THE ARCHITECTURAL FORUM

IN TWO PARTS

ARCHITECTURAL ENGINEERING

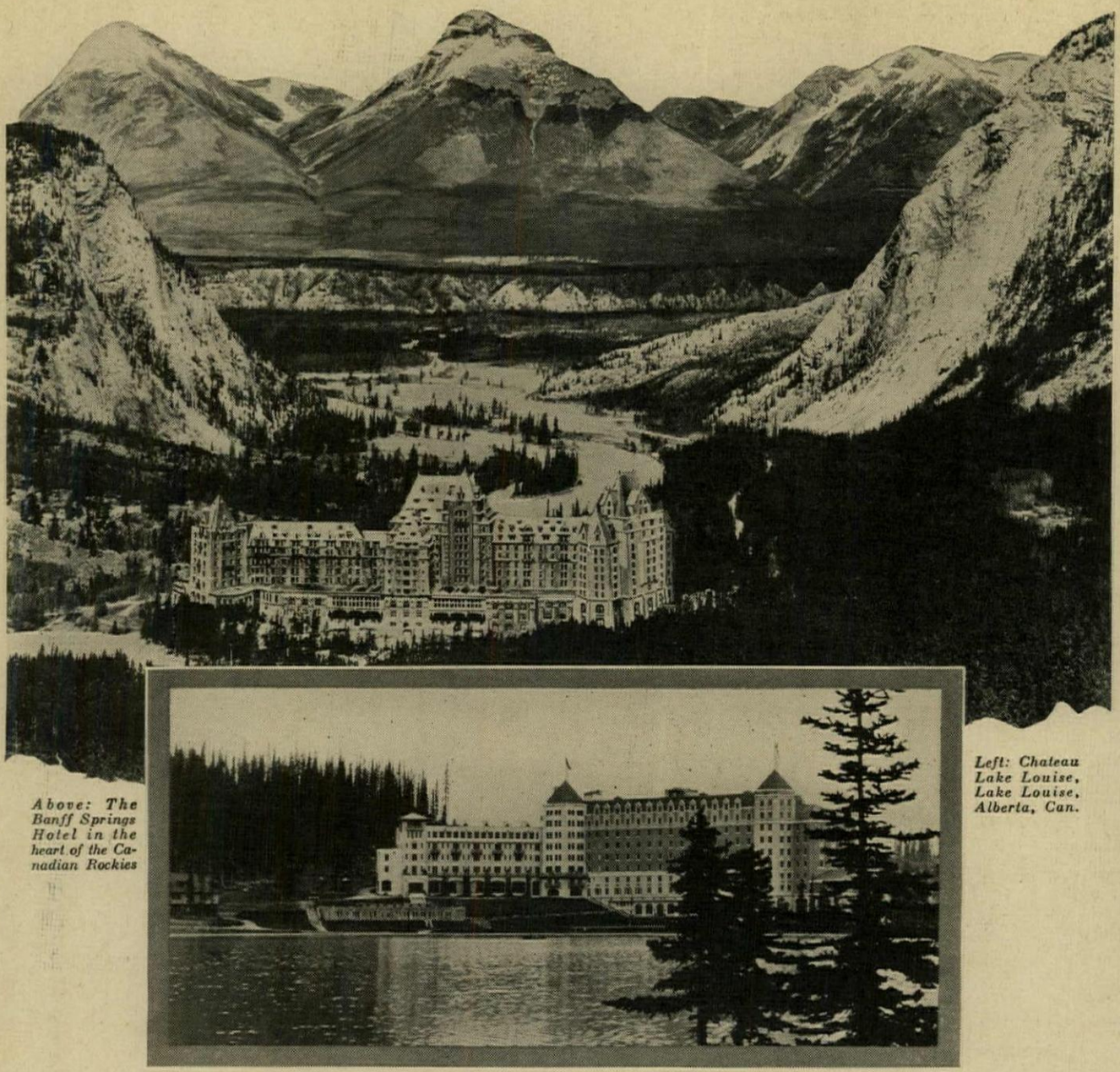
&

BUSINESS

PART TWO

AUGUST

1928



Above: The Banff Springs Hotel in the heart of the Canadian Rockies

Left: Chateau Lake Louise, Lake Louise, Alberta, Can.

In the Heart of Wonderland

Along the far trails of romance, as well as in the humming centers of commerce and industry, *Richards-Wilcox Elevator Door Hardware* assures maximum safety, service and satisfaction. There are R-W closers, hangers, checks, electric door operators, mechanical, electro-mechanical or safety interlocks for any and every requirement. Write for data on designs and specifications.

Richards-Wilcox Mfg. Co.

"A Hanger for any Door that Slides."

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

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LARGEST AND MOST COMPLETE LINE OF DOOR HARDWARE MADE

Twenty-Five Linear Miles of "Longspan" in This Chicago "Co-op"

Leo B. Steif & Co., Arch.
Lennox Haldeman Co., Plast. Cont.
Avery Brundage Co., Genl. Cont.

May We Send Your Specification Writer Samples of ⅜" Longspan Rib Lath with Specifications?

"3800 Sheridan Road" is one of the most outstanding of the beautiful large apartment buildings which face the lake front on one of America's most travelled boulevards.

It is fitting that so meritorious a plastering base as North Western Longspan Rib Lath should be part of so fine a structure. For all the suspended ceilings in this distinctive co-operative apartment building are reinforced with Longspan ⅜" Rib Lath.

And it is timely that other architects and contractors should know how well satisfied are the architects (Leo B. Steif & Co.) and the contractors of "3800 Sheridan Road" with the *quality* of the plastering obtained over North Western Longspan Rib Lath.

NORTH WESTERN EXPANDED METAL CO.

1234 Old Colony Bldg., CHICAGO

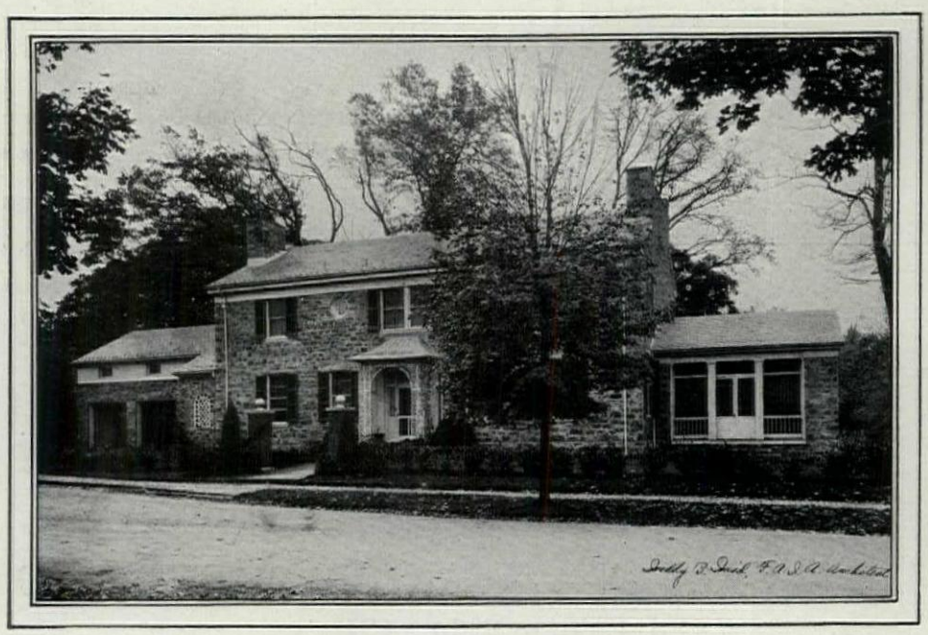
LONGSPAN RIB LATH

The Mechanical Perfection OF *Orange* ALUMINUM FRAME *SCREENS*

Every Orange Aluminum Frame Screen is made exactly to a specified size. It is made to fit one particular window and is installed by our own mechanics. Mechanical perfection and satisfactory operation is guaranteed.

These screens are made of extruded bars of aluminum, a special alloy developed for our use by the Aluminum Company of America, and which is one of the strongest non-ferrous materials made. Because of its lightness and many structural advantages, aluminum such as is used in our screen frames is now used in *Airplane Construction.*

The corners are carefully mitred and welded to form a solid seamless frame. Bronze wire cloth is held securely in place by a lock bar. There are no unsightly ridges, irregular corners, corrugated surfaces to mar the simplicity of the frame.



RESIDENCE OF H. P. COCHRAN, CHEVY CHASE, MARYLAND
Waddy B. Wood, F.A.I.A., Architect.

Orange Aluminum Frame Screens were chosen for this residence as the best screen available. It is interesting to note however, that these screens are moderately priced.

ORANGE SCREEN COMPANY

515 Valley Street . . . . . Maplewood, New Jersey

Orange Aluminum Frame Screens

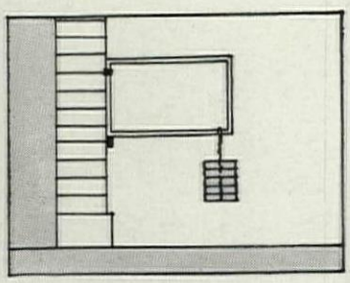
Aluminum has many recognized advantages. Light and strong, it has replaced heavier metals in many industries. From industry to the home was just a step, for capital, with unlimited resources for experiment, long has led the way for improvement in home building.

Extruded Bar Section

This section shows how the bronze screen cloth is held in place by a lock moulding.

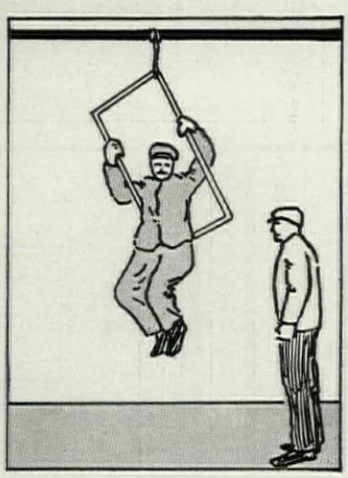
Easy to Operate

The strength and rigidity of these frames assures ease of operation, and the smoothness of the aluminum permits engaging parts to slide freely. Aluminum Frame Screens do not "sag" or "bind".



Not Easily Distorted

This shows one side of an Orange Aluminum Frame Screen secured to a vertical wall with five common bricks suspended at extreme end. The frame was pulled "out of square" only slightly; and after the weight was removed, the frame came back to normal, all corners 90°.



Another Tough Test

This test was made recently at our factory to show a customer that the welded corners were sound. An Orange Aluminum Frame Screen was suspended from an overhead support. A 200 pound man held on to the frame, lifting his feet clear of the floor for several minutes. The long sides of the frame were bent slightly out of line; but nothing happened to the corners.

Service

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

One of the nine beautiful Masonite Homes in Whitcomb & Keller's Sunnymede, South Bend, Indiana. Architect: H. Russell Stapp.

Architect H. Russell Stapp says this about *thermostatic wood*

"I FIND, through personal experience on my own jobs, that Masonite makes an ideal plaster base, and rigid tests conducted under my personal supervision have also proved that it is a highly efficient sound-deadener.

"There is no question but what Masonite keeps heat where it belongs. I would say that in homes where coal is used Masonite saves at least three tons a year, and I know that in our gas-fueled homes there is a substantial reduction in radiation."

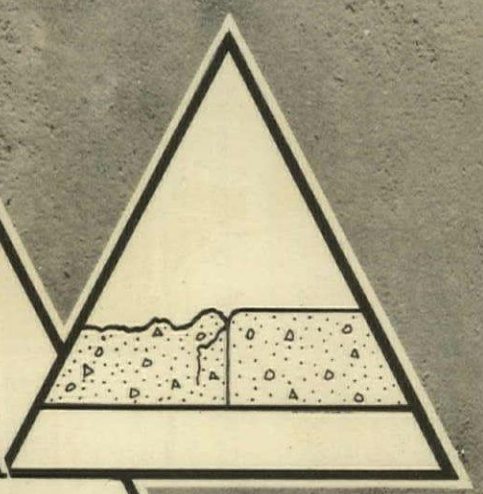
Full reports of Masonite tests, sample, and Book of Specifications will be sent promptly on request.

MASONITE CORPORATION
Dept. 688, 111 W. Washington St., Chicago, Ill.
Mills: Laurel, Mississippi

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

Ordinary Concrete Floor

Masterbuilt Metallic Hardned Concrete Floor



A 14 Year Test Tells

"Resurfacing the floor with ordinary concrete would have cost $792.00. Instead we resurfaced with Metallic Hardner at a cost of $871.20. This surface is still in good condition after 14 years in spite of an increased volume of traffic. The saving on up-keep in this period has paid for the Metallic Hardner five times over." . . . Extract from page 15 of "PLAIN TALK ABOUT CONCRETE FLOORS."

Results of over 15 years of practical tests under actual industrial traffic conditions are summed up in this graphic, concise survey. Invaluable data on initial costs and maintenance costs; reports from over 400 plant owners and engineers.

This book which points the way to better concrete floors is sent upon request to architects, engineers, contractors, building owners and managers.

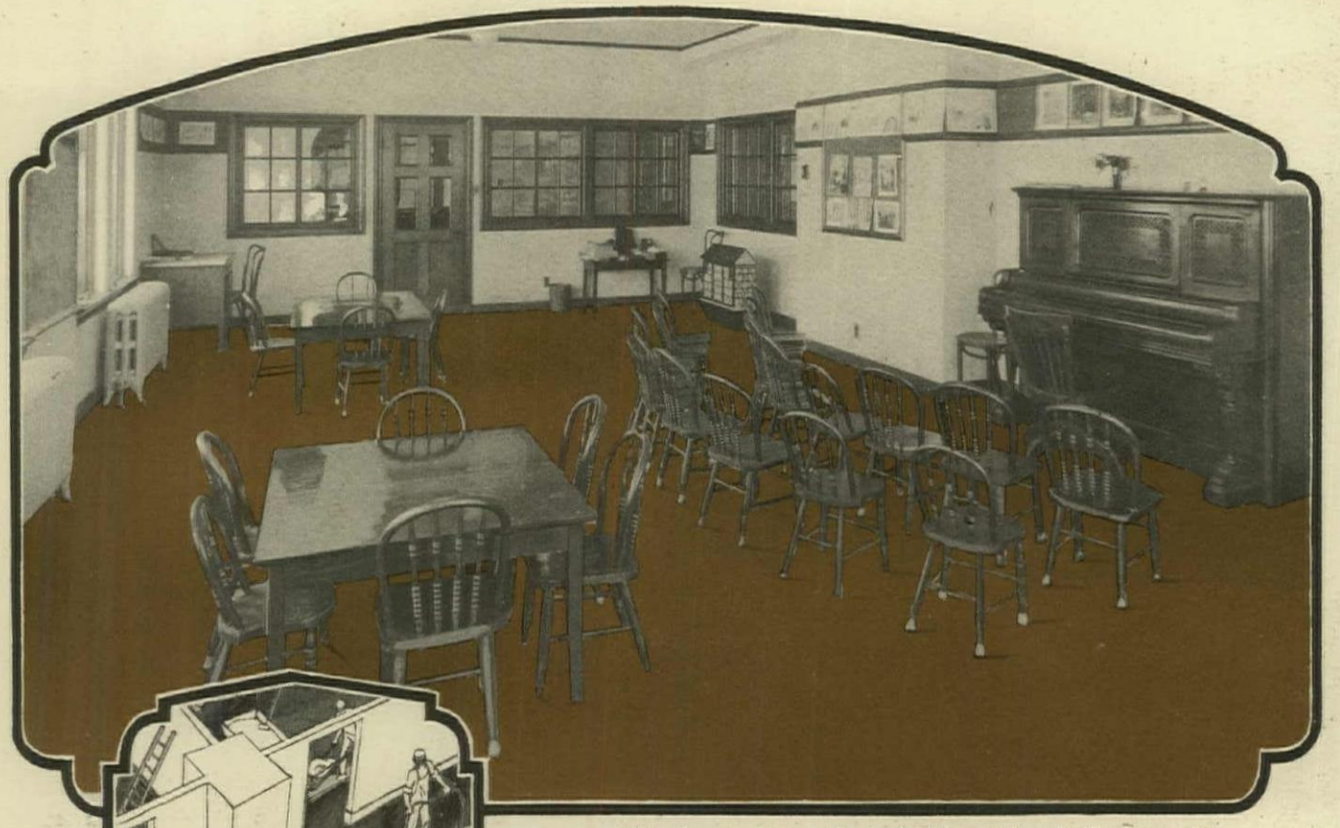
THE MASTER BUILDERS COMPANY

Euclid Avenue at 71st Street — Cleveland, Ohio

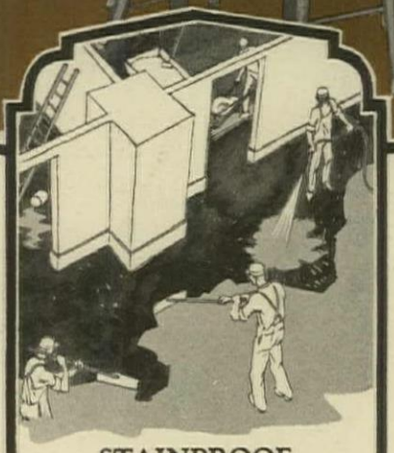
From unretouched photograph of floors—Northwestern Terra Cotta Co., Chicago, Ill.

BETTER CONCRETE FLOORS

MASTERBUILT FLOORS



Buff Colormix floor in United Hebrew Temple, St. Louis, Mo.
Maritz and Young, Architects



STAINPROOF

The Modern Curing and Protecting Film

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

Easily removed after all danger of staining is passed.

All new Colormix Floors are protected with Colormix Stainproof.

A Homelike Atmosphere

FOR churches, schools, hospitals—where serviceability, sanitation and economy are foremost considerations—there is a new demand for a warmer, more homelike atmosphere.

The soft, friendly coloring of Colormix floors goes a long way to remove institutional coldness and at the same time meet every requirement of service, sanitation and economy.

THE MASTER BUILDERS COMPANY
Cleveland, Ohio

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

Sales Offices in 110 Cities

COLORMIX FLOORS

COLORED HARDNED CONCRETE FLOORS

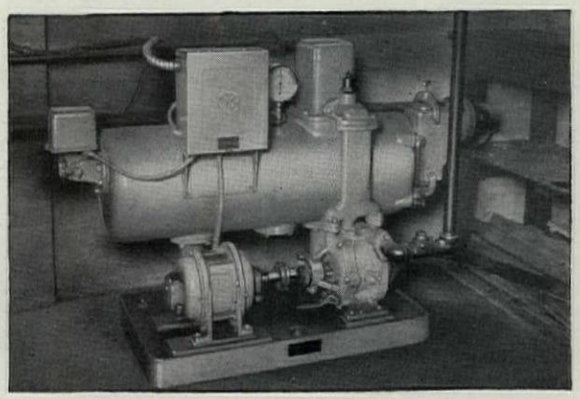
The Ruralist Press, Atlanta, Ga., Lockwood, Greene & Co., Architects and Engineers; H. M. Jackson & Co., Heating Contractors

Heat for the farthest radiator, too

THE Ruralist Press in Atlanta is one of the big printing plants in the Southeast. The floor areas to be heated are large.

To make certain that the radiator farthest from the heating boiler will receive its share of the heat just as quickly as the nearest radiator, the heating engineer installed a Jennings Vacuum Heating Pump.

This unit is suitable for 16,000 sq. ft. of equivalent direct radiation. By removing the condensation and air from the return line, discharging the air direct to atmosphere without back pressure, and returning the condensation under 20 lbs. pressure to the boiler, the Jennings Pump enables the heating system to function at high efficiency.



Jennings Return Line Vacuum Steam Heating Pump, size B-20 installed at the Ruralist Press, Atlanta, Ga.

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

Jennings Pumps

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

Packard Sales & Service Station
Broadway and Sherman Ave.
New York, N. Y.
Another Heggie-Simplex Installation

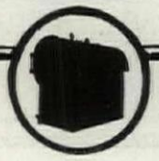
As Careful to Get Value As to Give It

AMERICA'S leading corporations have reached outstanding success through strict insistence on value not only in what they have to sell but in everything they buy. In boiler equipment an ever increasing number of these leaders is turning to Heggie-Simplex for reliable low-cost performance. The savings which they gained are available for your business too. Investigate this most modern of heating boilers today!

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

HEGGIE-SIMPLEX

ELECTRIC-WELDED STEEL HEATING BOILERS



For complete client satisfaction specify

THE BEST MADE---BEST KNOWN HEATING EQUIPMENT IN THE WORLD

ARCHITECTS and engineers everywhere are quick to realize the ready acceptance and consequent client good-will that results when they recommend American Radiator Equipment.

Boilers, radiators and all other heating products bearing the name "American" are the finest that engineering skill and ingenuity can produce. They are backed by the unequalled experience and manufacturing facilities of the world's largest makers of heating equipment. The best evidence of their superiority is the fact that the finest and most modern buildings in this country are equipped with American Radiator Heating products exclusively.

The New Ideal Redflash Boiler

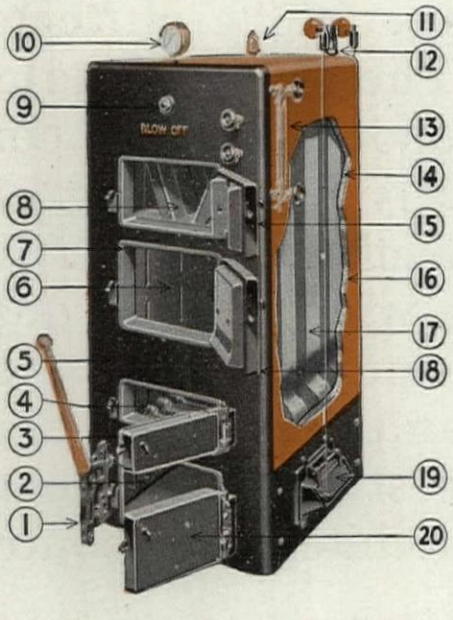
This beautiful new Boiler is one of the outstanding achievements of the American Radiator Company. The time has come when the people expect and demand not only a high degree of mechanical perfection in the products they buy—but products which are beautiful as well. The Ideal Redflash Boiler represents the culmination of our efforts to meet this demand. It is the finest combination of efficiency and beauty that has ever been developed and brought within the reach of the average home owner.

Promoting Better Homes—Better Heating

Our million dollar advertising campaign is acquainting home owners and builders everywhere with the advantages of this beautiful boiler, "American" Corto Radiators and other American Radiator products. It represents our sincere effort to promote better homes, better heating and a higher standard of health and living comfort for the people of America.

SPECIFICATIONS

1. Shaking mechanism, flexible, easily operated, durable.
2. Ashpit for easy caretaking, with cast-iron base of strong, trussed construction.
3. Porcelain enamel finished doors of enduring beauty.
4. Special grates allow use of small size coal, such as Buckwheat and Pea. Triangular top construction grinds clinkers when grates are shaken, facilitating caretaking.
5. Jacket, indestructible sheet steel, baked enamel finish.
6. Large, scientifically proportioned fuel chamber of abundant coal-carrying capacity for long firing periods.
7. All contact-surfaces on doors and platework ground to smooth dust-proof finish.
8. Long, double-gallery flue for hot gas travel secures high operating economy.



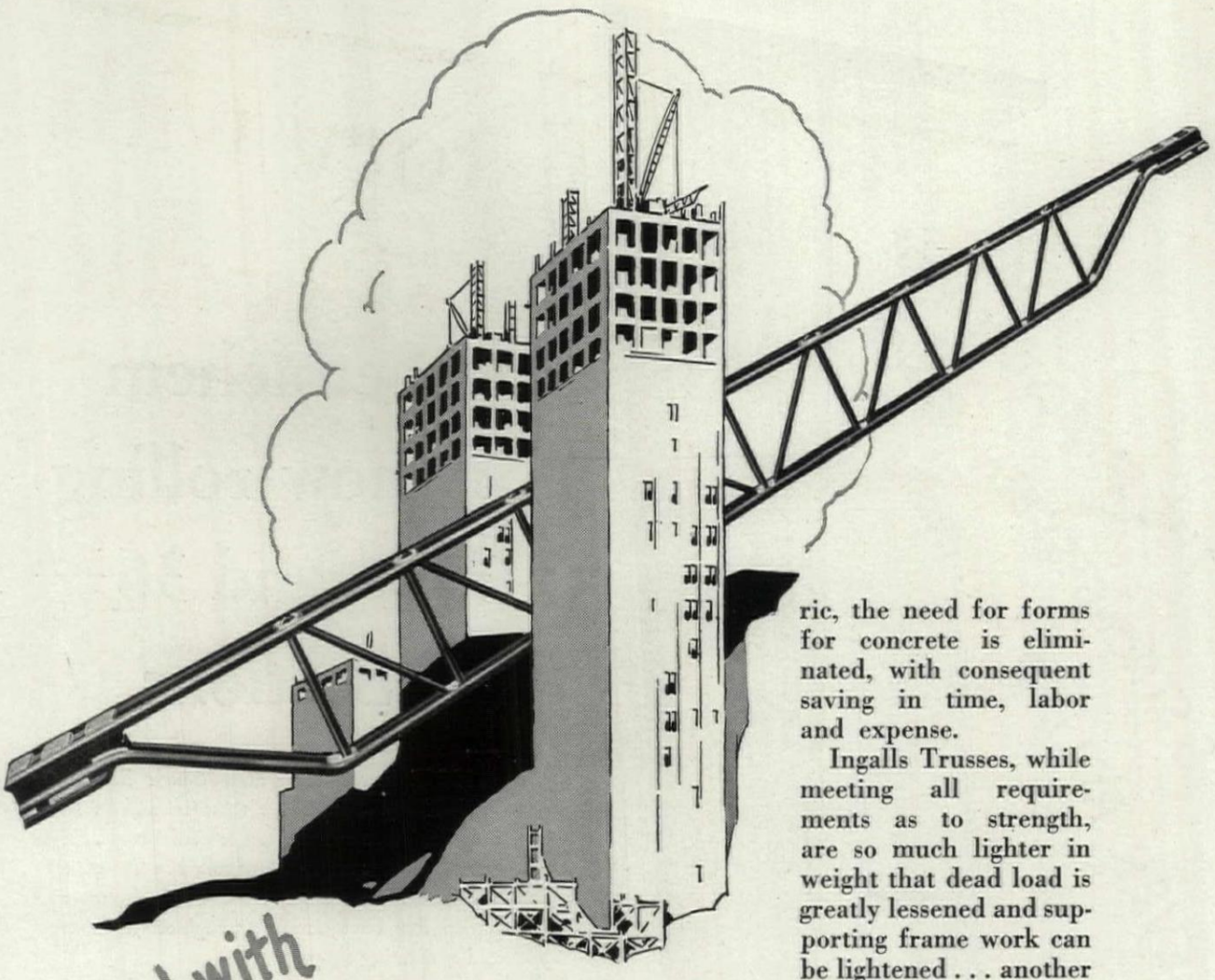
9. Blow-off, in front, makes cleaning easy.
10. Steam gauge, etc., provided with steam boiler. Water boiler also completely equipped.
11. Safety valve.
12. New sensitive Arco Mechanical Regulation.
13. Water gauge glass, brass fittings, easily read.
14. Latest type air-cell asbestos insulation prevents radiation heat loss.
15. Flue door with curved baffle lining insures easy gas travel.
16. Side metal jacket, indestructible.
17. All sections seepage-proof construction.
18. Fire-door with baffle lining containing secondary air distributor.
19. Primary Draft Inlet.
20. All doors, plate fittings, hinge pins, etc., porcelain enamel finished for permanent beauty.

NEW Ideal Redflash Boiler

And it costs no more than ordinary equipment

AMERICAN RADIATOR COMPANY

AMERICAN RADIATOR COMPANY, Arch. Forum 8-28
40 West 40th Street, New York City.
Please send me descriptive material about your new line of heating products.
Name .....
Address .....
City ..... State .....



Build with

INGALLS TRUSS

Floors and Roofs

The possibilities for better and less expensive design through the use of light weight Ingalls Truss Floor and Roof construction are almost infinite.

Not only is this modern building form adaptable to all types of structures, but it permits a speed and ease of erection unobtainable otherwise, and its use is regarded as essential for schools, hospitals, office buildings, apartments and other structures where fire-proof and sound-proof construction is required.

By using any of the various forms of metal lath or reinforced fabric, the need for forms for concrete is eliminated, with consequent saving in time, labor and expense.

Ingalls Trusses, while meeting all requirements as to strength, are so much lighter in weight that dead load is greatly lessened and supporting frame work can be lightened . . . another important economy.

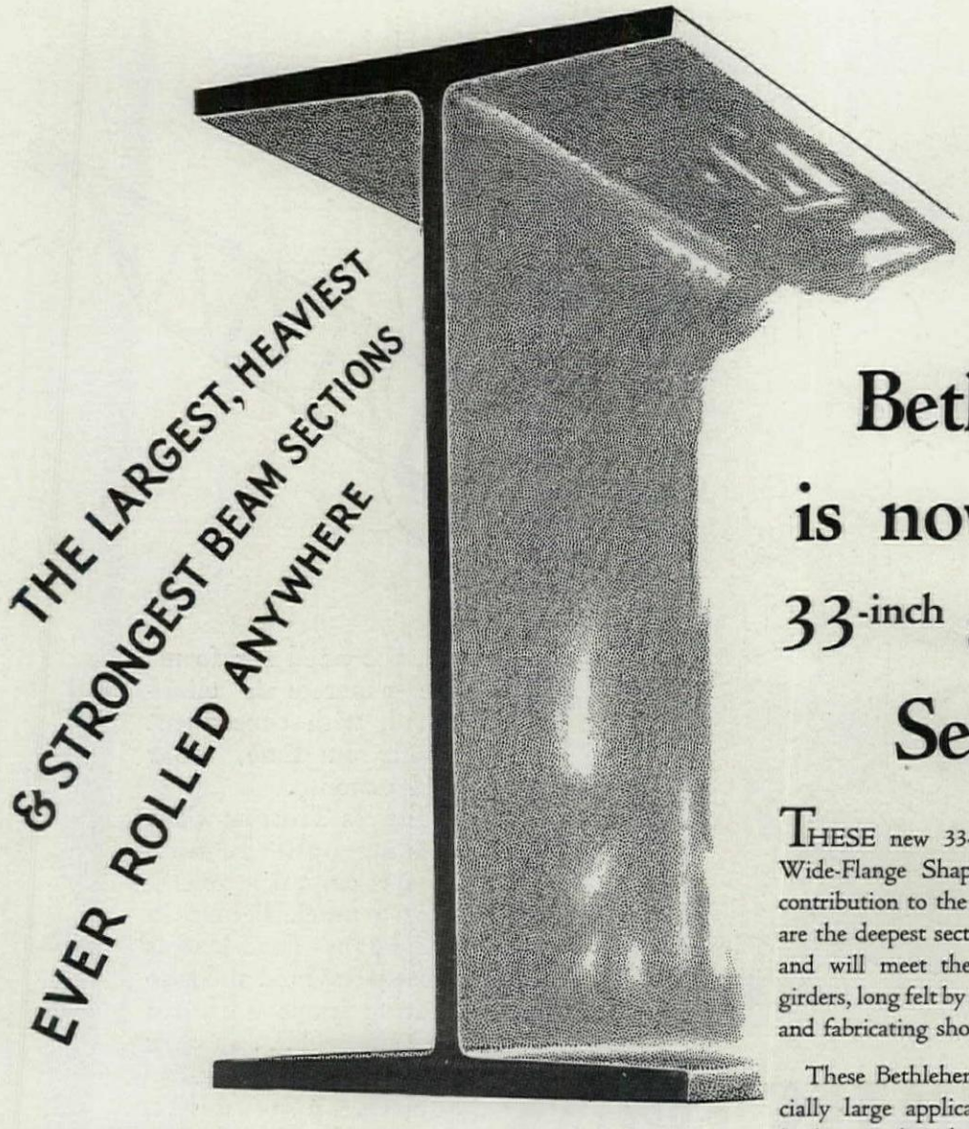
Safe, dependable, easy to handle, Ingalls Trusses immediately recommend themselves to all architects and engineers who have their clients' best interest in mind, presenting as they do, a remarkable list of economies and structural advantages over other types of floor and roof support.

We will be glad to furnish you with specifications, quotations or any other information required. Write us today.

Branch Offices } New York 117 Liberty St. | New Orleans 1717 New Masonic Temple | Atlanta 715 Healey Bldg. | Tampa 1004 Tampa Theatre Bldg.

SERVICE WORKMANSHIP INGALLS BIRMINGHAM, ALA. U.S.A.

The Ingalls Steel Products Co. Birmingham, Ala.



Bethlehem is now rolling 33-inch and 36-inch Sections

THESE new 33-inch and 36-inch Bethlehem Wide-Flange Shapes are this Company's latest contribution to the structural steel industry. They are the deepest sections ever rolled in this country and will meet the need for deeper beams and girders, long felt by architects, engineers, contractors and fabricating shops.

These Bethlehem deep sections will have especially large application in railway and highway bridges, and in building construction. For long spans they show considerable economy over any other sections.

They are rolled on Bethlehem's patented Grey Mills, like other sizes of Bethlehem Wide-Flange Structural Shapes. The introduction, years ago, of Bethlehem Wide-Flange Shapes—commonly known as Bethlehem Sections—was an important event in the history of Structural Steel. Their economy in weight and in cost of fabrication was promptly recognized. Bethlehem Sections were widely accepted, and so extensively used that it was necessary to increase the capacity for production by building two additional Grey Mills to meet the demand.

And now the introduction of this series of 33-inch and 36-inch Sections extends the range of application of Bethlehem Wide-Flange Shapes and makes it possible to more fully utilize their advantages and economies. Regular rolling schedules of the new deep sections are being maintained.

Weights and Section Moduli of these New Sections

33-inch			*36-inch*		
Section Number	Lbs. per foot	Section Modulus	Section Number	Lbs. per foot	Section Modulus
B33	125	394.3	B36	147	500.9
B33	135	422.3	B36	155	530.4
B33	143	449.4	B36	164	561.1
B33	152	478.4	B36	173	595.0
G33	202	676.0	G36	231	835.0
G33	210	707.3	G36	240	872.0
G33	220	741.4	G36	250	911.2
G33	230	778.0	G36	260	949.5

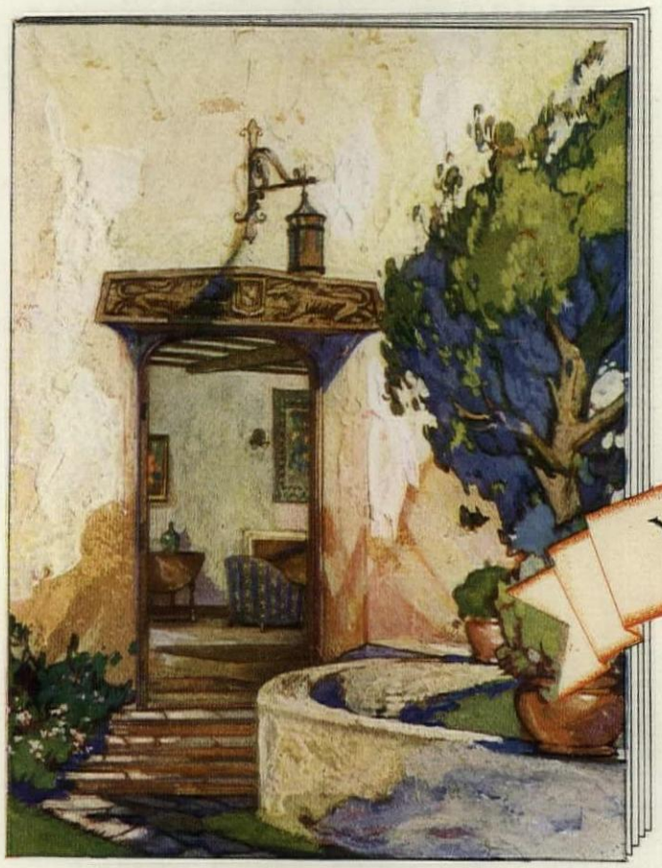
BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices in: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis, San Francisco, Seattle, Los Angeles, Portland, and Honolulu.

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of Our Commercial Products

BETHLEHEM
Wide-Flange
STRUCTURAL SHAPES

An accepted practice adapted to the *protection of plaster*



Now plaster can be reinforced with steel exactly like concrete. How this is done is described in the beautiful book, "Better Walls for Better Homes."

A timely discussion—in view of the trend of modern decoration. The coupon will bring it to you promptly.

Your copy awaits you **it is free**

EVERY architect knows the value of reinforcing concrete and will be quick to appreciate the advantages which similar reinforcing gives to plaster. More than 200,000 installations of STEELTEX have proved it successful.

STEELTEX is used in place of lath. It is a fabric of rust-proofed (galvanized) cold-drawn steel, combined with a double, waterproofed backing. When plaster is applied, a furring wire provides space for the plaster to spread under the fabric as well as over it. The steel is completely embedded. The backing not only produces automatic backplastering, but provides effective damp-proofing, sound-deadening and insulating qualities.

STEELTEX in sheets 50″x52″, is nailed to the studs. "Better Walls for Better Homes" gives complete details. Send for it.

New—Steeltex for Floors

STEELTEX for Floors, recently introduced, has already been used in numerous important installations. Heavier than other types of STEELTEX. Quickly applied over any type of beam or joist. Its obvious advantages include maximum construction speed, elimination of forms, prevention of droppings, uniform reinforcement throughout the slab, better curing, etc. The booklet, "STEELTEX for Floors," contains full details with working drawings. Send for your copy.

National Steel Fabric Company

DIVISION OF Pittsburgh Steel Co.

2708 Union Trust Bldg. Pittsburgh, Pa

The world's largest manufacturers of welded steel fabric

National Steel Fabric Co.
2708 Union Trust Bldg., Pittsburgh, Pa.

Without obligation send
☐ (check) *Better Walls for Better Homes*
☐ (check) STEELTEX *for Floors.*

Name_____

Street_____ Place_____

STEELTEX

THREE TYPES—SAME PRINCIPLE—SAME PROTECTION

for plaster . . . for stucco . . . for floors and roofs (concrete and gypsum)

NOW PLASTER IS REINFORCED WITH STEEL—EXACTLY LIKE CONCRETE

Library in the Office of The Architectural Forum, New York

You are invited to use the offices of

The ARCHITECTURAL FORUM

as headquarters when you visit New York

Here will be found such practical conveniences as telephone and stenographic service, an adequate architectural library, and in fact many of the dozen and one things which may contribute to the pleasure and profit of a sojourn in New York.

THE ARCHITECTURAL FORUM, 383 Madison Avenue

Illustration shows detail of tower, Sherry Netherland Hotel, New York. Toch Brothers "R.I.W." products were used on this important project.

PROJECTS *of* IMPORTANCE

On construction projects of importance leading architects and engineers specify and use Toch Brothers "R.I.W." waterproofing and damp-proofing compounds as well as "R.I.W." technical paints because of their absolute reliability ~ ~ Toch Brothers "R.I.W." products are the result of over 80 years of research and scientific manufacturing experience, devoted to the preservation of structural materials from deterioration and corrosion ~ ~ There is an "R.I.W." product to meet every requirement of every type of structure large or small ~ ~ The Toch Brothers laboratories with their experienced engineering staff, welcome the opportunity to cooperate with architects, engineers and building supply dealers in the selection and use of the most suitable products for the preservation and protection of structural material, and in those cases where unusual conditions are to be overcome.

SEE SECTION A, PAGE 86, SWEET'S ARCHITECTURAL CATALOGUE

The Authority of Accomplishment Since 1848

TOCH BROTHERS

DAMP-PROOFING & WATERPROOFING COMPOUNDS ~ TECHNICAL PAINTS

"R.I.W." PRODUCTS
for specific uses

A—Waterproofing compounds
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State Requirements Use Coupon Opposite!

REMEMBER IT'S WATERPROOF

R I W

Division of
STANDARD VARNISH WORKS

NEW YORK - CHICAGO
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TOCH BROTHERS, Dept. H-4
443 Fourth Ave., N.Y.
(or 2600 Federal St., Chicago)

Gentlemen:—I am particularly interested in further information about Toch Brothers' products for checked uses:

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Please send me complete literature on these subjects

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For THE FINEST BUILDINGS ...THE FINEST RADIATION..

No. 1 FIFTH AVENUE, NEW YORK

Architect, Helmle & Corbett
Heating Contractor, Chas. Darmstadt, Inc.
Builder, Jos. Seigel

AERO THE NATIONAL RADIATOR

In the years when Aero, the National Radiator, was the only complete line of tube-type radiation on the market, it was the almost invariable selection for the finest buildings. That was only natural.

Now, competing with many imitations, it is still chosen with amazing regularity. *That is significant.*

It indicates appreciation of the fact that Aero has, during more than six years, been rendering faithful, trouble-free service on heating applications of every character; and that it is the only complete line of tube-type radiation that can show so impressive a record of demonstrated dependability.

The man who selects Aero, the National Radiator, takes no gamble on the quality or on the satisfactory performance of his warming equipment.

NATIONAL RADIATOR CORPORATION

MANUFACTURER OF RADIATORS AND BOILERS

Ten Plants devoted to National Service through these Branch Offices and Warehouses:

Baltimore, Md.—2600-2622 Frisby Street
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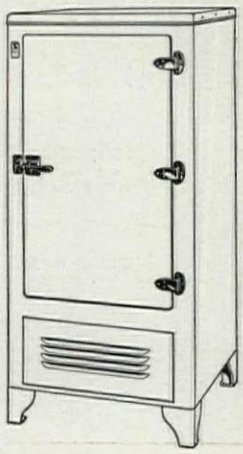
Cleveland, Ohio—935 E. 63rd Street
Indianapolis, Ind.—431 W. Georgia Street
Louisville, Ky.—1126 W. Breckenridge St.
New York, N. Y.—55 W. 42nd St.
Philadelphia, Pa.—121 N. Broad St.
Richmond, Va.—3032 Norfolk St.
Boston, Mass.—93-97 Oliver Street
Chicago, Ill.—2445 N. Keeler Avenue
Cincinnati, Ohio—Spring Grove and Elmira Avenue
Johnstown, Pa. — 221 Central Avenue
Milwaukee, Wis. — 124-130 Jefferson Street
Omaha, Neb.—108-112 S. Tenth Street
St. Louis, Mo. —1042 Central Industrial Ave.
Pittsburgh, Pa.—1509 Arrott Building
Washington, D. C. — 2205 Fifth Street, N. E.

A Specification that *helps Rent Apartments*

ELECTROLUX...NOISELESS REFRIGERATION BY HEAT....WINS AGAIN

Washington's Finest Apartment—Alban Towers—Installs Electrolux Refrigerators. Builder, B. F. Saul Co., 925 15th St., N. W., Washington, D. C.

Architects specify the modern refrigerator without moving parts for the new Alban Towers .... Washington, D. C.



EVERY architect knows that automatic refrigeration helps rent apartments. And architects of the finest new buildings are turning to Electrolux for ideal automatic refrigeration.

An example of this is the new Alban Towers being erected in the most delightful section of Washington, D. C. The architects of this magnificent structure have specified Electrolux Refrigerators for every apartment.

Amazing new principle of refrigeration

Electrolux operates on a startling new principle of refrigeration—heat makes cold without mechanical means. A tiny gas flame does all the work. It is absolutely silent and absolutely safe. Since nothing moves, there is nothing to wear out.

Less expensive to operate

Aside from the great value of Electrolux due to its long life, it is less expensive to operate. This point has a big appeal to the prospective tenant. And Electrolux costs no more than other refrigerators without its advantages.

Color finishes

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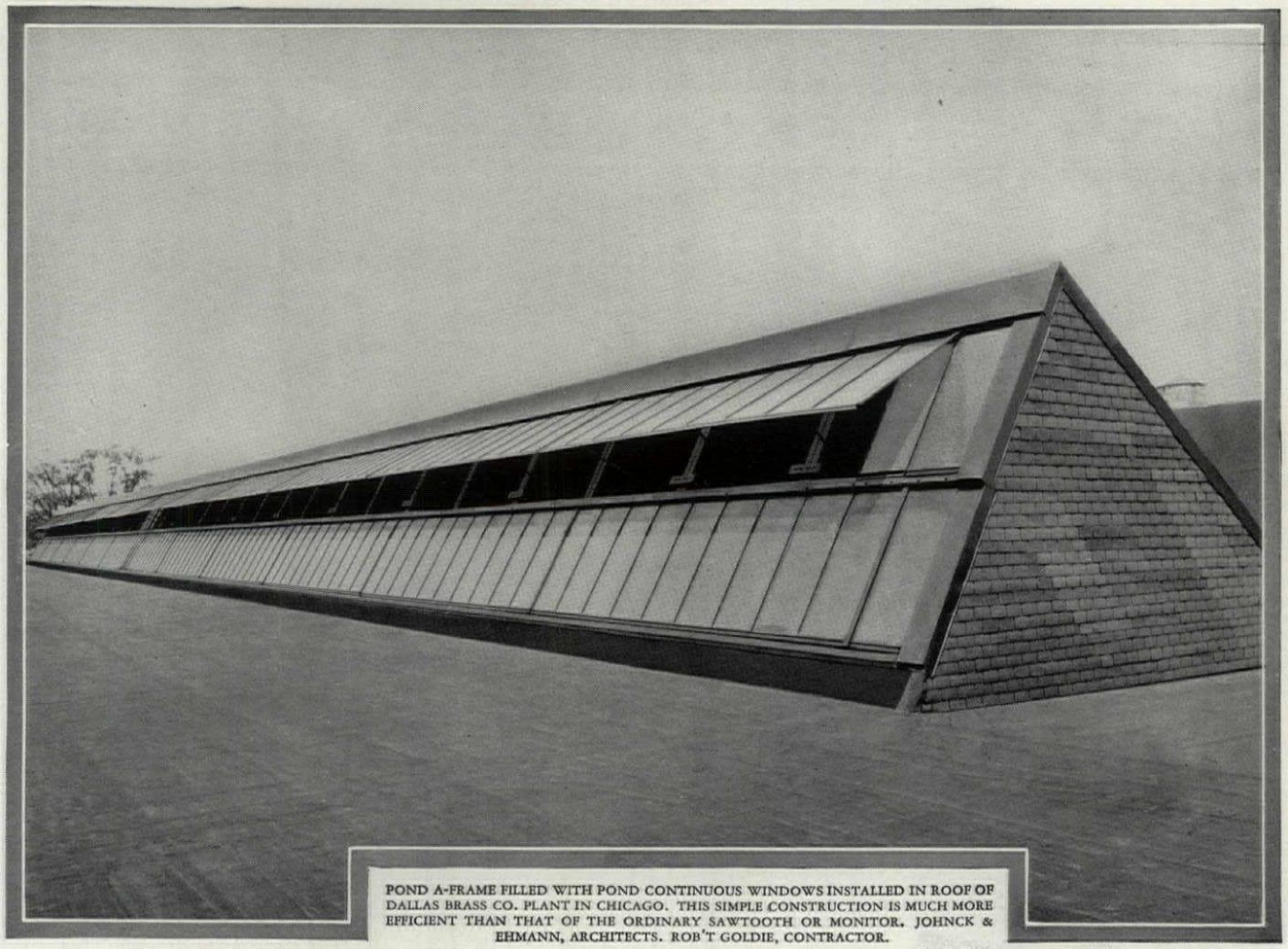

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BOOK DEPARTMENT

HOTEL PLANNING AND OUTFITTING

A Review by
TYLER STEWART ROGERS

ONLY rarely does the occasion arise when an individual or an organization, well equipped through broad experience and accurate knowledge, undertakes the production of an authoritative and comprehensive reference book on a subject so complex in its many ramifications and so important to the architectural profession and to the industry it serves as the planning and equipment of hotels. The very difficulties surrounding such an enterprise have been largely responsible for the dearth of sound information, in book form at least, on the problems involved in the development of modern hotels.

The hotel business today forms a vast industry, which for its materials, equipment, supplies and service reaches out into every channel of manufacturing, commercial and professional activity. It is called upon to provide adequate shelter, food, and a thousand forms of service for the traveling public. In addition to serving transient guests, the hotel industry must provide permanent housing and minister to the material wants of thousands of families which have given up the struggle with the servant problem to seek immunity in the shelter of apartment hotels, where service is perforce of a coöperative nature, and where the problems of domestic management are centralized. No form of effort, in fact no single type of business activity, represents so complicated a series of problems as does the modern hotel industry. It is functioning actively in every town and city, in the suburbs and the rural areas, along every highway, at every resort. Wherever people are, there are hotels; whatever their material wants, hotels supply them. This is indeed the most intimate of all industries, closest to the daily life of the country. Where but a few years ago hotels could be numbered by the hundreds, there are now thousands; where there were but two general types, there are now at least five, and all in wide and general use.

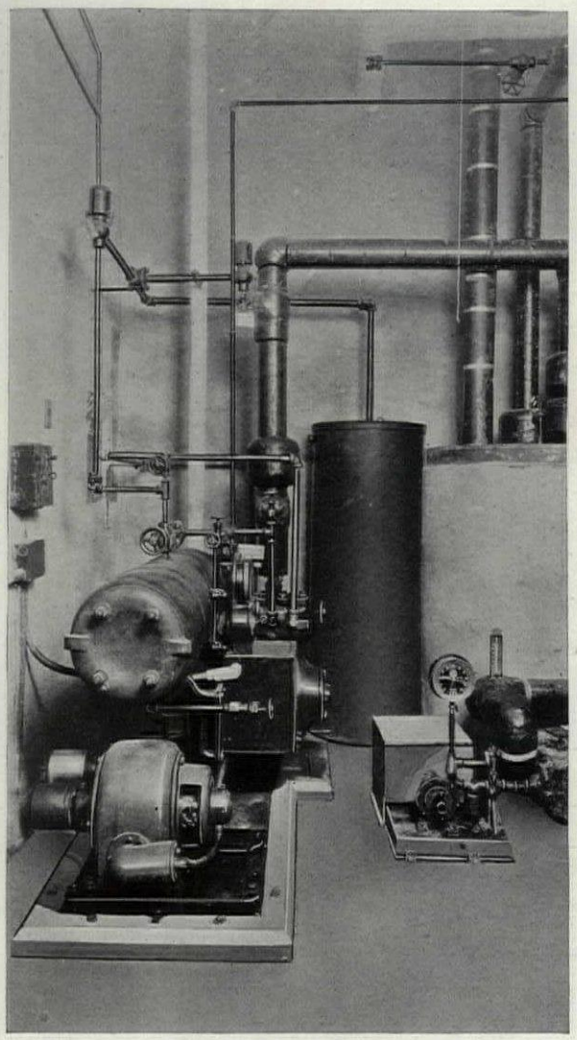
"Hotel Planning and Outfitting" is an impressive work of some 438 pages, well printed and bound and illustrated profusely with half-tones and many color plates and with plans of approximately 100 hotels now in active operation. Its publication was possible only because it is the product of the largest of the organizations catering to the hotel industry, an organization that has developed through a half-century until it is the only one of its kind that can completely furnish and equip a hotel from the bare walls to the point where the house is ready to open its doors to the public. The compilation of this book

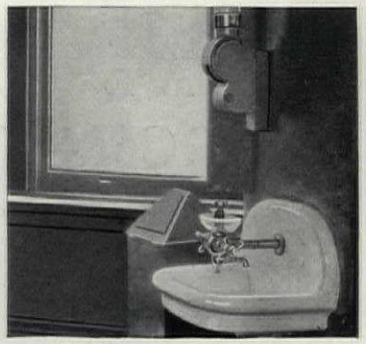
represents over two years' careful research and analysis by officials of the Albert Pick-Barth Companies together with the research of several consulting specialists who were retained for the purpose. The material has been drawn from a large group of hotels whose outfitting was executed wholly or in part by the Pick-Barth organization, and it represents a dependable cross section of the industry. The editors include C. Stanley Taylor, member of the firm of Lyon & Taylor, architects, New York, consulting editor of THE ARCHITECTURAL FORUM and *Hotel Management*, and general consultant on the design and economics of hotel projects; and Vincent R. Bliss, of the Albert Pick-Barth Companies; the contributors and consultants include Alexander B. Trowbridge and Harry Prince, consulting architects, and Horwath & Horwath, hotel accountants, and many others.

For the purpose of discussion in this book, hotels have been divided into three general types, wherein the problems of design and service vary to a marked degree. These are commercial, residential, and recreational, each serving a radically different purpose, but all operating along the same economically fundamental lines. Commercial hotels must be considered under two divisions,—first, the great urban hotels, of which there are relatively but a few, and second, the average 100- to 300-room commercial hotels located in the smaller cities and towns. It may be noted here that this book gives primary consideration to hotels of average size rather than to the complicated individual problems of the great hotels of our larger cities. The soundness of this plan is obvious. Information based on average experience is of great value to those conducting or about to engage in the operation of hotels of average size. The owners of very large projects can well afford to engage the services of hotel consultants; furthermore, the problem of the large hotel is highly individual in character, and here average experience is difficult to determine and uncertain of application. For the hotel of average size, however, data based on contemporary experience are invaluable. Attention is also given in full detail to the problems of the residential or apartment hotel, of which four types are recognized, based on the size and occupancy of the apartments and the type of food service rendered; and to the problems of resort hotels, where a wholly different purpose introduces many considerations not encountered in other hotel work.

The thoroughness with which the subject of hotel planning and equipment has been treated is best shown by a brief review of the contents. The first ten chapters are devoted to the planning of hotels, each type first being discussed with great clarity from the economic viewpoint, then taking up planning and construction problems, and finally architectural considerations. Chapters I to III are concerned with Analyzing the Commercial Hotel Project, Planning and Building, and Exterior Architecture. These chapters are followed by a group of fine duotone plates illustrating a large number of successful commercial hotels with their typical floor plans. Chapters IV to VII inclusive are similarly devoted to the Apartment Hotel and are followed by a series of plates with plans. Chapter VII discusses the Bachelor Hotel, and Chapters VIII to X inclusive are concerned with Resort Hotels. Before leaving planning problems, one chapter takes up the Remodeling of Hotels for Increased Profits.

Illustration shows the York installation which cools the drinking water for the bubbler fountain system at Saks-Herald Square, New York City





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Beginning with Chapter XII on Planning the Hotel's Furnishings, which is followed by a series of color and duotone plates, five chapters are devoted to furniture, carpets, draperies, linens and bedding. This section is followed by Chapter XVII, on the application of space-saving conveniences, in which the uses of doorbeds, built-in furniture, kitchenette equipment and other space economizers are fully developed. The remaining six chapters are devoted to the very important matters of food service facilities, including their relation to hotel planning, the general principles involved in food service layouts. facts about the construction of food service equipment, and invaluable data on silverware, glassware and china for hotel use. Throughout the book there will be found reference charts, tables, and summaries which present in convenient and highly useful form a great mass of practical information on various aspects of hotel planning and equipment. A large part of this material is not available elsewhere; much of the economic and cost data has never before been discussed in any publication. The rich experience of the executives and of the planning, engineering, technical, and merchandising staffs of the Pick-Barth organization is drawn on freely in the text, and these reference tables, provide for the first time to architects and to hotel executives a summation of practical knowledge gained through the closest sort of contact with thousands of hotels and with every type of hotel problem. The analysis of hundreds of hotel plans and of economic problems by Mr. Taylor and the consulting architects engaged with him in this work, and the presentation of much cost information by Horwath & Horwath, whose work is well known to hotel men, and equally authoritative information, rounds out the subject matter into a full and complete treatise on the hotel.

This volume is in no sense a manufacturer's catalog, though sponsored by and produced for a commercial organization. The tremendous production expense is made possible by the fact that the illustrative material shows work accomplished by this organization, which, because of the extraordinary breadth of its service in no wise limits the scope of the book, and by the nominal charge at which the book is sold. The architectural profession would profit largely if commercial organizations in other fields would publish equally authoritative and unbiased data on various similarly complex architectural and construction problems, which confront architects.

HOTEL PLANNING AND OUTFITTING; Commercial, Residential, Recreational. 438 pp., 8½ x 11½ ins. Price $10. The Albert Pick-Barth Companies, Chicago and New York.

THE GEOGRAPHY OF AMERICAN ANTIQUES. By Lurelle Van Arsdale Guild. 283 pp., 7¾ x 9¾ ins. Price $4 Net. Doubleday, Page & Company, New York.

THIS book is a guide to American antiques, to the furniture and household crafts produced from the time of our early colonists, of the period of the Pilgrim Fathers, to that of the Empire in the early portion of the nineteenth century,—to be exact, from 1820 to 1830. Ordinarily, all of this is considered together under the one term "Early American," and the student of that period is often confused by the medley of racial influences which he notes in the pieces thus designated. He will be happy to find in this work a complete and well ordered survey to dispel his confusion. The history

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of any period style involves necessarily the history of the people behind it, and prior to 1790 nine nations played noteworthy parts in the settling of our Atlantic seaboard. Each colony was confronted with different necessities, and drew from different inspirations at home; hence, each evolved a quite different style of household crafts and furnishings. Dividing the territory, state by state, the author shows how foreign styles and influences were modified by American conditions, and how household arts were related to the social conditions of the times. He traces the rise in each colony of master craftsmen, of greater and lesser cabinet makers, silversmiths, clock makers and glass blowers, relating interesting facts about the lives of each and the source from whence he drew his inspiration. By making his division geographical, he shows for what crafts each colony became famous.

