 square feet equivalent direct radiation.
No. 25. Illustrating Jennings Return Line Vacuum Heating Pumps. Size M, for equivalent direct radiation up to 5,000 square feet.

National Radiator Corporation, Johnstown, Pa.
Aero Radiators; Beauty and Worth. Catalog 34. Booklet, 6 x 9 ins., 20 pp., describing and illustrating radiators and accessories.
Six Great Companies Unite to Form a Great Corporation. Booklet, 28 pp., 8½ x 10½ ins. Illustrated. Valuable data on heating.

Oil Heating Institute, 420 Madison Ave., New York, N. Y.
What About the Supply of Oil Fuel? Booklet, 16 pp., 5½ x 8 ins. Illustrated.

Petroleum Heat & Power Co., 511 Fifth Avenue, New York, N. Y.
Heating Homes the Modern Way. Booklet, 8½ x 11¼ ins. Illustrated. Data on the Petro Burner.
Residence Oil Burning Equipment. Brochure, 6 pp., 8½ x 11 ins. Illustrated. Data regarding Petro Burner in a bulletin approved by Investigating Committee of Architects and Engineers.
Petro Mechanical Oil Burner & Air Register. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Data on industrial installations of Petro Burners.
Present Accepted Practice in Domestic Oil Burners. Folder, 4 pp., 8½ x 11 ins. Illustrated. A reprint from Heating and Ventilating Magazine.

Sarco Company, Inc., 183 Madison Ave., New York City, N. Y.
Steam Heating Specialties. Booklet, 6 pp., 6 x 9 ins. Illustrated. Data on Sarco Packless Supply Valves and Radiator Traps for vacuum and vapor heating systems.
Equipment Steam Traps and Temperature Regulations. Booklet, 6 pp., 6 x 9 ins. Illustrated. Deals with Sarco Steam Traps for hospital, laundry and kitchen fixtures and the Sarco Self-contained Temperature Regulation for hot water service tanks.

Spencer Heater Co., Williamsport, Pa.
Catalog. Booklet, 20 pp., 6⅛ x 9 ins. Illustrated. Complete line of magazine feed cast iron sectional and steel tubular heaters.
The Fire that Burns Uphill. Brochure, 24 pp., 6⅛ x 9¼ ins. Illustrated in color. Magazine feed heaters for steam, vapor and hot water heating.

B. F. Sturtevant Company, Hyde Park, Boston, Mass.
Tempervane Heating Units. Catalog 363. Booklet, 44 pp., 8½ x 11 ins. Illustrated. Data on "Heating Every Corner with Maximum Economy."

Trane Co., The, La Crosse, Wis.
Bulletin 14, 16 pp., 8½ x 10⅝ ins. Covers the complete line of Trane Heating Specialties, including Trane Bellows Traps, and Trane Bellows Packless Valves.
Bulletin 20. 24 pp., 8½ x 10⅝ ins. Explains in detail the operation and construction of Trane Condensation. Vacuum, Booster, Circulating, and similar pumps.
How to Cut Heating Costs. Booklet, 18 pp., 8½ x 11 ins. Illustrated.

HOSPITAL EQUIPMENT

The Frink Co., Inc., 369 Lexington Ave., New York City.
Catalog 426. 7 x 10 ins., 16 pp. A booklet illustrated with photographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linolite and multilite concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their particular fitness for special uses.

Holophane Company, 342 Madison Avenue, New York.
Lighting Specific for Hospitals. Booklet, 30 pp., 8½ x 11 ins. Illustrated.

The International Nickel Company, 67 Wall St., New York, N. Y.
Hospital Applications of Monel Metal. Booklet, 8½ x 11½ ins., 16 pp. Illustrated. Gives types of equipment in which Monel Metal is used, reasons for its adoption, with sources of such equipment.

Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and Cooper Square, New York.
Some Thoughts About Hospital Food Service Equipment. Booklet, 22 pp., 7½ x 9¼ ins. Valuable data on an important subject.

HOTEL EQUIPMENT

Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and Cooper Square. New York.
Some Thoughts on Furnishing a Hotel. Booklet, 7½ x 9 ins. Data on complete outfitting of hotels.

INCINERATORS

Home Incinerator Co., Milwaukee, Wis.
The Decent Way. Burn it with Gas. Brochure, 30 pp., 5¼ x 7¼ ins., inside. Illustrated. Incinerator sanitation equipment for residence use.
A. I. A. File, 12 pp., 8¾ x 10¾ ins., inside. Suggestions for architect on incineration, showing installation and equipment.
Specialized Home Comforts Service Plan Book. 40 pp., 8½ x 11 ins., inside. Illustrated. A complete outline of the many advantages of incineration.
Blue Star Standards in Home Building. 16 pp., 5½ x 8½ ins., inside. Illustrated. Explaining fully the Blue Star principles, covering heat, incineration, refrigeration, etc.

Josam Mfg. Co., Michigan City, Ind.
Josam-Graver Incinerators. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Kerner Incinerator Company, 715 E. Water St., Milwaukee, Wis.
Incinerators (Chimney-fed). Catalog No. 15 (Architect and Builders' Edition). Size 8½ x 11 ins., 16 pp. Illustrated. Describes principles and design of Kernerator Chimney-fed Incinerators for residences, apartments, hospitals, schools, apartment hotels, clubs and other buildings. Shows all standard models and gives general information and working data.
Sanitary Elimination of Household Waste. Booklet, 4 x 9 ins. 16 pp. Illustrated. Gives complete information on the Kernerator for residences.
Garbage and Waste Disposal for Apartment Buildings. Folder, 8½ x 11 ins., 16 pp. Illustrated. Describes principle and design of Kernerator Chimney-fed Incinerator for apartments and gives list of buildings where it has been installed.
Sanitary Disposal of Waste in Hospitals. Booklet, 4 x 9 ins., 12 pp. Illustrated. Shows how this necessary part of hospital service is taken care of with the Kernerator. Gives list of hospitals where installed.
The Kernerator (Chimney-fed) Booklet. Catalog No. 17, 20 pp., 8½ x 11 ins. Illustrated. Data on a valuable detail of equipment.

INSULATION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ ins., 32 pp. Discusses means of insulating roofs of manufacturing or commercial structures.
Insulation of Roofs to Prevent Condensation. Illustrated booklet, 7½ x 10½ ins., 36 pp. Gives full data on valuable line of roof insulation.
Filing Folder for Pipe Covering Data. Made in accordance with A. I. A. rules.
The Cork-lined House Makes a Comfortable Home. 5 x 7 ins. 32 pp. Illustrated.
Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet. 66 pp., 9½ x 11¼ ins. Illustrates and describes use of insulation for structural purposes.

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Insulating Quilt. Booklet. 7½ x 10½ ins., 24 pp. Illustrated. Deals with a valuable type of insulation.

Structural Gypsum Corporation, Linden, N. J.
Heat Insulation Value of Gypsteel. Folder, 4 pp., 8½ x 11 ins Brochure, by Charles L. Norton, of M. I. T.

JOISTS

Bates Expanded Steel Truss Co., East Chicago, Ind.
Catalog No. 4. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Gives details of truss construction with loading tables and specifications.

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To get any of the catalogs described in this section, put down the title of the catalog desired, the name of the manufacturer and send coupon to THE ARCHITECTURAL FORUM, 521 Fifth Avenue, New York.

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 182*

JOISTS—Continued

Concrete Steel Company, 42 Broadway, New York, N. Y.
Structural Economies for Concrete Floors and Roofs. Booklet, 32 pp., 8½ x 11 ins. Illustrated.
Modern Concrete Reinforcement. Brochure, 32 pp., 8½ x 11 ins. Illustrated.
Construction Details for Installing Havemeyer Trusses. Data sheets, 8½ x 11 ins. Illustrated.
Standard Practice for Placing Havemeyer Reinforcement in Columns, Beams and Slabs. Data sheets, 8½ x 11 ins. Illustrated.

KITCHEN EQUIPMENT

The International Nickel Company, 67 Wall St., New York, N. Y.
Hotels, Restaurants and Cafeteria Applications of Monel Metal. Booklet, 8½ x 11 ins., 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.
Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and Cooper Square, New York.
School Cafeteria. Booklet, 6 x 9 ins. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.

LABORATORY EQUIPMENT

Alberene Stone Co., 153 West 23rd Street, New York City.
Booklet, 8¾ x 11¼ ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.
Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.

LANTERNS

Todhunter, Arthur, 119 E. 57th St., New York, N. Y.
Hand-wrought Lanterns. Booklet, 5¼ x 6¾ ins., 20 pp. Illustrated in black and white. With price list. Lanterns appropriate for exterior and interior use, designed from old models and meeting the requirements of modern lighting.

LATH, METAL AND REINFORCING

Milwaukee Corrugating Co., Milwaukee
The Milcor Manual. Booklet, 96 pp., 8½ x 11 ins. Illustrated. Data on metal lath and similar materials.
Milcor Metal Ceiling Catalog. Booklet, 288 pp., 8½ x 11 ins. Illustrated. Data on metal ceiling and wall construction.
National Steel Fabric Co., Pittsburgh, Pa.
Better Walls for Better Homes. Brochure, 16 pp., 7¾ x 11¾ ins. Illustrated. Metal lath, particularly for residences.
Steeltex for Floors. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Combined reinforcing and form for concrete or gypsum floors and roofs.
Steeltex Data Sheet No. 1. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with round top chords.
Steeltex Data Sheet No. 2. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with flat top flanges.
Steeltex Data Sheet No. 3. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for folders on wood joists.
North Western Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
North Western Expanded Metal Products. Booklet, 8½ x 10¾ ins., 20 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plasta-saver and longspan lath channels, etc.
Longspan ¾-inch Rib Lath. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-Rib expanded metal.
A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regarding their use.
Norwest Metal Lath. Folder, 8½ x 11 ins. Illustrated. Data on Flat Rib Lath.
Truscon Steel Company, Youngstown, Ohio.
Truscon ¾-inch Hy-Rib for Roofs, Floors and Walls. Booklet, 8½ x 11 ins., illustrating Truscon ¾-inch Hy-Rib as used in industrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

LAUNDRY CHUTES

The Pfaudler Company, 217 Cutler Building, Rochester, N. Y.
Pfaulder Glass-Lined Steel Laundry Chutes. Booklet, 5⅛ x 7⅛ ins., 16 pp. Illustrated. A beautifully printed brochure describing in detail with architects' specifications THE PFAUDLER GLASS-LINED STEEL LAUNDRY CHUTES. Contains views of installations and list of representative examples.

LAUNDRY MACHINERY

American Laundry Machinery Co., Norwood Station, Cincinnati, O.
Functions of the Hotel and Hospital Laundry. Brochure, 8 pp., 8½ x 11 ins. Valuable data regarding an important subject.
Troy Laundry Machinery Co., Inc., 9 Park Place, New York City.
Laundry Machinery for Large Institutions. Loose-Leaf booklet, 50 pp., 8½ x 11 ins. Illustrated.

LAUNDRY MACHINERY—Continued

Laundry Machinery for Small Institutions. Loose-leaf brochure, 50 pp., 8½ x 11 ins. Illustrated.
Accessory Equipment for Institutional Laundries. Leather bound book, 50 pp., 8½ x 11 ins. Illustrated.
Dry Cleaning Equipment for Institutional Purposes. Brochure, 50 pp., 8½ x 11 ins. Illustrated.

LIBRARY EQUIPMENT

Art Metal Construction Co., Jamestown, N. Y.
Planning the Library for Protection and Service. Brochure, 52 pp., 8½ x 11 ins. Illustrated. Deals with library fittings of different kinds.

LIGHTING EQUIPMENT

The Frink Co., Inc., 369 Lexington Ave., New York, N. Y.
Catalog 415, 8½ x 11 ins., 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.
Holophane Company, Inc., 342 Madison Ave., New York, N. Y.
The Lighting of Schools; A Guide to Good Practice. Booklet. 24 pp., 8½ x 11 ins. Illustrated.
Lighting Specifications for Hospitals. Brochure, 30 pp., 8½ x 11 ins. Illustrated.
Industrial Lighting. Bulletin 448A. Booklet, 24 pp., 8½ x 11 ins. Illustrated.
Holophane Catalog. Booklet, 48 pp., 8½ x 11 ins. Combination catalog and engineering data book.
The Lighting of Schools. A Guide to Good Practice. Booklet, 24 pp., 8½ x 11 ins. Illustrated.
Pass & Seymour, Inc., Syracuse, N. Y.
Lighting Your Home with Alabox. Folder, 6 pp., 3 x 6 ins.
Smyser-Royer Co., 1700 Walnut Street, Philadelphia, Pa.
Catalog "J" on Exterior Lighting Fixtures. Brochure, illustrated, giving data on over 300 designs of standards, lanterns and brackets of bronze or cast iron.
Todhunter, 119 East 57th St., New York, N. Y.
Lighting Fixtures, Lamps and Candlesticks. 24 pp., 8½ x 11 ins. Illustrated. Fine assortment of lighting accessories.
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Industrial Lighting Equipment. Booklet, 32 pp., 8½ x 11 ins. Illustrated.
Commercial Lighting. Brochure, 24 pp., 8½ x 11 ins. Illustrated.
Airport and Floodlighting Equipment. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

LUMBER

National Lumber Mfrs. Assn., Washington, D. C.
Use of Lumber on the Farm. Booklet, 38 pp., 8½ x 11 ins. Illustrated.

MAIL CHUTES

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet, 4 x 9¼ ins., 8 pp. Illustrated.

MANTELS

Arthur Todhunter, 119 E. 57th St., New York, N. Y.
Georgian Mantels. New booklet, 24 pp., 5¾ x 6¼ ins. A fully illustrated brochure on eighteenth century mantels. Folders give prices of mantels and illustrations and prices of fireplace equipment.

MARBLE

The Georgia Marble Company, Tate, Ga.; New York Office, 1328 Broadway.
Why Georgia Marble Is Better. Booklet, 3⅜ x 6 ins. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.
Convincing Proof. 3⅜ x 6 ins., 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.
Hurt Building, Atlanta; Senior High School and Junior College, Muskegon, Mich. Folders, 4 pp., 8½ x 11 ins. Details.

METALS

Aluminum Company of America, Pittsburgh.
Architectural Aluminum. Brochure, 30 pp., 8½ x 11 ins. Illustrated. An excellent booklet on the subject.
Central Alloy Steel Corporation, Massillon, Ohio.
Sheet Iron Primer. Booklet, 64 pp., 5¼ x 7¾ ins. Illustrated.
The Path to Permanence. Brochure, 52 pp., 8½ x 11 ins. Illustrated. Data on sheet iron.
The International Nickel Company, 67 Wall St., New York N. Y.
Monel Metal Primer. 8 folders, 4 pp., 8½ x 11 ins. Illustrated. Valuable data on use of monel in kitchens, laundries, etc.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.
Architectural Interior and Exterior Woodwork. Standardized Book, 9 x 11½ ins., 240 pp. Illustrated. This is an Architects' Edition of the complete catalog of Curtis Woodwork, as designed by Trowbridge & Ackerman. Contains many color plates.

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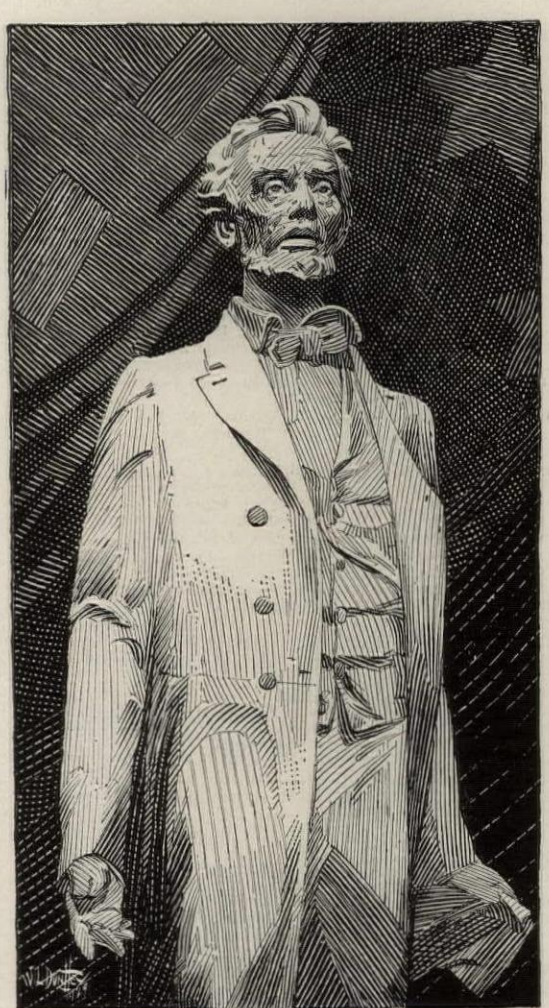

CLEVELAND'S NEW LINCOLN STATUE

Above is a drawing from a photograph of the statue "Lincoln at Gettysburg." This heroic bronze of the "Great Emancipator" is the work of the eminent sculptor, Max Kalish. It is soon to be unveiled in Cleveland.

