THE ARCHITECTURAL FORUM

IN TWO PARTS

ARCHITECTURAL ENGINEERING & BUSINESS

PART TWO

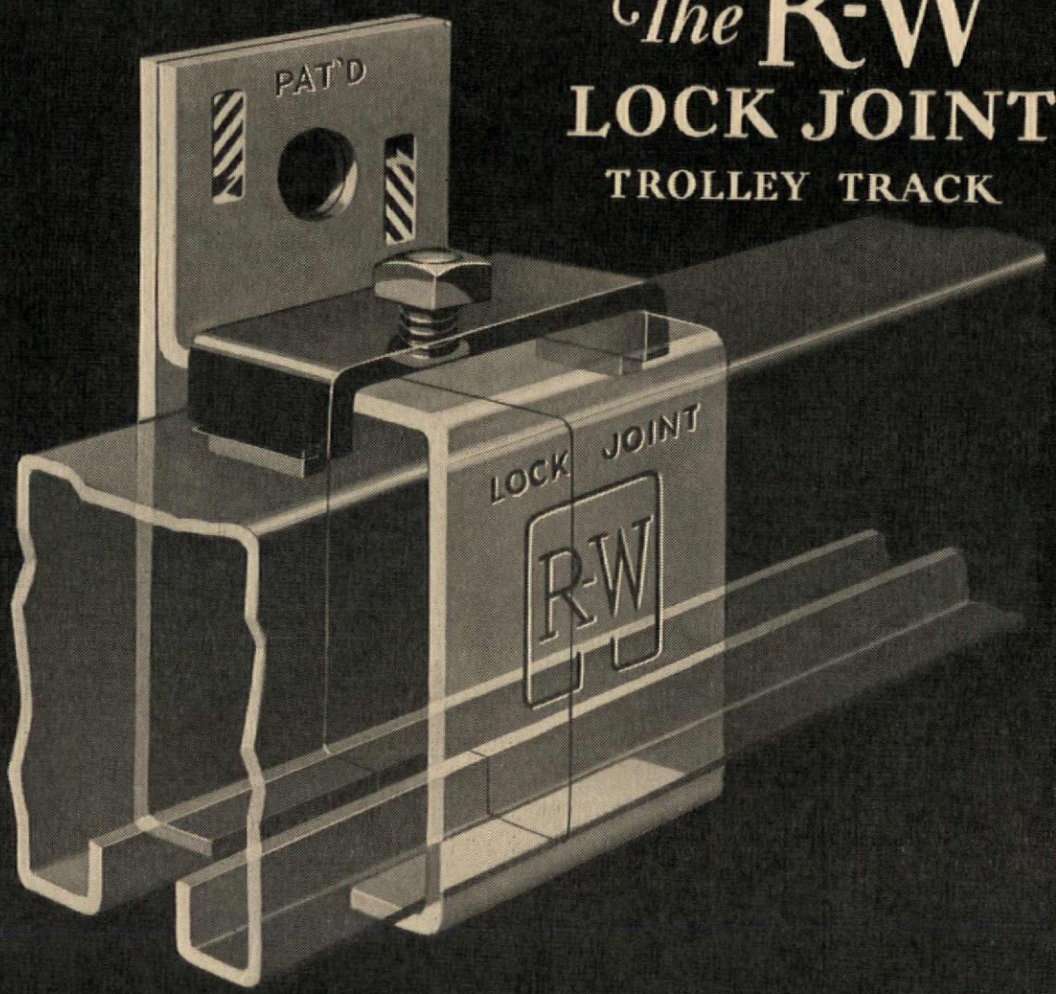
JUNE

1928

BANKS REFERENCE NUMBER
PRICE $3

It Locks the Joints Together *Permanently*

The R-W LOCK JOINT TROLLEY TRACK



Regardless of its length, your trolley track can now be made practically a *one-piece track,* by using the R-W Lock Joint.

A perfected product of Richards-Wilcox, it locks the joints so tightly that hangers operate smoothly and trouble-free.

The R-W Lock Joint can be obtained only with trolley track carrying the R-W trade mark. Ask for it by name.

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 Los Angeles San Francisco Omaha Seattle Detroit

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

THE YEARS MARCH BY --- BUT NATCO HALTS DEPRECIATION

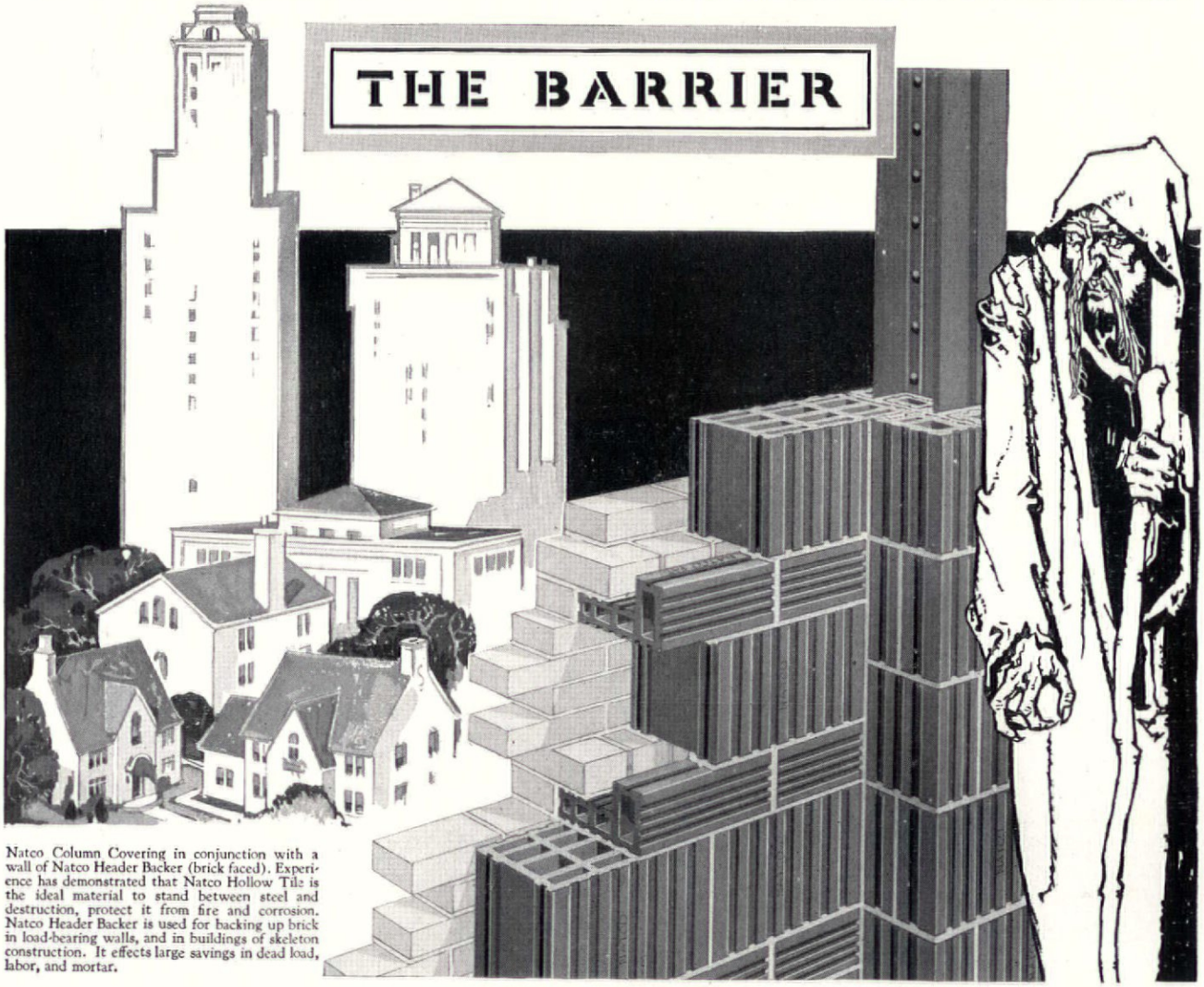
EACH year depreciation takes its toll, in beauty and in value, from buildings not built for permanence. What was some architect's pride becomes an eye-sore. What was a paying investment becomes a liability.

But structures built of Natco Hollow Building Tile are left untouched by time. Natco is made of special clay, mined, molded, and burned in great kilns to the density of flint, the durability of granite. Blood brother to the ever-lasting rocks, it partakes of their permanence.

Natco, the complete line of Hollow Building Tile, provides a tile for every building need. Natco Header Backer, Unibacker, Interlocker and Bakup for brick faced walls. Natco Double Shell Load Bearing and Triple X for stucco walls. Natco Tex-Tile and Vitritile for attractive finished face walls. Natco Partition Tile for plastered interior dividing walls. Natcoflor, Combination and Flat Arch Systems for floors. Natco Girder and Column Covering for protecting steel work from fire and corrosion.

No matter which of these Natco products you use, rest assured you are building for permanence. The years march by—but Natco halts depreciation.

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



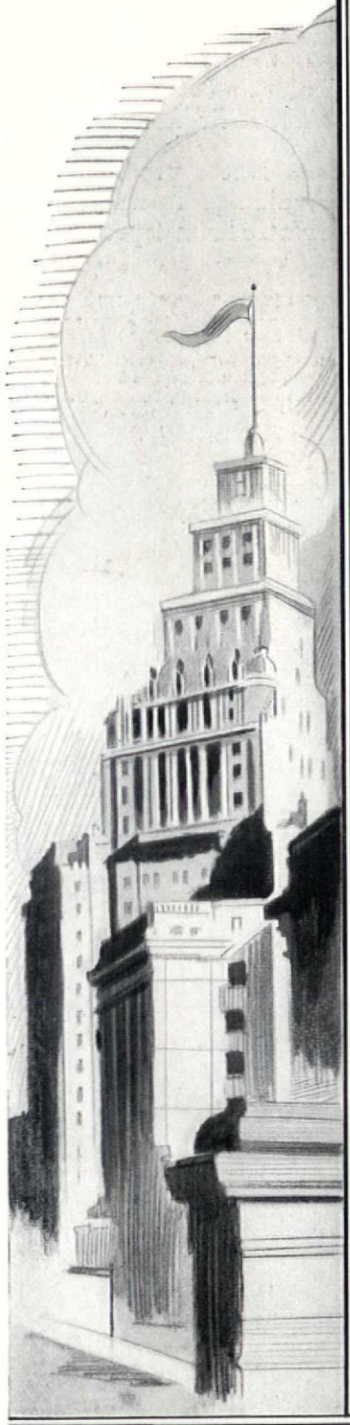
Natco Column Covering in conjunction with a wall of Natco Header Backer (brick faced). Experience has demonstrated that Natco Hollow Tile is the ideal material to stand between steel and destruction, protect it from fire and corrosion. Natco Header Backer is used for backing up brick in load-bearing walls, and in buildings of skeleton construction. It effects large savings in dead load, labor, and mortar.

NATCO

NATCO
THE *COMPLETE* LINE *of*
HOLLOW BUILDING TILE

HOLLOW BUILDING TILE

Keeping Pace

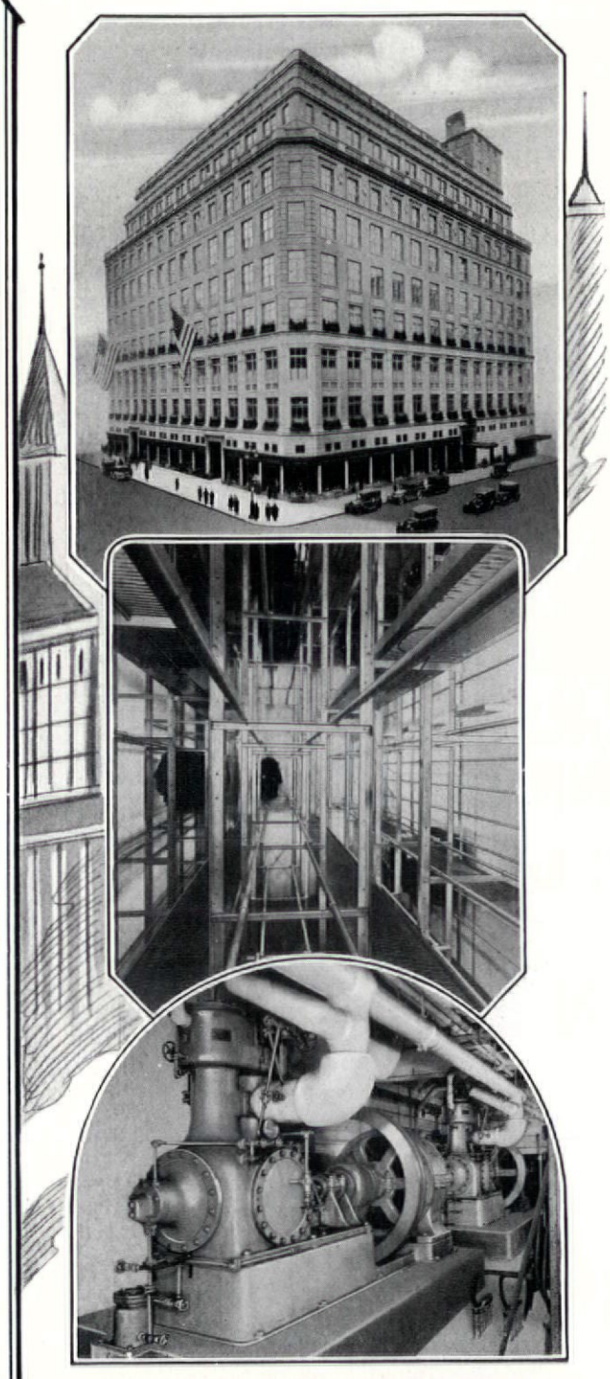


Specialty Shops and Department Store operators everywhere are realizing the importance of fur storage vaults for furs and fine garments during the summer months. Not only can they store their own unsold stock during the summer but fur storage facilities greatly assist in their sales efforts by offering customers this necessary service.

The York organization is prepared to give the architect the benefit of its experience in designing and installing fur storage units of all sizes.

Selfridge, Ltd., of London, Saks of Fifth Ave. and Herald Square, New York, Security Storage Company of Washington, and Mawson and DeMany of Philadelphia are a few representative installations.

Return the attached coupon for more information regarding the York system of fur storage refrigeration.



Upper—View of Saks, 5th Ave. Store, New York. Center—Interior view of fur storage vault at Saks. Lower—Three 10″ x 10″ enclosed motor driven compressors which supply refrigeration for the above instal-

YORK ICE MACHINERY CORP.,
York, Penna.
Please send me information regarding the York system of fur storage refrigeration without obligation on my part.

Name.....

Address.....

YORK
ICE MACHINERY CORPORATION
YORK PENNA

OK, visibly!



This means concrete pile certainty!—

YOU wouldn't pour concrete into uninspected forms ABOVE ground, would you? Then why risk it BELOW, where so much depends on the pile column length and taper?

The interior of every Raymond Steel Shell can be inspected inside, after driving, before concrete is poured. And remember—this protective shell is not later withdrawn. It is left in place, in the ground—in the RAYMOND Method.

CAST IN PLACE PILES · COMPOSITE PILES · PRECAST PILES · PIPE PILES

A FORM FOR EVERY PILE
A PILE FOR EVERY PURPOSE

BUILDING FOUNDATIONS · BULKHEADS & DOCKS · UNDERPINNING ETC · BRIDGES

P. S. Do you know about Raymond Composite Piles?

RAYMOND CONCRETE PILE CO.

NEW YORK
140 Cedar Street
CHICAGO
111 West Monroe Street
CANADA: MONTREAL
Branch Offices in Principal Cities

Raymond

KEWANEE STEEL BOILERS

Lower Heating Costs

The firebox of a boiler may be effective for making heat, but that of itself is not enough to insure efficiency. The boiler must be able to *use that heat.*

So, Kewanee provides unusually long travel for the flue gases, thus transferring useful heat to the water and making more steam to heat the building.

This means a distinct fuel saving, and is one of the reasons why Kewanee guarantees *lower heating costs.*

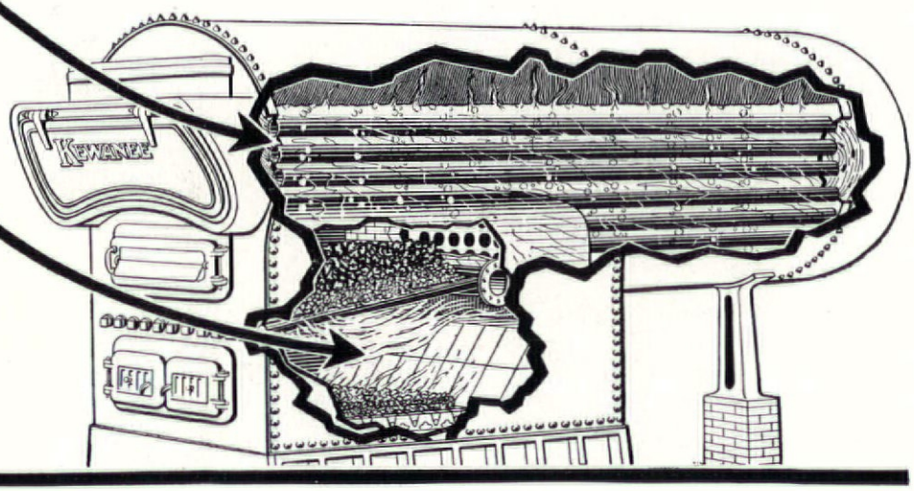
KEWANEE BOILER CORPORATION

Kewanee, Illinois

Branches in 40 Principal Cities

LONG TRAVEL OF FLUE GASES

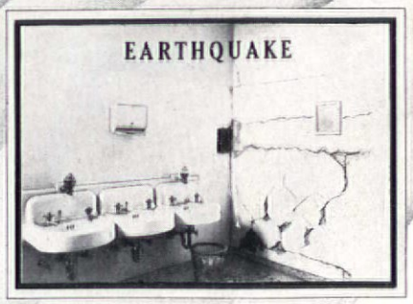
This long travel of the hot flue gases gives the water in the Kewanee boiler a chance to absorb all the extra heat which would otherwise escape, up the stack, unused.



Second of a Series—explaining just why Kewanee Boilers Cut Fuel Costs.

PROTECTION









Metal Lath "Proves" Itself in Time of Stress

In the Tokyo and Californa earthquakes, when buildings everywhere collapsed like veritable houses of cards, structures reinforced with Metal Lath showed but a few easily repaired cracks. (see ill. at top)

Again, when the mad fury of a West Indian hurricane brought death and millions of dollars' damage to Southern Florida, Metal Lath reinforced buildings established another "honor" record.

And in the thousands of residences which are yearly ravaged by fire, Metal Lath is again daily—almost hourly—practically proving its worth as a fire retardent.

* * *

A plastering base which yields so great a measure of protection in times of extra-ordinary stress likewise insures against *everyday* emergencies—the causes which result in cracked and streaked plastering.

And when you specify the 1/8" flat rib North Western PLASTA-SAVER Metal Lath, you have the added satisfaction of knowing that you have provided your client with this much desired protection *at the lowest possible cost to him.*

NORTH WESTERN EXPANDED METAL CO.
1234 Old Colony Bldg.
CHICAGO

NORTH WESTERN EXPANDED METAL CO.

Send samples of this very economical PLASTA-SAVER Metal Lath and literature.

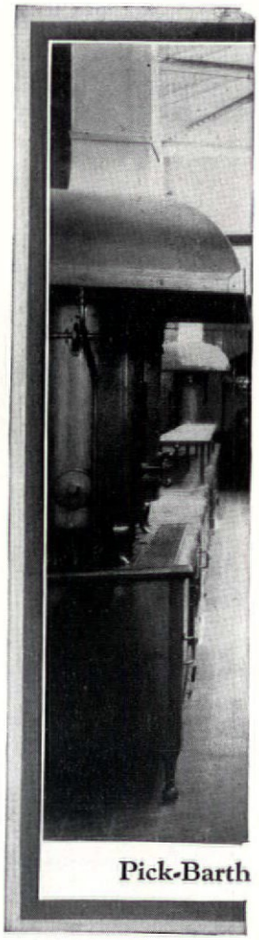
Name_____

Street_____

City_____ State_____

Plasta-Saver
1/8" FLAT RIB
METAL LATH

Where Quality is Emphasized PICK-BARTH *Kitchens are Preferred*



Pick-Barth

RECENT installations prove that "where quality is emphasized, Pick-Barth Kitchens are preferred." Consider, for example: The Ritz-Carlton, Boston; The Park Central, New York; The Sherry-Netherland, New York; The Lincoln, New York; The Warwick, New York; The Granada, Brooklyn; Leverich Towers, Brooklyn; and The Warwick, Philadelphia!

These hotels and many more which make up the roster of Pick-Barth installations daily prove the economy and worth of Pick-Barth Kitchens. The experience of hotels of every type and size throughout the country affirm the ever-increasing popularity of Pick-Barth equipment.

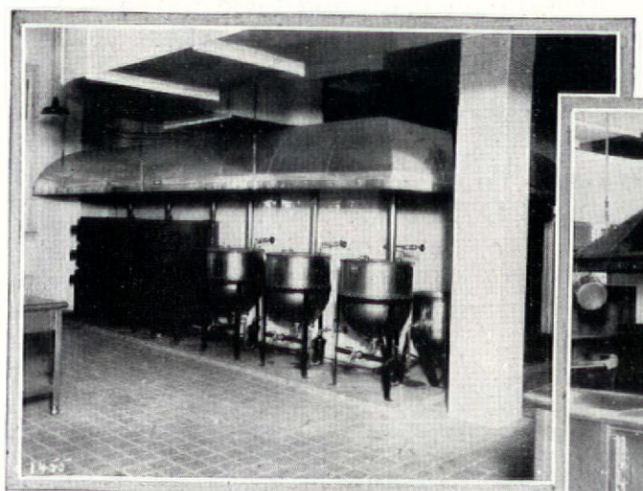
Where quality means superlative calibre in every part of every piece . . . where materials are chosen for stamina and long life... Pick-Barth Kitchens are the logical choice.

THE ALBERT PICK-BARTH COMPANIES

ALBERT PICK & COMPANY
208-224 W. Randolph St., Chicago, Ill.

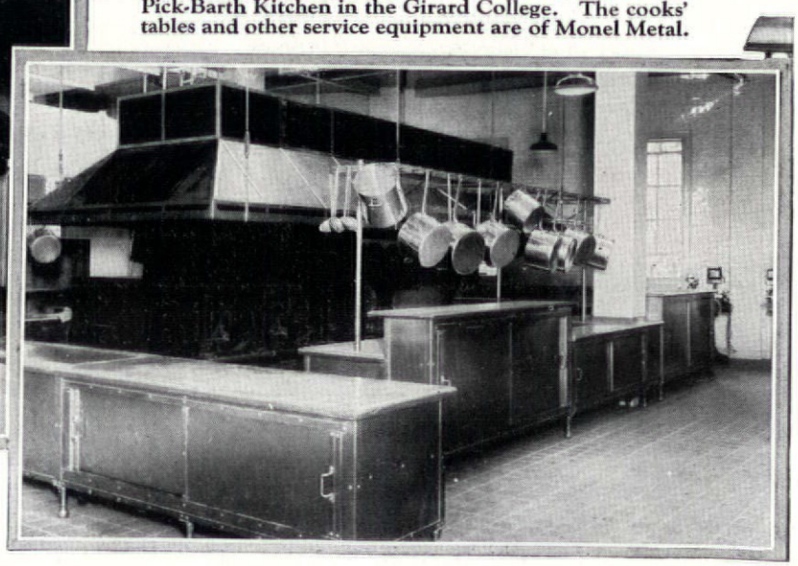
L. BARTH & CO., Inc.
32 Cooper Square, New York, N. Y.

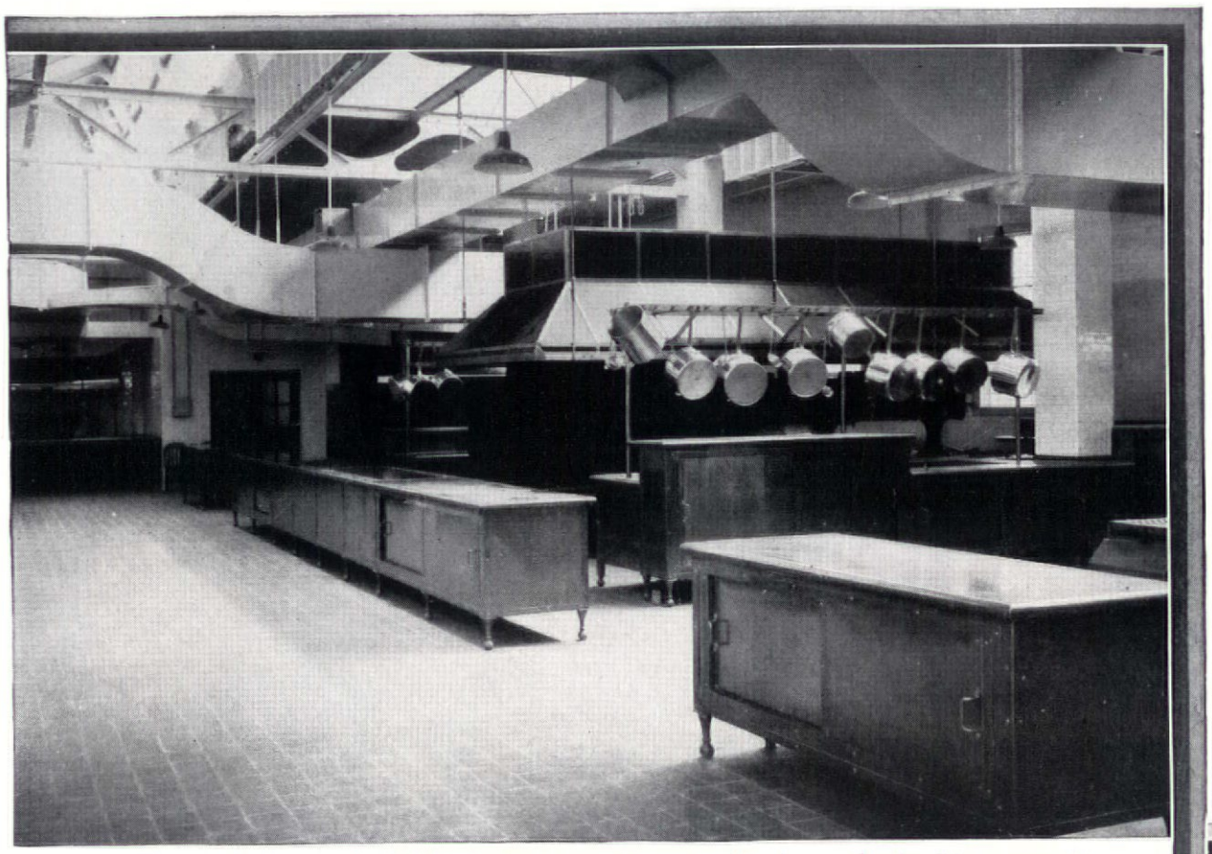
THE JOHN VAN RANGE CO., CINCINNATI, OHIO, *Manufacturing Division*



Above, a vegetable preparation department with three special steamers made exclusively by Pick-Barth.

Below, a view of the range and broiler division of the Pick-Barth Kitchen in the Girard College. The cooks' tables and other service equipment are of Monel Metal.

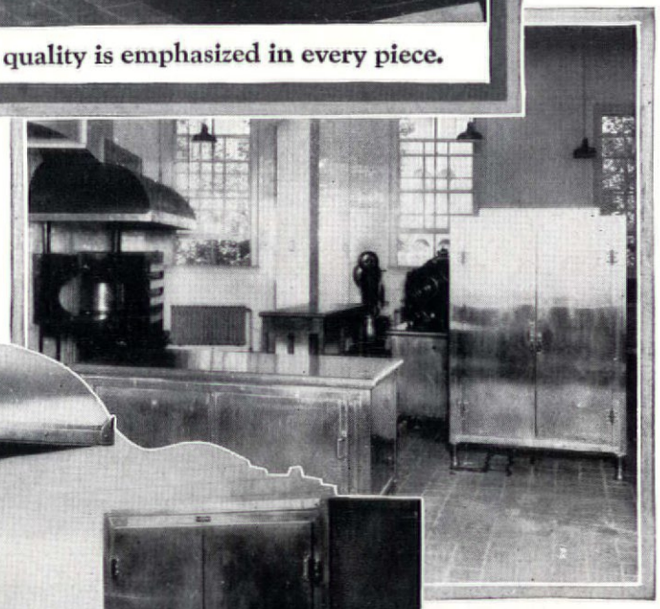


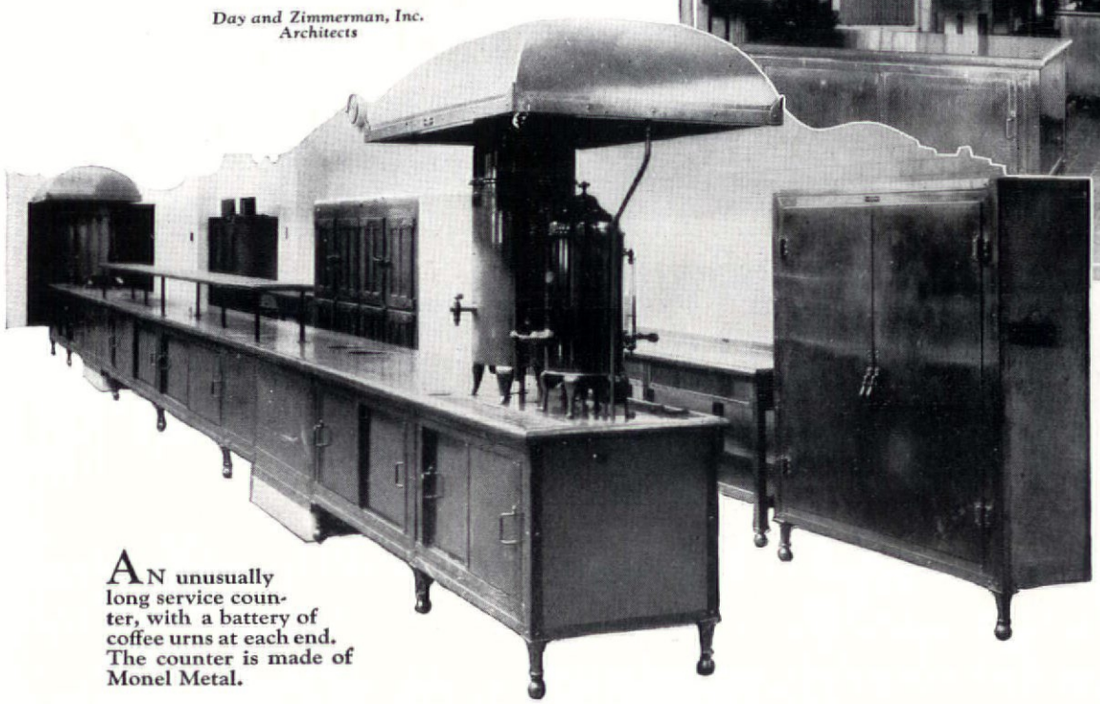


Kitchen, Girard College, Philadelphia, Pa. . . . where quality is emphasized in every piece.

THE Kitchen of the Girard College, Philadelphia, Pa., is one of the most notable examples of kitchen engineering in the entire country. Practically all of the service equipment was made, in whole or in part, of Monel Metal.

Day and Zimmerman, Inc.
Architects





AN unusually long service counter, with a battery of coffee urns at each end. The counter is made of Monel Metal.

ABOVE, even the proof boxes, work tables and cabinets are constructed of Monel, for permanent cleanliness and durability. The equipment throughout is Pick-Barth.

MILVACO COMPLETE HEATING SYSTEMS *and* HEATING SPECIALTIES *are used by discriminating engineers*

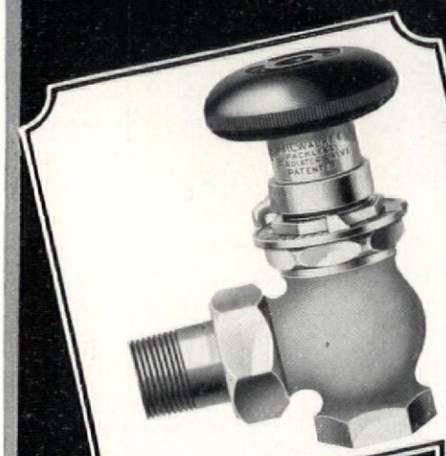


Fig No. 209
PACKLESS VALVE

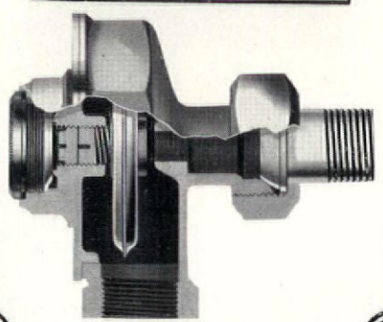


Fig. No. 1
THERMOSTATIC TRAP

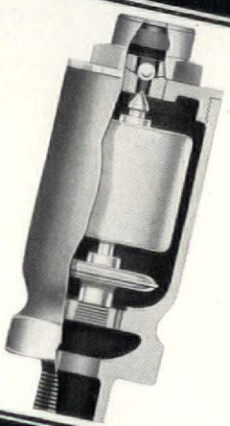


Fig. No. 12
AIR ELIMINATOR

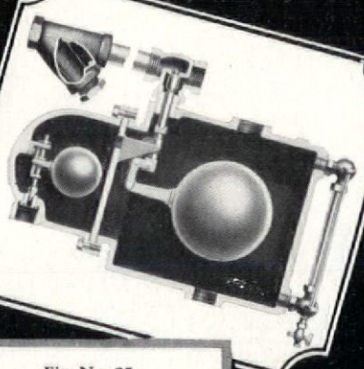


Fig. No. 85
DUPLEX BOILER
FEEDER

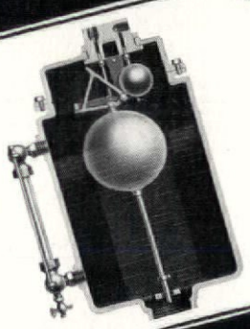


Fig. No. 80
DIRECT RETURN
TRAP

THE many large buildings throughout the country that are equipped with MILVACO Heating Systems and Specialties are bona fide evidence that the engineers have been satisfied with their superiority in actual performance.

For twenty-seven years the Milwaukee Valve Co. organization has been developing heating equipment that is correct from an engineering standpoint and practical and dependable in operation. In addition it manufactures an unexcelled line of "Milwaukee" standard brass valves, packed type radiator valves, gate, globe, angle, check valves, etc.

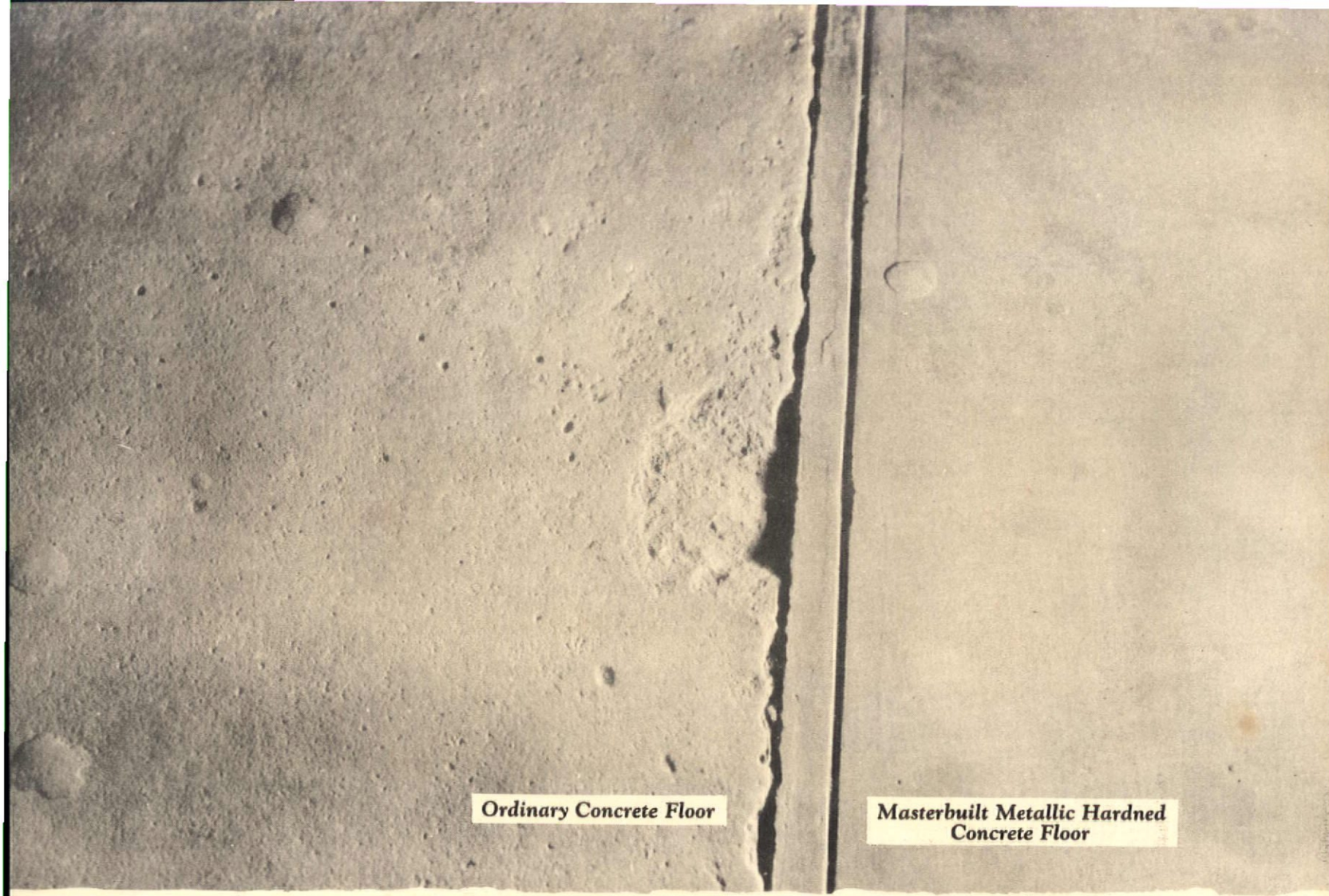
Get the habit of specifying and installing MILVACO *exclusively.*

Write for complete information, Dept. C

MILWAUKEE VALVE COMPANY

MILWAUKEE, WISCONSIN

OFFICES IN ALL PRINCIPAL CITIES



From unretouched photograph of floor in station of Penna. R. R., Cleveland, Ohio

Before You Specify Another Floor—

"The Pennsylvania started this practical test in 1912 when they laid a plain cement floor and a Metallic Hardned floor side by side in their Cleveland station. The hardned portion gets twice the traffic the plain does, yet see the difference." . . . . Extract from page six of the new book "PLAIN TALK ABOUT CONCRETE FLOORS," just off the press.

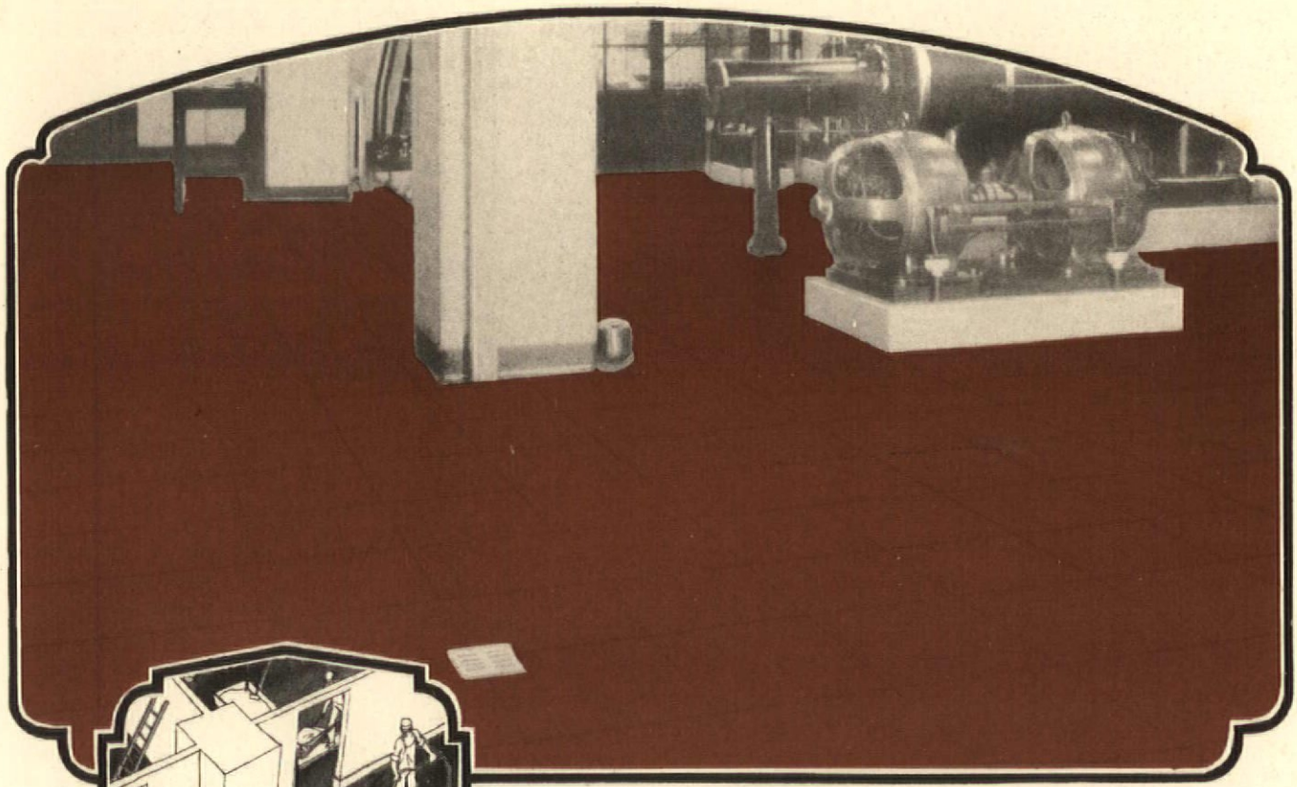
Experiences of 412 plant engineers and owners with different types of cement floor finish are reported in this survey of floor laying methods. Concise, thought-provoking, the book presents startling new evidence on a question that has baffled builders and owners for years, "How to lay concrete floors that will last under modern industrial traffic."

Before specifying another floor send for a copy of this book, sent upon request to architects, engineers, contractors and building owners and managers.

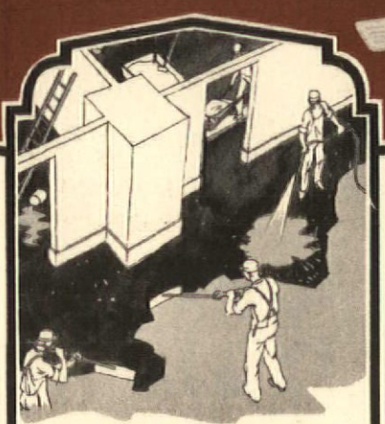
THE MASTER BUILDERS COMPANY
Euclid Avenue at 71st Street Cleveland, Ohio

MASTERBUILT FLOORS TRADE MARK

BETTER CONCRETE FLOORS



Red Colormix Floors were selected for the engine room of the Federal Reserve Bank, Cleveland, because of Colormix wearing quality and fine appearance.



STAINPROOF

The Modern Curing and Protecting Film

Applied over the surface 36 hours after troweling Stainproof dries to a tough, air-proof film that prevents staining and marring and insures perfect curing of the concrete.

Easily removed after all danger of staining is passed.

All new Colormix Floors are protected with Colormix Stainproof.

MASTERBUILT FLOORS
TRADE MARK

Power Plants are Show Places Today!

TODAY there is an ever-increasing demand for finer appearance in Power plants. Color? Yes, if it can still retain the necessary hardness. Colormix, hardened and colored all the way through, has successfully combined color and strength in a permanent, dust-free, trouble-free colored and hardened floor that meets every requirement. Thousands of beautiful lasting Colormix Floors are evidence of this fact.

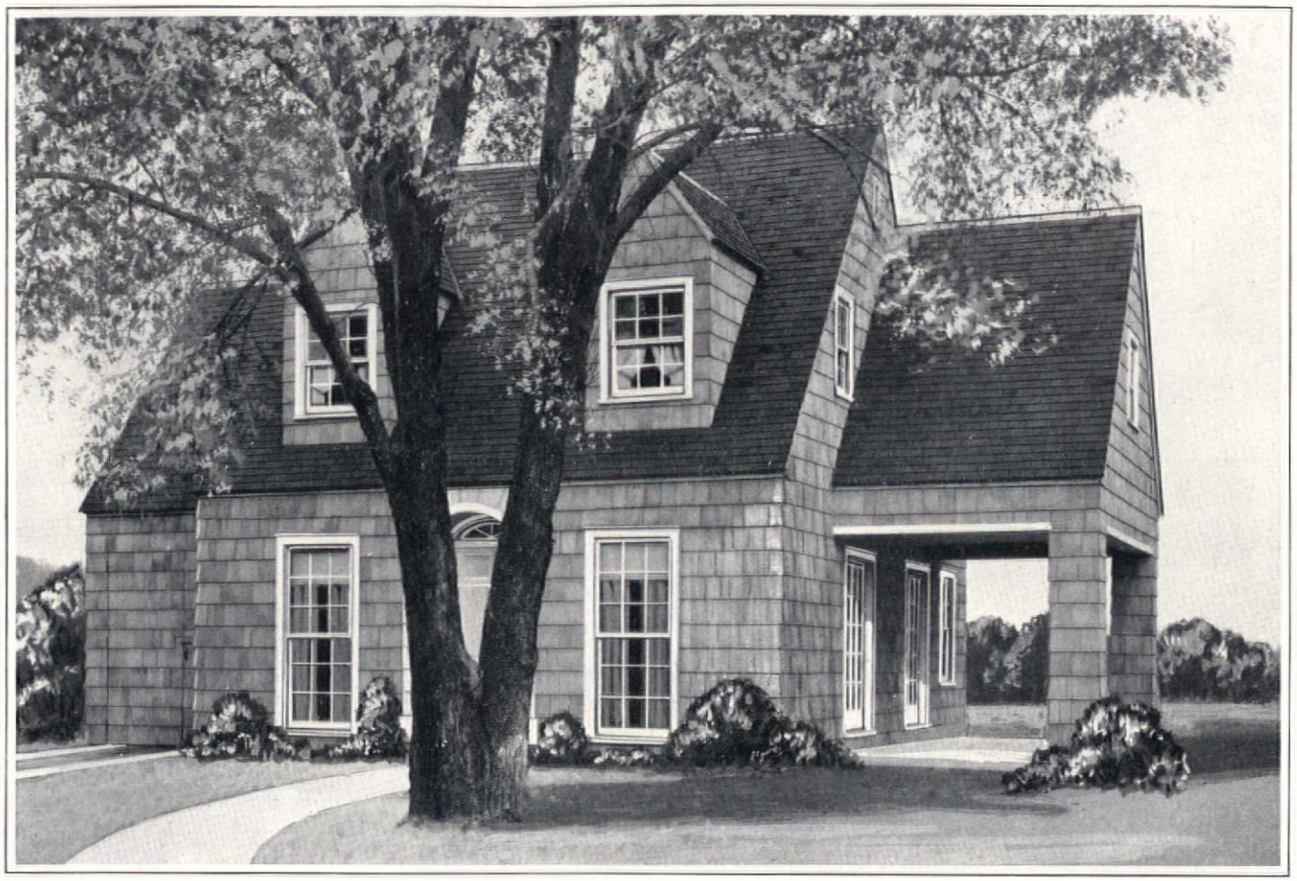
THE MASTER BUILDERS COMPANY
Cleveland, Ohio

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

Sales Offices in 110 Cities

COLORMIX FLOORS

COLORED HARDNED CONCRETE FLOORS



Residence of Al Zimmer, 2309 Locust St., North Kansas City, Mo. Architect: John Lawrence, Builders: Fritzlen & Hufford. Masonite Insulating Lath used as plaster base

Write for a free sample of this *thermostatic wood*

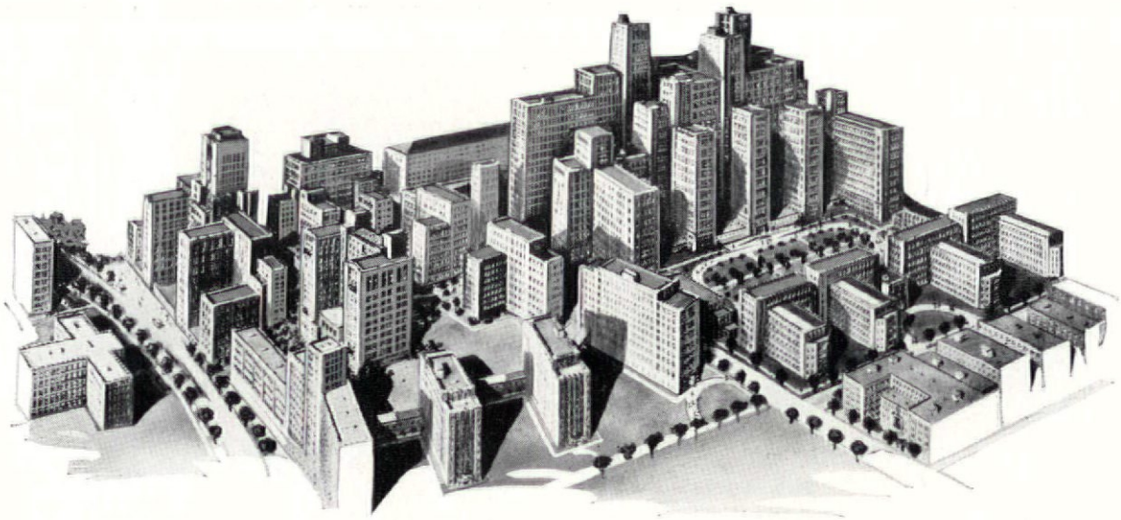
MORE and more architects are standardizing on Masonite, the thermostatic wood. They are specifying it not only for permanent structural insulation, but as a plaster base and as a sound deadener.

The coefficient of sound absorption of Masonite for C4-512 frequency is .31 according to the tests made by Prof. Paul E. Sabine of Riverbank Laboratories. The coefficient of an equal thickness of hair felt under the same test was only .17. Write for a sample of Masonite and for book of Specifications and Details.

MASONITE CORPORATION
Dept. 668, 111 W. Washington St., Chicago, Ill.
Mills: Laurel, Mississippi

Masonite
THERMOSTATIC WOOD FOR
STRUCTURAL INSULATION
Made by the makers of MASONITE PRESDWOOD
REG. U.S. PAT. OFF.

© M. F. Co.



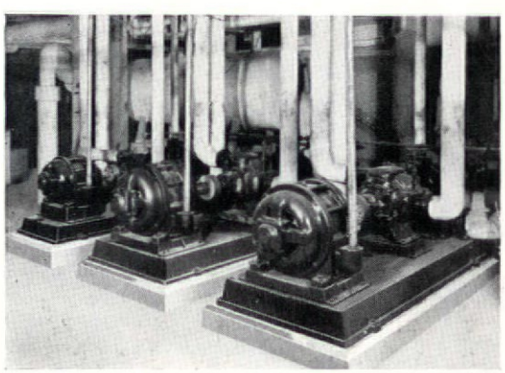
The Columbia-Presbyterian Medical Center, New York, N. Y., as it will appear when finished. James Gamble Rogers, Inc., architects; Werner Nygren, Inc., consulting heating engineers; Gillis & Geoghegan, heating contractors.

For the world's largest hospital

THE Columbia-Presbyterian Medical Center in New York City will, when completed, occupy about nine city blocks. It is said to be the largest hospital in the world.

Four Jennings Vacuum Heating Pumps have been installed—for removing condensate and air from the heaters for the hot water heating system and the domestic hot water supply.

Three of the four Jennings Vacuum Heating Pumps installed in this hospital.



THE NASH ENGINEERING CO.
12 Wilson Road, So. Norwalk, Conn.

RETURN LINE AND AIR LINE VACUUM HEATING PUMPS ~ CONDENSATION PUMPS ~ COMPRESSORS AND VACUUM PUMPS FOR AIR AND GASES ~ STANDARD AND SUCTION CENTRIFUGAL PUMPS ~ HOUSE SERVICE PUMPS ~ SEWAGE EJECTORS SUMP PUMPS

Jennings Pumps



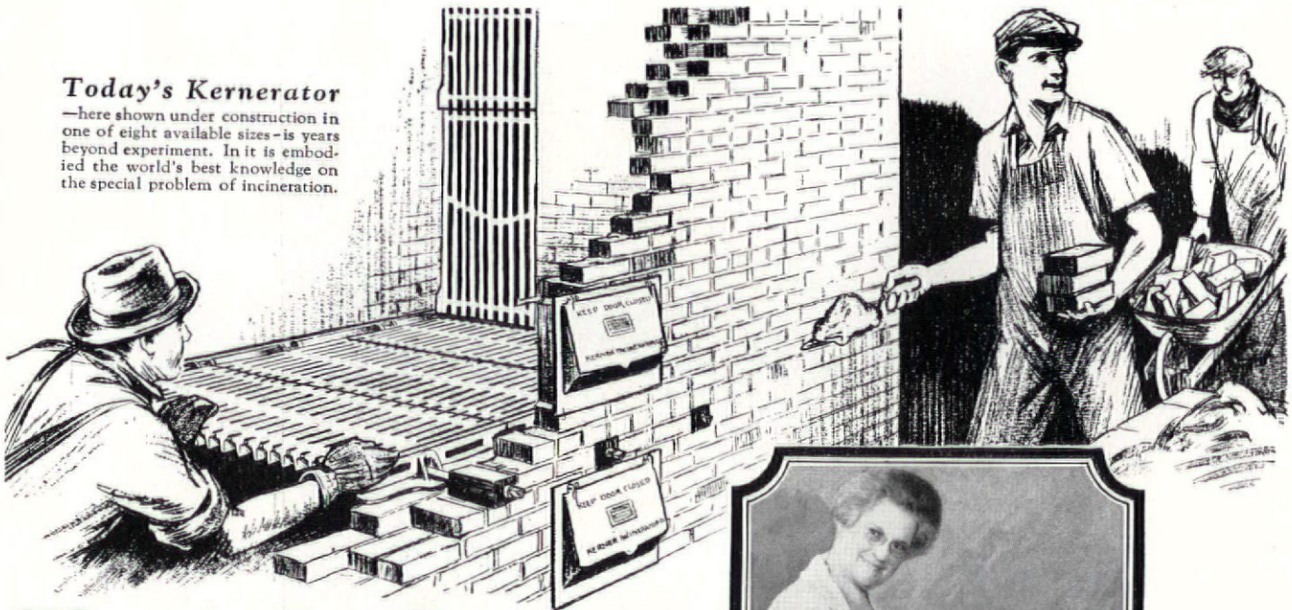
Comfortable Tenants Renew Their Leases

"PLENTY of heat—available at all times," is one of the first *essentials* in keeping tenants. Architects and owners in rapidly increasing numbers are turning to Heggie-Simplex Steel Boilers for the dependability that makes certain this important essential. These scientifically designed heating units assure complete dependability at costs that mean substantial additions to the earning capacities of the buildings in which they are installed.

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

HEGGIE-SIMPLEX

ELECTRIC-WELDED STEEL HEATING BOILERS

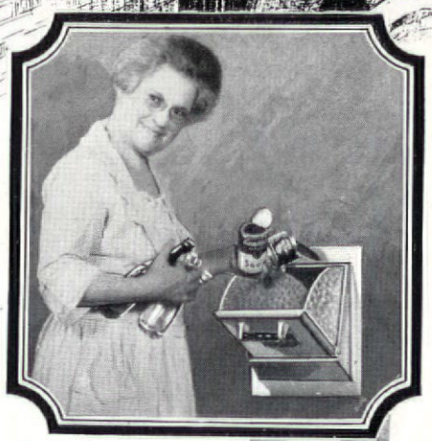


Today's Kernerator
—here shown under construction in one of eight available sizes - is years beyond experiment. In it is embodied the world's best knowledge on the special problem of incineration.

Why the First Kernerator

built experimentally fifteen years ago

Wouldn't Work



When the first Kernerator was built—fore-runner of today's time-tried system of costless garbage and waste disposal—it wouldn't work. It smouldered, smoked, sulked and quit cold. Then painstaking research resulted in the exclusive, patented Kernerator "By-Pass" feature — the heart of the present Kernerator.

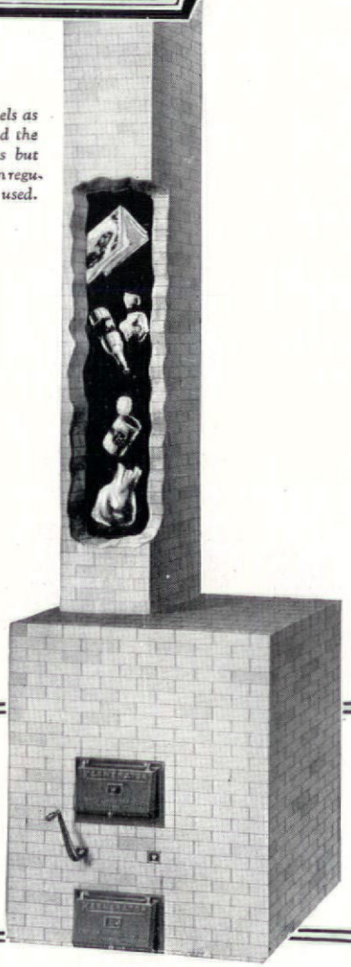
Without this *patented* Kernerator "By-Pass", developed by the inventors and pioneers of flue-fed incineration, combustion of trash and garbage without fuel other than the waste itself, *cannot be efficient or satisfactory.*

Such factors as smoke and flame control, odor-elimination, draft-creation, air-movement, moisture-eradication, gas distillation — these were not arrived at haphazardly in developing the Kernerator to its present state of high efficiency. They are not mere idle phrases, but vital considerations — and the Kernerator engineering personnel has mastered them.

See Sweet's, write for Kernerator catalogs in ready-to-file A. I. A. Folder 35J41 or phone your local Kernerator representative. Offices in 89 cities.

KERNER INCINERATOR CO., 715 East Water St., *Milwaukee, Wis.*

Residence models as low as $95 and the masonry adds but little more when regular chimney is used.

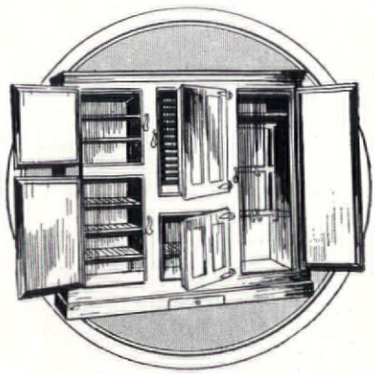


KERNERATOR

REG U S PAT OFF

THE CHIMNEY-FED INCINERATOR

"Garbage and Waste Disposal without Leaving the Kitchen"



Over 250,000 SATISFIED Users

ARCHITECTS especially appreciate the broad scope of McCRAY service — refrigerators to meet every need, from single units to complete installation for the largest institution

PIONEER in modern sanitary refrigerator construction, for 38 years McCray has held to an unyielding ideal of quality which is reflected in the remarkable service records of McCray installations.

McCray users have always been our best advertisements. This army of over 250,000 satisfied customers is striking evidence of that leadership which is further revealed in the fact that McCray is the world's largest manufacturer of refrigerators for all purposes.

In single stock units and complete built-to-order installations for the largest institution, McCray quality is held to this single high standard.

All McCray models may be used with electric or mechanical refrigeration of any type, or ice. Pure corkboard, sealed with hydrolene by a distinctive process, provides perfectly air-tight insulation.

Send for latest catalogs and further information about refrigerators to meet your specific need. No obligation, of course.

McCRAY REFRIGERATOR SALES CORPORATION
864 Lake St., Kendallville, Indiana
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McCRAY REFRIGERATORS

Another New York Apartment Installs ELECTROLUX . . .

The TUSCANY, 39th Street, near Park Ave., New York City. Farrar and Warmouth, architects. Henry Mandel Building Company, builders. Electrolux-equipped throughout.



Noiseless refrigeration by heat is being specified in the finest new hotels and apartments

THE beautiful Tuscany on fashionable East 39th Street, New York City, will rent to discriminating people. They demand the finest and most modern equipment.

Again the architects specify Electrolux—the refrigerator that works on a startling new principle —*heat makes cold.* A tiny gas flame or heat from electricity produces a steady cold. This refrigerator has no moving parts . . . is absolutely silent . . . never wears out . . . requires no attention. And, best of all, costs much less to operate. In spite of these features, Electrolux costs no more than other refrigerators of equal insulation and storage capacity.

Electrolux may be had in four new color harmonies besides the standard white finish. These are: Biscay Blue, Crystal Green, Ivory Tan, and Silver Grey. A wide range of sizes and prices will suit your exact needs.

The HOSTESS model Electrolux with five cubic feet of storage capacity. Over-all dimensions: 25 in. wide, 22 9-16 in. deep, 54½ in. high with legs.

Let us send you detailed specifications on standard models and information on special sizes. Please write. Servel Sales, Inc., Evansville, Ind.

ELECTROLUX REFRIGERATOR MADE BY SERVEL

Your HEATING REQUIREMENTS

THE MOST HEATING FOR EVERY DOLLAR INVESTED. UTMOST QUALITY & SERVICE



Fidelity-Mutual Life Insurance Co., Philadelphia, Pa.
Architect: Dantzinger, Borie and Medary
Heating Contractor: William M. Anderson
Engineer: Isaac H. Francis
Aero Radiation

THE first and final test of a heating installation used to be merely, "Will it warm the building?" Today, economics as well as thermodynamics, must be consulted. The question has become, "Will it warm the building *economically?*"

The answer, when National Products are used, is always, "yes." You can depend on National Boilers, and Aero the National Radiator, to convert a maximum of the heat in the fuel into healthful, even warmth in the building. Thousands of installations verify this.

You can expect the utmost in service from National Products, and all that is fine in cooperation from the National Organization. We'll be glad to demonstrate this to your complete satisfaction.

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St. Louis, Mo. —1042 Central Industrial St.
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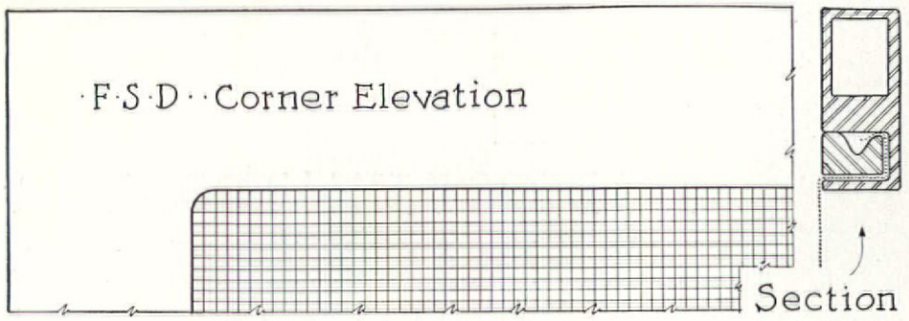
ORANGE SCREENS



The above details show the construction of our rigid one-piece ALUMINUM FRAME Screen. Unique, mitred and perfectly welded corners, and mitred lock bar holding screen cloth securely in place, are exclusive features found only in our screens . . . . . *Orange* ALUMINUM FRAME *Screens* were used to screen the charming home-like club shown below.



ROCK SPRINGS
COUNTRY CLUB
West Orange
New Jersey

~

C. C. WENDEHACK
Architect

ORANGE SCREEN COMPANY

Maplewood . . . . . *New Jersey*

Advantages of Aluminum Frames:

Aluminum has many recognized advantages. Light and strong, it has replaced heavier metals in many industries. From industry to the home was just a step, for capital, with unlimited resources for experiment, long has led the way for improvement in home building.

The alloy used in the manufacture of Orange Aluminum Screens was developed for our use by the Aluminum Company of America, and is exclusive with the Orange Screen Company.

It is one of the strongest non-ferrous alloys; light, with great tensile strength, extreme elasticity, and rigidity that makes it unsurpassed for metal screen frame construction. Orange Aluminum Screens will not rust, corrode or oxidize. Aluminum forms no colored salts and therefore will not discolor or stain draperies or other materials that may come into contact with it.

These screens are of close grain structure with natural smooth finish that permits engaging parts to slide freely. The surface is excellent for lacquer, enamel, or any finish desired.

The metal is formed in long bars by a process known as extrusion, which gives strength equal to steel or bronze with only one-third their weight.

The corners are carefully mitered and welded to form a solid, seamless frame. The wire cloth is held securely in place by an extruded aluminum bar forced into a channel on the back of the frame and locked in by friction.

This improved construction eliminates unsightly ridges, irregular corners, and uneven or corrugated surfaces that would mar the beauty of the frame.

Orange Aluminum Screens combine the desirable qualities of Beauty and Durability at a price in keeping with their value.

Service and Dependability

Write to our Maplewood, N. J. office for information or estimates and we shall instruct our nearest branch office to take care of your inquiry.

Orange Aluminum Frame Screens are manufactured and sold on a guarantee by the Orange Screen Company, a company which is backed by financial responsibility and 18 years of manufacturing experience.

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CELITE PRODUCTS

BARRIERS
TO INDUSTRIAL WASTE

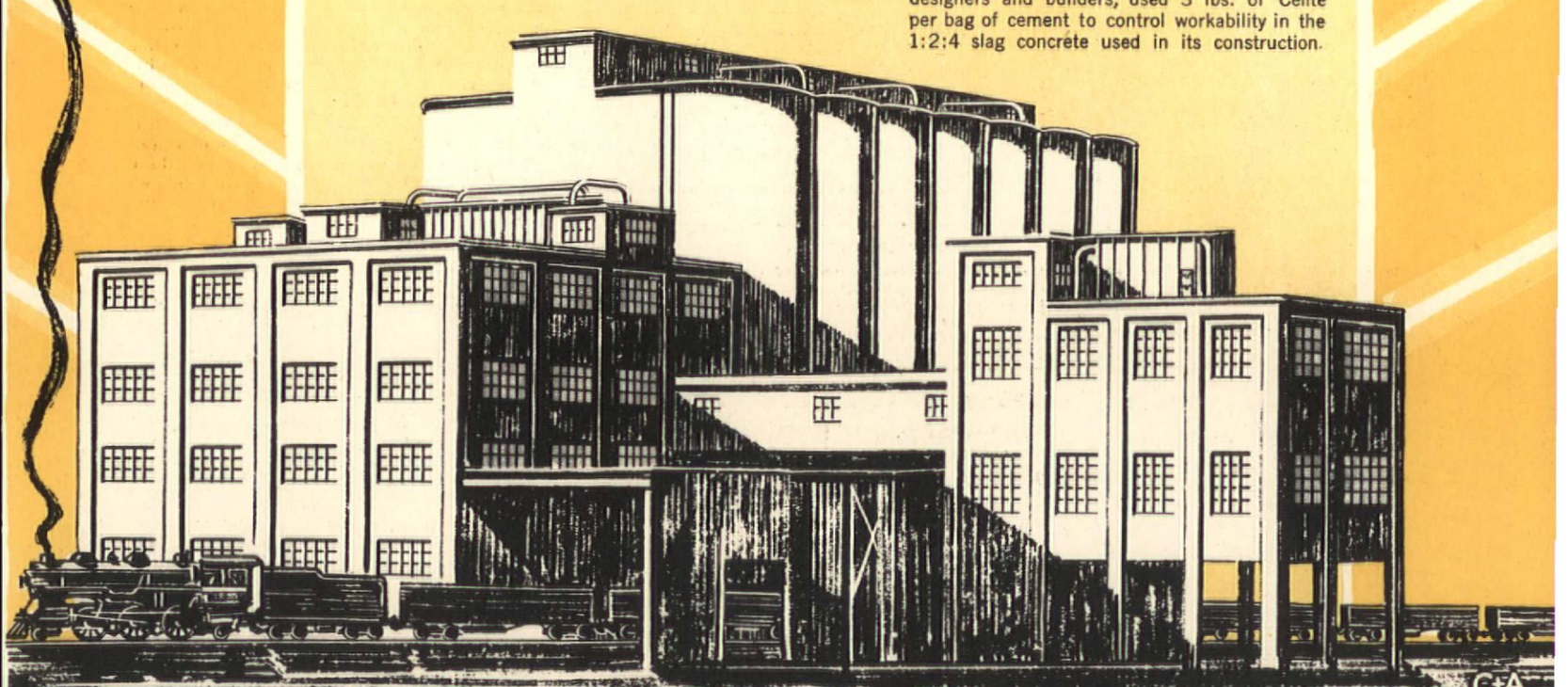
FILTER-CEL
AND
SUPER-CEL
FOR FILTRATION

SIL-O-CEL
FOR HEAT INSULATION

CELITE
FOR BETTER CONCRETE

©

Plant of the Federal Portland Cement Company, Buffalo, New York. M. A. Long Co. of Baltimore, designers and builders, used 3 lbs. of Celite per bag of cement to control workability in the 1:2:4 slag concrete used in its construction.