Mr. Guild is not only an authority on antiques, but an interior decorator and artist as well. One of the distinctive features of his work is its profusion of illustrations. He has illustrated the pieces he describes by means of some 700 of his own drawings, with a pictorial glossary to which the reader may refer. In this way the volume is a store house of accurate information.

NORTHERN ITALIAN DETAILS. By Walter G. Thomas and John T. Fallon. 143 Plates, illustrated and measured drawings, 9 x 12 ins., with introduction by John Mead Howells. Price $10. Scientific Book Corporation, New York.

NOT a little of the success with which architects and landscape architects, interior decorators, woodworkers, and makers of furniture are using Italian motifs is due to the extent to which measured drawings have been supplied to them. Architectural draftsmen and writers have traveled into every corner of Italy and have selected what seemed likely to be most useful, photographing and securing measured drawings with a fidelity to the original which is proved by the success with which their illustrations and drawings are followed in America. One of the most useful and best known of these works is that for which the material was gathered in northern Italy some years ago by Messrs. Thomas and Fallon, the material being published in one of the architectural journals and later issued in book or rather portfolio form.

This widely known work includes half-tone illustrations and measured drawings of details of buildings of many kinds and of the objects which they contain,—structural details, such as stairways, balconies, balustrades and parapets; doors and windows, cornices, loggias and colonnades; details used in gardens, such as fountains, urns, vases and pedestals; and objects such as tables, benches and chairs, which of course classify as furniture. The details illustrated are not so much those of large scale and great cost as those of a character likely to interest architects engaged in work of moderate size or extent. The great usefulness of the original edition of this volume is ample warrant for the issuing of this later edition. The great favor with which architects received the original issue and the wide extent to which these excellent details have been used during several years bespeak a welcome for a new edition. As has already been said, the authors or compilers exercised rare taste and discrimination in the choice of their material. This new edition, like the original issue, contains an introduction by John Mead Howells, adding to its interest.

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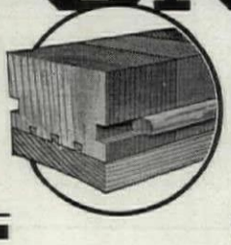

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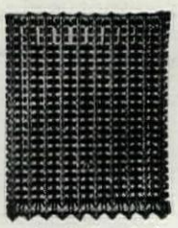

A typical stack of VENTO Cast Iron Heaters

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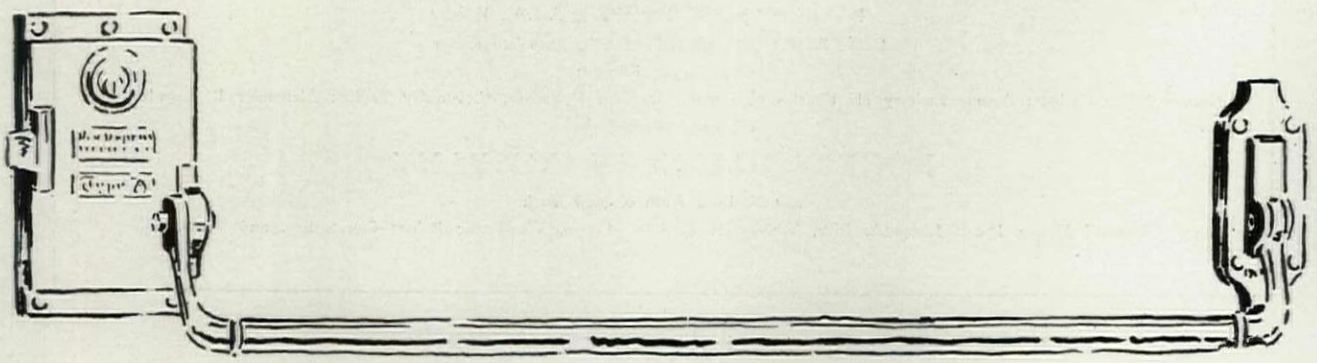
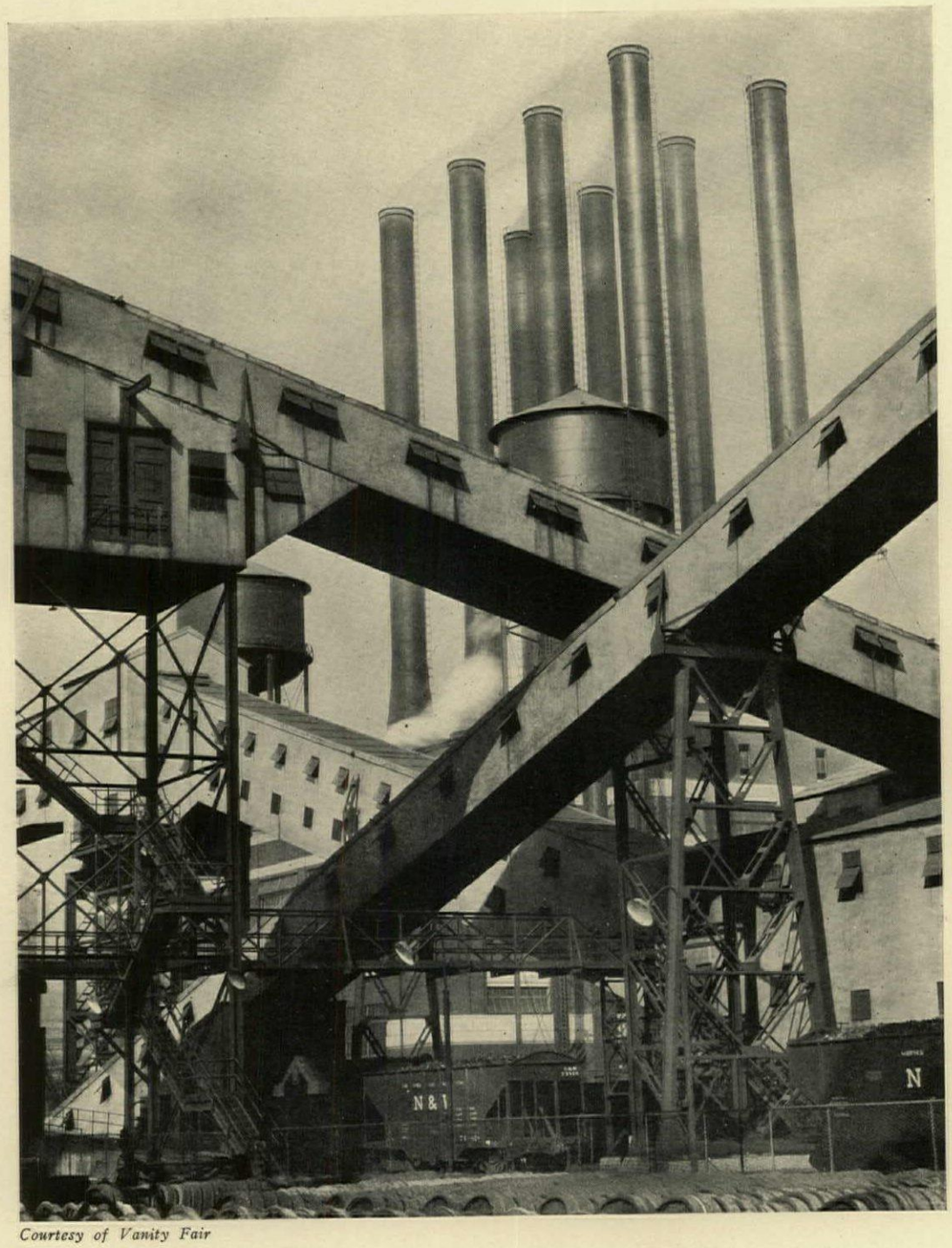




Courtesy of Vanity Fair

INDUSTRIAL ARCHITECTURE
THE FORD PLANT AT DETROIT

FROM A PHOTOGRAPH BY CHARLES SHEELER

The Architectural Forum

THE
ARCHITECTURAL
FORUM

VOLUME XLIX NUMBER TWO

AUGUST 1928

ARCHITECT AND CONTRACTOR, CO-WORKERS

BY
A. KENNETH McKEAND*

SO swift has been the pace in the development of modern building construction that there has been little opportunity to pause and ask ourselves where we are headed for, what landmarks have been passed, and whether we are moving forward in an organized body or in splendid, but unrelated, units. Progress, unbelievable progress, has been made, obstacles overcome, victories won, in which the owner, architect, engineer, contractor and manufacturer alike have each played an important part, and it is only human that each should ascribe to himself the major part in the achievement, and only partially realize that without the others, his efforts would have been unavailing. Nevertheless, the realization of this mutual dependence must be grasped if the fullest use is to be made of the opportunities that lie ahead, and it is the purpose of this article to show in what way the contractor is qualified to take his place in the councils of the leaders in this development, and to set forth the services he is prepared to render.

In the same relation that the "charge of the six hundred at Balaklava" stands to modern warfare, stands the "builder" of 50 years ago to the modern engineer-contractor of today. His function has changed from that of a master-mechanic, who by dint of leadership and ability could bring together the few simple factors entering into the smaller building operations of the period, to that of an expert controlling a diversity of elements over a wide field, and coördinating them into one comprehensive plan of action. The builder has not been alone in adapting his services to rapidly changing conditions. The modern architectural office bears as much resemblance to that of 50 years ago as a building of the '70's to the last word in steel construction today. Paradoxically, it is the very complication of mechanical and engineering problems that has given back to the architect-designer his true place in the structural scheme, and just as he has met the challenge of the zoning laws by creating new æsthetic formulæ, so did the limitations imposed on him by structural necessity prove the stepping stones to achievement that is the wonder of the world. To him we owe the evolution of the "skyscraper" from something of harsh utility to a form of challenging beauty. But the days have passed when he can claim for himself the sole honor in the creation of a building. As the factors entering into even the simplest of structures have increased in number and multiplied, he has surrounded himself with specialists in many fields, and his principal function is now to correlate the requirements of these experts into one coherent design.

A similar change has meanwhile taken place in the builder's organization. Contrary to popular conception, he is no longer a mere vendor of building. If his functions were simply to erect steel, brick, or concrete, he could be dispensed with and his place taken by a competent foreman. In other words, the essence of modern general contracting lies not so much in the furnishing of labor, materials and equipment, and the brokerage of subcontracts, as in skillful, centralized management for coördinating the work of many different trades, timing, organizing and synchronizing the installation in accordance with some predetermined plan. The experience, knowledge and data that he has gained in the exercise of these functions are what he offers to owner, architect and engineer,—not only in the execution of the plans, but in every stage of the development of the structure, from the preliminary sketch plans of the architect to turning over the completed building.

And yet what too often happens? How frequently have we all seen completed drawings, so cluttered with changes, corrections, contradictions and addenda that it might be presumed that their function was to mislead rather than to guide anyone in their execution. What usually do these last-minute changes represent, if not a belated realization that the owner's and architect's rather vague assumptions as to costs have been unduly optimistic? And so commences the business of cutting, slashing and slicing that will bring the emasculated project within the size of the financial budget. The cities of this country are full of monuments to this wasteful method,—their owners contemplating an ever-growing array of red figures on their ledgers, and their managers floor upon floor of empty offices. The data that would easily

*The author acknowledges indebtedness to Col. W. A. Starrett for aid in the preparation of this article.

Building for Industrial Trust Co., Providence
Walker & Gillette, Architects; George Frederic Hall, Associated
Built for Fixed Fee; Guaranteed Cost Limit
Starrett Bros. Inc., Builders

Building for National City Company, New York
McKim, Mead & White, Architects
Built on Cost Plus Percentage Basis
George A. Fuller Co., Builders

have allowed them to "cut according to their cloth" were in the hands of the builder, but he was not invited into conference. He was being held off until such time as the elimination race should be held which would produce a builder who could in some way construct identically the same building for less money than his competitors!

It would not be hard to imagine the disastrous consequences if a similar competitive method were used in the selection of an architect,—whereby men of varying ability, integrity and responsibility would be called upon to produce plans for a building, to meet certain stipulated requirements,—the award being made solely on the basis of the price at which the design could be produced. And yet the analogy is not so far fetched, for it was precisely out of the system of competitive bidding that there arose the idea that the general contractor was necessarily dishonest, usually unscrupulous, and only to be trusted when closely confined in a straitjacket of rigid plans and specifications and subjected continually to the most vigilant inspection. That such should be the outcome was inevitable, when price, rather than experience or ability, was the deciding factor, and where a builder's instinct for gambling,—on loopholes in specifications, on lax supervision, on probable changes and extras, or a turn in the market,—was of more value than an accurate analysis of building costs. If fortune favored the successful bidder, he pocketed the savings; if not, he was faced with the alternatives of losing money or "skinning" the work, and the interests of owner and builder became as far apart as the poles. The wonder of it is that things have worked out as well as they have under such contending forces, and it is to the credit of both that so many of these alliances have not ended in disaster. But gradually there is awakening a realization of the fact that coöperation and identity of interest between all parties engaged in a building enterprise are of infinitely more value than all the inspection and coersion in the world; and thus the true function of the builder is being established,—as a co-adviser with the architect in the development of a structure, as a cost expert, and as one whose knowledge and experience of practical construction, gained through personal experience in the field, will be applied to produce the best results with the greatest economy of expenditure.

However, the old idea is slow in dying, and its lingering is one of the greatest causes of waste in the building industry. A single example will suffice. One of the largest manufacturers in the allied automotive industries decided on the erection of a new plant to cope with the rapidly expanding demand for his product. Plans were drawn, and bids were invited from about ten of the leading builders. No action was taken on receipt of the bids, but several months later a new scheme was developed and submitted for competition. In all, five distinct and separate schemes were estimated on by all bidders before the contract was awarded. When it is realized that aside from the builder's own organization, estimates

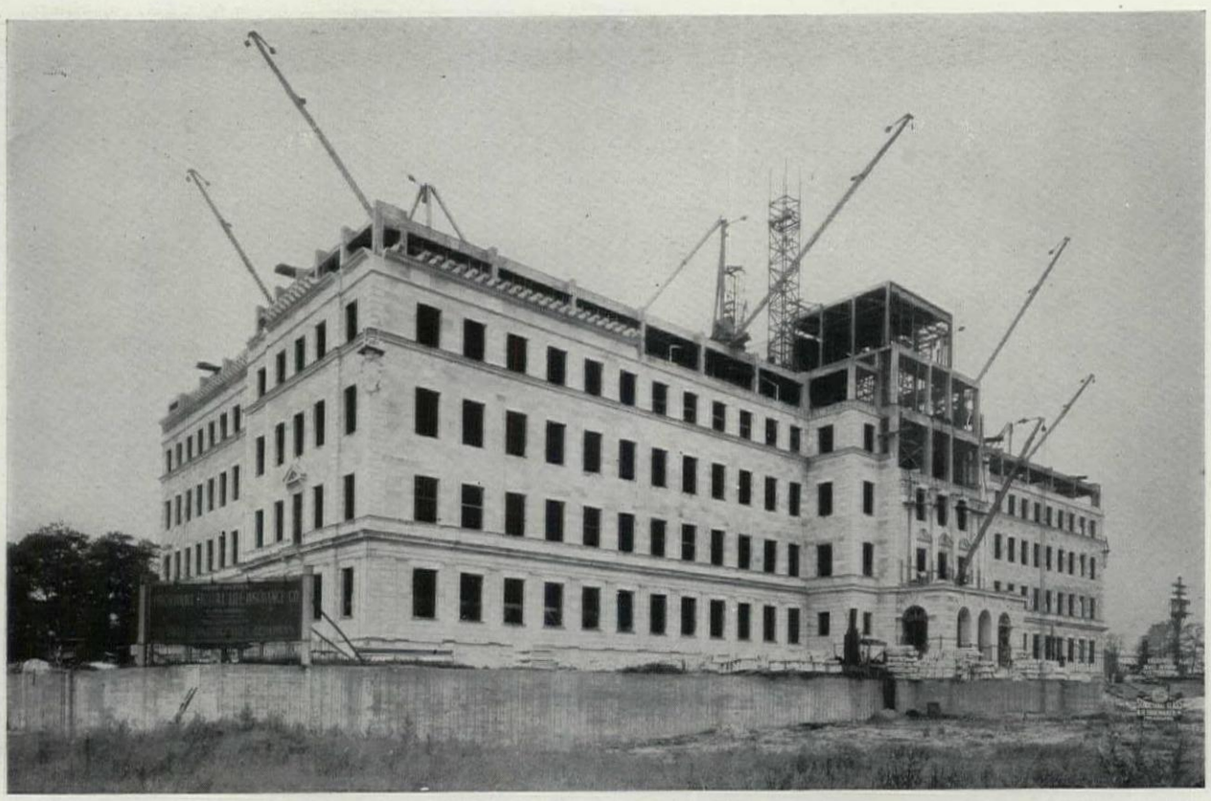
New Jersey Bell Telephone Building, Newark
Voorhees, Gmelin & Walker, Architects
Built on Cost Plus Fixed Fee Basis
Turner Construction Co., Builders

Building of Equitable Trust Co., New York
Trowbridge & Livingston, Architects
Fixed Fee, Guaranteed Limit of Cost Basis
Thompson-Starrett Co., Builders

from 30 or 40 subcontractors were necessary to complete each one of these bids, some idea of the prodigal waste entailed by such a method can be gained,—waste, incidentally, which must be paid for indirectly by the owner in increased building costs, due to the heavy burden of overhead borne by builder and subcontractors alike. What was the alternative? Each one of the builders invited to bid was the potential successful bidder, to whom would be entrusted the faithful execution of the plans. As such, the ability and integrity of one and all should have been beyond question. It is probable that from among the ten builders, some one would have been particularly desirable, through experience in similar work or because of intimate knowledge of local conditions. The owners had much to gain and little to lose by taking such a man into their confidence, making him an interested participant in the enterprise, and compensating him for the experience and pertinent knowledge he would bring to the development of the project,—presuming of course that the owners knew what they wanted and intended to build in good faith. If there were any question in their minds as to what their requirements were, or if economic considerations made the consummation of the project uncertain, there was all the more reason for eliminating useless competition. Not to have done so would, in any industry outside of construction, have savored of sharp practice.

Right here there is one of the weakest links in the building chain. To every one *bona fide* project on which bids are invited, there are several the probability of the execution of which is, to say the least, remote; but however slim the chances are, the owner usually feels perfectly free to put into motion the whole machinery of competitive bidding, whereby he will command the services of several highly trained organizations, without assuming any obligations or compensating them in any way for the time devoted to his project. Much has been said and many suggestions made of ways to cope with this obvious injustice, but the whole underlying cause is the prevailing notion that the only safe and economical way of securing the services of a builder is by competition. Often if the owner knew the reasons actuating the lowest bidder, he would realize, once and for all, the fallacy of such a method and gain some idea of the true functions of the legitimate builder. For, in the last analysis, the cost of a building is the sum total of a certain number of elements,—each comprising labor and material,—and true economy can only come from competent management and organization of the first and from careful, intelligent buying of the second. Given these, a building will cost what it will cost and cannot be made to cost less by any juggling of figures, and this is the price the owner should be prepared to pay. By so doing he will obtain the best and most economical results; there is no way of getting something for nothing.

This method of procedure brings us at once into



Building of Provident Mutual Life Insurance Co., Philadelphia
Cram & Ferguson, Architects
Built on Cost Plus Fixed Fee Basis
Turner Construction Co., Builders

the field of the "cost-plus" contract. Much has been written on this subject, but still the idea prevails,—among public officials, on building committees, and even among certain architects,—that under a cost-plus contract competition is almost or entirely absent, and that the builder has *carte blanche* to pile up expenditure, with little control by the individuals whose money is involved. If this were true, Barnum was indeed justified, because literally billions of dollars have been expended on building construction under the cost-plus form of contract. Fortunately, it is not the credulity of these owners which is in question, but that of the gentlemen who believe that such a method of procedure could have survived one single trial. There are several variations in the form of the cost-plus contract, but the main procedure under all remains the same. The original method compensated the builder in the form of a percentage of the actual cost; but as this was seen as a possible inducement to the builder to run up the cost, it has largely been superseded by a fixed fee, based on the probable cost, as estimated at the outset of the project. Here we have the true professional basis and the foundation of all great economies of construction. Of late years there has been added, as a further protection to the owner, a "guaranteed limit" clause, whereby the builder guarantees that the cost of erecting the building in accordance with the contract plans and specifications will not exceed the amount of his estimate, and assumes responsibility for payment of any excess over that amount. Once again it will be seen that the gambling element has been introduced, but it is gambling with full control of the circumstances and with all the cards on the table. As additional compensation to the builder for such risk as he is running in guaranteeing the cost, and to identify his interests even more closely with those of the owner, he is sometimes allowed a percentage of the saving realized below the upset price. Incidentally, it may be said that the builder who under any of the conditions outlined here fails to regard the interests of the owner as his own, has no place on any building enterprise under any contract.

Several questions may here suggest themselves to the reader. How is the guaranteed cost arrived at? What items of the builder's supervision are directly chargeable to the work, and what are included in his fee? How much of the work is done directly by the builder's own organization? How is competition secured among subcontractors, and what control is exercised by the owner and architect in the letting of subcontracts? How are changes and extras handled? How and when are payments due? There are others, but these are the main items on which the prudent owner will desire to be informed.

First. Upon completion of the final plans and specifications, an itemized estimate will be prepared, giving particulars of all estimates from subcontractors and that portion of the work to be executed directly by the builder, in full detail. To the total of these figures will be added a sum, not usually in excess of 3 per cent for contingencies, and the lump

Photo. Tebbs & Knell, Inc.

Hearst Publication Building, New York
Charles E. Birge, Architect
Built on Cost Plus Percentage Basis
Turner Construction Co., Builders

fee previously agreed upon. The sum total of all these items will represent the guaranteed limit of cost.

Second. As a general rule, no part of the general overhead, nor the service of any officer of the contractor, is chargeable as cost, and only the salaries of such men as are actively engaged on the building site or on actual expediting in the field, are paid by the owner. A careful examination by the writer of the records of some 20 projects revealed the fact that the costs under this head may vary from less than 1 per cent of the total expenditure on a fair sized office or loft building, to as much as 3½ or 4 per cent on a smaller but more intricate structure, where the work must necessarily proceed more slowly, and where the supervisory requirements would be as great as for a building involving two or three times the expenditure. These minimum requirements, on a building costing up to a million dollars, may roughly be taken to be a force of four or five,—superintendent, assistant superintendent (or "job runner," as he is sometimes called), timekeeper, material clerk, and stenographer; with the addition of an engineer, expediter, cost clerk, plan clerk and time and material checkers as the size and complexity of the operation increase, until on a building involving from ten to fifteen million dollars, a force of 20 or 30 may be legitimately employed in expediting completion of the structure.

Third. Under present practice, the majority of responsible builders execute not more than 20 per cent of the work with their own organizations. This will usually consist of the concrete work in the foundation, the masonry work, and the rough carpentry. These items play so important a part in the progress of the building that it is essential that they be under the direct control of the general contractor. Bids are taken on all materials entering into this work, and there is left, therefore, only the actual cost of the builder's own labor as a non-competitive element.

Fourth. The remaining 80 per cent consists of subcontracts and equipment purchases, awarded after intelligent competition among carefully selected bidders in each trade. These bids are tabulated and submitted, with the builder's recommendation, for the approval of the owner and architect before any obligation is incurred. The owner, however, is free to designate any subcontractor or material purchase he may favor, and, should the amount be higher than the figure recommended by the builder, the guaranteed limit would be increased by that amount.

Fifth. Detailed estimates of all proposed changes and extras are submitted to the owner and architect for acceptance. If approved, an architect's authorization is issued to the builder, increasing the upset price by the amount of the estimate. In this way, an owner is kept constantly aware of the money value of his decisions, and has the satisfaction of knowing that he will be called upon to pay only the actual cost of their execution. Thus one of the most constant sources of friction and irritation between owner and builder is removed, and a decision which,

under a lump-sum contract, might involve days of wrangling and subsequent delay, can be had at once.

Sixth. Reimbursement to the builder, together with a proportionate share of the fee, may be made monthly or, where a building is financed by means of a mortgage bond issue, at certain specified stages in the erection of the structure. In either case, the builder will have to support the amount of his application by receipted vouchers, invoices, payrolls, etc., in an amount equal to or in excess of the amount of his application, before any further payment is made.

How, then, does this work out in practice? The writer has in mind a building, costing around five million dollars, recently completed to the entire satisfaction of the owner, architect and builder,—a happy combination rarely achieved under the competitive form of contract. The builder was called in shortly after the selection of the architect and when there was nothing more than the sketch plan of the building. From these sketches and memoranda specifications, a preliminary estimate was made, to give the owner an idea of his commitments and to guide the architect in the execution of the plans. The architect availed himself from the outset of the practical knowledge of the builder, and in close collaboration the main structural features of the building were decided on and the excavation started. As soon as the scheme was sufficiently developed to permit complete structural steel plans to be made, figures were taken and a contract for fabrication let. Had it been necessary, as in the case of a lump-sum contract, to await the completion of the final plans and specifications before the letting of even the general contract, a loss of time amounting to between two and three months would have been inevitable. As it was, in view of the close collaboration from the beginning between all parties concerned in the financing, designing, erection and operation of the building, the risk of radical changes in the steel design was slight, and the owner was compensated for such minor changes as were called for in the working out of the detailed drawings, by a much earlier completion date.

The advantages resulting to the owner from such a contract as here described may be summed up as:

First. Saving of valuable time in starting the work and securing a much earlier completion date.

Second. Economics in construction, which unquestionably resulted from the combined knowledge of the architect and builder.

Third. Complete knowledge on the part of the owner of every measure taken for the advancement of the project, with the interest of all parties enlisted.

Opposed to this picture is another which was recently brought to the writer's attention. A small but sound banking institution in the west decided on the erection of a new home office to house its growing needs. A certain sum of money was set aside for the purpose, and a nationally known architect engaged to draw up the plans. He produced a scheme which seemed in every way to meet their requirements, at a cost, he assured them, that would not exceed the amount of their budget. On his advice, in order to save time and to take advantage of prevailing market conditions, he was authorized to let certain contracts direct, before the selection of the builder was agreed upon. When bids were taken for the remaining portion of the work, it was found that the figure of the lowest bidder was almost twice what they had anticipated. There was no question that a creditable building, adequate to their needs, could have been erected within their budget. But it was too late!

From this it may well be seen that coöperation cannot start too soon; frequently it comes too late; often, alas, not at all,—and the owner is deprived of one of the most valuable forms of service that the builder can render. There is no substitute for the experience and mature judgment that the able builder will bring to the conference room, and it is here, just as much as in the field, that his knowledge of ways and means and the cost thereof will clarify the problem and help toward wise decisions. Let the owner, then, select his builder as he does his architect,—for his reputation for honesty and integrity; for the services his training and ability have qualified him to render; for his record of past and present achievements,—and make such an arrangement with him that his concern shall be enlisted solely in building wisely and well. In so doing the owner will sow the seeds for a most fertile and effective collaboration.

Residence at Valhalla, N. Y.
Mann & MacNeille, Architects
Built on Cost Plus Percentage Basis
Barr & Van Buskirk, Builders

ARCHITECTURAL USE OF CAST STONE

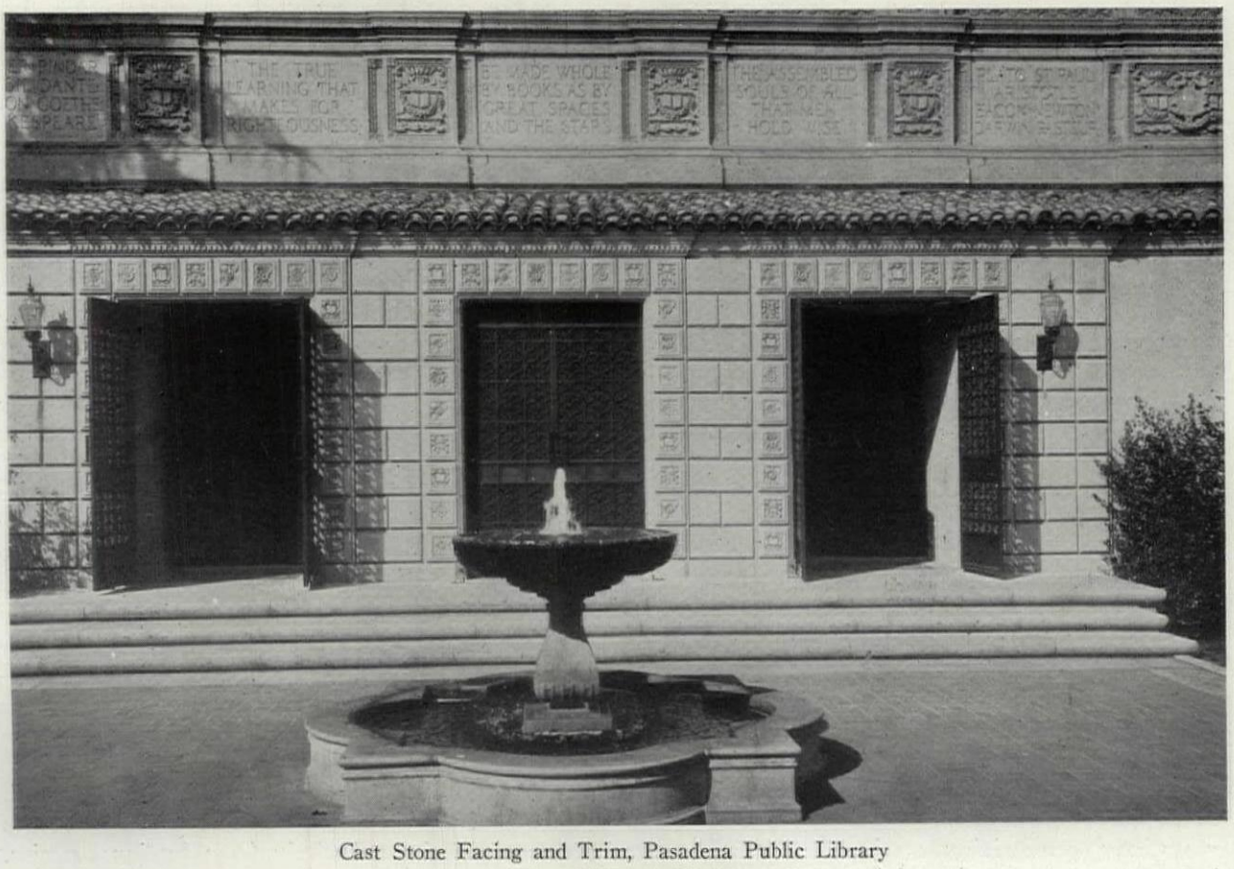
BY

JOSEPH B. MASON

THE chief obstacle to architectural use of cast stone in the past has been the difficulty architects have found in specifying this material. Adoption of standard specifications should remove this drawback. Thirty-four of the leading manufacturers of cast stone, art marble and similar products met during a recent conference of the American Concrete Institute at Philadelphia and agreed to form an Association of Cast Stone Manufacturers, the first task of which will be the establishment of standard specifications for cast stone. Another task of the new Association, we are told, will be the elimination of the confusing multiplicity of names now used to describe the various concrete stones on the market. So rapid has been the development of the use of cast stone and allied products in the past few years that we can hardly afford to longer ignore the fact that for certain purposes and under certain conditions their use is practical and desirable. There is a place for these products, and it would seem that those architects who have not already familiarized themselves with them should do so now, if for no other reason than that they desire to keep abreast of developments in the profession. Natural stone is and probably will continue to be satisfactory, but this fact does not preclude the development and use of interesting new cast stone products which have a wide range of uses. At least let us make ourselves aware of the possibilities that lie in their use.

One of the handicaps that manufacturers of cast stone have had to meet is the prejudice of some architects unfamiliar with the product, who regard it as imitation of natural stone and who, from lack of information, are not willing to believe that it has merit of its own. Many architects feel that there is only one reason why the use of cast stone should be considered, and that is its low price. This I do not believe to be true. There is a place and a use for cast stone on its own merits alone. The colors, textural effects and structural qualities of cast stone scientifically made are such as to meet an architectural need which, regardless of price, makes its use desirable. Then, too, there are instances where a particular color or quality of stone is required for a particular use at a time when other surfacings meeting these qualifications are absolutely unobtainable.

I have in mind an architect who wanted to use a certain buff sandstone on winter work which it was imperative be rushed to completion. The quarries from which this stone could be obtained were closed, and it was impossible for him to get it at any price. Here was a case where he was forced to call upon



Cast Stone Facing and Trim, Pasadena Public Library

Myron Hunt, Architect

Intricate Design in Cast Stone, Fine Arts Building, San Diego
Templeton, Johnson & Snyder, Architects

the makers of cast stone. He got in touch with a manufacturer who studied the problem and prepared a variety of samples. Absolute control of color and texture made it possible for the manufacturer, coöperating with the architect, to produce a cast stone of the exact nature desired, at a cost somewhat under that of the product which the architect had been making such a strenuous effort to obtain. It was no reflection on the competing material; it was, however, a demonstration of the triumph of man's ingenuity over nature and the barrier she has long maintained. Coöperation with architects is activity which forward-looking manufacturers of cast stone have encouraged in recent years to their advantage. The larger and more reliable companies now maintain drafting departments and consultants with a thorough understanding of architectural detail to render service to the architect and builder. This department assists in the selection of design of the various types of units. It assists in the preparation of estimates, in the taking of measurements incidental to the designing of special pieces, in the preparation of samples, of large scale drawings correctly interpreting the architect's plans, and in many other matters. Clay models are made up to be approved by the architect, either by actual inspection or by photographs.

In fact, the making, marketing and placing of cast stone have become a very complex and scientifically controlled industry. The constant effort of several of the larger manufacturers who for more than 20 years have been striving to raise the standard of the industry and the quality of its products, has been largely responsible for its strength today. The years of experiment and trial have developed scientific procedures which leave very little to chance. The careful selection of aggregates; the care in grading to secure utmost density; the crushing which is designed to give a cleanly broken or shattered aggregate rather than a pulverized material; the scientific application of thoroughly tested formulæ for both color and proportions; and in general the exactness and thoroughness of the entire process which places it on a high plane of mechanical perfection, make the cast stone products of today tangible, definitely known quantities which can be relied upon.

It is the men who are scouring the country for unique and beautiful natural stone to use as aggregates, who employ geologists and chemists as well as other competent technical men to assist them in making a stone which is in itself unique and beautiful, who interest me. In his heart no architect likes to or wants to imitate one material in another, and usually he will do so only when forced to for economy's sake. It can be done, as in the case I have mentioned, but it is not the aim of enlightened manufacturers to produce a cast stone that is merely an imitation. They realize that cast stone will not reach its highest development until it is recognized as a material having characteristics of its own of definite quality and capable of producing definite results both artistically and physically.

It is in the selection of the aggregates which they use in making cast stone that manufacturers are escaping the stigma of imitation. They search the country over and even hunt out the forgotten quarries of foreign lands in an effort to get stones. The result is that now they are giving us cast stone with colors and textures long ago given up by architects as being impossible to secure. A certain western manufacturer of cast stone recently employed a corps of geologists and conducted a minute search through a dozen states within shipping radius of his plant. In this search he found a number of natural stones with proper degrees of durability, hardness and texture, and what is extremely important, of proper color. He is now operating eleven small quarries which enables him to make cast stone of remarkably attractive color and texture. Many of the world's most beautiful natural stones, and those most desirable because of their durability and hardness, are no longer obtainable because of their scarcity or extremely high cost. Cast stone manufacturers are making a definite effort to supply architects with stone of this character. Igneous stones, occurring in broken or irregular veins so that they cannot possibly be quarried in pieces large enough for architectural use, are employed for this purpose. They are often taken from distant and sometimes almost inaccessible deposits, but the expense is justified in the quality and individuality of the product thus secured.

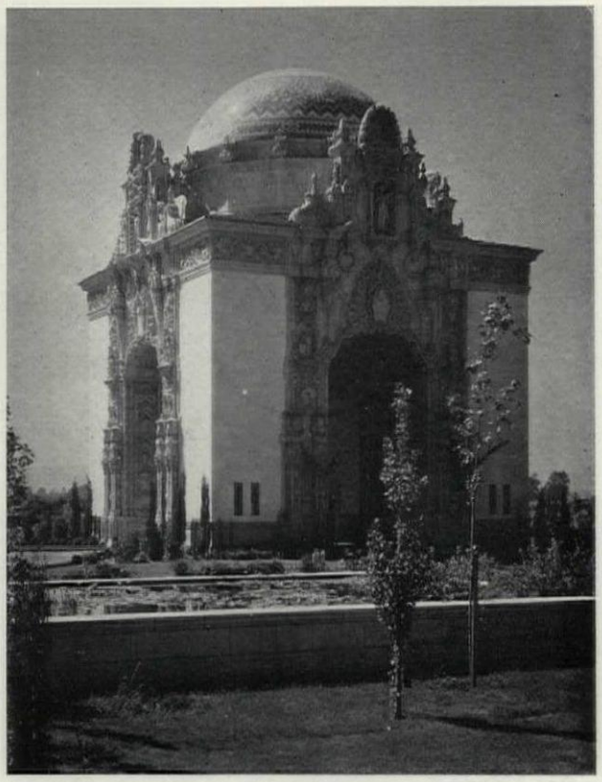
Much of marble as well as other expensive stones are obtained almost entirely from foreign quarries. They are selected for color and texture in addition

to the qualities which will produce a cast stone of strength and durability. Color is of course a very important consideration. The best cast stones are those which rely for their tints upon the natural color of the selected aggregates. Mineral pigments are used in small quantities to shade the cement mortar, but it is upon the natural hue of the aggregates that most cast stone relies for its colorful effect. Combining different shades of crushed stones or marbles according to formula, the producers obtain color effects which heretofore have been obtainable only in very rare natural stone.

To go into the extensive details of manufacture of the numerous forms of cast stone would convey a convincing picture of the care with which the products are made and would undoubtedly raise their standing in the eyes of architects who appear to believe that they are thrown together in a most haphazard manner. But such a description would be beyond the scope of this article. It will be enough for me to point out that the investment in machinery, equipment and buildings in a modern cast stone plant in many cases is in excess of half a million dollars, that the average for 200 plants is somewhat over $40,000 each. These companies, equipped as they are with efficient and complex machinery, take elaborate precautions in the selection and grading of the materials, in crushing, and in the final preparation and mixing of the concrete. Extensive systems of moulds, great curing rooms, and powerful finishing machinery are required. The largeness of the investment and the reputation which the manufacturers are building up slowly but surely, make it imperative that they supply reliable, satisfactory stone, and make them willing to stand behind the product with a guarantee that should please the most exacting purchaser.

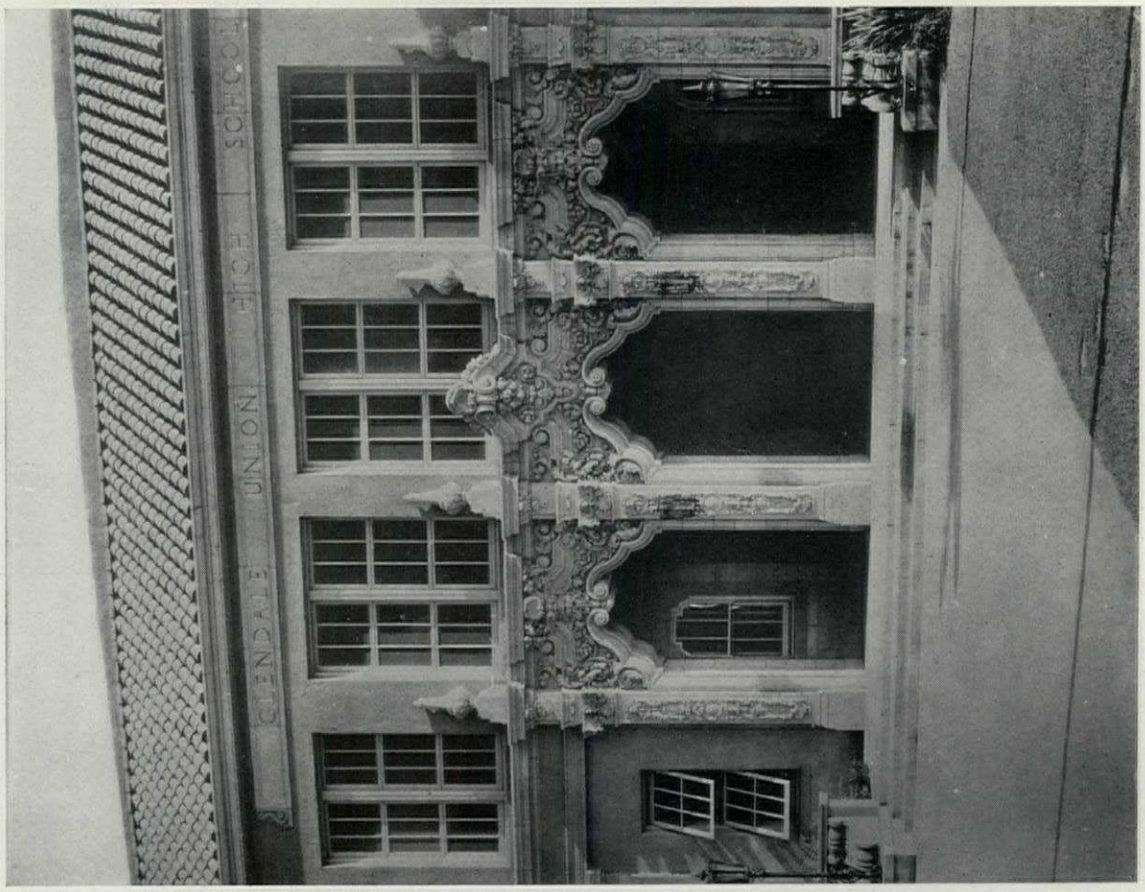
One of the interesting characteristics of cast stone is its adaptability to receiving numerous surface treatments. After proper curing, the flint-like product may be tooled or dressed in the same manner as natural stone, or the surface may be treated with acid to give an exposed aggregate effect. The architect may decide upon a particular color and textural surface, go to a manufacturer, and through coöperation with his service department perfect a stone which will exactly meet his requirements. Many of the manufacturers not only assume the task of perfecting a surface material which will exactly meet the need of any given work, but will assume the responsibility for installation. They will contract for the material in place and guarantee the installation.

I have said that cast stone has certain merits that make it desirable in itself, regardless of price. Before concluding I will outline some of its merits. First, I should say, is the close control of color and texture which enables the architect to specify the exact shade or finish he desires in a structure. Next in importance, possibly, is the fact that once the mould has been made, a given product may be turned out in great quantities at a constantly decreasing cost. That is, extensive ornamentation which calls for a repetition of a single pattern is possible at very low cost. From one mould hundreds of pieces may be made. Another excellent quality of cast stone is that it may be reinforced with steel so that it will carry a structural load while at the same time retaining its architectural value. The units are easy to handle, due to the fact that metal-carrying rings are embedded in the concrete before it sets. These rings are so arranged that when the unit is supported by cable it hangs at the exact angle at which it is to be placed. Cast stone may be made into most difficult patterns and shapes without incurring excessive expense, and it may be cast in thin, flat slabs of a size entirely impractical in natural stone. A piece having extreme projections in two or more dimensions may be constructed with comparative ease, whereas to carve such a pattern would require much labor and a block of enormous proportions. Another practical feature of cast stone is that individual units may be duplicated at any time, since both moulds and formulæ for color and texture are indefinitely preserved by the manufacturer.



Exterior Facing and Ornament of Cast Stone, Valhalla Memorial, Burbank, Cal.
Kenneth McDonald, Jr., Architect

The willingness of the manufacturers of cast stone to keep abreast of the most advanced architectural practice of the day is doing much to increase the use of their products. More than 20 years of development have given us these materials in a form which has been quite thoroughly tried and tested. The increasing emphasis on well executed architecture, significant decorative detail, and on color and textural effect, brings to the profession a need for such a product which is entirely logical and worth while.



CAST STONE ENTRANCE DETAILS
HIGH SCHOOL, GLENDALE, CAL.
J. C. AUSTIN, ARCHITECT

STUCCO EXTERIOR, TRIM OF CAST STONE
HIGH SCHOOL, HEALDSBURG, CAL.
W. H. WEEKS, ARCHITECT

NEW EFFECTS FROM COMMON BRICK

BY
R. S. TILDEN

THE past few years have seen a rather remarkable revival of architectural interest, as well as public appreciation, of common brick as an exterior facing material. Whatever may be the real reason, the fact remains that brick is, especially in the larger building centers, steadily becoming more generally used as a facing material. One of our prominent authorities has recently said that "there is no sound architectural reason why a building should not be brick from ground to roof." The underlying thought is that modern design, in its treatment of mass, tends toward the use of one material, and that brick is sufficiently flexible to permit the expression of individual ideas. It is possible that the examples commented upon in this article may offer suggestions to those interested in accomplishing such a result.

Foreign Brickwork Design. There is at this writing a very comprehensive exhibit of foreign architectural photographs on tour of the country, and the reception accorded this collection in such representative centers as New York, Chicago, Detroit, Cincinnati, Philadelphia and Boston is very conclusive evidence of the appreciation of its value to the architectural profession. Two examples are illustrated here, the first of which is the crematory of the city of Hanover (Fig. 1). While the principal interest to some may lie in the handling of brickwork in the mass, certain of the details of the masonry treatment deserve attention,—that over the doors, for example. The surface is broken by a gable-like treatment, and although each unit projects beyond that next below, all are set back from the face of the building sufficiently to give emphasis by deep shadows. The courses of brick in these projections are at an angle of 45° to the horizontal, while the courses in the cornice and similar points are laid vertically.

The bridge in the city of Hamburg (Fig. 2) shows a rather unusual treatment in the courses just below the coping. The header brick introduced into this basket-weave bond are cut out to a point. The curve of the abutment not only adds to the pleasing character of the design but shows the practical possibility of using curved walls, etc., laid to a comparatively short radius.

Rowlock Courses. The use of brick laid rowlock, or on edge, is not new but offers an opportunity for securing effects differing greatly in the matter of scale from brickwork laid in the usual manner. The bond in the example illustrated (Figs. 3 and 5) is the ordinary Flemish, with a rather wide "rough cut" joint which lends a distinct character to the surface. The entrance door detail shows that not only may

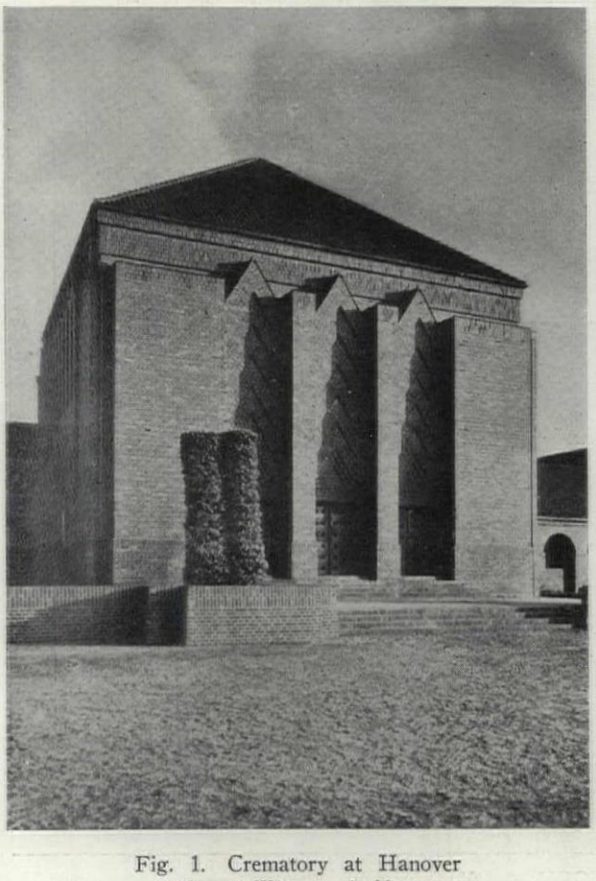


Fig. 1. Crematory at Hanover
Konrad Wittman, Architect

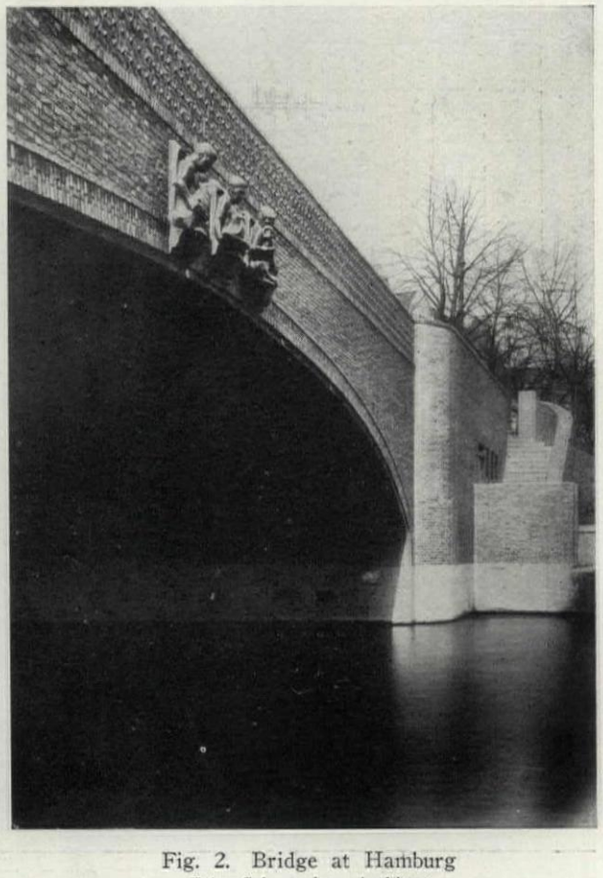


Fig. 2. Bridge at Hamburg
Fritz Schumacher, Architect

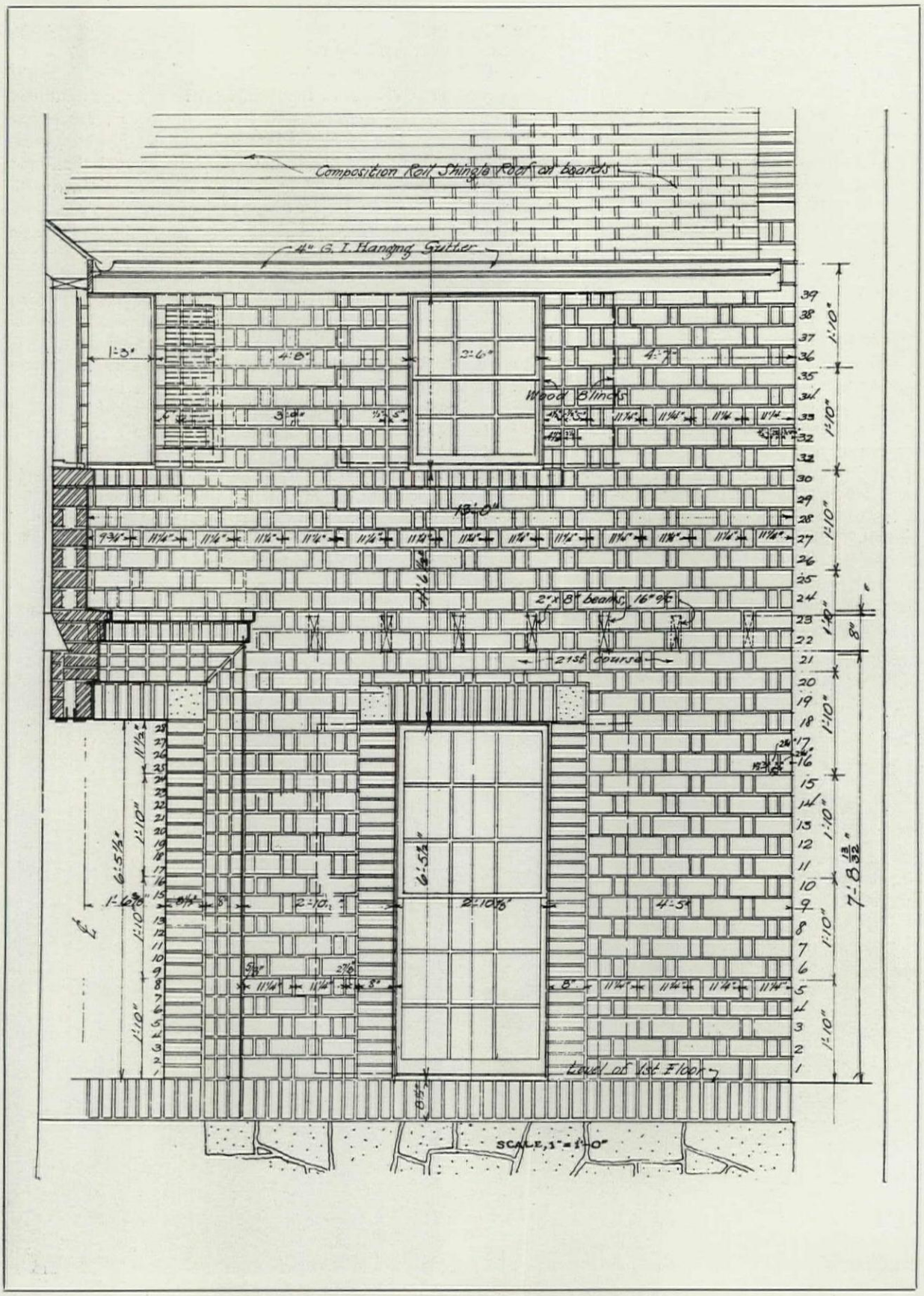


FIG. 3. DETAIL OF BRICKWORK SHOWN IN FIG. 5
HOUSE AT DOBB'S FERRY, N. Y.
THEODORE A. MEYER, ARCHITECT

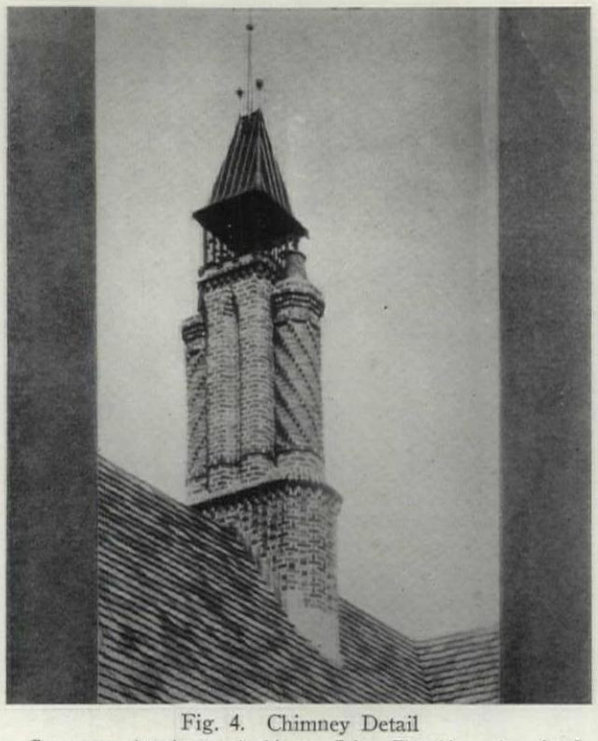


Fig. 4. Chimney Detail
Grosvenor Atterbury, Architect; John Tompkins, Associated

Fig. 5. Entrance Detail
Theodore A. Meyer, Architect

the wall surface prove attractive but that handling of simple projections may produce good results.

Chimney Decoration. The original conception of chimney brickwork serving simply as a protecting and enclosing material for flues is not universal, if some of the accompanying illustrations (Figs. 4, 6 and 7) may be considered evidence. That showing the central flue supported by two flues of circular shape indicates, at first glance, the use of specially shaped brick, but it is both possible and practicable to secure the "spiral" effect simply by projecting adjoining brick on successive courses. The chimney illustration (Fig. 7) showing the niche and the pattern work in the upper part offers a rather interesting sidelight on the frequently heard derogatory remarks as to present-day building trades workers. The bonds and patterns used in the chimney (and in the terrace floor as well) were only sketchily indicated on the details, the idea being to secure the interest of the workers by permitting them to choose the patterns to be laid in the various rectangles. The scheme was successful in obtaining better coöperation between designer and mechanic, not only insofar as this part of the building was concerned, but for the entire work. It might be noted here that the radius of the circular columns is 12 inches and that they are built up by first cutting individual brick in the form of a segment and then laying the column all headers. A help in reducing time required will be found in building a form of wood or other material whose inner diameter corresponds to the outer diameter of the finished column. The brick and mortar can then be laid within the form, one course high and, after setting, the entire course laid as a unit in the column. This same illustration shows, at the eaves of the gable wall, the introduction of "cut" or "splintered" brick, and a somewhat similar idea has been carried out in all of the walls. This is another instance where the exact design and location of these inserts were left to the fancy of the mason, who was not asked to follow any set pattern or to accept any predetermined spacing. The latitude allowed the bricklayer proved profitable in not only securing his coöperation, as already said, but also in doing away with constant measurement and reference to detail drawings, thereby conserving time and reducing cost.

