THE ARCHITECTURAL FORUM

ARCHITECTURAL ENGINEERING & BUSINESS

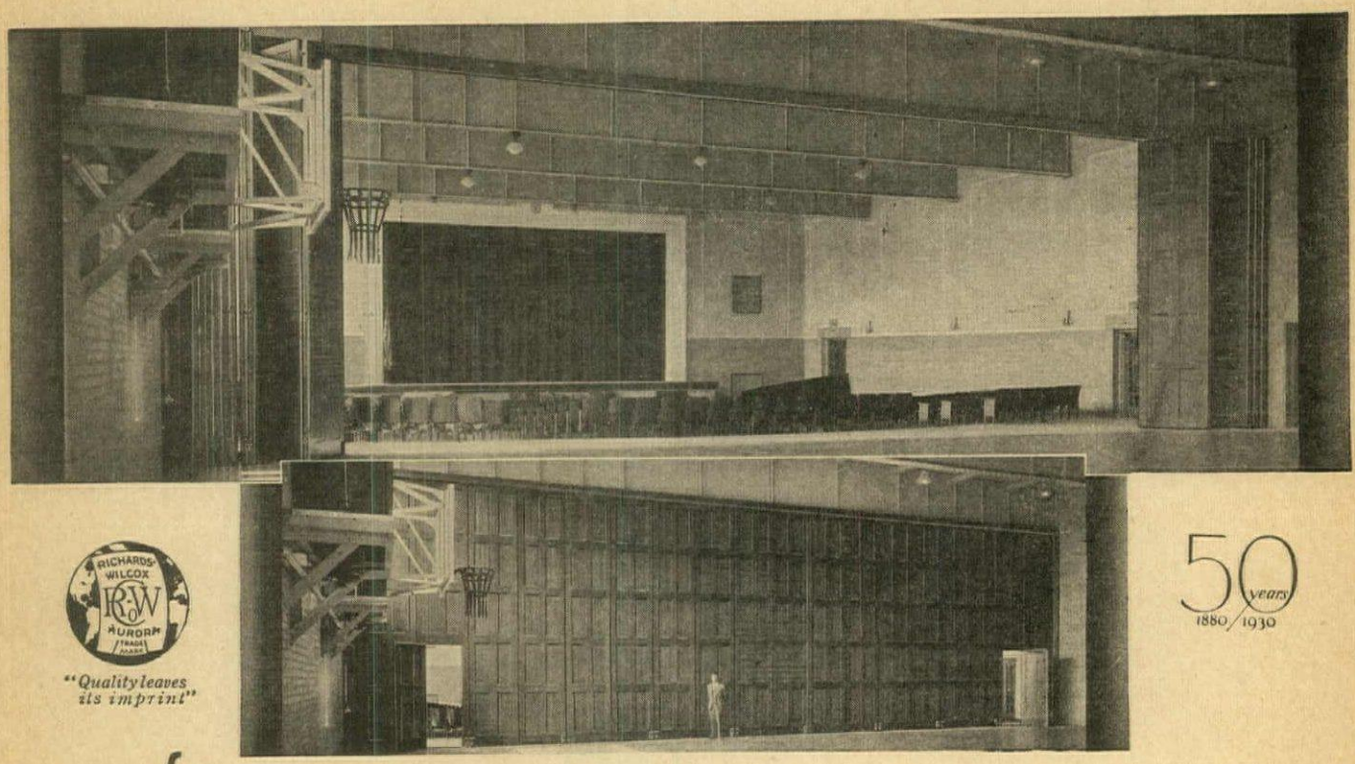
IN TWO PARTS PART TWO

OFFICE BUILDING REFERENCE NUMBER

JUNE 1930

PRICE $3.00

NO OPENING TOO HIGH . . . . NONE TOO WIDE



"Quality leaves its imprint"

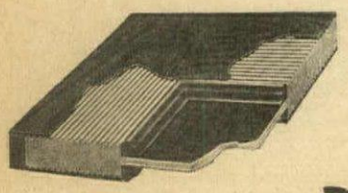
50 years 1880/1930

for FoldeR-Way partition doors

With FoldeR-Way, whole walls disappear and reappear, with practically no effort and no noise. Idle floor space is utilized; not a foot of it need be wasted with R-W equipment.

Here is a typical example, the Junior & Senior High School, Quakertown, Pennsylvania. The doors are 22 feet high, the opening 60 feet wide. Yet one man experiences no difficulty in moving the entire set of 20 doors. There has never been any trouble or costly upkeep connected with this or any other R-W engineered installation.

Let an R-W engineer show you how FoldeR-Way equipment will slide and fold away doors of any size. Write for Catalog No. 43 today.



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

Write for Catalog No. A-53, illustrating R-W Disappearing Door Wardrobes for the classroom.

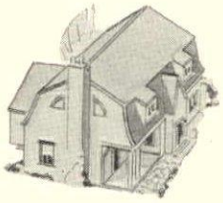
Richards-Wilcox Mfg. Co.

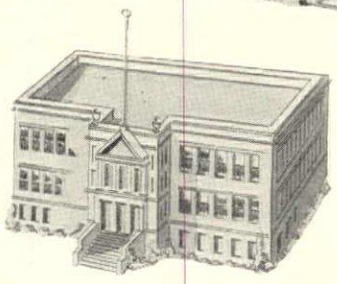
"A HANGER FOR ANY DOOR THAT SLIDES"

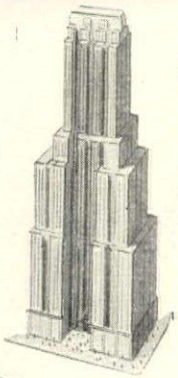
AURORA, ILLINOIS, U.S.A.

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

Natco Vitritile in Jefferson Medical College, Philadelphia, Pa. Horace Trumbauer, Architect; Doyle & Co., Contractors.







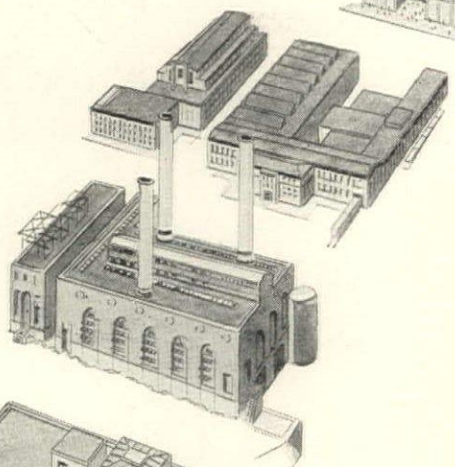
FOR SOME APPLICATIONS *in Every Building* FOR EVERY APPLICATION *in Some Buildings*

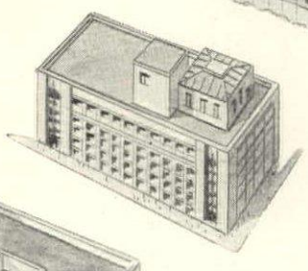
WITH a multiplicity of standard sizes and shapes that suit practically every condition and dimension and a range of beautiful shades to meet wide color-design requirements, Natco Vitritile (glazed and enameled) is a building material of infinite possibilities.

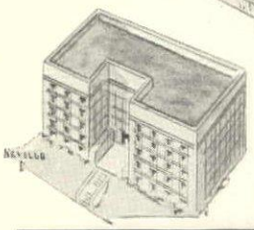
The load bearing units, finished both sides, can be used in exterior walls and partitions, on which no painting, plastering, or other finish is ever required. The units finished one side can be used for a variety of interior work. Kerfed units are available for furring.

Bullnose closures, sill, and lintel tile; wainscot, cove base, chamfered corner tile; these and numerous other types permit the obtaining of striking and unique effects.

Natco Vitritile brings to designer, builder, and user, immediate and permanent satisfaction.







TURN TO SWEET'S

NATCO

THE *COMPLETE* LINE *of* STRUCTURAL CLAY TILE

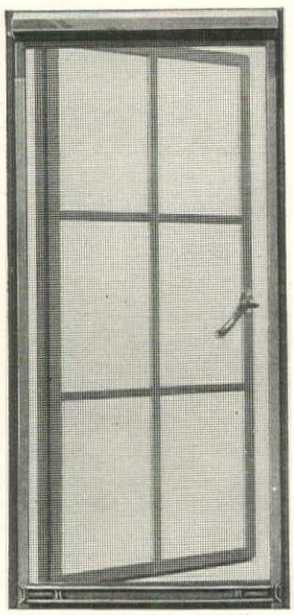
NATIONAL·FIREPROOFING·CORPORATION

THE LARGEST CONCERN IN THE WORLD MAKING A COMPLETE LINE OF STRUCTURAL CLAY PRODUCTS

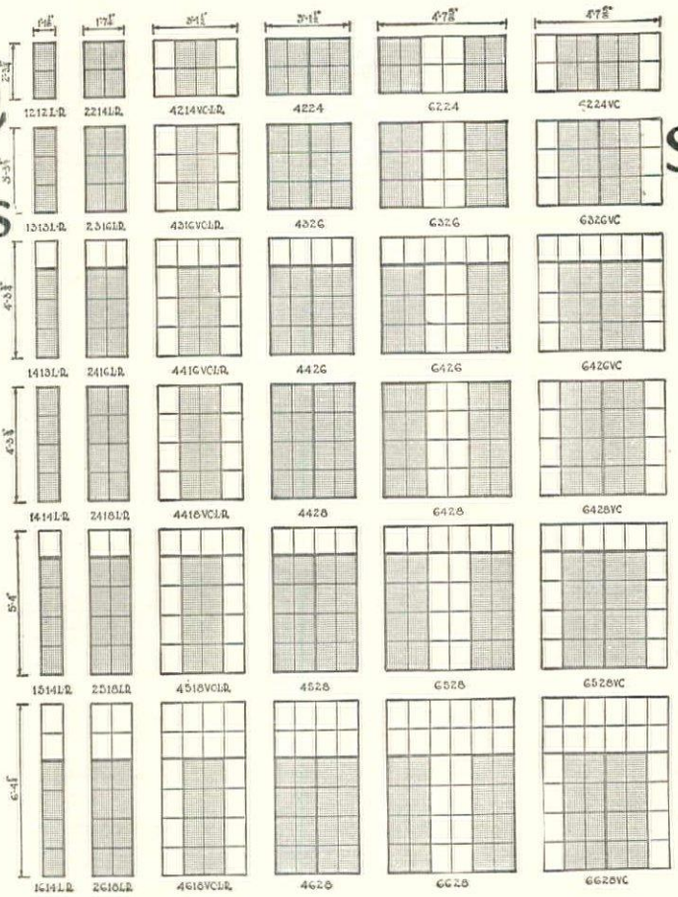
GENERAL OFFICES: FULTON BUILDING, PITTSBURGH, PA. BRANCHES: NEW YORK, CHANIN BUILDING; CHICAGO, BUILDERS BUILDING; PHILADELPHIA, LAND TITLE BUILDING; BOSTON, TEXTILE BUILDING AND NATIONAL FIRE PROOFING COMPANY OF CANADA, LTD., TORONTO, ONTARIO

TRUSCON
STANDARD CASEMENTS
MODEL No. 5
with CASEMENT SCREENS

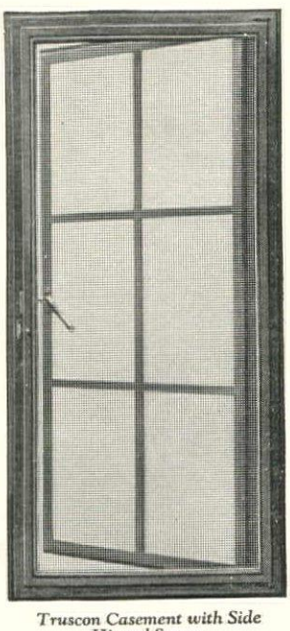
CASEMENT *Rol-up* SCREENS



Truscon Casement with Rol-up Screen



FLAT TYPE CASEMENT SIDE HINGED SCREENS



Truscon Casement with Side Hinged Screen

Standard Units of Screened Casements

The recognized high quality of Truscon Steel Casements in design and utility is further supplemented by screens of equal efficiency and economy. The screens of special Truscon design are quickly installed on any Standard Truscon Casement, Model No. 5. The Rol-up Screens are particularly desirable, because they are a permanent part of the casement, always instantly available and rolled up out of the way when not in use. The Side Hinged Screens are also a superior product and somewhat lower in cost. For a complete window service, specify Truscon Casements with Screens. *Full information and catalog on request.*

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO

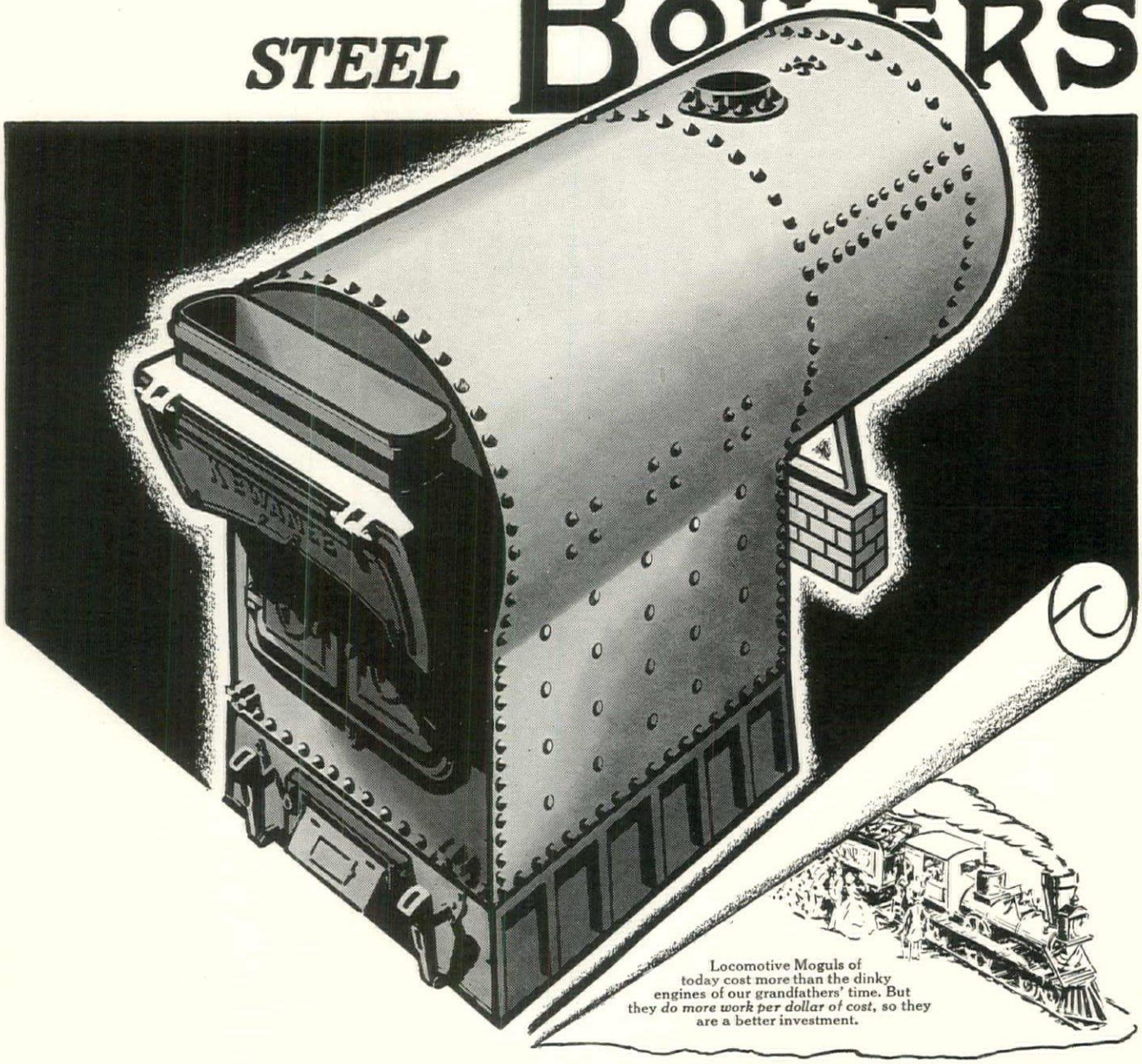
STEEL WINDOW DIVISION *Warehouses and Offices in Principal Cities*

Truscon Steel Company of Canada, Limited, Walkerville, Ontario

Build NOW While COSTS Are LOW

KEWANEE

STEEL BOILERS



Locomotive Moguls of today cost more than the dinky engines of our grandfathers' time. But they *do more work per dollar of cost*, so they are a better investment.

Kewanee Boilers, with their riveted steel construction, are built "oversize" and "overstrength." They *also* are capable of doing more per dollar of cost.

Then, too, the *extra years of life guaranteed* by their sturdy construction spreads their initial cost over many additional years.

KEWANEE BOILER CORPORATION
division of American Radiator & Standard Sanitary Corporation
KEWANEE, ILLINOIS

It Costs Less to OWN a KEWANEE

No MATCH for ATP

. . . . THE SELF-HEALING COAL-TAR PITCH *and* FELT

ROOF

Roofed with ATP
AMERICAN BANKERS INSURANCE CO. BUILDING
Cass and Ohio Streets Chicago, Illinois
Architects: Childs and Smith
General Contractor: E. P. Strandberg Co., Inc.
Roofing Conrt: Chicago Waterproofing & Roofing Co.

If there's a weak-spot in a roof, leave it to "little drops of water" to find and make it a leak-spot! Rain is the most relentless roof-wrecker known.

But there is one roof that laughs at rain, wind, fire, sun and other roof-destroying demons. It's the ATP Roof . . . made of materials that actually improve under conditions ruinous to ordinary roofs. Water preserves pitch—heat makes it self-welding, sealing all cuts and cracks. Fire, the elements and mechanical wear are helpless against ATP slag, tile or gravel armor. With or without bond, all ATP Roofs are made of exactly the same material. The bond is optional. Dollar for dollar, over periods of from 25 to 40 years, ATP-type roofs consistently outwear any other type of roofing known to man.