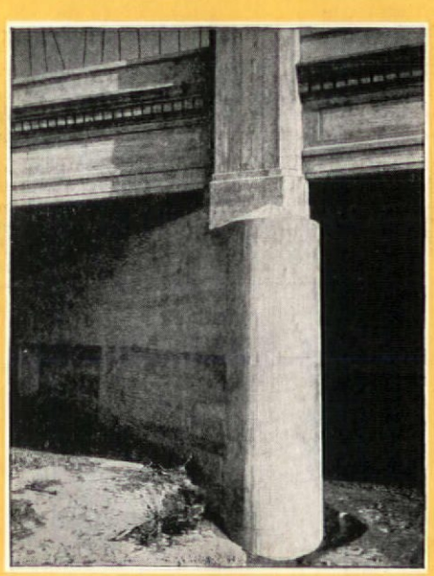
CELITE MAKES IT EASY TO PLACE PERFECT CONCRETE



Plaster mould work cast in place, using 1:2½:3½ concrete containing 3 lbs. of Celite per bag of cement, on the First Baptist Church building, Los Angeles. Allison and Allison, Architects.

CELITE

Workability Controls the Quality of Concrete in Place



Note the clean cut dentils and the flawless surfaces on this bridge built by the Lynch-Cannon Engineering Company of Salt Lake City and Los Angeles. 1:2:3½ mix, 3 inch slump, workability controlled by using 3 pounds of Celite per bag of cement.

THE QUALITY of concrete in place depends not alone on the proportions of the mix, the character of the aggregates and cement and the amount of water used.

WORKABILITY also is an important factor that determines how the mix is placed in the forms. Its benefits show up all along the line—in freedom from segregation, ease of handling and placing, freedom from honeycombing and higher minimum strength (which is, in fact, the effective strength of the concrete.)

This important property is controlled as definitely as slump or strength, by adding the workability agent Celite to the mix. Spectacular achievements in the placing of concrete as well as marked economies in every day construction are being made possible by increasing workability with Celite.

A Los Angeles architect, for instance, wanted to incorporate some delicate plaster mould work in the solid concrete walls of a church. He designed a mix for workability as well as strength—and obtained the clean cut work pictured above.

A Western contractor determined to pare down his patching expense. He added the workability agent Celite to the mix specified for a bridge award, and obtained a structure without a square foot of honeycombing over its entire surface.

In New York State a cement manufacturer wanted a plant that would speak well for concrete as a structural material. He obtained a perfect job, free from honeycombing, with slag concrete made workable by the addition of three pounds of this powdered siliceous material for each bag of cement used.

Almost every day brings reports of similar achievements in concrete made easier by using a mix designed with as careful attention to workability as to strength. Invariably the costs per yard in place are lower than when no attention is given to workability.

The workability agent employed is Celite, which is finely powdered pure amorphous silica. Mail the coupon for the facts about this microscopically fine aggregate that promotes workability, prevents segregation and increases water-tightness in concrete.

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CELITE PRODUCTS COMPANY

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Without placing me under any obligation send me complete information about the use of Celite in concrete.

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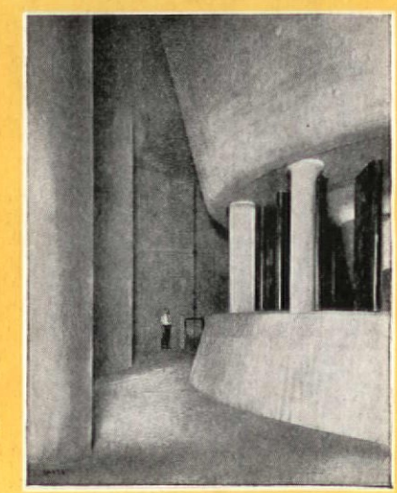
Address _____

City and State _____





Ohio Falls Hydro Electric Plant built for Louisville Gas and Electric Company by Byllesby Engineering and Management Corporation.

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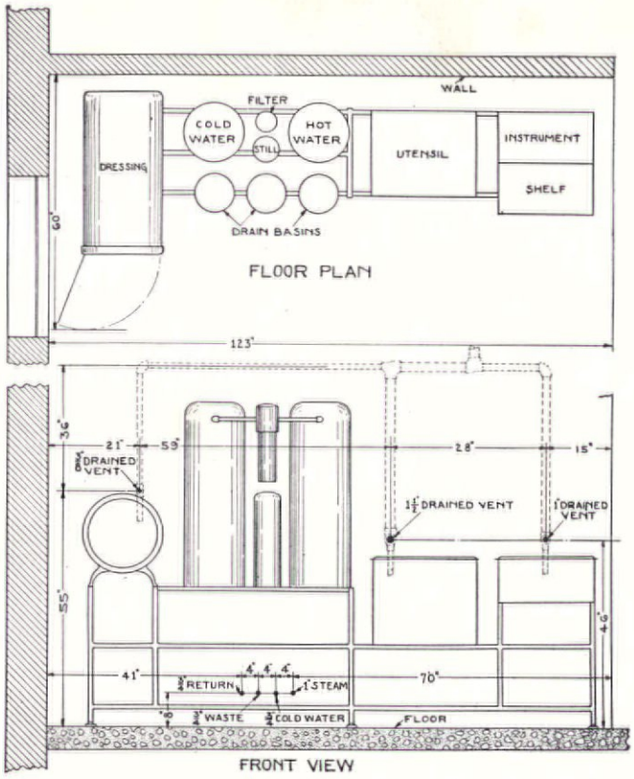
Roughing-in sizes
Number and location of outlets
Venting System
Heating requirements
General layout
Floor plans
"Built-in" specifications
General specifications
Expert counsel, if desired.



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Sterilizer installations in all hospitals bring up problems on which we can help you. Our Engineering Service can furnish you (without obligation) data on every phase of hospital sterilizer installation.

Let us assist you with the hospital that may be on your boards now. At least, let us send you at once our standard set of sterilizer data sheets with full catalog. Your name on the line below will bring three helpful publications to you immediately.

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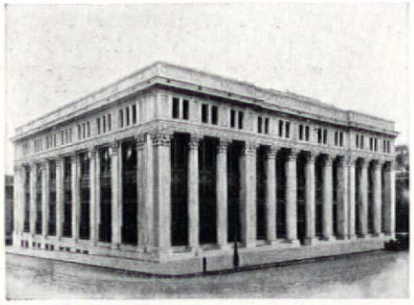
Mellon National Bank, Pittsburg, Pa. Trowbridge & Livingston, Architects, E. P. Mellon, Associate.

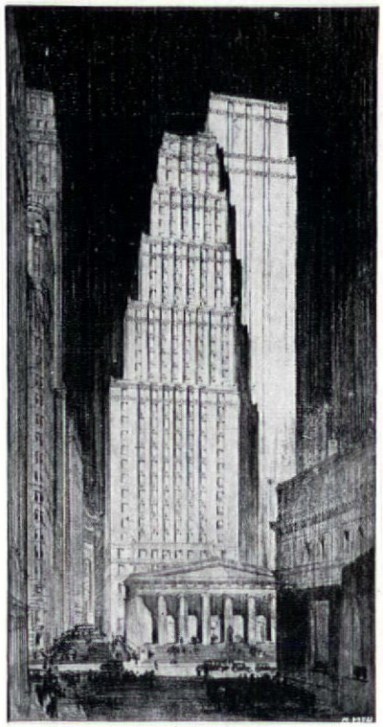


Detroit Trust Company, Detroit, Michigan. Albert Kahn, Architect.



New Bedford Institution for Savings, New Bedford, Mass. Adden & Parker, Architects.

SPENCER BANKS CLEANED

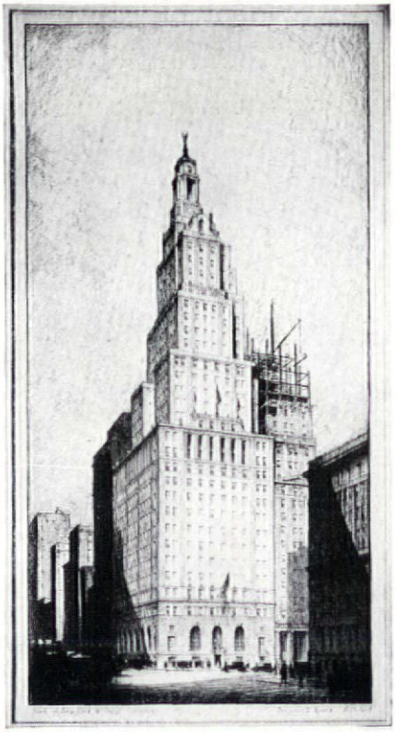


Chase National Bank, New York. Graham, Anderson, Probst & White, Architects.

PERMANENCE is the obvious ideal of the architect and owner when the corner stone of a new bank is laid. Few items can contribute more to the life of a building than provision for permanent cleanliness.

The Spencer System takes all dirt and dust out of the building, reduces cleaning costs to a minimum and preserves that new and prosperous appearance which means so much to any business.

If you are interested in the layouts and experience gained in equipping some of the largest and best banks in the country we will be pleased to furnish the information.



Bank of New York & Trust Co., New York. Benjamin W. Morris, Architect.



First National Bank of Biddeford, Biddeford, Maine. T. M. James & Co., Architects.



Wakefield Trust Co., Wakefield, Rhode Island. Hutchins & French, Architects.



Hardware Mutual Insurance Co., Stevens Point, Wis. Childs & Smith, Architects.

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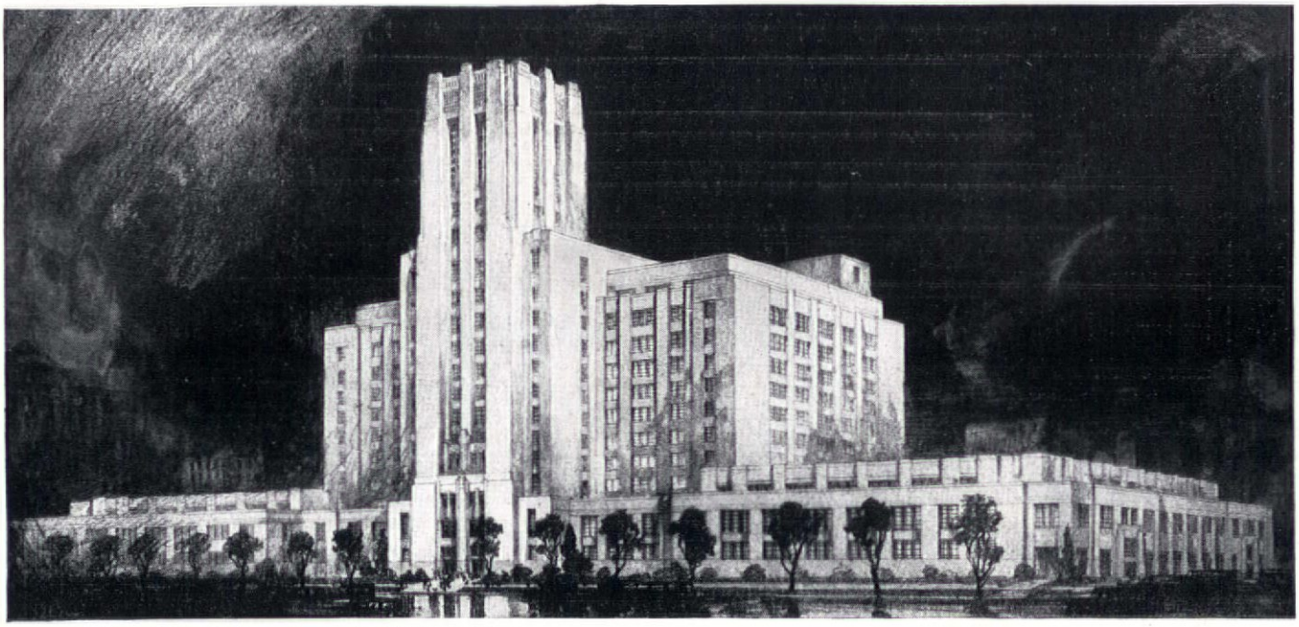
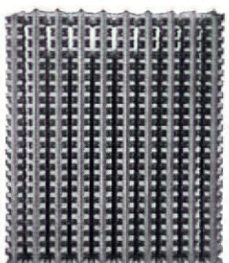


SEARS ROEBUCK BUILDING—MINNEAPOLIS: Martin C. Schwab, Consulting Engineer; B. W. Construction Co., Chicago, General Contractors; H. Kelly Co., Minneapolis, Heating Contractors; Geo. C. Nimmons & Co., Architects; Fan Equipment, American Blower, Detroit, Mich.

Unlimited durability and lowest net installed cost make VENTO *the inevitable choice of architects and engineers*

• • • Is it not significant that VENTO is "keeping company" with America's newest and greatest buildings?

Surely it is a reflection of VENTO'S quality and performance to be constantly chosen as heating equipment for so many of these great ultra-modern structures.



A typical stack of VENTO Cast Iron Heaters

Because there is no known limit to the durability of VENTO is but one of the reasons that it is so widely selected for these great buildings built to stand indefinitely.

Another is, that VENTO'S superiority costs no more, for a review of bids on complete projects, shows the net installed cost—in every instance—to be decidedly in favor of VENTO.

The new Sears Roebuck building pictured above is equipped with 24,000 sq. ft. of VENTO Cast Iron Heaters.

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Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.

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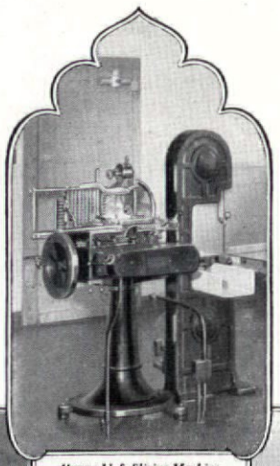
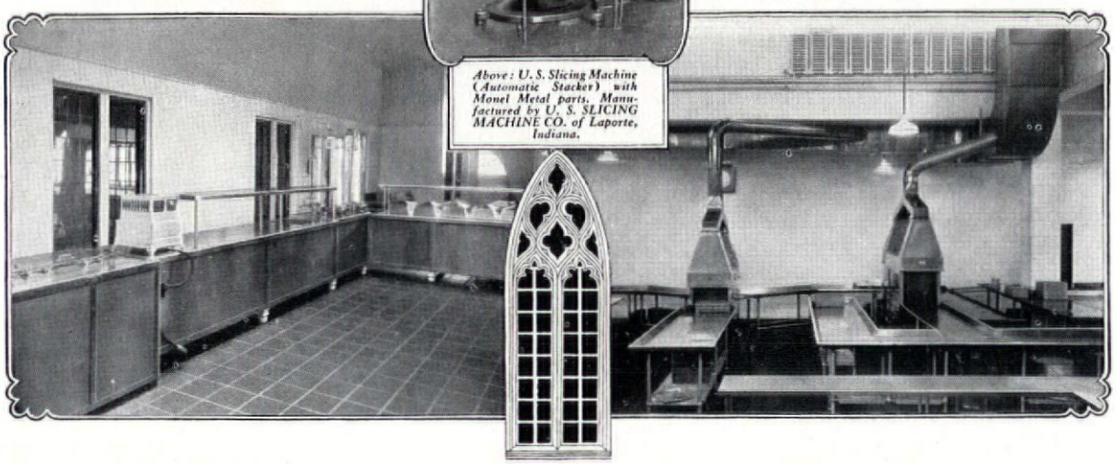
WHERE MONEL METAL SHINES



Below: Monel Metal Food Service Equipment manufactured by DUPARQUET, HUOT & MONEUSE CO. of Chicago, Ill., who installed slicing machine, dish washers and other Monel Metal Equipment.

Below: 2 Monel Metal Crescent Dishwashing Machines manufactured by THE CRESCENT WASHING MACHINE Div. of the Hobart Mfg. Co. of Troy, Ohio. Monel Metal dish tables, ventilators, etc. manufactured by the DUPARQUET, HUOT & MONEUSE CO.

Above: U. S. Slicing Machine (Automatic Stacker) with Monel Metal parts. Manufactured by U. S. SLICING MACHINE CO. of Laporte, Indiana.



UNIVERSITY OF NOTRE DAME

WHERE A MILLION DOLLAR INVESTMENT IS PROTECTED BY MONEL METAL EQUIPMENT

NOTRE DAME UNIVERSITY estimates that more than a million dollars are invested in its new dining hall. But it is confident that this investment is sound. It knows that the original equipment will render service for years to come and thus eventually more than pay for itself.

This confidence is well justified, for the food service equipment at Notre Dame is the finest that money can buy. It WILL last for years under the hardest kind of service. It is made of Monel Metal.

Monel Metal is most always used for installations of such a permanent character. Its rust-immunity, corrosion-resistance, and steel-like strength and toughness insure maximum life under the grind and stress of kitchen use. But in addition to its long life Monel Metal has other properties that recommend it for such installations. Its cleanability, its permanently bright appearance, its chip-proof surface make it the most attractive of available materials.

In planning food service installations that must protect large investments, you can protect your client's interests by specifying long-lived Monel Metal.

SEND FOR SPECIAL ARCHITECTURAL FOLDERS

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. The name "Monel Metal" is a registered trade mark.

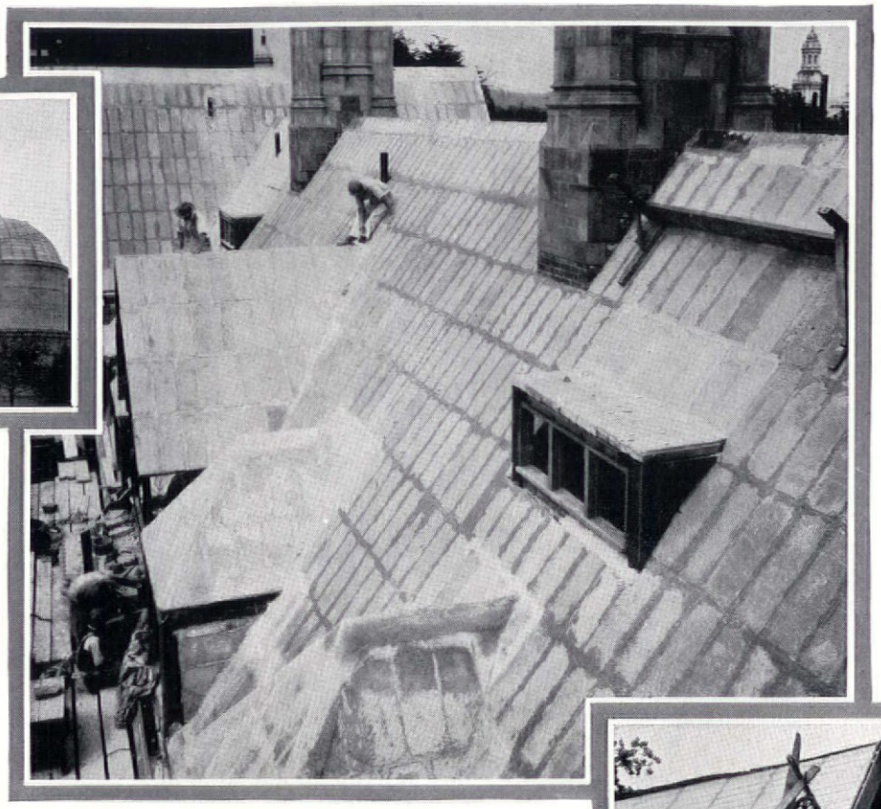
MONEL METAL

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



St. Casimir Church, Buffalo, New York
Architects: Oakley & Schallmo
6,500 sq. ft. Pyrobar 30-inch Roof Tile used

The small-sized units of Pyrobar Roof Tile are well adapted for curved surfaces, preserving a true radius and providing a smooth base for metal roof covering. This material avoids difficulties encountered in other methods.



Bingham Hall, Yale University
New Haven, Connecticut
Architect: W. B. Chambers
12,000 sq. ft. Pyrobar 30-inch Roof Tile used

Pyrobar Roof Tile makes for easy construction of pitched, gabled and dormered roofs with the added advantage because of its high insulating value of complete usability of attic floor space.

Short Span Pyrobar Roof Tile

Its extreme adaptability

PYROBAR Roof Tile combines these much wanted characteristics, the sum of which can be found in no other one material: 1, light weight; 2, economy in erection and supporting steel cost; 3, a fireproof nailing base adaptable to any type of roof covering; 4, high insulating value; 5, installation not delayed by extreme weather conditions.

While regarded as especially adapted for the more difficult types of roof construction and institutional types of buildings, it is equally desirable for flat roofs and industrial buildings.

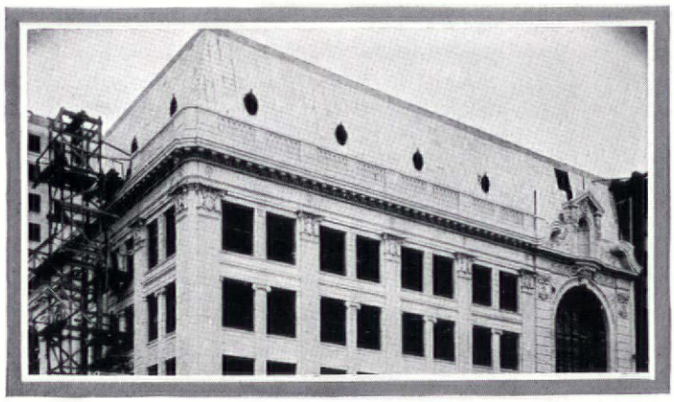
For temporary or replacement work, it offers the utmost in economy and simplicity of construction.

Added advantage is found in the fact that the United States Gypsum Company undertakes the complete erection of short span Pyrobar Roof Tile, including if desired the furnishing and placing of T-iron sub-purlins. Our consultation service is yours to command. Use the coupon.



Pavilion, Trenton, Michigan
Architects: H. P. Howe—W. C. Morris, Detroit
10,000 sq. ft. Pyrobar 30-inch Roof Tile used

Three Inch Solid Pyrobar Roof Tile is extra dense, 17 pounds per square foot, to provide a satisfactory nailing base for ornamental roof coverings. To meet unusual conditions of pitch or to hold extremely heavy roof coverings, we provide special Pyrobar Roof Tile or application details as required.



Loew's Midland Theatre, Kansas City, Missouri. Architect: Thomas W. Lamb
20,000 sq. ft. Pyrobar 30-inch Roof Tile used

Revival of the Mansard type of roof offers many interesting possibilities at the hands of a master architect. The construction of this almost vertical roof, formerly considered difficult, becomes a simple matter through the use of Pyrobar Roof Tile.

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General Offices: 300 West Adams Street, Chicago, Ill.

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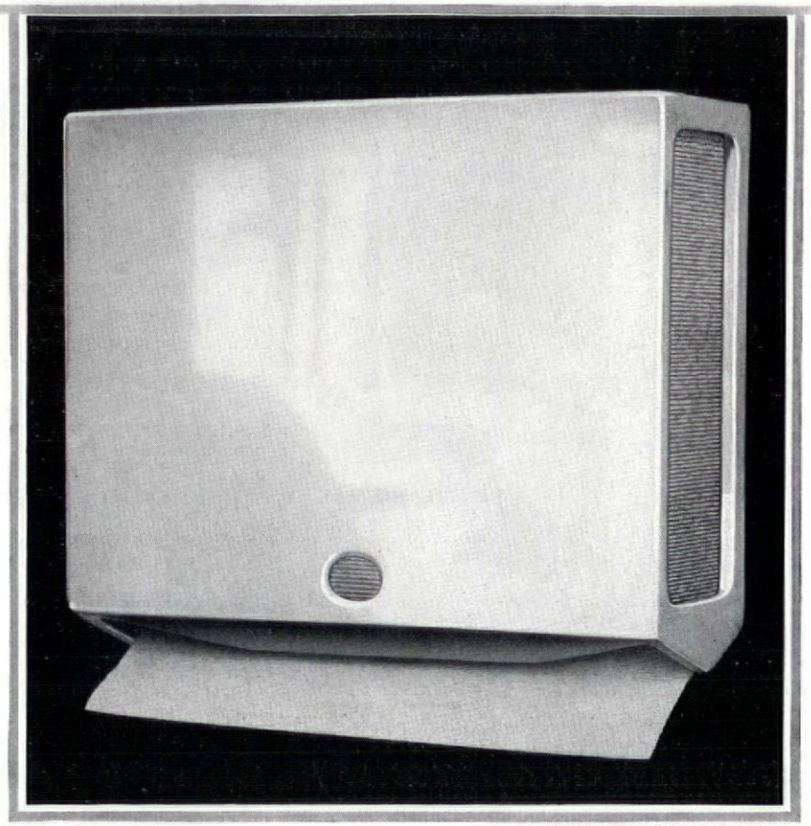
Please send your special architectural and engineering data on Pyrobar Roof Tile.

Name.....

Address.....

Architectural Forum, June, 1928

A.P.W. PAPER COMPANY, ALBANY, N.Y. U.S.A.



Onliwon towel cabinet, solid white porcelain. Can also be supplied with nickel silver door and Yale lock.

Soft . . absorbent . . highly economical

A SINGLE Onliwon towel is sufficient to wipe hands or face completely dry. For these towels are double folded—increasing absorbency and strength, so wet hands won't cause tearing.

The cabinets, too, are designed to look well—and to last. Supplied in a number of different styles, they are all neat looking . . . fool-proof . . . and easy to refill. Built strongly for lasting service.

Onliwon service cuts the cost of washroom maintenance.

A. P. W. Paper Company, Albany, New York, U. S. A.

Onliwon

TOILET PAPER AND PAPER TOWEL SERVICE

BOOK DEPARTMENT

REAL ESTATE TITLES AND CONVEYANCING

Reviewed by TYLER STEWART ROGERS

THE ownership of land and its sale or transfer are matters of fundamental interest to those engaged in any branch of the building industry, whether professionally as architects or as contractors or owners. The legal aspects of land ownership, titles, and conveyancing have become exceedingly complex through their gradual development from earliest times and through a lack of uniformity in state laws relating to the subject in this country. The authors of "Real Estate Titles and Conveyancing" have seen the need for a comprehensive treatise on the legal and practical aspects of land ownership and the transfer of ownership and have prepared a valuable reference book which combines the characteristics of a desk manual for the practicing lawyer; of a text book for students of law and real estate; of a help for those who are about to enter the exacting profession of title examiner, and of a comprehensive analysis of real property ownership for those who invest their funds in the ownership, leasing or mortgaging of land and real property. It is rare that a single volume serves so many purposes. Nevertheless, it may be said that this volume is of interest and value to all whose business brings them in contact with real estate in any of its many phases.

The work is divided into 20 chapters and 22 appendices in which correct legal forms used in real estate transactions are presented. In the first chapter the authors have discussed the "Development of Real Property Ownership." The two elemental systems of ownership,—the allodial and the feudal systems,—are briefly described as to their origin and their influence on subsequent legal practices. Attention is particularly devoted to the early forms of land holding in the United States and the original sources of title which form the basis for all land holding in this country. Chapter II is devoted to "Land and Its Constituents," and the third chapter discusses "Rights and Interest in Land." These two chapters constitute a condensed and valuable analysis of the legal background of property rights, beginning with a definition of property, an explanation of what can be owned, the constituents of land, including mineral rights, surface and sub-surface water, riparian rights, vegetable products, and fixtures. These matters directly affect owners' rights in property, and every land owner would profit by a clear knowledge of these legal distinctions. The third chapter takes up rights in realty, fees or estates of inheritance, extent of fee ownership, life estates, dower, courtesy and homestead. Here also are discussed the problems surrounding easements, rights of way, party walls and support of adjacent property; rights in light and air, future estates, tenancy and related problems. In these 46 pages is condensed an exceptionally clear exposition of the legal phases of real estate ownership, and if the book went no further it would be valuable to the layman for this material alone; valuable also to the real estate broker, and to the architect who desires to be familiar with the problems which must be encountered by his clients when purchasing land and erecting buildings.

The fundamental purpose of the volume is obviously to serve as a treatise for lawyers and title examiners. Beginning with Chapter IV on "Descriptions," which is devoted to the important matter of correctly defining the limits of property and identifying its location beyond all possibility of doubt, the authors have devoted five chapters to the preparation of legal documents associated with the transfer of real property. Chapter V covers "Land Surveys" and is in itself a condensed text book for civil engineers and surveyors. Chapter VI discusses the transfer of title and description, the development of the indenture form, and the manner in which title may change hands,—voluntarily, by descent or will, and involuntarily through legal action by others as in the case where ownership changes when a lien is enforced. Chapter VII is devoted to "Recording Acts" and explains the need for statutes requiring the recording of property and ownership. Chapter VIII is devoted to "Recording Offices" and contains a detailed list of the places where records which affect the title in real property are kept. The next section of the book is concerned with the practical problems of "Abstracting and Examination of Title" (Chapter IX); "Illustration of Examination of Title" (Chapter X); and "Report of Title" (Chapter XI). In this section there are given detailed instructions with illustrations of the actual forms used for a complete title search, examination and preparation of a title abstract and report. Chapter XII discusses the various forms of "Real Estate Title Actions" including foreclosure, partition, ejectment, action to quiet title, and sale or mortgage of trust property.

The practical nature of the remaining chapters is indicated by their titles. Chapter XIII relates to the business of "The Abstracter and Title Examiner," the nature of his organization, his plant and equipment, and his importance in the community. Chapter XIV discusses "Title Insurance"; and Chapter XV the "Preparation and Closing of Title." Chapter XVI is devoted to "Escrows"; Chapter XVII to "Real Estate Contract Law Suits"; and the three remaining chapters give illustrations of sale, exchange and mortgage loans.

The authors of this work,—Nelson L. North, Member of the New York Bar and Lecturer on Real Estate, New York University; and DeWitt Van Buren, also Member of the Bar, and Manager, Maintenance of Plant and Records, Title Guarantee and Trust Company, Brooklyn, are thoroughly equipped by experience, training, and a capacity to present their facts clearly and concisely, for the difficult task which they have successfully completed. The book was purposely constructed and arranged so as to quickly familiarize lawyers and realtors with the work of examining titles as conducted by abstract companies.

REAL ESTATE TITLES AND CONVEYANCING. By Nelson L. North and De Witt Van Buren. 719 pp., 6 x 9 ins. Price $6. Prentice-Hall, Inc., 70 Fifth Avenue, New York.

PUBLIC SCHOOL PLUMBING EQUIPMENT

Reviewed by C. W. SPENCER

IN designing schools, there is no detail which should receive more careful study and planning than the plumbing and sanitary layout. The importance of this can be readily understood when it is realized that defects in the sanitary plant of a school may cause serious injuries to the health of the students. These defects may be in the type of material used or in the way it is installed. Thus floors, walls and partitions made of material which is absorbent are very likely to give rise to unsanitary conditions which may have a lasting effect on the health of pupils. The fixtures themselves sometimes embody imperfections in design and material, as for instance porcelain, which is likely to craze or crack, after which it becomes absorbent. A round toilet bowl is not suitable for school purposes, since it permits liquids to spill over. In addition to this, the workmanship of installations is very important, involving a study of proper heights and spacing. It is considerations such as these which should govern the selection of an ideal set of school plumbing fixtures. Although many manufacturers offer plumbing fixtures which are said to be suitable for school purposes, none of them have a line of fixtures specially designed to be used in schools. This is probably due to the fact that school administrators and planners have not made the need for such a line sufficiently apparent, as no doubt manufacturers of plumbing equipment, among whom there is keen competition, would be more than willing to supply such a line if they knew exactly what the requirements were and that the demand would be sufficient to warrant the expense. Since there is no such ready-made system of school plumbing, it is necessary for those in charge of planning schools to make a careful study of the requirements in each particular case and to make them fit as nearly as possible the qualifications of the fixtures designed for hospitals, apartment houses, jails, factories, homes, or other types of buildings.

Probably the best way of approaching such a problem is to set up a group of standards by which all the fixtures to be chosen may be judged. These standards are the composites of various criteria or factors upon which the standards are based. Although it is primarily the duty of school administrators to set up standards and requirements of the units and materials to be used in school building, such administrators very frequently have not made a sufficient study of the problem and leave much to the discretion of the architects in charge of designing buildings. It is, therefore, very important that the architect know something of the numerous criteria going to make up the standards of a modern school sanitary system. Up to the present time, there probably has been no complete treatise on this subject, although a great deal has been done by educational engineering in developing the standards for other details of school

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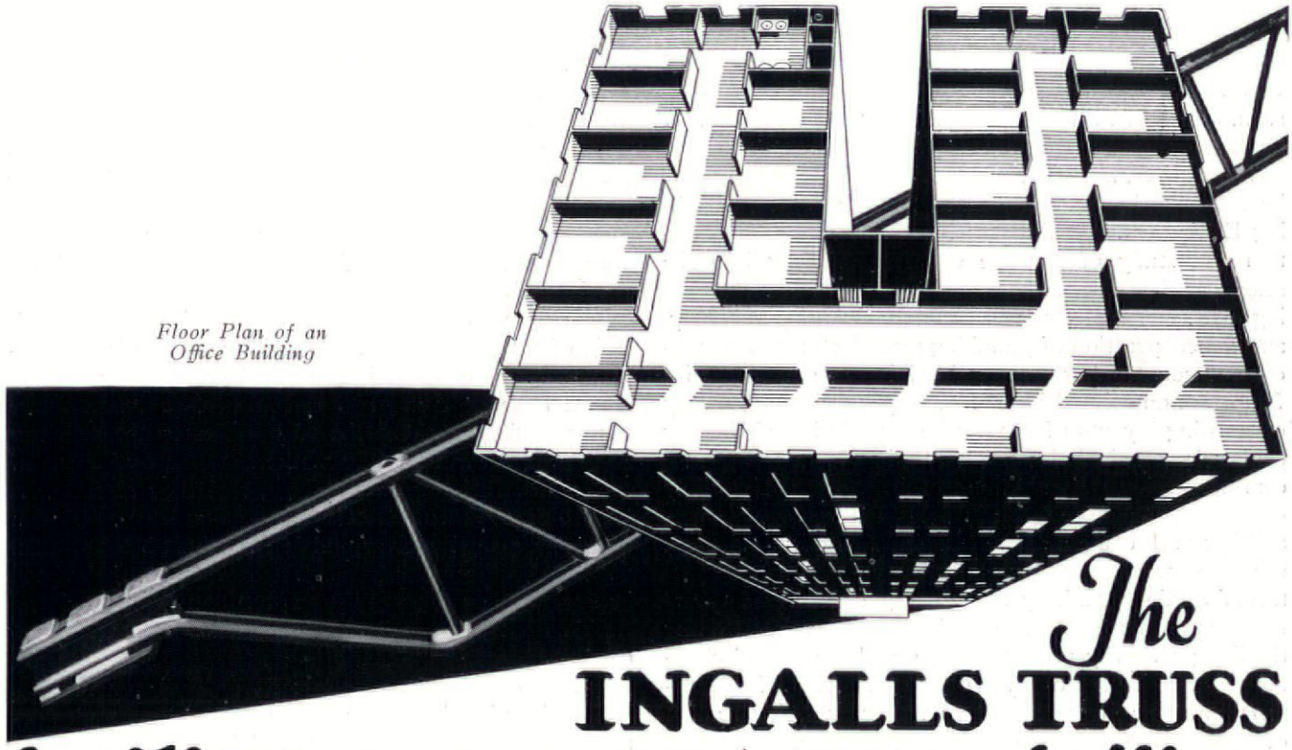

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work, such as the sizes of classrooms. Such information as is available from direct experience and experimentation had not been gathered in a complete work until very recently, and the standards of school plumbing, as such, have not kept pace with the rapid development of plumbing equipment designed for other buildings.

The subject, however, is well handled in a recent work by Minor Wine Thomas, called "Public School Plumbing Equipment." This book represents much investigation and study of possible elements entering into the selection of equipment for the sanitation of school buildings. Existing plants have been studied very carefully, and the coöperation of plumbing manufacturers throughout the country has been enlisted in the search for information on this subject. Not only has a careful study of existing layouts of schools been made but also study of hotels, public buildings, office buildings and public comfort stations. In addition to this, an exhaustive study of published material in the fields of school buildings, architectural equipment, sanitation, hygienic plumbing, school surveys, sanitary surveys, plumbing manufacturers' catalogs, sanitary codes and plumbing trade journals has been made. The subjects are developed along the line previously suggested here, and the second chapter contains a very clear, concise description of the criteria involved in the school plumbing as well as a list of criteria and a short explanation of each. The next chapter deals with the standards based on the criteria and experimental evidence. In this chapter such experimental investigations as have been made are presented as evidence in support of the standards set up. The following chapter is devoted to standards based on criteria and experiment but not supported by experimental evidence. In this field there is need for much further work, but such facts as are available are here presented in a very convincing manner. A checking list is given presenting a summary of criteria to be considered in standardizing plumbing equipment. Each item in this chapter represents a criterion which is discussed in the former chapters but is here reduced to a word or phrase. A summary of recommendations is also given containing a partial list of recorded standards which involve the best information yet worked out in conformity with the criteria of the checking list. Only those standards are suggested for which there is some evidence in their support drawn from experimentation or from experience. These recommendations should be very useful to the architect in making a careful study of the sanitary equipment of any school building or buildings, and they should also lead to the development of a line of plumbing equipment much more fitted to the needs of the school building than any that has been developed. The remainder of the book is occupied by a selected list of books and articles.

This book is not intended as a complete treatment of the subject of plumbing in its entirety and does not attempt to deal with pipe layouts or drainage systems but confines itself to study of the fixtures and their surroundings. The fixtures discussed include showers and swimming pools, which should be of especial interest.

PUBLIC SCHOOL PLUMBING EQUIPMENT. By Minor Wine Thomas. 128 pp., 6 x 9 ins. Price $1.50. Bureau of Publication College, Columbia University, New York.

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MODERN ARCHITECTURAL WORK. By Paul Bellot, O. S. B. A portfolio of plates, with text. Price $50. Marshall Jones Company, 212 Summer Street, Boston.

IN a limited edition folio monograph, in portfolio form, this work is devoted to recent ecclesiastical buildings designed by a French Benedictine monk. The volume contains 29 pages of appreciative and critical text, a full index of illustrations, and 116 plates, eight of which are in color, while 16 show plans, elevations, sections and details. The subjects considered are seven in number,—Quarr Abbey, in the Isle of Wight and, in Holland, St. Paul's Abbey, Oosterhout; the parish church, rectory and school in Noordhoek; the sisters' convent and kindergarten at Bavel; the college and chapel of the Augustinian Fathers, at Eindhoven; an enlargement of the parish church, at Heerle; and the cemetery chapel at Bloemendaal. Each one of the seven subjects is given exceptionally full photographic representation, so that no questions that may arise in the reader's mind are left unanswered. To those who are especially interested in examining the most recent phases of ultra-modern architectural development, the adequacy of the illustrative material for each building will prove a welcome contrast to the usual fragmentary and insufficient mode of recording contemporary work.

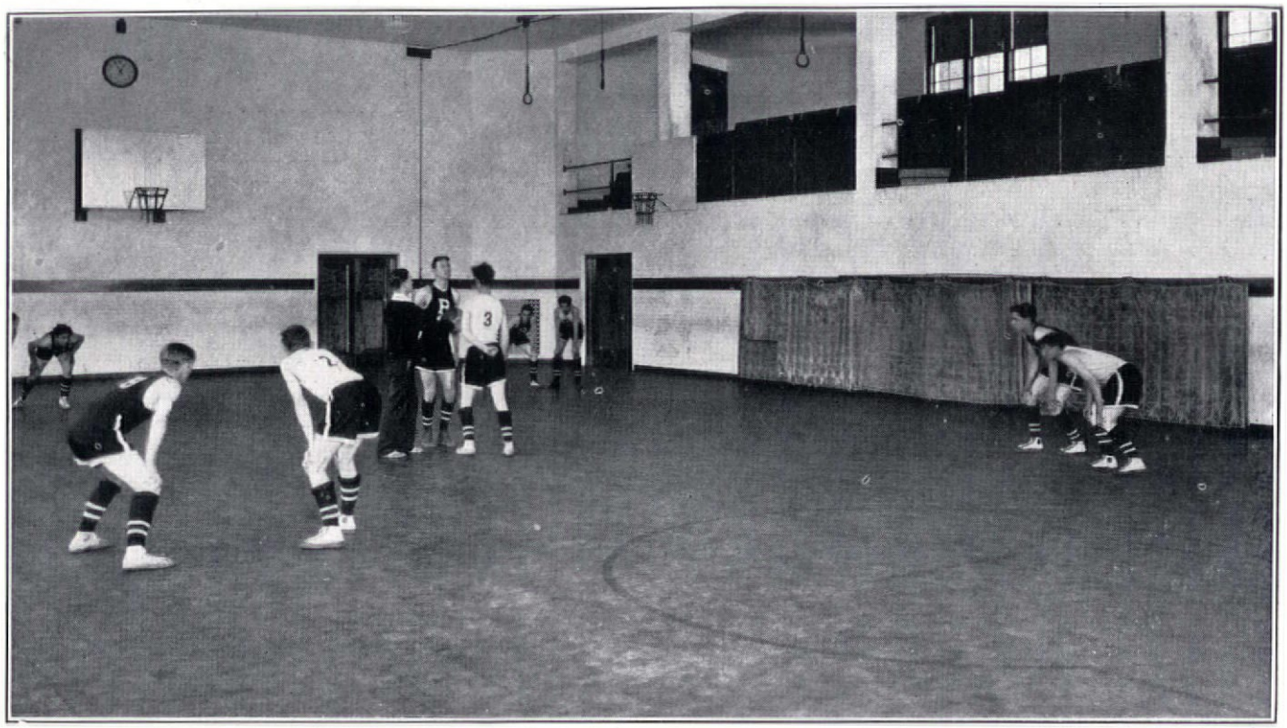
Dom Paul Bellot, to the exposition of whose achievements the volume is solely confined, was born in Paris in 1876. Obtaining his diploma from the Ecole des Beaux Arts at the age of 18, he entered the Order of St. Benedict at the Abbey of Solesmes. When the religious orders were expelled from France, the congregation to which Dom Bellot was attached removed to the Isle of Wight, where Quarr Abbey was ultimately built to receive them. In 1906, at the direction of his abbot, Dom Bellot went to Oosterhout in Holland to begin a monastery for monks who had taken refuge there after their expulsion from France. Nine months later, returning to the Isle of Wright, he devoted himself to the first permanent building at Quarr Abbey. At intervals thereafter he labored upon the completion of the abbey and at the different projects undertaken by him in Holland, all of which are here shown *in extenso*, and give a complete record of his work from the beginning of his practice.

Quite apart from any interest the buildings may possess in themselves, the circumstances of their origin exhibit a curious reversion to the mediæval method of procedure. In the middle ages the monastic bodies were the conservators of the art of building, as they also were of the other arts. When a church, an abbey or a castle was to be built, application was made to the abbot of one of the great monasteries who, thereupon, supplied the architect in the person of one of the monks skilled in design. The monk entrusted with this commission visited the site, prepared the drawings and supervised the construction of the edifice. There is sufficient documentary evidence to show that this was a recognized practice of the period, call the monkish designer architect, master mason, master craftsman or whatever you please. This usage accounts for numerous phenomena in the development and spread of architectural modes that it was customary, until comparatively recently, to attribute to mere coincidence. In Dom Bellot's case we see the old practice revived in all its essential points.

All the examples of Dom Bellot's work here presented are of brick construction and, one and all, they are expositions of the purely modern trend of architectural design, modified to some extent, however, by a more or less active consciousness of tradition. They are not so conspicuously radical in character as a great many of the recent Dutch and Scandinavian structures, nor so daring in conception. Neither have they, for the most part, the grace of form disclosed by several of the great brick structures that have distinguished the designing of public buildings in Sweden. So far as the composition of mass goes, the most convincing in external character are the abbey church at Quarr, and the octagonal cemetery chapel at Bloemendaal, in Holland. The other works are by no means lacking in vigor, but their exteriors offer none of the imaginative boldness that now and again enlivens the creations of Dutch, Danish or Scandinavian men of the newer school, nor do they afford the engaging stimulus of adroit or naive solutions of minor features occasionally to be found in both the public and domestic designs of the ultra-modern camp. In the exterior of the Oosterhout group, one is reminded of some of the barrack-like institutional brick architecture that marked the late Victorian Gothic episode in both America and England, and the question involuntarily arises, "What actual advance or betterment has occurred since then?"

Taken all in all, Dom Bellot's management of interiors is far more convincing than his achievements in the realm of external composition. The refectory in the conventual buildings at Oosterhout manifests an all-embracing quality that may equally well win the approval of either the pronounced modernist or the staunch adherent of tradition. The interior of the abbey church at Quarr, too, has much the same stable value that would elicit commendation from either school. On the other hand, the roofing system of the monastic church at Oosterhout, where the structural scheme and the fenestration are ingeniously interwoven, is both original and highly interesting, and likewise one of the most significant contributions Dom Bellot has made to current architecture. At the same time, it will be found worth while to scrutinize Dom Bellot's use of elliptical arches and low-haunched pointed arches, the latter not always pleasant in their application, although striking. In the matter of fenestration and the admission of light, in the English and Dutch work alike, distinctly interesting things have been done, although in a number of instances the angular brick tracery, while logical enough in the employment of material, is not comfortable to look at. Striking results are also gained by the use of vari-colored brick and divers-colored mortar joints.

Dom Bellot might be characterized not inappropriately as a "conservative modernist." His work is universally dignified and serious, and he never resorts to spectacular feats. While his buildings often lack suavity of execution, they are always honest in their obvious construction and fidelity to the structural aptitude of the materials used. Furthermore, whether his structures please or repel, they invariably possess a distinctive quality and afford food for thought. Careful examination of the plates in this volume cannot fail to repay anyone who is seriously concerned with the possibilities of interpretation in brick, a subject of importance to architects.



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From a Pen and Ink Drawing by Joseph Sinel

The Editor's Forum 39

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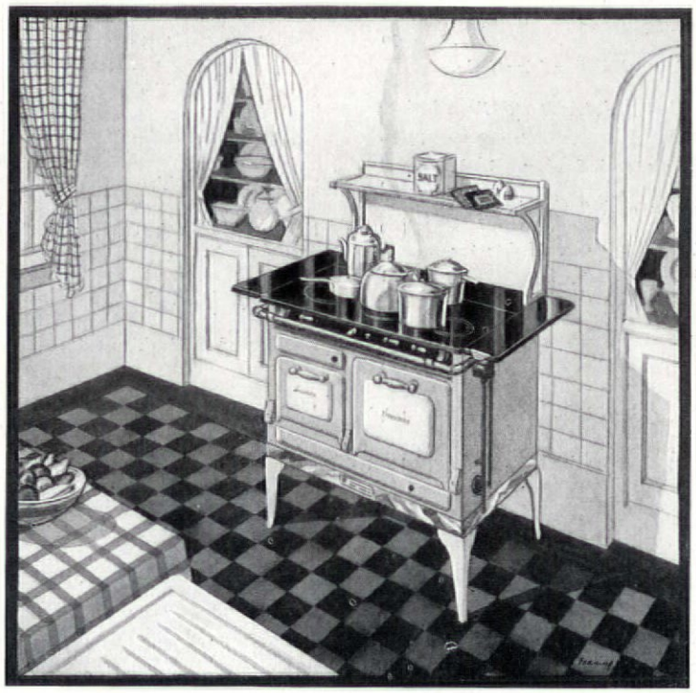

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"FINANCE AND CONSTRUCTION"

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The Architectural Forum

THE
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BANKING SCREENS

BY
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OF HOLMES & WINSLOW, ARCHITECTS

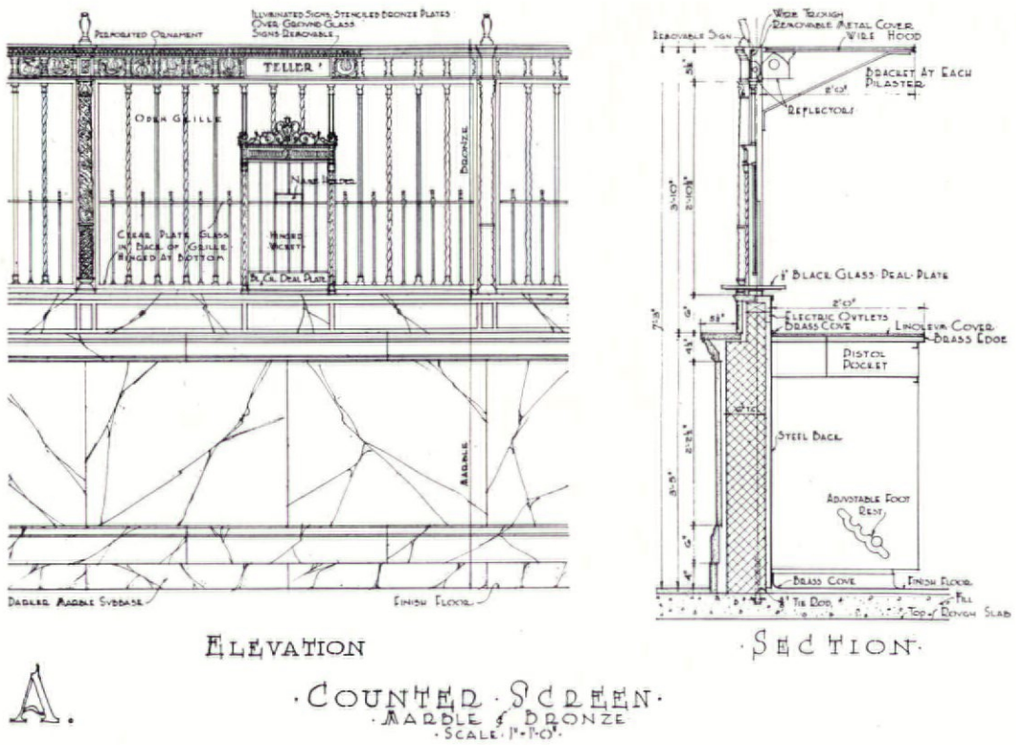
THERE has been, in the past two or three years, a decided trend in favor of discarding the high banking screen for a type of low banking counter, as depicted in illustration "F", and insofar as we are concerned, it has been the bankers themselves who have seen or heard of this type of counter who have insisted that it be used, or at least strongly considered. It was our first thought that, from an architectural point of view, the high screen was a necessity, but since we have carried out recently quite a number of banking rooms with the low type screen, I must confess that in my judgment, it does not in any wise affect the architecture of the room adversely, but does open up the quarters, securing a better appreciation of the merits of the room itself. We have shown in illustration "F" a counter that has been built several times by ourselves, and it is highly thought of by the bankers using it.

The normal height of the ledge and working counter is 41 inches, and we have arranged the upper ledge (that is, the ledge over which the money or pass book is handed) 10 inches higher, although in some cases this is only 7 or 8 inches over the counter. We keep it the 10 inches so that the tellers may have a practical space between the working counter and the upper ledge for storage of change machines or for the protection of stacked bills, etc. We believe, however, that should this low type be used, there should be at least one low wicket, that is a wicket the bottom of which is not over 41 inches from the floor as we have shown. This will be found a necessity for the use of small children who have recourse to a bank without their elders. The backing of the low counter should follow the high type of screen in regard to arrangement of cash drawers, cupboards, etc. The lighting of the low counter is effected by a continuous reflector just under the upper ledge, but set back in the corner as shown in the section of illustration "F."

Most banks insist on cages for the individual departments, and we have provided a low cage of metal (although it may be of wood or wire) with the solid portion extending up to the top of the marble ledge with glass (preferably clear plate glass) from the ledge to the top line of the bronzework. This will give the teller, we believe, sufficient security. Of course, a locked gate is provided at the rear of the cage. Building and loan associations, however, do not usually require cages for their tellers, and the low type of counter is especially adaptable to them. I am honestly of the belief that we are only seeing the beginning of this practice in this country, and that the more bankers become familiar with it the more general its use will become. Practically all bankers are talking about it, particularly if they are about to build new quarters. The idea of low counters for banking originated in Europe, and is much in vogue there. It has been suggested that with the low type of counter, the bank is more exposed to the danger of daylight hold-ups, but we believe this will work out in practice in just the opposite way, for if a hold-up were attempted it would be observed by every employe of the bank, and some employe not in the line of danger would be able to either fire a shot at the marauder or at least release the burglar alarm, the latter being what the robber most fears, almost without exception.

The one important attribute of this type of screen or counter, and the one large factor in favor of its ready adoption by bankers, is the personal banking idea it makes possible,—the close contact between depositor and teller,—and the further carrying out, behind the screen, of what at present exists between the officers and the depositor,—that close, personal banking idea without which any bank must expect to eventually fail, and which most banks encourage.

We show in the cuts accompanying this article, five types of high screens of sufficient diversity, and I believe that the individual designer may vary any type to conform to his own ideas. These screens are all practical and have been constructed, with variations, many times by our firm in various bank buildings. The first scheme, lettered "A," is the most likely to be required in a high class banking room, owing to the selection of fine materials,—marble for the lower part, or "die," as it is called, and bronze for the upper portion. The tile backing is the first portion erected, and while this is going



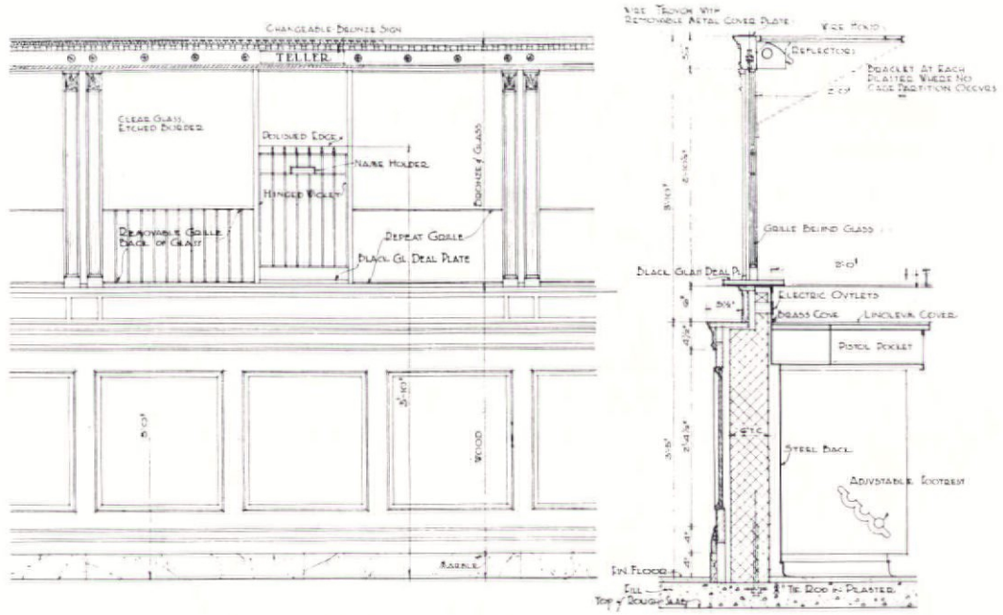
ELEVATION

SECTION

A. COUNTER SCREEN
MARBLE & BRONZE
SCALE 1"-1'-0"

up it is built around ⅝-inch rods, the rods extending clear to the top, one rod to a column or pilaster. Then the marble facing is applied, and we think it well to have a darker marble for the sub-base. The bronzework follows the marble, and after the pilasters and cornice have been set in place there is a nut with washer applied to the top of each ⅝-inch rod, and the tightening of this nut stiffens and holds the screen in place. The screen if over 10 feet in length will, however, need greater stiffening, and that is accomplished by the cage partitions; if no cages are contemplated, a ¾-inch rod from the top of the screen to the back wall may be necessary on approximately 10-foot centers. The counterwork at the back will not hold the bronze in place if no cages are installed. We have, in some screens where no cages have been installed, substituted a light T-iron for the rod and then stiffened the whole screen by a diagonal strut at the floor, being careful that the strut did not extend more than 16 or 18 inches out from the T-iron. This screen could have either high or low wickets at the option of the banker. Some sections of the country prefer what is known as the low wicket, that is with the deal plate level with the ledge and the counter back of it, while other sections prefer the high wicket as illustrated in this detail. The width of a wicket should be about 14 inches, and it is very important that the top of the wicket should not be too low. We usually make it not less than 5 feet, 6 inches from the finished floor, so that a person of average height will not have to stoop to talk with the teller. The "New Accounts" wicket in a savings bank should be anywhere from 2 feet to 4 or 5 feet wide, and we have installed them even wider in certain important instances.

Regarding glass in a screen of this type, it could extend from the top of the marble up to the first horizontal member, or from the top of the marble up to the cornice; or it could be eliminated altogether, whichever the banker might elect. Usually the glass is etched for the lower portion and clear above, or it may be, and sometimes is, clear throughout. We like to use an etched border on the glass to give it some distinction. A chipped glass may be used if preferred for the lower portion. No glass is used, of course, in the wickets. The bottom of the wicket must be kept 1½ inches or 2 inches above the deal plate, and wickets may be simply hinged, or as we sometimes make them, hinged and partially telescopic. Bankers, as a rule, are not roofing the wire cages all over, as they formerly did. Instead of this we install a continuous wire hood at the top of the screen about 2 feet wide. This is supposed to prevent a thief from making a hasty jump over the



ELEVATION

B. COUNTER SCREEN.
WOOD & BRONZE
SCALE 1"-1'0"

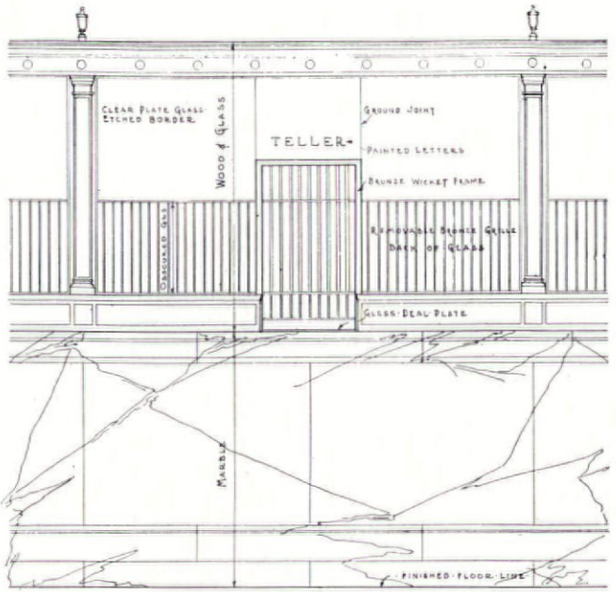
screen by stepping from the ledge. While a present-day thief hardly ever attempts this, it at least gives a slight feeling of protection to the teller.

The lighting of the counter from the screen is most important, and we provide a continuous reflector at the top and the back of the screen for this purpose. It should be arranged to light up in bays, with a pull chain back of each pilaster. The reflector should have a diffusing glass on the bottom to reduce the glare. It can easily be arranged so that this reflector with additional parts may be used to light the banking room by throwing the rays up to the ceiling. The reflector may also be used for lighting the sign in the frieze of the cornice, or a separate small reflector may be installed for the sign, as shown in the illustration. At this point it may well be said that no two banks require the same designation of wickets, and that each banker must be consulted to determine just what he requires.

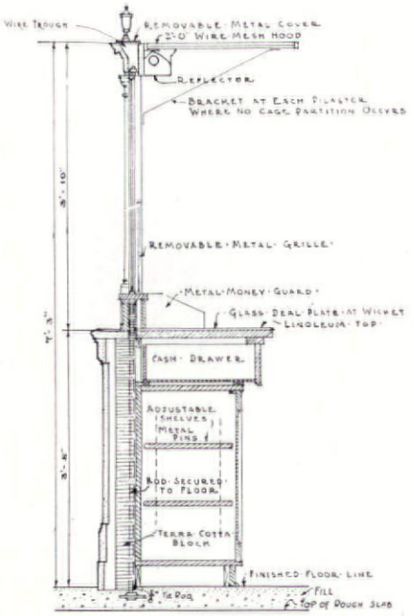
In the selection of the marble, see that a sound marble is used, either domestic or imported, one that will require very little waxing, for the wax generally falls out after a year or two, producing unsightly work. If a highly veined marble is used, it should be backed up with a cheaper American marble. The color of marble selected should depend upon the color scheme of the room, but we strongly prefer a one-color marble that is without much veining, and one that is soft in color and rather unobtrusive.

The ornamental work of the columns, pilasters and cornice of the screens shown in illustration "A," are cast bronze, while the plain portions are extruded. It is much more reasonable in cost if the cornice, for instance, is of extruded bronze with the cast portions applied, instead of the whole cornice being of cast bronze. The vertical bars in the illustration are of stock hollow shapes, a plain square bar set on the diagonal, and every other one twisted. These bars also have small and simple cast bronze caps and bases. The upright bars in the wickets are also of small, stock hollow shapes. The finest effect in cast bronze work is obtained by what is known as "lost wax casting," and such a casting is depicted in the illustration of the banking screen in the Federal Trust Company, of Newark, designed by Dennison & Hirons (p. 904). In ordinary bronze castings it is not possible to obtain any undercutting, but any degree of undercutting desired is possible with this process. It is very much more expensive to produce than the ordinary castings, however, owing to the fact that the wax model is destroyed in the process of casting and that instead of one model's serving for countless numbers of similar pilasters or other ornaments, a separate model is required for each column, pilaster or other ornamental feature.

There are many methods of designating the wicket. In screen "A," it is shown in the cornice, the letters being perforated on a bronze plate with ground



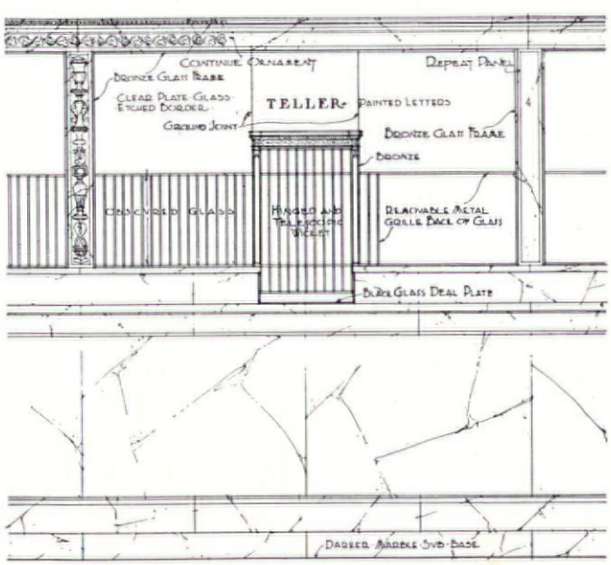
ELEVATION



SECTION

C.

COUNTER SCREEN
WOOD & MARBLE
SCALE 1"=1'0"



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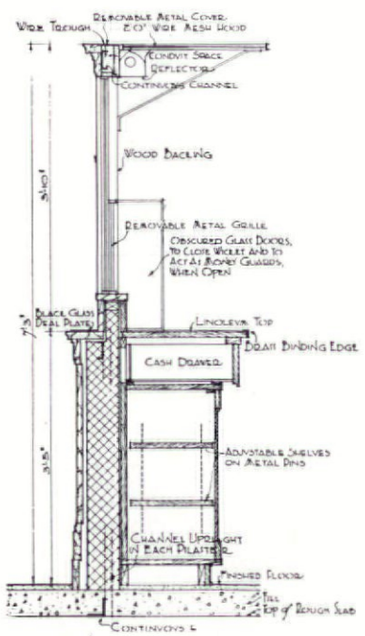
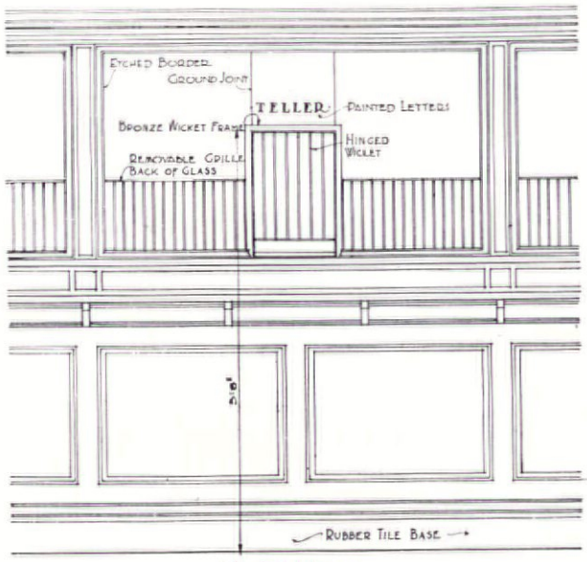


SECTION

D.

