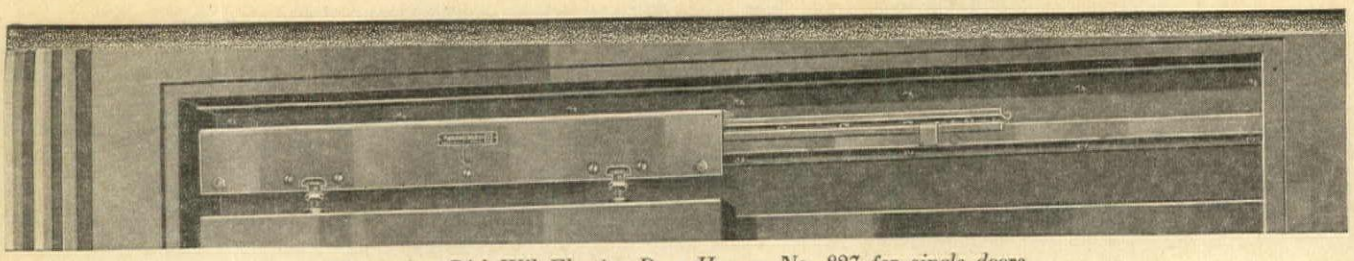
THE ARCHITECTURAL FORUM

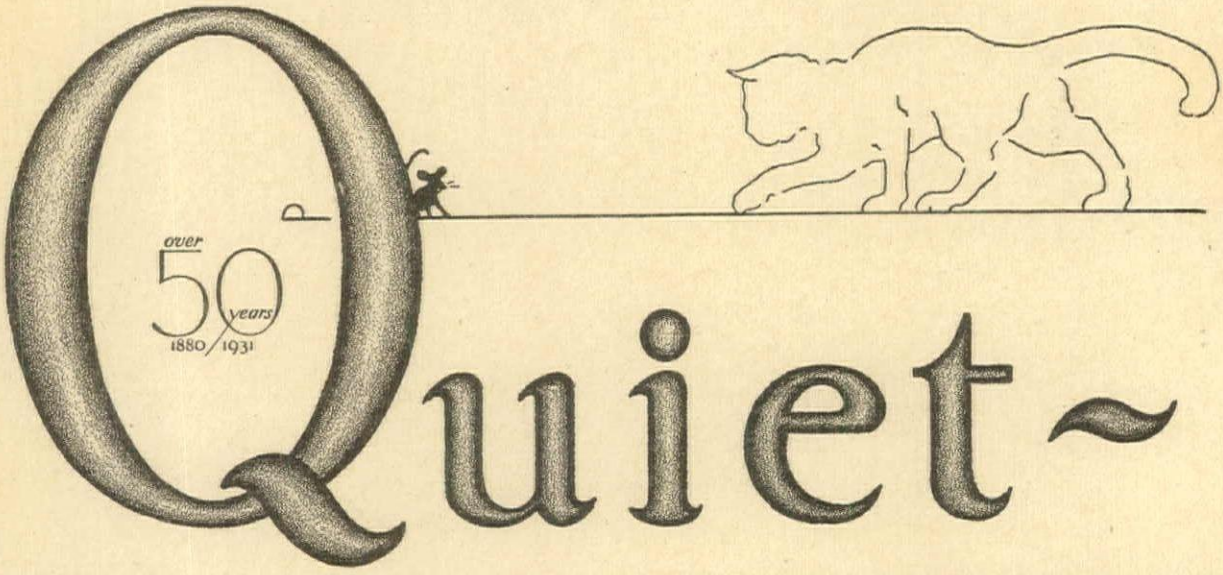
IN TWO PARTS PART TWO

ARCHITECTURAL ENGINEERING & BUSINESS

JANUARY 1931



Illustrating Rich-Wil Elevator Door Hanger No. 827 for single doors



The quietest thing we know (next to a cat stalking a mouse!) is a Rich-Wil Elevator Door Hanger in operation.

It is because the suspended weight of the elevator doors is equally distributed throughout their full travel. That is because the Rich-Wil hanger rides on over-size ball bearings extending the full width of the door, providing perfect alignment.

Extreme quiet and long service are thus assured. Friction is reduced to a minimum. Adjustments are quickly and easily made by simply loosening two nuts.

R-W equipment meets every elevator door requirement. R-W closers pay for themselves in valuable space saved. Standardize on R-W hangers, closers, checks, interlocks, the PowR-Way elevator door operator, and R-W signal systems of all modern types.

Consult an R-W engineer at any time without obligation. Send for R-W catalog No. 44.

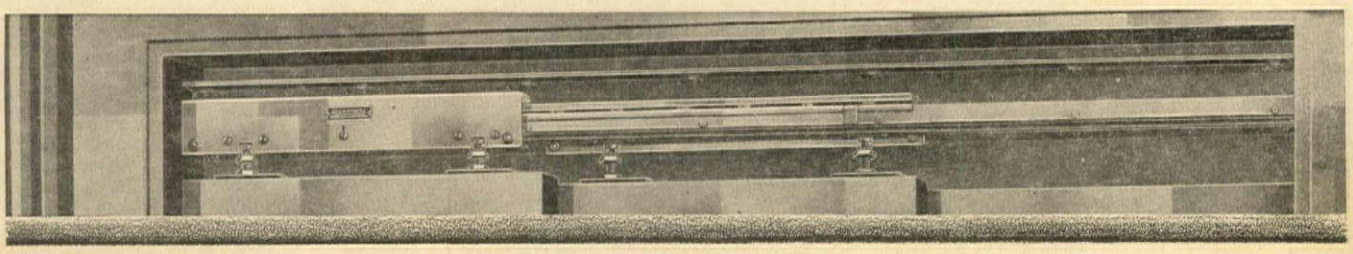
Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

AURORA, ILLINOIS, U.S.A.

Branches: New York Chicago Boston Philadelphia Cleveland Cincinnati Indianapolis St. Louis New Orleans Des Moines Minneapolis Kansas City Los Angeles San Francisco Omaha Seattle Detroit Atlanta Richards-Wilcox Canadian Co., Ltd., London, Ont. Montreal Winnipeg

Illustrating Rich-Wil Elevator Door Hanger No. 828 for 2-speed doors



Now you can specify Temlok in either

INCH OR HALF-INCH THICKNESSES

ARMSTRONG'S Temlok, the new low-cost fibre board for roof insulation, will be made from now on in *both inch and half-inch thicknesses.*

This is for your convenience.

The Armstrong Cork & Insulation Company recommends the solid-inch of roof insulation. But—if you prefer an inch of insulation in laminated half-inch layers, you can specify this. Or, where you deem a half-inch thickness adequate, you will be able to get Armstrong's Temlok in that size.

This range of thicknesses adds another advantage to the many features of Temlok. Fabricated from the heartwood of Southern pine, it is priced within the scale of other fibre insulations. It has extremely low conductivity—only .31 B. t. u., per square foot, per inch thickness, per degree Fahrenheit temperature difference, per hour, at 60 degrees mean temperature.

Also, Temlok's moisture absorption is less than that of any other fibre board. And it provides a strong, secure base for roofing.

We shall be glad to send you complete information and a sample of Armstrong's Temlok. There is no obligation, of course.

Armstrong's (A) *Product*

Just write to Armstrong Cork & Insulation Company, 900 Concord St., Lancaster, Pa.

Armstrong's Temlok

Roof Insulation that's so Economical and Efficient

A FORM *for* EVERY PILE
A PILE *for* EVERY PURPOSE
—*regardless of length*

It rests securely upon RAYMOND CONCRETE PILES

See the heavy reinforced steel shell that is left in the ground

It is significant that for this beautiful structure, termed "the last word" and "the world's finest theatre," these world-famous piles were selected as a foundation . . . so many experienced Architects, Engineers and Owners say they are "the last word" in concrete pile dependability.

RAYMOND CONCRETE PILE COMPANY

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

Raymond Concrete Pile Co., Montreal, Canada

Branches in Principal Cities

Elevator Lobby of the Consolidated Gas Company Building, Boston, Mass.

Architects: Parker, Thomas & Rice
Engineers: French & Hubbard
General Contractors: W. A. & H. A. Root
Elevators: The A. B. See Elevator Company

Beating the kickers to it . . . .

. . . . by providing good elevator service

Human beings are inconsistent—they'll wait hours in crowded lines for the ball game but start a riot at a few seconds delay in elevator service.

Rather than attempt the hopeless task of changing human nature, the Consolidated Gas Company, in their great Boston office building, cater to it—by providing elevator service that meets even the most unreasonable demands. They appreciate the value of the good will they can build among their tenants just as they recognize that good will is a priceless asset among the countless thousands which depend on them for power and light service.

Step into the lobby of the Consolidated Gas Company Building. Note how effectively and quickly the five passenger elevators handle the traffic. These elevators serve seventy elevator entrances equipped with ES side Arm Pneumatic Door Operators, Car Gate Operators and Interlocks. The signal system for the five cars consists of a Complete Flashlight Signal System with Flashlight Night Service Annunciator, Starters Call Back System and Horizontal Ground Floor Electric Light Indicators. The service car is equipped with Mechanical Indicators at all openings to indicate to waiting passengers the position of the car in the hatch.

ES equipment was chosen on the basis of its performance in other modern installations. ES engineering service is available to help you provide good elevator service.

ELEVATOR SUPPLIES COMPANY, Inc.

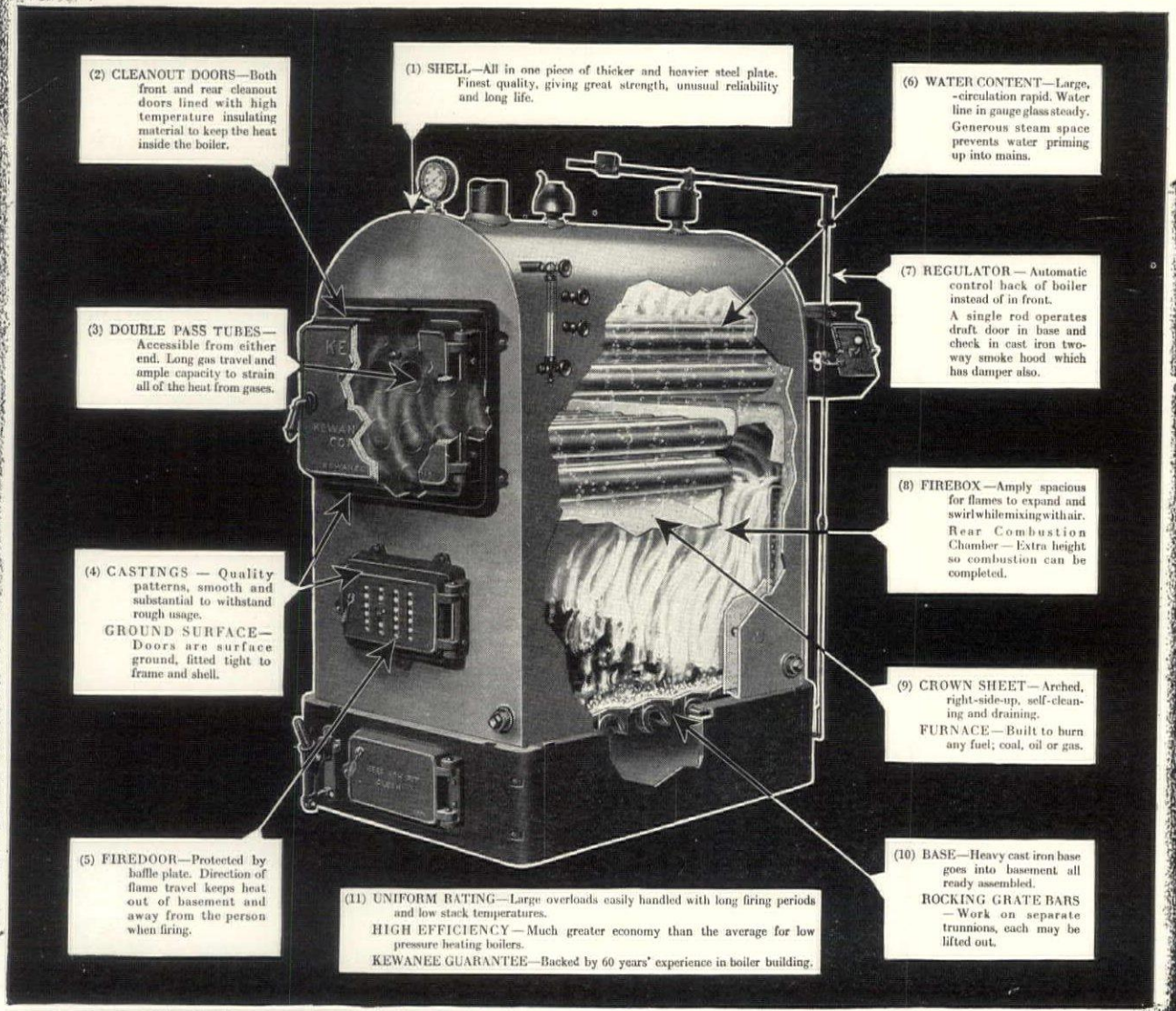
MAIN OFFICE AND WORKS
HOBOKEN, N. J.

BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT LOS ANGELES DALLAS PITTSBURGH PHILADELPHIA SAN FRANCISCO

KEWANEE

Type "R" STEEL BOILER
for Smaller Buildings

COMPARE the new Kewanee Steel Boiler with any other small heating boiler made, and it is quickly seen that the buyer certainly *gets more* by investing in Kewanee. The sectional view shows some of the unusual Kewanee features. Ask for Catalog Number 88.



Tapped for Excelso Water Heater

KEWANEE BOILER CORPORATION

division of American Radiator & Standard Sanitary Corporation

Branches in Principal Cities **KEWANEE, ILLINOIS** MEMBER OF STEEL HEATING BOILER INSTITUTE

TRADITION

"I'M finally convinced, Lad, that now is the time for us to start using arc welding.

I understand that welds produced by a shielded arc are welds that we can stand behind."

PROGRESS

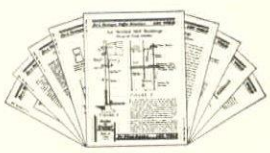
"Right you are, Pop, if we use the Lincoln 'Fleetweld' process. It is the only manual process with a completely shielded arc that produces welds economically.

In this process the shielded arc precludes practically all possibility of oxides and nitrides forming in the weld metal. Consequently welds produced by the Lincoln 'Fleetweld' process have a tensile strength of 60,000 to 75,000 lbs. per square inch—10,000 to 20,000 lbs. stronger than mild rolled steel.

And these welds are ductile. When pulled they will show a 20% to 30% elongation in 2 inches.

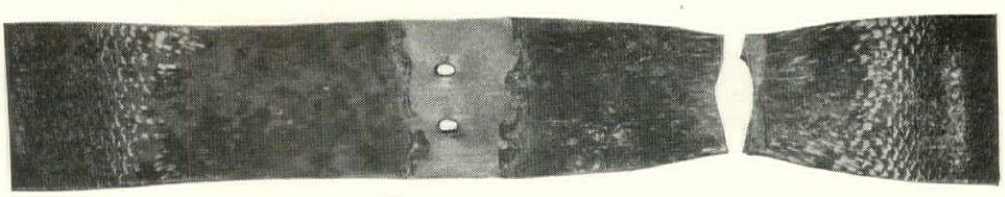
Welding with the Lincoln 'Fleetweld' process costs less because you can weld two or three times faster with it than with any other manual welding method.

Of course in many cases where production warrants automatic welding, the Lincoln 'Electronic Tornado' process will produce the same quality welds with a shielded arc but more economically."

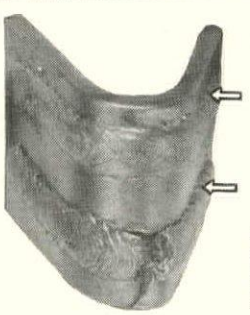


Write for a complete set of "Studies in Structural Arc Welding"

THE LINCOLN ELECTRIC COMPANY
Department No. 4-1 Cleveland, Ohio
World's Largest Manufacturers of Arc Welding Equipment



This test bar of steel plate welded by the Lincoln "Fleetweld" process broke when subjected to pull of 54,000 lbs. per square inch. The weld was machined flush with plate and two .182 in. diameter holes drilled through weld before testing. The stress imposed on the weld was 60,900 lbs. per square inch which stretched the holes to 17/64 in. diameter, an elongation of more than 40%.



Weld made by Lincoln "Fleetweld" process (shielded arc).

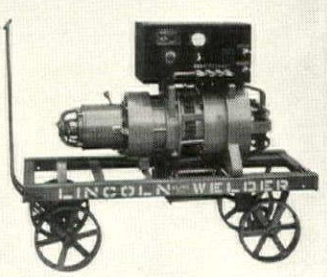
Weld made by ordinary arc welding method.

A simple test of the greater ductility of welds made by the Lincoln "Fleetweld" process. Both welds were made on a straight piece of steel plate which was then bent as shown.

W-159

LINCOLN "Stable-Arc" WELDER

Lincoln "Stable-Arc" welder, motor-driven portable truck type, for use where electric power is available.



UNUSUAL PLASTICITY

UNLESS the bricklayer is given good, rich, mortar, he cannot do quick, neat, economical brickwork. One part Brixment, three parts sand, makes a mortar plastic like a straight lime mix and strong as the brick itself.

It is unusually easy to spread, and when the bricklayer throws up a head-joint, the mortar sticks to the brick. Louisville Cement Company, Incorporated, Louisville, Kentucky.

CEMENT MANUFACTURERS SINCE 1830

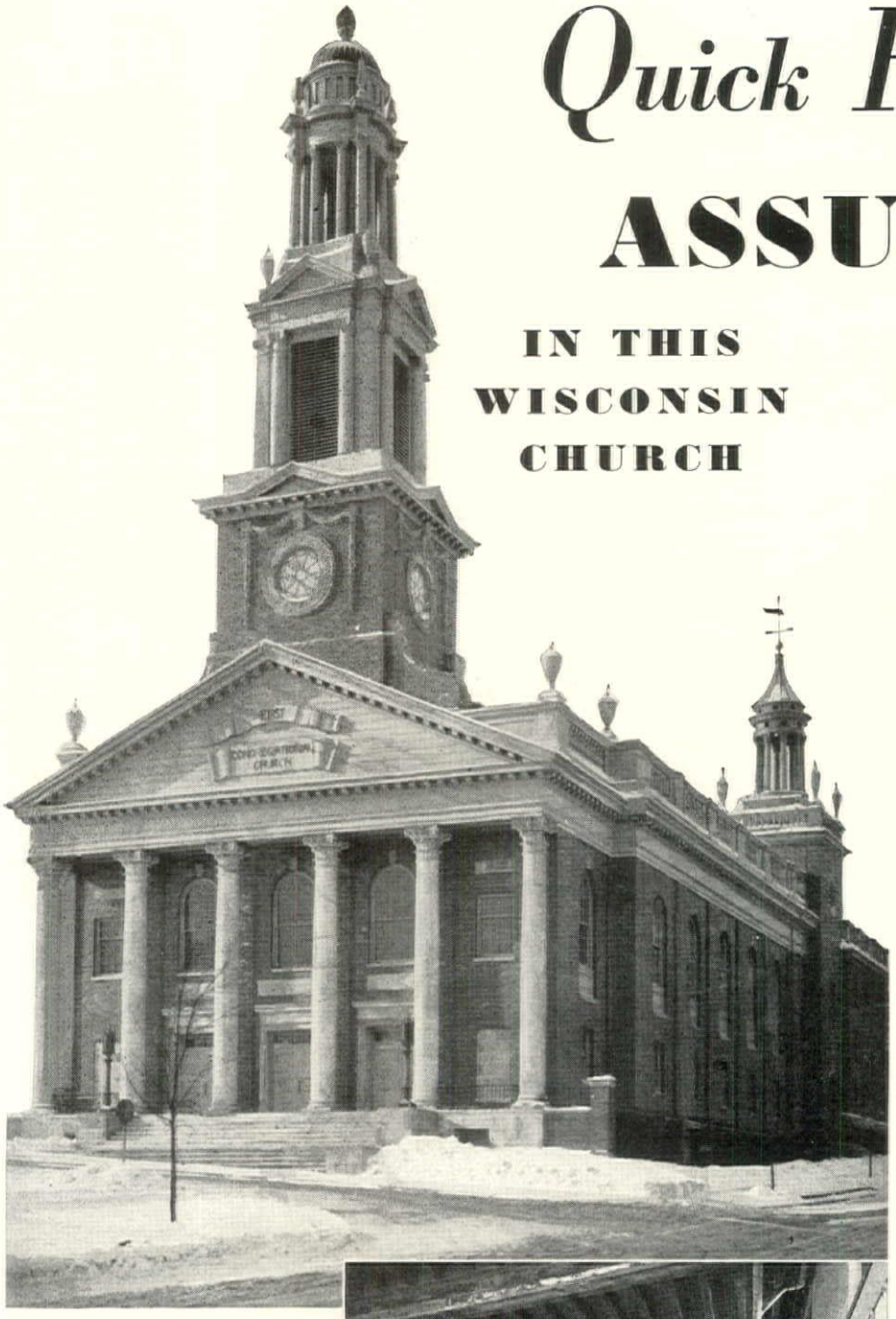
Mills: Brixment, N. Y. and Speed, Indiana

BRIXMENT

for MASONRY and STUCCO

Quick Heating ASSURED

IN THIS WISCONSIN CHURCH



Insulated with 7,000 square feet of Novoid Corkboard, the roof of the First Congregational Church of Madison, Wisconsin, protects the church from winter's cold and summer's heat. Law, Law & Potter, architects. General Paper & Supply Co., Contractors.

QUICK heating has been assured in the First Congregational Church of Madison, Wisconsin, by insulating the roof with Novoid Corkboard. The warm blanket of cork cuts down the rapid loss of heat through the roof. It holds the heat inside and makes it possible to bring the building up to a comfortable temperature in less time and with less fuel. And it can be held at that temperature easily and economically.

Roofs insulated with Novoid Corkboard are an essential in churches and other intermittently used and heated buildings. Not only does Novoid Corkboard assure quick heating and saving of fuel in winter, but it keeps the buildings cooler in summer. Cork keeps sun's heat out as effectively as it keeps in furnace heat.

COMPLETE DATA IMMEDIATELY AVAILABLE

For samples, prices and further information regarding Novoid Corkboard, write Cork Import Corporation, 345 West 40th Street, New York City.

LEFT—*Corkboard has novel use in the church gymnasium. A 4-foot wainscoting protects the athletes from hard knocks against the walls.*

Novoid Corkboard Insulation

For Churches and other Public Buildings

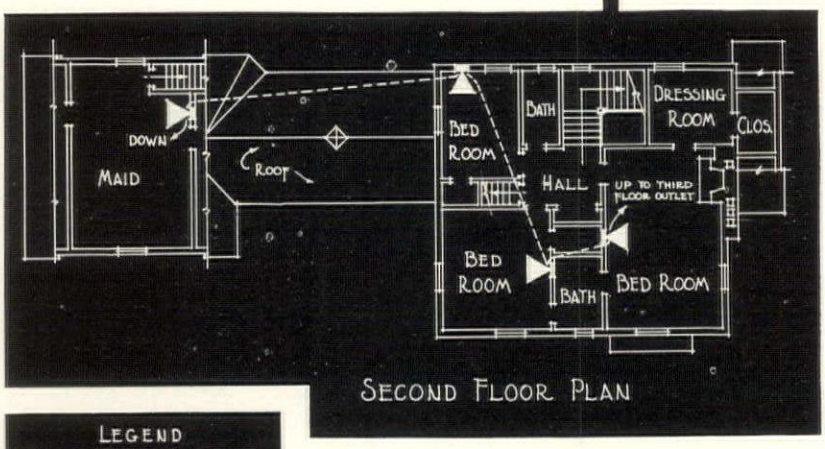
Complete telephone convenience is provided for in the residence of Mr. Russell F. Smith, 501 N. Ironwood Drive, South Bend, Indiana, by ten telephone outlets, including one in the basement and one on the third floor. Two central office lines permit greater freedom in using the service. Built-in conduit carries all necessary wiring. FETT, PEARSON & GOFFENEY, Architects, *South Bend, Indiana.*

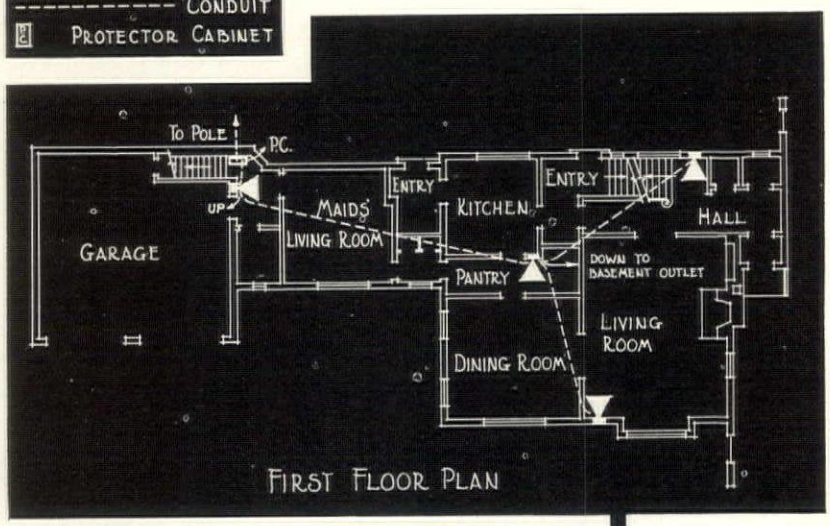
TODAY, TELEPHONE CONVENIENCE IS PLANNED IN ADVANCE

MODERN HOMES, built for comfort and convenience, have telephones throughout . . . in living room, library, kitchen, garage, bedrooms, nursery . . . wherever time and steps can be saved by quick communication.

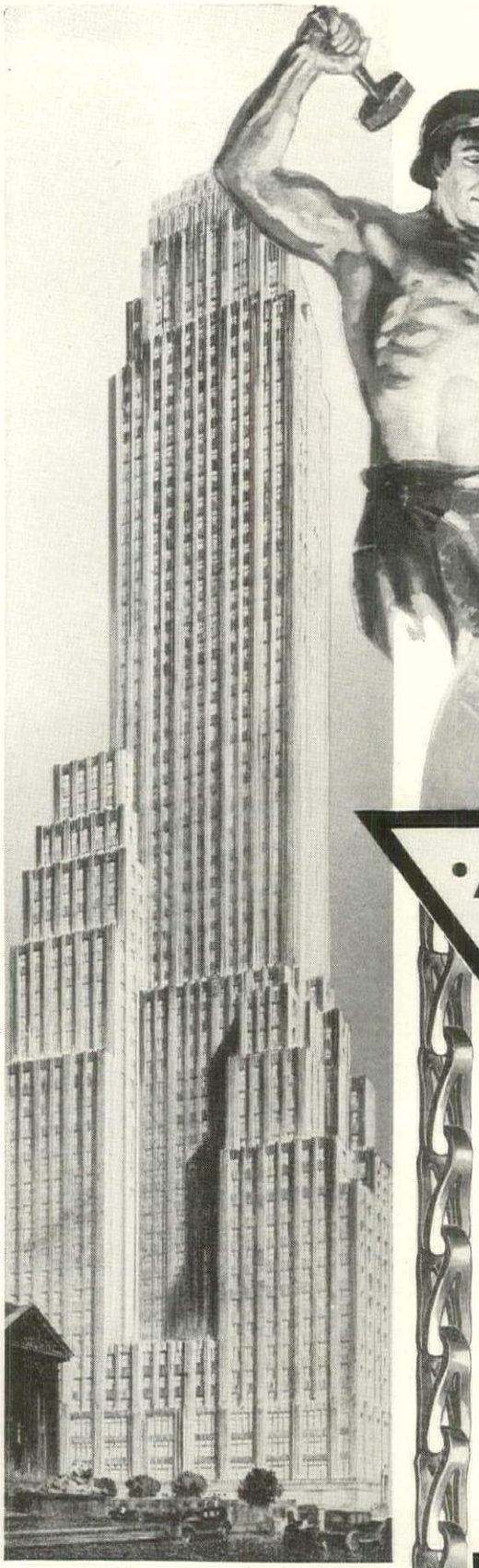
Many architects, in planning new or remodeled residences, now specify conduit for telephone wiring within the walls and floors. In this way, it is possible to provide telephone outlets at the most convenient locations in each of the important rooms. All wiring is completely concealed, thereby giving greater freedom from certain types of service interruption. Moreover, the home owner may use any number of outlets at a time, and can readily expand or rearrange his service to meet changing requirements.

Your local telephone company will be glad to assist you in planning the telephone arrangements for any of your projects. There is no charge for the service. Just call the Business Office.





AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES — BELL SYSTEM



ACCO

THE SYMBOL OF QUALITY IN CHAIN

THERE are four silent workers in each window . . . four lengths of dependable chain. Dependable because the material is the very best quality. Dependable because American Sash Chain is uniform in strength and size, link for link.

You are safe when you *specify* American Sash Chain.

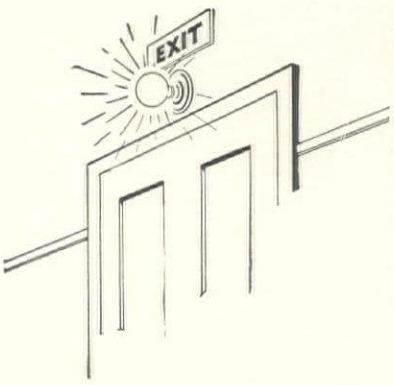
Write for full particulars.

AMERICAN CHAIN COMPANY, *Inc.*
BRIDGEPORT, CONNECTICUT
District Sales Offices:
Boston, Chicago, New York, Philadelphia, Pittsburgh, San Francisco

Equipped throughout with
AMERICAN SASH CHAIN
"500 Fifth Avenue Building"
Corner of 42nd St. and 5th Ave.
New York City
Architects: *Shreve, Lamb & Harmon*
Builders: *C. T. Wills, Inc.*
2017 Campbell Metal Windows

AMERICAN SASH CHAIN

Is there a place in *Your* plans *for* USELESS EXIT LIGHTS?



POWER fails—lights go out. It may be in a hospital where an operation is being performed . . . it may be in a theatre where crowds will become panicky . . . it may be in school auditoriums where programs will be interrupted.

This may not happen today or tomorrow; but when it does, will the foresight in your plans protect? Or will important light units fail with the power because no emergency lighting system was provided for? Will intended useful exit lights turn out to be USELESS EXIT LIGHTS?

Architects all over the United States are learning the advantages of an Exide Emergency Lighting Battery—and are specifying it for all kinds of buildings where crowds gather.

Include an Exide Emergency Lighting Battery in every building YOU plan and be safe.

An Exide Battery instantly and automatically takes over the entire emergency load when current fails—without so much as a throw of the switch.

And Exides are not expensive to buy . . . their maintenance cost is surprisingly low.

Find out more about Exide emergency batteries. Write for our Emergency Lighting Bulletin, or consult Sweet's Catalog, Pages D 5810-11. Better yet . . . have an Exide representative call. He has some interesting facts to tell you. Write today. No obligation.

AUTOMATIC PROTECTION for light and power. Picture shows typical Exide Emergency Lighting Battery in glass jars, which make inspection easy. Cells are arranged in neat, compact racks, and are placed in basements of buildings near the engine room. They take up little space and the arrangement is flexible.

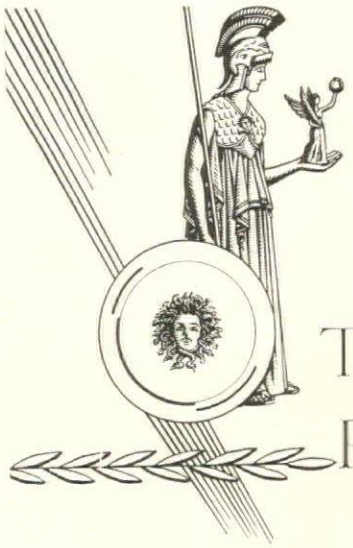
Exide

EMERGENCY LIGHTING BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto



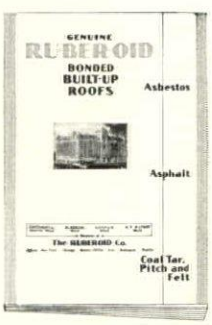
THE WISDOM OF SPECIFYING RU-BER-OID BUILT-UP ROOFS

Architects specify the type of built-up roof that best fits *each* building. Whether that choice is Asbestos, Coal Tar Pitch and Felt, or Asphalt, The Ruberoid Co. can afford to be impartial. Ruberoid has them all.

Ruberoid's flexible specifications meet any condition of climate, atmosphere, unusual wear or roof design. Their price range makes them attractive for any work. Their service record is proved over a long period of years.

To safeguard the architect, the builder and the owner, RU-BER-OID Built-up Roofs are guaranteed both as to workmanship and material for 10, 15 or 20 years, according to the specification used. This guarantee is backed by a National Surety Bond. These guaranteed or bonded roofs are applied only by approved roofing contractors of known skill and reliability.

For ready reference, you will find a complete catalog of RU-BER-OID Built-up Roof specifications in 1931 Sweet's. Should you desire extra sets of these specifications, or face a roofing problem resulting from unusual conditions, there is an engineering department at each Ruberoid office listed below. Simply write or 'phone. Your inquiry will receive our prompt attention.



The RUBEROID Co.

ROOFING MANUFACTURERS FOR OVER FORTY YEARS

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

ASPHALT SHINGLES AND ROLL ROOFINGS—ASBESTOS-CEMENT SHINGLES AND CORRUGATED SHEETS—ASBESTOS, ASPHALT, COAL TAR PITCH AND FELT BUILT-UP ROOFS—ASBESTOS, SHEATHINGS, FELTS, MILL BOARD, PIPE COVERINGS—KRAFT WATERPROOF PAPERS—COAL TAR AND ASPHALT FELTS AND SHEATHINGS—ASPHALT WATERPROOFING PAINTS AND CEMENTS—DRY FELTS AND SHEATHINGS

Offices & Factories: New York, N. Y.—Chicago, Ill. Millis, Mass.—Erie, Pa.—Baltimore, Md.—Mobile, Ala.

ARMCO INGOT IRON

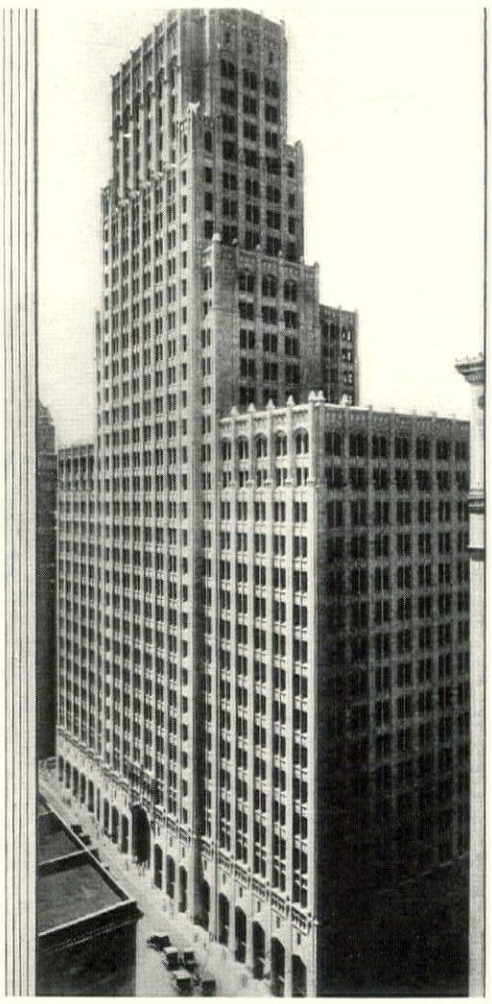
...sound construction with *low-cost* service

YOUR sheet and plate construction can be as sound and durable as the rest of the structure. Both in original cost and upkeep, Armco INGOT IRON is decidedly the economical metal.

Your assurance of long, dependable service lies in Armco INGOT IRON's splendid twenty-five year performance record—the longest record of actual service of any low-cost, rust-resisting sheets and plates. Here is a metal that's proved by impartial time and rigorous service.

Metal lath, cornices, marquises, window frames, skylights, heating and ventilating ducts, stacks—these are some of the places where Armco INGOT IRON serves long and economically. But let an Armco Engineer tell you more of this interesting story. He is only as far from you as your telephone.

TUNE IN—The famous Armco Concert Band
broadcasts every Thursday night
WLW—700 K. Cincinnati
Nine to nine-thirty,
E.S.T.



An important part of the modern skyscraper is the lath that sustains its inner walls. Architect George W. Kelham provided built-in security for the imposing Russ Building, in San Francisco, when he specified strong, rust-resisting Armco INGOT IRON lath. One hundred fifty tons of Herringbone lath were used.

THE AMERICAN ROLLING MILL COMPANY
Executive Offices: Middletown, Ohio
Export: The ARMCO International Corporation

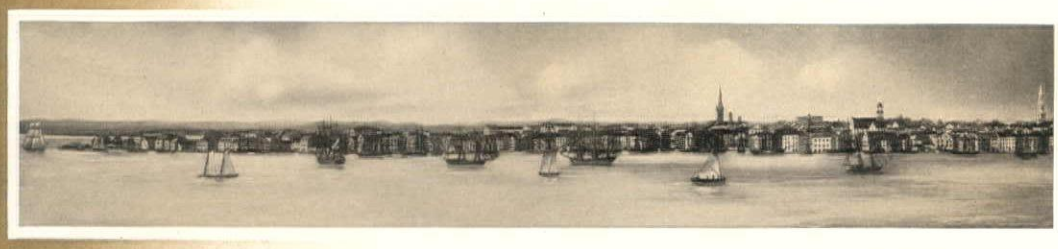
DISTRICT OFFICES: Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco

Back of this familiar symbol is nearly thirty years' experience in the manufacture of special analysis iron and steel sheets and plates. When you want a rust-resisting, low-cost metal be sure to see this triangle and the words "Armco INGOT IRON." It is your assurance of dependable, economical service.

"BE SURE IT'S MADE OF ARMCO INGOT IRON"

NEW YORK CITY

LOWER MANHATTAN



1798

Before the use of Elevators.

1876

22 years after Elisha Otis made the first Safe Elevator.

1908

A few years after the Otis high-speed gearless electric elevator was perfected.

1930

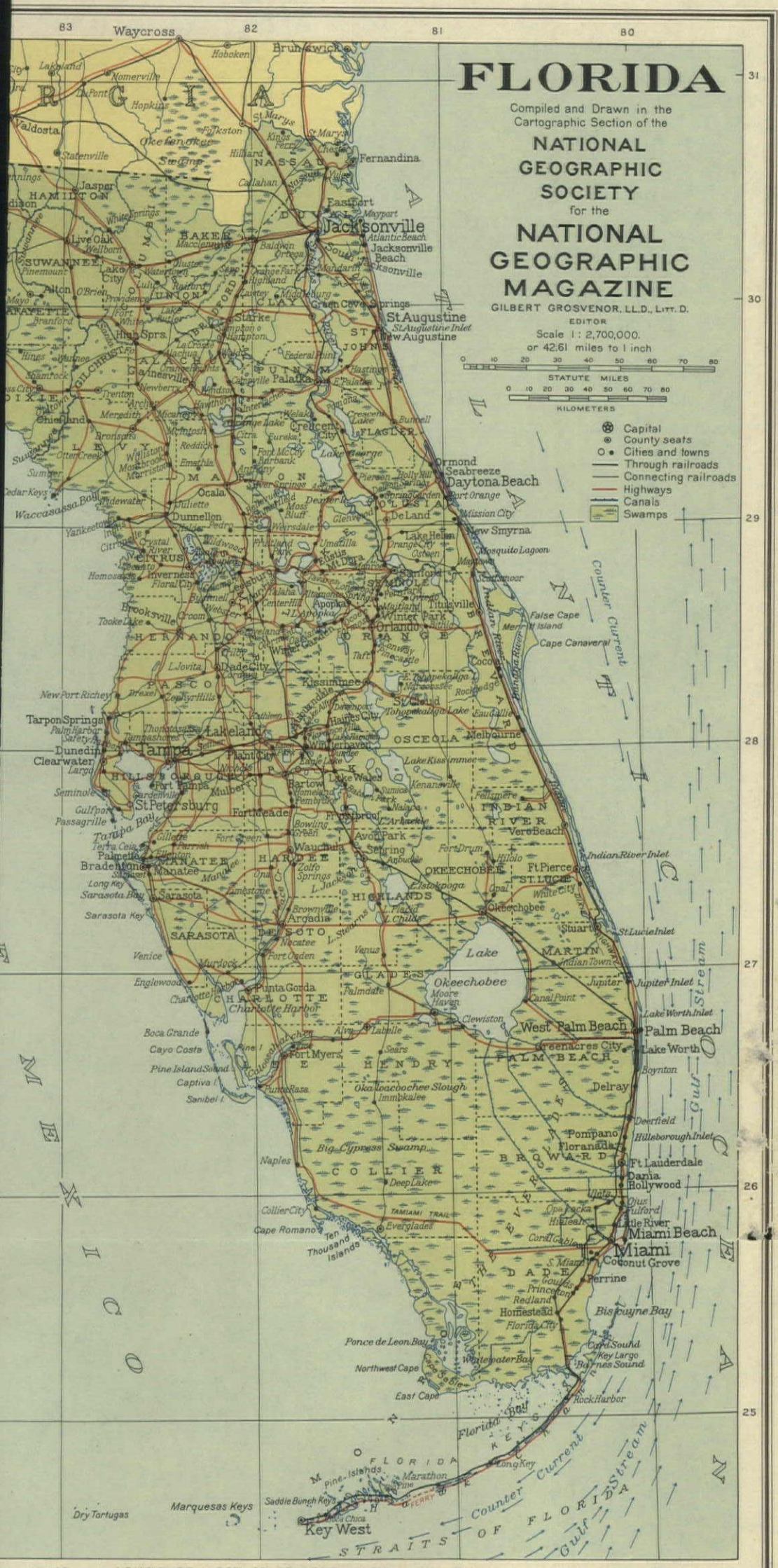
6 years after the introduction of Otis Signal Control Elevators.

ITS GROWTH IN 132 YEARS

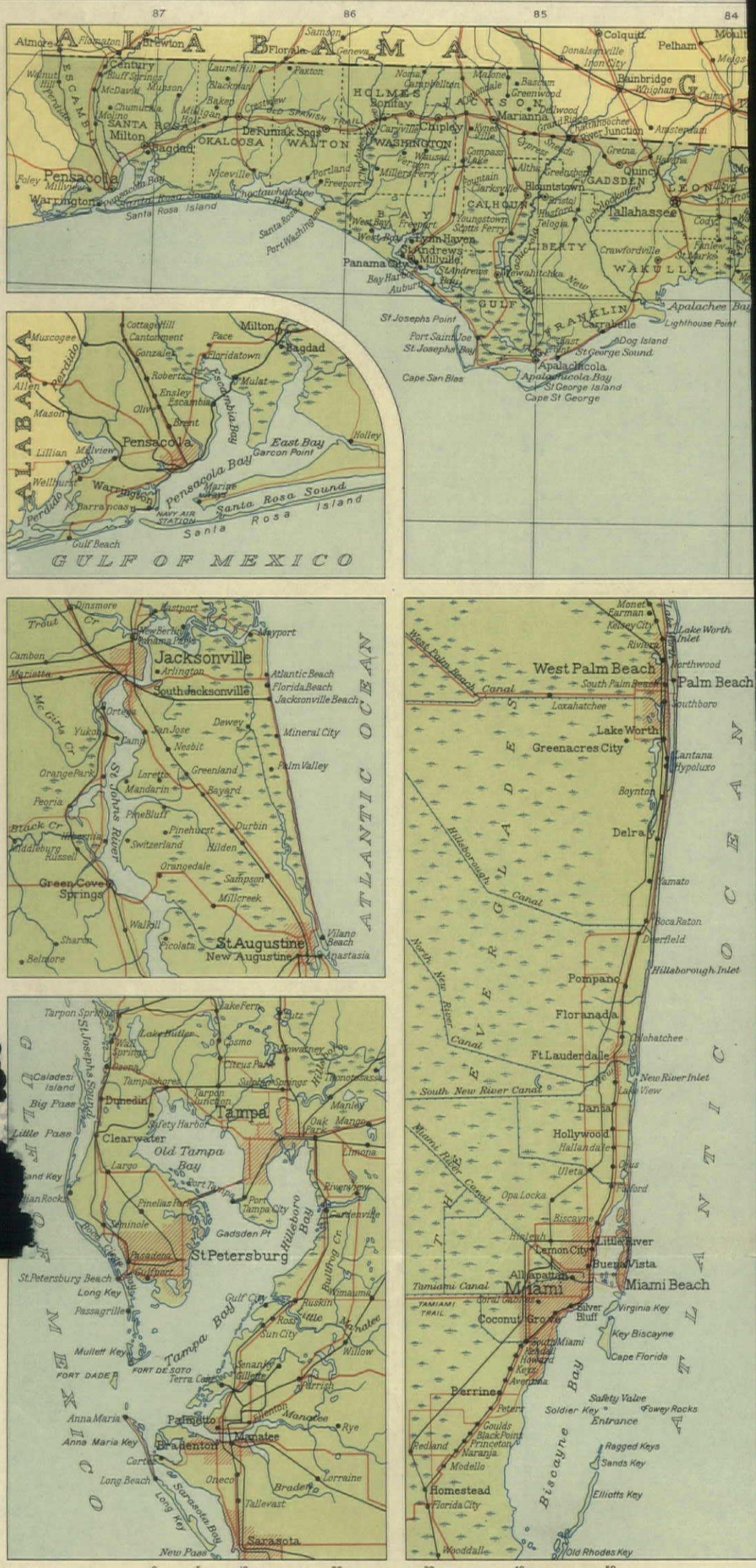
Presented to illustrate an outstanding example of the effect which the seventy-six years development of the Otis Elevator Industry has had on the cities of the World.

OTIS ELEVATOR COMPANY

OFFICES THROUGHOUT THE WORLD



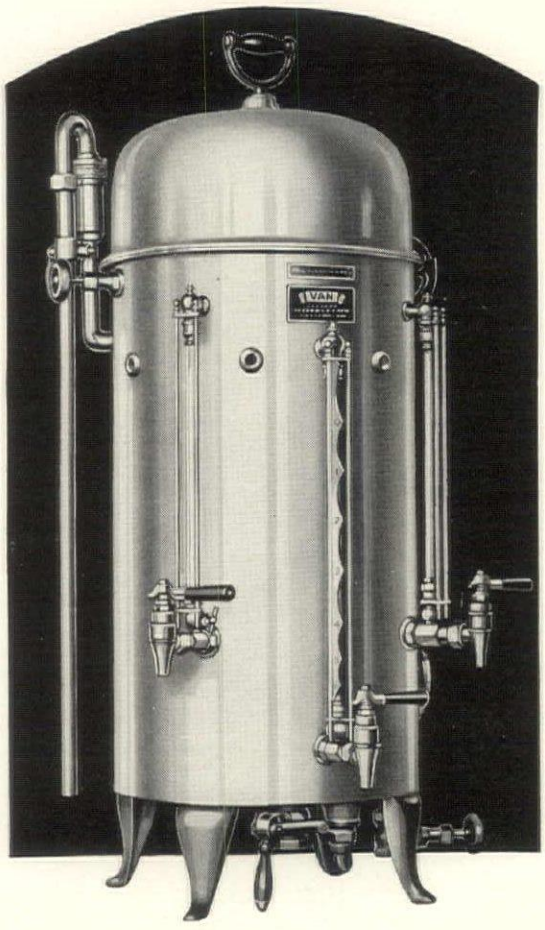
WILLIAMS & HEINTZ CO., LITHOGRAPHERS, WASHINGTON, D.C.



Since coffee is the most important single item on the menu . . . you really should recommend the

PETERSEN URN

Pyrex Glass Lined and Equipped with "Tomlinson" Faucets



SIZES AND PRICES OF THE FAMOUS "PETERSEN" COMBINATION COFFEE URN

For Gas	For Steam	Coffee Cap'y	Width incl. Diam.	Width incl. faucets	Height of Urn Cover closed	Height of Urn Cover open	Price
14E875	14E1075	4 gal.	16″	21″	43½″	48½″	$300.00
14E876	14E1076	6 gal.	17″	22″	47½″	53″	335.00
14E877	14E1077	8 gal.	18″	23″	50″	55½″	375.00
14E878	14E1078	10 gal.	....	....	....	....	425.00

"Petersen" Urns with Electric Heating Units — When ordering electrically heated urns state voltage of your electric current and whether alternating or direct current.

For Electricity	Coffee Cap'y	Diam.	Width incl. faucets	Height of Urn Cover closed	Height of Urn Cover open	Price
14E910	4 gal.	16″	21″	43½″	48½″	$360.00
14E911	6 gal.	17″	22″	47½″	53″	400.00
14E912	8 gal.	18″	23″	50″	55″	445.00
14E913	10 gal.	...	...	....	....	500.00

The "Petersen" Coffee Urn makes perfect coffee, according to the newest scientific principles of coffee-making. Fresh coffee is available for a much longer period due to the patented air chamber between the coffee jar and water jacket, which maintains an even temperature of approximately 200° Fahrenheit.

The "Petersen" Urn is easy to operate—cannot overfill the coffee water compartment. It extracts the maximum coffee flavor, with the least amount of tannin. It saves space—does the work of a two urn battery! Fitted with "Tomlinson" No-Drip Faucets.

There is no repouring with the "Petersen" Urn. It saves time and labor, and at the same time produces *better coffee!*

We make no extravagant claims for the "Petersen" Urn. Instead, we refer you to its many enthusiastic users.

The "Petersen" Urn is of the very heaviest and finest construction, presenting a handsome appearance in any service. The body is extra heavy cold rolled copper, heavily nickeled. The bottom is even heavier. The cover is hinged, which prevents it from being thrown around and possibly dented. The spray head is silver plated and may be swung out of the way or removed and cleaned. Made with Pyrex glass liner and fitted with "Tomlinson" No-Drip Faucets. With each urn is included filtrator and filter cloth.

The "Petersen" Urn is also offered in a two-jar size—does the work of a three-urn battery.

The "Petersen" Urn may be purchased through your equipment jobbers, or direct from The John Van Range Co.

Chicago Sales Office
1200 West 35th Street

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

Detroit Sales Office
170 East Larned Street

St. Louis Dallas Atlanta *General Offices: Oakley, Cincinnati, Ohio* Cleveland New Orleans

Von Duprin

Self-Releasing Fire and Panic Exit Latches

For the New Day

This, Sir, is the day of change.

Architectural forms and architectural materials that were good enough twenty years ago, are not always adequate now.

Yesterday's champion may trail the pack today. And be forgotten tomorrow.