THE first and foremost name in automatic Temperature or Pressure Regulation for air, liquids or gases is "SYLPHON." By twenty years of dependable performance in the industrial, chemical, architectural, and engineering fields Sylphon instruments have fairly won their recognition as the nation's "great emancipators" from manufacturing waste, process spoilage, and excessive fuel costs.

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Guardian Building
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Bailey's
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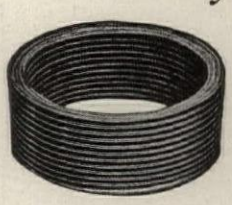

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 184*

MILL WORK—See also Wood—Continued

Better Built Homes. Vols. XV-XVIII, incl. Booklet, 9 x 12 ins., 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects for the Curtis Companies.

Curtis Details. Booklet, 19½ x 23½ ins., 20 pp. Illustrated. Complete details of all items of Curtis woodwork, for the use of architects.

Curtis Cabinet and Stair Work. Booklet, 48 pp., 7¾ x 10½ ins. Illustrated.

Curtis Windows. Brochure, 7¾ x 10½ ins. Illustrated.

Curtis Interior Doors. Booklet, 7¾ x 10½ ins. Illustrated.

Curtis Entrances and Exterior Doors. Brochure, 7¾ x 10½ ins. Illustrated.

Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.

Column Catalog, 7½ x 10 ins., 48 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installations.

The Pergola Catalog. 7½ x 10 ins., 64 pp. Illustrated. Contains illustrations of pergola lattices, garden furniture in wood and cement, garden accessories.

Klein & Co., Inc., Henry, 11 East 37th St., New York, N. Y.

Two Driwood Interiors. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Use of moulding for paneling walls.

A New Style in Interior Decoration. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Deals with interior woodwork.

Driwood Period Mouldings in Ornamented Wood. Booklet, 28 pp., 8½ x 11 ins. Illustrated.

How Driwood Period Mouldings in Ornamented Wood Set a New Style in Decoration. Folder.

Roddis Lumber and Veneer Co., Marshfield, Wis.

Roddis Doors. Brochure, 24 pp., 5¼ x 8½ ins. Illustrated price list of doors for various types of buildings.

Roddis Doors, Catalog G. Booklet, 184 pp., 8½ x 11 ins. Completely covers the subject of doors for interior use.

Roddis Doors for Hospitals. Brochure, 16 pp., 8½ x 11 ins. Illustrated work on hospital doors.

Roddis Doors for Hotels. Brochure, 16 pp., 8½ x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORTAR AND CEMENT COLORS

Clinton Metallic Paint Co., Clinton, N. Y.

Clinton Mortar Colors. Folder, 8½ x 11 ins., 4 pp. Illustrated in colors, gives full information concerning Clinton Mortar Colors with specific instructions for using them.

Color Card. 3¼ x 6½ ins. Illustrates in color the ten shades in which Clinton Mortar Colors are manufactured.

Something New in Stucco. Folder, 3½ x 6 ins. An interesting folder on the use of coloring matter for stucco coated walls.

ORNAMENTAL PLASTER

Jacobson & Co., 241 East 44th St., New York, N. Y.

A Book of Old English Designs. Brochure, 47 plates, 12 x 9 ins. Deals with a fine line of decorative plaster work.

Architectural and Decorative Ornaments. Cloth bound volume, 184 pp., 9 x 12 ins. 18 plates. Price, $3.00. A general catalog of fine plaster ornaments.

Geometrical ceilings. Booklet, 23 plates, 7 x 9 ins. An important work on decorative plaster ceilings.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Cabot, Inc., Samuel, Boston, Mass.

Cabot's Creosote Stains. Booklet, 4 x 8½ ins., 16 pp. Illustrated.

Minwax Company, Inc., 11 West 42nd St., New York.

Color Card and Specifications for Minwax Brick and Cement Coating. Folder, 4 pp., 8½ x 11 ins. Illustrated.

National Lead Company, 111 Broadway, New York, N. Y.

Handy Book on Painting. Book, 5½ x 3¾ ins., 100 pp. Gives directions and formulæ for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.

Red Lead in Paste Form. Booklet. 6¼ x 3½ ins., 16 pp. Illustrated. Directions and formulæ for painting metals.

Came Lead. Booklet, 6 x 8¾ ins., 12 pp. Illustrated. Describes various styles of lead cames.

Pratt & Lambert, Inc., Buffalo, N. Y.

Specification Manual for Paint, Varnishing and Enameling. Booklet, 38 pp., 7½ x 10⅝ ins. Complete specifications for painting, varnishing and enameling interior and exterior wood, plaster, and metal work.

Sherwin-Williams Company, 601 Canal Rd., Cleveland, Ohio.

Painting Concrete and Stucco Surfaces. Bulletin No. 1. 8½ x 11 ins., 8 pp. Illustrated. A complete treatise with complete specifications on the subject of Painting of Concrete and Stucco Surfaces. Color chips of paint shown in bulletin.

Enamel Finish for Interior and Exterior Surfaces. Bulletin No. 2, 8½ x 11 ins., 12 pp. Illustrated. Thorough discussion, including complete specifications for securing the most satisfactory enamel finish on interior and exterior walls and trim.

Painting and Decorating of Interior Walls. Bulletin No. 3, 8½ x 11 ins., 20 pp. Illustrated. An excellent reference book on Flat Wall Finish, including texture effects, which are taking the country by storm. Every architect should have one on file.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES—Continued

Protective Paints for Metal Surfaces. Bulletin No. 4, 8½ x 11 ins., 12 pp. Illustrated. A highly technical subject treated in a simple, understandable manner.

Sonneborn Sons, Inc., L., Dept. 4, 116 Fifth Ave., New York. N. Y.

Paint Specifications. Booklet, 8½ x 10¾ ins., 4 pp.

Toch Brothers, New York, Chicago, Los Angeles.

Architects' Specification Data. Sheets in loose leaf binder, 8½ x 11 ins., dealing with an important line of materials.

U. S. Gutta Percha Paint Co., Providence, R. I.

Barreled Sunlight. Booklet, 8½ x 11 ins. Data on "Barreled Sunlight" with specifications for its use.

Valentine & Co., 456 Fourth Ave., New York, N. Y.

How to Use Valspar. Illustrated booklet, 32 pp., 3¾ x 8 ins. Deals with domestic uses for Valspar.

How to Keep Your House Young. Illustrated brochure, 24 pp., 7 x 8½ ins. A useful work on the upkeep of residences.

Architectural Four-Hour Varnishes and Enamels. Booklet, 8 pp., 4½ x 6 ins. Data on a useful line of materials.

PARCEL DELIVERY DEVICES

Receivador Sales Company, Grand Rapids, Mich.

Architects' Portfolio. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with delivery problems and their solution.

PARTITIONS

Circle A. Products Corporation, New Castle, Ind.

Circle A. Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11¼ ins., 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.

Dahlstrom Metallic Door Company, Jamestown, N. Y.

Dahlstrom Standard Steel Partitions. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

Hauserman Company, E. F., Cleveland, Ohio.

Hollow Steel Standard Partitions. Various folders, 8½ x 11 ins. Illustrated. Give full data on different types of steel partitions, together with details, elevations and specifications.

Improved Office Partition Company, 25 Grand St., Elmhurst, L. I.

Telesco Partition. Catalog, 8¼ x 11 ins., 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.

Detailed Instructions for Erecting Telesco Partitions. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Complete instructions, with cuts and drawings, showing how easily Telesco Partition can be erected.

Richards-Wilcox Mfg. Co., Aurora, Ill.

Partitions. Booklet. 7 x 10 ins., 32 pp. Illustrated. Describes complete line of track and hangers for all styles of sliding parallel, accordion and flush-door partitions.

U. S. Gypsum Co., Chicago, Ill.

Pyrobar Partition and Furring Tile. Booklet, 8½ x 11 ins., 24 pp. Illustrated. Describes use and advantages of hollow tile for inner partitions.

PIPE

American Brass Company, Waterbury, Conn.

Bulletin B-1. Brass Pipe for Water Service. 8½ x 11 ins., 28 pp. Illustrated. Gives schedule of weights and sizes (I.P.S.) of seamless brass and copper pipe, shows typical installations of brass pipe, and gives general discussion of the corrosive effect of water on iron, steel and brass pipe.

American Rolling Mill Company, Middletown, Ohio.

How ARMCO Dredging Products Cut Costs. Booklet, 16 pp., 6 x 9 ins. Data on dredging pipe.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.

Catalog A. 4 x 16½ ins., 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

Cohoes Rolling Mill Company, Cohoes, N. Y.

Cohoes Pipe Handbook. Booklet, 40 pp., 5 x 7½ ins. Data on wrought iron pipe.

Duriron Company, Dayton, Ohio.

Duriron Acid, Alkali, Rust-proof Drain Pipe and Fittings. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Important data on a valuable line of pipe.

National Tube Co., Frick Building, Pittsburgh, Pa.

"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins., 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.

"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins., 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deaereating systems for eliminating or retarding corrosion in hot water supply lines.

"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 ins., 88 pp. This bulletin contains 254 illustrations of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, engineers, etc.

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LAMINATED construction secures for Whale-bone-ite exactly what the I-beam cross-section secures for steel girders—immense strength combined with light weight.

We and others have found it impossible to make a seat by any other method anywhere near as sanitary, as strong, or as light.

Fourteen years of on-the-job experience have failed to reveal a weakness. Now, more than a million Whale-bone-ite laminated seats stand the use and abuse of public toilets.

Those concerned with the design, construction and operation of buildings have found this experience safe to follow, so that today nearly all seats going into public toilets are of laminated construction.

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It is a well-known fact that public toilet seats receive constant, careless slam-bang abuse from the public. But the public cannot smash Whale-bone-ite. Its unbreakable laminated construction—guaranteed for the life of the building—immediately ends all replacement expense.

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Whale-bone-ite Seats are found quite generally in the guest bathrooms of fine hotels. Many new apartment houses are equipping all toilets with them.

Send for free cross-section
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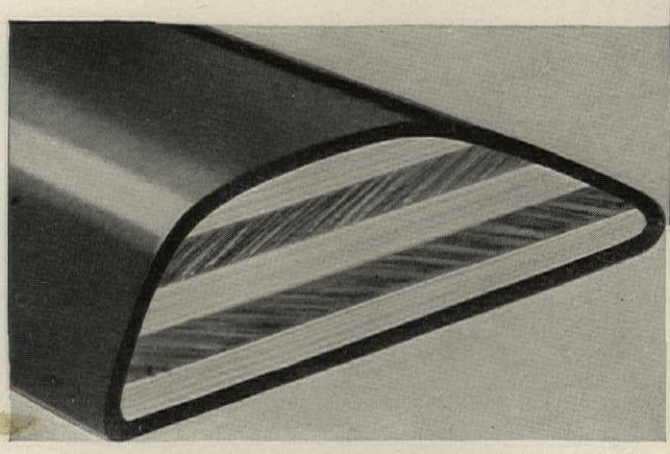
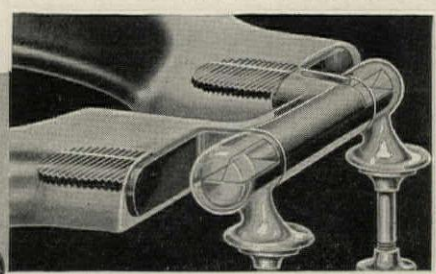
Figures show that on the average ordinary seats have to be replaced about every three years. If you want to end this needless expense, just as it already has been ended in more than a million public toilets in modern and remodelled buildings, simply install Whale-bone-ite Seats as fast as other seats wear out. Not only will the replacement expense end, but the toilets will be cleaner as Whale-bone-ite is easier to keep clean. Without obligation send for a free Whale-bone-ite cross-section. Simply address Dept. A-6, Seat Division, The Brunswick-Balke-Collender Co., 623 South Wabash Avenue, Chicago.



NOTE the Laminated Construction—a core of alternating-grain layers of hardwood—sealed and bonded to the whole by Whale-bone-ite. It is warp-proof and is guaranteed against warping, cracking, and splitting.



THE Whale-bone-ite steel hinge is moulded integral with the Seat forming an unbreakable unit. Covered with Whale-bone-ite, the hinge is as handsome as the Seat. It cannot tarnish. It is easy to clean.

BRUNSWICK
WHALE-BONE-ITE
TOILET SEATS

THE BRUNSWICK-BALKE-COLLENDER CO. Chicago

Atlanta	Chicago	Detroit	Minneapolis	Philadelphia	St. Louis
Birmingham	Cincinnati	Harrisburg	Nashville	Pittsburgh	Tampa
Boston	Cleveland	Houston	Newark	Richmond	Washington
Buffalo	Dallas	Kansas City	New Haven	San Antonio	Montreal
Charlotte	Denver	Los Angeles	New Orleans	San Francisco	Ottawa
Chattanooga	Des Moines	Memphis	New York	Seattle	Toronto

Sidney, Australia Havana Buenos Aires

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 186*

PIPE—Continued

Modern Welded Pipe. Book of 88 pp., 8½ x 11 ins., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.
Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.
Interior Walls Everlasting. Brochure, 20 pp., 6¼ x 9¼ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

PLUMBING EQUIPMENT

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog M. 9¼ x 12 ins., 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Crane Company, 836 S. Michigan Ave., Chicago, Ill.
Plumbing Suggestions for Home Builders. Catalog, 3 x 6 ins., 80 pp. Illustrated.
Plumbing Suggestions for Industrial Plants. Catalog, 4 x 6½ ins., 34 pp. Illustrated.
Planning the Small Bathroom. Booklet, 5 x 8 ins. Discusses planning bathrooms of small dimensions.

John Douglas Co., Cincinnati, Ohio.
Douglas Plumbing Fixtures. Bound volume, 200 pp., 8½ x 11 ins. Illustrated. General catalog.
Another Douglas Achievement. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on new type of stall.
Hospital. Brochure, 60 pp., 8½ x 11 ins. Illustrated. Deals with fixtures for hospitals.

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-Proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Watrous Patent Flush Valves, Duojet Water Closets, Liquid Soap Fixtures, etc. 8½ x 11 ins., 136 pp., loose-leaf catalog, showing roughing-in measurements, etc.

Maddock's Sons Company, Thomas, Trenton, N. J.
Catalog K. Booklet, 150 pp., 8½ x 10⅞ ins. Illustrated. Data on vitreous china plumbing fixtures with brief history of Sanitary Pottery.

Speakman Company, Wilmington, Del.
Catalog K. Booklet, 150 pp., 8½ x 10⅞ ins. Illustrated. Data on showers and equipment details.

Trenton Potteries Company, Trenton, N. J.
The Blue Book of Plumbing. Bound volume, 182 pp., 8½ x 10½ ins. Illustrated.

PUMPS

Kewanee Private Utilities Co., 442 Franklin St., Kewanee, Ill.
Bulletin E. 7¾ x 10¾ ins., 32 pp. Illustrated. Catalog. Complete descriptions, with all necessary data, on Standard Service Pumps, Indian Brand Pneumatic Tanks, and Complete Water Systems, as installed by Kewanee Private Utilities Co.

The Trane Co., La Crosse, Wis.
Trane Small Centrifugal Pumps. Booklet, 3¾ x 8 ins., 16 pp. Complete data on an important type of pump.

RADIO EQUIPMENT

Radio Corporation of America, Woolworth Building, New York City, N. Y.
R. C. A. Antenna Distribution System for Multiple Receivers. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Apparatus for apartment houses and similar large buildings.
R. C. A. Centralized Radio Receiving Equipment. Brochure, 8 pp., 9 x 11 ins. Illustrated. Radio equipment for hotels, hospitals, etc.

RAMPS

Ramp Buildings Corporation, 21 East 40th St., New York, N. Y.
Building Garages for Profitable Operation. Booklet, 8½ x 11 ins. 16 pp. Illustrated. Discusses the need for modern mid-city, parking garages, and describes the d'Humy Motoramp system of design, on the basis of its superior space economy and features of operating convenience. Gives cost analyses of garages of different sizes, and calculates probable earnings.
Garage Design Data. Series of informal bulletins issued in loose-leaf form, with monthly supplements.

