THE ARCHITECTURAL FORUM

IN TWO PARTS

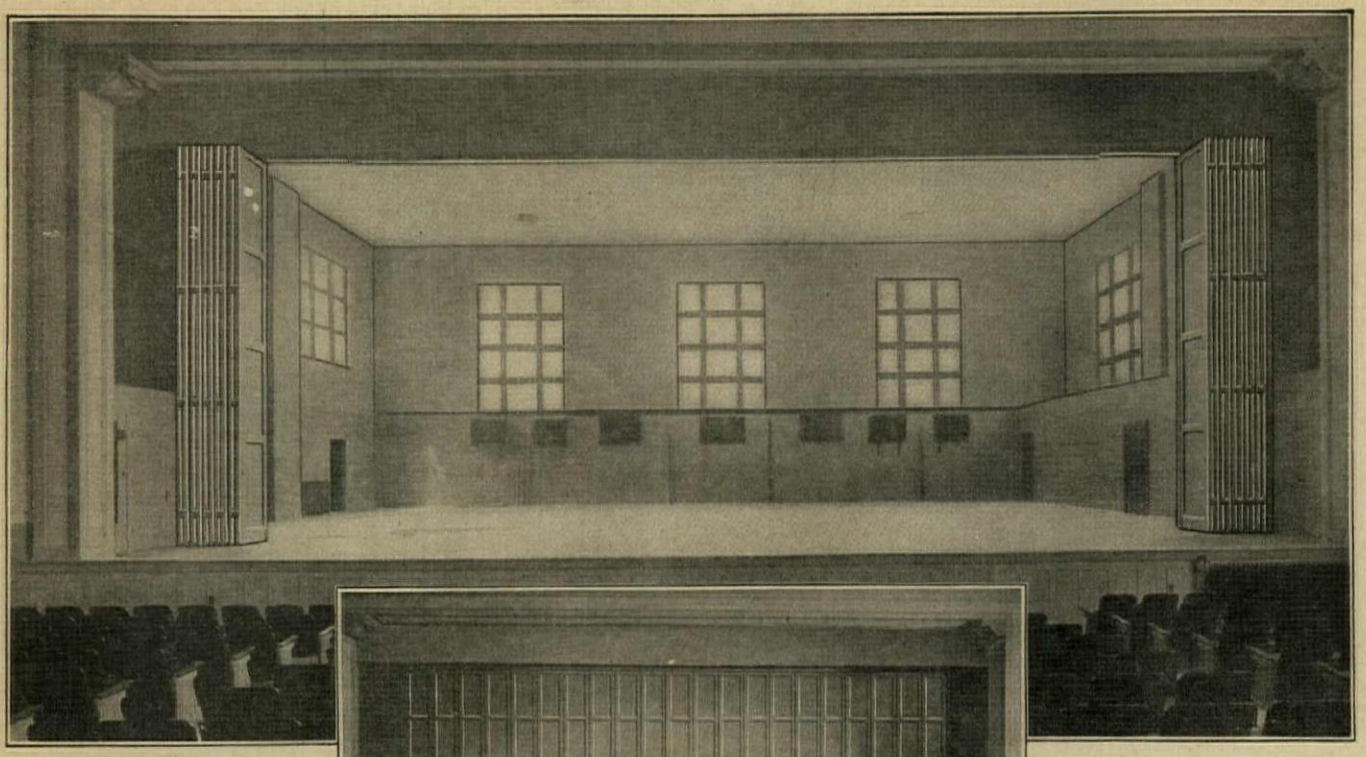
ARCHITECTURAL ENGINEERING & BUSINESS

PART TWO

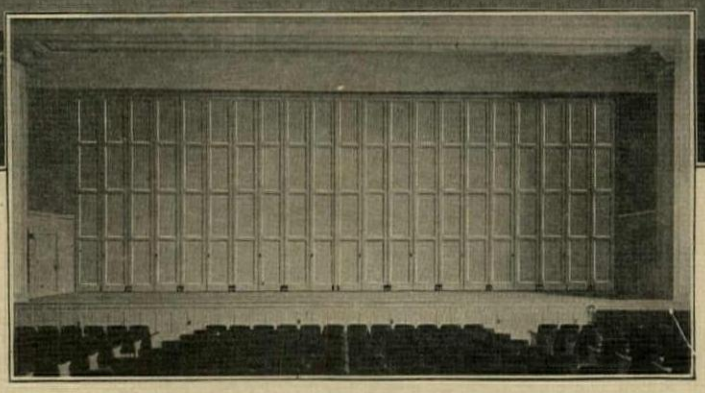
SEPTEMBER

1929

INDUSTRIAL BUILDING REFERENCE NUMBER
PRICE $3.00



21 doors, each 3 x 20 feet, separate this 63 foot opening between auditorium and stage-gymnasium in the Roosevelt School, Topeka, Kansas.



These doors can be quickly, quietly, smoothly opened and closed by a ten-year old child, thanks to FoldeR-Way and R-W engineering.

FOLDER-WAY

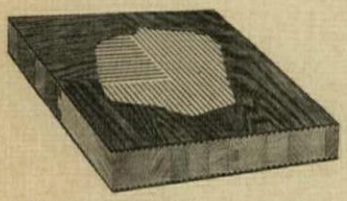
High, wide and handsome folding partitions-

for **all types of partition door installations. No matter how high or wide the opening may be, standardize on R-W equipment and be sure of continuous trouble-free performance.**

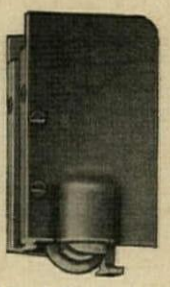
R-W FoldeR-Way partition equipment folds and slides large doors to either side . . . smoothly, quietly and with the least effort. Engineered to save space and meet every architectural need.

Feel free to consult the R-W engineering staff at any time regarding any doorway problem. No door is too large or too small for R-W Service. Send today for illustrated Catalog No. 43.

"Quality leaves its imprint"



The beauty and smooth operation of R-W Compound Key Veneered doors are lasting. Sagging, warping, swelling, shrinking, are practically eliminated by tongue and groove method of applying veneer. These famous doors are now made exclusively and sold only by R-W for FoldeR-Way partitions.



Specially designed bottom roller for FoldeR-Way doors, beautiful brass finish or dull black.

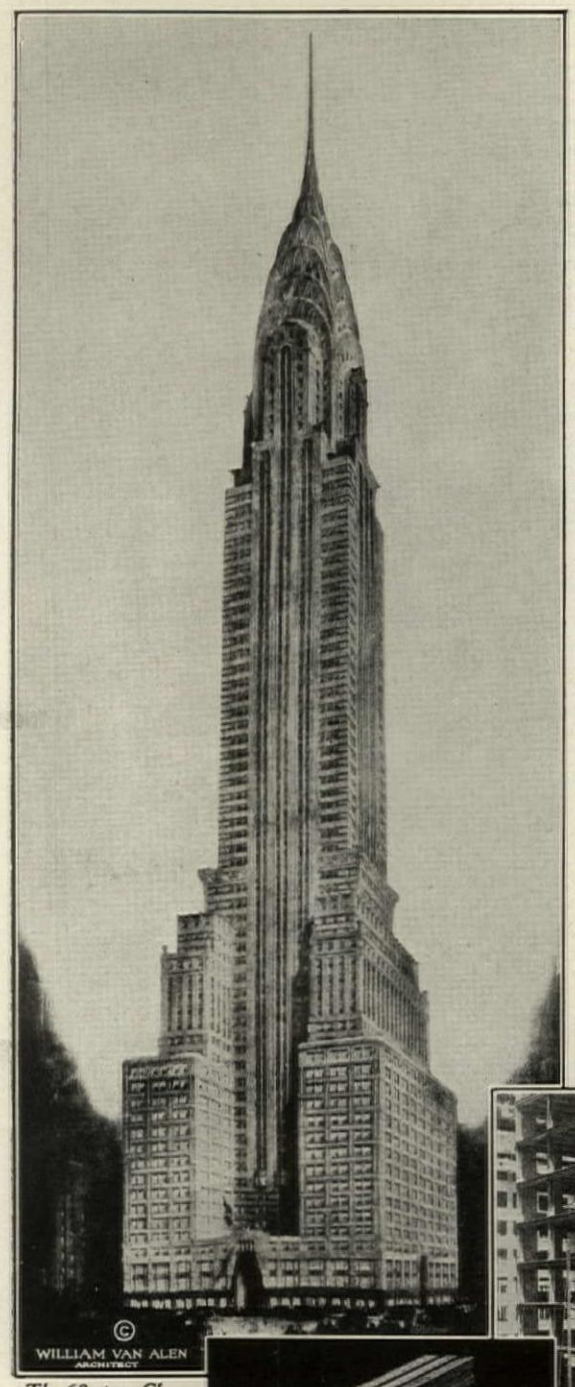
Richards-Wilcox Mfg. Co.

"A Hanger for any Door that Slides."

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

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

Montreal · RICHARDS-WILCOX CANADIAN CO., LTD., LONDON, ONT. · Winnipeg



The 68-story Chrysler Building, Lexington Ave. between 41st and 42nd Streets, New York. William Van Alen, Architect, Fred T. Ley & Co., Inc., Contractors.

The World's tallest office building uses NATCO ... *of course!*

AS BUILDINGS tower higher and higher, the responsibilities of the building material increase . . . And so the selection of Natco Header Backer for the walls, and Natco Column Covering for the fire proofing, of the new Chrysler Building is highly significant.

It tells of minimum weight, that saves frame and foundation costs, while providing fully adequate strength; it tells of dependability that must be beyond question; it tells of fire-safety that must be present in high degree and beyond doubt. It tells of economy, ease and speed of erection, and complete adaptability.

The use of Natco Structural Clay Tile in the largest buildings testifies to its desirability for *all* buildings. The Complete Natco Line furnishes a size and type for every application.

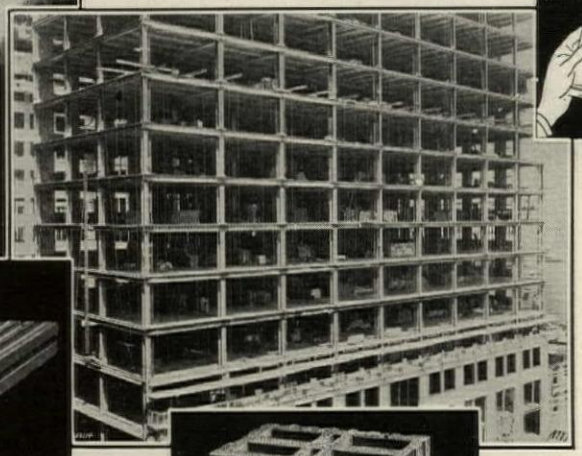
NATIONAL·FIRE·PROOFING·COMPANY

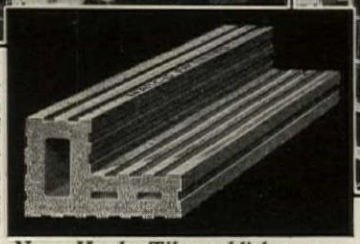
General Offices: Fulton Building, Pittsburgh, Pa.

Branch Offices: New York, Chanin Bldg; Chicago, Builders Bldg; Philadelphia, Land Title Bldg; Boston, Textile Bldg.

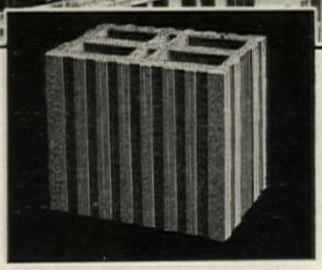
In Canada: National Fire Proofing Co. of Canada, Ltd., Toronto, Ontario

TURN TO "SWEET'S"





Natco Header Tile establishes a perfect bond between facing material and tile backing; full bearing value is allowed on full thickness of wall.



Natco XXX (Triple X) Backer Tile. Provides adequate strength, pronounced insulating value. Height of backer can be varied to meet different mortar joint conditions.

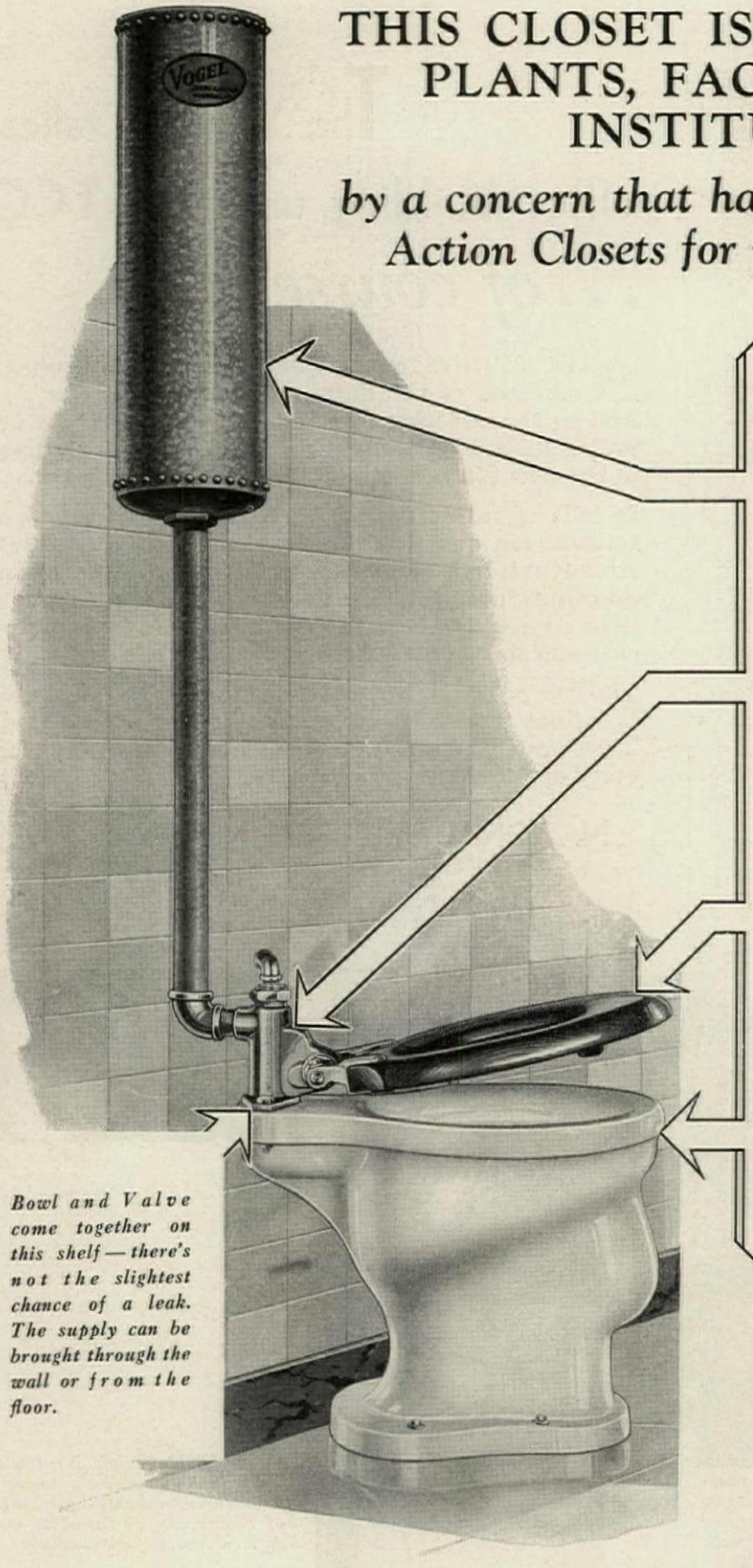
NATCO

NATCO
THE *COMPLETE* LINE *of*
STRUCTURAL CLAY TILE

STRUCTURAL CLAY TILE

THIS CLOSET IS DESIGNED FOR PLANTS, FACTORIES AND INSTITUTIONS

by a concern that has specialized on Seat-Action Closets for more than 20 years



Bowl and Valve come together on this shelf — there's not the slightest chance of a leak. The supply can be brought through the wall or from the floor.

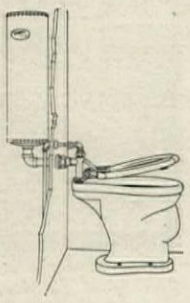
THE TANK is heavy galvanized iron, strongly riveted. Every tank is tested to 100 pounds air and water pressure.

THE VALVE will never wear out and will never leak. All operating parts are of high tension bronze. This valve was put on a test—opening and closing 150,000 times—and did not show the slightest wear. Even the washers were absolutely tight.

THE SEAT is made of hardwood, air-seasoned for two years. Open front seat can be supplied — also seat of indestructible composition.

THE BOWL is heavy twice-fired vitreous china, finished in a flawless glaze. It is syphon-action and flushes on less than four gallons of water. At 20 pounds water pressure between three and four gallons of water will flow into the tank in 15 seconds.

JOSEPH A. VOGEL COMPANY
Wilmington, Del. St. Louis, Mo.



Tank can be concealed in the wall.

The VOGEL *catalog, containing roughing in measurements and a complete description of all* VOGEL *products and their operation, will be sent promptly upon request.*

VOGEL PATENTED *Products*

Promise and Performance

The JOINT of Raymond Composite Piles, the method of joining timber to concrete, is so sound and simple that it is achieved perfectly every time in actual construction work. The RESULT is great strength, absolute alignment in driving and assurance of perfect results in every one of these extra long piles.

CAST IN PLACE PILES
COMPOSITE PILES
PRECAST PILES
PIPE PILES

*"A form for every pile
A pile for every purpose"*

BUILDING FOUNDATIONS
BULKHEADS AND DOCKS
UNDERPINNING ETC.
BRIDGES

RAYMOND CONCRETE PILE COMPANY

NEW YORK: 140 Cedar St. CHICAGO: 111 West Monroe St.

Raymond Concrete Pile Co., Ltd., Montreal, Canada

ATLANTA, GA.	CLEVELAND, OHIO	MIAMI, FLA.	SAN FRANCISCO, CAL.
BALTIMORE, MD.	DETROIT, MICH.	MILWAUKEE, WIS.	ST. LOUIS, MO.
BOSTON, MASS.	HOUSTON, TEX.	PHILADELPHIA, PA.	ST. PAUL, MINN.
BUFFALO, N. Y.	KANSAS CITY, MO.	PITTSBURGH, PA.	WASHINGTON, D. C.
CHICAGO, ILL.	LOS ANGELES, CAL.	PORTLAND, ORE.	LONDON, ENGLAND

RAYMOND

KEWANEE

STEEL RIVETED BOILERS

A boiler is bought *only once.* Its fuel must be bought *every year.* So, a low yearly fuel cost is far more important than the original price paid for the boiler.

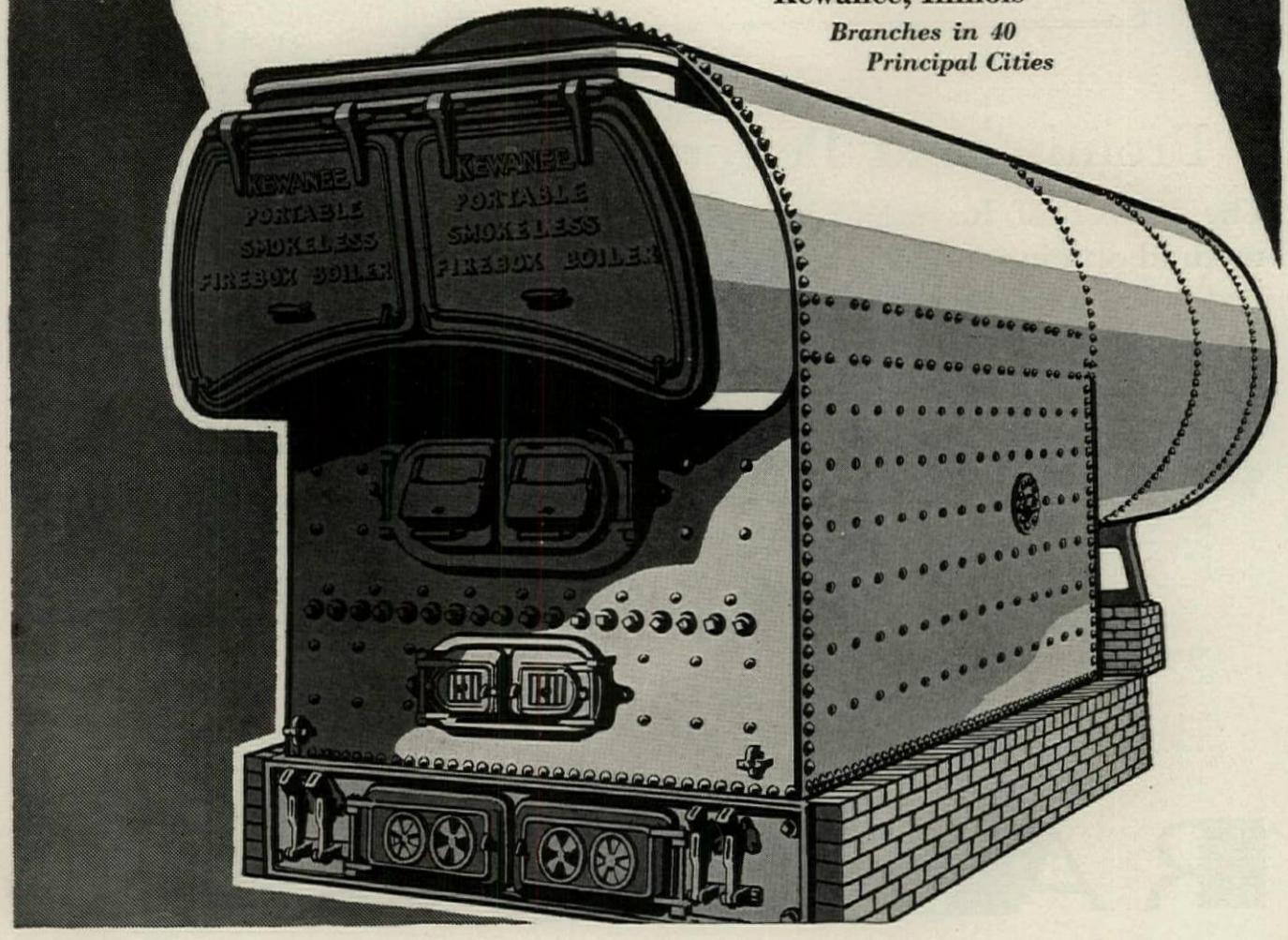
Kewanee makes no claims for "Bargain Basement" price. But it does claim—and these claims are backed by performance in the finest buildings—that in the long run Kewanee is the *best boiler investment any owner can make.*

KEWANEE BOILER CORPORATION

division of American Radiator and Standard Sanitary Corporation

Kewanee, Illinois

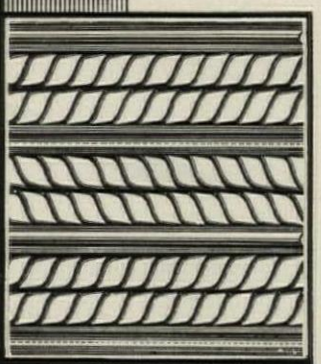
Branches in 40 Principal Cities



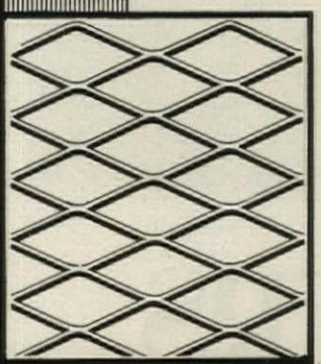
PLASTERING PROTECTION—

KEYSTONE COPPER STEEL LATH

KNO-BURN, JR



NORWEST



STEELHART

Make Selection From This Complete Line

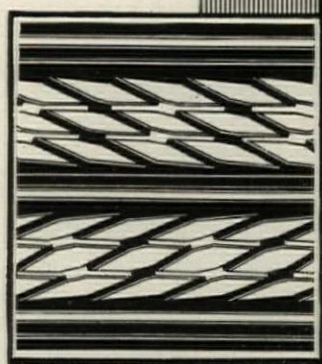
Whenever confronted by trying climatic or other abnormal conditions, we suggest that, as an added precaution, you specify that the Metal Lath plastering base be cut from KEYSTONE Copper Steel.

The American Society for Testing Materials have thoroughly tested this material for you. Their reports indicate that its *rust-resistive qualities* and *longevity* are *superior* to those of the so-called "Pure Irons" or other special analysis steels.

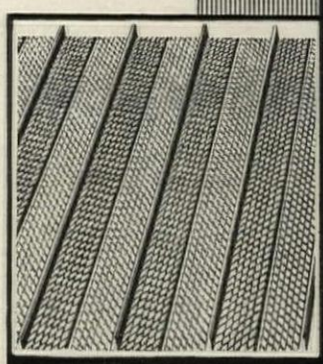
Despite this, prices are lower than other special alloys.

Practically all types of North Western Lath—flat and ribbed—can be had cut from this long lasting, economical KEYSTONE Copper Steel. Please check and mail coupon below for samples and complete details.

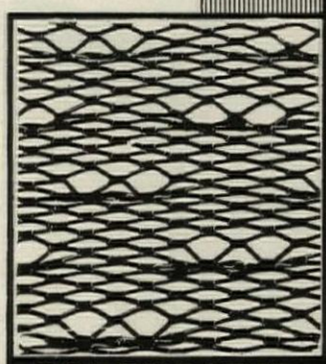
☐ *Send Samples.*
☐ *Send Specifications.*
☐ *Send Amer. Soc. for Testing Materials' Findings.*



PLASTA-SAVER



LONGSPAN



CORRUGATED

NORTH WESTERN EXPANDED METAL CO.

1234 OLD COLONY BLDG. CHICAGO

CORRECT WATERPROOFING AND DAMP-PROOFING PRACTICE

ARCHITECTS

CHARACTER OF WORK	SUGGESTED "R. I. W." SPECIFICATIONS	DATA
Dampproofing and Plaster-Bond. Interior or Exterior Masonry Walls above grade. Stain-proofing of interior plaster.	"R. I. W." No. 232.	Applied with roofers bristle brush or spray gun. A black, elastic tacky composition which resists dampness and gives perfect bond to hard wall plaster. Two coats should be applied.
Colorless Dampproofing for exterior treatment of Brick, Stone, Concrete, Stucco or other masonry exposed to the elements.	"R. I. W." Toxloxpore.	Will not darken or discolor masonry. Applied in two absorbing coats by brush or spray gun. Open masonry joints or holes should be pointed with "R. I. W." Elastic Caulking Compound. Assists in eliminating efflorescence.
Waterproofing, Integral Method, for Concrete, Stucco and other Portland Cement mixtures.	"R. I. W." Toxement.	A compound in powder or paste form which densifies and brings about the proper hydration of all Portland Cement Mixes. Should be used in proportion of 2% by weight of Portland Cement used. Adds materially to the workability and plasticity.
Waterproofing and Dampproofing for exterior of foundation walls, footings, etc. Also for preservation of wood sleepers laid in concrete.	"R. I. W." Marine Cement.	Applied with roofers brush. A black Dampproof, water proof and alkali-proof heavy bodied paint which does not require heating. For application in two coats.
Decoration and dampproofing of exposed brick, concrete, stucco, stone and other masonry.	"R. I. W." Liquid Konkerit.	A flat weather resisting cement paint made in white and colors in Priming and finishing coats.
Integral Hardening, densifying and accelerating set of Concrete, Cement Floors, brick mortar, etc.	"R. I. W." Toxmix Clear.	A colorless liquid to be used in proportion of 1 quart to the bag of cement. Increases compressive and tensile strength. Renders concrete or mortar permanently hard, dense and waterproof.

CHANIN BUILDING
On the new 56 story $12,000,000 Chanin Building in New York Toch Brothers' "R. I. W." Products were used.

THE AUTHORITY OF ACHIEVEMENT

TOCH BROTHERS

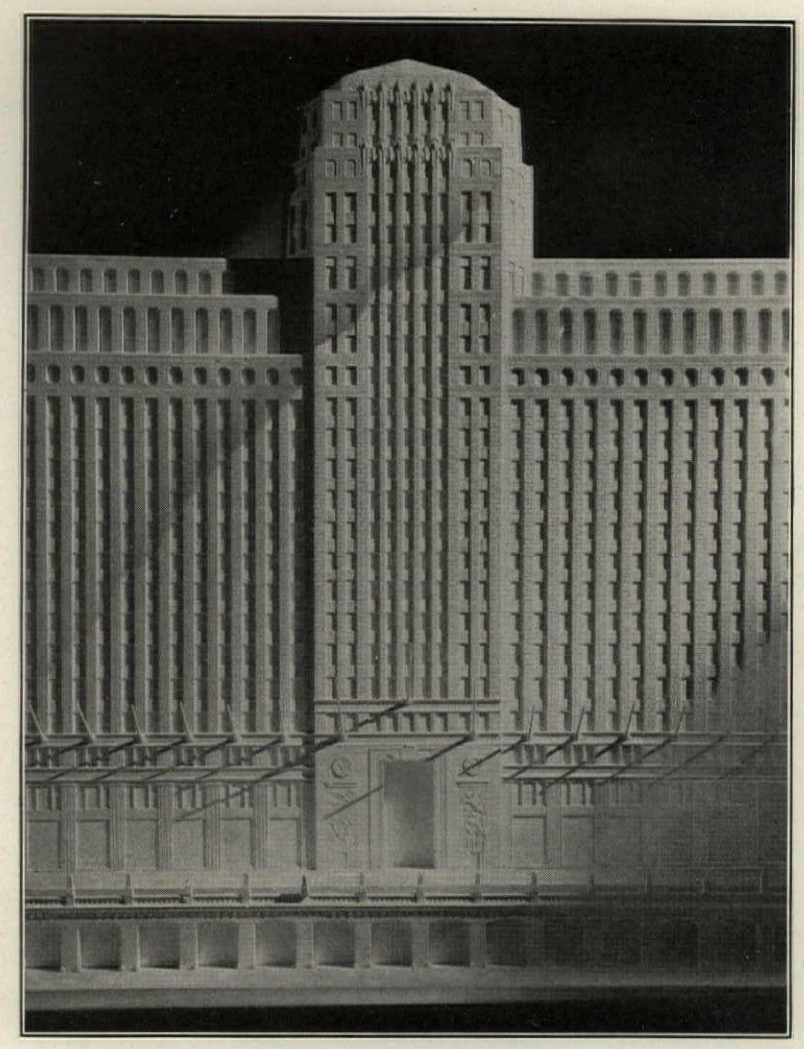
FOUNDED IN 1848

WATERPROOFING & DAMP PROOFING COMPOUNDS – TECHNICAL PAINTS

NEW YORK
CHICAGO
LOS ANGELES
LONDON

REMEMBER IT'S WATERPROOF
RIW

division of
STANDARD
VARNISH WORKS



THE MERCHANDISE MART
Chicago

Graham, Anderson, Probst and White—*Architects*

John Griffiths and Son Company
Contractors

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

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

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

All heavy duty areas are being integrally hardened with METALICRON.

Commercial areas are being integrally hardened with MASTERMIX.

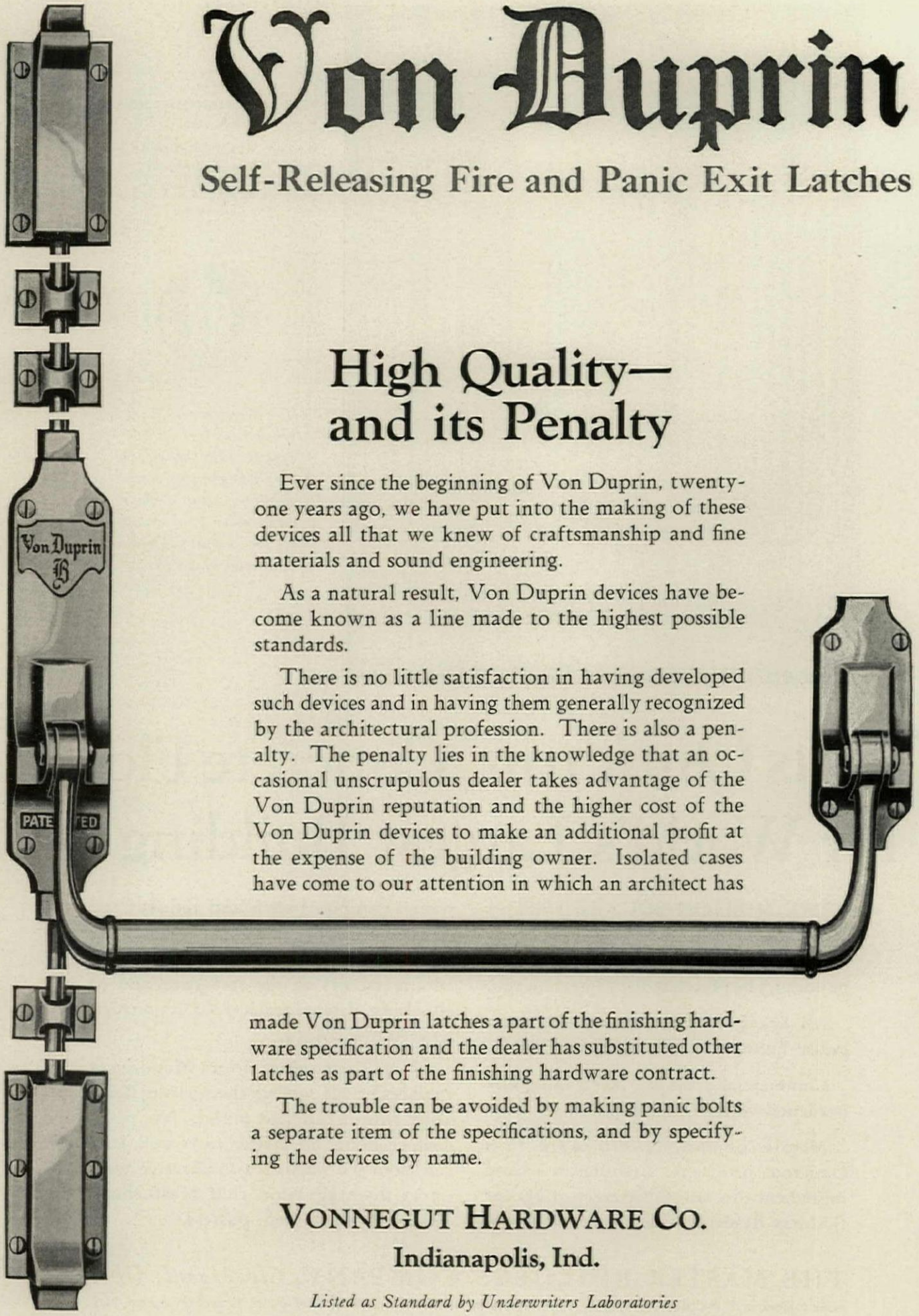
Metalicron and Mastermix are "Plus Omicron" products. Each has as a basic ingredient this latest discovery of Master Builders Research Laboratory, Omicron, which combines with and reduces the soluble elements in concrete, changing them from weak factors to strength-adding factors in the structure, and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

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

THE MASTER BUILDERS COMPANY, *Cleveland, Ohio*

Sales Offices in 110 Cities

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



Von Duprin

Self-Releasing Fire and Panic Exit Latches

High Quality— and its Penalty

Ever since the beginning of Von Duprin, twenty-one years ago, we have put into the making of these devices all that we knew of craftsmanship and fine materials and sound engineering.

As a natural result, Von Duprin devices have become known as a line made to the highest possible standards.

There is no little satisfaction in having developed such devices and in having them generally recognized by the architectural profession. There is also a penalty. The penalty lies in the knowledge that an occasional unscrupulous dealer takes advantage of the Von Duprin reputation and the higher cost of the Von Duprin devices to make an additional profit at the expense of the building owner. Isolated cases have come to our attention in which an architect has made Von Duprin latches a part of the finishing hardware specification and the dealer has substituted other latches as part of the finishing hardware contract.

The trouble can be avoided by making panic bolts a separate item of the specifications, and by specifying the devices by name.

VONNEGUT HARDWARE CO.

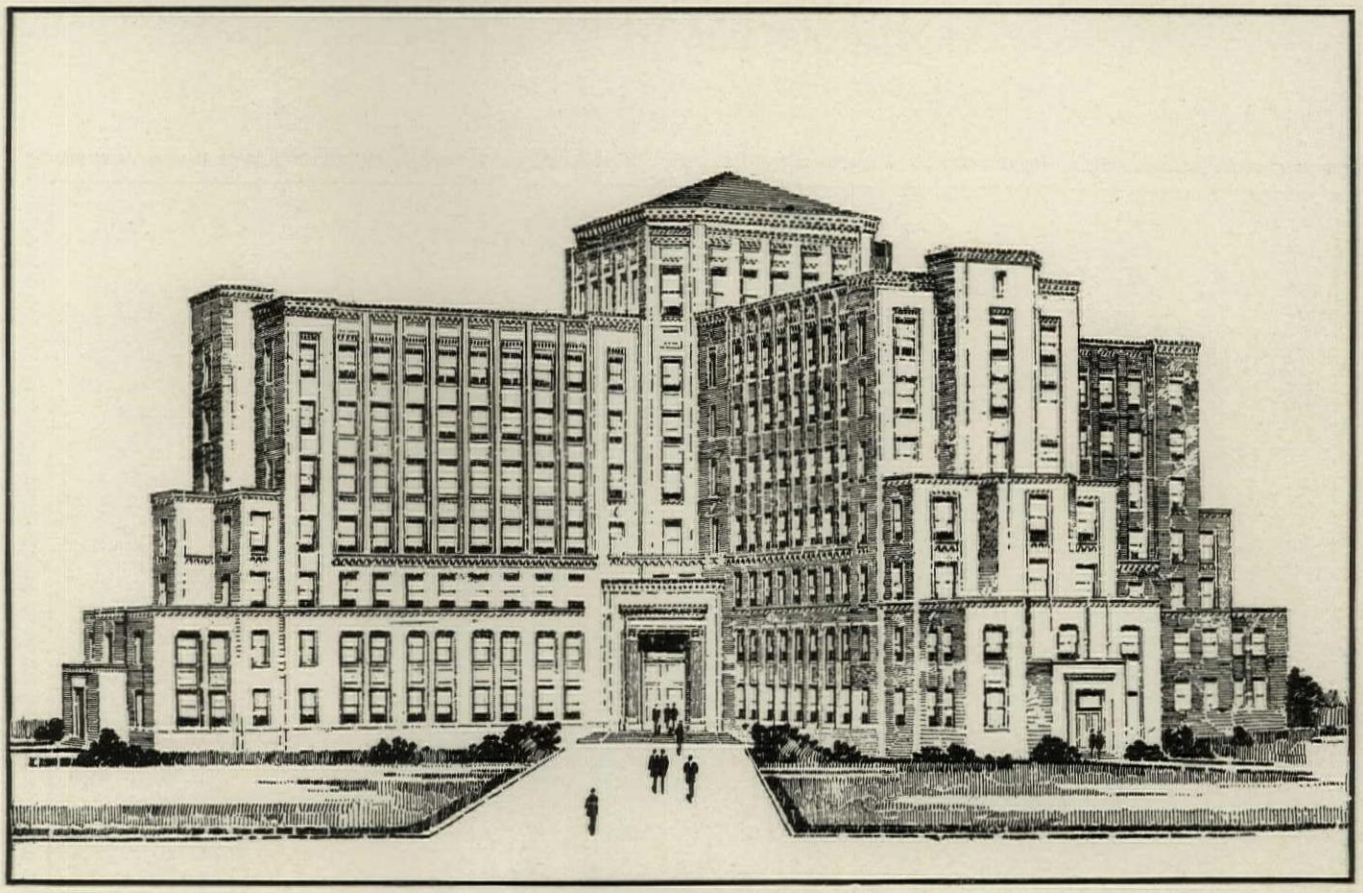
Indianapolis, Ind.

Listed as Standard by Underwriters Laboratories

EXIDES PROTECT

Administration building of locomotive plant

AGAINST CURRENT FAILURE

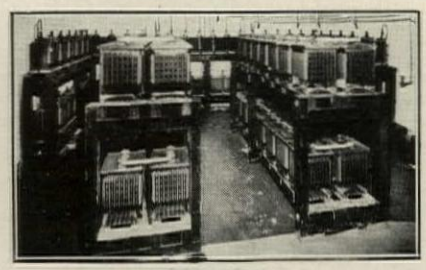


ADMINISTRATION BUILDING *of Baldwin Locomotive Works, Eddystone, Pa., protected against sudden darkness by 60-cell Exide Battery, Chloride type. Simon & Simon, Philadelphia, architects.*

Architects specified Exide Batteries to guard Baldwin building against sudden darkness

SUDDEN current failure will not endanger the occupants of the administration building of the Baldwin Locomotive Works' Eddystone plant. Reliable Exide Batteries stand guard.

Should normal power fail, important lights are switched to Exides . . . *instantly and automatically* . . . without a hand touching a switch. In the building shown here, main stairway, fire towers, executive offices, transformer, battery and engine rooms are safeguarded against sudden darkness. The architects realized that interruption of electric current might result in confusion and danger. That's why they chose *absolutely reliable* Exide Emergency Lighting Batteries for protection.



THIS DEPENDABLE EXIDE *protects lights in Baldwin administration building. The 25-cell Exide, Chloride type, in background, supplies current for entire telephone system throughout plant.*

Exide

EMERGENCY LIGHTING BATTERIES

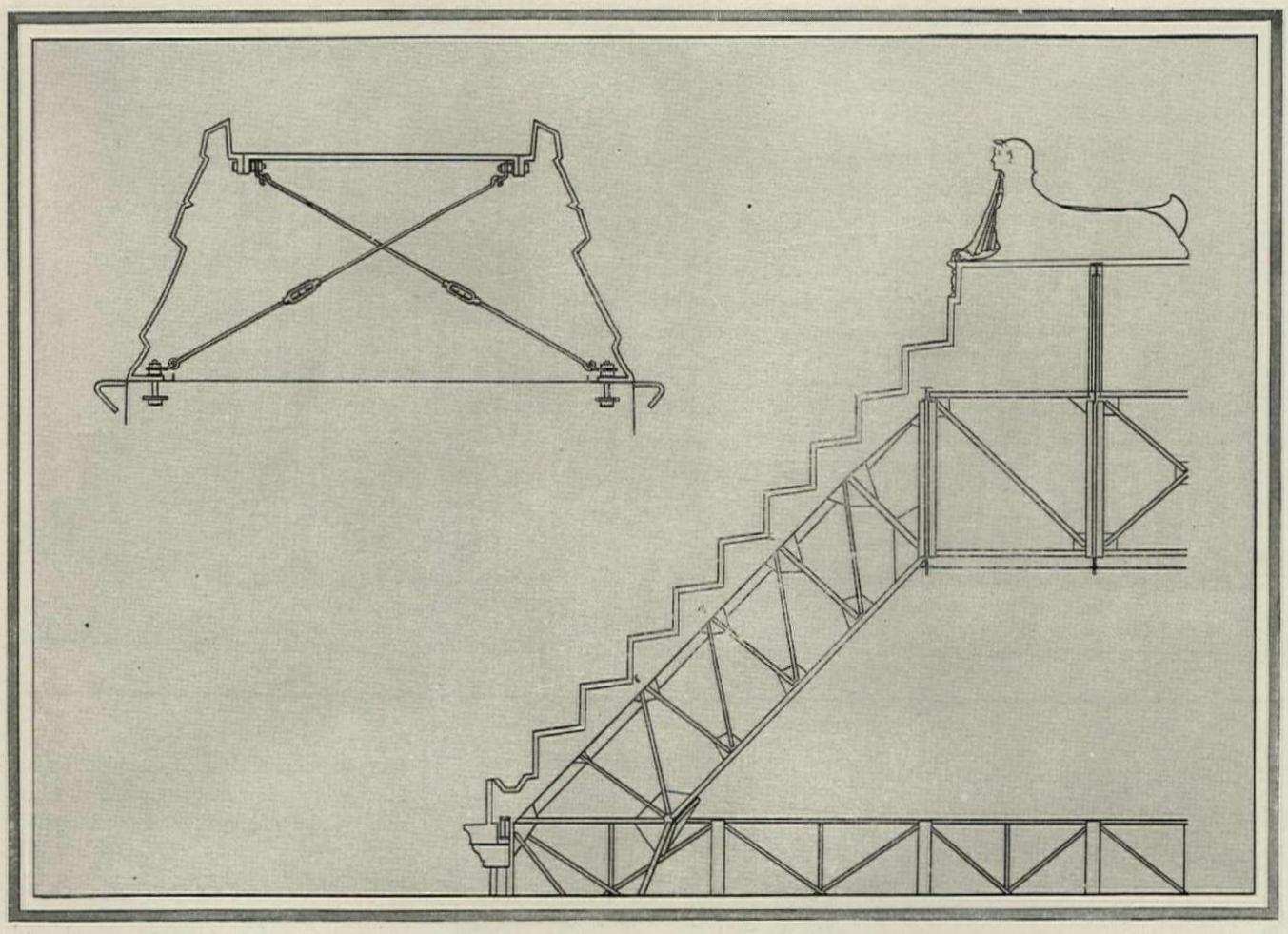
Exide engineers have combined in these batteries the following important qualities: (1) moderate initial cost, (2) exceptionally long life, (3) low operating cost, (4) simple, foolproof operation and charging, requiring no expert knowledge, (5) absolute power dependability. Architects all over the country are specifying this never-failing system of protection for hospitals, auditoriums, stores, theatres, offices and any buildings where the public gathers. Write for information.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

ANCHORAGE AND BRACING OF SPHINX- STRUCTURAL DETAILS OF STEPS AND PLATFORM

[*The sphinxes and pyramid are described on pages 24 and 25 of this issue*]



SPECIFICATIONS

ALCOA

THIS material shall be made of No. 43 alloy. The surface shall be free from imperfections and equal in smoothness and polish to sample submitted. The average tensile strength shall not be less than 17,000 lbs. per square inch and the weight shall not exceed .097 pounds per cubic inch.

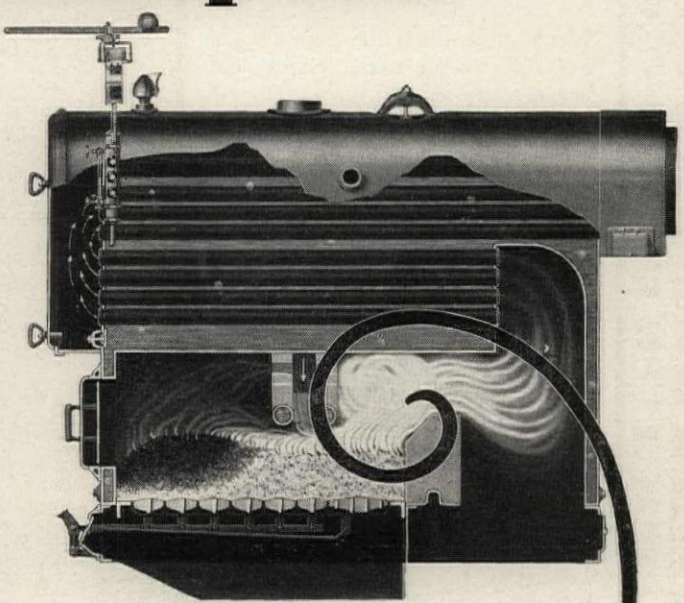
Further details of this particular job and of all others described in the booklet, "Architectural Aluminum" will be gladly furnished by,

ALUMINUM COMPANY OF AMERICA
2499 Oliver Bldg., Pittsburgh, Pa.
Offices in 19 Principal American Cities

ALCOA

ARCHITECTURAL ALUMINUM

No Smoke Passes This Whirlpool!

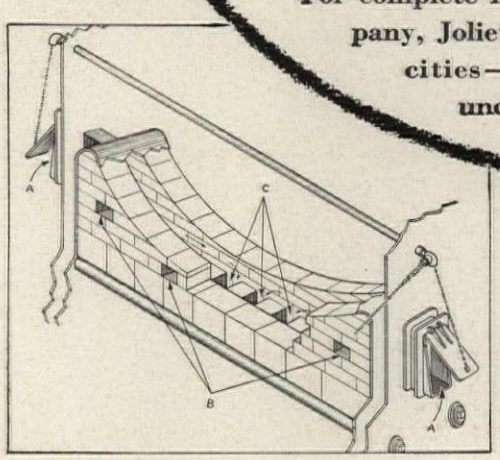


Like dry tinder—the soot laden gases of soft coal ignite the instant they strike this turbulent whirling mass of incandescent flame!

They burn and their usable heat units are utilized—because in this new Heggie-Simplex Smokeless Boiler there is always the right amount of oxygen to effect complete combustion. The additional oxygen necessary to burn bituminous coal smokelessly, but which can not be drawn through the fuel bed alone, is introduced through a special "carbureting chamber" over the fire.

Built of refractories, this chamber not only introduces the necessary additional oxygen but thoroughly heats it before passing it down onto the fire. A refractory bridge wall to the rear of this chamber baffles the fire, creating a whirlpool of flame which consumes all of the smoke and combustibles.

For complete facts, write Heggie-Simplex Boiler Company, Joliet, Ill.; representatives in principal cities—telephone and address listed under "Heggie-Simplex Boilers."



The "Carbureting Chamber" of the Heggie-Simplex Smokeless Boiler

Air is drawn in through intake doors (A) on both sides of the boiler. Volatiles arising from the fresh fuel are admitted through ports (B) in the forward wall. This inflammable mixture is thoroughly heated by the hot refractory walls of the chamber. It is ready for instant combustion when it passes through the jets (C) to mix with the gas stream flowing under the chamber.

Note there are no bothersome ceiling pulleys, long chains, etc. The operating device is "built in" the boiler.

HEGGIE-SIMPLEX
STEEL HEATING BOILERS


Your
Factory Floors
Would they stand the pounding of 2,000,000 motor cars, taxies and busses every month?
The average travel on this Michigan Avenue Bridge, Chicago, is 80,000 vehicles every 24 hours. It includes solid tire busses operating on a minute schedule during rush hours.
Wright
Rubber Block
Recent Installations:
Cedar-Biddle Bridge
Milwaukee, Wis.
16th Street Viaduct, Bascule
Milwaukee, Wis.
WRIGHT RUBBER TILE
Rubber Only Material That Withstands Tire Road Wear
NOV. 4-1924
K2558
CHICAGO ARCHITECTURAL PHOTOGRAPHING COMPANY

Meeting *Every Demand* in Modern *Building Construction*

Set aside your expansion, contraction and building settlement problems with the new EXPAN-HUB Soil Pipe.

For every type of building, from the small bungalow to the large skyscraper, EXPAN-HUB Soil Pipe (identify it by the *orange band*) takes the place of the ordinary soil pipe.

EXPAN-HUB has numerous features not to be found in any other soil pipe. These are

1. EXPAN-HUB is furnished with a compressible gasket which performs four important duties.
   a. Allows for Expansion
   b. Prevents Buckling of Stack
   c. Prevents lead from creeping
   d. Assures permanently Gas Tight Joints.

2. EXPAN-HUB has a greatly improved hub design being much thicker than old style soil pipe hubs. This reduces breakage when caulking to a minimum. The extra thickness of the hub is carried down even to the pipe proper where it tapers off a few inches below the hub.

3. EXPAN-HUB is quickly identified by the brilliant *orange band* on which is printed the name EXPAN-HUB. This band encircling every hub is the symbol chosen to distinguish this incomparable soil pipe from all other pipe.

Specify EXPAN-HUB (you'll know it by the *orange band*) for your next building. Any wholesaler can supply it.

EXPAN-HUB

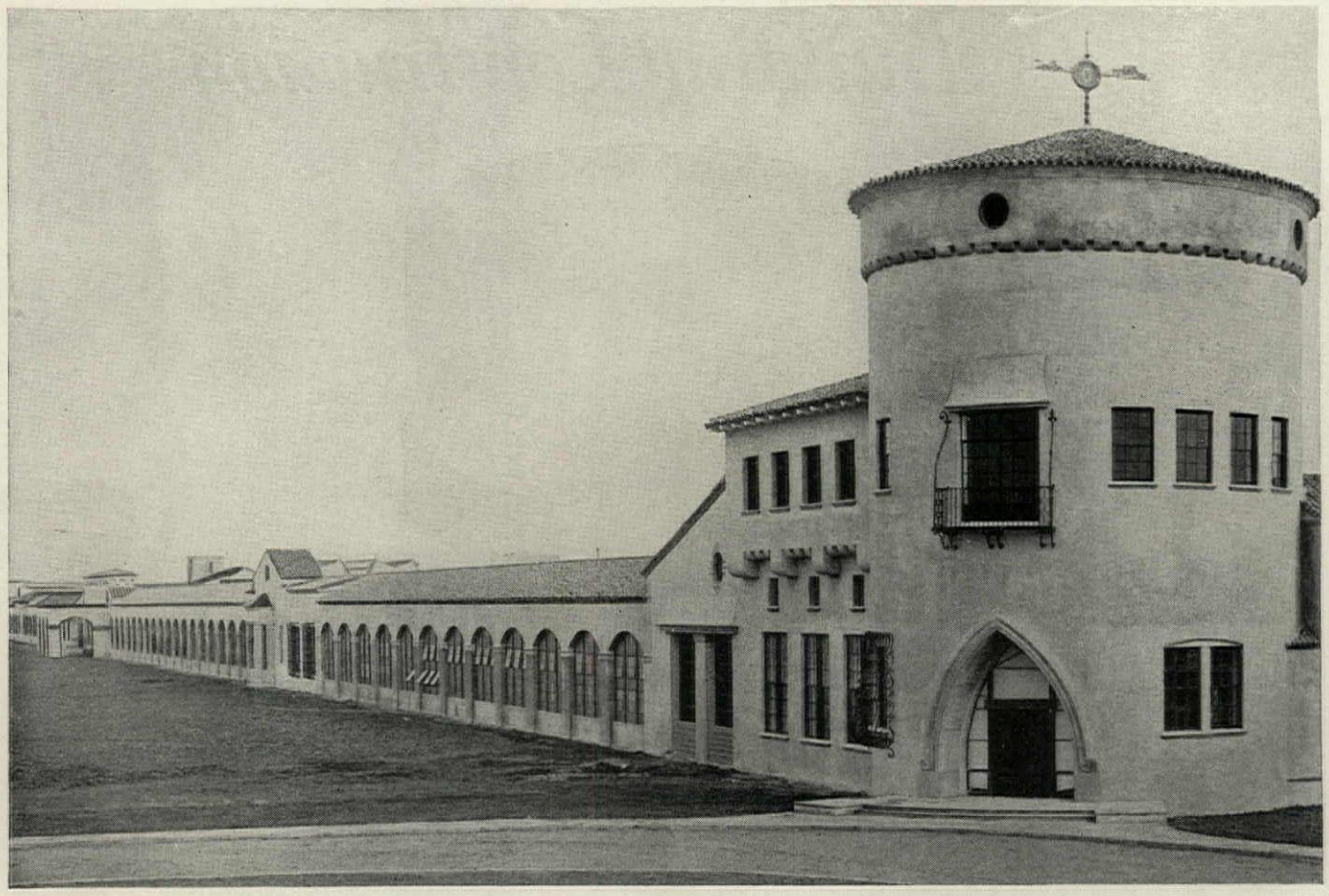
LOOK FOR THE ORANGE BAND

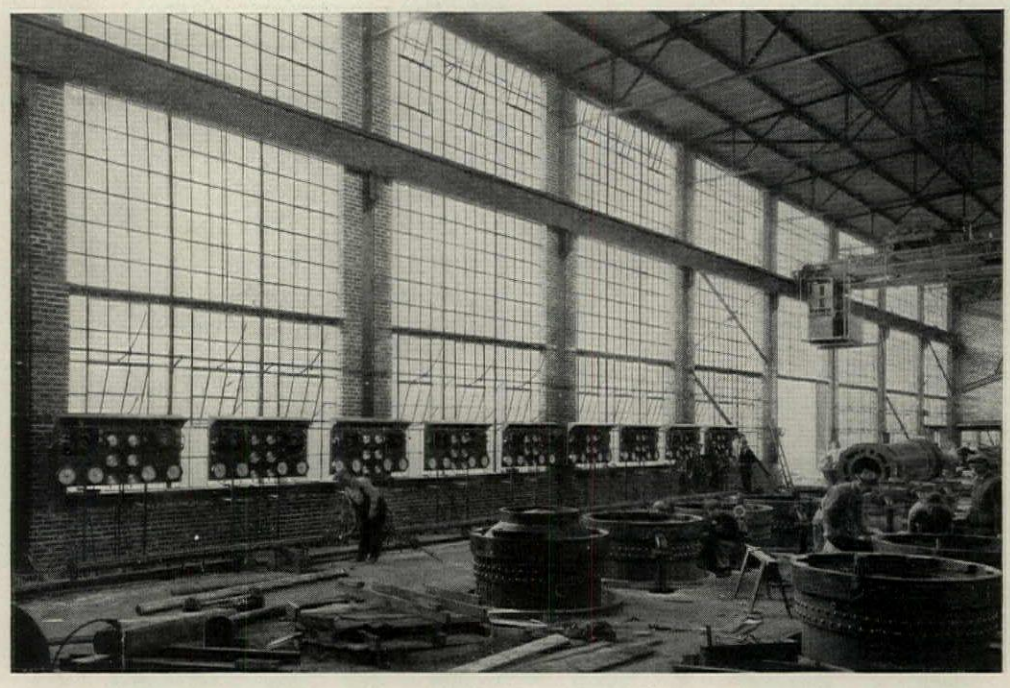
MANUFACTURED AND SOLD BY

ALABAMA PIPE COMPANY
Anniston, Ala.
342 Madison Ave. New York, N. Y. — 122 So. Michigan Ave. Chicago, Ill. — 1749 Sacramento St. San Francisco, Calif.

STRINGER BROS. CO., Inc.
1100 W. 38th St. Chicago, Ill. — Gadsden, Ala. — 128 Sidney St. Cambridge, Mass.

Meeting Industry's Demand





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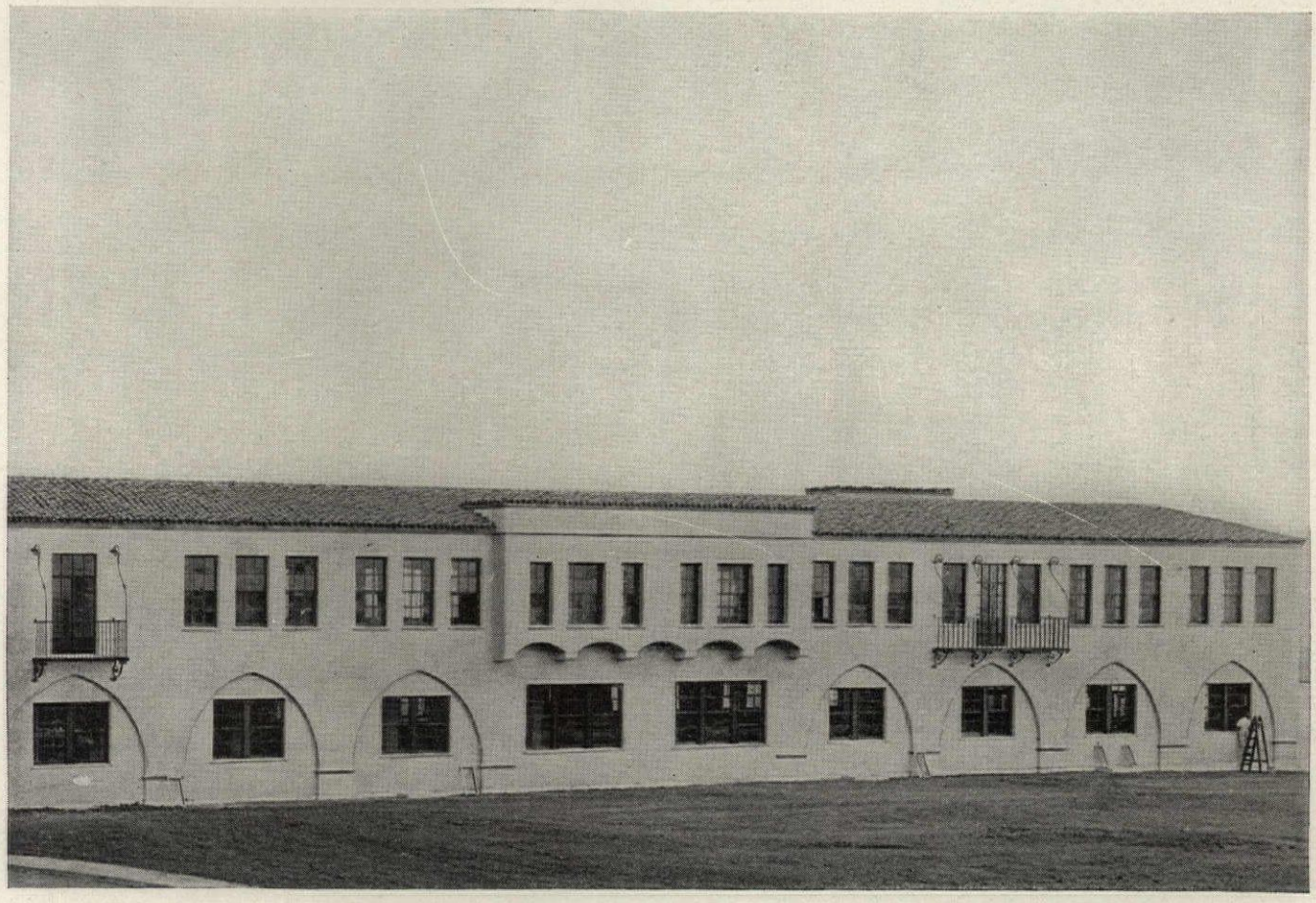

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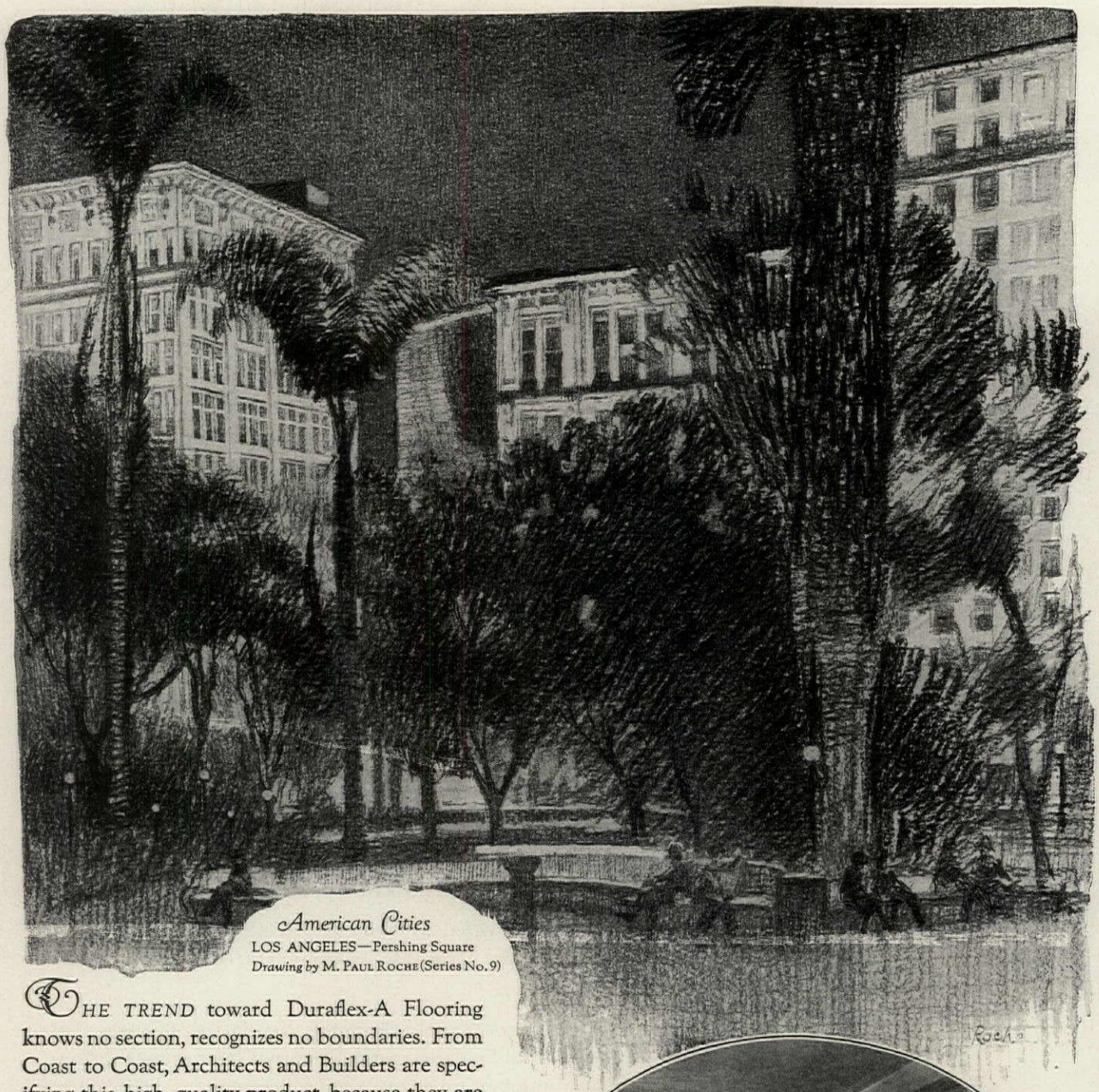

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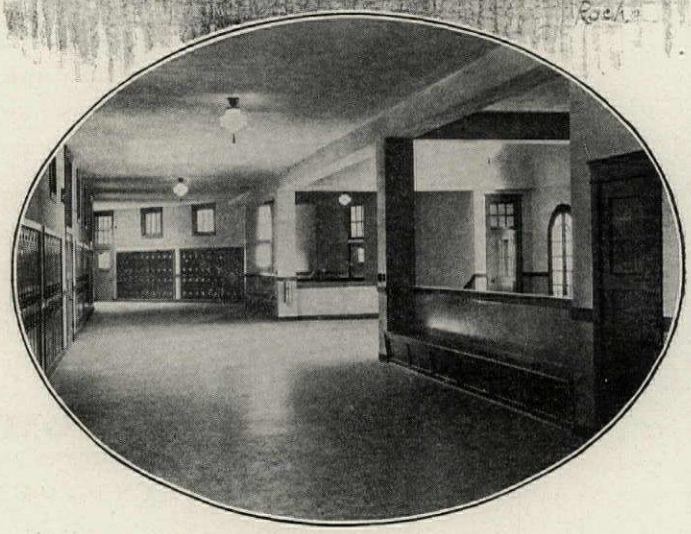

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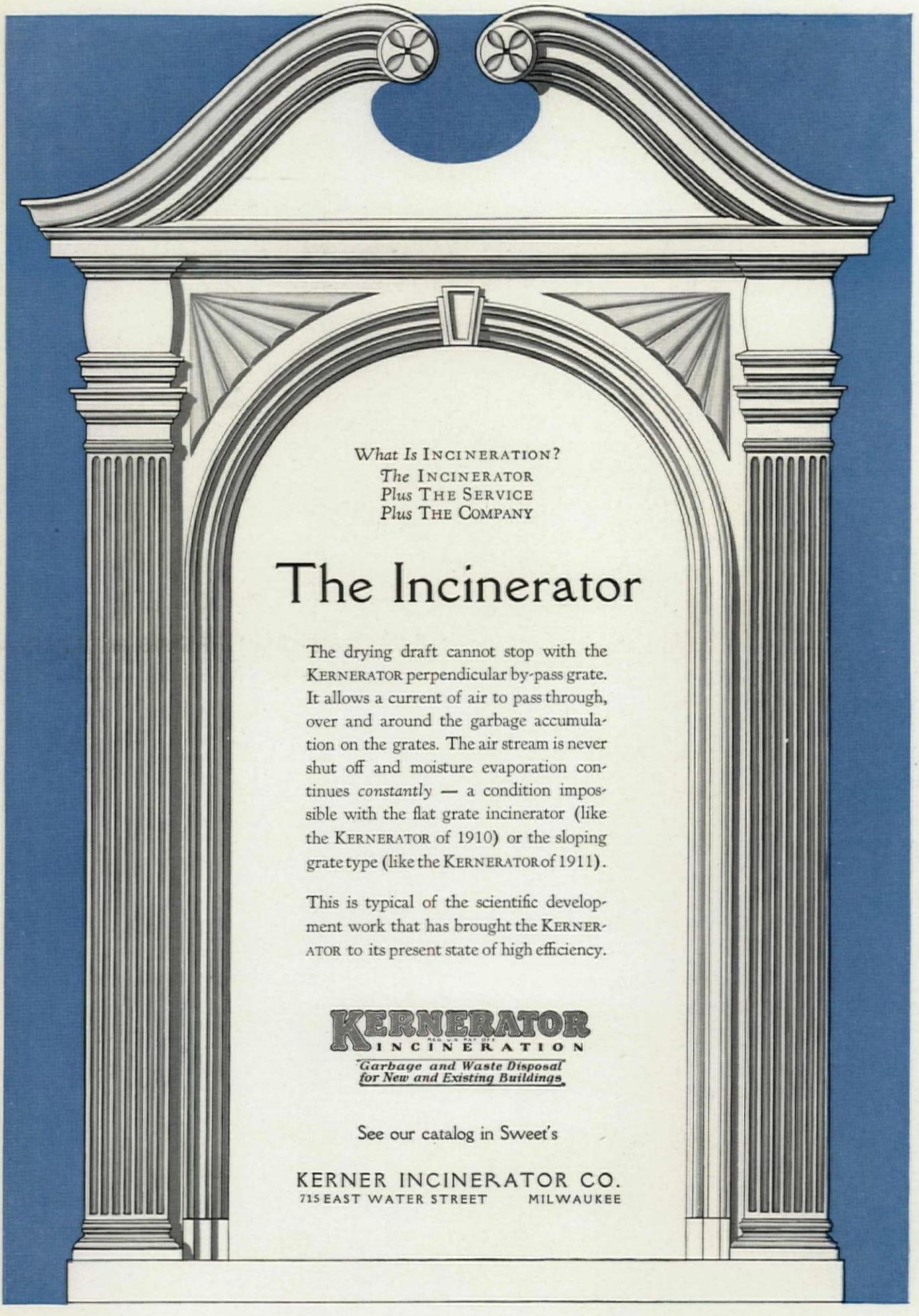

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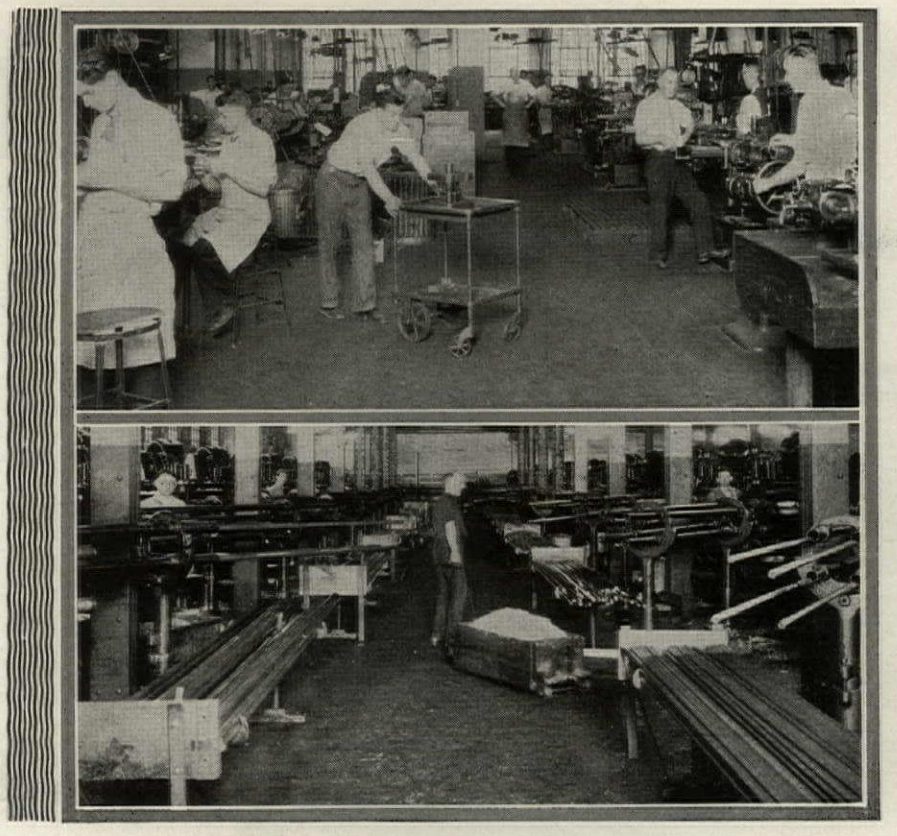
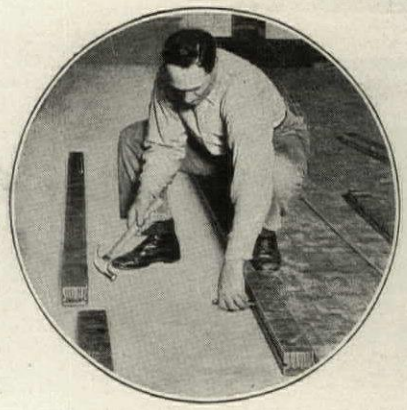


For Nine Years Blox-on-end Flooring Has Proved Its Worth to the AC Spark Plug Co., Flint, Mich.