Skintled Brickwork. This type of wall has possibilities for a wide variety of effects, two of which are shown in these illustrations (Figs. 8 and 9, and Figs. 10 and 11). In the first the face is laid in common bond, and little if any effort is made to secure a uniform type of joint. The individual brick are set at irregular distances from the normal face of the wall, the projections varying from flush to plus ¾ inch and the recessed brick from flush to minus ½ inch. In the second illustration the effect is very different, only certain selected brick departing from the usual procedure of being laid "to the line." In this case the projections vary from flush to plus ⅝ inch, none of the brick being set back of the face. It might be noted that both of these examples of brickwork are in the same locality and built with the same kind of brick and mortar. The difference in texture was accomplished simply by using different types of skintling. Other variations may be obtained by neglecting to strike or tool the mortar joints and by allowing the excess bedding mortar squeezed out by "shoving" the brick to permanently remain adhering to the face of the wall.

It has been the custom for many years to set lines

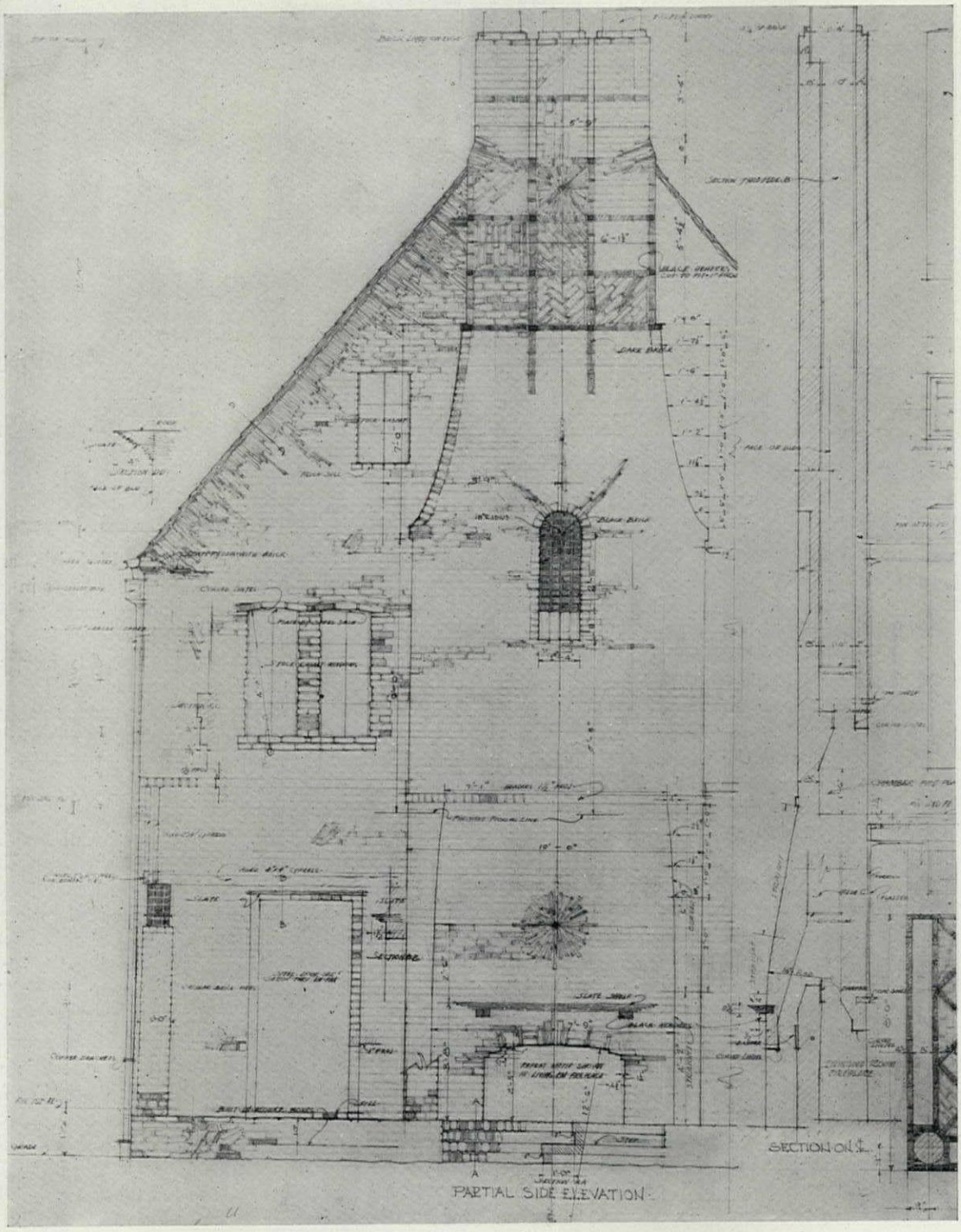


FIG. 6. DETAIL OF BRICKWORK SHOWN IN FIG. 7
JOHN T. BRIGGS, ARCHITECT

Fig. 7. Variety in Brick Texture
John T. Briggs, Architect

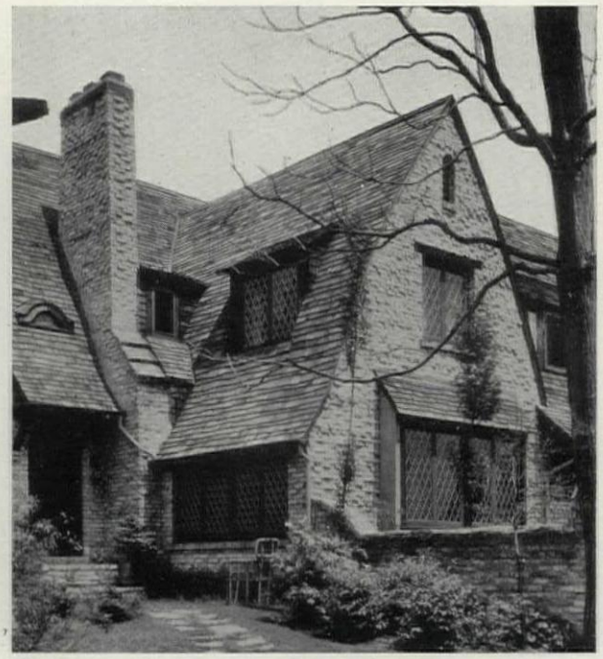


Fig. 8. Skintled Brickwork
S. S. Beman, Architect

for building brickwork with relation to the face of the wall and to make all measurements from this face line. If this method is followed and measurements made for individual brick in erecting skintled walls, the cost will be prohibitive. Lines for this type of wall should be placed at the back line of the wall, which is carried up plumb, and the facing brick set approximately as shown. Do not allow measurements for projections, etc., to be made except by eye. If this suggestion is faithfully followed, the cost of laying skintled walls will not be any greater than that for constructing what might be termed ordinary walls,—that is plumb, with level courses and joints struck one side.

Carved Brick. Such brickwork offers such a wide range of possibilities in connection with the decorative details of buildings that it could well be classed as something apart. The coöperation of architect and carver is, in many cases, closely indicated, and it may be that construction men or mason foremen could be of real assistance in suggesting practical ways of accomplishing desired results. One designed by the architect and executed by bricklayers, indicates some of the possibilities. It is built of the ordinary brick, those in the sails of the ship laid flat (4-inch side out) and the rest on edge, (Fig. 12). Joints were as indicated on the drawings. The carved head is simple, and was done with small chisels by the mason. The white water effect was secured by using a white cement mortar for the brickwork representing the waves under the bow of the ship. The mast, masthead decoration and pennant were of mortar. Both this and a companion figure, representing the stern of the ship, were part of the regular construction contract and were executed by bricklayers forming part of the contractor's regular organization.

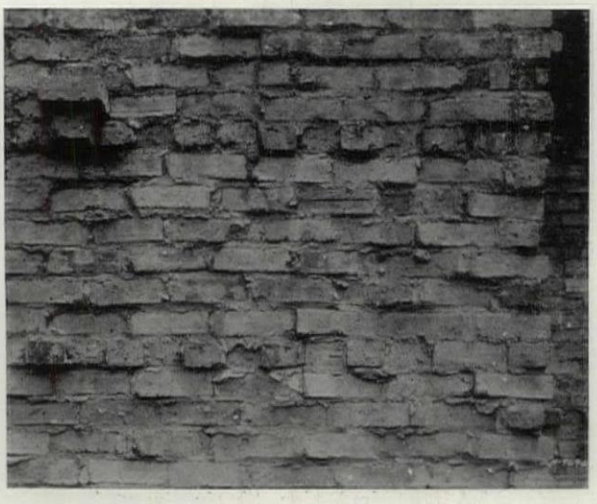


Fig. 9. Detail of Brickwork Shown in Fig. 8

The examples shown here, illustrating modern work in design and brickwork, are naturally but an infinitesimal fraction of those existing. Probably the most convincing demonstration of the interest this material holds for present-day designers could be had by looking out of windows in the upper floors of the taller buildings in any city and noting the many examples of decorative brick detail in buildings erected in recent years. To one familiar with the trend of architecture in a given city, it is possible, by noting the materials used to secure decoration, to name with a fair degree of accuracy the date of construction. One man noted for the excellence of his brickwork recently remarked that if designers would devote

Fig. 10. Detail of Brickwork Shown in Fig. 11
Russell Walcott, Architect

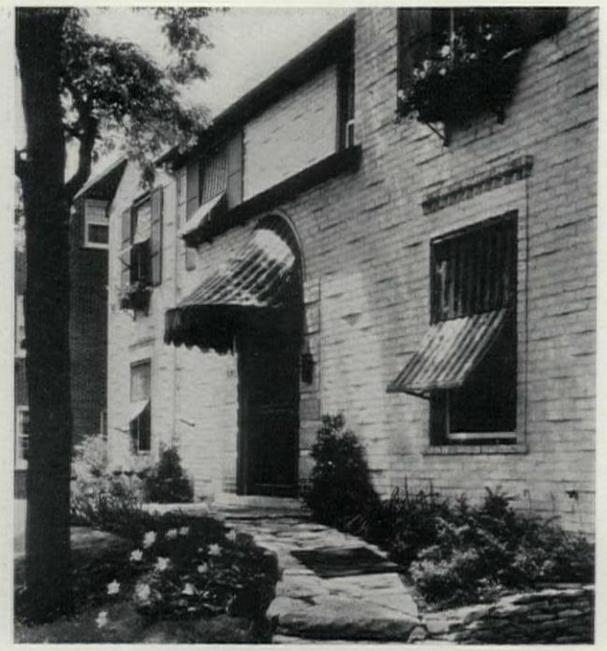


Fig. 11. Skintled Brickwork
Russell Walcott, Architect

more careful and conscientious effort to brick detailing, the time would be well repaid, resulting in more artistic buildings and lower costs to clients.

A building now under construction in the Grand Central zone of New York is a forerunner of what we may expect to see in the yet-to-be-built commercial buildings of America. In this particular design the facade above the second floor presents the effect of a series of parallel vertical planes. These are emphasized not only by the varying depth of projections but by a selection for shade of the brick used. This results in one vertical plane providing a contrast by the use of darker brick, while the adjoining plane uses brick of a somewhat lighter shade.

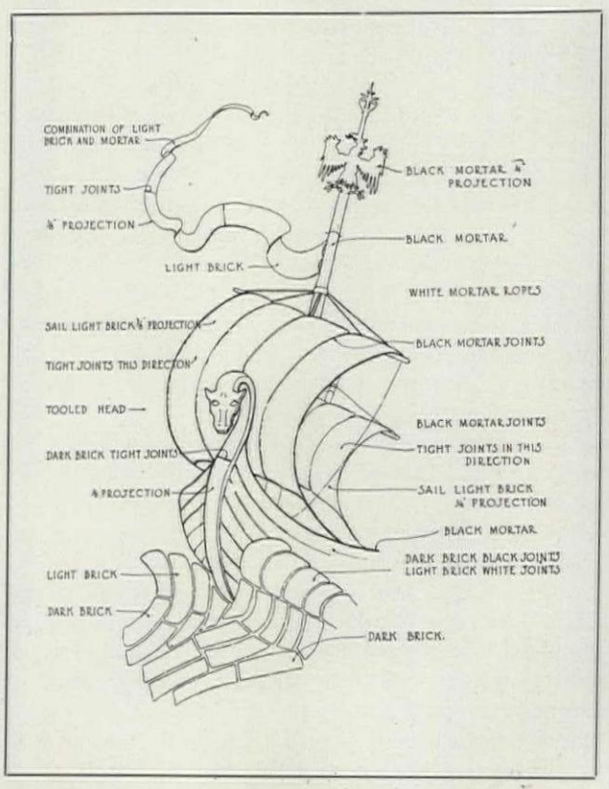


Fig. 12. Detail Used by Bricklayer in Executing Ship Design

Fig. 13. Ship Design, Simply Executed
John T. Briggs, Architect

BETTER STUCCO HOUSES

BY

ARTHUR C. ALVAREZ

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DURING the last decade use of the timber-framed stucco house has become established architecturally throughout the United States to a very wide extent. There are several very good reasons for the development of this type. It is comparatively low in first cost, and also in final cost, if correctly and carefully built. Architecturally and structurally it lends itself readily to the interpretation of a number of charming types of domestic architecture, notable among which are the English half-timbered cottage, the Spanish town house and farm house, the Italian villa, the Moorish house of north Africa, and the adobe pueblo structure of the southwest. By the incorporation of certain features in its structural design, at a comparatively slight additional expense, such a house may be made practically earthquake- and hurricane-proof. By their very nature, its exterior walls are fire-resistant to a considerable degree; and if care is taken with the stucco coating, its first cost will be its only cost; there should be no need of applying, later, paints or other preservative coatings in order to render it leakproof.

Because of its many desirable features, the demand for this type of house will increase to an amazing extent. The invested capital which it represents, large as it is at present, will amount to an enormous sum. Therefore, any structural details that will add to its life, whether it be exposed to freezing atmosphere, excessive rain, fire, severe earthquakes or hurricanes, should be of vital interest to architects, home owners, insurance companies and bankers. It is the purpose of the writer to outline how present building practice may be improved, so as to make the timber-framed stucco house more resistant to the severer exposures, and longer lived under ordinary conditions. These remarks will apply only to dwellings from one to three stories in height. No attempt will be made, nor is it necessary, to set forth comprehensively and in detail, the complete structural plans and specifications for such a house; instead, critical requirements will be outlined and discussed under the headings: (1) Foundations; (2) Framing; (3) Chimneys; (4) Stucco Covering.; (5) Roof Covering. The present article will deal with foundation and framing; a subsequent article with the three remaining subjects. The very severe earthquakes that occurred in 1927 in the Crimea, and more recently in Bulgaria and Greece, remind us of the ever-present earthquake hazard. In the Bulgarian earthquake more than 100 persons were killed, and more than 600 injured. The complete ruin of more than 13,000 buildings left about 295,000 people homeless. In the vicinity of Yalta, in the Crimea, more than 75 per cent of the buildings were completely demolished. On an average, about 50 destructive earthquakes occur every year throughout the world, and their location is not limited to foreign countries. It therefore behooves wise and provident architects and investors to build accordingly.

Foundations; Essentials for Resistance to Earthquakes. The reliability of the foundation being of prime importance, it is the first matter that requires consideration. The term "natural foundation" will be used here to designate the character of the terrain in which the excavation is made for the concrete foundation. Types of natural foundation are sand, clay, gravel, sand and clay, sand and gravel, gravel and clay, loam, mud, and the various kinds of solid rock in place. Solid rock in place is of course the best natural foundation for a structure in a region subject to severe earthquakes, because solid rock vibrates only elastically during an earthquake, by which is meant that the rock does not usually suffer a permanent dislocation as a result of the shock. Furthermore, the amplitude of vibration or amount of the swaying of solid rock is less than for any of the looser materials. During severe earthquakes a building that rests on loose sand, alluvium or river bottom sediment, marsh, or deep recent fill, such as frequently occurs on building lots as a result of street grading operations, will be violently shaken and may be permanently dislocated. Even if the frame remains intact, much damage to plastering and brick chimneys is likely to occur unless special care be taken in the design of foundation and chimneys.

Of course, for well known and obvious reasons, the areas of the different parts of the concrete foundation in plan should always be carefully arranged by the architect so as to be proportional to the vertical loads distributed over them. This is particularly necessary for foundations in the looser soils, such as marsh and alluvium, so that unequal settlement of the building, as the result of a strong shock, will be minimized. In the majority of cases a natural foundation of solid rock does not occur on the site at a reasonable depth for the type of structure under consideration. A large number of the residences in many cities must be located on talus slopes, alluvium or made ground. In order to reduce the earthquake risk to a minimum, when building on hazardous natural foundations such as these, certain precautions should be taken:

1. The natural foundation should be kept as dry as possible by drainage, wherever that is feasible. The value of drainage in reducing the susceptibility

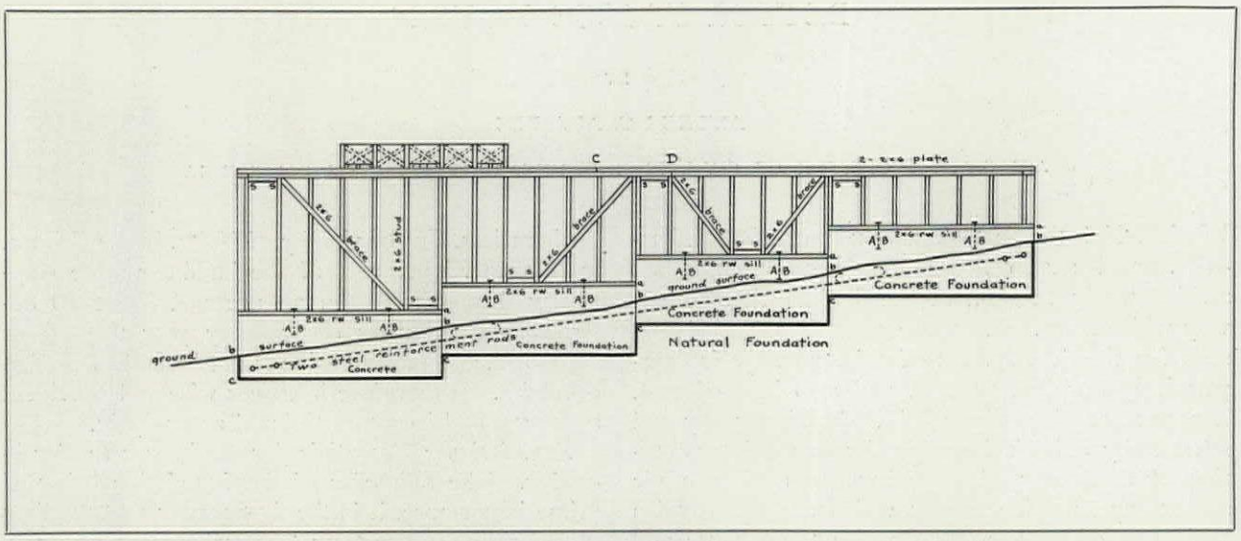


Fig. 1. Properly Braced Underpinning on Reinforced Stepped Foundation, with Anchor Bolts

of a soil to vibration is very great. The opportunity to drain a soft wet foundation for a house in a region of seismic disturbances should never be neglected.

2. The bearing pressure of the soil should be made very low; for example, one ton per square foot for foundations 3 feet and less in depth; one and one-half tons per square foot for foundations of more than 3 feet in depth. Since both the weight of this type of house and the magnitude of the loads applied within it are comparatively small, this requirement will not lead to excessive dimensions for the concrete foundation.

3. The foundation should be made deep. For example, assuming a flat alluvium site on which it is proposed to erect a residence of some size and cost, if the concrete foundation reaches to a depth of 6 or 8 feet in the alluvium, the building will be shaken much less violently than if the concrete goes down only 2 feet. Since in localities of soft clay it is necessary to place the base of the concrete foundation below the frost line, which, in the northern states ranges from 3 feet ordinarily to a maximum depth of 6 feet in extreme cases, this suggested depth of 6 or 8 feet, in order to reduce earthquake effects in treacherous regions, is not an excessive requirement. In order to gain the added bearing power that accrues from going to a greater depth with the concrete foundation in a soft natural foundation, the actual area on which the concrete bears must have its lateral support balanced, either by material superimposed to the same height on each side, as shown in Fig. 5, or, if the entire basement is excavated, by a reinforced concrete floor capable of resisting the conjugate upward pressure necessary for such lateral support, as in Fig. 6. The greater the bearing power of a natural foundation, the less disturbance will it suffer during an earthquake. For this reason, depth of concrete is desirable for a foundation in soft material. Where the depths differ on two sides of a concrete foundation, as in Fig. 7, the smaller of the two depths determines the bearing power.

4. The concrete foundation should be reinforced with some steel rods placed longitudinally. By thus enabling the concrete to bridge any soft spots in the natural foundation, this will tend to prevent unequal settlement, with its consequent damage to plastering. Such reinforcement serves also the important function of tying together the different parts of the concrete foundation, and would thus prevent the lower ends of the underpinning from spreading if the concrete should crack. The least amount of such steel for the shallowest proper depth of concrete is two $\frac{5}{8}$-inch corrugated rods, one placed 3 inches below the top surface of the concrete, the other the same distance above the base, since at different cross sections of the concrete longitudinal tension, due to unequal settlement, is as likely to occur at the top as at the base. For a concrete foundation ranging from 4 to 8 feet in depth, there should be two $\frac{3}{4}$-inch steel rods near the top, and two near the bottom. The rods should be overlapped at least 2 feet; their ends should be hooked into 180-degree bends, 6 inches in diameter. The overlap should not be placed at the corners of the foundation, but the rods should be bent around the corners of the foundation so that approximately the middle of the length of the rod is at the corner.

5. To prevent sliding during an earthquake, the excavation of the natural foundation should be stepped wherever the site is sloped, as illustrated in Fig. 1; the excavation should not be sloped as shown in Fig. 2. Another particularly precarious type of natural foundation is deep clay on a steep hillside watersoaked with seepage. Complete under-drainage and deep stepping are absolutely essential, because numerous are the instances in which houses on such foundations have slid, even in the absence of earthquakes.

Fig. 1 illustrates the minimum concrete foundation requirements for an earthquake-resisting two-story house located on a well drained compact sand-and-gravel natural foundation in a region where

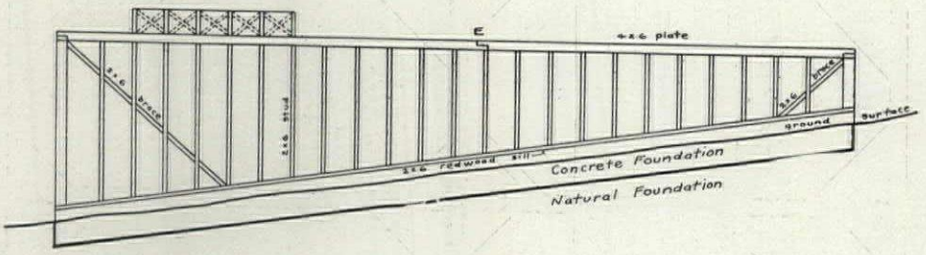


Fig. 2. Poorly Braced Underpinning on Sloping Foundation, without Anchor Bolts

neither freezing temperature nor hurricanes are likely to occur. To prevent decay of sill and base of underpinning, the vertical distance, *ab*, should be made a minimum of 8 inches; *bc* should be a minimum of 15 inches. If the natural foundation is clay or adobe, whether slightly sloped or level, it should be drained by surface trenching and sub-surface tiling, and *bc* should be between 24 and 36 inches, so that the base of the concrete will rest on a material of nearly constant moisture content. Depth here is important, because changes in moisture content of clay and adobe soils produce such large expansion and contraction, with consequent heaving of the building, that the plastering may be badly cracked. The permanence of a good stucco coating depends on the immovability of its backing.

Where a large amount of concrete will be required for the foundation, the architect should procure samples of the available local sands and crushed rock or gravels, and determine what mixture will give the most economical concrete that has the required strength and water-tightness. The best practice in this regard may be found outlined in a number of publications: (1) "Design and Control of Concrete Mixtures," published by the Portland Cement Association; (2) *Proceedings of the American Society of Civil Engineers,* October, 1924. Where only a small amount of concrete is involved, less precision may be used in proportioning the ingredients. Each cubic yard of set concrete should contain at least five bags of Portland cement. The least amount of mixing water should be used, consistent with ease of tamping the concrete in the forms. The sand and coarse aggregate, whether it be crushed rock or river gravel, should be hard, clean, well graded in sizes, and free from dust, clay or loam. Before adding the cement, these should be mixed thoroughly dry in the proportion of 1 of sand with about 2 of coarse aggregate, as measured by volume loose. The set concrete should be kept moist for at least one week after pouring.

At intervals of about 4 feet, ¾-inch bolts, 12 inches long, should be imbedded vertically in the concrete foundation, as shown at *AB* in Figs. 1 and 4, to provide for anchorage of the sills, which should be drilled to engage these bolts, and tightly bolted with nuts and washers. This anchorage is required because in many instances frame houses have been shifted laterally from the top of horizontal concrete foundations where the sills were not so anchored. In addition to anchorage by bolts, the sill should be kept from sliding longitudinally along the top of the concrete by having alternate short lengths of sill of, for example, 4- or 6-foot lengths, depressed into the concrete for a depth of about 6 inches, as shown in Fig. 4. It is very inexpensive to pour in the concrete to these different levels. If this is done on all sides of the building, and if the concrete foundation has been reinforced, as was previously recommended, sliding of the superstructure from the concrete foundation cannot occur. The non-sliding advantage of a sill, thus bolted and depressed at intervals in the concrete foundation, is assured only if the concrete foundation is reinforced with steel rods. Obviously, the frame of the house should be as securely anchored to the sill as the sill has been anchored to the concrete foundation, the sill thus serving as the structural connecting link between frame and foundation. This can be accomplished most effectively by the use of diagonal sheathing, because "toe-nailing" of underpinning to sill, as commonly practiced, is of doubtful structural value. In order to have ample nailing area, between diagonal sheathing and sill, the sill should be 3 inches thick by 6 inches wide, when the house is taller than one story. A 2 by 6-inch sill is sufficient for a one-story house.

If the basement space is not devoted to any type of occupancy, 2 by 6-inch timber corner crossties at all corners of the foundation, nailed against the top face of the sill, also against the bottom face of the plate or cap of the underpinning, will add greatly to the tenacity and rigidity of the building as a struc-

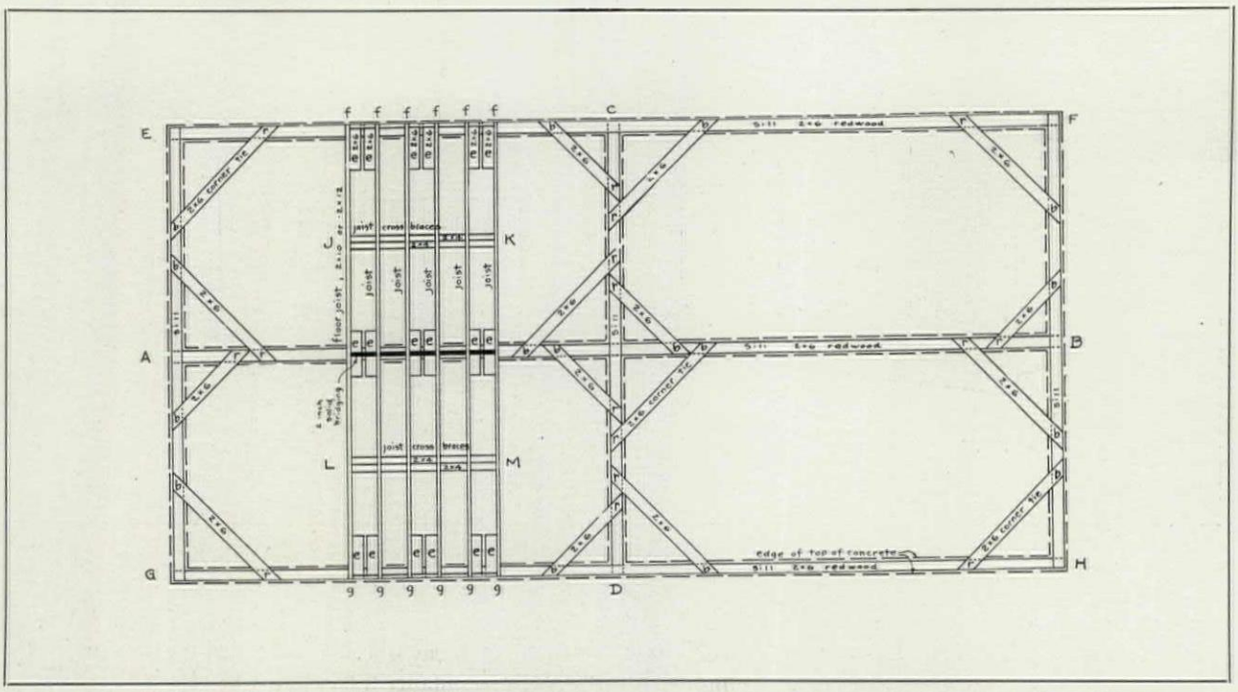


Fig. 3. Corner Ties for Sill and Plate Underpinning. Method of Attaching and Bracing Floor Joists

ture. Such timber corner crossties are illustrated in Fig. 3. To make them efficient, at least five 20-penny spikes should be driven at each joint to sill or cap. The crossties must first be drilled to receive these large nails, as otherwise they will be split, and thus practically worthless for the purpose intended.

Foundations; Essentials for Resistance to Hurricanes. It has been estimated that the maximum velocity of the wind in both the Florida hurricane of September 18, 1926, and the Cuban hurricane of October 20, 1926, was about 125 miles per hour. For safety in storms of this magnitude, buildings should be designed for a wind pressure of 30 pounds per square foot of flat vertical surface exposed; a design pressure of 20 pounds per square foot is too small. This was one of the definite conclusions reached as a result of the examinations made after these storms. In an earthquake, other factors being the same, the horizontal force exerted by a building on its foundations depends on the dead weight of the structure. The heavier the structure, the greater is this horizontal force. Because of its comparatively light weight, the timber-framed stucco house has a great advantage over a brick house in this regard. But in a heavy wind, the horizontal force exerted by a building on its foundation depends on the surface area exposed to the wind. Therefore, because of the light weight of its superstructure, the foundation of a timber-framed stucco house exposed to hurricanes must be made heavy enough to anchor the building against both sliding and overturning. To reduce the tendency to overturn, tall and narrow buildings should be avoided. Where the natural foundation is good, a minimum depth of 30 inches is recommended for the concrete foundation of a one-story house where severe hurricanes occur. This should be increased to 48 inches for a three-story structure. Furthermore, there should be incorporated all the details previously described as desirable in foundations for resistance to severe earthquakes, such as: (1) drainage of natural foundation, (2) stepping of excavation in natural foundation, (3) bolting of sill to concrete, (4) reinforcement of concrete, (5) depression of alternate short lengths of sill in concrete.

Framing Essentials for Resistance to Earthquake and Hurricanes. Some of the structural features required in the framing of a building for resistance to earthquakes are the same as for resistance to hurricanes. There must be a structural frame. All parts of the frame must be securely tied together. The frame must be very rigidly braced against horizontal thrusts in every direction. In addition, for resistance to hurricanes, the wind must be kept out of the building, This means that special protection must be provided for all openings, and that both the integrity and anchorage of exterior walls and roof must be assured. The tying and bracing of the parts of the frame are so important that particular attention should be paid to the structural details that are most effective for this purpose. Methods that should be employed will now be outlined under the headings: Underpinning, Floors, Exterior Walls, Roof. Several of these topics will be considered later.

Underpinning. In buildings of the limited height under discussion here, the bracing of the underpinning is of vital importance. There may be very serious effects of the collapse of the underpinning during a severe earthquake, because of inadequate bracing. It is of equal importance that the top of

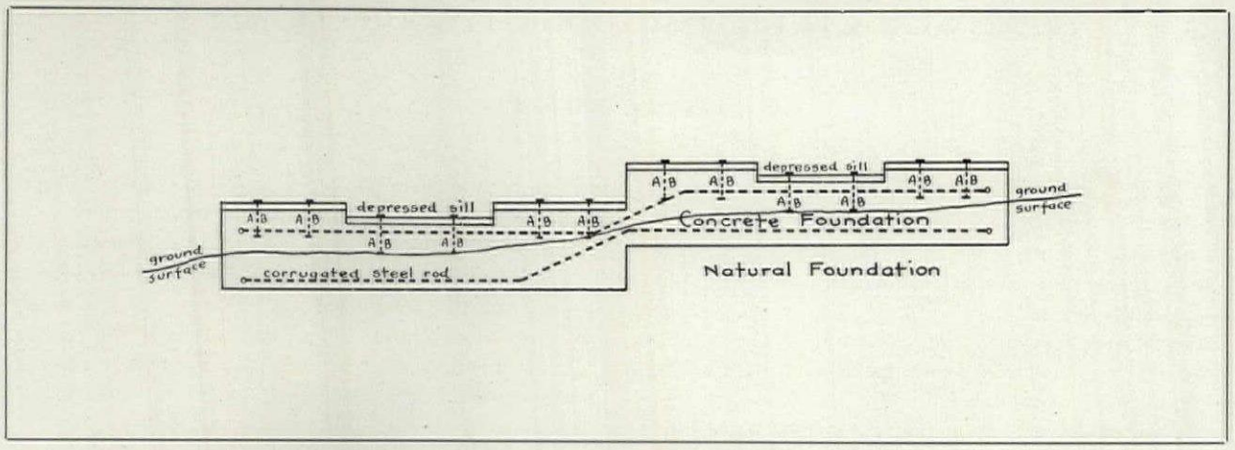


Fig. 4. Sill Depressed in Segments to Prevent Sliding

the concrete foundation be sufficiently high above the ground surface, so that the bracing of the underpinning, originally sufficient, does not become ineffective in time because of decay, due, for example, to gophers' piling up earth against the bracing. The sill should be of decay-resisting timber, such as redwood or red cedar.

For a one-story house, the underpinning should consist of 2 by 4-inch pine or fir studs placed 16 inches center to center; the underpinning of two- or three-story buildings should be 2 by 6-inch studs at the same spacing. All diagonal braces should be of the same sizes as the studs. The diagonal braces should be arranged as shown in Fig. 1, rather than as shown in Fig. 2, which illustrates common practice. The increase in rigidity, thus obtainable at a trifling increase in cost of labor, is very great, as analysis will show. In Fig. 1, note that the diagonal braces are continuous rather than broken between studs, as in Fig. 2; that their ends are double-mitered to blunter angles, which makes these ends stronger in compression than the ends of the braces in Fig. 1, which are only single-mitered; and that there are timber stays, marked as in Fig. 1, of stud size, which can be made very easily and effectively to take up the compressive stresses in the diagonal braces. The stays should be wedged with driving fit between the studs and should be attached to plate and to sill with ten 20-penny nails in each stay. The stays must be drilled to receive these large nails since, otherwise, if they are split by the nailing, their resistance is practically nullified. Assuming the common practice of using three 12-penny nails at each joint of the diagonal braces in Fig. 2, the underpinning, as braced in Fig. 1, can withstand a horizontal earthquake thrust at the level of the plate, that is ten times the safe similar thrust for the underpinning, as braced in Fig. 2. The underpinning of each side of the house should have at least two diagonal braces sloping in each direction, as shown in Fig. 1. The plate of the underpinning should be double, so that long splices, such as *CD*, will permit of sufficient nailing to produce tensile continuity in the plate. With continuity in the plate, the diagonal braces may be placed wherever the absence of openings permits, but preferably not at the ends of the wall, as in Fig. 2. A single-piece plate, spliced as at *E* in Fig. 2, is practically devoid of continuity in tension. Where a building is very long in plan, a transverse foundation, such as *CD* in Fig. 3, supporting a line of braced underpinning, is very advantageous to prevent bulging of the exterior walls at *C* and *D*, due to horizontal thrusts of hurricane or earthquake origin, as it is an efficient reinforcement.

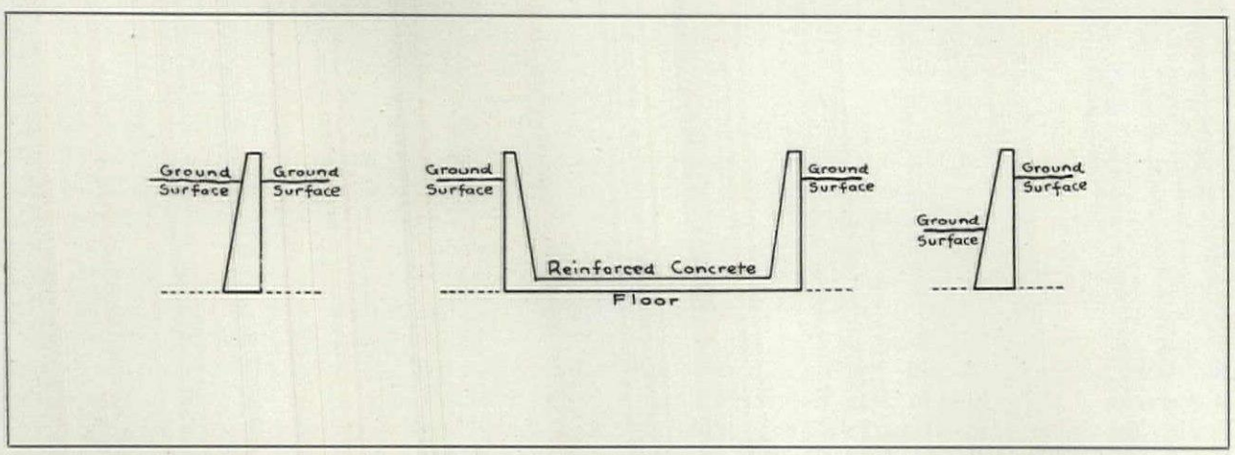


Fig. 5 Fig. 6 Fig. 7

THE STRUCTURE OF INDOOR TENNIS COURTS

BY

FRANK W. SKINNER

CONSULTING ENGINEER

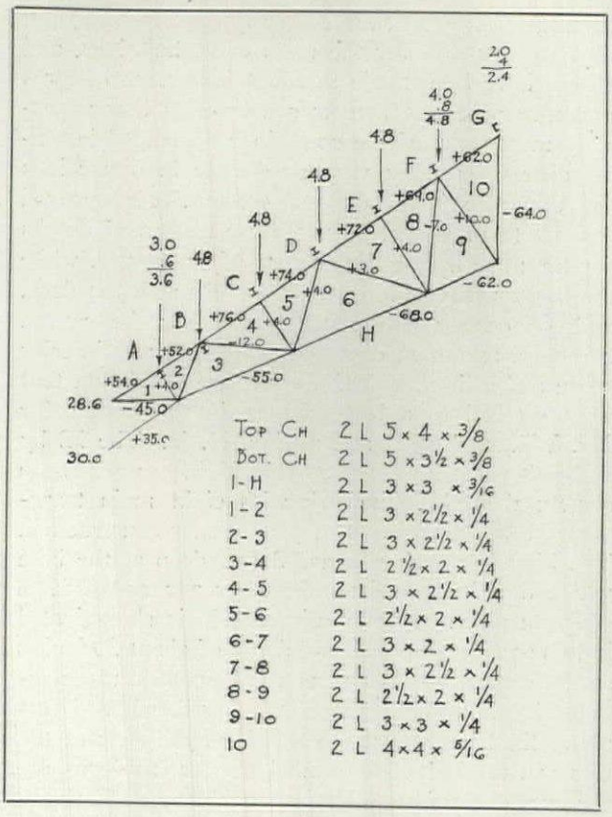
SINCE about 1900 a new type of structure has been developed to meet the requirements of complete shelter and protection for full-sized tennis courts, more than a score of which have been built and others planned for country estates and at high class pleasure resorts,—many on or near the Atlantic coast from Florida to Montauk Point. They have become much more elaborate and complete than mere roofs and walls enclosing playing spaces with ample clearance for full-scale operations. Besides affording commodious arenas for players and spectators, they often provide, usually in wings or extensions, lounges, dressing and toilet rooms, shower baths and other conveniences, and frequently swimming pools, making altogether complete equipments, involving expenditures that may reach from a minimum of about $80,000 to several times that amount.

The essential requirements for all tennis court buildings are an unobstructed, fully enclosed and well lighted area about 50 feet in height by a minimum of about 60 by 120 feet for a 36 by 78-foot standard court with a satisfactory, durable, level playing floor, and reliable first class heating and ventilating systems. As a tennis court is essentially a luxury, usually provided for the pleasure of wealthy owners and their friends and not required to produce financial returns or be limited by strictly economic considerations, it follows that the style, arrangement, equipment and details vary widely with the taste and fancy of the owner, local conditions and the personality of the architect, thus not only permitting but insuring wide variations of construction and equipment, so that no specific types of framing, plan, dimensions or equipment have been generally adopted. Each new building is generally of a new and distinct design. Generally, the longitudinal axis of the building is east and west, dressing rooms are on the north side, wall illumination on the south side, and skylights are in the roof above the whole playing area, those with a southern exposure generally being painted or whitewashed to prevent excessive glare. Owing to the considerable roof span required and the corresponding length of longitudinal bays, it is difficult to construct a satisfactory wooden framework with the usual truss forms, and even if one were built, the weight and fire hazard would be excessive; the bulk would be a serious obstruction to light and would be likely to give a heavy, clumsy effect. The newer form of truss that is a segmental arch made up of a network of short lengths of wood and having steel tie-rods to take the thrust, might be adopted. Such a roof structure was employed at Houston to house the recent Democratic Convention. However, the tie-rods might interfere with the playing, and the problem of skylighting would be serious. The latter problem might be eliminated if clerestory lighting were employed.

One of the covered tennis courts was designed by Warren & Wetmore for Harry Payne Whitney. It has high and heavy reinforced concrete walls, which on all sides are integral at the top with the lower part of the pitched roof which forms an eccentric cantilever structure enclosing an open rectangular space over the court and supporting there a double-pitched large skylight. Recently, from designs by the same architects, there has been built for Marshall Field a steel-framed tennis court building with eight transverse bents having their tall vertical posts in the side walls integral with the pitched rafters, both of plate girder construction; and the rafters of each pair are connected about midway between the eaves and the apex by adjustable horizontal tie-rods. The transverse bents are braced by light longitudinal wall and roof struts and trusses. This type provides rigid construction with riveted or bolted joints throughout, and is suggestive of church types.

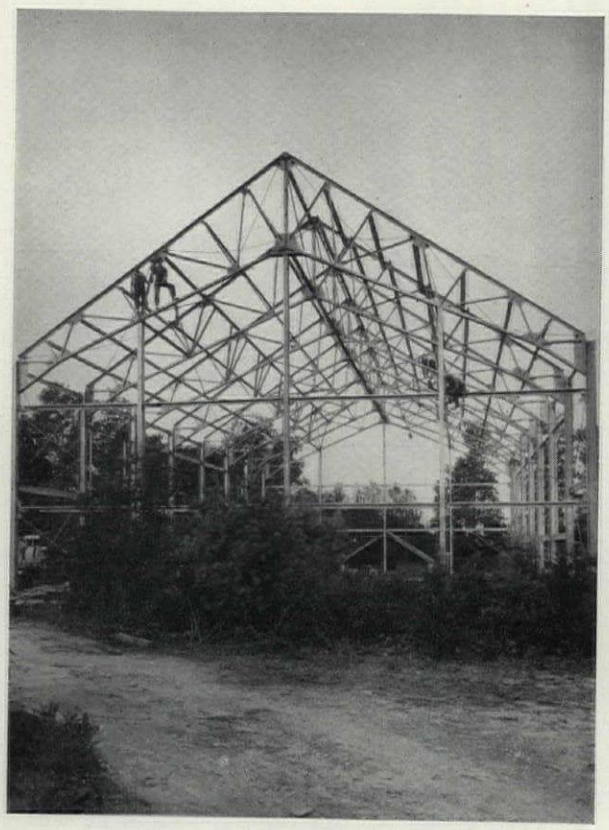
Delano & Aldrich have designed some of the recently built structural steel tennis courts for Henry Rogers Winthrop, Jr., for Harrison Williams, and for John T. Pratt, all of different types, and two of them have attached swimming pools. Mr. Winthrop's tennis court at Woodbury, N. Y., is about 130 feet long, 51 feet high and 67 feet wide over all, exclusive of the porch, 16 feet wide, on the south side. The steel framework weighed about 100 tons. There are eight transverse bents with vertical I-beam columns having deep riveted connections to the end vertical web angles of the light riveted pitched roof trusses, all of the members of which are pairs of angles with 2 to 5-inch flanges, and gusset plate connections. At the top chord panel points there are 12 lines of 7-inch I-beam purlins besides 7-inch channel purlins at eaves and ridge. The end and center panels between roof trusses and the end panels in all four walls are X-braced with 1-inch round diagonal rods; the side wall framing consists of horizontal and vertical channels, and there are horizontal channels and three intermediate columns in the end walls. Over the court there is a double-pitched 50 by 90-foot copper skylight, and the remainder of the roof surface is shingled, as are the walls. The shingles are laid on tar paper covering 7/8-inch matched wall boarding, nailed to 6-inch wooden studs covered on the inside with 1/2-inch insulation. The window sills are 9 feet above the grade of the court, and the steel sash are horizontally pivoted and are operated by vertical rods and gears. Radiators are set on the walls just above the tops of the foundation walls, 3 feet above the floor.

Considerable study has been given to securing the

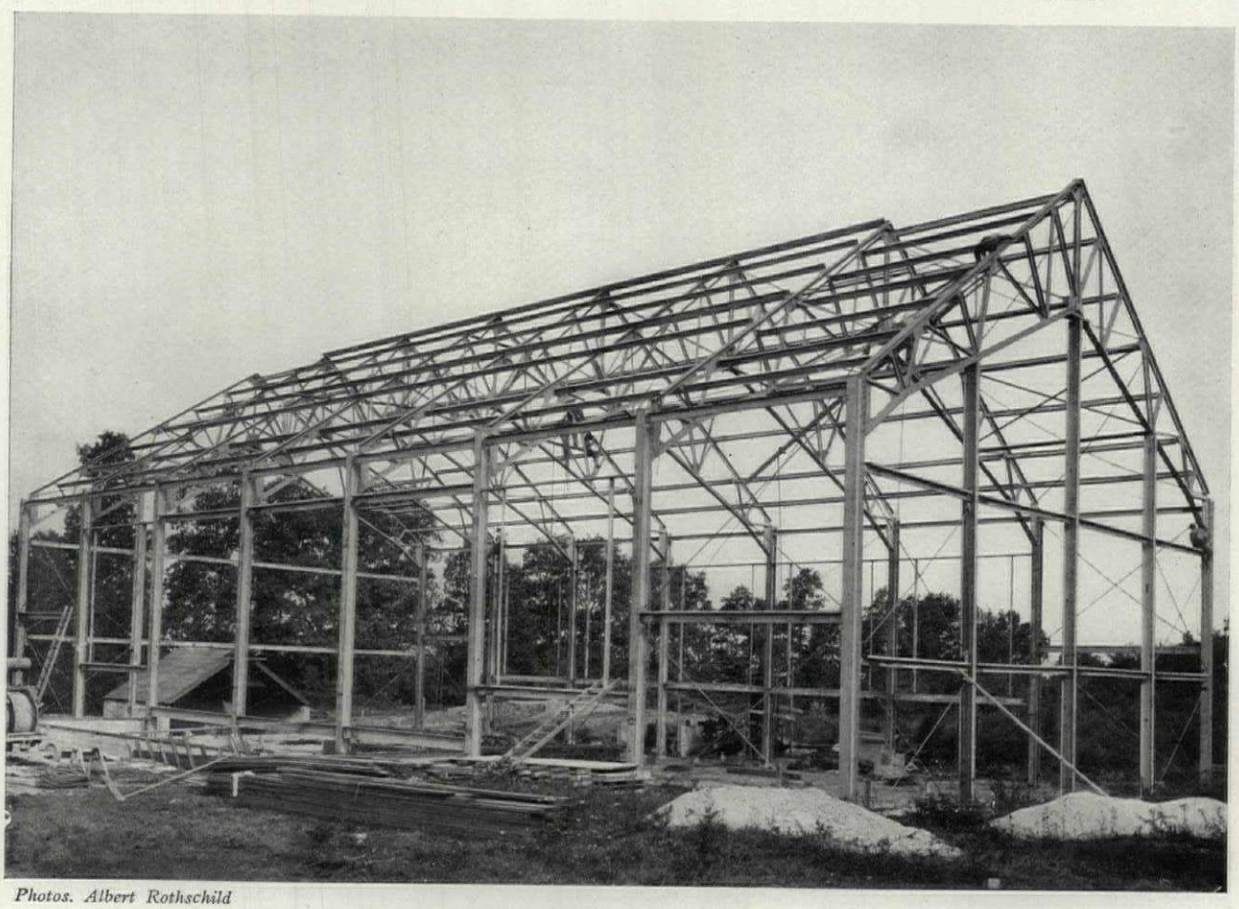


Top Ch	2 L 5 × 4 × 3/8
Bot. Ch	2 L 5 × 3½ × 3/8
1-H	2 L 3 × 3 × 3/16
1-2	2 L 3 × 2½ × ¼
2-3	2 L 3 × 2½ × ¼
3-4	2 L 2½ × 2 × ¼
4-5	2 L 3 × 2½ × ¼
5-6	2 L 2½ × 2 × ¼
6-7	2 L 3 × 2 × ¼
7-8	2 L 3 × 2½ × ¼
8-9	2 L 2½ × 2 × ¼
9-10	2 L 3 × 3 × ¼
10	2 L 4 × 4 × 5/16

TRUSS DIAGRAM



END VIEW OF STEEL FRAME



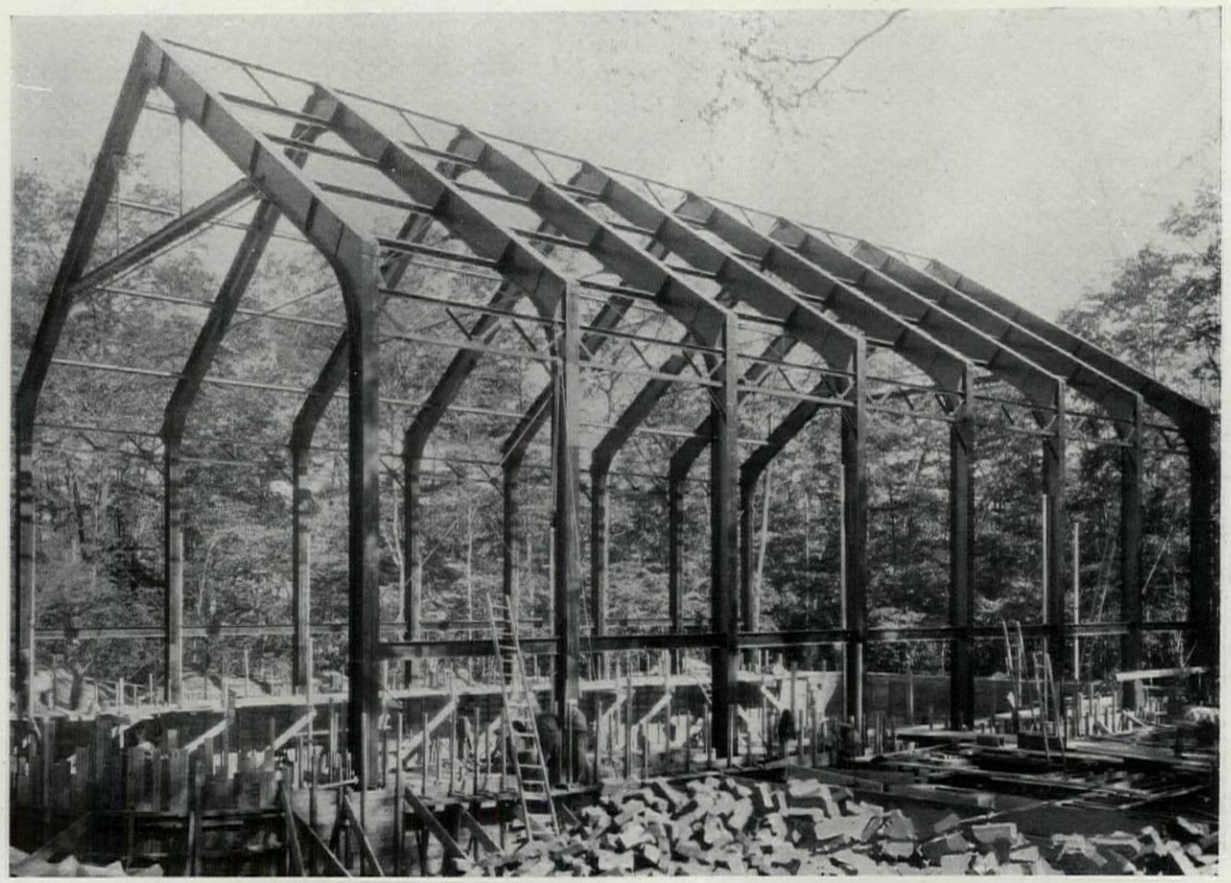
Photos. Albert Rothschild

STEEL FRAME FOR INDOOR TENNIS COURT OF HENRY ROGERS WINTHROP, JR., ESQ.