COUNTER SCREEN
MARBLE
SCALE 1"=1'0"



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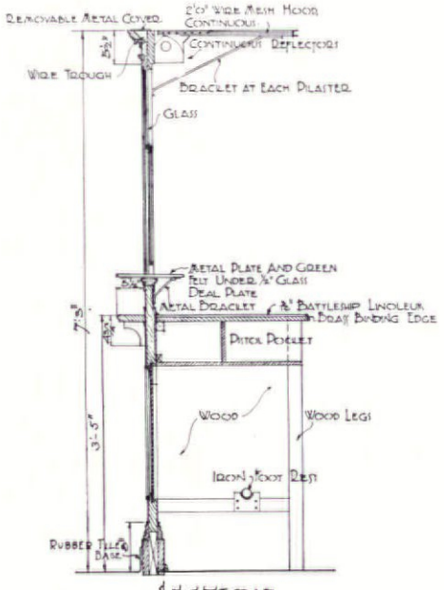
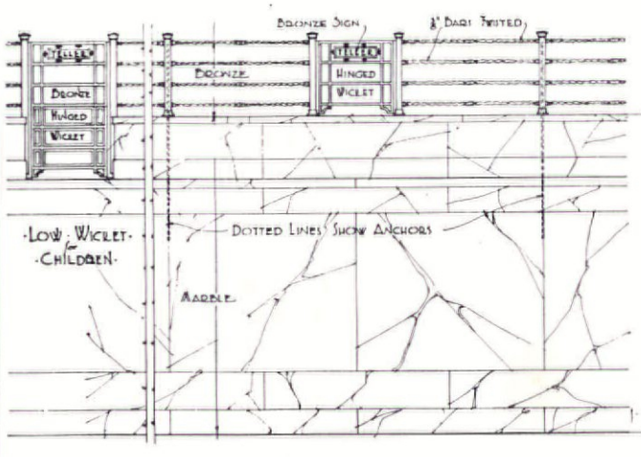


SECTION

E. COUNTER SCREEN.

WOOD
SCALE 1"=1'-0"



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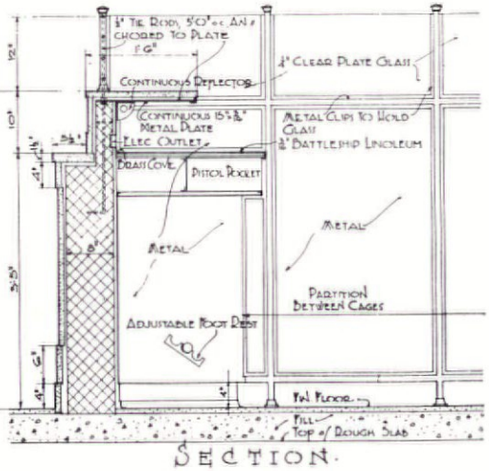
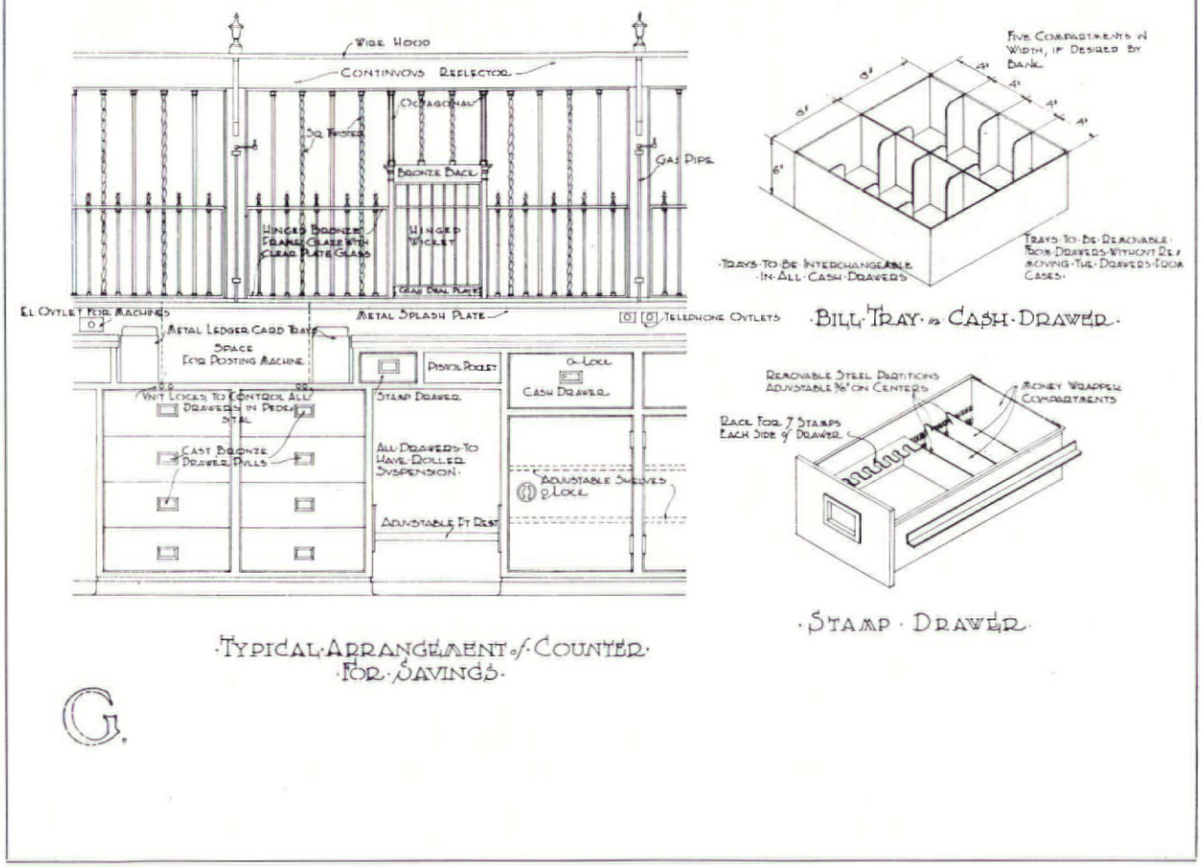


SECTION

F. LOW COUNTER SCREEN

MARBLE & BRONZE
SCALE 1"=1'-0"



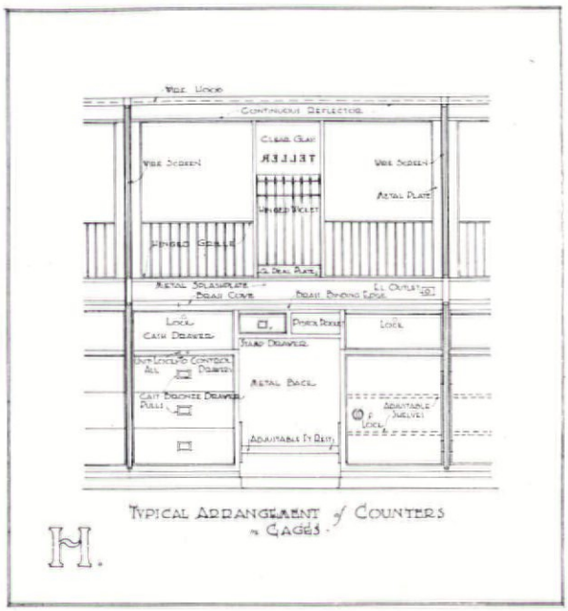
Typical Arrangement of Counter for Savings.

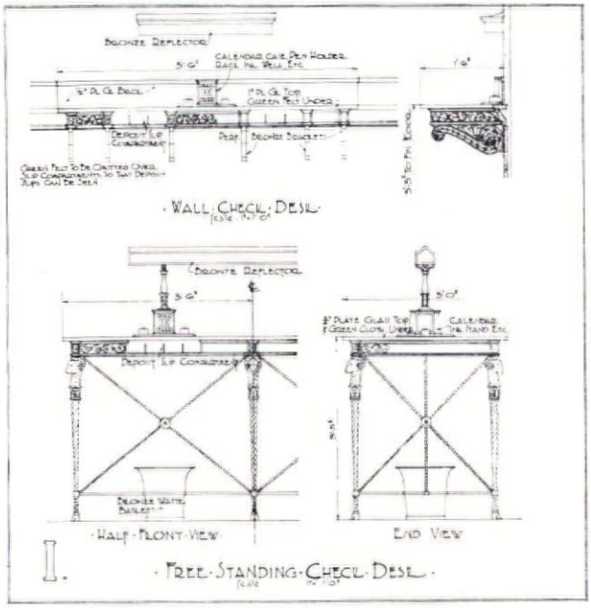
G.

glass back of it, and a small reflector to illuminate it. We always construct these signs so that they are interchangeable. It is also possible to have the same kind of an arrangement in the small cornice just over the wicket, but the letters would of necessity be smaller. There is still another method in which the sign stands out from the frieze of the cornice at right angles to the cornice. It may be either illuminated or not, as desired. The simplest and least expensive method, which is just as efficient, is the painting of the letters on the plate glass in gold with black edging (to make them more easily distinguishable) just over the wicket. If the plate glass of the screen is made up in three sections to a bay, as we have shown in several of the cuts, these also become interchangeable. The plate glass, if completely filling the entire space between the marble and cornice, should be made up in three vertical sections with a ground joint between the sections, or a small plain or ornamented bronze section could be introduced to cover the joint, such is as shown in illustration "B." In earlier banks it was the custom to have one large sheet of plate glass with only a cut-out for the wicket, but the banks were usually forced to replace the glass very often, due to breakage caused by settlement in the building, or to a heavy jar or impact or else to some other vibration.

We have found some bankers who wish to get away from the cold appearance of marble in a screen, and we have shown in illustration "B" a screen of which the lower part is wood. If richness is desired, it should be either mahogany, walnut or oak finished in soft tones. It could even be of wood painted, but unless the bank wishes to keep renewing the finish, it should be of the stained hardwoods, as just mentioned. It will be noted that this screen is constructed in the same manner as screen "A" except that wood is substituted for marble, and that another design of bronze upper screen is shown.

One illustration on page 904 shows a method of providing for a telephone to be used by two adjoining tellers. It shows a device that revolves and has a system of upright bars which always close the space between the cages, no matter which teller is using the telephone. Immediately under the telephone is a pass basket. The latter is an absolute necessity between the cages. There is also shown a detail of another type of pass basket, called a "tilting basket." We find this takes up much less room in a cage, where space is always at a premium, than the old type of wire pass basket that projected at least 5 inches into the cage on each side.



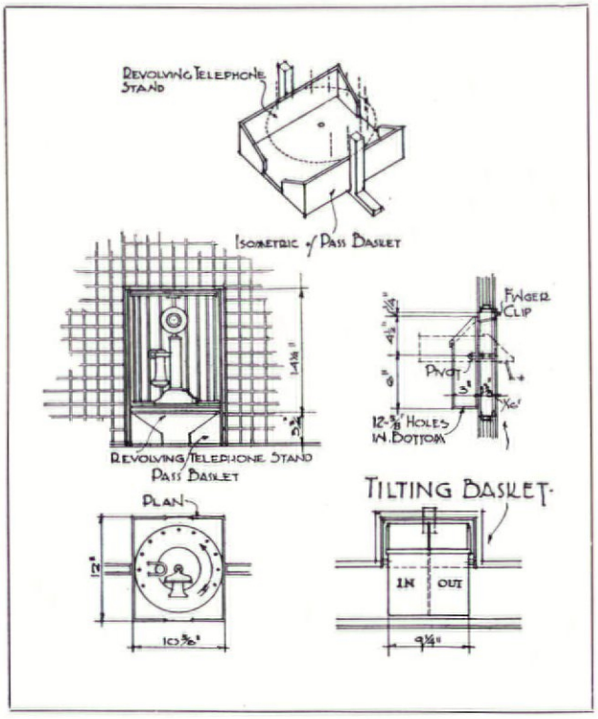


In illustration "C" is shown a modest cost screen with marble for the lower portion and wood for the upper part. We have shown this screen backed up with 4 inches of brick or tile rather than 6 inches. We do not believe the backing should ever be of less than 4 inches, and it is never necessary, in our opinion, to make it more than 6 inches, except where the low type of counter is used. This illustration shows a low wicket, and when low wickets are supplied for a screen, a bronze or baked enamel plate, approximately ⅛ inch in thickness, should be supplied for each side of the wicket on the counter side, so as to prevent anyone so inclined from fishing through the wicket with a wire for any bills exposed on the counter. A better but more expensive money guard than this may be provided by having two hinged glass doors in small bronze frames, (as depicted in illustration "D"), which when open will act as the proper guards, and when closed will show that the wicket is not in use. On the glass may be lettered in gold the word "Closed." There are various means used to indicate that a wicket is closed, and a simple and inexpensive method is to have each wicket supplied with a thin mahogany panel (with a small brace on the back) on which the word "Closed" is lettered in gold. This panel should extend from the top of the deal plate up to the top line of the protecting grille back of the glass and should be the full width of the wicket opening.

In illustration "D" is shown a complete marble screen. The pilasters and cornice may or may not be carved, according to the taste and importance of the bank. It is necessary, for the support of an all-marble screen, to have a channel iron frame instead of the rod uprights required for the other types. Two-inch or 2½-inch channels may be used, one for each pilaster, extending from the floor to the cornice, with similar channel sections, one running horizontally just below the ledge, and the other at the cornice line. On account of the weight of the material and to get proper fastening, the channel frame should be used.

Inasmuch as we have shown a low wicket in this scheme, a word about the deal plate would not be amiss. We usually supply deal plates in black glass, hone finish, as this type of glass lessens the strain on the teller's eyes. It is ½ inch in thickness and extends, in one piece, from approximately 1 inch from the front edge of the ledge to the back line of the counter. It should be countersunk so that it will project only 1/16 inch above either the marble ledge or the linoleum on the counter top. It also should be the full width of the wicket opening. One-half-inch plate glass with black billiard cloth stretched neatly under it, may be used in lieu of black glass if desired. The deal plate for the high wicket shown on several of the schemes is of similar glass, the full width of the wicket, but about 10 inches in depth. In illustration "E" is an all-wood screen which is the most reasonable of all, in cost. No channel iron frame nor rod uprights are necessary. If cages which would give the screen stiffness are not to be installed, light rods will have to be run from the cornice back to the wall, or some other means must be devised to hold the screen properly in place. This type of screen may be constructed of any hardwood desired. It will be noted that we have supplied a ledge even for this screen, because we believe a ledge necessary, not only to afford a place on which to write while standing in line, but for the general comfort and convenience of the patrons as well. It will improve this type of screen if a bronze glass mould is used to hold the glass in place.

We have shown in these illustrations two schemes for the counter work, one for a business bank and



Left. Telephone Stand with Pass Basket Between Cages

Right. Tilting Pass Basket Between Cages



Bronze Bank Screen for Federal Trust Company, Newark

Dennison & Hirons, Architects

one for a savings bank. That for the business bank shows two pedestals (as the compartments at either side of the teller's leg-room are called), to a cage, although we have many banks that have only one pedestal; the equipment we have shown we believe is complete. We usually make the two drawers on either side of the wicket interchangeable, as tellers have distinct preferences in the matter of placing the cash drawer on the right or the left side. The knee space should be ample and not less than 20 inches in width. We usually arrange a rubber stamp drawer (as shown on sheet "G"), and also a pistol pocket just under the counter at the knee space. On the floor, in the knee space, should be the rod for the burglar alarm daylight hold-up system. There should be one rod for each teller, although in some instances we have installed fewer.

A typical metal cash tray that fits easily into the cash drawer is shown in illustration "G." This should be either four or five compartments wide and two sets in depth. When four are used, the teller places the $1 and $2 bills in one compartment, and the others are for $5, $10, and $20. The cash drawer, whether of wood or metal, should be hung on ball-bearing extension hangers, so that the back compartment may be readily used. There should be numerous base receptacles and telephone outlets in the "splash plate," the vertical space between the top of the counter and the beginning of the grille.

Illustration "G" shows the counter work necessary for a savings bank, and shows a sinkage in the counter for the posting machine, used by a savings bank, with space at each side of the machine for card trays. It is much more practical and makes a better looking counter in every way to arrange for the posting machine in this manner rather than have it set on the top of the counter. Sheet "I" shows a free-standing check desk and a wall check desk, both of which may be varied or simplified as the designer wishes. Both types must have slip compartments, a set of four or five for each patron. If it is a free-standing check desk, a set of compartments should be on each side; but if the desk is long enough to accommodate six or eight persons while writing, at least four sets of compartments should be installed with either three, four or five compartments to a set. A wall desk, if only 4 or 5 feet long, should have a set of four or five compartments. The glass on top of the desks is never less than ½ inch and is usually ¾ to 1 inch in thickness and should be of plain plate glass with billiard cloth under it. It must be arranged, however, that the patron can see through the top of the slip compartments; in other words, omit the billiard cloth immediately over the compartments. Of course both types of desks must have good lighting facilities, reflectors preferred, and the necessary calendar cases with ink wells and pen trays, not to mention waste-paper baskets. The electric wiring for the lighting of a free-standing check desk leads from the reflector, is fastened to the under side of the desk, and then is carried through one of the legs down through the floor, terminating at a regular outlet box. At least this is the usual method of wiring it.

MATERIALS AND COSTS OF BANK INTERIORS

BY
WALTER CHARLES VOSS
CONSULTANT IN ARCHITECTURAL CONSTRUCTION

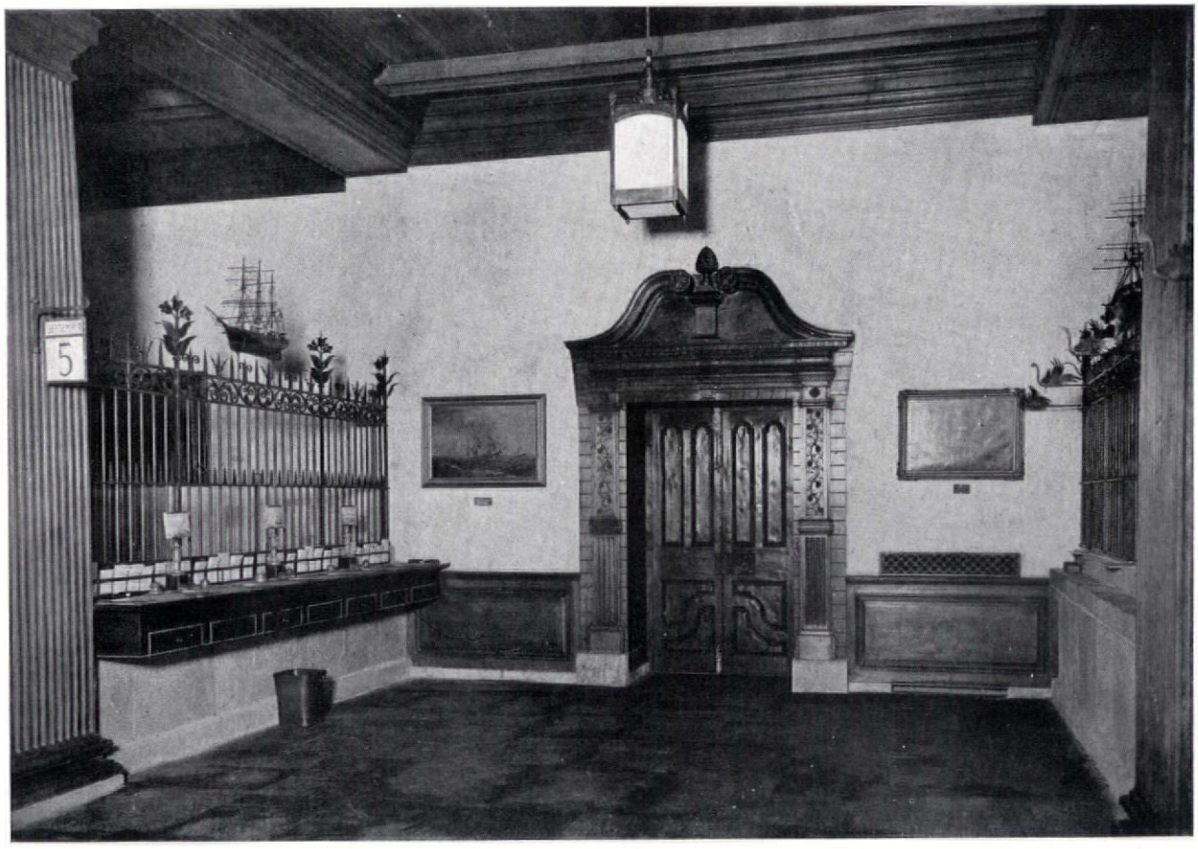
THE materials forming the interior floors, walls or ceiling surfaces of banking rooms may be divided into several basic classes for each of these elements of the structure. The *floors* may be finished in clay products, concrete, cork, linoleum, magnesite, natural stone, rubber or wood. The *walls* are usually finished in one or a combination of clay products, natural stone, plaster or wood. The *ceilings* may be finished in one or a combination of clay products, concrete, glass, plaster or wood, with painted or fabric finishes used in instances where desired. In most of these materials, interesting and pleasing effects may be obtained by a variety of colors, textures, shapes and sizes. *Durability and maintenance* costs are dependent upon such qualities as resistance to abrasion, fire, absorption and stains, and quality of workmanship. Variations in combinations of basic materials, as well as the selection of the material itself, will greatly influence character, and particularly costs. Many small units will increase application or installation costs, and irregular areas will increase cutting costs. At best, the values herein given are only general averages, intended as indications only.

Floors

Clay products vary in size, shape, color, and finish. As such, they present the most adaptable materials which the architect has for floor work. They may be divided into two general classes,—quarry and mosaic. Maintenance for these floors consists chiefly in repointing of joints and replacing of damaged or worn units, and may reasonably be classed as very low. Cleaning is simply and quickly accomplished. The ultimate cost for these floors should probably be rated as average.

Concrete is used in pre-moulded units or is cast in place to pattern. The past few years have seen an unprecedented development in this kind of work which makes this product exceedingly flexible. Ordinary concrete floors are not advisable for bank interiors, unless previously marked to pattern and then stained.

Terrazzo. The most common cast-in-place floor is terrazzo. This is combined with brass separation strips to form pattern and shrinkage planes. Color is almost invariably obtained by exposed aggregate finishes, although many use metallic oxide pigments



An Effective Use of Wood, Plaster and Wrought Iron



Granite Flagging for Floors; Carved Pine Trim with Pine Paneling and Ceiling

in addition. Pre-cast tiles are made with terrazzo and patterned effects, and variation in shape is produced as freely as with clay tiles. The maintenance of these floors takes the form of patching of cracks or oiling and waxing, and may be classed as low. The ultimate cost to the owner should be considered average.

Cork is either a "tile" or a "carpet." It is made as a natural product or as a composition employing pigments, gums and oils which slightly vary both color and durability. It is practically noiseless. The tile are obtainable in a variety of sizes, shapes and patterns, and some of the carpets are manufactured in patterned sheets or rolls. It is naturally of a somber color. *Linoleum* is in reality a cork composition product. It is made in plain and inlaid patterns. Maintenance of these floors is a matter of replacement in worn or stained areas and should probably be classed as high where traffic is heavy. The floor areas which are public receive exceedingly heavy and wearing traffic in most banks. The ultimate cost of such material would probably therefore be high for such work.



Interesting Tile Floor and Dado; Moulded Plaster Paneled Walls and Ceiling

Magnesite compositions are usually plastics applied to structural floor surfaces, producing a seamless or a patterned effect. Their main interest centers in color variety. They are semi-flexible, and as such are reasonably quiet and comfortable. Maintenance of this type of floor will consist mainly of repairing cracks, and should therefore be low. The ultimate cost of this floor may also probably be considered low.

Natural stone is used as flagging or as tiles. The common varieties are marble, bluestone and slate, although in some instances granite has also been used. The effects produced are the result of natural color and grain, shape of unit and surface finish. The tiles or slabs vary from 7/8 of an inch to 2 inches in thickness, with the former dimension most commonly specified. Where bluestone and granite are used, the thickness of the flagging will be from 3 to 6 inches. Maintenance of this floor consists mainly in repointing and in replacement of broken or disfigured units, and will be low. The ultimate cost may be classed as high, due to the cost of the original installation.

Rubber as a material for flooring is made in patterned tile or runners, and is produced with variety in grain and color. It comes in plain solid colors or in variations that simulate marble; the latter do not show soiling easily. It is in reality a composition for the purpose of toughness. It is resilient, and consequently quiet and comfortable. Maintenance of rubber floors consists mainly in surface treatments and washing to remove grit and dirt. It would be considered very low. The ultimate cost to the owner may be classed as low.

Wood is used for bank floors rather rarely today, but when employed is usually in a parquetry or herringbone pattern. It is extensively used in the smaller rooms of banks, such as private offices and committee rooms. It is subject to the usual shrinkage and swelling common to wood floors and must be of thoroughly seasoned stock, carefully laid, to give bank service. Maintenance for these floors means constant attention to surface and opened joints, as well as to replacement of worn portions. This would make maintenance high. The ultimate cost would also be high.

Walls

Clay products when used for wall decoration and finish are usually confined to dadoes and scattered faience tiles embedded in plasterwork. The decorative tile is customarily used. The natural characteristics outlined under floor tile apply here as well, except that resistance to abrasion enters only slightly into the necessary qualifications. Maintenance is

again a question of joints and miscellaneous replacement, and is very low. The cost of such dado work varies from 75 cents upwards, per square foot in place.

Natural stone may be the interior finish of the entire walls of a banking room, and if so used is constructed in the same way as exterior work. Limestone ashlar is most commonly so employed. Veneers are used as dadoes, and marble is the customary stone for this sort of work. Maintenance resolves itself to pointing repairs, and care must be exercised where limestone ashlar is used to provide protection against ink stains when counter desks are placed as a part of the wall furnishings. Interior ashlar work varies in cost from $1 upwards, and marble dadoes cost from $1.50 upwards, per square foot in place.

Plaster is probably the most common medium for wall finish and is used as an all-over texture finish, as a base for painting, murals and tapestries, and is often most ornamental in character. Plasterwork is also often made to resemble limestone ashlar, travertine and Caen stone. At times these effects are produced by pre-cast blocks of gypsum or other material, which are erected in the ordinary fashion as for natural stone. Color interest as well as texture may be obtained by the use of manufactured plasters. All-over or ruled plasterwork is more subject to the cracks resulting from settlement than either natural or artificial stone facings, and maintenance is required early in the life of the building to remedy these defects. Where expensive paintings or murals are used, the results of such cracks may often cause extensive repair bills. In most cases it is wiser to have mural paintings on canvas placed against the plaster, so that they will not be subject to defects that might develop in the plaster. All-over textured plasterwork will cost in the neighborhood of 60 cents per square yard; ruled or jointed imitation stonework costs about $4 per square yard; ornamental plasterwork will vary from $3.50 for panel and moulded work to $5 for heavily ornamented work, per square yard, over the average area; cornices cost about 35 cents per developed profile square foot, and mouldings average 35 cents per lineal foot, with each miter considered an additional lineal foot; pre-cast ashlar costs approximately $12 per square yard, which includes the base course; mural decorations will depend entirely upon the talent of the artists employed in their production. Ordinary painted plaster surfaces vary in cost from $1.50 to $2.50 per square yard, for plasterwork and painting.

Wood is often used to form paneled wall surfaces. In order to conserve the natural beauty of the wood, stains and wax or varnish finishes bring the tones of the room down to darker values, which may be objectionable in some banks. The common woods so employed are oak, chestnut, mahogany and walnut. The paneled wall is subject to shrinkage, and maintenance, at least in the earlier stages of the life of the building, resolves itself into refinishing. The wood must be kept alive by occasional refinishing and must be maintained for scars, broken arrises and such disfigurements. Paneling varies in price from about $1 to $3 per square foot, for average work, although much higher costs are entailed where carving is specified.



Walls of Pointed Ashlar and Ornamental Plaster; Marble Dado and Trim; Cork Tile Floor

Ceilings

Where *clay products* are used, timbrel vault construction is commonly specified. These tiles are laid in a variety of patterns and colors. They present fire-safe and easily maintained surfaces requiring only washing to bring them to their original condition. Occasional painting may be required also. Such construction, when independent of the upper floor frame, varies in cost with the spans and the decorations desired, but amounts to about $2 per square foot of projected ceiling surfaces.



Plaster Walls and Ceiling; Marble Dado; Rubber Tile Floor

Concrete is being used extensively in the Far West for ceiling ornamentation. The beams, girders, slabs and even the columns are left rough as they come from the forms and are stained or painted to develop pattern, mosaic effects and endless ornamentation. The only surface cost in this case is the staining or painting, which amounts to about 30 cents per square foot as an average. Maintenance cost is negligible, as the surface of stained concrete is washable. When paint is used, the repairs must be made by complete replacement, when washing no longer serves to return the surface to its desired state. Concrete, in its original placing, may also be developed into reliefs, panels, and moulded ornament which take the place of the commonly used plaster ornament. Highly ornamented concrete ceilings, of course, increase the cost, directly chargeable to ceiling finish, but not as much as applied plaster ornament would, particularly where repetition of motif is possible.

Stained and ornamental leaded glass is used only where ceiling-light construction is feasible. This work may be carried out to a highly ornate and ingeniously lighted form, but in the usual instances will vary in cost from $2 to $3 per square foot. Maintenance cost in such cases is merely a case of washing or replacement of broken pieces and the repainting of supporting framework, and is moderate.

Plaster is most commonly used for ceiling finish, and the same finishes are used for walls, with one difference. The ceiling ornament is usually more profuse than the wall ornament, and moulded panels, coffer and stucco work are very commonly employed. The ceilings may be flat or vaulted, depending upon the effect desired. Ceilings of plaster are almost always painted with cold water paints, and redecorating, particularly where highly ornamental motifs and mouldings are used, is expensive. Plaster ceiling maintenance, if properly attended to, is by far the most expensive of all. The cost of reasonably plain moulded ceiling construction, painted, is about $4 per square yard; for coffered, vaulted or highly ornamental flat ceilings, the cost will average from $3 to $6 per square yard.

When *wood* is used in ceiling construction it is almost entirely confined to beams and mouldings, very often supplanting moulded plasterwork as an economy. These beams may be stained and finished to harmonize with wall paneling or may be painted in tones to match the ceiling plasterwork. The cost of such work will be about the same as for wall paneling, and the total area should include the circumferential exposed dimensions of the ceiling beams.

MAINTENANCE AND COST OF FLOORS FOR BANKS

(HEAVY DUTY)

BASIC MATERIAL	NATURAL STONE			TERRAZZO		CONCRETE	
	Bluestone	Marble	Slate	Cast	Tile	Ordinary Stained	Pattern Tile
Resistance to							
(a) Abrasion	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Good
(b) Fire	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
(c) Absorption	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Fair
(d) Acids-Alkalies	Good	Good	Excellent	Fair	Excellent	Fair	Fair
(e) Stains	Good	Poor	Excellent	Poor	Fair	Poor	Poor
Maintenance Req'd	Joints Oiling	Joints Replacement	Joints Replacement	Cracks	Joints Replacements	Oiling & Waxing Cracks	Joints Replacements
Maintenance Rating	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Good
Approximate Cost Limits per Sq. Ft.	$1.00 up	1.25 up	1.00 up	.50-.75	.80-1.25	.40-80	.50 up

BASIC MATERIAL	CLAY PRODUCTS		CORK	MAGNESITE COMP.		RUBBER	WOOD
	Quarry	Mosaic	Tiling or Carpet	Linoleum	Plain		Plank, Parquetry
Resistance to							
(a) Abrasion	Good	Good	Fair	Poor	Good	Excellent	Poor
(b) Fire	Excellent	Good	Poor	Poor	Fair	Good	Poor
(c) Absorption	Good	Fair	Fair	Excellent	Good	Excellent	Fair
(d) Acids-Alkalies	Excellent	Excellent	Poor	Poor	Poor	Excellent	Poor
(e) Stains	Excellent	Poor	Poor	Fair	Fair	Excellent	Fair
Maintenance Req'd	Joints	Joints Replacements	Replacements	Waxing Replacements	Cracks	Washing	Finishing Repairs
Maintenance Rating	Excellent	Good	Fair	Poor	Good	Excellent	Fair
Approximate Cost Limits per Sq. Ft.	$.65-80	.60 up	.45-.70	.30-.40	.20-40	.70-1.00	.40 up

THE LIGHTING OF BANKS

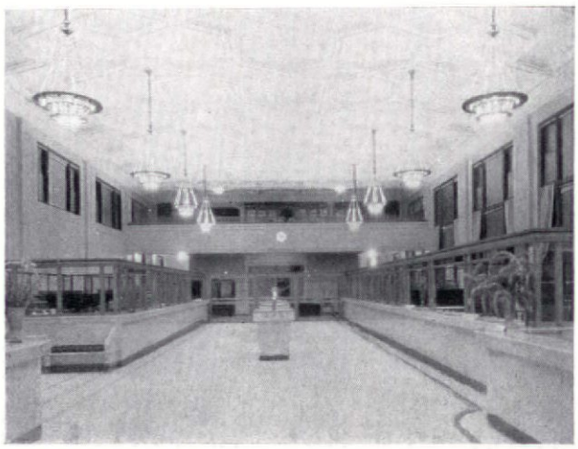
BY
WALTER STURROCK AND C. E. WEITZ

LIGHTING fundamentals, we are beginning to realize, lie deeper than any superficial standards set up in the drafting room of the engineer or the architect. Lighting is so intimately a part of ocular hygiene and conservation of vision that its use both in quantity and quality has been a subject of much study by the physiologist and research ophthalmologist. From these specialists the lighting engineer gets underlying facts which he, in turn, interprets in terms of equipment to provide illumination which meets the visual requirements. These underlying or foundational facts on how our eyes use light and how to safeguard vision have been learned only today, relatively speaking. The recent researches on light and vision give us a groundwork for practical lighting recommendations based on a more substantial foundation of facts than has been available heretofore. More has been learned about illumination, and more chapters have been written in the book of lighting progress in the last decade than have accumulated throughout all the periods of history.

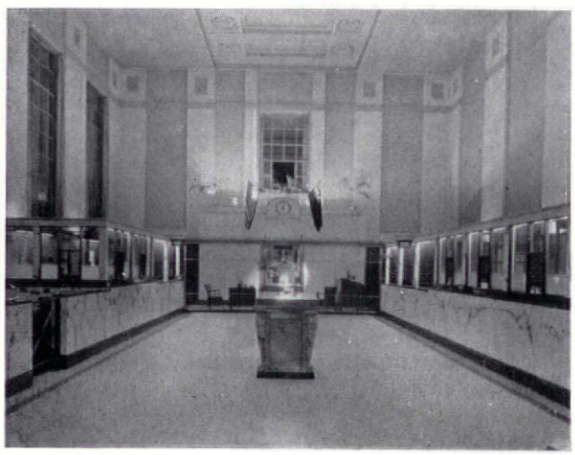
In large banking areas, where a great deal of study is given to the architecture, the lighting system becomes of primary importance, not simply to meet the demands for ocular work but as a part of the decorative design of the interiors. Fortunately, these two demands of a lighting system can be coördinated readily, so that no longer should we find in any new interior lighting systems which do not meet all the requirements. The general requirements for good illumination have been set forth in so many published articles that it seems everyone should know them thoroughly. Emphasis is always placed upon the avoidance of excessive brightness or glare, the elimination of heavy dark shadows, the desirability of uniform distribution, and, —particularly of late,—the physiological need for a greater amount of light than is ordinarily provided. These general requirements need no elaboration here.

Choice of Equipment. It goes almost without saying that the lighting fixtures employed in banks should be decorative and of pleasing appearance, both lighted and unlighted. The actual choice of equipment must depend on the character of the architecture, height of ceiling, color, columns, and such factors. Fixtures of the direct type add life and action to an interior and are the most efficient, but the system must be handled with care if the light is not to prove distracting and uncomfortably bright. Where exposed-lamp fixtures are desired to carry out a definite motif, it is well, where possible, to design the fixture around a central high-wattage diffusing unit to supply the main source of illumination, using small lamps merely to carry out the effect. Semi-direct or indirect equipment produces a soft, comparatively shadowless illumination, and may be designed to create an atmosphere of restfulness, stability, or severe dignity as desired. Lighting from equipment concealed in urns, wall pockets, or coves is pleasing, since it emphasizes architectural detail and seems to expand the dimensions of an interior. Supplementary decorative wall and column brackets, well shaded, add a touch of color and life. In all applications requiring a sufficient amount of light to permit comfortable working vision, the trend is distinctly away from lighting fixtures of the multi-light chandelier type as the primary light source. Such fixtures have some decorative significance, but they are relatively inefficient, and unless mounted very high, are usually sources of glare.

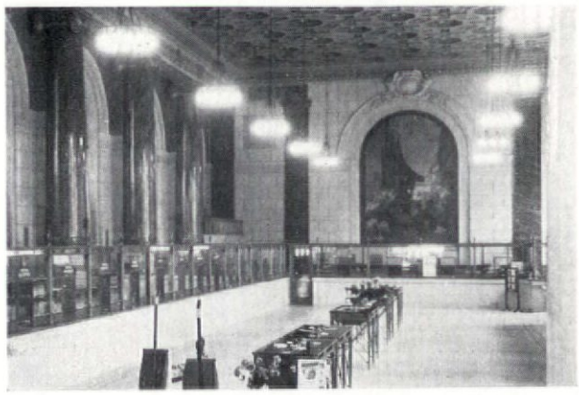
With these brief comments, let us leave the matter of fixture type for a moment and consider the



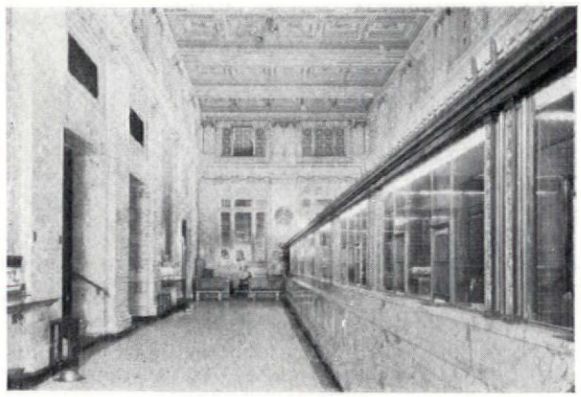
Pleasing Effect of Semi-Indirect Lighting Units



Spaciousness Gained by Absence of Ceiling Lights



Bare-Lamp Fixtures Are Often Harsh in Effect



Indirect Light from Above Cages Floods the Room

related question of amount or "level" of illumination, expressed in foot-candles. "Level of illumination" is the term used by lighting engineers to indicate the amount of light; a high level of illumination refers to a relatively large amount of light, and a low level to poorer illumination. The meaning of the term, foot-candle, as the unit by which the level of illumination is measured, is generally understood. It may be readily defined; 1 foot-candle represents the level of illumination on a surface 1 foot away from a light source of 1 candle, and perpendicular to the light rays.

Level of Illumination. Too many fixtures are installed, even today, with little regard to their performance as lighting devices. The lighting results are sometimes deplorable. It is surprising how many times certain lighting engineers have been called in to correct faults in bank lighting after an installation is put in and is working. Sometimes these complaints are due to glare, but in most cases it is simply a matter of insufficient illumination in the working areas. The question of the level of illumination has of late engaged major attention by reason of data from research laboratories as well as under working conditions. The experiences show that, with the average amounts of artificial lighting prevailing today, our eyes cannot see as easily, as quickly, or as accurately as they are capable of doing. As a result, much muscular and nervous energy is expended through eye strain and eye fatigue under low illumination, and we are confronted with an astonishing prevalence of eye defects.

The amount of light recommended for banks is 10 foot-candles for lobbies and banking rooms, and 15 foot-candles for cages and offices. These units of illumination, while not ideal, are generally accepted as reasonably adequate for the visual requirements of banking, assuming that care is taken to diffuse and distribute the light properly. With an acceptable standard of illumination set down as a starting point, the problem is then one of choosing methods, equipment, and wattage by which to accomplish the result satisfactorily, and which, at the same time, remains answerable to a treatment which enhances the importance of the architecture and is in harmony with the spirit of the interior. It would be serious if a lighting installation did not first and foremost measure up to its responsibilities from a utilitarian standpoint; and second, it would be unfortunate if advantage were not taken of its further possibilities to create a pleasing effect.

Lamp Sizes and Efficiency. The discussion of this subject will be facilitated by the introduction of another term, the "lumen." The lumen is the unit in which the light output of a light source is measured. Modern lamps are all rated in lumens of light output. The larger the lamp, the more efficient it is, as measured in lumens per watt. Table I shows the lumen output and lumens per watt efficiencies for several representative lamp sizes. The lumen output for lamps of all sizes may be obtained from the lamp manufacturers.

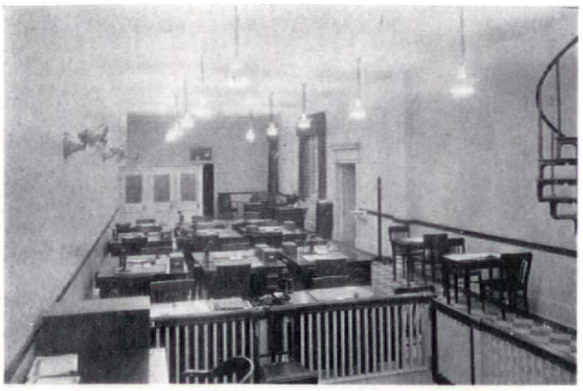
TABLE I

Comparative Efficiencies of Large and Small Lamps

Lamp Watts	*Lumen Output*	*Lumens Per Watt*
25	235	9.4
100	1320	13.2
500	9500	19.0
1000	22000	22.0

As is evident from Table I, it is always more economical, other things being equal, to use a small number of large lamps than to use a large number of small lamps to obtain a given foot-candle level of illumination.

How To Get 10 Foot-Candles. If 1 lumen is evenly distributed over a surface of 1 square foot, the level of illumination on that surface is 1 foot-candle. Therefore, a level of illumination of 10 foot-candles means that there will be 10 lumens per square foot actually delivered on the working plane over the entire area in question. Knowing the number of lumens wanted on the work, the problem is that of determining the number of lumens absorbed in the equipment and the number utilized on the ceiling and walls, in order to determine the total number of lumens required. For accurate lighting computations, the various text books and the bulletins of the lamp manufacturers should be consulted. The design procedure takes account of such factors as ceiling height, room size, and color



Freedom from Glare in Office Space; Semi-Indirect Lighting



Shaded Wall Brackets and Desk Lamps in Executives' Office

of walls and ceiling, all of which influence the resulting illumination. Table II is presented as a means of obtaining a rough check on the lamp lumens required with three different types of equipment, assuming a room of average size, with a light colored ceiling.

TABLE II

A Rough Check on Where the Lamp Lumens Go

Type of Equipment	Absorbed in Equipment	Allowance for Depreciation	Absorbed by Ceiling and Walls	Reaches Working Planes	Total Lumens Multiplier
White Glass Enclosing Globes	20%	20%	30-35%	25-30%	3-4
Indirect and Semi-indirect Units	25%	25%	30-35%	15-20%	5-6
Concealed Units—Cove Lighting	30%	25%	30-35%	10-15%	7-10

The "Total Lumens Multiplier," in the last column of Table II, may be used as a short-cut figure for determining roughly the total lamp lumens required to light a given banking area. For example, if a bank lobby 50 feet by 100 feet is to be lighted to a level of 10 foot-candles, multiplying the area, 5,000 square feet, by 10 gives 50,000 lumens to be delivered to the working plane. Say semi-indirect lighting is to be employed, for which the multiplier is 5 to 6. The lamp lumens generated must then be in the vicinity of 50,000 times this multiplier, or 250,000 to 300,000 lumens.

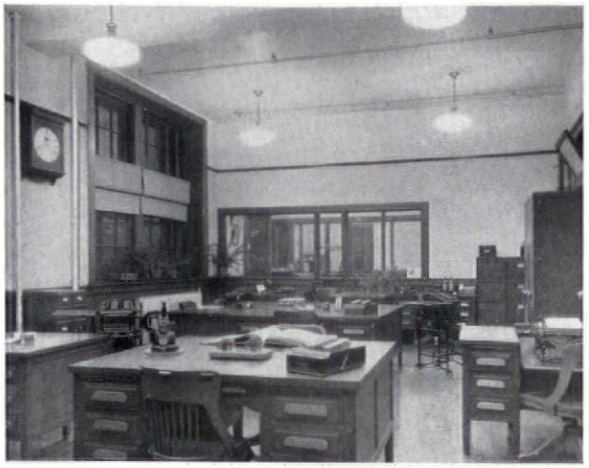
Decoration and Lumens. At first thought these figures may imply a decided inefficiency in the use of electricity to produce a desired illumination on the working plane. It should be remembered, however, that a considerable percentage of the lumens shown as absorbed by the ceiling and walls are reflected back and forth between these surfaces and, though wasted as far as lighting calculations are concerned, are highly useful from the standpoint of general effect. These are the lumens that brighten up the interior,—that reveal architectural beauties and lend general character to the interior. In this connection a dozen large banks were recently inspected and foot-candle readings taken in the main banking rooms. It was found that the working light measured from 2 to 6 foot-candles. Many of these rooms seemed dull and somber, out of step with the progress and spirit of the age,— in fact, out of keeping with their real ideals as reflected in modern bank advertising. One survey in complete detail of the electrical advertising used by one large banking house with over 50 branches indicates that the lighting employed for outside advertising purposes alone is comparable in amount to that used for interior lighting. Admittedly, it is important for banks to create favorable impressions by means of effective outdoor advertising. But is it not of equal or of greater importance for the interior lighting of the bank to be such that it too creates a favorable impression upon those who enter to transact business?

Lighting the Lobby. While the use of all bank lobbies and consequently their lighting requirements from the standpoint of vision are the same, the methods of lighting do not admit of any degree of standardization because of the wide diversity in architectural treatment. Examples range from the simplest store-like interior to those of highly ornate character with high vaulted roofs not unlike those of churches. The types of lighting may range from the orthodox suspended ceiling fixtures to such highly specialized methods as lighting from concealed sources,—coves, artificial skylights, and windows, — incorporated in the architectural plans.

Cage Lighting. It is a generally accepted fact that the work done by tellers and clerks requires more light than the lobby proper, and this has resulted in the almost universal practice of installing above the windows standard cage lighting units consisting of continuous troughs with small lamps behind diffusing glass cover plates. This is a very satisfactory form of supplementary lighting, and if the general illumination of the banking room is of the order of 10 foot-candles, this supplementary system will build the illumination up to that of the 15 foot-candles recommended. Foot-candle readings taken in a number of instances showed only 6 to 10 foot-



Overhead Lighting and Individual Lights



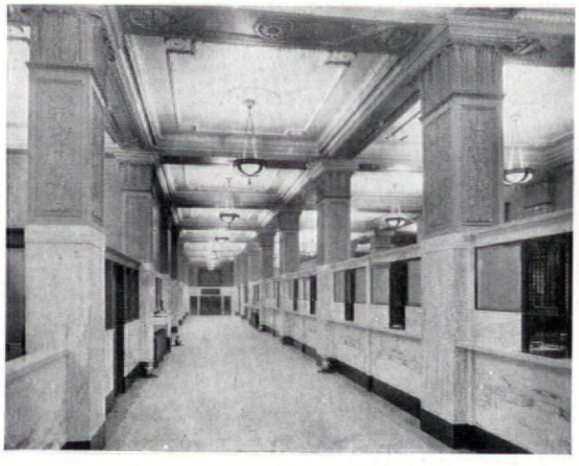
Semi-Indirect, Totally Enclosed Lighting Units

candles on the tellers' desks, but in these cases the general lighting ranged from 3 to 6 foot-candles. The deficiency, therefore, was in the general lighting of the room as a whole and not in the supplementary cage lighting. Because the prevailing levels of bank illumination are below the accepted standards, it is probably true that we find more local desk lighting units and more eye shields used by bank employes than by many other classes of office workers. In three cages in a large main bank a total of 13 individual desk lamps was observed. The inevitable result of such practice is splotches of high intensity light amid general gloom,—a lighting condition which ophthalmologists would have us avoid if we are to conserve our eyesight.

Offices. The level of illumination recommended for private and general offices in which close work is done, is 15 foot-candles, while for those offices in which little or no close work is done, 10 foot-candles suffice. In either case, where the ceiling permits its use, indirect or semi-indirect illumination evenly distributed over the working area should be employed. With such a system no individual desk lamps are necessary, and the attendant abuses and misuses are avoided. In many of the smaller banks and branches, where the general office work is done in sections adjoining the tellers' cages in the main banking areas, it is sometimes difficult to obtain the desired level of illumination from the overhead general lighting system. In these cases special lighting should be provided, such as sidewall brackets, supplementary overhead illumination, or well designed table lamps. A well designed table lamp might be defined as one which, by its construction and location, illuminates the table top adequately without glare,—either direct or reflected from the table top,—into the eyes of anyone working in that vicinity. Indirect lighting presupposes there being a ceiling and interior finish in light colors. Where such conditions do not prevail, there has been the inclination to compromise, because of otherwise poor efficiency, on direct lighting with white enclosing glassware; but whether this is the proper compromise is a debatable point in view of the trend toward higher levels of illumination. Better, perhaps, would it be to insist that interiors be finished with reference to the illumination system rather than the reverse, if we were to consider efficiency only.



Luminous Information Signs Are Used to Advantage



Luminous-Bowl Indirect Units Give Diffused Light

NOISE PROBLEMS IN BANKS

BY
CLIFFORD MELVILLE SWAN
CONSULTANT IN ARCHITECTURAL ACOUSTICS

THE necessity of producing quiet surroundings in banks and business offices, not to mention other types of buildings such as hospitals and schools, is daily claiming more and more attention. This is due to facts developed in various lines of research and experience, all pointing to the one conclusion. Medical science, for instance, informs us that there is a chemical and physiological action produced in the nervous system by prolonged exposure to noise, and that the resultant fatigue may go so far as even to cause collapse. Statistics in the medical department of one of our large banks showed an immediate and marked drop in the number of cases treated daily among the women clerks after the noise in the working rooms had been diminished. Experiments in psychology, as well as operating tests by office managers, show that the change from noisy to quiet surroundings results in greater freedom from errors and that more work is accomplished.

An interesting experiment was lately made by Dr. Donald A. Laird, of Colgate University, described in an article on "The Measurement of the Effects of Noise on Working Efficiency," published in the *Journal of Industrial Hygiene* for October, 1927. Dr. Laird found that 19 per cent less energy was consumed by a typist when working under quiet rather than under noisy conditions. The rapidity of work was also affected, there being an increase of 7.4 per cent in speed in the case of his most rapid typist when in quiet surroundings. Furthermore, under these conditions, there was an increasing output of work with the lapse of time, as the typist "warmed up," while the reverse was the case under exposure to noise. These results are verified by tests in the bank before mentioned, where the introduction of sound-absorbing treatment in a large adding machine room housing several hundred employes caused an average shortening by several minutes of the time necessary to do a stated amount of work every day. The statement is sometimes made by office managers that noise is soon relegated to the subconscious mind, that workers have become accustomed to it and do not think about it, and that the expense of installing absorbent materials is needless and wasteful. Nothing could be more untrue. Many workers of sensitive temperament are unable to shut the noise out of their consciousness, while even those more fortunate individuals who have the ability to concentrate do not for that reason escape the fatigue and loss of energy which inevitably occurs, even if subconsciously, as researches have established.

Modern science, having in some of its branches





Noise Problems Are Often Negligible Where Surfaces Are Small and Varied

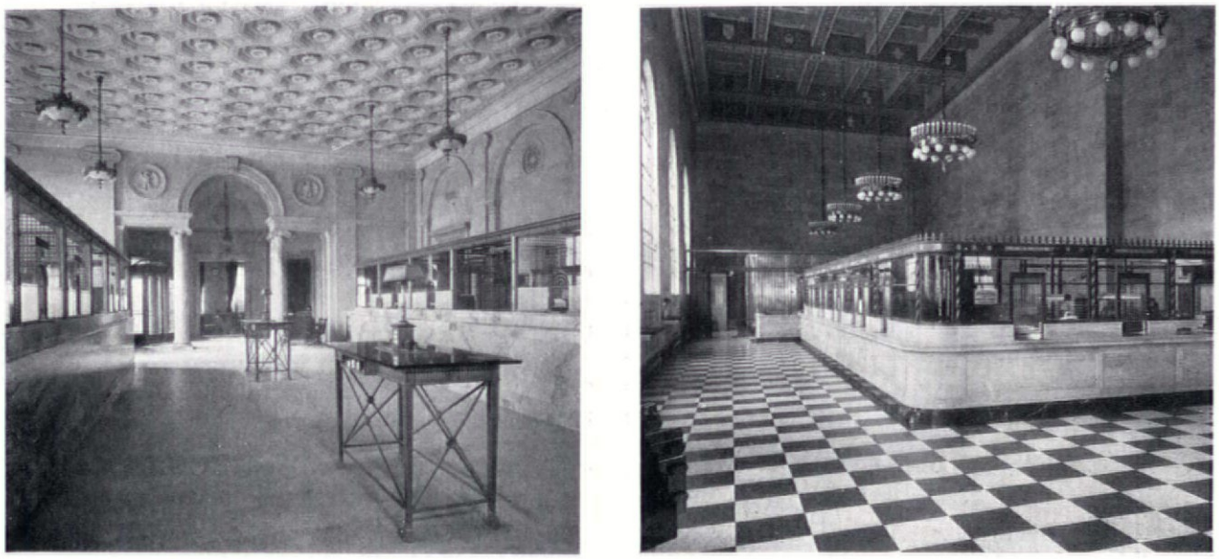


The Open Office Spaces and Many Machines of Modern Banks Complicate Noise Problems

established the fact that noise is undesirable, unhealthful and uneconomical, proceeds through other of its branches to develop and use materials and methods of building construction which produce the maximum of noise. This is due primarily to the demand for fireproof structures and for sanitary surfaces susceptible of frequent and easy cleaning. Consequently, we have the ever-increasing use of concrete, hard plaster, glazed tile and brick, terrazzo, stone, marble and the like. Even the office furniture and partitions are frequently of steel. What happens in a room finished in these ideal sound-reflecting materials? The pound of an adding machine lever, the click of a typewriter key, the ring of a telephone bell, the scraping of a chair,—any sound,—once produced in such a room, will send out a train of sound waves into the adjoining air. These waves travel until they meet the hard surfaces in every direction and are there reflected back on themselves with little loss of energy. The waves from one little sound will continue this process of reflection many hundred times, crossing and re-crossing, before their energy is finally dissipated. This takes several seconds of time, during which new sounds are being created to add their energy to the first and to one another. This causes an accumulation and consequent magnifying of sound in the room such as would not exist if each train of sound waves were fully absorbed in the course of only a few reflections. Add to this the increasing number of labor-saving but noise-producing office devices, and we find that the tendency is to make our offices more noisy instead of less so.

Of course, this is a condition which should not be tolerated. In every other direction, consideration is given to the comfort and health of the worker as affecting his efficiency. Lighting systems are carefully planned to give uniformly diffused illumination with the requisite number of foot-candle units at the desk. Colors of walls and positions of windows are carefully considered. The exact degrees of temperature and humidity most conducive to efficient output are studied and often secured. The flow of fresh air, its velocity and direction, and the percentage of carbon dioxide accumulated are all worked out with care. Even the best method of chilling drinking water has been made the subject of study; on a par with these in importance is the reduction of noise. The old adage concerning the value of an ounce of prevention is, of course, the first thing to remember. Floors should be covered with noiseless materials such as linoleum, cork or rubber tile, mastic preparations or the like. Machines should be of the "noiseless" variety as far as possible, or else segregated in one room which can be quieted. Harsh telephone bells should give way to mellow buzzers. When all such precautions have been taken, however, there must still remain a large amount of unavoidable noise, and it is of the utmost importance that this shall not be magnified by the reflecting process within a room. Sound-absorbing materials must be introduced in sufficient quantity to reduce the reverberation to a minimum.

The materials used for such purposes may be roughly divided into four classes,—furnishings, fiber boards, felts and masonry materials. The use of carpets, heavy hangings and stuffed furniture is not practicable for the average business office, except in such rooms as those for directors and executives, or for conferences. In such rooms rugs or carpets lined with half-inch felt, heavy curtains interlined, and overstuffed chairs and divans produce all the absorption required. In public and work spaces, however, and even in the average private office, such furnishings are undesirable and out of place. Hence, in the vast majority of cases, one must turn to use of materials of the other three classes which can be permanently placed on ceilings or walls, or both, and



The Treatment of Walls and Ceilings Affects the Acoustic Qualities of Banking Rooms

which will be pleasing in appearance and effective.

Let us first consider the fiber boards. These may sometimes be open to criticisms on the score of appearance, lack of durability, poor light reflection, or even low resistance to fire, but such is not always the case, and there are many places where their use is particularly desirable. They are usually low in cost, and some have the highest absorbing value of any material. They are semi-rigid and consequently easily handled. There are many types on the market, of varying degrees of efficiency. In general, the more compressed the board the less porous it is, and consequently the less efficient as a sound absorber. On the other hand, if it is but lightly compressed in manufacture, so as to form a spongy material, it may absorb a great deal of sound. This is particularly true of those boards which are perforated or scored in order to offer a greater surface to the sound waves. Fiber boards are made of sugar cane refuse, flax, wood fiber, excelsior and the like, varying widely in absorptive value with the thickness, degree of compression, amount of perforation, and the pitch of the sound.

In the class of felts, there are also a number of kinds, all nearly equal in efficiency, thickness for thickness. They are made of cattle hair, goat hair, jute, wool, shredded wood fiber and other substances. In some cases the fibers are simply felted or matted together, while in others, known as "punched" felts, the fibers are pushed through an interlining of burlap or some similar fabric which holds them in place and produces a firmer and more durable material with less likelihood of shearing of the face from the back than in the ordinary felting process.

Masonry materials are sometimes of tile and sometimes of plaster. There are several types of each. Being rigid substances with little or no flexibility, they rely almost entirely on their porosity to absorb sound. For this reason, different kinds vary considerably from one another according to their manufacture and application as affecting the number, extent and size of the intercommunicating pores which dissipate the sound energy. Of the tile, some are fired and some are cast. They are particularly desirable for vaulted ceilings or for wall ashlar where a true structural effect is sought. They form a permanent finish which does not deteriorate, which is fireproof, and which has a high acoustic value. They must be placed in the front rank of corrective materials. The plasters also are of several kinds. Some have their pores formed mechanically by uniformly graded aggregates, some chemically by effervescence, while in one type the holes are punched in the wet plaster by fine wires. The plasters, like the tiles, are fireproof, and are as durable as any standard plaster.

In choosing a material for sound correction, careful consideration must be given to the variation in absorption over the scale of pitch. There is a wide difference of results in this respect, and no material can be used intelligently unless reliable data are available showing the percentage of absorption over at least the most important region of the scale of audible tones. A material which will correct an auditorium for the hearing of speech may be entirely unsuitable for the hearing of music. Again, a finish which may be proper for music or speech, or both, may have almost no effect in absorbing office noises. The prevailing characteristic of office sounds seems to be the prevalence of very high pitches lying three, four or more octaves above "middle C," that is, from 2000 cycles up. In order to be effective as an office quieting agent, therefore, a corrective material must have high absorption at these upper pitches, regardless of what it may have in the lower scale. Some of the materials we have considered have this property and some have not. Some, which in themselves

are satisfactory, lose their efficiency when a decorative finish is applied.

This brings us to what is undoubtedly the most serious problem in the practical field of securing quiet in offices. In order to reflect light in sufficient quantity, and to present a surface pleasing in appearance, many absorbents must either be painted directly or concealed by a painted cloth covering. Especially in the latter case does this more or less impervious layer of paint constitute a barrier to the passage of the sound waves into the absorbent structure beneath, and this effect is most marked at the high pitches already mentioned as most difficult. The result is fatal to an effective result. On the other hand, if the surface is not painted and the pores are left open to the impinging sound, these same pores accumulate dirt and the surface becomes soiled so that both appearance and light reflection are impaired. The ideal solution would be to use over the absorbing material a coating which would be impervious to dirt, permitting passage of the shorter sound waves, and yet reflecting the light. Furthermore, the surface should be capable of being washed or redecorated or otherwise renovated without deterioration. Such a coating has yet to be discovered.

We have here one of the great objections to the use of felt and some fiber boards. Those which are natural'y dark in color require such a heavy coating to build up the light reflection that the sound-absorptive effect is too greatly diminished. Various schemes have been tried to overcome this difficulty, but none is wholly satisfactory as regards either appearance or permanence. Light colored materials on the other hand, like the tiles and plasters and some of the fiber boards, can be sprayed or stippled with a thin paint, such as water color, without serious damage to the absorption. The cast tiles, which have a fairly smooth surface, can even be washed and scrubbed when necessary. Apart from the effect of the decorative coating on the absorption of sound, we must consider the actual absorbing curve of the material itself. Obviously, those substances which have low absorption in the higher register must be ruled out. Use should be made of only those materials which show a high percentage of absorption above 2000 cycles, as otherwise the area of treatment required becomes so great as to be too expensive and often entirely impracticable.

Among those materials which show a sufficiently high degree of absorption in the upper pitches, it is interesting to note another feature. Laboratory measurements of absorption have thus far been limited to an upper boundary four octaves above "middle C" (4096 cycles). The limit of human audition is far above this. Whether any considerable portion of office noises consists of sounds above this pitch, and if so, whether they have any marked effect on the ear or nervous system, has never been demonstrated. If, however, these higher pitches should prove to be of importance, it is evident that those materials showing an ever-increasing percentage of absorption as they approach the pitch of 4096 cycles may fairly be assumed not to fall off sharply for some reasonable distance beyond this point and therefore to be more effective in this region than materials showing a descending curve at 4096 cycles. Of all the absorbent materials in use, the acoustical plasters alone show an ascending instead of a descending curve at the point mentioned. While, of course, too great a stress must not be laid on this fact, it is interesting to observe it, and future experiments may determine how far it is an argument in favor of the use of such materials.

It is a matter of congratulation that the need for quieting treatment is daily becoming more and more recognized and that new materials and methods are constantly being developed to meet this need. There are now about 30 such on the market. Caution must be exercised, however, regarding materials for which unjustified claims of acoustical efficiency are made. Because a surface is rough in texture or pitted with holes, it does not necessarily possess absorptive qualities. Nor does the presence of a number of sealed and isolated air cells in the interior give any absorption for reflected sound, although this does decrease the transmitted sound. Again, resilient material like cork and rubber, while preventing the production of sound, do not absorb incident sound waves to any marked extent. For high absorption, the cells or pores must be intercommunicating, fairly uniform in size, and of critical diameter; in other words, the material must have a texture throughout its mass much like sponge or coral with diminutive pores.

In our banking institutions a large field is presented for the use of these materials and quieting methods. The lofty and monumental spaces used by the public should be freed of their cave-like resonance; cages of tellers and clerks should be quiet to insure speed and avoidance of mistakes; adding and statistical machines, typewriters, telephones, switchboards and telegraph instruments should be segregated in treated spaces for the welfare and efficiency of the operators and the comfort of the others; conference rooms and executive offices should be quieted to insure privacy. The question is sometimes raised as to the desirability of subdividing working spaces into numerous small offices by partitions running to the ceilings. In general, this is not to be recommended from the acoustical standpoint. It is usually better and more effective to apply general treatment to a large open space than to treat small individual offices where the ratio of the ceiling area to the other surfaces is much smaller than in the large rooms. Low partitions, such as those enclosing cages are, of course, permissible.

Even in the brief survey of the matter made here, there should be facts sufficient to demonstrate not only the necessity of quieting but also the desirability of an intelligent study of the methods and materials to be used in any case. A little forethought will save much annoyance, criticism and expense.

BANK VAULT CONSTRUCTION AND EQUIPMENT

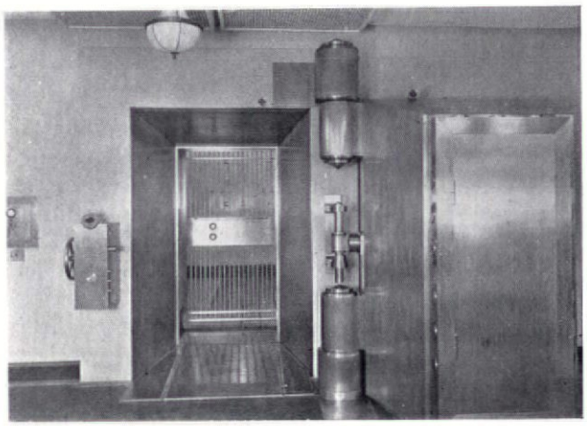
BY
FREDERICK S. HOLMES
VAULT ENGINEER

THE history of bank vault design has had little influence upon today's planning. While it is intensely interesting in the many changes in both principle and detail evolved to withstand the ever-developing technique of burglar attack, and while it becomes absorbingly fascinating when those changes are related to their causes, such retrospection is almost useless in planning a vault capable of resistance commensurate with the actual and potential powers of the skilled burglar of today.

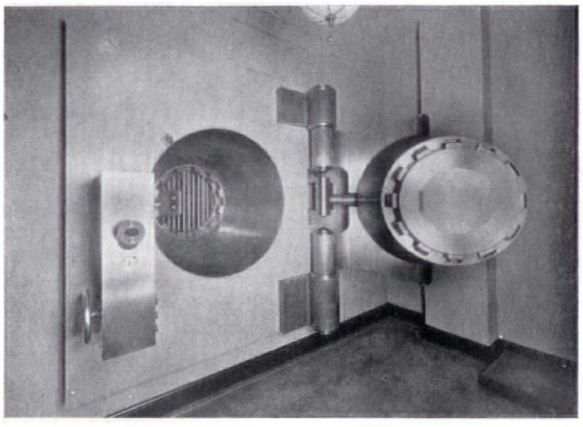
For half a century the fundamentals of protective strength in vaults remained practically static. There were some modifications to offset the introduction of the use of nitro-glycerin as a part of the attacking equipment, and refining of mechanical detail and securing better machine finish were developed, but on the whole, all demands were being met satisfactorily. Then suddenly the cutter burner, the fluxing rod, the electric chisel and hammer, and even the oxygen pipe, were prostituted to burglarious purposes, creating almost overnight a really terrifying menace that necessitated equally revolutionary changes in design and construction. Resistance-time values fell tremendously, and they are still low when related to construction costs as compared to those formerly obtaining. It took the vault designers and builders several years to adjust the industry to the new forms of menace. And though it is not possible, even utilizing the best available materials, to design a vault within reasonable cost limitations that would resist successfully a fully organized attack by the best known experts for more than a comparatively few hours, the situation is not as dangerous as might be inferred.

Any menace from the experts is quite remote, for they are few in number, well known, and employed in legitimate industry. Were they to become burglars, being men of intelligence they would not attack high class construction, involving some hours of the hardest kind of work and a large investment in equipment, when with their skill and the most rudimentary of outfits they could successfully burglarize most of the existing vaults in the country in a surprisingly short time. Moreover, it is relatively easy now, at reasonable cost, to provide protection that is adequate to resist attack by all burglars other than the known experts.

