THE ARCHITECTURAL FORUM

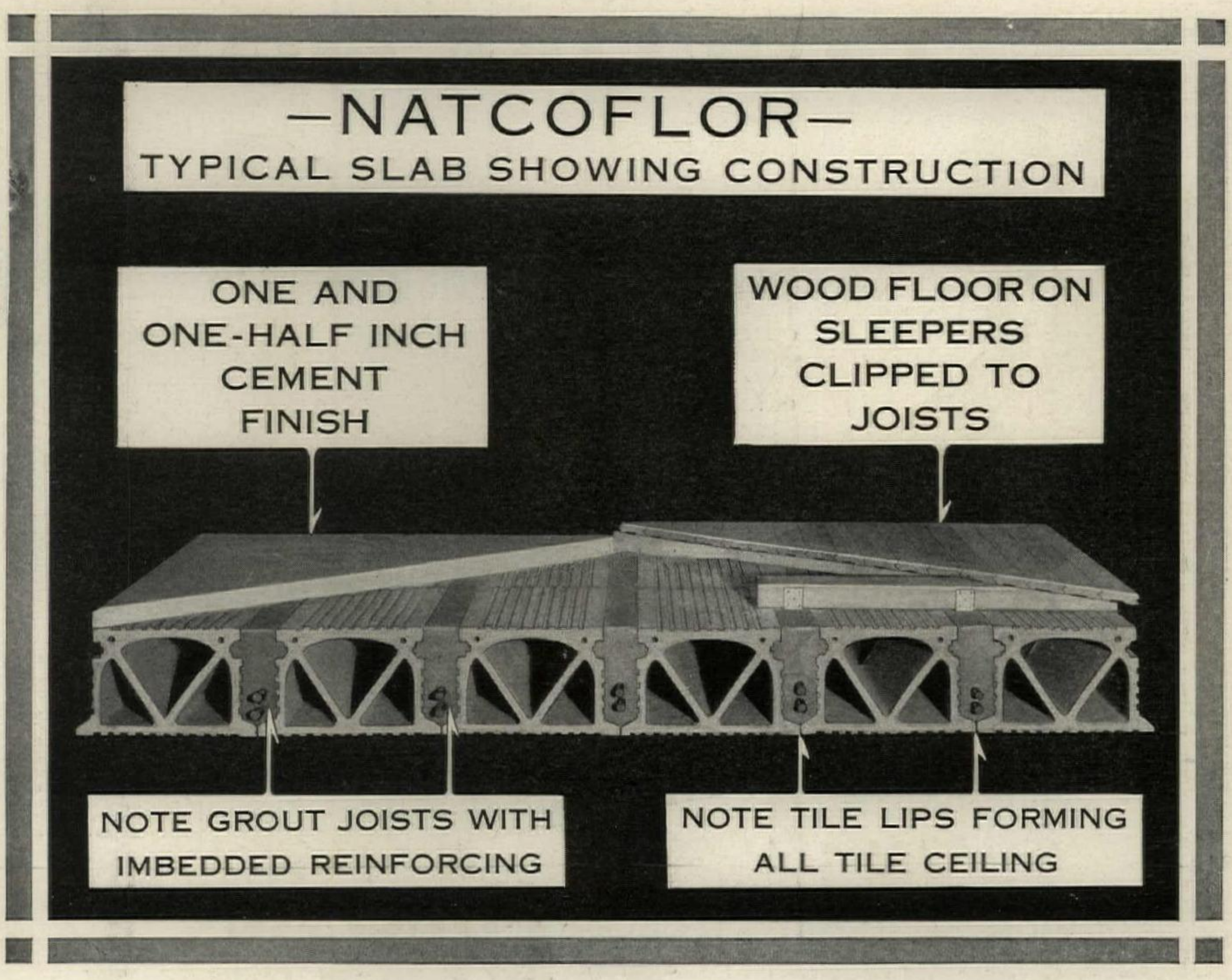
IN TWO PARTS

ARCHITECTURAL ENGINEERING
&
BUSINESS

PART TWO

JULY

1929



Higher Ceilings— at no Higher Cost

The use of Natcoflor instead of the usual type provides higher ceilings—at no extra cost.

Natcoflor saves floor depth; a 9-inch slab is equivalent to a 12-inch slab of any ordinary type of construction.

Natcoflor is strictly fire-proof and has high insulating qualities. It is soundproof. It is economical to install. Forms are easily and quickly erected, and lumber is of course reclaimable. The projecting lips meet to form an all-tile ceiling, on which only two coats of plaster are needed, instead of the usual three. Plaster stains are eliminated.

There is nothing complicated about the erection of Natcoflor. The tile are laid in rows. They are self spacing and self aligning. Reinforcing steel is put in, the ribs poured with grout—and the rough slab is finished.

On your next job, add ceiling height with no added cost, with Natcoflor.

NATIONAL·FIRE·PROOFING·COMPANY

General Offices: Fulton Building, Pittsburgh, Pa.

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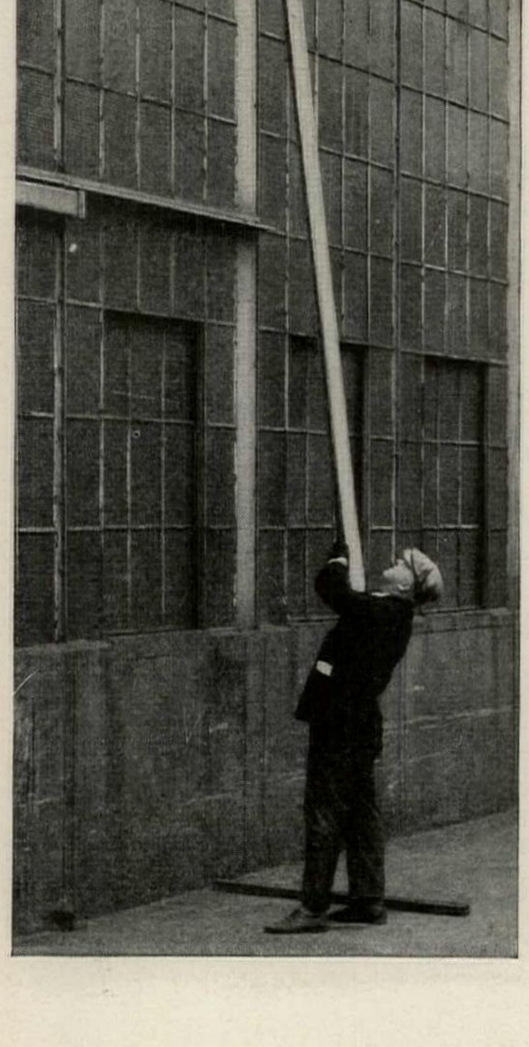
PAGE A383 — A416

TURN TO "SWEET'S"

NATCO
THE COMPLETE LINE OF STRUCTURAL CLAY TILE

LAID LIKE BOARDS



Ferrobord is furnished in any desired length, in 18 or 20 gage Armco Ingot Iron, and two depths of ribs. I-Plates and Ferrodeck Steeldeck roofs are also available.

TRUSCON Ferrobord

TRADEMARK REG. & PAT. APPLIED FOR

ROOFDECK

INSULATED AND WATERPROOFED

As easy to handle as boards, the six-inch wide units of Ferrobord interlock along their lengths and form a uniform, smooth, unperforated Roofdeck for the application of insulation and waterproofing. Ferrobord provides a rigid, fireproof, light weight roof, effects savings in initial cost and supporting structural work, and is quickly installed on any building, new or old. Permanence and rust resistance are assured by the use of Armco Ingot Iron exclusively. Write for complete information.

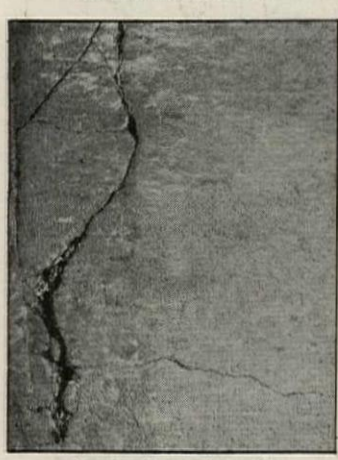
TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO
STEELDECK ROOF DIVISION

Trussed Concrete Steel Company of Canada, Limited, Walkerville, Ont.

Warehouses and Offices in Principal Cities of the United States and the Dominion of Canada

Plus
One Step Nearer

Result of corrosive wear



Result of corrosive and abrasive wear

Metalicron checks both corrosive and abrasive wear

THE laboratories of the Master Builders Company striving continually toward perfection in concrete, have contributed improvement after improvement to the life and serviceability of concrete floors. Hardness, strength, beauty have been made an integral part of the Master-built concrete floor.

The answer to disintegration

The most recent Master Builders discovery, after nine years of intensive research, is Omicron. This ingredient helps to solve a puzzling problem in concrete floor construction, identified as disintegration or corrosive wear.

Evidence of corrosive wear may be noticed on concrete sidewalks after salt has been used to remove ice or snow. Pitting of concrete in alkali soils, or the gradual breaking down of the structure in industries employing acid or alkali processes, these are easily detected.

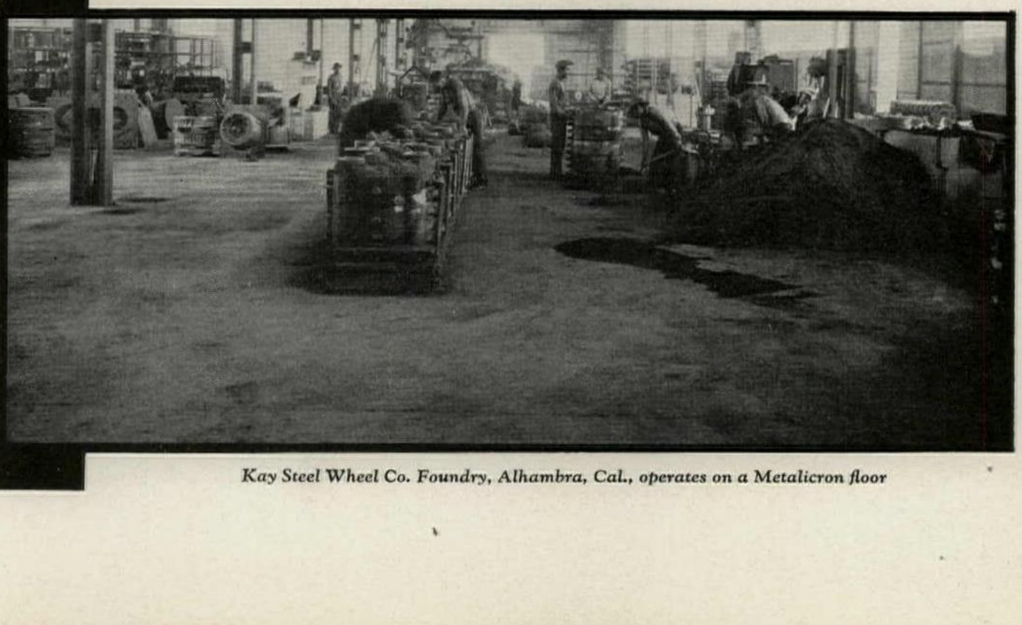
Although less obvious, mild acids and alkalis cause similar disintegration on concrete surfaces everywhere. Sulphur solutions passed off into the air in the burning of coal, oil and greases deposited by traffic, and a variety of other disintegrating agents are recognized as causes of corrosive wear.

With the discovery of Omicron, such corrosion or disintegration has been checked. In combination with Portland Cement, Omicron reduces the ratio or soluble elements exposed to acid or alkali reaction. The former point of attack of these disintegrating solutions is now fortified. In addition Omicron treated concrete has the further advantage of substantially greater tensile and compressive strength.

This new ingredient has now been combined with Master Builders Integral Hardners, still further extending the span of life and flexibility of installation of concrete floors. It brings the Masterbuilt concrete floor one more step toward perfection.

METALICRON
Master Builders Metallic Hardner
Plus OMICRON

Concrete, integrally hardened with Metalicron, now has increased its serviceability in floors for industrial plants. The wear and tear of heavy



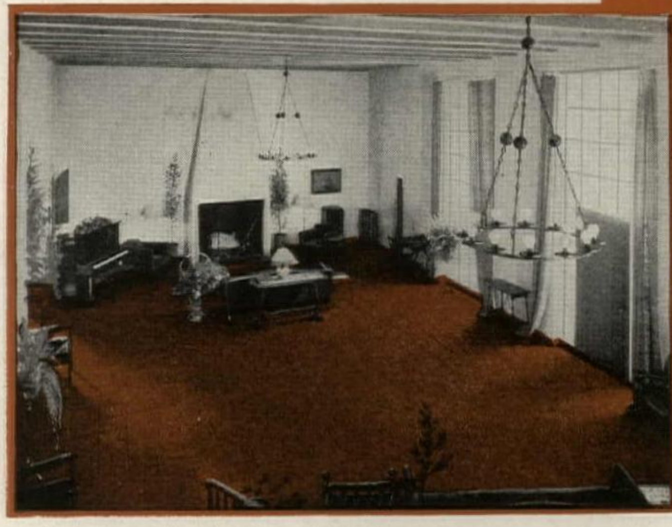
Kay Steel Wheel Co. Foundry, Alhambra, Cal., operates on a Metalicron floor

OMICRON
the Perfect Concrete Floor!

traffic finds the concrete protected by a tough ductile metallic aggregate. The disintegrating factors present in oils, greases, or other mild acids and alkalis now have little chance for chemical reaction. These old limitations need no longer be considered. A new Master Builders book, The Fifth Ingredient, will tell you why.

MasterMix Plus OMICRON For commercial and office buildings, hotels, schools and other buildings where floors are subjected to steady traffic, concrete with the new Master Mix makes an ideal floor. Containing Omicron, Master Mix also checks the ever present factors of disintegration. And, as always, Master Mix integrally hardens and waterproofs the floor, making it smooth, hard, dustproof, easily cleaned.

Five million sq. ft. Metalicron and Master Mix floors are being installed in the Merchandise Mart, Chicago. Graham, Anderson, Probst and White, Architects. John Griffiths & Son Co., Contractors.



Red Colormix Floor in the Womans Club, Huntington Park, Calif.

COLORMIX Plus OMICRON Colormix is the third member of the new Omicron family. Here is concrete with the tile-like gloss, a strength and beauty of color that is adaptable to the office building, private residence, the club building, the hospital, school or church. Colormix adds a permanent color to porches, driveways, swimming pools, as well as to floors. With Omicron, Colormix concrete is protected against efflorescence. It shows increased resistance to the attack of salt water and other mild alkali and acid disintegrants. And the new Colormix concrete shows an increase of from 19% to 68% in tensile and compressive strength, as compared with plain concrete.

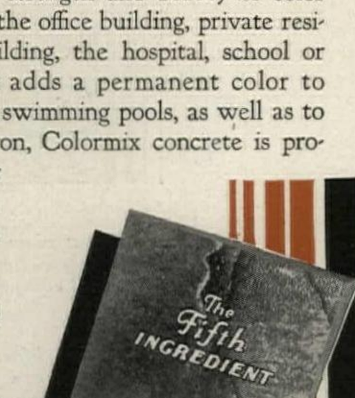
If your files are incomplete on any of the materials developed by Master Builders to extend the serviceability of concrete floors, write us for complete information.

THE MASTER BUILDERS COMPANY

Cleveland, Ohio

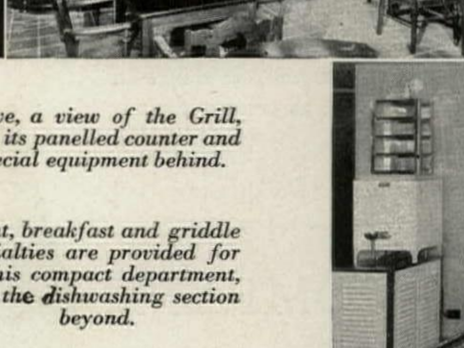
SALES OFFICES IN 110 CITIES

Factories in Cleveland, Buffalo, N. Y., and Irvington, N. J.



The New York Athletic Club,
New York City.
YORK & SAWYER, Architects

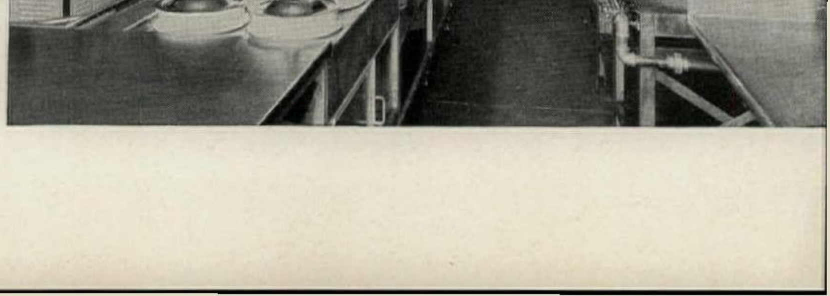
THERE IS FOR



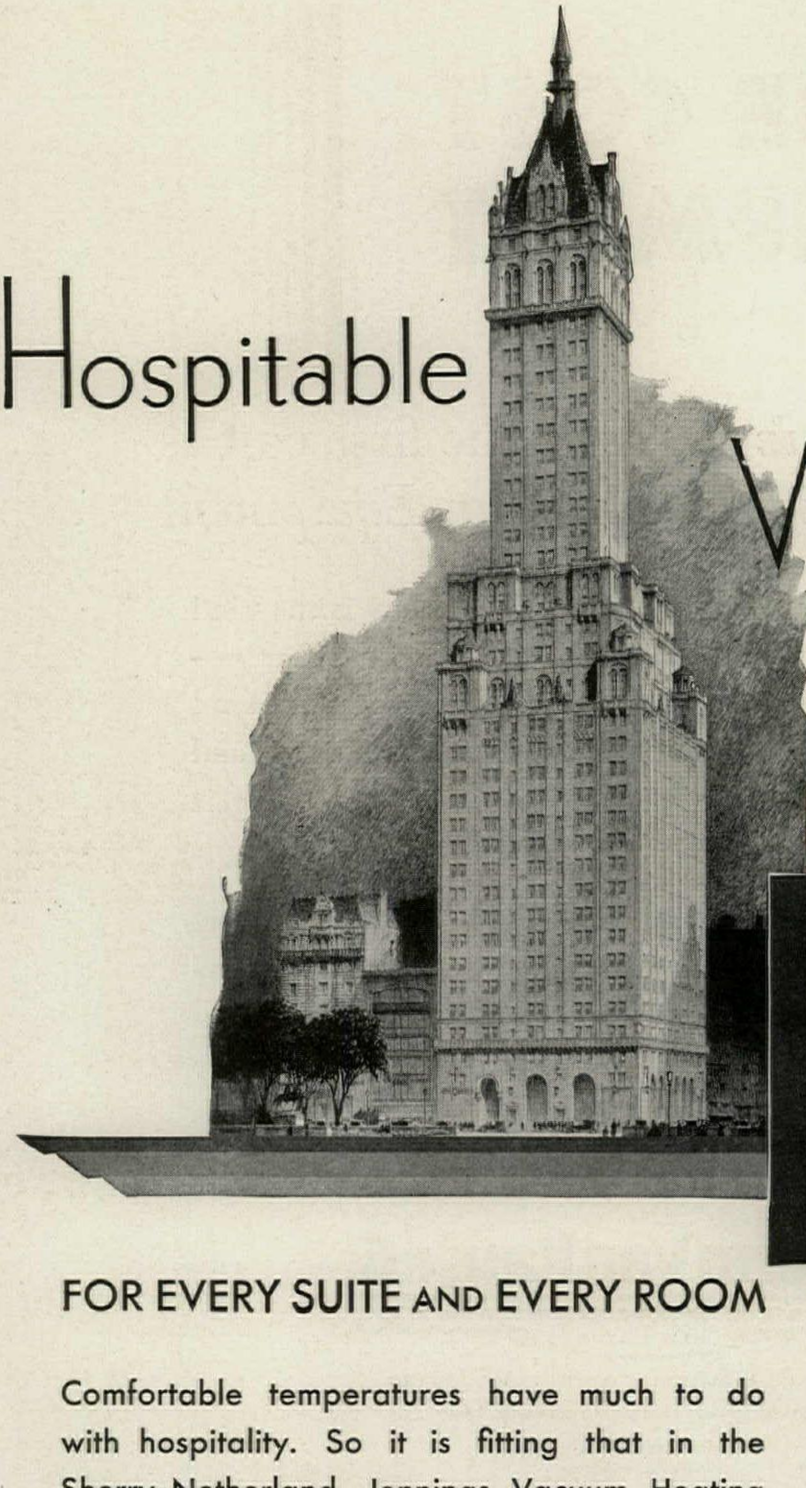
The main service aisle of the New York Athletic Club Kitchen, New York, reflects the character of this brilliant new institution. The entire equipment was designed and built in the great Van Factory.

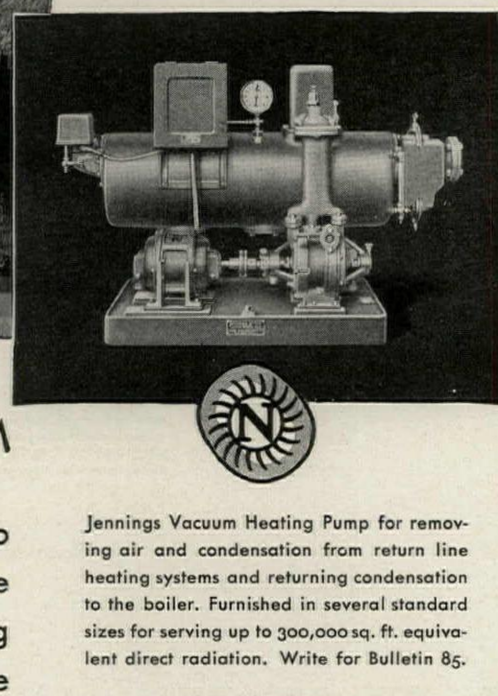
Above, a view of the Grill, with its panelled counter and special equipment behind.

Right, breakfast and griddle specialties are provided for by this compact department, with the dishwashing section beyond.



Hospitable Warmth...





FOR EVERY SUITE AND EVERY ROOM

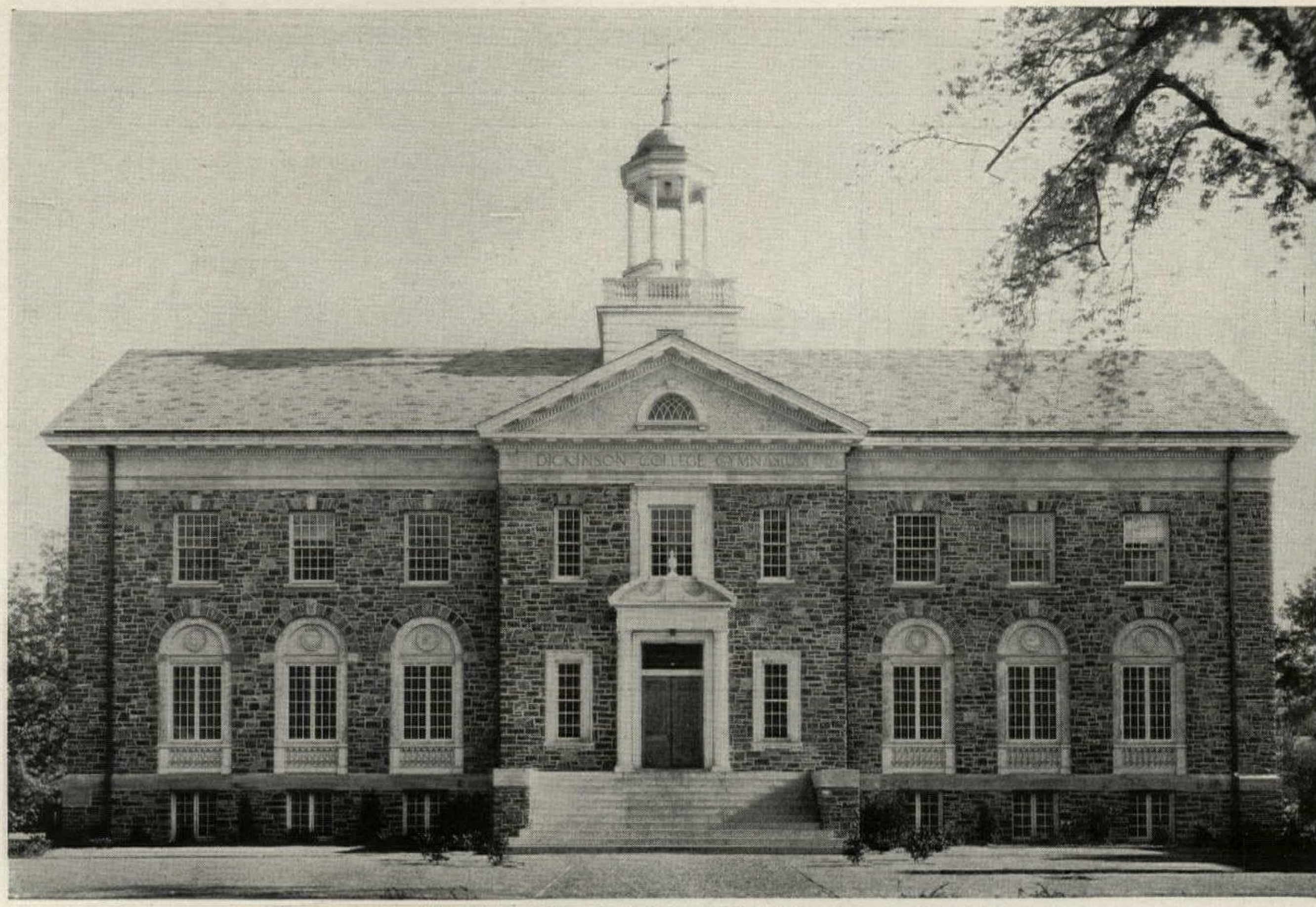
Comfortable temperatures have much to do with hospitality. So it is fitting that in the Sherry-Netherland, Jennings Vacuum Heating Pumps should be installed. For by keeping the heating system always free of air and condensation, Jennings Pumps make the radiation quickly responsive to varying heating demands.

Jennings Vacuum Heating Pump for removing air and condensation from return line heating systems and returning condensation to the boiler. Furnished in several standard sizes for serving up to 300,000 sq. ft. equivalent direct radiation. Write for Bulletin 85.

The Sherry-Netherland Hotel, New York, N. Y.; Schultze and Weaver, architects; Almirall & Co., Inc., heating contractors; Clyde R. Place, consulting engineer.

Jennings Pumps

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



New Gymnasium of Dickinson College, Carlisle, Pa. This building is protected from light failure by a 60-cell Exide Emergency Lighting Battery. William W. Emmart, Baltimore, Architect

Why architects specify this emergency lighting

They know it affords reliable protection to suit any building plan

ANY building where the public gathers must be protected against sudden power failure. Sudden darkness could be a menace in schools, theatres, churches, hospitals. That's why so many architects are specifying Exide Emergency Lighting Batteries. They know these batteries . . . they know they're adaptable to suit various building needs. And they know they are reliable. When power fails, lights continue to burn. They are switched to Exide Batteries *instantly, automatically.*

The devices used to control and keep the battery charged automatically are simple and fool-proof. No added men . . . no expert experience is needed to attend to them.

Forty-one years of building batteries for every purpose stand behind the Exide Emergency Battery. In this battery are combined to the highest degree these five essential qualities: (1) Absolute power reliability, (2) long life, (3) freedom from trouble, (4) low initial cost, (5) low operating cost.

An experienced Exide representative is at your service at any time. He can be of valuable assistance in planning emergency equipment. Consultation entails no obligation whatsoever.

SEE OUR Catalogue in SWEETS

Exide
EMERGENCY LIGHTING BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

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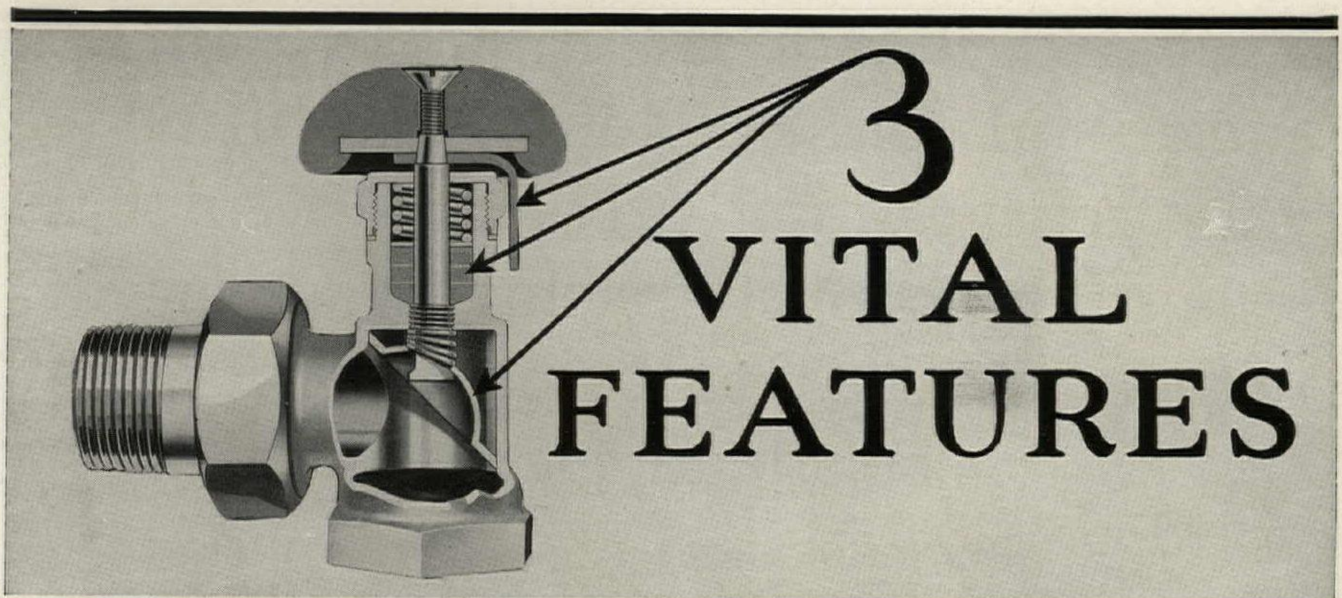


Found only in the

ARCO PACKLESS
HOT WATER VALVE No. 901

PACKLESS The same packless construction used in hundreds of thousands of Arco steam valves without one instance of failure. Complete protection against leaks—Relief forever from the expense and trouble of repacking.

EQUALIZING Adjustable stop—permits perfect balance of circulation—permanently set after installation—saves fuel.

SWINGING PLATE
Sharp edge of plate acts as cleaning tool—collection of sediment and sticking of valve impossible—Concave plate reduces friction—insures full circulation.

The new 901 is the latest addition to the 999 Packless series for steam, water, and vapor. These valves are rapidly replacing packed valves for Architects, and Heating Contractors realize the importance of the packless feature. Use Packless Valves on every job—large or small—owners will gladly pay the few cents difference per valve for the Arco protection against leaks and relief from repacking.

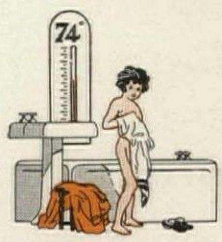
AMERICAN RADIATOR COMPANY

THERE'S A NATIONAL HEATING SYSTEM FOR EVERY BUILDING NEED

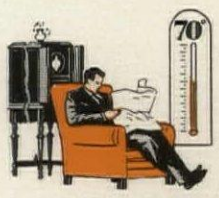
Playroom

Bed Rooms

Grandma's Room



Bath Room



Living Room

Quality—Hidden From Inspection But Apparent In Operation

Jacketed attractively for eye-appeal, the National Jacketed Boiler's chief claim to esteem is in its demonstrated quality. Quality built-in, hidden away, but expressing itself in outstanding efficiency, and upstanding service. Large grates, deep fire box, properly proportioned combustion chamber, long fire travel, unite to make this boiler easily fired, easy on fuel. Engineering design scientifically coordinates every part.

National Bonded Boilers are designed to perform efficiently with all leading types of fuel: coal, coke, oil and gas. They can be converted on the ground to meet the individual requirements of the fuel selected.

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.

National Heating Systems are *Made-to-Measure*; that means that the heating requirements of each room are scientifically determined. Then the boiler, the radiators, and the accessories required to establish a balanced system, proportioned in every respect to the need, are selected and installed by the National Heating Specialist.

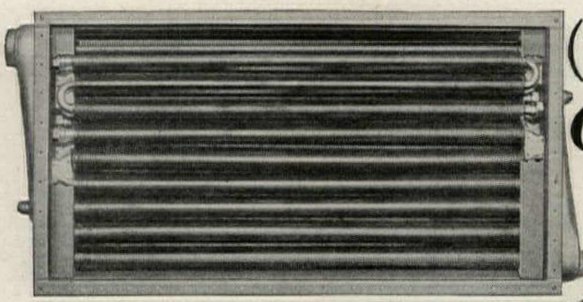
A line to us will bring you complete and helpful information.

NATIONAL RADIATOR CORPORATION

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

NATIONAL *Made-to-Measure* HEATING SYSTEMS

—and in Patrick T. ("Paddy") Harmon's new Chicago Indoor Stadium



Largest in the World

Hall, Lawrence & Ratcliffe, Inc., Architects — H. A. Durr & Company, Engineers — Carrier Engineering Corporation, Air Conditioning — Buffalo Forge Company, Fan System Apparatus

it is

AEROFIN

(The Standardized Light-Weight Fan System Heat-Surface)

that insures the Comfort of the Millions who will find Play and Pleasure in this great Structure, thruout the Winter

AEROFIN is selected by foremost Architects and Engineers for the Nation's most notable Buildings because it was developed specifically to meet their every requirement, not only, but to inspire their genius by its remarkable adaptability, its light-weight and its extraordinary compactness, while satisfying fully their primary demand of utter reliability.

There are three types, LOW PRESSURE AEROFIN, UNIVERSAL AEROFIN, HIGH PRESSURE AEROFIN, and 128 standardized encased Unit sizes, for pressures up to 350 lbs. gauge.

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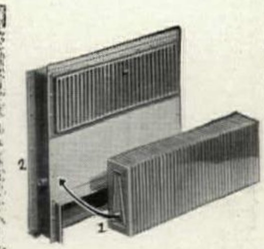
AEROFIN is sold only by Manufacturers of nationally advertised Fan Heating Apparatus



Radiator (1) comes installed in a steel case (2) more substantial than the wall itself. The complete unit is ready to install in any standard wall or partition. Note the installation at left, with radiator in the plastered wall under window.

HERMAN NELSON
RADIATOR

Out of Sight and Out of the Way—
the radiators that heat this room

TOTALLY new effects in interior planning of homes, offices and monumental buildings are made possible — long-sought ideals of the architect are realized—by a heating method that discards the space-wasting radiator forever.

The Herman Nelson Invisible Radiator fits *inside* the wall or partition. Requires no floor space. Places no limits on color harmony or furniture arrangement. Yet it brings all the advantages of finest radiator heat.

Once walled in the Herman Nelson Invisible Radiator never demands service; it is leak-proof, rust-proof, indestructible; even freezing does not harm it. Here, truly, is a new heating standard—from the standpoint of investment as well as comfort and sanitation.

Let us send you our book and complete data. The Herman Nelson Corporation, Moline, Illinois.

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For Steam, Hot Water, Vapor or Vacuum Heating

Our Contribution
to the art of Heating & Ventilation

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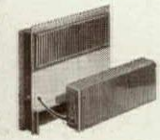
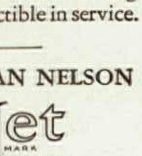
for the ventilation of schools, hospitals, offices and other buildings presenting an acute ventilating problem.

HERMAN NELSON *Invisible* **RADIATOR**



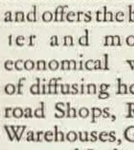
. . . supersedes all previous radiators, radiator cabinets or enclosures. Occupies no room space and makes possible any desired decorative scheme or furniture arrangement. Indestructible in service.

THE HERMAN NELSON hiJet HEATER



It operates at steam pressures from 1 to 150 lbs., and offers the better and more economical way of diffusing heat in Factories, Railroad Shops, Roundhouses, Mills, Warehouses, Garages, Gymnasiums and Industrial Buildings.

Herman Nelson Radiator Sections
for Blast Heating and Cooling



Indestructible, operating at any steam pressure from 1 to 150 lbs., non-corrosive and leak-proof.

May be arranged in banks to solve any special problem of heating or cooling.

SIX YEARS AGO when the Herman Nelson light weight, compact, indestructible radiator was placed on the market, it was immediately accepted as the greatest advance in the art of Heating and Ventilation in a generation. It has made possible heating and ventilation dependability and performance hitherto unattainable.

The Herman Nelson Wedge Core Radiator is an exclusive feature of all Herman Nelson Heating and Ventilating Products and accounts for their unequaled performance.

HEATING · VENTILATING · COOLING · DRYING · CONDENSING

THE HERMAN NELSON CORPORATION · *Moline, Illinois*

Builders of Successful Heating and Ventilating Equipment for over 20 Years

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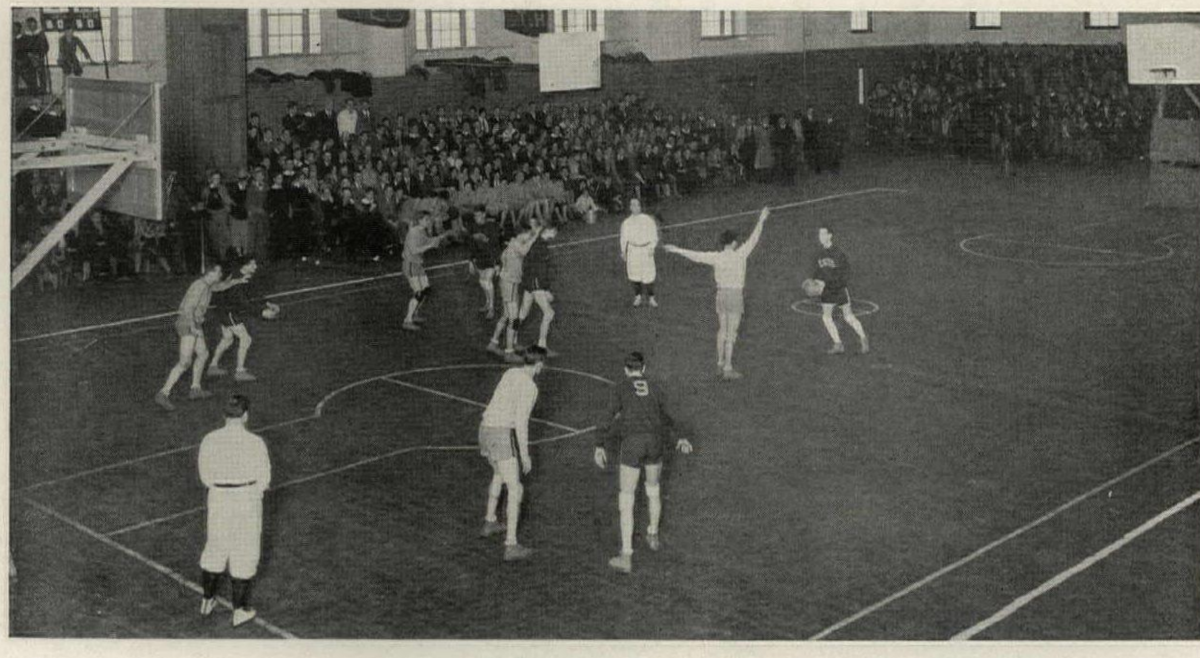
Built for Long, Hard Usage

THE G & G Hoist with the longest service record was that used regularly for 33 years in Madison Square Garden, N. Y. (McKim, Mead & White, Architects) until the building was demolished. Other examples are: Albany High School, Albany, N. Y., 16 years; Public School No. 61, New York City, 16 years; Finance Building, Philadelphia, Pa., 15 years; U. S. Capitol, Washington, D. C., 12 years; Chesapeake & Potomac Tel. Bldg., Baltimore, Md., 12 years.

See Sweet's 23d Archt. Ed. pp. C3729-37

GILLIS & GEOGHEGAN
544 West Broadway
NEW YORK

INSTALLED AT
STUDEBAKER CORPORATION OF AMERICA, SERVICE BUILDING, N.Y.C.
W. S. Ferguson Company, *Architects.*



BLOXONEND FLOORING
For the Capital's Finest School

Bloxonend is specified by nearly all prominent school architects for gymnasiums and shops.

This is the gymnasium of McKinley Technical High School, Washington, D. C., designed by A. L. Harris, Municipal Architect. The structure was erected at a cost of two and a quarter million dollars and is considered "The Capital's Finest School." The BLOXONEND floored gymnasium measures 185x92 feet—one of the largest high school gymnasiums in America.

F. C. Daniel, President of McKinley High, and the instructors and students are all justly proud of this BLOXONEND Floor. Above all else, it is SAFE—No splinters. The surface afforded is fast, resilient, handsome and smooth. This life-time floor may be utilized for any type of school activity without marring the floor's appearance or affecting its durability.

Write for sample and specifications

CARTER BLOXONEND FLOORING COMPANY, KANSAS CITY, MO.

