THE ARCHITECTURAL FORUM

IN TWO PARTS

ENGINEERING & BUSINESS

PART TWO

FEBRUARY 1928

Michigan Central Railroad
equips over 300 doors with R-W-

"The doors operate easily year after year. Our satisfaction is indicated by our constant re-orders"

J. F. Deimling, Chief Engineer, Michigan Central Railroad, says:

"In January, 1926, we completed a new 1190 ft. section of our freight house, making the total length 2000 ft.—perhaps the longest railroad freight house in the country. On one side of the freight house are the tracks; on the other side is a roadway where teams and trucks are constantly loading and unloading.

"In the original section of this freight house, which is 10 years old, we used Richards-Wilcox door hardware. Being perfectly satisfied with our 10 years' experience, we naturally selected R-W equipment for the newer additions. R-W equipped doors of the sliding type line the railroad track side of the freight house. On the teaming side, we use a vertical rolling door. All door openings are 9x9 ft.

"In June, 1926, we completed a new inbound freight house of the same type, three sets of tracks away. This building is 590 ft. long, with R-W equipped sliding doors throughout.

"Altogether, we have in these two freight houses over 300 doors equipped with R-W hardware, slides, and trolleys. We also have several FyReWall doors of Richards-Wilcox manufacture, as well as a folding door 17 ft. wide by 12 ft. high.

"At present we are constructing the Michigan Central Fruit Auction Building, which will be equipped throughout with R-W bi-fold and sliding doors and hardware.

"We have never had a complaint about our Richards-Wilcox equipment. The design is right, and the doors operate easily year after year. Our satisfaction is indicated by our constant re-orders."

R-W Engineers will gladly make an analysis of your plant requirements in the matter of doorways and conveying problems, without placing you under any obligation. Just write our nearest branch office.

Richards-Wilcox Mfg. Co.

"A Hanger for any Door that Slides."

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

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

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

THE BARRIER

WINTER
DIRECTS ITS SHAFTS AGAINST NATCO IN VAIN

NATCO Hollow Building Tile's prime purpose is *protection*. Its exclusive double shell construction, and moisture-stop feature, insulates structures with a multiple blanket of dead air. Resists the passage of cold. Saves fuel, increases comfort.

Strength is not neglected. Natco Tile, load bearing and so stamped, dependably supports tremendous burdens. Beauty is served alike by the finished face units such as Natco Vitritile and Tex-Tile, and special shapes such as Natco Header Backer, Unibacker, and Double Shell, which bear the weight and furnish the protection when brick or stucco is used for facing.

Natco meets the three great building needs: protection, strength, and beauty. For every floor, wall, and fireproofing requirement in the structures you design, there is a Natco Tile.

Natco Double Shell, Load Bearing Tile

The wall pictured above is Natco Double Shell, Load Bearing Tile, used for stuccoed structures. Each unit is equivalent to from 14 to 21 brick, saving labor, mortar, time and expense. Exterior stucco and interior plaster are applied directly to the tile, whose dovetail scoring provides an enduring bond. Since the tile never rusts, rots, sags, warps, or disintegrates, the stucco stays permanently.

[*Natco Hollow Building Tile is susceptible to use in both steel and concrete construction.*]

NATIONAL·FIRE·PROOFING·COMPANY

General Offices: **Fulton Building, Pittsburgh, Pa.**

Branch Offices: New York, Flatiron Bldg.; Chicago, Builders Building
Philadelphia, Land Title Bldg.; Boston, Textile Bldg.
In Canada: National Fire Proofing Co. of Canada, Ltd., Toronto, Ontario.

NATCO

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

HOLLOW BUILDING TILE

KEWANEE

STEEL Riveted BOILERS

Low Heating Cost

Here are some of the features of boiler design which are necessary to insure lower heating costs: 1; a spacious firebox so that the fuel may be burned properly, 2; ample heating surface and long and numerous flue gas tubes permitting the heat of combustion to be transferred to the water in the boiler, 3; sufficient volume of water content to absorb the heat without undue disturbance, 4; good circulation of the water content to prevent steam logging, 5; area enough to permit liberation of steam at the surface of the water, 6; steam space large enough to take care of the fluctuations of load.

All these features and many more *are built in Kewanee Steel-Riveted Firebox Boilers.* They are a potential guarantee of low yearly heating costs.

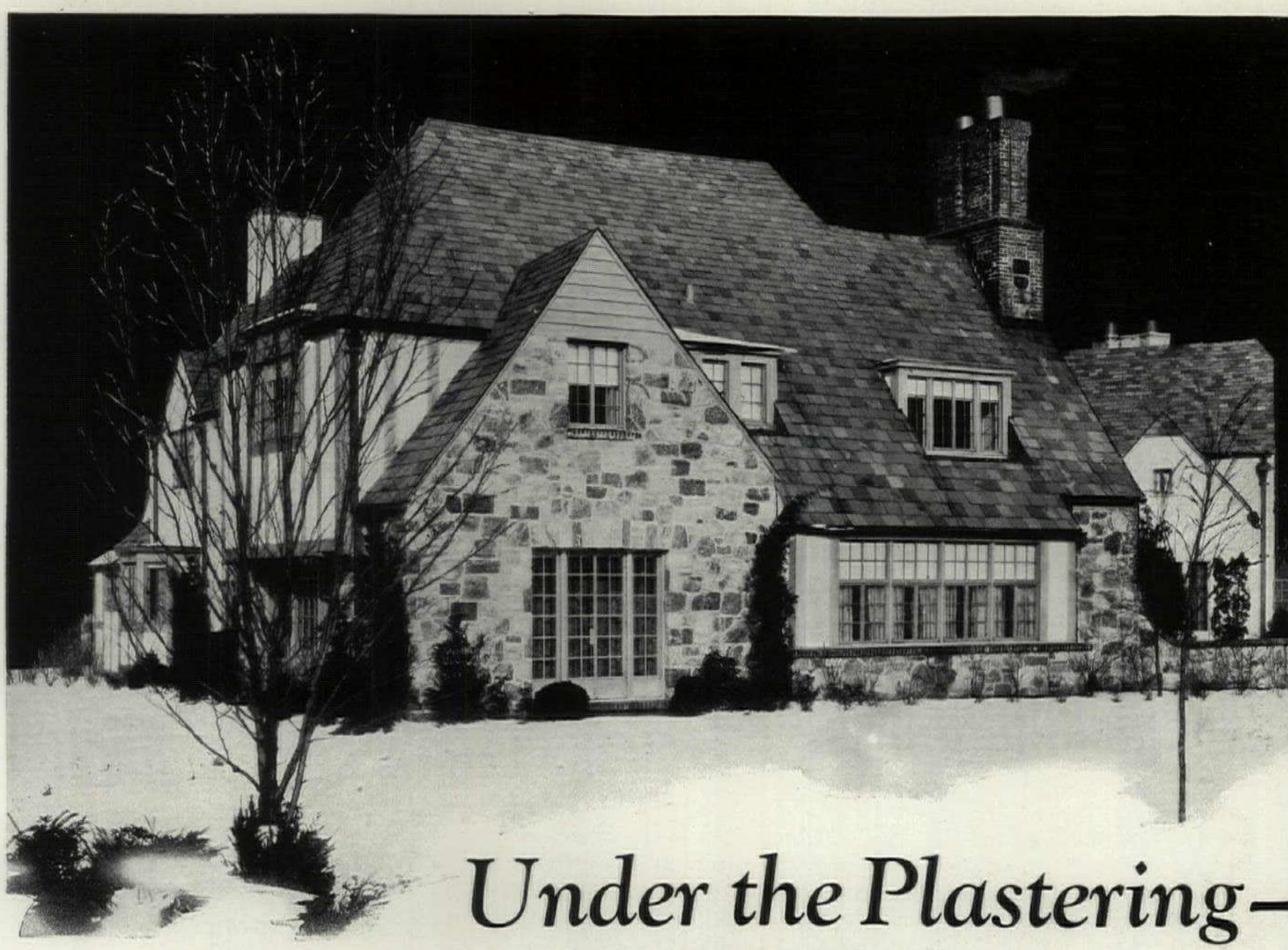
And when you consider that *every year* a boiler's fuel may cost from ¼ to ¾ of its purchase price it is easy to see that a low heating cost is far more important than the first cost of the boiler.

BE GUIDED BY THIS FOUNDATION
HONOR QUALITY STRENGTH SERVICE
RICE LEADERS OF THE WORLD ASSOCIATION

KEWANEE BOILER CORPORATION

Kewanee, Illinois — ***Branches in Most Leading Cities***

STEEL HEATING BOILERS RADIATORS WATER HEATERS TANKS AND WATER HEATING GARBAGE BURNERS



Under the Plastering–
---STEEL

IN designing this attractive Long Island residence, the architect made use of one of the most valuable of all known partnerships of building material—plaster applied on steel—PLASTA-SAVER Metal Lath.

- —Such construction is a miracle of strength in proportion to its weight and cost.
- —It affords appreciable fire safety—tends to prevent plastering troubles.
- —And it contributes materially to the life of the structure.

A construction so sound deserves the most careful consideration of every architect. Especially since the introduction of the North Western ⅛" flat rib PLASTA-SAVER Metal Lath has lowered its expense to a point where it costs not greatly more than inferior plastering on ordinary, combustible lath.

Shall We Send Specifications and Samples of PLASTA-SAVER?

NORTH WESTERN EXPANDED METAL COMPANY

1234 Old Colony Bldg., CHICAGO

Plasta-Saver

1/8" FLAT RIB

METAL LATH

W. W. AHLSCHLAGER, Inc., Chicago
Architects

ROXY *Theatre*

WHERE "Roxy and His Gang" hold forth . . . in the world's largest theatre . . . nearly four miles of plastered corners are permanently protected and reinforced by the world's greatest corner bead: Milcor "Expansion" Corner Bead, No. 1 [Pat'd. June 13, 1922]. The solid metal, exposed bead of this famous product is precisely straight and true . . . the expanded metal wings are sturdy and wide . . . the plaster keys through and forms a perfect bond with the wall base.

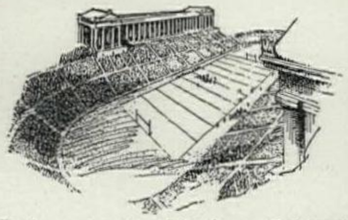
"Expansion" Corner Beads [for inner and outer angles], "Expansion" Casings [for door and window trim], "Expansion" Base Screed, Stay-Rib and Netmesh Metal Lath and other famous Milcor lines, are *common sense* products. They were *perfected* before being placed on the market . . . there has been no reason to change them in any detail . . . they are standardized, positively dependable products . . . they have been imitated, *but never equalled.*

Milcor Metal Tile Roofing—Metal Lath—Architectural Sheet Metal—Marquees—Metal Ceilings—Ventilators & Skylights—Rain Carrying Products — Warm Air Heating Equipment.

MILWAUKEE CORRUGATING COMPANY, *Milwaukee, Wis.*
CHICAGO, ILL. KANSAS CITY, MO. LA CROSSE, WIS. BOSTON, MASS.

MILCOR
"BUILD for SAFETY"

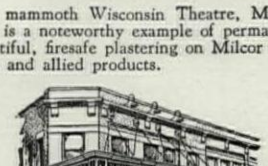
"Built for Safety" with MILCOR Products



In the construction of the famous Stadium at Soldiers' Field, Chicago, scene of the great Dempsey-Tunney fight and the ARMY-NAVY football game, Milcor "Expansion" Products were used.

The New Hennepin Theatre, Minneapolis, is one of many theatres throughout the Country with plastering safeguarded by Milcor "Expansion" Products.

The mammoth Wisconsin Theatre, Milwaukee, is a noteworthy example of permanently beautiful, firesafe plastering on Milcor Metal Lath and allied products.



The Broadway Theatre, Muskogee, Okla., is also built for safety with Milcor Products.

* * *

Hundreds of theatres have been made safe through the use of Milcor expanded metal lath, ventilators, furnace fittings, rain conductor systems, marquees, skylights, metal ceilings and walls, metal roofing and other Milcor Products. "Build for safety!"

"Expansion" Corner Bead No. 1
Pat'd.

Send for
"The Milcor Manual"

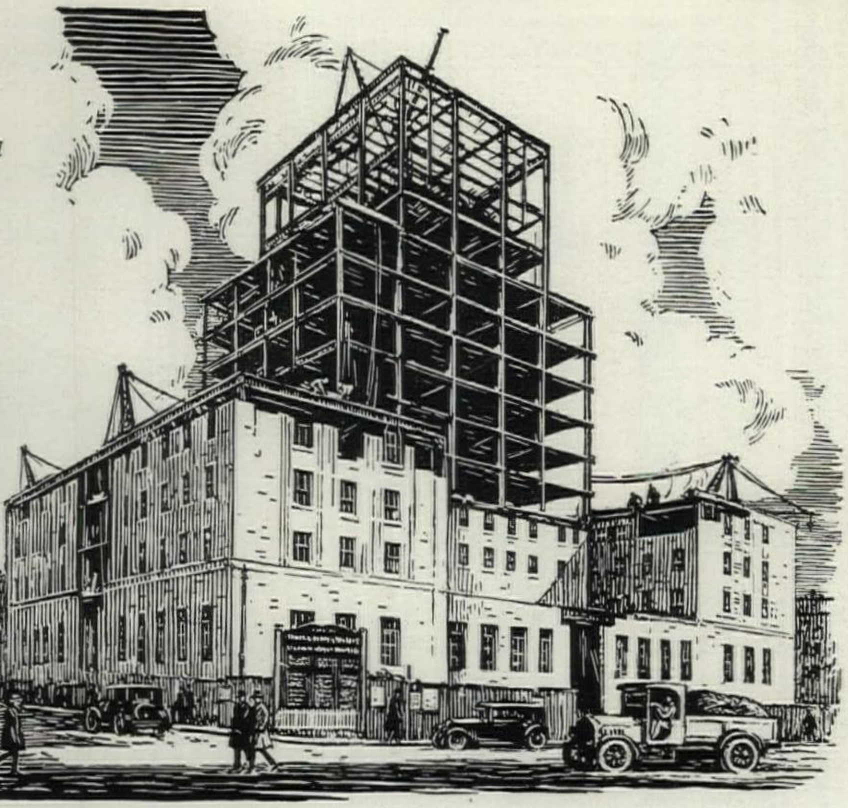
Above:
Netmesh Metal Lath; Stay Rib No. 1; 3/8" Stay Rib No. 2, and 3/4" Stay Rib Metal Lath No. 3.

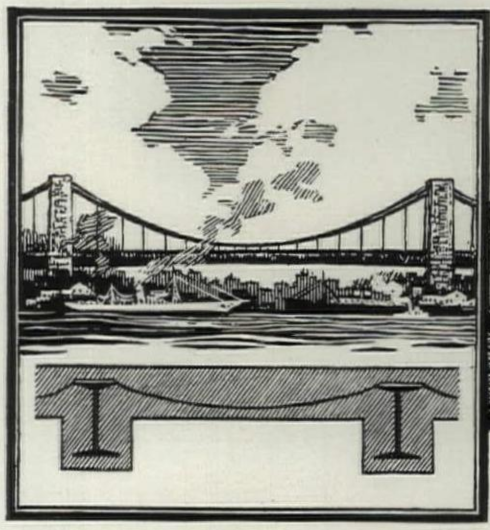
MILWAUKEE CORRUGATING CO., Milwaukee, Wis.
Please send, without cost or obligation, "The Milcor Manual" on metal lath construction.

☐ Check here if interested in Milcor Products for theatre construction.

Name..
Address..
City and State..

Municipal Building, Baltimore, Maryland
Architect: W. W. Emory
Contractors: J. Henry Miller, Inc.
125,000 square feet 4-inch Pyrofill Monolithic Floor Slab and 3½-inch Pyrofill Monolithic Roof Slab used





The Choice of Baltimore's City Fathers—

Gypsum-guarded steel!

STEEL—for its lightness, its strength, its speedy erecting! Gypsum—to guard steel's one vulnerable spot *by enclosing the sturdy sinews with a fire-fighting cloak*, light and quickly poured-in-place!

That is true economy—combining these two standard materials to create a structure of vastly less dead-load, yet strong, enduring and firesafe. Supporting beams, columns and girders are encased in gypsum. Floors and roof with highly-efficient steel cables carrying the load, protected with gypsum.

No other construction—*not one*—has the same high degree of firesafety, light weight, speed in erection and economy.

This organization will be glad to confer with you on your building problems, and to advise, supply and install if you wish, the proper type of gypsum construction. The coupon will bring full data.

UNITED STATES GYPSUM COMPANY
General Offices: 300 West Adams Street, Chicago, Illinois

STRENGTH

Designed on the same engineering principle as the suspension bridge, Pyrofill Monolithic floor and roof slabs are built for any desired load. Customary Building Department tests on the Baltimore Municipal Building showed but 1/16 of an inch total deflection under a load of 300 pounds per square foot, with no deflection upon removal of load—a characteristic performance.

USG
STANDARD BUILDING MATERIALS

Mail This Coupon Now

UNITED STATES GYPSUM COMPANY
300 W. Adams St., Chicago, Ill.

Please forward your special information on Pyrofill Construction.

Name..........

Address..........

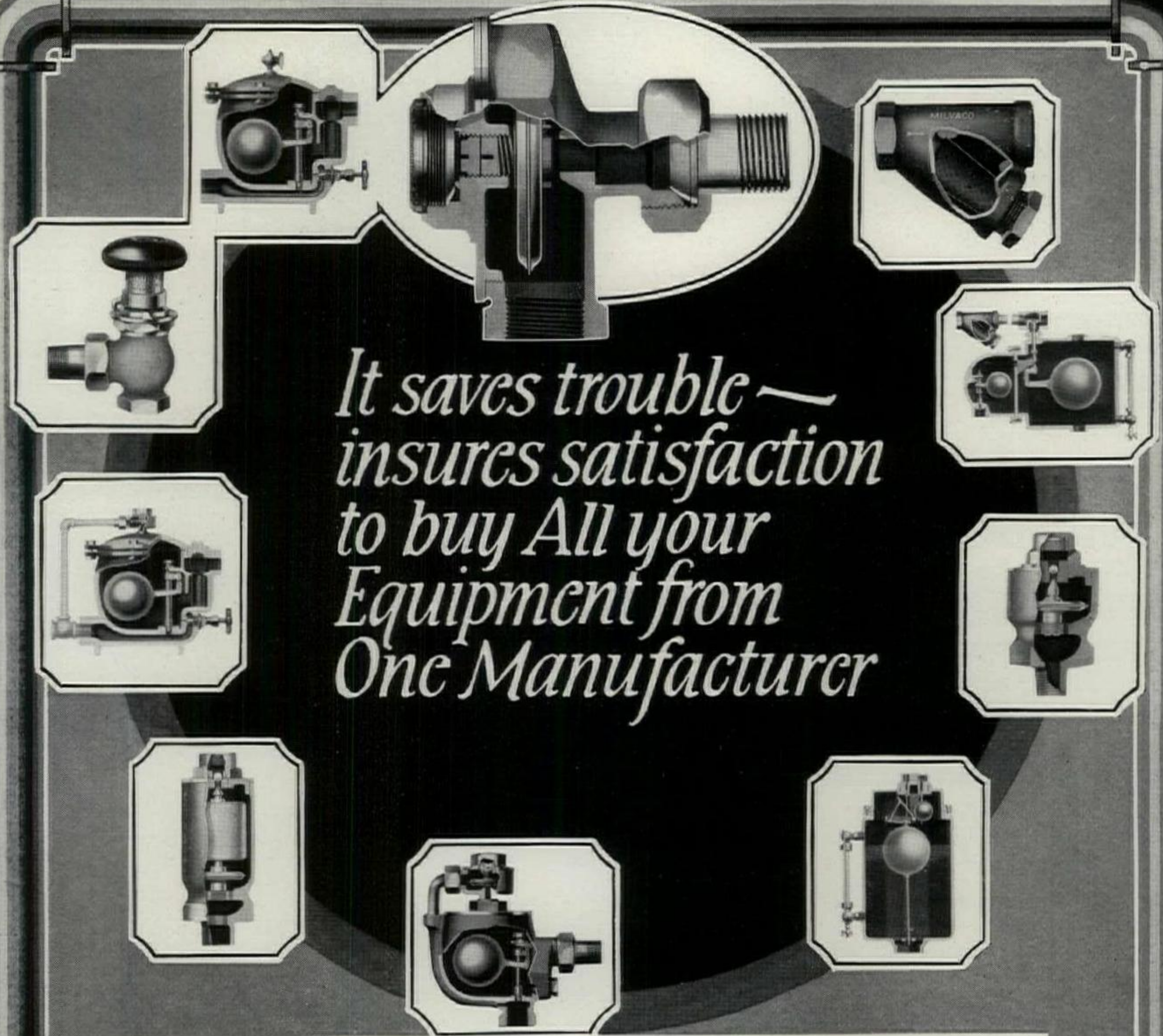
Architectural Forum, Feb 1928

PYROFILL

Reg. U. S. Pat. Off.

MONOLITHIC FLOORS AND ROOFS

Made by the United States Gypsum Company


It saves trouble—
insures satisfaction
to buy All your
Equipment from
One Manufacturer

Now! at Popular Prices....

Complete Heating Equipment For Every Need

The NEW IDEAL SECTIONAL BOILER

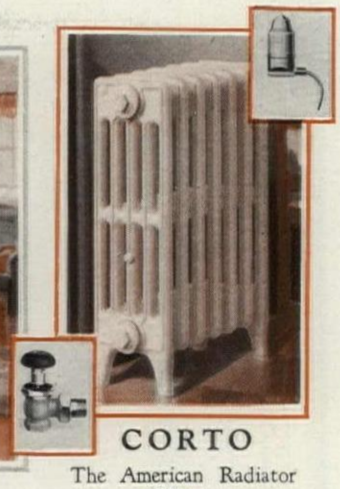
First Completely Equipped, Metal Covered, Porcelain Enamel Finished Boiler

THE New Ideal Red Jacket Boiler is the answer of the American Radiator Company to the demand of modern home owners for better and more beautiful things.

With long double flue gallery through which the combustion gases must pass before escaping, a distance twice the boiler's length, a very high degree of operating efficiency is attained.

All accessories are supplied; the boiler is completely equipped. Inside its beautiful metal cabinet exterior is a one-inch air-cell asbestos lining, providing a thorough and indestructible insulation. All sections are joined by a gas-tight construction, insuring absolute cleanliness and freedom from dust.

An Ideal Red Jacket Boiler downstairs, and beautiful Corto radiators upstairs, are specifications which you may make with the utmost confidence—and pride.



CORTO

The American Radiator Classic with "American" Precision Accessories World Standard for Heating Comfort

1. Perfected design — double flue gallery — highly efficient.
2. Thoroughly and indestructibly insulated.
3. Equipped with mechanical regulation and all accessories.
4. Clean and permanently beautiful — all doors porcelain enamel finish.

AND IT COSTS NO MORE THAN ORDINARY EQUIPMENT

A New Day of Usefulness for the Cellar

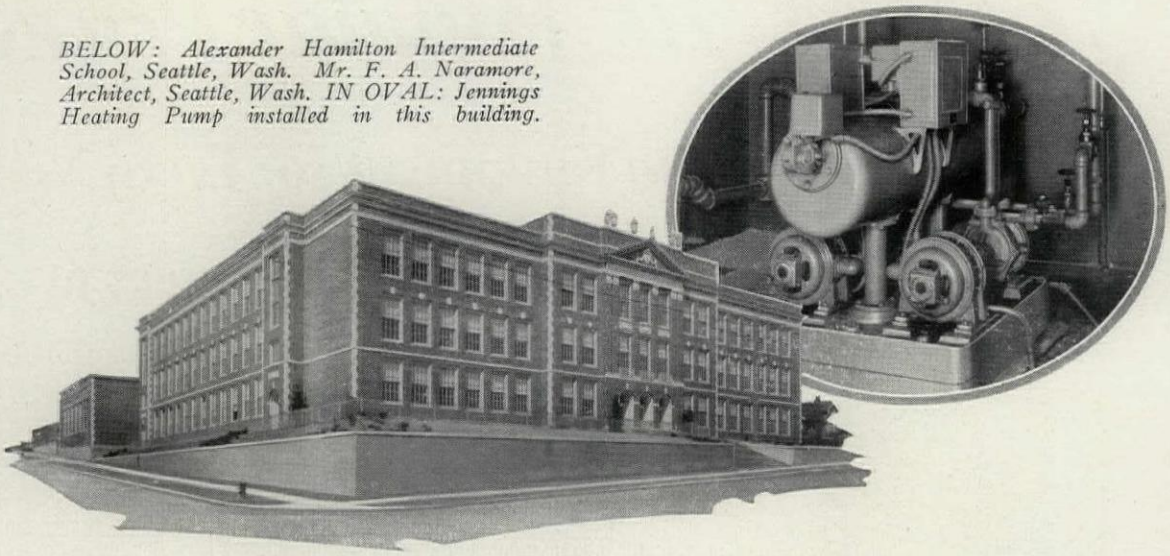
A "gym" for dad—a workshop for the boy—a healthful playroom for the children—or perhaps a billiard room. These are now replacing—in modern homes—the dingy, dusty cellars of the past. And the New Ideal Red Jacket Boiler, with its permanently beautiful red enamel jacket and black porcelain enamel doors, has made this transformation possible.

AMERICAN RADIATOR COMPANY

MAIL THIS COUPON TODAY

Arch. Forum 2-28
AMERICAN RADIATOR COMPANY
Adv. Dept., 40 West 40th St., N. Y. City
Please send me descriptive material about your new line of heating products.
Name............
Address............
City............
State............

BELOW: Alexander Hamilton Intermediate School, Seattle, Wash. Mr. F. A. Naramore, Architect, Seattle, Wash. IN OVAL: Jennings Heating Pump installed in this building.



The second function of the heating system

Every good vacuum system performs two functions. The first is to generate steam and to supply this to the radiation.

The second is to rid the system of air, and to return the condensation to the boiler.

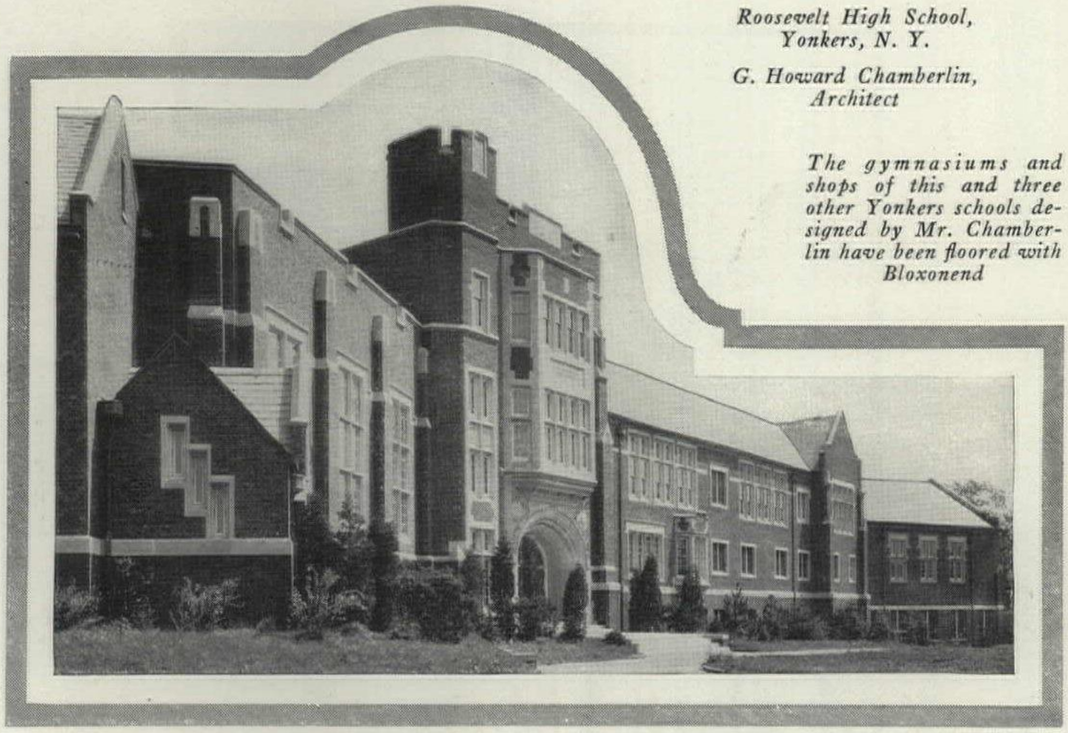
The second is the job of the heating pump. The better the pump, the greater the useful heat obtained from the fuel consumed,—the more flexible and superior the system.

Architects and engineers who are entrusted with the planning of our finest buildings prefer the Jennings Pump for this important work. The new Alexander Hamilton Intermediate School in Seattle is but one of innumerable Jennings Installations.

NASH ENGINEERING COMPANY

12 WILSON ROAD SO. NORWALK, CONN.

Jennings Pumps



Roosevelt High School, Yonkers, N. Y.

G. Howard Chamberlin, Architect

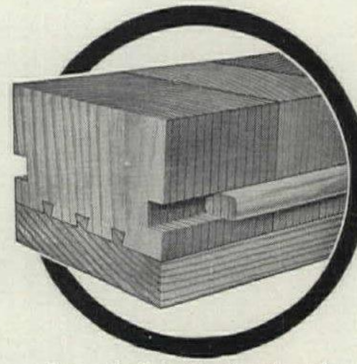
The gymnasiums and shops of this and three other Yonkers schools designed by Mr. Chamberlin have been floored with Bloxonend

School Officials *like* Bloxonend

Harry S. Richards, Principal of the Roosevelt High School, Yonkers, N. Y., writes: "It gives me pleasure to recommend BLOXONEND FLOORING as a type suitable for shops and gymnasiums. It has proven very satisfactory in our school."

School officials and athletes invariably are enthusiastic about BLOXONEND. Its surface is firm and fast yet resilient; durable, attractive and cannot sliver or splinter.

And because school officials *like* BLOXONEND, it is specified for gymnasiums and shops by most prominent school architects.



Comes in 8 ft. flooring lengths —the tough end grain up

Would you like to have sample and specifications?

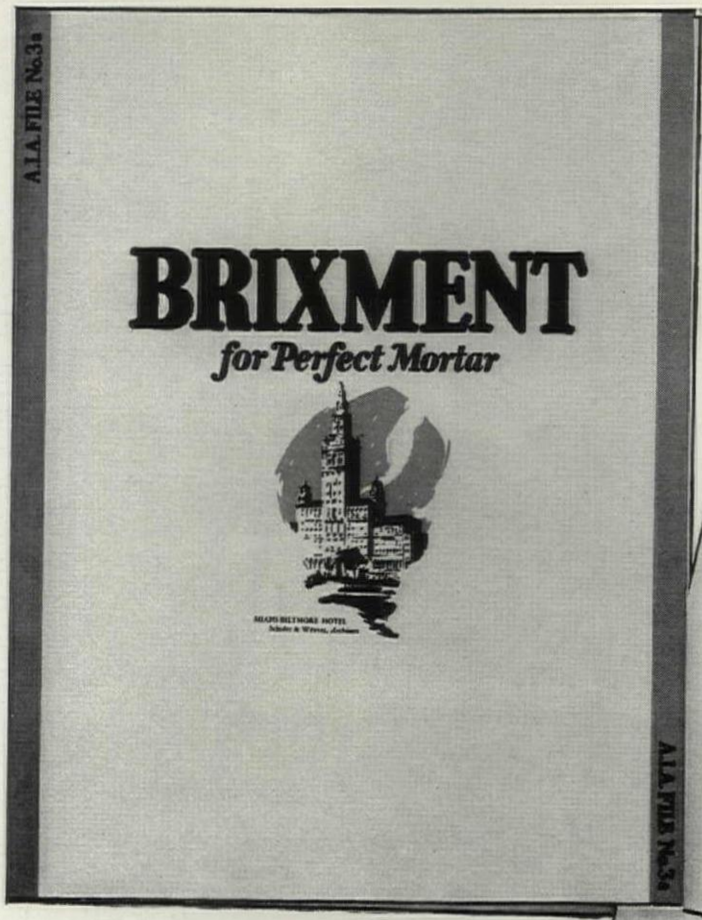
CARTER BLOXONEND FLOORING COMPANY

Kansas City, Missouri

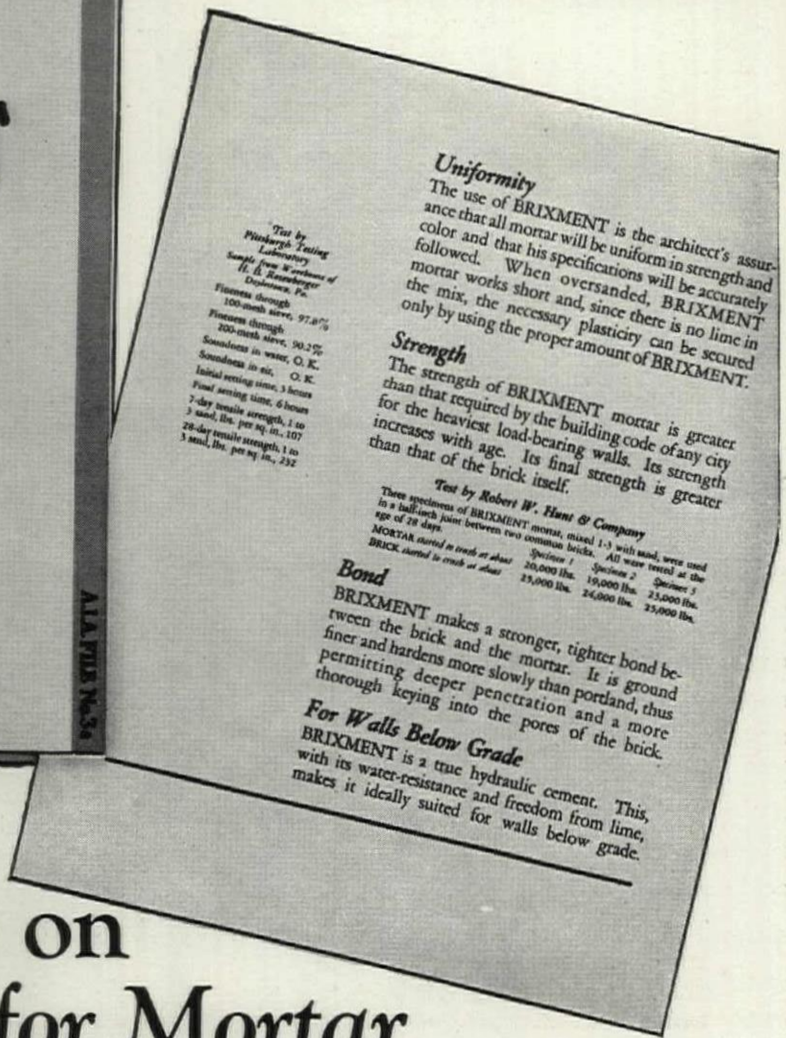
Branch Offices in Principal Cities—See Sweet's

BLOXONEND

Lays Smooth **FLOORING** *Stays Smooth*



In this ONE Book



Complete Information on BRIXMENT *for Mortar*

JUST off the press and yours for the asking—a new, concise, sensibly prepared handbook giving all the advantages of BRIXMENT mortar for brick, tile and stone masonry.

Uniformity of strength and color, bonding qualities, adaptability to winter use and work below grade, analysis, tests, estimating data, specifications—these are some of the subjects treated. Also partial list of well-known BRIXMENT buildings with names of architects and contractors.

A valuable self-filing reference book. Your copy on request. The coupon below is for your convenience.

BRIXMENT
for Perfect Mortar

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LOUISVILLE CEMENT CO., *Incorporated*
Louisville, Kentucky
Send copy of the BRIXMENT handbook to

Name ....

Address ....

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

The foundation of a new development in floor construction..

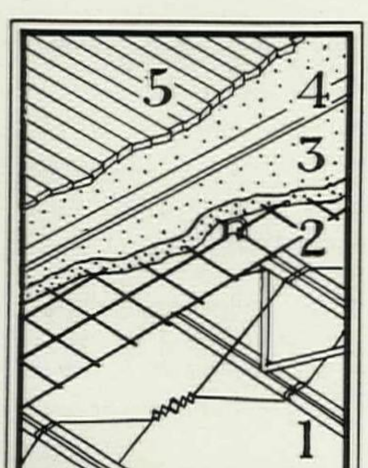
The construction detail sheets of architects and contractors are now recording the development of a type of floor construction which bids fair to revolutionize building practice and standards under a wide variety of conditions.

It is based on the performance of the Havemeyer Truss. The accompanying photographs tell a part of the story, structurally. But they cannot show the rapidity of construction, flexibility, load-carrying capacity, rigidity and economy.

The opportunities for using the Havemeyer Truss are apparently unlimited. Almost every day reports show new ways in which it has solved unique structural problems. *As its advantages are being more widely appreciated by engineers and architects, the Havemeyer Truss is being used in a constantly broadening field of building and engineering construction to produce better results, more speed and greater economy.*

Workmen are here shown installing Havemeyer Trusses on the Biarritz Apartments, Atlantic City. After trusses are spaced, they are firmly bridged.

Already the Havemeyer Truss has reached beyond industrial and commercial work into the residence field. It is providing the fireproof, economical, rigid construction which architects and builders have always wanted. Its broad usefulness in all types of buildings assures its becoming a powerful factor in construction of the future. Complete information is available, and the simple standard specifications are easily and quickly adapted to any job. For specific details and literature, write to Concrete Steel Company, 42 Broadway, New York. Sales Offices and Warehouses in principal cities.



1 Havemeyer Truss, with cross bridging.

2 Layer of reinforcing fabric, having heavy waterproof backing that eliminates forms.

3 Concrete slab, varying in thickness, depending on load and spacing of trusses.

4 Wood Screeds.

5 Finished wood floor.

What GEORGE A. NORDGREN

Chicago Builder and Contractor

says about Masonite

INSULATING LATH

SERVICE AND QUALITY

George A. Nordgren

Building Construction

MEMBER ... ICAN SOCIETY OF CIVIL ENGINEERS

TELEPHONE MAIN 4199

MASONRY
REINFORCED CONCRETE
CARPENTRY
REPAIRS
ALTERATIONS

W. MADISON ST.
Chicago

Oct. 28, 1927

Mason Fibre Company
111 W. Washington Street
Chicago, Illinois

Dear Sir:

The installation of Masonite in the Sauerman residence was my initial experience with this material. Its application was very simply handled. The convenient sizes and the ship-lap joints in the boards made the wall as tight as a drum upon completion.

I am without question much in favor of your product Masonite for answering and solving the problem of insulating buildings from cold and heat.

I shall be very glad to recommend your product in the future and if I am in position to use your material on my own initiative I shall use Masonite without hesitation.

Yours very truly,

G. A. Nordgren

GAN:HBA

Masonite is a combined sound-deadening, insulating and building material whose sales are increasing by leaps and bounds. Send for sample and descriptive booklet.

MASON FIBRE COMPANY
Dept. 628
111 W. Washington St., Chicago, Ill.
Mills: Laurel, Mississippi

Masonite

MANUFACTURED LUMBER FOR
STRUCTURAL INSULATION

BOOK DEPARTMENT

NEW ISSUE OF STANDARDS BY A. S. T. M.

A Review by
FRANK W. SKINNER, C.E.

UNTIL technical handbooks or pocketbooks for architects and engineers began to appear about 50 years ago, little was accurately known about the physical properties of building and industrial materials except what was found in generally inaccessible records of scientific investigations and published in more or less reliable text books. Builders and designers selected and proportioned materials largely in accordance with common practice, loose precedents, and their own arbitrary choice. They had little knowledge of strength and durability, especially under varying conditions, and scarcely any standards of quality except individual requirements, thus being practically obliged in large measure to steer a costly course between the Scylla of excessive strength and waste of material and the Charybdis of weakness, deterioration and disaster. In timber framing, in masonry and in structural ironwork this condition was acknowledged by the use of the famous "factor of safety," a sort of blanket insurance policy of allowing unit working stresses of from $\frac{1}{12}$ to $\frac{1}{2}$ the supposed breaking strength.

With the writing of standard specifications for wrought and cast iron and for iron structures, their publication and wider and wider acceptance by railroads and municipalities and their adoption by architects and engineers, more and more accurate and extended researches and records became available and were demanded until the recognition of the importance of accuracy and uniformity and the establishment of universal standards justified the creation of a great national society, representative of designers, producers and consumers. It is provided with funds and the endorsements of leading technical associations and equipped with the services of the most expert and experienced specialists who have systematically determined the strength and other qualities of the principal construction materials, established methods of testing them, and have fixed standard requirements for their essential properties that have been widely adopted by designers, manufacturers and purchasers to the vast promotion of the speed, safety, economy and durability of construction.

Every three years this society issues a new book of standards containing previous standards, any necessary revisions, and tentative new standards that are recommended for further application before final adoption. These standards are almost universally accepted and very widely adopted in manufacture and in specifications,

Any book reviewed may be obtained at published price from THE ARCHITECTURAL FORUM promoting great uniformity of quality and requirements and effecting an enormous saving of individual time and responsibility. This edition contains 340 standards, of which the first volume has for steel, 63; wrought iron, 9; pig and cast iron, 9; ferro alloys, 8; non-ferrous metals, 50; and miscellaneous subjects, 8. The second volume has for cement, lime and gypsum and clay products, 43; preservative coatings, 31; waterproofing and roofing materials, 25; rubber, insulation and textile materials, 25; timber and miscellaneous materials, 72. Structural steel for buildings is required to have a tensile strength of 55,000 to 65,000 pounds and a yield point of not less than 30,000 pounds. Concrete reinforcement bars shall be plain or deformed, each of three grades with tensile strengths varying from 55,000 to 85,000 and yield point from 33,000 to 50,000 pounds. Galvanized iron and steel sheets are classified in seven grades corresponding to the weight of zinc coating, and are tested for flaking. Wrought iron pipe must be made of a specified quality of iron, and have given thickness and weight for standard, extra-strong, and double-extra-strong; each end shall be threaded, and each piece shall have a threaded coupling. All pipes are subject to bending tests and to hydrostatic pressure tests of from 700 to 2,200 pounds according to kind and size from ⅛ to 12 inches inside diameter. Cast iron soil pipes of 2- to 3-inch diameter and 5-foot length shall weigh from 5½ to 20 pounds per foot, including hub, shall be made of tested iron, and shall endure hydrostatic pressure test of not less than 50 pounds. If coated, it shall be first heated to 300° Fahr. and dipped for two minutes in coal tar, pitch and oil.

First among the non-metallic materials is Portland cement, which must conform to several chemical requirements; must pass 78 per cent through a No. 200 sieve; must not set sooner than 45 minutes nor after 10 hours; must pass steam test for soundness, and must develop tensile strengths per square inch of 225 and 325 pounds in 7 and in 28 days respectively. For natural cement the requirements are much less severe, including the strength, which is only 150 to 250 pounds. Quicklime must contain given minimum percentages of calcium, magnesium, silica and carbon, and have not more than 15 per cent residue. Hydrated lime for plaster, mortar, stucco and for addition to Portland cement concrete must have the fixed composition and residue, pass the soundness test, and if used for finishing plaster, have a plasticity figure of not less than 200.

Seven specifications are devoted to gypsum and its products. They give composition and fineness of raw gypsum; chemical composition, proportion, setting time and strength of gypsum plasters; composition and fineness of gypsum plastering sand; descriptions, tests, strengths, weights, and joints of all board and plaster boards; dimensions, physical properties and tests of wall tiles. There are nine specifications for securing specimens and making tests of concrete and concrete aggregates. The specifications for hollow wall tiles classify them as medium, hard and soft, and permit maximum absorption of 15-28 per cent, minimum compressive strengths of 350 to 1,400 pounds per square inch, and specify weights, dimensions, weathering and fire resistances and workmanship and describe various tests. The floor tile specifications are similar, but their mini-

mum strengths vary from 850 pounds to 4,600 pounds.

The 30 specifications for preservative coatings include those for raw linseed oil, turpentine, zinc oxide, white lead, red lead, iron oxide, and other pigments. Properties, composition and methods of testing are given. The specifications for joists, planks, stringers, and posts, with an appendix, tables and formulæ for working stresses, afford a comprehensive treatise on the classification, properties, treatment, defects, and proper uses of timber that should be of unusual value in design and construction. There are 25 specifications for use of waterproofing methods and for materials and fabrics, and tests for roofs, walls, floors, etc. There are seven specifications for insulating materials and their proper tests.

AMERICAN SOCIETY FOR TESTING MATERIALS STANDARDS, 1927. Two vols., 6 x 9 inches, Published by the American Society for Testing Materials, 1315 Spruce Street, Philadelphia. Vol. I, 871 pages, $7.50. Vol. II, 1,000 pages, $7.50.

ELEMENTARY BUILDING SCIENCE. By Alfred Everett. 159 pp., 5¼ x 8½ ins. Price $2.50. Oxford University Press, 35 West 32d Street, New York.

PRESENT-DAY builders are confronted with the necessity of learning the best uses of countless new structural materials and likewise with becoming conversant with new methods of using in many instances materials which are well known. The excessive cost of building in any form today renders necessary the use of many economies and "short cuts" which are wholly legitimate, and likewise the avoiding of certain other means of saving which are not favored by careful builders. The responsibility, in fact, is not entirely that of building contractors, for architects, and particularly architects' specification writers, must assume their share of responsibility when it comes to securing the utmost in honest building for each dollar of the client's appropriation.

All this has brought construction to what the author of this work terms a "science." In the preface he says: "The title 'Building Science' has been adopted with a certain amount of hesitation. No new subject is implied, but rather the application of physics and chemistry to building and building materials and related problems. Mechanics, especially statics, is of fundamental importance, but has not been included, partly because it is more closely related to mathematics and should be taught in conjunction with that subject, and partly because it has already been dealt with in other published works. The text is mainly a selection of material, gathered in the course of many years' experience and from many sources, of scientific principles necessary for an intelligent study of building problems in general. The importance of practical work cannot be over-emphasized, yet inexperienced students often miss the essential conclusions to be drawn from an experiment owing to their want of familiarity with scientific apparatus. With this in view, the text is intended to serve as a summary of the results obtained by the experiments. It will be evident, therefore, that the exercises should first be carried out, and the preceding text will then form a connected account of the whole. In order to economize time, many of these exercises may be performed by the lecturer as class demonstrations, individual students being called upon to assist. A section on materials is included, not as a complete treatment of the subject, but to show the

Physical Properties of Paint

The two important components of paint are the vehicle and the pigment for upon them depend the life and wearing quality of the paint.

The Vehicle

Of all paint vehicles linseed oil is recognized as the best and most suitable to withstand wear and exposure.

Even if used alone, linseed oil provides a certain amount of protection as it adheres strongly to the surfaces on which it is applied. But this film soon wears away under the elements and abrasive action of dust, etc.

To increase its wearing capacity this film is made stronger by the addition of some solid substance known as the pigment.

The Pigment

Where the preservation of metal surfaces is the main object, first consideration should be given to a pigment that aids in preserving the original elasticity or "life" of the oil.

The pigment *must* be inert—that is, it shall not undergo any chemical change in use because such a change must cause the film to become pervious and lose its protective power.

The thickness of paint films is limited. Beyond a certain thickness the paint runs, or in drying forms a tough skin on the outer side leaving the inner portion soft. By preventing the access of air to the under parts this outer skin retards and even prevents thorough drying.

Flake Graphite as a Pigment

Flake graphite has proved, by far, to be the best pigment for metal protective paint. It is the only one of the carbon family that has the marked endurance necessary for a protective paint pigment.

Dixon's Silica-Graphite Paints are composed of boiled linseed oil for the vehicle and natural flake graphite for the pigment with the addition of small amounts of colors for tinting. They meet the above specifications in every respect.

It is absolutely inert and is not affected by the action of acids, alkalies or other deteriorating agents. It has the peculiar quality of "water repellancy" and as corrosion does not occur except in the presence of water or dampness, this is a strong point for its use as a pigment.

Silica is used to give the natural flake graphite still further endurance. Experience has shown that a mechanical mixture of silica and graphite is is no way equal to the natural combination as found in Dixon's Silica-Graphite Paints.

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The author, a well-known English structural engineer and a master in a widely known technical school, writes having in view present-day building in England, but there is little in his 15 chapters which is not equally applicable to building in America, and a careful study of the volume is recommended to architects, specification writers, builders, and indeed to anyone interested.

REAL ESTATE MERCHANDISING. By Albert G. Hinman and Herbert B. Dorau, Assistant Professors of Economics, Northwestern University School of Commerce; Research Associates in the Institute for Research in Land Economics and Public Utilities. With Introduction by Richard T. Ely, Director of the Institute for Research in Land Economics and Public Utilities. 363 pp. Price $6. A. W. Shaw Co., New York.

REAL Estate Merchandising" recognizes the business which renders service to buyers and sellers of real property as a profession. The authors in their work on urban land economics in the Institute for Research in Land Economics and Public Utilities realized the need for a thorough text book for the use of both the student in colleges and universities and the real estate dealer in the field. Their efforts to create an authoritative work have been notably successful, meeting the needs of both.

In undertaking a comprehensive treatise on real estate merchandising, the authors have recognized the student's need for an analysis of the fundamental considerations which motivate the profession of real estate merchandising, and have founded their book on an almost elementary discussion of the basic factors which cause people to buy and sell realty. At the same time they have not neglected the need of the active real estate dealer for practical guidance on the many problems which arise in the actual conducting of his profession, and hence the book peculiarly combines the features of a college text book and a practical business handbook. The value of this sort of treatment to the student cannot be overestimated, for while he is acquiring a solid foundation of elementary principles he is also acquiring a working knowledge of the practical problems which he will encounter when engaged in the actual practice of real estate merchandising. The elementary nature of some parts of this book would at first sight seem unimportant to the practicing real estate dealer, but a thorough study of the entire problem, as presented in this text book, would unquestionably be of greater value, even to the experienced broker, than a glance at the first chapters might indicate. Further on in the book an active broker would find much of a highly practical value in his daily work.

The first five chapters, covering only 48 pages, discuss in considerable detail real estate merchandising as a public calling and as a profession in the making, the requisites for success in real estate merchandising, realty as a merchandising commodity, and the real estate market. There is much of significance in the latter chapter which discusses, Why do people buy realty? What people buy realty? What realty do people buy? When do people buy realty? and the contro-questions of Why do people sell realty? What people sell realty? What realty do people sell? and When do people sell realty? Here in a few pages is given the real practical background of all real estate merchandising activity. Beginning with Chapter VI on real estate business administration, the book takes up in the five ensuing chapters the practical problems of organizing and administering an active real estate office. There is a chapter on multiple listing, and others on managing real estate, selling, selecting the salesmen and securing permanence in the sales force. The remainder of the book, beginning with Chapter XI, which is a brief analysis of the sale process, is devoted to selling and advertising methods as related to the active practice of the real estate profession. There are chapters on planning real estate advertising; selecting advertising mediums; constructing the selective appeal; writing copy and headlines; displaying the advertisement; advertising by mail; preparing the sales letter; and measuring the effectiveness of merchandising methods. Five appendices are included, giving the code of ethics of the National Association of Real Estate Boards, laws relating to the registration of real estate brokers and salesmen, and regulations concerning the multiple listing system. This logical division of the subject of real estate merchandising into its basic elements, its practical administrative problems, and successful merchandising methods, is commendable. The authors have recognized in their preliminary research work the need for translating the theory of the classroom into the practical problems of the active real estate office, and have embodied in their work a great mass of information obtained through questionnaires and interviews with many practicing brokers.

The close relation between real estate merchandising and the architectural profession suggests that this book will be of interest and value to those architects who have come to recognize the fact that their work is largely a corollary to real estate transactions. While the authors have given no special recognition to this relationship, it is definitely touched upon in the brief answer to the question, "Why do people buy realty?" People buy realty for their own use or for profit. When they buy unimproved realty for their own use, they plan to erect buildings for homes or for business purposes. When they buy realty for profit they either take improved property for its income or for re-sale, and very often for alteration and resale. People buy unimproved realty for profit with intent to erect buildings for their income from rents or for sale at a profit as well as to hold the property for re-sale without improvement at a higher price. A fair percentage of real estate transactions, therefore, are preliminary to beginning building or alteration projects. The architect who is thoroughly conversant with real estate problems may put his knowledge to excellent use through appreciating the opportunities for obtaining new business that result from the transfer of ownership of both improved and unimproved real estate.

"Real Estate Merchandising" is a most comprehensive and thorough text book on the broad field of real estate theory and practice. It has all of the characteristics of a standard reference book that will command recognition for many years, both in active real estate offices and in colleges and universities. To those who are now engaged in or plan to enter this important profession, the book will undoubtedly take precedence over all previous works on the subject. Real estate owners (present and prospective), investors, builders, and architects, will find in this work much helpful information and guidance in their contacts with real estate operations, and a new appreciation of the importance in our present-day economic structure of those who are professionally engaged in real estate merchandising in any of its many forms.

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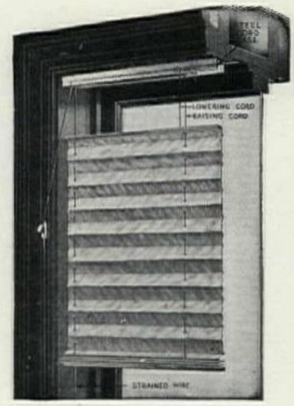

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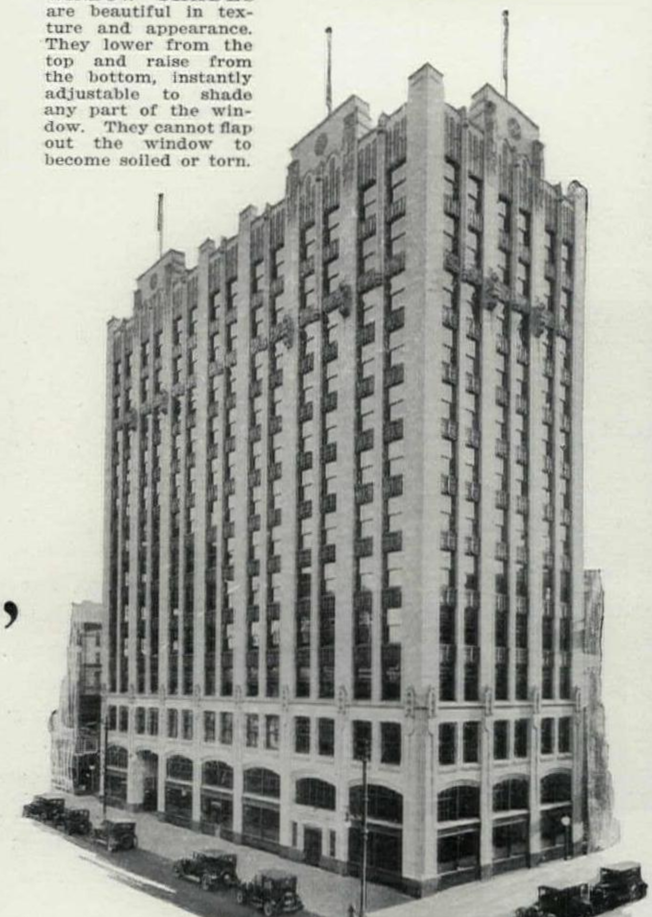

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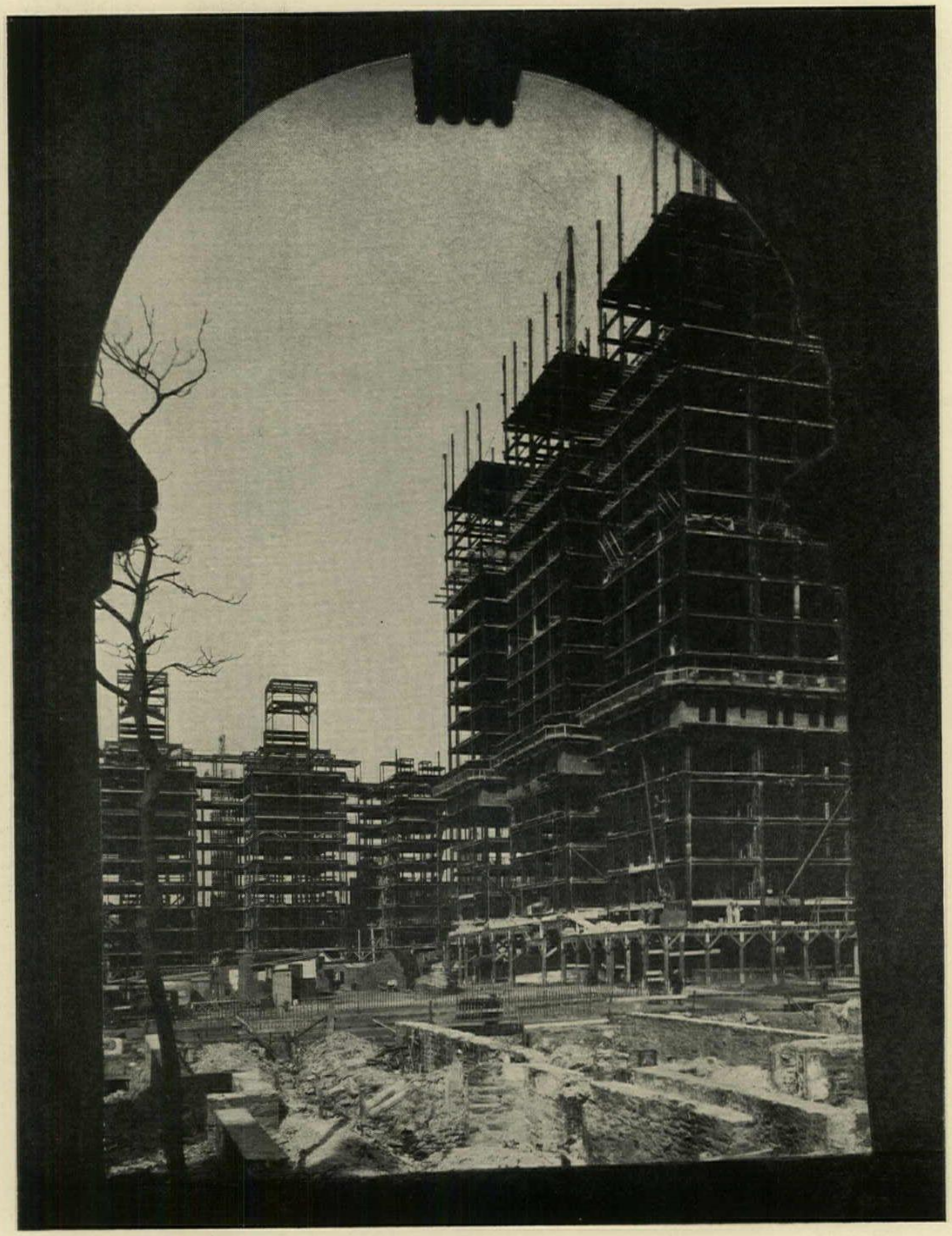
Published Monthly by
ROGERS & MANSON COMPANY
383 Madison Avenue, New York

Howard Myers, Pres.; James A. Rice, Vice-Pres.; Robert Sweet, Sec. and Treas.; Paul W. Hayes, Asst. Treas.
Yearly Subscription, Payable in Advance, U.S.A., Insular Possessions and Cuba, $7.00. Canada, $8.00. Foreign Countries in the Postal Union, $9.00

Single Copies: Quarterly Reference Numbers, $3.00; Regular Issues, $1.00. All Copies Mailed Flat
Trade Supplied by American News Company and its Branches. Entered as Second Class Matter at the Post Office at New York, N. Y.