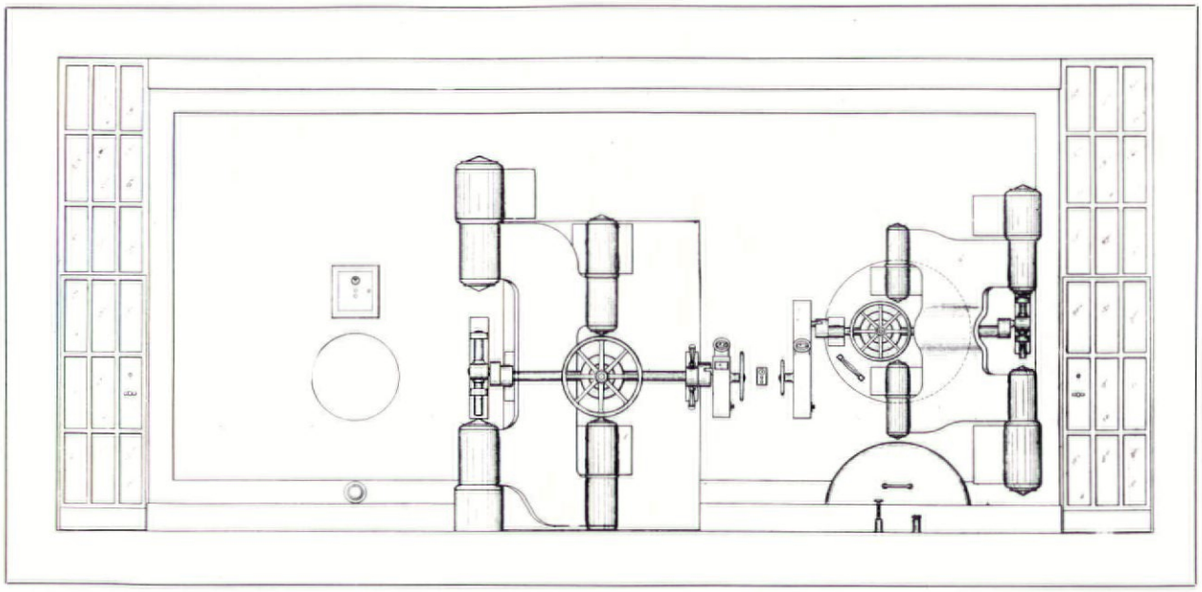
The Vault. What constitutes a vault that today provides adequate protection? Engineers, whether acting as consultants or employed in the industry, disagree upon details, but they are in agreement upon fundamentals. There is no doubt that protection against fire is best served by the use of reinforced concrete walls; that tool, torch, and shock resistance is afforded with composite metal linings or inter-linings; that a single and thick door with few or no rebates affords the most protection for a given cost, with emergency doors provided in an otherwise single-door vault; that the entire structure should be so located as to afford free observation upon all its six sides; that electrical protection is essential; and that liberal ventilation must be assured. But opinions regarding the details to be employed in providing these fundamentals differ more widely than is warranted by an analysis of the known facts. Perhaps the greatest diversity of opinion is exhibited with respect to the value of reinforced concrete walls without linings or interlinings where dependence is placed upon such construction for burglar resistance as well as fireproofing. This is a most important question, because the correct answer is essential to providing adequate protection under present-day conditions. The disagreement arises from three causes—(1) sales competition, influenced by the effort to obtain contracts through low prices; (2) the lack of adequate requirements for low burglary insurance rating through the manual which is based on what might be termed "vault mortality tables"



A 36-Inch Emergency Door



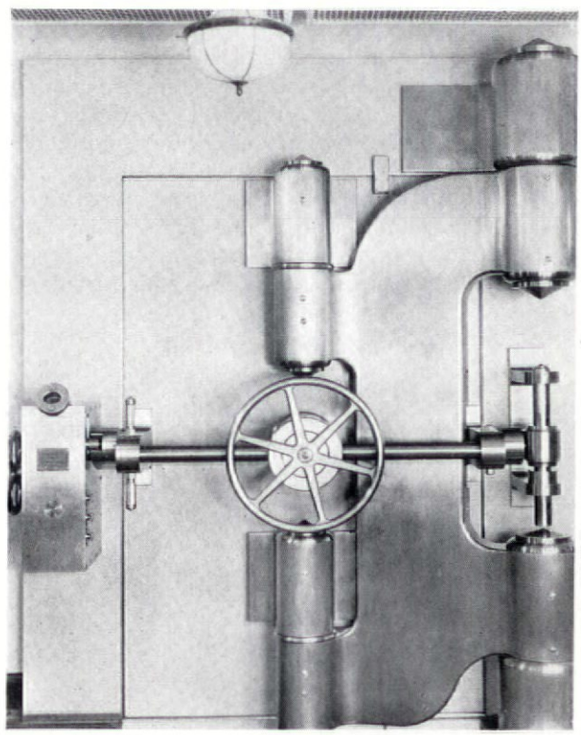
A 36-Inch Security Door



Front Elevation of Vault, Showing Ventilating Hood Depressed

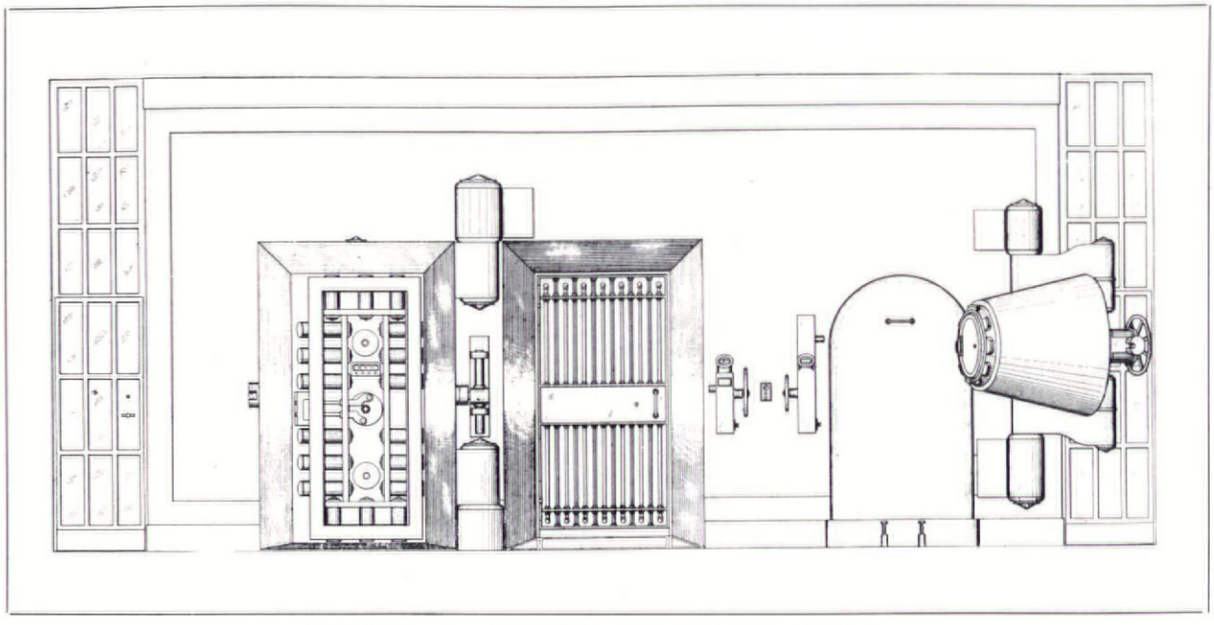
rather than upon the actually known resistance value of the constructions rated, as determined by unprejudiced tests; (3) and perhaps most of all through the broadcasting of peculiar interpretations of evidence produced by various tests.

Ordinary reinforced concrete of itself can be cut by burglars' tools with what, to those accustomed to seeing its demolition in the usual manner, would seem amazing rapidity, the concrete being removed and reinforcements cut with either hammer and chisel or the torch. It has been demonstrated that a manhole 2 feet in diameter can be cut through such a wall in less than two hours. The time consumed in cutting the hole is naturally dependent on the type and materials of the reinforcements and the number and skill of operators, as well as on the efficiency of the tools and torches they employ. Shock, tool and cutter torch resistance (and that involves not only resistance to the naked flame of the oxyacetyline torch but the fluxing rod and oxygen pipe combinations), is obtainable with linings and inter-linings which are available to all manufacturers through the use of several metals and materials. The shock resistance in this type of vault construction is provided partly by the inherent strength of the tool- and burner-resisting elements, and even more by plates of low steel, which tie and support them. A tool-resistant element commonly used is five-ply welded steel. The deep chilled outer face and diamond-like crystals of a special product, recently developed for the purpose, combine in a single plate both tool and cutter torch resistance. Metals of various kinds, both plain and in combination with copper and other metals, are being used, and though steels of all kinds are easily cut with the torch, simple cast iron has a degree of resistance such that, though simple perforation is not difficult, to cut a manhole is a tedious operation and can be done only by experts. Such materials constitute the lining, or it may be the inter-lining, the latter term being applied when there is an interior buttressing element or construction having on its inner face the usual open hearth steel plates.



Security Door, Closed

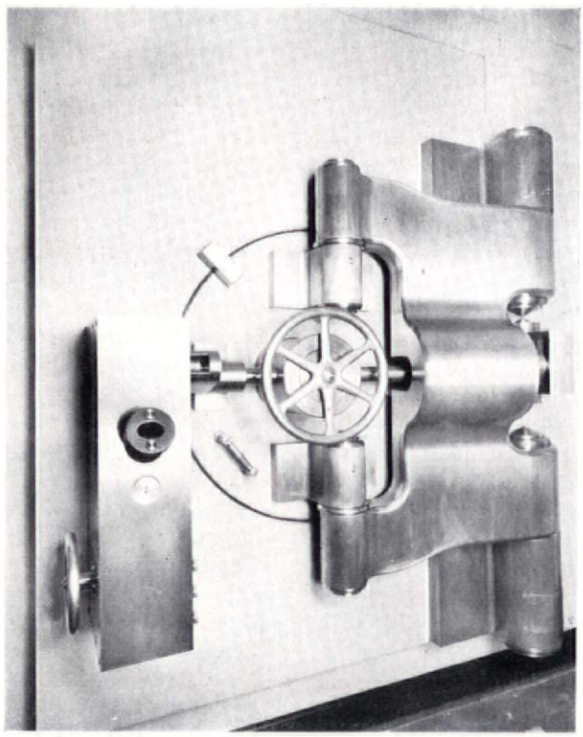
The burglarious method of entering a vault with reinforced wall and steel lining is to take away a section of the concrete envelope, cut an opening manhole size through the lining, push the released disc into the vault, and climb in. With a drill-and-



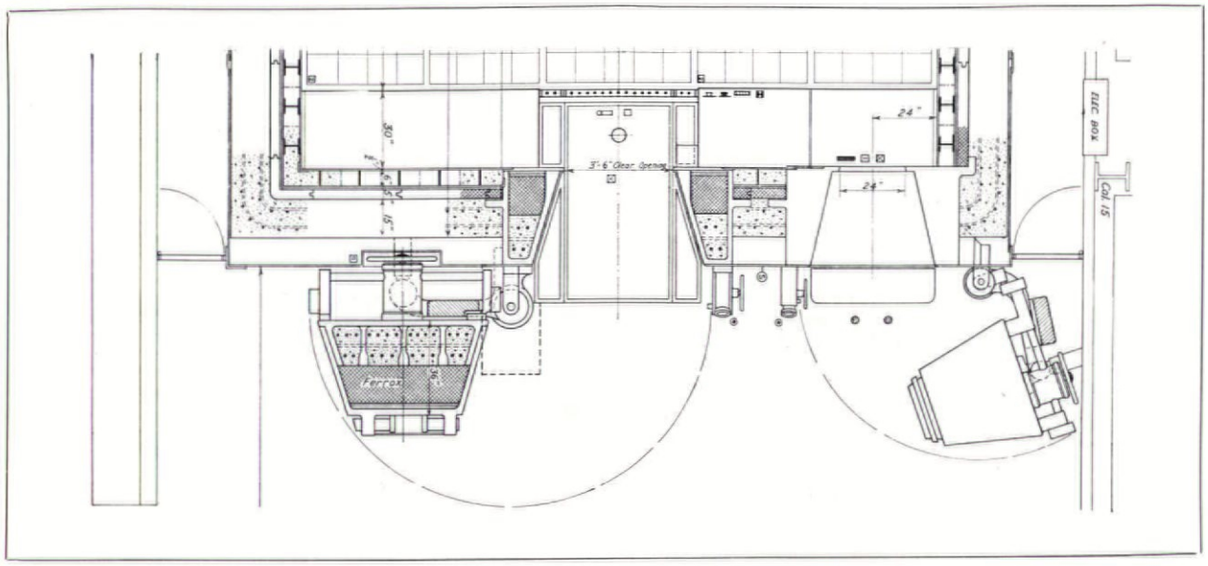
Vault Doors Open; Ventilating Hood Raised in Position

torch-resistant lining such an attack is made more difficult. But since there is constant development and counter development, and in view of the reasonable advances in attack technique that unquestionably will be made during the future lifetime of a vault, it is desirable to be somewhat ahead of the known present demands for adequate resistance. Therefore, in some vault walls there is the outer envelope of reinforced concrete, then the tool-and-torch-resistant inter-lining backed by a buttressing wall. With a buttressing element backing up such an inter-lining, even though some rapid means of cutting the latter should be devised, a cut-out disc could not be pushed in, and since the inter-lining is anchored at frequent intervals to the inside wall, the piece could not be pulled out but must be removed in small sections, requiring a long period of time. The buttressing wall, although of cheap construction, more than doubles the value of the inter-lining. One of the most economical and efficient designs is a series of H-beams closely bolted to the inside of the inter-lining, with intermediate rows of steel studs tapped into the inter-lining and steel inner-lining, which is also bolted to the inside flanges of the beams, the space between being solidly filled with concrete. It is best to consider the advisability of creating the greatest resistance time, so that the structure will be wholly beyond the "yegg" class.

Vault Doors and Locks. Door design follows rather closely that of the wall, with this difference,—that the door is a section of the wall with a joint, and must be treated with reference to the weakness of that joint. And there is another still more important difference, in that while the wall must be entered through a manhole, the door need have but a single small hole opposite the vital spot at the locking connections. Therefore, in the door, as compared to the wall, resistance to shock, tool, and burner must be greatly increased without the necessity of increasing the fire resistance. If the doors are thin, the chances of successful burglary can be improved by increasing the simple perforation to handhole size, through which the connections may be easily reached and disrupted. If the door is measurably increased in thickness, so that the operator stands 2 feet, or even 3 feet or more away from the locking mechanism, the difficulties of entry are so increased that thick doors, aside from their ad-



Emergency Door, Closed



Section Plan; Security Vault of Buttressed Wall Design

vertising value, are warranted. They provide not only maximum resistance but cost comparatively little more than the thinner construction, because once given a set of hinges, pressure mechanism, bolt work, and locking devices, they can be made proportionately heavier and the door materially thickened at a comparatively small cost. The combination locks, locking devices, and the bolt-throwing mechanism may be transferred to the jamb, leaving the time lock on the door. In an attack this makes two penetrations necessary. Since there are always chances of failure with a single penetration where the locks are combined, these chances of failure are increased many times when the locking mechanisms are separated; and the attack-resistance time is more than doubled at slight additional cost. Ordinarily, the locking mechanism can be seen on the inner face of the door. With a balanced construction, where it takes as long to put a small hole through the door as to put a manhole through the wall, successful operation upon the locking mechanism through a small hole in the wall so unbalances the design as to reduce resistance-time values perhaps 90 per cent. A cure for this is to house the combination locking mechanism with heavy steel plates, so that it cannot be reached in such a manner.

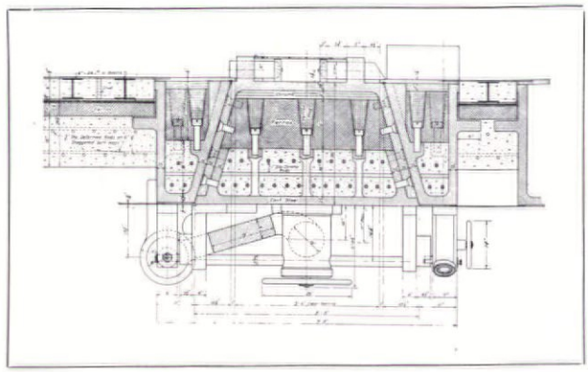
Single doors, rather than outside and inside doors, have almost entirely superseded those of older design. The cost of second door hinges, pressure, bolting and locking mechanisms and the cost of the vestibule and the extra width and height of double-door construction made necessary to get a given clear opening, if put into a single door give many times the resistance value. The elimination of tongues and grooves and rebates at the edges of the doors and the substitution of a single machined surface constitute a marked advance in value and appearance of vault doors. These are referred to generally as "plug doors." The change has come about through a realization that every rebate is a reaction seat against which explosives may work to tear the door apart. This does not apply with as much force to modern heavy doors as to the thinner doors of laminated design. Furthermore, it is somewhat more expensive to make a door with steps, and the result is not nearly so impressive as the plain surface. Again, the plain step lends itself to a very low incline at the bottom of the door, some 3 or 4 inches in 3 or 4 feet, and this incline is so flat that the lowering platform of yesterday is not required except in the case of round doors, which are no longer the vogue.

Little change has come about recently in the design of time and combination locks. The time lock assumed its present state of mechanical simplicity several years ago, after having undergone a series of complicated changes. It now means only the winding of a time movement set for a given number of hours, at the expiration of which a dogging mechanism is automatically tripped and the boltwork released for unlocking. If these time movements were absolutely dependable, only one would be necessary. But they are not, and because time lock experts may not be available when a movement fails, the smallest number in use is two. To avoid the danger of a lockout because of the possible failure of the remaining movement, a third movement is common. Four movements are frequently employed to be well on the safe side of things. The combination lock has not changed in principle for 40 years, as it would seem that it had then been brought to practical perfection. Automatic bolt-throwing devices, in the form of springs or weights, have been abandoned, as once set they cannot be controlled to unlock the boltwork at the time determined. The now standard time lock goes off duty at the beginning of business hours, but the combinations still maintain the door in a locked position so long as may be desirable. A refinement of

recent years consists in the counter-balancing of the so-called foot bridge or foot plate which forms the runway through the entrance. As doors grew wider and thicker, these plates became difficult to operate until accurate counter-balancing at all points of their swing became a necessity. The emergency door is small, usually circular. It should be a counterpart of the main door in construction, and is always to be recommended. It not only permits immediate access to the vault in the event of a lockout of the main door, but affords means of ventilation, a subject that was almost wholly ignored in former years.

Ventilation has become recognized as one of the important features of vault design. It may be accomplished in several ways. The emergency door may open into a plenum chamber from which the air under pressure is forced through the opening, deflected to distributing conduits either at the ceiling or under the floor, liberated at the ends of the aisles to find its way through the vault and out the main door, where in the better class of installations it is picked up by a ceiling exhaust register; or, where the use of a plenum chamber is not practicable or desirable, a fan draws the air in through the emergency opening and effects the same interior distribution. Or else interior ductwork may be connected directly to an outside supply by a hinged conduit section which during the day is located against the top of the vault door opening. A combination of supply and exhaust ductwork has been used in some of the largest vaults. This type confines itself to the circulation of the air entirely within the vault. The need for ventilation rests largely upon the fact that a great number of heat units are liberated in the vault by the lighting system and must be taken out by forced draft, since a vault has no fenestration, and the air space is relatively small for the number of people using the vault.

Vault Equipment. The usual vault equipment needs no particular description here, but it is interesting to note that the use of stainless steel has in the last two or three years obtained wide favor, and that tens of thousands of safe deposit boxes, as well as many paneled steel ceilings, vault door finishing plates, and architraves, are being made of this material, which seems to be stainless in fact as well as in name. It is a trifle harder to work than low steel, and while the per pound cost is high, the elimination of upkeep costs may make it a good investment. Furthermore, its use does away with the otherwise necessary coating of anti-rust materials, usually in the form of oils and greases, which must be kept fresh to avoid rust and which frequently damage the clothing of box-renters. In recent years plate glass mirrors, located at the ends of transepts or aisles, have become popular by not only adding to the attractiveness of the interior finish but to a degree actually functioning as a protective element, in that all sides of a person standing in the aisle and facing the boxes can be observed by the custodian or who ever is in charge of the vault.



Horizontal Section of Door; Composite Construction

It is unfortunately true that often too little consideration is given to details of the design of safe deposit boxes. The subject fairly bristles with interest, not only as regards construction of the work, but also as to the business organization, policy and administration of the bank. The flat, uninteresting facade of a bank of safe deposit boxes gives little hint, to the uninitiated, of its real meaning. It is the curtain that hides a large proportion of the country's wealth, and conceals the things that spell comedy, drama and tragedy beyond belief. Frequently the whole of a man's possessions lies in his little tin slide behind a thin steel door, and it is often surprising to see what little thought is given to the make-up of this door.

The real crux of the material side of the safe deposit business, and its greatest danger, is in the key lock. One of the most famous lock makers of the world has said: "No lock having a key hole has ever been made or invented which is absolutely proof against picking, nor is it probable that one will ever be or can be made." Security is a relative term, and while no key lock is absolutely "pick-proof," some of them are so difficult to pick as to defy attack except by an expert aided by all favorable circumstances. This exactly describes present conditions, and while most modern safe deposit key locks are reasonably good, some are decidedly superior. As the security of the box depends upon the key, it would seem the part of wisdom to choose the best of locks. Practically all of the safe deposit locks being made today are of flat tumbler or lever type, some makers having as many as eight of these tumblers adjusted to a single key. Use of the preparatory or attendant's key is universal. Where the plain tumbler lock is used, the utmost protection should be given to the storage and handling of the keys before they are given to a box renter, because the honesty of the employes is the only guarantee against duplication of keys, and many robberies have been due to this cause. The so-called changeable key lock is undoubtedly the highest class safe deposit lock on the market today. This is a lock having adjustable levers which can be set to any selective key of its class. When a box is vacated by one tenant, these tumblers are returned to normal

position ready to be set to any other key. Meanwhile these keys are sealed in heavy paper envelopes, and a new renter selects his pair of keys by taking any package from the large number. In other words, the key he selects has never been seen by an employe of the bank.

As key locks are more or less readily forced from the door, and as "yeggs" have taken advantage of this fact, some devices have been placed on the market looking to reinforcing the lock and providing auxiliary bolts which spring into locked position when the lock is being forced. These devices, however, have not had a very wide application, except in outlying districts. Large boxes are frequently fitted with bolt work, and often have two locks, dial or key, providing double protection in addition to the custodian's check, and the dial or combination locks are fitted with supplementary key locks, the key being held by the custodian, to make sure that the box shall not be opened by the owner except in the presence of an attendant.

The importance of so small an item as the tin box should not be overlooked. Many of these are so weak in construction and so poorly finished that they should not be used. The tin, aside from the key, is the one part of the work that is handled by the box renter and should be rigid and nicely finished. The lid should be fastened with a high class latch or its equivalent Small key locks, once in universal favor, are now seldom used. The high class tin box of today has so-called "runners" pressed outwardly from the bottom, the box taking bearing on two narrow lines instead of across the entire bottom, which resulted in collecting dirt and dust.

The electrical equipment of the modern vault includes high tension wiring for the general lighting system, which, if the vault is large, is thrown on and off by an automatic switch actuated by a remote control operated through a key lock, instead of by the usual button, to guard against the possibility of the vault's being thrown into darkness either accidentally or intentionally. Some large vaults carry an emergency low tension lighting system which functions immediately if the high tension power is cut off. In large security vaults power lines are run in to operate various machines. Constant, night-burning lights are installed in most of the recently constructed vaults. These are used to permit anyone locked in the vault, accidentally or otherwise, to read an instruction card, giving the home telephone numbers of bank officials and indicating a method by which he may unlock the time lock and wait for the officers to release him. People have been locked in even the smallest of vaults, both accidentally and intentionally, and a unit of this sort is always desirable.

While under normal conditions the average person lives comfortably upon 100 cubic feet of air per hour, the mental strain upon a locked-in victim has been considered so serious that auxiliary devices to lessen this hazard of mental strain are upon the market. These have taken two forms,—one is the so-called breathing tube, which consists of a permanently installed tube, 3 or 4 inches in diameter, passing through the vault wall and fitted with a plug which can be removed from the inside of the vault. Some of these tubes carry small ventilating fans. Their practicability in extreme conditions has been questioned, and they should not be recommended in connection with the highest class of vault work. Tanks of oxygen with releasing valves and a chemical to be spread on the floor to absorb carbon dioxide have found some favor. Many vaults are equipped with closing alarm gongs, which ring at intervals during the time the vault doors are being closed and which are intended to act as a warning to any who may have remained unnoticed in the vault. As there is quite a list of accidental lock-ins, it would seem that consideration should be given to means of preventing them.

Electrical protection is somewhat outside the field of vault design, yet every security and safe deposit vault should be electrically protected. Often there is a question regarding the character of electrical protection to be used, whether central office or isolated alarm. This must be decided by conditions surrounding each installation. Sometimes it is answered by the adoption of both systems for a single vault, which of course provides double security.

Wherever practicable, a vault should be so located as to make possible arrangements for observation upon all six sides. Sometimes observation of the bottom can be effected only by setting the vault upon a series of low piers, spaced several feet apart, these spaces being observed through inclined mirrors located below glazed floor sections. This is the best safeguard against successful tunneling. Without these spaces even electrical protection is not always sufficient, because the circuits may be broken and such interruption interpreted as the result of grounding, corrosion, or the settling of foundations. Then all that could be done would be to cut out the damaged circuits and retain the remainder of the system, thus allowing a possible unprotected area for a tunnel. With observation there is always the resistance-time of the vault to be depended upon to carry between the rounds of the patrol, and more important still is the assurance, obtainable through it alone, that an interruption is not caused by a tunneling operation.

The entire subject of vault construction is so complicated and dependent on details, whether a large or small project be involved, that no attempt has been made here to cover it fully. A specification for a large vault and its equipment often covers several hundred pages. This may sound extravagant, but it is literally true. Moreover, such detailed description is essential to put vault bidding and building on the same basis of actual competition on a single definite design as is the case in general building construction. Without such detailed specifications, competitive bidding loses much of its value.

SECURITY VAULTS OF REINFORCED CONCRETE

BY
H. R. DOWSWELL
OFFICE OF SHREVE & LAMB, ARCHITECTS

PRIOR to 1920 the materials of security vault walls, unless they were of extreme thickness, were considered as being of secondary importance. In the smaller vaults brickwork was frequently employed, and occasionally concrete with a small precentage of steel reinforcing bars. The larger and more important vaults were in the majority of cases constructed of concrete heavily reinforced, but in all of them a steel lining was considered as offering the chief resistance to attack. This attitude toward steel linings was due to the position taken by the National Bureau of Casualty and Surety Underwriters, who in their Manual of Burglary, Theft and Robbery Insurance thus define a "Class 10 Vault," which is the highest classification they have established: "No. 10 Vault,—lined throughout with steel at least 1½ inches thick, or with walls constructed of *non-reinforced* concrete or stone at least 54 inches thick, or of reinforced concrete or stone at least 27 inches thick."

Vault engineers and vault manufacturers accordingly concentrated their efforts on the development of linings. Until the advent of the burning torch, drills and explosives furnished the only means of attack. Consequently, vault linings were designed to resist drilling, since if a lining could not be drilled, explosives could not be effectively used. The development of the burning torch forced vault engineers and manufacturers to experiment with torch-resisting materials, since it was found that materials which were drill-proof offered little resistance to the torch. Unfortunately, torch-resisting materials can be drilled with comparative ease and are readily shattered by explosives. Linings were therefore developed, combining, in several layers, drill-resisting materials with others designed to resist burning. This practice called for thicker linings, resulting in increased cost in both materials and fabrication. This, briefly, was the condition in vault design when the Federal Reserve Bank entered upon its extensive program of branch bank construction. Very little information of practical value was available, for although vault manufacturers had tested various lining combinations in their shops and laboratories, few, if any, extensive tests had been attempted under conditions such as would be encountered during burglarious or mob attack.

In 1920 the Federal Reserve Bank instituted a series of practical tests under the direction of Alexander B. Trowbridge, their consulting architect, in an effort to establish the relative resistance of all the known types of vault wall and lining construction and to rate these resistances in terms of cost. Tests can be made to show almost any result desired. The value of any test or series of tests, therefore, depends on the objective and the integrity and open-mindedness with which the tests are carried out. The Federal Reserve tests did not seek to discredit any material or method but merely intended to establish relative values. The test walls were constructed by a reputable contractor under careful supervision, while the linings were built and submitted by leading vault manufacturers.

It is the purpose of this article to discuss only wall construction, and consequently we are interested in the tests only insofar as they relate to walls. Concrete, consisting of carefully graded fine and coarse aggregates and fairly rich in cement, was found to offer considerable resistance to all three methods of attack,—drills, explosives and torch,—when steel reinforcement extended entirely through the walls and at right angles to direction of attack.

In order to study this type of wall further, it was decided to carry out additional tests and also to compare various types of reinforcement. A year later, 1921, a second series of walls were ready for testing. The concrete mixture in all of the second

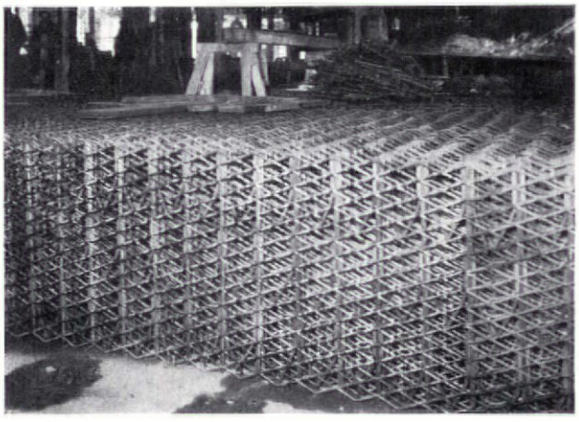


Fig. 1. Vault Floor Reinforcing on Edge, Spaced by Vertical Bars

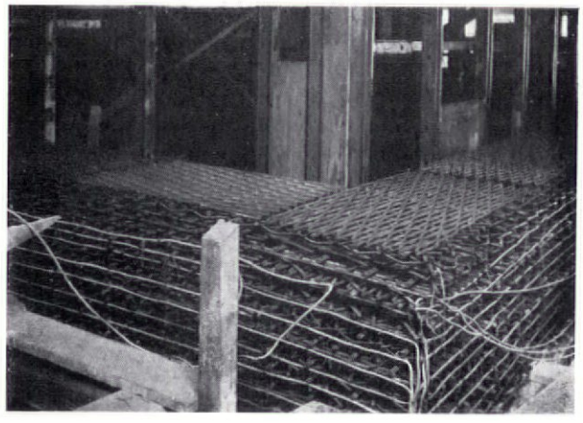


Fig. 2. Chisel-Resisting Bars Horizontal. Reinforcing Mesh Reversed in Each Layer

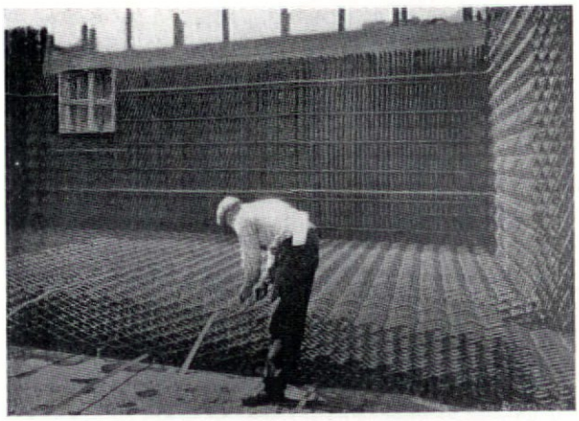


Fig. 3. Wall Reinforcing Placed on End. Bars Through the Meshes

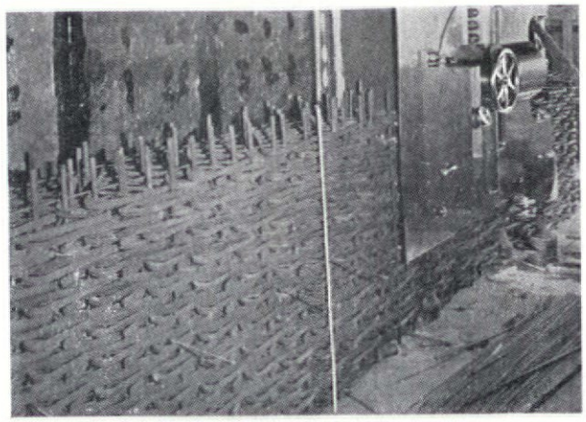


Fig. 4. Reinforcing Frames of Bent Bars At Angles to Face of Wall

series was uniform, but the method of placing and the type of reinforcing varied, a special effort being made to try out materials which were available for use without the necessity of expensive fabrication. Two types of reinforcing, each of relatively low cost, were found to be very effective,—one, a heavy expanded metal, combined with a trussed bar; the second consisting of a series of frames formed of heavy steel bars which were united by smaller members.

A brief description of these two methods, together with a third and somewhat similar system which has since been developed, will, with the accompanying illustrations, show how far vault wall construction has progressed since the tests referred to were carried out. One of these materials consists of heavy steel plates expanded into a diamond mesh, —the diamonds measuring approximately 8 inches long by 3 inches wide. This mesh preferably is laid flat and extends horizontally through the wall to within about 1½ inches of each wall face. On top of this trussed bars are laid at right angles to the wall face,—spaced approximately 8 inches apart,—with prongs formed by shearing portions of the flanges, bent out from the main bar at an angle of about 45°. Similar construction is used for the vault floor and roof except that, to carry out the same theory, the sheets are placed on edge and the bars vertically. Fig. 1, which shows a portion of a vault floor mat 4 feet thick, illustrates this form of construction.

There are several variations from this type of construction, each of which adheres closely to the basic principles of the test walls. Fig. 2 shows ¾-inch chisel-resisting bars laid lengthwise between the sheets and the mesh reversed in each layer. It should be mentioned that in both of these types ¾-inch diameter rods are threaded through the meshes at approximately 1-foot centers. Fig. 3 indicates the sheets in the walls placed on end with rods threaded through the meshes. This type resulted from a demand for a cheaper wall, since it permits of a reduction in steel by using a wider spacing of the sheets. It is of course obvious that when the sheets are laid flat the spacing is determined by the diameter of the separating bars.

One company manufactures reinforcement consisting of horizontal and vertical type reinforcing. The

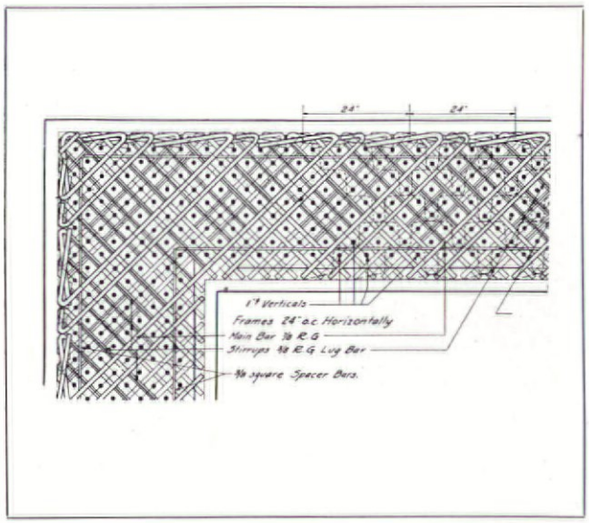


Fig. 5. Plan of Horizontal System of Bent Bar Frames with Verticals

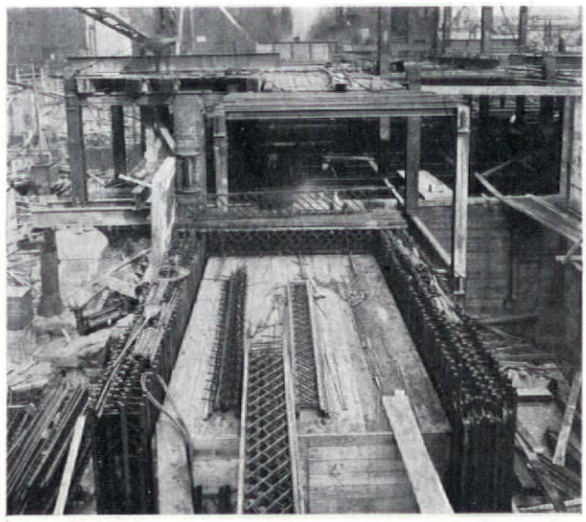


Fig. 6. Vault Under Construction, Showing Vertical Reinforcing

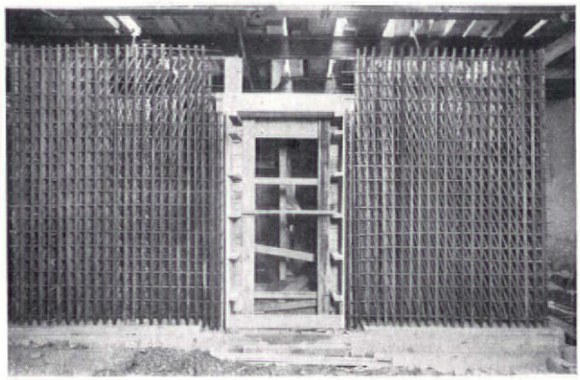


Fig. 7. Front View of Vertical Reinforcing

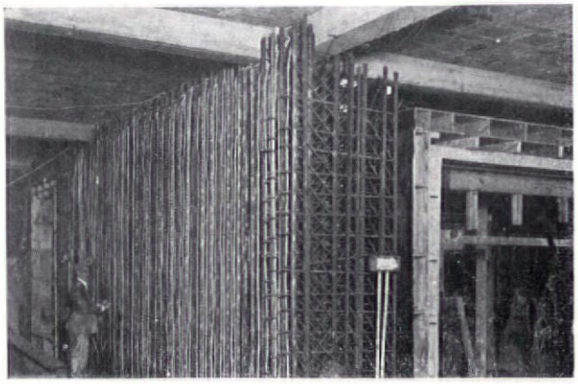


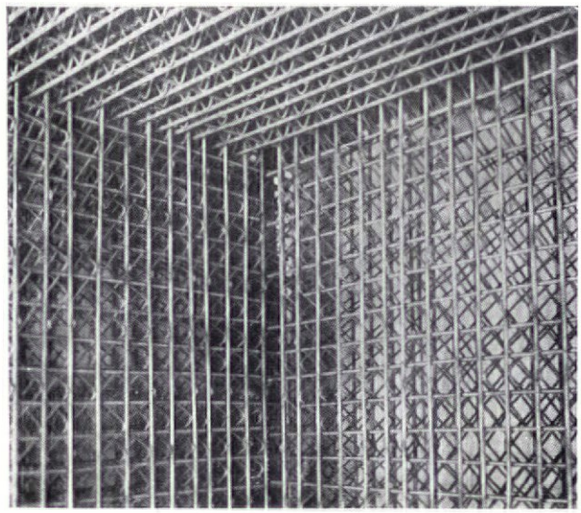
Fig. 8. Showing Placing of Electrical Protection Cables

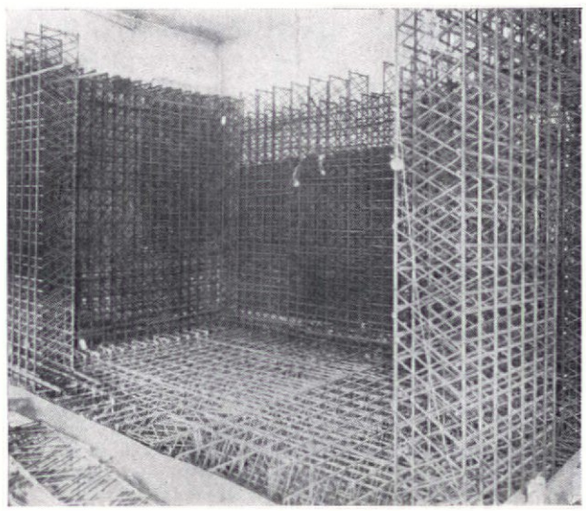
frames for the horizontal type are similar in appearance to sled runners and are laid flat in rows with the bent ends at the outside face of the wall. The axis of every frame is inclined at 45° to the face of the wall and the frames are at 90° to each other. Separators, parallel to the wall, are placed between adjacent rows of frames, and heavy bars are inserted vertically and threaded through the various members. Figs. 4 and 5 show a portion of this type of reinforcing The vertical system manufactured by this company consists of three types of frames designed for heavy, medium and light construction. In all three types round bars are threaded through the diagonal members of the frames. Figs. 6, 7 and 8 show portions of vault walls under construction using this vertical reinforcing.

Within the last few years a third manufacturer, has entered the vault reinforcing field. This company employs a system of frames which is a modification of the bar joist. These frames are generally placed vertically in the walls but may be laid horizontally. Figs. 9 and 10 show two diagrams illustrating this system. In vaults using these types of reinforcing, the steel constitutes from 5 to 9 per cent of the cubic contents of the walls, floors and roof, depending upon the spacing of the mesh, the size of the bars forming the frames, and the spacing of the frames.

The most satisfactory concrete mixture consists of one part of cement, one and one-half parts of sand, and three parts of broken stone or gravel, the stone being graded between the limits of a ¼-inch and a ¾-inch mesh. Experience has shown that in order to maintain a desirable water cement ratio, it is advisable to use an inert material in the mixture in order that the concrete may flow readily. When completely embedded in concrete, these types of construction result in a vault extremely difficult to penetrate, even if subjected to mob attack.

Figs. 2 and 8 show the usual placing of electrical protection cables. These cables are embedded in the outer face of the concrete and thus provide the first line of defense. In conclusion it should be mentioned that since the development of these reinforcing systems the National Bureau of Casualty and Surety Underwriters has given its No. 10 Classification to vaults without linings when constructed with walls, floor and roof 18 inches or more in thickness, reinforced with mesh or frames of the types shown, spaced at certain specified intervals.





Figs. 9 and 10. Reinforcing System Employing a Modification of the Bar Joist

DETERMINING THE BANK'S REQUIREMENTS

BY

FREDERIC C. HIRONS

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IN ORDER to start the drawings and specifications for a bank building of any type, it is of the greatest importance that the architect have a conference with the building committee and decide certain details. The architect is fortunate if he has a small building committee that will pass on these various matters and make prompt decisions. There are three things that come in the planning and designing of any building that it is well for the architect to make clear to his clients. They are, (1) the requirements of the building in regard to its size; (2) its cost and (3) the materials to be employed in its construction. The client can decide the first two, but he will have to leave it to the architect to tell him what the materials should be. To start the planning of a building in the most efficient manner, an architect should thoroughly familiarize himself with the type of the bank, trust company, savings bank, national bank or private banking company, its methods of doing business, number of accounts, etc.

A list of requirements and questions upon which the architect should have definite information and decisions should include:—

1. Number of officers who will occupy the officers' space on the main floor of the bank.
2. Number of committee rooms or private offices desired, with the approximate sizes of each.
3. Number of tellers and wickets.
4. Are tellers both paying and receiving, or are paying and receiving accounts separate?
5. Number of bookkeepers. Number of stenographers. If it is a large bank, the bookkeepers are usually placed on a floor apart from the main banking room, as there is considerable noise involved in their work with the adding machines. It is advisable to use some sound-absorbing material that will deaden the noise in the working quarters, and thus greatly increase the efficiency of the working staff.
6. Number of men employes and number of women employes, so that provision can be made for locker rooms and toilet facilities.
7. Safe deposit department requirements.
8. Sizes of vaults. In large banks it is considered the best practice to have a separate vault for the bank securities, aside from the safe deposit vault. In the security vault, the number of money chests and lockups required must be determined. In the safe deposit vault, the number of boxes of each size desired must be ascertained. These boxes will vary in size from 1 inch by 5 inches by 2 feet deep to practically a small safe. In obtaining information about the number of boxes, the banker should give the architect concise and accurate information as to the number, sizes and type of these boxes, and also the provisions which should be made for growth.
9. Number of coupon booths,—individual or double,—and the rooms of various sizes that can be used for corporations, payroll rooms, or for committees of public institutions, trustees of estates, etc. How many officers and attendants are in charge of this department?
10. Is a trunk storage vault for silver, etc. desired?
11. Should a vault for fur storage be provided? What type of temperature regulation is desired in the fur storage vault?
12. Are any dining room accommodations needed for the employes during noon hour? In some of the larger banks in the great cities, it has been found desirable to keep employes in the bank during the whole day. With that in view, some banks supply luncheon for their staffs.
13. Number of directors, so as to determine the size of the directors' room.

This list in a general way will give the preliminary information that is necessary for the architect in relation to the banker's idea as to the amount of money he wants to spend, the size and requirements of the building, and the material and equipment. The architect should request that the surveyor for the bank or superintendent obtain definite information for the architect's use. This is a questionnaire that this firm gives to the bank surveyor, requesting him to fill in the information on each question. This will save considerable time and greatly facilitate getting out the drawings.

Expansion. One of the most important items in the preliminary study of a bank is the question of future expansion. A bank should have the possibilities of 100 per cent expansion over its current needs. It is an absolute fact that the businesss of a bank will greatly increase when it gets into its new quarters, and it is a common ocurrence at the end of ten years for a bank to need more than double the facilities it had at first.

Contracts. From practice it has been found that the best results are obtained by making three contracts for banking work, — one for the construction of the building itself; second for the interior equipment, which includes banking screens, finished floors in the banking room, electric protection for daylight hold-ups, bells, pneumatic tubes, etc.; and the third contract for the vaults and vault equipment. For the protection of the vault, the banker will probably have some definite ideas. The contract for the building should be let first. The contract for the vault second, and the interior equipment contract last. The chief reason for letting this equipment contract last is that it gives the architect and the banker time to study carefully the minute details.

ELECTRICAL PROTECTION FOR BANKS

BY

DUGALD A. SHAW

BANK EQUIPMENT ENGINEER, WEARY & ALFORD COMPANY

A DOUBLE-HEADED question disturbs the ordered thoughts of almost every banker today: How can he keep the doors swung wide in public welcome, and still keep out the gunman? His contacts with customers, more personal than they have ever been, have stimulated competition among architects and the manufacturers of bank equipment to lower the counter screen,—approaching, as it were, without quite arriving at a form of cafeteria service so much desired by a less welcome visitor,—the bank bandit! That gradual elimination of barriers between the teller and depositor marks a changing status of the bank. Its use is no longer limited to a select circle of the financially well-to-do. Everybody is invited, even the successors of the late Jesse James. It is curious how men of the bandit breed occasionally acquire a halo instead of a noose, for rascality paraded under picturesque names is rascality still. Perhaps the popularity of a Jesse James is due to the fact that "he got away with it." Had he fallen from his horse and started to run, we might hear less of a proposed statue to his memory. But shout "Stop thief!" and people will become a mob, a herd, with the jungle urge to hunt. A thug chased by a crowd knows that he had better throw his gun away, and thereby hangs our tale.

Styles change, even in thieving. A decade ago it was burglary; since the war, holdups have been the popular sport. The record of the past 20 years, according to the American Bankers Association, shows that bank burglaries outnumber holdups, although more is heard of the latter as they are more sensational,—more romantic! The banker gains nothing from report of a burglary, so there is no broadcast if he can prevent it. If he would consult his own interests, as others consult him, and listen to the insurance underwriters, the banker would learn that they say in unmistakable language that the problem of burglary protection resolves itself into two phases:

First,—prevention or interruption of an attack through prompt detection of the burglar's presence.

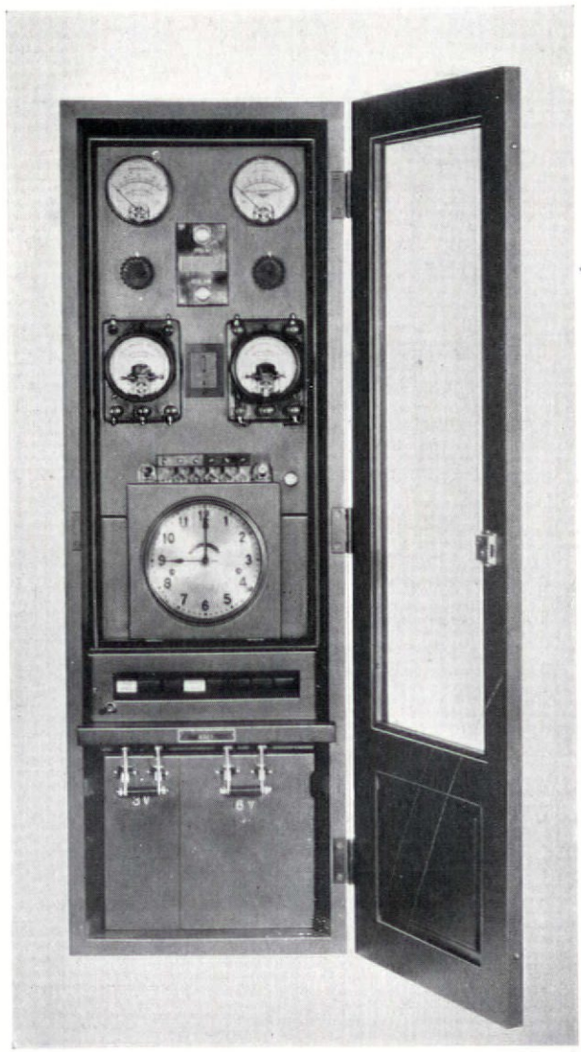
Second,—mechanical resistance to an attack.

The first recommendation means only one thing,—good vault equipment. The heading of this article is its complement. In the two recommendations combined is an answer to the banker's question: How can I keep out the gunman and still throw the doors wide open to the public? We make that assertion without qualification and knowing full well that there are other forms of defense,—gas, turrets, bullet-proof shelters, sawed-off shotguns,—all dangerous playthings and a menace to the law-abiding as well as to the law-breaker.

Until the middle of the nineteenth century the locksmith had not developed his craft rapidly. The Egyptians had a lock with wooden tumblers, which was clumsily imitated by the Romans. Mediæval goldsmiths relied mostly on bolts, bars and armed guards. One hundred years ago the key for a good strong-box lock weighed about a pound. A crime wave following the Civil War demonstrated that there was no such thing as an unpickable lock in this country. The combination lock was invented, and the burglar was surely beaten,—for maybe two years. Threats, backed up by the muzzle of a gun, or a charcoal brazier, forced the cashier to reveal the combination, and as the result of a demand for forms of defense not dependent upon human frailty, the time lock came into being, and with it came doors so well fitted that the joints were proof against the insertion of gunpowder. We of today laugh at those "well fitted" vault doors, and so did the yeggs of yesterday upon the advent of liquid explosives. The next defense was an automatic bolt-opening device, a self-controlled apparatus with all the mechanism on the inside of the door. The door itself was steadily improved in construction to resist attack from the newer and more powerful explosives. Then came the torch; and burglary was back on the front page. Weapons of attack and means of defense in this never-ending warfare remind one of the race in naval armaments; the Merrimac and Monitor, battleship and submarine, U-boat and depth-bomb. Methods of defense cannot remain static. The vault manufacturer and lock maker had contributed their best in the form of stronger and better built doors, in the development of torch-resisting and drill-resisting metal, in more cunningly constructed locks. Reinforced concrete had also taken more defensive shape. The lines were holding, but there were, and still are, hundreds of outlying banks without the wherewithal to buy new vault work. Those banks are in bad defensive shape against an attack from the gang,—organized crime; savagery with the weapons and equipment of science and the cunning wherewith to use them.

Reinforcements came from an infant science. Electricity had cast off its swaddling clothes. Why, people might even use it for cooking; it would possibly supplant horse power as a means of transportation! Electricians sprang up in droves. Out of the ruck came the first burglar alarm. Bank robbery was a popular form of sport in the newer territories, and the first practical burglar alarm was a contribution from the open spaces, from the stamping ground of Deadwood Dick and his kind. The principle of that early alarm, more highly developed of course, forms the basis of most of the systems of electrical protection used today; that is, the surrounding of the vault with devices to surely cause an alarm in case of attempt at forcible entry.

Compared with present-day models, the early types



Typical Control Cabinet Showing Relays, Automatic Re-set Instrument, Timer, Indicator, Etc.

were in a class with the horseless carriage,—but they did the work. They were mysterious, there was no telling what it was all about, so the yeggs usually passed up the banks so protected and picked the soft banks. The original intention was to summon the police, but an attack on a bank in the earliest days of electrical protection gave a hint of a totally different effect. One winter night a gang of yeggs entered a bank in Nebraska, seized, gagged and bound the watchman, placing him in a chair thus trussed with a facetious invitation to "see how it was done." What happened when they started to force the vault, is best described in the words of the watchman who was still tied up when found there next morning. "Say," said he upon the removal of the gag, "when the alarm went off, them fellers never even stopped to say good-bye." Overcoats, mittens and tools left in the flight backed up his statement; and nobody else in town had heard the alarm!

Two general types of electrical protection, both originally designed to summon the police, are in use today: (1) the silent alarm; (2) the local alarm. The first warns the police by means of a line to headquarters, to a local police station, or to a central agency which sends its own armed riders and in turn relays the news of an alarm to the police. The second type sounds a loud alarm on the premises, inside and outside the building, so that everybody in the vicinity will hear it. Those two methods, in one form or another, are the basis of all the types of electrical protection listed in the Burglary Manual. The police alarm, or silent alarm, is perhaps peculiarly of value in states which are organizing *vigilantes*,—strong armed citizens, taught the use of sawed-off shotguns, who will spring to arms at a summons from the bank and work with the local police in rounding up the robbers.

Making the defeat of a burglary or a hold-up dependent upon the capture of the crooks looks like a tactical error to the writer, from the individual banker's point of view. As an auxiliary to the local alarm it is to be recommended, but we are reminded of that first turn at sentry duty when the sergeant quotes from the instruction book to report all suspicious circumstances to the corporal of the guard and adds out of his own experience: "Don't think you are the whole blankety army." The fact that the bank was "protected" would, of course, reduce the possibility of attack.

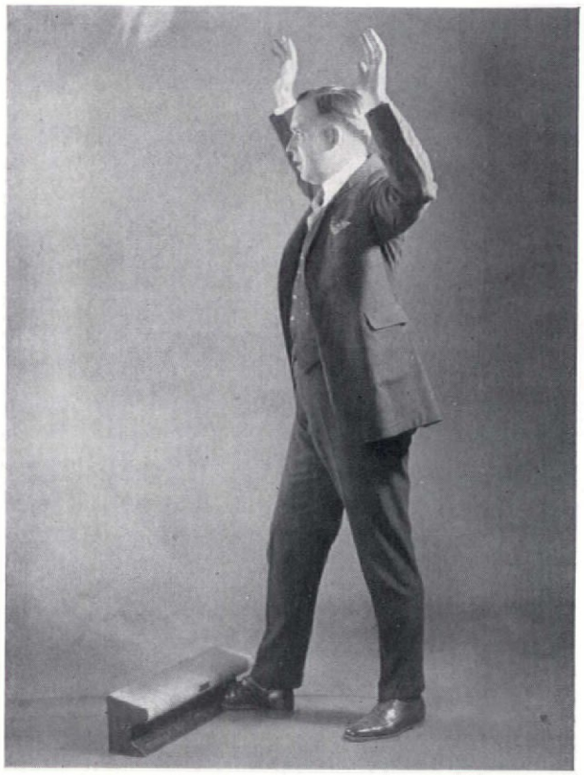
When the local gong goes off, the whole neighborhood knows about it, and so do visitors, welcome or otherwise, even though it be a false alarm; and even though there be a dozen false alarms, the gong would still do its real work, for it is a curious fact that the virtue of the local alarm is no longer that of a police summons. Its continued use has brought to light that no burglar or hold-up man can stand for a single instant against the sound of an alarm. This would differentiate the "local" method from others as a reliance upon psychological reaction rather than upon physical action. The clang of the gong is the howl of the bogey man, the Cro-Magnon on the rampage, the drum call of the jungle that the hunt is on. Have you ever seen a close-up of the end of a man hunt? It is not a lovely sight. The hunted knows there is no pleasure in it—for him! Outside is the driver of the car with the engine running. Should he elect to save his skin, and if he has the immediate means, the jig is up for the others. They know it, and police records bear it out. Those inside gongs are intended to stimulate the racket outside, to make sure that the gangsters hear the alarm; and when they do hear it they are on their way; nor do they stand upon the order of their going.

Out of a number of attacks where abandoned attempts showed evidence of flight without any known alarm, we cite one that happened in an Iowa town. The cashier of the bank called the bank on the telephone, and, getting no answer, hurried down to find that a burglar gang had forced the door of the vault and had started on the safe, but had quit the attempt

and skipped. Nothing other than the ringing of the telephone had caused their precipitate flight. Electrical protection is the modern equivalent of the watch dog,—a sentry,—something that will give warning that marauders are aprowl. It is not, however, a substitute for vault work, nor is it likely to take the form of live wires designed to give the thief a shock should he attempt to leave finger prints on the vault structure. That kind of thing is ruled out. An employe working overtime, the watchman on his nightly rounds, an industrious charwoman, would be the likely victim in any electrical equivalent of the mantrap or spring-gun. The gong on the outside of the building acts as a deterrent simply by its presence there, for the potential yeggs can see that the bank is "protected."

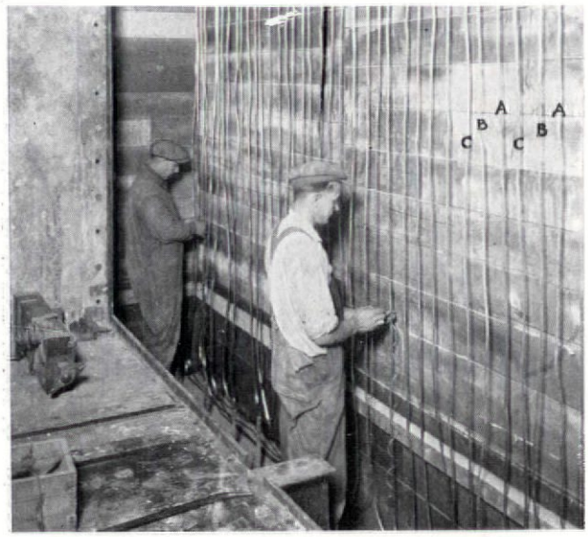
In highly specialized electrical equipment, there are, needless to say, many patented devices, but the working of an alarm system is nobody's secret. Out of what might be termed the "age of confusion" in burglar alarms, two types survived; in one type a grille work of cables was used, and in the other the protective feature was a "lining." In the cable type, lead-covered wires or cables are embedded in the masonry at the time the vault is built, tests being maintained continuously during their installation and also during the pouring of the concrete. The wires are set at approximately 3-inch centers and hooked up on different circuits, the number depending on the size of the vault, in such a manner that no two wires of the same circuit are adjacent to one another. In the event of a faulty circuit, the distance between live wires will never be more than 6 inches. Linings are installed either on the outside or the inside of the vault, the latter more adapted to existing structures, in the form of a special sensitive material described as an "open and closed circuit lining," which in turn is covered by light steel plates to protect it against any accidental penetration that would consequently cause a false alarm. Another form provides a grille work of closed-circuit wires protected by some form of envelope other than steel, such as plaster, or other fairly firm and protected materials. Those who have taken part in or supervised the cutting of hard concrete know that it means sledge hammer work or use of explosives. The forcing of a vault, therefore, without breaking cables or penetrating the lining, is not even probable.

There are two standard methods of protecting the door so that an alarm will sound in case of an attempt at a forced entry. One method is by applying heat-sensitive contacts to the inner surface of the door, which act upon the same principle as the sprinkler heads in a fire-protection system. A moderate degree of heat closes an open circuit in one or more of the contacts nearest the point of heat and sets off the alarm. Another method is to embed an "electrical lining" in the doors under either the outer or inner finish plate. This method requires the coöperation of the vault manufacturers and is standard practice, but is not practicable when the door is already in place. In both methods of door protection, alarm contacts are placed upon the door bolts to cause an alarm should the bolts be out of, or moved from, a locked position. In some cases additional protection is provided,—although not demanded by the underwriters, who are only concerned with forcible entry,—by placing contacts on the door locks. For doors of moderate thickness, the first method, the heat sensitive contacts, would appear to be preferable as least expensive, and for heavier doors the second method, the concealed lining, is recommended. A lining under the inner plate is not so good, since the attack would have to practically ruin the door to reach the lining. All the vault manufacturers are equipped to prepare their doors for electrical linings, and the additional expense involved in the purchase of new vault work is a comparatively small item.



Bank Teller Giving Alarm by Foot-Rail Contact

The instruments used in the control of the system,—relays, timers, indicators,—are assembled in a cabinet, which is located for protection inside one of the vaults, preferably in the vault that, in accordance with the bank's established practice, is the last to be closed. Since an alarm system must be self-contained and self-protecting, it must also be self-controlled, as otherwise it could be turned "on" or "off" at will by anyone desiring admittance, whether it be the head of a gang or the head of the bank. There must also be some form of automatic control whereby the system will be disconnected from the night burglar alarm in the morning, switched on for day-raid



Setting Cables for Wall Protection, A, B and C Are Separate Circuits on Approximately 3-inch Centers

duty, then back again for the recognized hours of thievery. In some systems this is done by using a time lock similar to that used by the vault manufacturer for the time-control of door bolts. Bankers who have suffered damaged nerves as a result of a "lock-out" know that a timer which must be set every day is dependent upon a memory frequently harassed by financial problems. The "eight-day clock" as used by makers of one of the standard systems, the "continuous-running timer," as it is described, does not depend upon anybody's memory. It gives a "winding warning." Like the neglected young of the human species, it makes more noise yet, and keeps it up until somebody does pay attention!

How long does the alarm ring when it goes off? In the best systems, about 15 minutes. Some used to go all night, and maybe some still do so. If anybody in the neighborhood is not aroused by the din of a rapid-fire gong in that time, he is probably sleeping it off. One thing is certain: the yeggs would be off too. Suppose, however, that they had tripped the alarm with malice aforethought, one might ask, and returned to "pull the job" when the citizenry had retired and the police were on their third game of checkers,—what then? Well, if it were out of commission in the first place, the yeggs would not waste any further time on an experimental alarm. If they thought, further, they had put it out of business for the night by turning in a false alarm, they would be badly fooled provided it were equipped with an automatic resetting device. This feature is not demanded by the underwriters and it is a proof that some manufacturers have set a standard for themselves that will more than meet the requirements of the underwriters. The resetting device will stop the ringing of alarms (from any cause) at the end of a specified time,—from 15 to 20 minutes,—and automatically re-set the alarm system for another attack.

The latest development in burglar alarms, and one that has only been perfected within the past few years, is the sound-sensitive alarm. It takes the place of cables and sensitive linings for the walls, floor and ceiling. The controls, door protection and alarm mechanism are practically the same as for the cable type. Sound-sensitive detectors,—the size of the vault determines the number,—are fastened to the walls or ceilings like so many wasps' nests. They are, in effect, microphones. There is nothing new about the theory of the sound wave. Cry "boo" when you see a grasshopper feeling the air with his antennæ, and watch him jump. Do the same in a vault equipped with a sound-sensitive system, and the indicator will dance with joy. Wait till the alarm is turned off, however, before making such a test. That such a system must be fool-proof, super-efficient as it were, is self-evident. In actual commercial use over a period of years, it appears to be completely successful. It has a special appeal for the architect and builder in that its installation, aside from a few runs of conduit, can be deferred until most of the other sub-contractors are out of the way. The noises of an attack on the vault structure are caught by the "mikes" and the disturbance, stepped up, is relayed to the gong. The "mikes" are also sensitive to the snapping of torches and other vibrations produced by an attack on the vault doors, although not affected, —at least not enough to cause an alarm,—by vibrations originating outside the vault from street cars, trucks, machinery and things of that kind.

The banker and his architect, having in mind the purchase of vault equipment, will hear much talk of the Underwriters' Laboratories, of "Class No. 10 Vault Construction," and of "Grade A Electrical Protection," therefore a few words of description. The Underwriters' Laboratories is an organization maintained by the underwriters of insurance to serve as a central testing station where products designed to prevent fire, theft, robbery and burglary or to protect property in general, can be investigated and their merits ascertained. The classifications for vault construction were not determined by laboratory tests but grew out of what was considered good practice,—in the days before the invention of the cutting torch. Class No. 10 is the highest standard of vault construction recognized by insurance companies and one which entitles the owner to the maximum discount based on physical equipment, or, as they term it, "mechanical defense." It is exemplified by the vault having 18-inch reinforced concrete walls, a steel lining half an inch thick, and the standard 10-inch door. Neither heavier and better looking doors nor stronger walls get a better rate,—yet. Grade A is the highest form of electrical protection recognized by the underwriters of insurance and entitles the owner to a 65 per cent discount on any rate for burglary insurance based on physical protection, even that for a Class No. 10 vault. It was established by tests at the Underwriters' Laboratories. It would appear, then, that the people who insure against burglary must think fairly well of electrical protection. They make this distinction between

physical protection and electrical protection, however. A 10-inch door built 20 years ago is still in Class No. 10, whether the builder is still in business or not. Manufacturers of electrical alarm systems must pay a yearly fee for each model approved, to keep it approved. If the manufacturer goes out of business and no similar concern takes over the responsibilities and care of his models, they come off the list of approved systems, and the 65 per cent comes off the list of approved discounts. Before asking for bids for his client, the architect will be well advised to consult the "Who's Who" of burglar alarm manufacturers.

Specifications for electrical protection can of necessity merely outline the general requirements of a system to be selected, one that has been developed by the manufacturer and passed by the Underwriters' Laboratories. Any arbitrary demands in the specifications might mean trouble over insurance premiums and would certainly be an invitation to argue as well as to bid. A comparison of the relative merits of the various systems is something else, and should be a determining factor in the awarding of a contract. Some systems just "get by" the underwriters, and others provide a scope of protection much in excess of those standards. The essentials of a system of electrical protection against burglary and holdup are outlined in these paragraphs.

1. The purpose of that part of the system of electrical protection embracing defense against burglary is that an alarm will sound or be turned in automatically under any of these or similar conditions:

(a) An attack on the vault walls, ceiling, floor slab or door by torch, drill, explosives or other burglarious means.

(b) An attempt to open the vault door at other than regular working hours or in a regular manner.

(c) Any attempt to cut the wires forming a part of the installation,—the lead to the gong for example.

(d) Any tampering with the alarm gong, if it be a local alarm.

2. In the event of a holdup, the alarm is set in motion by manual contacts—push-buttons, or by some variation of that process; a foot-rail, for example.

3. In electrical protection for a night depository, there is no choice of type; the cable system is used.

After the awarding of the contract, the work will, for the greater part, be covered by the specification head "Coöperation with Other Trades." The manufacturer should be kept informed of the progress of the building operation in order that he have his material on the site in time. This is generally done in two parts, viz.,

(a) Cables, conduit and other concealed parts which are installed early.

(b) Visible equipment,—controls, push-buttons, alarm gongs,—which are installed shortly before the keys are turned over to the owner.

Experience dictates that the conduits should be furnished and installed by the owner, that is, that they be included in the electrical contract. It would eventually come around to him, however it were handled, and it is standardized material.

There is one item of burglar alarm equipment that the architect cannot blink at, and that is the location of the alarm gong. It is enclosed in a heavy steel housing, emblazoned on the front with the legend "Burglar Alarm," pierced with louvres to let out the sound, and so anchored to the wall that only an explosion would dislodge it. How the architect loves signs, clocks, or bird houses of any kind plastered on "his" building! That gong housing on the outside of the building for example,—let's stick it around in the alley or back of the parapet where it won't be seen. It can't be done. One of the unalterable,—the architect might call it "unutterable," —commands of the underwriters is that the gong housing be so located that he who runs may read the inscription "Burglar Alarm," and that nothing be done to blanket the sound of the gong. Furthermore, they specify that the gong be placed from 15 to 25 feet above the sidewalk. They have unbent so far recently as to decree that an alarm housing may be recessed, provided that such will not muffle the sound of an alarm and provided further that any grille in front of the gong housing may readily be removed or opened for an inspection of the housing and its contents "without difficulty" by the Laboratories' representative or by factory inspectors. The architect must make up his mind early in the development of his elevations that the gong or other alarm housing will appear somewhere on one of the main elevations. If he leaves it to a mechanic who thinks in terms of burglar alarms and not of architectural orders, there is no doubt that it will meet the requirements of the underwriters,—but how!

In calling for bids, and before awarding the contract, the experienced architect will ask in effect: "Who are you, and what have you? Is your system sold outright, or is it rented?" If the work be included in the general contract, as is sometimes done even for the vault itself, the contractor will more than likely buy "for a price," and the difference in price between the best alarm equipment and something that will just get by, is a matter of a few hundred dollars at the most. Bearing in mind that the protective value provided by a first class complete alarm system is so much greater per dollar of cost than is afforded by any other protective measure, the price is of relatively less importance than is the type of system, the quality of the equipment, the nature of service to be rendered, or the standing of the manufacturer. The approval of the Underwriters' Laboratories is, of course, essential on account of the large discounts allowed for an approved system. The best systems, however, provide a scope of protection in excess of those demanded by the underwriters who are concerned only with a forcible entry. In a chart representing bank losses from all causes, including burglary and robbery, that sector colored to indicate embezzlement and "inside jobs" makes

quite a splash. There is also the factor of carelessness. Few householders have not, at some time or other, left their doors unlocked, and the same thing happens in the best regulated banks as to vault doors.

The most complete local alarm system with which the writer is familiar effectively guards against the leaving of the vault unlocked overnight and also protects the combinations and time locks from disloyal tampering. The central station type also provides means of detecting and correcting such conditions, involving again, however, a dependence upon human fallibility which is the occasion of the condition in the first place. The humble watch dog is introduced as a form of insurance policy. Hire a man to do that kind of work, and the premium for burglary or robbery insurance is immediately discounted. An article of this kind would be incomplete without some data about insurance rates for burglary and for robbery. They represent the insurance companies' reaction to bank defenses.