REFRIGERATION

The Fulton Syphon Company, Knoxville, Tenn.
Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE—See also Construction, Concrete

North Western Expanded Metal Company, Chicago, Ill.
Designing Data. Book, 6 x 9 ins., 96 pp. Illustrated. Covers the use of Econo Expanded Metal for various types of reinforced concrete construction.
Longspan ¾-inch Rib Lath. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-Rib expanded metal.

Truscon Steel Company, Youngstown, Ohio.
Shearing Stresses in Reinforced Concrete Beams. Booklet, 8½ x 11 ins., 12 pp.

RESTAURANT EQUIPMENT

John Van Range Company, Cincinnati.
Planning Restaurants That Make Money. Booklet, 78 pp., 8½ x 11 ins. Illustrated. Excellent work on equipment.

ROOFING

The Barrett Company, 40 Rector St., New York City.
Architects' and Engineers' Built-up Roofing Reference Series; Volume IV Roof Drainage System. Brochure, 64 pp., 8½ x 11¼ ins. Gives complete data and specifications for many details of roofing.

Federal Cement Tile Co., 608 S. Dearborn Street, Chicago.
Federal Nailing Concrete Roof Slabs. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Roof Standards. Booklet. 30 pp., 8½ x 11 ins. Illustrated.
Federal Interlocking Tile and Glass Tile. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Federal Long-Spare Roof Slab. Folder. 4 pp., 8½ x 11 ins. Illustrated.
New Federal Light Six Roof Slab. Folder. 4 pp., 8½ x 11 ins. Illustrated.

Heinz Roofing Tile Co., 1925 West Third Avenue, Denver, Colo.
Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips.
Italian Promenade Floor Tile. Folder, 2 pp., 8½ x 11 ins. Illustrated. Floor tiling adapted from that of Davanzati Palace.
Mission Tile. Leaflet, 8½ x 11 ins. Illustrated. Tile such as are used in Italy and Southern California.
Georgian Tile. Leaflet, 8½ x 11 ins. Illustrated. Tiling as used in old English and French farmhouses.

Johns-Manville Corporation, New York.
The New Book of Roofs. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Roofing from the Architect's point of view.

Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill.
"Ancient" Tapered Mission Tiles. Leaflet, 8½ x 11 ins., 4 pp. Illustrated. For architects who desire something out of the ordinary this leaflet has been prepared. Describes briefly the "Ancient" Tapered Mission Tiles, hand-made with full corners and designed to be applied with irregular exposures.

Milwaukee Corrugating Co., Milwaukee.
Milcor Architectural Sheet Metal Guide. Booklet. 72 pp., 8½ x 11 ins. Illustrated. Metal tile roofing, skylights, ventilators, etc.
Milcor Sheet Metal Handbook. Brochure. 128 pp., 8½ x 11 ins. Illustrated. Deals with rain-carrying equipment, etc.

Sheet Steel Trade Extension Committee, Terminal Tower, Cleveland.
This committee will send upon request full data published by its members on steel roof decks and specifications for their use.

Structural Gypsum Corporation, Linden, N. J.
Relative Effectiveness of Various Types of Roofing Construction in Preventing Condensation of the Under Surface. Folder, 4 pp., 8¾ x 11 ins. Important data on the subject.
Gypsteel Pre-cast Fireproof Roofs. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Information regarding a valuable type of roofing.

U. S. Gypsum Co., Chicago, Ill.
Pyrobar Roof Construction. Booklet, 8 x 11 ins., 48 pp. Illustrated. Gives valuable data on the use of tile in roof construction.
Sheetrock Pyrofill Roof Construction. Folder, 8½ x 11 ins. Illustrated. Covers use of roof surfacing which is poured in place.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¾ x 10¾ ins., 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

SCREENS

American Brass Co., The, Waterbury, Conn.
Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ ins., giving actual samples of metal screen cloth and data on fly screens and screen doors.

Athey Company, 6015 West 65th St., Chicago, Ill.
The Athey Perennial Window Shade. An accordion pleated window shade, made from translucent Herringbone woven Coutil cloth, which raises from the bottom and lowers from the top. It eliminates awnings, affords ventilation, can be dry-cleaned and will wear indefinitely.

Orange Screen Co., Maplewood, N. J.
Orsco Aluminum Screens. Booklet, 8 pp., 8 x 11 ins. Illustrated. Data on a valuable line of screens.
Orsco Screens and Other Products. Brochure, 20 pp., 8 x 11 ins. Illustrated. Door and window screens and other hardware.

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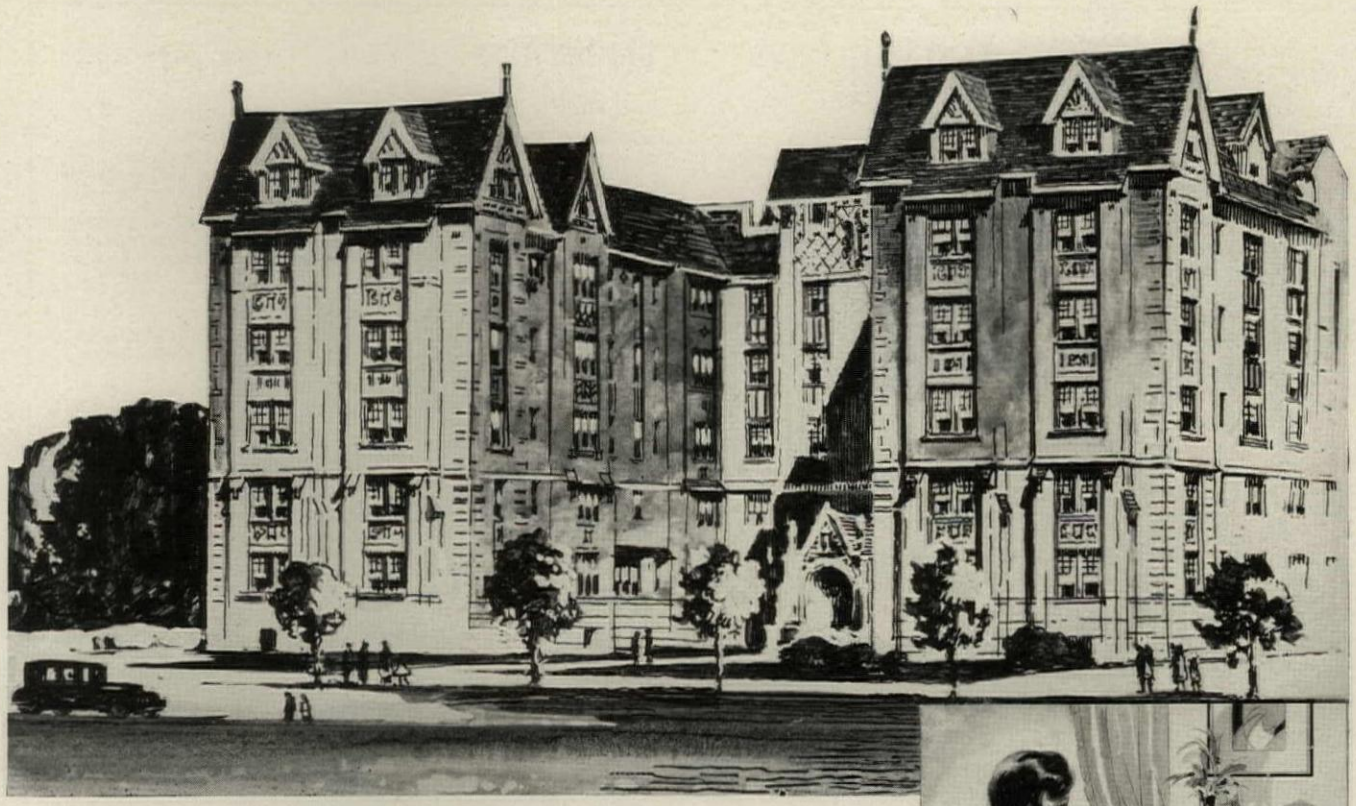

Hampden Hall, Pittsburgh—*H. C. Hodgkins, Architect*

Hampden Hall
(PITTSBURGH)
is installing the new RCA Centralized Radio

A single antenna will provide radio reception for 55 apartments in the new Hampden Hall, now being erected in Pittsburgh.

The owners have solved the antenna problem by adopting RCA Centralized Radio.

In each apartment there will be a wall outlet, connected with the central antenna, enabling the tenant to connect his own receiver, pick out his favorite stations and programs—and get better reception than if he had his own individual aerial.

RCA Centralized Radio is being adopted by hotel and apartment house builders as necessary equipment in modern residence construction. It is available in two principal forms:

1. A single antenna connected with a distribution system to radio receivers in rooms throughout the building. As many as 80 radio sets of different makes can be independently operated from this common antenna by plugging into wall outlets—and far more satisfactorily than by the use of individual antennae. Additional central antennae may be installed, if required, for additional groups of 80 receivers.

2. Centralized radio receiving equipment to distribute broadcast programs to as many as 3000 rooms throughout a building. Equipment may be installed to transmit a single program, or to make available the choice of programs from two, three or four broadcasting stations.

The first method is ideally adapted for apartment houses, dormitories, office buildings, etc., where tenants desire to have their own receiving sets. It does away with the unsightly multiplicity of individual aerials, and the inconvenience of connecting them with distant rooms.

The second method is particularly designed for hotels, hospitals, sanitariums, schools, passenger ships, etc., where transient occupants of rooms may enjoy radio programs from loudspeakers or headsets, all operated from a central receiving instrument.

Descriptive pamphlets of these two systems, and of the special apparatus designed for them, are available for architects, builders and building owners.

The Engineering Products Division, Radio-victor Corporation of America, at any District Office named below, will answer inquiries, and prepare plans and estimates for installations of any size.

ENGINEERING PRODUCTS DIVISION
RADIO-VICTOR CORPORATION OF AMERICA
261 FIFTH AVENUE, NEW YORK CITY

Chicago, Illinois
100 West Monroe Street

Atlanta, Georgia
101 Marietta Street

Dallas, Texas
Santa Fe Building

San Francisco, California
235 Montgomery Street

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 188*

SHADE CLOTH AND ROLLERS

Columbia Mills, Inc., 225 Fifth Avenue, New York, N. Y.
Window Shade Data Book. Folder, 28 pp., 8½ x 11 ins. Illustrated.

SHELVING-STEEL

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Steel Shelving. Catalog E. Illustrated brochure, 40 pp., 8⅝ x 11 ins. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

SOUND DEADENER

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Deadening Quilt. Brochure, 7½ x 10½ ins., 28 pp. Illustrated. Gives complete data regarding a well-known protection against sound.

STEEL PRODUCTS FOR BUILDING

Bethlehem Steel Company, Bethlehem, Pa.
Steel Joists and Stanchions. Booklet, 72 pp., 4 x 6¾ ins. Data for steel for dwellings, apartment houses, etc.

Sheet Steel Trade Extension Committee, Terminal Tower, Cleveland.
This committee will send upon request full data published by its members on steel partitions and specifications for their use.

Steel Frame House Company, Pittsburgh, Pa. (Subsidiary of McClintic-Marshall Corp.)
Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Illustrated.
Steel Framing for Gasoline Service Stations. Brochure, 8 pp., 8½ x 11 ins. Illustrated.
Steel Frame Standard Gasoline Service Stations. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Three standard designs of stations.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.
Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 ins., 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Volume 1. Series B. Indiana Limestone Library, 6 x 9 ins., 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Volume 4. Series B. Booklet. New Edition, 8½ x 11 ins., 64 pp. Illustrated. Indiana Limestone as used in Banks.
Volume 5. Series B. Indiana Limestone Library. Portfolio, 11⅜ x 8¾ ins. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
Volume 6. Series B. Indiana Limestone School and College Buildings. 8½ x 11 ins., 80 pp. Illustrated.
Volume 12. Series B. Distinctive Homes of Indiana Limestone. 8½ x 11 ins., 48 pp. Illustrated.
Old Gothic Random Ashlar. 8½ x 11 ins., 16 pp. Illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Ave., Chicago, Ill.
Catalog No. 33. Series 500. All-Metal Construction. Brochure, 20 pp., 8½ x 11 ins. Illustrated. Deals with store fronts of a high class.
Catalog No. 34. Series 202. Standard construction. Booklet, 16 pp. 8½ x 11 ins. Illustrated, complete data on an important type of building.
Detail Sheets. Set of seven sheets, 8½ x 11 ins., printed on tracing paper, giving full-sized details and suggestions for store front designs.
Davis Solid Architectural Bronze Sash. Set of six sheets, 8½ x 11 ins., printed on tracing paper. Full-sized details and suggestions for designs of special bronze store front construction.

The Kawneer Company, Niles, Mich.
Store Front Suggestions. Booklet, 96 pp., 6 x 8½ ins. Illustrated. Shows different types of Kawneer Solid Copper Store Fronts.
Catalog K. 1927 Edition. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Details of Kawneer Copper Store Fronts.
Detail Sheets for Use in Tracing. Full-sized details on sheets 17 x 22 ins.
Kawneer Construction in Solid Bronze or Copper. Booklet, 64 pp., 8½ x 11 ins. Illustrated. Complete data on the subject.

Modern Bronze Store Front Co., Chicago Heights, Ill.
Introducing Extruded Bronze Store Front Construction. Folder, 4 pp., 8½ x 11 ins. Illustrated. Contains full-sized details of metal store fronts.

STORE FRONTS—Continued

Zouri Drawn Metals Company, Chicago Heights, Ill.
Zouri Safety Key-Set Store Front Construction. Catalog, 8½ x 10½ ins., 60 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects' files.
International Store Front Construction. Catalog, 8½ x 10 ins., 70 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects' files.
Store Fronts by Zouri. Booklet, 30 pp., 9 x 12 ins. Illustrated.

TELEPHONE SERVICE ARRANGEMENTS

All Bell Telephone Companies. Apply nearest Business Office, or American Telephone and Telegraph Company, 195 Broadway, New York.
Planning for Home Telephone Conveniences. Booklet, 52 pp., 8½ x 11 inches. Illustrated.
Planning for Telephones in Buildings. Brochure, 74 pp., 8½ x 11 inches. Illustrated.

TERRA COTTA

National Terra Cotta Society, 19 West 44th St., New York, N. Y.
Standard Specifications for the Manufacture, Furnishing and Setting of Terra Cotta. Brochure, 8½ x 11 ins., 12 pp. Complete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.
Color in Architecture. Revised Edition. Permanently bound volume, 9⅛ x 12¼ ins., containing a treatise upon the basic principles of color in architectural design, illustrating early European and modern American examples. Excellent illustrations in color.
Present Day Schools. 8½ x 11 ins., 32 pp. Illustrating 42 examples of school architecture with article upon school building design by James O. Betelle, A. I. A.
Better Banks. 8½ x 11 ins., 32 pp. Illustrating many banking buildings in terra cotta with an article on its use in bank design by Alfred C. Bossom, Architect.

TILE, HOLLOW

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Wall Construction Bulletin 174. 8½ x 11 ins., 32 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
Standard Fireproofing Bulletin 171. 8½ x 11 ins., 32 pp. Illustrated. A treatise on the subject of hollow tile as used for floors, girder, column and beam covering and similar construction.
Natco Double Shell Load Bearing Tile Bulletin. 8½ x 11 ins., 6 pp. Illustrated.
Natco Face Tile for the Up-to-Date. Farm Bulletin. 8½ x 11 ins.
Natcoflor Bulletin. 8½ x 11 ins., 6 pp. Illustrated.
Natco Header Backer Tile Bulletin. 8½ x 11 ins., 4 pp. Illustrated.
Natco Unibacker Tile Bulletin. 8½ x 11 ins., 4 pp. Illustrated.

TILES

Hanley Company, Bradford, Pa.
Hanley Quarry Tile. Folder. 4 pp., 5 x 8 ins. Illustrated.

C. Pardee Works, 9 East 45th St., New York, N. Y., and 1600 Walnut St., Philadelphia, Pa.
Pardee Tiles. Bound volume, 48 pp., 8½ x 11 ins. Illustrated.

United States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 120 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

VALVES

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
No. 51. General Catalog. Illustrated. Describes the complete line of the Crane Co.

C. A. Dunham Co., 450 East Ohio St., Chicago, Ill.
The Dunham Packless Radiator Valve. Brochure, 12 pp., 8 x 11 ins. Illustrated. Data on an important type of valve.