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FRED F. FRENCH CO., ARCHITECTS

THE
ARCHITECTURAL
FORUM

VOLUME XLVIII NUMBER TWO

FEBRUARY 1928

OIL BURNING FOR THE ARCHITECT

PART 1. WHAT THE OIL BURNER IS AND WHAT IT DOES

BY
P. E. FANSLER
ASSOCIATE EDITOR, THE HEATING AND VENTILATING MAGAZINE

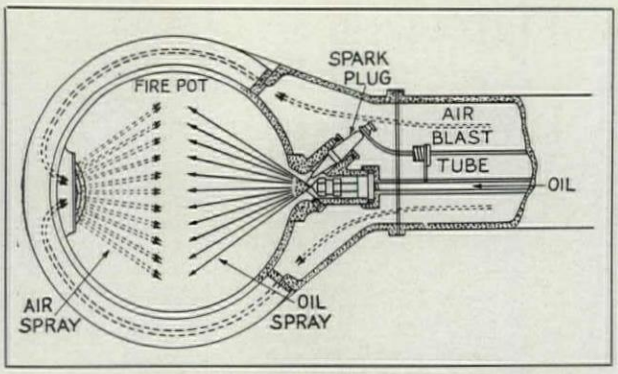
SO frequently is the architect asked by a client for data on the use of oil fuel for domestic use, or for a specific recommendation or opinion relative to this burner or another, that it has become necessary for him to acquire accurate knowledge of this subject. So many types and so-called types of oil burners are being exploited that the architect should be able to describe to his client in simple terms the basic principles of operation, the outstanding merits of the different types, and the definite limitations of this form of heat production. It is, therefore, proposed rapidly to sketch the essentials; then to summarize the pros and cons.

Of the houses built during 1927, it is estimated that 110,000 were constructed from plans and specifications drawn up by architects. If each of these houses had been equipped to burn oil, at an average cost of $700, these home owners would have invested, in the aggregate, $77,000,000,—rather a large sum to be expended on the basis of the architects' recommendation of oil burners. As a matter of fact there were installed, during 1926, by 26 leading manufacturers, 77,000 burners, representing an aggregate cost of $64,000,000, and the business of 1927 probably was not far from 140,000 burners, worth $115,000,000. It is impossible to determine what proportion of the burners marketed last year was installed in new houses, but there is evidence that the architect is an important factor in this comparatively new field of endeavor.

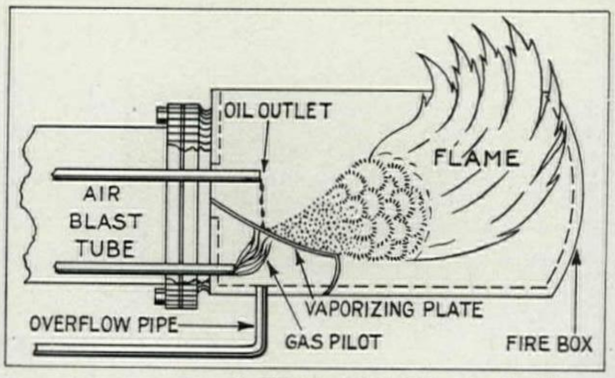
This summary does not take into account the simple and cheap atmospheric burners, directly gasifying the oil, and depending upon chimney draft for the air supply. Some burners of this type are really remarkable little devices. They burn light oils with comparatively high efficiency. They frankly are for the man of small means; require periodical cleaning; usually are manually controlled, and are not suited to anything but smaller houses. Many of these devices, however, are little more than smudge-pots, and are manufactured and marketed by men with little or no knowledge of the science of oil combustion; they consist of a few rough or semi-finished castings, and are sold for cash, with no thought of service or possibility of come-back. The atmospheric burner has had its genesis and its greatest distribution throughout the oil-producing section of the southwest, where oil is cheap and where not infrequently the home owner burns oil from his own well. It is not an important factor, outside of the oil-producing areas, and is seldom considered by an architect.

The Modern Automatic Mechanical-draft Burner. The domestic oil-burner type of today uses an electric motor varying from 1/10 to ¼ h. p., to drive a blower or fan which furnishes air for combustion at a definite rate. Usually the motor also drives a pump that draws oil from the storage tank and delivers it to the burner at a rate that gives the best heat-transfer results with the boiler or furnace in which the burner is installed. One mark of a first class burner is its ability to control accurately the flow of oil and air in an unvarying ratio, exactly as determined by the expert who adjusts the burner when it has been installed. The typical burner of the present time is characterized by intermittent operation; perhaps, from the standpoint of the home owner, it is more to be desired than the constantly functioning burner, although, with all its super-human automatic starting and stopping, under the guidance of a thermostat located in a distant part of the house, it is a moot question whether it is the more desirable from a technical standpoint.

Every Oil-burner Installation a Problem in Heating Engineering. One of the greatest mistakes that have characterized the merchandising plans of more than one manufacturer has been the belief that selling oil burners is just like selling anything else,—merely merchandising a commodity. The truth of the matter is that heating plants in homes, office buildings, hotels and schools should be, and nearly always are, engineering projects. Consequently, the installation of a highly specialized device for burning liquid fuel adds an engineering problem that must be worked out on the basis of what has already been designed and put in. An appreciation of this fact must precede oil-burner development, as trouble invariably will follow its disregard. An



Fire Pot Type of Burner in Which Air Blast and Oil Blast Enter the Fire Pot from Opposite Sides



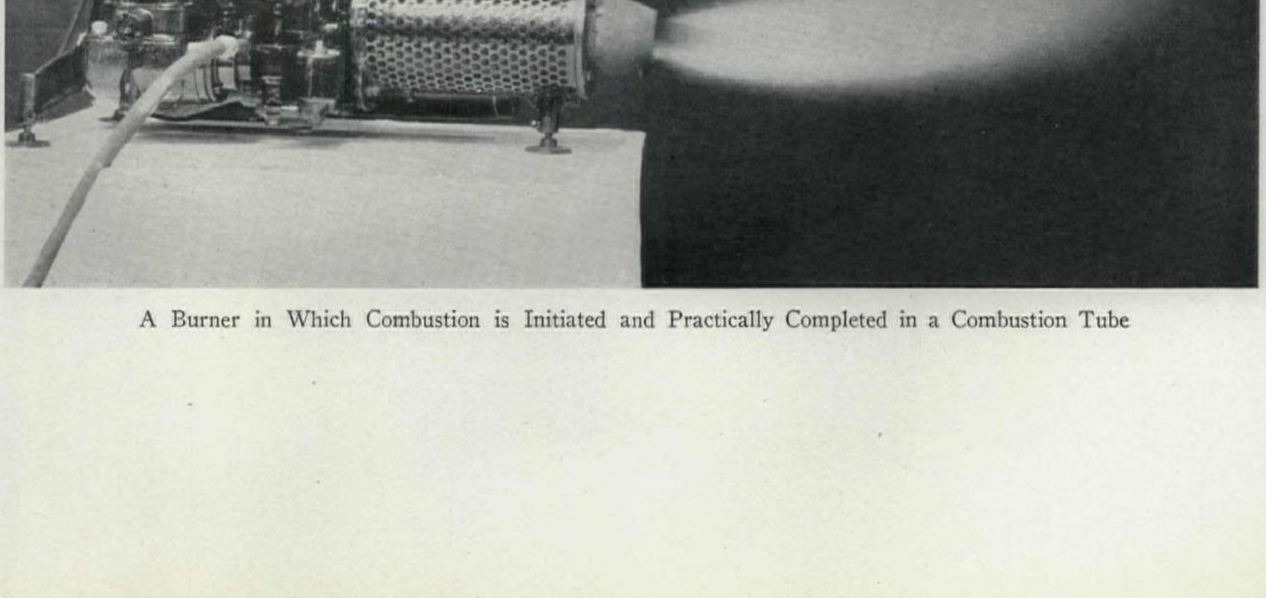
Vaporizing Pot Type in Which Oil is Directly Gasified on Drip from the Open End of a Pipe

oil burner certainly cannot be considered adapted to any and every heating plant; neither can it be hailed as a panacea for sick heating plants that have not given satisfaction. It is probable that no small portion of the sales resistance that has been encountered in the past has been due to over-enthusiasm on the part of agents, nearly all selling on a commission basis, and eager to promise anything to get the signature on the dotted line.

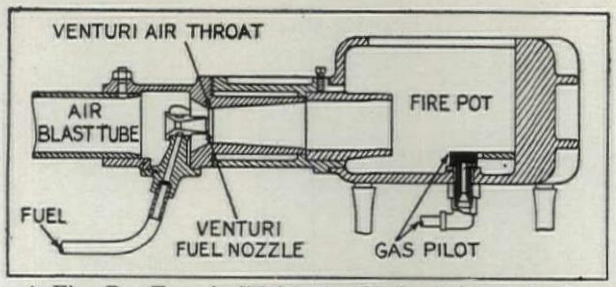
First Principles of Oil Combustion. In the first place, the so-called oil burner does not literally burn oil, as such, at all. Oil sold for domestic heating, like gasolene, is a hydrocarbon, derived from crude oil by the process of distillation, and it will not burn until changed into gaseous form and mixed with air. The carburetor of an automobile performs this function of gasification by drawing air through or over gasolene. The oils used for domestic fuels are much more difficult to change into gas, and frequently require heroic treatment. Consequently, the oil burner is, first of all, a mechanism for converting liquid hydrocarbon into gaseous hydrocarbon. This gaseous hydrocarbon differs, in one essential, from the manufactured gas that is so rapidly developing as a house-heating fuel,—it is not "stable" at ordinary temperatures, and unless maintained in a heated state quickly reverts to liquid form. So it must be made only at the rate at which it is required. In the intermittent type of burner the mechanism is dormant as long as the temperature in the house remains above the point at which the thermostat is set. When the house cools one or two degrees below that point, the operation of the thermostat causes the burner to begin to make oil-gas at a definite and predetermined rate, and to ignite this gas in the combustion chamber or firepot of the boiler or furnace.

The rate of combustion usually is such that the boiler operates at or near its point of highest efficiency. When sufficient heat has been developed to bring the temperature in the building back to one or two degrees above the desired point, the thermostat again acts, this time to stop the production of gas; consequently, the production of heat halts until the temperature again drops. So the burner "floats" intermittently, producing heat to match the more or less steady loss of heat from the building.

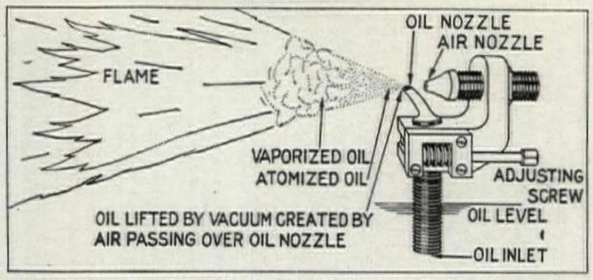
Gas-making and Combustion Are Automatically Initiated. There are, then, two essential functions of this type of burner,—the production of a gas-



A Burner in Which Combustion is Initiated and Practically Completed in a Combustion Tube



A Fire Pot Type in Which the Oil is Atomized in the Throat of a Venturi Nozzle

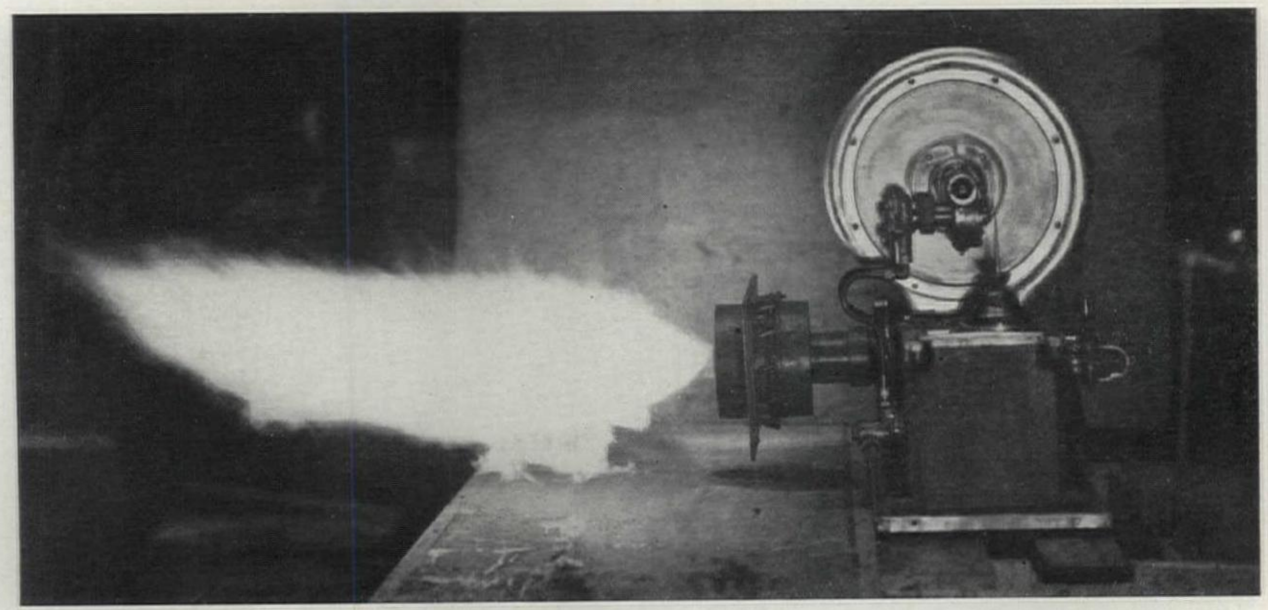


Atomizing Device Similar to Dressing Table Atomizer in Principle

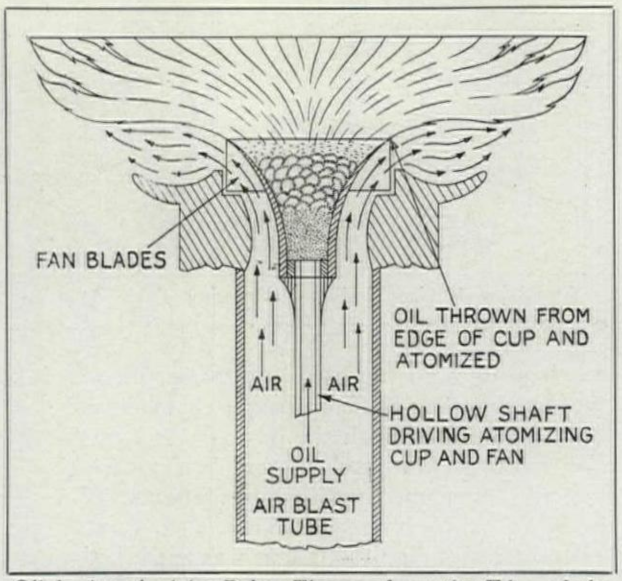
air mixture, and its automatic ignition. Now there is only one way that oil can be changed into gas, and that is through heating it. Atomizing the oil or breaking it up into minute globules is merely a preparatory step, vastly increasing the surface of a given quantity of oil. This increased surface allows heat to act more quickly on a given volume of oil than if it were in a single large sphere, or in a sheet, or even spread out in a thin film. When a burner of this type starts, ignition is accomplished through a hot electric spark or a gas-pilot flame. The heat from either of these gasifies the oil globules close to the point of ignition, and combustion almost instantaneously spreads through the entire jet of atomized oil. The radiant heat from the flame quickly heats the refractory lining of the combustion chamber, in whatever form it exists, and this heat is reflected back and performs a useful and necessary function in speeding up the gasification of the oil globules. It is highly important that none of these tiny drops of oil strike any part of the boiler walls, as they would quickly build up a film of soot, and soot is a most excellent insulator which would soon reduce the efficiency of the boiler as a heat-transfer device.

Air and Oil-gas Proportions Should be Definite. It is obvious that a prime function of the burner mechanism is to cause a definite amount of air to be introduced to the combustion chamber and there intimately mixed with the oil-gas. It is impossible for a burner to produce complete combustion if exactly the theoretically correct amount of air is admitted; there must be an excess over the theoretical amount required, but as was aptly said, "there must not be a ***surplus*** of excess air." Between 25 and 50 per cent excess air will be needed with most burners, although as much as 100 per cent must be used with burners of poor design. The metering devices, then, must be extremely accurate in measuring the amounts of air and of oil fed to the burner. When the burner is installed the setting should be made only on the basis of flue-gas analysis made with an Orsat apparatus. This will indicate the degree of combustion efficiency obtained, and the burner, once set at the optimum point, should not be disturbed. It is a pretty safe gamble that any manufacturer, or his representative, who insists on making an examination of the heating plant before definitely signing up for the burner, and who checks the efficiency of his burner by an actual flue-gas analysis, can be relied upon to deliver a satisfactory equipment.

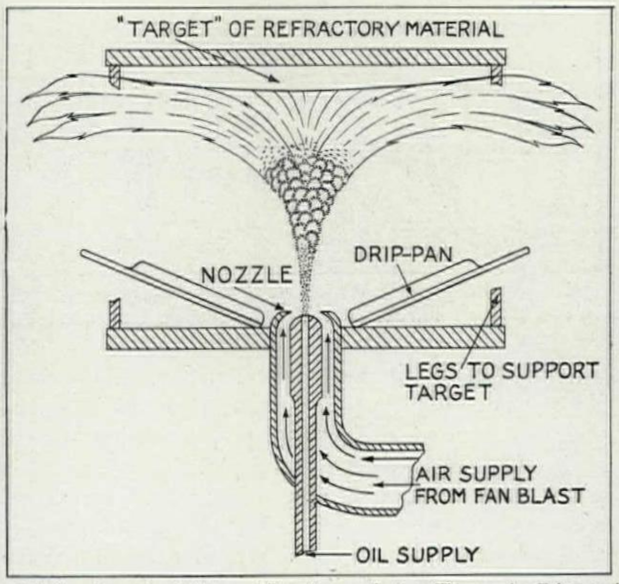
Vital Features of Leading Burner Types. There are so many types and styles of burners that it



"Gun" Type Burner, Atomizing Oil by Throwing It from the Edge of a Rapidly Revolving Cup



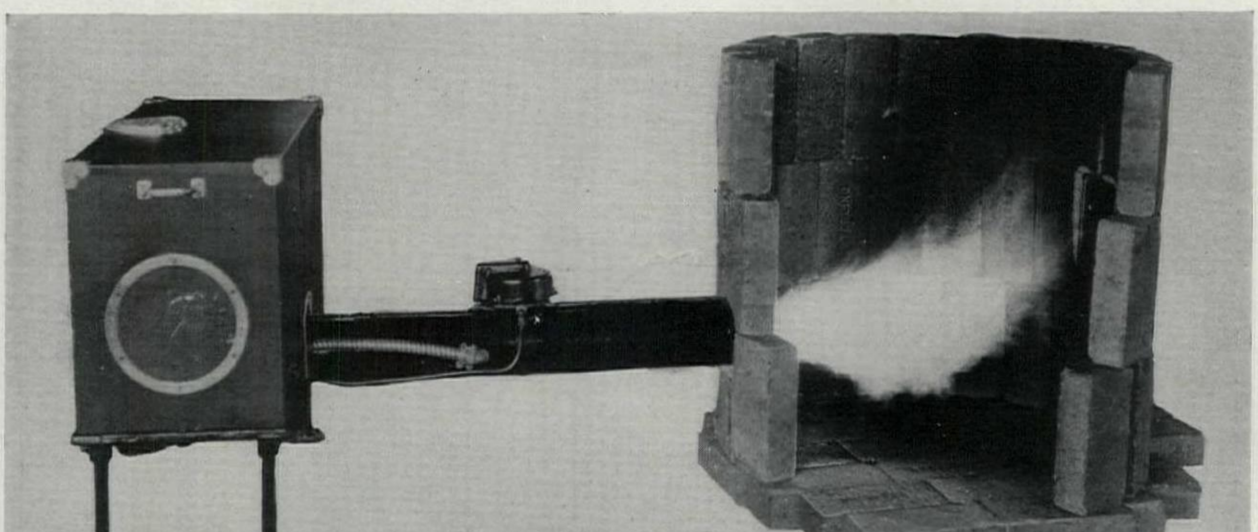
Oil is Atomized by Being Thrown from the Edge of the Vertical Chalice-Like Cup Which is Rapidly Rotated



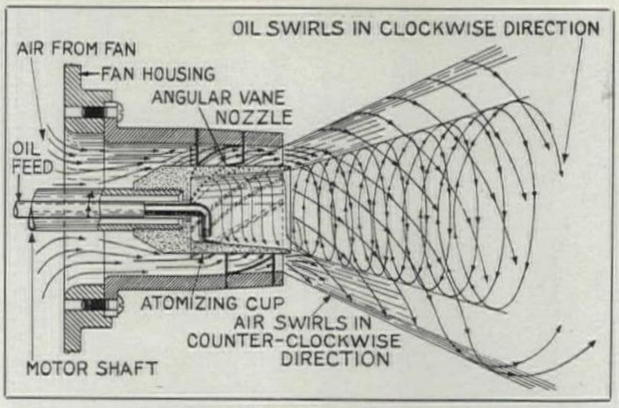
Oil is Atomized by a Nozzle, and the Flame is Directed Against a Refractory Target Above

is practically impossible to classify them in any completely satisfactory way; suffice it to mention the more important, and comment on their salient features. Two of the earliest types, dating back at least a quarter of a century, are "the rotating cup atomizer" and the "nozzle atomizer" using compressed air to break up the oil. The latter type followed the burners developed for navy use, but were better adapted to larger units than were required for domestic heating. The use of the rotating cup at the end of a horizontal shaft, atomizing oil by feeding it to the inside of the cup and throwing it from the sharp edge by centrifugal force, had its genesis on the Pacific coast, and had extended use long before oil was used as a domestic fuel east of the Mississippi River. This type has long been so well developed that at a recent exhibition of burners one manufacturer showed a 1917 model beside another of the 1927 vintage, and only careful examination of details showed any change. This type of burner has one distinct advantage in that it can be used with almost any fuel oil that can be burned. It produces a conically-shaped flame that can be flared, when installed in a wide firebox, and lengthened, when set in a long and deep boiler. One manufacturer ships from California to an eastern distributor by way of the Panama Canal. The tiny burners destined for Long Island homes are carried in steamers that are fired with huge burners of the same make.

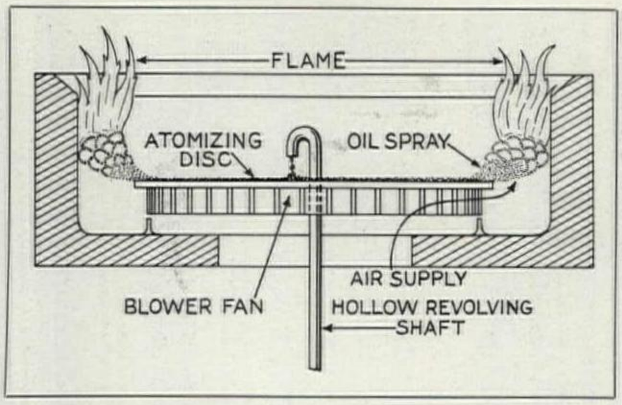
A later development of this type of burner provides for a vertical revolving cup set in the center of the chamber, at the grate level, and driven by a motor set outside of the boiler, the drive being through spiral gears. The cup, in this case, has a wide, flaring mouth, so that the oil is thrown



A Burner Typical of Several Makes, Atomizing Oil at One End of a Blast Tube



Oil Thrown from a Revolving Horizontal Cup Mixes with Counter-Revolving Air. This Produces a Flame Similar to that Shown at Bottom of Page 252



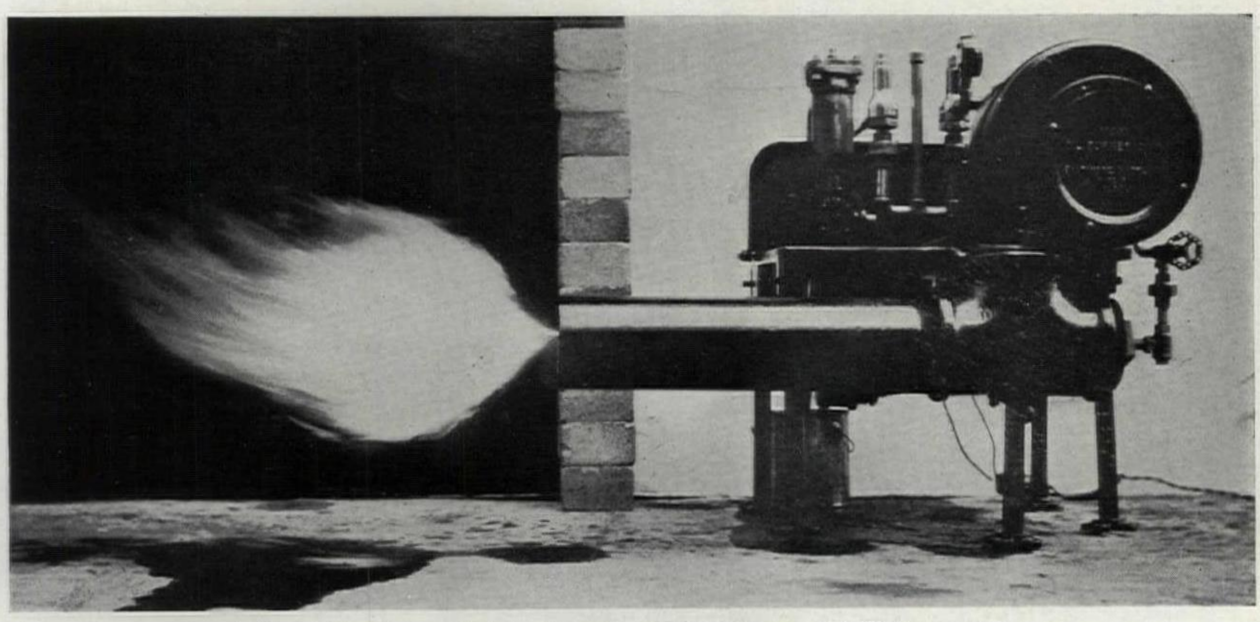
Oil Carried Through a Vertical Shaft is Delivered to a Revolving Horizontal Disc and Gasified by the Radiant Heat from the Surrounding Refractories

in an almost horizontal sheet. Another design flattens the cup to a revolving disc driven in the same manner and handling the oil in the same way. Several small burners use modified discs or cups, but the drive is direct from a motor placed vertically in the ashpit.

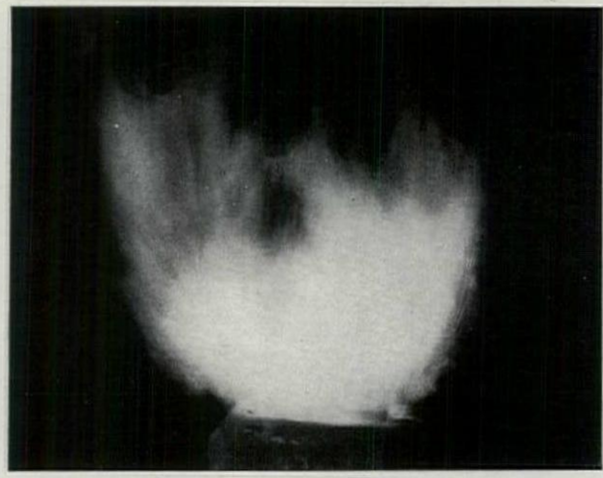
The "Gun" Type. Then there is the "gun" type burner, in which an air blast is carried in a horizontal tube set with its end projecting into the lower part of the boiler, usually through the ash-door frame. In this tube is a rotating cup driven by a set of vanes on its outer surface, against which the air blast acts. Oil is fed into the cup through a hollow shaft, and is atomized by being thrown from its periphery. Again, this type follows the huge burners developed to use heavy oils in large boilers. Another well developed burner utilizes the simple principle of the dressing table atomizer. A small vertical tube is set with its lower end dipping into a sump containing oil maintained at a fixed level. The air blast directed across the upper end of the tube draws oil from the sump and atomizes it by the force of the blast.

Developed for the Steam Car,—Now Leading Domestic Burners. Distinctive types of burners for domestic heating were the offspring of burners first developed for use in steam automobiles. These were the first types to be automatically started by a thermostat, and the idea of dispensing with manual attention and having the burner started through the action of the thermostat, and intermittent in operation, has generally been "sold" to the American public. From one of these types has sprung the "combustion-pot" burner, in which combustion is initiated and partially completed in a metallic pot, sometimes lined with refractory material, the pot taking the place of the bricked-in combustion chamber. Yet another type of burner brings about atomization by forcing the oil through a small orifice, or by drawing it through the throat of a Venturi tube,—a passage having a restricted section forming a neck. The ingenuity of American engineers has produced an almost incredible number of modifications of the various essentials of burner design.

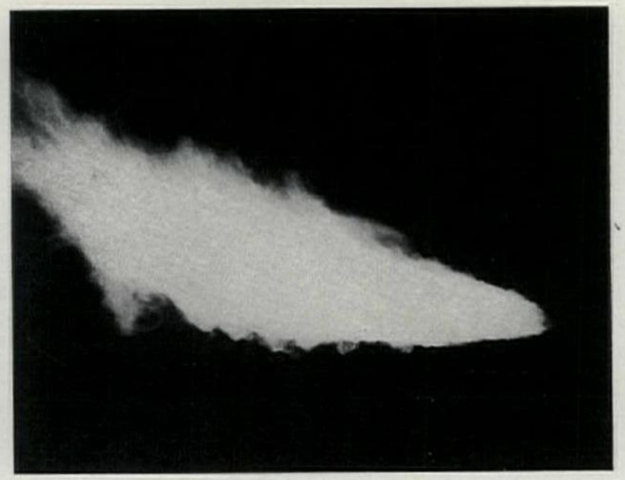
The Controls Are Really Super-human. Probably the most fascinating phase of oil-burner his-



A Blast Tube Burner Made up Largely of Usual Commercial Fittings and Parts



The Extended Flame of a Pot Type Burner Using Flue Gases to Slow Down and Quiet Combustion



Flame Produced by an "Atomizer Type" of Burner Similar to that Shown in One of the Diagrams on Page 251

tory has been the development of the controls by which the burner's functioning is governed. Assume that it is required to start a burner, where a small gas flame is maintained as a pilot, and where this flame is expanded to produce a large hot flame that will insure ignition. Oil is to be atomized by forcing it through a hole in a nozzle. Also it is desired to safeguard the operation, so that if for any reason ignition is not accomplished, the burner will not continue in operation, squirting raw oil into the combustion chamber. A tiny electric motor drives, through a train of gears, a slowly revolving plate of bakelite, into which are moulded circular arcs of copper. Bronze fingers rest on the disc in such a way as to complete electrical circuits through the metallic portions. The living room, in which the thermostat is located, grows colder than the temperature at which the thermostat is set. The contraction of the thermostatic element closes the circuit to the little motor, and it starts rotating the slowly moving disc. A finger makes a contact, and the burner motor starts, building up air pressure with the blower and oil pressure with the oil pump. At the same instant another circuit is closed, opening a magnetic gas valve and causing the small pilot flame to expand. By this time the oil pressure has built up to the required degree, and the oil nozzle opens. The atomized oil is blown into the gas flame, gasified by its heat, and the combustion reaction between the oil-gas and the air from the blower is initiated. When sufficient time has elapsed to provide for the ignition, the gas valve is automatically closed and the gas flame dies down to a minute pilot, consuming very little gas. Suppose, however, that combustion had not been brought about, possibly because the gas pilot had been extinguished or because the gas supply had been cut off. An interlocking control is located in the stack, and unless this is heated to a definite minimum temperature in a definite number of seconds after the burner motor starts, it acts to shut down the entire burner, and it cannot again be started until the trouble has been remedied, thus insuring safety.

Of course this control device must go through a definite cycle; each operation must be in its proper order and with definite timing. Therefore, human ability has been transcended in its design, and if something should happen to stop the control device before it has completed its cycle for starting the burner, such as an interruption to the electric service, the control on the resumption of service would immediately move to the starting point of the cycle and go through a complete program to put the burner in operation properly.

Protection Against Human Error. Again, there has been provided a safeguard against the home owner who likes to "air out" the house. If the windows of the room in which the thermostat is located are left open for any length of time, the thermostat will start the burner, and it will continue to generate heat in the boiler with no chance of the thermostat's shutting off the burner, because the room cannot be warmed up with the windows open. Under such conditions it might easily be possible for the burner to generate enough heat to lower the water line in the boiler and cause serious damage. But a little safety device, located just inside of the boiler wall, is interlocked with the burner control, so that as soon as the water or steam rises to a definite temperature, the burner is shut off, regardless of the fact that the thermostat may be calling for heat. In this way the owner of a burner is protected even from his own carelessness, and it is no wonder that with such operation and control, the use of fluid fuels is rapidly spreading throughout the United States.

The April issue of THE ARCHITECTURAL FORUM will set forth in detail the usual clients' questions, and will give specific information on which the architect may rely in giving answers to his clients, who so often depend entirely on his counsel in the matter.

Editor's Note. Diagrammatic illustrations used through the courtesy of Good Housekeeping Institute.

THE DEEPEST FOUNDATIONS

BY

FRANK W. SKINNER

CONSULTING ENGINEER

THE efficiency of the great industrial furnaces now in use made possible column loads that necessitated footings below a deep stratum of treacherous clay underlying the Cleveland Union Terminal Building. The tallest of subterranean piers were built there in open wells safely excavated far beyond previous foundation limits notwithstanding increasing dangers of crushing, flooding, fire and explosion, 260 feet below the surface. Not until about the beginning of the present century were there developed the great furnaces that can properly heat huge steel ingots. Not until these great 10-ton castings could be heated almost white-hot was there perfected the structural steel that alone makes possible the metropolitan skyscraper. Not until buildings towered to heights of from 20 to 50 stories did their column loads produce such enormous concentrations of weight on the foundation piers that nothing short of solid rock bearings is satisfactory footing for them.

In the public square in Cleveland, where the

Cleveland Union Station

Graham, Anderson, Probst & White, Architects

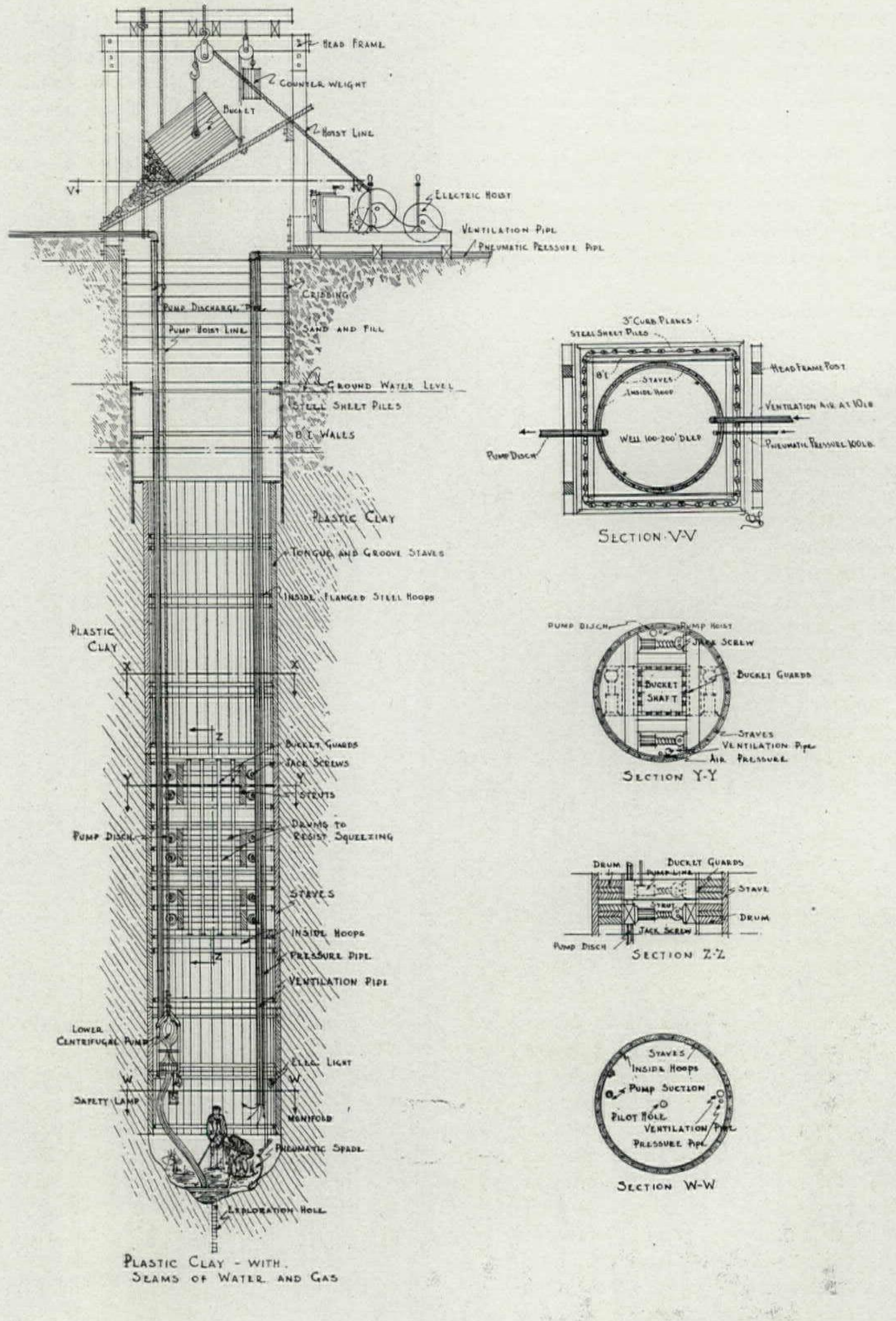


DIAGRAM SHOWING METHOD OF SINKING THE DEEPEST FOUNDATIONS
CLEVELAND UNION STATION
GRAHAM, ANDERSON, PROBST & WHITE, ARCHITECTS

$11,000,000, 52-story Union Terminal Building rises to a height of 708 feet above the street, bedrock is more than 250 feet below the surface, and to carry the foundation to it there was required much deeper excavating than has ever been done for building foundations,—deeper indeed than the deepest of open dredged caissons, more than the penetration of the longest piles that have determined previous maximums, and far deeper than the utmost limits of pneumatic caisson work below water levels which have measured, in millions of dollars, the cost of many of the great New York buildings, where it was necessary to pass through no more dangerous quicksand to reach the rock only 100 feet below the earth's surface. The conditions were somewhat similar to those in Chicago, but far more difficult and dangerous in that the required depth in Chicago is much less, and the deadly methane gas is not encountered. The safe, rapid, and economical construction of the 87 main foundation piers of the Union Terminal Building is therefore an achievement of the first magnitude, of high importance to the architectural profession, that was accomplished by the vision and courage of the designer, supplemented by the ability of the builders and the skillful use of the best standard methods and equipment, all ably coördinated.

The great building, facing two sides of the public square and covering a 260 by 300-foot irregular area of more than 71,000 square feet, provides 560,000 square feet of rentable floor space in its 120 by 120-foot tower and in the remainder of the structure extending two stories below street level. Its 17,000-ton steel superstructure is supported on 87 very deep and slender concrete piers from 4 to 10½ feet in diameter that extend to a maximum depth of 210 feet below the bottom of the general excavation, itself 52 feet deep. The excavation to subgrade of the great basement pit, drained to half-mile ditch by four pumps that with their motors were movable on small trucks, required the removal of many thousand yards of earth, handled by steam shovels that later were used to load the 20,000 yards of muck from the deep foundation pits and to handle the steam hammers with which hundreds of tons of sheet piles were driven to line the upper parts of these pits.

When the excavation reached the surface of the great bed of water- and gas-bearing plastic clay, a particularly highly developed system of excavation was adopted; numerous small but powerful and rapidly working spades cut away the tough clay, leaving the smooth vertical sides of the circular wells, which were immediately covered with 4- and 6-foot vertical tongue and groove wooden staves forming short, complete cylindrical sections held in place by inside top and bottom steel rings. Section after section of this lining was built, from the top downward, as the excavating progressed, and after the clay had been exposed to the atmosphere it gradually began to swell, exerting sometimes such a powerful squeeze that it was necessary to brace the sides of the wells with many adjustable horizontal diaphragms having

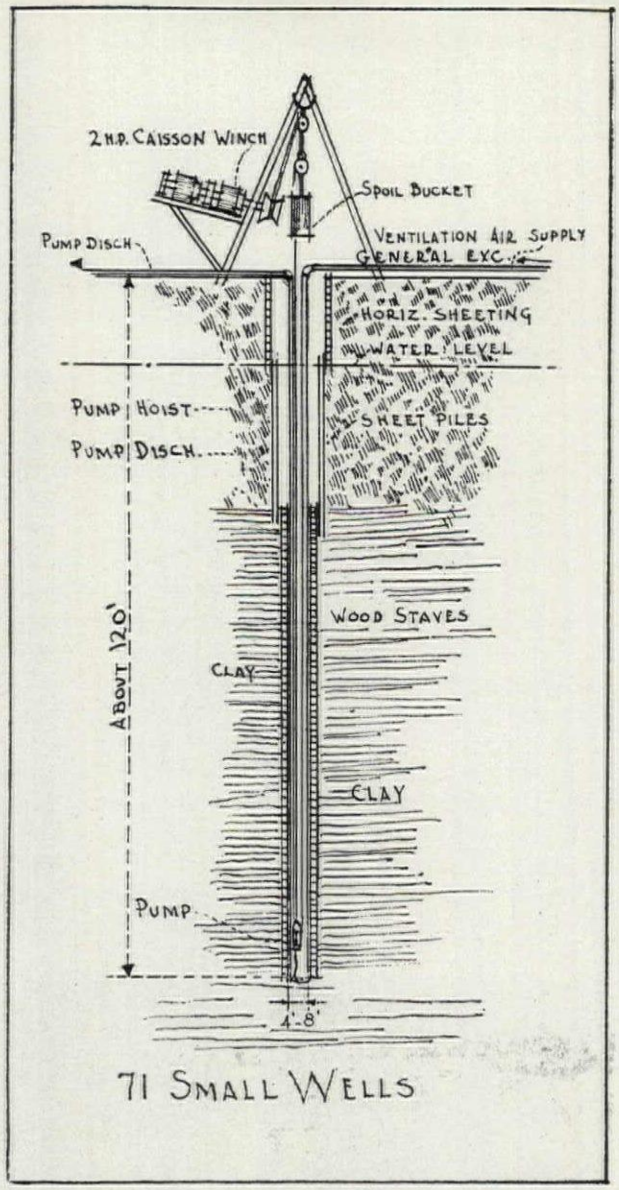


Diagram Showing the Method of Sinking the Small Wells

pairs of powerful jackscrews frequently operated to maintain the required diameters of the shafts.

Great quantities of water, flowing through seams in the clay, threatened to drown out the workmen, and were removed by powerful centrifugal pumps which, mounted with their 16-horse power electric motors in narrow frames, were suspended in the wells and were capable of delivering 200 gallons per minute to a height of more than 100 feet. At depths of more than 100 feet the first pump remained stationary while a duplicate was lowered successively to the bottom of the well and discharged into its section pipe so that the upper pump acted as a booster and was able to deliver to the bottom of the general excavation, where its discharge was disposed of to a drainage ditch. The 20,000 yards of muck, excavated by the handful, was hoisted from the wells in cylindrical buckets operated by 26 electrical hoists of from 2 to 20 horse power, raising it at a speed of from 100 to 130 feet per minute, the same muck buckets serving for the ordinary ascent and descent of from one to four workmen in each well.

Most insidious and dangerous of all the difficulties encountered was the heavy flow of methane gas that entered the wells at a depth of 190 feet or more below the surface and which, although colorless, odorless and tasteless, was detected both by observation of its bubbles, rising through water that filled the 3-inch pilot holes driven in advance of the general excavation, and by the action of the safety lamps that flickered when a very small quantity of the gas was present and that were automatically extinguished before it accumulated sufficiently to be dangerous. This gas, which is poisonous, inflammable and explosive, has for many years been encountered in the same stratum in Cleveland, where on former occasions it has cost many lives. The contractors were therefore forewarned and safely disposed of the gas by the installation of a 1000-foot blower that poured large quantities of pure air at 10-pound pressure into the bottoms of the wells, thus diluting and sweeping out the gas, an operation that was supplemented by the exhaust of high-pressure air from the pneumatic spades and by the almost continual motion of the large buckets passing up and down in the narrow wells. Notwithstanding all of these precautions, even after the gas had been removed from one of the wells, the quantity was so great that before it was dissipated in the general excavation it was ignited by an accidental spark and burned a number of workmen.

The smallest wells were carried to a depth of about only 100 feet, where they terminated in a hard stratum of the clay; 16 of the largest wells were carried down to bedrock, which was dressed down to a depth of 8 or 10 feet to prove its soundness and thickness. When satisfactory bottom was reached, the wells were fixed with solid masses of concrete mixed at a maximum rate of 750 yards per 24-hour day in a machine operated by an engine and discharging 1-yard batches of concrete to the distributing system, which consisted of a 240-foot steel tower in which the concrete bucket was hoisted and delivered to several hundred feet of steel chutes, supported on counter-weighted suspended trusses, and hung from a high line cable. This flexible system, commanding every part of the general excavation, delivered not only to all of the wells but also to the forms for the massive concrete retaining wall that protected the high sides of the pit.

Notwithstanding the installation of the abundant mechanical equipment, the experienced subway and foundation builders of New York who were the contractors for the substructure employed a force of about 250 men that, most of them working continuously in three 7½-hour shifts per day, completed these foundations and also some minor foundations, constructed with 54 steel piles, 16 inches in diameter and from 20 to 30 feet deep, in about nine months at a cost of $500,000, which compares favorably with the cost of many foundations of not one-half this depth, an achievement of no mean size.

Square and Tripod Head Frames Over Many Wells for the Foundations

CONCEALING THE RADIATOR

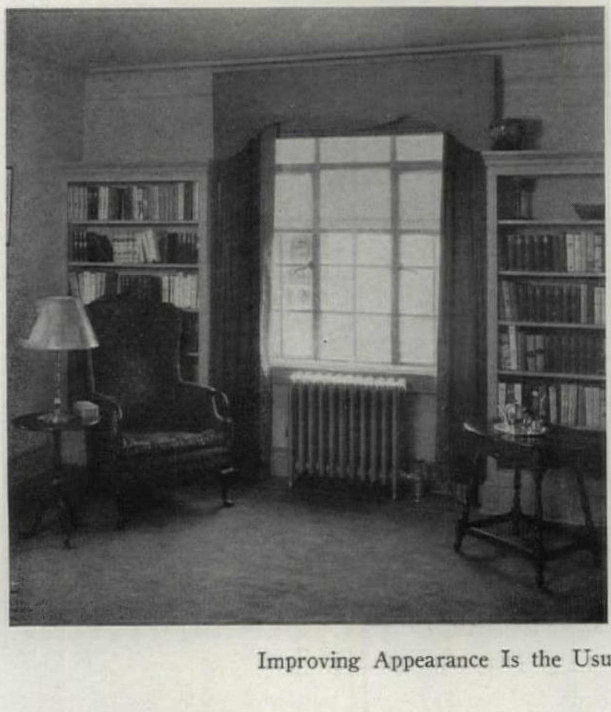
BY

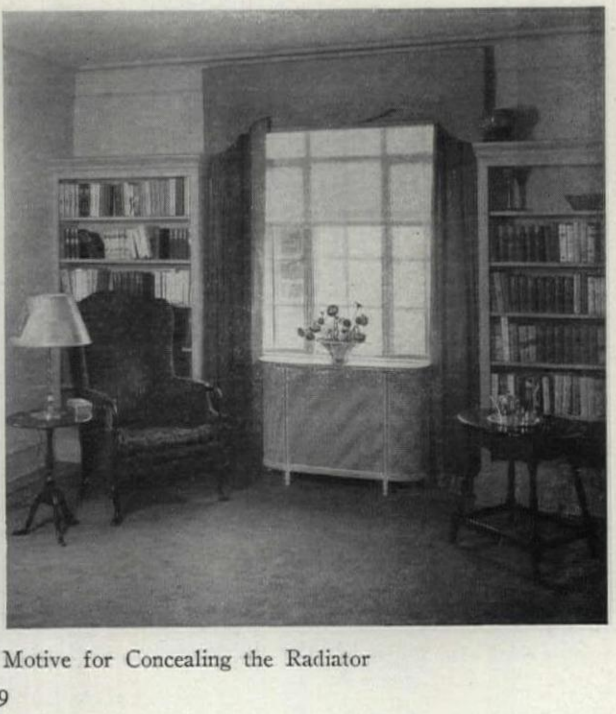
ROBINSON V. FROST, C.E.

FROM the first there has been a persistent effort to get radiators out of sight. The radiator has never been able to supersede the fireplace or even the parlor stove as a focal point for the home circle, for as yet we have been unable to invest it with a personality; hence, while we recognize its usefulness we cannot accept it on that ground as a member of the family circle. Likewise it has failed to gain acceptance as an article of furniture, or even as a part of the decorative treatment. As the latter it has most insistently demanded recognition,— first as an ornate piece of art, highly embellished with supposedly artistic designs, and then, as the manufacturers recognized the trend of public sentiment, with the lines simplified, until today we have the slender tube type of radiator in which the straight line and plain surface are emphasized. Notwithstanding the appearance of the more clean-cut and dignified design that more easily harmonizes with its surroundings, the practice of concealing the radiator has grown with such strides that today the development of the concealed type of radiator is looked upon as the next step in the progress of the science of heating.

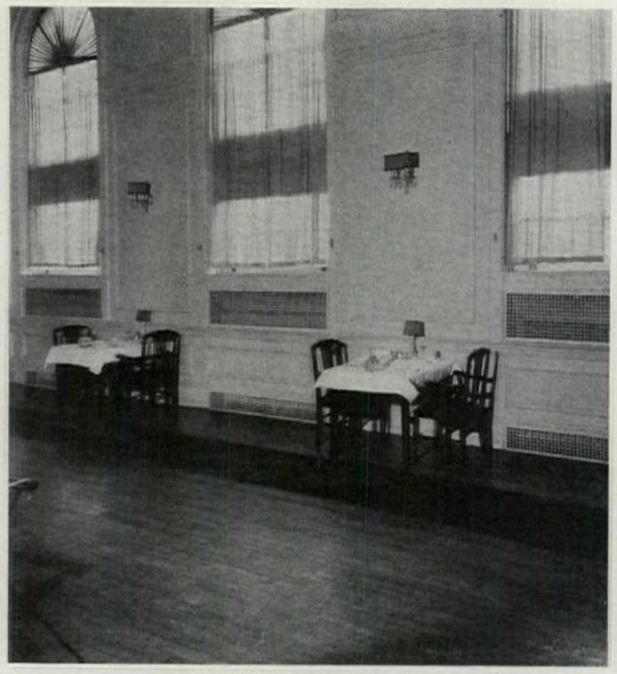
While the concealed type of radiator is rapidly becoming important, we cannot speak of it as having "arrived" commercially, for the development of those types of radiators designed specially for concealment is in a state of flux, and the sale of such radiators is still but a small part of the total production. The other phases of concealed radiator practice, those of building in recesses or using enclosures as parts of the architectural treatment for the partial or complete concealment of the cast iron type of radiator, have grown with enormous strides. To this practice may be attributed not only the rapidly growing development of the type of radiator designed especially for concealment, but also the development of the portable type of enclosure or cabinet now sold by furniture, hardware and department stores. But probably the greatest increase is in the number of radiators that are enclosed as parts of the building construction. One hardly realizes the demand that exists at the present time for this type of enclosure. The only indication that we have of the extent of this demand is in observing the great variety and the great frequency of these installations. In the finer type of residences, in office buildings, and in public buildings of every description where architectural beauty has been featured,—churches, theaters, auditoriums, art galleries, libraries, college buildings, hotels, clubs, restaurants, stores, banks, railroad stations and the like,—one can see every day installations of direct cast iron radiators concealed in built-in enclosures.

Of course these installations are made where first cost is not the primary consideration and where there is a demand for beauty and harmony rather than for bare utilitarian requirement, for one who conceals the radiators faces not only the additional cost of enclosure, which is frequently higher than the cost of the installed radiator, but also faces the probability that he will be required to install at least 25 per cent more radiation to give the required capacity. Consequently, the concealed radiator presents a problem that requires the attention of the architect, for installations that do not require his supervision are very infrequent. The architects deserve full credit for this movement, which is now looked upon





Improving Appearance Is the Usual Motive for Concealing the Radiator



A Concealed Radiator Installation That Has Proved Efficient as Well as Sightly
Harry Gordon McMurtrie, Architect

as likely to become one of revolutionary character to the entire heating industry, for it was they who first voiced the demand for concealment of the radiator, and it is they who have continued to insist upon it.

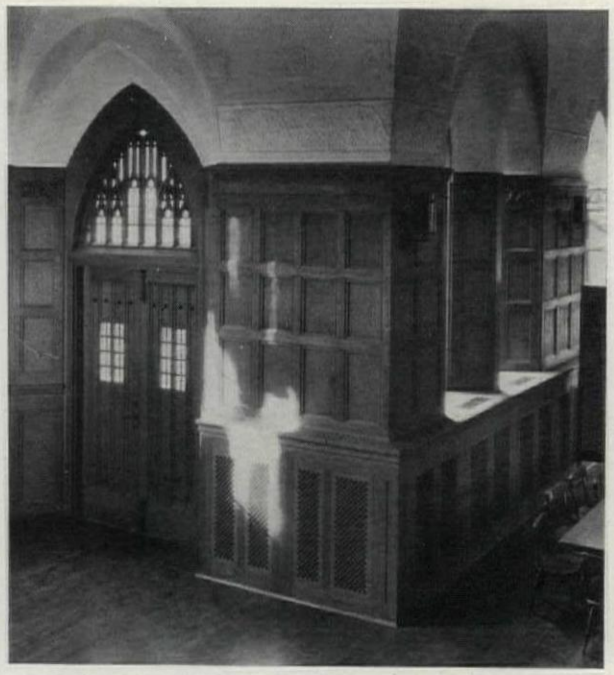
"Condensation" and "Heating Effect." Until recent years it had generally been assumed that the performance of a radiator was entirely dependent upon the rate of condensation, and that the measurement of condensation formed a complete index of the rate of heat transfer. Now we know that there are other factors that have a most important bearing upon the rate of heat transfer or, more properly speaking, upon the "heating effect" of the radiator. The term "heating effect" as applied to a radiator is new in heating nomenclature, it being used to distinguish between the useful heat derived from the radiator and the heat input as measured by condensation. In making this distinction there are difficulties, for at present we have no definite means of measuring this quality of heat transfer. It is this quality we have seen fit to designate as "heating effect," which may receive more attention in the heating industry. While concealing the radiator had its beginning in an endeavor to hide unsightly utility, it has grown into an important phase of the science. We have observed on numerous occasions that when a cast iron direct radiator is enclosed in a casing or cabinet of certain definite proportions, we seem to get very much more heat out of it than we do when it is exposed; but when we measured the condensation from the enclosed radiator we found that the condensation was much less than that from the same radiator when exposed without the enclosure. At first we had no reasonable explanation for this seemingly impossible condition, until we began to make observations of the temperatures in the room at various heights from floor to ceiling. Then we found that whereas the temperature difference between floor and ceiling was about 15 degrees with the direct radiator, when the same radiator was enclosed it was about 5 degrees.

Properly concealed radiators may save fuel, increase comfort and improve health. It has long been a frequent complaint against radiator heating that the rooms were either underheated or overheated, but few of us realized that that impression was due very largely to our positions in the rooms, whether standing or sitting. It has always been the custom to measure the temperature of a room at a level of about 5 feet above the floor, which we call "breathing line height," and if we maintained a temperature of 70° at that level, we assumed that the room was properly heated. But how many ever took the trouble to hang a thermometer at the floor level and another at the ceiling? Would it not be a great surprise to find a temperature of 62° at the floor level and a temperature of 77° at the ceiling? This temperature difference at different levels may be the source of our ideas of overheating or underheating. A child playing on the floor may be in a temperature of 63°, while a tall man standing erect may have his head in a temperature of 72° or 73°. But when he sits down he may drop into a temperature of 67°. If you passed from a room heated at 70° into another heated to but 65°, you would have an immediate sense of discomfort, particularly with the low humidity usually existing in heated rooms in winter. Yet the condition exists in most houses heated with the ordinary radiator. The nature of the seemingly greater "heating effect" of enclosed radiators cannot be completely explained at present, but it is generally assumed that the enclosure about the radiator pro-

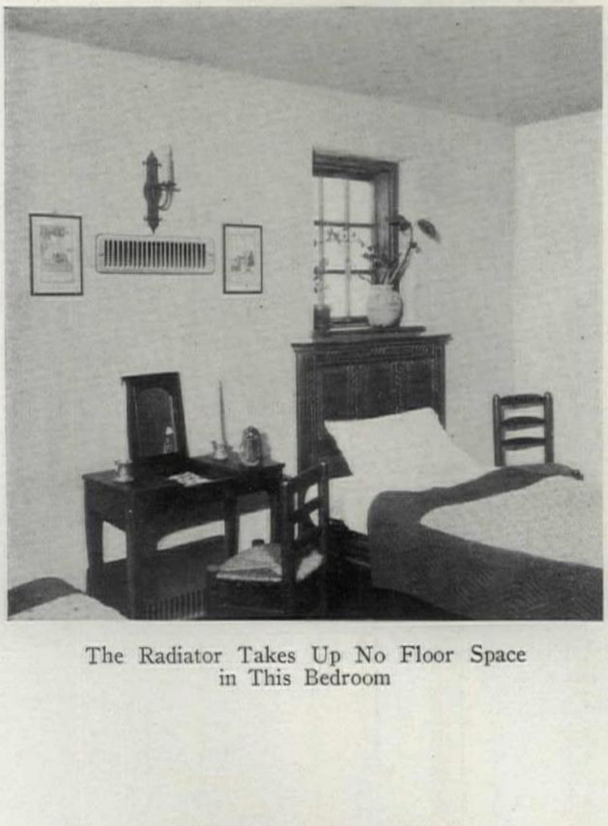
A Shallow Wall Cabinet Which Is Made a Part of the Decorative Treatment duces a more rapid circulation of air over the radiator surfaces, and this action in turn induces a more thorough circulation of the air in the room, thus preventing the stratification of hot air at the ceiling that exists with the direct radiator. However, this action may be but one of several of a varied nature that have a bearing upon the result.

With the growth of the practice of concealing the radiator, new types have been designed especially for the purpose. The so-called "fin" type, of which there are now a dozen or more on the market, has many desirable features as a concealed heating unit. This type possesses a number of metal fins that add radiating surface to some form of prime surface of tubular or more intricate shape. It has as its essential feature, simplicity, lightness, compactness. While the selling price of these units is now somewhat above that of the corresponding capacity in cast iron, it may be expected to drop as selling volume increases and production costs decrease. Although the trend seems to be toward a new type of heating unit for concealed radiator installation, the usual cast iron radiator is employed with excellent results.