Here are some culls from the Manual of Burglary, Theft and Robbery Insurance:

1. The basic rate per thousand for burglary on that old time "insulated" cupboard painted black and labeled "Safe," is $25.00
2. In "Class No. 10 Vaults" this rate comes down to 2.00
3. For watchman service there is a discount of 10%
4. Territorial discount.

(a) Some states are statistically more law-abiding than others, or at least less open to attack. In Maine and Maryland the territorial discount is 40%

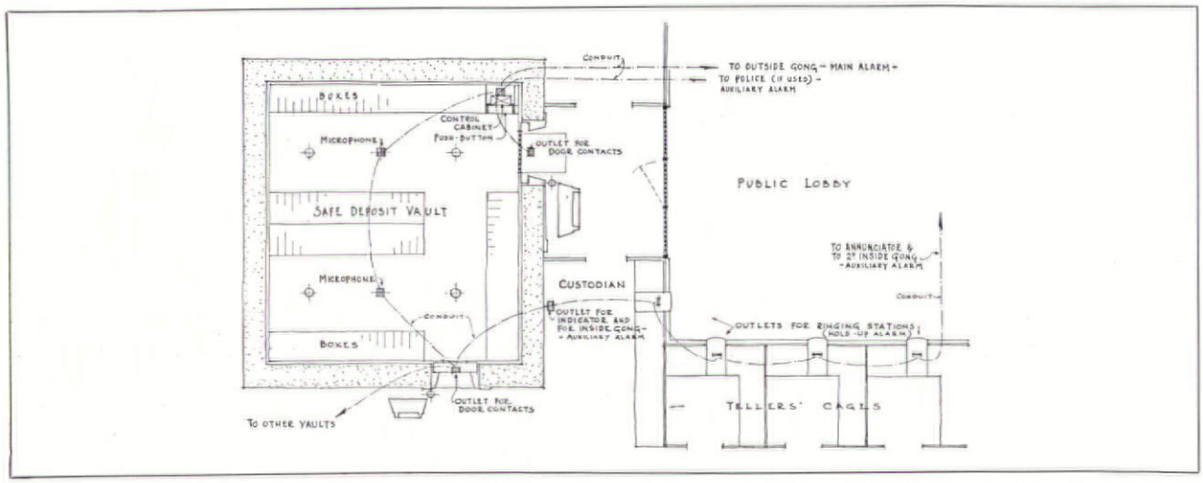
(b) In Illinois and Oklahoma, where there is apparently an open season for bandits, the discount is ..... nil

(c) Parts west, taking in Hollywood, get .. 20%

5. Population discounts vary; as the birth rate rises the insurance rate comes down, regardless of locality. That seems to let out the natives and bears out the claim that New York gunmen do all the Chicago robbing and vice versa.
6. Then comes the discount for electrical protection which, for a Grade A System, regardless of locality or strength of vault, is 65%

Robbery is something else. The best the insurance people will do, even with police guards and holdup alarm, is a 20 per cent discount. There is less at stake, however, in actual cash loss from holdup than from burglary. The stock newspaper statement to the effect that the robbers scooped five thousand in the cages and missed fifty thousand in the vaults does not make the thugs feel badly. They got what they were after,—all the cash in sight,—and they got it while one might hold his breath. The only thing that could keep an organized gang out of a bank during working hours is a cordon of police or a regiment of soldiers. If things should come to such a pass, the securities in the bank would hardly be worth the paper they were printed on. The banker must do his business out in the open in this day and age and, in so doing, must necessarily take some chances as he does every time he steps off the curb. By exercising reasonable caution in crossing the street he may keep his name out of the papers, and by doing the same thing with his bank he may keep the name of his bank off the casualty list.

In the exercise of reasonable precautions the architect should unhesitatingly recommend that his client keep in mind not only the insurance standards for good vault work, but the advertising as well of the potential defense of a heavy door supplemented by a complete burglar alarm system, one with adequate ringing stations to provide alarm in case of holdup; that the alarm system should be selected only after careful investigation and be of a type providing the largest possible scope of protective service rather than one that merely meets the limited requirements of the underwriters, a system furnished by a well known and reliable concern that offers a genuine inspection service. Thus equipped he may invite all his friends to the bank with reasonable expectations that no unwelcome visitors will try to crash the gate.



Plan Showing Conduits and Outlets for a Sound-Wave Alarm System. Hold-Up Alarm Is Operated by Foot-Rails in Tellers' Cages

THE HEATING AND VENTILATING OF BANKS

BY

PERRY WEST

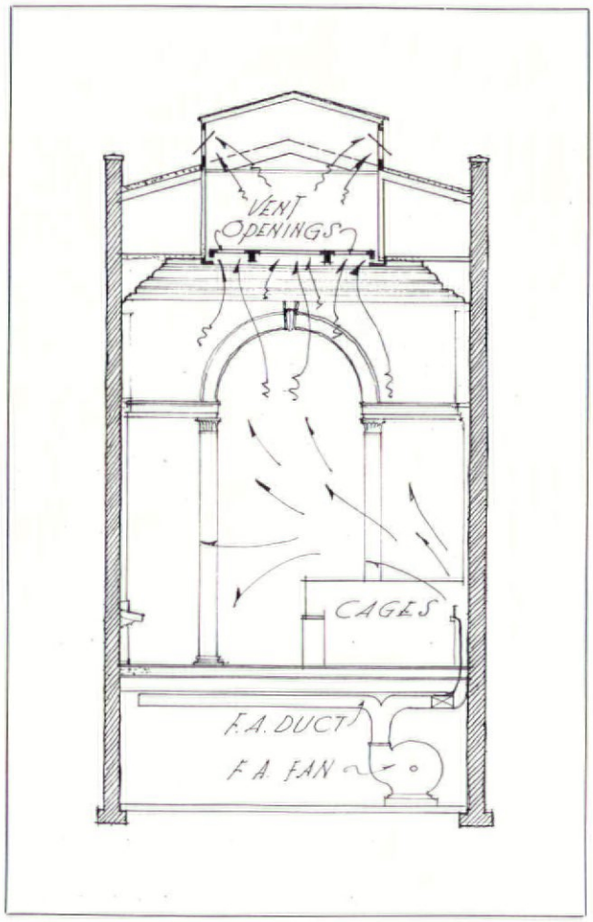
CONSULTING HEATING AND VENTILATING ENGINEER

THE banking building presents a variety of problems for both the architect and the mechanical engineer, not only on account of the diversity of the departments to be provided for and the different uses to which the spaces are to be put, but also on account of the different characters and proportions of the areas to be treated. In the smaller bank we usually have the relatively large main banking room, with its high ceiling and large cubic contents per occupant, and in conjunction with this the cages and officers' rooms, which are less spacious and more densely occupied. The working spaces for bookkeepers and stenographers are sometimes located on mezzanines or galleries around the walls, over the cages. Such working spaces may also be provided adjacent to the main banking room, in basements, or on floors above. There is usually a board room, either with or without committee rooms, sometimes located on the gallery, sometimes in the rear, and sometimes on an upper floor. Toilets are provided for men and women, accessible to the several departments and, in modern practice, with rest and recreation rooms adjacent. Vaults are of course a necessary adjunct to any bank. In larger banks, cafeterias and dining rooms with kitchens, for the working staffs and officers, are frequently added. The working spaces are frequently separated from the main banking room and located in adjacent rooms or in other stories of the building, thus eliminating the galleries in this room. In still larger banks the officers' rooms or spaces are separated from the main rooms and located adjacent to them or on other floors. In addition, such buildings may include concessional spaces for stores, restaurants, luncheon clubs, auditoriums, etc. The building may be extremely high, with elevator shafts and stairs to act as flues for producing drafts and otherwise distributing the proper operation of the heating and ventilating apparatus. The kind of sash to be used, whether double-hung or of some form of casement or ventilating sash, steel or wood, weatherstripped or plain, also has a bearing upon the designing of the heating and ventilating apparatus.

In connection with all of the problems which these various conditions impose upon the proper selection and designing of the heating and ventilating equipment, the first and most important consideration is that the architect should have a thorough understanding with his equipment designer as to the exact requirements to be met, the uses to which the various parts of the building are to be put, and the space requirements for the equipment, the ducts, the pipes, radiators, etc., before the design has progressed beyond the sketch stage. The importance of this can scarcely be overestimated in face of the fact that a recent survey has shown that the heating and ventilating, (especially the ventilating,) in most of our banking buildings are not functioning properly because these requirements were not so worked out, and because the equipment was installed with an attempt to meet building conditions that did not allow the proper functioning of this equipment. The matter of first cost is frequently allowed to interfere with the selection and designing of the proper apparatus, but if our past experiences are to be of value to us in this connection, I should say that after viewing so many examples of improper ventilating, it would have been much better to omit the apparatus altogether and save its cost rather than to install a defective system, which would be soon shut down and allowed to stand as an idle investment. In many cases investigated, much simpler and less expensive systems were installed later to act in place of the systems which did not function, but it stands to reason that the proper kind of a system can be better and more cheaply installed at the time the building is erected.

On the whole, I think we may say that the heating of banking buildings, as it is practiced today, is fairly satisfactory, but that the ventilation is generally poor. The combination of the two is generally faulty, causing drafty, over-heated and otherwise poorly conditioned atmosphere, principally because the specific requirements are not properly worked out between the architect and his equipment designer, and also because the designer is not allowed enough funds for either his equipment or its study and design. There is perhaps a broader field for the improvement of the heating and ventilating equipment of this class of building than in those of many others with which we deal.

Heating. The heating may be by steam, hot water or furnace, and the fuel may be coal, oil or gas. With steam or hot water, the heating may be by direct radiation or partially or wholly by indirect or hot blast methods. If the building is purely for daytime banking purposes, steam with direct radiation is perhaps the best, as it will keep the walls warm long after heat is shut down and will tend to offset their cooling effect quickly after it is started up. Working spaces, board rooms, committee rooms and other such spaces as are likely to be used at times when the main banking room is not in use, may be piped on separate systems, or be equipped with auxiliary gas, electric or domestic hot water heating, so that heat may be shut off of the main banking



Upward System of Ventilation, Fresh Air Supply Behind Tellers' Cages

room at such times. Radiators for the main room should be under windows, generally in recesses with grilles in front and over the tops. The newer types of concealed fin radiators are adaptable to this arrangement. Vestibules should be well heated and provided with revolving doors to prevent an influx of cold air, especially in tall buildings. Skylights should be protected with enough radiation to prevent sweating and the dropping down of cold air on the heads of people below. The main room should be under automatic temperature control. While temperature control is desirable elsewhere, and while it generally saves an appreciable percentage of the cost of fuel, it may be omitted, excepting in the main room.

Vaults generally do not require heat, except in special cases where employes are continually on duty and where heat may be necessary to dispel chill and dampness. Warm air or electrical heat is usually employed. The cages where clerks are on duty continually should be well heated and arranged with automatic or good hand control. Spaces around the public desks and in coupon rooms, reception rooms, and other public spaces which patrons enter directly from the outside should be especially well heated, preferably under automatic control. Board rooms, committee rooms, officers' rooms, toilets, rest rooms, recreation rooms, dining rooms and work rooms should be well heated, and with the exception of work rooms and private offices, they should be under automatic control. It should be remembered, in connection with the heating of all purely banking spaces, that the occupants are generally sitting, at very light work, and that with the nervous energy expended and the thin clothing worn, especially by the female employes, a comparatively warm and draft-free atmosphere is required.

In the cheaper class of buildings a one-pipe steam system may suffice, but banking buildings are generally of a character to warrant a two-pipe vapor or vacuum-heating system. Any bank structure of appreciable size had best be equipped with a vacuum system, since the requirements for quick and positive circulation are pronounced in this type of building. Care should be exercised to properly balance the system, so that none of the vital parts of the building, such as the cages, working spaces, officers' quarters, board rooms or private offices, are on ends of long runs, remote from the boiler, where the steam will be lost first and regained last as the pressure is dropped and raised on the boilers.

Boilers for small buildings may be of cast iron or steel; for larger buildings steel is most used, and for buildings where great capacity is required in small floor space, water-tube boilers may well be installed. Where a private electric generating plant is to be used, the boilers should be high-pressure, to operate at from 100- to 150-pound pressure, and the heating system should be operated on exhaust steam with a vacuum return system and automatic live steam made up through pressure-reducing valves. Generally speaking, a private plant is not a paying investment when the electric current can be purchased for 2 cents or less per kilowatt hour. Run of mine soft coal or fine anthracite at $6 per ton is 20 per cent cheaper than heavy fuel oil at 5 cents per gallon for the larger plants, and larger size coal at $12 per ton is 20 per cent cheaper than furnace oil at 10 cents per gallon for the smaller plants, not considering any savings in costs of coal and ash handling, which in many instances are greatly in favor of oil burning. The cost to install stokers for coal burning or oil equipment for oil burning will run from 25 per cent to 50 per cent of the cost of the boilers, depending upon the size of the plant, and stokers should save from 10 to 15 per cent of the coal over good hand firing. Coal and the lighter fuel oils (28 to 32 Be) are adaptable to full automatic control of the fire from a thermostat in the main banking room, and this relatively simple and cheap form of temperature control may be very successfully used for the smaller institutions. The heavier fuel oils (14 to 16 Be) are not adaptable to full automatic control and are best used where a competent operator is on duty at all times.

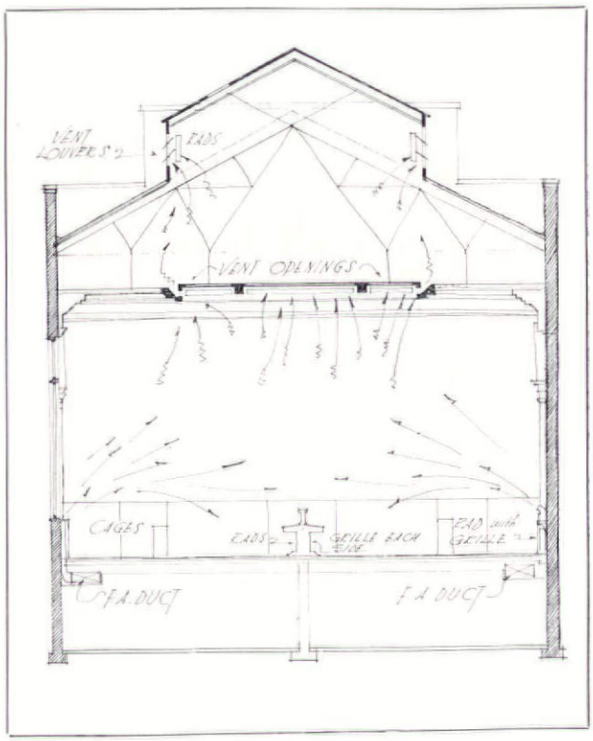
Hot Water Heating. This type of heating is not especially adapted to banking buildings unless it is

to be operated fairly continuously, since the large spaces and massive construction constitute too much inertia to be readily overcome by the slow action of hot water. It is easily adapted to simple and inexpensive temperature control, and when properly designed and operated gives good and economical results as compared with a steam system for heating over the same periods of time. Its first cost is substantially the same as for two-pipe vapor or vacuum steam without temperature control, and somewhat cheaper when the water system is operated from one central automatic temperature control as compared with full individual automatic temperature control for a steam system. Hot water is not so well adapted to buildings over five stories high, on account of excessive pressures on the radiators unless the system is divided into vertical sections.

Furnace Heating. Wihout fan circulation this from of heating is not suitable except for small banks, but with fan circulation it may be extended to a moderate sized building. It has the advantages of low first cost, combining heating with ventilation, quick response, and the elimination of radiation. Care should be exercised to avoid a type of construction that may leak dust or gases from the furnace into the rooms, and also to get a type with automatic humidifying apparatus for preventing excessive dryness in the overheated air, especially near warm air inlets. Furnace heating is not especially efficacious in warming up the cold walls of large rooms, and it is susceptible to disarrangement in operation by wind and by the chimney effect of the building.

Indirect or Hot Blast Heating. This has substantially the same advantages and disadvantages as furnace heating, except that the hazards from gas are eliminated, the dust nuisance is not so great, and the conditions of the air may be more fully controlled.

Ventilation. The ventilation of the main banking rooms in small banks has not, until quite recently, received much attention, except to depend on the windows and doors. It has been found, however, that with the increasing dust and automobile smoke of the outside air, especially in the larger cities, this method is quite destructive to books and records and that a great saving is effected by the use of artificial ventilation and air cleaners. The spaces in and around the cages, the mezzanines, galleries, coupon booths and any other small rooms are the only areas within the main banking room which generally require ventilation, except in the larger institutions. One problem, however, is how to introduce and remove enough air from these spaces without creating drafts. Another problem, which becomes increasingly difficult of solution as the sizes of the rooms increase, is that the inside temperature is considerably lower than the outside temperature in summer, so that the air introduced is not only disagreeably warmer, but becomes cooled and therefore more humid, frequently to the extent of depositing moisture or preventing the evaporation of perspiration, thus causing papers and books to feel sticky, blot

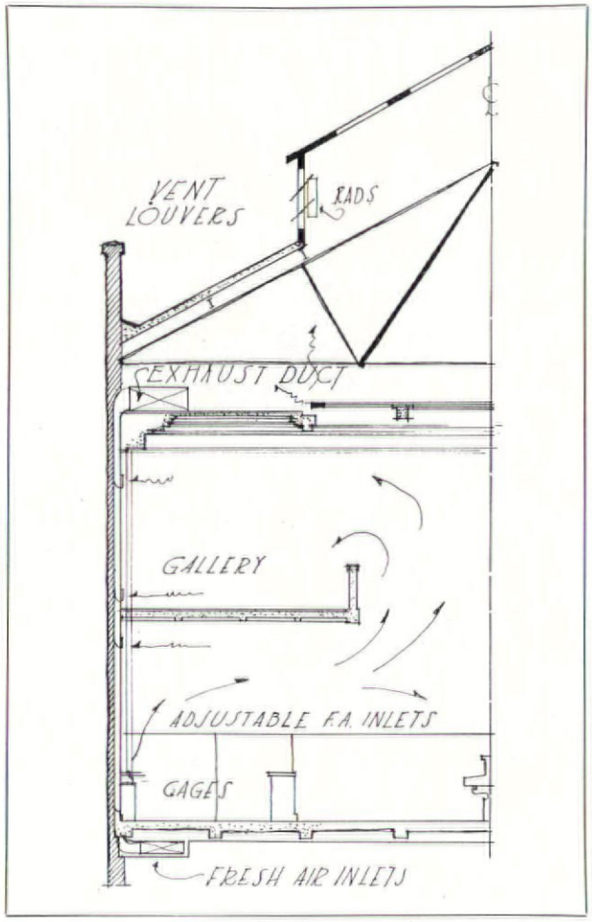


Upward Ventilation and Direct Steam Heating System for Large Bank

and become soiled. The only proper solution of the latter problem lies in the use of refrigerating and dehumidifying apparatus for decreasing the moisture contents of the air to a point considerably below the dew point of the inside air, and then in reheating this air, even in summer, to a point not more than 5° Fahr. below the inside temperature, in order to prevent drafts. This process is expensive and requires heat even in summer, but it should be carefully considered before going ahead with any other kind of a ventilating system for the main banking room.

In cases where the size of the room or the character of the work does not warrant this treatment, the air may be first passed through filters, thence through automatically controlled heaters, and then to the spaces to be ventilated. It should be delivered well above the heads of the occupants, and for cages it should be directed upward and outward at an angle so as to prevent drafts. Where possible, it is advisable to bring this air in along the window sills, directed upward for winter (so as to meet and diffuse with the down-falling cold air), and outward for summer so as to afford air movement for cooling. Adjustable outlets are preferable in any case, so that the angle of the air stream may be varied to suit conditions and even directed outward and downward for summer cooling.

Where there are no mezzanines over cages, the foul air may be exhausted through skylights in the main ceiling, either by mechanical or natural means, or through grilles and flues where no skylights are



Upward System of Supply and Exhaust Ventilation in Banking Room with Gallery

available. Where mezzanines exist, a portion of the foul air should be exhausted from the rear of the cages near the floor so as to establish a local circulation, while the greater portion may be exhausted from around the walls of the galleries near the ceilings, so as to afford a circulation for these. It is also well, in connection with both the exhaust from the cages and from the galleries, to have both bottom and top grilles provided with adjustable louvers so that the air may be removed from near the floor, from near the ceiling, or both, as required.

Coupon booths and other small rooms, without windows, within the main banking room should be provided with separate systems of exhaust ventilation and have louvered doors for admitting air from the main room. Where this kind of ventilation is inadequate, the best solution is to treat the entire main banking room as a unit; introduce tempered air in winter and dehumidified and cooled air in the summer through a multiplicity of grilles with proper diffusers in the ceiling, and remove the foul air through grilles around the walls near the floor. Separate exhaust systems should be provided for coupon booths and other small rooms as was just explained. Conditioned air should also be supplied through the ceilings under any galleries over cages, and foul air should be exhausted from near the floor around the walls of any galleries. This kind of a system is sometimes designed to operate as an upward system by introducing the air around the walls, from under seats and platforms, and through window sills and jambs, the foul air being removed through grilles in the main ceiling and in the ceilings under galleries; but it is invariably found that this is a difficult system to handle without creating objectionable drafts. The principle of upward ventilation appeals on first thought as being the natural and easier method, especially for summer, but inasmuch as the air must frequently be cooler than the room in winter to prevent overheating, and should be cooler than the room in summer to prevent sweating, the introduction of the air at the floor usually causes complaints of drafts. If the air can be introduced upward through window sills and ledges around the walls, with adjustable outlets, the conditioned air method may be used as described for the raw air method, but on the whole the downward system is usually preferable. Remote push-button control of the ventilation for cages and small room systems is advisable in order that attendants may easily adjust the ventilation to suit conditions.

Toilet Room Ventilation. This should be entirely separate from the remaining ventilation and may be by gravity or mechanical exhaust with louvered doors for admitting air from adjacent spaces. Where obtaining a natural supply is not feasible, an artificial supply of cleaned and tempered air should be employed, but care should be exercised to have the supply less than the exhaust. Remote push-button control with interlocking arrangements, so that supply fans cannot be run without exhaust fans, is advisable for toilets. Ventilation for toilets should provide from 12 to 20 air changes per hour.

Rest and Recreation Room Ventilation. This should be separate and similar to that for toilet room ventilation, except that the supply and exhaust may be about balanced and interlocking control features omitted. About six air changes per hour should be provided.

Ventilation of Working Spaces. This is variously treated according to the density of occupancy, nature of work, kind of employes, i. e.,—men, women, boys or girls, available funds, and character of the space. These general rules can be laid down:

1. Each floor or section of floor, or in some cases two or three floors (wherein the same kinds of activities are housed under the same management), should be provided with a separate system. This applies particularly to supply systems, but may with best results be extended to exhaust systems, although many floors of the same institution may be connected to the same exhaust system. The ventilation of working spaces should not be combined with other ventilation, nor should separate and dissimilar departments be combined, especially where they are under separate managements, since their requirements and ideas are different. The most satisfaction is given when

each department has control over its own ventilation, especially over the air supply. The ventilation of these spaces, or of other parts of the banking company's quarters, should not be combined with the ventilation of rentable portions of the building.

2. Air supply should be from side outlets near the ceilings, preferably with adjustable outlets for directing the air current upward or downward. The exhaust, if employed, should be from side outlets near floors and ceilings, with adjustable louvers so as to exhaust from either or both points.

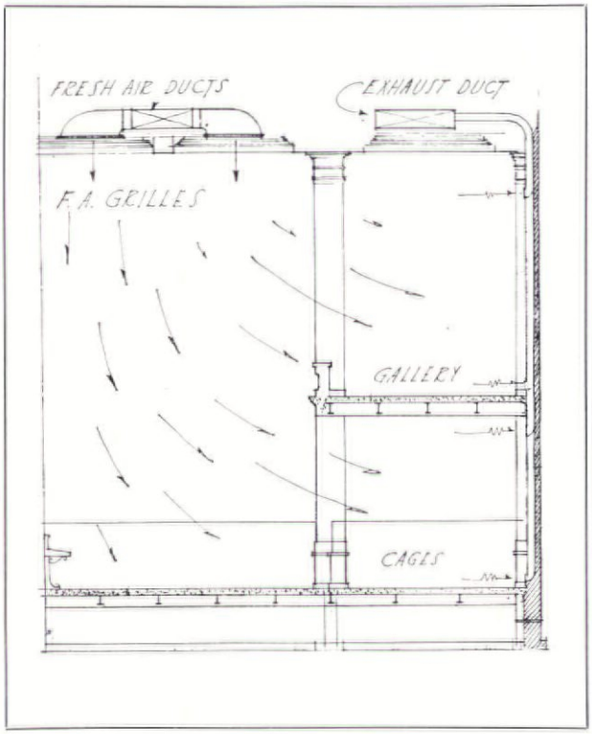
3. In basements there should be an exhaust as well as a supply system for removing the excessive heat in summer. On upper floors the exhaust system may be omitted, and skylights, ventilators or even the natural leakage through windows and doors be used, but in the better class of closely occupied spaces a mechanical exhaust system, or at least an adequate gravity system, should be employed.

4. The air supply should be filtered and automatically tempered, and to cut down operating expenses a recirculation system may be employed. The recirculated air is introduced from the rooms at a point just ahead of the heaters, so as to deliver the air to them at a temperature of about 50° Fahr. by mixing the recirculated air with the fresh air. This should operate under automatic control from a thermostat just ahead of the heaters, which would automatically deliver 100 per cent of fresh air at 50° and above,—and would recirculate more air as the temperature outside falls, up to about two-thirds of the total quantity at 0° Fahr. outside.

5. The air supply may range anywhere from 10 to 30 cubic feet per person per minute and from .5 to 1.5 cubic feet per minute per square foot of floor space, with an exhaust of from 80 to 90 per cent of these amounts.

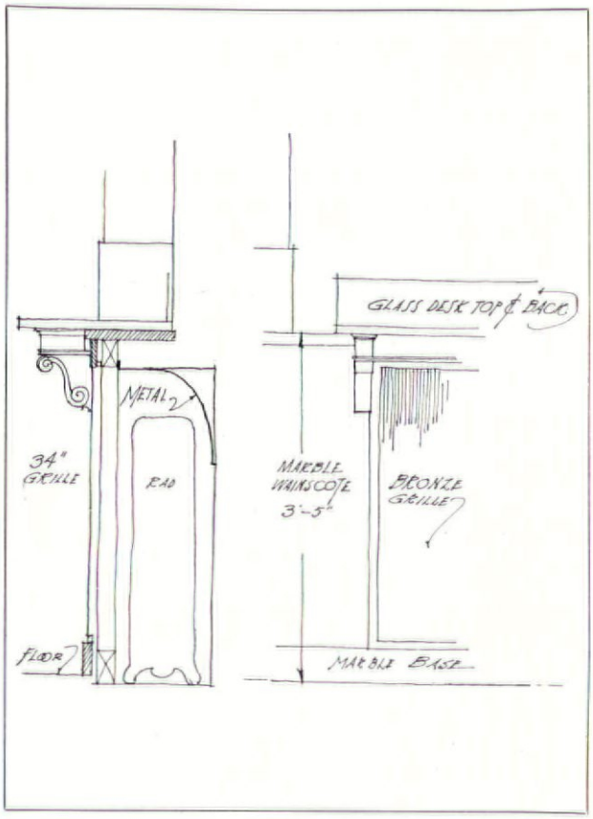
Ventilation of Board and Committee Rooms. This should be separate exhaust ventilation, affording about 15 to 20 air changes per hour. Where feasible the air supply may be taken from the main banking room, but otherwise there should be a supply from the outside. The air supply should be filtered and automatically tempered, and the apparatus should be separate from other systems. The apparatus should be under remote push-button control from the respective rooms.

Kitchen and Dining Room Ventilation. This should be by separate exhaust ventilation from the kitchen, with hoods over ranges, kettles, urns and bake ovens, affording about 20 air changes per hour. The dining rooms may be very successfully ventilated by exhausting into the kitchen, but an adequate automatically tempered and filtered air supply should be furnished for the dining rooms with side inlets near the ceiling or vertically through the window sills. Exhaust may also be taken from the dining room to supplement the exhaust through the kitchen, but ample flow should be maintained *from* the dining room *toward* the kitchen, in order to keep the kitchen odors from reaching the dining rooms and other parts of the building. The foul air from kitchen and dining rooms should be discharged above the roof and in such locations as not to be objectionable in adjacent quarters or where it might be drawn into fresh air intakes. The kitchen exhaust should be taken up separately in a heavy iron or masonry flue with automatic fire damper, automatic bypass around fans, and with steam jet fire-extinguishers, since vapors frequently collect and take fire in kitchen flues.

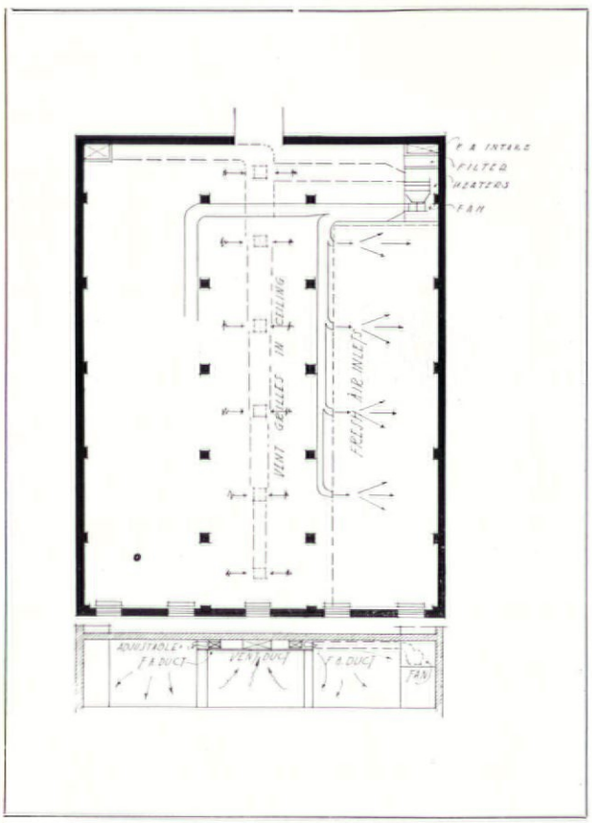


Half-Section Showing Downward System of Cooled and Humidified Air and Exhaust

Ventilation of Machinery Spaces. Boilers and engine rooms entirely below grade should be supplied with filtered and tempered fresh air, although it is not necessary to provide for as much heating of the air as is generally required for other spaces, since the heat from the apparatus and piping will usually suffice. From four to six air changes per hour are usually sufficient, except in cases of congested equipment where much heat is given off. Exhaust systems are required where such heat is to be removed or where odors from machinery might otherwise escape to the upper floors. Such exhaust should be by mechanical means unless dependable gravity methods may be provided through flues around the outside of the chimney or through other flues of sufficient height to overcome the vagaries of the wind and weather. Care must be exercised to see that the boiler draft is not interfered with, either by the removal of too much air from the boiler room and adjacent spaces or by the lack of fresh air supply by either natural or artificial means. The removal of air from the boiler room is likely to cause



Sketch of a Type of Concealed Radiator Under Check Desk



A Simple System of Ventilation for Office or Work Space

back drafts, and the carrying of flue gases out into the rooms. All foul air from machinery rooms should be carried to a point above the roof and discharged so as not to cause a nuisance to surrounding quarters or be drawn back into any fresh air intake. Air conditioning may be necessary in certain instances of shut-in, congested spaces, but special care must be taken to prevent drafts where this is employed.

Generally. Fresh air intakes should be from points two or three floors above grade or sufficiently high to prevent the intake of dust and dirt. If air is taken from the roof, intakes should be from points removed from chimneys, exhaust outlets, and other contaminating influences. Air filters should be of the metal constructed type and either automatically self-cleaning or provided with convenient equipment for cleaning and reconditioning. Main exhaust dampers should be provided with remote control for operation from convenient points, or with automatic control for closing when the systems are not in operation, and for opening when they are, so as to conserve heat and prevent back drafts. Each fresh air inlet or foul air outlet should be provided with a louver, damper or deflector, as required, so that each individual opening may be properly adjusted. Fresh air inlets should be provided with metal roll type or other convenient shutters for closing off when not in use, and both fresh air inlets and foul air outlets should be provided with wire mesh bird guards. All ventilators, hoods, bird guards and other metalwork above the roof should be of copper or other rust-resisting material. Stair and elevator enclosures, especially in tall buildings, should be provided with tight or revolving doors to overcome the chimney effects of these shafts on the air movements.

Unit Ventilation. Ventilating units may be employed to advantage in many departments, where more elaborate systems are not procurable, and they lend themselves very well to use in cages, working spaces, board rooms, etc. They have one particular advantage favorable to satisfactory results as far as the occupants of such spaces are concerned, and that is that they may be locally controlled to suit those within the immediate vicinity. They should be enclosed or built within recesses, with adequate provisions for fresh air supply from a clean source and be provided with individual or centralized filters. The foul air may be removed by the methods described for other types of supply systems.

Some recent developments in the use of concealed heaters with tempered air supply from a plenum fan system, so dampered that part of the air can be so supplied and part recirculated from the room, would indicate that these may also be used to advantage for the less elaborate systems. Adjustable dampers are used so that any portion of the air supply may be from the plenum system, and arrangements are also such that the air so supplied acts on an ejector principle to accentuate the recirculation from the room.

WHAT THE BANKER EXPECTS OF HIS ARCHITECT

BY
C. STANLEY TAYLOR

A LARGE proportion of average individual business success may be attributed to the capacity for appreciating the other person's side of a business problem. Many of the troubles which are encountered in business relationships could be more readily smoothed out if the capacity for understanding the other man's point of view were more uniformly distributed among business and professional men. Nowhere is this fact more definitely obvious than it is in the architectural profession today. Disappointments on the part of clients in most cases originate in a lack of mutual understanding.

It is quite refreshing to take up a problem deliberately from the opposite point of view and to learn, from an analysis so made, some of the workings of the client's mind, and thus establish factors which will result in a more satisfactory conclusion of the business contact. In this article it is our purpose to discuss the architect's relationship with banker clients by endeavoring to analyze what the banker expects of the architect whom he has engaged to design a new structure or to alter and improve existing banking quarters. From such an analysis we may develop a basis upon which the architect may carry to completion a bank building project with the utmost satisfaction to both himself and his client.

When a banking organization plans to build, it is confronted with essentially the same problems that are present in any building operation of an investment nature. To these are added a few highly specialized problems centered around protective systems, vaults, and arrangement of space which will result in the most efficient conducting of the bank's business. In spite of the fact that bankers are often looked upon as the sources of money for building operations, they must give as careful consideration to their own expenditures as do firms in other lines of business. When a bank builds, the economic aspects of the investment must be analyzed from every point of view or the bank will be involved in an expenditure greater than its income warrants, or will be possessed of an inefficient structure. Even though bankers devote their attention exclusively to financial matters, they are not as a rule acquainted with the details of financing and other economics of building operations. They properly look to their architects for facts which will enable them to analyze the cost of their new building, the maintenance cost, and in some instances the income which may be derived through the rental of the space not used by the bank itself. This aspect of the situation is sometimes overlooked by architects who fail to appreciate the fact that bankers devoting themselves to corporate securities and governmental matters rather than to mortgages and loans on real estate, may be just as much in need of guidance in the development of their own projects as a home-builder or the head of an organization without building experience.

The first problem the banker must solve is the determination of the type of building in which to house his institution. He may elect to build a structure solely for banking purposes, in which case he desires a more or less monumental building of no great size, all of the space of which is to be devoted to the requirements of his own business. The other type of bank structure provides banking quarters in combination with rentable space in the form of either stores or offices. The latter type is designed to produce a certain amount of income which may be applied toward reducing or eliminating the carrying charges accompanying the investment in land and building. Bankers are still struggling with the problem of choosing between these two types of structures. They seek buildings which will express their strength, integrity and responsibility, and the wealth of their organizations. They have been accustomed for many years to the creation of monumental buildings of architectural beauty and great dignity. Possibly each has taken a certain amount of personal pride in having a building which is superior to those of his competitors. On the other hand, bankers have found the burden of these buildings to be very real. Their maintenance cost has constituted a drain upon the banks' resources and profits, and the gradual depreciation of the value of the structures has been another element of cost which they have frequently been unable to justify as attributable to the advertising value of the buildings.

Banks in large cities, such as New York, Chicago, Philadelphia and elsewhere, have had forced upon them the necessity for combining income-producing space with their banking quarters, in order to offset the very excessive rent cost in the congested areas where their bank buildings must be located. They have frequently accepted this requirement and have created buildings of greater size in which the banking quarters take a relatively small percentage of the space. Since smaller banks look to these larger organizations for precedents, not only in their banking operations but in their methods of doing business and housing their organizations, there has come to be a fairly general acceptance in smaller communities of the idea of combining banks with income-producing space. Probably the trend will continue in this direction, for, after all, no intelligent banker can on the one hand advise his customers against extravagant expenditures for business buildings and industrial plants and on the other hand erect "banking monuments" which do not pay for themselves. An illustration of this occurred recently in Philadelphia, where one of the well established banks purchased a site and informed the

architect that a 10-story bank and office building was desired. The architect, apparently having more than the usual business acumen, immediately inquired as to the reason for a 10-story building. The bankers' rather surprised response was that the added space was to reduce the cost of carrying their building. The architect took it upon himself to make a careful analysis of the cost of the property and of the proposed structure, including the usual operating costs and the gross income to be expected from the office space to be thrown on the market. He found that a 10-story building would almost carry the investment, but would leave no margin for its amortization. A little further study showed that a 14-story building would not only take care of all carrying charges on the investment, including depreciation, but would amortize the cost of the building in 20 years and give the bank its quarters free of all expense. Upon reporting these findings to his banker clients, they adopted his suggestions and displayed a great deal of confidence in the architect's judgment on all the other business matters which developed during the course of the operation.

After the type of building has been established, the space requirements for conducting the bank's business must be established through a careful study of the actual working methods of the bank. The banker conceives of this problem in two ways. He probably has a fairly fixed idea as to the size of the public space and a fair knowledge of the amount of working space necessary to take care of his employes and the bank's working space and equipment. The banker does not always analyze this problem in terms of cost, but he very soon finds that this aspect requires attention. He expects his architect to work these general ideas as to the size and layout of his public and working spaces into a structure which will fall within a cost figure which has been at least roughly determined upon. Bankers have accepted the necessity for combining their quarters with income-producing space with much grace. They have nevertheless retained a strong and well founded desire for creating an imposing display of strength, wealth and high position both within their quarters and throughout the buildings they own.

It is undoubtedly necessary that banking quarters create an atmosphere of permanence and dignity through consistent architectural character. The use of the finest materials and the soundest methods of construction is imperative. Nothing can be more disastrous than evidence of false economy through structural cheapness or the failure of building materials or finish. The architect is expected to utilize his designing talents to create a masterpiece of architecture and at the same time to exercise his business acumen and ingenuity to the end that the bank may be well housed at reasonable cost. In both these basic requirements, the banker looks to his architect for a knowledge of protective systems, vaults, bank equipment, and the organization of the bank's work to the end that the space may be so arranged as to reduce to a minimum the time and labor required in the daily work. Much depends upon the architect's cleverness in planning a layout to afford the greatest security to cashiers, tellers and clerks during banking hours and to form an invisible but impregnable line of defense against intrusion after the bank is closed. Perhaps the most important phase of this problem is the designing of vaults. The banker is beginning to appreciate that securing economical vault construction is an important problem and that it is one in which the architect can play an important part. The Federal Reserve Board, prior to the development of Federal Reserve Bank buildings in some 20 cities throughout the country, appropriated $120,000 for special research into the construction of vault walls and linings. This work was carried out under the direction of Alexander B. Trowbridge, who was consulting architect for the Federal Reserve Board, and resulted in the construction of experimental vault walls of many types, which were subsequently penetrated under time tests. As a result of this research, many millions of dollars were saved in the erection of the Federal Reserve Bank buildings throughout the United States.

One matter which the banker usually places wholly in the architect's hands is the provision of adequate space to take care of the business which is anticipated. Large banks have many thousands of accounts and have widely adopted the system of classifying the accounts alphabetically or numerically, with a teller assigned to each division. This requires a multiplicity of tellers' cages and involves unusual liberality in the public space to provide for the many customers who must be accommodated at once. Congestion in public space is exceedingly dangerous. There must be ample room at all times to afford the guards an opportunity for close supervision of all persons, even during the rush closing hours and during the times there is extra business which comes when payrolls are being prepared.

The banker has a right to expect that the architect, knowing approximately the amount of money available for his new building, shall proceed to draw up sketch plans which are not exaggerated and which come fairly within the given appropriation. It is utterly illogical to provide sketch plans which obviously cannot be built for the desired cost and which must result in the forming of unfavorable opinions on the part of bank directors when this fact is ultimately determined, and it is always far better to face facts in the beginning. The banker expects to give his architect the data for the functional plan. No one knows his individual business as well as he; no one can forecast its growth as well. His architect may wisely call the banker's attention to the value of elasticity in plan, to the anticipation of growth, to modern planning ideas which have been successful elsewhere, but he must at the same time appreciate the effects of local conditions and methods of doing business. What is good for a bank in one city or town may not of necessity apply in another instance.

SPECIFICATIONS FOR BANK BUILDINGS

BY

LEWIS W. FOSTER

OF THOMAS M. JAMES COMPANY, ARCHITECTS

SPECIFICATIONS for bank buildings have the same fundamental principles as those for any other type of structures. The better these principles are known, the better specifications will be written. The specifications determine the success of a building project to a greater extent than any other document, and they affect every person interested in the project. The responsibilities of the specification writer are, therefore, many and varied. They may become a source of pleasure and satisfaction to the man who writes them, or they may be decidedly irksome. Incidentally, they may be the direct cause of the failure of a project, or of the architect. The responsibilities of the writers of specifications for bank buildings are as great as those placed upon the writers of specifications for other types of buildings. The kinds of materials and the quality of materials and workmanship vary greatly; probably the quality is higher in bank buildings than in other commercial structures. Any one type of building naturally has its particular features which are not common to other types. This possibly applies in a greater degree to bank structures than to most other types of buildings, since few others require as much special equipment,—such as the bank counter screen, the security vaults, the various protective devices, and particular kinds of furniture and equipment. The hospital, of course, requires the most exacting and varied equipment and detailing.

The specifications for a bank building (and this applies to other particular types of buildings in varying degrees) offer an excellent opportunity for standardization. By this we mean the use of standard sections of the specifications, standard paragraphs or standard sentences, descriptive of some particular material, method, or class of workmanship. The use of standard subdivisions of the general specification will save the architect considerable time, but they should be used with the greatest of care. This will be considered in greater detail in later paragraphs of this article. The success of any building project is probably due more to the proper spirit of coöperation between those interested than to any other one thing. The writer of specifications must ever bear this in mind, and should at all times take particular care to foster this feeling throughout his specification and to demand that it be the guiding factor in the actual construction work; otherwise the proper coördination of the work of the various trades will not result. Without this spirit of coöperation no building project can be considered a complete success.

We must assume that the writer of specifications for bank buildings is experienced and qualified. All will have their own theories and systems as their aid in completing a proper specification and for use as a reminder and check upon their work. There are certain fundamentals which go to make up a good specification for a bank building. Some of the more important principles, if emphasized here, will serve to call them again to mind. Without a complete knowledge of the basic principles, the specification writer is very likely to lose sight of them in constructing his specification as a whole. It is well to avoid repetition in a specification as far as possible, although a certain amount will be necessary, especially if the specification be divided into sections, as the work is divided into trades. Repetition in a specification is required under these conditions in order that the estimators will overlook nothing and in order that the workmen at the building will overlook no important features where the activities of various trades come together. The specification writer must realize the weaknesses that exist in the building industry as a whole. He must realize the rush which always develops during the estimating periods and must prepare his specification to overcome, as far as possible, the possibility of there being error due to complications and lack of clarity in the specifications. Clarity, then, is one of the most important qualities of good specification writing. Cut your cloth to fit the man. Exert yourself for clarity and simplicity. Specify exactly what you want. It is better not to say anything on a subject than to say too much and to say it indefinitely. Eliminate all unnecessary clauses. Say nothing that will suggest indecision in the slightest degree. Do not write anything that you know will not be enforced to the letter.

The reader may ask about the "or equal" clause. Many specification writers say, and try to make themselves believe, that the use of this clause is wrong. The great majority of writers, however, use it constantly. It is a good clause and proper, but be sure that the specifications define its meaning properly and clearly. Leave no doubt in the minds of any of the estimators as to what the meaning of the clause is and why it is used in the specification. It should mean that the architect is the sole judge of the "equality" of materials and that his approval is necessary in writing and his decision is final. The purpose of the "or equal" clause is to protect the owner from a "monopoly" price, or to allow an available material to be substituted at the architect's discretion for a material that could not be delivered at the proper time. Building conditions and requirements are changing constantly. Everyone connected with the building industry is endeavoring at all times to bring down the so-called high cost of building. At the same time, they are trying to build

better. The specification writer is supposed to be fully acquainted with all phases of the building problems and with the rapid changes in the industry. The use of a properly defined "or equal" clause comes to the rescue of a specification writer when criticism is directed against him by the owner who hears of some new material or method and learns that his architect is not fully acquainted with it. The use of this "or equal" clause brings to the architect's attention for the first time many of these new materials and methods. It is sometimes advisable to allow the general contractor, in preparing his proposal, to give alternate proposals for materials or methods which he may consider the equal of those which have been specified. Coming in an alternate proposal, these new materials are presented and can be investigated and given proper consideration after the bids have been submitted and when there is more time to reach a decision as to their value. The use of this much discussed clause allows the writing of a specification with a broadness not readily attainable without it, and if properly defined, "or equal" can work no harm.

Specifications are written primarily as an accurate guide in building. They are practically the only records of what is required in the nature of materials, methods and workmanship, and they are, therefore, of the greatest importance. To be sure, the estimators, the contractors and the workmen may seem to disregard the specifications to an unreasonable degree. This may be due largely to the fact that they are in many cases entirely too complicated and involved. It is best to use simple words that any workman can understand and to make the sentences just as short as possible. Technical language should be used only in its well known trade meaning. Always give directions; never make suggestions. Do not try to conceal obligations. State clearly and specifically the results you want to have accomplished and the methods that must be used to obtain these results.

A financial institution is very likely to consider its building project with its commercial aspects uppermost in the minds of the building committee. The building is erected primarily to provide quarters for the bank. It must meet the requirements of the particular institution at a cost the committee decides it can afford. The bank must guard, at all times, the interests of its stockholders and of its depositors. Today "service" is very much stressed in banking circles. We find the banks providing service unheard of a few years ago. The bank building should be considered a form of service for the bank's depositors. The success of the bank is very closely related to the success of the building architecturally, as well as being dependent on the quality of service which it can provide for its customers. The success of any banking institution is very intimately connected with the success of the community as a whole. The specification writer must take these things into account in the preparation of his specification. He must be in close touch with all developments of the project from its inception to its completion. He must know intimately the vital requirements. He must see that the materials and equipment he specifies are the best to meet these requirements. He is responsible, in great measure, for the success or failure of the work, since a poor specification will seriously affect the bank, its service to its depositors, and its value to stockholders and community.

Standardization is of great assistance in specification writing, especially in bank work. Standards developed by constant use are undoubtedly of great value. The term "standardization" in architectural work is often frowned upon, as "too commercial." But, in writing specifications for bank buildings, we are writing specifications for institutions that *are* commercial. Standardization can be and has been used successfully. It is recognized by the American Institute of Architects and it has published certain standard documents that without question have been a great success and relieve the duties of the specification writer considerably. Various trades have successfully produced standard specification documents for their particular trades. These, too, have been of great assistance to the specification writer. Standardization in specification work should be considered simply as an aid to accuracy and clearness,—a method to assist the production of a good specification. Architects who use an old specification corrected and changed for a new piece of work are unthinkingly standardizing,—so why not standardize and take advantage of short cuts and the great saving of time made possible by this simple means?

Standardization must, however, be used with considerable care. It is a most harmful tool if used improperly. Unless carefully used, it leads to unnecessary repetition, and many times there is a possibility of contradiction. Standard sections of a specification, standard paragraphs and standard sentences may very readily be used to describe the various materials in any type of building and to describe the methods and quality of workmanship in any kind of a specification. They apply particularly well to the description of the materials and methods and workmanship for a bank building, and especially to the highly specialized features peculiar to a bank, such as counter screens, vaults, protective devices, equipment, etc. The cost of the completed structure must always be kept in mind in using various standards. It is probable that a series of standards may be evolved for such items as must be regulated by costs. In considering the vault requirements for a bank building, we realize that the cost of the vault may vary greatly. The prime measure of vault construction requirements is the rating established by the burglary insurance underwriters. They have fixed various classifications whereby the rate that the bank must pay for burglary insurance is determined. These rates vary greatly, depending upon the construction of the vault, its floors, walls and roof as well as the construction of the vault doors

and the equipment within the vault. It is also affected by the protective devices which may be installed. Like all measures of this type, they are based on minimum requirements. Institutions that keep only a few dollars and no securities in the vaults may not, when they consider the insurance rates, feel that it is worth while to meet even the minimum requirements. The larger institutions, on the other hand, which store collateral and securities and have safe deposit boxes for the use of their customers, will undoubtedly decide, because of the insurance rates, to more than meet the minimum requirements. Many banks, for one reason or another, may wish to exceed very greatly the minimum requirements. Many feel that such action is good advertising,—that they are providing the greatest degree of protection to their customers, thus improving the service.

It is possible, therefore, for the specification writer to have several different standards for vault construction, for vault doors and for vault equipment, and to use his judgment in regard to a particular project in the selection of the standard for vault work. In consultation with the bank's building committee it can be very readily determined upon before the specifications are written, in order that the institution will have the vault which will best suit its particular requirements. The use of standards will require constant checking because of constantly changing conditions and new technical developments. The subject of counter screen construction may be treated in a similar manner, and costs will naturally vary with the type of screen and the kind of material of which it is constructed. Perhaps the latest development in this field is the so-called "screenless" counter. Many bankers feel that this type does not offer their employes the proper amount of protection. The other extreme would be the so-called "bullet-proof" counter screen where "bullet-proof" materials, such as glass, wire and steel are used. There are various other types of counter screens which are probably more common than either of the two extremes mentioned here. These types vary considerably in cost, from the wood counter and counter screen, to that of marble or bronze in various combinations. The specification writer must have in mind the costs of the various types of counter screen. The architectural design affects the specifications for the counter screen to a much greater degree than the construction of the vaults. In considering the various protective devices, costs and insurance ratings must be thoroughly investigated before the specifications are written, since costs will mount in proportion to the protection required. There is the question of protecting the vault from attack from the outside during hours that the bank is open for business as well as during the hours that the bank is closed. There is the question of protecting the interior safe deposit boxes, storage vaults and security chests from attack at all times. There is also the possibility of a person's being locked in the vault, and this must be considered by the specification writer.

Standards or no standards, a bank building project cannot be completely successful without the proper spirit of coöperation between all parties to the project. This includes the owner, the architect and his employes, the contractor, the various sub-contractors, and the workmen. The specifications should be permeated with this spirit of coöperation without which coördination between the trades cannot be obtained. Without proper coördination delays result, costs climb, and unsatisfactory workmanship and materials develop in spite of the most careful and rigid inspection by the architect, and trouble develops in all its "57 varieties." With coöperation, the resulting success can be enjoyed alike by owner, architect, builder, workmen and the community in general. It can then be said that the poor old specification writer has fulfilled his responsibility. He has written another good specification for a bank building.

For the convenience of specification writers there is included here an outline list of many details which a specification should include.

GENERAL CONDITIONS. Use Standard General Conditions of the Contract as published by the American Institute of Architects.

ADDITIONAL GENERAL CONDITIONS. There are generally some items of General Conditions in addition to those included in the American Institute of Architect's General Conditions of the Contract, such as definitions of the sections or divisions of the specification, of the "or equal" clause, surveys, checking, photographs, progress work, schedules, etc.

ADDENDA. Various addenda which may be written from time to time during the estimating period or during the construction of the building may be added at this point in the specification.

MISCELLANEOUS GENERAL CONDITIONS. This section would include various items which are of a general nature,—items which must be done by the general contractor for the general benefit of all of the various sub-contractors and trades which may be employed on the building, such as cleaning the building, removal of rubbish, layout of the work, cutting, patching and repairs, any special plan which the contractor is required to provide, watchmen's service, etc.

TEMPORARY WORK. This section would cover such items as may be of a temporary nature, but which will be required for the use of the various trades, and covers such subjects as storage bins, sheds, batterboards, bracing and shoring, centering, electric work, elevators, building enclosures, fences, etc., protection of adjacent structures, pumping, stairways, water supply, etc.

WRECKING OF EXISTING BUILDING. Permits; Insurance; Bonds; Public utility service; Inventory; Materials.

EXCAVATION. Description of probable soil conditions resulting from test pits, borings, etc. Unit prices for additional excavations, rock, etc.

FILLING AND GRADING. Back fill; Rough grading; Top soil; Excess materials; Planting beds; Sodding; Seeding.

LAND DRAINAGE. Dry wells; Cisterns; Dry drains.

PUBLIC UTILITY SERVICES. Permits; Locations; Rules and Regulations; Sanitary drains; Rain drain; Water supply; Electricity; Gas; Telephones.

CONCRETE WORK. Materials; Aggregates; Cement.

CONCRETE. Mixtures; Reinforcing; Bars; Piers; Cages; Mesh; Forms.

WORKMANSHIP. Approval; Freezing weather; Mixing; Openings; Bond; Cutting; Joints; Placing; Protection; Repair; Tests.

CONSTRUCTION. Areas; Bases; Bulkheads; Curbs; Expansion joints; Fences; Fireproofing; Floors; Floor construction; Floor fill; Under floor; Wearing surface; Hardener; Foundations; Forms; Gutters; Lintels; Partitions; Pits; Piers; Retaining walls; Footings; Facing; Roof construction; Sidewalks; Stairs; Tanks; Trenches; Walls; Vaults; Materials; Methods; Mixture; Care; Coöperation; Floors; Insulation; Openings; Reinforcing; Waterproofing.

MASON WORK. Materials; Workmanship; Brickwork; Materials; Common brick; Paving brick Concrete brick; Enamel brick; Face brick; Fire brick; Hollow brick; Metal ties; Laying of common brick; Laying of face brick.

CUT STONE WORK. Materials; Granite; Limestone; Marble.

WORKMANSHIP. Carving; Cutting; Moulded work; Washes; Reveals and returns; Finish; Setting granite; Setting limestone; Setting marble; Cast stone; Hollow tile; Terra cotta.

WATERPROOFING AND DAMPPROOFING. Materials; Workmanship; Guarantee.

MARBLE, SLATE, TILE, TERRAZZO WORK. Materials; Samples; Marble; Slate; Tile; Terrazzo; Installation; Cleaning and polishing; Guarantee; Setting marble; Setting slate; Setting tile; Placing terrazzo.

STRUCTURAL STEEL. Use the Standard Specifications for Structural Steel as adopted by the American Institute of Steel Construction, in such degree of detail as may be required by the particular work.

MISCELLANEOUS IRONWORK. Materials; Workmanship; Measurements; Field work; Guarantee; Construction; Gratings; Coal bin chutes; Ladders; Trench covers; Pit covers; Railings; Cleanout doors; Curb angles; Grilles.

BRONZE WORK. Materials; Workmanship; Construction; Hardware; Glass frames; Grilles and wickets; Vault grilles; Radiator grilles; Entrance doorway; Windows.

SHEET METALWORK. Materials; Workmanship.

ROOFING. Inspection; Guarantee; Materials; Slate; Tar and gravel; Workmanship.

FURRING AND LATHING. Materials; Workmanship; Construction; Ceilings; Beams and cornices; Chases, air ducts, etc.; Corner beads.

PLASTERING. Materials; Workmanship; Ornamental plastering.

CARPENTRY. Rough carpentry; Screens; Bucks; Ridge boards; Blocks; Plates; Anchors; Cornice work; Portico; Roof boarding; Nailing strips; Planking; Balconies; Slides; Scuttles; Stairs.

EXTERIOR FINISH WORK. Doors and frames; Window frames and sash; Columns, etc.

INTERIOR WOOD FINISH. Veneers and veneered work; Solid stock; Models; Junction strips; Base; Chair rail; Stools; Wire moulding; Architraves; Doors and door frames; Stairs; Counter screen; Wood partitions; Dado work; Mantels; Telephone booth; Cornices; Panels, etc.

FLOORING. Materials; Linoleum; Rubber tile; (see also Marble, Slate, Tile, Terrazzo work); Workmanship; Finish; Cleaning.

PAINTING. Samples; Materials; Workmanship; Exterior work; Interior work; Bank painting; Plumbing apparatus; Heating apparatus; Electrical apparatus; Signs.

GLASS AND GLAZING. Samples; Measurements; Guarantee; Protection; Materials; Distribution; Setting.

PLUMBING. Materials; Workmanship; Fixtures; Sanitary drainage system; Rain drainage system; Vent system; Cold water supply system; Hot water supply system.

HEATING. Materials; Workmanship; Temporary heat; Boilers, etc.; Tools; Piping; Valves; Hot water heating system; Vapor heating system; Steam heating system; Covering; Automatic control.

VENTILATION. Ducts; Fans; Equipment; Installation, etc.

ELECTRICAL WORK. Materials; Conduit and fittings; Wires and cables; Service switches; Switchboard; Entrance service; Test and guarantee; Workmanship; Outlets; Lighting system; Power system; Telephone system; Low tension system; Electric protective system; Electric lighting fixtures.

VAULTS, VAULT DOORS, VAULT EQUIPMENT AND SECURITY BOXES, ETC., require detailed specifications of a highly specialized character developed by the vault engineer in collaboration with the architect.

STRUCTURAL FRAMES OF BANKS

BY
H. G. BALCOM
CONSULTING ENGINEER

THE structural steel framing for bank buildings, which this article is intended to describe in a general way, offers as many or more varied problems of engineering than are found in almost any other class or type of building. In bank structures, as in the case of other buildings of a monumental type, the structural design is regulated by conditions which the architect has pre-determined,—that is, the general layout of the banking room, and the architectural effect of the exterior in many cases practically fix the conditions that the engineer, in laying out the framework, is bound to follow. The varied conditions of framing found in bank buildings are, of course, due to the varied types of bank buildings, from the small country bank, where only a banking room and bank working space are required, to the larger city banks, where generally the banking room is located in the lower floors of a tall building. The steel layout for the smaller type of bank buildings is illustrated in Types A and B, which the writer has taken the liberty of referring to as "country banks," as they are generally found in the smaller cities and outlying communities. In the main, such a bank requires only a large banking room, one basement and a working mezzanine floor, and these banks are, of course, of extremely simple structural design. The columns in the basement story that support the banking room floor are generally laid out in the most economical way possible, and the clear span roof beams or trusses are generally located in the same way,—if not fixed otherwise by some considerations of the architectural design.

In buildings of Types A and B, columns in the exterior walls are sometimes used, but where the masonry construction is sufficient to take the roof loads, the roof girders or trusses rest directly on the walls with the proper bearing plates. The roofs of many of the smaller banks of this type throughout the country are carried on simple types of trusses. The air space between the hung ceiling and the roof of such a building serves as an insulating space against the hot sun, which might otherwise make the banking room unbearable in the summer.

Type A illustrates the framing of a bank one story high, in which it was not necessary to provide a skylight, since adequate daylight was admitted from the windows across the front and along one side. The roof is supported by simple steel girders from which the segmental plaster ceiling is hung. The bank of this kind is framed in the simplest way.

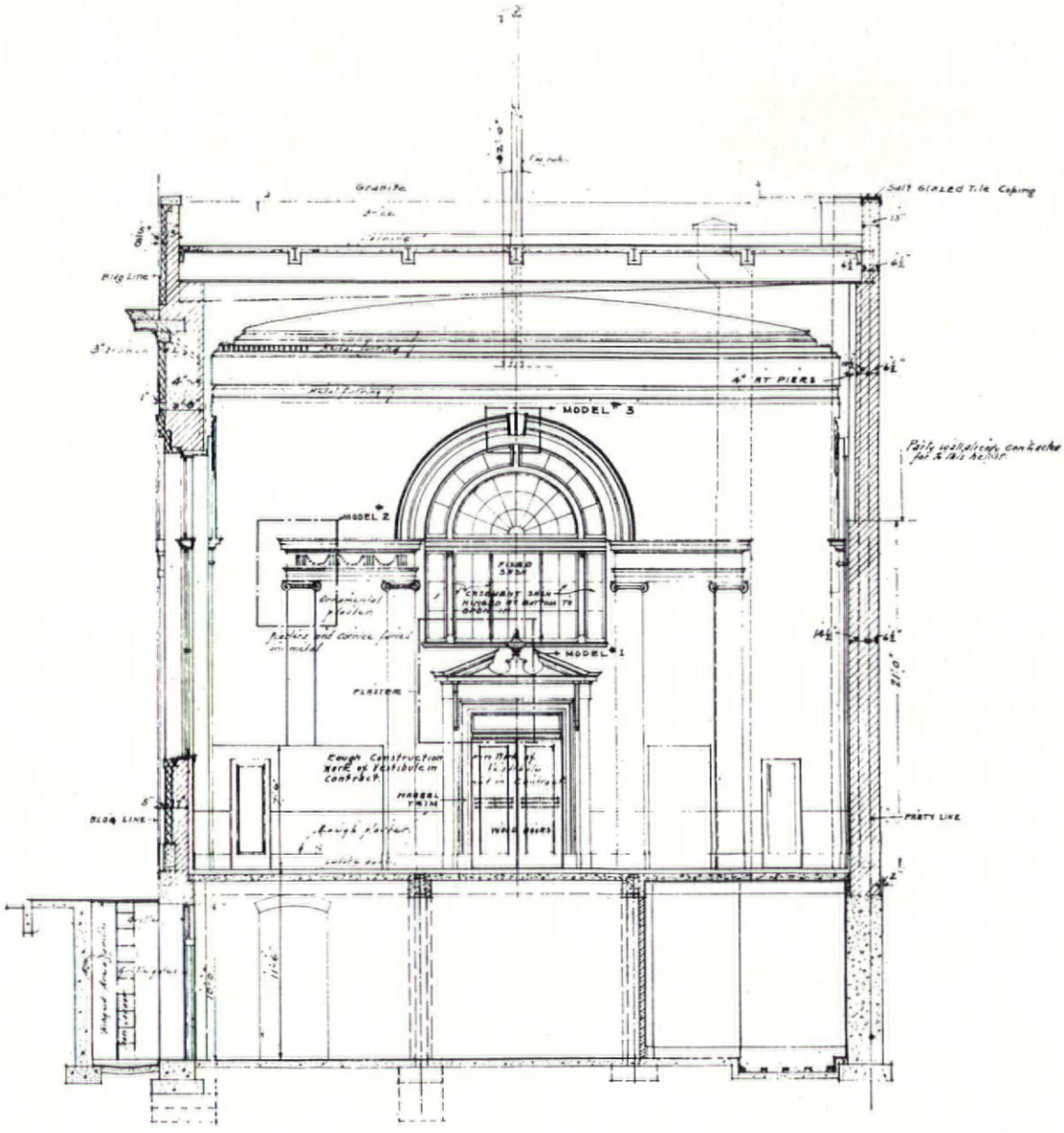
Type B illustrates a bank building similar to that of Type A, excepting that a skylight is used in the roof for light and ventilation where the building is located on an interior plot, and light and ventilation are not from the side windows as in Type A.

Type C illustrates the condition where the banking room is located in the lower stories of a tall building, and where it was possible to extend the columns of the office building through the banking room. While this is not often the case, the extending of the columns through the banking room naturally gives a more economical layout for steelwork than if building columns were carried on girders and trusses and the banking room free of columns.

A rather useful method of keeping a clear span banking room with a maximum of height and still supporting floors above, is illustrated in Type D. In this case the supporting steel girders are located in an upper story, and the floors above the banking room are supported on steel hangers. While this type of steel framing with suspended upper floors is more expensive than the usual type of framing, it does in many cases solve the architect's problem of getting area where it is most desirable and using the space for the steelwork in a less important part of the building. Both the fabrication and erection of steelwork on this type of framing are more costly than for ordinary steel-cage construction. A layout of this type may, without increasing the cost of the steelwork by any considerable amount, be extended to supporting two or three floors above the banking room, but if the structure is carried to a much greater height, cost of steelwork will be increased.

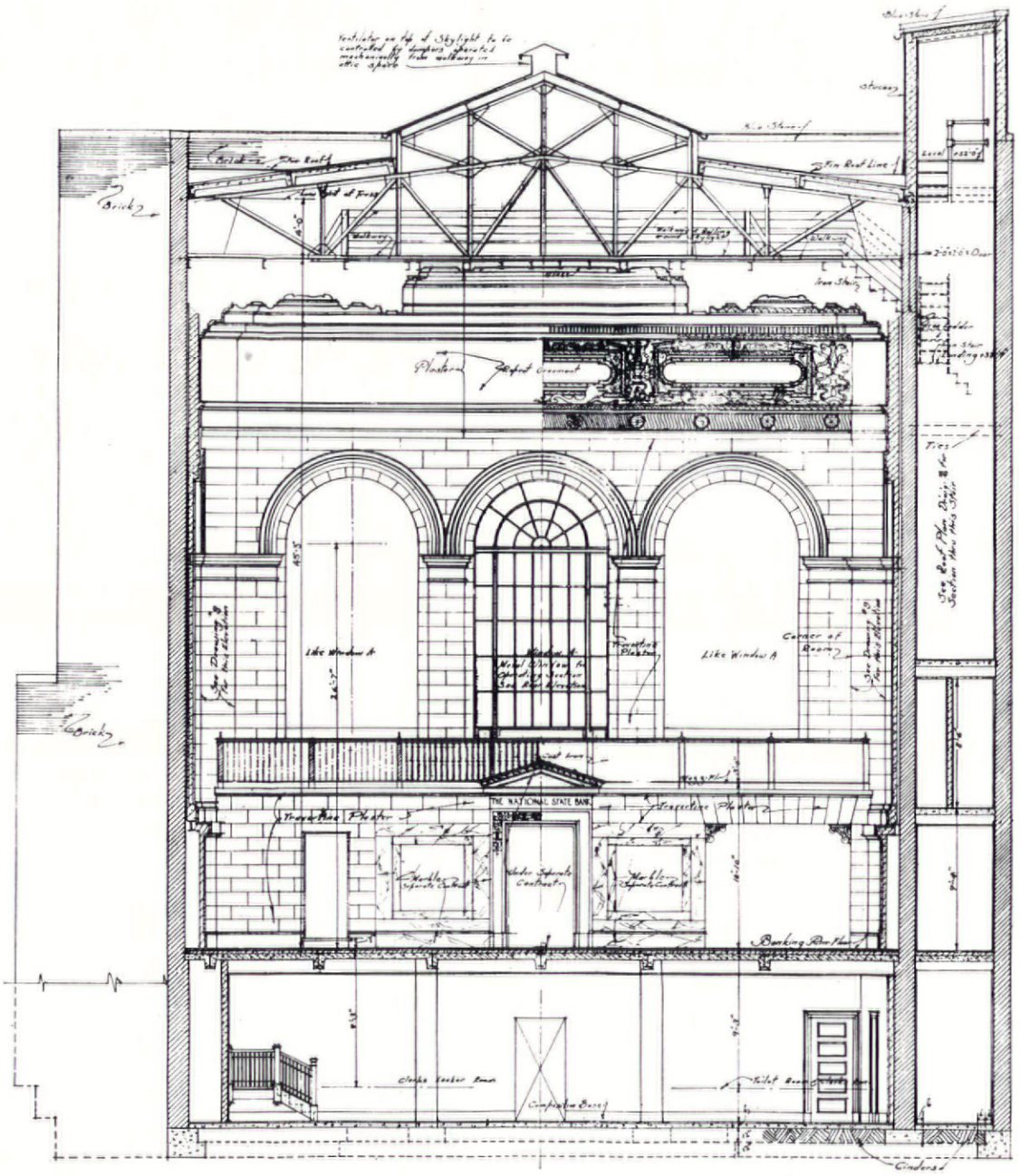
Type E illustrates about the maximum condition of heavy steel framing that is generally found in bank buildings. The two-story trusses shown in this illustration span a banking room approximately 80 feet wide, and in addition carry 14 or 16 office floors above. Trusses are generally used under these conditions, as they permit passageways between the members and make the space between the trusses available. Box girders were used to support the structure over the front and rear where the span was short enough to allow such construction. The large two-story trusses were used where the span was the maximum and many stories of office floors had to be supported. In the open court, one-story trusses were used, as there were no office floors to be supported. The flat roof of the court is placed at the lower chord of the truss and is provided with vault lights to admit light to the main banking room.