Into this age of constant searching for new and better materials, the new series genuine Type "B" Von Duprin device brings a wholly new conception of exit service. Modern in line, stronger, more reliable than any devices known a few short months ago, these new Von Duprins are finding their rightful place on the doors of the noblest structures of today.

Sweets
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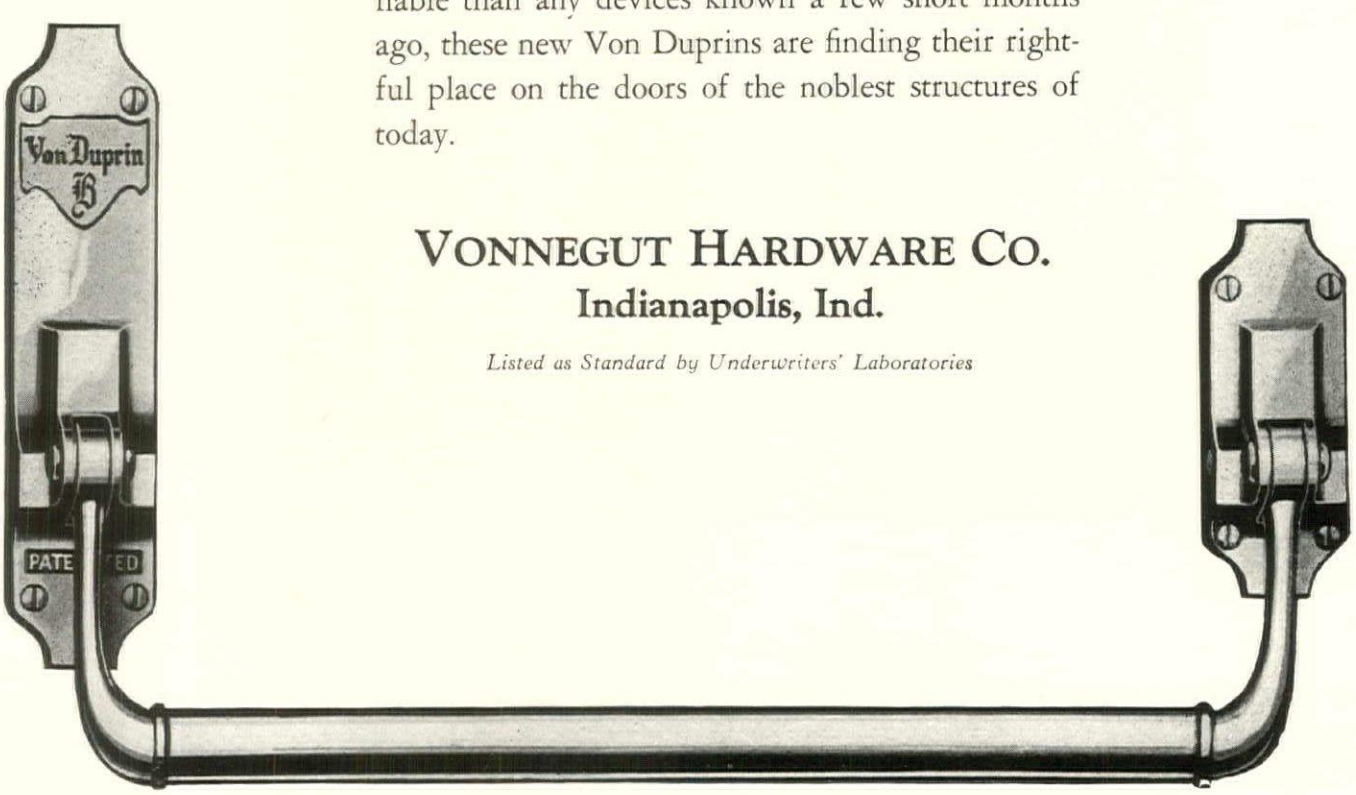

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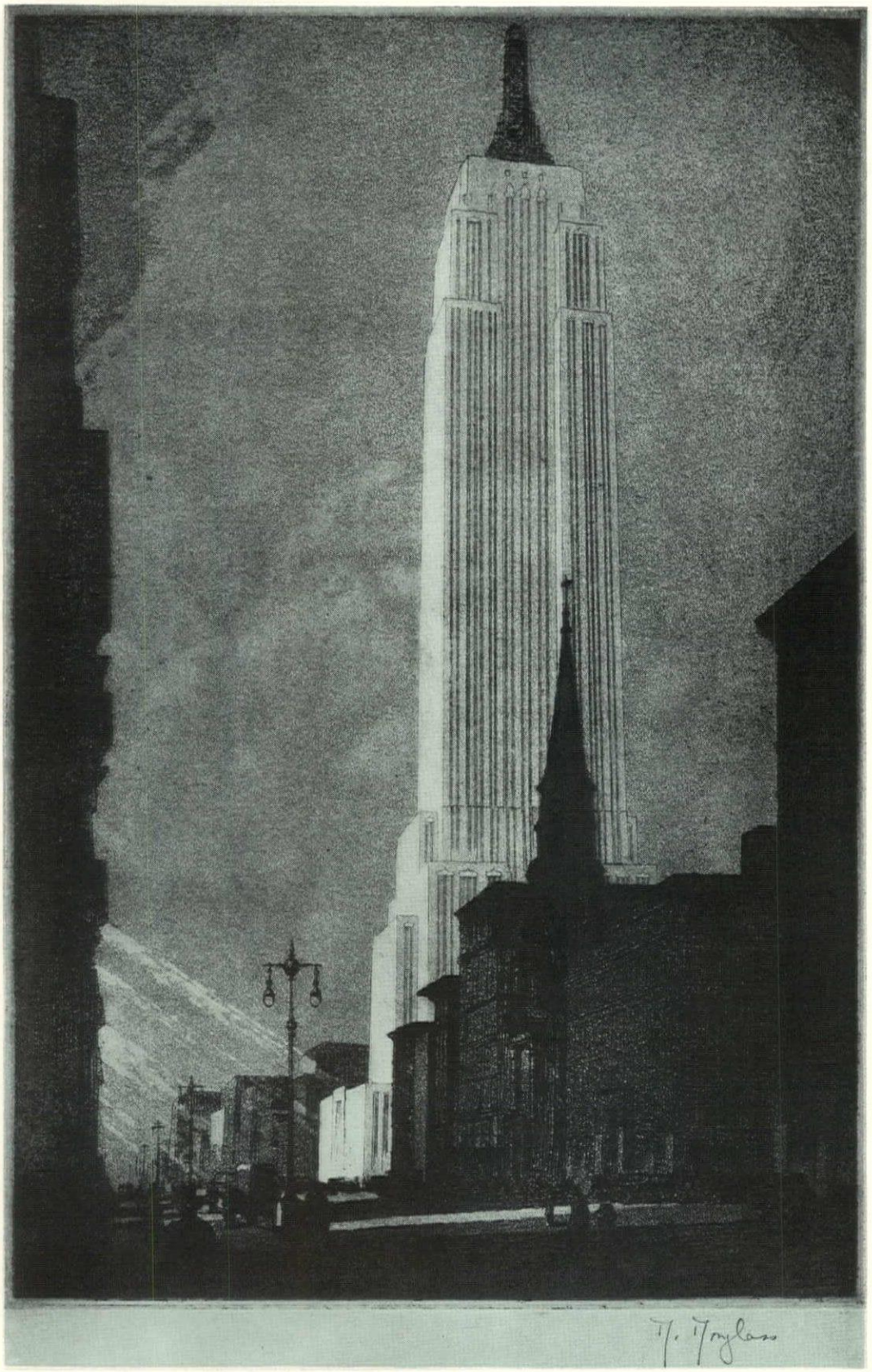

WHERE STONE AND STEEL BLEND WITH THE BLUE

Aquatint etching of the Empire State Building, New York, N. Y., the world's tallest building—Shreve, Lamb and Harmon, Architects—Fred. Brutschy, Consulting Plumbing Engineer—Meyer Strong & Jones, Inc., Consulting Heating Engineer—Starrett Bros. & Eken, Inc., General Contractor—J. L. Murphy, Inc., Plumbing Contractor—Baker Smith & Co., Heating Contractor . . . Jenkins Valves were selected for both the heating and plumbing of this monumental structure . . . Jenkins Bros., New York — Boston — Philadelphia — Chicago — Houston

It's a mighty tall army . . if you average just the four tallest men.

And another way to keep the average high is to give all the short ones leave of absence while the average is taken.

An average is reliable and useful *only* when you are *certain* that it includes *all* the factors that it should . . . "all present or accounted for" . . . And especially is this true in judging heating system steam consumption figures.

There are no less than *forty-five* separate variable factors that may affect the steam consumption of any heating system. To allow any one of them to be overlooked, forgotten or disregarded may lead to faulty conclusion or false decision.

We have prepared a "check-list" of these 45 variable factors to help you check your steam consumption figures and estimates. Write for one or more copies. We will be glad to send them gratis to anybody.

Engineers, architects and heating contractors will find the related subjects of heating steam consumption analysis, estimating and heating cost accounting, as presented by Warren Webster & Company, of vital interest.

A request for further details will bring a Webster steam heating specialist to discuss this vitally important subject.

A Heating System for Every Need and Every Purpose

Heating requirements vary so widely that no one type of heating system can be expected to provide the greatest return on the dollar invested in the heating equipment for all types and sizes of buildings. Realizing this, Warren Webster & Company have consistently developed an entire group of Webster Systems of steam heating to provide *a heating system for every need and every purpose.*

Webster MODERATOR System provides "Controlled - by - the-Weather" heating and makes possible new methods of operation and new standards of economy. Can be applied to any existing steam heating system of sufficient size.

IMPROVED Webster Vacuum System provides distribution balanced from the start—the supply of steam to each radiator is so equalized that all radiators get steam at the same time and in substantially the same proportion, regardless of distance from the boiler. May be supplemented by HYLO Vacuum Variator, permitting manual control by building operator. Applicable to new or existing installations.

IMPROVED Type "R" System for residences and larger buildings as well, combines advantages of steam heating with advantages of hot water, but without limitations. Meets fully the operating requirements of newer fuels, newer types of radiation and newer thermostatic controls. Also provides better-than-ever heating service with old radiation and old controls.

Full details of any or all of these systems will be furnished on request.

Warren Webster & Company, Camden, N.J.
Pioneers of the Vacuum System of Steam Heating
Branches in 60 Principal U. S. Cities
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Webster
Systems of Steam Heating

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This is one of a series of advertisements discussing the factors affecting heating steam consumption. The purpose of the series is to call attention to the methods of heating steam consumption analysis, estimate and heating cost accounting developed by Warren Webster & Company to provide a reliable basis for comparing heating system efficiency. Actual detailed facts and figures of steam consumption of a number of Webster Systems of Steam Heating, prepared in accordance with these methods, are available for your examination.

BOOK DEPARTMENT

COLONIAL IRONWORK IN OLD PHILADELPHIA

A REVIEW BY
OLIVER SEMPLE BARTON

IT can hardly be said of ironwork that overmuch has been written of it, so far as the United States are concerned, and this latest work will command immediate attention. Perhaps no form of craft work possesses a stronger appeal for the architect. Iron has been a most useful material since the earliest days and has always been closely associated with architecture, either giving protection in troublous times or decoration in later days. The author of this work presents a volume of plates and drawings devoted exclusively to the ironwork of colonial Philadelphia and of the same city during the early days of the republic, a work of the utmost value to the architect and one which will be welcomed by anyone interested in craftsmanship in iron. The introduction by Fiske Kimball is sympathetically and historically in harmony with the work of the author and voices an appeal to architects to make themselves responsible for the craftsmen employed to carry out their ideas of coördination between a building's structure and its embellishment, be it of iron or what not.

Cast Iron Balcony Railings,
232-234 South Third Street

The city which saw the birth of American independence and which was for many years the nation's capital emerged from the ordeal of the Revolution vastly better off than either New York or Boston. William Penn had founded well, and the city was the home of wealth, culture and prosperity, and the Quakers supplied a large part of the funds that made possible the embellishment of their city. Its civil and ecclesiastical architecture as well as the purely domestic and business houses afforded, almost without exception, backgrounds for some of the finest wrought iron of colonial days. The plates and drawings presented here help one to realize how much we are indebted to the citizens of Philadelphia for such a splendid "survival of the fittest" of the ironworker's art. The young town had been begun on the banks of the Delaware River, and during its first century of existence there had been erected many buildings of note displaying not on'y an English influence but much of a strongly native character. To this day we are indebted to their builders for sound construction and use of enduring materials. The builders were influenced by the needs of a young and isolated life, and today the ironwork reveals its part in the development of new ideas, beauty and good taste, resulting in a series of heirlooms full of charm and dignity, a delight to architects, artists and all who have a desire for a more sincere appreciation of the dignified and æsthetic, in both architecture and the allied crafts.

The illustrations in this volume lead us to live over the life of colonial days when men and women passed in and out of beautiful buildings or lived a life of charm and comfort in houses which were something apart from absolute English type, something which gave a less limited view of existence and its possibilities. Mr. Wallace has run his gamut with a keen eye for the development of ironwork, from the solidity of square bars and plain railings of the early period up to the time of the Revolution. To the earlier time belong the fences of St. Paul's and the gates of Christ Church burying ground and others. The sturdy fence and graceful gates of St. Peter's and the careful consideration of correct detail and proportion in the comprehensive draftsmanship displayed in the drawings of William Allen Dunn help one to a better understanding of the fine qualities of the earlier work. Much of it was influenced by English ideals, as both plates and drawings indicate. Careful consideration of the illustrations proves that much attention was paid to proper spacing and that thought was given to soundness of outline and construction.

Withal a free flowing is true of all curves and spirals, while spikes and finials surmounting both gates and rails are frankly what they were intended for,—protection as well as to give a proper finish. It is evident that the author has a keen feeling and interest for his subject, for the care taken in the selection of examples for reproduction gives added charm and assurance to his work.

Following the earlier types there came what might be known as the work of the "middle period," when a certain lightness and grace of pattern were displayed in nearly all examples chosen. The introduction has well mentioned the fine stair balustrade of "Solitude" on the Schuylkill, and the balcony and railings of the Stephen Girard Warehouse. These latter in particular call for

Selected Books on Architecture

Colonial Iron Work in Old Philadelphia
By Wallace and Dunn

THIS splendid collection of photographs and measured drawings will prove a welcome addition to the library of every architect, for its carefully selected examples are certain to give helpful suggestions on every problem of design. The work shows the evolution in the use of iron for ornamentation from the plain square bars of the pre-Revolutionary Powel railing, through the graceful, simple curves of the Solitude stair and the Dirard balcony, to the Greek Revival with its ornaments and even ensembles in cast iron.

Both the photographs and measured plates are clearly printed in large size, so that every detail may be easily seen. Profiles and sections are also given.

150 full page plates, 200 figures, 40 full page measured drawings, cloth. Price $15.00.

Mexican Houses
By Garrison and Rustay

THE houses in this volume are carefully selected examples of the Minor and Domestic Architecture of the country. These are 45 plates of measured drawings of small houses. These show not only plans, facades, elevations, and details, but are complete with notes on the color materials and ornamentation.

Over 200 photographs illustrate interiors as well as exteriors, facades, patios, gardens, doorways and windows, and some splendid examples of wrought iron work, use of glazed tiles for wall treatments, dados, fountains, niches, and kitchens.

174 full page plates, 10 x 13½ inches, with 8 pencil sketches, and 45 full page measured drawings, cloth bound. Price $15.00.

American Theatres of Today—II
Edited by R. W. Sexton

THIS second book is devoted to a discussion of the various phases of the plan, design, and equipment of the modern theatre building. Chapters on various subjects have been contributed by men who stand at the head of their profession in the several fields.

There are one hundred and sixty-four pages, 125 of which are full page plates, illustrating plans, sections, and exterior and interior views of the most recently designed theatres in this country. The text, too, is illustrated in many cases by specially prepared drawings.

Contents by Chapters—1. Tendencies in the Design of the Present-day Theatre. 2. The Design of the Modern Theatre. 3. A Standard Method of Planning a Theatre. 4. The Decoration of a Theatre. 5. Electrical Installation in the Modern Theatre. 6. Theatre Acoustics. 7. Heating and Ventilating a Theatre. 8. The Theatre Owner and the Architect. 9. The Theatre of Tomorrow.

164 pages, 10 x 13 inches, over 300 figures, cloth. Price $13.50.

Gargoyles, Chimeres, & Grotesque in French Gothic Sculpture
By L. B. Bridaham

THIS book contains about six hundred clear examples of sculpturesque detail, most being shown in the original architectural setting, which makes this an important source book for architecture as well. All classes of details are treated, such as capitals, brackets, pinnacles, gargoyles, chimeres, tympanum sculpture, symbolic and non-symbolic work in stone, and stall details, misericordes, and civil carvings in wood. Many of the photographs are of work which has been destroyed during the World War, therefore representing the only records of such sculpture. An introductory text gives the historical setting in which such sculpture was born, and indicates the forces responsible for its existence.

250 pages, 9½ x 12½, 600 figures, cloth. Price $18.00.

American Commercial Buildings of Today
By R. W. Sexton

THE latest developments in the design of commercial buildings in this country are given in this new work.

The illustrations are divided into four groups: Skyscraper Office Buildings; Private Business Buildings; Stores and Shops, and Banks —Interiors and Exteriors. Each group is preceded by an article in which the problems of design are described and suggestions made to aid their logical solution.

There are over three hundred pages of photographs of exteriors and interiors, details, plans, scale drawings, and sketches. The buildings illustrated are modern in that they are of recent conception and may be said to be characteristic of today.

324 pages, 9½ x 12½ inches, over 300 full page plates, cloth. Price $18.00.

Sent Prepaid on Receipt of Price.
Architectural Forum, 521 Fifth Avenue, New York

special study. Not only are the old churches and their burial grounds with their fine examples of entrance gates and enclosing fences well presented, for we are as well made familiar with the balustrades, rails and newel posts of domestic buildings. Nearly every home of any importance had its entrance steps of white marble or stone embellished with ironwork of more or less artistic value. Some extremely good examples are shown, wherein the ironworker at his forge evidently had an appreciation of the social standing of the architect's or builder's clients. Here and there is a little touch of the Gothic, while others are quite English in derivation, and still not entirely so. Both plates and drawings give a fine array of bars, rosettes, bosses, rails and newels. The more ornate of these latter were topped with handsome urns, the whole being rich in detail. We are pleasantly shown the so-called "Greek influence." The outcome of the Classical or Georgian period in England,—use of the fret, the key border, the honeysuckle pattern as well as the pineapple finials and knobs of cast iron, all are well illustrated. The cast iron rosettes and railings were quite as fine as the wrought work, and indeed were often used in combination with it, lending a direct touch of solidity and strength. An almost poetical touch is given where the lyre is in use in a number of gates and grilles, as also in balustrades. These prosperous colonials were housed in residences where even the entrances suggested the taste and elegance of their owners!

In bringing this worthwhile volume to a conclusion the authors have given a few well chosen cast iron examples,—two balcony railings, one displaying hounds in graceful and strong scrolls, the other griffons supporting urns, repeated by pedestals surmounted with fruit and pendant swags, all of virile Classical design, while the ironworker's art in moulded form is richly set forth in the porch of "Hatfield House," and brings to a fitting conclusion the series of plates and drawings bespeaking appreciative attention. The ensembles following are replete with suggestions and will be, no doubt, as much of service as was their original purpose. This may not be said of the generality of ironwork of today. Careful study of the well founded work of colonial and other times will surely result in sound and comprehensive work. Until the appearance of this volume the surface of the subject had been only touched, and even then it was usually in connection with ironwork in the South, and in Charleston in particular. So this work, one feels, is a long step forward. It is not surprising that a certain eminent present-day craftsman in iron has chosen Philadelphia as the city in which to work out his ideals!

COLONIAL IRONWORK IN OLD PHILADELPHIA. By Philip B. Wallace. Measured drawings by William Allen Dunn. 147 pp., 9½ x 12½ inches. Price $15 Net. Architectural Book Publishing Co., Inc., New York.

HIGHWAY TRAFFIC, REGIONAL SURVEY OF NEW YORK, Volume III. By Harold M. Lewis in consultation with Ernest P. Goodrich. 172 pages, 8½ x 11 ins. Illustrated; cloth. Price, $3. Published by Regional Plan of New York and Environs.

THE relation of highway traffic to buildings may not be apparent when one is blockaded on a highway in the country where visible buildings are few in number, but these traffic blockades in country roads are as time-consuming and inconvenient as many urban traffic blockades. In urban communities, traffic congestion has

The CRYER VALVE Crier

of the D. G. C. TRAP & VALVE CO., Inc., 1 E. 43rd St., New York

Number Five | New York, N. Y., MUrray Hill 2-7320 | *January, 1931*

The flame is drawn into the sleeve around the Venturi tube, caused by partial vacuum created by force of the issuing jet of steam in the Cryer Radiator Control Valve.

Flame Test Shows Why Benefits of Hot Water Heat Are Achieved in Steam Systems

The unique circulating effect of the Cryer Radiator Control Valve on vapor, vacuum or steam heating systems is strikingly shown by the Flame Test.

The flame of a lighted match or candle held just under the jet of steam issuing from the venturi tube, is drawn into the sleeve around the tube (see above). In actual operation the steam and air mixture in the radiator is drawn into the sleeve from the first section of the radiator, in exactly the same way and then recirculated when it strikes the incoming steam.

This continual circulation of steam, air and vapor, quickly heats the entire radiator evenly and holds it constantly at any temperature between 90° and 212° F., as modulated.

Thus you get full hot water advantages combined with the quickness and flexibility of steam or vapor. Large fuel savings are achieved. An equable, even heat always attainable.

No other valve or steam system duplicates these two-in-one effects.

Cryer Thermostatic Radiator Trap Has Rugged Construction

Full Details of How the Cryer Thermostatic Trap Operates

The Cryer Thermostatic Radiator Trap on the return end of the radiators of any two-pipe low pressure steam, vapor or vacuum heating system, allows water, air and gases to pass from the radiator into the return line, while preventing steam from doing so.

If only condensed water and gases are in the trap, at a temperature less than that of steam, the volatile liquid in the metallic bellows and the bellows itself expand slightly, but not enough to close the opening between the plug on the end of the bellows and the seat through which the contents flow into the return line.

When steam is in the trap, it causes sufficient expansion of the bellows to close the opening between the plug on the end of the bellows and the seat, thus preventing steam from flowing into the return line.

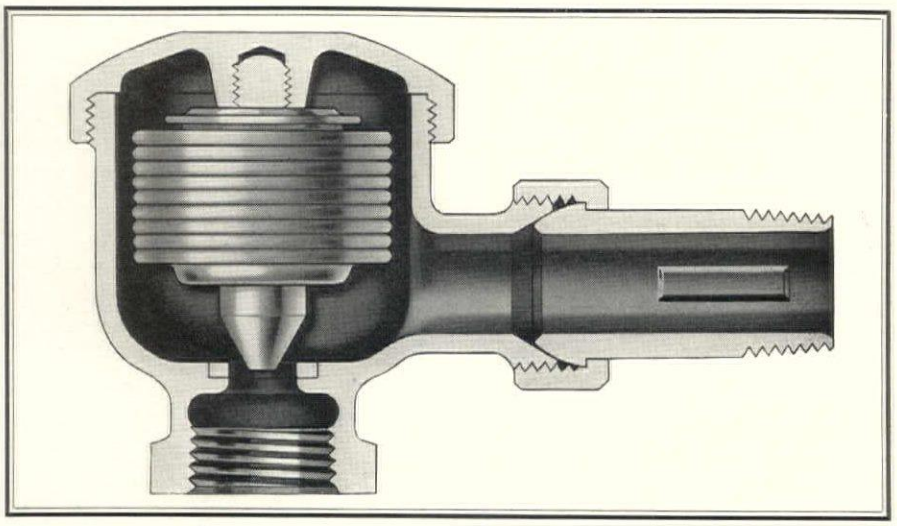
New Trap Uses Special Alloys for Bellows and Seat

In making the Cryer Thermostatic Radiator Trap a special bronze alloy for the bellows, and stainless steel for the seat are used.

On these two parts of any thermostatic trap depends mainly its satisfactory service.

The special alloys used in the Cryer Thermostatic Radiator Trap are exclusive with that trap. They insure its functioning uniformly and without waste or noise on any low pressure steam, vapor or vacuum system. It is designed for operation at up to 5 lbs. pressure (maximum limit 10 lbs.) and with any practicable vacuum in the return line.

The Cryer Thermostatic Radiator Trap is standard for use on all forms and types of radiation, and in conjunction with any radiator inlet valve of any type whatsoever. Together with the Cryer Radiator Control Valve it provides "hot water" heat on steam systems, as described in column 1.



Cutaway view of Cryer Thermostatic Radiator Trap, showing special alloy bellows and stainless steel seat.

Selected Books on Architecture

American Apartment Houses, Hotels, Apartment Hotels of Today
By R. W. Sexton

PROBABLY at no time in the history of the world has the style of architecture in a country changed so radically during such a short period of time as it has in the United States during the past decade. This is particularly true of the plan of the multi-family dwelling—the apartment houses, hotels, apartment hotels. Just two years ago, Mr. Sexton prepared a book entitled "American Apartment Houses of Today." This book recorded the progress that had been made up to that time in the development of a type of building which had been evolved to relieve the perplexing housing problem with which the larger cities were confronted.

This companion volume depicts an entirely new collection of apartment houses. Included in this second volume is a collection of hotels and apartment hotels gathered from all parts of the country. Every building is illustrated by exterior views and typical floor plans. There is also included an assortment of photographs of interiors in these several types of multi-dwellings.

There are plans of over one hundred and fifty apartment houses, fifty hotels, fifty apartment hotels and fifty pages of interiors.

328 pages, 10 x 13 inches, over 600 figures, cloth. Price $18.00.

New Building Estimators' Handbook
By William Arthur

A REAL help in preparing bids for modern construction based on over 30 years' experience. Residences, churches, apartments, schools, municipal and other types of building are fully analyzed with labor and material figured chiefly in hours and quantities. All the data was taken from actual cost records of work done in various sections of the country. Many of the examples have been illustrated and conditions are fully described. Wherever possible the author has arranged the data in tabular form for quick reference and the 600 tables mean a big saving of time to the user. A glance at the following chapters will give some idea of the wide scope of this Estimators' Guide. The new 30-page index affords quick access to any item.

Contents—Measurements of Building Work, Quantity System of Measuring, Speed and How Affected by Climate, Hand and Machine Labor, etc. Excavations and Filling, Piling and Underpinning, Concrete Work, Reinforced Concrete, Stone, Gravel, Marble and Terra Cotta, Brickwork, Cement Stone, Structural Iron and Steel, Tile and Gypsum Fireproofing, Steel Sash and Steel Buildings, Plaster, Carpenter and Joiner Work, Millwork, Glass, Roofing Sheet Metal Work, Hardware, Painting, Plumbing and Gas Fitting, Heating, Electric and Conduit Work, Filing, Asbestos Materials, Dairy Barns, Silos and Tanks, Municipal Work, Weights and Measures.

1,050 pages, 5 x 7 inches, 467 figs., flexible fabrikoid. $6.00.

Building Estimator's Reference Book
By F. R. Walker. With Supplement

ANOTHER authoritative guide to present day labor and material unit costs. All data being given on a basis of work done the same as in Arthur's book. Walker has analyzed examples of larger structures so that it will prove more helpful to the city estimator.

The new edition covers every operation from excavating to electric elevators with brand new information on Cinder Concrete Building Units, Van Guilder Concrete Walls, all kinds of Insulation and Wall Sheathing, French and Spanish Tile Roofs, Rough Slate Roofs, Art Metal Doors and Trim, Metal Elevator Enclosures, Linoleum Floors, Rubber Tile, Foreign and Domestic Marble Freight and Passenger Elevators, Mechanical Refrigeration, Stokers, Types of Steel Joists. A vest pocket book giving 200 pages of selected data is given free with each reference book. This is not sold separately.

1,800 pages, 4½ x 6⅝ inches, illustrated, fabrikoid. $10.00.

Estimating Construction Costs
By G. Underwood

THIS new book is reviewed at length on Page 46, Part 1 of this issue. A feature of it is the manner in which costs of labor and materials are presented in chart form. These costs are based on what might be called an average cost of production.

Each of the following chapters is devoted to an explanation of manner in which the charts were computed, with full information regarding the jobs involved.

Contents—1. Transportation of Materials. 2. Handling Materials. 3. Excavation. 4. Piling. 5. Concrete. 6. Wood Construction. 7. Brick, Tile, and Stone. 8. Structural Steel. 9. Lathing and Plastering. 10. Roofing, Flashing and Waterproofing. 11. Pipe Work and Heating. 12. Plumbing. 13. Electrical. 14. Painting and Glazing. 15. Machinery and Machinery Erection. 16. Overhead. 17. Estimating. 18. Prices of Construction Materials.

620 pages, 6 x 9 inches, illustrated, fabrikoid. Price $6.00.

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Architectural Forum, 521 Fifth Avenue, New York

a definite relation to buildings. It is the kind of building occupancy, however, that is the controlling influence, as traffic congestion of the worst kind can be found where the building bulk is comparatively small. The study of highway traffic, traffic congestion, or whatever term we may apply to it, is related to town planning, which should be definitely the work of architects.

Although the work under consideration pertains to New York and its environs, it develops certain fundamental principles that are applicable to all cities. It also describes the methods of securing data and their analysis so as to constitute a basis for forming conclusions. The origin of traffic and its objective are the important bases of the whole matter of traffic congestion. The data are presented in detail, both in tabular and graphic forms and illustrations from photographs. While the matter of analysis of commercial traffic is the principal purpose of the survey, consideration is given briefly to week-end congestion.

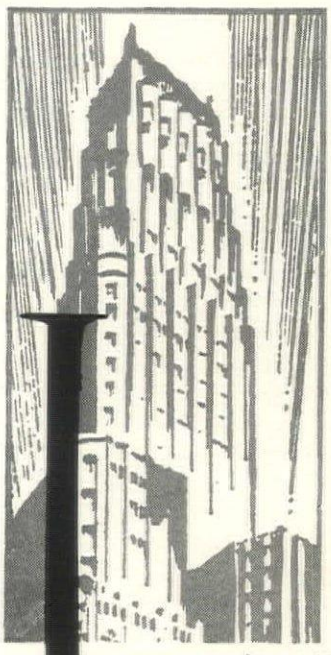
Whether we agree with the conclusions of the writers as drawn from the study of the facts or not, we can form our own conclusions and in doing so secure a better understanding of certain principles of town planning. New York presents an unusual and possibly unparalleled problem. Like all of the older American cities, it was incorrectly laid out and entirely unsuited for modern vehicular traffic and, in addition, it is handicapped by its unusual topography. From these conditions lessons can be drawn which can be of value to town planners.

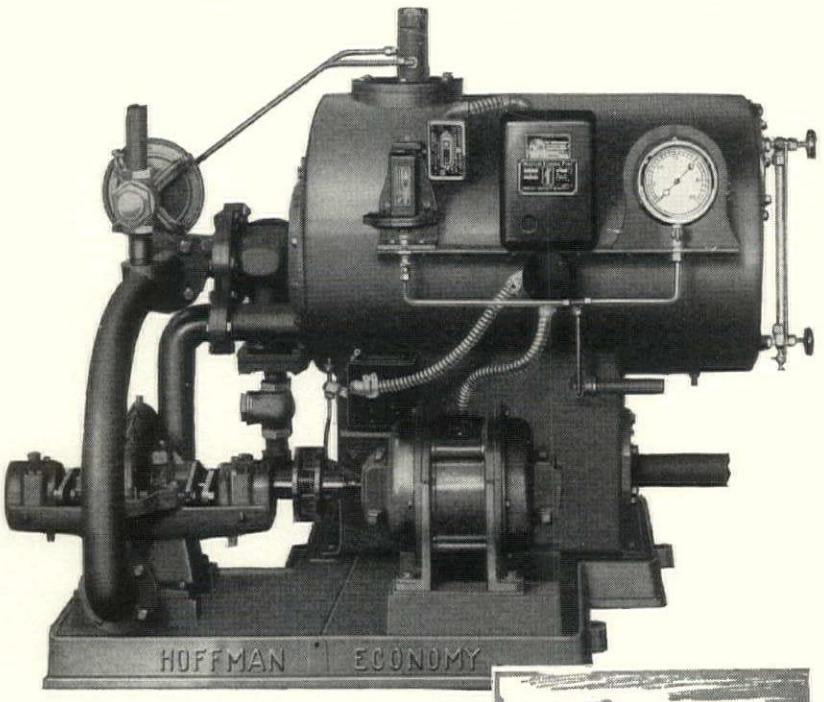
The influence of building volume or bulk *per se* on traffic is not made apparent in this survey. The influence of the tall building on street congestion has been the familiar war cry of a certain group of town planners and zoning engineers, apparently because the tall building was the most conspicuous object in sight. Observation demonstrates, however, that the nature of building occupancy, street widths and access to, through and exit from a district are far more important factors than building volume or bulk. This work should be of interest and value to every one who is concerned with highway traffic and the influence of buildings thereon.

PROMOTING NEW HOTELS; WHEN DOES IT PAY? By W. I. Hamilton. 158 pp. Price $2.50. Harper & Brothers, New York.

THE era of unexampled prosperity which has just come to an end has left as a sort of aftermath quite a number of tragedies of one kind or another in the building field. Even the small town wants to resemble a city; a city strives to emulate a large city; and every large city on the continent tries to be as much like New York as possible. The use of the skyscraper type of building is justified where land values are extremely high or where areas are limited, as in New York or Boston, where both cities are wholly or largely surrounded by bodies of water; but what possible justification can there be for building structures 20 or 30 stories high in small and insignificant cities, in the South or West, where land values are low and where space abounds for expanding in all directions,—and particularly where such structures can be filled with great difficulty, if at all? It is one indication of the American craze for sheer "bigness."

To this mania for bigness the hotel business seems to



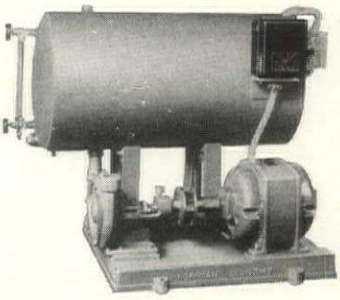


Hoffman-Economy Return Line Vacuum Pump

Jet-type vacuum producer used in these pumps is the simplest and most dependable method for exhausting air and vapors. It has no moving parts and never wears out. With jet vacuum producers, hotter water can be handled than with other types.

IF A PUMP IS NEEDED...

HOFFMAN HAS ONE FOR EVERY TYPE OF HEATING SYSTEM . . .



Hoffman-Economy Horizontal Condensation Pump

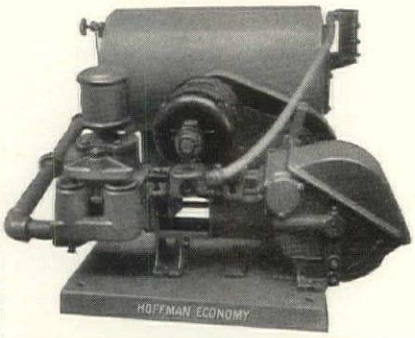
Adapted for high or low pressure steam installations where condensation will drain to horizontal receiver. Sturdily constructed in every detail. Made in single and duplex units

WHY go to Tom, Dick and Harry for different types of pumps, when Hoffman's complete line will take care of your requirements for *every heating purpose.* Whether for high or low pressure, vacuum or air-line systems, here is a complete source of pump supply.

You can install any of the Hoffman-Economy Pump models with the assurance that it will satisfactorily do the job for which it is intended. A study of actual operating conditions has led to numerous improvements that exactly suit these pumps to every kind of modern heating systems.

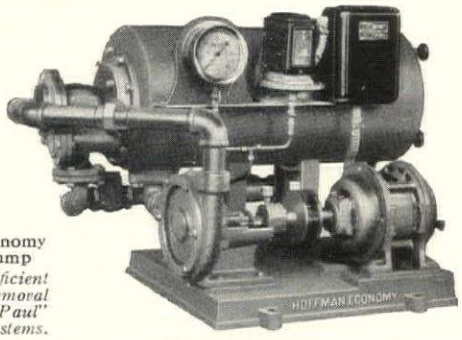
The Return Line Vacuum Pump, illustrated above, typifies the Hoffman-Economy high standard of excellence. It employs a jet-type vacuum producer, the simplest and best known method of exhausting air and vapors. There are no close clearances on the pump and, because the vacuum producer has no moving parts, it never wears out. Almost boiling water is handled with complete efficiency. Exceptionally low inlet in most cases makes a pump pit unnecessary.

For complete technical information on Hoffman-Economy Pumps and all Hoffman specialties, write for our catalog. Hoffman Specialty Company, Inc., Dept. EF-26, Waterbury, Conn.



Hoffman-Economy Reciprocating Pump

A dependable unit for use in laundries, greenhouses and other industrial establishments where moderate priced equipment is required.



Hoffman-Economy Air Line Pump

A highly efficient unit for the removal of air from "Paul" or air line systems.

HOFFMAN-ECONOMY PUMPS

have fallen a ready victim. Too many and altogether too large hotels have been built to cater to towns' ambition or civic pride. Many a large town or small and unimportant city has a pretentious hotel building, named usually after some local or historical celebrity (a further concession to civic vanity) which is not and probably never will be profitable to its owners or operators. Even in New York, with its vast volume of transient business, there is an over-supply of hotels, and many excellent houses in a desperate effort to secure patronage are offering "hotel accommodations and service at rooming house rates."

Hotel men and hotel associations are fully aware of the danger and are attempting to call a halt in the building of unnecessary hotels. This volume by the Director of Operations, Associated Hotels, Inc., is an examination of the many factors which regulate the conducting of hotels, and as such it well merits the study of those who contemplate the building of hotels, those who supply the funds, and the architects and builders who plan and construct them. The volume is the result of wide study, experience and research, and it deals with every phase of the problem as it affects profitable operation of a hotel.

ESTIMATING CONSTRUCTION COSTS. By G. Underwood. 620 pages, 6 x 9 ins., illustrated, leather. Price $6. McGraw-Hill Book Company, Inc., New York.

A RADICAL departure is made in this work from the usual exposition of estimating by other authors. Estimating construction costs is of such great importance in the building industry and in architecture that an improvement in working data deserves careful consideration. The usual estimating manual presents its data in the form of tables, and when several factors are involved the process of determining the item of cost or quantity is somewhat involved and likely to be in error.

Mr. Underwood presents a method of measuring quantities of material and cost of labor by the use of graphic charts only. The material charts are confined to determining the cost of material per unit of quantity, such as the cost of sand per 1,000 bricks laid in ⅜-inch mortar joints for varying prices of sand up to $5 per cubic yard. The basis of such a chart is 4/10 cu. yd. of sand for 1,000 bricks. Other charts show the cost of cement and lime. Charts are given for ½-inch and ⅝-inch mortar joints. The costs of other materials used in construction are given in similar charts.

The labor charts are for 8-, 9- and 10-hour days, based on a unit of labor per man per day and covering a wide range of wage scales. The only variable would be the basic unit of work performed or material required. While Mr. Underwood's assumptions in these respects appear to be reasonable and safe under normal conditions, it is possible for some contractors to have experience data which justify a different basic unit of labor.

The use of a chart in a bound volume may not always be convenient, and that is one reason why architects and, more especially, engineers, prepare their own working tables for desk use. The material and labor charts are so simple and similar in form that charts for desk use could be made at small cost. Such charts could be made for basic factors different than those employed by the author. In fact, this work presents a new method which should relieve estimating of some burdensome labor in determining the material and the labor costs per unit.

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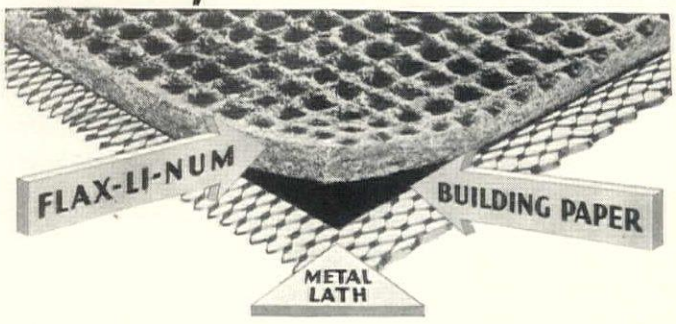

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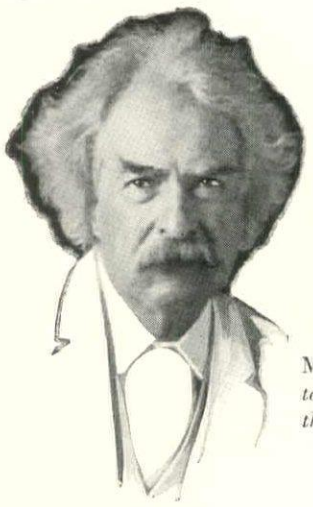

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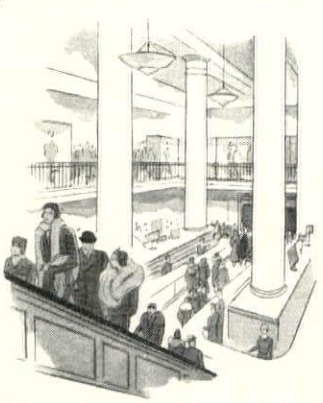

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THE ARCHITECTURAL FORUM

VOL. LIV, No. 1

CONTENTS

JANUARY, 1931

PART I—ARCHITECTURAL DESIGN

PART II—ARCHITECTURAL ENGINEERING AND BUSINESS

THE ARCHITECTURAL FORUM is published monthly by National Trade Journals, Inc., 521 Fifth Avenue, New York, Wheeler Sammons, Chairman of the Board; H. J. Bligh, President; E. J. Rosencrans, Treasurer.

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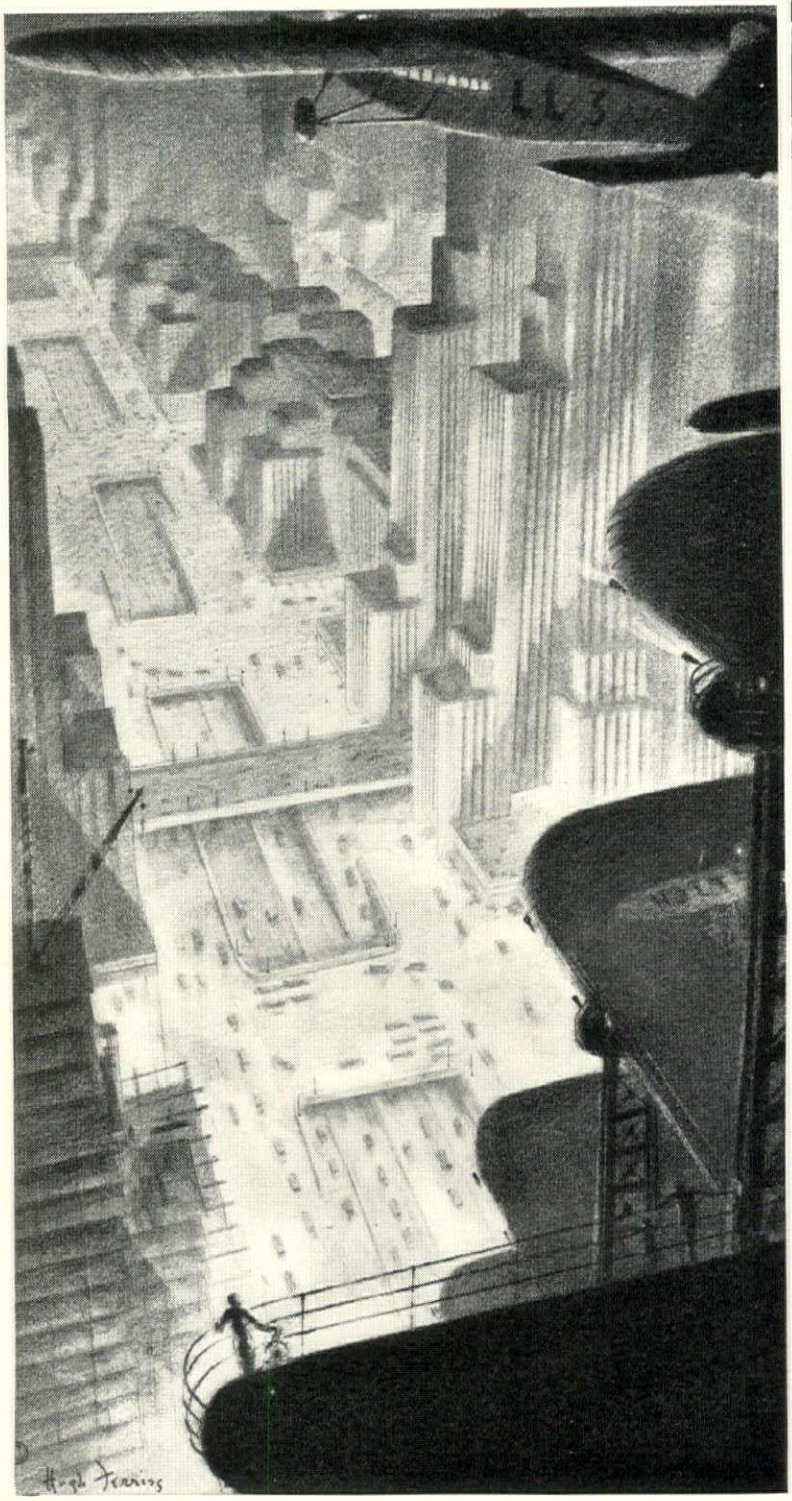

"SKYSCRAPER HANGAR IN A METROPOLIS," BY HUGH FERRISS. AN ENLARGEMENT, ON SPECIAL STOCK FOR FRAMING, WILL BE MAILED WITHOUT CHARGE TO ANY ARCHITECT, ENGINEER OR BUSINESS EXECUTIVE.

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THE
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VOLUME LIV NUMBER ONE

JANUARY 1931

THE ANNUAL FORECAST of ARCHITECTURE AND BUILDING 1931

NEVER in the ten years since THE ARCHITECTURAL FORUM inaugurated its annual survey and forecast has the subject of future building activity been so important to the architectural profession. Will the architect's business be better in 1931? That is the question which is of paramount interest.

The forecast for 1931 is the most difficult which has yet been undertaken because we are now riding in the aftermath of a "red figure panic." This forecast is therefore based upon an unusually broad and careful investigation which this year was encouraged by the United States Department of Commerce because of official recognition of the stabilizing values of increased activity in the building construction industry.

The results of this survey are, to some extent, encouraging. It looks as though business will improve gradually. There will be no phenomenal recovery, but the year 1931 promises to be the beginning of a better business cycle for architects. In order that architects may judge for themselves and perhaps apply some interesting comparisons to their own business, we are presenting the major results and deductions together with graphic and tabular data.

SOURCES

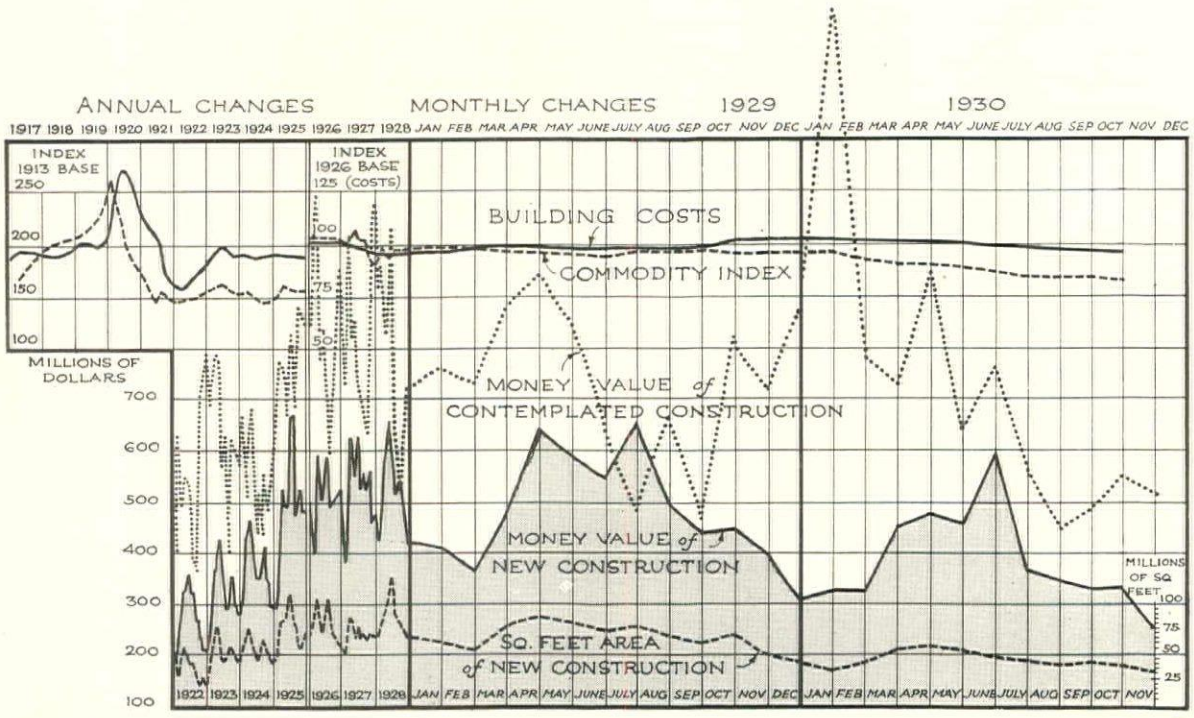
A CAREFULLY developed questionnaire was sent by THE ARCHITECTURAL FORUM to every architectural office in the country asking for detailed information covering types and values of buildings actually being planned or under definite consideration for the year 1931. A similar questionnaire was sent to a large number of mortgage sources in every part of the country to uncover money conditions in relation to building finance. Investigators visited the government departments, particularly those which might be the source of new construction programs for 1931, and a series of personal interviews was conducted with contractors, engineers and others who qualified to render valuable opinions. But the architect is the advance guard of the building industry,—the first person to know of the building project outside the owner's immediate circle. He is, therefore, the primary source of information as to the future building activity and that is why the major activity of this survey is directed to architects. He is also the first to receive actual money from the new building project.

In considering the architect's business for 1931, it must be remembered that a substantial part of his income will be derived from projects planned during that year, although the actual letting of contracts may not take place until the following year. This condition will be particularly significant in connection with publicly financed work where the authorization of planning may occur in 1931, although actual construction in some instances will not begin until the end of the year or in the 1932 building season. The architect's income in 1931 will perhaps have in it a larger proportion than usual of fees emanating from the planning stages of various projects, particularly those which may fall in the publicly financed groups and in the institutional fields.

REASONS FOR INCREASE OVER 1930

THERE are six sound reasons for anticipating an improvement in business for the architect in 1931.