Principles of Enclosure Construction. If certain definite rules are followed in the construction of the enclosure, not only may the heating effect be measurably increased but there may be a marked saving in fuel as well. It is very easy in the construction of the cabinet or enclosure to nullify all the economic value to be derived from an enclosure, and there are many installations of concealed radiators that injure rather than improve the heating effect,—though they may achieve their purposes of decorative effect. The features of correct design are indicated in the diagram shown on page 262. Each of these features is important, and the alteration of any one may nullify the effect of all. Determining these features is the development of years of observation. Research extended over a period of six months and was fully reported in a paper under the title "Some Facts about Enclosed Radiation" presented before the 31st annual meeting of the American Society of Heating and Ventilating Engineers. Within the past year research on radiator enclosures has been undertaken by the Engineering Experiment Station of the University of Illinois, reported in Bulletin 169 under the title, "Effect of Enclosures on Direct Steam Radiator Performance" by Maurice K. Fahnestock, but the latter research differs from the writer's in that heating effect was not considered, only condensation from the radiator being taken into account. In this regard the research was very thorough, and it is now understood that the University has additional equipment that will enable it to study heating effect as well as condensation. In the research so far completed, the data compiled agree very closely with the writer's. The only other research of record which is of value as a check is that of Dr. Charles Brabbee, conducted while he was at the University of Berlin-Charlottenburg in about the year 1908. In Dr. Brabbee's work, like that at the University of Illinois, only condensation was considered.



The Cast Iron Radiators Are Successfully Concealed in St. Paul's Church, Chestnut Hill, Pa.
Zantzinger, Borie & Medary, Architects



The Radiator Takes Up No Floor Space in This Bedroom

A cast iron radiator concealed after the manner shown in one illustration on page 260 has many desirable features and can be used effectively except in thin walls. These principles as applied to a cast iron radiator are very well shown in the illustration just mentioned. This installation, in a club dining room, by Harry Gordon McMurtrie, architect, proved so successful that this is the most easily heated room in the building, although the ceiling height is over 20 feet and there are full height windows.

Many types of radiator enclosures are available, varying from the simple deflector over the top of the radiator through the different types to those having humidifying pans and elaborate grilles. It has generally been thought that there should be at least 2 inches clearance between radiator and the inner surface of the enclosure, but this has been disproved, as better results are obtained by placing the inner surface of the enclosure in direct contact with the front and back of the radiator. This is particularly true in the use of the new tube type radiators with their larger clearance.

A very attractive concealed radiator installation, although not making full use of the heating surface, is illustrated from a design by Zantzinger, Borie & Medary, architects (page 261). A cast iron radiator, concealed in an enclosure, not only lends itself to more harmonious decorative treatment, but the improved economy and health derived may be considered reasons for the added expense of enclosure in any type of installation. Indeed these latter reasons may be the controlling factors by which the practice of concealing radiators will become well nigh universal. The development along these lines will probably be in producing small, light and inexpensive radiators especially for this purpose. Today, however, an architect contemplating the use of one of the new fin type radiators has several points to carefully consider before selecting any one type because of the wide variation in design and rated capacity. There is a lack of standardization, which of course prevents the use of one manufacturer's fitting in place of that of another, and therefore one particular make must be selected and provided for in the heating layout. In making this choice the architect must therefore carefully weigh the different factors of strength, durability, ease of cleaning dust from the unit, probable life, space comparisons, safe ratings, etc. To illustrate the wide variation in ratings we can make a comparison on the item of space required. Three units, designed for concealing in the wall, are each 36 inches long, approximately 3½ inches deep, and rated for a casing 35 inches high, but variously rated at 39, 37 and 27 square feet equivalent direct radiation, two nearly 50 per cent greater than that of the other. Two others, having the dimensions mentioned but approximately 7 inches deep, are rated at 55 and 42 square feet respectively. Three other radiators designed for cabinet installations are approximately 55 inches long, 9 inches deep and 38 inches high to top of cabinet. One is rated at 55 feet, the second at 70 feet, and the third at 101 feet, while a cast iron direct radiator of the same space dimension is rated at 110 square feet. The architect, therefore, has quite a problem before him in selecting the best design for his purpose. Undoubtedly, before many years, this wide difference in ratings will have been eliminated, for the existing condition has decided disadvantages to both the house owner and the manufacturer.

Heating effect and æsthetic effect do not always go hand in hand, but the newer developments in concealing the radiator have demonstrated that they are not essentially antagonistic factors. It is possible to combine attractiveness with efficiency in the heating equipment, and great strides are now being made in this direction.

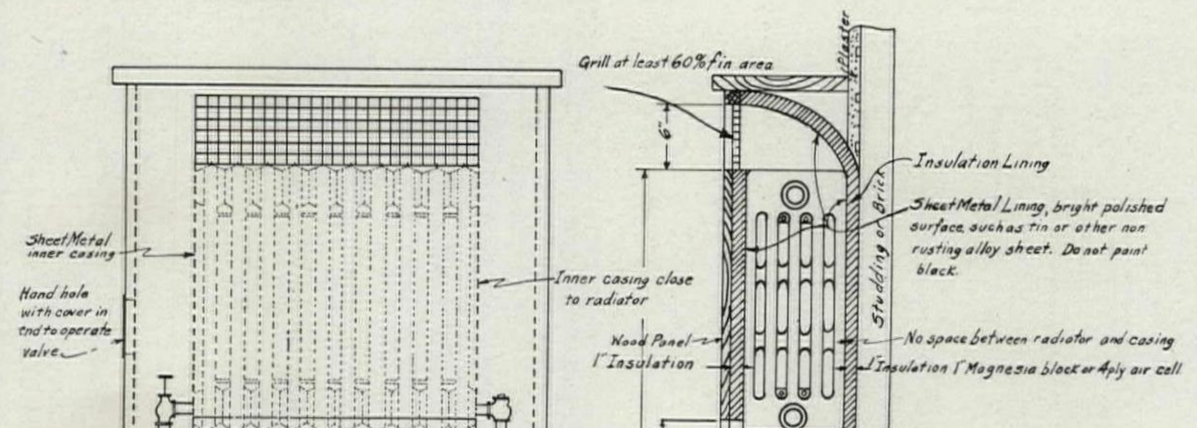


Diagram Showing the Essential Features of the Type of Radiator Enclosure Found Most Efficient in Tests Conducted by the Author

ECONOMY IN SMALL HOUSE CONSTRUCTION

BY

A. G. HILLBERG

PRESIDENT, MIDHAMPTONS HOMES CORPORATION

SPECULATIVE small house construction offers a wide field for the builder, but the architect seldom has an opportunity of aiding in this work. This might be because a builder, erecting houses as a speculation and anxious to produce them at as low a cost as possible, will create designs based on use of stock millwork, stock trim, short spans, etc., to gain his objective. He is rather afraid of the architect with his artistic tendencies that may lead to higher costs because of drawings calling for expensive or difficult work. The disastrous results of the builder's activity in the architectural field of designing are clearly shown in our suburbs, where the mass production of ugly, standardized types of houses standing side by side in symmetrical rows is altogether too common. Practically the only favorable comment that can be made about such houses is that the prices asked are surprisingly low, which is made possible only through strict standardization of every detail of the building project. Consequently, when architects do undertake the work of designing small houses for mass production, they should contrive to produce a plan offering sufficient variety in the arrangement of the rooms to permit alteration of the shape of the dwelling through rearranging standard room units without interfering with the standardization of the details of construction.

A solution of this problem can be obtained, as is shown in Fig. 1, where the living room, kitchen, and bath, forming the main unit, have been so laid out that the fireplace, boiler and kitchen flues are placed together and are in one most economical interior chimney. Interior chimneys are obviously the cheapest. The kitchen and bathroom fixtures occupy opposite sides of the same interior partition, which reduces the plumbing system to its simplest and cheapest form. The bedrooms and an eventual dining room, all of standardized dimensions, can be grouped around such a main unit, as is shown by the dotted lines. Should an angular plan be desired, the rooms could be grouped as shown in dot and dash lines. Should more bedrooms be required, the unit indicated in Fig. 2 could be used to replace the corresponding bedroom unit shown in Fig. 1. By using floor plans such as those indicated, the shape of the house could be altered without interfering with the strict standardization of the details entering into the construction, and by placing the houses irregularly on their respective plots, the monotony could be relieved and a more pleasing appearance obtained than if a symmetrical arrangement were adopted.

When designing the shapes of the various rooms, it should be borne in mind that the floor systems must be supported in the simplest way and that it is not economical to run the joists in different directions in adjacent rooms, even if somewhat shorter spans could thus be obtained. The building should be so designed that all joists in the same floor system run parallel. Inasmuch as lumber comes in lengths which are multiples of even feet, the room dimension running parallel to the joists should also

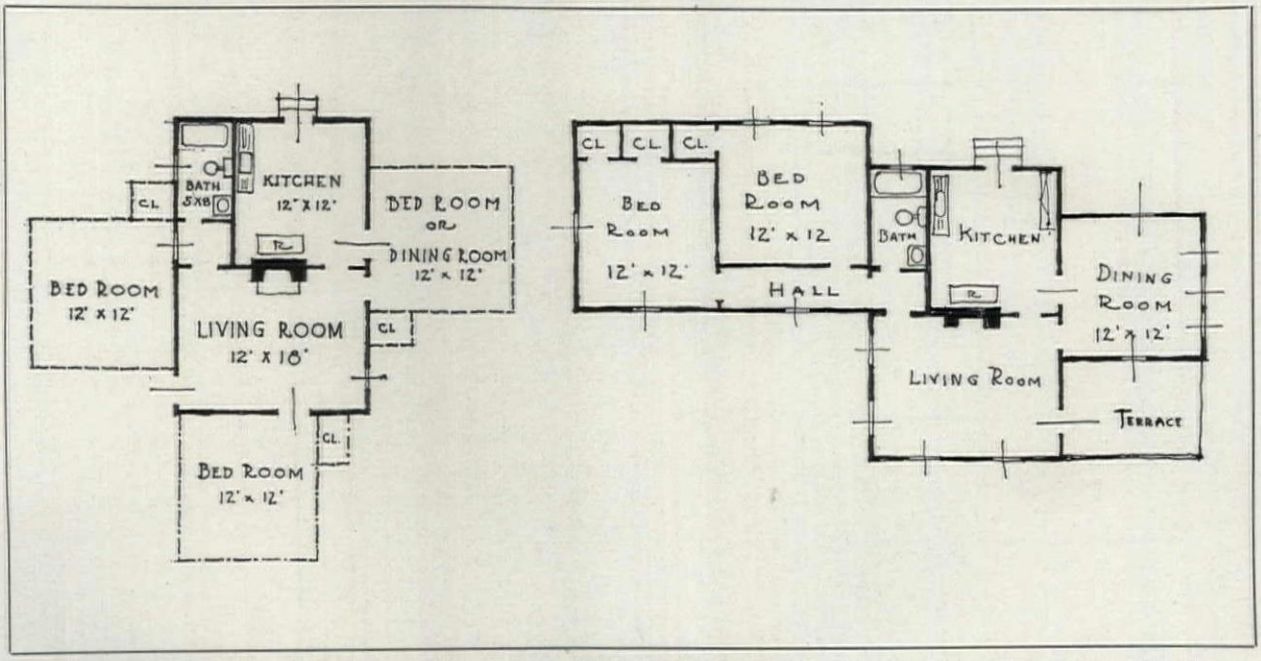


Fig. 1. Plan of Standard Units Showing Several Possible Variations

Fig. 2. Interesting Plan Developed From Same Units Shown at Left

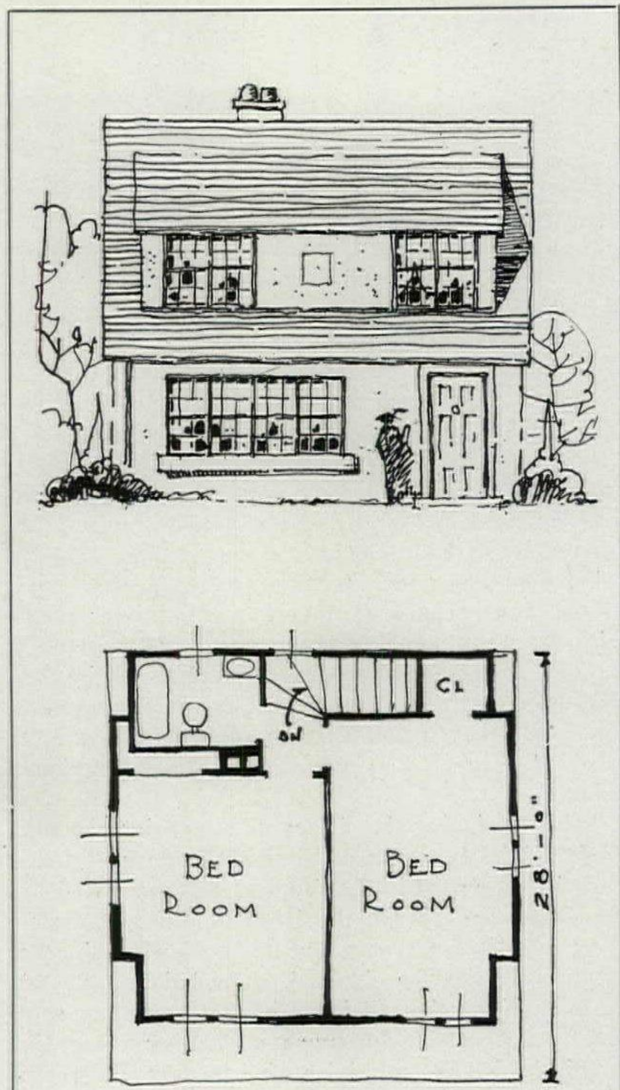


Fig. 3. An Economical Plan for Speculative Houses, Though Monotonous in the Usual Rows

be in even feet. Thus a room with dimensions of 14 feet, 6 inches or 16 feet, 6 inches should be avoided, as 16-foot and 18-foot lumber would have to be cut, and the waste per joist would be 18 inches.

As two-story houses are less expensive to build than those with all of the rooms on one floor, at least part of the dwelling should have a second story. This story need only be large enough to accommodate two bedrooms and a bath, but by having one part of the building taller than the other a more pleasing roof construction is possible. However, there could be no more economical house than that shown in Fig. 3, which is practically square in plan and two stories in height. But the difficulty of giving it a pleasing exterior treatment, and of varying it sufficiently to avoid monotony, when a large number of such houses are to be built along the same street, makes its use inadvisable except for the very cheapest type of developments.

For very small bungalows it is possible to use the four standard units as shown in Fig. 4, with two bedrooms and bath as one unit, the living room another, the kitchen a third, and a garage the final unit. Figs. 4a, 4b and 4c show how these rooms can be grouped so as to vary the exterior appearances and the interior arrangements of the bungalows.

Having considerd the plan and the possibilities of securing variety and interest, even when the room units are standardized, we may turn our attention to the economies possible in the various details of construction.

Foundations. Many houses are now built without basements, but this practice is not to be recommended where houses are to be built as a speculation and for all-year occupancy. Many builders maintain that the basement sells the house and do not dare to invest their funds in houses without this feature. However, it is not necessary to have a basement extending under the entire structure. The cost of excavating the foundation can be cut materially by having a basement just large enough to accommodate the furnace, coal and wood bins, and a vegetable cellar. As a rule, a minimum of 200 square feet will suffice, and the headroom need not be over 7 feet. This, of course, eliminates the possibility of locating the laundry tubs in the basement, but washing facilities can, at a less expense, be obtained by having a combination sink and tub in the kitchen, similar to the usual apartment house practice. All foundations around unexcavated portions need to extend only to the frost limit in the ground, which varies in different localities. Usually from 2 to 2½ feet are enough. Poured concrete basement walls 7 to 8 inches in thickness are always the most economical, providing suitable concrete aggregates are to be found at or near the building site. Concrete blocks 8 x 8 x 16 inches may be used. In soil where good drainage is available, the basement floor need only be 1½ to 2 inches in thickness, made of a good grade of concrete with ¾-inch gravel or stone aggregate. In unexcavated portions care should be taken to allow 12 to 18 inches of clearance underneath the joists to insure sufficient ventilation. Otherwise the joists and sub-floor will soon be weakened by dry rot, and in specially humid climates they may become covered with fungi.

First Floor System. If poured concrete foundations are used, it is necessary to specify a sill on which to rest the joists, as it is more difficult and expensive to mould the concrete to obtain an absolutely level bed for the joists along the entire foundation. A sill can be laid, leveled up and then grouted at less expense than trying to make the top of the concrete level (Fig. 5). When concrete blocks are used, such a sill is not required, as an experienced mason will have no trouble in laying them level. The joists can be laid directly on the blocks and held in place by an encircling frame as shown in Fig. 6. This frame holds the joists firmly at their ends and results in a saving in the bridging, as one row placed at the joist centers is usually sufficient to obtain a rigid floor system. Over door and window openings this frame is doubled to insure structural safety. A satisfactory seat for the joists can be obtained by nailing a piece of 1 x 2-inch shingle lath to the inside of the frame. It is advisable to carry the sub-floors out over this frame so as to form a complete platform on which to place walls and partitions (Fig. 7). In the first place, this method of support cuts off the basement from the open spaces in the walls, thus forming a fire stop; and secondly, it prevents the builder from nailing his studs to the sides of the joists. The latter practice is objectionable because the joists will shrink and the floor will sink down, leaving open spaces underneath the baseboard, which stays in a fixed position, being nailed to the wall. In regard to the bridging of the joists, it will be found that metal bridging as sold by various manufacturers is much cheaper and more satisfactory than that ordinarily cut from 1x 2-inch shingle lath. No plaster ceiling need be specified for the underside of the joists if it is desired to keep the cost down, although such a ceiling of plaster on metal lath is desirable from a standpoint of fire protection.

Outer Walls. Many different treatments can be given to the outside walls, and such variation will tend to break up the monotony of a row of houses. If stucco treatment is desired, it is most economical to use galvanized wire cloth, usually welded, and manufactured with a waterproof paper backing. This material comes in standard sheets, generally 4 feet wide, which fit the usual stud spacing of 16 inches, making it possible to omit the sheathing. This reduces first cost but increases the fuel costs of the owner. It is poor economy from his point of view to omit any insulation. The scratch coat should be the customary cement mixture, and the finishing coat can be given different textures at low expense. In order to obtain various color effects, nothing is cheaper than cold water paint containing a waterproofing agency. The use of colors already mixed with the cement, which are now obtainable,

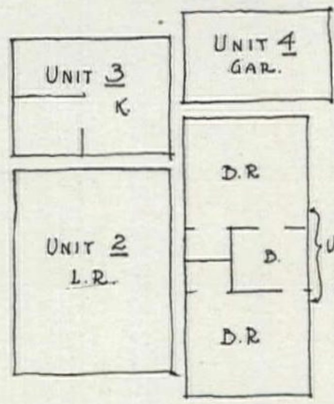


Fig. 4

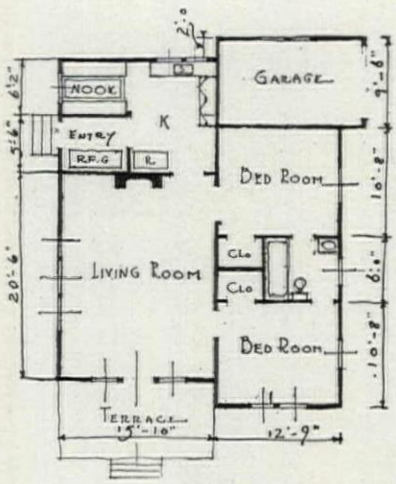


Fig. 4a

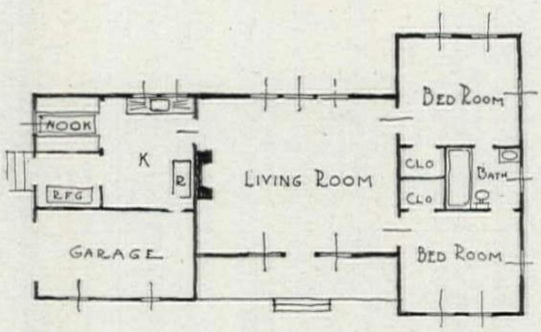


Fig. 4b

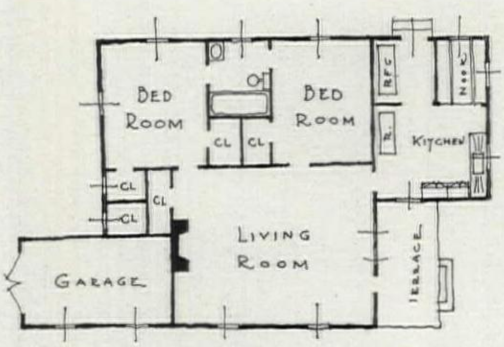


Fig. 4c

The Economical and Standardized Units of Fig. 4 Are Used in Composing the Three Other Plans

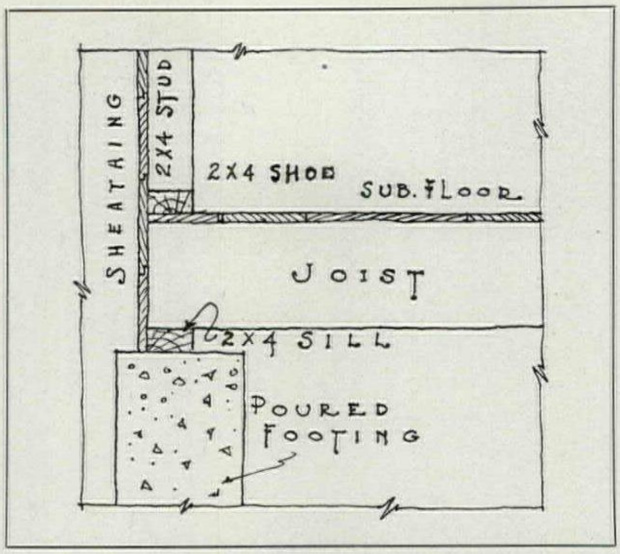


Fig. 5. Section Designed Primarily for Economy, Showing Sill

is much higher in cost, but the quality of the color is far superior to that had by the cheaper painting method. Applying stucco by machinery, that is so-called stucco or cement "guns," has been tried and no doubt can be undertaken economically in certain localities. However, in one instance, in a locality where extremely high winds prevail, this method had to be abandoned because a great amount of material from the gun was blown away before it could reach the wall. Another difficulty is also the tendency of such apparatus to provide a coating of even thickness, which may show the pattern of the wire netting.

Clapboards and shingles are also economical wall coverings, especially when the sheathing is eliminated. When shingle lath is used as a base for the shingles there is a good opportunity for bracing the corners with ⅞-inch boards and butting the shingle lath against the braces. This method is to be preferred to notching and thus weakening the studs to take the diagonal braces. With clapboards or square-edge sheathing, laid so as to overlap, a further economy can be obtained by using uprights at the corners and butting the boards against them, thus avoiding the expense of mitering the boards. Many builders use 2 x 4-inches above the window and door openings, which necessitates use of small pieces forming a truss between the top of the opening and the plate. A less expensive, more efficient and structurally stronger framing can be obtained by specifying the distance from the underside of the plate to the top of the window frame as 6, 8, 10, or 14 inches, permitting the use of 2-inch planks of the given dimensions, doubled as shown in Fig. 8. An economical way of framing the corners so as to provide nailing for both the outer and inner wall coverings is to be found in the so-called "Dutch post," which is built up of three 2 x 4-inch studs.

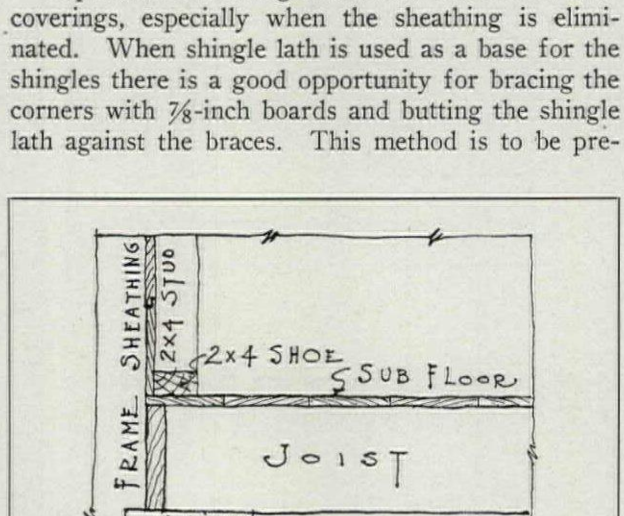


Fig. 6. Section Showing Use of Encircling Frame with Joists Resting Directly on Blocks

Interior Wall Treatment. As the interior treatment of a house is much more expensive than the exterior, great care should be exercised in choosing the various materials and the methods of application. The use of wall board is generally costly unless the walls are to be papered, as wall paper can be directly applied on wall board. It is rather expensive to use wall boards with the necessary "cats," pointing up of the joints and taping them in order to obtain a sufficiently smooth surface to take an architectural finish. In the writer's experience it has been found cheaper to use plaster board and to apply a white coat to it, treating its surface with trowels, sponges, brushes, etc., in order to obtain the desired finish. A very satisfactory interior wall can be obtained at a minimum cost by using some kind of plaster-saver lath covered with a scratch coat and a sand-finished brown coat, thus omitting entirely the white coat. To such a wall it is necessary to apply a coat of sizing or the cost of subsequent painting will be rather high. What has been said about interior wall treatment is equally applicable to ceiling finishes. The cost of woodwork can be kept down to a minimum by using a single-member base in conjunction with the usual trim around doors and windows.

Roof Construction. A certain amount of the charm and effect of a house is dependent upon the shape of the roof and the materials used thereon. One of the most effective and inexpensive roof constructions consists of wood shingles laid 5½ inches to the weather, nailed to 1 x 2-inch shingle lath. Lately No. 1 ribbon slate has been quoted at such a low figure that if laid on shingle lath, the cost may only be $2 or $3 more per square. Asphalt strip shingles laid on continuous sheathing are also a very economical form of roofing, and contrasting color effects may be obtained easily. However, such shingles have a tendency to curl eventually, and a double-dipped asphalt shingle will be found to be more economical, although it may increase the cost about $4 a square. In designing a roof it should be borne in mind that dormers, hips, valleys, etc., are expensive and should be avoided as far as possible. The cost of adding a small dormer containing a window may vary from $20 to $30. Great care should be exercised in detailing the roof overhang both on the rakes and eaves, and much trouble can be avoided if the shingles or roof sheathing is carried out over a moulding and bedded over it in mastic cement or other plastic, non-drying compound.

Fireplaces and Chimneys. Although open fireplaces are much to be desired in all houses, they should be avoided in speculative work if the expense is around $300, unless it is felt that a fireplace will have great weight as a selling point and will thus pay its way. If a fireplace is desired, it should be so located as to contain all of the required flues in its surrounding brick masonry. Every house designed for winter occupancy in a northern climate must have a furnace, and if the building site is located where gas cannot be obtained, there should be an additional flue for the kitchen range. Fireplaces projecting through outer walls should be avoided, as the outer and visible part of the masonry must be given architectural treatment and this, as a rule, involves use of a greater quantity of brick. The beauty of such an outer chimney is not disputed, but it represents considerable expense. Furthermore, the type of house we are considering is usually occupied by families of small means, and it is a well known fact that an outside chimney is not as economical as one located entirely inside of the house, where the radiation of heat through the masonry helps to keep the house warm. An ideal location for a fireplace is shown in Fig. 1, where the masonry containing the flues need be of minimum dimensions, as only the chimney top is visible above the roof line.

Millwork. Another item that involves a great deal of expense is special millwork. In order to keep the cost down it is advisable to select standard millwork from the catalogs of reputable millwork concerns, and it is usually found that there is a sufficiently great variety of sizes and shapes offered to satisfy all reasonable requirements. In selecting the sizes of the windows, it should be borne in mind that the use of several different odd shapes or sizes on the same house involves unnecessary expense, because the carpenters must hunt among the frames to find the particular one wanted. It is, therefore, well to limit oneself to two or possibly three different sizes of windows and two sizes of interior doors. The most convenient sizes for interior doors are the stock 2 feet, 6 inches x 6 feet, 8 inches or 2 feet, 6 inches x 7 feet for room doors, 2 feet x 6 feet, 8 inches or 2 x 7 feet for closet doors. It will facilitate the construction if the "heads" of all door and window openings are at the same height above the floor.

Bathrooms. Nothing is more pleasing to the eye than a well proportioned bathroom with tile floor and walls, but unfortunately this involves use of

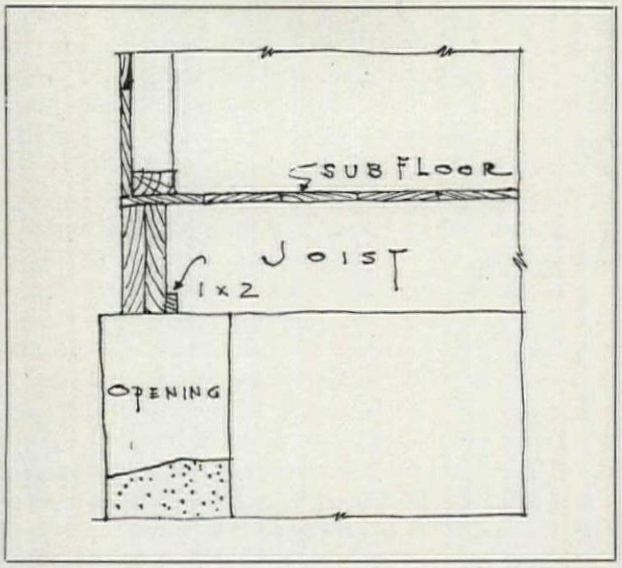


Fig. 7. Section Showing Sub-floor Running Through and Joists Resting on Minimum Nailing Strip

expensive materials and workmanship. Where strict economy is desired, the floors may be covered with linoleum. The walls, up to a height of 4 feet, can be provided with a wood sheathing to which may be secured one of several different types of wall board that have a pressed tile pattern. The upper edges of the boards may be covered by a 7/8 x 2-inch or a 7/8 x 2½-inch dado cap and the rest of the walls

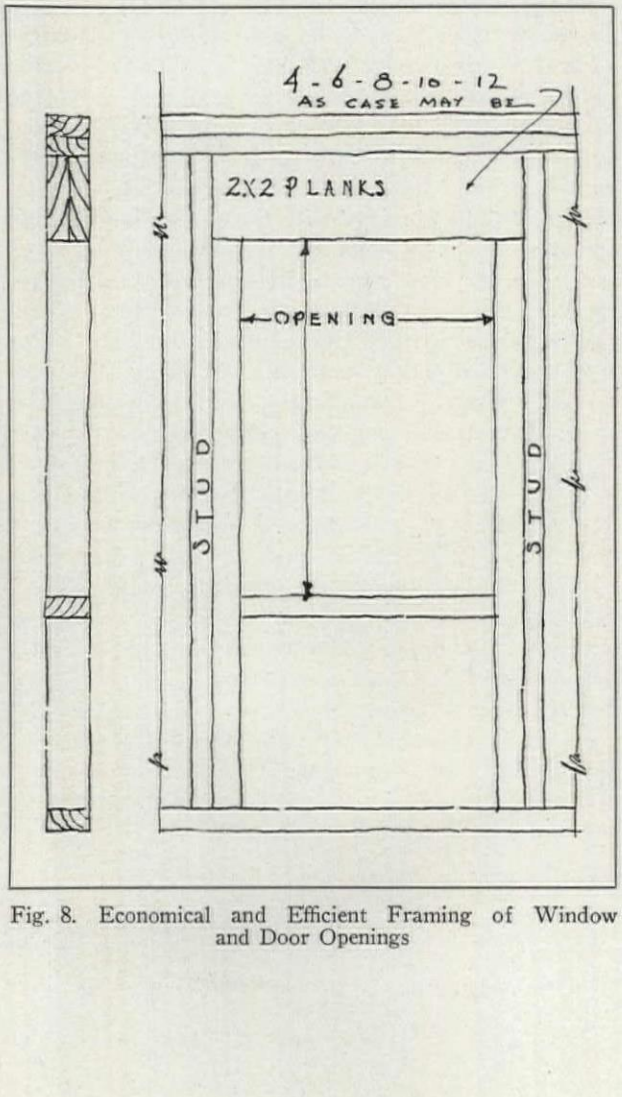


Fig. 8. Economical and Efficient Framing of Window and Door Openings

given two coats of sand-finished plaster. Another type of economical finish can be obtained by plastering the lower portion of the walls, but if such walls are not given an extra good coat of paint, they will soon disintegrate, especially around the bathtub and the lavatory. The fixtures can be selected from manufacturers' catalogs, and a local plumber consulted as to which fixtures he can obtain at reasonable prices. Often such plumbers are able to obtain a good grade of second-class fixtures that are unimpaired from a sanitary and mechanical standpoint, and there is no reason why such fixtures should not be acceptable. The use of brass pipe may be desirable in certain localities, and it behooves the architect to familiarize himself with the quality of the water in the particular locality. In many places, especially where good artesian water is available, wrought iron pipe will be found to give good and lasting service at low cost.

Heating. Many different opinions are put forward as to the most efficient and economical system of heating for a small house, but the writer has found none to compare with warm air systems in economy and efficiency. If a house is small, compact, and contains only one or two small rooms on the second floor, a pipeless furnace should be given serious consideration. If a house is beyond the capacity of a pipeless furnace, warm air systems should be looked into, especially those now used in many localities of this country. Many such have "cold air" registers inside of the house, and the furnace, therefore, is only called upon to add a few degrees of heat to this already heated air in order to keep the rooms at the desired temperature. There is a type in which an adequate amount of humidity is supplied to the air by the furnace. In this a surplus of water escapes from a humidifier into the ash pit, where it is evaporated and mixed with the air passing through the live coals, thus making the furnace act more or less as a gas producer, increasing the combustible value of the coal. For a small house a pipeless furnace could be installed for about $150, and the warm air furnace would cost from $300 to $350, at the present writing. Should the house be of bungalow type and rather elongated, neither of the heating systems mentioned can be used, and it is necessary to resort to other types, using hot water, or high- or low-pressure steam or vapor. For the small house it is believed that the hot water system is the best, but due to the slowness of operation it can hardly be used satisfactorily in localities subject to sudden temperature changes. Steam will be more satisfactory in such places, as it is possible to drive such a heating plant and obtain quicker results.

Painting. Much money may be spent on the exterior and interior painting of a house, and much of this can be eliminated where economy is the prime consideration. All outer trim and woodwork, including clapboards, must be painted with three coats of good lead and oil in order to prevent checking, but shingle and stucco walls may be left *au naturel.* The painting of the interior woodwork depends largely upon the class of material used. For instance, yellow pine trim may require a coat of shellac before applying the paint. For cypress or white pine, two coats of a good grade of paint are usually sufficient. A very satisfactory and inexpensive effect can be obtained by using yellow pine trim and simply staining it. For pine or fir doors it will be found economical to mix varnish with the first coat, using a flat white paint. A second coat of paint in the desired color will then suffice in order to obtain a satisfactory and economical finish. Sand-finished interior walls can be left without further treatment, but if they are to be painted they should be sized for oil paint, or a good grade of cold water paint applied.

Flooring. Sub-floors are absolutely necessary only in the first floor system, and then really only over unexcavated portions. Floors over basements and all second floors need not have sub-floors. It is advisable to have at least the living room provided with hardwood flooring, but in all other rooms to have a cheaper grade of fir or N. C. pine flooring. In kitchens and bathrooms, which are to be covered with linoleum, economy can be obtained by using flooring 6 inches wide of fir or spruce, but such flooring must be "face nailed" in order to prevent curling.

In Conclusion. The aim of this article is to emphasize the methods that can be used successfully in obtaining economical small houses without sacrificing their architectural beauty. Some months ago an architect said that in his opinion the days of the $5,000 house had passed, and he was rather surprised when shown a house of sizable proportions which had just been completed within that amount, and that there were no secrets as to how this had been accomplished. The entire undertaking had been standardized to such an extent that several days before the building operation was begun, carpenters had been busy cutting studs, framing for window openings, joists, and roof rafters, and stacking them on the ground ready for use. The millwork was all selected from a manufacturer's catalog and was on the ground before the building was started, so that it was possible to place all exterior frames of the house before sheathing. Several changes had also been made in the plans in order to have as little waste as possible in the lumber, and the labor was so supervised and organized that every man knew exactly what to do next.

HEATING AND VENTILATING SYSTEMS IN PRELIMINARY DESIGN

BY

HAROLD L. ALT and PRICE L. ROGERS

HEATING AND VENTILATING ENGINEERS

THE procedure most frequently followed in the designing of the modern building would be humorous if it were not so expensive. As engineers of considerable experience in this class of work, the writers feel that the system they have encountered must be universal. The usual procedure is to have the architect make preliminary studies and to give these to the engineer, who approximates the amount of heating and ventilating necessary, making certain recommendations to the architect. The architect then begins to make a further serious study of the matter in an endeavor to incorporate the engineering requirements in the preliminary designs without destroying the general scheme. In making various alterations to do this, certain improvements suggest themselves and are also incorporated. Other suggestions of the engineer it may be impossible to accommodate in the preliminary design as contemplated, and the architect then makes some really radical departures from the original scheme in order to give the engineer what he wants. One good turn deserves another, and one little change often results in several more, so that by the time the plans go to the engineer a second time they are often,—as far as heating and ventilating are concerned,—unrecognizable to the engineer. As a result of this the engineer starts all over again and has to develop an entirely new set of requirements to suit the revised layout. Then the architect takes another try at it and again revises; this game of battledore and shuttlecock goes on until the alterations and their effect on the heating and ventilating system become small enough to be practically negligible. At this point the plans may be said really to be ready for the engineer to begin his work of the incorporating of the equipment.

There are so many ways and means of heating and ventilating that to lay down hard and fast rules for the architect's information is exceedingly difficult; one engineer will ventilate in a manner that another engineer wouldn't use under any circumstances, and another engineer will design a heating system entirely different from that employed by some of his engineering brothers. Yet each one is going by what his experience has taught him and is using, to the best of his ability, his brains and his craft to produce the most for the owner's investment. And neither can be condemned any more than one of two architectural designs can be condemned when they are of equal beauty and practical utility.

Inadequate Preliminary Drawings. Preliminary plans are often inadequate,—as far as heating and ventilating are concerned,—especially in the matters of,

(a) Boiler Room Space,
(b) Chimney Sizes,
(c) Flue and Duct Spaces,
(d) Pent Houses for Fans,
(e) Connecting Openings between Boiler Room and Building.

Of all the items listed, the first seems to be that which gives the most trouble. Even in finished designs, boiler rooms are often too small, incorrectly located, and put in places to which access is difficult. In preliminary drawings the boiler room area is not only insufficient as a rule, but the height is almost as often entirely inadequate, necessitating the raising of ceilings or the dropping of floors, to allow boilers and steam piping to be installed. When considering the location of the boiler room it is most important to select a location where the handling of coal, ashes or oil will be convenient, and where the steam may be distributed to the building in an economical manner from the standpoint of the pipe layout. Since the greatest heating load usually occurs on the north and west sides of a building, it is often desirable to locate the center of steam distribution somewhere near the northwest corner. In H-shaped buildings the best position is generally in the cross-bar of the H. It is evident that this placing of the boiler room will result in shorter average runs and in reducing the amount of large-size pipe required.

Next to the boiler room difficulty, and it is a close second, is the matter of size and height of the chimney. Often a high chimney might seriously affect the architectural beauty of the building; yet the architectural beauty will not keep the tenants of the building warm, and that is what the high chimney might aid in doing. In recent years this question of chimney height has in many cases provided its own answer because of the increasing heights of new buildings; yet, even today, the average building seldom has the height necessary to give adequate draft without extending the chimney a considerable distance above the roof.

Hardly less important is the matter of duct and flue space; here the difficulty is not so hard to understand, because the amount of duct and flue space is not fully determined until the ventilation requirements of the building have been decided upon, and the exact locations of these ducts and flues are often unknown even to the engineer until he begins trying to install the ventilating system. Ventilation differs so profoundly in various types of buildings that the space entirely suitable for one type of structure is absolutely unsuited for another type of equal cubage. There are *upward* ventilation and *downward* ventilation, ventilation *without* cooling and ventilation *with* cooling, and sometimes no ventilation at all. Consequently, in talking about duct and flue spaces, the type and size of the building itself will control the amount of space needed for ducts and flues, and the method of ventilating will have large influence in determining where these spaces should come. Pent houses on the roof are normally the least difficult of all details to take care of, but their general locations should be selected and sufficiently strong construction provided that these structures may be added when required without affecting the framing way down to the basement.

Approximating the Heating Requirements. Assuming that the approximate cubage of a building is known, it is possible to approximate the heating requirements where the outside temperature goes to zero by dividing the total cubage by the factors shown in Table I. This gives the total radiation which would be necessary if ordinary standard cast iron radiation were used. Of course it is only approximate. This amount of radiation will be called the equivalent amount of direct radiation required and, hereafter, will be abbreviated to E.D.R. (Equivalent Direct Radiation). From this E.D.R. the boiler size can be determined, as far as the heating is concerned, by choosing a boiler that will give this amount of radiation. In other climates this E.D.R. will vary as the temperature outside rises, and in this manner, with zero outside and 70° Fahr. inside, the difference between the room temperature and the outside temperature is 70° Fahr. With any other difference, the E.D.R. will be found by using the equation,—Actual Temperature Difference÷70×E.D.R. equals Actual E.D.R. Thus if the building were situated in a climate where the minimum outside temperature only fell to 35° Fahr., the E.D.R. as calculated using the factors in Table 1 would have to be modified to

35/70×E.D.R. which equals ½ E.D.R.

which is only another way of saying that, with half of the temperature difference, the equivalent direct radiation would also be only half, and, with three-quarters of the temperature difference, the E.D.R. would be only three-quarters as much.

TABLE I

Divisors to be Used to Determine the Approximate Direct Radiation Load in Various Types of Buildings

Class of Buildings	*No. of Buildings Averaged*	*Ratio of E. D. R. to Cubage*
Residences,	16	1 to 46
Churches,	4	1 to 86
Schools (private—no ventilation),	2	1 to 72
Schools (public—ventilated),	4	1 to 72
Factories (60° rise only),	10	1 to 72
Office Buildings,	9	1 to 76
Apartment Houses,	11	1 to 76
Hotels,	15	1 to 74
Hospitals.	3	1 to 66

Note—By "cubage" of a building as used in the above table is meant the *total* cubage which has been computed, exclusive of attics and unheated spaces.

Approximating the Ventilation Requirements. With ventilation the figures will be less accurate because the quantity of ventilation is not fixed by such a positive factor as the outside temperature. In calculating probable ventilation requirements. only average conditions can be assumed, and they will not fit any special case exactly, although they should fit approximately.

It has been found in various buildings that, with reasonably good ventilation throughout,—say, three to six air changes per hour,—the ventilation load will run about 100 per cent of the radiation load. Where excellent ventilation is expected, this figure may be increased to 150 per cent, while in buildings where the air changes are to be cut down to the minimum the additional load may be only in the neighborhood of 50 per cent of the E.D.R. for the same building. Such figures will apply to office buildings, institutions, hospitals and other buildings where the occupants are not crowded together in confined spaces, such as occur in auditoriums and school buildings.

Developing the Boiler Capacity Required. To obtain the approximate boiler horse power necessary for the building, it is only necessary to divide the sum of the E.D.R. for heating plus the E.D.R. for ventilating, plus about 25 per cent for hot water and incidentals, by 100. For example, suppose a hospital of 1,000,000 cubic feet with fairly good ventilation expected and a minimum outside temperature of 10° Fahr. above zero. The E.D.R. for heating would be for zero outside. . . .

1,000,000/66 or 15,151 sq. ft. for heating

but as the outside only goes to 10° Fahr. above zero the E. D. R. is revised to

60/70 of 15,151 or 12,986 sq. ft., say 13,000 sq. ft., and with fair ventilation throughout, the ventilation load would add about 100 per cent, or 13,000 square feet more, making a combined load of

13,000 sq. ft. E. D. R. for heating,
13,000 sq. ft. E.D.R. for ventilating,

26,000 sq. ft. E.D.R. combined load,
6,500 sq. ft. for incidentals,

32,500 sq. ft. E.D.R. total which, divided by 100, equals 325 boiler horse power. In order to have one spare boiler, it is logical to assume that three boilers would be used, each of 160 b.h.p.

There are boilers of all shapes, makes, and sizes; long and short, high and low, water-tube, fire-tube, etc.; no boiler room could accommodate *efficiently* all types of boilers; yet it is wise to try to make the boiler room large enough to accommodate any one of several types of boilers large enough for the building. The three most general classifications of boilers are, cast-iron sectional for low-pressure use;

Boiler Horse-power	Steel Boilers						Cast Iron		
	High Pressure Water Tube			Low Pressure Fire Tube			Low Pressure Horizontal		
	Wdth.	Lgth.	Hgth.	Wdth.	Lgth.	Hgth.	Wdth.	Lgth.	Hgth.
50	–	–	–	(2) 23'	20'	14	(2) 21'	20'	13'
100	(2) 42'	19'	19'	(2) 23'	25'	16'	(2) 21'	22'	13'
150	(2) 42'	21'	19'	(2) 25'	27'	20'	(3) 31'	21'	13'
200	(2) 42'	22'	19'	(3) 33'	26'	16'	(3) 31'	23'	13'
250	(2) 42'	27'	19'	(3) 33'	28'	18'	(4) 39'	21'	13'
300	(2) 42'	33'	19'	(3) 36'	29'	20'	(4) 39'	23'	13'
350	(3) 42'	48'	19'	(3) 36'	32'	20'	(5) 48'	22'	13'
400	(3) 42'	37'	19'	(3) 36'	34'	20'	(5) 48'	21'	13'
450	(3) 42'	39'	19'	(3) 36'	35'	20'	(5) 48'	24'	13'
500	(3) 42'	39'	19'	(4) 47'	31'	20'	(6) 57'	23'	13'
550	(3) 42'	43'	19'	(4) 47'	33'	20'	(6) 57'	24'	13'
600	(3) 42'	43'	19'	(4) 47'	35'	20'	(7) 66'	23'	13'
650	(4) 42'	45'	19'	(4) 47'	35'	20'	(7) 66'	24'	13'
700	(4) 42'	45'	19'	(4) 47'	37'	20'	(8) 75'	23'	13'
750	(4) 42'	48'	19'	(5) 58'	31'	20'	(8) 75'	24'	13'
800	(4) 42'	48'	19'	(5) 58'	33'	20'	–	–	–
850	(4) 42'	48'	19'	(5) 58'	35'	20'	–	–	–
900	(4) 42'	48'	19'	(5) 58'	38'	20'	–	–	–
950	(5) 42'	60'	19'	(6) 69'	33'	20'	–	–	–
1000	(5) 42'	60'	19'	(6) 69'	37'	20'	–	–	–
1100	(6) 42'	66'	19'	(6) 69'	37'	20'	–	–	–
1200	(6) 42'	66'	19'	(8) 91'	31'	20'	–	–	–

TABLE II

TABLE SHOWING APPROXIMATE DIMENSIONS FOR BOILER ROOMS BASED ON THE USE OF HIGH-PRESSURE CROSS-DRUM STEEL BOILERS, LOW-PRESSURE FIRE-TUBE STEEL FIREBOX BOILERS, AND CAST-IRON LOW-PRESSURE HORIZONTAL SECTIONAL BOILERS

Note. Figures in parentheses as (1), (2), (3), etc., indicate the number of boilers contemplated, of which one will be a spare. If mechanical stokers are to be used on water-tube boilers, reduce the length about 40 per cent and add 5 feet to the height.

steel fire-tube for low-pressure; and steel water-tube for high-pressure. For this reason the architect should decide as soon as possible if high-pressure steam will be needed for any purpose and, if not, whether he wants to use low-pressure steel boilers, or the cast iron sectional type. It will make a great difference with the boiler room in many ways, and competent advice should be sought if it is not available in the architect's own office.

Dimensions of Boiler Rooms. Table II shows the approximate dimensions of boiler rooms required for plants of different types, including the minimum height necessary to accommodate such boilers. It should be noted that where mechanical stokers are to be placed under water-tube boilers, the height must be increased about 5 feet, as boilers are usually set higher for stokers than for hand firing. Oil fuel often makes it necessary to raise fire-tube boilers to get sufficient combustion space, but this amount of rise is not generally enough to affect the height of the boiler room materially. It is important to remember that with steel boilers space must be provided either at the front or at the rear sufficient to draw the tubes for cleaning or repair; this, in most cases, nearly equals the length of the boiler. If a boiler room is sized according to the information given in Table II, it may not be possible to get every manufacturer's boiler into this space, but *most* boilers will go in, and it is assured that, at least, *some* boiler will fit.

It must be understood that the dimensions given in Table II include space for boilers only; usually there are certain other pieces of apparatus, such as boiler-feed pumps, automatic-return pumps, vacuum pumps, feed-water heaters, house pumps, water filters, air compressors, hot-water heaters and storage tanks, which will have to be accommodated in space outside of that quoted. It might be said that a floor area of about 50 per cent of the boiler room is generally sufficient to receive all such equipment.

Chimneys for Boiler Plants. Consideration should be given to the fact that a certain height must be provided to produce the *intensity* of draft, and a certain area is required to carry off the *volume* of gas. The exact minimum height cannot be determined until the full details of the steam plant are decided upon and the overload—if any—on the boilers determined. Approximations covering average conditions are quoted in Table III, which may serve to give some idea of the height and size necessary as soon as the boiler load has been calculated as previously explained. For oil-burning plants the height of chimney uusally need not exceed 80 feet, and the area—*not the diameter*—need be only about two-thirds of the area which would be required for a coal installation. Care should be taken of course to be sure that the use of coal in the future is such a remote possibility that it may be neglected before the area of the chimney is reduced, as height can be added, but to increase diameter is usually impossible after the chimney is once built.

Boiler Horse-power	Coal		Oil	
	Dia. In.	Hgth. Ft.	Dia. In.	Hgth. Ft.
50	21	50	18	80
100	27	60	22	80
150	30	70	24	80
200	36	80	30	80
250	40	90	34	80
300	42	100	36	80
350	42	110	36	80
400	48	110	40	80
450	48	125	40	80
500	54	100	45	80
550	54	110	45	80
600	60	100	50	80
650	60	110	50	80
700	60	125	50	80
750	66	100	54	80
800	66	110	54	90
850	66	125	54	90
900	72	110	60	90
950	72	110	60	90
1000	72	125	60	90
1100	72	150	60	100
1200	78	125	66	100

TABLE III

Showing Approximate Diameters and Heights of Chimneys for Various Sizes of Plants, Using Coal or Oil Fuel

Mechanical Draft Objectionable. Low chimneys are sometimes necessary and can be used only in combination with some form of mechanical draft. Any artificial means of draft production is expensive, as it entails greater internal losses in the boiler plant and introduces additional expense in the first cost, which in turn raises the interest charge and depreciation. Mechanical draft should be avoided wherever possible. The little undergrate electric-driven blower for intermittent use is a cheap and useful adjunct to a building's heating plant, but installations carrying mechanical draft beyond this point are of questionable desirability.

Areas for Toilet Exhausts. In regard to duct and flue spaces necessary to ventilate, the toilets will have a larger air change than the ordinary rooms, so that this must be allowed for in settling the duct area required. If it is assumed that the toilet, locker and similar rooms are exhausted to the extent of ten air changes per hour, the duct area in square feet near the toilet will be $\frac{1}{2400}$ of the cubage ventilated, this gradually decreasing as the fan is approached to a point close to the fan, where the area will be about $\frac{1}{6000}$ of the cubage handled.

For example, assume a toilet and locker room of a total cubic contents of 5,000 feet, and about half-way from this toilet room to the fan is located a second room of 3,000 cubic feet. Then the duct area for the first room will be

$$5{,}000 \times \frac{1}{2400} \text{ or } 2\tfrac{1}{4} \text{ sq. ft.}$$

and where the second room comes in the duct for the second room will be

$$3{,}000 \times \frac{1}{2400} \text{ or } 1\tfrac{1}{4} \text{ sq. ft.}$$

As the two ducts unite at a point about half-way to the fan, the combined duct will have an area about half-way between $\frac{1}{2400}$ and $\frac{1}{6000}$ or, say, $\frac{1}{4200}$ of the total cubage handled. Then

$$(5{,}000 + 3{,}000) \times \frac{1}{4200} = 2 \text{ sq. ft. area}$$

and if no more connections come in, the area at the fan would reduce to

$$(5{,}000 + 3{,}000) \times \frac{1}{6000} \text{ or } 1\tfrac{1}{2} \text{ sq. ft. approx.}$$

Areas for Ordinary Ventilation. In other rooms, involving normal ventilation of say six air changes per hour, the factors would change from $\frac{1}{4000}$ at the room, down to $\frac{1}{10000}$ at the fan; and rooms with ducts connecting into the main line at intermediate points would have the main line duct carrying the total of all rooms supplied beyond any given point, and the factor would be approximately proportional to the distance of the point from the fan. That is, at a point one-quarter of the way from the fan to the end of the system the factor would be about $\frac{1}{8500}$, a point half-way between the fan and the end of the system would use about $\frac{1}{7000}$, and one three-quarters of the way would use $\frac{1}{5500}$.

To illustrate, assume two rooms with a cubage of 2500 each at the point farthest from the fan, another room with a cubic of 7000 cubic feet about one-third the distance nearer the fan, and a fourth room of 5500 cubic feet very close to the fan. The areas which will have to be provided to accommodate ducts and flues for these rooms will be:

First two rooms, $2500 \times 2 \times \frac{1}{4000}$ or $1\frac{1}{4}$ sq. ft.

After taking on the next room the area will increase to

$$[(2500 \times 2) + 7000] \times \tfrac{1}{6000} \text{ or } 2 \text{ sq. ft.}$$

When the fourth room is added the duct area becomes $(2500 \times 2 + 7000 + 5500) \times \frac{1}{10000}$ or $1\frac{3}{4}$ sq. ft. Supply ducts can be approximately determined by the same method.

Theaters and Schools Require Special Consideration. In theater work the cubic contents need not be considered, as the ventilation is based entirely on the number of occupants, and running from 20 to 25 cubic feet per minute per occupant. Schools follow the same rule except that they use 30 cubic feet per pupil. In these cases it is only necessary to multiply the number of occupants by the cubic feet supplied per hour and use one-sixth of this figure in place of the cubic contents to determine the duct sizes. When cooling is to be installed, the air quantity for theaters must be materially increased, reaching nearly double, and, sometimes full double that required for plain ventilation. It is essential that the sizes of ducts and flues running to the roof space over the auditorium must be sufficient to supply all occupants in the gallery and on the ground floor except the seats under the balcony; these should be supplied from the ceiling under the balcony and not from the main ceiling.

Theater Duct and Flue Areas. For every occupant supplied from the main ceiling, about 0.025 square feet of flue or duct area must be allowed, and for every occupant seated under the balcony about 0.033 square feet. The exhaust leaving at the floor either through the usual mushroom, or by other means, may be sized in the same manner, except that it must be remembered that the mushrooms in the balcony should care for all balcony seats and the mushrooms in the main floor for all the main floor seats.

As an example of the application of this, assume a theater of 3000 capacity with 1000 in the balcony and 800 under the balcony. With plain ventilation the duct going to the roof space above the main ceiling would have to carry air for all seats except the 800 under the balcony, so that the size of this duct would be

$$(3000 - 800) \times 0.025 \text{ or } 55 \text{ sq. ft.}$$

and the size of the duct going to the registers in the ceiling under the balcony would be

$$800 \times 0.033 \text{ or } 26 \text{ sq. ft.}$$

while the duct coming from the balcony mushrooms would be

1000×0.033 or 33 sq. ft.

and the duct from the ground floor mushrooms would be

2000×0.025 or 50 sq. ft.

When cooling is to be carried on, these areas should be increased by at least 90 per cent.

School Flues and Ducts. In schools the air quantity often required by law is 30 cubic feet per minute per pupil, and the average schoolroom works out with a supply flue and an exhaust flue each of 3¾ to 4 square feet area, assuming 50 pupils. Where trunk lines are used, such as in the attic exhaust lines, the area of the trunk line will run from 0.075 square feet per pupil served at the far end down to 0.03 square feet per pupil served near the fan. Intermediate points will range between these two figures, as has already been explained. In the basement the total duct area will keep within the same limits, although if single ducts are used for each room the basement duct area will be not less than 0.04 square foot per pupil. Where unit heaters are used, exhaust flues only will be required, flues generally terminating in a plenum space in the attic.

Apparatus Rooms. The sizing of apparatus rooms, i. e., the rooms for receiving ventilating equipment, will vary considerably in different apparatus arrangements; where pre-heaters, air washers, re-heaters, and fan are used, the length of the apparatus room, in order to set these in proper order and continuously in line, may be between 27 feet and 35 feet, the longer dimension being required for larger sets of apparatus. The width of the room will vary with the quantity of air being handled, and the width of the air washer should first be developed. This can be determined by calculating the air washer area, which is obtained by dividing the cubage ventilated by 5000. Then, if the height of the air washer is approximately equal to the width, the width will be the square root of the area, and the height will be the square root of the area plus about 2 feet for the pan under the washer. In cases where it is desired to keep within a limited headroom, the area of the washer may be divided by the headroom minus 2 feet, in order to determine the width. The width of the room must be sufficient to accommodate not only the washer but the circulating pump and the connections to the heaters, and to leave a working space around the apparatus. Therefore the width of the room should be approximately the width of air washer plus 8 feet.

As an example, assume that ventilation is being supplied to a cubage of 1,000,000 feet and the size of apparatus room is desired where headroom of 13 feet is obtainable. Then the area of the air washer will be $\frac{1,000,000}{5000}$ or 200 square feet, and as the headroom is 13 feet, the width of the washer will be $\frac{200}{13-2}$ because the pan under the washer and a little clearance over the top will equal a reduction of 2 feet in the effective washer height.

200/11 is 18 feet, the width of washer.

18 feet plus 8 feet equals 26 feet, the width of room. The length of room (as this is a large capacity equipment) will be about 30 feet. The height of room has already been given as 13 feet.

Pent Houses on Roofs. Some idea of the probable size of the pent house for exhaust fans on the roof may be gained by assuming it to be a cube, the cubage of which equals the cubage ventilated divided by 250. This assumption will do down to pent houses of about 200 cubic feet capacity for direct-connected exhaust fans, and down to about 500 cubic feet in the pent houses for belted fan installations. No pent house should be made for less than these minimum amounts, and for belted fans the dimension of the pent house parallel to the belt should not be less than 12 to 13 feet on small units, up to 17 feet or so on large units serving a million cubic feet in the ventilated portion of the building.

Fuel Storage. It is generally conceded that the absolute minimum fuel storage allowable is a three-day supply to take care of a holiday falling on Monday, etc. In Table IV is given a schedule covering the number of cubic feet of storage space necessary for one day's supply of coal and the number of gallons necessary for one day's oil consumption. These amounts can be multiplied by the number of days desired, and the total will be the space required. It should not be forgotten that the amounts quoted in Table IV are the amounts based on a heating plant operating at 100 per cent of its capacity; in other words, they are based on extreme weather conditions, and in ordinary winter weather, with the temperature around 30° to 35° Fahr., the fuel consumption will only run about half as much as indicated.