This article is written with the idea of indicating typical conditions only, since each individual building presents its own particular problems in the steel layout, just as it does in other particulars. One building, which the writer regrets that he was unable to illustrate, and which in his opinion was most interesting and unique, had an elliptically shaped banking room. This, of course, is an unusual form, and it involved many interesting features of steel construction. The typical problems are all that the writer has attempted to mention in this brief article.



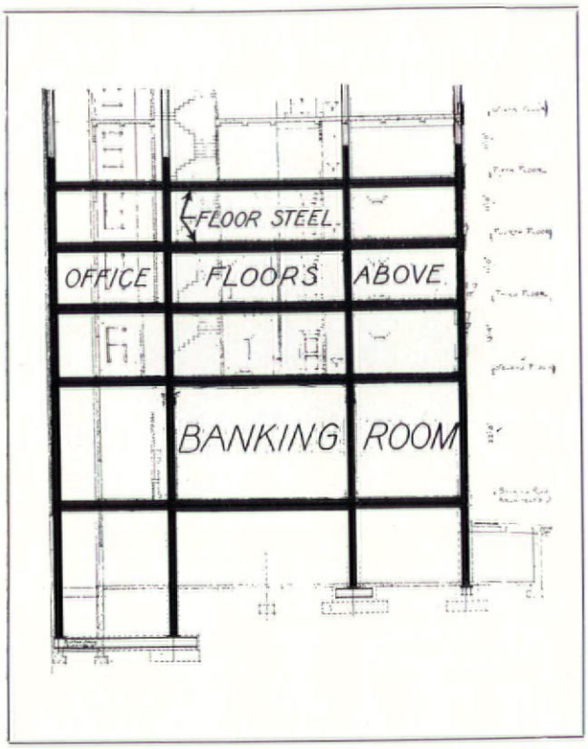
TRANSVERSE SECTION
LOOKING · TOWARD · FRONT

TYPE A

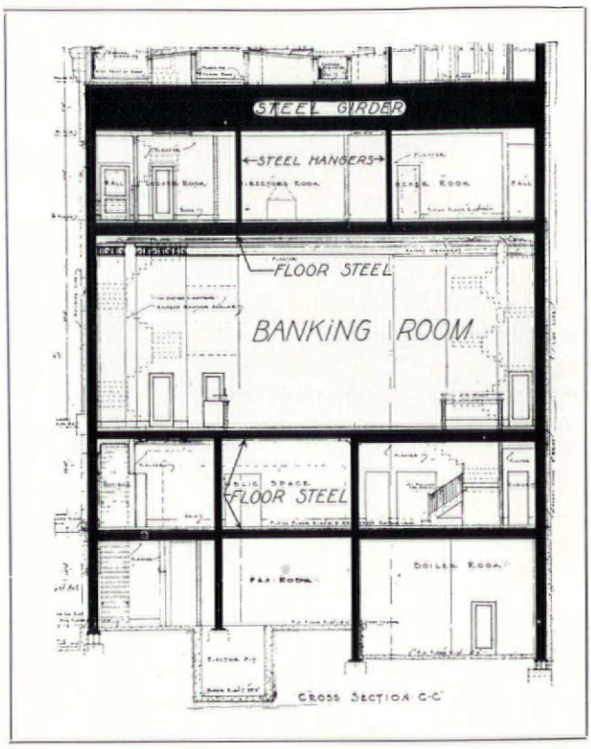


TRANSVERSE SECTION A-A

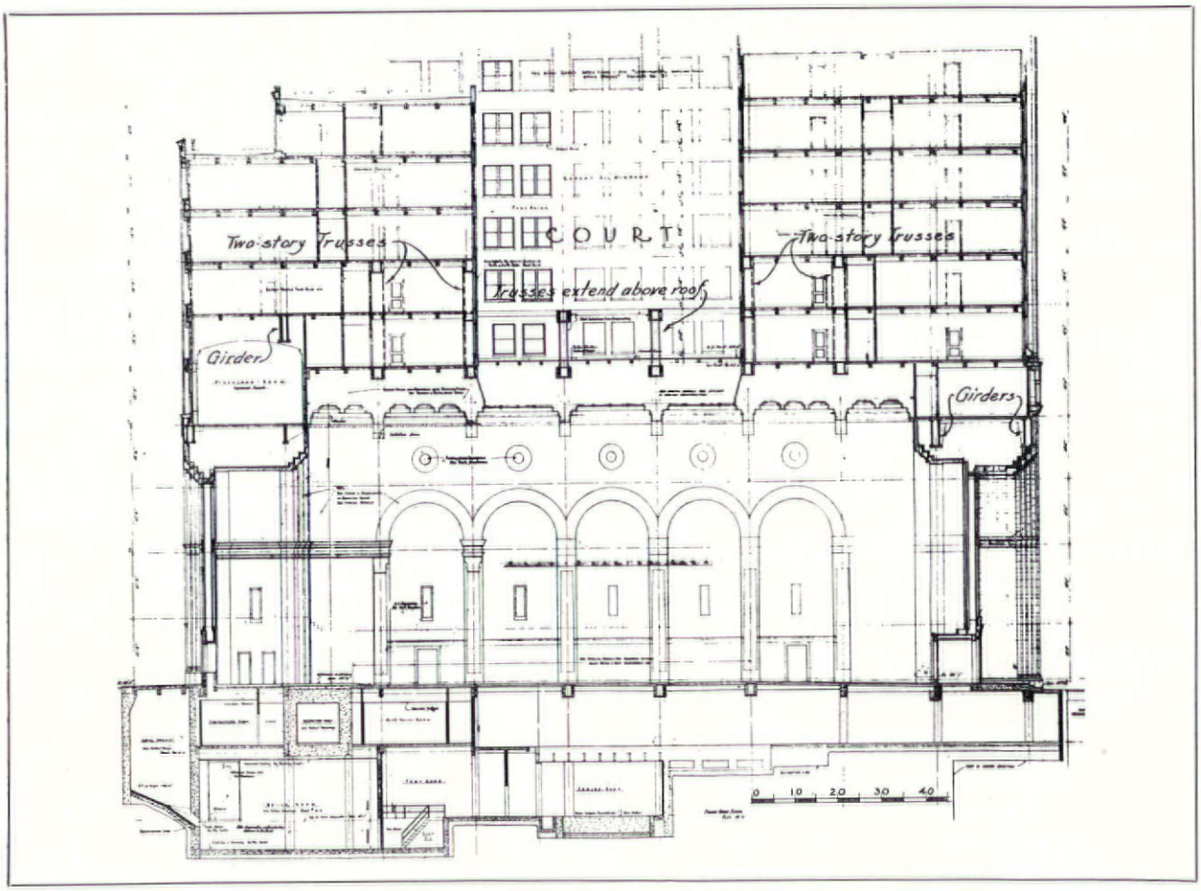
TYPE B



TYPE C



TYPE D



TYPE E

SUPERVISION OF BANK BUILDING CONSTRUCTION

BY
GARDNER C. COUGHLEN
OF WEARY & ALFORD COMPANY

THAT the solidity and permanence of a banking institution may be expressed in a manner befitting its standing in the community, the construction of the building should embody in every detail the ultimate in the economical use of the materials chosen and in the labor of erection and installation. The drawings and specifications will prescribe the quality of materials and labor desired, but the superintendent of construction, resident on the site, is the man responsible for securing the quality of all labor and, in many instances, the quality of material furnished at the building.

Supervision of building construction requires a high degree of intelligence, based on experience in both office and field, and an executive ability similar to that required of any army field general. Certain general rules of conduct may therefore be laid down for the guidance of construction supervision. A series of instructions concerning the superintendence of any kind of building construction should be predicated on the theory that they are supplementary to the drawings and specifications. Such instructions should be considered the philosophy governing the entire construction program and should therefore stress the major "do's" and "don'ts" which experience and good practice seem to dictate as reasonable for all concerned in the erection of the building.

Building construction for a bank should be considered from an angle somewhat other than building construction for an individual. Banks are generally strongholds of conservatism and caution, and yet they are desirous of obtaining the best of quality products at the lowest prices possible with quality the ruling desideratum. The members of a bank's building committee are usually men who have had experience with other building construction operations, either as members of school boards or other building committees or through the bank's mortgage department. The construction superintendent therefore will find it necessary to consider the experience of his building committee, so that harmonious relations will govern the whole proceeding.

The superintendent should be in complete charge of all field operations and public relations. Whatever the superintendent may do will establish a reputation, either good or bad, for his employers as well as for himself, and he must therefore, be exceptionally careful to be correct, positive, conservative and considerate in all dealings with the persons with whom he may come in contact. The superintendent must always keep in mind the fact that the architect has furnished him, to the best of his ability, with drawings and specifications in such condition that from the time construction work starts he must supply the "know how" that the documents cannot furnish. No decision respecting anything whatever should be made without considering all facts bearing upon the question at issue, so as to arrive at the best decision the judgment of the superintendent makes possible. After making a decision known to others, it should not be changed unless there are given reasons for the change that are more logical than those on which the decision was based; a vacillating attitude destroys the superintendent's administrative control of the work.

In the construction of the building the owner has purchased something that must be delivered to him in accordance with all the contract documents. At the same time, each contractor has agreed to deliver a definite article to the owner and, therefore, the most serious duty the superintendent has to perform is to see that the spirit of every contract is executed in a manner equitable to both parties. The owner should not be expected to accept less than he has bought, and the contractor should not be expected to deliver more than he has sold. As every building contract requires a "give and take," equity between all parties concerned must be considered.

Directions to the superintendent should include those enumerated in these paragraphs.

A. As soon as possible, check all drawings and analyze the specifications, and either notify the head office of any discrepancies or list indefinite points for answer.

B. Check bench marks, property lines, and overhangs of adjoining buildings, and arrange for the establishment of one permanent bench mark reasonably close to the building, but not closer than 200 feet.

C. Examine all detail sheets and become familiar with their requirements.

D. Before establishing dimensions for constructing surrounding items that will be made from shop drawings, be sure that the shop drawings on file are the finally approved copies. Wherever any dimensions are in conflict with dimensions on the original scale drawings, follow those established by the shop drawings unless they appear to be illogical.

E. The superintendent must assume responsibility for the correctness of dimensions and for the worth of materials or workmanship furnished, so that the contract requirements are adhered to and the progress of the work made smooth for all concerned. Procrastination or lack of knowledge with respect to the necessity for rejection of faulty work and the consequent necessity for changes is condemned by the careful architect. Vigorous action with respect to such work should be taken immediately upon discovery. Faulty material should be discovered before it is incorporated in the building, and faulty work should be discovered promptly after it has been done.

F. As the person in control of construction, the

superintendent should endeavor to settle all questions himself, referring to the H.O. (home office) only such matters as should properly receive the attention of the H.O. before determination. Except in unusual cases, all questions that refer to matters shown on the drawings, mentioned in the specifications or covered by shop drawings or subsequent specific instructions from the H.O., should be answered by the superintendent. In all cases the superintendent should not forget that he is the man who is familiar with all conditions at the building, and in referring any matters to the H.O. for final determination he should be sure to explain all conditions that should be known by the H.O. before making the decision.

G. As soon as convenient, the superintendent should arrange a progress schedule, inform the various contractors of the dates tentatively fixed, and secure their reaction, after which he should prepare a final schedule and keep in constant touch with the contractors whose material must arrive within the ensuing four to six weeks. The superintendent should not depend on the H.O. to look after this detail, since whatever may be done by the H.O. on this item is supplementary to the superintendent's efforts.

Since the limitations placed on this article preclude a full discussion of all the construction work and the superintendent's responsibilities thereunder, only the matter of superintendence of several items of finish work in the banking rooms will be covered, it being assumed that the reader has some reasonably thorough familiarity with the general building construction supervision necessities.

H. *Ornamental and Miscellaneous Iron*

1. Have material delivered according to a prearranged schedule, in proper sequence, and as soon as other work is ready to receive it. See that all items to be built into concrete or brick are on the site in time. 2. See that stonework is not damaged when installing window and door frames. 3. When framing of any kind is to be set in basement or other spaces that require waterproofing, see that all anchor bolts are waterproofed into the concrete before such framing is set. 4. Check location of stairs carefully where marble and plasterwork join with such stair construction. 5. See that calking around all door and window frames or other openings is done correctly. 6. Be very careful that floor checks are set level, at the correct floor heights and centers. 7. Make sure that steel sash operate properly, and check at frequent intervals to see that no plaster, dust or other substances have gathered in the sash and frame contacts to cause springing or bending of the sash when closing them during construction operations. 8. Have framing for all openings and for counter screen delivered and set in time for work of the contractor setting partitions and so that the electrician can get in his work, and that later the marble contractor may start setting marble for screens and columns. 9. Check laying out of all openings and screen center lines from the bench lines and marks originally established. 10. See that the screen framing is fastened with bolts to floor direct or to sleepers provided, and to columns and walls, being careful that the correct height is maintained and that framing is set in straight, plumb lines. 11. See that all finished work is well protected after erection, so it will not be damaged by workmen of other trades. 12. Check up to see if any finished doors or windows will have to be left out to allow vault doors to be moved in.

Make sure that:

13. Work is lined up and not allowed to sag in such places as in long, unsupported lengths of counter screen. 14. All field joints and miters are well fitted. In bronzework no filling materials are allowed. Shop joints are brazed and scarcely, if at all, perceptible. 15. Pilaster bases are evenly spaced at deal plates, and that joints between marble ledge and metal top screens, and between linoleum counter tops and top screen, are tight. 16. Joints where metal abuts wall or other surfaces are tight and neatly made. 17. Bronze doors are properly hung; that edges of doors line up with joints; that doors are not out of wind, and that floor clearance is proper. 18. Concealed screw fastening is used wherever possible; that all exposed screws are neatly fitted and that heads are not damaged.

When the erection is complete see that:

19. All screws are in place. 20. All movable parts operate properly, and that hardware is complete and in order. 21. All key work, and proper keying, have been carried out. All keys, properly tagged, are turned over to the superintendent who gives a receipt. These keys are given to the bank officials later, with keys for other work. 22. All work is well cleaned, scratches and abrasions removed, and finish left in its originally intended condition. 23. Exposed hardware and other items subject to handling are covered or otherwise protected. 24. All miscellaneous loose items, such as signs, officers' ledge sets, calendar cards, etc., are accounted for. 25. All small items likely to be stolen are stored in a safe place. 26. Proper bank officials are given thorough instructions as to the operation of any special equipment and methods of cleaning or otherwise keeping the work in first rate condition.

J. *Marble*

1. Install steel framing for counterwork first of all, so that the electrician may start on his work, since no tile backing of screens can be done until all electrical work is completed. 2. Be sure that all steel framing is set from bench center lines and mark, set straight and plumb, and anchored thoroughly to walls, columns and floor. 3. Start work on walls and screen as soon as plaster and tile contractor is out of the way. 4. Check up to see that all piping and conduit work is in before laying floors. 5. See that finished floor levels and other heights are taken from original bench marks, previously established. 6.

Wire anchors of any material other than that specified must not be allowed. 7. When large size marble tile are used for floors, the fill should be laid across the space first to within 3/8 inch of underside of marble; then the tile should be wet and the setting mortar buttered over the entire surface, and tamped down to its right level. 8. Have all marble set for floors before the erection of radiator grilles or other ornamental work, so that proper fit of the latter may be made. 9. In spaces having marble base with cove and tile floors, have cove and base installed as soon as practicable, so that tile floor may be laid afterward. 10. Have all window stools and other horizontal or prejecting marble, such as counters or corners, covered where necessary, as soon as installed, to prevent damage.

Make sure that:

11. Mechanics are not allowed to use ledges for work benches or to store material on. 12. Stair treads are protected with boards securely held in place. 13. Fitting against other material is properly done, and cutouts for floor hinges, etc., are well jointed. At single-acting floor hinges, the base should be notched out at the bottom to clear the knuckle on the hinge arm and to permit the door to open without breaking the base. 14. Slabs are matched as to color tone and as to figure if any, bearing in mind the character of the material. 15. Electrical and other outlets are correctly placed. When outlets occur in the base, they should be centered if at all possible. Misplaced outlets detract from the appearance of any work. 16. Wet plaster is not permitted to fall on marble.

When floors are laid see that:

17. Packing boxes, etc., are *carried* and not *dragged* over the floors, as deep scratches are often made in this manner. 18. Mechanics do not leave tobacco stains on floors, since they cannot be removed from some kinds of marble. 19. Oil from pipe cutting or other sources, including putty, is kept off floors and walls.

When marble setting is finished see that:

20. Joints are well pointed and in a plane. 21. Joints in moulded and flat work, if not in a plane, are rubbed down and the original finish restored. 22. All floors are properly rubbed, and that scratches, etc. are removed from treads, thresholds and other surfaces not polished. 23. All surfaces are thoroughly cleaned and left in finished condition. 24. Adequate protection is provided on surfaces that may be splashed by water thrown from the grinding and polishing machines.

K. *Metal Cage Equipment*

1. Cage equipment is sometimes of wood, in which case much of what is often written on cabinet work will apply. 2. Installation of metal cage equipment is generally started after adjoining work is fairly well completed.

During erection see that:

3. Work is well fitted, properly fastened together, and solidly anchored in place, with all screws and nuts drawn up tight. 4. Cage posts and other upright supports are shimmed to concrete floor and do not rest on linoleum. Cage post feet, after floor covering has been laid, are to be solidly fastened to floor and post. 5. Electrical work is installed along with equipment, including all special electrical devices. 6. Abutments of counters and marble ledges are at the exact levels to allow for linoleum tops; distance from front of marble ledge to rear of counter is kept so that deal plate will have proper projection at front; counters are perfectly level so deal plate will have uniform projection above linoleum top. 7. All hardware is neatly fitted. 8. All cove or other shoe moulding is in place. 9. After erection is complete, this branch of the work requires very thorough checking on account of its intricate detail and many miscellaneous items.

See that:

10. All work is cleaned up, including insides of drawers, cupboards, etc., scratches or other abrasions and exposed screw heads are touched up with enamel, and that finish in general is placed in its originally intended condition. 11. Linoleum tops are clean and that any joints between linoleum and other materials are tight and well made. Note that in general linoleum is to be laid without joints in itself. Air bubbles under linoleum are not permitted. 12. All equipment operates properly. 13. Hardware is as specified, operates properly, keying is correct, and all keys work; keys are tagged and turned over; stack locks or other locking devices are adjusted and work properly. 14. Drawers, etc. work easily and shut tight. This refers also to cupboard doors, etc. 15. All drawer interiors are complete and as called for. Filing devices, shelves, loose trays, inksets, bulletin boards, stop-payment panels and other miscellaneous items are complete and accounted for. Drawers that are interchangeable are in the locations indicated. 16. Bank officials are properly instructed in care and upkeep of the work and in operation of any mechanical features.

L. *Vault Work*

This work is generally completed some time before opening, and mechanics are sent later to do the final cleaning. On completion it should be gone over and checked. It is well to suggest here that extreme accuracy be used, in setting the doors, as to levels and position so that architraves will connect properly with adjoining surfaces and doors will balance properly.

In checking, these items should have careful attention. See that:

1. Vault doors are properly balanced. A door that is balanced can be given a slight push when in any open position and it will come to rest in a short distance and remain there. If a door is not balanced, it will move of its own accord from several different open positions, provided, of course, that the hinges are not binding. 2. Time lock and combinations

function. The time lock should be tried out for several days to make sure it is all right. Bank officials should lock and unlock doors at this time so as to become familiar with them. 3. All keys for glass doors, time locks, safe deposit boxes, etc., are on hand and work their respective locks. Every safe deposit box key should be tried. All keys should be turned over to the proper bank official by the vault foreman and be receipted for. 4. Burglar alarm is entirely connected with vault equipment and in working order. Bank officials should be made thoroughly familiar with the care and operation of the protection system by the foreman. 5. Fans. light fixtures or other work of an electrical nature installed under the vault contract is complete and working. 6. Bond boxes are as specified, and that special sheet metal equipment for large boxes is as called for. Sometimes special sheet metal equipment is furnished and installed by others, in which case see that after this equipment is installed, locker doors, etc., close properly.

7. Painting is well done and as specified. This includes the interiors of lockers, safe deposit nests, bond boxes, exposed lining, etc. 8. All work is properly fitted, with especial reference to exposed finish joints. 9. All natural finished surfaces are in good and clean condition, free from abrasions, rust, etc., and they are given a heavy coat of protective grease, if not of stainless steel, before the foreman leaves. 10. All miscellaneous items, such as hinges, hardware, gates, grilles, footbridges, etc., are in place, and are as called for. 11. Proper bank officials are given thorough instruction by the vault foreman in care, upkeep and operation of all equipment. 12. Vault work generally comes from the factory coated with grease as a rust preventative. After this is removed, a heavy coat of grease or oil is applied until final cleaning. Once cleaned and in use, all polished surfaces should be cleaned weekly by means of a soft cloth and light oil. This leaves a clean surface coated with a thin film of oil, and if regularly and properly done, will keep the work in good condition at all times.

13. After the foreman leaves, and until the men return for the final cleaning, polished steel surfaces are regularly inspected for rust spots. Should rust spots develop, immediately coat them with grease, a supply of which should be left by vault foreman for this purpose. 14. Never allow an inexperienced man to try to remove rust from polished steel. This work is for an expert. 15. Under no conditions use salamanders near polished steel, whether they are coated with grease or not. The acid fumes given off in combustion will cause rust to appear in a few hours. After 24 hours this rust will be almost impossible to remove without ruining the work. 16. Keep mechanics and others not familiar with the equipment, especially doors, from fooling with it. Much damage, hard to repair, can be done by mechanics of other trades who are fascinated by mechanism and often want to "see how it works."

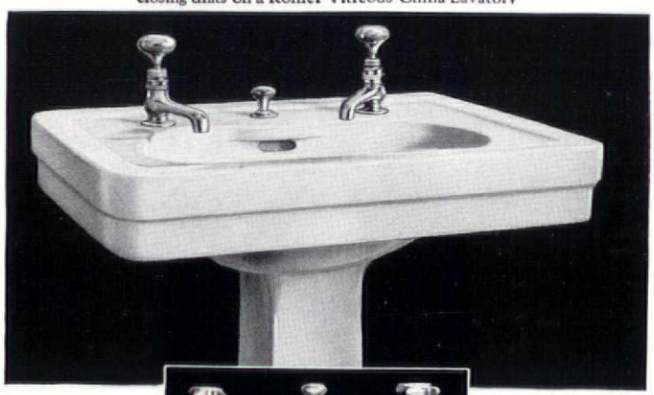
M. *Ceramic Tile and Terrazzo*

1. Make sure that all piping, conduit work and marble cove base is in before laying any tile floors. 2. Have brass mat frames set at time of laying marble floors. 3. See that a uniform joint is kept in floors and borders, and that it is laid to straight line. 4. Do not allow any blistered tile to remain in the floor; colors of tile must be uniform unless character of tile allows variation. 5. Floors must be level, and border on similar lines, straight and parallel. Easing off to square up rooms should be done in dark or otherwise obscure places. 6. If floor of some other material adjoins tile floor, see that the edge of tile is stopped against a perfectly straight board. Should there be a partition or screen covering such a joint, arrange to have the joint in center of the partition. 7. All joints must be grouted full, and afterwards the entire floor must be well cleaned. 8. See that no cement is left on floor after cleaning, as this will leave spots that are extremely hard to remove. 9. When setting tile wainscot, check the finished wall lines from the bench center lines, and the height of the wainscot above the finished floor from bench marks previously established. 10. The finished terrazzo floor must be well rubbed to produce an evenly polished surface.

N. *Miscellaneous Equipment*

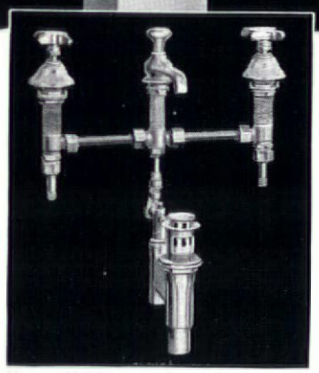
1. Check carefully all schedules and requisitions covering miscellaneous equipment not included in other contracts. See that shipment of such material is made in time, and after checking, store in a safe place any items that are not fastened in place. 2. If fire extinguishers are ordered, have them put in work spaces, etc., where they are easily seen and accessible. 3. Toilet accessories fastened in place should be located so as to look well and at the same time be convenient. 4. Other miscellaneous items generally used are included in this list: Cuspidors and mats, inkwells, blotter pads and inksets, waste baskets, electric fans, rubber mats and the like. 5. Initial supplies of such items as toilet paper, paper towels, liquid soap, etc., are generally ordered, in which case see that they are turned over to the person who will have charge of them. 6. Electric lamps are not included in fixture contracts. As soon as it can be done, a schedule of proper sizes of lamps for different fixtures should be made up. If the bank has not already a lamp contract, it should make one with its dealer. Order an extra supply of each kind of lamp. Lamping up is usually done by the electrician who hangs the fixtures. See that all lamps light and that switching is correct. Turn extra lamps over to the bank. 7. Vault keys should be turned over to the bank direct by the vault foreman. All other keys are turned over to the superintendent. A few days before the opening, these keys should be turned over to the individual who is to have them in custody. See that all keys are uniformly tagged and hung in key cabinet in a systematic manner.

K-8065 Interchangeable Lavatory Faucets with self-closing units on a Kohler Vitreous China Lavatory





K-8065 Kohler Interchangeable Lavatory Faucet with self-closing unit and oscillating handle. To change to compression faucet, remove compact self-closing unit.



K-8002 Kohler Combination Lavatory Fitting. May be equipped interchangeably with compression valves as shown or with the self-closing type. This fitting has the positive-acting Kohler lift drain with patented spring ball to keep the drain open or closed.



K-8067 Kohler Interchangeable Lavatory Faucet with compression unit. To change to self-closing type, take out removable seat and compression unit.

New Kohler Faucets

with *interchangeable* "insides"

Here are improved types of fittings to be included in the Kohler line of superior plumbing brass.

The new self-closing faucet on the lavatory illustrated above permits an easy changeover to the compression type without disturbing the faucet body, by simply unscrewing the self-closing unit and inserting in its place a compression unit. The combination lavatory fitting allows the same interchange.

The self-closing units give an even flow of water simply by pushing the oscillating handle in any direction. When the handle is released the faucet closes promptly. The compression units open at half turn and give a strong, even flow of water.

Both the self-closing and the compression types are designed to make the replacement of wearing parts easy. The compression unit has a removable seat unit, with encased removable swivel disc washer. The finest materials are used and long life and satisfactory service assured.

The Kohler line of plumbing brass contains many other new and superior fittings which will appeal to your more discriminating clients. You may find it advantageous to keep in touch with these important developments by reading the KOHLER OF KOHLER NEWS. If you are not receiving this interesting monthly publication, please send us your name.

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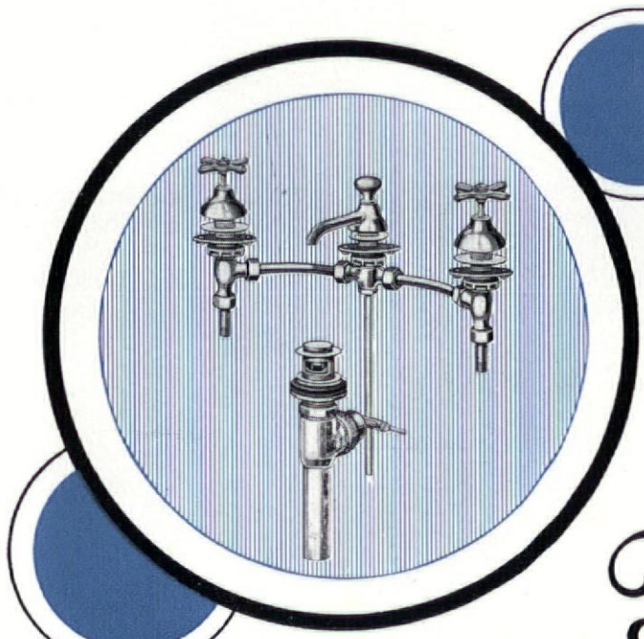
KOHLER OF KOHLER

Plumbing Fixtures

LOOK TO THE VITAL



For modern plumbing

The new Mueller G-3612 Fitting is an all-metal chromium plated lavatory combination. The Pop-Up Drain is positive in action, closes water-tight with a snap and when open, leaves a wide free passage for water. The drain plug is removable without the use of tools.

Chromium plate has definite advantages over all other finishes. Its brilliant mirror-like surface is harder, does not tarnish, and is easily kept clean and bright. Chromium plated fittings are in harmony with modern design because of the sharp, positive contrast they present with vitreous ware of white or any of the new colors.

If you would specify permanent plumbing fixtures, send for your copy of the Mueller catalog.

PLUMBING BRASS AND

SPOTS OF PLUMBING

Beauty
that goes deeper than the surface

The true beauty of a plumbing fixture lies not only in handsome lines and lustrous finish, but also in the skill with which experienced craftsmen have shaped the finest materials into a smoothly working mechanism designed to operate without possibility of failure. Modern architecture can use only the finest fittings.

Beautiful Mueller fittings when combined with new forms and colors, set up perfect harmonies in the modern manner.

Truly, the beauty of Mueller plumbing goes deeper than the surface. Since the business was founded by Hieronymus Mueller in 1857, Mueller has specialized in brass. Today Mueller is the largest manufacturer of plumbing brass goods in the country. Mueller quality is a by-word with every plumbing merchant and gas or water works executive who is familiar with Mueller craftsmanship because every piece of Mueller equipment is tested and all parts subject to wear or strain are reinforced. Nothing leaves the factory until it is worthy of Mueller's reputation for quality.

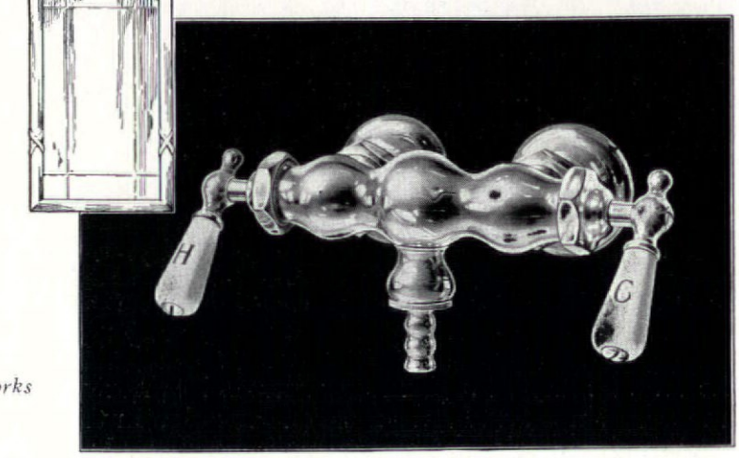
MUELLER CO., (*Established 1857*) Decatur, Illinois
World's Largest Manufacturers of Plumbing Brass Goods
Branches: 101 Park Ave., Architect's Bldg., New York, Dallas, Los Angeles, San Francisco
Canadian Factory: MUELLER, Limited, Sarnia

MUELLER

VITREOUS WARE

MIRROR-BRIGHT

today-tomorrow-always!



Fixture by
Wolverine Brass Works

EVERLASTING is the bright, new appearance of "CRODON" plated plumbing fixtures. Their brilliant lustre is permanent. Plated with "CRODON", bathroom, kitchen and washroom fittings forever retain their beauty and look of cleanliness.

Neither tarnish nor corrosion attack "CRODON". It needs no polishing—an occasional wiping keeps it mirror-bright. Seven times harder than nickel, it defies wear indefinitely.

Because of their beauty and economy, "CRODON" plated plumbing fixtures are being installed in an ever-increasing number of new hotels, apartments, hospitals, office buildings and homes. Manufacturers and jobbers now carry them in stock or can have fixtures "CRODON" plated for you in their shops or our own.

Our service department would welcome an opportunity to give you full information about "CRODON" plated faucets, flush valves, shower sprays, mechanical stoppers, builders hardware or other metal fittings. If estimates for any building project are desired we will gladly refer you to our licensees.

☆ ☆ ☆

CHROMIUM CORPORATION *of* AMERICA
General Offices: 120 Broadway, New York
Branch Offices and Plants:
4645 West Chicago Ave., Chicago, Ill. — 3125 Perkins Ave., Cleveland, Ohio — *and at* Waterbury, Conn.
Metal and Thermit Corp., *Agents,* South San Francisco, Cal.

CRODON

TRADE MARK REG. U. S. PAT. OFF.

THE CHROME PLATE

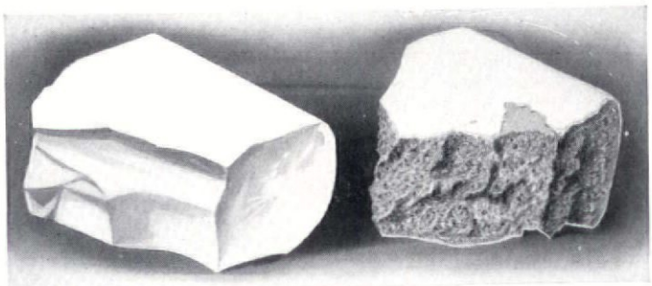
PERMANENTLY BEAUTIFUL · DOES NOT TARNISH · WEARS INDEFINITELY



What's the Difference Between a Genuine Vitreous China Urinal Stall and an Ordinary One?

The same difference that you would understand in considering a water closet or lavatory made of anything but Genuine Vitreous China.

The superiority of vitreous china over other materials being well known—the advantages of specifying Douglas urinal stalls are apparent.—Bear in mind they will not craze or discolor, that they are easily kept clean and absolutely impervious.



A Sectional Piece of Douglas Vitreous China Urinal

A Sectional Piece of the Ordinary Urinal

Write for Catalogue and list of Buildings where the Genuine Douglas Vitreous China Urinal Stalls are being used.

Manufactured by

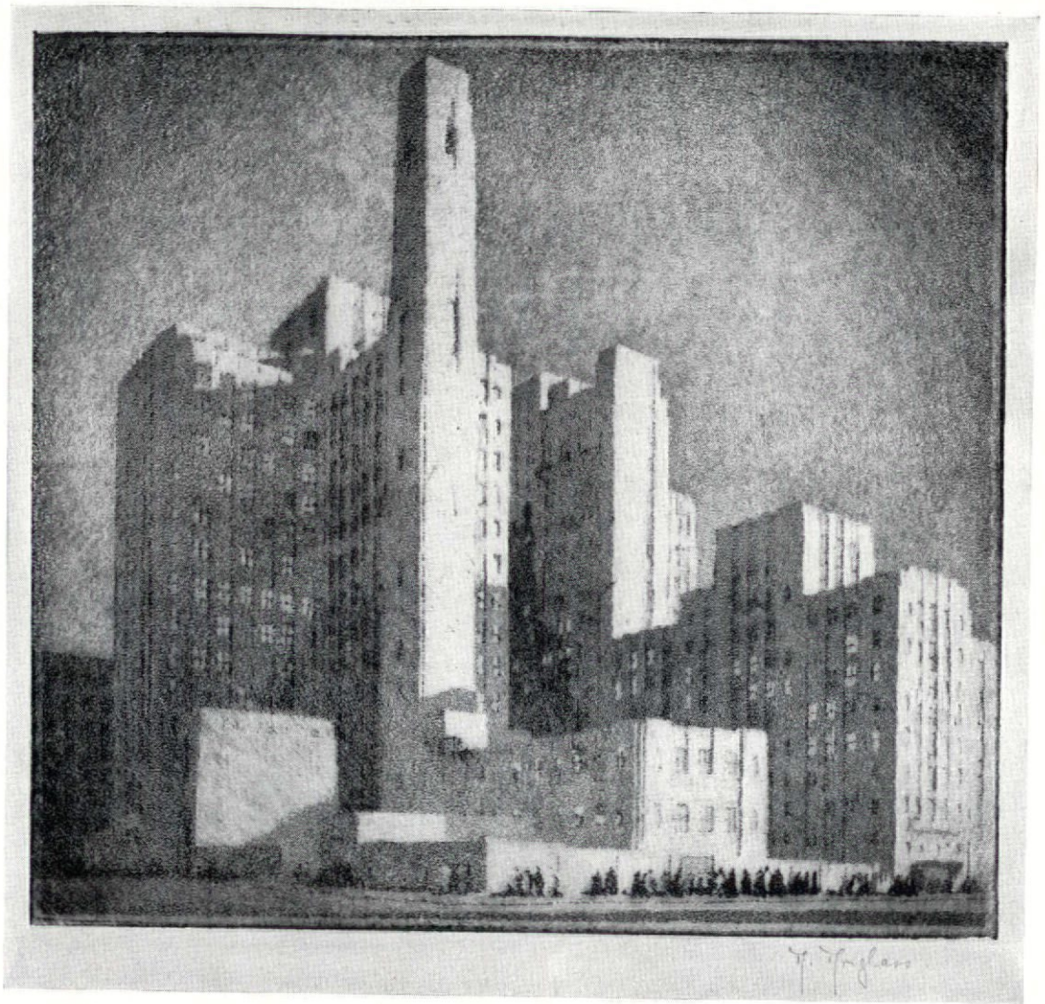
The John Douglas Co.

Makers of High Grade Plumbing Fixtures

General Office: Cincinnati

Factories: Cincinnati, O. Trenton, N. J.





A Donald Douglass Aquatint study of the MEDICAL CENTER, NEW YORK, *which consists of a group of buildings occupying a space of approximately twelve city blocks **** Architects, James Gamble Rogers, Inc.; General Contractors, Marc Eidlitz & Son, Inc.; Consulting Heating and Ventilating Engineers, Werner Nygren, Inc.; Heating Contractors, Gillis & Geoghegan.*

Over 7500 Jenkins Radiator Valves



Fig. 176 Jenkins Right-hand Radiator Corner Valve

Durability, sanitation, silence were the reasons given for installing a hot water heating system in the huge Medical Center, New York, but *durability* was the deciding factor.

Necessarily a reputation for durability governed the selection of Radiator Valves, and over 7500 Jenkins Valves were installed, including globe, angle and corner types, with hand wheels or lock shields.

Your clients will get the benefit of long-term service, if specifications call for valves marked with the Jenkins name and "Diamond". May we suggest that you instruct your specification writers to make definite mention of these identifying marks?

JENKINS BROS.

80 White Street . . . . . New York, N. Y.
524 Atlantic Avenue . . . . . Boston, Mass.
133 No. Seventh Street . . . . Philadelphia, Pa.
646 Washington Boulevard . . . . Chicago, Ill.

JENKINS BROS., Limited
Montreal, Canada London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

Can advertising make the architect's job easier..?

PEOPLE who do not know the relative merits of products buy on price alone. Is there an architect who has not exhausted his vocabulary in convincing a client that the better product would prove less costly in the long run?

Maddock, through continued, forceful advertising featuring the Improved Madera, is making people conscious of the wisdom of installing this fine, scientifically constructed toilet. The architect who specifies it can now be increasingly sure that it will be welcomed by his client.

THOMAS MADDOCK'S SONS CO. TRENTON, N. J.

MADDOCK'S *Improved*

MADERA





NEW

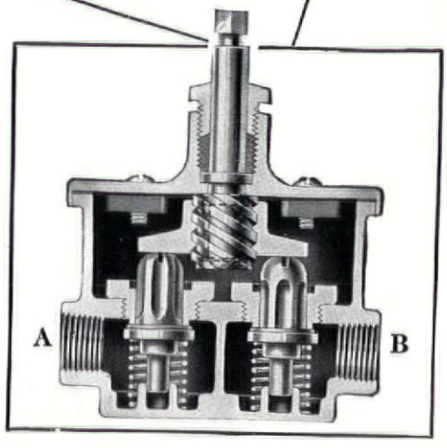
Diagram shows New Clow "Triumph" mixing valve. Cold water valve at right opens first; the water enters at B. Hot water valve follows; the water enters at A. Cold water valve shuts off before the hot water is full on. Note how water presses *with* the closing of this valve—not against it. Note also phosphor bronze springs which help closing of both valves.

The New Clow "Triumph" Mixing Valve

The new Clow "Triumph" Shower Mixing Valve closes *with* water pressure—not against it. Moreover, phosphor bronze springs on both hot and cold valves further insure a proper closing each time. Water cannot trickle, to cause wear on seats.

And the seats are renewable. They are not threaded, but are held in place with screws. A few turns of a screwdriver removes them. No wrench is needed.

The Clow Mixing Valve is just one of the new "Triumph" line of fixtures. Write us for further information on this line of "15 year tested" fixtures.



JAMES B. CLOW & SONS, 201-299 N. Talman Avenue, CHICAGO
Sales offices in principal cities

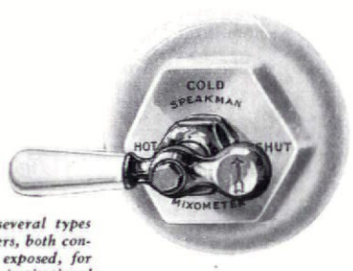
CLOW

PREFERRED FOR EXACTING PLUMBING SINCE 1878

Gentlemen prefer showers

COUNTRY CLUBS, Y. M. C. A.'s, and schools have taught the genus homo the lure of the shower. They also have taught him the name Speakman. The man of the house will always thank the architect who will scheme a Speakman Shower into his home—either in a stall or over a tub. If you are not completely supplied with information and specifications, please write us.

SPEAKMAN COMPANY
WILMINGTON, DELAWARE



There are several types of Mixometers, both concealed and exposed, for residential, institutional and club installation.

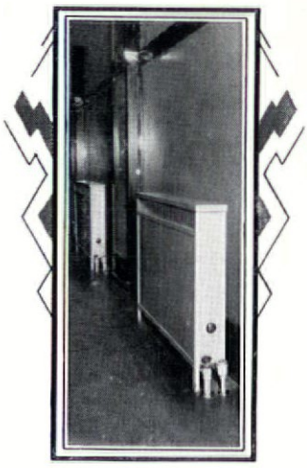
SPEAKMAN SHOWERS and FIXTURES

Everywhere, Radiators are Giving Way to Trane Concealed Heaters



Asbury Gables Ideal Home, Wm. F. B. Koelle, Architect, Philadelphia, Pa.





Trane Heat Cabinets

Visible type heating units, employing the same heating principle as Trane Concealed Heaters. Finished in any tone or grain to match furnishings. Wide variety of shapes to fit any wall space.

The modern demands for spaciousness — beauty — comfort, have established this trend in room heating

Today, a new building hardly seems up-to-date if it is heated with old-fashioned radiators. There is something strikingly different about the appearance of a room equipped with Trane Concealed Heaters, that appeals instantly to every person entering it. No radiators to waste space and interfere with interior arrangement. Only an inconspicuous damper grille in sight — every other part of the heating unit is hidden between the walls.

But the present popularity of Trane Concealed Heaters could not have been attained without an equal improvement in heating results. With thousands of units in successful service, it is universal experience that these modern heating units heat rooms more quickly and provide more flexible control. Regulation, in fact, is instantaneous, with the opening or closing of the damper grille.

Trane Concealed Heaters are not hidden or recessed radiators, radiator shields or screens. You need Bulletin 24 to explain the difference and acquaint you fully with the many advantages of convection heating, with the Trane all-copper heating element.

Mail the coupon.

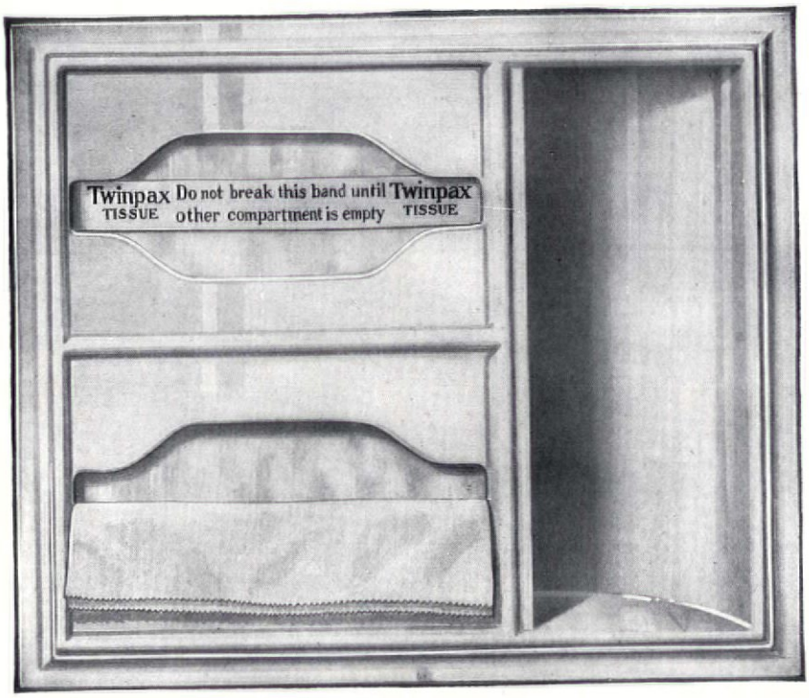
HEAT CABINETS **TRANE** CONCEALED HEATERS

··· PUMPS AND HEATING SPECIALTIES ···

THE TRANE CO. (Est. 1885)
220 Cameron Ave., La Crosse, Wis.

Send Bulletin 24, "How to Select and Install Trane Concealed Heaters."

Name.....
Name of Firm.....
Address.....
City..... State.....



"Why wasn't it thought of before?"

IN Twinpax Toilet Fixtures there are two packs of toilet tissue, so that if one pack is unexpectedly exhausted another is at hand. Besides this feature the Fixture itself (tile) is very handsome.

The Fixture may be had in any color, and in either the recessed style, as illustrated above, or in a projecting style.

Blue prints, prices and other details will be very gladly furnished on request.

NATIONAL PAPER PRODUCTS COMPANY

Architectural Service Division

CARTHAGE, N. Y.

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Ask for A. I. A. Filing Catalog

ANNOUNCING

Lower Prices on Duriron

THE greatly increased production of Duriron acid-proof drain pipe and fittings, made possible because of its wide acceptance by Architects and Engineers as the standard material for carrying corrosive wastes, has resulted in lower manufacturing costs.

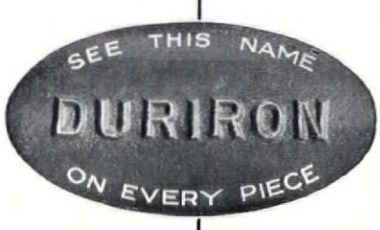
Duriron prices, therefore, have been radically reduced, and Duriron may now be specified in cases where other unsuitable material formerly was used, because of the initial saving.

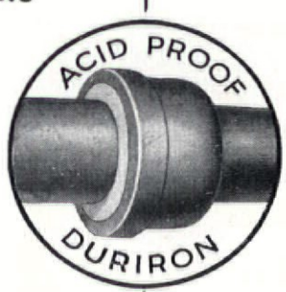
Duriron acid-proof drain pipe, installed the same and as easily as extra heavy cast iron soil pipe, outlasts the building in which it is installed, and eliminates forever the costly and disfiguring results of leaking acids.

Literature especially prepared for the Architects' files will be mailed on request.

Duriron is produced only by

The DURIRON COMPANY DAYTON·OHIO





We Rate Urinals In This Order



THE Trenton Potteries Company manufactures all three of the standardized types of urinals. It is fair to assume therefore that our opinion as to the sanitary value of the respective types is less likely to be colored by prejudice than that of a manufacturer whose plant facilities enable him to make less than the entire line.

Our unqualified recommendation is that the Stall type stands head and shoulders over the Pedestal and Wall types. Our Sanitary Engineers have made exhaustive studies of the question. They have examined installations under every conceivable condition. For cleanliness of the product itself, absence of danger of clogging, limit of floor space, cleanliness of floor surrounding and ease of maintaining the toilet room in perfect condition, these sanitary engineers vote the Urinal Stall the best.

Yet, if your customer insists that he wants the Pedestal Urinal, we can supply you. They are made just as good as we can make them—from our famous Te-pe-co double-fired Vitreous China.

A folder showing all three types of urinals and their relative merits will be gladly sent on request

THE TRENTON POTTERIES COMPANY

Trenton, New Jersey, U. S. A.

Export Office, 115 Broad St., New York City

World's Largest Manufacturer of All-Clay Plumbing Fixtures

TE-PE-CO

Long Service at Reasonable Cost—



that's why ARMCO Ingot Iron was chosen for this cornice

THE California Commercial Union Building lies in San Francisco's throbbing business heart—a tribute to the vision of its builders . . . and Architect George Kelham.

From foundations to tower durability was wrought into this structure.

Its rust-resisting ARMCO Ingot Iron cornice was chosen primarily for its ability to withstand Rust-Fire*. Still, ductility was another important consideration. Many complex details indicated a soft, workable sheet metal—one that would form to design without loss of time or wastage of materials.

Architects the world over are achieving lasting, economical sheet metal installations with ARMCO Ingot Iron—at reasonable cost to clients. Despite its dollar-saving virtues, ARMCO Ingot Iron's initial cost is considerably lower than that of rarer metals used for similar purposes.

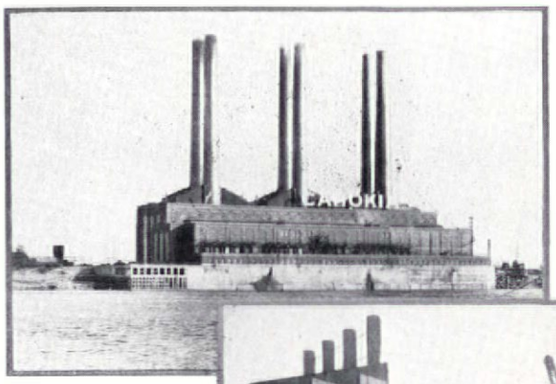
If any of your current commissions involve sheet metal construction, our Architectural Service Bureau will be glad to suggest the appropriate material for the plans you have in mind. Write or phone the office nearest you for this service.

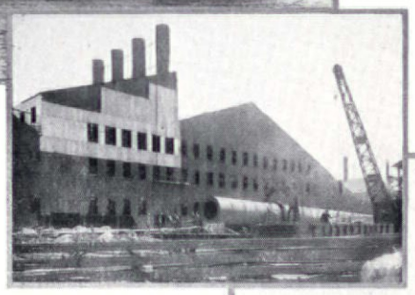
ARMCO
INGOT IRON
RESISTS RUST

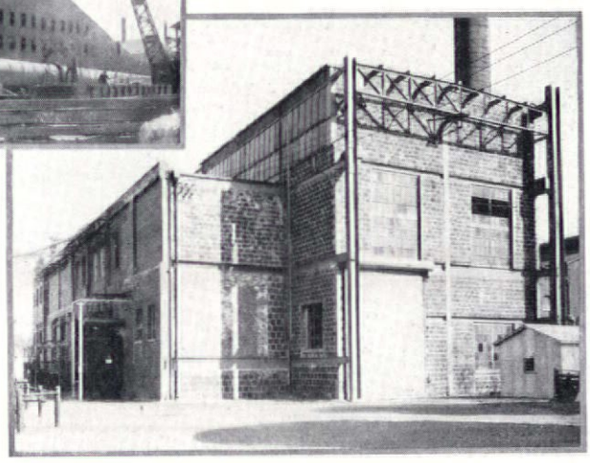
The American Rolling Mill Company
Executive Offices, Middletown, Ohio
Export: The ARMCO International Corporation
Cable Address—ARMCO, Middletown (O.)

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

* *Here RUST-FIRE is retarded. The only difference between rusting and burning is time—both are oxidation. You can feel and see the fire produced by rapid burning. But when metal rusts, the process is too slow to see. Rust is the "ash" of this fire.*







From left to right: The Union Electric Light and Power Company of Illinois, Cahokia River Power plant at St. Louis; The United Power & Light Corp. of Kansas' Power Plant at Hutchinson, Kansas; The North American Cement Company's Plant at Catskill, N. Y. All constructed by McClellan & Junkersfeld.

"Youngstown" —of course!

The three plants, shown above, all constructed by McClellan and Junkersfeld, contain the following "Youngstown" materials: 118 tons of Youngstown Steel Sheets—25 tons of Youngstown Steel Pipe—42 tons of Youngstown Nails—16 tons of Youngstown Annealed Wire—and 30,350 pounds of Youngstown-Buckeye Rigid Steel Conduit.

We are justly proud that architects, engineers, and constructors throughout America, find "Youngstown" products more than equal to the conditions they are called upon to encounter. Perhaps no products of a similar nature enjoy as enviable and reliable a reputation.

The Youngstown Sheet & Tube Company

General Offices: Youngstown Ohio

District Sales Offices in Principal Cities

COHOES

Pipe insurance is included in every installation of Cohoes Genuine Wrought Iron Pipe. The entire surface of every length is carefully inspected after which it is subjected to a hydrostatic pressure test 7 to 10 times more than it will encounter in use. Cohoes pipe has a proud record of over 73 years' performance; based upon an unswerving policy of closely adhering to the original formula of Genuine Wrought Iron Pipe.

You'll find many uses for the Hand-Book PIPE FACTS. Send for it



CHAMBERLIN-VANDERBILT HOTEL
Old Point Comfort, Va.
Marcellus E. Wright, *Architect*
Chas. E. Taylor Co., *Plumbing Contractor*

COHOES ROLLING MILL CO.
COHOES, NEW YORK
BRANCH OFFICES: PHILADELPHIA · CHICAGO · LOS ANGELES · NEW YORK
CLEVELAND · MINNEAPOLIS · BOSTON · NORFOLK · FORT WORTH

Our Contribution
to the art of Heating & Ventilation



FIVE YEARS AGO when the Herman Nelson light weight, compact, indestructible radiator was placed on the market, it was immediately accepted as the greatest advance in the art of Heating and Ventilation in a generation. It has made possible heating and ventilation dependability and performance hitherto unattainable. The Herman Nelson Wedge Core Radiator is an exclusive feature of all Herman Nelson Heating and Ventilating Products and accounts for their unequaled performance.

HEATING · VENTILATING · COOLING · DRYING · CONDENSING

UNIVENT

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



HERMAN NELSON *Invisible* **RADIATOR**



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

THE HERMAN NELSON hiJet UNIT HEATER



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

Herman Nelson Radiator Sections
for Blast Heating and Cooling



Indestructible, operating at any steam pressure from 1 to 150 lbs., non-corrosive and leak-proof. May be arranged in banks to solve any special problem of heating or cooling.

THE HERMAN NELSON CORPORATION · *Moline, Illinois*

Builders of Successful Heating and Ventilating Equipment for over 20 Years

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BELFAST, ME.	UTICA	SCRANTON	SAGINAW	CINCINNATI	DES MOINES	ST. LOUIS	DALLAS	SALT LAKE CITY	SAN FRANCISCO
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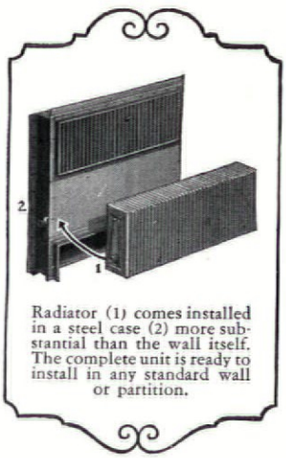


Radiator (1) comes installed in a steel case (2) more substantial than the wall itself. The complete unit is ready to install in any standard wall or partition.

The Wedge Core
RADIATOR
INDESTRUCTIBLE
TRADE MARK

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

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

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

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

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

HERMAN NELSON
Invisible
RADIATOR
For Steam, Hot Water, Vapor or Vacuum Heating

BUILDING WONDERS NEVER CEASE

OUT beyond the harbor a deep toned whistle announces the approach of a great ocean liner racing for her port, with a new trans-Atlantic record . . . overhead the roar of powerful motors signals the conquest of the air . . . in the studio the click of a switch sends a radio message around the globe . . . this is the day of speed . . . of wonders . . . of progress unrestrained.

In the midst of these bewildering changes, great towering structures rise along the avenues of America's leading cities . . . others are being planned . . . each one seems more beautiful, more enduring, more wonderful. The genius of the modern architect and the skill of his plans will stand as wonders of this age; for while he brings forth a new interpretation of beauty and charm he has endowed his creations with enduring qualities. There has been no compromise with dependability in the selection of materials used—only products of acknowledged leadership entered these magnificent edifices.

The pipe lines . . . the very arteries of these great structures . . . how necessary that they should efficiently perform . . . that they should not fail. Underneath floors and behind walls, they silently and faithfully carry on . . . meeting the increasing demands of passing years, that service shall endure.

The New York Life Building, illustrated, is another addition to the long list of America's superstructures whose major pipe tonnage is "NATIONAL"—The Recognized Standard for Building Purposes.

NATIONAL TUBE COMPANY
PITTSBURGH, PA.



NEW YORK LIFE INSURANCE CO. BUILDING
NEW YORK CITY
Architect: Cass Gilbert
General Contractors: Starrett Brothers
Heating Contractors: Baker, Smith & Co. Inc.
Plumbing Contractors: W. G. Cornell Co.

EXCELSO WATER HEATERS



WALES APARTMENT

in MILWAUKEE too

PRACTICALLY costless Hot water!—Ideally clean and pure!!—that is the story of water heated for domestic uses the Excelso-*Indirect* way.

THE FIRE of the steam or vapor heating boiler does double duty—it also takes care of a constant and uniform supply of hot water for every home, hotel or office purpose. The care and cost of a separate fire is saved. Not a drop of the water being warmed comes into contact with iron.—The flow is entirely through the copper coil and patented ground joint brass connections.

Specify "hot water by Excelso" and you specify by name the very best.

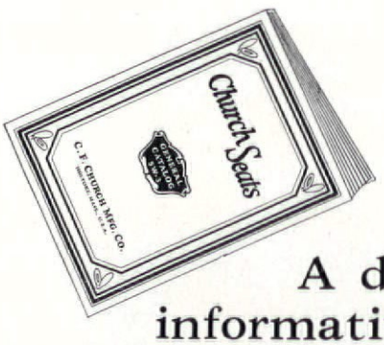
Excelso Products Corporation
DIVISION OF AMERICAN RADIATOR COMPANY
69 Clyde Ave. Buffalo, N. Y.

SINGLE, DOUBLE and TRIPLE



copper coil heaters in all needed sizes to supply Hot Water

FOR ONE FAMILY OR ONE HUNDRED FAMILIES



A definite informative catalog of toilet seat equipment

Church Sani-White and Sani-Black Seats are recognized nationally as the leading toilet seats made, They are described in detail in our illustrated, 100-page architects' catalog.

Whether you specify Church Seats or not, this catalog merits a permanent place in your reference library. It will be of definite value to you in determining which types of toilet seats meet most completely the needs of every building—hospitals, hotels, office buildings, industrial and public buildings as well as apartments and private homes.

Write for this catalog! It will be sent to you without charge. Address C. F. Church Manufacturing Co., Dept. 6-6 Holyoke, Mass.

Church Seats
sani-white

Also manufacturers of Church Sani-Black Seats

"GUNITE" AND THE "CEMENT-GUN"
Trade Mark

The report of the experts on the New York City schools has recommended the use of an "inch coating of Gunite over the inner face and top of the coping walls."

This report also states that:—

"Some of the difficulties referred to are problems deserving of careful consideration and their solution will be profitable alike to public and private ownership, and should be suggestive of certain uses of materials and methods of construction which may well be adopted as minimum standards for new buildings."

"GUNITE"

should be specified wherever an absolutely waterproof, weatherproof and fireproof mortar is required.

Let Us Aid You in Preparing Specifications and Estimates

CEMENT-GUN CO., INC.
ALLENTOWN, PA.

We Also Have a Contract Department Prepared to Give You Bids on Any Work You May Have

We offer to Bank Architects the essence of 63 years as inventors, designers, manufacturers of Locks



S&G Changeable Sealed Key Safe Deposit Lock, (double-horn type)

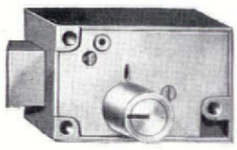
There is a Sargent & Greenleaf Lock to protect the bank's cash and securities at every point, and the valuables entrusted to its care by clients

Not all architects of financial institutions realize that this veteran organization of bank lock makers is largely responsible for the safety of securities, funds and other valuables without which modern banking would be impossible.

In 1865 James Sargent, founder of the company, devised the improved S&G Combination Bank Lock. Noting the superior construction of these locks, The United States Treasury transferred its patronage to Sargent & Greenleaf, and has specified S&G Combination Locks ever since... Now obtainable with the *Singlvision Dial* which permits only the operator to read the combination numbers.

In 1874 the first Time Lock ever applied to a vault door was invented, built and installed in the First National Bank at Morrison, Illinois. Although that bank retired it, after forty years of faithful service, in favor of a modern S&G Time Lock, the old original still functions perfectly . . . Now there is also the S&G *Timebination Lock* which combats the danger of holdups by bandits.

In 1921 Sargent and Greenleaf designed the Changeable Sealed Key Safe Deposit Lock to help Banks obtain incontrovertible court evidence that they had taken every possible precaution against duplication of keys and unauthorized entrance to boxes, as well as to provide the most conveniently operated, the most secure, the most durable and economical lock possible.



S&G Changeable Sealed Key Safe Deposit Lock, (single-horn type)

Sargent & Greenleaf Inc.

ROCHESTER **NEW YORK**

Since 1865 makers of good bank locks for Main Emergency Doors, Tellers' Wickets, Tellers' Vault Doors, Vault Day Gates, Cashiers' Lockers, Cages, Safe Deposit Boxes, Grille Gates

A few of the more recent installations of S&G Locks

Chase National Bank (Lexington Avenue) New York
SLOAN AND ROBERTSON, Architects

Bank of America, New York
TROWBRIDGE AND LIVINGSTON, Architects

Farmers Loan & Trust Company, New York
PEABODY, WILSON AND BROWN, Architects

Equitable Trust Company, New York
TROWBRIDGE AND LIVINGSTON, Architects

New York Stock Exchange, New York
TROWBRIDGE AND LIVINGSTON, Architects

City Safe Deposit Company, Albany
HALSEY McCORMACK AND HELMER, Vault Engineers

Rochester Savings Bank, Rochester
McKIM MEADE & WHITE, Architects
J. FOSTER WARNER, Assoc. Architect

First National Bank, Roselle, N.J.
WARRINGTON G. LAWRENCE, Architect

National Exchange Bank, Milwaukee
VAN RYN AND DE GELLECKE, Architects

National Bank of Commerce, Milwaukee
KIRCHOFF AND ROSE, Architects

First National Bank, Toledo
HOGGSON BROTHERS, Architects

Bank of Montreal, Montreal
E. F. ABELL, Vault Engineer

Union Trust Company, Detroit
SMITH HINCHMAN AND GRYLLS, Architects. HALSEY McCORMACK AND HELMER, Vault Engineers

Liberty Title and Trust Company, Philadelphia
DENNISON AND HIRONS, Architects

Commercial Trust Company, New Britain
HOPKINS AND DENTZ, Architects

SARGENT & GREENLEAF, Rochester:

Write me what cooperation you render the architect who desires information on bank locks.

Name _____

Firm _____

Address _____

Bank _____



Built for Long, Hard Usage

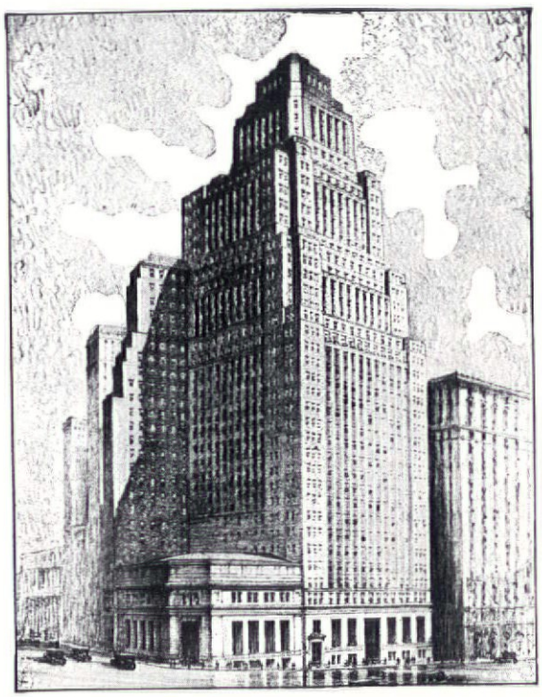
THE G&G Hoist with the longest service record was that used regularly for 33 years in Madison Square Garden, N.Y. (McKim, Mead & White, Architects) until the building was demolished. Other examples are:

Albany High School, Albany, N. Y., 15 years; Public School No. 61, New York City, 15 years; Finance Building, Philadelphia, Penna., 13 years; U. S. Capitol, Washington, D.C., 11 years; Chesapeake & Potomac Tel. Bldg., Baltimore, Md., 11 years.

See Sweet's 22d. Archt. Ed. pp. C3183-91

GILLIS & GEOGHEGAN
544 West Broadway
NEW YORK

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



Equitable Trust Company
11 Broad St., New York, N. Y.
Trowbridge & Livingston, Architects.
E. F. Abel, Fixture Archt.

The G&G ATLAS PNEUMATIC TUBE SYSTEM
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THAT Mechanical Messengers are Faster and More Dependable than Human Messengers is illustrated by comparisons between conditions in the former and new quarters of the Equitable Trust Company. Important reports and documents which formerly were often late to reach various departments are now promptly delivered. As "time is *big* money" in financial institutions the substitution of 30-feet-per-second Mechanical Messengers for irresponsible page boys is invaluable.

This selection of G&G Atlas Pneumatic Dispatch Tubes follows those of other prominent architects, engineers and bankers.

INSTITUTION	ARCHITECTS OR ENGINEERS
Stone & Webster and Blodget	Stone & Webster
Brockton National Bank	Thomas M. James
Journal Square National Bank	Wm. Neumann, Archt. / Dietz, Pennell & Jordan, Engrs.
Central Union Trust Co.	Buchman & Kahn
Chase National Bank	Graham, Anderson, Probst & White
Bank of Montreal	Selected by Owner
Farmers Loan & Trust Co.	Selected by Owner
National City Building	McKim, Mead & White
Hamilton Trust Co	Purdy & Davis, Archts. / Dietz, Pennell & Jordan, Engrs.
Fidelity-Phila. Trust Co.	Simon & Simon
Union National Bank	Selected by Owner
Reading National Bank	Selected by Owner
Mitsui & Co., Ltd., Tokio	Trowbridge & Livingston
Canadian Bank of Commerce	Selected by Owner
Union Dime Savings Bank	Selected by Owner
Stamford Trust Company	H. J. Hardenberg

Sweet's 22d Archt. Catalogue pp. C-3192-C-3193

G&G ATLAS SYSTEMS, Inc., 544 West Broadway, New York, N.Y.