Bloxonend lays rapidly and can be installed in old plants with but slight interference to daily operations.

IN 1920 the AC Spark Plug Co., Flint, Mich., floored a new machine shop with 26,000 square feet of BLOXONEND. In 1926 an additional quantity of BLOX-ONEND was used in a new addition because the original installation had lived-up to every claim we made for it.

The performance of BLOX-ONEND through the years has resulted in it being looked on as a *Production Asset* by AC Plant Officials. The floor has remained smooth under trucking, constant footwear and severe machine shop usage. Trucking has been made easy, floor maintenance eliminated and the comfortable resiliency afforded is appreciated by employees. Oils and grinding solutions coming into contact with the floor have had no effect on the durability of BLOXONEND.

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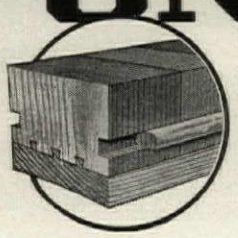
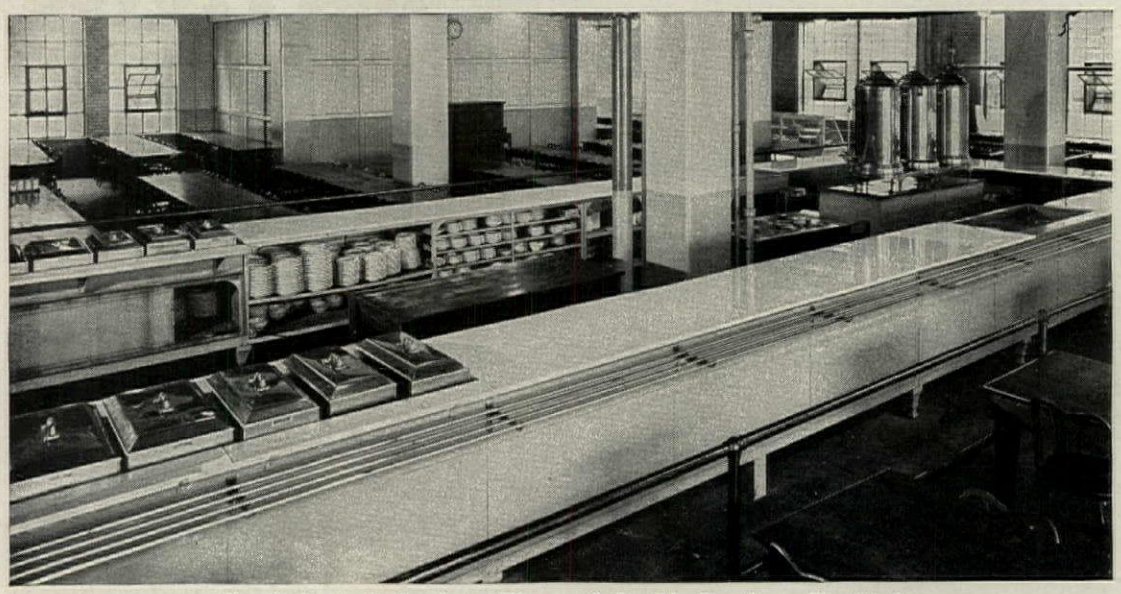


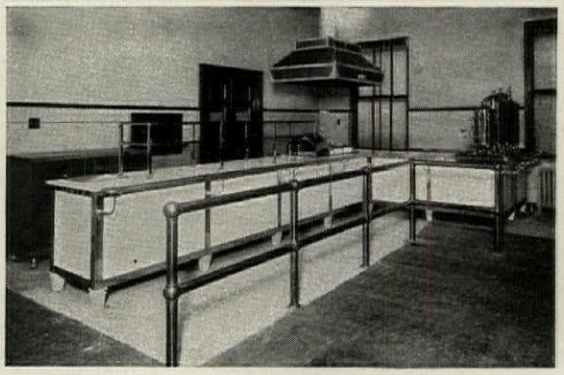
Bloxonend is made of Southern Pine with the tough end grain up. It comes in 8 ft. lengths with the blocks dovetailed endwise onto baseboards

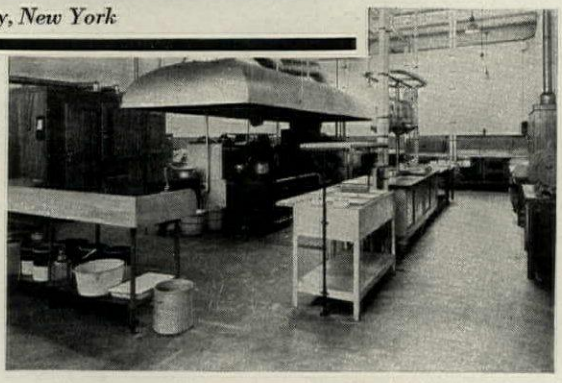
Lays Smooth
Stays Smooth

PLAN WITH INDUSTRIAL



Van Cafeteria in the plant of Procter & Gamble, Port Ivory, New York





Left, Van Cafeteria, Western Union, St. Louis, Mo.

Above, Van Kitchen, Dodge Brothers Plant, Plymouth, Mich.

Below, an unusual cafeteria created by Van for the Berkshire Knitting Mills, Reading, Pa.

VAN ON CAFETERIAS

Just notice the famous names on these pages . . . America's leading industries who have come to Van!

Van cafeterias have been chosen for many of the country's largest industrial plants. The roster of Van installations is an unparalleled recommendation — a series of precedents, indeed, that will impress you or your clients.

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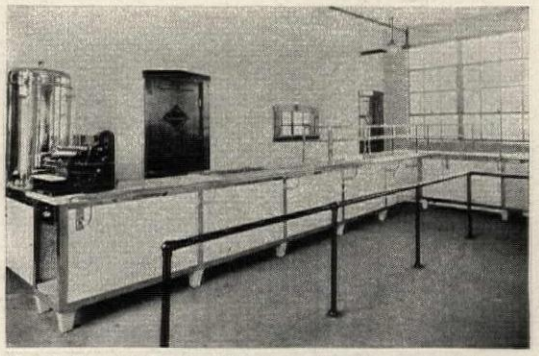

Van Cafeteria, Edison Electrical Appliance Co., Chicago

Van Cafeteria, Goodyear Plant No. 3, Akron, Ohio

Below, Montgomery Ward & Company chose a Van Cafeteria for their Fort Worth establishment

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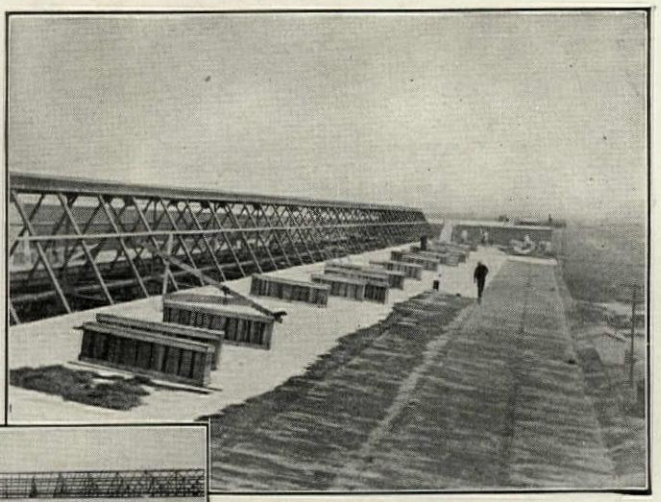
Interior of Bliss & Laughlin plant showing clear light reflecting under surface of Gypsteel roof deck.



Gypsteel roof being laid in severe weather last January.

Method of tying Gypsteel roof slabs to give roof definite computable structural strength.

FOR WINTER INSTALLATION

Gypsteel Pre-Cast Gypsum Roof Laid Quickly Under Severest Winter Conditions

ON the new plant of Bliss & Laughlin, Inc., in Buffalo, New York, 88,290 square feet of roof deck were laid in thirty-five working days in December and January. The weather was so severe that the water proofing could not follow for weeks, yet the job is in wonderful shape.

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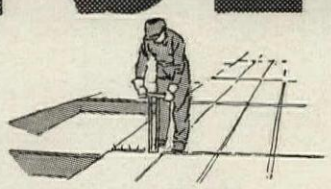
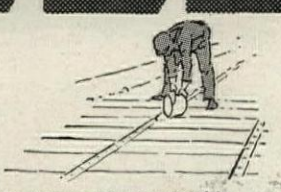
GYPSTEEL

Laying a Gypsteel slab



Tying the reinforcement



Grouting the joints between slabs

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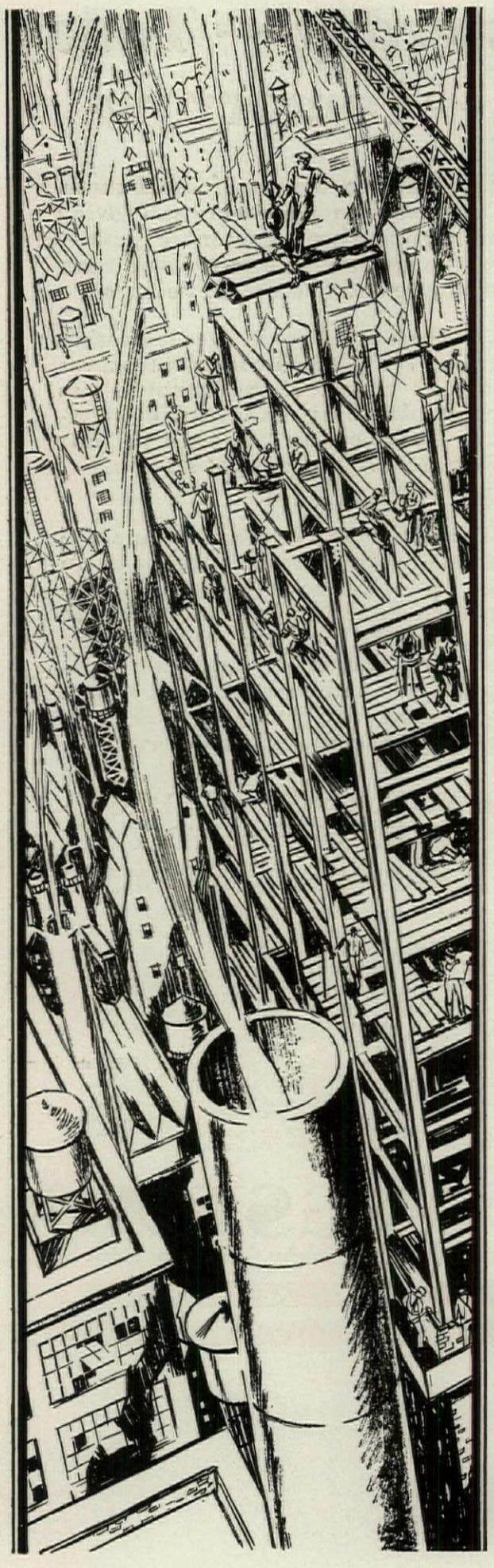

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BOOK DEPARTMENT

THE DESIGNING AND PLANNING OF AIRPORTS

A REVIEW BY
CLIFFORD WAYNE SPENCER

TO be forward-looking is one of the most important characteristics of the successful architect as well as of those engaged in other professions. Architecture should be not only abreast of the times but several steps in advance, so that as soon as an important new industry develops, architects will be ready and competent to provide for the proper housing of that industry in buildings appropriate in design and convenient in layout. It is very evident that the next few years are to see a phenomenal development in the air transport industry all over the world. It is still an infant industry, and the ground has scarcely been broken. Indeed, it does not require a very vivid imagination to visualize in the near future the day when the bulk of all passenger travel will be through the air and when much of the freight will be transported by the same means. It will be a great advantage for people to live in pleasant temperate regions and be supplied with food brought fresh from luxuriant tropical sections in gigantic planes within the period of a very few hours. Such gigantic transportation systems as are certain to develop will require a great number of specialized structures and terminal facilities. As the architects of a few decades past have been concerned with the building of great rail and shipping terminals, so the architect of the future will be called upon to design great airports which will combine many features of railroad terminals with facilities necessary for travel by air. This time is not far distant.

The airports so far developed in America are surprisingly disappointing as to both appearance and convenience, consisting too often of a few dilapidated looking shacks grouped about a dusty, uneven field in the midst of a desolate waste of dumps and ash heaps. Such surroundings have a very definite effect on the popularity of travel by air, since the dispiriting impressions gained at the start and finish of an air trip will do much to counteract the genuine pleasure to be experienced from a trip by air. Certainly a person who has to undergo a combined sand and cinder blast or to tramp through mud and water and ride in cold weather with water-soaked feet will not be in a hurry to repeat the experience. Of course such conditions do not exist at all fields. Some of the newer fields, especially in Europe, are very pleasing and convenient, and the arrival and departure of planes take place with all the smoothness, quiet and order of a modern rail terminal. In many places the planes are warmed up at a considerable distance from the platform and brought quietly into position, and the passengers pass from the waiting rooms to the planes through covered passageways, after which the planes move smoothly away at a signal from a central control. As has been said, the air passenger service in Europe is much in advance of that in the United States, due in a large measure to encouragement from several European governments in the form of subsidies and other aid. This lead of European over American facilities is being cut down through the efforts of private citizens and increased interest on the part of the public.

Some of the newer fields in this country have followed foreign precedent and are models of efficiency and good design. There can be no doubt that such fields will increase rapidly in number, and many forward-looking architects are preparing to take advantage of the opportunities which are sure to arise in this field. In order to supply information to those who design and operate airports as well as to stimulate airmindedness in the general public, Lieutenant-Colonel Stedman S. Hanks, of the U. S. Air Corps Reserve, has made an extended tour of the important airports of Europe and has studied their advantages and shortcomings with relation to the construction of airports in the United States. The results of these investigations and of Colonel Hanks' extensive knowledge of the subject are published in a book entitled "International Airports." The design, construction and operation of the important airports of Europe are carefully studied and compared with some of the best in this country, and there is given considerable information on airport operation in foreign countries which has never before been available in printed form. Many of the most noted authorities and men high in European and domestic air circles have coöperated by supplying information resulting from their vast and varied experience. Among them are Major G. E. Woods-Humphrey, General Manager of the Imperial Airways; Colonel the Master of Sempill, President of the Royal Aëronautical Society; General Sir W. Sefton Brancker of the Air Ministry; A. Plesman, Director of the Royal Dutch Air Lines; M. H. Kahn of the Society for the Promotion of Aëronautics in France: Director Otto Merkel, Dr. Dierbach, and Captain Otto Bertram of Deutsche Luft Hansa; and many other heads of air groups and directors of airports.

The international nature of air travel in Europe introduces many considerations into the study of European airports which as yet have not had much influence in America. However, with lines being established to Canada, Mexico, the West Indies and Central and South America, these factors should be taken into consideration in planning American airports. An important advantage of providing an airport with pleasing, permanent looking architecture is that it conveys to the public mind the fact that air travel is an established thing and is here to stay, a feeling which is not fostered by the American factory shed type of building. As

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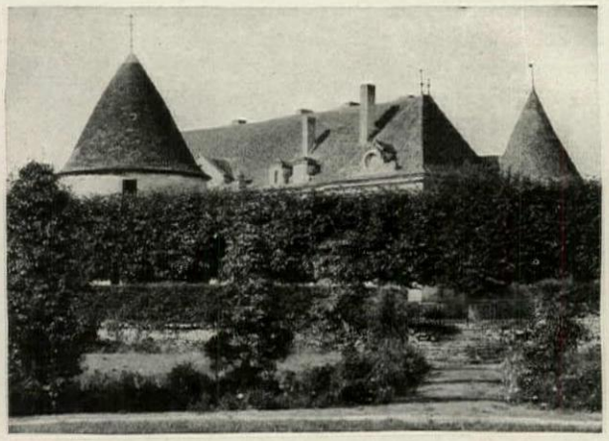
Small Manor Houses
AND
Farmsteads *in* France

By Harold D. Eberlein and Roger W. Ramsdell



Chateau de Missery, Cote d'Or

IN all the wide search for architectural types in which to design and plan the American home, there has been found nothing more beautiful and appropriate than what is called "French Provincial," the term applying to the better order of farm houses, *manoirs,* and even to minor chateaux. It is a type full of graceful informality along with the touch of dignity or sophistication which renders it just a trifle formal; it is expressive of eighteenth century charm, and it suits admirably the needs of the present-day builders of suburban or country homes. In the refined and slightly reticent exteriors of the old French country houses, much emphasis is placed upon excellent architectural lines, while their interiors show carefully arranged and spacious rooms with well placed chimneypieces, doors and windows.

This excellent and authoritative work should be in the library of every architect whose practice includes work of any kind of residence character. It brings to the attention of American architects a type which is fresh and new without being freakish. It includes 254 illustrations from original photographs showing subjects complete as well as in great detail, together with many measured drawings and perspective plot plans. Flat Quarto (7½ x 11 ins.), bound in handsome library blue buckram, stamped in gold, uncut edges with gilt tops.

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THE ARCHITECTURAL FORUM
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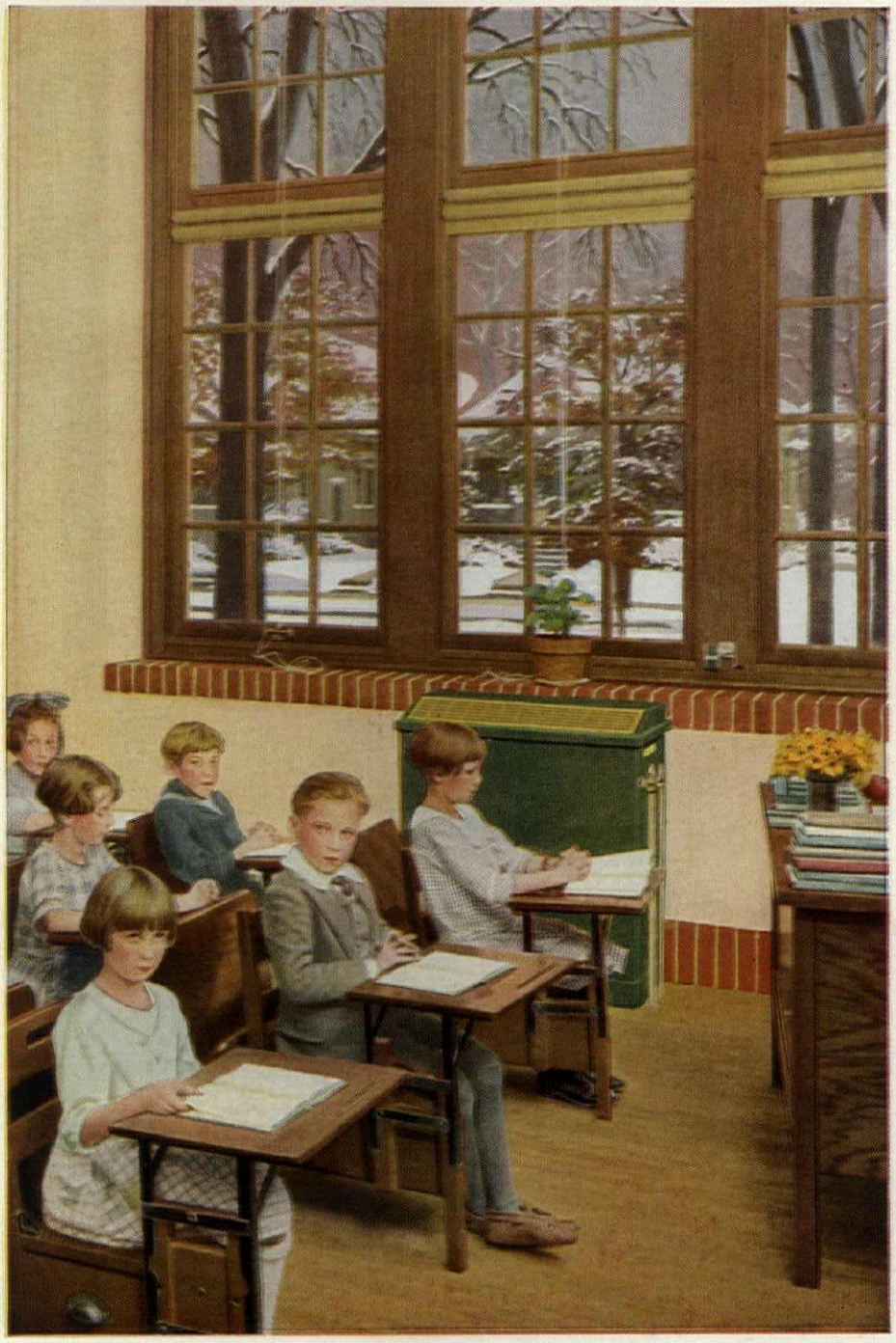
planes of great size are expected to be developed in the near future, the hangars should be made much higher and wider than at present seems necessary, and in the layout of a new field ample provision should be made for a great increase in the volume of air traffic. The mechanical and scientific equipment of the fields should include such apparatus as will supply weather information to the fliers, and a new development in Europe which will doubtless become universal is direct radio communication between the fields and planes in flight. By the use of this service it is possible for a pilot to learn his position by means of triangulation with two stations, even though he be lost in a fog. The safety advantage of this will be quite evident.

The direct results of Col. Hanks' study of European airports is given in the form of detailed descriptions of famous European fields such as Tempelhof at Berlin; Le Bourget, near Paris; Croydon at London; Schiphol at Amsterdam; Waalhaven at Rotterdam; Statens Luftavn at Copenhagen; and Littorio at Rome. Representative American airports are those at Buffalo and the municipal airports at Chicago and at Oakland, Cal. Other ports are shown in plan and illustration and give a very clear impression of what the modern airport should be like. Conditions of European air travel are made clear in the chapter "Impressions of an Air Voyager in Europe."

The airports of Europe closely resemble railway stations, being busy all day long with planes arriving and departing on schedule. The average European airport covers about three quarters of a square mile and has hangar space ample for the largest planes with fuel storage for about 30,000 gallons of gasolene and oil. There is usually an attractive restaurant, and there is a staff to supply reports as to wind direction and weather conditions along an entire route. The handling of passengers and freight at an airport is assuming greater importance daily and requires a considerable staff of operators as well as much forethought in planning. The workings of an air transport system are rather complicated and should be carefully studied by those interested in airport design. It is probable that the bulk of air transport in the United States will soon be concentrated under the control of one or a very few large companies as is the case in Europe where the Deutsche Luft Hansa, Imperial Airways, and Royal Dutch Air Lines carry the bulk of the passengers and freight. In the case of the Deutsche Luft Hansa the airports are constructed by the cities under the guidance of an expert furnished by the Luft Hansa, thus insuring a large number of well planned fields throughout the country.

The desirable features to be included in a well planned airport as described by Col. Hanks include a few briefly summarized points. The airport should be at the junction of several feeder air routes and on a main trunk line with good transportation facilities and close to the business section of the city. If possible the city itself should be located to the leeward of the field so that prevailing winds will not blow smoke over the field. Present practice is to have fields of circular form with eight runways orientated with respect to prevailing winds and not less than 3,500 feet in length. A carefully designed drainage system should be worked out so that the field will not be wet and muddy. Runways where necessary should be smooth and free from dust and should be reached by a paved roadway to allow planes to "taxi" smoothly into



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position for starting. The buildings should be located well away from the field to allow an adequate safety zone and a clear approach. They should be laid out so that traffic may circulate freely without collisions or causing congestion. The structures should be built in accordance with the best practice of modern fireproof construction, and the design be carefully studied for architectural character. The planning of lighting is a most important phase of airport design and is fully treated by Col. Hanks in a chapter on "The Lighting of Airports," as is also the subject of "Communication, Radio, Telephone and Telegraph." A summary of "Typical American Airport Rules and Regulations and Regulations of the United States Air Commerce" gives much useful information as to the actual manner in which planes should leave and enter an airport, all of which should be thoroughly understood by anyone undertaking design in connection with airport construction. A great deal of similar information is contained in the appendices dealing with the International Air Navigation Convention, the Pan American Convention on Commercial Aviation, Typical International Air Commerce Regulations, and the Berlin Airport Company's contract with the city of Berlin.

The complexity of factors entering into the design of airports calls for a highly specialized study of the subject and naturally involves a great deal of coöperation between the architectural and engineering professions in order that the fields may present a pleasing appearance and be scientifically and practically correct. Already men in architectural offices in New York and throughout the country are busy with the design of airports, and as the air transportation industry expands there are certain to be greatly enlarged opportunities in this field. It is hard, at this early stage, to determine just what the nature of the airport of the future will be, but the present tendency seems to be toward combining other features with the actual necessities for flying in order to increase public interest as well as to provide pleasant pastimes for passengers and those awaiting arrival of planes, as at the Littoria Airport in Italy, which is composed of a two-story hangar building, a three-story airplane factory with a three-story observation tower above, a hotel, club house, tea garden, athletic field, and a concrete grand stand. The effect of all this has been to greatly increase the interest of the Roman populace, and other cities may well profit by the example. It is to be hoped that the architectural profession will seize this opportunity.

INTERNATIONAL AIRPORTS. By Stedman S. Hanks. Lt.-Col. Air Corps Reserve. 195 pp., 5¾ x 8½ ins. Price $5. Ronald Press Company, 15 East 26th Street, New York.

RUSSIA, EUROPE AND AMERICA: AN ARCHITECTURAL CROSS SECTION. By Erich Mendelsohn. 224 pp., 9 x 13 ins. Price $6. Architectural Book Publishing Co., Inc., 108 West 46th Street, New York.

IN "Russia, Europe and America," Erich Mendelsohn pictures Europe in a sort of spiritual-economic sandwich. In type, in illustrated material, Europe's part in the work and in the world scheme becomes small. Russia's depth of feeling, intuition, and religious urge, and America's rationalism and unproblematic power of realization are seen as the dominant world forces of the day, —America individualistic and earthy, Russia collective and God-aspiring. This standpoint Mendelsohn presents

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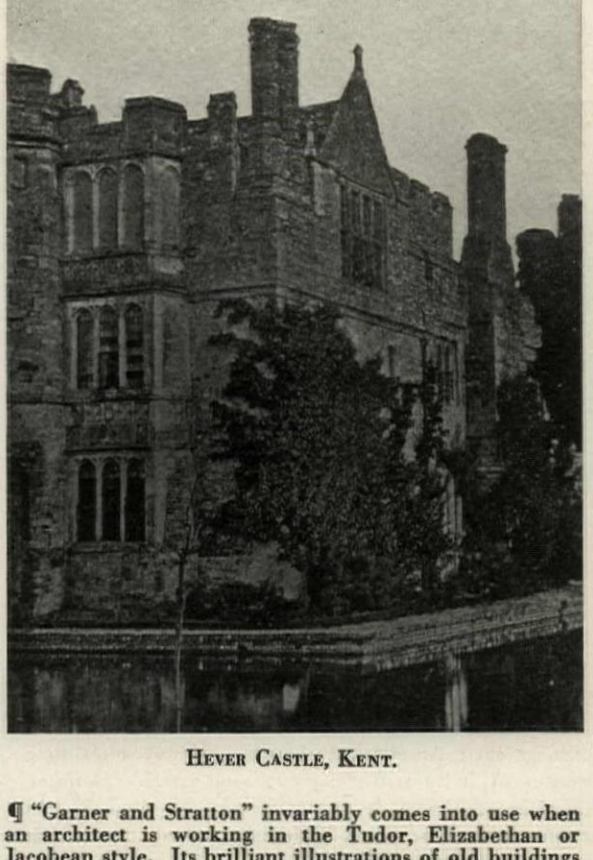

HEVER CASTLE, KENT.

¶ "Garner and Stratton" invariably comes into use when an architect is working in the Tudor, Elizabethan or Jacobean style. Its brilliant illustrations of old buildings may be depended upon to afford precedent for modern work and to supply inspiration for adapting these marvelous styles to present-day use. The difficulty of securing the two volumes, their unusual size, and the fact that they have dealt chiefly with elaborate work have hitherto prevented their wider use.

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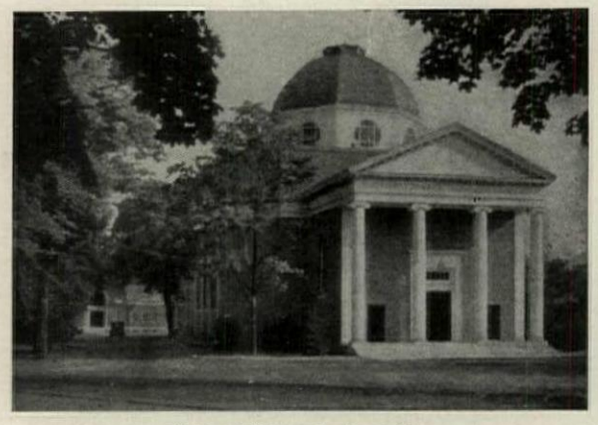
Its Part in the Development of the Campus

By

CHARLES Z. KLAUDER *and* HERBERT C. WISE



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A NEW and ever higher standard is being established for the architecture of educational structures of all kinds. Some of the most beautiful buildings in all America are those venerable halls in academic groves in Charlottesville, Cambridge, Princeton and elsewhere built by early American architects, and now after long decades of indifferent designing and careless planning American architects are rising anew to the situation and are designing educational buildings of every type which closely rival even the best work of a century ago, while in planning and equipment they establish a standard which is wholly new.

¶ In this valuable and important work two widely known architects of educational buildings collaborate in reviewing the entire situation as it applies to college and collegiate architecture. They have carefully studied practically every important institution in the country, and in their text they discuss administration buildings; dormitories; recitation halls; chapels and auditoriums; gymnasiums; libraries; and structures intended for certain definite and specific purposes, such as the teaching of music, all this being well illustrated with views of existing buildings and in many instances with floor plans and other drawings. A valuable and extremely practical work to add to the equipment of any architect's office.

301 pp., 7½ x 10 ins.

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with power in writing and with poetry in illustration. America's steady growth as an industrial organism is depicted parallel with Russia's yearning toward the transcendent human relationship, now changed from God to man, to man and organized society; a yearning born of the frustration of armies of Russians in the war now seeks fulfillment through the technical ability of America to equip society on a collective scale.

In Russia this phenomenon finds expression in the striving for a utilitarianism out of proportion to the means of attaining it. Contrasted are illustrations of the building of a skyscraper in Chicago and a power station in Kief. The building in Chicago springs like a plant from the ground, carrying its own structure and adding cell on cell to its organism; that in Kief resembles the laborious conjuring of a phantasy. For its scaffold, a Russian forest is moved like Shakespeare's wood to the site, and in its branches primitive man squanders material. America has also its thirst to transcend the everyday realization of a technical adroitness,—to express a greater America, wherewith America loses itself in ornament. Nearly all efforts at impressing ourselves in this way Mendelsohn meets coldly, with nothing like the feeling that a justly conceived aspiration is successfully reached. Contrasted with the Iberian gate in Moscow, the Church of the Transfiguration and Wassilij Blaschennyj, anything America has to show in the matter of decorative feeling must of necessity appear impoverished. That the Russians in their detail can also produce trash is exemplified by the Church of the Resurrection. The Russian rush to use of glass and steel, factory chimneys and reinforced concrete is condemned as an illogical substitution of media in expressing idealism. Some of the German feeling for material pushed to its logical final expression has been grasped by the Russians without adjustment to other architectural considerations,—the technique of making these dreams practical, the understanding of how to make them suitable to Russian climatic conditions and Russian economic life. America possesses technique and common sense. Russia, alas, monopolizes imagination and vision and daring. Of New York's "Gateway of the Nation" Mendelsohn says pithily: "It is not alone America's size and wealth which are pathetically symbolized in the Gate of the World."

As the filling in this sandwich, Europe's position is that of adjustment to a situation full of peril and fraught with problems. Europe is pictured as antagonistic to the changing newer world,—out-distanced in wealth and power by America at the start, too spiritually inelastic to make the Russian leap, and too divided for taking concerted action. Yet Europe was ever the *locus* of good sense and genius, of wisdom, and invention. Let Europe concentrate on itself, and in so doing it will concentrate on the constructive basis of the world edifice and the world law. Among the European buildings illustrated in this volume the author reserves the palm for several Dutch structures,—the airdrome at Orly; and with justifiable lack of reticence, his own textile factory at Leningrad. Some slips of logic on the part of Le Corbusier are noted without proffering the usual consolation of reference to him as a "poet." In "America, Europe and Russia," Mendelsohn has, himself, achieved poetry and also an exposition founded on an interest of which not one section but the whole world is the scope.

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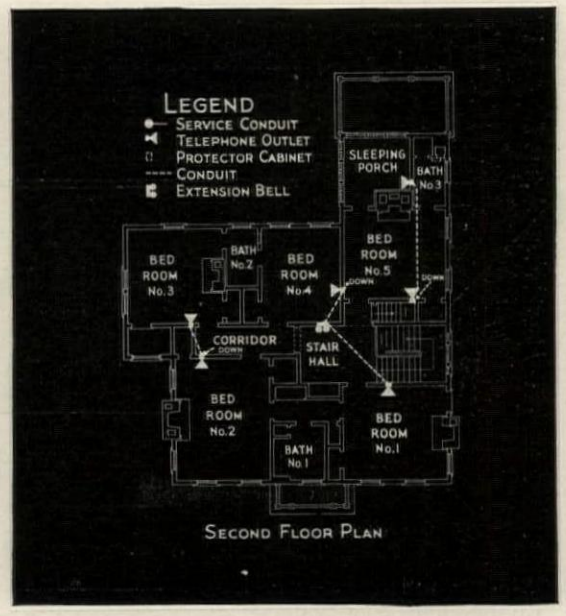

IN PLANNING for telephone convenience in new and remodeled homes, there are many things which must be given consideration: the number and arrangement of telephones to provide greatest ease and comfort in use of the service . . . the location of the telephone service entrance . . . the conduit layout . . . protection to the apparatus from water and extreme heat . . . and many other details.

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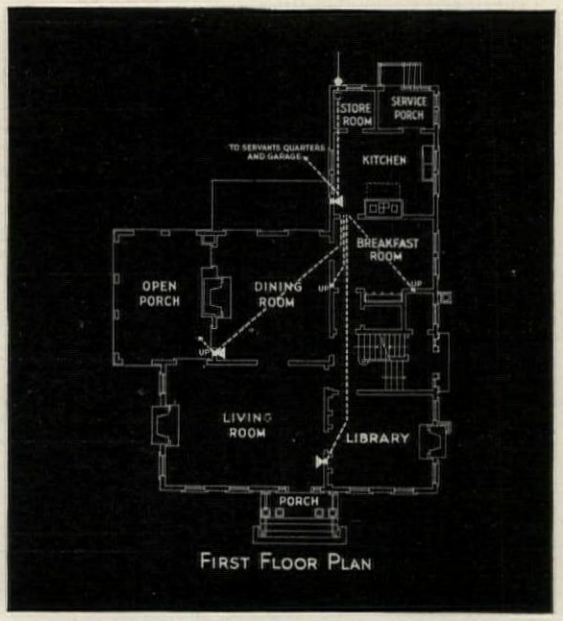

In the residence of Mr. J. W. Goldsmith, of Atlanta, three telephone outlets downstairs and six upstairs provide facilities for installing telephones at convenient locations. There is an additional outlet in the servants' quarters over the garage. Exposed wiring is made unnecessary by the conduit layout. PRINGLE AND SMITH, Architects.

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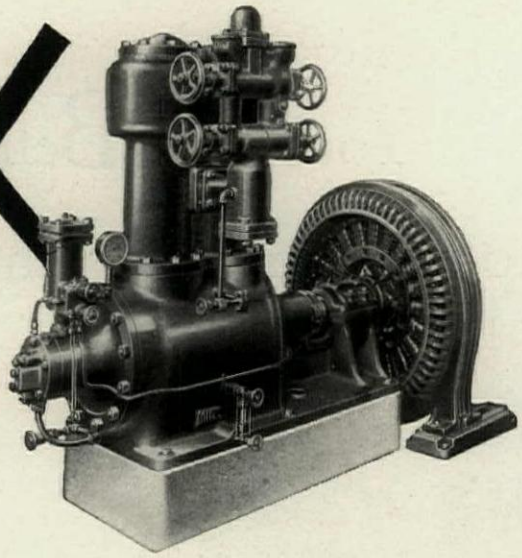

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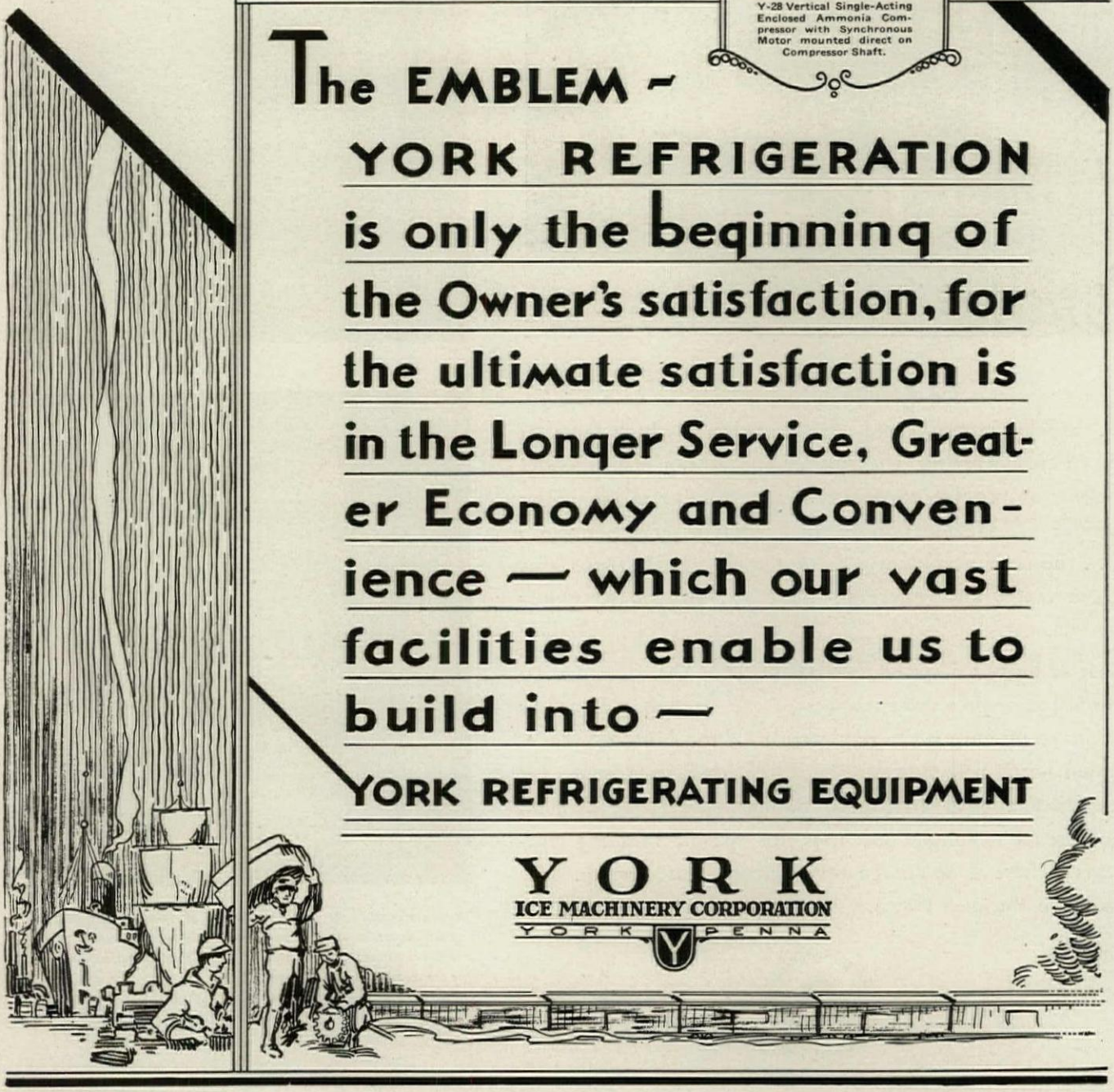

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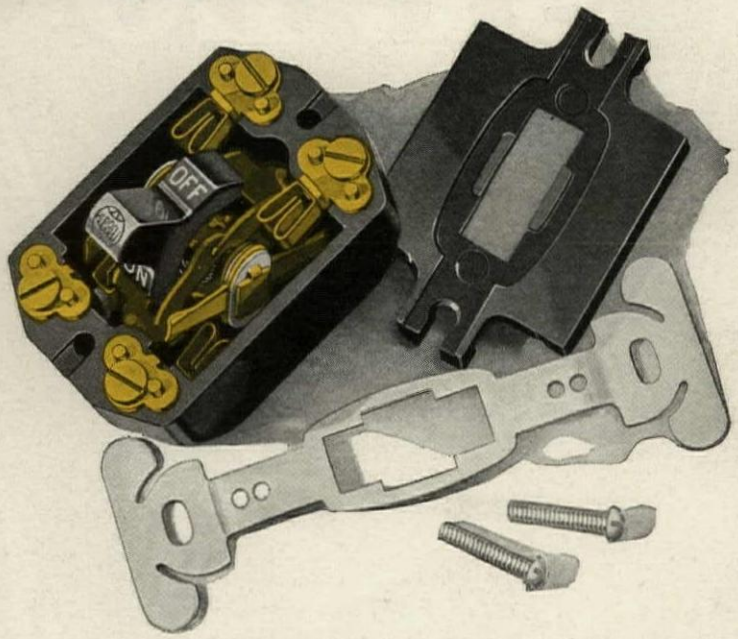

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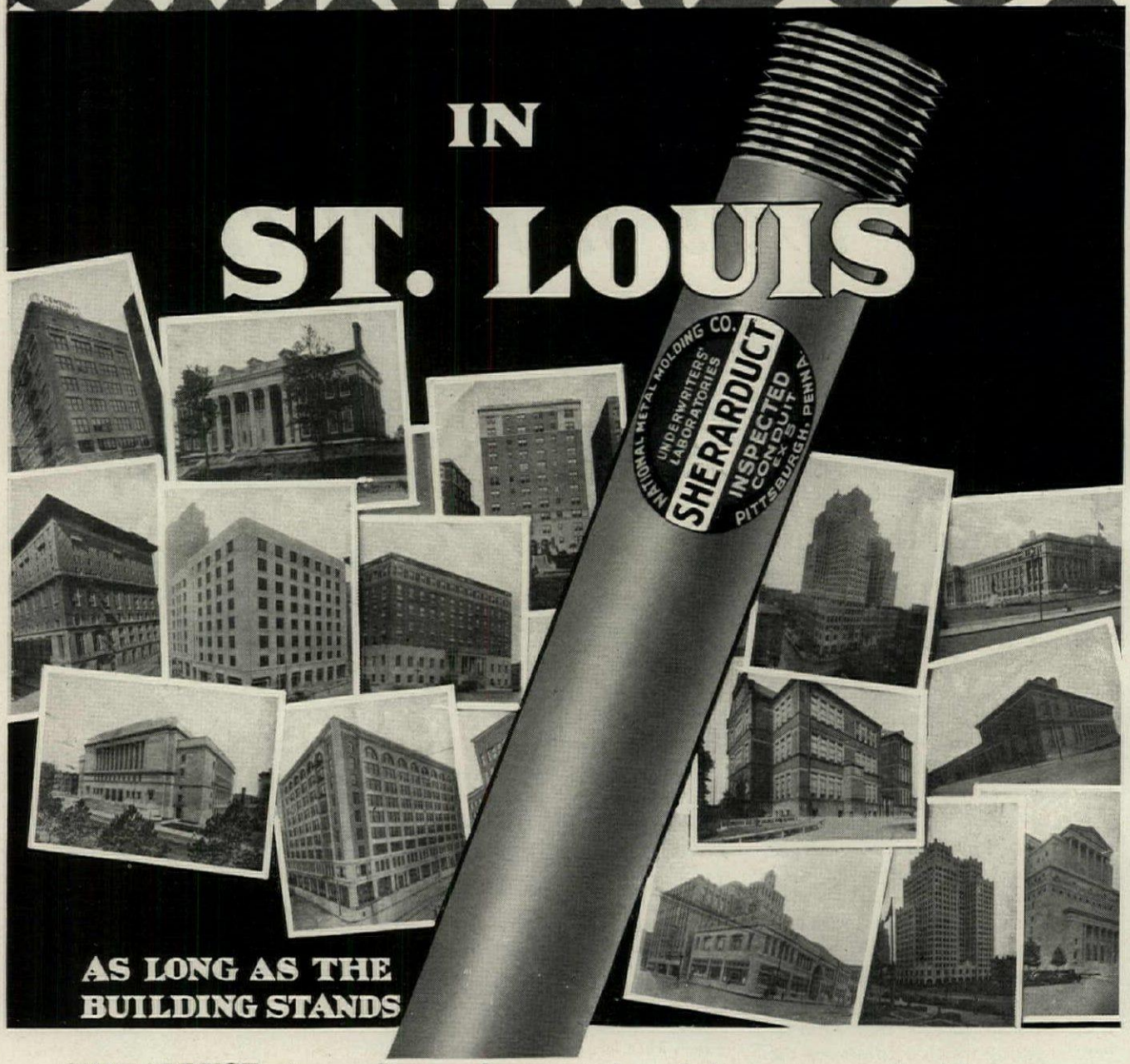

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VOLUME LI — SEPTEMBER 1929

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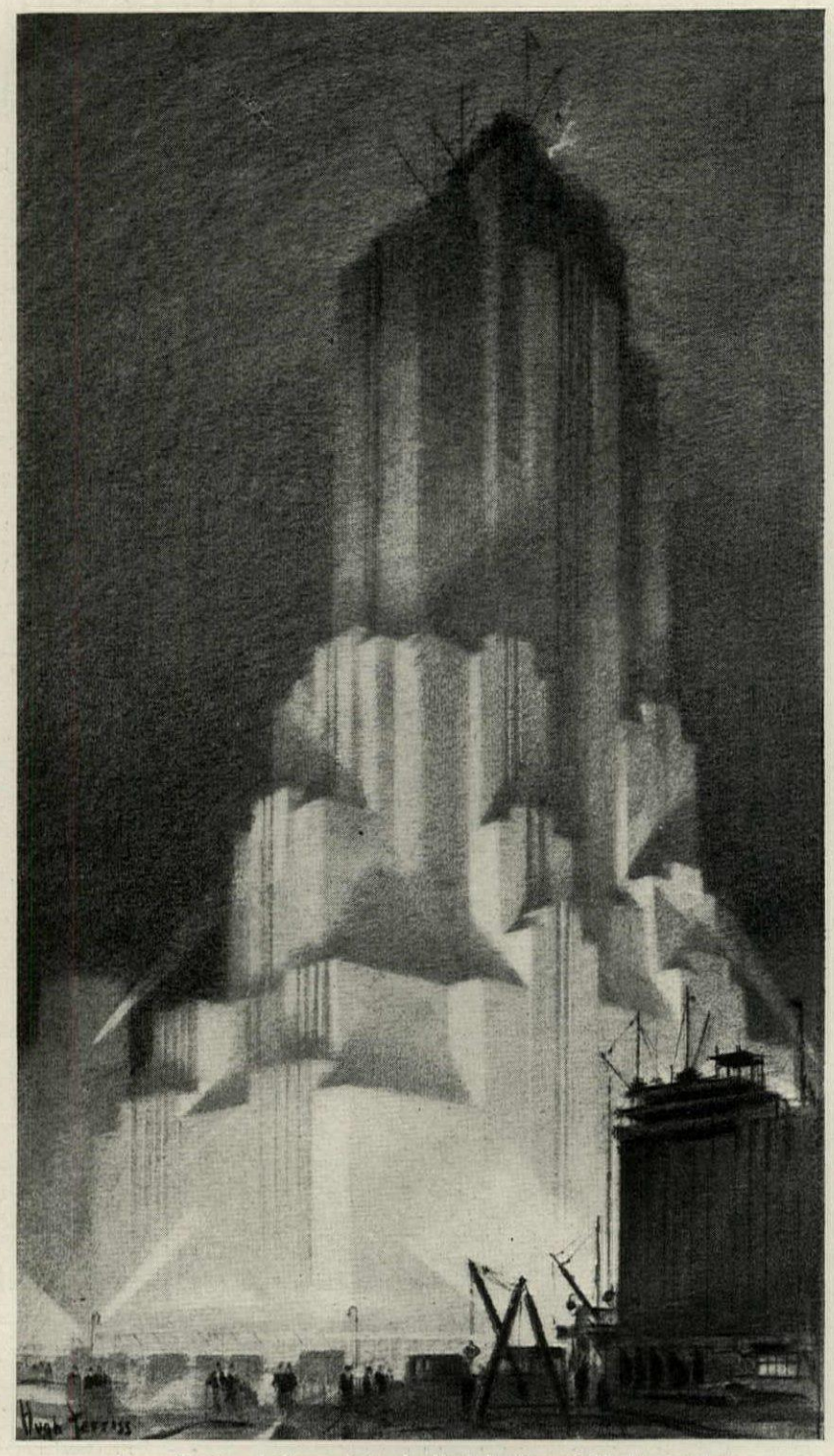

A reproduction of this rendering by Hugh Ferriss, suitable for framing, will be mailed free of cost to any architect

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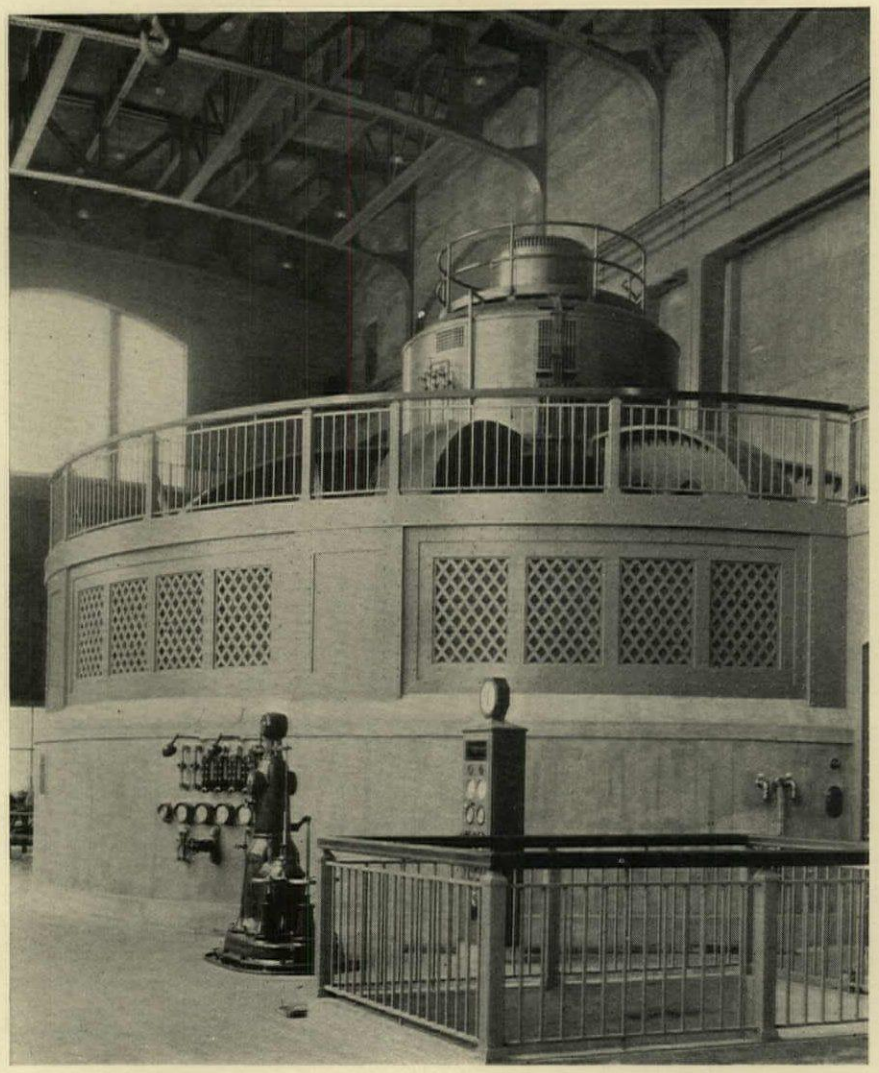

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THE
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VOLUME LI NUMBER THREE

SEPTEMBER 1929

ROOF TYPES FOR INDUSTRIAL BUILDINGS

BY
CARL de MOLL
ARCHITECT AND ENGINEER, THE BALLINGER COMPANY

ONE of the modern archæologists, writing on the development of religious and domestic architecture, considers that the roofs of various buildings are designed in accordance with the ancestry of the people,—whether they are descended from a nomad tribe living in tents or from a clan of troglodytes inhabiting caves. From this he deduces the development of the domed roof in one civilization and that of the peaked roof, carried by posts or trusses, in others. While this is an interesting speculation historically, it has little bearing on modern design.

The roofs of modern buildings are divided, however, into two classes. Roofs of municipal, religious and domestic buildings are designed either for shelter and to keep out the weather, or æsthetically for architectural effect. The roofs for industrial buildings, however, while purely utilitarian, must be designed for a number of different functions. A roof is usually considered simply as a cover for protection from the elements, but as applied to an industrial building, there are many considerations, almost the only function in common being to keep out the rain. Roofs are designed to keep out the sun and also to admit the sun; to keep out the air and also to let out air and gases; and to keep out the light and also to admit the light.

The simplest form of roof is, of course, that over the narrow building, with wood joists spaced closely together, boarded on top, and with some covering of felt or metal similar to that of a small city house. As industrial buildings become larger and more complicated, and as modern production becomes more complex and requires larger units, it is necessary to reduce the number of columns to get wider spaces for modern machinery. This has led to the use of heavy girders and various forms of trusses, the simplest form being the "A" truss, high in the center and low at the eaves, giving a distinct pitch in two directions, with a monitor or two-sided skylight at the apex, where light is needed and sunlight is not objectionable, or a single saw-tooth along the north side so as to afford light without direct sunlight's entering the building. This, of course, is only possible where the trusses run north and south. The trusses of a Howe, Pratt, Warren or lattice type can be used, and these are made of either wood or steel, depending on the length of the span.

In a roof constructed of steel trusses, the columns should be fireproofed, and unless the roof is very high above the floor, all of the steel should have a fireproof covering of concrete or some similar material. This is not so necessary in a building equipped with automatic sprinklers, but it should be considered, especially where the spans are large and where the destruction of one truss would wreck a large area of roof. There have been a number of very interesting types of wood trusses developed, some of which are made of relatively thin material, spiked together without the use of heavy steel rods. These are usually of some form of the lattice truss, and can be made with flat or curved top chords and have even been designed for an extreme overhang for use in grandstands of race courses, where a line of posts along the front would be very much in the way. These are, of course, much cheaper than a steel truss of the same span.

In some modern manufacturing plants in this country, where the buildings are several hundred feet wide and over 1,000 feet long, the question of providing proper ventilation is very serious, due to the fact that in the summer most of our prevailing winds are from the west and south. This means that it is difficult to get ventilation through the plant without some artificial assistance. Also in the construction of buildings of

Super-span Sawtooth Roof of the Atwater Kent Manufacturing Company, Philadelphia
The Ballinger Company, Architects and Engineers

these enormous areas, it is necessary to obtain most of the light through the roof. This can be done, first, by the use of glass laid into the body of the roof; secondly, by using flat skylights following the approximate slope of the roof without ventilation; third, by using vertical or slightly sloping sash on the sides of monitors, projecting above the roof surface, these sash, pivoted or hinged, allowing the hot air to escape or fresh air to enter; and lastly, by constructing what is known as the "sawtooth" roof, which derives its name from the similarity between the cross-section of the roof and a saw. These are usually built with the glass facing the north, the glass being either perpendicular or built on a slight slope, and the rest of the roof being solid, sloping from the top of one sash to below the bottom of the next sash to the south. This form of roof affords the greatest amount of light with the least quantity of direct sun at the work level, and as the light is almost entirely from the northern part of the sky, it has a much steadier intensity than light from any other direction. This type of roof was developed in England many years ago for textile mills, and it is still the best for most forms of production requiring strong light.

For many years these sawtooth roofs have been designed with a great number of posts. As these were usually very much in the way, the next development was to raise the entire roof high enough to get a truss of the Howe type to carry a number of skylights across the building. This, of course, raised the side walls and also increased the cubic contents of the building, not only increasing costs, but also increasing the cost of heating. A much more economical method of framing sawtooth roofs without columns is what is known as the "super-span construction." This system was developed and patented by The Ballinger Company, of Philadelphia, and employs both longitudinal and transverse trusses. Back of the glass is an ordinary type of truss which supports the roof longitudinally for a distance of from 60 to 70 feet. These trusses, in turn, are supported at intervals of up to 70 feet by a heavier transverse truss whose bottom chord is at the same level as the valleys, and whose top chord extends outside the sawteeth, connecting their peaks one to another, the structural members of the skylights becoming the struts and braces. It is similar to an ordinary bridge truss, except that the angles of the web members are not equal in each pair. With this system of framing, spans of 100 feet in width and of any length are constructed at only a slightly greater cost for the building than for a sawtooth roof constructed on columns in each valley. If widths greater than 100 feet are to be roofed, a row of columns with a maximum spacing of 70 feet is required for each 100 feet. In the spacing of a large number of similar machines in a limited floor area, we find that the omission of columns is of great importance. In a building 100 feet wide, roofed with a clear span, it is frequently possible to put from 15 to 20 per cent more looms than in a building with three lines of columns.

Another type of roof construction is the arch, which may be of masonry, concrete, bow-string truss or a type of lattice truss. One of the best examples of roofs of this character was the steel arch roof formerly over the train shed in the Broad Street Station, Philadelphia, which

Sawtooth Roof of the John Warren Watson Company, Philadelphia
The Ballinger Company, Architects and Engineers

had a span of 300 feet and a rise of 108 feet. This was destroyed by fire, and as this type is very expensive to build, and very high in maintenance cost, it is, undoubtedly, obsolete.

There have been a number of roofs built of the curved truss similar to a Howe truss, in which the thrust is taken care of by tie-rods. In continental Europe a large number of factories are being built with concrete arch roofs of up to about 50-foot span. These are very interesting pieces of construction, due to the extremely economical use of material. A roof of 45-foot span is built with a 4-inch concrete slab with a rise of about 8 feet, and with a radius of about 32 feet. There are ribs of 6 x 8 inches spaced on 16-foot centers, with reinforced concrete tie-beam of about 6 x 8 inches at the spring lines under each of these ribs. These roofs look very well and are remarkably economical in continental Europe, due to the fact that building materials are relatively high in price and labor costs very low. The writer does not know of any case where these have been used in this country. There are, of course, many shapes and designs which have been used for roof construction, due to irregularities of plant or unusual conditions, but in industrial construction, it is more economical to use the simplest form possible, designing beams or trusses to use standard shapes.

The construction of the roof between supports may be concrete slab, either stone or slag concrete, or concrete made of cinders. These concrete slabs are erected with wood forms, or in some cases with a stiffened wire reinforcement, upon which the concrete is applied without supporting formwork. Another similar type is built of corrugated galvanized iron with concrete slabs, without reinforcement. Other types are cast gypsum, either cast as in the case of concrete, or made of slabs of gypsum cast in forms on the ground and set in place; wood plank or large slabs made of baked terra cotta tile, cement, concrete tile or a tile made of asbestos and cement. There are also roofs simply covered with corrugated galvanized iron or corrugated asbestos lumber. Most of these types of roofing, of course, have to be covered with some waterproofing material. Where the roof is steep, it can be covered with wood shingles, asphalt shingles, asbestos shingles, felt roofing combined with either tar or asphalt, with or without a crushed slag or stone surface, or in some cases with a prepared felt roofing which is applied in long sheets cemented together along the edges. Where the roof is flat, it is necessary that this felt roofing be an impervious membrane, as there is always danger of a certain amount of water's remaining on the roof during or after heavy rains. Where the roof is used as a promenade, or where there is much foot traffic over it, it is necessary to apply terra cotta tile or heavy slate on top of the membrane to take the wear.

In all roof coverings, the most important point seems to be the flashing, that is, where the roof connects with gutters or connects to the side walls, most of the leaks occurring at these points, and as this portion of the roof is usually the flattest, most of the walking over the roof, and therefore most of the damage to the roof, takes place at these points. The ideal flashing is one that is water-tight, flexible, and not affected by temperature changes, as the difference between temperature in the sun in summer and the extreme cold in our northern winters, will amount to nearly 170 degrees, sometimes more.

Sawtooth Roof of the Building for Leland Electric Company, Dayton
The Ballinger Company, Architects and Engineers

One of the most important questions in the design of a roof is the condition of temperature and humidity which is to be maintained inside of the building. We are tending more and more to carrying certain ideal atmospheric conditions inside of our manufacturing plants, without regard to conditions outside. For many years it has been necessary to humidify most textile plants, not only to keep the fibers in proper working conditions, but also to avoid formation of static electricity. We find today that more and more plant owners are desiring a very accurate control of humidity, that is, within one or two degrees. This means not only humidification in the winter, but de-humidification in the summer, and with this high humidity, great care must be taken not only with the insulation of the roof, but frequently with many of the structural members. The water from the atmosphere will condense on the various parts of the roof and drip to the floor, and on the machinery or material in process of manufacture. We are, therefore, using fixed glass in our sawtooth skylights, putting adequate condensation gutters under this glass, and insulating the roofs with cork or other insulating material. Even in buildings where excess humidity is not a factor, we find in the far north that the insulation of a roof is frequently economically justified, due to the large reduction in the cost of heating the top story. In certain plants, where there are corrosive fumes, it is necessary to use non-corrosive metals in the flashings and the sash bars. These are made of Monel metal in some cases, and in other cases, of lead.

The most important thing in the construction of roofs of large areas is the recognition of the relatively large amount of expansion and contraction of the entire roof, due to temperature changes. This imposes serious strains on roof flashings, and on metal sills of continuous skylights. Failure to compensate for these stresses is the cause of the majority of roof leaks in buildings of this character. As our modern civilization is so intense and all work is done at such high pressure, it is important that every building should be designed for the most efficient use. Only in this way can the fatal date of obsolescence be moved far ahead in the future. We know that by careful design, a building is available for use a great many more years than formerly. It is, therefore, imperative in the designing of a modern production plant, that the best engineering service be obtained, as only by the employment of experienced experts in architecture and engineering is it possible to obtain the best and most efficient building for the least expenditure of the manufacturer's money.

FLOORS AND FLOORING FOR INDUSTRIAL BUILDINGS

BY

WALTER M. CORY

CONSULTING ENGINEER

THE selection of proper floor wearing surfaces is of prime importance in the design of modern industrial buildings. The floors are subjected to a large variety of severe services, and failure of the floor surface to stand up under operating conditions may cause damage to merchandise or structure resulting, directly or indirectly, in appreciable financial loss.