1. Volume of building arising through normal channels will probably equal that of 1930.



BUILDING CONSTRUCTION IN THE UNITED STATES SINCE 1922

This graphic review provides for a rapid comparison of building activity by years from 1922 to 1928 and by months in 1929 and 1930. It shows the following: (a) volume of construction; (b) money spent for new buildings; (c) money value of contemplated buildings indicated by plans filed; (d) index of building costs; and (e) index of general commodity costs. Based on figures from U. S. Department of Commerce, F. W. Dodge Corporation and *Engineering News-Record*.

COMPARISON BETWEEN ACTUAL NEW BUILDING CONSTRUCTION IN 1930 AND FORECAST FOR 1931 IN TWENTY BUILDING TYPES

This comparison indicates only projects which were constructed from architects' plans. The figures for 1930 do not include engineering or other projects where architects' services were not employed. This particularly applies to the field of dwellings under $10,000 and to the industrial field.

BUILDING TYPES	RECORDED* CONSTRUCTION	ESTIMATED UNRECORDED CONSTRUCTION	TOTAL CONSTRUCTION 1930	1931 FORECAST
Automotive	$86,984,700	$17,396,940	$104,381,640	$113,098,500
Banks	59,200,800	5,920,080	65,120,880	63,189,200
Apartments	308,042,700	77,010,675	385,053,375	311,548,800
Apartment Hotels	104,300,000	12,516,000	116,816,000	126,731,000
Clubs, Fraternal, etc.	44,877,800	13,463,340	58,341,140	84,939,000
Community & Memorial	35,856,200	3,585,620	39,441,820	77,461,300
Churches	72,876,200	14,575,240	87,451,440	119,375,100
Dwellings (Below $20M)	78,200,000	15,640,000	93,840,000	107,194,500
Dwellings ($20M-$50M)	87,400,000	8,860,000	96,260,000	99,736,600
Dwellings (Over $50M)	72,600,000	3,630,000	76,230,000	74,591,300
Hotels	53,346,300	21,338,520	74,684,820	100,774,500
Hospitals	157,426,600	31,485,320	188,911,920	207,828,000
Industrial	343,286,900	34,328,690	377,615,590	225,270,400
Office Buildings	216,671,800	43,334,360	260,006,160	331,993,400
Public Buildings	120,269,400	12,026,940	132,296,340	426,350,800
Schools	351,524,500	70,304,900	421,829,400	444,012,500
Stores	193,141,900	13,519,933	206,661,833	90,794,500
Theaters	27,449,000	4,117,350	31,566,350	84,337,000
Transportation	74,300,000	3,715,000	78,015,000	55,042,500
Welfare, Y.M.C.A., etc.	23,600,000	1,180,000	24,780,000	35,518,300
TOTALS	$2,511,354,800	$407,948,908	$2,919,303,708	$3,179,787,200

(*) *Based on figures from United States Department of Commerce and F. W. Dodge Corporation.*

2. Publicly financed building will add volume and stimulus. The building programs of the federal, state, county and municipal governments will be definitely under way.
3. Greatly decreased costs of building.
4. Improvement in mortgage conditions and financing of building.
5. Demand for institutional and residential buildings is increasing.
6. Better construction is being demanded by owners and financial interests, eliminating support for speculative "jerry-building" and thereby increasing the demand for competent architectural service.

VOLUME OF BUILDING

TO indicate the potential building activity of 1931 as being approximately equal to that of the past year, there will be found herewith a tabular comparison of actual building construction of the year 1930 and potential building activity as derived from the forecast figures. This comparison is made in twenty building types and the figures do not include those structures which were not designed by architects, such, for instance, as a large proportion of dwellings costing less than $10,000 and about half the industrial construction of the country. They serve, therefore, as a basis for comparing past and probable activity in relation to the architect's own business and can be used in general to indicate the building types in which architects are most likely to find work during the coming year. An examination of this tabulation shows the following major trends.

The comparisons between actual construction in 1930 and the forecast figures for 1931, as obtained from architectural offices and other sources, show the following:

BUILDING TYPES	CHANGE OF ACTIVITY AS FORECAST FOR 1931
Automotive	Very slight increase, if any
Banks (individual buildings)	Practically the same as 1930
Apartments	Decrease about 18%

1931 PREDICTIONS BY DISTRICTS IN TWENTY BUILDING CLASSIFICATIONS

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	TOTAL U.S.A
Automotive	$ 9,216,800	$26,916,500	$1,574,400	$11,885,900	$50,114,300	$13,390,600	$113,098,500
Banks	4,161,500	31,570,000	922,500	1,508,800	21,094,500	3,931,900	63,189,200
Apartments	18,310,600	140,771,500	6,428,800	21,076,800	71,796,100	53,165,000	311,548,800
Apartment Hotels	2,214,000	37,761,000	697,000	18,757,500	44,944,200	22,357,300	126,731,000
Clubs, Fraternal, etc.	7,931,000	37,896,000	3,383,300	8,122,800	21,537,100	6,068,800	84,939,000
Community and Memo.	5,785,100	31,287,100	2,086,900	4,715,000	11,287,300	22,299,900	77,461,300
Churches	15,061,300	35,257,700	5,403,800	9,444,300	40,272,100	13,935,900	119,375,100
Dwellings (Below $20,000)	9,229,100	38,544,100	4,792,900	10,479,600	30,385,100	13,763,700	107,194,500
Dwellings ($20,000 to $50,000)	10,266,400	34,628,600	5,514,500	8,540,300	28,905,000	11,881,800	99,736,600
Dwellings (Over $50,000)	6,519,000	24,374,500	5,986,000	6,367,300	19,434,000	11,910,500	74,591,300
Hotels	7,093,000	29,113,700	15,612,700	11,897,800	23,135,900	13,921,400	100,774,500
Hospitals	33,257,000	61,501,700	9,987,600	21,344,500	58,728,000	23,009,200	207,828,000
Industrial	10,639,500	108,223,600	4,292,700	10,750,200	59,413,100	31,951,300	225,270,400
Office Buildings	23,866,100	63,591,000	4,346,000	33,189,500	153,270,300	53,730,500	331,993,400
Public Buildings	19,192,100	224,602,100	7,125,800	19,466,800	130,892,500	25,071,500	426,350,800
Schools	42,824,300	155,682,600	16,502,500	41,524,900	144,282,700	43,195,500	444,012,500
Stores	4,813,400	25,030,500	2,427,200	17,412,700	29,757,800	11,352,900	90,794,500
Theaters (all types)	7,728,500	39,060,700	2,583,000	13,653,000	15,694,800	5,617,000	84,337,000
Transportation	1,947,500	37,720,000	1,086,500	3,321,000	7,892,500	3,075,000	55,042,500
Welfare, Y.M.C.A., etc.	3,792,500	16,006,400	205,000	615,000	8,605,900	6,293,500	35,518,300
TOTAL VALUE OF NEW BUILDINGS	$243,848,700	$1,199,539,300	$100,959,100	$274,073,700	$971,443,200	$389,923,200	$3,179,787,200

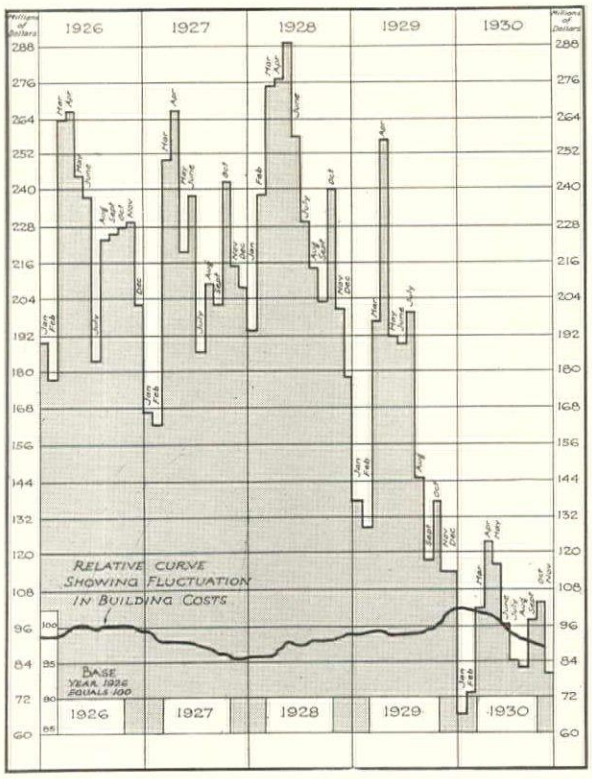
New Construction Under Architects' Supervision as Shown Above	$3,179,787,200
Probable Additional Work for Architects' Under Government, State, County and Municipal Emergency Building Programs	800,000,000
TOTAL NEW BUILDING FROM ARCHITECTS' PLANS	$3,979,787,200
Buildings Not Designed by Architects	960,000,000
TOTAL ESTIMATED CONSTRUCTION FOR 1931	**$4,939,787,200**

BUILDING TYPES	CHANGE OF ACTIVITY AS FORECAST FOR 1931
Apartment Hotels	Slight increase
Club & Fraternal	Increase about 40%
Community & Memorial	Increase about 100% (Indicated, but doubtful)
Churches	Increase about 37%
Dwellings (Below $20M)	Increase about 15%
" ($20-$50M)	Slight increase
" (Over $50M)	Approximately the same
Hotels	Increase about 30%
	Note: A small volume of hotel construction in 1930, also projected hotels, will find financing difficulties and it is probable that the forecast figure is high.
Hospitals	Increase about 10%
Industrial Buildings	Decrease about 40%
	Note: The forecast figure may be somewhat high because of difficulty in financing some of the contemplated projects.
Public Buildings	Increase over 200%
	Note: This great increase will be due to publicly financed building programs.
Schools	Increase about 5%
Stores (Including Warehouses)	Decrease about 55%
Theaters	Increase nearly one and a half times
	Note: Several contemplated chain projects bring up the forecast figure.
Transportation (Railway & Airports)	Decrease about 30%
Welfare—YMCA, etc.	Increase about 45%

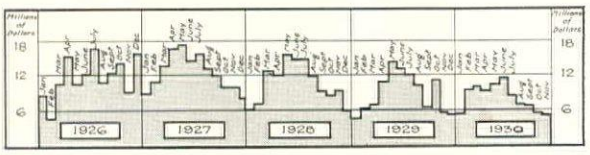
This comparison will serve to indicate to the architect what seem to be the best fields in which to seek work for the year 1931. The importance of working closer to financing institutions is indicated, particularly for the residential fields where the greatest volume of money will be available.

FIVE YEARS' ACTIVITY IN 7 MAJOR BUILDING TYPES

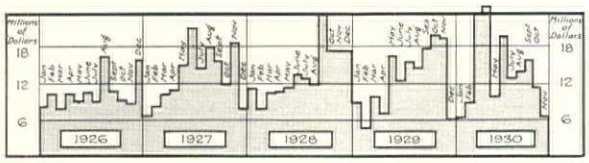
These charts indicate the monthly expenditures of money over a period of five years for each type of building. Note how the residential field, which includes dwellings, apartments and hotels, contributed to the 1930 shrinkage of total volume



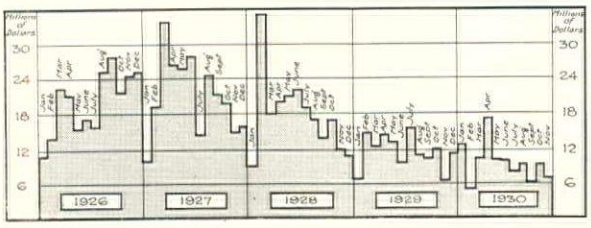
Residential Buildings



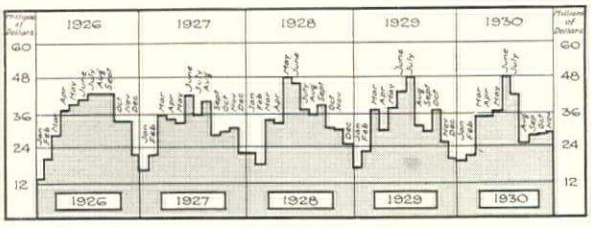
Churches



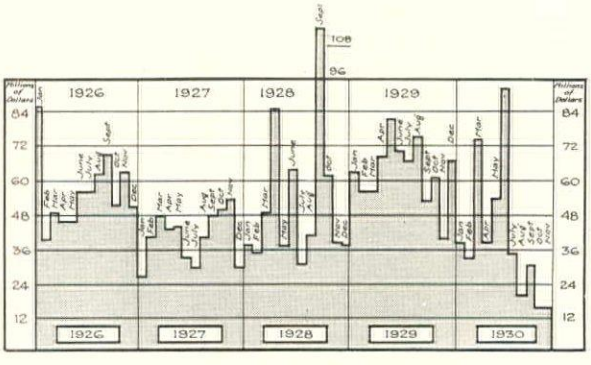
Hospitals and Institutions



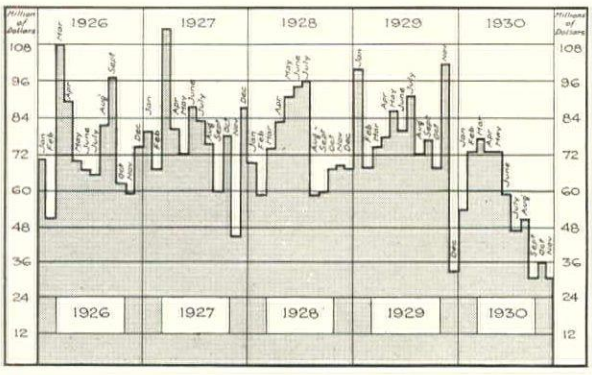
Club and Fraternal Buildings



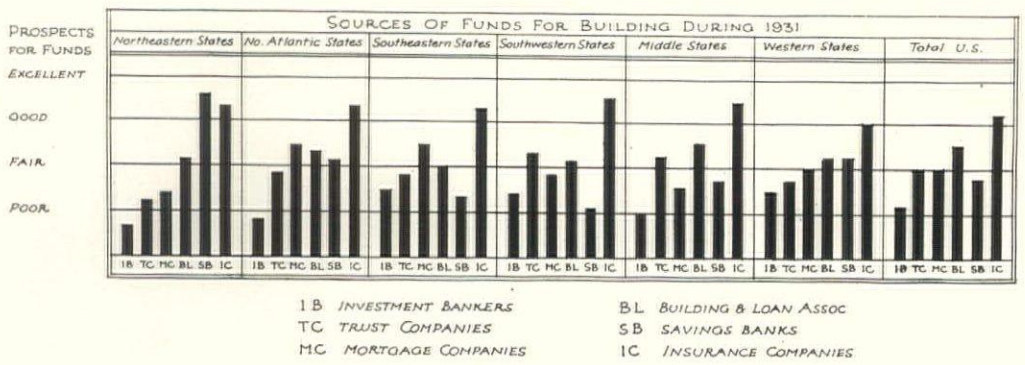
Schools and Colleges

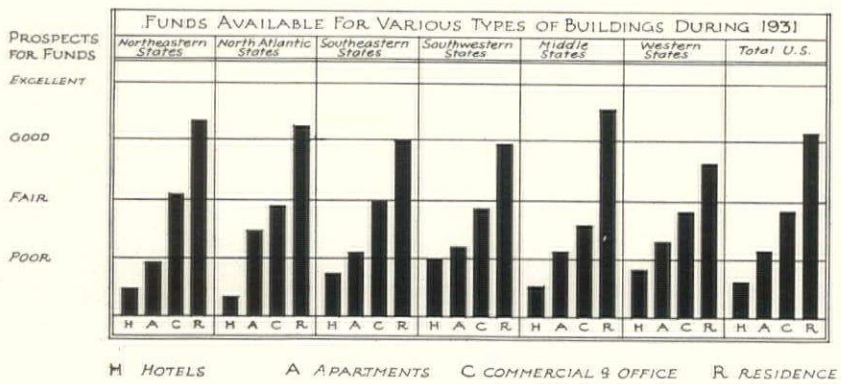


Industrial Buildings



Commercial Buildings





1931 MORTGAGE MONEY FORECAST

Graphic interpretation of reports from 86 major building centers. Upper chart shows relative availability of money through six major mortgage sources. Lower chart shows relative preference by loaning interests on the four major building types in six divisions of the U. S. See also mortgage money condition map on next page.

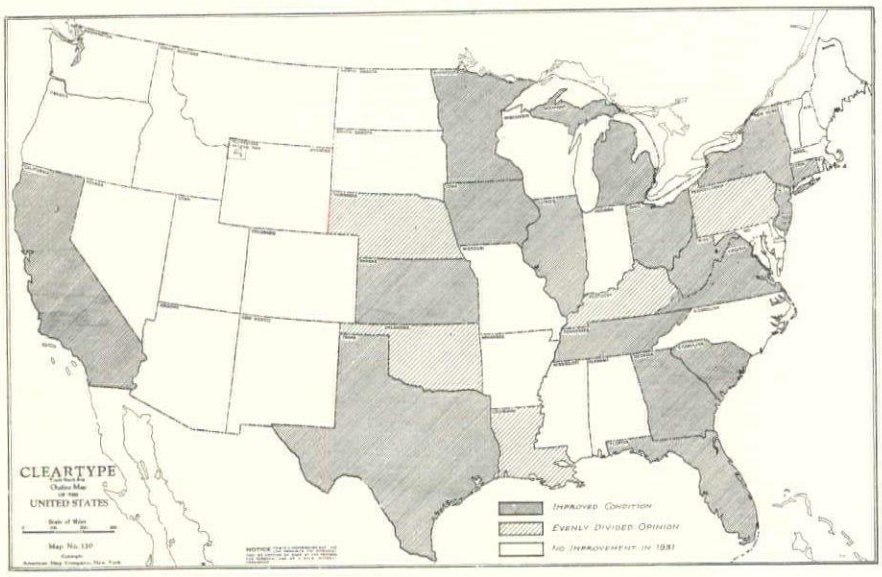
PUBLICLY FINANCED BUILDING

LATE in 1929 a definite program was started by the federal government to encourage publicly financed building construction as a most powerful force working toward the alleviation of unemployment and the stabilizing of tottering economic balances. The federal government began to formulate huge appropriations to be used for the construction of federal buildings of all kinds and in all parts of the country. Toward the end of 1930, official announcements appeared to the effect that several hundred millions of dollars would be appropriated for new building expenditures in the year 1931. In the referendum votes of last election, over a half billion dollars was appropriated for state construction activities of which at least $300,000,000 is to be expended for new building. A large part of this money has already been specifically appropriated and announcements will soon be forthcoming as to the actual types of buildings and locations where such developments will take place. In all it is quite probable that well over a billion dollars will be put into action in the year 1931 through these publicly financed programs. Practically all of this work will be of the type which architects are called upon to design. While it is true that much of the work will be carried out through various governmental architectural bureaus, strong influences are being applied to cause the distribution of the work to local architects. Architects everywhere will be well advised to seek all possible information as to local activities of this nature and to pursue the proper methods of contact with those who control these programs.

DECREASED COST OF BUILDING

OF utmost significance in connection with the encouragement of new planning through normal sources is the greatly decreased building cost. The decrease amounts to from ten to twenty per cent in different parts of the country. Several industrial buildings have just been refigured and show a decreased total cost of approximately 18 per cent as compared with a year ago. Figures for high priced residential work (houses costing from $80,000 upward) in certain sections are from 11 to 14 per cent less than last year. Some of the larger contractors have stated that specific office buildings show similar decreases in cost. Residential construction costs in general have been decreasing correspondingly.

It is obvious that this is the time to build and that owners can enjoy unusual savings by going into the market within the next few months. It would seem apparent that this condition will help to bring building activity for new plans or bring into action plans which have been lying dormant in various stages of development.



FORECAST OF MORTGAGE MONEY CONDITIONS IN 1931

The map indicates the result of the survey, showing, —(a) dark sections—improved mortgage money conditions expected; (b) lighter sections—probably about the same as 1930; (c) white sections — no improvement anticipated—money difficult.

MORTGAGE CONDITIONS

IN order to get diversity of opinion, every type of financial concern was questioned, including savings banks, trust companies, mortgage companies, investment bankers and building and loan associations. Responses were obtained from practically every large center in the country—eighty-six cities in all being involved in this survey. The graphic charts here shown indicate conditions.

In regard to second mortgage money, it was found that little help was indicated for the speculative builder who, as a rule, requires a large amount of secondary financing in order to carry on. Of the replies received, 85 per cent stated that secondary financing for the average speculative proposition would be very difficult to obtain. There seems to be almost a conspiracy toward the elimination of "jerry building." This does not mean that sound, legitimate operations will not be financed, but it does seem to threaten a paralyzing blow to the type of construction which has been anathema to the architect and detrimental to his business. The conclusions which we have drawn from this mortgage money survey are: (1) there is considerably more money available now for building purposes than there was a year ago; (2) there is an obvious preference shown for loans on dwellings due to a desire to diversify security and the fact that much of the available mortgage money is in the hands of sources favoring this type of loan; (3) a reasonable assurance of a fair amount of funds for sound commercial projects in those localities which are not now suffering from an overbuilt condition; (4) mortgage money conditions will continue to improve in a sound though gradual manner; (5) a growing demand by financial interests for architectural service to insure quality in construction.

QUALITY CONSTRUCTION

THERE is a trend toward better planning and construction of all types of buildings, particularly those requiring mortgage financing. Loaning institutions have recently been forced to examine their collateral more carefully and in many instances they have found buildings deficient in plan, construction and equipment, with consequent high operating costs and rapid depreciation. They have found that it does not pay to "economize" by eliminating competent architectural service or by cutting fees or limiting the service which the architect renders. This will mean more work for architects and the adequate fees which come from better appreciation of the value of services rendered.

With this presentation we leave the 1931 forecast in the hands of the architect himself. It is our opinion that an improvement will begin to be evident in 1931, probably toward the end of the first quarter and more definitely in the second quarter of the year. The factors and trends which have been here set forth seem to indicate that there will be increased activity for the architect, at an even earlier time than that of almost any other business.

C. STANLEY TAYLOR.

THE EMPIRE STATE BUILDING

SHREVE, LAMB & HARMON, ARCHITECTS

VIII. ELEVATORS

BY

BASSETT JONES*

IT is too early to say all that might be said about the elevators in the Empire State Building. In several respects the elevator requirements of this building were beyond the apparatus available at the time the building was planned, so, in this regard, new apparatus had to be designed and built to meet the conditions.

The proper time to discuss these matters is after the equipment has been put in operation and any operating difficulties that may develop corrected. Progress in any art always involves development, and, during the past decade, of no mechanical art has this been more true than in elevators.

THE GENERAL PROBLEM

During this decade rapidly increased economic pressure, plus the zoning laws, have brought about a constantly accelerated growth in the size and height of buildings, both of which, at the present time, have reached a maximum in the Empire State Building.

Ten years ago the zoning laws had brought about the design of tower type buildings built upon comparatively small ground area. This led to a restriction in the area of the upper floors that, coupled with the distances traveled and the corresponding time consumed, presented an elevator problem that resulted in the development of the semi-automatic, high speed, signal-operated, push button elevator, new in the Standard Oil Building at 26 Broadway but now common in by far the largest number of tall buildings since built countrywide. Thus high speed was attained with safety. It then became possible to obtain good elevator service in such buildings without using so many elevators that the space occupied by corridors and hoistways reduced the available rentable yield or occupiable space below the economic limit.

The subsequent competition in height of buildings soon reached a new limit. Buildings erected on a limited ground area resulted in a tower of small plan area that would permit only the installation of a small number of elevators. Yet the owner often wished to build a tower of more floors than such a number of elevators of any practical high speed could serve and render the desirable character of service. This, and other economic factors limiting the height of a building on any given ground area, led to the projecting of large tower type buildings on large ground areas, which, due to the enormously increased number of passengers that had to be handled in a given time, in its turn introduced new elevator problems.

If the elevator cars were merely increased in size so as to handle more passengers per car, a limit in the practical size of cars was soon reached. If the number of elevators was correspondingly increased, then the resulting sacrifice of yield area interposed a limitation, and again a limit was placed on building height.

These problems have all led to the installation of elevators operating at much higher speeds than were considered at the time the first signal-operation elevators were installed, and to the discussion and projection of the double-decked elevator, the duplex elevator (or two independent elevators operating in a single hoistway), and to the "plaza floor." The latter scheme consists in dividing the building horizontally into two or more superimposed buildings, so far as elevators are concerned, each elevatored separately. The main terminal landing, or "plaza floor," in each such division of the building is served by large fast express elevators from the street level and making no other stops.

PRELIMINARY DISCUSSION OF THE EMPIRE STATE BUILDING

All of the above new possibilities were discussed with the owners of the Empire State Building. They were advised that it did not seem wise to introduce any radical departure from tried elevator practice in a building of this character and in one where speed of completion was considered to be of such economic importance. No such entirely new method or equipment can be expected to work, entirely and completely, directly it is installed. Generally, it is a long distance from

*Of Meyer, Strong & Jones, Inc., Consulting Engineers for mechanical and electrical equipment of the Empire State Building.

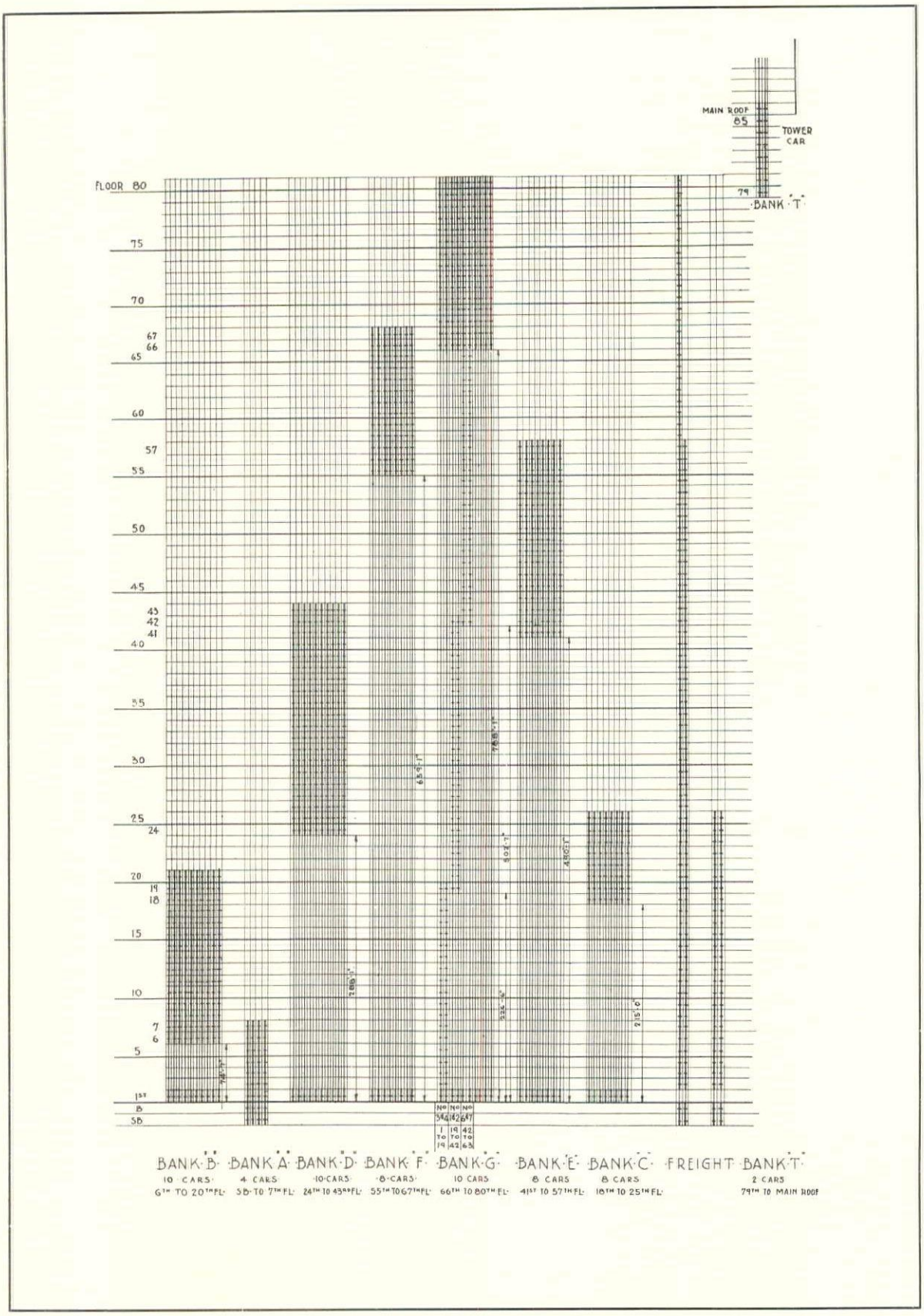


DIAGRAM OF ELEVATOR BANKS
EMPIRE STATE BUILDING

the blueprints of new designs of machinery and a machine operating as desired. The adjustments and part replacements required to make the machine do what is expected of it take time and interfere with operation. Yet the only proper test of the design is to put it into operation under service conditions, and with elevators this means experiment with an occupied building. Least practical will these experiments be in a building of diversified occupancy where the traffic cannot be controlled and directed by the owner, as is possible in a one-purpose building where the tenants are the owner's employes and where the owner himself has understanding of the technical problems involved and patience enough to go along with the ironing-out process.

Therefore it was decided to lay out the elevator plant for the Empire State Building on the basis of a tried and accepted method. This, of course, put a limitation on building height that, in the future, will be removed where one or all of the proposed new methods, double-decking, duplexing, and the "plaza floor" can be wisely employed.

Large as are the ground area and tower section of the Empire State Building, the practical ultimate limit of the elevator method, using a single-deck high speed car in a hoistway, all cars running to the street level, proved to be eighty floors. This result was obtained by the repeated determination of elevator plant based on repeated modifications of plan, coupled with first cost and operating cost estimates,—indeed, the only way in which such a result can be obtained free from large probable error.

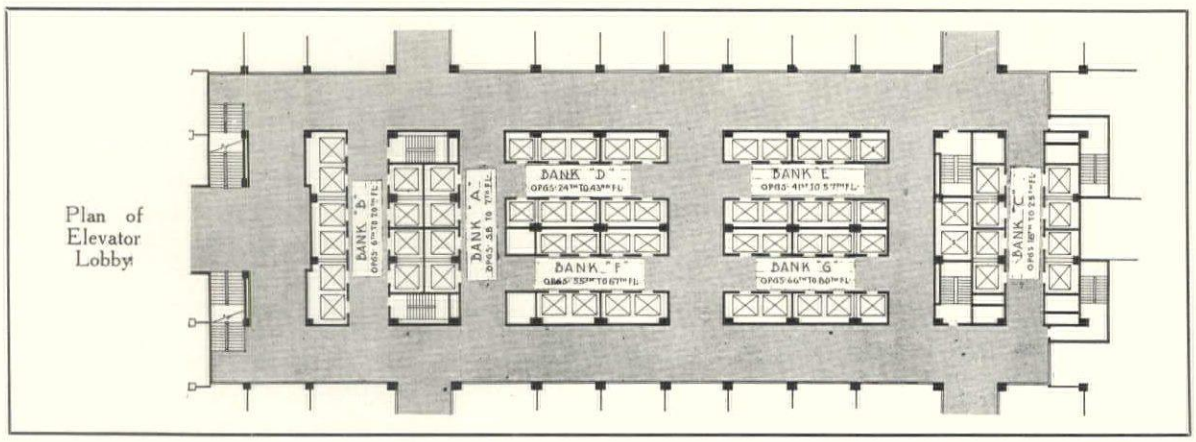
Throughout these preliminaries there existed the necessary close coöperation between the owner, the architects and the engineers.

SOME DETAILS OF EQUIPMENT

Even this height of building could only be attained by the use of the largest practical cars traveling at the highest speed attainable and apparently practical at the present time, anticipating that ultimately, or possibly before the building was fully occupied, the now known to be unnecessary speed-restriction imposed by the existing elevator rules of the City of New York would be removed. In cities other than New York many elevators are now operating at speeds considerably in excess of the present limitation, and, due to the necessary automatic mechanical and electrical features of such elevators, they are much safer than the usual, slow speed, all manually-operated equipment.

The use of such large cars traveling at such high speeds in the Empire State Building, introduced duty requirements beyond the capacity of existing designs for hoisting machinery, requiring the design and construction of much new equipment. The weight of the very long hoisting ropes in the high rise banks, coupled with the weights of car, load and other dependent parts imposed duties never before reached in strictly passenger elevators. The weight of trail or operating and signal cables alone is a considerable item. Indeed, when the layouts were first prepared, four elevators of the high rise bank were arranged for night and holiday service, answering calls from all eighty floors. When the reactions and loads for these four elevators were subsequently worked out, it developed that the resulting enormously long trail cables weighed so much that an additional hoisting rope and compensating rope were required to handle them. Rather than add to the already large number of hoisting ropes of special construction, six elevators in this bank will be used for this service, each pair anwering calls from a different group of floors.

It then appeared that, in order safely to "pawl" the cars and connected loads, or bring the cars to stop in case of overspeed, the total loads applied by the safeties to the heaviest guides or rails available for use on this building, required that two safeties be employed for this duty on each car, one below the car and one above, dividing the



Plan of Elevator Lobby

load in two. Each half of the load will be applied between two different sets of guide fastenings. This requires that the guides be fastened between floors in addition to the usual fastenings at the floor levels. Additional vertical steel members are used to carry the intermediate fastenings.

In order to bring such high speed cars to a quick stop under emergency conditions without resulting injury to the passengers, the so-called "monomass" construction has been used throughout. Ordinarily, the mechanical safety attached to every passenger car, which grips the guide rails when the car reaches a predetermined excess speed, thus acting like the emergency brake setting on a railroad car, must be so set that it will bring the fully loaded car to a stop within a reasonable distance. Then, if the car contains but one or two passengers and so weighs much less than when fully loaded, the safety, properly set for full load in the car, will bring the lightly loaded car suddenly to rest. To avoid this, the whole moving system, car, counterweight and ropes, is tied together as a unit and all brought to rest simultaneously. Thus the load in the car is but a small part of the whole system, and one safety setting will bring it to rest practically in the same distance independently of car load. The safeties are of a type that can easily be reset, provided the system is intact, merely by reversing the car motion.

For elevators of such high rise,—between 800 and 1,000 feet,—traveling at such high speeds, the depth of pits and length of overhead run-bys determined on the basis of the old and usual methods for bringing an elevator car to an emergency stop short of the bottom and top of its hoistway, are impractical. Furthermore, very elaborate tests of such final emergency stopping devices that function independently of the car safeties have proved the inadequacy of such methods and such devices for such speed-load combinations. This has led to the development and use of radically different methods and devices for providing ultimate safety, and which do not require great depth of pits or length of top run-by. Such greatly improved and more certain ultimate safety equipment, now well tried out, will be used in the Empire State Building. Such devices were first employed relatively so long ago as in the Chicago Tribune Tower in Chicago, where structural limitations in pit depths rendered the older devices useless. The elevators in the Empire State Building will be safer than any elevator of much slower speed and less duty that has yet been installed.

The danger of injury to the passenger at the landing, due to improper relative manual operation of both car and landing door, which accounts for over 90 per cent of the elevator accidents in the United States, is eliminated by the use of automatic stops and interlocking of the operation of both car and door necessary to make practical the operation of the modern high-speed elevator.

THE PLANT

Having determined by suitable statistical methods the demands that will be made on the elevator plant, the number of elevators of proper passenger capacity and duty and their proper arrangement in banks and groups of floor served can be determined by calculation. It then becomes a problem to fit this proper arrangement into the building within the practical limitations of plan and construction. Generally the ultimate result is more or less of a compromise, but, unless the most desirable arrangement is first set up, the amount of any compromise is indeterminate and may result in wholly unsatisfactory equipment.

Working on this basis, the ultimate elevator plant now being installed in the Empire State Building is shown diagrammatically on the riser diagram and in the accompanying table of data. There are 58 passenger elevators arranged in seven banks. There are four high-speed freight or service cars serving above the ground floor, and two large slow-speed freight cars serving basements and ground floor.

The arrangement of the passenger cars in banks, as to number of cars in a bank and the floors served, is of course a compromise within proper limits between the ideal arrangement and the requirements of plan and of construction. The proper simultaneous development of building, steel and elevator plans avoided the common error of attempting to fit an elevator plant into a previously fixed building arrangement and steel layout. The essential space requirements of the elevator equipment were established before the detail structural drawings were begun and a mutually satisfactory compromise reached so that the proper number of proper size and shaped cars could be installed, arranged in proper banks so disposed as to provide reasonably easy access to and egress from the cars.

Of recent tower buildings, the Empire State Building is unique in that the tower proper begins at the *fifth floor,* where a major setback occurs. At the fifth floor the yield area is about 69,000 square feet. At the sixth floor the yield area is about 30,000 square feet. In this way, ample light and air are obtained on all floors. This also has the result of reducing the number of floors having very large yield area to the five lowest, which, due to the short travel, makes it possible to serve these lowest floors with a small bank of large elevators. The framing of these lower floors is such that additional elevators can be introduced into the

yield area about the central core where tenants may so desire.

But at that, the cross section of the tower, even at the 80th floor, with a yield area of over 18,000 square feet, is larger than the ground floor area of many other tower type buildings. When fully occupied by the probable class of tenancy that will rent in a building of this type in this locality, keeping the future of this district in mind, the total occupancy is estimated at about 19,000. The maximum, five-minute, traffic peak for this class is about 2,400. Elevators must be provided easy of access, capable of moving this number of persons in five minutes. In order to accomplish this with a minimum practical number of elevators, many of which have a hoist exceeding 500 feet, the elevators must move fast, if each car is to complete a number of round trips and receive a number of loadings during this peak period.

It results that the three, high-rise banks, with hoists respectively of practically 600, 770 and 950 feet, must be rated at a speed of at least 1,000 feet per minute. The occupancy to be served by these banks is large, requiring large cars rated at 3,500 pounds load. No such loads had been previously moved at this speed in passenger service, so here special hoisting engines and roping were required together with special safety arrangements. Even at this, the highest rise bank required the use of ten such elevators, the largest number it is practical to operate as a single bank, and only then because the round trip time is long enough to prevent undue accumulation of cars at the bottom terminal.

The lower rise banks do not require such speed, but the two lowest banks do require what now seem to be the largest practical size cars for this service, rated at 4,000 pounds load. Had it been decided to increase the number of large floors above the fifth floor, a condition would soon have been reached where double-decking would have provided the only practical solution.

Above the 80th floor, which had been decided upon as the topmost floor to which it was economically sound to provide regular elevator service by a whole bank, are five floors of smaller area served by shuttle elevators from the 80th floor. The often-seen mistake of running part of the highest rise bank to these floors was not made. This always upsets the schedule and makes it practically impossible for the bank to render good service at any of the floors it serves. In such high-rise, high-speed elevators, figured to the minimum possible number, the schedule becomes of vital importance. If the cars are not dispatched on time and maintain the proper spacing, at least to an approximate degree, the cars rapidly get bunched, and the service becomes very poor. A few seconds difference in time means a long distance in travel. Here we are dealing with a vertical railroad system, in which it is almost true that cars must run on a time-table.

To take care of this situation a very complete interchangeable automatic dispatching system will be installed that makes it possible to adapt the despatching system to the kind of service required during different periods of the day. A complete auxiliary telephone system providing for easy communication between operators, starters and machinery rooms has been installed.

In a building as large as the Empire State Building the matter of handling freight, furniture, food, milk, drinking water and the like becomes a serious problem. In addition, the delivery of mail almost assumes the aspect of a mail car matter. Provision has been made for fast, large, service and freight cars and for the possibility that one car will be devoted almost exclusively to postal distribution.

The elevator contract for this building is the largest one-building contract ever let. The magnitude of the work involved is so huge that the elevator manufacturers have established in the field what amounts to a construction organization separate from their regular New York organization. They have coöperated in every possible way, in engineering, in design and in development of the necessary new equipment, without which coöperation it would have been impossible to feel certain of success in such an undertaking.

The following may serve to indicate the magnitude of the installation.

The total number of landing entrances to the elevators is 1,239.

The total length of both car and counterweight guide rails is 27 miles.

The total length of hoisting ropes, compensating ropes and safety ropes is 120 miles.

The total length of the hoistways is nearly seven miles,—about the distance from the Battery to 110th Street,—and this vertical railroad, considered as a single track line, has a one-way traffic capacity, fully loaded but without undue crowding, of 30,000 persons an hour! This, because the elevators can carry 15,000 persons going in one direction in 30 minutes.

The total load capacity of all the elevators taken together is 225,000 pounds (100 long tons), —practically the capacity of a train of ten standard flat cars. Conceive that this train of ten, fully loaded, flat cars is being lifted vertically at a speed of ten miles an hour, and some idea of the power required can be formed. While these figures may mean little, they perhaps furnish a scale for the reader who is not familiar with elevator facts.

TOWER BRACING

ART OR PSEUDO-SCIENCE?

BY

DAVID CUSHMAN COYLE

THERE are three ways of tackling the intangible in this life, all leading to satisfactory results. They are religion, art, and pseudo-science. The last is especially worthy of consideration. Take astrology, for instance. The fate of men and nations can be predicted with absolute certainty through observation of the position of sun and planets. What could be more satisfactory? The client is pleased, the practitioner is paid, all's well with the world.

It is much the same way with the bracing of tall buildings. There is an elaborate theory that governs the whole subject,—several of them, in fact. One can design roughly after the manner of Fleming, or one can plunge boldly into the depths of the slope deflection method and (given an imaginary building) come up panting two years later to receive one's Ph. D. There are also half-a-dozen intermediate schools of thought, all of whose disciples enjoy in common that peace of soul which a well organized pseudo-science offers to its devotees. They are like the German mathematicians who recently built a concrete dome 250 feet across and 4 inches thick. The sheer beauty of a perfect mathematical equation drugs the mind so that it is no longer conscious of this unpleasant world filled with gyp contractors, thunderstorms, politicians, sulphur fumes, nervous old ladies, and similar intangible factors.

THE fact is that it has been commonly assumed that the reason people put wind bracing in a building is so that the wind won't blow the building over. If this were the usual purpose of bracing, and if anybody knew how much the worst probable wind pressure amounted to, and if anybody had any idea of the relative effects of the steel frame and the masonry in resisting wind; then if one could only work the slope deflection method in less than a year, one would be at the threshold of a real scientific knowledge of the matter. But since the object in view is not generally safety, and since nobody knows anything much about the loads and the resistances, the more hifalutin the mathematics, the more pseudo the science. For a pseudo-science is the application of exact methods to data that have nothing to do with the case.

The only reason for preferring astrology is that as a rule the predictions of the astrologist are sufficiently postdated to give him time either to die or to escape before they are put to the proof. A building, however, is too apt to be built before the death of those responsible for it; and if it is unsatisfactory it is just too bad.

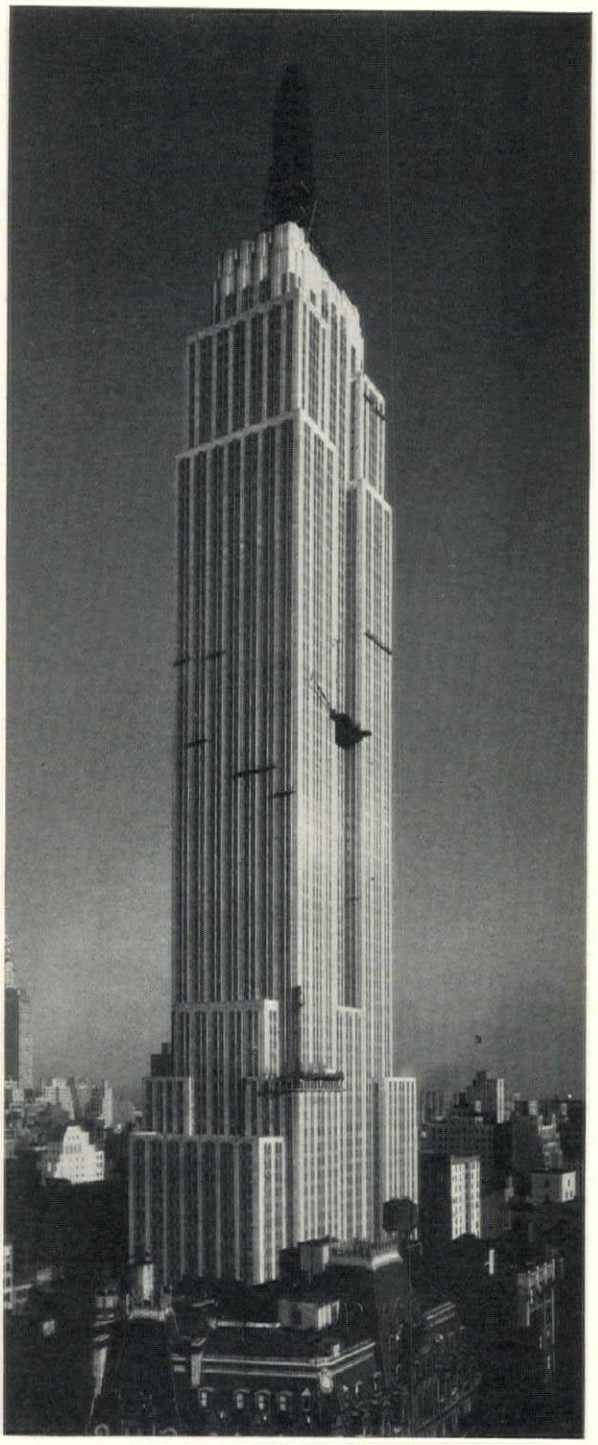
THERE are of course some types of structures that are braced for safety, or should be, and for those types the common theory is satisfactory, and as close to the facts as the nature of the case requires. Two-story houses in hurricane districts obviously need bracing. At Miami in 1926, a large number of them were blown all over the place. The same may be said of radio towers, train sheds, armories, straw hats, silk umbrellas, circus tents, and similar structures.

It is an error, however, to infer that, because a small or light building is liable to be blown away, a larger one would be treated the same way, only more so. Before starting to design the building it is very desirable to have a rough idea of what we are trying to accomplish. As soon as we get beyond a few stories in height, we are generally out of the class of structures liable to be blown over, and we are met with an entirely different set of requirements. The first, and often the only requirement, is that of the law. In New York the law requires bracing for all buildings over 100 feet in height. The majority of such buildings are so wide, and so filled with partitions, that no practical reason exists for the use of bracing, other than the laudable desire of the authorities to have the building look legal. In such cases the bracing is purely cosmetic, and certain types of detail which are of no great value as bracing are very properly used for this purpose. This applies particularly to top and bottom angles, which give an appearance of stiffness without interfering with the architectural finish.

IT is therefore advantageous, when designing buildings of this second type, to be fully conscious of the nature of the design, and the reasons for its use. A considerable amount of harm has resulted because of inexperienced persons assuming that top and bottom angles, or

similar devices, were being used effectively to stiffen a particular building, when in fact they were put in solely for looks. As a result some men may have had several years experience in the use of such bracing without knowing that it is merely an optical illusion. Two good examples of this danger appeared in Miami at the time of the hurricane; both were buildings which because of their shape and their light walls, really did require bracing for safety. One was designed by an engineer who used a commonly accepted detail, in ignorance of the fact that it is only half as strong as it looks. His building cracked its walls badly, and had to be reinforced with additional braces to remove the more or less justified fears of the public. The other was a case of "free engineering;" here a draftsman in a steel company used angle connections of practically no strength at all in a slender building where serious bracing was obviously required. Similar designs have been used in New York hundreds of times, with entire justification, because of the nature of the buildings involved. But in the instance mentioned the connections were called on to carry actual stresses, a function for which they were not suited. If the wind had happened to strike the building flatwise instead of endwise, it would probably have attained the distinction of being the only steel-framed office building ever to have been blown down. As it was, it was condemned after the storm, and cut down to a lower height.

If it is wise to know what one is about when designing medium-sized buildings, it is even more essential when dealing with high and slender towers. This third class is even more subject to misunderstanding and pseudo-scientific obfuscation than the second. For here we get definitely out of the range of mechanical solutions and into the field of subjective experiences and the human nervous system. The problem of the tall tower, in a word, is to make it so stiff that the tenants will never feel the motion. To brood portentously over a complex mathematical egg, and finally emerge with a mere assurance of safety, is to flap the ears in a solemn manner. What really matters is whether the tenants will give the building a bad name, after experiencing their first thunder squall.



The World's Tallest Tower, the Empire State Building. Shreve, Lamb & Harmon, Architects

IT is not sufficient to take the simple bracing details of a typical nineteen story apartment, with its perfectly naïve theory of loads and stresses, and extend the same principles to a sixty story slender tower. The bracing in the ordinary apartment building often carries no stress whatever, while that in the tall tower will be seriously loaded. It is therefore possible to deceive oneself completely as to the deformations that will occur, taking the ordinary building as a basis of comparison. Because of the technical connection between deformation and relative stress, it is also possible to compromise even the safety of the structure, where X-bracing is used in connection with the more common details.

The design of a tall tower for comfort is a

Photo. Wurtz Bros.

Downtown New York's Tallest. The Bank of Manhattan Building. H. Craig Severance, Architect

problem in mathematics, to be sure, but it is much more than that. It involves the judgment of the engineer on the imponderable characteristics of the particular building: its exposure to wind, the tunnel and eddy effects of other towers, the material and arrangement of walls and partitions, the slenderness ratio, and the intelligence of the owners as affecting the possibility of a frivolous attitude being taken toward the question of stability.

ALL these factors having been considered, the engineer is in a position to choose a nominal unit load. This load is expressed in pounds per square foot, but its real meaning is quite different. It is a highly abstract quantity, and exists only in relation to another equally abstract number, the so-called "theoretical deflection per story." The latter, which may be as much as a quarter of an inch, is a number which expresses the engineer's opinion of the proposed occupants of the building and their degree of nervous sensitivity. In a ritzy apartment the psychology is apt to be different from that in an office, a store, or a restaurant; and the theoretical deflection varies accordingly. A good illustration of the abstract quality of all these factors is the effect of walls. The law requires that all wind stresses be carried by steel, but anyone who omits the masonry walls on a high tower without a corresponding change in the unit load or in the allowed deflection will furnish a valuable example to those interested.

Having determined the unit load and the deflection per story, the designer may safely proceed to mathematics, provided he keeps track of what he is about, and does not mistake an abstract number for a concrete fact. In the end, if he has chosen his factors wisely, and if he knows the mathematics, and if the owner and the architect have been willing to give him a fair scope, the chances of a stiff and substantial building are good.

HERE, you see, we are choosing between pseudo-science and art. The relevant factors in the design of a tall tower are some of them impossible to measure, others not even material at all; there are two ways to deal with data of this kind. The easiest is to ignore them and substitute wind loads and steel stresses out of the city code. Then by kicking up a pother over the distribution of the stresses and emitting a dense cloud of Phis and Thetas, one can please all parties without straining the mind. The resulting building, as the vibration tests show, may be good or bad or very bad, according to luck.