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

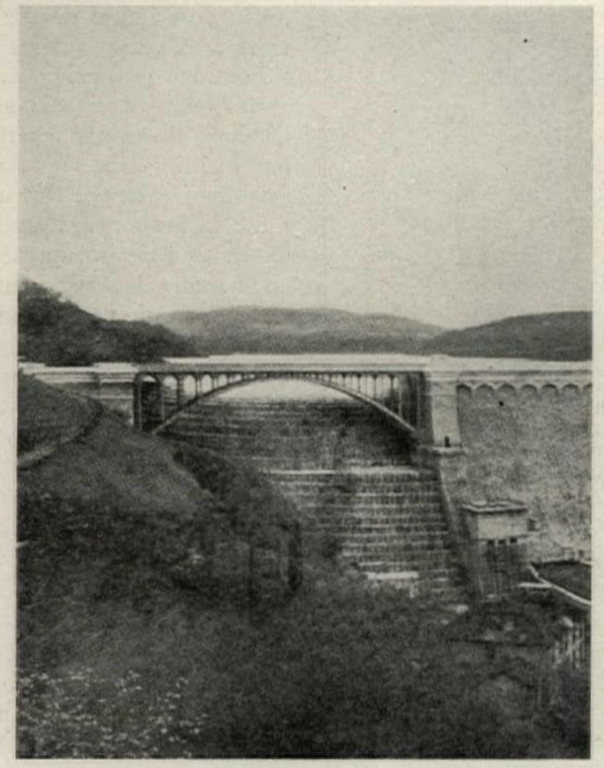
BOOK DEPARTMENT

THE IDEALS OF ENGINEERING ARCHITECTURE

A REVIEW BY

CLIFFORD WAYNE SPENCER

THE importance of engineering to architecture is something easily appreciated by all, and the necessity for good engineering in buildings has never been so great as in the present era, with its towering structures based entirely on engineering formulæ and principles. This necessity is duly appreciated by the architectural profession, and no architect would dream of attempting to design an important building without the aid of good construction engineers. On the other hand, the importance of architecture to engineering has too often been disregarded, and the country is full of structures whose engineering character has led their designers to feel that any adornment or artistic treatment was unnecessary, so that the resulting structures, by their barrenness or bad arrangement of parts, give a depressing effect of extreme ugliness. The designing of great engineering structures is often entrusted to men trained to figure accurately and to build with great mathematical precision but with little or no understanding of the fundamentals of artistic arrangement and adornment. As the training of architects errs perhaps on the side of too much study of archaic forms and ancient beauty, so the curriculum of the engineering student has contained too little consideration for the æsthetic possibilities of structural forms. More care and consideration for the appearance of engineering works would undoubtedly lead to a greatly improved type of engineering without making it necessary to sacrifice any of the utilitarian or economic advantages so important from a practical point of view. Often the things which go to make or mar the beauty of a structure seem surprisingly trivial. A well designed set of finials may save from ugliness the most ungainly of bridges without the use of any other decorative feature whatever. More often the structure can be given a curving or sweeping motion or rhythm that will add immeasurably to its æsthetic quality without impairing its strength in the least. Therefore, the attention of the architect is needed.



Part of Dam at Croton, N. Y.
From "The Ideals of Engineering Architecture"

New discoveries in engineering science have added greatly to the resources at the command of the engineering designer and doubtless will continue to do so. New materials and new ways of using old materials also are opening up vast new possibilities in the field of engineering as well as in that of architectural design. The comparatively modern use of steel and concrete, both independently and in combination as ferro-concrete, has put into the hands of the designer a medium of vast possibilities which at the same time provides unprecedented structural advantages. In the use of these materials engineering plays a far more important part than ever before, the materials and new scientific processes making possible a much lighter type of construction than was ever possible in the old masonry and wooden structures, and at the same time permitting buildings to be carried to almost unlimited heights. These new possibilities make it more desirable than ever that more attention be paid to the artistic planning of engineering works. If an engineer is to plan the whole, he should be sufficiently grounded in the basic principles of art and architecture to enable him to work out his designs in the most pleasing manner possible. On the other hand, if a special consultant is to be employed to beautify the structure, he should strive to understand the underlying principles and purposes of the work, for in no other way will he be able to achieve that harmonious and satisfying effect which should result.

For nearly two decades Charles Evan Fowler has been working to "develop a trend of thought, along somewhat systematic lines, tending toward a real system for the treatment of engineering structures by means of basic architectural design." His book on this subject has recently been published and is entitled "The Ideals of Engineering Architecture." Mr. Fowler is an eminent consulting civil engineer, the designer of many important structures, and author of many works on engineering and architectural subjects. The volume itself is perhaps the most extensive work on the subject of engineering architecture yet produced and covers the subject in a

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most complete and thoroughgoing manner. Most of the text matter is in the form of descriptions and criticism of a large number and variety of engineering structures in all parts of the world, with special reference to the design features of the examples shown. These discussions are abundantly illustrated from photographs of the structures themselves, showing features favorable or unfavorable to the appearance as pointed out by the author in the text descriptions. The ideas and aims of the art of engineering architecture and the part played by the structural engineer in the new architecture are discussed at some length in the introduction, and there is also a brief historical sketch of engineering architecture including a description of the seven wonders of the ancient world. A very clear statement of the fundamental considerations governing a good engineering and a good architectural design is given, and a comparison drawn between them, the prerequisites of good architectural design being sincerity, propriety, style, and scale. As a matter of fact, the fundamentals are probably much the same in both cases, and the symmetry, harmony, simplicity and proportion ascribed by the author to good engineering design are but other words to define the sincerity, propriety, style and scale said to be necessary to successful architectural design. The major portion of the work is devoted to bridge design, this being the class of structure which is most likely to be entrusted to the engineering profession. Stone bridges are among the oldest in the world, and their design is the result of tradition developed through the ages, the most usual form being that of the arch. Many fine examples are shown, and the lessons drawn from the criticisms by the author will be found valuable in other lines. Concrete bridges are a more modern development and lend themselves readily to architectural treatment, as is very evident from the examples discussed in the chapter on "Concrete Bridge Design." Steel bridges are by far the most important, commercially, in this country and have furnished some of the worst as well as the best examples of bridge architecture. Many types and varieties are described and illustrated, including among others, the Forth Bridge, Scotland; the Queensboro, Hell Gate, and Brooklyn Bridges, in New York, and many other existing and proposed spans. The treatment of details, abutments and piers and the application of ornament to all sorts of engineering work are discussed, and the chapters on "Stone Towers," including lighthouses, steel towers, mooring masts for dirigibles, dams and power houses are all interesting from the architectural point of view and important from that of engineering.

In the modern era it has more than ever before come to be necessary for the architect to understand the engineering point of view, and since the great variety of subjects which form the basis of architectural education will not permit the student to go into the more technical phases of engineering to any great extent, it is very fortunate that we have available a work written by one who sees problems as the engineer sees them and is yet keenly alive to the artistic possibilities latent in every structure. The work abounds in matter of value to both architects and engineers and deserves wide circulation.

THE IDEALS OF ENGINEERING ARCHITECTURE. By Charles Evan Fowler. 303 pp., 6 x 9 ins. Illustrated. Price $4. Gillette Publishing Company, 221 East 20th Street, Chicago.

THE NEW MODE OF INTERIOR DECORATION

A REVIEW BY

CLIFFORD WAYNE SPENCER

WHEN a movement attracts as many followers and creates as widespread a disturbance among people of culture and understanding as does the so-called "modern art" movement, we should endeavor to decide for ourselves, if possible, just what its possibilities are and whether it is to become a lasting part of the world's art or is merely a frenzied attempt on the part of a dissatisfied and restless group of artists to accomplish overnight that which would normally require a period of one or more centuries to work itself out. Certain it is that a vast number of artistic sins are being committed in the name of modern art and that many people without the requisite good taste and background to create objects of beauty have seized the opportunity to foist on an unsuspecting public all sorts of atrocities bearing the *art nouveau* label. On the other hand, there can be no doubt that an underlying current of truth and reason runs through the movement, and that as time goes on a definite and national style will be evolved. As is always the case with a new movement of this sort, there is a tendency to unduly ridicule the efforts of its followers, due largely to lack of understanding of the ideals and aims actuating them. We are very likely to ridicule and make fun of that which we do not understand, and lest we condemn unjustly, it is always well to make an effort to comprehend the viewpoint of those who believe in the new movement before forming fixed and definite opinions.

Much of the published material on this subject has been of such a nature as to still further confuse the earnest seeker after understanding, it apparently being the habit of writers on this topic to envelope the entire subject in a veil of abstractness and absurdity. The simplicity and logic back of the movement is admirably expressed in the book entitled "The New Interior Decoration," by Dorothy Todd and Raymond Mortimer. According to these authors, the new design is a natural product of the age we live in,—the age of science and standardization. The theory is that the beauty that expressed the life of bygone eras should not be borrowed and grafted onto our own lives, but that we should evolve a new set of ideals of beauty inspired by the objects that surround us. The industrial prosperity of the present century is due not only to the invention and development of machinery but also in a large measure to the methods of modern business management. Scientific studies of production methods have been made and have rendered it possible to eliminate from the processes of manufacture much of the lost motion and other elements not absolutely essential to the making of the finished product. It is this elimination of the unnecessary that the modernists claim to be their keynote, and they propose to carry the efficient methods of modern business into the private lives of the people and to express in their surroundings the spirit of the new industrial civilization.

They propose to treat the modern house as a "machine for living in," and claim that "gracefulness in things, as in persons, results from an elimination of the unnecessary,—so that in order for a thing to be beautiful it must be useful." The modern designer "begins with an idea of utility and achieves beauty by careful arrangement and proportion of the necessary parts." Since the furnishing and decoration of a house depend largely on the manner in which the house is built, the authors of this work on interior decoration devote a great deal of space to a discussion of architecture and of modern architecture, which they claim to be a new renaissance of architecture based on the beauty of utility and made possible largely through the use of the new materials,—steel and ferro-concrete,—it being no longer necessary to work within the narrow confines prescribed by the use of brick, stone, and timber. The new materials and new engineering science permit of previously impossible shapes and sizes, and this gives the modern designer unlimited new opportunities. As the authors of the present work point out, "forms in architecture depend principally upon the materials employed, and the contemporary renaissance in architecture comes from the discovery of a new material,—reinforced concrete. With the use of a steel framework, the break with the old forms became a logical consequence. The first possibility afforded by these materials is that windows can stretch from wall to wall of a room, from one concrete support to the next. A house, if desired, may be entirely walled with glass. Hitherto the width of windows has been limited by the material,—stone or brick or wood,—which spanned their tops. It has been usual to light a room with tall, narrow windows. Today it is possible to use the more logical method of having a window at the level of the eye running the entire width of a room. In this way the general appearance of the facade at once changes. Horizontal lines dominate, and the ground floor plan dictates the form of the exterior."

Modern life is characterized by a tendency to concentrate a large number of people in limited areas, so that it has become, "more economical, as well as more harmonious, to build houses in series instead of singly. By standardizing various types of houses it is possible to enormously reduce the cost. The individual house is already an anachronism in cities, for the nineteenth century practice of making a street a collection of narrow houses, like towers, is utterly unpractical. But it is possible to build enormous buildings, each apartment in which, has its open air terrace and garden. To facilitate this and to give light and air to streets, the buildings in the centers of cities are bound to approximate in form increasingly the pyramid. Already the zoning laws in New York are resulting in buildings of this sort, but in cities, where the space is less limited, the angle of retreat from the street can be advantageously more acute. In the past enormous mansions were built for the rich, confined cottages for the poor. Slowly these inequalities are disappearing. The modern house or flat needs to be large enough for a small family, and no larger, for the diminution in the supply of domestic servants is certain to continue. The modern architect is solving the problem by building the house as one large room with alcoves and balconies intended to serve various purposes."

In treating interior decoration, the subject is divided

into two parts,—one on continental decoration and the other dealing with English and American decoration. The history and development of decoration have been closely bound up with that of architecture, and as in architecture the first requisite of good furniture is utility and comfort; especially is this true as regards chairs and beds. "With regard to the actual decoration of a room, there is naturally great variety of opinion. Le Corbusier advocates extreme simplicity,—color-washed walls; tiled or composition floors; unshaded opaque electric light bulbs hanging from metal pipes or ordinary twisted electric wires; no curtains; bent wood chairs; metal desks; and the pictures,—if any,—carefully placed to focus the architectural forms of the room. The habit of concealing radiators in framework of Louis Quinze design is naturally abhorrent to these decorators, who not only reject all 'period' decoration as unsuitable to the present, but delight in emphasizing the beauty of function. There is usually no attempt to mask gas or water pipes that run along the wall." Whenever possible, furniture is made in the form of built-in fixtures and becomes definite parts of the architecture of the room. "Economy in labor as well as the increasing demands of hygiene, receives in the modern house an attention it never received before. For floors a composite material of cement, sawdust and cork is now much used in France. It is durable and easily cleaned without being noisy, and can be procured in various degrees of hardness. Today our hygienic dislike for dust has led to a positively æsthetic preference for such objects as least collect it. A room crammed with dust traps offends our eye, and as a result there is a tendency to use American cloth where our parents would have used velvet. Chairs and tables can be painted with the same hard enamel which is used for motor car bodies, which neither marks with wet nor can be easily scratched."

Opposed to this school of decoration there is the more conservative work of the English decorators, whose problem more often consists of transforming an old interior and making it suitable to the uses of an up-to-date civilization. In this they have been particularly successful in creating a more intimate type of treatment. The authors of the present work admit that while from their point of view there is practically no worth while contemporary English architecture, "it is arguable that their interiors are better suited to contemporary sensibility than the austerer work of the French school. The mechanical forms, the absence of all caprice, it may be said, will possibly suit the civilization of the future. They seem intended for Robots, rather than for human beings. As life grows more uniform and is increasingly dominated by machines, we may wish in our homes to escape from this impersonality. We need fantasy, imagination, within our houses. We want to relax, to enjoy intimacy, to feel,—as well as actually to be,—comfortable. The Le Corbusier style of decoration is as formal as the old French *salon,* which had hard backed chairs at regular intervals all around it. We require our homes to be more quiet, more informal, more personal. It is difficult to say that one of these attitudes is right, and the other wrong." As to American architecture and decoration, the authors are somewhat non-committal, merely expressing a vague hope that "the approaching years are likely to witness a vigorous revival of original design."

About half of the book consists of a plate section showing illustrations of examples of work in all phases of the modern design. The work of Le Corbusier receives considerable attention and is represented in illustrations of many rigidly severe interiors, including an entrance hall in which the heater with its accompanying smoke pipe and water pipes constitutes the predominating decorative feature. Many of the interiors which follow are perhaps more intimate and somewhat more cheerful, and yet in all the impression is one of that clean barrenness which one usually associates with the interiors of refrigerators or hospitals. The illustrations of furniture include many extreme types, such as chairs consisting of pieces of bent pipe over which are stretched pieces of cloth or other material. These certainly constitute a good illustration of the "principle of the elimination of the unnecessary," and although they may have been designed to give a maximum of comfort they certainly do not give comfort to the eye. Mural decorations by Duncan Grant and Vanessa Bell are allotted considerable space and illustrate some of the best work of the modern English designers. The fabrics, rugs and tapestries shown are very interesting and in many cases attractive, since this sort of material lends itself more readily than some others to the forms of modern art, and the new fabric designs are often pleasing even to those who do not care for modern art in its other forms.

The final chapter is devoted to a description of the practical methods used in obtaining the modern effects, and for those who wish to try their hand at the new decoration, it should furnish many pointers and much valuable information on rearranging older rooms in the newer manner. Advice is given as to the selection and arrangement of furniture and fittings, methods of lighting, floor coverings and carpets, and curtains and textiles.

For those who wish to know what the new movement is all about, this is perhaps as sanely written an explanation as has yet come to our attention, and the illustrations indicate the tendencies of some of the better class of interior decoration in the modern manner. "The authors do not consider that all the experiments illustrated are successful; but they have tried to choose illustrations representative of the best work known to them. They believe that the twentieth century is likely to be distinguished by an important renaissance in architecture and the arts subsidiary to it, and it is their hope that this book, incomplete as it is, may help to persuade others of this exciting possibility. They have deliberately excluded from their survey all work in which traditional styles, even in modified forms, are apparent." They also claim to have excluded all work claiming to be modern but which is "only eccentric." The uninitiated, on viewing the frontispiece might be led to wonder just where the distinction lies! As has already been said, this new type of decoration and furnishing should be studied and its philosophy examined before an opinion is formed. Nothing worthless could have aroused such enthusiasm and enlisted so many earnest followers, and even the most conservative sometimes admit (though perhaps reluctantly) that in some of its more moderate aspects the style has a certain charm as well as interest.

THE NEW INTERIOR DECORATION. By Dorothy Todd and Raymond Mortimer. 92 Plates, 42 pp., text 8½ x 11 ins. Price $6. Charles Scribner's Sons, 597 Fifth Avenue, New York.

CONTENTS THE ARCHITECTURAL FORUM JULY 1929

PART ONE—ARCHITECTURAL DESIGN

PART TWO—ARCHITECTURAL ENGINEERING AND BUSINESS

PARKER MORSE HOOPER, A.I.A., Editor

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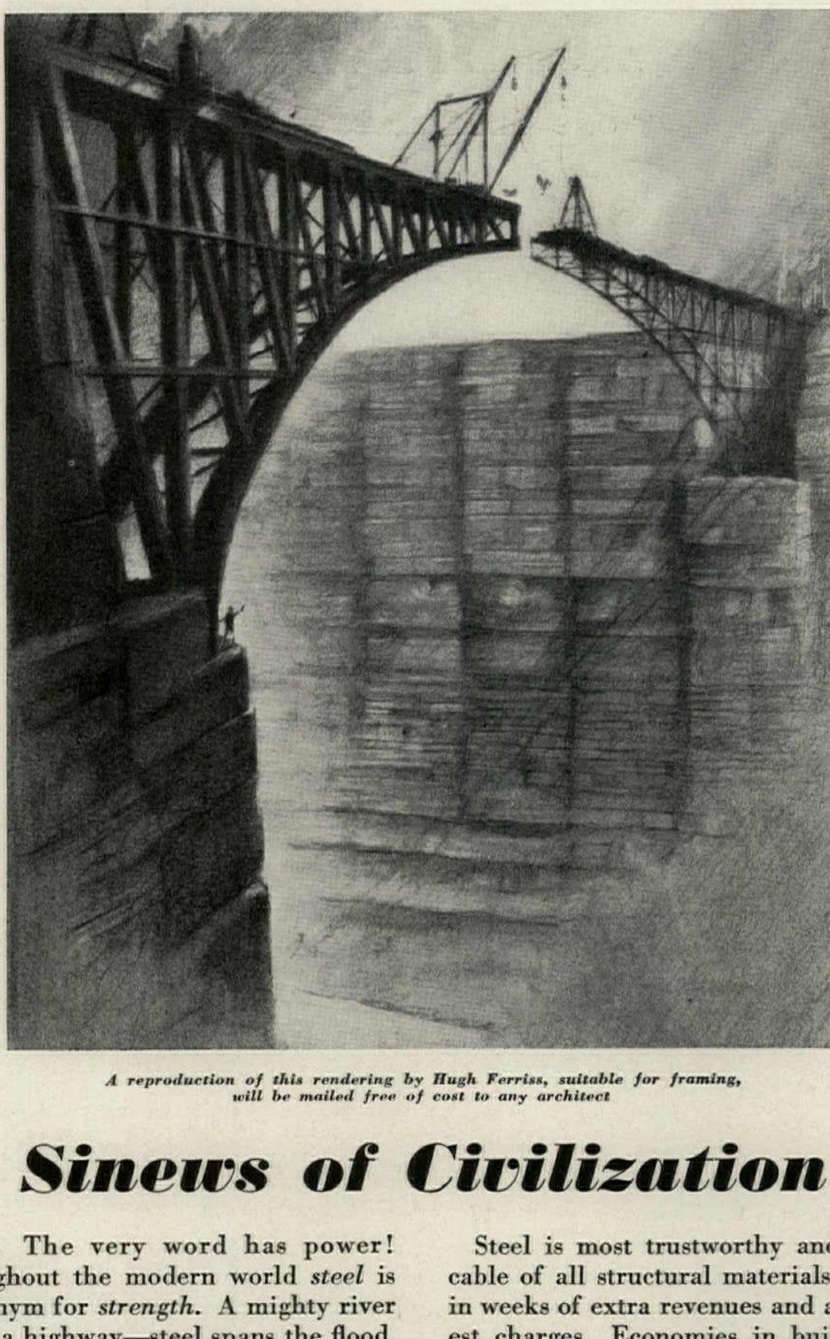

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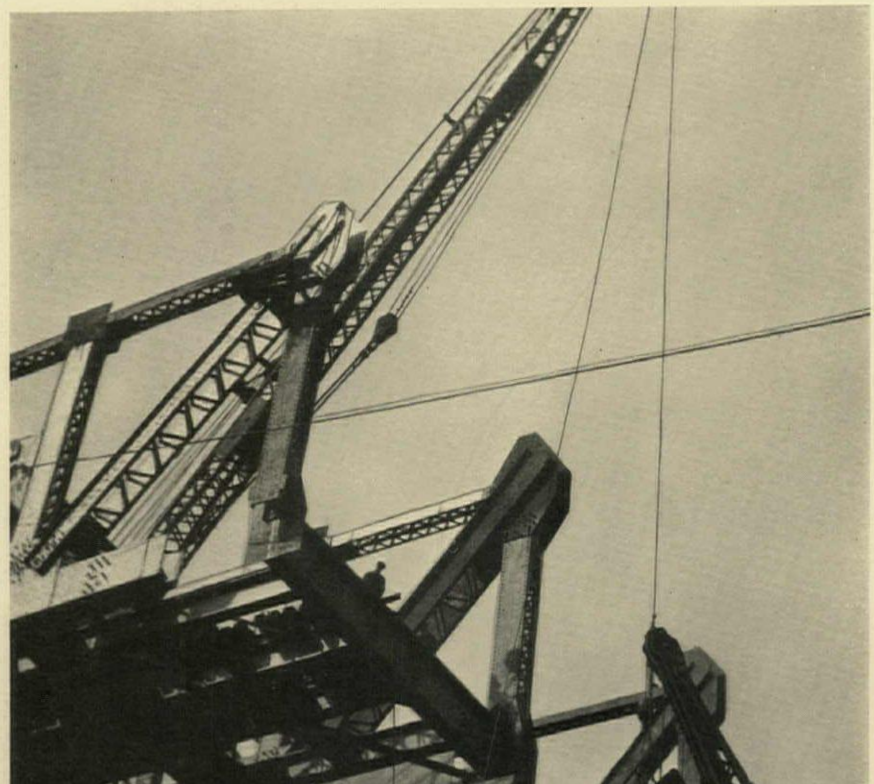

PLACING TRUSSES
APPROACH TO NEW CLEVELAND UNION TERMINAL

From a Photograph by Margaret Bourke-White

THE
ARCHITECTURAL
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VOLUME LI NUMBER ONE

JULY 1929

MINIMIZING HEAT LOSSES IN RESIDENCES

BY

P. E. FANSLER

NOT so long ago the heating plant was just a heating plant; the architect was chiefly concerned with the æsthetic side of his profession, and with the attempt to reconcile his clients' usually hazy and frequently absurd demands with the possibilities in structure and design. Having accomplished this essential task, the architect generally passed on, *in toto*, the problem of heating to the local artisan, of plumbing to the specialist in that line, and the lighting to the electrician.

Today, due largely to the intensive research that marks the age, heating plants for homes, as well as for commercial and industrial buildings, have reached a stage of specialized development, and the architect who would intelligently advise his clients is forced to inform himself regarding the highly perfected equipment now available.

With growing consciousness of the need for and possibilities of economical heating plants has come an appreciation of the fact that there is little use in specifying and having installed a highly efficient heating plant unless an equally intelligent effort is made to conserve the heat that is generated. Consequently, we find a rapidly growing industry, nurtured largely by the heating industry, concerned with the conservation of heat.

An important factor in the rapid development in this field is the research that has been carried on during the last four or five years, first at the research laboratory of the American Society of Heating and Ventilating Engineers, and later, under the guidance and correlating influence of the society, extended to the research laboratories of nine great technical schools. Far from being an academic and impractical sort of research, this has been so thoroughly practical that the data developed have had almost immediate application to the problem of more efficient construction.

Where Heat Goes. This article is but a brief summary of the problem of preventing heat developed by the heating plant from "heating all outdoors." Obviously, all of the heat generated in the boiler or furnace during the entire heating season does "escape" from the house; otherwise the house would grow hotter and hotter until spontaneous combustion would be initiated. But if the *rate of loss* can be reduced to the irreducible minimum, the fuel requirements of the owner also will be at a minimum. The problem, then, is to *minimize the rate of heat loss.*

Analysis of the problem shows that fuel is consumed to replace heat lost (a) through the walls, (b) through the window glass, (c) through ceilings and roofs, (d) through doors that are, from time to time opened, and (e) through infiltration, i.e., in heating to room temperature the cold air that filters in through cracks around windows and doors and, in poorly constructed houses, through the walls themselves.

A study of a large number of typical houses shows that these losses average about in this way:

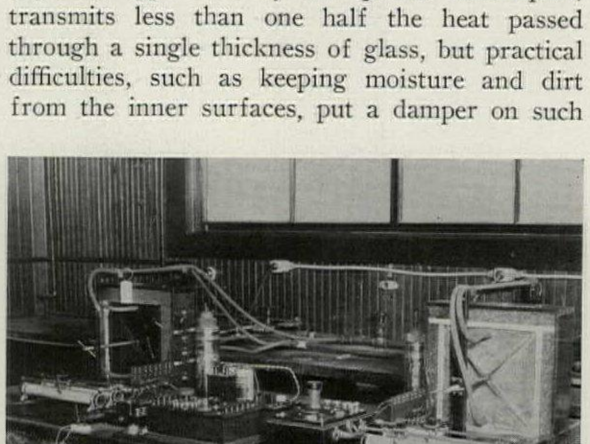
(a) Heat loss through walls, 27%
(b) Heat loss through glass, 26%
(c) Heat loss through roofs, 16%
(d) Heat loss through opened doors, 4%
(e) Heating infiltrating air, 27%

It is to be seen that three of these items constitute 80% of the total loss of heat; it remains to be seen how much these items can be reduced.

Reducing Wall Losses. Briefly, heat loss through walls depends upon the wall area and the coefficient of heat transmission. This coefficient is the number of British thermal units transmitted per hour, per square foot of area, per degree Fahr. difference between the inside and outside air temperature for such air conditions as exist in the coldest weather in the locality under consideration. Designated as "U," this coefficient then becomes a direct measure of the ability of any wall structure to retard heat flow.

Coefficients for typical building construction of today are given in Fig. 1 and these typical types of present-day practice. As the largest and smallest values of U are approximately in the ratio of 2:1, it is evident that the best wall construction will allow heat to escape at about one half the rate of heat loss through a wooden wall of cheap and common construction. If, then, a house has a gross wall area of 2,400 square feet, with 20% windows, the net wall area will be 1,920 square feet, and the heat loss through this wall will be slightly less than 30% of the total heat loss for the house. If the house were built of frame construction of the better sort, wood lath and plaster on one side of the studding and sheathing, building paper and lap siding on the other, the transmission coefficient would be 0.222. If, however the lap siding were replaced by stucco on metal lath, and if the spaces between the studding were completely filled with a poured insulation, the coefficient would be reduced to 0.110—almost exactly one half that of the uninsulated construction. With this latter wall then, it would be possible to save about half of the 28% heat loss charged to the net wall area, or 14% of the heat that would be lost through the cheaper construction. Other materials properly applied could produce a wall equally as heat-resistant.

Heat Loss Through Glass. Taking the heat loss through the glass of our typical house as 26% of the total loss from the house, we are immediately faced with a difficult problem in trying to reduce this loss. The quality of glass and the thickness have practically nothing to do with it. A double glass window, if the two panes are close together, approximately one quarter inch apart, transmits less than one half the heat passed through a single thickness of glass, but practical difficulties, such as keeping moisture and dirt from the inner surfaces, put a damper on such usage. If use of three panes were practical, this 26% loss could be reduced about three quarters.



Apparatus for Testing Heat Conductivity of Building Material by Hot Plate Method

Roof Losses. Losses through roofs vary even more than through walls. For a roof with wood shingles on wood strips and with nothing on the under side of the rafters, the coefficient may be taken as 0.50, while with the same construction with the addition of 2-inch sheets of corkboard nailed to the under side of the rafters and plastered on the inside, the coefficient would be almost exactly one fifth as great. An equally heat-resistant construction would be shingles over wood strips, wood lath and plaster on the under side of the rafters, and the spaces between the rafters evenly filled with an insulating material. There are, of course, many insulating materials and many more combinations of structural and heat-resistant materials. Thus it will be seen that it is possible to save, as between the poorest and best roof construction, about four fifths of the 16% of the heat loss of our average house.

The loss attributed to opened doors is quickly disposed of; it is small, and it is hardly controllable by the architect.

Infiltration. Cold air entering through the walls, and through cracks in and around windows and doors, as the result of wind pressure on the house, requires an expenditure of fuel as great as that required to offset the heat loss through the material walls,—almost 30% of the total. This loss can be materially reduced (a) by the use of high class weather strips, properly installed; (b) by applying so-called storm windows, properly calked, on the windows taking the brunt of winter winds; (c) by installing, when the house is built, windows and doors having a minimum of cracks, both in length and width; (d) by reducing the number of windows on those sides of the house exposed to normal winter storms; (e) by calking the cracks between window and door frames and walls, and (f) by giving careful attention to the construction of the walls themselves. Here we find many factors contributing to the loss, and as many possible ways of minimizing the wastage of fuel.

In many classes of construction metal windows are being used more and more, and manufacturers of this kind of equipment are leaving no stone unturned to produce windows that will be as nearly air-tight as possible. As an example of the leakage of residential casement steel windows, a test at the University of Michigan showed, with an indicated wind velocity of 20 miles an hour, and with the window as tight as good manufacturing and installing could insure, a leakage of only 25 cubic feet per hour per linear foot of movable portion of window. To illustrate the effect of a slight opening,—with 1/64-inch shims placed between the weathering contacts at the

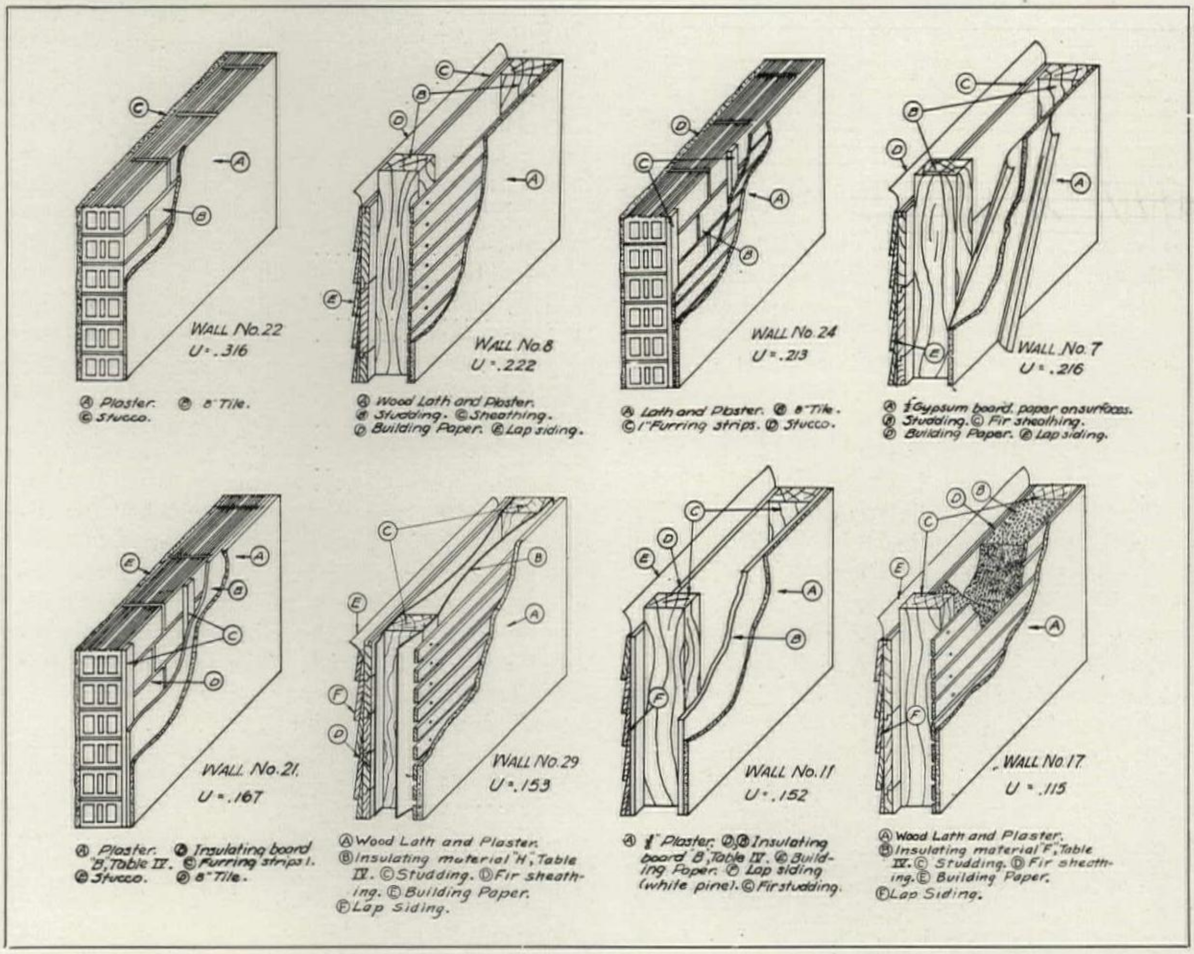


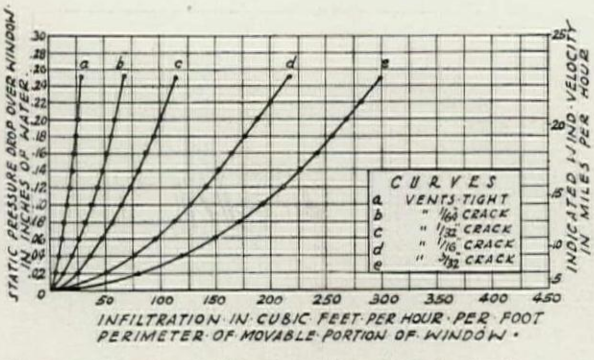
Fig. 1. Common Types of Wall Construction. The Smaller the Numerical Value of "U," the Coefficient of Heat Conductivity, the Better the Wall as an Insulator

swinging edge, the leakage was 100 cubic feet,—four times as great,—while with the crack increased to 3/32 inch, the air streamed through at the rate of 260 cubic feet per hour. It will be evident that the architect who makes a careful study of infiltration prevention can render a real service to his client who builds a house but once and buys fuel every heating season.

Quantitative Tests. The earliest studies to quantitatively determine heat loss from building structures were made on walls and roofs. These showed how widely the rate of heat loss varied with the individual materials and with the methods of using and combining them. The derived data stimulated the American mind to discover preventatives of heat loss,—and the era of house insulation began. One of the most important aids to the advancement of knowledge of heat loss through walls and roofs is the heat-flow meter, developed from a crude laboratory device to a practical field instrument by Percy Nicholls, physicist at the U. S. Bureau of Mines experiment station, Pittsburgh. This device is applied directly to the wall or roof under investigation and permits the instantaneous and direct measurement of the *rate of heat flow.* Naturally it indicates flow inward as well as outward, and one of the most fascinating evidences of its sensitiveness occurs when it is attached to the under side of a roof. On a bright day, when the rate of flow is approximately constant, the passage of a heavy cloud over the face of the sun is almost instantly shown by the meter reading.

It has been determined, through the use of this meter, that the flow of heat through a new wall is not what it will be under identical temperature conditions when the wall has aged. Also, when the wall is wet after a rain, the resistance to heat flow is not what it is when the wall is dry. Furthermore, the wide variations found in concrete walls, due to differences in "mix" and method of construction, have corresponding variations in heat flow.

Data on heat flow through homogeneous materials were both abundant and accurate, thanks to precise laboratory tests, but when it came to determining heat flow through typical composite walls of modern structures, the heating engineer



Curves Showing Infiltration Through Metal Casement Sash Under Various Conditions

was hard put to it. The conductance of a composite wall (the B. t. u. transmitted per square foot per hour per degree Fahr. difference between surface temperatures) had, in the past, been computed by an empirical formula, depending upon values experimentally determined; the accuracy of the final result also was open to question.

The worth of the heat flow meter in checking values of conductance of composite walls for which the computed values were known, as well as for finding values for walls difficult to handle by formula, at once became apparent. An elaborate series of field tests made during the last year, offers illuminating information on this subject.

The three last items indicate the interesting findings in regard to concrete, brick and tile, the fact that computed figures previously accepted probably are not accurate, and that a wide divergence exists in conductance where concrete is one of the elements, due to the wide difference in physical characteristics and the lack of uniformity in a given wall. Because of this discovery, a great deal of attention is being given to this phase of the study, and it is expected that both the range in actual values and safe average figures will be determined.

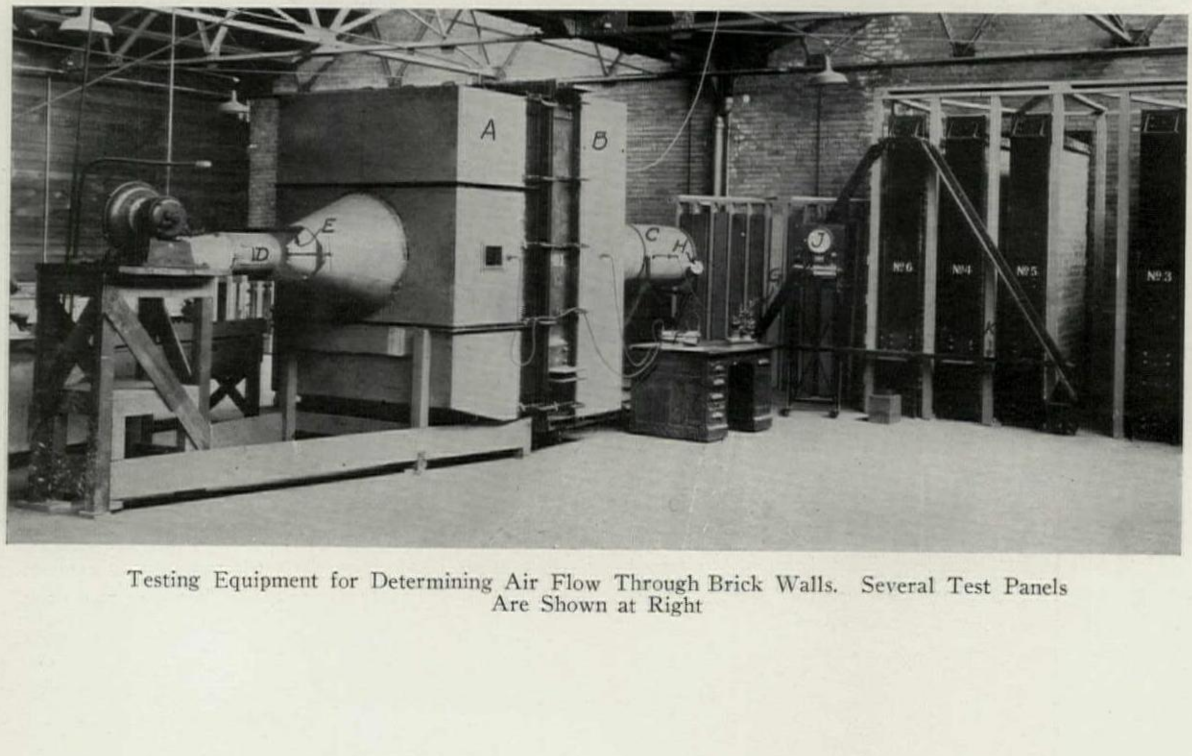
Here are some of the data obtained:

Construction	Conductance As measured	Conductance As computed
2¼" T. G., felt, 3/16" slate..	0.36	0.37
1⅜" plaster on wire netting	1.64	1.68
Guaranteed 5-ply roofing, 1¾" pine	0.46	0.48
4" brick, 8" tile, plaster, paint	0.30	0.31
Plaster, 3" gypsum block, plaster	0.87	0.88
13" brick, plaster..........	0.28	0.30
Clapboard, paper, sheathing, studding, lath, plaster, wall paper (which surprised the investigators)..	0.28	0.27
8" concrete slab, 1:2:4 mix..	1.79	1.04
8" concrete slab, 1:2:4 mix..	1.66	1.04
4" brick, 8" tile, plaster....	.60	.31

As might be expected, some unlooked-for results were obtained during a long series of field tests with the heat flow meter. During the study of heat flow through a tile, brick veneer wall, there was a decided drop in temperature, followed by a gradual rise. The low temperature continued over a three-day period. The salient data obtained are given here:

	Jan. 13	Jan. 14	Jan. 15	Jan. 16
Lowest outside temperature	40	23	18	20
Highest rate of heat flow (actual)	9.5	11.4	15.3	15.7
Highest rate of heat flow (theoretical)	8.9	14.0	15.6	15.1
Per cent of theoretical of actual rate of heat flow	93.7	122.1	102.0	96.1
Total heat flow for 12 hrs., (actual)	72.2	122.4	168.3	143.3
Total heat flow for 12 hrs., (theoretical)	106.7	168.0	187.2	153.6
Per cent of theoretical of actual total heat flow..	147.8	137.2	111.2	107.1

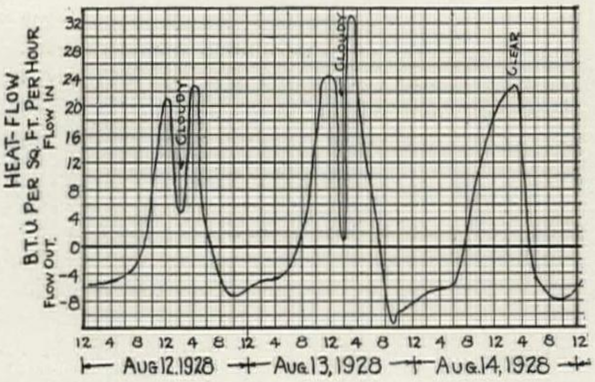
It is evident that the maximum measured rate of heat flow increased as the outside temperature



Testing Equipment for Determining Air Flow Through Brick Walls. Several Test Panels Are Shown at Right dropped, but not as rapidly as the theoretical rate of heat flow found by multiplying the conductance of the wall by the temperature difference. When the outside temperature started to rise, the measured rate of flow became greater than the theoretical rate. Lag in heat loss, due to the heat capacity of the wall, caused this condition, which was not fully appreciated until brought to light by these tests. The total heat loss over the 12-hour period as measured was less than the computed loss, based upon a continued maximum temperature difference over the entire period. This condition should be taken into account when estimating heat losses from buildings involving large wall masses capable of storing heat.

Another interesting finding developed through tests on the walls of the Hotel Schenley and of the Schenley Apartments, Pittsburgh, both being 4-inch brick, 8-inch tile and plaster. The conductance of the walls of the former, as determined by the meter, was almost exactly twice that of the latter. A study of the possible reason led to the fact that the heat-flow meter had been applied to a narrow strip of wall in the hotel, with an edge close to a window and another adjacent to a wall. Undoubtedly the lines of heat flow through the wall spread out from the inner to the outer surface, causing the discrepancy. From this, the operators learned to be more careful in choosing a location for the meter. The next year or two undoubtedly will see the accumulation and tabulation of a great many figures that will render more accurate the determination of heat losses from all portions of buildings of every class.