DELANO & ALDRICH, ARCHITECTS

View of Framework

most attractive and satisfactory type of framing and roof construction for the main court buildings, and efforts have been made to adapt important features of greenhouse and hangar construction that apparently meet some of the conditions demanded in tennis courts, but they vary so greatly in dimensions that they afford little direct precedent. It has proved difficult to modify the greenhouse types and details for the much larger dimensions of the courts, while the hangar trusses have been found much too deep, and to occupy too much space for the courts. Strength, minimum obstruction to light and interior space and a light, graceful effect are desiderata that were secured to a large degree in the design for Mr. Williams' court at Bayville, N. Y. The 72 by 130-foot court building, 50 feet high, has a 230-ton structural steel framework with eight main transverse Gothic arch bents of plate girder construction. The hingeless arch ribs are 3 feet deep at the base where they have horizontal flanges anchor-bolted to concrete piers. Each semi-arch rib is shop-riveted in two sections, tapered to a depth of about 20 inches at the crown, where and at the haunches, there are field riveted splices. The springing line is 8½ feet above the base, and up to this level the ends of the ribs are vertical with parallel flanges, made as are the curved portions with four 6 by 6-inch X-flange angles and ½-inch web plates. The end panels between arch ribs are X-braced with 1-inch round

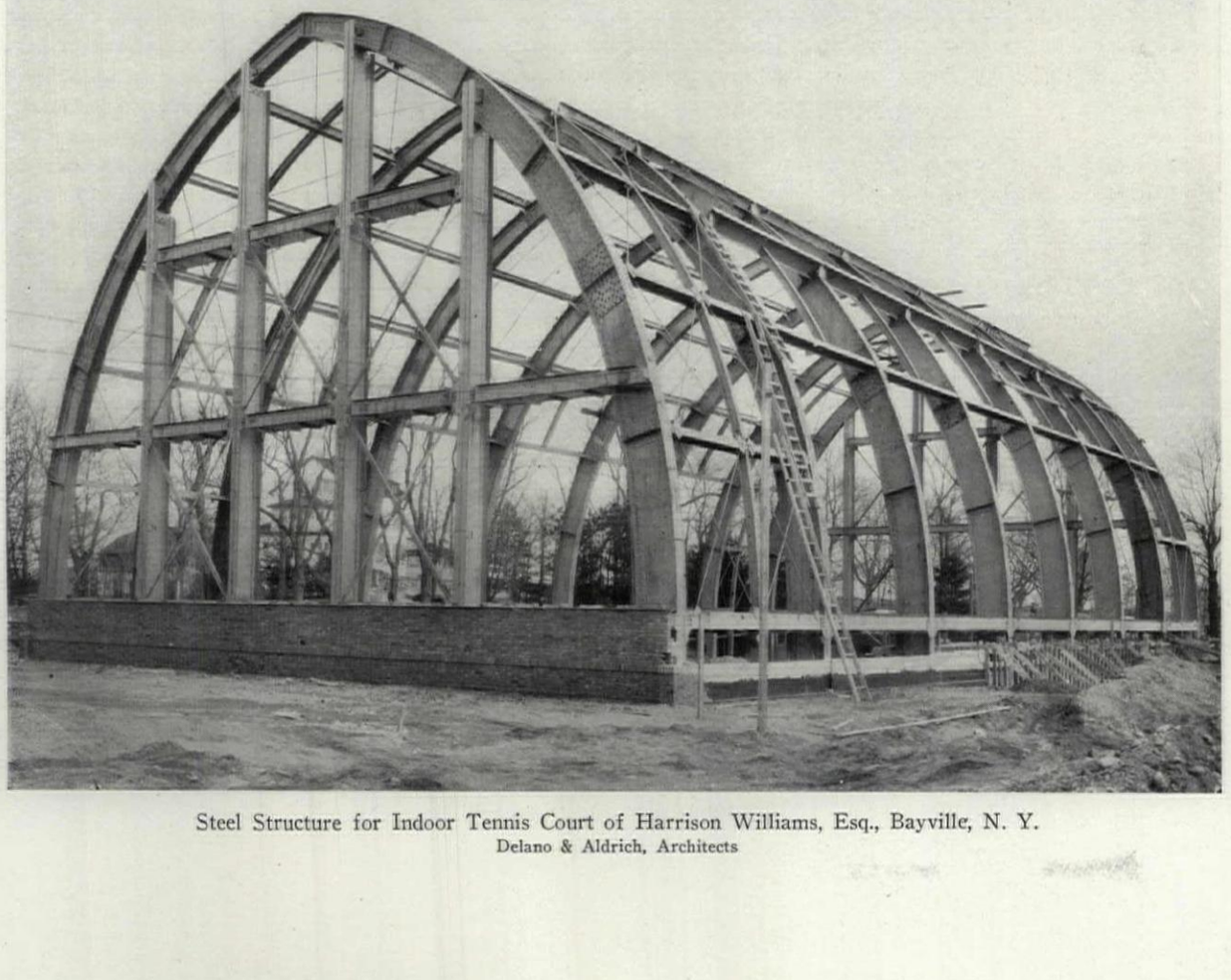


Steel Frame of Indoor Tennis Court on the Estate of Marshall Field, Esq., Huntington, N. Y.
Warren & Wetmore, Architects; Office of John Russell Pope, Consulting Architects

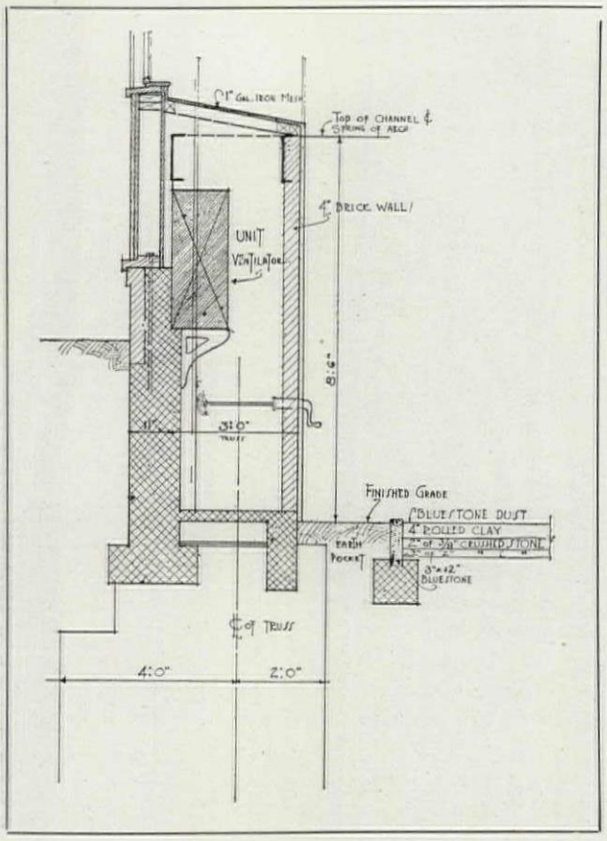
diagonal rods. Each end wall has four intermediate columns with I-shape cross sections, and is X-braced with 3½ by 3½-inch angles in the three center panels. In each side wall there is a double line of horizontal longitudinal channels at the spring line, and above them are 11 lines of longitudinal I-beam purlins, flush with the outer flanges of the arch ribs, provided with nailing strips to receive the 3-inch splined, dressed planks that are slated to form the roof and side walls.

In the center of the roof there is a copper skylight, about 52 feet wide; a wooden lattice with 2½-inch diamond mesh is set about midway between the inner and outer flanges of the arch ribs, concealing the purlins and reducing the apparent exposed depth of the ribs, giving them a slender appearance. The lattice and steelwork are painted in contrasting colors. The thoroughly rolled clay floor has a broken stone foundation and a bluestone dust finish and is enclosed by a bluestone curb. In two of the north side wall bays there are 14 by 14-foot windows with horizontally pivoted steel sash operated by miter gears and rods. Artificial illumination is provided by about 50,000 kw. of 200-watt white lamps and reflectors set in a continuous trough at eaves level, beside which additional lamps light the roof spaces, all controlled by a solenoid switch by which they can all be simultaneously turned on or off. Modulated steam heating units, each with an independent electric blower, are installed along the walls under the

End View of Framework



Steel Structure for Indoor Tennis Court of Harrison Williams, Esq., Bayville, N. Y.
Delano & Aldrich, Architects

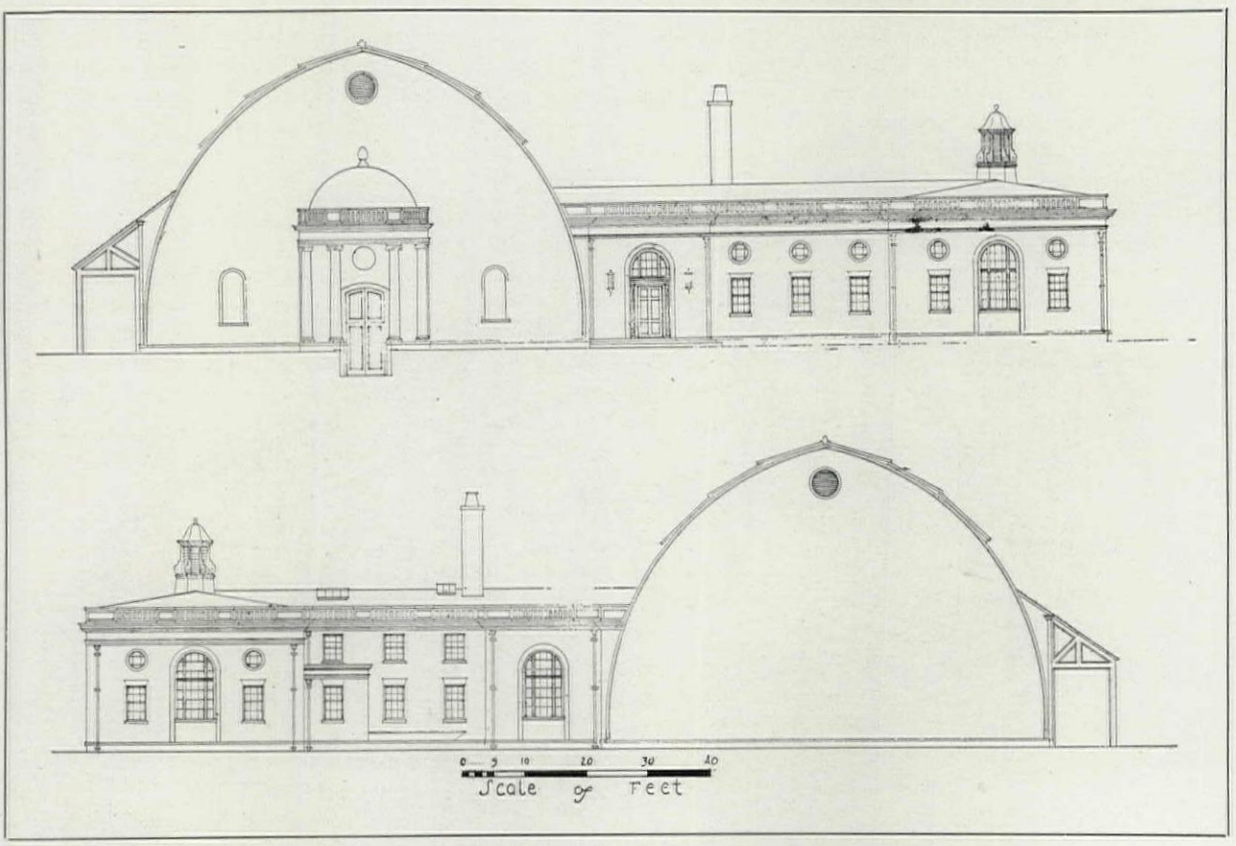


Section Showing Details

high window sills, and are enclosed by an inside brick curtain wall. Between the roof planking and the interior lattice work there is a layer of waterproof paper and another layer of chemically treated hair felt. On the north side of the court there is a 90 by 85-foot two-story extension containing lounge, kitchen, dressing rooms, baths and a 20 by 49-foot tiled salt water swimming pool with complete pumping, heating and filtering apparatus.

The steel frameworks for both the Winthrop and Williams tennis courts were erected in about two weeks each by a foreman and five men, using a guyed steel derrick with 65-foot boom and pneumatic riveting hammers operated by air from a portable gasolene compressor. Since the erection of these buildings, the company that fabricated and erected the steelwork has nearly completed the erection of another tennis court, very similar to the Williams court, for Mrs. H. P. Davison, and in the latter work has handled the structural steel with the 50-foot, 5-ton boom of a crane truck.

The most recent advance in indoor tennis court construction is explained by Gavin Hadden, C. E., in *American Lawn Tennis*, May 20, 1928. In his design the trusses arch the court longitudinally, giving a maximum headroom, at the net line, and come down to anchorages well back of the base lines; a most logical arrangement. The arc of the truss is similar to the arc of the tennis ball's flight.



East and West Elevations

Tennis Court of Harrison Williams, Esq., Bayville, N. Y.

Delano & Aldrich, Architects

HEATING AND VENTILATING FOR ARCHITECTS
ARTICLE IV

BY
PERRY WEST
CONSULTING ENGINEER

IT is not the details of the different kinds of heating and ventilating systems and apparatus with which the architect is primarily concerned. Rather it is with the broader principles and the general scheme of a system which will best fit the particular project which he has in hand. For this reason it is generally better if the architect's genius is employed on a visualization of the general scheme rather than on the making of a plan around some particular kind of system or apparatus. Most experienced architects realize that there is a general weakness toward preconceived ideas that certain kinds of systems and apparatus are necessary, and that these are the important factors in success; for example,—that a certain kind of boiler, pump, fan or heater, or that a vapor system, a vacuum system, a fan system or a split system is the all-important factor. It should be remembered that there are many different kinds of systems and apparatus which may be used with equal success, provided the design and installation of the equipment are proper, and provided also that their care and operation are commensurate with the service which they are intended to render. There are many features and not a few details of every mechanical equipment in which the architect is vitally interested, and it is with these features and details that we shall deal here rather than with those in which the designing engineer is particularly interested. There are certain items of mechanical equipment,—such as kitchen equipment, laundry equipment, hospital equipment and refrigeration which are not, strictly speaking, heating and ventilating items, but which are usually handled with the heating and ventilating equipment. The general features of these will be included.

The personal factors must be taken into full consideration in connection with each installation. The first of these are the owner's preferences and connections, as well as his ideas of the character and quality of the service. The owner must be educated away from as many of his superficial and impractical ideas as possible. Another personal factor enters into the operation and care of the equipment. There should be a definite planning for this by either installing such simple apparatus as may be properly taken care of by the most incompetent attendants likely to be employed, or by arranging for more competent attention to more complicated equipment, either by the owner's employes or through some outside organization. This is perhaps the most important item of the personal problem, as there are more failures of mechanical equipment due to improper care and operation than from any other one cause. Especially is this true of the equipment in schools, hospitals and public or semi-public buildings if they are not under carefully supervised operating departments. All of these primary problems should be solved at the inception of the project. The requirements as to space for apparatus, chimneys, ducts, flues, pipe spaces, etc., should be worked out during the sketching stages and not after the plans are so far advanced that necessary and possible changes cannot be made. This is most important. Lack of proper space and arrangement are responsible for more failures than any other one cause outside of improper care and operation.

Turning now to the different kinds of building projects and the particular features of their equipment with which the architect is vitally concerned, we shall endeavor to cover these briefly. For the more general discussion of the different kinds of heating and ventilating systems, together with their advantages and disadvantages, relative costs and space requirements, the reader may refer to the author's articles in the April and June, 1928 issues of THE ARCHITECTURAL FORUM.

Residence Heating Apparatus. Because of the small size of the average residence operation and the general practice of not employing special expert advice on the heating, a great many of these plants are an annoyance to their owners. There is generally at least one defect in every otherwise satisfactory system, such as an improper chimney, inefficient radiation in one or more of the important rooms, improper air elimination, improper sizes or grading of pipes, too small a boiler or improper location and connection of the apparatus, which necessitates continual attention and the carrying of excessive pressures to overcome the difficulties. It is unfortunate that these conditions exist in so many of our houses where such avoidable annoyances should be eliminated, and where they may be avoided, by giving proper study and thought to the planning. It is impossible to lay down rules here for the complete elimination of these difficulties, but the architect should see that the points now to be taken up are properly taken care of by some one who is competent. The chimney should be of the proper height and size, should be so located as to be as near as possible to a proper location for the boiler and so as not to be interfered with by back drafts from air disturbances caused by adjacent roofs or buildings.

Boilers and Furnaces. The boiler or furnace should be of ample capacity but not so large as to operate inefficiently on the average winter loads. It should be located as near to the center of the load as possible, and be convenient for coal and ash handling. When feasible it should be near the exposed

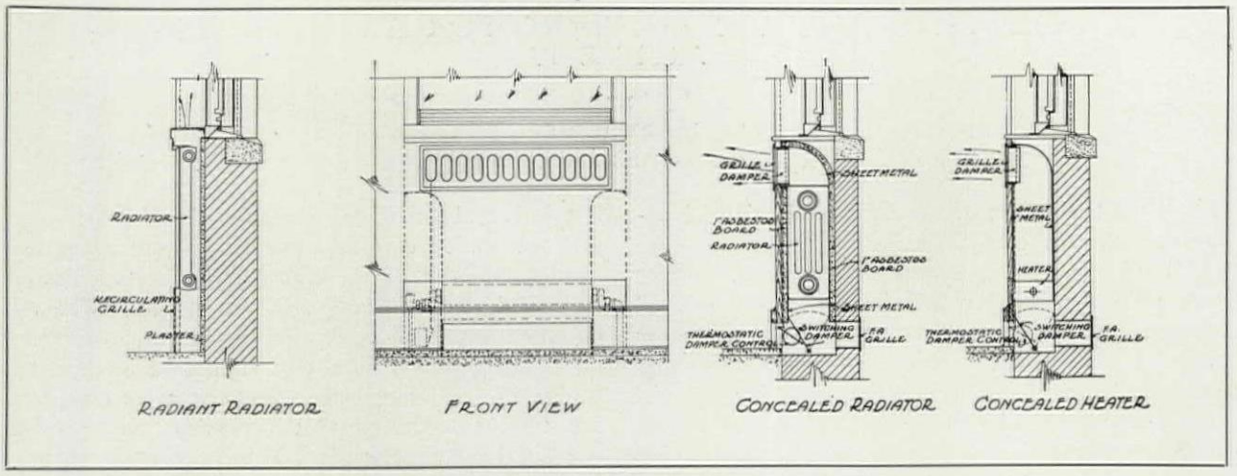


Fig. 1. Sections of Radiant Radiator, Concealed Radiator, and Concealed Heater

sides rather than the warmer sides of the building, and near the breakfast room, dining room, bathroom, living room or any other rooms requiring heat early in the morning or continuously rather than near bedrooms and other such rooms wherein the requirements are less exacting. Boilers for gas or oil should be specially designed for these fuels, as the ordinary coal-fired type of boiler will seldom prove efficient with fluid fuels. The piping should be balanced so that there will not be long runs to some parts of the building and short runs to other parts, since the long runs will require more pressure and longer time for circulation, as compared with the shorter runs. When long runs are unavoidable, separate lines should be used. One way of reducing uneven lengths of runs, in any steam or hot water system, is to run the supply and return mains parallel and with the flow in the same direction, so that the first radiator fed from the boiler is connected to the end of the return farthest from the boiler. This makes the combined length of the supply and return for each radiator practically equal.

Air Elimination. Proper air elimination is one of the most important requirements of any steam system. Securing the best automatic air valves or other automatic air eliminating apparatus is a good investment. Poor elimination of air is not only an annoyance in the matter of the time required for the heat to return to the radiators whenever the pressure is reduced and is again being raised, but is costly in the amount of fuel required to raise the extra pressure for driving the air out through the small apertures of usual air valves. The steam could be recirculated at much less pressure and with much less expenditure of fuel, but for the requirements of air elimination. The extra fuel for this may amount to as much as 20 per cent of the total fuel used, depending upon the regularity of operation.

The two-pipe open or vapor systems eliminate air most freely and are generally equipped with automatic devices for preventing the return of the air except through the slow leakage which is unavoidable in any system (through the joints and pores of the materials). Such systems operate over long periods, frequently at pressures below atmosphere, thus keeping the radiators filled with vapor as long as any appreciable heat remains in the boiler. The pressure must be raised, however, above atmosphere for certain periods, in order to eliminate such air as may leak into the system. One- and two-pipe closed steam systems must have air valves on the radiators and at the ends of basement mains. These valves should be of the best quality and may be of the non-return type for preventing the return of air to the system when once it is removed, somewhat as was just described. Although most of these non-return valves require slightly more pressure to operate than do the ordinary air valves, they are in operation for so much shorter periods that they are a convenient and economical adjunct to most systems. Open or vapor systems may be operated so that the condensation is always returned to the boiler by gravity, or they may be equipped with automatic apparatus for periodically returning the condensate by means of the steam pressure from the boiler. With the former arrangement, pressures above a few ounces are not permissible, as the water would be raised above the air outlet and either be discharged or close the outlet. With the latter arrangement, any pressure may be carried, and it is recommended for use in all except the smaller installations.

Radiators and Grilles. Radiators or warm air registers are recommended to be placed under or near windows, although there is some advantage in placing warm air registers on the inside walls so that the flues for them may be run in inside partitions, and be kept away from the cooling effect of the outside walls and from obstructing the window openings. The locating of the sources of heat under the window causes a mingling of the rising current of warm air with the falling current of cold air at this point. This offsets the chilling effect of the most severe exposure and at the same time produces the best diffusion of air in the room. The modern tendency is toward use of heating units designed to keep the

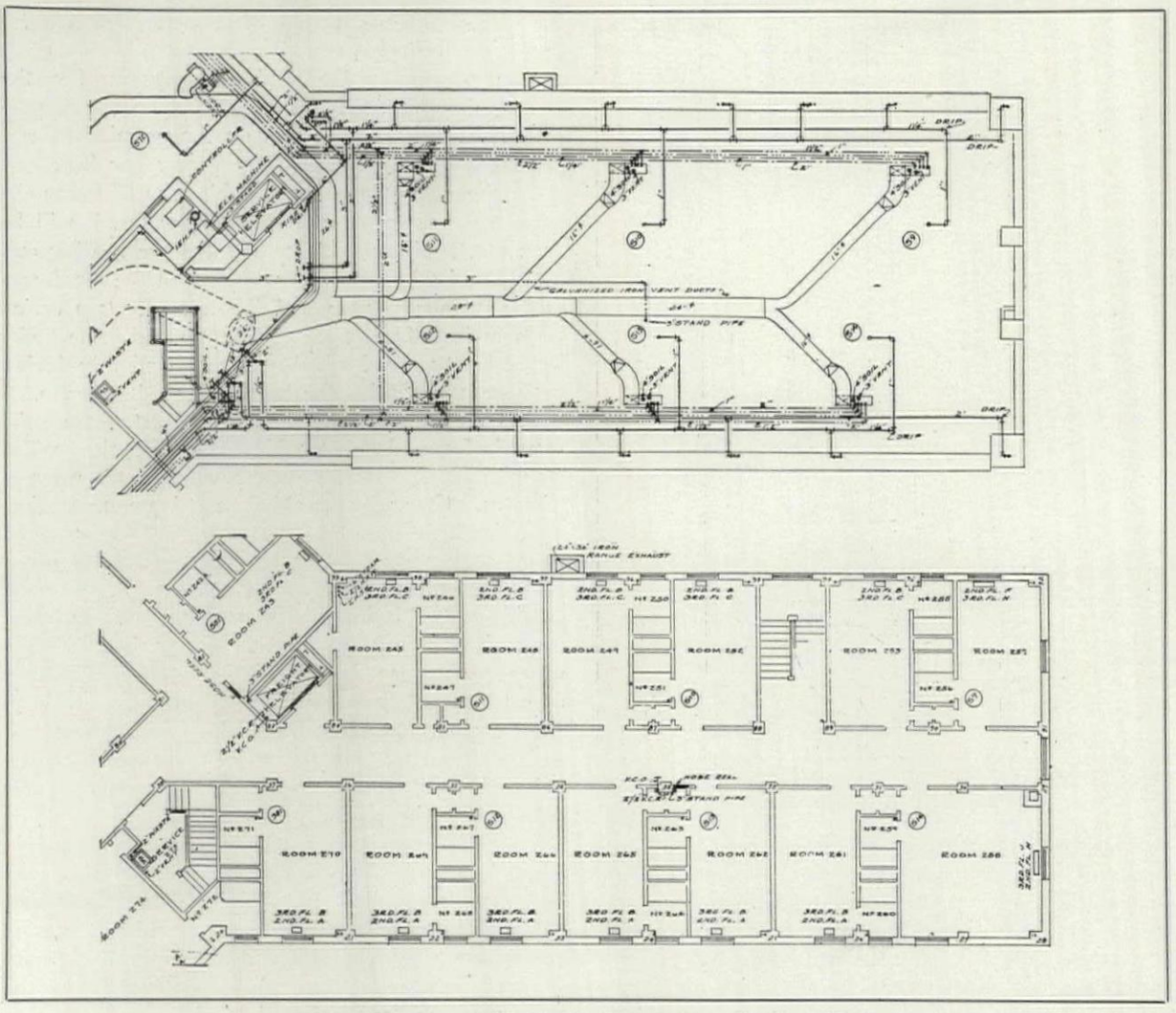


Fig. 2. Heating and Ventilating Layout for a Southern Hotel

heat from rising to the ceilings, thereby tending to equalize the temperature between floor and ceiling. This prevents unnecessary waste of heat by cutting down the losses through ceilings and upper parts of walls and makes for more comfort for the occupants, with less expenditure of fuel. Radiators designed for this purpose give off more of their heat by *radiation* and less by *convection* than do ordinary radiators. The concealed or cabinet type of heater may be used for the same purpose. These accomplish this by drawing the cold strata of air from the floor and replacing this air with warm air through a grille above, thus confining the circulation to a zone more or less between the floor and the height of the grille. Ordinary radiators may be used in the same way by installing them in scientifically designed cabinets or recesses with proper casings, grilles and dampers.

Fig. 1 shows a radiant type of radiator, a concealed heater and a concealed radiator arranged as was just described. Any of these may be used with or without fresh air connections from the outside. It should be noted that the control of the heat is by dampers controlling the volume of air passing over the radiator, and that no control valves are necessary on the steam or water connection. Valves may be included for use in case of repair or for long shutdowns if desired. The air control dampers may be automatically operated by self-contained thermostats located in the return air to each heater; this constitutes a splendid control system without pipes or auxiliary machinery. The fresh air connection may be from the outside or from a duct system supplied by a fan. In the latter case, air filters and humidifying apparatus may be used. In any case a switch damper is provided for varying the proportions of fresh and recirculated air. In case the fresh air is supplied from a fan, it assists the recirculation by an ejector action.

Residence Ventilating Apparatus. Ordinarily speaking, residences do not require much artificial ventilation. An exhaust fan for the kitchen, one for the laundry, and one for each toilet room are good adjuncts to any well appointed establishment. Ventilation may be provided for living rooms, dining rooms, reception rooms, ball rooms, etc. by means of the concealed heaters referred to or by a warm air fur-

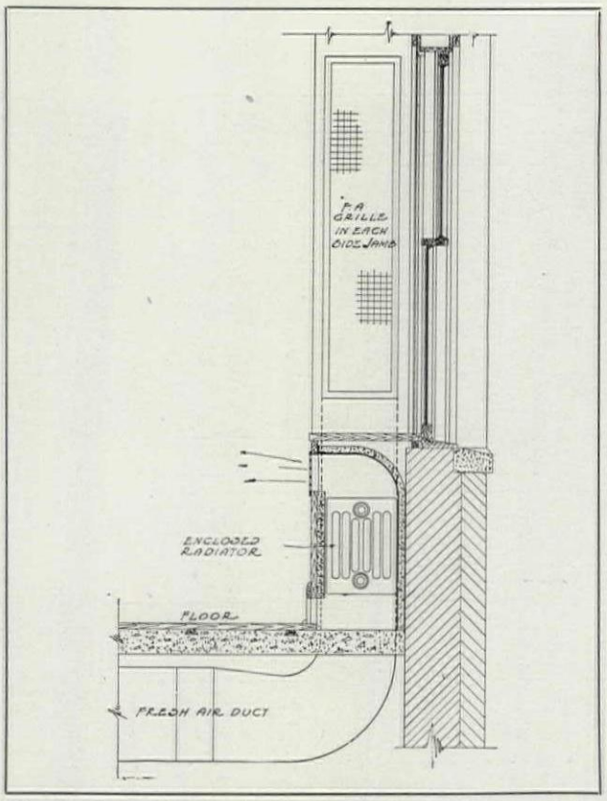


Fig. 3. Typical Method of Providing Fresh Air for Dining Rooms, Ball Rooms, Etc.

nace system of heating and ventilating. Furnaces are now being marketed with fan circulation which makes them very positive and economical in operation. In any furnace installation, recirculation ducts should be provided from the main stair hall and the principal first floor rooms to the fresh air intake of the furnace, and louvered openings should be installed in the walls or doors of second floor rooms leading into the main hall so as to prevent the wind pressure against any particular room from retarding the flow of heated air to these rooms. Such a recirculation arrangement is very economical for heating up or for regular use in extremely cold weather.

Hotel Heating Apparatus. The heating of hotels is generally by steam and sometimes by hot water. The boiler horse power requirements for modern hotels in our northern cities are about these:

For bedroom for heating and ventilating	0.75 to 1.00
For 1000 cubic feet for heating and ventilating	0.2
For bedroom for heating water	0.25
For bedroom for refrigeration	0.10
For kitchen for a 100-room hotel about	15.00
For a 1000-room hotel (kitchen) about	30.00
For laundry for a 100-room hotel about	20.00
For a 1000-room hotel (laundry) about	50.00

This represents an average of about 1.3 boiler horse power per bedroom for all purposes.

The maximum electrical requirement for the average hotel is about 0.5 kw. per room for all purposes. If this is generated on the premises it will require about 1.9 boiler horse power per bedroom. Assuming that 80 per cent of this is available as exhaust for use for heating and hot water, it will be seen that it about balances the average heating and hot water load, figuring 40 per cent of the maximum as the average heating load. There are certain variations in load factors, however, and while the lighting and hot water loads decrease only slightly during the summer months, the heating load disappears, so that there is a preponderance of exhaust steam to be wasted from April to November in the colder climates and for a much longer period in the warmer climates. Generally speaking, a private generating plant for furnishing the electric current for light and power and exhaust steam for heating and hot water becomes a financial success where current from the outside costs 2 cents or more per kw. hour and may range from this up to 5 cents per kw. hour for the warmer climates. Nothing is included in these figures for management and general business overhead for the operating of such an added department. If such a department entails added expense to an organization not already equipped to manage it, the rates given here should be increased.

There are two points which should be borne in mind, however. One is that the refrigeration may be steam-driven and furnish just about sufficient exhaust steam to generate the hot water. This is not apparent at first, since the maximum hot water demand represents from two to three times the boiler horse power required to drive refrigeration machines, but the total daily consumptions are about equal. The only requirement necessary to take advantage of this is large hot water storage, averaging about 25 gallons per bedroom. Under this arrangement the hot water and refrigeration may be produced for about 20 per cent more than the cost of either when produced separately. The other point is that when a complete generating plant with reserve units is not a paying investment, a single steam-driven turbine unit for use as a pressure-reducing valve on the heating system and to generate the bulk of the electric current with auxiliary and break down cross connection with the public service electric company's lines for taking care of the variations in load during the heating season and the entire electric load during the non-heating season, constitutes a most economical arrangement for almost any hotel or other similar building. For further data as to the boiler and machinery plants of hotels, the reader is referred to the author's article in the April issue of THE ARCHITECTURAL FORUM.

The radiation in the principal rooms should be preferably of the concealed or built-in heater type. Radiators in bedrooms and elsewhere should be preferably of the legless type, hung on walls and

connected to pipes run out of the walls so as to keep all radiators and connections free of the floors.

A vacuum system of heating or a forced circulation hot water system is preferable in a hotel on account of quick response and the positive circulation to all parts of the building at all times. Bathrooms, toilet rooms and public rooms may be piped on separate circuits with centrally located control valves on each of these and on the system supplying the bedrooms, so that any one or more of these sections may be cut off when not required. This is especially important in warmer climates where a little heat is required in toilet rooms and public spaces morning and night when not required elsewhere. Fig. 2 illustrates a steam system for a southern hotel employing separate systems for bathrooms and for bedrooms. Sometimes heating equipment is omitted from interior bathrooms, and in some such cases the radiator for the adjacent bedroom is placed near the bath so as to serve both. While an interior bath (without exposure) requires little heat, it must be warmer than the bedroom should be so early in the morning before the bedroom is heated, after being ventilated and cooled by open windows during the night. To try to heat both rooms with one radiator not only requires more surface and more fuel, but it also defeats the requirements mentioned. Fig. 4 shows a good arrangement of bedrooms with interior bathroom heating.

Hotel Ventilating Apparatus. It is of the first importance that the kitchen of a hotel be ventilated. Next in order of their importance as to ventilation are the toilets, dining rooms, ball rooms, assembly rooms, public rooms, lobbies, barber shops, laundries, store rooms, and machinery rooms. Bedrooms are rarely supplied with artificial ventilation except indirectly through exhaust from adjoining bathrooms. Corridors of the bedroom floors, especially the lower floor corridors of tall hotels in warm climates, are sometimes equipped with exhaust ventilation. Kitchens usually occupy from 50 to 80 per cent of the floor space required for dining rooms. Dining rooms are proportioned on from 8 to 12 square feet of floor space per person served. Kitchens must have exhaust ventilation of from 20 to 40 air changes per hour. Most of this may be exhausted through the hoods of ranges, dishwashers and urns, but in larger kitchens there should be exhaust outlets distributed around the rooms, especially in alcoves, under galleries, around ranges, steam tables, etc. Toilet rooms should have from 20 to 60 air changes per hour; interior baths 10 to 15; dining rooms 6 to 12; bathrooms 6 to 10; assemblies 10 to 15; lobbies 4 to 6; store rooms 1 to 2, and machinery rooms 6 to 12. The intensity of ventilation is to be varied with the character and requirements of the operation and the type and character of apparatus used. With good air conditioning apparatus and a well designed distribution system, the intensity of ventilation may be reduced to or below the minimum figures given here. Double mechanical systems require less air than either the single-supply or the exhaust system.

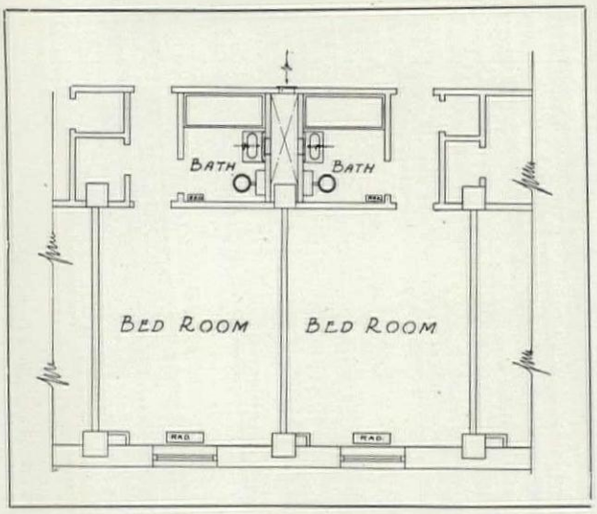


Fig. 4. Exhaust System for Interior Baths

Duct Sizes. As a rough guide for the sizes of main ducts, the velocity in supply ducts leaving the fan may range from 900 to 1200 feet per minute, but should be gradually and progressively reduced, in accordance with accepted practice, throughout the duct system leading from the fan. Main exhaust ducts may have velocities ranging from 800 to 1000 at the fan inlet with gradual and progressive reductions throughout the systems. A rough guide to the space occupied by single-width fans may be had on the assumption that the outside length is twice the width, and the capacity in thousands of cubic feet of air per minute equals the product of the length by the width in feet. The height is about 1⅓ times the length. Double-width fans of the same diameter have twice the capacity. This gives ample space, which may be slightly reduced when the apparatus is actually laid out. Fig 2 illustrates a typical layout of exhaust ventilation for both interior and exterior bathrooms. Fig. 5 shows a typical hotel ball room with exhaust ventilation. The fresh air may be taken in through concealed radiators or heaters as shown in Fig. 1, or from a fan supply system through a system such as shown in Fig. 3. Large portions of the kitchen air supply may be taken from the dining room if adjacent to, above, or below the kitchen, thereby assisting in ventilating the dining room and tending to carry the cooking odors and noise toward the kitchen and away from the dining room. The air supply for all portions of a hotel should be filtered and washed, and automatic humidifying apparatus should be provided. In some of the better installations, air cooling and dehumidifying apparatus may be used in dining rooms and assembly rooms. This subject was also discussed generally in THE ARCHITECTURAL FORUM for April, but there are several specific points which may well be covered here.

Department Store Heating Apparatus. Department store heating is a comparatively easy matter as far as the heating system itself is concerned. It is usually vacuum steam or forced hot water and

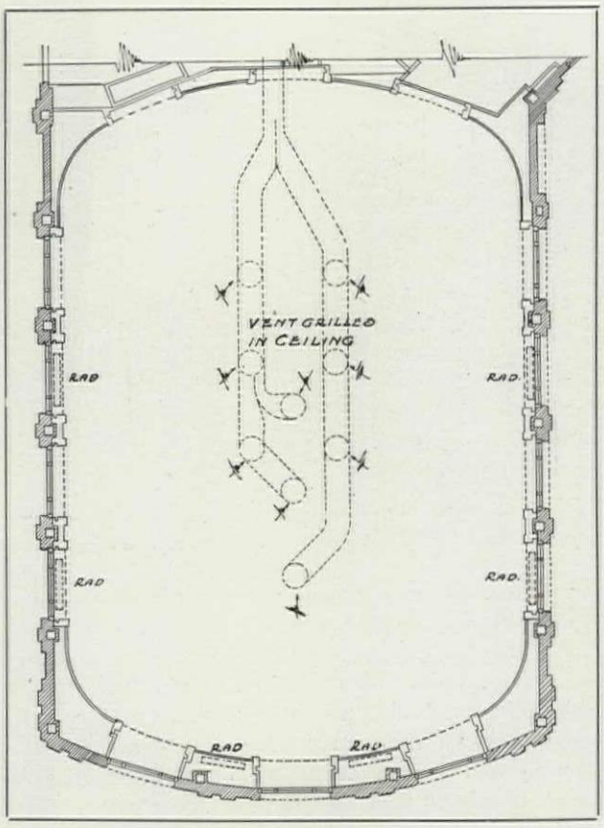


Fig. 5. Typical Ball Room Exhaust System

should be under automatic control for the main sales floors if not for the entire building. The first floor and bargain basements of the modern city store are so congested, have so little exposure, and there is so much heat given off by lights, machinery and people that the problem is one of cooling rather than heating most of the time. The first or street floor does require special attention for the heating around entrances. If this is not properly taken care of, the entire first floor may be drafty and disagreeable. These conditions are usually met by a proper combination of the heating and ventilating systems. A private generating plant is not so likely to be a paying proposition in a store as in a hotel, as the heating requirements are less in proportion to the available exhaust steam. Where much refrigeration is required for fur storage or for air cooling, an absorption refrigerating system, using this surplus exhaust steam, may be employed to reëstablish this balance. A plant may become a paying investment under such conditions. High pressure steam is generally required for cooking and for sterilizing, etc., so that the entire boiler plant is usually operated at around 100 pounds pressure.

Department Store Ventilating Apparatus. The street floor and all sales basements should have the best kind of supply and exhaust ventilation. The fresh air supply should be at least filtered, washed and tempered under automatic control, and the washers should be arranged for humidifying and humidity control. The fresh air should be brought in high around the walls, especially over show windows, and the exhaust should be taken out through grilles in the floor cases, well distributed over the entire floor area. Two or more floors may be ventilated together with the same volume of air where conditions are favorable. The street floor, where ceilings are high and the crowding less than in the basement, may be supplied with fresh air which in turn is exhausted through the floor for ventilating the first basement. Air cooling is frequently used for the main sales floors, especially for bargain basements, and sometimes for dining rooms and assembly rooms. A complete system affording dehumidifying cooling and reheating for summer, and heating and humidifying for winter, all under automatic control, should be employed. The partial cooling of air without enough refrigerating capacity to reduce its moisture content and without reheaters to raise the temperature to within 6 to 8 degrees Fahr. of the outside temperature will result in a chilly, humid, disagreeable atmosphere. A good store ventilating system, employing filtered and washed air but without air cooling and dehumidifying, costs about $50 per 1000 cubic feet of space ventilated. A system for air cooling and dehumidifying will cost about 50 per cent more.

To overcome the drafts and cooling effects caused by cold air being drawn in through the street entrances, two precautions are usually taken. One of these is to supply more air to this floor than is exhausted through the ventilating system so as to allow the excess to pass through the elevator shafts and stairs which would otherwise draw this air in through the entrances. The other is to supply large volumes of reheated air to the vestibules, thus providing a warm greeting to patrons and at the same time insuring that the air which leaks in is warm. Dining rooms, kitchens, assembly rooms, waiting rooms, toilet, store rooms, machinery rooms, etc., should be ventilated as for hotels.

Commercial Buildings. Stores, restaurants and assemblies may use the same kind of apparatus as specified for hotels and department stores. The cost of apparatus for this class of building ranges from 5 to 10 per cent of the cost of the building. The heating and ventilating apparatus for the commercial type is discussed in the author's article in THE ARCHITECTURAL FORUM for June.

Industrial Buildings. These may be very successfully heated by forced circulation hot water or by vacuum steam. Unit heaters are used very extensively and are very efficacious, especially in rooms with tall ceilings. The use of units tends to keep the heat down in the working zone and at the same time saves floor and wall space, piping, etc. Central fan systems are used to accomplish the same purpose and usually work out best where particular air conditioning is necessary. For relative costs of different kinds of heating and ventilating systems for industrial buildings see *The American Society of Heating and Ventilating Engineers' Journal* for January, 1928.

SANITARY DESIGN IN MODERN BUILDINGS

BY

HAROLD L. ALT

SANITATION has grown in recent years to be an important consideration,—especially in buildings of considerable size. There are probably two reasons why the architect must consider sanitation and plumbing,—first, plumbing installation is more or less dogmatic and is largely controlled by local plumbing codes with which the architect must comply; second, the plumbing pipes, which are of sufficient size, require special concealment, so that an architect must take into account the locations of these pipes in connection with the structural and architectural features of the building. In its humble way, plumbing quietly provides a "service" in a building that is essential to health and comfort. Every architect realizes that it is necessary to have a sufficient number of toilet rooms scattered through a building to adequately serve the occupants, and he must consider the desirability of having outside windows in such rooms, the desirability of artificial ventilation, and the absolute necessity of providing mechanical ventilation in toilet rooms without windows.

Number of Plumbing Fixtures. It is not desirable to install fixtures which may never be required, but it is even worse to have a shortage of fixtures. In buildings where the number of occupants per floor or per section of a floor can be approximated with reasonable accuracy, the number of plumbing fixtures should be proportioned to the number of occupants. In an office building the space is not rented nor are the partitions located at the time the structure is designed, and consequently the number of plumbing fixtures must be proportioned to the area.

PLUMBING FIXTURES PER 100 PUPILS FOR AMERICAN SCHOOLS

Fixture	Max.	Min.	Average (per 100 pupils)
Waterclosets	7.29	2.95	4.92
Urinals	2.19	1.47	1.79
Lavatories	10.22 (a)	1.82	4.90
Drinking Fountains	4.66	0.52	1.68
Slop Sinks	1.11	0.26	0.68

(a) Excessive.

The variations in the figures, which are based on actual schools, are due somewhat to the increased facilities provided for the younger children in the grammar schools. An average of five high schools and three grammar schools ranging from 500 to 2,000 pupils shows this interesting tabulation in the ratio of fixtures to each 100 occupants:

Fixtures:	Waterclosets		Urinals		Lavatories	
Class of Building	Max.	Min.	Max.	Min.	Max.	Min.
High Schools	5.33	2.95	2.19	1.47	10.22	(a) 2.26
Grammar Schools	7.29	6.03	2.18	1.57	6.43	1.82

(a) Excessive.

These same buildings have also been worked out on a cubage basis, the buildings ranging from 500,000 cubic feet to 4,500,000 cubic feet. Maximum and minimum ratios for the high schools and grammar schools show these figures per 100,000 cubic feet:

Fixtures:	Waterclosets		Urinals		Lavatories	
	Max.	Min.	Max.	Min.	Max.	Min.
High Schools	3.31	2.09	1.54	0.73	4.09	2.11
Grammar Schools	7.00	4.36	2.40	1.03	4.27	2.00

NUMBER OF OCCUPANTS PER FIXTURE FOR MEN

	Waterclosets		Urinals		Lavatories	
	Aver.	Max.	Aver.	Max.	Aver.	Max.
Auditoriums	150	250	300	400	150	300
Banks	16	20	25	35	15	25
Churches	150	200	300	400	150	300
Clubs	50	100	200	300	100	150
Department Stores	100	200	250	300	100	200
Factories	25	30	50	60	20	30
Hotels			(See Note A.)			
Hospitals			(See Note B.)			
Libraries	150	200	300	400	150	300
Office Buildings			(See Note C.)			
Public Buildings			(See Note D.)			
Schools			(See Note C.)			
Theaters	150	250	300	400	150	300
Y.M.C.A.			(See Note E.)			

NUMBER OF OCCUPANTS PER FIXTURE FOR WOMEN

	Waterclosets		Lavatories	
	Aver.	Max.	Aver.	Max.
Auditoriums	100	150	150	300
Banks	10	15	15	25
Churches	100	150	150	300
Department Stores	75	125	100	200
Factories	15	20	20	30
Hotels		(See Note A.)		
Hospitals		(See Note B.)		
Libraries	100	150	150	200
Office Buildings		(See Note C.)		
Public Buildings		(See Note D.)		
Schools		(See Note C.)		
Theaters	100	150	150	300
Y.W.C.A.		(See Note E.)		

Note A—Modern hotels usually install an individual bathroom for each bedroom, the bathrooms being supplied with one watercloset, one lavatory and one bath or one shower or a combination of both.

Note B—Hospital fixtures are so varied in type and so special for the services required that no standards of quantity can be quoted.

Note C.—Given in detail elsewhere in this article.

Note D—Varies depending upon use of building and accommodation desired.

Note E—Varies in different parts of the building according to the uses at different floors.

A few office building ratios are also given for what they may be worth, although it should not be forgotten that these four buildings are all in service and that the plumbing fixtures have proved adequate.

SQUARE FEET OF FLOOR AREA PER FIXTURE

Building	Men's W.C. Sq. ft.	Women's W.C. Sq. ft.	Urinals Sq. ft.
Office Building No. 1	5143	7200	7200
Office Building No. 2	2050	4100	4100
Office Building No. 3	5038	7316	7316
Bank & Office Building	3435	6870	3435

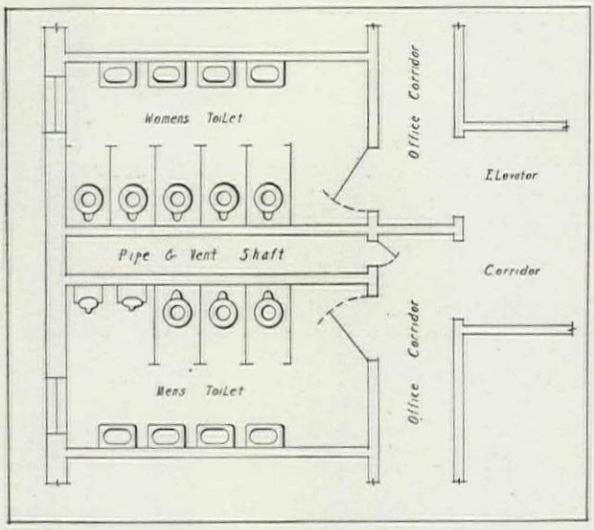


Fig. 1. Arrangement of Fixtures in an Office Building

Arrangement of Fixtures. In arranging toilet rooms it is usually desirable to place the urinals next to the windows, then the waterclosets, and the lavatories close to the toilet room doors. Where a room is wide enough, the lavatories may be located on the opposite wall near the windows, as in the arrangement shown in Fig. 1. Consideration should also be given to toilet room locations so as to serve all portions of each floor without too great a travel distance. In large buildings the cheapest arrangement, as far as installation cost is concerned, is to place the toilet rooms for each sex adjacent to each other so as to use the same risers and vent shafts. Care must be taken, however, to keep the doors as far apart as possible, and, preferably out of sight of each other. A typical layout is indicated in Fig. 1. Where the travel distance from the farthest office door to the toilet room door exceeds 200 feet, the toilet room becomes an inconvenience rather than a convenience, and it is far better to place two groups of smaller toilet rooms on each floor than it is to use only one larger group and thus double the travel distance. Moreover, with two groups of toilets, one may be used in case of difficulty with the other. For very small office buildings, an economical arrangement is to locate the toilet rooms off the stair landings midway between floors, and to alternate the rooms,—between the first and second floors would be, say, a young women's toilet; between the second and third floors, a women's toilet; between the third and fourth floors, a men's toilet, etc., to the top of the building. With this arrangement access to a toilet for either sex is obtained from each floor by either going down or up half a flight of stairs.

Toilet rooms are so much governed by local conditions in the building that it is hard to give anything in the nature of a standard arrangement. If it is remembered to put the fixtures most requiring ventilation next to the outside windows, to screen the entrances from passing observers, to keep the entrances for toilets accommodating opposite sexes out of sight of one another, and not to make the travel distances too great, the chief toilet room demands will have been met. It is also a good thing to introduce a slop closet and slop sink so as to use

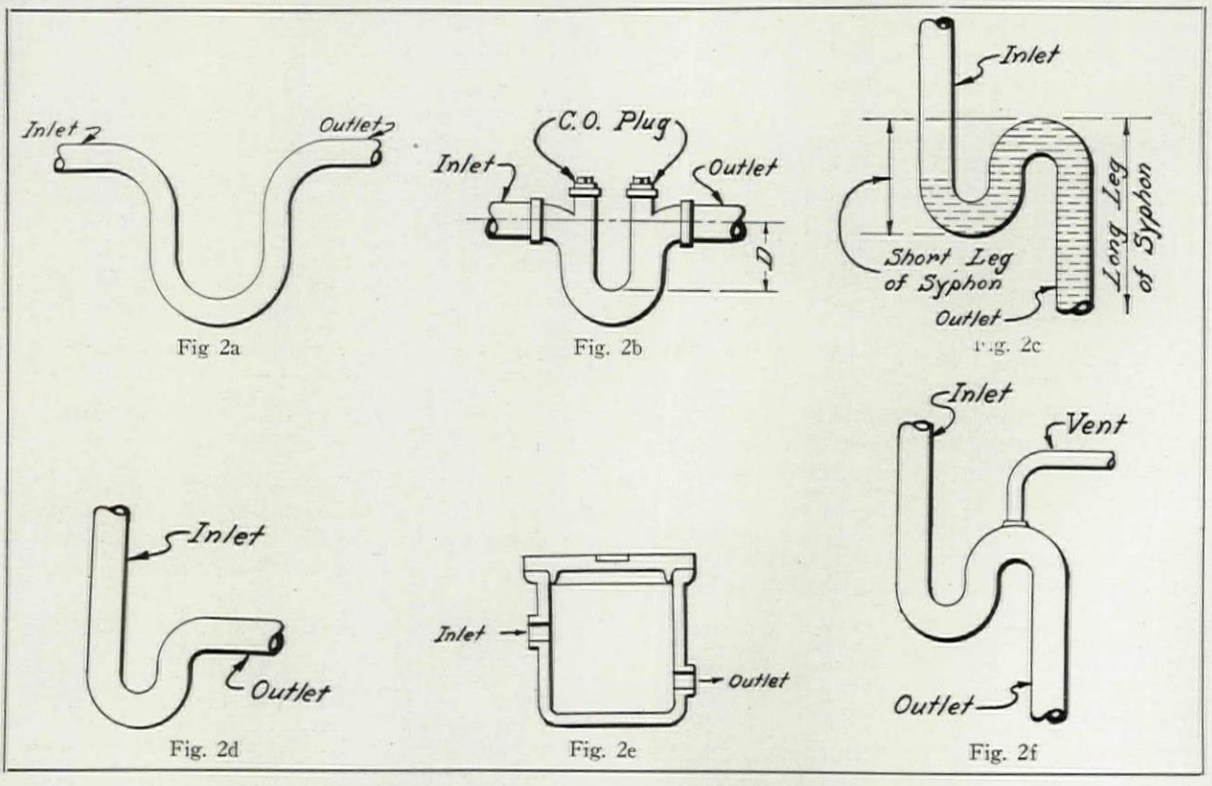


Fig. 2. Various Types of Plumbing Traps: 2a and 2b, Running Traps; 2c, "S" Trap; 2d "P" Trap; 2e, Pot Trap; 2f, Crown Vented "S" Trap.

the same piping as the toilet rooms where possible, as this makes separate plumbing risers for slop sinks unnecessary. Floor drains are not usually installed in toilet rooms, owing to the fact of insufficient water being used to keep the traps filled; they are still used in some cases, but it is questionable if they are necessary, and they certainly are undesirable. Drinking fountains are usually limited to corridors, where the surrounding walls and floors should be well protected against splashing.

Plumbing Traps. The basic idea underlying all plumbing design as far as the soil, waste and vent systems are concerned, is that all sewer gas generated either in the street sewers or house drainage pipes must be prevented from entering the rooms. As far as the pipe system itself is concerned, sound pipes and gas-tight joints are necessary. The openings which must be made in the piping system for the drainage outlets of fixtures cause the real difficulty. The most satisfactory solution yet found is to water-seal such outlets by means of what is commonly termed a trap. In its simplest form this is nothing more complicated than a bend in the waste or soil pipe made so that water is trapped and retained, thus preventing the flow of gas or air. The first passage of water through a trap leaves a sufficient quantity of water to form a seal against gas or air, as shown in Fig. 2b, where the depth of the water seal is indicated by "D."

There are many kinds, styles and designs of traps, so many that a whole article could be devoted to their illustration and description and still leave the subject far from complete. Most traps, however, fall into four or five general classes which may be listed as "S" traps, "P" traps, pot traps and various special traps, shown in Fig. 2. Some traps are integral parts of the plumbing fixtures,—such as water-closet traps, slop sink trap standards, etc.; other fixtures, as lavatories, baths, sinks, etc., must have the traps supplied in the waste piping. A favorite provision in many plumbing specifications is, "Each and every fixture must be properly trapped." While the water-seal does prevent the free flow of gas into the room, the seal may be "broken" by the loss of the water. In many instances syphonic action is set up by a heavy flow of water through the trap, or even by a heavy flow from some nearby fixture, which, in passing rapidly down the waste line, leaves a partial vacuum in its wake, or builds up a pressure in front of it. The syphonic action is illustrated in Fig. 2c and when the water is drawn out of the trap of a fixture by the discharge of the fixture itself, the action is termed, "self-syphonage," whereas, if the water is drawn out by the discharge of an adjacent fixture or fixtures, the trap is simply "syphoned."

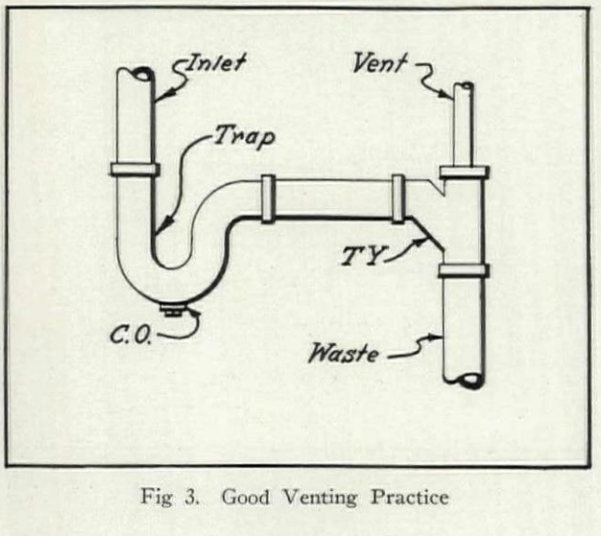


Fig 3. Good Venting Practice

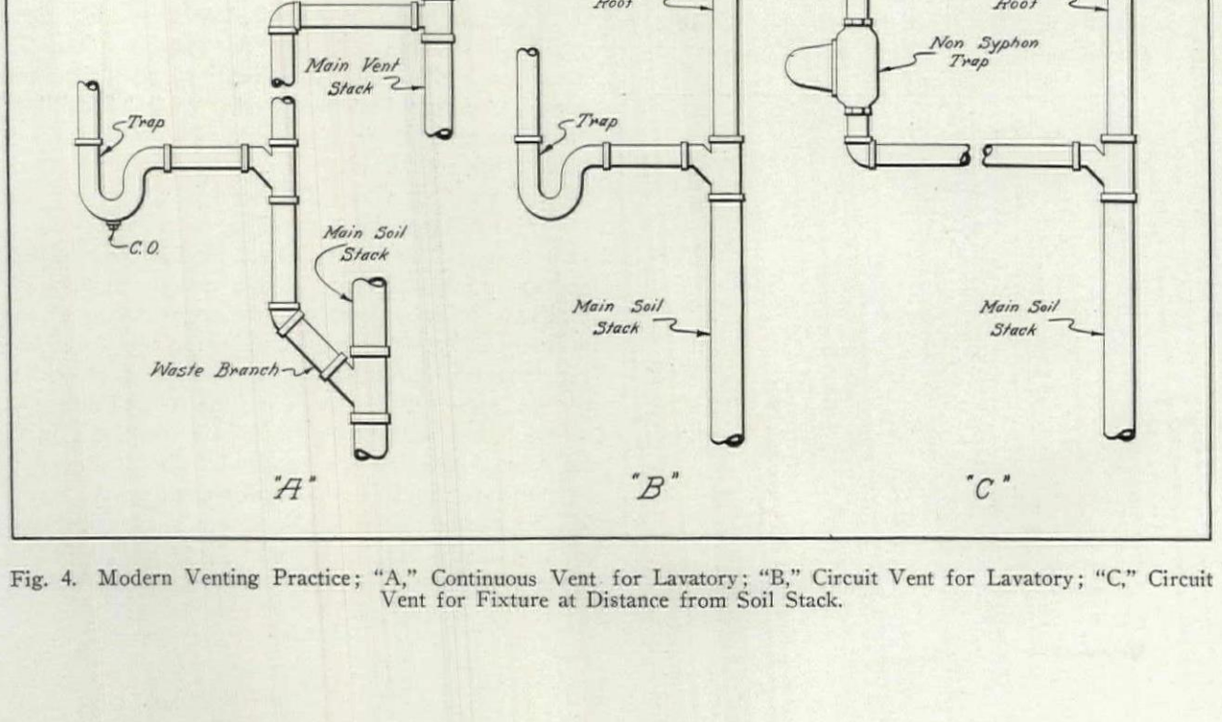
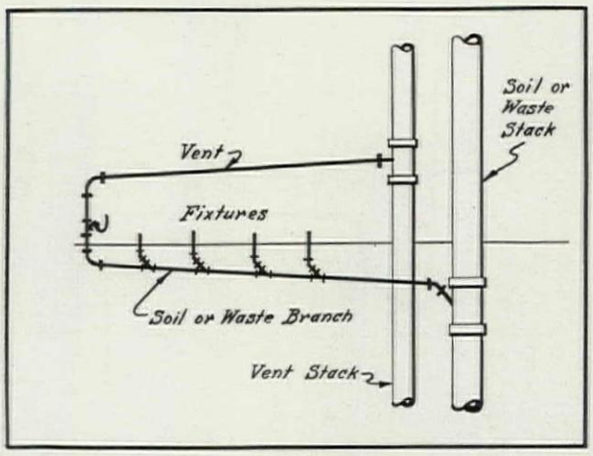
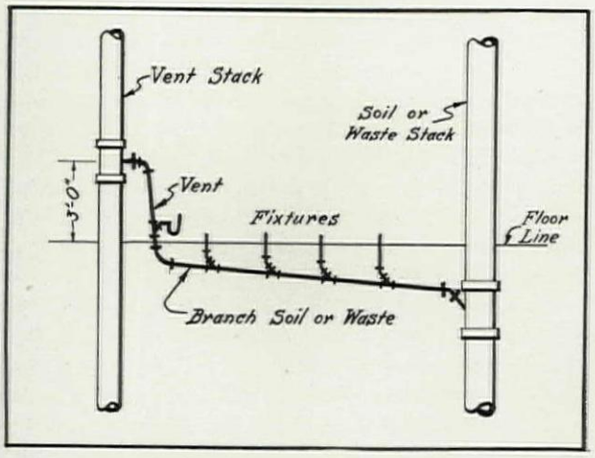


Fig. 4. Modern Venting Practice; "A," Continuous Vent for Lavatory; "B," Circuit Vent for Lavatory; "C," Circuit Vent for Fixture at Distance from Soil Stack.