AMERICAN TAR PRODUCTS COMPANY

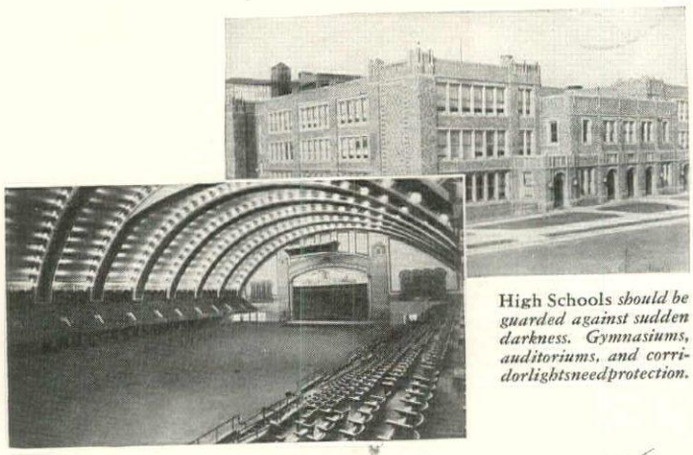
Division of The Koppers Company

KOPPERS BUILDING, PITTSBURGH

New England Division: Tar Products Corporation, Providence, R. I.

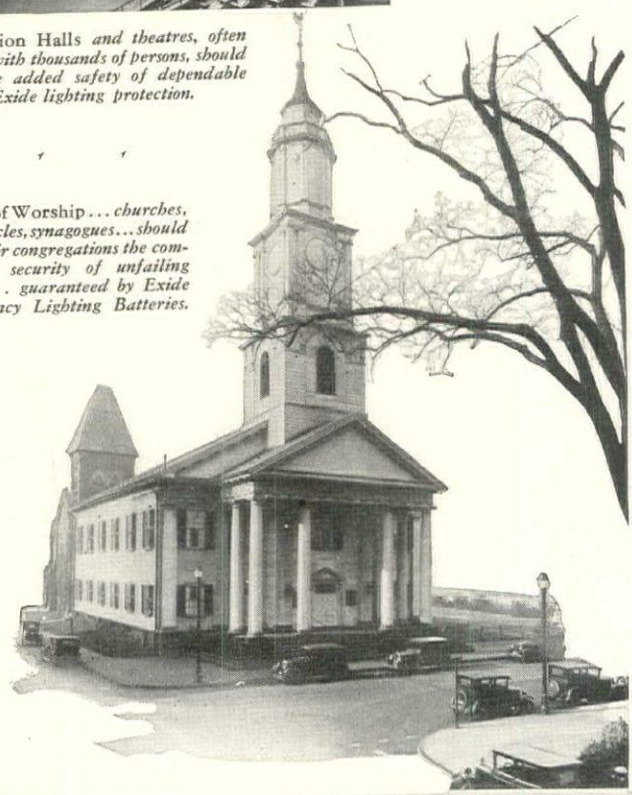
Plants at Chicago, St. Louis, Birmingham, Milwaukee, Kearny, N. J., Youngstown, O. Utica, N. Y., Providence, R. I., and Follansbee, W. Va.

Should Public Buildings



High Schools *should be guarded against sudden darkness. Gymnasiums, auditoriums, and corridor lights need protection.*

Convention Halls *and theatres, often packed with thousands of persons, should have the added safety of dependable Exide lighting protection.*



Places of Worship . . . *churches, tabernacles, synagogues . . . should give their congregations the comfortable security of unfailing light . . . guaranteed by Exide Emergency Lighting Batteries.*

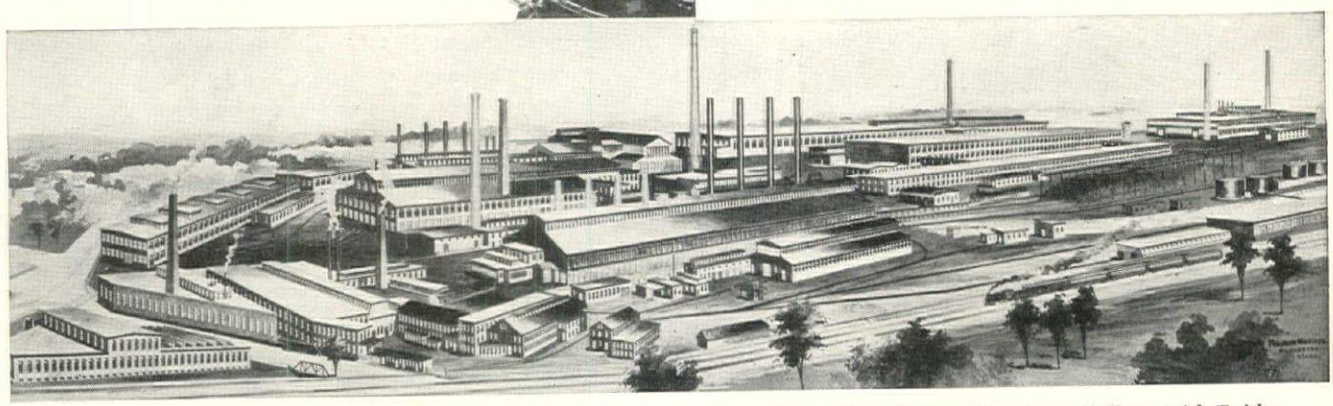
MANY public buildings have *useless* exit lights. For if electric current suddenly fails, exit lights, unless protected, also fail. Surely, then, unprotected exit lights are useless.

There are many vital locations in modern buildings, in addition to the exits, that should be guarded against power interruptions. Operating rooms in hospitals . . . vaults in banks . . . auditoriums and projection rooms in theatres . . . lights in stores . . . special operations in factories . . . and many others.

That's why so many architects all over the country specify Exide Emergency Lighting Batteries to guard against unexpected current failure. Should power suddenly be cut off, lights will continue to burn, because Exides will take over the entire emergency load . . . *instantly and automatically* . . . without a hand touching a switch.

Exide Emergency Lighting Batteries can be fitted into any budget. Their cost is moderate—depending entirely upon how extensive is the protection provided. Exides are also economical to operate. The devices necessary to control these reliable batteries and keep them in a fully charged condition are simple. No addition to the normal personnel is needed to attend them.

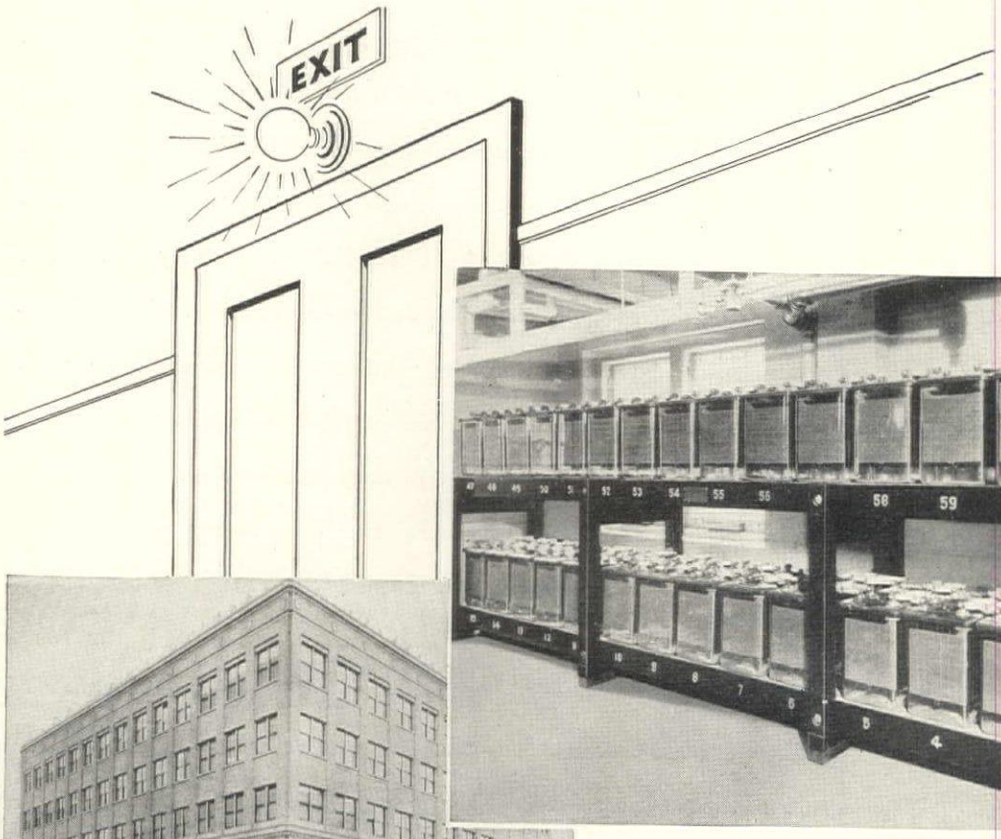
Write for one of our engineering representatives to call and discuss emergency lighting with you. Absolutely no obligation. Or if you wish, we will send you our Emergency Lighting Bulletin. A note will bring it. Write today.



Industrial plants *the country over protect special operations against material spoilage from sudden power failure, with Exides.*

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

have USELESS EXIT LIGHTS?



Here is a typical Exide *Emergency Lighting Battery. Note how clean and compact it is . . . how little cellar space it requires . . . how accessible for attention, although little attention is needed.*

Department Stores, *banks, hotels, all should protect their patrons against unexpected current failure and its possible results. Exide Emergency Lighting Batteries can do this job economically and absolutely dependably.*

This Hospital *protects its patients and staff with Exides. Small or large hospitals should guard against sudden darkness in operating rooms, delivery rooms, X-ray rooms, wards, etc.*

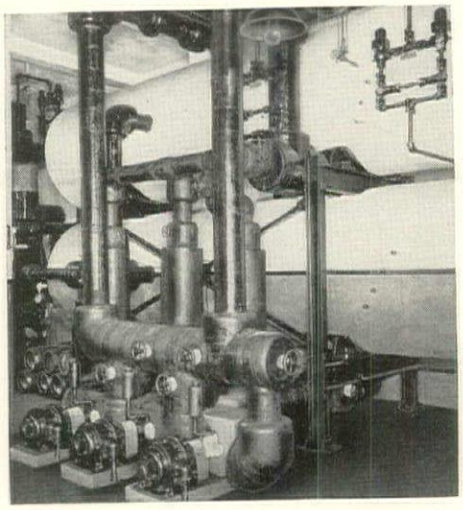
Exide

EMERGENCY LIGHTING BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

A MESSAGE TO ALL USERS OF REFRIGERATION IN INDUSTRY



ADVANTAGES of the York Patented Ammonia Circulating System

LOWER OPERATING COSTS: Higher operating suction pressures with attendant increase in operating efficiency and decrease in power consumption.

LOWER TEMPERATURES: Produces lower temperatures with minimum evaporating surface.

EASE OF OPERATION: Evaporating system may be cut out of service by merely stopping the ammonia recirculating pump. It is unnecessary for the operator to adjust valves to regulate the flow of liquid ammonia through the evaporator.

SAFETY: Assures dry gas to the compressor, thereby eliminating compressor troubles and increasing the life of the equipment.

FLEXIBILITY: Its refrigerating effect is immediate. Entire charge of liquid ammonia is carried in the low pressure receiver, precooled to evaporating temperatures, available for instant use.

EASILY DEFROSTED: Especially adapted to low temperature work. The evaporating system may be drained of liquid ammonia and hot gas introduced to the coils. Defrosting is positive and rapid.

THE refrigerating effect of ammonia liquid is much greater than ammonia gas. To be efficient, therefore, an evaporating system must operate with its entire surface covered with liquid ammonia.

Although this principle is well known, its use in the refrigerating field has been limited because of numerous difficulties encountered in commercial application. The York Patented Ammonia Liquid Circulating System (Patent No. 1718312) successfully overcomes these difficulties and utilizes the refrigerating effect of liquid ammonia to a degree never before attained. This system has shown such marked gains in efficiency and economy of operation in many industrial processes, that the savings effected have quickly paid for the entire cost of the equipment necessary for its application.

The York Patented Ammonia Liquid Circulating System incorporates in its design the York Ammonia Float Control, the York Low Pressure Receiver and the York Liquid Circulating Pump.

In operation a constant level of liquid ammonia is maintained in the low pressure receiver by means of the float control, regardless of fluctuations in load. The liquid circulating pump circulates liquid ammonia from the low pressure receiver through the evaporator, the ammonia gas and unevaporated liquid returning to the receiver. The ammonia gas passes on to the compressor and the unevaporated liquid recirculates through the evaporator.

Consult our nearest direct factory branch regarding the application of this system to your particular requirements.

YORK

ICE MACHINERY CORPORATION

GENERAL OFFICES: » » YORK, PENNSYLVANIA

Need a gas mask ?

Never!

BECAUSE →

Inspecting or cleaning a sewage pump need no longer be a "gas mask job"

INSTALL A *Jennings*

which is located above the pit where it is easy to get at

HERE is a sewage pump that is easy to take care of. Installed entirely out of the pit, the pump, driving motor and controls always are accessible.

Nothing is submerged except the suction pipe. The interior of the pump can be laid open, and the impeller removed for inspection and cleaning, without even going near the pit.

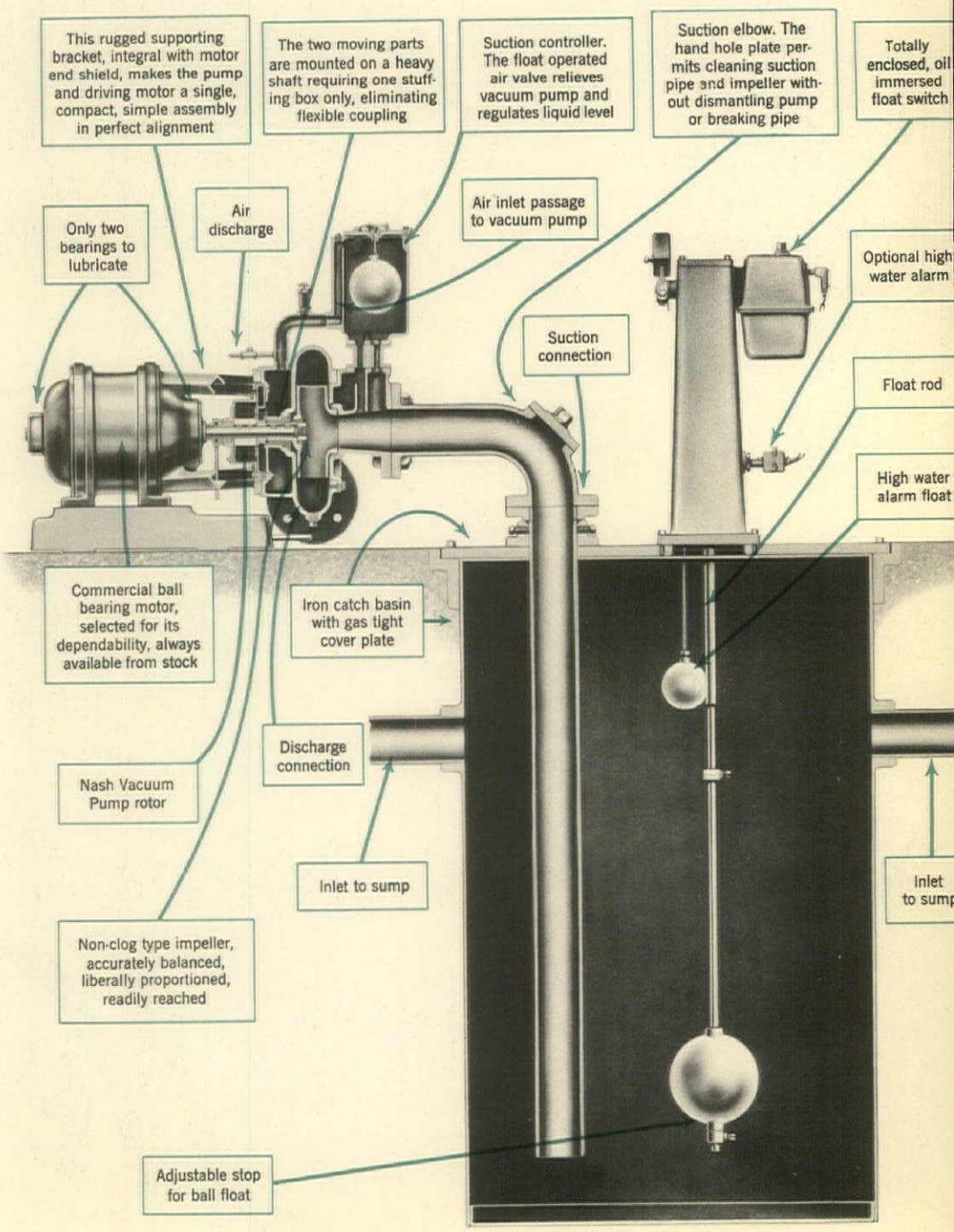
Jennings Suction Sewage Pumps are furnished in eleven sizes with capacities from 45 to 450 g.p.m. of unscreened sewage. Heads up to 75 ft. Write for Bulletins 113 and 124.