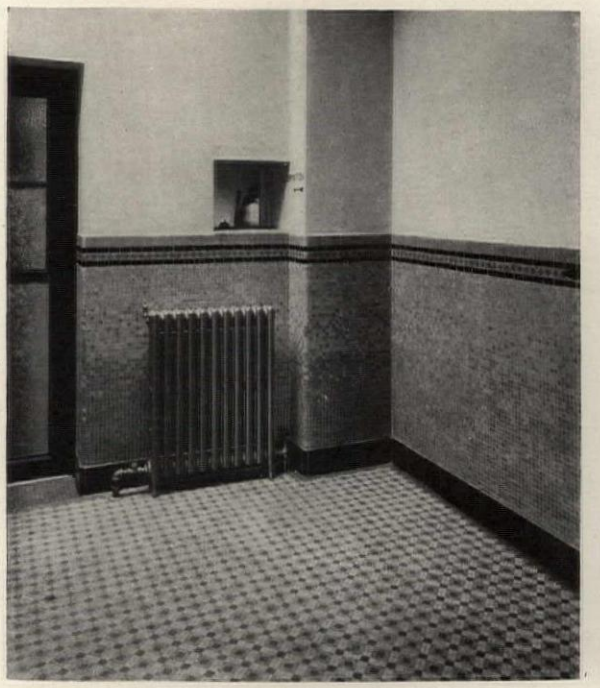
The careful designer will make a thorough study of general and special requirements in each division and sub-division of a plant and then select a suitable wearing surface for each. In studying the subject of floor wearing surfaces, it is necessary to inquire very thoroughly into the work to be performed thereon. Often a rather obscure condition, such as water or oil drippage from manufacturing processes, will eliminate use of a surface which would otherwise be ideal. Often requirements are so exacting or conflicting that no known floor surface properly meets the condition, and the designer is forced into unsatisfactory experimentation, or else he must openly use that which most nearly conforms to requirements.

Economic considerations naturally play an important part in the selection of floor surfaces. One must not only take into consideration the initial cost of the floor in place, but must also include the cost of any special finishing treatments, increased structural costs due to the possible added dead load, and maintenance costs, and at the same time obtain a satisfactory equivalent rental cost for the entire structure. Another important consideration which must not be ignored is the reluctance of financial and loaning interests to view single or special use buildings with the favor accorded general or multi-use structures, for obvious reasons.

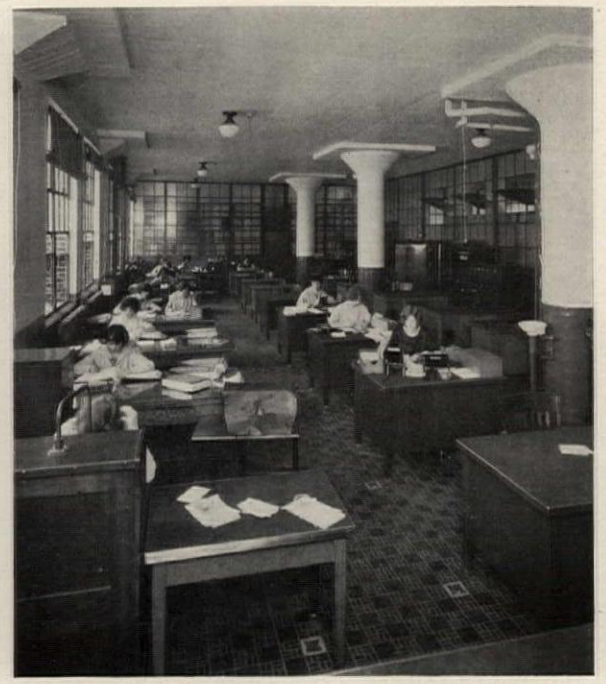
The floor designer should generally use recognized standards except where occupancy demands special treatment, and in selecting these surfaces he should choose that most adapted to other uses and requiring the least amount of special construction for its proper installation.

The present-day industrial plant usually covers a very wide range of operations in which a dozen or more types of floor treatment are required to properly meet the needs of a single building. No one flooring material is adapted to all the different manufacturing processes.

A typical industrial plant manufacturing a commodity combining textile, metal and wood working departments may call for use of all these kinds of floor surfaces throughout the building:



Tile Used in an Entrance Lobby



Embossed Linoleum in Office Space

Battleship Linoleum Floor in the General Offices

Entrance lobby ..... *marble.*
Passenger elevator floor..... *rubber tile.*
General office..... *linoleum.*
Private offices..... *carpet.*
Drafting room..... *hardwood.*
Receiving and shipping dept... *metallic hardened concrete floor.*
Sewing machine rooms..... *factory maple.*
Machine shop and press room.. *wood block*
Plating room..... *mastic.*
Foundry ..... *earth.*
Toilet rooms..... *glazed tile.*
Stairs and passageways.. *concrete, with non-slip abrasive metal.*

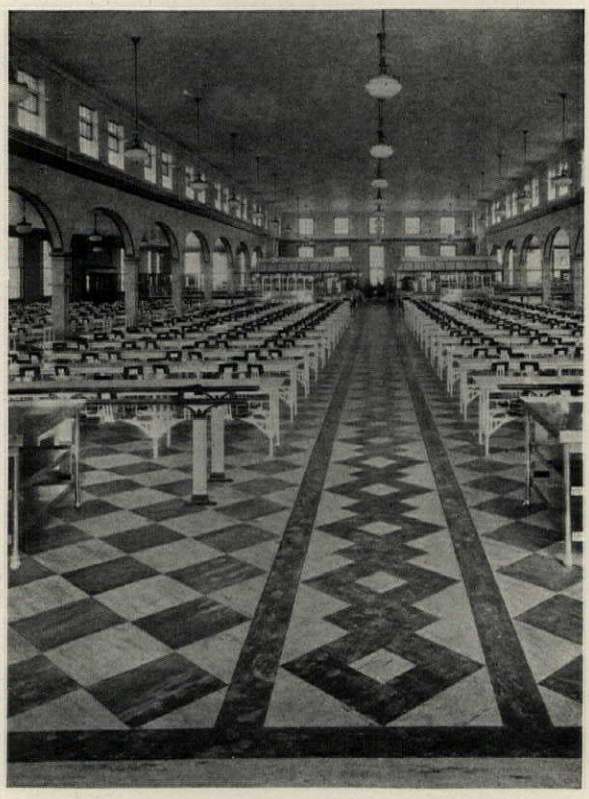
It does not follow that a proper selection of floor surfaces for one building will apply to another structure, even if used for manufacturing similar commodities. Different processes, methods of handling, class of personnel, location and financial considerations would probably result in quite a different selection of floor surfaces.

The designer should acquaint himself with the early history of the subject, as this will be of great value in getting a proper perspective. A brief historical sketch of the subject during the last quarter century may be of general interest, as the evolution of this phase of industrial building design has been influenced by the general trend toward economical, effective, fireproof and sanitary factory construction.

The industrial building in common usage about the beginning of the twentieth century was the so-called "mill type" structure. This type consisted of brick bearing walls with timber columns, girders and hardwood flooring over wood joists. Good prime hardwood was then economical and readily obtainable, and it made excellent floor wearing surfaces, particularly for the textile industry.

Several serious fires focused attention on one of the shortcomings of the mill type building and finally resulted in a modification of the design and produced the "slow-burning type mill" building. This type of construction retained the brick bearing walls and timber columns and girders, but called for all timber to be planed and free from sharp corners, and substituted timber beams spaced from 4 to 6 feet apart with planed, splined, plank underfloor and a hardwood wearing floor.

Iron and steel soon entered into the construction of these buildings, first by the substitution of Lally columns for the wood columns, and later structural steel was substituted for the columns, girders and beams. The use of structural steel in building construction work made it possible to construct higher buildings without too much loss of floor space due to columns, and the use of the bearing wall type of building gradually gave way to that of the skeleton type of construction, which, as its name implies, depends



Rubber Tile in the Cafeteria of Textile Machine Works

on a skeleton for its strength, and the materials composing its enclosing walls, floors, etc., are primarily determined by other than structural considerations.

The transition to structural steel developed the need of fireproofing the structural members. In the slow-burning mill type buildings, the plank underfloor had served to carry the floor load to the beams. It was necessary to use fireproof construction to carry the floor loads to the beams and floor arches. These were first of masonry, and later concrete arches were developed to meet this requirement. At first the hardwood floor wearing surface was retained on top of the fireproof arch, but progress in the use of concrete gradually made this material a contender for the floor surface as well as for the supporting arch.

Concrete was used in industrial building work to a limited extent early in the century, but many years elapsed before reinforced concrete began to make serious inroads on the older types of construction. With the improved design of exteriors of this type of building, introducing architectural effects in the concrete itself, as well as using brick veneer, reinforced concrete soon practically dominated the multi-story industrial building field, and concrete has become a strong competitor for supremacy as a floor wearing surface. This material has many of the basic requirements of the ideal floor for general purposes

Machine Shop Floor of End Grain Wood

Metallic Hardcured Concrete Floor for Heavy Duty

and receives full recognition in present-day floor design. It is economical in first cost; the wearing surface may be considered part of the structural design; it can be made hard, practically impervious, sanitary, fireproof and inert, and is almost universally obtainable. Concrete has its limitations as a floor surface, however, and will not satisfactorily serve for numerous special uses. Oil and acid have injurious effects on concrete; water on floors, if in quantity, will penetrate the minutest cracks in suspended floors; application of intense heat will cause concrete to disintegrate; alternate applications of heat and water are likely to produce spalling. Hardening of concrete is influenced to some extent by the weather and the method of finishing as well as by the mechanics or workmen doing the actual finishing. It is, therefore, more or less non-uniform. Hardness, too, militates against its use in many cases, and the more decorative and artistic floor surfaces supplant it in others.

The floor surfacing industry has been experiencing steadily increased demand to meet both economic and special requirements, and we can look for considerable activity in this field. The enormous increase in the use of metal in almost every commodity has resulted not only in a demand for floors capable of withstanding the heavy duty entailed but also many complementary services in such places as plating rooms, rust-proofing rooms, etc. The early foundries were in one-story buildings with earth floors, but it is

Applying a Coating to a Concrete Floor to Make it Hard and Dustless

not uncommon now to find these activities on upper floors of multi-story buildings, and the floor wearing surface must meet the requirements.

No attempt has been made in this article to recommend any particular type of floor, as each may be used to advantage by the skillful designer, and the confines of such an article are much too small to treat even one material exhaustively. In my practice, I check each material against the two requirements always present,—first, the service required, and, second, the cost of such surface treatment.

In general, concrete should receive first consideration in the floor wearing surface for any given service. It is usually possible to add a hardener, a waterproofing ingredient, or a coating to meet the majority of the general requirements. Concrete fails to meet many of the special requirements, and this fact opens the door to use of a large variety of special floor surfaces.

Depletion of the forests has made prime hardwood too expensive for industrial floor surfacing, except where its qualities are specifically required. This material makes a clean, resilient, warm and serviceable floor and is widely used, as flat grained maple for textile rooms and recreation spaces, and as end grained blocks for machine shops and similar usage. Oak also may be used to advantage under certain conditions.

Marble, travertine, vitrified tile, brick, slate and stone represent a class of wearing surfaces which are being used in increasing quantities in industrial building lobbies, entrances, etc., along with the growing demand for the display of a reasonable amount of individuality and æsthetic expression in the modern industrial building rather than viewing the structure as a mere enclosure to house an industry. General composition, individual taste, and financial consideration will usually dictate the choice of the materials.

Linoleum, rubber tile, carpets and composition floors are of a group which have numerous special uses in the industrial building and are particularly adapted to office use.

Mastic floors have proved exceptionally effective where acids or large quantities of water are encountered, and considerable success has been had in using this material for heavy trucking such as is common in printing plants.

The earth floor probably is without equal for the foundry floor, and it is used wherever possible for this occupancy. We have been discussing the adaptability of various materials for floor wearing surfaces in industrial buildings under the assumption that proper preparation, application, workmanship, protection and care in service are provided in each case.

If proper bond is not obtained between the sub-floor and the finished floor, the floor surface is likely to break down due to causes which would not affect the floor if a good bond were secured.

Proper workmanship is just as important as the correct design or use of proper materials. One must remember, too, that even after satisfying these three conditions, failure may result, for well bonded, well laid floors can easily be ruined by careless or insufficient protection immediately after laying and before the process has been completed.

If a floor is to give good and lasting service, it must not only be well designed, of proper materials and of good workmanship, but it must be known that the bond between the floor and the floor surface is complete, that the material has been protected from water, heat, cold, being used, etc., or if it be of a type which requires special finish after being laid, that the special treatment has been expertly given, and, last but by no means least, it must be serviced or maintained by the application of the several treatments which may be required depending on the material used, such as waxing, oiling, the use of water for cleaning or its non-use, etc. These special treatments as to the care of the floor should be insisted upon by the designer to the extent that he should see that full and complete instructions are placed in the hands of the owner and their importance forcibly brought to his attention.

It is only by adhering to all these principles under the present development of floor service treatments that the designer can hope for success.

ESTIMATING THE COST OF INDUSTRIAL BUILDINGS

BY

H. H. FOX

VICE PRESIDENT, TURNER CONSTRUCTION COMPANY

THE three usual kinds of estimates of the costs of industrial buildings are: (1) the cubic foot estimate; (2) the square foot estimate, and (3) the quantity survey. It is assumed that for the readers of THE ARCHITECTURAL FORUM no definition of these terms is necessary. The cubic foot basis and the square foot basis are similar in accuracy and reliability,—it might be more correct to say, in inaccuracy and unreliability. Neither is of any value unless used by a person of judgment and experience. Both experience and good judgment are needed.

A fourth method involves a compromise between the cubic foot estimate and the quantity survey. It might be called the "broken down" cubic foot method. It is based on a tabulation of the cubic foot cost of every trade in a number of actual buildings. Heating, for instance, in a series of industrial buildings, may vary in cost from 1¼ cents to 2½ cents per cubic foot; plumbing from .8 cent to 2 cents. When a sufficient number of analyses of this kind are available, it will be possible by considering the requirements in each trade separately to build up a total cubic foot cost for a completed building which will be more reliable than the cubic foot cost as usually determined.

This table shows cubic foot analyses of four industrial buildings:

Building No.	(1)	(2)	(3)	(4)
Structural Trades:				
Excavation;	$0.012	$0.007	$0.020	$0.007
Piles;	...	...	...	.014
Reinf. concrete;	.079	.077	.100	.075
Miscel. iron;	.004	.004	.005	.003
Masonry;	.005	.004	.008	.007
Windows (including glazing);	.004	.006	.006	.010
Roofing and S. M.;	.003	.003	.002	.004
	$0.107	$0.101	$0.141	$0.120
Finishing Trades:				
Cement floor;	$0.009	$0.006	$0.005	$0.007
Ext. cement finish;	...	.001	.002	.004
Doors, millwork and hardware;	.007	.007	.008	.014
Plaster and M. L.;	...	.001	.001	.002
Painting;	...	.004	.008	.006
Metal toilet parti.;	...	...	.001	.002
Special items.	.001	.002	...	.006
	$0.017	$0.021	$0.025	$0.041
Mechanical Trades:				
Plumbing;	$0.007	$0.009	$0.010	$0.012
Heating;	...	.012	.015	.023
Wiring;	...	.009	.006	.006
Sprinklers;	...	.007	.010	.009
Elevators;	...	.008	.013	.003
Ash hoists;	...	.001	...	...
Stack;	...	.001	.001	...
Tank and supports.	...	.001	.002	.001
	$0.007	$0.048	$0.057	$0.054
General Conditions	0.020	0.026	0.050	0.037
Total (without fee)	$0.151	$0.196	$0.273	$0.252

In determining the proper cubic foot cost to be applied in a given case, these items should be carefully considered:

1. *Foundation Conditions.* When tall buildings are placed on soil, especially on city plots where the footings cannot project beyond the building lines, the footing designs become complicated and expensive. New York is fortunate in having rock foundations for so many of its tall buildings. Piles of ordinary length, supporting a building designed to carry average industrial live loads, will add from 2 to 4 cents to the cubic foot cost of the building.

Foundations along a water front or on an old shore line beyond which new land has been made, may be very expensive both because of the depth to which it is necessary to go in order to find solid bottom, and because of old cribs or scows which may be encountered far below the surface and which will interfere with pile driving. The writer knows of one such case where the foundations of a building cost as much as the land on which the plant was built.

2. *Floor Loads and Column Spacing.* The cost of a building is increased by increasing the live loads or by widening the column spacing. If we take as a base the cost of a reinforced concrete building designed for live loads of 150 pounds per square foot and having 20 x 20-foot column spacing, the increase in cost per square foot caused by heavier loads or wider column spacing is approximately as shown in this table, assuming good foundation conditions, a height of six or eight stories, and that no structural steel column cores are to be included:

BUILDING NO. 1

Five-story and basement grocery warehouse, 273 by 105. Floors reinforced concrete; flat slab construction; 200-pound live load. Bays 21 feet square. 4-ton soil bearing. Concrete exterior. Total floor area, 166,500 square feet. Area of floors and walls, 229,000 square feet. Volume, 2,072,000 cubic feet

Live Load	Column Spacing 20′ x 20′	Column Spacing 25′ x 25′
150 pounds	0	$0.15
200 "	$0.08	0.25
250 "	0.18	0.37
300 "	0.28	0.48

3. ***Story Heights.*** The square foot cost of a building equals the cubic foot cost multiplied by the average story height. A building costing 25 cents per cubic foot and having 12-foot story heights will cost $3 per square foot. If the story height is increased, the cubic foot cost will decrease because the cost of the floor construction will be divided by a greater height between floors; but the cost per square foot will increase, because there are more wall area, more heating, etc., per square foot of floor.

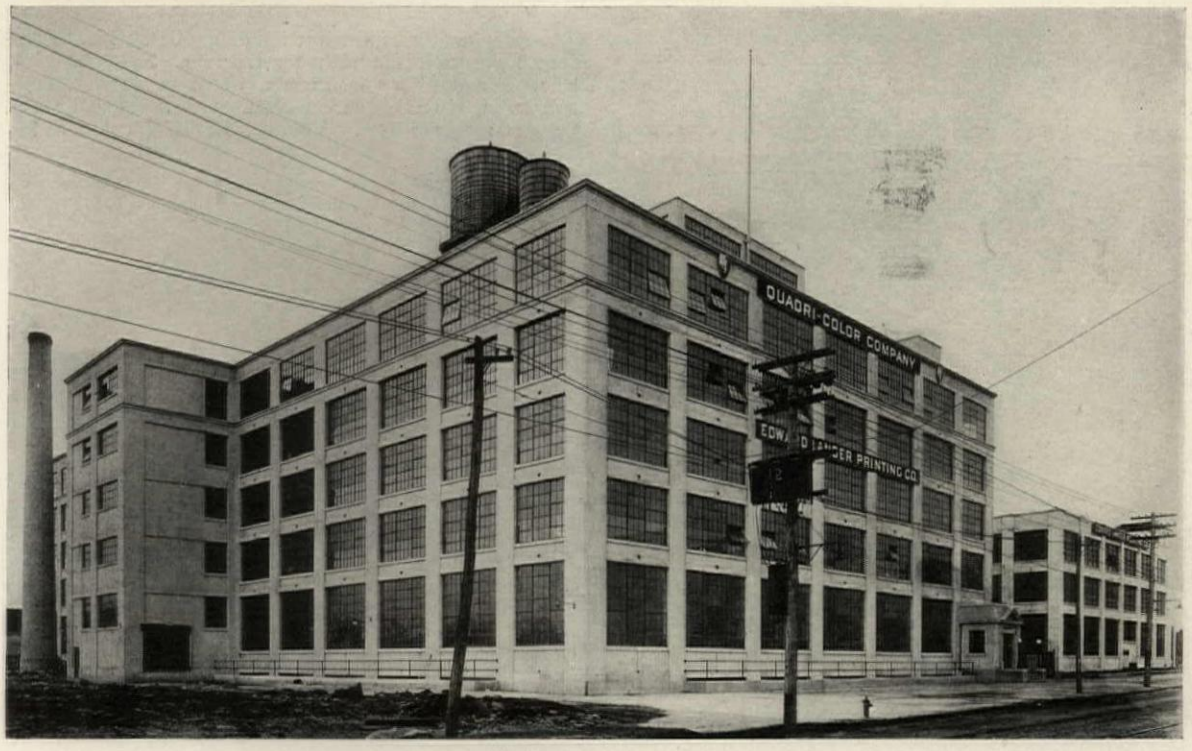
4. ***Size and Shape of Building.*** The cost of the structural frame of an industrial building,—that is, of the footings, columns, floors and roof,—is about the same per square foot of floor area as is the cost of the walls and windows per square foot of wall and window area. Let us assume a unit of $1.50 per square foot for each, and take two buildings with 12-foot story heights, (A) 50 x 100 feet and (B) 200 x 200 feet. The cost of the frame, walls and windows for one story will be:

	Floor	Walls	Total	Per sq. ft. of floor area
(A)	$7,500	$5,400	$12,900	$2.58
(B)	60,000	14,400	74,400	1.86

This comparison shows clearly why a small building costs more per cubic foot than a large structure. There are other factors which increase the discrepancy, such as job overhead, plant installation, and more expensive heating plant on account of relatively greater radiation.

Quantity surveys are not usually made by architects. When a project is ready for final estimate as a basis for awarding a contract, that work is usually performed by contractors; and there is not much to be said about the actual steps taken in the preparation of a quantity survey which would be of interest to the readers of this article. The New York Building Congress published on February 10, 1925 a paper prepared by a committee of contractors describing the basis of a sound quantity survey and pointing out the pitfalls and errors which most commonly occur; but there seems to be one contractor born every minute who is willing to take work at a loss, and this paper has had no effect on the birth rate.

Estimating in General. There are some points related to estimating which, although they do not come strictly under the title "How to Esti-



BUILDING NO. 2

Five-story and basement printing building, 283 by 140. Reinforced concrete; flat slab construction. 19 by 20 bays. Concrete exterior. Typical live load, 250 pounds. 6-ton soil bearing. Total floor area, 234,850 square feet; area of floors and walls, 330,000 square feet. Volume, 3,010,000 cubic feet

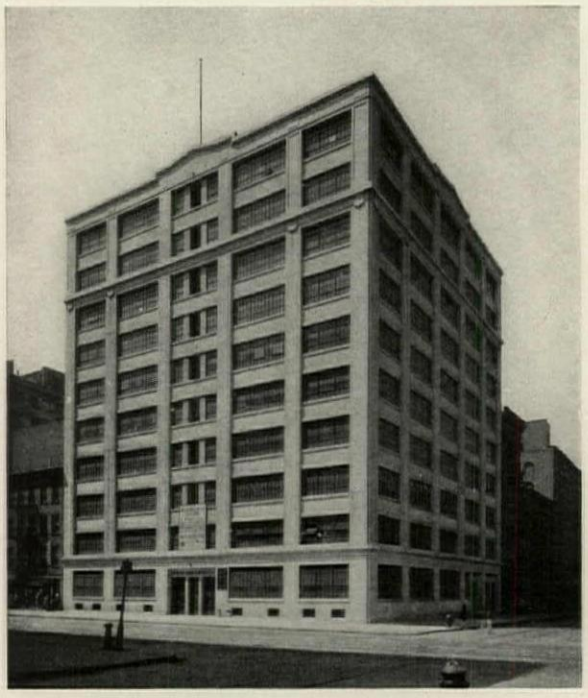
mate the Cost of Industrial Buildings", may well be given heed to by architects in the interest of sound and accurate estimating. First, a specification should not contain the words "or equal." Few articles of different manufacture are "equal"; and only the architect knows whether he will accept an "equivalent" as an "equal." If an architect wants material of a specific manufacturer, he should first satisfy himself by direct negotiation with the manufacturer that a satisfactory price will be quoted to contractors who are to prepare estimates, and then specify the article outright by name. Or, he can name two or more acceptable manufacturers. If he does not choose to do this, he should describe the article and omit any manufacturer's name. Contractors have to gamble enough without having to guess whether an architect considers a Ford "equal" to a Chevrolet, or vice versa.

Secondly, there is the clause which occurs in many "General Conditions" which is grossly unfair and should never appear in a specification: "All Federal, State and Municipal Laws and ordinances and all rules and regulations and requirements of Municipal Departments or other public authority shall be considered and are hereby made a part of the contract. Any labor and materials in addition to that described herein or shown on the drawings necessary to comply with such laws, rules, ordinances or regulations shall be performed and furnished by the contractor." A contractor's responsibility for compliance with laws should be limited to his methods of handling the work.

Do not ask to have bids submitted on Monday mornings. For many hours before a bid is submitted, an estimator has to talk almost continuously to subcontractors in order to reconcile their bids with the plans and specifications. Most subcontract bids arrive in the mail the day before the date of opening the general contract bids. If that day is Saturday, there is a good chance that the subcontractor cannot be reached, and too much remains to be done on Monday.

All work of one trade should be specified under one heading. That sounds elementary; but there still exist specification writers who specify painting under the various headings of doors, windows, ironwork, plastering, or anything else that needs paint. One may stumble across odds and ends of ironwork almost anywhere. This adds to the difficulty of reconciling the subcontract bids with the plans and specifications.

It may seem that a disproportionate amount of space has been devoted in this article to the "cubic foot" and "square foot" methods of esti-



BUILDING NO. 3 (left)

Ten-story and basement loft building, 103 by 100. Reinforced concrete. flat slab construction. 200-pound live load. 3- and 4-ton soil bearing. Concrete exterior. Total floor area, 110,000 square feet; area of floors and walls, 163,500 square feet. Volume, 1,220,000 cubic feet

BUILDING NO. 4 (below)

Four-story shoe factory; F-shaped; 220 by 50, with wing 202 by 50. Reinforced concrete; flat slab construction. Bays 16 feet, 3 inches square. Concrete exterior, with brick curtain walls. Typical live load, 150 pounds. Pile foundations. Total floor area, 87,500 square feet; area of floors and walls, 154,300 square feet. Volume, 1,097,300 cubic feet

mating as compared with the "quantity survey" method; but as a matter of fact, more remains to be learned about the former, and at times they are vitally important. It is often necessary to make a commitment for a building operation before data are available from which a quantity survey can be made; and when the financial soundness of such an operation depends on a slight margin, much depends, as can readily be seen, on the accuracy of the preliminary estimate.

FACILITIES FOR PERSONNEL WORK

BY
HARRY M. TRIMMER
INDUSTRIAL CONSULTANT

THE plant manager usually remarks to the architect "I want a thoroughly up-to-date layout for our personnel work, but the space and equipment must be kept at a minimum." For time and space saving, there are certain fundamentals of good design, equipment and operation in personnel departments, just as there are basic principles in designing a fireplace or a foundry, a kitchen or a concert hall. Ask any plant manager if he would like to save $1,500 a year in his overhead! Yet this expense can easily be incurred by a poor Employment Department layout that requires an extra watchman to guard its entrances and exits and keep applicants from getting into the plant.

This article will review the design and working principles of Employment and Medical Departments, without in any way setting up a standard of perfection. The discussion will be confined to these two sections only, and will not include Training Departments, Recreation Rooms, Wash and Locker Rooms, or other personnel facilities found in many companies. Attention will be centered on the small and medium-sized plant, where economy is essential.

Good personnel layout and equipment make a direct and continuous contribution to effective plant operation and to the reduction of overhead expense. The question is often asked "How much must be spent to obtain good personnel facilities, how much space is required, and what is the best location?" Good layouts and operating methods can be produced with much less money and space than is commonly supposed, provided the needs of each company are carefully analyzed to begin with.

Employment Department. The best location for the Employment Department depends upon the services it renders to applicants and to employees. If it is frequently used by the employees, it should be located where they can reach it quickly and conveniently, and if possible nearest the departments that use it the most. It is commonly assumed, in a company occupying several floors in a building, that the Employment Department must be on the street floor. This is not necessarily the best location, as it might be better to have the department on the second or third floor near the employees it serves, and have the applicants use the stairs or elevator. The fact is sometimes overlooked that when an employee goes to the Employment Department he usually is costing the company money and production, whereas an applicant for employment can spend additional time going to the department without any cost to the company or undue inconvenience to himself. Regardless of where the Employment Department is located it must have convenient access to the street or yard, and have its facilities so arranged that casual inquirers cannot get into the plant while on their way to it or after entering it. This should be arranged without the use of extra watchmen or other persons.

Almost all Employment Departments have frequent contact with the Cashier's Office or Payroll Department, and in some cases the employment manager supervises the shop timekeepers. In some companies the Employment Department pays off employees at termination, and in other companies the employee himself goes to the office to get his final pay. All these different policies must be considered in locating and arranging the Employment Department.

Diagram 1 illustrates an Employment Department combined with a Medical Department, located on the second floor of a four-story factory having 1,000 employees. The one main doorway must serve both departments as entrance and exit for applicants and employees, for factory departments and the street. There is natural light from only one side. The Employment Department has three rooms totalling 494 sq. ft., and the Medical Department, four rooms with 646 sq. ft., a total for the two departments of 1,140 sq. ft. A clerk seated in the Employment Waiting Room, near the large open doorway, can control the entrances to the factory departments and the exit to the street, and in addition can handle inquiries.

In practically every company the steps in hiring are fundamentally the same. Whether or not a separate room or space is required for each step depends on the frequency and intensity of use. For a large company, having many applications and engagements, there would be (a) Waiting Rooms, (b) Application Room, (c) one or more Preliminary Interview Rooms, (d) one or more Test Rooms, (e) a Hiring or Final Interview Room, (f) a Record Room and (g) the Personnel Manager's Office. "But," you say, "that is much too much. I am planning for a smaller company that can afford only limited space." You can probably reduce all the above rooms to two or three and still have a layout sufficient for your small needs. "How am I to

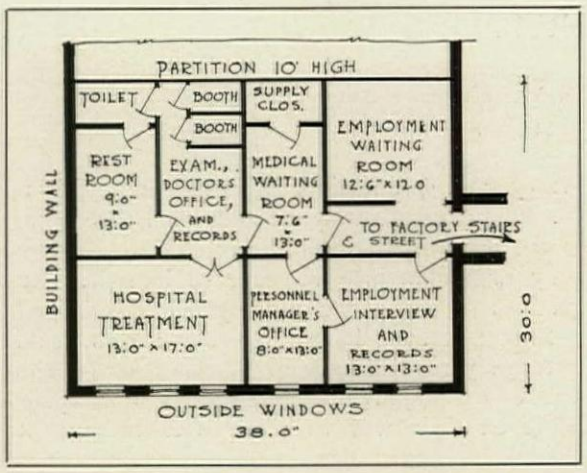


Diagram 1. Combined Employment and Medical Departments for a Factory

know how many rooms I should have, for a good up-to-date layout?" Here are some of the fundamentals from the experience of other companies that may help in deciding the plan.

Waiting Room. This is one of the two or three rooms regarded as an absolute requirement. It should be large enough to accommodate the average number of applicants at one time, with definite provision, however, through some expedient, for accommodating the peak loads that occur in every company. Early one stormy looking morning I visited a plant whose employment manager had advertised for a large number of skilled mechanics. The small waiting room, opening directly on the street, was soon filled and a long line of men formed along the sidewalk. A sudden downpour of rain drenched them to the skin. The higher grade, independent mechanics promptly sacrificed their places in line, more concerned with their comfort than immediate prospect of a job. Only the mediocre and unskilled were left for the employment manager. The money spent for advertising was practically wasted and the expected production from the new men was lost. Worst of all, the rain-soaked men carried a bad impression of the plant in their mind. This is one of the hidden losses that does not show up on the company books. It can be avoided by careful planning. It is not necessary to carry the burden of a large waiting room that is normally only half used; a small room can be used if it opens on a hallway or a stairway, or is adjacent to another room that can be temporarily supervised, or connects with a covered passageway in the yard.

The path of the inquirer from the street, to the waiting room, to the inquiry clerk, and back to the street, should be made as short and direct as possible, with no way of getting into the plant without permission. It is particularly important that the applicant who has been interviewed and either hired or rejected, does not pass out through the same room in which applicants are waiting interviews; see Diagrams 1 and 3. This may seem a minor point but it is important in planning. Let me illustrate its importance. A company had advertised for five milling machine operators. Among the first to apply was a man whose appearance and manner indicated that he was obviously below the standard required by the company. The interview clerk in rejecting him said, "Sorry, but there is no opening for you." In leaving he had to pass through the room where the remaining applicants were waiting, and naturally not having understood the distinction made by the clerk said, "Nothing doing boys, the milling machine jobs are all filled." All the milling machine applicants immediately followed him out, and the employment manager lost some good material.

Some companies require two waiting rooms, one each for male and female; other companies, with less intensive use, permit the two sexes to mingle in one room or set separate hours of interview for each sex. This latter method is practical only under very favorable labor conditions, and where the separate hours are advertised and known to applicants. Much the same remarks apply to one or two rooms for shop applicants and office and sales applicants. The decision depends upon the intensity of use and the policy of the company. A separate waiting room or entrance for employees is preferable so that employees and applicants for employment do not have a chance to engage in conversation. In most smaller type companies, however, one waiting room is made to serve for all applicants and employees, regardless of sex or type of position. Diagram 3 illustrates how even this one so-called indispensable room was omitted. One end of the lobby of the cafeteria and recreation hall was used during interview hours as a waiting room and of course never conflicted with

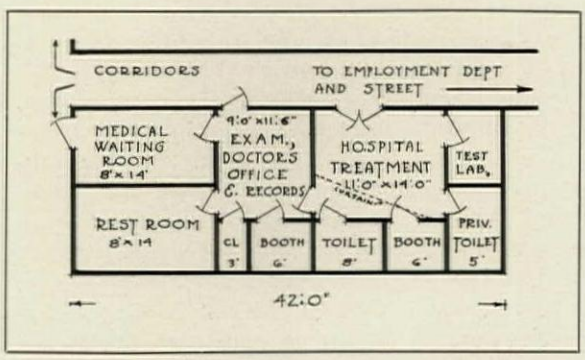


Diagram 2. Medical Department on the Second Floor of an Industrial Plant. Lighted by Skylights

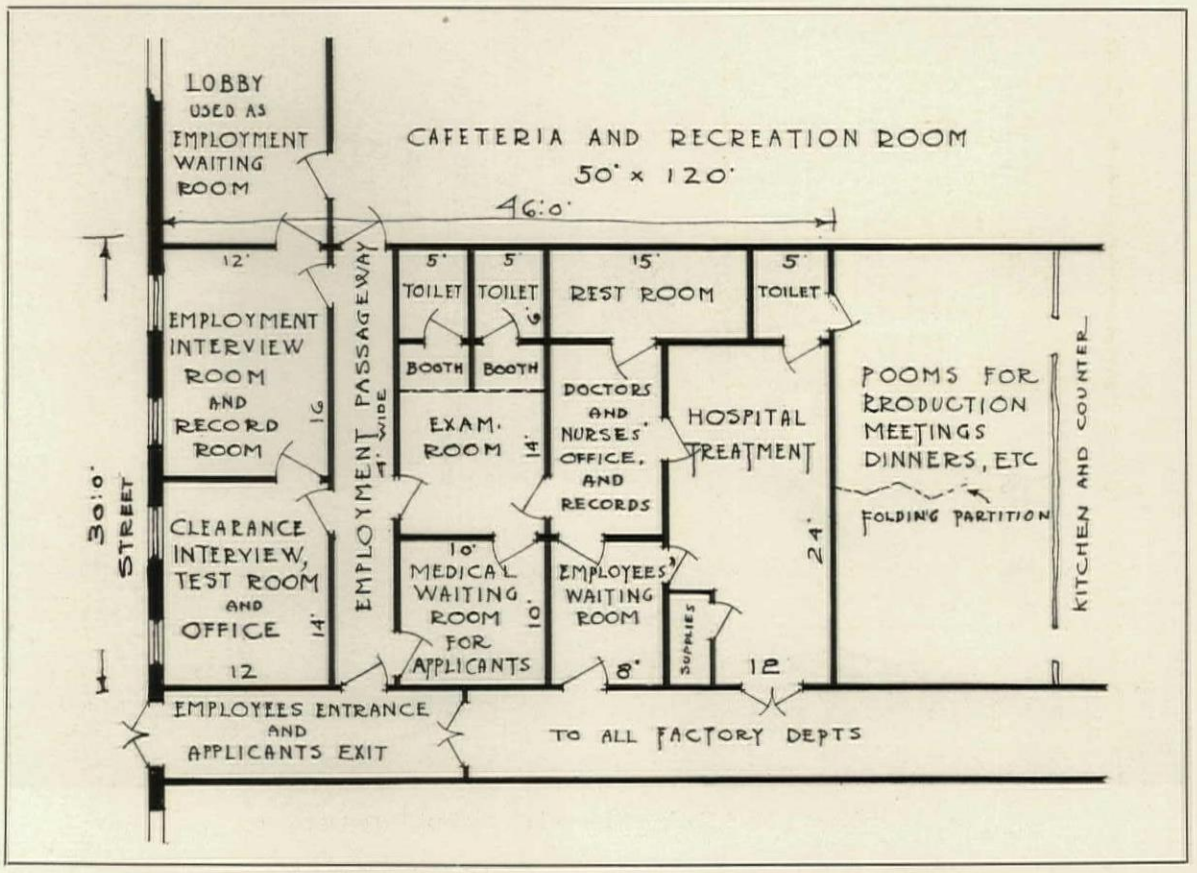


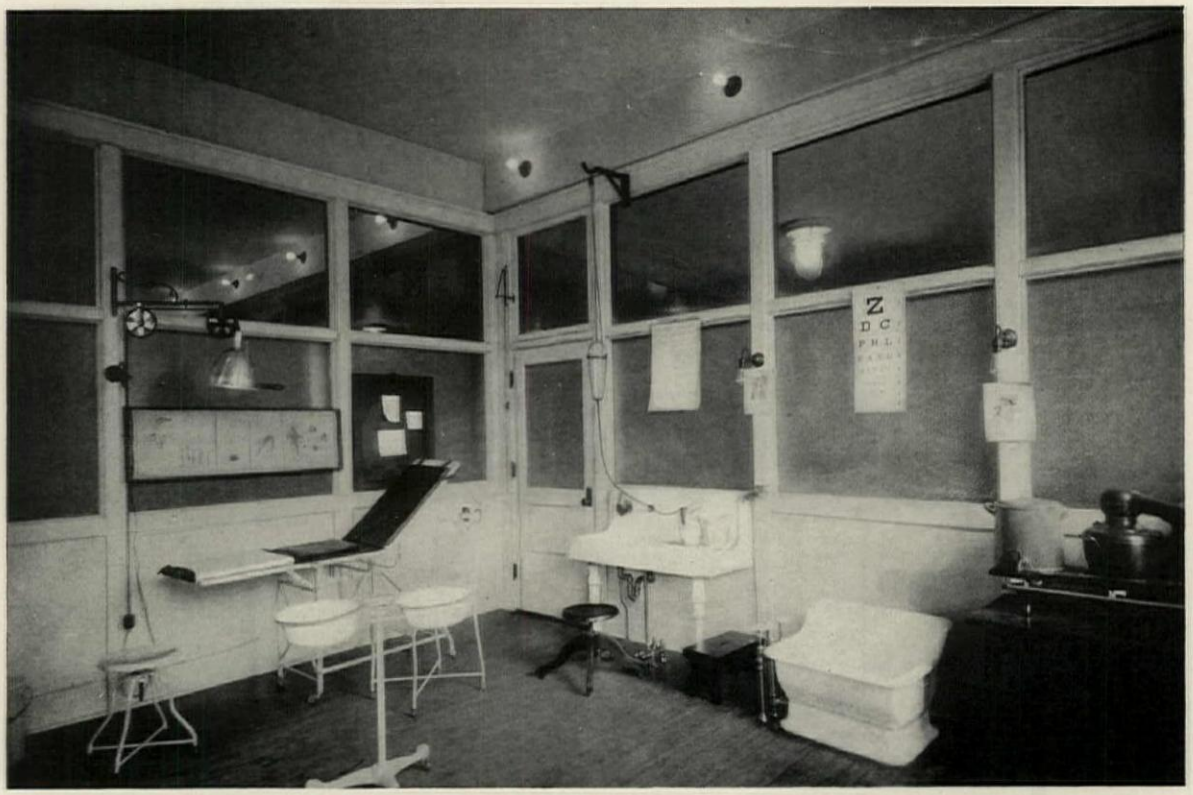
Diagram 3. A Well Arranged Layout for the Employment and Medical Departments of an Industrial Plant
The Ballinger Company, Architects and Engineers

its use as an entrance for other activities due to the difference in the time of its various usages. Approximately 150 square feet of floor space were saved by this method. The layout shows an Employment Department designed for 1,500 to 2,000 employees, of two rooms and passageway, totalling 480 square feet, on the street floor, with exits possible on all sides and having overhead light in addition to windows.

Application Room. "Never heard of one," say some managers. "Must have one," say others. The difference lies largely in company policy and labor conditions. Some companies give practically every inquirer a blank to fill out on the spot even though there is no job open, and use these applications as a prospect file from which to obtain employees when needed. If there are many applicants simultaneously filling out blanks, adequate table or shelf space is of course required. Other managers refuse to give out application blanks, and take a written record only when the applicant is being hired, in which case no separate application space is needed. Between these two extremes, the majority of companies doubtless take their place by giving out application blanks only to likely-appearing candidates for the hard-to-fill jobs. For this limited use, a small part of the waiting room or of the interview room can be fitted with a table or shelf.

Interview and Test Rooms. Here again the question "Are they necessary?" must be answered according to the actual needs of the individual company. Some companies have several small rooms or booths so that three or more persons can be interviewed simultaneously, each booth being shielded as to sight and conversation. The same booths can sometimes be used where hiring tests are given,—for office workers on typewriters, adding machines, etc., and for shop workers by means of manual tests. Whether the interviewing and the testing are done in one room or several, convenient access must be provided to the shop, office and medical sections. This allows for the practice in many companies of sending the applicant to the shop or office for interview by the department head for whom he is to work, and to the Medical Department for physical examination, all of which is usually done before the applicant returns to the Employment Department for formal hiring.

Hiring Room and Record Room. The hiring room, sometimes called the final interview room, can be used, like the old-time barroom, for many purposes. In it there may be combined the func-



Interior of a Well Equipped Room in a Medical Department

tions of taking applications, interviewing, testing, hiring and filing of records. It can be so used with entire satisfaction in companies that do not have frequent applications or engagements. Diagram 1 illustrates this type of use.

Manager's Office. One of the chief functions and contributions of the employment manager is the final clearance interview of employees at termination. Some companies insist that employees, regardless of position, rate of pay or reason of termination, be interviewed by the employment manager himself before an employee can be cleared from the payroll. This office should combine accessibility, privacy and control. It must be so located with connections to the shop and office that employees can readily reach the employment manager when required and that he can as quickly reach them; it must be enclosed or set off to permit confidential conversation in person and over the telephone, and, if possible, it should be placed so that the employment manager has visual supervision over the activities in the surrounding rooms under his control.

General Arrangement. Engineers and architects are frequently called in to analyze and improve methods of producing or handling materials in a factory. Even a slight saving on each unit of production is very properly regarded as worth while. Considering the space occupied by the Employment and Medical Departments and the number of different applicants and employees passing through them, the frequency of use per square foot in these departments is higher than in many other departments in the average plant. A slight saving in time or effort per person is quite as worth while a contribution to the operation of a plant as a saving in handling of materials.

It is trite to remark that good design and equipment are fundamental to such efficient operation. Yet it is astonishing to note how frequently the simple essentials of effective layout are disregarded in these much used departments. Case after case comes to mind,—in one plant, interviewing is frequently retarded and sometimes completely stopped by intermittent distractions in an adjacent passageway; in another, the assistant, and in his absence, the employment manager himself, must go to the next room scores of times daily for records of applicants and former employees because sufficient allowance was not made near at hand to accommodate the files that so rapidly expand in every Employment Department; in another Employment Department, applicants in the waiting room can hear the questions and answers of the clerk and the man he is interviewing; another employment manager must go upstairs to a private room whenever he wishes to talk confidentially over

the telephone or to give a private interview, etc. Movable partitions, of wood or steel frames, are convenient for forming the rooms of Employment and Medical Departments, as they can be used with clear or obscure glass either standard height or extended to the ceiling for privacy.

There are few, if any, so-called "perfect" layouts, as in practically every case some desirable features must be sacrificed because of building, space, or money restrictions, to obtain facilities more essential for the department. Careful analysis should disclose these handicaps beforehand so they can be weighed and provided for in other ways, and not learned with surprise and regret after the layout is built and the new department is in operation. Certain defects in Diagram 1 are evident, due to physical characteristics of the building. The space shown in this layout illustrates the requirements, of an average plant employing around 1,000 people. This area could be made to serve a plant of 2,000 to 2,500 if the frequency or intensity of use was not too great. The layout is a good example of the principle of using the space with natural light and ventilation for those rooms used constantly, or by permanent employees, and using the inside, artificially lighted space for rooms used infrequently, or even continuously by transients rather than by the permanent staff.

Have you ever gone to a plant as a customer to buy their product and entered a sales room that was badly furnished and lighted and that had in general a second-rate appearance? Most companies spend real money in dressing up their front hall so customers will get a good impression of their product. The Employment Department is the "front hall" of a company to great numbers of people who favorably or adversely affect production and profits. Yet too often this department suffers from a lack of arrangement and facilities that belie the real standards and character of the company. Floors, walls, lighting and ventilation should be given particular attention. Examination of many Employment Departments will show that bad impressions are created not so much by cramped space, bad arrangement, second-rate equipment, and lack of toilet facilities, as by floors worn with shop and street grime, hand-marked walls, dull paint, dingy lighting, and stuffy air. These latter defects can be easily remedied and yield a return in appearance and effectiveness on both applicants and employees far beyond the cost.

Medical Department work falls into three groups,—(a) treatment of injuries, (b) medical consultation or care, and (c) physical examinations. The type of service rendered under the first of these three will largely decide where the Medical Department should be located. Where injuries are severe, or of a lesser nature but frequently occurring, the Medical Department should be located as close as practical to the source of the injuries; contrarily, there are several excellent reasons for having the Medical Department immediately adjoining the Employment Department, particularly if physical examinations are given at the time of hiring. Some companies are fortunate in that the Medical Department can be near both the factory sections it most frequently serves and also the Employment Department. Where these two departments must be split, the advantage resulting from having the Medical Department near the needs of the employees usually outweighs the disadvantage to the Employment Department staff and to applicants. Diagram 2 is a layout for a Medical Department located on the second floor, with manufacturing departments on all sides and the Employment Department on the first floor. Natural light is obtained overhead from skylights. The space totals 672 square feet. In Diagram 3 is shown a layout that is adjacent to both Employment Department and manufacturing departments, with six rooms, totalling 900 square feet.

The work of the Medical Department usually requires space for the following, although frequently two or more functions can be combined in one room,—(a) Waiting Room, (b) Physical Examination Room or Booths, (c) one or more Treatment or Baking Rooms, (d) Rest Room, (e) Doctor's Office and Record Room.

Waiting Room. When the calls at the Medical Department can be scheduled and controlled, a very small room will suffice. If scheduling is not practical, a larger room must be provided, and in some cases, two rooms,—one for males and one for females. If physical examinations are given to applicants before hiring, it is bad policy to have them wait their turn in the same room in which injured employees are waiting their call to have wounds dressed. The use of two rooms can sometimes be avoided by using a small passageway or by having the applicants report at hours when no dressings are being given to employees.

Examination Room. The steadily increasing use of physical examinations at hiring requires some definite provision for doing this work quickly and at a minimum of floor space. Two or more small booths, in a room partly used for other purposes, permit the physician to examine one man while the next is preparing. These booths can be as small as 3′ x 4′ or 5′, each one shielded as to sight and conversation. In addition, adjacent open space must be available for scales, eye charts, etc. A distance of 20′ is preferable for use in eye examinations,

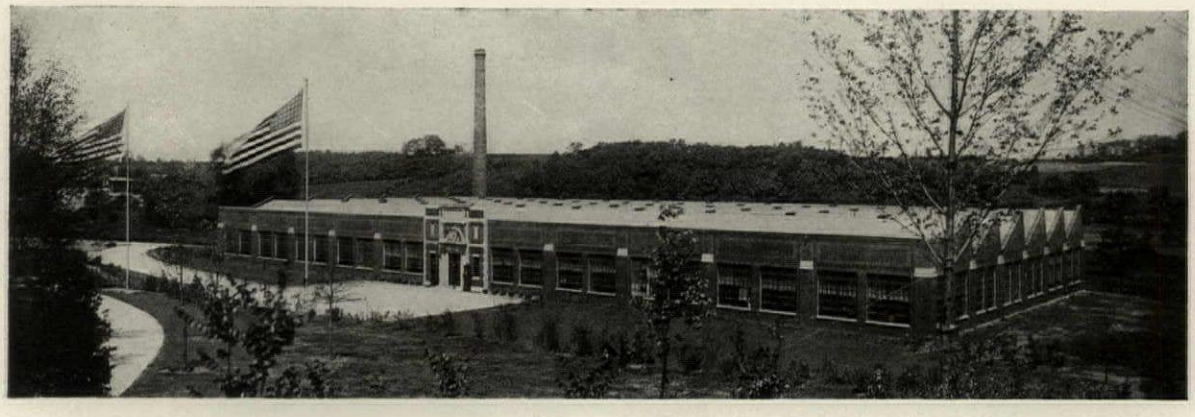
but this is not a requirement, as mirrors can be used to obtain the required distance. It is particularly important that toilet facilities be immediately adjoining the examination space.

Treatment Room. The size of the treatment or hospital room varies widely in different companies. Where the injuries consist of slight cuts and bruises, or where complete hospital equipment used by other companies is available in the same building, this room can be kept at minimum size. Where injuries are severe or frequent, or where additional hospital facilities are remote, the hospital room should be ample to take care of peak loads and to accommodate large pieces of apparatus used for extreme cases. Many companies find it more economical in fees and saving of production to equip this room with special apparatus than to send their injured employees outside for treatment. It is therefore advisable to be liberal in allowing space for future needs in this room and to economize on space elsewhere. Whether a special room for baking, massage, or electrical treatments is required, again must be decided by the needs of each company. In most cases, a corner of the hospital room can be screened off to accommodate one or two pieces of such apparatus.

Complete plumbing facilities are necessary in this room,—hot and cold water, drains, gas outlets and electric plugs. A surgical sink is a requirement for the work of most companies and to somewhat lesser extent a utility or slop sink is necessary. Other fixed pieces of equipment may be desirable. All doors leading into the hospital room and in passages giving entrance to the hospital, should be at least 3′ wide to permit ready use of stretchers or wheel chairs for emergency cases. It is still better to provide double doors, using only one door for ordinary purposes. The walls of the room should be closed to the ceiling,—of heavy materials or of glass,—to keep out noise and dirt but more particularly to keep in objectionable cries and odors that have a habit of occurring in the best-regulated families. For obvious reasons the hospital room should be so located as to obtain outside air and light. Floors in the Medical Department, and especially in the hospital room are usually subjected to heavy wear and yet must be kept in first-class condition. It is wise economy to spend a little more for the first cost of a good floor or covering than to run the expense of frequent scrubbings, patching, or painting. Some companies paint the Medical Department walls in warm buff or tan color. This takes away the glaring, white, "operating-room" look, and has a good mental effect on the employees.

Rest Room. Rest rooms are required by law in many industrial localities. Such rooms are particularly valuable where large numbers of females are employed. Whether one or several rooms are within the Medical Department itself, or are scattered through the plant with a matron in charge of each, is a matter of company policy. These rooms should be of such size and shape as to accommodate the required number of 2′ 6″ x 6′ cots or couches at a minimum use of floor space. Toilet facilities should be convenient to each room if possible. If the rest room is within the Medical Department, it should be arranged so the nurse can conveniently supervise it at all times.

Office and Record Room. Space is usually required sufficient for consultation work by the doctor, clerical work by the nurse or clerk, and for file cabinets of records. These activities may sometimes be carried on in the examination room or the rest room, depending on the frequency of use. Some companies with a full time doctor and complete medical service require a separate room for the doctor. It is customary not to have clerical work or filing of records done in the hospital room, but space for this should be located immediately adjoining it. Most Medical Departments are supervised by one person, and it is advisable to arrange all rooms so that their entrances and exits can be controlled by one person from a central location, preferably from the record room or office where the routine work is done. In Diagrams 1, 2 and 3, the nurse at her desk in the record room can control all other rooms in the department.



DAYLIGHT ILLUMINATION OF INDUSTRIAL BUILDINGS

BY

WILLIAM R. FOGG

THE BALLINGER COMPANY, ARCHITECTS AND ENGINEERS

PROBABLY one of the most significant facts now becoming recognized concerning modern commercial, industrial and institutional buildings is that their useful life has been increased during the past quarter of a century by about half. This is evidenced by the change of policy of loaning institutions in increasing the number of years over which mortgage loans may extend, and decreasing the yearly amortization payments on the mortgages. Another evidence is the increasing acceptance by the public of building securities as a conservative and stable form of investment.

An examination of the reasons for this change will show that buildings designed in accordance with modern standards more nearly approach an ideal solution of the problem of requirements of their occupancy than has ever been possible in the past. This is due to the perfecting of materials of construction and their proper use by architects and engineers for the purposes intended. Almost all the desirable requisites in a building of a given type are now obtainable, which was not true to the same extent at the beginning of the present century. Architectural styles may vary in the future as in the past. As far as the utilitarian requirements of a building are concerned, however, it is now possible by skillful use of materials available to obtain a building of permanent construction almost perfectly adapted to its purpose.

What is true of buildings as a whole applies

Interior of Modern Printing Plant for Mack Printing Company, Shown at the Top of Page. Sawtooth Construction with Maximum Daylight Illumination and Super-span Truss Construction, Eliminating all Columns
The Ballinger Company, Architects and Engineers

Clothing Factory, Erected 30 Years Ago. Wall and Window Spaces of Equal Width; 15 feet, 9 inches Story Height; 68 feet, 8 inches Wide

Interior of Clothing Factory, Erected 30 Years Ago, Showing Valuable Lighting Space Lost Above Windows Due to Type of Construction Then Prevalent

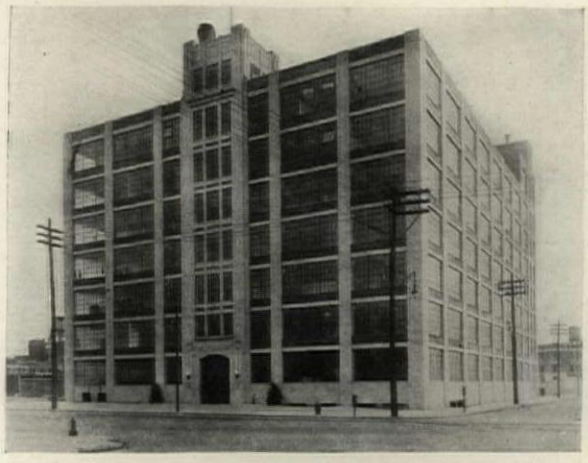
The Ballinger Company, Architects and Engineers

in a notable degree to the important matter of bringing daylight illumination to their interiors. It is now possible to obtain in the side walls of buildings almost any amount of window area which may be required, and the same is true of skylight area in roofs.

Development of window construction has been along the line of greater area of glass and less width of bars dividing the windows into sections. Protection against the elements, including fire, and suitable means for ventilation, screening, hanging shades and cleaning are well provided. Many improvements have also been made in the production of glass itself to better adapt it to particular requirements. Satisfactory glass is now readily obtainable to meet any need for clearness and surface and for the direct transmission or for the diffusion of daylight. Special glass is manufactured for the purpose of excluding objectionable rays, and there are other forms of glass which permit the passage of beneficial sun rays.

Wall Lighting. Due to the materials of construction commonly in use a quarter of a century ago, the practicable wall openings then available in the average building were much restricted in size as compared with those used at present. At that time the ordinary construction was such that not more, and often less, than 50 per cent of the wall area above the window sills was available for windows. Walls consisted of alternate masonry piers and wood windows, the wall and window spaces being about equal in width. Window jambs were quite deep, due to the thickness of the walls. In this construction the wall piers supported the floor beams, the masonry arches over the windows supporting merely the masonry above them to the window sill above. Because of the wood beam floor construction and the arched heads of the windows, some window area was usually lost near the ceiling where it would have been most valuable. In addition, the projecting beams and girders of the floor construction above prevented the maximum penetration and reflection of the daylight by the ceiling.

With modern construction, the usual average of available wall area for windows is from 80 to 85 per cent. This is made possible by the use of concrete or steel frame construction to carry the floor loads, reducing the wall columns to a minimum width and the window jambs to minimum depth. Window lintels are so constructed that the necessary depth is obtained by the beam extending above the floor instead of below the ceiling. This permits the tops of the windows to be at the same height as the ceiling, and is the ideal lighting condition. With the development of mushroom concrete construction, omitting beams and girders, an entirely flat ceiling is provided permitting maximum daylight penetration and reflection. Where conditions require it, the window area can be practical and economical methods of construction be increased to almost 100 per cent. This is done by using



Exterior of Modern Telephone Manufactory for Western Electric Company, Having Window Area of Between 80 and 85 Per Cent

Interior of the Building, 120 Feet Wide, 12-Foot Story Height, Showing Advantages of Flat Slab Construction, Window Heads Reaching to Ceiling

The Ballinger Company, Architects and Engineers

mushroom construction and having the floor slab cantilevered beyond the columns, placing all columns inside the building and omitting wall columns entirely.

As a result of having the wider windows, made possible by the use of new structural methods, the daylight illumination in the interior of a building is increased more than in direct proportion to the increase in width of the window openings. This is due to the fact that the average illumination is much better with wide windows and very narrow wall columns than with alternate window and wall spacing of approximately equal widths. In general, the doubling of the size of the window is found to almost triple the effective illumination. More important than any increase in width, however, is an increase in the height of a window. As the economical story heights of buildings are somewhat rigidly determined for various occupancies, a variation in this respect above the window sill cannot be great without exceeding the normal cost, so that utilization of all available height is important. This is done to the greatest possible degree with modern construction.

With buildings having an average story height of about 12 feet, the limit of good daylight illumination for average working purposes is reached at about 25 feet from the windows. For distances greater than this, the variation between maximum and minimum is usually more than 3 to 1, which is considered the limit in good practice. For buildings wider than this there remains the choice of increasing the story height, increasing the window area, or using artificial illumination in the more remote areas.

Owing to the fact that light entering the building through the side walls is always influenced by the exposure of the walls in relation to the sun, there results an unevenness of illumination at different times of the day. At one period the illumination is at a maximum, and probably excessive, and at another period it is at a minimum, and perhaps inadequate, except close to the windows. The minimum illumination of a given location therefore determines its availability as working space under daylight conditions. It is estimated that with working hours from 8 A. M. to 5 P. M., in the latitude of New York, artificial illumination is required upon an average of two hours per day during the year in buildings of average width which are dependent upon side wall illumination.

Roof Lighting. To be of the most value for general purposes, light must be as nearly uniform as possible during the whole working period. This uniformity of illumination is best obtained by dependence upon a light source in which there is relatively little variation and which is in all cases at or above the minimum required. This is accomplished by illumination of the building from overhead by a type of construction which will exclude the direct rays of the sun and depend upon the more uniform reflection from the clouds. For this purpose the well known sawtooth skylight type of roof construction is used. It will be evident that if the light is brought through the sides of monitor skylights, instead of through sawtooth skylights, the conditions will be very similar to those which exist with windows in the side walls.

Originally developed for use in textile factories, the sawtooth skylight has been generally adopted by all industries requiring good average daylight without glare. The sawteeth are usually constructed with spans of from 20 to 25 feet when beams are used, and are economically constructed with simple trusses for spans as great as 40 feet. For greater spans a patented type, known as the "super-span" truss, is used, com-

Exterior of Modern Textile Manufactory for James Lees & Sons Company, Showing Almost 100 Per Cent Area of Windows Above Sill Line

Interior of the Factory Showing Elimination of Columns at Wall Line to Obtain 100 Per Cent Window Area; 15-Foot Story Height; 120 Feet Wide

The Ballinger Company, Architects and Engineers

bining two or more sawteeth in one truss to eliminate obstructing posts from the floor area. The glass area in these sawteeth varies with the lighting requirements, being usually between 30 and 35 per cent of the floor area. A difference in practice exists with reference to the position of the glass portion of the sawteeth, some being vertical and others having a slope. When sloping, care is taken to avoid so much slope that direct sun will be admitted to the building. It is unquestionably true that more light will be admitted by the sloping skylight than by the vertical, but as the vertical skylights remain clean much longer than the sloping, it depends upon the cleaning whether one admits more light than the other.

In addition to guarding against excessive slope of the skylight, it is important also that the skylight face directly north, if the sun's rays are to be excluded during the early morning or late afternoon. This is of so much importance that it was obtained at some additional building expense at a plant recently constructed having an area of 1,200,000 square feet of sawtooth roof construction. As the street lines of the lot were at an angle of nearly 90 degrees with the cardinal points of the compass, it was necessary to construct the sawteeth parallel with the east and west diagonal of the building, instead of parallel with the walls. With sawtooth skylights flat glass is most frequently used, although recently corrugated glass has been used with satisfactory results. In either case wire glass should be used for safety considerations, to prevent the hazard of falling glass, injuring employes or machines.

Ventilation of sawtooth skylights is usually effected by having the upper or lower rows of lights, or both, hinged at top and opened outward by means of hand- or motor-operated mechanism controlling any desired length of skylight. With corrugated glass, which is installed without frames, ventilators on the roof are used, or sections of glass are omitted and mechanical ventilating units are installed. In addition to the reflection of the northern sky through the sawtooth skylights, it has been found that the sloping roof of the sawtooth adjoining on the north can be made to reflect some of the light from the south. If instead of slag, which is gray in color and turns dark when wet, white pebbles are used on the surface of the roofing, or a dull-finish white surface roofing is used, an appreciable increase in illumination is obtained. It is estimated that with usual hours from 8 A. M. to 5 P. M., in the latitude of New York, artificial illumination is required upon an average of not more than half an hour per day throughout the year in sawtooth skylight buildings of proper construction.

Window Construction. Wood windows, which were suitable for the small window openings of earlier days, are not well adapted for the larger openings because of the increase in size of members which would be necessary to obtain the same strength as steel. For ordinary commercial and institutional buildings the most commonly used window construction is therefore of metal. Owing to the strength of the metal it is possible to obtain very large glass areas with practically no obstruction from the members

forming the window sash, and there is practically no exclusion of light because of them. Originally metal windows were of hollow sheet steel, but these have now generally been displaced by windows having members of rolled steel or other solid metal construction. Steel windows, owing to their standardized construction and their being made by mass-productive methods, can be obtained for all requirements in a highly competitive market.

Steel windows, unless properly protected, are subject to corrosion and more rapid deterioration than wood and for that reason should be painted at regular intervals. Galvanizing of steel windows and other means of metal protection are, therefore, used at times in addition to ordinary painting. One objection to use of steel windows in the past has been the fact that the metal-to-metal contact was not as tight as with wood, and the heat requirements of the building were accordingly increased, due to air leakage. With the better type of sash, however, double-contact surfaces are provided with an air space between, which greatly reduces the air and heat loss through sash openings. Metal windows are produced in a great variety of designs, of both plain and of artistic types. With them, ventilation is provided in an even greater variety of ways than with the original wood windows.

The double-hung sash, originally the most common, probably because of its wooden prototype, which is either weighted or counterbalanced, with top section sliding down and bottom section sliding up, is much less used than formerly. One objection to the double-hung type is that only half of the window opening is available for ventilation at any one time. This has been overcome by having the upper and lower sash pivoted or sliding in such a manner as to obtain the entire opening for ventilation. The most common type of window now in use is the rigid frame with movable sections pivoted on a horizontal axis, one portion of the sash moving in and the other out. Another design is the projected type, having movable sections hinged on a horizontal axis and projecting inside or outside as desired.

Then there is a combination casement and projected sash. This has a section at the bottom hinged at the sill and opening in, providing ventilation without draft, and an upper double casement portion for part or full ventilation when desired.

Cleaning of fixed windows in large areas in factories is only practicable with a scaffold swinging from the outside. Most windows are of the ventilated type, and with pivoted or hinged sash provided with only a single row of fixed panes around the sides, so that it is possible, though not convenient, to clean them through the ventilator openings. Windows of the double-hung type, where not made reversible, are provided with hooks in the frames for the attachment of cleaners' belts when working from the outside. Casement sash are usually cleanable from the inside of the window. Screening of pivoted steel sash openings against entrance of insects at one time presented a difficult problem, usually solved by using an unsightly circular screen. This has been overcome by providing two screens, one above and one below, with spring brass rubbing strips pressing against the sash where pivoting occurs. Conditions of humidity, where condensation is likely to occur at windows, are provided for by means of double glazing and by providing condensation gutters for removal of condensation when formed, without dripping.

Glass. One of the most important improvements in the manufacture of glass on a commercial scale is the new method of producing a flat glass by direct drawing of the sheet from the furnace. A superior product is thereby obtained at a lower cost of production. This process is now rapidly replacing the old method of blowing a cylinder and then cutting and flattening it, with the resultant waviness of surface. Another improvement in glass manufacture was the production of wire glass. With the increase in the glass area in the walls and skylights of buildings there came the need for greater resistance of the glass in order to prevent the spread of fire from one area or from one building to another. This is successfully accomplished by the use of glass in which a wire mesh is embedded to hold the particles together in the event of the glass cracking into pieces. This glass is obtainable in the cheaper rough surface type at a cost of but little more than plain glass, and also in polished plate glass at a moderate increase in cost. Where the exposure is not great, ordinary glass clips and putty are accepted by the insurance companies or authorities, but where glass is likely to crack badly, due to intense heat, glazing angles, securely attaching the glass to the frame around its entire perimeter are required for maximum protection and lowest insurance rates.

Several kinds of glass are now available which have a diffusing action and re-direct the rays of the sun toward the interior of the building. This tends to correct the effect of plain glass where the light adjacent to the window is too bright and where farther away it is insufficient for ordinary working purposes. Care must be taken in the selection of this diffusing glass to avoid that which will cause a glare and an objectionable effect upon the eyes of the workers. Some makes of this glass now available show almost twice as much illumination remote from the windows as plain glass. This type of glass

is preferably placed in the upper window sash only, the lower sash being glazed with the ordinary type of glass. In any event, a row of clear glass at eye height is desirable to enable the employes occasionally to obtain a distant view in order to relieve eye strain.

Until recently it was not realized that the ordinary glass used for windows and skylights was not transmitting to the interior of the building all of the rays of the sun. Extensive experiments have now shown that the ultra-violet rays, which, although invisible to the eye, have a beneficial effect upon the health, are excluded by ordinary glass. Efforts have been made to remedy this deficiency in ordinary glass, and a number of manufacturers of window glass are now producing, under a trade name, a special product which has the characteristic of transmitting as much as from 40 to 50 per cent of the normal ultra-violet rays in ordinary sunlight. This glass is being produced in increasing quantities with a corresponding reduction in cost, so that at the present time it can be obtained at a cost for the material of only from four to five times that of the ordinary window glass. It is slightly more transparent than ordinary glass. Use of ultra-violet rays glass was at first restricted largely to the sun parlors of hospitals, sanitariums, and similar buildings, but more recently it has been introduced into commercial and industrial structures, a notable instance being that of the new plant of the Watson Stabilator Company of Philadelphia. Another type of glass, as well as preventing the entrance of the heat rays of the sun, prevents the injurious effect of the actinic rays upon certain classes of colored materials and eliminates eye strain due to glare.

Owing to the glare and heat of the sun's rays, it is frequently necessary to provide some form of protection for windows exposed to the direct rays of the sun in the morning or afternoon. One of the most inexpensive types of shades for providing ventilation consists of a series of wood or fiber strips fastened together at intervals and raised or lowered by means of cords, the shade rolling at the bottom as it ascends. Another type, somewhat more expensive, provides for greater flexibility of the light and air and is a modification of the Venetian type of blinds, which can be arranged to direct the light upward toward the ceiling, preventing glare and at the same time providing ventilation. One method of providing against the discomfort from the direct rays of the sun is to use a semi-transparent paint applied to the surface of the windows, usually of a bluish tinge. This has the effect of preventing glare and also of preventing the entrance of the heat rays of the sun, thus to some extent reducing the heat in the interior without unduly diminishing the amount of light.