Jenkins Brothers, 80 White Street, New York.
Office Buildings Yesterday and Today. Folder, 8½ x 11 ins. Illustrated. Valves for use in office buildings.
The Valve Behind a Good Heating System. Booklet, 4½ x 7¼ ins., 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections.
Jenkins Valves for Plumbing Service. Booklet, 4½ x 7¼ ins. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

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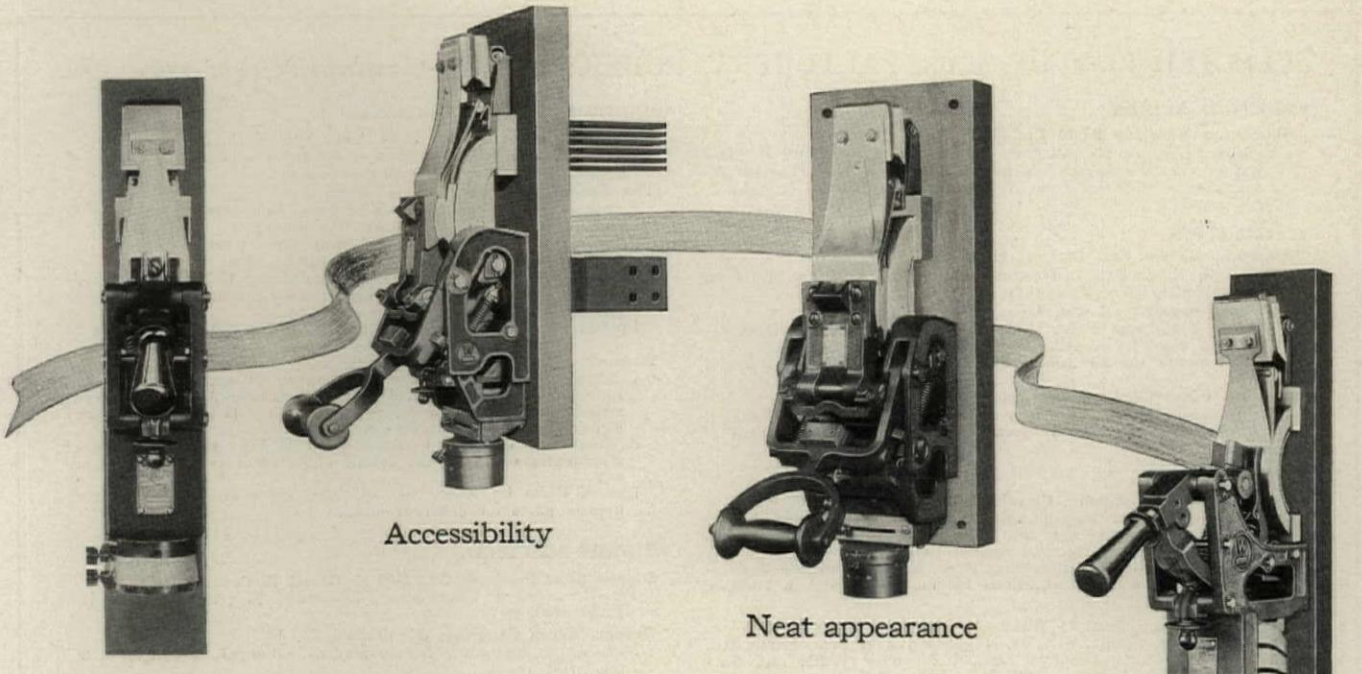

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Panelboards
Safety Switches
Switchboards
Transformers
Turbines
Wiring Devices

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 190*

VENETIAN BLINDS

Burlington Venetian Blind Co., Burlington, Vt.
Venetian Blinds. Booklet, 7 x 10 ins., 24 pp. Illustrated. Describes the "Burlington" Venetian blinds, method of operation, advantages of installation to obtain perfect control of light in the room.

VENTILATION

American Blower Co., Detroit, Mich.
American H. S. Fans. Brochure, 28 pp., 8½ x 11 ins. Data on an important line of blowers.

Duriron Company, Dayton, Ohio.
Acid-proof Exhaust Fans. Folder, 8 x 10½ ins., 8 pp. Data regarding fans for ventilation of laboratory fume hoods.
Specification Form for Acid-proof Exhaust Fans. Folder, 8 x 10½ ins.

Staynew Filter Corporation, Rochester, N. Y.
Protectomotor High Efficiency Industrial Air Filters. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on valuable detail of apparatus.

WATERPROOFING

Master Builders Company, Cleveland, Ohio.
Waterproofing and Dampproofing and Allied Products. Sheets in loose index file, 9 x 12 ins. Valuable data on different types of materials for protection against dampness.
Waterproofing and Dampproofing File. 36 pp. Complete descriptions and detailed specifications for materials used in building with concrete.

Minwax Company, Inc., 11 West 42nd St., New York.
Waterproofing Stadia. Folder, 4 pp., 8½ x 11 ins. Illustrated.
Transparent Waterproofings for All Masonry Walls and Surfaces. Folder, 4 pp., 8½ x 11 ins. Illustrated.
Data Sheet on Membrane Waterproofing. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Sommers & Co., Ltd., 342 Madison Ave., New York, N. Y.
"Permantile Liquid Waterproofing" for making concrete and cement mortar permanently impervious to water. Also circulars on floor treatments and cement colors. Complete data and specifications. Sent upon request to architects using business stationery. Circular size, 8½ x 11 ins.

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y.
Pamphlet, 3¾ x 8¾ ins., 8 pp. Explanation of waterproofing principles. Specifications for waterproofing walls, floors, swimming pools and treatment of concrete, stucco and mortar.

Toch Brothers, New York, Chicago, Los Angeles.
Architects' Specification Data. Sheets in loose leaf binder, 8½ x 11 ins., dealing with an important line of materials.

The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
Par-Lock Specification "Form D" for waterproofing surfaces to be finished with Portland cement or tile.
Par-Lock Specification "Forms E and G" membrane waterproofing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure.
Par-Lock Waterproofing. Specification Forms D. E, F and G. Sheets, 8½ x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit requirements.
Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8½ x 11 ins. Official Bulletin of Approved Products—Investigating Committees of Architects and Engineers.

WEATHER STRIPS

Athey Company, 6035 West 65th St., Chicago, Ill.
The Only Weatherstrip with a Cloth to Metal Contact. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on an important type of weather stripping.

WINDOWS

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.
Fenestra Blue Book. Brochure, 75 pp., 8½ x 11 ins. Illustrated. Data on steel windows.

The Kawneer Company, Niles, Mich.
Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Pivoted Sash. Catalog 12-A. Booklet, 48 pp., 8⅝ x 11 ins. Illustrates and describes windows suitable for manufacturing buildings.

WINDOWS, CASEMENT

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.
Fenestra Casements. Booklet, 14 pp., 8½ x 11 ins. Illustrated. Discusses casements, particularly for residences.
Fenestra Screen Casements. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
Decorating With Casements. Booklet, 18 pp., with inserts in color 6 x 8½ ins. Deals with use of decorations, particularly draperies, with casement windows.

WINDOWS, CASEMENT—Continued

Hope & Sons, Henry, 103 Park Ave., New York, N. Y.
Catalog, 12¼ x 18½ ins., 30 pp. Illustrated. Full-size details of outward and inward opening casements.

The Kawneer Company, Niles, Mich.
Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Casement of Copper Steel. Catalog C-217. Booklet, 24 pp., 8⅝ x 11 ins. Illustrated brochure on casements, particularly for residences.
Lupton Heavy Casements. Detail Sheet No. 101, 4 pp., 8½ x 11 ins. Details and specifications only.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Casement Window Hardware. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Shows typical installations, detail drawings, construction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.
Architectural Details. Booklet, 8½ x 11 ins., 16 pp. Tables of specifications and typical details of different types of construction.
List of Parts for Assembly. Booklet, 8½ x 11 ins., 16 pp. Full lists of parts for different units.

WINDOW SCREENS

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.
Fenestra Screen Casements. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

Orange Screen Company, Maplewood, N. J.
New Vogue Aluminum Frame Screens. Booklet, 12 pp., 3½ x 8½ ins. Illustrated.

WINDOW SHADES AND ROLLERS

Columbia Mills, Inc., 225 Fifth Avenue, New York, N. Y.
Window Shade Data Book. Folder, 28 pp., 8½ x 11 ins. Illustrated.

WINDOWS, STEEL AND BRONZE

David Lupton's Sons Company, Philadelphia, Pa.
A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 8⅝ x 11 ins. Deals with Pond Continuous Sash. Sawtooth Roofs, etc.
How Windows Can Make Better Homes. Booklet, 3⅞ x 7 ins., 12 pp. An attractive and helpful illustrated publication on use of steel casements for domestic buildings.

Truscon Steel Company, Youngstown, Ohio.
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Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet, 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.
Continuous Steel Windows and Mechanical Operators. Catalog 126. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

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American Walnut Mfrs. Association, 618 So. Michigan Boulevard, Chicago, Ill.
American Walnut. Booklet, 7 x 9 ins., 46 pp. Illustrated. A very useful and interesting little book on the use of walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.
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Curtis Companies Service Bureau, Clinton, Iowa.
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National Lumber Mfrs. Assn., Washington, D. C.
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Minwax Company, Inc., 11 West 42nd St., New York.
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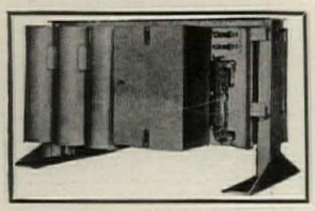

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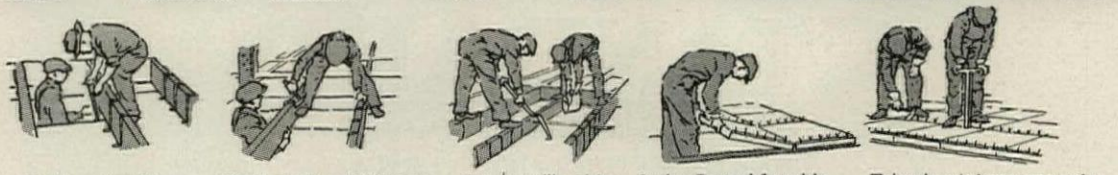

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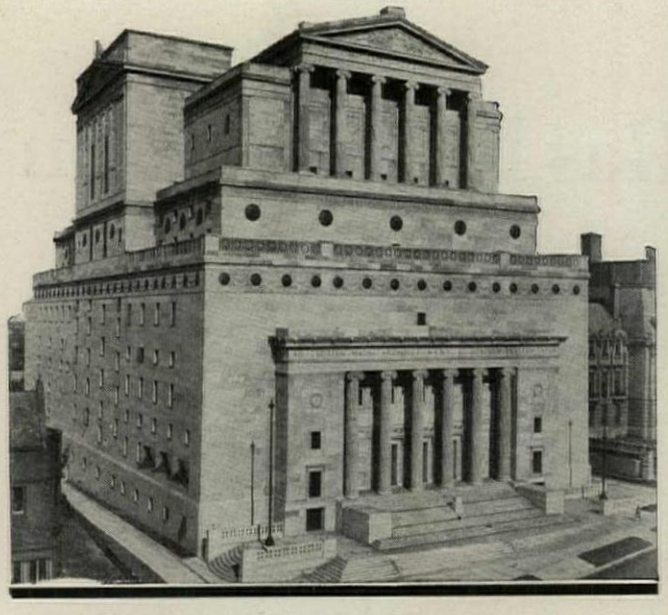

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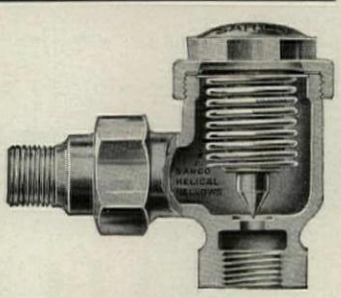

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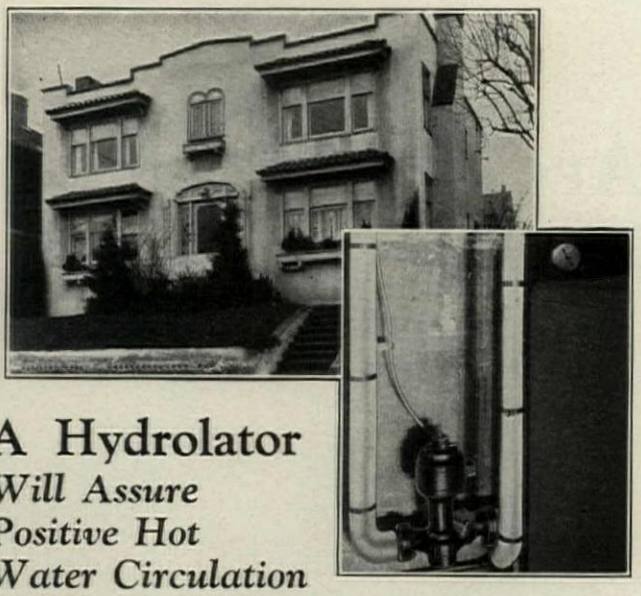

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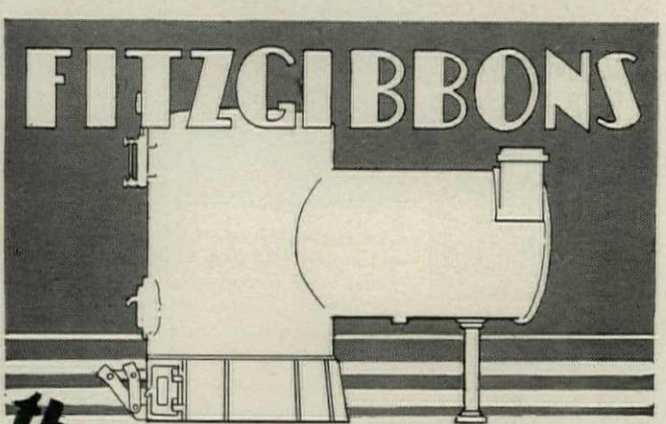

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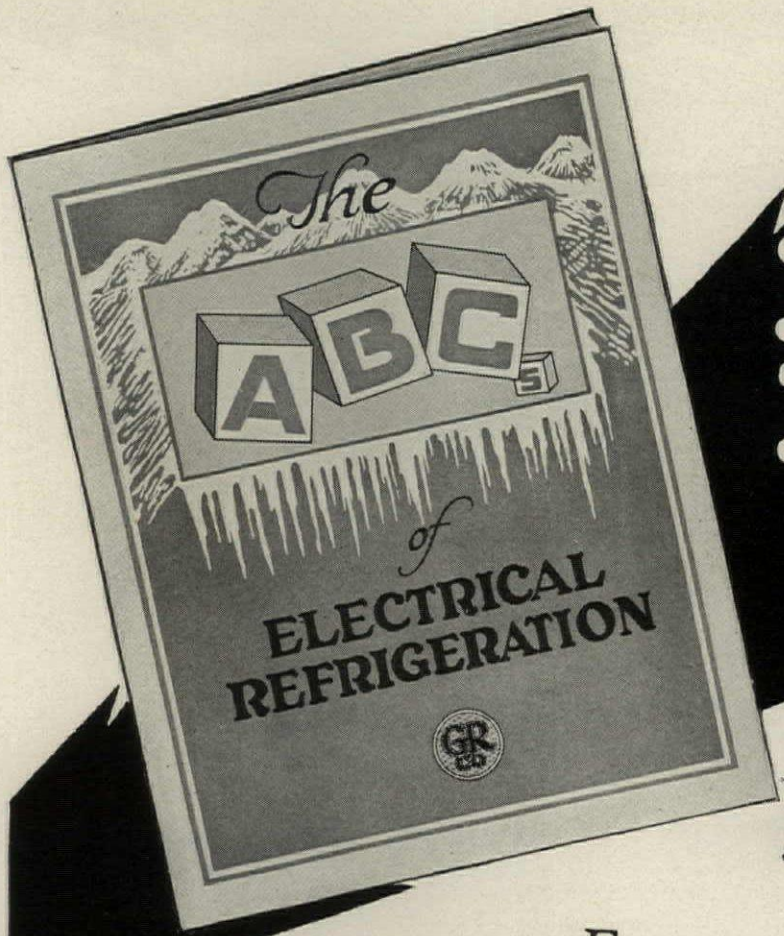

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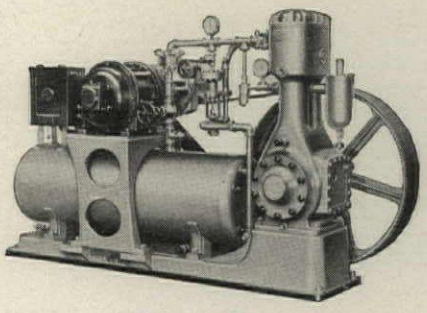