TABLE IV

Approximate Fuel Consumption for One Day of Extreme Weather

Horsepower Required	Soft Coal Cu. Ft.	Weight Tons	Hard Coal Cu. Ft.	Oil Gals.
50	94	2	90	340
100	188	4	180	680
150	282	6	270	1020
200	376	8	360	1360
250	470	10	450	1700
300	564	12	540	2040
350	658	14	630	2380
400	752	16	720	2720
500	940	20	900	3440
600	1128	24	1080	4080
800	1504	32	1440	5440
1000	1880	40	1800	6800
1200	2256	48	2160	8160

Note. This is figured on running 24 hours per day; for 18-hour periods of operation use ¾ of these quantities, and for 12-hour operation use ½. If a cheap, heavy oil is to be used, the number of gallons given may be increased by about 40 per cent.

ARCHITECTURAL LAW

ZONING, TRAFFIC, AND BUILDING TYPES

BY

ARTHUR C. HOLDEN, ARCHITECT

Editor's Note.—Leonard Cox, of the office of Arthur C. Holden & Associates, Architects, is serving as Architectural Consultant to the Temporary Commission to Examine and Revise the Tenement House Law. In the standards recommended herein, Mr. Holden has closely followed the standards proposed in the report of the Commission to the state legislature. The text itself is a part of recommendations made for the amendment of the Building Zone Resolution of the City of New York.

IN the discussion of congestion today we hear much concerning the high building and of overtaxed streets. Many generalizations are made as to whether or not our skyscrapers are a blessing or a menace; whether they should be permitted or legislated out of existence; and whether or not it is possible to do something to the streets that will make it possible for them to function a little better. There is some show of debate, too, as to whether traffic is as bad or worse in a city of low buildings like London than in our own skyscraper town of New York. In all this welter of discussion there has so far been little attempt to analyze the situation and separate individual facts from generalizations of opinion.

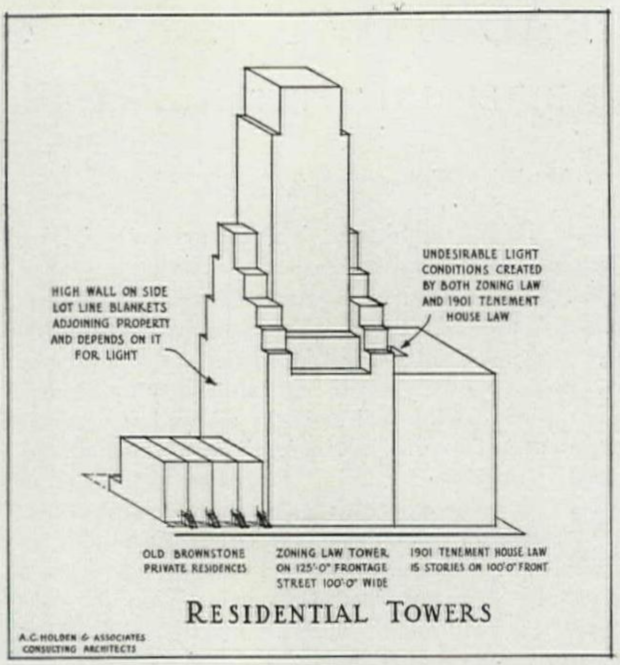
Divergence of Skyscraper Types. It may be just possible that high buildings need not be condemned *en masse*. Perhaps all skyscrapers are not alike; some may be good and desirable, while others may be harmful and therefore not so desirable. Some may cause congestion, and others may reduce congestion. Perhaps the deplorable congestion of street traffic may in some cases actually be due to high buildings, and in others to the increasing use of the automobile, and in still other cases the cause may be a bad street plan. The attempt to differentiate should at least be made. There have been developed in the last dozen years three main types of the very tall building,—the office type, the residential type, and the loft type. Of these only one,—the office building,—had begun to approach its present stage of development in New York when the zoning law regulating height and bulk of buildings was passed in 1926.

The zoning law established limitations upon the *uses* of buildings within prescribed areas. By such means business was kept out of purely residential districts, and heavy or objectionable manufacturing was in turn kept out of business districts. The law also established limitations upon the *area* of the lot permitted to be built upon. These restrictions were designed primarily to protect certain types of residential structures, though the extent of coverage allowed was of necessity influenced by the location and economic usefulness of the property. On the other hand, in the case of *height* restrictions, the zones established were designed to deal principally with office buildings, and in this case also the economic value of the property was the governing factor in the height permitted. The financial district had long suffered from the small sizes of plottages available. As a result, great care was taken in framing the law not to make the height limitations and the setbacks required too burdensome.

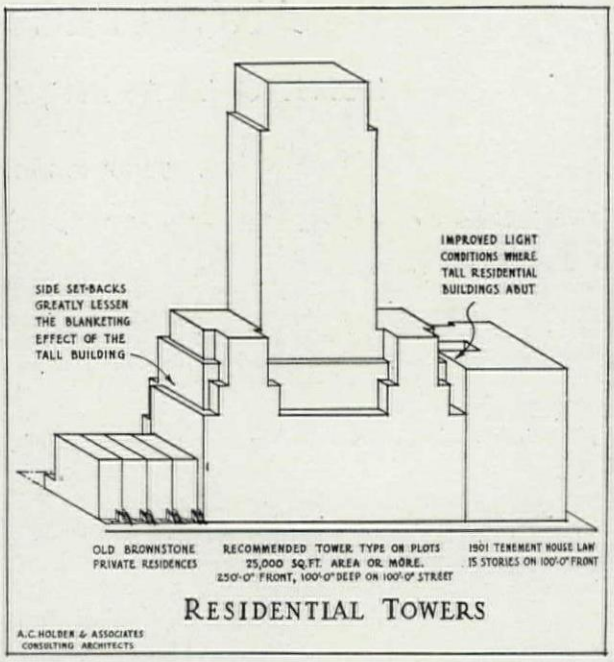
It was originally not thought necessary to differentiate as to heights and setbacks allowed for various types and uses of buildings. The development of neither residential nor loft buildings had been carried to a point where they created special problems of a character to be dealt with under the zoning act. As a result, so far as height and bulk were concerned, the same law governed the construction of office buildings, manufacturing loft buildings and certain classes of residential buildings. The severity of the restrictions as to height and bulk depended solely upon the height or area district in which the property happened to be located. As has already been indicated, the economic value of the land had been the controlling factor in fixing these restrictions. The greatest concern was exercised with regard to high value of land. It was deemed necessary to permit such heights as would not cause hardship or loss to the owners of valuable land. The tendency was therefore to scale up the allowable limitation generally so as not to appear to discriminate unduly against land in less desirable sections. The tendency of all land values to advance toward the economic limit set by ultimate permitted use was unforeseen. Attention was focused upon the expected uses. Because the resultant developments were expected to be desirable, no differentiation was made which related the size and shape of the building to other probable uses. The possibility had apparently been overlooked that certain other uses for buildings of great height and bulk might create problems capable of threatening the health and efficiency of the community.

Residential Buildings. It was originally supposed that the height and bulk of residential buildings were controlled in the main by the state tenement house act, but it was ultimately discovered that by definition the tenement house act governed only the construction of buildings where three or more families did their cooking. One had only to pledge the tenants of the building not to cook, and the building was exempted from the more stringent requirements for court sizes, light, and air, and even exits imposed by the tenement house law.

Under the influence of natural economic pressure, the exterior aspects of a certain class of fireproof residential buildings therefore began to take on the aspect of the well known office skyscraper of the financial district. Now this was all very well at the



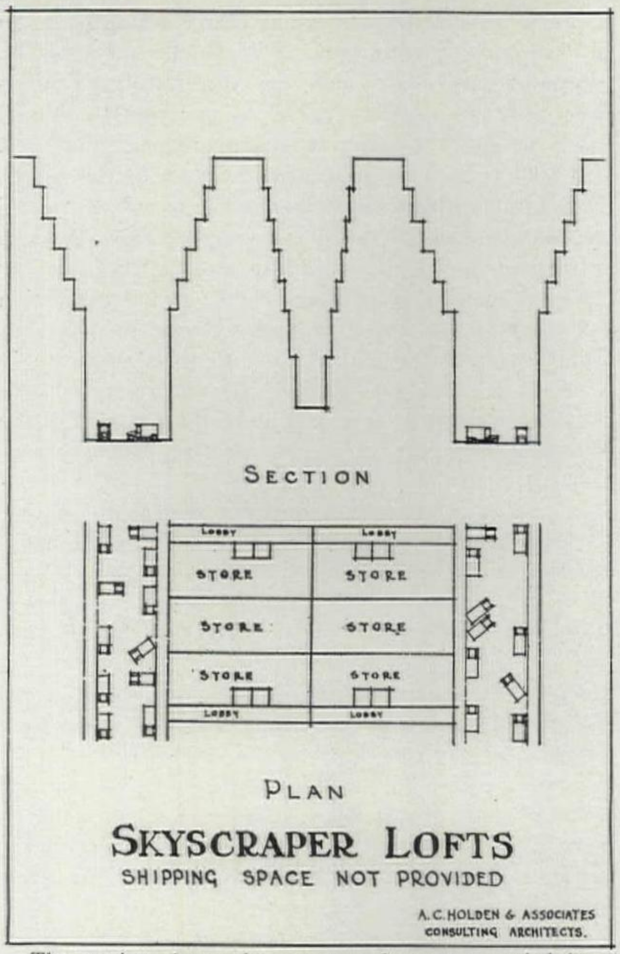
The tower in the center is made possible by the failure of the tenement house law of 1901 to provide limitations upon the height of residential buildings. The root of the trouble lies in an unenforceable definition of a tenement house. As land values increase, residential buildings tend to expand to the limits set by the zoning law, which permits the blanketing of adjoining properties, and insufficient light courts, and creates undesirable living conditions.



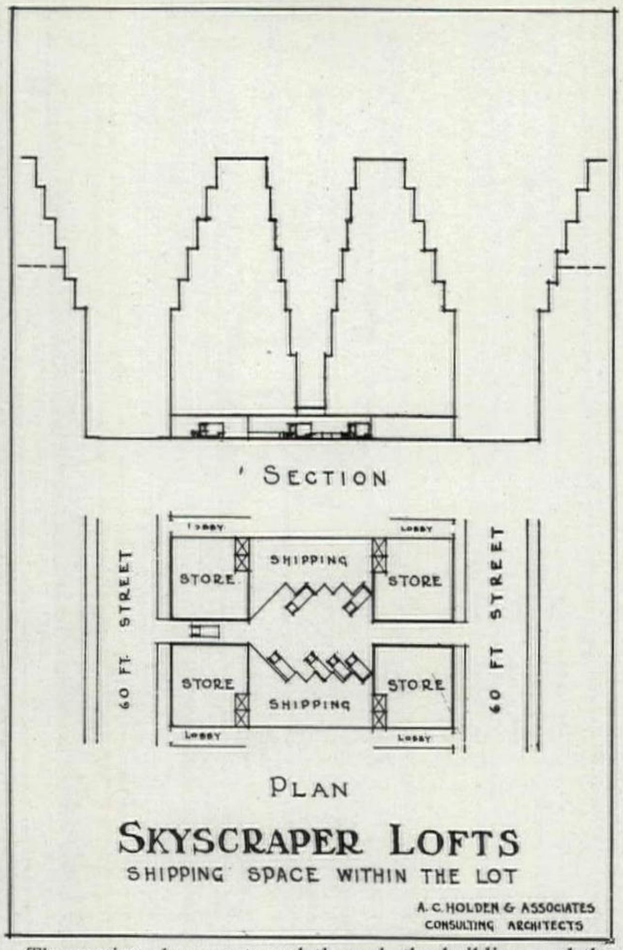
The tower in the center, according to the recommendations made, will be permitted only when 25,000 square feet or more are assembled in one plot. The mass of the building will be required to set back from the lot line with a height 5 feet greater than the width of the street on which the building fronts. This feature is a protection to the adjoining 15-story tenement (1901 law) on the corner, as well as to the old fashioned 4-story brownstone fronts.

start. The first skyscraper residential building in a block meant exceptionally good light and air for its own tenants, but it meant shadows and dark rooms for adjoining property owners. Where, however, skyscraper residential buildings ultimately become built up closely together, it means that the one damages the other. It means that although the upper stories may remain extremely desirable, the lower floors become not only undesirable but actually unhealthful for the reason that no sunlight can penetrate the excessively deep courts. While such courts may be quite possible in office buildings, which are occupied on the average eight hours during the day, there is a very different story to tell when the buildings are occupied both day and night. Doctors are united in their contention that all living quarters should be exposed during at least a portion of the day to the play of direct sunlight. The Committee on the Regional Plan of New York and Environs has carefully studied the question of sunlight penetration into living quarters and reports that it should be possible to determine minimum requirements for courts and window sizes by the minimum healthful standards of sunlight penetration. It is therefore a sound public health policy to impose restrictions as to height and bulk which are more stringent in the case of residential than in the case of office buildings. Such a policy, moreover, is to be recommended because it is an equitable protection to adjoining property owners. The great impetus that the development of apartment hotels and hotel buildings has attained today makes it imperative that height and bulk requirements should be immediately revised to differentiate between residental and office buildings. The forthcoming recommendations for the revision of the state tenement house law will mark the first step in the direction of such differentiation.

Manufacturing and Loft Buildings. Residential buildings, however, are not the only structures which because of their use call for special restrictions upon height and bulk. In all of the outcry today against congestion, more is being said about traffic than we have ever heard before. The work that is done in buildings has perhaps as much to do with the origination of traffic as any other single cause. Buildings where manufacturing is done are the direct cause of the origination of much of our heaviest traffic. Our zoning law as at present worded permits loft buildings to be carried to the same heights as office buildings. The modern, high-powered, express freight elevator has made this possible. The law does differentiate as to zones where light manufacturing and heavy manufacturing may be carried on. Where the economic value of the land is great, however, the height and area zones are likely to permit excessive development in height and bulk irrespective of the use to which the building is to be put. As a result of this situation, it is small wonder that in our newest manufacturing sections the streets are inadequate to take care of the traffic. It brings small relief to be able to reflect that it is the economic value of land that has virtually forced the skyscraper type of loft building. The setbacks required by law do, it is true, give far better conditions of light and air than



The section shows the amount of street occupied by a truck backed up to the curb. High loft buildings increase the use of the sidewalks for shipping and produce conditions intolerable for trucking, besides making traffic conditions practically unbearable with trucks backed up in such a way as to occupy approximately half of the street.

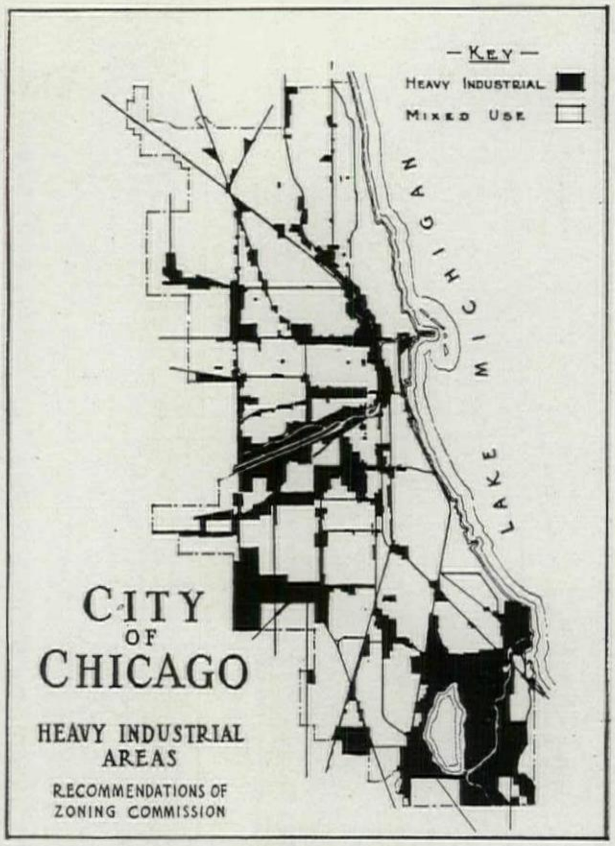


The section shows a tunnel through the building, and the plan shows a possible arrangement of special shipping space within the lot. Several building owners might coöperate to allow for shipping space in their interiors. Allowed heights of new loft buildings should bear a fixed relation to the shipping area provided.

have ever been obtainable in lofts before, but the taller buildings create a problem in traffic congestion which is carried at times even to the point of traffic stagnation. At the present time, in manufacturing loft districts, the sidewalks are used as shipping platforms. One line of trucks at each side of the street waiting to receive or discharge goods narrows the space available for the passage of traffic. Such conditions result in constant traffic jams. The price that industry pays for this is higher shipping and transportation costs, which are added directly to the cost of doing business. An amendment to the zoning law which will cut down the permitted height and bulk of manufacturing loft buildings to within the traffic and shipping limitations of the streets is urgently needed. Additional height and bulk may be allowed, however, where adequate trucking space for shipping and driving through, is provided for in the ground stories of the buildings. Where economic pressure has once commenced to operate to increase the height of a type of building up to the point where the traffic conditions created become a menace, the tendency can be checked only by restrictions by law.

Recommendations. Attention should be focused upon the differences in use in our present skyscraper types, and from these differences, with due consideration to safety, public health and the expeditious handling of the city's work, there should be worked out diversified requirements as to height and bulk. For example, in residential sections it is wise to keep walls as far as possible away from interior lot lines. It is wise, also, to require setbacks on the side lot lines, to prevent the erection of a solid row of buildings of excessive height likely to effectively shut off sunlight from buildings located on the northern side of such a row. There is great advantage in retaining openings between buildings through which it is possible for sunlight to penetrate. In the case of residential buildings also, it is both expedient and wise to make the angle for minimum setback requirements sharper than that, for example, required of office buildings.

The policy that may well govern the framers of a revision of the law is to balance, on the one hand, stringent regulation designed to check undesirable tendencies against liberal allowances extended in reward for conformity to sound principles of development. For example, loft and manufacturing buildings, though open to drastic restrictions as to height and bulk, may be permitted both greater bulk in the



The heavy industrial areas of Chicago have naturally followed the radiating railroad lines upon which the city is dependent. The zoning commission has endeavored to preserve adjoining areas available for residence.

lower stories and greater height for the setback stories where complete provision is made inside the buildings for trucking, shipping, and driving through. There are, of course, other matters ripe for consideration in a possible revision of the zoning law. In particular there is the growing need for the reservation of residential zones in proximity to manufacturing and mercantile districts. Problems of this sort have developed since the original passage of the ordinance, and are even at this time beginning to demand attention. By such provisions the city's transportation burden may be in some degree lightened. Most immediate, however, are the considerations which have to do with the proper study and the discovery of the proper interrelation of the factors of height, bulk, and use.

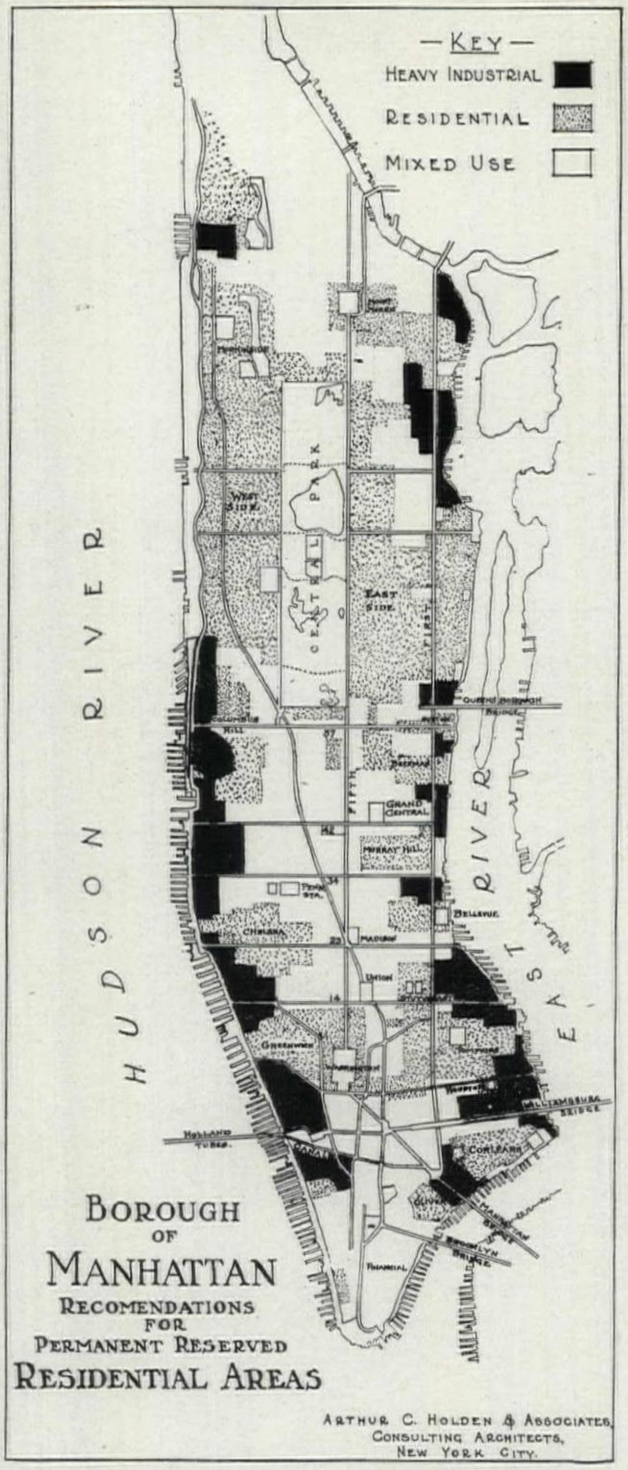
Unrestricted Districts Not Satisfactory. At the present time there are within Manhattan vast districts which so far as modern use is concerned are virtually undeveloped. Nor has there yet been worked out any progressive plan for their development. Until recently it has been assumed that as the city grew industry would expand into these districts, and for this reason most of these localities have been designated upon the city zoning map as "Unrestricted," as to use. On the other hand, there has been a great deal of propaganda recently about "rebuilding the slums." Much that has been said on this subject is purely sentimental. The old buildings in these so-called "slum areas" have certainly fallen into a shocking condition. It is something to stir the deepest sentiments of any true American that his fellow citizens should be asked to pay rent to live in such habitations. The rents that are paid, however, are held at their present levels because of the potential market valuations of the land upon which the old tenements stand. Considered simply as dwellings, a great number of these old tenements are a losing proposition to their owners. The gradual expansion of industry into these old, unrestricted districts has enabled tenement owners to hold their property in spite of rental losses in the hope that ultimate sales at high enough figures will more than pay back the losses during the period when the property was carried as a slum.

The Case of "San Juan Hill." A typical instance is the course that property in the west sixties of Manhattan has taken. A neglected residential neighborhood back of the New York Central freight yards was allowed to fall into bad repair. The tenements fronting on the streets filled up almost exclusively with negroes. Property adjoining became less desirable for residential purposes. Neglect of repairs made conditions worse. Then came the advent of the automobile and the need for garages and repair and service stations on cheap land. Garages began to invade the district. Then there commenced a movement to assemble large plottages, creating an active market for real estate almost irrespective of the condition of the buildings. This occasioned a general advance in the prices of real estate. Mounting interest charges and taxes put a heavy drain upon the owners, so that in turn less cash was available for maintenance. The effect upon the tenants was higher rents for buildings in worse repair. The effect upon the owners was higher paper value and a retarded market for industrial properties. Today many of the owners are still holding onto property on which the carrying charges exceed the rents, in the hope that a possible future Hudson River bridge in the neighborhood may boost the prices of their real estate. From the point of view of the city, the district has gone from bad to worse. The social and health problems of the neighborhood constitute a tax upon the whole city. So bad were the implications which were connected with the very name of the district, that the attempt has been made to drop the name of "San Juan Hill" and know it as "Columbus Hill." Meanwhile it is neither a residential nor a manufacturing and commercial district, and so far as its present state of development is concerned, it is undesirable from many points of view for either use.

Needs of Industry Vital. Surely it should be possible in any proposed amendment to the zoning law to take better cognizance of the needs of industry, and to set down definite regulations designed to benefit not only industry itself but the general good of the city. It benefits neither industry nor the city to simply write the words "Unrestricted Use" upon the zoning map. In the first place, it does not supply the transportation and shipping needs of modernized industry to expect industry to grow by merely taking over undesirable districts originally laid out for residential needs. Blocks ranging from 600 to 900 feet long and only 200 feet in depth are likely to create difficult problems because of their shape, and when the long frontage is on a 60-foot street, the problem becomes well night insoluble. There is no reason why high prices should be paid for industry on streets which have never been intended for industrial use. In the second place, the prices which industry has been forced to pay for assemblages of plottage have given a speculative stimulus to land values. This has been felt both directly in high prices for industrial plottage and indirectly in high prices for all adjoining property available for housing purposes. As a result, the rents exacted of industrial workers living near the plants have been advanced, with resultant pressure for higher wages.

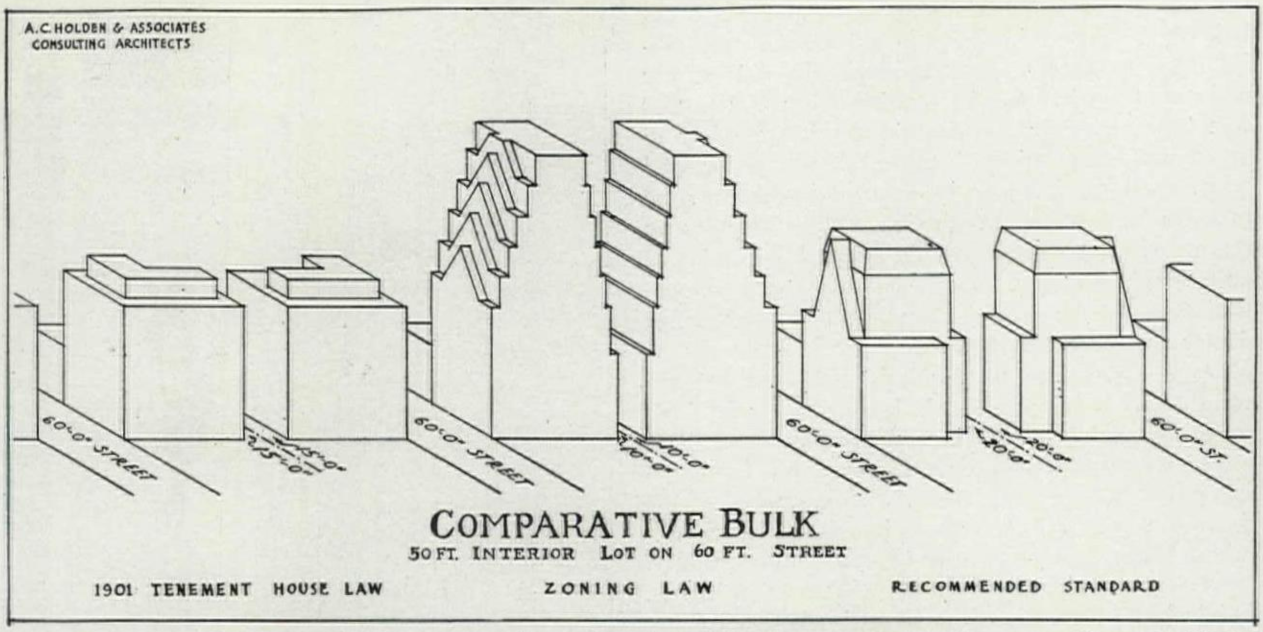
In the third place, in the search for cheaper homes, industrial workers have been forced into the outlying districts, with the necessity of long periods of travel daily upon expensive transportation systems. There are two primary objections to the long trip to and from work; one is the cost in time to the worker, for which industry pays in the lowered vitality of the worker; the other is the cost in cash which industry pays in the form of higher wages and higher taxes necessitated by the practice of subsidizing the construction and operating costs of transportation systems which are not self-supporting. It is the high rents exacted for old fashioned, sunless, undesirable homes convenient to work that are forcing migration to outlying districts and to the suburbs.

Effect Upon Transportation Problems. This movement has contributed more than any single cause to complicate our transportation problem. There has been much loose talk about the tendency of population to move away from Manhattan, and its desirability, but it is a physical as well as an economic impossibility to transport all of the workers required in an industrialized and commercialized Manhattan to and from the other boroughs both night and morning. The day is not far distant when mandatory provision will be made by the zoning law, restricting for residential purposes districts immediately adjoining areas where manufacturing and commercial and mercantile enterprises are carried on. Furthermore, assessments and taxation must be so equitably adjusted that the assessed values and the resulting taxes upon residential properties will not be disproportionate to the rents that can be charged. It must be borne in mind that land values established at a low level are essential if homes are to be rented at low rates. With the additional interior partitions necessary for privacy and the additional required plumbing, residential construction cost runs higher than the cost of construction for manufacturing and commercial uses. The rental market, however, except in the luxury class of homes, is directly the reverse. Here there is a clear case where it is



The peculiar geographical character of Manhattan Island has produced an uneven distribution of industry and housing. It is now practically certain that most of the older sections cannot properly be rebuilt for housing unless permanently restricted to residential use. This should not, however, prevent the use of the lower stories for stores or other uses essential to a residential neighborhood. On the accompanying map a preliminary attempt has been made to zone in such a way that residential areas are so distributed with relation to light and heavy industrial areas as to reduce congestion.

necessary for zoning regulations to set aside areas where residence values may become stabilized. It should not be necessary to argue here that such a policy will not work hardship upon the owners of



(a) The building is not permitted to cover more than 70 per cent of the area of the lot. Front wall may be 1½ times as high as street is wide. Courts are of uniform height throughout. Pent houses may cover 50 per cent of roof area.

(b) The rear yard must be 10 per cent of the depth of the lot. In Manhattan Borough the front wall is in general allowed to be 1½ times as high as the street is wide (in some districts to 1¼ times and in others 2½ times).

(c) The rear yard must be 20 feet deep. The side walls may extend along the lot line for a depth of 60 feet only. Both front and side walls must set back 10 feet above the street height plus 5 feet.

property. It will tend to check the speculative exchange of land in certain sections, but the stabilization of the income should compensate for this.

A consistent zoning policy which includes the proper relation of residential and industrial zones will bring relief to the general problem of congestion. In the first place, the reservation of zones in which heavy traffic is not likely to originate in proximity to zones suffering from heavy traffic is in itself an immediate relief to the traffic pressure in the congested areas. This is of fundamental importance to industry. In the second place, it is no less important to dedicate definitely restricted localities permanently to housing. It is only through the incentive furnished by such a guarantee that improved residential areas of modern standard can be developed. New building in such areas, while perhaps only slightly reducing the population, will nevertheless tend to reduce congestion. Higher buildings with elevators and apartments planned two rooms deep, with garden courts and open spaces, will afford far more healthful accommodations than the present neglected tenement neighborhoods. Finally, every residential area preserved within walking distance of a mercantile, commercial, or manufacturing area reduces the congestion due to transportation, which is one of the worst manifestations of our problems.

The Hope of the Future. There is room of course for great difference of opinion as to what should be done to alleviate the effects of congestion as well as room for differences as to what is reasonably within the possible range of accomplishment. It is strange, however, that so little progress has been made toward getting at the root of the problem. If subway trains are overcrowded the public shouts "build more subways"; if the streets are jammed with automobiles, the public asks for more policemen; if the situation gets worse there is a demand that the sidewalks be cut away and the roadways widened. If rents are high the public expects to have a law be passed setting everything right. The public hasn't the time or the desire to try to find out what is the matter.

The public is not mature enough, even the experts themselves are not yet mature enough, to know that expert advice is valueless unless balanced with an understanding of public need and public policy. In the great overgrown, over-balanced City of New York there is the need today for a great getting together of experts in order that those who are experts in their own line may at least get an understanding of the point of view and of the experience of the others. Our civilization has developed to such a point today that the directing forces have outgrown the mental concept of the individual. By the inter-relation of individuals of different training, however, the group concept can be carried much further, and the forces in our social system with which the individual alone is unable to cope may be controlled and directed by an intelligent group leadership. The solution of the problems will be dependent on such coöperation.

Perhaps the problem of the further development of city zoning ordinances is one of the foremost that has arisen to challenge the capacity of the individual expert. Bound up with it is the key to the current which sways the whole course of city growth and city life. It is not a problem which can be left with a bunch of theorists to be toyed with.

BUSINESS AND FINANCE

THE ARCHITECT AND BUILDING FINANCE

BY

C. STANLEY TAYLOR

THE interesting changes which have taken place in the practice of architecture within the past decade have established the profession in an economic position far more comprehensive and important than is at first realized. A very large proportion of the building activity of this country, now and in the years to come, takes on the nature of a business investment. This is obviously true in the case of structures which are built for the purpose of profitable resale or to return income on an investment. It has also become definitely true in the case of buildings that are constructed to house industrial and commercial enterprises. Factory buildings, warehouses and various types of commercial structures have become extremely important tools of industry. Their design and construction exercise a powerful influence on the profits of the businesses operated within them. If the buildings are inefficiently designed, it means that operation and handling costs may often mount to a figure which eliminates profit. If they are not well constructed, it means that maintenance and depreciation costs may so offset profits as to cause red ink figures in the annual statements.

Architecture's Advertising Value

Following the examples of leading industrial and commercial organizations, practically all business men are giving today much more serious consideration to the structures which they build for their own use. Accountants are introducing construction and building maintenance costs seriously into their figures. The appraisals of such enterprises made for purposes of financing through stock and bond issues give a prominent position to buildings as important assets of the business. In the same manner these buildings have taken their place in what might be termed the "institutional" advertising programs, particularly of the larger industries. Well designed structures are definitely featured as a part of their general newspaper and magazine advertising. Advantage is taken of strategic locations for the designing of factory buildings which will impress the passing public. Thus architecture is being gradually woven into the fabric of commerce and industry, assuming very important proportions as compared to its place but a few years ago.

The housing movement, which is carrying thousands of families into apartment buildings and apartment hotels, calls for architectural service which involves not only skillful and efficient planning, but the designing of exteriors which will attract the interest of tenants. Stores and shops, theaters,—in fact almost all structures in which business enterprises of any nature are operated,—are demanding architectural design based on higher standards of business operation and of living environment. Even in the construction of modern homes, both small and large, this business aspect of architectural practice enters. There is a strong trend today on the part of the prospective home builder to give much thought to his investment. In days not long past the building of a house was more or less dissociated from business consideration. There was little thought given to resale or financing values. But today it has become recognized that the home is logically a part of one's estate, and often a very important part.

The Architect's Responsibilities

If, then, we take the term "building finance" in its broader meaning to include not only mortgage financing but also the sales or asset valuation of a structure, it becomes immediately apparent that the architect is a powerful factor in his business relationship with the investment. It is often within the power of the architect to establish the failure or success of a building in accordance with the plans he draws. His specifications will tell the story of reasonable or excessive maintenance and depreciation charges. His presentation of the project may have a powerful influence on its financing. It is for these reasons that every architect, even though his practice may be restricted to residential work, should give serious consideration to his place and his responsibility in relation to the owner's investment. An interesting fact is to be noted in studying the programs of many architectural organizations within the past few years. Almost without exception those offices which have been most successful are those offices in which there exists a definite measure of appreciation of the business aspects of the building projects entrusted to them. Conversely, we find organizations which have depended entirely on designing skill passing gradually out of the picture, while good, profitable work follows the line of least resistance from the practical point of view of the average business man. These statements do not mean that the architect must become completely businesslike in his administration, nor do they mean in any way a sacrifice of architectural integrity or belittling of good design. The ideal situation is to be found when the two elements are combined, to the end that structures of fine appearance and a high degree of efficiency of purpose may be created.

There are two ways in which the architect may establish and hold his contact with the important function of building finance, or in other words, with the business side of any building project. The first way is to gain for himself through observation and study a general knowledge of the various elements which create successful financing and operation in the building field. The second way is to understand and appreciate the contribution which can be made by experts of various types who, in a consulting capacity, will assist in making plans successful. If we examine today a building which is undoubtedly achieving its purpose by operating successfully from the owner's point of view, we will almost always discover that a happy combination of brains and experience has been involved. We shall find either that the building was designed by an architect who has had sufficient experience in the type to know its business problems and to meet them successfully, or we shall find that either through the owner's or the architect's insistence someone has been brought in who could and did contribute the necessary knowledge of operation to establish the project in a successful manner.

The Architect's Business Position

Many architects probably do not realize that a few years ago,—perhaps 10 or 12 years back,—the profession went through a very serious and critical period. In a sense its ultimate place in the American business world hung in the balance. The question then was,—would the architect assume his rightful position in relation to building projects, or would he be but a hired designer, paid by owners and contractors to develop simply pictures in accordance with specific instructions? A great many of the larger architectural offices and also many of the smaller units in the profession responded in a most interesting way to this situation,—sufficiently to swing the scales in a most favorable manner. There are some who will question this statement and who will refuse to recognize that the profession ever faced such a critical situation. To these we can only suggest consideration of two or three important facts.

The Architect as Business Adviser

Almost all of the leading architectural offices today have a full appreciation of the business aspects of the projects on their boards. This is true even to the point of finding individuals, in many of these offices, whose sole work has to do with business administration,—not only of the office itself but of the projects of clients. There exists today a very close relationship between architects and bankers or other sources of mortgage loans and between architects and building managers, real estate experts and other types of consultants who contribute to the economic design of a structure. The architect today stands in a very different light in the eyes of the average business man. He is not only a designer but he is often recognized as a sound advisory source. The questions which are asked in the average architectural office today pertain much more to the business than to the æsthetic requirements. These questions are broader in their range,—they delve into profit making or operating functions to a far greater degree than ever.

Cost Estimates and Finance

In connection with many types of building operations, the first requirement demanded of the architect is the preparation of sketch plans and outline specifications of such a nature that they may materially assist in financing. Very often this is not only ordinary senior financing but has to do with bond issues and other types of public financing on a large scale. It is very often the case that general financing agreements are required on large operations even before land is actually purchased. The architect's function here is to provide sketch plans which will show what kind of a building can be built on the particular site in question, and from which tentative operating and income schedules can be developed sufficiently to justify a preliminary financing commitment. At this point there enters one of the most important functions which the architect can possibly perform in connection with the financing of a building project. This is the function of preliminary cost estimating, and it is here that the architect's great responsibility begins, because at this point a countless number of building projects have been started in the wrong direction. Innumerable instances can be given where building committees have been misled by architects' optimism in regard to ultimate costs. Case after case can be cited where financing negotiations have fallen through because preliminary cost determinations were made in a vague or fallacious manner. To erroneous preliminary cost estimates there may be charged the loss of many a good project which has never passed the preliminary stages in the architect's office, because of a false start. It is to be remembered, after all, that most individual or committee administrations of a building project are being operated in a thoroughly practical manner by business men. Almost without exception, clients are willing to face facts if they are presented in a dependable and sincere manner. What clients do not like is to face facts after the actual operations are under way or nearly complete,—that is, if the facts prove original estimates to have been far too low.

Aspects of Preliminary Cost Figures

Careful observation of a great many building projects seems to prove that it is quite possible to make preliminary estimates which are not far from the ultimate truth. It does not matter if the building so developed is smaller than the client had hoped to obtain under his budget, nor does it matter if he cannot go into certain luxurious types of materials, finishes or equipment. What really does matter is that he shall know approximately what he can get for a given amount of money, or approximately what the building he wants will cost. He can change his ideas or increase his budget if he finds that it is necessary, but after he has plunged into the investment and is coming to the finishing stages, if he discovers a great discrepancy between the estimate and the actual cost, he often finds himself in very hot water. He finds that he cannot go back to his mortgage financing sources and increase his loan. He often has no additional capital of his own, nor can he obtain it. What then usually happens is one of two things. Either the project goes under foreclosure and is finished by someone else, or it becomes necessary to greatly cheapen the finishing and equipment of the building, which is very unfortunate. We have today many examples of well designed and well built structures which have been forced to cheapness in the finishing stages because of failure to properly estimate and budget building costs. Consequently, these buildings are operating under unnecessarily high maintenance costs and are suffering from a degree of visible depreciation and shoddiness which directly affects renting both in the size of the income and in the percentage of vacancies.

Here is a situation which often is charged to the architect's failure to obtain proper preliminary estimates,—and the charge is often fair, because this cost is perhaps unfortunately often a part of the architect's responsibility. Of course, it is not a direct financial responsibility, because the architect in no sense guarantees the cost of the building, but it is to be noted that where costs greatly exceed estimates, the client will hold this fact against the architect forever.

Reliable Cost Data Essential

This is not the place to discuss methods of estimating costs, particularly preliminary costs. Articles will appear from time to time in this section of The Architectural Forum covering this subject from a number of important practical angles. It is sufficient to say here that experience has proved that preliminary estimates of a fairly dependable nature may be had if sufficient care is exercised to determine costs by correct comparisons and through sound sources of information. Obviously, the architect should not shun a discussion of costs, nor should he in any way attempt to gracefully evade this subject. On the other hand, he should be the first to insist upon such a determination and the first to bring his client squarely face to face with this practical side of his project. We have never yet met a client who broke off relationship or indicated an unpleasant attitude because the architect brought him face to face with the truth before his money was in danger. We have seen thousands of cases of the reversed situation,—all of which proves that one of the most important relationships of the architect to this question of building finance is that of cost estimating.

Presentation of Preliminary Sketches

The actual physical presentation of sketch plans is highly important. The first impression which a banker or an investor gains in relation to a new building project is regarding the location and general purpose of the building, but the most powerful impression he gains is its first visual interpretation, which, of course, must be from the sketch plans prepared by the architect. Owners themselves are not always aware of this fact, and the architect should clearly indicate to the owner the importance of proper presentation. Naturally, the larger the project or the more involved its financing, the more carefully should this presentation be made, and here again the architect plays an important role in building finance.

Thus far there has been no indication that the architect must become a past master of building finance. Of course, if he reaches a point where he establishes financial connections in which he can actually aid clients in obtaining building and mortgage loans or in the promotion of a project, it is obvious that he can benefit materially. On the other hand, if he will only discharge the functions which come naturally within the scope of his work, fitting them into the business needs of the project, he will have accomplished all that is necessary.

Specifications and Costs

In this connection we naturally come to a consideration of specifications. The selection of building materials and equipment is of tremendous importance in relation to the business success of the new building, as has already been indicated. The building field of today offers such a tremendous scope for selection that even in the less expensive types of construction it is quite possible to incorporate materials and equipment which will function in a manner consistent with successful operation. As buildings have assumed a more important position in the economic structure, it is but natural that their span of useful life should have been materially lengthened. Construction costs are so high and individual projects are often so large that short-term investments have become impossible in this field. At the same time, even as a chain is as strong only as its weakest link, so a building is only as good and will exist only as long as the poorest major materials and equipment which are incorporated in it. Consequently, the architect must become even to a greater degree than he is, an exponent of the use of good materials and equipment. He must be a demonstrator of the fallacy of cheapness in construction,—and all from the business point of view. This is another way in which he can render a tremendously valuable service in relation to building finance and make an equally valuable economic contribution.

If the architect of today will do these things in conjunction with good designing, he will not only fulfill his true function, but he will have discharged his responsibility to the owner in a manner which will earn many tangible rewards.

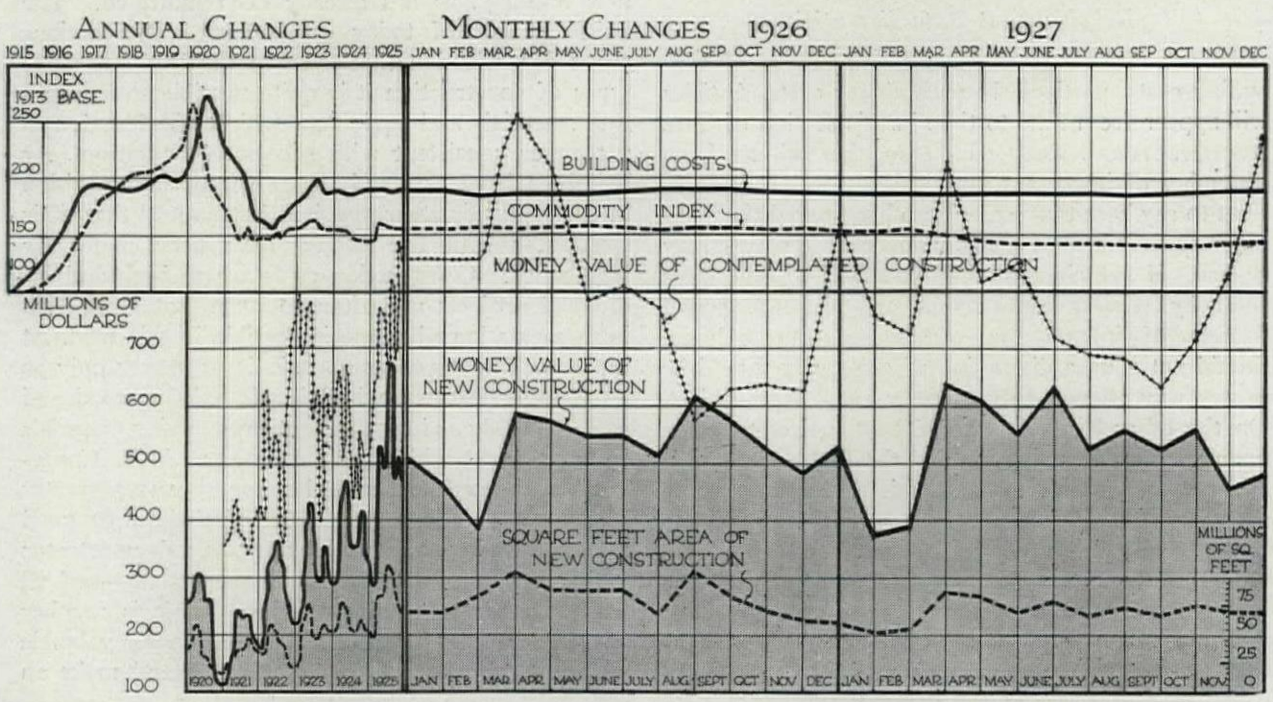
THE BUILDING SITUATION

A MONTHLY REVIEW OF COSTS AND CONDITIONS

NOW that the figures are available for the year 1927, it is interesting to learn, according to the F. W. Dodge Corporation, that last year was the second best year in the construction industry. For the entire country the figures given for total 1927 construction are estimated at a little over $6,800,000,000, which is about 30 per cent less than for the year 1926. The chart included here presents in graphic form the history of building activity since 1920. The years 1926 and 1927 are shown in monthly totals, both in money value and in physical volume of construction as measured by square feet of new floor area. One very interesting detail as indicated by the chart is that the month of December recorded a total plan filing of unusual proportions. The plans filed in the month of December indicate contemplated construction totaling $988,915,100. These figures show a gain of 20 per cent over the amount reported in November, 1927, and 9 per cent over the amount reported in December of 1926. All indications point to a considerable volume of contract letting to take place early in the year 1928,—thus starting off the year as predicted in THE FORUM Forecast for 1928, which indicates a year at least as active as 1927, with totals perhaps slightly greater.

The contemplated construction is well worth analyzing to find out in what territories this early activity may be anticipated. The new work contemplated in New York state and northern New Jersey in December showed a gain of 68 per cent over the total of November, 1927, but a loss of 7 per cent from December, 1926. In the New England States there was a loss of 12 per cent from the amount reported in November, but a gain of 25 per cent over the corresponding month of last year. Evidently, there is to be greater building activity in the New England district in 1928 than during 1927. In the Middle Atlantic States there is shown an increase of 51 per cent over the amount reported in December, 1926, indicating a considerable increase in building activity. The Pittsburgh district showed somewhat less than in December, 1926. The Northwest shows a drop of 23 per cent from December of 1926. The Southeastern States show a drop of 11 per cent, and Texas a drop of 8 per cent. The year promises to be a good one for architects. In a great many offices there has been a slacking off over the ending period of the year, but the middle of January, when this review was written, already presented indications of renewed designing activity in most sections.

In many areas throughout the country there is evidently to be activity by speculative builders.



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

ARCHITECTS, COSTS AND CONTRACTORS

BY
MORTON C. TUTTLE
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IT is commonly assumed, almost as an axiom, that the final cost of any building operation will of necessity be greater than the first estimates promise. This cost obviously concerns the buyer more than anyone else, yet the procedure conventionally followed in construction work may leave him with less control of his expenditures than anyone connected with his enterprise. He finds his function virtually reduced to that of trusting others and paying the bills which they present. He entrusts the investment of his building funds to those he believes more expert than he is in the technical problems involved. The basic cause of an owner's inability to control the cost of building is discoverable in the fact that the erection of any structure today involves complexities of design and equipment,—and hence the employment of a number and variety of specializing designers, contractors, and workmen such as were not dreamed of even 25 years ago. The immediate cause is attributable to a conservative disposition on the part even of able business men, which leads them to attempt to meet the complex building requirements of the present by the direct and simple means which sufficed a generation or more ago.

There are two important aspects to every construction design: first, the aspect of utility; second, the aspect of cost. Distinct though these are, their interrelations must never be lost sight of. An office building may be designed so as to satisfy every requirement of utility. Yet, if the cost of the finished building is excessive, the necessity for fixing rents high enough to insure an adequate return on the investment may disastrously reduce the tenancy of the accommodations offered. If mill, or warehouse, or factory represents excessive expenditure of capital, the inevitable overhead charges for the interest on the investment may seriously impair operating profits, or even reduce them to the vanishing point. Clearly, then, a design which has been drawn with theoretical utility primarily in mind, and without strict consideration of the cost of all the individual elements whose sum will constitute the total cost of the finished structure, must be viewed as essentially unsatisfactory. It is not sufficient to know that this design provides for a usable building. The scheme is not adequate if, by substituting other details and other materials for those specified, an equally excellent structure may be obtained in less time for less money. If cost is a vital concern, and if it must be controlled, then, obviously, someone fully competent in cost matters should be constantly in contact with every step in the development of any design whose fulfillment in structural form involves cost. Unfortunately, however, men who are competent to direct the designing and at the same time to check the cost of each phase of its progress are extremely few. And the more the nature of the design is such as to appeal primarily to the designer's creative imagination, just so much the more are considerations of cost likely to be overlooked.

Protecting the Owner's Expenditure. It is fairly evident that the present procedure in undertaking a building operation of any magnitude is likely to involve an owner in avoidable expenditures, and to cause him eventual dissatisfaction or even keen disappointment. It is possible, however, for the owner to be so informed in advance as to the cost of developing each of several schemes that he may be able to proceed with complete assurance that the proposed undertaking will not require expenditures beyond those which, in the beginning, he has accepted as satisfactory and reasonable. This may be accomplished through the employment of an expert in construction costs, either a member of the architect's staff or a consulting expert. In either event such an expert will be a man of broad training, who has spent years in direct contact with actual building operations and who has devoted himself to calculating both the practical utility and the cost—in time, labor, and materials—of every element of building.

Complete Preliminary Estimates Necessary. Called into consultation at the inception of a building problem, such an architectural cost expert should be able, after consultation with the owner, to prepare a number of sketch plans of buildings of various types, any one of which would satisfy the general requirements outlined. He should be prepared, further, to render an accurate estimate of the cost of carrying out each of these plans, and to select the best for presentation to the owner with the estimate in sufficient detail so that the owner may judge, not only the probable cost of the whole, but the cost of each of the elements. Such an analyzed estimate makes it possible for the owner to weigh the importance of each feature in terms of its cost, and to retain this feature or to discard that, according to his judgment as to its relative dispensability. The plan thus generally outlined, estimated, and finally approved serves to establish a budget by which the detailed development of the design can be controlled. The cost expert should check every step in the progress of the work and safeguard against such departures from the plan as would increase the cost.

Architects who do not have trained cost experts in their own organizations find it advisable to have the collaboration of a consulting cost expert. They find that his services relieve them of a heavy load of responsibility, supply them at first hand with otherwise almost unobtainable practical information, and, by constantly and clearly defining the limits of the creative endeavor, stimulate concentration upon the essentials of excellence in both structural and decorative design. Furthermore, in the end, a building plan developed in conformity with a preliminary budget, for whose application the cost expert is accountable, is pretty certain to present no necessity for those hasty and disfiguring last-minute modifications and eliminations which harrow the souls of all such designers as take worthy pride in their work. A concrete example is that of a library building which was completed with a saving of $35,000 without sacrificing beauty of design, because of the collaboration of designer and cost expert.

It may be argued, at this point, that the cost expert is likely to insist on so reducing the design to its barest outlines that its character, beauty or effectiveness will be lost. The opposite may well be the case, as the savings suggested by the cost expert may easily go far toward making possible various elaborations calculated to enhance the attractiveness of the structure. If they do not, they will result in no further scaling down of purely decorative items than is properly demanded by the suitability of the building to the class of service which it is to render. Once final plans have been completed by the collaboration of designer and cost expert, they should be accompanied by an exact and accurate estimate of cost for every item of materials and labor which will enter into the building, together with an estimate of the time which should be allowed for completing each step in the building program.

Selecting the Contractor. The next step is the selection of the contractor best qualified to erect the building. The general contractor must possess a wide knowledge of material markets; he must know intimately the reputations of the sub-contractors in various lines; he must know the prices and the values of different classes of workmanship and different brands of materials. This knowledge of the general contractor may be used in either one of two ways, depending upon the form of business arrangement made with him. If he is put into competition with other contractors, his interest is to produce, at the lowest cost, a building which will pass inspection.

Competitive Bids. The theory governing the competitive method of selecting the general contractor is that this individual will, in so far as possible, safeguard his own interests, and that the architect or engineer will safeguard the interests of the owner. Here is a conflict of interests which is necessarily unfortunate. It sets the contractor on the watch for every possible flaw in the architect's specifications, and encourages him to make high charges for every departure from them which changes or enlarges the original plan. And, worst of all, it drives the contractor to do all his buying, both of materials and of sub-contract service, on the basis of *price* rather than of *value*. The general contractor, today, is by no means merely a kind of foreman mechanic who directs the work of his own employes. In the erection of a modern office building, for example, the general contractor's direct payrolls average hardly more than 15 per cent of the total cost of the structure. The remaining 85 per cent of this cost is absorbed in purchases from others—purchases which include rentals of machinery, materials, and labor through the medium of sub-contractors. To subject the general contractor to the pressure of competition is, therefore, to force him into making 85 per cent of his commitments in the cheapest available labor and materials markets. And this procedure inevitably relaxes his control over the quality of his purchases and over his method of making them. In the construction of an office building the services of some 30 different sub-contractors are employed and of a greater number of dealers in materials. Now, clearly, the facilities, or the skill, or the business ethics of no ten plumbing concerns will be quite the same,—or even equivalent. No ten different painting contractors will deliver equally satisfactory workmanship and supply equally reliable materials. One plastering concern will do a far better piece of plastering than almost any other in its locality. And in the business of building, as in other lines of business, the services of the expert are seldom obtainable at as low a figure as those of the incompetent.

It is poor policy to place a general contractor in a position where his knowledge and ability must be employed for the most part in safeguarding his own interests rather than those of his employer. Accordingly, he should be tentatively or fully engaged by the owner at the same time that the architect or engineer is employed. Under such circumstances it should be understood that he is to work *with* the architect,—concerning himself, first, with matters of cost, as they develop in the design proper; next, with purchasing; and lastly, with the conduct of construction. Thus engaged, the contractor will often be found to serve as a reliable cost expert, and in any event as so efficient a supervisor of costs that through his agency the owner may from first to last feel confident of controlling his expenditures. So long as the general contractor is not subjected to the pressure of competition, he can work in this way; but, as soon as competition is forced upon him, his interest shifts, and such knowledge as he possesses is reserved for his own protection, not for that of his employer. We submit therefore,—and here engineers and architects are pretty much in agreement,—that if competition is to be applied in building, it should be resorted to, not among the general contractors,—who are to be the buyers of plumbing, and painting, and steel work,—but directly among the plumbers and painters and steel men. Only in the latter case is it possible to appraise the real value of the service offered in relation to the prices asked, and to determine whether the proffered figure is really as attractive as it seems.

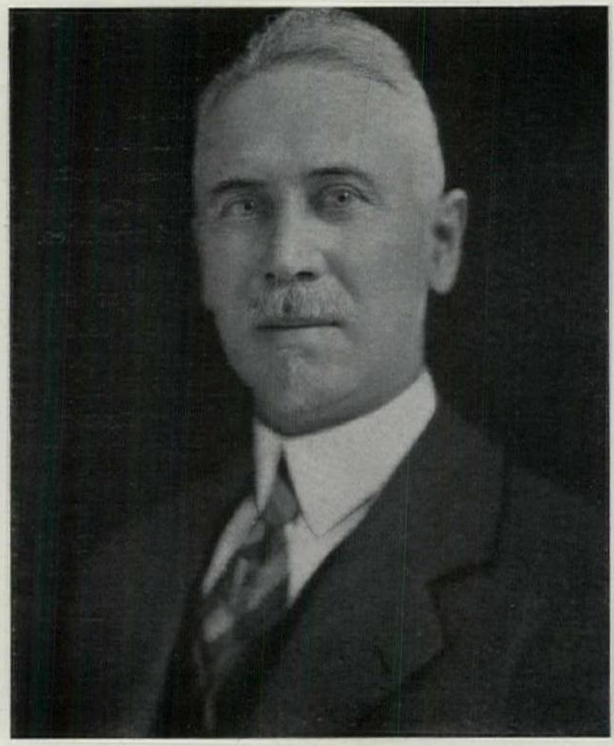
It may, of course, be argued at this point that the architect's specifications, by which contractor and sub-contractor alike are bound, will stipulate the exact character of the work to be performed and the quality to be achieved; and that careful inspection should suffice to insure adequate fulfillment of these specifications. Anyone possessing a sense of humor might delight in following this optimistic theory in its application to a surgical operation, to the painting of a portrait, the composing of a piece of music, or even to the humble yet subtly exacting process of making an apple pie. In his inner consciousness, every intelligent person is aware that the one chance of obtaining good work is to entrust a task to the competent. Inspection offers no substitute for honesty and ability. Granting that the contractor has been employed as an agent and not as an enemy, he will, when plans are completed, proceed to gather the bids of sub-contractors and material dealers. He will submit these bids with his recommendations to the architect, who in turn, after consultation with the owner, will determine which proposals are the most satisfactory. This procedure will enable those in command to make selection, not solely on the basis of price, but on the basis of value to be expected.

It will be the contractor's responsibility to organize finally all the interrelated functions of the building undertaking, to set up his organization, to arrange time, material and labor schedules, and with the least possible delay to get the work under way. If he performs his task as he should, he will keep the architect and owner constantly and reliably informed of the progress of operations, from the standpoint of actual time and money expenditures in comparison with previously submitted schedules. If changes in plans are ordered, he will make the necessary revisions in his schedules, and advise as to their bearing upon original time and expense estimates.

Knowing from start to finish the progress of operations, the owner will find himself able to control every aspect of his undertaking through the ablest collaborators, and, as completion draws near, to plan with complete confidence on the utilization of the new construction. If the work develops savings over the estimates, it is to his advantage; if conditions arise which necessitate expansions or other considerable alterations in the original plan, he pays only what these cost and with a full understanding of the situation. And in the end there will be delivered to him precisely the kind of building which he looked forward to owning.