Insulation. Turning from a classification of heat losses through walls and roofs to the problem of reducing these losses to the economical minimum, there are to be considered three classes

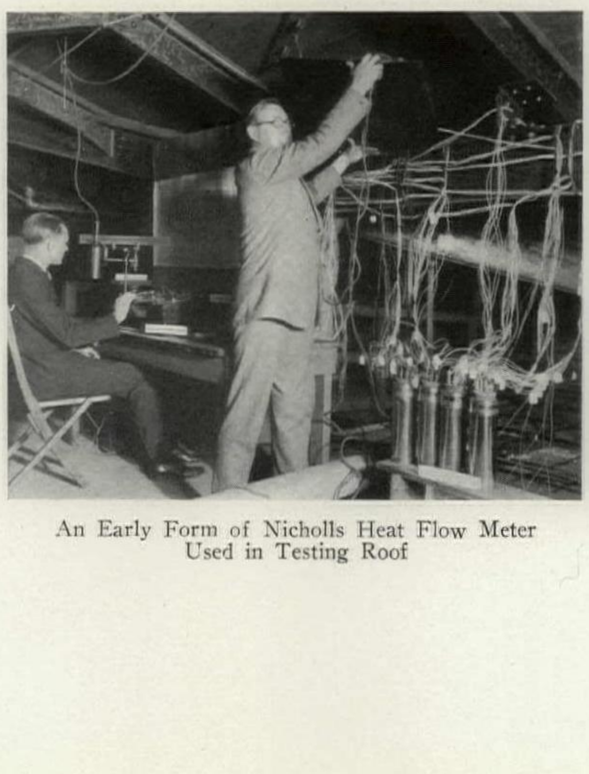


Graphic Record of Heat Flow Through Roof Showing That Cloudiness Reduces Inflow

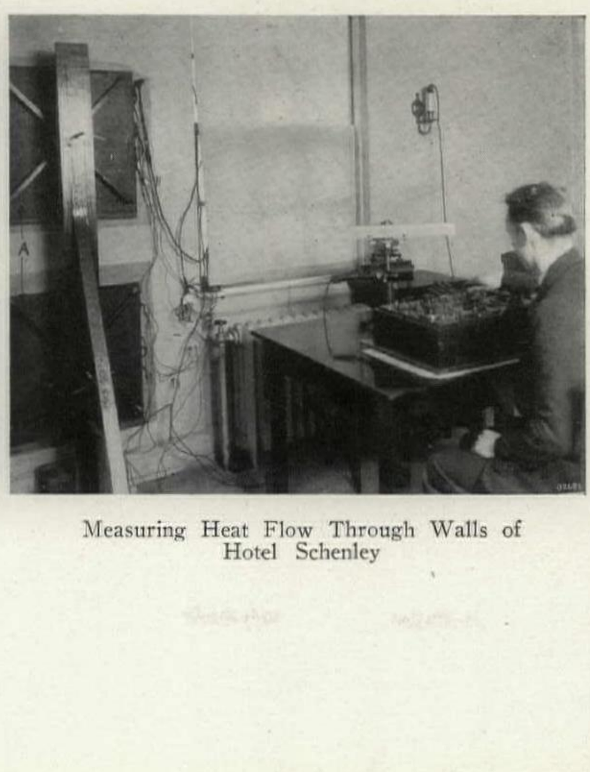
of insulation: rigid boards, flexible, and "fills." Each has qualifications for specific applications. Practically every type will absorb water to some extent; and insulation, when moist, ceases, in a large measure, to fulfill its function. Where there is a chance that condensation will occur, some effective waterproofing should be provided. Fire- and vermin-resisting qualities also should be given consideration.

Modern buildings designed for factory or office use usually have so much glass in proportion to wall surface that wall insulation seldom is warranted. The window area may be 60% to 70% of the aggregate exposed wall area, and the heat loss through 1 square foot of glass approximates that through 4 square feet of conventional 13-inch brick construction. So the heat loss through the wall is practically negligible.

It is in the home, where comfort is paramount, that insulation is more than justified. With about one-fifth of the wall surface glass, the remaining wall area is well worth insulating, to say nothing of the roof. A plain brick wall is more of a sieve than is popularly assumed. With a 15-mile wind,



An Early Form of Nicholls Heat Flow Meter Used in Testing Roof



Measuring Heat Flow Through Walls of Hotel Schenley it will pass about 7½ cubic feet of air per square foot per hour. The addition of a coat of plaster on furring will reduce this to one-fifth of a cubic foot. Insulation will reduce this air leakage to an almost negligible amount and, at the same time, reduce the heat loss through the wall.

Workmanship and Heat Loss. A comprehensive series of tests recently has been made at the University of Wisconsin to determine the rate of air infiltration through brick walls of various kinds. An elaborate test equipment was so constructed that sample sections of wall could be inserted between two air chambers, with all peripheral joints thoroughly calked. Air pressure was produced in one of the chambers by a blower, and the air that passed through the wall into the other chamber was emitted through small calibrated orifices and its quantity measured.

Test wall sections were built up of two classes of brick,—hard and soft,—and in such a way as to differentiate between good and poor workmanship; in the latter, the mortar was "skimped" between the two outside surfaces of the wall, *but the outside appearance was identical.* Great variation was found in the air-passing character of the different walls. Careful analysis of a mass of data showed that there were many factors, and that reasons for certain results were more conjecture than anything else. Of the results, Professor Larson says:

"Since poor workmanship consists mainly in leaving voids between the bricks in the interior of the wall, and since the porous brick is likely to be much less uniform in density, it may be that poor workmanship opens up passageways for air through short distances from the face of the porous brick to the voids, and then out on the other face of the wall through a short distance of brick. This explanation requires that the hard brick wall passes most of the total infiltration through the mortar joints."

"Another possible cause for this greater variation between the best and the poorest of porous brick walls, as compared to the best and poorest hard brick walls is in the effect of the porosity of the brick on the proper setting of the mortar. It is likely that the porous brick draws the water from the mortar before it has had time to set, and consequently causes an opening of pores and shrinking away of mortar from the brick surfaces."

It will be evident that the architect, by insisting on the highest class of workmanship and materials, and by watchful inspection during the construction of brick walls, can insure to his client walls that will pass a minimum of air, and consequently result in materially reduced fuel bills and provide more comfort for the occupants.

That the economic thickness of insulation can be determined from essential data is shown in a typical analysis recently made by M. S. Wunderlich, in which he assumed:

An annual heat demand of 6,000 degree days.
Anthracite coal at $17.00 per ton.
Coke at $12.50 per ton.
Bituminous coal at $9.00 per ton.
½-inch insulation at $90.00 per 1,000 sq. ft., applied.
1-inch insulation at $130.00 per 1,000 sq. ft., applied, and where 1-inch insulation is applied to side walls, $15.00 is added per 1,000 sq. ft. to take care of additional depth of window and door frames, the insulation being installed to take advantage of air spaces and having a conductance of 0.30 per unit inch.

The conclusions drawn by Mr. Wunderlich are thus summed up:

"From this table it will be evident that the saving with 1-inch insulation in the ceiling, with $17.00 per ton coal, is slightly greater than the saving with ½-inch insulation in the side walls, and that with $9.00 per ton coal the saving with 1-inch insulation in the ceiling is slightly less than the ½-inch insulation in the side wall, while with $12.50 per ton coke the saving is the same. This would indicate that with a higher fuel cost the insulation in the ceiling should be increased over that indicated as compared with side walls, and that with $9.00 per ton coal the thickness of the ceiling insulation approaches the thickness of insulation of the sidewall. Therefore, it follows with the average cost of fuel to the home owner, that the ratio of ½-inch insulation in the side walls to 1-inch insulation in the ceiling is a well balanced insulated job."

A HOUSE FOR MASS PRODUCTION

BY

R. BUCKMINSTER FULLER

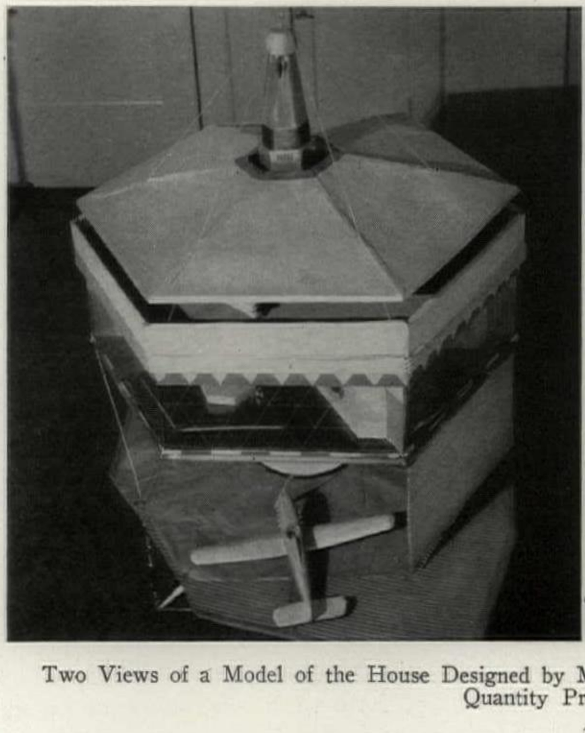
Editor's Note. The brief but illuminating and stimulating description of this house is taken largely from an address by Mr. Fuller, in Chicago, where his models were first exhibited.

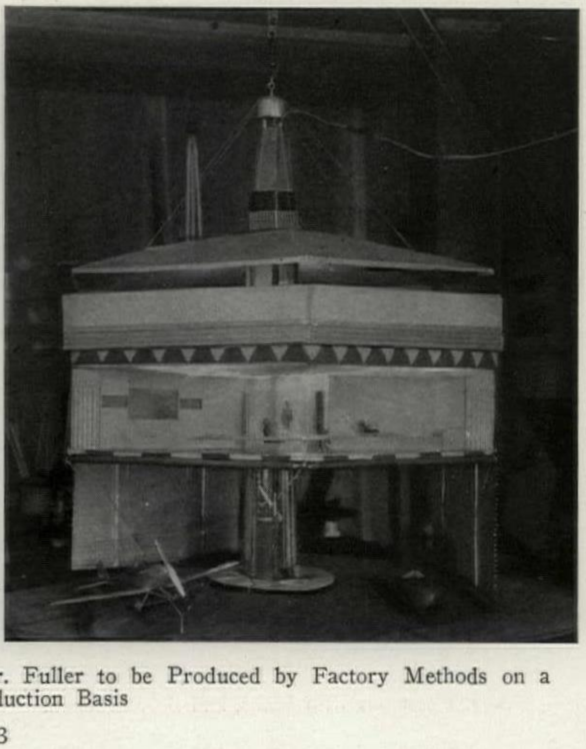
IT must be clearly understood that the models and drawings here presented are in no way assuming of perfection or that they indicate the only solution of a problem. They do, however, represent a very definite attempt at housing design on a 'best-for-all' basis, with no concession to material appearance or to vanity in advance of proper engineering and general scientific solution. By vanity is meant an association of ideas as to how something should be done because in the past a solution has been related to some event or person of whom we are fond, rather than to solving problems on the basis of their clearest reference to intelligence.

"Inasmuch as the major abode of the United States,—and it is assumed for discussion that the United States represents the advanced nations of the world,—is still the five-room individual house, and inasmuch as but 1 per cent of the five-room houses are designed by architects, it being economically inexpedient in a 'tailoring' business to design so small an entity, and inasmuch as the majority of these individual houses of the United States have still no bathrooms, there is indeed involved a problem of industrial best-for-all design.

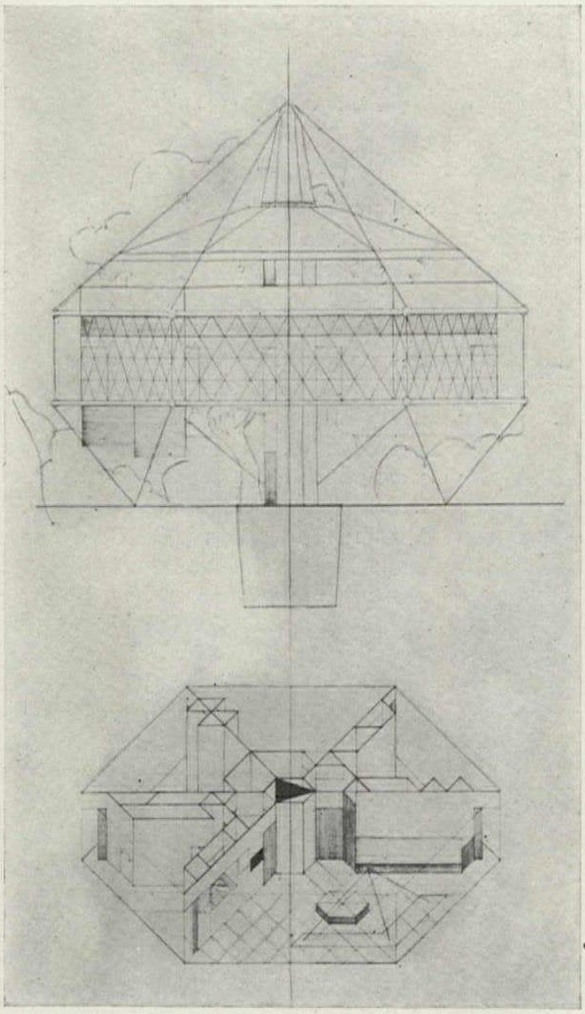
"That there are 2,000,000 people who die in houses annually from floods, earthquakes and tornadoes, that there are multi-millions who die from unsanitary housing conditions, all of which can be overcome mechanically with no effort at all, indeed emphasizes the problem that there is a best-for-all solution. Inasmuch as we are all here in this world to live, and the one thing we need most is housing, housing on an industrial basis of fabrication, as opposed to the picayune 'tailoring' business it is today, would be in proportion to all other businesses as the battleship to a small boat. It has been found that the great popular buyers for monkey wrenches, automobiles, hats, etc., cannot purchase housing as they want it, there being no centralized industries on a universal competitive basis to overcome the exigencies enumerated before, to economically survive on their claim that they can overcome them, and so perform.

"This house is 40 feet high, 50 feet in diameter, proof against earthquake, flood, tornado, electrical storms, marauders, etc. It contains two bedrooms, each with its bath; foolproof worm-gear elevator; laundry unit in which each piece of soiled clothing is individually deposited, and completely finished and ready to use in 3 minutes; cooking grills which are like a piano and

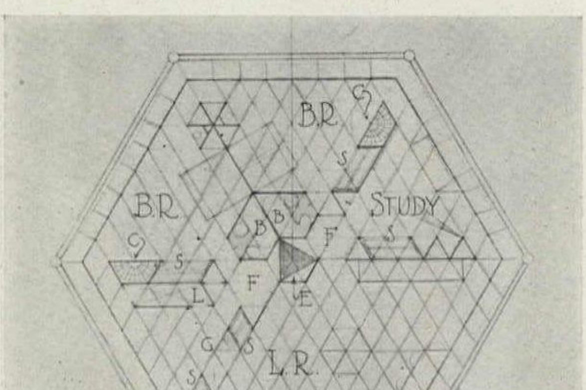




Two Views of a Model of the House Designed by Mr. Fuller to be Produced by Factory Methods on a Quantity Production Basis



Elevation and Isometric Drawing of the Dymaxion House, Showing Stability of Construction Obtained by Triangulation of Steel in Tension



Plan of Dymaxion House Having Living Room, Study, Bedrooms with Baths, and Service Room

have nothing to do with a servant; refrigerator; dish closets in which the shelves come around to one instead of one's going around for them! incinerator pocket in which one shells the peas, etc., without ducking down under the pipes; pneumatic, soundproof floors and doors on which the children cannot hurt themselves; library in which the bookshelves come around to one, completely equipped with maps, globes, atlases, drawing board, typewriter, mimeograph, calculating machines, television unit, radio loud speaker and microphone; individual power plant providing both light and heat; sewerage disposal; compressed air cleaner; pneumatic beds; built-in furniture; semi-circular hanging coat closets with capacity of 32 overcoats or 50 dresses; hangar in which the transport unit, an amphibian airplane-automobile, is found as part of the equipment of the house; a 50-foot diameter play deck on top of the house sheltered from storms but where sun baths may always be had; windows that cannot be broken and are never opened, as the air is brought in mechanically without losing any of its fresh, spring smell, but freed of all dust and combined with the proper amount of humidity,—air never too wet nor too dry—and of the proper temperature, blown in through the rooms so that at the North Pole or at the equator no bed clothes need ever be used as the air is always perfect; where any amount of light or coloring of the light may be had in any room from completely indirect, translucent lighting of ceilings or partitions; rooms that are all soundproof so that when anyone rests he may rest in perfect peace. All delivered and ready to move into complete as described, it weighs but 6,000 pounds; at 50 cents a pound for this combination of conveniences, which involves aluminum, casein, etc., it comes to but $3,000 delivered. This house, apparently from cost of Diesel engine operation figures now current, can be maintained at a total expenditure of $5 a month. Being on a functional basis of design, like a ship, it can now be sold not on the land it occupies any more than the ship on the water it occupies, but on the acceptance time-faith basis of all other products.

"It is evident to all the most ardent æsthetes that such truth can also be beautiful. With such apparent results to be obtained on a best-for-all basis, it is evident that should the great industrial housing so indicated develop, which it must inevitably do, all other forms of housing extant will be obsolete and we will need at once 2,000,000,000 houses, let alone factories, office buildings, etc., of equivalent economic engineering economy, wherefore none need fear of being bereft of their business provided they realize that good prestige and organization, rather than material inventory, form their chief stock in trade."

PHOTO-VISUALIZING FOR ARCHITECTS

BY

LEICESTER K. DAVIS

ILLUSTRATED FROM PHOTOGRAPHS BY THE AUTHOR

NOT for one moment is this article intended to go on record as recommending that survey photographs be made to take the place of professionally produced progress pictures which are now so thoroughly relied upon for records of the major phases of modern construction. The points which it emphasizes are meant solely to aid those who have need of accurate visualizations of subjects which cannot wait for, or perhaps do not justify employment of, the commercial camera man's skill and equipment.

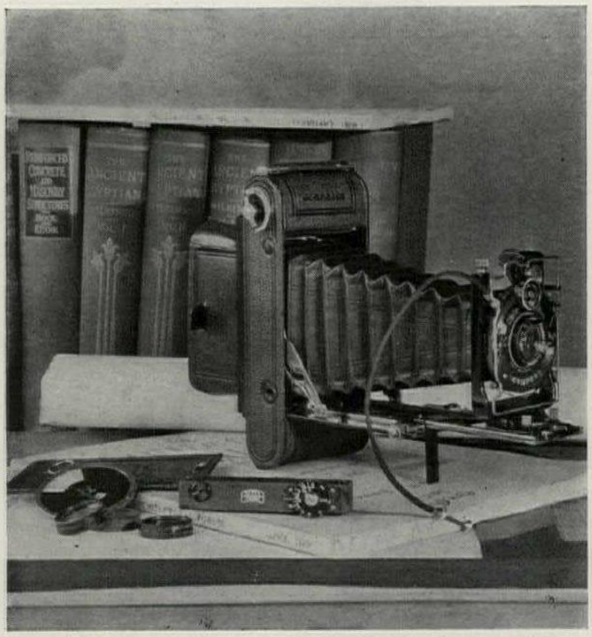
Architects and engineers, construction superintendents and field investigators have assured me that failure on their part to make more use of the little camera as a survey instrument has been due merely to not knowing "how it should be done." Time and again there is need of visual surveys: records of structural practice; details of construction rapidly assuming change of form or being lost to view beneath concrete, brick or plaster; good and bad methods of handling or storing material; incidents which to be of practical value as part of reference data must be secured on the spot, without delay. "I've tried making such photographs," one architect recently said to me, "but with very few exceptions, results haven't justified the bother of lugging a camera about. Most of my stuff has come out all wrong,—important details lost in inky shadows, craftsmen in action looking like woolly dolls, close-ups that make your eyes ache trying to see what they are all about, and distortion that's like a bad dream. It simply can't be done,—by me at least."

It can be done, however, and should be by every architect, engineer or supervisor who knows the value of recorded day-to-day impressions that only a clean-cut photograph can give as irrefutable evidence for future reference. To back that assertion, let's begin with consideration of the qualities demanded in such photographs.

Pictorial effects have no place in the photograph that's intended to become part of a permanent record of structural facts. Niceties of composition, intriguing play of lights and shadows, have no value. Detail is what we are after, —all of it that can be secured, with identity and relationship of elements made clear and brought out needle-sharp, and faults of material or method shown beyond a shadow of doubt.

"That's all true enough," says the man who consistently has had the reverse of such results. "I know as well as you do what makes a successful survey photograph, but how would you handle a problem like this? I want for my files a picture of methods employed on an installation that's in progress. In another half-day it will be out of sight behind courses of brick. I've a particular reason for wishing to show the workmen on the job in action and unaware that a photograph is being taken. It's a dark day with rain, and never a chance for a peep of sunlight. And to get this picture I've got to perch on a scaffold, 20 feet from my subject. That's a fair sample of actual conditions *I've* been up against." A creditable survey shot in a situation such as that would be hopeless if attempted with equipment of insufficient capabilities, but it would be no problem at all with the right sort of camera. To prove that, before we go further, just examine, on page 106, a reproduction of an actual survey photograph made in the rain, under light conditions worse if anything than those just described. No one could wish for more detail, particularly in the heavily shadowed portions. This photograph was made during an inspection trip with a little camera not much larger than a notebook, taking a 2¼ x 3¼-inch picture. Its ability to do the work lay, of course, in better than average lens and shutter,—in a lens having reserve speed enabling it to register details in low visibility, and a shutter adjustable to the exact timing required.

The Lens. The average individual whose experience in photography hasn't gone much beyond the "press the button" stage is far from being certain as to what is meant by "speed" in a lens. Usually he has a hazy idea that it is associated with some special form of grinding or quality of glass peculiar to its type. If at all familiar with the numbers by which lens speed is designated, he realizes that "f :4.5" means an extremely fast lens, while "f :5.6" or "f :7.7" is considerably slower. Beyond that he is not sure as to what it is all about. A good many architects and others who are interested in survey photography, purely as a means to an end, have been surprised to learn that, broadly speaking, the speed of a lens is gauged by the amount of light which it admits to the emulsion-coated film on which the latent image is formed during exposure. A lens is numbered according to the ratio of the diameter of its full aperture to its focal length. For example, the diameter of an f :4.5 will, at full opening, divide exactly 4.5 times into the focal length of the camera for which it is intended, while a slower lens will be of smaller proportionate diameter. This does not mean that mere ability to admit a great amount of light makes a fast lens perfect in its recording. With speed as just



The Little Camera Which Made the Illustrations for this Article. Exposure Meter, Supplementary Lenses, Color Filter and Range Finder Also Shown

defined, there must be refractive qualities that correct aberration and distortion, eliminate chromatic blur and other errors far too technical for discussion here.

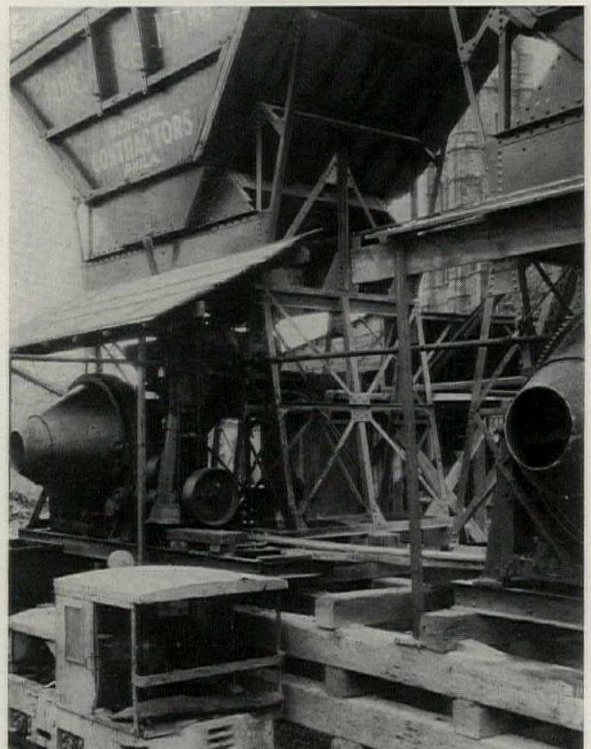
The point to be emphasized is that the faster the lens,—considering performance strictly in terms of light,—the greater will be its latitude for effective operation on badly lighted subjects. Correct refraction is quite as important as high speed. No qualities of depth and definition can be too good. For all-round performance under exacting conditions, I can unhesitatingly recommend the Carl Zeiss "f :4.5 Tessar" as being the ideal type for survey work; with its speed are flatness of field, depth, covering power, definition, precision.

Exposure. Correct exposures are, of course, necessary for the success of survey photographs. They must be timed for the details which are most wanted in the finished print or enlargement. The gauging of exposure,—determination of just what fraction of a second or number of seconds are required to get the details,—has made survey photography discouraging to many an architect and engineer whose records might otherwise be crammed with invaluable visual data. Here again, equipment of capacity unequal to demands made upon it has been to blame for a large percentage of failures.

There are several outstanding factors concerning exposure which should be understood. Generally speaking, a survey photograph has to be taken as rapidly as possible. With most views the use of a tripod is both inexpedient and a nuisance. Nine times out of ten there is fast or slow motion as well as fixed detail to be recorded, and the exposure must stop the one while securing the other.

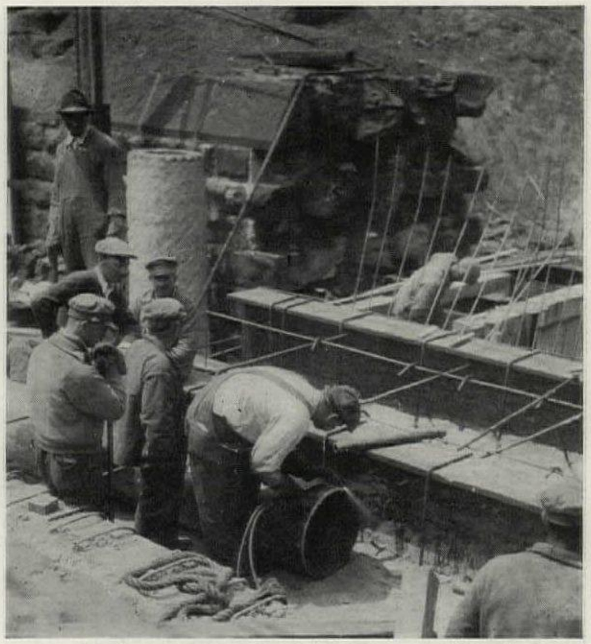
Shutters. With correct analysis of the light with which we are working, there must be latitude in shutter speed that copes with every situation. A shutter of average snapshot limitations falls far short of requirements. As proof of this, suppose one has a camera with shutter adjustable to the usual 1/25-second, 1/50-second and 1/100-second instantaneous range. These will do nicely for everyday amateur picture taking. With an f :4.5 lens wide open it is possible to secure very fair records of street scenes, if not too close upon pedestrians and vehicles, on a cloudy day at 1/25-second. In better light faster action may be stopped by using 1/50-second, while, with light conditions being equal, some very fast action may be stopped at 1/100-second. These divisions are inadequate, however, where bad lighting and motion require timing that borders upon actual time-exposure, or when in brilliant light there is action of "newspaper speed" variety to be stopped.

The shutter of the camera selected for survey work should have, in addition to at least 1/200-second maximum speed, a variety of in-between adjustments slower than 1/25-second in order to

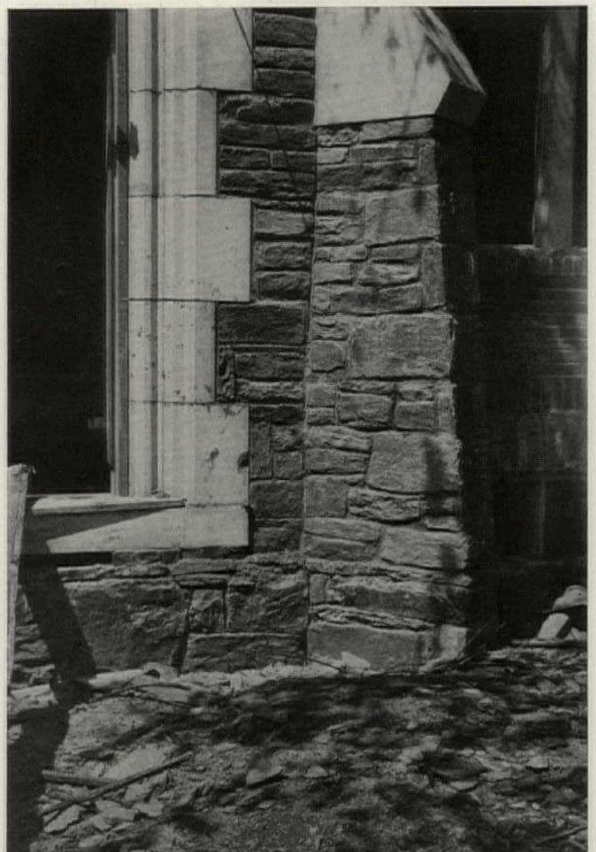


A Fast Lens and Slow Instantaneous Exposure Secured This Sharp Result on a Dark, Rainy Day go the limit when necessary. The "Compur" shutter of the little camera with which all the accompanying illustrations were made offers a choice of eight instantaneous timings: 1-second, 1/2-second, 1/5-second, 1/10-second, 1/25-second, 1/50-second, 1/100-second, and 1/250-second. I find repeated use for all of them. Coupled with the reserve speed of the f :4.5 Tessar, they make few and far between the survey pictures which have to be passed by because of faulty light.

Of course, one must bear in mind that working at slow exposures calls for extreme steadiness of the camera,—1/25-second might be set as the deadline beyond which there is risk of hand or body tremor causing blur in the negative. In some instances, where exigency has demanded a hand-held snap or no picture at all, I have secured remarkably clear and fully timed negatives at 1 1/10-seconds. In others, where the passing of heavy trucks, the grind of nearby machinery, or the shaking of a scaffold under wind pressure has caused vibration, 1/25-second has not been fast enough to prevent disappointing fuzziness of outlines. When vibration or unsteadiness of hand or body is at all suspected, it is well to work with the shutter set at 1/50-second or faster, and if in poor light to open up to a lens aperture that calls on whatever lens reserve is required. Experience has taught me the wisdom of securing as firm a camera support as possible for all exposures slower than 1/25-second. The folding strut beneath the lens board of most small cameras usually makes it easy to find a foothold on some rigid object from which focus and exposure may be made with assurance that all movement has been eliminated.



This Sharply Angled Shot at 25 Feet Would Have Been Hard to Get Without the Aid of the Eye-level Focusing Frame



Close-ups of Details Such as This to be of Real Value Call for Critical Estimate of Distance

Photographing Motion. It is sometimes surprising to those who haven't figured the thing out how well fast-moving distant or semi-distant objects may be stopped by an exposure that is apparently much too slow for the task. Not long ago, I made an overhead shot of an army airplane laying a smoke screen at well over 150 miles per hour. Just what its altitude above me was I could not say. But through the wire focusing frame the airplane was tiny indeed. At closer range, as any news photographer would tell one, a wide open f :4.5 and many hundredths of a second focal plane exposure would have been required. My lens diaphragm happened to be set at f :8, with shutter working at 1/100-second. There was no time to make readjustment to higher speeds, so I made the attempt, hoping to stop the smoke trail but having no idea that the plane would be more than a blurred speck. The result amazed me; enlarged from the 2¼ x 3¼-inch negative, that plane stood forth as though it had been cut out and pasted on the print. Magnified under an ordinary reading glass, the rods and wheels of its landing gear were sharp and clear.

Some Structural Elements Call for Exposures That Disregard Unimportant Objects. Note Clearness of Essential Details

This instance is cited because of its bearing on those slow exposures where the survey subjects include distant or semi-distant objects moving too fast for close recording. The explanation, given by rule and formula, is, of course, that motion upon the film surface is proportionate to the distance of the object from the film. My airplane experience has stood me in good stead many a time since, when 1/10-second or even 1/5-second exposures made necessary by heavily overcast skies have recorded rapid motion *at a distance,* enlargement later bringing up the details to the size required for reference use.

Essentials for Architectural Photography. Research in photography has been quite as exhaustive as in other major sciences. It has established laws and has reduced them to rules which may be easily understood and followed by anyone. Boiled down to essentials, there are but three points on which the architect who wishes to make successful visual surveys needs to be thoroughly assured. These are: (1) that the lens of his camera be capable of admitting sufficient light for the film to "see" the details he desires in good light and bad; (2) that the lens be capable of refracting the lines, planes and colors of the object with fidelity and freedom from aberration and distortion; (3) that the shutter which regulates the volume of light required to form the image may be so adjusted that the aperture keeps the amount of light static despite changes in exposure time.

Focusing. The most important requirements in lens and shutter have already been discussed. The final element to be considered is focus, produced by the forward and backward movement of the lens and shutter assembly, required to register subjects at different distances sharply on the film. There is no need to go into the principles and laws which govern refraction, conjugates, bending of light waves, circles of confusion and what not. It is enough to say that the distance of lens from object determines the extension of bellows necessary for an image in critical focus. On the base board of one's camera, below an indicator attached to the lens carrier, is the scale which shows what extension must be made to insure sharp focus of objects at various distances. At the start of this scale, where the indicator rests when the bellows are at normal open position, will be found a marking ("Inf." or "Infinity") at which all objects beyond a definite distance will be critically sharp. On the type of camera which is here illustrated, the lens is rated as having 4¼-inch focal length; that is, with bellows at normal extension the lens is at Infinity focus, 4¼ inches away from the film surface. With such a focal length, Infinity begins at about 40 feet, all objects from one-half that distance on being sharp.

Infinity distances vary with focal lengths; the greater the focal length, the greater the distance at which Infinity begins. The ability of the camera of short focal length to perform as a fixed focus instrument at comparatively short range is, of course, a recommendation for its use on surveys. It is hardly necessary to add that the survey photographer should be thoroughly familiar with the focal length of his camera before he takes the field. Little more than these few facts would have to be known were it possible to confine survey photographs to subjects at Infinity. Some of the most important shots, however, must be made at distances shorter than 40 or even 20 feet, and for these detail must be as sharp as possible.

The focusing scale is intended to provide for these close-ups, and it does. But it does not tell one that the moment the lens moves forward of the Infinity mark it has lost ability to register unlimited focal depth. Only so far and no farther, depending upon the point at which the indicator is stopped, will the distances before and beyond the object produce sharply focused images. The more the lens is advanced, the shorter these distances become. It would be bewildering if this information and nothing more were given as an aid to close-up focusing where it is not possible to see on the ground glass exactly what will be secured in the negative. Luckily, it has all been worked out by formulæ. These have been tabulated for easy and accurate reference in compact little depth-of-focus charts which show at a glance the depth of critical focus before and beyond objects at given distances, with lenses of different focal length, working at various apertures.

In making a photograph of a structural element at, say, 15 feet, with the diaphragm of a 5 5/16-inch lens set at f:6.3, the depth-of-focus table will tell one immediately that from such a combination one may expect sharp focus from 12 feet, 11 inches to 17 feet, 10 inches, while for the same lens reduced to f:16 these distances will be 10 feet, 9 inches to 24 feet, 10 inches.

In survey photography many subjects are met with in which the principal object desired is closer than Infinity distance, while others almost equally important extend far beyond the limits imposed by the depth of focus rule. An example of this would be a structural element at 15 feet from the lens, with desired contributing elements 100 feet or so beyond. The difficulty is easily overcome, for the Infinity point may be brought nearer than normal by establishing a hyperfocal point beginning at half its distance before the object and extending far beyond.

While in theory such a thing as fixed focus is an impossibility, every lens aperture has its hyperfocal distance, beyond which all objects will be sufficiently sharp for practical purposes. This distance may be determined either by ground glass or focusing scale. With hand-held cameras it may be worked out by a simple formula: the diameter of the aperture desired multiplied by the focal length of the lens and the product divided by 100 for average detail, or 200 if extremely critical definition is required. To the quotient is added the focal length, the sum being the exact distance of the object upon which the lens must be accurately focused to insure far and near sharpness. Handy little tables have been prepared which give all this information at a glance. Their advantages are obvious, when one realizes that with our little camera of 4¼-inch focal length opened at f:5.6 aperture and focusing scale set at 27 feet, everything wished for in the negative will be secured from 13½ feet on.

Judging Exposure. There should be no guesswork as to exposure where a variety of subjects under different light conditions are encountered. Even the experienced professional photographer is often puzzled in determining just how much or how little light of photographic quality he has to deal with. Time of year, atmospheric haze, color, nearness of objects, absorption of light by surrounding objects, and reflected light are all factors having direct bearing upon correct timing. It is also important that the exposure calculation be based upon the light reflected by the object itself and not by surrounding objects.

A Long Range Shot at 1/50 Second Proving That a 2¼ x 3¼-inch Negative Can Record the Facts

There are several types of exposure meters which make possible quick and accurate calculations. These may be roughly classified as: (1) card meters, which give close approximations of the light and subjects present, with proper exposures given for full range of apertures and shutter settings; and (2) extinction meters, which are sighted directly upon the object and manipulated until the light admitted by the eyepiece is reduced to proper exposure point, readings being taken from the instrument. My own preference is for either a "Diaphot" or a "Justophot," both of which are of the extinction type. The former is quite inexpensive, handy in size, and once its extinction point is understood, it will be found dependable for interior or exterior use. The Justophot is more precise in its calculations, eliminating all chance of error, no matter how difficult the subject or its lighting.

Whatever means are employed in figuring out exposure, it is well to bear in mind the axiom: "Expose for the shadows, and let the high lights take care of themselves." If after detail, one must be sure to time the shot to get it on the negative. The emulsions of modern films and plates provide a surprising latitude in the matter of exposure; so it is better to err on the side of too much time rather than too little.

Distance gauging is not likely to be a great problem to men experienced in making rapid approximation of measurements. It is nevertheless well to be provided with a dependable range finder for close-ups that require critical definition. There are several types which give most satisfactory results,—compact little instruments not much larger than a cigarette lighter, requiring but rapid sighting and a finger and thumb turn of a calibrated dial to obtain readings of from 4 to 100 feet. A range finder will also be found quite valuable in making distance approximations where a tape is not available or practicable.

The Camera. And now for a brief consideration of the camera itself with which to make good survey photographs. Compactness, completeness, and ease of manipulation are equally important. After experience with various makes and types, my choice has settled upon the little camera here shown. It has everything and more to be desired by the architect, engineer or structural supervisor. Closed, its outside dimensions are but 7 x 3½ x 1½ inches. It weighs a trifle more than a pound, and its capabilities and adaptability extend to the most complicated forms of visual survey making. It is, of course, equipped with the f:4.5 Tessar lens and the Compur shutter already described. With these are included several features which make immediate appeal. The foremost perhaps is the "Iconometer" focusing frame, which swings out from and moves with the lens and shutter assembly. Through it the operator may view and compose his picture at architectural eye level, or standing point, up to and through the instant of exposure. There is also a brilliant reflecting finder adjustable to vertical and horizontal views, but on survey work the Iconometer will be much more frequently called into play. In fact, many a sharply-angled downward slant, over a scaffold's edge or into an excavation, would be next to impossible without it.

The rising front of this little camera is also of considerable importance. A simple finger and thumb control raises and lowers the lens and shutter assembly at will, increasing or decreasing the amount of foreground and helping to obviate distortion caused by tilting the camera. The hooded focusing back attachment, double extension of bellows, convertibility to roll film, film pack, cut film or plate, and adaptability to wide-angle and telephoto work through the use of supplementary lenses, are other features seldom found in a camera of such small size.

What the average "snapshotter" usually considers to be poor lighting is often an advantage to the survey photographer. As a matter of fact, I try when possible for a slightly overcast day on work requiring exterior views of construction. Brilliant sunshine may be fine for simple record pictures or contrasty pictorial effects, but with structural elements it is quite another matter. "Expose for the shadows and let the high lights take care of themselves," but, as with all rules, this rule has its exceptions. To pierce the inky blackness cast by glittering sunlight upon a complicated structural detail half in and half out of shadows, and to expect a satisfying approximation of correct values, is asking too much of even the long-range emulsions found in modern films and plates. One will get one or the other, depending upon which one has time for, but there is small chance of getting both with the even balance of detail a good visual survey should have. Slightly overcast skies help matters mightily, and if one has the right sort of lens and shutter combination, there need be no worry about getting a good exposure on a bad day, provided it be at effective shutter speed.

Wide Angle and Telephoto Work. There are times when even an f:4.5 lens must have assistance. I speak particularly in reference to subjects which require a much wider angle of view than is made possible with the Tessar used alone. For this, a little wide-angle attachment becomes a very welcome accessory. It is slipped over the mount of the Tessar, shortening the focal length considerably and widening the angle of view in a most satisfactory manner. In such cases use of the ground glass becomes necessary, but this is made easy by the focusing back of the little camera just described. Supplementary lenses for telephoto work may also be used, making possible close-ups of distant and semi-distant objects which could be had in no other way.

A good filter should be part of the survey photo fitted kit. This, too, is slipped over the regular lens. Filter action slows up the ultra-violet rays which normally register far ahead of colors farther down the spectrum. Used in connection with panchromatic plates or films, a filter brings out reds and yellows which otherwise would be expressed in tones far darker than the originals. Used with ordinary films or film packs,—which now possess a high degree of color perception,—a light yellow filter will do much toward snapping out the contrasts of surfaces on which there is an abundance of reds and yellows. A filter increases exposure in ratio to its factor; that is, a 5-time filter lengthens normal exposure by just that many times; and except under the most brilliant light conditions, with lens at wide apertures, it is seldom feasible to use a filter without a tripod or other fixed support. A tripod should be carried.

CHOOSING THE STRUCTURAL SYSTEM AND MATERIAL

PART III—FLOORS AND ROOFS

BY

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ONE of the most important problems facing the designer of fire-resistant buildings is the choice of the floor construction to meet the particular requirements of his project. It is not the intention of this article to describe all of the various systems that have been devised, but rather to deal with the special characteristics of those most widely accepted, and to point out their respective advantages and limitations.