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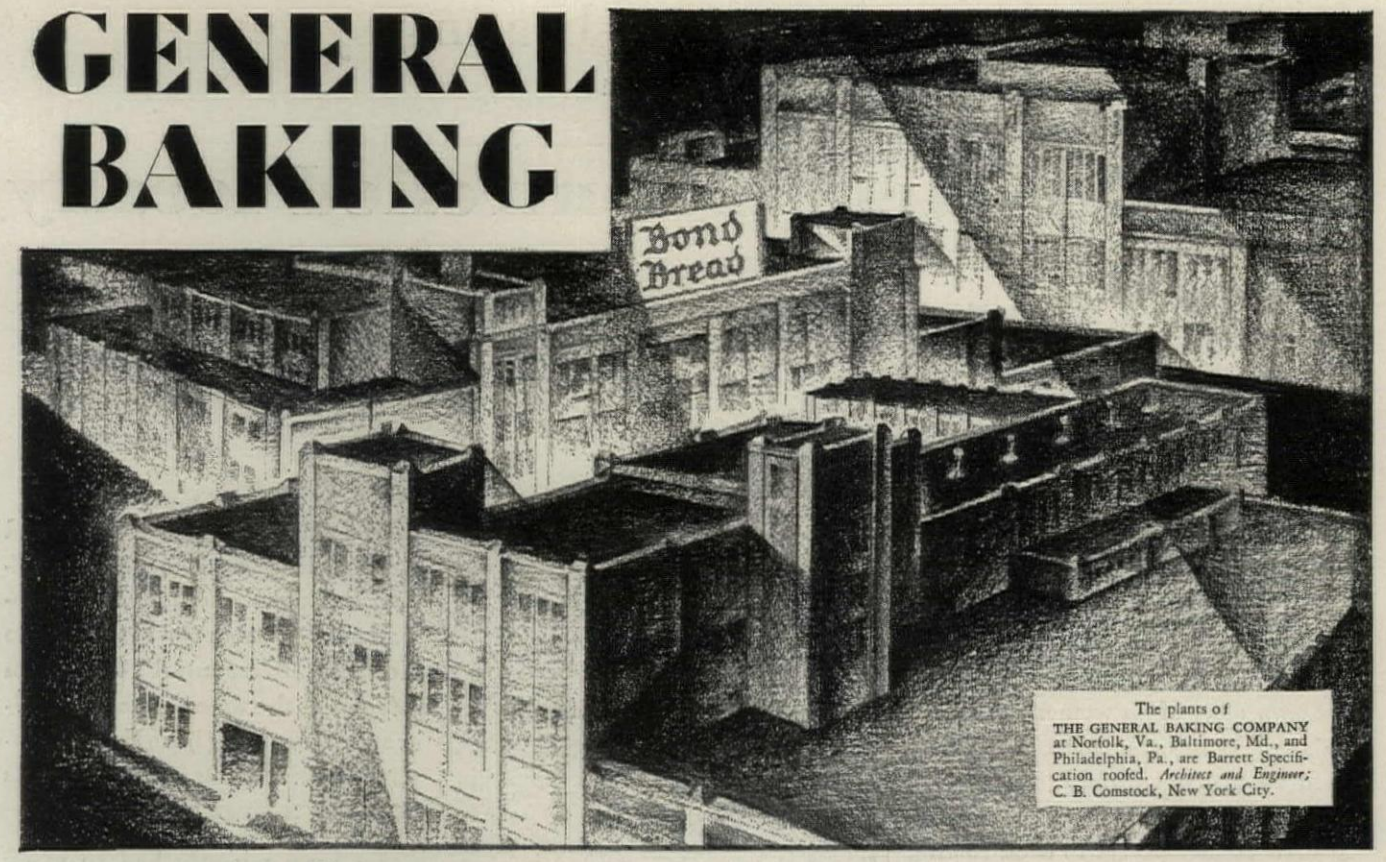

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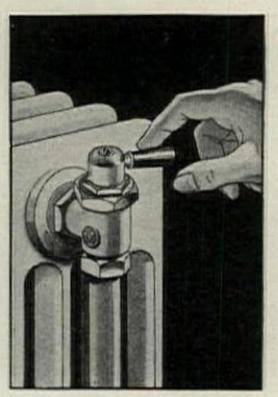

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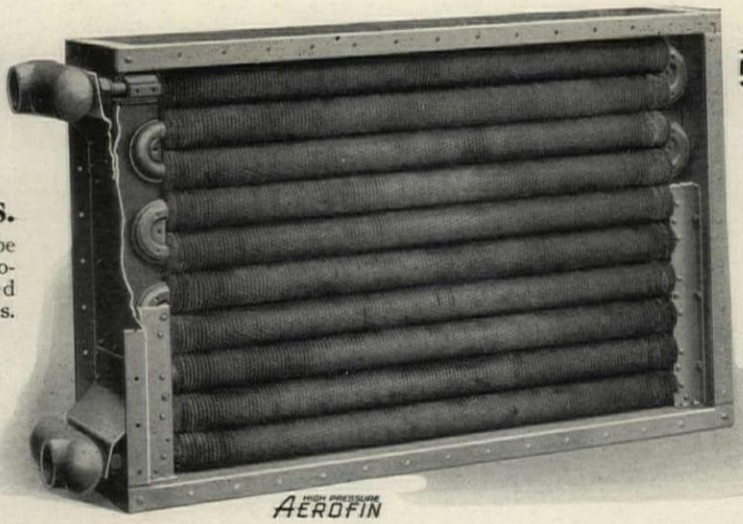

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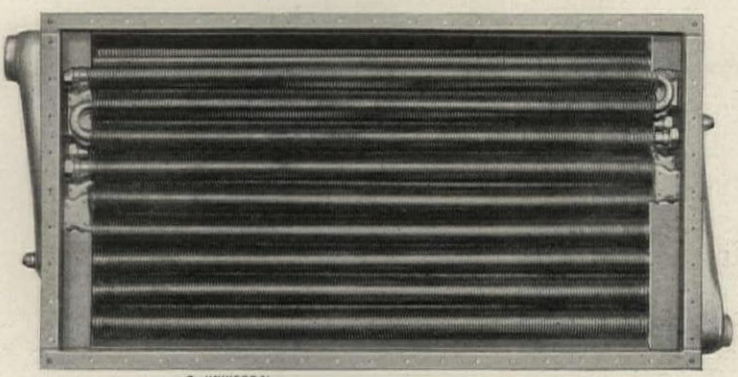

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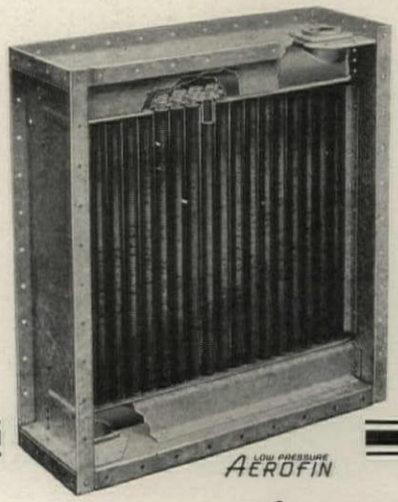

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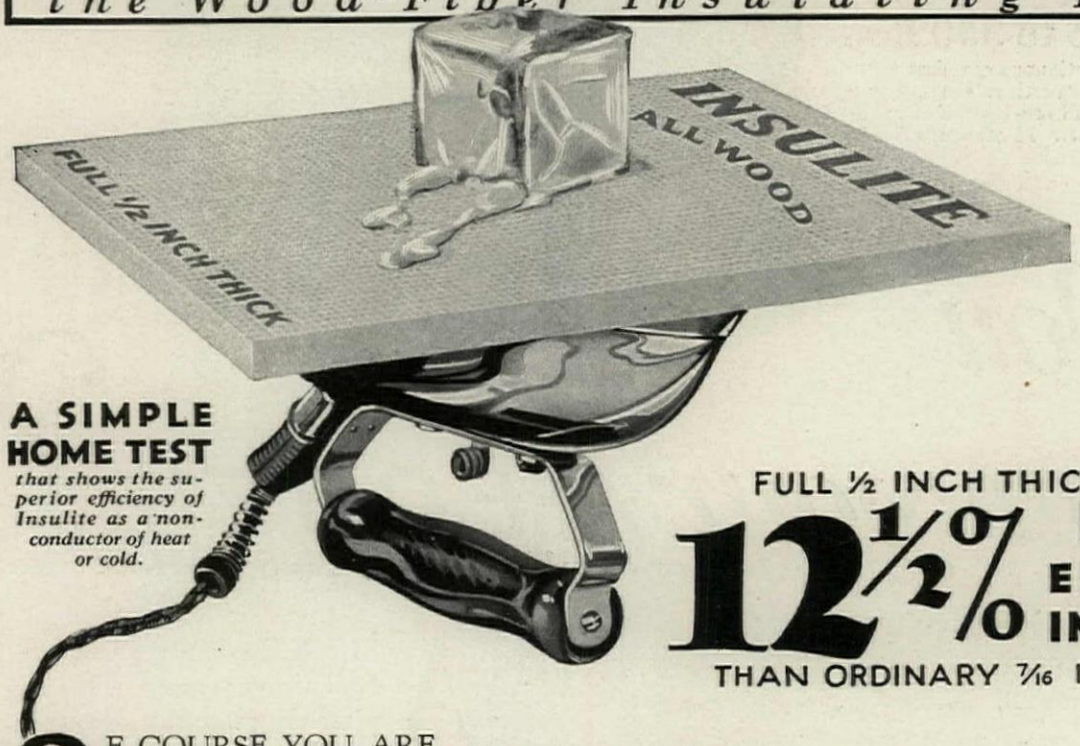

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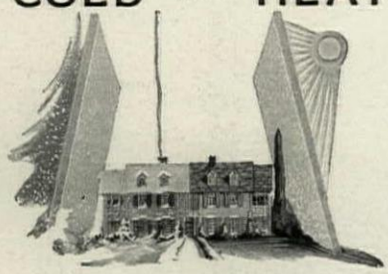

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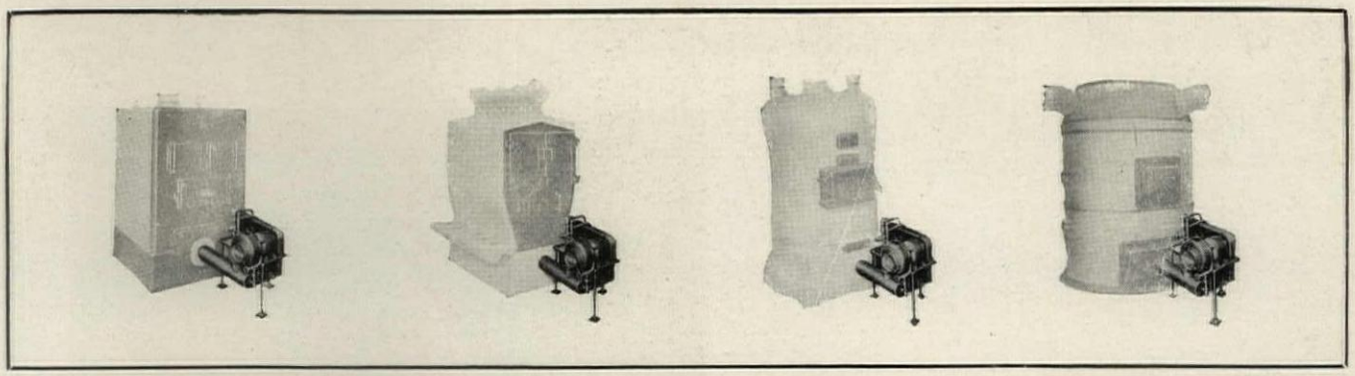

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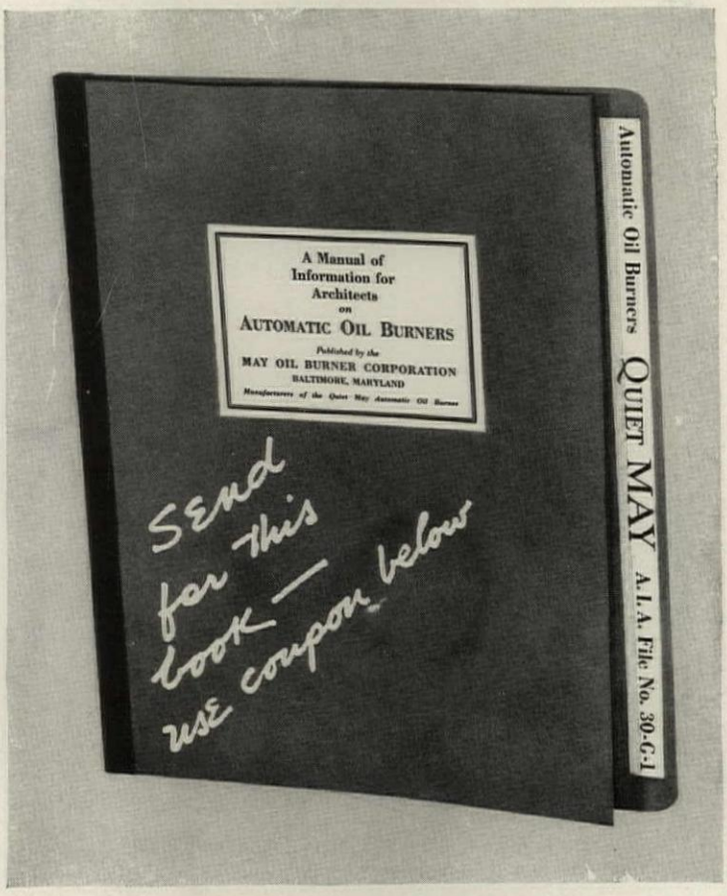
WILL ALWAYS BE LOW . . .
because an adequate supply is assured for many generations . . .



CAREFUL study of the following statistics from the most recent report of the U. S. Bureau of Mines shows that an abundance of oil fuel for hundreds of years is a certainty.

Number of Producing Wells	311,042
Producing area—Acres	2,140,684
Proved Undeveloped Area—Acres	1,103,905
1926 Production per day—Barrels	2,100,000
Reserve of Producing Wells—Barrels	3,210,449,000
Estimated Amount of Oil Left in Ground Under Production after Present Pumping and Flowing Methods Cease—Barrels	26,394,157,000
Unproved but Likely Area Within Which New Fields May be Found—Acres	1,105,454,459
Total Production of Oil in the United States during the Past 70 Years—Barrels	8,666,622,000

Send for our Manual of Information for Architects on Automatic Oil Burners if it is not already in your files.

MAY OIL BURNER CORPORATION
3500 East Biddle St., Baltimore, Md.