An art, on the other hand, is concerned with combining material and mental factors so as to produce a desired impression on the minds of human beings. Parts of its technique can be learned from books, but in great measure it requires genius and experience. The art of skyscraping is still in its infancy, but owing to a happy combination of vision, native genius and good luck, it has already produced some very good examples along with the very bad, to serve as a background of experience for the future.

CONTRACTORS—PURE AND IMPURE, —BUT NEVER SIMPLE

BY
KENNETH M. MURCHISON

THE art of contracting for the erection of buildings has changed quite a bit since the World War. Commercialism is rearing its Medusa-like head more and more. New conditions have arisen, and the contractors, like all other good American citizens, must meet and conquer.

Besides having to be more efficient, more zealous and more omniscient than ever before, the modern contractor is, more often than seldom, called upon to assist in the financing of new projects. And he does it not only to clinch the job in the first place, but because he has found out that there is money in it for him.

He has become aware that under the old system the banker or the bond house or whoever hands out the wad gets the most profit out of it, and he now affiliates himself with some responsible financial house with a look-in on some of the French dressing or gravy, or perhaps he does the banking.

THE ALMIGHTY DOLLAR

Any contracting firm which can help out the owner of a piece of property by doing his secondary financing is in a much better position to get the job than is the pure but bankerless builder. And that is why I sometimes feel sorry for the small fellow who announces that he has started in the building game but who has not tied himself up with some mammonly partner. This kind of builder will have to content himself with small jobs, with alterations and with country houses, but that is not the way leaders in the contracting business think it should be prosecuted in these modern days. Unless he wants to be always a small contractor forsooth (and, by the same token, there will always be small jobs for the small contractors), the budding builder should either marry a girl whose old man is a retired capitalist and who believes in his son-in-law, or get somebody with a great roll of cash to help him over the jumps.

One of my friends is the head of a building corporation that earns its livelihood by competitive bidding. This young fellow is always busy; he is always excited; he is bidding on four or five things at the same time; and he is always losing a $200,000 job by $180! Or, in those delicious moments when he *is* the lowest bidder, the Board of Selectmen decides to take some of the alternates, and my friend again loses the job by $84.37!

But he likes it. The game is something like golf. There is always that ray of hope dangling before his eyes that he may do the next hole in three, or be able to hit the ball on the nose.

A FEW DON'TS

Those architects who try to put through a building operation by means of subcontracts are really entitled to the pity and sympathy of their confreres. In the first place, few architects are properly set up for such a project. Architects' superintendents are not building superintendents, and the building superintendent that an architect gets to carry out a subcontract job is generally one of a crowd of floaters, which class of employes can get the architect into plenty of trouble.

It does not seem natural that an architect can do the actual construction work for a client at a saving which might offset the general contractor's fee. Certain it is that the architect, when he lets himself in for this sort of thing, is doing nothing but hunting trouble. Has he an estimating department? Is he *au courant* with the prevailing prices on all subcontracts? Has he any other jobs being done by the same subcontractors, so that the subcontractor may combine his superintendence and overhead on two jobs close to each other? Where is his transportation department? And who meets the general payroll each week?

The modern up-to-date American general contractor is entitled to the admiration of the architectural world for his capacity, his looking-forwardness and his faculty for administration.

IT'S LIKE RUNNING A WAR

When you come to analyze it, the administration of a speedy, complicated and difficult building operation is amazing. There are a myriad of things to contend with. Everything necessary to be delivered on a certain day is there that day. And the gang that handles it is there as well, overalls on, waiting for it. As to delivery of materials at the building, that too is more onerous than it used to be, because our street traffic no longer admits of great piles of brick and dirt and broken stone taking up half the roadway. The placing of the ground floor slab in jig time is of paramount importance, serving as it does a mul-

tiplicity of uses, one of which is to keep the architect from falling into the cellar.

Anyhow, taking it by-and-large, putting up a modern skyscraper or a big hotel in a few months' time is a man's job, and it belongs to the contractors,—not to the architects.

There is a great pile of dollars yet to be made in real estate and in buildings, and that is where the architect should take stock of himself and consider investing his surplus cash. Not in Wall Street, my brothers, where nobody knows what they're really doing until they are broke, but in city property which, if well situated, has comparatively little chance of declining in value. Then, in the development of that city property along well studied lines is where the architect should shine.

YES, WE ARE LEARNING ALL THE TIME

A few architects have taken advantage of their opportunities and have invested in building operation, but they could be counted, here in New York at least, on one's fingers. The rest of them, when they get anything laid up, either buy their wives chinchilla coats, or go downtown and ask their stock brokers to recommend something.

And what does a broker know? Nothing, my friends; or if not nothing, then next to nothing. "Rock Island is well thought of," or "Castor Oil is due for a rise," or "They're going to cut a melon in Transcontinental Food." That is the kind of stuff that is handed out to the prospect.

The builders who are also bankers can, as I said before, put over a deal with consummate ease compared to the contractors who have to go outside for their money. But they have to wear smoked glasses day and night. They are beset by propositions of every kind, propositions for which trusting architects have drawn up elaborate sets of drawings, added to which are the promoters' works of art in the way of financial set-ups.

But the questions of demand for space, junior financing, cubic cost, and other little items of interest and taxes often turn themselves into such bacteria of trouble that the whole thing resolves itself into a total waste of time for all concerned. That seems to be the fate of 19 out of 20 projects which find their way into the developing room of a big building organization or an architectural office which has the reputation of going into deals.

HE MAY DO A LITTLE CHOOSING

Would you bring your boy up to be an architect? Well, I believe I would, if he exhibited any tendencies that way, and also, if I had one. He needn't expect to die rich, nor will he ever be the President of the United States, but he will have a good time out of life and should enjoy a reasonably happy social position.

But would I bring him up to be a builder? That is another matter. He would have to look up to, or pretend to look up to, the architects from whom he is trying to get a job, and that might kill him off early in life. Then besides, he would probably be in a fight with the unions most of his life, and that is not so pleasant either. He is blamed for everything that they think the architect should be blamed for, and he always has to pay for some mistakes made by some mysterious draftsman.

INDIGESTION

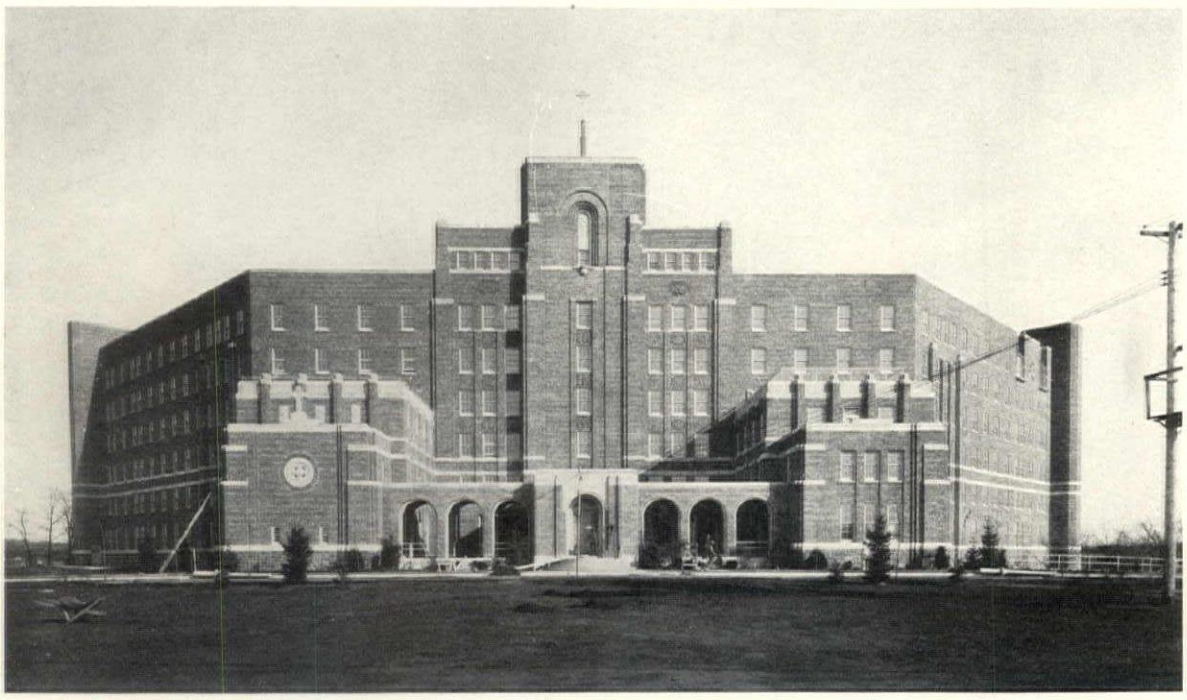
Perhaps some day the big builders will swallow up the architects. This pretty little how-d'ye-do has been a matter of discussion time and time again. A few big companies like the Fred F. French aggregation seem to get along very well with their own architectural forces, but one cannot help thinking that every once in a while a little bird's-eye viewing wouldn't do any harm.

There is no doubt that the big concerns, if they wanted to cut out the architects from their field of vision, could easily get very competent designers to head their departments for $15,000 or $20,000 a year,—perhaps less. The companies, however, with but few exceptions prefer to sidestep that question entirely, just like the politicians on the Prohibition question, and remain in a receptive mood to the blandishments of the architectural profession, to give or take as the case might be.

In the old days there used to be a feeling of distrust in the building industry between the architects and the contractors, but happily that condition is entirely a thing of the past, and nowadays architects and builders may be seen walking hand in hand up Fifth Avenue and eating out of the same plates in low-priced restaurants.

HE NEED NOT KNOW BRICKLAYING

A big contractor is something like a big chef. Does a big chef cook? He does not. He is a business man. It is his business to make the kitchen pay. And if it does not pay, it is up to the chef to find out why it doesn't pay and to stop up all the leaks. He might go up to the range occasionally to taste the sauces, and so might the big contractor go over to his buildings from time to time to see whether the job is moving along as it should move. But the big contractor need not necessarily be an expert builder. He is a financier, an organizer, a pusher, an analyst of men, a diplomat. It is he who is responsible for the tremendous stride of the building industry of the United States. Without his genius of organization and of driving capacity our great skyscrapers and mammoth commercial structures would not be possible today. If he had not devised ways of erecting these structures in ten or twelve months, the interest charges and fees would eat them up, and the projects would fall by the wayside.



THE ST. CLOUD HOSPITAL

PLANNED AS A COMPLETE UNIT, IT COMBINES BOTH GENERAL AND SPECIAL FACILITIES

SCHMIDT, GARDEN & ERIKSON, ARCHITECTS

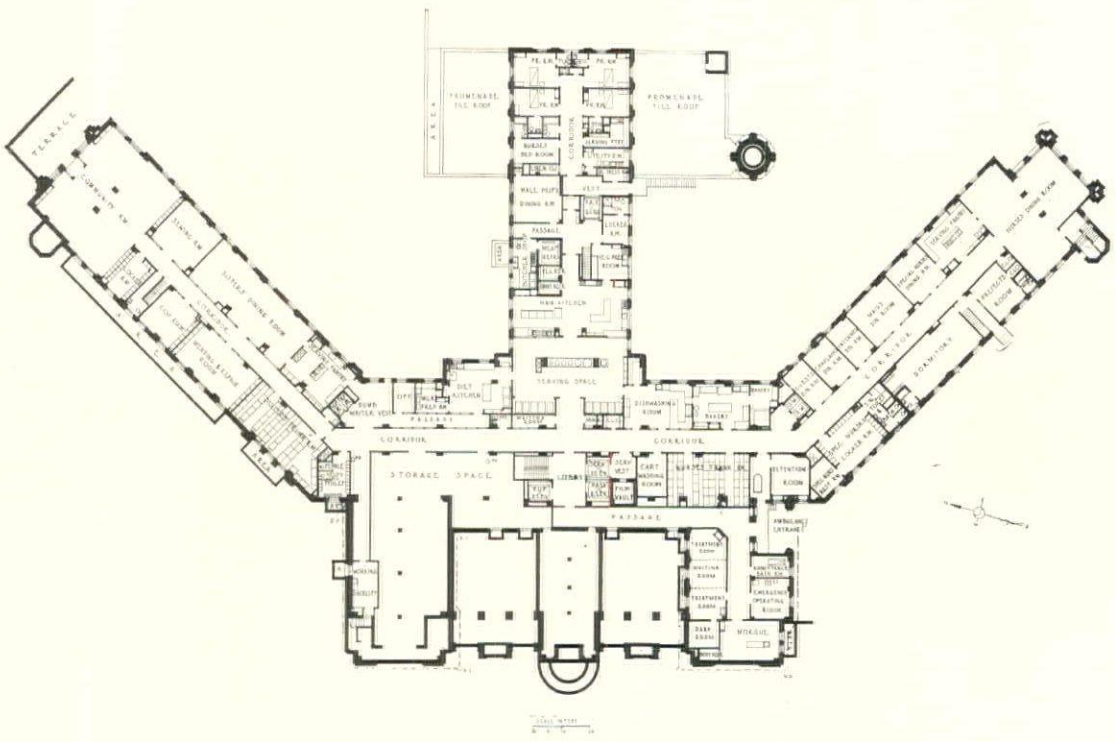
BY
A. T. NORTH

HOSPITAL service is provided in all large cities by both general and special hospitals. The St. Cloud Hospital is so located, however, that it was planned and equipped to provide *all* of the things that are now considered necessary for a complete modern hospital. As St. Cloud is an important Minnesota railroad center, its location is strategic in the possibilities of serving a large contributory territory.

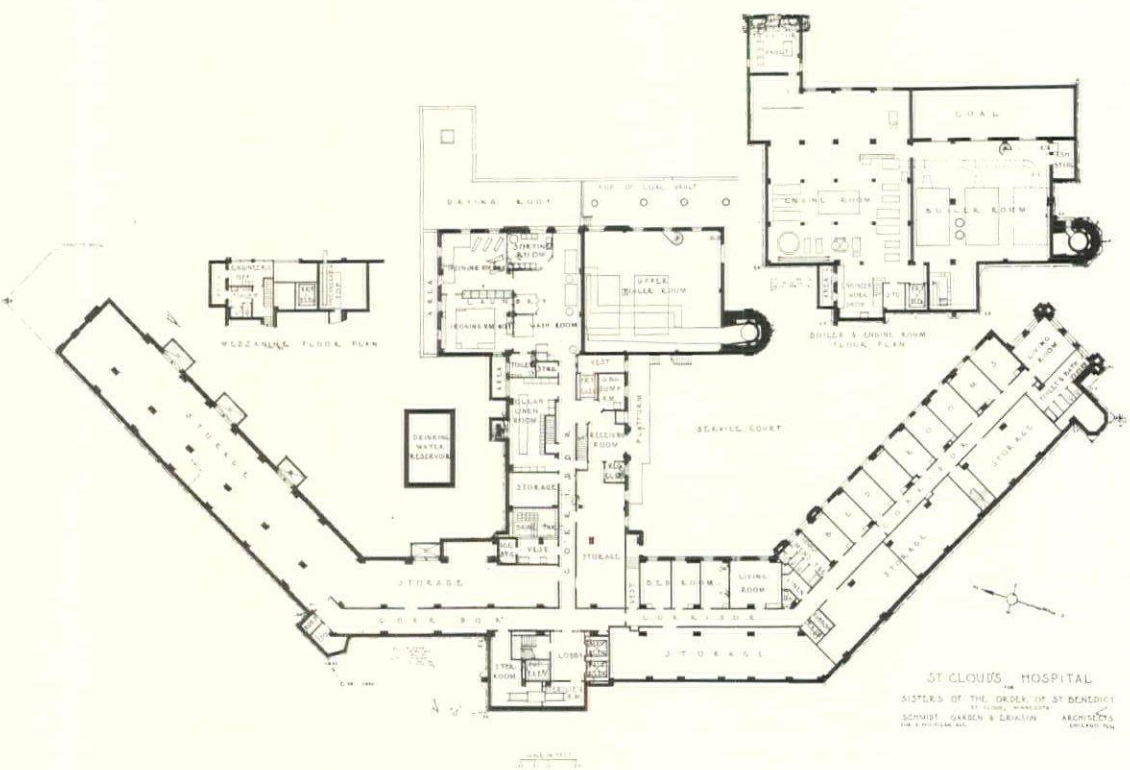
Grounds of sufficient area were provided, permitting the orientation for exposing all parts of the building to the sun, the two principal wings extending from the central portion in a northeastern and southeastern direction. The contour of the ground was such that this plan arrangement was constructed with a minimum of excavation for the basement and sub-basement floors. The principal front (west) is on the higher ground, facing the highway with an ample lawn area between. The rear front (east) faces the lower ground along the Mississippi River providing sufficient area for the outdoor use of the patients and employes. The site was well selected for benefits to the patients and employes and for effecting certain economies in building construction.

The spacious grounds were used to store all of the coarse materials such as brick, stone, sand, gravel, cement, reinforcing steel and form lumber. The foresight of the contractors in purchasing the materials in ample time for prompt delivery, their storage and use without delays, and the wellnigh perfect organization of the contractors' forces, contributed to an unexpectedly low cost of construction.

The exterior walls to the floor lines above adjacent grades are faced with seam-faced, random, ashlar granite, which was obtained from the rejected stone piles at quarries located from three to ten miles from the site. The retaining walls around the rear driveways and at the terraces, some of which are high, were faced with the same material. The stones were split and squared by the stone masons at the wall. The use

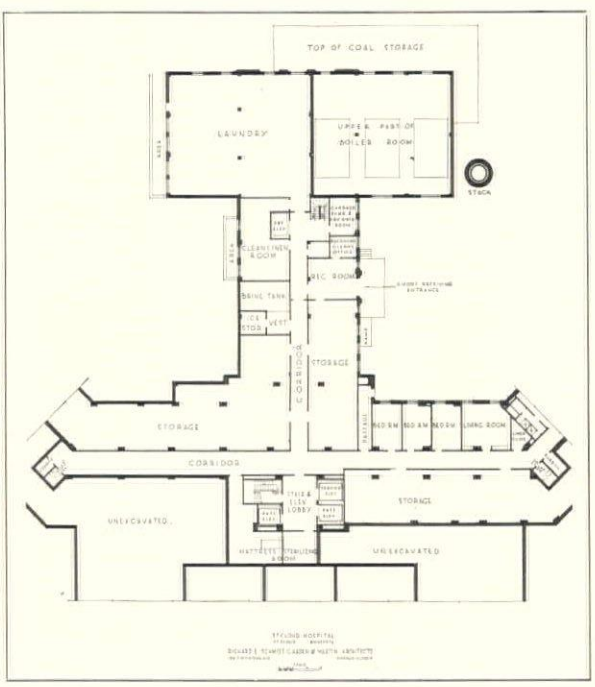


Basement Plan



Sub-Basement Plan

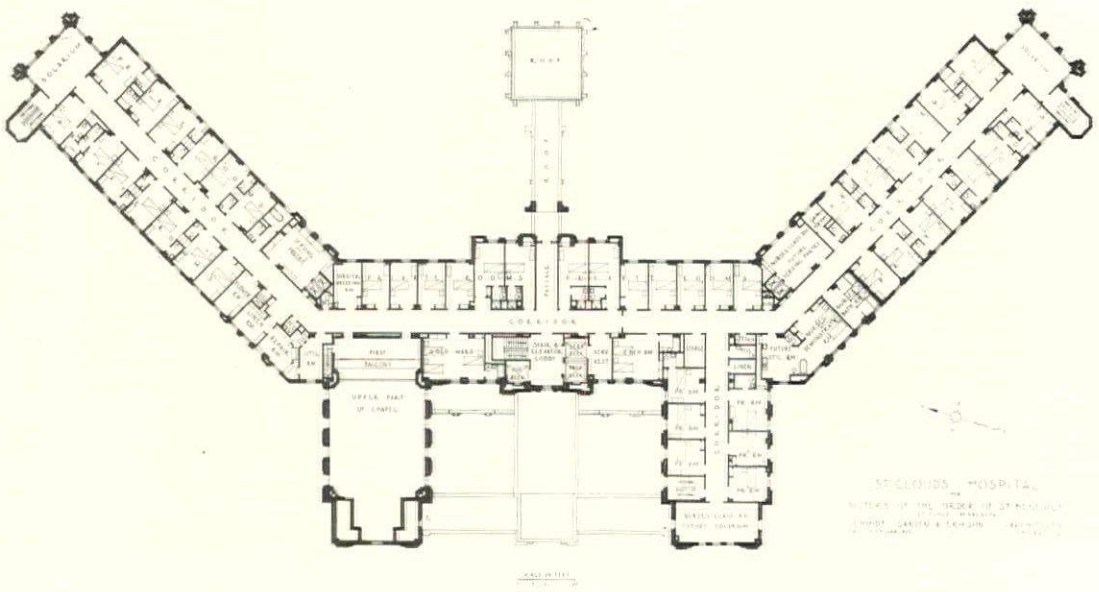
Rear view of the hospital and grounds. Looking from the east across the Mississippi River. (Below) A portion of the sub-basement plan



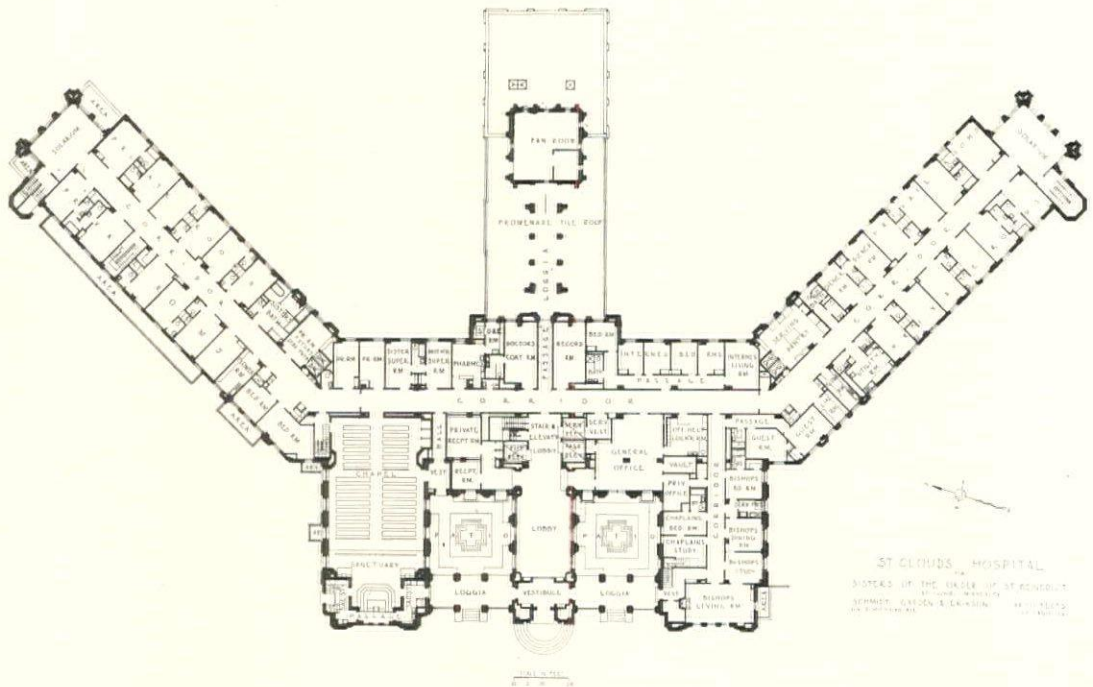
of stone trim, except for the window sills, was confined almost entirely to the principal elevation and in just sufficient amount and placement to enhance the appearance of the building. Although this brick structure is of large dimensions, the shape of the plan and the discriminating use of brick surfaces in different planes give to it an appearance of appropriate distinction.

Much of the concrete work was executed in cold weather, which entailed considerable expense for artificial heat, canvas, fuel and labor. The upper stories were concreted in December and the roof and roof structures in early January. The temperatures were low, as was to be expected in that locality. In the total cost of construction, as stated, is included that of considerable road construction consisting of a concrete foundation and brick pavement, pavement of delivery courts and service driveways, retaining walls with all of the required grading. The large smokestack with granite base was also included.

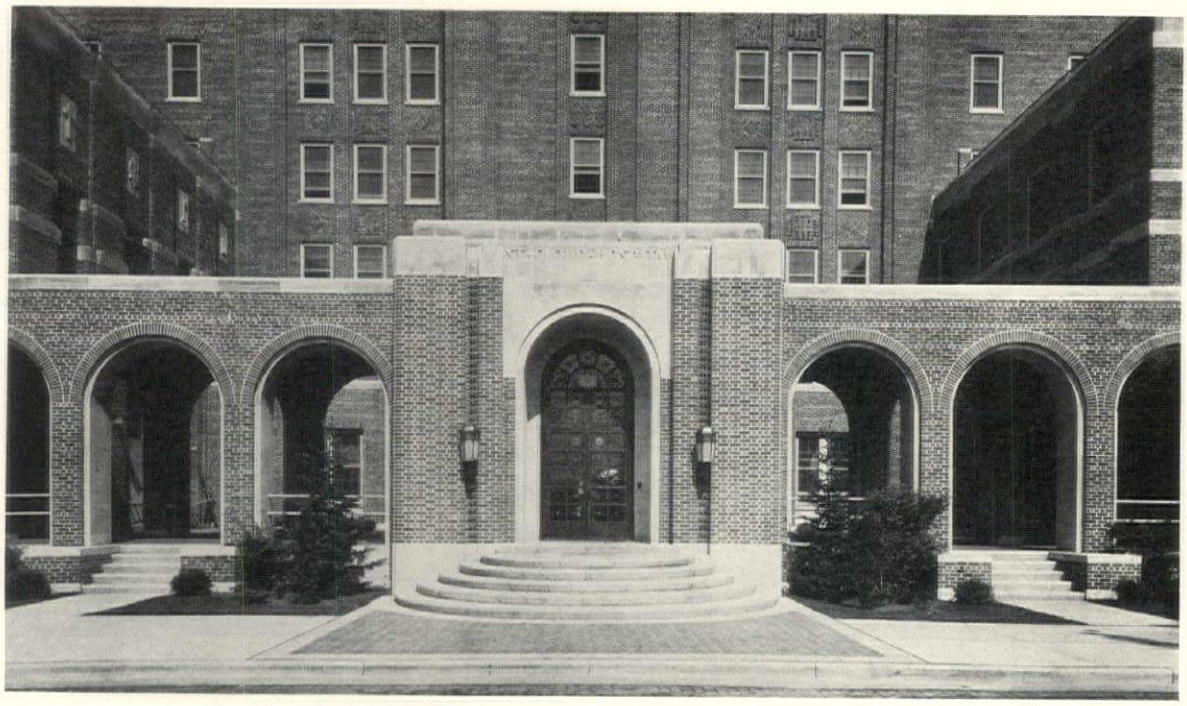
THE walls of the Chapel are finished with face brick, stone trimmings, mosaic panels and ornamental glass windows. The concrete ceiling is decorated in colors, and the wainscotings are made of marble and wood. The walls of the entire culinary department and basement corridors, wherever food is transported from the ranges to the elevators and dumbwaiters, are faced with light tan glazed brick. An unusual amount of glazed tile was used in the operating department, delivery rooms, baths, toilets and floor serving pantries. There are metal dust chutes and laundry chutes in each wing leading to the sub-basement. Mechanical refrigeration is provided, wherever required, throughout the building, including the laboratory boxes, body case and refrigerated drinking water. The ceilings of all corridors, and of many of the rooms where required, are finished with sound-absorbing materials. City water system and a deep well provide two sources of water. The



Second Floor Plan



First Floor Plan

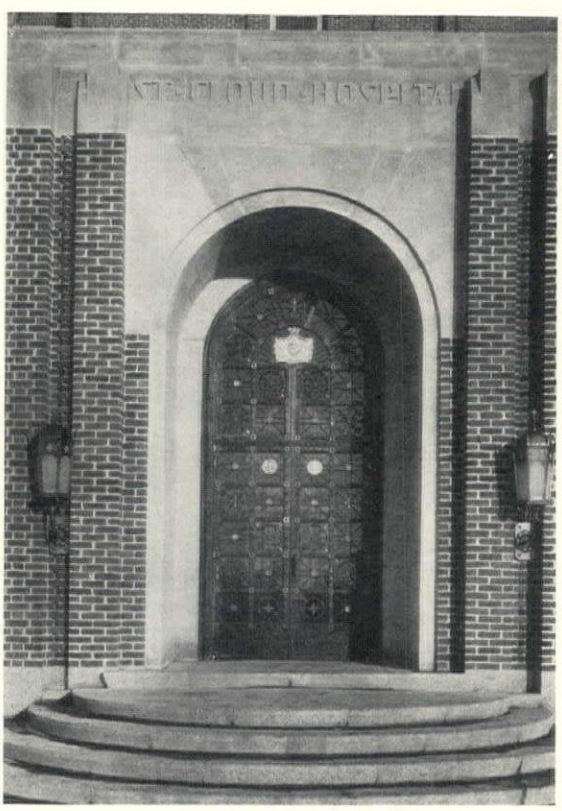


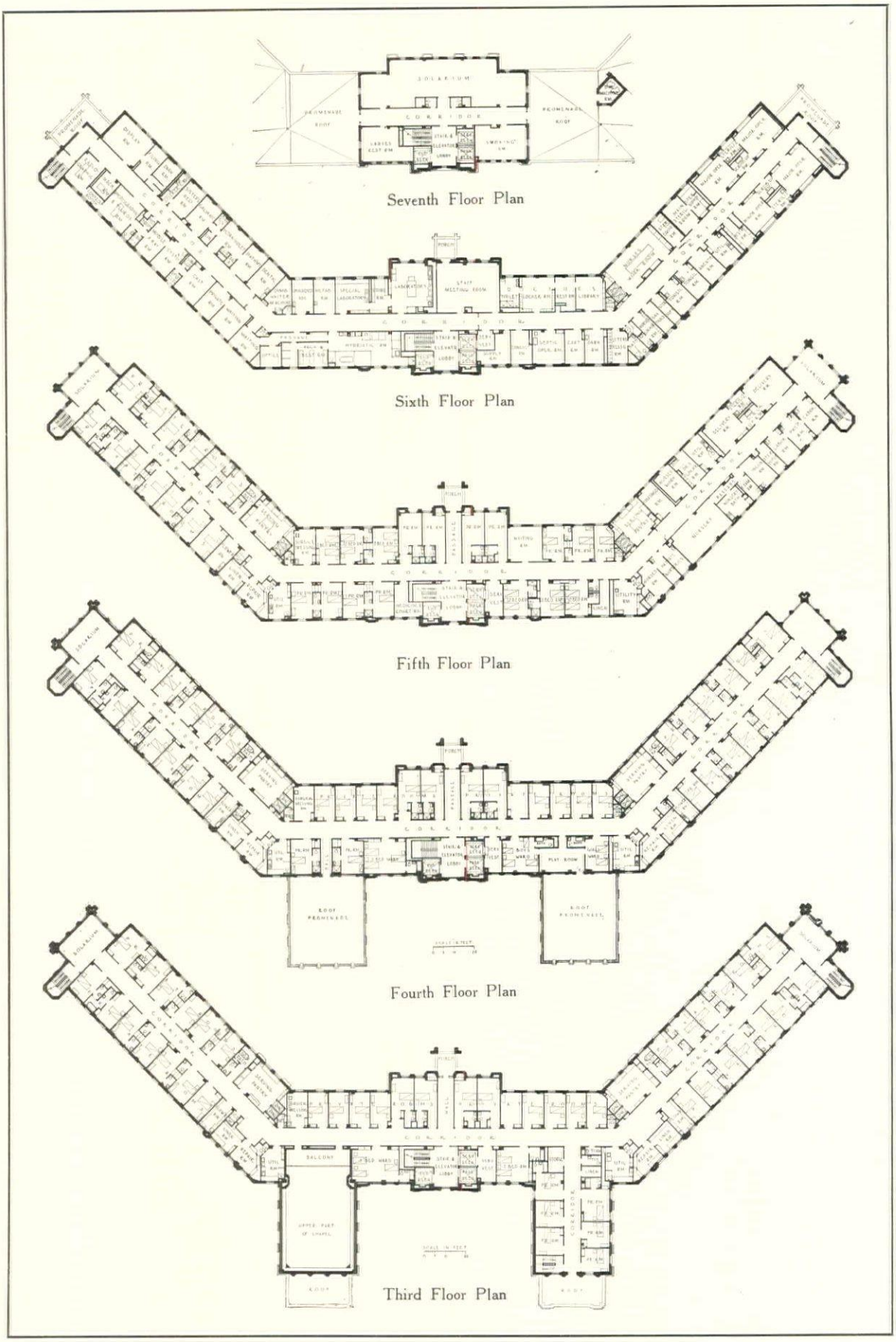
laboratories, operating department, delivery rooms, diet kitchens, autopsy room, record rooms and similar places are all finished with the best of materials and a liberal amount of fixed furnishings and equipment was included in the building cost as given.

The hospital has now become classed as a business enterprise, which should not only earn sufficient revenue to meet the operating expenses and fixed charges but also to earn a profit. It is not now considered to be entirely a charitable enterprise. As a result of the two conceptions of the hospital, formerly they were often designed for monumental architectural effect,—especially if a memorial hospital,—as well as for hospital purposes. At the present time hospitals are designed to be effective buildings operated for a profit. Local or other conditions may cause it to be impossible to operate a hospital profitably and necessitate deficits being made up by contributions by persons or financial support by governmental authorities. It should be the purpose of the architect to design a hospital structure in the most economical manner consistent with durable construction and efficient operation.

THE plan is an essential factor in economical operation, not only in eliminating waste space but in correlating the parts so that operation is effected with a minimum of labor expense, fuel and power. As the plan contributes more largely to efficient operation than any other factor,—the plan is fixed when the building is constructed and inefficient management can be

The Main Entrance. The steps on either side lead into patios flanking the Lobby. Notice the brick coursing and the spandrels in the wall behind. (Below) A detail of the entrance and door grille





Seventh Floor Plan

Sixth Floor Plan

Fifth Floor Plan

Fourth Floor Plan

Third Floor Plan

An arcade at the right of the Main Entrance

corrected,—it is always interesting to make a study of the plan and the relation of the parts or departments to each other.

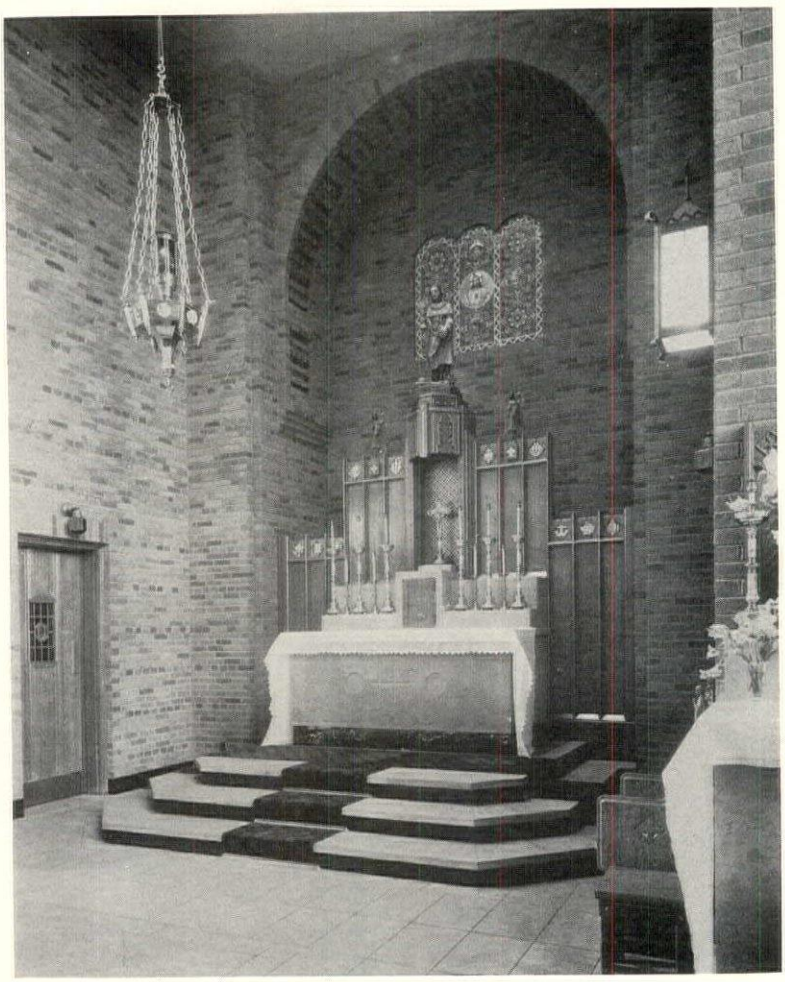
In the St. Cloud Hospital, the boiler and engine rooms and laundry are placed at the extreme end of the central wing, the engine and boiler room floors are below the sub-basement level. Aside from the laundry, the linen room, garbage dump room, receiving department for supplies, linen sterilizing rooms, and bedrooms for help, the remainder of the sub-basement is used for storage rooms. The contour of the ground made it impossible to daylight some of these storage spaces, which does not detract from their usefulness.

The basement floor, central wing, contains the kitchen, serving room, refrigerators and other rooms associated with the preparation and storage of food, and over the laundry and boiler room are located four private rooms for contagious disease patients, nurse and service rooms, all isolated from the remainder of the hospital. The south wing contains the different dining rooms, locker room, dormitory and toilets. On the south side of the central portion is the ambulance entrance, adjacent to which are the emergency operating room, detention room and other rooms, common to that entrance. The north wing is used by the Sisters of the Order of St. Benedict for their special purposes. Some dark storage space is provided on this floor also.

THE central portion of the first floor is used for the general administrative offices, Chapel, the Bishop's and the internes' quarters. The north and south wings contain private rooms for patients, serving pantries and utility rooms. The second, third and fourth floors are typical in containing private rooms, serving pantries, utility rooms, a two-bed and a three-bed ward, linen, repair and flower rooms, and surgical dressing room. The fifth floor is typical except that in the south room is located the maternity department with delivery, labor, preparation, incubator, waiting and nursery rooms. There are also six two-bed rooms on this floor.

The sixth floor is occupied entirely by the operating rooms and the various laboratories. Three major and one minor operating room, with all of the accessory rooms, are located in the south wing. Special operating rooms, hydriatric room, general and special laboratories, library and staff meeting room, occupy the central position. The north wing is occupied by the dental diathermic, ultra-violet, galvanic, x-ray, fluoroscope, radio-graphic and cast room, with all of the necessary accessory rooms. The seventh floor, or pent house, contains a large solarium, women's rest room, smoking room and elevator lobby. A solarium is located also at the end of the

The Reception Lobby, looking toward the Main Entrance door



The Altar in the Chapel Sanctuary. The door leads through a Sacristy to the entrance Loggia

north and south wings, from the first to the fifth floors inclusive. All roofs are finished to be used as promenades.

The owners propose to build other buildings in the future, one to be a convent for the Sisters, the other a nurses' residence. The quartering of Sisters and nurses in the hospital is a temporary expedient. However, all the spaces at present occupied by Sisters and nurses have been built in accordance with hospital requirements and it will only be necessary to install and connect serving and utility room plumbing, cooking and refrigerating fixtures in rooms set aside for the purpose in the portions for the use of patients. Ultimate normal patient capacity is 225, 189 private or single bedrooms and 36 in thirteen wards of two beds to five beds each. Every private or single bedroom is adequate for two beds. If two or more patients cannot pay the charge for a single room, something that constantly happens in hospital practice, a number of single bedrooms will be occupied by two patients without overtaxing the culinary department, laundry and any other service.

The plan is designed for two extensions in front, joining at right angles and symmetrical to the wings already constructed. Near the two obtuse angles of the plan, rooms of corridor width are placed in the present wings to be used eventually as corridors leading to the future wings.

The building contains all of the services required for modern medical practice, and is Class A, according to the rating of the College of Surgeons and the American Hospital Association.

Certain plan and cost data will be of interest to show the relation of different use areas and elements of cost. In appraising the cost, the topography of the ground, the market conditions of material and labor, and the scope of the hospital facilities must be considered. The relative areas for the different elements of the plan will pertain to a complete hospital, including housing the nurses and Sisters in the same building. It should be noted that there is an unusual amount of storage space in the basement which, owing to the unusual contour of the ground, was secured with a minimum of cost. It was not a normal condition.

Interior of a Patio flanking the Main Entrance. (Above, at the right) A view of the rear court and boiler stack. Notice that the details of the brickwork are consistent throughout the building, not a usual practice in the ordinary hospital

PLAN AND COST DATA

ST. CLOUD HOSPITAL, ST. CLOUD, MINN.

SCHMIDT, GARDEN & ERIKSON, CHICAGO, ILLINOIS, ARCHITECTS

Owners: Sisters of the Order of St. Benedict, St. Joseph, Minnesota.
Contractor: Hutter Construction Company, Fond du Lac, Wisconsin.
Size of Ground: 575′ 0″ x 1500′ 0″. Ground area, 862,500 sq. ft.
Six floors above grade, two basements. Contents, 2,574,000 cu. ft.*
Floor areas above grade, 167,960 sq. ft.; below grade, 32,915 sq. ft.
Capacity: Beds for patients, 225; wards, 36; private rooms, 189.

FLOOR AREAS

	Square Feet	
Wards	3,140	2.50%
Private rooms	30,200	26.00%
Stairs, elevators, shafts	5,600	4.60%
Public corridors, including corridor partitions	28,300	24.50%
Offices, lounges, entrances	2,015	1.60%
Operating and all rooms pertaining to them	7,560	6.50%
Clinics	520	.40%
Pharmacy and laboratories	1,200	1.00%
Kitchen, dining rooms, serving rooms and food storage	8,100	7.00%
Laundry and linen rooms	2,770	2.20%
Boiler, engine and fuel rooms	7,990	6.50%
Nurses', internes', help's quarters, including corridors	16,120	14.00%
Solaria	3,950	3.20%
		100.00%

*A.I.A. Standard Measurement.

COST DATA

Excavation, foundations, reinforced concrete, brickwork	$ 398,764.94	Insulation	2,850.00
Granite and cut stone	71,507.00	Lath and plaster	88,532.00
Miscellaneous iron	21,563.00	Marble	18,040.00
†Plumbing	106,133.40	Sound-absorbing material	31,532.00
Metal toilet partitions	652.00	Tile, terrazzo and rubber tile	61,659.00
†Heating, ventilation, boilers and breeching	114,921.80	Painting	28,465.00
†Electrical work, telephones, signal system	43,514.26	Electric fixtures	10,181.65
†Refrigeration	14,006.00	Hardware	16,065.23
†Elevators	16,685.00	Weatherstrips	3,430.00
†Sterilizers	11,750.00	Steel furniture, bronze tablets, door plates	30,488.65
†Kitchen equipment	18,822.50	Dumbwaiters	8,464.00
†Laundry equipment	19,185.46	Incinerators	4,080.00
Carpentry, rough and finish	119,387.00	†Clocks	4,346.00
†Mattress disinfector	1,804.15	Window screens	8,383.00
Hollow metal doors	9,410.00	Window shades, awnings	1,525.63
Windows	23,605.00	Elevator entrance units	7,735.00
Roofing and sheet metal	23,486.00	Metal cases and shelving	50,000.00
Glass and glazing	1,665.00	Chapel and lobby	23,529.00
		Total net cost, materials and labor:	$1,416,168.67

†Items not included in the general contract.

LEARNING THE TRENDS FROM THE FACTS

BY

EDWARD P. SIMON

Edward P. Simon is a Member of the Well Known Firm of Philadelphia Architects, Simon & Simon. He Is a Member of the American Institute of Architects, and of the Architectural League. In Addition He Is Vice-President of the Philadelphia Building Congress

The major portion of a speech before the Philadelphia Building Congress at a dinner to Secretary Lamont, December 9, 1930.

MOTORING through the woods of Maine several years ago I was uncertain as to the proper road to reach my destination, and accosting a stranger asked him a number of questions regarding the roads thereabouts and the names of the nearest villages. To all my questions his answer was "I don't know"; finally, in desperation, I asked him what he did know. After quite a pause he said, "Well, I know I'm not lost." It would seem to me the building industry finds itself in the position that both the stranger and I occupied at that time. He knew where he was, and I knew where I wanted to go.

I may well start with the question: How can we best take steps to ascertain where we are going and thereby aim to cure certain ills which today afflict the building industry? This same question is being asked throughout the world today, as is evidenced by the report of the proceedings of the International Congress of Architects, held at Budapest, in September. I quote from their proceedings: "The Reform of Professional Architectural Instructions to Conform to the Exigencies of Practical Life: 'Considering the economic conditions of today, as well as the radical changes in production since the World War, the Congress deems it necessary that a more complete instruction should be given in finance, economics and the working of organizations than formerly.'" Without detriment to the architects' artistic conceptions, the compositions should be studied with an idea of their actual execution, especially from an economic point of view.

THE PRICE OF ECONOMIC ERRORS

The economic structure of buildings has changed no less than the physical during the last fifty years. Formerly, the typical building enterprise concerned one man or a small group; if a manufacturer or a merchant needed a new factory or store he paid for it out of the profits of his business. Today, almost every building of importance is owned by a great body of investors. A mistake in building economics seventy-five years ago affected only one enterprise; a mistake in building today reaches far beyond the building into the pockets of thousands of direct investors.

For example, had Harper & Brothers in 1854 sunk more capital in the building they then erected in Franklin Square, New York, than their publishing business could afford, their consequent losses would have affected only Harper & Brothers. When, however, an Empire State Building is erected in 1930, representing an investment of approximately $50,000,000, its financial success directly involves the fortunes of thousands of people, many of whom may never *even see the building.*

An uneconomic building in 1930 is obviously much more serious to the public than was the same type of building in 1854. The shift in ownership and financing has effected a complete dependence of every branch of the building industry upon every other branch. I do not mean the obvious fact that the work of architects, engineers and contractors is all inter-related; but in the most inclusive sense, the fortunes of realtors, bankers, designers, builders and investors hinge upon the success of every sizable building project.

INEVITABLE RELATIVITY

In the long run, realtors cannot flourish at the expense of bankers, nor operators at the expense of contractors. Every unsound enterprise means direct loss, not only to the owners and builders of that particular building, but to every sound project in the neighborhood as well, because the soundly financed projects must meet the competition of lowered rents in the foreclosed projects. It's like the rain—

"That falls alike
Upon the just and unjust feller;
But most upon the just, because
The unjust has the just's umbrella."

Now no investor or contractor courts loss. Losses in building occur because owners ignore or do not understand all the elements in modern building economics. A wrong estimate spells disaster, and that wrong estimates are as common as right ones is attested by the general state of the building industry throughout the country. The Associated General Contractors of America vouch

for the statement that there have been 50 per cent of failures in cycles of five-year periods in the building industry.

OUT OF STEP

The situation, I grant you, is unduly severe and dependent on many factors possibly not fully capable of control and elimination, yet this alone is not the basic cause of affairs. Many of these projects could never have been an unqualified success under even boom conditions. In other words, the present distress in the building industry is by no means due entirely to the general business depression. Col. W. A. Starrett, writing in 1928, at the peak of prosperity, said:

"When an industry ranks among the first two or three in a great industrial nation, and no one engaged in it makes more than a living except indirectly, something is wrong. The answer is that building, while conducted with high technical efficiency, is economically the most disorganized major activity known to modern business, agriculture perhaps excepted. Building and farming linger in the economics of the 19th century, whence all but they have fled."

But it is not so much where we are, but where we are going that counts. The entire human family can be divided generally into two great groups—those who are interested in where we are, and those whose chief concern is where we are going. The former believe that deviation from tradition spells disaster. They fulfill a certain function in society by preserving values that have already been won; but the others, that look to the future, the prophets that are interested in where we are going, they are the ones who effect progress.

CURBING LOSSES

Nothing will so stimulate building as reducing the likelihood of losses in buildings. Today we cannot escape the fact that many building operations have fallen far short of their expected possibilities. But this direct loss, often a very severe one, is still only a small part of the widespread damage. Foreclosed properties and their improvements, sold under the hammer or taken over by the mortgage holders, with the previous equity eliminated, may be rented at lower rates; and these rentals affect and jeopardize other neighboring properties which may have been economically conceived and soundly financed. In other words, one's neighbors and what they do, can endanger not only our lives and safety, but also our pocket books.

Further curtailment in avoidable losses will react very definite'y not only towards reducing building costs but likewise the interest required on funds invested in the builders' industry. Just as life insurance companies have found that health research and health education, by increasing longevity, can reduce insurance rates, so the building industry will discover that economic research and economic education, by reducing risk to capital, can lower building losses.

WHO HAS THE FACTS?

The question is asked: How can the architect, the builder, the contractor, the investor, get the facts vital to his enterprise?" Why should it not be possible for a new owner to profit by the experience of the former owner? Why should not the architect be in a position to secure from one source accurate and comprehensive information as to the many factors which it is his task to consider, whereas today it is necessary for him to collect his information from many sources, many of which are questionable?

Why should not the banker be in a position to learn accurately the actual cash investment which the prospective builder is prepared to invest in his own enterprise, and why should it not be possible for the builder to determine in advance the financial responsibility both of the owner and the sub-contractor? What would it mean to the legislator if he had at his disposal a reliable fund of information as to the real property values, the relative congestion of various areas, and above all, business trends? And no less important, what would be the value of such a source of information to the City and State Engineering Departments?

Some of these facts which *should be available to all,* are known only to the designer, others only to the realtor, and still others only to the builder and the banker. Obviously it is impossible for one individual or one isolated organization to cover the whole field. The task of getting a comprehensive picture of all phases of the building industry cannot be delegated to the banker any more than it can be represented as strictly an architect's problem. It is a problem which we all must face, for it is in this age of dynamic building economics, increasingly vital to the success of all.

POOLING THE INFORMATION

It would seem that the builder should pool his information with the materials man, the banker with the architect, the electrical contractor with the plumbing contractor. It is industry's problem—one problem of applying scientific principles to an industry which has fallen behind in the march of progress. I believe that the problem of co-ordinating and pooling our information, the question of developing a fund of knowledge which will make it possible for all those interested in the industry to know with a great degree of accuracy where his money is coming from, is not impossible of solution. I believe that reasoning men, brought together by a common interest, can find a way out.

THE QUESTION OF SIZE

A RE-APPROACH TO THE STUDY OF ZONING

BY A. B. RANDALL

Zoning, as applied to the height and bulk of buildings, has been the subject of a research study made at the School of City Planning of Harvard University under the direction of the late George Burdett Ford, General Director of the Regional Plan Association and author of building codes and zoning ordinances for many cities. The results of this study will be published soon by the Harvard University Press. In this article, Mr. Randall, who was associated with Mr. Ford, comments upon the salient features of the problems of building height and bulk.