An important adjunct to the proper illumination of a building, whether by daylight or artificial light is the proper painting of the walls and ceilings. Numerous paints are available for this purpose, it being chiefly important that the paint be of light color to reflect rather than absorb light, and that it will adhere and not change color after application.

From this it will be evident that methods and materials of construction are available for solving practically all the problems in the bringing of daylight illumination inside the building. There will, however, always be the necessity for services of skilled architects and engineers in the study of any given building problem to insure the application best suited in that particular case.

Interior of Modern Radio Manufactory of Atwater Kent Manufacturing Company, Using Super-span Sawtooth Skylight Showing Reflecting Value of Light Colored Roofing Material on Slope of Adjoining Sawtooth

The Ballinger Company, Architects and Engineers

ARTIFICIAL ILLUMINATION OF INDUSTRIAL PLANTS

BY

A. L. POWELL

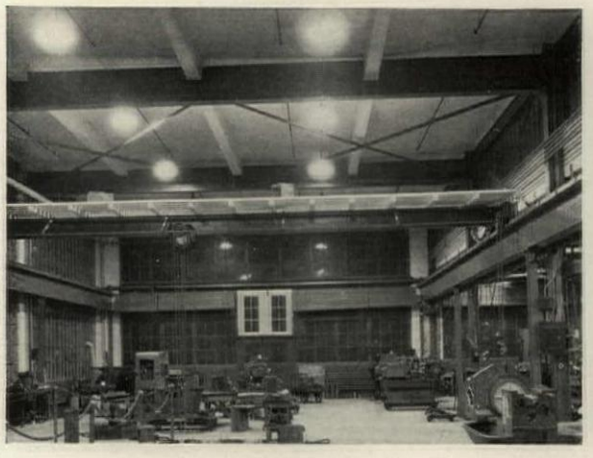
ELECTRICAL ENGINEER

WHEN one pauses to view the advance of civilization, one is greatly impressed to find how inter-related and inter-dependent are the various elements which combine to produce a given result,—how one great advance hinges on development in some other field of activity, and how man or nature seems to rise to the occasion and provide what is necessary for outstanding economic changes.

If an economical, reliable, convenient and powerful source of artificial light were lacking, work at full efficiency would be possible only in the hours of sunshine, and all machinery would have to be placed so that it would receive daylight. Fifty years ago there were available to light the industrial plants only weak, flickering candles, oil lamps and gas burners, and if these only were available today we would not be living in the industrial age. There can be no doubt that the introduction and rapid development of electric lighting is one of the very foundation stones of this twentieth century progress. Space does not permit a discussion of the fact that proper lighting does increase production, reduce shrinkage, promote safety and health, and keep the worker in a cheerful, contented frame of mind.

In brief, the industrial plant should be illuminated throughout to such a level that the worker can see the necessary detail quickly, without overtaxing the eyes. There must be no violent contrasts in brightness, no bright light sources in the field of view, and no glaring, annoying reflections from polished objects. One of the most important questions is,—what constitutes the right amount of illumination? A study of the functioning of the eye with increasing illumination shows a rapid improvement in visual acuity in the lower range of foot-candle values, and a much lower rate at higher levels. It must be borne in mind that such tests are generally based on the observation of black objects on white backgrounds, and in the industrial plant it is rare that these conditions prevail. Generally, the things to be seen are of varying shades of gray, with much less contrast, so that the standard visual acuity curves are much higher on the scale. Investigators do not really know where the upper limit lies. Plants which a few years ago were content with an illumination of 5 foot-candles have gone through the stages of providing 10, 15 and 20 foot-candles, and the most progressive are now demanding even more light for truly efficient operation. We cannot determine just how much light to supply in industrial plants from purely theoretical considerations, since tests of actual installations show that increased output is obtained as more light is supplied. There seem to be several features which have not yet been fully analyzed.

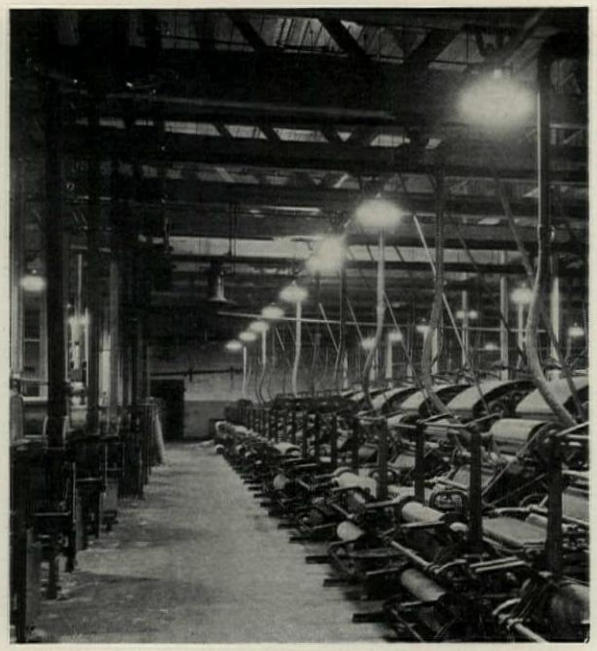
As we supply more and more foot-candles, other complications are introduced. The higher wattage lamps required are considerably brighter than those previously used. Additional precautions must be taken, therefore, to diffuse the light and reduce contrasts. With the present conditions as to ceiling heights and factory arrangement, using the commercial types of reflecting and diffusing devices, the limit of thoroughly



Machine Shop. Medium fine work. 500-watt white bowl lamps, dome reflectors. Outlets spaced 18 x 18′. Lamps 23′ above floor. Ceiling 25′. Ceiling white, walls glass. Illumination level 20 foot-candles.
Goss & DeLieuw Machine Company, New Britain, Conn.

Hardware manufacturing. Blanking punch presses. 150-watt white bowl lamp, dome reflector. Outlets 10 x 10′. Lamps 8′ 6″ above floor. Ceiling 10′. Walls and ceiling white. Illumination level 12 foot-candles.
Russell & Erwin Co., New Britain, Conn.

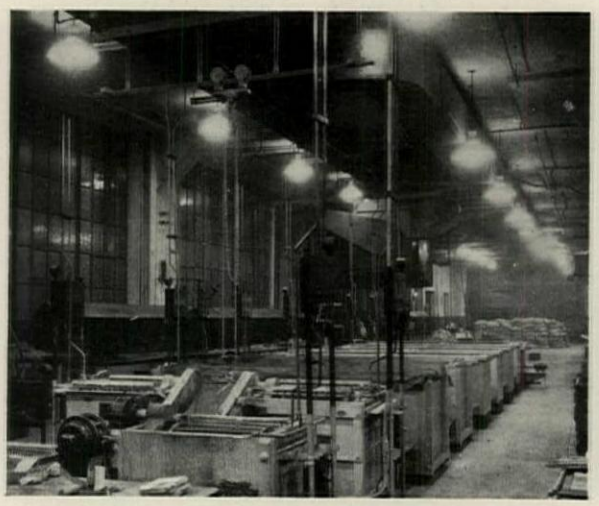
Textile mill. Spinning. 300-watt clear lamps, diffusing globes. Outlets spaced 14 x 21′. Lamps 12′ above floor, ceiling 14′. Ceiling white, walls principally glass. Illumination level 8-foot candles.
Chicopee Mills, Chicopee, Ga.



Textile mill. Rough fiber carding. 200-watt white bowl lamps, dome reflectors. Outlets 16 x 15′. Lamps 14′ above floor. Roof trusses 16′. Ceiling white, side walls white and glass. Illumination level 10 foot-candles.
Valway Mills, La Grange, Ga.

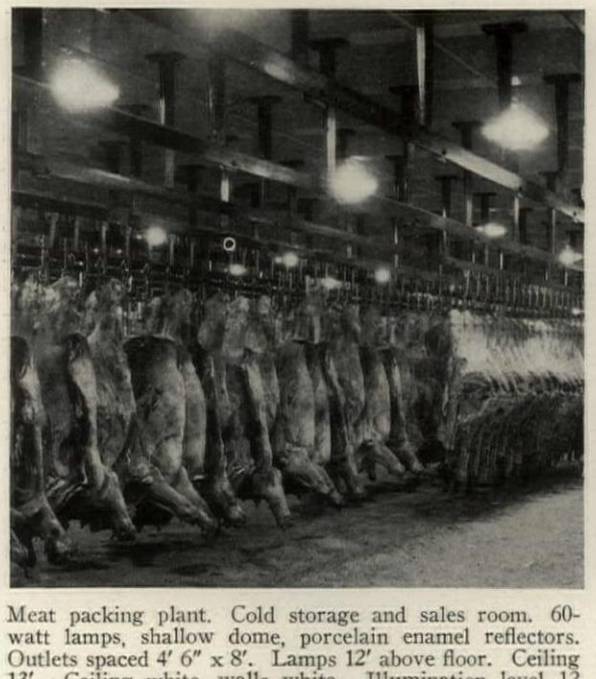
comfortable general artificial illumination seems to be in the neighborhood of 50 foot-candles. As we go above this value the installation is likely to become so glaring that many of the good effects of the higher level illumination are nullified. There is no doubt that when the demand for more artificial light is very general, the ingenuity of the scientist and engineer will come to the fore and will devise adequate ways and means of meeting the situation in all respects.

Common sense dictates the installation of a moderate level of general illumination (10 to 20 foot-candles) throughout the plant, supplied by uniformly spaced overhead units which are equipped to properly diffuse and distribute the light. This should be supplemented by peaks of high level illumination (100 foot-candles and upwards) at working points where fine detail is to be observed. There are many forms of reflectors for general illumination. The types most applicable to the industrial plant are: A standard dome reflector with bowl white lamp.

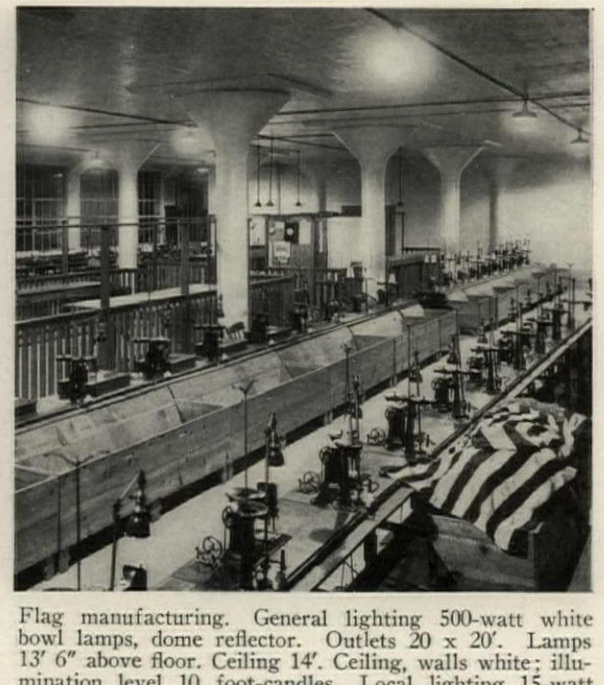


Electrical manufacturing. Electro-plating department. 300-watt clear lamps, diffuser. Outlets 12 x 12′. Lamps 15′ above floor. Ceiling 18′. Ceiling white. Walls glass. Illumination level 12 foot-candles.
General Electric Company, West Philadelphia Works.

Instrument manufactory. Coil winding. 500-watt clear lamps. Luminous bowl, indirect lighting fixtures. Outlets 9 x 17′. Lamps 9′ above floor. Ceiling 12′. Ceiling white. Walls glass. Illumination level 20 foot-candles.
Leeds & Northrup Co., Philadelphia



Meat packing plant. Cold storage and sales room. 60-watt lamps, shallow dome, porcelain enamel reflectors. Outlets spaced 4′ 6″ x 8′. Lamps 12′ above floor. Ceiling 13′. Ceiling white, walls white. Illumination level 12 foot-candles. Cudahy Packing Co., Norfolk, Va.



Flag manufacturing. General lighting 500-watt white bowl lamps, dome reflector. Outlets 20 x 20′. Lamps 13′ 6″ above floor. Ceiling 14′. Ceiling, walls white; illumination level 10 foot-candles. Local lighting 15-watt lamps. Annin & Company, Verona, N. J.

Diffuser with clear lamp.

Prismatic glass bowl-shaped reflector with clear or white bowl lamp.

Mirrored glass bowl reflector, clear lamp.

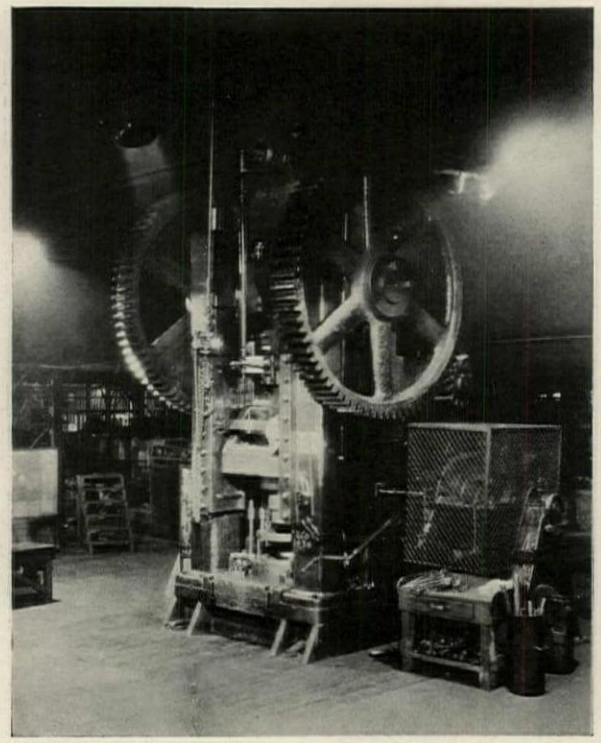
White glass enclosing unit, semi-indirect and totally indirect equipments are also applicable to factory use provided the surroundings have good reflective properties.

A discussion of the characteristics of the different forms of equipment, their efficiencies, their effect on the appearance of the lighted room, their method of preventing direct and reflected glare, type of shadows produced, and the ease of maintenance, would require several of these pages. All these factors should be given consideration in making a selection, and the handbooks on lighting practice present careful analyses of the relative merits.

In designing a building one is frequently unaware of the future requirements for lighting. A structure may be planned to be a storehouse, and a few years later changed conditions may

Silk mill. Weaving. 200-watt lamps, prismatic bowl reflectors. Outlets 6′ centers in weaver's alley, 12′ centers in rear alley. Lamps 9′ above floor. Ceiling 13′, ceiling white, walls white. Illumination level on work 25 foot-candles; on back of looms 6 foot-candles. Arohnson Silk Mill, Coatesville, Pa.

Color printing. Press room. General illumination. 300-watt clear lamps, diffuser. Spacing 12 x 12′. Lamps 12′ above floor. Ceiling 14′. Illumination level 18 foot-candles. Projector type equipment with 200-watt daylight lamps. Color identification unit at inspection table. Waverly Press, Baltimore



Close-up view showing the application of a projector type unit (or intensifier) for giving high level local lighting at a 1200-ton straight side power press.
Federal Pressed Steel Co., Milwaukee

cause it to be used for manufacturing processes. It is much more expensive to re-wire a building than to install adequate wiring when it is being constructed. Not knowing definitely the future of a structure, the architect or designing engineer should provide an adequate number of overhead outlets, plus a sufficient number of circuits with wire of suitable size to take care of normal demands for lighting. If a given area is used as a storage space or for rough work, 100-watt lamps on each outlet may be adequate, whereas, if fine machine work is carried on, 300- or even 500-watt lamps may be necessary. A reasonably safe general rule to follow is to space outlets no farther apart than the height of the ceiling. Thus in a normal loft building with 10- to 15-foot ceilings, there should be four outlets in each typical bay. With the advancing standards of illumination, inadequate wiring is being found more and more often to be an obstacle toward providing the lighting which industrialists need and desire. In some instances the cost of re-wiring puts a serious burden on a projected improvement. In others, the voltage drop in the existing wiring not only causes an expensive waste of energy and poor regulation but actually reduces the illumination below the expected level. This situation is so serious to the users of light that the National Electric Light Association, through its Commercial and Industrial Lighting Committee, has undertaken activities to call attention to the importance of this matter and aid the lighting service engineers of its central stations in assisting architects and others in the specification of such wiring as will meet the probable requirements of the near future. A committee of experienced illuminating electrical engineers has prepared specification paragraphs covering the quantity elements.

The specifications are based on the use of 15-ampere fusing on branch circuits and, to quote, it is suggested that: "In no case shall one branch circuit for overhead lighting supply the lighting for a work space or rentable area greater than 400 square feet or a bay approximately 20 x 20 feet, or shall one branch circuit for overhead lighting supply more than 800 square feet of hall or passageway or other non-rentable or non-productive area. Based on the wattage of outlets specified on the plans, branch circuits shall be so arranged that the load on a circuit shall in no case exceed 1,000 watts, except in a case of a single lamp of larger size."

In these paragraphs the size of wire is specified with respect to the length of run by two sizes, namely, Nos. 10 and 12, B. & S. being recommended. Other features treated are panel boards and feeders. This method of specification conforms to ordinary wiring practice except that a higher standard is called for. It has the further advantage of clearness and definiteness, which enables a non-technical man to check compliance accurately. The wiring specified in this manner will carry the next larger size of incandescent lamp without excessive lowering of voltage. This feature, while relatively inexpensive, is likely to result in large future economies for the owner and user. If adequate wiring and a reasonable number of outlets are installed, the problem of correct lighting is quite simple. The owner or lessor can install the coördinated size of lamp and reflector to meet his special requirements.

The accompanying illustrations are from night photographs of installations which are considered as representative of good practice today. In the captions are presented reasonably complete details, so that each illustration really represents the solution of a typical lighting problem.

HEATING AND VENTILATING OF INDUSTRIAL BUILDINGS

BY

WALTER E. HEIBEL

OF VOORHEES, GMELIN & WALKER, ARCHITECTS

IN the early days of the factory system, chief importance was attached to the *quantity* of output, and little attention was paid to the employes' comfort or to the *quality* of the product. But as time passed a comfortable working space was soon recognized as being essential, and the proper heating of industrial plants became more and more standard practice. Today the heating system is always considered along with the design of an industrial building from its very inception. The large number of concerns now manufacturing factory heating equipment bears witness to the universally high standards found in heating systems. Ventilation and air conditioning are likewise of prime importance and should receive the same care and foresight as the heating work, but due to the highly specialized nature of the control of humidity, etc., this problem is usually left to the specialist for solution.

For the average industrial building the owner has the choice of any one of three types of heating systems. Broadly, they can be classed as: (1) fan system; (2) direct steam; (3) direct hot water. The fan system has been placed at the head of the group for the reason that experience has shown this type to be well adapted to the average manufacturing plant. Under the classification of fan systems there are two different types to consider: (A) the unit heater system of heating, and (B) the central system of heating.

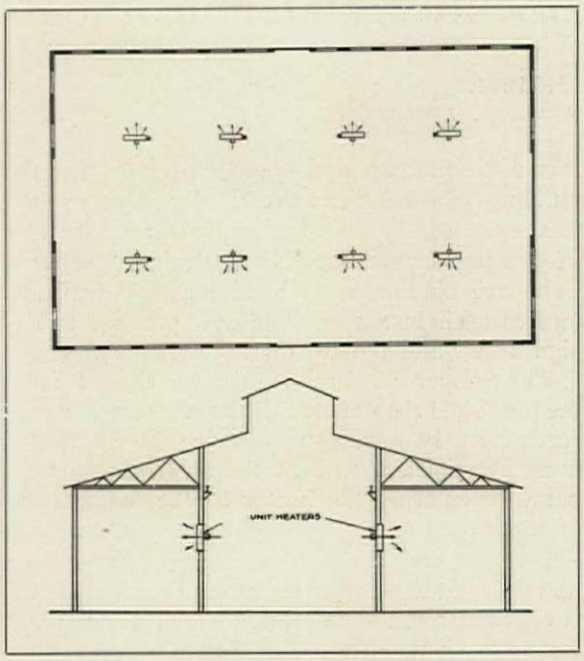
With the unit heater system the space to be heated is equipped with one or more units, each consisting of a fan and heater. Refinements have been added to some makes of equipment in the form of air filters and humidifiers, but the units which meet the demand of average service need only a heating element and a fan for distributing the heated air. This equipment is designed either as wall-mounted or floor-mounted units. Various sizes are available, so that almost any combination of space and other conditions can be met by standard equipment. In the floor type of unit the capacities range from about 3,000 c.f.m. to about 10,000 c.f.m. of air delivery. Standard wall-hung units generally run smaller in size and air delivery. It is the practice of manufacturers to give their equipment a catalog rating in B.t.u.'s per hour or equivalent surface for direct radiation in order to facilitate the choosing of the proper sizes.

The customary method for figuring the B.t.u. loss from a building is followed, and from this value the size and number of units for the building can be determined. By dividing the total heat loss by 240, the equivalent square feet of heating surface can be determined. Special units are obtainable to meet unusual demands, and in such instances, it is best practice to design heater and fan for the requirements.

The proper air heater may be chosen from the published data of any of the air heater manufacturers. In making this choice the air heater must be sufficient to heat the air from its temperature entering the heater to the temperature of the heated space plus the degrees of diffusion (H-h), where H=temperature of air leaving unit heater; h=room temperature. When air is re-circulated, the heater must then theoretically supply only the heat of diffusion, representing as it does the transmission losses. The fan may be chosen from the catalog data of any reliable fan manufacturer, giving volume, horse power, etc.

For the ordinary heating project it is satisfactory to figure that all air is re-circulated. The only factor involved which would demand outdoor air being admitted is that of ventilation, and ventilation requirements in factories are usually met satisfactorily by the ordinary leakage through windows and doors. Where the occupancy is highly concentrated, or where processes employed demand it, forced supplying of fresh air is effected by means of connections, directly through the building walls in convenient locations, or by utilization of a portion of the window openings. It is desirable in any event to provide dampers in order that the quantities of fresh air and re-circulated air can be controlled. Floor type units are preferable for the average industrial plant for the reason that they can be obtained in larger sizes, thus requiring fewer units, less piping and lower maintenance cost. As a practical consideration, use of any equipment which can rest on a solid floor generally simplifies the installation work. Floor space is seldom so valuable that a few square feet cannot be allotted to the heating equipment.

Heat distribution can be effected easily by maintaining high outlet velocities from the heater openings and thus create a general motion of the air in the heated space. This general air movement is highly desirable for its effect upon the employes' comfort, providing that a direct blast of air upon any one is avoided. Very satisfactory results also are being obtained by



A Good Arrangement of Wall Type Unit Heaters for Satisfactory Heat Distribution

the smaller units which lend themselves well to suspension from walls, girders, or other parts of the building structure. These units are of very simple construction, usually with the heater and propeller type fan-mounted in a sheet metal casing, and with the fan wheel mounted directly on the shaft of a small fractional horse power motor. These units are used to considerable advantage in augmenting the heating effect of other forms of systems, for warming cold spots which occur near large doors, the opening of which is necessary for the passage of material.

In the cheaper grade of buildings, the direct-fired unit heater has found some favor. With this equipment fuel is burned directly in the unit and the heat transfer is made directly from the hot flue gases to the air which is being circulated by the fan through properly designed air passages. There are many obvious objections to any form of direct-fired heater, among which are the fire hazard involved, the easy access and resultant tampering by unskilled operators, the untidiness which generally surrounds a furnace regardless of what fuel is used, and the high maintenance and operating costs.

Central Heating. For a great many years, before the advent of unit heaters, the principal source of heating in industrial buildings was the central heating plant with a system of distributing ducts for conveying the heated air to the various parts of the building, running through the structure overhead, or in trenches underground. This system generally averages higher in cost than the unit system, but it shows some economies in operation and maintenance. Where careful control of atmospheric conditions is necessary, or where special ventilation is desirable, this system is preferred. In such buildings as lithographic plants, hat factories, textile mills, and manufacturing plants for candies and food products, temperature, humidity and air movement are all important and can be maintained with remarkable accuracy by means of a central heating plant with control equipment.

The central heating plant consists essentially of an air heater and a system of distributing ducts. To this is added an air filter, if cleanliness in the building is important. The design of the system provides openings and dampers for re-circulation of the major portion of the air, and in very large plants, or where the heating plant is isolated from the heated space, ducts for returning air to the heating plant are installed. Distributing ducts are attached to the heating equipment for conveying the air to the various parts of the building. These ducts are usually installed overhead in the roof trusses

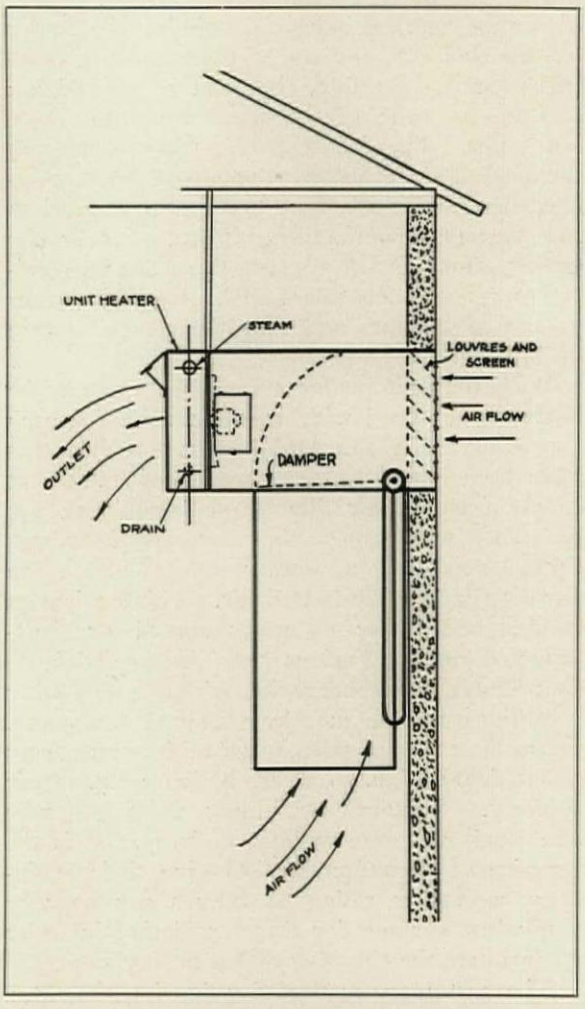


Diagram Showing Air Flow in Unit Heater Equipped with Damper for Re-circulation

Floor Mounted Heaters in an Industrial Building

or along the ceiling, but convenience occasionally requires that they be placed underground. The velocities maintained throughout the ducts are relatively low in order that the frictional resistance against which the fan must operate will be low enough to prevent excessive horse power requirements for the fan. With large installations, duct velocities of 2,500 feet per minute to 3,000 feet per minute at the fan outlet are usual, with a gradual lowering of velocity to about 800 feet at the last outlet; but with smaller duct systems, or where preventing noise is an element, 2,000 feet per minute velocity should not be exceeded. In some manufacturing plants, both supply and exhaust fans are employed. With such systems, the outlet of the exhaust fan is connected to outdoors through an exhaust hood and also connected through a duct with the intake side of the supply fan for re-circulating a portion of the exhaust air.

The design of the duct system should be made only after a careful study of the building and equipment plans. A carelessly designed duct system usually results in there being made a series of subsequent changes which may materially alter the original intent and purpose of the system, or involve a series of price "extras."

The location of ducts should be such that the heated air from the supply outlets may blow toward the outer walls as well as toward the center where it can overcome most effectively the heat losses from the building. The design of the ducts and distribution outlets should be carefully considered to determine the best means of insuring suitable temperatures at the breathing line without overheating the upper part of the floor or building and thus cause an excessive heat loss through the roof. Frequently the upper section of a building is merely a storage space for unused heat, and only a well designed distributing system can place this heat in the zone where it will be of use to the occupants.

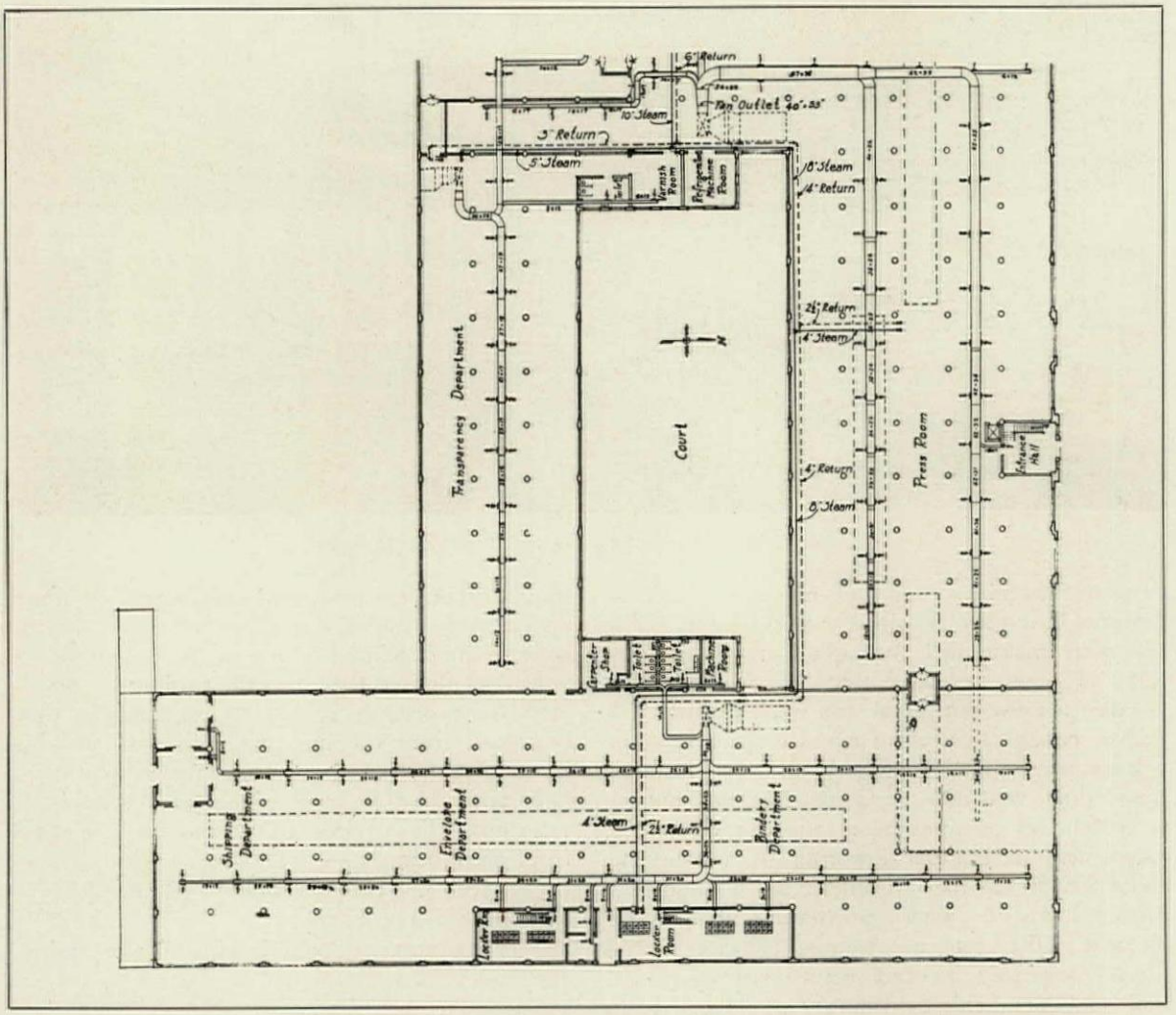
In calculating the size of equipment necessary, the procedure is first to calculate the total heat loss from the building; this loss includes the total B.t.u. per hour transmission plus window and door leakage. The next step is to determine the volume of air to be circulated from the formula:—

Cubic feet of air per minute=B.t.u.÷[.2375x .074x60x(H-h)] where:

H=Temperature of air leaving heater, minus duct loss;

h=Room temperature.

It is customary to design the heating systems for industrial plants to maintain a temperature in zero weather of 60° within the building. The loss of heat in the air passing through the ducts from the heater to the supply outlets in the building is generally represented by a temperature drop of 10 degrees. In choosing the air heater an actual velocity through the heater of from 1,000 feet per minute to 1,200 feet per minute should not be exceeded, and the heater should be ample in size to care for the heavy load imposed upon it during the warming up period. The operation of a fan system of heating is usually intermittent, for it has been found that with the exception of a few unusually cold and windy days, a few hours' operation per day is sufficient. Where variable speed is possible for the fan, economies can be effected by cutting down the flow of heated air after the building has been brought up to temperature. This is particularly true when the steam supplied to the air heaters is taken from a common supply for various purposes, and the operation of the boilers is continuous. Where the boiler load is purely



Duct and Equipment Layout for Air Supply and Distribution in the Plant of the American Lithographic Company, Buffalo

one of heating, the most economy can be obtained by completely closing down the heating system and banking the fires in the boilers.

Direct steam heating is very commonly used in buildings of any nature, and for industrial plants it is found most frequently in multiple-story buildings. Radiators of the wall type have been found preferable to pipe coils or column type of radiators for the reasons that they can easily be installed with the least infringement on floor space, and have a very good heat emission factor. Care should be used in installing radiators to keep them far enough from the walls to insure a good circulation of air between the radiators and the walls, and thus prevent an excessive heat loss through the walls. Trombone coils and header coils have been used extensively in the past, but are not found so frequently in modern installations. Difficulty in keeping any pipe coils tight and problems of drainage preclude their more general use. Steam is supplied to the radiators at low pressure (0 pound to 2 pounds), and the usual two-pipe system with vent and return traps through which return condensation passes to the boiler is generally used. A separate drip line is used where risers require it or where the mains are sufficiently large to make it desirable. In many buildings it is desirable to use a vacuum pump and receiver in place of the return and vent traps, and a vacuum is carried on the return mains which insures rapid circulation and positive return of the condensation.

Except in multi-story buildings, basements are rarely found in industrial structures. Therefore, in order to avoid using trenches, which are always undesirable, the customary method is to place the steam mains under the roof and feed the steam down to the radiators. The return mains are located beneath the radiators and graded back toward the boiler room. Supply valves of the packless type should be used on

the radiators, and thermostatic traps should be installed on the return ends of all radiators and coils. Provision should be made for dripping the heat risers when radiators are shut off.

When possible, roofs should be insulated, for the loss of heat transmitted through the roof can be minimized to a degree that will easily offset the expense involved. On buildings having flat roofs, insulation is essential in order to obviate the necessity of installing an excessive amount of radiation on the floor directly beneath the roof. Roof insulation has the added advantage of keeping out excessive heat during the summer months. On buildings several stories in height, an upfeed system is preferable for the reason that the natural tendency for heat to rise makes the heating for the lower floors more difficult than for the upper floors, which, due to the flue effect, receive considerable warm air through stairways, shafts, etc. Air leakage is inward on the lower floors and outward on the upper floors. This condition, obviously, is modified by wind and exposure.

Vacuum Systems. Very recently, specially controlled vacuum systems have been developed for meeting the varying heating requirements within a building. A source of great heat waste has existed through overheating during the milder weather prevalent in the fall and early winter, and in the spring. With the ordinary vacuum system, steam at approximately the same temperature and amount continually fills the radiators. Since the radiation is calculated to provide the necessary temperatures in the most severe winter weather, generally assumed as zero, with a 15-mile per hour wind blowing, this same heating effect will be too much for the average day encountered during the heating season. Therefore, any equipment which will moderate the intensity of the heating effect of the radiators is highly desirable, and it is with this thought in view that certain manufacturers of heating specialties have developed the equipment just referred to. In one typical method of regulation the amount of steam fed to the radiators is controlled, and in another method the temperature of the steam is controlled by varying the absolute pressure at which steam is furnished the radiators. For instance, the temperature of steam at 2 pounds' gauge is about 216°, and at 18 inches of vacuum is approximately 177°. Such heat regulation should effect very great saving in fuel consumption when the operating engineer has knowledge and full understanding of its merits and limitations, and it should be considered in every installation where vapor systems are being planned.

Hot water heating for industrial plants in many ways is ideal for the reasons that temperature regulation is made simple by means of varying the water temperature, and convenience in piping can be arranged when forced circulation is used. In very large plants and groups of buildings, forced hot water heating has been, and still is, largely used, but the installation costs are greater than for other systems.

Exhaust steam is frequently available for heating industrial plants. It is usual to assume that the economies thus obtained are very great, but in practice it is rarely possible to use the exhaust steam to anywhere near its maximum effectiveness, unless the chain of circumstances surrounding its use is just right. For instance, the maximum demand on the heating system comes during the warming-up period, or before the plant assumes operation for the day. During this interval there is no exhaust steam available. When exhaust steam is available, later on, the demand for heating is so low that little steam is required. It is found to be very difficult to so regulate the heating requirements that they will fit the exhaust steam supply, and in order to utilize this steam to its fullest, additional control equipment is necessary and high maintenance cost is the result.

Air Conditioning. Any discussion of the control of the atmospheric conditions in an industrial plant should include air conditioning. Furthermore, this discussion should include a study of the effect of this control, not alone on the comfort of the employes, but on the product as well, for it is only by such means that good over-all efficiency can be obtained. The stepping up of production has made necessary new and better manufacturing machinery. Machines in the hands of skilled designers and builders have become more or less perfected. Competition in price and quality has demanded further improvement in production methods, and attention has been concentrated on the elements other than machines and operators which affect the product.

The general conception of air conditioning includes, in addition to temperature control, full control of humidity and air distribution. Where temperature control generally contemplates a heating of the air during the winter months, it necessitates a cooling of the air during the warm summer months. Absolute humidity, low during the winter months, requires an increase of moisture in heated spaces, and humidity, relatively high during the summer months, generally requires a decrease if air temperatures are lowered. Control of humidity and air movement as it affects the comfort and health of employes is equally desirable in all manufacturing establishments, where the occupancy is of any great density, but in textile mills, candy plants, bakeries, match factories, paper mills, and many other

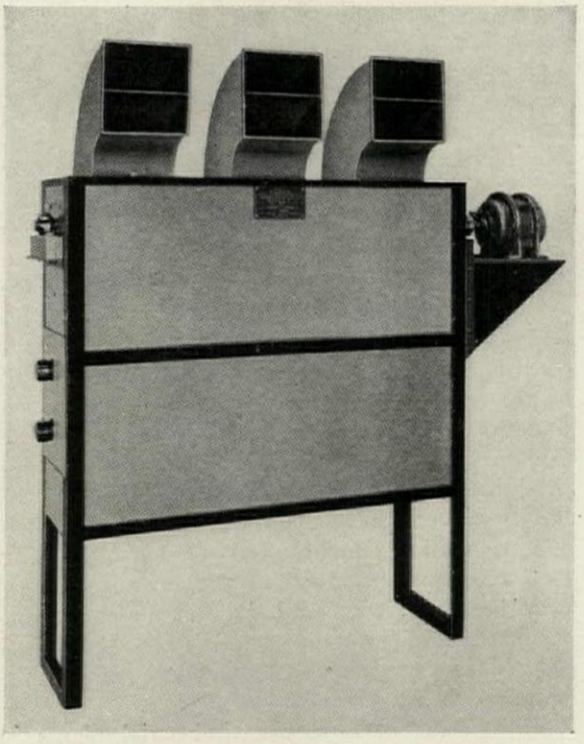
plants, such control is essential. The physical properties of many products are materially changed with changing moisture contents. Anyone observing the condition of a carding room in a textile mill after a period of shut down of humidifiers, and with heat still maintaining regular temperatures, can testify to the havoc that can be wrought with valuable materials.

The full air conditioning unit consists of a fan, heater, filter, humidifier (or de-humidifier), and the auxiliary equipment such as refrigerating machine, pumps, motors, control equipment, etc. The plant may be arranged as a single central system to provide air conditioning to the entire factory, or it may be arranged in multiple units, each complete in itself, and designed to provide control over a certain section of the building. Where varying conditions in the plant exist, or where rooms are partitioned off, the unit system is very desirable, but before either a central system or a unit system is decided upon, a very careful check of all fundamental data affecting the system should be made. In some processes, it is more convenient to segregate the humidifier from the other equipment and install humidifier heads in the building, or to provide humidity evaporating pans at convenient locations in the duct work.

Where humidity conditions require a lowering of the wet bulb temperature of the air below the dew point, refrigeration is necessary. In view of the great expense involved in the operation and maintenance of a refrigerating unit, it is essential to maintain as high a degree of temperature as possible, consistent with comfort and health and effect on the product, in order to keep the quantity of refrigeration used at a minimum. The heat-absorbing capacity of the refrigerating equipment must be sufficient to overcome all heat transmission and leakage quantities, in addition to the lowering of the temperatures of the incoming air with its resultant water vapor, condensate and latent heat of water vapor. This means that the temperature of the air must be cooled down a considerable amount below the final desired temperature, so that as the transmission and leakage gains are being met, the temperature of the air is being drawn closer and closer to the final room temperature mark. It is not uncommon to find cases where the transmission and leakage gains are insufficient to insure a proper final temperature and humidity in the building, and therefore a re-heater is always installed which provides any makeup heat that is necessary. A typical installation of air conditioning equipment is shown here, making clear the design of the fan, heater, humidifier and distributing ducts. This installation was made in a lithographing plant.

Automatic temperature control for the heating system in the average industrial plant is not essential, and it is rarely installed except where some processes make it desirable, or where fully automatic air conditioning plants are employed. Pneumatic systems of temperature control are most commonly used. For direct radiation systems there are types of electric thermostats and direct-acting valves which are sometimes used.

There are now on the market a number of direct-control valves for two-pipe direct heating systems, where this new device replaces the supply valve on each radiator. These valves are provided with a thermostatic element in the valve and depend in performance upon the circulation of air through them. Although these valves may properly be said to have passed the experimental stage, they are all too new to rely on as implicitly as would be the case had they a better background of use. A truly modulating valve has also been developed to accomplish some degree of heat regulation. This valve is more in the form of a supply radiator valve, but inwardly is so designed as to give minute throttling and steam distribution in the radiator. This valve, although depending entirely upon manual control, can become an element of no little heat saving with a little interest and experience on the part of the engineer. A key-operated valve is desirable in order to prevent any tampering with the engineer's adjustment by inexperienced men.



A Unit Heater Designed for Floor Mounting

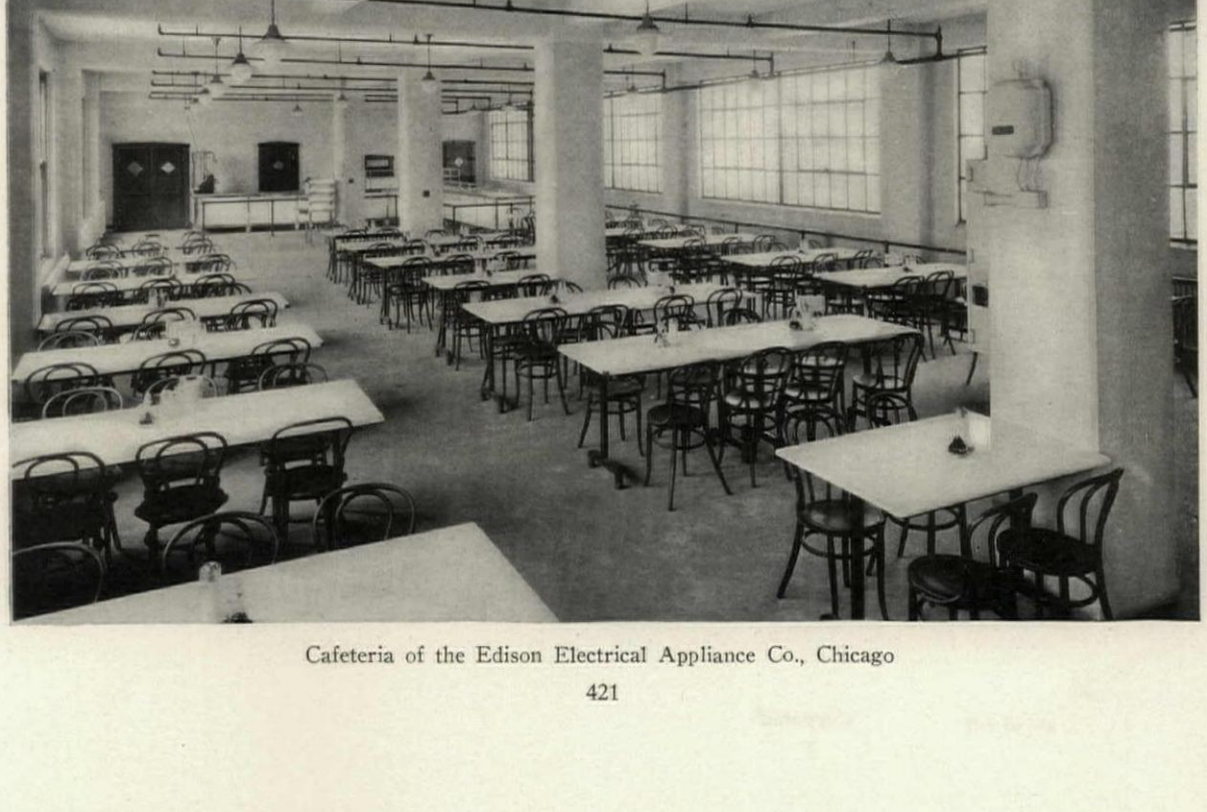
PRACTICAL PLANNING FOR THE FACTORY CAFETERIA

BY
VINCENT R. BLISS
OF TAYLOR, ROGERS & BLISS, INC., CONSULTANTS

IF, as is usually the case in modern industrial buildings, a cafeteria is to be included for the benefit of employes, this feature should be given careful and practical attention in the architectural plans, or its operation will suffer, and its outfitting cost will quite likely be affected as well. The actual planning of the food service facilities should, of course, be placed in the hands of trained kitchen engineers such as are connected with the leading outfitting concerns, but in order that they may have a satisfactory basis upon which to work, it is imperative that the size, character and location of the dining room and kitchen space should be determined in accordance with a few well defined principles.

Calculating the number of meals to be served is at best only an estimate in any individual case, so that general percentage figures are used only as a means of comparison. The proportion of employes who will be likely to patronize the cafeteria will depend upon: (a) the type of employes, particularly whether they as a class will be likely to eat in a restaurant at all; (b) the location of the plant with reference to the employes' homes; (c) the existence of outside restaurant facilities within reasonable distance; (d) the attractiveness of the cafeteria and of the food served. These factors should all be borne in mind when it is said that under reasonably favorable circumstances the average experience is that about 60 per cent patronize the cafeteria at the start, and that this may increase gradually to approximately 75 per cent within a year's time if the cafeteria operation is satisfactory. Thus, if a single lunch period is used, a plant with 300 employes would require a cafeteria of 200 or more seats. It might be mentioned that two lunch periods are frequently used, one reason for this being the desire to allow factory and office employes to use the cafeteria at different times. If this is done it will naturally reduce the number of seats in proportion to the total number of employes. Some excess capacity should really be figured upon to take care of future expansion.

Whether single, double or multiple cafeteria service counters should be used is a problem that will have to be solved by the kitchen engineer. Greater serving speed can be obtained in industrial cafeterias than in those catering to the public, due to there being a more limited menu. The maximum for a single counter is about 200 persons served in from 10 to 12 minutes, which is about as long as it is wise to make



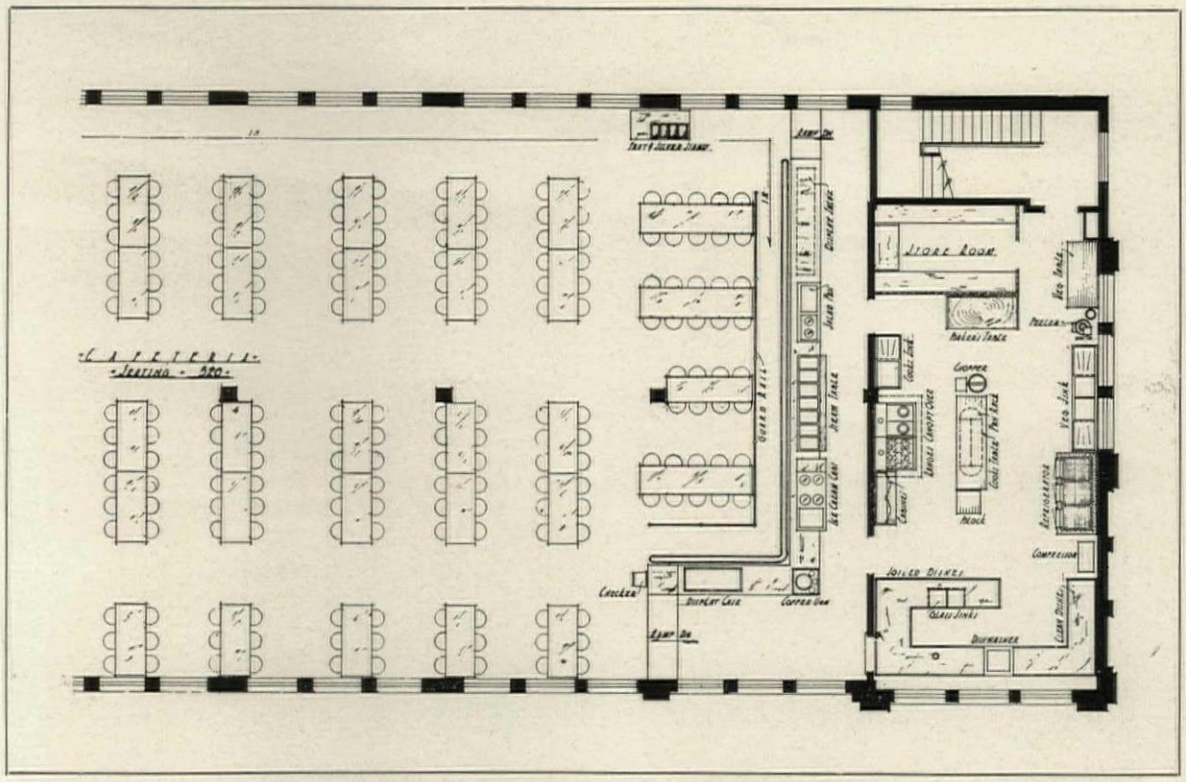
Cafeteria of the Edison Electrical Appliance Co., Chicago

Employes' Cafeteria, Illinois Steel Company, South Chicago

people stand in line. If more than 200 employes are to be fed, therefore, either two lunch periods or double service counters will be necessary. This question, and also the length of the counter, will have a bearing upon space requirements as well as upon room arrangement, and therefore should be settled as soon as possible.

Space Requirements. The accepted method of calculating space is to use an area per seat formula, yet this cannot be taken strictly at its face value, for it will be found that there are several variable factors among which the most important are: the type of seating arrangement (size of tables, amount of aisle space, etc.); the shape of the room, and the resulting amount of waste space; the type of counter layout (whether single, double, or multiple service); and the completeness of the kitchen facilities. Barring any abnormal amount of waste space, this rule may be accepted as a safe normal working formula: For cafeterias of medium size (120 seats and up) the area of the dining room, including the cafeteria counter, should be 15 square feet per seat. While there have been cafeterias in which this figure is reduced to as low as 12½ or 13 square feet per seat, this does not allow a comfortable amount of space at tables and makes it necessary to use large seating units which may be satisfactory for high school pupils, for instance, but which is undesirable for adults. In the interest of comfort and the elimination of crowding and confusion, therefore, it is wise to adhere to the 15 square feet per seat rule. The cafeteria kitchen should occupy a room from 25 to 33 1/3 per cent as large as the dining room and service area, adding about 5 square feet per seat and making a total for the kitchen and dining room of 20 square feet per seat.

On this basis a 200-seat cafeteria would need a total area of 4,000 square feet, of which 1,000 square feet would be occupied by the kitchen, 500 square feet for the serving counter, etc., and 2,500 square feet for the dining room proper. It should be mentioned that in a very small cafeteria the space per seat would have to be larger than the figures given here. For example, a 32-seat lunch room such as is used in some industrial buildings, notably in telephone exchanges, would need about 720 square feet of space or an area of 22½ square feet per seat. The minimum area for a kitchen, regardless of the size of the restaurant, is from 300 to 350 square feet.

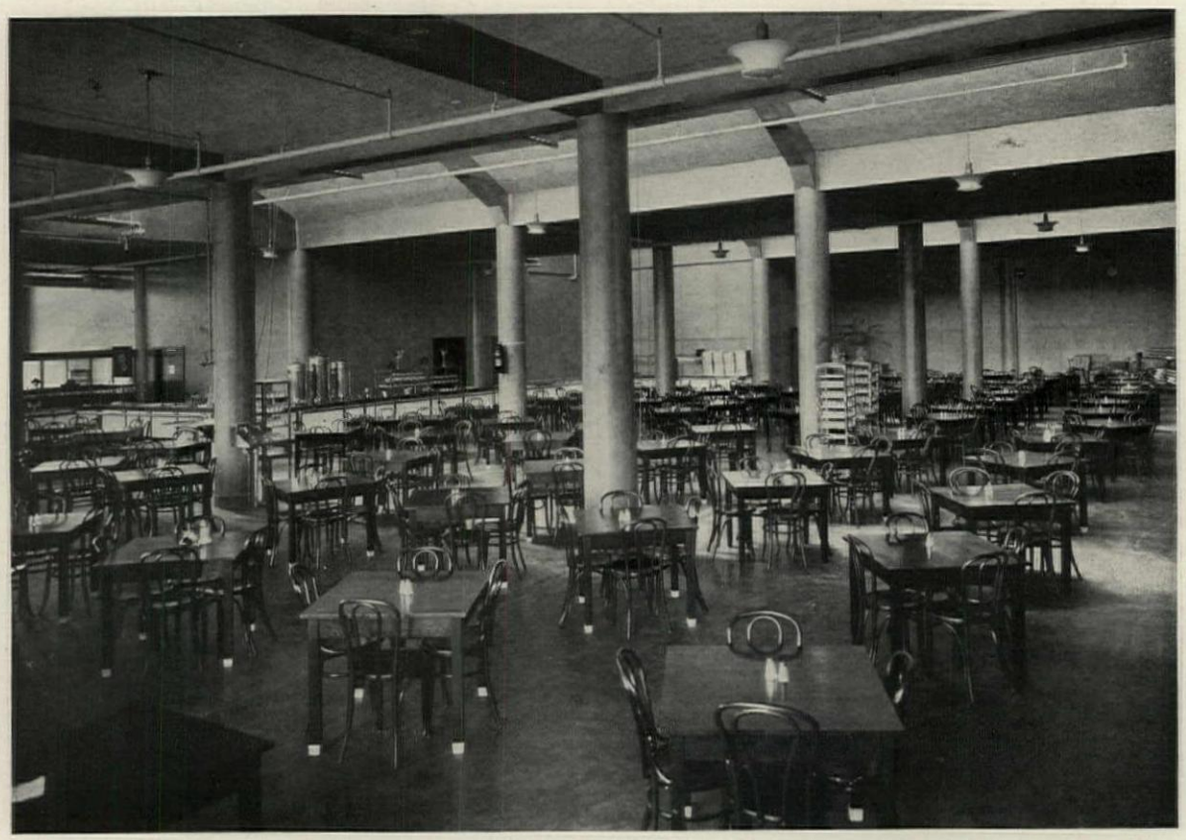


Plan of the Kitchen and a Portion of the Cafeteria of the American Can Co., Chicago

Location in the Building Plan. The first requirement is good light and air and pleasant surroundings, for the factory lunch room will be poorly patronized and thus fail to serve its purpose if these are not had. The second is to locate the cafeteria in such a way as to make it accessible to employes of all classes without making them travel unnecessary distances, and without causing confusion and congestion in corridors or other passageways. One of the best schemes has been to group all of the employe accommodations, such as washrooms, locker rooms, smoking or card rooms, etc., together with the cafeteria on the ground floor, close to the entrance of the building. This is logical and convenient in every way. It also agrees with the general advisability of placing the cafeteria near the building's entrance which, among other things, makes it accessible to the employes of neighboring plants, if such outside patronage should be desired. There is no objection from the standpoint of operation to an upper floor location for the cafeteria, although if this is done the matter of incoming supplies, garbage disposal, etc., needs rather careful attention and requires easy access to a good sized service elevator located within convenient reach of the service entrance to the building.

It is of the greatest importance to locate the kitchen immediately adjacent to the cafeteria, for otherwise its smooth operation will be severely impaired. The best practice is to have the kitchen extend along one side of the cafeteria room, with the serving counter directly in front of it and with suitable openings or passages between the two for bringing replenishments to the counter. Where absolutely necessary, the kitchen may be located on the floor below, but this requires unusual precautions in order to make service practical, and it usually involves expense of installing dumbwaiters or conveyors.

Room Arrangement. The dining room itself should be rectangular, and while not necessarily square, it should not be more than about two times as long as wide. Irregularities in the shape of the room should be avoided as far as possible, especially if they interfere with the use of a straight counter, for although L- and U-shaped counters are practical, they are more expensive to build than straight counters. The ideal kitchen also is rectangular and about one and one half times as long as it is wide. In very small restaurants the kitchen, cafeteria counter and tables are all installed in one open room, but this is not desirable, for it is almost impossible, under these circumstances, to handle the ventilating problem, to say nothing of the unsightliness which results. Large size cafeteria kitchens often should be divided into two or more rooms in order to segregate the store room,



Employes' Cafeteria in the Montgomery Ward & Co. Building, Fort Worth

dishwashing department or other subdivisions from the main kitchen. Whether or not this is likely to be necessary will develop as the actual equipment engineering plans are being prepared.

Auxiliary Requirements. Adequate provision for hot and cold water, steam, gas, power, sanitation, drainage and ventilation unfortunately cannot be handled by means of any known set of general formulæ,—and yet, unless they are handled with accuracy, they are likely to prove troublesome. For this reason it will be advisable to call in the cafeteria specialist at as early a time as possible in order that all such technical matters may be settled before the building plans have progressed far enough to allow any complications to arise.

Counter Construction. Cafeteria counters should be built of metal; wooden counters are unsanitary and impractical. Inexpensive metal counters have an angle iron framework with galvanized steel panels which may be suitably painted, while better grades have porcelain enameled steel, glass, or Monel metal panels. While glass counter tops are popular, the present trend is toward the use of polished Monel metal, as this eliminates breakage and is equally sanitary. Table tops of linoleum, rubber tile, composition or ¾-inch glass are all satisfactory, but wood is not. There is a type of table especially designed for industrial use which has a pipe-leg base with stools attached, and this has practical points in its favor, although it is not very likely to appeal to high class employes.

Specifications and Bids. It is well to offer a word of caution about cafeteria equipment specifications. When one manufacturer bids on another's specifications, he is really figuring his method of construction against the original, and there is frequently a world of difference between the two. This may be unavoidable, but its danger will be minimized if the architect will insist upon very explicit specifications in the first place, and upon an equally clear definition of variations in either construction or materials from additional bidders. Especial attention should be paid to the kinds and gauges of metal used, as this is one of the most common points of variation. The lack of standardization among equipment manufacturers makes these precautions essential if the contract is to be awarded on a fair basis.

PLUMBING AND SANITATION OF INDUSTRIAL BUILDINGS

BY
A. R. McGONEGAL
SANITARY ENGINEER

DESIGNING the plumbing equipment for factories, mills, warehouses and industrial buildings and plants or groups of buildings requires almost as varied treatments as there are purposes for which the plants are built. This variation persists in every study made. Not only does the proportionate number of fixtures vary, but the type as well; and the materials to be used, both rough and finishing, must be made applicable to the particular use. In hotels, apartments, office buildings, schools and similar structures, there is a known ratio of the number of fixtures per room, per unit of area or space, or other fixed measurement; and even the types of fixtures are of well recognized standards, whereas every industrial building or plant seems to present a different basis of design.

Modern warehouses have great floor areas and have few employes to be provided for. Steel works, shipyards, car and locomotive shops, potteries, paper mills, and similar plants cover large areas, frequently with many buildings, and have but few more employes per unit of area than the warehouse, though they are widely scattered and the several groups of employes are "settled" in their particular parts of the plant, instead of laboring in one section for a time and then moving to another as in warehousing. On the other hand, clothing factories are heavily peopled per unit of area.

Fixture Ratio. In industrial work the ratio of fixtures must be based on the number of employes, but in the case of few employes and large areas this ratio should be modified by the time factor. While it is true that in modern manufacturing practice, piece work is the rule and time out is the employes' time, still it is poor organization practice to require an employe to go great distances for toilet purposes, and in group assembly work it is out of the question.

The toilet fixture ratio established in the factory laws of many states,—one water closet to each 15 employes,—appears to be well justified in practice if modified by the individual conditions presented. For instance, in small plants the ratio might better be 1 to 12. Two urinal fixtures are generally accepted in lieu of one water closet, provided half the legal number of water closets are furnished and urinals substituted for the others. The proper installation and economical maintenance of plumbing fixture equipment require that fixtures shall be grouped and not scattered, and while nothing is gained by having more fixtures than are necessary for the number of people to be served, a toilet room containing fewer than six water closets and eight or ten urinal fixtures will be generally found unsatisfactory. It is good practice, too, to figure one more closet and one or two more urinals in each toilet room than the numerical ratio indicates, to take care of fixtures out of use, unusual demand, and similar conditions. Sometimes an extra closet enclosure is provided with a lock for the foremen, but it is generally considered better to provide a separate private room for them. Small wash sinks or lavatories should be in each toilet room for reasons of personal cleanliness, these being in addition to the regular wash-up facilities provided elsewhere. Bearing in mind that employes should not be required to go long distances, clothing factories and similar well peopled factories in loft buildings should have at least one room for each sex (if both are employed) on each floor, and if the number of employes exceeds 200, two toilet rooms are better. In specially built factories of the long and narrow type two toilet rooms staggered on opposite sides, each one quarter the way from the end, will be good design. In steel mills or in other places where men are more scattered, separate toilet buildings are to be preferred; perhaps one to each fairly large building or group of small structures will be found best, but the time element should be considered. The writer has seen single industrial buildings of such length as to justify two or even three toilet locations.

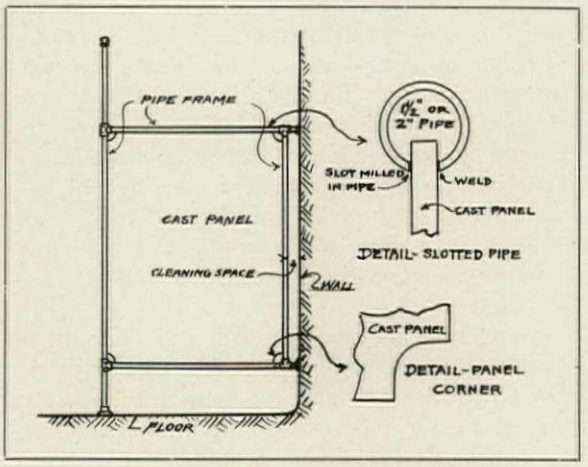
Wall, Floor and Partition Materials. Naturally, in industrial work, great care should be taken in wall, floor and partition work to make it of the most substantial and lasting character, and of materials easily cleaned and kept clean. It is a demonstrated fact that employes will not have the urge to disfigure or damage fixtures or fittings in a substantial, well lighted, and well kept toilet room. Sunlight is not only one of the chief germicidal agents but is a cleanliness aid without peer. Every toilet room should have more than ample window area opening out into a space open from ground to sky and far enough removed from any walls or buildings opposite to assure direct sunlight to all the windows for half the day.

In selecting material for wall and floor finish, it is proper to couple reasonable cost with desirable qualities. Perhaps the most satisfactory floor surface will be one of the several bituminous mastic floors laid as a unit on a concrete subfloor. They are not unduly expensive, are

water- and vermin-proof, wear well, and if need be they can be "ironed over" or can be taken up, remixed and relaid.

For wall work the writer has never seen any material lending itself to this purpose better than the mottled salt glazed hard burned brick to be had in any locality. It can be had in a very light tan, and if laid in a fat cement mortar with thin tooled joints it presents a scratch-proof, pencil-proof, and practically non-absorbent surface. It can be carried to a height of 8 or 9 feet, and the upper walls and ceiling finished in white hard plaster for light-reflecting purposes. These bricks can be had with coved bases and rounded for room corners so as to eliminate dirt-retaining angles, and the plastered ceiling can also be rounded to the walls.

The selection of partition materials offers a wide range of choice, but when finished the partition should be very strong, and easily kept clean. All fastenings to wall or floor should be made with heavy toggle, lag or through bolts, exposed faces flush where possible, and concealed nuts upset. If partition work is of metal, welding or brazing should be the rule. In selecting metal partitions of commercial units, they should be judged on their strength, rugged construction and durability because of the rough usage they must stand in industrial plants. A satisfactory closet partition can be made up with a 2-inch steel or iron pipe frame, the pipes slotted to receive a cast or rolled sheet 3/8, 1/2 or even 3/4 inch thick. A rough surface cast panel possesses the advantage of discouraging attempts to write on it, and it is practically unbreakable. The pipe at the front of the frame should be carried up above the partition panel and be connected across the fronts by a transverse pipe high enough to discourage attempts to swing on it. The pipe at the back of the frame should be supported 2 inches away from the wall, leaving the wall



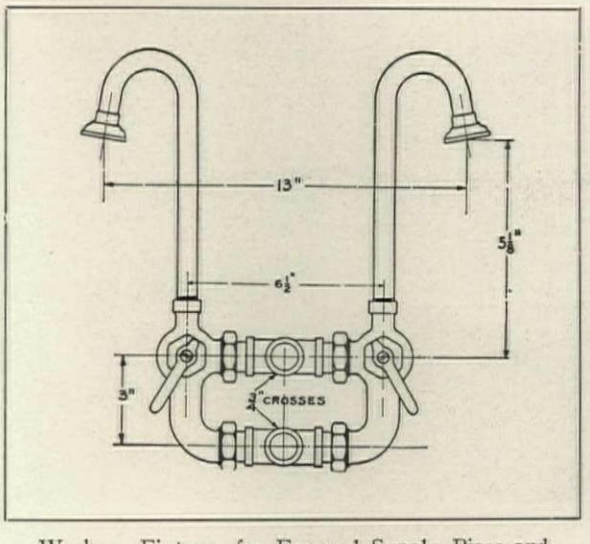
Details of a Pipe and Panel Closet Partition

surface free for cleaning. The fittings with which the pipe frame is put together should be welded or brazed, if indeed the whole pipe frame for the partition work is not welded without fittings. For finish, plain lead and oil in a neutral gray will be found satisfactory. If the partitions extend out far enough to constitute an acceptable screen, there is little need for doors to the closet enclosures, and it is no longer considered necessary or advisable to provide them.

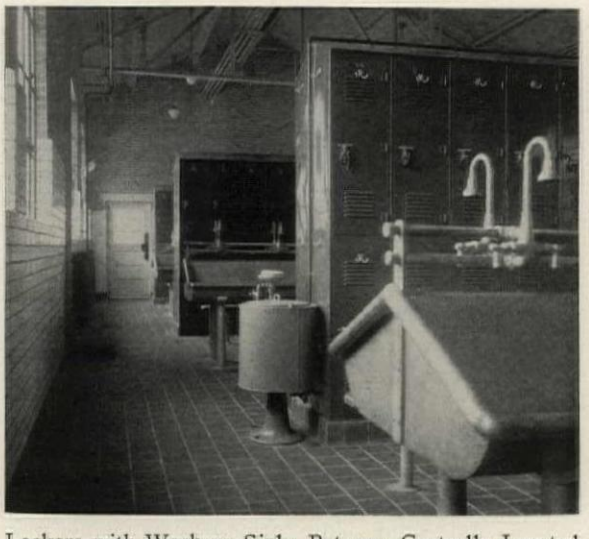
Locker and wash-up rooms have a decided advantage over groups of lockers scattered throughout the plant. It is not so necessary that these facilities be within easy distance of the places of employment, and consequently they can be constructed in larger units. It is not considered good policy to have the lockers in toilet rooms because of odors, the greater moisture content of the air near more or less constantly running water, and other reasons; but it is good practice to have them adjacent to toilet rooms or buildings. Wash-up sinks are in general use at quitting time only, and may well be located in locker rooms if the plan is such as to make such construction desirable.