Let us consider the problem at the moment when the architect's preliminary sketches have been approved and it is necessary to determine the structural design of the floors and roof. We can safely assume that the location and type of occupancy are known. The general dimensions of the building, the lengths of the spans and the proportions of the bays, are evident from the preliminary drawings. The locality determines the building ordinance which must be adhered to, or the architect develops his own standard for the structural design, based on his knowledge of what constitutes good practice.

In the larger buildings the first step in structural design is to make a tentative choice between a reinforced concrete and a steel frame. This is important, since some floor systems are not suited to both. Even if the building is a low structure with bearing walls, the framing of the interior will be of either of some form of steel or reinforced concrete, except in rare instances where bearing partitions may be used. If steel is employed, there are a number of floor systems covering a wide range of applicability. Prominent among these, in the east, is the so-called "cinder arch," which has been used extensively in New York. The present municipal ordinance covering this system went into effect about 13 years ago, and it permits 4-inch cinder concrete slabs, properly reinforced, to be used in fire-resistant buildings for clear spans of up to 8 feet. As a 16-foot column spacing would be too close for economy, and as furthermore it would result in placing a concentration on the center of the girder, the almost universal practice is to space columns up to 24 feet and to bring the beams onto the girders at the third points. This system is particularly economical in New York, where neither the code nor department ruling has placed any limiting value on the load per square foot that may be carried by a 4-inch slab, provided that the sectional area of steel reinforcement meets the requirement of the empirical formula. General practice would seem to allow anything up to about 300 pounds per square foot, which is the sidewalk requirement. The concrete functions principally as a stiffener for the suspended mesh.

Cinder Concrete. To what extent we are justified in the structural use of cinder concrete depends upon the character of the materials, workmanship and exposure. Good work can be done with clean, anthracite cinders, and there is no evidence that the reinforcement corrodes in dry locations. Unfortunately, much of the cinder concrete now being placed, on even large structures, is neither well mixed nor thoroughly compacted. Furthermore, the structural slab is often screeded off level with the top flanges of the steel beams, which practice permits the cinder fill to come into direct contact with the wire reinforcement which, of course, passes over these supports. Presuming that a well proportioned cinder concrete offers some protection against corrosion, it would seem desirable to raise the slab sufficiently to give at least a 1-inch thickness over the metal. Aside from these criticisms, however, and the propriety of using cinder concrete in buildings referred to by their owners as "monumental," it is a type of construction which has undoubtedly proved both economical and satisfactory with steel frames. But it should be remembered that in cities such as New York, where many firms of subcontractors have specialized in laying "floor arches," the price per square foot is much less than could be expected in many localities.

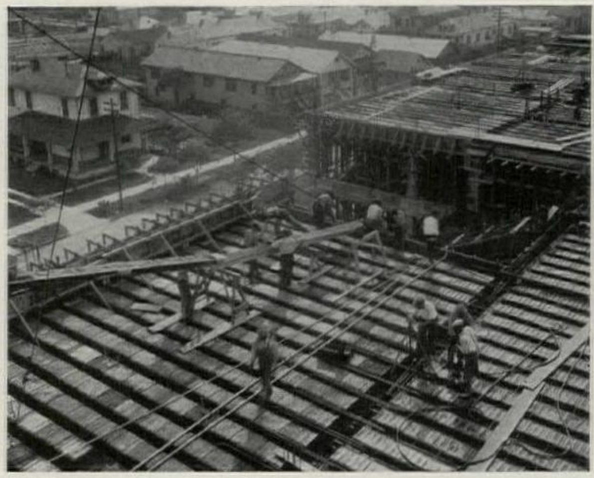
Ribbed Floor Systems. Whereas the use of cinder concrete is principally confined to certain large centers, various types of ribbed floor construction are widely used throughout the country. These originally developed from the solid concrete slab by the simple expedient of replacing the concrete in the lower portion of the slab with fillers, such as terra cotta or gypsum block, or by framing voids with wood or metal pans. As this portion of the slab, being below the neutral surface, carries no compression except over supports, it is quite practical to concentrate the reinforcement in ribs spaced from 16 inches up to several feet on centers, and to design the latter of sufficient width to properly enclose the steel and provide for shearing stresses. The advantage of this method lies in the reduced dead load. For example, a solid concrete slab 10 inches thick would weigh 120 pounds per square foot; the same thickness, with 8-inch gypsum block fillers and a

Wire Fabric in Place for the 4-inch Cinder Concrete "Arches" on an Office Building in New York

Concrete Rib Construction with Gypsum Block Used As Fillers on a Building in Baltimore

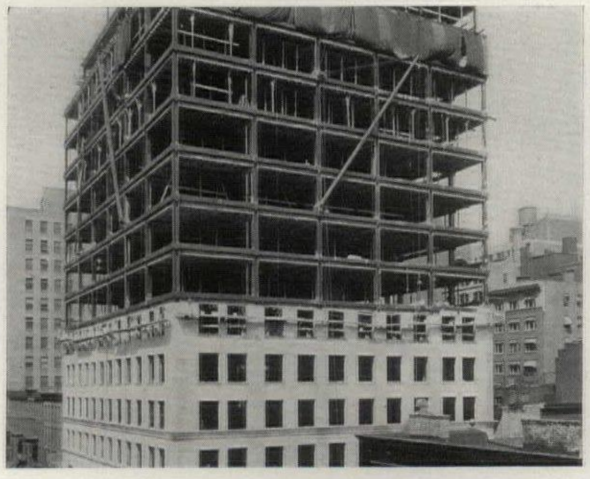
2-inch "topping," would weigh 60 pounds. If it is desired to use a metal lath as a base for ceiling plaster, the metal or wood pans show even greater saving in weight, giving a floor load of only about 50 pounds for the same thickness. On multi-story buildings this is a very important matter, as the entire frame, including the footings, can be made correspondingly lighter. This type of floor can be used to advantage with either a structural steel or reinforced concrete frame, and it is particularly suited to comparatively light live loads, ranging from 40 to 90 pounds per square foot, and to long spans of from 18 to 28 feet.

It is futile to make general statements as to the comparative values of the various ribbed systems. From the structural designer's viewpoint, they all have the same characteristics. Ribs, 4 or 5 inches wide, are placed between filler blocks or pans and computed as small, individual T-beams. Many architects consider that the advantage of plastering upon a gypsum or terra cotta surface amply justifies the somewhat greater cost of the block systems, but metal pans are widely and successfully used in all parts of the country. These latter are referred to as of the "removable" or the "permanent" type, depending upon whether they are taken out and re-used or left in place. The reinforcement of the ribs or joists, as they are sometimes called, consists of one or two rods or bars, alternate rods being raised at about the fifth points of continuous spans to resist the tendency of the beam to fail in shear, or more correctly, in diagonal tension. Where light concentrations occur, such as under terra cotta partitions, joists of double width and with twice the typical reinforcement are employed; a "bridging joist" is used near the middle of long spans to give lateral support. It is usually possible to avoid the use of stirrups, as most building codes follow good practice in allowing 60 pounds per square inch in

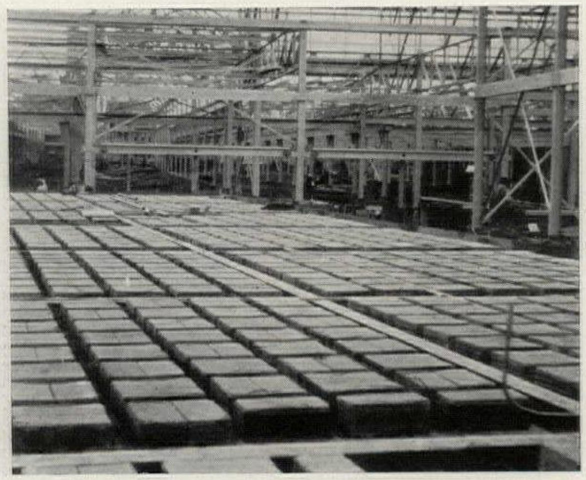


Metal Tile or Permanent "Tin Pans" Ready for the Pouring of the Concrete on a School Building in New Orleans

Removable Pans in Place on a San Francisco Garage; a "Bridging Joist" is Provided Along the Center Line of the Span



Type of Framing Suited to a Two-way Floor System. Necarsulmer & Lehlbach, Architects



Two-way System Formed with Structural Fillers of Slag Concrete; the Panels are Practically Square

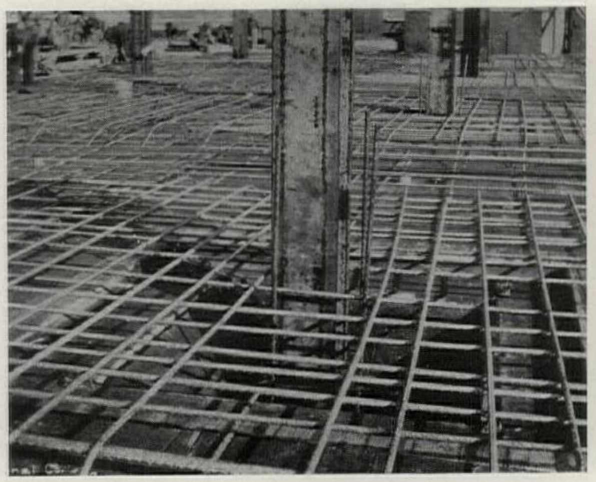
vertical shear where the longitudinal reinforcement is properly anchored. If the shearing stresses are critical, or if the requirements for negative bending moment over continuous supports demand a larger section adjacent to supporting members, it is possible to obtain tapered pans, the use of which results in flaring the ribs. If the design actually requires stirrups, the "continuous" type is probably the more economical.

Over the tops of the terra cotta or gypsum fillers, as well as where metal or wood pans are used, it is customary to place a thin slab of concrete cast integrally with the ribs. The thickness of the slab, referred to as the "topping," is generally specified by code as not less than 2 or 2½ inches. Where the lower limit is sufficient over terra cotta or gypsum block, it would seem desirable to have at least 2½ inches over pan construction. Building ordinances do not usually make this differentiation. Reinforcement, in the form of small rods or wire fabric, is placed in the topping in order to carry the load to the joists and strengthen the slab against stresses due to volumetric changes or impact. The pan systems are particularly adapted to buildings where hung ceilings are necessary in order to provide for ducts.

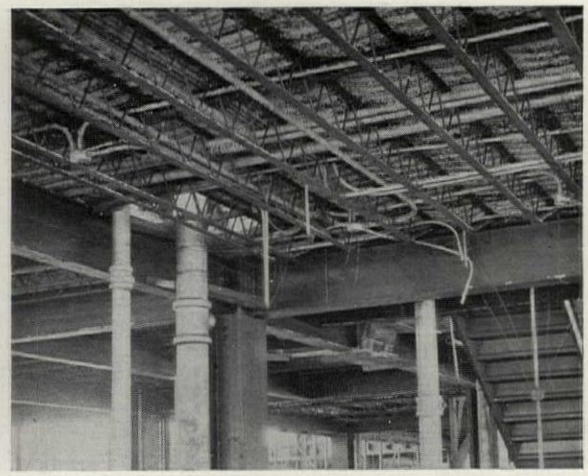
Two-way Systems. Ribbed floors designed as two-way systems, that is with concrete joists running in two directions, constitute an extremely interesting part of this subject. The steel dome is the two-way application of the principle of the metal pan. The two-way system employing precast concrete or terra cotta blocks between the joists is well known. These are both proprietary designs but have been widely used and with excellent results when the plan of the building and partition arrangement is appropriate for a two-way distribution. Taking advantage of the principles underlying the design of flat plates, which have been studied by many investigators both in this

Typical Reinforced Concrete Beam-and-slab Construction as Designed for a New York Post Office. A. S. Alschuler, Architect

Typical Reinforced Concrete Girderless Floor Construction with Drops Over Columns and Half Drops at Walls. Cass Gilbert, Architect

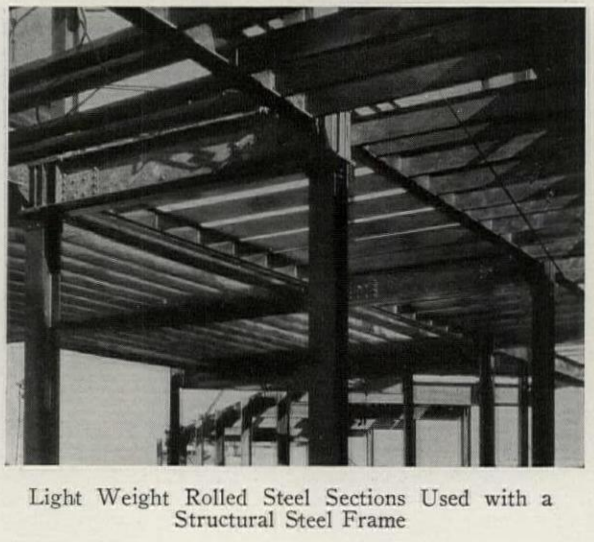


Typical Arrangement of Reinforcement for the Two-way System of Girderless Construction; the Steel Column Cores Are Used Only Through the Lower Stories of This Warehouse



Typical Light Construction of Pittsburgh Office Building, Showing Pipes Passing Through the Joists and Concrete Carried by Metal Fabric. Joists Are Doubled Under Light Concentrations

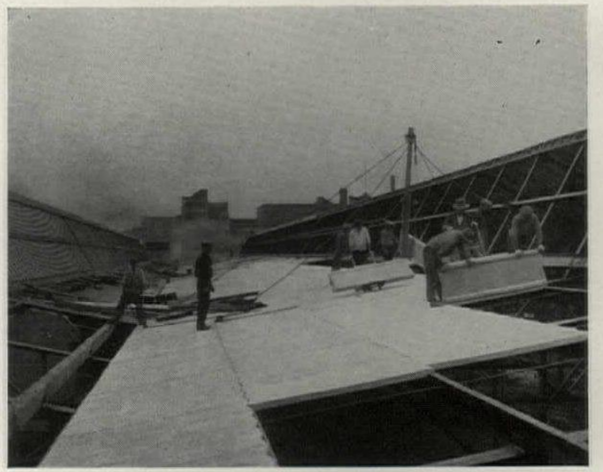
country and abroad, the owners of these systems have gained the approvals of many building departments, and among them those of our largest cities, for the use of empirical coefficients in the moment computations. In the past it has been the practice to compute the sustaining power of a concrete slab of two-way design as if it consisted of a series of parallel beams, entirely neglecting the strength due to "plate action." In the light of both theoretical analyses and practical tests, it would appear justifiable to use moment coefficients on two-way designs 30 per cent less than those that would be applied to individual beams under similar conditions of restraint. In other words, the bending moments on all two-way slabs, of both solid and ribbed construction, might well be approximated as $\frac{WL}{12}$, $\frac{WL}{15}$ and $\frac{WL}{18}$ instead of as $\frac{WL}{8}$, $\frac{WL}{10}$ and $\frac{WL}{12}$ in which W=total load per lineal foot carried in the direction of the reinforcement under design, and L = span as ordinarily defined. As a general principle, it may be borne in mind that when a building can be framed to obtain approximately square bays, with supporting girders or walls on all four sides, there may be a distinct saving in using a two-way system. It can be employed with either bearing walls, steel or concrete frames and have a wide range of application, being suitable for all loads up to those ordinarily used on the floors of buildings intended for light manufacturing purposes.



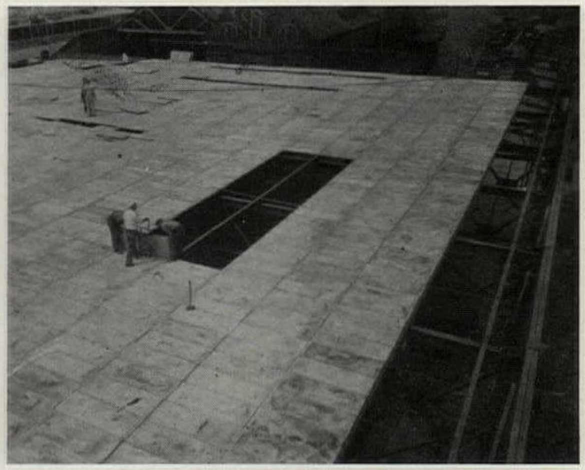
Light Weight Rolled Steel Sections Used with a Structural Steel Frame

A comparatively new system employing slag block units between concrete ribs, running in two directions, furnishes an economical design falling under this classification. The blocks are made of Portland cement, sand and slag; owing to their strength and comparative lightness, they serve in a structural capacity as well as acting as fillers. A topping of concrete is not necessarily required, but it may be used to give the exact thickness called for by the design. This system is adaptable to either a structural steel or reinforced concrete frame and is particularly economical for light and medium loads. During this year it is being installed in several of the largest hotels in New York.

Beam and Slab. The first type of reinforced concrete floor construction that came into use for other than extremely short spans is known as the "beam and slab." In the typical arrangement, columns are placed on about 20-foot centers; girders run between columns in one direction, usually across the building, and the beams frame into the girders at the third points of their spans. An industrial building designed for a live load of 200 pounds per square foot with bays 20 feet square, would require, approximately, a 4-inch thickness for slabs, supported by beams and girders 8 by 20 inches and 12 by 28 inches, respectively. The depths are taken from the top of the



Pre-cast Concrete Channel Slabs Being Placed Over a Structural Steel Frame on a Detroit Factory

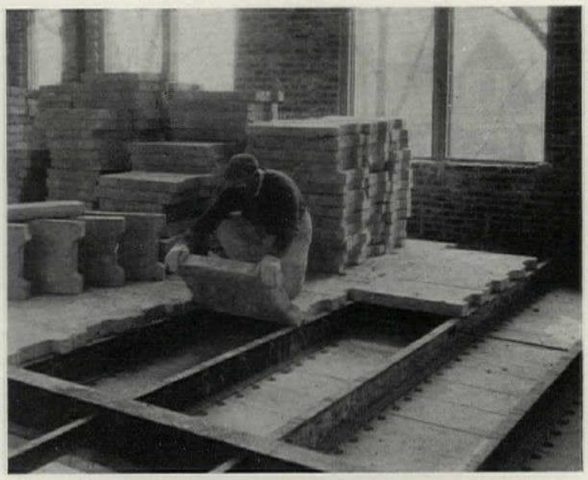


A Large Roof Area of Pre-cast Concrete Slabs Laid Over Railroad Yards in Hoboken

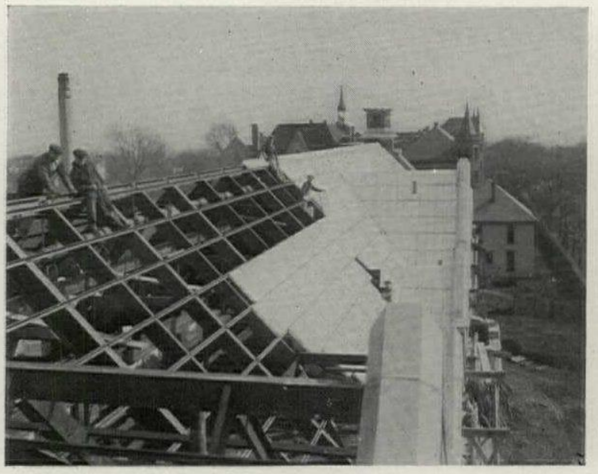
slab. This system is still used for floors built of solid concrete, the arrangement of which does not lend itself to the generally more economical design known as "girderless construction." Obviously, such a system can be adapted only to a concrete frame.

Girderless System. Within recent years beam-and-slab designs have been largely superseded by the girderless type wherever the size of the building and the interior arrangement permit three or more consecutive bays in each direction, provided that the bays are approximately square and of about the same size. This system, however, is not usually economical for live loads of under 100 pounds per square foot, and its particular function is use for industrial buildings and warehouses with live loads ranging from 125 to 300 pounds per square foot of floor area. For the loads ordinarily used in apartment house construction, a pan or ribbed design is more desirable from the viewpoint of structural economy, entirely aside from the architectural difficulty presented by the flared column heads. For industrial buildings designed for a live load of 200 pounds per square foot, and employing drop panels over the columns, the sizes of structural members for a bay 20 feet square would be approximately an 8-inch thickness for the slab; drop panels 6 feet, 8 inches square and projecting 3 inches below the soffit of the slab; column capitals 4 feet, 6 inches in diameter. These dimensions would conform to the requirements of most cities, including New York and Chicago. The girderless system can be used to advantage with either a reinforced concrete frame, which is the usual construction for comparatively low industrial buildings, or with structural steel column cores, which have recently become popular for comparatively tall city buildings.

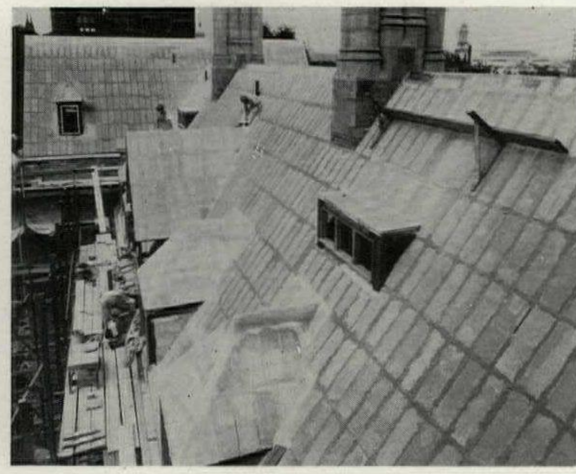
Light Steel Joists. Passing from the class of heavy concrete construction to that of the lighter sections, we have various types of pressed and rolled steel joists. These are not used to advantage with a concrete frame, and although capable of carrying light manufacturing loads on comparatively short spans, are particularly suited to designs requiring live loads of from 40 pounds to 75 pounds per square foot. Pressed metal joists have been on the market for many years and are used in exactly the same way as wooden joists, except at a somewhat greater spacing, and usually as supports for a 2-inch concrete sub-floor poured on metal lath or similar construction. Recently, the new "light steel joists," which are actually light trusses, have been developed and widely used. This construction is extremely simple, the ends of the joists resting on supporting walls, or steel girders and the upper chords carrying the structural slab which may be of either concrete or gypsum, cast over metal reinforcement. As the joists are of open design, it is possible to conceal pipes within the floor. The plaster of the ceilings is applied to metal lath attached to the lower chords of the joists. The latter are occasionally



Pre-cast Gypsum Floor and Ceiling Blocks Used with Light Weight Rolled Steel Sections



Gypsum Tile Being Placed Over a Structural Steel Frame on a College Building in Illinois



Short Span Gypsum Tile Laid Over a Structural Steel Frame on a Dormitory for Yale University

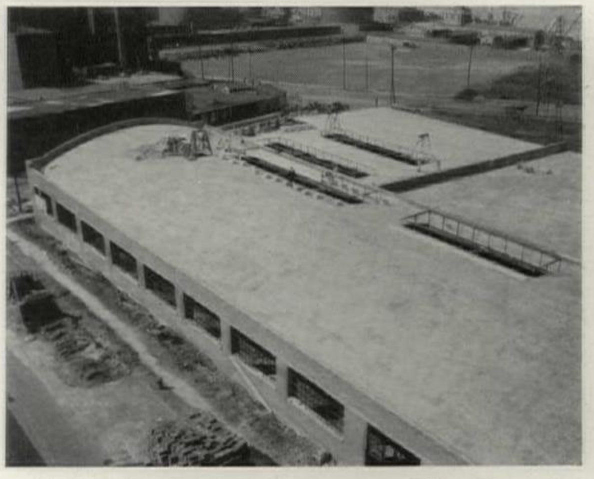
spot-welded to the upper flanges of the girders, and wire bridging is used to give lateral stiffness. Sometimes more lateral support may be required.

To fill the demand for a strong and rigid floor, yet one of lighter weight than would be obtained with standard sections, there have recently been placed upon the market light weight rolled steel beams which are normally set from 2 to 4 feet apart and used to support slabs of either concrete or gypsum. The latter may be in the form of pre-cast units or poured in place, reinforced with metal lath or mesh. These systems are generally used with structural steel frames, but are also suitable for floors supported by bearing walls.

Non-fireproof Framing. Owing probably to its obvious simplicity, framing the interiors of non-fireproof buildings, having exterior masonry walls, is a subject that has received very little attention. In fact, one often sees wooden posts and girders used in residence construction, with the result that the natural shrinkage of the wood causes the interior of the building to settle appreciably. To minimize this difficulty cast iron columns filled with concrete should be used in place of wooden posts, as the increased cost is negligible. For the main girders, carried by the columns, H-sections with square flanges should be employed for the support of the wooden floor joists. The standard I-beam sections are not very satisfactory, since the lower flange does not give adequate bearing and necessitates either bolting a carrying ledger to the beam, which is somewhat awkward, or the loss of headroom resulting from allowing the joists to rest on the tops of the steel girders, instead of framing into them. The studding of main partitions should, of course, rest directly on the upper flanges of the girders and not upon the joists comprising the floor system. The sizes of wooden floor joists and the requirements for anchorage, or coping and bridging, are of such general knowledge that the subject will not be further treated in these articles.

Fire-resistant Roofs. The design and construction of fire-resistant roofs is a subject that has received considerable study during recent years. It is not a simple matter to build pitched roofs that will satisfy both structural and architectural demands and at the same time be practically fireproof. In ancient and mediæval buildings use of the wooden truss was the only alternative when the architectural treatment made impracticable the employment of vault or dome. Modern practice, however, demands that our monumental buildings be roofed with something more fire-resistant than lead-covered timber frames, and the result has been the employment of structural steel and reinforced concrete. Some years ago there was much talk of building with pre-cast concrete units. This system was actually applied to the walls of a few moderate-sized structures for which large slabs were cast upon the ground and raised into place by means of jacks. Twenty years ago the author worked as assistant superintendent on a large concrete residence, the pitched roof of which was built in this manner. Ridge and rafters were cast in place, after which large concrete slabs were raised from the ground by means of a gin-pole and dropped in place on the supporting members. It is quite possible, with proper care in detailing, to make a satisfactory weathertight and fire-resistant roof in this way, but it cannot be recommended as economical, nor would the concrete surfaces, even when colored, be architecturally acceptable in most cases.

At the present time, structural steel of standard or special sections would seem to be the most desirable for the supporting members of pitched roofs. Welded connections have been found satisfactory, particularly where electric welding was practicable. This method was successfully em-



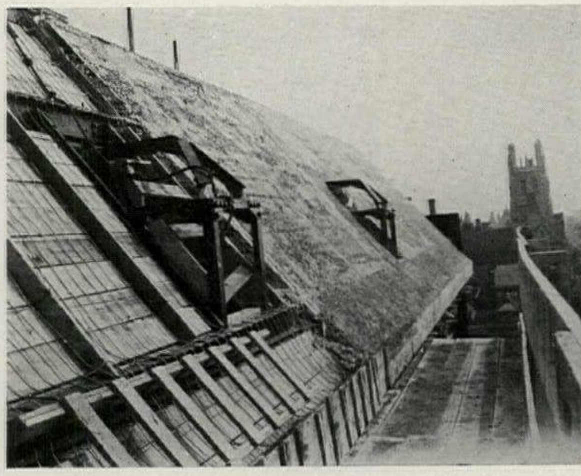
Gypsum Poured in Place Over a Thin Sheet of Compressed Gypsum Formed This Roof Surface

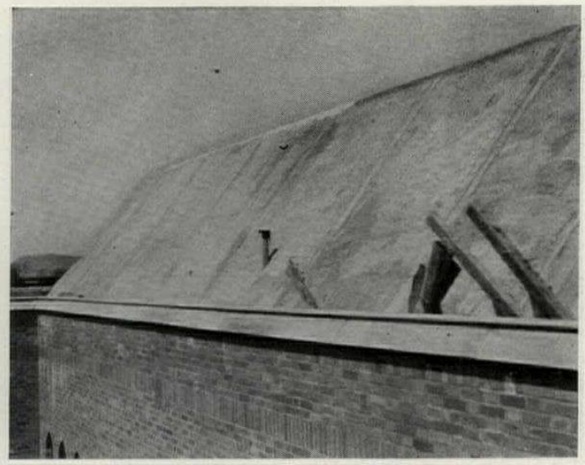
A Steel Deck Being Laid Over a Structural Steel Frame On An Ohio Factory

ployed for the purpose of attaching the purlins to the rafters, on the steel framed roof of a large dormitory recently built at one of our eastern universities. Several materials, or rather systems, can be used over the steel. For industrial buildings, pre-cast concrete slabs offer a satisfactory surfacing but are not practical as a base for slate or tile. It is also possible to employ terra cotta "book blocks" laid between steel purlins, or pre-cast gypsum blocks. The steel of the roof should be designed to meet the special requirements of the system. These methods are particularly suitable for large roof areas which are not too complicated in design. If gypsum is employed, it is necessary to give the blocks a waterproof coating as soon as laid in order to protect them from moisture before the application of the surfacing material. The individual slabs should be securely anchored to the steel purlins and the joints filled with a gypsum mortar. Another very satisfactory method, which has been successfully applied to the roofs of monumental buildings, is the use of cinder concrete slabs cast in place over the structural steel framing. There is also a choice of various other materials, including gypsum and mixtures containing Portland cement combined with certain light weight aggregates which are suitable for roof work and are placed in a plastic state. When hardened, the cinder or composition slab is coated with a 2-inch layer of a proprietary material, applied like cement mortar, which serves to receive the nails holding the slate or tile in place.

Flat Roofs. A flat or slightly pitched roof offers no particular structural problem. In this case the designer's attention must rather be centered upon making the deck waterproof. The numerous offsets introduced by our so-called "setback" laws, applying in all of the larger cities, have become the rule rather than the exception and are taken care of as a matter of course by the engineer or structural designer. The problem of waterproofing, however, is more often slighted. Specifications seldom fail to properly describe the typical work, but the details of flashings and the proper use of suitable mastics as joint fillers are too often left to the devices of the subcontractor.

Volumetric Changes. In this work, as well as in all else concerned with building construction, it is essential to realize that volumetric changes due to variations in temperature and moisture actually cause appreciable movement in our structures. The hair cracks which are characteristic of concrete and stucco surfaces, when used continuously over an extended area, usually have their counterpart in the joints of brick, terra cotta, natural and artificial stone. If the work is well done, the cracks are too small to cause trouble on unrestrained surfaces; they express what might be called the "respiration" of the building and are hardly more serious than the very measurable lengthening of large concrete structures under the heat of the sun. But the unit, or assembly, as the case may be, must be free to move, or something will break. An actual instance is on record of a cinder concrete roof filling having expanded with sufficient force to shear off a parapet post somewhat over a foot square in horizontal section and reinforced with four ¾-inch rods. Good construction provides a mastic filled joint where materials are capable of expansion about parapets, chimneys or penthouse walls. This has become an established practice. Difficulty arises from much more subtle causes, among which is the contraction of the fluid concrete in the process of hardening. Provision should be made to permit the initial contraction of the concrete without rupture, and the work should be designed to allow each unit freedom to swell and contract with climatic changes which are certain to occur.





These Two Views Illustrate the Use of Reinforced Cinder Concrete Supported by a Structural Steel Frame. At the Right the Concrete Has Been Covered by a 2-inch Thickness of Nailing Material

In most cases it is a mistake to cast long sections of concrete monolithically. The amount of reinforcement used in our industrial buildings, or others with reinforced concrete frames, tends to hold the mass together and to distribute the strains due to secondary stresses, but even for such structures it is desirable to limit the lengths between joints to 300 feet. A complete separation is then made between the two parts; double columns are constructed on the exterior, and the floor slabs are built as cantilevers on each side of a transverse joint, passing entirely across the building from the top of the footings to the roof, where the parapet and roof slab are also divided. Retaining walls, particularly those used in landscape work, often show signs of disintegration or develop serious cracks after only a few years' exposure. Although there are usually contributary causes, most difficulty is due to two factors,—faulty design in not providing properly for volumetric changes, and faulty construction which results in porous concrete. Both of these evils are preventable, and we all know that excellent results can be obtained in concrete if the work is properly designed and conscientiously built. It is an extremely simple matter to divide parapets and retaining walls into sections by introducing joints at the posts or pilasters. If such are made effective by the use of some material which prevents the adhesion of the two surfaces and gives a slight cushion, no difficulty will be experienced.

Terraces, etc. Similarly, the floors of exposed terraces must be given a chance to expand and contract. Sidewalks supported upon soil are generally cut through on 4- to 6-foot centers, which is satisfactory under normal conditions without any joint filler. The surfacing of exposed terraces, however, often requires carefully designed jointing to provide for temperature variations. Specifications normally call for a membrane seal beneath the tile or concrete wearing surfaces of loggias and exposed roof decks. Equal attention should be paid to the character of the mastic used to fill the expansion joints. Overflow due to expansion may be controlled by not filling the joints quite full, but there are few materials that will follow the receding masonry when the joint is broadened by contraction.

The method of obtaining a suitable grade over large areas of so-called "flat" roofs is another subject that deserves consideration. The simplest solution, and one often applied, is to lay the structural slab absolutely level and to obtain drainage by the use of cinder filling. This, however, increases the dead load, and where feasible it is better to pitch the roof slab itself. Of course there is no real objection to having an absolutely level roof surface, as the same guarantee can be obtained from the roofers, but if it is desirable to avoid pools of water remaining after rainy periods, a slight pitch is essential. It is usually practicable to work out a suitable grade in connection with the insulation of the roof, which becomes an important matter where conditions are likely to produce condensation. The steel roof deck, a type of covering which is extremely economical, and well adapted to certain types of buildings, presents a real problem in relation to insulation. Although furnishing a perfect base for the application of membrane roofing, ½ inch of fibrous insulation board is inadequate to prevent heavy condensation on the under side of the metal. It would seem desirable to provide thorough ventilation beneath all such installations.

NOTE. The author wishes to acknowledge his indebtedness to these firms and associations for the use of the photographs used as illustrations: American Steel & Wire Co.; United States Gypsum Co.; Truscon Steel Co.; Republic Fireproofing Co.; Barney-Ahlers Corporation; Jones & Laughlin Steel Corp.; Federal Cement Tile Co.; American Cement Tile Co.; Marc Eidlitz & Sons, Inc.

WALL STREET ENTERS THE BUILDING FIELD—II

BY

JOHN TAYLOR BOYD, JR.

THE preceding article, in THE FORUM for May, dealt with recent developments in construction finance, quite revolutionary in themselves and in their possible effect on the building industry. Introduced into the New York building world by several large corporations, with the strongest Wall Street financial support, they indicate a decided trend toward the efficiency of large scale operation. In this article there are discussed three specific financial plans illustrating the new methods. The plans are those of the Fred F. French Company, the Henry Mandel Associates, and the plan of the new triple combination of the Beaux-Arts Development Corporation,—a syndicate headed by a group of prominent architects with the huge U. S. Realty & Improvement Corporation, and the National City Bank, now the third largest bank in the world.

As explained in the former article, the principles of this method of financing, which is novel to the building industry but not outside it, are chiefly: (1) Investment value, as compared with the speculative element which characterizes too much conventional real estate finance. (2) Sale to the public of long term security issues at low rates for both junior and equity financing, involving the entrance of the public into ownership purchase of common stock of real estate.

These three financial plans are presented solely as illustrations of the new ideas of building finance. No attempt is made to select any one plan as the best. That is impossible, because the financial plan of a building varies in each case as does its architectural plan. Furthermore, any financial plan should be judged from these different viewpoints:

1. Of the construction corporation, seeking a steady supply of fresh capital at low rates.
2. Of the banking house whose aid is enlisted to market security issues directly to the huge public, composed of some 17,000,000 investors and speculators scattered all over the country. The securities sold must be sound and attractively priced in order to sell in competition with the flood of security issues of all types.
3. Of the individual investor, who selects his securities from among the myriad of offerings, according to his personal needs and preferences.
4. Of the building industry, to which the need is vital of obtaining for its expansion a constant flow of fresh capital at low rates.
5. Of the welfare of the American economic structure, which depends to a large extent upon the prosperity of the whole construction industry.

The financial plan of the Fred F. French Company is the first to be considered here. This is because this plan is well understood, having been in operation for a number of years and having been extensively advertised to the public. In the "French plan" the point of departure from conventional methods rests in its financing of that remainder of the cost of the completed building above the first mortgage of approximately 50 per cent by means of the sale of long term security issues directly to the public, using its own permanent sales force. In this way, the French Company obtains a never-ending stream of millions of dollars of new capital for its colossal building program, at presumably a much lower cost than it would if it used the ordinary methods of either mortgage bond issues or long term first and short term junior mortgages, both of which involve seeking equity from wealthy speculators.

In the French plan, the public takes on an actual ownership share in the individual building, with the opportunity of sharing in prospective profits in (1) increased land values, (2) increase in equity as mortgage is amortized, and (3) in prospective earnings and dividends. The investor's position is different from that of the purchaser of the conventional mortgage bond, who is a creditor and whose return is limited. The owner of stock in a French Company building depends for the soundness of his investment on these factors: (1) The success of the French Company's management, (2) the large proportion of equity, equal to approximately one-half of total cost, and (3) the economy and safety of the long term system of financing of junior and equity finance, under which both profits and repayment of junior financing are deferred for several years, until the earnings of the property are sufficient to carry the load. This advantage of long term financing was discussed in the earlier article. It was pointed out that it is (1) the terrific burden of heavy discounts, of premiums and high amortization rates on junior mortgages, and commissions of one sort or another,—often totaling 15 per cent or more,—and (2) the much higher cost of obtaining equity money, for which a big speculative profit must be shown "on paper," which break the back of many an intrinsically sound building enterprise. And, equally important to this financial load of short term issues, there may be charged the abandonment of many a good building enterprise, to the detriment of the construction industry.

The French plan bears two points of resemblance to the conventional method. One is its use of the conservative "institutional" first mortgage. In the ordinary French project the proportion of mortgage to total cost is, as already said, as near 50 per cent as practicable. The interest rate is usually 5 or 5½ per cent, and the mortgage is amortized. The second point of its resemblance to conventional methods is that the French plan does not directly give to the investing public the full benefit directly of diversified ownership in the chain of buildings, although the Company itself receives this protection of diversified risk. The typical French security issue is limited to a single building, which is incorporated as a separate company, with limited liabilities, as in the case of the usual mortgage bond issue which is not "guaranteed" by the house of issue. Thus the investor puts all his eggs into one basket. On the other hand, it should be pointed out that the investor may gain the protection of an investment in a chain of buildings by spreading his purchases over a number of French buildings. Incidentally, the investor has also the opportunity of buying the common stock of the "parent" Fred F. French Company, which is now traded in in the unlisted market in New York. This stock, which not so many years ago was "given away" as a bonus, recently sold at over $1,000 a share before its split-up. The French plan illustrates the great advantage of the long term method of junior financing. It would indicate that the customary division of financing into the long term first mortgage on the one hand and on the other the short term remainder of cost, is arbitrary, and has been carried to an illogical extreme. It runs up building costs and, in addition, it brings in its train a list of evils of excessive speculation.

The technical details of the French plan are interesting. The public buys preferred stock (6 per cent cumulative preferred, $100 par value) to the amount of about half the total cost of the operation, and with each share of this preferred stock the investor receives without further cost to him one share of common stock. For each share of common stock thus issued to the public, the Fred F. French Company receives one share of common as its profit. The result is that the investing public shares fifty-fifty with the French Company in the common stock ownership of the building, thus entitling it to half the profits. Profits accrue through retirement of the preferred stock, which is expected at the end of ten years in the average case. The retirement of the preferred is accomplished in ten equal payments of 10 per cent each, as the earnings permit, and no dividends can be paid on the common until all the preferred is paid off.

The Fred F. French Company performs all the operations that are necessary to produce a completed building,—buying the site, designing and constructing the building, selling the securities. In addition it operates the completed property through the Fred F. French Management Company. "Total cost" is the cost of land, construction, of carrying charges during construction, cost of selling securities, and of the normal fees paid to the Fred F. French Company for architecture, contracting, underwriting, for managing the building, and for the necessary advertising. I am informed that the usual underwriting fee is 5 per cent of the total cost of a French operation. This expense, be it noted, offsets somewhat the usual mortgage bond discount or charges for junior financing, but here again, in the French plan, the cost is spread over a period of years. The charge is not deducted at the beginning but instead is capitalized, and its payment is deferred.

When one has mastered the main points of the French plan, it is easy to understand the plan of the Henry Mandel Associates, which seems to be modeled along similar lines. The chief difference is that the Mandel plan gives the investing public the benefit of diversification through part ownership in a chain of properties, in addition to taking an interest in an individual structure. More specifically, the investor purchases "units" of stock at $110 per unit. The unit consists of one "investor's" share of $10 in the Henry Mandel Associates, the parent company, and one $100, 6 per cent convertible gold note in a single building. This gold note is convertible into 6 per cent cumulative preferred stock in the single building at the end of one year after completion of the structure, at the option of the holder, and, at the option of the company, in two years. The note matures in about ten years. Now, the investor's share of the common stock of the parent company, Henry Mandel Associates, is matched, share for share, and is paid for, dollar for dollar, by a "founder's" share, owned by Henry Mandel. In other words, Mr. Mandel invests in the common stock of the parent company owning the chain of properties, on the same basis as the public and to the same extent. Also, since the investors in the first buildings of the chain take a greater risk than those who invest in the later projects, when the success of this new enterprise has been presumably proved, these original investors will probably buy their common stock in the company owning the chain on a more favorable basis. In other words, the price of the investor's,—and of the founder's,—shares will doubtless be increased with each successive operation.

Other differences between the French and Mandel plans are (a) that the mortgage proportion of cost is about two-thirds in the Mandel plan, and (b) that the Henry Mandel Associates makes public semi-annual financial statements of its own condition and of that of each of its buildings.

It should be pointed out that there is a theoretical limit to the expansion of the Mandel chain of buildings. That lies in the proviso that Henry Mandel himself invests dollar for dollar with the public in the parent company. Today there is no man in the world, nor any group of men, wealthy enough to go on indefinitely matching dollar for dollar with the American investing public. This is an era of mass-investment as well as of mass-production and mass-marketing. Everyone in Wall Street appreciates this fact but, curiously, the building industry has scarcely yet grasped it.