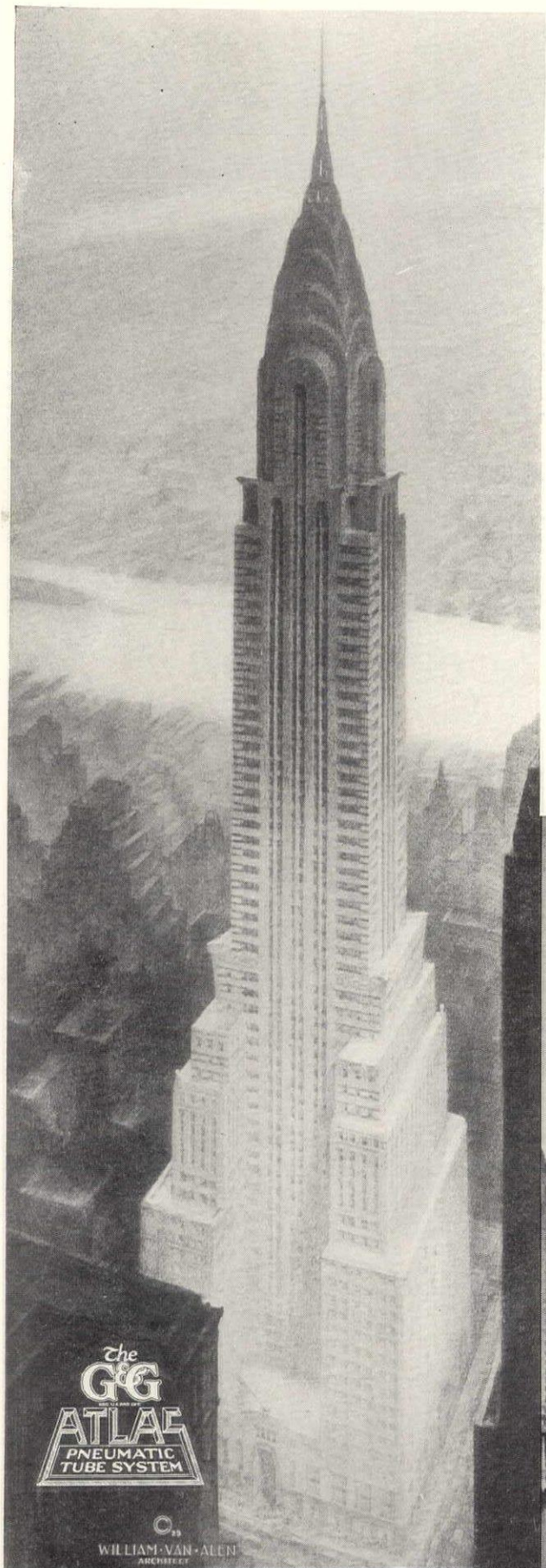
NASH ENGINEERING COMPANY
33 Wilson Rd., SOUTH NORWALK, CONN.

Jennings

SUCTION
SEWAGE

Pumps





G&G ATLAS PNEUMATIC TUBES

IN THE WORLD'S TALLEST BUILDINGS

For the Texas Company in the new Chrysler Building, New York; for the Bank of The Manhattan Trust Company in The Manhattan Company Building at 40 Wall Street, New York, (these buildings to be the tallest in the world); and for the new Head Office Building of the Canadian Bank of Commerce, Toronto, Canada, (the tallest building in the British Empire) ... G&G Atlas Pneumatic Tubes will be installed and provide 30 feet per second Mechanical Messenger Service to speed handling of mail, telegrams and documents among scattered departments. For... Mechanical Messengers are faster and more dependable than human messengers . . . Drawing of typical bank installation and table of space requirements upon request.

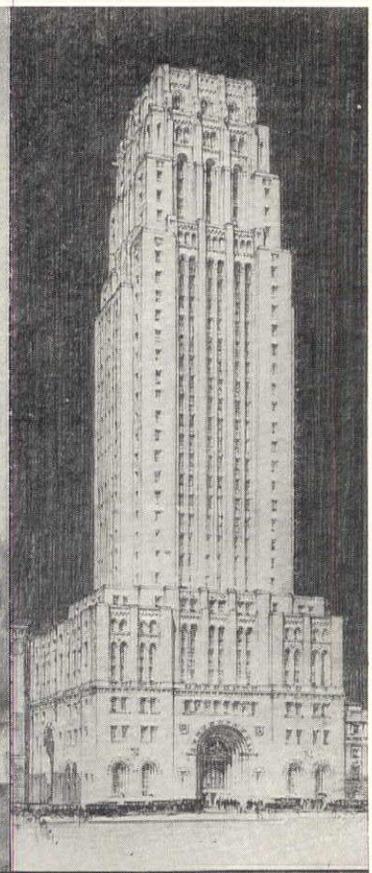
Catalog in Sweet's Archt. Cat. 24th Ed. pp. D 5113-15
Catalog in Specification Data 1930 Ed. pp. 232-233

G&G ATLAS SYSTEMS, INC.

544 West Broadway **New York City**
407 Dominion Bank Bldg., Toronto

Among other G&G Atlas Installations are:

NAME	ADDRESS	ARCHITECT
BANK OF MONTREAL	Head Office	*McKim, Mead & White, Architects*
MITSUI & COMPANY	Tokio, Japan	*Trowbridge & Livingston,*
NATIONAL CITY BANK OF N. Y.	New York	*None*
CHASE NATIONAL BANK	New York	*Graham, Anderson, Probst & White*
EQUITABLE TRUST CO.	New York	*Trowbridge & Livingston (E. F. Abell, Equipt. Spec.)*
N. Y. STOCK EXCHANGE	New York	*None*
FOREMAN STATE NATIONAL BANK	Chicago, Ill.	*Graham, Anderson; Probst & White*
NORTHWESTERN NATIONAL BANK	Minneapolis	*Graham, Anderson, Probst & White*
FIDELITY PHILADELPHIA TRUST CO.	Philadelphia	*Simon & Simon*
UNION TRUST COMPANY	Cleveland	*Graham, Anderson, Probst & White*



THE CHRYSLER BUILDING
NEW YORK, N. Y.
William Van Alen
Architect
Fred T. Ley & Co., Inc.
General Contractor
Louis T. M. Ralston
Consulting Engineer

THE MANHATTAN CO. BUILDING
H. Craig Severance, Architect
Yasuo Matsui, Associate Architect
Morrell Smith, Archt. for Bank Quarters
Walker & Gillette, Assoc. Archts. for Bank
E. F. Abell, Equipment Specialist
Starrett Bros., Builders

The CANADIAN BANK of COMMERCE
TORONTO
Head Office Building
Darling & Pearson, Architects
York & Sawyer, Consulting Architects
E. F. Abell, Equipment Specialist
Anglin-Norcross, Ltd., General Contractors

Von Duprin

Self-Releasing Fire and Panic Exit Latches

The Advantage of the Separate Specification

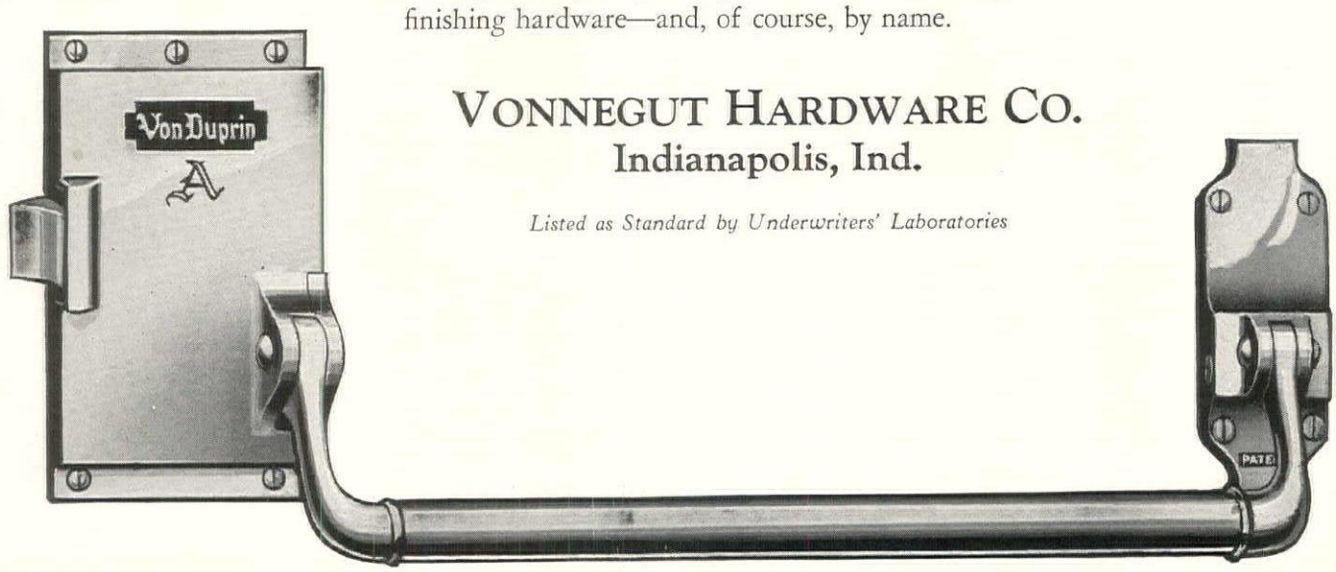
There are two ways in which panic bolts are commonly specified. Some architects include them with the finishing hardware; others make them a separate item of the specifications.

The latter method has the very definite advantage of helping the building owner get what is specified. The former always tempts the occasional unscrupulous dealer to substitute cheaper devices as part of the finishing hardware contract.

Sweets
Pages C3130-C3135

It is to prevent this that we protect all hardware dealers by selling every reputable dealer at the same fair prices.

As a further means of insuring the delivery of the genuine, we urge that you specify panic devices separately from the finishing hardware—and, of course, by name.



VONNEGUT HARDWARE CO.
Indianapolis, Ind.

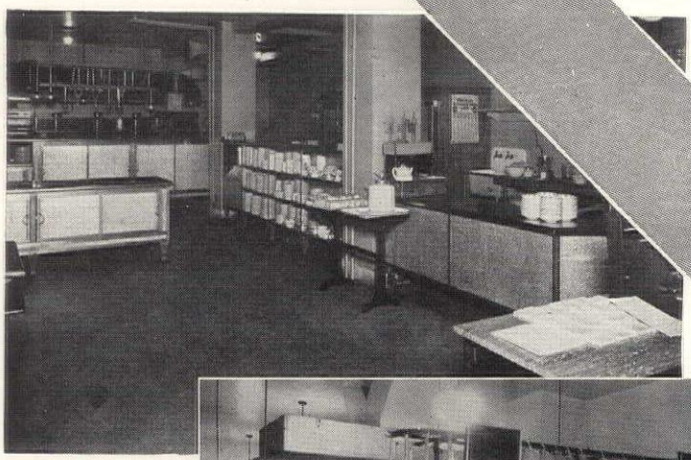
Listed as Standard by Underwriters' Laboratories

Five Years From Now Your Client Will Tell You This—

"Thanks again for recommending VAN Kitchen Equipment"

And ten . . . or even twenty . . . years later your client will say the same thing. Van Equipment makes lasting friends . . . for itself *and for you!* You have a right to the good will which it will bring you!

You can specify Van Equipment for the most limited appropriation. It meets every need, at a low first cost and with assurance of daily economy. Shall we send details?



Above, Van Kitchen serving the well known Hotel Andrew Johnson, Knoxville, Tenn.

Right, a fine Van equipped kitchen of the Colony Club, Detroit, Michigan

Five books on food service problems have just been prepared for architects. Gladly sent free, on request.

The John Van Range Co.

EQUIPMENT FOR THE PREPARATION AND SERVING OF FOOD

Cincinnati

DIVISION OF ALBERT PICK-BARTH COMPANY, INC.

St. Louis Dallas Atlanta Charlotte Cleveland New Orleans

Chicago Sales Office, 1200 West 35th Street
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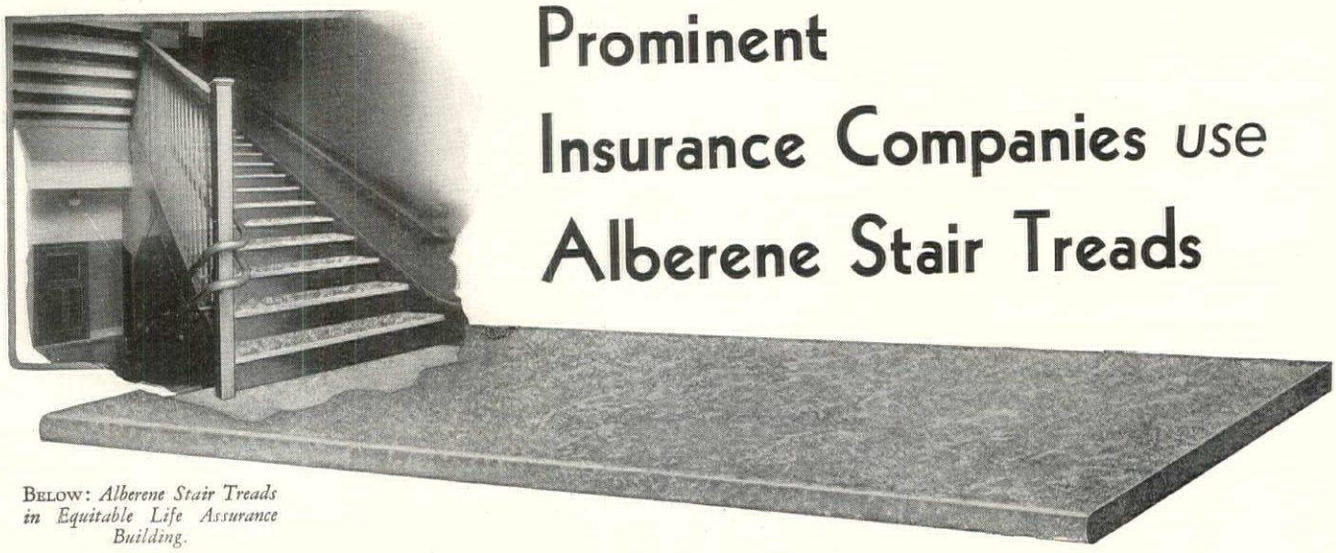
See SWEET'S Pages C3798—3801

The John Van Range Co., Oakley, Cincinnati, Ohio

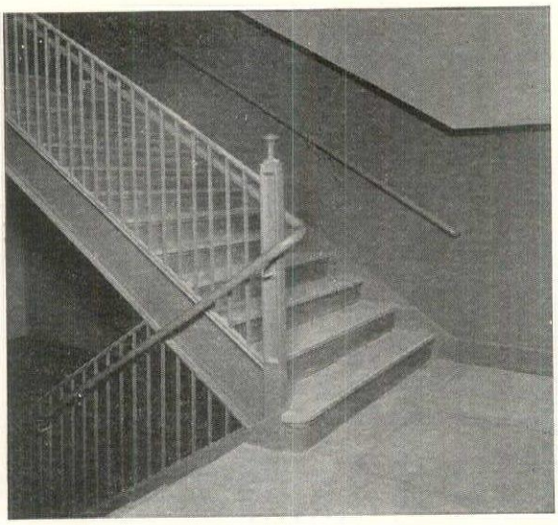
Please send me, without cost or obligation: ☐ Planning Restaurants That Make Money. ☐ Practical Planning for School Food Service. ☐ Practical Planning for Church Food Service. ☐ Practical Planning for Hospital Food Service. ☐ Practical Planning for Club Food Service.

Name..... Address..... City..... State..... BH-6

Prominent Insurance Companies use Alberene Stair Treads



BELOW: *Alberene Stair Treads in Equitable Life Assurance Building.*



Typical Public Building Installations of Alberene Stone Stair Treads and Landings:

Buildings:	*Architects:*
EQUITABLE LIFE ASSURANCE BLDG., New York	Starrett & Van Vleck
PRUDENTIAL BLDG., Newark, N. J.	Cass Gilbert
FIDELITY MUTUAL LIFE INSURANCE CO., Philadelphia, Pa.	Zontzinger, Borie & Medary
NATIONAL CHAMBER OF COMMERCE BLDG., Wash'ton, D.C.	Cass Gilbert
PROVIDENT TRUST CO. BLDG., Philadelphia, Pa.	Rankin & Kellogg
CITY COURT BLDG., Buffalo, N. Y	Col. Howard Beck
WILLIAM PENN HOTEL, Pittsburgh, Pa.	Janssen & Cocken
MAYO CLINIC BLDG., Rochester, Minn.	Ellerbe & Co.
PENN ATHLETIC CLUB, Philadelphia, Pa.	Zantzinger, Borie & Medary
SOUTHERN RAILWAY BLDG., Washington, D. C.	H. W. Hasselbach
U. G. & I. BLDG., Philadelphia, Pa.	Perry Shaw & Hepburn
NEW YORK STATE OFFICE BLDG., New York City	W. E. Haugaard

Insuring permanent satisfaction and no depreciation

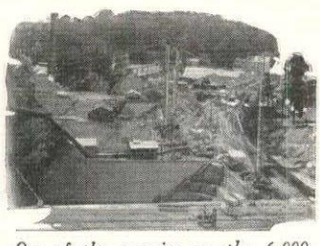
1. DURABILITY—Alberene Stone stair treads have been in use for 21 years in the Provident Trust Company Building in Philadelphia. They have been, and still are, free of repair cost.
2. SAFETY—These treads are safe—wet or dry. They do not wear smooth, because the specially selected stone used for treads is high in abrasive content.
3. CLEANLINESS—Alberene Stone is moisture-resisting. Always easy to clean—and to keep clean.
4. FIREPROOFNESS—Streams of cold water can be played on heated Alberene treads without causing any cracking or breaking.
5. APPEARANCE—The natural light, blue-grey color gives good visibility against any background, and it harmonizes with any color scheme.

For use in office buildings or any type of public building, Alberene Stone stair treads and landings offer the advantages given above and others equally important, such as ease of machining, economy of installation, etc. Send for Bulletin on Stair Treads and Interior Uses.

ALBERENE STONE CO., 153 W. 23rd St., New York, N. Y.

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

Quarries and Mills at Schuyler, Virginia



One of the quarries on the 6,000 acre tract at Schuyler, Virginia.

ALBERENE STONE

THE NATURAL STONE OF DIVERSIFIED UTILITY

This brochure, ARCHITECTURAL ALBERENE, *sets forth in detail the interior and exterior uses of Alberene Stone.*

THE ARCHITECTS' VERDICT:

"Plaster needs STEEL REINFORCEMENT like reinforced Concrete in Principle"

The walls and ceilings of this artistic residence are lathed with RIBBED STEELTEX . . . the interior plaster is steel-reinforced for lifetime permanency.