AF-8-29

MAY OIL BURNER CORPORATION
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Please send me items checked below

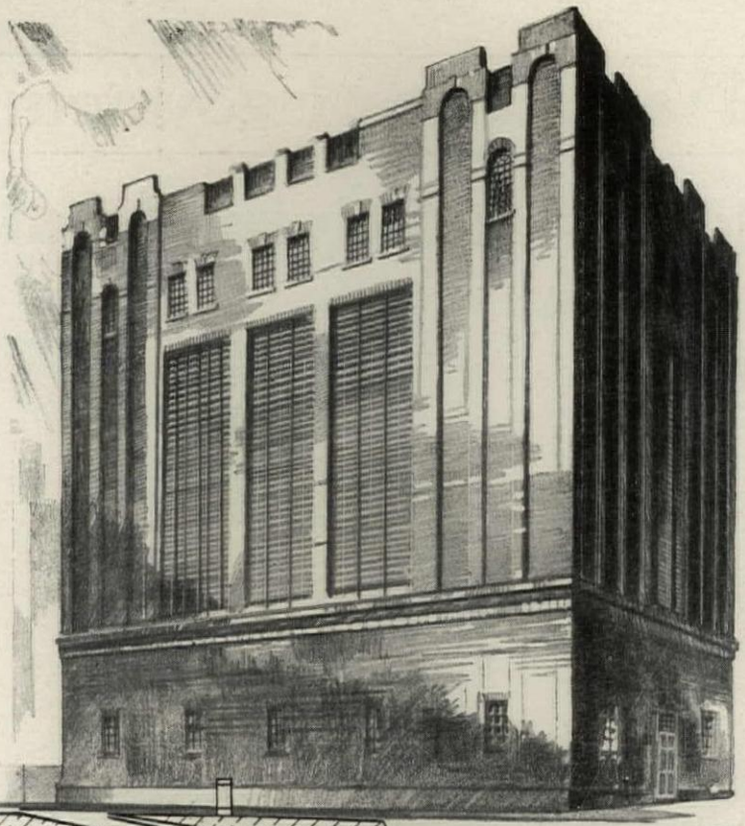
☐ Manual for Architects
☐ Book for Home-Owner

Individual_____

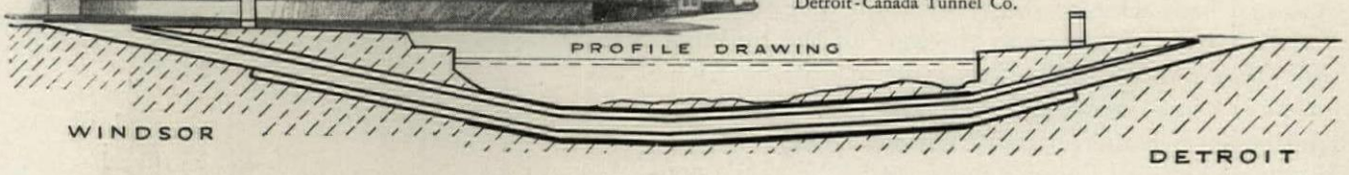
c/o Firm_____

Street_____

City_____ State_____

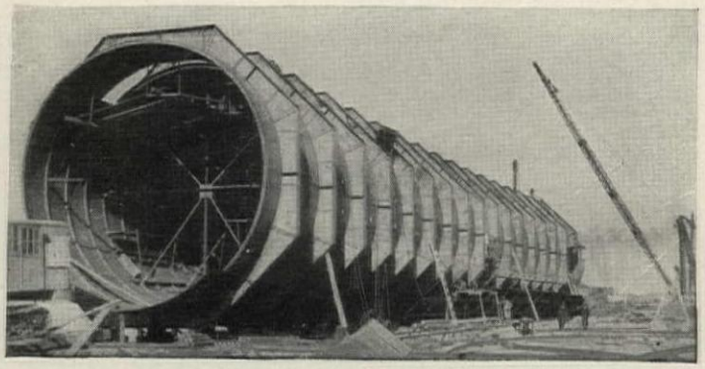


One of the Ventilation Buildings. Construction by Parklap Construction Corp. for the Detroit-Canada Tunnel Co.



The International Air *will always be good in the* DETROIT-CANADA TUNNEL

SILENTVANES *were chosen!*



—It was because of a reputation for low operating cost that Silentvanes have built up for themselves in the Holland Tunnels and the George A. Posey Tube in California . . .

—and because of Sturtevant's special experience in building fans for this kind of work . .

. . . Silentvanes were chosen!

The new tunnel connects Detroit, Michigan and Windsor, Ontario. It consists of a single tube 5100 feet long with a roadway 22 feet wide. There are two ventilating buildings—one in Canada and the other in the United States.

To keep the air pure at all times—even in emergencies—twenty-four Sturtevant Silentvane Fans were chosen—twelve Blowers and twelve Exhausters. Capacities range from 61,500 to 195,000 C.F.M. Under maximum operating requirements, the load will be about 900 H.P.

Architects and Engineers are invited to make use of the Sturtevant Research Laboratories where valuable cooperating facilities are available in the development of special ventilating apparatus.

River Tube construction by Porter Bros. & Robt. Porter for the Detroit-Canada Tunnel Co.,

Plans and specifications by Parsons, Klapp, Brinckerhoff and Douglas, New York City.

Ole Singstad, Consulting Engineer on Ventilation.

Sturtevant

REG. U.S. PAT. OFF.

HEATING-VENTILATING AND POWER PLANT EQUIPMENT

B. F. STURTEVANT Co.
Hyde Park,
BOSTON, MASS.

Plants at: Berkeley, Cal., Camden, N. J., Framingham, Mass., Galt, Ontario, Hyde Park, Mass., Sturtevant, Wis.
Canadian Representative: Kipp Kelly, Ltd., Winnipeg
Offices in Principal Cities.

The Dunham Differential Vacuum Heating System

provides completely satisfying heat for the beautiful new

STERICK BUILDING

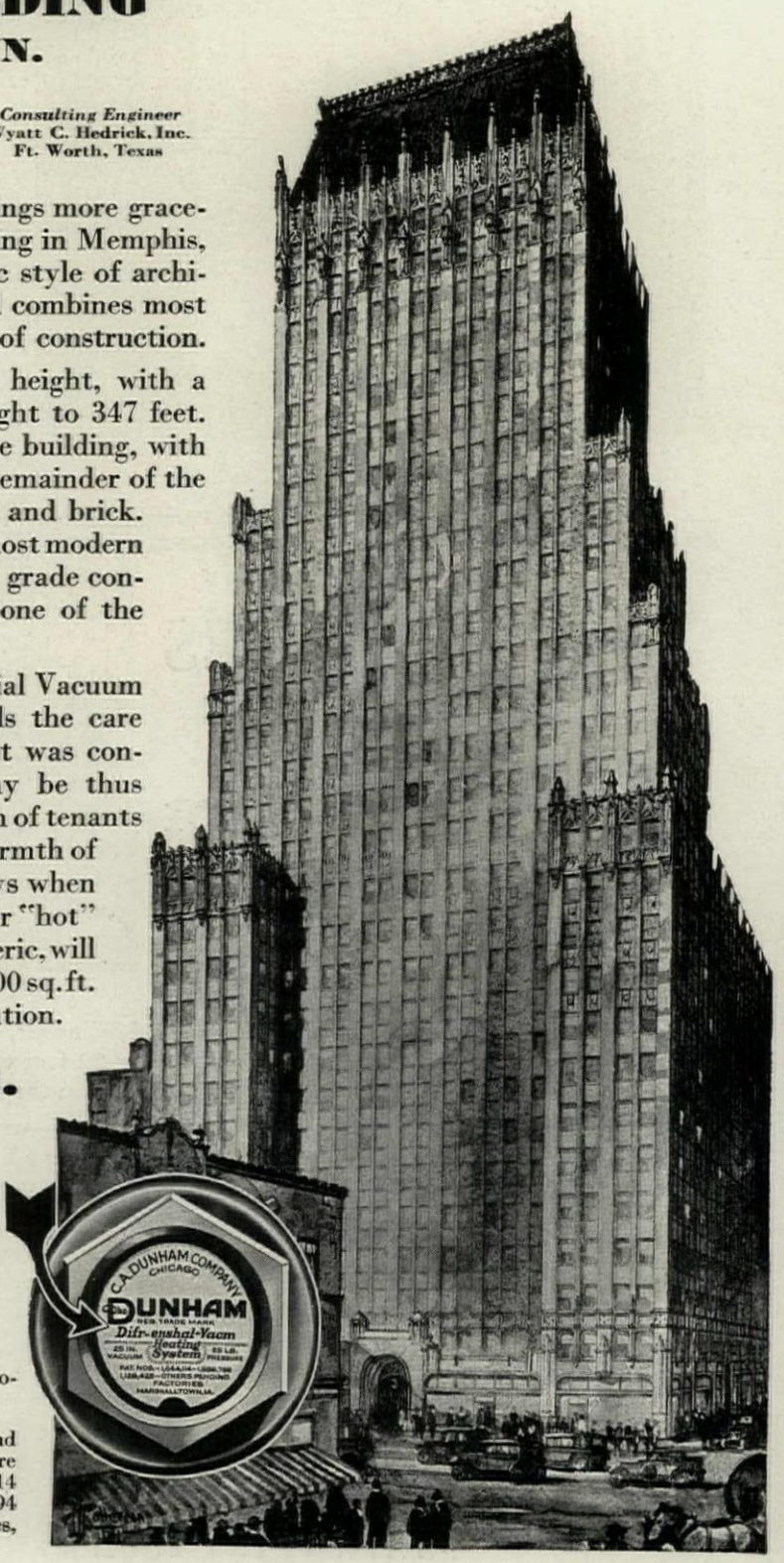
MEMPHIS, TENN.

Architect	*Heating Contractor*	*Consulting Engineer*
Wyatt C. Hedrick, Inc.	J. W. Hull Plumbing &	Wyatt C. Hedrick, Inc.
Ft. Worth, Texas	Heating Co., Memphis	Ft. Worth, Texas

FEW American cities can boast of buildings more gracefully beautiful than the Sterick Building in Memphis, Tenn. The charm of the towering Gothic style of architecture in which this building is designed combines most fittingly with the modern set-back type of construction.

The Sterick Building is 29 stories in height, with a mansard roof which brings the total height to 347 feet. Polished granite is used in the base of the building, with three floors above in Bedford stone, the remainder of the building being faced with artificial stone and brick. High speed electric express elevators, the most modern of equipment and appointments and high grade construction throughout make the Sterick one of the South's most outstanding structures.

The selection of the Dunham Differential Vacuum Heating System for this building reveals the care with which every detail of its equipment was considered. For not only will fuel economy be thus assured the owners, but comfort and health of tenants will be cared for by the mild, beneficent warmth of Sub-Atmospheric Steam on the many days when but little heat is required; in colder weather "hot" steam, at pressures higher than atmospheric, will provide ample warmth. There is over 34,000 sq. ft. equivalent direct radiation in this installation.



C. A. DUNHAM CO.

DUNHAM BUILDING

450 E. Ohio St., CHICAGO

Over eighty sales offices in the United States, Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

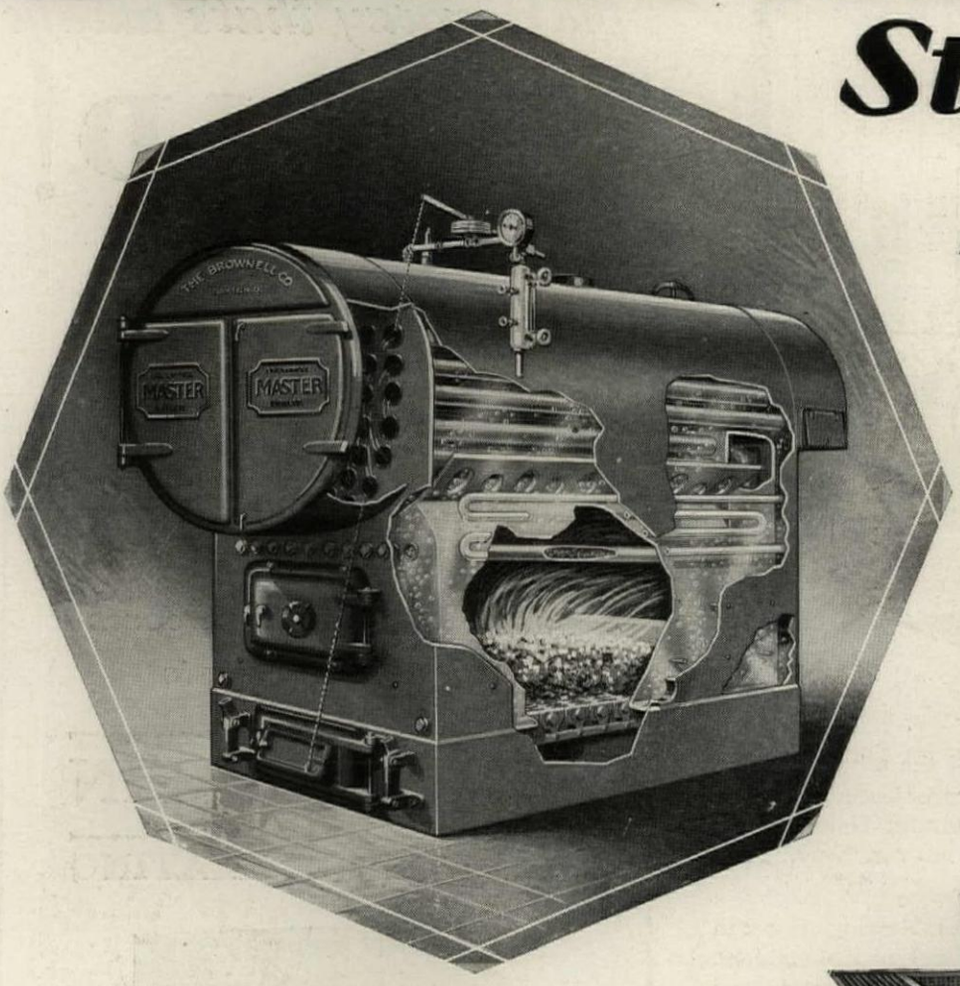
Look for the name DUNHAM

This nameplate identifies a genuine Dunham Thermostatic Radiator Trap.

The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114 and 1,706,401, and Canadian Patents Nos. 282,193, 282,194 and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

BROWNELL

Stands Alone



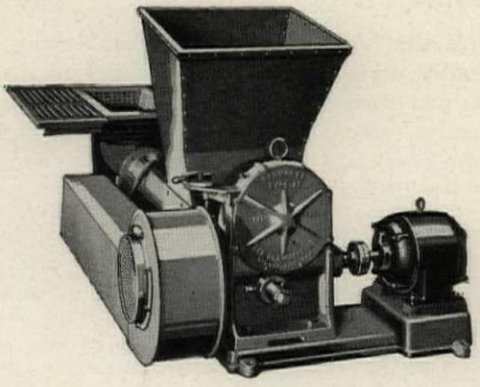
The Brownell Company has been designing and building boiler room equipment for 74 years. They are the only company in the entire country building both boilers and stokers. Neither is an "assembled" product—both being designed and built in their entirety at the Brownell Shops.

The Brownell Welded Steel Boiler line is complete and embodies features exclusively "Brownell"—features that combine in one unit effective heating, year round domestic hot water service without resorting to an auxiliary heater, and without heating the building in warm weather; also, when oil fired, an odorless inbuilt incinerator.

Send for Boiler Bulletin M-65 and S-65. Also Stoker Bulletin S-50.

The Brownell Company, Dayton, Ohio

Representatives in Principal Cities

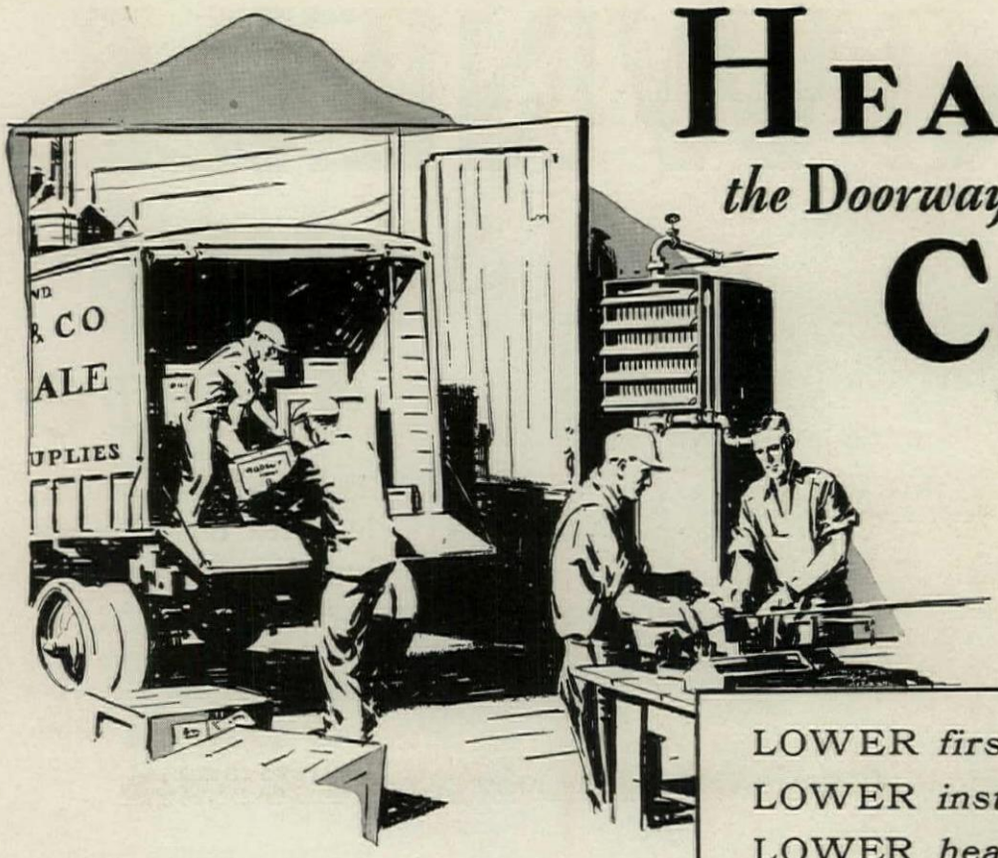


Brownell Automatic Underfeed Stokers are far heavier built than any other make—also built to closer tolerances—obviously reducing maintenance expense and prolonging their period of dependable service.