Lockers are of two general classes,—those with wire mesh or expanded metal fronts which ventilate into the room, and those with closed fronts and ventilated by duct and fan. If ventilated by fan, the air intake should be from the outside or else protected against dust. Many installations are supported from walls or on stands 8 to 12 inches from the floor to permit cleaning under, and the tops should be so sloped as to prevent dust collection or the lodgment of papers or cast-off clothing thrown there. Unit steel lockers come in a wide variety of stock styles and sizes. Double-tier lockers are extensively used, but wider units are necessary than for the single tier, and in cold climates the short locker is hardly suitable for heavy outer garments. A narrower long locker is more satisfactory to the user and makes for contentment of the employe. Locker keys cause endless trouble through loss of keys, leaving keys at home, and wear. Three-number combination knob locks will give an almost endless variation of settings, can be had with almost any make of locker, and will generally be more satisfactory than the keyed locks.

Wash-up sinks can be had in a great variety of styles and in several materials. Slate, soapstone, an especially treated cement, glazed earthenware, and enameled iron are offered by several manufacturers, and they may be had in long, narrow, single or double patterns, individual type lavatories, large circular basins accommodating several around the rim, or long trough-like sinks with individual tipping basins. The class of users, the space available, the shape of



Wash-up Fixtures for Exposed Supply Pipes and Double Sink



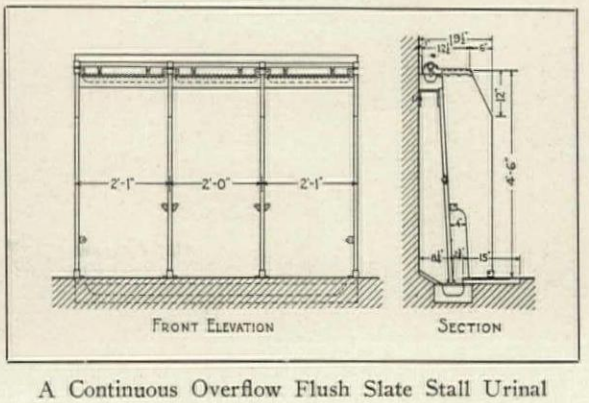
Lockers with Wash-up Sinks Between Centrally Located Drinking Fountain

room and other considerations generally dictate the selection of the particular type and material. If the designer is intent on permanency, perhaps it is better to build the wash-up sinks to fit the requirements. An alloy of metals can be used to form up a wash-up sink to fit any specified conditions. There are a number of instances in industrial plumbing where "Monel" metal wash sinks have been given hard usage over a long period of years and are still intact and untarnished, special handwashing compounds and mechanics' soap notwithstanding. Monel metal is a natural alloy of copper with a high nickel content.

The use of a gooseneck spray supply fixture for wash-up sinks is practically universal. This fixture mixes hot and cold water through a single column in much the same manner as a shower bath fixture; indeed it is identical in design and operation, but on a smaller scale. The usual equipment has hot and cold faucets so that each user can vary the temperature to suit, and as there is no stopper in the sink waste, washing is always in running water. Sometimes knee-action or elbow-action valves are used, but they seem particularly subject to repair costs, and the quick compression hand-operated faucets are more generally used. In cases where the manufacturing process requires volumes of very hot water and the wash sink supply is taken from it, it is well to use a temperature-limiting valve on the line, and more often than not, pressure regulators on both general supply lines will save water and avoid excessive splashing. In some cases a liquid soap distributing system is deemed desirable, but while special mechanics' soap can be had in liquid form most operators prefer their own particular brands, and the trouble required to maintain a soap system can thus be avoided.

Shower baths are frequently provided for workmen, and these are preferably installed in "gangs" with a single pipe feed from a temperature-regulating valve set at a predetermined degree. Such a valve should be provided with a constantly flowing waste to keep the valve "set," but this waste connection can usually be arranged to discharge so that the water can be put to a useful purpose. It is usually considered unnecessary to divide off the showers with partition work; a number of valved heads are grouped in a suitable room with one or two large drains in the floor.

The urinal fixtures may be either the well known earthenware stall type or constant-flush slate fixtures. If of earthenware, the vitreous ware fixture is more permanent and sanitary than the glazed biscuit porcelain on account of its resistance to crazing. At the present time it cannot be obtained wider than 18 inches, but they can be set in battery with three to six intervals. The constant-flush slate fixture consists of especially non-absorbent slate waste trough,

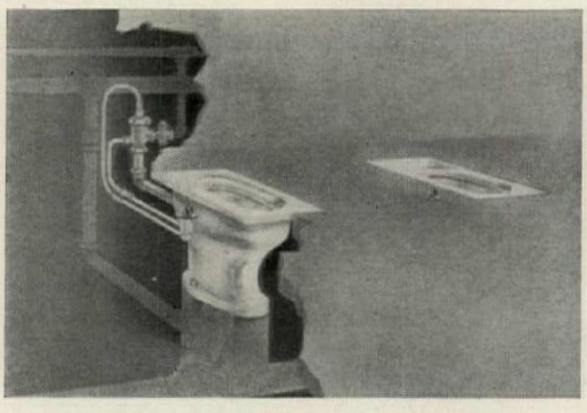


A Continuous Overflow Flush Slate Stall Urinal

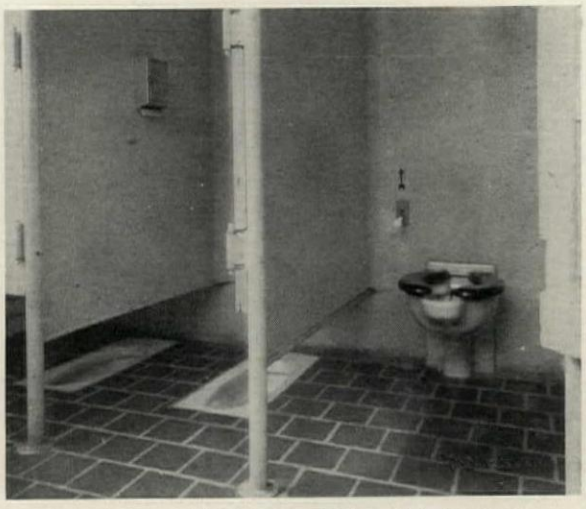
backs, wing slabs and a flushing trough with serrated edges distributing a constant and even thin film of water over the whole width of the fixture. These slate slabs are built into a unit fixture of as many stalls as may be desired and are standard with either 21- or 24-inch divisions. On account of the exceeding thinness of the water film when properly adjusted, the water consumption will not be unduly great and will probably compare favorably with that of the stall type with hand-operated valves. Whichever type is used, the waste should be set in the floor so the floor will drain into it. No trap under a urinal fixture should be less than a 3-inch to prevent stoppages.

To the selection of water closet fixtures the engineer should give most careful consideration. Some plants employing foreigners have found it necessary to have part of the equipment in "squat closets." The fixture is practically the same as the regular type except that the water surface is farther back in the bowl, and the rim surface is formed into a floor slab. Some doctors claim that this type of fixture should be be used to the exclusion of the generally accepted standard height of from 15 to 16 inches. It is their theory that a squatting posture promotes proper physical action and that the comfortable chair-like bowl interferes with it. Certain it is that the subject has received much thought, for only a few years ago the low bowl had some vogue, and today one prominent maker is forming the rim of his best selling bowl to fit a theoretically proper position. Many of our schools and institutions use the juvenile height of 13 inches, and wall hung closets are frequently set at this height.

Wall closets, if used, should be of the blow-out type and not the siphon action, but they must have flush valve operation and a strong pressure, certainly of not less than 50 pounds. They should be supported from a cast iron "chair" embedded



Squat Type Closets Operated by Floor-push Flush-valves



Squat Type Closets of Syphon Jet Pattern, at Left of a Wall Type Closet

in the wall and concrete floor and not supported by the soil pipe with a yoke. For industrial work the writer's preference is for the 15-inch height standard siphon jet bowl specified by the Federal Specification Board, except that the siphon limb should be enlarged to pass a 2½-inch ball. This extra large waterway is insurance against constantly obstructed closet bowls with attendant annoyance and cost of taking up to clear. The added cost of this enlargement would be more than offset by the cost of disconnecting and resetting for a single stoppage. If these special bowls are ordered, the inspector should see that the stock bowls are not substituted, by passing a 2½-inch wooden ball through each one before permitting its setting and connection. In addition to demonstrating that the specified waterway is furnished, it shows that there is no interior obstruction such as drips or clots of glaze fired on the ware to become catch-alls in service.

The method of flushing will depend on available pressure, pipe sizes and other considerations. The practice has become very general to make a complete flushometer installation, but the use of tanks is coming back into favor. With high grade fittings few or no repairs are needed except a single ball cock washer and a new tank ball every two or three years, and it is a simple matter to shut off the valve on the supply and replace them. The average flushvalve rarely goes longer than that without needing attention, and the repair of any one of the several best on the market is a rather complicated matter of several washers and packings. Even the diaphragm type which seems to be the simplest has two or three washers and a diaphragm. The greatest trouble with the tank seems to be the tendency of some workmen to take the cover off and store bootleg and other supplies in the tank, or to use it as a repository

for empty bottles, cast-off underwear and the like. This can be checkmated by fastening the cover down so that it requires a special tool to remove it. The better grade of vitreous tank is practically everlasting. Whether tanks or flush-valves are used, a careful selection should be made and adhered to so that it will not be necessary to carry repair parts for several different makes. This also applies in the case of shower valves, sink faucets, and plumbing valves generally. Parts should be interchangeable so far as possible, and a single line of repairs should cover all needs. High grade rubber-covered composition seats are water- steam- and vermin-proof. The hinges should be of cast metal and should be rustproofed by the Bower-Barff process or chromium plated to give a non-corrosive finish.

Sinks. For general wash-up purposes floor sinks are generally preferable to slop sinks in industrial work. Mechanical floor scrubbers are used on large floors, and they can be wheeled over a floor sink and washed out and, in any service, a floor sink will do all that a regular slop sink will and be handier. Floor sinks are set down on the floor construction with the rim flush with the surface so that they act as floor drains. If it should be found necessary to use floor drains elsewhere about buildings for dry manufacturing, care should be taken that there will always be enough water to keep them sealed. Of course, in certain lines of manufacture floor drains are necessary to take care of excess liquid waste and splashings, but in such cases the permanency of trap seal is assured.

So simple a matter as the location and service of drinking fountains has a great bearing on one of the vital points in plant operation,—labor turnover. Proper and satisfactory plant operation requires that the several employes' stations be occupied daily by those familiar with their duties. Constant change of personnel, even temporarily, or temporary but recurring indisposition on the part of employes has a tendency to slow down production and sometimes to interfere with even the quality of the output. Laborers require drinking water, and the temperature conditions under which they work, the character of work, the section of the country and the season all have definite bearing on the amount of water needed to maintain the workers' health at par and on the manner in which it should be provided, so it is not possible to plan an installation without these facts as a basis. The subject of drinking water furnished in manufacturing plants has been the subject of much study by medical men working with some of the largest industrial organizations in the country. The almost universal opinion among them is that the lack of care in the item of drinking water causes much layoff on account of stomachic and intestinal disorders, and is a frequent cause of cramps and diarrheal disturbances, upsetting the rhythm of work, especially where employes work on a traveling assembly or where work of gangs under high temperatures is the rule.

The human skin is an important factor in elimination and in keeping the worker's body fit. The skin cannot do its duty unless supplied with moisture. Employes engaged in light manufacturing in cool rooms do not drink as much as heavy workers or those working in high temperatures. The workmen should and will drink from about a minimum of three pints to over a gallon a day, depending on conditions. The amount to be furnished should be about twice the amount of the use estimated. The consumption will be less when light work is done in moist, cool surroundings without moving about much. Dryness, heat, moving about and heavier work will increase the amount.

Two considerations are important. The drinking fountains must be generous in number so that no employe need go far to quench his normal thirst. Unnecessary distance tends to make for fewer drinks, and each drink of more water than necessary, sometimes even of harmful amounts, whereas if fountains are clean and inviting and handy it results in many small drinks that don't tend to waterlog the intestinal tracts and induce sluggishness. The second consideration is the temperature of the water served. Ice cold water, especially ice water, if taken while the body is heated, has a tendency to produce cramps and the following intestinal disturbances, and under certain conditions this may stop body perspiration and induce "colds." Continual recurrence of this condition may have a definite and permanent effect on health. On the other hand, employes will not drink water so warm as to be unpalatable, and their health and effectiveness suffer from a lack of moisture. The consensus of medical opinion, as expressed by those working directly in industrial plants, is that a temperature at the mouthpiece of about 50° Fahr. should be maintained. This temperature makes some artificial cooling necessary. No natural ice cooling arrangement can function satisfactorily. If the cooling is handled at a central unit and the water pumped through circulating lines, the connected unit should be small enough so the water would leave the pump not lower than 47° and be not warmer than 53° at the return. It is probably better to have individual cooling units which can be maintained at a definite pre-determined temperature. There are a large number of manufacturers of these refrigerating units, and there is almost infinite variety to select from. Care should be

taken, however, that the selected unit is so constructed that the cooling element itself containing the refrigerant in either gaseous or liquid form is not immersed in or in direct contact with the drinking water, as the gas might escape through a minute leak and contaminate the water. For instance, sulphur-dioxide gas escaping into the water would form sulphurous acid, which is good for neither man nor pipe on account of its corrosive action.

As to the fixture itself, the diagonal stream is generally considered the most sanitary, and probably the dual stream gives the best shaped bubble for drinking. It should be adjusted to the point where the "bubble" gives a sufficient amount for a satisfying drink without the drinker feeling an urge to follow the stream down with his lips, to contaminate or be contaminated by the nozzle.

The water supply and sewerage planning for a manufacturing establishment is not necessarily complicated, but the layout varies with every different line of manufacture and with the local conditions present. Paper mills use vast quantities of water, soil it in the process, and then must get rid of it. Certain types of reduction plants and steam power plants are also heavy water users, as are cloth finishing works and large laundries. On the other hand, garment factories, cloth print shops, and similar businesses use little water, and a multitude of other industrials vary between the extremes.

Cross Connections. The provision of quantities of water for manufacturing purposes lies outside the plumbing field and is taken care of in plant installation, but certain precautions must be taken against contamination of the water supply for purely human use such as drinking, washing, and sometimes cooking, and it is quite within the province of the plumbing designer to see that there is no opportunity for cross connection between the two uses or between the pure water supply source and the source of water used in plant operation, if they be different. It is not enough that there be a checkvalve between the two, because unfortunately checkvalves do not always work, and even when they do, a single deadly bacterium can pass through the tightest checkvalve ever made during a temporary unfavorable difference in pressure, and populate the entire domestic supply in a few hours. The same thing can happen if the system is designed with an emergency gate valve between the two systems. A complete contamination does not always require that the valve be carelessly left open.

The only definite and positive preventive of cross connection is a complete separation with an "airbreak" between. This can be accomplished by setting up an emergency supply for the industrial needs by discharging the potable water through a balanced ball cock over an open surge tank and pumping from the tank into the industrial line. This pumpage power can be taken from the supply itself. In the days before city water treatment became general, it was quite a customary thing to use the city supply of hard water and to install in each building a duplex pump powered by hard water to pump a soft water supply from a cistern. If the normal city pressure is greater than the industrial supply pressure, there will be no water wastage in the duplex pumping process, but if they be the same or the industrial pressure greater, then there will be an overflow wastage which, however, will usually involve less cost on excess water charge than the cost of current and maintenance of an electric pump. Sometimes this small wastage can be led to storage tanks for boiler feed or other purposes. With these duplex water pumps, an entirely automatic arrangement can be made, the relative areas of the pistons and proper valves being all that is necessary, whereas an electrically-driven unit arranged for automatic service would need pressure-control valves, contactors, starters and similar apparatus to keep in repair.

There are innumerable cases where epidemics of disease have been definitely traced to careless or inefficient cross connections in industrial plants. The threat of reduction of pressure on the clean water side is always present. This is especially true with city water pressure, which is likely to drop appreciably during daily peak consumption in homes. Mains sometimes break or a joint blows out and cuts down the pressure, or there may be a bad fire and the fire department pumpers "bleed" the main. In any of these cases, instead of the supply flowing *to* and *into* the plant's system, it flows *from* the system out into the mains. Any purposedly or carelessly opened valve on the supply to a mixer, vat or other apparatus, instead of filling it simply empties its contents out into the clean water mains of the plant and the city. On return to normal this contaminated water can be drawn at the kitchen sinks in the neighborhood of the plant or even at the drinking fountains in the plant itself, and the owners of the establishment are both morally and legally responsible.

In one case on record, hides were soaking in a vat, and the attendant desiring more water opened the supply valve during a bad fire and the soaking liquid was immediately sucked out into the city mains, creating in the weeks that followed a scourge of anthrax. Scores of serious cases and many deaths were reported. A typhoid epidemic with several fatalities followed a similar opening of a valve in a steam power plant cross

connection between the city supply and a condenser supply from a polluted river. An unusual but extremely serious case with many deaths occurred when a hose from a clean water supply was put in a vat of chemicals (one of which was arsenic) and the attendant, after going to another part of the building to turn the water on, returned to find the chemical vat empty. There are scores of such cases on record, and the only sure remedy is a positive air break between the city supply and the industrial supply, and in the plant itself an air break between the industrial supply and the supply to drinking fountains, lavatories, wash-up sinks, showers and similar fixtures. If thought necessary, excess industrial water may be used to flush closets and urinals, but there is the ever-present possibility that an ignorant workman may cut in a cross connection when putting in a new fixture or making repairs and extensions. The definite air break can be had in several ways: by a duplex pump or a power pump drawing from an open surge tank; by the city supply feeding a roof tank when only low pressures are needed in industrial lines; or with vertical loops some 40 feet high with an automatic air relief valve set at a pre-determined release pressure.

Pipe corrosion is serious enough to warrant very careful planning. Corrosion or rusting of water supply pipe not only reduces its capacity progressively during the process but ultimately makes necessary its replacement, and it is a prolific source of repair annoyance and costs. High grade brass pipe (80 per cent or more copper) is of course a very great protection against corrosion, but in large plants the pipe cost would be prohibitive, and it is cheaper to provide deactivators to remove the oxygen by passing through beds of steel or iron scrap or by automatically adding an alkaline solution. Chlorine and alum, frequently used to assist in clarifying during settling or filtration, only make water more corrosive by gleaning out the turbid elements which tend to protect the pipe. The alkaline solution, usually lime, is added after settling. The larger cities of the country are now treating their municipal water supplies to reduce the rate of corrosion, and some of them have been very successful; but it will be many years before such treatment is universally applied, and in the interim, the architects and engineers for industrial buildings and plants must ascertain whether the city supply under consideration is so treated, and if not, must plan their own treatment. Up to a few short years ago little was known about pipe corrosion, but several separate studies have been and are still being made by the different metal trades bodies, and by various government agencies, and enough definite knowledge is now in hand to indicate that it can be controlled up to certain limits. We can measure the rust-forming water conditions from day to day, or hourly if need be, through the use of a common indicating solution that can be handled by an ordinary laborer, and adjust our alkalinity accordingly.

Pipe. As to material for our water piping system, if high grade brass is beyond our budget, cast iron pipe will unquestionably give the longest and most satisfactory service, and should always be used when underground or in contact with concrete. Unfortunately, cast iron pressure pipe cannot be had in the smaller sizes used in general plumbing connections, and we must use either galvanized wrought iron or galvanized steel. Screw pipe wherever practicable should be exposed for inspection and painting so as to reduce outside corrosion. Many experiments have been made for ascertaining relative life of wrought iron and steel pipe. The results seem to show that while corrosion covers greater areas in the steel pipe, the pitting is deeper in the wrought iron. Pipe makers believe that the effective removal of the mill scale can be accomplished and that it will reduce pitting. However, the evidence points to a usually longer life for the wrought iron pipe. The cost of installation is the same.

The sewerage of industrial buildings or plants more often than not calls for earnest study. In some manufacturing lines great quantities of waste must be handled. In others trade wastes, sometimes offensive and even poisonous, must be neutralized, at least partially, and still others carry great proportions of solid matter in suspension. The day is passing when we may dump our unusual waste indiscriminately into city sewers, into nearby rivers, or spue it out on the land to rot and spread a stench over the countryside. States have river pollution laws, cities that are forced to maintain sewage treatment works are jealous of their sewer systems, and the county health official is abroad in the land.

If the sewage is to be discharged into the city sewerage system, or if it is to be treated in a septic tank before discharging it into a nearby stream, it must approximate domestic sewage in composition and contain only such putrescible matter as can be reduced by the plant to which it is bound, all other matter being removed or neutralized by special treatment. Heavy matter in suspension can be removed by suitable rotating screens, and the screenings can be de-hydrated and baled. Other suspended solids and colloidal matter can be removed in settling or sludging tanks, and the effluent chemically neutralized. If the plant is large enough to justify attendance, the sludging process can be of the activated type

and sufficiently complete to justify omission of the septic tank and the use of a timed contact bed on the effluent. The de-hydrated sludge resulting from this process can be bagged and sold, possibly for enough to pay the cost of the operation. The Milwaukee sewage works cannot furnish enough bagged sludge to satisfy their market, and this condition is general wherever such systems are in use.

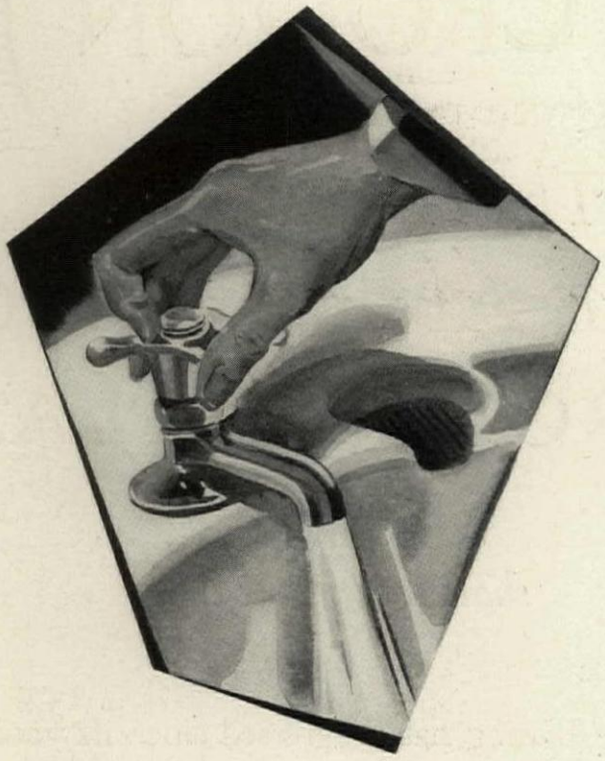
The design of the sewerage system itself is of course dictated by the size of building or plant and the processes used. If the plant is very large, consisting of many scattered buildings on a level tract, it may be found advantageous to keep the sewers closer to the ground surface than would be possible if a normal and necessary grade is given to the sewer lines. This can be accomplished by dividing the tract of land into areas, discharging the sewage of each area into a manhole limited in depth to 7 or 8 feet, and installing in it an air- or steam-operated automatic lift to raise the sewage to near the surface, from whence it will flow by gravity to the next manhole, repeating the process from manhole to manhole.

Under no circumstances should the fall of the sewer be unduly flat, especially if sewage has much matter in suspension. The use of automatic sewer flushing basins is sometimes necessary on the dead end of a sewer, but they should never be used on the assumption that when used they permit flatter grades. The necessary sewer grades are dependent on several factors, but a general average velocity of flow of about 4 feet per second, at least in the smaller sizes, must be maintained to make a sewer self-scouring. Small sewers must have more grade than large to maintain an even velocity. In the absence of accurate computation to a theoretical finding, there is a "rule of thumb" rule that is accurate enough for all practical purposes,—"provide one foot fall in each 10 feet times the number of inches diameter,"—one in 40 for 4-inch, one in 60 for 6-inch, one in 80 for 8-inch, and so on. But it is also well to consider that increasing the fall increases capacity and reduces sizes, and for that reason alone, a number of short, well graded sewers with manholes and lifts intervening, make for a small, well scoured and easily accessible main line, whereas a long flat graded sewer must be larger and subject to stoppage, and the far end may be very deep and inaccessible for cleaning, repairs, connections or extensions. Roughly speaking, doubling the fall will increase the capacity some 40 per cent or more, and a correspondingly smaller sewer can be used.

If securing a permanent and trouble-free sewer system is the sole consideration, extra heavy cast iron pipe with calked lead or iron cement joints will be selected for the sanitary lines, and unless there are acids and corrosive chemicals to be handled, cast iron should be considered for the industrial waste. With its lead lock joints, modern cast iron pipe makes a straight, smooth, even sewer without leakage, and strong enough to prevent settlement or displacement. If acid wastes inimical to metal surfaces are to be carried, it may be necessary to use hard burned tile pipe, but if used it should be laid with hot poured bituminous cement joints, on a continuous bed of steel reinforced concrete, and with all joints completely enveloped in cement mortar. Needless to say, this construction approximates the cast iron sewer in cost, but reinforcing and concrete are necessary to protect it and keep it in alignment and put it on a service par with the cast iron construction. With strong acid wastes, silicate iron special acid-resisting pipe may be required, but it is necessarily expensive, and whether to use it or not will be indicated by the concentration and temperature of the waste handled. Suggestions for the use of concrete tile pipe are often made, but so far concrete tile reasonably proof against bottom erosion and top disintegration due to gases in sewage has not been placed on the market. Some lengths may stand the test, but the texture varies, even from the same lot and no line is better than its weakest piece of pipe.

For the soil and vent pipe above ground and the vertical industrial wastes and the rainleaders, the most economical and lasting construction again favors extra heavy cast iron. Wrought iron or steel screw pipe might be favored by a contractor for reasons of his own, and it is very often used in hotel, apartment house and similar building work where there is objection to the hubs of the cast iron pipe coming in the story height, but in industrial work this consideration is nonexistent, and permanency is the aim. The rough plumbing should follow the accepted "Hoover Code" construction, with all fixture traps vented by stack or separate vent lines unless the local regulations provide for more complete venting.

Pure enough for BABY...



but it may ruin PIPE!

THE purity of the water is by no means an indication of its corrosiveness. Depending on their sources and the treatments they undergo, some waters are but *normally* corrosive while other waters—and often those which are purest—are *highly* corrosive.

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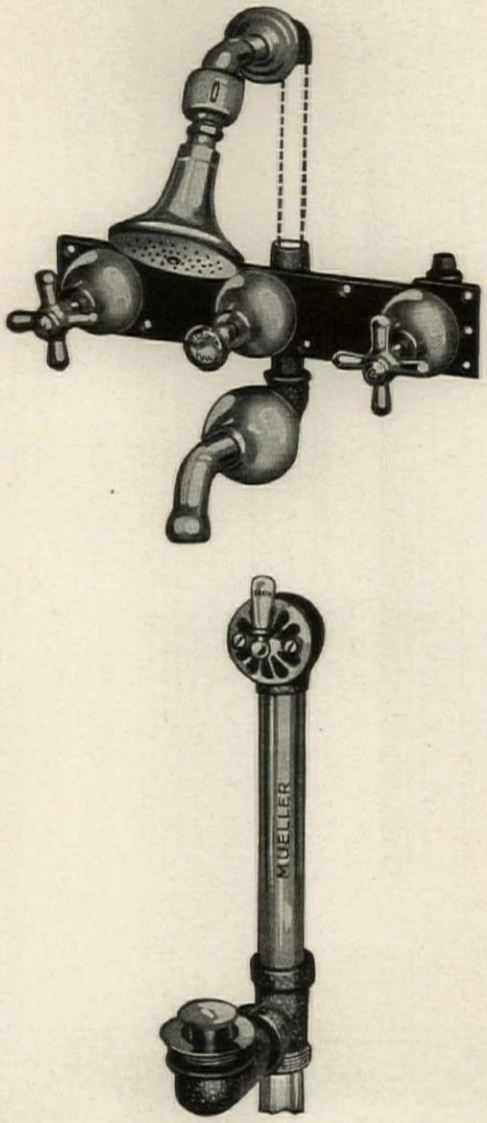
"Or equal"



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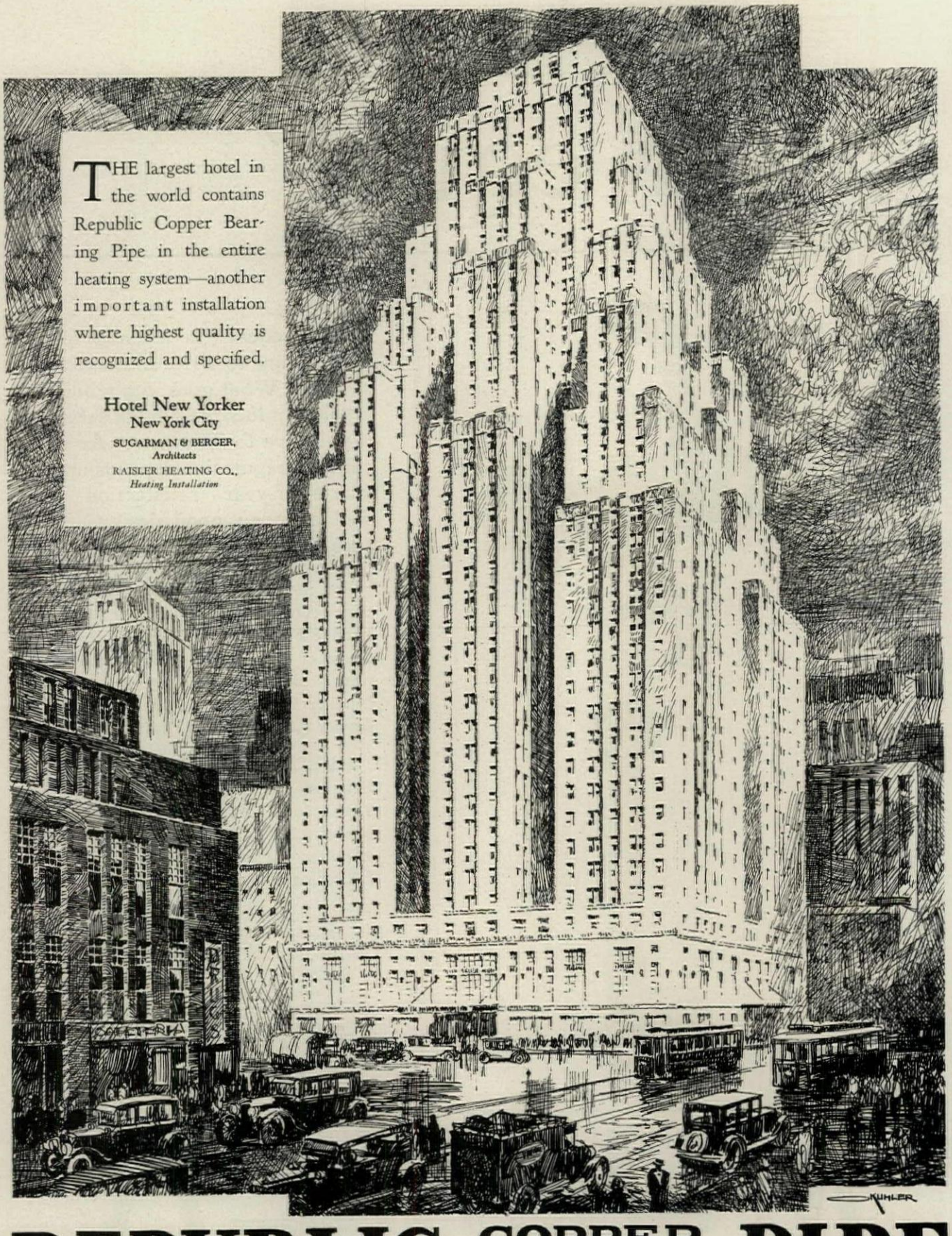

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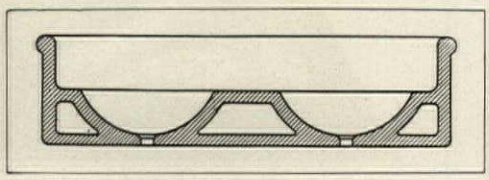

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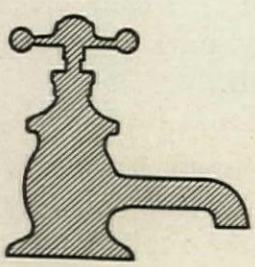

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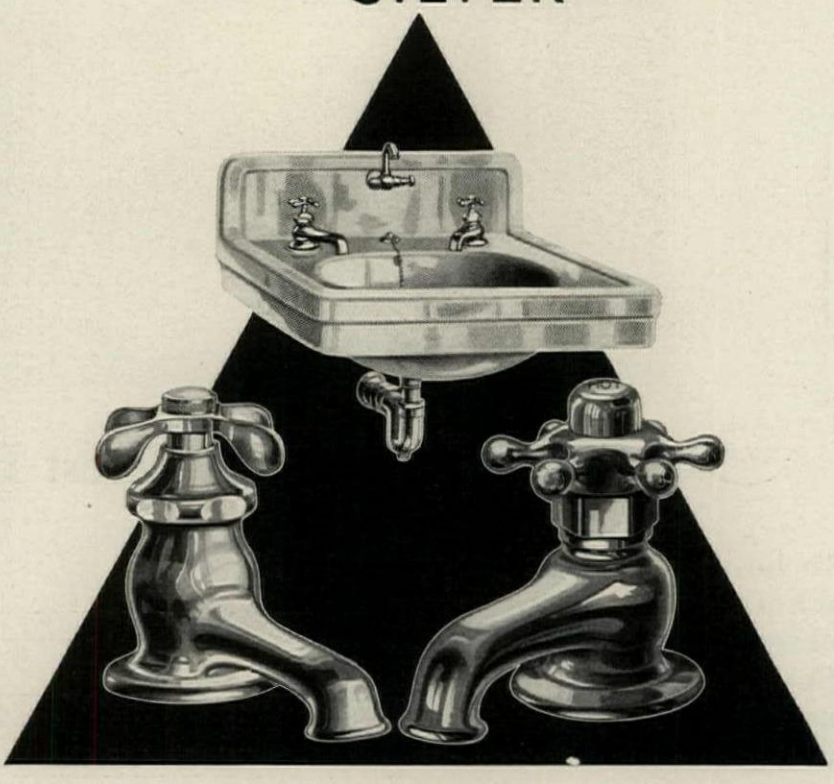

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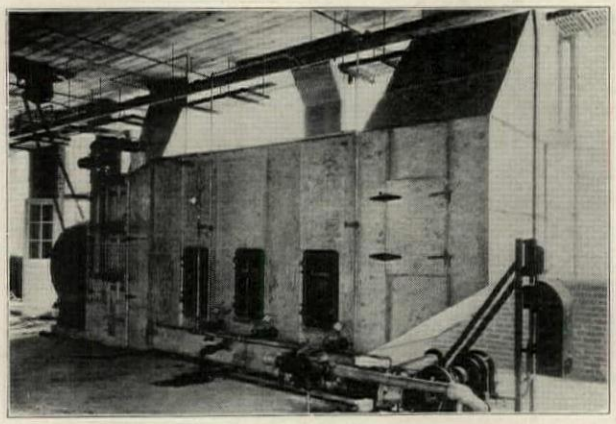
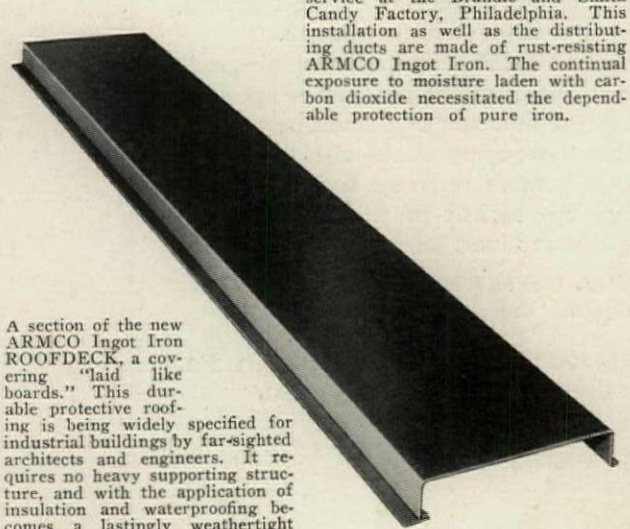
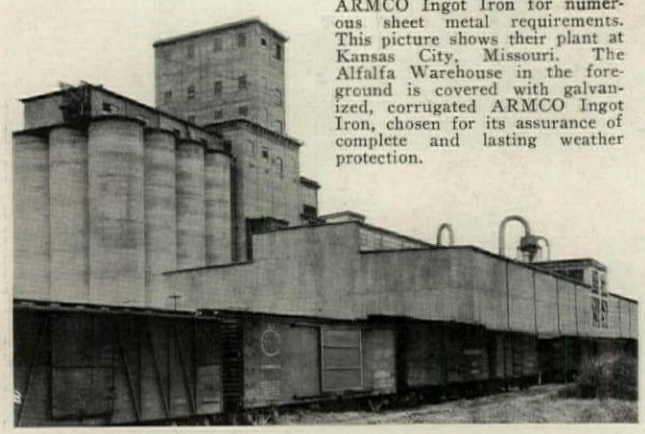
before you specify sheet metal for industrial buildings . . . .



A Webster type B dehumidifier in service at the Brandle and Smith Candy Factory, Philadelphia. This installation as well as the distributing ducts are made of rust-resisting ARMCO Ingot Iron. The continual exposure to moisture laden with carbon dioxide necessitated the dependable protection of pure iron.



A section of the new ARMCO Ingot Iron ROOFDECK, a covering "laid like boards." This durable protective roofing is being widely specified for industrial buildings by far-sighted architects and engineers. It requires no heavy supporting structure, and with the application of insulation and waterproofing becomes a lastingly weathertight protection. "Ferrobord" and "Rigideck" are the trade names of this product.



The Purina Mills is one of the many great industries that use ARMCO Ingot Iron for numerous sheet metal requirements. This picture shows their plant at Kansas City, Missouri. The Alfalfa Warehouse in the foreground is covered with galvanized, corrugated ARMCO Ingot Iron, chosen for its assurance of complete and lasting weather protection.

IF you would relieve your industrial clients of a heavy burden—sheet metal upkeep—look over the impressive record of ARMCO Ingot Iron before you specify.

This rust-resisting iron has the *longest record of actual service* of any low-cost sheet metal used in building construction.

For twenty-two years ARMCO Ingot Iron has given plant owners dependable, low-cost service. Service that minimizes repairs and replacements and yields a good return on the investment.

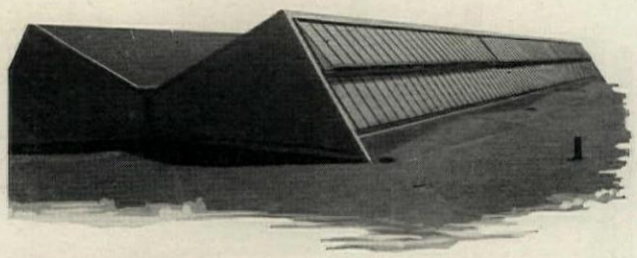
This impressive service record comes from uniform purity. Rust-promoting impurities are virtually eliminated from ARMCO Ingot Iron. Then, for added protection, the pure iron is given a heavy galvanized coating. Sheet after sheet and shipment after shipment these high standards of manufacture prevail.

If you are confronted with a problem that involves the use of sheet metal in industrial buildings, an ARMCO Development Engineer will gladly assist. Just call on the office nearest you for this cooperation.

The American Rolling Mill Company

Executive Offices: Middletown, Ohio
Export: The ARMCO International Corporation
Cable Address—ARMCO, Middletown (O)

District Offices:	Chicago	Detroit	Pittsburgh
	Cincinnati	New York	St. Louis
	Cleveland	Philadelphia	San Francisco



A skylight over the workroom of the Nash Motor Corporation, Cincinnati. After nine years service the ARMCO Ingot Iron frames are in good condition, while the steel sash shows evidence of considerable tubercular rust beneath the paint. Architects: Zettle & Rapp, Cincinnati, Ohio.

ARMCO

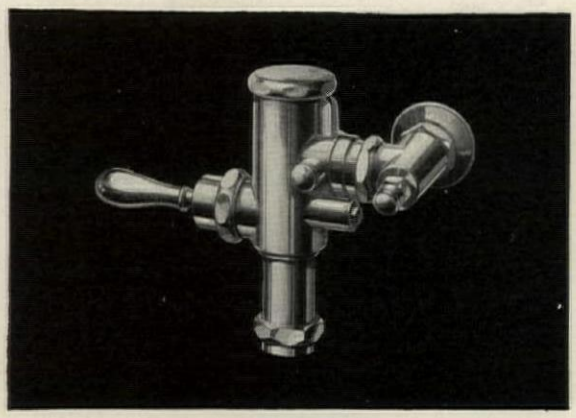
ARMCO INGOT IRON RESISTS RUST

MEETING ARCHITECTURAL STANDARDS OF QUALITY

Main quadrangle and (below) dormitories of New College for Men, Oak Hill, Rochester, N. Y., showing buildings equipped with Solid Nickel Silver plumbing fixtures supplied by The John Douglas Company, Cincinnati, Ohio. Architects: Gordon & Kaelber, Rochester, N. Y.

UNIVERSITY OF ROCHESTER NEW COLLEGE FOR MEN

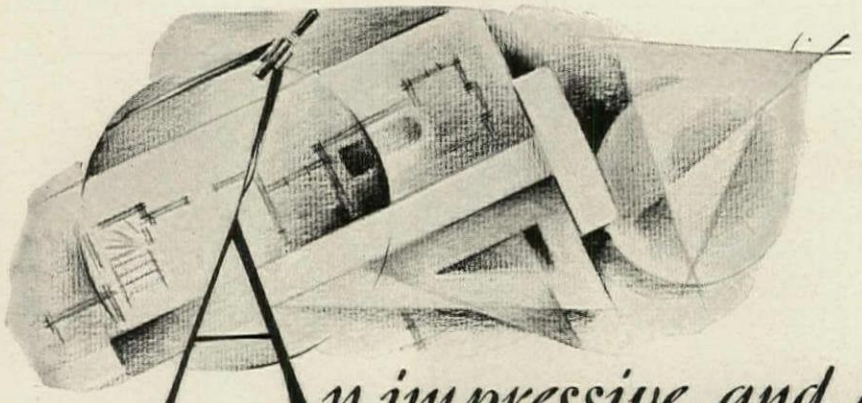
THESE MODERN BUILDINGS HAVE SOLID NICKEL SILVER PLUMBING FIXTURES BY DOUGLAS



18% 22 Nickel SILVER

The adoption of Solid Nickel Silver plumbing fixtures for the handsome new buildings of the University of Rochester suggests that every detail has been carefully specified so that this widely-watched building project may be in keeping with the highest architectural standards of today. Comparable in both beauty and physical properties to Pure Nickel and high alloys of Nickel, Solid Nickel Silver fixtures retain their lustrous, clean-looking appearance under severe use. They are corrosion-resisting and easily kept bright. Because of its hardness, toughness and strength, resembling tough bronze, Nickel Silver increases the wear-resistance of valve seats, and produces fixtures which are not easily marred or broken during installation or use. Solid Nickel Silver fixtures are being specified for both large and small installations where beauty, endurance and practical wearing qualities are of prime importance.

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



An impressive and growing list of architects specify this newest and greatest Speakman Shower

NEVER before has any shower had such an instantaneous acceptance by the architectural profession. Many architects have recalled specifications in order to include this revolutionary Speakman shower.

And no wonder! For this remarkable new shower head is utterly different and vastly superior from everything that has gone before. With a single turn of a convenient lever, you can flush the shower head free of every trace of clogging sediment. Further turns of the lever adjust the stream to anything from a single sluicing downpour to a stinging needle spray. National advertising featuring this famous shower is now running in The Saturday Evening Post.

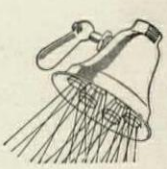
The new Speakman shower is a *family* shower. No matter what your taste in sprays, this shower gives it to you immediately.

Finished in the superlative, never-tarnishing Speakman Chromium plate. If you are not now specifying this new Speakman Self-cleaning Shower, by all means get the facts: Speakman Company, Wilmington, Del.

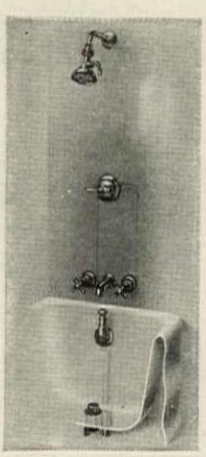
K-3395. Pat. applied for

A turn of the lever sluices all sediment away

Another turn of the lever gives a normal spray



Or you can adjust to a veritable stinging needle shower



K4035M—The complete Speakman shower, with the new Self-cleaning, Anystream head, in Speakman Chromium plate

SPEAKMAN

SHOWERS & FIXTURES

This sign of CONFIDENCE identifies the 4-SQUARE DEALER

NOW you can write lumber into your specifications in definite terms and have a *positive check* on what is actually delivered. You can end all doubts.

4-Square Lumber provides this long-needed protection. It is *packaged* lumber—with *species* and *grade* plainly printed on the label. What you see *on* the label is *in* the package.

It safeguards your interests and those of your clients.

4-Square Lumber is properly *seasoned* as fine lumber should be. And it is milled to *precise standards* of size and finish.

It is cut to exact lengths and *trimmed square at both ends*—to eliminate needless hand trimming on the job and to promote fine workmanship.

It is packaged and labeled *at the mill*. And it is *guaranteed* by Weyerhaeuser. It reaches the job in the *original* packages for identification and protection. Substitution of cheaper species or lower grades is made impossible.

Items listed on this page are now ready and can be had of progressive lumber dealers, or they can get them for your jobs.

Finishing Lumber
Bevel Siding · Drop Siding
Colonial Siding
Softwood Flooring
Ceiling and Partition
Shelving · Stepping
Casing · Base · Mouldings

WEYERHAEUSER FOREST PRODUCTS
ST. PAUL, MINNESOTA
Weyerhaeuser Sales Co., *Distributors*, Spokane, Washington
District Offices: Minneapolis, Kansas City, Chicago, Toledo
Pittsburgh, Philadelphia, New York

4 SQUARE LUMBER

Species and Grade are Marked and Guaranteed

TRIMMED SQUARE .. PACKAGED .. READY TO USE .. GUARANTEED

PRESTIGE

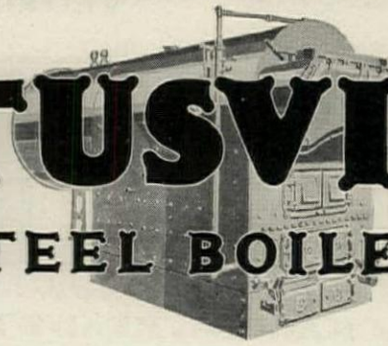
THE past success of Titusville Boilers has influenced their selection time and time again.

Accordingly we find 3 Titusville Scotch Marine Boilers installed in the new Willougby Tower Building—one of Chicago's newer and finer skyscrapers.

Here they will do their part in meeting the need of modern day commerce—namely efficient and dependable heating.

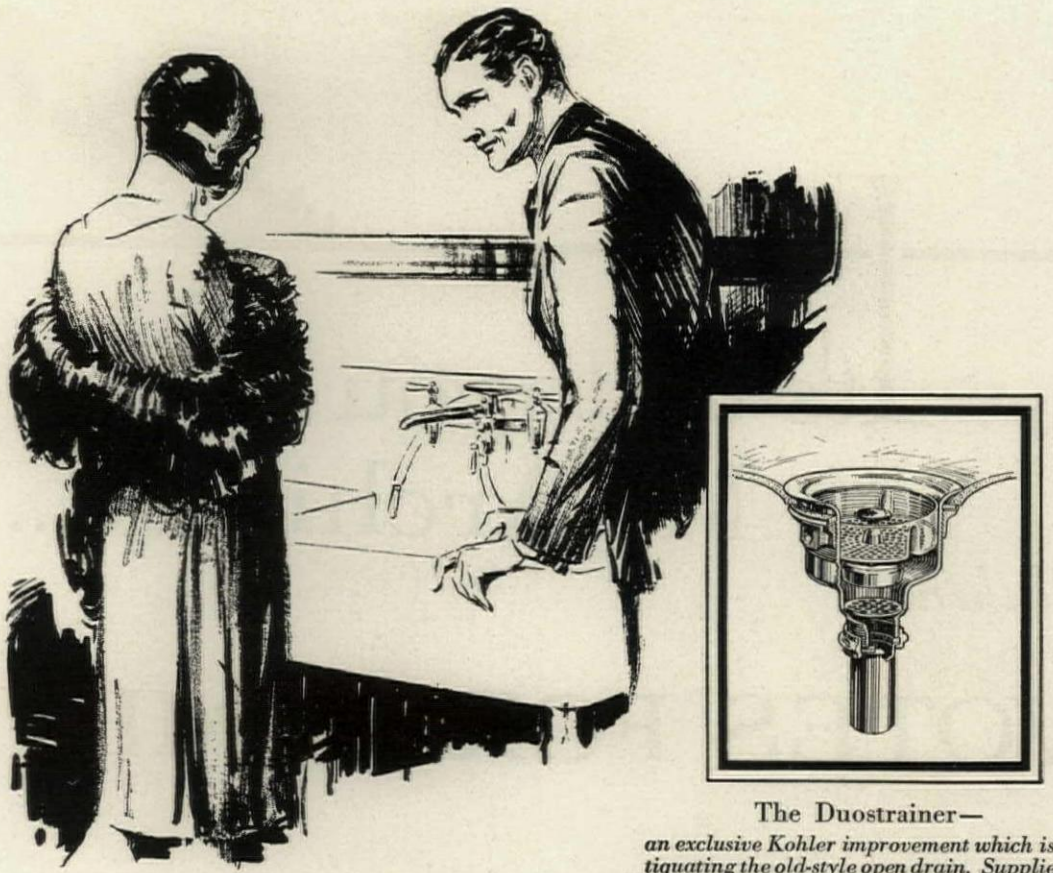
TITUSVILLE IRON WORKS
Division of Struthers-Wells Titusville Corp.
TITUSVILLE, PA.

ARCHITECT S.N.CROWEN AND ASSOCIATES



TITUSVILLE
STEEL BOILERS

TIW 11



The Duostrainer—
an exclusive Kohler improvement which is antiquating the old-style open drain. Supplied as regular equipment on most Kohler sinks at very moderate extra cost

LITTLE THINGS LIKE THIS

make kitchens modern

The Kohler *Duostrainer* makes a modern sink. A modern sink makes a modern kitchen. The *Duostrainer* is one of those little things that, to the architect's eye, are far more significant than their size or cost suggests.

A Kohler *Duostrainer* Sink holds water just like a lavatory bowl. The removable strainer cup collects disagreeable debris for easy, quick disposal. No woman who has ever seen this useful innovation can be blamed for dismissing the open-drain sink as far behind the times in convenience.

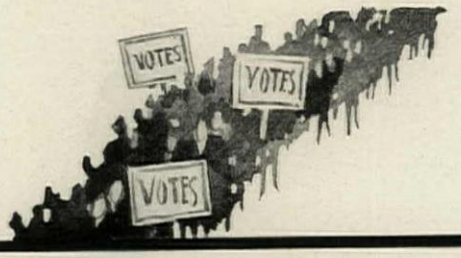
A Kohler sink with this modern improvement costs no more than an ordinary sink. But the added value to the architect's client is likely to be very considerable.

KOHLER CO., *Founded 1873,* Kohler, Wis. · *Shipping Point,* Sheboygan, Wis. · *Branches in Principal Cities*

KOHLER OF KOHLER

PLUMBING FIXTURES

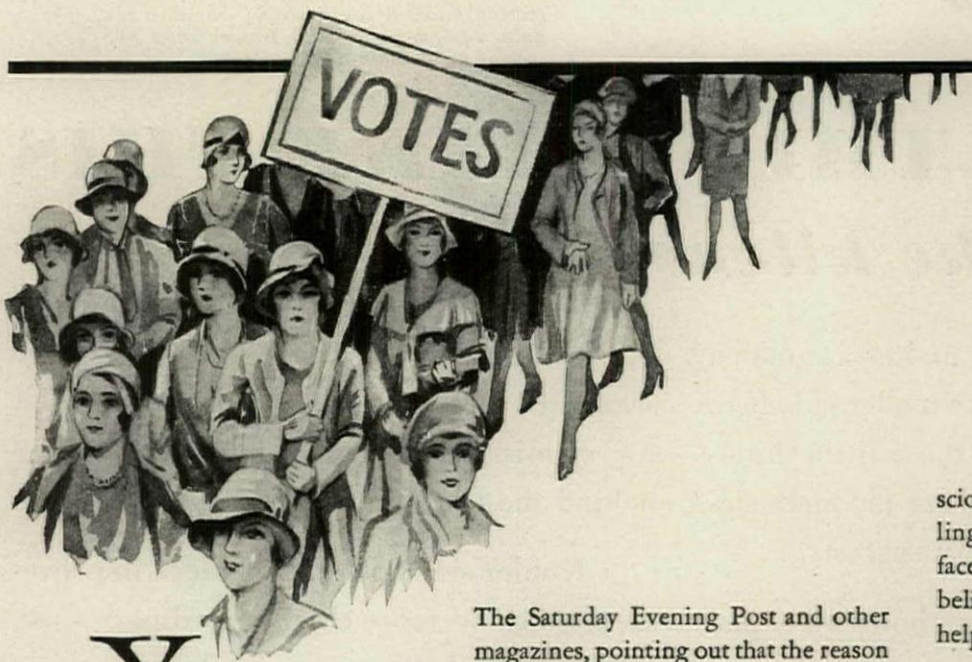
LOOK FOR THE KOHLER TRADE MARK ON EACH FIXTURE



It's up to you Mr. Architect...

shall there be

VOTES FOR WOMEN?



YOU gentlemen plan the houses and buildings of the country. The decision in this matter is squarely up to you.

Here are the facts: This spring and early summer Thos. Maddock's Sons Company made an interesting experiment to learn if what it conceived to be a serious woman's hygienic problem was actually as important to fastidious women as it seemed.

National advertising was run in The Saturday Evening Post and other magazines, pointing out that the reason for constant stoppage in the ordinary toilet, when used for the disposal of sanitary pads, is due to a trapway no larger than a golf ball. It showed that the trapway in the nationally famous Improved Madera is greatly oversize —that flushing is so powerful, yet quiet, as to assure instant, safe disposal. It asked women, if interested, to write.

Thousands did so, indicating beyond doubt that they were thoroughly conscious of this embarrassing and troubling problem. This brings us face to face with a question in which we believe the American architect cannot help but be concerned.

"Should women and women's needs be adequately provided for in planning buildings and dwellings?" *Is there any reason why women should not have a vote in influencing the architect's choice of equipment?*

There are many finely made toilets. But there is only one specifically designed to meet the needs of the modern woman of refinement. It is the Improved Madera. Thomas Maddock's Sons Company, Trenton, N. J.

FEET THAT NEED NEVER RETURN—

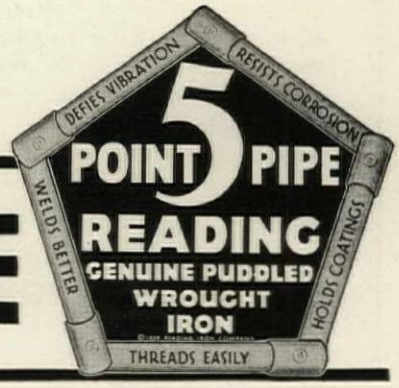
With the retreating footsteps of the man who installs it, plumbers vanish from the life of Reading 5-Point Pipe. The feet of repair men need never return—as long as the building lasts!

Think what this means in yearly pipe savings—in freedom from repair bills and from possible property damage through pipe failure. Then you will know the great advantage of using Genuine Puddled Wrought Iron, the pipe material that gives proved reliability and economy at a truly moderate first cost. All Reading 5-Point Pipe is time-tested puddled wrought iron. Insist on getting the genuine.

READING IRON COMPANY, Reading, Pennsylvania

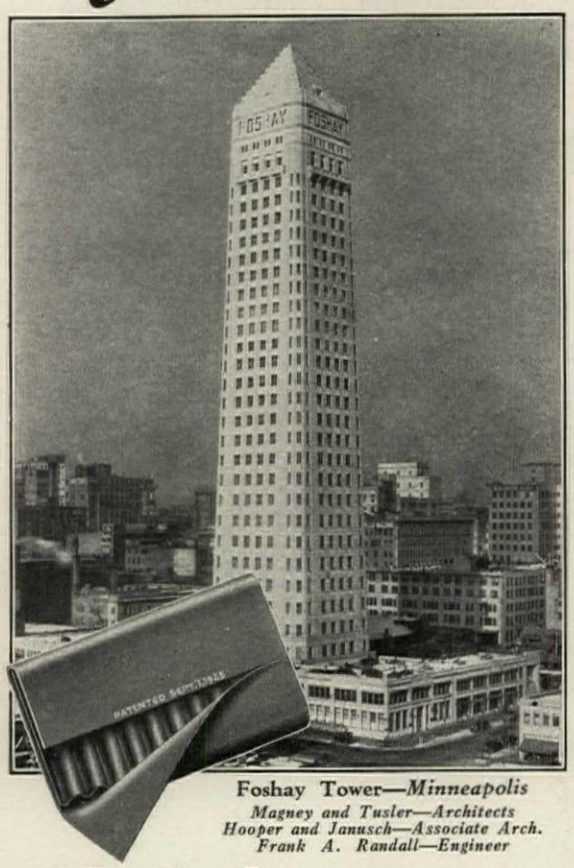
Atlanta · Baltimore · Cleveland · New York · Philadelphia
Boston · Cincinnati · St. Louis · Chicago · New Orleans
Buffalo · Houston · Tulsa · Seattle · San Francisco
Detroit · Pittsburgh · Ft. Worth · Los Angeles · Kansas City

GENUINE PUDDLED WROUGHT IRON
READING PIPE
DIAMETERS RANGING FROM 1/8 TO 20 INCHES



COWING
Pressure Relieving
JOINT

Patented September 1, 1925



Foshay Tower—*Minneapolis*
Magney and Tusler—Architects
Hooper and Janusch—Associate Arch.
Frank A. Randall—Engineer

A Positive Protection against Cracks and Spalls

The Cowing Pressure Relieving Joint gives such protection to any facade of stone, terra cotta or marble . . . Its record of performance can be found in many world-famous buildings . . . It is a part of the standard specifications of many leading architects.

The Cowing Joint is installed in place of one mortar joint in each story height—it consists of a corrugated sheet lead filler enclosed in a sheet lead envelope . . . it zones a building into story heights . . . it delivers exact and automatic compensation for all destructive stresses thrown on the facing material by temperature changes, compression or imposed loads.

The Cowing Joint is neat . . . it will not squeeze out . . . it lasts as long as the building . . . it protects the mortar joints and eliminates frequent tuck pointing.

Write for our Illustrated Booklet

Cowing Pressure Relieving Joint Co.

160 N. Wells St. - Chicago, Ill.

FAMOUS USERS OF KEWANEE HIGH PRESSURE WATER SYSTEMS

DEL-MONTE

MORE proof that only a Kewanee will do. Back in 1919, the California Packing Company, Merced, California, packers of famous Del-Monte Brand food, installed a Kewanee *High Pressure* System at their Mt. Eden factory. Since then two other *High Pressure* units have been installed in other parts of their factory. Today—all are "going fine."

From modest bungalow to large estate there is a Kewanee *High Pressure* System to suit every need. Over *200 models* of *High Pressure* water supply, electric light and sewage disposal plants are made by Kewanee. Also a full line of Centrifugal Pumps and Deep Well Turbines from the small $69.50 outfit to those which fit wells from 12″ to 36″ in diameter.

Kewanee will show you how to save dollars and trouble. Write for data.

KEWANEE PRIVATE UTILITIES COMPANY
442 S. Franklin Street Kewanee, Illinois

Dealer Correspondence Invited

MINERAL WOOL
The Perfect Insulator

✓COLD PROOF
✓HEAT PROOF
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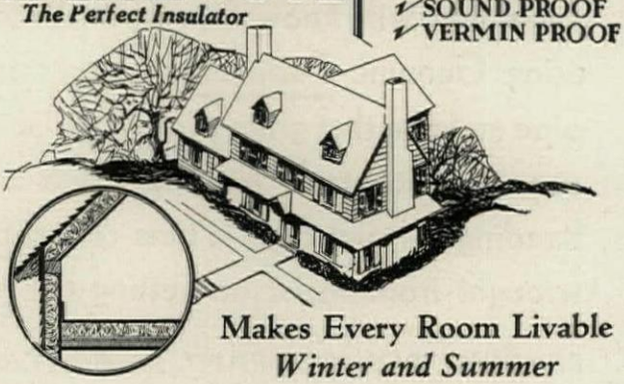
✓VERMIN PROOF



Makes Every Room Livable *Winter and Summer*

Cold rooms in Winter and hot rooms in Summer are a thing of the past in buildings insulated with Mineral Wool.

Placed in the walls, floors and rafters of a building, Mineral Wool acts as a protective shield which repels heat, cold and sound.

It is a real economy—saving enough in Winter fuel within a short period to cover installation cost—adds untold comfort and increased resale value to a building.

Mineral Wool is a sanitary, indestructible, entirely mineral material, easy to apply and inexpensive.

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U. S. MINERAL WOOL CO.
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COLUMBIA MINERAL WOOL CO. South Milwaukee, Wis.

Three splendid hotels of the Development Service Corporation to have General Electric Wiring

When these three superb hotels are finished they will provide every modern comfort for their guests. Electrically, they will, of course, be the last word.

General Electric Wiring Materials will guarantee lasting electrical efficiency with the very minimum of maintenance costs.

As in so many modern buildings that are being erected throughout the country, their architects and engineers and builders will take no chances with anything but the *best* of materials. General Electric is proud to have been called upon to provide the wiring.

WOODROW WILSON, New Brunswick, N. J. (at left)
Architect—Thomas, Martin & Kirkpatrick, Philadelphia, Pa.
General Contractor—Wark Co., Philadelphia, Pa.
Electrical Contractor—Beaver Engineering Co., Newark, N. J.

BEACH HOTEL, Bridgeport, Conn. (center)
Architect — Thomas, Martin & Kirkpatrick, Philadelphia, Pa.
General Contractor—Wark Co., Philadelphia, Pa.
Electrical Contractor—Watson-Flagg Engineering Co., New York

WHITE PLAINS BELMONT, White Plains, N. Y. (at right)
Architect—Thomas, Martin & Kirkpatrick, Philadelphia, Pa.
General Contractor—James Stewart & Co., Inc., New York
Electrical Contractor—The Howard P. Foley Co., New York

GENERAL ELECTRIC WIRING SYSTEM

MERCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONNECTICUT

Te-pe-co *Bathrooms in Color*

THE utmost in sanitation. The utmost in charm of design. And *now* the utmost in beauty of color! Surely, with so much to recommend them, there is little wonder that a nation-wide enthusiasm for Te-pe-co Vitreous China and Porcelain Plumbing Fixtures grows greater every day.

Architects, who plan the finest of homes and owners who occupy them, are making the most of the popular color trend with products of Trenton Potteries Company manufacture.

The beautiful bathroom above serves to illustrate but one of the many distinctive variations made possible by Te-pe-co Fixtures.

Makers of Te-pe-co Fixtures—and users of Te-pe-co Fixtures—are not satisfied with color *only*, but *only color at its best.* And *all* Te-pe-co Fixtures, *white* or *colored*, carry the same guarantee of quality and durability.

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Trenton, New Jersey, U. S. A.

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Export Office:
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Sales offices in
Philadelphia, Boston
and San Francisco

THE TRENTON POTTERIES COMPANY
TEPECO
TRENTON, N. J.
U. S. A.

Our Guarantee

The Trenton Potteries Company makes but one grade of ware—the best that we can produce—and sells it at reasonable prices. We sell no seconds or culls. Our ware is guaranteed to be equal in quality and durability to any sanitary ware made in the world. The TE-PE-CO trade mark is found on all goods manufactured by this Company and is your guarantee that you have received that for which you have paid.

A copy of "Bathrooms of Character" Edition B—together with color chart showing the various tints and grainings of Te-pe-co ware, will be forwarded upon receipt of 10c in postage.

TE-PE-CO
All Clay Plumbing Fixtures

VILLA RIVIERA the name of one of the most recent and most modern of apartment buildings in Long Beach, Calif., was given it, no doubt, with reference to the environment more than to the architectural character of the building itself. The style is English Gothic.

This commodious and handsome structure, sixteen stories in height above street level, faced with stucco and art stone, fireproof throughout and provided with every device for the comfort of its occupants, was completed in 1928 at a cost of a million and a half of dollars. Byers Pipe was used for all heating lines and all hot and cold water supply lines, assuring dependable service for many years to come.

A. M. BYERS COMPANY
Established 1864 Pittsburgh, Pa.
Distributors in All Jobbing Centers

BYERS PIPE
GENUINE WROUGHT IRON

VILLA RIVIERA,
Long Beach, Calif.
Architect
Richard D. King,
Los Angeles, Calif.
Heating and Plumbing Contractors
H. I. Stiller & Co.,
Los Angeles, Calif.
Plumbing and Heating Supply House
N. O. Nelson Mfg. Co.
Los Angeles, Calif.

First Cost

Acid wastes quickly corrode and destroy ordinary pipe.

Corrosion and failure of the acid drainage line entails far more expense than the original installation.

Add to the replacement the damage to finish and decoration and it is evident that the first cost is trivial.

Install acid-proof Duriron. It lasts with the structure. The first cost is the last.

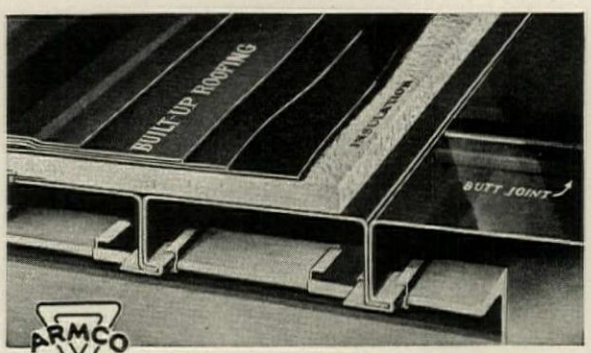
Preprint (Sweet's 1930 Edition) sent on request.

The Duriron Company, Dayton, Ohio

DURIRON
FOR ACID SERVICE

RIGIDECK FOR ROOFS

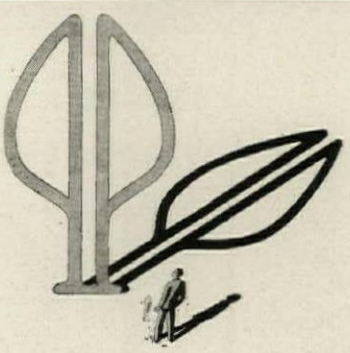
Insulated to Any Degree and Waterproofed



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

GENFIRE STEEL COMPANY
YOUNGSTOWN, OHIO

Warehouses and Offices in All Principal Cities. Dealers Everywhere



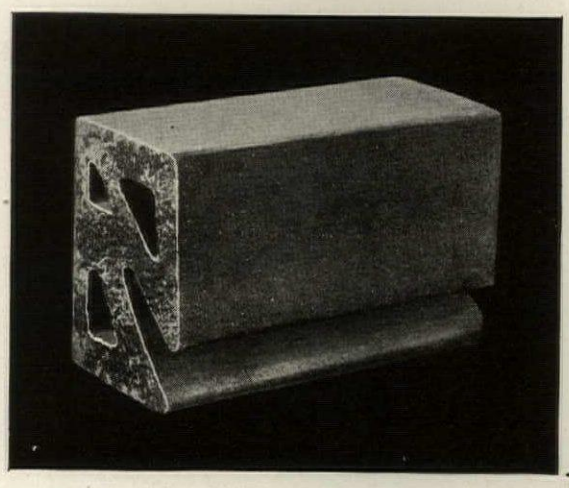
Now you can be sure you get the kind of wood you specify

When you want to use a good soft-textured pine for finishing purpose, write "Pondosa" in the specifications. Then the Pondosa Pine trade-mark stamped on the end grain of a board will see that you get it. This trade-mark carries with it the assurance that each piece has been thoroughly seasoned, rigidly graded and carefully milled under Western Pine Manufacturers' Association standards and supervision.