But to this point, this complicated discussion of building finance has failed to answer the real question at issue. That is the simple, homely question which the prospective investor asks the stock salesman: "How much, exactly, can I expect to get out of it?" That question is the crux of the situation for everyone concerned. To throw light on it, I quote from the pamphlet issued by the Henry Mandel Associates,—"Our Plan,—Your Opportunity." On page 26 is the table which gives the expected operation of the retirement of the preferred stock:

End of Year	Net Profits Per Share	Dividend Received	Preferred Stock Principal Repaid	Outstanding	Reserve
1st	$14	$6.00	....	$100	$8.00
2nd	14	6.00	$6	94	10.00
3rd	14	5.74	10	84	8.26
4th	14	5.04	10	74	7.22
5th	14	4.44	10	64	6.78
6th	14	3.84	12	52	4.94
7th	14	3.12	12	40	3.82
8th	14	2.40	13	27	2.42
9th	14	1.62	13	14	1.80
10th	14	.84	14	....	.96

Then, on the next page, it is said that after the preferred stock is retired, Henry Mandel Associates "will receive $14 per share per year for each share of common stock of the building. If it is assumed that a stock earning $6 per share is worth $100, then this income of $14 per share gives the common stock of the building a value of $233 a share." This is the stock for which the investors in the first building paid $10 ten years before, and received, meanwhile, no return on it, which adds to its cost at the end of ten years at say 6 per cent compound interest.

In Part IV of the same pamphlet, entitled "How Investors' Common Gains Value" is said: "Our experience has been that such buildings have a valuation on completion of upwards of 20 per cent above the cost of land and buildings, and that this increases after completion. Buildings are commonly sold at completion at profits of from 15 per cent to 50 per cent above cost." On "the conservative assumption that the property gains 20 per cent in value at completion, the common stock of the building gains (in the typical case illustrated) immediately a value of $50." This value "rises as the 6 per cent cumulative preferred stock is retired, with the result that, at the end of the retirement period, this common stock value per share will include the $100 which was the original cost of the preferred stock investment." Then it is said that "land in the areas (of Manhattan Island) where the Henry Mandel organization operates has a natural increase in value ranging from 3 per cent to 10 per cent annually. Assuming the lower figure, this increased land value represents a gain of $225 a year for each share of common stock of the building."

Office Building, New York, Financed on the Mandel Plan

Farrar & Watmough, Architects

The effect of these assumptions of increased value of the common stock is summarized in this table, copied from the pamphlet:

Source of value	Number of Years after Completion of Building 1	5	10	15
(1) Gain in value of building at completion....	$50.00	$50.00	$50.00	$50.00
(2) Natural increase in land value..........	4.50	13.50	24.75	36.00
(3) Retirement of preferred stock equity	....	36.00	100.00	100.00
Total	$54.50	$99.50	$174.75	$186.00

These figures are, of course, estimates. No one can actually tell just what the exact financial position of the building will be in future years in respect to rentals, nor can one know exactly when obsolescence will set in, affecting the "economic life" of the property and its value. On the other hand, I believe that these mathematical computations of the *possibilities* of common stock ownership in real estate are well worth publishing, because they throw a new, clear light on the possible advantages of equity ownership in good real estate. That is an essential factor in real estate finance in these days when the investing public is seeking common stock ownership in basic American industries.

The plan of the Beaux-Arts Development Corporation-U. S. Realty & Improvement Company-National City Bank triangular combination, as illustrated in their first enterprise,—the \$5,200,000 Beaux-Arts Apartments, Inc., located on East 44th Street, New York,—is more complex and is even more radical than the other two. The magnitude of the program contemplated, and the elimination of mortgages astonished New York, accustomed as it is to bold finance. This plan is not easy to describe. Kenneth M. Murchison, President of the Beaux-Arts Development Corporation,—the real estate promotion company composed chiefly of architects, discussed the plan frankly with me one morning.

The complication in the Beaux-Arts Apartments plan of finance centers in the involved interrelations of the three affiliated companies sponsoring the project. Between them, they perform about the same function as do the single French and Mandel organizations, in producing and operating a chain of buildings and selling securities to the public in the process, making investors part owners in the properties. Therefore, the picture clears if we imagine the triple combination taking the place of the French organization, and issuing securities, in the form of preferred and common shares, limited to a single building which is separately incorporated. That makes clearer the position of the investing public in the enterprise, and that, after all, is the point of this whole business. It is shown in this comparison, in which, in the Beaux-Arts plan, the three sponsoring companies are lumped together as "the Companies":

Division of Ownership in the Beaux-Arts Apartment Finances

	Total First Cost of Operation	Ownership of Common Stock (Profits)
Investing Public	75% consisting of 1st 6% preferred stock	40%
"Companies"	25% consisting of 2nd 6% preferred stock	60%

Division of Interests in the Fred F. French Plan

	Total First Cost of Operation	Ownership of Common
Mortgage Company	50% mortgage	0
Investing Public	50%—6% pf. stock	50%
French Company	0	50%

As compared with the conventional method, it is also apparent that, in the Beaux-Arts plan, the first preferred, bought by the public, takes the place of the usual two or three mortgages, and that the second preferred, contributed by the "Companies," takes the place of the usual equity. This arrangement puts the public in a very strong investment position. The investor cannot be "wiped out" by foreclosure. In fact, equally important, the consistent application of the principle of deferred profits protects that small proportion of junior mortgage risk which lies in his first preferred shares. Thus the soundness of the first preferred may be described by saying that about 85 per cent of it replaces a first mortgage (corresponding to the conservative 66 2/3 per cent first mortgage). The remaining 15 per cent contains a junior mortgage risk, or on the basis of a 60 per cent first mortgage, it represents an 80 per cent-20 per cent division.

The position of the public in the Beaux-Arts plan is completely explained when we understand the details of the retirement of the two series of preferred stock, and the possibilities of profit on their 40 per cent ownership in the common stock.

The first preferred is 6 per cent cumulative, retirable in whole or in part, at the "Companies'" option, at a price of \$102.50 per share. It is sold with the common in "units" of one share of first preferred and one share of common, at \$100 a unit. It is expected that one-third of the first preferred will be retirable in ten years (Mr. Murchison thinks it will be six), leaving the remainder outstanding to the amount of 50 per cent of total cost of the property. The second preferred, representing approximately another 25 per cent of cost, should be retired completely about three years later. At the end of this period, the common stock, which originally represented nothing but hopes of future profit, may have an equity behind it of about one-half the original cost. In addition, the full benefit of any appreciation in the property accrues to the common shares. Earnings on this common are expected to be \$3 a share at the end of ten or a dozen years; if earnings permit, dividends may be paid on it before all the preferred is retired.

Comparing this \$3 per share return on the Beaux-Arts Common with the \$14 expected return on the Mandel common (which costs \$10 a share), we see a large difference. The difference may be partly explained by the fact that the

Beaux-Arts Apartments, New York
Firm of Kenneth M. Murchison, and Raymond Hood, Godley & Fouilhoux, Architects

Mandel preferred shares represent a 33 1/3 per cent equity risk above the mortgage, whereas the Beaux-Arts first preferred is more nearly equivalent to a first mortgage risk. One might therefore conclude that the Beaux-Arts plan is designed to attract a more conservative class of investors.

It remains to describe the operation of the Beaux-Arts plan within the three companies and their subsidiaries. "The Companies," we have seen, provide the 25 per cent equity cost of the project in the form of second preferred, and take 60 per cent of the common shares as deferred profits. On the Beaux-Arts Development Corporation there falls the burden of taking the entire issue of second preferred stock. What actually happens is that the Development Corporation buys the site for the building and contributes it, at a fair value, to the enterprise, receiving in payment the second preferred shares. This is, of course, a form of the familiar subordination principle. The individual architect among the stockholders who has worked up the project receives the architectural commission on a basis of office cost plus fee, the fee being taken in stock. The next point is that the Development Corporation, having provided most of the equity, obtains most of the common stock profits, specifically approximately 40 per cent, or the same share as the public. That is, three shares of common go with one share of second preferred. That leaves 20 per cent of the common still to be accounted for. This is split half and half between the U. S. Realty & Improvement Corporation and the National City Bank. Actually, this 20 per cent of common goes into the treasury of the U. S. Realty Management Corporation, which is a subsidiary formed to own and operate the chain of properties that it is proposed to establish. This U. S. Management Corporation is owned equally by U. S. Realty and the bank, through the latter's securities subsidiary, the National City Company. When we have said that both the National City and U. S. Realty have an interest in the Beaux-Arts Development Corporation, we have completed the description of the chain of relationships in the three affiliated companies.

The responsibility of the U. S. Realty in the organization is two-fold. First, it constructs the building through its subsidiary, the George A. Fuller Company, on a cost-plus fee contract. Second, it shares with the National City in financing and underwriting the project. The function of the National City is to share with U. S. Realty in underwriting and to sell the securities to the public through its vast chain of branches, representatives and agents, assisted by its powerful affiliated group of Wall Street investment houses. The underwriting was done at cost, the charge therefor being 5 per cent, plus 20 per cent of common profits as noted, thus deferring the financier's profits. This compares with an 11 per cent charge on a mortgage bond issue, which, however, is deducted at the start. This issue of units of first preferred and common, to the amount of $3,937,500, was sold to the public, so we are told, in one day.

One point more. The Beaux-Arts Development Corporation really represents the land interest, which, as everyone knows, is the crux of the situation in many a real estate project. Recognizing this fact, we have this division:

Division of Interests in the Beaux-Arts Apartments

	Investing Public	Land Owner (Beaux-Arts Develop. Corp.)	Construction & Finance (U. S. Realty & Nat'l City)
1st pref. stock	75% of total cost and 100% of issue	0	0
2nd pref. stock	0	25% of total cost or equity 100% of issue	0
Common stock	40% of issue	40% of issue	20% of issue

Thus, from the point of view of the construction industry, the Beaux-Arts plan may be summarized in very simple terms. The owner of a valuable plot of land goes to the officers of the U. S. Realty & Improvement Company and persuades them that they could do no better than to construct and finance a building on that particular plot. The land owner contributes the site, at a fair value, as the 25 per cent equity in the deal, and takes the 6 per cent second preferred in payment, plus a 40 per cent share in the future common stock profits. U. S. Realty agrees to finance the remainder of the cost, namely 75 per cent, which it does by joining with the National City Bank in underwriting the sale to the public of the first preferred shares. U. S. Realty also constructs the building. The profit to U. S. Realty and to the National City interests is 20 per cent of the common shares, each receiving 10 per cent. This common goes to the U. S. Realty Management Company in which both U. S. Realty and the Bank have an equal interest. Practically everybody, public included, contributes money, land and services at cost and defers his profits for several years.

Clearly, this method of long term financing, with deferred profits and public participation in the ownership of a building, is revolutionary in its efficiency. It raises real estate finance to a more stable investment basis. Still more important, it requires, to no small extent, that the adoption of the chain principle be considered in order to induce all interests concerned to accept deferred profits. With a chain of successful properties, people are willing to undergo a few lean years if they know that they are investing in a sound, continuing enterprise, by a method which steadily increases their equity, causing appreciation of the common stock and which, at the end of the waiting period, begins to flower with expanding profits. More accurately described, "deferred profits" really means postponing the taking of profits. In a successful real estate enterprise of the type here considered, the profits theoretically increase from the start, but are not taken out immediately. Particularly, they are not taken out in advance, as is sometimes done in "shoe string" operations. They may, however, be "anticipated" through the appreciation of the common stock before it pays dividends.

In conclusion, it should be said that the architect's position in the new development is important. Architects have every reason to approve efficiency and sound investment value in buildings. Particularly will they approve of the initiative of the group of architects who form the majority of the owners of the Beaux-Arts Development Corporation. These men seem to have applied the new ideas on a broad and consistent scale. They have shown, I think, the possibilities of the leadership of architects in improving the methods of building finance.

THE SUPERVISION OF CONSTRUCTION OPERATIONS

BY

WILFRED W. BEACH

CHAPTER 7, FOUNDATIONS AND MASONRY MATERIALS

IN these dissertations on the general subject of construction supervision, we are seeking to discuss the problems confronting a superintendent somewhat in the order that they are presented to him during the progress of the work. He arrives at the site about the time the building is being staked out and the excavating is beginning. Shortly thereafter, materials start to arrive,— form lumber, cement, concrete aggregates, reinforcing rods, brick and other masonry materials. The superintendent has, perforce, to inspect these and to watch the excavating at the same time. Ordinarily, the latter duty is not onerous, as soil conditions in small areas are generally uniform. It is only when they lack such uniformity that supervisory duties at this preliminary stage become at all pressing.

Two features somewhat out of the ordinary are introduced in connection with the schoolhouse work here described, to show that the need for the exercise of diplomacy and acumen may exist at the initiation of proceedings, perhaps in as great a degree as at any other stage of the work. One such feature is a presumption of irregular soil conditions, demanding a local test; and the other is the supposition of an improper personal interest in certain phases of the operations by members of the board of education. Such an undue interest may sometimes develop into one of the most embarrassing phases of the work. Its ramifications may be extensive and most ominous, without being readily discernible or easily traced. Pressure may be brought to bear from unexpected sources to influence leniency in the judgment of certain materials or even in the retention of incompetent employes and subcontractors. In such an event, the architect has but one course to pursue, and that is to act in accordance with his best judgment for the good of the building, regardless of consequences.

After the board meeting on Tuesday afternoon, the architect and superintendent were taken to the gravel pit by the contractor. The storm of the preceding day had done considerable damage by washing the top soil down into the pit and mixing it with the sand and gravel. At first sight, it appeared useless to attempt to extract any more usable material from the place, but the contractor was determined and promised to put in a power pump and washing plant, if needed. With this understanding, deliveries were permitted to continue, though the architect had heard severe criticism of the gravel in board meetings, originating, presumably, with parties having crushed rock to sell. But both sand and gravel were of such excellent quality that it would have been unjust to forbid their use, if the silt could be kept out or removed.

Returning to the building site, they found two large trucks unloading the first deliveries of common brick. These were not being dumped but were being handled like face brick. This fact alone was enough to arouse suspicion, and hence an immediate inspection was made, revealing a much too great percentage of soft brick.* Evidently the yard was not sending out the "selects" approved by the superintendent. The architect would have rejected the whole delivery without further ado, but the superintendent called his attention to the interest of a board member in the transaction and proposed having them culled at the expense of the manufacturer to bring them up to grade. The contractor telephoned the yard but could get no satisfactory assurance at that end. He turned to the architect. "I suppose you know," he said, "that this lumber dealer on the board has a one-third interest in that brick yard, but do you fully realize what we are up against on this job? So far as I have been able to find, the chairman is the only one on the board who hasn't an axe to grind. Except for him, everyone, including the husband of the woman member, is trying in some way, open or underhanded, to make something out of this schoolhouse. So you men are not only superintending me but the owner's representatives as well; a nice situation. Now, I'm supposed to be saving a dollar a thousand by buying these bricks instead of shipping in good stuff but, if you say these are rejected, back they go, and I'll shoot in some from my regular supply which I know will be O. K. " Before a reply could be made, the lumber dealer drove up, saying he had been advised by the yard that there had been a mistake in the hauling, that the brick had been loaded from the wrong pile. This the contractor knew to be a fabrication, but they listened to the dealer's further assurance that he would have these culled and that there would be no further complaint about the quality. There they allowed the matter to rest for the time being.

The steam shovel and trucks were working in the excavation, but they could not function to advantage in the lower portion on account of the

* Specification for common brick: "All common brick shall be square-edged, sound, hard-burned, firm in texture, fairly uniform in size, shape and color, and free from lime lumps, cracks or other serious defects. No soft or salmon colored or other unduly absorbent bricks accepted. All shall be first-hand, 98 per cent whole."

mud. Some of the trucks were being used for hauling cinders to improve the temporary driveways. The architect was much concerned about the character of soil that would be encountered at the level of the bottom of the footings. The excavating had thus far disclosed nothing but sandy loam (below the black top soil), with a small percentage of clay. Borings and other excavations in the vicinity indicated this to be the general character of the terrain for a depth of from 3 to 5 feet, at which level the increasing ratio of clay and gravel tended rapidly to replace the loam, thus providing a bearing stratum, several feet in depth, which the architect deemed capable of sustaining a superimposed loading in excess of 4,000 pounds per square foot. There had been small doubt of reaching such a stratum, as the footings were originally designed, but, having raised them 3 feet, the situation was no longer one of certainty.* It was therefore decided by the architect that as soon as excavating had reached bottom (a plane 9 feet below finished basement floor), the superintendent would have two tests made by the contractor at points to be selected. This procedure was covered by two specification provisions. Under the general subject of "Testing Materials" was found:

"TESTS shall be made by the Contractor of his workmanship and materials and of the operation of mechanical equipment as required by law and the Contract Documents, all in manner directed by the Architect or approved by him. All expenses in connection with such tests, including the use of materials, labor, power, light, heat and equipment, shall be borne by the Contractor, unless otherwise stated.

"ADDITIONAL TESTS, not called for by the specifications, shall be provided by the Contractor under direction of the Architect, at the expense of the Owner, except that, in cases where such tests give evidence of defective materials or workmanship for which the Contractor may be required to make allowance or replacement, then the cost of such tests shall be borne by the Contractor. The expense will be audited by the Architect who, if same is to be charged against the Owner, will have an extra order issued for the amount as elsewhere provided, which amount will include 10 per cent to cover Contractor's overhead and profit.

"NOTICE OF TESTS shall be given to the Architect or his Superintendent by the Contractor in due time to permit advising all those interested. No tests will be deemed valid unless duly witnessed by the Architect or his Representative.

"RECORDS of all tests, neatly typed on 8½" x 11" sheets, accompanied by necessary diagrams, charts or photographs to thoroughly explain same, all in duplicate and duly certified and signed, shall be prepared by the Contractor as part of the expense of the tests, and deposited with the Architect."

And, under "Trench Excavating" in "Foundation Work":

"INSPECTION AND SOIL TESTS. Bottoms of all trenches and pits shall be left level, free from rubbish and reasonably smooth. No concrete for footings may be poured until the Superintendent has had opportunity to examine surfaces to be covered. He may then order the surfaces to be placed in better condition or may order a test of the bearing capacity of the soil made by the Contractor at the Owner's expense, after which the bottom of the trench or pit shall again be prepared at directed depth and re-submitted for inspection."

After the architect left, the superintendent strolled over to the brick yard to confirm his suspicion that there had been no mistake in the delivery of the wrong brick. Being after hours, no one was about the premises. He could see beyond question that there had been no activity around the pile of "selects" since he had first inspected it. A large new pile, from which deliveries to the school had evidently been begun, was of the same character of brick as those already unloaded at the site. It was obvious that, if the latter had to be reculled, the same would be true of this entire pile, containing over 50,000 brick. No doubt remained in the mind of the superintendent as to the intent of the brick makers. The pile of "selects" had been made up for exhibition purposes only, with no intent to deliver therefrom. He could visualize the trouble ahead if the manufacturers continued deliveries, relying upon the "pull" of their partner on the board to prevent rejection. He was early on the job next morning and stopped the first brick truck, loaded as he anticipated, and notified the contractor not to permit the brick to be taken off. The driver telephoned his office, and shortly there again appeared the ubiquitous lumber dealer who now contended that it had been arranged with the architect on the preceding day that the brick should be culled at the job. The superintendent pointed out that this applied only to what was already unloaded and said with finality that no more improper material would be permitted to be brought to the premises. The dealer tried to reopen the subject from the beginning by arguing that the brick were being discriminated against; that, inasmuch as none were destined to be exposed to the weather, better brick than those offered were not needed. To this the superin-

* See Chapter 1, pages 30 to 34 of T. M. Clark's "Building Superintendence," The Macmillan Company, 1895. There is much of value to the young superintendent in this volume, but one must bear in mind that building conditions and methods are constantly undergoing changes, and hence certain items treated by Mr. Clark, such as the discussion on concrete here referred to, are obsolete.

tendent rejoined that it was his business to see that all material entering into the construction was up to the standard* that the owner was paying for. The dealer was so palpably inclined to make an issue of the matter that the superintendent telephoned to the chairman of the board and asked him to come over and be present at the discussion. His appearance was somewhat disconcerting to his fellow board member, who was asked to re-state his case. Then, before anything else could be said, the chairman drew him aside and, after a brief colloquy, the latter spoke to the truck driver and the two drove away, much to the surprise of both contractor and superintendent. The chairman explained that he had anticipated some such *impasse* from the beginning and had foreseen the advisability of the dealer's resigning from the board on account of his extensive interest in selling construction materials. This he had just consented to do, and hence would deliver no more brick until after his official connection had been formally severed. The contractor thereupon said that he would cancel the order for the remainder of the brick, and he agreed to see that those already on the ground were properly sorted before any were used.

Unfortunately, architects and engineers (and even some specification men) are not of one accord in their attitude toward common brick quality. For this there are probably several reasons. One is that engineers like to provide tests for structural materials,—and ordinary common brick will not stand severe tests. "Good bricks should be quite hard and burned so thoroughly that there is incipient vitrification all through the bricks. A sound, well burned brick will give out a ringing sound when struck with another brick or with a trowel. A dull sound indicates a soft or shaky brick. This is a simple and generally a sufficient test for common bricks, as bricks with a good ring are generally sufficiently strong and durable for any ordinary work," according to F. E. Kidder in "Building Construction and Superintendence." "Very soft, underburned bricks will absorb from 25 to 35 per cent of their weight in water. Weak, light red brick, such as are frequently used in filling in the interiors of walls, will absorb from 20 to 25 per cent, while the best bricks will absorb only 4 or 5 per cent. A brick may be called 'good' which will absorb not more than 10 per cent," according to Baker in "Masonry Construction."

One frequently finds an architect's specification which carefully discriminates between the different grades of hollow clay tile, classified according to their function in building, but making no such distinction between the various purposes of the common brick. In general, three distinctive grades of hollow tile are recognized: well burned "'load-bearing," capable of withstanding prescribed crushing loads; well burned "non-load-bearing," suitable for any walls subjected to limited light loadings; and soft porous tile for partitions, needing only sufficient density to withstand rough handling. The same classification could be used for common brick, if intended for the same usages. But, as few common bricks are used for non-bearing partitions, the soft grade is "taboo" and, since any good common brick is to be considered "load-bearing," the one grade, which may be termed "good," is the only grade permitted under the majority of architectural specifications. However, in some communities, the ordinary run of local brick in common use is not up to such standard of "goodness," and the "outside" architect is confronted with the problem that we have been discussing. Investigation will likely disclose the fact that the better class local architects in the vicinity where such brick are the only brick made, are accustomed to call for two grades of common brick, thus:

"COMMON BRICK shall be firm and compact, well and evenly burned, of a good grade of clay or shale, free from lime lumps, of fairly uniform size, shape and color, free from cracks or other serious defects and 90 per cent whole. They shall not have over 20 per cent absorbency. They may be used for all brick masonry, except where select common brick or face brick are called for.

"SELECT COMMON BRICK shall be equal in all respects to the foregoing specification for common brick, except that they shall be hard burned, 98 per cent whole, and shall not have to exceed 10 per cent (or 5 per cent) absorbency. They shall be used whenever called for, also for all piers laid in cement mortar and for the facing of all outside walls, except where face brick or other material is called for."

Probably such "selects" are shipped in, in those instances. A too exacting common brick specification is unwise, since unnecessary hardness means undue vitrification, which makes the brick difficult to lay, slippery when wet or cold, and not readily adherent to any but pure cement mortar. In the work being used here as an illustration, the walls above the basement were chiefly of load-bearing hollow tile, with facing of pressed brick, common brick being used only for certain piers and walls of heavy loading, and for certain basement partitions. The brick were correctly specified, and the specification properly interpreted.

The brick subject being disposed of for the time being, the contractor and superintendent next gave attention to conditions relating to the excavating. The general excavating (subcontract) extended to 6 inches below the tops of the footings (see Fig. 10), but the additional hand

* See Chapter VII of Part I of "Building Construction and Superintendence," by F. E. Kidder (William T. Comstock Company, 1923), for an excellent dissertation on the manufacture and characteristics of the different kinds of brick.

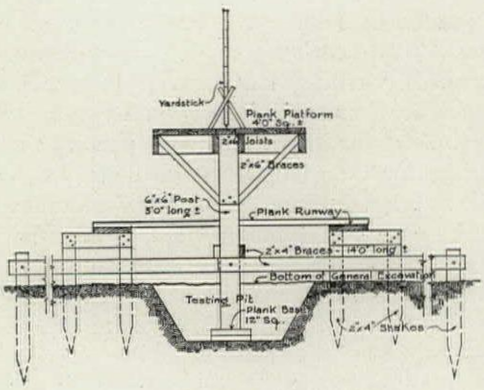


Fig. 9. Platform for Testing Bearing Capacity of Soil

work of trenches and pits was included under "Concreting" for obvious reasons. Specifications for this work read:

"GENERAL EXCAVATING is assumed to extend to sufficient depth (9 inches below upper planes of various basement floors) to permit material from trenches and pits to be distributed and compacted under cinder floor fill. This Contractor shall provide additional cinders or sand, if any is needed, to bring areas up to proper planes to receive the floor material as specified, or shall remove any surplus.

"ALL PITS AND TRENCHES shall be excavated to neat size required, if banks are sufficiently firm to be used as forms for concrete. If not, the form work required for upper portions of footings and pit walls shall be extended to bottoms of same, and the excavating shall be increased to accommodate same, without additional cost to the Owner."

Then followed the paragraph on "Inspection and Soil Tests" previously quoted. This was supplemented by a paragraph under "Concrete Footings":

"INCREASED DEPTH OR WIDTH OF FOOTINGS shall be provided by the Contractor when so ordered by the Architect, for which the Contractor will be allowed an extra price of fifty cents (50 cents) per cubic foot of concrete thereby made necessary, which price shall include also the cost of required additional excavating, back fill, overhead cost and profit. If additional form work is required in such case, it shall also be provided and will be paid for at the rate of five cents (5 cents) per superficial foot. Additional reinforcement shall also be provided, if required, and will be paid for at the rate of four cents (4 cents) per pound. All such extra payments will be made in accordance with provisions in General Conditions covering same."

A formal order was received from the architect's office next morning, covering the labor and material necessary for two soil tests, and the superintendent delivered copies to the contractor and the secretary of the board, directing the former to proceed with the work on authority of the architect's signature, without waiting for formal board action. This "Change Order No. 3" was in form similar to those preceding, but the clause covering remuneration read: "for which material and labor, you will be reimbursed by the Owner to the extent of the net cost of same, plus 10 per cent; subject to the audit and approval of the Architect's superintendent, which gross sum will be added to your contract price."

Bottom was reached that morning along the south end of the east wing, and a shallow pit was dug out and leveled at the grade at which footings were supposed to rest. For testing purposes, a platform was constructed as shown in Fig. 9. This was supported and rigidly braced atop a post, the bottom of which was exactly 144 square inches in area. This contrivance was erected in the pit, extreme care being taken that the base should rest on original soil, perfectly level, since any tipping would cause compression on one side or corner and render the test worthless. While held rigidly in this position, the post was anchored in each of four directions, by means of a "two-by-four," 14 feet long, placed horizontally (so as to offer no resistance to the settlement of the post), and each outer end was attached by means of a heavy spike to a stake driven firmly into the ground, the other end similarly spiked to the post. Another spike was driven at the center of the platform, and a yardstick was erected on the head and braced in position. A reading was taken on the yardstick by means of a surveyor's level, and referred to a permanent bench mark. The object of resting the end of the yardstick on the nail head is to have a definite spot to which reference can be had in case the yardstick is displaced.

Sacks of cement were used for loading, placed two at a time on opposite sides, with much precision, to avoid disturbing the set-up; next, two were placed on the other two sides and one on each of the four corners, eight in all, making a superimposed load of 800 pounds. A second reading then taken showed a settlement of 1/8 inch. Another 800 pounds was then deposited, but the reading on that showed no further appreciable settlement, nor was more noted until the fifth such loading, when the platform went down 5/16 inch more. The test was thereupon stopped and the loading left to stand over night, with a watchman to guard it. In the morning it was found to have gone down 3/8 inch more, a total settlement of 13/16 inch, which the superintendent deemed excessive. He might recommend increasing the spread of the footings at this end (which was the lowest part of the basement, containing the boiler room) or carrying them down to a firmer stratum, if within reasonable depth. It appeared that they were in exceptionally poor soil, immediately at the head of a small ravine, and that it might be better to increase the depth throughout a limited area, rather than to make a re-study of the footings and their reinforcement, so he ordered another hole prepared, 3 feet deeper, and repeated the test. It was a new proceeding in the locality and attracted a considerable "gallery," and proved to be the cause of much comment. As a result, the laborers were distracted and less careful with the next test, and therefore made a failure of the set-up. The third was unevenly loaded and likewise failed. The next was given due care and succeeded, both as a test and in demonstrating the bearing capacity of the stratum reached. The first load reading showed 3/16 inch settlement, and the next (with 1,600 pounds on) an additional 1/16 inch. Thereafter, no appreciable difference was detected, even with 4,000 pounds on the platform. The superintendent then ordered another 800 pounds added, which went down another 1/16 inch. Next morning, the loading was found to be stabilized at a total settlement of 5/16 inch, which was deemed quite satisfactory, in view of the fact that the first ¼ inch was an initial settlement.

Particular note was taken of the characteristics of this substantial bearing stratum, and the trenches were carried down to it at the southwest corner and stepped up from it (as the stratum tilted) until normal height was reached, all in accordance with telephonic instructions from the architect. He arrived on the scene before the final testing set-up was dismantled, inspected the reports of the tests, and estimated the sum due the contractor for the additional concrete, excavating and back fill, as provided in the specifications. Change Order No. 4 was written accordingly, covering 840 cubic feet of concrete, etc., at 50 cents a foot, a total of $420 extra for the item. To this was added the sum of $115 for the cost of conducting the tests, as provided in Change Order No. 3.

The ground had sufficiently dried out after the rain for observation as to the amount of moisture the soil would normally carry. The architect decided to adhere to the provisions for waterproofing included in the contract, which will be treated of in another chapter. He had been uncertain as to whether or not membrane waterproofing was indicated for the boiler room floor and lower walls, as specified for the swimming pool. His judgment was that the tile drainage around the walls would be sufficient to keep this section dry, even at the depth of the ash pits under the boilers, in this case the lowest point.

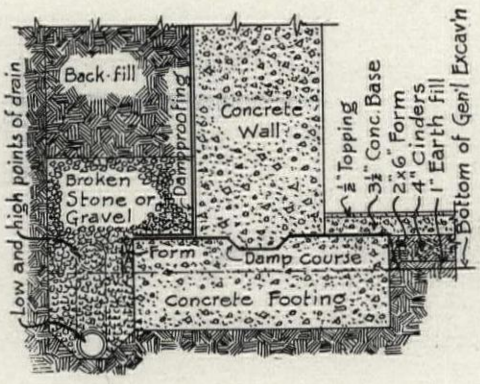


Fig. 10. Section Through Footing

Careful observance of all soil conditions is of first importance in building construction, especially when the architect is working in unfamiliar territory. The Chicago building ordinance gives these restrictions as to maximum loads permitted:

	Lbs. per sq. ft.
On pure clay, at least 15′0″ thick.......	3,500
On pure clay, dry and compressed......	4,500
On pure firm sand, at least 15′0″ thick..	5,000
On a mixture of clay and sand........	3,000

That these allowable loadings are "safe" to the extent of being extremely light is proved by experience and evidenced by competent authorities. Those given in Kidder's "Architects' and Builders' Pocket Book" are about twice as heavy. In point of fact, it is difficult to lay down any fixed tabulated figures assumed to apply to different soil compositions, though several writers quote what they consider a "summary of good practice."* It will be seen that these weights in tons per square foot from the New York building code, 1916, are much greater than the loadings used in Chicago:

	Tons
Wet clay	1
Wet sand or firm clay..............	2
Sand and clay, mixed or in layers.....	2
Fine and dry sand..................	3
Dry hard clay or coarse sand..........	4
Gravel	6
Soft rock	8
Hardpan	10
Medium rock	15
Hard rock	40

The two important factors relating to foundation bearings are that a certain safe loading shall be arrived at and that the various footings shall have been so designed that the loads shall be fully

* See "Foundations by Albert M. Wolf" in Hool & Kinne's "Reinforced Concrete and Masonry Construction"; also "Foundations on Land" in Merriman's "American Civil Engineer's Handbook."

equalized for all foundations, guaranteeing equal settlements (if any) throughout the entire building area. If one uses a reasonable factor of safety in his footing load computations and these are free from error, one need have no fear of settlement cracks appearing, providing that the supporting stratum is uniform in character and that there is no undue variation in the subsequent live loading. It is therefore the superintendent's duty to closely observe the character of the stratum on which the footings are deposited and report for consideration any lack of uniformity. A location similar to that we have presupposed for discussion may disclose such a dip in the harder subsoil as to demand considerable spread of footings or even the driving of piles.*

Much of the requisite ability to judge soil-bearing capacity by inspection is solely a matter of experience. The superintendent must train himself to expertness in this particular. For soils manifestly too soft to attempt a spread footing (with carrying capacity under 2,000 pounds per square foot) or where the stratum overlying such soft material is too thin, recourse must be had to some means for compressing such soil, or for carrying the foundations down to bedrock or suitable hardpan. The design and supervision of pile, caisson and concrete-filled well foundations is a branch of engineering demanding diligent study by any superintendent confronted with such needs.**

On straightaway concrete footing work, which constitutes an overwhelming percentage of all present-day foundations in this country, a superintendent has little to worry him, other than watching the concrete and checking dimensions, neither of which is, however, to be slighted in the smallest degree. Contractors have been known to make their trenches an inch or more scant in depth or width, or both. A saving of 1 inch in the depth of all footings of this school building would have totaled about 270 cubic feet of concrete and 10 cubic yards of excavating; and of more importance is the fact that it would have cut down the efficiency of the concrete from 6 to 8 per cent.

It is customary, in soil of sufficient firmness, to cut square banks and use the natural earth for forms, rather than to line the trenches with wood. In either event, there are frequent droppings of earth into the trenches (or into the fresh concrete), and hence the excavated material must be kept well back and adequately shored. Some architects specify that the bottoms of trenches shall be tamped before concrete is poured. Others prefer to have the concrete deposited directly on the natural earth bed, without tamping, because the presence of a tamp in the trench offers a constant temptation to compress in place the loose material that should be removed, if specification requirements are to be complied with. In either event, the superintendent must carefully watch the bottoms and sides of the trenches just before and during pouring and see that all surfaces are in proper condition to be covered. He must also be a good judge of the water-bearing capacity of soil strata. Foundation work must frequently be carried on in wet weather, in which event it may be found advisable to proceed with soil tests under unfavorable conditions. Such tests have been made and trench bottoms leveled in mud and running water, with a pump constantly at work. Ideal conditions are not always at the command of the superintendent. He takes conditions as he finds them and does his best, his goal being the securing of proper results.*

When the bottom of the general excavation for the school building was reached in the east wing and the trenching (which, with the foundation work, was being handled by the contractor's own forces) was begun, the superintendent told the general foreman that shoring was specified. This was covered by a special provision under "General Excavating," in addition to the paragraph in the "Supplementary General Conditions" quoted in Chapter 4:

"SHORING. The Contractor shall provide and install all shoring, sheet piling and other bracing required to maintain the banks of all excavated areas until foundation work has been approved for back filling. The Contractor shall be wholly responsible for the retention of all banks, but his shoring or other false work will not be permitted to encroach upon space required for foundation construction or form work."

The superintendent and foreman agreed that this left the matter to the option of the contractor, who would obviously be the loser if damage resulted from lack of foresight in this particular;

* A central heating plant chimney at the University of Illinois, Urbana (Temple & McLane, architects, 1897), has a foundation 20 feet square on the bank of the historic Boneyard Creek. In this small area, the variation in the bearing strata is so abrupt that the footing was divided diagonally in halves, one of which rests on firm soil and the other on a number of wood piles. At last account, the stack (150 feet high) was as erect and firm as when first put to use.

** For dissertations on heavy foundation work, the reader is referred to "Foundations, Abutments and Footings" by Hool & Kinne, "Pile Foundations" in "Reinforced Concrete and Masonry Structures" by the same authors, "Improvement of Bearing Capacity" in Merriman's "American Civil Engineer's Handbook," "Piling in Compressible Soils" in Volume 1 of "Architectural Construction" by Voss & Henry, "Foundations on Compressible Soil" in "Building Construction and Superintendency" by F. E. Kidder, or an exhaustive treatise on the subject of "Piles and Pile Driving" in Dr. J. A. L. Waddell's "Bridge Engineering."

* Part of the footings of a three-story office and apartment building of fireproof construction in Mitchell, S. D., are on quicksand. This shifty material will stay in place so long as the pressure against it is equal in all directions. A soil test such as described proved that the sand would carry 3,000 pounds per square foot and the loads were distributed accordingly. Under similar conditions in Cairo, Ill., a locomotive was used to pump water from the basement of a freight house, with the result that sand in the unfloored space went with the water, a footing was undermined, and considerable settlement took place, causing a bad crack, before the pumping was stopped.

hence the foreman said he would report that the banks were apparently solid, and that shoring at that depth was not customary in that locality. The contractor could then act as his judgment dictated. Before shoring was ordered, another rain occurred, immediately after which the first truck load of shipped-in brick was dumped too close to the northeast corner of the excavation, causing a small landslide which caught a man in the trench and broke his leg. Thereupon, all banks more than 6 feet high were shored, and no further trouble resulted. It will be noted that the owner, architect, superintendent and foreman were free from blame in the matter, and that the responsibility had been placed where it belonged; but the man of most experience had guessed wrong. No one has ever become infallible in the "building game."

Excavations in rock, or in sand or gravel containing boulders, necessitate specification clauses covering such conditions. If they are definitely predetermined, the contract may be formulated accordingly; but it is common practice to cover uncertainties by demanding unit prices from bidders on excavated materials out of the ordinary, thus:

"ROCK EXCAVATION. It is assumed that the material excavated will be such as can ordinarily be handled by a steam shovel. If a boulder or boulders or solid rock be encountered of mass in excess of one cubic yard, necessitating blasting or breaking by other means, the Contractor will be allowed a unit price per cubic yard for same in addition to the amount of his contract.* Each bidder is requested to state in his bid the gross cost per cubic yard for such excavating in addition to that included in his contract for ordinary excavating."

It is then up to the superintendent to determine what excavated materials are affected by such a clause and to make due allowance for them, if allowances are indicated. Advance data as to soil conditions by borings or digging are informative but not conclusive. An architect designs his footings according to the best information available, and has the bidders make their proposals accordingly, eliminating all uncertainties, so that all bids will be on like quantities. The best practice does not countenance "passing the buck" to the contractor by means of such uncertain demands as:

"ROCK. Level off rock at depths indicated, and if at these levels firm rock is not found the Contractor shall excavate to greater depth until proper surface is secured."

If there is a possibility that usable sand or gravel will be found in the excavation, the superintendent may be charged with the responsibility of determining its fitness for use in concrete or mortar, thus:

"SAND AND GRAVEL. As excavating progresses, the Superintendent shall be afforded opportunity to inspect materials uncovered and may direct the separation (without additional expense) of all sand and gravel suitable for building purposes. Same shall be kept free from earth and shall be stored on premises to be used as directed. The Contractor shall allow a unit price of $2 per cubic yard for all sand and gravel so obtained and used."

* Or, if preferred, will be allowed a fixed amount per cubic yard.

Forcing the contractor to pay current prices for materials so used makes him more or less indifferent as to their incorporation in the work, and makes it simpler for the superintendent to control such usage. When the use of material from the excavation is permitted at a direct saving to the contractor, one who is unfair needs unusual watching. The unit price for extra concrete also applies in event of the discovery of some old cistern or other filled-in hole in the excavated area. If this extends below new work shown on the drawings, proper attention should be given to it. Footings should be carried to original soil under the same proviso as applies to other soils of insufficient bearing capacity, as previously quoted. If only floors occur over the old excavation, or if it is only a narrow trench crossing under a footing, such reinforcement can be added to the concrete as will guarantee safety, without adding bulk.

Thus, with premises well founded, calculations carefully made and checked, and construction adequately supervised, one is reasonably assured of satisfactory results; but, if changes are to be made from the footings as originally designed, there should be no question as to whose is the responsibility for such changes or for conditions resulting therefrom.* On compressible soils, where the spread of the footings is such that minor settlement is anticipated, one should bear in mind that such "live loads" as are imposed upon warehouse floors act as "dead loads" after coming to rest for a time. This means that, upon the completion of such a structure, it may be expected that all structural dead loads will have operated to produce their permanent effect on the footings, whereas the more or less permanent live loadings are yet to be applied. It is therefore of much import that such foundations be designed with sufficient spread to permit of minimum settlement, unequal as it is bound to be.

* A case is on record where the building committee of a large church, employing non-resident architects, hired their own superintendent, one familiar with local conditions. He found that the footings in certain locations were inadequate on account of soil conditions, and took it upon himself to change them and so notified the architects. Later, when bad settlement cracks occurred, the owners sued the architects for heavy damages, but the latter were able to show that they had no direct knowledge of the conditions uncovered by the excavating, that the information as to the change in footings was definite and not submitted to them for approval, and that they could not be held responsible for effects after being relieved from control of the causes. Such incident affords ample testimony to the need of the owner's insistence that the superintendent or clerk-of-the-works shall always be employed by the architect, direct,—never by the owner. There should be no divided responsibility for structural design.