Photo. P. J. Weber

Administration Building, Central Maine Power Co., Augusta
Joseph D. Leland & Company, Architects
A Building Erected by the Morton C. Tuttle Co. Under the System Outlined in This Article

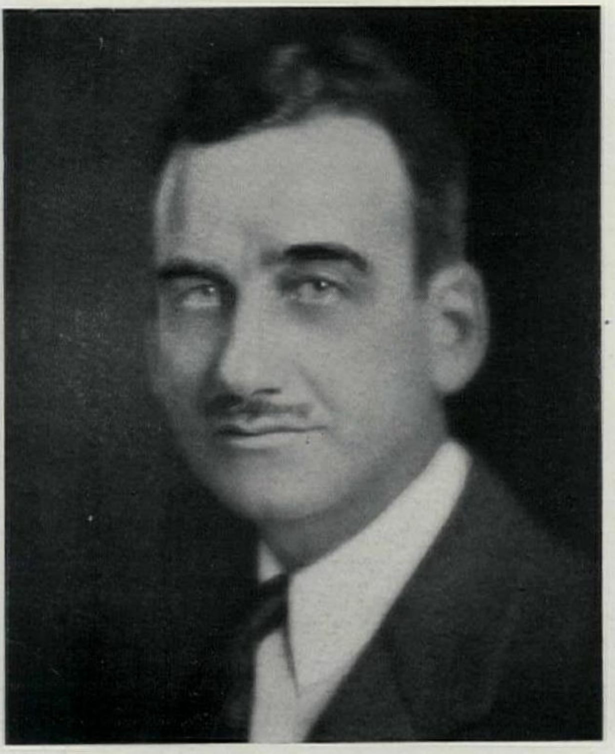


WILLIAM J. SAYWARD

WILLIAM J. SAYWARD was born in Woodstock, Vt., in 1875. Whatever he may have been when he first descended the rugged slopes of the old Green Mountains, whatever grimness or dourness of that forbidding soil may have adhered, today we know him, after he has enjoyed 14 years of Georgia sunshine, as a pleasant, genial man,—a man not self-seeking; as enduringly dependable as the granite of his native hills; a man so rigorously fair-minded that he has been known to regret the salary he asked and received from his first employer, because he "couldn't have been worth it." He was graduated in civil engineering from the University of Vermont in 1897, and in architecture from the Massachusetts Institute of Technology in 1901. His early training was gained in the office of McKim, Mead & White, where he remained until 1908, leaving them to study in Europe. On his return he was, until 1913, a member of the firm of Wilcox & Sayward of Seattle. In 1913 he came to Atlanta to form with Mr. Edwards the present firm of Edwards & Sayward. There is not space allotted to make a comprehensive list of the work of this active firm, but the Girls' Senior High School of Atlanta, the Columbia Seminary buildings at Decatur, Ga., and the auditorium building of the University of Florida can be mentioned as typical.

Mr. Sayward has taken a very active part in the development of the North Georgia Chapter of the American Institute of Architects, of which he was president in 1917 and 1918. He is now regional director for the Southeastern States of the A. I. A., and was elected a Fellow of the Institute in 1926.

HAL. F. HENTZ.



HAL F. HENTZ

NO firm of architects in the South has done more to advance taste in architectural design than has that of which the subject of this sketch is the senior member. Born in Florida in 1884, Mr. Hentz received his early training in the schools of that state. Naturally his collegiate course was undertaken in a Southern institution, Emory University, in Georgia. For his professional course, however, his eyes turned to Columbia and from there on to Paris, where he spent 1908 in the Atelier Julien. His early professional experience was gained in the office of Kirby, Petit & Greene of New York.

It was in Columbia, however, that acquaintances were formed which were to ripen into the partnership of later years. The partnership of Hentz & Reid was established in 1909, the two young men returning to the South where they opened an office at Macon, Ga. At this time, the dean of architectural practice in the immediate section was G. L. Norman, of Atlanta, who became attracted by the capacity of the young firm, and an alliance was formed under the name of Norman, Hentz & Reid. Upon the death of Mr. Norman the former firm name was resumed, but this was soon enlarged to include Rudolph S. Adler. As Hentz, Reid & Adler, the firm's practice increased in size and character. The death of Mr. Reid in 1927 caused a further readjustment of the firm as Hentz, Adler & Schutze. Mr. Hentz' personal qualities and ideals have compelled the recognition of his fellows so that he has twice been called upon to serve as president of the Georgia Chapter, A. I. A., which office he now holds.

WILLIAM J. SAYWARD.

THE ORGANIZATION AND PROCEDURE OF ALLIED ARCHITECTS

THE ALLIED ARCHITECTS ASSOCIATION OF LOS ANGELES

BY
EDWIN BERGSTROM, PRESIDENT

Editor's Note. In ever-increasing numbers we find public buildings and others designed by the "Allied Architects" or the "Associated Architects." The interest evoked by the results achieved naturally has a corollary in the curiosity in regard to the organization and procedure of the associations. Architects generally have evinced interest in this form of architectural organization, and public spirited leaders have seen in them an opportunity for service. New associations are being formed, and there is a likelihood of still further steps in this direction.

We are privileged to give in some detail the salient features of one of the most successful organizations of this kind, the Allied Architects Association of Los Angeles. We plan to present in a later issue the correspondingly interesting features of several other outstanding organizations.

THE Allied Architects Association of Los Angeles was founded nearly seven years ago by 32 licensed architects associating for the purpose of providing architectural service for buildings built with the proceeds of public tax money.

The plan, the idea, the ideal of this organization were perhaps best expressed in the statement published by the Board of Directors in July, 1921:

"These architects believe that they can subordinate and submerge their individual interests, to the end that they shall collectively as allies and co-workers offer the civil authorities a method of securing the best of architecture in public structures at no greater cost to those authorities for their collective services than would be paid to an individual architect, and with the utmost assurance that the buildings would be built for the least possible cost.

"The idea is to give collective service,—the ideal is to achieve thereby an adequate expression of the art of architecture in our public structures. The idea and the ideal are expressed in the by-laws of the Association: 'The paramount purposes of this Association are to advance the art of architecture, and by the professional coöperation and collaboration of all its members to secure for and to provide municipal, county, state and national governments with the highest and best expression of the art of architecture in the designing, planning and construction of public buildings, structures and improvements and at the least possible cost. It is not intended that this Association shall accept or perform architectural services for private individuals, firms, or corporations; but this shall not be deemed to prevent the Association from rendering such services to its members.'

Rights of Members. "The Association has planned broadly. It has its own drafting, engineering and superintendent forces, its own offices, and its own entity throughout. As an Association it has no capital stock; the rights, interests, privileges and liabilities of every member are equal, and no member can have or acquire a greater interest therein, nor be subject to a greater liability, than any other member. A member is without interest in the assets of the Association other than that conferred by his membership; on termination of membership for any reason, all rights and interests of the member in the assets of the Association cease. Any gains the organization may make will be principally expended in those things that will be of aid to all architects in their professional duties, such as a comprehensive architectural library, meeting rooms and educational facilities for draftsmen. It is intended that only the most nominal gains will accrue to the membership; hence, a membership is attractive and will be confined to those architects only who are in sympathy with the idea of this Association and the opportunity it offers to give public service, and who have achieved the qualifications for membership. The by-laws so express this point: 'Any architect who, because of his ability and qualifications has advanced the art and profession of architecture and is especially fitted to render professional services for public welfare, is eligible as a member of this Association.'

"The membership is open to those individual architects who have achieved these high qualifications; by application to and approval of the Board of Directors and 90 per cent of the entire membership, such an architect becomes a member of this organization and, as evidence of such election, the certificate of the Association is issued to him. The membership is safeguarded from those who fail to fulfill the loyal service demanded or who find the work irksome or not to their taste; a membership can be terminated (a) by resignation of the member, (b) because of dereliction of duty to the Association or other cause by a vote of 75 per cent of the members, or (c) for any reason, by a vote of 90 per cent.

"The cost of membership has been put at the nominal fee of $100; this has been fixed in the charter of the Association, so that the entrance of any architect to the Association will not be barred by its cost. The Association desires the personal services of its members, not their money. The members will be compensated for their services to the Association.

Duties of Members. "It is not expected that the duties of the members will be onerous, but there are no qualifications in this respect. Every member has signed this document on the books of the Association: 'I hereby acknowledge that I have read the Articles of Incorporation and the by-laws of this Association, and I do promise and agree that I will comply with and uphold the principles and aims of this Association as expressed in them. I further promise and agree that I will render promptly, diligently and faithfully to the Association such personal service as may be assigned to me by the Board of Directors, and for the compensation, if any, allowed by them, and will endeavor, to the best of my ability, to work harmoniously and unselfishly with my fellow members of this Association.'

Los Angeles Hall of Justice
The Allied Architects Association of Los Angeles, Architects

The Control and Administration. "The business and the property of the Association are conducted, managed and controlled by the Board of Directors. Those first elected were:

OCTAVIUS MORGAN	REGINALD JOHNSON
EDWIN BERGSTROM	DAVID C. ALLISON
MYRON HUNT	

The officers first elected were:

OCTAVIUS MORGAN .... *President*
EDWIN BERGSTROM .... *1st Vice-president*
DAVID C. ALLISON .... *2nd Vice-president*
H. M. PATTERSON .... *Treasurer*
J. J. BACKUS .... *Secretary*

Both directors and officers are subject to immediate removal for neglect of duty or other causes.

"The administration of the work of the Association and the operation of its departments are in accordance with the most efficient and economical practice; its chief divergence from the ordinary practice is its machinery for securing the collective criticism and service of its members. The talented designers, those men who have really been educated to know and understand the good things in architecture and to express them, those men who too infrequently have the opportunity to function on public work, will be afforded the opportunity by this Association, and the member whose qualifications most fit him for the work in hand will function most strongly on that work, and every member will contribute his ability to the work of the Association under the direction of the Board of Directors.

"The practical sides of the undertaking, as well as the æsthetic, are fully cared for; the Association gives its most experienced minds to exercise the business and executive functions and to care for the structural, mechanical, electrical, architectural, sanitary and supervising problems. Its carefully selected and rounded out membership gives, in every branch of architectural work, a collective service that no private individual, firm or corporation can buy.

"The individualistic touch is necessary to all architecture and to every art; without it there is no life or interest. So in this association, this touch can never be lost, because the method of organization under which it operates provides that some individual member will always have the architectural expression of the problem, under and subject to the criticism of his co-workers.

"The Board of Directors shall have power to enter into contracts, acquire and assume obligations and to borrow money, make or issue notes, bills or evidences of indebtedness in the manner provided by law. The Board of Directors shall have full power and authority to require members to perform services assigned to them by said board and upon the failure, refusal or neglect of any member to perform the same, said board shall have power, upon being directed so to do by a vote of three-fourths of all the members expressed by letter ballot, to forfeit all interests and rights of such member in said Association.

Compensation of Directors. "There shall be no compensation paid to any director for attendance at any meeting of the board or of the members.

Power to Fix Compensation. "The directors shall have the power and authority, and it shall be their duty, to fix the compensation to be paid to members of the Association for their individual services rendered to the Association, and to fix the compensation to be paid to its officers, representatives and employes.

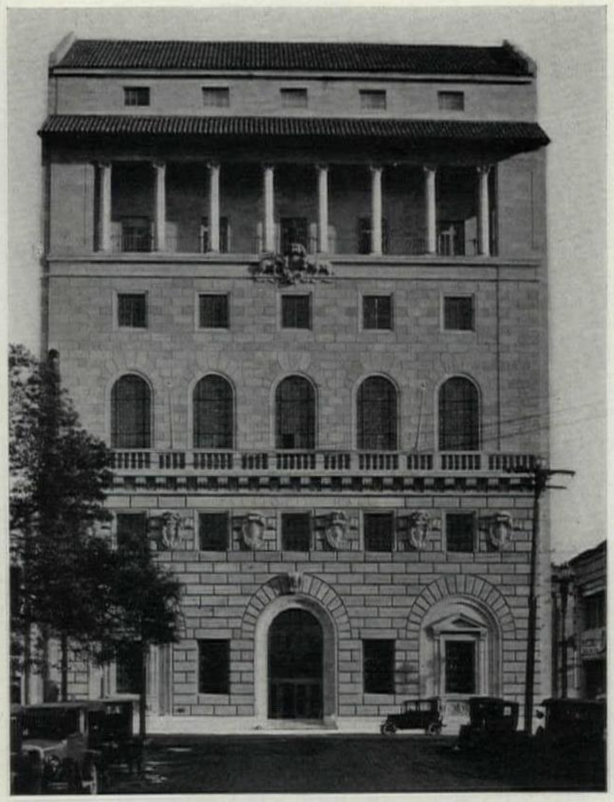
Division and Application of Profits. "Profits acquired by the Association shall be divided in the month of January of each year among the members whose membership has been continuous for a period of one year prior to the date of said division and shall be deemed to be the amount of funds determined by the Board of Directors as available for division after all expenses of the Association have been paid, including payments to members for services rendered and amounts not required for conducting the affairs of the Association. Every member signs a waiver of all his rights to the Association."

Reasons for the Form of Organization. The architects organizing the Association were all members of the American Institute of Architects. The doing of this work in this manner was discussed in chapter and committees. It was found entirely impractical to do the kind of work that it seemed best to do through the chapter organization of the Institute. The service of members to the chapter is compulsory because of membership therein; the services rendered by members to the Association are entirely voluntary;—the chapter executives are ever-changing; the responsibilities of the practice of architecture require unchanging executives;—the chapter is a branch of a national body and therefore is not an organization organized for profits or one that can assume the responsibilities and liabilities of a business organization. If the chapter should assume business obligations, the Institute would become involved in its financial problem without doubt, and thereby would be created a situation impossible for the Institute. The Allied Architects Association organization is incorporated under the laws of California. The indebtedness which the Association may incur is limited in the by-laws to $20,000.

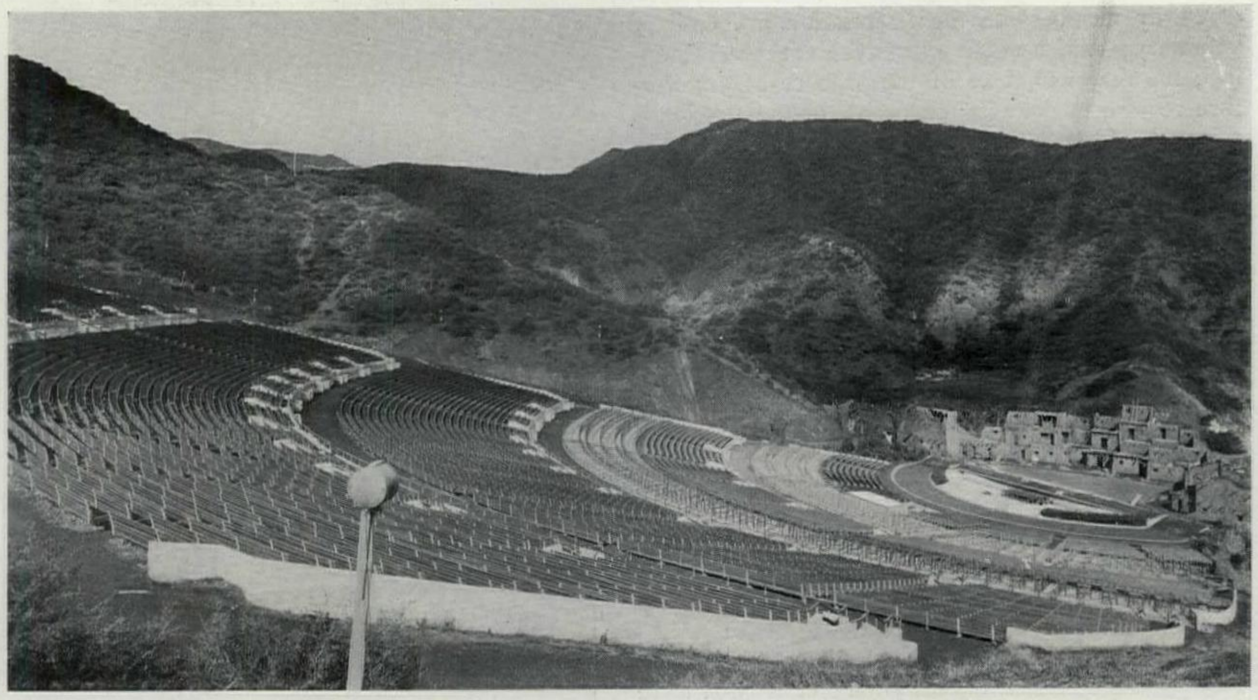
Avoiding Pitfalls. In the organization care was taken to avoid some of the pitfalls that seemed to have caused other altruistic associations of architects to fail. The organizers studied carefully all available data regarding several of these attempts and visited several of the localities where attempts had been made to render collective architectural services. How well the present organization has avoided these causes of failure is evidenced by the fact that this organization has been functioning for six and one-half years, has completed some very important commissions, has continuing contracts for several years to come, and has the continued enthusiastic interest of its members.

Fees, and Payments on Contracts. The organization gives its combined services for a single fee and performs its work through its own complete organization down to the very last detail of practice. Its contracts have been based on a 6 per cent fee, modified by the extent of the services rendered, and in all respects have been exceptionally fair and equitable contracts for architectural services for public buildings. The contracts provide and complete preliminary sketches (which, when accepted by the public body, can be deviated from only as the development of the working drawing compels modifications or as the public body may by resolution require); the preparation of the working drawings and specifications; the preparation of the contract documents and the construction contracts; bonds and insurance instruments; and the supervision and superintendence of the work. Payments to the architects become due as the services of the architects progress, and are payable monthly beginning with the performance of service, the amount due being based on preliminary estimates of the cost of the building, fixed by the public body, until such time as the actual costs of the building are determined, when any necessary adjustments in fee are made. The contracts provide for various additional services that may be rendered by the architects in addition to those on which the basic fee is computed and an equitable charge therefore in addition to the basic fee.

Procedure in Actual Work. The functioning of the organization has really been very simple. The Board of Directors, after signing a contract for a project, sends a written statement to the members outlining the requirements of the building as fixed by the public body, and requesting each member to submit at an open meeting of the Association, in any manner he desires, his ideas of the proper solution of this problem. The various suggestions and sketches submitted by the members are thoroughly discussed at meetings of all members, at which the public officials are always present. Often the discussions, in which the officials take part, run over three or four such meetings. It has been easy for the members and officials by this open discussion to arrive at two or three possible solutions of the problem, any one of which might be proper. These two or three tentative solutions have then been returned to each of the members, asking them again for their criticisms and suggestions. These are re-assembled, and again at open meetings these second offerings are considered and out of the discussion of these, always with the public officials present, there has been no difficulty in selecting the *parti*. When this scheme has thus been decided by the members and officials, the Board of Directors appoints one of the members to take personal charge of the design and the working out of the *parti* into a final design. The board criticises the design as it grows, and also appoints a small number of its members as a jury of design. The board selects for both designer and the jury, those members who, in its judgment can best solve the particular problem in sympathy with the general solution decided upon by the membership. Thus the final *parti* is worked out of many sugges-



Patriotic Hall of Los Angeles
The Allied Architects Association of Los Angeles, Architects



Hollywood Bowl

Allied Architects Association of Los Angeles, Architects

tions offered by the members and is the result of many full and free criticisms of them by the entire membership and the public officials. The development of the selected solution is placed in the hands of the men most competent to develop the particular *parti*, whether or not he may have submitted the approved scheme, and associated with him are those members who will work sympathetically. The Association has found, and the designers admit, that the designer has invariably profited by the sympathetic criticism of his jury and in the final design there is no question but that the individuality of the designer has been preserved and that the design has gained by the jury criticism.

As the design is developed by the designer, the drawings are brought up one or more times before a general meeting of the members and officials to be freely criticised, and as a final step they are brought to the Board of Directors and must receive its criticism and approval before they receive the stamp of the Association as the final design and final solution. All work of drafting and preparing of documents is done in the drafting room and offices of the Association by its own staff. No work is apportioned out to any member. The designer and the jury invariably develop the design in the drafting rooms of the Association. For the development of the working drawings, further juries of the members are brought into active work. There is a permanent jury of engineering and a permanent jury of specifications whose duty it is to meet with the designer and jury of design and discuss and fix upon the construction and materials and to criticise the development of the structural drawings and the preparation of the specifications, and finally, after the designer has approved them, to approve them in writing to the board whose final approval must be had.

Supervision. Responsibility for the direct supervision of the work of construction is always maintained in the Board of Directors, which delegates one of its members to supervise a project, and this member and the designer and the chairman of the jury of construction and specifications meet regularly at the building for inspecting purposes and to give directions to the general superintendent of the Association who is in direct charge of the field work for the Association. The final acceptance of work of construction is on the signatures of these members.

Office Methods. The offices and drafting room of the Association are organized to give complete service, the drafting room carrying its own sanitary, electrical, mechanical and acoustical engineers. The Association calls in as advisers on special problems the best outside talent available.

The general office of the Association has been fully organized, and the accounting department has developed very valuable and exhaustive forms whereby the costs of doing work have been established down to the finest details for the purposes of record and efficiency. The general office, in consultation with various counsel, has developed full and complete contract agreements for the use of contractors and public bodies on public buildings, which are receiving wide application because of their full detail requirements. Approximately 200 forms have been worked out and are in use by the Association in connection with its work, and these forms are invaluable.

Budget. As soon as a project is contracted for by the Association, the board prepares a budget for the work wherein it distributes the probable amount

Preliminary Study, Acute Unit of the Los Angeles County General Hospital
Allied Architects Association of Los Angeles, Architects

of the fee to reserve, preliminary work, working drawings, supervision and superintendence, and general expenses. The limits of the expenditures set by this budget for the development of the various portions of the work control the drafting and other costs.

Payment of Members. The profits distributed to the members as such have been very nominal, amounting in the aggregate to approximately the amount of the membership fee. The payment of the members for services has been on an hourly basis at a rate which has been established by the Board of Directors, the rate being the same for every member. The number of hours of service given by each member is kept by the Association, and the total amount of compensation received by the member for any service performed by him for the Association, whether it be on the architectural or engineering problems or on the development work of the Association, and also the spending its reserve, are determined by the Board of Directors by fixing the number of hours.

Political and Legal Difficulties. The Association, functioning on public work, is subject to political attack at all times, and like any association, must expect to have its motives questioned, its compensation questioned, and its legality in service assailed. The Los Angeles Association has been the subject of violent political attack, culminating in 1926 in forcing the Attorney General of the State of California to bring *quo warranto* proceedings against it asserting that its organization was illegal, that it was illegally performing architectural services, and that the service which it was performing could be performed by individuals only, seeking to enjoin it from performing further services, and the County of Los Angeles from making further payments under its contracts. These proceedings were heard in the Superior Court and injunction denied without leave to amend. The decision was appealed to the Supreme Court of California, and in July, 1927 a unanimous opinion of the Supreme Court written by the Chief Justice upheld in every particular the decision of the Superior Court and set out that the Association was legally incorporated and as an Association could render full and complete architectural services so long as its members were licensed architects under the laws of California. The legal status and responsibilities of the Association were thus finally established by the highest court authority, and the decision was far-reaching in its effects upon the question of associations of architects, whether of two or 50, and incorporations of architects performing architectural services. The litigation has been long and costly to the Association, but it has borne the expense because it felt that the question should be settled as to the responsibility and qualifications of associations and incorporations to perform architectural services, and because it felt that the service it was rendering to the public was of such importance that it should be continued if possible.

Results of the Work. The gains which the Association has obtained by its business have been entirely expended for the betterment of the architectural profession and for the development in the community of an appreciation of architectural service and architectural design. This has been done in many ways, and two of its most lasting of efforts will be the encouragement it has given to architectural education in the local colleges and appreciation of design in the schools and the development of an architectural library open to the public under charge of competent librarians.

The work which the Association has done in these years includes:

(1) Giving advice regarding various public works and enterprises, such as the Los Angeles Colisseum, restoration of the San Fernando Mission, and architectural features of the Los Angeles city viaducts.

(2) Forming for the City and County of Los Angeles a plan and scheme for development of an administration center.

(3) Work on the exterior of the Hall of Justice; Los Angeles Museum of History, Science and Art; Patriotic Hall; acute unit of the Los Angeles County General Hospital; acute unit of the Olive View Sanitarium; three playground buildings for the Playground Department of the City of Los Angeles; and development of the Hollywood Bowl.

Complete preliminary sketches, working drawings, plans and specifications have been prepared for all of the buildings and structures itemized under (3).

The essentials of the success of a similar enterprise based on the experiences of this Association would seem to be these:

First. The rendering of public service in order to achieve better public buildings must be constantly adhered to and upheld as the paramount purpose of the organization. It is essential that the organization must be kept altruistic in its nature and that the members must always have the feeling that they are giving something to public service and giving more than they are being compensated for.

Second. The work of the Association must be limited strictly to public work in order that the private practice of a member shall not be infringed upon. An Association would have no excuse for functioning if the public work in its locality were being adequately done or if its objects were to cut out competition, or if it were necessary for it to engage in the usual political maneuverings to obtain its work. The Association, an association, to perform public service, must be politically above criticism.

Third. Every member must be paid for the time he puts into the organization, regardless of what the rate of compensation may be, and each member must be paid at the same rate as every other member, regardless of his ability, in order that the equality of his rights as partner may be unquestioned.

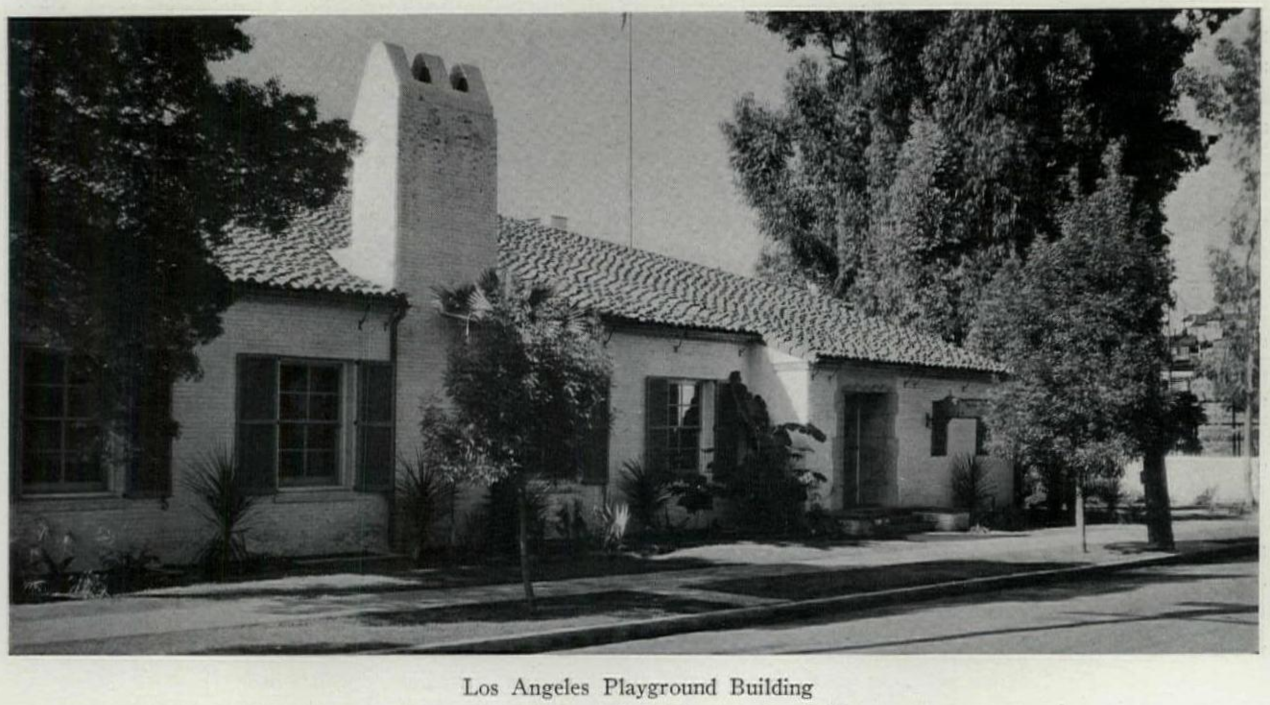
Fourth. The organization must be made representative of all abilities and qualifications, so that at some time or other every member will be able to contribute something to its success.

Fifth. Frequent meetings must be held to discuss all details of the work and problems in hand so that each partner will be kept personally interested.

Sixth. The actual work must never be apportioned out to members; complete architectural organization must be kept and maintained during the progress.

Seventh. As the objective of the organization is to provide better public architecture, it cannot be an organization for individual profit to its members; and the expenditure of any surplus funds the organization may accumulate must be made so as to accrue to benefit the architectural profession as a whole. In this case profits are being expended, first, on the building up of a working library of fine arts; second, in a development of fine arts educational system in southern California and the founding of scholarships; third, a development of public appreciation of the arts of design and architecture.

Eighth. Each member must voluntarily relinquish any interest that his estate might have in the assets of the organization, insofar as he can legally do so, and request that any such assets that have accumulated to him shall accrue to the benefit of the Association as a whole.



Los Angeles Playground Building

Allied Architects Association of Los Angeles, Architects

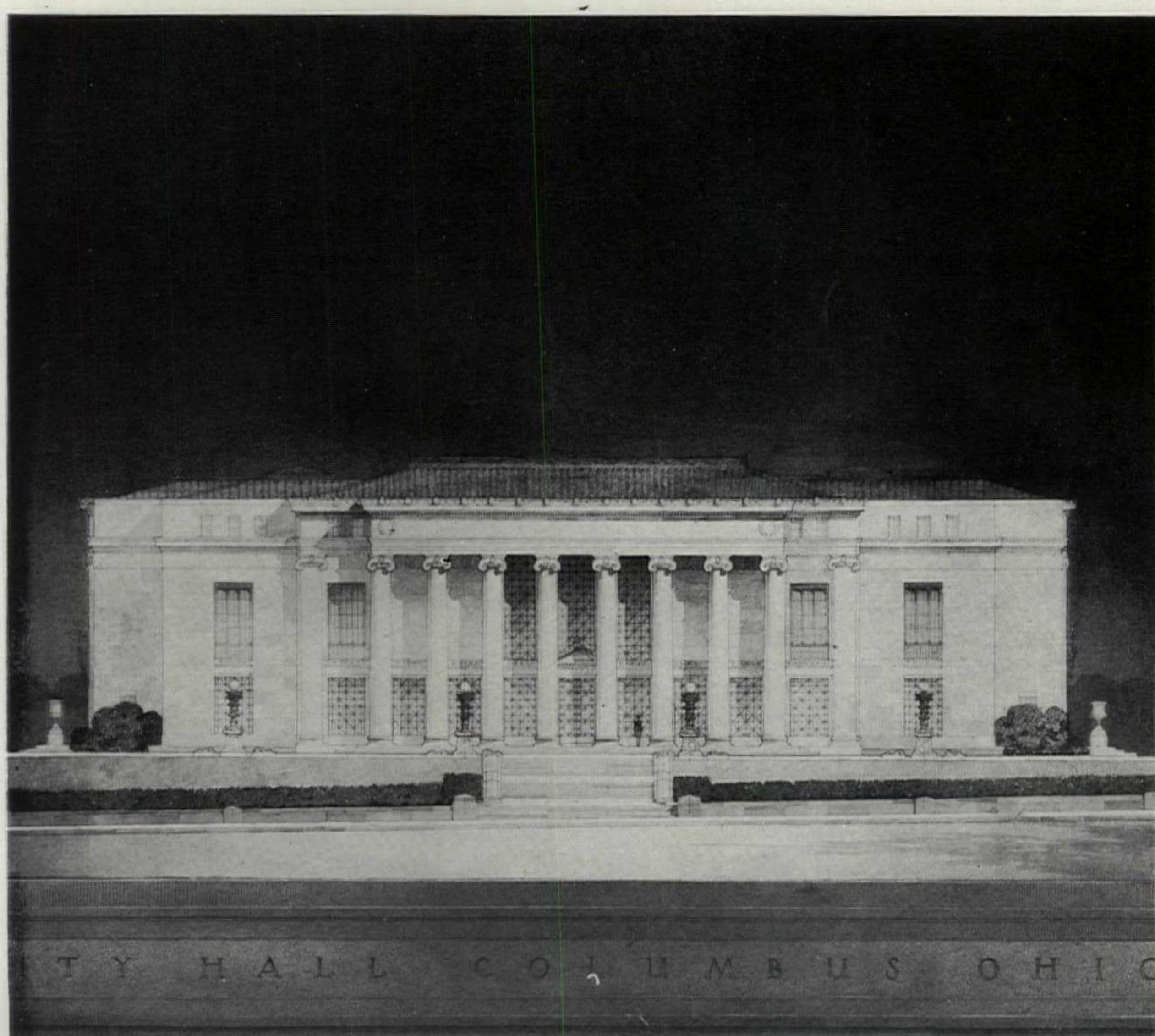
THE ALLIED ARCHITECTS ASSOCIATION OF COLUMBUS, LTD.

BY

W. A. PAINE

THE Allied Architects Association of Columbus, Ltd., was formed in February, 1924. The office of the Association is located in Columbus, O. The purpose of this Association is to provide by professional coöperation and collaboration architectural services for the design and construction of a city hall for Columbus and for such other public buildings and improvements in Columbus and Franklin County, paid for by the proceeds of taxation, as because of their civic importance seem to merit the efforts of a group of architects, and to perform such architectural service in a manner to advance the art of architecture and to contribute to the public good.

In the latter part of the year 1923 the City Council of Columbus requested the Columbus Chapter of the American Institute of Architects to advise it as to how to proceed in securing the best architectural service for the proposed new city hall. A committee from the Chapter was appointed to take up this matter and make recommendations. Various possibilities were presented, among them being an association of architects who would work together in an effort to give the city the benefit of the combined talent of the architects of Columbus. This suggestion was favorably received by the Council, and the Chapter proceeded to form the organization known as the Allied Architects Association of Columbus, Ltd. Opportunity was given all practicing architects in Columbus and Franklin County, whether or not belonging to the American Institute of Architects, to make application for membership in the new organization, and the project was thoroughly discussed at an open meeting of the Chapter to which all architects of Columbus



City Hall, Columbus, O.

The Allied Architects Association of Columbus, Ltd., Architects were invited. Under the Ohio laws, an incorporation was found impossible, and a partnership association limited by statute to 25 members was adopted as the best method of organization. A nucleus of 12 members was elected at a Chapter meeting, and these members elected the remaining 13 from among those who had made application for membership.

The amount of capital stock subscribed by each member was fixed at $200, making a total of $5,000. The affairs of the organization have been conducted by a board of five managers, elected by the membership. The board elects its own officers, consisting of president, vice-president, secretary and treasurer. Since the specific purpose of the Association, as set forth in its by-laws, was to provide architectural service for a new city hall, as authorized by the City Council, and for other public buildings paid for by the proceeds of taxation, no effort has been made to obtain work or publicity. The design of those buildings already undertaken has been determined by a paid competition among the members, the winner being appointed to act as chairman of the committee on design, with compensation determined by the board of managers. The board of managers organized its own office, selecting a production manager, a stenographer and draftsmen. Careful supervision is had by the board over all work in the office, and board meetings are held regularly each week, at which all matters requiring its attention are acted upon. An executive committee, consisting of two members of the board, passes on matters which do not require the action of the full board. Special work is assigned to different members of the Association, when occasion arises. All special work receives remuneration fixed by the board of managers. The by-laws, however, stipulate that the members of the board are not to receive compensation for attendance at the meetings of the board.

The standard form of contract of the American Institute of Architects is used, and the usual fees of 5 and 6 per cent are charged, depending on the size of the building involved. When separate contracts are let, an additional fee of 2½ per cent is charged. On large buildings the contract calls for a clerk of the works to be employed by the owner. Each year a certified public accountant examines the books of the Association and makes a written report. The bookkeeping is of a simple character, but careful cost records are kept for each project. As provided in the by-laws, any and all profits derived from the conducting of the business of the Association may be divided among the members at such times and in such amounts as the board of managers may see fit and arrange for, and the board may divide and apportion parts of such profits among persons other than members for valuable considerations or for reasons that may be deemed sufficient by said board of managers, subject to the approval of a majority of the members. So far it has not seemed desirable to divide any of the profits among the members beyond the payment regularly each year of 6 per cent on the stock and the payment of a special extra dividend of 100 per cent on the stock at the end of the third year.

The Association holds itself in readiness to serve the city of Columbus in every way possible. In some cases advice and suggestions involving some expense have been furnished without charge, as a matter of civic interest. A substantial contribution has been made to the Lake Forest Scholarship Fund for students of architecture and landscape architecture. The legal responsibilities of the Association are those placed by the law of the state of Ohio on partnerships doing business in the state. The commissions awarded to the Association are: Cleveland Avenue Fire Engine House, cost $29,000, completed in 1925; City Hall, cost $1,200,000, to be completed early in 1928; Sub-station, cost $16,500, completed in 1927; Public Safety Building, estimated cost $900,000; and the Northmoor Fire Engine House, estimated cost $25,000.

So far all of the work of the Association has been successful. It is perhaps too early to claim complete success, because the city is only part way through a building program. Public work is often attended by difficulties and delays caused by lack of funds, and Columbus is no exception to the rule. Gradually, however, difficulties are being ironed out.

The advantages of an Allied Architects Association as they are seen here are: (a) The development of the ideas of a number of architects on any given problem by holding a competition for the project. (b) The interchange of suggestions, both as to design and in regard to practical matters of construction, engineering and mechanical equipment. (c) The confidence inspired in city officials and the public by the sincere and harmonious collaboration of a group of professional men on public buildings. (d) The personal pleasure and interest that each member of such a group obtains from working together. (e) The potential benefit that may be rendered to the community, not only by the high character of the actual service given in the production of well planned and well designed public buildings, but also by the application of any gains made by the organization to the advancement of architectural education and the increase of appreciation of good architecture.

Certain disadvantages of this form of organization have been cited by its opponents:

(a) It deprives the privately conducted offices of work that they might otherwise obtain.

(b) The work done by a group of architects loses the individual character that would be given to it if designed by one architect or firm of architects.

(c) There is difficulty in holding the interest of all the members of so large a group.

These disadvantages assume greater or less importance depending on the conditions under which the group operates and the type of men composing its membership. The Columbus "Allied" believes that these objections do not obtain to any great extent in its organization.

SUPERVISING THE SANITARY INSTALLATION

BY

A. R. McGONEGAL

MEMBER AMERICAN SOCIETY OF SANITARY ENGINEERS

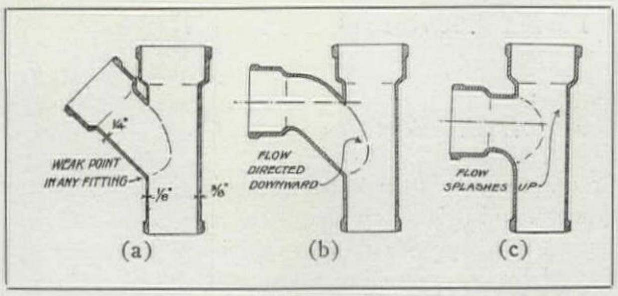
TIME was when a plumber was an artisan in more than the sense of being a worker at the business of installing pipes to carry in the water supply and to carry waste and sewage out. Much of this work was in lead, as his trade name indicates, and he made his own traps, flanges and sometimes pipe, cast his tacks or fastening plates, made his solder, took great pains with his wiped joints, and generally prided himself on his handiwork of the trade. An order to such a man to install plumbing in a house carried with it assurance of work well done. Specifications, minutely detailing the work in hand and the results expected, were not necessary. He made his own specifications as he went along, and when the work was finished it represented his level best,—a monument to his ability and artistry as a craftsman. And he built his business on his reputation for good work and fair dealing, and not on his ability to submit low estimates!

There is, however, another side to the picture. The symmetrically installed lead pipes, sturdily fixed in place, embellished with immaculate blacked and silver-wiped solder joints, all too frequently constituted a menace to the health and longevity of the householder. Perhaps not so much in the country and sparsely settled districts, but certainly so in the crowded sections of a great city. The journeyman or master in lead was not always a journeyman or master in sanitation. While lead was long used for underground water supplies, it was rarely used for drains, they being generally of brick, stone or tile. It is only just beyond the memory of men now living that cast iron pipes began to be used for drainage purposes, and, after proving their worth for several years underground, then for vertical lines outside and inside buildings, practically limiting lead to branch lines.

Prior to the early years of the nineteenth century, what we may call plumbing was a ground floor proposition, and mostly out of the house proper, so that lack of ventilation, loss of a trap seal, a by-pass here and there, and other sins against sanitation were not of very great moment; but with the advent of cast iron pipe came plumbing fixtures within the house and above the ground floor, and adherence to sanitary principles was a necessity. At first the fixtures were inside and the pipe was run outside, but even then it was seen that the pipe must be open at the top in order to prevent syphonage of the trap seals, and to avoid odors the open pipe was extended above the eaves of the roof. All plumbers did not carry the pipe up, some claiming it unnecessary, and out of the complaints as to variance in trade practice was born the first plumbing regulation. It was first enforced by the "guilds," as the plumbers' associations or unions were then known, and later by the health officers, and it is today one of the five cardinal points on which all plumbing regulations are built and enforced by our plumbing inspectors.

The Plumbing Contractor and Low Bids. The entry into the plumbing field of cast iron pipes, and later of rolled and welded pipes, has had the effect of gradually eliminating the artisan from the business and supplanting him with fitters. The use of such pipes and stock fittings naturally tends to standardization, and the necessity for and enforcement of plumbing rules also lead to the same end, so that as the need for artistry in workmanship disappeared, skill in designing, ability to direct workers, ingenuity in saving space and labor, and similar talents became of moment. These attributes, together with buying ability, business system and financial resources, are what should be the only reasons for difference in bids today. Unfortunately, much of the material used in plumbing work, especially the hidden portion, is costly as to the metal itself or else it is used in such quantity as to be costly in the aggregate. Generally speaking, the base material costs all manufacturers the same,—the potters' or moulders' organization sees that the unit labor cost is the same, and delivery costs are pretty much alike, so that any sales advantage must be carved out of business overhead and dividends. This leads to paring weights down so that the weight used is the minimum instead of an average, as it should be, and advantage is had in saving in total tonnage output; to the substitution of more of a cheaper metal in alloys; to thinning down castings and even bearing surfaces; and generally cheapening the basic materials a plumber works with, through a fault in the system of supply and demand, of which he has only a hazy idea.

If pipe of a certain stock pattern will cut and calk or thread well and is acceptable to the city inspector, why should the plumbing contractor be interested if the pipe averages 3 per cent short of regulation weight, provided he can buy it a cent a foot cheaper in carload lots than he can some other make? If the stuffing box on one valve is much smaller than on another and it is $100 cheaper for the lot, the price is the important point, as the work will be completed and turned over to the owner before the valve needs repacking or repair. Then, too, much of the material on a large project is purchased by a price clerk or office man with no practical knowledge. The head of a large plumbing and heating contracting business cannot look after the little details of purchase and supply. He usually has no intention of skimping the work in any important particular, but in these days of close competitive bidding he must take advantage of every little item so as to



(a) Weak fitting; wall not the same thickness all around
(b) Properly directed flow in a long turn T-Y
(c) Poorly directed flow in short T-Y branch

permit him to make a lower offer than his brothers.

Cost and the Specification. Specifications are also frequently so worded as to allow substitution of good but cheaper materials, and it is considered quite legitimate to take advantage of such opportunities; but there are, unfortunately, plumbing concerns with a reputation for being tricky, a reputation earned by perhaps years of substitution and deceit. Of these there is need to warn, for if they are given a contract at a price below estimate and cost, there is little chance of inspection being close enough to force work from them which will stand through the years, unless an inspector is set over every workman and all materials are tested on delivery.

The plumbing code of your city prescribes a MINIMUM quality of materials and workmanship, and the rules cover the OUTLINE of a proper plumbing system. It is the city inspector's duty to see that you have this minimum with certain trade allowances, and that your system conforms reasonably closely to the outlines planned and, finally, that the system is water- and gas-tight at the time of inspection. A reasonably good system of plumbing should be better than the minimum in both quality of materials and workmanship, and in the little details which go to make the system satisfactory and workable. It is the duty of the architect to take care of this through complete and clear specifications, and it is the duty of his construction inspector to see that they are carried out. Many plumbing specifications are long and involved, contain many "saving clauses," and generally go much into detail about those things covered by regulations, trade conditions or practice, and are singularly vague on the details which really go to make for ultimate satisfaction in the operation and freedom from repair needs of the finished work. This leads to necessity and pay for extra work and is where the vigilance and attention to detail on the part of the construction inspector will be of value,—and a word of advice to him will not be amiss.

A System for the Architect's Superintendent. On a large project, system from the start will save much in the end. Where there is a record of every transaction, every instruction given, every interpretation of specification, and a written memorandum of every occurrence having a bearing on the orderly prosecution of the work, there can be no argument as to a dimly remembered oral statement. The keeping of such a record is a comparatively simple matter, if it is adhered to. One large engineering firm furnishes its inspectors with small duplicating books very much like the order pad used in the corner grocery. Every time a question is put up to the inspector, he replies in writing, giving the original to the workman and noting the man's name and the time on the duplicate in his book. The slips are numbered consecutively, so as to check against loss; spoiled slips are marked; the book is filed in the office, and each night a brief reference is made to it on the record and report sheet, and it is indexed against the specification clause number bearing on the matter. At any time in the future, on a question as to the meaning of any specification provision, all notes bearing on it can be immediately located in the original duplicates, made at the time and not simply copied down later, in some report from memory. These order pads, with any lettering, printed in black ink for originals and in red for duplicates, on rough common paper set in the book in alternate leaves and with carbon paper attached, can be purchased in quantity very cheaply from those who make a specialty of supplying them.

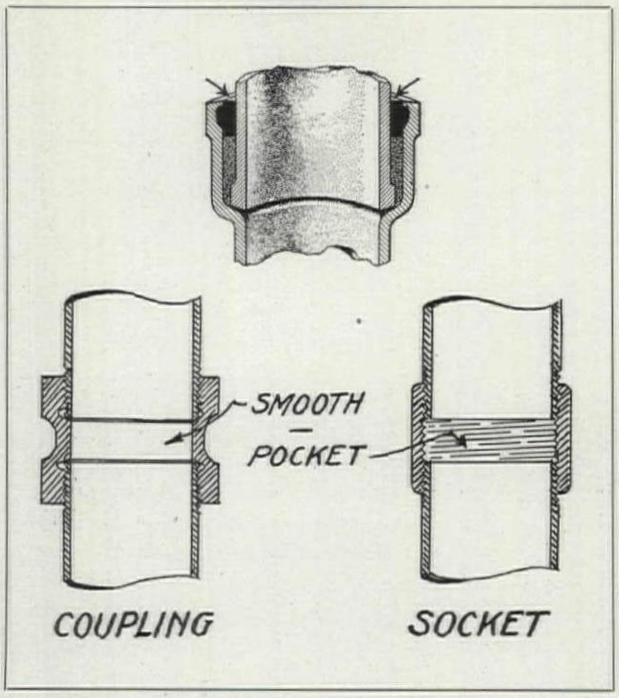
Inspecting the Sewer Work. The construction inspector will have little cause to check the plumber during the preliminary work, and he may safely leave inspection of the run of sewer and its grades and testing to the city inspector. He should, however, make a cursory examination of the character of cast iron pipe and fittings delivered on the work, noting that the weight generally and the wall thickness of the fittings are the same as those of the pipe, as fittings are more often skimped than pipe, and weakness in a branch may develop after completion of the work and cause much damage. Pipe of unequal thickness of wall, the inner and outer circles not being concentric, should be thrown out. This defect is more common than is generally supposed and is due to improper placing of the core, or to falling of the core in the mould just before casting. It can be readily detected at the spigot end. In large buildings, foundations have probably been carried down so sewer work cannot affect them, but where foundations rest on the ground at sewer level or above, care should be taken to keep sewer lines reasonably far away, and in the case of piers, equi-distant, if possible. Foundations are sometimes affected by the looser earth of a pipe ditch becoming an intermittent water course which keeps the surrounding area wet or alternately wet and dry and throws it out of balance with dry areas of supporting ground.

It should not be necessary to caution about the danger from vibration where pipes are passed through main walls and built in solid, but such construction is rather frequent. The plumber builds in his sleeve, and after the pipe has been passed through it, the builder fills in between the sleeve and the pipe with cement mortar. This fill should always be made with a bituminous compound of some sort, and the finish can easily be made by sliding metal collars.

In case a sewer ditch is dug deeper than the final grade of sewer, it is well to require that it be supported at proper intervals by concrete yokes, piers, or other workmanlike means to spread the weight on solid ground and not on a loose refill. This requirement is usual in city codes and is sometimes in specifications; but it is rarely carried out, though it is important that it should be.

Preventing Stoppage. The inspector can insure the sewer against future stoppages, if he will see that all openings in the sewer are kept closed except when actually being worked on. Regular test plugs, caps, or turned wooden plugs should be used for this purpose. Temporary closing with rags, wads of paper, excelsior, brickbats, and similar makeshifts is almost as bad as leaving an open end, as they frequently wash or fall into the pipe and catch at some point to gradually build up an obstruction that may not be evident until after completion of the building, and then cause an expense of thousands of dollars. The same care should be extended to all pipe openings throughout the building, and eternal vigilance is the price of a clean sewer line and stack installation. If stacks are not carried up ahead of masonry, bricklayers' chips, mortar splashings, drippings from floor pourings, sticks and blocks from forms and similar debris find lodgement in the open pipe, fall down the vertical, and catch in the offsets and the horizontal lines. Terrazzo polishers and floor finishers generally are the greatest offenders and are hard to cure of the habit of pouring the cement washings down the nearest stack line. Millions of dollars are wasted annually in old and new buildings in cutting out traps, pipe and fittings found partly filled with dried and set cement washings.

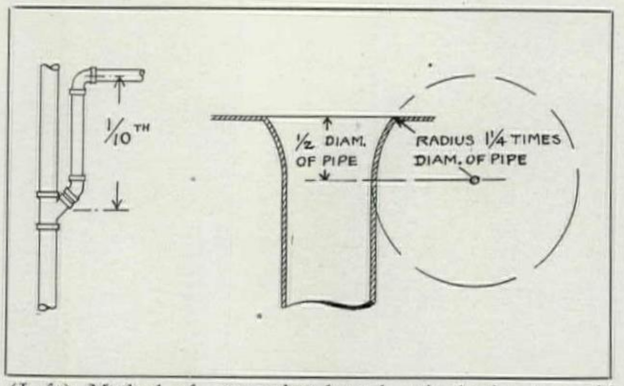
Stacks and Branches. When the stacks and branches are run there are a great many opportunities for poor workmanship and some for substitution of materials, and the inspector should be especially vigilant. It is to be presumed that the specifications cover the important question as to whether the soil, waste and vent piping is to be extra heavy cast iron, galvanized steel, or genuine wrought iron galvanized. It is not the purpose of this article to draw distinctions between the advantages or disadvantages of using the three materials, but in deciding the question as to the best material to use, the architect and his construction inspector should consider the material of which the structure is to be built and select the pipe which will give the best service for the "reasonably-to-be-expected life of the building." This does not necessarily mean total life, but the number of years before a complete remodeling is necessary to bring it up to date. In the business section of a rapidly growing city, once magnificent structures are frequently pulled down in 15 or 20 years to make way for larger and more magnificent buildings, and some authorities have even estimated that the average life of a "skyscraper" is limited to 30 years. Not that the structure becomes dangerous, but that the time arrives when the cost of upkeep



(Above) Grooved hub to prevent "creeping" of lead joints
(Below) Smooth surface of coupling contrasting with vulnerable "pocket" of ordinary socket joint

overtakes its earning power, principally through extensive repairs to heating and plumbing equipment, elevators, and mechanical equipment generally. By making our piping system of pure lead or pure copper, providing for expansion, self-welding all joints, and completely insulating it from contact with building material through wrapping with an enduring damp- and decay-proof cover, we might be able to plumb our buildings to endure for hundreds of years; but, except in the case of a very few monumental buildings, this is unthinkable on account of the cost and the pipe space necessary. Brass pipe in the larger sizes and the fittings for it being beyond the usual purse, the choice is restricted to the first mentioned three kinds of pipe, and sufficient information can be obtained through trade sources to select intelligently that which will best answer the needs on the particular project.

Pipes and Joints. One argument against the use of cast iron pipe in tall buildings is the "creeping" of lead joints, so often heard of but rarely seen. If trouble of this kind is anticipated and cast iron is otherwise indicated but is frowned on for this alone, it is easy to specify the type of pipe with annular grooves cast inside the hub, which pipe can be furnished by any foundry. The lead cannot work out of this sort of a joint. There are substitute materials on the market to save the cost of handwork in calking, but they have not generally proved satisfactory. Either hot poured lead or pure lead wool, well calked, makes a satisfactory and permanent joint. Some architects object to the greater space occupied by the hubs of the cast pipe, projecting every 5 feet some 2½ inches more than the smooth wall of rolled pipe which can be cut in story-height



(Left) Method of connecting branch rain leader to avoid splashing and poor flow
(Right) Method of forming rain leader entrance at roof

lengths, allowing fittings to come in floor construction. It may be superfluous to note that all fittings on soil, waste or rainwater lines of galvanized steel or galvanized wrought iron should be of the recessed drainage pattern, though it is not necessary that they be themselves galvanized unless called for by the code or the specifications. The zinc coating is a very necessary protection to the rolled pipe, which by reason of its laminated structure is more subject to corrosion than the granular texture of the cast iron of which the fittings are made. Galvanizing simply adds about 60 per cent to the cost of the fittings without any corresponding benefit, and is apparently a survival of the day when it was the practice to have the fittings of the same finish as the pipe, without study as to the necessity of it. If not prohibited by code or otherwise, uncoated fittings, such as the heavy steam pattern, are suitable for use on vent lines, but heat-treated or malleable fittings must be galvanized, as the process changes the texture so as to require protection. Malleable fittings are always used on iron water or gas piping; therefore, fittings on such work will always be galvanized.

One refinement which can be, but rarely is, practiced, is to require that all exposed threads on the pipe be painted with red lead or asphaltum to protect them. Naturally, when pipe is threaded the zinc is cut off, leaving the steel or iron exposed to corrosion at the worst possible place, immediately at a joint where strain may develop. Some day the practice will be to have all fittings countersunk or recessed so as to protect threads, and until that time comes, protection of exposed threads is desirable. Nipples should match the pipe. If galvanized steel pipe is used, galvanized steel nipples will be in order, but if wrought iron pipe is specified, the construction inspector should see that the nipples are of the same material and preferably of the same make. All wrought iron nipples are plainly marked with knurling or letters, while steel nipples are not marked. See that the short nipples as well as the long are galvanized. There is quite a difference in cost between black and galvanized, and between steel and iron, and substitution is easy.

All rolled pipe for plumbers' use, whether steel or iron, is delivered with both ends of the length threaded, and with one thread protected by a band coupling commonly termed a "socket." This was originally furnished by the maker to protect the thread on the end commonly dragged in handling, and is a steel or iron band spun or rolled from the same material as the pipe and threaded clear through. The practice grew, and is prevalent in all but a few cities where the code forbids, of using the thread-protecting band sockets as couplings to connect the pipes on long runs. There are several reasons why this practice is bad. Dirt from handling frequently gets in the threads, they are often jammed in handling, and are threaded with a running or continuous thread instead of a taper thread such as all proper fittings have. A running thread does not make as tight a joint, is more likely to loosen under strain, and from the theory standpoint cannot make up into a permanent, gas-tight joint. In practice such a joint usually rusts tight unless there is much strain or vibration, and then it causes trouble by persistently breaking out in leaks. It leaves a slight pocket in the line to catch paper and solid matter and build up an obstruction, and finally, from a structural standpoint, it is undesirable because it is not only of the same laminated structured material as the pipe itself, but by reason of the method of making it, the grain is crossed. In any event, it cannot make up into as straight, true and tight a joint as a taper thread, cast recessed fitting, like the others in the line.

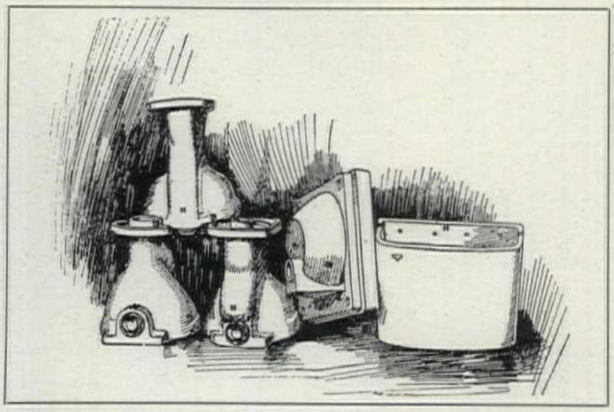
Fittings. Many city codes forbid the use of short turn fittings altogether; others permit them where the change in direction is from horizontal to vertical; but many of the city codes still permit their promiscuous use, though they are becoming stricter on this point each year. An abrupt change in direction from a horizontal line of pipe to a vertical drop might not be detrimental to the continued satisfactory functioning of the system, but if the specification or the code permits, the inspector should require that all branch lines discharging into a vertical main do so through a long-turn fitting partaking more or less of the nature of a combination of a "Y" and eighth-bend, and condemn the so-called "sanitary" tee, a short-turn pattern. If the vertical main is a vent above the fitting, the fixture discharge splashes against the back wall of the fitting, sprays up into the unwashed part, and tends to gradually build up a mound of greasy material or other solid matter until the vent is closed off and ceases to function. If the main is a soil or waste, the excess head of the discharge from above or the selectivity of a solid stream tends to bar entrance from the branch, the fixture discharge is sluggish, and the branch pipe is not sufficiently self-cleansing.

The use of the terms "long turn" and "short turn" simply refers to manufacturers' classification, and the radius usually follows no set standard. In fact, many cities prohibit a short-turn soil pipe fitting with a longer radius than a so-called long-turn screw pipe fitting, simply because of the maker's classification. In the case of the branch fittings, some codes require that the top of the arch of inlet shall break through the wall of the running line at a point at or below the center line of the inlet. This appears to be ample for the purpose and does not require so much projection of the inlet branch as would be the case of a combined "Y" and eighth bend, but such a fitting should never be used to discharge a vertical waste into a horizontal running line.

Sleeves should be used where pipes pass through floors, as pipes should not, in any case, be cast in solidly when a concrete floor is poured; neither should stacks ever be built in solidly in chases or wall construction. Adequate support of the pipes themselves should be provided by yokes, suitably fastened to the pipes and resting on floors or other construction. Too often the weight of the stack is carried by the branch fittings, thus putting great strain on them. Pipes in a plumbing system are peculiarly subject to troubles caused by expansion and contraction and should never be built or cast in solid in concrete or other masonry. This is especially true of fittings. Not only does the index of expansion differ materially between the masonry and the pipes, but the pipes carry alternate volumes of warm sewer air, cold water, and even hot vapors.