Specify Pondosa for fireplace trim, mantels, staircases, balustrades, baseboards, paneling and moulding. And for outside wood-work, too. It paints to perfection. Address Dept. 75, Western Pine Manufacturers' Association, Portland, Oregon.

Pondosa Pine
The Pick o'the Pines

BONDED FLASHINGS



Announced by

The Barrett Company

FOR many years The Barrett Company has devoted itself conscientiously to the task of assisting architects and engineers with their roofing problems. It has now taken important forward steps in extending and perfecting its roofing service.

1. Barrett Flashings, constructed according to Barrett Specification and used in conjunction with Barrett Specification Bonded Roofs, will now be bonded for the same period as the roof itself is bonded. The Barrett Specification provides definite construction features and the use of Barrett Flashing Blocks for brick walls or Barrett Flashing Forms in concrete parapets.

2. The Barrett Company will also guarantee for 10 years Barrett Flashings constructed without Barrett Flashing Forms or Blocks, but built according to definite Barrett Specifications and used in conjunction with Barrett Specification Bonded Roofs.

Barrett Bonded Flashings to match the famous Barrett Specification Bonded Roofs are in line with the established thoroughness of Barrett's complete roofing service. They are bonded against repair and maintenance expense for 20 or 10 years and—like the Barrett Specification Roof—they are built to outlast by many years the liberal provisions of the bond. Now, more than ever, a Barrett Specification Roof on your building is a roof off your mind.

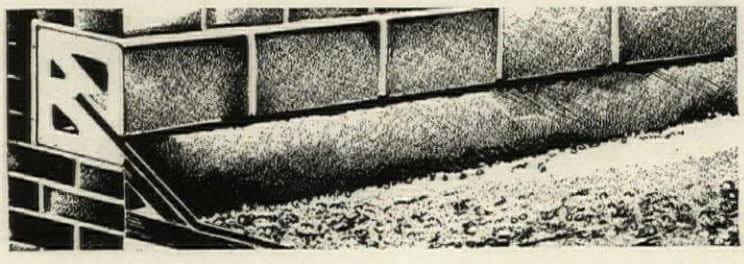
Architects, construction engineers, roofers and building owners everywhere are invited to write us for details and complete specifications.

THE BARRETT COMPANY

40 Rector Street New York, N. Y.

In Canada:

THE BARRETT COMPANY, Ltd., 5551 St. Hubert Street, Montreal, P. Q.



The New

AMERICAN COMMERCIAL AND SAVINGS BANK

DAVENPORT, IOWA

Architects
Weary & Alford

Plumbing Contractors
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Plumbing Jobbers
N. O. Nelson Mfg. Co.

Watrous

FLUSH VALVES AND CLOSET BOWLS
USED THROUGHOUT

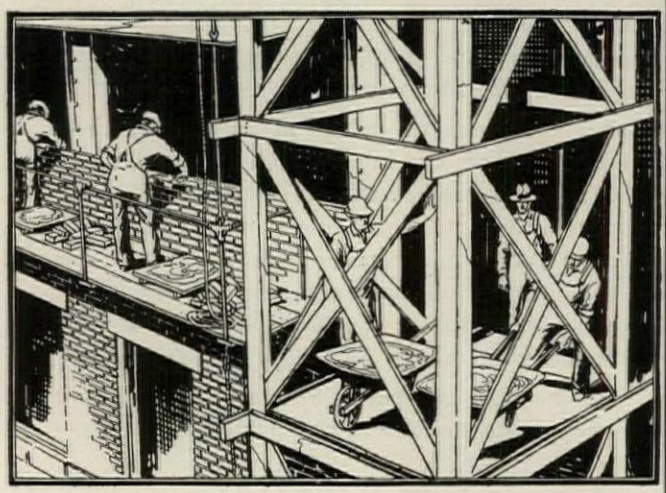
Write for details to
PLUMBING DIVISION

THE IMPERIAL BRASS MANUFACTURING COMPANY

1238 West Harrison Street CHICAGO

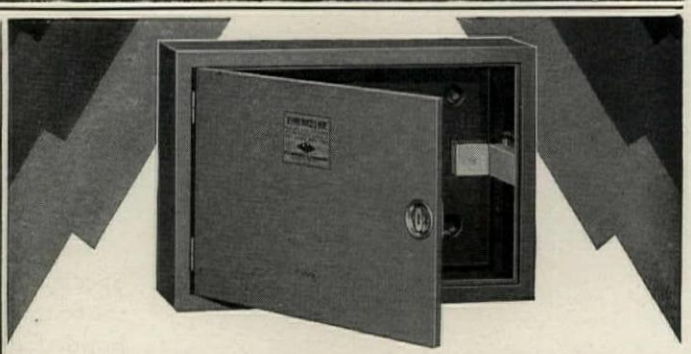
BRANCH SALES OFFICES IN ALL PRINCIPAL CITIES

UP TO SPECIFICATION



MORTAR is up to specification, when Kosmortar has been specified for the masonry. The errors of the hit-or-miss methods of the mixing box are eliminated by the simplicity of preparing Kosmortar, merely the addition of sand and water. Kosmortar, itself, is always uniformly strong; exacting tests of raw materials and laboratory-controlled manufacture assure absolute uniformity in plasticity, color, and strength. Consequently, Kosmortar is always up to specification. Write for complete information. KOSMOS PORTLAND CEMENT COMPANY, Mills, Kosmosdale, Kentucky; Sales Offices, Louisville, Kentucky.

KOSMORTAR . . . A Mason's Cement—easy to spread



The RECEIVADOR

Takes And Safe-Keeps All Deliveries Without Delivery Man Entering Home
Economical . . Efficient . . Attractive

STATISTICS tell that each apartment or residence averages five deliveries a day: dairy, bakery, grocery, meat-market, newspaper, laundry, department stores, dry cleaner, tailor, etc. Damages to unprotected parcels, annoyances of incompleted deliveries and dangers of going to door for deliveries are well understood. The Receivador obviates all this—*makes deliveries of supplies and parcels automatic.* High grade in design, construction, finish and service value—yet very reasonably priced. Now in finest apartment buildings and residences in all parts of United States. On market since 1916. Interesting architect's portfolio explains in detail, with valuable ideas for installing. Write for copy now.

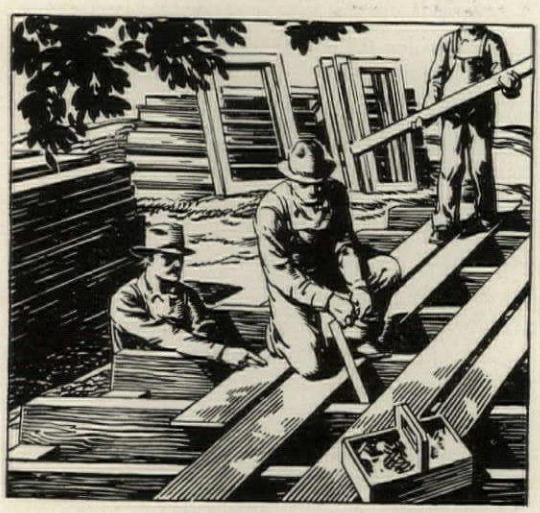
Explained . . . .

Installed in door: depth does not protrude beyond door knob. Or in wall of vestibule, direct to kitchen, over refrigerator, etc. etc. One or more compartments, for all and any size deliveries. Made of electrically welded furniture steel, insulated. Finish: mahogany, walnut, quartered oak, olive green: of rust proof baked enamel. Locks automatically: after delivery outside door cannot be opened until delivery is removed from inside—after which outside door becomes unlocked for next delivery. Interesting literature explains in entire detail: sent on request.

See SWEET'S Catalog

RECEIVADOR SALES CO.
74 Ionia Ave., N. W. Grand Rapids, Mich.

Guaranteed "Tree-Mark" lumber to fill detailed specifications for doorways, interior panelings, etc.



"Tree-Mark" lumber safeguards every heavy construction specification.

Look for the Tree Symbol *

FROM

Beautiful Doorways to Sturdy Joists . . .

GUARANTEED "TREE-MARK" LUMBER safeguards your specifications

GONE is the day of uncertainty as to whether lumber delivered for detailed uses will meet your particular specifications. Now the National Lumber Manufacturers Association guarantees, to your client's dealer, that each piece of lumber bearing its trade-mark—the "Tree-Mark" symbol—is of the quality indicated thereon by the official marks of the expert grader. And that lumber so marked is carefully manufactured "American Standard Lumber from America's Best Mills." A 100% assurance that the interests you serve are fully protected.

Many architects have found the Lumber Consultants—100 experts employed by the great lumber associations, trained in wood technology, construction and engineering methods — render invaluable assistance in solving all kinds of construction problems. Their services are free: they will be glad to assist you . . . they will bring you information relating to the specifying and using of "Tree-Mark" lumber.

NATIONAL LUMBER MANUFACTURERS ASSOCIATION
Washington, D. C.

Offices in New York, Chicago, Boston, Pittsburgh, Indianapolis, Memphis, Kansas City, Minneapolis, San Francisco, New Orleans

Send Now for Free Booklets

* *This Tree symbol stamped on a piece of lumber is your guarantee that the quality indicated thereon by the marks of the expert grader is correct . . . that the lumber is carefully manufactured "American Standard Lumber from America's Best Mills."*

National Lumber Manufacturers Association
Dept. 5005, Transportation Bldg., Washington, D. C.

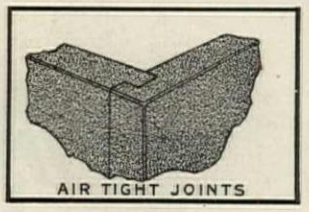
Gentlemen: I would like to have a Lumber Consultant arrange to call. Send the booklets checked.

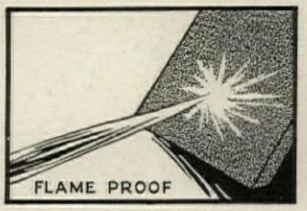
Modern Home Interiors ( )
Taking the Mystery out of Lumber Buying ( )
Choosing the Industrial Building ( )

Name .....

Firm .....

City ..... *State* .....





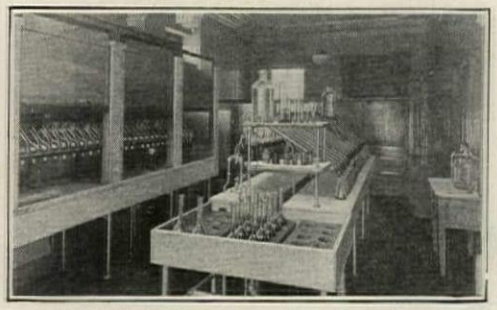
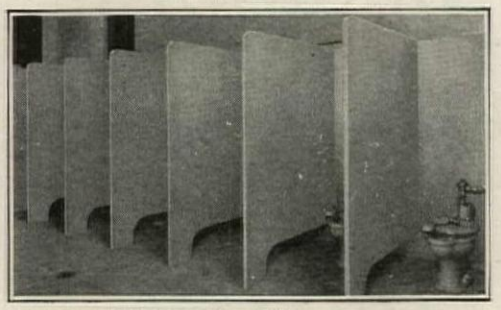
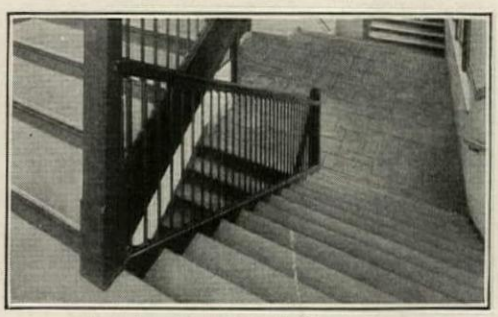


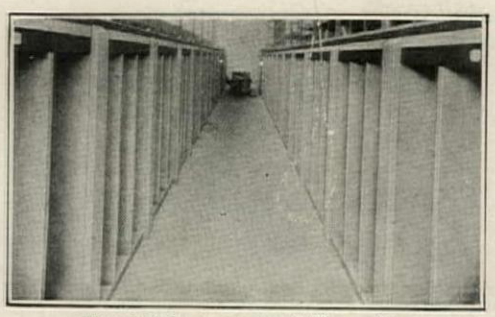
Table-Tops, Sinks and Hoods of Alberene Stone



Toilet Partitions of Alberene Stone



Treads and Landings of Alberene Stone



Electrical Compartments of Alberene Stone

Serving Industry Efficiently in *Many* Different Ways

INDUSTRY has found many uses for quarried Alberene Stone because of its inherent diversified properties. Where sanitation, acid resistance, durability and compactness are required, Alberene is chosen on its record of performance.

Technicians consider Alberene the standard material for laboratory table tops, sinks and fume hoods, and it has been used in practically every important laboratory built in the past 20 years.

Architects specify Alberene for sanitary work, such as toilet partitions and shower compartments, with absolute assurance that their clients will have installations that will give perfect satisfaction and be free from upkeep-costs.

The high dielectric strength of Alberene, its economy, and the flexibility of construction its use makes possible, has brought about a change in the design and erection of compartments in sub-stations and the use of Alberene is increasing tremendously.

Stair treads and landings of Alberene Stone are safe whether wet or dry because of the natural abrasiveness of the stone, and this same quality assures durability.

Tanks, vats and other fixtures that must resist acid, moisture and heat, such as those used in dyeing and bleaching processes are constructed of Alberene because it enables them to stand up under 24 hour service, where a less durable material would fail and interfere with production schedules.

Bulletins are available covering these and other major industrial uses of Alberene Stone and the Company thru its Service Department will gladly supply detailed information covering any application of the material.

ALBERENE STONE COMPANY

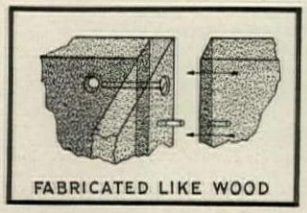
153 West 23rd Street, New York City

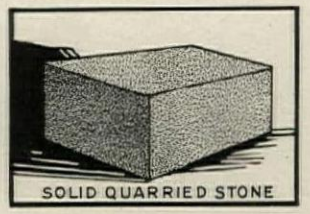
Chicago Boston Cleveland Pittsburgh Newark, N. J.
Philadelphia Richmond Rochester Washington, D. C.

Quarries and Mills at Schuyler, Va.

ALBERENE STONE

THE NATURAL STONE OF DIVERSIFIED UTILITY—





The Invisible Superintendent at the Mortar Box *Assures the Mix* SPECIFIED

EVEN when the architect specifies the ideal mix for portland-cement-and-lime mortar, he has no assurance that his specifications will be accurately followed unless his superintendent is constantly at the mortar box... The proportion of lime may be increased for the sake of plasticity or the mix may be oversanded. In either case the strength of the mortar is impaired.

The use of BRIXMENT, *however, is your assurance that all mortar will be uniform in strength and color and that specifications will be accurately followed.* If oversanded, BRIXMENT mortar works short and, since there is no lime in the mix, the necessary plasticity can be secured only by using the proper amount of BRIXMENT. *Handbook on request.* Louisville Cement Company, *Incorporated,* Louisville, Kentucky.

District Sales Offices: 1610 Builders Bldg., *Chicago;* 301 Rose Bldg., *Cleveland;* 602 Murphy Bldg., *Detroit;* 101 Park Ave., *New York*

BRIXMENT
for Mortar and Stucco

Put the
PLANNING
of this floor
up to
TROY
ADVISORY
SERVICE

ASK Troy the questions you ask yourself about institutional laundry facilities. Let Troy's engineers work with you. Let them submit detailed layouts and specifications.

Put the entire problem of planning the laundry floor up to TROY ARCHITECTS' ADVISORY SERVICE. What size, type and number of machines? Where to place each piece of equipment in order to prevent waste motion and cross-traffic? How to utilize existing floor space economically and so provide for future expansion? TROY ARCHITECTS' ADVISORY SERVICE answers these and the many other questions that are certain to arise.

When designing hotels, hospitals, schools and clubs, do not hesitate to take advantage of this service. It incurs no obligation...no charge.

TROY LAUNDRY MACHINERY COMPANY, INC.
Chicago ⋅ New York City ⋅ San Francisco ⋅ Seattle ⋅ Boston ⋅ Los Angeles
J. ARMSTRONG & CO., Ltd., European Agents: London, Paris, Amsterdam, Oslo. Factories: East Moline, Ill., U.S.A.

TROY
LAUNDRY MACHINERY

SINCE 1879 . . . THE WORLD'S PIONEER MANUFACTURER OF LAUNDRY MACHINERY

Some of The Most Important Contractors Were Asked~

Tudor City unit No. 9, Fred F. French Co. Your name sent us will bring particulars about Gypsteel Partition Tile and the immediate deliveries from stock anywhere in the metropolitan zone.

IS IT TAKING too much for granted to believe that you want a better Gypsum Partition Tile? One that is less likely to break in handling, shipping, or erection? One that has two and a half times the crushing strength? One that despite the superiority over the ordinary tile costs no more?

Gypsteel Partition Tile has met with real enthusiasm among the contractors. Following are a few of the many important ones who are using Gypsteel Partition Tile on important jobs: George A. Fuller, Turner Construction Co., Thompson-Starrett Co., James Stewart Co., Fred F. French, W. J. Kennedy Co., George Colon & Co., F. T. Ley Co., John Mulligan Inc., McNeil Construction Co., and Henry Brandt & Co.

The many letters of approval from the above contractors are, each in themselves, accolades of approval from the best practical authorities.

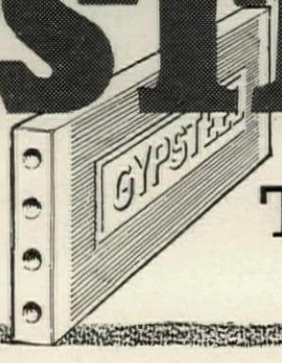
Gypsteel Gypsum is derived from phosphate rock by a unique system which controls its crystaline structure. This control gives a better Gypsum and makes for a stronger and tougher Partition Tile. *Yet this better tile costs no more.*

STRUCTURAL GYPSUM CORPORATION

General Offices: LINDEN, N. J.

Sales Offices: IN PRINCIPAL CITIES

GYPSTEEL



Partition Tile

For general or specific information, write to this association. . . . .

PROOFING WITH STRUCTURAL CLAY TILE

Innumerable fires, over a long period of years, have proven the protective advantages of Structural Clay Tile. In fact the original purpose of modern Clay Tile was fireproofing. Its high reputation as a building material is founded on that service.

Column and girder coverings, walls, partitions, furring, floors, and enclosures of Structural Clay Tile completely protect a building and its contents. A covering of Clay Tile preserves structural steel indefinitely.

While used most extensively in large steel structures, it is of great importance in homes and other buildings. In addition to its fireproofing qualities, Structural Clay Tile gives strength, permanence and economy.

STRUCTURAL CLAY TILE Association

An Authoritative Institution for Research and Development, Representing 85 Per Cent of the Production of Structural Clay Tile in the U. S. A.

1403 ENGINEERING BUILDING,
CHICAGO, ILLINOIS

STRUCTURAL CLAY TILE
SHIELDS · SHELTERS · PERPETUATES

Residence of Mr. Chester Moody
1857 Lake Drive, Milwaukee, Wis.

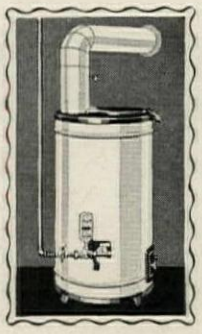
Incinor-equipped

Architect: Geo. Schley & Sons

"No Garbage Can Shall Deface My Handiwork"

—that, undoubtedly, was one of the Architect's thoughts in specifying INCINOR, the Home Incinerator, for this delightful modern home. For what could have been more destructive to its charm than those twin eyesores—the garbage can and the rubbish pile—so glaringly frequent in suburban communities where refuse collections are often casual at best!

But there were many practical reasons as well for the choice of INCINOR. It requires no building-in; no special chimney. It occupies small space in the basement, its only requisite a gas connection.



But in client satisfaction its advantages are great. Bushels of wet garbage, litter and refuse are reduced—with gas, *"the decent way"*—to a handful of sterile ash, quickly, safely and without odor. No bother—simply press the lighter button and clean gas flame rapidly does the rest. INCINOR-*ization* of refuse as fast as it accumulates eliminates fire hazards, safeguards health and prevents vermin—three much-to-be desired features in any home.

Investigate—No home too small, no plant too large for an Incinor. Complete architectural data for the asking. *Send today!*

Sweet's Catalogue C-4089

HOME INCINERATOR CO., MILWAUKEE, WISCONSIN
SECURITY BUILDING

·INCINOR·

THE HOME INCINERATOR

Good Riddance

GARBAGE .. RUBBISH .. TRASH

© 1929, H. I. Co.

HOME INCINERATOR COMPANY
Dept. I9, Security Building, Milwaukee, Wisconsin
Please send me free Architectural File data on home incineration.

BURN IT WITH GAS — THE DECENT WAY

Name .....

Address ..... *City* .....

Model D-4 Frigidaire
White Duco finish; seamless Porcelain-on-steel lining; approx. 4 cu. ft. of food space; dimensions, 26¼" wide, 23" deep, 48" high; freezes 24 full-size ice cubes.

Model D-5 Frigidaire
White Duco finish; seamless Porcelain-on-steel lining; approx. 5 cu. ft. of food space; dimensions, 28½" wide, 24½" deep, 56¾" high; freezes 42 full-size ice cubes.

Model AH-P-5637 Frigidaire
One of the eight special Apartment House Cabinets; equipped either for unit or multiple installation; white Duco finish; Porcelain-on-steel lining; approx. 4 cu. ft. of food space; dimensions, 24¼" wide, 19" deep, 56¼" high. Freezes 30 full-size ice cubes.

Specify Frigidaire *for the apartments you plan*

YOU add a visible asset to the apartments you plan by specifying Frigidaire. It makes an instant and powerful appeal to the prospective resident.

Frigidaire offers an important combination of features which are of special interest to apartment residents. Here are some of them . . . smooth and unobstructed surfaces . . . of gleaming Porcelain-on-steel or white Duco . . . conveniently elevated shelves . . . entirely concealed mechanism, so quiet that you don't hear it start, stop, or run . . . surplus refrigerating power which guarantees the safe keeping of foods during even the hottest weather . . . and the famous Frigidaire "Cold Control" which provides six speeds for freezing ice cubes and desserts.

At the nearest Frigidaire showroom, the new Frigidaires are now on display...Frigidaires adapted in size, capacity, and shape for the requirements of any apartment building. You are invited to call for complete information and to ask for literature especially prepared for the architect and builder. Or, if you prefer, write us . . . today. Frigidaire Corporation, Subsidiary of General Motors Corporation, Dayton, Ohio.

The Schroeder Hotel
Milwaukee
Vilter Refrigeration Throughout

SUCH A SMALL PERCENT OF THE TOTAL . . .

THE difference between installing ordinary refrigeration and a Vilter system engineered to meet specific needs can be, at most, a very small percentage of the total cost of the building. Yet the refrigeration system may easily be reckoned the most important unit entering into construction or replacement.

There is no need to use less than the world's standard of refrigeration. The architect, engineer and maintenance man all know Vilter as the leader—the maker of refrigeration systems which are low in installation cost, lowest in upkeep and most efficient in operation.

Your inquiry is solicited by our engineering department; full cooperation is promised. *The Vilter Manufacturing Company, 816 Clinton Street, Milwaukee, Wisconsin.*

Vilter

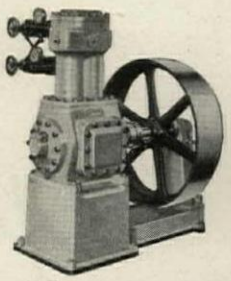
For an authoritative solution of your refrigeration problems consult our Engineering Department.

59-29

SINCE 1867

Architects welcome Lipman FREE Refrigeration Engineering Service . . .

Our staff of expert refrigeration engineers is at your service for free advice. Solving complicated refrigeration problems is the job of these men every day. Avail yourself of this free service. There is no obligation whatsoever—and we mean exactly that. Address the General Refrigeration Co., Beloit, Wisconsin, Department "J-27."



Lipman
ELECTRIC REFRIGERATION

KITCHEN ENGINEERING

THIS covers planning and designing to secure working economies. Likewise the furnishing of standard equipments, and special labor saving items for preparing and serving food. Over a half century in business. Finest of installations to our credit.

BRAMHALL·DEANE·CO.
49-53 E. 21st Street
NEW YORK CITY

Even in the middle of the Pacific...

Monel Metal food service equipment brings cleanliness with economy

Above: *Royal Hawaiian Hotel at Honolulu, in which the Dohrman Hotel Supply Co. of San Francisco installed Monel Metal kitchen equipment. Architects: Warren & Wetmore, New York.*

UNTIL less than 50 years ago Hawaii was one of the outposts of civilization, yet today, in its hotels and tourist accommodations, it is as modern as any mainland city.

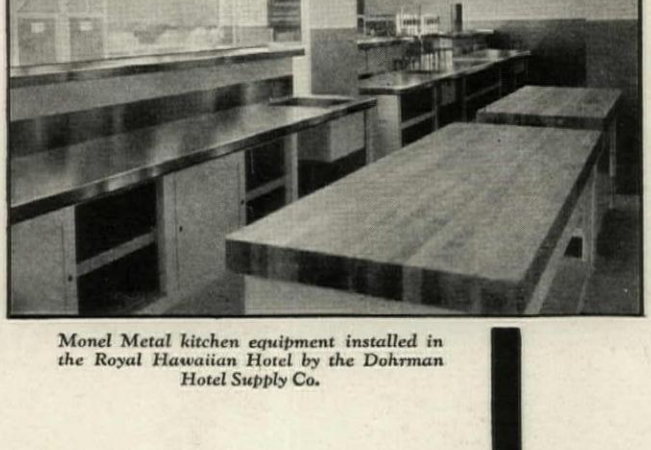
The new Royal Hawaiian Hotel at Honolulu furnishes evidence of the rapid progress made in the Hawaiian Islands. Designed by Warren & Wetmore of New York, equipped with every modern convenience, this beach palace is the last word in hotel construction.

The use of Monel Metal for all food service equipment is one of the many indications that no pains have been spared to build the best. In the Royal Hawaiian, as in most of the large hotels in the United States, Monel Metal was used because of its rare combination of essential properties.

It will not rust. It resists corrosion. It has the toughness and strength of steel with no coating to chip, crack or wear off. It is easier to clean and keep clean. Naturally, it retains its silvery beauty throughout its long life.

In specifying for quality installations, take advantage of Monel Metal's outstanding advantages. Let us send you detailed information describing the many architectural uses of Monel Metal.

SEND FOR SERIES OF AIA FOLDERS



Monel Metal kitchen equipment installed in the Royal Hawaiian Hotel by the Dohrman Hotel Supply Co.

Another view in the Royal Hawaiian Hotel showing Monel Metal equipment installed by the Dohrman Hotel Supply Co. of San Francisco, California.

MONEL METAL

Monel Metal is a technically controlled Nickel-Copper alloy of high Nickel content. It is mined, smelted, refined, rolled and marketed solely by The International Nickel Company, Inc. The name "Monel Metal" is a registered trade mark.

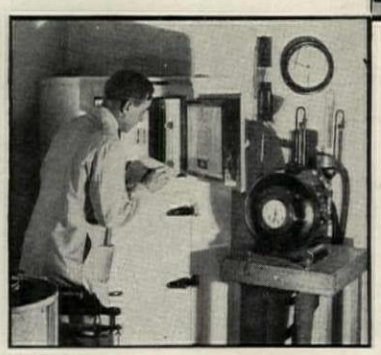
THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

INCO MONEL METAL

UP-TO-DATE APARTMENT

Specifications include GAS REFRIGERATION

Electrolux has no machinery to need servicing, to ever wear out, to make the slightest noise



Above—This Beautiful Apartment House *at 915 West End Ave., New York City, is equipped throughout with the Gas Refrigerator. Rosario Candela, architect.*

• • •

Extreme left—Hudson Gables *apartments at 181st St. and Northern Ave., New York City, Electrolux-equipped. Horace Ginsberg, architect.*

• • •

Left—*Picture shows Electrolux being tested and approved in Good Housekeeping Institute Laboratories.*

TESTED refrigeration without a sound . . . long life at lowest operating cost . . . freedom from service and replacement troubles. These are a few of the advantages Electrolux, the Gas Refrigerator, brings to apartments.

That's why the experience of architects all over the country is leading them to include Electrolux, the Gas Refrigerator, in their specifications for modern apartments.

No Machinery . . . Low Cost

Electrolux has no machinery . . . no moving parts. This means there is nothing to wear, need attention, or make the slightest sound. A tiny gas flame and a mere trickle of water do all the work of making silent, endless cold.

And, best of all, Electrolux costs less to operate than any other refrigerating system.

Write for detailed specifications on the Gas Refrigerator. There is a wide range of models . . . one for the smallest apartment or the largest mansion. Just address your request to Servel Sales, Inc., Evansville, Indiana.

ELECTROLUX THE GAS REFRIGERATOR
MADE BY SERVEL

"U.S." Rainbow Line

50% Easier Pulling

Circuit Testing in one-third the time

United States Rubber Company

TRADE MARK

We'll gladly serve you through your jobber

1790 BROADWAY · · NEW YORK

United States Rubber Company, Room No. 490, 1790 Broadway, New York, N. Y.

☐ Please send me free samples of the 8 colored wires comprising the "U. S." Rainbow Line.

☐ Please send me proof of the above statements.

*Name*_____ *Address*_____

*Company*_____ *Title*_____

THE **RAINBOW LINE** OF "U. S." PARACORE WIRES AND CABLES

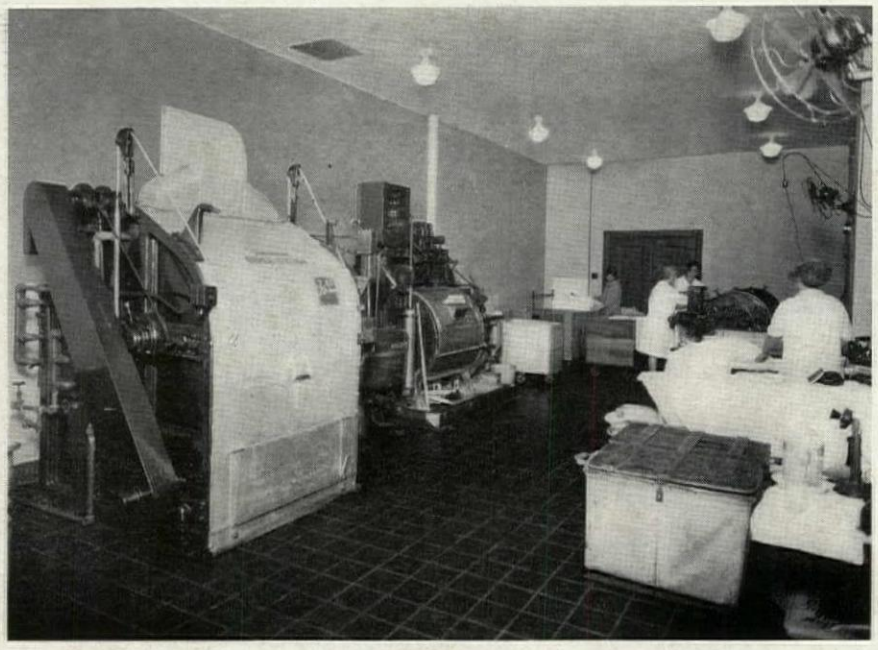
No. 60 *of a series of advertisements featuring prominent laundry installations*

The laundry department *for the* Office Building

Mutual Benefit Life Insurance Company Building, Newark, N. J.—one of America's most modern office structures. W. A. Starrett, Architect, New York.

Have you noticed how many office buildings, nowadays, are being planned to include a *laundry* department? Modern architectural practise. The Mutual Benefit Life Insurance Company, Newark, N. J., for example—it has a laundry of its own, right in its own big building. A department designed with the collaboration of American Laundry Machinery Company engineers.

The laundry situation in the building you are planning . . .



The same "American" engineers who helped with the planning of this modern office building laundry, as well as scores of other laundry departments, commercial and institutional, will be glad to put some helpful laundry-practise facts before you. Talk with them about a laundry department for the building you are planning.

The Mutual Benefit Life Insurance Company's modern laundry, where as many as three thousand pieces daily are laundered perfectly and rushed back to service.

THE AMERICAN LAUNDRY MACHINERY COMPANY

Norwood Station, Cincinnati, Ohio

The Canadian Laundry Machinery Co., Ltd.
47-93 Sterling Road, Toronto 3, Ont., Canada

Agents: British-American Laundry Machinery Co., Ltd.
Underhill St., Camden Town, London, N. W. 1, England

Selected List of Manufacturers' Publications

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

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

ACOUSTICS

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

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

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

ASPHALT

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

BRICK

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

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

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

CEMENT

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

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

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

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

CEMENT—Continued

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

CONCRETE BUILDING MATERIALS

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

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

CONCRETE COLORINGS

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

CONSTRUCTION, FIREPROOF

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

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

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

CONSTRUCTION, STONE AND TERRA COTTA

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

CORNICES, METAL

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

DAMPPROOFING

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

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

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

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

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

DOORS AND TRIM, METAL

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

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 189*

DOORS AND TRIM, METAL—Continued

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

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

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

DOORS, SOUNDPROOF

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

DRAINAGE FITTINGS

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

DUMBWAITERS

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

ELECTRICAL EQUIPMENT

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

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

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

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

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

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

ELEVATORS

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

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

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

ESCALATORS

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

FIREPLACE CONSTRUCTION

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

FIREPROOFING

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

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

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

FLOOR HARDENERS (CHEMICAL)

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

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

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

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

FLOORS—STRUCTURAL

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

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

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

FLOORING

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

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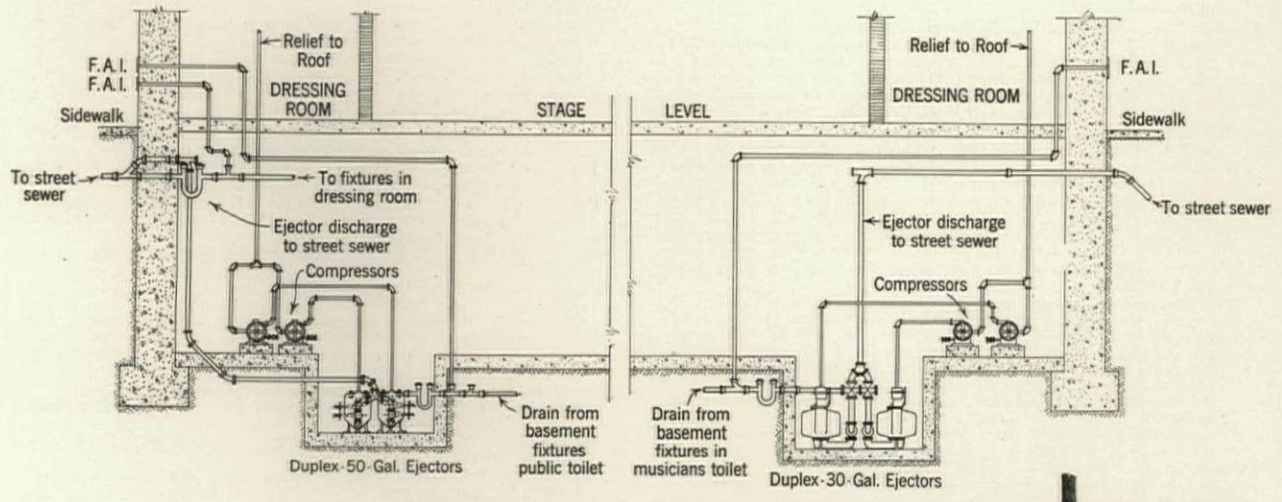


SECTIONAL DIAGRAM SHOWING THE METHOD OF SANITARY DRAINAGE FOR A THEATRE
Where the Toilets under the Stage are below, the Street Sewer Level, and discharge thru Ejectors

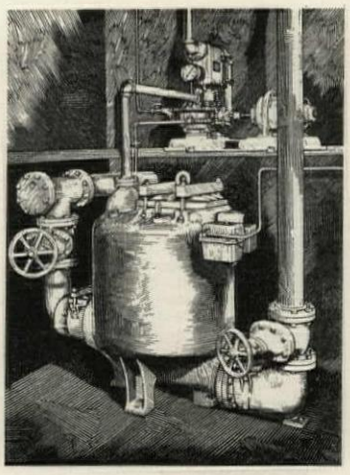
Hammerstein Theatre, New York, N. Y., Herbert J. Krapp, architect. Two sets of Jennings Sewage ejectors are installed in this theatre in a similar manner to that shown above.

Ejecting sewage quietly

It is often desirable, when planning a building such as a theatre, to conserve space by putting lounge rooms and lavatories in the basement.

Where this is done, however, two problems may arise. The basement floor may be at so low a level that gravity flow of sewage and drainage from fixtures to street sewer cannot be obtained. Mechanical equipment for raising the sewage must be installed. But locating such equipment under the stage or auditorium is impossible if operation is noisy.

A satisfactory solution to both problems is found in the Jennings Sewage Ejector. Automatically controlled, working with low pressure air furnished by a Nash Hytor Compressor, it handles unscreened sewage and drainage at little cost and with minimum attention. Simplified in design, the Jennings Ejector employs no air valves, reciprocating compressors or other complicated parts. It is quiet and vibrationless in operation.



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 Bulletins 67 and 103.

Jennings Pumps

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

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

FLOORING—Continued

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

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

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

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

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

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

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

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

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

FURNITURE

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

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

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

GLASS CONSTRUCTION

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

Libbey-Owens Sheet Glass Co., Toledo, Ohio.
Flat Glass. Brochure, 12 pp., 5⅛ x 7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

GREENHOUSES

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

GREENHOUSES—Continued

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

HARDWARE

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

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

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

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

HEATING EQUIPMENT

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

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

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

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

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

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

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

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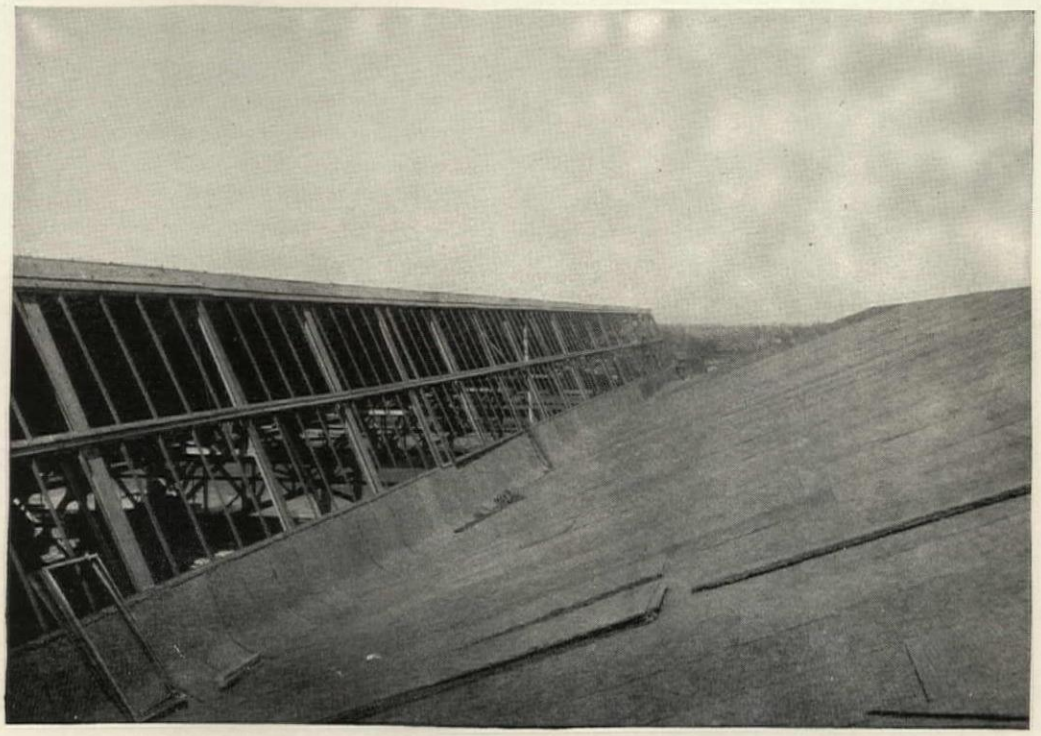
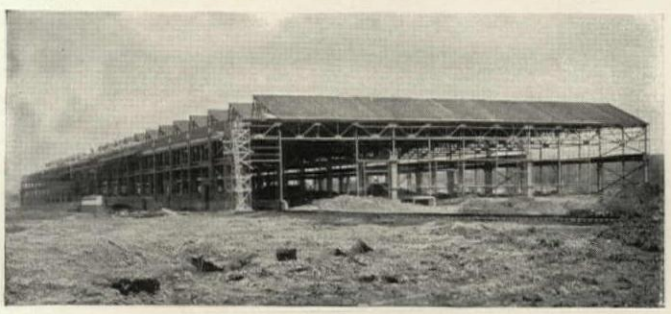
PROTECTED *by* Carey Built-up Roofing

. . . five thousand squares of it!



One of the Middle West's foremost industrial structures—the new plant of The Chase Brass and Copper Company, Euclid, Ohio, protected with a 5,000-square Carey Built-up Roof. The Austin Company, Engineers and Contractors.



IT is not surprising that the fine new plant of The Chase Brass and Copper Company, Euclid, Ohio, was given the dependable overhead protection of a Carey Built-up Roof. For, since 1873, architects have been specifying this trouble-free roofing for the country's foremost buildings.

The "custom-made" roof, the "prescription" roof —built up layer upon layer, sealed and resealed again and again. Made of Carey's own selected and blended materials, embodying in its construction the skill of more than half a hundred years. Weather-wise, lastingly dependable . . . the Carey Built-up Roof!

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"A ROOF FOR *EVERY* BUILDING"

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 192*

HEATING EQUIPMENT—Continued

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

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

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

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

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

Nash Engineering Company, South Norwalk, Conn.
Bulletin 85. Booklet. 12 pp. 10¾ x 7½ ins. Illustrated in color. Describes construction and operation of the Jennings Return Line Vacuum Heating Pump.
Bulletin 87. Brochure. 8 pp. 10¾ x 7½ ins. Illustrated in color. Deals with Sizes T and U Jennings Vacuum Heating Pump for 2500 and 5000 square feet equivalent direct radiation.
Bulletin 63. Booklet. 4 pp. 10¾ x 7½ ins. Illustrated. Describes in detail the Unit Type Motor Driven Jennings Condensation Pump.
Bulletin 52. Brochure. 6 pp. 10¾ x 7½ ins. Illustrated in color. Devoted to Jennings Standard Centrifugal Pumps for house service, boosting city water pressure to supply top stories, for circulating warm water, etc.

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.

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.

HOISTS, TELESCOPIC

Gillis & Geoghegan, Inc. 535 West Broadway, New York.
G & G Telescopic Hoist. Booklet. 24 pp. 8½ x 11 ins. Illustrated complete data on hoists.
Ash Removal. Folder. 8½ x 11 ins. Illustrated. Hoists for removing ashes from basements.

HOSPITAL EQUIPMENT

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

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

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

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

HOTEL EQUIPMENT

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

INCINERATORS

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

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

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

INSULATION

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

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.

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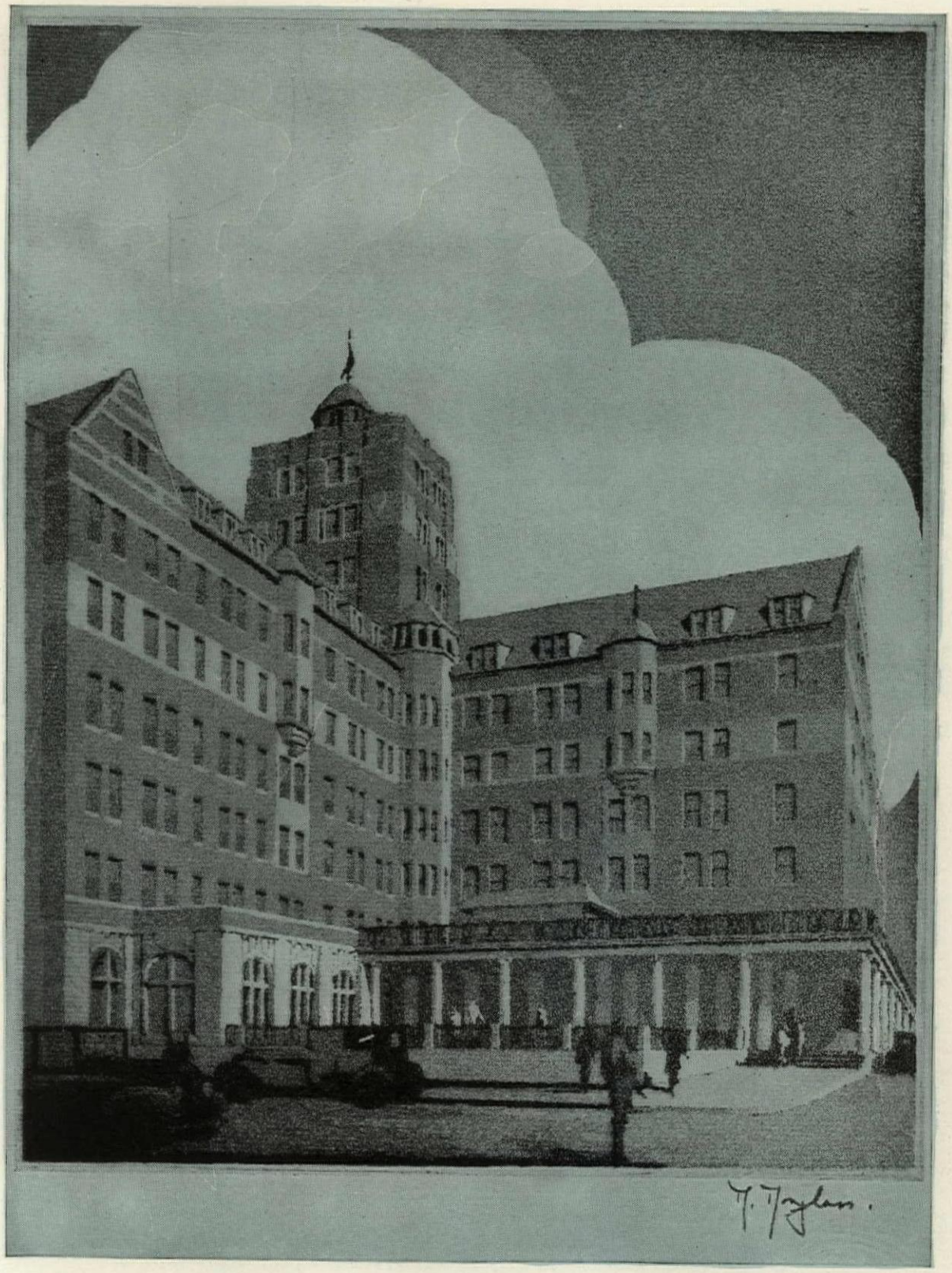

Aquatint study of the Whitcomb Hotel, St. Joseph, Mich. ⌒ Pond & Pond ⌒ Martin & Lloyd, Chicago, Architects ⌒ Max W. Stock Construction Co., General Contractor ⌒ Andrew Epple, Heating and Plumbing Contractor . . . Jenkins Valves are used for the heating as well as the plumbing of this new hotel . . . . . Jenkins Bros. ⌒ New York ⌒ Boston ⌒ Philadelphia ⌒ Chicago . . . Jenkins Bros. Ltd. ⌒ Montreal ⌒ London.

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"Into these structures . . . . . ought to go the aspirations of the nation, its ideals expressed in terms of beauty." — Calvin Coolidge concerning Government Buildings.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 194*

JOISTS—Continued

Modern Concrete Reinforcement. Brochure, 32 pp., 8½ x 11 ins. Illustrated.

Construction Details for Installing Havemeyer Trusses. Data sheets, 8½ x 11 ins. Illustrated.

Standard Practice for Placing Havemeyer Reinforcement in Columns, Beams and Slabs. Data sheets, 8½ x 11 ins. Illustrated.

KITCHEN EQUIPMENT

The International Nickel Company, 67 Wall St., New York, N. Y.
Hotels, Restaurants and Cafeteria Applications of Monel Metal. Booklet, 8½ x 11 ins., 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.

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

LABORATORY EQUIPMENT

Alberene Stone Co., 153 West 23rd Street, New York City.
Booklet, 8¾ x 11¼ ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.

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

LANTERNS

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

LATH, METAL AND REINFORCING

Milwaukee Corrugating Co., Milwaukee
The Milcor Manual. Booklet, 96 pp., 8½ x 11 ins. Illustrated. Data on metal lath and similar materials.
Milcor Metal Ceiling Catalog. Booklet, 288 pp., 8½ x 11 ins. Illustrated. Data on metal ceiling and wall construction.

National Steel Fabric Co., Pittsburgh, Pa.
Better Walls for Better Homes. Brochure, 16 pp., 7¾ x 11¾ ins. Illustrated. Metal lath, particularly for residences.
Steeltex for Floors. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Combined reinforcing and form for concrete or gypsum floors and roofs.
Steeltex Data Sheet No. 1. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with round top chords.
Steeltex Data Sheet No. 2. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with flat top flanges.
Steeltex Data Sheet No. 3. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for folders on wood joists.

North Western Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
North Western Expanded Metal Products. Booklet, 8½ x 10¾ ins., 20 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plasta-saver and longspan lath channels, etc.
Longspan ¾-inch Rib Lath. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-Rib expanded metal.
A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regarding their use.
Norwest Metal Lath. Folder, 8½ x 11 ins. Illustrated. Data on Flat Rib Lath.

Truscon Steel Company, Youngstown, Ohio.
Truscon ¾-inch Hy-Rib for Roofs, Floors and Walls. Booklet, 8½ x 11 ins., illustrating Truscon ¾-inch Hy-Rib as used in industrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

LAUNDRY 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.

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.

Smyser-Royer Co., 1700 Walnut Street, Philadelphia, Pa.
Catalog "J" on Exterior Lighting Fixtures. Brochure, illustrated, giving data on over 300 designs of standards, lanterns and brackets of bronze or cast iron.

Todhunter, 119 East 57th St., New York, N. Y.
Lighting Fixtures, Lamps and Candlesticks. 24 pp., 8½ x 11 ins. Illustrated. Fine assortment of lighting accessories.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Industrial Lighting Equipment. Booklet, 32 pp., 8½ x 11 ins. Illustrated.
Commercial Lighting. Brochure, 24 pp., 8½ x 11 ins. Illustrated.
Airport and Floodlighting Equipment. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

LUMBER

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

MAIL CHUTES

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

MANTELS

Henry Klein & Co., Inc. 40-46 West 23rd Street, New York.
Driwood Mantels. Booklet. 12 pp. 8½ x 11 ins. Illustrated. Fine line of eighteenth century English and American 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.

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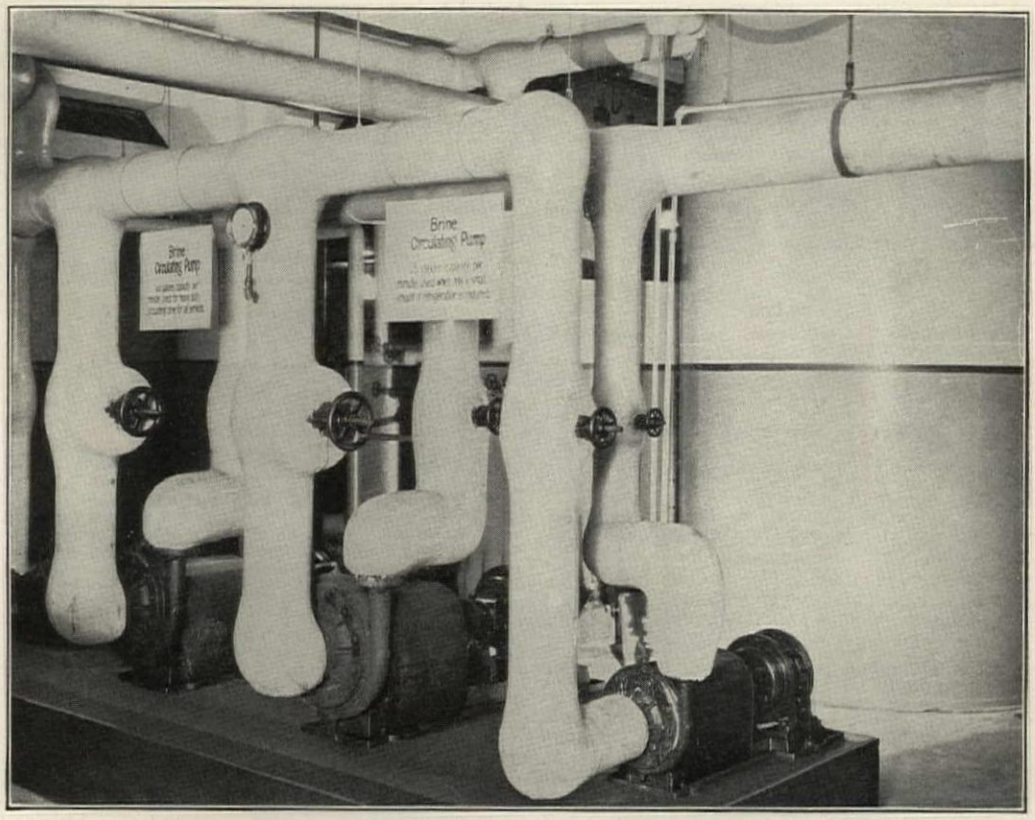

Brine lines and connections for the drinking water system, Ohio Bell Telephone Building, Cleveland, insulated with Armstrong's Cork Covering canvas jacketed. Hubbell and Benes, Architects.

Permanent Insulation *for* Cold Lines . . .

COLD lines insulated with Armstrong's Cork Covering are permanently insulated. They can safely be run in chases or behind walls and ceilings with the assurance that they will not sweat and that there will be no staining or damage to the plaster from condensation on the lines.

When pipe lines are insulated with Armstrong's Cork Covering, no excess refrigerating capacity need be figured to allow for progressively increasing line losses, as is the case when moisture-absorbent insulation is used. Armstrong's is nonabsorbent, airproof and moistureproof. It retains its initial efficiency unaffected by any normal service conditions.

Armstrong engineers are always at the service of architects who are planning and specifying insulation for refrigerated lines. Armstrong offices are located in the principal cities and an inquiry will put you in touch with the nearest one. Armstrong Cork & Insulation Company, 900 Concord Street, Lancaster, Pa.; McGill Bldg., Montreal; 11 Brant Street, Toronto.

Armstrong's Cork Covering

for Cold Lines, Coolers and Tanks

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 196*

MILL WORK—See also Wood—Continued

Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.
Column Catalog. 7½ x 10 ins., 48 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installations.
The Pergola Catalog. 7½ x 10 ins., 64 pp. Illustrated. Contains illustrations of pergola lattices, garden furniture in wood and cement, garden accessories.

Klein & Co., Inc., Henry, 11 East 37th St., New York, N. Y.
Two Driwood Interiors. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Use of moulding for paneling walls.
A New Style in Interior Decoration. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Deals with interior woodwork.
Driwood Period Mouldings in Ornamented Wood. Booklet, 28 pp., 8½ x 11 ins. Illustrated.
How Driwood Period Mouldings in Ornamented Wood Set a New Style in Decoration. Folder.

Roddis Lumber and Veneer Co., Marshfield, Wis.
Roddis Doors. Brochure, 24 pp., 5¼ x 8½ ins. Illustrated price list of doors for various types of buildings.
Roddis Doors, Catalog G. Booklet, 184 pp., 8½ x 11 ins. Completely covers the subject of doors for interior use.
Roddis Doors for Hospitals. Brochure, 16 pp., 8½ x 11 ins. Illustrated work on hospital doors.
Roddis Doors for Hotels. Brochure, 16 pp., 8½ x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORTAR AND CEMENT COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Folder, 8½ x 11 ins., 4 pp. Illustrated in colors, gives full information concerning Clinton Mortar Colors with specific instructions for using them.
Color Card. 3¼ x 6½ ins. Illustrates in color the ten shades in which Clinton Mortar Colors are manufactured.
Something New in Stucco. Folder, 3½ x 6 ins. An interesting folder on the use of coloring matter for stucco coated walls.

ORNAMENTAL PLASTER

Jacobson & Co., 241 East 44th St., New York, N. Y.
A Book of Old English Designs. Brochure, 47 plates, 12 x 9 ins. Deals with a fine line of decorative plaster work.
Architectural and Decorative Ornaments. Cloth bound volume, 184 pp., 9 x 12 ins. 18 plates. Price, $3.00. A general catalog of fine plaster ornaments.
Geometrical ceilings. Booklet, 23 plates, 7 x 9 ins. An important work on decorative plaster ceilings.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

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 3¼ 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.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES—Continued

Valentine & Co., 456 Fourth Ave., New York, N. Y.
How to Use Valspar. Illustrated booklet, 32 pp., 3¾ x 8 ins. Deals with domestic uses for Valspar.
How to Keep Your House Young. Illustrated brochure, 24 pp., 7 x 8½ ins. A useful work on the upkeep of residences.
Architectural Four-Hour Varnishes and Enamels. Booklet, 8 pp., 4½ x 6 ins. Data on a useful line of materials.

PARCEL DELIVERY DEVICES

Receivador Sales Company, Grand Rapids, Mich.
Architects' Portfolio. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with delivery problems and their solution.

PARTITIONS

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

Dahlstrom Metallic Door Company, Jamestown, N. Y.
Dahlstrom Standard Steel Partitions. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

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

Improved Office Partition Company, 25 Grand St., Elmhurst, L. I.
Telesco Partition. Catalog, 8¼ x 11 ins., 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.
Detailed Instructions for Erecting Telesco Partitions. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Complete instructions, with cuts and drawings, showing how easily Telesco Partition can be erected.

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

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

PIPE

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

American Rolling Mill Company, Middletown, Ohio.
How ARMCO Dredging Products Cut Costs. Booklet, 16 pp., 6 x 9 ins. Data on dredging pipe.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog A. 4 x 16½ ins., 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

Cohoes Rolling Mill Company, Cohoes, N. Y.
Cohoes Pipe Handbook. Booklet, 40 pp., 5 x 7½ ins. Data on wrought iron pipe.

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

National Tube Co., Frick Building, Pittsburgh, Pa.
"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins., 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.
"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins., 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and 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.

REQUEST FOR CATALOGS

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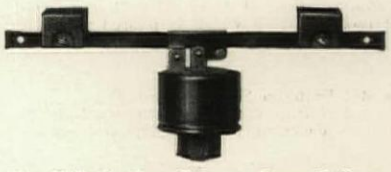
The Right Kind to Install First

Sylphon Damper Regulator No. 23—for Low Pressure Steam Boilers



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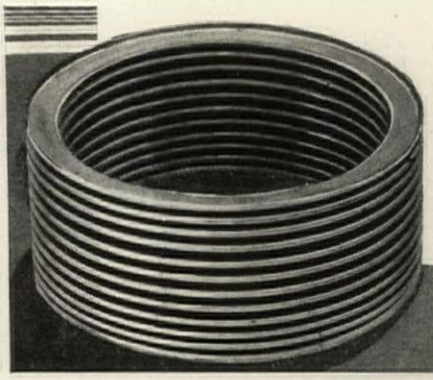

SIXTEEN years ago Sylphon Damper Regulators provided the first efficient automatic checking and increasing of drafts in proportion to steampressure or water temperature and they have never been equalled. On hundreds of thousands of heating plants they have proved their absolute superiority. They have demonstrated one of the many soundly practical applications of the famous Sylphon Bellows, the seamless, solderless diaphragm. It is the most sensitive and durable expansion member known and after years of usage shows no deterioration or change of form.

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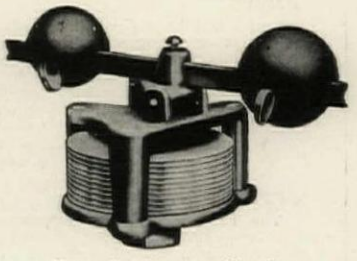

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The Famous Sylphon Bellows

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 198*

PLASTER—Continued

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.

PNEUMATIC TUBE SYSTEMS

Gillis & Geoghegan, Inc., 535 West Broadway, New York.
G & G Atlas Systems. Booklet. 12 pp. 8½ x 11 ins. Illustrated. Tube systems for department stores.
Quickly and Efficiently Handling Sales Transactions. Folder. Illustrated. Plan of tube system for a department store.

PUMPS

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

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

RADIO EQUIPMENT

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

RAMPS

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

REFRIGERATION

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

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.

REINFORCED CONCRETE—See also Construction, Concrete

Longspan ¾-inch Rib Lath. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-Rib expanded metal.

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

RESTAURANT EQUIPMENT

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

ROOFING

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

Federal Cement Tile Co., 608 S. Dearborn Street, Chicago.
Federal Nailing Concrete Roof Slabs. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Roof Standards. Booklet. 30 pp., 8½ x 11 ins. Illustrated.
Federal Interlocking Tile and Glass Tile. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Federal Long-Spare Roof Slab. Folder. 4 pp., 8½ x 11 ins. Illustrated.
New Federal Light Six Roof Slab. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Catalog and Roof Standards. Booklet. 36 pp. 8½ x 11 ins. Illustrated. Full data on Featherweight Concrete Insulating Roof Slabs, and Featherweight Nailing Concrete Roof Slabs.
Examples of Theatres and Theatre Roofs. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

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

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

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

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

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

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

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

SEWAGE DISPOSAL

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

Nash Engineering Company, South Norwalk, Conn.
Bulletin 97. Booklet. 16 pp. 10¾ x 7½ ins. Illustrated in color. Describes the design, construction and operation of the Jennings Suction Sump Pump.
Bulletin 11. Brochure. 8 pp. 10¾ x 7½ ins. Illustrated in color. Deals with Nash Hytor Vacuum Pumps for air and gases.
Bulletin 67. Booklet. 16 pp. 10¾ x 7½ ins. Illustrated in color. Describes Type A Jennings Sewage Ejector for handling Unscreened sewage and raising it from basements below sewer level.
Bulletin 103. Brochure. 16 pp. 10¾ x 7½ ins. Illustrated in color. Deals with small size Type B Jennings Sewage Ejector.

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"Whale-bone-ite" has made possible a toilet seat strong enough to defy the slam-bang abuse of the public—to be guaranteed for the life of the building—to end immediately all replacement expense.

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We and others have found it impossible to make a seat by any other method anywhere near as sanitary, as strong and as light. Fourteen years of service have proved its value. More than a million are in use. Those concerned with the design, construction and operation of buildings have found this experience safe to follow, so that today nearly all seats going into public toilets are of laminated construction.

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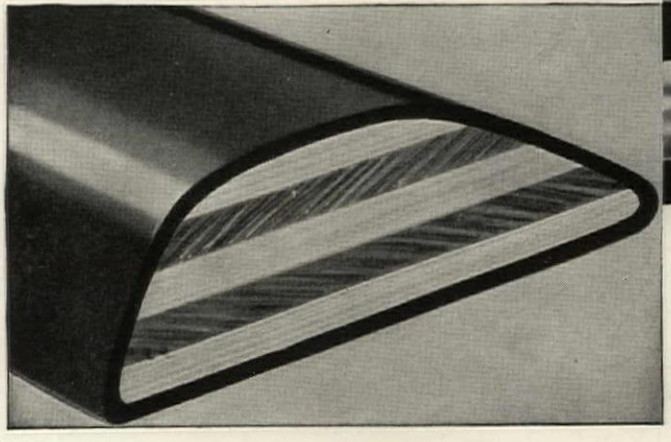
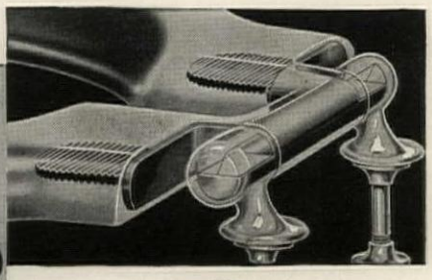
Figures show that on the average ordinary seats have to be replaced about every three years. If you want to end this needless expense, just as it already has been ended in more than a million public toilets in modern and remodelled buildings, simply install Whale-bone-ite Seats as fast as other seats 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-7, Seat Division, The Brunswick Balke-Collender Co., 623 South Wabash Ave., Chicago.



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



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

Brunswick

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Charlotte	Denver	Los Angeles	New Orleans	San Francisco	Ottawa
Chattanooga	Des Moines	Memphis	New York	Seattle	Toronto
Sidney, Australia			Havana		Buenos Aires

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 200*

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., 8½ x 11 ins. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

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.
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.

STORE FRONTS—Continued

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, 9⅛ 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 Street, Pittsburgh, Pa.
Natco. The Complete line of Structural Clay Tile. Booklet. 39 pp. 8½ x 11 ins. Illustrated. A General Catalog.
Natco Double Shell Load Bearing Tile Bulletin. 8½ x 11 ins., 6 pp. Illustrated.
Natco Face Tile for the Up-to-Date. Farm Bulletin. 8½ x 11 ins.
Natcoflor Bulletin. 8½ x 11 ins., 6 pp. Illustrated.
Natco Header Backer Tile Bulletin. 8½ x 11 ins., 4 pp. Illustrated.
Natco Unibacker Tile Bulletin. 8½ x 11 ins., 4 pp. Illustrated.

TILES

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

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

United States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 120 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 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 Brothers, 80 White Street, New York.
Office Buildings Yesterday and Today. Folder, 8½ x 11 ins. Illustrated. Valves for use in office buildings.
The Valve Behind a Good Heating System. Booklet, 4½ x 7¼ ins., 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections.
Jenkins Valves for Plumbing Service. Booklet, 4½ x 7¼ ins. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

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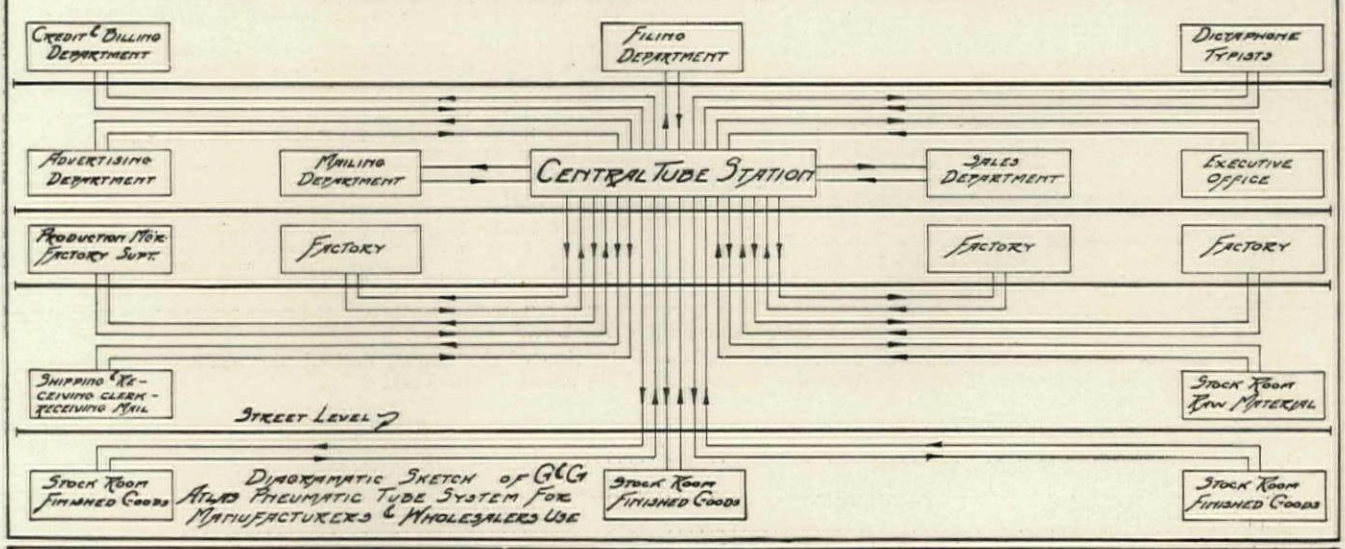
Data Sheet of measurements, etc. mailed upon request.