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Architects, K. M. Vitzthum & Co.
Plumbing Contractors, M. J. Corboy Co.
Plumbing Jobbers, Standard Sanitary Mfg. Co.

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W. T. Frey, 605 Swetland Bldg., Cleveland, Ohio
John Sherin, Park View Hotel, Cincinnati, Ohio
Derbyshire & Mack, Real Estate Trust Bldg., Philadelphia, Pa.
W. E. Blair, Jr., care Coronado Hotel, St. Louis, Mo.
W. C. Shanley, 811 E. Armour Blvd., Kansas City, Mo.
Thos. J. O'Brien, 1812 Exchange Bldg., Memphis, Tenn.
E. P. Scales Eng. Co., Bennie Dillon Bldg., Nashville, Tenn.
H. E. Darton, 506 Carondelet St., New Orleans, La.
Dillard-Lewis & Co., Construction Industries Bldg., Dallas, Tex.
R. J. Shank, 920 Grand Ave., Des Moines, Ia.
Rex W. Williams, 402 Scott Bldg., Salt Lake City, Utah
Wm. P. Horn Co., 58 Federal St., San Francisco, Cal.
L. C. Coombs, 1010 North Gardner St., Los Angeles, Cal.
Richard O'Brien, 524 22nd St. North, Seattle, Wash.



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Blue prints, specifications and complete data gladly furnished.

WRITE for Catalog

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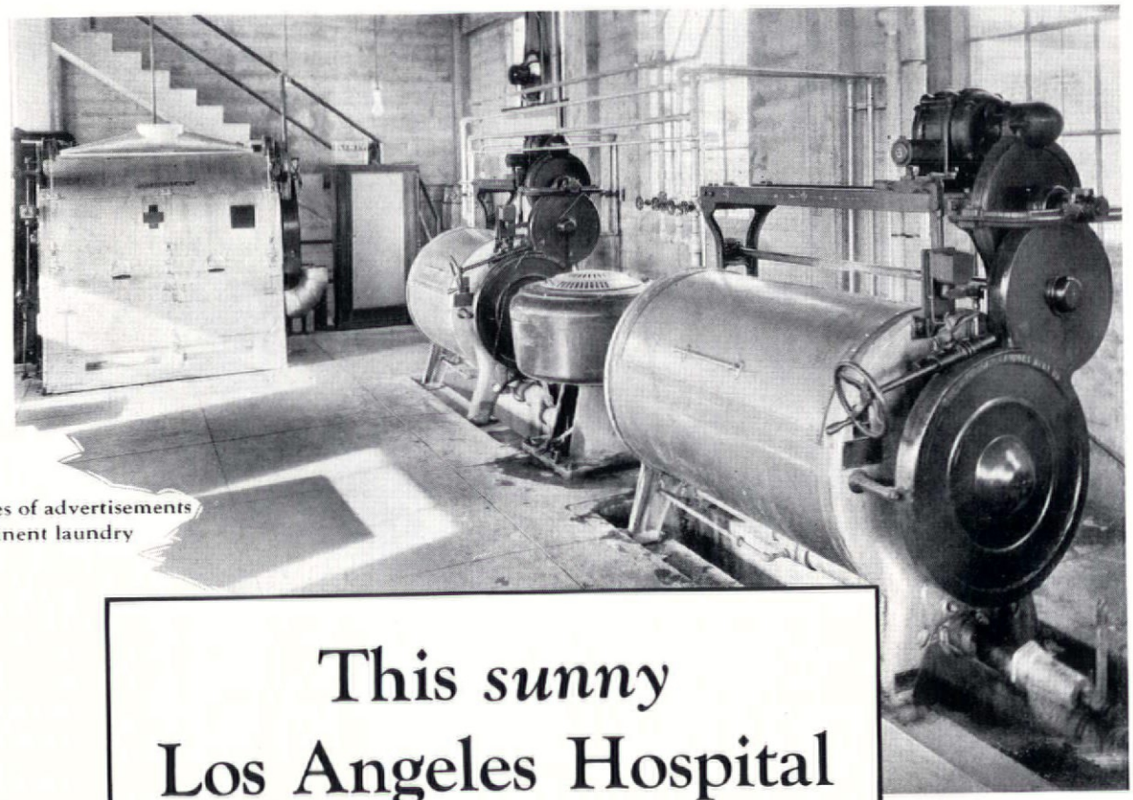
Manufacturers of "The Invalid Elevator."



No. 45 of a series of advertisements featuring prominent laundry installations

This *sunny* Los Angeles Hospital *has an "American" Laundry*

In the Queen of the Angels Hospital, the indispensable laundry department—from washers to presses—is completely "American" equipped

IN the very beginning, the architect who planned the building saw to it that laundry work would never be a problem for the officials of the Queen of the Angels Hospital, at Los Angeles.

For a modern laundry department was included in the original blue-prints.

And, from the day this hospital opened it doors, this "Americanized" department has been self-supporting. Here the laundry work is handled efficiently, promptly, under the direct supervision of the hospital officials.

For many years it has been the privilege of American engineers to cooperate with architects in planning and designing institutional laundries. One of these men will be glad to confer with you—give you first-hand information about floor space, equipment and general laundry practice. Just write.



Albert C. Martin of Los Angeles, Cal., was the architect for the imposing new building of the Queen of the Angels Hospital, at Los Angeles

The American Laundry Machinery Company
***Norwood Station*, Cincinnati, Ohio**

THE CANADIAN LAUNDRY MACHINERY CO., LTD.
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Agents: BRITISH-AMERICAN LAUNDRY MACHINERY CO., LTD.
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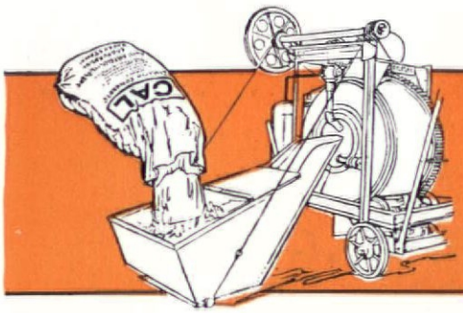

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Density, easy workability, and proper cure are all essentials of permanent watertight concrete. CAL used dry at the mixer can impart all these qualities to any Portland Cement mixture, at the same time bringing it to high early strength. ¶ For eight years, architectural specification has recognized the advantages of CAL for improved and more rapid concrete; for better stucco and mortar. ¶ The CAL Book, which contains records of CAL performance under architectural supervision, will be sent upon request.

¶ See Our Catalog in Sweet's.

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The Roxy Theatre is protected by JOHNS-MANVILLE Built-up Asbestos Roofing

The Roxy Theatre was built at a cost of twelve million dollars. Here is the world's greatest theatre, the largest of pipe organs, a famous broadcasting studio, magnificent lobbies, comfortable dressing rooms, offices, club rooms and rehearsal halls all under one roof—and that roof of Johns-Manville Built-up Asbestos. The roof was chosen with full knowledge that it must give positive protection to one of the most costly interiors ever constructed.

The selection of this roofing to protect the beautiful appointments in the Roxy Theatre is one more endorsement of the record which Johns-Manville Built-up Asbestos Roofs have made all over the country. Tens of millions of square feet of Johns-Manville Built-up Asbestos Roofing cover theatres, large and small, factories, warehouses, railway stations, public buildings and many other structures.

For every building with a flat or low pitched roof, regardless of size or cost, this product of Johns-Manville offers guaranteed safety, long-lived and certain performance, with little or no maintenance costs. In fact years of use with no repairs is the general rule.

Johns-Manville Service to Architects

Write us for information about roofing, acoustical control, insulation for high and low temperature lines, flooring, electric wiring ducts, and many other features of modern construction. Address: Architectural Department, Johns-Manville Corporation, 292 Madison Avenue, New York.



Johns-Manville Roofing on the roof of the Roxy. Walter W. Ahlschlager Architect Chanin Construction Co. General Contractor

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BUILT-UP ASBESTOS ROOFING

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*, 383 Madison 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., 10 x 12½ ins. Important data on a valuable material.

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

ASH HOISTS—ELECTRIC AND HAND POWER

Gillis & Geohegan, 535 West Broadway, New York, N. Y.
General Catalog. 8½ x 11 in. 20 pp. Fully illustrated. Contains specifications in two forms (with manufacturers' name and without). Detail ¼ in. scale for each telescopic model and special material-handling section.
G. & G. Telescopic Hoist. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Electric and hand power models; watertight sidewalk doors; automatic opening, closing, and locking devices.

BANK VAULTS

Macomber Steel Co., Canton, Ohio.
Bank Vault Reinforcing. Folder, 8 pp., 8½ x 11 ins. Designing Data and Insurance Rating.

BASEMENT WINDOWS

Genfire Steel Company, Youngstown, Ohio.
Architectural Details. Booklet, 28 pp., 8½ x 11 ins. Details on steel windows. A. I. A. File No. 16E.

BATHROOM FITTINGS

A. P. W. Paper Co., Albany, N. Y.
Onliwon for Fine Buildings. Folder, 8 pp. 3¾ x 6 in. Illustrated. Deals with toilet paper fittings of metal and porcelain.
Architects' File Card. 8½ x 11 in. Illustrated. Filing card on toilet paper and paper towel cabinets.
A Towel Built for Its Job. Booklet, 8 pp. 4¼ x 9⅝ in. Illustrated. Paper Towel System and Cabinets.
Cabinets and Fixtures. Booklet, 31 pp. 5¾ x 4¾ in. Illustrated. Catalog and price list of fixtures and cabinets.

BRICK

American Face Brick Association, 1751 Peoples Life Building, Chicago, Ill.
Brickwork in Italy. 298 pages, size 7½ x 10½ in., 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, will be sent postpaid upon receipt of $6.00. Half Morocco, $7.00.
Industrial Buildings and Housing. Bound Volume, 112 pp. 8½ x 11 in. 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 $2.

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, 15 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.

CEMENT

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

Cement Gun Company, Inc., Allentown, Pa.
Gunite Bulletins. Sheet 6 x 9 in. Illustrated. Bulletins on adaptability of "Gunite," a sand and cement product, to construction work.

Kosmos Portland Cement Company, Louisville, Ky.
Kosmotar for Enduring Masonry. Folder, 6 pp., 3½ x 6½ in. Data on strength and working qualities of Kosmortar.
Kosmortar, the Mortar for Cold Weather. Folder, 4 pp., 3⅝ x 6½ in. Tells why Kosmortar should be used in cold weather.

Lawrence Cement Co., New York, Boston and Philadelphia.
Dragon Super Cement. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on a vaduable waterproof material.

Louisville Cement Co., 315 Guthrie St., Louisville, Ky.
BRIXMENT for Perfect Mortar. Self-filing handbook 8½ x 11 inches. 16 pp. Illustrated. Contains complete technical description of BRIXMENT for brick, tile and stone masonry, specifications, data and tests.

North American Cement Corporation, 285 Madison Ave., New York.
The Cal Boon. Brochure. 32 p. 6 x 9 ins. Illustrated. Use of Cal in Portland Cement mixtures.

Pennsylvania-Dixie Cement Corp'n., 131 East 46th St., New York.
Celluloid Computing Scale for Concrete and Lumber, 4⅝ x 2½ ins. Useful for securing accurate computations of aggregates and cement; also for measuring lumber of different sizes.

Portland Cement Association, Chicago.
Concrete Masonry Construction. Booklet, 47 pp., 8½ x 11 ins. Illustrated. Deals with various forms of construction.

CEMENT—Continued

Town and Country Houses of Concrete Masonry. Booklet, 19 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 Mixtures. Brochure, 32 pp., 8½ x 11 ins. Illustrated.
Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
Concrete in Architecture. Bound Volume. 60 pp., 8½ x 11 ins. Illustrated. An excellent work, giving views of exteriors and interiors.

CONCRETE BUILDING MATERIALS

Celite Products Company, Chicago, New York, Los Angeles. Designing Concrete for Workability as Well as Strength. Brochure. 8 pp. Illustrated. Data on an important material for drying concrete.
Better Concrete; Engineering Service Bulletin X-325. Booklet, 16 pp., 8½ x 11 ins. Illustrated. On use of Celite to secure workability in concrete, to prevent segregation and to secure water-tightness.
Economic Value of Admixtures. Booklet, 32 pp., 6⅛ x 9⅛ ins. Reprint of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete Institute.

Concrete Surface Corporation, 342 Madison Ave., New York.
Bonding Surfaces on Concrete. Booklet, 12 pp., 8 x 11 in., illustrated. Deals with an important detail of building.

Dovetail Anchor Slot Co., 149 West Ohio St., Chicago.
Dovetail Masonry Anchoring System. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on a system of anchoring masonry to concrete.

Kosmos Portland Cement Company, Louisville, Ky.
High Early Strength Concrete, Using Standard Kosmos Portland Cement. Folder, 1 p., 8½ x 11 in. 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 in. Illustrated. Data on coloring for floors.
Dychrome, Concrete Surface Hardener in Colors. Folder. 4 pp. 8 x 11 in. 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 in. 32 pp. Illustrated. A treatise on fireproof floor construction.

Northwestern Expended Metal Co., 1234 Old Colony Building, Chicago, Ill.
Northwestern Expanded Metal Products. Booklet. 8½ x 10¾ in. 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.

DAMPPROOFING

Philip Carey Co., Lockland, Cincinnati, Ohio.
Architects' Specifications for Carey Built-Up Roofing. Booklet. 8 x 10¾ in. 24 pp. Illustrated. Complete data to aid in specifying the different types of built-up roofing to suit the kind of roof construction to be covered.
Carey Built-Up Roofing for Modern School Buildings. Booklet 8 x 10¾ in. 32 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.

Genfire Steel Company, Youngstown, Ohio.
Waterproofing Handbook. Booklet. 8½ x 11 ins. 80 pp., A. I. A. File No. 7. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dusting and hardening concrete floors, and accelerating the setting of concrete. Free distribution.

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

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

The Vortex Mfg. Co., Cleveland, Ohio.
Par-Lock Specification "Forms A and B" for dampproofing and plaster key over concrete and masonry surfaces.
Par-Lock Specification "Form J" for dampproofing 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.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 191*

DOORS AND TRIM, METAL

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

Richards-Wilcox Mfg. Co., Aurora, Ill.
Fire-Doors and Hardware, Booklet. 8½ x 11 in. 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.

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.

DUMBWAITERS

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

ELECTRICAL EQUIPMENT

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

Benjamin Electric Mfg. Co., 120 So. Sarigamore St., Chicago.
Reference Wall Chart, 22 x 28½ ins. "Enables one to select at a glance the right type of reflector or other lighting equipment."
Benjamin-Starrett Panelboards and Steel Cabinets. Booklet, 80 pp. 8½ x 10½ ins. Full data on these details for light and power.
Benjamin-Starrett Panelboards for Light and Power. Booklet, 80 pp., 8½ x 11 ins. Illustrated. Full data on company's line of panelboards, steel cabinets, etc.

General Electric Co., Schenectady, N. Y.
"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.

Pick & Company, Albert, 208 West Randolph St., Chicago, Ill.
School Cafeterias. Booklet. 9 x 6 in. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.

Signal Engineering & Mfg. Co., 154 W. 14th St., New York.
Signal Call Code System. Booklet, 16 pp., 8½ x 10 ins. Illustrated. Important telephone accessories.
Fire Alarm Systems,—Bulletin A-35. 12 pp., 8½ x 9½ ins. Illustrated. Data on fire alarn equipment.

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, 13 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.

Concrete Engineering Co., Omaha, Nebr.
"Handbook of Fireproof Construction." Booklet, 53 pp., 8½ x 11 in. Valuable work on methods of fireproofing.

FIREPROOFING—Continued

Genfire Steel Company, Youngstown, Ohio.
Fireproofing Handbook, 8½ x 11 in. 32 pp. Illustrated. Gives methods of construction, specifications, data on Herringbone metals, lath, steel tile, Trussit solid partitions, steel joists, Self-Centering formless concrete construction.

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

FLAGSTONES

J. G. Robinson, 6202 Germantown Avenue, Philadelphia.
Robinson Flagstones. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Data and Specifications.

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. 23 pp. 8½ x 11 in. Illustrated. Valuable work on an important subject.

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.

FLOORS—STRUCTURAL

Truscon Steel Co., Youngstown, Ohio.
Truscon Floretyle Construction. Booklet, 8½ x 11 in., 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 & Insulation Co., Pittsburgh, Pa.
Armstrong's Cork Tile Floors. Booklet, 7¾ x 10½ in. 30 pp. An illustrated work on cork flooring.
Linotile for Home Floors. Brochure. 7½ x 10½ ins. 27 pp. and colored enclosures of floor installations.

Armstrong Cork Co. (Linoleum Division), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog. 8½ x 11 in. 40 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors.
Armstrong's Linoleum Pattern Book, 1927. Catalog. 3½ x 6 in. 272 pp. Color Plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.
Quality Sample Book. 3½ x 5¾ in. Showing all gauges and thicknesses in the Armstrong line of linoleums.
Linoleum Layer's Handbook. 5 x 7 in. 32 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 in. 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.

Barber Asphalt Co., Philadelphia.
Specifications for Applying Genasco Asphalt Mastic. Booklet. 8 x 10½ in. Directions for using Asphalt Mastic for flooring.

Blabon Company, Geo. W., Nicetown, Philadelphia, Pa.
Planning the Color Schemes for Your Home. Brochure illustrated in color; 36 pp., 7½ x 10½ in. 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 in. Gives patterns of a large number of linoleums.
Blabon's Plain Linoleum and Cork Carpet. Gives quality samples, 3 x 6 in. of various types of floor coverings.

Bonded Floors Company, Inc., 1421 Chestnut St., Philadelphia, Pa.
A series of booklets, with full color inserts showing standard colors and designs. Each booklet describes a resilient floor material as follows:
Battleship Linoleum. Explains the advantages and uses of this durable, economical material.
Marble-ized (Cork Composition) Tile. Complete information on cork-composition marble-ized tile and the many artistic effects obtainable with it.
Treadlite (Cork Composition) Tile. Shows a variety of colors and patterns of this adaptable cork composition flooring.
Natural Cork Tile. Description and color plates of this super-quiet, resilient floor.
Practical working specifications for installing battleship linoleum, cork composition tile and cork tile.

Carter Bloxonend Flooring Co., Keith & Perry Bldg., Kansas City, Mo.
Bloxonend Flooring. Booklet 3¼ x 6¼ in. 20 pp. Illustrated. Describes uses and adaptability of Bloxonend Flooring to concrete, wood or steel construction, and advantages over loose wood blocks.
File Folder, 9¾ x 11¾ in. 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.

An effective suburban sewage ejector station

Larchmont, New York, offers an interesting example of the use of Jennings Sewage Ejectors for handling sewage in suburban residential communities.

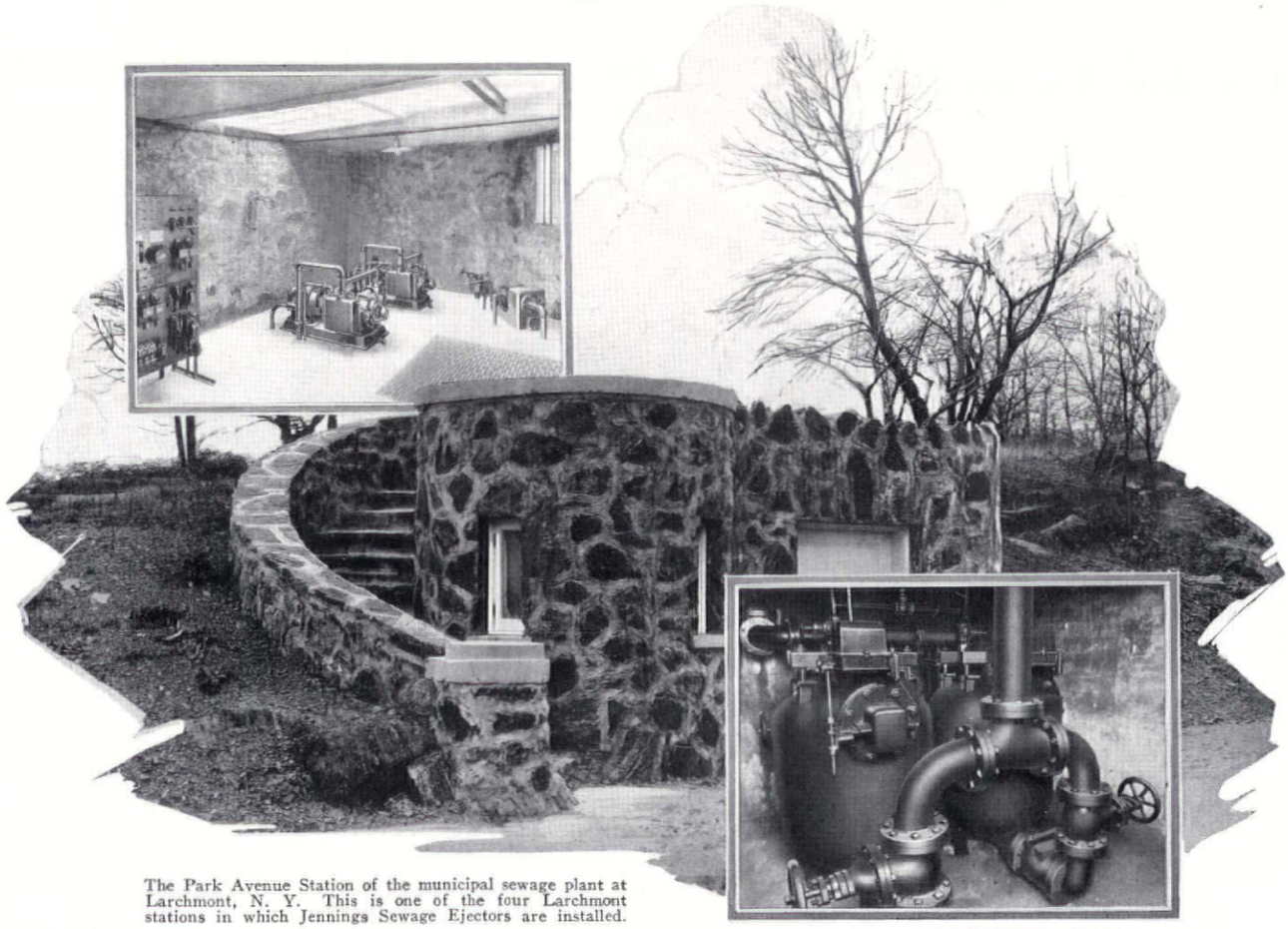
Here, eight units are installed in the Magnolia, Park, Willow and Woodbine Avenue Stations.

Jennings Sewage Ejectors are supplied in several standard capacities up to 1500 g.p.m. Heads up to 50 ft. For pumping unscreened sewage or drainage from basements below the street sewer level, handling crude sewage from low level districts, pumping effluent, sludge and other heavy liquids. *Write for Bulletin 67.*

NASH ENGINEERING CO., 12 Wilson Road, South Norwalk, Conn.

RETURN LINE AND AIR LINE VACUUM HEATING PUMPS – CONDENSATION PUMPS – COMPRESSORS AND VACUUM PUMPS FOR AIR AND GASES – STANDARD AND SUCTION CENTRIFUGAL PUMPS – HOUSE SERVICE PUMPS – SEWAGE EJECTORS – SUMP PUMPS – FLAT BOX PUMPS – MARINE PUMPS

Jennings Pumps



The Park Avenue Station of the municipal sewage plant at Larchmont, N. Y. This is one of the four Larchmont stations in which Jennings Sewage Ejectors are installed.

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

FLOORING—Continued

Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich.
Grauer-Watkins Red Asphalt Flooring. Folder, 4 pp., 8½ x 11 in. Data on a valuable form of flooring.

Thomas Moulding Floor Co., 165 W. Wacker Drive, Chicago.
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, Secifications and Uses. Brochure, 16 pp., 11¼ x 13¾ ins. Illustrated. Data on floors.

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

United States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 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.

U. S. Rubber Co., 1790 Broadway, New York.
Period Adaptations for Modern Floors. Brochure. 8 x 11 in. 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.
Ars Ecclesiastica Booklet. 6 x 9 in. 48 pp. Illustrations of church fitments in carved wood.
Theatre Chairs. Booklet. 6 x 9 in. 48 pp. Illustrations of theater chairs.

Kensington Mfg. Company, Showrooms, 41 West 45th St., New York.
Illustrated booklet indicative of the scope, character and decorative quality of Kensington Furniture, with plan of co-operation with architects, sent on request.
Photographs and full description of hand-made furniture in all the period styles, furnished in response to a specific inquiry.

Kittinger Co., 1893 Elmwood Ave., Buffalo, N. Y.
Kittinger Club & Hotel Furniture. Booklet. 20 pp. 6¾ 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.

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

New York Galleries, Madison Avenue and 48th Street, New York.
A group of Distinguished Interiors. Brochure, 4 pp., 8¾ x 11¾ ins. Filled with valuable illustrations.

White Door Bed Company, The, 130 North Wells Street, Chicago, Ill.
Booklet. 8½ x 11 in. 20 pp. Illustrated. Describes and illustrates the use of "White" Door Bed and other space-saving devices.

GARAGES

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

GLASS CONSTRUCTION

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

Libbey-Owens Sheet Glass Co., Toledo, O.
Flat Glass. Brochure, 11 pp., 5⅛ x 7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

Mississippi Wire Glass Co., 220 Fifth Ave., New York.
Mississippi Wire Glass. Catalog. 3⅞ x 8½ in. 32 pp. Illustrated. Covers the complete line.

GREENHOUSES

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 in. 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.
Brochure, 61 plates, 8½ x 11 ins. Illustrated. Locks nad builders' hardware as presented in 22nd edition of Sweet's.

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

McKinney Mfg. Co., Pittsburgh.
Forged Iron by McKinney. Booklet, 6 x 9 ins. Illustrated. Deals with an excellent line of builders' hardware.
Forged Lanterns by McKinney. Brochure, 6 x 9 ins. Illustrated. Describes a fine assortment of lanterns for various uses.

Richard-Wilcox Mfg. Co., Aurora, Ill.
Distinctive Garage Door Hardware. Booklet. 8½ x 11 in. 65 pp. Illustrated. Complete information accompanied by data and illustrations on different kinds of garage door hardware.
Distinctive Elevator Door Hardware. Booklet, 89 pp., 16 x 10½ ins. Illustrated.

Russell & Erwin Mfg. Co., New Britain, Conn.
Hardware for the Home. Booklet, 24 pp., 3½ x 6 ins. Deals with residence hardware.

HARDWARE—Continued

Door Closer Booklet. Brochure, 16 pp., 3½ x 6 ins. Data on a valuable detail. Garage Hardware Booklet, 12 pp., 3½ x 6 in. 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 Street, Detroit.
Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8½ x 11 in., on these important subjects.

American Radiator Company, The, 40 West 40th St., N. Y. C.
Ideal Boilers for Oil Burning. Catalog 5½ x 8½ in. 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 in. 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
Ideal Arcola Radiator Warmth. Brochure 6¾ x 9¼. 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.

James B. Clow & Sons, 534 S. Franklin St., Chicago.
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 Street, Chicago, Ill.
Dunham Radiator Trap. Bulletin 101. 8 x 11 in. 12 pp. Illustrated. Explains working of this detail of heating apparatus.
Dunham Packless Radiator Valves. Bulletin 104. 8 x 11 in. 8 pp. Illustrated. A valuable brochure on valves.
Dunham Return Heating System. Bulletin 109. 8 x 11 in. Illustrated. Covers the use of heating apparatus of this kind.
Dunham Vacuum Heating System. Bulletin 110. 8 x 11 in. 12 pp. Illustrated.
The Dunham Differential Vacuum Heating System. Bulletin 114. Brochure, 8 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.

Excelso Products Corporation, 119 Clinton St., Buffalo, N. Y.
Excelso Water Heater. Booklet. 12 pp. 3 x 6 in. Illustrated. Describing the new Excelso method of generating domestic hot water in connection with heating boilers. (Firepot Coil eliminated.)

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.

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill.
Vapor Heat Bulletin 21. 8½ x 11 in. 32 pp. Illustrated. Contains new and original data on Vapor Heating. Rules for computing radiation, pipe sizes, radiator tappings. Steam table showing temperature of steam and vapor at various pressures, also description of Illinois Vapor Specialties.

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

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

May Oil Burner Corp., Baltimore.
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.

Milwaukee Valve Co., Milwaukee.
MILVACO Vacuum & Vapor Heating System. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Important data on heating.
MILVACO Vacuum & Vapor Heating Specialties. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Deal with a valuable line of specialties used in heating.

Modine Mfg. Company, Racine, Wis.
Thermodine Unit Heater. Brochure, 24 pp., 8½ x 1 ins. Illustrated. Apparatus for industrial heating and drying.
Thermodine Cabinet Heater. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Cabinet heaters to buildings of different kinds.

Molby Boiler Co., Inc., New York and Lansdale, Pa.
Molby Heating Boiler. Booklet, 24 pp., 4 x 9 ins. Illustrated. Deals with well known line of boilers.
Chimney Construction. Booklet, 26 pp., 6 x 9 ins. Data recommended by National Board of Fire Underwriters.

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



102 Sylphon PACKLESS EXPANSION JOINTS

Specified by the Architects, and the Consulting Engineer for This 38 Story, 596 Foot, FURNITURE MART TOWER Chicago

What more convincing testimony could be given Sylphon efficiency and everlasting dependability than the installation of *102 Sylphon Packless Expansion Joints* on Steam Heating Risers *in the great tower of the largest building in the world*, by men who are acknowledged leaders in their professions?

Architects, George C. Nimmons & Co., Chicago
Consulting Engineer, A. C. King, Chicago
Heating Contractors, Gallagher & Speck, Chicago

Avoiding Use of Space Wasting Expansion Loops and Packed or "Sliding Sleeve" Expansion Joints



THE almost universal selection of Sylphon Packless Expansion Joints for Steam Heating Risers, in notable buildings now under construction or contemplated throughout the nation, is based upon *demonstrated efficiency* in countless installations,—upon *fact not theory*,—upon *performance and not claims.*

In the light of modern engineering and construction methods it is manifestly unwise to cling to the antiquated joints "*packed with trouble*" and carrying repacking requirements. At best they are "Leak Loose" or "Jam Tight,"—and wholly unfit for a vacuum system or one where a slight vacuum is pulled.

The Sylphon Packless Expansion Joint, containing the seamless all metal Sylphon Bellows is *Steam tight—yet free to move without jamming.* Installed on the vertical riser as simply and easily as any pipe fitting, *it becomes as permanent as any other part of the structure.*

Why then, risk damaging drains on pipe work? Why tap radiator branches? Why waste story height space for "Expansion loops"? Why worry over repacking jobs, almost impossible tasks, when the riser is concealed in furring?

These are the questions the leading architects, engineers and heating contractors are asking themselves today and they are NOT DOING IT! They are installing Sylphon Packless Expansion Joints.

We will be glad to send printed matter giving complete details of Sylphon Packless Expansion Joints, together with all information as to dimensions, prices and shipping weights. Just use the coupon attached for your convenience or write if you prefer. Your correspondence is invited.



The ORIGINAL GENUINE SYLPHON BELLOWS

The motor element in all Sylphon Instruments is the most accurate, durable and flexible temperature control unit known to science.

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Originators and Patentees of the Sylphon Bellows Dept. F

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

THE FULTON SYLPHON COMPANY — Sylphon — AUTOMATIC TEMPERATURE CONTROL

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

HEATING EQUIPMENT—Continued

National Radiator Corporation, Johnstown, Pa.
Aero Radiators; Beauty and Worth. Catalog 34. Booklet 6 x 9 in., 20 pp., describing and illustrating radiators and accessories.
Six Great Companies Unite to Form a Great Corporation. Booklet, 27 pp., 8½ x 10½ ins. Illustrated. Valuable data on heating.

Petroleum Heat & Power Co., 511 Fifth Avenue, New York.
Heating Homes the Modern Way. Booklet, 8½ x 11¾ ins. Illustrated. Data on the Petro Burner.
Residence Oil Burning Equipment. Brochure, 6 pp., 8½ x 11 ins. Illustrated. Data regarding Petro Burner in a bulletin approved by Investigating Committee of Architects and Engineers.
Petro Mechanical Oil Burner & Air Register. Booklet, 23 pp., 8½ x 11 ins. Illustrated. Data on industrial installations of Petro Burners.
Present Accepted Practice in Domestic Oil Burners. Folder, 4 pp., 8½ x 11 ins. Illustrated. A reprint from Heating and Ventilating Magazine.

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

HOSPITAL EQUIPMENT

The Frink Co., Inc., 24th St. and Tenth Ave., New York City.
Catalog 426. 7 x 10 in., 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.

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

The Pick-Barth Companies, Chicago and New York.
Some Thoughts About Hospital Food Service Equipment. Booklet, 21 pp., 7½ x 9¾ ins. Valuable data on an important subject.

Wilmot Castle Company, Rochester, N. Y.
Sterilizer Equipment for Hospitals. Book, 76 pp. 8½ x 11 in. Illustrated. Gives important and complete data on sterilization of utensils and water, information on dressings, etc.
Sterilizer Specifications. Brochure, 12 pp. 8½ x 11 in. Practical specifications for use of architects and contractors.
Architects' Data Sheets. Booklet, 16 pp. 8½ x 11 in. Illustrated. Information on piping, venting, valving and wiring for hospital sterilizer installations.
Hospital Sterilizing Technique. Five booklets, 8 to 16 pp. 6 x 9 in. Illustrated. Deals specifically with sterilizing instruments, dressings, utensils, water, and rubber gloves.

HOTEL EQUIPMENT

Pick & Company, Albert, 208 West Randolph Street, Chicago, Ill.
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. Brochure, 30 pp., 5¼ x 7¼ ins. Illustrated. Equipment for residence use.
A. I. A. File. 12 pp., 8¾ x 10¾ ins. Specifications for incinerators.

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. 8 pp. Illustrated. Describes principle and design of Kernerator-Chimney-fed Incinerator for apartments and gives list of buildings where it ahs 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 Gernerator. Gives list of hospitals where installed.

INSULATING LUMBER

Mason Fibre Co., 111 West Washington St., Chicago, Ill.
Booklet, 12 pp., 8½ x 11 in. Illustrated. Gives complete specifications for use of insulating lumber and details of construction involving its use.

INSULATION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ in. 32 pp. Discusses means of insulating roofs of manufacturing or commercial structures.
Insulation of Roofs to Prevent Condensation. Illustrated booklet. 7½ x 10½ in. 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 in. 32 pp. Illustrated.
Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 11¾ ins. Illustrates and describes use of insulation for structural purposes.

INSULATION—Continued

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

Philip Carey Co., The, Cincinnati, Ohio.
Carey Asbestos and Magnesia Products. Catalog. 6 x 9 in. 72 pp. Illustrated.

Celite Products Co., 1320 South Hope St., Los Angeles.
The Insulation of Boilers. Booklet. 8 pp., 8½ x 11 ins. Illustrated. On insulating boiler walls, breechings, and stacks to reduce amount of radiation.
Heat Insulation Specifications and Blue Prints. Booklet, 20 pp., 8½ x 11 ins. Illustrated. On approved types of insulation.

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

JOISTS

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

Genfire Steel Company, Youngstown, Ohio.
Steel Joists. 8½ x 11 ins. 32 pp. A. I. A. File Number 13G. Illustrated. Complete data on T-Bar and Plate-Girder joists including construction details and specifications.

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 in. 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.

McDougall Company, Frankfort, Ind.
Kitchens for Homes and Apartments. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Views and plans of conveniently equipped kitchens.
File Folder. Service sheets and specifications useful in preparing kitchen layouts.
Domestic Science Kitchen Units. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with flexible line of kitchen equipment.

Pick & Company, Albert, 208 W. Randolph St., Chicago, Ill.
School Cafeteria. Portfolio. 17 x 11 in. 44 pp. Illustrated. An exhaustive study of the problems of school feeding, with copious illustrations and blue prints. Very valuable to the architect.
School Cafeterias. Booklet. 9 x 6 in. 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 in., 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.
Hand Wrought Lanterns. Booklet, 5¼ x 6¼ in. 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

Genfire Steel Company, Youngstown, Ohio.
Herringbone Metal Lath Handbook. 8½ x 11 in. 32 pp. Illustrated. Standard specifications for Cement Stucco on Herringbone. Rigid Metal Lath and interior plastering.

National Steel Fabric Co., Pittsburgh.
Better Walls for Better Homes. Brochure. 16 pp. 7¾ x 10¾ 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.

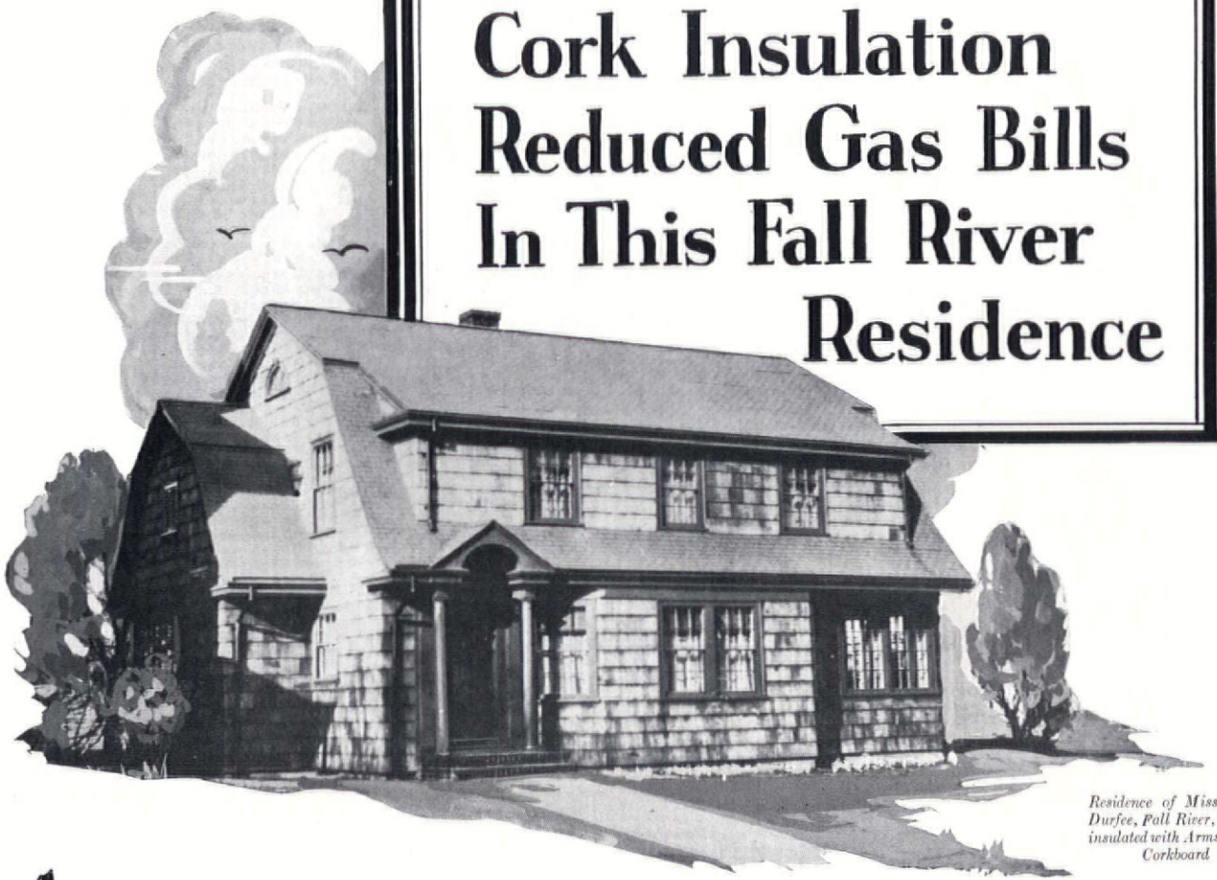
Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
Northwestern Expanded Metal Products. Booklet, 8½ x 10¾ in., 20 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plasta-saver and Longspan lath channels, etc.
Longspan ¾-inch Rib Lath. Folder 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-rit 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.
Northwest 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, ½ x 11 in., illustrating Truscon ¾-inch Hy-Rib as used in industrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

LAUNDRY CHUTES

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

Cork Insulation Reduced Gas Bills In This Fall River Residence



Residence of Miss Anne Durfee, Fall River, Mass., insulated with Armstrong's Corkboard

An actual experience in heating a cork-lined house

THIS record was taken in the home of Miss Anne Durfee, Hancock Street, Fall River, Mass. The house is 36 x 26 feet, of frame-shingle construction, with asphalt shingle roof, the attic rough-floored.

All exposed walls are insulated with Armstrong's Corkboard 1½ inches thick, nailed to studs. All ceilings on the second floor are insulated with Armstrong's Corkboard, 2 inches thick. In addition, the house is weather-stripped.

Uninsulated, the radiation requirements of the house were calculated at 600 ft., hot water; and insulated, 430 ft. The radiation actually installed was 446 ft., with clock-thermostat control.

Based on the average heating season of 6000 degree days, the estimated gas consumption was 429,000 cu. ft., for the house *uninsulated*.

Actually, 353,000 cu. ft. were consumed, a saving of 76,000 cu. ft. due to the cork insulation. At $0.75 per thousand cubic feet, the cost of heating the house with gas was only $265, the first year. It is estimated that coal to heat the house *uninsulated* would have cost $237.

Thus, Armstrong's Corkboard Insulation enabled the owner to enjoy the convenience and cleanliness of gas heating for very little more than the cost of coal.

Armstrong Engineers will be glad to answer questions regarding heat-saving as applied to any building you may be designing. Armstrong Cork & Insulation Company, 132 Twenty-fourth St., Pittsburgh, Pa.; McGill Building, Montreal or 11 Brant Street, Toronto 2, Ont.

Armstrong's Corkboard Insulation

A Heatproof Lining for Walls and Roof

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

LAUNDRY MACHINERY

American Laundry Machinery Co., Norwood Station, Cincinnati, Ohio.
Functions of the Hotel and Hospital Laundry. Brochure, 8 pp., 8½ x 11 ins. Valuable data regarding an important subject.

LIBRARY EQUIPMENT

Art Metal Construction Co., Jamestown, N. Y.
Planning the Library for Protection and Service. Brochure, 52 pp. 8½ x 11 in. Illustrated. Deals with library fittings of different kinds.
Library Bureau Division, Remington Rand, N. Tonawanda, N. Y. Like Stepping into a Story Book. Booklet. 24 pp. 9 x 12 in. Deals with equipment of Los Angeles Public Library.

LIGHTING EQUIPMENT

The Frink Co., Inc., 24th St. and 10th Ave., New York City.
Catalog 415. 8½ x 11 in. 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.
Gleason-Tiebout Glass Co. (Celestialite Division), 200 Fifth Avenue, New York.
Next to Daylight Brochure, 19 pp., 4 x 8½ ins. Illustrated. Deals with a valuable type of lighting fixture.
Celestialite Circular No. 40. Folder, 4 pp., 3½ x 6 ins. "What Nature does to the Sun, Celestialite does to the Mazda lamp."
Attractive Units in Celestialite. Folder, 12 pp., 3¼ x 6½ ins. Illustrates Decorated Celestialite Units.
It Has Been Imitated. Folder, 4 pp., 10 x 13 ins. Data in an important detail of lighting equipment.
Smyser-Royer Co., 1700 Walnut Street, Philadelphia.
Catalog "J" on Exterior Lighting Fixtures. Brochure, illustrated, giving data on over 300 designs of standards, lanterns and brackets of bronze or cast iron.

MAIL CHUTES

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

MANTELS

Arthur Todhunter, 119 E. 57th St., New York, N. Y.
Georgian Mantels. New Booklet. 24 pp. 5¼ x 6¼ in. 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. 3¾ x 6 in. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.
Convincing Proof. 3¾ x 6 in. 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.

MEMORIALS

Georgia Marble Company, Tate, Ga.
Today for Tomorrow. Bound volume, 77 pp., 9½ x 12½ ins. Lavishly illustrated.

METALS

The International Nickel Company, 67 Wall St., New York, N. Y.
The Choice of a Metal. Booklet, 6¼ x 3 in. 166 pp. Illustrated. Monel Metal—its qualities, use and commercial forms, briefly described.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.
Architectural Interior and Exterior Woodword. Standardized Book. 9 x 11½ in. 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 in. 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 in. 20 pp. Illustrated. Complete details of all items of Curtis woodwork, for the use of architects.
Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.
Column Catalog, 7½ x 10 in. 48 pp. Illustrated. Contains prices on columns 6 to 36 in. diameter, various designs and illustrations of columns and installations.
The Pergola Catalog. 7½ x 10 in. 64 pp. Illustrated. Contains illustrations of pergola lattices, garden furniture in wood and cement, garden accessories.
Roddis Lumber and Veneer Co., Marshfield, Wis.
Roddis Doors. Brochure, 24 pp., 5¼ x 8½ in. Illustrated price list of doors for various types of buildings.
Roddis Doors, Catalog G. Booklet, 183 pp., 8½ x 11 in. Completely covers the subject of doors for interior use.
Roddis Doors for Hospitals. Brochure, 15 pp., 8½ x 11 in. Illustrated work on hospital doors.
Roddis Doors for Hotels. Brochure, 15 pp., 8½ x 11 in. Illustrated work on doors for hotel and apartment buildings.

MORTAR COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Folder, 8½ x 11 in. 4 pp. Illustrated in color, gives full information concerning Clinton Mortar Colors with specific instructions for using them.
Color Card. 6½ x 3¼ in. 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.

OFFICE SUPPLIES

Eugene Dietzgen Co., 166 W. Monroe St., Chicago.
General Catalog. 500 pp. 6 x 9 ins. Illustrated. Complete line of drafting and surveying supplies.
Use and care of Drawing Instruments. Booklet. 18 pp. 6 x 9 ins. Illustrated. Discusses proper care of equipment.
Sample Book of Drawing and Tracing Papers. Brochure. 23 pp. 3½ x 7 ins. Illustrated. Papers recommended for these uses.
Ozalid Booklet. 16 pp. 4 x 8½ ins. Illustrated. Data on a positive reproduction paper.

ORNAMENTAL PLASTER

Jacobson & Co., 241 East 44th St., New York.
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. 183 plates. 9 x 12 ins. 18 plates. Price, $3.00. A general catalog of fine plaster ornaments.
Geometrical ceilings. Booklet. 23 plates. 7 x 9 ins. An important work on decorative plaster ceilings.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Creosote Stains. Booklet. 4 x 8¼ in. 16 pp. Illustrated.
National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book. 5½ x 3¾ in. 100 pp. Gives directions and formulae for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.
Red Lead in Paste Form. Booklet, 6¼ x 3½ in. 16 pp. Illustrated. Directions and formulae for painting metals.
Came Lead. Booklet, 8¾ x 6 in. 12 pp. Illustrated. Describes various styles of lead cames.
Cinch Anchoring Specialties. Booklet. 6 x 3½ in. 20 pp. Illustrated. Describes complete line of expansion bolts.
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 in. 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 in. 12 p. 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 in. 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 in. 12 pp. Illustrated. A highly technical subject treated in a simple, understandable manner.
Sonneborn Sons, Inc., L., Dept. 4, 116 Fifth Ave., New York.
Paint Specifications. Booklet. 8½ x 10¾ in. 4 pp.
U. S. Gutta Percha Paint Co., Providence, R. I.
Barreled Sunlight. Booklet, 8½ x 11 in. Data on "Barreled Sunlight" with specifications for its use.
Valentine & Co., 456 Fourth Ave., New York.
How to Use Valspar. Illustrated booklet, 32 pp., 3¾ x 8 in. Deals with domestic uses for Valspar.
How to Keep Your House Young. Illustrated brochure, 23 pp., 7 x 8½ in. A useful work on the upkeep of residences.
Zapon Co., The, 247 Park Ave., New York City.
Zapon Architectural Specifications. Booklet, 28 pp., 8½ x 11 in. Describes odorless brushing and spraying lacquers and lacquer enamels.

PAPER

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

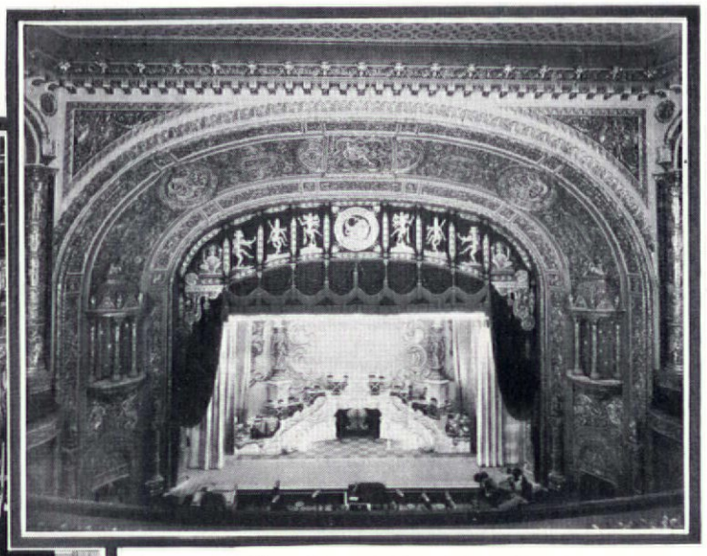
PARTITIONS

Circle A Products Corporations, New Castle, Ind.
Circle A Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11¼ in. 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.
Hauserman Company, E. F., Cleveland, Ohio.
Hollow Steel Standard Partitions. Various folders, 8½ x 11. 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 in. 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 in. 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 in. 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.
Pyrobar Partition and Furring Tile. Booklet. 8½ x 11 in. 24 pp. Illustrated. Describes use and advantages of hollow tile for inner partitions.

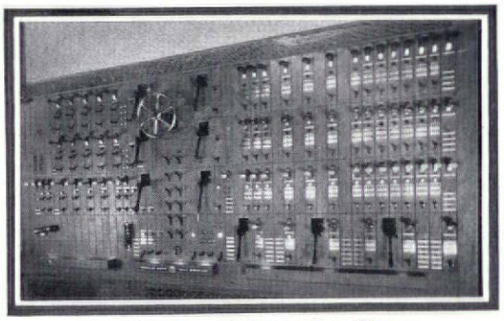
SELECTING EQUIPMENT



Lobby of Loew's State Theater showing Elaborate Lighting Fixture and Decorations.



View of Stage in Loew's State Theater.



Westinghouse Multi-Pre-Set Theater Switchboard.

for the modern theater

ELABORATE fixtures, decorations and lighting effects represent a large percentage of the cost of modern theaters. Loew's new State Theater at Syracuse, N. Y., is representative of this modern trend.

The various lighting and stage effects are exceptionally elaborate, requiring a positive and easy method of control. For this important function, a Westinghouse theater switchboard with its multi-pre-set features was selected. This board allows all scenes to be set up in advance and requires merely the flip of a handle to change from one scene to another.

Westinghouse Products for Theaters:

Circuit-breakers	Motors and control
Fans	Panelboards
Fuses	Ranges
Insulating materials	Safety switches
Lamps	Solar-glow heaters
Lighting fixtures	Switchboards

Watthour meters

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse

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

PIPE

American Brass Company, Waterbury, Conn.
Bulletin B-1. Brass Pipe for Water Service. 8½ x 11 in. 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 in. Data on dredge pipe.

Central Foundary Co., Graybar Building, New York.
Introducing Nuhub Soil Pipe. 1-page folder giving data on soil pipe.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "A". 4 x 6¼ in. 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 in. Data on wrought iron pipe.

Duriron Company, Inc., Dayton, Ohio.
Duriron Acid, Alkali, Rust-proof Drain Pipe and Fillings. Booklet, 20 pp., 8½ x 11 in., 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 in. 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 in. 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deaerating systems for eliminating or retarding corrosion in hot water supply lines.
"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 in. 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 in., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.
Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.
Interior Walls Everlasting. Brochure, 20 pp., 6¾ x 9¼ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

PLUMBING EQUIPMENT

Central Foundary Co., Graybar Building, New York.
G. & W. Revent and Drainage Fittings. Booklet, 164 pp., 4¼ x 6¾ ins.

C. F. Church Mfg. Co., Holyoke, Mass.
Catalog S. W.-3. Booklet, 95 pp., 7¾ x 10½ in. Illustrated. Data on Sani-White and Sani-Black toilet seats.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "M." 9¼ x 12 in. 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 in. 80 pp. Illustrated.
Plumbing Suggestions for Industrial Plants. Catalog. 4 x 6½ in. 34 pp. Illustrated.
Planning the Small Bathroom. Booklet. 5 x 8 in. 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.

Eljer Company, Ford City, Pa.
Complete Catalog. 3¾ x 6¾ in. 104 pp. Illustrated. Describes fully the complete Eljer line of standardized vitreous china plumbing fixtures, with diagrams, weights and measurements.

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. 10⅞ x 7⅞ in. 242 pp. Illustrated. Complete data on vitreous china plumbing fixtures with brief history of Sanitary Pottery.

PUMPS

Chicago Pump Company, 2300 Wolfram St., Chicago, Ill.
The Correct Pump to Use. Portfolio containing handy data. Individual bulletins, 8½ x 11 ins., on bilge, sewage, condensation, circulating, house, boiler feed and fire pumps.

Kewanee Private Utilities Co., 442 Franklin St., Kewanee, Ill.
Bulletin E. 7¾ x 10¼ in. 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 Kenwanee Private Utilities Co.

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

RAMPS

Ramp Buildings Corporation, 21 East 40th St., New York.
Building Garages for Profitable Operation. Booklet. 8½ x 11 in. 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 Sylphon Company, Knoxville, Tenn.
Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REFRIGERATORS

Lorillard Refrigerator Company, Kingston, N. Y.
Lorillard Refrigerator, for hotels, restaurants, hospitals and clubs. Brochure. 43 pp. 8 x 10 ins. Illustrated. Data on fine line of refrigerators.

REINFORCED CONCRETE—See also Construction, Concrete

Genfire Steel Company, Youngstown, Ohio.
Self-Sentering Handbook. 8½ 11 in. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and floors with a combined form and reinforced material.

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

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

ROOFING

Barber Asphalt Co., Philadelphia, Pa.
Specifications, Genasco Standard Trinidad Lake Asphalt Built-up Roofing. Booklet. 8 x 10½ in. Gives specifications for use of several valuable roofing and waterproofing materials.

The Barrett Company, 40 Rector St., New York City.
Architects' and Engineers' Built-up Roofing Reference Series; Volume IV Roof Drainage System. Brochure. 63 pp. 8½ x 11¼ ins. Gives complete data and specifications for many details of roofing.

Bird & Son, Inc., E. Walpole, Mass.
Bird's Roofs. Folder, 16 pp., 3½ x 6 ins. Illustrated. Data of roofing materials.

Philip Carey Co., Lockland, Cincinnati, Ohio.
Architects Specifications for Carey Built-up Roofing. Booklet. 8 x 10¾ in. 24 pp. Illustrated. Complete data to aid in specifying the different types of built-up roofing to suit the kind of roof construction to be covered.
Carey Built-up Roofing for Modern School Buildings. Booklet. 8 x 10¾ in. 32 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.

Heinz Roofing Tile Co., 1925 West Third Avenue, Denver.
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 in. 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.

Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill.
"Ancient" Tapered Mission Tiles. Leaflet. 8½ x 11 in. 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.

Structural Gypsum Corporation, Linden, N. J.
Relative Effectiveness of Various Types of Roofing Construction in Preventing Condensation of the Under Surface. Folder, 4 pp. 8½ 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.
Pyrobar Roof Construction. Booklet. 8 x 11 in. 48 pp. Illustrated. Gives valuable data on the use of tile in roof construction.
Sheetrock Pyrofill Roof Construction. Folder. 8½ x 11 in. Illustrated. Covers use of roof surfacing which is poured in place.

SASH CHAIN

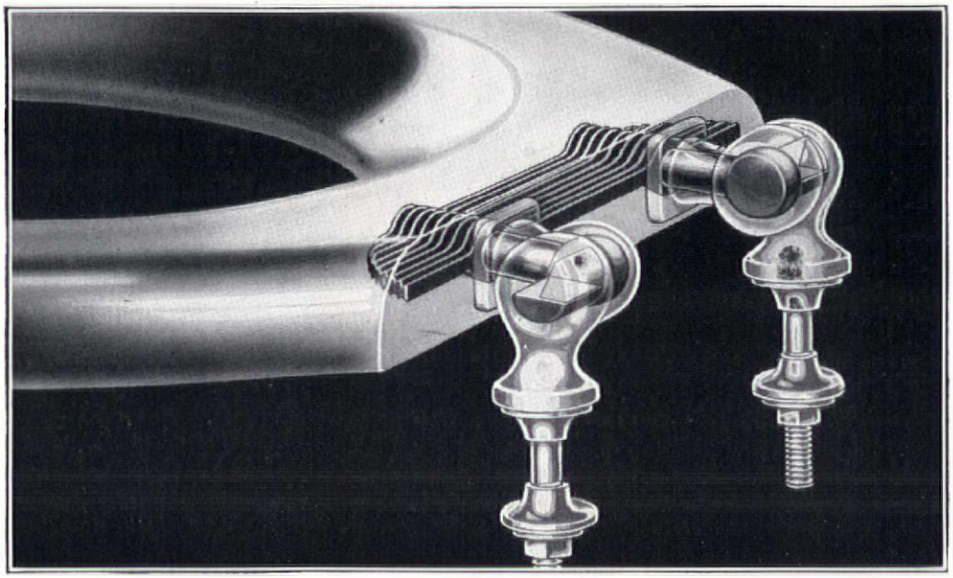
Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Chain Catalog. 6 x 8½ in. 24 pp. Illustrated. Covers complete line of chains.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¾ x 10¼ in. 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

This New Hinge is *molded* into the seat itself

Whale-bone-ite's supremacy clearly maintained by this new feature





Seat shown is Model 23-968. Phantom view gives details of construction.

ON the union between hinge and seat depends the permanence of your seat installation. Realizing that the unsanitary metal hinge with its cleaning problem and loosely connected parts was a weakness in closet seats, the makers of the Whale-bone-ite Seat have perfected a new-type hinge which is actually part of the seat itself.

This new hinge is molded in one operation as an integral part of the Whale-bone-ite Seat. Re-inforced by a metal die-cast, one-piece insert, it is covered with highly-polished Whale-bone-ite. Thus it has the same strength and finish as the Whale-bone-ite Seat itself.

The makers of the Whale-bone-ite Seat offer this newest feature on all models of both closed and open-back seats. Whale-bone-ite is the only seat having the hinge you see pictured here. It is one more reason why you should specify this finest of seats for your building.

WHALE-BONE-ITE TOILET SEAT

THE BRUNSWICK-BALKE-COLLENDER CO., CHICAGO

Albany	Boston	Chicago	Dallas	Detroit	Kansas City	Minneapolis	Philadelphia	San Francisco	Tampa	Ottawa
Atlanta	Buffalo	Cincinnati	Denver	Harrisburg	Los Angeles	New Orleans	Pittsburgh	Seattle	Washington	Toronto
Birmingham	Charlotte	Cleveland	Des Moines	Houston	El Paso	New York	Richmond	St. Louis	Montreal	Havana

For free cross-section of a Whale-bone-ite Seat, address Dept. 189 Seat Division, The Brunswick-Balke-Collender Co., 623 South Wabash Avenue, Chicago

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 11¼ in., 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.

SHELVING-STEEL

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

SKYLIGHTS

Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich.
Grauer Wire Glass Skylights. Folder, 4 pp., 8½ x 11 in. Illustrated. Data on an important line of wire glass lights.
The Effectiveness of Sidewalk Lights. Folder, 4 pp., 8½ x 11 in. Illustrated. Sidewalk or vault lights.
Let in the Light—The Light That's Free. Folder, 4 pp., 8½ x 11 in. Illustrated. Data on securing good lighting.

SOUND DEADENER

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

STAIRWAYS

Woodbridge Ornamental Iron Co., 1515 Altgeld St., Chicago.
Presteel Tested for Strength—stairways, catalog, 92 pp., 8½ x 11 ins. Illustrated. Important data on stairways.

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.

Genfire Steel Company, Youngstown, Ohio.
Herringbone Metal Lath Handbook. 8½ x 11 in. 32 pp. Illustrated. Standard specifications for Cement Stucco on Herringbone.
Rigid Metal Lath and interior plastering.
Fireproofing Handbook. 8½ x 11 ins. 32 pp. Illustrated. Describes the full line of products manufactured by the Genfire Steel Company.

Ingalls Steel Products Co., Birmingham, Ala.
Construction Details. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Important data on building with steel.
Standard Specifications for Reinforced Concrete and the Ingalls Truss Floor. Brochure, 8 pp., 8½ x 11 ins. Authoritative specifications covering much construction.
Ingalls Truss. Booklet, 12 pp.,8½ x 11 ins. Loading values and details.

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.

Steel Frame House Co., Pittsburgh.
Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Data and details.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.
Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 in. 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Vol. 1. Series B. Indiana Limestone Library. 6 x 9 in. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Vol. 4. Series B. Booklet. New Edition. 8½ x 11 in. 64 pp. Illustrated. Indiana Limestone as used in Banks.
Volume 5. Series B. Indiana Limestone Library. Portfolio. 11¾ x 8¾ in. 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 in., 80 pages, illustrated.
Volume 12, Series B—Distinctive Homes of Indiana Limestone. 8½ x 11 in., 48 pages, illustrated.
Old Gothic Random Ashlar. 8½ x 11 in., 16 pages, illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Avenue, Chicago, Ill.
Catalog No. 31. Series 500. All-Copper Construction. Illustrated brochure. 20 pp. 8½ x 11 ins. Deals with store fronts of a high class.
Brasco Copper Store Front. Catalog No. 32. Series 202.
Brasco Standard Construction. Illustrated brochure. 16 pp. 8½ x 11 ins. Complete data on an important type of building.
Detail Sheets. Set of seven sheets; printed on tracing paper, showing full sized details and suggestions for store front designing, enclosed in envelope suitable for filing. Folds to 8½ x 11 ins.

STORE FRONTS—Continued

Davis Solid Architectural Bronze Sash. Set of five sheets, printed on tracing paper, giving full sized details and suggestions for designing of special bronze store front construction, enclosed in envelope suitable for filing. Folds to 2½ x 11 ins.

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

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

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

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 in. 12 pp. Complete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.
Color in Architecture. Revised Edition. Permanently bound volume 9⅛ x 12¼ in., 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 in. 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 in. 32 pp. Illustrating many banking buildings in terra cotta with an article on its use in bank design by Alfred C. Bossom, Architect.

TILE, HOLLOW

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

TILES

Kraftile Company, 55 New Montgomery St., San Francisco. High Fired Faience Tile. Booklet. 32 pp. 8½ x 11 ins. Illustrated. Presents a fine line of tiles for different purposes.

Unites States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

VALVES

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

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

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill.
Catalog. 8½ x 11 in. 88 pp. Illustrated.

Jenkins Bros., 80 White St., New York.
The Valve Behind a Good Heating System. Booklet 4½ x 7¼ in. 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 in. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

VENETIAN BLINDS

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

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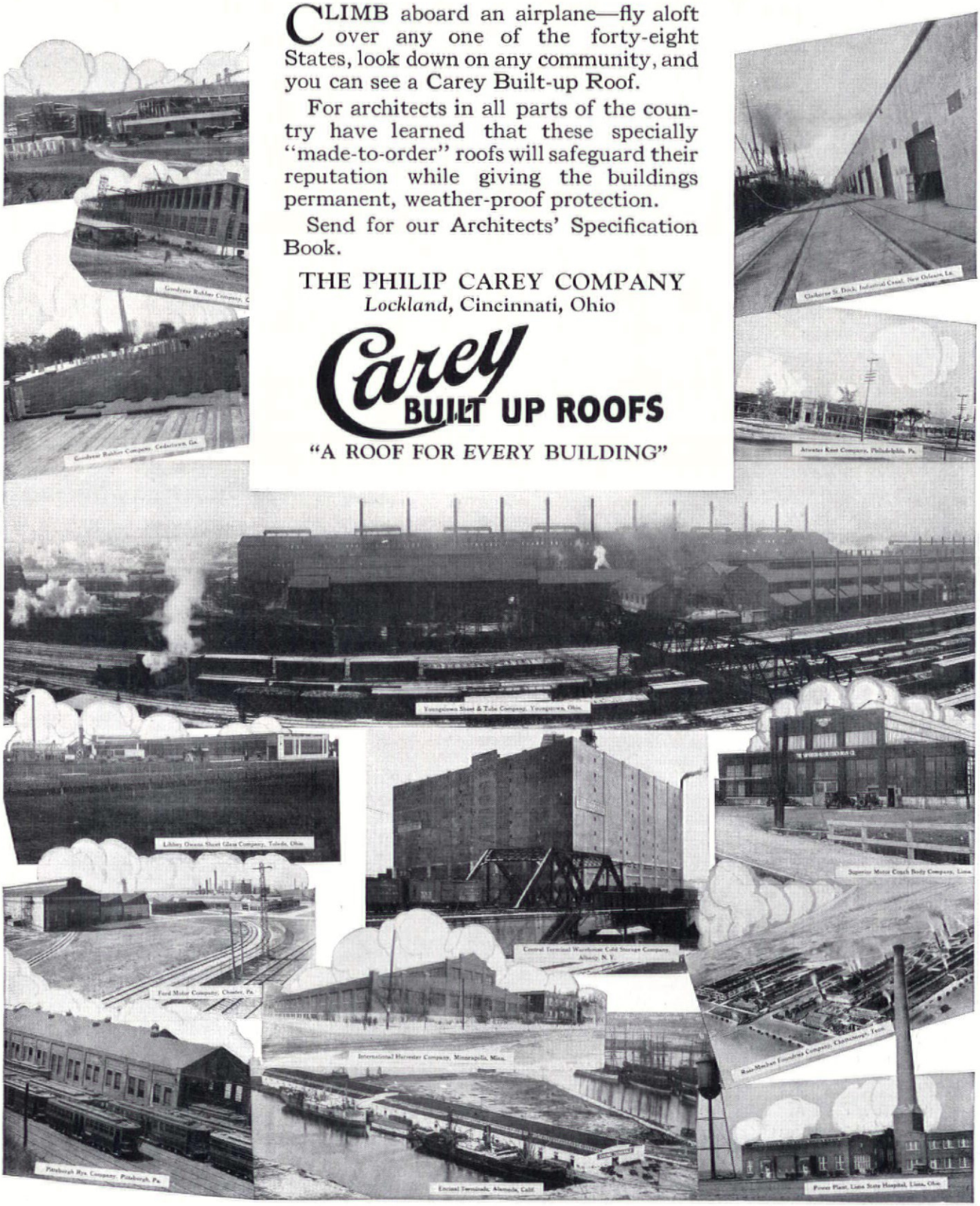



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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 202*

VENTILATION

American Blower Co., Detroit, Mich.
American H. S. Fans. Brochure, 28 pp., 8½ x 11 in. 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.

Globe Ventilator Company, 205 River St., Troy, N. Y.
Globe Ventilators Catalog. 6 x 9 in. 32 pp. Illustrated profusely. Catalog gives complete data on "Globe" ventilators as to sizes, dimensions, gauges of material and table of capacities. It illustrates many different types of buildings on which "Globe" ventilators are in successful service, showing their adaptability to meet varying requirements.

Van Zile Ventilating Corporation, 155 East 42nd St., New York, N. Y.
The Ventadoor Booklet. 6½ x 3½ in. 16 pp. Illustrated. Describes and illustrates the use of the Ventadoor for Hotels, Clubs, Offices, etc.

WATERPROOFING

Carey Company, The Philip, Lockland, Cincinnati, Ohio.
Waterproofing Specification Book. 8½ x 11 in. 52 pp.