Figs. 5 and 6. Two Arrangements of "Loop" Venting

There are three ways of preventing syphonage and self-syphonage. One is to make the trap so deep that the water-seal cannot be syphoned out by any ordinary contingency; this is hardly practical owing to the increased danger of stoppage occurring in such deep traps. The second method is to make a large reservoir in the trap so formed, that although the trap may be partially syphoned, there will still be enough water retained in the chamber to reseal the trap. The third method is most commonly employed and is known as "venting" or "back venting."

Venting. The fundamental idea of the vent is the principle that a syphon can be broken by a very small hole admitting air to the top of the syphon. In venting plumbing traps the "very small hole" is made a fairly good sized hole to make it more difficult to clog up by splashings, scale, rust, etc. Theoretically, such a vent should be attached to the high point of the trap, as illustrated in Fig. 2f, and vents were so connected for many years. The vent so located was very quickly blocked by particles thrown up into it by centrifugal action of the water as it flowed around the bend. While there is considerable confusion in the terms applied to vents and venting in different parts of the country, a vent connected to the high point or crown of the trap is generally termed a "back" vent or "crown" vent. To overcome the clogging of the vent opening a method of piping was devised which is usually termed a "continuous" vent. With this type of vent a "P" trap is necessary, and instead of venting at the high point, the outlet is carried horizontally a short distance (usually not to exceed 18 inches) and is then connected into a drainage tee or TY, from the bottom of which the waste is taken and to the top of which the vent is connected as shown in Fig. 3. This method of venting is regarded today as being the surest way, and is the method required in New York.

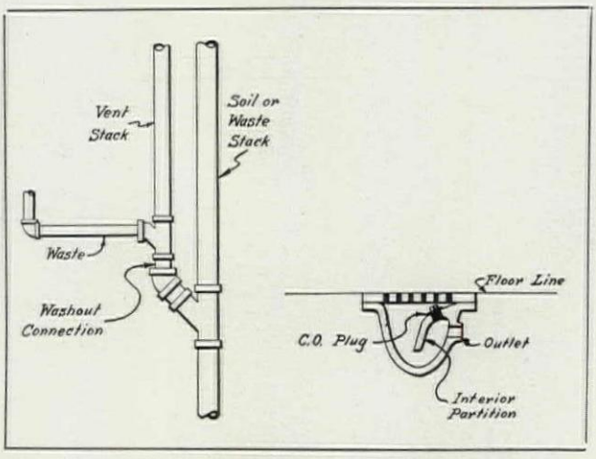


Fig. 7. *Left:* Washout Connection at Base of Vent Stack. *Right:* Partition Trap, to be Avoided.

Watercloset, stall urinals, baths and bottom outlet slop sinks do not lend themselves to continuous venting. Fixtures which permit the use of a true continuous vent are the sink, lavatory, wall hung or lip urinal, back outlet slop sink, and laundry tray. With waterclosets a vent is usually taken off the vertical side of the lead bend immediately below the fixture. Bottom outlet slop sinks are similarly treated; stall urinals and bath traps have tees on the waste lines immediately beyond the traps to which the vent connections are made. Another method of venting is known as "circuit" or "loop" venting. In many ways this method of venting seems just the opposite of that just described. With "circuit" or "loop" venting there is no individual vent connection to the soil or waste from the fixture; instead, the main soil or waste line itself is vented and the fixture traps are kept as close as possible to the vented line. This is the method used in Philadelphia and many other places, although various minor modifications are incorporated in the requirements of the different cities. In some localities the rule is to have regular traps on fixtures and to keep the traps within certain specified distances of the vented line; in others, traps are allowed at greater distances from the vented line but are required to be of the non-syphon type; in still others, all wastes up to certain lengths can be carried into a vented stack singly and without vents, but if two wastes are united at any point, then that point must be vented. In theory,

circuit or loop venting makes the main vented soil or waste line or the main vent itself perform the function of a continuous vent. The way in which this is done is indicated in Fig. 4, where "A" is a continuous vent for a lavatory, "B" a circuit vent for the same fixture, and "C" shows the usual method employed in circuit venting when the fixture is farther away from the vented line. The term "loop" vent has been developed from applying circuit venting to batteries of fixtures, the end of the waste pipe being "looped" back to the soil or waste pipe, or,—if there are other fixtures above on the same stack,—to a separate vent stack as shown in Fig. 5. Sometimes to save piping the main vent stack is placed at the opposite end of the battery from the soil or waste stack and the end of the horizontal drainage is connected into the vent 3 feet above the floor. Fig. 6.

Every vent stack should have a washout connection made at the bottom by emptying the waste from some fixture (usually not a water closet) into the base of the vent stack in the manner shown in Fig. 7. The idea back of this is to wash out dust, dirt and scale which otherwise might settle at the bottom of the stack and in time cause trouble. House traps and fresh air inlets in general seem to be included with continuous venting and are often omitted with circuit venting; this rule, however, has many exceptions. The original idea back of the requirement calling for a house trap is to exclude from the building the sewer gas originating in the street sewers and to allow a current of fresh outside air from the fresh air inlet to circulate through the house lines. If the house trap is omitted, then the air circulating through the house piping is from the street sewer and is more than likely to be sewer gas. Consequently, if a trap in the building should be syphoned in spite of the venting precautions taken,—or a cleanout should be opened up temporarily for cleanout purposes,—it is likely that the air coming from the drainage system would not be as objectionable with a house trap and fresh air inlet installed as it would with the house drain connected to the street sewer with an untrapped run of pipe. All good plumbing codes prohibit the use of traps depending for their waterseal on an interior partition of the trap. An example of this type of trap, which should be avoided, is shown in Fig. 7, where the cleanout screw is particularly objectionable owing to the ease with which an opening can be made through the partition by the removal of this screw.

Floor drains are seldom if ever vented, for three good reasons; in the first place a floor drain usually has a deep seal trap and a comparatively large quantity of water retained in the trap, so that its syphonage is difficult; in the second place it is not subject to sudden and concentrated discharges of water; and, third, it is likely to have long periods of disuse, when there is a tendency for the water to evaporate, leaving the trap dry. This evaporation would be hastened by connecting a vent near the trap and subjecting the water to a circulation of air over its surface.

Roof leaders should always be carried down to the basement separately and should be trapped before entering the drainage system. If leader traps are not installed, sewer gas is likely to find its way up through the leaders and out of the leader boxes on the roof; these leader boxes in some instances may be located close to windows or other points where sewer gas would be objectionable. Area drains, in climates where the outside temperatures go below freezing, should consist of boxes with dirt pockets in the bottoms, and the piping from these boxes should be carried inside of the buildings, trapped, and then connected to the nearest drainage lines. Trouble may develop unless these traps are placed inside of the buildings where they are protected from freezing. No venting is desirable on area drain traps or roof leader traps, because it is open to the objections as in the case of floor drains.

One of the first points to be determined in laying out the plumbing for a building is deciding on the size and elevation of the outside sewer. It is generally considered as good practice to have the invert of the building connection not lower than the top of the street sewer, and of course if it can be kept even higher it is better. The practical objection to coming in below the top of the street sewer is that when this sewer is running full the sewage will back into the house line and may cause a stoppage.

Sub-sewer Drainage. When fixtures or drains lie below the level of the street sewer, as often happens in basements and sub-basements, it is necessary to pump the sewage to a point high enough to permit it to flow to the street sewer by gravity. This is often done by a sewage ejector of the compressed air or centrifugal pump type. Where such ejectors are necessary, they are installed in conjunction with pits or receivers in which the sewage is collected and expelled from time to time by the entrance of compressed air or the action of the pump. Where dependable action is important, such ejectors are generally installed in duplicate, and the discharge pipe is carried out and is connected to the house drain beyond the house trap. A check valve is also placed in this line to prevent the sewage backing down into the ejector after each period of operation. Usually a fresh air inlet is required or a vent on the pit, and in some localities the vents on all lines emptying into the pit must be carried through the roof separately. In other places the vents may be connected into vent stacks used on the gravity lines, thus saving piping.

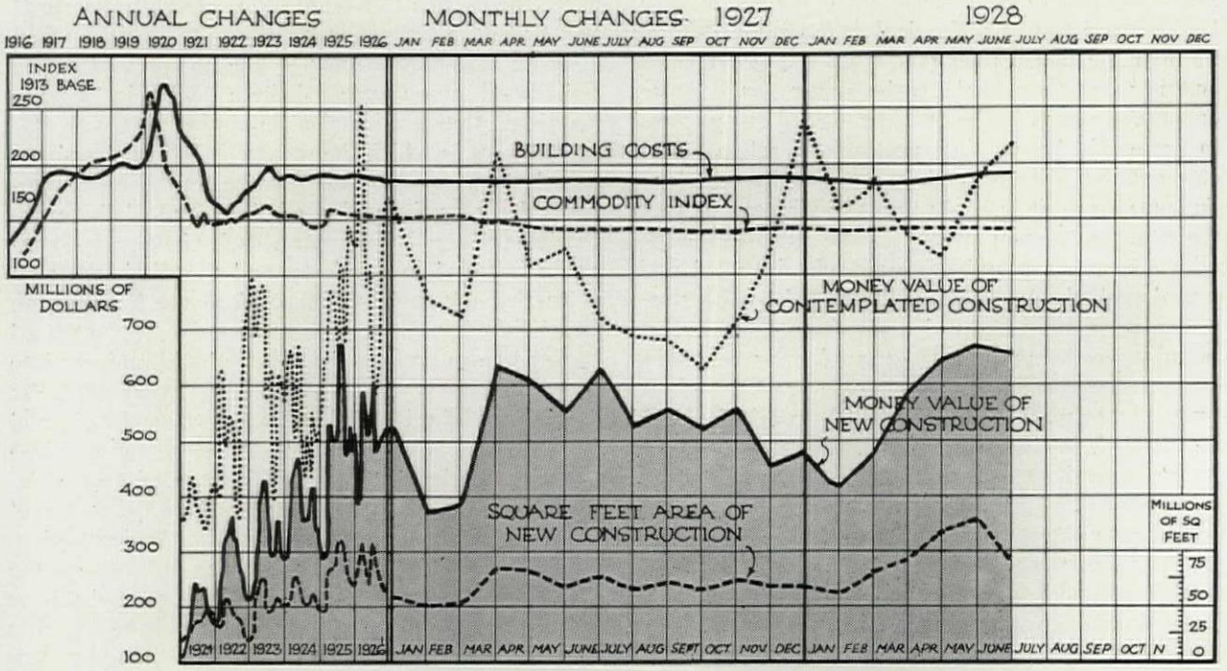
Roof Leaders. When these are not run on the outside of a building, they should be carried all the way to the basement entirely separate from all other piping and at the bottom should have running traps through which they are connected into the house drain. A house drain which carries combined soil and roof drainage is usually sized on the basis of roof water to be handled plus one pipe size for the soil. The carrying capacity of the house drain varies with the pitch, but it can be obtained from almost any handbook having a table on flow of water in sewers.

THE BUILDING SITUATION

THE RETURNS FOR JUNE ESTABLISH NEW RECORDS

THERE has been a rather phenomenal increase in building construction during the first half of 1928, which has been quite contrary to the general predictions made at the beginning of the year, when indications led most experts to anticipate activity approximately equal to that of 1927, or possibly slightly lower. Not only do the figures recorded by the F. W. Dodge Corporation show new records being established for June and for the first six months, but they show an unusually large volume of contemplated new work in several important sections of the country. June construction in the 37 eastern states, representing about 91 per cent of the entire United States, amounted to $650,466,200. This is the second highest monthly total on record, being 3 per cent ahead of the June, 1927 record and only about 2½ per cent under the total for the preceding month of this year. A glance at the chart upon this page shows graphically the comparison of activity between this month and half-year and similar periods since 1920. Contemplated new work reported in June amounted to the exceptional total of $1,030,095,000, which is 17 per cent in excess of the May, 1928 total and 41 per cent ahead of the June, 1927 record.

There has been an interesting change in the type of contruction contituting these totals. The June contract record included 40 per cent of all construction for residential buildings, 20 per cent for public works and utilities, 14 per cent for commercial buildings, and 10 per cent for industrial projects. This represents a lessening predominance of residential construction and an increase in industrial work and public works utilities. The regional situation is particularly interesting. New York state and northern New Jersey established a new record for June in new building contracts, and an increase of 9 per cent for the first six months over the total for the first half of last year. Contemplated construction shows an increase of 77 per cent over the total for June, 1927. In the New England States new construction showed a 15 per cent increase over the total for June last year, but a drop of 32 per cent from the amount reported in May, 1928. The first six months' construction totals 21 per cent higher than the corresponding period of last year, while contemplated new work is more than double the amount reported for last June. In the Middle Atlantic States a new June contract record was established. While the six months' total represents an increase of 12 per cent over the corresponding period last year, contemplated projects dropped 19 per cent from the amount reported for the month of June, 1927.



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.

PAYMENT FOR ARCHITECTURAL SERVICES

DETERMINING AND COLLECTING FEES

BY
C. STANLEY TAYLOR

WITH the exception of a relatively few well established architectural offices whose prestige has brought them an extensive clientele of the highest quality and whose business enables them to decline commissions from prospective clients of doubtful credit rating, practically every architectural office experiences at some time or other serious difficulties over the problem of securing adequate architectural fees and of collecting the fees which have been charged and earned. It may be safely said that every architect has given this problem of fees and their collection a great deal of serious consideration. It is a subject worthy of more frequent discussion and exchange of ideas for the benefit of the profession. This is a two-fold problem,—what to charge, and how to get the fees charged. Each of these phases has various aspects worthy of consideration, among which several might be noted. In establishing architectural fees, the architect must determine the value of the services, the basis upon which he establishes his charges, and the variations in charges based upon different types of service rendered. The problem of getting the fees involves salesmanship, the rendering of service commensurate in value with the fees charged, the conducting of his work so that the client will have no hesitancy in paying the established charges after the agreement has been signed, and finally protection against losses through bad credit.

Professional service can rarely be measured by accurate, fixed standards. Doctors have long been accustomed to charging for their services in accordance with their patients' capacity to pay, rendering some services free and charging high fees for equivalent services to others. Lawyers have followed somewhat the same course, although in that profession the tendency is to charge in accordance with the importance of the case, because there is no obligation to accept work when called upon, as in the case of the medical profession. Architects, however, have established a custom of basing their fees on a percentage of the cost of the work carried out under their direction. While this is not a fixed practice for all types of work, it is largely prevalent, so that the general public has learned to measure the cost of architectural services in terms of a percentage of the cost of the work designed and carried out. There is, therefore, in the architectural profession, something in the nature of a fixed or standard charge, and a real problem revolves around deviations from this standard charge, made necessary either by unusual conditions arising on a specific problem, or by variations in the caliber of the services rendered, resulting from less or greater experience and knowledge, with a correspondingly less or greater value of the services to the client. From the client's point of view, architectural services are seldom rated at their true value, probably because clients rarely appreciate the amount of work involved and the skill and training required to carry on professional activities. They seldom realize that the average architectural office is something of an organization, with assistants "behind the scenes" to do a great deal of preparatory and detail work, which the client sees only in the form of drawings, specifications or occasional supervision of construction work.

In architectural problems in which economic considerations predominate over æsthetic matters, such as in the development of investment buildings, industrial structures, and the like, the typical client is fairly well able to measure the architect's capacity, because the measure is based on familiar terms, and is measurable in similar structures produced by the architect for others. Likewise, in important institutional work, such as hospitals and schools, and in some more or less technical design problems, such as theaters and the more complex hotels, there is public recognition of the need for special training and experience, and there is usually a willingness to pay without question adequate fees charged for such service. Where æsthetic considerations predominate, as in the development of better residences, the design of churches, public works and monumental structures of various types, the average prospective client is less capable of distinguishing between the value of the services of one architect and those of another, with the consequent result that where cost limitations sway the client's choice, there is a definite tendency to give undue consideration to the fees charged by various architects as against their real capacity to handle the proposed work. It is hardly necessary to say that consideration of the fees charged by various architects influences the selection of architects to a greater or less degree in the great majority of building problems.

The importance of the work accomplished by the American Institute of Architects in establishing minimum fees for various types of work is in no wise diminished by the fact that the very result which was sought has brought along with it other problems to the architectural office, where experience and capacity warrant higher charges than the minimum established. It is true that the minimum fee of 6 per cent for average work is frequently lowered, not only by architects who are not members of the Institute, but occasionally by those who are. This may be due to competition or because a proposed project involves much repetitious work, as in the case of a tall loft building, and the minimum charge is in such cases not only greater than the traffic will bear, but greater than the services are worth. "Cut-rate" architects introduce the most difficult problem in maintaining and getting adequate architectural

fees. They render a service much less complete and probably much less valuable than that rendered by an office which we may call, for lack of better words, a more ethical office. In the large cities this situation is most acute. A case in point personally known to the writer, concerned the designing of a Park Avenue coöperative apartment building in New York, costing approximately $600,000 to build. The promoters paid the architect $3,600 for drawings, including the four elevations, plans of the basement, ground floor, second floor, typical floors, and roof. Into these plans were condensed indications of all mechanical equipment, such as the location of plumbing fixtures, electrical outlets and radiators; but there were no specifications, structural drawings or details of mechanical equipment, and no full-sized details. Obviously, the architect did not render any supervisory service. The promoters turned over the entire project to their builders, and they purchased materials and such equipment as they saw fit and probably used stock designs of cut stonework, ornamental ironwork and other decorative elements as were approximately indicated on the architect's drawings. The normal fee for this project under the American Institute of Architects schedule would have been ten times the fee received by this designer. Actually, the architect designing this building was making a fairly substantial income out of such work, for he put into his plans little of the skill and experience required for a really competent handling of such a problem. In the face of such competition it is not strange that many members of the Institute, striving to maintain the standards to which they are pledged, wonder how they can get adequate work.

The primary purpose of this article is to invite a general discussion of the subject and to secure an interchange of ideas and experiences. A number of important considerations affecting architectural fees are outlined for this purpose, and some matters frequently overlooked when considering the problem are presented in detail. It is evident to many that the standard minimum fee of 6 per cent must be varied in accordance with the amount of work involved in the proposed commission. From various sources we have gained the impression that these factors customarily influence architects in establishing their charges for specific commissions.

1. *Size of the Work.* Few architectural offices can do small residential work on a 6 per cent basis, and the customary charge ranges from 8 to 10 per cent for buildings costing less than $15,000 to possibly $25,000. Some architectural offices are so organized that they cannot take any project costing less than from $50,000 to $100,000 for less than 10 per cent and make a reasonable profit on the work. Large projects, on the other hand, such as great office buildings, large industrial plants and other types of structures running into $1,000,000 or more, can profitably be handled in almost any architectural office for less than 6 per cent, and in some cases charges as low as 4 or 5 per cent may represent an adequate compensation for the services rendered.

2. *Repetitious Work.* Many commercial and industrial buildings and tall apartments, hotels and similar structures repeat typical plan units so many times that the actual design work and detailing are reduced all out of proportion to the cost of the construction. Here again, less than the minimum fee may represent adequate compensation.

3. *Alterations.* The Institute recognizes the extra time, labor and skill involved in handling alteration work by establishing a minimum charge of 10 per cent. This minimum charge is subject to the same variations as the minimum of 6 per cent for new construction, due to the size of the project, the amount of detailing involved, the number of repeated units, and other factors.

4. *Decorations and Special Designs.* The problems involved in interior decoration, and in the design or purchase of furniture and cabinet work, are often more time-consuming than on alteration work, and a still higher fee may be necessary. Interior decorators frequently charge 15 per cent or more or obtain this amount of compensation through their discounts, and architects cannot afford to handle the work on a lower basis than a decorator. Frequently this problem is solved by a *per diem* charge, independent of the cost of furnishings and decorations.

5. *Consultation and Testimony.* Architects are frequently called upon for consultation work only or for court testimony, and for such work no percentage fee is possible. Here the charges must be based,—like those of the lawyer,—on the importance of the case and the value to the client of the services.

6. *Building by the Sub-contract Method.* The Institute has established a 4 per cent extra charge for handling construction work direct with sub-contractors, and this charge is exclusive of the cost of a resident superintendent. Usually this charge is adequate for the extra services performed, but the responsibility involved deters many architects from undertaking such contracts, regardless of the compensation. Firms engaged in large projects and equipped to handle the routine office problems and field supervision involved in sub-contract construction may properly make a lower extra charge and still be adequately compensated.

7. *The Value of Services.* The final governing factor is the relative value of the services rendered, due to the exceptional experience, talents and prestige of individual offices. This is a most difficult matter to estimate, and the problem is usually solved by charging what the traffic will bear and cheerfully declining prospective commissions where the client is unwilling to concede that value is represented in the higher than normal charge. Thus, the first problem is to establish a sound and fair fee for each individual project, based on the nature of the work to be performed and the intangible matter of the value of the services to the client. In the opinion of many, it is much more ethical to vary fees in this manner than to adhere to standard rates, making some clients

pay greater profit to balance losses on some others.

The next problem is in maintaining the established fees in competition. Only a small percentage of the architects of the country do not at some time or other have to seek desirable work. They are faced with a definite trading problem. Shall they bargain for a commission by cutting fees, or not? This is probably the most critical matter that ever arises in the development of an architectural practice. Under these circumstances the office gets the reputation of being a cut-rate office or a reputation for knowing the value of its services and maintaining its standards against all comers. The latter, of course, ultimately is the only sound course, provided the fees charged are actually commensurate with the value of the services rendered. Rather than offer a reduction in charges to secure desirable work in friendly competition, the successful method in the long run is to confine selling activity to presenting evidence of the fairness and reasonableness of the fees charged, based upon experience, past work, client's recognition of meritorious services, and prestige. More particularly, the reasonableness of the fees charged may be demonstrated by the nature of the architect's organization, the degree of responsibility he assumes, the completeness of the drawings and specifications he prepares, and the adequacy of supervision rendered by the architect's office. These are the real selling points for architectural services, for these are the things in which offices vary and which really measure to the client what he receives for the amount he pays. Selling effort is still repugnant to many architects, but subconsciously or otherwise, every architect does a certain amount of selling and is to a certain degree a successful salesman.

This brings us logically to the problem of how to get architectural fees. Broadly, this implies how to get commissions, but we cannot devote much time here to a discussion of selling methods. Basically the most successful method of getting new commissions is to incorporate into each project that is done within the office, such meritorious work that it will automatically bring recognition of capacity and ability, and with it new commissions. The problem of getting fees has other aspects of equal importance; we shall concern ourselves here with getting fees after the contract has been established. This phase of the problem has two distinct aspects. They are difficulty in collecting fees due to misunderstandings or trouble in the conduct of the work, and those due to bad credit of the clients. The conduct of every architectural project from the development of a $10,000 house to the designing and construction of a $5,000,000 hotel involves such a maze of problems and so many conflicting considerations that it is rare indeed that the entire project goes through smoothly without misunderstandings or even grave conflicts with the client. We can dismiss from consideration here the difficulties and misunderstandings that may develop with contractors or within the architect's own office, except insofar as they influence the client's appreciation of the services rendered and his willingness to pay the entire fee agreed upon. Architects have been forced to the realization that a successful practice involves very rigid conducting of office practice on the most businesslike basis. Only through exercising extreme care to reach a complete agreement with the client upon every detail as each problem develops can the architect safely protect himself from controversies which may cause the client to feel that the architect has been lax in his service.

Beginning with the very first relations with the client, it is most vital that the agreement that is reached be completely understood by both parties and expressed in a written contract so clearly that the responsibility and obligations of both the architect and the client are mutually understood. This is not a plea for elaborate and lengthy legal documents, cleverly worded by lawyers for both parties to cover every possible contingency that may arise; on the other hand, it cannot be doubted that the skill with which the contract is drawn and the clearness with which each element is phrased are most vital to the elimination of unpleasant controversies.

Probably the most important group of misunderstandings arise over the approval of preliminary plans. Few clients realize that when the preliminary drawings have been revised and restudied until they meet his requirements, his approval commits him to additional charges and costs if changes are subsequently directed. This is a matter the architect can largely control in two ways. First, he can make certain that the final preliminary drawings incorporate every feature with which the client is concerned; in other words, that they are complete with the exception only of structural features. In this connection the architect can advantageously prepare such thumb-nail perspectives and sketches as may be required to enable the client to visualize the structure more conventionally presented in the drawings. The second step is to go through a complete check list of all items mentioned by the client in preliminary conferences, together with all items which must be incorporated in the final working drawings and specifications, making written notes as to the client's reaction to each point before proceeding further. This work should then be followed by a written statement to the client to the effect that the approval granted to the preliminary drawings and check list completes the first part of their contract, and that in accordance therewith subsequent changes directed by the client are subject to an extra charge. By accompanying this memorandum or letter with a bill for the preliminary drawings, the architect at once brings to a head two matters: first, he establishes the client's written approval of the work thus far performed; and secondly, he obtains compensation for his services, or else immediately brings up any evidence there may be that the client is dissatisfied with the work so far accomplished. Neglect to render a bill promptly when payments are due is unbusinesslike and may lead to difficulty later on.

The next important group of difficulties surrounds the opening of proposals for construction. This generally brings to a head the architect's control of building costs, and is of extreme importance whenever the client has indicated a definite limitation upon expenses and has required the architect either in writing or by direct implication to keep the cost within a predetermined maximum. In a previous article we have discussed methods of keeping costs within a fixed budget. If the architect has followed those methods throughout the preliminary stages of his work and has acquainted the client with the effect upon costs which his decisions in the preliminary work have made, most of the trouble usually encountered at this stage is eliminated. The remaining problem arises from the fact that no preliminary estimates are sufficiently accurate to assure in advance the size of the ultimate contract proposals, and frequently bids are received so far above anticipated figures that the client is imbued with doubt as to the effectiveness with which the architect has controlled costs. Frequently the first bids received are higher than need be, due to misinterpretation of specifications or drawings on the part of the bidders, which can be cleared up through a frank discussion of the estimates with the low bidders. When this recourse fails to bring the price within the client's requirements, the architect is forced at considerable expense to revise his drawings and specifications and secure new bids in order to satisfy the client that he has performed his part of the contract in the proper manner. These difficulties are largely eliminated by constantly acquainting the client with the cost aspects of his building project as they develop in the early stages, and by explaining the margin of error which necessarily exists in preliminary estimates and which can only be determined by these actual proposals. One of the most successful methods employed by several leading architectural offices is to obtain from several contractors, who are ultimately to be invited to present final proposals, preliminary estimates based upon the approved preliminary drawings. This enables the architect and the client to reach some approximate agreement as to changes that may be necessary before the preliminary drawings are carried into the working drawings. When this is done the architectural office must exercise exceeding care that the final drawings and specifications do not deviate in any respect from the preliminary drawings without written approval of the client and an understanding of the effect upon cost of the modifications.

The third group of difficulties arise during the contruction operation. Lack of adequate supervision,—or perhaps lack of appreciation on the part of the client of what constitutes the architect's supervisory responsibilities,—is a fertile cause of misunderstanding. Forty per cent of the total fee is usually charged for supervision. A considerable amount of work in this stage is done in the architect's office, checking shop drawings, selecting and approving materials, preparing full-sized details and checking contractors' requisitions for payment. This work is seldom visible to the client; he conceives of supervisory work as being confined largely if not wholly to the architect's presence on the site during all construction stages. Frequently the client is not at the building when the architect or his representative appears. He, therefore, measures the architect's attention to this problem by the number of times he finds him at the site. Two solutions are offered to this problem. The first is to explain to the client in the early stages or to incorporate a clear statement in the contract as to the actual services which are to be rendered; another effective system is to have the superintendent submit a brief written report to the client following each visit to the work, indicating the conditions found and the general progress being made with respect to the anticipated completion date. If this is not done, at least such a statement should accompany each bill rendered for services during that particular construction period.

The other problem of collecting fees is due to the credit of the client. Promotional projects are the usual source of difficulty in collecting the fees that have been established. It is no reflection on the architect if he insists in all cases upon some evidence of the client's capacity to pay for the work he has ordered, and particularly is this important when the client is not well known to the architect or of such prominence that his credit standing can be readily checked through the usual mercantile sources. Many times have architects failed to give a thought to this problem in their anxiety to obtain commissions for interesting or imposing construction projects. The architect has only himself to blame if he does not ascertain the credit standing of his clients before undertaking a commission. Subsequently, however, much difficulty can be avoided if bills are rendered promptly in accordance with contract agreement as each stage of the work is completed. When the bills are not promptly paid, the architect should follow up the matter without delay, and if necessary decline to proceed with work until the matter is adjusted.

To summarize, then, the problem of architectural fees and how to get them resolves itself into a matter of good business judgment and good business conduct. Charges should be established upon a sound basis which represents adequate compensation to the architect for his skill and time, and adequate value to the client as a result of the work performed. Getting architectural fees is first a matter of intelligent salesmanship, not of "horn tooting"; and secondly, of conducting each stage of the work that credit problems are eliminated at the start and that a complete agreement is maintained between the architect and his client on every problem that arises which involves the client's decision. A final matter is to keep the client well acquainted throughout the project with the work actually being done by the architect, so that no doubt may arise as to the adequacy of the service for which the client is paying.

THE AMERICAN PUBLIC BUILDING

THE POPULAR MISCONCEPTION OF ITS PURPOSE, AND ITS CONSEQUENT LACK OF USEFULNESS

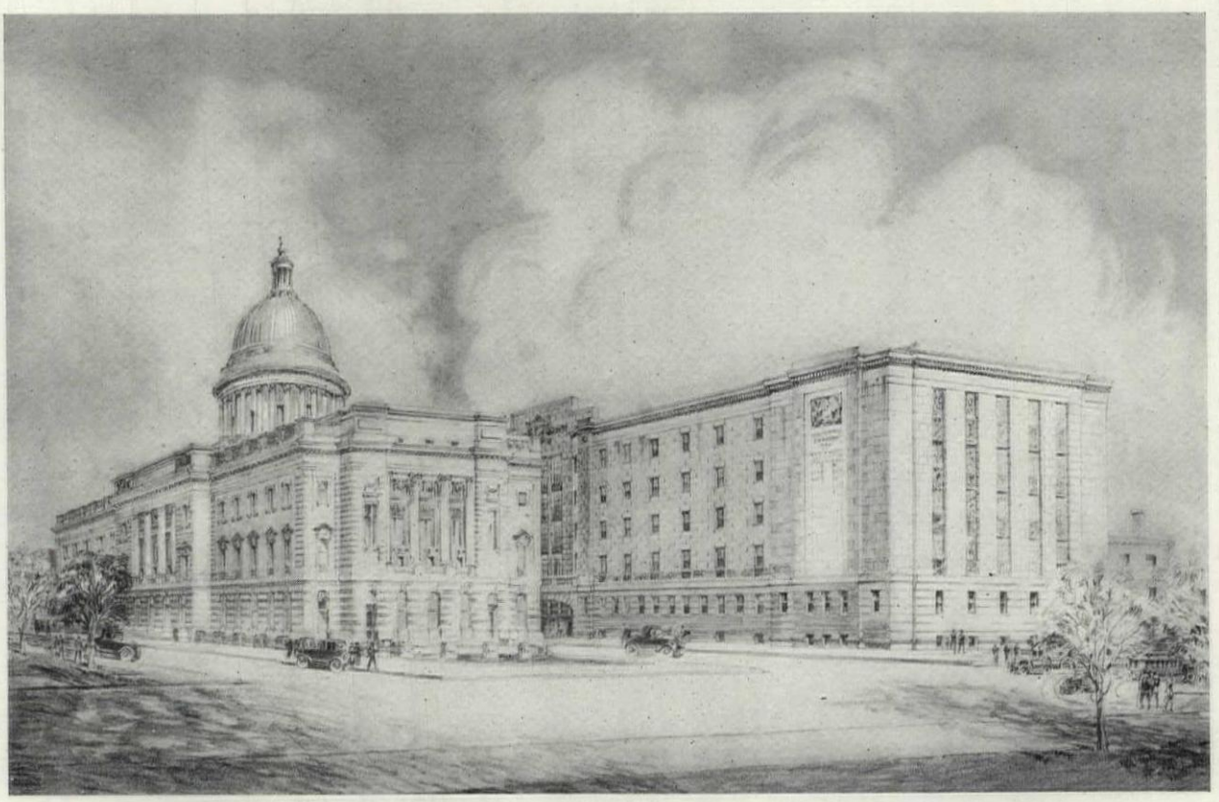
BY
ARTHUR T. NORTH

IT is a frequently made and generally accepted statement that "the past half-century has witnessed greater architectural development than the entire previous history of the world." This is true, because, preceding the past half-century, many of the essential materials of modern construction did not even exist.

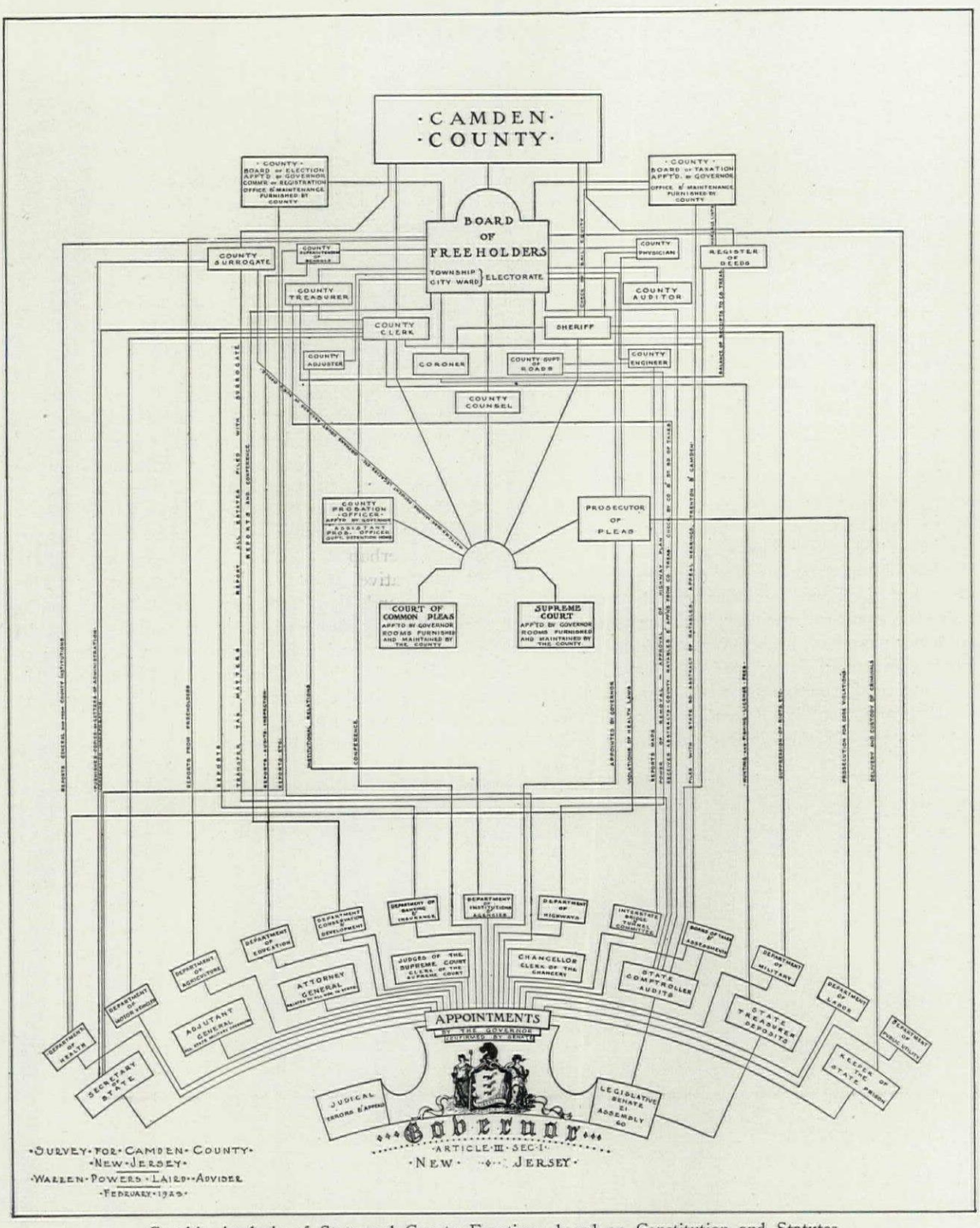
Commerce and industry jointly constitute the mainspring of this architectural development, actuated directly by necessity and accumulated wealth. The three principal elements of the new architecture are the plan for essential utility, the structure for strength and durability, and the enclosure for protection. There is an indissoluble economic tie between the useful building and commerce and industry. As the latter expanded, the useful building came into being, perhaps very largely through the contributory and creative efforts of the structural engineer, the heating and sanitary engineer, the electrical engineer, and the transportation engineer who has devised our elevators, escalators and conveyors of every kind. Along with this development of commercial and industrial building, equal development has taken place in the dwelling, the theater, the schoolhouse and other buildings. All of these types have responded almost immediately to the changes in our style of domestic life, amusements and of education.

One type of modern structure, however, can usually be classed as a failure,—the public building, more particularly the public structure used for governmental purposes. The American public building,—state house, court house or city hall,—is often a failure because it lacks the essential element of utility. Several reasons contribute to this failure,—some of ancient origin and some of this day. In old times the governmental building might have been the palace of the king and his fortress, the archiepiscopal palace in some countries, the feudal castle, or the cathedral. In each of these were housed authority and wealth,—the people were largely slaves, economic, political and religious. These buildings,—the palace, fortress, cathedral, or castle, were of such sizes that they always dominated the surrounding country and adjacent buildings, and the more wealthy and powerful the government the more imposing was its housing. The building, then, became the visible, unchanging symbol or manifestation of government.

This conception of government buildings was



Perspective Showing Relation of Old and New Court Houses, Camden County, N. J.
Edwards & Green, Architects; L. F. Pilcher, Consulting Architect



Graphic Analysis of State and County Functions, based on Constitution and Statutes

brought to America, and quite naturally, because political freedom was not in existence at that time. When America did become free it was, perhaps, an exhibition of egotism and, maybe, a manifestation of an inferiority complex that inspired the pretentious public building. After becoming free from foreign domination, we built our capitol at Washington with its great dome and imposing approaches. Was this merely because of tradition, or was it a defiance to the rest of the world? The form of the capitol at Washington was followed by those of most of the states, and we now possess a collection of domed state houses that are unequaled for ugliness and inefficiency. It is a subject for useless speculation, it is true, as to what our public buildings would be had the capitol been designed for

utility first and dignity second. It is apparent that, as we descend in the scale of governmental importance and wealth to the county and municipality, the public building becomes progressively worse. Reproduction always deteriorates from the model; it is inevitable, and, strange to say, no apparent effort was ever made, except in perhaps few instances, to employ an adequate style for public buildings.

Architectural competitions for public buildings are largely a political expedient. Elected officials aim to avoid any appearance of discrimination between architects which might reflect on their professional ability, and the competition is held to maintain a position of apparent fairness. Architects are the only professional men who have to compete for commissions. It is unheard of to require lawyers, physicians, surgeons, engineers and other professional men to compete by submitting samples of their wares. The custom of holding unregulated competitions was attended with evils that precluded the participation of many of the more competent architects.

Some leaders of the profession, recognizing the barriers to satisfactory results of competitions, entered into a campaign to improve conditions which resulted in the adoption by the American Institute of Architects of rules for conducting competitions. Competitions conducted according to Institute rules with *experienced professional advisers* are productive of very satisfactory results. In some competitions it is customary for the competitors to select by ballot the architect member of the jury of award, thus insuring competent architectural judgment. Generally effective precautions are taken to preserve the anonymity of the competitors. Competitions today, however, too often are disappointing, and these should receive condemnation.

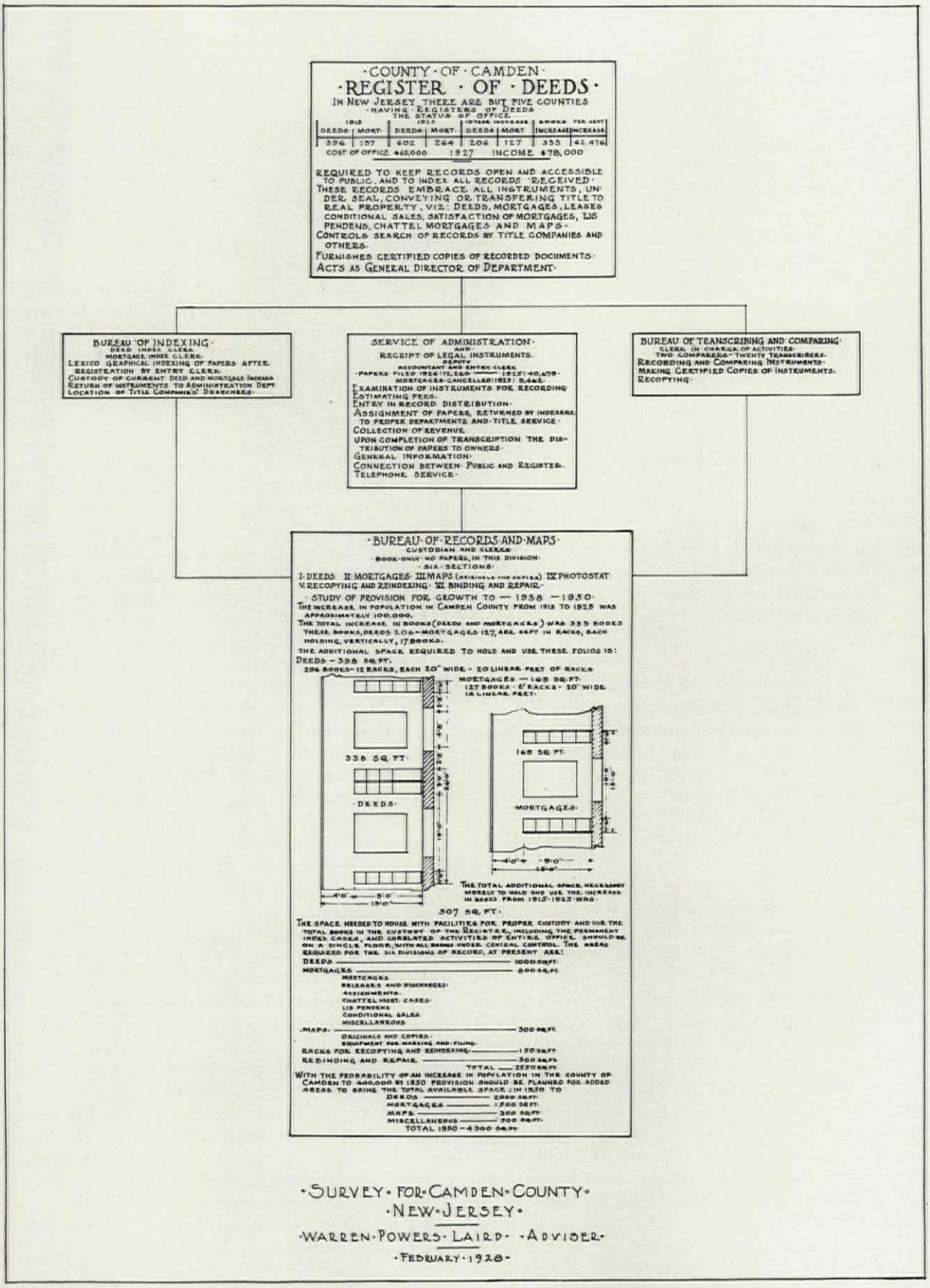
A public building is merely a place in which the public's business is transacted,—that is its essential purpose, and utility must be the objective of the plan. The question arises, how are we able to recognize or determine what constitutes utility in a public building? In the usual "Institute" competition an "architectural adviser" is chosen who prepares the basic program of the competition. This program usually allocates certain floor areas to the various departments or bureaus that are to be housed. How this allocation is determined is not generally known, but probably it is agreed upon between the architect and the heads of the departments or bureaus. The official or department head may or may not be competent to advise,—he may not even be familiar with the routine process of his office. Such is the result of our political scheme of "spoils to the winner" or election by a popular vote that has no knowledge of the functions of the department or the requisite ability of its head. The public building, as we have it, is not fundamentally right. It is true that the business of government has expanded greatly within the past two decades and that it will continue to expand with increasing population and new governmental functions. Today many states, counties and cities are building new state, county and city "office buildings" in which to conduct their business because their monumental buildings are found to be unsusceptible to alteration for greater usefulness. If we would measure the waste space in vast corridors, rotundas, excess story heights, unused attics and domes, it would be found that it would provide space for sizable and useful office buildings in which the public's business could be conducted economically and efficiently. Planning has now changed its emphasis from Beaux Arts *parti* to efficiency!

A fine example of recent and efficient building is that in Camden County, N. J. The existing court house became inadequate for the increased business of the county, and the board of freeholders employed Dr. Warren Powers Laird, of the University of Pennsylvania, to make a survey of the existing conditions and draw up recommendations for future procedure. Dr. Laird and his associate, Professor Pilcher first made an analysis on which were based the recommendations. The functions of county government are prescribed by statutory enactments which are the basis of the analysis. The analysis and recommendations were divided into four items:

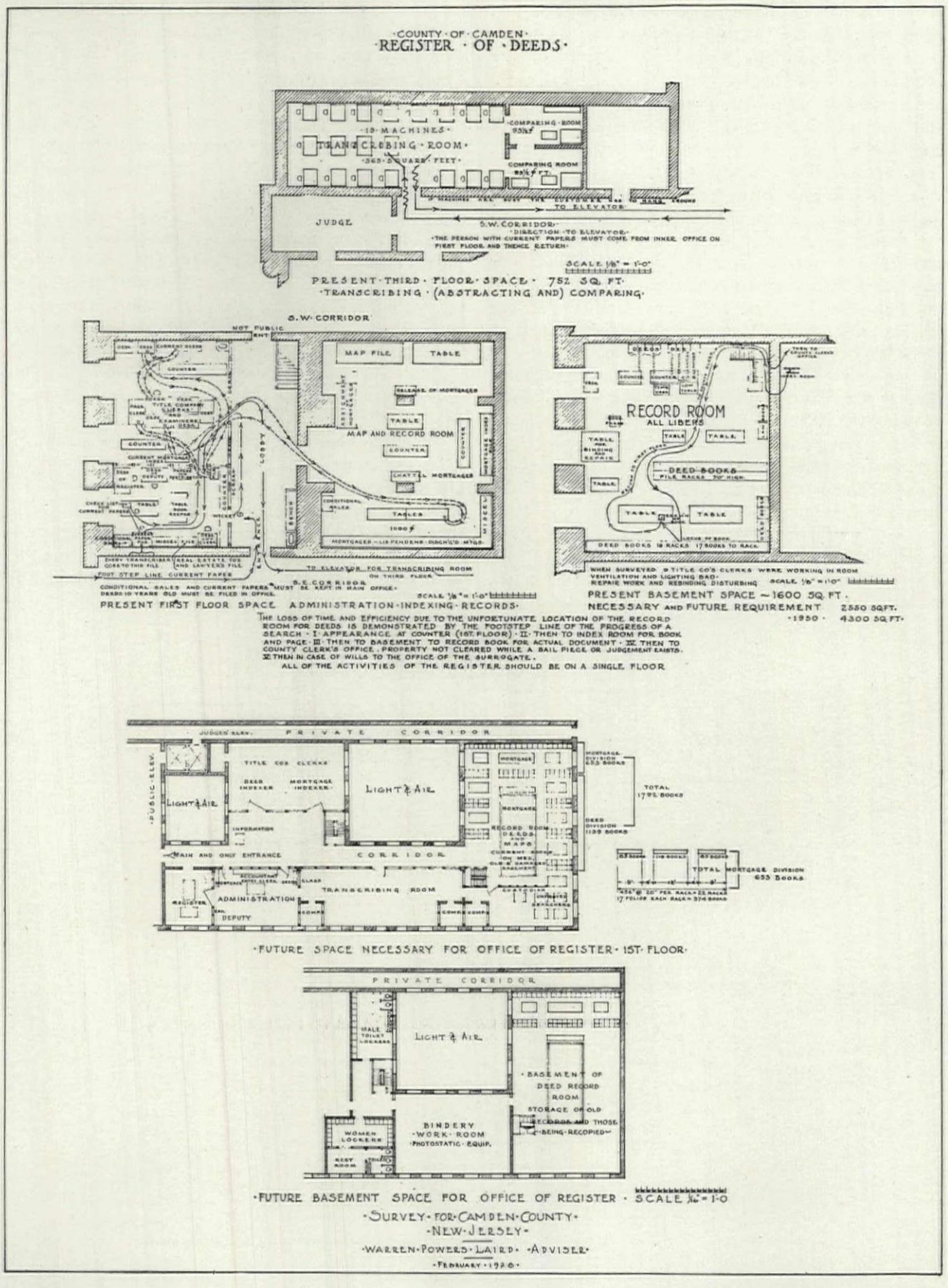
(1) The origins and inter-relations of state and county activities as provided in the statutes.
(2) The exposition of local or county activities to determine location and relation of parts.
(3) An analysis of the several county activities and their method of operation.
(4) A translation into plan diagrams of room arrangements with equipment suitable for present and future requirements.

Utilization of the present court house in connection with the new building was a factor in the problem, which involved certain changes in the existing structure. The proposed building operations are intended to accommodate the county business until 1950, and provisions are made for future extension when necessary.

A chart was prepared showing the relations between the various county and state departments or officials, both elective and appointed. A second chart shows the relations of the board of freeholders with the county officials appointed by them, the various committees of the board, the elective county officials, and the officials appointed by the governor. These two charts indicate the relationships and the functions of the county government. Specific charts were made for each department, bureau or official, on which are memoranda on its functions, personnel, nature of services, documents, files and equipment. From these data and their analysis were prepared plans showing the resultant space needs and the forms they should take, in both the new and old buildings, for the most efficient and economical operation. The survey in an important sense is a representation of cause and effect. The statutory and administrative causation of the many activities of county government determines a basis which con-



Detailed Analysis of the Functions of the Register of Deeds, showing Divisions of the Work, Various Kinds of Records, and the Area of Working Space Required for Each. This Type of Analysis was made for Each County Office.



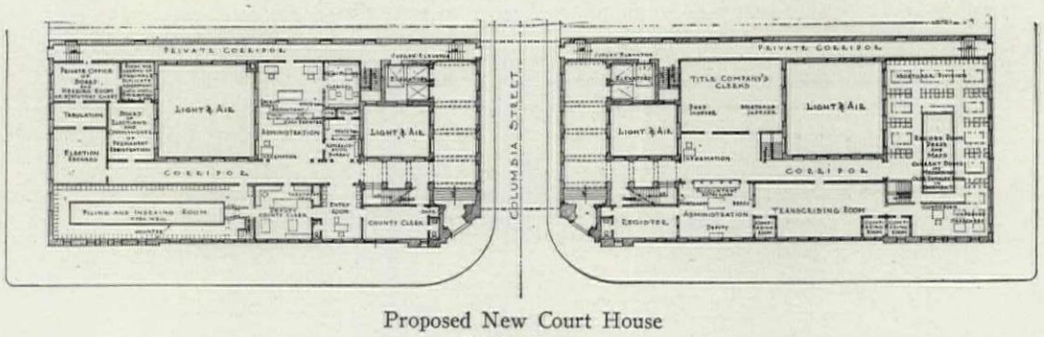
Analysis of Arrangement and Working Routes of Present Office of Register of Deeds, and Revised Arrangement Recommended for the New Court House.

stantly increases in its demands for efficient housing, resulting from the continued growth in population, commerce, wealth and social requirements of the community.

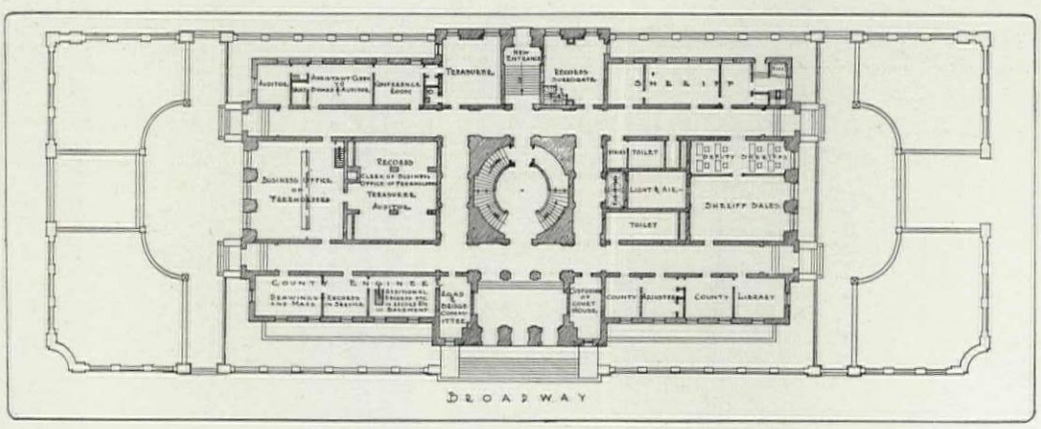
The solution of the problem of what constitutes a suitable public building can be attained only by such a method as is here described and, in part, illustrated. It is a rational and scientific method, logically developed from certain fundamental data. Should this method be adopted generally by public officials who are authorized to erect public buildings, such structures would emerge from the classification of our most wasteful, inadequate and architecturally inferior buildings into a classification comparable with the best of our industrial and commercial structures. Dr. Laird's report contained an estimate of the cost of remodeling the existing court house, dome repairs, the new court house, paving and other items. Charts showing the functions of the various officers, departments and bureaus, floor plans for their proper housing, plans for the new building and alteration of the old, block and traffic plans,—to the number of 36,—supplemented the written report. It is a splendid exposition of how to ascertain the record facts, to express the facts in charts and plans, and to estimate requirements in terms of future population.

A study was made of the routine of public business in each department, and the suggested plans were made so as to facilitate its dispatch. In the old building it was found, in some departments, that the routing of business was very unscientifically arranged, causing delay and inconvenience. The planning of any place wherein business is to be transacted is as definite and scientific as laying out a railroad freight yard. Our public buildings are usually mere aggregations of large and small rooms to which the work of the occupants and the public must be adjusted, and the result is that they are often wasteful, inconvenient and inadequate. The work must first be laid out, and to it the room be adapted. A freight terminal laid out with equal lack of intelligence would not function. Architects must realize that planning, in many instances, is a scientific and definite process similar to that of any other engineering project.

Dr. Laird has produced a splendid example of what constitutes logical and scientific planning, the process of its making, and its coördination into the form of a complete building. When this is done, the enclosure of the structure is but a further application of analysis and conclusion. Utility was here the basic consideration, and artistic enclosure the corol-

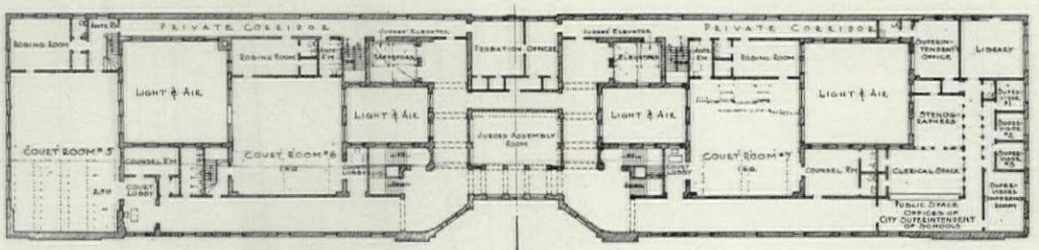


Proposed New Court House
Sixth Street

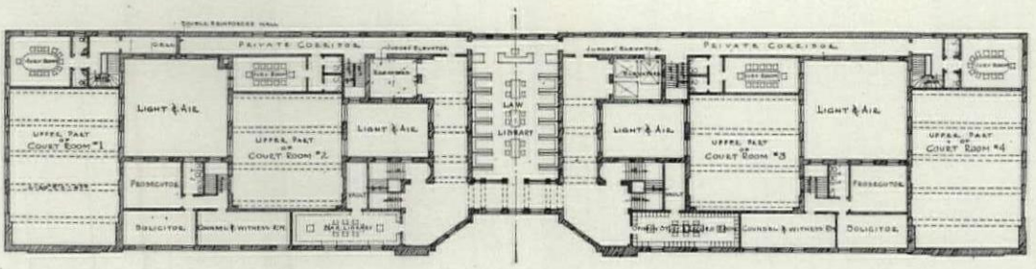


Old Court House

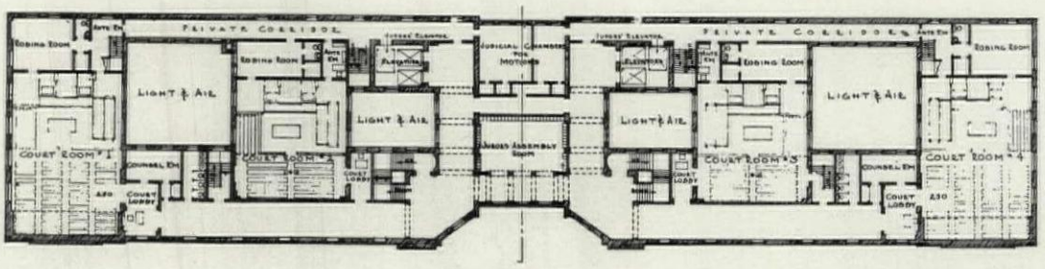
First Floor Preliminary Plan Showing Relation of Old to New Court House. Later Development Closes Columbia Street, Making a Lobby of this Area.