RIBBED

STEELTEX LATH REINFORCES PLASTER WITH EMBEDDED STEEL . . . does it Automatically

Thousands of leading architects realize the value of STEEL REINFORCEMENT in plaster,—*that's their verdict.* But that is not all . . . there are other essentials, too. In fact, to obtain a permanent, quality plastering job, the plaster lath for interior walls and ceilings MUST give all TEN (10) results as indicated in the *MERIT CHART (at left, below).

Any plaster lath will give SOME of these ten results,—Ribbed *STEELTEX* lath for interior plaster gives ALL ten results . . . in a desirable and satisfactory manner. WHY COMPROMISE? Use Ribbed *STEELTEX* lath for interior plaster,—it is now suitable, economical and practical for every type of home or building . . . whether a costly mansion or humble cottage.

★ MERIT CHART	Ribbed STEELTEX for Plaster
Reinforcing	√
Insulation	√
Sound deadening	√
Automatic back-plastering	√
Adds structural value	√
Added security over suction or plaster keys	√
Angle reinforcement at no added cost	√
Assurance of having proper and uniform thickness of plaster	√
Prevents lath marks from showing on finished plaster	√
Crack prevention	√

The Merit chart above shows the ten results you MUST get with a plaster lath to obtain the RIGHT job. Ribbed *STEELTEX* lath gives ALL ten results.

Ribbed *STEELTEX* is the easiest handled lath on the market . . . and comes in sheets, neatly packed in bundles, ready for application. Ribbed *STEELTEX* lath is quickly and easily applied and when plastered becomes a one-piece, solid STEEL-REINFORCED plaster slab . . . *like reinforced concrete in principle.*

RIBBED

STEELTEX applies easily

RIBBED

STEELTEX minimizes plaster cracking hazards

In addition to RIBBED *STEELTEX* lath for interior plaster, there are THREE other styles of *STEELTEX* . . . same principle . . . same protection,—such as: *STEELTEX* for stucco,—*STEELTEX* for stone and brick veneer,—*STEELTEX* for floors and roofs (concrete and gypsum). *Write for free descriptive literature.*

The reinforcement of Ribbed *STEELTEX* is composed of a network of cold-drawn, electrically-welded steel wire (heavily galvanized). This steel mesh is securely woven onto a tough, pure-fibrous backing. Across the back of every *STEELTEX* sheet are rows of V-shaped metal RIB STIFFENERS . . . insuring board-like rigidity.

Write for the COMPLETE merit chart showing Ribbed *STEELTEX* lath IN COMPARISON with OTHER types of plaster lath . . . it's worth your effort . . . it's FREE . . . sign and mail the coupon below and get this interesting LATH COMPARISON CHART.

NATIONAL STEEL FABRIC COMPANY

Union Trust Bldg. Division of Pittsburgh Steel Co. *Pittsburgh, Pa.*

WORLD'S LARGEST MANUFACTURERS OF WELDED STEEL FABRIC › › › ›

National Steel Fabric Company,
Union Trust Building, Pittsburgh, Pa. Dept. 50-E

Gentlemen: Please send your ☐ LATH COMPARISON CHART also your book ☐ "BETTER WALLS FOR BETTER HOMES." This request to obligate me in no way.

Firm Name .....

Individual's Name .....

Address .....

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

Prevent the line loss and expensive work that results from dew damage. Insulate all brine cold lines with moisture-resistant Novoid Cork Covering.

When dew gets into the covering on cold lines, and insulation is soaked, line losses go up. Pipe chases must be opened and the covering replaced.

Natural dewdrop magnified

Dew Damage *threatens every* COLD LINE

Novoid Cork Covering gives long service because it is moisture-proof

MOISTURE is the enemy of most cold pipe coverings. It works into crevices, spreads through the insulation—*and when cooled below the dew-point*—condenses as dew. Then the covering is useless and must be replaced.

But this does not happen where Novoid Cork Covering is used. Novoid Cork Covering is impervious to moisture.

That is why you can use Novoid Cork Covering on brine, ammonia or ice water lines running through hot, humid rooms. Or seal it up in partitions or pipe chases and know that it won't absorb moisture and have to be replaced in a short time.

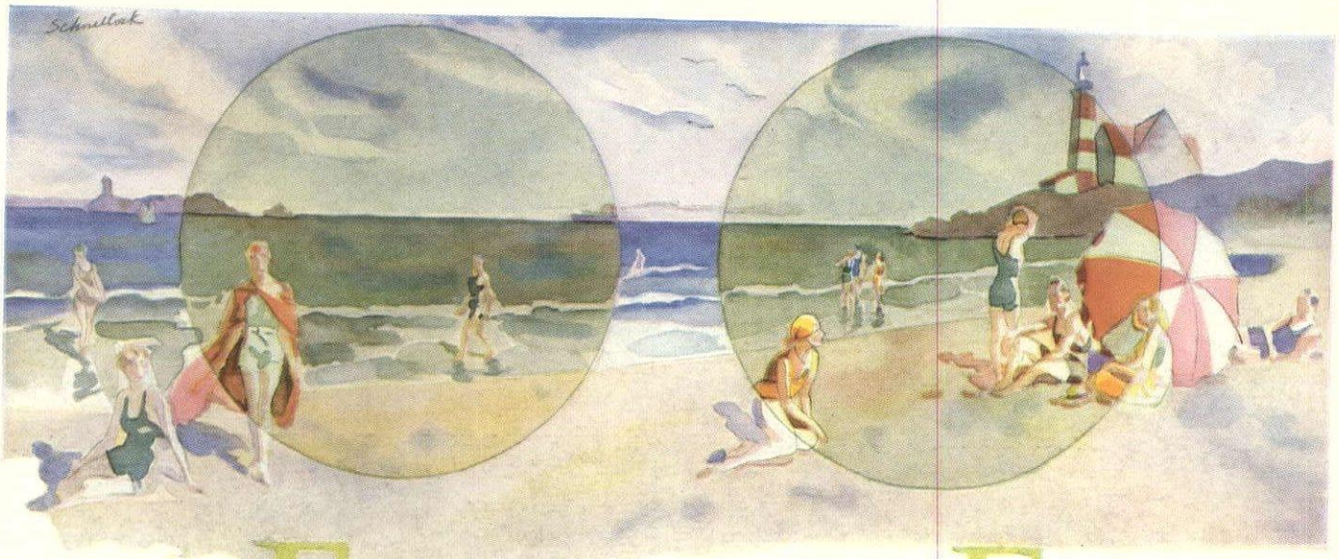
That, too, is why Novoid Cork Covering keeps its insulating value indefinitely. It stays dry and efficient and is not subject to progressive deterioration, which means steadily increasing lines losses and overloaded refrigerated machines.

Novoid Cork Covering is made for all sizes of pipes and fittings and in thicknesses suitable for all classes of cold lines from below-zero brine to drinking water.

Novoid Corkboard Insulation

CORK IMPORT CORPORATION 345 W. 40TH ST. NEW YORK

Samples and further information will be sent on request. Write to Cork Import Corporation, 345 West 40th Street, New York City.



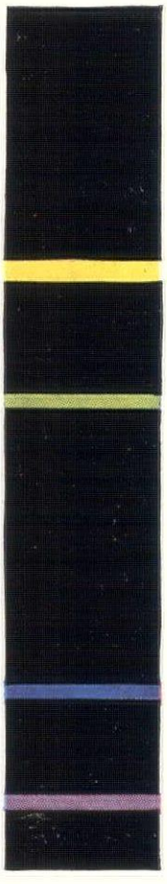
as Easy on your Eyes
as sun glasses

COOPER HEWITT light is as easy on your eyes as the light which comes to them through yellow-green sun glasses worn at the beach on a bright sunny day. Like sunlight, that is, with the glaring and much of the other irritating rays filtered out. But with this important difference: Cooper Hewitt light is not a filtered light, it just does not contain any irritating rays.

Science says the cool yellow and green rays of the spectrum are the rays by which we see best. The remarkable seeing *power of Cooper Hewitt light is accounted for by the composition of its spectrum — over 90% yellow-green.*

Yellow-green sun glasses, you know, absorb a large portion of all the rainbow colors of which sunlight is composed — *except* yellow-green, which the glass transmits. Thus yellow-green rays are in large measure practically the only rays which such sun glasses permit to enter your eyes. And not only do you see with greater comfort; but objects appear sharper and clearer, for these yellow-green light rays lie in the middle of the spectrum and are the rays by which human eyes see best.

Cooper Hewitt light is composed *almost entirely* of these soft, yellow-green rays. It comes to your eyes from the long (50-inch) tube of radiant mercury vapor as the essence of clear, transparent, sharp-seeing daylight, perfectly diffused. No glare. No dark shadows. All objects under it stand out as sharply and clearly as if magnified.



Blue and violet which have comparatively little seeing power, comprise less than 10% of Cooper Hewitt light.

Little wonder then that in industries where efficiency is the watchword — where vision must be keen and quick — and where the comfort of workers is rightfully considered important — Cooper Hewitt light is everywhere in use. Most of the leading automobile plants are lighted with Cooper Hewitt lamps. So are the mechanical departments in many of the leading newspapers. Likewise, the big furniture factories, textile mills, etc.

It will interest you to learn the many advantages — in the use of Cooper Hewitt illumination. A new illustrated booklet, "Why Cooper Hewitt Light is Better than Daylight," is yours for the asking. General Electric Vapor Lamp Co., Hoboken, N. J.

Join us in the General Electric Hour, broadcast every Saturday evening at 9 o'clock E.S.T. on a nation-wide N. B. C. network.

GENERAL ELECTRIC

VAPOR LAMP COMPANY

(*Formerly Cooper Hewitt Electric Company*)

[*See next page*]

where WOULD *you go to thread a needle?*

In an exaggerated circumstance—say, when you thread a needle—you recognize instantly the importance of both the adequacy and the direction of light. And just so does light play its part in your industrial plant.

· — ·

Poor lighting annually exacts a tremendous toll from American industry. It is responsible for a high percentage of the "seconds" turned out in every plant. It is the direct cause of innumerable mistakes all along the production line, wasting materials, wasting time, wasting profits.

· — ·

Exact figures on the number and value of rejects, seconds and other losses caused directly and indirectly by inadequate and improper lighting are, of course, most difficult to obtain. But this much can be said:

· — ·

Only 15 per cent of America's industrial plants are adequately and properly lighted. In these, accidents are comparatively few, seconds run low and production is high.

· — ·

Only 29 per cent can be said to be "fairly well lighted." In these, accidents are more common, the percentage of seconds runs higher and production is lower.

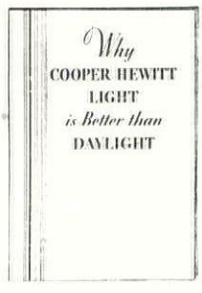
BETTER THAN DAYLIGHT

· — ·

The remaining 56 per cent of all industrial plants are classed as poorly lighted. And in these, investigation has shown, the accident rate is high, the percentage of seconds is high and production is lowest.

· — ·

Cooper Hewitt mercury-vapor light, as some thirty different industries in America have discovered, is *the* light that "gets the industrial needle threaded." Some reasons why it helps reduce waste to a minimum, improves quality, and increases efficiency and profits generally are given on the opposite side of this page. Many of the reasons are simply explained in the new illustrated booklet, "Why Cooper Hewitt light is Better than Daylight." Free for the asking. Address: General Electric Vapor Lamp Co., 893 Adams St., Hoboken, N. J.



JOIN US in the General Electric Hour broadcast every Saturday evening on a nation-wide N. B. C. network

GENERAL ELECTRIC
VAPOR LAMP COMPANY

(Formerly Cooper Hewitt Electric Company)

(See preceding page)

DAYTON POWER AND LIGHT

RE-ROOFED while the PLANT was RUNNING

17-Point
Holorib Roof Deck

1 A copper-bearing steel roof deck, combined with sufficient insulation to prevent condensation.

2 A long-lived roof, requiring a minimum of maintenance.

3 Its light weight reduces the requirements of the structural steel—(one square foot of Holorib weighs approximately 5 lbs., including insulation and waterproofing).

4 Carries required loads over wide purlin spacing with ample factors of safety.

5 Makes a firm, smooth and inherently dry mopping surface for the application of insulation and roofing felts. The affinity of its component parts gives it a much longer life than other roofs.

6 Quickly laid. Speeds the completion of the building.

7 May be laid in any weather men can work — nothing to pour — nothing to freeze — nothing to dry out.

8 Applicable to flat, pitched, saw-tooth, monitor, bowstring or curved surfaces.

9 Unaffected by atmospheric changes. Expansion and contraction are negligible.

10 Saves winter fuel. Provides cooler interiors in warm weather.

11 Saves insurance. Takes a fireproof rating when used over incombustible contents.

12 Telescoping end laps made over the purlins form tight interlocking joints.

13 Triangular reinforcing ribs running longitudinally in the sheet form a continuous beam that rests directly on the purlins.

14 May be welded in place forming a rigid yet self-adjusting foundation for insulation and waterproofing.

15 Lower in cost than any other types of fire-resistive roof of the same insulating efficiency.

16 Provides attractive ceilings. It is not a dust collector.

17 May be used as a highly satisfactory floor with or without concrete.

The Dayton Power & Light Company of Dayton, Ohio, was forced to re-roof its Fourth Street plant, and keep more than a million dollars' worth of electrical machinery dry and in operation.

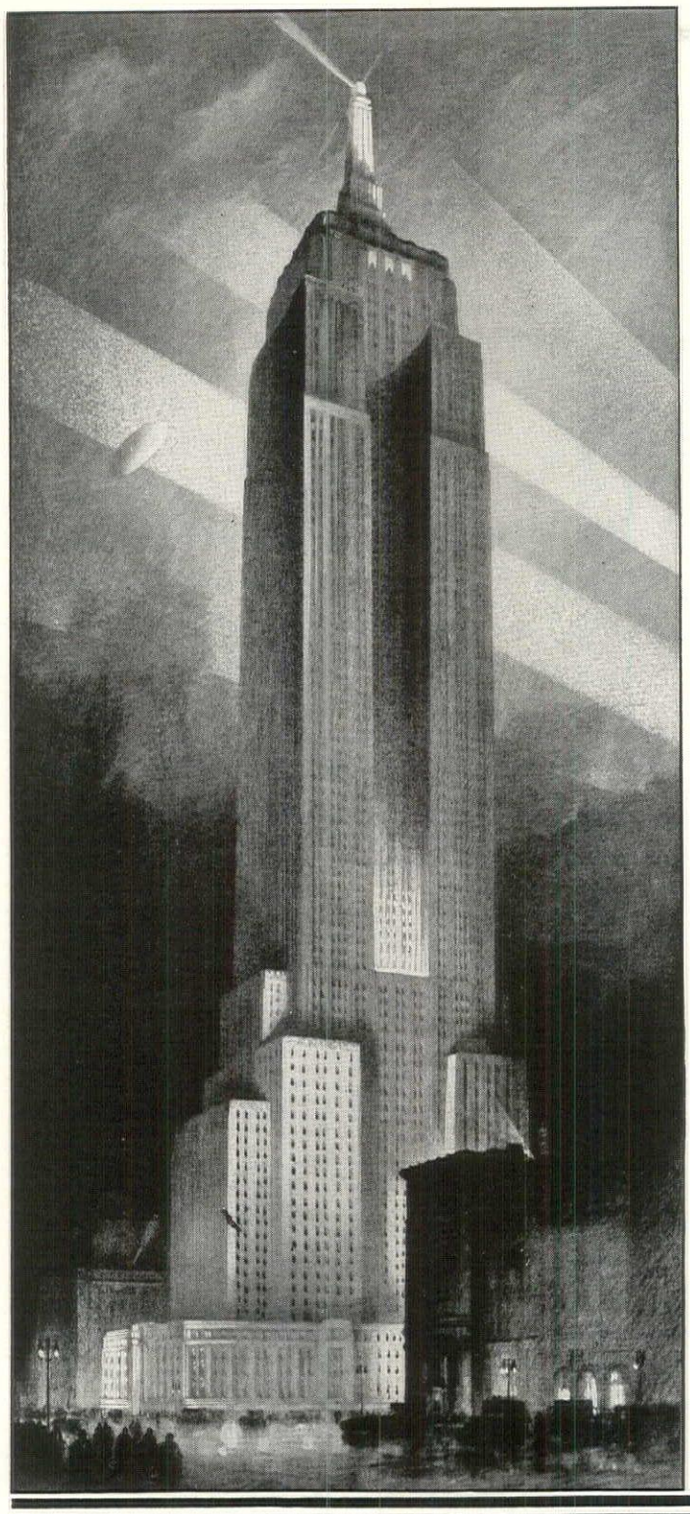
As the old roof was removed, Fenestra Holorib deck was immediately laid with insulation and roofing felts asphalted on top. Each night the growing Holorib roof was joined to the diminishing old roof and waterproofed.

Fenestra Holorib is now a part of the Detroit Steel Products Company; sold through country-wide Fenestra Holorib representatives and backed by the oldest and largest steel window manufacturer in America. Immediate shipments are available. Engineering and designing service for the asking without obligation. Telephone the nearest Holorib or Fenestra representative or write for literature to:

Fenestra Holorib Division

DETROIT STEEL PRODUCTS COMPANY
2250 East Grand Boulevard
Detroit, Michigan

Fenestra
HOLORIB
ROOF DECKS FLOOR FORMS



—and NOW Empire State

EMPIRE STATE — Chrysler — Bank of Manhattan — Equitable Trust — No. 1 Wall St.—Daily News—New York Life—the largest and tallest of our modern office buildings use Orangeburg Underfloor Wiring Systems.

Forming a hidden network of wireways beneath the floor—the fibre duct can be easily tapped to make outlets *exactly* as desired. Permanent—economical—convenient.

For 9 years, Orangeburg Systems have been serving office buildings as the most effective method of wire distribution.

THE FIBRE CONDUIT CO.
Makers of Orangeburg Fibre Conduit since 1893
292 MADISON AVE., NEW YORK, N. Y.