In installing cast iron soil and waste stacks, joints should be straight to avoid leaving shoulders in the hubs, but with wrought pipe it is immaterial whether pipes are plumb, canted or offset. An exhaustive investigation by the Bureau of Standards indicates that regardless of height or of any slight variation from the vertical, the falling water-borne waste increases its velocity of fall at a normal rate of acceleration until the friction on the sides of the pipe becomes greater with the increase of velocity than the force produced by acceleration, and thereafter the rate of fall remains constant. In the experiments and deductions it is indicated that the rate of fall of fixture discharges in a stack of any height, even including that of the proposed 110-story building in New York, will not exceed some 28 to 32 feet per second, depending on conditions. This would not apply to rain leaders which might conceivably be running solid or under head. It does, however, give rise to speculation as to whether much smaller soil stacks could not be used in very large buildings, with much saving in space and cost of material. If the velocity in a 4-inch horizontal branch graded ¼-inch per foot is 3 feet per second, and the rate of fall in a stack is ten times that, then the stack could dispose of the discharge of ten branches loaded to capacity provided they discharge into the stack at different points, if capacity is arranged at the foot to get the total discharge away without interference with the flow from the stack; and the writer expects to see this practice exemplified in some larger buildings.

Rain Leaders. In the matter of interior rain leaders, the construction inspector is solely responsible for getting a good installation by the plumbing contractor. Outside of the matter of sizes, and a requirement that the roof connections be tight, the city code leaves it open, and rain leaders are seldom detailed in the plans, and only roughly covered by the specifications. It is up to the man on the work to look after some mighty important details of installation. One problem is that of getting an amount of roof water equivalent to the capacity of the downpipe into it. Slope and area of roof must be properly proportioned, but there is the loss of effective area due to entry through a right-angled orifice. This loss of effective area is about one-sixth for any constant velocity in the smaller sized pipes, but it can be eliminated and the full area of the downpipe utilized by spreading the top of the pipe out into a small, cone-shaped opening with curving sides. The height of the cone should be half the diameter of the pipe, and the radius of the curving sides one and a quarter times the diameter. A table covering the different sizes can be worked out and templates made, it being borne in mind that the sides of the inlet must be curved at the proper radius.



Showing marking on vitreous china fixture "culls" or seconds; two short parallel red lines where shown

If the code permits and the building is taller than its surroundings, with no roof garden or condition under which sewer air would be a nuisance, traps should be left off main rain leaders, only including them on leaders from courts, balconies and other surfaces lower than the main roof, and on main leaders which have branches from them. If they are necessary, it is better to group them, several on a trap. In those cities having combined sewer systems taking both rain water and sanitary drainage into the same mains, it is better construction to separate the two systems inside the building and join them in the house sewer outside the walls, increasing the size from that point. In such a case a single trap can be made to serve for all. Where branch rain leaders from courts, oriels, balconies or bays are connected into vertical leaders from the main roof, two conditions must be provided against,—the possibility of impounded air in the main line blowing out through the shorter branch and causing spouting, and the practical closing of the branch owing to solid streams of water in the main downpipe. Both of these conditions can be avoided by turning the branch down parallel to the main leader for some several feet, and then branching through a "Y" and eighth bend. The vertical pipe run of the branch should be not less than one-tenth of the length of main pipe above the junction. Such a connection will tend to accelerate discharge from a branch line instead of to retard it, and will not require increasing size of leader unless the branch takes a large area.

Inspecting Roughing-in. In roughing-in or getting piping ready for fixture settings, too much stress cannot be placed on checking all measurements to some permanent point and level. The inspector should personally see that the journeyman has followed the manufacturer's directions as to measurements, and that all outlets are square or plumb as the case may be, and are left flush with the finished floor or wall line. The journeyman may say "I'll straighten that when the fixtures are set." The time to get the measurements right is at the time the pipe is installed, and insistence on this point will save regret later. In case of a large general toilet room, with the fixtures in battery, a template should be made of lumber for each battery, with the outlet centers plainly marked. Fixtures cannot be set square and gas-tight if the connections are not in the proper places, and the appearance and stability of the finished work depend on the faithfulness with which this portion of the work is handled and supervised.

Shower Pans and Other Connections. In case lead pans are used under the floor finish for shower compartments, the lead should be liberally coated with asphaltum on both sides before setting it in place; and after connecting the waste, it should be temporarily plugged and the pan kept full of water till the cement and tile are ready to put down. Dry pans are apt to develop leaks which do not show up till after completion and the shower is put in use, and the water contents have a tendency to prevent workmen from walking in them, using them for tool receptacles, and similar abuses. Many architects prefer a four- or five-ply tar paper and hot pitch shower pan to lead, but the continuous water test should be used just the same. If lead closet bends or stubs, or other lead connections are specified, they should be painted with asphaltum after test and wrapped with tar paper or sheet asbestos.

Quality of Fixtures. It is not often that plumbing contractors try to slip in "culls" or second grade vitreous plumbing fixtures, but if they do, it can easily be detected through the presence of two short parallel red lines at the top rears of closet bowls (sometimes under flushing spuds), on the sides of the basin bowls of lavatories, and on the inside backs of closet tanks just under the covers. Perfect ware is, of course, not practicable commercially, and certain minor defects are allowed in each piece. Classification of enameled iron ware is shown by pasted labels. It is suggested that Department of Commerce Bulletin No. 52, on "Staple Vitreous China Plumbing Fixtures" will be of interest to all construction inspectors. Substitutions which frequently occur when the fittings are not purchased with the earthenware fixtures, are composition lavatory, bath, and closet tank supplies, and nickel plated iron supplies and trap waste nipples to wall. These are easily detected.

Valves. The matter of valves rarely receives attention due a subject of such interest to the one who is to keep up repairs on the work. Every fixture in the building should be valved so that repair at any one fixture will not necessitate cutting a whole line out of service, and every riser or return line should be valved at the foot where it leaves or joins the main. Cross-connections between lines for emergency use should be as few as possible, and they should be grouped and valved so that operation and changes are all controlled at one point. If it is necessary that a valve in the combination be located at a distance, it should be motor-operated (no matter how small it is), and the operation and tell-tale located with the other valves. In a building of any size, all valves should be numbered, the piping and valves diagramed, and a copy furnished on completion. Valves buried in walls or floors should either be in suitable covered boxes or the bonnets should be so left that repairs can be made from the surface. Globe valves seriously interfere with flow of water, having something like 20 times the frictional coefficient of a gate valve of the same size, and if used at all on horizontal lines should be inserted in the line with the stem in a horizontal position so that the lines can be drained. The cost of repairing a small valve is equal to more than its first cost, so it is of paramount importance that the valves be selected with great care. It is also desirable in general to have all valves of a class of the same make.

Water Pipes. Water pipe sizes are usually fully covered in the specifications for the work; if not, it is the duty of the construction inspector to check the plumber's layout and see that the sizes are ample, especially the supplies to flush valves which require a rate of flow equal to about five times as many closet tanks. These larger sizes for flush valve operation generally apply only to sizes below 3-inch, as the principle of overlapping operation tends by reason of the short flush of the valve to overtake the size required for the longer tank fill. Every installation should have the sizes accurately figured, taking length of pipe, number of elbows, number and kinds of valves, and initial head or pressure into consideration. Nearly all makers of flush valves are glad to furnish formulæ and tables which facilitate the laying out of a suitable piping system. Care should be taken to keep velocities below a point that may cause singing in the pipes, and in large or high buildings, the judicious use of water-pressure regulators is recommended to keep pressures within reasonable limits. Water hammer can be guarded against by the use of shock absorbers, there being several on the market, at least one of which needs no relief pipe, repair or readjustment, and can be plastered over in the wall or floor construction after it has been once set. These shock absorbers take the place of the obsolete air-chamber, which soon after installation becomes waterlogged and of no effect, and fails to operate.

A WELL PLANNED ARCHITECTURAL OFFICE

THE OFFICE OF
B. H. WHINSTON

AN architect very rarely has the opportunity of finding an office space exactly suited to his needs. From his student days onward he always has his ideal office in mind; the scribbles on the edge of his first *projet* may be expressions of his dream of the office he will some day control, where clients will flock to see him and where he will diffuse the atmosphere of his own personality. When he at last has his diploma and begins to work over the drafting board in some established architect's office, his ideas concerning his own office are usually materially changed. He realizes that he must provide some space for contractors to look over blue prints and to take off quantities. He must also provide for waiting clients and salesmen.

In one of the smaller cities he may be able to build an attractive little office structure of his own, demonstrating his ability as a designer. In the larger cities he is usually forced to seek office space on some upper floor, and to adapt this space as well as he may to his purposes. In New York it may seem particularly difficult to obtain just the right light and space conditions. Mr. Whinston, whose office is here illustrated, searched high and low, and finally located a bare penthouse loft in a six-story office building. The loft was 28 feet square and 14 feet in height, with light on three sides. Usually, an office of this size has a meager supply of light from only one side. The penthouse had a large studio window on the north, which gave an ideal light for the workers in the drafting room. A window was installed in the south side, so that daylight is now admitted on all four sides.

One enters the office by ascending a small stair which opens directly into the reception room. The combined stenographer and switchboard operator controls this room and the entrances to the private office and the estimating room. The estimating room is strategically placed, so as to be directly available from the reception room for contractors, and from the drafting room, so that plans and information are easily available. A second door leading from the reception room admits one to the private office which, in turn, connects directly with the drafting room and with the library and sample room. The private office is finished in walnut pilasters and paneling. The panels above the doors and windows are appropriately decorated with plaques representing the various arts, such as sculpture, painting, architecture, music and poetry. The large panels give excellent settings to renderings of drawings and photographs of the architect's work. The ceiling is attractively coffered.

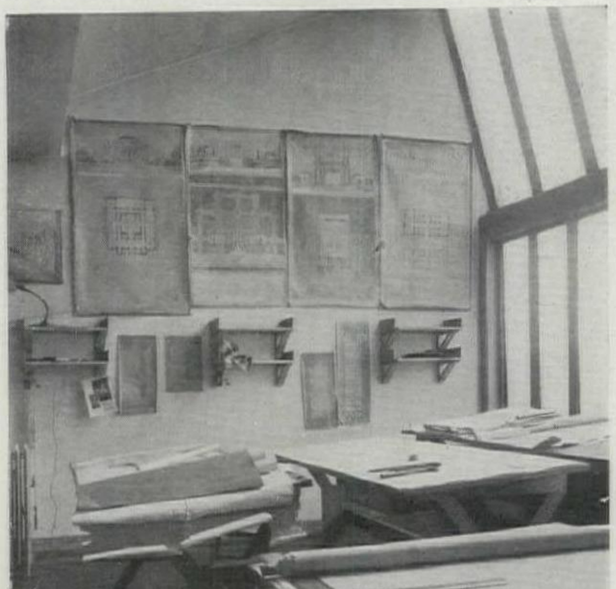
View of the Architect's Private Office

Private Office

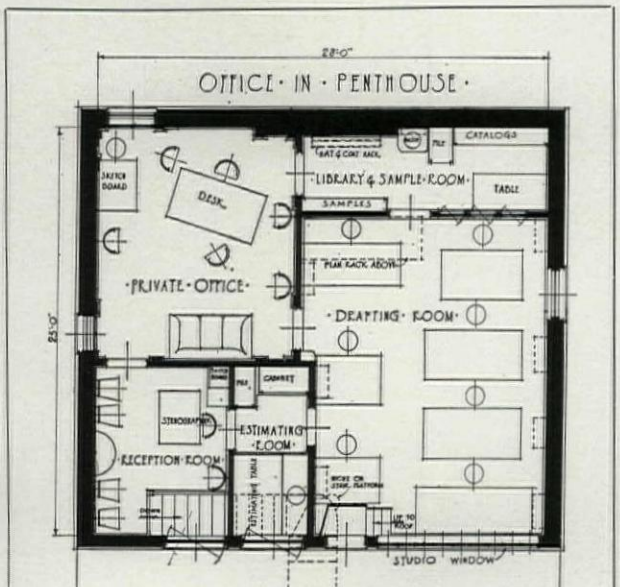
Reception Room

The doors are interestingly treated with leaded glass, as are also the windows of this private office. The furnishings are comfortable and in keeping with the spirit of the room. The architect's private drafting table adds a note of the atelier and relieves any severity there may be. The reception room is treated in somewhat the same manner as the private office, as will be seen in these illustrations. The drafting room is equipped with tables having drawers for instruments, and at the side of each table is a rack for the keeping of those odds and ends that otherwise might collect on the drafting board itself. Obviously, in a drafting room of this size, it would have been unwise to devote floor space to the storage of plans and blue prints, so a plan rack occupies the space above one of the tables.

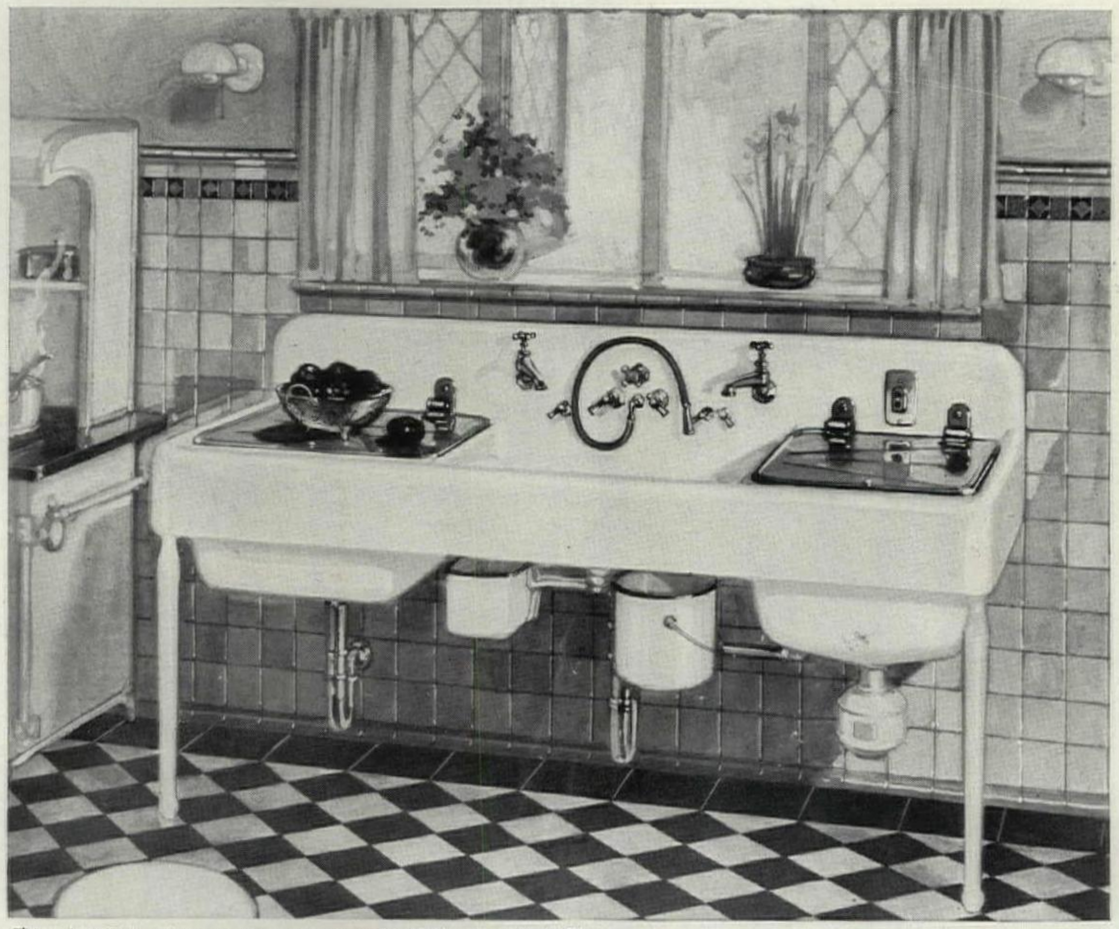
The office has an unusually compact and efficient plan. No space is wasted, and the general scheme has been evolved to make communication and accessibility contributing factors to the work of the office. The rooms have been made attractive and comfortable in a pleasing, intimate way.



A Corner of the Drafting Room



Plan of the Office



This sink, in Spring Green enamel, will be featured in Kohler advertising in The Saturday Evening Post, Feb. 25; Liberty, March 10; Ladies' Home Journal, April

The 1928 definition of "*modern*"

THIS picture reveals more clearly than words the astonishing advance in sink design that has taken place in the short space of little more than a year. Compare it with sinks that were deemed "modern" in 1926!

This is the newest and most complete of Kohler Electric Sinks. On the right, an electric dishwasher. On the left, a utility or laundry tray. In the center, a "regular" sink, 8 inches deep, with the new Kohler Duostrainer drain, which enables the sink to hold water without a dishpan, and catches debris in its removable cup. All three compartments have this improved drain.

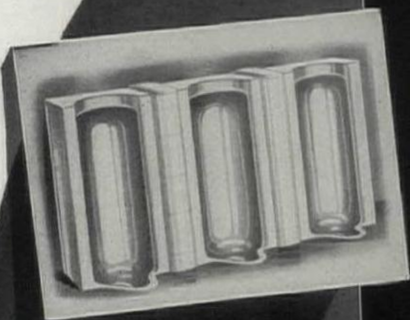
Other noteworthy features are the low 8-inch back, the two swinging-mixing faucets, the rinsing hose, and the refuse container and "tool box" underneath. The brass fittings are of Kohler design and make, and are chromium plated.

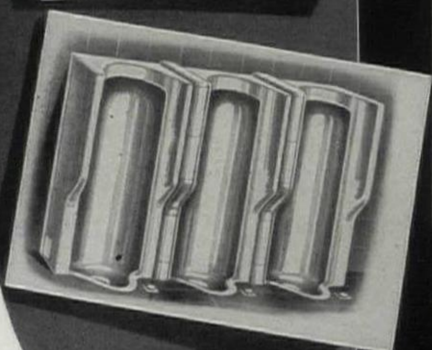
This fine sink is only one of many new models, electric and non-electric, which establish totally new standards of convenience, efficiency, and beauty. All of these sinks may be had in Kohler Color Ware, lending themselves to the creation of distinguished color effects in kitchen design.

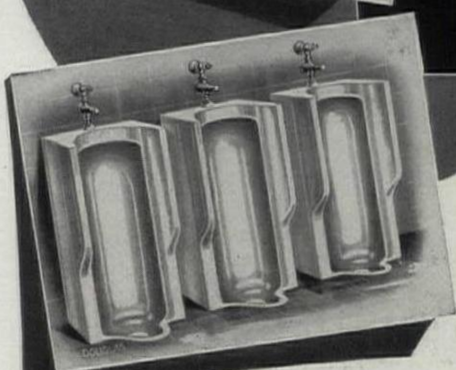
Kohler branches and wholesalers handling Kohler Ware are ready to give you further information about these Kohler innovations. Or you are invited to write direct, if you prefer, for descriptive literature.

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

KOHLER OF KOHLER
Plumbing Fixtures







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

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

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

Although urinals of this kind have been manufactured comparatively a short time, you will find them installed in the better buildings throughout the U. S.

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

THE BEST IS CHEAPEST · DOUGLAS · TRADE MARK · INCRESCENT

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is exclusively a MADDOCK product
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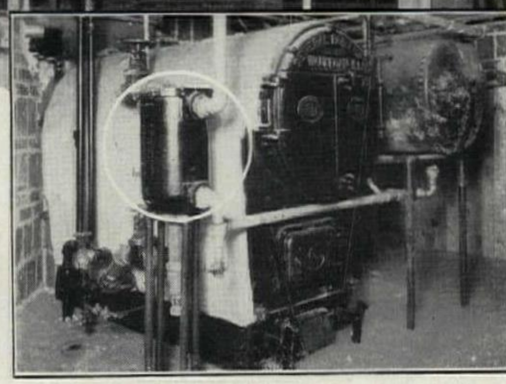

In This Chicago Building . . . .

10 Families
1 Restaurant
1 Barber Shop
3 Stores

Architect:
Z. Erol Smith

are supplied
HOT WATER
practically without cost

The convenience and economy of the Excelso way for heating running water the year around; the fact that it is so easily and quickly connected to round, sectional or tubular boilers, using the regular system of piping and tank; because it does away with the obstructive and short-lived fire-pot coil—all are reasons for specifying of Excelso Water Heaters.

Connected to the outside of the building's heating boiler is an Excelso Water Heater. Burns no fire itself, yet furnishes a constant and practically costless supply of hot water to the fifteen tenants.

Excelso Products Corporation

DIVISION OF AMERICAN RADIATOR COMPANY

69 CLYDE AVENUE BUFFALO, N. Y.

Nationally Distributed by Leading Wholesalers and Boiler and Radiator Manufacturers

EXCELSO WATER HEATERS

Sizes for One Family or One Hundred Families

Handling Acids Safely

PAWTUCKET HIGH SCHOOL, *Pawtucket, R. I.* R. C. N. MONAHAN, *Architect*

THE extensive use of corrosives in educational, hospital and commercial structures demands drain lines that will not corrode under the destructive attack of acid waste.

Architects and Engineers specify Duriron drain pipe and thus eliminate acid waste troubles, as it alone meets the requirements of this service.

It is a fact that where corrosives are wasted in the drainage system Duriron will last with the building without repairs, replacements and damage.

The chemical waste lines from the laboratory of this school are of Duriron acid-proof soil pipe.

Duriron is produced only by

The DURIRON COMPANY DAYTON·OHIO

A definite informative catalog of toilet seat equipment

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

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

Write for this catalog! It will be sent to you without charge. Address C. F. Church Manufacturing Co., Dept. 6-2 Holyoke, Mass.

Church Seats sani-white

Also manufacturers of Church Sani-Black Seats

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Vertically Drawn Flat Glass

Preferred by discriminating buyers because--

Quality---Vertically drawn, perfectly flat, uniform in thickness, has a natural brilliant fire polish and either side may be glazed out.

Service---Adamson Service is dependable.

Production---With our new extensive additions, facilities are increased and we are never out of production.

A brand you [VERTICALLY DRAWN FLAT GLASS — ADAMSTON FLAT GLASS CO. — CLARKSBURG, W. VA.] can depend upon.

ADAMSTON FLAT GLASS COMPANY
CLARKSBURG, W. VA.


COHOES
Basil Wagner—*Residence*
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Genuine Wrought Iron Pipe
The word Genuine is important because in the manufacture of iron pipe —*Genuine* means that it is puddled according to the original formula which insures its non-corroding and rust resisting qualities.
At Cohoes—every length of pipe is Genuine. It is then stamped with the name and the year in which it was made.
The Hand Book of Pipe Facts tells the story and is a valuable reference word. Send for it.
COHOES ROLLING MILL CO.
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BRANCH OFFICES: PHILADELPHIA · CHICAGO · LOS ANGELES · NEW YORK
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To be equipped throughout with the

Watrous

Flush Valve

The Watrous Flush Valve promotes correct sanitation and prevents water waste by delivering the *exact* quantity of water required by the bowl with which it is used. The refill port which determines the flow is very easy to adjust, and is prevented from clogging by automatic, self-cleansing mechanism which clears itself of foreign matter in the water whenever a flush takes place. When the Watrous Flush Valve is installed in combination with the Watrous Duojet Closet, the water-saving is very pronounced, as the latter requires only a very limited supply of water for a thorough flush and refill. Also, its design avoids the danger of clogging.

Watrous fixtures are furnished chromium plated if desired. Write for details

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Watrous Flush Valves—Duojet Closets—Self-Closing Basin Cocks—Combination Lavatory Fixtures—Pop-Up Wastes—Liquid Soap Fixtures—Etc.

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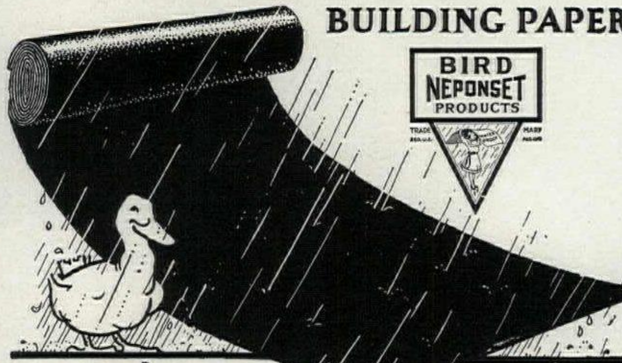
BIRD'S NEPONSET BLACK BUILDING PAPER



Waterproof!

NEPONSET BLACK is a tough, heavy Waterproof Building Paper that keeps out dampness and drafts. Its glistening, asphalt-coated surface sheds water like a duck's back.

For a permanent barrier against the elements, specify Bird's Neponset Black. Over roof boards and under slate, tile, metal or asphalt shingles it makes a water-tight covering. When placed back of stucco and under clapboards or shingles it keeps out drafts and dampness and makes the heating of the house more economical.

Your contractor or builder can get Neponset Black at a moment's notice. It is standard stock with dealers in Bird's Building Products. Refer to Sweet's or write to us for complete specifications.

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An important message to you about the *EFFICIENCY* of VITA GLASS

VITA Glass—the remarkable window glass that admits the healthful ultra-violet rays of sunlight—is open to the most searching investigation.

The proof of its value is so conclusive that Vita Glass is now being installed in hundreds of America's leading homes, hospitals, schools, apartment houses and office buildings.

Vita Glass is used in 15 stories of the new Equitable Trust Co. Building, New York.

All claims made for Vita Glass are based on actual results . . . on scores of experiences here and in England, where in 1924 Vita Glass was discovered and developed.

The facts prove beyond all question that Vita Glass at all times transmits a sufficient volume of the vital ultra-violet rays for all health purposes.

After weathering, transmission power stays constant

All glasses, from exposure, lose some of their ability to transmit visible and invisible light. This phenomenon is called "solarization." This process diminishes some of the transmission ability of Vita Glass during the first few weeks, but after that its transmission power stays constant and is more than ample to bring indoors a sufficient volume of ultra-violet rays for every health purpose. This has been proven conclusively by all experiences and tests with Vita Glass over a period of years.

Biological tests conducted under the auspices of the Council on Physical Therapy of the American Medical Association prove that, even in winter, Vita Glass admits a sufficient amount of ultra-violet rays to prevent the development of rickets—that dreaded and common disease of childhood. Furthermore, the general health effects were such as to show a material gain in weight under Vita Glass as compared to ordinary glass.

Statements based on visible . . . provable results

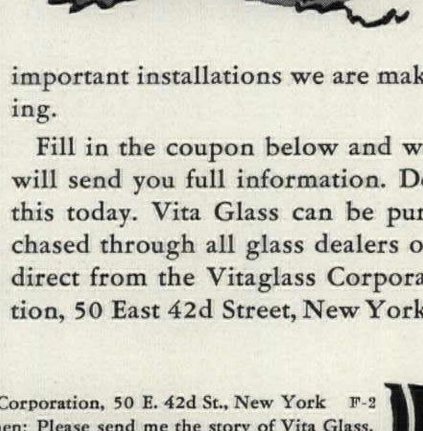
The facts about Vita Glass are not based on theory but on actual results . . . visible . . . provable results upon the health of actual people living under Vita Glass:

School children, in Smethwick, England, who in a ten months' test increased their height and weight notably and decreased absences due to illness 40 per cent.

Fathers, mothers and children in their homes, who are enjoying the tonic, invigorating effect of Vita Glass, just as much today as they did two years ago when it was first installed.

Patients in hospitals, whose convalescence has been speeded up and where after several years of use, hundreds of other grateful patients are still enjoying its beneficial effects.

The facts are yours for the asking. We want you to have the complete story, including a record of many convincing biological tests. We also want to tell you about some of the important installations we are making.



Vita Glass Solarium at Brown's Physical Training Farm, Garrison, N. Y. Mr. Brown says, "The daily sunbath under Vita Glass is a necessary part of our health-restoring routine."

Fill in the coupon below and we will send you full information. Do this today. Vita Glass can be purchased through all glass dealers or direct from the Vitaglass Corporation, 50 East 42d Street, New York.

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Gentlemen: Please send me the story of Vita Glass. I am particularly interested in Vita Glass for ☐ Home ☐ Office ☐ School ☐ Hotel ☐ Apartment House ☐ Factory.

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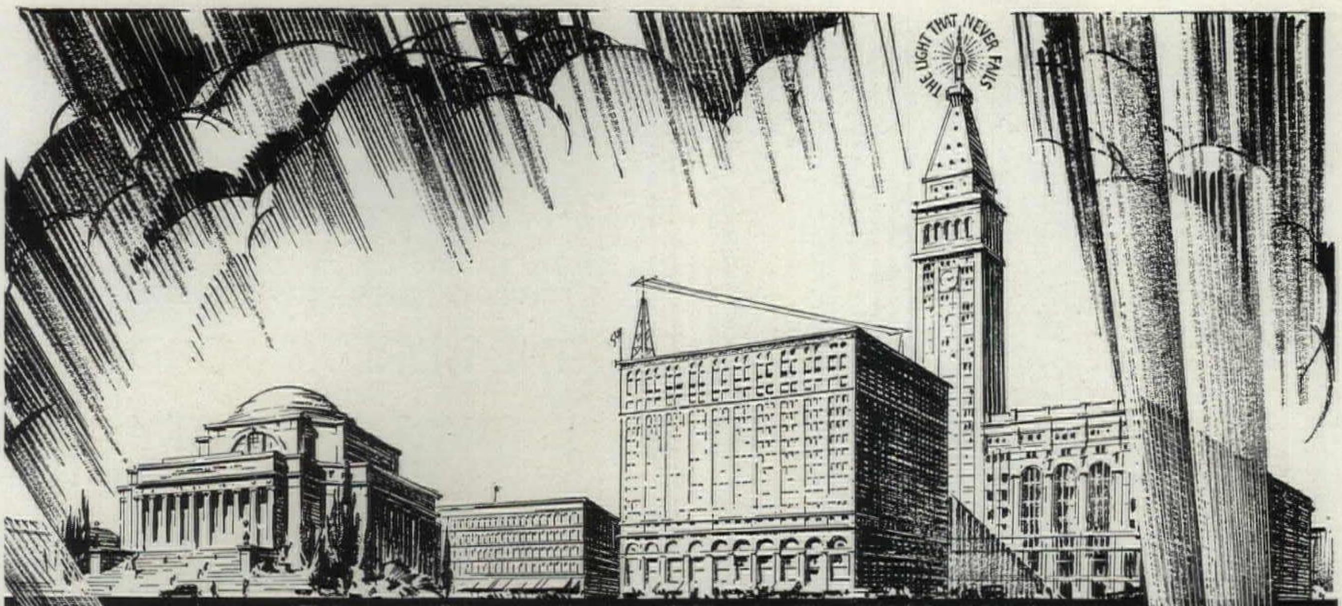


CELESTIALITE

—The Light of Logic

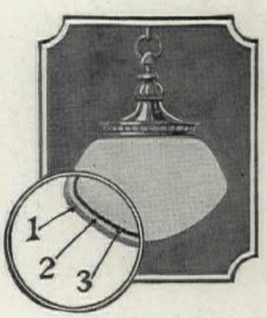
And the architectural profession agrees! This is proved by the growing popularity of the inimitable three-layer lighting globe —CELESTIALITE—Next to Daylight...Metropolitan Life Insurance Company, Columbia University, John Wanamaker and innumerable other institutions the world over have installed CELESTIALITE. Why? Because every day the world is becoming more conscious of the importance of better vision.

Secretary Hoover says:

"Economic progress during 1927 brought Americans to the highest material living standard this country or any other country has ever known," said Secretary Hoover in his annual report to the President. Applied to the lighting problem this means that the American people deserve and will *demand* a light that will not hurt the eyes. And the farsighted architect is fulfilling this demand.

Celestialite protects the eyes

CELESTIALITE, the three-layer lighting globe, throws a soft, white light that safeguards the eyes. The three individual layers of glass diffuse, soften and perfect the light rays so that one can work for hours and hours without eye-strain. The eyes see better under CELESTIALITE, and besides, CELESTIALITE throws a light that beautifies everything it falls upon.



Celestialite's Three Layers:

1—An inner layer of blue whitens and perfects the light.

2—A middle layer of white filters out all the glare.

3—An outer layer of crystal glass, provides body and strength.

A marvelous soft white light results that safeguards the eyesight

Unusual Trial Offer

It is difficult for you to realize what remarkable illumination CELESTIALITE provides. See a lighted sample in your own office. We will be glad to arrange for such a demonstration if you will write us on your firm's stationery.

CELESTIALITE

(PATENTED)

NEXT TO DAYLIGHT

GLEASON-TIEBOUT GLASS CO. A.F.-2
200 Fifth Avenue, New York City

Kindly send me free catalogue, A. I. A. file, and fragment of CELESTIALITE showing its three layer construction.

Name..................................

Position..................................

Address..................................

City..................................

In 1893, a roof of Barrett Pitch and Felt was laid on the Peter Gengler Company building, Galveston, Texas, by the George Roofing Company of that city. After 34 years, the roof is still giving satisfactory service.

1927

Ralph H. Cameron, A. I. A., San Antonio, was the architect for the Medical Arts Building, San Antonio, Texas, shown above. A Barrett Specification Roof covers this building. Gen'l Contractor: Jack P. Haines; Roofer: Turner Roofing & Supply Co., both of San Antonio. Photo copyrighted by Harvey Patteson, San Antonio.

EVEN BACK IN THE 90's IT WASN'T NEWS!

" . . . and while many details of building practice underwent considerable change during this period, on one point architects and builders stood firm. They had found from a quarter century's experience that one type of roofing construction outclassed all substitutes . . . the properly built roof of coal-tar pitch and felt.

"And further passage of time has amply backed up their finding. Many of these old roofs—roofs 35, 40, even 50 years of age—are still rendering dependable protection, their years of service by no means over."

* * *

It is a matter of record that the past 50 years has demonstrated the superiority of pitch and felt built-up roofs. Impressive present day structures are evidence of this. For, in the great majority of cases, the finest of our modern buildings are protected by The Barrett Specification Roof—a pitch and felt roof acknowledged as the highest form of permanent roof protection.

When you specify this roof the owner receives a Surety Bond—a guarantee against repair or maintenance expense for 20 years.

This Surety Bond is issued only (a) when the roof is laid by an experienced roofer, one approved by The Barrett Company; (b) when a Barrett Inspector has supervised the job to see that The Barrett Specification has been followed to the letter. And then, after the roof is completed, there's still another check-up: the famous "cut test" made by the Barrett Inspector.

In addition, two years after the roof is laid, the Barrett Inspector makes another thorough examination of the roof.

With such thorough inspection service—obtainable only with The Barrett Specification Roof—is it surprising that these roofs give staunch service many years after the 20-year guarantee has run out?

Proved Efficiency

The Barrett Flashing System (Flashing Block or Flashing Form in combination with Barrett Flashings) provides these all-important things:

A Flashing that allows for expansion and contraction, settlement or shrinkage.

A Flashing that is easy to install—that gives entire freedom from up-keep expense at a moderate cost.

THE BARRETT COMPANY
40 Rector Street, New York City
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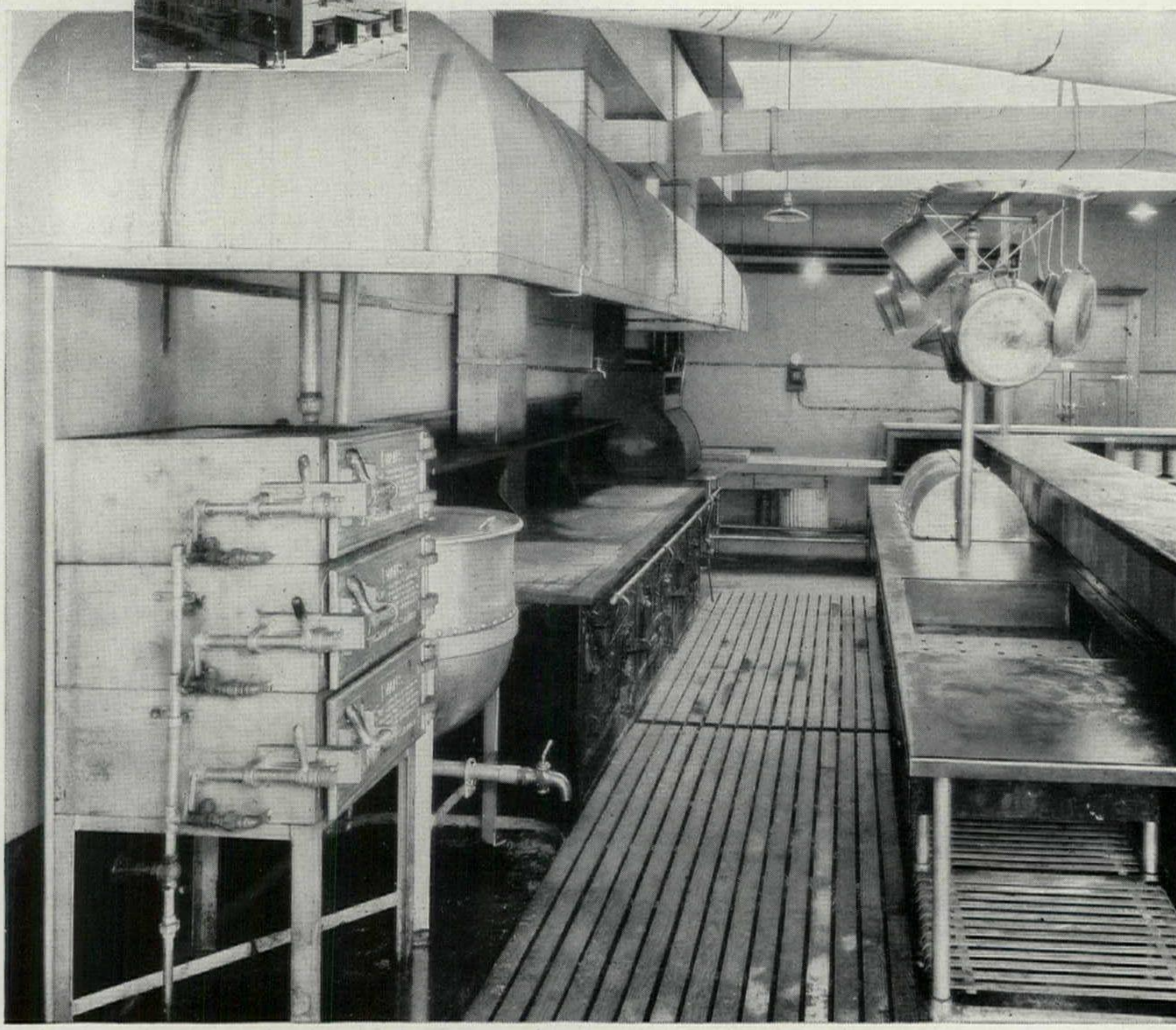
The Barrett Company, Limited
5551 St. Hubert Street, Montreal, Quebec

Barrett Specification Roofs

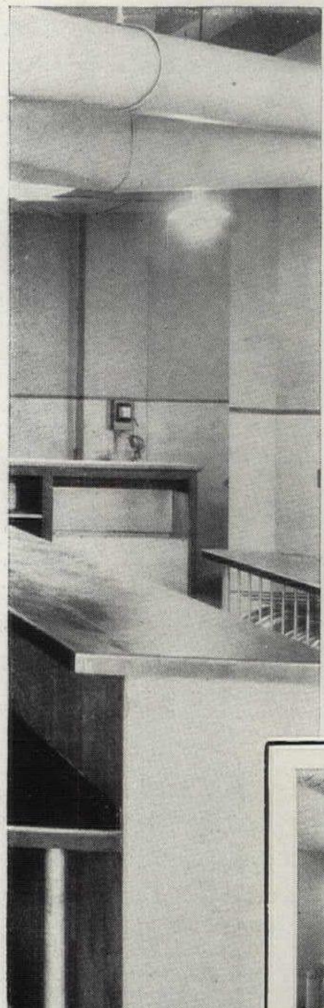
Van kitchens service



A Van Kitchen Serves the Hotel King Cotton, Greensboro, N. C., as it

There is an unmistakable sturdiness about Van Equipment that bespeaks its calibre. It is attractive in appearance, it is workmanlike, it is efficient—but above all, it is *durable*, built for dependability and long life. The Hotel King Cotton of Greensboro, N. C., whose kitchen is shown here, is a typical Van user. There are other Van Kitchens in hospitals, hotels, clubs, colleges and institutions of every size and type throughout the country, all serving as efficiently as the day they were installed.

are unfailing in their --and economical always



ANY user of Van Equipment will tell you —and this is the truest test—that Van dependability is a constant source of satisfaction. As year follows year Van Kitchens continue to serve as efficiently as if they were newly installed. They stand up under twenty-four hour service, under use and abuse, and are ever unvarying in their devotion to duty.

And you've never known such economy! Van Equipment is economical the day you buy it and every day after that. It helps cut operating costs, reduces replacements, makes light work of "upkeep."

We are only too happy to answer inquiries concerning Van Equipment and its place in *your* plans.

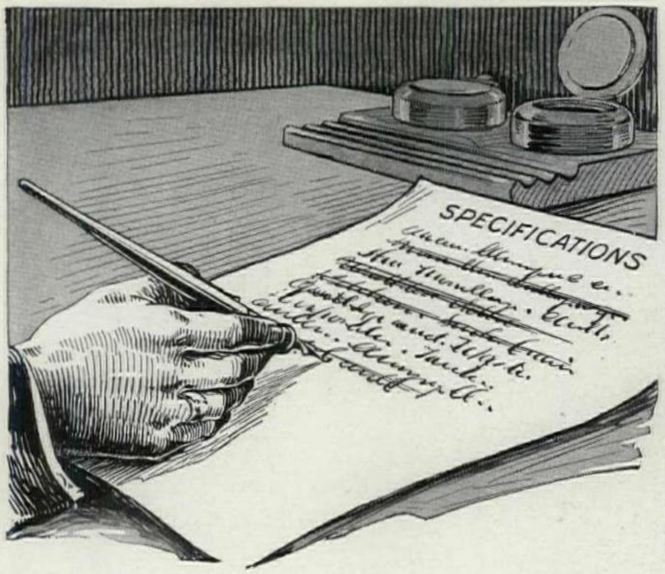
would serve you

Right, a general view of the efficient kitchen of the King Cotton Hotel.

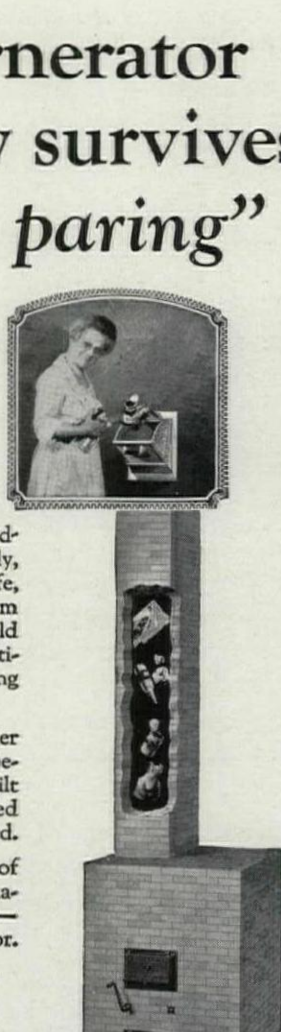
NEW ORLEANS
CLEVELAND
ATLANTA

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

CHICAGO
LOUISVILLE
DETROIT



The Kernerator invariably survives the *"cost paring"*



YOU'VE gone through the "cost paring" process time and again. Your client demands certain things. You add others which are indispensable. The resulting total cost is too high. Then comes the "paring" — eliminating this and that to reduce costs.

But the Kernerator, once included in the specifications, is rarely, if ever, eliminated. No housewife, who has once glimpsed freedom from garbage drudgery, would think of continuing with the antiquated, tiresome, germ-breeding garbage pail method.

The architect will not consider eliminating the Kernerator because he knows it must be built in — it can rarely be installed after the building is completed.

That's why upwards of 2500 of America's leading architects habitually specify the Kernerator—the original flue-fed incinerator.

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

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THE CHIMNEY-FED INCINERATOR

55

Garbage and Waste Disposal without Leaving the Kitchen

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PRESTEEL *Tested for Strength* Stairways

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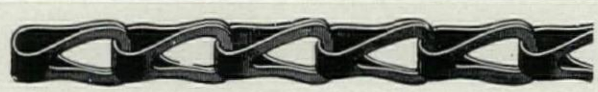


"RED METAL" (Solid Bronze)
"GIANT METAL" (Phospher Bronze)
AND STEEL (Cold Rolled)

SASH CHAINS

For Two Generations Leading Architects Have Specified SASH CHAINS

Manufactured by

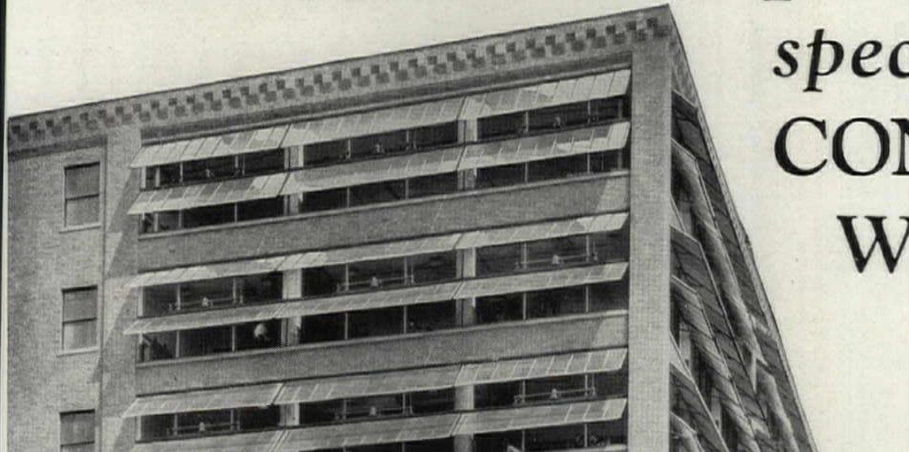
THE SMITH & EGGE MFG. CO.
Bridgeport, Conn.

ORIGINATORS OF SASH CHAIN

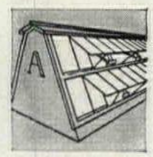
See Page B1797 Sweet's Catalog

For efficient production

specify POND CONTINUOUS WINDOWS

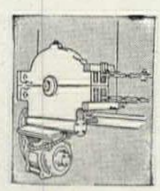


Long runs of Pond Continuous Windows in Plant No. 2, Wing No. 1, of the Firestone Tire and Rubber plant at Akron, Ohio. Wilbur Watson & Associates, Architects.



Pond Continuous Windows

in Pond A-Frames give more light and ventilation for less money than skylights with ventilating sash. Use Pond Operating Device, tension type, for all sash operating purposes.



Pond Operating Device

employs tension principle to open and close large groups of steel windows. It gives efficient mass control and exceptionally long service.

A MAN WILL naturally do more when he can fill his lungs with fresh air—when he can see fine work without straining his eyes. That is why production is increased by the plentiful use of Pond Continuous Windows throughout a plant.

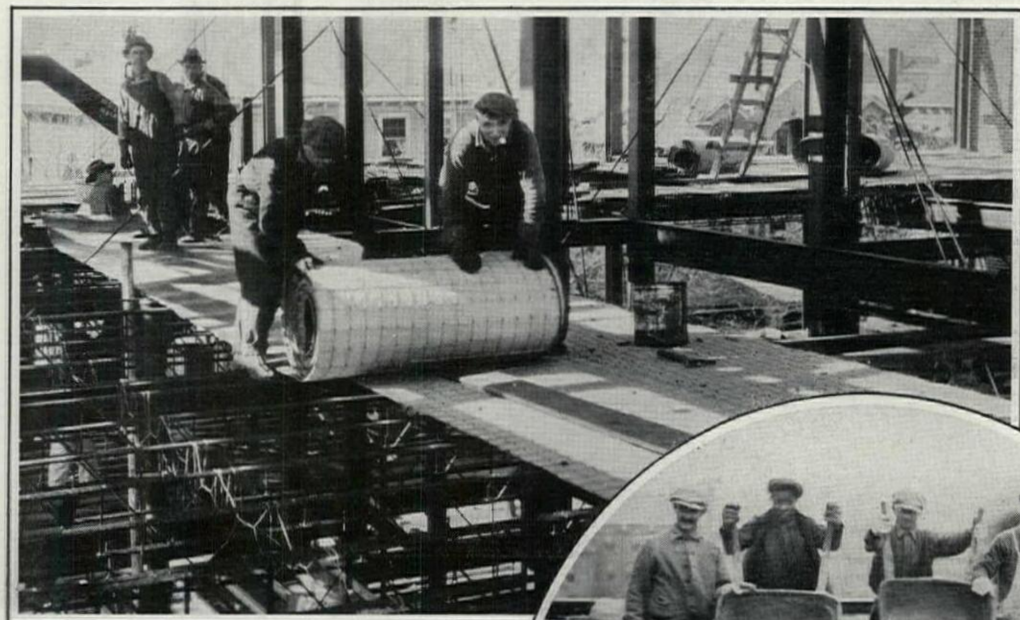
The correct application of the various types of Lupton Windows is a sure and economical way to provide any building, whatever its size and placement, with abundant daylight and natural ventilation. And these two essentials to good work not only increase production but reduce labor turnover and cut plant equipment costs. Thousands of successful Lupton Window installations prove this to be a fact.

Send for our Pond Continuous Window Catalogue, which shows a number of examples where Lupton has co-operated with leading Architects and Engineers to increase the productiveness of a plant through better light and ventilation.

DAVID LUPTON'S SONS COMPANY 2207 E. Allegheny Avenue, Philadelphia

Lupton Products

ANNOUNCING
a practical development



Placing STEELTEX

Biarritz Apartments
Atlantic City, N. J.
Owner: Herbert V. Realty Co.

Pouring concrete on STEELTEX

Biarritz Apartments
Atlantic City, N. J.
Contractor; Charles F. Wagner

ADVANTAGES OF STEELTEX FOR FLOORS

Wood or Metal Forms Eliminated—STEELTEX functions in place of the forms and also provides the reinforcing.

Concrete Saved—and proper consistency is maintained. No droppings through watertight backing.

Steel Properly Embedded—the full value of rigidly welded mesh is developed as true reinforcing.

Time and Labor Saved—STEELTEX is cut from rolls to any desired length insuring ease and speed of application.

Work can proceed in safety and comfort—on STEELTEX, and it protects the floors below even while concrete is being poured.

Cleaning-up Expense Eliminated—no droppings of concrete through STEELTEX—clean underside of this material is suitable ceiling finish for many types of buildings.

Rust and Chemical Action Prevented—by the heavily galvanized reinforcing.

Sound-Deadening—this quality of the heavy backing makes STEELTEX especially desirable in the construction of hospitals, schools, hotels and apartments.

Water Cement Ratio—is maintained as originally proportioned. This insures full strength development of concrete and facilitates curing.

Temperature Stresses Resisted and Reinforcing Correctly Spaced—the use of STEELTEX eliminates the necessity of inspection or special handling to cover these points, resulting in speed and economy.

in floor construction

STEELTEX for Floors—the most rapid, efficient and economic slab construction ever devised.

"We have decided to use this material over bar joists on a large office building in Connecticut.

"As you know, we are quite familiar with the use of STEELTEX for Plaster and for Stucco, and after becoming interested in the possibility of its use for concrete floors, we personally inspected the Biarritz Apartments job in Atlantic City and examined data on other jobs as furnished by your representative.

"We have concluded that this material in actual use gives a very satisfactory performance, meeting all the claims you have made for it. For this reason we intend to specify it at all times where concrete floors on steel joists are indicated."

Lyon & Taylor, Architects
New York, N. Y.

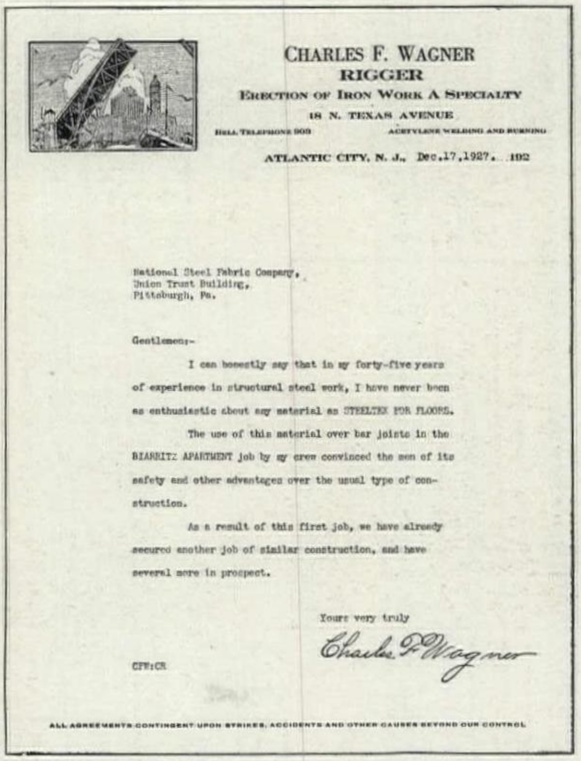
"Always an advocate of steel joist construction, I had just about decided to eliminate this type of construction from my work because of unsatisfactory results of so-called metal lath reinforcement. I am now convinced that STEELTEX is a lifesaver for steel joist construction. It gives a clean-cut, permanent, truly reinforced slab which is stronger, and loss of concrete is done away with.

"I have three (3) additional apartment jobs under way and you may be assured that STEELTEX will be used throughout as a form and reinforcement for these floors."

Chas. R. Geisler, Architect
Pittsburgh, Penna.

"We are very glad to advise that the concrete floors, which have all been poured over STEELTEX, are entirely satisfactory. The material came up to our fullest expectation in the saving of time and labor, and in preventing the loss of concrete. Work was able to proceed on all floors without interruption of work on the floors below."

Herbert V. Realty Co.
Atlantic City, N. J., Owners



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ERECTION OF IRON WORK A SPECIALTY
18 N. TEXAS AVENUE
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ATLANTIC CITY, N. J., Dec.17,1927. 192

National Steel Fabric Company,
Union Trust Building,
Pittsburgh, Pa.

Gentlemen:-

I can honestly say that in my forty-five years of experience in structural steel work, I have never been as enthusiastic about any material as STEELTEX FOR FLOORS.

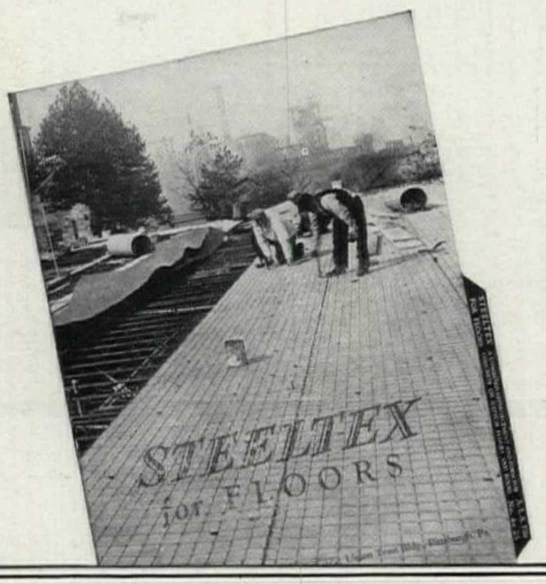
The use of this material over bar joists in the BIARRITZ APARTMENT job by my crew convinced the men of its safety and other advantages over the usual type of construction.

As a result of this first job, we have already secured another job of similar construction, and have several more in prospect.

Yours very truly
Charles F. Wagner

CFW:CR

ALL AGREEMENTS CONTINGENT UPON STRIKES, ACCIDENTS AND OTHER CAUSES BEYOND OUR CONTROL



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DIVISION OF Pittsburgh Steel Co.

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National Steel Fabric Co., 602 Union Trust Bldg., Pittsburgh, Pa.
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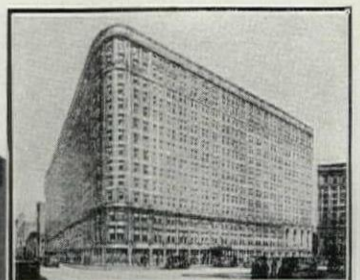
PHILADELPHIA
Franklin Trust Building

SAN FRANCISCO
Rialto Building

ATLANTA
Healey Building

CINCINNATI
Union Trust Building



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A TRUSS of one piece of steel without rivets, bolts or welds in shear or tension sums up the outstanding features of the Bates-Truss Joist.

In the Bates Expansion Process, no material is cut from the web of the original structural section. The process simply transforms the plain web of the I-beam section into an expanded lattice truss web. The act of expanding increases the depth of the beam and materially increases its strength. The points of contact of the lacing and flange members are simply unsheared, unmolested portions of the original plain web.

The properties of a Bates-Truss Joist are readily calculable by standard formulae. The strength is uniform. The process of manufacture automatically tests every joist for any possible defect in either material or workmanship. The human equation is completely eliminated.

Your request for a copy of the Bates-Truss Joist Catalog, with its complete loading tables, will be complied with promptly.

Bates Expanded Steel Truss Co.