Catalog in Sweet's Archs. Cat., 23rd Ed. pp. C3740-41
Catalog in Specification Data, 1929 Ed. pp. 228-229

G&G ATLAS SYSTEMS, INC. 544 West Broadway, New York, N.Y.
407 Dominion Bank Building, Toronto



Diagrammatic Sketch of G&G Atlas Pneumatic Tube System for Manufacturers & Wholesalers Use

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 202*

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.

WEATHER STRIPS

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

WINDOWS

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

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

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Pivoted Sash. Catalog 12-A. Booklet, 48 pp., 8½ x 11 ins. Illustrates and describes windows suitable for manufacturing buildings.

WINDOWS, CASEMENT

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

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.

WINDOWS, CASEMENT—Continued

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

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

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

WINDOW SCREENS

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

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

WINDOW SHADES AND ROLLERS

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

WINDOWS, STEEL AND BRONZE

David Lupton's Sons Company, Philadelphia, Pa.
A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 8½ 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.
Drafting Room Standards. Book, 8½ x 11 ins., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.
Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet, 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.
Continuous Steel Windows and Mechanical Operators. Catalog 126. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

WOOD—See also Millwork

American Walnut Mfrs. Association, 618 So. Michigan Boulevard, Chicago, Ill.
American Walnut. Booklet, 7 x 9 ins., 46 pp. Illustrated. A very useful and interesting little book on the use of walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.
American Walnut for Interior Woodwork and Paneling. 7 x 9 ins. Illustrated. Discusses interior woodwork, giving costs, specifications of a specimen room, the different figures in Walnut wood, Walnut floors, finishes, comparative tests of physical properties and the advantages of American Walnut for woodwork.

Curtis Companies Service Bureau, Clinton, Iowa.
Curtis Cabinet and Stair Work. Booklet, 47 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.

National Lumber Mfrs. Assn., Washington, D. C.
Airplane Hangar Construction. Booklet, 24 pp., 8½ x 11 ins. Use of lumber for hangars.

WOOD FINISH

Minwax Company, Inc., 11 West 42nd St., New York.
Color card and specification for Minwax Flat Finish. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a penetrative, preservative stain finish giving stain and soft wax effect.

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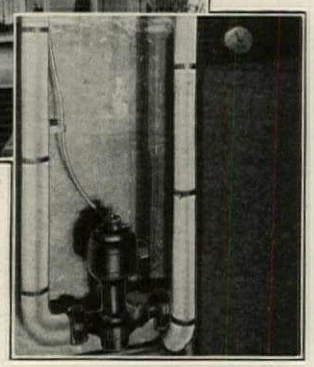

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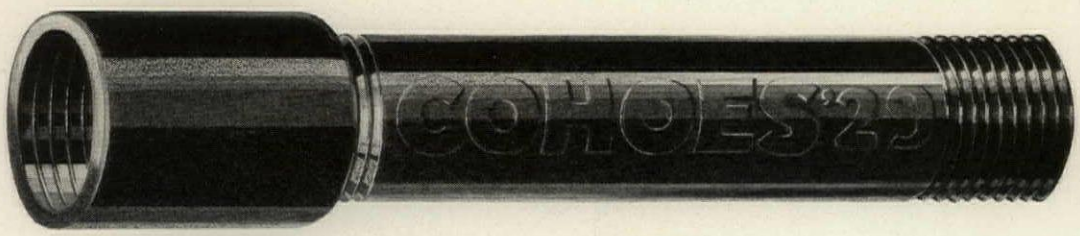

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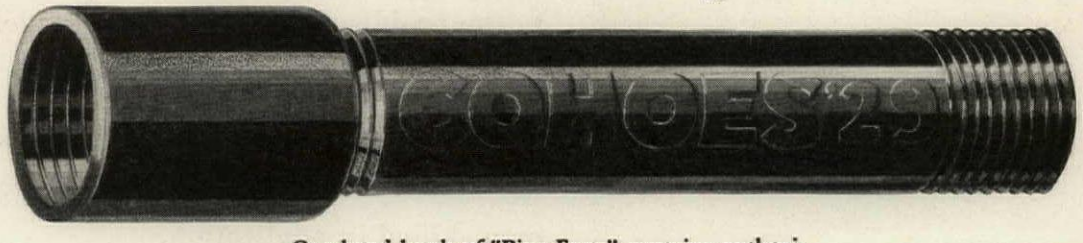

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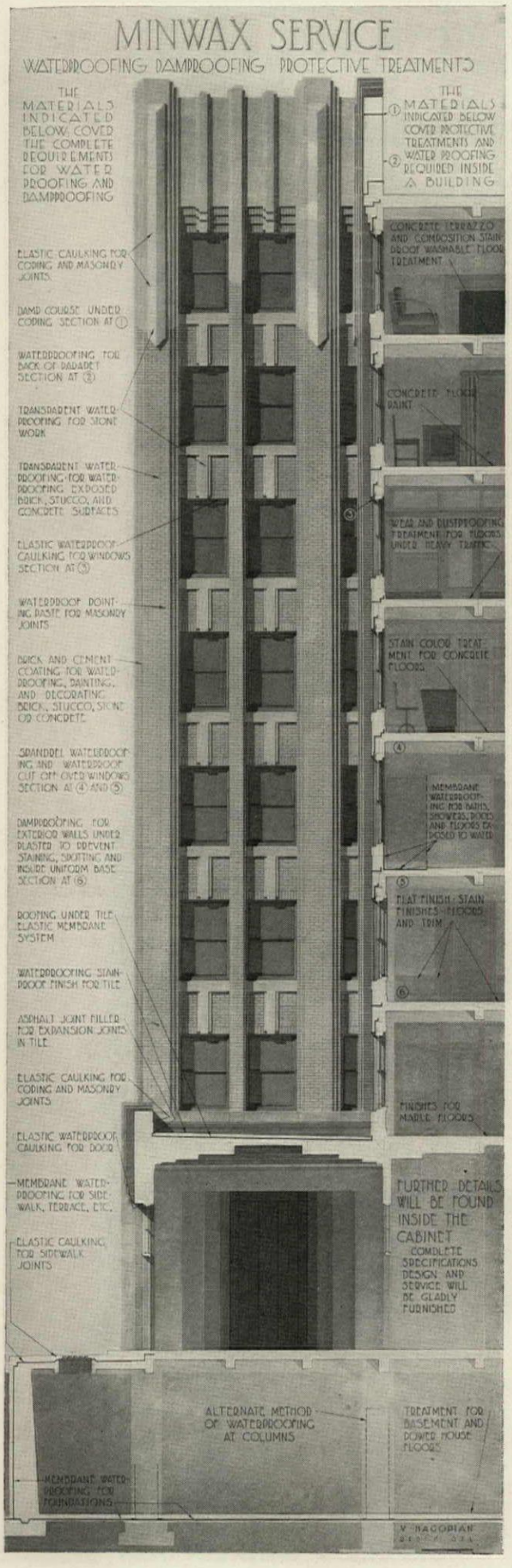

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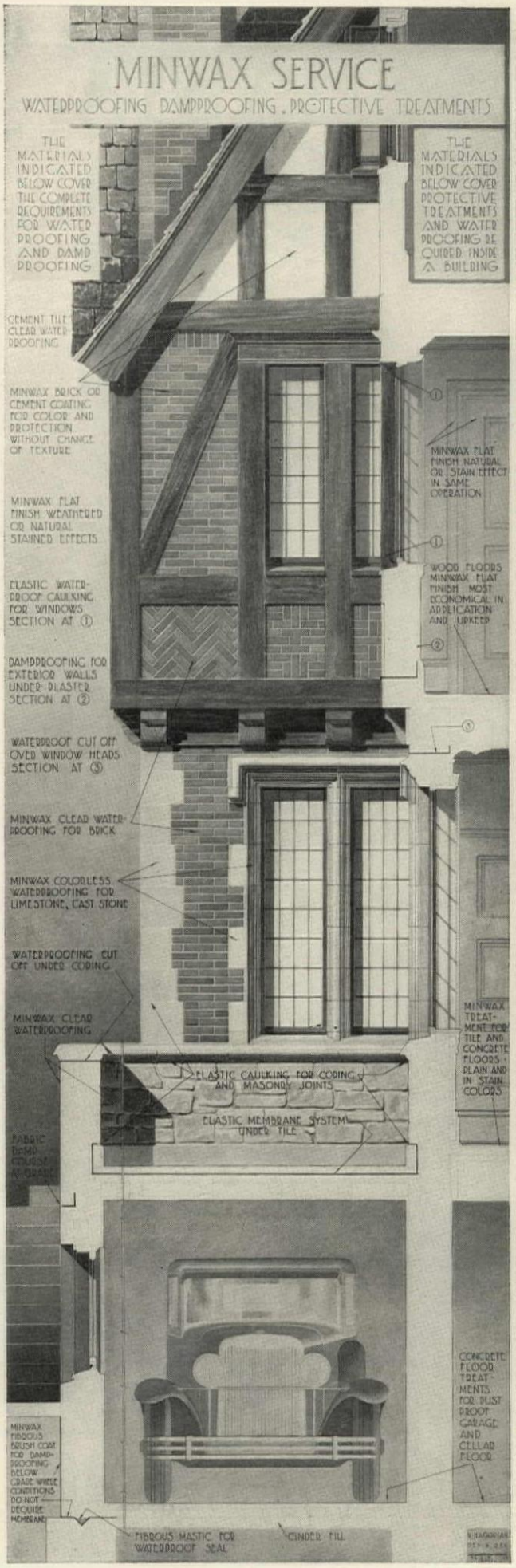

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Cincinnati Enquirer, Cincinnati, Ohio
Niels Esperson Building, Houston, Texas
Exchange National Bank, Tulsa, Okla.
Smith-Young-Tower Bldg., San Antonio, Texas
American Bank Building, New Orleans, La.
Alamo National Bank, San Antonio, Texas.
Book Tower Building, Detroit, Mich.
Maccabees' Building, Detroit, Mich.
Standard Oil Building, New York
10 East 40th Street Bldg., New York
Central Union Trust Co., New York
Public Ledger Building, Philadelphia, Pa.
Public Ledger Addition, Philadelphia, Pa.
Lewis Building, Philadelphia, Pa.
Camden County Court House, Camden, N. J.
Haddon Hall, Atlantic City, N. J.
Hunter-Dulin Building, San Francisco, Cal.
Merchants Nat'l Trust & Savings Bank, Los Angeles, Cal.
Four-Fifty Sutter Bldg., San Francisco, Cal.
Confederation Building, Ottawa, Ont., Canada
Canada Permanent Mortgage Corp., Toronto, Ont., Canada
Mercantile Library Building, Cincinnati, Ohio
Post-Dispatch Building, Houston, Texas
Second Nat'l Bank Bldg., Houston, Texas
Southwestern Bell Tel. Co., Dallas, Texas
Eaton Tower, Detroit, Mich.
Continental Life Ins. Co., St. Louis, Mo.
New Amsterdam Casualty Co., New York
Mountain States Telephone & Telegraph Co., Denver, Colo.
First National Bank, Philadelphia, Pa.
Barnett National Bank, Jacksonville, Fla.
Merchants Nat'l. Bank Bldg., Mobile, Ala.
Calvert Building, Baltimore, Md.
Equitable Building, Baltimore, Md.
Continental Trust Co., Baltimore, Md.
Mutual Building, Richmond, Va.
First National Bank, Charlotte, N. C.
Franklin Square Building, Washington, D. C.
Onondaga Office Building, Syracuse, N. Y.
State Mutual Life Assurance Co., Worcester, Mass.
Baker Building, Minneapolis, Minn.
Roanoke Building, Minneapolis, Minn.
Foshay Tower, Minneapolis, Minn.
Pittsfield Building, Chicago
Mayo Clinic, Rochester, Minn.
MacChesney-Rubens-Wolbach Building, Chicago.
Medical Arts Building, Houston, Texas
Petroleum Building, Houston, Texas
Nix Building, San Antonio, Tex.
Manhattan Life Ins. Bldg., New York
Ohrstrom Building, New York
Medical Arts Building, Omaha, Nebr.
Continental Oil Building, Denver, Colo.
E. I. du Pont Building, Wilmington, Del.
E. I. du Pont Corp., Wilmington, Del.
J. J. Greenberg, (Office and Garage Bldg.,) Philadelphia, Pa.
Board of Trade Building, Los Angeles, Cal.
Public Utilities Building, Portland, Oregon
1411 Fourth Ave. Building, Seattle, Wash.
Star Building, Toronto, Ont., Canada
Medical-Dental Building, Vancouver, B. C.
Gran Via Building, Compania Telefonica Nacional de Espana, Madrid, Spain

This list contains only installations having four, five or six Otis Signal Control Elevators. Fifty-six buildings having more than six of this type elevator were listed in a previous advertisement. There are forty-three additional buildings containing less than four Otis Signal Control Elevators each.

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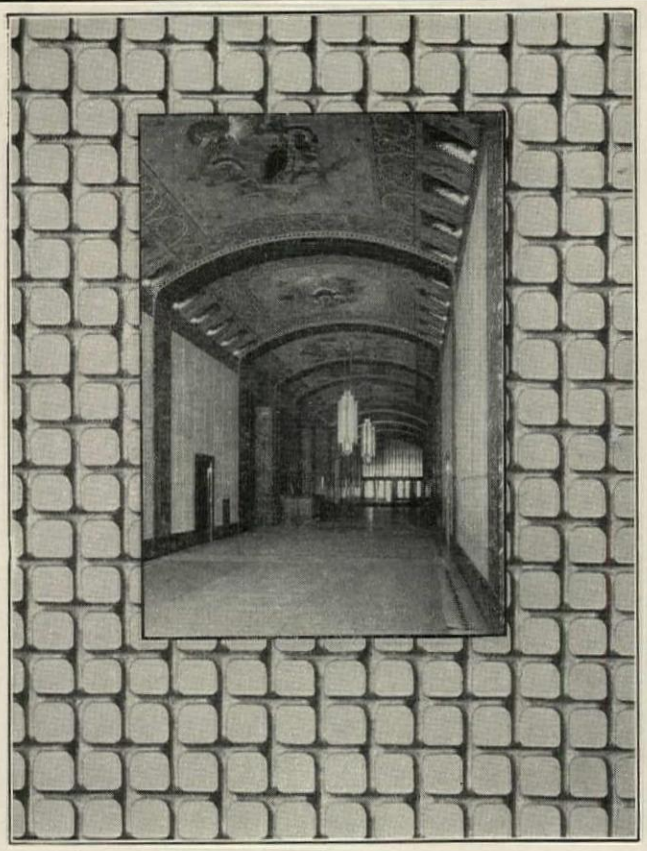

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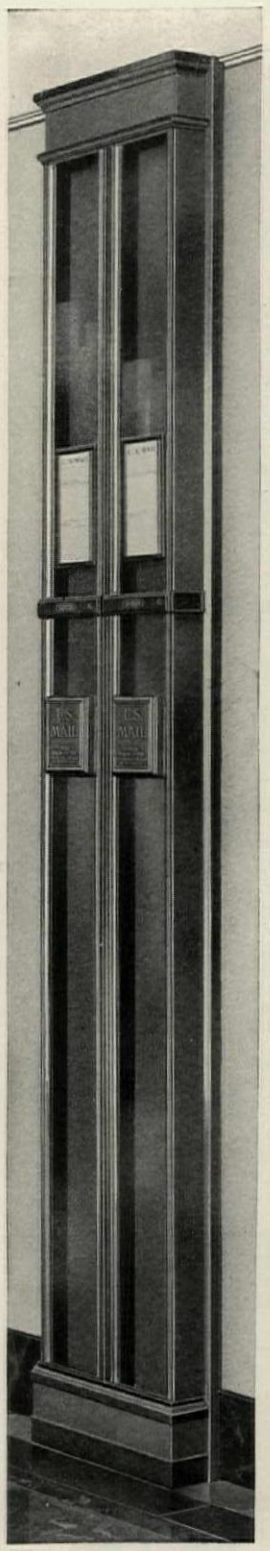

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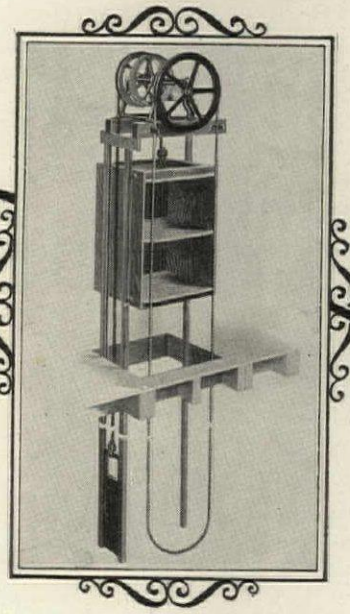
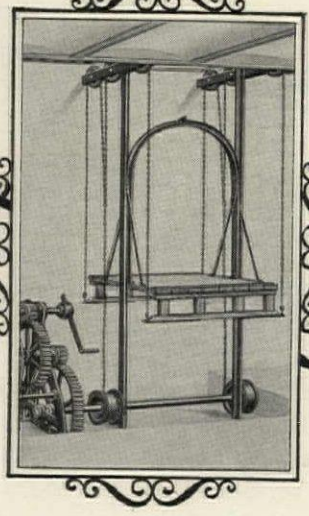
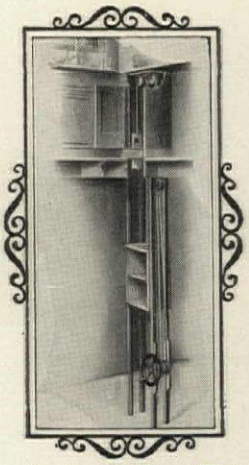


Geared Automatic Brake Dumb Waiter Type "FDCG"



Sidewalk Elevator at Left

MODERN construction necessitates the most improved and economical equipment of every kind. Most architects are well acquainted with the advantages of Sedgwick Dumb Waiters and Elevators.



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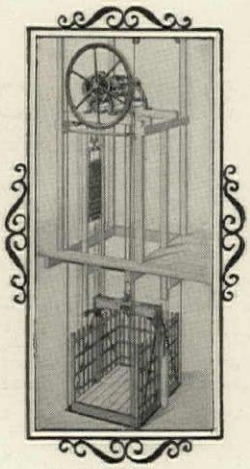

Freight Elevator

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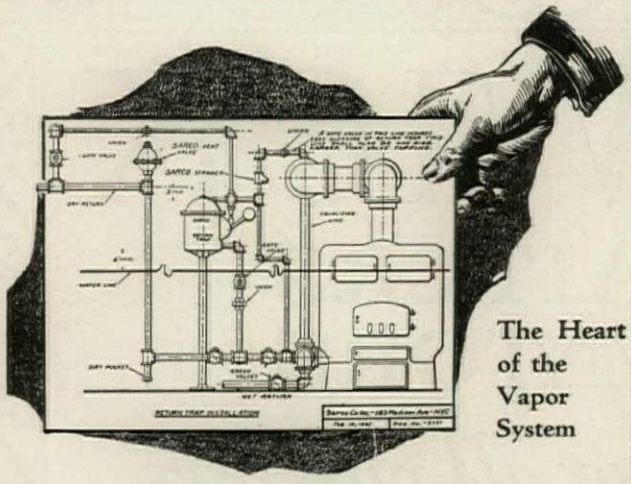

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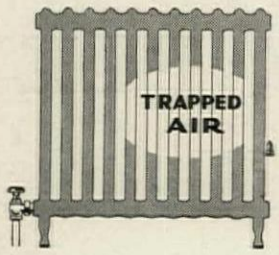

MANY *contractors have experienced this trouble.* When new water radiators are used on a steam job the steam short circuits across the top openings and closes the air valves before all the air has vented. This trapped air greatly reduces the heat output of the radiator—and often to such an extent that additional sections are necessary.

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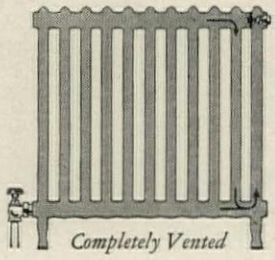
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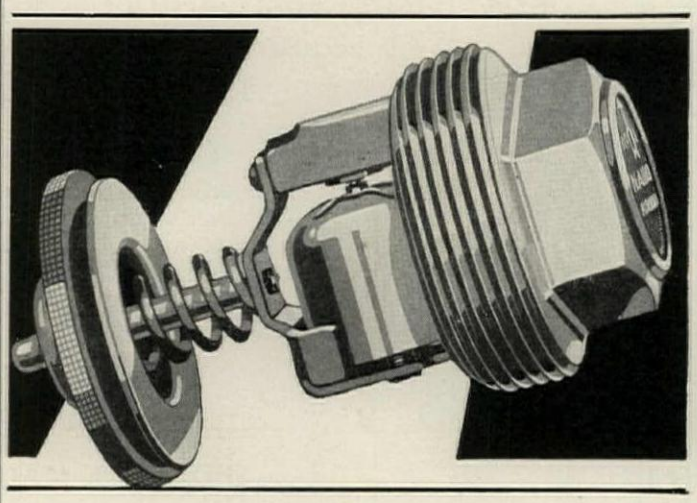

In-Airid No. 1 for Steam

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Airid Air Valves No. 500 and Vac-Airids No. 510 for old-style steam radiators.

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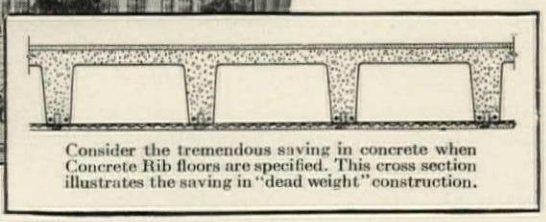
Kansas City, Mo.

Contractors:
Fleming-Gilchrist Construction Co.
Kansas City, Mo.

Owners and Builders:
John Kelly & Son
Kansas City, Mo.



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

Where Silence is Golden

The concrete floor of rib design contributes immeasurably to the development of a sound-proof structure, making it the ideal floor construction for apartment buildings and hotels . . . *where silence is golden.*

Meyer Steelform Construction assures the utmost in sound-proof concrete rib floor construction at the lowest cost. The air space between the ribs acts as an insulator; also as a "storehouse" for pipes and conduits, permitting these units to run in all directions entirely free of the structural element. *Maximum resistance to sound is obtained by suspending the ceiling 1" or more, thereby breaking the contact between plaster ceiling and concrete joists.*

In addition, Meyer Steelform Construction provides greater rigidity and permits of high speed building operation. The saving in concrete, *alone*, as a result of the minimum "dead weight," is a *welcome economy.*

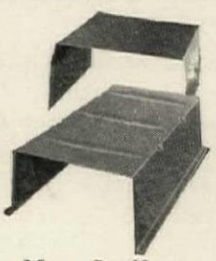
Meyer Removable Steelforms are installed by an organization specially trained to render the greatest possible cooperation to both architect and contractor. A nominal rental—based on continued reuse of the forms—covers both installation and removal. Warehouses located at strategic centers make possible immediate shipment to the job.

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

CONCRETE ENGINEERING COMPANY

General Offices: Omaha, Nebraska

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



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

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

MEYER Steelforms

THE STANDARD

THE ORIGINAL REMOVABLE STEEL FORMS FOR CONCRETE RIB FLOOR CONSTRUCTION

The Guaranteed

SONNEBORN APPLIES LAPIDOLITH

TRADE MARK

SONNEBORN INSPECTS The JOB

IN YOUR client's behalf you are interested in getting a concrete floor hardening job that will give long and satisfactory service. Sonneborn can guarantee you such service. But unless you insist on a Sonneborn job the chances are that low price will win the order, and at the prices that concrete floor hardening material can now be bought, there can only be one result—Quick and lasting dissatisfaction.

There is only one *satisfactory* way to harden, wearproof and dustproof concrete floors—the Sonneborn Guaranteed Quality Way.

Architects who are interested in jobs that will stand up, will realize the ultimate economy and service of intrusting hardening work to Sonneborn, who guarantee every job, and stand behind their guarantee, and always make good.

The Sonneborn Method calls for the use of Lapidolith, the original concrete floor hardener, and for the correct application of Lapidolith by a Sonneborn Service Crew trained to apply Lapidolith in the right way and in the proper amount. We are prepared to quote a price in advance direct to the architect so there can be no misunderstanding between architect and contractor about the cost of the work. We can compete on price but do so reluctantly, because we cannot give at a low price as fine a job as that which is possible to supply at a fair price.

To get a job that will reflect credit on the architect and contractor by lasting for years, specify Lapidolith to be applied by Sonneborn under guarantee.

L. SONNEBORN SONS, *Inc.*

Way to Harden Cement Floors

WE GUARANTEE Every Sonneborn Job

If our inspection shows that a floor is not too greatly deteriorated and that a good hardening job is still possible—

If Lapidolith, the original concrete floor hardener, is used—

If a Sonneborn Service Crew applies Lapidolith—

We guarantee such floors to remain wear-proof and dustproof for a period of years, dependent on specific conditions of use.

A few of the many concerns that use Lapidolith

General Motors Corp.
National City Co.
Wm. Wrigley Jr. Co.
International Harvester Co.
Paramount-Famous-Lasky Corp.
Ford Motor Co.
Campbell Soup Co.
Nash Motor Co.
U. S. Rubber Co.
American Car & Foundry Co.
Bell Telephone Co.
Hershey Chocolate Co.
American Sugar Refining Co.
Fleischmann Yeast Co.
New York Central Railroad
Dairymen's League
Wurlitzer Mfg. Co.
R. J. Reynolds Tobacco Co.
Continental Can Co.
Westinghouse Elec. & Mfg. Co.
Carborundum Co.
Radio Corp. of America
Bethlehem Steel Corp.
Hamilton Watch Co.
Midwest Refining Co.
Standard Oil Co.
Eastman Kodak Co.
American Can Co.
New York Life Insurance Co.
American Woolen Co.
Crane Co.
A. G. Spalding & Bro.
Sikorsky Mfg. Co.
Proctor & Gamble
Libby, McNeil & Libby
Otis Elevator Co.
Loew's Theatres, Inc.
Remington Typewriter Co.
Madison Square Garden Corp.
Cluett-Peabody Co.
Studebaker Corp.
Drake Bros. Bakeries
Pierce-Arrow Motor Co.
Shredded Wheat Co.
Kelly-Springfield Tire Co.
Liggett & Myers Tobacco Co.
Daggett & Ramsdell
Guaranty Trust Co.
J. C. Penney, Inc.
Western Electric Co.

SONNEBORN GUARANTEES THEM!

Some other Sonneborn Products

Lignophol—Penetrating preservative for wood floors.

Cemcoat—Durable wall coating. Stays white after other paints turn yellow.

Hydrocide Colorless—Invisible liquid Chemical Waterproofing. Caulks exterior walls against weather.

114 Fifth Avenue, N.Y.

L. SONNEBORN SONS, Inc., 114 Fifth Ave., New York.

I am interested in your method of hardening concrete floors under guarantee. Please send me full information.

Name.....
Address.....
Company.....
Position.....

A.F.9

Think of heat SAVING as well as heat MAKING when figuring heating equipment

COMFORT and economy cannot be *installed* in a home like furniture. They must be *built* in. The finest, most expensive heating equipment can be little more than two-thirds effective if true wall and roof insulation is not built in as a part of that equipment. Otherwise at least one-third of the heat will escape.

Balsam-Wool blanketing should be a part of the heating equipment because it is *true* insulation—a heat *saver*. A full inch can be used at little or no additional cost because it makes possible a 25% saving in radiation. During occupancy, annual fuel reductions of from 25% to 40% are assured.

Balsam-Wool is *true* insulation because it is *flexible*—because it fits snugly into walls and roof—because it tucks into every crack and cranny—because it seals spaces around window and door frames. Obviously, this is the way to make a house heat-tight. Obviously, this insulation, thick and woolly, does what rigid types cannot do.

Before planning heating equipment, investigate Balsam-Wool. We will gladly furnish samples and technical data. We will gladly answer your questions.

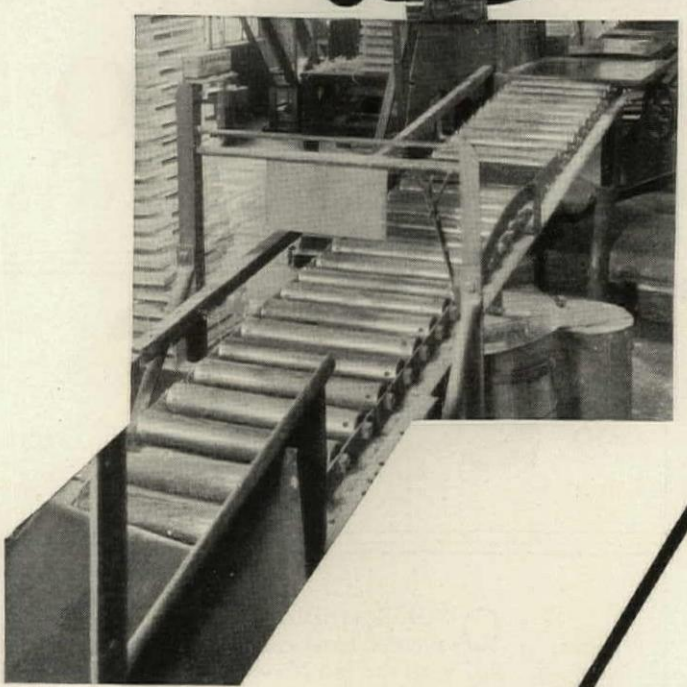
WOOD CONVERSION COMPANY
CLOQUET, MINNESOTA

Makers of Balsam-Wool, the Flexible Insulating Blanket. Also Makers of Nu-Wood—the ALL WOOD *Insulating Wall Board and Lath*

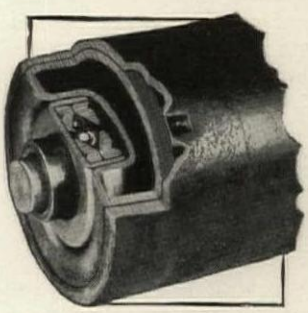
Sales Offices: New York, 3107 Chanin Bldg.—Detroit, 515 Stephenson Bldg. Chicago, 360 N. Michigan Ave.—Minneapolis, Baker Bldg.—Kansas City, 231 W. 47th St.—Seattle, 621 Liggett Bldg.

SOLD THROUGH RETAIL LUMBER DEALERS

Strength



Where it properly belongs



Here's a Reason

The Three-Point Bearing For Heavy Use

The Roller—2⅞ in. in diameter, heavy gauge steel ⅜ in. in diameter, steel balls, hardened by special process. 13/16 in. cold rolled shaft. Locked in frame, the size of which is determined by the load to be carried. Called a three-point bearing because the balls are in contact with the ball race at three points, thereby distributing weight and wear evenly and lengthening the life of the Conveyor.

IF you will investigate Standard Conveyors, all types, you will see in each certain features of construction. These features have made it possible for users to obtain dependable and economical service from their Standard Conveyor Systems regardless of the products or materials handled. Standard Conveyor Systems stay in operation because they are constructed properly. They make it possible to more efficiently apply and utilize man-power and floor space.

Let us tell you about the successful conveyor installations made for firms who had need for equipment similar to the needs of Y-O-U-R clients.

STANDARD CONVEYOR COMPANY

NORTH ST. PAUL, MINNESOTA

Baltimore Office, 15 W. Franklin St.
Boston Office, 755 Boylston Street
Buffalo Office, 908 Ellicott Square
Chicago Office, 549 West Washington St.
Cincinnati Office, 609 American Bldg.
Cleveland Office, 5005 Euclid Avenue
Dallas Office, 6313 Oram Street
Detroit Office, 420 U. S. Mortgage Bldg.
Kansas City Office, 1321 Union Ave.
New Orleans Office, 1003 Magazine St.
New York City Office, 420 Lexington Ave.
Philadelphia Office, 2401 Chestnut Street
San Francisco Office, 4401 San Bruno Ave.
Seattle Office, 321 Lumber Exchange Bldg.

The Electric Furnace-Man

(Patented Automatic Coal Burner)

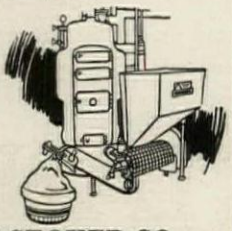
Safeguards the home with

UNIFORM—CLEAN—DEPENDABLE HEAT

THE ELECTRIC FURNACE-MAN insures protection, barring out fire-hazard, minimizing winter colds and other ailments, and further aiding health by providing UNIFORM HEAT—without smoke, smudge, dust or irritating odors.

This MODERN scientific achievement is a mechanical device which uses the economical Buckwheat or Rice sizes of ANTHRACITE. Brought to a high state of perfection—time-tested and proved in thousands of installations—this device is revolutionizing home-heating practice. It is giving home owners a new conception of AUTOMATIC HEATING EFFICIENCY—with absolute SAFETY.

The ELECTRIC FURNACE-MAN is available for the modest home as well as the mansion. For every heating system — warm air, steam, vapor or hot water. EXCELLENT FOR HOT WATER SUPPLY.



Labor-saving—no grates to shake —no drafts to regulate. Here is AUTOMATIC HEAT without hazard. Easily installed in a few hours and at a very reasonable cost.

Arrange now for your installation and insure next winter's comfort.

Patented product of DOMESTIC STOKER CO.

Domestic Stoker Co., 7 Dey Street, New York

I would like to hear more about this interesting system and have you arrange to show me one or more local installations.

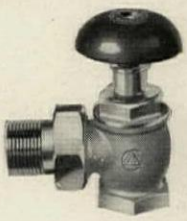
Name.....

Address.....

.....

Why *have so many* CONTRACTORS *standardized on* ARCO PACKLESS VALVES?

No. 999 Steam



No. 901 Water

OWNER satisfaction is necessary for your success. How can your customers be satisfied with the job if every year or so valves leak and have to be repacked? Why not give your customers the satisfaction of Arco Packless valves? They never need repacking and they are leak-proof. Owners will gladly pay the few cents extra cost for the protection of these quality valves. They will take Arco Packless every time when you explain how in the long run these valves actually cost less than the cheapest packed valve made.

The latest addition to the complete line of Arco Packless valves is the already famous 901 Hot Water Valve. The 901 is the only valve on the market that combines these three vital and exclusive features all in one valve.

PACKLESS—does away with the expense and trouble of repacking—complete protection against leaks.

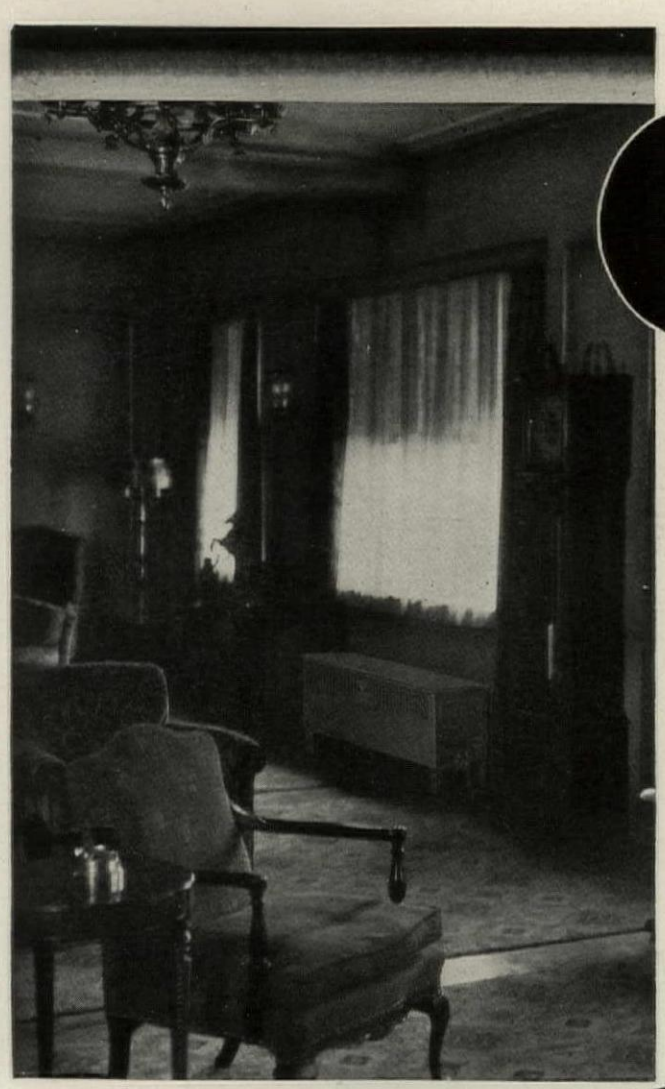
SWINGING PLATE—So designed that it acts as a cleaning tool—impossible for the valve to stick.

EQUALIZING FEATURE—Adjustable stop with indicator makes it possible to balance the job after installation and then set permanently, maintaining a perfect equalization of flow regardless of pipe sizes.

If you are not using Arco Packless Valves it will pay you to investigate this broad line of low-priced quality valves.

AMERICAN RADIATOR COMPANY

Makers of a complete line of VALVES, VENTS *and* REGULATORS



Quicker, CLEANER HEATING

—and at less cost with this Modern Radiator

The modern McQuay is *more* than an attractive radiator. It dispenses healthier, moistened heat quicker, with a decided fuel saving.

The tube and copper fin heating unit is the most efficient medium known for transferring heat. And the heated air is sent out **in a horizontal direction** with sufficient initial velocity to circulate it completely—heating rooms far more quickly and preventing soiling of walls and drapes.

Due to this complete circulation, and the greater heating effectiveness of moist air, rooms are kept comfortably warm with lower radiator temperatures—**materially reducing heating costs.**

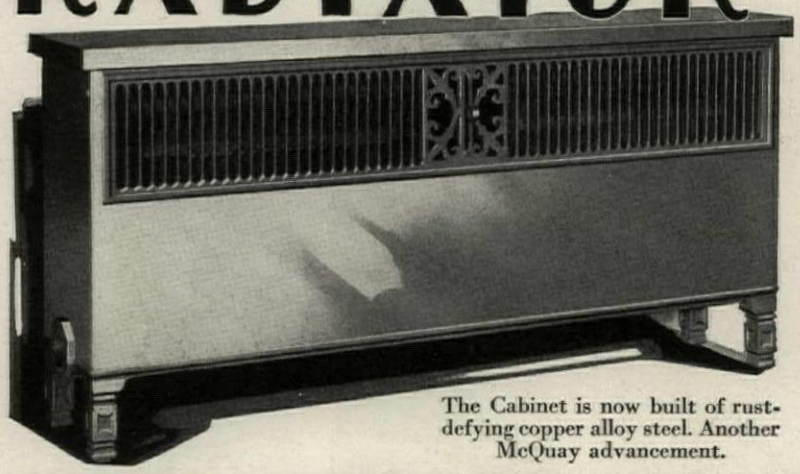
Honestly Rated

McQuay radiators are accurately rated. They will heat every bit of the capacity guaranteed by their catalog ratings.

Weigh Less—Occupy Less Space

A 50 square foot McQuay weighs about 75 pounds. You can tuck it under your arm. That cuts freight, handling and installation costs.

McQUAY Cabinet RADIATOR



The Cabinet is now built of rust-defying copper alloy steel. Another McQuay advancement.

McQUAY RADIATOR CORPORATION

General Offices, 35 East Wacker Drive, Chicago

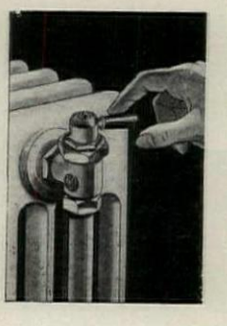
Branches in most principal cities

Your client's cheviot suit ... his wife's chiffon frock

— and *the heating specifications*

MODERN woman's scanty raiment brings the need for more heat in homes than is comfortable for wool-clothed men. Yet, even this new condition can be provided for in heating specifications. Many architects and heating engineers are specifying Hoffman Controlled Heat, – the remarkably flexible system created by adding Hoffman Controlled Heat equipment to any standard boiler and radiators, whether oil, gas or coal fired.

The modern secret of Hoffman Controlled Heat lies in its ability to deliver to each room as much or as little heat as its occupant desires, without effect on the temperature of other rooms. The heat output of each radiator is regulated *from the radiator*. Only as the call comes for more heat, does the supply of steam accumulate. There is no waste and therefore an amazingly low fuel consumption.



Hoffman Controlled Heat equipment comprises, (1) Hoffman No. 7 Modulating Valves for radiators, (2) Hoffman Return Line Valves, which automatically open for passage of air and water and close to steam, (3) the Hoffman Damper Regulator which automatically controls the draft, (4) the Hoffman Differential Loop which safeguards the water line of the boiler at all times and, (5) No. 15 Vacuum Valve that vents air and prevents its return to system through the vent port.

A request on your letterhead brings you a copy of the Hoffman Controlled Heat booklet, which explains all details. Address Hoffman Specialty Company, Inc., Dept. EF9, Waterbury, Connecticut.

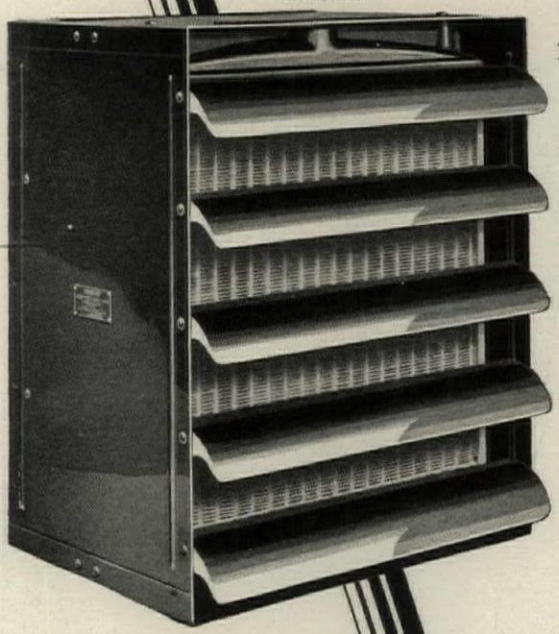
HOFFMAN

CONTROLLED HEAT

LOWER *heating costs*

LOWER *first costs*

LOWER *installation costs*



Heat with Unit Heaters

VENTURAFIN
TRADE MARK REG.

METHOD OF HEATING

YOU can heat more economically with the Venturafin Method of Heating. Here are the reasons:

1. Venturafin Units can be installed with fewer fixtures and fittings.
2. Venturafin Units force heated air directly where it is needed. They give positive heat control and eliminate wasteful heating of ceiling areas without first heating working areas.
3. Venturafin Units are adaptable to practically any position without loss of efficiency. They can be mounted on wall or ceiling with ordinary ¾-inch hanger pipes, an exclusive American Blower feature—or they can be used as a floor stand unit with a recirculating box. Venturafin Units are furnished with individually adjustable louvres which permit the forcing of heated air in any or several directions simultaneously.
4. Venturafin Units are practically indestructible. They are equipped with non-corrosive steam heating coils—the well-known Ventura fan manufactured by American Blower—and an electric motor made by the world's largest motor manufacturer—all housed in sturdy, die-formed, beautifully finished steel case.

There are many other reasons, too, why the Venturafin Units cost less to buy, install and maintain . . . why they offer unusual economies in heating factories, shops, stores, garages, and many other types of buildings.

Phone your heating contractor. He will be glad to tell you more about the Venturafin Method of Heating and to show you how you can materially reduce your annual heating costs. Or, mail the coupon. No obligation either way. (900)

The Venturafin Method of Heating for stores, salesrooms, factories, shops, garages and many other types of buildings.

COUPON

American Blower Corp.
6000 Russell St., Detroit

Please send me your 24-page Venturafin Book

*Name*_____

*Address*_____ *City*_____

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

American Blower

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

The Dunham Differential Vacuum Heating System

will furnish comforting warmth for the residents of Philadelphia's beautiful new apartments

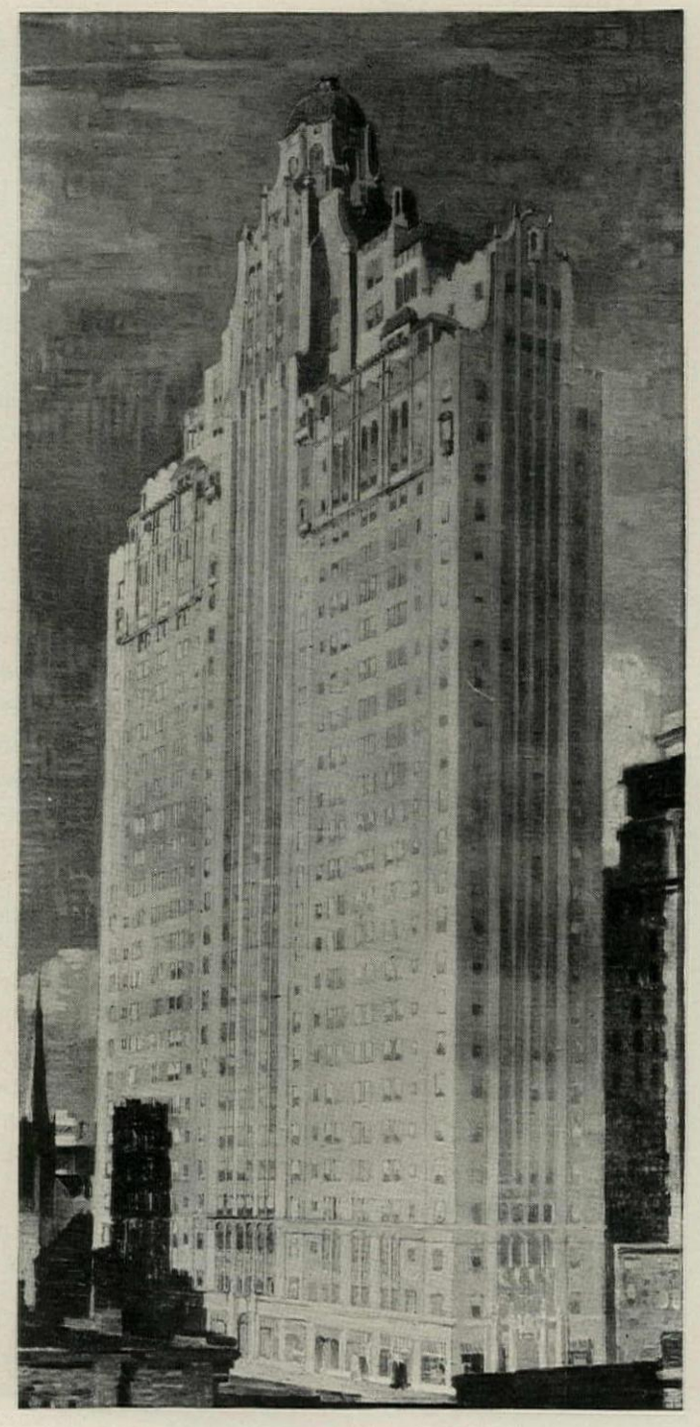
The Drake

Architect: Ritter & Shay
Consulting Engineer: Isaac Hathway Francis
Heating Contractor: V. N. Welamb Co.
General Contractor: Murphy Quigley Co.

IN Philadelphia, at Spruce Street, just west of Fifteenth, rises a new and beautiful apartment which Philadelphians will know as The Drake. In this monumental structure, towering high above every other edifice and making a most conspicuous addition to Philadelphia's skyline, will live those who seek a residence of distinction—the privacy of a home—the facilities and advantages of a modern hotel and the cuisine of a super-excellent cafe . . . Due to its location The Drake is convenient to railway stations, important shopping centers, office buildings, banks, theatres, clubs and churches. Suites are arranged in simplex and duplex, both furnished and unfurnished.

The Dunham Differential Vacuum Heating System is being installed. This is of material interest alike to the management and to the tenants. Steam, in the Dunham Differential System, is circulated under a vacuum throughout the whole system, the degree of vacuum determining how "hot" or "cool" the steam will be. This steam of varying temperatures insures large fuel savings for the management and healthful heat comfort for the tenant.

There is approximately 192,000 sq. ft. of rentable floor area with 40,461 sq. ft. of radiation, there being a total of 1,432 radiators.



C. A. DUNHAM CO.

DUNHAM BUILDING
450 East Ohio Street :: CHICAGO

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

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

Look for the name DUNHAM

This nameplate identifies a genuine Dunham Thermostatic Radiator Trap.

Another big New York building makes sure of *efficient, economical heating*

Bricken Textile Building
as it will look when completed
Bricken Construction Co., Builders, Owners and Operators.
Buchman & Kahn, Architects
Raisler Heating Co., Heating Contractors
Below is shown one of the three Fitzgibbons Boilers going into the building.
The Fitzgibbons is easy to handle, even where New York's traffic is heaviest.

The big new Bricken Textile Building, now rapidly nearing completion at 1441 Broadway in the heart of New York City, is equipped with a battery of three Fitzgibbons Steel Heating Boilers.

The Bricken Construction Co. owns and operates many buildings in New York and ranks among the city's largest and most successful builders and operators.

Contributing to its success is the Company's policy always to supply efficient heating. And Bricken Buildings are noted for their excellent heating conditions.

Naturally, in such large scale operations, success depends not only upon providing satisfactory heating, but also upon producing it at lowest cost.

It is significant, therefore, that the Bricken Company has selected Fitzgibbons Boilers for a large majority of their buildings and for nearly all of those erected during the past 5 years.

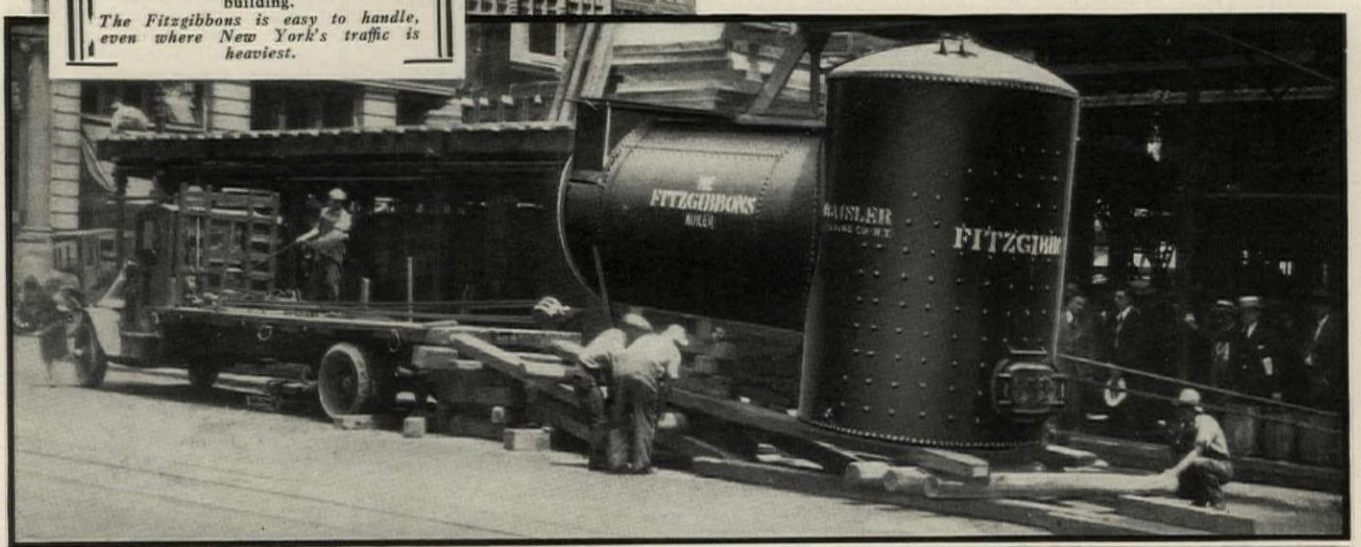
The reasons why any Fitzgibbons-heated building is sure to have efficient heating at lowest cost, are found in the superior combustion and the faster and more efficient heat transfer which are the natural result of clearly defined scientific advantages of Fitzgibbons Boiler design.

These features of design and advantages, including the exceptionally quick "pick-up" of the heating load, are fully explained in the Fitzgibbons Boiler catalog. A copy will be mailed to you, promptly, upon request. Tell your secretary to write for it.

FITZGIBBONS BOILER COMPANY, Inc.
570 Seventh Avenue New York, N. Y.
Works: Oswego, N. Y.

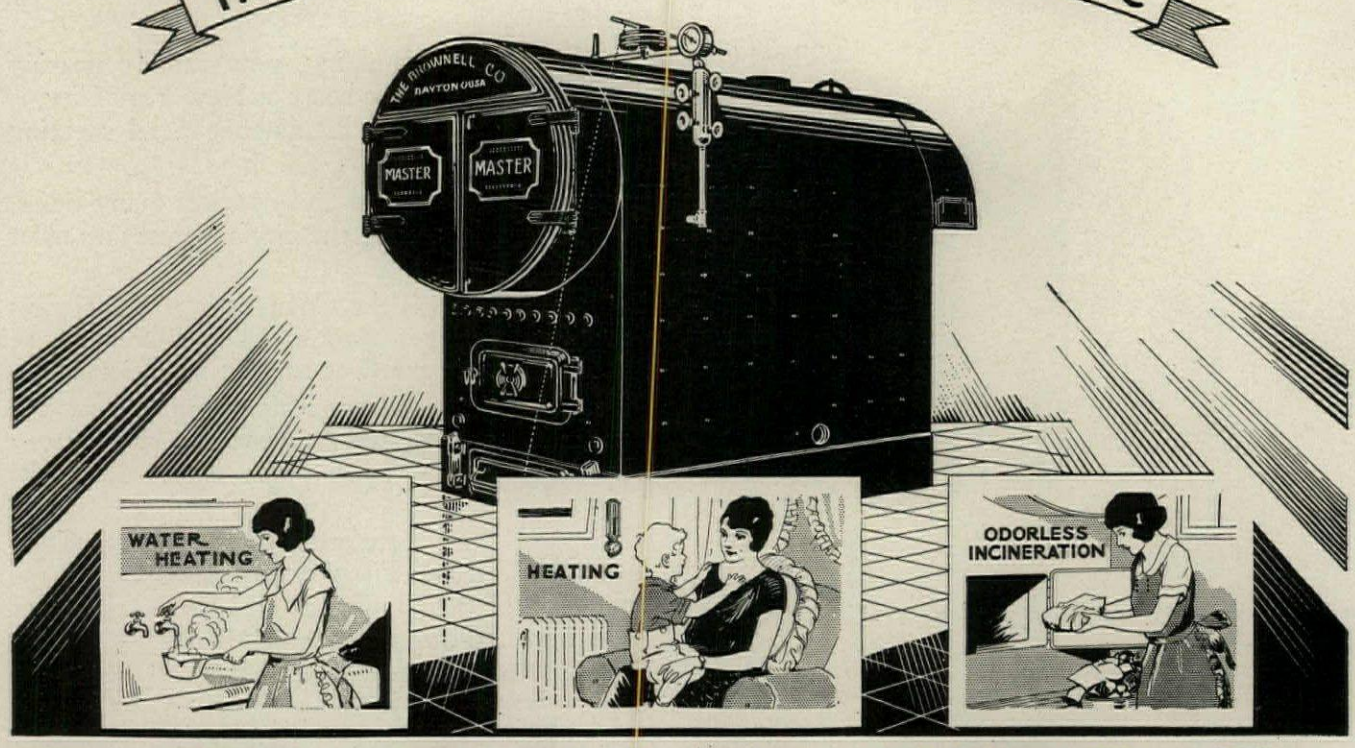
Branches and Representatives

Baltimore	Pittsburgh	Pittsfield	San Antonio
Bridgeport	Boston	Richmond	Reading
Detroit	Buffalo	Philadelphia	Rochester
	Syracuse	Winston-Salem	



FITZGIBBONS STEEL HEATING BOILERS

THE GREAT MULTI-FEATURE BOILER



BROWNELL

An Engineering Masterpiece

The matchless performance of the Brownell "Master" Heating Boiler is the strongest possible evidence of Brownell unrivaled leadership. Here is an outstanding boiler, possessing features that will save hundreds of dollars on the initial boiler room investment. A wonderfully efficient boiler---producing quick, comfortable heat; an all-season domestic hot water heater; and when oil-fired, providing an odorless incinerator; thus eliminating the cost of outside or separate accessories.

Nothing in modern manufacturing practice could be more efficient or more scientific than the precautions which Brownell takes to make sure of flawless quality and workmanship. Master-craftsmen produce completely all Brownell products in the great Brownell plant, where seventy-four years of boiler room experience dominate this dependable line.

Get Boiler Bulletin M-65

The Brownell Company, Dayton, Ohio

Established 1855 — Offices in Principal Cities.

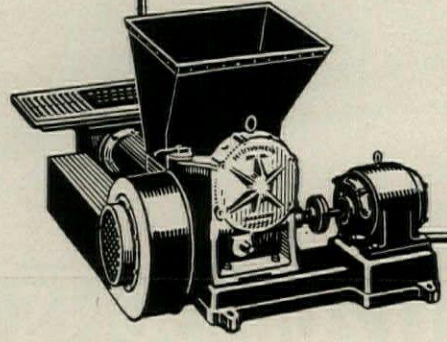
BROWNELL ELECTRIC WELDED STEEL BOILERS

BROWNELL AUTOMATIC UNDERFEED STOKERS

Automatically Controlled FIRING

and here again, Brownell engineering brings you added comfort and economy in perfect mechanical Firing of Furnace or Boiler at exactly the temperature you wish, regardless of weather conditions. Set the clock thermostat at the heat you want and the fire is regulated automatically, resulting in a steady even temperature and a saving in fuel of 15% to 50%.

(Send for Stoker Bulletin S-50)



Nave of St. Paul's Church looking towards the rear. Chestnut Hill, Pennsylvania.
Zantsinger, Borie & Medary, Architects. Isaac H. Francis, Engineer. P. Gormly Co., Heating Contractors

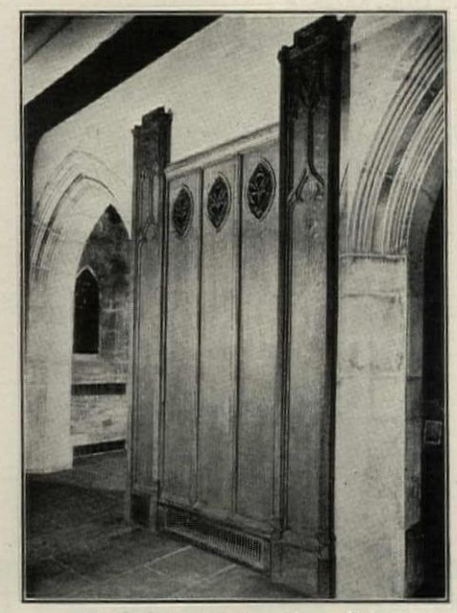
Heated by Hidden ROBRAS 20-20 Radiators

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

THE problem of heating a church has here been handled most intelligently. ROBRAS 20-20 Radiators are enclosed in the wall, out of sight, and out of the way.

ROBRAS 20-20 Radiators were used in the shallow space behind the wainscot and in the wall under the windows. Floor grilles admit the cool air, which when heated, is discharged from the ornamental grille at the top of each panel. This grille fits in exceedingly well in the decorative scheme.

Additional radiation was provided by enclosing ROBRAS 20-20's in the end walls. The heated air is discharged from vents such as are visible above the door.



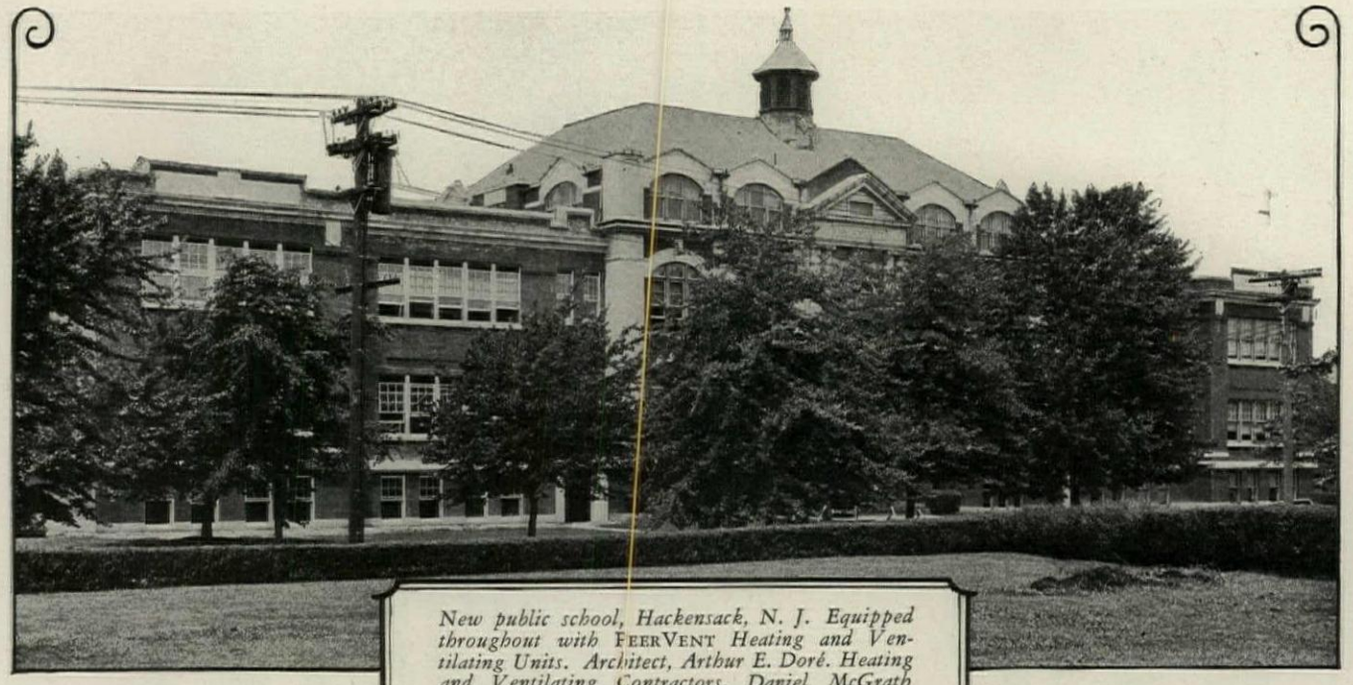
Method of using decorative grille in wainscot to conceal source of heat.

ROBRAS 20-20 Radiators so accelerate the circulation of air that the air directly under the roof and at the floor level are much more nearly the same temperature than it is possible with any other type of radiation.

Another advantage of this more rapid circulation is that the entire church is more quickly heated, once the heat is turned on. It is the flexibility of assembly of these radiators that makes it possible to use them in a place of almost any shape or size. They are adaptable.

Sweets catalogue, your A. I. A. File, or one of our offices can give you additional information.

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



New public school, Hackensack, N. J. Equipped throughout with PEERVENT *Heating and Ventilating Units. Architect, Arthur E. Doré. Heating and Ventilating Contractors, Daniel McGrath Company.*

1914 ▲ ▲ ▲ ▲ ▲ ▲ 1929

A public school in Hackensack, N. J., built in 1914, was equipped throughout with PEERLESS Heating and Ventilating Units.

A new Hackensack school building, recently completed, is equipped with our improved PEERVENT Heating and Ventilating Units.

Repeat orders like this one, over a period of fifteen years, are proof of satisfactory service.

PEERLESS Units installed eighteen years ago are still giving perfect satisfaction. The improved PEERVENT *Unit of today is backed by forty years of specialized experience in heating and ventilation.*

PEERLESS UNIT VENTILATION CO., INC.
Pioneers in Unit Ventilation
BRIDGEPORT, CONNECTICUT

Selling Agents in Principal Cities from Coast to Coast

PEERVENT

HEATING AND VENTILATING UNITS

UNIVERSITY CIRCLE, BALTIMORE, MD.

The Spencer equipped buildings in this picture are, left to right: University Church; Burford Apartment; De Sota Apartment; Geneva Apartment; Fenway Apartment; Eden Hall Apartment and Guilford Apartment.

A ring of facts set with figures for jewels

YOU, as an architect, are deluged with claims for building equipment and material. You have heard it said so often, that "architects everywhere prefer the so-and-so to any other" that it no longer makes a permanent impression upon your memory. Yet the simple truth is that when architects can once persuade their clients to try a Spencer Heater, in home, apartment, institutional or industrial building, more Spencers follow that installation.

Here in this picture of University Circle are figures to prove that fact. Nearly everything in sight in this picture is Spencer equipped. Seven of the buildings visible are marked. More are Spencer equipped, including several just out of sight. In more than one of these buildings, a Spencer replaced other forms of heating systems for greater efficiency, greater cleanliness and for economy. Mr. Thomas W. H. Abbot, of the Guilford Building Company, owners of the apartment house on the extreme right above, writes:

"I know of no better recommendation than our coal bills since and before installing Spencers. Our coal cost during the heating season of 1926 was $4,672.60. During 1927, the coal cost was $4,720.00 —we burned soft coal during this period. Since that time we have added to our properties. All of our properties, including the new ones, are now burning No. 1 Buckwheat coal in Spencer Heaters, and our coal cost during the heating season of 1928 was only $5,214.43. This was only an increase in coal cost over our lowest year of $542.00 and our added load amounted to 11,600 sq. ft. of radiation and tank heaters for domestic water heating 2,000 gallons of water.

"We therefore feel that we have saved fuel beyond all expectations and only wish we had listened to your story sooner. We no longer find it necessary for a night fireman, which also gives us a saving. We also contemplate a further saving, and that in maintenance on paints and wall paper. We shortly expect to erect an eight-story apartment, which will be Spencer heated."

Write for the newest Spencer catalog, showing cast iron sectional and steel tubular Spencers in sizes for any building from three-room bungalow to skyscraper. SPENCER HEATER COMPANY, Williamsport, Pa.

SPENCER
Magazine Feed
HEATERS
for steam, vapor or hot water

Here's the book

that takes out *all* of the guess-work and *most* of the figure-work in the selection and layout of Fan System Heat-Surface ~ ~ ~

COMBINING in one compact Bulletin complete Data on AEROFIN (LOW PRESSURE), AEROFIN (UNIVERSAL), and AEROFIN (HIGH PRESSURE),—the original service-proved, non-ferrous, encased Fan System Heat-Surface,—this thumb-indexed Book is as usable as it is useful. Extensive Tables of Final Temperatures and Condensations at various Steam Pressures, Physical Data, Sizes of Pipe Connections, Air Friction Tables, large Temperature Effects Charts on Linen, Notes on Thermostatic Control, and 23 Piping Diagrams in 4 colors, based on the long actual experience of AEROFIN users, among them America's most brilliant Engineers. A truly invaluable Book for your constant use. Your copy will be forwarded gratis upon request to Newark, on your business letterhead. *Ask for Bulletin F-99.*

AEROFIN (HIGH PRESSURE) 25 to 350 lbs.

AEROFIN (LOW PRESSURE) Up to 50 lbs.

AEROFIN (UNIVERSAL) 2½ to 150 lbs.

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

LIST UPON REQUEST

AEROFIN CORPORATION

850 Frelinghuysen Avenue, NEWARK, N.J.
11 West 42nd Street, NEW YORK

Burnham Bldg. CHICAGO
Land Title Bldg. PHILADELPHIA
United Artists Building DETROIT
Oliver Bldg. PITTSBURGH
Paul Brown Bldg. ST. LOUIS

An Announcement

And the Electrol Creed

The men who are directing Electrol's progress have a deep-rooted faith in the future of the oil burner industry. They believe that the prosperity and growth of each manufacturer and its dealer organization are built on two foundation stones—man-power and management.

In building trained man-power for its dealers, Electrol has established the most complete sales and engineering training courses within the burner industry.

In building management, Electrol has pursued the policy of building up the strongest possible management. It has sought and secured outstanding men of proved capacity in oil-burner research, design, manufacturing and merchandising.

Through its latest step in carrying forward this policy Electrol announces that:

LEOD D. BECKER, having disposed of his interest in *Fuel Oil Journal,* becomes President of Electrol Incorporated.

M. E. SIMPSON becomes Vice-President in Charge of Sales, following the recent acquisition of the Electrol Distributing Corporation, of New York, by Electrol Incorporated.

HAN A. KUNITZ becomes Chief of Research Engineering.

* * *

W. T. KOKEN advances from President to Chairman of the Board.

LIONEL L. JACOBS continues as Vice-President and General Manager.