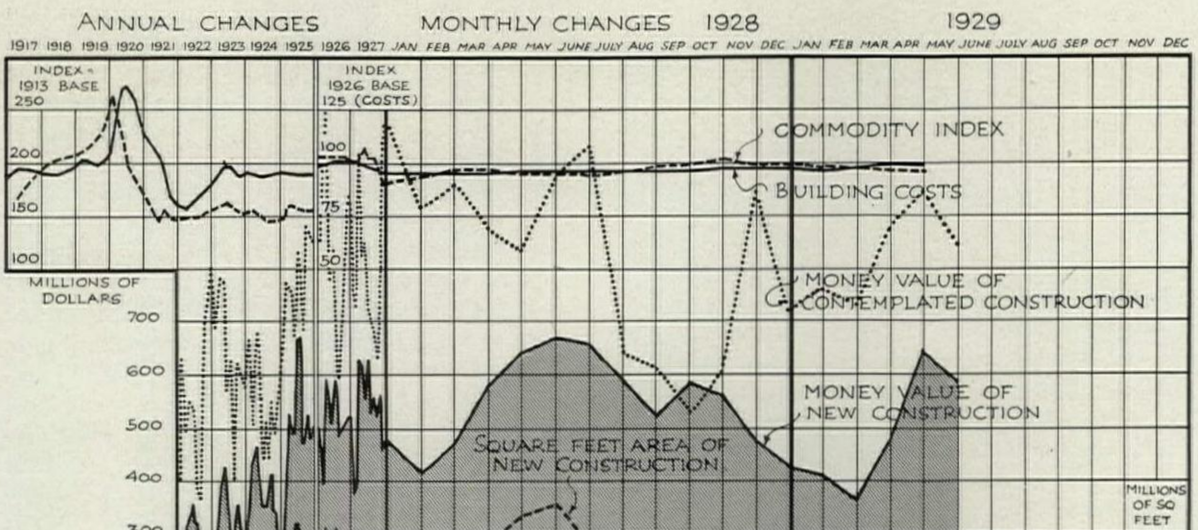
THE BUILDING SITUATION

A MONTHLY REVIEW OF COSTS AND CONDITIONS

THE anticipated increase in construction activities during the month of May has only partly materialized, a fact due in part to recent labor disputes in New York. The value of construction contracts awarded in the 37 eastern states during the month of May was, according to the F. W. Dodge Corporation, $587,765,900, a decline of 9 per cent from the preceding month, and 12 per cent lower than the total for May, 1928. Total construction for the first five months of 1929 shows a decrease of 11 per cent from the 1928 figures for a similar period.

The effect of the labor dispute in New York is evidenced in the decided falling off in contracts awarded in the New York-northern New Jersey district. The May total of $122,474,600 was 28 per cent below that of April, and 34 per cent below the figures for May, 1928. This brings the total for the first five months 24 per cent below that for 1928. The middle Atlantic states suffered a similar recession. The May figures showed contracts valued at $59,419,500. This is a decline of 44 per cent from the April total, and is 23 per cent below the total for May, 1928. In spite of these losses the volume of work awarded for the first five months of 1929 was only 7 per cent less than during 1928. The New England states May figures of $43,745,300, showed an improvement of 7 per cent over April, but a decrease of 28 per cent from May of last year. Less significance is attached to this decline when it is noted that the 1928 figures for this district were abnormally high, breaking all previous May records. Contracts for the five months were 17 per cent below the five months of 1928. With a total of $71,472,100, contracts awarded in the Pittsburgh district amounted to 17 per cent more than April and 8 per cent more than May of last year. This high figure brought the total since the first of the year up to 1 per cent above that for a similar period in 1928.

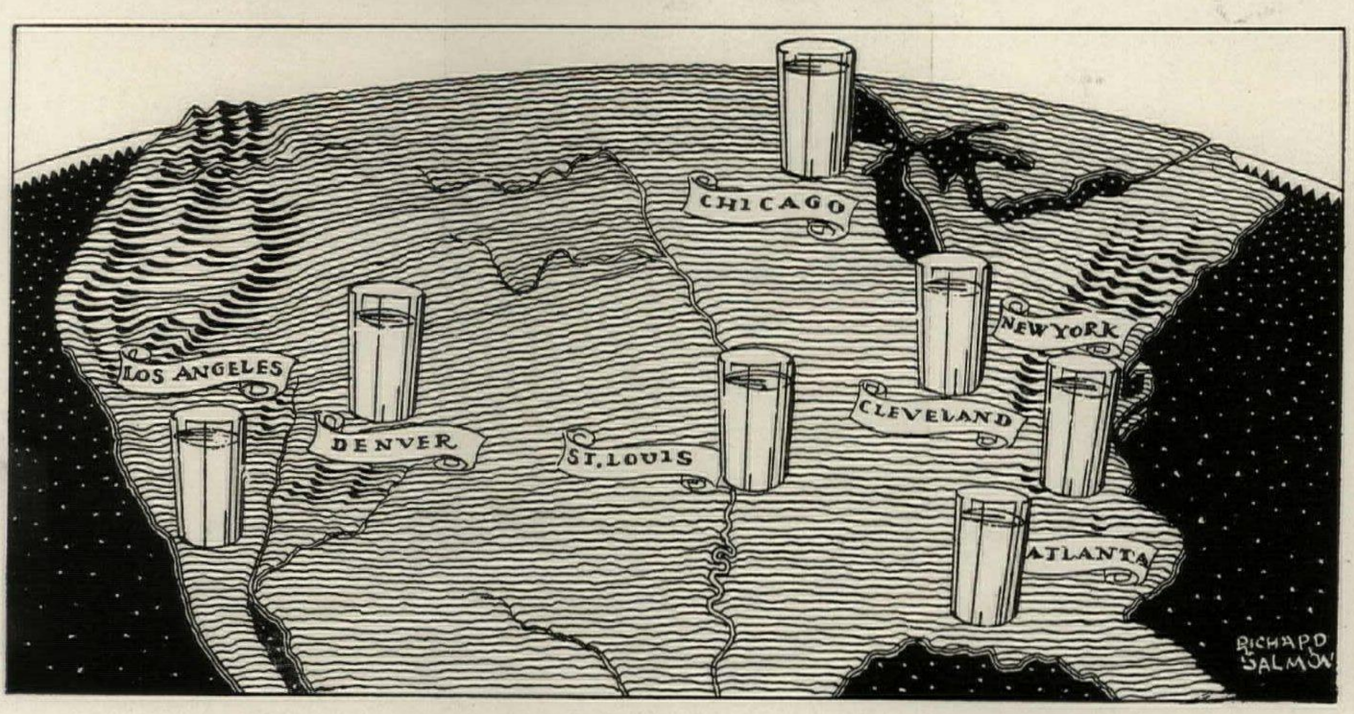
In the central western district the figures for the first five months ran 10 per cent below the five months of 1928. Nevertheless, the May figures of $199,136,400 were 18 per cent above the April record, and 3 per cent higher than May, 1928. The northwestern district shows a decided improvement when compared with either the previous month or the previous year. The May contracts amounted to $13,322,400, an amount 21 per cent ahead of the April total and 40 per cent ahead of the total recorded for May of last year.



THESE various important factors of change in the building situation are recorded in the chart given here: (1) *Building Costs.* This includes the cost of labor and materials; the index point is a composite of all available reports in basic materials and labor costs under national averages. (2) *Commodity Index.* Index figure determined by the United States Department of Labor. (3) *Money Value of Contemplated Construction.* Value of building for which plans have been filed based on reports of the United States Chamber of Commerce, F. W. Dodge Corporation and *Engineering News-Record.* (4) *Money Value of New Construction.* Valuation of all contracts actually let. The dollar scale is at the left of the chart in millions. (5) *Square Foot Area of New Construction.* The measured volume of new buildings. The square foot measure is at the right of the chart. The variation of distances between the value and volume lines represents a square foot cost which is determined, first by the trend of building costs, and second, by the quality of construction.

Water . . . Water EVERYWHERE

and everywhere it's different . . !



WATERS from different sources may look alike and taste alike. They may be equally pure for drinking. And yet they may be very different in their action on pipe.

Some waters are normally corrosive. Other waters—often those that 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.

To meet all different water conditions, The American Brass Company offers *two* alloys of Anaconda Brass Pipe.

For normally corrosive waters—Anaconda 67 Brass Pipe. This pipe contains not less than 67% copper. It is guaranteed to be structurally sound and physically perfect. It is semi-annealed and seamless.

For highly corrosive waters—Anaconda 85 Red-Brass Pipe. This pipe contains not less than 85% copper, and is offered as the best corrosion-resisting pipe obtainable. It, too, is fully guaranteed.

Proved by 16 years of testing!

These two alloys will serve all water conditions. This has been proven in 16 years of exhaustive research—when various alloys of brass pipe were tested, to determine which alloys would best resist various degrees of corrosion. The laboratory tests were then checked with tests of actual use—and Anaconda 67 Brass Pipe and 85 Red-Brass Pipe is the result.

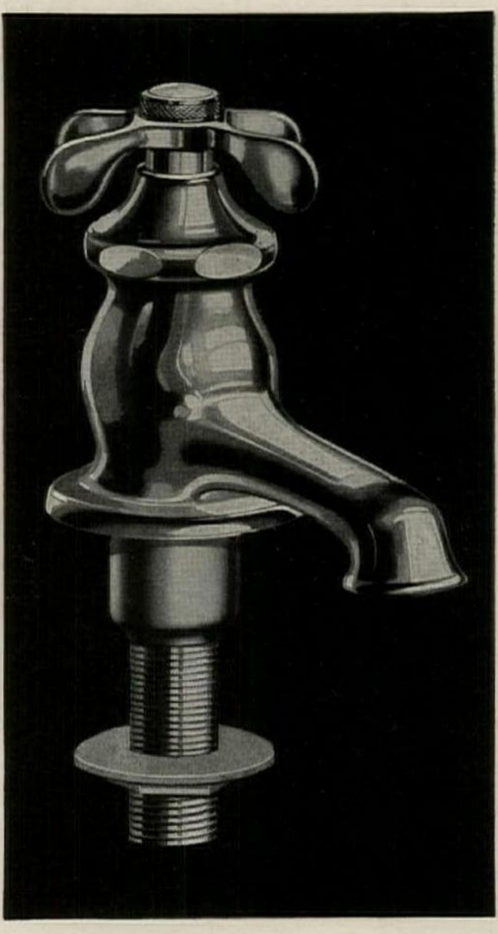
An important service to architects

Today, the Technical Department of The American Brass Company is prepared to help determine the character of the local water supply and recommend the best alloy of pipe for use under specific conditions. You are cordially invited to communicate with The American Brass Company, General Offices, Waterbury, Conn.

ANACONDA BRASS PIPE

FOR HOT AND COLD WATER LINES

MEETING ARCHITECTURAL STANDARDS OF QUALITY



Solid Nickel Silver faucet manufactured by The John Douglas Co., Cincinnati, Ohio. Below: Buncombe County court house and jail, Asheville, N. C. Architects: Millburn-Heister & Co., Washington, D.C.; Solid Nickel Silver plumbing fixtures by The John Douglas Co.

BEAUTIFUL...LONG-WEARING SOLID NICKEL SILVER PLUMBING FIXTURES BY DOUGLAS

Solid Nickel Silver plumbing fixtures are ideally suited for use in public buildings and in other installations where fixtures must be everlastingly clean-looking and attractive. Similar in lustre and color to Pure Nickel and other high Nickel alloys, Solid Nickel Silver fixtures insure permanent beauty that endures through years of service. They are corrosion-resistant and therefore easily cleaned. In hardness, toughness, and strength Solid Nickel Silver resembles tough bronze. These physical properties render Solid Nickel Silver plumbing fixtures difficult to mar or break during installation or use and make valve seats highly wear-resistant. In no other available fixture material will you find such a desirable combination of essential properties.... No wonder plumbing fixtures of Solid Nickel Silver meet the highest architectural standards of quality.

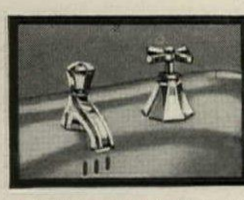
18/22 Nickel SILVER

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

The Growing Vogue *of Kohler Colored Fixtures*

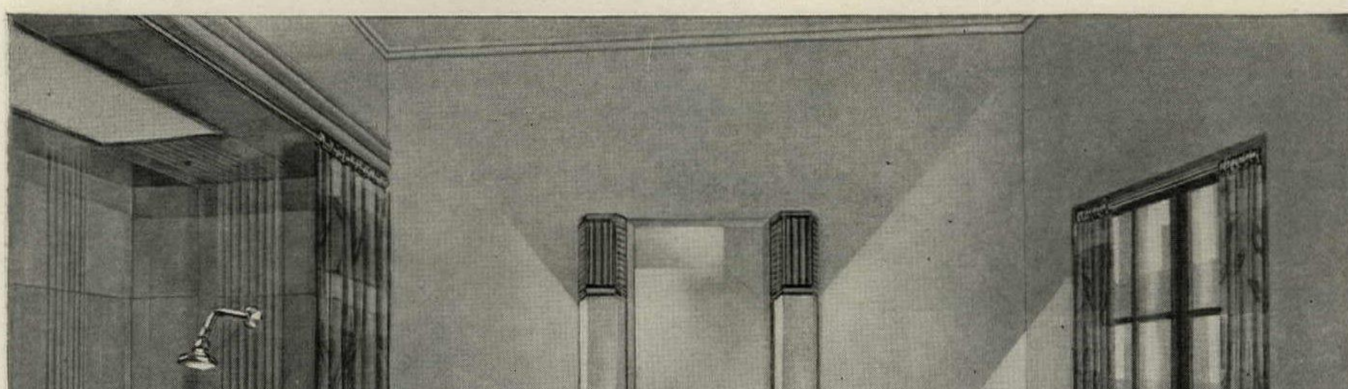
Architects of note are studying with increasing interest the possibilities of Kohler Colored Fixtures. Designers of fine houses, apartments, and hotels are enjoying the greater scope that these fixtures give to creative imagination.

Mr. Ely Jacques Kahn used Kohler Colored Fixtures in his bathroom in the current exhibition at the Metropolitan Museum of Art in New York. The bathroom pictured below is also Mr. Kahn's design, the full color rendition showing Kohler fixtures in *autumn brown*, with walls and floor in delicate harmony while hangings introduce subtle contrasting tones.



Kohler metal fittings in chromium plate match Kohler fixtures in quality and beauty

It is worth bearing in mind that Kohler Colored Fixtures cost only a very reasonable amount more than white and add comparatively little to the cost of the complete bathroom. So the use of these beautiful fixtures is in no sense confined to costly bathrooms. . . . You are invited to visit a Kohler display room for a leisurely study of the Kohler colors. Also, please mail the coupon below.



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LOOK FOR THE KOHLER TRADE MARK ON EACH FIXTURE

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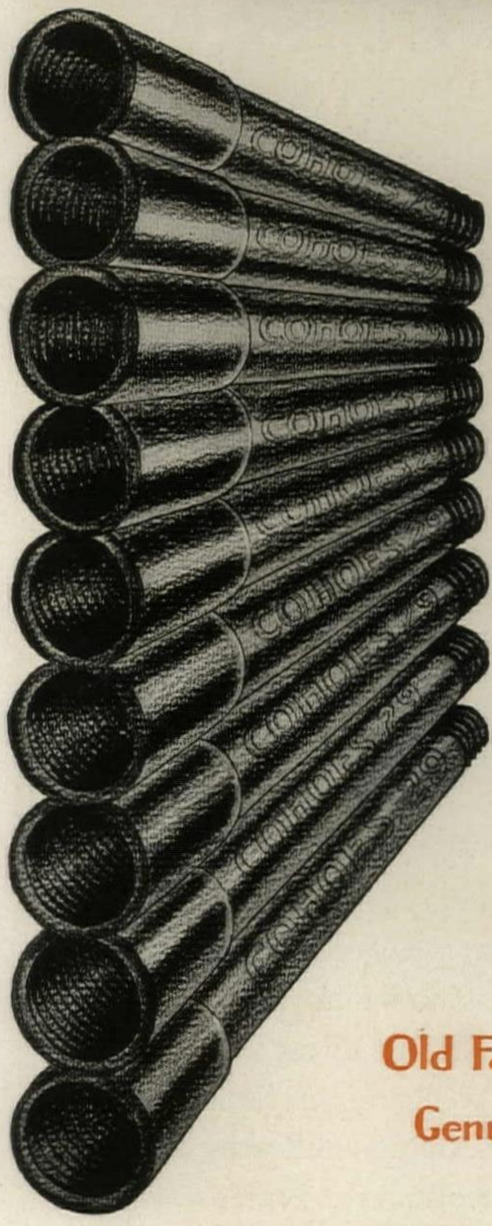

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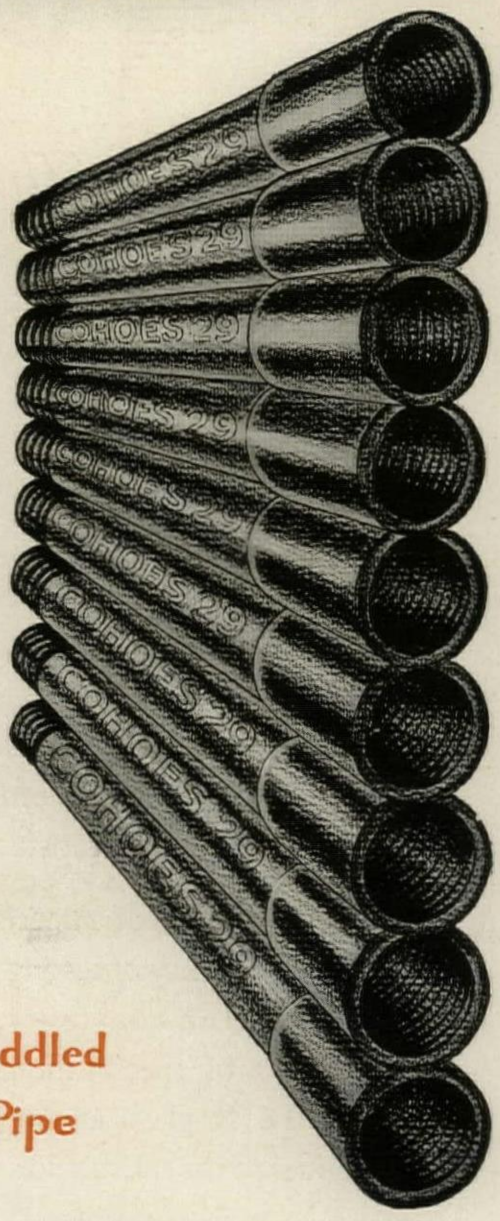

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Many architects and heating engineers have found the answer. It is Hoffman Controlled Heat. With this modern luxurious system, the heat output of each radiator is regulated or changed at any time by the pressure of a finger on the lever handle of the radiator valve. This system automatically adjusts itself to the hour-to-hour need for heat. It is economical as well as comfort assuring, because only as the call for heat increases does the supply of steam automatically accumulate.

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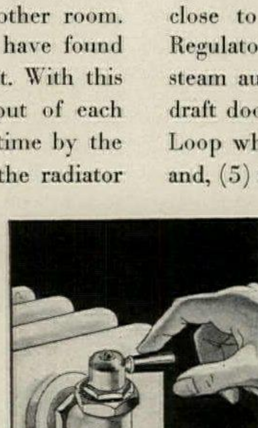
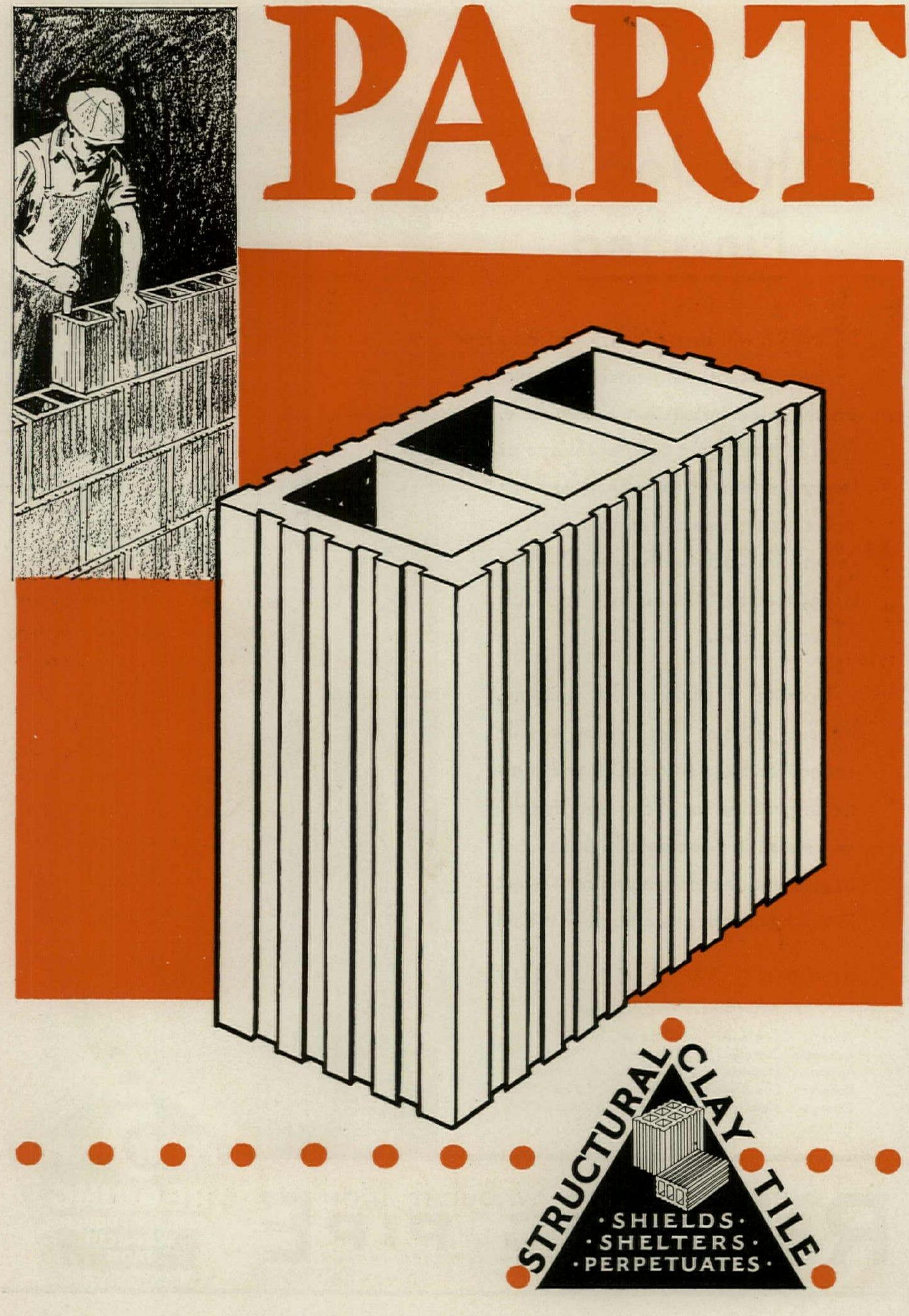


Hoffman Controlled Heat is guaranteed in writing by a conscientious maker to fulfill every promise for years. For architects and heating engineers who are interested in modern heating methods we have published a booklet describing in detail the operation of Hoffman Controlled Heat. Address Hoffman Specialty Company, Inc., Dept. EF-7, Waterbury, Connecticut. It will reach you promptly.

HOFFMAN CONTROLLED HEAT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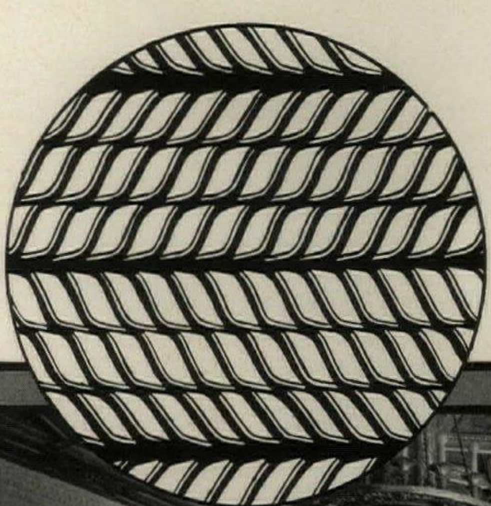

IS the result of definite economy and saving accomplished by its use. In these days of super-construction, where many tons of plaster are used in one building alone, a contractor can appreciate any real saving as long as the work is not cheapened.

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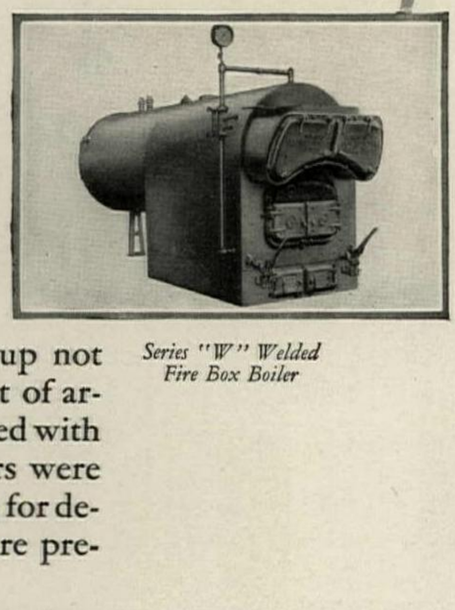

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THE architects who designed this wonderful group not only considered appearance from the standpoint of artistic endeavor but also knew that this must be combined with a never-failing source of heat—thus Titusville Boilers were chosen for this most important task. Their reputation for design, material and workmanship is such that they were preferred above others.

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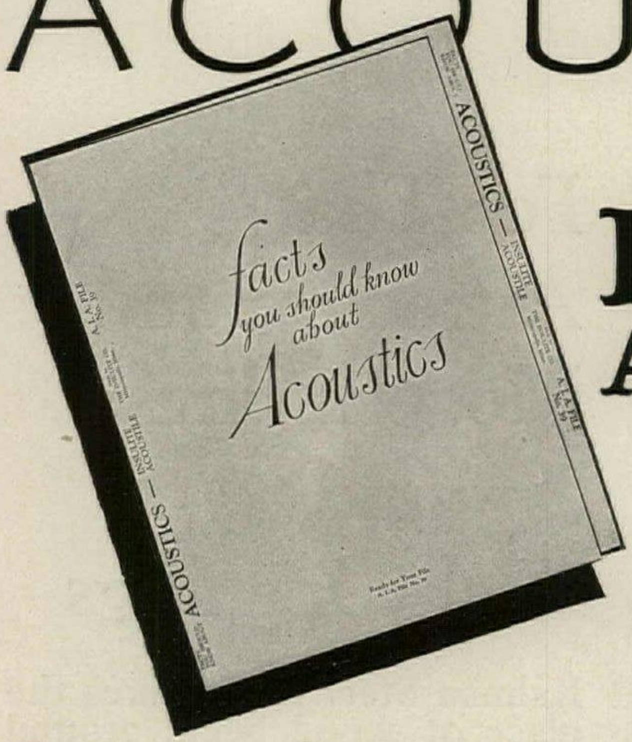

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Insulite Acoustile is economical because in a single material it provides not only first class acoustical treatment, but also decorative beauty and exceptional insulation against heat and cold.

Write for the above book, "Facts You Should Know About Acoustics." It is attractively bound in a Standard A. I. A. file folder which makes this valuable acoustical information immediately available whenever needed. Ask for A. I. A. File Number 39.

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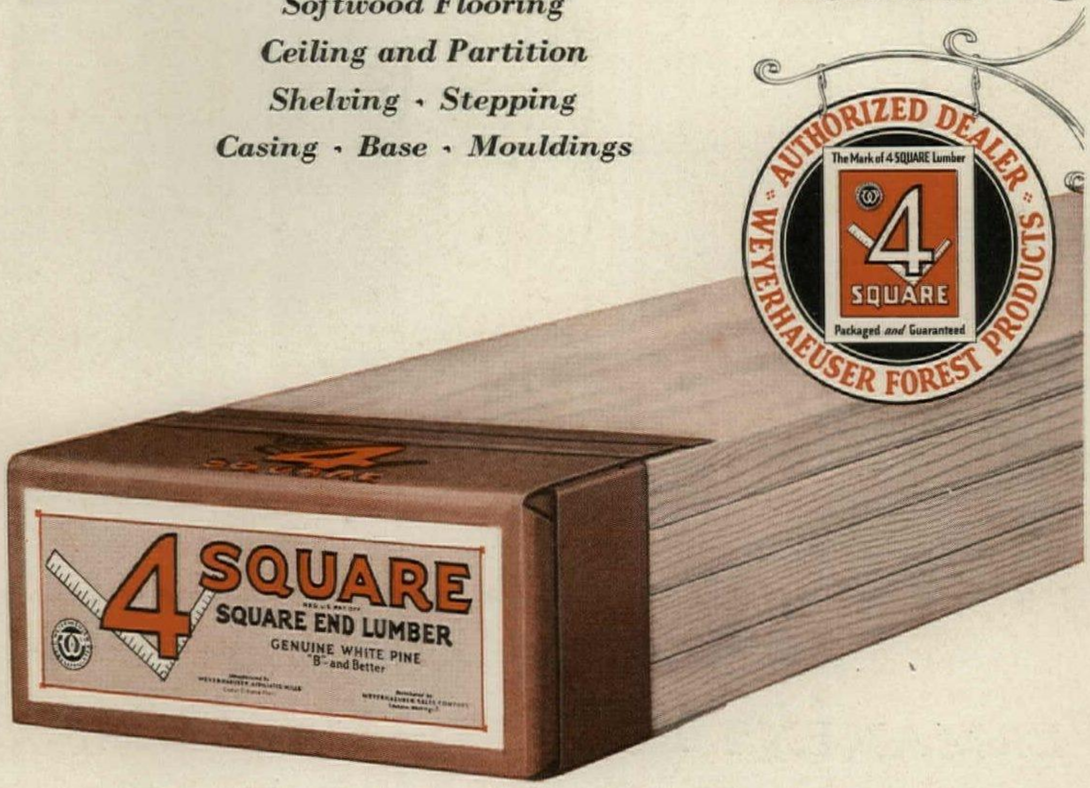

SPECIFYING lumber by species and grade is common practice. But a practically automatic and completely *definite check* against specifications is a new and needed *protection*.

4-Square Lumber gives the architect this protection. When to the species and grade in his specifications he adds the words "4-Square Brand," he knows, beyond question, that he will get what he specified.

4-Square Lumber is *packaged* lumber — and more. Every package is labeled with exact *species* and *grade*. It is *identifiable* quality. It prevents substitution and "mistakes." It builds confidence.

4-Square Lumber is *fine* lumber—properly *seasoned* — milled to precise standards of size and finish. It is *guaranteed* by Weyerhaeuser and comes to the job in the *original* packages.

4-Square Lumber offers plus value in time saving. Every piece is cut to exact length and *trimmed square at both ends*. Much hand trimming on the job is eliminated. Better work is possible.

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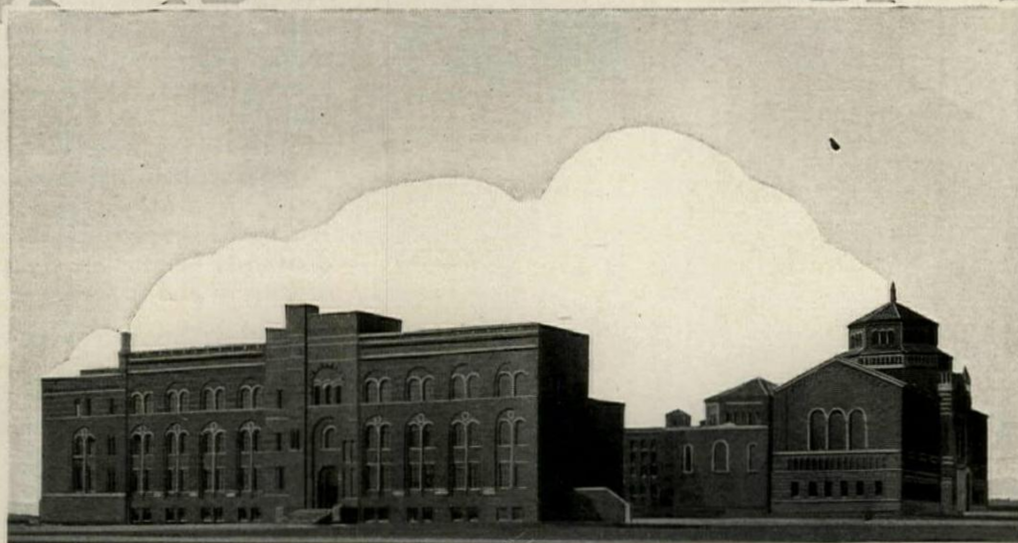

Physics and Biology building of the Southern Branch of the University of California at Los Angeles; equipped with smokestacks, hot water and steam return lines of Toncan Iron.

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YOU will find that architects and builders who have the future in mind, are frequently specifying Toncan Copper Mo-lyb-den-um Iron for pipes and the exposed parts of buildings.

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The wonderfully enduring qualities of Toncan make it invaluable for all those barely noticed and hidden parts of buildings that must be protected from moisture and exposure. For ventilating systems, canopies, gutters, spouts, skylights, window frames, etc.

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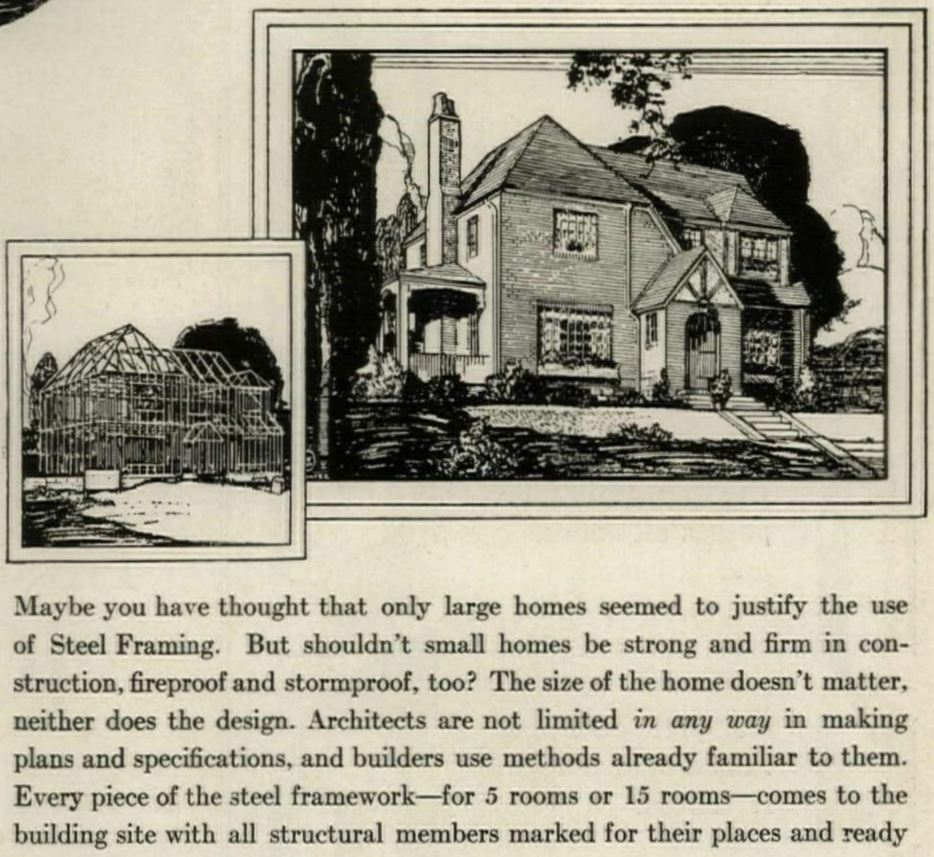
A small home or a large home

both can have the advantages of
SKY-SCRAPER CONSTRUCTION
with
STEEL FRAMING



Maybe you have thought that only large homes seemed to justify the use of Steel Framing. But shouldn't small homes be strong and firm in construction, fireproof and stormproof, too? The size of the home doesn't matter, neither does the design. Architects are not limited *in any way* in making plans and specifications, and builders use methods already familiar to them. Every piece of the steel framework—for 5 rooms or 15 rooms—comes to the building site with all structural members marked for their places and ready for quick and easy erection.

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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.

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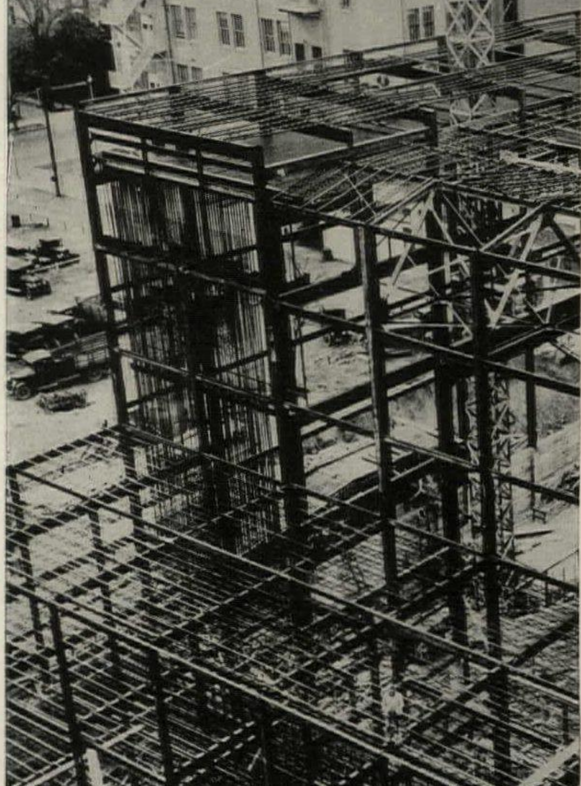

NO WELDS IN STRESS—one piece of steel—expanded—without rivets, bolts or welds in shear or tension—these are the features responsible for the rapid gain in Bates-Truss Joist popularity.

A simple I-beam section is expanded into a lattice truss web. The expansion increases the depth of the beam—the truss materially increases its strength. The points of contact of the lacing and flange members are simply unsheared portions of the original plain web. By this process, all defective beams are automatically eliminated.

Contractors, engineers, builders should all know about the Bates Expanded Steel Truss. We have prepared a book giving complete information. A copy will be mailed to you upon request.

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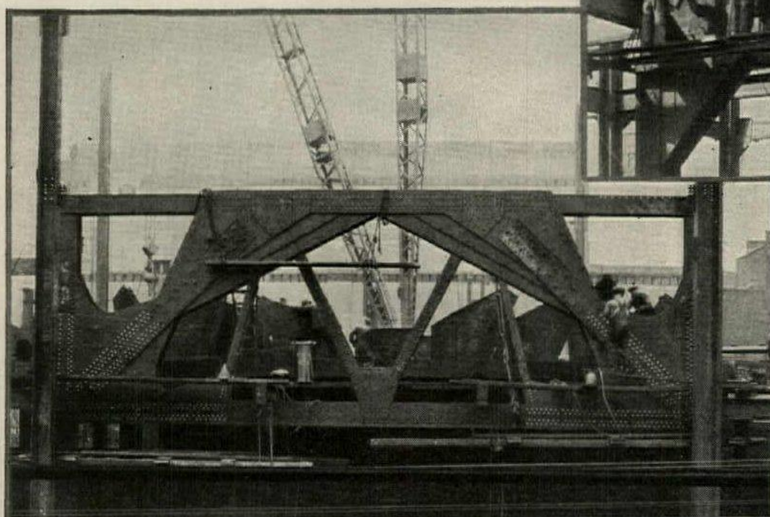
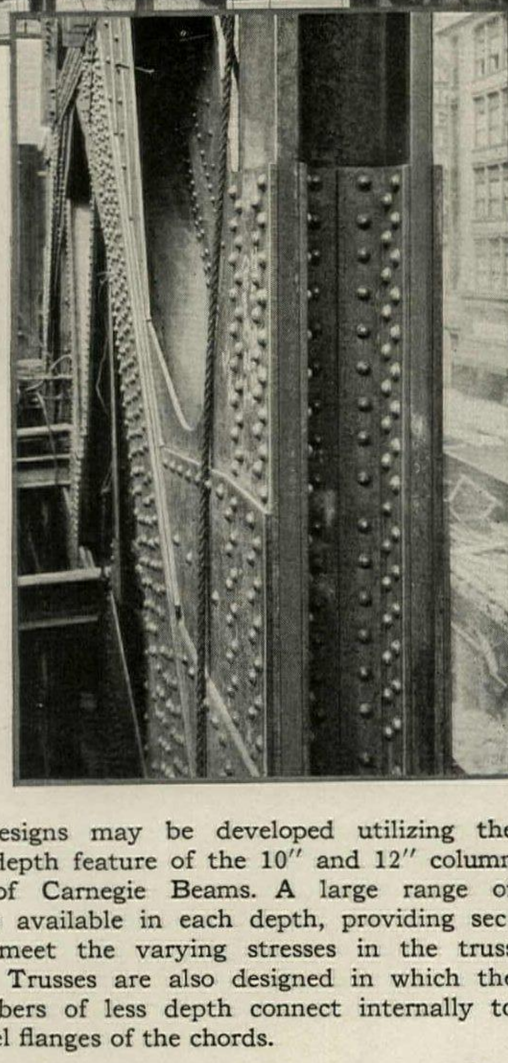
Sales, Engineering and Executive Offices EAST CHICAGO, IND.

Carnegie Beams solve a difficult problem





THE MARBLE columns of the Union Gas and Electric Company Building in Cincinnati (John Russell Pope—Garber & Woodward, Associate Architects—Euphrat & Hanly, Steel Designers) presented a difficult problem in steel designing, in that the outside dimensions of the finished columns limited the size of the section that could be used for the steel cores. The photograph on the right shows how Carnegie Beams solved the problem with complete satisfaction. Section CB 146, weighing 345 pounds per foot, was used as a column, reinforced internally with two 11″ x 1″ plates riveted to the web and four 6″ x 6″ x 1″ angles riveted to the web and inside faces of the flanges. This type of reinforcement was made possible by the parallel flanges of Carnegie Beams, a unique feature of these sections. Eight surfaces are provided for connections instead of four.

The upper photographs show two heavy trusses for the same building. In these the top chord, the end diagonals, and in the case of the larger truss, the posts were all Carnegie Beams of the same section as the columns. Note also Carnegie Beams used as web members and the simplicity of the gusset plate construction.

Similar designs may be developed utilizing the constant depth feature of the 10″ and 12″ column sections of Carnegie Beams. A large range of weights is available in each depth, providing sections to meet the varying stresses in the truss members. Trusses are also designed in which the web members of less depth connect internally to the parallel flanges of the chords.

Carnegie Beams offer an economy, utility and flexibility of design never before possible in structural steel. Write for copy of handbook—"Carnegie Beam Sections."