ORANGEBURG
UNDERFLOOR
FIBRE DUCT SYSTEM

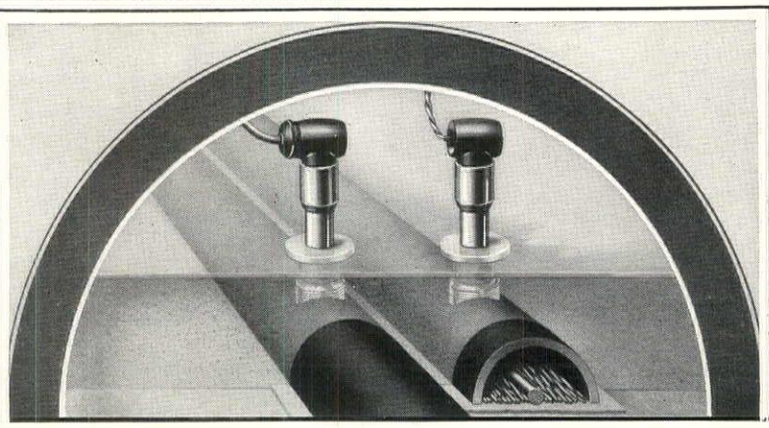
EMPIRE STATE BUILDING

Shreve, Lamb & Harmon
Architect

Meyer, Strong & Jones
Engineer

Starrett Bros., Inc.
Builder

L. K. Comstock & Co.
Electrical Contractor

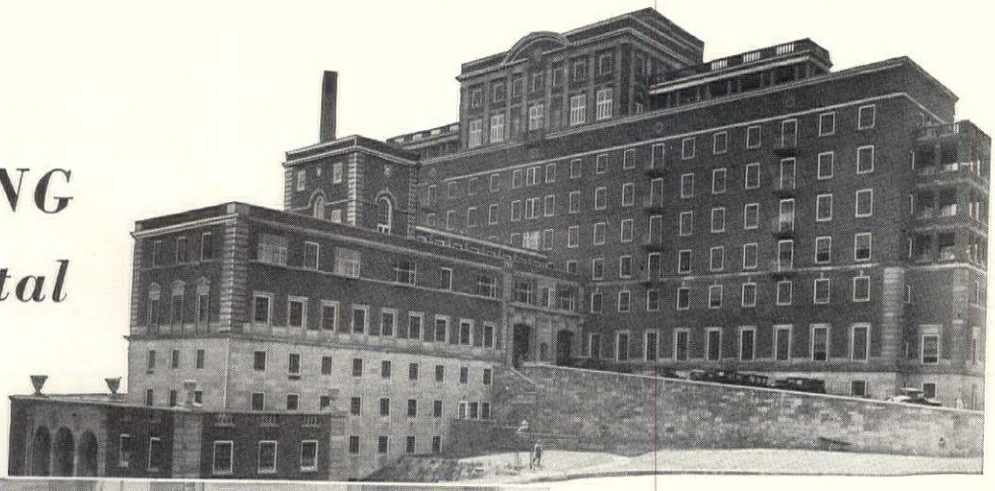


A few other leading office buildings using Orangeburg Systems

Western Union Bldg., N. Y.
N. Y. Telephone Co., N. Y.
Rand Building, Buffalo, N.Y.
Aetna Life Insurance Co. Hartford, Conn.
Fidelity-Philadelphia Bldg. Phila., Pa.
Sun Life Ins. Co., Montreal
Canadian Bank of Commerce Toronto
Dept. of Commerce Bldg., Washington
Koppers Bldg., Pittsburgh
And many others.

4110

GLEAMING Monel Metal



The Montefiore Hospital, Pittsburgh, Pa., has Monel Metal food service equipment, installed by THE BERNARD J. GLOEKLER COMPANY, *Pittsburgh, Pa. Architect:* SCHMIDT, GARDEN & ERICKSON, *Chicago, Ill.*

View of Nurses' Cafeteria, Montefiore Hospital. The table top, work bench, sinks, cafeteria counter trim, railings, refrigerator trim, linings, are all Monel Metal, installed by The Bernard J. Gloekler Company, Pittsburgh. In the left hand corner may be seen a Monel Metal urn manufactured by THE LYONS SANITARY URN COMPANY, *New York.*

. . . the mark of the modern hospital kitchen

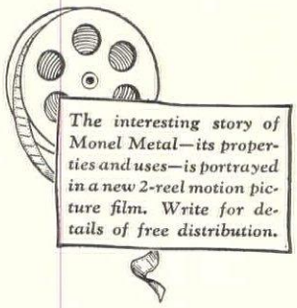
MODERN hospitals may differ widely in the design and construction of appointments and appurtenances, but there is one respect in which most progressive institutions are alike. These leaders almost invariably use food service equipment of Monel Metal.

The reason for this is simple: Monel Metal is the *only* material that combines all the properties and advantages essential to the most efficient and economical operation of hospital kitchens. It alone affords complete immunity to rust and resistance to corrosion, together with steel-like strength and lasting attractiveness.

Monel Metal is widely specified because it facilitates scrupulous cleanliness with little cleaning. Its sanitary, silvery surface requires no attention beyond ordinary care. It has no coating to chip, crack or wear off.

These pronounced advantages not only find high favor with hospital dieticians and chefs—they are appreciated by hospital executives and others who also recognize the broader usefulness of Monel Metal in other branches of hospital service, such as clinical and laundry equipment.

To complete your file of Monel Metal hospital data, send for "Modern Kitchens," a 72-page illustrated book on the specification and construction of food service equipment.



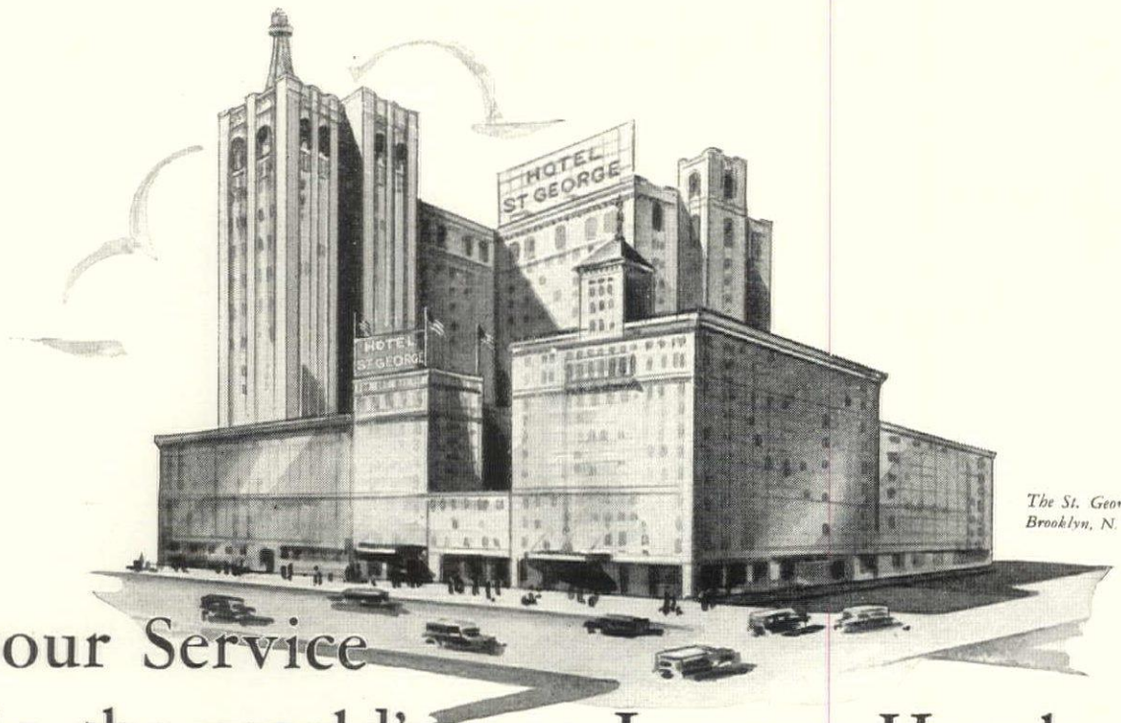
The interesting story of Monel Metal—its properties and uses—is portrayed in a new 2-reel motion picture film. Write for details of free distribution.

MONEL METAL

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

INCO MONEL METAL TRADE MARK

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



The St. George, Brooklyn, N. Y.

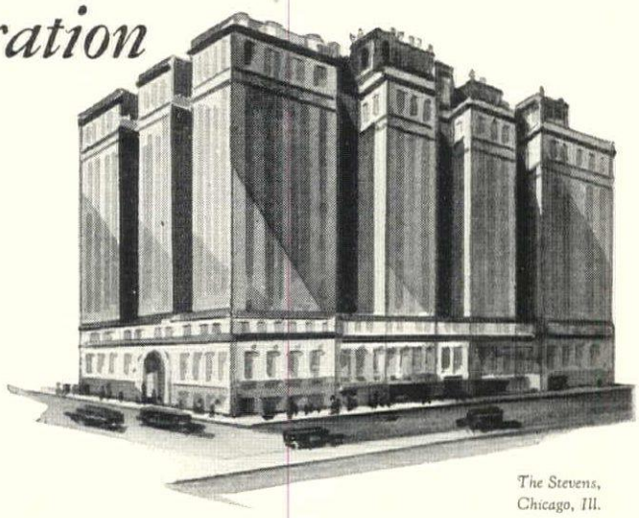
At your Service in the world's two Largest Hotels ....*Carbondale Refrigeration*

Conditioning air; freezing ice; cooling drinking water, refrigerators and cold storage rooms; freezing ice cream — such is the service rendered by Carbondale at the Stevens, the world's largest hotel. And now at the St. George, the largest hotel in greater New York, second only to the Stevens, Carbondale Refrigeration is providing comfort for the thousands of guests.

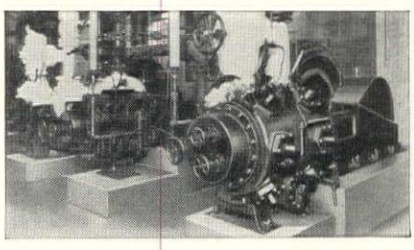
No greater testimonial could be extended to Carbondale than the selection of its refrigerating equipment for these leaders in the hotel field. Architects, engineers and owners have confidence in Carbondale equipment—confidence that is based on performance over a period of more than 35 years, in every business and industry that uses refrigeration.

The assistance of our engineering department is freely offered in helping to apply the most efficient refrigerating system for any cooling, freezing, or air conditioning need.

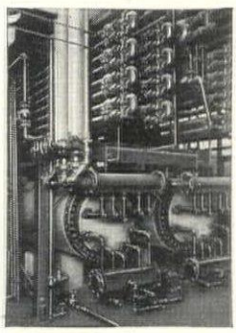
THE CARBONDALE MACHINE COMPANY
Carbondale, Pa. *Branches in principal cities*



The Stevens, Chicago, Ill.



Worthington "Feather Valve" (Reg. U. S. Pat. Off.) compressor used exclusively in the Carbondale Compression Refrigerating System

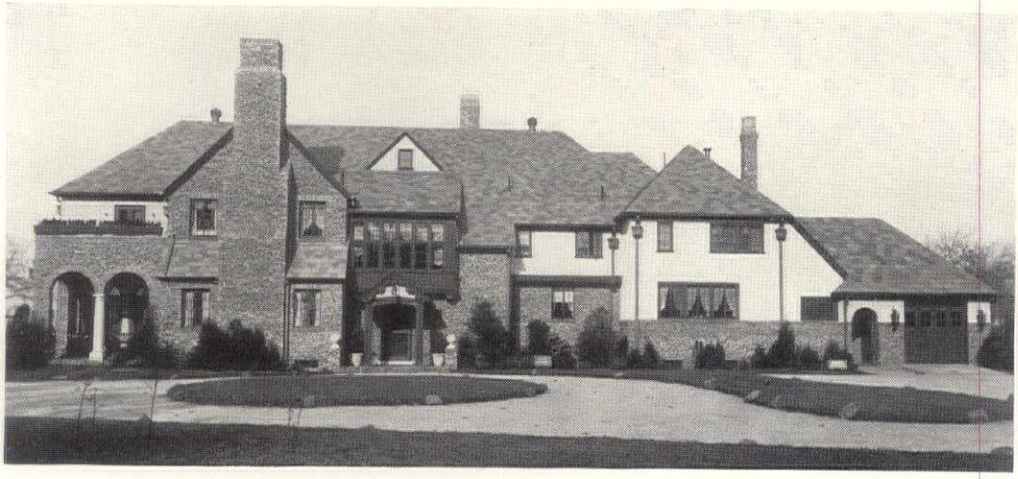


A typical absorbtion refrigerating installation showing generators with rectifiers and exchangers mounted above.

Carbondale Refrigeration
CARMACO
ABSORPTION AND AMMONIA COMPRESSION MACHINES

CARBONDALE AMMONIA COMPRESSION REFRIGERATING SYSTEMS USE WORTHINGTON "FEATHER VALVE" COMPRESSORS

A Convenience feature of the modern Residence



On the estate of Mr. Monroe Eisner, Red Bank, N. J., are fourteen telephone outlets: eleven in the residence, and one each in the superintendent's cottage, the stables and a detached garage. Built-in conduit connects these outlets and carries the wiring for the telephone system which includes intercommunicating features. The dining-room and breakfast-room outlets are served with a portable telephone.

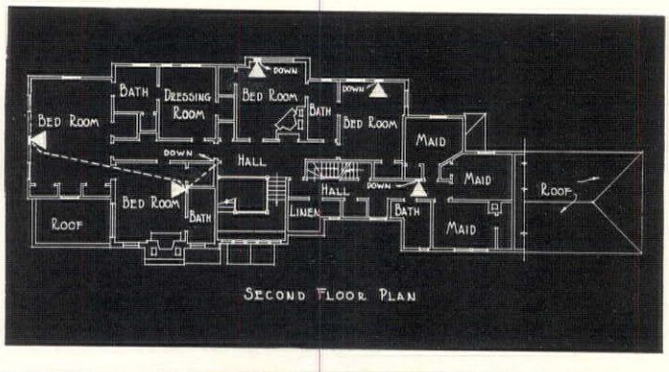
FRED M. TRUEX, Architect, *New York City.*

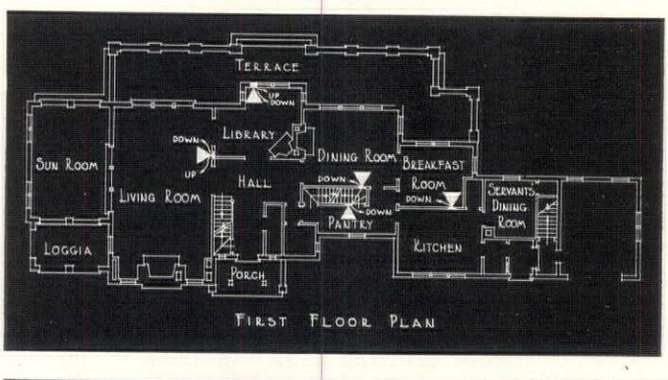
Telephone outlets *throughout* the house

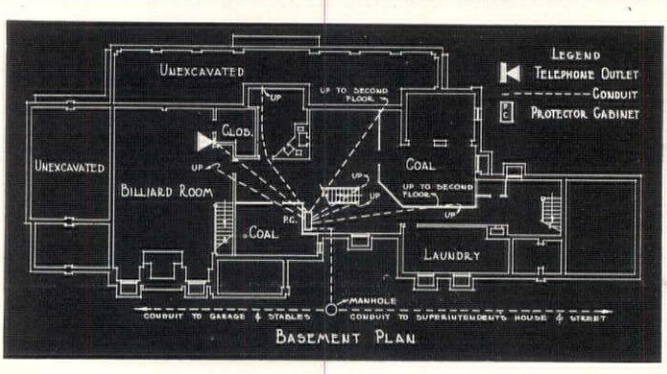
THE TELEPHONE REQUIREMENTS of the modern household are radically different from those of a few years ago. Telephones are needed in many locations . . . living-room, library, dining-room, kitchen or pantry, breakfast nook, garage, game room, bedrooms, servants' quarters . . . wherever, in fact, they will save steps and time, and add to comfort and convenience.

Many architects are meeting this demand for complete telephone convenience by specifying conduit for the telephone wiring in their plans for new and remodeled residences. In this way they provide for telephone outlets in all of the important rooms. The home owner can use just those he desires, and he can readily expand or rearrange the service to meet changing needs. In addition, he can enjoy the improved appearance that results from concealed wiring.

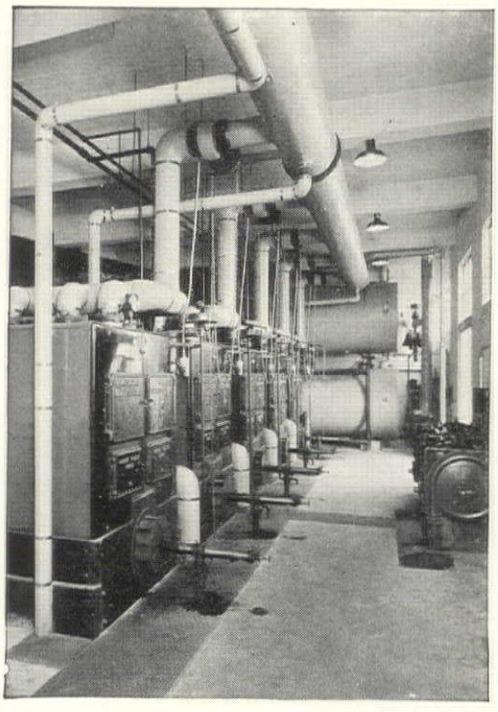
Your local Bell Company will gladly confer with you and your clients in planning the telephone arrangements for all your building projects. There is no charge. Just call the Business Office.