BY first discarding all old data, opinions and preconceptions,—endeavoring to ascertain what were the desirable things that should be expected of height and bulk regulations,—how far these were being affected by the present laws and what improvements might be suggested,—Mr. Ford, General Director of the Regional Plan Association, inaugurated a re-approach to zoning. In this he endeavored to draw conclusions from the data available and follow them through to a logical conclusion exactly as is done in the solution of an algebraic equation which, after the original equation is set up, leads on regardless of the opinion of the calculator. The original equations are naturally the difficult ones; but, although they must take into account the very complex workings and the many ramifications of present-day urban life, they divide themselves into certain groups, even though the data and the relations of cause and effect within the group often are highly controversial.

Included among those things which are to be desired and which should make the city more livable are: light, air, outlook, privacy, freedom of movement and the avoidance of congestion, as well as various and sundry amenities that have their effect on the general wellbeing.

These are large equations to set up in any study, and Mr. Ford felt that the data inserted in them from the available facts were more often a mere sounding than a finished product, but revealed lines of attack and paths for later exploration.

SOCIOLOGISTS' VIEW

Thus, while definite recommendations were drawn up from the findings, Mr. Ford felt that they were tentative at best and matters which should have further analysis and study before their full adoption. The sudden and untimely death of Mr. Ford last summer has cut short his plans for further investigation along these lines. The general basis, except for constitutional legality, is still a subject for much controversy. The sociologist, desiring better conditions of living for the community, tends to deplore the skyscraper and all the evils that attend its presence in our intensively used districts; while on the other hand there is the viewpoint of the property owner, often with a building showing an inadequate return on his investment, together with ever mounting taxes and the falling off of income in his building.

The sociologist, in cooperation with medical authorities, has made valuable studies of the requirements and features which should be afforded for human habitation and the quarters in which human beings may work efficiently. These studies stress particularly the need of sunlight, light, air, outlook and freedom from congestion both in the prevention of disease and for the full enjoyment of living. These factors have direct effect not only on the physical, but also the psychological, wellbeing of the inhabitants of our communities.

Conclusive quantitative proof of the desirability of these things is almost impossible, as is also the setting up of any unqualified standard for safety and wellbeing below which we should not go. The general indications would lead to the belief that, while sunlight, air, outlook, privacy, the avoidance of a sense of "shut-in-ness" and of actual congestion are highly desirable, we are not able to set up a minimum requirement which, let us say, if curtailed by 10 per cent would spell disaster but if augmented by 10 per cent would spell relative happiness and prosperity.

ECONOMISTS' VIEW

The viewpoint of the property owner and the economist advances a directly opposite line of thought, and questions whether it will be possible under existing conditions to construct buildings to meet the requirements and the things desired by the sociologist and the zoning enthusiast in such a way that the owners and the others connected with the building industry can obtain a sufficient return on their investments, and also that the masses and the general majority of people shall be able to pay for proper accommodations. In addition to this they deny emphatically all the imputations of evil that have been heaped on the skyscraper, and declare it to be a monument to efficiency and a boon to the community.

Furthermore it is maintained that, were the city spread out to double its size and were all our buildings correspondingly less in height, there would be exactly the same pedestrian traffic on the streets, and even additional vehicular traffic.

Mr. W. D. Heydecker and Mr. E. P. Goodrich, in Survey Volume VII of the Regional Plan of New York and Environs, present in collected form not only most of the data that have been amassed through years of work by others but also much highly valuable and original material, based on their own researches and analyses that they have collected. This forms what is probably the most outstanding work on the subject of requirements of the human being in the matter of living and working quarters.

THE SKYSCRAPER

Messrs. W. C. Clark, Vice President and Economist of S. W. Straus & Co., and J. L. Kingston, architect, in their book, "The Skyscraper," published by the American Institute of Steel Construction, present the economic side of the picture, as based on conditions found in the erection of a multi-story building on a site in the intensively used center of one of our choicest districts. They show that, on land at peak prices, it is only possible to erect very tall buildings under the present-day conditions of land values, rentals and building costs. Likewise they lay to rest (let us hope, permanently) certain superstitions that it is most unprofitable to erect skyscrapers. In fact their work contains a notable understatement of the case of the skyscraper in certain particulars. The National Association of Building Owners and Managers, vitally interested in the matter of height and bulk regulation, has had a committee, of changing personnel, over a period of many years, studying the aspects of this question, and their proceedings contain pertinent data.

CONFLICTING OPINION

Any reader taking up the subject will find masses of conflicting data, suppositions and opinions. The reader will agree in turn first with those who would improve the living conditions of the masses, and then with the building owners and managers; he will wonder how the model buildings of the sociologist can be erected either to show a profit on valuable land and at current rentals or, if running at a profit, conjecture who the tenants may be and how they could afford to meet the rentals required.

"WHITE COLLAR" HOUSING

That the problem is an acute one is evidenced by the conferences called by President Miller of the Borough of Manhattan, to endeavor to institute the construction of moderately priced apartments within the range of the pocketbook of the "white collar" classes, so-called, and thus prevent a yearly exodus of the population. Is the answer to be some form of curtailment or leveling of land values, in order to make this possible, or will the American principle of mass production—of which the construction of the skyscraper is but another form—make this possible, and still provide suitable quarters?

Mr. Ford considered these two and many other intermediate points of view in his research study, and on this subject wrote:

In view of these facts and tendencies, we have felt for some time that there must be an entirely new approach to the subject of determining the most effective height, bulk and form for city buildings.

There must be available data that would prove quantitatively the dollars and cents value of sunlight, light, air, privacy, outlook and freedom of movement. If such data were available, then it would be possible to so frame a zoning control over height, bulk and form as to assure the maximum light, air and outlook and freedom of movement consistent with an assured and reasonable return on the investment. This is the problem to which we have set ourselves in this study, to see what the best recent experience of the most intelligent and farseeing builders would warrant in the way of such control, with a particular view to seeing if the right kind of zoning might not be used to protect the rule-of-thumb builder and the blind follower of precedent against himself.

We want to see if the building regulations can be so developed that they not only protect the neighbor, but protect the builder himself against the uneconomic types of building and too early obsolescence. This is our problem, and it applies not just to the larger cities, but to all, large and small.

CHAOTIC COMPETITION

There is no doubt whatever but that in the growth of cities many sites have been marred by the erection not only of ugly buildings but by forms of development which were either unsuccessful at the outset or soon became so. Some buildings were erected covering the major parts of their plots. This enabled their owners and the tenants of the building to enjoy light, air and outlook over other lower and usually older buildings. In time these buildings were overshadowed by even higher neighbors, and the race for a place in the sun continued until, with keen competition, (often only for an advertising value), and darkness, losses of rental value or high vacancies overtook the hindmost. Not only were changes in style and in the character of space, service and accommodations factors of obsolescence, but these losses of light, air and outlook, combined with mounting

taxes as the values of land increased with the advent of more and larger buildings, caused a form of economic obsolescence to render buildings valueless many years before they would be physically useless. In certain cases, even where a farsighted owner endeavored to protect his future by covering a smaller percentage of the plot than was customary, he had no full assurance that some neighbor would not build to the limit and, using the light and air he had provided, add nothing to the common fund of these desirables. It was clear that, for the common good and the mutual protection of all concerned, some form of coöperation and mutual recognition of rights was needed.

THE ECONOMIC APPROACH

It was therefore a question, granting the present height and bulk regulations for buildings as having a very definite purpose and use, how well these regulations were serving their purposes, and what effect they were having on buildings in the most intensively used and valuable districts. These districts, where the situation tends to become acute, are the clinic in which it is necessary to study symptoms, avenues of approach to the cure (if any) and the steps to be undertaken in preventing the difficulty.

Granting the findings of the zoning experts, the medical authorities and the sociologist, as far as they go, that there are value and necessity for light, air, outlook, privacy and other amenities, the necessity for any given amounts is not conclusively proved for all types of conditions; it is possible to study the matter from another viewpoint—the economic approach. This indicates that there is a recognition of the money value, or premium, set upon these things in the market today. This economic recognition, although affected by other factors and conditions, is relatively definite as compared with the quantitative exactness of the medical testimony, and is definitely reflected in the rentals that people will pay for various types of space.

RENTAL FACTORS

This variation of rentals with exposure, orientation and height above the street is very obvious in apartments, hotel rooms and the usual offices. In all cases where any type of unit is located on small courts or under the shadow of high adjacent walls, a very materially lower rental value exists. Where such units are located facing the open and high up in the building, with an abundance of sunlight, light, air and a commanding outlook, rentals are at a premium, as shown by a study of rental schedules of office buildings and apartment houses. The building manager recalls the time when the uppermost floors of his building were looked upon with suspicion and distrust by tenants; now the reverse is becoming true. Any

Underwood & Underwood

Lower Broadway, New York. Street congestion is not entirely a matter of building height and bulk. It depends somewhat upon building occupancy and the nature of activity in particular areas

rental policy is the reflection of the desires and the demands of tenants at the time, based on the consensus of their recognition of values. Public opinion is the *cause* and rental schedules the *effect*.

Rental differences clearly indicate that space having sunlight, light, air, outlook, freedom from the noise, dust and heat of our streets, and an increased sense of privacy may command anywhere from 50 per cent to 200 per cent rental over that obtainable for space without these conditions.

In the Wall Street district of New York, space 50 to 70 feet from the nearest window may command $3.50 per square foot per year; when so-called "outside" space will bring from $5 to upwards of $7.50, depending on whether it is on a lower story or in a tower. There is of course in addition the factor of prestige, exclusiveness and the general scarcity of space in the summits of our tallest buildings which adds to rental value. Nevertheless, the values of the things desired and demanded by the zoning enthusiast is too widespread in buildings where adequate vertical transportation is afforded, to be seriously discounted on the basis of prestige and advertising value to the tenant. Apartments and their rental schedules show the same tendency and conditions.

This recognition of the value of natural light and the other factors has been materially aided by the zoning laws and height and bulk regulations.

We may legitimately ask what effect these height and bulk regulations have had on the buildings and their construction in order to utilize the values which they have materially aided in creating. It is evident that there is a great deal left still to be desired.

UNEXPECTED EFFECTS

The present height and bulk regulations have brought about an unexpected condition. In many cases the condition of tenants is unimproved, and occasionally even worse than formerly. Under the provision that a tower can occupy only a quarter of the lot area, owners use all the building bulk and net rentable area possible under the law in order to show a return on the investment; and have increased the sizes of plots developed in order to obtain a tower of practical size, thus creating space remote from the windows and all natural light and air in lower stories. This is detrimental to working and living conditions, unless the space is well lighted by artificial means and mechanically ventilated,—a profitless procedure for the building owners.

Analysis of several of the latest New York skyscrapers shows that the levels between the ground floor zone and the base of the tower contain a very large proportion of the total usable areas of the buildings, but produce a much smaller relative proportion of the total revenue of the project. With a more limited size plot, either no tower has been erected, or the tower's proportions make it comparatively unprofitable. The present laws thus tend to penalize the owners of small and moderately sized plots to a greater degree than the owners of larger plots.

Under present laws the street is safeguarded from being unduly shut in by buildings; but the spaces between buildings back to back are far less open, where there is need of even more openness.

There is a trend among advanced builders to consider the *form* of a building more than mere height and bulk regulations. They have recognized the possibility of a greater income in relation to cost in well planned buildings having *less* bulk than the zoning laws would permit in the lower and base portions of their buildings; thus they create "quality" space, obtain a high rate of rental return, and save the amounts of construction cost that would be incurred by the creation of inferior building space. Thus, while they may show a lesser amount of gross revenue, the expenses, operating, interest and so forth, are less to an even greater degree; and the net income shows a higher rate of return on the capital invested.

Height limitation alone would appear to serve no useful purpose, and it should be obvious that this type of limitation would not tend to ameliorate any condition in the present city. Would it not be better for the people to live in even higher buildings, if they occupied a lesser proportion of their plots, and thus be afforded more light, air and outlook than are now afforded in the low structures which often occupy an unduly large proportion of their sites? Is it necessary that we should conform ourselves to the ideas and the states of civilization of London, Paris and Berlin? Is squalor to be found in the skyscraper, and is the low building of some six to eight stories possessed of some peculiar and unusual form of civic virtue?

TRAFFIC DENSITY

Considerable thought and attention were given to the matter of building bulk and its effect on the density of traffic. In this matter all past evidence tended to show that, as buildings became larger and higher, they had a greater occupancy; and that this occupancy and their visitors tended to clog the streets and the transportation facilities at certain "peak" times. The available past data seemed to indicate that the most intense concentrations of traffic were found where the buildings were of moderate height, particularly in the theater and the retail shopping districts, and not in the locations pre-empted by the skyscraper office and apartment building. The National Association of Building Owners and Managers had clearly brought out this point, and their findings were corroborated in several additional reports compiled by other bodies and individuals.

Mr. Ford arranged an analysis of over half a dozen representative buildings involving different purposes or uses, and then compared the traffic found to and from their doors with their bulk and usable space. Certain past analyses had indicated that an office building would have to be 32 stories high to create as much traffic as an eight-story department store, or some similar relationship. However, the results obtained showed that the data obtained were insufficient and too conflicting to prove conclusively any such rules. The theater was not studied, but office, store, loft and apartment buildings were analyzed on a comparative basis, taking several examples of well known buildings in each group. In each case the daily, door-traffic, peak count, often during only a few minutes, was related or converted to an hourly rate and then compared to the total net or usable area in the building,—or sales area in the store,—and to the volume of the building.

RESULTS OF TRAFFIC ANALYSIS

The results of this analysis showed that the apartment house had comparatively the least pedestrian traffic and next in the order of increasing traffic volume were the bank building, the office building and the loft building, while the maximum occurred in the department store. Obviously, the large theater, opera house or

athletic park grandstand would exceed even this, but they were not analyzed in the comparisons.

The point of most particular interest in this matter was that results showed that even the same types of buildings varied greatly and indeed differed as much from one another as they did from other types of buildings. This would lead one to the natural conclusion that it would be difficult and almost impossible to set up any definite rule for the regulation of building bulk and area on the basis of the particular type or use for which it might be designed, since the possible variation would be as great within its own class as it might be if used for some other purpose.

It may be believed that bulk and area of buildings, within the class of a given use, would be almost synonymous and that the only marked variation would come about from very inefficiently planned buildings. The building height alone has little effect on the massing of large numbers of people on a street, since in most cases elevators cannot be designed to move the normal occupancy in one direction in less than three-quarters of an hour. Bulk and usable areas are thus the pertinent factors. When height and bulk of buildings become too great for the capacities of surrounding streets, additional levels must be provided, or when discomfort of large numbers of people congested at one time on the street reaches a degree that is really serious, it will be necessary to exercise some form of voluntary "staggering" of office and working hours that will relieve the matter. This should at that time be relatively easy to effect, since it will be to the interests of all concerned.

PEAK CONGESTION

Study of the peak of congestion in different types of uses of buildings showed that the loft building had its peak considerably earlier than the office building and in fact would be likely to be coincident only with the peak of the store employes. In looking over the peaks of office buildings, they were unlikely to conflict greatly with other buildings, and indeed were, in general, more or less individual, some showing this peak at 1 p. m., others at 8:45 a. m., still others,—occupied by brokers and so forth,—as late in the morning as 9:45, while in some cases the only marked peak would occur at a little after 5 p. m. This showed that the various businesses have already adapted or are adapting themselves to a helpful staggering of arrivals and departures. In the case of department stores there is the employes' peak of traffic, which occurs either later or earlier than those of the customers, and, due to the fact that the majority of store employes are fed in the store at noon, there is no peak load on the streets from them at that time.

Underwood & Underwood

The variation in activity surrounding low buildings may serve to create an even greater traffic congestion than pertains around buildings of greater height and bulk. Fulton Market, New York

The store peaks of the customers occur after 10 and usually end before 4 in the afternoon. This load tends to be very much more constant and at a very much higher rate when compared to the area or the cubic foot volume of the store, than is the load caused by the office building. Some spots, having the greatest or very great pedestrian traffic congestion, have this, absolutely irrespective of the heights of the adjacent buildings, and in may such cases these buildings are generally of relatively low height.

SKYSCRAPER SAFETY

The matter of safety in skyscraper office buildings under conditions of fire, storm and earthquake was reviewed and, rather than any discovery of increased elements of danger in the tall building, it was found that quite the reverse was indicated. A recent occurrence interestingly illustrates this point: an advertiser, who desired to call attention to fire hazard, published a picture of a tall office building with masses of smoke about it. It was most impressive and well calculated for the effect intended. However, the National Association of Building Owners and Managers did not believe that it was good business to alarm unduly the tenants or prospective tenants of skyscrapers, and therefore, challenged this bit of sensationalism, with the result that it was acknowledged that the actual fire depicted

was in a lumberyard many blocks from the office building. The advertisers were unable to cite any instance of menace from a skyscraper and, in the study made, it was only possible to find instances of where they had been bulwarks in stopping conflagrations among low and non-fireproof buildings. The few known fires in tall buildings have been confined to a few floors or even units. People above and below the fire have actually had no reason, other than curiosity, to cease their work.

The truth of the matter is that the skyscraper, under greatly stricter scrutiny and regulation than its lower neighbor, is by far the safer place.

HEALTHFULNESS

In the matter of comparative healthfulness of working and living quarters, there was no evidence to show that the tall building was less healthful than its lower neighbor. In fact, tests of the relative amounts of dirt, dust and gases in the air at any time on different levels of the skyscraper show conclusively that the higher levels have far better conditions than those found near the street level. Previous discussion has brought out the consensus of popular opinion regarding upper level space on the basis of light, air and outlook. There is no indication whatever that this is incorrect, provided they do not have to walk up or down.

MR. FORD'S CONCLUSIONS

Mr. Ford's general conclusions in the matter of the height and bulk regulation were that, in all types of buildings, it would be very much to the advantage of the people living and working in them, as well as to the advantage of the owners who would have to earn a fair return on the investment, and for the building industry, in order that sufficient capital would be directed to create this necessary form of wealth, that they be permitted to be constructed to sufficient height, bulk and area required by conditions; and that the space should be developed in an economical manner, which would both assure space of good quality and eliminate the construction of unnecessary and profitless space, as is so often done in the buildings planned and conceived under the present laws. Building form is thus of paramount importance. Such "directive zoning" would indicate the desirability of increasing the proportion of space that may be occupied by towers and decreasing the areas and the building bulk permitted in the portions of the building above the ground floor zone, as previously described, and extending in height to the base of the tower.

The tentative basis on which this has been worked out in Mr. Ford's recommendations would be that towers could occupy an unlimited percentage of the plot up to twice the maximum wall height at the street line, provided they stay at least 40 feet away from the lot lines and at least 40 feet away from the center line of streets. In the event of a tower of abnormal size, the distances from street and lot lines would be increased in certain proportions. Above this limit set, towers would be allowed to occupy only 25 per cent of the plot area as in the present law.

Rear yard of a 20-foot minimum depth would be required, proportionally larger with the height of the building at the rear line and in accordance with the district in which the building is located. Inner courts would be prohibited unless equal in size to at least two rear yards back to back. In order further to increase the light and air that would be available in the base of buildings immediately above the ground floor zone, there would be the requirement that side yards or courts should be located at a height above the street equal to its width. These would have a minimum width of 10 feet and a maximum of 40 feet, being controlled by the height of the building.

A series of directive regulations of a generally similar nature but adapted to the districts and the uses were set up for various types and districts of apartment houses, tenements or multi-family dwellings.

It is too long a matter to describe these or the suggested changes in the regulations in the business or the other districts, as these occupy many pages of text, tables and isometrics of building form in the book mentioned. The outstanding fact remains and is of paramount importance that these changes and amendments suggested are all based on a study of both the desired things as formulated by the sociologist and the planner of cities, and also by the requirements of building economics. Of course it is not possible to go to the extremes that might be indicated by considering only one phase of the conditions. If the sociologist only were consulted, a type of building might be indicated which could not show a profit, or which the majority of our population would be unable to occupy due to excessive rentals. If the building owner were given full sway, he might incline to be ruled too greatly by dollars-and-cents considerations, particularly at the present time, and advocate the construction of undue building bulk concurrent with an excessive percentage of the plot covered, thus resulting in a structure that might tend to become obsolete before its day, due to the construction of other larger, higher and better buildings.

Based upon such a premise, it is to be hoped that these findings and the various ramifications and details of the study will serve as a directive aid to city planners, zoners, sociologists, building owners, managers and architects.

DETERMINING APARTMENT RENTALS

BY

LEONARD COX

OF COX & JOHANSEN, ARCHITECTS

THE tendency of modern multi-family dwellings toward the so-called "minimum coverage" type is growing greater every day. So far most of the proponents of this type have laid the greater emphasis on the savings made in primary construction cost and have more or less neglected the question of the rental value of such apartments. As a result many fine projects have had to be abandoned because not even the undoubted saving in primary cost could absorb the high cost of land when the occupancy was reduced so low.

It is high time that there was an attempt to produce a scientific technique for rent appraisal that will more accurately show the real rental values than the present method of relying solely on the real estate broker's guess as to what they will be.

An examination of a large number of rent schedules and plans shows that the collective experience of real estate brokers recognizes varying rental values for different apartments based on their different exposures to light, air and sun, but does nothing to determine very accurately what those values may be. So widely divergent is opinion in these matters that it is impossible to arrive at any set of factors that can be plotted on a curve similar to those which may be plotted for all sorts of cost factors. Even if there were any agreement perceptible this latter task would still be difficult in view of the obvious fact that the rent of any given apartment may well be affected by a half-dozen separate factors at the same time.

IT is obvious, therefore, that if any satisfactory technique is to be established it can only be done by a sort of trial and error method. This means that from the examination of many schedules and plans some possible quantity is determined for each factor. These factors are then reapplied to schedules and plans and the results compared to see how far from the conventionally derived rents the thus-determined rents will be. If the variations are too great the quantities must be changed and tried again, and so on, until something is finally found that seems to answer.

Before, however, this can even be attempted the factors which are to be considered must first be themselves determined. If every possible factor were to be taken account of, the list would be ridiculously long and the necessary computations entirely too cumbersome to be practical at all. Analysis of hundreds of buildings shows that the very large theoretical number may be reduced to an actual ten or twelve.

The first is the number of baths. Many people fail to realize that it costs just as much to construct a bath-room in a one-room apartment as it does in a four-room. As a general rule this different proportion of cost of bath to total cost is not properly expressed in the rents. There must be therefore a factor for baths having such a value that this difference in cost ratio may be reflected in the final rental value.

The same thing is equally true of kitchenettes, dining alcoves, bed closets with beds, dressing closets where special fittings are used, and in the higher price classes pantries and servants' halls.

As the list of these factors must not be made too long, no value need be assigned for such things as ordinary closets, foyers, vestibules, and corridors on the basis that such things occupy, as a general rule, a more or less constant percentage of the floor space in varying sizes of apartments. There is one notable exception to this rule: the case of one-room and two-room apartments. A special factor must be assigned to these two types of apartments to take care of this discrepancy.

PROCEEDING from the interior to the exterior of the apartment it is obvious that the first and most important factors should be those for sun, light and air. A little research shows that these three may all be combined in one factor by differentiating between the cardinal points of the compass.

The next most important factors affecting an apartment from the outside are outlook, quiet, and cross-ventilation. There is always a certain social and psychological advantage in apartments facing a street and, of course, in those which face a yard of sufficiently generous size to assume the aspect of a private garden or park. The value of quiet has been often underestimated, but is now becoming recognized for the very potent factor that it is. In order to cut down the number of factors employed, cross-ventilation may be arbitrarily taken care of by allowing the full value for each frontage of an apartment where there is more than one and adding them all together

instead of trying to pro-rate the factors to the actual length of each frontage.

Finally we must have a factor to take account of the height of the apartment above the street. All real estate brokers seem to be more or less agreed as to the relative desirability of apartments at varying heights but differ widely as to the actual amount of rent increase that should be charged.

TAKING all of the factors discussed into account, we find that the rent for any given apartment may be said to be the result of the interpolation of the correct values for the various factors in the following formula:

G equals (**PR**+**B**+**D**+**C**+**K**+**FR**) x (1.00+**N**+**E**+**S**+**W**+**Q**+**V**) in which the symbols have the significance shown in the following table:

G	equals	Gross rent of apartment.
P	"	Primary rent per room (per month or per year).
R	"	Number of rooms in apartment.
B	"	Number of baths (to be multiplied by rate for same).
D	"	Number of dining alcoves (also pantries, service halls to be multiplied by rate for same).
C	"	Number of bed closets with beds (times rate as above).
K	"	Number of kitchenettes (times rate as above).
F	"	Amount per room extra for height above street.
N	"	Premium (if any) for **N** exposure } Premium
E	"	" " " **E** " } for outlook
S	"	" " " **S** " } is added to
W	"	" " " **W** " } these.
Q	"	" " " quiet
V	"	to be added to 1 and 2 room apartments.

Having gone this far the next problem is to find the correct values for the different factors. The first of these, **G,** is to be found, and depends on all the others.

P, the primary rent, can be determined only by comparison with market values in the neighborhood in which the project is contemplated. In the middle range of apartment houses on New York City side streets, it lies as a rule somewhere between three-hundred and four-hundred dollars. As will be shown later **G** may be taken as a known quantity and **P** unknown, in which case the equation is simply solved for the value of **P**.

R, the number of rooms, should include all ordinary rooms, such as Living Room, Dining Room, Library, Chamber, Kitchen, Maid's Room, and any other room which may legally be so used. It does not include Dining Alcove, Foyer, Pantry, Kitchenette, Bath, Lavatory, Servants' Hall, Gallery, etc.

B: There seems to be a more or less general agreement that a bath has about one-quarter the rental value of a room. As the size and quality of rooms rise, so do the size and appointment of baths. Therefore a value of **P**/4 is assigned as the rent of a single bath. The total rental of baths therefore is represented by **BP**/4.

D: The same general values of rental that applied to baths may well be applied to Dining Alcoves. As apartment rooms get beyond a certain size and quality, Dining Alcoves disappear, to be replaced by Dining-Rooms. Therefore the total rental value of Dining-Alcoves is represented by **DP**/4.

C: Applying the same principle to bedclosets with beds, their total rent value is **CP**/4.

K: Similarly Kitchenettes rate as **KP**/4.

F: An application of an average of the values given by managers for this factor to existing buildings and rent schedules shows that $20.00 per room per year may be added for the third, fourth, fifth, sixth and seventh floors successively, and $10.00 per room per year per floor for each floor above the seventh, to and including the fourteenth. Above that point no material addition is expected unless there are set-backs or pent houses with terraces where $50.00 per room per year may be added. If, of course, set-backs or pent houses occur below the fourteenth floor, the $50.00 addition should be made at that point too.

These figures seem to hold good for the medium range of fireproof elevator buildings. In the very highest grades these figures may well be doubled. For the cheaper grades of building one-fourth of the standard is enough until the so-called "minimum rental" class is reached, where $1.00 per room per floor is probably enough. It must not be lost sight of that this factor is cumulative. An apartment of four rooms on the fourth floor receives a premium of $160.00 and one on the seventh floor of $400.00. This increment factor can be still more accurately determined by using the curve in the accompanying graph, Fig. 1. From this we see that the premium for the four room apartment on the fourth floor should be $200.00 instead of $160.00 while the seventh floor apartment remains $400.00.

N. E. S. W.: In reckoning the factors to be added to the primary rent for value of exposure, there are two things to be considered. The first is the amount of daylight in the apartment and the second is actual sunlight. These quantities do not appear to increase in a simple arithmetical ratio with the distance away of an opposing wall, but in a geometrical one. Furthermore, the height of the opposing wall surely has a distinct bearing. Also, had we not already taken into account the height of the apartment itself above the street that would also have to be considered. Any accurate determination of the rate of increase in light and sun is tremendously complicated, and it is doubtful if even then the actual values could be reflected in the rents. These values may however be approximated from a study of rent schedules, and certain tendencies established. These

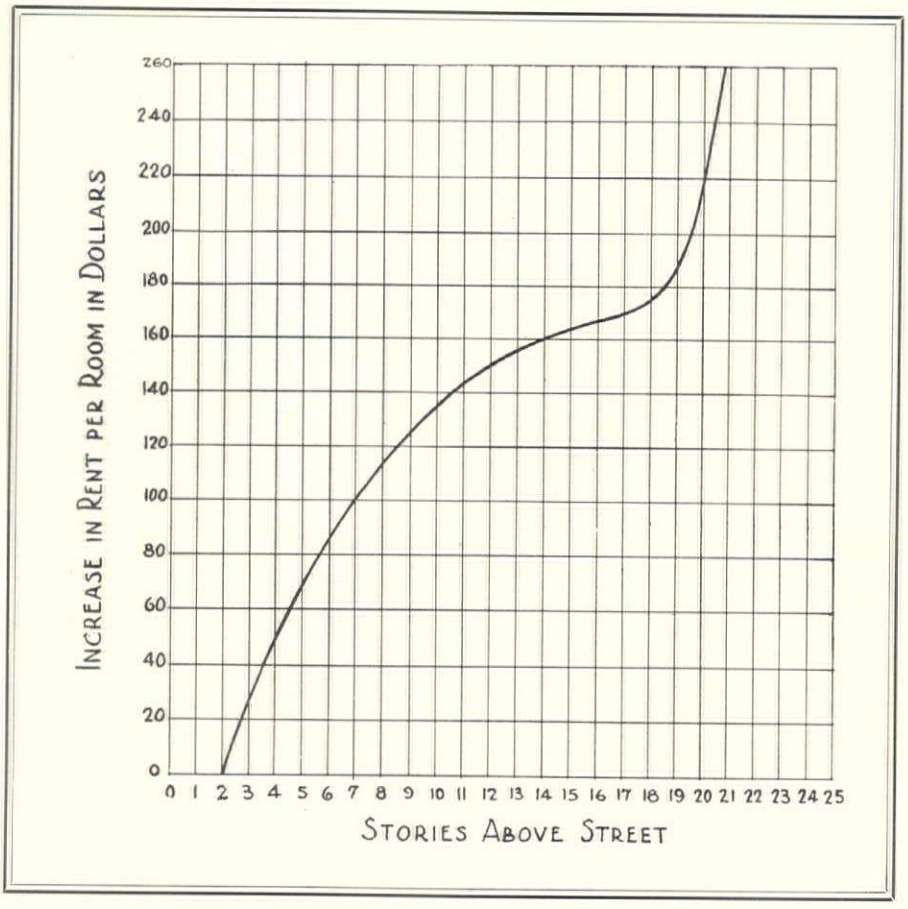


Fig. 1. Rental Variations in Apartments at Different Heights Above the Street

are expressed in the form of rough curves in the accompanying graph, Fig. 2. These are based on the assumption that **E** and **W** exposures give some sunlight, while **N** exposure gives none.

From these curves we see that an apartment facing for example North on a sixty foot street where the opposite wall is 100′0″ high is worth four to five percent more than a similar apartment facing a wall less than 40′0″ away. If it faces South on the same street it is worth 17.5% more than if it looked North and faced a 100′0″ wall less than 40′0″ away. The unit in this system is always the poorest apartment in the building.

Outlook should also be figured in at this point. To the above figures should be added, so practice suggests, about 15% when the apartment faces a street, park, river, etc. The increase of the **N, E, S, W** factors proper with the increase in distance of opposing walls will take care of, for example, an attractive view of a river, or park.

Q: In thickly populated urban centers no factor for quiet should be included unless one facade of the building abuts immediately upon such an element as an elevated line, docks, bridge or some other such arterial traffic route which produces either more than a usual amount of noise during the day or some unusually continuing or intermittent noise during the night. A fair allowance for this factor seems to be 5% for apartments separated from noise producing element by one range of rooms; 10% for other apartments having windows within 100′0″ of noise source; and 15% for all other apartments.

V: This last of the variable quantities must be inserted to take care of the fact that the fairly constant ratio of foyer, closet and corridor space to room space is thrown out of line when it is applied to one-room and two-room apartments. To make up for what would otherwise be a loss, the broker assigns a percentage increase which averages about 30% for one-room and 20% for two-room apartments.

A couple of typical examples are worked out to show just what happens. The first is a four-room front apartment on the fourth floor of a building which is on an interior lot on the north side of a sixty-foot street. It consists of Living Room, 2 Chambers, 2 Baths, Kitchen and Dining Alcove. The building opposite is ten stories or 100′0″ high. The second example will be a one-room apartment on the 10th floor of a building on an interior lot. This apartment faces East into a side court where the opposite wall is 150′0″ high and 25′0″ distant. It consists of a Living Room with Kitchenette, Bath, and Bed Closet with bed. In both cases **P** equals $300.00.

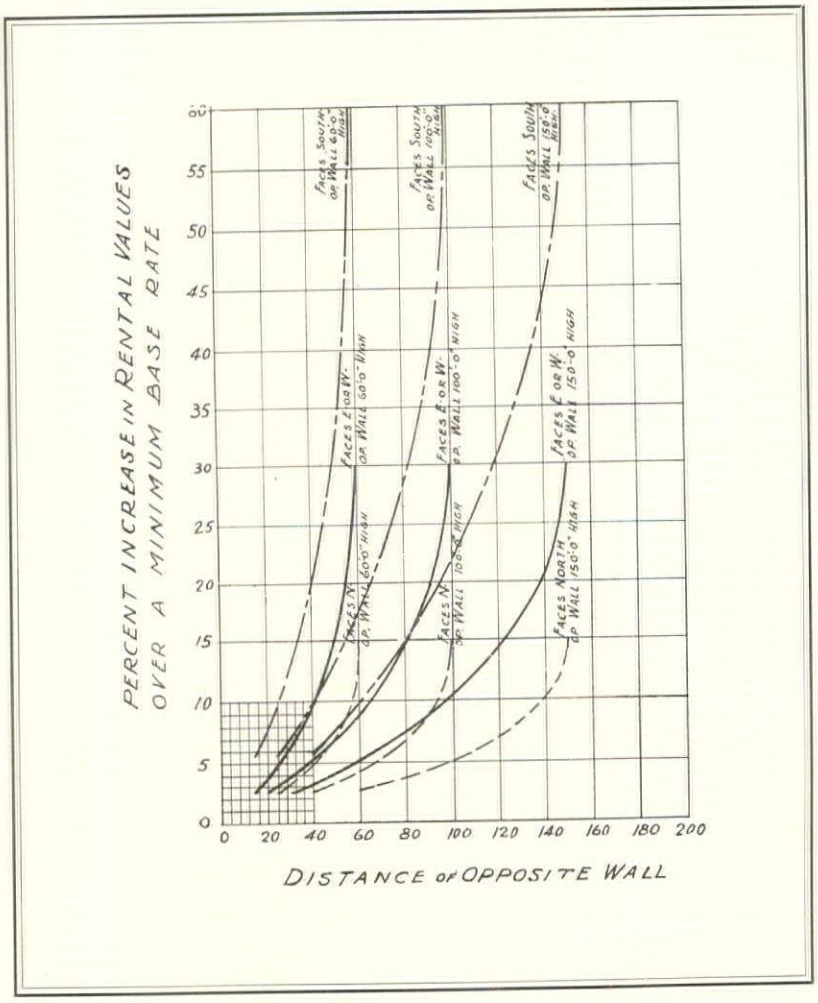


Fig. 2. Percentage of rental increase for varying amounts of sun and light in apartments regardless of height above street

Example 1: **G** = to be found
P = $300.00
R = 4
B = **2P/4** = **P/2** = $150.00
D = **P/4** = $75.00
C = O
K = O
F = $50.00 (from Fig. 1)
N = O
E = O
S = 32.5%: 17.5% (from Fig. 2) + 15%
W = O **Q** = O **V** = O

Substituting these quantities in the formula given above:

G = (1200.00 + 150.00 + 75.00 + 200.00) x 132.5% = $2153.12 or figured to nearest $25.00, $2150.00

Example 2: **G** = to be found
P = $300.00
R = 1
B = **P/4** = $75.00
D = O
C = **P/4** = $75.00
K = **P/4** = $75.00
F = $135.00 (from Fig. 1)
N = O
E = O (see Fig. 2)
S = O **W** = O **Q** = O
V = 30% (one-room apartment)

Substituting these quantities in the formula:

G = ($300.00 + 75.00 + 75.00 + 135.00) x 130% = $858.00 or figured to nearest $25.00, $850.00.

So far only the method of finding the gross rental for a single apartment has been considered. It is, however, obvious from the above examples that the gross rent for any number of apartments **A** is:

$$G = \frac{(PR+B+D+C+K+FR) \times (A.00+N+E+S+W+Q+V)}{A}$$

where all the symbols represent the sums of the various factors for each apartment and **A** represents the number of apartments.

Having cited examples of the application of this method to a single apartment, an example will now be shown of its use in comparing two different plans for a given piece of property. The property in question is an interior lot 100′0″ x 100′0″ on the S. side of a 60′0″ street. It is abutted on the E and W by ten story buildings. Behind it to the south is a fifteen story building. Plan A (see Fig. 3) has a total of seven apartments or 23 rooms. Plan B (Fig. 3) has only six apartments or 20 rooms. A scrutiny of market conditions shows that $300.00 per room is about the highest primary rent that can be obtained in that locality. The land cost (say $20.00 per square foot) is the same for both buildings.

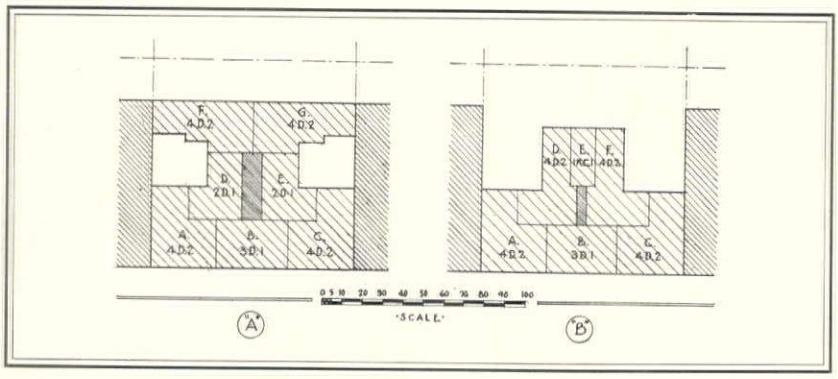


Fig. 3. Two possible types of development for a given plot for comparison of rental values

How then can Plan B compete with Plan A, except on the basis of desirability of apartments which must be reflected in the rents? It is necessary therefore to make an exact comparison of the rents. For this purpose any floor (say the sixth) is taken. For this floor then the following are the quantities to be substituted in the rent formula:

(A)
G = to be found
P = $300.00
R = 23
B = 9**P**/4 = $675.00
D = 7**P**/4 = $525.00
C = **O**
K = **O**
F = $85.00 (Fig. 1)
N = .57 = 3 (.04 + .15) (Fig. 2)
E = **O**
S = .11 = 2 (.055) (Fig. 2)
W = **O**
V = .40 = 2 (.20)
Q = **O**

$$\therefore \mathbf{G} = \frac{(6900+675+525+1955) \times 8.08}{7}$$

$$= \frac{81,244.40}{7} = \$11,606.34+$$

(B)
G = to be found
P = $300.00
R = 20
B = 10**P**/4 = $750.00
D = 5**P**/4 = $375.00
C = **P**/4 = $75.00
K = **P**/4 = $75.00
F = $85.00 (Fig. 1)
N = .57 = 3 (.04 + .15) (Fig. 2)
E = .035 (Fig. 2)
S = .535 = 3 (.075) + 2 (.155) (Fig. 2)
W = .035 (Fig. 2)
V = .30
Q = O

$$\therefore \mathbf{G} = \frac{(6900+750+375+75+75+1700) \times 7.475}{6}$$

$$= \frac{67,088.125}{6} = \$11,181.35+$$

This small difference in rent taken with the much smaller primary cost will show, even including land the same in both cases, a greater return on the equity for Plan B than Plan A contrary to what seemed at first sight to be the case. The rental for each separate apartment being found, a rent schedule for comparison may be made as follows, reading to nearest $25.00:

(A)

Apt. **A 4D2**	(1200+150+75+340) x 119%	= 2,100.00
B 3D1	(900+75+75+255) x 119%	= 1,550.00
C 4D2	(same as **A**) x 119%	= 2,100.00
D 2D1	(600+75+75+170) x 120%	= 1,100.00
E 2D1	(same as **D**) x 120%	= 1,100.00
F 4D2	(same as **A**) x 105.5%	= 1,850.00
G 4D2	(same as **A**) x 105.5%	= 1,850.00
		$11,650.00

(B)

Apt. **A 4D2**	(1200+150+75+340) x 134.5%	= 2,375.00
B 3D1	(1200+75+75+255) x 119%	= 1,550.00
C 4D2	(same as **A**) x 134.5%	= 2,375.00
D 4D2	(same as **A**) x 111%	= 1,950.00
E 1KC1	(300+75+75+75+85) x 137.5%	= 850.00
F 4D2	(same as **A**) x 111%	= 1,950.00
		$11,050.00

Certainly this difference of less than 5 percent is justified by the difference in the value of the various apartments according to the light and air they receive, and surely by the difference of nearly 15 percent in the cost of land and buildings in the two cases.

So far, in considering all this question of comparison of plans, **P** has been taken as a known quantity. There will be times, however, when **G** will be the known quantity and **P** the unknown. For example a loaning institution is asked to make a loan on a proposed building. The promoters' set-up shows a gross rental of so many thousands of dollars, but does not give any further information than that this amount represents so many rooms at an average of so much per room. The loaning institution, suspecting that this average rental is too high for this particular building in the locality proposed, must have some method for finding the primary rent which is a really fair standard of judgment. This may be found by the same methods of analysis as before, by simply rearranging the original formula, including in it the values of **B, D, C** and **K** in terms of **P**. Therefore, if

$$\text{A.G.} = \frac{(\mathbf{PR}+\mathbf{P}\ (\mathbf{B}+\mathbf{D}+\mathbf{C}+\mathbf{K})}{4} + \mathbf{FR})\ (\mathbf{A}.00+\mathbf{N}+\mathbf{E}+\mathbf{S}+\mathbf{W}+\mathbf{Q}+\mathbf{V})$$

then

$$\mathbf{P} = \frac{4\ \overline{(\mathbf{AG}}\ \overline{(\mathbf{A}.00+\mathbf{N}+\mathbf{E}+\mathbf{S}+\mathbf{W}+\mathbf{Q}+\mathbf{V}}-\mathbf{FR})}{4\mathbf{R}+\mathbf{B}+\mathbf{D}+\mathbf{C}+\mathbf{K}}$$

in which all the terms are derived as before.

As an example let Plan A, Fig. 3, be considered as a 10-story building of which the gross rent is stated to be $110,000.00, and assume that apartment B on the first floor is lost in order to provide entrance and elevator lobbies. Then the various quantities necessary for a solution will be as follows:

G = $110,000.00
P = to be found
R = 227 (10 x 23) − 3
B = 89 (10 x 9) − 1
D = 69 (10 x 7) − 1
C = O
K = O
F = (see Fig. 1) and find **FR** = 23 (26+50+62.5+85+100+115+126+135) = 16088.5
N = 5.51 (10 x .57) − .19
E = O
S = 1.10 (10 x .11)
W = O
V = 4.00 (10 x .40)
Q = O
A = 69 (10 x 7) − 1

Substituting these quantities in the formula given above

$$\mathbf{P} = \frac{4\left(\frac{110{,}000.00 \times 69}{69.00+5.51+1.10+4.00} - 16088.50\right)}{908+89+69}$$

the purely arithmetical solution of this equation gives as a result **P** = $297.38. This then is the standard of judgment desired and enables a direct comparison of value with other buildings of the same sort in the same neighborhood.

If it is desired to carry this comparison still further toward complete accuracy, the value of **P** should be reduced to a price per square foot of Living Space. This Living Space is defined as the floor area of all rooms as defined above under the explanation of **R.** The aggregate of this space in the building, divided into **P,** times **R,** gives the price per sq. ft. of Living Space. When this has been found the rental of any apartment is determined as before, substituting for **PR** in the formula **L.S.** the number of sq. ft. of Living Space in the apartment, times the price per sq. ft.

As an example, assume that Plan A in Fig. 3, has its apartments planned as follows:

Apt. **A**	LR 22′-11″x13′-6″	= 309.98	
	Ch 15′- 9″x11′-0″	173.25	
	Ch 16′-10″x12′-0″	201.99	
	K 9′- 3″x 7′-0″	64.75	
		749.97 x 10	= 7499.70 sq. ft.
Apt. **B**	LR 22′-6″x13′-0″	= 292.50	
	Ch 15′-5″x11′-3″	173.44	
	K 8′-9″x5′-0″	43.75	
		509.69 x 9	= 4586.61 sq. ft.
Apt. **C**	Same as **A**	749.97 x 10	= 7499.70 sq. ft.
Apt. **D**	LR 22′-0″x12′-0″	= 264.00	
	K 8′-3x6′-6″	53.62	
		317.62 x 10	= 3176.20 sq. ft.
Apt. **E**	Same as **D**	= 317.62 x 10	= 3176.20 sq. ft.
Apt. **F**	LR 23′-3″x13′-6″	= 313.875	
	Ch 17-0″x12-0″	204.00	
	Ch 15′-0″x12-0″	180.00	
	K 8′-6″x7′-0″	59.50	
		757,375 x 10	= 7573.75 sq. ft.
Apt. **G**	Same as **F**	= 757.375 x 10	= 7573.75 sq. ft.
	Total Living Space		41,085.91 sq. ft.

Then if price per sq. ft. $\mathbf{L.S.} = \frac{\mathbf{P \times R}}{\mathbf{L.S.}}$

it must be $\frac{\$297.38 \times 227}{41{,}085.91} = \$1.6433$

In substituting these values in making up a rent schedule, the odd points can be dropped and a schedule made using **L.S.** = $1.65 and **P** = $300.00. The rent schedule for the sixth floor would then appear as follows:

Apt. **A**	(1237.45+150+75+340) x 119%	= 2144.91 = 2150.00
B	(840.98+75+75+255) x 119%	= 1483.54 = 1475.00
C	(same as **A**) x 119%	= 2144.91 = 2150.00
D	(524.07+75+75+170) x 120%	= 1012.88 = 1025.00
E	(same as **D**) x 120%	= 1012.88 = 1025.00
F	(1249.67+150+75+340) x 105.5%	= 1914.47 = 1925.00
G	(same as **F**) x 105.5%	= 1914.47 = 1925.00
		$11,675.00

Compare this with the rent schedule as originally found for this plan. The difference in total rent for the floor does not enter into the problem as it is simply the result of reading all rents to the nearest $25.00 and will disappear when the schedule for the entire building is made out.

By the use of this method apartments could be kept from being priced too low or too high, and each is given a rental which is a direct reflection of the actual accommodation provided.

DOUBTLESS a study of this system may reveal other uses of the relations set down, but enough has been said to show the practical value of an actual measuring stick for rent appraisal as against mere opinion. The chief value in its use, however, would seem to be that which provoked it; the necessity for a more accurate method of appraising the rental value of different plans for the same lot, where the question of the number of rooms or apartments provided is a vital one.

It seems safe to say that a more general adoption of some such system of rent appraisal would do much to further a decrease in bulk and lot coverage of multi-family dwellings in congested and semi-congested areas where land values are high. Such a general adoption must of course result in some modification of the factors used herein as study may prove them wrong, but the whole system, being relative, would not be affected. In any case the time has come when multi-family dwellings must be appraised as scientifically as office-buildings and this system is offered as a suggestion leading towards the eventual creation of better and cheaper living accommodations.

SUPERVISION OF CONSTRUCTION OPERATIONS

BY
WILFRED W. BEACH

CHAPTER 21, CONTINUED. FURRING, LATHING AND PLASTERING

OUTSIDE masonry walls, on the inside of which plaster is to be directly applied, must first be effectually treated to render them dampproof. Any moisture seeping through not only stains the finished plaster surface, but damages the decorating and tends to cause disintegration of the plaster. To obviate this, exterior walls are either furred or treated with a "plaster bond" dampproof paint, which must serve the dual purpose of repelling moisture and bonding the plaster to its backing. Furring is effected either by building porous (or semi-porous) clay tile * against the inside surface of the wall, or by attaching vertical wood or metal strips at regular intervals for the receipt of lath and plaster. If strip furring be used, it is essential that it be of a size that will hold the lath a sufficient distance from the wall to prevent the plaster keys coming in contact with the wall surface. If such a surface is rough or irregular, it is necessary to "shim" (block or wedge) out the furring to a perfectly vertical plane at a proper distance to guarantee safe procedure.

An awkward feature of plastering against strip furring is the difficulty of preventing an accumulation of droppings from packing the lower portion of the furred space. It is not unusual to observe a series of discolorations above the base against outside walls in occupied rooms, where furring had been used to prevent such damage. There are only two efficient ways of guarding this, neither of which is commonly mentioned in specifications. One is to coat that portion of the wall back of the base, to a height of about 2 feet, with dampproof paint; the other to omit the lath and plaster back of the base until all droppings have been raked out. The area back of the base is either plastered or not, as the specifications require. Such spaces should be plastered in severe climates, where occurring against outside walls, as a matter of insulation against cold; and, in general, on interior partitions, for sound insulation. However, such plastering is often omitted, for economy's sake, in cheap work, and to form wire raceways in better buildings. Hence an inspector can scarcely demand plastering behind basegrounds, unless it is specifically called for.

The practice of dampproofing the insides of exterior walls with a plaster-bond paint is quite prevalent and, if well done, the work is efficacious in preventing both moisture and so-called "alkaline" stains from disfiguring the wall surfaces. The chief objections to this are that:

(1) The painting is too frequently carelessly applied and under improper conditions;

(2) The paint medium used is not always the most suitable;

(3) The perfect inspection of such work is very difficult;

(4) In cold climates, outside walls need airspace insulation or its equivalent to prevent their being susceptible to the deposit of condensation.

If hollow tile is used for backing or furring, it will intercept both moisture and cold to a considerable degree. If then, to such surfaces there is added the extra precaution of a *good* dampproof coating, the specification writer has reasonably safeguarded his finished plaster surfaces.

Specifications are more or less definite on the subject of enclosing a building (with muslin, boards, storm sash or regular sash in all openings) for protection of drying plaster in both hot and cold weather; but it is left to the superintendent to see that such protection is removed promptly in hot weather after the plastering has set; also that there is sufficient heat maintained for proper drying in cold weather. Frozen plaster is likely to disintegrate, and hence may have to be removed. In fact, none of the necessary precautions should be slighted in the least degree.

Interior plaster and exterior stucco are of many varieties, brands, makes and for many purposes. Ordinary interior plaster is either lime mortar or some form of "hard wall" or "patent" plaster, chiefly gypsum derivatives. As to mixing the ingredients, methods vary. The most common procedure is to add sand and water to the plaster material at the site; but some makers claim added advantage in having the sand premixed. In localities where volume of business warrants, there are concerns that deliver lime mortar in plastic form, ready to be applied. All prepared plasters contain fibrous material, mostly cattle hair, as a necessary binder. The recommended specifications of the National Lime Association (Washington) say that: "Hair shall be clean cattle hair or suitable fiber and must be well beaten and thoroughly separted." If lime mortar be mixed at the site, this element must be added in the mortar box. There are standard specifica-

* Gypsum block is not deemed a good material for furring outside walls; moisture tends to its disintegration.

tions for proportioning all the ingredients for lime plaster, varying according to the coat for which it is intended and the surface to which it is to be applied.