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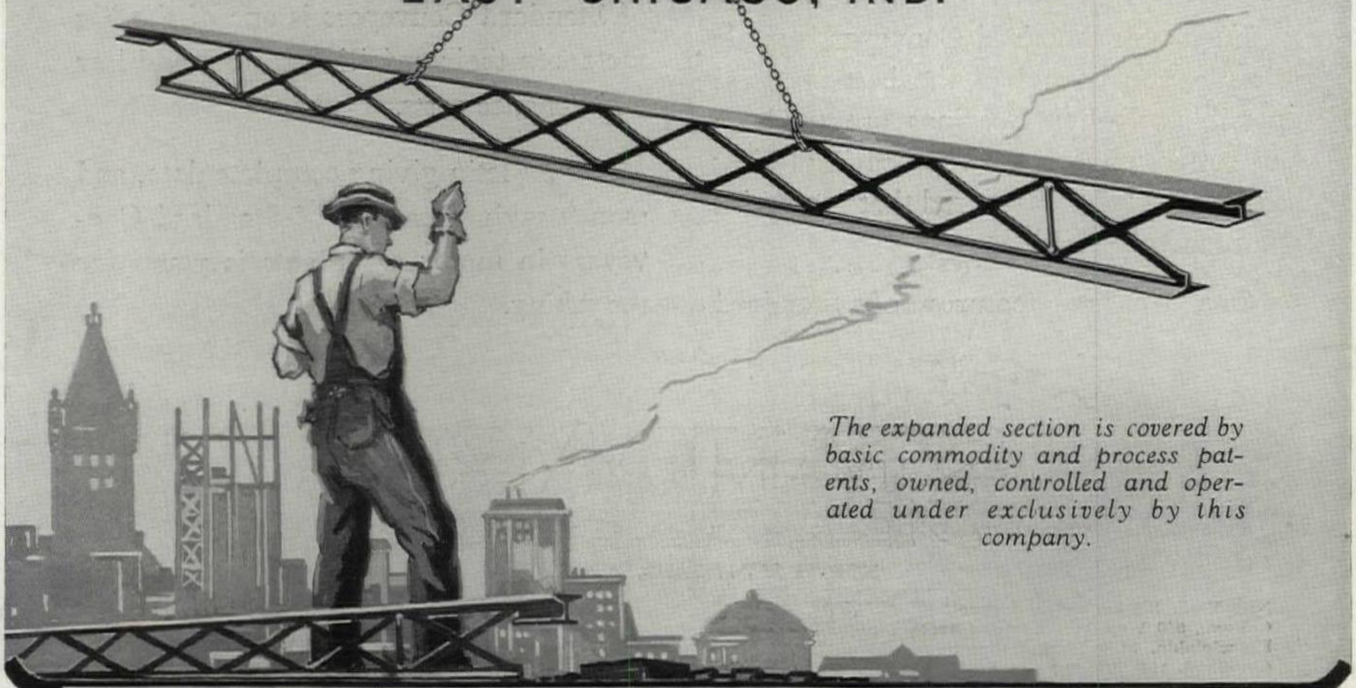
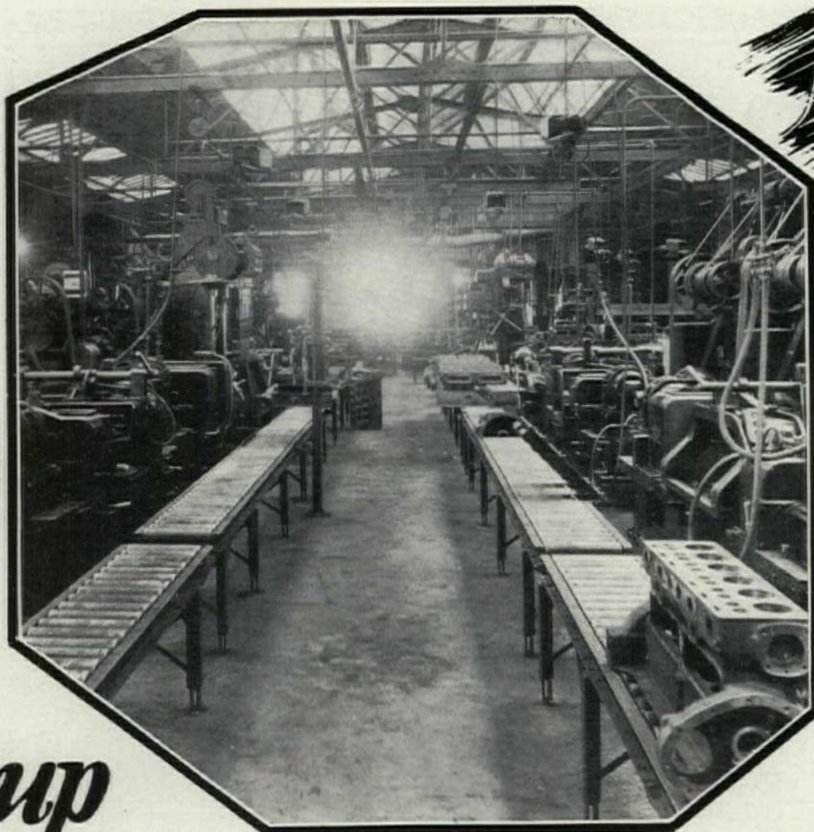
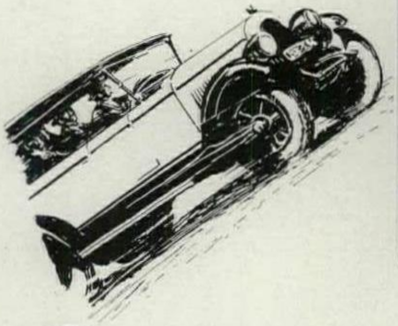


The expanded section is covered by basic commodity and process patents, owned, controlled and operated under exclusively by this company.





Selected List of Manufacturers' Publications

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

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to *The Architectural Forum*, 383 Madison Ave., New York, or the manufacturer direct, in which case kindly mention this publication.

ACOUSTICS

The Celotex Co., Chicago.
Acousti-Celotex. 16 pp., 8½ x 11 ins. Illustrated brochure on a valuable material for facing walls and ceilings.
Specifications and Details for application and decoration of Acousti-Celotex, 11 pp., 8½ x 11 ins.

R. Guastavino Co., 40 Court St., Boston.
Akoustolith Plaster. Brochure, 6 pp., 10 x 12½ ins. Important data on a valuable material.

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

ASH HOISTS—ELECTRIC AND HAND POWER

Gillis & Geohegan, 535 West Broadway, New York, N. Y.
General Catalog. 8½ x 11 ins. 20 pp. Fully illustrated. Contains specifications in two forms (with manufacturers' name and without). Detail ¾ in. scale for each telescopic model and special material-handling section.
G. & G. Telescopic Hoist. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Electric and hand power models; watertight sidewalk doors; automatic opening, closing, and locking devices.

BASEMENT WINDOWS

Genfire Steel Company, Youngstown, Ohio.
Architectural Details. Booklet, 62 pp., 8½ x 11 ins. Details on steel windows.

Truscon Steel Co., Youngstown, Ohio.
Truscon Copper-Steel Basement Windows. Booklet, 8 pp., 8½ x 11 ins. Illustrated with installation details. Specifications and construction details.

BATHROOM FITTINGS

A. P. W. Paper Co., Albany, N. Y.
Onliwon for Fine Buildings. Folder, 8 pp., 3¼ x 6 ins. Illustrated. Deals with toilet paper fittings of metal and porcelain.
Architects' File Card. 8½ x 11 ins. Illustrated. Filing card on toilet paper and paper towel cabinets.
A Towel Built for Its Job. Booklet, 8 pp., 4¼ x 9⅝ ins. Illustrated. Paper Towel System and Cabinets.
Cabinets and Fixtures. Booklet, 31 pp., 5¾ x 4¾ ins. Illustrated. Catalog and price list of fixtures and cabinets.

Morton Mfg. Co., 5163 West Lake St., Chicago.
Bathroom Cabinets for Homes, Apartments, etc. General Catalog, 20 pp., 8 x 10¾ ins. Illustrated. Specifications, installation details, etc.
Booklet, 12 pp., 3¾ x 6¾ ins. Illustrated. Deals with four models of bathroom cabinets.

BRICK

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

Common Brick Mfrs. Assn. of America, 2134 Guarantee Title Bldg., Cleveland.
Brick; How to Build and Estimate. Brochure, 96 pp., 8½ x 11 ins. Illustrated. Complete data on use of brick.
The Heart of the Home. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Price 25 cents. Deals with construction of fireplaces and chimneys.
Skintled Brickwork. Brochure, 15 pp., 8½ x 11 ins. Illustrated. Tells how to secure interesting effects with common brick.
Building Economy. Monthly magazine, 22 pp., 8½ x 11 ins. Illustrated. $1 per year, 10 cents a copy. For architects, builders and contractors.

BUILDING, STEEL PRODUCTS FOR

Truscon Steel Company, Youngstown, Ohio.
Truscon Data Book. Catalog. 3½ x 6 in. 128 pp. Illustrated. Contains complete information with illustrations on Truscon reinforcing steel, steel windows, metal lath, standard buildings, concrete inserts, steel joists, pressed stamping and chemical products.

CEMENT

Carney Company, The, Mankato, Minn.
What Twelve Men Said About Carney. Booklet. 8½ x 11 ins. Illustrated. Opinions of well-known architects and builders of Carney Cement used for mortar.

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

Kosmos Portland Cement Company, Louisville, Ky.
Kosmortar for Enduring Masonry. Folder, 6 pp., 3½ x 6½ ins. Data on strength and working qualities of Kosmortar.
Kosmortar, the Mortar for Cold Weather. Folder, 4 pp., 3⅛ x 6½ ins. Tells why Kosmortar should be used in cold weather.

CEMENT—Continued

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.

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

CONCRETE BUILDING MATERIALS

Celite Products Co., 1320 South Hope St., Los Angeles.
Better Concrete; Engineering Service Bulletin X-325. Booklet, 10 pp., 8½ x 11 ins. Illustrated. On use of Celite to secure workability in concrete, to prevent segregation and to secure water-tightness.
Economic Value of Admixtures. Booklet, 32 pp., 6⅛ x 9⅛ ins. Reprint of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete Institute.

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

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

National Building Units Corporation, 1600 Arch St., Philadelphia.
Durability and Utility of Straub Cinder Building Blocks. Brochure, 14 pp., 8 x 11 ins. Report on this material by Pittsburgh Testing Laboratories.
Sound Absorption of Cinder Concrete Building Units. Booklet, 8 pp., 8 x 11 ins. Illustrated. Results of tests of absorption and transmission of sound through Straub building blocks.
Philadelphia. Cinder Concrete Building Units. Brochure, 36 pp., 8¾ x 10¾ ins. Illustrated. Full data on an important building material.

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

CONCRETE COLORINGS

A. C. Horn Company, Long Island City, N. Y.
Keramic Catalog. Booklet. 8½ x 11 ins. 26 pp. A magnificent brochure, illustrated in color, describing a valuable line of specialties for use with concrete floors—colorings, hardeners, waterproofing, etc.

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

CONSTRUCTION, FIREPROOF

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

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

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

DAMPPROOFING

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

Genfire Steel Company, Youngstown, Ohio.
Waterproofing Handbook. Booklet. 8½ x 11 ins. 72 pp. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dusting and hardening concrete floors and accelerating the setting of concrete. Free distribution.

A. C. Horn Company, Long Island City, N. Y.
Waterproofing, 9½ x 11½ in. Folder. Contains folders giving data on excellent waterproofing and dampproofing materials.

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

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 173*

DAMPPROOFING—Continued

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

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

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.

The Compound & Pyrono Door Company, St. Joseph, Mich.
Pyrono Handbook for Architects and Contractors. 8½ x 11 ins. 16 pp. Contains full information regarding Pyrono Fireproof Veneered Doors and Trim, with complete details and specifications.
Pyrono details in sheet form for tracing.

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.

DUMBWAITERS

Sedgwick Machine Works, 151 West 15th St., New York.
Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¾ x 8¼ ins. 60 pp. Illustrated.
Catalog and pamphlets, 8½ x 11 ins. Illustrated. Valuable data on dumbwaiters.

ELECTRICAL EQUIPMENT

Frank Adam Electric Company, St. Louis, Mo.
Catalog No. 35—1925. Panelboards—Steel Cabinets. 7¾ x 10½ ins. 64 pp. Illustrates and describes sectionally built panelboards, an important line of steel cabinets and the fittings which go with them.

Benjamin Electric Mfg. Co., New York, Chicago and San Francisco.
Benjamin-Starrett Panelboards and Steel Cabinets. Booklet, 80 pp. 8¼ x 10½ ins. Full data on these details for light and power.
Benjamin-Starrett Panelboards for Light and Power. Booklet, 80 pp., 8½ x 11 ins. Illustrated. Full data on company's line of panelboards, steel cabinets, etc.

General Electric Co., Schenectady, N. Y.
"Electrical Specification Data for Architects. Brochure, 36 pp., 8 x 10½ ins. Illustrated. Data regarding G. E. wiring materials and their use.
"The House of a Hundred Comforts." Booklet, 40 pp., 8 x 10½ ins. Illustrated. Dwells on importance of adequate wiring.

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

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.
Variable-Voltage Central Systems as applied to Electric Elevators. Booklet, 13 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
Westinghouse Panelboards and Cabinets (Catalog 42-A). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Important data on these details of equipment.
Beauty; Power; Silence; Westinghouse Fans (Dealer Catalog 45). Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.
Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Cooking apparatus for buildings of various types.
Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.
Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.

ELEVATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.
Otis Push Button Controlled Elevators. Descrive 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, 4¾ x 8¼ ins. 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.
Catalog and pamphlets. 8½ x 11 ins. Illustrated. Important data on different types of elevators.

FIREPROOFING—See also Construction, Fireproof

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

Genfire Steel Company, Youngstown, Ohio.
Fireproofing Handbook, 8½ x 11 ins. 64 pp. Illustrated. Gives methods of construction, specifications, data on Herringbone metal lath, steel tile, Trussit solid partitions, steel, lumber, self-centering formless concrete construction.

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

FLOOR HARDENERS (CHEMICAL)

Master Builders Co., Cleveland, Ohio.
Concrete Floor Treatment. File, 50 pp. Data on Securing hardened dustproof concrete.
Concrete Floor Treaments—Specification Manual. Booklet, 23 pp. 8½ x 11 ins. Illustrated. Valuable work on an important subject.

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

FLOORS—STRUCTURAL

Truscon Steel Co., Youngstown, Ohio.
Truscon Locktyle. Booklet. 8½ x 11 ins. 8 pp. Illustrations of material and showing methods of application.
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.

FLOORING

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

Armstrong Cork Co. (Linoleum Division), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog. 8½ x 11 ins. 40 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors.
Armstrong's Linoleum Pattern Book, 1927. Catalog. 3½ x 6 in. 272 pp. Color Plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.
Quality Sample Book. 3½ x 5¾ in. Showing all gauges and thicknesses in the Armstrong line of linoleums.
Linoleum Layer's Handbook. 5 x 7 in. 32 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.
Enduring Floors of Good Taste. Booklet. 6 x 9 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.

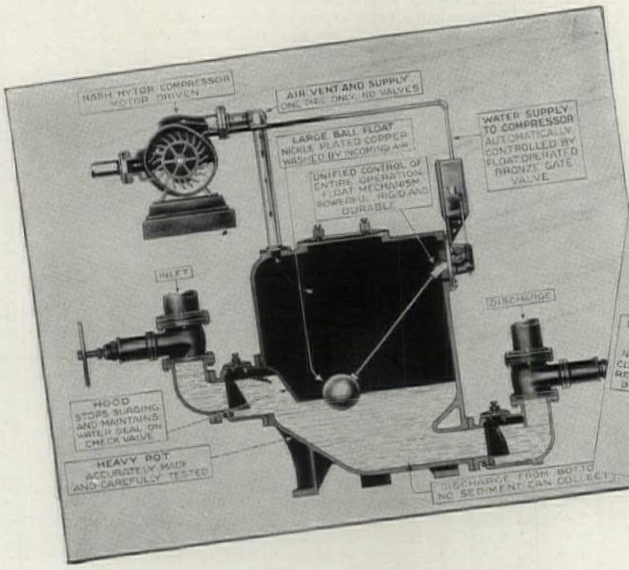
Barber Asphalt Co., Philadelphia.
Specifications for Applying Genasco Asphalt Mastic. Booklet 8 x 10½ ins. Directions for using Asphalt Mastic for flooring.

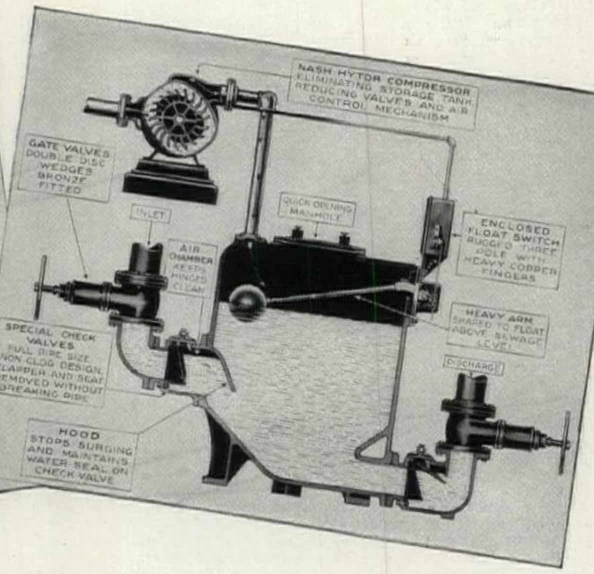
Blabon Company, Geo. W., Nicetown, Philadelphia, Pa.
Planning the Color Schemes for Your Home. Brochure illustrated in color; 36 pp., 7½ x 10½ ins. Gives excellent suggestions for use of color in flooring for houses and apartments.
Handy Quality Sample Folder of Linoleums. Gives actual samples of "Battleship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

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

Carter Bloxonend Flooring Co., Keith & Perry Bldg., Kansas City, Mo.
Bloxonend Flooring. Booklet. 3¼ x 6¼ ins. 20 pp. Illustrated. Describes uses and adaptability of Bloxonend Flooring to concrete, wood or steel construction, and advantages over loose wood blocks.
File Folder. 9¾ x 11¾ ins. For use in connection with A. I. A. system of filing. Contains detailed information on Bloxonend Flooring in condensed, loose-leaf form for specification writer and drafting room. Literature embodied in folder includes standard Specification Sheet covering the use of Bloxonend in general industrial service and Supplementary Specification Sheet No. 1, which gives detailed description and explanation of an approved method for installing Bloxonend in gymnasiums, armories, drill rooms and similar locations where maximum resiliency is required.

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





Read how this sewage ejector works

Sewage, under the action of gravity, flows through the inlet check valve into the pot. As it accumulates, it raises a ball float, which, when the pot is full, actuates a float switch, starting up the Nash Air Compressor.

Compressed air is delivered into the top of the pot, closing the inlet check valve and expelling the sewage through the outlet check valve. When the pot has been emptied, the float, having reached the lower limit of its travel, opens the float switch, stopping the compressor, through which, then, the air in the pot is vented.

Sewage again flows by gravity into the pot repeating the cycle.

Notice that there are no complicated air valve mechanisms—no screens, separators, storage tanks, reciprocating compressors, or inaccessible parts. Operation is simple—an advantage that contributes to reliability and economy.

Write for Bulletin No. 67

NASH ENGINEERING COMPANY
12 Wilson Road So. Norwalk, Conn.

Jennings Pumps

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

Continued from page 174

FLOORING—Continued

Norton Company, Worcester, Mass.
Filing Folder. 8½ x 11¾ ins. 27 pp. Illustrated with drawings. Specification data for architects.
Large illustrated folder on modern flooring.

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

United States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 pp., 8¼ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

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

Zenitherm Co., Inc., 390 Frelinghuysen Avenue, Newark, N. J.
Zenitherm Floors. Booklet, 14 pp., 8½ x 11 ins. Illustrated. Floors for interior and semi-interior use.
Contractors' Handbook. Brochure, 10 pp., 4½ x 6 ins. Complete data for using Zenitherm.

FURNITURE

American Seating Co., 14 E. Jackson Blvd., Chicago, Ill.
Ars Ecclesiastica Booklet. 6 x 9 in. 48 pp. Illustrations of church fitments in carved wood.
Theatre Chairs. Booklet. 6 x 9 in. 48 pp. Illustrations of theater chairs.

Concealed Bed Corporations, 58 East Washington St., Chicago.
Eight-Room Convenience at Six-Room Price. Booklet, 16 pp., 3¼ x 5 ins. Illustrated. Data on concealed beds for home owners.
Save Floor Space. Brochure. 36 pp. 4 x 8¾ ins. Illustrated. Describes Holmes beds, giving measurement data.

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

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

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

GARAGES

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

GLASS CONSTRUCTION

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

Libbey-Owens Sheet Glass Co., Toledo, Ohio.
Flat Glass. Brochure, 11 pp., 5⅛ x7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

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

GRILLES

Wickwire Spencer Steel Co., Inc., 41 East 42nd St., New York.
Clinton Grilles. Booklet. 9 x 11 ins. 12 pp. A brochure on metal grilles, particularly for use over heating radiators.

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.

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

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

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

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.

Sargent & Company, New Haven, Conn.
Details to Which Standard Hardware Can Be Applied. Booklet. 6 pp. 9 x 12 ins. Illustrated. Treats with diagrams, portions of doors and windows to which hardware can be applied.
Sargent Locks and Hardware. Bound volume. 534 pp. 9 x 12 ins. Illustrated. Complete catalog of Sargent line of hardware.

HEATING EQUIPMENT

American Blower Co., 6004 Russell St., Detroit.
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 Type "A" Heat Machine. Catalog 7¾ x 10½ ins. 32 pp. Illustrated in 4 colors. A brochure of high-efficiency heating apparatus for residences and commercial buildings.
Ideal Water Tube Boilers. Catalog 7¾ x 10⅝. 32 pp. Illustrated in 4 colors. Data on a complete line of Heating Boilers of the Water Tube type.
Ideal Smokeless Boilers. Catalog 7¾ x 10½ ins. 32 pp. Illustrated in 4 colors. Fully explains a boiler free from the objection of causing smoke.
Ideal Boilers for Oil Burning. Catalog 5½ x8½ in. 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.
Corto—The Radiator Classic. Brochure 5½ x 8½ in. 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
Ideal Arcola Radiator Warmth.Brochure 6¼ x 9¼. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.

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

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

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

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

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

S. T. Johnson Co., Oakland, Calif.
Bulletin No. 4A. Brochure, 8 pp., 8½ x 11 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 Co., Kewanee, Ill.
Kewanee on the Job. Catalog. 8½ x 11 ins. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 78, 6 x 9 ins. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.
Catalog No. 79. 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.

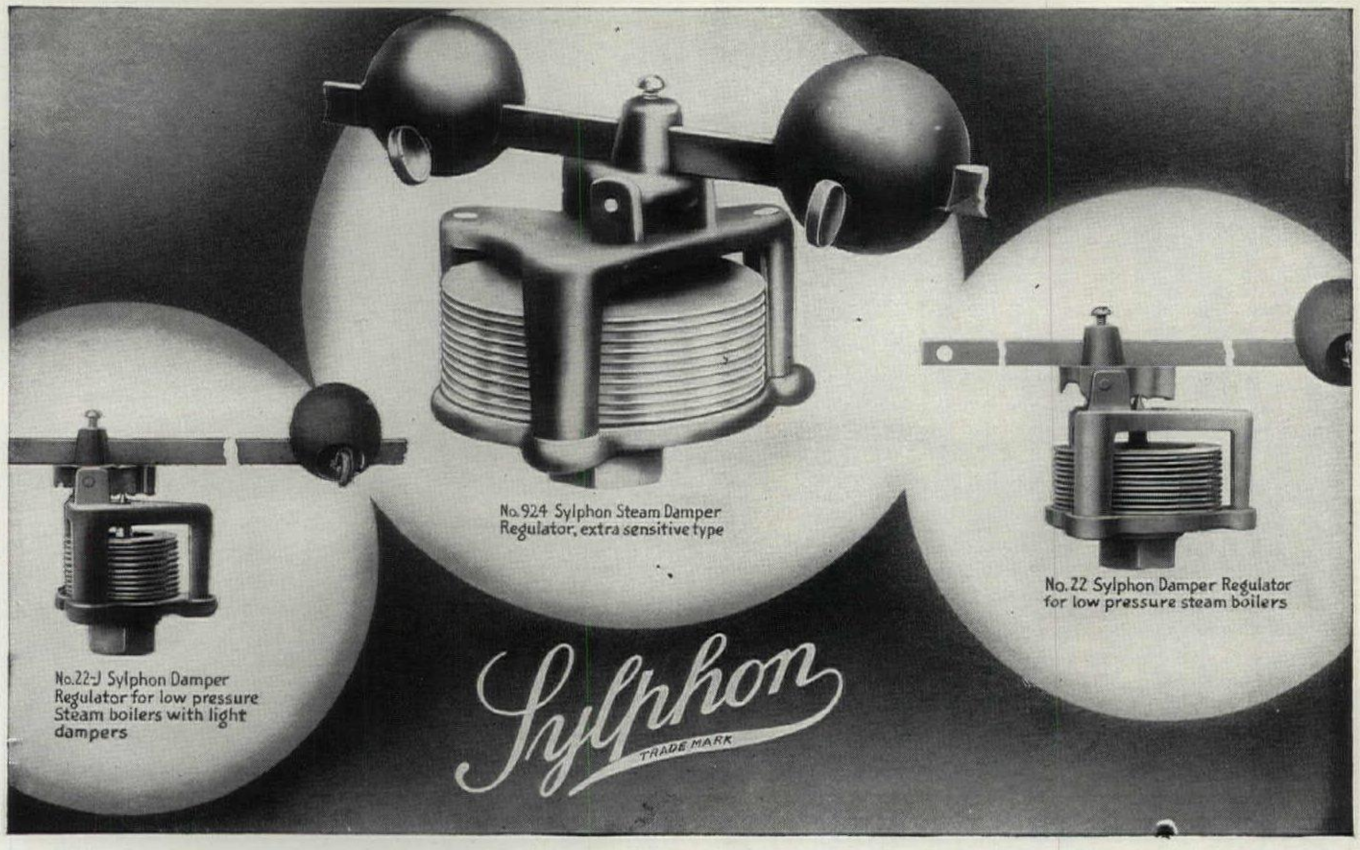
May Oil Burner Corp., Baltimore.
Adventures in Comfort. Booklet, 24 pp., 6 x 9 ins. Illustrated. Non-technical data on oil as fuel.
Taking the Quest out of the Question. Brochure, 16 pp., 6 x 9 ins. Illustrated. For home owners interested in oil as fuel.

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

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

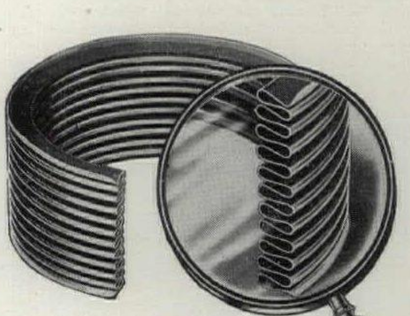
National Radiator Company, Johnstown, Pa.
Aero Radiators; Beauty and Worth. Catalog 34. Booklet 6 x 9 ins., 20 pp., describing and illustrating radiators and accessories.

Petroleum Heat & Power Co., 511 Fifth Avenue, New York.
Heating Homes the Modern Way. Booklet, 8½ x 11¾ ins. Illustrated. Data on the Petro Burner.
Residence Oil Burning Equipment. Brochure, 6 pp., 8½ x 11 ins. Illustrated. Data regarding Petro Burner in a bulletin approved by Investigating Committee of Architects and Engineers.



Helping the Steam Heating Plant Automatically Deliver the Goods!

Sylphon automatic regulation of draft dampers makes any boiler do a better job—saves fuel, saves firing, and prevents over or underheating. A Sylphon Steam Damper Regulator eliminates the need for continual trips to the cellar to adjust draft dampers. These sturdy, self-contained damper regulators, through years of dependable performance on leading boilers, have proven to be a guarantee of heating satisfaction.



Cross section of cut-open Bellows showing formation of folds or corrugations to equalize the strain of expansion and compression, giving the durability for which the Sylphon Bellows is so justly well-known.

It's The Sylphon Bellows That Makes Them Dependable

The exclusive feature of Sylphon Steam Damper Regulators is the well-known Sylphon Bellows, used as the diaphragm in every genuine Sylphon Damper Regulator. This diaphragm with its everlasting sensitiveness and positive action governs the opening and closing of draft dampers in smooth, continuous and proportionate response to slight changes in steam pressures.
You can give your client no better guarantee of complete heating satisfaction than that offered by the Fulton Sylphon Steam Damper Regulator.

Refuse imitations—Insist upon the genuine

Send for Bulletin FDR-8 containing detailed information.

The Fulton Sylphon Company

Originators and Patentees of the Sylphon Bellows

Knoxville, Tennessee, U.S.A.

SALES OFFICES IN: New York, Chicago, Detroit, Boston, Philadelphia, and in all the principal cities of U. S.

European Representatives: Crosby Valve and Engineering Co., Ltd., 41-42 Foley Street, London, W.1, England

Canadian Representatives: Darling Bros., Ltd., 120 Prince Street, Montreal, Canada

Sylphon Steam Damper Regulators

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

HEATING EQUIPMENT—Continued

Petro Mechanical Oil Burner & Air Register. Booklet, 23 pp., 8½ x 11 ins. Illustrated. Data on industrial installations of Petro Burners.
Present Accepted Practice in Domestic Oil Burners. Folder, 4 pp., 8½ x 11 ins. Illustrated. A reprint from Heating and Ventilating Magazine.

The Thatcher Company, 39 St. Francis St., Newark, N. J.
Helpful Hints on Choosing Your Heater. Booklet, 20 pp., 3½ x 6¼ ins. Illustrated. Valuable data on types of heating.
Economical Warmth. Brochure, 8 pp., 3½ x 6¼ ins. Illustrated. Deals with economical heating.

Rome Brass Radiator Corp., 1 East 42nd St., New York.
Steam Heat by Wire. Folder, 8 pp., 4 x 6 ins. Illustrated. Data on an improved electric heater.
Robras Electric Steam Radiator. Folder, 4 pp., 8½ x 11 ins. Illustrated. A means of obtaining supplementary or emergency heating.

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

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
Oil Heating at Its Best. Brochure, 24 pp., 5 x 8 ins. Illustrated. Non-technical description of the advantages of using oil for heating.
Oil Heating and What It Means to the Architect. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Use of oil from an architect's point of view.

HOSPITAL EQUIPMENT

The Frink Co., Inc., 24th St. and Tenth 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.

The Kny-Scheerer Corporation of America, 119 Seventh Ave., New York.
Hospital Equipment, 16th Edition. 7¼ x 10½ ins. 232 pp. Illustrated. Complete description of Hospital and Surgical Furniture, Hospital Appliances including Operating Tables, Cabinets, Sterilizers for Water, Dressing and Instruments, also Hydrotherapeutic Apparatus.
Surgical Sundries. Second Editions. Booklet. 7⅜ x 10½ ins. 48 pp. Illustrated. A complete line of glassware, enamelware, rubber goods, restraint apparatus, instrument sterilizers, sputum cups, wheel chairs and sick room comforts.
Electro Medical. 25th Edition. Booklet. 7¼ x 10½ ins. 160 pp. Illustrated. A complete line of Albee Bone Sets. Apparatus for AC and DC Cystoscopes, Heat Magnets, Vibrators, Compressors, Electric Light Baths, High Frequency Apparatus and X-Ray Apparatus and Accessories.

The Pick-Barth Companies, Chicago and New York.
Some Thoughts About Hospital Food Service Equipment. Booklet, 21 pp., 7½ x 9¼ ins. Valuable data on an important subject.

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

HOTEL EQUIPMENT

Pick & Company, Albert, 208 West Randolph St., Chicago, Ill.
Some Thoughts on Furnishing a Hotel. Booklet. 7½ x 9 ins. Data on complete outfitting of hotels.

INSULATING LUMBER

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

INSULATION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ 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 in. 32 pp. Illustrated.
Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 11¾ ins. Illustrates and describes use of insulation for structural purposes.

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

INSULATION—Continued

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

Flax-li-num Insulating Company, St. Paul, Minn.
"Heat Insulation for Houses." Booklet, 64 pp., 9¾ x 11¼ ins. Illustrated. Authoritative information on thermal insulation with complete specifications for all types of buildings.

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

Celotex Company, The, 645 N. Michigan Ave., Chicago, Ill.
The Hidden Comfort of Costly Homes. Booklet. 8½ x 11 ins.
Celotex Specifications. Booklet. 8½ x 11 ins.

JOISTS

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

Truscon Steel Co., Youngstown, Ohio.
Truscon Steel Joists. Booklet. 8½ x 11 ins. 16 pp. Illustrated with typical buildings and showing details of construction. Tables of sizes and safe loads.
Truscon Steel Joist Buildings. Illustrated 32-page brochure attractively illustrated, showing types of buildings equipped with Truscon Steel Joist.
Strip Steel Joist Construction. 14-page booklet, with illustrations. Reprint of paper presented to Building Officials' Conference, Madison, Wis., 1925, by J. J. Calvin, Secretary, Strip Steel Joist Association.

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.

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

Pick & Company, Albert, 208 W. Randolph St., Chicago, Ill.
School Cafeteria. Portfolio. 17 x 11 ins. 44 pp. Illustrated. An exhaustive study of the problems of school feeding, with copious illustrations and blue prints. Very valuable to the architect.
School Cafeterias. Booklet. 9 x 6 ins. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.

LABORATORY EQUIPMENT

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

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

LANTERNS

Todhunter, Arthur, 119 E. 57th St., New York.
Hand Wrought Lanterns. Booklet, 5¼ x 6¼ ins. 20 pp. Illustrated in Black and White. With price list. Lanterns appropriate for exterior and interior use, designed from old models and meeting the requirements of modern lighting.

LATH, METAL AND REINFORCING

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

Milwaukee Corrugating Co., Milwaukee, Wis.
The Milcor Manual. Booklet, 8½ x 11 ins. 64 pp. Illustrated. Covers Milcor methods and materials, metal lath, corner beads, steel domes, channels, etc.

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

Wickwire Spencer Steel Co., Inc., 41 East 42nd St., New York.
Clinton Wire Lath. Brochure, 9 x 11 ins. 51 pp. A valuable booklet on metal lathing and the proper method of using it.

Truscon Steel Company, Youngstown, Ohio.
Truscon 1-A Metal Lath. 12-page booklet, 8½ x 11 ins., beautifully printed, with illustrations of details of lath and method of application.
Truscon ¾-inch Hy-Rib for Roofs, Floors and Walls. Booklet, ½ 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.

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

LAUNDRY CHUTES

The Pfaudler Company, 217 Cutler Building, Rochester, N. Y.
Pfaudler Glass-Lined Steel Laundry Chutes. Booklet, 5⅛ x 7⅜ ins. 16 pp. Illustrated. A beautifully printed brochure describing in detail with architects' specifications THE PFAUDLER GLASS LINED STEEL LAUNDRY CHUTES. Contains views of installations and list of representative examples.

LAUNDRY MACHINERY

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

LIBRARY EQUIPMENT

Art Metal Construction Co., Jamestown, N. Y.
Planning the Library for Protection and Service. Brochure, 52 pp. 8½ x 11 ins. Illustrated. Deals with library fittings of different kinds.
Library Bureau Division, Remington Rand, N. Tonawanda, N. Y.
Like Stepping into a Story Book. Booklet. 24 pp. 9 x 12 ins. Deals with equipment of Los Angeles Public Library.

LIGHTING EQUIPMENT

The Frink Co., Inc., 24th St. and 10th Ave., New York City.
Catalog 415, 8½ x 11 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 Co. (Celestialite Division), 200 Fifth Avenue, New York.
Next to Daylight Brochure, 19 pp., 4 x 8½ ins. Illustrated. Deals with a valuable type of lighting fixture.
Celestialite Circular No. 40. Folder, 4 pp., 3½ x 6 ins. "What Nature does to the Sun, Celestialite does to the Mazda lamp."
Attractive Units in Celestialite. Folder, 12 pp., 3¼ x 6½ ins. Illustrates Decoratd Celestialite Units.
It Has Been Imitated. Folder, 4 pp., 10 x 13 ins. Data on an important detail of lighting equipment.

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

MAIL CHUTES

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

MANTELS

Arthur Todhunter, 119 E. 157th St., New York, N. Y.
Georgian Mantels. New Booklet. 24 pp., 5¼ x 6¼ ins. A fully illustrated brochure on eighteenth century mantels. Folders give prices of mantels and illustrations and prices of fireplace equipment.

MARBLE

The Georgia Marble Company, Tate, Ga. New York Office, 1328 Broadway.
Why Georgia Marble is Better. Booklet. 3⅜ x 6 ins. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.
Convincing Proof. 3⅜ x 6 in. 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.

METALS

American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.
Reference Book. Pocket Ed. 2½ x 4½ ins. 168 pp. Illustrated. Covers the complete line of Sheet and Tin Mill Products.
Apollo and Apollo-Keystone Galvanized Sheets. Catalog. 8½ x 11 ins. 20 pp. Illustrated.
Research on the Corrosion Resistance of Coppen Steel. Booklet. 8½ x 11 ins. 24 pp. Illustrated. Technical information on results of atmospheric corrosion tests of various sheets under actual weather conditions.

The International Nickel Company, 67 Wall St., New York, N. Y.
The Choice of a Metal. Booklet, 6¼ x 3 ins. 166 pp. Illustrated. Monel Metal—its qualities, use and commercial forms, briefly described.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.
Architectural Interior and Exterior Woodwork. Standardized Book. 9 x 11½ ins. 240 pp. Illustrated. This is an Architects' Edition of the complete catalog of Curtis Woodwork, as designed by Trowbridge & Ackerman. Contains many color plates.
Better Built Homes. Vols. XV-XVIII incl. Booklet. 9 x 12 ins 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects for the Curtis Companies.
Curtis Details. Booklet, 19½ x 23½ ins. 20 pp. Illustrated Complete details of all items of Curtis woodwork, for the use of architects.

Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.
Column Catalog, 7½ x 10 in. 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.

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, 183 pp., 8½ x 11 ins. Completely covers the subject of doors for interior use.
Roddis Doors for Hospitals. Brochure, 15 pp., 8½ x 11 ins. Illustrated work on hospital doors.
Roddis Doors for Hotels. Brochure, 15 pp., 8½ x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORTAR COLORS

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

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Creosote Stains. Booklet. 4 x 8½ ins. 16 pp. Illustrated.

A. C. Horn Company, Long Island City, N. Y.
Keramic Catalog. Booklet, 26 pp., 8½ x 11 in. A magnificent brochure illustrated in color, describing a valuable line of specialties for use with concrete floors—colorings, hardeners, waterproofing, etc.

National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book, 5½ x 3¼ in. 100 pp. Gives directions and formulae for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.
Red Lead in Paste Form. Booklet, 6¼ x 3½ in. 16 pp. Illustrated. Directions and formulae for painting metals.
Came Lead. Booklet, 8¾ x 6 in. 12 pp. Illustrated. Describes various styles of lead cames.
Cinch Anchoring Specialties. Booklet. 6 x 3½ ins. 20 pp. Illustrated. Describes complete line of expansion bolts.

Pratt & Lambert, Inc., Buffalo, N. Y.
Specification Manual for Paint, Varnishing and Enameling. Booklet, 38 pp., 7½ x 10⅝ ins. Complete specifications for painting, varnishing and enameling interior and exterior wood, plaster, and metal work.

Sherwin-Williams Company, 601 Canal Rd., Cleveland, Ohio.
Painting Concrete and Stucco Surfaces. Bulletin No. 1. 8½ x 11 ins. 8 pp. Illustrated. A complete treatise with complete specifications on the subject of Painting of Concrete and Stucco Surfaces. Color chips of paint shown in bulletin.
Enamel Finish for Interior and Exterior Surfaces. Bulletin No. 2, 8½ x 11 ins. 12 pp. Illustrated. Thorough discussion, including complete specifications for securing the most satisfactory enamel finish on interior and exterior walls and trim.
Painting and Decorating of Interior Walls. Bulletin No. 3. 8½ x 11 ins. 20 pp. Illustrated. An excellent reference book on Flat Wall Finish, including texture effects, which are taking the country by storm. Every architect should have one on file.
Protective Paints for Metal Surfaces. Bulletin No. 4. 8½ x 11 in. 12 pp. Illustrated. A highly technical subject treated in a simple, understandable manner.

Sonneborn Sons, Inc., L., Dept. 4, 116 Fifth Ave., New York.
Paint Specifications. Booklet, 8½ x 10¾ ins. 4 pp.

U. S. Gutta Percha Paint Co., Providence, R. I.
Barreled Sunlight. Booklet, 8½ x 11 in. Data on "Barreled Sunlight" with specifications for its use.

Valentine & Co., 456 Fourth Ave., New York.
How to Use Valspar. Illustrated booklet, 32 pp., 3¾ x 8 ins. Deals with domestic uses for Valspar.
How to Keep Your House Young. Illustrated brochure, 23 pp., 7 x 8½ ins. A useful work on the upkeep of residences.

Zapon Co., The, 247 Park Ave., New York City.
Zapon Architectural Specifications. Booklet, 28 pp., 8½ x 11 ins. Describes odorless brushing and spraying lacquers and lacquer enamels.

PAPER

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

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.

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

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

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

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

Trowbridge & Livingston
Architects

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Where Dependable Waterproofing Was Demanded

When the time came to consider waterproofing the Mitsui Bank, owners, architects, and builders very definitely decided not to chance havoc of water or dampness, and we were awarded the contract.

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We have waterproofed many of the world's outstanding buildings, yet we keep men busy waterproofing jobs even as small as elevator pits, etc.

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Waterproofing Engineers and Contractors

New York: 345 East 33RD St. Boston: 65 Albany St.

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

PIPE

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

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

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

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

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

National Tube Co., Frick Building, Pittsburgh, Pa.
"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins. 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.
"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins. 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deaerating systems for eliminating or retarding corrosion in hot water supply lines.
"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 ins. 88 pp. This bulletin contains 254 illustrations of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, engineers, etc.
Modern Welded Pipe. Book of 88 pp. 8½ x 11 ins., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.
Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.
Interior Walls Everlasting. Brochure, 20 pp., 6¾ x 9¼ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

PLUMBING EQUIPMENT

C. F. Church Mfg. Co., Holyoke, Mass.
Catalog S. W.-3. Booklet, 95 pp., 7¾ x 10½ ins. Illustrated. Data on Sani-White and Sani-Black toilet seats.

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

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

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

Eljer Company, Fort City Pa.
Complete Catalog. 3¾ x 6¾ ins. 104 pp. Illustrated. Describes fully the complete Eljer line of standardized vitreous china plumbing fixtures, with diagrams, weights and measurements.
Standardized Sixteen Circular. 3¾ x 6¾ ins. 18 pp. Illustrated.

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

Maddock's Sons Company, Thomas, Trenton, N. J.
Catalog "K." 10⅝ x 7⅞ ins. 242 pp. Illustrated. Complete data on vitreous china plumbing fixtures with brief history of Sanitary Pottery.

Speakman Company, Wilmington, Del.
Speakman Showers and Fixtures. Catalog. 4½ x 7½ ins. 250 pp. Illustrated. Catalog of Modern Showers and Brass Plumbing Fixtures, with drawings showing layouts, measurements, etc.
Toned Up in Ten Minutes. Booklet. 7½ x 10½ ins. 16 pp. Illustrated. Modern Showers and Washups for Industrial Plants, showing the sanitary method of washing in running water.

PUMPS

Chicago Pump Company, 2300 Wolfram St., Chicago, Ill.
The Correct Pump to Use. Portfolio containing handy data. Individual bulletins, 8½ x 11 ins., on bilge, sewage, condensation, circulating, house, boiler feed and fire pumps.

Kewanee Private Utilities Co., 442 Franklin St. Kewanee, Ill.
Bulletin E. 7¾ x 10¼ 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.

RAMPS

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

The Trane Co., LaCrosse, Wis.
Trane Small Centrifugal Pumps. Booklet. 3¼ x 8 ins. 16 pp. Complete data on an important type of pump.

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

Genfire Steel Company, Youngstown, Ohio.
Self-Centering Handbook. 8½ x 11 ins. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and floors with a combined form and reinforced material.

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

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

ROOFING

American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Better Buildings. Catalog. 8½ x 11 ins. 32 pp. Describes Corrugated and Formed Sheet Steel Roofing and Siding Products, black, painted and galvanized, with directions for application of various patterns of Sheet Steel Roofing in various types of construction.
Copper—Its Effect Upon Steel for Roofing Tin. Catalog. 8½ x 11 ins. 28 pp. Illustrated. Describes the merits of high-grade roofing tin plates and the advantages of the copper-steel alloy.
The Testimony of a Decade. Booklet. 8½ x 11 ins. 16 pp., with Graphic Chart and illustrations showing losses to various Iron and Steel Sheets for roofing, from atmosphere corrosion.

Barber Asphalt Co., Philadelphia, Pa.
Specifications, Genasco Standard Trinidad Lake Asphalt Built-up Roofing. Booklet. 8 x 10½ ins. Gives specifications for use of several valuable roofing and waterproofing materials.

The Barrett Company, 40 Rector St., New York City.
Architects' and Engineers' Built-up Roofing Reference Series; Volume IV Roof Drainage System. Brochure. 63 pp. 8½ x 11¼ ins. Gives complete data and specifications for many details of roofing.

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

Heinz Roofing Tile Co., 1750 Champa St., Denver.
Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips.
Italian Promenade Floor Tile. Folder, 2 pp., 8 ½ 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.

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

Milwaukee Corrugating Co., Milwaukee, Wis.
The Milcor Architectural Sheet Metal Guide. Booklet. 8½ x 11 ins. 64 pp. Illustrated. Gives valuable technical sheet metal data.

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

SASH CHAIN

Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Chain Catalog. 6 x 8½ ins. 24 pp. Illustrated. Covers complete line of chains.

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.

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

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.

The Higgin Manufacturing Co., Newport, Ky.
Your Home Screened the Higgin Way. Booklet. 8½ x 11½ ins. 13 pp. Illustrated in colors. Complete description of Higgin Screens, designed to meet every need.

SHELVING-STEEL

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

SKYLIGHTS

Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich.
Grauer Wire Glass Skylights. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on an important line of wire glass lights.
The Effectiveness of Sidewalk Lights. Folder, 4 pp., 8½ x 11 ins. Illustrated. Sidewalk or vault lights.
Let in the Light—The Light That's Free. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on securing good lighting.

SOUND DEADENER

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

STAIRWAYS

Woodbridge Ornamental Iron Co., 1515 Altgeld St., Chicago.
Presteel Tested for Strength—stairways, catalog, 92 pp., 8½ x 11 ins. Illustrated. Important data on stairways.

STEEL PRODUCTS FOR BUILDING

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

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.
Vol. 1. Series B. Indiana Limestone Library. 6 x 9 ins. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Vol. 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. 11½ 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 pages, illustrated.
Volume 12, Series B—Distinctive Homes of Indiana Limestons. 8½ x 11 ins., 48 pages, illustrated.
Old Gothic Random Ashlar. 8½ x 11 ins., 16 pages, Illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Avenue, Chicago. Ill.
Portfolio. 8½ x 11 ins. 32 pp. Illustrated. Selected examples of Brasco Copper Store Fronts suitable for different businesses and varying conditions of locations.
Catalog 28. 8½ x 10¾ ins. 20 pp. Illustrated with plates. Details of Brasco Copper Store front construction. Also showcases, ventilator sashes.
Detail Sheets. Set of five sheets giving details and suggestions for store front designing enclosed in envelope convenient for filing.
Brasco Copper Store Fronts; Series 202, Brasco Standard Construction. Illustrated brochure. 16 pp. 8¾ x 11 ins. Complete data on an important type of building.
Brasco Copper Store Fronts; Series 500, All-Copper Construction. Illustrated brochure. 20 pp. 8½ x 11 ins. Deals with store fronts of a high class.

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

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

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

SWIMMING POOL EQUIPMENT & STERILIZATION

R. U. V. Company, Inc., 383 Madison Ave., New York City.
Water Sterilization by Means of Ultra Violet Rays. Booklet. 8½ x 11 ins. 16 pp. Full data on a system of purifying water.
Swimming Pool Sterilization. Booklet. 8½ x 11 ins. 24 pp. Describes a method of purifying water in bathing pools.

Wallace & Tiernan Company, Newark, N. J.
The W. & T. Chlorometer, Technical Publication, No. 55. Booklet. 8½ x 11 ins. 8 pp. Illustrated. A useful brochure dealing with the value of pure water and the importance of the chlorination process in sterilization.
W. & T. Chloro-Clock. Folder. 8½ x 11 ins. Illustrated. Mechanism for feeding small quantities of sterilizing solutions.
Manual Central Solution Feed Chlorinator, Type M. S. P. Folder. 8½ x 11 ins. Illustrated. Valuable for swimming pool equipment.

TERRA COTTA

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

TILE, HOLLOW

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

TILES

Unites States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

VALVES

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

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

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill.
Catalog. 8½ x 11 ins. 88 pp. Illustrated.

Jenkins Bros., 80 White St., New York.
The Valve Behind a Good Heating System. Booklet. 4½ x 7¼ ins. 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections.
Jenkins Valves for Plumbing Service. Booklet. 4½ x 7¼ ins. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

VENETIAN BLINDS

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

VENTILATION

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

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

Globe Ventilator Company, 205 River St., Troy, N. Y.
Globe Ventilators Catalog. 6 x 9 ins. 32 pp. Illustrated profusely. Catalog gives complete data on "Globe" ventilators as to sizes, dimensions, gauges of material and table of capacities. It illustrates many different types of buildings on which "Globe" ventilators are in successful service, showing their adaptability to meet varying requirements.

Van Zile Ventilating Corporation, 155 East 42nd St., New York, N. Y.
The Ventadoor Booklet. 6½ x 3½ ins. 16 pp. Illustrated. Describes and illustrates the use of the Ventadoor for Hotels, Clubs, Offices, etc.

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

WALLS, INTERIOR

Zenitherm Co., Inc., 390 Frelinghuysen Ave., Newark, N. J.
Zenitherm Walls. Booklet, 23 pp., 8½ x 11 ins. Illustrated. Deals with fine treatment for interior walls.
Folder of Architectural and Decorative Ornaments Achieved with Zenitherm. Stock baseboards, mouldings, etc.

WATERPROOFING

Carey Company, The Philip, Lockland, Cincinnati, Ohio.
Waterproofing Specification Book. 8½ x 11 ins. 52 pp.
Genfire Steel Company, Youngstown, Ohio.
Waterproofing Handbook. Booklet. 8½ x 11 ins. 72 pp. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dustproofing and hardening concrete floors, and accelerating the setting of concrete. Free distribution.
A. C. Horn Company, Long Island City, N. Y.
Waterproofing. Folder. 9½ x 11½ ins. Contains folders giving data on excellent waterproofing and dampproofing materials.
Master Builders Company, Cleveland, Ohio.
Waterproofing and Dampproofing and Allied Products. Sheets in loose index file, 9 x 12 in. Valuable data on different types of materials for protection against dampness.
Waterproofing and Dampproofing File, 36 pp. Complete descriptions and detailed specifications for materials used in building with concrete.
Sommers & Co., Ltd., 342 Madison Ave., New York City.
"Permantile Liquid Waterproofing" for making concrete and cement mortar permanently impervious to water. Also circulars on floor treatments and cement colors. Complete data and specifications. Sent upon request to architects using business stationery. Circular size, 8½ x 11 ins.
Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y.
Pamphlet. 3¾ x 8¾ ins. 8 pp. Explanation of waterproofing principles. Specifications for waterproofing walls, floors, swimming pools and treatment of concrete, stucco and mortar.
Toch Brothers, 110 East 42d St., New York City.
Specifications for Dampproofing, Waterproofing, Enameling and Technical Painting. Complete and authoritative directions for use of an important line of materials.
The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
Par-Lock Specification "Form D" for waterproofing surfaces to be finished with Portland cement or tile.
Par-Lock Specification "Forms E and G" membrane waterproofing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure.
Par-Lock Waterproofing. Specification Forms D, E. F and G. Sheets, 8½ x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit requirements.
Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8½ x 11 ins. Official Bulletin of Approved Products,—Investigating Committees of Architects and Engineers.

WEATHER STRIPS

Athey Company, 6035 West 65th St., Chicago.
The Only Weatherstrip with a Cloth to Metal Contact. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on an important type of weather stripping.
Chamberlin Metal Weather Strip Company, 1644 Lafayette Boulevard, Detroit, Mich.
Chamberlin Metal Weather Strip Details, 1925 edition. Catalog. 8½ x 11 ins. 48 pp. Complete specifications and full-sized details. With or without 9 x 11¾ ins. folder conforming to A. I. A. filing system. May also be used in loose leaf form.
Excluding Cold and Dust with Chamberlin for 32 years. Booklet. 5⅜ x 7⅜ ins. 16 pp. Illustrated. Completely and interestingly illustrates application of Chamberlin equipment.
Chamberlin Details for Wood Sash and Doors. 50 pp., 8½ x 11 ins. Data and diagrams relating to weather-tight doors and windows.
Details and Specifications for Calking with Chamberlin Plaster-Calk. Folder, 4 pp., 8½ x 11 ins.
How Rain, Dust and Cold Are Kept Out. Folder, 10 pp., 5¼ x 7¼ ins. Weatherstripping for Residences.
The Higgin Manufacturing Co., Newport, Ky.
Higgin All-Metal Weather Strips. Booklet. 6 x 9 ins. 21 pp. Illustrated in colors. Describes various types of Higgin Weather Strips for sealing windows and doors against cold and dust.

WINDOWS

Detroit Steel Products Co., Detroit, Mich.
Blue Book of Steel Windows. Booklet, 128 pp., 8½ x 11 ins. Illustrated. Data on solid rolled steel windows for residential and industrial buildings.
The Kawneer Company, Niles, Mich.
Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.
David Lupton's Sons Company, Philadelphia, Pa.
Lupton Pivoted Sash. Catalog 12-A. Booklet, 48 pp., 8⅝ x 11 ins. Illustrates and describes windows suitable for manufacturing buildings.

WINDOWS, CASEMENT

Detroit Steel Products Co., Detroit, Mich.
Fenestra Residential Windows. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Rolled steel windows for residences and apartments.
Crittall Casement Window Co., 10951 Hearn Ave., Detroit, Mich.
Catalog No. 22. 9 x 12 ins. 76 pp. Illustrated. Photographs of actual work accompanied by scale details for casements and composite steel windows for banks, office buildings, hospitals and residences.

WINDOWS, CASEMENT—Continued

Genfire Steel Company, Youngstown, Ohio.
G. F. Steel Standard Casement Windows. Booklet, 16 pp., 8½ x 11 ins. Data and architectural details of casements.
Hope & Sons, Henry, 103 Park Ave., New York, N. Y.
Catalog. 12¼ x 18½ ins. 30 pp. Illustrated. Full size details of outward and inward opening casements.
The Kawneer Company, Niles, Mich.
Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.
David Lupton's Sons Company, Philadelphia, Pa.
Lupton Casement of CopperSteel. Catalog C-122. Booklet, 16 pp., 8⅝ x 11 ins. Illustrated brochure on casements, particularly for residences.
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.
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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.

WINDOWS, STEEL AND BRONZE

Detroit Steel Products Co., Detroit, Mich.
Blue Book of Steel Windows. Booklet, 128 pp., 8½ x 11 ins. Illustrated. Data on solid rolled steel windows for industrial and residential buildings.
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Fenestra Architectural Windows. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Data on projected and counter-balanced rolled steel windows.
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 cosements for domestic buildings.
Truscon Steel Company, Youngstown, Ohio.
Truscon Mechanical Operators for Steel Windows. Brochure. 8½ x 11 ins. 65 pp. Complete description of various kinds of installations with drawings of details.
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American Walnut Mfrs. Association, 618 So. Michigan Blvd., Chicago, Ill.
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West Coast Lumber Trade Extension Bureau, Seattle, Wash.
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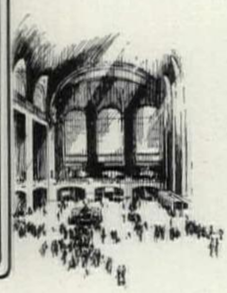

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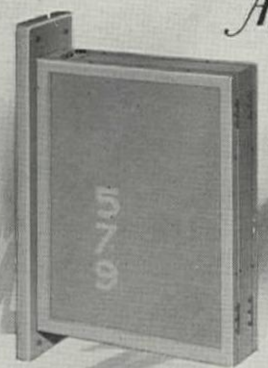

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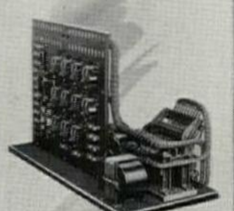

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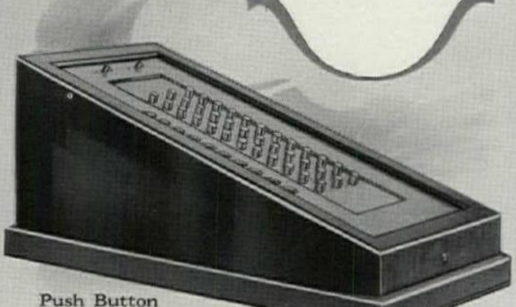

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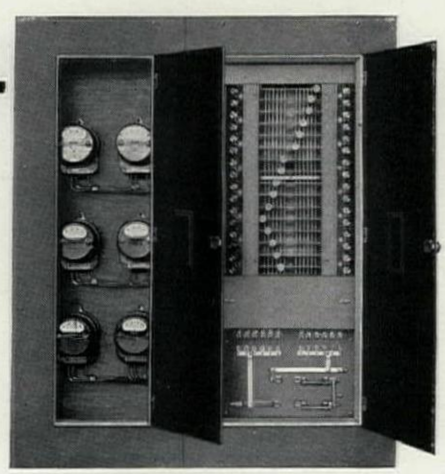

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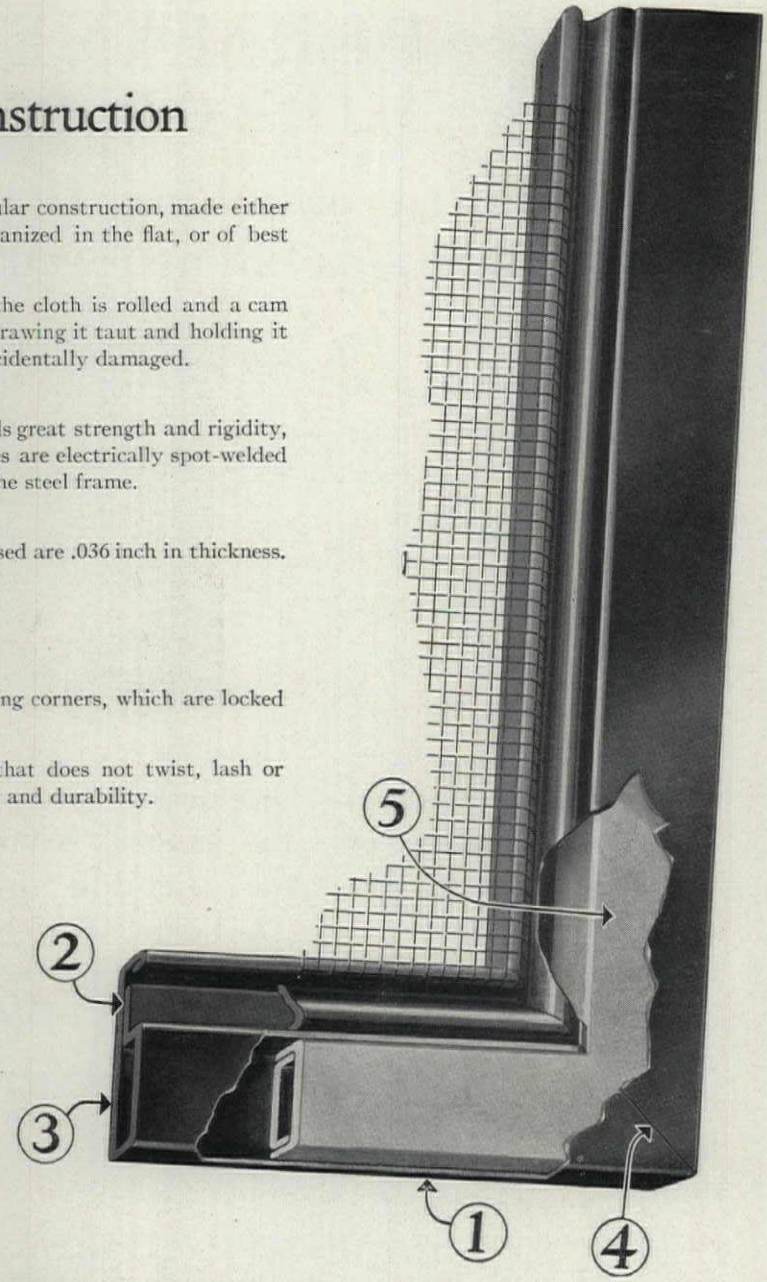

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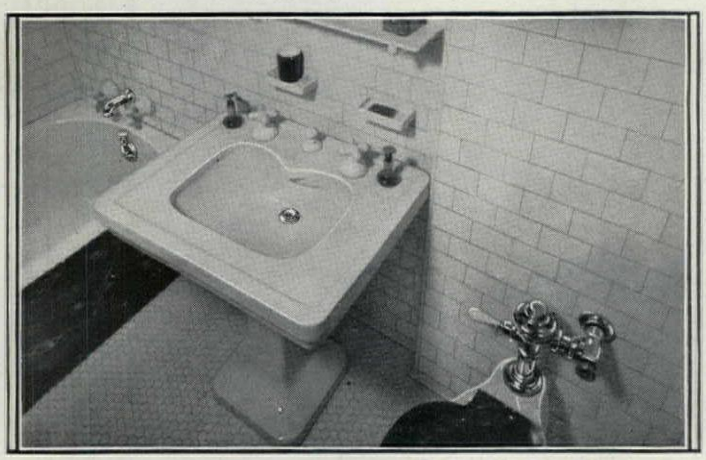

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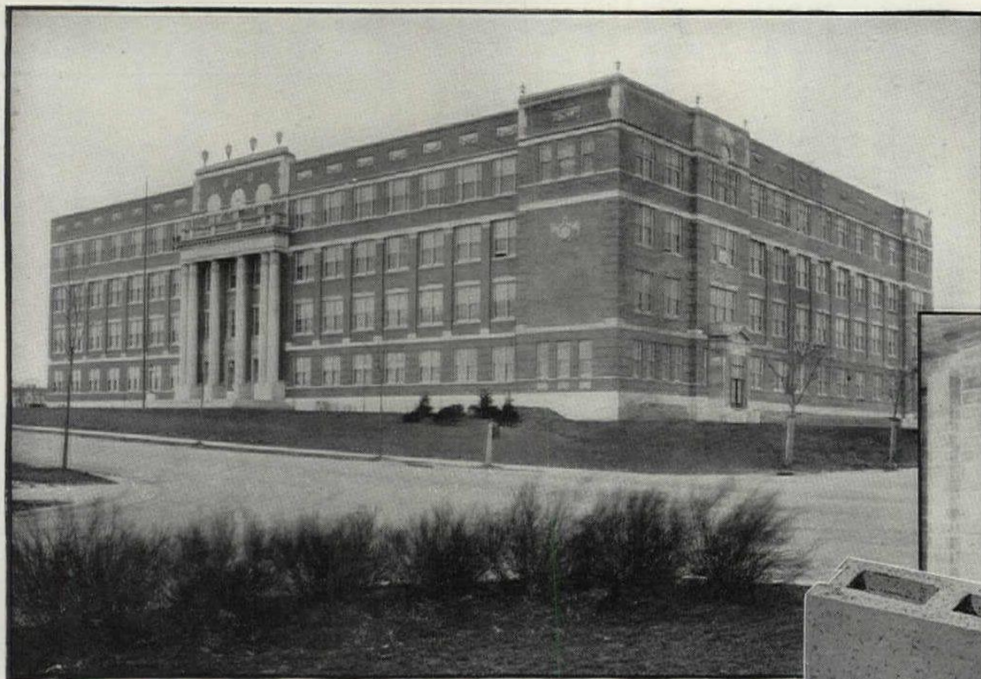

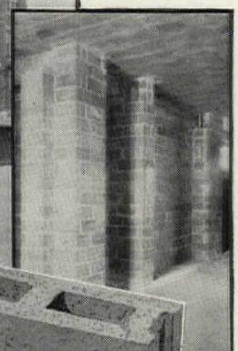

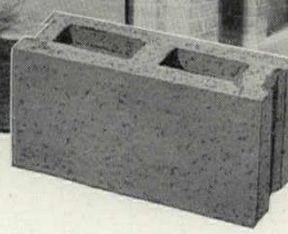

Southwest High School, Kansas City, Mo. Charles A. Smith, Architect. Cinder Block in backing and Cinder Tile in all partitions. This operation is one of several large schools in Kansas City built of Cinder Block and Cinder Tile.