Third Floor



Second Mezzanine



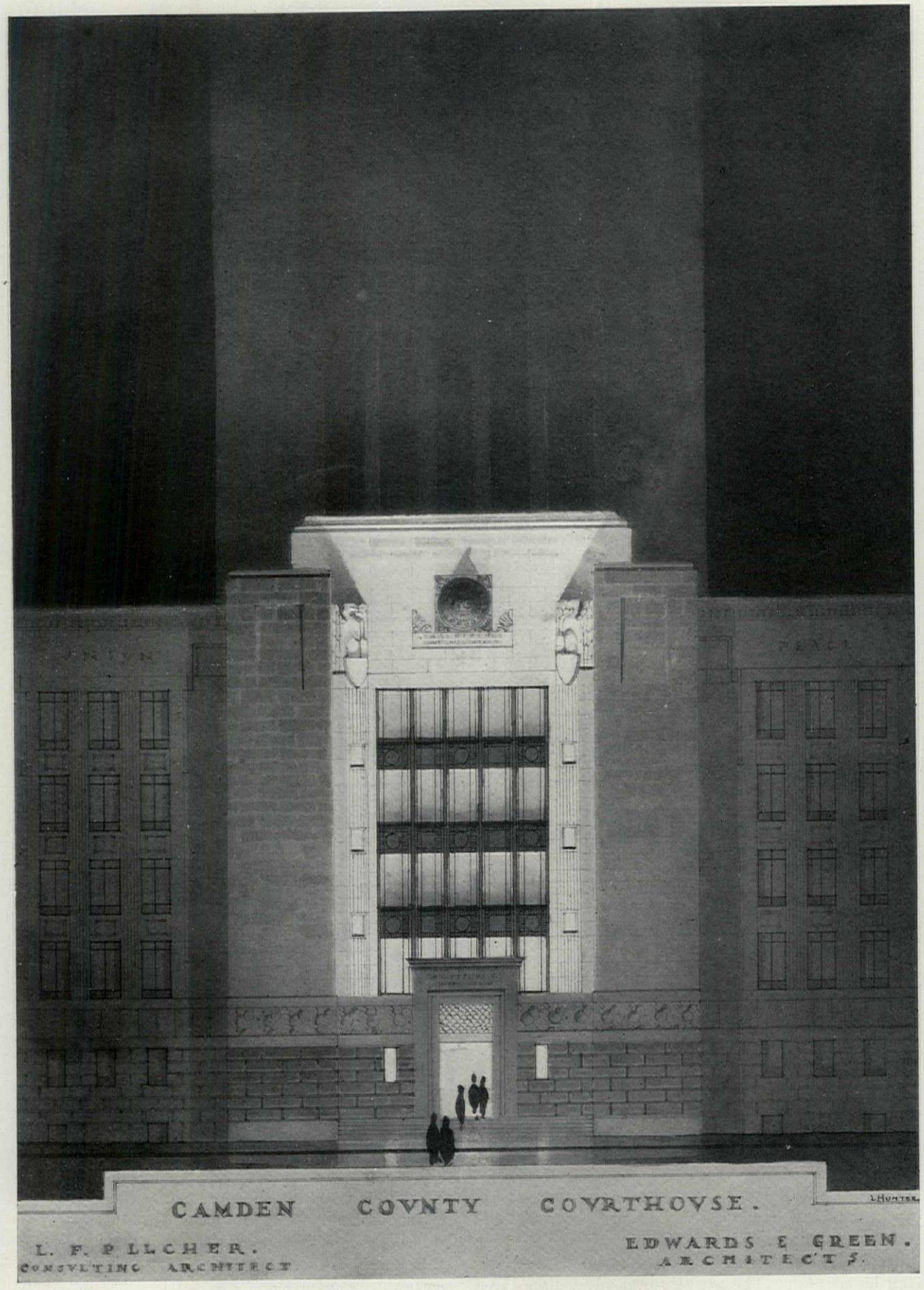
Second Floor

Preliminary Plans of Upper Floors of New Camden County Court House Showing Lofty Court Rooms and the Use of Mezzanines for Various Services. Fourth Floor Plan Is Similar to That of Second Mezzanine

lary,—the result being most happy and satisfactory. Making such surveys, analyses and recommendations is justly within the scope of architectural professional practice. In fact, no other persons are better qualified to perform such services. And, when allied with that other function of architecture, city planning,—and so employed jointly,—all the problems of governmental housing, urban traffic and community improvements will be solved in the best manner.

The Court House Annex Committee, of which Dr. Leslie H. Ewing is Director, as well as Director of the Board of Freeholders, made an intensive examination and study of Dr. Laird's survey and recommendations. The Committee referred it to the Board of Freeholders with a resolution recommending its adoption. The architectural adviser appeared before the Board and described all of the subjects treated, and the Board by resolution unanimously adopted the report. The improvements were authorized, Edwards & Green of Camden were employed to prepare the plans and supervise the construction, and the Board also employed Professor Lewis F. Pilcher, Vice-dean of the School of Fine Arts, University of Pennsylvania and former State Architect of New York, as consulting and advisory architect.

Editor's Note. Since the action here described of the Board of Freeholders, the City of Camden employed Dr. Laird to make a survey and recommendations for a new city hall and its location, together with a municipal bus terminal, and has retained Professor Pilcher as consulting and advisory architect. It has been decided that the new city hall will be built jointly with the new Court House Annex for reasons of economy and convenience. These will be published in due time in THE ARCHITECTURAL FORUM.



ARCHITECTS' RENDERING OF ENTRANCE PORTION OF NEW CAMDEN COUNTY COURT HOUSE

THE ARCHITECT AS CONSTRUCTOR

PART II—WHITHER DO WE TREND?

BY

WILFRED W. BEACH, ARCHITECT

IN a preceding article in these columns (May, 1928) the author attempted to set forth several reasons for assuming that architects should, in certain instances, for the good of the profession and in the interests of their clients, essay the actual execution of their brain products rather than assign it to low bidders and take chances on what ensues.

No claim of originality can be made for this idea. Several years ago, D. Everett Waid, discussing in *The Brickbuilder* the work of Mann & MacNeille, New York architects, took occasion to say, by way of comment: "The tendency among architects to sublet work and even to execute it by employing labor and contracting for materials themselves is perhaps due to the existence of many incompetent brokers who call themselves general contractors. That tendency may receive an impetus when architects realize that their proper standing is jeopardized by the growing power of a class of contractors who are dealing altogether with owners and with an avowed purpose of standing between owner and architect, and even employing architects as a subservient part of their own organizations. Desire for self-preservation should warn present-day architects that they must thoroughly qualify themselves with practical knowledge of materials and construction and structural design. Otherwise, they may find themselves on a salary basis, making artistic sketches for business men whose main interest is money profit, and who have not the æsthetic appreciation which animated the craftsmen-architects of old."

Mr. Waid prefaced this by saying: "Many architects are called upon to do such (construction) work occasionally and to a small extent; but perhaps only one architect known to the writer (other than the firm mentioned) possesses a construction department that has developed a complete organization trained to estimate costs, to buy material and hire labor, and to execute construction work according to its own standards."

But there appears to have been a more or less steady increase in such practice since the time at which Mr. Waid wrote, as witness the operations of Addison Mizner in Florida and those of Benjamin Marshall in Chicago and elsewhere. That there is a wholesome satisfaction in following this line of endeavor, which agreeably supplements that of creating the ideas in the drafting room, is not to be doubted. One has but to enjoy the experience to fully appreciate this!

Assuming that the practice of our profession is at once our calling and our means of livelihood, we are thereby undertaking certain responsibilities, not only for ourselves and our dependents, but for our clients as well. No matter which we hold to be of major importance, our obligations to our clients are considerable. The question is, are we carrying out those obligations to the best of our respective abilities by seeking to remain only the artistic designers mentioned by Mr. Waid? We are, if architecture is a thing of lines and renderings only. But we cannot help but realize that it is much more than that. If so, are we shirking our responsibilities by choosing only the easier and more enjoyable tasks and delegating what we deem the arduous and more risky details to those supposedly without our ideals, —to be evolved with or without our supervision? Is it enough for one to say "I've adopted architecture as a *profession* and see no reason for turning commercial by branching out into construction"?

But commerce is not necessarily criminal. It merely has criminally inclined barnacles clinging to its unexposed surfaces. One can be quite commercial without soiling one's delicate fingers. In fact, most of us would be considerably broadened, possibly improved, if we were privileged to have more business experience. This article is not, however, intended as an argument in favor of all architects' jumping at once into the building field in an effort to do away with the general contractor. It is to be considered more in the light of an academic discussion of the present-day trend of the general practice of design and construction; not, strictly speaking, an arraignment of either. It was inspired by the published statement, in considerable detail, of the secretary-manager of a Texas association of general contractors who may be assumed to reflect to a considerable extent the opinions of many others throughout the whole country. There he vigorously decried the effect of competitive-bidding contracting because it not only induces the owner to "indulge in the common pastime of 'whip-sawing' the three low contractors" but influences them to give "their 'subs' and 'dealers' the same or worse treatment than they complain of on the part of owner and architect."

Quite disregarding any theory as to what causes a contractor to mistreat his "subs and dealers," we believe that there are still many general contractors upon whom architects are justified in depending for the execution of high class work, but we agree with Mr. Watson, the secretary-manager just quoted, that competitive bidding does not tend to produce such.

Aside from any argument on the subject, however, there is really no sound theory for asserting that the architect has less right in the construction field than has the contractor or engineer in the preparation of building drawings and specifications. Perhaps each should stay in his own corner, though it

would appear that a distinct process of evolution is at work to bring him out. If so, why should the architect be the one to refuse to "evolute"? Tradition, conservatism, pride and inertia tend to hold him strictly to his professional sphere, though he may be missing considerable of the joy of creating by that very conservatism. No need to write volumes on the subject of an architect's experiences with low bid contractors. Probably no architect will aver that he enjoys watching over them or hiring others to do such detective work,—nor later explaining to the owner why certain things slipped by because the detective was neither omniscient nor omnipresent. We may agree with Mr. Watson that "even the ordinary honest contractor, faced with a possible loss through a price competition, forced bid, can find many ways to skimp his work,—giving construction that will pass the eye of the average inspector, but not giving the owner the quality he wants or thinks he is getting." But are we to agree further with him in his conclusion that "in the main, future construction work will be handled by firms which unite in one organization the functions now separately performed by architects or engineers and contractors?" It would appear that the contractors have thrown down the gauntlet,—that some of them, at least, are of the opinion that either the architect or the general contractor is to dominate the building of the future to the practical elimination of the other. We are not, at this writing, attempting to either prove or disprove this,—not even discussing the plausibility of the theory. We do know that certain general contractors have been striving for some time to eliminate the architect (and succeeding in doing so, insofar as their work is concerned), and that certain architects have successfully conducted their own construction operations. Whether or not these are phases indicative of a distinct trend in the evolution of the building industry, who can say?

Basing our dissertation upon these premises, we merely seek to show that it should be no more difficult for the architect to maintain his status as "the boss of the works" under such a new dispensation (or is it a swinging back of the pendulum to an older order?) than for the contractor to usurp that function. Nor, we maintain, will the architect sacrifice any of his dignity by becoming a practical builder. If there be caste in the personnel of the industry, present-day architects must assume their stratum to be located somewhere between the high level of the creative designer and that of the aforesaid detective. May not that of the honest builder be assumed to be at least as high? Obviously, being good builders is better than being poor detectives, which the gentleman from Texas considers us. Perhaps, as usual, "the proof of the pudding is in the eating." It is of less import to convince members of our profession that they should add construction forces to their organizations than to offer assistance to those who contemplate such an undertaking. Such a departure is not, to be sure, to be lightly undertaken. It is a serious matter and, once decided upon, introduces more novelties into one's practice than merely the buying of materials and the hiring of mechanics.

As we are often made painfully aware, one of the most important of an architect's functions, perhaps the most vital to his practice, is that of getting the business to keep his office going. So long as he adheres to a strictly professional status, his competition is, to a large extent, confined to that with others in the same line. He seldom has opportunity to compete with contractors who offer "planning service," even if he dared to do so. Such business is generally "cinched" by trained salesmen before the architect has heard it is in prospect. And it is into the field occupied by these contestants that the constructing architect is entering in order that, for the good of the owner as well as for the profit of the architect, the independent existence of the latter shall not be too greatly circumscribed. The percentage of his former clients and of those new clients naturally coming to him, who may be convinced that his scheme of "cost-plus" building is quite sane, may be too small to warrant the change in policy,—probably it would be. In any event, the architect may be presumed to be seeking to enlarge his clientele by means of his new form of practice.

He must go out after new business. In order to best fit himself to secure it, he must first convince himself that he has better buying ability and better construction methods than (or, at least, equally as good as) those possessed by others. This may not be difficult. He has learned by painful experience what are the outstanding shortcomings of the average general contractor. Summed up, chief among these are:—

1. Indifferent buying.
2. Straining credit to the detriment of close buying.
3. Buying from favorites or to repay obligations.
4. Too little price competition, for various reasons.
5. Poor foremanship.
6. Too much dependence upon foremen.
7. Too meager instructions to foremen.
8. Insufficient expediting.
9. Unbalanced expediting.
10. Careless general supervision.
11. Poor bookkeeping.
12. Slack (or nil) cost accounting.
13. Intense application to business getting at the expense of other activities.
14. Substituting shrewdness for efficiency.

The list might be indefinitely extended. It may be considered the natural result of the competitive bidding system and the temptation it offers to the crook or the shyster. This is not an indictment of all general contractors, by any means, but of the many who have not the inherent honesty or strength of character to fortify them against temptation. The experienced architect is well aware of the more gross deficiencies of these gentry and can, when he seeks to displace them, so equip his forces and so conduct his operations as to eliminate such defects and others.

In the matter of buying, he has a considerable advantage over the ordinary general contractor,—as has any builder who installs his own drafting room. He is not limited as to the number of copies of drawings he can send out for factory bids, nor has some one else the fixing of a dead line when those bids must be in. He can assiduously seek the lowest prices, consistent with satisfactory output. Contractors too often buy through accustomed channels, even when other supply concerns are much more in need of business and are willing to bid accordingly. General contractors are also likely to favor those whose bids have been used in securing the work, regardless of whether or not their prices are bedrock. This is ethically proper, to be sure, but it is not of particular benefit to the owner. For instance, a local contractor on a certain remodeling project would have used a bid of $1,500 for the millwork, the lowest local price. But the owner entrusted his work to a constructing architect, who located a good mill 800 miles away which actually needed the business and delivered the goods, "f.o.b.", for $750. Nor is such an event unusual. We have all remarked upon the unaccountable variation in bids that is always to be expected on minor items. Another case in point is that of three bronze-plated grilles needed to fill certain openings in an office counter. The concern supplying the counter priced them at $50 each. Bids from ornamental metal concerns ranged from $45 to $250 for the three,—and they were ordered and delivered at the lowest price. For a country bank building, the two local hardware dealers (one of whom any local builder would surely have patronized) each asked $200 for the finish hardware. The constructing architect bought the same bill from a wholesale house for $135. The wholesaler wanted $87.50 additional for kick-plates, thresholds and push-bars, not on the original list. These were obtained from a manufacturer for $67.50. Verily, there is much of interest in the life of a purchasing agent!

Another advantage possessed by the architect is that he has not someone else's restrictions to prevent his getting prices on materials of different values. The highest priced, which might be the only material which would satisfy a specification calling for strictly "first class," may not be absolutely necessary to the location,—but a contractor's attempt to substitute, even at a price allowance, might be viewed with suspicion. He is supposed to profit by all changes, hence had best be held to the terms of the contract. Departures therefrom are not to be encouraged. But the constructing architect, doing business under a "cost-plus-lump-sum" contract, has no such inhibitions,—he can make all such changes to the sole benefit of the owner. He need not invariably buy "first class," when the particular need does not require it. And he has the further advantage of being able to pay cash,—with the owner's money,—and to take all benefits of cash discounts. It will also be found that prices quoted on a strictly cash anticipation are frequently lower, even when not subject to discount. In the matter of selecting foremen, one must exercise the greatest caution and acumen. A foreman can make a project successful, with proper support, or he can mar it in short order. Good foremen are not easily secured. Good general foremen are exceedingly scarce. The policy of trade unions in denying their members permission to learn or work in more than one trade doesn't make for the training of general foremen. They must arrive outside of, or in spite of, union restrictions. But general foremen are to be found, nevertheless, and should be well paid,—they must be properly remunerated in order to be held, and they must be handled with tact. They know that they know, but may not be so sure that the architect does. They have had experience under all sorts, and their respect for the new employer needs to be carefully developed.

It is not to be supposed that any architect will, without previous experience in building construction, suddenly embark upon such an enterprise on a large scale. But most of us have, at one time or another, carried out minor operations through direct employment of labor, and have executed larger work by means of multiple small contracts to the exclusion of a general contractor. If this further comprehensive step is to be taken, however, it must be only after due consideration and proper preparation.

One must decide what crafts will be subcontracted and what will be directly employed; whether the project will be "union" or "open shop," and what equipment is necessary. The latter had best be procured only as needed for each project. Perishable items, such as buckets, hose, rope and material used and destroyed in temporary construction are to be charged to the particular work; others, such as barrows and general building equipment, are to be charged to the builder's overhead and remain his property. The larger items, such as concrete mixers, hoists and the like, can be either purchased or rented as is deemed advisable. In either event, the owner should pay rental for such items of major equipment as are used on his work.

Now, to return to the important subject of getting the business. If the architect has already established his prestige as a conservative estimator and the type of man who is dependable,—who will carry out his obligations, if it is humanly possible so to do,—he has built an excellent foundation upon which to erect his new business. His statements will be convincing and will carry weight accordingly. He can, among other things, show how work by his own forces will reflect these advantages to the owner:—

1. It can be started without waiting for drawings to be completed and without loss of time in taking general contract bids, thus materially reducing carrying charges.

2. The architect, and the owner through the architect, will exercise more direct control over the laborers and minor contractors.

3. The builder, by using the owner's funds instead

of his own, does not have to add interest to his carrying charges, but can buy in the lowest markets and take advantage of all possible discounts.

4. The cost of a builder's bond is also saved.

5. The owner finds himself paying lowest costs for the most suitable materials and appliances, instead of paying the highest prices a contractor is able to collect for what must be inspected and judged.

6. Changes can be made at net cost. The "extra" bugaboo is avoided.

7. By the judicious use of premiums and bonuses, especially good and speedy performances may be secured, without being found unduly expensive.

8. Occupancy of the premises or any part thereof can be had by the owner before completion, without question or added expense.

9. In case the work is prematurely terminated, adjustments can be affected with minimum trouble. This is sometimes valuable in cases where churches or lodges have not been able to collect subscriptions. They can quit if and when their money runs out.

10. The one point in favor of competitive bidding contracting is that the owner is thereby supposed to know in advance what his building is to cost. Barring extras, he does acquire this information. But he is a long way from knowing if it is costing as little as it should or if he is sure to get what he is paying for. With the architect as builder, the owner does get what he is paying for and at actual net cost. More than that, he should not expect. It is admitted that general contracting is a gamble,—with the owner a novice playing the other fellow's game. For that reason, he hires the architect (if he thinks he needs him) to look out for his interests. But frequently the contractor is smooth enough to have the architect set aside, thus removing one of the gambler's obstacles.

Having "sold" the commission, if he be so fortunate, the architect proceeds with the drawing up of a contract, the approval of preliminary sketches, the preparation of working drawings, the selection of a general foreman, and the procuring of prices on the items first demanding purchase. The contract form included here was most carefully evolved from several under consideration and has been repeatedly used. The fundamental idea is that it is merely an expression of mutual understanding between two parties who have absolute confidence in each other and merely desire a record of their understanding. Such a contract should never be entered into on any other basis. It will not safeguard an owner against swindling by a dishonest builder any more than will any other form of cost-plus contract. There is no way of enforcing honesty in a purchasing agent if he chooses to be a crook. One can only check him up and get rid of him. In this sort of a contract, the architect (or builder) is merely acting as a purchasing agent, skilled in the buying of labor and material to produce a building.

The amount of his remuneration for such service is presumably discussed and arranged at the time of his employment. If he be the type of architect we are discussing and addressing, he has not been accustomed to cutting his prices to get business and will not now begin to do so. Naturally, the proper fee for the service we are describing is a combination of the customary architects' charge and the ordinary good contractors' profit. Experience will prove that new work costing upwards of $50,000 can be handled to advantage at such combined rate, but that alterations and minor operations at such a fee will not be particularly remunerative. Perhaps work costing over $500,000 could be done for slightly less, but it is hardly a safe assumption. We are discussing work done for profit and not for the average architect's "living wage." It is assumed that both the owner and the architect-builder are to profit by the deal. Close scrutiny of this contract form is recommended to any architect who proposes to conduct building operations. It can, no doubt, be improved upon, but it should prove a good basis upon which to found an agreement. Specifications used with it need no general conditions and but few supplementary general conditions. But one's instructions to the men on the site must be most ample and explicit. These will be set forth later in another article to be published in THE ARCHITECTURAL FORUM.

The subject of the various numbered articles of the accompanying contract may be summarized as:—

1. Description of the work.
2. Drawings and specifications.
3. Minor changes in the work.
4. Major changes in the work.
5. Expediting the work
6. Purchase of materials.
7. Invoices required.
8. Advancement of funds.
9. Itemized statements.
10. Payment of builder by owner.
11. Definitions of terms Equipment, Tools and Supplies.
12. Rights of owner's representative.
13. Lien indemnity.
14. Advertising signs.
15. Insurance.
16. Payment for builder's services.
17. Stopping of the work.
18. Arbitration.

These subjects might of course be incorporated as the headings for each article of the contract. A contract form as used by the author is given in full on the page opposite and on the page following.

THIS AGREEMENT, MADE this day of

Nineteen Hundred
BY AND BETWEEN of hereinafter

called the "Builder," and
hereinafter called the "Owner."

WITNESSETH that the Builder in consideration of the agreements made by the Owner, agrees with the said Owner as follows:

Article 1. The Builder shall and will secure all material and provide all labor necessary to the design, erection and equipment of

the Owner on its property located in as shown by the preliminary drawings and specifications prepared by the Builder and approved by the Owner, which drawings and specifications are identified by the signatures of the Parties hereto and made a part of this contract.

Article 2. The Builder shall furnish such further working drawings, specifications, details and explanations as may be necessary to fully describe the work to be done. All drawings, blueprints, and specifications are and remain the property of the Builder, the Owner, at option, retaining a set of each as a permanent loan.

Article 3. The Owner shall be at liberty to order minor changes from the approved drawings and specifications and the Builder shall revise his work to conform to the same (provided that due notice is given of the change and that said change does not involve delay in the completion of the work) without in any way affecting the terms of the contract.

Article 4. The Owner shall also be at liberty to order major changes from the approved drawings and specifications under the same conditions as set forth in Article 3, except that for each major change the Builder shall be allowed a fee of fifteen per cent (15%) of the estimated cost, such changes only to be made when authorized in writing by the Owner.

Note: Any change involving an additional expenditure of five hundred dollars ($500.00) or more shall be considered a major change.

Article 5. The Builder shall start the work at the site as soon as sufficient material can be delivered to insure continuous rapid progress of the whole work and shall do everything possible, consistent with good workmanship and minimum cost to push all parts of the work to completion. With the consent of the Owner, such premiums as are agreed upon between the Parties hereto may be paid to get quicker deliveries or secure overtime work at the Building, the extra cost of such procedure and of all personal expediting or tracing of shipments to be paid for by the Owner.

Article 6. The Builder will purchase all material and labor for the work at the lowest possible prices consistent with the grade needed, whether buying in the open market or by competitive bidding as may be found most expedient, and will supply such additional copies of prints and specifications as are needed to obtain lowest prices. The Builder will also take advantage, on behalf of the Owner, of any tenders which the Owner may receive for material suitable for the building and will also make use of such additional second-hand material as the Owner may provide for the work. All orders and contracts for material, etc., involving an expense of

or more shall receive the approval of the Owner before being placed.

Article 7. Invoices of all materials shall be secured by the Builder in triplicate. Original invoices shall be checked and approved by the Builder and shall accompany the monthly statements mentioned in Article 9. Duplicates will be kept on file at the Builder's Home Office.

Article 8. The Owner shall advance to the Builder, as needed, sufficient funds to meet all payrolls when due and to pay bills for materials in time to take advantage of possible discounts. In case it may be necessary to make advances before the actual payrolls can be made out or invoices furnished, then such advances shall be based upon estimates supplied by the Builder as to the amount of funds so required.

Article 9. The Builder shall furnish the Owner, on or about the fifth day of each month during the progress of the work, an itemized statement for the preceding calendar month, as defined in Article 10, of all labor, material, etc., incident to the work under this contract, and of all funds advanced by the Owner during such period. These statements shall be accompanied by the original invoices previously mentioned.

Article 10. The Owner shall pay to the Builder within three days after receipt of monthly statement above mentioned, the balance due the Builder up to the amount of the entire actual cost incurred during the preceding month; such actual cost to include the net cost of all materials, supplies and labor (including superintendent and foremen) provided; freight, express, and cartage charges; prevailing rental for equipment, etc., required for economical construction and for the time actually needed upon the premises; cost of fuel, power, light and water used during construction; net cost of sub-contracted work, materials and supplies; traveling and hotel expenses, incident to the work (and of special help when authorized by the Owner); cost of permits, fees and royalties; all premiums for insurance

carried on the work; all incidental expenses, liability and outlay incurred in connection with the work, such as telephone and telegraph charges, personal tracers, temporary sheds, fences, offices, toilet rooms, walks, soil tests and other necessary tests. Actual costs as above outlined give the Owner the benefit of all cash and confidential discounts of every nature.

Article 11. The following differentiation shall be made between the terms Equipment, Tools, and Supplies in order to reckon the net cost as described in the preceding Article:

"Equipment," on which the Owner shall pay rent, will include concrete and mortar mixers, excavators, wheel and slip scrapers, steam engines, elevators, hoists, derricks, drill machines, electric motors, gasolene engines, forges, pneumatic hammers, pumps, power saws, platform scales, wagons, surveying instruments, temporary heating apparatus, typewriters and desks.

"Tools," furnished by the Builder at his own expense, will include all small portable hand tools and mechanics' trade tools except such perishable items as will be charged under "Supplies."

"Supplies," charged to the Owner as part of the cost of the work, will include all special or perishable items necessarily purchased for the particular work. These remain the property of the Owner and may be disposed of by him at the completion of the work.

Article 12. The Owner's representative will be permitted access at all times to records, correspondence, account books, drawings, specifications, vouchers, invoices and payrolls relating to the work for the purpose of auditing the expenses incident to the work and gaining other information relating thereto.

Article 13. The Builder shall idemnify the Owner and save him harmless from all mechanics' liens upon the premises on which the building is located arising out of the work to be performed under this contract, provided that the Owner shall have paid to the Builder the amounts due at all times.

Article 14. The Builder may display at least two advertising signs in conspicuous places about the premises, such signs to be furnished, erected and removed all at his own expense. Other billboard privileges at the site remain vested in the Owner.

Article 15. The Builder shall provide such liability and compensation insurance as may be necessary to protect both Parties to this agreement (and as part of the cost of the building) except that the Owner shall provide fire insurance in amount sufficient to protect the interests of both parties to this contract, including building equipment and tools. At the option of the Owner, the Builder will also carry accident and public liability insurance, otherwise it is assumed that the Owner elects to assume such risks.

Article 16. In addition to the actual cost of the work as herein before defined, the Owner shall pay to the Builder for his services and for the use of his organization and tools in the construction of this work, the sum of

in installments as follows:

(Note: It is understood that the foregoing partial payments represent approximately 85% of the fee earned by the Builder up to the time such payments are stated to be due.)

Article 17. If the work should be stopped for a period of one month under an order from the Owner or any Court, through no fault of the Builder or anyone employed by him, or if the Owner should fail to pay to the Builder, within ten days of its presentation and maturity, any sum due to the Builder, then the Builder may, upon three days' written notice to the Owner, stop work and terminate this contract and recover from the Owner the balance unpaid for services under Article 16 and also full payment for all material furnished and all sub-contract and other work executed as well as loss and damages sustained upon any plant and material and upon any incompleted sub-contract, together with all cost of collecting such unpaid balance.

Article 18. In the event of any disagreement arising under this contract between the Parties hereto, it shall, upon written notice of either Party, be submitted to three arbitrators for decision. Each Party shall choose one arbitrator within five days after receipt of such notice, the third to be chosen within five days by the two thus selected. The decision of all or a majority of said arbitrators (which shall be rendered within.....days of the appointment of the third arbitrator) shall be final and binding on both Parties to this contract. The expense of such arbitration shall be agreed upon in advance and shall be borne equally by both Parties.

IN WITNESS WHEREOF the said Parties to these presents have hereunto set their hands and seals the day and year first above written.

....., Builder,

By .....

.....

..... Owner,

By .....

The Bellaires—Consummate grace and artistry, and distinguished by the delicate symmetry of contour that reveals the hand of the master craftsman, is this newest Kohler design. The *Bellaires* is not to be thought of as merely a lavatory—it is a luxurious dressing table as well. Superbly executed in vitreous china, in the Kohler Colors or in white, with legs and fittings finished in gold or chromium plate, this magnificent fixture symbolizes the modern spirit in bathroom design and awakens new desires for the architect to satisfy.

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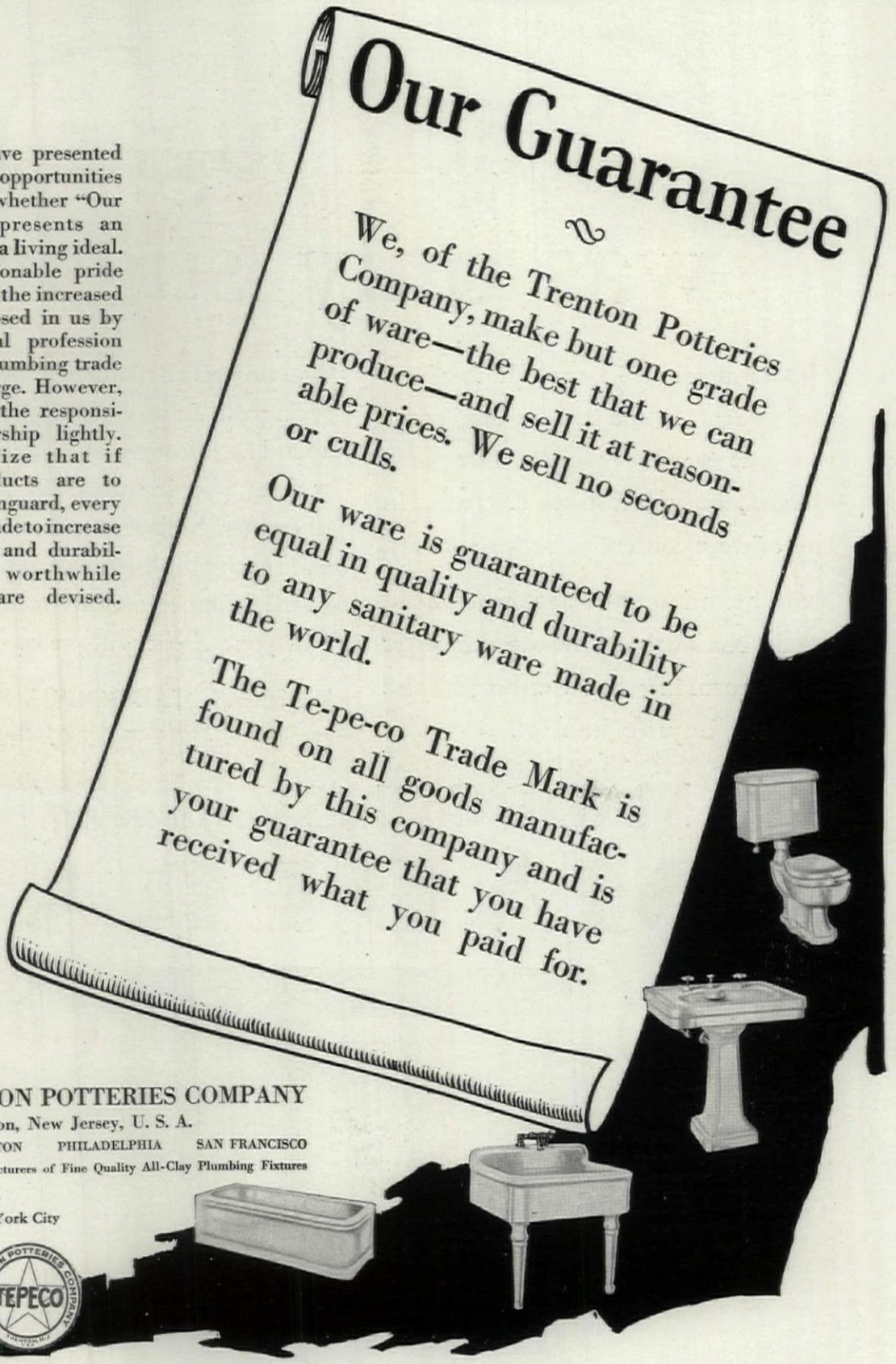
THE years have presented innumerable opportunities to demonstrate whether "Our Guarantee" represents an empty phrase or a living ideal. It is with pardonable pride that we point to the increased confidence imposed in us by the architectural profession as well as the plumbing trade and public at large. However, we do not take the responsibility of leadership lightly. We fully realize that if TE-PE-CO products are to remain in the vanguard, every effort must be made to increase their usefulness and durability whenever worthwhile improvements are devised.



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AT THE WORLD'S FINANCIAL CENTER

ACROSS the street from where the first President of the United States took oath of office, and on one of the most valuable pieces of land in the world, a new and magnificent structure now towers far into the air.

Within the shadow of its casting are the world's most famous financial headquarters. Here will stand another landmark created by master minds of the architectural and engineering professions—emphasizing modern beauty and efficient design.

Responsibility for such structures rests heavily. Every selection of materials will challenge the wisdom of their sponsors as time determines their service quality, adequacy and durability. Many miles, many tons, of "NATIONAL" Pipe have now become an integral part of this building. The reputation for general dependability, consistently appearing throughout tubular history from the earliest days of pipe making, gives every promise that this piping bears the same ratio to successful performance as the building itself.

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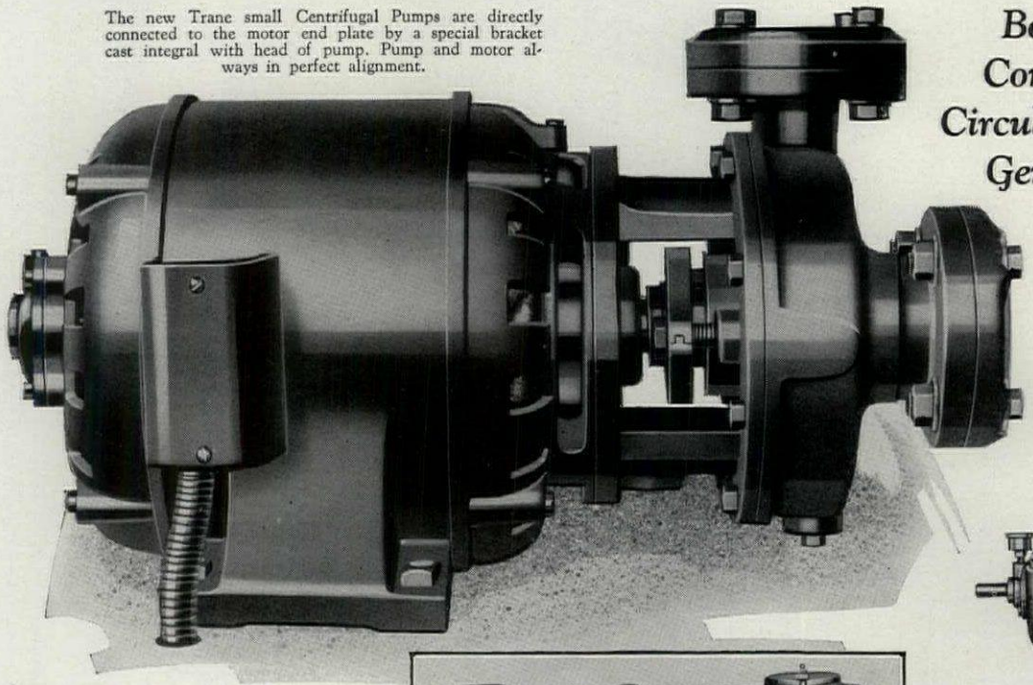
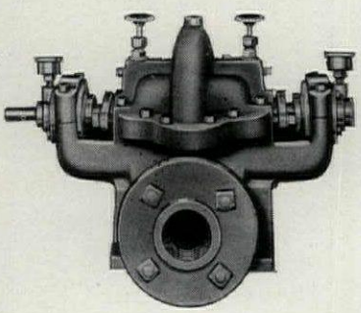
Trane Announces—
Improved Line of Centrifugal Pumps

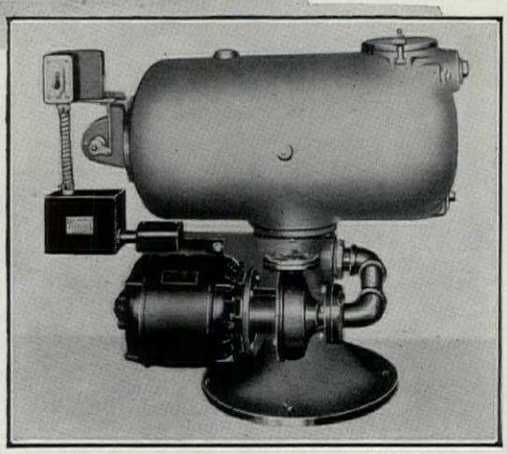
The new Trane small Centrifugal Pumps are directly connected to the motor end plate by a special bracket cast integral with head of pump. Pump and motor always in perfect alignment.



Boiler Feed—
Condensation—
Circulating—Booster
General Service

The new Trane horizontal split shell centrifugal pump for booster, circulating and boiler feed service.





Trane Condensation Pumps are furnished completely assembled and wired for installation. Pump, Motor, Receiver, Switch Box, and Motor Protective Equipment mounted as a single unit on one base.

A complete new line of centrifugal pumps! Increased capacities! Higher efficiency! More compact units! Easier to install! Completely assembled! Nothing extra to buy! One-man installation! All of these features and many others are built into the new line of Trane Centrifugals for boiler feed, condensation, circulating, booster and general service work.

Every refinement that will make the installation easier and increase the service of the pump has been included. Higher efficiencies have been obtained in these new units than were ever before secured in Centrifugal Pump history. ¾ H.P. motors do work that has required one or 1½ H. P. in the past. On the larger pumps, 7½ H. P. motors do work that has always required ten. Capacities are surprising. Operation costs are lower. Pumps are quiet in operation. Light in weight, yet sturdy in construction.

And with all these features the prices are still low. Send for new bulletin containing complete information on this improved line of pumps at once.

This is No. 2 of a series of three announcements of new Trane equipment. Announcement No. 1 presented the new Under-Window Type Concealed Heater. No. 3 will appear in an early issue of this paper.

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WHAT shall the cornice be?

Rust-resisting ARMCO Ingot Iron. In those few words, was the cornice of this West End Baptist Church, Birmingham, destined to endure . . . and save money for its owners.

Architect J. E. Green and Sheet Metal Contractor C. A. Bain knew that ARMCO Ingot Iron would form easily and successfully to the intricate details called for in the plans. Moreover, they knew that the first cost of this pure iron was considerably lower than that of the rarer metals—*and that it would last.*

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When a client's proposed expenditure indicates a long-lived sheet metal at moderate initial cost, *there* is the place for ARMCO Ingot Iron. At least, hundreds of architects and their satisfied clients think so.

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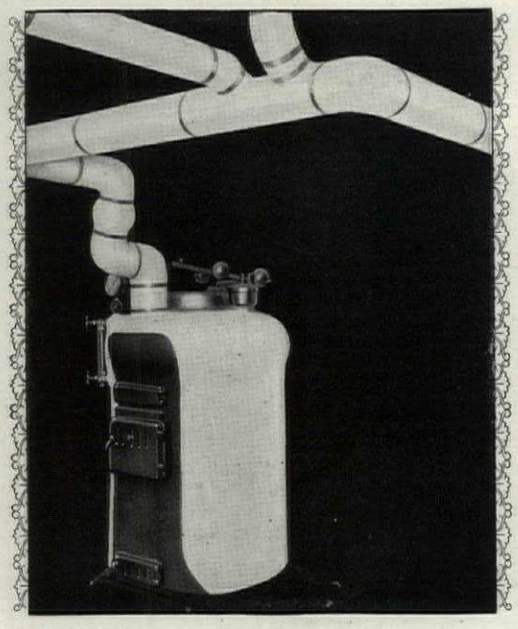

The choice of insulation for heater pipes is exceedingly important, yet the decision is easily made. Improved Asbestocel is the low-pressure pipe insulation which is nationally sold and which is standard in quality and performance everywhere. When you specify 3-ply Asbestocel you know that the performance and the appearance of the insulation will be the same wherever the building is located, whatever its size is, and whoever makes the application. There is no other heater pipe insulation which offers you such standardization.

National advertising in general magazines, building papers and other trade papers, keeps Asbestocel before the public. Building committees and individual house owners know the name and will gladly accept your specification of Asbestocel.

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Another Asbestos product of especial interest to architects is the Johns-Manville Asbestos Shingle. By using these Shingles you can obtain any textures and colors you want, besides which the roof will be fireproof and literally permanent.

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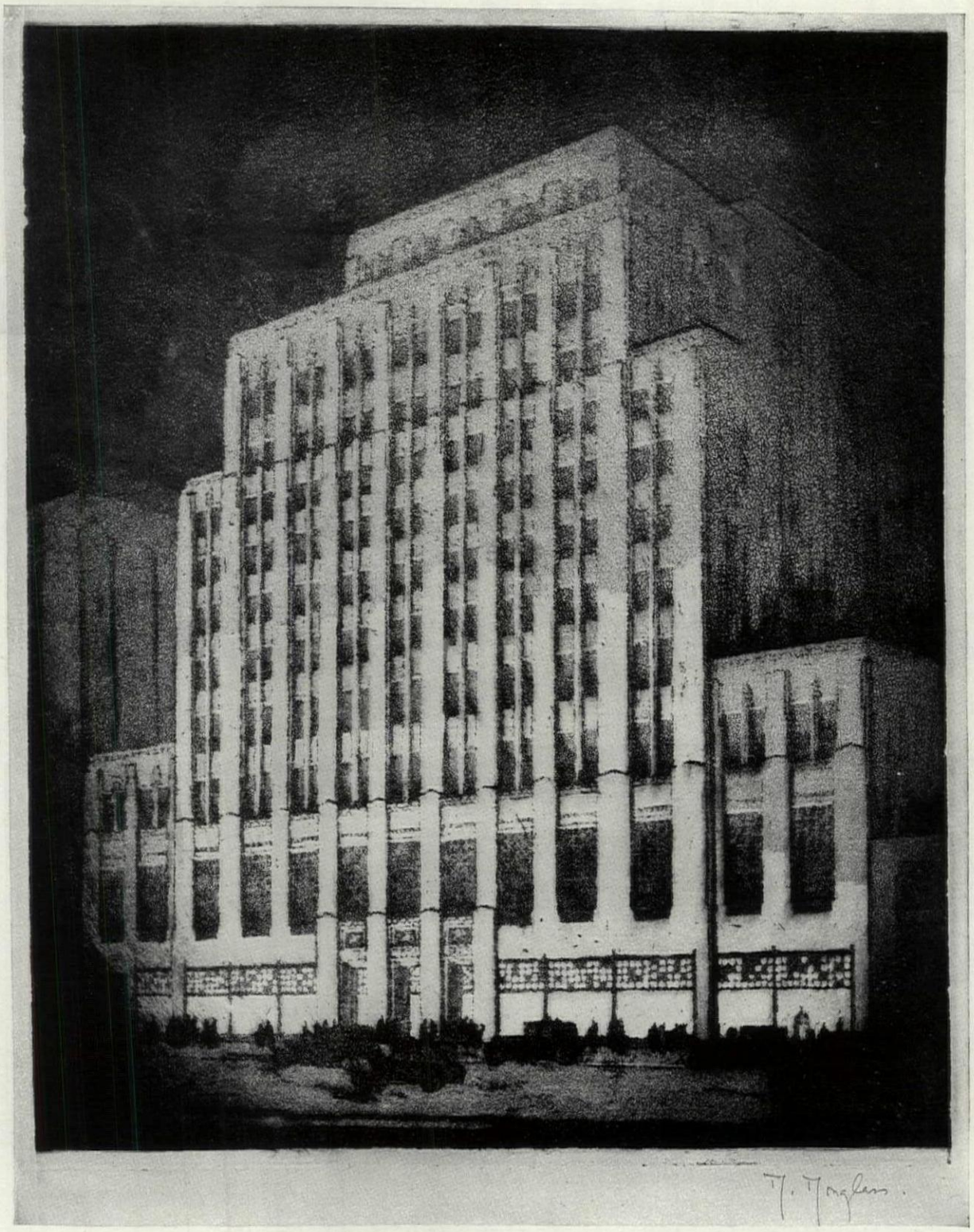

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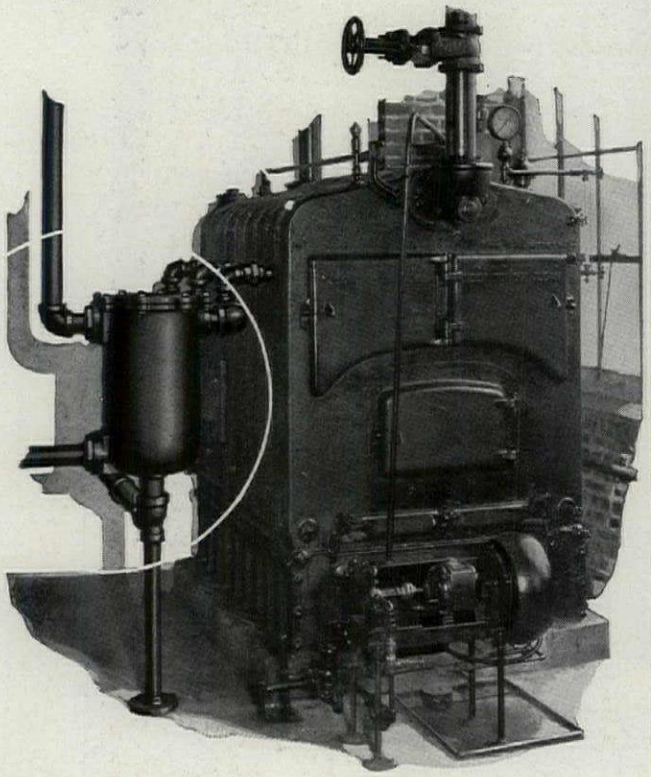

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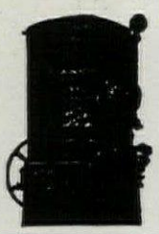
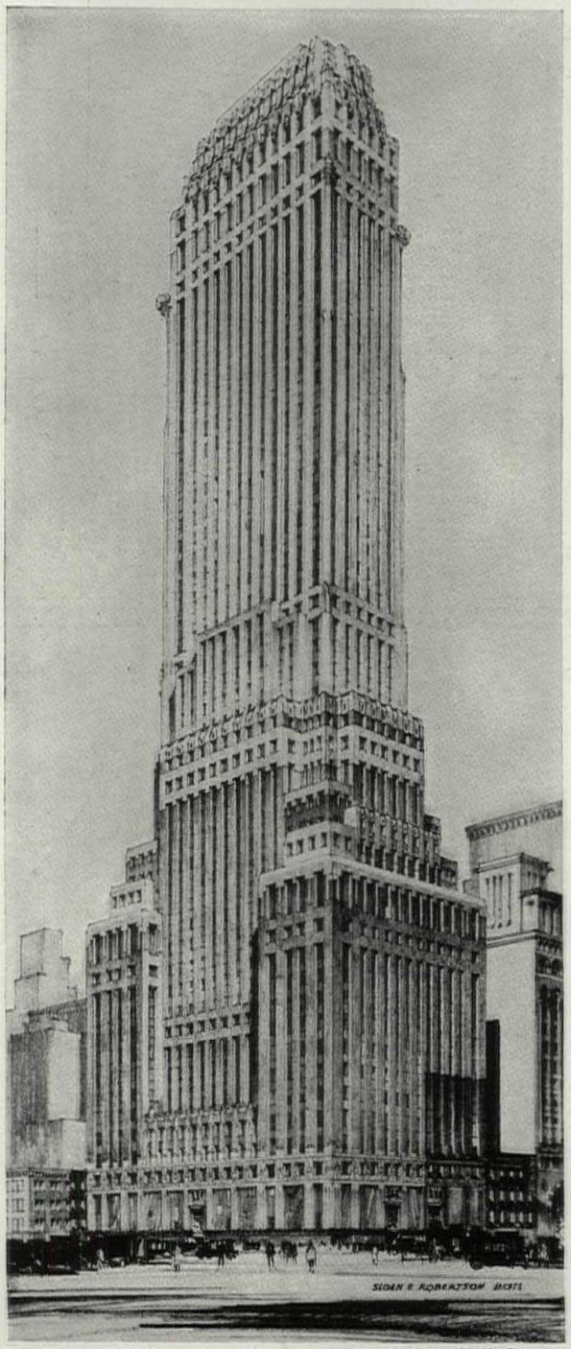


THE CUTLER MAIL CHUTE

In order to meet the requirements of the Regulations of the Post Office Department as to location and arrangement, the matter should be taken up early, thus avoiding changes which might otherwise become necessary. Full details and information on request.

THE CUTLER MAIL CHUTE CO.
GENERAL OFFICES AND FACTORY
ROCHESTER, N.Y.

Advisers— Schooled in Steel



The Chanin Building now under construction in New York City, in which Youngstown steel pipe is being used for plumbing and heating. *Architects;* Sloan & Robertson. *Mechanical Engineers;* Clark MacMullen & Riley. *General Contractor;* Chanin Construction Co. *Plumbing Contractor;* Louis Black. *Heating Contractor;* Jarcho Brothers.

EVERY Youngstown Sheet and Tube representative is at your disposal for sound advice on any problem connected with the selection of Pipe, Conduit or Sheet Metal. You are urged to call upon these steel-trained counsellors to serve you in an advisory capacity, and help you with your problems.

These men are thoroughly schooled in steel, and will bring to you a wealth of steel lore acquired by their thorough schooling and wide experience. In addition to the representative's own broad knowledge of steel requirements he has at his disposal the research facilities of the Youngstown Sheet and Tube metallurgical laboratories to assist him in working out new and complex problems.

This advisory service is yours for the asking—and entails not the slightest obligation or expense. It's just another Youngstown service.

THE YOUNGSTOWN SHEET & TUBE CO.

General Offices: Youngstown, Ohio

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"Just Ask"

PIPE SHEETS CONDUIT

YOUNGSTOWN

THE owner of a Barrett Specification Roof can say, "Good-bye to roof troubles!" And, the architect's responsibility is definitely underwritten. Barrett Specification Roofs are inspected throughout construction by Barrett inspectors—and bonded.

A Barrett Specification Roof protects the Schuyler School, Kearny, N. J. *Architects:* Guilbert & Betelle, Newark, N. J. *Contractors:* F. & C. Haerter, West New York, N. J.

Another School Roof is going to be *Forgotten!*

KEARNY, N. J. is justifiably proud of its Schuyler School—built to shelter 800 of its youngsters as they advance from their primers to their careers. The principle "nothing is too good" applies to school construction above all others. And the school commissioners of Kearny applied the idea to the utmost.

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And, as it so consistently happens, the type of roof decided upon was the Barrett Specification Roof. When the Barrett Specification Roof is put down, a 10 or 20 year Surety Bond is issued . . . guaranteeing the owners against repair or maintenance expense for the full period promised in the Bond. But 20 years is *not* the limit! Hundreds of Barrett Pitch and Felt Roofs laid 30, 40 and 50 years ago are still giving expense-free service to their owners. *There* is economy—and unfailing protection.

Depend on the Barrett Approved Roofer

Throughout the United States and Canada a limited number of roofing contractors have been approved by Barrett to lay the Barrett Specification Bonded Roof. These men have earned a reputation for doing efficient work—a name for absolute dependability.

Good workmanship is a big part of any good roof. Good workmanship is a certainty when you provide for a Barrett Specification Roof.

THE BARRETT COMPANY
40 Rector Street, New York City

IN CANADA:
The Barrett Company, Limited
5551 St. Hubert Street, Montreal, Quebec

And Barrett Specification Roofs have the advantage of fire-safety. The slag or gravel surface is immune to flying sparks, and the roof itself possesses the necessary tensile strength to be self-supporting even in extreme emergency. That is why the Barrett Specification Roof carries the Class A . . . base rating . . . by the National Board of Fire Underwriters.

For further information regarding these economical, fire-safe roofs address Built-Up Roof Department, The Barrett Company, 40 Rector Street, New York City.

Barrett Specification Roofs

Know Electrol by the Homes It Heats

The beautiful Bedford, Massachusetts, home of Mr. Arthur H. Hayden. Heated by Electrol

The COST *of oil heat* IS LOW *with* ELECTROL!

Not expensive, as some may think. Electrol Automatic Oil Heat costs less than coal in many instances... often practically the same ... and, in a few cases, more. But even when the cost is higher, the home owner still considers the expense low and entirely commensurate with the greater comfort and many advantages provided by this finer oil burner.

Electrol principles and design produce the highest efficiency of any automatic heating unit operating in a coal-burning boiler. Electrol produces more heat from every dollar's worth of oil.

Electrol operates intermittently instead of continuously, burning fuel only when heat is needed.

Shuts off automatically, remaining off when the outside temperature becomes warmer than the temperature indoors.

... And Electrol's automatic operation eliminates the need for and expense of a janitor, or the nuisance of furnace tending on the part of the owner. Requires practically no attention whatever... Always a steady unvarying temperature in the house, regardless of severe weather or sudden changes. ...The exact temperature desired is maintained without more than two degrees variation.

... The heat comes on automatically every morning before the occupants of the house are up.

...And Electrol is regulated in every phase of its operation by *The Master Control*, standing watch, day and night, like a living sentinel always at the furnace door.

Quiet... All-Electric... Entirely Automatic —Electrol will give you a new conception of how dependable an oil burner can be.

Complete Automatic Oil Heating Service Wherever Electrol is Sold

Wherever Electrol is sold you will find complete automatic oil heating service, backed by a sound, large and growing manufacturing organization. All installations are made by factory trained men. Regulation and adjustment service is available, day or night, if the burner should ever require attention.

Purchase of Electrol can be financed along with the financing of the new building.

Write for the Electrol Regulation A. I. A. Folder containing desirable information for your files. Or if you prefer, consult the Electrol Sales and Service Representative in your city. Electrol Inc. of Missouri, 179 Dorcas Street, St. Louis, U. S. A.

Electrol automatic oil heat is providing a satisfying and lasting adventure in greater comfort and convenience for thousands of home owners. Architects, recognizing the dependability of this finer burner, are specifying it for homes of all types, large and small.

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Important information relating to automatic oil heat and specific details of Electrol operation and construction are given in the Electrol Regulation A. I. A. Folder. The Coupon will bring a copy for your files.

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The OIL BURNER with *The Master Control*

Listed as Standard by the Underwriters' Laboratories, and bears their label.

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Gentlemen: We will appreciate a copy of the regulation A. I. A. Folder.