For hard wall and patent plasters, instructions for proportioning and mixing the sand and water are given either in the architect's specifications or in the printed directions of the manufacturers, and from these there must be no deviation. This is equally true of methods of application. In general, interior plaster is put on in two coats over gypsum block or other masonry surface; and in three coats over wood or metal lath, or plaster board. Makers of hydrated lime specify three-coat work on masonry surfaces; and, where plasterers have been able to impose their demands upon the public, they insist upon three coats in all cases. The first coat on lath is called a "scratch coat," and is roughly troweled on, to cover all surfaces to a thickness of from ⅛ to ¼ inch, and with just enough pressure to force it through the lath and form adequate keys. It is roughly scratched while still plastic, to afford good adhesion for the second or "brown coat," which should be applied after the first coat has begun to set, but is still not too dry. If it has become so, it must be sprinkled sufficiently to prevent its suction ruining the next coat. On the other hand, if the second coat is applied while the first is still too green, the keys of the first coat may be impaired. In cheap work, the scratch and brown coats are sometimes combined, but still considered two coats, and hence, if one wants the scratch coat applied independently, it should be so specified. Where combined, the total thickness of plaster is slightly reduced, thus saving some weight, as well as expense.

In two-coat work on masonry, the brown coat is applied directly to the tile, brick or gypsum, or to the bond coat on concrete. If, however, the masonry surface shows inequalities, the hollows should first be filled in with patches of scratch coating. The thickness of the brown coat on all work is established by the grounds, screeds and metal beads. "Screeds" are dabs of plaster set to serve as guides where the distance between grounds is greater than the length of the "rod," which is the plasterer's straightedge. Grounds are placed by the carpenter;—½ to ⅝ inch thick for two-coat work, and ¾ to ⅞ inch for three-coat work, depending upon specification requirements. The brown coat is filled out to these guides, except just enough to leave room for the finish coat,— 1/16 to ⅛ inch. A very thin finish coat is called a "skim coat," and is sometimes specified in cheap work, in which case, the brown coat is filled flush with the grounds. True planes are essential for the brown coat and are obtained by expert manipulation of the darby and rod. The "darby" is a long two-handled trowel. A steel trowel of rectangular form is used to make first application of all plaster, and to give a smooth finish to a putty coat. A somewhat similar trowel, made of wood and called a "float," is used to produce a sanded or float finish. For certain variations of this, the float is covered with burlap, carpet or other material; or the plasterer makes impressions with his palm on the plastered surfaces,—or does any one of a number of other things to produce the kind of finished surface that is called for. This is frequently required to be in accordance with an approved sample, which may either be on hand when the plastering is estimated, or may be described in the specifications and prepared by the plasterer after he gets to the building. Special surfaces of putty coats are sometimes similarly provided for, in place of the regular smooth troweling.

Lime putty is produced by soaking hydrated lime in clean water for at least 12 hours; and it can also be made from slaked lump lime, or from materials supplied by the makers of hard wall and patent plasters, who issue the necessary directions for their use. Instructions for making putty from hydrated lime are to be had from the National Lime Association, for either the hard troweled coat or the white sand finish. For either finish, enough must be mixed each day for next day's work. Coloring matter is sometimes used in sand finish, and should be mixed most thoroughly with the dry sand and lime, using the greatest care to secure exactly the same proportion of ingredients in each batch.

In addition to the regular finishes already mentioned, there is an infinite variety of special finishes, including Keene's cement, Portland cement, and the various imitations of stone, such as travertine, Caen stone, scagliola, etc. Each of these (except cement) is applied, strictly in accordance with the maker's directions, over the regular brown coat. Specifications for Keene's cement plaster call for a certain amount to be added to the lime of the scratch and brown coats. Portland cement plaster is generally mixed with sand in ratio of 1 to 3, as for mortar, with a small admixture (5 to 15 per cent) of lime or inert ingredient, for better plasticity. The troweled finish coat may be as rich as 1 to 2, or even 1 to 1½, as for floor finishes. Cement plaster may be applied directly to lathed or masonry surfaces, or against scratch or brown coats of lime plaster, but not to gypsum. Care should be taken that the first and each successive surface that is to receive Portland cement plaster is properly moistened, to make adhesion certain. The successive coats are troweled or floated on, ⅛ to ¼ inch thick, until the required total thickness has been attained; each coat (except the

last) left rough, and the next applied soon after the initial set has taken place. Finish coats of Portland and Keene's cement plaster are frequently used for wainscoting in bathrooms, kitchens, etc., and may be marked or scored in imitation of tiling. Imitation stone joints in plaster are sometimes cut through the surface and pointed.

In general, the characteristics of exterior plastering are similar to those of interior work, but a much more durable material is demanded. For this reason, architects specify materials that are known to fulfill such demand, and they are applied only as the manufacturers direct. There have been too many failures of such coatings, due to the use of improper materials, inadequate precautions against discoloring, poor workmanship, insufficient attention to adhesion, incorrect finishing, etc. There is but one right course to be followed,—to use proper materials, properly proportioned and mixed, and correctly applied to surfaces that are in the right condition. Although the dictionary's meaning of stucco is practically the same as that of plaster, the plaster industry has definitely established the application of the word "stucco" to exterior work, and "plaster" to interior, and hence they are only to be so used in the building industry. Neither term indicates use of any particular ingredients. These are strictly matters of specification demands. The finish coat material of either plaster or stucco can be rendered into pre-cast ornament and run moulds, each of which must conform to details or models.

The whole subject of plastic materials and their use in building construction is too extensive for the limitations of this treatise. For more comprehensive discussion, the reader is referred to "Building Construction" by W. C. Huntington, C.E., (John Wiley & Sons), to the publications of the manufacturers of lime, cement and gypsum products, and to the descriptions of their materials and the specifications for their use as they appear in the annual editions of *Sweet's Architectural Catalogs*.

Every building superintendent must have a working knowledge of plaster and stucco materials and their ordinary usage. He must also know where to go for needed information relating to every kind and type of unusual plastic materials and finishes. He continually adds to his knowledge and experience, but can hardly hope to know it all. Moreover, materials and customs vary in different localities, and from year to year in any locality. Those who have to do with them must constantly preserve an open-minded attitude on all such subjects.

But, even with all possible knowledge gained by study and experience at his command, and with the exercise of all due precaution, no superintendent can be expected to give 100 per cent perfect supervision to all the plastering on an operation of any size. There are too many possible imperfections that cannot well be detected until after the scaffolding has been removed and the work can be inspected at close range,—and after the finish coat is dry. Chief of these are:

(1) Inequalities of surface, especially along the lines of joinings of two applications, such as around patches and at the meeting of work at different scaffold heights.

(2) Bent corner beads and other metal members, damaged during or after plastering, by shifting scaffold, or through other carelessness.

(3) General waviness of surface, including too much fullness around openings and other places where trim is to be applied.

(4) Insufficient adhesion between coats.

(5) Improper setting and drying, manifest in surface checks, cracks, crazing, cat faces, etc. ("Cat faces" are small clusters of short cracks.)

(6) Lime spots, due to insufficient slaking of lime. Cat faces are sometimes due to this fault.

(7) Cracks due to settlement of supporting construction.

(8) Defects in straight line corners and curves, especially in arches, run moulds, bull noses, coves and other special work.

(9) Insufficient support and attachment of ornament, and poor matching and alignment of members that should have perfect continuity.

(10) Miscellaneous damage after completion.

Any of the foregoing or other defects, if at all serious, may constitute a sufficient reason for rejection of the affected area; even an entire work, if the deficiencies are too prevalent. In the event of defects in the supporting construction (Item 7), it must be determined just where lies the responsibility. The plasterer is responsible for the proper condition of all areas which he covers by lath or plaster, except in instances of settlements, such as are caused by the shrinkage of wood joists, or other deformations beyond his control. This is a point for the superintendent's keen discernment, as is also the question of who is responsible for damages to finished work (Item 10). Regarding the latter, the generally accepted procedure makes it the duty of the superintendent to post himself, if possible, as to who caused the damage, then to issue an order for its repairing, and to see that the cost thereof is charged against the proper party; or, for repair of damages of unknown origin, to issue like orders, and to make entry of the cost in a common account, the aggregate of which is later to be prorated among all those contractors and subcontractors (including the plasterer) whose employes were at work in the building after the plastering was partially completed. Obviously, none should

be assessed against those who have finished their work and removed their forces. Inasmuch as charges for plaster patching are ordinarily made on a time-and-material basis, or at a fixed rate per square yard, it is essential that the superintendent verify the report of the plaster foreman regarding such repairing, at the end of each day's work, or at the completion of each patch, if the accounts are to be dependable.

Assessments against subcontractors should, of course, be charged to their principals, since the architect is not supposed to have direct dealings with subcontractors. In some localities, plastering contractors' associations have very positive rules relating to charges for patching. Both architects and superintendents who find themselves operating in places thus controlled, should be familiar with such matters and govern themselves accordingly. If the superintendent discovers a discrepancy between such rules and his contract stipulations, he must promptly advise the home office and have the matter adjusted.

However, after all is said and done regarding a plastering contract, it resolves itself into a question as to whether or not the finished work is acceptable. Any criticism made by an inspector prior to completion must be regarded largely as advisory, since it is the condition of the final product in which he is most concerned. If corrections amount only to minor patching, the matter is not serious, but, if large areas are faulty, approval of the entire work may be withheld. In that event, it is a question for the architect to settle with the contractor direct. To obviate delays, or for other reasons, factors of expediency may enter into the subject, and decision becomes an issue depending upon the terms of the contract, the owner's major interests, etc., quite beyond the office of the mere superintendent. Nor should he be taken to task for defects discovered in the finished work, except as he might fail to report them. Unless the superintendent has erred by exceeding his authority in any particular, the contractor is solely to blame for having produced something that is not acceptable according to the terms of the contract.

CHAPTER 22
MARBLE AND TILE

MARBLE, tile and terrazzo, as used for the finished surfaces of buildings, are merely forms of masonry veneer applied to floors, walls and ceilings, both inside and out. Stone, terra cotta, brick and various imitations of masonry materials are similarly used, either as veneer or incorporated structurally in the walls. These latter materials have been treated in these articles under their respective headings; and a discussion of terrazzo will be found under Chapter 12,—"Finished Concrete Surfaces," of which terrazzo is merely a refined form.

Marble is a comprehensive term applied generally to any limestone of sufficient density to take a polish. It is quarried in many locations distributed the world over. The marbles in use in North America are known as *domestic* and *imported*. The former are produced from districts from Mexico to Alaska, and the latter are derived chiefly from western and southern Europe. For convenience, marble is (or always should be) specified to conform to approved samples. The superintendent has to see that it does so conform. However, there are certain faults, prevalent in many marbles (especially in those of the more beautiful colors and figurations), and he must be able to discriminate between flaws that are not condemnable defects and those that are.

Having inspected the marble as to kind, quality and veining, the superintendent is next concerned as to its finish. This may be in various degrees of smoothness, from dull-honed to highly polished and waxed; also exemplified by the sample. For unpolished work there are several stones other than marble that are used for wainscoting, mantel facings, etc., such as travertine, Caen stone and Indiana limestone. Any of these for such and similar interior work may be included in a marble contract.

Except in purely decorative areas, where little or no wear is anticipated, stone for floor slabs and stair treads should be selected for its especial hardness. Some of the domestic marbles, such as the coarse-textured Georgia white and gray, are acceptable for this service, as are also soapstone and slate, which are often used for stair treads. Slate and various limestones are similarly used for coarse flagging. Marble may be rendered in parti-colored designs, composed of pieces of any desired size, and including pictorial mosaics. Tesseræ (mosaic pieces) are roughly cubical, ordinarily about ¾ inch each way, though as small as ¼ inch for finer designs. Larger pieces of floor marble are ⅞ inch or more in thickness; sometimes 1¼ inches for pieces 12 inches square and larger. For flagging, the thickness of blocks ranges from 1¼ to 2½ inches. All thicknesses of slabs for either floor or vertical work should either be specified or shown by detail; otherwise

one must be content with ⅞-inch stock in most cases. These and other dimensions should be clearly set forth in shop drawings, a copy of which should be in the hands of the superintendent.

FOR wainscoting and other wall covering, ⅞-inch slabs are generally used; for free-standing partitions, ⅞- to 1¼-inch stock, depending upon the size of the member. Base, cap and other special trim must be as detailed. The thickness of standing marble is usually disguised at exposed edges, either by the use of thicker corner pieces, or by a combination of miter and quirk which provides a small (⅛- to ¼-inch) reëntrant angle in place of the full square corner. If neither of these features is called for, the architect must be content to see the marble merely lapped at such corners, with visible ⅞-inch edges.

Erection of standing marble immediately follows plastering, and precedes the laying of finished floors. The planes of finished vertical surfaces are either established from those of the plastering or by some other positive reference approved by the man in charge. This needs careful foresight, as does also the condition of all items that are to be concealed by marble. Wall slabs are blocked out from the backing by means of dabs of plaster of Paris (never solid-backed), and are held in place by brass or bronze anchors or copper wires, and by brass or bronze dowels, and bedded in plaster of Paris. In the case of free-standing stall partitions and the like, concealed fastenings are generally considered inadequate, and hence bolted angle clips are used, ordinarily of some white metal or nickel plated brass. Such partitions may be housed into one another and into the wall slabs, or may have butt joints. The latter are cheaper and most common, and will be used unless otherwise stipulated. Close joints, about 1/16 inch, are the rule for all marble work. They are rendered in plaster of Paris or non-staining cement, white or some desired color. The rigidity of slab work is of prime importance and must receive the closest attention of all concerned. Good mechanics produce finished marble work that is practically perfect, and nothing short of this is to be tolerated in this department of first class building. If any piece is insecure or out of place or alignment, or

CONDENSED LIST OF TILES

THEIR CHARACTERISTICS & USES

KIND OF TILES	THICKNESS	SHAPES AND SIZES	COLORS	SURFACES AND GLAZES	GENERAL USES
CERAMIC MOSAIC	¼	Square - 2⅜ - 1⅞ - 1⅛ - ¾ - ½ - 1/32 Oblong - 2⅜ × 1⅛ - 1⅞ × ¾ - 1⅛ × ½ Hexagon - 1¼ - 1 Pentagon - 2⅛ Trapezoid - 2 3/16 × 1 1/16	See Vitreous and Semivitreous Tiles, Also Flat and variegated colors such as Textures, & Flashings	Unglazed	Floors Walls Swimming Pools Plunge Baths Kitchen Sinks Interior Exterior
ENAMEL MOSAIC GLAZED MOSAIC			See Dull Glazed Tiles	Bright	
DULL GLAZED MOS. MATT GLAZED MOS.				Dull Matt	
FAIENCE MOSAIC	VARIABLE	Any Shape or Size Less Than 2¼ Square Inches in Area	See Faience Tiles	Plain or Embossed Bright, Dull or Matt	
PLASTIC MOSAIC			See Plastic Tiles	Plain or Embossed Unglazed	
VITREOUS TILES	½	Square - 3 - 2⅛ - 1½ - 1⅛ Oblong - 3×1½ - 3×1 - 3×½ - 2⅛×1 1/16 - 1 1/16×½ Hexagon - 3 - 2 Octagon - 3 Triangle - 3 - 1 47/64 - 1 5/32	White, Celadon, Silver-gray Green, Blue-green, Light-blue Dark blue, Pink, Cream, and Granites of these Colors	Unglazed	Floors Walls Fireplaces Interior Exterior
GLAZED				Bright	
DULL GLAZED MATT GLAZED			See Dull Glazed Tiles	Dull Matt	
SEMIVITREOUS TILES		Same as Vitreous Tiles, Also: Square - 6 - 4¼ Oblong - 9×3 - 6×4 - 6×3 - 6×2 - 6×1½ 6×¾ - 6×½ - 4¼×2⅛ - 4¼×1 1/16 Hexagon - 6 - 4⅛ - 6×3 - 4¼×2⅛ Octagon - 6 - 4¼ Pentagon - 5 5/16 - 2⅛	Buff, Salmon, Light-gray, Dark gray, Red, Black, Chocolate, and Granites of these Colors	Unglazed	
GLAZED				Bright	
DULL GLAZED MATT GLAZED			See Dull Glazed Tiles	Dull Matt	
FLINT PAVING TILES HYDRAULIC	¾	Square - 6 - 4¼ Oblong - 6×4 - 6×3 - 6×½ Hexagon - 6 - 4⅛ Octagon - 6	White, Light gray, Dark gray Celadon, Sage, Light blue Dark blue, Green, Cream	Unglazed	Floors-Walls Interior-Exterior
	¾ and 21/32	Square - 6 - 4¼ Oblong - 10×5 - 9×3 - 6×3 - 6×½ Hexagon - 6 - 4¼	See Semivitreous Tiles		Floors Interior-Exterior
WHITE GLAZED TILES	½ and ⅜	Square: Basic Sizes For Fields 6 - 4¼; Other Sizes 3 - 2⅛ - 1½ - 1 1/16 - ¾ - ½ Oblong: 6×3; 6×2 - 6×1½ - 6×1; 6×¾ - 6×½ - 4¼×2⅛; 4¼×1 1/16 - 3×1½ - 3×1; 3×½ - 3×¼ - 2⅛×1 1/16	White	Plain or Embossed Bright	Walls Interior
DULL GLAZED TILES MATT GLAZED TILES	⅜ - ½	Hexagon: 3 - 2 Octagon: 3	• Unlimited Color Range • Selection must be made from Samples and Colors Specified by number	Plain or Embossed Dull Matt	Walls Fireplaces Interior
ENAMELS				Bright	
PLASTIC TILES	½ and over	Obtainable in all of the above, and special shapes and sizes	Colors that result from firing of natural clays	Plain or Embossed Smooth or Rough Unglazed	Floors Walls Fireplaces Interior Exterior
FAIENCE			See Dull Glazed Tiles	Plain or Embossed Bright, Dull or Matt	
QUARRY TILES	½ - ¾ - ⅞ - 1¼	Square - 12 - 9 - 6 - 4¼ - 3 Oblong - 12×6 - 9×6 - 9×4¼ - 9×3 - 6×3 Hexagon - 8×4	Red, Gray, Buff, Brown, and Flashed	Unglazed	Floors Interior-Exterior

possessed of any sort of defect (other than inherent faults as in the approved sample), it must be made right. Of most particular importance is the anchoring of small pieces of trim, especially casing plinths and thresholds. These are so often inadequately secured that some architects permit them to be attached by means of screws having exposed heads and washers, rather than take the chance of finding them loose, months later.

Imitation marble (pre-cast terrazzo) is set and secured in the same manner as marble, but is often specified with other terrazzo. In localities where marble, tile and terrazzo are installed by different contractors, all three trades may be due to work independently in some small room at one time. The pre-cast terrazzo man may even add to the confusion. To obviate this, some architects group these trades, making one individual responsible for the measurements, shop drawings and sequence of the work of all.

MARBLE for floors has each piece bedded solid and the joints (usually about 1/16 inch) rendered full, all in non-staining cement mortar. The customary depth for underbed for mosaic and 7/8-inch marble-block flooring is 2 inches. This should be increased for thicker marble, and due consideration should also be given in the formation of the structural slab to all intended ramps, slopes for drainage, etc., as otherwise some awkward cutting must be done to provide sufficient depth for a proper setting bed. Then, too, the usual precautions must be taken to have the slab roughened, moistened and coated with grout or bonding cement, since the finish surface material, be it marble, tile or terrazzo, must attach firmly to the slab. Although it is generally assumed that floors of this kind are waterproof, such is not necessarily the case, nor are they so regarded by architects or others familiar with such construction. Where actual waterproofness is needed, as under shower bath stalls, flower beds and the floors and sides of tanks, fountains, etc., located over finished ceilings, lead safing is installed between the structural slab and the underbed of the finished material. Such safing and its drainage should be carefully detailed, to be included with Plumbing. There are many other materials, including various kinds and thicknesses of glass, metal inserts, etc., which are used in somewhat the same manner as marble for floors and wall coverings, and these may be included in a marble contract or let separately. Each such material must be treated as intended by its producers, and both the product and its application inspected accordingly.

Tile is applied to floors, walls and ceilings, as an ornamental or useful covering, for the same general purposes as marble, but by another craft. Whereas standing marble and that for ceilings and soffits depends entirely upon metal anchorage for its security, tile is cemented in place in all cases, unless one makes an exception of certain special tile arch construction. The accepted backing for tile is masonry (brick or hollow tile, not gypsum blocks) or metal lath with rigid supports, not more than 12 inches apart. It is immaterial, in so far as construction is concerned, whether or not plaster is applied back of marble, but it is not customary to use lime or gypsum plaster back of tiling. Instead, the tile setter lays his bed of Portland cement mortar directly against the lathed or masonry surface. In the case of tile flooring laid over wood joist construction, it is necessary to provide a concrete setting bed under the tile setter's mortar setting bed, the former not less than 1 inch thick and laid over waterproof paper turned up at all edges. It is also advisable, in new work of this kind to use narrow unmatched boards for the subfloor under the concrete setting bed, and to lay them 1/4 to 3/8 inch apart to allow for swelling, in case they should happen to get wet. Inasmuch as there are more potential causes for cracking of tile floors in wood frame buildings than in those of more stable construction, it is advisable to use more preventives to guard against such mishaps. One safeguard is to embed a wire mesh in the concrete bed. This is particularly necessary in areas larger than about 16 square feet. Some specification writers also call for a sand cushion to form a cleavage plane over the structural slab, in which case due allowance must be made (not less than 2½ inches) for the combined thickness of sand cushion, concrete bed, mortar bed and tile. The concrete setting bed is merely a means for bringing the under surface up to a proper level, and is not needed if the customary 2 inches is allowed for ordinary tiling, or 2½ inches for quarry tile. Specifications for this work are thoroughly standardized by the Associated Tile Manufacturers (Beaver Falls, Pa.) and issued as "Basic Specifications for Tilework, Publication No. K-300." These are in general use by architects and should be familiar to every building superintendent.

THERE is wide variation in the kinds and designs of tile, and hence specifications are explicit as to what is demanded. Approved samples, showing type, design and color range should always be at the job for comparison, together with diagrams showing the intended layout. For the characteristics and uses of tile, the reader is referred to Page 133 ,"Condensed List of Tiles," compiled by the Associated Tile Manufacturers. As to terms, whereas the dictionaries give *ceramics* and *keramics* the same meaning, the tile industry has chosen to apply "keramics" to the entire field, and has narrowed the usage of

"ceramics" to tiles smaller than 2¼ inches, of all shapes, used to form mosaics of regular or irregular pattern or special design, for either floors or walls. Ceramic tile may be glazed or unglazed, and may be colored through the body or in the glaze only. Glazed tiles (other than faience) do not wear well, and hence are seldom used in floors, except as needed to supply small bright spots in a color design. Nearly all standard tile, shown in catalogs and carried in stock by dealers (tile contractors), include an extensive line of "trimmers" of all sorts, from which one may select the needed shapes for almost any purpose.

The body of a tile may be either hand- or machine-pressed, of moist or dry clay, the latter variety being known as "dust-pressed." Ordinary glazed wall tile has a dust-pressed body, termed "bisque" after its first firing. The face of the bisque is dipped, by hand or machine, in the glaze, and is then refired to produce the desired surface. This may be either bright glazed (enameled) or dull glazed (matt finished). Glazed tile may be had in white or any one of a number of solid colors and shades. These colors are materially affected by the firing, and hence there is a certain degree of variation in all the shades, even in the white. One must know in advance just what are to be the limits of such color range, and establish them by the samples. The regular grades of tile are "Select," "Standard" and "Commercial." They are graded at the factory, and a certificate is issued with each barrel of tile sent out; hence a superintendent is spared the burden of trying to do his own grading, the which is to be considered a task for experts only. He should, however, insist upon getting the certificate, and must be sure that it applies to his particular shipment. In addition to the regular grades, tile are sold (sometimes specified) in percentages (50-50, 40-60, etc.) of two grades, and shipped accordingly. Contractors have been known to attempt part substitution of cheaper tile in this manner, and hence, if under suspicion, they must be watched and circumvented. Vitreous and semi-vitreous tiles are either glazed or unglazed. Flint tiles (also called "paving" and "hydraulic") are unglazed. All these tiles have been given various names by producers, and hence the superintendent is less concerned in their terminology than he is in seeing that they correspond with approved samples.

FAIENCE is a term applied to handmade tile, plain and embossed, glazed and unglazed. It is moulded from plastic clay, compressed by being forced out of the pug mill, then cut up, repressed, shaped by hand and fired. The glazing is also handwork and is applied after the first firing, several colors, if desired, on each piece. Unglazed faience is fired but once, and hence the clay prepared for it must contain the necessary natural mineral ingredients to produce in the kiln the requisite color. Variations in this coloring are caused by difference in heat throughout the kiln, and may produce variations in a single tile. By controlling the heat, it may be made to "flash," inducing even more marked colorings, called "flashings." Decorative inserts, especially for floor designs, are produced in partly glazed faience, having the glaze applied only to the depressed areas of unglazed faience, then refired.

Faience and other plastic clay tile are very durable and are used for exterior as well as interior work. The body of dust-pressed tile is more porous and may absorb moisture back of the enamel, causing serious damage where subjected to freezing. This may occur in unheated show window enclosures or vestibules, or in unfinished buildings not properly heated, and hence must be duly guarded against. Deterioration of glazed tile appears first in the form of minute cracks ("crazes") in the surface, after which it may show chipped corners or edges. If such tile are carelessly allowed to freeze before acceptance, either before or after setting, they should be rigidly inspected after being warmed and dried. Any visible tendency toward crazing during construction is sufficient cause for rejection (if one supposes he has bought perfect tile), since, once started, the disintegration process may continue indefinitely.

PROMENADE or quarry tile is an unglazed plastic clay tile of a texture resembling roofing tile and face brick. It comes in various colors, sizes and thicknesses up to 12 x 12 x 1¼ inches, and is chiefly used for the paving of walks, decks, large hearths, etc., interior or exterior, and is, in some makes, produced with a full line of trimmers.

The smaller sizes of tile (ceramics) are assembled at the factory as mosaics, either in designs or "allover" patterns, and pasted face-down on heavy paper, with due allowance (approximately 1/16 inch) for joints. The pieces so mounted are laid while still attached to the paper, care being taken by the setter to so match the joints between mountings that there is no appreciable distance between his and those spaced at the factory. Standard specifications allow 1/16 inch for joints for vitreous and semi-vitreous tile, glazed and unglazed, for walls and floors; 3/16 inch for flint and hydraulic tile; ¼ inch for faience and other plastic tile; and ½ inch for quarry tile. The latter are somewhat irregular in shape and are frequently laid with joints even wider than ½ inch. These are commonly troweled smooth, either flush with the surface of the tile, or slightly concave. Commercial tile of all kinds may also pos-

sess irregularities, and hence cannot be laid with joints as close as those for selects and standards.

Being a finished product, tilework, after the tile itself has been passed upon, is either accepted or rejected at completion. Imperfections are easily discernible and are (except in cheaper grades, in which slight defects are permissible) promptly ruled out. The more common of these are: (1) irregular jointings; (2) bad cutting of fillers, or poor judgment in their location and size; (3) use of defective tiles; (4) loose tiles; (5) poor attachment of setting bed to backing; and (6) imperfect planes, alignment and angles. In the interest of the economy that is obviously intended when tile of commercial grade is specified, the superintendent should not be too critical of such work and thus defeat that intent. Certain minor imperfections that would not be encountered in better grade tile may have been unavoidable in laying the commercial.

Just before acceptance, all tile surfaces should be properly cleansed with clean water. If the surface is rough, as in some faience, it may be necessary to use a 3- to 5-per cent solution of muriatic acid (commerical hydrochloric) to remove particles of mortar, etc. This is true of all unglazed faience in both floors and walls. Though tile may be considered a durable material as measured by "ordinary wear and tear," it is susceptible to injury by violence, staining and other abuse, and hence must be adequately protected after completion, both before and after acceptance, until the work is turned over to the owner. It is frequently damaged by oil and varnish stains, and by misuse when furniture and equipment are taken into a building; therefore a superintendent must be on watch to see that due care is exercised to prevent such mistreatment. This precaution applies equally to marble and to all other such finished materials.

CHAPTER 23—FINISH CARPENTRY

UNDER the heading "Structural Carpentry" (Chapter 19), there was given a general idea of separation between that branch of woodworking and the finish work with which we are now to deal. The important features of this are not so much a question of whether this or that item is in one classification or the other, but that every needed item is taken care of, and that none is included more than once. In our school building, the subcontract for Finish Carpentry included all door and window frames, exterior and interior, but did not include structural bucks for interior openings. It included wood finish floors and their coverings, but not the matched roof sheathing.

Delivery of exterior frames is made as soon as the building has advanced to a stage where they are about to be needed and can be properly cared for. They must be inspected at once, measured and compared with details. Their exterior dimensions must be such as to fit the openings for which they are intended; and, in cases where sizes of glass are also indicated on the drawings, these are likewise to be accommodated. Our superintendent cautioned the mill foreman about tacking the staff beads on the outsides of the frames, so that they would be easily removable for calking. Regardless of his warning, he found about half of the staff beads solidly nailed, when he called to inspect the frames, prior to priming. He told the foreman to have these nails driven through, and the members tacked back on with fewer nails, with heads projecting. If delivered at the site as originally attached, the superintendent knew from experience that the beads might be carelessly pried off and damaged.

Weather stripping is sometimes incorporated in the carpentry specifications, sometimes made a separate contract or subcontract, sometimes omitted, perhaps to be done a year later, after the sash may be assumed to have done with shrinking. In any event, both weather stripping and calking, if included in the original construction, should be done as late in the contract stage as feasible, in order that continued shrinking thereafter may do the least possible harm. The superintendent should make himself thoroughly conversant with what is demanded in each of these factors; then see that each of them, as well as of staff beads, frames, sash and all other affected parts is in first class condition when the calkers and weather strippers are through.

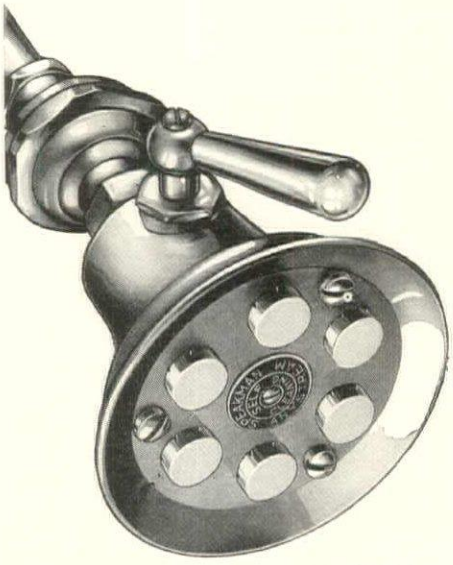
BEFORE plastering was completed, wood finish began to arrive from out of town. Specifications forbade this being stored in the building during plastering, except in a room specially prepared to receive it. The boys' gymnasium was to contain no plastering, and hence it was cut off from the remainder of the building by filling the doorways with matched sheathing. Temporary radiators were installed, and the room was rendered quite dry before the first finish was delivered. Where no such provision is made, all wood finish must be kept out until the entire building is dry; otherwise one may later have to condone shrinkage cracks, and perhaps slight warping of affected members. In large buildings, delay from this cause is avoided by completing by stories or sections, temporarily cut off to facilitate drying. The room assigned to receive wood finish is ordinarily treated as a paint room and given over to the care of the contractor or subcontractor for this branch of the work.

To be continued in THE FORUM *for February*

WHEN YOUR CLIENT INSTALLS SPEAKMAN ANYSTREAM SELF-CLEANING SHOWER HEADS HE WILL NEVER HAVE EITHER OF THESE INCONVENIENCES..

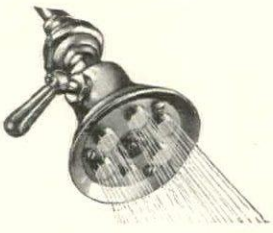
Stopped-up head

Failure to shower properly because of low water pressure

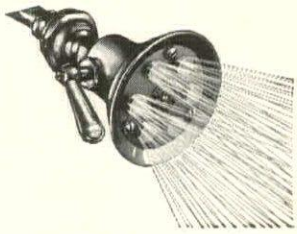


SPEAKMAN Anystream Self-cleaning Shower Head, K-3395 — Finished in Speakman Chromium Plate. (Pat. Jan. 2, 1923.)

Flushing out all scale and dirt



Normal shower



Needle shower

The Hotel Gibson in Cincinnati proved this when they installed 707 of these modern shower heads . . .

Afterward they wrote of the heads:

"They have created splendid comments from our guests and have eliminated all of our shower troubles."

The Speakman Anystream Self-cleaning Shower Head has six tapered plungers, each of which has a series of tapered slots. By turning the lever handle these plungers are moved in or out and allow the bather to have all degrees of shower volume and force. When the plungers are extended their entire length, pipe scale and sediment which could easily stop up an ordinary shower head are flushed out instantly.

These new heads can be installed with Speakman or any other kind of shower. They are finished in Speakman Chromium Plate. Literature giving complete details of their construction will be mailed promptly — also a celluloid mechanical model.

SPEAKMAN COMPANY
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IN ONE OF THE WORLD'S GREATEST MEDICAL CENTERS

The COLUMBIA-PRESBYTERIAN MEDICAL CENTER
NEW YORK CITY

Engineer: Werner Nygren *Architect:* James Gamble Rogers
General Contractor: Marc Eidlitz & Son *Heating Contractor:* Gillis & Geoghegan
Plumbing Contractor: W. G. Cornell Co.

A great modern hospital lays exacting requirements upon those who build it. Within its walls, temperature, air, light, noise, vibration, and whatever else has influence must be controlled in the interest of the skilled work that is to be done, the precise use of delicate instruments that are to be employed, the sensitive processes of nature that are to be invoked, for the restoration of health.

All these provisions must be guarded. No makeshift devices, no compromises of quality in material or thoroughness in workmanship, can be tolerated. It is an evidence of merit for any equipment or any product to find important use in such a building.

In the magnificent structures that make up the Columbia Medical Center in New York, NATIONAL was used for the major pipe tonnage. Superior special processes (applied to butt-weld sizes ½ to 3-inch) make it Scale Free and give a uniform, dense surface to resist corrosion. Serving in many of the finest buildings in the country—NATIONAL has proved worthy of the confidence that has made it—

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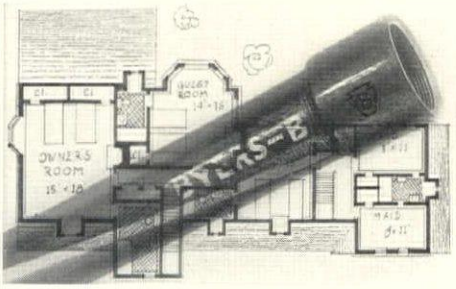
IN THIS business age of specialization, competent counsel and scientific information are essential. This is why A. M. Byers Company, in presenting the message of Byers Genuine Wrought-Iron Pipe to the general public, stresses the importance of following the recommendations of recognized architects and builders.

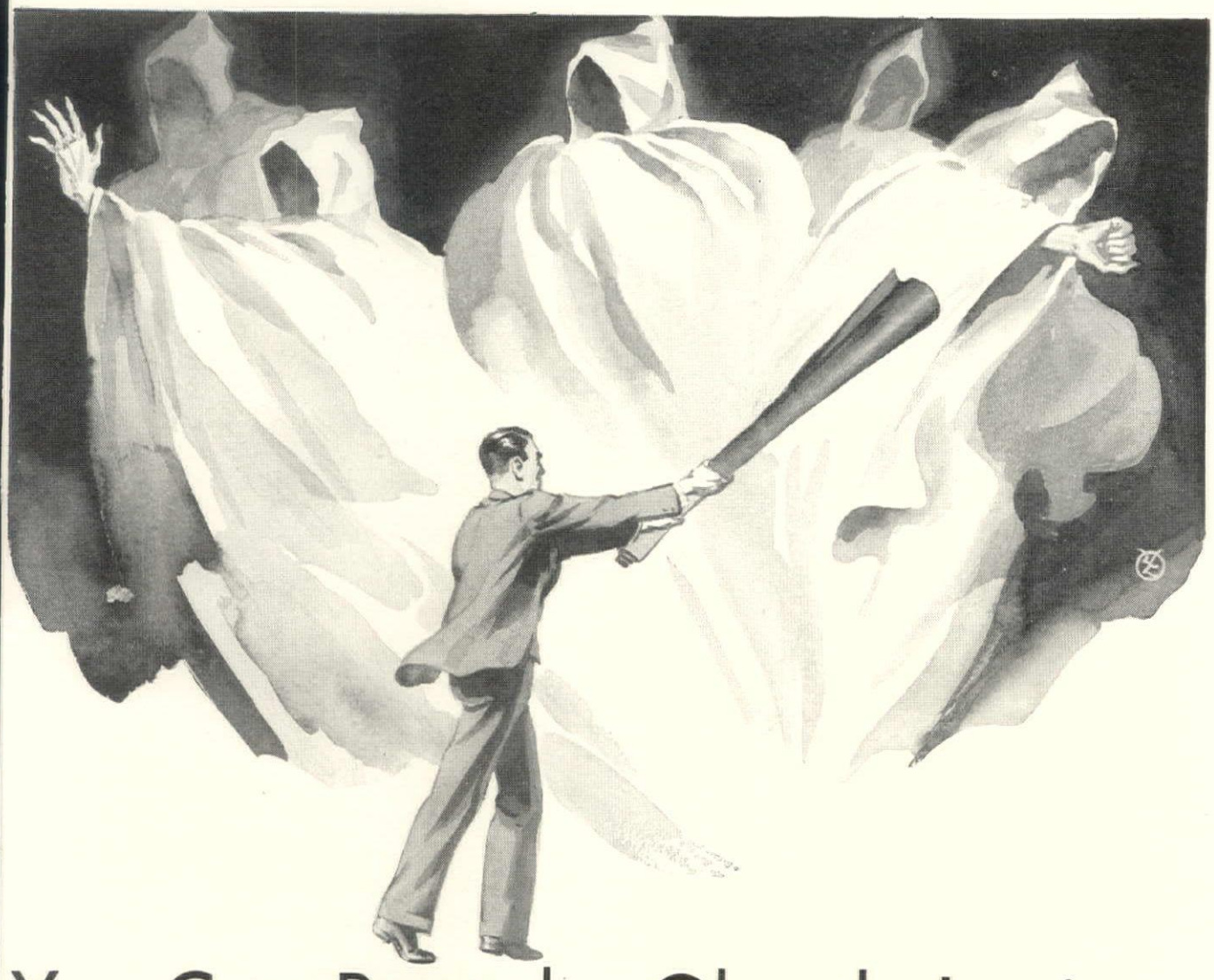
Leading architects and builders know that in any "pipe prescription" Byers Genuine Wrought-Iron Pipe is a basic feature. As an architect or builder, you know the places where actual service has demonstrated the superiority of Byers Genuine Wrought-Iron Pipe. You know also the error of substituting unsuitable materials in these places. A statement we make to the public is this: When specified and installed by building-specialists for definite purposes, Byers Genuine Wrought-Iron Pipe is the utmost in service and durability — and present and future economy!

Important: We want you to use Byers Genuine Wrought-Iron Pipe in those services for which it is best suited. In every home there are specific places for Byers Pipe. We accept as a business responsibility preservation of its traditional superiority in its proved field of service. Whatever your pipe problem, we will be delighted to place the facilities of our organization at your disposal in helping to solve them. Look for the Spiral Stripe! Write to us. A. M. Byers Company, Pittsburgh, Pa. Established 1864.



BYERS GENUINE WROUGHT-IRON PIPE

AN INVESTMENT—NOT AN OUTLAY



You Can Rout the Ghostly Legions With Your Plans and Specifications

Of all weapons that can be used against the hideous legions, that wait to attack faulty or poorly designed plumbing installations, there is none so sure, so deadly as exact plans and specifications.

When these specifications call for plumbing and fixtures designed to meet and defeat the particular hazards of the job, the careless operation and heavy wear that will be encountered—the battle for sanitation at low through-the-year costs is more than half won.

To get such plumbing into specifications is neither difficult nor costly.

The Clow Soldier of Sanitation stands ready at all times to help you select the proper fixtures, to work out the most economical layouts. At his finger tips is the accrued knowledge of Clow's 52 years of specialized plumbing experience.

At his back is the most complete line of specialized plumbing fixtures in the world, developed to meet particular needs in schools, hospitals, industrial plants, public buildings and similar installations as well as the smallest bungalow.

When you specify such fixtures, your plans and specifications become a sword that ghostly enemies cannot withstand.

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PREFERRED FOR EXACTING PLUMBING SINCE 1878

Consult your architect

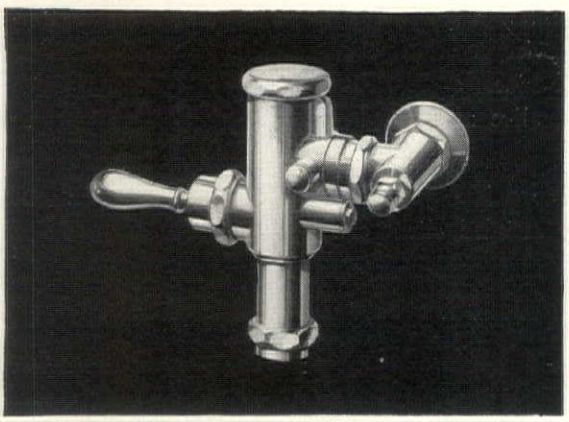
The Clow Soldier of Sanitation is your ally in the battle for low costs, long life and perfect sanitation in plumbing installations. The world's longest line of specialized plumbing—and 52 years collective experience help him help you. Call him in. This is Bill Latimer, Albany, N. Y.

MEETING ARCHITECTURAL STANDARDS OF QUALITY

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

UNIVERSITY OF ROCHESTER NEW COLLEGE FOR MEN

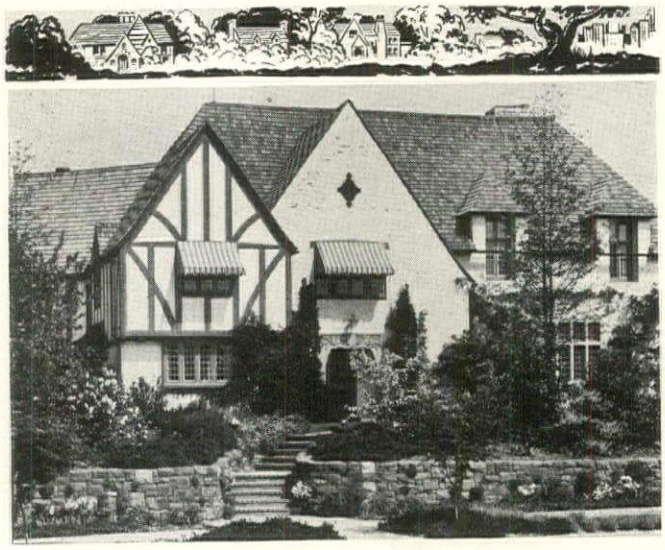
THESE MODERN BUILDINGS HAVE SOLID NICKEL SILVER PLUMBING FIXTURES BY DOUGLAS



18% 22 Nickel SILVER

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

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



House in Portland, Ore., Kirtland Cutter, Architect. Cabot's Blended Roof Shakes; Cabot's Old Virginia White on brickwork. Cabot's Quilt in walls to deaden noise and reduce cost of heating installation and fuel bills.

Saves Their Money

Now is a moment when an architect can as easily make a friend for life as a foe.

All Cabot's house building specialties are planned and manufactured in the true spirit of New England thrift—the thriftiest thrift in the world!

Highest quality materials, simplest and most efficient manufacturing methods; put these two things together, mark the finished product at a fair and reasonable price, hold the goodwill of the customer by supplying service at all times—and you have a formula for business success that has kept Samuel Cabot, Inc., alive and growing for generations.

You save your client's money when you deal with such a firm; and every satisfied client can bring you a dozen more.

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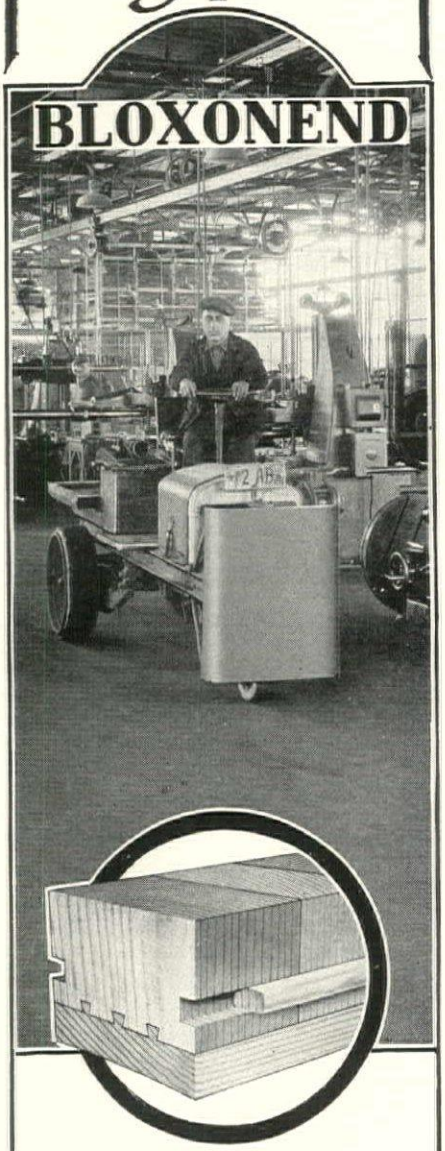

BLOXONEND is the only factory flooring that combines the essential qualities of ***durability, resiliency*** and ***lasting smoothness.*** It is made of Southern Pine, the tough end grain forming the wearing surface.

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Bloxonend comes in 8 ft. lengths and is laid over old or new concrete or wood floors without interrupting operations.

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NOT ONLY~ WHO ~BUT ALSO HOW MUCH ~AND THEN WHY

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MT. SINAI HOSPITAL, Cleveland, Ohio
Charles R. Greco, Architect
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MICHAEL REESE HOSPITAL, Chicago, Ill.
Schmidt, Garden & Martin, Architects
PASSAVANT HOSPITAL, Chicago, Ill.
Holabird & Roche, Architects
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STATE OF MAINE HOSPITAL, Bangor, Me.
Coolidge & Carlson, Architects
HURLEY HOSPITAL, Flint, Mich.
Thielbar & Fugard, Architects
JEWISH HOSPITAL, St. Louis, Mo.
Graham, Anderson, Probst & White, Archts.
UNIVERSITY OF BUFFALO
McKim, Mead & White, Architects
UNIVERSITY OF ILLINOIS (now building), Urbana, Ill.
James M. White, Architect
Charles A. Platt, Consulting Architect
CHRYSLER MOTOR CAR CO. CHEMISTRY LABORATORY, Detroit, Mich.
Smith, Hinchman & Grylls, Architects
AMHERST COLLEGE, Amherst, Mass.
McKim, Mead & White, Architects
Tenney & Ohmes, Inc., Engineers
VILLA NOVA COLLEGE, Villa Nova, Pa.
Paul Monaghan, Architect
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DUKE UNIVERSITY (now building), Durham, N. C.
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Isaac Hathaway Francis, Engineer
WEST TEXAS TECHNICAL SCHOOL, Lubbock, Tex.
Sanguinet, Staats & Hedrick, Architects
R. F. Taylor, Engineer
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Archer & Allen, Architects
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COLUMBIA UNIVERSITY, New York City Teachers College
McKim, Mead & White, Architects
Werner Nygren, Engineer
NEW YORK STATE PSYCHIATRIC INSTITUTE, New York City
Sullivan W. Jones, Architect
UNIVERSITY OF KENTUCKY, Lexington, Ky.
Coolidge & Shattuck, Architects
HENRY FORD SCHOOL OF NURSING, Detroit, Mich.
Albert Kahn, Inc., Architects
UNIVERSITY OF TENNESSEE MEDICAL SCHOOL, Memphis, Tenn.
Jones & Furbringer, Architects
SOUTHWESTERN PRESBYTERIAN UNIVERSITY, Memphis, Tenn.
Henry C. Hibbs, Architect
NEW YORK UNIVERSITY, New York City
William S. Gregory, Architect
NEW YORK LIFE INSURANCE CO., New York City
Cass Gilbert, Architect
UNIVERSITY OF INDIANA (now building), Bloomington, Ind.
Robert Frost Daggett, Architect
Charles R. Ammerman, Engineer
UNIVERSITY OF PENNSYLVANIA, Philadelphia
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Seek out not only where DURIRON is used, but how extensively, and with what history. No Duriron Drain Pipe in service for which we recommend it has ever failed because of corrosion. Calked joints stay tight. Experience among those named right here points to the basic economy of specifying "Duriron Throughout" as original equipment. Temporary plumbing is out of place in a building created for generations to come.