• In California's newest school



MODERN WARMTH protects the pupils

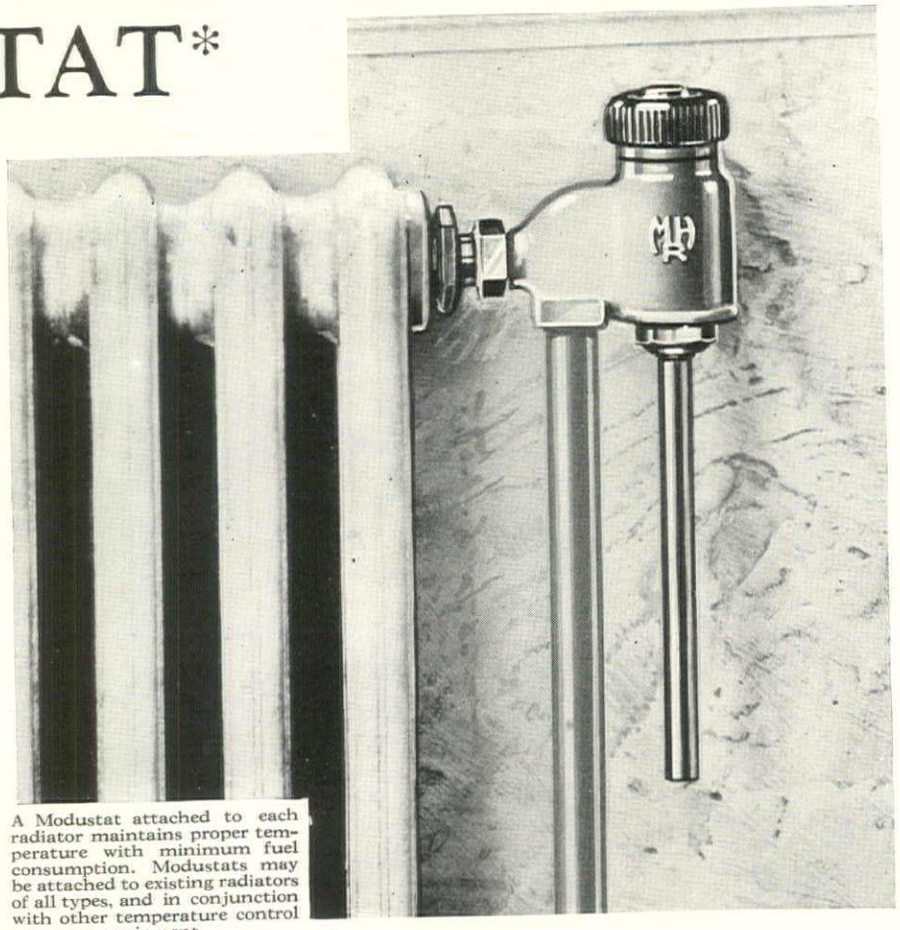
The new East Oakland High School is a fine example of the thorough planning and construction that goes into most public buildings today.

Naturally when it came to heating equipment only the most efficient plant could be considered. That is why a battery of five Ideal Redflash Boilers was installed—one of the largest low pressure heating installations on the Pacific Coast.

AMERICAN RADIATOR COMPANY

40 WEST 40th STREET, NEW YORK, N. Y.

Every Radiator "Thinks" for Itself with the *new* MODUSTAT*



A Modustat attached to each radiator maintains proper temperature with minimum fuel consumption. Modustats may be attached to existing radiators of all types, and in conjunction with other temperature control equipment.

Automatically maintains a temperature to suit the occupants of each individual room . . . . .

Now the Modustat, a new type self-contained *modulating* radiator valve, is available to bring new satisfaction to radiator heating systems. The Modustat lets each radiator act independently of all others—the valve automatically modulates so as to maintain any desired temperature.

Neat, simple, sturdy construction on a *new principle* insures accuracy and dependability. The Modustat is a worthy new member of the Minneapolis-Honeywell Regulator family, for 45 years in the forefront of heat control development.

In office buildings, hotels, hospitals, and the better class of homes and apartments, Modustats repay their cost in fuel saving. More comfortable and healthful conditions result from a smaller range of temperature variations. Minneapolis-Honeywell Regulator Company, 2722 Fourth Avenue South, Minneapolis, Minn.

Automatic Temperature *and* Pressure Regulation

Minneapolis-Honeywell temperature and pressure controls and motor valves are available for every type of room or space heating installation. Send for our catalog.

MINNEAPOLIS
HEAT REGULATOR
HONEYWELL

*RELIABLE *individual radiator control—an important new heating development.*

THE ARCHITECTURAL FORUM

VOL LII, No. VI — JUNE, 1930

CONTENTS

OFFICE BUILDING REFERENCE NUMBER

PART ONE—ARCHITECTURAL DESIGN

PART TWO—ARCHITECTURAL ENGINEERING AND BUSINESS

THE ARCHITECTURAL FORUM is published monthly by Building Division, National Trade Journals, Inc., 521 Fifth Avenue, New York. H. J. Redfield, Chairman of the Board and Treasurer; Howard Myers, President and General Manager; John Thomas Wilson, Vice-President; James A. Rice, Vice-President; C. Stanley Taylor, Vice-President; Henry J. Brown, Jr., Secretary.

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Photo. Van Anda

THE NEWS BUILDING AND THE CHRYSLER BUILDING, NEW YORK, NEARING COMPLETION

THE
ARCHITECTURAL
FORUM

VOLUME LII NUMBER SIX

JUNE 1930

THE SKYSCRAPER OFFICE BUILDING

BY
PAUL ROBERTSON
PRESIDENT, THE NATIONAL ASSOCIATION OF BUILDING OWNERS AND MANAGERS

THE skyscraper is distinctly American. Its design and development have been largely the work of American architects. The successful operating of huge buildings is an American enterprise. The success of the skyscraper is due to the fact that it fits admirably into the scheme of American life and business. When properly designed, it is the most efficient type of business building that can be provided and it contributes greatly to the efficiency of business generally. This is accomplished by providing quarters which are conducive to better work and also in providing a great number of neighbors in the same and adjoining buildings with whom business may be speedily transacted.

America's history has been one of great industrial and commercial growth and expansion. The growth of the business of the nation could have been traced throughout the years, even though all other factors were unknown, by the evolution of the business districts of American cities. The advent of machine methods of manufacturing brought about the business man who needed office space from which he could direct the distribution of the increased volume of production. As manufacturing developed and commerce increased, the need for office space grew. Instead of spreading out all over the cities, he recognized the value of centralizing business activities, and this was made possible by making buildings higher. In this day of really big business, it is only natural that we find the mammoth buildings of the present.

The development of the tall office building has been seriously handicapped by the low height limitations imposed by the same type of mind that looked with holy horror upon the advent of the railroad with its paralyzing speed of 15 or 20 miles an hour. In Chicago, for example, the height of buildings has been jockeyed up and down no less than six times, causing an uneven development throughout the business district. The owner who built during the low-limit years found himself facing severe competition from the owner who was able to make a greater use of his site when the limit was raised.

The skyscraper is the result of the operation of economic laws rather than due to the fancy of architects or the whim of property owners to see buildings soar to higher levels. Its development has not been contrary to public policy but rather has been a great contribution to the upbuilding of the commercial structure of the nation. Were there no zoning laws compelling set-backs, even better plans providing for adequate light and air would be carried out. The set-backs would probably be there just the same, but extended to lower floors. Many of the zoning laws defeat their very purpose by forcing the construction of deep, dark and poorly ventilated space in the main base of the building. Methods of construction giving adequate light and air provide office space of a type that is suitable for and acceptable to business men. The building owner is as vitally concerned with light and air as any zoning protagonist. He utilizes the facilities at his disposal in providing adequate illumination, both natural and artificial, for his building. He knows the part that good ventilation, which means good air, plays in the success of his building as a commercial enterprise.

The old hue and cry that the skyscraper is responsible for traffic congestion has been growing weaker and weaker as traffic authorities have thrown light upon the question. One need only cite the congestion of London streets, where there are no skyscrapers, but with a business district spread "all over the map" to show the fallacy of the argument that the skyscraper causes congestion. Boston, a low building level city, has as great a traffic problem as New York or Chicago, where the tallest structures are three and four times the height of Boston buildings.

Meanwhile, economic laws continue to operate and they have brought about the day of the taller building and the larger building. The trend toward buildings of greater height and cubage has been impressed upon office building owners and managers through both the rental surveys and the Building Planning Service of the National Association of Building Owners and Managers. In 1924, the rental survey showed that the average office building had 61,473 square feet of rental area. The survey of January 1, 1930, disclosed the fact that the average office building in the United States had 83,708 square feet of rental area, representing a 33 per cent increase in a period of six years. The surveys, of course, include the old as well as the new office buildings. As time goes on the average size will increase still further, it is indicated, by the listing in the January 1, 1930, survey of new buildings under construction in more than 40 of the major cities of the United States. These new buildings have an average rental area of 217,151 square feet.

The trend toward larger buildings is also demonstrated in the experience of the Building Planning Service of the National Association of Building Owners and Managers. This service, established seven years ago to provide architects and owners of building projects with the viewpoint of experienced building managers, as the final test of the economic worth of building projects, has analyzed building plans from an operative standpoint for owners and architects in 41 cities of the United States and four Canadian cities. The average of the buildings was 211,076 square feet of rental area. This figure is remarkably close to the average size of the new buildings under construction as reported by the January 1, 1930, rental survey.

The improvement of illumination and ventilation has contributed to the utilization of office building space. Fifteen years ago, it was deemed necessary that 110 square feet of floor area be provided for each person in the office. Ten years later, it was conceded that 100 square feet were adequate, and a survey made at that time in the financial district of New York proved this to be common practice. Some of the more recently constructed buildings have been designed on a basis of allotting to each occupant 90 square feet.

What has made the skyscraper possible? That it is a component part of the business structure of the nation is attested to by the thousands of tall buildings to be found in the business centers of America's leading cities. The value of the lands and buildings represents an aggregate investment of more than seven billion dollars, making the office building business one of America's greatest industries. It is greater than the automobile industry, as great as the steel industry, and half as great as the railroad industry in amount of capital invested. The significance of these facts is often lost to view because of the individual characteristics of each office building and its management. There is collective thought and action, however, in the office building business, since the management of the principal buildings of the United States is united in the common cause of developing the highest standards of service, maximum utility and profitable operation of the buildings.

The industry does more than furnish the abode of the business of the nation. It is a contributing factor to the greatness of the nation. The intensive utilization of land made possible by the skyscraper has increased its valuation to figures which would have been unbelievable before the advent of the tall building. These high valuations have produced a high revenue to the government in taxes. Often the office building owners have been victimized in the matter of taxation and have been forced in some cities to assume more than their fair share of this burden. This has been due to political reasons to a great extent, since business districts have but few voters, so a shift of taxes from outlying districts to the central business districts has become a favorite and frequent piece of political manœuvering. In this way, the skyscraper has done more than its reasonable share in contributing to the coffers of the tax-spending bodies. An idea of the tax burden of the office building industry may be gained from the most recent Experience Exchange Report of the National Association of Building Owners and Managers, which shows that, out of every dollar collected in the form of rentals, 16 cents is paid out in taxes, the largest single item in the expense of operating an office building.

The story of the skyscraper is that of continuing progress. Already the first of the skyscrapers are disappearing, and their places are being taken by structures that are elevating the skylines of American cities. The inexorable laws of economics which brought the skyscraper into being 40 years ago are operating to replace these original buildings with structures of greater heights and greater cubage. Nothing should be done in the way of legislating against the fundamental factors which made the skyscraper possible. Such legislation is more than a blow to the office building itself; it is a blow struck against the economic system which has brought America to the fore among the nations of the world. America's symbol is the skyscraper. It represents the progressive spirit of the nation, the vigor to get things done and the tenacity of purpose to keep everlastingly on the upward path. The skyscraper bespeaks the power and glory of the American people and nation.

FACTORS IN OFFICE BUILDING PLANNING

BY

JAMES B. NEWMAN

OF THE FIRM OF ELY JACQUES KAHN

DURING the building boom of the past few years there have been erected an unparalleled number of large structures. The interested observer has noted in the progress of this work an equally rapid development of the plan, the general character, and quality of the buildings.

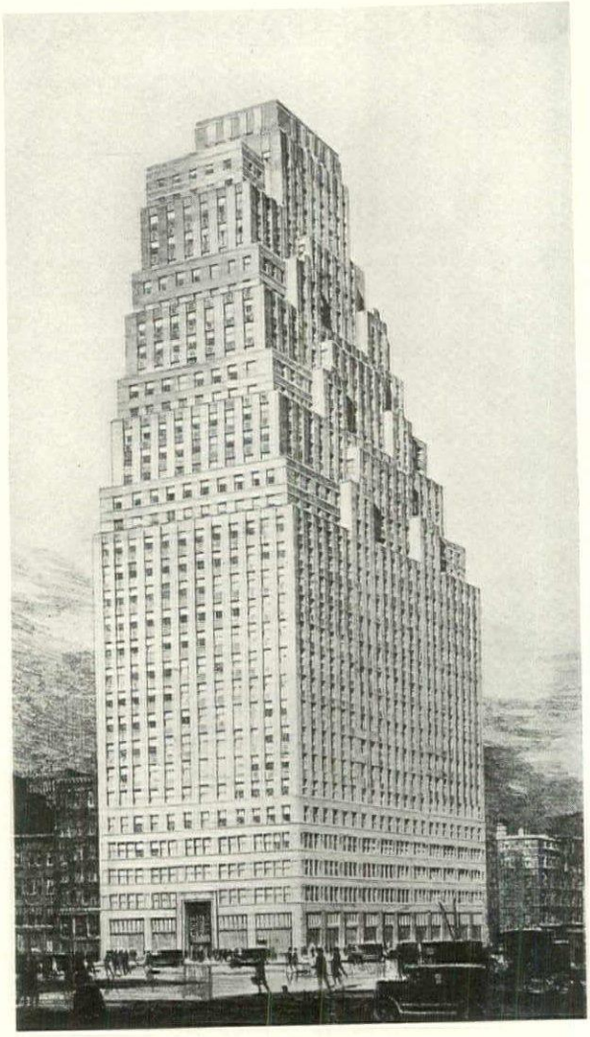
PLANS AND INVESTMENT. Just as the business enterprise of the past, with limited capital funds, has passed from the hands of the individual entrepreneur to great business organizations with complex financial structures, made possible through financial organization, so has the building of the present passed from the hands of individuals to syndicates backed up not only by their own funds, but by the much larger resources of the general community drawn upon through all of the known banking channels. The natural effort to secure the greatest possible return upon invested capital has led to the keenest of competition in the development of the plan, as the financial return is directly correlated with the efficiency of the plan. Because the financier is also immediately concerned with the safety of the capital funds which are tied up for a period of many years, he insists on the utmost flexibility of plan, so that in case of necessity the building may be rapidly and economically converted from one type and occupancy to another. This, in common parlance, means safety of investment through diversification.

PLANS AND PURPOSES. The plan of a large commercial structure obviously depends upon the purpose for which it is constructed, and the design of the building logically develops from the plan and its purpose. In this article attention will be centered upon several New York structures, as they embody not only the typical features common to the buildings of all large cities, but include additional features due to zoning laws, and they occur in such large numbers that all types of plans are available.

SITE AND BUILDING TYPE. For any given plot under consideration, casual attention is first given by the architect, as a rule, followed up by intensive group study, to determine the type of building most appropriate for the economic development of the site. In the actual solution of the problem, as a whole, this is a factor of the first magnitude, and calls for the exercise of the keenest judgment of realtors, who know the market demands; of the architect and his corps of trained assistants, who know the advantages and disadvantages of various plans; of the builder with his first-hand knowledge of the cost factors involved; and of the owner with his bankers, who determine the ultimate limits of expenditure. As a result of this combined study, decision is finally rendered as to whether the structure involved is to be an office building, with light and convenience of paramount importance, or a loft building with somewhat less convenience and with relatively large areas and deep spaces suitable for show rooms, light or heavy manufacturing, storage, etc. Decision is also reached as to whether the plans are to be developed primarily for one, two or several occupants per floor. If some large concern, occupying several floors, is to be accommodated, this will materially affect and probably definitely determine the major elements of the plan and the entire building. If the building happens to be one for a single occupant, this part of the problem is largely determined, and the structure is erected to meet the needs of this occupant, with only such consideration given to general planning as will insure proper placing of services so that the occupant can dispose of the property if the necessity for so doing should arise.

TIME FACTOR. Views so divergent are sometimes presented at these meetings that a final decision cannot be immediately reached. The plan develops as a compromise, and is altered from time to time, on paper, as circumstances require. Three sets of plans were well developed for the Squibb Building at Fifth Avenue and 58th Street before all groups were fully satisfied, and it can be said without much exaggeration that *time* is sometimes a powerful factor in forcing a decision. If a decision cannot be reached at all, frequently the building is so erected that it may be considered a "border line" structure between two classes, and with provision made to convert it to one class or the other.

THE LOT. To leave the building committee, whose influence is active throughout the entire project, and to return to the building plan, a most potent factor in its development is the character of the lot itself, and according to its size, type and general zoning restrictions, plans of varying characteristics may be developed. For this analysis, the site discussed may be classified as an interior lot, fronting on a single street, of



120 Wall Street Building, New York
The Firm of Ely Jacques Kahn, Architects

narrow, average, or of very substantial width; an interior lot running from street to street; a corner site; a block front site fronting on three streets; or a complete block with light on all sides. For each of these plots, a certain general type of plan usually develops more efficiently and satisfactorily than others.