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Selected List of Manufacturers' Publications

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

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

ACOUSTICS

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

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

AIR FILTERS

Staynew Filter Corporation, Rochester, N. Y.
Protectomotor High Efficiency Industrial Air Filters. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on valuable detail of apparatus.

BANK VAULTS

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

BASEMENT WINDOWS

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

BATHROOM FITTINGS

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

BRICK

American Face Brick Association, 1751 Peoples Life Building, Chicago, Ill.
Brickwork in Italy. 298 pages, size 7½ x 10½ in., an attractive and useful volume on the history and use of brick in Italy from ancient to modern times, profusely illustrated with 69 line drawings, 300 half-tones, and 20 colored plates with a map of modern and XII century Italy. Bound in linen, will be sent postpaid upon receipt of $6.00. Half Morocco, $7.00.
Industrial Buildings and Housing. Bound Volume, 112 pp. 8½ x 11 in. Profusely illustrated. Deals with the planning of factories and employes' housing in detail. Suggestions are given for interior arrangements, including restaurants and rest rooms. Price $2.

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

CEMENT

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

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

International Cement Corporation, New York.
Incor Cement. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Data on a perfected, early strength Portland cement.

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

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

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

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

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

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

CEMENT—Continued

Town and Country Houses of Concrete Masonry. Booklet, 19 pp., 8½ x 11 ins. Illustrated.
Facts About Concrete Building Tile. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
The Key to Firesafe Homes. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Design and Control of Concrete Mixtures. Brochure, 32 pp., 8½ x 11 ins. Illustrated.
Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
Concrete in Architecture. Bound Volume. 60 pp., 8½ x 11 ins. Illustrated. An excellent work, giving views of exteriors and interiors.

CONCRETE BUILDING MATERIALS

Celite Products Company, Chicago, New York, Los Angeles.
Designing Concrete for Workability as Well as Strength. Brochure. 8 pp. Illustrated. Data on how improved workability in concrete is secured without excessive quantities of water.
Better Concrete; Engineering Service Bulletin X-325. Booklet, 16 pp., 8½ x 11 ins. Illustrated. On use of Celite to secure workability in concrete, to prevent segregation and to secure water-tightness.
Economic Value of Admixtures. Booklet, 32 pp., 6⅛ x 9⅛ ins. Reprint of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete Institute.

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

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

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

CONCRETE COLORINGS

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

CONSTRUCTION, FIREPROOF

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

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

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

DAMPPROOFING

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

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

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

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

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

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 165*

DOORS AND TRIM, METAL

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

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

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

DOORS, SOUNDPROOF

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

DUMBWAITERS

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

ELECTRICAL EQUIPMENT

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

Benjamin Electric Mfg. Co., 120 So. Sarigamore St., Chicago.
Reference Wall Chart, 22 x 28½ ins. "Enables one to select at a glance the right type of reflector or other lighting equipment."
Benjamin-Starrett Panelboards and Steel Cabinets. Booklet, 80 pp. 8½ x 10½ ins. Full data on these details for light and power.
Benjamin-Starrett Panelboards for Light and Power. Booklet, 80 pp., 8½ x 11 ins. Illustrated. Full data on company's line of panelboards, steel cabinets, etc.
Benjamin Electric Ranges. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Data on an excellent line of ranges for apartment house use.

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

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

Signal Engineering & Mfg. Co., 154 W. 14th St., New York.
Signal Call Code System. Booklet, 16 pp., 8½ x 10 ins. Illustrated. Important telephone accessories.
Fire Alarm Systems,—Bulletin A-35. 12 pp., 8½ x 9½ ins. Illustrated. Data on fire alarn equipment.
Electrical Signaling Devices and Control Equipment. Booklet, 11 pp., 8½ x 11 ins. Illustrated.

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

ELEVATORS

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

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

Sedgwick Machine Works, 151 West 15th St., New York, N. Y.

ELEVATORS—Continued

Catalog and descriptive pamphlets, 4¼ x 8¼ ins. 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.
Catalog and pamphlets. 8½ x 11 ins. Illustrated. Important data on different types of elevators.

FIREPROOFING

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

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

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

FLAGSTONES

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

FLOOR HARDENERS (CHEMICAL)

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

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

FLOORS—STRUCTURAL

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

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

FLOORING

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

Armstrong Cork Co. (Linoleum Division), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog. 8½ x 11 in. 40 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors.
Armstrong's Linoleum Pattern Book, 1927. Catalog. 3½ x 6 in. 272 pp. Color Plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.
Quality Sample Book. 3½ x 5¼ in. Showing all gauges and thicknesses in the Armstrong line of linoleums.
Linoleum Layer's Handbook. 5 x 7 in. 32 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.
Enduring Floors of Good Taste. Booklet. 6 x 9 in. 48 pp. Illustrated in color. Explains use of linoleum for offices, stores, etc., with reproductions in color of suitable patterns, also specifications and instructions for laying.

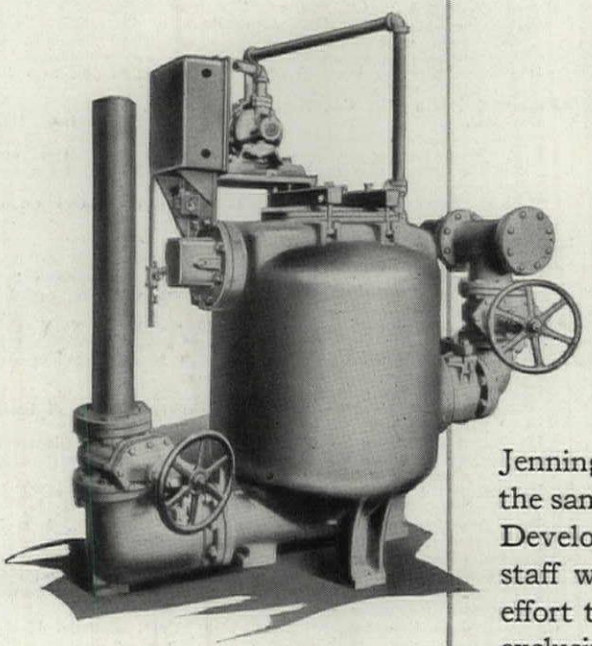
Barber Asphalt Co., Philadelphia.
Specifications for Applying Genasco Asphalt Mastic. Booklet. 8 x 10½ in. Directions for using Asphalt Mastic for flooring.

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

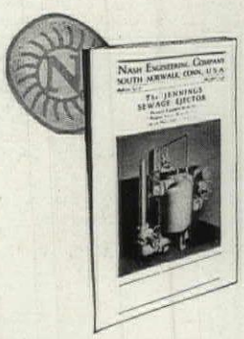
Bonded Floors Company, Inc., 1421 Chestnut St., Philadelphia, Pa.
A series of booklets, with full color inserts showing standard colors and designs. Each booklet describes a resilient floor material as follows:
Battleship Linoleum. Explains the advantages and uses of this durable, economical material.
Marble-ized (Cork Composition) Tile. Complete information on cork-composition marble-ized tile and the many artistic effects obtainable with it.
Treadlite (Cork Composition) Tile. Shows a variety of colors and patterns of this adaptable cork composition flooring.
Natural Cork Tile. Description and color plates of this superquiet, resilient floor.
Practical working specifications for installing battleship linoleum, cork composition tile and cork tile. Resilient Floors in Schools. Resilient Floors in Stores. Resilient Floors in Hospitals. Resilient Floors in Offices. Resilient Floors in Apartments and Hotels. Booklets, 8 pp., 8½ x 11 ins. Illustrated.
Specifications for Resilient Floors. Leather bound booklet, 48 pp., 8½ x 11 ins. Illustrated.

Carter Bloxonend Flooring Co., Keith & Perry Bldg., Kansas City, Mo.
Bloxonend Flooring. Booklet 3¾ x 6¼ in. 20 pp. Illustrated. Describes uses and adaptability of Bloxonend Flooring to concrete, wood or steel construction, and advantages over loose wood blocks.

Made by the makers of Jennings heating pumps



The Jennings Sewage Ejector, complete with compressor. Supplied in standard capacities to 1500 g.p.m. Heads to 50 ft.



Bulletin 67 is the one to write for.

FROM the initial test of the rough castings to the final inspection of the assembled product, the same exacting methods of precision manufacture that have identified the construction of the Jennings Heating Pump are to be noted in the Jennings Sewage Ejector.

Jennings Sewage Ejectors are made in the same plant, by the same organization. Developed by the Jennings engineering staff which devotes its entire time and effort to the design of high grade pumps exclusively, Jennings Sewage Ejectors can be depended on in the several services for which they are built.

Architects and engineers, who during the past twelve years have specified and recommended the Jennings Heating Pump for 30,000 and more buildings in which they are installed, can with equal confidence rely on the Jennings Sewage Ejector for pumping unscreened sewage or drainage from basements below the street sewer level, handling crude sewage from low level districts, pumping effluent, sludge and other heavy liquids.

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

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

Jennings Pumps

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 166*

FLOORING—Continued

File Folder, 9⅜ x 11¾ in. For use in connection with A. I. A. system of filing. Contains detailed information on Bloxonend Flooring in condensed, loose-leaf form for specification writer and drafting room. Literature embodied in folder includes standard Specification Sheet covering the use of Bloxonend in general industrial service and Supplementary Specification Sheet No. 1, which gives detailed description and explanation of an approved method for installing Bloxonend in gymnasiums, armories, drill rooms and similar locations where maximum resiliency is required.

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

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

W. & J. Sloane Mfg. Co., 577 Fifth Avenue, New York.
Linoleum Patterns. Brochure, 10 pp., 8½ x 11 ins. Illustrated. Deals with fine assortment of floor coverings.
Linoleum Floors. Booklet, 42 pp., 8½ x 11 ins. Illustrated. Linoleum Data and Specifications for Architects.

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

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

United States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 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 in. 60 pp. Richly illustrated. A valuable work on the use of rubber tile for flooring in interiors of different historic styles.

FURNITURE

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

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

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

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

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

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

GARAGES

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

GLASS CONSTRUCTION

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

Libbey-Owens Sheet Glass Co., Toledo, O.
Flat Glass. Brochure, 11 pp., 5⅞ x 7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

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

GREENHOUSES

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

HARDWARE

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

HARDWARE—Continued

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

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

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

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

HEATING EQUIPMENT

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

American Radiator Company, The, 40 West 40th St., N. Y. C.
Ideal Boilers for Oil Burning. Catalog 5½ x 8½ in. 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.
Corto—The Radiator Classic. Brochure 5½ x 8½ in. 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
Ideal Arcola Radiator Warmth. Brochure 6¼ x 9¼. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.
How Shall I Heat My Home? Brochure, 16 pp., 5¾ x 8½ ins. Illustrated. Full data on heating and hot water supply.
New American Radiator Products. Booklet, 44 pp., 5 x 7¾ ins. Illustrated. Complete line of heating products.

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

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

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

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

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

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

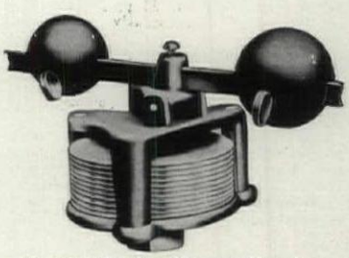
Kewanee Boiler Corporation, Kewanee, Ill.
Kewanee on the Job. Catalog. 8½ x 11 in. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 78, 6 x 9 in. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.
Catalog No. 79.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

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

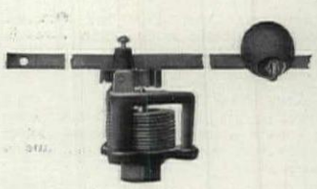
Milwaukee Valve Co., Milwaukee.
MILVACO Vacuum & Vapor Heating System. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Important data on heating.
MILVACO Vacuum & Vapor Heating Specialties. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Deal with a valuable line of specialties used in heating.

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

Fifteen Years Ago The Fulton Sylphon Company Introduced Accurate Automatic Damper Regulation



No. 924, Sylphon Damper Regulator
Extra Sensitive.



No. 22-J. Sylphon Damper Regulator
For low pressure steam boilers with light dampers.

SYLPHON Damper Regulators built around the Sylphon Bellows, *a one piece seamless, solderless, flexible and durable diaphragm* solved for all time the problem of efficient checking and increasing drafts in proportion to steam pressure or water temperature.

Their appearance marked the passing of the old style damper regulators with their faulty diaphragms. *Flat rubber discs* deteriorated or changed form. *Flat metal* or corrugated discs broke and even when new had a slight snap action. *Built up diaphragms* leaked or broke at the soldered edges.

Sylphon Damper Regulators Prevent Fuel Waste and Save Fuel Costs

The owner of the towering hotel, apartment, office building or modest home, who studies the scientific action and the care and wear proof construction of Sylphon Damper Regulators, will be quickly convinced.

Thirty-five manufacturers of boilers, long ago made Sylphon Damper Regulators standard equipment. They have been successfully used on hundreds of thousands of heating plants and are specified generally as the most reliable.

There is a Sylphon Damper Regulator for Every Steam, Hot Water or Vapor Heating Plant

Send for fully illustrated and descriptive literature covering the various Sylphon Damper Regulators, their construction and installation.

The Original and Only Genuine
SYLPHON BELLOWS

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

THE FULTON SYLPHON COMPANY, *Knoxville, Tenn., U. S. A.*

Sales Offices: **New York, Chicago, Philadelphia, Boston, Detroit. All Principal Cities in the U. S.** DEPT. F

Gentlemen:

We are interested in Sylphon Damper Regulation for

_____

Name _____

Company _____

Address _____

City _____ State _____

THE FULTON SYLPHON COMPANY
Sylphon
AUTOMATIC TEMPERATURE CONTROL

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 168*

HEATING EQUIPMENT—Continued

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

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

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

Petroleum Heat & Power Co., 511 Fifth Avenue, New York.
Heating Homes the Modern Way. Booklet, 8½ x 11¼ ins. Illustrated. Data on the Petro Burner.
Residence Oil Burning Equipment. Brochure, 6 pp., 8½ x 11 ins. Illustrated. Data regarding Petro Burner in a bulletin approved by Investigating Committee of Architects and Engineers.
Petro Mechanical Oil Burner & Air Register. Booklet, 23 pp., 8½ x 11 ins. Illustrated. Data on industrial installations of Petro Burners.
Present Accepted Practice in Domestic Oil Burners. Folder, 4 pp., 8½ x 11 ins. Illustrated. A reprint from Heating and Ventilating Magazine.

Reznor Mfg. Co., Mercer, Pa.
Heating by the Ultimate Method. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on gas heating.

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

HOSPITAL EQUIPMENT

The Frink Co., Inc., 24th St. and Tenth Ave., New York City.
Catalog 426. 7 x 10 in., 16 pp. A booklet illustrated with photographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linolite and multilite concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their particular fitness for special uses.

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

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

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

HOTEL EQUIPMENT

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

INCINERATORS

Home Incinerator Co., Milwaukee, Wis.
The Decent Way. Brochure, 30 pp., 5¼ x 7¼ ins. Illustrated. Equipment for residence use.
A. I. A. File. 12 pp., 8¾ x 10¾ ins. Specifications for incinerators.

Kerner Incinerator Company, 715 E. Water St., Milwaukee, Wis.
Incinerators (Chimney-fed). Catalog No. 15 (Architect and Builders' Edition). Size 8½ x 11 ins. 16 pp. Illustrated. Describes principles and design of Kernerator Chimney-fed Incinerators for residences, apartments, hospitals, schools, apartment hotels, clubs and other buildings. Shows all standard models and gives general information and working data.
Sanitary Elimination of Household Waste, booklet, 4 x 9 ins. 16 pp. Illustrated. Gives complete information on the Kernerator for residences.
Garbage and Waste Disposal for Apartment Buildings, folder, 8½ x 11 ins. 8 pp. Illustrated. Describes principle and design of Kernerator-Chimney-fed Incinerator for apartments and gives list of buildings where it ahs been installed.
Sanitary Disposal of Waste in Hospitals. Booklet. 4 x 9 ins. 12 pp. Illustrated. Shows how this necessary part of hospital service is taken care of with the Gernerator. Gives list of hospitals where installed.

INSULATING LUMBER

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

INSULATION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ in. 32 pp. Discusses means of insulating roofs of manufacturing or commercial structures.
Insulation of Roofs to Prevent Condensation. Illustrated booklet. 7½ x 10½ in. 36 pp. Gives full data on valuable line of roof insulation.
Filing Folder for Pipe Covering Data. Made in accordance with A. I. A. rules.
"The Cork Lined House Makes a Comfortable Home." 5 x 7 in. 32 pp. Illustrated.
Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 11¾ ins. Illustrates and describes use of insulation for structural purposes.

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

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

Celite Products Co., 1320 South Hope St., Los Angeles.
The Insulation of Boilers. Booklet. 8 pp., 8½ x 11 ins. Illustrated. On insulating boiler walls, breechings, and stacks to reduce amount of radiation.
Heat Insulation Specifications and Blue Prints. Booklet, 20 pp., 8½ x 11 ins. Illustrated. On approved types of insulation.
Sil-O-Cel Insulation Materials and Allied Products. Brochure, 16 pp., 8½ x 11 ins. Illustrated. Important data on insulation.

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

JOISTS

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

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

KITCHEN EQUIPMENT

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

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

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

LABORATORY EQUIPMENT

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

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

LANTERNS

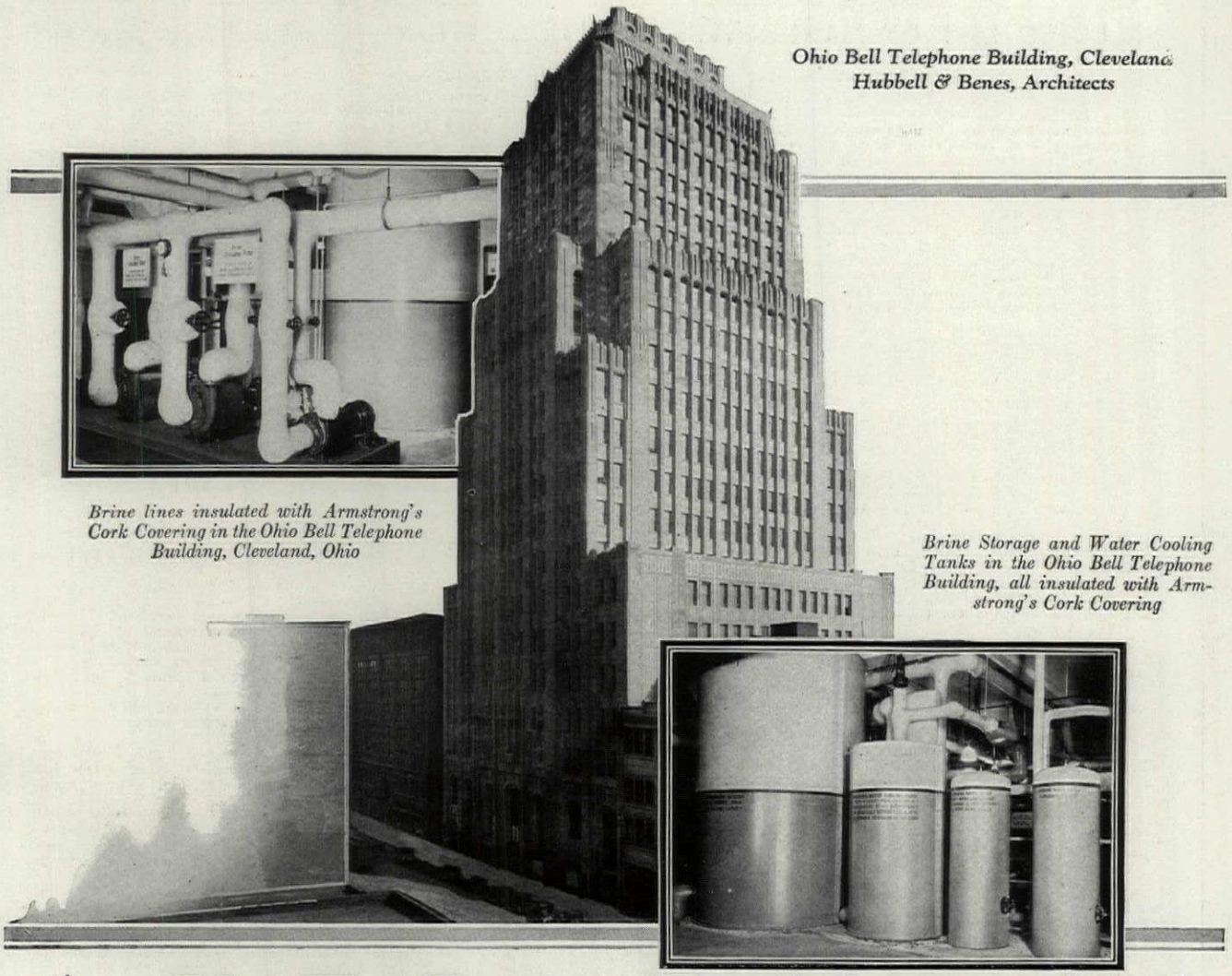
Todhunter, Arthur, 119 E. 57th St., New York.
Hand Wrought Lanterns. Booklet, 5¼ x 6¾ in. 20 pp. Illustrated in Black and White. With price list. Lanterns appropriate for exterior and interior use, designed from old models and meeting the requirements of modern lighting.

LATH, METAL AND REINFORCING

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

National Steel Fabric Co., Pittsburgh.
Better Walls for Better Homes. Brochure. 16 pp. 7¾ x 10¾ ins. Illustrated. Metal lath, particularly for residences.
Steeltex for Floors. Booklet. 24 pp. 8½ x 11 ins. Illustrated. Combined reinforcing and form for concrete or gypsum floors and roofs.
Steeltex Data Sheet No. 1. Folder. 8 pp. 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with round top chords.
Steeltex Data Sheet No. 2. Folder. 8 pp. 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with flat top flanges.
Steeltex Data Sheet No. 3. Folder. 8 pp. 8½ x 11 ins. Illustrated. Steeltex for folders on wood joists.

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



Ohio Bell Telephone Building, Cleveland
Hubbell & Benes, Architects

Brine lines insulated with Armstrong's Cork Covering in the Ohio Bell Telephone Building, Cleveland, Ohio

Brine Storage and Water Cooling Tanks in the Ohio Bell Telephone Building, all insulated with Armstrong's Cork Covering

An Up-To-Date Refrigerated Drinking Water System . . .

THE Ohio Bell Telephone Company Building in Cleveland uses a circulating refrigerated drinking water system. Fresh, filtered water is supplied to thirty fountains from a central refrigerating plant, always at just the right temperature—approximately 45 degrees.

Temperature control throughout the long runs, as well as economy of operation, are largely the result of the efficient insulation. All distributing lines, brine piping, and tanks are insulated with Armstrong's Cork Covering. The "line loss," or heat absorption, is kept so low that the water at the most remote fountain is within a few degrees of the cooling tank temperature.

Being nonabsorbent of moisture, Armstrong's Cork Covering *stays dry* and retains its initial efficiency indefinitely. It does not deteriorate and lines covered with it do not sweat. They can safely be enclosed in chases or run anywhere without danger of drip and discoloration of walls and ceilings.

Armstrong Engineers are prepared to assist architects and engineers in designing drinking water systems. Write for the book, "Refrigerated Drinking Water." A copy will be sent free on request. Armstrong Cork & Insulation Company, 132 Twenty-fourth Street, Pittsburgh, Pa.; McGill Building, Montreal; 11 Brant Street, Toronto 2.

Armstrong's Cork Covering

For Cold Lines, Coolers and Tanks

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 170*

LATH, METAL AND REINFORCING—Continued

Northwest Metal Lath. Folder. 8½ x 11 ins. Illustrated. Data on Flat Rib Lath.

Truscon Steel Company, Youngstown, Ohio.
Truscon ¾-inch Hy-Rib for Roofs, Floors and Walls. Booklet, ½ x 11 in., illustrating Truscon ¾-inch Hy-Rib as used in industrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

LAUNDRY CHUTES

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

LAUNDRY MACHINERY

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

LIBRARY EQUIPMENT

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

LIGHTING EQUIPMENT

The Frink Co., Inc., 24th St. and 10th Ave., New York City.
Catalog 415. 8½ x 11 in. 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.

Gleason-Tiebout Glass Co. (Celestialite Division), 200 Fifth Avenue, New York.
Next to Daylight Brochure, 19 pp., 4 x 8½ ins. Illustrated. Deals with a valuable type of lighting fixture.
Celestialite Circular No. 40. Folder, 4 pp., 3½ x 6 ins. "What Nature does to the Sun, Celestialite does to the Mazda lamp."
Attractive Units in Celestialite. Folder, 12 pp., 3¼ x 6½ ins. Illustrates Decorated Celestialite Units.
It Has Been Imitated. Folder, 4 pp., 10 x 13 ins. Data in an important detail of lighting equipment.

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

LUMBER

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

MAIL CHUTES

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

MANTELS

Arthur Todhunter, 119 E. 57th St., New York, N. Y.
Georgian Mantels. New Booklet. 24 pp. 5¼ x 6¼ in. A fully illustrated brochure on eighteenth century mantels. Folders give prices of mantels and illustrations and prices of fireplace equipment.

MARBLE

The Georgia Marble Company, Tate, Ga. New York Office, 1328 Broadway.
Why Georgia Marble is Better. Booklet. 3⅜ x 6 in. 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.
Hurt Building, Atlanta; Senior High School and Junior College, Muskegon, Mich. Folders, 4 pp., 8½ x 11 ins. Details.

METALS

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

MILL WORK—See also Wood

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

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

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

MILL WORK—Continued

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

MORTAR AND CEMENT COLORS

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

ORNAMENTAL PLASTER

Jacobson & Co., 241 East 44th St., New York.
A book of Old English Designs. Brochure. 47 plates. 12 x 9 ins. Deals with a fine line of decorative plaster work.
Architectural and Decorative Ornaments. Cloth bound volume. 183 plates. 9 x 12 ins. 18 plates. Price, $3.00. A general catalog of fine plaster ornaments.
Geometrical ceilings. Booklet. 23 plates. 7 x 9 ins. An important work on decorative plaster ceilings.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

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

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, 8¼ x 6 in. 12 pp. Illustrated. Describes various styles of lead cames.
Cinch Anchoring Specialties. Booklet. 6 x 3½ in. 20 pp. Illustrated. Describes complete line of expansion bolts.

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

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

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

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

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

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

PAPER

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

PARTITIONS

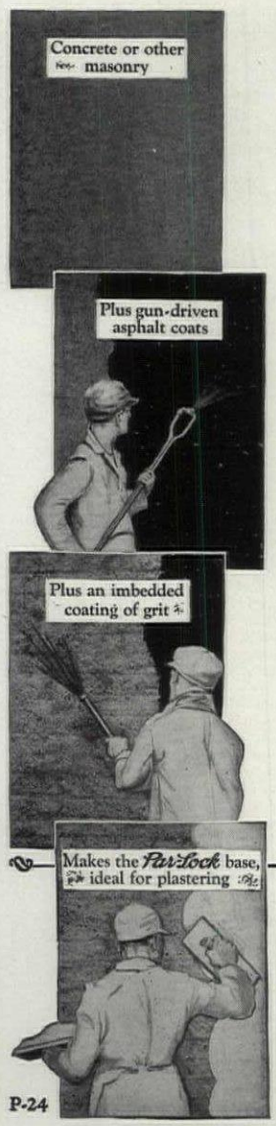
Circle A Products Corporations, New Castle, Ind.
Circle A Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11¼ in. 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.

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

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

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

The Union Central Life Building Annex
Third & Vine Streets, Cincinnati, Ohio
Architects, Garber & Woodward
General Contractor, The Ferro Concrete Construction Co.
Par-Lock Applied by the Par-Lock Appliers of Columbus.



Efficient Protection for Fine Interiors

THE splendid Union Central Life Building, Cincinnati, Ohio, has a recently completed Annex, of striking design and a model of good construction. Par-Lock Plaster Key was employed on all ceiling slabs, columns and beams, except where finished for acoustical effect.

Par-Lock is applied in accordance with a variety of specifications for a wide range of uses. Essentially, it is a Plaster Key that protects the plaster against moisture, stain or cleavage originating from causes within the structural surface. It is also invaluable in a wide range of damp-proofing and water-proofing operations. Applied only by responsible Par-Lock Appliers, this treatment assures uniformly, efficient interior protection.

THE VORTEX MANUFACTURING CO., *1984 W. 77th St.*, CLEVELAND, O.

Par-Lock
PLASTER KEY

P-24

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BOSTON, 45 Commercial Wharf
BUFFALO, 958 Ellicott Square Bldg.
CHICAGO, 111 West Monroe Street
CLEVELAND, 218 Hunkin-Conkey Bldg.
COLUMBUS, 751 South Cassingham Rd.
DETROIT, 2544 First National Bldg.
KANSAS CITY, MO. 2035 East 19th Street
MINNEAPOLIS, 434 Builders Exchange
NEWARK, N. J., 24 Commerce Street
NEW YORK CITY, 50 Church Street
PHILADELPHIA, 1700 Walnut Street
PITTSBURGH, 614 Bessemer Building
SCRANTON, PENNA. Cedar Avenue
ST. LOUIS 1011 Telephone Building
TORONTO, 2258a Bloor Street, West
TRENTON, 339 Broad St. Bank Bldg.
YOUNGSTOWN, 503 City Bank Building
WILKES-BARRE, PA. 904 Second Nat'l Bank Building
PAR-LOCK CORK INSTALLATIONS
United Cork Companies Lyndhurst, N. J.

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

PARTITIONS—Continued

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

PIPE

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

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

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "A". 4 x 6½ in. 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

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

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

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

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.
Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.
Interior Walls Everlasting. Brochure, 20 pp., 6¼ 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 in. Illustrated. Data on Sani-White and Sani-Black toilet seats.

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

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

John Douglas Co., Cincinnati, Ohio.
Douglas Plumbing Fixtures. Bound Volume. 200 pp. 8½ x 11 ins. Illustrated. General catalog.
Another Douglas Achievement. Folder. 4 pp. 8½ x 11 ins. Illustrated. Data on new type of stall.
Hospital. Brochure. 60 pp. 8½ x 11 ins. Illustrated. Deals with fixtures for hospitals.

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

Eljer Company, Ford City, Pa.
Complete Catalog. 3¾ x 6¾ in. 104 pp. Illustrated. Describes fully the complete Eljer line of standardized vitreous china plumbing fixtures, with diagrams, weights and measurements.

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

Maddock's Sons Company, Thomas, Trenton, N. J.
Catalog K. 10⅞ x 7⅞ in. 242 pp. Illustrated. Complete data on vitreous china plumbing fixtures with brief history of Sanitary Pottery.

Speakman Company, Wilmington, Del.
Catalog K. Booklet, 150 pp., 8½ x 10⅞ ins. Illustrated. Data on showers and equipment details.

PUMPS

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

Kewanee Private Utilities Co., 442 Franklin St., Kewanee, Ill.
Bulletin E. 7¾ x 10¼ in. 32 pp. Illustrated. Catalog. Complete descriptions, with all necessary data, on Standard Service Pumps, Indian Brand Pneumatic Tanks, and Complete Water Systems, as installed by Kenwanee Private Utilities Co.

PUMPS—Continued

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

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

RAMPS

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

REFRIGERATION

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

REFRIGERATORS

Lorillard Refrigerator Company, Kingston, N. Y.
Lorillard Refrigerator, for hotels, restaurants, hospitals and clubs. Brochure. 43 pp. 8 x 10 ins. Illustrated. Data on fine line of refrigerators.

REINFORCED CONCRETE—See also Construction, Concrete

Gemfire Steel Company, Youngstown, Ohio.
Self-Sentering Handbook. 8½ 11 in. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and floors with a combined form and reinforced material.

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

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

ROOFING

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

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

Bird & Son, Inc., E. Walpole, Mass.
Bird's Roofs. Folder, 16 pp., 3½ x 6 ins. Illustrated. Data of roofing materials.

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

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

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

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

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

SASH CHAIN

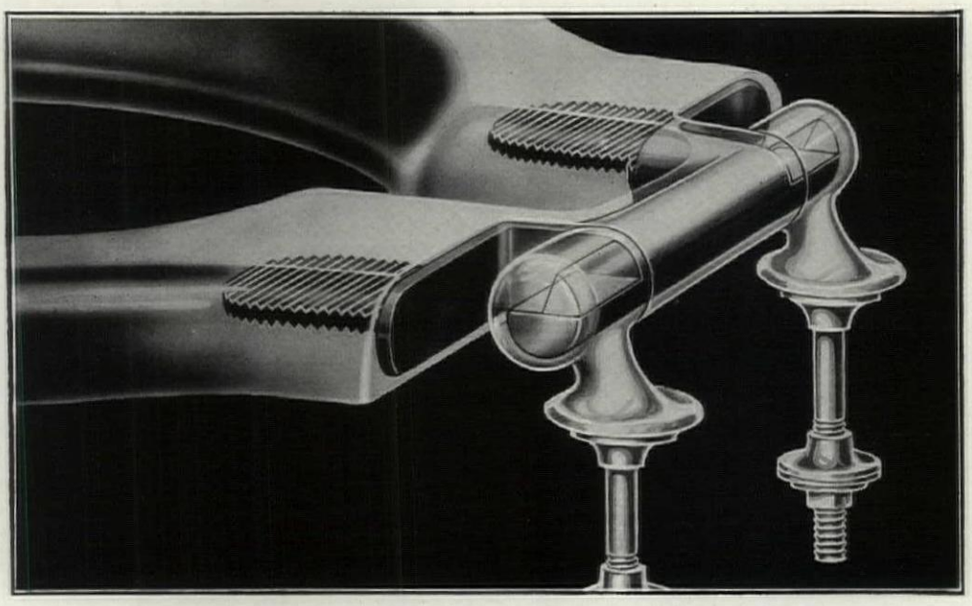
Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Chain Catalog. 6 x 8½ in. 24 pp. Illustrated. Covers complete line of chains.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¾ x 10¼ in. 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

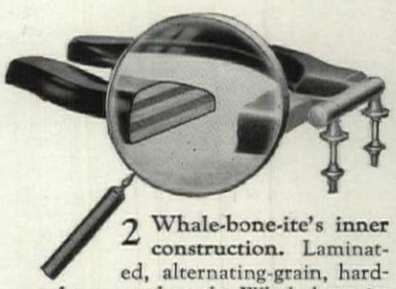
At the Same Price..

you can have Whale-Bone-ite



Why miss Whale-bone-ite's important features?

1 The new Whale-bone-ite Hinge. Makes both seat and hinge one unbreakable solidified unit, impervious to moisture, absolutely non-corrosive. No other closet seat offers you this hinge.



2 Whale-bone-ite's inner construction. Laminated, alternating-grain, hardwood core makes the Whale-bone-ite Seat proof against splitting, warping, or cracking. Every Whale-bone-ite Seat is guaranteed for life of the building.

A WHALE-BONE-ITE SEAT costs no more than the cheapest composition closet seat. This is a fact every architect and building operator should know. Don't think a substitute is just as good. It isn't. Only-Whale-bone-ite is "like Whale-bone-ite."

Architects have for years recognized Whale-bone-ite as the standard seat for all fine buildings. To-day, probably 90% of all the fine commercial buildings, hotels, schools, and hospitals are equipped with Whale-bone-ite. No other toilet seat has proved in actual use to have this seat's amazing durability.

The Whale-bone-ite Seat is one piece . . . molded when soft into shape around a core of alternating-grain layers of hardwood. Thus it has no cracks or seams to harbor germs. No thin veneered surface to wear through. Easy to clean, non-inflammable, its beautiful surface will last a lifetime.

The new Whale-bone-ite hinge is molded in one operation as an integral part of the seat. Reinforced by a metal, die-cast, one-piece insert, it is covered with highly-polished Whale-bone-ite having the same strength and finish as the surface of the seat. Any model of Whale-bone-ite Seat may be obtained with this new hinge.

When you choose the Whale-bone-ite Seat, you obtain service: long, dependable wear. Don't accept any less than Whale-bone-ite offers you.

WHALE-BONE-ITE TOILET SEAT

THE BRUNSWICK-BALKE-COLLENDER COMPANY · CHICAGO

Albany	Boston	Chicago	Dallas	Detroit	Kansas City	Minneapolis	Philadelphia	San Francisco	Tampa	Ottawa
Atlanta	Buffalo	Cincinnati	Denver	Harrisburg	Los Angeles	New Orleans	Pittsburgh	Seattle	Washington	Toronto
Birmingham	Charlotte	Cleveland	Des Moines	Houston	El Paso	New York	Richmond	St. Louis	Montreal	Havana

For a free cross-section of a Whale-bone-ite Seat, address Dept. 262 Seat Division, The Brunswick-Balke-Collender Co., 623 South Wabash Avenue, Chicago.

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

SCREENS

American Brass Co., The, Waterbury, Conn.
Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ in., giving actual samples of metal screen cloth and data on fly screens and screen doors.

Athey Company, 6015 West 65th St., Chicago, Ill.
The Athey Perennial Window Shade. An accordion pleated window shade, made from translucent Herringbone woven Coutil cloth, which raises from the bottom and lowers from the top. It eliminates awnings, affords ventilation, can be dry-cleaned and will wear indefinitely.

Orange Screen Co., Maplewood, N. J.
Orsco Aluminum Screens. Booklet, 8 pp., 8 x 11 ins. Illustrated. Data on a valuable line of screens.
Orsco Screens and Other Products. Brochure, 20 pp., 8 x 11 ins. Illustrated. Door and window screens and other hardware.

SHELVING-STEEL

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Steel Shelving. Catalog D. Illustrated brochure, 40 pp., 8½ x 11 in. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

SKYLIGHTS

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

SOUND DEADENER

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

STAIRWAYS

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

STEEL PRODUCTS FOR BUILDING

Bethlehem Steel Company, Bethlehem, Pa.
Steel Joists and Stanchions. Booklet, 72 pp., 4 x 6¾ ins. Data for steel for dwellings, apartment houses, etc.

Genfire Steel Company, Youngstown, Ohio.
Herringbone Metal Lath Handbook. 8½ x 11 in. 32 pp. Illustrated. Standard specifications for Cement Stucco on Herringbone.
Rigid Metal Lath and interior plastering.
Fireproonng Handbook. 8½ x 11 ins. 32 pp. Illustrated. Describes the full line of products manufactured by the Genfire Steel Company.

Ingalls Steel Products Co., Birmingham, Ala.
Construction Details. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Important data on building with steel.
Standard Specifications for Reinforced Concrete and the Ingalls Truss Floor. Brochure, 8 pp., 8½ x 11 ins. Authoritative specifications covering much construction.
Ingalls Trusses. Booklet, 12 pp., 8½ x 11 ins. Loading values and details.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

Steel Frame House Co., Pittsburgh.
Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Data and details.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.
Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 in. 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Vol. 1. Series B. Indiana Limestone Library. 6 x 9 in. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Vol. 4. Series B. Booklet. New Edition. 8½ x 11 in. 64 pp. Illustrated. Indiana Limestone as used in Banks.
Volume 5. Series B. Indiana Limestone Library. Portfolio. 11⅜ x 8¾ in. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
Volume 6, Series B—Indiana Limestone School and College Buildings. 8½ x 11 in., 80 pages, illustrated.
Volume 12, Series B—Distinctive Homes of Indiana Limestone. 8½ x 11 in., 48 pages, illustrated.
Old Gothic Random Ashlar. 8½ x 11 in., 16 pages, illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Avenue, Chicago, Ill.
Catalog No. 31. Series 500. All-Copper Construction. Illustrated brochure. 20 pp. 8½ x 11 ins. Deals with store fronts of a high class.
Brasco Copper Store Front. Catalog No. 32. Series 202.
Brasco Standard Construction. Illustrated brochure. 16 pp. 8½ x 11 ins. Complete data on an important type of building.
Detail Sheets. Set of seven sheets; printed on tracing paper, showing full sized details and suggestions for store front designing, enclosed in envelope suitable for filing. Folds to 8½ x 11 ins.

STORE FRONTS—Continued

Davis Solid Architectural Bronze Sash. Set of five sheets, printed on tracing paper, giving full sized details and suggestions for designing of special bronze store front construction, enclosed in envelope suitable for filing. Folds to 2½ x 11 ins.

The Kawneer Company, Niles, Mich.
Store Front Suggestions. Booklet, 96 pp., 6 x 8½ ins. Illustrated. Shows different types of Kawneer Solid Copper Store Fronts.
Catalog K, 1927 Edition. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Details of Kawneer Copper Store Fronts.
Detail Sheets for Use in Tracing. Full-sized details on sheets 17 x 22 ins.
Kawneer Construction in Solid Bronze or Copper. Booklet, 64 pp., 8½ x 11 ins. Illustrated. Complete data on the subject.

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

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

TERRA COTTA

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

TILE, HOLLOW

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Wall Construction Bulletin 174. 8½ x 11 in. 32 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
Standard Fireproofing Bulletin 171, 8½ x 11 ins., 32 pp. Illustrated. A treatise on the subject of hollow tile as used for floors, girder, column and beam covering and similar construction.
Natco Double Shell Load Bearing Tile Bulletin, 8½ x 11 ins., 6 pp. Illustrated.
Natco Unibacker Tile Bulletin, 8½ x 11 ins. 4 pp. Illustrated.
Natco Header Backer Tile Bulletin, 8½ x 11 ins., 4 pp. Illustrated.
Natcoflor Bulletin, 8½ x 11 in. 6 pp. Illustrated.
Natco Face Tile for the Up-to-Date Farm Bulletin, 8½ x 11 ins.

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Kraftile Company, 55 New Montgomery St., San Francisco. High Fired Faience Tile. Booklet. 32 pp. 8½ x 11 ins. Illustrated. Presents a fine line of tiles for different purposes.

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

VALVES

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

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

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

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

VENETIAN BLINDS

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

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

VENTILATION

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

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

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

Staynew Filter Corporation, Rochester, N. Y.
Protectomotor High Efficiency Industrial Air Filters. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on valuable detail of apparatus.

WATERPROOFING

Carey Company, The Philip, Lockland, Cincinnati, Ohio.
Waterproofing Specification Book. 8½ x 11 in. 52 pp.

Genfire Steel Company, Youngstown, Ohio.
Waterproofing Handbook. Booklet. 8½ x 11 in. 80 pp. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dustproofing and hardening concrete floors, and accelerating the setting of concrete. Free distribution.

Master Builders Company, Cleveland, Ohio.
Waterproofing and Dampproofing and Allied Products. Sheets in loose index file, 9 x 12 in. Valuable data on different types of materials for protection against dampness.
Waterproofing and Dampproofing File., 36 pp. Complete descriptions and detailed specifications for materials used in building with concrete.

Sommers & Co., Ltd., 342 Madison Ave., New York City.
"Permantile Liquid Waterproofing" for making concrete and cement mortar permanently impervious to water. Also circulars on floor treatments and cement colors. Complete data and specifications. Sent upon request to architects using business stationery. Circular size, 8½ x 11 in.

WATERPROOFING—Continued

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y.
Pamphlet. 3¾ x 8¾ in. 8 pp. Explanation of waterproofing principles. Specifications for waterproofing walls, floors, swimming pools and treatment of concrete, stucco and mortar.

Toch Brothers, 110 East 42nd St., New York City.
Specifications for Dampproofing, Waterproofing, Enameling and Technical Painting. Complete and authoritative directions for use of an important line of materials.

The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
Par-Lock Specification "Form D" for waterproofing surfaces to be finished with Portland cement or tile.
Par-Lock Specification "Forms E and G" membrane waterproofing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure.
Par-Lock Waterproofing. Specification Forms D, E, F and G. Sheets 8½ x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit requirements.
Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8½ x 11 ins. Official Bulletin of Approved Products,—Investigating Committees of Architects and Engineers.

WEATHER STRIPS

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

WINDOWS

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

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

WINDOWS, CASEMENT

Crittall Casement Window Co., 10951 Hearn Ave., Detroit, Mich.
Catalog No. 22. 9 x 12 in. 76 pp. Illustrated. Photographs of actual work accompanied by scale details for casements and composite steel windows for banks, office buildings, hospitals and residences.

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

WINDOWS, CASEMENT—Continued

Genfire Steel Company, Youngstown, Ohio.
Architectural Details, Casement Windows and Doors. 8½ x 11 ins. 28 pp. A. I. A. File No. 16E. Specifications and construction details.

Hope & Sons, Henry, 103 Park Ave., New York, N. Y.
Catalog. 12¼ x 18½ in. 30 pp. Illustrated. Full size details of outward and inward opening casements.

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

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Casement of Copper-Steel. Catalog C-122. Booklet 16 pp. 8⅝ x 11 in. Illustrated brochure on casements, particularly for residences.
Lupton Heavy Casements. Detail Sheet No. 101, 4 pp., 8½ x 11 ins. Details and specifications only.

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

Truscon Steel Co., Youngstown, Ohio.
Architectural Details. Booklet. 8½ x 11 ins. 16 pp. Tables of specifications and typical details of different types of construction.
List of Parts for Assembly. Booklet. 8½ x 11 ins. 16 pp. Full lists of parts for different units.

WINDOW SHADES

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

WINDOWS, STEEL AND BRONZE

Genfire Steel Company, Youngstown, Ohio.
Architectural Details, Steel Pivoted, Commercial and Architectural Projected Windows. 8½ x 11 ins. 24 pp. A. I. A. File No. 16E. Specification and construction details.

David Lupton's Sons Company, Philadelphia, Pa.
A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp. 8½ x 11 in. Deals with Pond Continuous Sash, Sawtooth Roofs, etc.

WINDOWS, STEEL AND BRONZE—Continued

How Windows Can Make Better Homes. Booklet. 3⅞ x 7 in. 12 pp. An attractive and helpful illustrated publication on use of steel casements for domestic buildings.

Truscon Steel Co., Youngstown, Ohio.
Drafting Room Standards. Book, 8½ x 11 in., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.
Truscon Solid Steel Double-Hung Windows. 24--pp booklet, 8½ x 11 in., containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.
Continuous Steel Windows and Mechanical Operators. Catalog 126. Booklet, 32 pp. 8½ x 11 ins. Illustrated.

WOOD—See also Millwork

American Walnut Mfrs. Association, 618 So. Michigan Blvd., Chicago, Ill.
American Walnut. Booklet. 7 x 9 in. 45 pp. Illustrated. A very useful and interesting little book on the use of Walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.
"American Walnut for Interior Woodwork and Paneling." 7 x 9 in. pages, illustrated. Discusses interior woodwork, giving costs, specifications of a specimen room, the different figures in Walnut wood, Walnut floors, finishes, comparative tests of physical properties and the advantages of American Walnut for woodwork.

Curtis Companies Service Bureau, Clinton, Iowa.
Better Built Homes. Vols. XV-XVIII, incl. Booklet. 9 x 12 in. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects, for the Curtis Companies.

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

West Coast Lumber Trade Extension Bureau, Seattle, Wash.
"Durable Douglas Fir; America's Permanent Lumber Supply." Booklet, 32 pp., 7 x 11 ins. Illustrated. Complete data on this valuable wood.
"Douglas Fir Wall Hanger." Metal-bound hanger, 31 x 32 ins. An attractive advertisement for Douglas fir.
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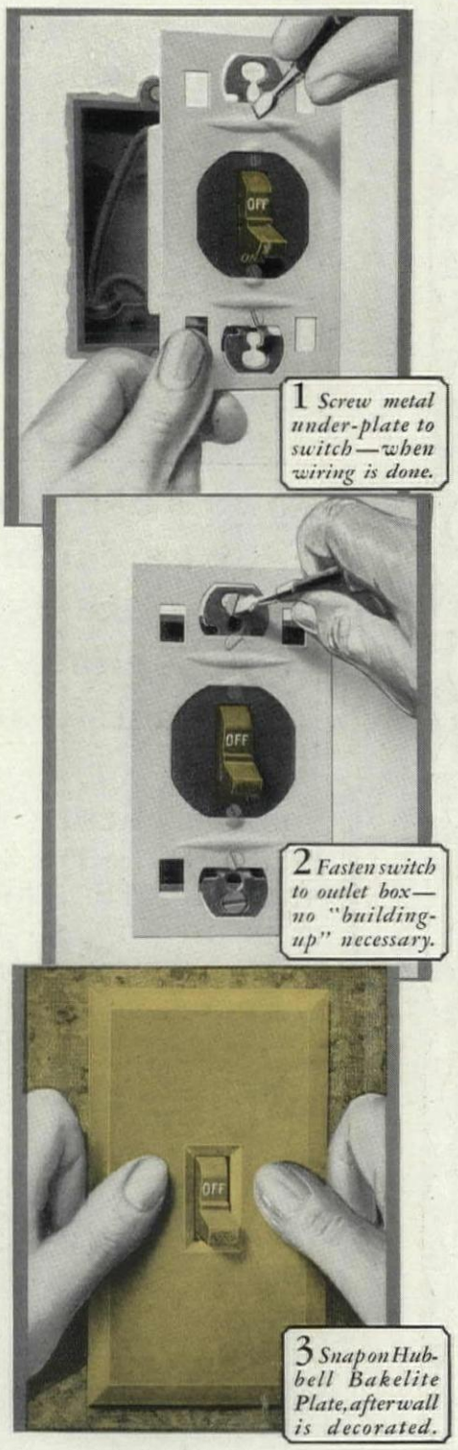

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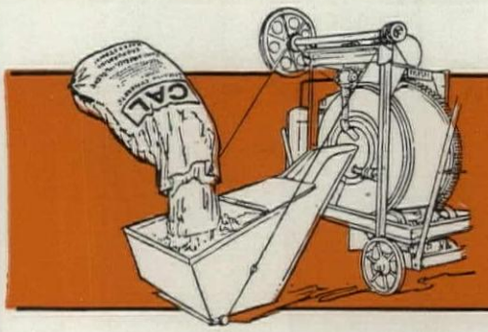

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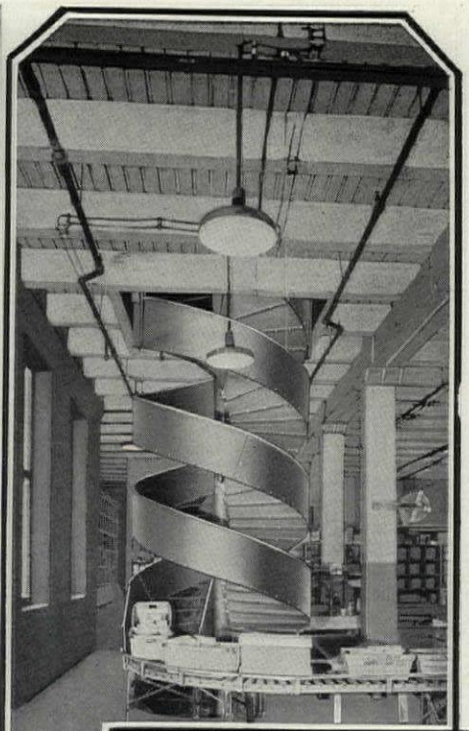

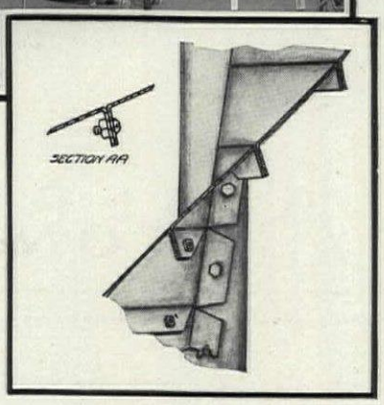

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Seattle Office, 321 Lumber Exchange
Charlotte Office, 301 Builders Bldg.

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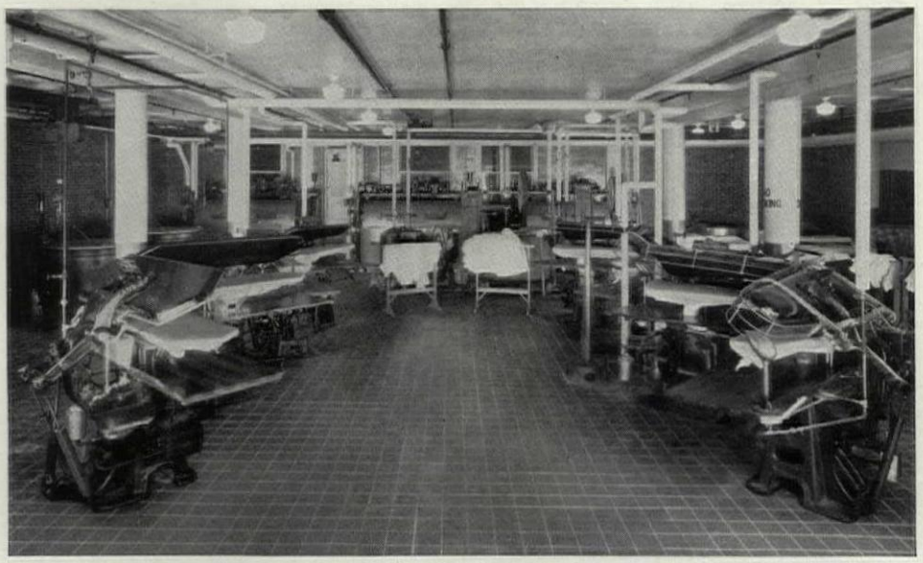
At your disposal . . .

—*the services of the Engineers who installed this hospital laundry*



Showing the space-saving arrangement of the drying and pressing equipment at Harper Hospital, Detroit. Ask us to send you some helpful file material on this splendid "American" installation.

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This is a Concrete Road—But Surfaced by **Con-Tex**

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SPECIFICATIONS for both Roadway and Sidewalk were:

THE MIX: 1 part Portland Cement
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REINFORCEMENT—Light 4" Expanded Metal Mesh
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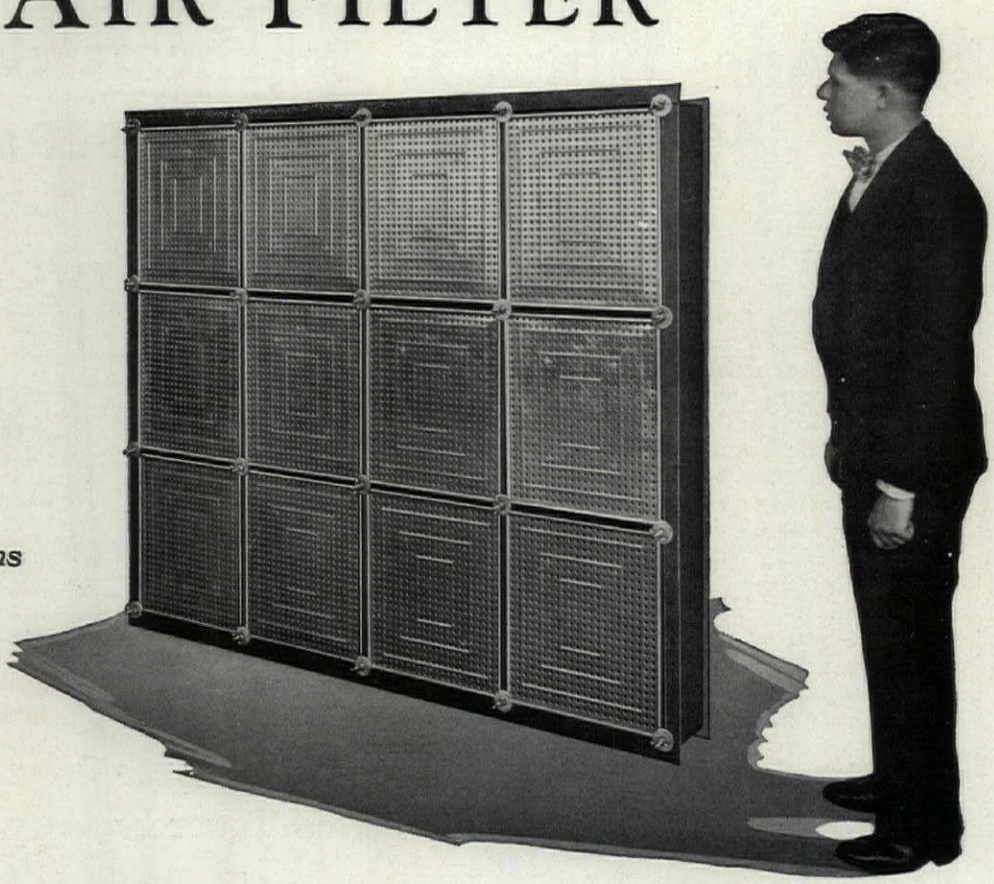

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Ans: When it overheats during 95% of the heating season.

THERE IS a new and better standard for determining whether or not a heating system is obsolete. This standard came into existence with the advent (January, 1927) of the Dunham Differential Vacuum Heating System.