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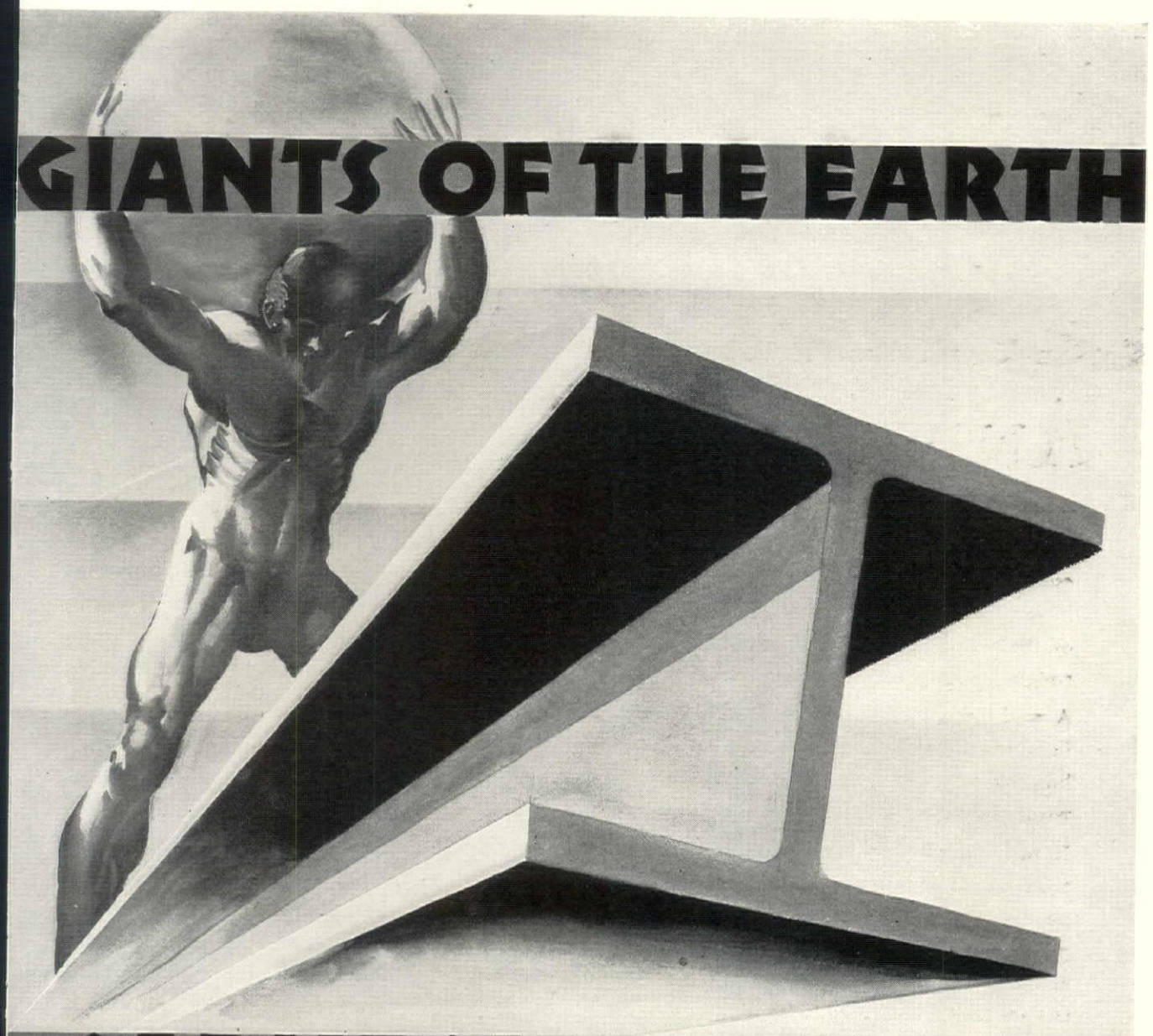

OUT of the dim mists of antiquity come myths of giants . . of Atlas who upheld the blue vault of heaven . . of Hercules and his twelve stupendous tasks . . of Goliath and Cyclops and a host of others.

Today another race of giants shoulder the world's work. Carnegie Beams are the modern giants of the earth. Introduced less than four years ago, they have been conspicuous in recent notable construction. The Empire State Building, the Chrysler Building, the new Waldorf-Astoria, Hotel New Yorker, the Irving Trust Company Building, the Koppers and Grant Buildings in Pittsburgh, the Penobscot and Fisher Buildings in Detroit, the Department of Commerce Building in Washington, Strawbridge & Clothiers Store in Philadelphia, the Carew Tower in Cincinnati, No. 1 LaSalle Street and the Palmolive Building in Chicago . . these and countless others are borne on the broad shoulders of Carnegie Beams. Such widespread usage is the best indication of their adequacy to the needs of architects and designers. Their broad flanges present advantages applying to any type of construction involving the use of Structural Steel, regardless of size or type of architecture.

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Selected List of Manufacturers' Publications

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

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

ACOUSTICS

R. Guastavino Co., 40 Court Street, Boston.
Akoustolith Plaster. Brochure, 6 pp., 8½ x 11 ins. Akoustolith as Related to Architectural Acoustics. Booklet 10 pp., 8½ x 11 ins.

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

ASH HOISTS

Gillis & Geoghegan, Inc., 544 West Broadway, New York.
G & G Telescopic Hoist catalog, 8½ x 11 A. I. A. Standard Classification 30il, contains complete descriptions, method of selecting correct model to fit the building's needs, scaled drawings showing space requirements and specifications.

ASH HOISTS—TELESCOPIC

Gillis & Geoghegan, Inc., 544 West Broadway, New York.
G & G Telescopic Hoist catalog, 8½ x 11 A. I. A. Standard Classification 30il, contains complete descriptions, method of selecting correct model to fit the building's needs, scaled drawings showing space requirements and specifications.

BRICK

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

CABINET WORK

Henry Klein & Co., 25 Grand Street, Elmhurst, L. I., N. Y.
Driwood Period Mouldings in Ornamented Wood. Brochure, 28 pp., 8½ x 11 ins. Illustrated.
Ensemble Offices for the Banker and Broker. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Luxurious Office Partitions in Walnut, Mahogany and Quartered Oak. Folder. 4 pp., 8½ x 11 ins. Illustrated.

CARPETS

Collins & Aikman Corporation, 25 Madison Avenue, New York.
"Seemingly Seamless Carpets." Booklet, 8 pp., 8½ x 11 ins. Illustrated.

CEMENT

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

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

Medusa Portland Cement Co., 1002 Engineers' Building, Cleveland.
Medusa Waterproofed Gray Portland Cement. Booklet, 30 pp., 8½ x 11 ins. Illustrated.
Medusa White Portland Cement, Non-Staining. Brochure, 30 pp., 8½ x 11 ins. Illustrated.

Portland Cement Association, Chicago, Ill.
Concrete Masonry Construction. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Deals with various forms of construction.
Town and Country Houses of Concrete Masonry. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Facts About Concrete Building Tile. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
The Key to Firesafe Homes. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Design and Control of Concrete Mixers. Brochure, 32 pp., 8½ x 11 ins. Illustrated.
Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
Concrete in Architecture. Bound Volume, 60 pp., 8½ x 11 ins. Illustrated. An excellent work, giving views of exteriors and interiors.

CHURCH EQUIPMENT

John Van Range Co., Cincinnati.
Practical Planning for Church Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

CLUB EQUIPMENT

John Van Range Co., Cincinnati.
Practical Planning for Club Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

CONCRETE BUILDING MATERIALS

Concrete Steel Company, 2 Park Avenue, New York, N. Y.
Modern Concrete Reinforcement. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

CONSTRUCTION, FIREPROOF

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

CONSTRUCTION, STONE AND TERRA COTTA

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

DAMPPROOFING

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

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

DOORS

The Kawneer Company, Niles, Michigan.
Detail sheet, 8½ x 11 ins., with A.I.A. File No. featuring Heavy Welded Bronze Doors.

David Lupton's Sons Company, Philadelphia.
Lupton Commercial Steel Doors. Folder. 8½ x 11 ins. Illustrated.
Lupton Steel Industrial Doors. Brochure. 8 pp., 8½ x 11 ins. Illustrated. Details and specifications.

DOORS AND TRIM, METAL

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

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Tubular Steel Doors. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

Kalman Steel Company, Chicago, Ill.
Finishing Door Openings. A.I.A. file holder with 20 loose-leaf sheets of details and specifications.

The Kawneer Company, Niles, Michigan.
Detail sheet, 8½ x 11 ins., with A.I.A. File No. featuring Heavy Welded Bronze Doors.

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

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

DOORS, SOUNDPROOF

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

DRAINAGE FITTINGS

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

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

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 115*

DUMBWAITERS

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

ELECTRICAL EQUIPMENT

Bryant Electric Co., Bridgeport, Conn.
Catalog No. 30. Complete catalog of wiring devices 8⅝ x 10½ ins. 152 pp.
An Electrical Specification. Contains information and data useful in connection with the writing of electrical specifications. Illustrated. 8½ x 11 ins. 12 pp.
The Bryant Home of Ideas. Contains data and suggestions useful in connection with residence wiring. 8½ x 10 ins. 16 pp.
"KeNeX" and "HooKeX" Bulletin No. 5129. Contains data and specifications pertaining to devices for use in connection with the hanging of lighting fixtures, making such fixtures portable or removable, soldered joints being eliminated. 8½ x 10 ins. 6 pp.
Hospital Signal Devices. Bulletin HS-622-RP. Complete information on hospital signal devices. Pull Control Type. 8½ x 10 ins. 46 pp.
Hospital Signal Devices. Bulletin HS-1023. Magnetic Control Type. 8½ x 10 ins. 26 pp.

The Electric Storage Battery Co., Philadelphia.
Emergency Lighting and Emergency Power Data. Booklet. 12 pp., 8½ x 11 ins. Illustrated.

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

Ward Leonard Electric Co., Mt. Vernon, N. Y.
Mobile Color Lighting. Booklet, 46 pp., 8½ x 11 ins. Illustrated. Valuable work on the subject.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.
Variable-Voltage Central Systems as Applied to Electric Elevators. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
Westinghouse Panelboards. Catalog 224. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
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.

ELEVATORS—Continued

Catalog and pamphlets, 8½ x 11 ins. Illustrated. Important data on different types of elevators.

ESCALATORS

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

FIREPROOFING

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

Concrete Steel Company, 2 Park Avenue, New York, N. Y.
Economical Fireproof Floors for Suburban Buildings. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Havemeyer Steel Joist. The Joist with the Twin-Tee Chords. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

National Fireproofing Company, Fulton Building, Pittsburgh.
Natco; The Complete Line of Structural Clay Tile. Booklet. 48 pp., 8½ x 11 ins. Illustrated.
Make the Facing Bear Its Share. Folder, 8½ x 11 ins. Illustrated.
Unibacker, The Tile That Binds. Folder, 8½ x 11 ins. Illustrated.
Face Tile Walls. Folder, 8½ x 11 ins. Illustrated.
Meeting Every Need. Folder, 8½ x 11 ins. Illustrated.
Natco Vitritile. Folder, 8½ x 11 ins. Illustrated.
Natco Double Shell Load Bearing Tile. Folder, 8½ x 11 ins. Illustrated.

FLOODLIGHTING

National Terra Cotta Society, 230 Park Avenue, New York, N. Y.
Terra Cotta Buildings Are Superior for Floodlighting. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

FLOOR HARDENERS (CHEMICAL)

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

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

FLOORS—STRUCTURAL

Concrete Steel Company, 2 Park Avenue, New York, N. Y.
Havemeyer Steel Joist. The Joist with the Twin-Tee Chords. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

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

Structural Gypsum Corporation, Linden, N. J.
Gypsteel Pre-cast Fireproof Floors. Booklet, 36 pp., 8½ x 11 ins. Illustrated. Data on flooring.
Service Sheet No. 3. Specifications and Details of Design and Construction for Gypsteel Pre-Cast Floors and Ceilings. Folder, 8½ x 11 ins. Illustrated.

FLOORING

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

Blabon-Sandura Company, Inc., Finance Building, Philadelphia.
Blabon's Linoleum Styles for 1930. Booklet, 64 pp., 6¼ x 8½ ins. Illustrated.
Detailed Instructions for Handling and Laying Linoleum. Brochure, 40 pp., 3¼ x 5¾ ins. Illustrated.
Blabon's Linoleum Floors and Where You Will Find Them. Booklet, 8 pp., 8½ x 11 ins. Illustrated.
Comparison of Tests. Folder, 8½ x 11 ins. Illustrated.

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

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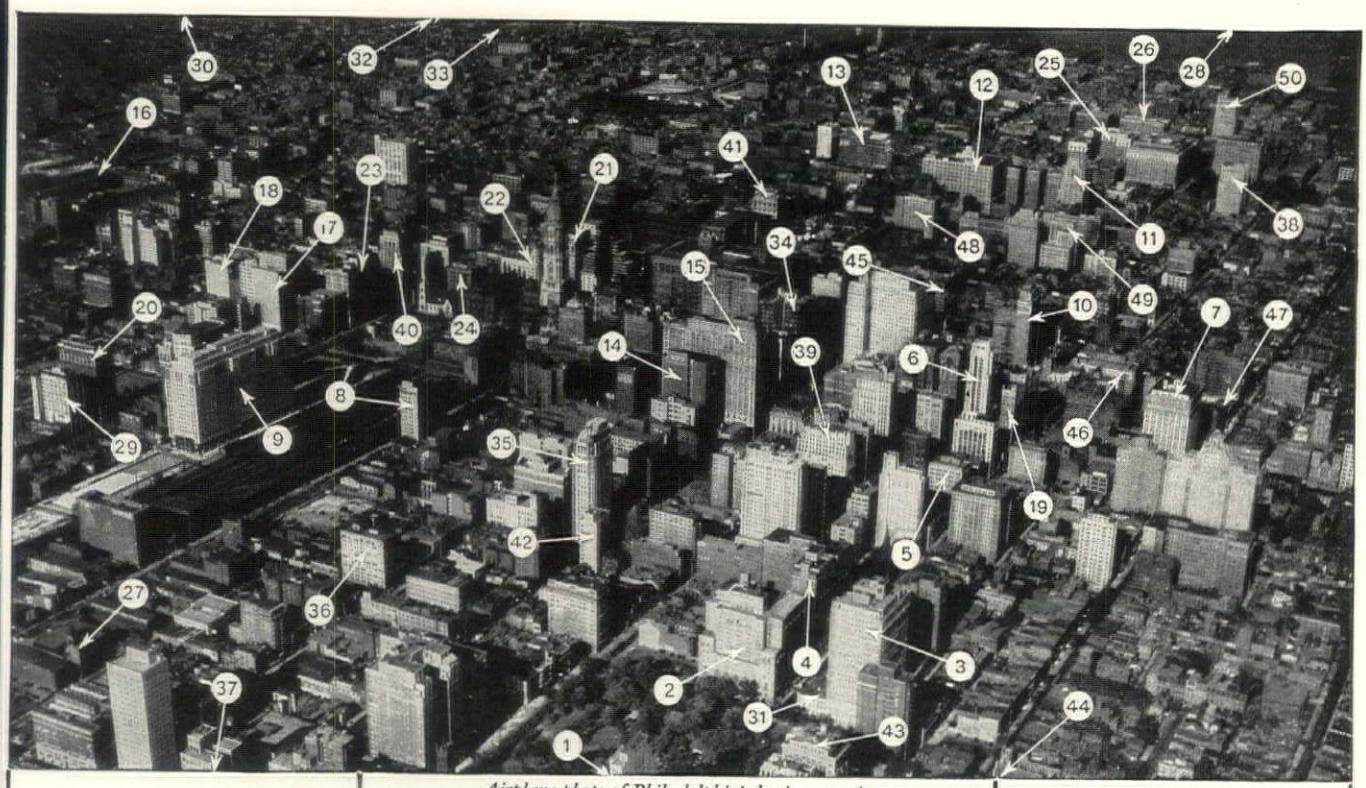

Airplane photo of Philadelphia's business section.

These Philadelphia buildings are Jennings equipped.

1. Chateau Crillon, 19th & Locust Sts.
   1 Duplex Jennings Vacuum Heating Pump
2. Penn Athletic Club
   1 Duplex Jennings Vacuum Heating Pump
3. Barclay Apartments
   1 Duplex Jennings Vacuum Heating Pump
   2 Jennings Condensation Pumps and Receivers
   1 Duplex Sewage Ejector
4. Warwick Hotel
   1 Duplex Jennings Vacuum Heating Pump
5. Gulf Refining Building
   1 Duplex Jennings Vacuum Heating Pump
6. Lewis Building
   2 Duplex Jennings Vacuum Heating Pumps
7. Atlantic Refining Bldg.
   1 Duplex Jennings Vacuum Heating Pump
8. Fox Theatre Building
   1 Duplex Jennings Vacuum Heating Pump
9. Pennsylvania RR., Broad Street Station and other buildings
   3 Duplex Jennings Vacuum Heating Pumps
   2 Duplex Jennings Condensation Pumps
   1 Single Jennings Vacuum Heating Pump
   1 Jennings Suction Sump Pump
   2 Jennings Centrifugal Pumps
10. Chancellor Court Apartments
    1 Duplex Jennings Vacuum Heating Pump
12. Phila. Elec. Bldg. (Edison Bldg.)
    1 Duplex Jennings Vacuum Heating Pump
2. Gimbel Brothers
   1 Duplex Jennings Vacuum Heating Pump
13. Strawbridge and Clothier
    5 Duplex Jennings Vacuum Heating Pumps
    1 Single Jennings Sewage Ejector
14. Franklin National Bank Bldg.
    1 Duplex Jennings Vacuum Heating Pump
15. Packard Building
    1 Duplex Jennings Vacuum Heating Pump
16. New Terminal Commerce Bldg. Reading Railroad
    1 Single Jennings Vacuum Heating Pump
    3 Jennings Centrifugal Pumps
17. Y. M. C. A. Naval Annex
    1 Duplex Jennings Sewage Ejector
    2 Jennings Suction Sump Pumps
18. Hahnemann Hospital
    1 Triplex Jennings Sewage Ejector
    2 Jennings Suction Sump Pumps
19. Mitten Building
    1 Duplex Jennings Vacuum Heating Pump
20. Bell Telephone Company
    1 Duplex Jennings Vacuum Heating Pump
21. City Hall Annex
    1 Duplex Jennings Vacuum Heating Pump
22. Bulletin Bldg.
    1 Jennings Vacuum Heating Pump
    1 Duplex Jennings Vacuum Heating Pump

Serving these Philadelphia buildings

In fifty important buildings in Philadelphia's business section, the heating systems are served by Jennings Vacuum Heating Pumps. Other Jennings Equipment installed in these buildings includes House Service Pumps, Condensation Pumps, Sump Pumps and Pneumatic Sewage Ejectors.

Philadelphia architects, engineers and building owners know that Jennings Pumps can be depended upon to give long, efficient service with a minimum of attention. Nash Engineering Company 12 Wilson Road, South Norwalk, Conn.

Jennings Pumps

23. U. G. I. Building
    1 Jennings Vacuum Heating Pump
    1 Duplex Jennings Sewage Ejector
    1 Duplex Jennings Vacuum Heating Pump
24. Bulletin Annex
    1 Jennings Vacuum Heating Pump
25. Public Ledger Building
    2 Jennings Vacuum Heating Pumps
26. Independence Hall
    1 Single Jennings Vacuum Heating Pump
27. Stanley Theatre
    1 Single Jennings Vacuum Heating Pump
28. R-C-A Victor Corporation
    2 Jennings Condensation Pumps and Receivers
    1 Duplex Jennings Vacuum Heating Pump
29. Robert Morris Hotel
    1 Duplex Jennings Vacuum Heating Pump
30. Schmidt's Brewery
    1 Jennings Vacuum Heating Pump
31. Curtis Institute of Music
    2 Duplex Jennings Vacuum Heating Pumps
32. Philadelphia Electric Co. Sta.
    1 Duplex Jennings Vacuum Heating Pump
33. Pennsylvania Sugar Company
    4 Nash Hytor Compressors
    1 Nash Hytor Vacuum Pump
34. Land Title Building
    2 Jennings Air Line Pumps
35. Architects Building
    1 Jennings Vacuum Heating Pump
36. Central Medical Building
    1 Duplex Jennings Vacuum Heating Pump
37. Warburton House
    1 Duplex Jennings Sewage Ejector
38. Farm Journal Building
    1 Duplex Jennings Vacuum Heating Pump
39. 1600 Walnut Street Building
    1 Single Jennings Vacuum Heating Pump
40. Liberty Title & Trust Company
    1 Duplex Jennings Vacuum Heating Pump
41. Frank & Seder
    1 Duplex Jennings Vacuum Heating Pump
    1 Jennings Condensation Pump and Receiver
42. Office Bldg.—17th & Sansom St.
    1 Single Jennings Vacuum Heating Pump
43. Rittenhouse Apartments
    1 Jennings Condensation Pump and Receiver
    1 Duplex Jennings Air Line Pump
44. Apt. House—19th & Spruce Sts.
    1 Duplex Jennings Vacuum Heating Pump
45. Bankers Trust Bldg.
    1 Duplex Jennings Vacuum Heating Pump
46. Sylvania Hotel
    1 Duplex Jennings Vacuum Heating Pump
47. Engineers Club
    1 Single Jennings Vacuum Heating Pump
48. Philadelphia Electric Company
    1 Duplex Jennings Vacuum Heating Pump
49. Jefferson Hospital
    1 Duplex Jennings Vacuum Heating Pump
50. Maryland Casualty Company
    1 Duplex Jennings Vacuum Heating Pump

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 116*

FLOORING—Continued

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

Goodyear Tire & Rubber Co., Inc., Akron, Ohio.
Beautiful Floors, Architects' Reference Book. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Valuable data on flooring.
Rubber Flooring News Monthly publications. 8½ x 11 ins. Illustrated. Giving data on flooring for buildings of many types.
Manual of Goodyear Rubber Tile Installation Booklet. 7¾ x 10¾ ins. Illustrated.

C. Pardee Works, 101 Park Ave., New York, N. Y., and 1600 Walnut St., Philadelphia, Pa.
Pardee Tiles. Bound Volume, 48 pp., 8½ x 11 ins. Illustrated.

Stedman Rubber Flooring Company, South Braintree, Mass.
Stedman Ray-Proof Rubber. Booklet, 12 pp., 5½ x 8 ins. Illustrated. For X-ray Rooms.
Stedman Tile, The Original Reinforced Rubber Floor. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Valuable data on flooring.

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

FURNITURE

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

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

GLASS CONSTRUCTION

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

GREENHOUSES

King Construction Company, North Tonawanda, N. Y.
King Greenhouses for Home or Estate. Portfolio of half-tone prints, varnishes, 8¾ x 10½ ins.

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

GYPSUM

Structural Gypsum Corporation, Linden, N. J.
Service Sheet No. 1. Specifications and Details of Design and Construction for Gypsteel Pre-Cast Long-Span Roofs. Folder, 8½ x 11 ins. Illustrated. Service Sheet No. 2. Specifications and Details of Design and Construction for Gypsteel Pre-Case Short-Span Roofs. Folder, 8½ x 11 ins. Illustrated.
Service Sheet No. 3. Specifications and Details of Design and Construction for Gypsteel Fireproof Pre-Cast Floors and Ceilings. Folder, 8½ x 11 ins. Illustrated.
Service Sheet No. 5. Specifications and Details of Design and Construction for Gypsteel Pre-Cast Assembled Slab Roofs. Folder. 8½ x 11 ins. Illustrated.

HARDWARE

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

HARDWARE—Continued

Automatic Exit Fixtures, 8½ x 11 ins. A catalog of hardware for exit and entrance doors to auditoriums.

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

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

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

Todhunter, Inc., 119 East 57th St., New York, N. Y.
Colonial Hardware. Booklet. 12 pp., 8½ x 11 ins. Illustrated. Deals with hardware of the best type for exterior and interior use.

HEATING EQUIPMENT

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

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

Bryant Heater & Mfg. Co., 17825 St. Clair Ave., Cleveland, Ohio.
Handbook on Heating Buildings with Bryant Gas Furnaces. Booklet, 12 pp., 8½ x 11 ins. Illustrated.
Handbook on Heating Water with Bryant Gas Boilers. Brochure, 20 pp., 8½ x 11 ins. Illustrated.
Handbook on Heating Buildings with Bryant Gas Boilers. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

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

D.G.C. Trap & Valve Co., 1 East 43rd St., New York, N. Y.
Cryer Radiator Control Valve. Bulletin, 8½ x 11 ins. 12 pp. Illustrated. Explains operation and advantages of this radiator control valve on two-pipe vapor, vacuum or gravity steam systems.

C. A. Dunham Company, 450 East Ohio St., Chicago, Ill.
Dunham Radiator Trap. Bulletin 101, 8 x 11 ins., 12 pp. Illustrated. Explains working of this detail of heating apparatus.
Dunham Packless Radiator Valves. Bulletin 104, 8 x 11 ins., 8 pp. Illustrated. A valuable brochure on valves.
Dunham Return Heating System. Bulletin 109, 8 x 11 ins. Illustrated. Covers the use of heating apparatus of this kind.
Dunham Vacuum Heating System. Bulletin 110, 8 x 11 ins., 12 pp. Illustrated.
The Dunham Differential Vacuum Heating System. Bulletin 114. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for small buildings.
The Dunham Differential Vacuum Heating System. Bulletin 115. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for large buildings.
Dunham Built Dwyer Unit Heaters. Booklet, 31 pp., 8½ x 11 ins. Illustrated.

REQUEST FOR CATALOGS

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

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Address .....

You may never design a PLANETARIUM *or a* QUICK-FREEZE PLANT..

Each requires a different insulation, but these unusual Armstrong installations may help you with other jobs.

FEW people can tell you what a planetarium is. So far as we know, there's only one in the United States—the Adler Planetarium in Chicago. It's a miniature universe, with planets and stars in exact duplication of the solar system. Intricate machinery causes each to move in its actual orbit in relation to the others.

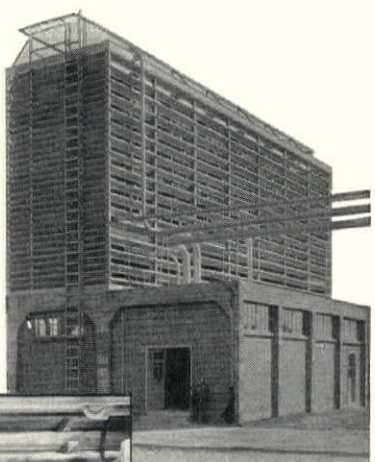
Controlled temperature and freedom from ceiling condensation are essential in such a building. So the architect, Ernest A. Grunsfeld, Jr., called on the Armstrong Cork & Insulation Company—and the practical answer given by Armstrong engineers was a 2-inch layer of Armstrong's Corkboard on the building's dome-shaped roof, providing ideal insulation.

Heat cannot pass the roof of the new Adler Planetarium. Armstrong's Corkboard forms a perfect barrier. Architect, Ernest A. Grunsfeld, Jr., Chicago.

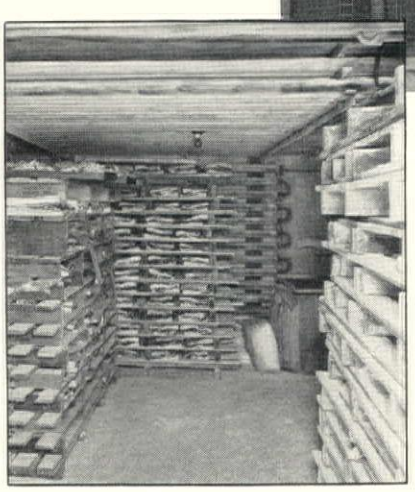
HOW TO HOLD 50° BELOW ZERO? Just as interesting, in another way, are two plants recently built for the quick-freezing of foods. Cudahy Brothers Packing Company of Milwaukee freezes meats; Vita Fruit Products, Inc., of Lodi, California, fruits. In each case, this freezing is done at 50 to 60 degrees below zero—mighty cold temperatures to maintain.

Armstrong engineers advised 12 inches of Armstrong's Corkboard on walls and ceiling. Because of cork's efficiency, these freezing rooms are now permanently insulated to hold low temperatures.

CUSHIONING A FACTORY FLOOR. In Canada, the Canadian Goodrich Company, Ltd., found itself faced with the problem of installing heavy, vibrating machinery on the third floor of its new building. Placed over beams, column bases, and floor joists, Armstrong's Cork Machinery Isolation cushions the whole third floor. Vibration cannot harm this building now.



Outside view of one of the coolers of Vita Fruit Products, Inc., Lodi, California. Armstrong's Corkboard insulates the plant throughout.



This room in the new quick-freeze plant of Cudahy Brothers' Packing Company, Milwaukee, is insulated with 12 inches of Armstrong's Corkboard.

We could mention many similar installations. Each day sees some new question, some new situation. For these and other Armstrong Insulation Products serve many purposes—in ways that might never occur to you. Next time you are confronted with a puzzling installation—and what architect isn't?—see if cork won't do the job. Put it up to Armstrong engineers. Their experience may suggest just the method you are looking for. Write to Armstrong Cork & Insulation Company, 900 Concord Street, Lancaster, Penna.

Armstrong's (A) *Product*

Armstrong's Cork Products

CORKBOARD..CORK COVERING..CORKOUSTIC..CORK MACHINERY ISOLATION..INSULATING BRICK

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 118*

HEATING EQUIPMENT—Continued

The Fulton Sylphon Company, Knoxville, Tenn.

Sylphon Temperature Regulators. Illustrated brochures, 8½ x 11 ins., dealing with general architectural and industrial applications; also specifically with applications of special instruments.

Sylphon Heating Specialties. Catalog No. 200, 192 pp., 3½ x 6¾ ins. Important data on heating.

Hoffman Specialty Company, Inc., 25 West 45th St., New York, N. Y.

Heat Controlled With the Touch of a Finger. Booklet, 46 pp., 5¾ x 8¾ ins. Illustrated.

How to Lock Out Air, the Heat Thief. Brochure, 48 pp., 5 x 7¼ ins. Illustrated.

Janette Manufacturing Company, 556 West Monroe Street, Chicago.

More Heat from Any Hot Water System on Less Fuel. Folder. 4 pp., 8½ x 11 ins. Illustrated. Deals with use of the "Hydrolator."

S. T. Johnson Co., Oakland, Calif.

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

Kewanee Boiler Corporation, Kewanee, Ill.

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

McQuay Radiator Corporation, 35 East Wacker Drive, Chicago, Ill.

McQuay Visible Type Cabinet Heater. Booklet, 4 pp., 8½ x 11 ins. Illustrated. Cabinets and radiators adaptable to decorative schemes.

McQuay Concealed Radiators. Brochure, 4 pp., 8½ x 11 ins. Illustrated.

McQuay Unit Heater. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Gives specifications and radiator capacities.

Modine Mfg. Co., Racine, Wisc.

Modine Copper Radiation. Booklet, 28 pp. 8½ x 11 ins. Illustrated. Deals with industrial, commercial and domestic heating.

A Few Short Years. Folder. 4 pp. 8½ x 11 ins. Illustrated. Heating for garages.
Dairy Plant Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Industrial Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Modine Unit Heater. Folder. 6 pp., 8½ x 11 ins. Illustrated.

Nash Engineering Company, South Norwalk, Conn.

Bulletin 85. Booklet. 12 pp. 10¾ x 7½ ins. Illustrated in color. Describes construction and operation of the Jennings Return Line Vacuum Heating Pump.

Bulletin 87. Brochure. 8 pp. 10¾ x 7½ ins. Illustrated in color. Deals with Sizes T and U Jennings Vacuum Heating Pump for 2500 and 5000 square feet equivalent direct radiation.

Bulletin 63. Booklet. 4 pp. 10¾ x 7½ ins. Illustrated. Describes in detail the Unit Type Motor Driven Jennings Condensation Pump.

National Radiator Corporation, Johnstown, Pa.

The Crimson Flame. Folder, 6 pp., 4½ x 7 ins. Illustrated.
Contento Brings Contentment to Your Home. Folder, 12 pp., 3½ x 6 ins. Illustrated.

National Jacketed Boiler. Folder, 4 pp., 8½ x 11 ins. Illustrated.
National Super-Smokeless Boiler. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Aero, the National Radiator Sizes and Ratings. Booklet, 16 pp., 5 x 7⅞ ins. Illustrated.

Sarco Company, Inc., 183 Madison Ave., New York City, N. Y.

Steam Heating Specialties. Booklet, 6 pp., 6 x 9 ins. Illustrated. Data on Sarco Packless Supply Valves and Radiator Traps for vacuum and vapor heating systems.

Equipment Steam Traps and Temperature Regulations. Booklet, 6 pp., 6 x 9 ins. Illustrated. Deals with Sarco Steam Traps for hospital, laundry and kitchen fixtures and the Sarco Self-contained Temperature Regulation for hot water service tanks.

B. F. Sturtevant Company, Hyde Park, Boston, Mass.

Tempervane Heating Units. Catalog 363. Booklet, 44 pp., 8½ x 11 ins. Illustrated. Data on "Heating Every Corner with Maximum Economy."

U. S. Blower & Heater Corporation, Minneapolis, Minn.

Blowers, Heaters and Washers. Booklet, 64 pp., 8½ x 11 ins. Illustrated.

HOISTS, TELESCOPIC

Gillis & Geoghegan, Inc. 535 West Broadway, New York.

G & G Telescopic Hoist. Booklet. 24 pp. 8½ x 11 ins. Illustrated complete data on hoists.

Ash Removal. Folder. 8½ x 11 ins. Illustrated. Hoists for removing ashes from basements.

HOSPITAL EQUIPMENT

Bryant Electric Co., Bridgeport, Conn.

Hospital Signal Devices. Bulletin HS-622-RP. Complete information on hospital signal devices. Pull Control Type. 8½ x 10 ins. 46 pp.

Hospital Signal Devices. Bulletin HS-1023. Magnetic Control Type. 8½ x 10 ins. 26 pp.

The Frink Co., Inc., 369 Lexington Ave., New York City.

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

The International Nickel Company, 67 Wall St., New York, N. Y.

Hospital Applications of Monel Metal. Booklet, 8½ x 11½ ins., 16 pp. Illustrated. Gives types of equipment in which Monel Metal is used, reasons for its adoption, with sources of such equipment.

John Van Range Co., Cincinnati, Ohio.

Practical Planning for Hospital Food Service. Brochure, 62 pp., 8½ x 11 inches. Illustrated.

Wilmot Castle Company, Union Trust Bldg., Rochester, N. Y.

The Hospital Sterilizer Data Sheets. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on planning sterilizer installations.

HOTEL EQUIPMENT

Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and 34 Cooper Square, New York.

Some Thoughts on Furnishing a Hotel. Booklet, 7½ x 9 ins. Data on complete outfitting of hotels.

INCINERATORS

Josam Mfg. Co., Michigan City, Ind.

Josam-Graver Incinerators. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Kerner Incinerator Company, 715 E. Water St., Milwaukee, Wis.

Incinerators (Chimney-fed). Catalog No. 18 (Architects' and Builders' Edition). Size 8½ x 11 ins., 20 pp. Illustrated. Describes principles and design of Kernerator Chimney-fed Incinerators for residences, apartments, hospitals, schools, apartment hotels, clubs and other buildings. Shows all standard models and gives general information and working data.

Sanitary Elimination of Household Waste. Booklet, 4 x 9 ins. 16 pp. Illustrated. Gives complete information on the Kernerator for residences.

Garbage and Waste Disposal for Apartment Buildings. Folder, 8½ x 11 ins., 16 pp. Illustrated. Describes principle and design of Kernerator Chimney-fed Incinerator for apartments and gives list of buildings where it has been installed.

Sanitary Disposal of Waste in Hospitals. Booklet, 4 x 9 ins., 12 pp. Illustrated. Shows how this necessary part of hospital service is taken care of with the Kernerator. Gives list of hospitals where installed.

Estate Type Kernerator. For Estates and Country Homes. Booklet, 8 pp., 8½ x 11 inches. Illustrated.

INSULATION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ ins., 32 pp. Discusses means of insulating roofs of manufacturing or commercial structures.

Insulation of Roofs to Prevent Condensation. Illustrated booklet, 7½ x 10½ ins., 36 pp. Gives full data on valuable line of roof insulation.

Filing Folder for Pipe Covering Data. Made in accordance with A. I. A. rules.

The Cork-lined House Makes a Comfortable Home. 5 x 7 ins. 32 pp. Illustrated.
Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 11¾ ins. Illustrates and describes use of insulation for structural purposes.

Cork Import Corporation, 345 West 40th Street, New York.

Novoid Cork Covering for Cold Pipes, Coolers and Tanks. Folder 8½ x 11 ins. Illustrated.
Novoid Corkboard Insulation. Folder 8½ x 11 ins. Illustrated.

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.

REQUEST FOR CATALOGS

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

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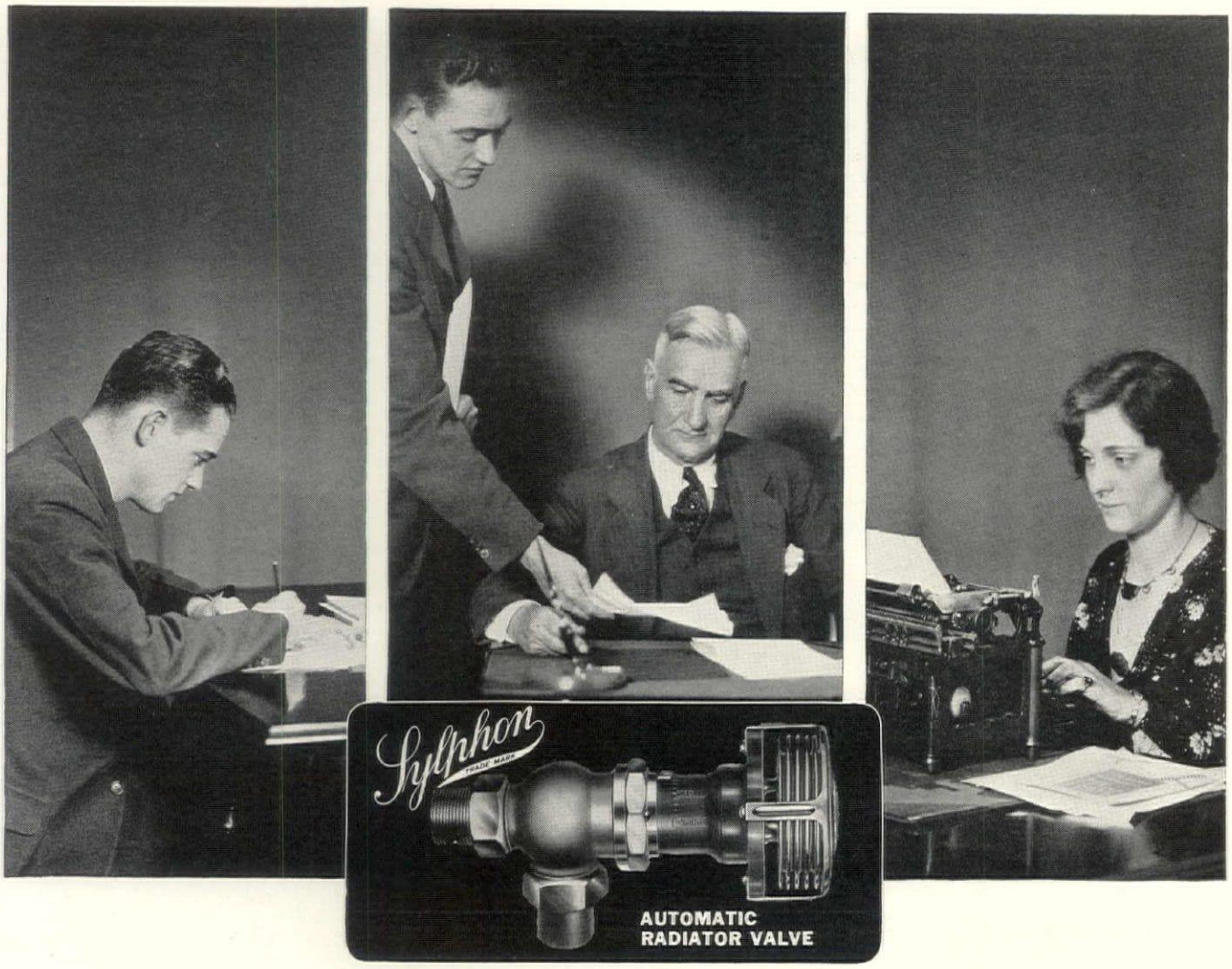

Where Everybody is HEAT Happy

COMFORT MAKES HIGHER INDIVIDUAL EFFICIENCY

Sylphon No. 875 Automatic Radiator Valves bring heat harmony to any steam heated apartment, home, office, or factory building. They save fuel also by preventing room temperature fluctuating and repeated adjustment. These new Sylphon complete control units, responding to slightest changes in the air temperature, automatically regulate the steam flow to the radiators.

Once the marked thermostatic head is set, they maintain that constant degree of warmth desired by the occupants of each room. Without any further radiator attention Sylphon Radiator Valves hold one room "Cool," one "Medium" and another "Hot" and so on with the whole thermometer range of comfort as the selective limit.

THE AUTOMATIC RADIATOR VALVE

Banishes Fuel Wasting, Fluctuating Temperatures

Room temperatures never get "too Hot" or "too Cold" when a Sylphon 875 Radiator Valve is on guard. It is a combination Packless Valve and Thermostatic Control Unit, easily installed, inexpensive and without electrical or mechanical accessories to get out of order. Its use prevents uneven wasteful and injurious heat. Architects may specify these Sylphon Radiator Valves with perfect confidence in their lasting efficiency. Both angle and globe types fully described in our literature.

Sylphon
TRADE MARK

WRITE NOW FOR **BULLETIN AA** 250

FULTON SYLPHON CO.
KNOXVILLE, TENN., U.S.A.

Representatives in all Principal Cities in U. S. A.,—European Representatives, Crosby Valve and Eng. Co., Ltd., 41-2 Foley St., London, W. I., Eng.; Canadian Representatives, Darling Bros., Ltd., 140 Prince St., Montreal Que., Canada

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 120*

JOISTS

Concrete Steel Company, 2 Park Avenue, New York, N. Y.
Havemeyer Steel Joist. The Joist with the Twin-Tee Chords. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

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

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

Kalman Steel Company, Chicago, Ill.
Steel Joists. Brochure, 20 pp., 8½ x 11 ins. Joists and accessories. Firesafe Floor and Roof Construction. Booklet, 8 pp., 8½ x 11 ins. Joists, lath and accessories.

KITCHEN EQUIPMENT

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

John Van Range Co., Cincinnati.
Practical Planning for Church Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Practical Planning for Club Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

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Planning Restaurants That Make Money. Booklet, 78 pp., 8½ x 11 ins. Illustrated. Excellent work on equipment.

Practical Planning for Hospital Food Service. Brochure, 62 pp., 8½ x 11 inches. Illustrated.

LABORATORY EQUIPMENT

Alberene Stone Co., 153 West 23rd Street, New York City.
Booklet, 8¼ x 11¼ ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.

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

LANTERNS

Todhunter, Inc., 119 East 57th St., New York, N. Y.
Lanterns. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Deals with a fine assortment of fixtures for exterior and interior use.

LATH, METAL AND REINFORCING

Concrete Steel Company, 2 Park Avenue, New York, N. Y.
Havemeyer Building Products, Booklet, 40 pp., 8½ x 11 ins. Illustrated.

Kalman Steel Company, Chicago, Ill.
Firesafe Building Products. Booklet, 20 pp., 8½ x 11 ins. Lath, fireplace accessories, beads, etc.

Milcor Steel Co., Milwaukee.
The Milcor Manual. Booklet, 96 pp., 8½ x 11 ins. Illustrated. Data on metal lath and similar materials.

Milcor Metal Ceiling Catalog. Booklet, 288 pp., 8½ x 11 ins. Illustrated. Data on metal ceiling and wall construction.

National Steel Fabric Co., Pittsburgh, Pa.
Better Walls for Better Homes. Brochure, 16 pp., 7¾ x 11¾ ins. Illustrated. Metal lath, particularly for residences.

Steeltex for Floors. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

Combined reinforcing and form for concrete or gypsum floors and roofs.

Steeltex Data Sheet No. 1. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with round top chords.

Steeltex Data Sheet No. 2. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with flat top flanges.

Steeltex Data Sheet No. 3. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for folders on wood joists.

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

LAUNDRY MACHINERY

American Laundry Machinery Co., Norwood Station, Cincinnati, O.
Functions of the Hotel and Hospital Laundry. Brochure, 8 pp., 8½ x 11 ins. Valuable data regarding an important subject.

Laundry Equipment of Small Hotels, Hospitals and Institutions. Booklet, 36 pp., 8½ x 11 ins. Illustrated.

LAUNDRY MACHINERY—Continued

Troy Laundry Machinery Co., Inc., 9 Park Place, New York City.
Laundry Machinery for Large Institutions. Loose-Leaf booklet, 50 pp., 8½ x 11 ins. Illustrated.

Laundry Machinery for Small Institutions. Loose-leaf brochure, 50 pp., 8½ x 11 ins. Illustrated.

Accessory Equipment for Institutional Laundries. Leather bound book, 50 pp., 8½ x 11 ins. Illustrated.

Dry Cleaning Equipment for Institutional Purposes. Brochure, 50 pp., 8½ x 11 ins. Illustrated.

LIGHTING EQUIPMENT

The Frink Co., Inc., 369 Lexington Ave., New York, N. Y.
Catalog 415, 8½ x 11 ins., 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.

Gleason Tiebout Glass Company, 67 West 44th St., New York, N. Y.
Fragment of Celestialite. Booklet, 24 pp., 7 x 10 ins. Illustrated. Data on lighting for offices, schools, hospitals, etc.
Celestialite Catalog 727. Booklet, 18 pp., 8½ x 11 ins. Illustrated. Valuable brochure on lighting.

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

Todhunter, 119 East 57th St., New York, N. Y.
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Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Industrial Lighting Equipment. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Commercial Lighting. Brochure, 24 pp., 8½ x 11 ins. Illustrated.
Airport and Floodlighting Equipment. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

MAIL CHUTES

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

MANTELS

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

Todhunter, Inc., 119 East 57th St., New York, N. Y.
Georgian Mantels. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Illustrates and describes an excellent assortment of fine mantels based on Georgian precedent.

MARBLE

The Georgia Marble Company, Tate, Ga.; New York Office, 1328 Broadway.

Why Georgia Marble Is Better. Booklet, 3⅜ x 6 ins. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.

Convincing proof. 3⅜ x 6 ins., 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.

Hurt Building, Atlanta; Senior High School and Junior College, Muskegon, Mich. Folders, 4 pp., 8½ x 11 ins. Details.

METALS

The International Nickel Company, 67 Wall St., New York N. Y.
Monel Metal Primer. 8 folders, 4 pp., 8½ x 11 ins. Illustrated. Valuable data on use of monel in kitchens, laundries, etc.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.
Your Dream Kitchen, Booklet, 11 pp., 7¾ x 10½ ins. Illustrated. Fine line of fittings for kitchens, breakfast alcoves, etc.

Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.
Column Catalog, 7½ x 10 ins., 48 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installations.

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

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Klein & Co., Inc., Henry, 11 East 37th St., New York, N. Y.
Two Driwood Interiors. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Use of moulding for paneling walls.

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

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

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

Roddis Lumber and Veneer Co., Marshfield, Wis.
Roddis Doors. Brochure, 24 pp., 5¼ x 8½ ins. Illustrated price list of doors for various types of buildings.

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

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

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

ORNAMENTAL PLASTER

Jacobson & Company, 239 East 44th Street, New York.
A Book of Modern Design. Booklet, 44 pp., 9 x 12 ins. Illustrated. Decorative plaster, particularly for ceilings.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Medusa Portland Cement Co., 1002 Engineers' Building, Cleveland.
"How to Paint Concrete and Masonry Surfaces." Booklet, 16 pp., 8½ x 11 ins. Illustrated.

Minwax Company, Inc., 11 West 42nd St., New York.
Color Card and Specifications for Minwax Brick and Cement Coating. Folder, 4 pp., 8½ x 11 ins. Illustrated.

National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book, 5½ x 3¼ ins., 100 pp. Gives directions and formulæ for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.

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

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

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

PARTITIONS

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

Irving Hamlin, Evanston, Ill.
Hamlinized Folding Partitions Made from Hamlin's Evanston Soundproof Doors, Sectional and Movable. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Hauserman Company, E. F., Cleveland, Ohio.
Movable Steel Partitions for sub-dividing office and industrial space. Folders on complete line, 8½ x 11, giving full data on the different types of steel partitions with details, elevations and specifications. Also 40-page Architects' Portfolio AIA—28A3, containing 20 full page plates of practical office layouts.

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

Henry Klein & Co., 25 Grand Street, Elmhurst, L. I., N. Y.
Telesco Partition. Catalog, 8¼ x 11 ins., 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.

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

Improved Office Partition Co., 25 Grand St., Elmhurst, L. I., N. Y.
(See Henry Klein & Co.)

PARTITIONS—Continued

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

Structural Gypsum Corporation, Linden, N. J.
Service Sheet No. 4. Specifications for Gypsteel Partition File. Folder, 8½ x 11 ins. Illustrated.

Telesco Office Partition, 25 Grand St., Elmhurst, L. I., N. Y.
(See Henry Klein & Co.)

PIPE

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

Anaconda Pipe For Water Distribution. Booklet, 30 pp., 8½ x 11½ ins. Illustrated. Data on brass and red brass piping.

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

Bethlehem Steel Company, Bethlehem, Pa.
Bethlehem Wrought Steel Pipe, Catalog P. Booklet, 20 pp., 4¼ x 7¼ ins. Illustrated.

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

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

Maurice A. Knight, Akron, Ohio.
Knightware in the Princeton Chemical Laboratory. Booklet, 16 pp., 6¾ x 8½ ins. Illustrated.

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

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

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

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

Walworth Company, Statler Office Building, Boston, Mass.
Approved Valves and Fittings for Fire Lines in New York. Folder, 6 pp., 8½ x 11 ins. Illustrated.

C. N. I. Pipe Manual. Booklet, 18 pp., 4½ x 7½ ins. Illustrated.

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.

Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.

Interior Walls Everlasting. Brochure, 20 pp., 6¼ x 9¼ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

Structural Gypsum Corporation, Linden, N. J.
Plaster Time Book. Booklet, 4 x 7 ins., 48 pp. Illustrated. Gives specifications, yardage, and general instructions for using Gypsteel Gypsum Plasters.

PLUMBING EQUIPMENT

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

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Crane Company, 836 S. Michigan Ave., Chicago, Ill.

Plumbing Suggestions for Home Builders. Catalog, 3 x 6 ins., 80 pp. Illustrated.

Plumbing Suggestions for Industrial Plants. Catalog, 4 x 6½ ins., 34 pp. Illustrated.

Planning the Small Bathroom. Booklet, 5 x 8 ins. Discusses planning bathrooms of small dimensions.

Duriron Company, Dayton, Ohio.

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

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.

Watrous Patent Flush Valves, Duojet Water Closets, Liquid Soap Fixtures, etc. 8½ x 11 ins., 136 pp., loose-leaf catalog, showing roughing-in measurements, etc.

Kohler Company, Kohler, Wis.

Catalog K. 322 pp., 8½ x 11 ins. Illustrated. Loose-leaf catalog showing complete line of plumbing fixtures and accessories.

New Beauty and Utility in Plumbing Fixtures. Booklet, 36 pp., 6 x 9 ins. Illustrated. Shows well-arranged bathrooms, kitchens, etc.

Speakman Company, Wilmington, Del.

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

PNEUMATIC TUBE SYSTEMS

G & G Atlas Systems, Inc., 544 West Broadway, New York.

12 pp., 8½ x 11. Illustrated booklet of tube systems for retail stores and other buildings.

4 pp., 8½ x 11. Data Sheet showing schematic diagrams for hotel, bank, factory and wholesale buildings, table of sizes, space requirements and preliminary layout steps. A. I. A. 35h21.

PUMPS

C. A. Dunham Co., 450 East Ohio Street, Chicago, Ill.

Dunham Vacuum Pump. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

Kewanee Private Utilities Co., 442 Franklin St., Kewanee, Ill.

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

Nash Engineering Company, South Norwalk, Conn.