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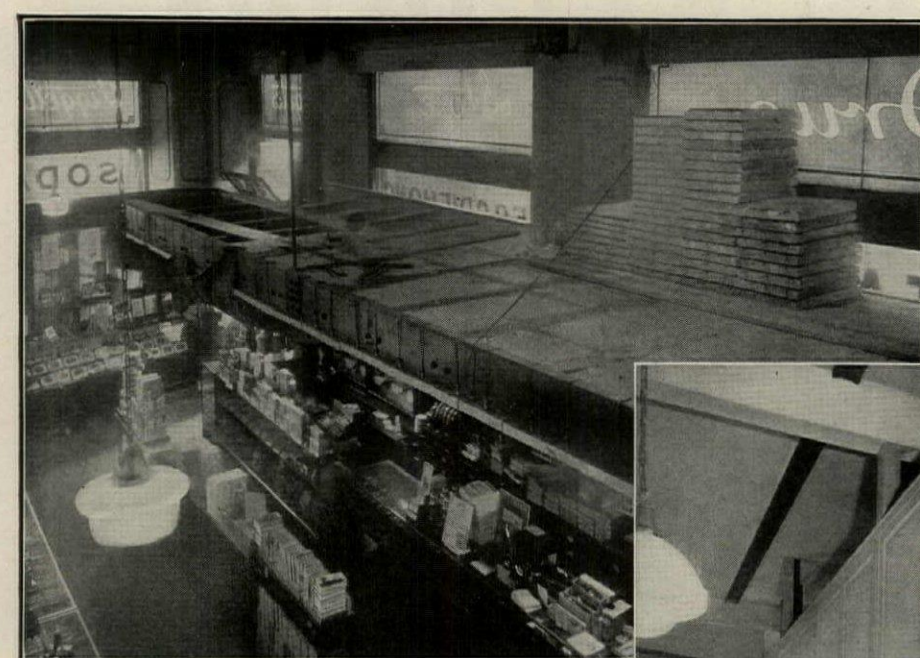
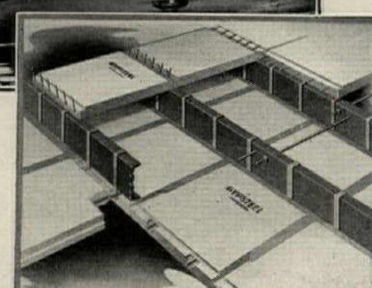


Mezzanine in Liggetts Drug Store, Broadway and 42nd St., New York, under construction.

Completed mezzanine.

A MEZZANINE CONSTRUCTION

That Does Not Interrupt Sales



Showing method of hanging Gypsteel ceiling slabs and laying floor slabs.

NOT infrequently you will be asked to design a mezzanine to be built under the following conditions:

Use of floor space below mezzanine must not be interrupted during the construction. (This means no forms or scaffolding can be used.)

Quick completion of the job essential. (No wait permitted for poured material to harden.)

Must pass underwriters. (Fire-proofing material essential, eliminating timber construction.)

Must be economical. (A light weight construction to cut cost of steel and supporting members.)

Where all these conditions must be met the Gypsteel System with its pre-cast gypsum floor and ceiling slabs, alone fills the requirements. Nothing else will do. The pre-cast ceiling slabs can be hung without forms or scaffolds as soon as the steel work is in place. Floor slabs can be laid and their steel reinforcements tied together immediately afterward. The work can easily be completed within a few hours time after the steel is in place. Usually these mezzanines are completed over a holiday or week-end.

This Gypsteel construction is the lightest type of floor construction, absolutely fireproofing the steel. It is put up without forms or the mess of dripping materials. The strength and light weight of the pre-cast gypsum slabs cuts down steel requirements and keeps the cost down.

A LIST OF NEW YORK MEZZANINE INSTALLATIONS

National City Bank — *McKim, Mead & White*
Liggett Stores — *Owners*
Penn Station — *McKim, Mead & White*
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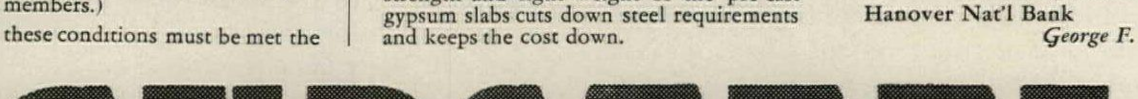
Munds & Winslow — *Walker & Gillette*
Savoy Plaza Hotel — *McKim, Mead & White*
Hanover Nat'l Bank — *George F. Pelham*

GYPSTEEL



Hanging ceiling slabs — Clinching ceiling slab hangers — Grouting ceiling slabs — Laying Gypsteel floor slabs — Tying the reinforcement together.

General Offices: Linden, N. J.

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Minwax Concrete and Terrazzo Floor Finish—is a clear, amber colored liquid, a combination of mineral waxes, oils and gums. It cures after application to a tough, rubbery, dry mineral gum which will polish under traffic or friction, possesses great binding power and, being predominately mineral in character, is highly resistant to all usual concentrations of acids and alkalies. When mopped on the surface, the material penetrates quickly, going into the floor sometimes as much as half inch in spots where the floor is unusually porous; then it cures and hardens, binding, filling and toughening the whole wearing surface, densifying and sealing it so that it is waterproof and therefore stainproof and sanitary as well as dustproof and wear resistant.

This material seeks, particularly in its application to Terrazzo, the ultimate lasting protection of the floor—not a superficial polish or surface coating.

This same material, with the same properties, may be had in three shades of color under the name Minwax Colored Concrete Floor Finish.

Near you there is a Minwax expert ready to confer with you on your flooring problems, or on questions of waterproofing or dampproofing. Feel free to call upon him. See our catalogue in Sweet's.

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- Foundation Dampproofing
- Caulking Compounds
- Plasterbond Dampproofing
- Asphalt Products
- Brick and Cement Coating
- Transparent Waterproofing
- Concrete and Terrazzo Floor Finish
- Concrete Floor Paint
- Wood Finishes and Waxes

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.

AIR FILTERS

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.
Making the Most of Your Protectomotor. Folder, 6 pp., 3½ x 6½ ins. Illustrated.
The Protectomotor Industrial Air Filter. Folder, 6 pp., 4 x 9 ins. Illustrated.
Introducing the Model C. P. Pipe Line Filter. Folder, 8 pp., 4 x 9 ins. Illustrated.

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.

BATHROOM FITTINGS

A. P. W. Paper Co., Albany, N. Y.
Onliwon for Fine Buildings. Folder, 8 pp., 3¾ x 6 ins. Illustrated. Deals with toilet paper fittings of metal and porcelain.
Architects' File Card. 8½ x 11 ins. Illustrated. Filing card on toilet paper and paper towel cabinets.
A Towel Built for Its Job. Booklet, 8 pp., 4¼ x 9⅜ ins. Illustrated. Paper Towel System and Cabinets.
Cabinets and Fixtures. Booklet, 32 pp., 5¾ x 4¾ ins. Illustrated. Catalog and price list of fixtures and cabinets.

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.

CEMENT—Continued

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., 3⅝ 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.
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.

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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Name .... Business ....

Address ....

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 169*

DAMPPROOFING—Continued

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.

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.

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.

ELECTRICAL EQUIPMENT—Continued

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.

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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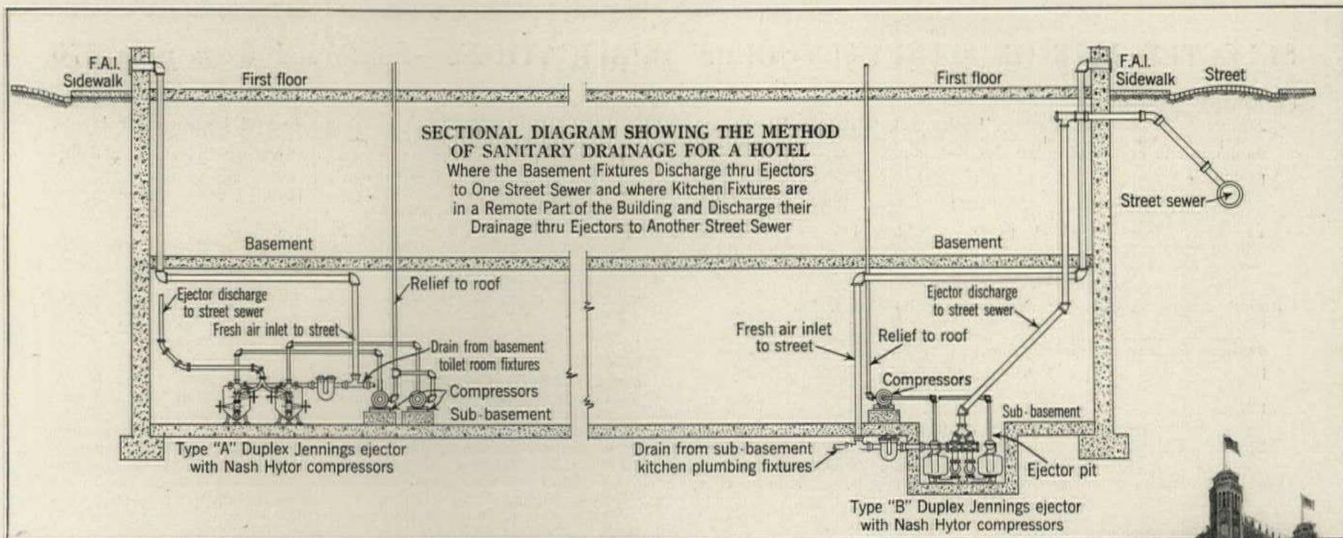
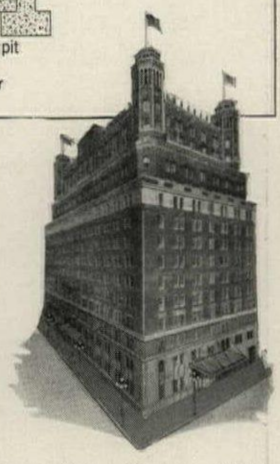
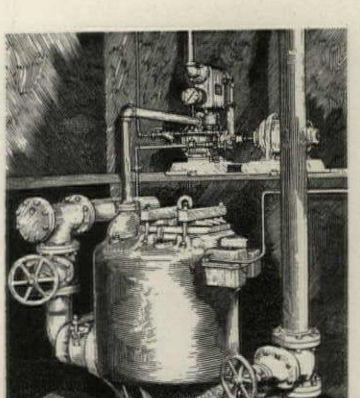




Leverich Towers Hotel, Brooklyn, N. Y. Starrett & Van Vleck, architects; Jarcho Bros., Inc., plumbing contractors. Two sets of Jennings Sewage Ejectors are installed in the Leverich Towers in a manner similar to the diagram shown above.

Getting full value from basement floors

BASEMENT floors in the modern hotel are too valuable to be used merely for storage space. Especially when the problem of raising sewage and drainage ten, twenty-five or even fifty feet, to street sewer level is so readily solved.



Jennings Sewage Ejectors are furnished in standard sizes with capacities ranging from 30 to 1,500 g.p.m. Heads up to 50 ft. Write for Bulletin 67

For serving basement kitchens, laundries, and wash rooms, the Jennings Sewage Ejector affords an efficient, reliable unit. Pneumatic in operation, it raises crude sewage or drainage to the necessary height without screening. Low pressure air is furnished by a Nash Hytor Compressor only when material is being moved. Air valves and air storage tanks are not employed. A Jennings Ejector cannot clog; retains its original capacity throughout its entire life.

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 170*

FLOORING—Continued

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.

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.

Stedman Products Company, South Braintree, Mass.

Stedman Tile, The Original Reinforced Rubber Floor. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Valauble data on flooring.

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.

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.

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.

FURNITURE—Continued

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.

New York Galleries, Madison Avenue and 48th Street, New York.

A Group of Distinguished Interiors. Brochure, 4 pp., 8¾ x 11¾ ins. Filled with valuable illustrations.

GARAGES

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.

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., 5¼ 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.

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, 8¼ 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.

McKinney Mfg. Co., Pittsburgh, Pa.

Forged Iron by McKinney. Booklet, 6 x 9 ins. Illustrated. Deals with an excellent line of builders' hardware.

Forged Lanterns by McKinney. Brochure, 6 x 9 ins. Illustrated. Describes a fine assortment of lanterns for various uses.

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, 6¾ x 9¼ 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.

REQUEST FOR CATALOGS

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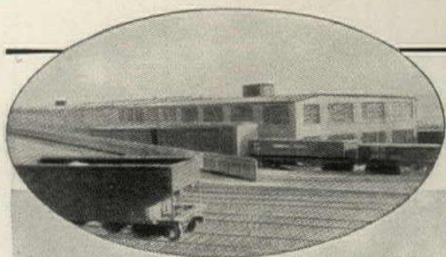
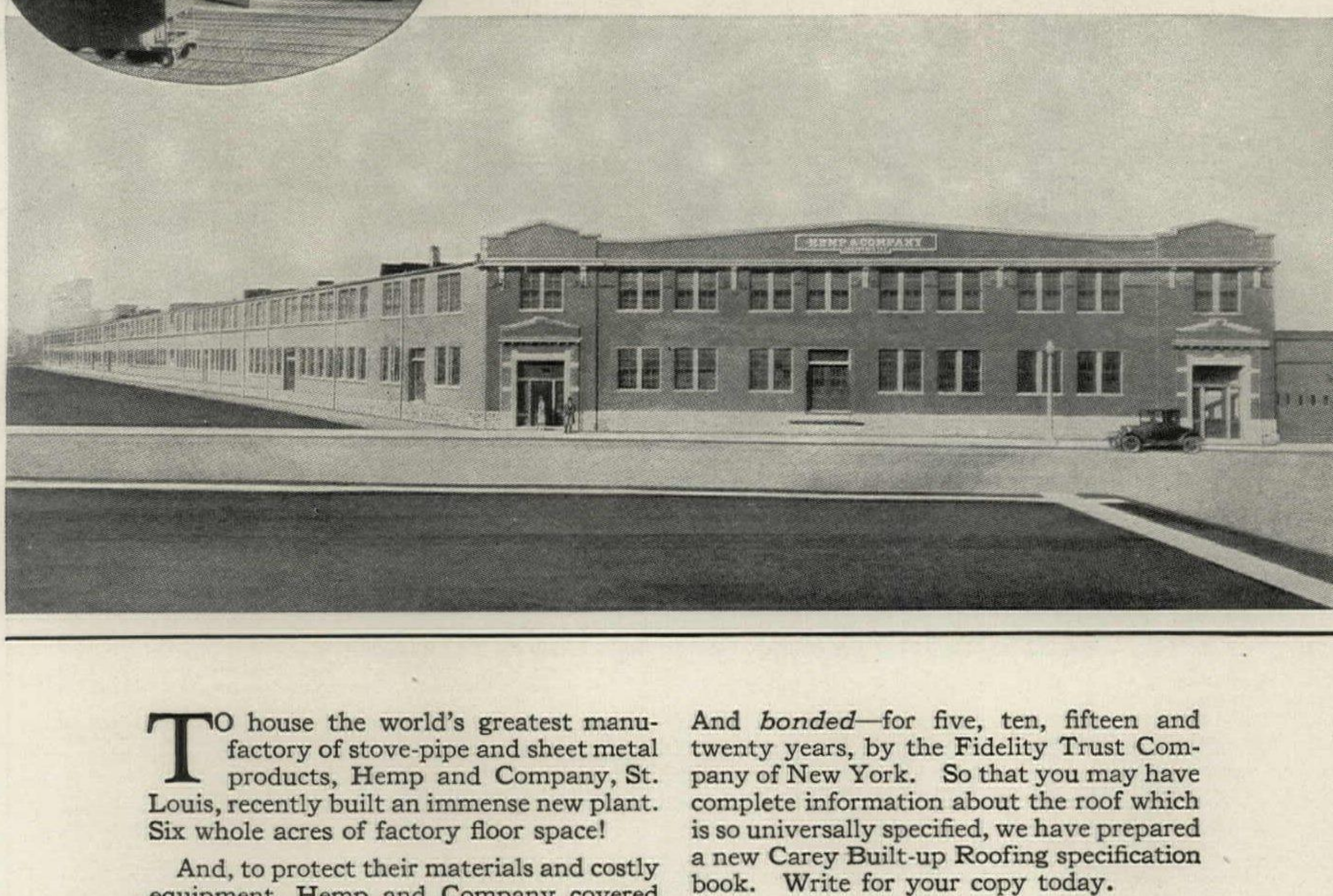
The largest plant of its kind in the world is CAREY BUILT-UP Roofed!



The huge, six-acre manufacturing plant of Hemp and Company, St. Louis, was given the dependable protection of more than one hundred thousand square feet of Carey Built-up Roofing.



TO house the world's greatest manufactory of stove-pipe and sheet metal products, Hemp and Company, St. Louis, recently built an immense new plant. Six whole acres of factory floor space!

And, to protect their materials and costly equipment, Hemp and Company covered this splendid plant with Carey Built-up Roofing. More than 100,000 square feet of perfect overhead protection!

Hundreds of industrial structures, in cities everywhere, are weather-protected by Carey Built-up Roofs. Roofs blended of selected materials, built up as Carey has learned to build, in half a hundred years. Sealed, resealed, and then sealed again. And *bonded*—for five, ten, fifteen and twenty years, by the Fidelity Trust Company of New York. So that you may have complete information about the roof which is so universally specified, we have prepared a new Carey Built-up Roofing specification book. Write for your copy today.

Carey
BUILT-UP ROOFS

"A ROOF FOR EVERY BUILDING"

THE PHILIP CAREY COMPANY, *Lockland,* CINCINNATI, OHIO

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 172*

HEATING EQUIPMENT—Continued

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 7¼ 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."

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.

HEATING EQUIPMENT—Continued

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 11¾ 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.

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Dallas Architect

Insulates with Two Inches of Corkboard for Year Round Comfort . . .

WHEN Mr. H. B. Thompson, architect, Dallas, Texas, planned his own home, he determined to build a house that could be kept comfortable winter and summer by providing *ample* protection against an outside temperature range of 90 degrees. He used two inches of Armstrong's Corkboard Insulation on the walls and second floor ceiling with such excellent results that, a year later, he made the following report:

"After investigating thoroughly the various insulating materials on the market, I decided to use cork for the insulation of my residence. I have been highly pleased with the results obtained in the wide range of temperature, from ten to one hundred degrees above zero. During the hottest weather, the house was at all times cool and comfortable, and the upstairs rooms practically as cool as the downstairs rooms.

"A comparison of fuel bills with houses of the same cubical contents shows a saving of from forty to fifty per cent in fuel bills, which has convinced me that while the initial cost may be higher, the saving in fuel alone will more than pay for the difference in cost, to say nothing of the added comfort."

Armstrong's Corkboard Insulation on the second floor of Mr. H. B. Thompson's residence at Dallas, Texas. The plaster is being applied directly on the cork, without lath.

The full value of insulation, from both the comfort and the investment standpoints, is realized only when *ample thickness* is used. Two inches of Armstrong's Corkboard for the roof and at least one and a half inches for the walls is the most economical insulation in returns per dollar of cost. Armstrong Cork & Insulation Company, 900 Concord Street, Lancaster, Pa.; McGill Bldg., Montreal; 11 Brant St., Toronto, 2.

Armstrong's Corkboard Insulation

A Heatproof Lining for Walls and Roof

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 174*

Continued from page 174

INCINERATORS—Continued

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 11¾ 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.

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.

LATH, METAL AND REINFORCING—Continued

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 7⅜ 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 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.

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What Would Washington Say?

An almost commonplace speculation, yes! In the 153 years of American Independence, celebrated this month, such a question has occurred countless times. But, in fact, just what *would* Washington say?

Suppose he should behold our disks that sing, our radio that whirls the human voice around the earth, our aircraft that have conquered the skies and our talking moving pictures—to say nothing of our automobiles, rushing railway trains, vast industrial plants, towering buildings, giant steamships, our telegraph, telephone and electric lights, and electric refrigeration?

Here is the answer—He would say, "MARVELOUS"—and in two days he would cease to marvel. It would then be an "old story" to him, *just as it is to all of us, now wondering what science will next bring forth.*

ALSO AN "OLD STORY"

Like the more spectacular discoveries of science the *Sylphon Bellows* is also an "old story." For twenty years its contribution to industrial progress and human comfort while, not so dramatic has been none the less, *basic and essential.* It is the World's most durable, flexible and sensitive expansion member and is employed as the motor element of hundreds of thousands of thermostats in the most highly recognized radiator traps, refrigerating machines, automobiles, industrial and building temperature regulators.

As a damper regulator it is factory equipment on the principal heating boilers; as a sealing diaphragm in packless valves in thousands of representative buildings; as a diaphragm in packless fuel pumps; in pressure governors and many other important diaphragm applications. During the war it operated the firing mechanism of deep-sea mines, the governing mechanism of torpedoes and was invaluable to the airplane.

It is constantly finding new fields of usefulness.

The original and genuine Sylphon Bellows is used only in Temperature and Pressure Regulators manufactured by the Fulton Sylphon Company. Our plant is the largest in the world devoted exclusively to the manufacture of thermostatic instruments.

We invite those interested to write for fully descriptive bulletins and to submit (without obligation) problems involving Sylphon Temperature or Pressure Regulation. Address Department A

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 176*

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.
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.

ORNAMENTAL PLASTER—Continued

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.
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.

PAPER

A. P. W. Paper Co., Albany, N. Y.
Here's a Towel Built for Its Job. Folder, 8 pp., 4 x 9 ins. Deals with "Onliwon" paper towels.

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, 8¾ 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.

REQUEST FOR CATALOGS

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This Public Toilet Seat

DEFIES

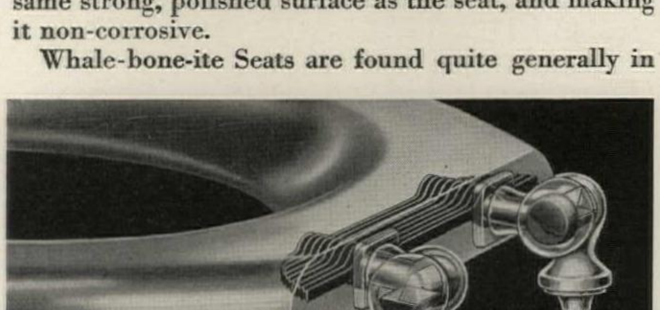
slam-bang abuse

Careless, constant, unrelenting abuse is the only treatment a public toilet seat can expect. From the looks of some, you would think the public went armed with axes and sledge hammers. The only way to defy such treatment is to install seats that simply cannot be smashed.

Whale-bone-ite is such a seat. Though it costs no more than the cheapest composition closet seat made, its unbreakable construction—guaranteed for the life of the building—immediately ends all replacement expense.

Its handsome polished Whale-bone-ite surface will last a life-time. It is easy to clean and non-inflammable. Its hinge also is covered with Whale-bone-ite, giving it the same strong, polished surface as the seat, and making it non-corrosive.

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.



THE WHALE-BONE-ITE Seat and Hinge form an unbreakable unit. The seat is molded around a laminated core of alternating-grain layers of hardwood, making it proof against warping, cracking and splitting. The die-cast hinge is molded integral with the seat.

Send for free cross-section —see its strength yourself

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-5, Seat Division, The Brunswick-Balke-Collender Co., 623 South Wabash Avenue, Chicago.

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Chattanooga	Des Moines	Los Angeles	New Orleans	San Francisco	Ottawa
		Toronto		Havana	

BRUNSWICK

WHALE-BONE-ITE

TOILET SEATS

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

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 deareating 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.
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.

Weil Pump Co., 215 W. Superior St., Chicago, Ill.
Pumps. Booklet, 8½ x 11 ins. Illustrated. Individual bulletins with specifications on sewage ejectors, and bilge, house, condensation, booster and boiler feed pumps.

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 11¾ 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.

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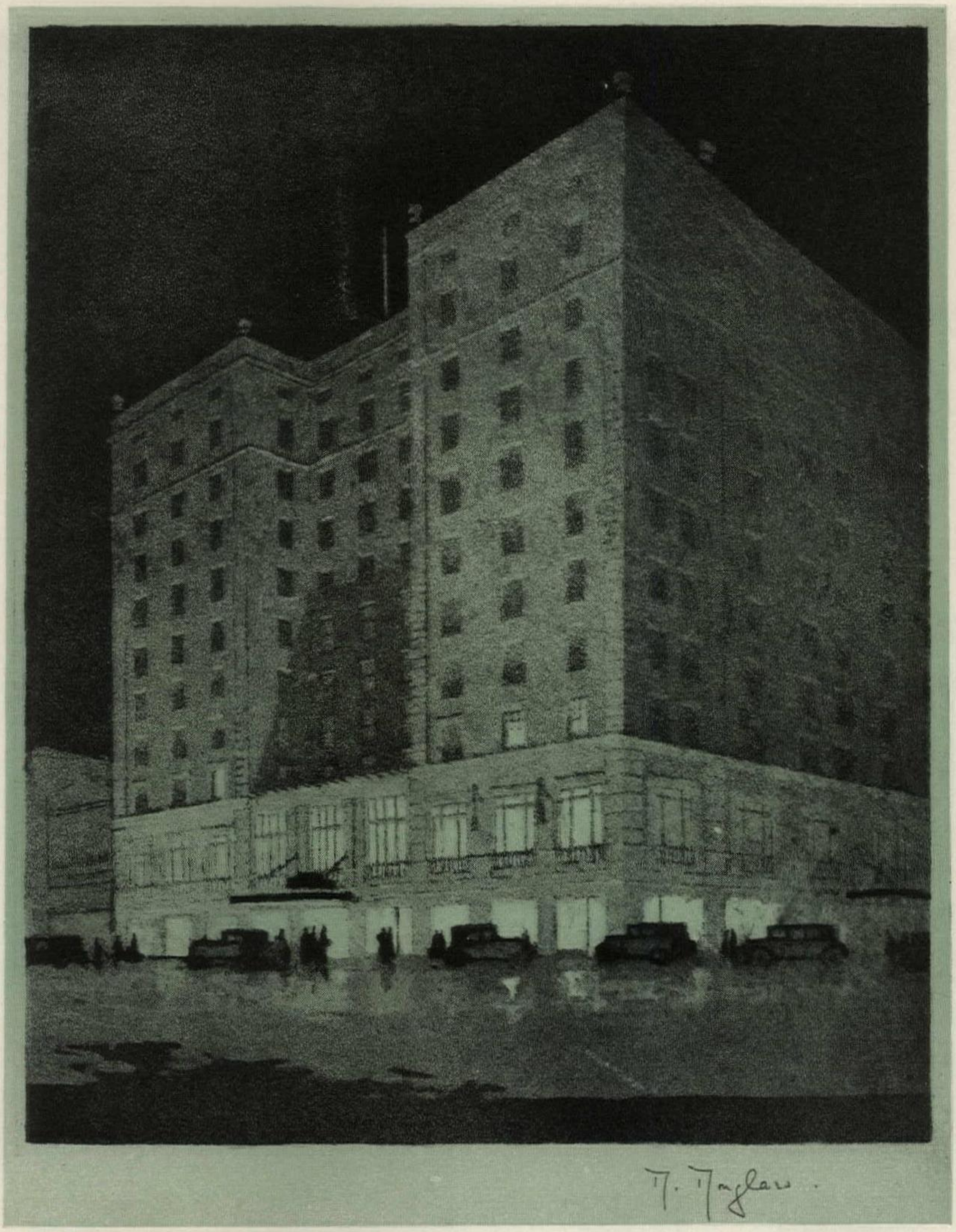

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 180*

ROOFING—Continued

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 10¼ 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.

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, 11⅛ 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.

STONE, BUILDING—Continued

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.

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, 9⅜ x 12¾ 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.

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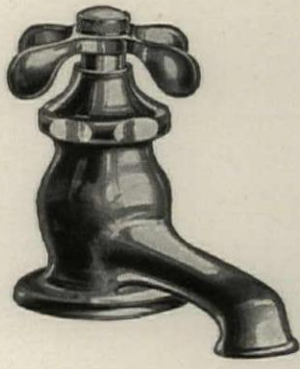

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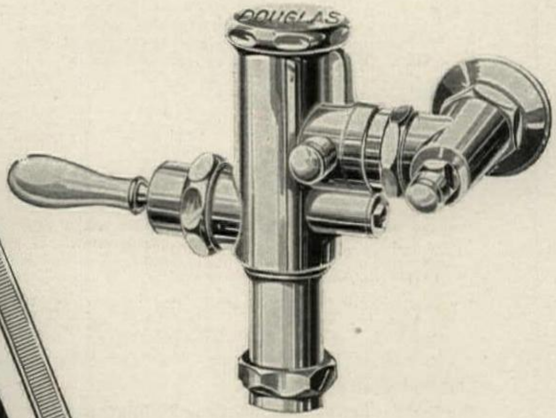

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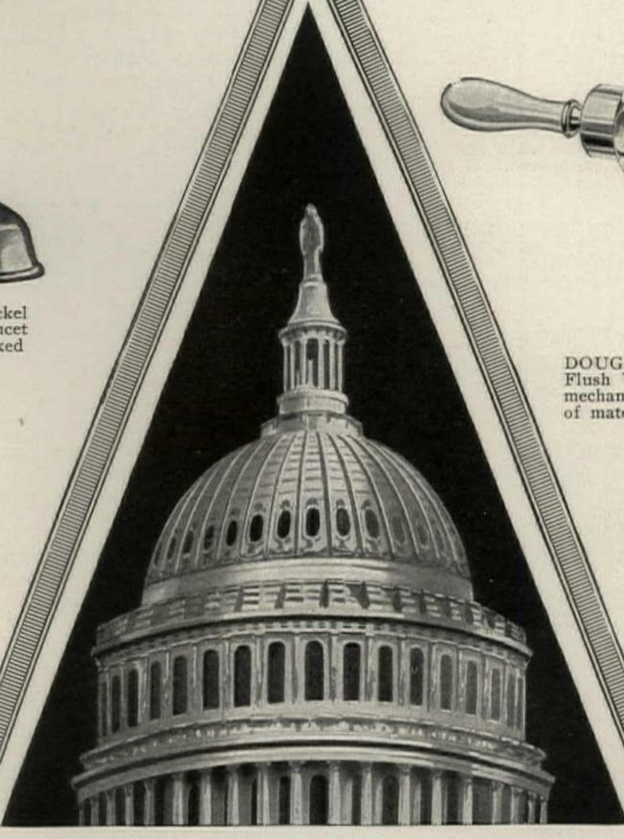

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 182*

TILES—Continued

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 12¾ 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 Bros., 80 White St., New York, N. Y.
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.

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

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

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.

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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.
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Richards-Wilcox Mfg. Co., Aurora, Ill.
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Window Shade Data Book. Folder, 28 pp., 8½ x 11 ins. Illustrated.

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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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National Lumber Mfrs. Assn., Washington, D. C.
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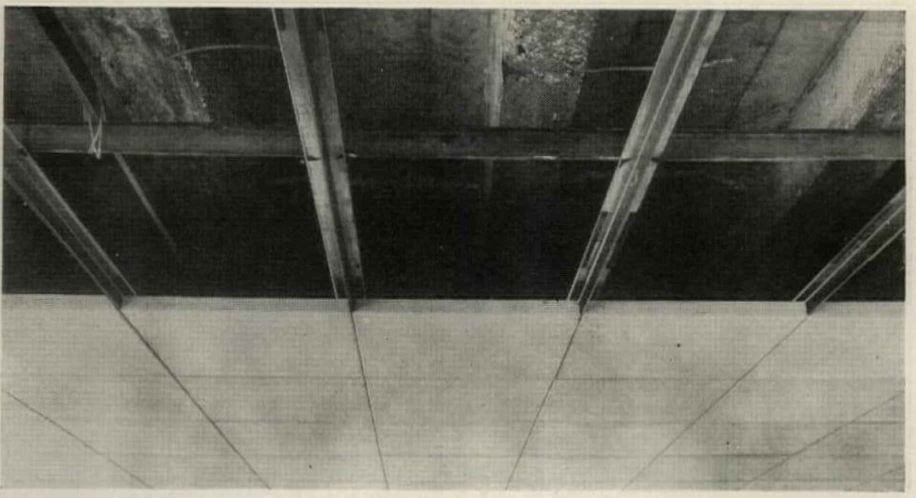

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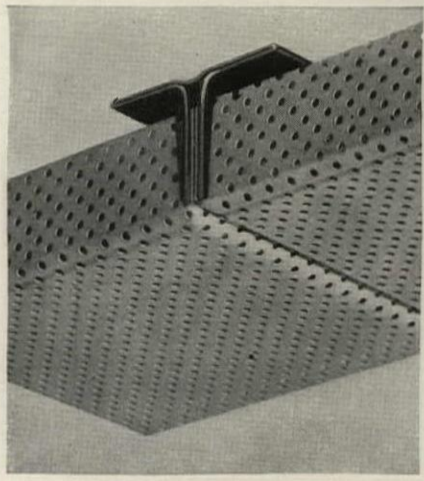

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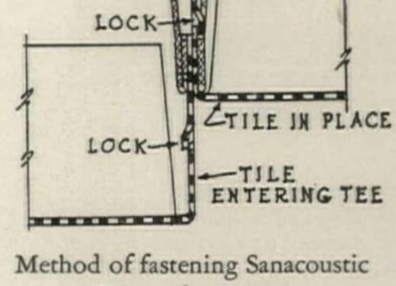

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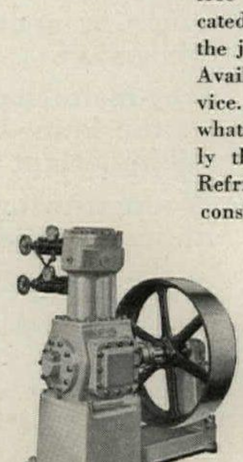

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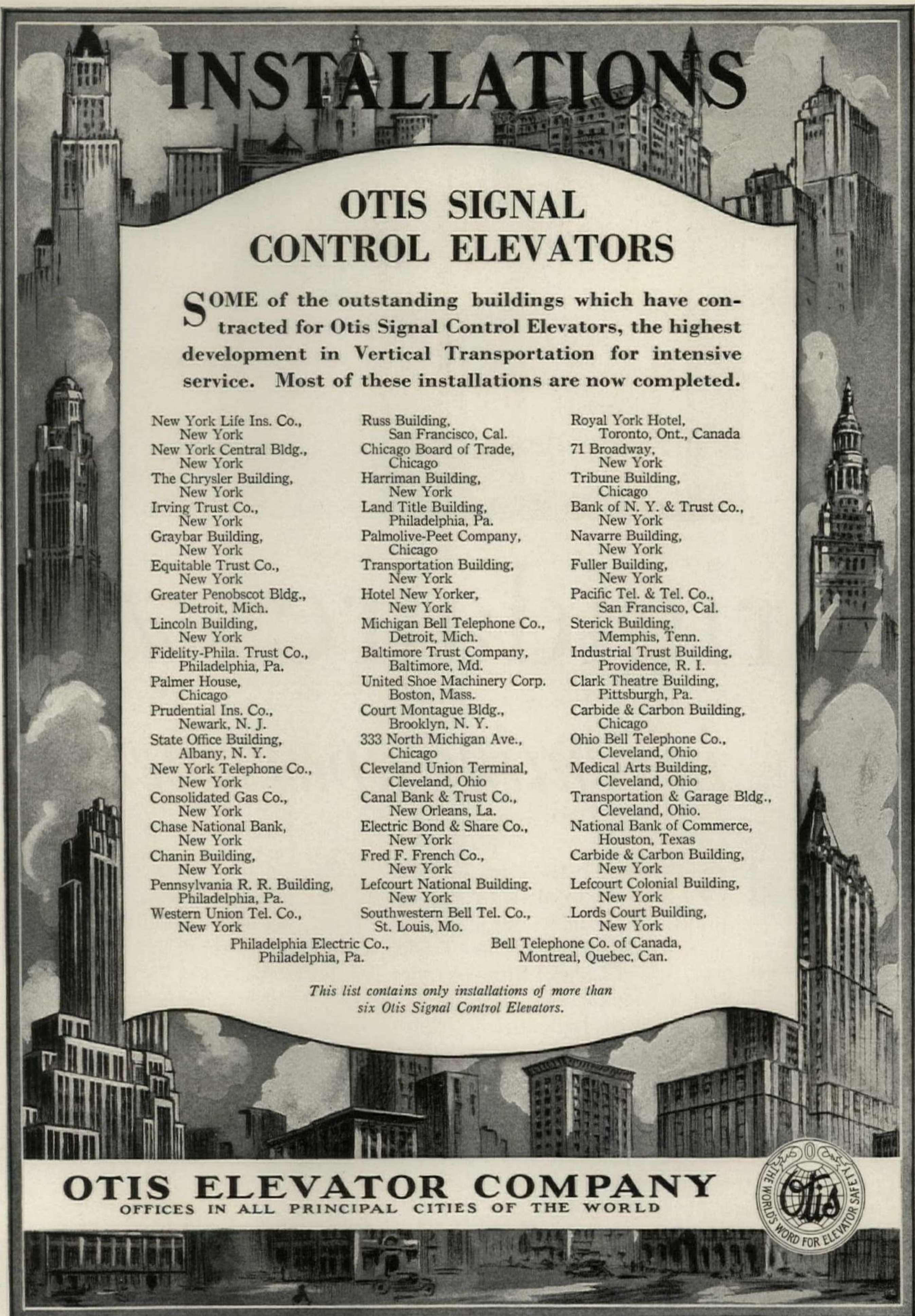
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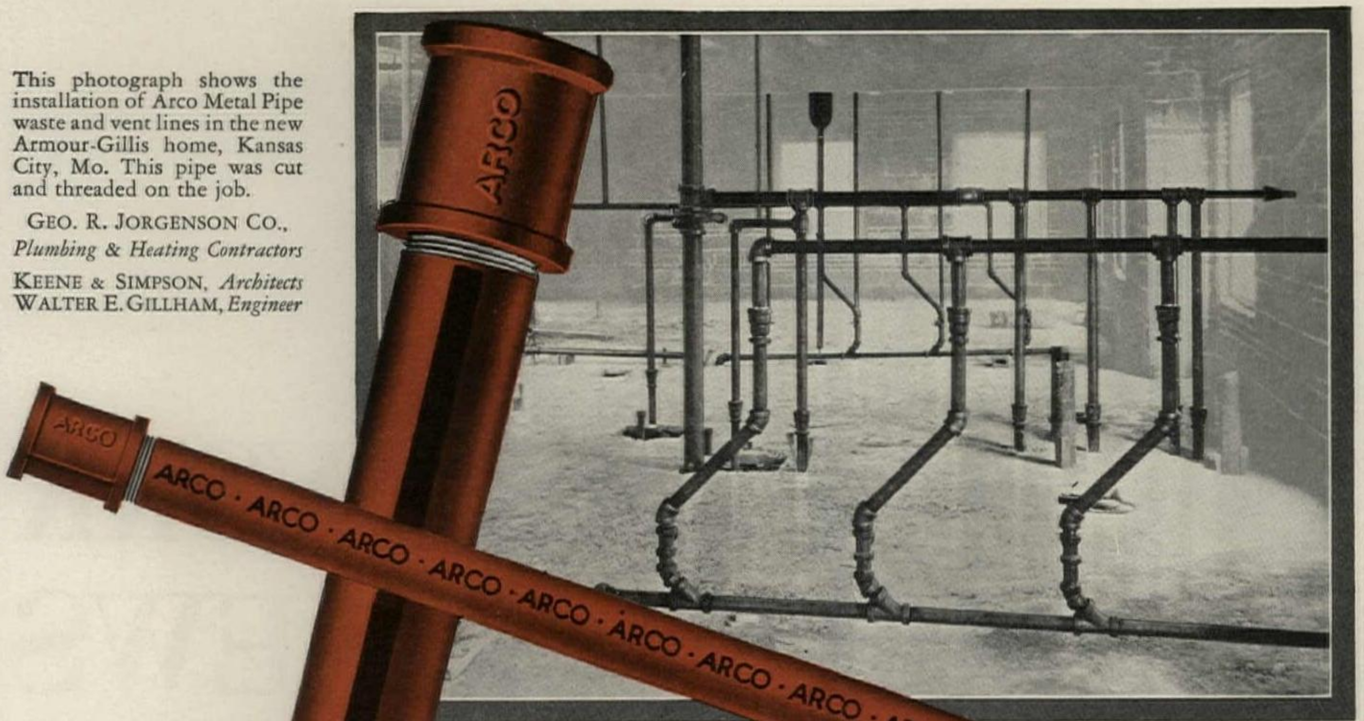

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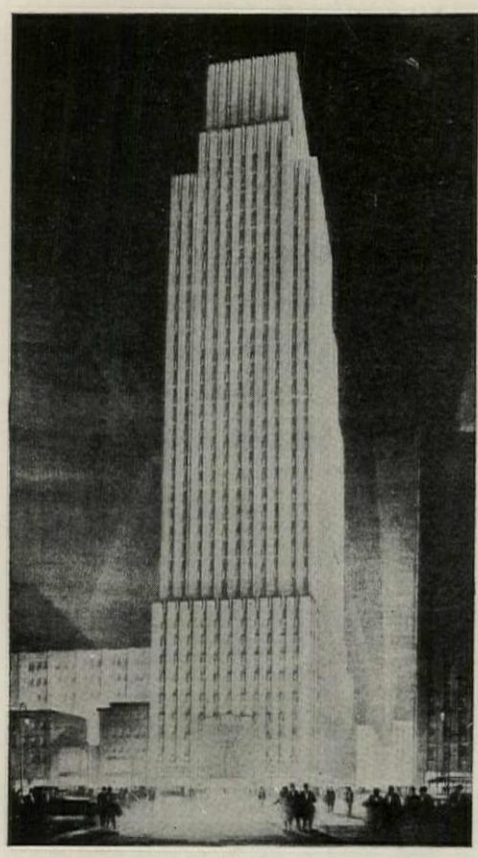

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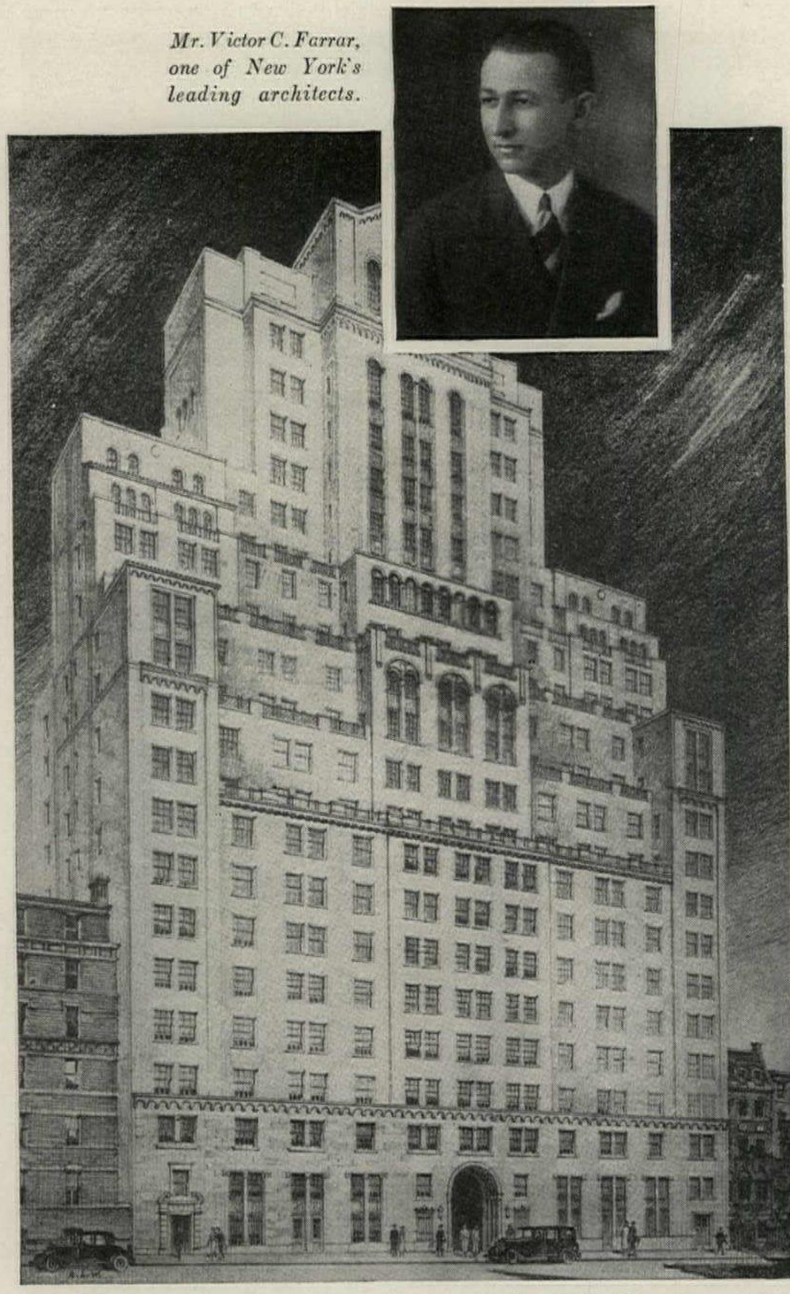

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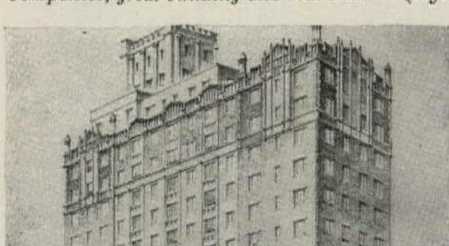
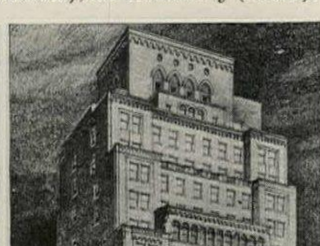
Mr. Victor C. Farrar, whose opinion of Electrolux appears on this page, is a member of the firm of Farrar and Watmough, architects for The Henry Mandel Companies, great building and real estate firm of New York City. Three of their immense apartment houses that contain the Gas Refrigerator are shown here: the Brittany (left below), the Tuscany (right below), the Lombardy (above).