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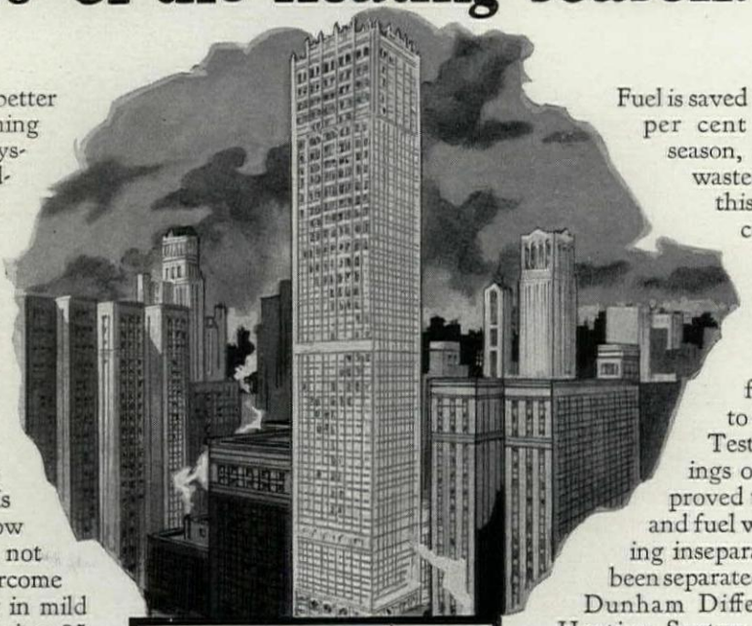
Today, in this newest and most revolutionary achievement (the Dunham Differential Vacuum Heating System) pressures at or above atmosphere are done away with during mild weather. As a result, overheating and its twin brother, wasteful window opening, are eliminated.



The Barlum Tower

Detroit, Mich.

USING Edison Central Station Steam Heating service, the Barlum Tower during the heating season, September 12, 1927 — June 5, 1928, operated on the remarkably low consumption of

292.08 pounds of steam per sq. ft. of active radiation (48,000 sq. ft. installed, 40,800 active).

2684 pounds of steam per 1000 cubic ft. of total cubage.

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Fuel is saved during ninety-five per cent of the heating season, instead of being wasted. The amount of this saving, on fuel-cost records kept by those who have installed this Dunham Heating System, has ranged from 20 per cent to 40 per cent.

Tests in typical buildings of every sort have proved that heat comfort and fuel waste, far from being inseparable, should have been separated years ago. In the Dunham Differential Vacuum Heating System they are being kept far apart in hundreds of structures with most gratifying success. For example, Detroit's new 40 story skyscraper, the Barlum Tower, is distinctive not only because of its great height, but also because its heating system does not overheat.

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Petro sets new low record

for service calls per burner!

Survey shows only 1.91 calls per burner per year

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A recent survey made by a state University checks absolutely with Petro's own records. It confirms our statement that Petro requires less service than any other domestic oil burner on the market, *bar none!*

Their survey shows that only 1.91 service calls were made per Petro per year! We believe this to be the lowest record ever established.

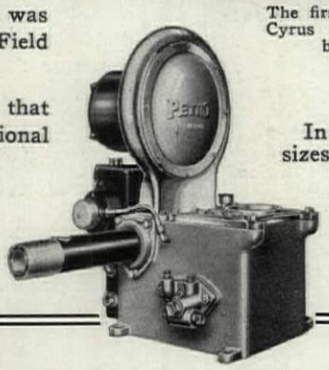
The first domestic Petro was installed in this home of Cyrus Field Judson, November, 1923. This original burner is giving most satisfactory service.

Guaranteed Oil Heat

Our own records cover 90% of all the thousands that have been installed since November 1923, when the first Domestic Petro was turned on in the home of Cyrus Field Judson, Ardsley-on-Hudson, N. Y.

It is this perfect 5 year record that has resulted in the Petro unconditional guarantee. Should any Petro ever fail to give complete satisfaction, it will be removed and the purchase price refunded.

Once you see how Petro engineers have simplified oil heating by using air as a motive force, you will appreciate the success of the Petro Domestic Oil Burners. Their design is the result of 25 years' experience in pioneering and developing industrial oil burners.



Petro's Board of Directors

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Pres. Petroleum Heat & Power Co.

Five Domestic Sizes

In specifying Petro, you have 5 domestic sizes, all fully automatic, all listed as standard by the Underwriters' Laboratories, to burn oil as low as 24 gravity fuel oil. Any heating plants from 200 sq. ft. of steam radiation up to 18,000 sq. ft. may be equipped with ONE Petro. Any domestic Petro will operate efficiently on any grade of house heating oil from the heaviest to the lightest. Industrial models range from 50 h.p. to 1000 h.p. using 14 gravity oil.

Your local Petro dealer has factory-trained installation and service men. They are permitted to make no installations beyond a radius that cannot be serviced promptly and efficiently.

To insure your clients all the comforts of uninterrupted automatic oil heat at the lowest cost per b.t.u. specify Petro. Write for engineering data that will assist you.

PETRO

REG. U.S. PAT. OFF.

Domestic and Industrial Oil Burners

Petroleum Heat & Power Company, 511 5th Ave., New York City

Makers of oil burners since 1903

FESS SYSTEM CO. (subsidiary) 220 Natoma St., San Francisco, Calif.

Georgetown Preparatory School, Garrett Park, Maryland, safely, economically, dependably heated with Johnson Rotary Oil Burners.

Is there really a problem in selecting oil burners?

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

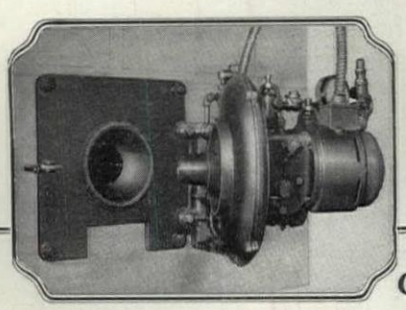
In selecting any product, you check the standing of the maker, the reliability of the representative. The same tests assure oil burner satisfaction. Why, then, is there any problem?

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

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

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

S. T. JOHNSON CO.
MAIN OFFICE AND FACTORY, 000 ARLINGTON AVE., OAKLAND, CALIF.
FACTORY BRANCHES
SAN FRANCISCO, SACRAMENTO, STOCKTON, PHILADELPHIA
YOU WILL FIND OUR LOCAL REPRESENTATIVE'S ADDRESS IN YOUR TELEPHONE DIRECTORY



JOHNSON OIL BURNERS

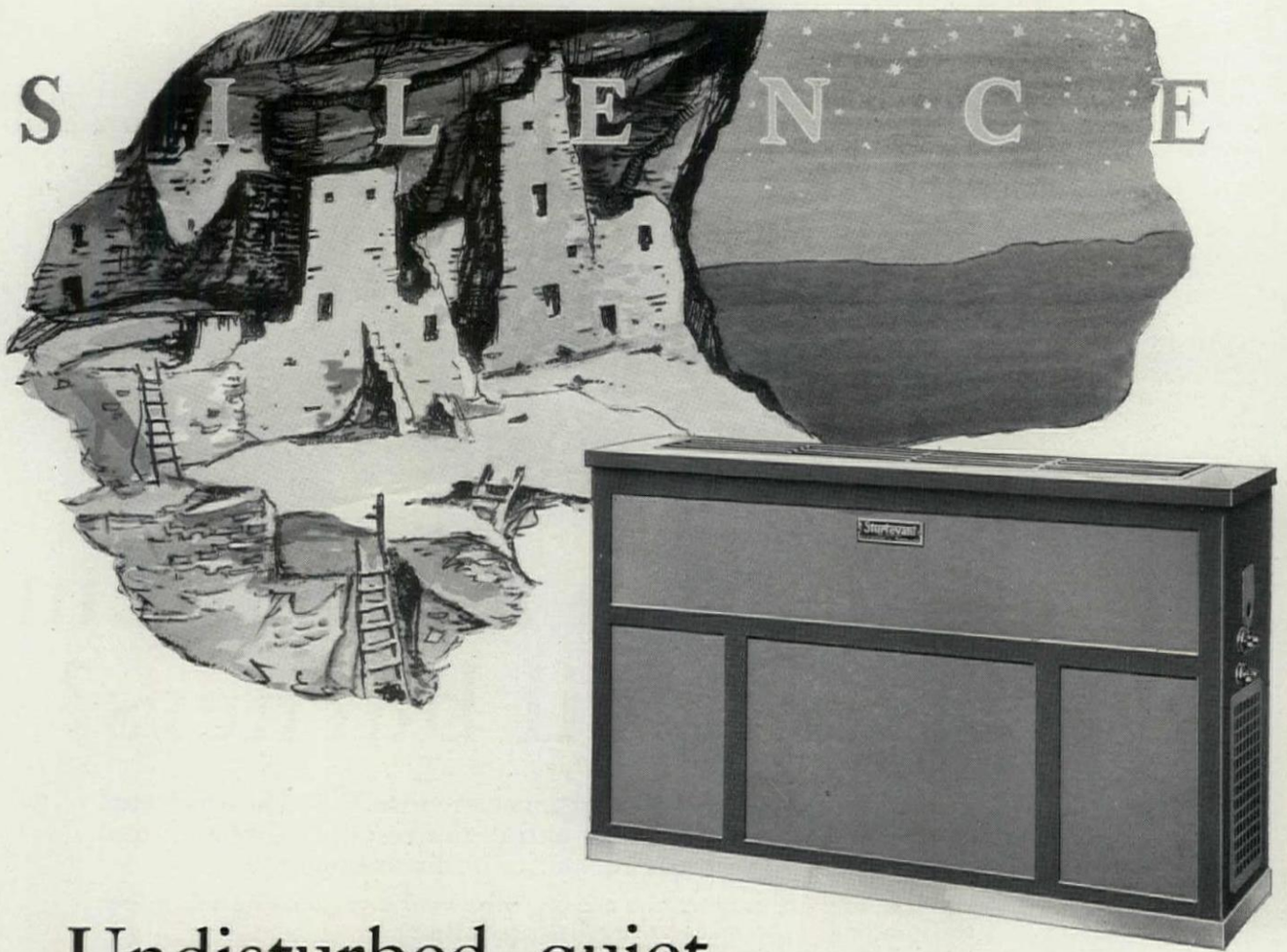
Oil Burner Equipment for Every Heating and Power Purpose

Approved

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

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

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



Undisturbed quiet . . .

no operating sound comes from the "Silent" Sturtevant

TURN the control of the "Silent" Sturtevant Unit Ventilator to the starting position. Immediately within the attractive metal cabinet a powerful fan and motor begin their work. But so smoothly and quietly do they run that you cannot hear the slightest operating sound.

Many months of designing and experimenting are behind this Sturtevant Equipment. All of this company's research facilities were enlisted to solve the problems its development presented. Fans and motors, specially designed for silent operation, were evolved.

There are many more pertinent facts in our Catalog No. 344-A. You will be sure to find them of interest. The nearest office below would welcome your request for a copy.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Camden	Cleveland	Detroit	Los Angeles	Minneapolis	Rochester
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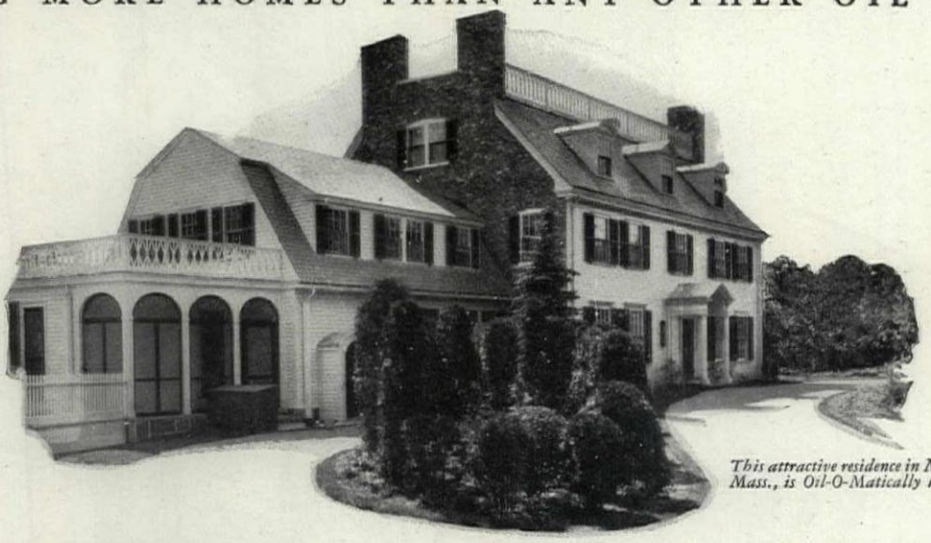
Canadian Offices at: Toronto, Montreal and Galt, Ont. Also Agents in Principal Foreign Countries.

Sturtevant REG. U.S. PAT. OFF. *the Silent Unit Ventilator*

HEATING MORE HOMES THAN ANY OTHER OIL BURNER



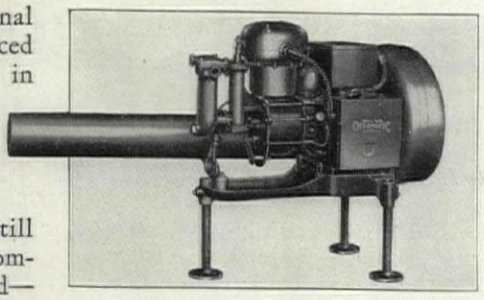
This attractive residence in Milton, Mass., is Oil-O-Matically heated.

Deservedly a favored specification...

on its performance in more than seventy thousand installations

THE weight of both professional and public preference has placed Williams Oil-O-Matic heating in more homes by far than any other oil burner. For nine years it has proved itself entirely dependable and satisfactory.

Now Williams engineers offer still quieter, simpler, and more economical oil heat in the new, improved—



Model J Williams Oil-O-Matic *—new efficiency, new economy*

By reason of basic, patent-protected principles, the new Model J Williams Oil-O-Matic *meters out each drop* of the low-cost fuel oil it burns.

Thus the richness of the air-fuel mixture is even more positively controlled than by the carburetor of a fine car. The correct, permanent setting of this metering device is accurately determined by the Williams technical expert when each burner is installed. He sets it and it is never changed.

Oil-O-Matic brings comfort to this home through long northern winters.

For this reason, perfectly proportioned mixture is never left to chance. It is maintained regardless of natural draft and weather conditions. This exclusive, patented Williams Oil-O-Matic principle assures perfect combustion, saves fuel and prevents carbon deposit inside the combustion chamber.

Burns low-cost, high efficiency fuel oil

A second unique advantage of Model J Williams Oil-O-Matic is the patented atomizing chamber where the measured-out oil is whipped to a bubbly froth. The high combustibility, produced by this thorough atomization, means not only economy, but efficiency as well.

Factory-trained Williams installation experts are always at your disposal. A great many architects and engineers find these Williams men useful because of their sound and wide knowledge of oil heating practice.

Full, standard specifications and concise information about Williams Oil-O-Matic heating has been prepared in a file-size, indexed data folder. May we mail it to you? Just send coupon now.

WILLIAMS OIL-O-MATIC HEATING

Listed as Standard by the Underwriters' Laboratories

Williams Oil-O-Matic Heating Corporation A.F. 8-8
Bloomington, Illinois

Please send me your Architectural data file piece on Williams Oil-O-Matic Heating.

Name.....

Address.....

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

COAL ROLLS DOWN

The camper hangs his kettle up above the fire, for fire burns *up*. The camper builds his fire of sticks piled in a pyramid for fire burns *up-hill*. The Spencer Gable-Grate is sloped to make fire burn up-hill, the way it burns easiest and best.

Men are careful about taking a big rock from the bottom of a slope. Bottom support removed may cause a landslide of all above. Fuel in a Spencer Magazine rolls down because fire takes fuel away from the bottom of a slope to make more roll down by gravitation.

Client good opinion climbs when you keep heat costs down

Every architect who ever put a Spencer Heater in his home, put many more in the specifications for buildings he prepared. For more than thirty years, architects have been among the most appreciative users of the Spencer. You know that fire burns up-hill and coal rolls down. If you knew how much these two simple laws can save in time and money, you can add even more to the enthusiasm with which your clients accept the buildings you design.

Demanding grates and cheerful Gables

Spencer Heaters do save time, trouble and annoyance in heating a home or any building, because the Spencer Magazine holds a 24-hour supply of fuel. Spencers save as high as fifty per cent of a home owner's annual heat bill, for they are made with a sloping Gable-Grate, built especially to make them burn the smaller sizes of fuel that are so inexpensive because flat grates won't burn them right.

New Spencer Heaters, just announced, have been designed to burn any small-sized non-coking graded fuel. They burn No. 1 Buckwheat anthracite as successfully as Spencers have for more than thirty years. They have been tested and approved for burning by-product Pea coke, and other fuels as well. Yet with these improvements, Spencer prices have been lowered.

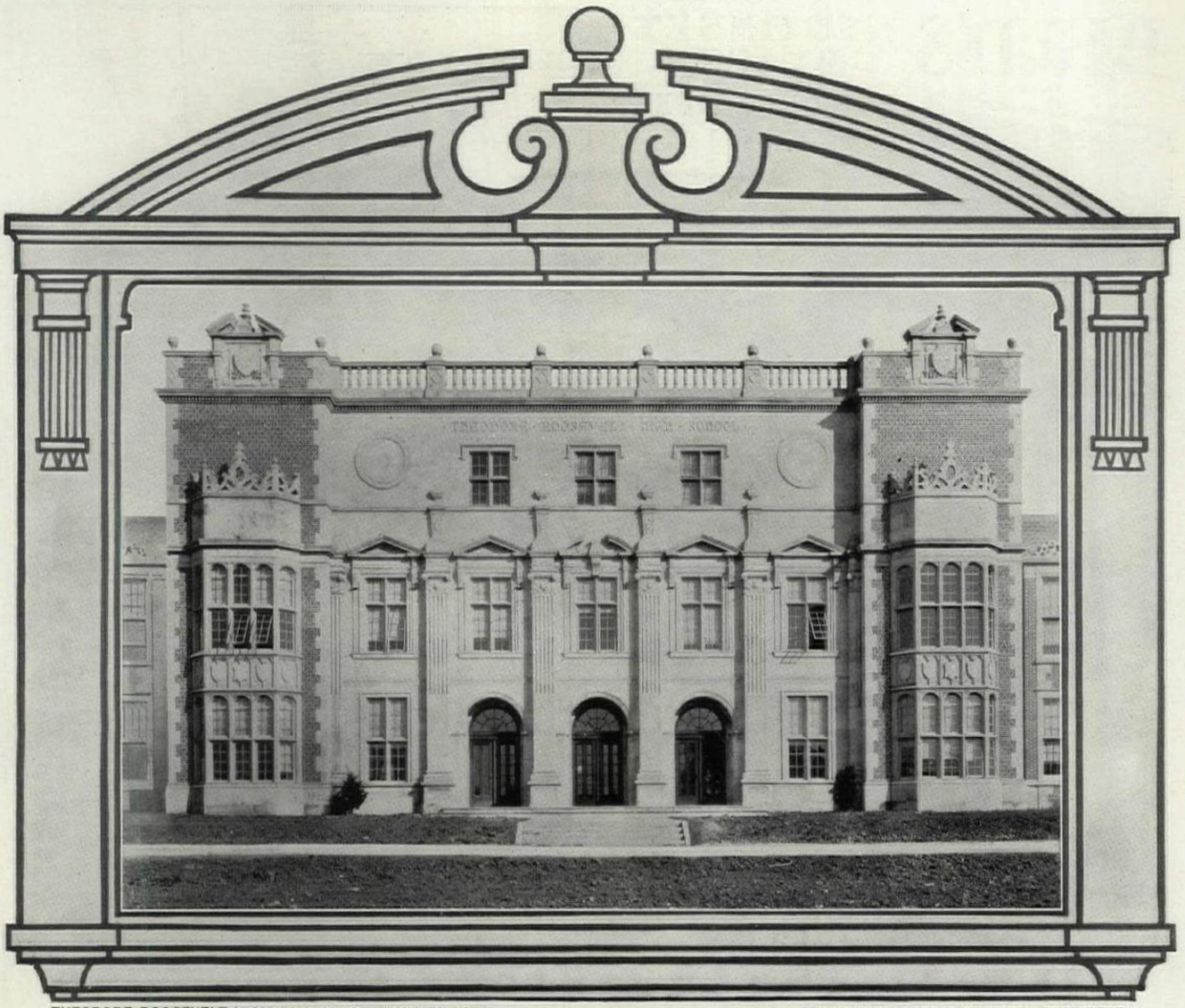
Quality pays for itself

Of course you specify brass and copper in pipes and spouts to keep up-keep down. Yet those are deferred savings. Even cheap pipes and gutters last for a while. A heater in the cellar begins asking for fuel the first cold day. A Spencer begins paying for itself with the first shovelful of coal or coke. It soon pays for its slightly higher cost, then its entire cost, and after that it earns for your client the brass and copper, insulation and weather stripping that he ought to have.

Specify Spencer Heaters in any building, for there is a size and type for every home, industrial, commercial or institutional building. Write for specifications, descriptions and guaranteed capacities of Spencer Heaters—the heaters with the Gable-Grates that keep up-keep down. Spencer Heater Company, Williamsport, Pa. Division of Lycoming Mfg. Co.

SPENCER SAVES

SPENCER
steam, vapor or hot water
HEATERS



THEODORE ROOSEVELT HIGH SCHOOL, DES MOINES, IOWA . . . . . PROUDFOOT, BIRD & RAWSON, ARCHITECTS
EQUIPPED WITH JOHNSON HEAT CONTROL

ARCHITECTS are eager to recommend The Johnson System of Heat Control; and they do so with that surety which characterizes the profession. Hundreds have specified Johnson Heat Control, because its results are so unusually significant and totally individual. The common heat waste in a building becomes nil: and fuel costs are actually reduced twenty-five to forty per cent. Constant and unwavering is the service of the all-metal construction of the Johnson System; and despite weather conditions and changes, there is not a faltering moment during its night and day operation. Johnson Heat Control fulfills the architect's real aim and desire for practicability, comfort and economy . . . . which constitute his personal service to his clients.

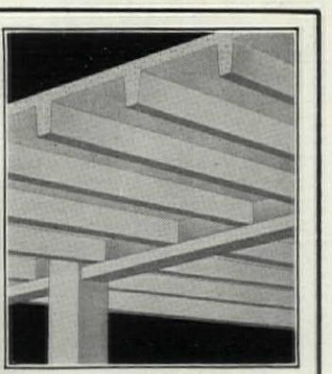
The Dual Thermostat (Night & Day) Control . . The All Perfect Graduated Intermediate Control

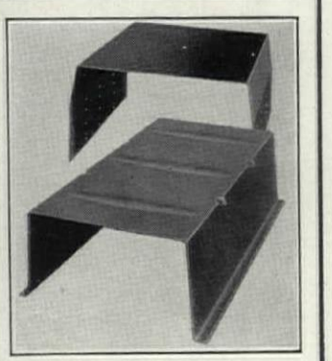
JOHNSON SERVICE COMPANY
MILWAUKEE, WISCONSIN
AUTOMATIC TEMPERATURE REGULATION SINCE 1885
. . . . BRANCHES IN ALL PRINCIPAL CITIES . . . .

JOHNSON · HEAT · CONTROL

300,000 Sq. Feet of MEYER STEELFORMS for 333 NORTH MICHIGAN AVENUE BUILDING

A Ceco Product





A NEW national landmark rears its graceful height along Michigan Boulevard, Chicago—the new 333 North Michigan Avenue Building.

And another tribute rises to the speed, the economy, and lasting sturdiness of Meyer Steelform construction.

Designed by Holabird & Roche, architects, and constructed by Hegeman-Harris Co., general contractors—this beautiful skyscraper typifies the latest accomplishment in architectural and engineering design. That is why 300,000 square feet of Meyer Steelform was used in its erection.

Whenever you have a reinforced concrete job in which economy, durability and speed of construction are problems, you will find the answer in Ceco Super-Service and Ceco and Meyer Products. Call our nearest office or write 801 North 11th St., Omaha, Neb.

CONCRETE ENGINEERING COMPANY

General Offices: Omaha, Nebraska

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Chicago, Detroit, Milwaukee, Minneapolis, Des Moines, Kansas City, St. Louis, Dallas, Houston, San Antonio, Oklahoma City, Los Angeles, San Francisco, Pittsburgh

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(2814)

Other Ceco Products

Meyer Adjustable Shores
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Ceco Reinforcing Bars and Bar Chairs
Ceco Welded and Triangle Fabric

Ceco Column Spirals

Ceco Metal Weather Strips and Screens

Ceco Metal Lath and Hook Hangers

Ceco Hot and Cold Rolled Channels
Ceco Corner, Base Bead and Mouldings

Ceco Steel Roofing and Siding
Ceco Steel Fence, Gates and Posts

Engineering Service

REVIEWS OF MANUFACTURERS' PUBLICATIONS

THE AMERICAN TREE ASSOCIATION, Washington. "Our Program." A brochure on reforestation.

Thoughtful writers and economists are constantly calling the attention of the public to the fact that our American forests, which during many years have been depleted, are now about to disappear altogether. Travelers in many parts of the country will remember the dreary prospect seen from car windows of vast areas which were once covered with thick growth of forest which are now endless expanses of rough land filled with the stumps which are all that remain of forest trees. Lumbermen and sawmills have done their deadly work and have gone on leaving ruin and desolation in their wake. The American Tree Association is engaged in construction work to conserve what areas of forest land still remain and to repair the devastation which ruthless waste of timber has wrought. This is the end of legislation by federal and state governments, and the Association's publications are designed to arouse and increase public interest.

LOUISVILLE CEMENT COMPANY, INC., Louisville. Brixment for Perfect Mortar." A brochure on its use.

Securing enduring masonry, whether of stone or brick, is dependent to a large extent upon the excellence of the mortar which is used; and the excellence or quality of the mortar depends, in turn, upon the quality of its ingredients. This booklet deals with "Brixment, a mason's cement that combines the characteristics of Portland cement and lime, having both strength and plasticity. When mixed with sand and water it makes perfect mortar for any type of brick, tile or stone masonry." The brochure's supply of data covers fully all the different matters which have to do with such a material: What it is; How Used; How to Estimate; Uniformity; Strength; Bond; For Walls Below Grade; Resist Moisture; Convenient Setting Time; Clean Permanent Joints; Winter Use; No Efflorescence; Does Not Fade Colors; Economy; Where Obtained; etc. The booklet also gives a complete analysis of the material.

WOOD CONVERSION CO., Cloquet, Minn. "Insulation Against Heat and Sound." A booklet on insulation.

Much of the improvement made in building materials long on the market and the perfecting and introduction of new materials are the result of laboratory tests and research, often at the hands of highly trained and specialized engineers. The printed matter which comes in this folder, made according to A. I. A. rules, deals with a material much studied and tested. "Balsam-Wool Standard Building Insulation" is a blanket form of insulation against heat and sound. It is made of wood fibers in fleecy wool form, permanently matted together between two sheets of asbestos-coated tough Kraft paper. For sound absorption, as distinguished from sound transmission, Balsam-Wool is made in another form, known as "Balsam-Wool Sound Absorbent." The subject matter of these different folders and leaflets has been prepared in the light of the most painstaking and careful research, and they are full of data.

SEDGWICK MACHINE WORKS, 150 West 15th Street, New York. "Sedgwick Dumbwaiters and Elevators."

There are not many types of buildings in which lifts or dumbwaiters 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 dumbwaiters for receiving ice or other supplies from delivery entrances; in business quarters the uses for dumbwaiters are as numerous as they are varied. This brochure illustrates and describes the valuable line of lifts, dumbwaiters, elevators and hoists which during many years generations of Sedgwicks have been developing,—dumbwaiter outfits of a number of kinds; iceless refrigerators; book lifts; fuel, log and trunk lifts; freight elevators; grip hoists; invalid and hospital elevators, and "gravity drops," a term adopted to distinguish outfits designed for use where, for one reason or another, the loads are uniformly down, which sometimes happens in buildings.

GLEASON-TIEBOUT GLASS CO., Celestialite Division, 200 Fifth Avenue, New York. "Nature's Way Imitated."

From the experimental laboratories of the manufacturers of lighting equipment there have been produced marvelous results in the matter of obtaining the utmost from economical use of electrical current. This small folder or leaflet, for example, gives some interesting data on the fabrication or building up of the glass, known as "Celestialite," widely used in making lamps, and shows a cross section of the glass, which contains (1) a layer of blue, which makes a miniature sky; (2) a translucent layer of white, which creates a miniature cloud; and (3) a layer of clear glass, giving a miniature setting of atmosphere. "Celestialite" takes over Nature's duty in the sky and softens and diffuses the electric rays of the Mazda lamp. The three layers of "Celestialite,"—clear, translucent white and transparent, rectifying blue,—filter out the glare and scientifically provide a very nearly perfect light for the eyes.

NATIONAL RADIATOR COMPANY, Johnstown, Pa. "National Boilers." A valuable brochure on heating.

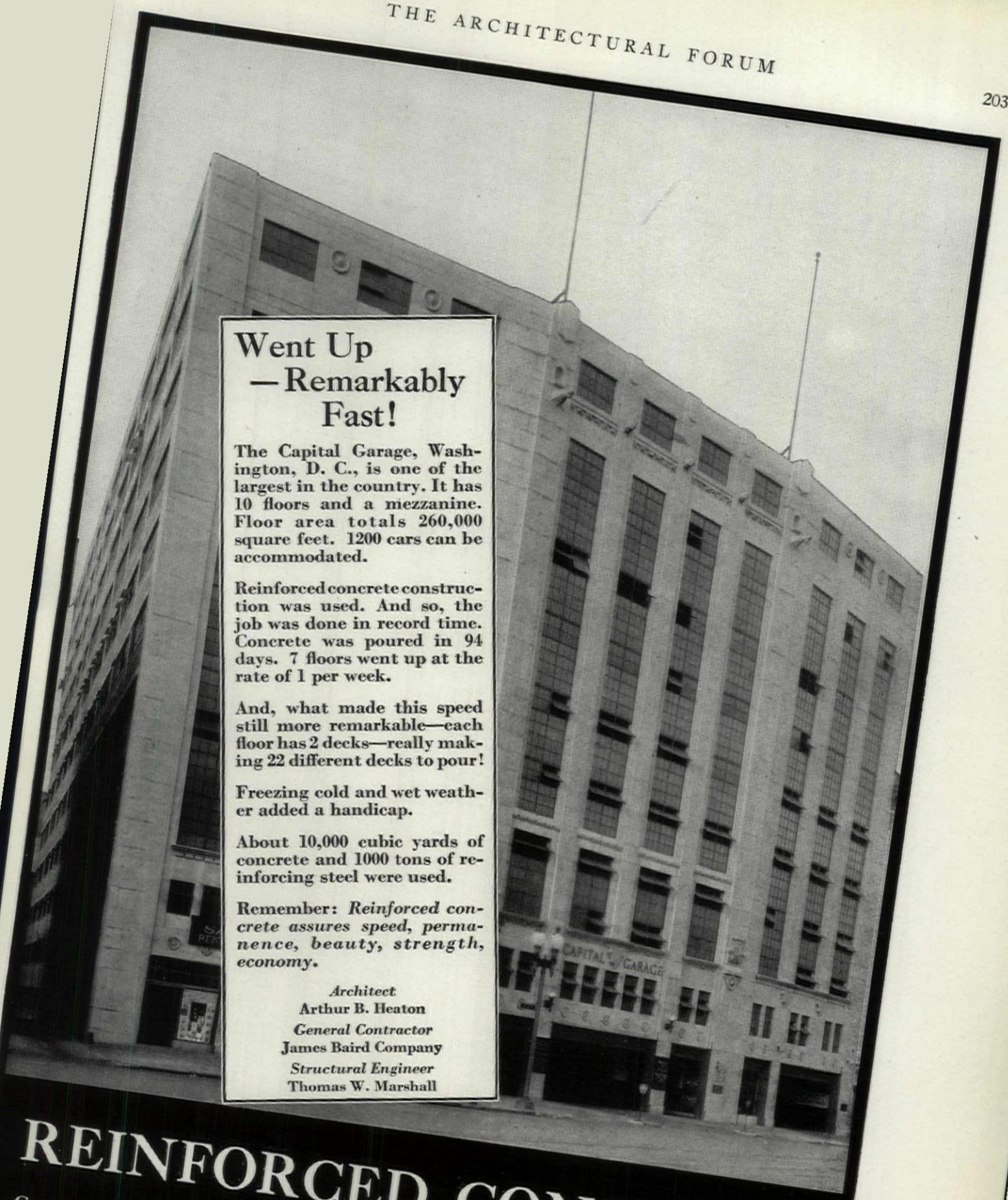
Good steam or hot water heating depends largely upon the equipment's including two details of excellent quality,—boilers and radiators; any defect or shortcoming in either will impair the value of the equipment as a whole. For this reason careful architects and engineers exercise great caution in selecting boilers and radiators, particular thought being given to the capacities of boilers and to the sizes as well as to the forms of the radiators, since their forms must be such as to be useful in the places where they stand. This folder deals with the National Boilers and particularly with the AERO radiators supplied by this firm, radiators made in four patterns and 18 heights, artistically designed, with slender, graceful lines and good proportions. AERO radiators are rated, based upon tests made at Cornell University. No attempt has been made to follow the old standards of sizes with their graduated steps in rating.

UNITED STATES GYPSUM COMPANY, Chicago. "Pyrobar Voids." An important brochure on their use.

An important system of floor construction is that which makes use of "floor voids," which are described as pre-cast units of structural gypsum, possessing the advantages of being "fireproof, of high insulation value, soundproof, of light weight, permanent, and ideal in the concrete joist system of floor construction. Spans of up to 30 feet are possible with this system, and consequently it offers exceptional advantages in schools, hotels, hospitals, apartments and similar buildings where light weight, fireproof floor construction is desired. With Pyrobar Joist Facers between the voids, a uniform plastering base is obtained, requiring a minimum of plaster and precluding the need of any ceiling lath. No other type of floor void construction will give the uniformity and light reflection where there are unplastered ceilings as that provided by a Pyrobar Floor, particularly if the Pyrobar Joist Facers are used."

ARMSTRONG CORK & INSULATION CO. "Armstrong's Corkboard Insulation." Excellent data on the subject.

When one reviews the many advantages which proper insulation gives a building and then realizes that the cost is never great and sometimes quite small, one is surprised that every structure built,—and certainly every residence,—is not thus treated. This brochure, intended for use with the A. I. A. system of filing, deals *in extenso* with the widely known products of the Armstrong firm for insulating walls and roofs. The booklet covers the subject in every possible detail, illustrates the approved method of using corkboard insulation with different types of construction, and gives in the form of a chart directions for determining the thickness of corkboard which is necessary (in addition to the structure of the roof itself) to give the roof resistance to the transmission of heat that will prevent condensation. In addition to giving in full specifications which have been found helpful in securing the proper use of these materials, the brochure gives views of many buildings using them.



Went Up —Remarkably Fast!

The Capital Garage, Washington, D. C., is one of the largest in the country. It has 10 floors and a mezzanine. Floor area totals 260,000 square feet. 1200 cars can be accommodated.

Reinforced concrete construction was used. And so, the job was done in record time. Concrete was poured in 94 days. 7 floors went up at the rate of 1 per week.

And, what made this speed still more remarkable—each floor has 2 decks—really making 22 different decks to pour!

Freezing cold and wet weather added a handicap.

About 10,000 cubic yards of concrete and 1000 tons of reinforcing steel were used.

Remember: *Reinforced concrete assures speed, permanence, beauty, strength, economy.*

Architect
Arthur B. Heaton
General Contractor
James Baird Company
Structural Engineer
Thomas W. Marshall

REINFORCED CONCRETE

Concrete Reinforcing Steel Institute
Tribune Tower
Chicago

Rail Steel Bar Association
Builders Building
Chicago

REVIEWS OF MANUFACTURERS' PUBLICATIONS

CORK IMPORT CORPORATION, 1400 Broadway, New York. "Corkansteel Homes." A valuable booklet.

Changes and improvements in methods of building are so numerous and come with such rapidity that it is not always easy to keep abreast of advanced practice. This folder, for example, deals with a highly ingenious type of construction, closely resembling the type of building used for tall commercial structures, this particular type being used for residences and making use of cork and steel. Upon the foundation there is anchored, by bolts sunk deep into the concrete, the rigid steel frame which forms the support or "skeleton" of the house. Corner posts and supporting beams are of heavy steel, between which are placed upright bars. Roof rafters are likewise of steel. Into this skeleton or framework the covering of corkboard is fitted and secured by steel clips that hold the metal lathing which acts as a base on the exterior for stucco finish and on the inside for plastering. Among the advantages which the folder gives, when the "Corkansteel" method is used, are (1) Fireproofness, since corkboard coated with mortar will resist the passage of flames, and (2) Economy in Heating, as corkboard resists the transmission of heat through the walls.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh. "Engineering Achievements."

To review and present in the form of illustrations its signal triumphs in the way of inventive skill for one year, the famous Westinghouse firm issues this interesting brochure. "Anything, no matter how extraordinary, becomes a commonplace if it continues a few years. Rapid advance in electricity no longer awakes astonishment,—it is merely expected. A cessation would amaze the public. In this compressed account of some of the engineering achievements of 1926 there are hundreds of developments, each a separate problem, each laboriously and correctly solved by various groups of men, all sinking their identities in that of the company. Many of these developments, singly, would have been amazing a few years ago. The least of them would be conspicuous if made in other industries in which rapid progress is less a matter of course. It is probably true that in no other of the great industries, even those youthful ones centering about gasolene transportation, does the annual review indicate such a volume of laboriously-won advancements, and the electrical industry has been making this rapid progress for three decades." The illustrations show marvels in the way of heavy traction locomotives, turbo-generators, converters, changers, circuit breakers, switchboards and other devices, all of the first magnitude as to size and intricacy, built by Westinghouse.

WESTERN ELECTRIC COMPANY. "Public Address System, Nos. 1-A, 2-A, 3-A and 4-A." A detail of equipment.

One detail which would add vastly to the usefulness of many a building is the mechanism by means of which the sound of a speaker's voice or in fact sound of any sort is strengthened or amplified and even transmitted. This mechanism, as described in these important booklets, is a development of the Bell Telephone Laboratories, Inc., the research laboratories of the American Telephone & Telegraph Company and the Western Electric Company. "It supplies an insistent demand that had long existed for an equipment to provide voice amplification and its directional distribution in the smaller places for assembling, such as churches, lodge halls and school auditoriums. Even speakers in good voice only occasionally have been able to make all hear clearly. As a result the Western Electric Public Address System is widely used. With this equipment any speaker can address capacity audiences in such places and make himself heard by all. Another result following naturally is that good speakers are able to conserve their voices. This amplifying system also may be used to transmit speech and music from one part of a building to another,—as in a hotel where there are several auditoriums and dining rooms. In schools and colleges this system may be used to transmit a lecture to several classrooms, or it may provide music for drills, for marching in the halls and stairways, and for assemblies, and other school activities."

SAFETY STAIR TREAD CO., Wooster, Ohio. "Wooster Safe-Groove Stair Tread." An important detail of equipment.

Those familiar with the claims which are often being made for personal injuries know how frequently such injuries are the result of slipping and falling on stairs, ramps or even on floors which have not been protected by being properly surfaced, particularly unfortunate when it is remembered that the cost of such surfacing, paid once for all, would probably have been much less than the amount paid in compensation for results of one such accident. This publication and various folders which are sent with it deal with the fine line of treads supplied by this firm,—in various sizes and easily anchored or riveted to surfaces of stone, marble, granite, concrete, iron, steel, wood, or indeed of any material; and stairways which are so badly worn as to be dangerous are easily and quickly made safe and restored to their normal appearance by the use of these treads. All necessary details of data are given, and among the many illustrations there are several showing stairways of marble for which treads of white brass base have been used, these treads adding considerably to the architectural dignity of the stairways. The booklet should be in every data file.

STRUCTURAL GYPSUM CORPORATION, Linden, N. J. "Gypsteel Pre-cast Fireproof Floors."

The effect which fire has on steelwork is well known among builders and architects, for though the steel will not burn, it will, when exposed to intense heat, warp and "buckle" to such an extent that it is utterly ruined. True fireproof construction, therefore, should be such that the steel be absolutely insulated from such exposure, and the material which is used to insulate it should not only be non-combustible but also highly fire-resistant. This is only one of the many essential fireproofing qualifications combined in structural gypsum, making it the ideal fireproofing material. The "Gypsteel" construction system recommended by the Structural Gypsum Corporation of Linden, N. J., is fully explained in a booklet issued by that corporation, called "Gypsteel Pre-cast Fireproof Floors." The importance of the booklet and its value to architects and engineers should secure it a place in any specification file.

HOLOPHANE GLASS COMPANY, INC., New York. "Holophane Catalog, Commercial Edition."

In this extremely useful brochure there are given data of several different kinds highly important for architects and engineers. Besides listing, and in many instances illustrating and describing, the details or fittings manufactured by this firm, there are several pages devoted to tabulations which are important. Pages 10 and 11, for example, give charts showing indices for the various sized rooms and ceiling heights met with in ordinary lighting practice, while pages 12 and 13 give the coefficients of utilization applicable to Holophane Reflectors for rooms of the dimensions given on the earlier pages. The matter of reflectors is alone an item of great importance, and a large part of the booklet is devoted to their use,—in show windows, sales rooms, lecture rooms and auditoriums,—in all sorts of places where reflectors are useful in lighting, and where the selection of the most appropriate types should be given consideration. The booklet is of course valuable.

INDEX TO ADVERTISING ANNOUNCEMENTS

PART 1—ARCHITECTURAL DESIGN

PART 2—ARCHITECTURAL ENGINEERING AND BUSINESS

WHERE MONEL METAL SHINES

All-Monel Metal service counter in service kitchen of Rochester Chamber of Commerce. Installed by HOLDERLE BROS. Inc., Rochester, N. Y. thru the Rochester Gas and Electric Company.

The CHAMBER OF COMMERCE

ROCHESTER, N. Y.

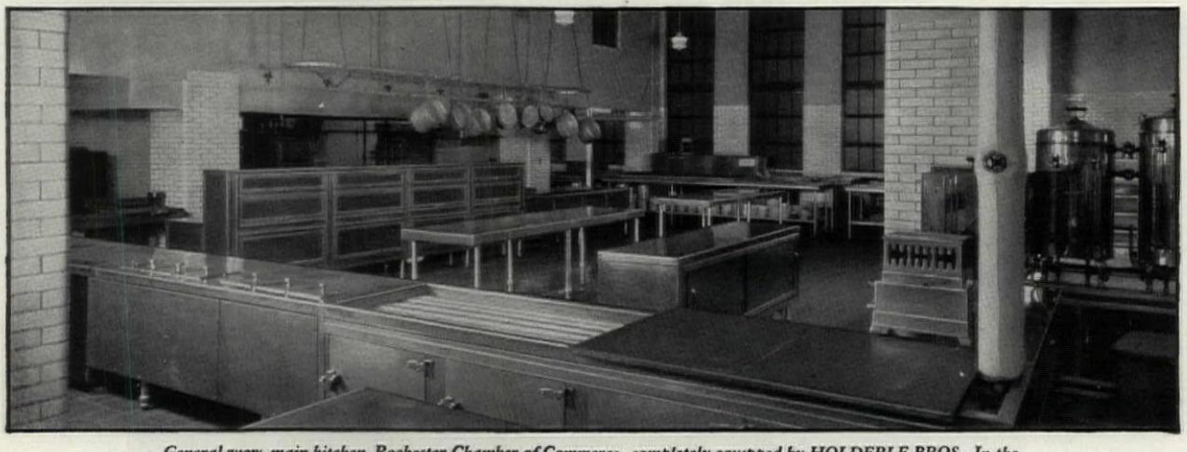
WHERE MONEL METAL SURFACES ASSURE THE CLEANLINESS OF FOOD SERVICE EQUIPMENT

ALL Rochester products are entitled to use the slogan "Rochester Made Means Quality"—a slogan whose use is fostered by The Rochester Chamber of Commerce.

But of all the Rochester products that justify this description, no product could merit it more than this Monel Metal food service equipment installed in its own building by The Rochester Chamber of Commerce.

This equipment is an ideal demonstration of what quality can mean. Made of gleaming Monel Metal by a painstaking Rochester fabricator it is attractive to look upon, economical to use, but above all, easy to clean...Since it is made of Monel Metal, it is rust-proof and corrosion-resisting. It will retain its bright, lustrous appearance for years and years. It is hard to dent or scratch, and it has no coating to chip, crack or wear off. It is the most durable of available materials.

In planning food service installations for buildings of a public or a semi-public character, you can insure highest quality by specifying Monel Metal. Why not write for literature prepared for architectural reference files?



General view, main kitchen, Rochester Chamber of Commerce, completely equipped by HOLDERLE BROS. In the background is a Blakeslee Monel Metal dishwashing machine mfd. by G. S. BLAKESLEE CO. of Cicero, Ill.

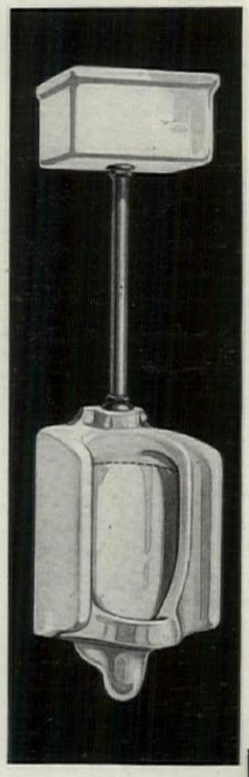
SEND FOR SPECIAL ARCHITECTURAL DATA FOLDERS

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.

WE MAKE THEM ALL
and here's one we especially recommend



It's the Correcto No. 720, illustrated at left—a combination of rare quality vitreous china *with an installed cost very little more than for mediocre designs or inferior materials.*

The floor is left clear for cleaning, a very important advantage. Wide wing shields insure privacy and eliminate the necessity for costly marble partitions. An integral flushing rim gives even distribution of water and eliminates the corrosion found with metal spreaders. The integral trap has an accessible cleanout above the floor and saves the cost of a trap with additional piping, fittings and labor.

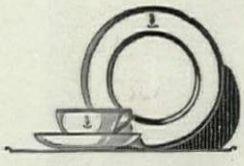
Illustrated below at left is the No. 726 Battery, supplied in 21″ or 24″ widths, center to center. At right is No. 725, the single stall, 18″ wide, with integral side wings. These designs, both of vitreous china, also have an integral flushing rim—assurance of perfect water action. There is no metal spreader. Consequently there is nothing to corrode.

Note the smooth roundness of design, eliminating pockets and corners.

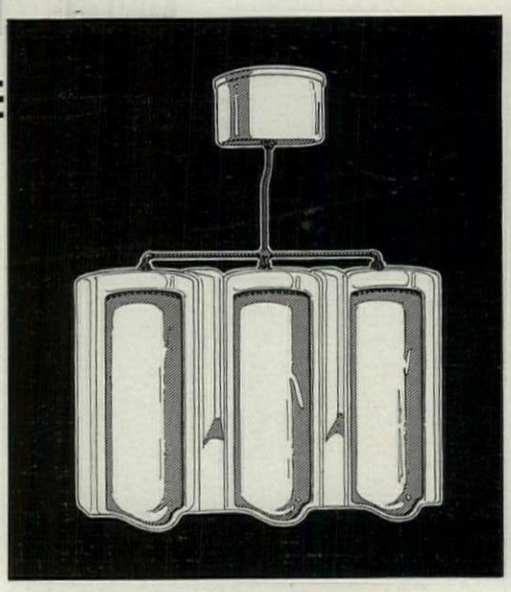
* * * * *

These, like all Eljer fixtures, are highest quality two-fired vitreous china, *guaranteed not to craze* or discolor. They withstand the Government Red Ink test without a whimper. Their surfaces remain pure white.

There are Eljer fixtures of all kinds to meet all conditions. There may be several in the Eljer Catalog that will be helpful right now. A copy will be gladly sent if you will write Eljer Company, Ford City, Pa., Plants at Ford City, Pa., and Cameron, W. Va.

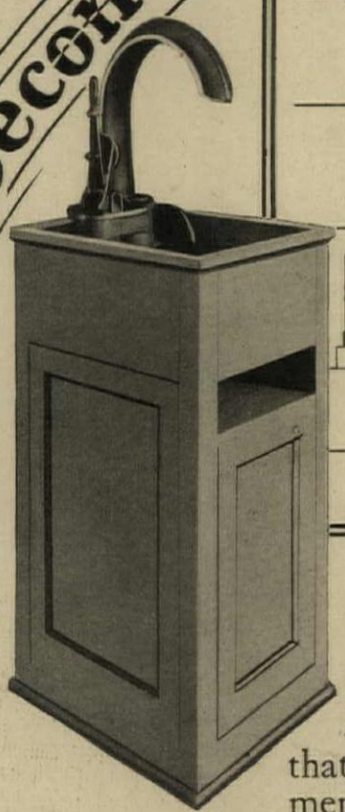


Eljer China is similar in texture to the finest French Table China—but with the added toughness necessary to withstand rough usage. Acidproof and rustproof.

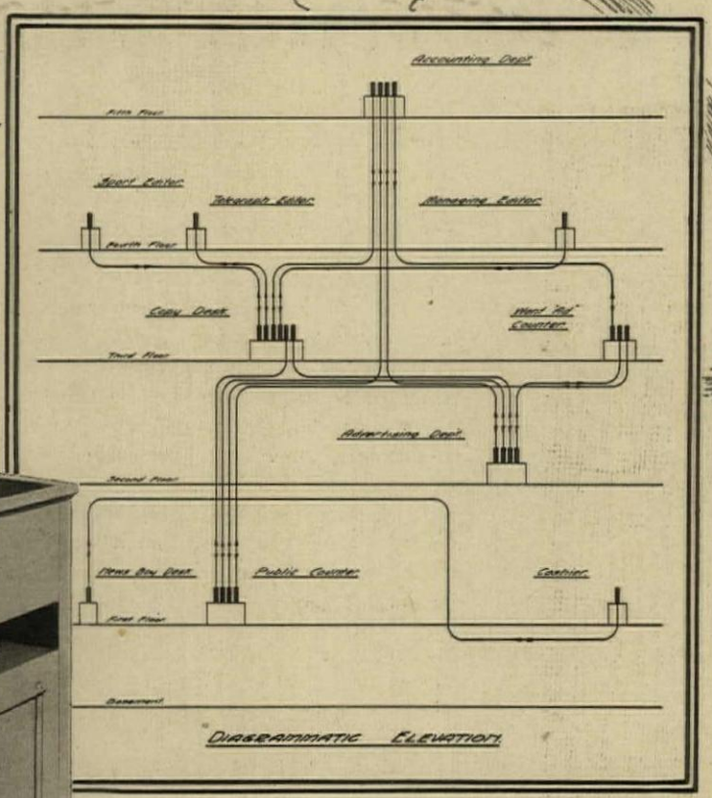


ELJER
VITREOUS CHINA PLUMBING FIXTURES

Traveling Five Floors in a Few Seconds



Pressure Up Delivery Gooseneck Terminal with air deflector. 2¼-in. and 3-in. only. Air does not discharge above desk. Overcomes objection to air blowing around top of desk. Air can be discharged under desk or through floor.



When the architects designed the new building for the Cincinnati Enquirer they did more than merely assemble bricks and mortar into a good looking structure that would protect those within from the elements without; they planned a highly modern efficient newspaper plant, and, as you can see from the above diagram, a Standard Pneumatic System played an important part in bringing in, effecting the speedy system of communication so necessary to a great modern daily. To architects who realize the worth while saving that can be effected for any industry by the installation of a Standard Pneumatic System of communication, we will be glad to send a detailed analysis of the installation shown here. Remember that payrolls prove that such installations pay for themselves, eventually.

STANDARD
CONVEYOR COMPANY

NORTH SAINT PAUL, MINNESOTA

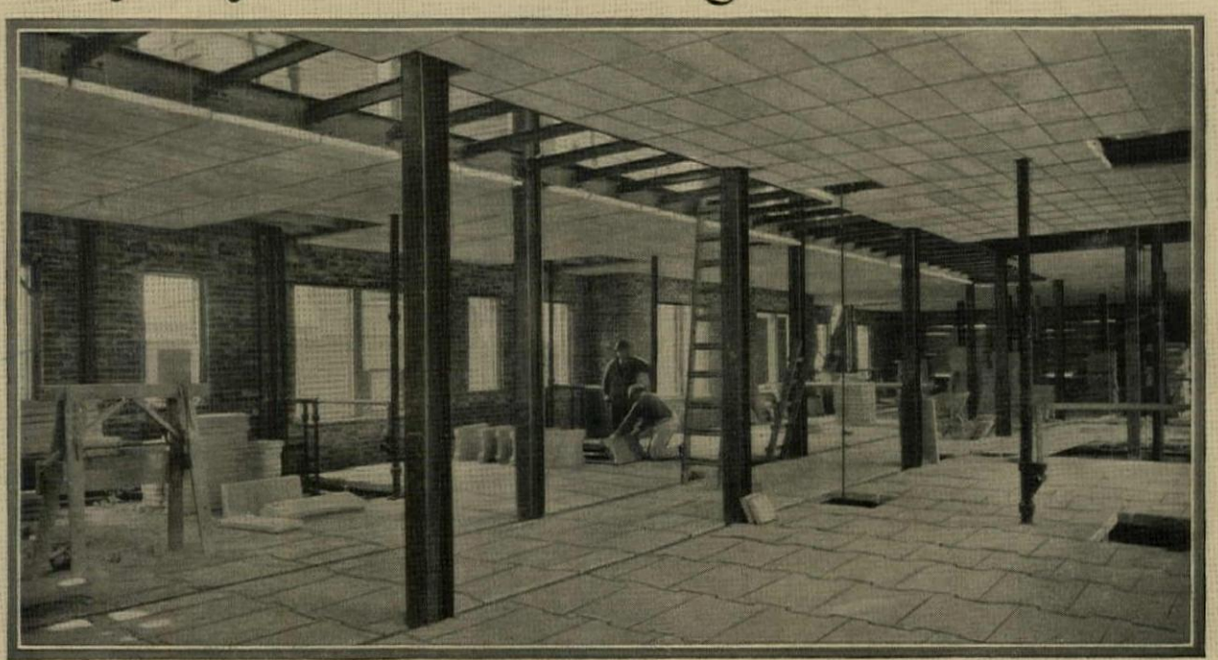
New York Office, 420 Lexington Avenue
Chicago Office, 549 West Washington Street
Philadelphia Office, 3110 Market Street
Cleveland Office, 1108 Hippodrome Building
Buffalo Office, 908 Ellicott Square
Kansas City Office, 419 Manufacturers' Ex. Bldg.
Milwaukee Office, 209 Wisconsin Avenue
Los Angeles Office, 335 So. San Pedro St.
Seattle Office, 321 Lumber Exchange
Charlotte Office, 301 Builders Bldg.

From actual photographs of the Henry Rachlin Apartment building at East Orange, New Jersey. Floor and ceiling constructed of Pyrobar Interlocking Structural Tile

U S STANDARD BUILDING MATERIALS

Pre-Cast structural tile *for floor and ceiling—*

A new light weight fireproofing construction developed by the United States Gypsum Company



Interlocking of floor tile and positive method of supporting the ceiling tile by steel gyves attached to reinforcement imbedded in the tile

FOR many years engineers have sought a pre-cast system of structural floor and ceiling slabs. The scientific and practical answer is here in the UNIT SYSTEM OF GYPSUM CONSTRUCTION with *Interlocking* Floor Slabs and *Fireproofing* Ceiling Slabs.

Conforming to time tested principles, this development is in step with the progress of steel framing methods.

It provides the desired combination of *steel for strength* and *gypsum for protection*, with the added advantages of speed, certainty and economy in construction.

The main characteristics of the new pre-cast, precision-made materials may be summarized as follows:

Mill manufacture insures definite and uniform strength of materials.

No pouring required on the job, hence no waiting for materials to dry or cure.

Form work is eliminated and construction is simplified.

The Interlocking feature of the Floor Slabs provides an added element of strength.

The Ceiling Slab construction provides a flat ceiling. No objectionable beams, and affords two full inches of gypsum fire protection as required by Underwriters.

The Ceiling Slabs may be used with other forms of floor construction or the Floor Slabs may be used with any desired type of ceiling.

This construction is adaptable to any type of standard section structural steel beams, Junior I beams, expanded I beams, metal lumber or bar joists spaced 30 inches on centers. United States Gypsum Company, *Fireproofing Dept.* 300 West Adams St., Chicago, Illinois.

Please send me your Architectural and Engineering data on Unit System of Gypsum Construction. (Check here ☐ if you want our representative to call.)

Name.....

Address.....

Architectural Forum, Aug., 1928

UNIT SYSTEM OF GYPSUM CONSTRUCTION

INTERLOCKING FLOOR SLABS—*FIREPROOFING* CEILING SLABS

MADE BY THE UNITED STATES GYPSUM COMPANY