Detail of Peckham Junior High School, Milwaukee, showing Cinder Tile in Corridor.

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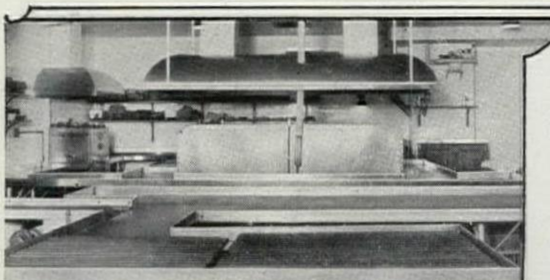
FROM the depths of its subterranean cellars to the tips of its gilded spires, The Savoy-Plaza IS perfection in hotel design and construction. The owners' demand for the very finest materials dictated the use of Monel Metal food service equipment and Pure Nickel cooking utensils.

This is just one more case that proves that Monel Metal equipment is invariably found in the kitchens of most modern buildings.

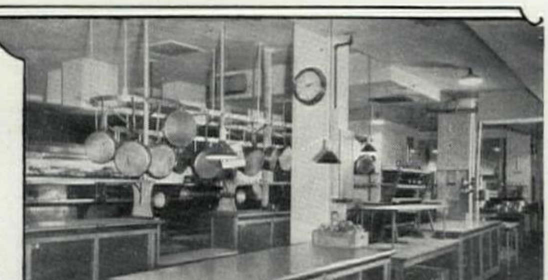
This silvery Nickel alloy is the cleanest and most attractive of any of the materials available for food service equipment. It is economical because it is clean, and it is clean because it will not rust, because it resists corrosion, and because it is tough and scar-proof.

When planning food service installations for hotels, hospitals, institutions or for private homes, insure your clients' lasting satisfaction by specifying long-wearing Monel Metal.



AT LEFT
Crescent Monel Metal dish washers in The Savoy-Plaza. Mfd. by the Crescent Dish Washing Machine Div. of Hobart Mfg. Co., Troy, O. Installed by L. Barth & Son.

AT RIGHT
Monel Metal kitchen equipment in The Savoy-Plaza. Mfd. by L. Barth & Son, New York. Nickel cooking utensils mfd. by the Joseph Heinrichs Corp., New York.

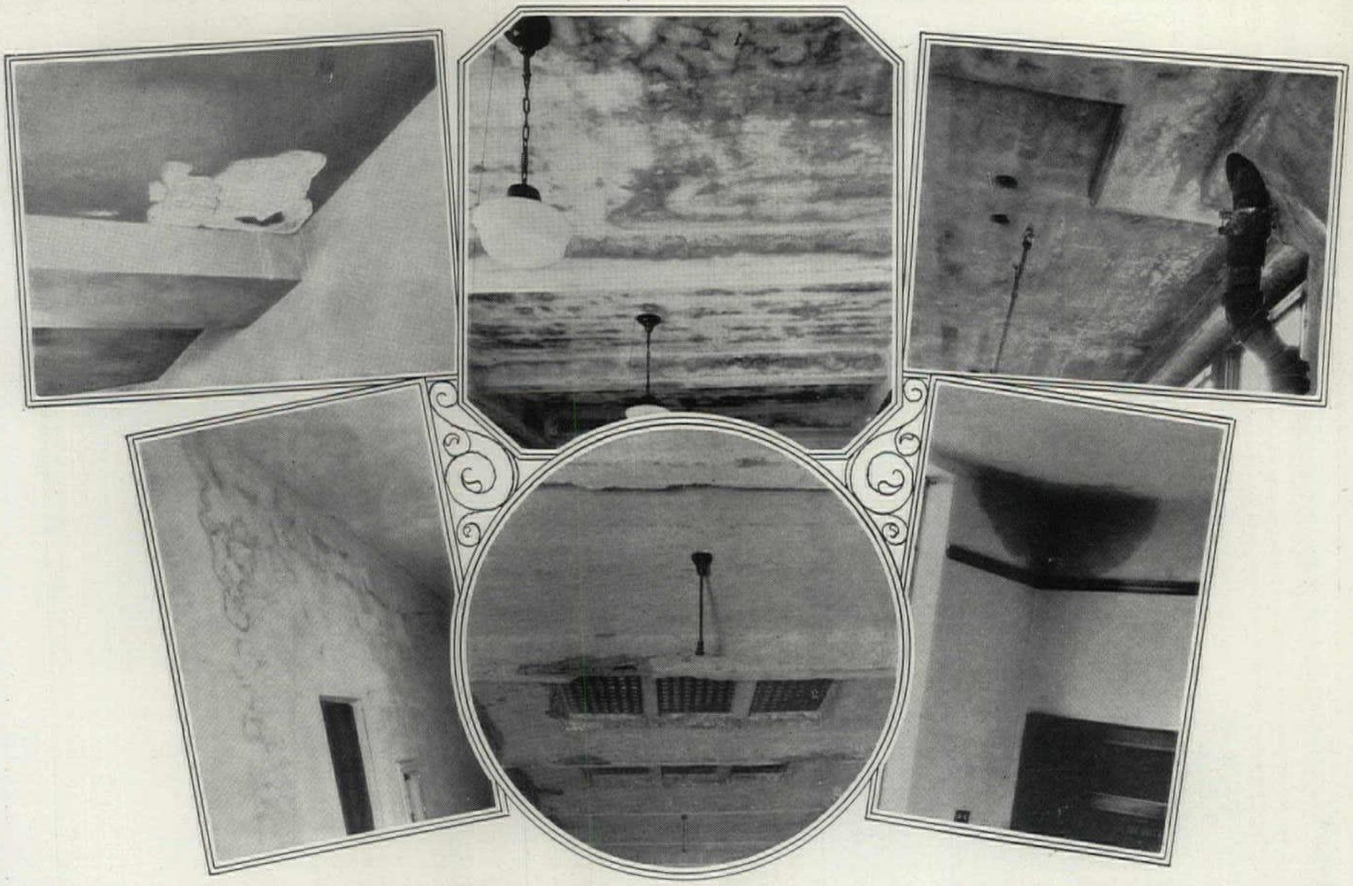


SEND FOR SPECIALLY DESIGNED ARCHITECTURAL FOLDERS

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

MONEL METAL

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



PLASTER FAILURES

They Are All Preventable

WHETHER the defect arises from wall leakage, from condensation of moisture, chemical reaction, cleavage strains between plaster and its support or merely from insufficient key, there is an answer to the problem and that answer is Par-Lock.

Par-Lock is a most effective combination of dampproofing and key. It improves the insulating value of plaster and wall structure, dispensing with the need of air spacing outer walls. Its asphalt cushion adjusts differences of expansion and avoids cleavage.

Let the nearest Par-Lock Applier teach you how to make direct plastering safe and permanent with Par-Lock.

Par-Lock Appliers

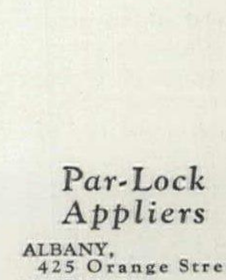
ALBANY, 425 Orange Street
BALTIMORE, 613 West Cross Street
BOSTON, 45 Commercial Wharf
BUFFALO, 958 Ellicott Square Bldg.
CHICAGO, 122 S. Michigan Avenue
CLEVELAND, 404 Hunkin-Conkey Bldg.
COLUMBUS, 751 South Cassingham Rd.
DETROIT, 2511 First National Bldg.
KANSAS CITY, MO. 2035 East 19th Street
MINNEAPOLIS 200 Builders Exchange
NEWARK, N. J. 24 Commerce Street

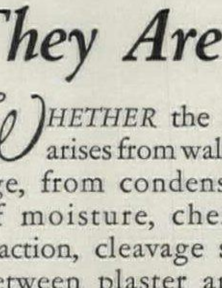
Par-Lock Appliers

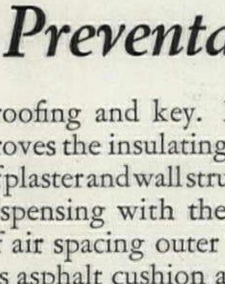
NEW YORK CITY, 50 Church Street
PHILADELPHIA, 1700 Walnut Street
PITTSBURGH, 207 Fulton Building
SCRANTON, PENNA. Cedar Avenue
ST. LOUIS 515 Chemical Building
TORONTO, 2258a Bloor Street, West
TRENTON, 339 Broad St. Bank Bldg.
YOUNGSTOWN, 503 City Bank Building
WIKES-BARRE, PENNA. 904 Second Nat'l Bank Building
PAR-LOCK CORK INSTALLATIONS United Cork Companies, Lyndhurst, N. J.

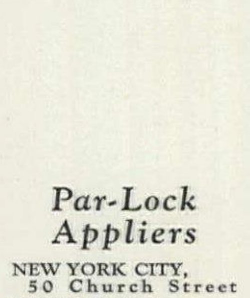
THE VORTEX MANUFACTURING COMPANY
1984 West 77th Street · · *Cleveland, Ohio*

Par-Lock
PLASTER KEY



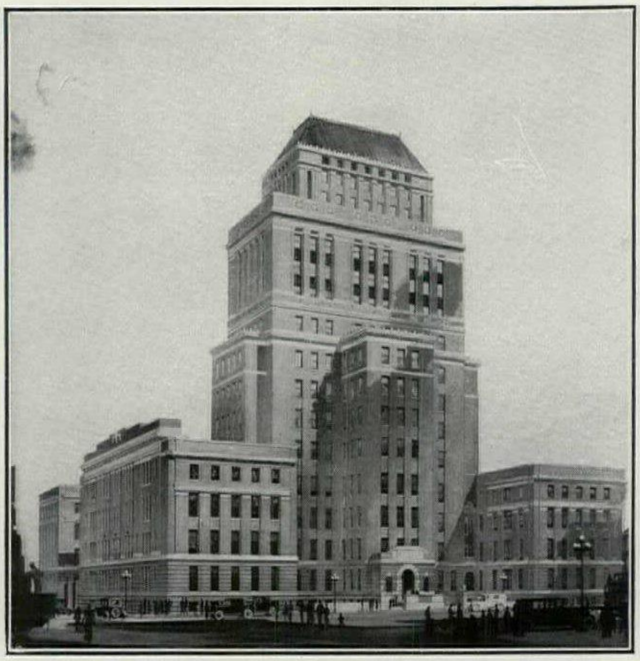






P 18

Detroit Receiving Hospital Selected Castle Sterilizers for Merit and Service



CASTLE

The technique of Exact Sterilization, a non advertising treatise in 5 sections, is a valuable help in your surgery. Free on request.

This large institution selected Castle equipment for its quality, and for the service this company renders.

One hospital telling another of this merit has resulted in the largest increase in sterilizer business ever recorded.

Competent advice will be given willingly on complete installation rearrangement, or additions.

WILMOT CASTLE COMPANY, 1209 University Ave., ROCHESTER, N. Y.

Sterilizers for Hospitals, Physicians, and Dentists

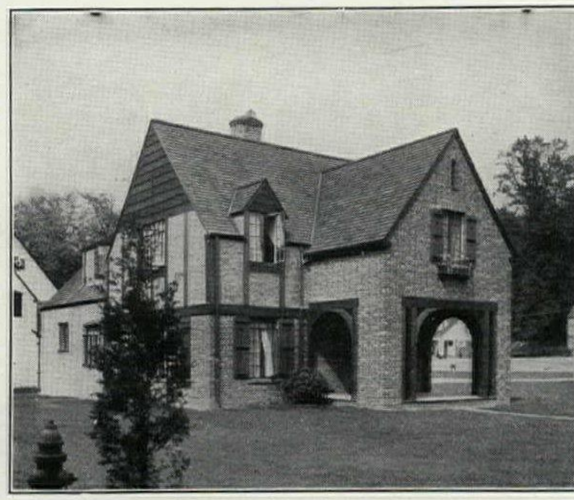
CASTLE

FOR FREE BOOKLETS ON STERILIZING TECHNIQUE — FILL AND MAIL TODAY

NAME................................ ADDRESS..............................

CABOT'S

Time Tested Insulation



Residence at Tarrytown, N. Y. Insulated with Double-ply Waterproof Quilt. King-Walsh Corporation, New York City, Architects and Builders

Cabot's Quilt prevents the passage of heat into or out of buildings. It keeps them warmer in winter—cooler in summer.

Not only is Cabot's Quilt effective as an insulator and at the most reasonable cost, but it is rot-proof, vermin-proof and permanent. It is flexible and will not crack. It is easily and cheaply applied. It is light in weight and does not require special strengthened construction when it is used.

When a house is built with Cabot's Quilt as an insulator, it makes it so much warmer that a smaller boiler and smaller radiators and piping can be used.

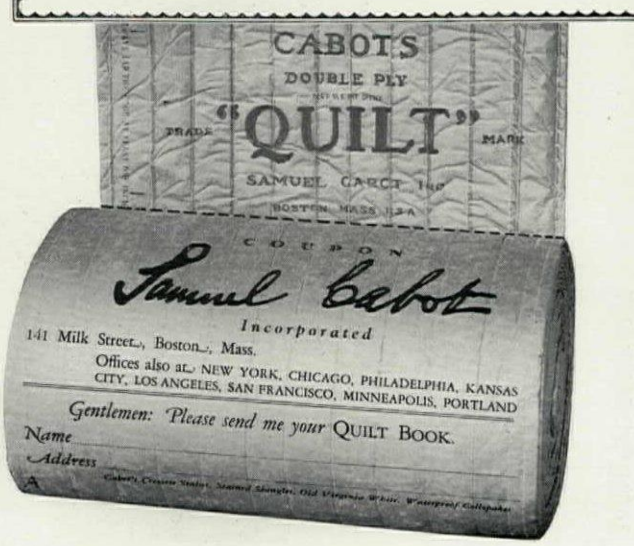
This saves enough money to pay for the cost of all the Quilt and its installation and leaves a profit besides. Thereafter the Quilt pays dividends from year to year by reducing fuel consumption.

Exactly the same economies apply to any other kind of building when insulated with Cabot's Quilt.

Cut the coupon below (Roll of Quilt) and send it in today for free Quilt Book.

Cabot's Quilt

IN SUCCESSFUL USE FOR OVER 30 YEARS



No. 40 of a series of advertisements featuring prominent laundry installations

Every modern club,

of course, has its own modern laundry

THE Women's City Club, Detroit, is no exception. The architects who planned this modern building included a laundry department in the original blue prints. And this indispensable department, from washers to presses, is "American"-equipped throughout. In fact, it has been our privilege to equip most of the modern laundries throughout the land—club, hospital and institutional.

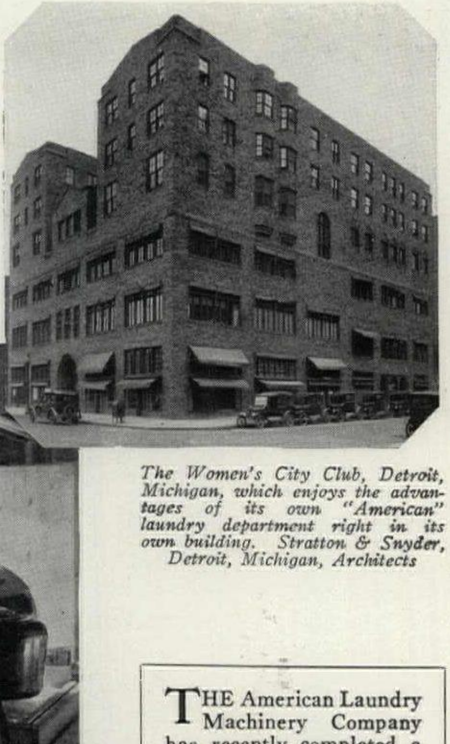
The modern club laundry is planned from the start

For many years the engineers of The American Laundry Machinery Company have cooperated with architects in planning and designing institutional laundries. They will be glad to confer with you—give you first-hand information about floor space, equipment, and general laundry practice. A letter will bring an expert to your office at once.

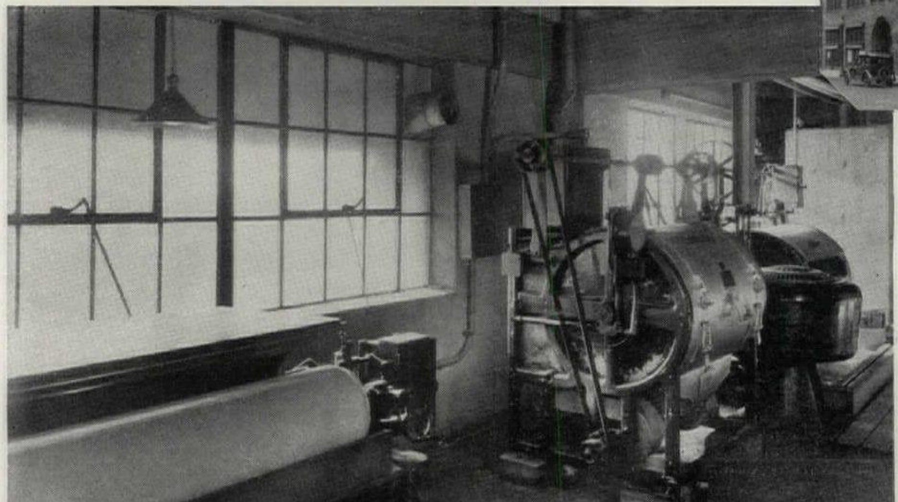
The American Laundry Machinery Co.

Norwood Station, Cincinnati, Ohio

THE CANADIAN LAUNDRY MACHINERY CO., LTD.
47-93 Sterling Road, Toronto 3, Ont., Canada
Agents: BRITISH-AMERICAN LAUNDRY MACHINERY CO., LTD.
Underhill St., Camden Town, London, N. W. 1, England



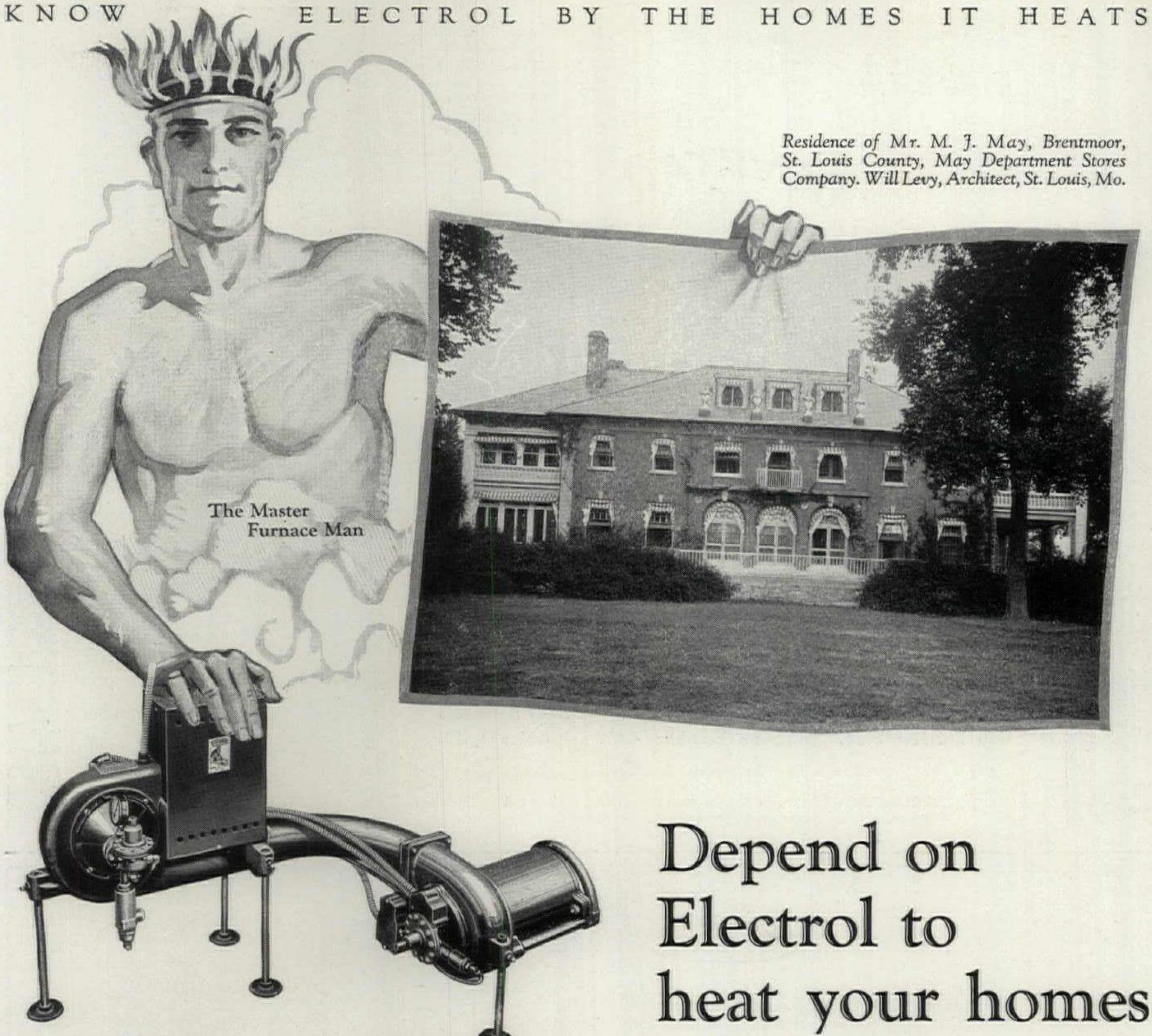
The Women's City Club, Detroit, Michigan, which enjoys the advantages of its own "American" laundry department right in its own building. Stratton & Snyder, Detroit, Michigan, Architects



The laundry department at the Women's City Club, Detroit, Michigan. An interesting feature is the electrically heated flat work ironer and drying tumbler, exclusive features which The American Laundry Machinery Company alone is prepared to furnish

THE American Laundry Machinery Company has recently completed a desk-file of valuable information pertaining to laundry practice in schools, hotels, clubs and institutions. Write for your folder of this interesting material.

KNOW ELECTROL BY THE HOMES IT HEATS



Residence of Mr. M. J. May, Brentmoor, St. Louis County, May Department Stores Company. Will Levy, Architect, St. Louis, Mo.

Depend on Electrol to heat your homes

OWNERS of the homes you are designing will speak of their heating plants with unusual praise if you specify the Electrol Oil Burner.

Modern heating means *oil* heating, and it is especially significant that the advanced engineering of Electrol has made it the choice of many leading architects.

For residences of all sizes, and buildings of practically every type, depend on the oil burner with *The Master Control.*

Electrol is All-Electric and Entirely-Automatic. Quiet, almost beyond belief. Self-regulating to any room temperature desired, providing *constant comfort* through coldest days.

If you have not received a copy of the regulation A.I.A. folder describing specific installations, special features and helpful specification data, your request will bring the folder promptly.

Depend on Electrol to heat your homes!

ELECTROL INC. of Missouri, 179 Dorcas St., St. Louis, U. S. A.

ELECTROL

The OIL BURNER with *The Master Control*

Listed as standard by the Underwriters' Laboratories, and bears their label. Approved by the New York City Board of Standards and Appeals — and by the Commonwealth of Massachusetts Department of Public Safety.

The Hunter-Dulin Building
San Francisco, Calif.
Schultz & Weaver, *Architects*
Lindgren & Swinnteron
General Contractors
H. J. Brunnier
Structural Engineer

Built with

DOVETAIL MASONRY ANCHOR

SLOT SYSTEM

From the Ground Up

After the steel girders were fitted and secured, next and most important operation was—**Dovetail Anchor Slot**—starting from the ground up before the first concrete form was erected. Dovetail Metallic Anchor Slot was nailed to the inside of the column and spandrel beam forms.

Then the concrete was poured. After the concrete had set and the forms removed, **Dovetail Anchor Slot** remained firmly imbedded in the concrete. Dovetail Anchors were fitted in the slot Dovetail fashion wherever the Mason wished to put them, and the walls of one of San Francisco's skyscrapers clung steadfast. This is the reason we can truthfully say that this distinguished building was built with **Dovetail System Masonry and Anchor Slots**—from the ground up.

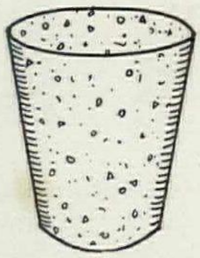
Complete Technical Illustrated Data
Designed for Your File on Request

THE DOVETAIL ANCHOR SLOT CO.

660 Builders Bldg. Phone Franklin 4436 Chicago, Ill.

Branches in Principal Cities

ALL DOVETAIL products are patented and the word "Dovetail" is registered in the U. S. Patent Office



$V = \frac{1}{3}\pi H(R^2 + r^2 + Rr)$

$V = H\pi r^2$

MORE CONCRETE!

It takes more figures to find the volume of a truncated cone—but a cylinder of the same base and height has more volume. Figure it out for yourself. More friction surface, too.

MacArthur Concrete Piles are cylindrical in shape—hence, contain more concrete. It is made of six gallons of water per bag of cement concrete, compressed in place by seven tons pressure.

A Special Pile for Every Condition

MacARTHUR CONCRETE PILE CORPORATION

15 Beekman St. New York

We Also Install Pipe Piles

ALL WATER SUPPLIES
In This Great Country
Of
WATER CONSUMERS
Are
STEADILY DETERIORATING

Established 1880
B. T. LOOMIS
Originated and Patented
First Mechanical Filter
1880

They Will Never Be Better
EXCEPT? WHY?

Send For Booklet

The Loomis-Manning Filter
Distributing Company
1424 South 37th Street, Philadelphia, Pa.

A PFAUDLER CHUTE IS SANITARY GLASS LINED ECONOMICAL LABOR SAVING LOW PRICED STURDILY BUILT

New improvements and price reductions make the Pfaudler glass-lined chute the greatest laundry chute "buy" on the market today. Write for descriptive brochure.

The Pfaudler Co.
Rochester, N.Y.

PFAUDLER

THE CUTLER MAIL CHUTE

Every feature of manufacture and installation governed by the highest standards as developed through more than forty years experience. With the ultimate in construction goes, too, a similar conception of service.

Details and estimates on request.

CUTLER MAIL CHUTE CO.
GENERAL OFFICES AND FACTORY
ROCHESTER, N.Y.

It pays *you to know and* recommend KEWANEE

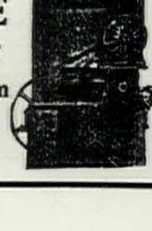
Make yourself the leading home-builders' counselor of your community—give the *right* answer to every homebuilder's problem, and you'll have more work than you can do—at your own prices.

That's why it pays you to recommend KEWANEE for any job of private water supply, electric light or sewage disposal—from bungalow to country estate or club. Over 200 systems and our quarter century of experience insure a correct job for every man's need.

Our Architect's Specification Book enables you to plan any installation of private water supply, electric light or sewage disposal. KEWANEE special engineering counsel is free—at your request.

Write for the KEWANEE Specification Book NOW

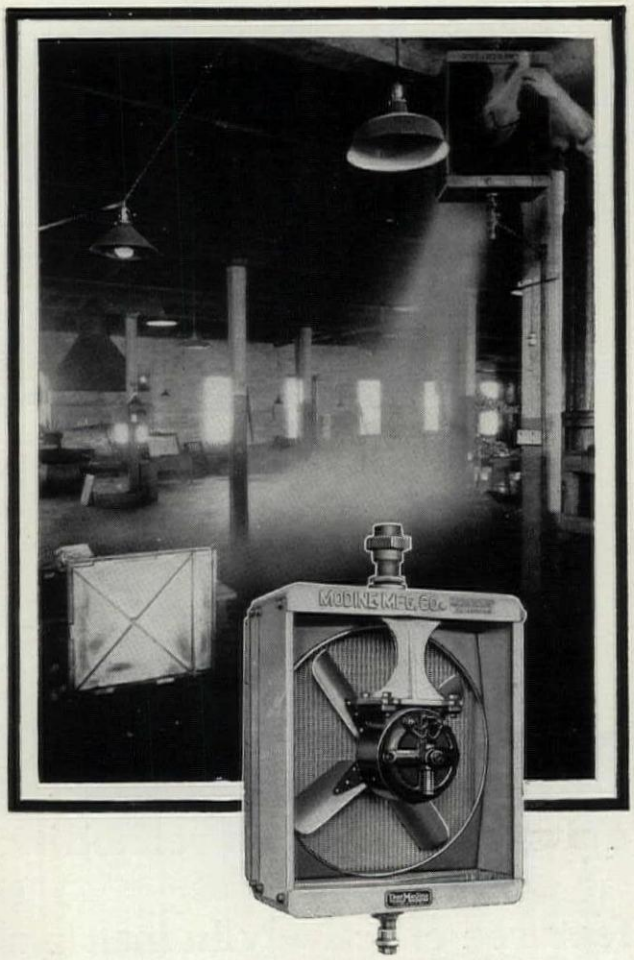
KEWANEE PRIVATE UTILITIES CO.
422 S. Franklin St.
Kewanee, Ill.



KEWANEE
"Bungalow Model Jr" Water Supply System
Now $103

heat!

Delivered and kept where *you* want it



Thermodine Unit Heater No. 701 — there's a Thermodine for every size space.

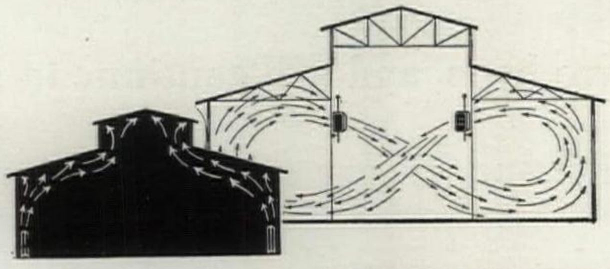


Diagram shows how Thermodine Unit Heaters circulate heated air. Below—Course of heated air circulation where c. i. radiation is used.

THERMODINE Unit Heaters not only put a generous volume of heat where it's needed—they keep it there. Keep it where it is needed most, in the working area.

The unretouched photograph above of a "smoke bomb test" graphically illustrates how Thermodine Unit Heaters project heat to the floor. And the heat rises only to the plane of the heaters where it is drawn in by the fans, reheated and again projected down to the floor. A constant circulation of heated air in the working zone. Little heat is allowed to escape above the plane of the heaters, to be wasted at the roof.

The many other advantages of Thermodine Unit Heaters warrant your closer investigation. Let us send you Catalog No. 127.

MODINE MANUFACTURING CO., (*Heating Division*)
1718 RACINE ST. *Branch Offices in all large cities* RACINE, WIS.

TherModine

Unit HEATER

A MODINE Product

FOR STEAM OR HOT WATER HEATING SYSTEMS

The Progress of Heating and the Prevention of Heat Waste

Eleventh of a Series

Large Buildings Add To Problem

THE primitive home in the ground, the hut, the wigwam, the cabin, the great halls of the early Romans, despite crude and inadequate means of heating, presented far less of a problem than our present day mammoth, modern architecture does. ¶ Huge areas to heat, many floors, multiples of separate rooms and the greatly increased throngs of humans and their varying natures make heating today more difficult and costly than it used to be. ¶ Heavy heat must be kept constantly, and distributed long distances: at the disposal of the building's occupants. ¶ Immense tonnage of coal is required, intense warmth is carelessly allowed, and great waste of heat and fuel cost prevails. ¶ The Johnson System of Heat Control, its automatic regulation of heat and fuel consumption, is therefore an essential part of modern day heating, an economic necessity in present day buildings.

JOHNSON SERVICE COMPANY
MILWAUKEE, WISCONSIN

Branches in all principal cities of United States and Canada

The All Metal And Dual Thermostat (*Night and Day*) Control

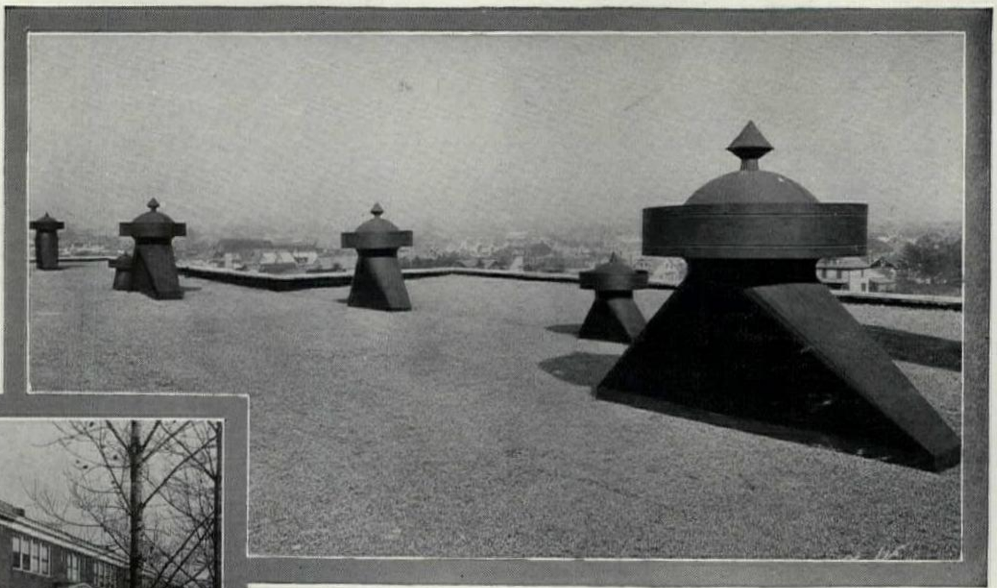
The Johnson System of Temperature Control is designed and installed to conform perfectly with every system of heating, and every principle of modern architecture and building construction. . . . . .

DRAPER SCHOOL
County of Schenectady,

E. G. Atkinson, Schenectady, *Arch.*

Ventilated by

"GLOBE" Ventilators



Schools have been a splendid proving ground for "GLOBE" Ventilators. They have given such efficient service in this field that many architects who have been identified with school planning have come to consider "GLOBE" Ventilators as the standard school ventilation.

Low first cost—efficient—no upkeep

GLOBE VENTILATOR COMPANY

TROY, NEW YORK Department F

The Herman Nelson hiJet Unit Heater

TRADE MARK

With

The Wedge Core RADIATOR INDESTRUCTIBLE

TRADE MARK

Leak-proof, rust-proof, indestructible. Lower installation cost, smaller pipe lines, no reducing valves necessary. Never requires service. Freezing cannot harm it. Operating steam pressure from 1 to 150 lbs. Can be suspended from pipe lines or moved from place to place. Long range heat distribution. The ideal heating unit for

Factories · Mills · Railroad Shops · Roundhouses
Warehouses · Garages · Gymnasiums · Auditoriums

Write for our new catalogue

THE HERMAN NELSON CORPORATION
MOLINE ILLINOIS
Makers of the
UNIVENT *and the* HERMAN NELSON INVISIBLE RADIATOR

Write for your copy of the Herman Nelson hiJet Unit Heater catalogue

VENTADOOR

A ventilating panel for doors

The "Ventadoor" is easily operated by the guest; it provides cross ventilation when open. Important first cost saving in comparison with the old over-door transom.

VAN ZILE VENTILATING CORPORATION
155 EAST 42nd ST.
NEW YORK CITY

A Heating Unit FOR Every Purpose

All Venturafin heating units have more than five times the efficiency of ordinary radiators, wall coils, etc. They can be used with either steam or hot water and force heated air where you want it, and as much as you want—eliminating hot spots, cold working areas, and affording better ventilation, more even distribution of heat and more perfect heat control.

Venturafin No. 4. Furnished with or without a recirculating box. It delivers 2000 cubic feet of heated air per minute, weighs 350 lbs. and is equivalent to 500 square feet of direct radiation—radiators, wall coils, etc. This unit is particularly adaptable for industrial applications—garages, warehouses, factories, shops and industrial plants of every type and description.

Venturafin No. 2. A compact, highly efficient heating unit for stores, offices, small factories, shops, churches, lodge halls, garages and scores of other installations where high efficiency, compactness and pleasing appearance are essential. This unit delivers 450 to 900 cubic feet of heated air per minute, weighs less than 80 lbs., is materially smaller in size than an ordinary radiator and is the equivalent of from 125 to 200 square feet of ordinary radiation.

The Universal Heating and Ventilating Unit, finished in first quality furniture stock steel, for schools, public and office buildings, has practically the same characteristics as the Venturafin units except that heated air is forced into circulation by a multiblade fan, instead of a disc fan.

Venturafin No. 7. This is the largest Venturafin unit built. It has a capacity of 8000 cubic feet of heated air per minute, weighs 1100 lbs. and takes the place of 2000 square feet of radiators, wall coils, etc. This unit is highly desirable for heating large areas in factories, warehouses, amphitheatres, and smaller structures where heating with ordinary methods is impractical, and ofttimes impossible.

Heat with Unit Heaters

For complete information on heating or electric ventilating equipment get in touch with the nearest American Blower office, or write direct to the factory.

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

(703)

American Blower

"Sirocco" - VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

REVIEWS OF MANUFACTURERS' PUBLICATIONS

THE CENTRAL FOUNDRY COMPANY, New York. "The Lynn Drain Trap." A folder on its use in many ways.

In plumbing installations of many kinds the drain trap is perhaps the most important single detail; the perfecting of the drain trap, in fact, and its wide use in installations of various kinds constitute one of the chief means by which modern plumbing has reached its present high state of development. This small folder deals with the Lynn Drain Trap, much used for automobile washstands, and in stables, breweries, factories, hospitals, etc. It has maximum efficiency in operation, with minimum size, weight and cost. It is a simple, well made, ingenious device, especially desirable in garage service, where, for instance, it will hold back oil, gasolene, etc., so that water enters the drain practically clear.

SPENCER HEATING COMPANY, Williamsport, Pa. "The Business of Buying a Heating System." Data on the subject.

Heating apparatus is as a rule the most expensive single item of a building's equipment. Its cost varies from 12 per cent of the total cost of a structure in smaller houses to 6 per cent or even less in buildings of more elaborate construction. Moreover, the comfort of the family occupying the house depends largely upon the excellent working of the heating equipment, as also does generally the possibility of either renting or selling. This brochure presents a study of different types of heating systems,—one-pipe and two-pipe steam, vapor and hot water; it also deals with the matter of domestic hot water supply, and gives data on the various kinds of fuel and their costs, present and future. One highly valuable part of the booklet deals with the "Spencer Heater" and its use for heating in many places.

UNITED STATES GYPSUM COMPANY, Chicago. "Structolite for Industrial Buildings." Some data on its use.

Architects as well as engineers and builders know the value in constructing roofs and floors of a material which is of light weight, fireproof, highly insulating, and quick to set. Recognizing the demand for a building material possessing these qualities, the United States Gypsum Co. some years ago developed "Structolite," the advantages of using which are dealt with in this brochure. The booklet has to do with Structolite's application to factories and other industrial buildings and gives the results of tests having to do with compression, resistance to fire, cold weather construction, etc., and of particular interest is page 7 which gives data on heat losses obtained by the American Society of Heating and Ventilating Engineers. The figures give the conductivity in British thermal units of the loss per hour per square foot per degree of difference in temperature of walls constructed of quite a number of different materials. The booklet deals fully with the use of this material.

THE SNEAD & COMPANY IRON WORKS, INC., Jersey City. "Library Planning, Bookstacks and Shelving."

Of the many kinds of commissions which are likely to come into the office of an architect of general practice there are not many which are at once more interesting and more exacting than those for designing and planning libraries. The modern library, in fact, has been so studied and developed that it has become a highly specialized institution, and the matter of its planning may well be given the architect's greatest care and skill. Much of a library's success depends logically upon its being properly equipped, and the equipping of libraries, again, has been so carefully studied that it would be difficult to imagine much further possible advance. This splendidly produced volume deals with exactly this. Prepared under the direction of well trained and widely known architects, it is a complete study of libraries large and small,—public libraries, libraries in institutions, and libraries in such public buildings as capitols, etc., giving illustrations of exteriors and interiors, and in many instances floor plans as well. Its treatment of the matter of library fittings of every possible type naturally leaves nothing to be desired. The work would be almost invaluable to any architect likely to be called upon to plan a library of any kind, and its value to a librarian would be very nearly as great. It covers the entire subject of libraries.

SEDGWICK MACHINE WORKS, 150 West 15th Street, New York. "Sedgwick Dumb Waiters and Elevators."

There are not many types of buildings in which lifts or dumb waiters of one kind or another are not useful and desirable. In the average residence it is generally convenient to have a lift for moving trunks or furniture, and in apartment houses or old residences remodeled into small apartments it is usually necessary to have dumb waiters for receiving ice or other supplies from delivery entrances. In business quarters the uses for dumb waiters are as numerous as they are varied. This brochure illustrates and describes the valuable line of lifts, dumb waiters, elevators and hoists which during 35 years the Sedgwick Machine Works have been developing,—dumb waiter outfits of a number of kinds.

PITTSBURGH REFLECTOR COMPANY, Pittsburgh. "What Engineers Found Out About Show Windows."

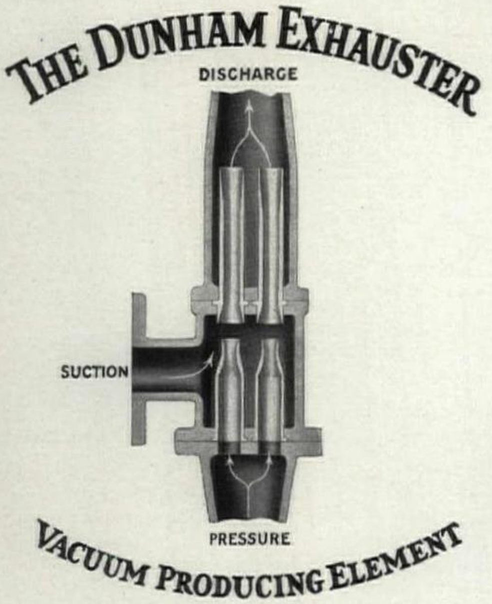
Very interesting and ingenious are the results recorded in this brochure of investigations into the practical effect of show window illumination on actual sales in shops. "These tests have been made under widely differing conditions, in different cities, and on fair and stormy nights; when crowds were large, when crowds were small; on mid-week nights, on Saturdays, on holidays; every precaution possible, apparently, was taken, that the tests might be accurate. The specific percentages indicative of increased business vary with each test, but it is interesting to note that in each case highly profitable increases in sales were revealed." The study was based, logically, upon experiments with show windows properly illuminated and arranged with all the taste and skill which the display men of the shops could give.

MISSISSIPPI GLASS COMPANY, New York, St. Louis, Chicago. "Making Daylight Better."

While use of what is broadly termed "wire glass" is strongly urged if not insisted upon by fire and building laws and insurance companies, there are other types of glass which correct and improve lighting conditions, and the development of all these forms has been brought about by the excellent work done in the laboratories of certain manufacturers. This brochure says: "In 1899, the underwriters based the standard for wire glass on the product of the Mississippi Wire Glass Company,—the original manufacturers of wire glass. Since then this product has been universally recognized as the standard." In regard to glass used to improve lighting conditions, the booklet says: "By means of repeated tests and the scientific study of daylight illumination through glass, the Mississippi Wire Glass Company has developed several types of glass to meet various conditions, and this company is qualified and prepared to advise what type will best meet indicated requirements."

AMERICAN ROLLING MILL CO., Middletown, O. "ARMCO Ingot Iron; Its History and Service."

Study and research into the nature and properties of different metals have developed some highly interesting facts in connection with the use of metals for certain industrial purposes. For example, it was the complaint of farmers that some modern steel products were not giving them the service which a previous generation had secured from iron that led to research into the matter by the Department of Agriculture, and this study or research resulted in the substantiating of the now commonly accepted electrolytic explanation of corrosion. This brochure, of interest to architects and builders, deals with what is known as "ingot iron," made to withstand corrosion. Blue annealed ARMCO ingot iron was specified for an ocean-going barge built by the Netherlands government because of its proved resistance to corrosion by water laden with organic acids, as well as for resistance to salt corrosion. Fresh water is corrosive, particularly if industrial waste is present. The Jefferson-Placquemine drainage and sewer system at New Orleans carry industrial waste and sewage from five cotton seed oil refineries. Huge pipes of ARMCO ingot iron, three-eighths inch thick, not only carry this waste, which sometimes lies in the pipes two weeks at a time, but in addition carry the brackish warm water of the lower Mississippi.



The Dunham Exhauster, operating on the jet or ejector principle, possesses the highest efficiency of any vacuum producing element practical for use in a high vacuum pump. It is in fact the only device of its kind that enables today's high vacuums to be successfully maintained. It contains no moving parts, is not subject to appreciable wear, and its efficiency is uniform under all conditions likely to be encountered in a heating system.

An Essential Requirement of Modern Vacuum Heating

VACUUM return line systems of heating, which have been standard for a number of years, require a vacuum producing element with capacity not much in excess of ten (10) inches of vacuum. Sub-atmospheric heating, now becoming standard, has made a new demand and requires a pump capable of producing and maintaining high vacuums up to twenty (20) and twenty-five (25) inches.

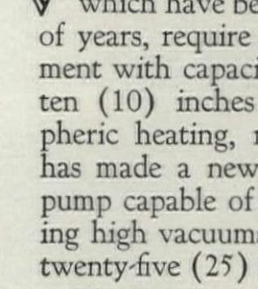
The Dunham Vacuum Pump, utilizing the Dunham Exhauster or Vacuum Producing Element, meets today's needs. The high air capacity claimed for pumps of the turbine type, measured through orifice plates, does not meet these high vacuum demands because air is only a small part of the load such a vacuum pump must handle. **Condensable gases must also be handled.**

The only known method by which this may be done is by drawing these gases into the water stream, thereby condensing them, thus turning a troublesome factor into a means of creating still higher vacuums.

Pumps of the turbine type, because of the very nature of the turbine principle, cannot absorb the vapors and are not capable of making use of these condensable gases.

The Dunham Exhauster, operating on the jet or ejector principle, possesses the highest efficiency of any vacuum producing element practical for use in a high vacuum pump. It is in fact the only device of its kind that enables today's high vacuums to be successfully maintained. It contains no moving parts, is not subject to appreciable wear, and its efficiency is uniform under all conditions likely to be encountered in a heating system.

Look for the Name
DUNHAM
This nameplate identifies a genuine DUNHAM Radiator Trap



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

C. A. DUNHAM CO.

DUNHAM BUILDING

450 East Ohio Street, Chicago

REVIEWS AND ANNOUNCEMENTS

THE MACOMBER STEEL CO., Canton, O. "Massillon Roof Trusses." Authoritative data on their construction.

The resources of manufacturers of steel are frequently greatly enlarged by judicious combinations of plants. Such a merger has been recently effected by a consolidation of two manufacturing plants in Ohio,—the Massillon Steel Joist Co. and the Canton Bridge Co., under the name of the Macomber Steel Company. This publication, as well as two others which are being issued with it,—"Massillon Metal Lath" and "Massillon Bar Joists,"—contains data invaluable to architects, engineers and builders. Diagrams illustrate different types of roof trusses as used for such large buildings as garages, gymnasiums, auditoriums, industrial and commercial structures, and tables give data regarding loads which are in accordance with the published American Institute of Steel Construction Specifications.

FEDERAL CEMENT TILE COMPANY, Chicago. "For Public Buildings; The Roof for Permanence."

It is not necessary to remind architects or builders of the importance of care in selecting roofing materials, particularly for covering large areas, which present problems not always encountered when constructing roofs of smaller dimensions. This booklet dwells upon the value of Federal Cement Tile for roofing large areas, either flat or pitched, and considers their permanence, fire-safety, architectural beauty, light weight, high strength and low cost,—a cost less than that of any other permanent type of roofing or even of roofing which is combustible. The brochure says that "from the Gulf of Mexico up into Canada, in all kinds of weather, pre-cast Federal Slabs have been in service for the past quarter-century," and it presents views of many large buildings with flat or pitched roofs so covered. The booklet is a helpful and useful work.

THE REPUBLIC ASBESTOS BOARD CORPORATION, Buffalo. "Asbestos, the Unquenchable Stone."

Few of the materials dealt with by architect and engineers and their specification writers are more interesting than asbestos. "It is one of the most marvelous productions of inorganic nature, a physical paradox, for it is a mineralogical vegetable, both fibrous and crystalline, elastic and yet brittle, a floating stone, and as capable of being spun and woven as wool, silk, or cotton." This brochure is a study into asbestos, its nature, where it is found, the methods of its production, and some of its many uses, particularly in the form of wallboard. As can readily be seen, the very nature of asbestos gives it a high value for use in building, and since the forests of America are being gradually used up, the importance of a material such as this should not be overlooked by anyone concerned with construction. Wholly apart from its discussion of wallboard, however, this booklet has a value which is considerable in several ways.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO. "Electrical Equipment for Heating and Ventilating."

In any large building the motor or motors are to the mechanical equipment what the heart is to the human body, —the source of energy or activity, upon which everything depends. This particular booklet or brochure deals with the motors of different types manufactured by the Westinghouse firm; it has to do with the use of motors in large structures of different types, such as department stores, office buildings, hotels, clubs and railroad terminal stations, and also in the Holland Vehicular Tunnel, one of the twin tubes connecting New York and New Jersey, equipped with eighty-four Westinghouse motors and provided with four ventilating shaft houses, one at each entrance and two in the Hudson River. The data regarding motors are supplemented by data having to do with motor-driven fans,—their types, selection, control, power consumption, etc. The extent of the information which the brochure contains and the concise manner in which it is presented give the publication a high value to architects and engineers and their staffs.

AMERICAN ABRASIVE METALS CO., New York. "Feralun Antislip Treads Make Walkways Safe."

A large proportion of the accidents which occur daily are due to slipping, particularly on stirways. The necessity of making stairways and ramps safe for public use has brought about the perfecting of surfaces which, since they give a definite grip or "bite," make slipping impossible. This folder deals with the use of "Feralun,"—iron with an abrasive grit embedded in the wearing surface at the time of casting. The grit, exceeded in hardness only by the diamond, projects slightly above the surface of the metal and "bites," which makes it impossible to slip on walkways or stairs equipped with Feralun. The folder says that in a prominent terminal of one of the largest railroads, there were 141 accidents in two months on stairs equipped with another type of tread. Use of Feralun prevented further accidents.

MODINE MANUFACTURING CO., Racine, Wis. "The Thermodine Cabinet Heater Catalog 327."

Useful as a heating radiator is, it is never ornamental, and during a large part of the year, when its utility is not needed to counteract its ugliness, it is likely to annoy the houseowner by interfering with carefully contrived decorative effects. The Thermodine Cabinet Heater heats and humidifies a room without injuring its effect,—in fact the architecturally designed cabinet would improve the appearance of any room. It consists of a copper heating section placed near the bottom of a metal cabinet. The section heats the air passing through, causing it to rise to the top of the cabinet. Room air is admitted below the section to complete the cycle. The velocity attained is considerable, and perceptible far out into the room. The heat is delivered into the room entirely by convection, eliminating direct radiant heat losses accompanying cast iron radiation.

George L. Berg is occupying new offices at 2711 East Tremont Avenue, The Bronx, New York.

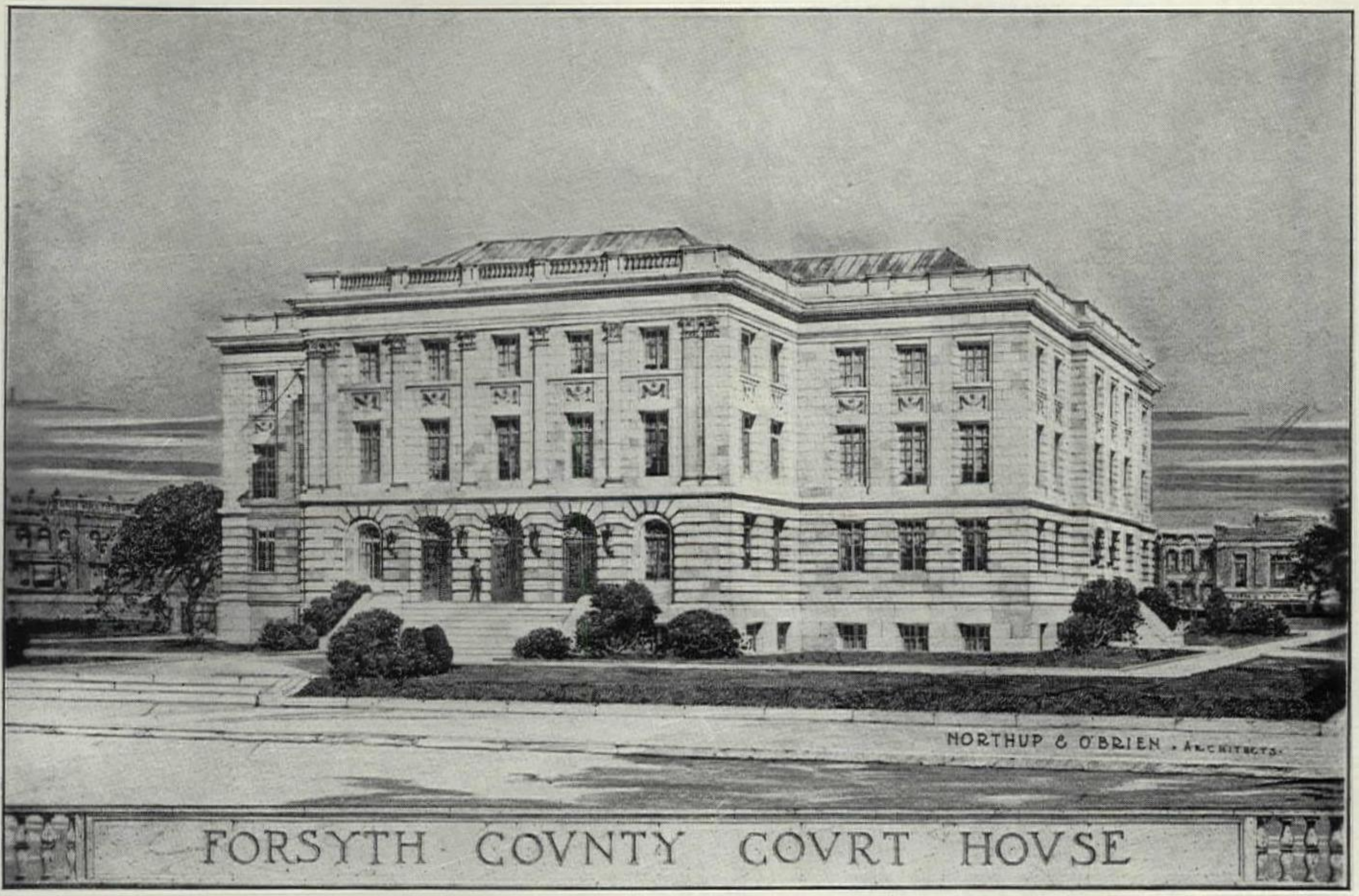
Carleton Monroe Winslow announces removal from the Van Nuys Building to the Architects' Building, Los Angeles.

Clarence G. Johnson, 414 North Fourth Street, Albuquerque, N. M., desires the catalogs and other publications issued by manufacturers.

Announcement is made of the opening by Kemper Nomland of an office at 35 South Raymond Avenue, Pasadena. With him William McCay is associated.

Carl A. Mulvey announces the opening of an office at 817 Second National Bank Building, Houston, Tex. He desires samples and publications of manufacturers.

Wanted.—Manager in architect's office in New York, one having had experience in similar capacity Give experience in detail, and name salary expected. X. Y. Z., THE FORUM.



Architect, Northup & O'Brien
Contractor, J. A. Jones Construction Co., Charlotte, N. C.

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