ZONING DIAGRAMS. The first essential step is the preparation of the zoning diagrams, which consist of a section with the enveloping limiting lines, with the set-backs, and a composite plan with all the set-back stories superimposed in true geometrical relationship on the full plan of the lot. Such zoning diagrams are shown in this article for the 120 Wall Street Building. Figures 17 and 18. The story heights used in the preliminary diagram are generally taken, as they have proved satisfactory in other similar work. The typical floor-to-floor height in loft buildings is 11 feet, 6 inches. In narrow lots this is occasionally shaded to 11 feet, 3 inches or even to 11 feet. With large open floors, where the visual impression of 11 feet, 6 inches would be unsatisfactory, the height is sometimes increased possibly to 12 feet. In office buildings with lighter framing, and frequently no sprinklers, heights are often taken about 3 inches less than in loft floors of corresponding area. The first story, if mezzanines are to be provided, runs from 19 to 20 feet on the average, while second stories, having excellent display windows, frequently run from 12 to 13 feet. The order sometimes is reversed and the second becomes the high story, suitable for a bank, trust company or other such tenant, while with many clients walking up, the first story height becomes about 14 feet. If it cannot be

Zoning Diagrams
120 Wall Street Building

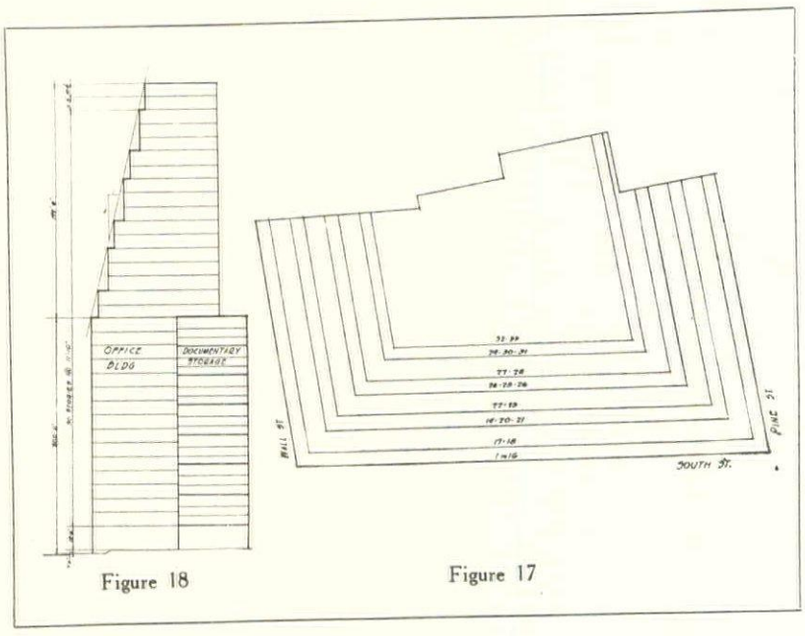


Figure 18

Figure 17

Section with enveloping, limiting lines, with the setbacks, and composite plan with the setback stories superimposed in true relationship to the plan of the lot.

determined what tenant may desire the space, the first and second stories are sometimes taken nominally at about 14 and 12 feet, and columns are figured heavy enough so that if a tenant comes later who wants a high story, the intermediate framing in his area can be removed, and two stories be thrown into one. This was done in the case of the quarters of the Sterling National Bank in the Chanin Building, and much the same arrangement was followed in the new Bricken Building at Broadway and 39th Street (Plate 150, page 813, Part One).

SETBACKS. Two stories are generally taken at each set-back in the case of smaller lots, while set-backs of about half a bay are indicated in larger buildings of considerable height. This affords a reasonable maximum floor area in the preliminary set-up, and indicates roughly about what area and cubage can be sacrified, if it is decided to voluntarily give up space in taking set-backs at column lines, or as may be otherwise necessary to get a well proportioned mass.

AREA CALCULATIONS. The tentative gross area of the building is calculated from the zoning diagram, usually without courts, as at this stage it is not always certain where courts will occur, if at all. Dormer allowances are also neglected in the preliminary set-up, as their use depends upon ultimate development of the plan and elevations. The net area is usually assumed as a certain percentage of the gross, roughly from 75 to 80 per cent, depending upon the extent to which the plan is broken up. In making the computations of areas it is necessary to assume some limit to the building height. In preliminary computations this is largely a matter of zoning diagram observation. When gross areas work down to within 4,000 to 5,000 feet, the danger line is approaching. If the allowable tower area, 25 per cent of the lot, is somewhere in this vicinity, an arbitrary tentative limit can be set, and this limit can then be later varied if calculations indicate that it is desirable.

ELEVATOR FACTOR. With tentative net areas and heights from the zoning diagram, the number and placing of the elevators are determined. If the sketch under consideration is for an office building, the total number of cars is roughly determined by a rule of thumb method by dividing the net rentable area from the second floor to the top by 25,000. This rule, determined by earlier types of buildings and equipment, is nevertheless fair enough for the preliminary studies. If there are enough elevators, they are so broken up into banks that each carries its equitable share of the floor area, while serving a reasonable number of floors, and the intermediate machine rooms are placed as much as possible where the disposition of areas under the zoning law is favorable. When the plan reaches a point where more refined calculations are necessary, the population of the building is determined on an assumed density, and enough elevators are provided to take care of the peak loads at morning, noon, and night, at reasonable intervals of time. Time intervals range from 15 seconds, which is excellent, to a minute for some towers, which is poor. Intervals of 30 seconds are good.

The Squibb Building, New York
Firm of Ely Jacques Kahn, Architects

HOW ELEVATORS WERE FIGURED. The occupancy of the 120 Wall Street Building was figured at the rate of one person to each 90 square feet, and at the morning peak, one-eighth of the entire number of occupants can be carried in five minutes. The high rise group of five cars serving 12 floors has an interval of 29 seconds. The six local elevators in the same building have

an interval of 18 seconds, the difference being due partly to the extra car, and partly to the shorter run. This shows why elevator requirements increase so rapidly as the building height increases, and why tower occupants must necessarily be satisfied with somewhat longer intervals. The new Adler Building (Plate 141, page 795 Part One), under construction at Broadway and 41st Street, will be 40 stories, and the net area of each tower floor will be only 2,500 square feet. Four elevators are being used for the tower portion to reduce the interval to 35 seconds, although on occupancy three cars are more than sufficient.

LOFT ELEVATORS. In loft buildings, the most satisfactory way of determining the number and type of elevators required is by comparing the structure with others of similar characteristics, the uppermost total approaching the number required for an office building of the same size, but with a substantial proportion of the cars being used for freight. In such buildings good quality combination elevators are commonly used to carry both factory employes and freight. With factory employes usually constituting a substantial proportion of the total occupancy, passenger occupancy requirements are much reduced and the time interval is usually long. This has been the theory in the past, but it is easily noted now in an ever-increasing competition for tenants, that much higher grade installations are being made in loft buildings. If there is any doubt as to the number of elevators which should be provided, the framing may provide for extra shafts or blank shafts may be constructed.

SERVICE ELEMENTS, STAIRS. Other service elements in the plan are readily determined, although there is question as to their disposition. As a general rule, in office and loft buildings there is at least one stairway and one fire tower stairway, the total number depending upon the occupancy. The minimum required width between strings is 3 feet, 8 inches, and with landings the space occupied by a stairway in the typical story is approximately 8 x 18. According to code regulations, such a stairway will provide for an occupancy of approximately 50 people per floor, if unsprinklered, or 100 people per floor if the building is sprinklered; or, roughly, the two required stairways will take care of office floors having up to 12,500 square feet and loft floors up to 25,000 square feet. If further facilities are required, additional stair lines can be installed or 3-foot, 8-inch stairs can be increased in width by increments of 1 foot, 10 inches, whichever appears more desirable in the plan. In non-sprinklered floors no point in the floor area should be over 100 feet from a stairway, while in a sprinklered building this distance may be stretched to 150 feet. If public corridors are provided, giving easy egress from remote sections, this distance can be increased at the discretion of the authorities. The stairways should also be remote from one another or at least so arranged as to easily tap different sections of floor area. As floors diminish in area, some of the extra stairways can be eliminated. In the new Adler Building, as the net area of each tower floor is only 2,500 square feet, the fire tower stairway only is required in this portion of the building. Floor landings in loft buildings should be roomy, because service lines such as sprinkler risers, standpipes, and frequently meters, are placed here.

TOILET FACILITIES. The number of toilet fixtures may also be computed and installed as provided by law for the given occupancy, but often they are installed in smaller numbers on the theory that toilet rooms can be easily enlarged if required. In office buildings there is often only one set of general toilet rooms per floor. In good grade buildings, it is becoming common, almost, to see not only high grade fixtures, but also chromium fittings, wainscots and stalls of carrera glass, fine floor tiles, etc. Basin risers, always provided in office buildings, are seldom provided in loft buildings. Provision is often made in loft buildings for as many sets of toilets as it is assumed there may be tenants, because executives generally do not care to have their employes mix with those of others. Provision is usually made for private toilet rooms and occasionally for still other groups for office employes. With so many uncertain factors to consider, many builders provide for a general arrangement that seems reasonable to them, but do not install nor show the arrangement on the renting plans. The tenant is shown where the stacks and vent shafts are, and is told that within reason toilet facilities will be installed as required.

OTHER SERVICES. The remaining plan elements are the shafts for various mechanical uses, the flue, the porters' closets, etc. These are all important and if properly installed contribute considerably to the economical maintenance of the building. Smoke flues frequently are installed, even if the building is heated from public utilities, to provide for ultimate contingencies. In reducing floors under the zoning law it is sometimes desirable to shift flues and shafts, and within moderation this can be done. If possible they should be so arranged as to avoid this.

SPECIFIC EXAMPLES OF ANALYSIS

With a general knowledge of all the utility components of the plan, specific examples will be next considered, using the lot analyses noted.

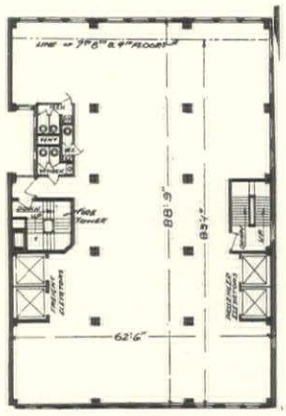


Figure 1
15-19 West 39th Street

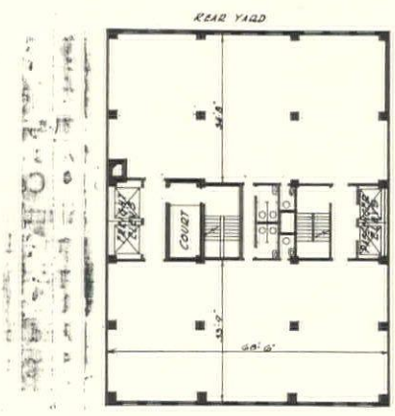


Figure 2
247 West 35th Street

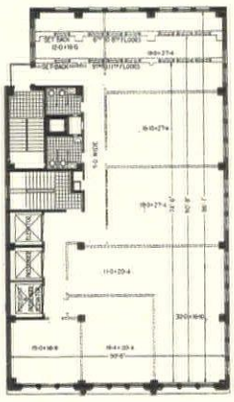


Figure 3
24 West 40th Street

LOT ANALYSIS. Interior lots, with single street fronts, are very commonly used for loft buildings. In the conventional treatment, the passenger elevators and general stairs are placed on one side, with the freight elevators, fire tower stairs, and toilet rooms on the other, as illustrated at 15-19 West 39th Street (Fig. 1). The elevators and stairs are placed near the center of the lot, favoring the front, if possible under zoning, to cut the length of travel from the entrance doors in the first story, and the travel to the show room in the loft. This arrangement leaves the light area free of encumbrances, provides for simple set-backs, makes a very satisfactory open floor for a single tenant, and provides for a front and back loft without crossing of freight and passengers. In this plan, the toilet rooms are not only provided with mechanical ventilation, but also vent onto the fire tower court. This court at the extreme side has walls on only three sides, and is economical to construct, besides disappearing in upper floors.

AN INTERIOR LOT DEVELOPMENT. An interesting development of this plan is that of 247 West 35th Street, in which all of the utilities have been placed in the dark band through the center of the lot, providing for two small lofts of approximately equal size. The stairs were shifted out of the way in the first story on a mezzanine, and with the fire tower court and toilets starting at the second floor, the first floor store runs clear through, with the freight and passenger entrances at opposite sides as before. Tenants in many cases eliminated the through corridor at the toilet rooms, also the private toilet, and used instead two sets of toilets on each side.

A NARROW LOT PLAN. Sometimes the interior lots to be developed are so narrow that all facilities are concentrated on one side, of which an example is the *Scientific American* Building (Fig. 3), at 24 West 40th Street. This plan is especially desirable if the light happens to be good on one side. In a plan such as this, the service elevator may be placed nearest the street, as a corner post car, and be provided with a service corridor to the street in the first story; or a sidewalk lift may be used, and freight be shunted across in the basement to the innermost car. This latter scheme was followed in the Rolls Royce Building at 32-34 East 57th Street.

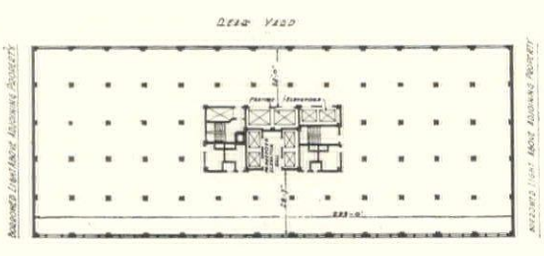


Figure 4
Allied Arts Building

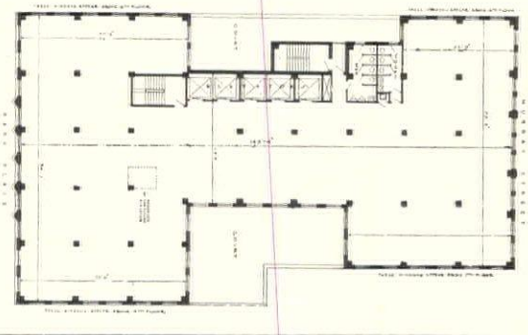


Figure 5
Park-Murray Building

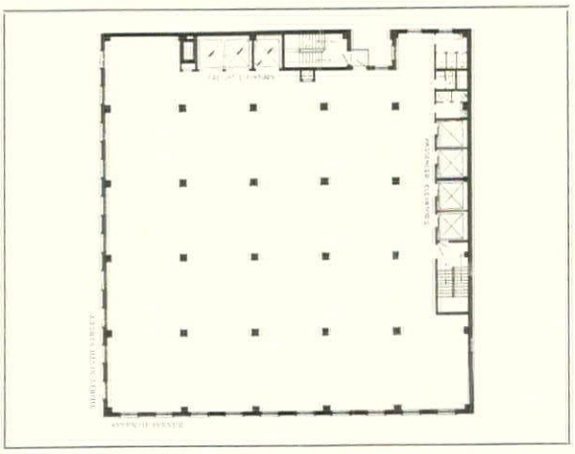


Figure 6. Seventh Avenue and 39th Street

A WIDE INTERIOR LOT. With wide interior lots, as in the case of the Allied Arts Building, 304-310 East 45th Street (Fig. 4), it may be advantageous to concentrate the entire service unit in the center. This makes an ideal division for two tenants, but for further division a corridor must be provided around the center utility group, resulting in some crossing of freight and passenger traffic. This latter can be avoided, and four tenants be provided for by carrying the passenger hall through between two groups of freight elevators. In upper floors, due to set-backs, the space between the elevators and the front wall becomes practically only a passage. In this particular building, to avoid this difficulty, the two elevators nearest the street were dropped off in the upper stories, and the toilet rooms shifted to the side. Time intervals in such buildings cannot even be discussed.

STREET TO STREET LOT. For an interior lot, running from street to street, the Park-Murray Building, 9-15 Park Place, 8-12 Murray Street (Fig. 5), affords a typical example, in this case the development being an office building. The light is protected on each side, but with the large legal court on the south side, irreparable damage would not be done should the light protection be lost. The court at the rear of the elevators, while not legally required, insures light and air to service units and is of some benefit to the office space. Consideration was given at one time to eliminating this court and placing the elevators at the lot line, but this would have required deepening the opposite court. This would have been done, as a matter of fact, if the building had been built high enough to have required the larger legal court on the south side. The practical necessity for an increasing interior court limits at once the height to which an office building can be erected on an interior lot, because as the height increases, the court is pinched between the lot line and tower, and the tower can go only to the height for which the available court will figure.

ONE OR TWO TENANTS. The plan of the building at the northwest corner of Seventh Avenue and 39th Street, Fig. 6, is a typical example of a layout for one tenant. It gives the maximum open area, utilizes the full light on the two street fronts, and leaves the maximum store area available either as a whole or in divided units. The passenger and freight entrances may be widely separated. Structural units easily carry to the top without set-back interference.

The plan of the building at the northwest corner of Sixth Avenue and 37th Street (Fig. 7), provides for two tenants per floor without crossing of freight or passenger traffic, and makes use of lot line windows, and likewise has all of the satisfactory features ascribed to Fig. 6. This latter plan has three windows per bay, which though more common in lofts, do not provide for center division of bays.