Brownell

Electric Welded Steel

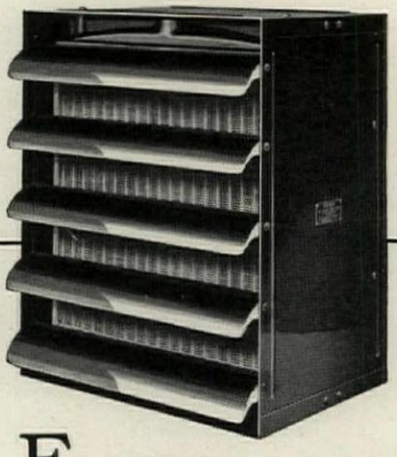
Boilers



HEAT
the Doorway that's always
COLD!

LOWER *first costs*
LOWER *installation costs*
LOWER *heating costs*

VENTURAFIN
TRADE MARK REG.
METHOD OF HEATING



Heat with Unit Heaters

ICY DRAFTS no longer chill the whole building whenever doors swing open, once Venturafins stand guard at your doorway. Venturafin Unit Heaters easily conquer any cold that comes their way. They are always effective and efficient.

With the Venturafin Method of Heating, you can actually *control* heat in every part of the building. You can *force* healthful, heated air—accurately and directly—where it is needed most. You can wipe out cold corners and heat pockets. You can avoid freezing one worker and roasting the next.

Venturafin forces heated air directly into working areas—*where* you want it, *when* you want it, and as *much* as you want. It saves you the needless expense of heating ceiling areas first.

You'll be surprised, too, at the moderate cost of Venturafin Units . . . their adaptability to practically any position in your plant . . . their economy of space . . . their low maintenance costs and the actual saving in fuel that results year after year. You'll note, also, the increased productiveness of your men when they work under heating conditions that are exactly right.

Call in any of the reliable heating contractors in your city. Ask them for all the facts about Venturafin, or mail the coupon.

For stores, showrooms, factories, shops, garages and many other types of buildings.

(886)

AMERICAN BLOWER CORPORATION, DETROIT, MICH.
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONT.
BRANCH OFFICES IN ALL PRINCIPAL CITIES

American Blower
"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

COUPON

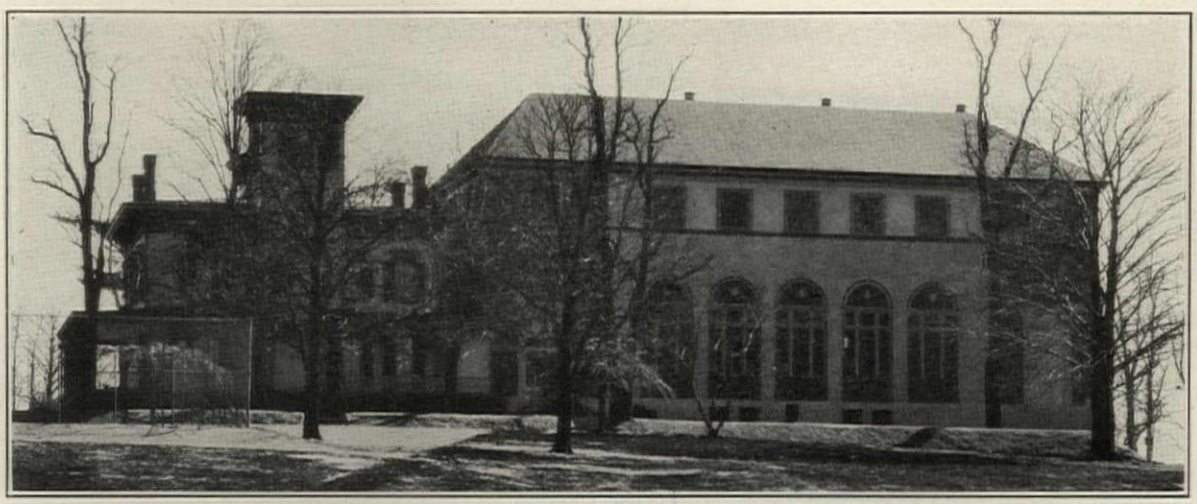
American Blower Corp.
6000 Russell St., Detroit

Please send me your 24-page Venturafin Book

*Name*_____

*Address*_____ *City*_____

Preference for Oil Heat usually implies knowledge of Electrol



Elks Club, Glen Cove, N. Y.
Heated by ELECTROL

YOU MAY NOT REALIZE how much Electrol, the Oil Burner with the Master Control, has contributed to the now widespread and general acceptance of oil heat.

For more than a decade, Electrol has played a leading role in the improvement of heating methods and the elimination of furnace drudgery. In that time, Electrol's reputation for healthful comfort, cleanliness, labor-saving convenience, and fuel economy, has done much to mould favorable public opinion for this new form of home comfort.

You can specify Electrol Automatic Oil Heat secure in the knowledge that your professional judgment is wholly in accord with your client's ideas. Both will be right in preferring Electrol.

Electrol employs electricity throughout. A small electric motor furnishes the power. An electric thermostat keeps the temperature uniform. Ignition is entirely electric. Quiet . . . economical . . . completely automatic.

Wherever Electrol is sold you will find a complete oil-heating service, backed by a sound, large and growing manufacturing organization. Purchase can be financed along with the financing of the new building.

Write for the Electrol regulation A. I. A. Folder, or consult the Electrol Sales and Service Representative in your city.

ELECTROL INCORPORATED
179 Dorcas St. St. Louis, U. S. A.

A Consultation Service for Architects

Electrol has a staff of engineers who devote their entire time to the formulation of heating plans and specifications from information sent us by architects. Electrol welcomes the opportunity to put this free service at your disposal.

MEMBER OF
OIL HEATING INSTITUTE

ELECTROL

The* OIL BURNER *with the Master Control

LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES

REVIEWS OF MANUFACTURERS' PUBLICATIONS

NATIONAL LUMBER MANUFACTURERS' ASSOCIATION. "Transformation from Old House to New Home."

It is amazing what can be done to alter the appearance of an old and completely unattractive house when there is brought into action even a fair degree of architectural skill along with adequate funds. Houses erected 20 or 30 years ago were generally well built with good materials upon excellent foundations and so well roofed that their roofs are often in good condition today. Their architecture, however, left almost everything to be desired, for it was before the time when architects exerted themselves to make the small house attractive, and such work was generally left to carpenters, trained as a rule in use of old fashioned methods of building without much care given to the dress in which structural strength might be clothed. What can easily be done to completely transform the appearance of such houses is well demonstrated in this excellent brochure issued by a large association of lumber manufacturers. "A number of old houses typical as to shape, height, and general appearance have been chosen for examples, carefully studied, and new designs developed for each and presented here. They will serve as suggestions applicable to thousands of old houses. The individual application may easily be determined according to personal preference, location, and cost, in consultation with the lumber dealer, carpenter, and architect." One detail of the brochure,—a detail of more than passing interest,—is presented upon two pages which show the extremely unpretentious old frame house at West Branch, Ia., in which President Hoover was born, while three extremely well considered designs show what could easily be made from it.

METALS COATING COMPANY OF AMERICA, 495 N. Third Street, Philadelphia. "Metalayer, The Putting-on Tool."

There are of course countless uses for a device which spreads a metallic coating of any desired thickness over a surface of any material. This folder deals with a tool which, operated by compressed air, feeds a continuous wire of any required metal into an oxy-acetylene melting flame. A compressed air jet atomizes the melted metal and distributes it over the surface being treated. To mention but one of the purposes for which the device is used, there is the very important detail of protecting iron or steel against corrosion. The folder says: "Because of the thickness of the coatings it applies, Metalayer creates a new order of effectiveness in rustproofing. Size is no obstacle; bridges, railway signal towers, high tension transmission towers, etc., may readily be zinc-coated to a depth insuring indefinite life. There is no danger of hidden corrosion, nor is it necessary to add metal in the original design to offset corrosion. Structures of the most vital importance, like bridges, may be coated by Metalayer with complete confidence and with a marked saving in maintenance cost. Iron and steel mechanical parts, exposed to the weather and difficult to paint, are effectively protected by Metalayer. Examples are pipe fittings, bolts and nuts, roofing nails, and certain parts in the brake rigging of railway cars and in mining machinery. Parts subject to wear and abrasion may be coated to a depth that allows for wear. If desired, copper, bronze or lead may be applied over the protective zinc coating. Street lighting standards, ornamental grilles, sign posts, etc., may be given highly artistic effects in this manner. Hardware may be made of iron or steel instead of bronze, and finished with Metalayer coatings that combine protection with decorative effects. Chemical vats may be made of iron and cheaply metal-lined; and parts exposed to corrosive gases may be made of iron or steel, and coated with lead, monel metal, cadmium, or whatever is needed. Sometimes two coats of different metals give better protection than a single metal."

The folder describes another use for the tool and gives several illustrations showing interesting decorative effects had by spraying molten metals of different colors through stencils, thus producing pattern in relief. "Decorative uses of Metalayer cover a wide range. Iron hardware may be given a durable coating of copper, bronze, or nickel. Coatings may be left with the natural (matt) surface, or burnished. If not exposed to wear, they may be given beautiful colorings by chemical means, imitating the natural oxides and patina of old metal. Not only metal, but plaster, tile, pottery and wooden articles may be coated in this manner. Use may be made of contrasting metals.

AMERICAN ENCAUSTIC TILING COMPANY, LTD., 16 East 41st Street, New York. "Lombardic Mosaic."

The various publications being issued by the American Encaustic Tiling Company are excellent examples of everything which such publications should be. With wares of great beauty and artistic excellence to deal with, those in charge of compiling different booklets and brochures make full use of all the resources of illustrating in color, and the results are publications which convey to architect, engineer or decorator an excellent idea of the combinations and effects to be had by using artistic tiling of one kind or another.

RANDOM ASHLAR STONE. "The Common Sense of Ashtone." The proper methods of using the material.

Everybody wants a substantial home, not only for comfort, but also because one wants a permanent home. Two important factors must be considered when choosing a building material. First, it must have strength. Second, it must have beauty. In both respects "Ashtone" completely measures up to requirements. Hewn from the earth, Ashtone has solidity and lasting strength. As for beauty, no material ages so gracefully, nor so staunchly defies time. Producing a beautiful building is a complex affair, involving many factors. Not only the material must be right, but it must be properly put together. Occasionally a building of Ashlar falls somewhat short of expectations, simply because the builder failed to employ the stone to the best advantage. Generally it is the fault of the builder; when it is, it is due to his unfamiliarity with his working medium. This booklet is issued to give one a knowledge of this remarkable stone.

JOHNS-MANVILLE CORPORATION, 292 Madison Avenue, New York. "Floridene Stone, A Natural Travertine."

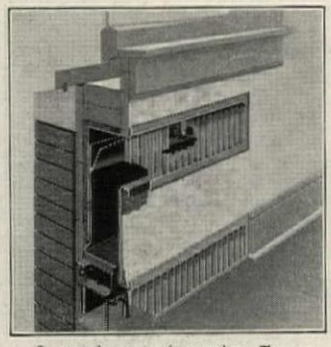
Architects and their designers are constantly looking for new varieties of stone and marble, the use of which means so much when employed for such interior uses as facing the walls of vestibules, foyers, halls and corridors, and for facing at times the walls of certain monumental interiors. The richness of real travertine has of course placed it among the most desirable of materials for such uses, since the beauty of its appearance is unquestioned, while its durability is attested by its use during many centuries,—from early Roman times to the present day. Real travertine, however, has necessarily been brought from abroad, and the fact that its cost has been considerable has naturally interfered with its use in places where it would have been highly desirable. This brochure or folder gives data regarding a travertine quarried in America, its history having a certain tinge of romance. "It was quite by chance that the presence of travertine was discovered, on what is now known as the 'Floridene' properties. Due to an embargo on building materials, a contractor in Florida sought to discover on his native soil a suitable concrete aggregate. He discovered a small part of the Floridene deposits and took samples of the stone to mineralogists for analysis. Not long after it was proved that his find was a natural travertine. J.-M. Floridene Stone is found in free ledge formation, unfaulted, there having been no geological disturbance in this area. At the time of the initial operation, various engineers estimated the quantity of available stone in excess of 80,000,000 cubic feet. Recent core drillings, however, reveal the practicability of mining to four times the depth that formed the basis of the original estimate. This stone ranges in color from a light creamy buff to darker shades of cool grayish cast, with soft and interesting mottlings. These include flowering effects of pure calcite. The intermediate tints and shades admit unusual latitude for successful combinations with other materials, thus avoiding the more restricted scope which the architect encounters in harmonius use of the imported travertines. J.-M. Floridene Stone has a finer grain than the imported travertines with less pronounced pitting and less noticeable laminar structure. It is more easily cleaned, an important consideration in economical building upkeep. The structure is unusually sound and uniform. Being homogeneous in formation, there is practically no grain which limits cutting in different directions or which rigidly restricts setting. It is also unusually free from flaws and faults. This makes extreme care in handling unnecessary and conduces to economy in setting costs. There are no structural limits to the size slab which may be had. The booklet is well illustrated.

Do You Still Specify Radiators?

In this modern age with its demands for greater comfort, beauty and efficiency, there is no place for the old fashioned radiator. There is a new mode in heating—Trane Concealed Heating—which is far superior. It is just as difficult to conceive of a perfect modern interior with unsightly radiators in view, as it would be with exposed piping, conduits and drains.

Trane Concealed Heating does away with radiators entirely and provides a system of heating which affords greater heating comfort and economy. It harmonizes perfectly with any decorative scheme — it does not take up any floor space—and costs no more than cast iron radiation equipped with high grade metal covers. The only visible parts are the inconspicuous grilles.

Trane Concealed Heaters are built in standard units with adjustable steel stacks which permit installation in any type of construction. There is complete accessibility to the heating element through the lower grille. It is not necessary to disturb any part of the wall or setting. The economy of Trane Concealed Heating rests on the scientifically developed heating element and the method of distributing heat into the room, which eliminate entirely the undesirable radiant rays.



Sectional view of complete Trane Concealed Heater installation.

A perfect heating system, of course, will employ Trane Vapor Heating in conjunction with Trane Concealed Heaters and Trane Specialties. Trane Bellows Packless Valves and Traps are well known for their high quality and exclusive features which make them essential in any high grade heating installation.

Our new booklet "Modern Style in Room Heating" will be sent you on return of the coupon.

HEAT CABINETS **TRANE** CONCEALED HEATERS
PUMPS, UNIT HEATERS, AND HEATING SPECIALTIES

The Trane Bellows Radiator Trap

The Trane Bellows Packless Valve

THE TRANE CO.,
Dept. 8, 220 Cameron Ave., La Crosse, Wis.

Send free booklet on new style in heating.

Name _____

Address _____

City _____ **State** _____

REVIEWS AND ANNOUNCEMENTS

STEDMAN PRODUCTS COMPANY, South Braintree, Mass. "Stedman Tile of Reinforced Rubber."

Quite lately a man who has had unusual opportunities for inspecting floors made of different sorts of rubber commented on the wide use of such flooring materials and attributed their extensive use to several of the admirable qualities possessed by rubber but particularly to the excellence of the designs or patterns in which such materials are to be had. This excellence is more than suggested by this booklet, issued by a large manufacturer of rubber tile floorings, for many illustrations in color as well as in black and white show interiors of different sorts floored with rubber tile in a wide variety of colors and designs which show study of the best in floor design both ancient and modern. While the nature of the material and the fact that it must be subject to "quantity" production naturally preclude use of complicated designs, there are such vast numbers of patterns which while extremely beautiful and distinguished are quite simple that the matter of design is not difficult to deal with. Then there are all the resources in use of borders and inlays to add heightened dignity to the body or field of a floor. The booklet, in fact, deals with more than the subject of reinforced rubber for flooring. "Laboratory research at the Stedman factory has led to the adaptation of reinforced rubber as a covering material for much used furniture such as desks, tables, counters, dressers, tops of refrigerators, enameled sinks, and similar objects. Its resilience, durability, silence and beauty make it highly desirable upon surfaces that receive unusually hard wear. Reinforced rubber on tables, sink drains, and refrigerator tops prevents the chipping of china and glassware and protects enameled surfaces. On desks and counters it supplies a smooth, attractive, and noiseless working surface. The widespread use of Stedman reinforced rubber has led to the production of many special accessories."