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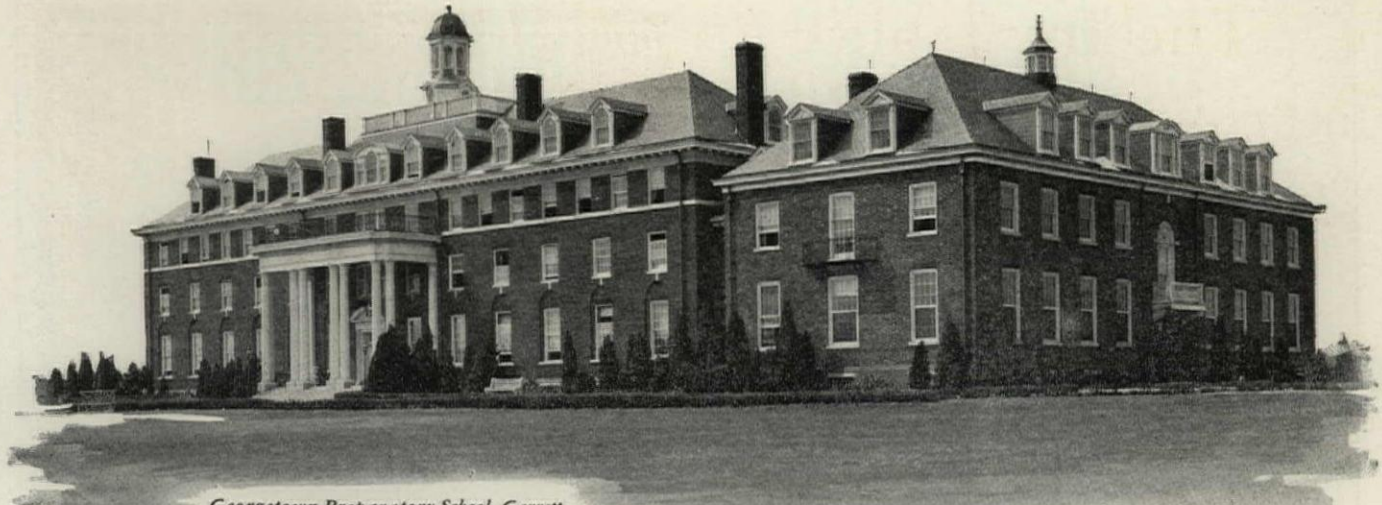

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Is there really a problem in selecting oil burners?

Last year 100,000 new oil burners were installed. Those selected on the basis of manufacturer and dealer responsibility are proving their worth with the regularity of the automobile.

In selecting any product, you check the standing of the maker, the reliability of the representative. The same tests assure oil burner satisfaction. Why, then, is there any problem?

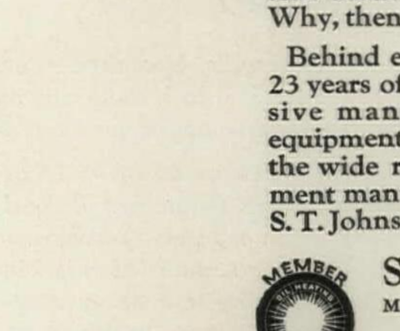
Behind every Johnson burner lies 23 years of experience in the exclusive manufacture of oil burner equipment. This experience, plus the wide range of oil burner equipment manufactured, means that the S. T. Johnson Co. has solved and can solve your every heating and power problem.

Scores of thousands of Johnson Burners are supplying owners from Maine to California with dependable, economical, convenient heat.

An Engineering Service is maintained for you, for heating and ventilating specialists, for anyone with heating problems. The accumulated data of a score of years is available.

S. T. JOHNSON CO.

MAIN OFFICE AND FACTORY, 729 ARLINGTON AVE., OAKLAND, CALIF.
FACTORY BRANCHES
SAN FRANCISCO, SACRAMENTO, STOCKTON, PHILADELPHIA
YOU WILL FIND OUR LOCAL REPRESENTATIVE'S ADDRESS IN YOUR TELEPHONE DIRECTORY



JOHNSON OIL BURNERS

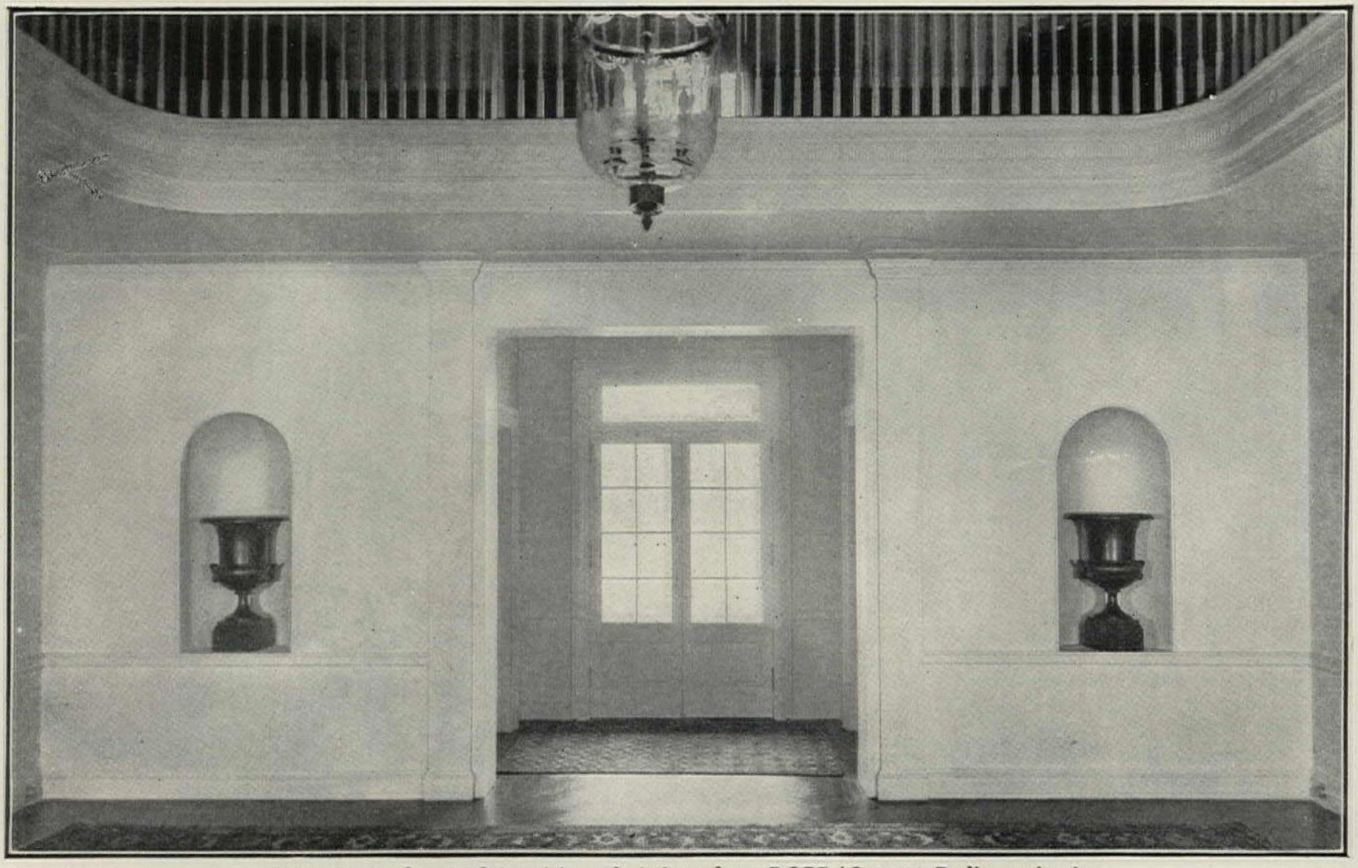
Oil Burner Equipment for Every Heating and Power Purpose

Approved

Johnson Rotary Burners are approved by the New York Board of Standards, the Underwriters Laboratory, and by fire prevention bureaus everywhere.

Johnson Rotary Burners, with either manual or automatic control, are made in three styles and five sizes — giving a range of from 250 to 27,800 square feet of steam radiation or the equivalent.

We also manufacture low pressure oil burners and pumping equipment. Steam atomizing, natural draft, and whirlwind burners, crude oil pumps, also electric or steam driven oil pumping and preheating equipment.



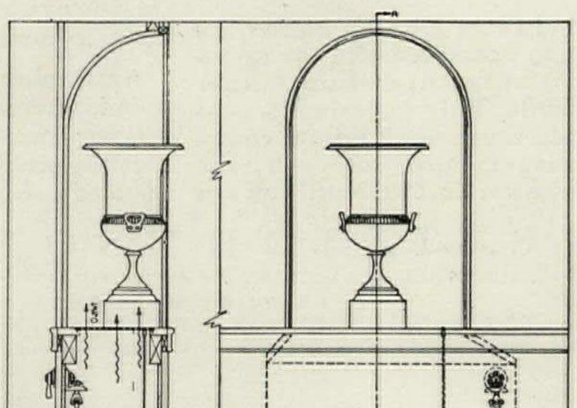
Grilles in the floors of the niches admit heat from ROBRAS 20-20 Radiators in the house of C. H. Mathiessen, Jr., Center Island, L. I. James Cameron Mackenzie, *Architect*

Heated by Hidden ROBRAS 20-20 Radiators

In the Wall—Out of Sight—Out of the Way

THE designer of this attractive entrance hall showed no little ingenuity when he put ROBRAS 20-20 Radiators behind the walls in the manner shown. They are out of sight, and out of the way. To permit the passage of heated air from the radiators into the hall, he had grilles installed in the floors of each of the niches. When it is desired to get the full effectiveness from the ROBRAS 20-20 Radiators, the urns can easily be removed to give a more free opening for the passage of the heated air.

The cold air finds its way to each radiator through the floor openings on the reverse side of the walls. Here there is, on one hand, a cloak room, and on the other a room for preparing flowers.



Method of installation showing inlet opening from the reverse wall.

Because ROBRAS 20-20's are only 20% the size of equal cast iron radiators, a comparatively large amount of this kind of radiation can be installed in a small space. ROBRAS 20-20's can be used in the walls where a recess only the depth of standard studding is necessary. They can be used under staircases where grilled outlets can be made in the risers. These radiators, when installed, give added beauty to the design of the room. They cost but little more than cast iron radiators with enclosures.

ROME BRASS RADIATOR
CORPORATION
ONE EAST FORTY-SECOND STREET , NEW YORK CITY

Part of a group of 3-apartment buildings erected around Dante and 89th Streets, Chicago, by John R. O'Connor. All are heated with McQuay Cabinet Radiators.

A Selling and Renting Asset in any Building

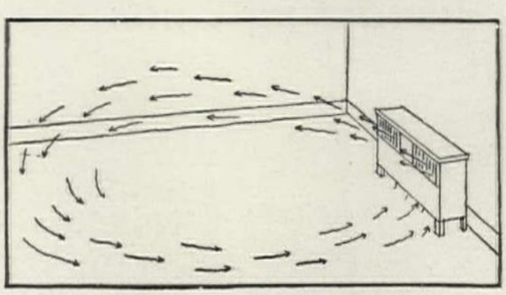
When asked why he selected McQuay Radiators to heat this group of buildings Mr. O'Connor—one of Chicago's foremost developers and builders—replied: **"Because my experience has shown that this radiator is one of the best assets a building can have. The small additional cost means nothing. Every one who sees these radiators, wants them. And this means quicker selling and renting."**

A Complete Radiator

McQUAY Cabinet RADIATOR

Not Just a Cover

The McQuay takes air from near the floor, heats it and then sends it into the room, in a horizontal direction, with sufficient velocity to get it to the farthest points.



Here, at last, is a radiator which adds, rather than detracts from the appearance of rooms. A complete radiator, enclosed in an attractive cabinet of heavy furniture steel which can be painted or enamelled to harmonize with the decorative treatment.

The heating unit of copper has proved extremely efficient. This plus the more complete circulation afforded by McQuay lowers heating costs noticeably.

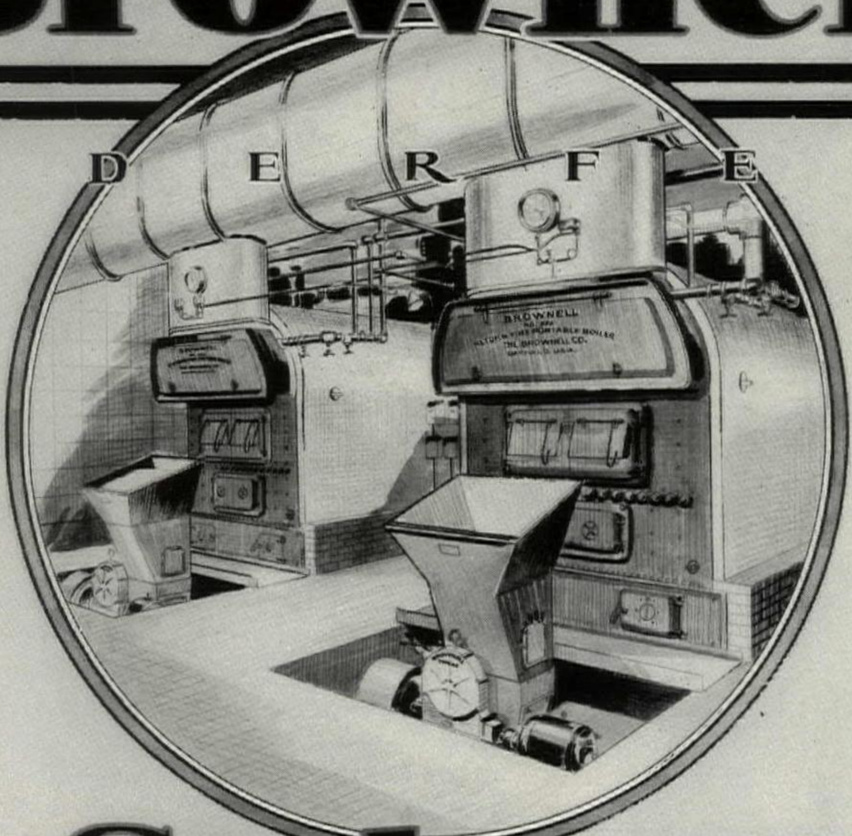
McQuay Radiators and Unit Heaters are Sold only thru recognized Heating Contractors.

McQUAY RADIATOR CORPORATION General Sales Office: 35 E. Wacker Drive, Chicago

Boston: 10 High Street
Cleveland: 291 E. 149th Street
New York: 2148 Graybar Building
Newark, N. J.: J. F. McLaughlin Co., 738 Broad Street
Pittsburgh: Bushnell Machinery Co., Century Building

Brownell

UNDERFEED



Stokers

Pay For Themselves Out of the Savings

Why buy good coal only to waste it on hand-firing, or install a high grade boiler only to throttle its efficiency with a coal shovel?

Underfeed firing is the modern, money-saving way and it is the Brownell way.

Brownell Underfeed Stokers may be installed under old or new boilers of any type or capacity. Plants so equipped burn the cheapest of coal, slack, screenings, or buckwheat, saving money on price. They require less of that cheap coal to maintain the pressure; also save on tonnage. In addition, they materially reduce boiler room labor—another economy.

Brownell Underfeed Stokers operate on the forced underfeed principle whereby the proper mixture of coal and air is constantly and automatically fed, thereby obtaining a uniform temperature, or boiler pressure, as well as effecting the economies on fuel and labor just referred to. They also eliminate smoke and enable the owner to observe his local smoke ordinance.

The Brownell line is complete—contains the particular type and size stoker individual requirements demand. Write for Bulletin S-50.

The Brownell Company

Established 74 years ago **Dayton, Ohio** *Offices almost everywhere*

BROWNELL

BOILERS STOKERS

When You Are In Chicago

We will be delighted to have you call at our new offices

75 East Wacker Drive

MATHER TOWER BUILDING

THE ARCHITECTURAL FORUM is pleased to announce that its mid-western staff is now located in new offices in the Mather Tower Building, 75 East Wacker Drive, Chicago, Ill. Together with the staffs of the other fifteen publications which make up NATIONAL TRADE JOURNALS, INC., they are now occupying the entire sixth floor of this beautiful new structure. With all modern facilities now available to make for prompt and efficient service, the members of THE ARCHITECTURAL FORUM staff extend a cordial invitation to all their friends to call.

If visitors wish to make our offices their business headquarters while in Chicago, they will be furnished a private office for conferences and with stenographic, telegraphic and mail service to suit their requirements. Delivery of telegrams and mail will receive most careful attention.

As now organized, there are four groups, and a nucleus for a fifth, making up NATIONAL TRADE JOURNALS, INC., each group having their respective staff in these offices. These groups are: National Building Publications; National Food Products Publications; National Diesel Publications; National Sports Publications; and a National Textile Publication. Specialty Salesman Magazine is also a property of NATIONAL TRADE JOURNALS, INC.

The magazines of NATIONAL BUILDING PUBLICATIONS are: THE ARCHITECTURAL FORUM, BUILDING AGE, HOME BUILDERS' CATALOG, GOOD FURNITURE MAGAZINE, THE HEATING & VENTILATING MAGAZINE.

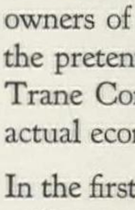
Mather Tower Building is conveniently located for business visitors to Chicago. THE ARCHITECTURAL FORUM staff will welcome the opportunity to serve you when you are in Chicago.

The new science in heating . . .
which embodies beauty and economy

Wherever good taste and common sense prevail, there is instant acceptance of Trane Concealed Heating. Interiors can be planned to meet the exact requirements of a particular style or period without the embarrassment of clumsy radiators to mar the harmony of the completed room. Trane Concealed Heating offers economies that appeal to owners of moderately expensive homes as well as the pretentious ones. It must be remembered that Trane Concealed Heating is not a luxury but an actual economy.

In the first place, the cost is no greater than that of ordinary cast iron radiation equipped with metal covers. Heating is more efficient because of the scientific distribution of warm air in the rooms—installation is simpler due to the extreme light weight of the units which are completely assembled at the factory — there are no extras. Accessibility is provided through an opening at the floor permitting removal of unit without disturbing the wall.

In addition to the Concealed Heaters, Trane makes everything necessary for a complete system (with the exception of the boiler and piping) including Trane Specialties such as the Bellows Valves and Traps. The valves are positively sealed by the bellows against leakage; no packing is necessary. A complete Trane System is guaranteed to give utmost heating satisfaction. Our new booklet describes the specialties as well as the Trane Vapor Heating System. Mail the coupon.



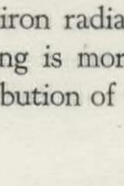
The Trane Bellows Packless Valve.

HEAT CABINETS **TRANE** CONCEALED HEATERS

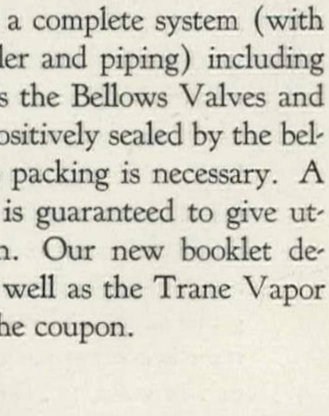
PUMPS, UNIT HEATERS, AND HEATING SPECIALTIES

THE TRANE CO., Dept. 7.
220 Cameron Ave., La Crosse, Wis.
Send free booklet on the new style in heating.

Name ____________ Position ____________
Address ____________
City ____________ State ____________



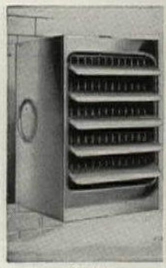
The Trane Bellows Trap



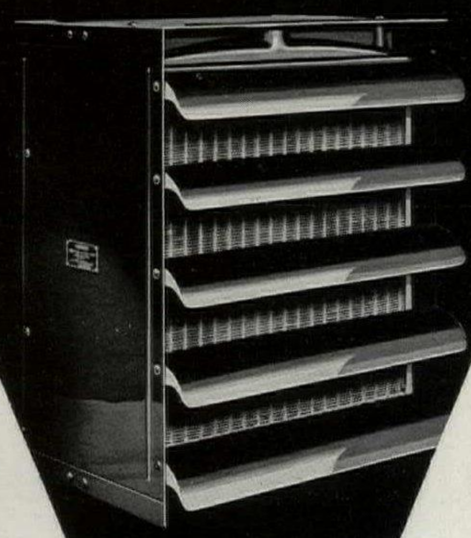
PROVED

and Now Improved

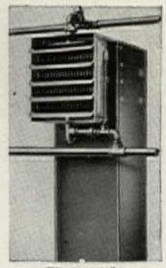
HEAT WITH UNIT HEATERS



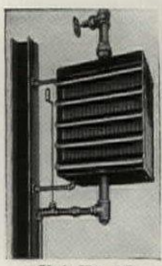
Units
No. 20 and 25



Units 30 and 35 (Industrial) for installations shown



Unit with
recirculating box

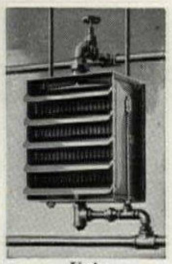


Unit No. 35
suspended on
column

VENTURAFIN

TRADE MARK REGISTERED

METHOD OF UNIT HEATING



Unit
suspended
from ceiling

For Factories, Garages, Stores and many other applications

ALL THE advantages and economies of the original Venturafin Units that have saved industry thousands of dollars in maintenance and heating costs have been retained in this new and improved series of units.

Ease of control . . . ability to heat up quickly . . . *forced heat* principle . . . scientifically designed heating element with air-foil shaped tubes and extended surfaces . . . the fact that Venturafin Units force heated air in any direction, or in several directions simultaneously . . . are sound engineering advantages that warrant the installation of the Venturafin Method of Heating.

How well Venturafin has fulfilled its purpose in the past is evidenced by thousands of satisfactory installations. Once you see these units and *know* more facts about them, you will be convinced of their superiority of performance and construction and their wide adaptability. They can be easily and economically installed in any building without sacrificing valuable floor space.

Call in your heating specialist and let him go over your plant. He will quote you prices and tell you facts you wish to know about the Venturafin Method of Heating.

If you prefer, phone the nearest American Blower Branch Office, or mail the attached coupon for our new, beautifully illustrated 24-page book. It is free.

COUPON

Please send me your 24-page Venturafin Book.

Name ________________

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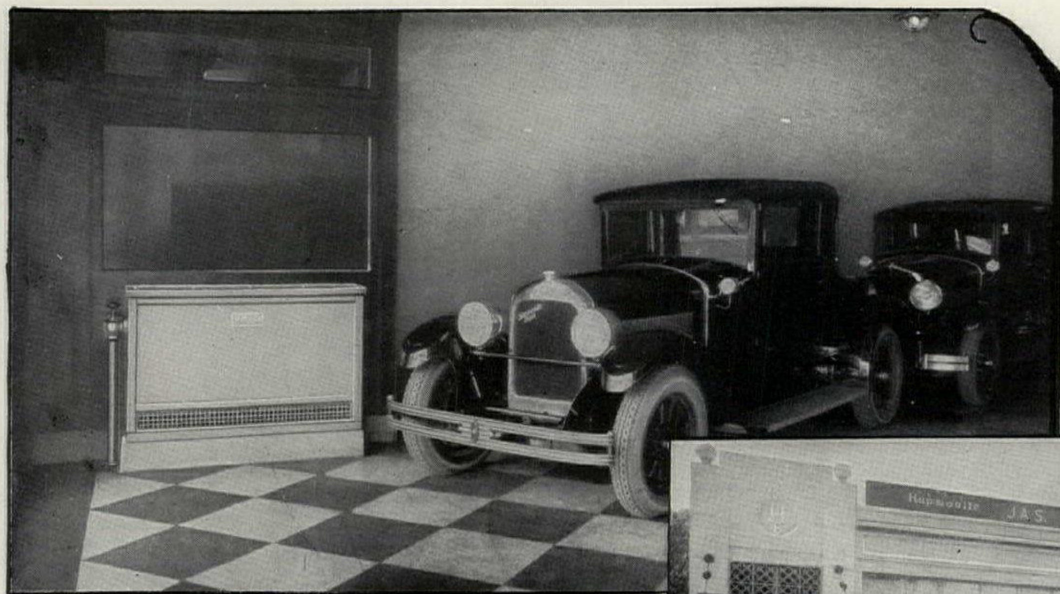
AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO
BRANCH OFFICES IN ALL PRINCIPAL CITIES

(879)

American Blower

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



James J. Williams, Hupmobile Motor Sales, Rochester, N. Y. Architect and Engineer: S. Firestone, Rochester, N. Y. Heating and Ventilating Contractors: Bareham & Mc Farland, Rochester, N. Y.

Here's a quiet, comfortable salesroom

MAKING the prospective buyer comfortable is one of the fine points of salesmanship. That's why salesrooms, nowadays, are so comfortably furnished, heated, and ventilated.

In the salesroom of James J. Williams, Hupmobile agent in Rochester, four Sturtevant Unit Heater-Ventilators are giving the kind of service that only Unit Heater-Ventilators can give. Heating by recirculation, they quickly warm up the salesroom after it has been left unheated overnight or over the week-end. Not only do they heat much more rapidly than cast-iron, direct radiators . . . they give ten times more heat!

Primarily, however, Sturtevant Unit Heater-Ventilators are used to furnish controlled, draft-free, outdoor air, filtered clean and tempered to any degree desired. They are SILENT in operation, compact, good-looking.

Sturtevant Unit Heater-Ventilators provide the architect and engineer with an adaptable heating and ventilating system that will fit almost every building and almost every special requirement. No costly duct work is necessary. Why not get the facts? Our new Data Catalog contains much information of interest and value to you . . . we will be glad to send you a copy.

40 pages of helpful data for the architect and engineer, including full information on Sturtevant Unit Heater-Ventilators, and showing typical installations. A copy will be sent for the asking.

B. F. STURTEVANT COMPANY

Plants and Offices at: Berkeley, Cal., Camden, N. J., Framingham, Mass., Galt, Ontario., Hyde Park, Mass., Sturtevant, Wis. *Canadian Representative*: Kipp Kelly, Ltd., Winnipeg, *also Branches in Principal Cities and Agents in Foreign Countri.s.*

Sturtevant

REG. U.S. PAT. OFF.

The Silent Unit Heater-Ventilator

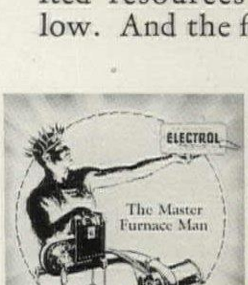
"We never dreamed we could afford it"

MANY builders have denied themselves the comfort of Electrol automatic oil heat because of the mistaken idea that Electrol was beyond their means. And some architects have hesitated to specify Electrol because they thought that it was not within the client's budget.

The enviable service record for which Electrol is so well known and the generous praise of Electrol users everywhere give the impression, naturally enough, that the outstanding quality of this finer oil burner is high priced. Such is not the case—as any owner and hundreds of architects will tell you.

The greater fuel efficiency and longer trouble-free service of Electrol automatic oil heat have established it as an outstanding oil burner value. Users everywhere agree that Electrol pays for itself in fuel economy, cleanliness, and in its labor-saving convenience.

Every Electrol installation is made to conform to the exact requirements of the building to be heated. Consequently, the price varies slightly, due to variations in the size of the tank and other minor factors. In any case, home builders of limited resources find the price surprisingly low. And the first cost is final—no extras come later.



You will find the Electrol dealer competent to assist you in outlining specifications. He will work with you conscientiously to determine the accurate estimate of Electrol's cost on any given job.

Let us send you the regulation Electrol A. I. A. Folder for permanent filing.

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

ELECTROL

The* OIL BURNER *with the Master Control

LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES

REVIEWS OF MANUFACTURERS' PUBLICATIONS

CURTIS BROTHERS & COMPANY, Clinton, Ia. Several brochures on trim. Admirable assortment of woodwork.

The growth of good taste in domestic architecture which has made steady progress during the last few years is naturally considerably quickened by the production, at costs quite moderate, of excellent wood trim for exterior as well as for interior use. As architects know, the designing of "stock" woodwork carried ready for delivery by many manufacturers has often left much to be desired; sometimes it has been largely if not completely lacking in architectural character, or else been so scaled that it could be appropriately used in only a few instances. The Curtis firm, for many years known for the excellent designing, scaling, and manufacture of its wood trim, is now issuing four booklets illustrating, describing and listing details of trim likely to interest the most careful architects and the most discriminating home owners: "Curtis Windows"; "Curtis Cabinet and Stair Work"; "Curtis Interior Doors"; "Curtis Entrances and Exterior Doors." Among the many excellent types of woodwork admirably presented in these brochures one might perhaps choose for special mention the beautifully designed fan-lights for use over important doors, several excellent mantels, and a number of hanging china cupboards and cupboards intended to be placed in corners. The brochures give the locations of a number of distributing centers where Curtis wood trim is to be had, and it gives as permanent display and sales offices the locations 9 East 41st Street, New York, and 1414 South Western Avenue, Chicago. The booklets are full of suggestions of importance to designers and specification men and also to home owners.

COPPER & BRASS RESEARCH ASSOCIATION, New York. "Ornamental Bronze in Banking Rooms."

The importance of metal in various forms and the dignity which its proper use may add to a bank's interior are brought directly to one's attention by this beautifully produced publication. The selection of photographs from which were made the 38 plates of the brochure was made by George S. Chappell, Frederic C. Hirons, and Julian Clarence Levi, the illustrations being interior views of distinguished banks in different parts of the country. Counter screens and grilles of many kinds, doors and gates, check desks, calendar cases, lighting fixtures and other accessories of bronze are shown, details designed in a wide variety of architectural styles and given all the different finishes which bronze can be made to take. "This book contains selected examples of bank interiors in which the architect has achieved noteworthy results through the use of ornamental bronze. As the plates indicate, bronze is adapted to the variety of architectural forms that occur in the banking room,—to the massive gate that conveys an impression of strength in its size and of beauty in its proportions and design; to the counter screen that not only symbolizes protection but gives it; to the railing gate that must withstand constant use, and to the check desk that is an indispensable element in an interior of this type. The distinction of the examples shown in these plates is attributable in some instances to the design and use of bronze itself and in others to the felicitous combination of this metal with other materials. Whether bronze is considered in its ornamental treatment alone or in its relation, so treated, to the interior as a whole, it is evident that the metal offers architects a highly flexible medium for creative effort. The architect of today is expected to produce effects of enduring beauty within a period of time that would have seemed incredibly short to the ancients. Ornamental bronze in case and extruded forms makes this possible as do few other materials. The book is a compendium of all that is best in American bank interiors today. The plates should be regarded as sign posts which indicate the trend of design and craftsmanship in the use of bronze for the ornamental treatment of banking rooms. The leading ornamental bronze firms were invited by the Copper & Brass Research Association to submit photographs of interior work executed for banks in recent years. More than 300 photographs were submitted, and the plates which have been included here represent the choice of a committee of architects." This well produced brochure should be received and studied by all architects who are interested in bank design.

THE BRYANT ELECTRIC COMPANY, Bridgeport, Conn. "Standard Wiring Symbols for Buildings."

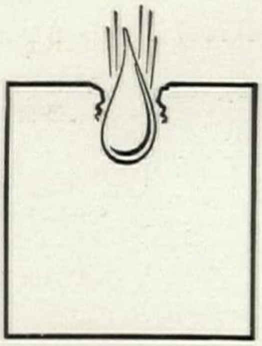
For the guidance of draftsmen and specification men, the Bryant Electric Company issues a folder giving the standard wiring symbols for buildings of any type. The company acknowledges the assistance, in the preparation of the folder, of the Association of Electragists in systemetizing what had become a rather complex use of many different symbols for indicating on floor plans or other drawings the exact sort of wiring which is desired for the various purposes for which electricity is now used. The folder is of course quite complete, illustrating all the symbols of one kind or another which could be required on a building of almost any type.

KNAPP BROS. MANUFACTURING CO., CHICAGO. "Architects' Hand Book on Metal Trim."

With the advance of use of fireproof construction, and particularly with growth of building on a vast scale, there has logically come about the extensive use of metal trim for interiors, useful not only because of its being fireproof, but also because of its strength, which gives long wear, and the low cost of its maintenance when once installed. There has also come about, on the part of manufacturers, a full realization of the fact that if metal trim was to be used to a very large extent it must be made to possess real architectural merit, and their realization of this fact has brought into the market an assortment of metal trim likely to please architects who are highly discriminating. This booklet, issued by one of the leading firms producing metal trim, gives complete data on its use and presents illustrations of buildings of almost every type in every part of the country where its metal trim has been used. "This handbook has been compiled to give service to the architect, engineer, owner, and builder. The products of the Company are classified according to their function, and the method of presentation is to give, first, the essential information concerning them, and second, to follow this by detailed drawings of the various products and to show practical structural drawings of their application and actual photographic illustrations of installations. The information given is not in specification form, but it contains all of the data necessary for specifications."

JOSAM MANUFACTURING CO., Michigan City, Ind. "Josam Graver Incinerators." Their increasing use.

Modern sanitation in the home naturally regards with complete disfavor the presence of the old fashion garbage can, and the use of incinerators, which has long been growing, has now become well nigh universal. The great utility of the incinerator for domestic use, the simplicity of its mechanism, and the ease with which it is operated are all suggested by this folder being issued by the Josam Manufacturing Co. "Truer words were never spoken than 'Cleanliness is next to Godliness.' Science and education have made it possible to combat disease (man's greatest enemy) by adopting sanitary measures to protect his health and insure his comfort. Prevention of disease is the cry of the age. Flies and disease germs breed in rubbish piles and garbage cans. In order to eliminate these sources of disease, The Josam Manufacturing Company offers a safe and sanitary device, namely the Josam Graver, Floor Fed, Gas Fired, Portable Garbage and Rubbish Incinerator. This unit is so designed that it can be installed in any residence, old or new, in a few hours. Its special design is such that the feed door is placed in the kitchen floor, while the incinerator is in the basement below. The operation is simple, safe, and sanitary. The doubly-safe charging door is conveniently arranged under the sink, or in any convenient location. By merely sliding the top door with the foot, the garbage or refuse is deposited in the tube. By a slight pressure of the foot on the floor button, the bottom door releases the garbage into the incinerator, and automatically comes back into place, tightly sealing the tube. The lower door is always closed, unless held open with a pressure of the foot. Normally, both doors are closed, making an absolutely tight seal. Besides the convenient location for feeding, sweeping directly into the Josam Graver Incinerator is a decided advantage. This forms a receptacle for floor accumulations."



HOFFMAN SPECIALTY COMPANY, Waterbury, Conn. "How to Lock Out Air, the Heat Thief."

Since the selection of a heating system depends in a large measure on the character of the building to be heated, on the types of fuel available, and on certain other conditions, the subject of heating deserves and generally receives careful consideration or study which is greatly aided by the excellent brochures, booklets and other publications which are issued by the manufacturers of heating apparatus. This valuable brochure deals with the subject of steam heating, using the vacuum system. In addition it contains valuable data of a somewhat miscellaneous order which are sure to be useful to architects, engineers, builders and home owners. On page 28, for example, the booklet gives the temperatures which under normal conditions prevail in most of the principal cities of the United States during the heating season, which is generally reckoned from October 1 to May 1.

AMERICAN ENCAUSTIC TILING COMPANY, LTD., 16 East 41st Street, New York. "Aetco Tiles in the Home."

These pages of THE ARCHITECTURAL FORUM, devoted as they are to bringing to the attention of architects the most interesting and valuable of the publications which are being issued by manufacturers, have made frequent mention of the booklets, brochures, and other publications which deal with decorative tiling. It has been a pleasure during many years to note the constantly improving standard of good taste which has marked the production of tile, and the expanding sphere of their use. This particular booklet emphasizes just this, for in addition to illustrating a great variety of tile which are decorative in the highest degree, it shows excellent uses of tile for bathrooms, kitchens, pantries, the facings of fireplaces and chimney breasts, and also for walls, wainscots and floors for such places as conservatories, greenhouses, etc. And there are illustrated in this booklet wall fountains and fountains apart from walls; panels set into walls, particularly the walls of loggias, of stairways, where tile are particularly decorative; and one especially interesting illustration shows a grille or screen which conceals a radiator, the grille being of a beautiful design and color and having all the open work or reticulation required.

EDWARDS & COMPANY, INC., 140th and Exterior Streets, New York. "Modern Hospital Signaling."

Unless an architect or specification writer has become experienced in the planning, designing and equipment of hospitals, he might reasonably be unfamiliar with the development to which signaling systems for hospitals have been brought. This has been suggested by examination of the booklet which describes and illustrates the devices for this purpose which are manufactured by this firm, a variety which is astonishing. The introduction to the booklet says: "Because every hospital has characteristics peculiar unto itself, arrangement of equipment which may fill requirements in one, may fall far short in another. For this reason this bulletin lists and describes hospital equipment in unit form. It describes all the component parts which may go to make up any desired system. This leaves the selection, makeup and arrangement to the hospital authorities, the architect, or the engineers. Our engineering department, with years of signaling experience behind it, is always at the service of those wishing advice or suggestions concerning selection of units, arrangement, or wiring diagrams best suited to any particular condition. As a further aid to visualizing any particular type of system, there are incorporated, in this bulletin, in addition to unit listings, what may be called 'model systems.' They are offered as suggestions, along with exemplary wiring diagrams and wiring data. Systems comprising complete equipment embrace: Nurses' Call; Doctors' Paging; Doctors' 'In' and 'Out'; Maids' or Nurses' Location; Door Bell and Ambulance Entrance; Telephones; Return Call; Watchman's Time Detector; Fire Alarm and Tank Alarm. All Edwards devices are designed to give positive and efficient service, are thoroughly tested before leaving the factory, and are planned and designed for the simplest possible installation."

Frank McCandless Crooks announces the opening of new offices at 508 Third Avenue, Pittsburgh.

V. L. Ricketts, 56 Marion Street, Pittsburgh, desires the catalogs and other publications of manufacturers.

Edwin J. Kraus announces the opening of offices at 201 Arcade Building, Racine, Wis. Manufacturers' publications and samples are desired.

Domenic A. Valvano announces his removal from Elizabeth, N. J., to Linden, N. J. He would appreciate the catalogs and other publications of manufacturers.

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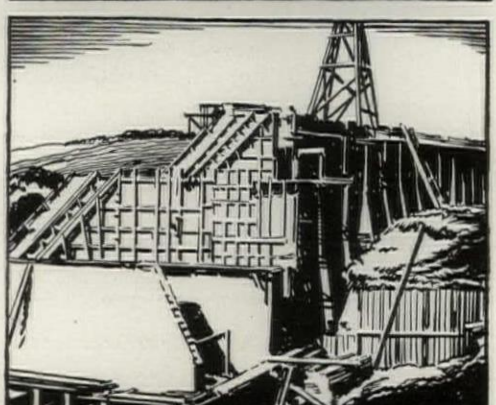

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