LEWIS L. SCOTT continues as Patent Attorney and Consulting Engineer.

J. P. FEELEY continues as Assistant to the General Manager.

Executive and Sales Offices of the company will be located in New York City. The factory remains at St. Louis.

Under this leadership, Electrol's extensive program of sales expansion and engineering improvements, already under way, will be more intensively carried forward. This program, directed by this management, insures a wider lead for Electrol's position as the largest producer of quality burners. Actual shipments of Electrols this year already exceed last year by more than 60 per cent.

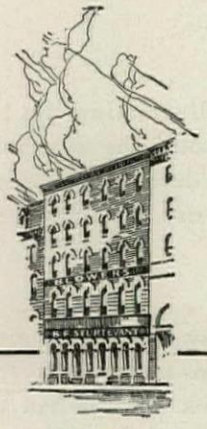
* * *

Electrol believes that discrimination between the sham and the solid, the superficial and the substantial, will be developed to a high degree in the burner industry during the year immediately ahead.

That which is unworthy carries its own punishment and its own penalty. Its true character is inevitably disclosed. When the "tumult and the shouting" die down, the strong man, the strong institution, the honest product, will be more solidly entrenched than ever.

This is HISTORY

. . . from five men to two thousand . . . from one floor to twenty-three acres



The First
B. F. Sturtevant
Plant

It is only a step back to the time when ventilating science was considered a fad. Fans and blowers had never been thought of. Most of the alloy steels of high tensile strength used in their manufacture were then unknown. Magnesium, vanadium, tungsten and manganese were laboratory curiosities.

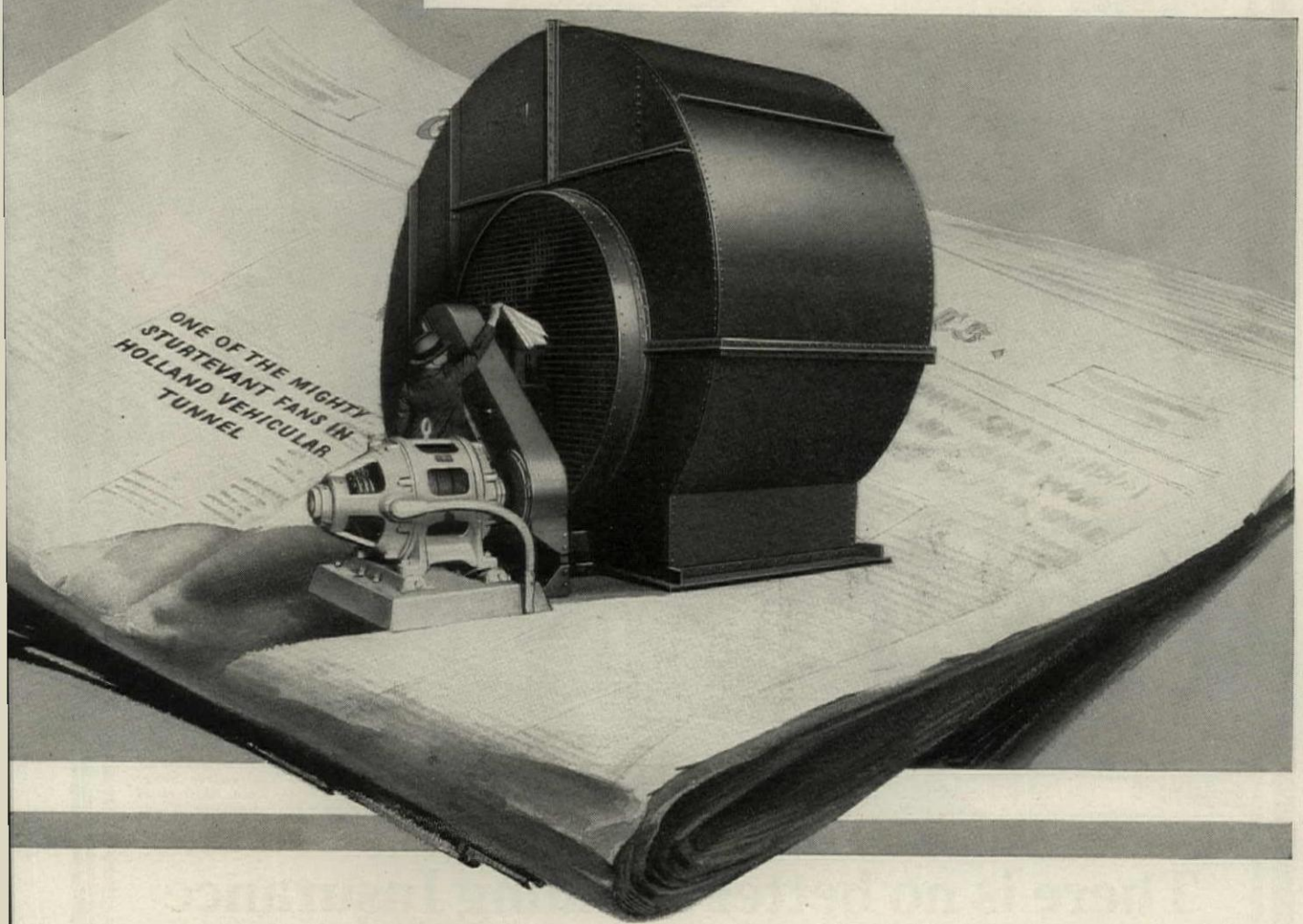
When Mr. Sturtevant built his first blower there was little demand for his apparatus!

But recognition of inventive genuis came surely and quickly. One of the earliest orders Mr. Sturtevant received was for a blower for the United States Capitol. That's History!

Sturtevant

REG. U.S. PAT. OFF.

This is NEWS



They say that an institution is the lengthened shadow of one man. This we know—that the power and personality of Mr. Sturtevant is still with us. "A lap or two in the lead" is still the motto.

. . . Sturtevant has just delivered the most powerful induced draft fan ever built. That's News!

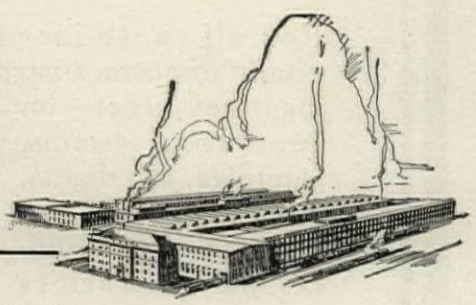
Sturtevant built the fans for the Holland Vehicular Tunnel under the Hudson River . . . for the George A. Posey Tube, connecting Alameda and Oakland, California . . . for the new Detroit-Canada Tunnel . . . for the New York Life Building.

And so it goes. History is the background. But *today's* success depends on today's ability to build apparatus that will win in the competitive markets of this very exacting age.

It will be a pleasure to send literature covering the latest types of Sturtevant ventilating equipment. Address our nearest branch office.

B. F. STURTEVANT COMPANY, Hyde Park, Boston, Mass.

Branch Offices in Principal Cities; Canadian Offices at: Toronto, Montreal and Galt.
Canadian Representative: Kipp Kelly Ltd., Winnipeg—Also Agents in Principal Foreign Countries



The B. F. Sturtevant Works, at Hyde Park, Boston, Mass., one of the Sturtevant Plants

HEATING-VENTILATING AND POWER PLANT EQUIPMENT

TONCAN

Replica of the Parthenon of Athens. Built 33 years ago for the Tennessee Centennial at Nashville. This building is now being restored at a cost of $500,000. Ten tons of Toncan Iron are being used for the heating and ventilating system.

Architects—Hart, Freeland & Roberts, Nashville, Tenn., Consultant Architect, William Bell Dunsmore, New York City. General Contractors—Foster & Creighton Co., Nashville, Tenn. Sheet metal Contractor—H. E. Parmer Co., Nashville, Tenn.

There is no better Building Insurance than Rust-Resisting TONCAN

ASK leading architects and contractors about Toncan Copper Mo-lyb-den-um Iron. They will be glad to tell you a few of the many ways in which this remarkable metal has saved them worry and expense.

For all those inconspicuous yet vitally important parts of the buildings they erect—for pipes, drains, ventilating systems, canopies, sky-lights, window frames, etc.—progressive builders and contractors specify this rust-resisting, anti-corrosive alloy of iron, copper and molybdenum.

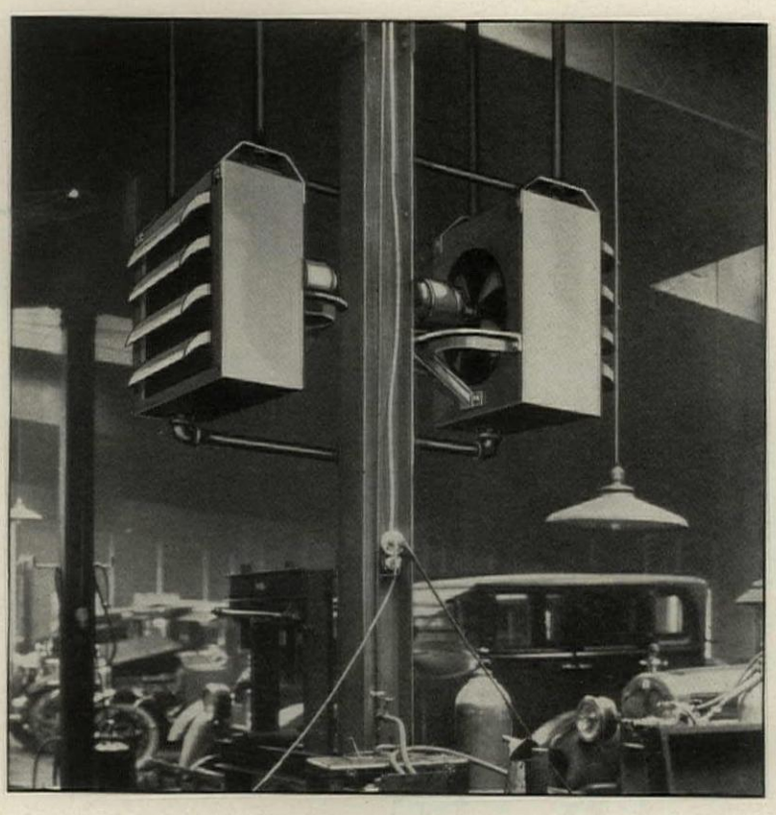
They know Toncan puts an end to repair and maintenance costs. They know that in specifying this famous material, they are giving their clients the best possible protection against undue deterioration.

Let us mail you a copy of the free booklet about Toncan Iron. Write to us.

REG. U.S. PAT. OFF.
TONCAN
COPPER
Mo-lyb-den-um
IRON

CENTRAL ALLOY STEEL CORP.
Massillon and Canton, Ohio

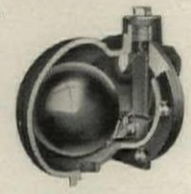
WORLD'S LARGEST AND MOST HIGHLY SPECIALIZED ALLOY STEEL PRODUCERS



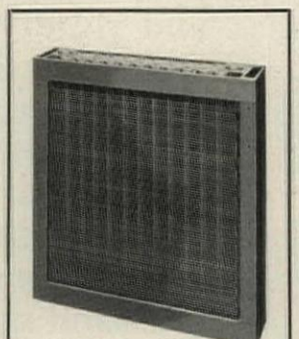
The First and Last Word in Unit Heating

TRANE

TRANE has developed a line of unit heaters which have become the choice of those who demand equipment which is engineered to perform consistently better and more economically. The Trane patented heating element is unique. There are no soldered, welded or brazed joints. The seamless copper tubes are rolled into headers like boiler tubes, a type of construction noted for extreme ruggedness. Smooth one piece, metal fins give an unusually high heat transmission ratio per unit of weight and also offer minimum resistance to the circulated air. Trane Unit Heaters are tested to a 350 lb. pressure.



Trane Float Drip Trap.



Trane manufactures Blast Heating Units, embodying the patented Trane Heating Element giving unusual light weight and compactness for a given heating effect.

Heat with Unit Heaters

The original cost of Trane Unit Heating is often below that of cast iron radiation. In addition to that, your fuel consumption is lower and you have a scientifically correct heating system which provides healthful and comfortable working conditions. When installed with outside air ducts, you have a year-round ventilating system which will meet the strictest regulations. There are 18 sizes and types of Trane Unit Heaters to choose from.

Floor Type Re-circulating Box.

For full information on Trane Unit Heating Systems, send the coupon.

HEAT CABINETS **TRANE** CONCEALED HEATERS

PUMPS, UNIT HEATERS, AND HEATING SPECIALTIES

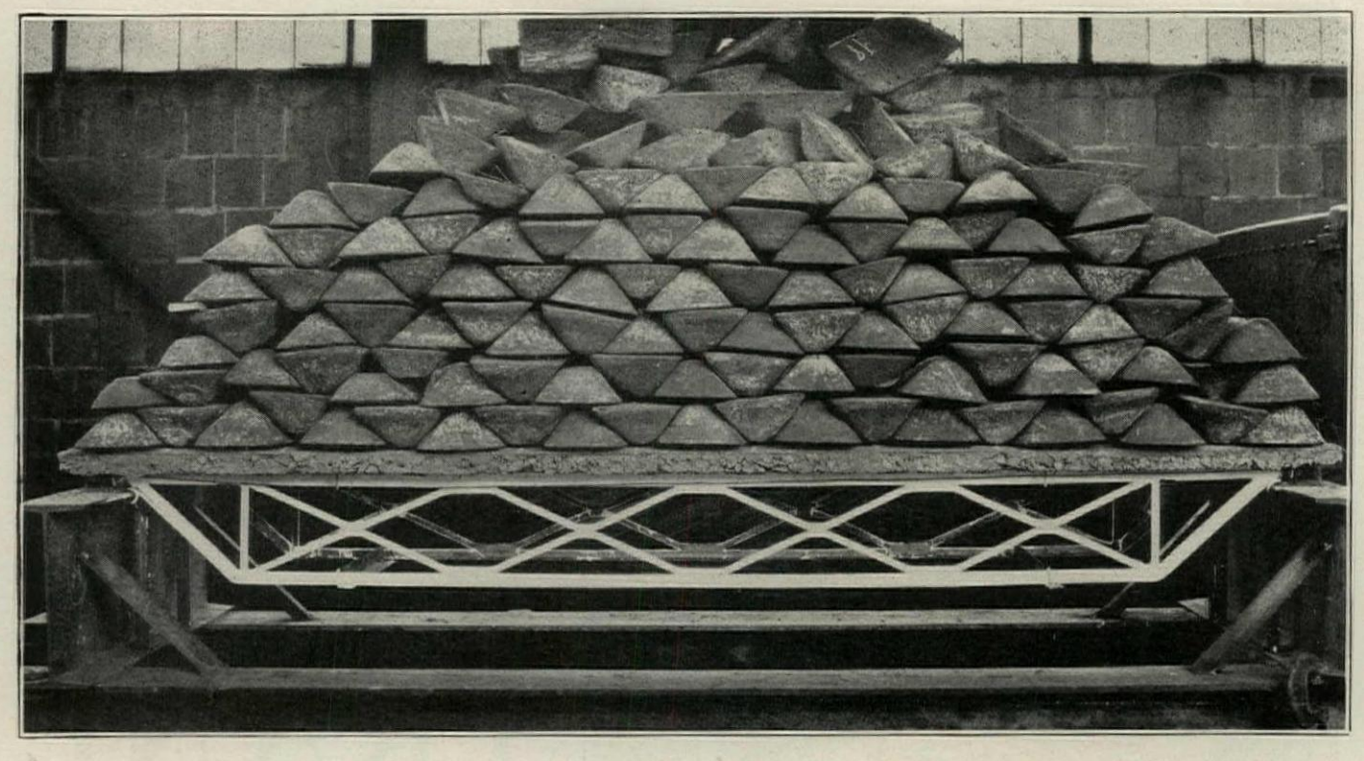
THE TRANE CO., Dept. 8,
212 Cameron Ave., La Crosse, Wis.

Send free booklet on "How to Cut Heating Costs."

Name_____

Address_____

City_____ **State**_____



Improved Floor and Roof Construction

Kalman Joists Under Failure Load

Clear Span .....9′-11½″
Dead load per joist.....505 pounds
Live load per joist.....12813 pounds
Total load per joist.....13318 pounds
Load at Safety Factor of 2.32

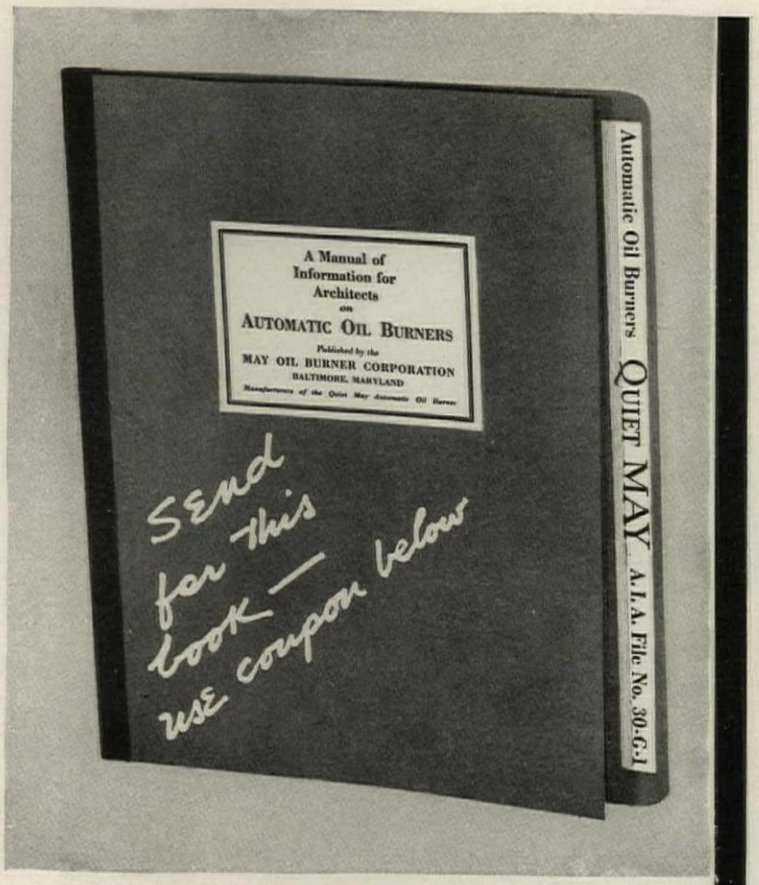
Here is one of the many reasons why the modern Kalmantruss Steel Joists meet with such universal approval. In construction, they are held in vertical position and rigidly braced with positive Kalmantruss Rigid Bridging — a bridging that assures the proper distribution of loads. Kalmantruss Joists, Kalman Rigid Bridging, Kalmanlath and the modern line of Kalman accessories offer many outstanding advantages for improving fire-safe floor and roof construction.

KALMAN STEEL COMPANY
Successors to Sykes Metal Lath Company

KALMAN STEEL

MODERN, FIRE-SAFE BUILDING PRODUCTS

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



THE ARCHITECTS' MANUAL ON AUTOMATIC OIL BURNERS

is a useful guide for any office that is planning buildings in which oil will be used as a fuel

It is of inestimable value to the designer and specification writer who wish to cover the details in connection with the installation of any approved make of oil burner. In addition to being a comprehensive textbook on oil burners, it contains a complete reprint of the Regulations of the National Board of Fire Underwriters, covering oil burners.

This Manual will be sent to you upon request. It affords you the opportunity of obtaining complete information on *oil as a fuel* in one well-edited manual.

AF-9-29

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

Please send me items checked below

☐ **Manual for Architects**
☐ **Book for Home-Owner**

Individual_____

c/o Firm_____

Street_____

City_____ **State**_____

MAY OIL BURNER
CORPORATION

3500 E. Biddle Street, Baltimore, Maryland

Ready for Concrete

One of the savings resulting from use of Havemeyer Trusses is ability to pour the concrete slab without formwork. Metal Lath is secured solidly and directly to the trusses, and the concrete is poured without need of further support. The saving in materials and labor is obviously very large. A fire-proof floor for residences such as this, reduces the fire hazard by more than half, for the largest percentage of fires originate in the basement.

Because of the demand for comprehensive data on the various uses of Havemeyer Trusses, Concrete Steel Company has produced a complete folio of 32 pages and 3 data sheets giving the most recent information. In requesting this book "Structural Economies for Concrete Floors and Roofs," please address Executive Offices.

HAVEMEYER TRUSS

Executive Offices

Concrete Steel Co.

42 Broadway New York

District Offices: Birmingham, Boston, Chicago, Detroit, Milwaukee, Minneapolis, Philadelphia, Pittsburgh, St. Paul, Syracuse, Washington.

These modern hotels --and many more

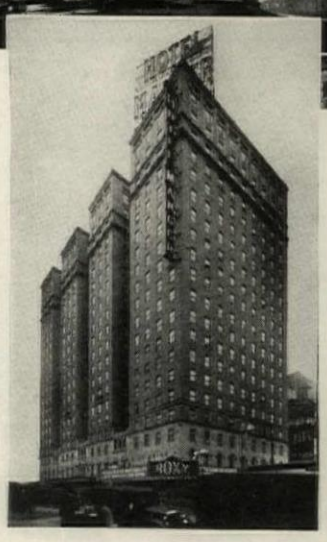
The Sherry-Netherland—*New York*

The Los Angeles-Biltmore

Barlum Hotel and Tower—*Detroit*

Left:
The Mark Hopkins
San Francisco

Above:
The Lord Baltimore
Baltimore



Above:
The Morrison
Chicago

Left:
The Manger
New York

Hotels in every important city of the United States and many foreign countries have Bethlehem Wide-Flange Structural Shapes—generally known as Bethlehem Sections—in their steel framework.

Bethlehem Sections are likewise being extensively used in the framework of industrial buildings, bridges, hangars, apartments, theatres, office and bank buildings, public buildings, and numerous other structures. Architects, engineers and contractors the world over have long recognized the light weight and the economy in cost of fabrication of these Wide-Flange Shapes.

With the introduction, about one year ago, of 33- and 36-inch Sections, Bethlehem further broadened the service of a famous series of shapes. Bethlehem Wide-Flange Structural Shapes—H-Columns, I-Beams and Girder Beams—are being rolled in all popular sizes on regular schedule at the Bethlehem, Pa., and Lackawanna, N. Y., Plants.

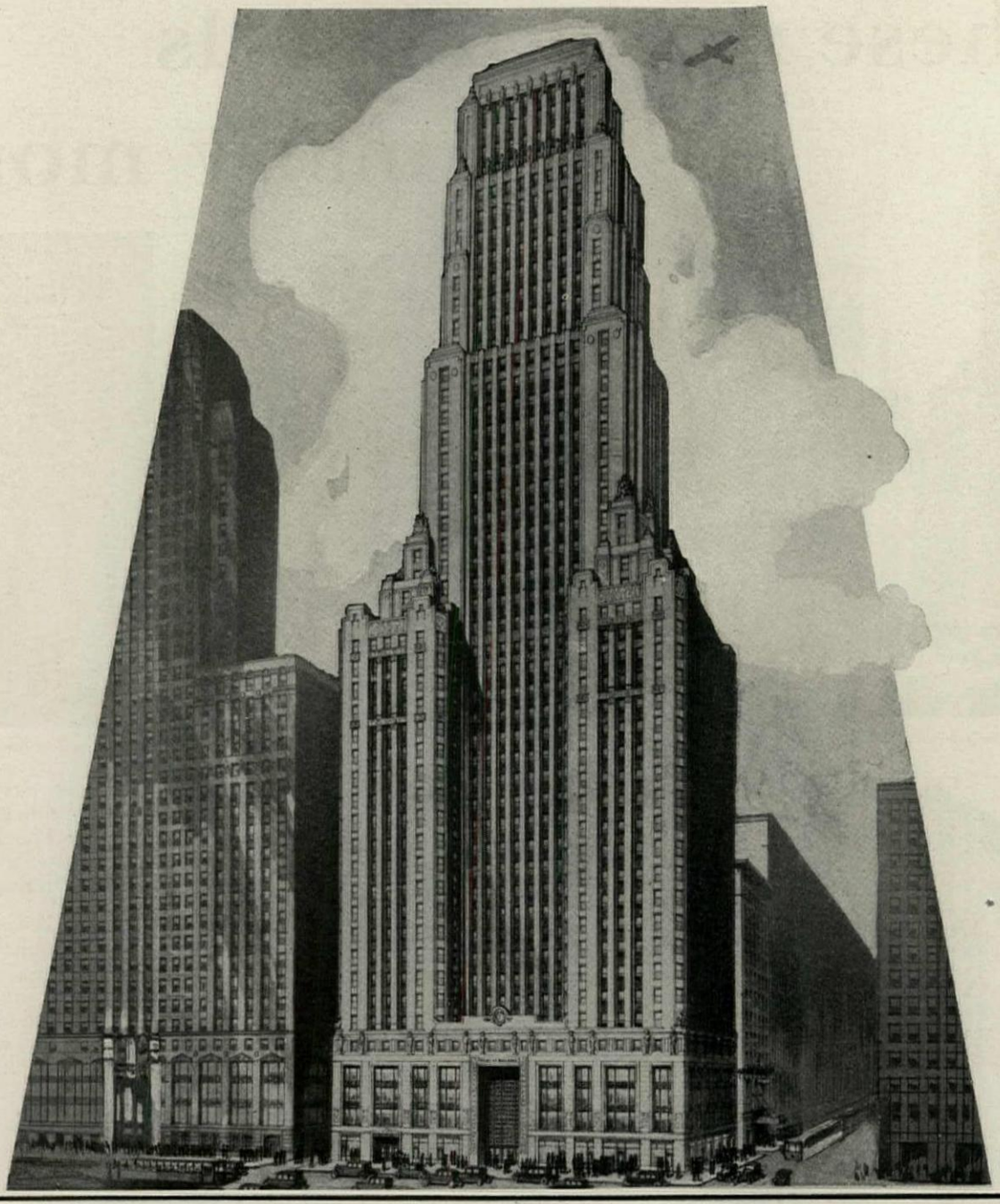
BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

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

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

BETHLEHEM WIDE-FLANGE STRUCTURAL SHAPES



Castles in the air are coming true

Years back, men dreamed dreams and saw visions . . . built into the air futile, chimerical castles beyond conception and possibility. Then came Steel! To lend its powerful sinews, its prodigious strength, to the realization of these dreams. Towering structures climbed into the sky—loftier and ever more defiant until now the gigantic reality dwarfs the imagination. Today it is a bold air castle indeed that can challenge the structural adaptability of Steel.

And Steel is ever augmenting its forces anew. The most recent addition to its ranks are Carnegie Beam Sections, bringing with them greater strength and efficiency, new economies, and boundless possibilities . . . .

Let courageous men dream on! . . . . .

Pictured above is the magnificent No. 1 La Salle Street Building, Chicago. K. M. Vitzthum & Co., Inc., Architects. James B. Black, Structural Engineer. John Griffiths & Sons Co., General Contractor. American Bridge Company, Fabricator. Carnegie Beam Sections were used in its construction.

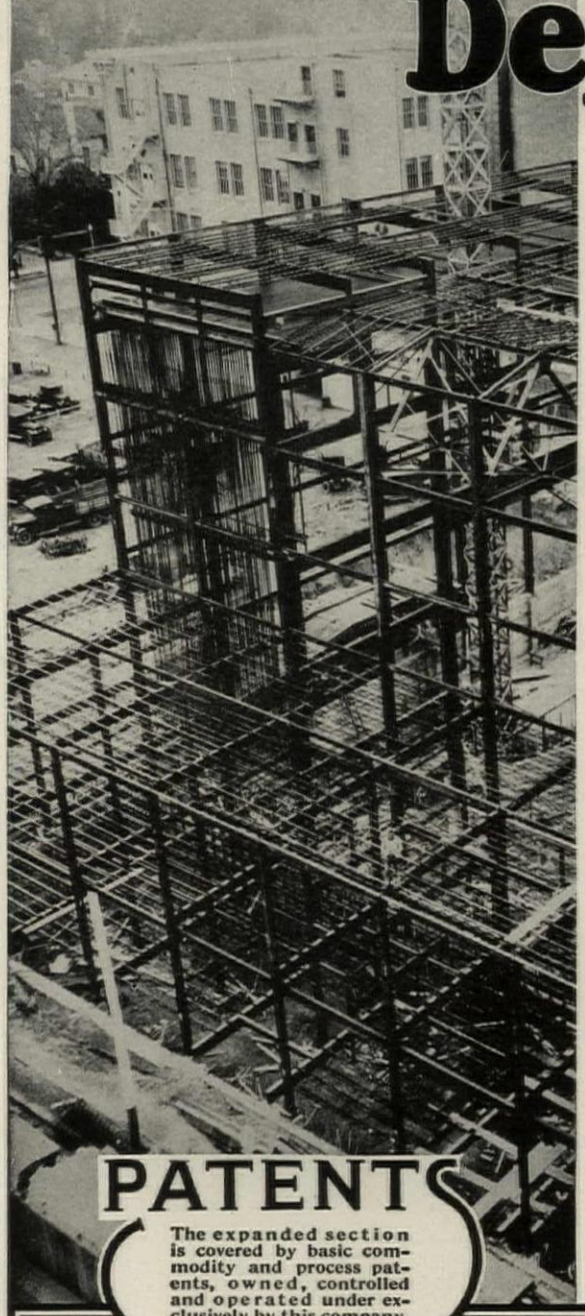
CARNEGIE STEEL COMPANY - PITTSBURGH, PA.

Subsidiary of United States Steel Corporation

28

CARNEGIE BEAMS

One-piece Gives Dependability



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.

BEST Bates Expanded Steel Truss Co.

PATENT

The expanded section is covered by basic commodity and process patents, owned, controlled and operated under exclusively by this company.

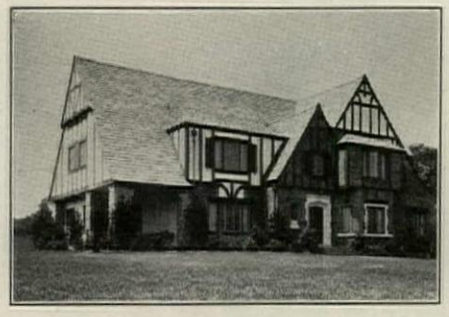
PANTAGES THEATRE, Fresno, Cal.
B. Marcus Priteca, Archt.
Earl B. Newcomb, Eng.

BATES-TRUSS JOISTS

Sales, Engineering and Executive Offices EAST CHICAGO, IND.

Successful builders of homes

capitalize the value of permanently



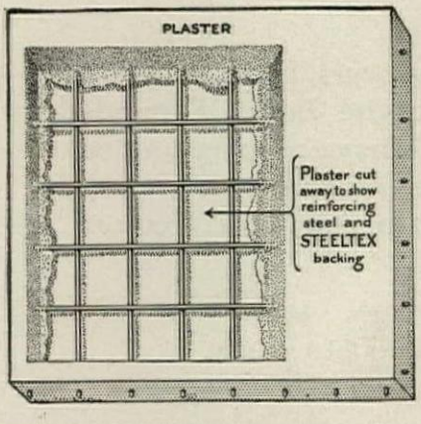
Concrete, brick, stone, sound timbers, and the NEW RIBBED STEELTEX for reinforcing plaster walls and ceilings make this home of Mrs. Frank Gaynor, Westchester-Biltmore Country Club, Rye, N. Y., as permanent as it is beautiful. One of eight houses built or under construction by Thomas W. Gotti, 506 Main St., New Rochelle, N. Y., in each of which lasting wall-beauty is assured by the NEW RIBBED STEELTEX. Richard W. Buckley, Mamaroneck, N. Y., architect.

STEELTEX is adapted to safeguard plaster walls and ceilings in homes of modest proportions, as well as in the most elaborate structures. Witness this attractive moderate-priced home of Mr. Oscar J. Nollett, Roosevelt, L. I., N. Y., designed by Louis J. Day, Floral Park, L. I., architect. It is reinforced throughout with the NEW RIBBED STEELTEX, for permanently beautiful plaster.

This charmingly designed home at 11 Cranford St., Forest Hills, L. I., is the tenth STEELTEX-reinforced job built—and sold as fast as completed—by Guyon L. C. Earle, Inc., Forest Hills. The NEW RIBBED STEELTEX reinforces its interior plaster with a welded fabric of rust-proofed steel, on guard against all strains. The architect is Lawrence Elliott, New York City.

7 reasons why the investment builder likes the New *Ribbed* Steeltex

1. It makes plaster a lifetime material.
2. New V-rib stiffener produces level lathing job of boardlike rigidity.
3. Slab of uniform thickness assured—smooth in front as well as back.
4. Furring device assures embedment of reinforcing steel.
5. All plaster functions in the slab—no waste in keys or hangovers.
6. Plaster applies easily and stays put.
7. Reinforced plaster now economical enough for any home.



WHAT IS REINFORCED PLASTER? — Reinforced plaster is plaster strengthened with embedded STEELTEX. Protecting against strains in all directions is a network of rustproofed steel. Attached to the steel is a tough absorptive fibrous backing. When plaster is spread, it slides under the steel network, smooths out against the backing, and then additional plaster is spread over the steel. The resulting plaster slab is smooth in back as well as in front, with the steel embedded between. Thus the principle of *embedded steel*, that is used to strengthen great concrete structures, has been brought within easy reach of the every-day home of even the most modest proportions.

Buyers seek Wall-Beauty— Insured with the New *Ribbed STEELTEX*

These shrewd investment builders are profiting from the fact that plaster on walls and ceilings can now be made a permanent building material that adds to sale values!

Your prospects, like theirs, will be immediately interested in the greater economy and value of beautiful plaster permanently strengthened against strains with the NEW RIBBED STEELTEX.

The NEW RIBBED STEELTEX is the result of more than eight years of effort to bring reinforced plaster construction to even the most modest home. It is a plaster base consisting of welded steel fabric and a tough, fibrous backing. The new features include a V-rib stiffener that brings board-like rigidity and a heavier, absorptive backing to which the plaster clings tight.

Our free book, *Better Walls for Better Homes*, gives full information about the economy and lasting value of reinforced plaster, which STEELTEX alone can provide. Write for a copy.

National Steel Fabric Company

DIVISION OF
Pittsburgh Steel Co.

3609 Union Trust Bldg. Pittsburgh, Pa.

the New *Ribbed*

STEELTEX

"BUILDS LIFETIME WALLS AND CEILINGS"

and modern apartment houses
reinforced plaster walls and ceilings

In this attractive modern apartment house at Woodmere, L. I., N. Y., all plaster adjacent to exterior walls, and certain other plaster surfaces where conditions are most severe, are reinforced by the NEW RIBBED STEELTEX. Architect, William L. Rouse, 2 W. 43rd St., New York City; owner and builder, Farwood Realty Co., Far Rockaway, L. I., N. Y.

The NEW RIBBED STEELTEX adds permanently beautiful and permanently valuable plaster walls and ceilings in these modern apartments, constructed at moderate cost, 94th and Polk Ave., Elmhurst, N. Y. The owner and builder, Thomas Guidera, Elmhurst, N. Y., has built throughout for tenant satisfaction.

Washington Irving Gardens, Tarrytown, N. Y. in which all interior plaster is reinforced by STEELTEX. Mt. Pleasant Realty Corporation, owners and builders; Margon and Holder, New York City, architects. The NEW RIBBED STEELTEX makes plaster a permanent building material.

Investors find real profits in economy of the New *Ribbed STEELTEX*

Progressive builders of apartment houses have adopted the NEW RIBBED STEELTEX because they find it profitable. Tenant satisfaction from beautifully finished plaster walls and ceilings is but one result of its use.

Lathers and plasterers like the NEW RIBBED STEELTEX because it works well and is rapidly applied. The job is finished sooner and to the owner's greater satisfaction.

There are no upkeep costs on plaster walls and ceilings that are reinforced with the NEW RIBBED STEELTEX.

The building costs less to operate when this scientific plaster base is used because the heavy backing adds heat insulating value to walls and ceilings—also sound-deadening.

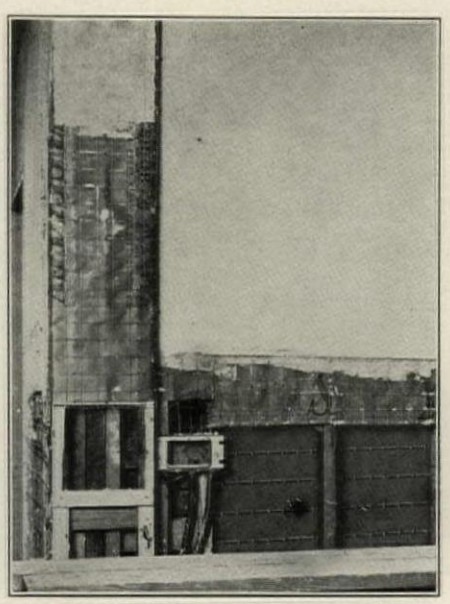
The initial investment is low, for RIBBED STEELTEX adds nothing to the cost of the finished wall, while producing a superior and more permanent job. These economies have resulted in an enthusiastic reception of the NEW RIBBED STEELTEX by experienced builders throughout the country.

Write for complete information about RIBBED STEELTEX and other members of the STEELTEX family, including STEELTEX for Stucco and Overcoating, STEELTEX for Brick and Stone Veneer, and STEELTEX for Floors and Roofs (concrete and gypsum).

the New *Ribbed*
STEELTEX
"BUILDS LIFETIME WALLS AND CEILINGS"

Four economies of the New *Ribbed* Steeltex

1. Low first cost—lathers and plasterers like it, and work is rapidly finished.
2. No upkeep costs—plaster reinforced with RIBBED STEELTEX takes on new strength.
3. Reduced operating costs—the heavy backing adds heat insulating value—also sound-deadening.
4. Tenant satisfaction—through permanently beautiful walls and ceilings.



REQUIRES NO NEW APPLICATION METHODS—Plaster goes up easily on RIBBED STEELTEX with long, smooth sweeps of the trowel. The level, rigid sheets save mud on the scratch coat and assure even thickness of plaster slab with uniform reinforcement. Note fibrous, absorptive backing, furred-out steel reinforcing fabric, and new V-rib stiffeners on back of sheet.

REVIEWS OF MANUFACTURERS' PUBLICATIONS

THE OIL HEATING INSTITUTE, 342 Madison Avenue, New York. "Your Guide to Oil Heating Satisfaction."

During the last few years there have grown up a number of associations composed of manufacturers of certain building materials or utilities, formed for the purpose of carrying on research likely to benefit all the associations' members. Such an organization is the Oil Heating Institute which, according to this recently issued booklet, "was founded by leading manufacturers of oil heating equipment for the purpose of establishing the highest standards of design and heating service, and for increasing the general knowledge of oil heating. The Institute carries on impartial research and educational work and serves as a central bureau of information on oil heat." This publication, which is in brochure or booklet form, is devoted to illustrating and describing the oil-heating or oil-burning equipment supplied by the Institute's members. Each page is devoted to the output of some one firm, the members being given this publicity in alphabetical order. The illustrations, while necessarily few, are calculated to give an architect, a builder or a home owner an excellent idea of the workings of the apparatus in question, and the arrangement of the printed data in paragraphs is such as to readily explain the matter.

TRANSIT MIXERS, INC., Call Building, San Francisco. "Concrete Facts." A booklet for architects and engineers.

As is well known by every architect, engineer, contractor or builder, success in using concrete depends upon giving proper care to its mixing and pouring. Modern research and investigation into the properties of various building materials have been keen and thorough, but in regard to no material has the research been carried out with more care than in regard to concrete. One result of all this is that both mixing and pouring have been so reduced to rules and formulæ that provided the ingredients are what they should be, there is now little, if any, excuse for building with concrete which fails to give the wear for which it was intended. The production of uniformly high quality concrete is dependent upon: (1) proper provision for accurately measuring aggregates and cement; (2) complete dry mixing of aggregates and cement; (3) a system for accurately measuring and adding an exact quantity of water, and a provision to insure a complete mixture of the whole; (4) a system of operations that will insure delivery of the completed mix exactly where, when and in the quantity wanted without segregation; (5) then a method of mixing while discharging that delivers the mix in perfect form for work, either in stiff or wet mix. Years ago there came into use upon large operations the machines for mixing concrete,—machines so powerful that they could do and do thoroughly work entirely beyond the ability of workers who used old-fashioned methods,—and like everything else having to do with concrete building, these machines have been improved and then improved again until, like some of the modern apparatus for heating, they seem to be "almost human." This booklet deals with the "Paris Transit Mixer," which consists of a revolving drum, constructed to be mounted on a truck, deriving the power for rotating and tilting the drum from the truck motor. This drum is cylindrical in shape, having a cone or apex end, for receiving the components and discharging them, mixed. The inside of the drum is provided with a series of baffle plates and bars that insure a complete distribution of the mix as the drum rotates. Water tanks, consisting of one main tank and one reserve tank, are installed at the top of the mixer. The water is sprayed through a feeder pipe in the center of the drum, and the volume is automatically controlled. Paris Transit Mixers are built in sizes to suit standard makes of trucks and have capacities varying from two to five yards. A size to meet the requirements of all weight restrictions as well as the needs of any community is thus supplied. Architects who have been distressed by the delay on concrete work caused by cold weather will be interested in this paragraph on page 14 of the brochure: "There is no longer any need to discontinue concrete construction during the winter months. You can deliver hot concrete during freezing weather and open up a great field heretofore always closed."

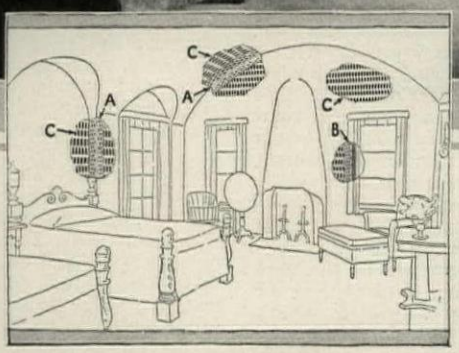
FEDERAL CEMENT TILE COMPANY, 608 S. Dearborn St., Chicago. "Featherweight Concrete Insulating Roof Slabs."

The ingenuity of manufacturers together with extensive research into the nature and possibilities of certain building materials produces many materials which are new and invents new uses for materials which are old. This is particularly true of concrete, a material which is almost literally as old as history, but now so well studied and thoroughly analyzed that there have been overcome certain qualities or characteristics which have hitherto prevented its use for certain forms of building. This brochure deals with the use of concrete for roofing. Years of research and development in the study of both roof slabs and the steel frame to support them, have created through the Featherweight Insulating Concrete slab an ideal in overall economy. The design of this slab represents the most advantageous distribution of the concrete. It is available for long spans (made to fit purlin spacing). The slab weighs 10 pounds per square foot for spans up to 6 feet, 8 inches. For longer spans, the weight varies,—for example, an 8-foot slab weighs 12 pounds per square foot. This not only permits fewer steel purlins, but lighter purlins as well, The result is a structural steel frame of the lightest possible weight and cost, consistent with the strength and service essential to good roof construction. It is a significant fact that Featherweight Concrete Slabs usually require no heavier steel design than any other roof material available today. The added value of the concrete deck in permanence, fire-safety, saving in maintenance, now makes it the one logical choice of architects, engineers and owners.

EXCHANGE SAWMILLS SALES CO., Kansas City. "Beautiful Floors of Low Cost, Unsurpassed Durability."

Floors, particularly in residences, seem to be vastly more important today than they were before the custom of using rugs or the custom of leaving the floors bare came into vogue. At present careful architects and builders and particular housekeepers give considerable attention to floorings and to the wood which is so often used for them,—a matter of importance, since in addition to being of reasonable cost to begin with, they must present an attractive appearance and at the same time be sufficiently durable to withstand the hard wear to which floors are nearly always subjected. "Here fits in long-cherished Southern Pine, dealt with in this booklet, for more than one hundred years the dependence of builders almost the country over, not alone for its structural qualities, but for its natural beauty of grain, as well. Many an old-time floor still serving the home owner is built of Southern Pine, because among its foremost qualities are those of durability and unsurpassed length of service. This company takes carefully selected Southern Pine trees and from the heartwood itself, long known as the most beautiful and durable section of tree, makes its All-Heart Premium Brand Edge Grain Flooring, a flooring that has had the endorsement of large and small builders in practically every section of the country. Beginning with the very best quality of wood available, the company's policy of production requires the most minute attention, by skilled men, to every detail of manufacture. After more than 30 years of experience, these men are well fitted to supervise the production of this flooring so that the buyer gets a dollar in value for every dollar he spends. Accuracy of manufacture is, perhaps, a no greater requirement in lumber manufacture anywhere than in the production of flooring. The beauty of floors is dependent a great deal upon the perfect fitting of side and end joints in the floor, which in turn must depend to a great extent upon the accuracy of manufacture of the flooring. The most careful supervision is given to this phase of manufacture. Proper seasoning, too, must be carefully done according to long established standards, so that the flooring may be shipped in the best possible shape, with proper moisture content, and go to the building with every advantage of well seasoned flooring. In huge dry kilns, minutely regulated as to temperature, All-Heat Premium Brand Edge Grain Flooring is seasoned and made most highly useful and dependable. Through all of the processes of manufacture this all-heart flooring has the personal supervision of the plant manager, aided by other men long experienced in the production of the highest type of flooring."

MILCOR PRODUCTS keep walls permanently beautiful



THE many structural advantages of *Milcor* Metal Lath, Expansion Corner Bead and Expansion Casing place them among the most practical and economical of all modern building materials. Beautiful walls formed on these bases of enduring metal remain permanently free from defects.

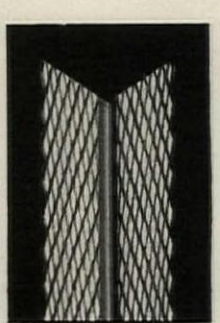
Milcor Stay-Rib Metal Lath represents the most advanced development in an expanded metal plaster base. It has great rigidity and strength due to reinforcement with longitudinal ribs. Its mesh pattern is so formed that the slightest pressure of the trowel completely imbeds it into the plaster. It provides maximum protection against cracks.

Milcor Expansion Metal Corner Bead and Casing have patented expanded metal wings extending back from the actual corner or metal moulding . . providing an ideal key and reinforcement for the plaster . . Strains, blows and shocks are cushioned and absorbed without danger of cracking or chipping the plaster.

Specify *Milcor* Products for permanence and fire-safety. A *Milcor* Manual will be sent you upon request.

MILWAUKEE CORRUGATING COMPANY
1405 Burnham Street **Milwaukee, Wisconsin**

(B) *Milcor* Expansion Metal Casing is also distinguished by the expanded metal wing . . . This wing provides a secure bond and key for the plaster around doors, windows and other wall openings where settling and resulting cracking of plaster often occurs.



(A) *Milcor* Expansion Corner Bead is distinguished by its expanded metal wings . . . This feature . . . a *Milcor* patent . . . makes a perfect grip upon the plaster and prevents chipping or breaks at corners.

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

MILCOR PRODUCTS

Ingot Iron

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

Copper Alloy Steel

REVIEWS AND ANNOUNCEMENTS

THE JOHN VAN RANGE CO., Cincinnati. "Planning Restaurants That Make Money." A good work on the subject.

The opening of a successful restaurant, lunch room, cafeteria, or eating place of any sort presupposes the solving of so many problems that a prospective owner may well take account of all data available on the subject,—problems connected with location, amount of floor area, amount of rental demanded etc.,—and only when these and some other more or less related problems have been disposed of does there come consideration of planning, changes in construction, equipment, etc., which concern both the owner and the architect handling the commission. All this has been made the subject matter of an extremely valuable booklet issued by this widely known concern, a division of the Albert Pick-Barth Company, Inc. The booklet has been prepared for the John Van Range Co. by Messrs. Taylor, Rogers & Bliss, specialists who have made a study of problems involved in the planning, equipment and operation of hotels and restaurants. It is a complete and adequate work on the subject.

"Before you, who are opening a new restaurant, have gone too far with your plans, we suggest that you pause to take a good, square look at the restaurant business, and by recognizing some of the troubles of your predecessors, take advantage of their experience and see to it that in your own business these dangers will be reduced to the point of ordinary business risks. Two facts should be recognized about the restaurant industry, first that it is keenly competitive, and second, that it is a business which has shown a rather high percentage of failures. These two facts do not mean that the restaurant industry is not naturally profitable, but they do indicate very plainly that restaurants are profitable only if wisely planned and intelligently operated. How important this is may be judged from the results of a recent survey which revealed the fact that 50 per cent of all restaurant failures were the direct result of inexperience and incompetence. Other causes were lack of capital, bad location, high rent etc., and to a large degree these too can be traced back to inexperience and faulty judgment.

"There has been a great deal written in recent years about the elements which make for success in restaurant operation, and much of this advice comes from men whose knowledge of the restaurant business is exhaustive and whose understanding of its difficulties is keen. The effect of this thought on the industry is certainly apparent to anyone who compares the character of the average restaurant today with that which existed a number of years ago. In these writings, however, it is noticeable that most of the attention has been given the problems of restaurant operation, and relatively little to those which confront the man who is just going into business. We, who have been continually in contact with new restaurant projects, are so impressed by the need of more thoroughness in the early forming of plans that, for purposes of reminder, we feel it will be helpful to give a brief list of the factors which determine the chances for success of a new restaurant. Now, let us call your attention to the fact that the majority of decisions which must be made in the organizing and preliminary planning of a restaurant cannot be changed later even if they are found to be wrong. If your cooking is bad, you can improve it; if your service is unsatisfactory, your food cost too high, your purchasing or management unwise,—they are all things which can be corrected as soon as the difficulties appear. But,—when you settle on the kind of restaurant you are going to operate, the location it will occupy, the premises you will rent, the improvements you make on the building, and the type and arrangement of equipment you install, you have made permanent decisions, and if they prove to have been unwise, the cost of correcting them is generally almost prohibitive. Because of this fact, our sincere advice to the man who is opening a new restaurant is that he should take ample time and should secure experienced counsel to assure himself that these vitally important matters are settled with real business foresight. From our experience in observing the operation of thousands of restaurants, we can say positively that the degree of study given to these first problems is the truest gauge of profitable restaurant operation. The success of large chain operators is only in part the result of their efficient management,—it is due in no less a degree to the excellent judgment which they have used during the crucial period of the early planning of their new units." As might be expected, the work is replete with excellent illustrations.

Margon & Holder have opened new offices at 18 East 41st Street, New York. Publications are desired.

Isaac Hellerman announces the opening at 101 Park Avenue, New York, of an office for the practice of structural engineering. He is associated with Ben H. Krey, Mechanical and Electrical Consulting Engineer.

Announcement is made by Sylvan Bien and Harry Prince of the formation of a firm for the practice of architecture under the name of Bien & Prince, at 415 Lexington Avenue, New York. Catalogs and other publications of manufacturers will be appreciated.

A Statement. Regarding an advertisement in THE ARCHITECTURAL FORUM of May, 1929, we have been advised by the Widmer Engineering Company that the St. Louis University High School Building was originally designed by Barnett, Haynes & Barnett, architects, and that the Widmer Engineering Company reconstructed the building in 1927, at which time The Philip Carey Company put on a new roof over practically the entire roof area.

CHICAGO PUMP COMPANY, 2300 Wolfram Street, Chicago. "Useful Information and Miscellaneous Tables."

Modern building sometimes seems to involve rather more of engineering than of architecture. Particularly since there came the use of steel in constructing the vast masses which soar skyward and which often extend far down into the bowels of the earth, the work of the engineer has come to be of the highest importance. The use of pumps plays an important part in actual construction as well as in a building's equipment. During the time of construction pumps must often be used in removing bilge water or seepage; there are also many other uses for pumps during stages of erection, and as details of permanent equipment they are, of course, required as sewage, condensation, circulating, fire, house and vacuum pumps. This brochure deals with the large assortment of pumps carried by this large concern, giving all the data necessary for selecting the type and size of a pump for any given purpose. What is said on one page regarding "Determining Capacities of Bilge Pumps" is particularly interesting: "The kind of soil being drained is one important factor. Clay soil will yield less water than sandy soil. The amount of seepage in clay soil will be more nearly equal during dry or rainy weather than in any other kind of soil. Sandy soil will yield considerably more water in rainy than in dry weather, but will not retain the water nearly as long as clay. Proximity of a river or lake to the soil to be drained also has an important bearing on the capacity of the bilge pump to be used. Clay soil will yield considerably less water and at very nearly the same rate continuously, whereas sandy soil will yield more water, and the proportion will increase materially during heavy rains or high water. The farther the basement floor is below the street sewer, the greater the probability that it will drain larger areas than the immediate building area, and the greater will be the seepage; so the same kind of soil will yield more water if the basement floor is 5 feet below the street sewer than if it is 2 feet below. Again, we have to bear in mind that as we descend, sandy soil will yield in proportion a greater amount of water than clay."

VAN RENSSELAER P. SAXE, C.E.

Consulting Engineer

STRUCTURAL STEEL
CONCRETE CONSTRUCTION

Knickerbocker Building Baltimore

TONCAN~a Plaster Reinforcement PLUS! (A metal Lath that resists rust)

Corridor in New York Life Insurance Suite,
New York Life Building, New York City.
CASS GILBERT, *Architect*

WHEN a plaster job assumes the responsibility of period interpretation in ceiling, sidewall, pilaster and arch, the lath specification takes on a new significance.

A plaster reinforcement, expanded from Toncan Copper Molybdenum Iron with its universal acceptance for rust resistance would, in itself, justify preference. In addition, all Berloy laths have resquared ends, full covering width and the maximum number of strands per square inch to insure plaster economy and strength.

When you specify Toncan, your plaster base exemplifies the modern application of product justification.

A Berloy lath for every purpose.

REG. U. S. PAT. OFF.
TONCAN
COPPER
Mo-lyb-den-um
IRON

METAL LATH

COMPLETE INFORMATION UPON REQUEST

THE BERGER MANUFACTURING CO.
CANTON, OHIO

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Boston	Dallas	Kansas City	New York	Roanoke
Chicago	Detroit	Los Angeles	Philadelphia	San Francisco
Cleveland	Jacksonville	Minneapolis	Pittsburgh	St. Louis

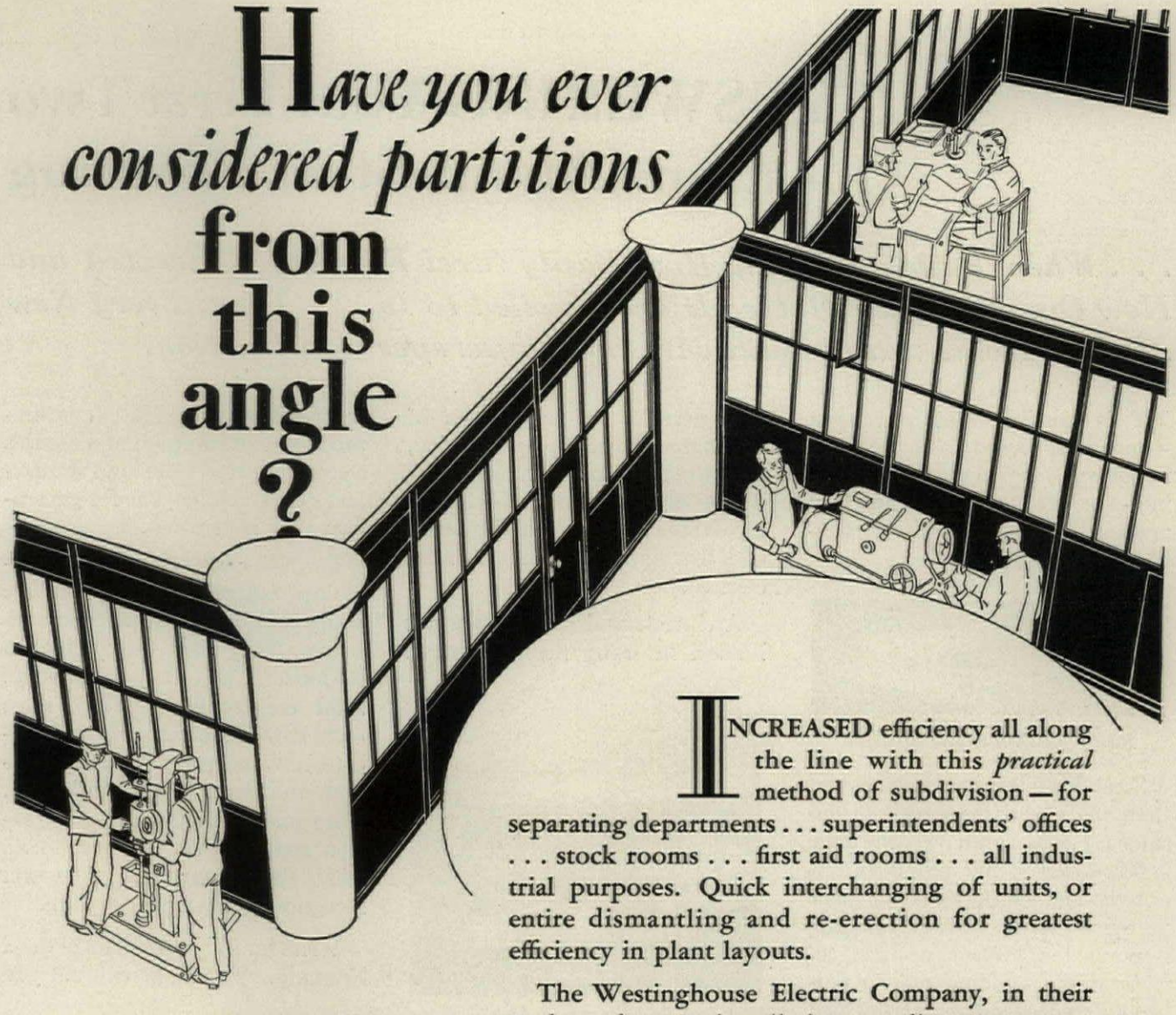
Export Dept.—Canton, Ohio

INDEX TO ADVERTISING ANNOUNCEMENTS

PART 1—ARCHITECTURAL DESIGN

PART 2—ARCHITECTURAL ENGINEERING AND BUSINESS

Have you ever considered partitions from this angle?



INCREASED efficiency all along the line with this *practical* method of subdivision — for separating departments . . . superintendents' offices . . . stock rooms . . . first aid rooms . . . all industrial purposes. Quick interchanging of units, or entire dismantling and re-erection for greatest efficiency in plant layouts.

The Westinghouse Electric Company, in their 8 plants, have 51 installations totaling 120,000 sq. ft.; the Eastman Kodak, 20 installations totaling 42,000 sq. ft.; the Gillette Safety Razor, 53 installations totaling 40,000 sq. ft., and General Electric Company has over 265 installations! Many other well known progressive companies are similarly benefiting by the use of Hauserman Movable Steel Partitions.

Mail the coupon for complete information. Keep your plant layout always in step with production needs.

Factories — Stock Rooms
Garages — Work Rooms
Warehouses — Show Rooms
Loft Buildings
Public Utility Plants
Offices—General and Executive

Five types, many colors and finishes.

THE E. F. HAUSERMAN CO., *Partition Specialists*
6883 Grant Avenue, CLEVELAND, OHIO
Direct Factory Branches in 13 Principal Cities—Organized for Service Nationally
Newark Philadelphia Buffalo Boston Hartford Chicago New York Pittsburgh Detroit Cincinnati St. Louis Washington, D. C. Cleveland

HAUSERMAN PARTITIONS
OF MOVABLE STEEL

THE E. F. HAUSERMAN CO.
Cleveland, Ohio

Send me more information about partitions for

Name .....

Firm .....

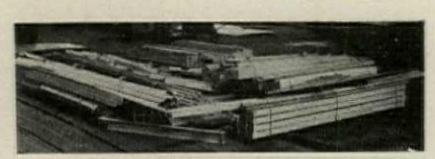
Address .....

AF 9-29

ANSWERING Your First Two Questions About Steel Framing

. . . When Builders Learn How Easily Steel Framing is Erected and How Quickly Other Materials are Applied to It . . . Then, Every New Modern Home will be Built with this Skyscraper Construction.

IT is possible that you have pondered over two of the most important things about Steel Framing—the erection of it, and the application of other building materials to it.

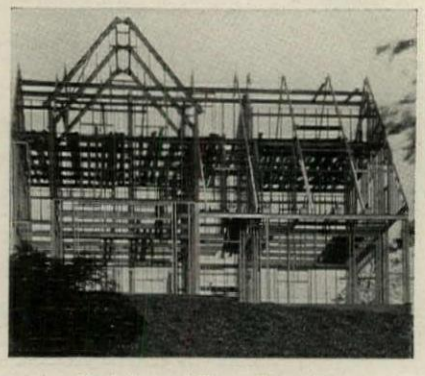


Ready for Immediate Erection

Steel Framing is easier erected than any other framework. Consider for a moment. Every piece is fabricated at the mill, cut to fit exactly and marked for its place in the structure. Steel Framing is ready for erection when it arrives at the building site—a radical difference from material which must be inspected for defects. There is no wait for seasoning. The framework is assembled and bolted together by workmen familiar with home building, without any of the delays that may be encountered in ordinary construction.

Any building material that can be applied to ordinary framing can be applied to Steel Framing. Not only applied as easily, but in most cases quicker. Each member of the framework is perforated with holes spaced two inches apart. This permits the application of any material by clipping or wiring, with the great strength and rigidity of Steel Framing serving to give these materials a firm base and to reinforce them into solid construction.

Architects and builders are not limited in using Steel Framing.



Quick and Easy Erection

This method of skyscraper construction is just as adaptable to individual styles and designs as ordinary framing. Special provisions of any kind are unnecessary.

Homes built with Steel Framing are better homes—more valuable and longer-lasting. Steel won't warp or shrink, so plaster walls will not crack or fall. Steel Framing is the strongest, most rigid framework that can be built. It puts all of the advantages of skyscraper construction into any home—large or small. It is fireproof and stormproof, and assures a structure that will stand staunch and unharmed by time for generation after generation.

Day after day, everywhere, people are buying homes. They are being cautious, more so than ever before. They want their homes to be modern, and they want good, solid construction. They have seen how some properties depreciate in value, run down in appearance and become just old houses. They may not know the construction method that will give them what they want, but they will recognize it when you explain.

Write for full particulars of Steel Framing. The story will tell you

Permanent Construction

why new homes—truly modern homes—are being built with this skyscraper construction.

THE STEEL FRAME HOUSE COMPANY

Subsidiary of McClintic-Marshall Corporation

Oliver Building . . . . . Pittsburgh, Pa.

STEEL FRAMING

THE MODERN METHOD OF HOUSE CONSTRUCTION

An escape into silence

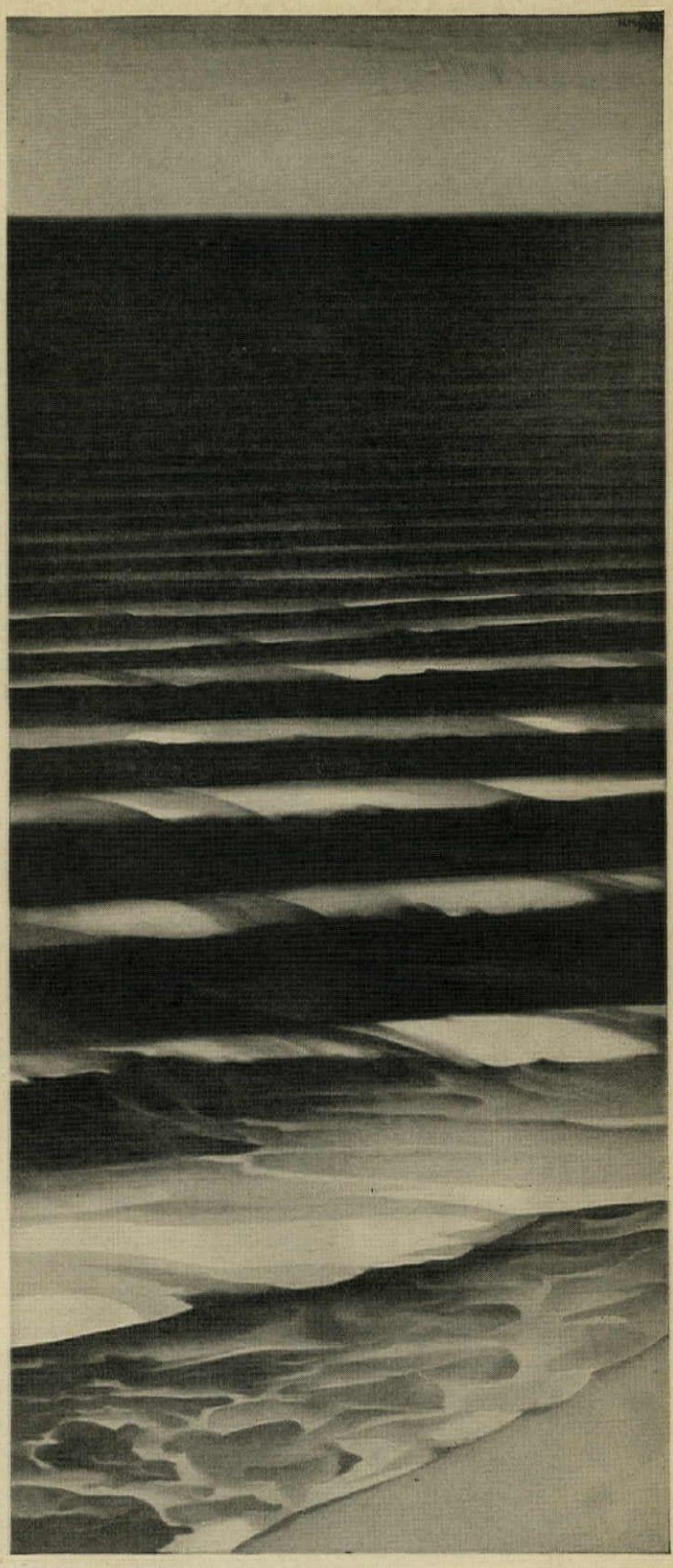
The ideal condition, in this industrial age, for maximum efficiency of work, rest and recreation, is comparative quiet, for *we live in bedlam.* In and out of homes, offices and workshops we suffer a confusion of jarring noises.

Sound travels in waves. Sound waves created in one room may not be halted by a wall or ceiling, but set it vibrating, somewhat as a telephone diaphragm vibrates, with the result that the sound is re-created on the opposite side.

Modern science has made possible the confining of sound within the room in which it originates. Such confinement is provided by the U S G System of Sound Insulation.

This system is a supplemental construction for forming floors, partitions and ceilings so that sound will not be transmitted through them. It includes the treatment of vents, ducts, etc., and the setting of machinery bases.

The U S G System of Sound Insulation is installed, under contract, by the United States Gypsum Company, which assures undivided responsibility, and guaranteed results. For information address Sound Insulation Department, United States Gypsum Company, Dept. 27K, 300 W. Adams St., Chicago, Ill.



The United States Gypsum Company offers a complete sound service, which includes noise absorption and auditorium correction, as well as sound insulation

U S

USG SYSTEM OF SOUND INSULATION

Created by the United States Gypsum Company

Now adopted by prominent architects as necessary modern equipment.

Dittmar Apartment Hotel
San Antonio, Texas

Associate Architects: Richard Vander Straton; Herff and Jones
General Contractor: E. W. Orffinger

The New Dittmar Apartment Hotel of San Antonio Chooses RCA CENTRALIZED RADIO

THE architects and owners of the Dittmar Apartment Hotel, now being built in San Antonio, Texas, have specified RCA Centralized Radio as a feature of this modern residence construction.

By the installation of the simplified RCA system the ever-increasing problem of disfiguring antennae and lead-in wires is eliminated at the outset. Each of the tenants of the new Dittmar Apartment will be able to operate his own receiving set simply by plugging his antenna lead into a wall outlet connecting with the central antennae.

It is noteworthy that radio reception will be much better than under the old system of individual aerials.

RCA Centralized Radio is being adopted by builders of modern hotels and apartment houses as necessary equipment. It is available in two principal forms:

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

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

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

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

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

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

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

Chicago, Illinois
100 West Monroe Street

Atlanta, Georgia
101 Marietta Street

Dallas, Texas
Santa Fe Bldg.

San Francisco, California
235 Montgomery Street