PITTSBURGH REFLECTOR CO., 304 Ross Street, Pittsburgh. "Floodlighting." A treatise on the subject.

By the term "floodlighting" there is brought to the mind of the average man the more or less ornamental lighting equipment required for the night lighting of fountains, certain important buildings, some advertising signs, etc. Such lighting, however, is frequently required for purposes which are wholly practical. Often construction areas, railroad classification yards, and airports must be so lighted unless their use at night is to be made wholly impossible. This is particularly true in the case of airports, since the approach to an airport must be made plainly visible to enable aviators to properly use the airports' facilities. "Floodlighting, through common consent, has become a sort of blanket term, denoting a wide variety of exterior night lighting application. Floodlighting made its appearance in lighting practice shortly after the perfection of the gas-filled tungsten lamp employing a concentrated light source which made the projection of powerful beams of light for considerable distances possible when installed in weatherproof lighting units containing paraboloidal mirror reflectors." To consider more in detail the necessity of floodlighting for airports, this extremely helpful booklet has this to say: "Successful night flying is an accomplished fact. Projectors, floods, obstruction lights, boundary lights and beacon lights make safe night flying possible. The air mail could not reach its full usefulness as long as it was limited to the role of an auxiliary daytime service. After the completion of the artificial lighting system for the 900-mile airway between Chicago and Cheyenne, Wyo., transcontinental air mail became a through-service. Rotating beacons at 10-mile intervals along the night airway mark out the course for the aviator. In addition, airports must be equipped so as to mark off the landing fields, and provide sufficient illumination for reasonable safety in landing airplanes at night. For these purposes, floodlights find useful application." It would hardly be possible, in the space here allowable, to more than suggest the wide application of the subject matter of this very valuable booklet. It should certainly be had by every architect or engineer, or by anyone else interested in subjects to which floodlighting of any variety would apply.

Robert C. Edwards announces the opening of new offices at 1143 East Jersey Street, Elizabeth, N. J.

Atlee B. Ayres and Robert M. Ayers announce their removal to the 30th story of the Smith-Young Tower, San Antonio. They would appreciate the catalogs and other publications of manufacturers.

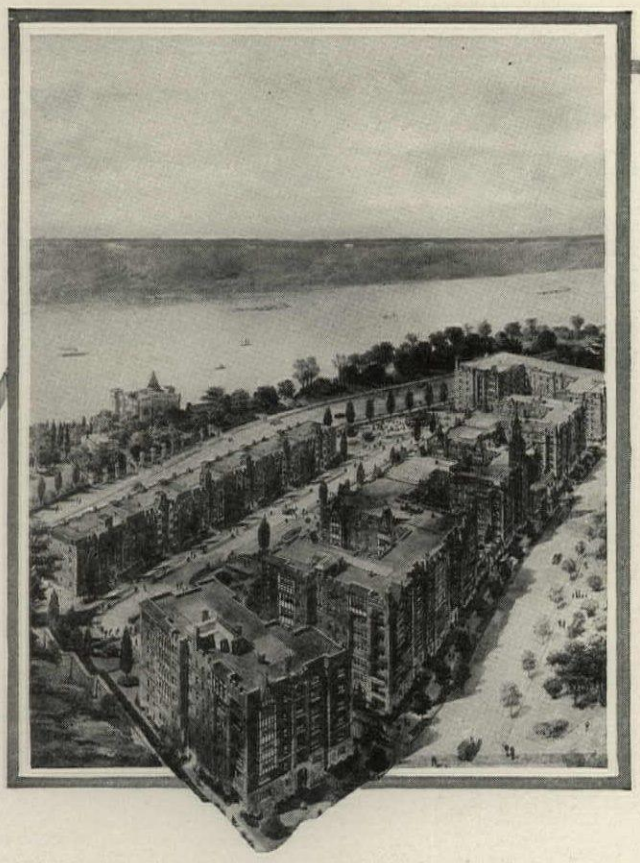
A Correction.—In the June issue of THE ARCHITECTURAL FORUM an error was made in crediting the design for the stores in the Station Plaza at Larchmont, N. Y., which were illustrated on page 883. D. A. Summo was architect.

EASTMAN KODAK COMPANY, Rochester. "The X-ray in Industry." An important application of the useful X-ray.

When one thinks of the X-ray at all, there immediately comes to mind its use in a hospital, a dental laboratory, or in some other place where it is a powerful aid to medical or dental science. "But such a valuable tool should not readily confine itself to the needs of the anatomical sciences in this day of alertness to new uses for existing processes. X-rays are increasingly being used to determine the internal structure of inanimate objects, such as steel and aluminum castings. This information, as part of a brief survey of the theory and use of X-rays in industry, is included in this booklet. The publication, which will be sent to those interested, suggests some of the industrial applications of X-rays in inspecting the internal construction of opaque materials. This booklet should stimulate manufacturers to visualize many applications of radiography peculiar to their own business."

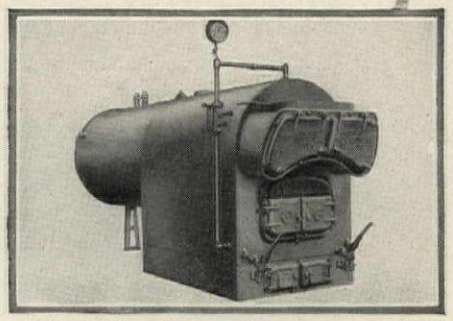
ARMSTRONG CORK & INSULATION CO., Pittsburgh. "Roofs That Pay Dividends." Excellent work on roofs.

Any roof with a comparatively small investment can be made to pay large dividends, in fuel saving and comfort. The ordinary roofs are heat-porous. Heat passes through them readily, either from the furnace during the winter or from the sun in the summer time. The sweltering indoor temperatures which lower the efficiency of employes on hot days, especially in top-story rooms, are due in no small degree to the uninsulated roof. In many buildings where high humidity is present, especially in paper mills, laundries, bakeries, printing plants, etc., moisture condenses out of the air in cold weather and collects on the ceiling. Dripping of water follows, spoiling goods, hindering employes, and rusting machinery. In general, it may be said that insulation should be applied on the roof of every building where heating cost, comfortable working or living conditions, or prevention of condensation is of importance. Armstrong's Corkboard is thoroughly practical to use on any kind of a roof deck on either a new or old building. This brochure, published by Armstrong Corkboard & Insulation Co., should not be overlooked by the architect or the engineer, and the individual home owner will find it very useful and helpful. It is replete with data on a subject which is receiving practical study at the hands of builders and engineers everywhere.



Hudson View Gardens New York City

Attractive and Comfortable



Series "W" Welded Fire Box Boiler

THE architects who designed this wonderful group not only considered appearance from the standpoint of artistic endeavor but also knew that this must be combined with a never-failing source of heat—thus Titusville Boilers were chosen for this most important task. Their reputation for design, material and workmanship is such that they were preferred above others.

There are scores of other similar installations in all large cities.

THE TITUSVILLE IRON WORKS CO.
Titusville, Pa.

TIW-4

TITUSVILLE

SERIES "W" WELDED FIRE BOX

BOILERS

INDEX TO ADVERTISING ANNOUNCEMENTS

PART 1—ARCHITECTURAL DESIGN

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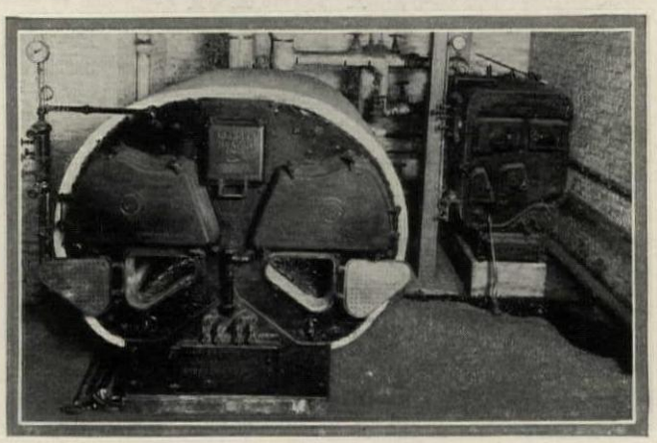
Illustrated at the right is beautiful Beaufort Gardens, of Mt. Vernon, N. Y., designed by Margon & Glazer, architects, of New York City. Below is a picture taken in the boiler room showing the Spencer Steel Tubular Steam Boiler for heating, and the Spencer Cast Iron Sectional Heater used as a tank heater. Note the open doors of the steam boiler. They were left open long enough for a time exposure to register the glow of the fire in the fire box—yet the gauge hand has not even flickered enough to blur the photograph.



Heat and hot water at nine cents a day and no night fireman to pay

HERE are three different points of view given by one man. Mr. August Stolz, the heating contractor for Beaufort Gardens, was also the builder, and is the owner now. What he says about his experience with heating should have and does have triple authority. This is what he says:

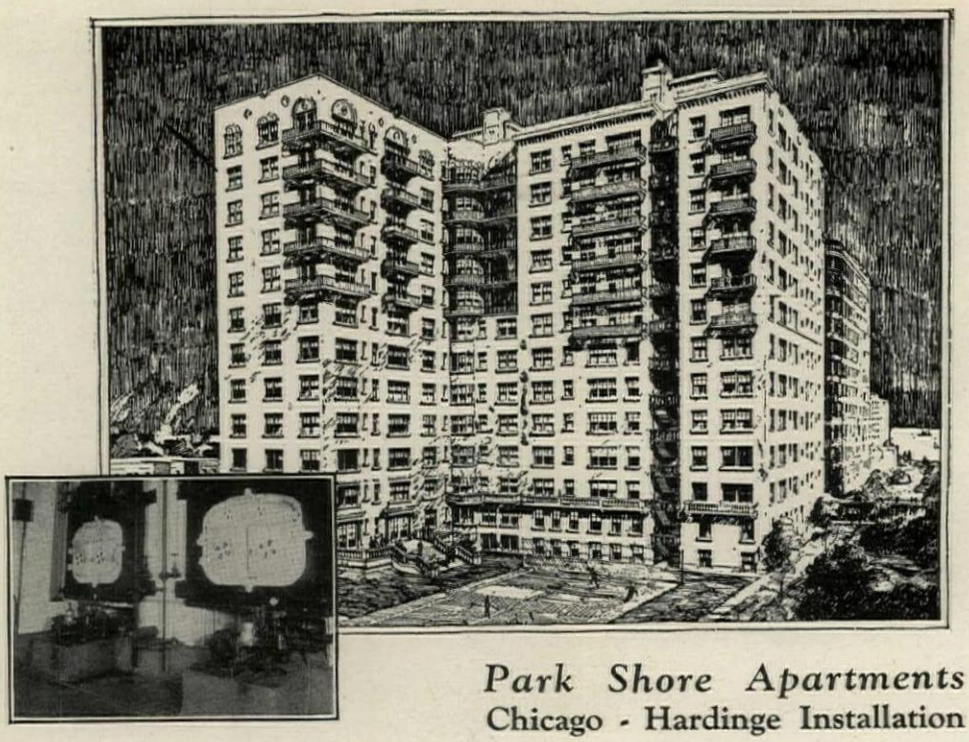
"Here, with a small Spencer for hot water in the summer, we burn the same No. 1 Buckwheat all the year 'round. Our total cost for 365 days a year for 37 families, ran about 9 cents per family per day, for heat and hot water.

"You may have figures to beat this; but remember, in operations of this kind with which I am connected, there is no skimping on heat and hot water service.

"After installing various types of heating plants, I have come to the conclusion that your proposition, up to date, has proven the most satisfactory and economical for my work."

Here are some of Mr. Stolz' figures. For the 365 days, for 37 families, 175 tons of No. 1 Buckwheat anthracite were used for heat and a 1,500 gallon hot water tank. The reason why the cost per family is so low is simply because the Spencer burns No. 1 Buckwheat anthracite, with no blowers, and no machinery, at about half the cost of domestic anthracite sizes. The Spencer needs no night fireman—for it is a magazine feed heater. Once the magazine is filled, steam, vapor or hot water for heat and for a tank heater is supplied at the temperature required, without any attention, for twelve to twenty-four hours. For apartment house design, as well as commercial and industrial buildings, architects everywhere agree with Mr. Stolz that the Spencer "has proven the most satisfactory and economical for my work." Write for new catalog showing all of the Spencer cast iron sectional and steel tubular heaters. SPENCER HEATER COMPANY, Williamsport, Pa.

SPENCER
Magazine Feed
HEATERS
for steam, vapor or hot water



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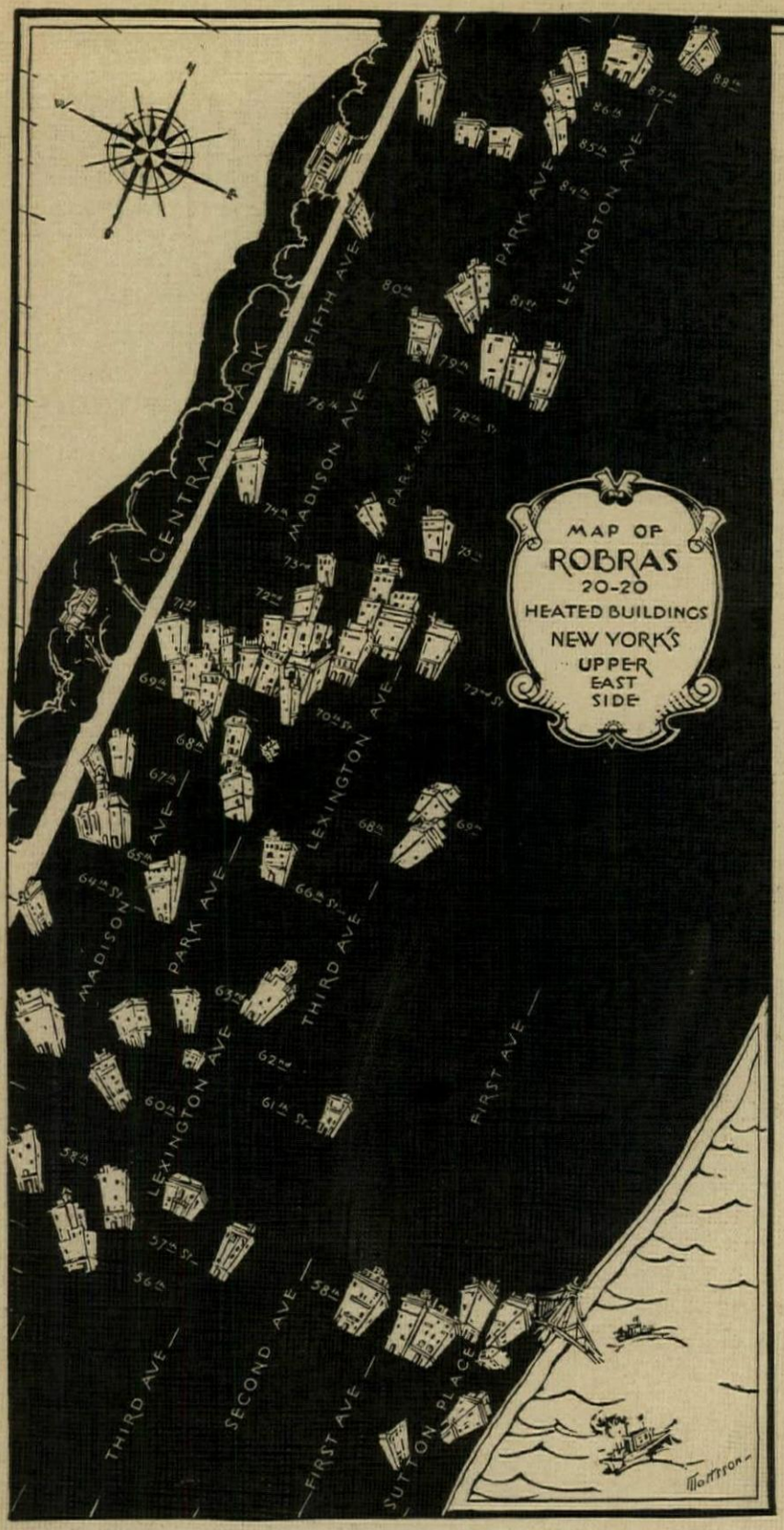

WHY IS Each of These Important Buildings ROBRAS 20-20 Equipped?

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Because they go in the wall out of sight, and out of the way. Because they contain more square feet of radiating surface per cubic foot, than any other radiator. In other words, more Robras 20-20 Radiation can be installed in any given space, than can any other type or kind of radiation, no matter what the size or shape of the space may be.

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