Bulletin 52. Brochure. 6 pp., 10½ x 7¾ ins. Illustrated in color. Devoted to Jennings Standard Centrifugal Pumps for house service, boosting city water pressure to supply top stories, for circulating warm water, etc.

Bulletin 97. Booklet. 16 pp., 10½ x 7¾ ins. Illustrated in color. Describes the design, construction and operation of the Jennings Suction Sump Pump.

Bulletin 11. Brochure. 8 pp., 10½ x 7¾ ins. Illustrated in color. Deals with Nash Hytor Vacuum Pumps for air and gases.

REFRIGERATION

The Fulton Syphon Company, Knoxville, Tenn.

Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE—See also Construction, Concrete

Concrete Steel Company, 2 Park Avenue, New York, N. Y.

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

Kalman Steel Company, Chicago, Ill.

Building for Permanence. Booklet, 8 pp., 8½ x 11 ins. Reinforced concrete products.

Truscon Steel Company, Youngstown, Ohio.

Shearing Stresses in Reinforced Concrete Beams. Booklet, 8½ x 11 ins., 12 pp.

RESTAURANT EQUIPMENT

John Van Range Company, Cincinnati.

Planning Restaurants That Make Money. Booklet, 78 pp., 8½ x 11 ins. Illustrated. Excellent work on equipment.

ROOFING

Federal Cement Tile Co., 608 S. Dearborn Street, Chicago.

Catalog and Roof Standards. Booklet, 36 pp. 8½ x 11 ins. Illustrated. Describes Featherweight Concrete Insulating Roof Slabs, including complete data, weights and dimensions, specifications and detail drawings. Also includes complete information on Featherweight Nailing Concrete Roof Slabs for use with ornamental slate or copper covering. The catalog is profusely illustrated and contains also a partial list of users.

Examples of Theaters and Theater Roofs. Brochure, 16 pps., 8½ x 11 ins., Illustrated. Contains views of theaters designed by some of the country's leading architects.

Federal Interlocking Tile and Glass Tile. 4 pp., 8½ x 11 ins. Illustrates and describes complete roof or precast concrete slabs requiring no composition covering.

Heinz Roofing Tile Co., 1925 West Third Avenue, Denver, Colo.

Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips.

Italian Promenade Floor Tile. Folder, 2 pp., 8½ x 11 ins. Illustrated. Floor tiling adapted from that of Davanzati Palace.

Mission Tile. Leaflet, 8½ x 11 ins. Illustrated. Tile such as are used in Italy and Southern California.

Georgian Tile. Leaflet, 8½ x 11 ins. Illustrated. Tiling as used in old English and French farmhouses.

Johns-Manville Corporation, New York.

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

Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill.

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

Milcor Steel Co., Milwaukee.

Milcor Architectural Sheet Metal Guide. Booklet. 72 pp., 8½ x 11 ins. Illustrated. Metal tile roofing, skylights, ventilators, etc.

Milcor Sheet Metal Handbook. Brochure. 128 pp., 8½ x 11 ins. Illustrated. Deals with rain-carrying equipment, etc.

Structural Gypsum Corporation, Linden, N. J.

Gypsteel Pre-cast Fireproof Roofs. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Information regarding a valuable type of roofing.

Service Sheet No. 1. Specifications and Details of Design and Construction for Gypsteel Long-Span Pre-Cast Roofs. Folder, 8½ x 11 ins. Illustrated.

Service Sheet No. 2. Specifications and Details of Design and Construction for Gypsteel Short-Span Pre-Cast Roofs. Folder, 8½ x 11 ins. Illustrated.

Service Sheet No. 4. Specifications and Details of Design and Construction for Gypsteel Pre-Cast Assembled Slab Roofs. Folder, 8½ x 11 ins. Illustrated.

SCHOOL EQUIPMENT

John Van Range Co., Cincinnati.

Practical Planning for School Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.

Specification Sheets. 7¾ x 10¾ ins., 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

Nash Engineering Company, South Norwalk, Conn.

Bulletin 67. Booklet. 16 pp. 10¾ x 7½ ins. Illustrated in color. Describes Type A Jennings Sewage Ejector for handling Unscreened sewage and raising it from basements below sewer level.

Bulletin 103. Brochure. 16 pp. 10¾ x 7½ ins. Illustrated in color. Deals with small size Type B Jennings Sewage Ejector.

SCREENS

American Brass Co., The, Waterbury, Conn.

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

Athey Company, 6015 West 65th St., Chicago, Ill.

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

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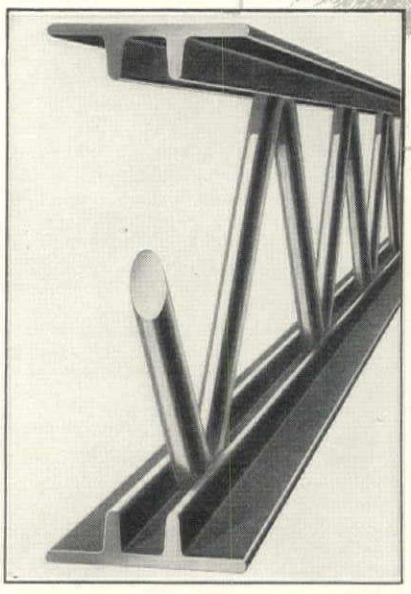

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 126*

SHELVING-STEEL

David Lupton's Sons Company, Philadelphia, Pa.

Lupton Steel Shelving. Catalog E. Illustrated brochure, 40 pp., 8⅝ x 11 ins. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

SHOWER STALL DOORS

The Kawneer Company, Niles, Mich.

Folder with A.I.A. File No. featuring new Shower Door, furnished in Solid Bronze, Chromium Plated or Solid Nickel-silver.

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.

Bethlehem Structural Shapes Bound Volume, 368 pp., 4¼ x 6¾ ins. Illustrated.

Steel Frame House Company, Pittsburgh, Pa. (Subsidiary of McClintic-Marshall Corp.)

Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

Steel Framing for Gasoline Service Stations. Brochure, 8 pp., 8½ x 11 ins. Illustrated.

Steel Frame Standard Gasoline Service Stations. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Three standard designs of stations.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.

Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 ins., 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.

Volume 1. Series B. Indiana Limestone Library, 6 x 9 ins., 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.

Volume 4. Series B. Booklet. New Edition, 8½ x 11 ins., 64 pp. Illustrated. Indiana Limestone as used in Banks.

Volume 5. Series B. Indiana Limestone Library. Portfolio, 11⅞ x 8¾ ins. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.

Volume 6. Series B. Indiana Limestone School and College Buildings. 8½ x 11 ins., 80 pp. Illustrated.

Volume 12. Series B. Distinctive Homes of Indiana Limestone. 8½ x 11 ins., 48 pp. Illustrated.

Old Gothic Random Ashlar. 8½ x 11 ins., 16 pp. Illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Ave., Chicago, Ill.

Catalog No. 33. Series 500. All-Metal Construction. Brochure, 20 pp., 8½ x 11 ins. Illustrated. Deals with store fronts of a high class.

Catalog No. 34. Series 202. Standard construction. Booklet, 16 pp. 8½ x 11 ins. Illustrated, complete data on an important type of building.

Detail Sheets. Set of seven sheets, 8½ x 11 ins., printed on tracing paper, giving full-sized details and suggestions for store front designs.

Davis Solid Architectural Bronze Sash. Set of six sheets, 8½ x 11 ins., printed on tracing paper. Full-sized details and suggestions for designs of special bronze store front construction.

The Kawneer Company, Niles, Mich.

Catalog M, 1929 Edition, 64 pages, 8½ x 11 ins., with the A.I.A. File No., profusely illustrated. General Catalog.

Detail Sheet and descriptive folder, 8½ x 11 ins., with A.I.A. File No. featuring "B" Store Front Construction, designed along modernistic lines.

Book of Installations featuring modern fronts. Booklet, 32 pp., 8½ x 11 ins.

Detail Sheets. Set of seven sheets in Portfolio, 8½ x 11 inches. A.I.A. File No.

Detail Sheet and descriptive folder, 8½ x 11 inches, with A.I.A. File No., featuring "B" Store Front Construction, designed along modernistic lines.

National Terra Cotta Society, 230 Park Avenue, New York, N. Y.

Terra Cotta Stores and Store Fronts. Booklet, 15 pp., 8½ x 11 ins. Illustrated.

TELEPHONE SERVICE ARRANGEMENTS

All Bell Telephone Companies. Apply nearest Business Office, or American Telephone and Telegraph Company, 195 Broadway, New York.

Planning for Home Telephone Conveniences. Booklet, 52 pp., 8½ x 11 inches. Illustrated.

Planning for Telephones in Buildings. Brochure, 74 pp., 8½ x 11 inches. Illustrated.

TERRA COTTA

National Terra Cotta Society, 19 West 44th St., New York, N. Y.

Standard Specifications for the Manufacture, Furnishing and Setting of Terra Cotta. Brochure, 8½ x 11 ins., 12 pp. Complete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.

TIMBREL TILE VAULTS

R. Guastavino Co., 40 Court Street, Boston.

Timbrel Arch Construction. Booklet, 8 pp., 8½ x 11 ins.

TILE, STRUCTURAL CLAY

National Fireproofing Corporation, Fulton Building, Pittsburgh, Pa.

Natco. The Complete Line of Structural Clay Tile. Booklet, 48 pp., 8½ x 11 ins. Illustrated. A General Catalog.

Natco Vitritile Bulletin No. 164. 40 pp., 8½ x 11 ins. Illustrated. Shows color charts, sizes and shapes, actual installations, etc.

Natco Header Backer Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.

Natco Unibacker Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.

Natcoflor Bulletin. 8½ x 11 ins., 6 pp. Illustrated.

Natco Double Shell Load Bearing Tile Bulletin, 8½ x 11 ins., 6 pp. Illustrated.

TILES

Flint Faience & Tile Co., Flint, Mich.

Vitocraft Tiles, Unglazed. Folder, 4 pp., 8½ x 11 ins. Illustrated. Details of patterns in full color. Ask for Form A-322.

Faience Tiles for Bathrooms. Folder, 4 pp., 8½ x 11 ins. Illustrated. Ask for Form A-303.

Faience and Vitocraft, Unglazed. Folder, 4 pp., 8½ x 11 ins. Illustrated. Views of installations. Ask for Form A-304.

Flintcraft Files. Folder, 4 pp., 8½ x 11 ins. Illustrated. Machine-made floor or wall tile. Ask for Form A-363.

Hanley Company, Bradford, Pa.

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

C. Pardee Works, 101 Park Ave., New York, N. Y., and 1600 Walnut St., Philadelphia, Pa.

Pardee Tiles. Bound volume, 48 pp., 8½ x 11 ins. Illustrated.

TRUSSES

McKeown Bros. Company, 523 South Keeler Avenue, Chicago.

Truth in Architecture. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with use of trusses of wood.

Factory Built Bowstring Trusses. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Timber Trusses. Folder, 4 pp., 8½ x 11 ins., Illustrated.

VALVES

Crane Co., 836 S. Michigan Ave., Chicago, Ill.

No. 51. General Catalog. Illustrated. Describes the complete line of the Crane Co.

C. A. Dunham Co., 450 East Ohio St., Chicago, Ill.

The Dunham Packless Radiator Valve. Brochure, 12 pp., 8 x 11 ins. Illustrated. Data on an important type of valve.

Jenkins Brothers, 80 White Street, New York.

Office Buildings Yesterday and Today. Folder, 8½ x 11 ins. Illustrated. Valves for use in office buildings.

Walworth Company, Statler Office Building, Boston, Mass.

Walworth Valves, Fittings and Tools, Catalog 88. Bound Volume giving data on a wide variety of details.

VENETIAN BLINDS

Columbia Mills, 225 Fifth Avenue, New York.

A Manual for Architects. Booklet, 6 pp., 8½ x 11 ins. Illustrated.

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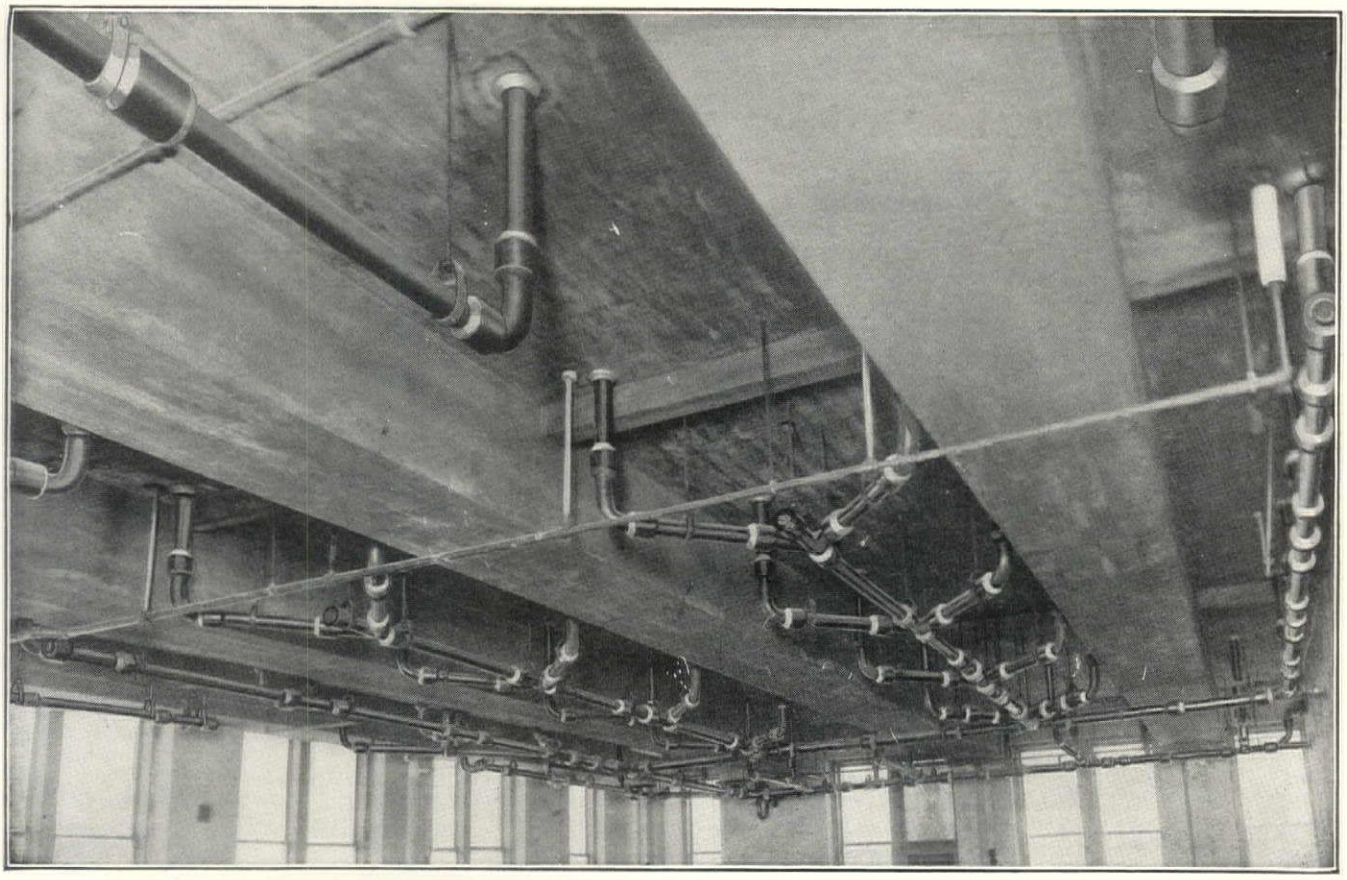

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 128*

VENTILATION

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

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

Specification Form for Acid-proof Exhaust Fans. Folder, 8 x 10½ ins.

Orange Screen Company, Maplewood, N. J.
Window Ventilator, Filters the air. Folder 4 pp., 8½ x 11 ins. Illustrated.

WATERPROOFING

Medusa Portland Cement Co., 1002 Engineers' Building, Cleveland.
Medusa Waterproofed Gray Portland Cement. Booklet, 30 pp., 8½ x 11 ins. Illustrated.

Minwax Company, Inc., 11 West 42nd St., New York.
Waterproofing Stadia. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Transparent Waterproofings for All Masonry Walls and Surfaces. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Data Sheet on Membrane Waterproofing. Folder, 4 pp., 8½ x 11 ins. Illustrated.

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

WEATHER STRIPS

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

WINDOW GLASS

Pittsburgh Plate Glass Company, Grant Building, Pittsburgh, Pa.
Pennvernon Window Glass With the New Flatter Surface. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

WINDOWS

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Pivoted Windows. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Sections, hardware, and other details, and illustrations of installations.

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

The Kawneer Company, Niles, Michigan.
Circular, 8½ x 11 ins., with A.I.A. File No. featuring full size details and specifications of Sealair In-swinging windows. The above to be furnished in non-ferrous metals and steel.

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

Lupton Commercial Projected Windows. Brochure. 24 pp., 8½ x 11 ins. Illustrated. Details and specifications.

WINDOWS, CASEMENT

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.
Fenestra Casements. Booklet, 14 pp., 8½ x 11 ins. Illustrated. Discusses casements, particularly for residences.

Fenestra Screen Casements. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

Decorating With Casements. Booklet, 18 pp., with inserts in color 6 x 8½ ins. Deals with use of decorations, particularly draperies, with casement windows.

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Casement of Copper Steel. Catalog C-217. Booklet, 24 pp., 8⅝ x 11 ins. Illustrated brochure on casements, particularly for residences.

WINDOWS, CASEMENT—Continued

Lupton Creates a Complete Casement. Folder, 8½ x 11 ins. Illustrated data on a casement providing for screens, shades and draperies.

Lupton Heavy Casements. Detail Sheet No. 101, 4 pp., 8½ x 11 ins. Details and specifications only.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Casement Window Hardware. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Shows typical installations, detail drawings, construction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.

Architectural Details. Booklet, 8½ x 11 ins., 16 pp. Tables of specifications and typical details of different types of construction.

List of Parts for Assembly. Booklet, 8½ x 11 ins., 16 pp. Full lists of parts for different units.

WINDOW SCREENS

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Pivoted Windows Screened. Booklet, 8 pp., 8½ x 11 ins. Data on screening and window ventilation.

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

WINDOWS, STEEL AND BRONZE

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Steel Window Inserts. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Suggestions on correct use of inserts.

David Lupton's Sons Company, Philadelphia, Pa.
A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 8⅝ x 11 ins. Deals with Pond Continuous Sash. Sawtooth Roofs, etc.

How Windows Can Make Better Homes. Booklet, 3⅞ x 7 ins., 12 pp. An attractive and helpful illustrated publication on use of steel casements for domestic buildings.

Truscon Steel Company, Youngstown, Ohio.
Drafting Room Standards. Book, 8½ x 11 ins., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.

Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet, 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.

Continuous Steel Windows and Mechanical Operators. Catalog 126. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

WOOD—See also Millwork

American Walnut Mfrs. Association, 618 So. Michigan Boulevard, Chicago, Ill.
American Walnut. Booklet 7 x 9 ins., 46 pp. Illustrated. A very useful and interesting little book on the use of walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.

American Walnut for Interior Woodwork and Paneling. 7 x 9 ins. Illustrated. Discusses interior woodwork, giving costs, specifications of a specimen room, the different figures in Walnut wood, Walnut floors, finishes, comparative tests of physical properties and the advantages of American Walnut for woodwork.

Wood Conversion Company, Cloquet, Minn.
Nu-Wood Insulating Board and Insulating Lath. Booklet, 24 pp., 4 x 6 ins. Illustrated.

True Insulation for Your Present House. Brochure, 12 pp., 5 x 7 ins. Illustrated.

Evidence of the Economy of Heating with Gas. Booklet, 11 pp., 5 x 7 ins. Illustrated.

House Comfort that Pays for Itself. Brochure, 32 pp., 5¼ x 7¾ ins. Illustrated.

WOOD FINISH

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

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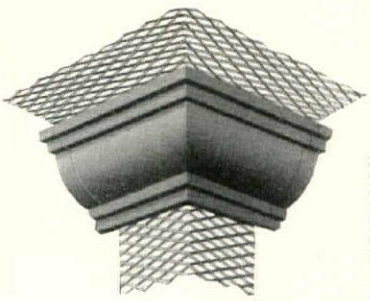

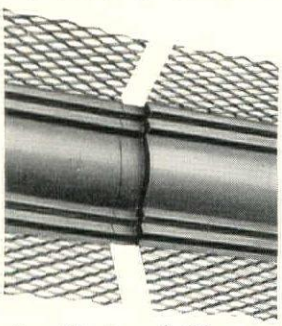

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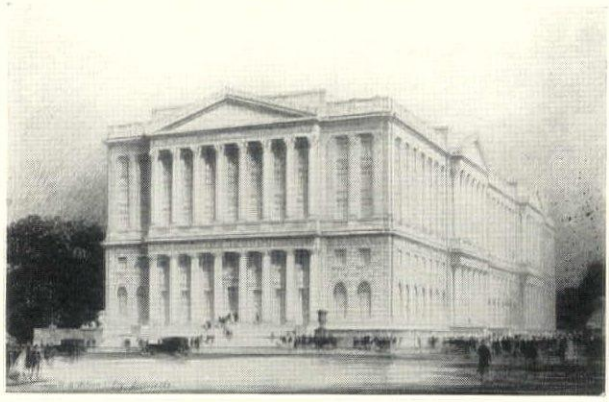
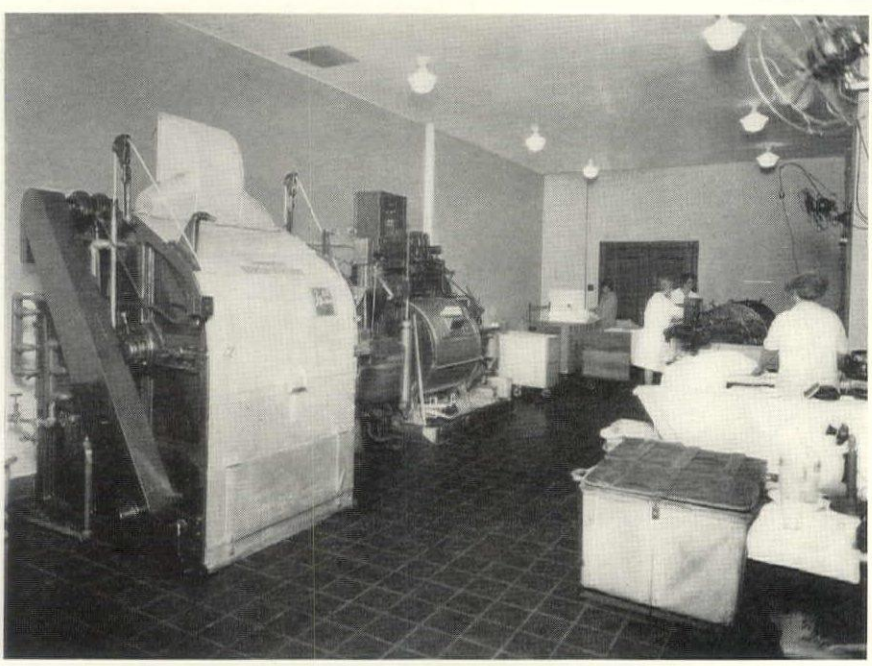


Mutual Benefit Life Insurance Company Building, Newark, N. J.—one of America's most modern office structures. W. A. Starrett, Architect, New York



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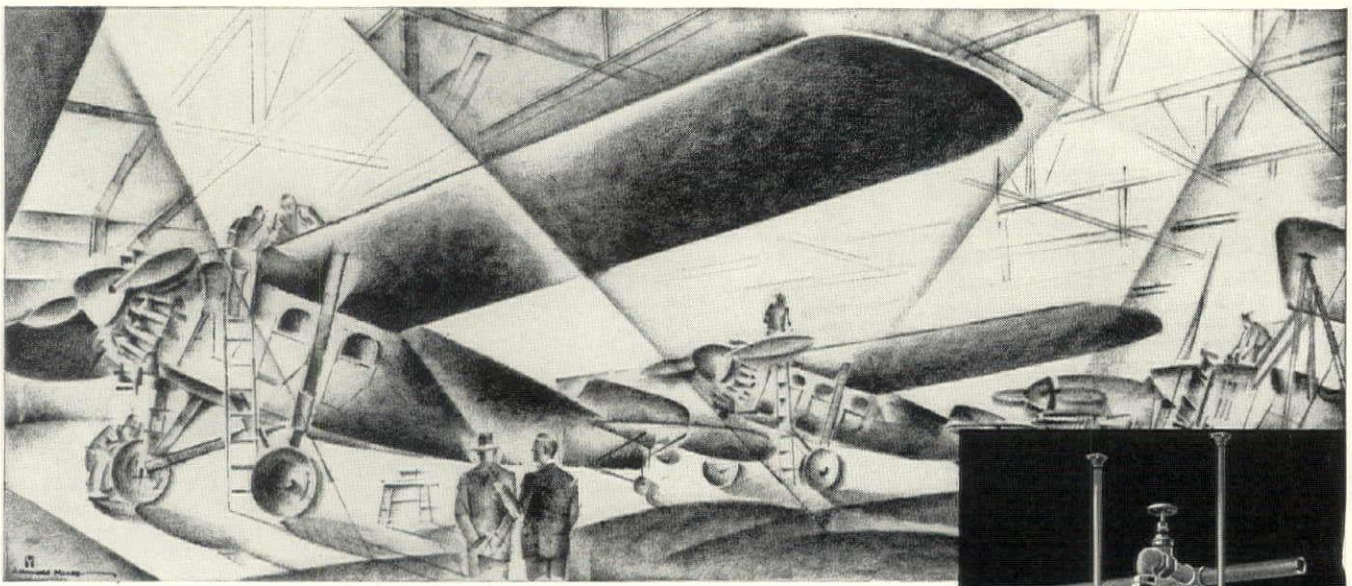
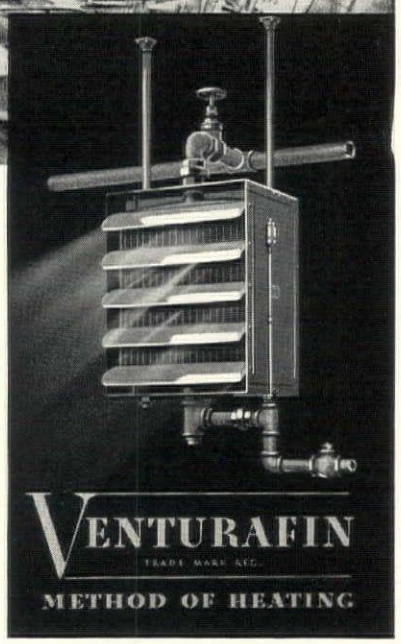


HEAT WITH UNIT HEATERS



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REVIEWS OF MANUFACTURERS' PUBLICATIONS

RODDIS LUMBER & VENEER COMPANY, Marshfield, Wis. "Roddis Flush Doors in School Buildings."

There is probably no building of any kind which receives harder wear and rougher usage than a school structure, and material of any kind which goes into a school building must be strong, durable and the best of its kind if it is to properly serve its purpose. This booklet deals with the well known Roddis Flush Doors as they apply to such structures. "School buildings in all parts of America are equipped with Roddis Flush Doors,—in large and small cities, townships, villages and country districts. Roddis Flush Doors are preferred universally for school buildings, because they possess every prescribed essential in school building codes and requirements, and afford important advantages no other door provides. Roddis' completely solid, cross-unit, five-ply construction positively prevents warping, sagging, shrinking, checking and separating throughout all the years the door is in use. Every inch of the door is of the same even thickness and unusual strength to withstand and endure the unavoidable hard usage and abuse given doors in school buildings. Roddis Flush Doors insure a permanency as lasting as the main structure and possess attractive door beauty besides. Practically all distracting and annoying noises from corridors and between rooms fail to penetrate the solid, five-ply Roddis flush door. There are no thin, vibrating panels to transmit sounds, so that quiet is assured for the individual period of study, recitation or lecture in each of the rooms."

THE WILCOLATOR COMPANY, 17 Nevada Street, Newark. "The Aqualator."

If an interior of any kind is to be comfortable in cold weather, it is necessary that it be supplied with two things,—heat and humidity; one is not enough. Any good heating installation supplies the heat; a system to provide proper humidity is equally necessary. A bulletin of the United States Department of Agriculture says: "There is little doubt that in most dwellings during the heating season the air is dryer than is best for health and comfort. The relative humidity is too low. A room in which the air is properly humidified will be more comfortable at a lower temperature than one in which the moisture content is too low." Physicians and health authorities in general agree that dry indoor air dries out the air passages in the nose and throat, causing the surface of the mucous membrane to lose its moist covering. This gives bacteria a much better chance to penetrate the thin membrane and set up a cough or cold, frequently followed by bronchitis, influenza, pneumonia and sinus trouble. Other effects of too dry air on individuals are sleeplessness, irritability, dry and chapped skin, itching, and burning of the eyes. Catarrhal conditions and tuberculosis are both said to be aggravated by too dry air. Dry air also affects adversely our homes and their contents by drying out the woodwork and furniture, causing windows and doors to shrink and crack, the floors to creak, the plaster to crack, and rugs, draperies and upholstery to wear out more rapidly. All these bad effects of dry air on human beings and the homes they live in can be eliminated by an efficient humidifier. For health and comfort they should be eliminated."

This brochure deals with the "Aqualator," which is described as "a simple, inexpensive humidifier for overcoming the dangers and discomforts of dry air in homes, offices, apartment houses, public buildings and industrial plants" during the heating season. In addition to humidifying the air, the Aqualator thoroughly washes the air. "Many of our enthusiastic users consider the ability of the Aqualator to wash out stale tobacco smoke and cooking odors of importance almost equal to its humidifying effect of improving health and preventing deterioration of furniture and fixtures in the home. The home wall model is recessed into the wall and is connected to the water system. There is no water to be carried. It is turned on or off by a simple valve. There are no moving parts or motors. No electrical connections. In appearance the wall model Aqualator is a mirror with a grille above and below it, set in an attractive frame, close to the wall. The humidifying member is concealed behind this frame, where it is easily accessible for regulation."

UNITED STATES REGISTER CO., Battle Creek, Mich. "Grilles and Screens."

Modern buildings of many kinds provide opportunities for the effective use of metal screens or grilles. One of the most popular of these uses is over the openings of hot air ducts or else used to conceal heating radiators when they are recessed within walls, as is often done; and there are of course other uses to which grilles may be put. This brochure illustrates and describes a large variety of such screens, or grilles, their designs being chosen with excellent taste and worked out in metals of different kinds. The booklet also deals with all the other utilities manufactured by the firm.

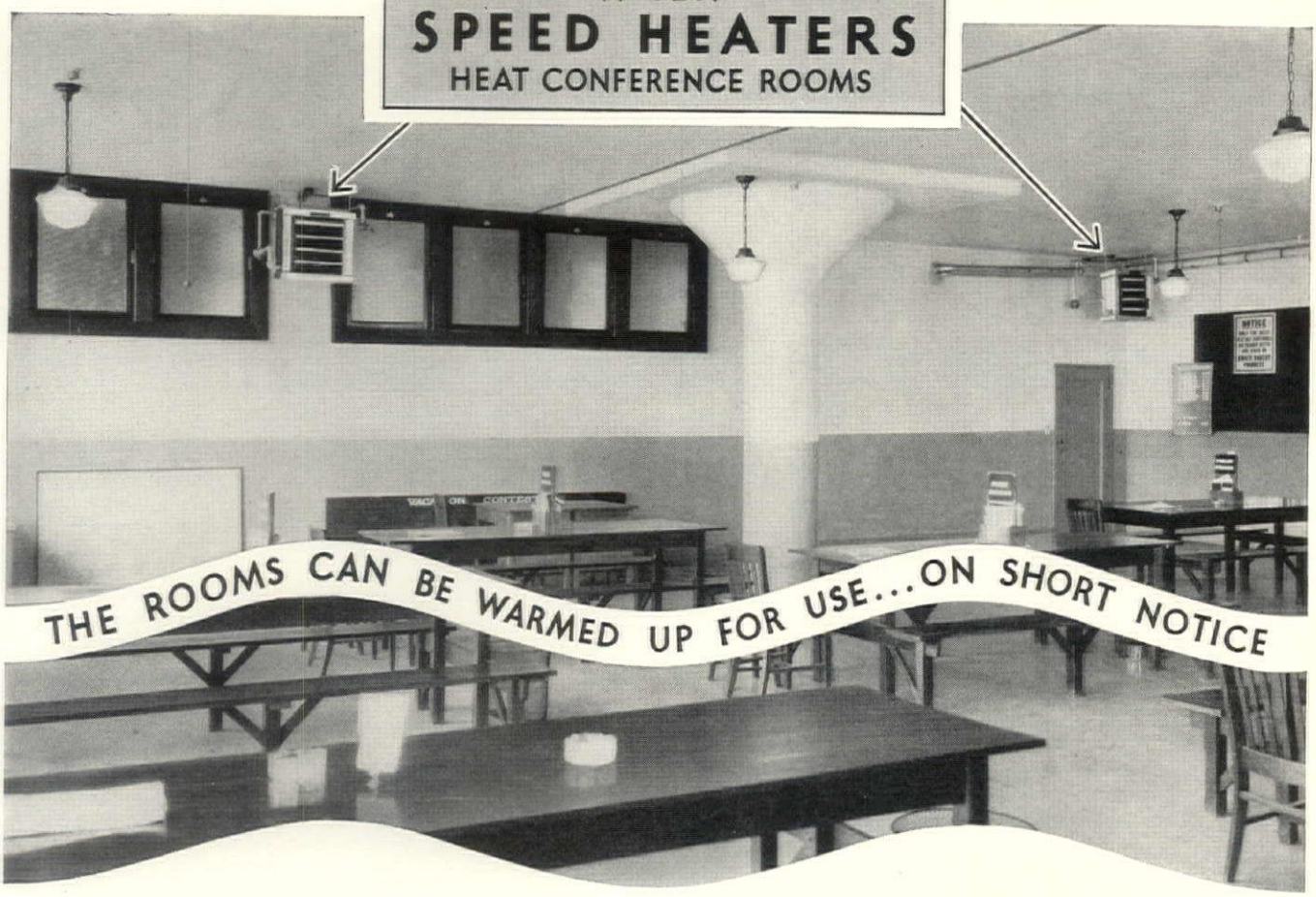
JOHNS-MANVILLE CORPORATION, 292 Madison Avenue, New York. "The Invisible Home."

Many architects find difficulty in impressing upon their clients a correct understanding of the value of proper insulation. Most building appropriations are limited, and to get a house up at all it is necessary to stretch the amount available to the utmost, and there is constant temptation to sacrifice something invisible,—such as insulation,—to something else which can be seen and which because it is seen seems to justify its cost. And yet the cost of insulating a house against the passage of heat through its walls and roof can be amply justified upon grounds which are entirely economic. It need not be difficult for an architect to prove to a client that the cost of insulating a house against the passage of heat would be repaid in a few years' time, by saving on fuel bills, and that this saving would be made for as long as the home stands, long after the cost of insulation has been forgotten.

"Everyone, no matter who he is, nor where he lives, wants his home to be complete in comfort. In winter, when the angry, cold winds howl around the house and the snow piles high in the frosty night, we want to sit in comfort and contentment in a warm and cozy home, free from excessive furnace cares. And in summer, too, while a blazing sun seems to blister the out-of-doors, we want to enjoy a cool and comfortable home. It is easy and economical to have such a home,—a livable home. Proper, thick insulation in the walls and roof of your home will keep heat where it belongs,—inside in winter, when you need it there, and outside in summer. Insulation in the home means the use of a material that resists the passage of heat. This heat-resisting element in the material is the 'dead air' cells it holds. This 'dead air' is air that is absolutely still and not in circulation, and the more dead air cells there are, and the smaller they are, the better.

"Now, the air space between the inside and outside walls of your home is not dead air, and it does not check heat leakage. Contrariwise, since it is free to circulate to some extent, it increases conductivity of heat through the walls. Thus heat passes through freely. If this air space between the walls were filled with a thick material that holds millions of 'dead air' cells in small confined spaces, the walls would be properly insulated with heat loss reduced to a minimum. J-M Home Insulation is a thick insulation containing millions and millions of tiny dead air cells, with each cell resisting firmly the circulation of air. Besides, the material itself,—rock wool,—resists the passage of heat and noise. There is nothing mysterious about insulation. In every home you will find many examples of its use. The furnace and furnace pipes are insulated to stop heat from escaping and wasting fuel. Insulation in your refrigerator prevents the heat from penetrating and melting the ice too rapidly. In the same way the J-M Home Insulation retards the passage of heat from the hotter to the colder element. J-M Home Insulation reduces the leakage of heat generated by your furnace to a minimum. Since heat stays inside longer, when J-M Home Insulation is used, less heat is required and your furnace needs less attention. You save fuel, which within a few years will pay for the most of this efficient insulating material. And in the summer time you will have a home that will be from 8° to 15° cooler than it is outside. J-M Home Insulation is made from rock. The rock is melted and blown into shreds resembling sheep's wool. Since it is made of rock, it is everlasting and fireproof. Since it contains millions of microscopic dead air cells, it has a high insulating value."

WHEN SPEED HEATERS HEAT CONFERENCE ROOMS



Sales conference room in the plant of the Krug Baking Co., Jamaica, Long Island. Architect and Engineer: George R. Fennema, New York City. Speed Heaters installed by Louis Frisse, Heating Contractor, Brooklyn, N. Y.

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REVIEWS AND ANNOUNCEMENTS

FEDERAL SEABOARD TERRA COTTA CORPORATION, 10 East 40th Street, New York. "Terra Cotta Futurities."

Under the editorship of Leon V. Solon, this association of terra cotta manufacturers is issuing a series of what might be called monographs, in which a number of well known architects express their views on the subject of terra cotta. One of these monographs is by William F. Lamb, who says: "Terra cotta in the recent past has been looked upon as a sort of poor relation of a great array of building materials. It has been used mainly to interpret a design which proved too costly to be developed in stone, and has been warped and twisted out of all reason to fit conditions not at all in character with its own. It has so often been substituted to 'meet a price' and been fabricated as cheaply as possible that the architect has justly acquired a prejudice against it. In the new enthusiasm for right thinking toward his work, the architect has begun to study terra cotta with a rational and logical eye, designing for his material, its advantages and limitations, and the modern manufacturer has begun to experiment with a view to realizing the best that is in his product. The revolutionary change in the point of view toward the fundamental function of architecture applies as well to manufacture as to design. The builder, the producer and the architect have become one organization, each contributing his part and helping to solve intelligently the others' problems. Terra cotta in the future benefits by this new attitude. It will be used logically with a proper feeling for its qualities and not to carry out a design which, to be honest, should be executed in other materials. It will be manufactured not as cheaply as possible but with due regard for the excellent characteristics of the material and the processes that go into its making." The booklet is full of ideas.

THE HERMAN NELSON CORPORATION, Moline, Ill. "Herman Nelson System of Ventilation."

Quite as important as heating is the matter of securing adequate ventilation. Many people who profess to have a high value for fresh air are peculiarly susceptible to drafts or even to the slightest noticeable movement of air, the result being that they are unwilling to open windows, which of course is the usual means of securing ventilation. Unless there is use made of some system of admitting air without there being any perceptible air current, a room is practically sealed up, and the same air, breathed again and again, is extremely injurious to the room's occupants. The places in which bad ventilation (or none at all) is most objectionable seem to be offices, small restaurants and schoolrooms, to say nothing of sleeping cars and places where there are many people. This booklet deals with the excellent system for securing ventilation made and sold by the Herman Nelson Corporation. "Costs of installation and maintenance are always to be considered, and are frequently deciding factors. Since the Herman Nelson System requires no extra plant capacity or fuel to operate, and involves very little incidental installation expense, it may often be employed where ventilation by another method would be impractical or prohibitive in cost. This is particularly true in the case of existing buildings. Moreover, temporary installations are feasible because the character of the equipment is such that the apparatus may readily be changed or moved. There are cases where ventilation may prove a good investment from a mere comfort standpoint, as in theaters and rest rooms. In the majority of cases, however, ventilation must be regarded from the more serious angle. No better example is afforded of the serious importance of ventilation than in schools which are crowded with pupils engaged in work and study for long periods of time every day. Aside from the removal of normal body heat and odors, ventilation is frequently necessary for the removal of obnoxious odors, fumes or dust. Where this is the case, exhaust ventilation is usually employed, and the subject needs little discussion. Aside from a variety of special industrial problems, the most common use of ventilation of this special character is in toilets, kitchens, etc."

Max Maser, interior designer, is occupying new offices at 1223 Spruce Street, Philadelphia.

Lawrence C. Licht announces the opening of offices at 4 North Dean Street, Englewood, N. J.

Howard Steitz announces his removal from the Wilder Building to the Architects' Building, 217 East End Avenue, Rochester, N. Y.

Samuel Z. Moskowitz desires the catalogs and other publications of manufacturers sent to his two offices,—51 Riverside Drive, New York, and 63 Hazle Street, Wilkes-Barre, Pa.

At a recent meeting of the Architects' League of Hollywood, L. G. Scherer was elected president, Verner B. McClurg vice-president, and J. A. Murrey secretary-treasurer. The League is entering upon what promises to be a year of very active endeavor.

Palmer Shannon announces his second exhibition of "cameragraphs" at the rooms of the Architectural League, New York, from January 15 to January 30, 1931. The exhibits will include reproductions of architectural drawings, the work of several of the New York renderers during 1930.

PITTSBURGH TESTING LABORATORY, Pittsburgh. "The Protective Value of Independent Inspections."

The proper inspection of materials, of fabrication and of construction is always essential to the proper execution of a building contract. The inspection bureau is employed by the architect, engineer or owner to inspect and test those things which are susceptible of variation of quality or workmanship. The value of this independent inspection lies in the financial disinterestedness of the inspection bureau, in the technical qualifications of the inspectors, and in the possession of the necessary scientific apparatus and other facilities required for the work in hand. There is also the certainty that the tests and inspections will be conducted according to the best standards or by any accepted program. Testing and inspection give insurance against loss caused by the improper execution of contracts which is of the same value as insurance against loss by any other cause,—fire, burglar or accident.

FLAX-LI-NUM INSULATING COMPANY, St. Paul. "Bi-Flax, an Insulated Metal Lath."

Architects and builders well know the value of metal lath, and are convinced of the importance of providing in a building of any type against passage of heat through its walls, thus rendering a building warmer in winter and cooler in summer. In view of this it should not be difficult to understand the value of a material which is both metal lathing and an insulating substance. Such is "BI-FLAX," dealt with in this brochure. "BI-FLAX is a combination of diamond mesh expanded metal lath and Flax-li-num. But although the two are a single unit, they are separated by waterproof paper. The insulation does not touch the plaster base. It is in no way a part of it. It functions as insulation only. BI-FLAX is furnished in sheets of convenient size, 24 x 48 inches. The metal lath extends 1 inch beyond the Flax-li-num on one side and at one end. When BI-FLAX is applied, the sheets of insulation butt tightly together behind the metal lath which in this way overlaps at all joints."

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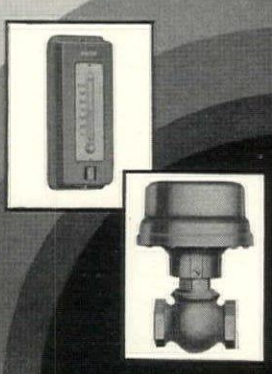

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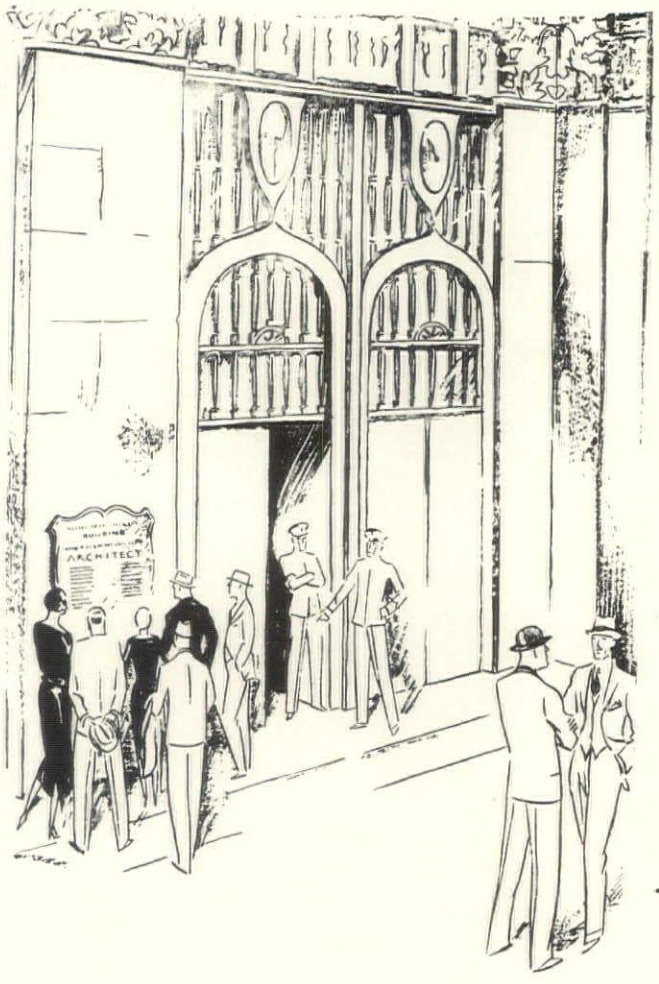

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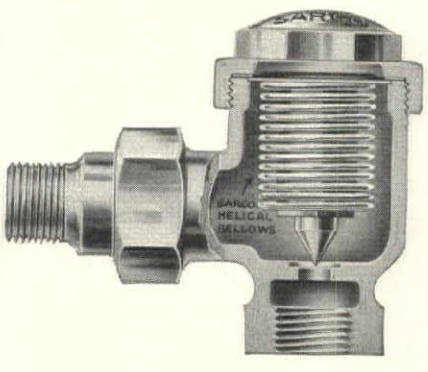

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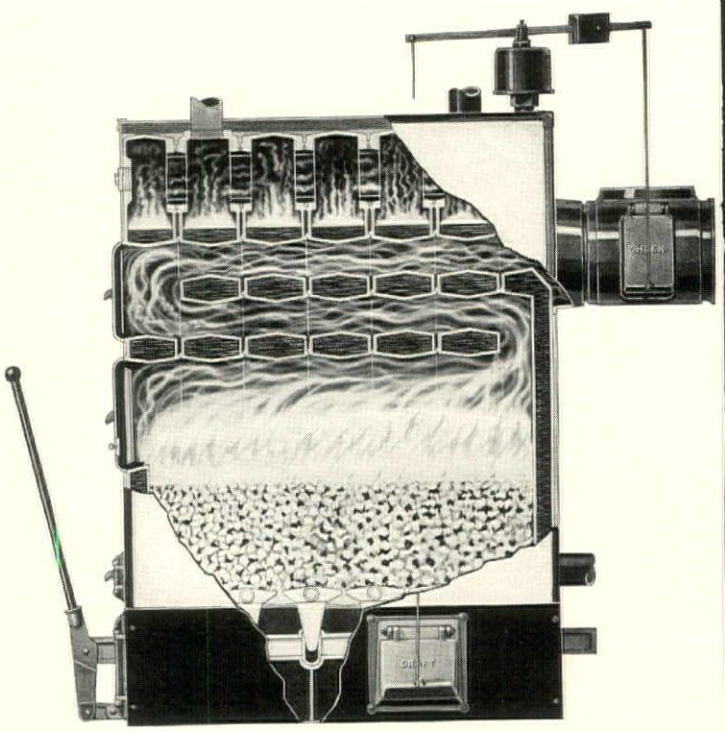

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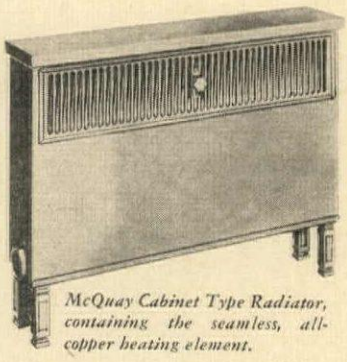

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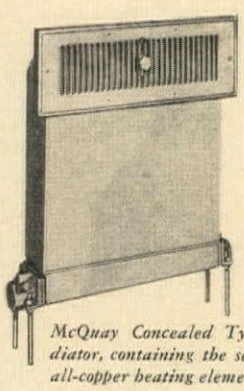

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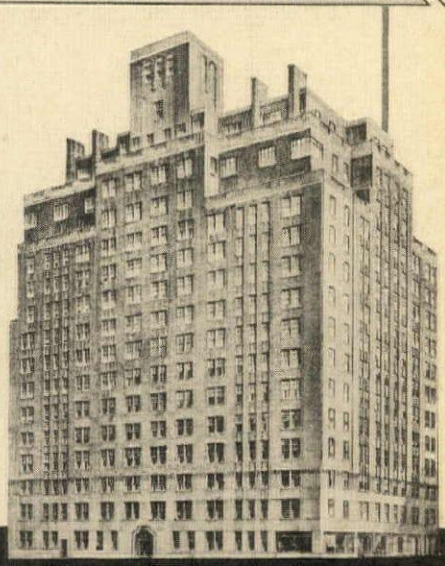

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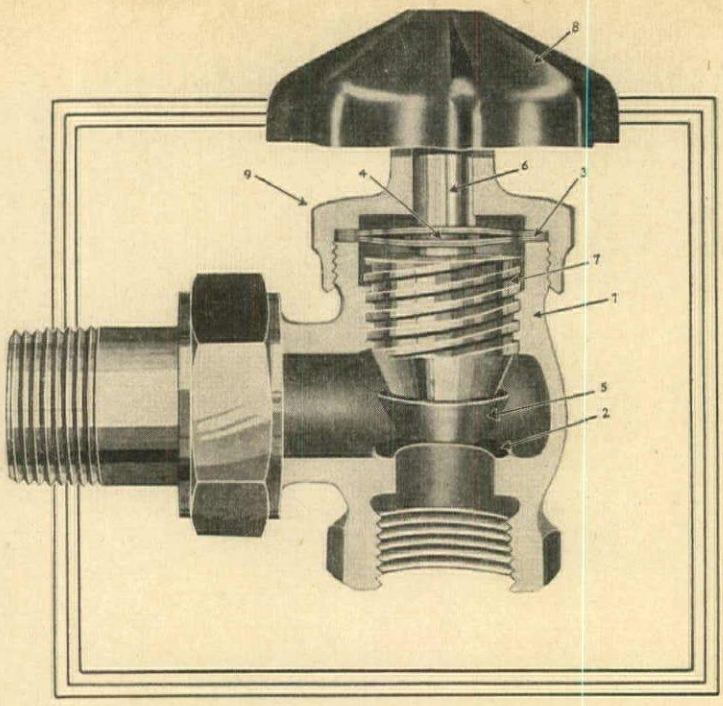

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