Genfire Steel Company, Youngstown, Ohio.
Waterproofing Handbook. Booklet. 8½ x 11 in. 80 pp. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dustproofing and hardening concrete floors, and accelerating the setting of concrete. Free distribution.

Master Builders Company, Cleveland, Ohio.
Waterproofing and Dampproofing and Allied Products. Sheets in loose index file, 9 x 12 in. 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.

Sommers & Co., Ltd., 342 Madison Ave., New York City.
"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 in.

WATERPROOFING—Continued

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

Toch Brothers, 110 East 42nd St., New York City.
Specifications for Dampproofing, Waterproofing, Enameling and Technical Painting. Complete and authoritative directions for use of an important line of materials.

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

WEATHER STRIPS

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

WINDOWS

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

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

WINDOWS, CASEMENT

Crittall Casement Window Co., 10951 Hearn Ave., Detroit, Mich.
Catalog No. 22. 9 x 12 in. 76 pp. Illustrated. Photographs of actual work accompanied by scale details for casements and composite steel windows for banks, office buildings, hospitals and residences.



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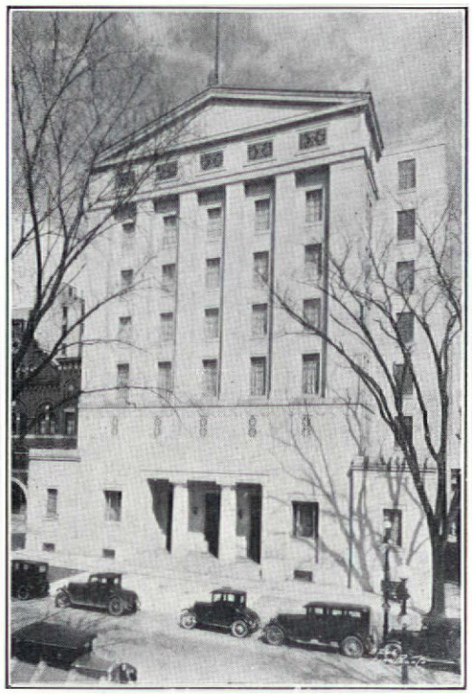

Masonic Temple, Lansing, Mich.
Edwin A. Bowd, Architect

These shafts will never communicate fire—

Smooth operation and artistic design are desirable in elevator enclosures, but of far greater importance is safety from fire. United Metal Elevator Enclosures carry the Underwriters' Label of certified protection.

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Send for the United hollow metal handbook.

THE UNITED METAL PRODUCTS CO.
CANTON, OHIO

UNITED METAL DOORS

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 204*

WINDOWS, CASEMENT—Continued

Genfire Steel Company, Youngstown, Ohio.
Architectural Details, Casement Windows and Doors. 8½ x 11 ins. 28 pp. A. I. A. File No. 16E. Specifications and construction details.

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

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

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Casement of Copper-Steel. Catalog C-122. Booklet 16 pp. 8⅝ x 11 in. 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 in. Illustrated. Shows typical installations, detail drawings, construction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.
Architectural Details. Booklet, 8½ x 11 in. 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,

Truscon Steel Co., Youngstown, Ohio.
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 SHADES

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

WINDOWS, STEEL AND BRONZE

Genfire Steel Company, Youngstown, Ohio.
Architectural Details, Steel Pivoted, Commercial and Architectural Projected Windows. 8½ x 11 ins. 24 pp. A. I. A. File No. 16E. Specification and construction details.

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

Truscon Steel Co., Youngstown, Ohio.
Drafting Room Standards. Book, 8½ x 11 in., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.

WINDOWS, STEEL AND BRONZE—Continued

Truscon Solid Steel Double-Hung Windows. 24-pp booklet, 8½ x 11 in., containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.

WOOD—See also Millwork

American Walnut Mfrs. Association, 618 So. Michigan Blvd., Chicago, Ill.
American Walnut. Booklet. 7 x 9 in. 45 pp. Illustrated. A very useful and interesting little book on the use of Walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.
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Curtis Companies Service Bureau, Clinton, Iowa.
Better Built Homes. Vols. XV-XVIII, incl. Booklet. 9 x 12 in. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects, for the Curtis Companies.

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

West Coast Lumber Trade Extension Bureau, Seattle, Wash.
"Durable Douglas Fir; America's Permanent Lumber Supply." Booklet, 32 pp., 7 x 11 ins. Illustrated. Complete data on this valuable wood.
"Douglas Fir Wall Hanger." Metal-bound hanger, 31 x 32 ins. An attractive advertisement for Douglas fir.
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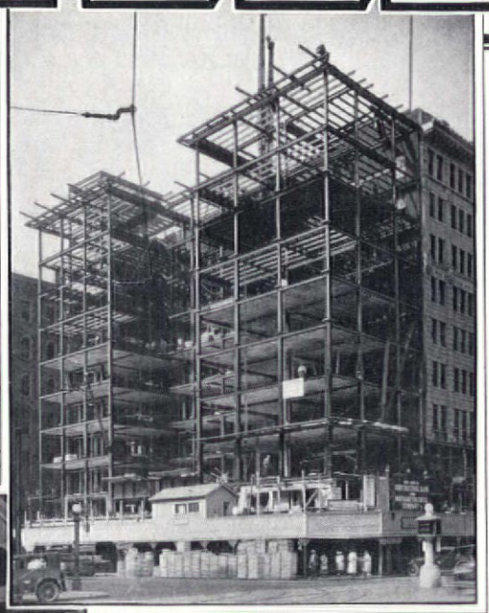

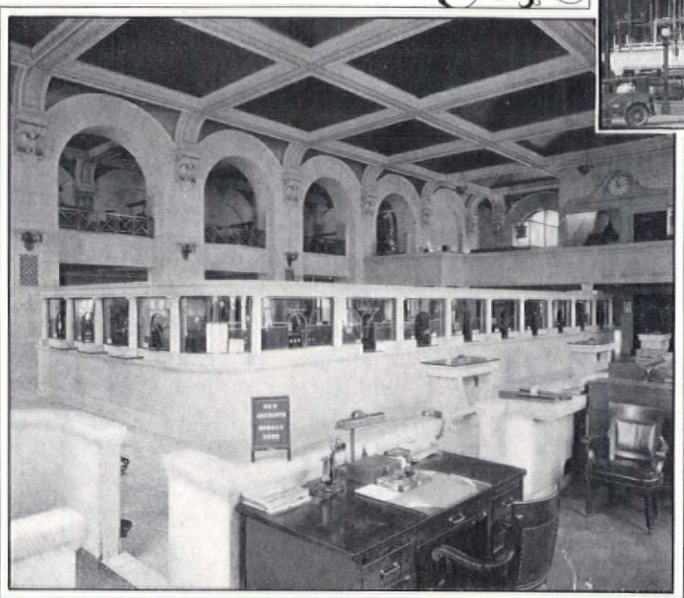

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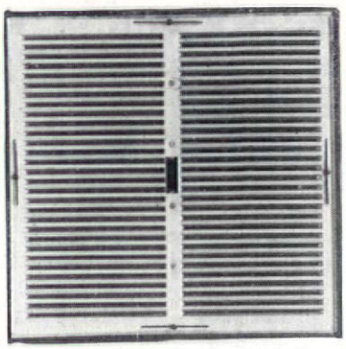

According to estimate of the U. S. Weather Bureau, there are more than 100,000 particles of dust in a cubic inch of air. Dust and soot ruin costly fixtures, paintings, hangings, etc. They make frequent cleaning necessary and add hundreds of dollars yearly to cleaning bills of large public buildings.

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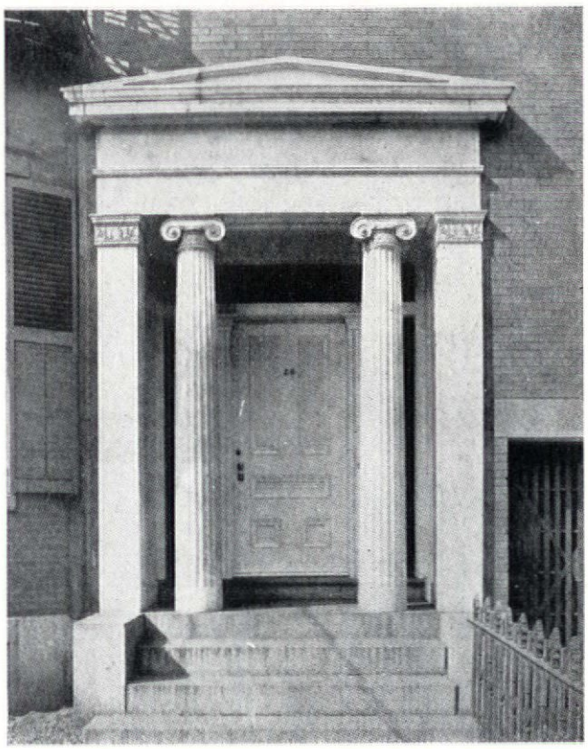
By HOWARD MAJOR



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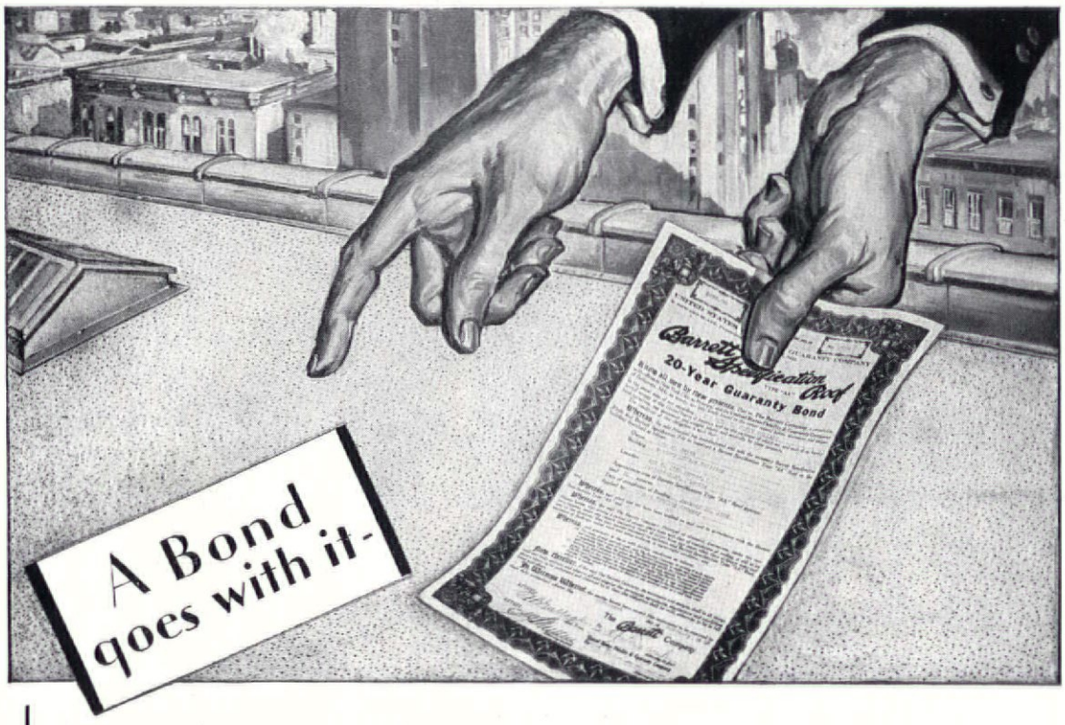

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FOR THE OWNER OF *THIS* BUILDING

WHAT'S the best thing that can be said of a roof—once it's laid? Just this—it's a roof you can forget.

A roof that never raises a rumpus about repairs and maintenance—a roof so trouble-free that you never have to give it a second thought. And this, of course, is exactly what your client gets in a Barrett Specification Roof.

When a Barrett Specification Roof is completed the building owner receives a Surety Bond, guaranteeing him against repair or maintenance expense for the next 20 years.*

Twenty years—that's leaping ahead to 1948, the middle of the century. How can any roof, no matter how finely constructed, last so long?

That question has already been answered. You've read the series of advertisements which appeared in this magazine during the past year. These advertisements showed a number of well-known American landmarks—business buildings that have survived from the 70's, 80's and 90's—roofed with Barrett Pitch and Felt!

And here's a significant fact. These old Barrett Roofs, without repairs, stood weather-tight not merely 20 years but 30, 40 and even 50 years. (Is it thinkable that the Surety Company which bonds Barrett Specification Roofs for 20 years would shoulder this responsibility if it were not for such records?)

Interested in that kind of roof? Then write us for full information.

*The Barrett Company also offers a Specification Type "A" Roof which is bonded for 10 years. This type of roof is adaptable to a certain class of buildings. The same high-grade materials are used, the only difference being in the quantities.

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Throughout the United States and Canada a limited number of roofing contractors have been approved by Barrett to lay the Barrett Specification Bonded Roof. These men have earned a reputation for doing efficient work—a name for absolute dependability.

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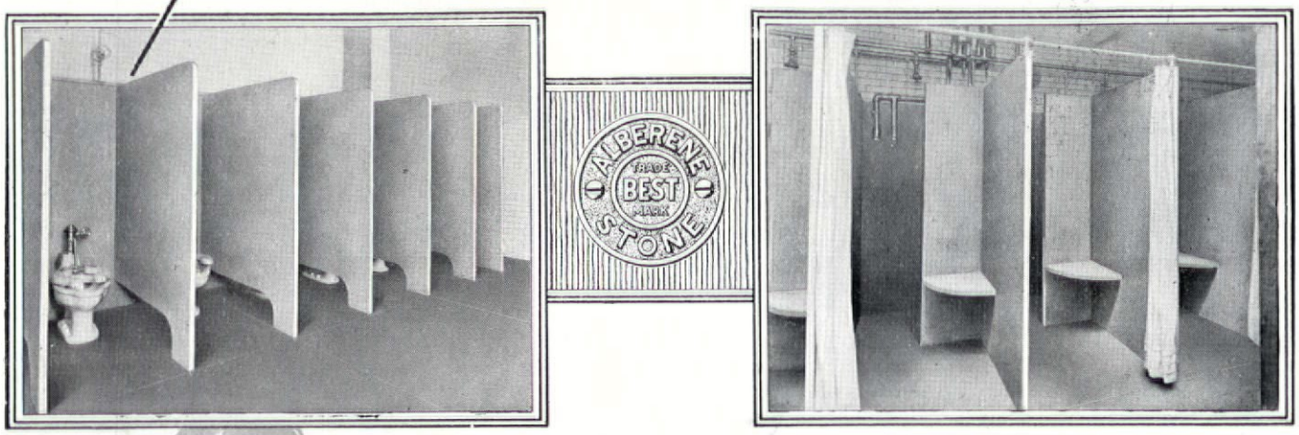
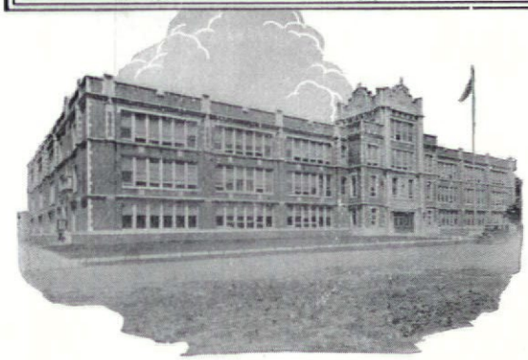
ALBERENE STONE





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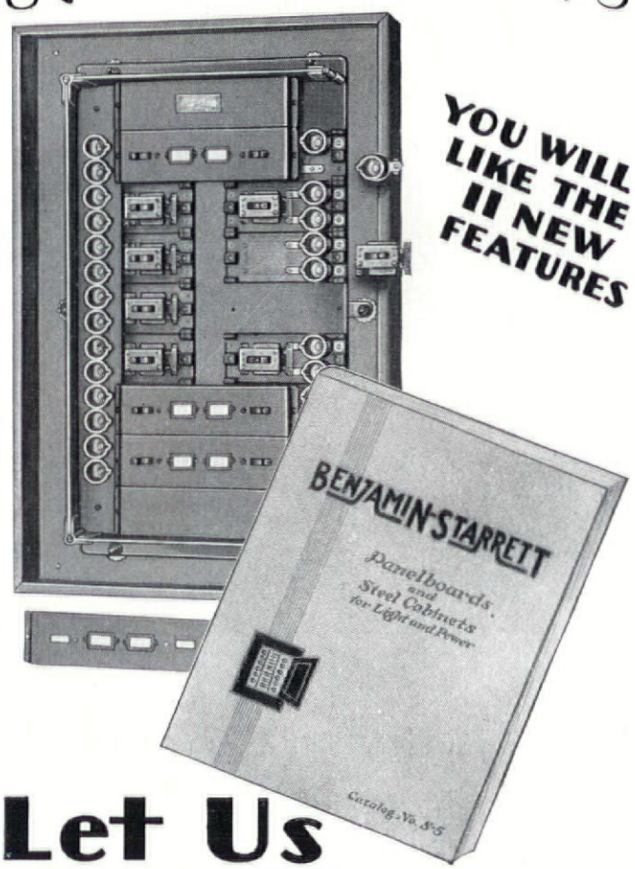

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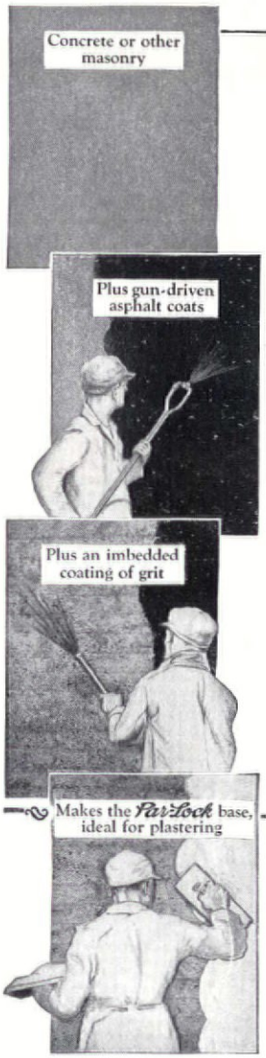

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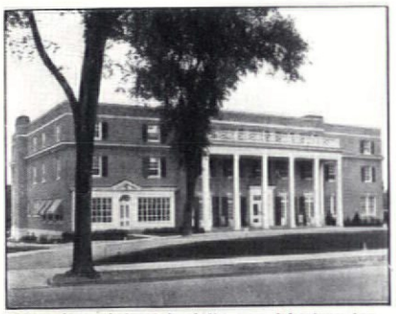
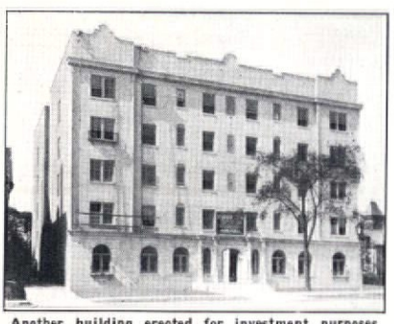


Above is a photograph of the new Johnstown Inn, Johnstown, New York, Havemeyer Truss Floor System used throughout. Architect, R. E. Sluyter. Contractors, Scriven & Spawn.



The Havemeyer Truss Floor System is ideally adapted to commercial investment buildings such as offices, theatres, garages, etc. The Martin Building (above) at Elizabeth, New Jersey is an example of a moderate sized investment building employing the Havemeyer System throughout. Frank A. Berry, Architect. John W. Ferguson Company, Builders.



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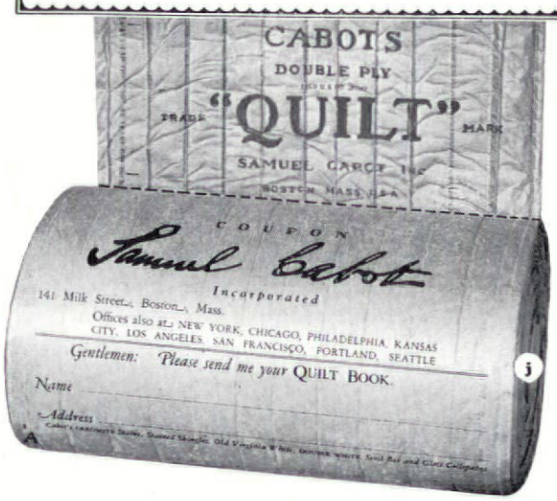



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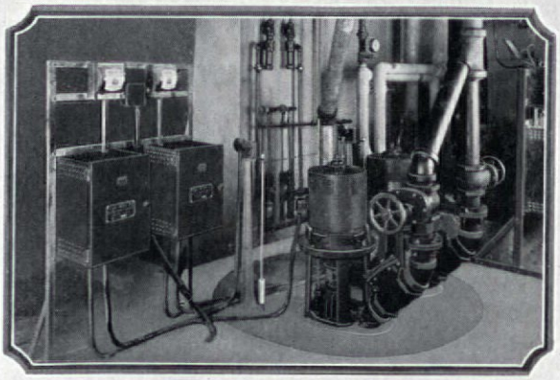

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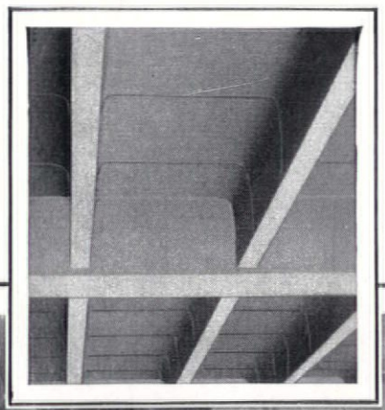



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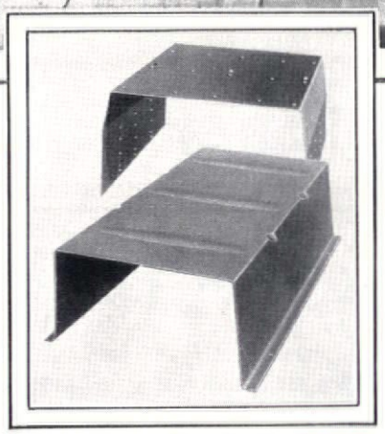

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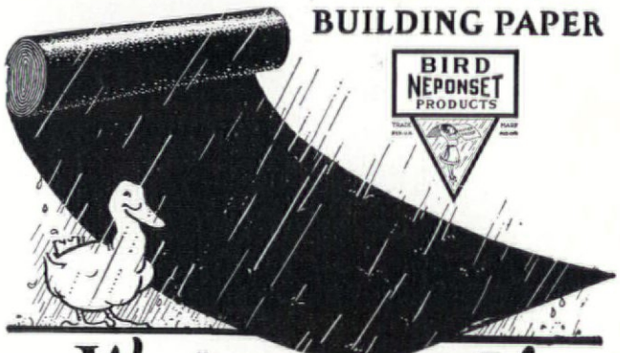

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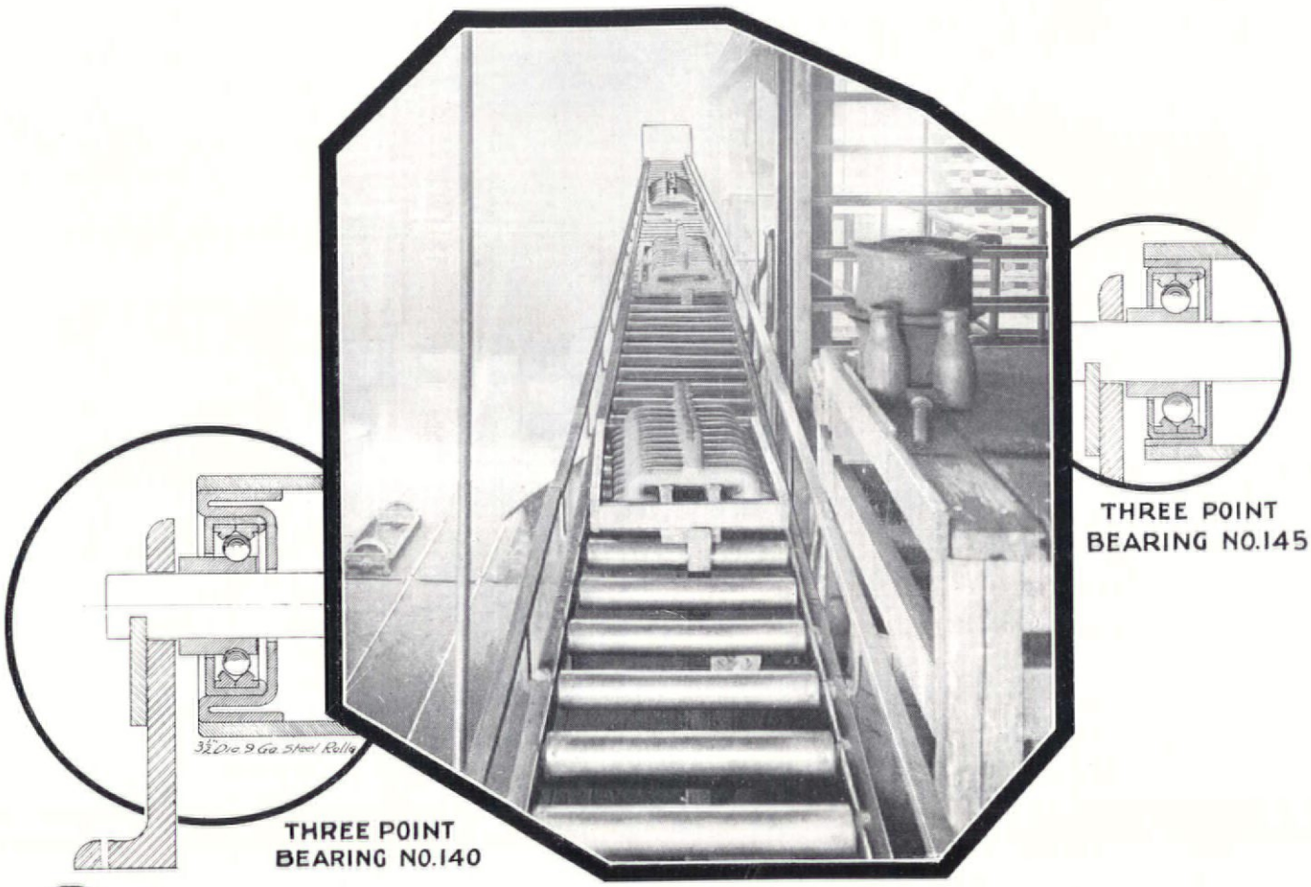

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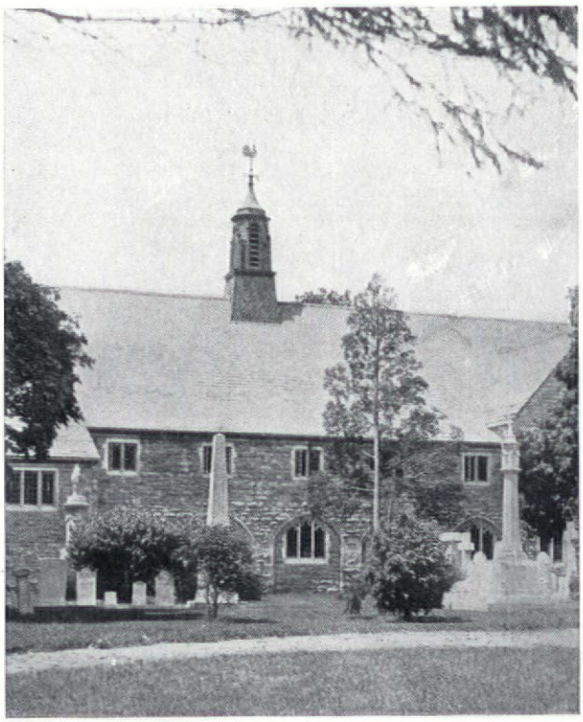
PERHAPS no architect who ever lived in America built up more of a personal following than Bertram G. Goodhue. His was one of the two or three names which came instantly to mind when Gothic ecclesiastical architecture was mentioned, and his churches, many and prominent, have exerted their influence upon ecclesiastical architecture all over the world. But Mr. Goodhue was equally talented in other and quite different ways. He well knew how to handle architecture of entirely other kinds, and his drawings, book plates, illustrations and type faces were of such note that they all but compete with his work as an architect of Gothic churches.



THIS volume constitutes a record or review of Mr. Goodhue's achievements in many fields. Those who collaborated or worked with him have contributed to its text, and its illustrations set forth the excellence of his work in all the arts of which he was an acknowledged master. It is a magnificent and authoritative work, issued by the Press of the American Institute of Architects.

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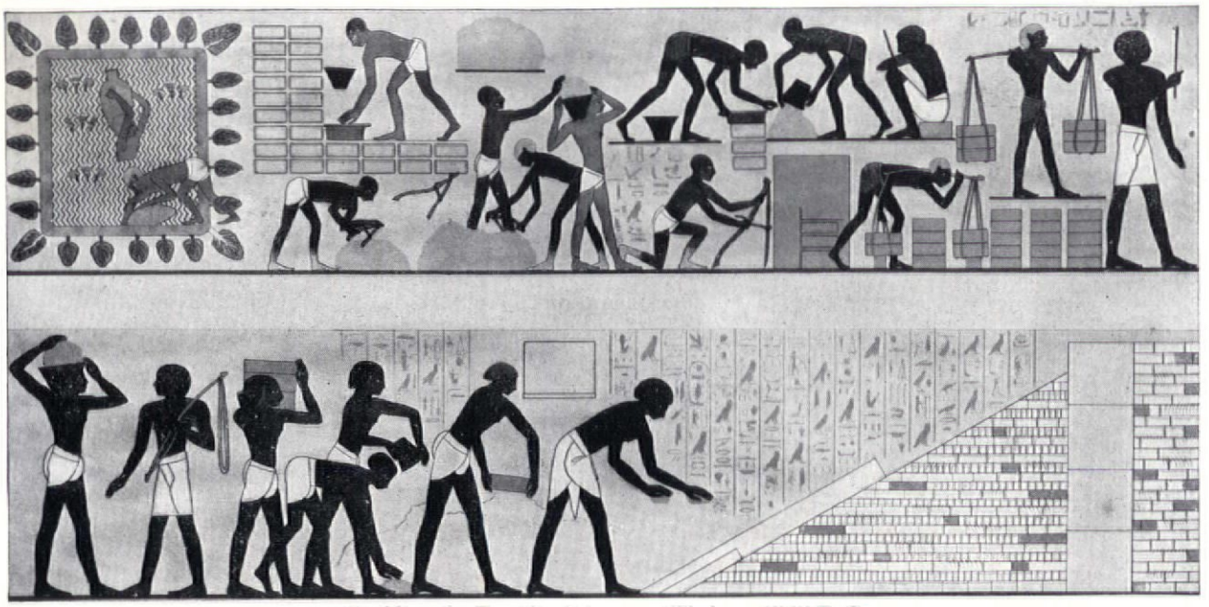
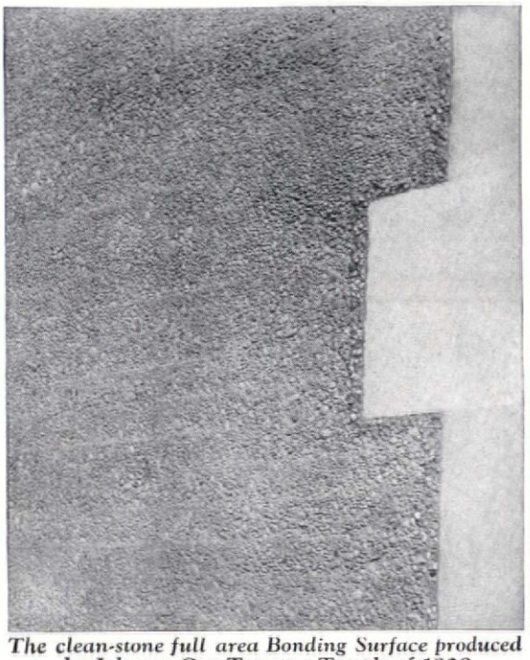


Building the Temple of Amon at Thebes—4000 B. C.
Courtesy Metropolitan Museum of Art



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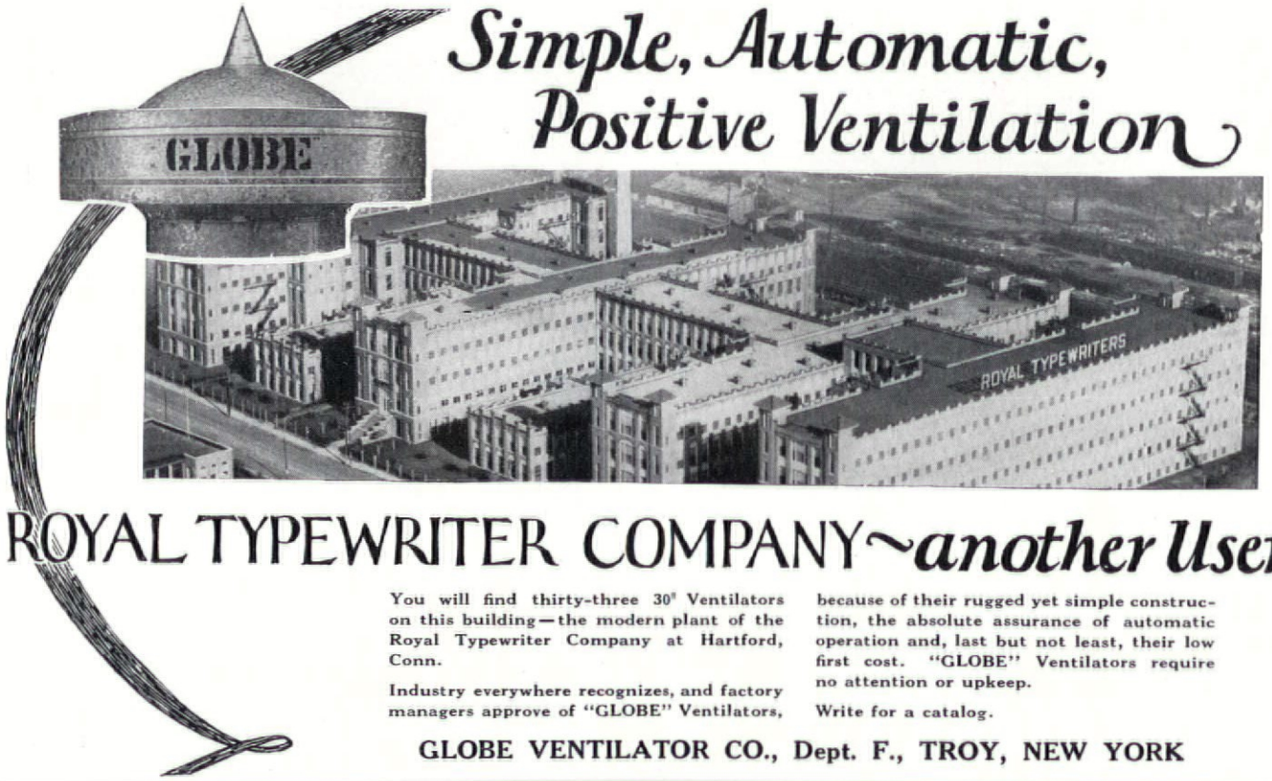

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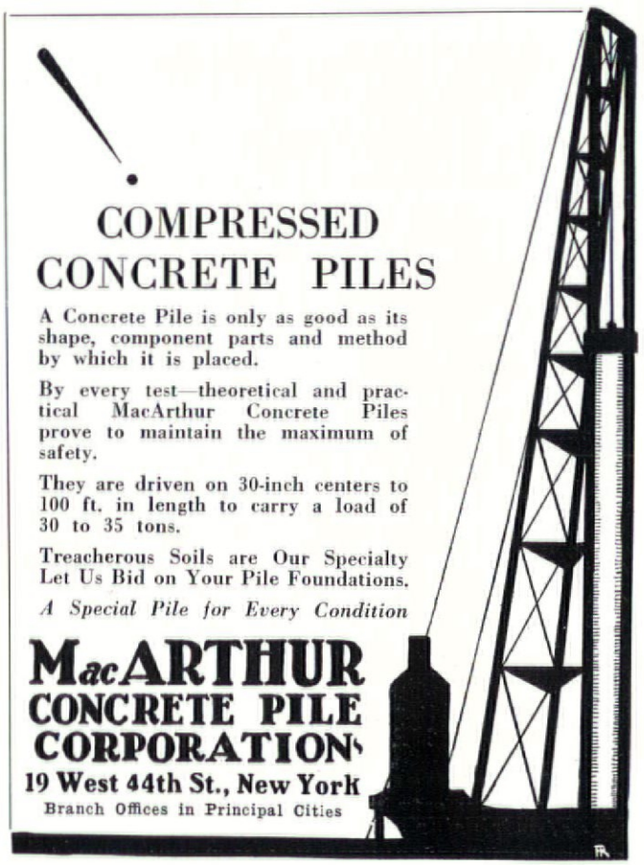

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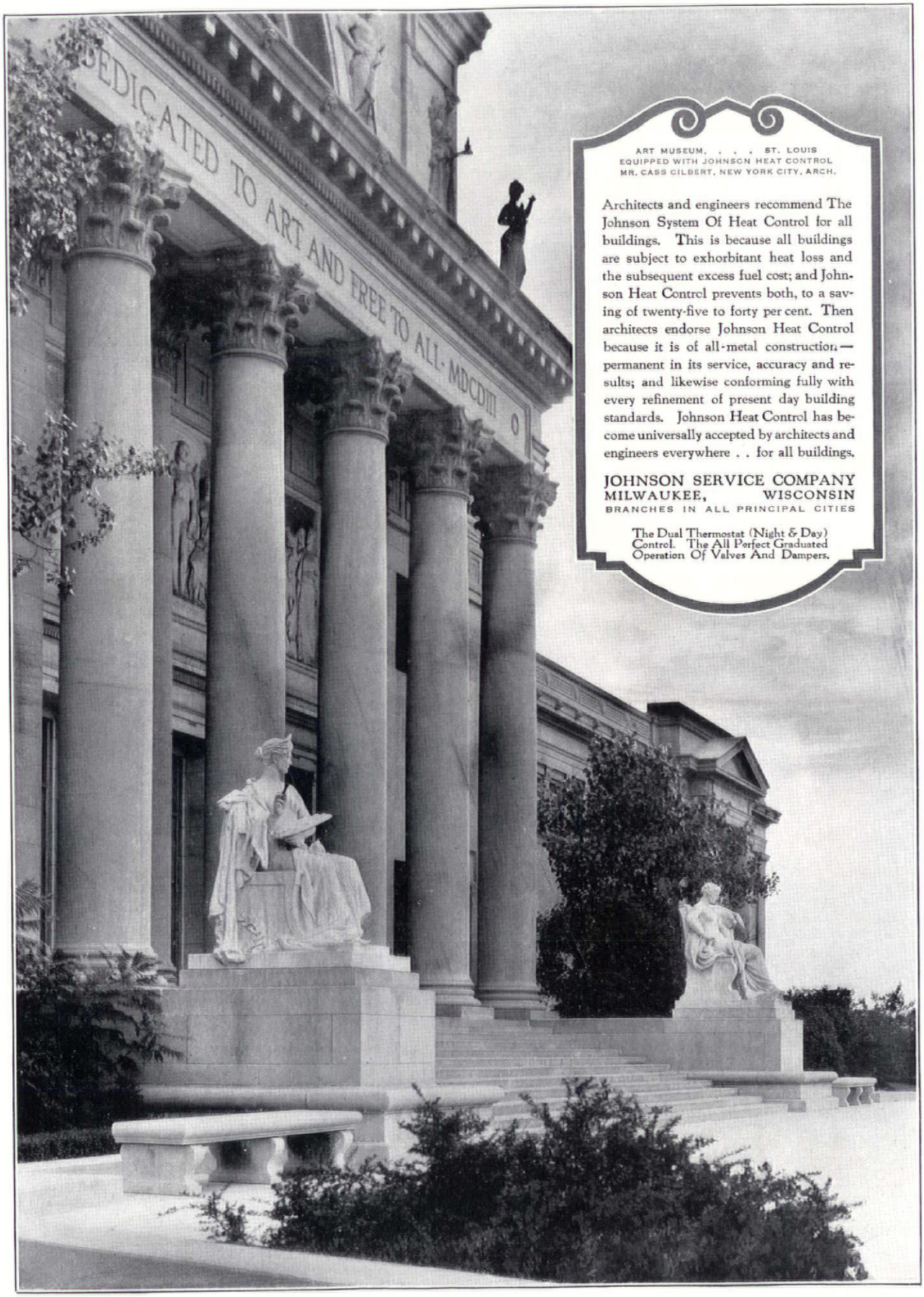

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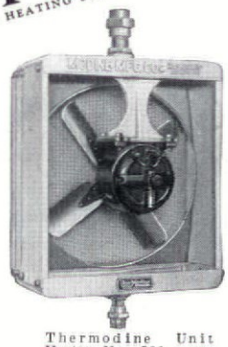

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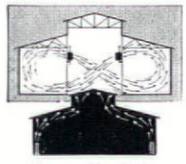
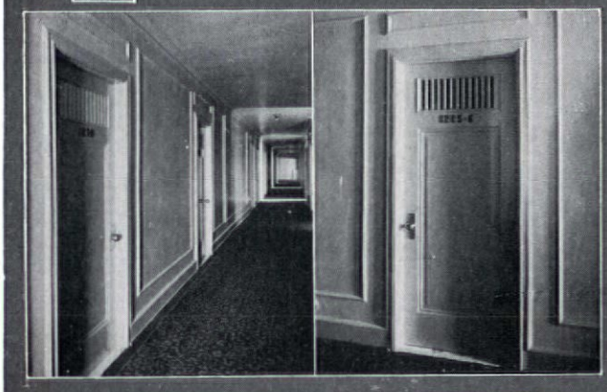


Above—Circulation of heated air down to working zone with Thermodine Unit Heaters.
Below—Circulation with cast iron radiation or pipe coils.

VENTADOOR
A ventilating panel for doors



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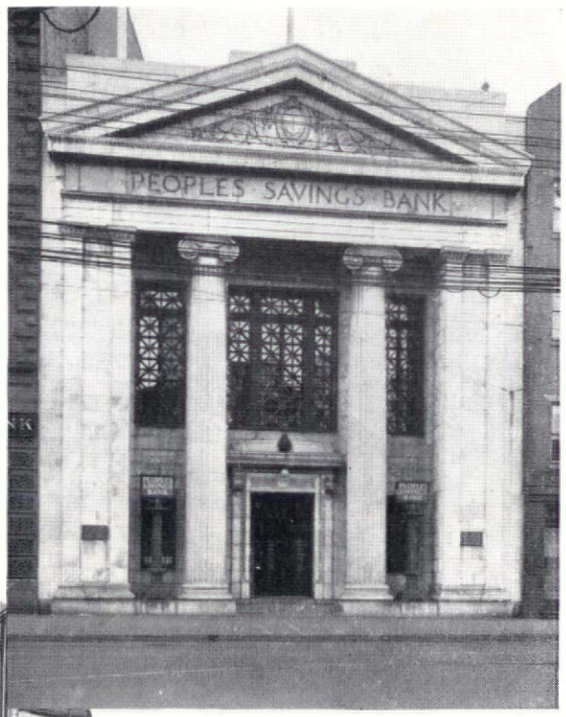

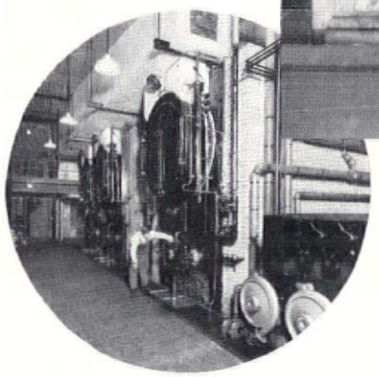

(Above) Petro serves the People's Savings Bank of Providence, R. I.

(In circle) View of the industrial Petro Oil Burners used in the Old Colony Trust Co. Bldg., Boston, Mass.



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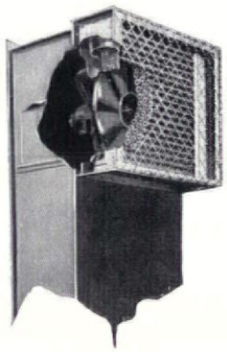

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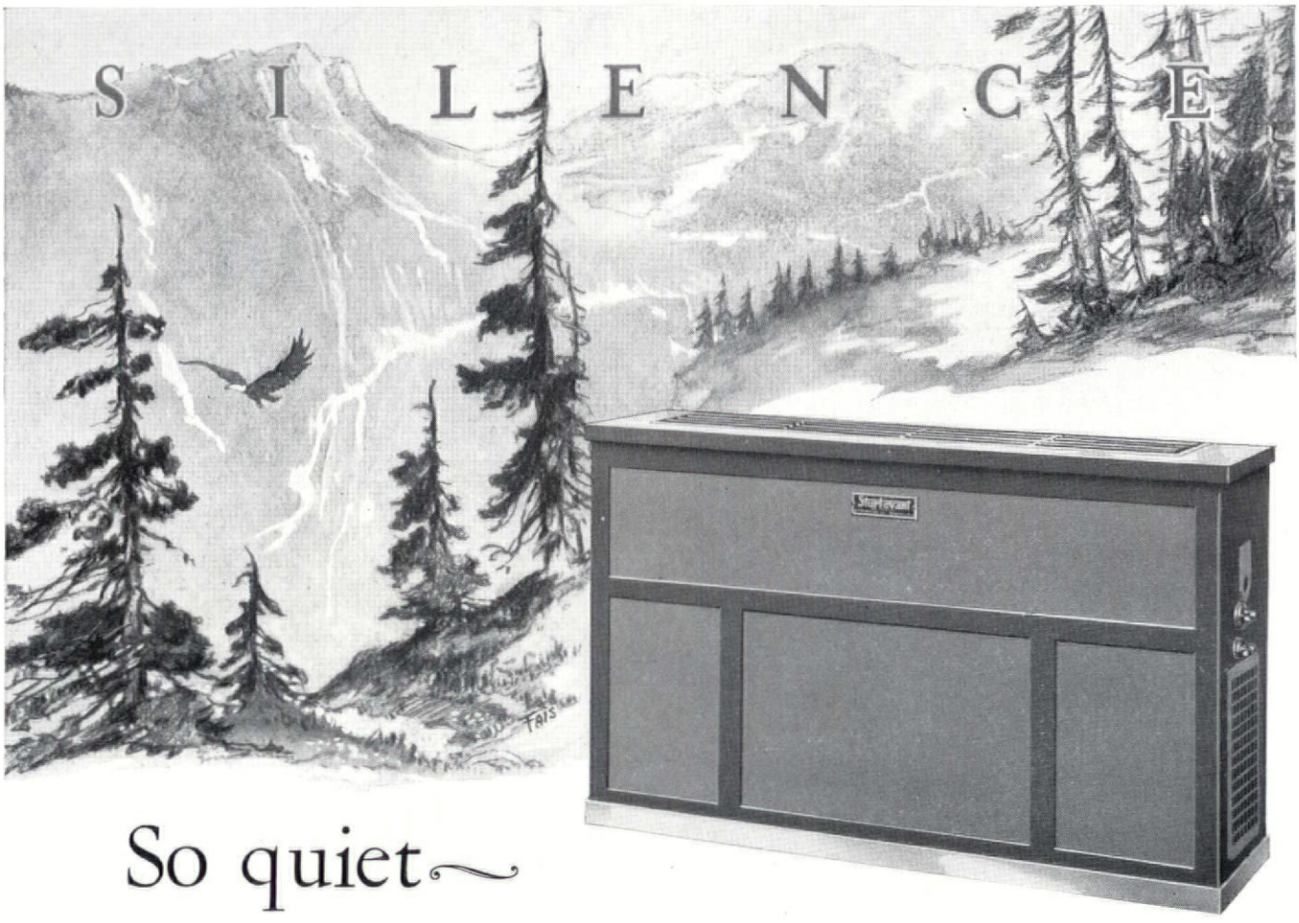

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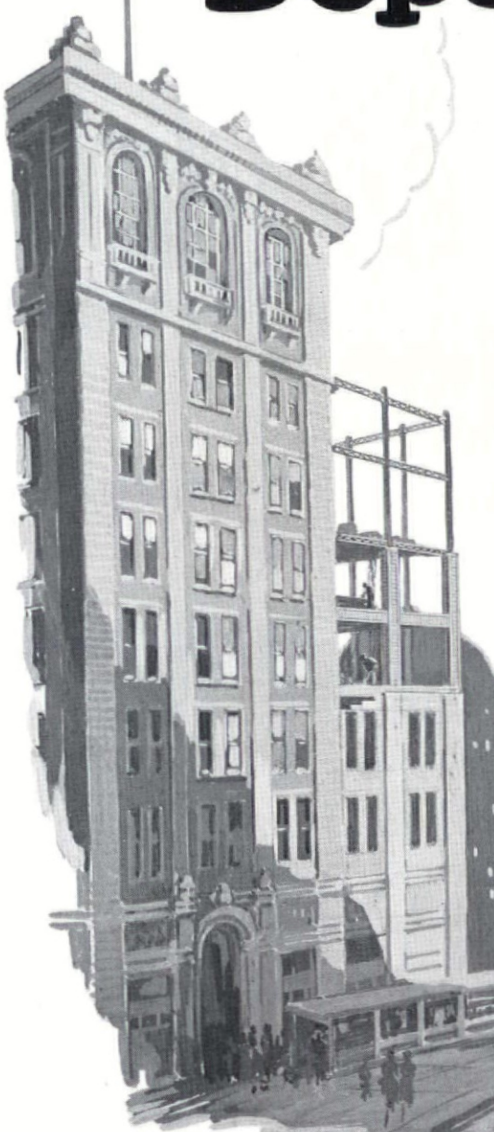

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REVIEWS OF MANUFACTURERS' PUBLICATIONS

AMERICAN BLOWER COMPANY, Detroit. "Drugged on the Job by Bad Air." An important brochure on ventilation.

Statistics having to do with "business efficiency" have much to say regarding the necessity of supplying ample circulation of pure air in offices or other places in which large numbers of people assemble for work. Some of these statistics, in fact, estimate the losses incurred where the ventilation is not sufficient, and other statistics even compare the extent of these losses in dollars and cents with what is likely to be the moderate cost of equipment which would render these losses unnecessary. This folder presents interesting data on the use of the blowers which are important details of ventilation equipment, giving data in tabular form.

KLIEGL BROTHERS, 321 West 50th Street, New York. "Kliegl News; Bulletin No. 2" A booklet on stage lighting.

The marvelous lighting effects which enter into the highly advanced technique of modern stage productions have been brought to perfection by men who have made special study of the problems theatrical lighting presents. Only when one remembers the primitive stage lighting in even the best theaters a generation ago, can the present height of excellence be fully appreciated. Architects, interior decorators, and others concerned with this important matter will be interested in this Bulletin upon the subject. It illustrates and describes an excellent line of foot lights, border lights, proscenium lights, strip lights, dimmers, and a number of other devices for obtaining special effects. When use of a lighting medium as flexible as electricity is directed by men highly proficient in such work, there would seem to be no demand of the stage which could not be met. This Bulletin is also of interest to men designing store interiors.

THE ATLAS PORTLAND CEMENT COMPANY. "For Railroad, Highway and Municipal Uses."

In planning large projects, such as civic centers and other related groups of buildings, the architect often has to give considerable attention to the various details of landscape architecture which serve to bind the group together. A great deal can be accomplished in this direction by introducing such objects as bridges, ornamental lamp-posts, balustrades, stone benches, and other ornamental stonework. In this work the advantages of cast stone over cut stone include economy without any loss in æsthetic appeal, and the possibilities in this direction are made still greater by the use of white cement. The Atlas Portland Cement Company has issued a booklet covering this subject which should be of value in helping architects realize the effects that can be achieved by using this medium in designing their outdoor architectural accessories. Perhaps the section on railroads and highways will not be as important to the average architect, as will those sections covering "bridges, lighting standards, stucco and benches," with their descriptive text.

GLEASON-TIEBOUT GLASS CO., Celestialite Division, 200 Fifth Avenue, New York. "Next to Daylight."

Increase in the use of electrical current has been followed by an amazing improvement in the means of using it. In no department of this use has improvement been more marked than in what pertains to lighting, and it is a far cry from the lighting equipment used twenty-five or thirty years ago to the scientifically designed and built fixtures and other details used today. So brilliant, indeed, is the light now had from electric lamps that means must be taken to soften it, just as the brilliance of the sun must be tempered. This brochure dwells upon the properties of the glass known as "Celestialite" and used for lamps, so called because it gives the nearest approach to the best of all light,—daylight. "Celestialite" glass is made of three layers of different glasses fused together when blown into the mould. These three different glasses are: (1) Clear crystal glass to provide body and strength. (2) A special translucent white glass to diffuse the rays and soften the light. (3) A rectifying layer of transparent blue glass, to whiten, clarify and perfect the light. Combined, — you have Nature's way imitated—"Celestialite," fully described here.

AMERICAN NOKOL COMPANY, Chicago. "A New Guide to Oil Heat for Homes." A valuable work on use of oil.

There are of course a number of advantages which follow the use of oil for fuel. Among them are its cleanliness, freedom from the problems of disposing of ashes, the ease with which it is to be had almost everywhere, and above all the possibility of securing even, regular heat without the frequent firing of a furnace. This brochure dwells upon the desirability of using oil as fuel and describes and illustrates the widely known "Nokol" equipment. Every detail of its mechanism is explained, and there are given views of numerous homes in different parts of the country which are heated with "Nokol," an important detail.

THE RUBEROID COMPANY, Chicago, New York, Boston. "Ruberoid Facts Worth Knowing."

The wide variety of building materials included in the "Rubberoid line" is indicated in this brochure,—composition shingles; roll roofings; insulating and sheathing papers; cementing compounds; waterproofing; paints for many purposes; nails, etc. A particularly interesting part of the booklet is that which deals with the fabrication or construction of prepared roofings and shingles. There is given a cross section which illustrates the building up of a prepared roofing substance, one layer or thickness of material over another, and of three components,—*felt*, the fabric which forms the background; *saturant*, which penetrates the felt and forms a protective casing around each fiber; *coating*, which seals in the saturant, preventing its evaporation and excluding the moisture which would eventually cause the rotting of the felt. The brochure will especially interest architects, also engineers and builders.

THE OIL HEATING INSTITUTE, 350 Madison Avenue, New York. "Oil Heating, The Modern Miracle of Comfort."

Use of oil for heating logically supplies ground for much interesting study, and considerable attention has been given the subject by engineers and technicians, their findings being of interest to the laity and particularly to those using oil or else contemplating its use. This brochure is issued by an association made up of 24 manufacturers of oil-burning apparatus. The Oil Heating Institute is the first organization created for the express purpose of increasing the general knowledge of a mechanical equipment making for greater ease and comfort of living. It is an unincorporated organization, founded to carry on research and educational work in oil heating. It also serves as a central bureau of information, where anyone may secure unbiased facts and advice on oil heat or the use of oil for fuel. To each of the members there have been assigned two pages which describe and illustrate the firm's oil-burning mechanism. The great value of the booklet renders it of the first importance to architects and engineers, and it is also valuable to builders.

THE GENERAL FIREPROOFING BUILDING PRODUCTS, Youngstown, O. "G F Steel Basement Windows."

There are, of course, many places in buildings where the area of walls exposed to outer air is so limited that in order to light the interiors at all there must be careful use of the space which might be converted to window use. One such position is in a cellar or basement, where the distance between the ground level and the timbers which support the first floor is likely to be extremely small; and another position is that just below the show windows of a shop building, where most careful use must be made of the space if the basement is to receive any light or air whatever; sometimes the distance between the sidewalk and the floor of the window is scarcely more than 1 foot. This little folder describes the G F Steel Basement Window, useful for installation in these highly restricted spaces, since the extreme slenderness of their steel muntins permits the entrance of as much light as possible, and also because, being made of steel, they are not subject to expansion and contraction, which cause the windows to stick and be difficult to open in moist weather and to admit draughts of cold air during the seasons when the weather is extremely dry.



Assuring Greater Permanency In Stucco Construction

The self-furring qualities of Cup Kalmanlath assure a more perfect and a more permanent bond between lath and stucco. The plasterer in applying stucco to Cup Kalmanlath is rigidly guided and compelled to give an adequate thickness of stucco by the unique "cup" design of the mesh. As a result Cup Kalmanlath forms a perfect backbone (not background) for the stucco. It gives you a wall with high crack-resisting qualities—a wall that can take up the twists and strains, thereby assuring greater permanency of construction.

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KALMANLATH

REVIEWS AND ANNOUNCEMENTS

TRUSCON STEEL COMPANY, Youngstown, O. "Quality Windows for Good Buildings." A booklet on their use.

Production of windows upon the vast scale, which is required in these days of extensive building, has resulted in careful study as to their most efficient design and to the reduction of their costs. Supplying windows in great numbers to structures of all possible types has taught lessons in both directions, and the steel windows now upon the market embody every improvement which ingenuity can suggest or manufacturing skill supply at the lowest cost which use of improved methods makes possible. This helpful brochure has to do with the steel double-hung and counter-weighted windows made by this widely known firm. It contains illustrations and data of every imaginable kind and other drawings explain their construction and their mechanism when used for structures of many widely different kinds. The entire publication is valuable indeed.

ATLAS PORTLAND CEMENT COMPANY, New York. "Remodeling with Stucco." A booklet on the subject.

Just because construction of any kind is extremely costly, considerable attention has been directed toward remodeling or altering buildings which already exist. Every community in America can show examples of skillful remodeling, sometimes out of all recognition of the original structures. Much is to be done with stucco in these alterations, and in this brochure (one of many useful booklets issued by the Atlas Portland Cement Company) there are shown exteriors of a number of ugly and antiquated buildings (mostly of frame) together with the same structures after having been carefully remodeled, shorn of their superfluous ornament, and then coated with stucco, which of course presents them to the world in a new dress. The brochure also illustrates residences, of the "brownstone front" type which have had their architectural shortcomings remedied and their facades coated with stucco, to their advantage.

BUFFALO FORGE CO., Buffalo. "Industrial Heating with Buffalo Unit Heaters." Data on heating installations.

Architects who plan large industrial buildings and contractors who erect them know that special problems concerning heating and ventilation are often presented for solution. The two matters are sometimes closely related, since certain forms of manufacturing demand that there be sufficient ventilation, or rather a sufficiently strong current of air, to remove the fumes, odors or vapors which some forms of manufacturing create. This brochure deals with use of "Unit Heaters," being used for heating warehouses, garages, factory buildings, large stores, freight sheds, depots, steel mills, foundries, machine shops, woodworking plants, and other buildings where flexibility, efficiency, economy of operation and low first cost are requisites. The types of Unit Heaters described are the "Breezo-Fin," the "Vento," the "Direct Fired Heater" and the "Hi-Pressure Heater."

HOLOPHANE GLASS COMPANY, INC., New York. "Holophane Industrial Lighting." A work on its improvement.

Factories and manufacturing buildings of various sorts are among the types of structures which have shown amazing architectural improvement during late years. This improvement is not only connected with design and plan, but it has to do also with their equipment, and in no detail of equipment has more progress been made than in lighting, a subject well dealt with in this brochure. "Industrial plant managers are well acquainted with the facts that compared with ordinary lighting an adequate system will increase production by from 10 to 20 per cent. Spoilage and 'seconds' are decreased a like amount. Accidents to life and limb are decreased by 25 per cent. The morale, that indefinite factor which adds so enormously to efficiency, is improved, and all these advantages are secured at an insignificant cost." This illustrated brochure, from a well known firm of specialists, deals fully with the subject of lighting manufacturing buildings and areas, and gives all the requisite data.

AMERICAN ROLLING MILL COMPANY, Middletown, O. "Incidents That Have Pointed the Way."

The development of the steel industry from beginnings comparatively small to what is one of the marvels of the modern world has by no means been without picturesque incidents,—and sometimes matters of the greatest moment to the human race have been the outcome of incidents which in themselves seem trivial. This brochure is made up of pages which appeared originally in *The Outlook*,—advertisements no doubt, but advertising conceived in the broadest possible spirit and replete with what might deservedly be called "human interest." A review of all these pages together seems to give them a new and stronger interest than when they were seen as they appeared in their original form. The pages suggest more than a little of that broad spirit of coöperation and helpfulness which has played so important a part in the building up of the vast steel industry.

THE MACOMBER STEEL COMPANY, Canton, O. "Designing Data and Insurance Rating."

There is probably no detail of a bank building which compares in importance with its vault; in fact the security of a vault might well be accepted as a gauge or measure of a bank's importance. The value of a vault of course depends wholly upon the skill with which it has been built and equipped,—reason enough why bank architects devote earnest study to both. This folder presents data, drawings and other details dealing with "standardized reinforcing systems for banks, jewelry stores, isolated plants, financial institutions, and vaults in general,—large or small." It illustrates with considerable care the use of reinforcing materials, and the fullness of its dealing with the subject could hardly fail to be of interest to architects who wish to keep fully abreast of the advance in affording protection which is being made by vault manufacturers and their technicians. The helpfulness of the booklet should secure for it wide use.

W. D. Knox is occupying new offices at 210 Birmingham Theater Building, Birmingham, Mich.

Warne, Tucker, Silling & Hutchinson, Charleston, W. Va., desire the catalogs and other publications of manufacturers.

The residence illustrated on page 38 of THE FORUM for May is by J. Ivan Dise, and credit should have been so given.

Smith & Senter issue notice of their removal from Okmulgee, Oklahoma to 307 Philtower Building, Tulsa, Oklahoma.

Webster C. Moulton and Guy Moulton announce their removal to the Hills Building, 215 Montgomery Street, Syracuse, N. Y.

George C. Nimmons & Company announce the removal of their offices to 333 North Michigan Avenue, Chicago, and the change of firm name to Nimmons, Carr & Wright, to include George Wallace Carr and Clark C. Wright, who have been associated with the firm as partners for years.

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Made in four standard colors: Natural, Light Brown, Medium Brown, and Dark Brown. Easily and quickly applied by any workman at minimum cost. One application means no more material or labor cost for years to come. Be sure to specify Lignophol—a Sonneborn Product.

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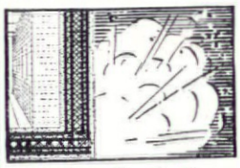

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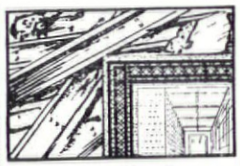

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For more detailed information refer to Sweets Catalog or if time allows write us for recommendations regarding your specific problems.

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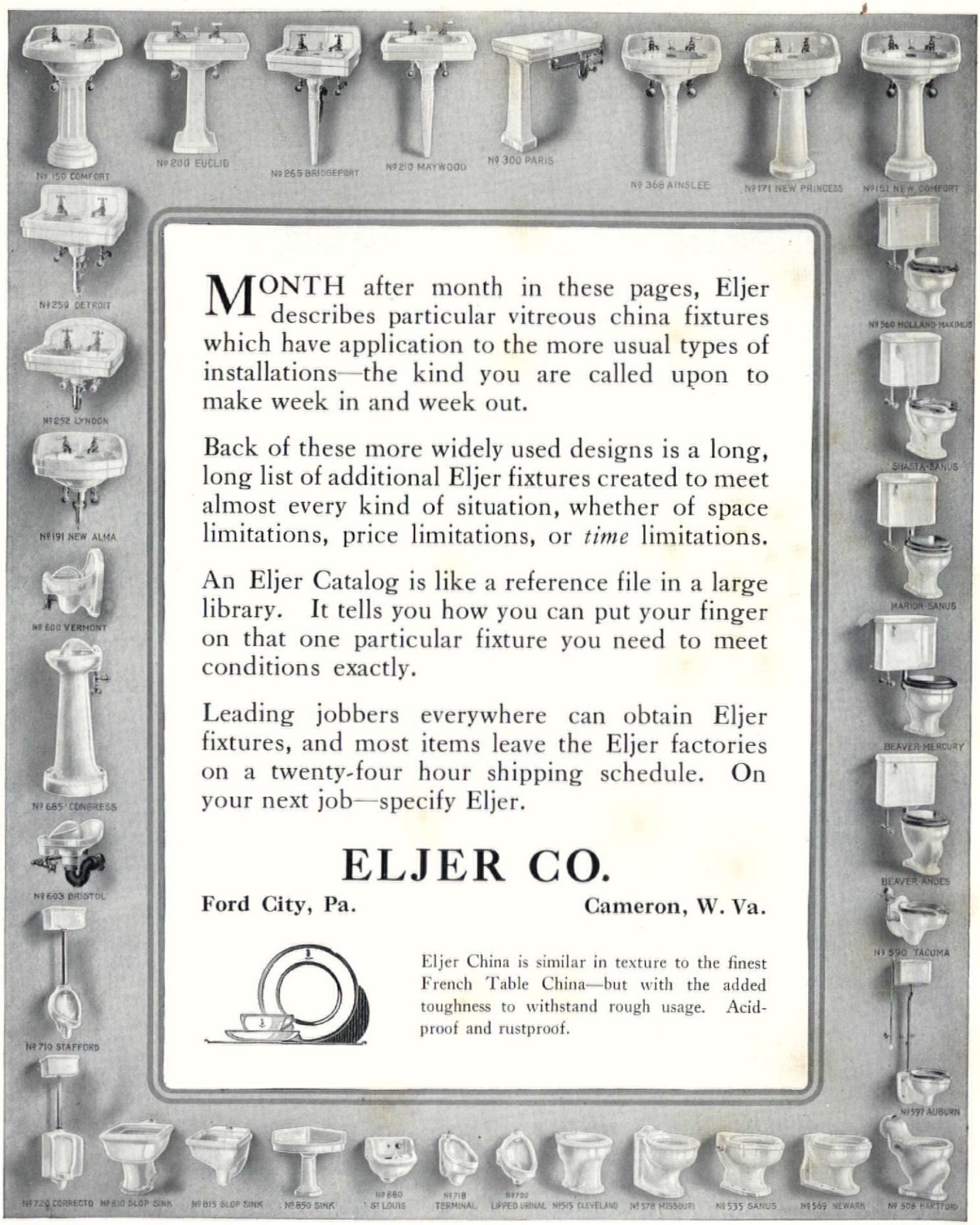

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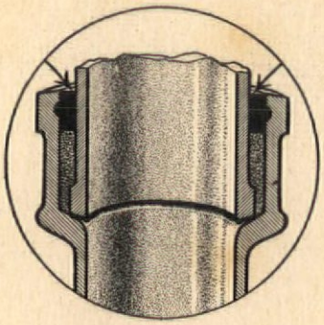
ELJER CO.

Ford City, Pa. **Cameron, W. Va.**

Eljer China is similar in texture to the finest French Table China—but with the added toughness to withstand rough usage. Acid-proof and rustproof.

FOR THE TALLEST BUILDINGS



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NUHUB is the soil pipe with the bead at the base of the hub. This bead assures double strength where the hub and the barrel of the pipe meet—*where strength is needed most.*

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Look for the Bead at the Base of the Hub and the Led-LoK Groove inside!



Strength Where Strength Is Needed Most

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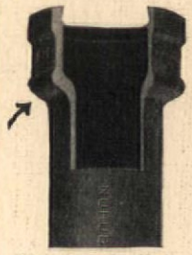
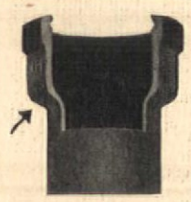


Reinforced Hub and Led-LoK Groove

The Led-LoK is the one lead groove worthy of NUHUB soil pipe. This lead groove—on all "Central Foundry" soil pipe for the past fifteen years—is retained in NUHUB pipe. The lead *can't* work loose.



OLD STYLE SOIL PIPE

Compare photo 1 with photo 2. Note thin easily broken wall at base of hub in old style pipe. See how this glaring weakness has been eliminated in NUHUB pipe.

NUHUB

TRADE MARK

SOIL PIPE



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