PICTORIAL REVIEW BUILDING REPLACED. The last two buildings are 23 stories high,

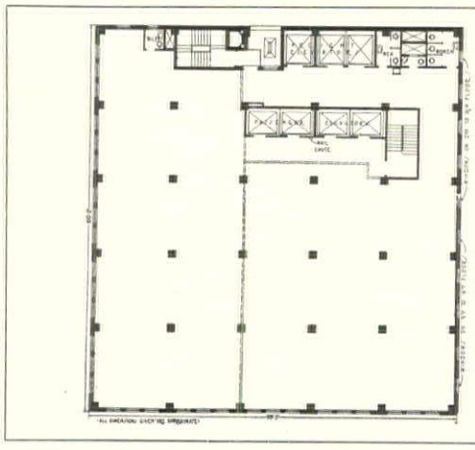


Figure 7. Sixth Avenue and 37th Street

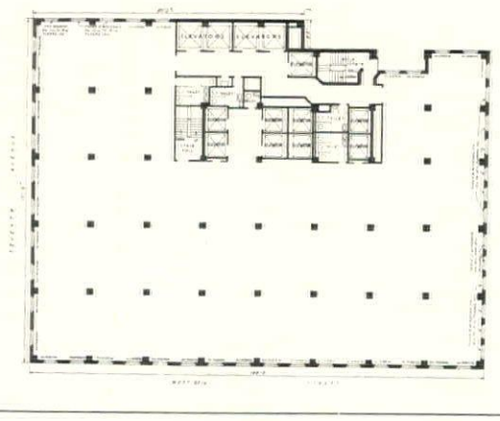


Figure 8. 530 Seventh Avenue

and are on lots about 100 feet square. Higher buildings on larger lots are next to be considered, and of these the 530 Seventh Avenue loft building, Fig. 8, is an interesting example. It replaced the old Pictorial Review Building. Here is an example of the obsolescence of a single-purpose building. The Pictorial Review was an extremely well constructed building, and comparatively new. It was built, however, for a special firm, and a special printing business. The columns, being approximately 16 feet on centers, were entirely too close, and the story heights, in the neighborhood of 16 feet, were entirely too high. The neighborhood had changed completely in the brief span of this building's life, and it was necessary to make a new construction investment with a commensurate return. When the new building was first under consideration, 30 stories high, an immediate problem was the installation of a 100 per cent sprinkler system, to secure the most favorable insurance rates, and to avoid irksome fire drill regulations, etc. There were no sprinkler heads on the market, approved by the Bureau of Fire Prevention, which would stand the hydrostatic pressure with the tanks at the lofty bulkhead elevation. The simple engineering solution consisted of providing an intermediate system of pressure and gravity tanks supplying the sprinkler heads in the lower half, and another set of tanks in the bulkhead supplying the upper half. The two systems are not cross-connected in any way, and each is fed from the street through clearly identified independent siamese connections, and each has its own set of pumps. On the weight of engineering advice, this type of installation was approved by municipal authorities and is becoming quite common.

ELEVATORS. Eight passenger cars were arranged in two banks, with an ample freight corridor separating them from five service cars. The arrangement provides for two occupants per floor without freight interference. The utilities were set as far back as conveniently possible from both avenue and street, leaving approximately two bays at the west lot line, necessary for efficient use of the space. The local elevators drop out before progressing far into the setback floors, allowing the stairs to set back and with the fire tower and the express elevators to form a core drawn tightly into the inner section of the plan, permitting maximum height to be obtained. Of two general sets of toilet rooms, one, on local floors, was placed in the alcove between the express elevators. This means both a local and an express night car, but the space saved more than compensates for this additional expense.

There is not much likelihood that this structure will ever be used as an office building, but if such a development does take place, then the elevator alcoves of the first story would be cut through into the freight hall, and the local combination cars would operate with the local passengers, and the high rise combination elevators would work with the express passenger cars. The upper floors would be suitable for small office spaces, the lower floors being suitable for large office areas.

TRUCK LOADING. The owner also wisely provided a truck space and an ample loading platform so that cars could back in, and keep their loads from the sidewalk.

THE SQUIBB BUILDING. The Squibb Building at Fifth Avenue and 58th Street is a corner office building on which the owner freely spent money and time to insure that it would be an office building of the highest type, fully worthy of the location, and the success the building has enjoyed in renting is a reward of the owner's

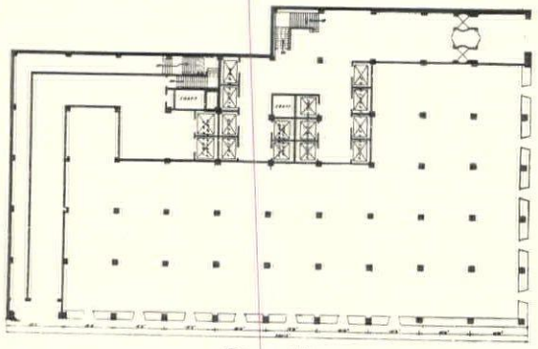


Figure 10

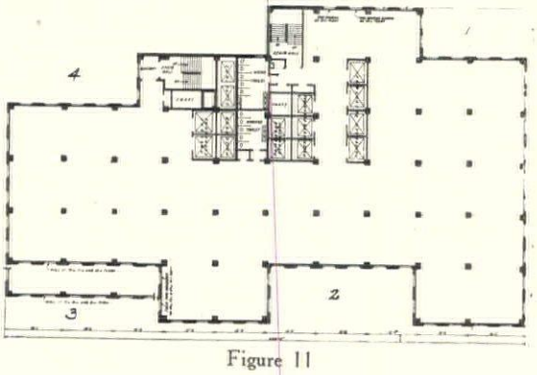


Figure 11

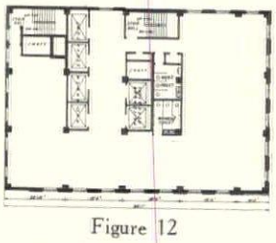


Figure 12

The Squibb Building, New York

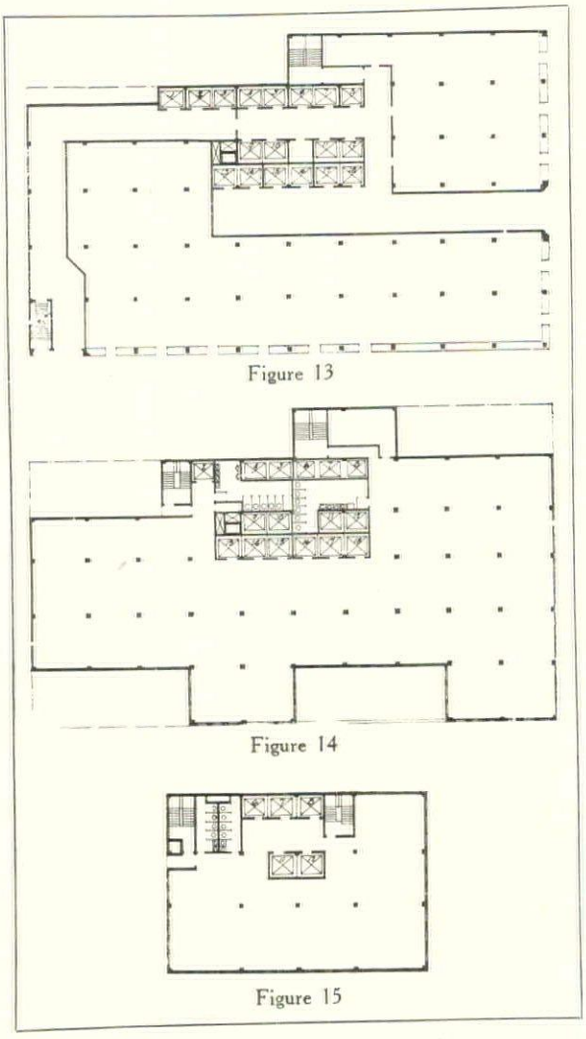


Figure 13

Figure 14

Figure 15

The Squibb Building, New York

optimism. The general features of the plan as finally carried out are shown in Figures 10-12.

There was most intensive study and inquiry to determine the plan basis. A question of immediate concern was how to develop the lot devoting the minimum area to courts, and at the same time develop a high grade building. Considerable work was done toward preparing a plan suitable for a department store which would take care of the several normally darker lower floors. Abandoning this idea, many office building sketches were tried out. The separation of the store area into two parts, at this location, and probable congestion and confusion due to elevator arrangements constitute serious weaknesses in the alternate first floor plan. The typical plan has some points in its favor, but the offset floors did not divide up well. The alternate tower plan is better in some respects than that actually constructed. In the latter the service unit approaches 58th Street too closely. This developed from arrangements considered necessary in the typical plan, and as there were not many of the tower floors, and as it was considered that they would be let in one-floor units, no great concern was felt about the matter.

Plan as Built. Returning to the building as constructed, attention was concentrated on the typical plan, as it is this plan which makes or breaks a building. There were three set-back conditions applying to the lot. The set-backs for a portion 100 feet on the avenue by 150 feet on the street adjacent to the corner began 200 feet above the datum curb, for the southerly 18 feet on the avenue set-backs started 125 feet above datum, and for the rear 50 feet on the street set-backs started 120 feet above datum. The lower six stories were built full except for a rear yard, providing for tenants who wanted large amounts of space. Courts were placed at points 1 and 3, the vulnerable positions under the zoning requirements noted above. Court 2 was placed to throw light into the central space, while Court 4 was built to care for the rear. Exterior courts as 1, 2, and 3 cut into dark areas of lower stories, and, as set-backs occur, become smaller and finally disappear, leaving the full available area in upper floors. Interior courts, such as Number 4, increase as they go up, and definitely limit the height of the adjacent structure.

Elevators. Thirteen signal-control elevators of the highest type have been installed, arranged in two banks, giving satisfactory intervals, and working well with the plans. Two freight elevators have been installed, serving the lower half.

Although it is an office building, sprinklers were installed in its lower two-thirds to secure favorable insurance rates for tenants who might have valuable stocks in the lower stories and shops in such a location. The building was constructed in accordance with all requirements of the New York Labor Law to provide for any ultimate contingency. It was filed, however, as an office building to relieve tenants of irksome regulations as to the size and swing of office doors, fire drills, etc.

Sprinklers, Etc. A sub-basement has been built with provision to install a heating and electric system, though it is actually heated by the public utility. Numerous ample shafts to take care of special requirements have been installed. The mechanical system was rounded out with a pipe story at the top of the tower.

Materials. The building is of the same white marble and glazed brick as the other buildings in the square, "of simple lines, embodying in its character the modern note characteristic of contemporary life." The Benedict metal work of the front, with the great door feature, revolving doors, etc., will indefinitely preserve its luster.

BRICKEN TEXTILE BUILDING. The recently completed 33-story Bricken Textile Building, Fig. 9 (Plate 141, page 795, Part One), fronting on Broadway, Seventh Avenue and 41st Street, is based on exactly the same principles as 530 Seventh Avenue, and has exactly the same type of plan, with the added benefit of three streets for frontage. The sprinkler system, on the same basis, is the second of the type installed. There are the same number of elevators, but their capacity is somewhat greater to provide for the larger floor areas. There was considerable discussion as to the type of structure, some thinking an office building to be proper. The show room type of building, however, was provided, but it may be observed that the space is suitable for many types of offices.

THE 120 WALL STREET BUILDING, Fig. 16, occupying the block front on South Street from Wall to Pearl Street, was a pioneer in the lower Wall Street region.

UNIQUE STORAGE PLAN. The zoning diagrams, Figs. 17 and 18, show favorable setbacks. It was proposed to devote this rear area to a documentary storage area serving the large banks, insurance, and financial houses of the nearby districts. These storage files were to be constructed as in a library, the stacks taking transfer files instead of books. The entire construction was to be erected in a fireproof shell, of unfireproofed steel and floor plate, each story being about 7 feet in the clear. The building department would not allow the installation unless fireproofed throughout, even though structural slabs were installed every second story. The stack scheme was abandoned, therefore, as it was not an economically feasible venture on this basis. The typical plan, Fig. 16, was finally selected, and certain additional plots, which were leased, measurably protect the rear lot line.

FOUNDATIONS. It was known that soil conditions were bad, and that pneumatic caissons would be required to rock at depths of approximately 80 and 90 feet below grade. As such caisson work is costly, it was advantageous to provide long spans and reduce the number of columns to a minimum. A comparison of Figs. 16 and 20 will show the great reduction made. The deeper girders required higher stories. The increased cost due to the greater cubage, additional steel tonnage, etc., was more than offset by caisson saving, and at the same time, the tenants benefited by the more open floor.

ELEVATORS. There are 16 signal control cars and framing provides for two additional elevators. The cars were arranged in three banks, reducing the floors served per bank, and also early releasing area confined to the elevator hall.

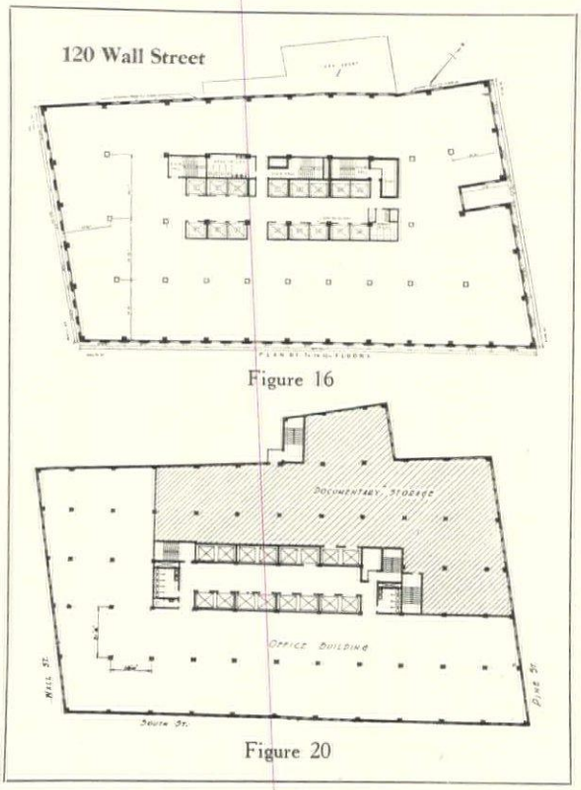


Figure 16

Figure 20

120 Wall Street, New York

With such an installation there is always necessary something of a compromise between the width required in the first floor and that required in upper floors. With the dropping out of elevator group 1 to 6, followed by 12 to 16, much more room is provided for offsets on the Wall and South Street sides, and the Pine Street side was sacrificed in the upper stories, as the least valuable. The small Pine Street court is the result of there being an uncertain title to the area so indicated, due to a faulty conveyance of approximately 100 years ago. The first floor was raised 3 feet above grade to provide depth to the basement without going too far below the ground water line, which occurs relatively near the surface. No vaults were developed, and girders were placed around the outer walls, spanning two bays between caissons, carrying the intermediate wall columns. This is a further example in caisson economy.

MATERIALS AND DESIGN. In regard to the building height, 33 stories were provided. If there had been a positive certainty that the building would rent as rapidly as it did, it would have been made 50 stories at least.

SUMMARY OF PLANNING PROCEDURE

Reviewing this analysis of the plan problem, it will be recalled that the location is carefully considered by a competent jury which determines

the desirable type of building; that a zoning diagram is prepared; tentative computations are made from which all of the service elements may be tentatively estimated; and a preliminary financial set-up made. On the basis of this information a preliminary sketch may be developed, starting with the typical plan as the basis, making such modifications as appear reasonable and desirable in working out the other floors. The way plans may be reasonably expected to develop on certain general types of lots has been pointed out. On the basis of the sketch, more accurate computations can be made for a further check upon services, and a more accurate financial set-up. If the scheme appears financially possible, further steps, not a part of this study, are taken to put through the deal, and if successful another building is under way.

2 Park Avenue, New York
Firm of Ely Jacques Kahn, Architects

BLOCK BUILDINGS. The tendency today is toward bigger and better buildings. Block developments are under way, and are going to increase in number because the problems of light and air can be better handled; there can be a more economical and rational treatment of service units, and arrangements can be more easily devised for proper handling of freight. More agreeable masses and more uniform treatments can be worked out, especially if certain faults with the zoning system are corrected. Block developments can be along more rational economic lines. It is obvious that if all business and economic barriers were swept aside, and two structures, such as those at Broadway and 38th Street and Broadway and 39th Street, now developing independently, were constructed as one and the same building, a more satisfactory and economical unit could be developed.

CONVERTIBLE BUILDINGS. In line with the ever-improving quality of big buildings, there has been a narrowing of the gap between office and loft structures, and many buildings as now constructed are suitable for either group. Lofts normally require deeper space, and while this difficulty is hard to get around, there can usually be found types of offices and show rooms which fit very well into the larger lower floors, leaving the upper floors for smaller units. The elevators in combination buildings must be so arranged that they can be used as either freight or passenger cars. In banks of elevators this is especially easy, as passengers can enter at one end of the bank, and freight can enter at the other, or the freight can be handled through basement driveways. As the need changes, cars can then be changed from one use to the other without even a structural change. Sprinklers are quite often installed in office buildings, and provision can easily be made for future installation. If sprinklers ever become unnecessary, they can be removed, and in many cases they have been. Additional plumbing lines can readily be installed in loft structures while building if conversion to an office building is considered likely.

So far as floor loads are concerned, recent code revisions in New York at least have made office loads plus partition allowance practically the same as loft loads where light manufacturing only is concerned. The problem of possible conversion from one type of building to another is usually seriously discussed in connection with the plan development of a structure, and this is just one other characteristic of the modern spirit of standardization and efficiency.

OFFICE BUILDINGS FROM AN INVESTMENT STANDPOINT

BY
C. F. PALMER
PRESIDENT, PALMER PROPERTIES, ATLANTA

THE subject of office buildings from the investment standpoint may be subdivided into three main classes: (1) Good; (2) Bad; (3) Indifferent. If the purpose be to record the history of individual properties, then a long article should be devoted to Class 3, the indifferent (from the investment standpoint);—to Number 2, the bad;—and a brief coverage to Number 1, the good. Such an allocation would be based on quantitative history. The bad investments in office buildings outnumber the good, while the indifferent form by far the largest class. Why? Because until recent years the high type of business judgment used in other major commercial undertakings involving the investment of capital had not been applied in the office building field.

Thirty years ago a building failure was somewhat excusable. Large structures were then pioneers. No adequate history of earnings over long periods of time was available. The operating end,—that which corresponds to production in manufacturing,—was still in a state of flux with few standard practices. The renting or selling end was equally experimental. The building owner did not know what his market demanded, because that market itself did not know its own needs. No wonder that grief came to the owner, —and that meant grief to the architect, because the successful architect is he who has made his clients succeed. In the office building field the demand can be accurately determined. This demand must be properly appraised. An idle race horse has a great appetite. An empty office building means spending such an amount of capital in meeting its fixed charges that it frequently fails before it has had a chance to run the race.

THE "MONUMENTAL." Buildings of a monumental order are no longer being erected. Time was when ornamental structures created comment and discussion. Neither excessive height nor flamboyant decoration now creates more than passing interest, with the result that the purely monumental structure no longer serves its primary purpose,—to advertise the name of an individual or a business. It has so far lost its novelty that it is out of place as a memorial to a big business leader or to a large corporation to increase his or its prestige in the field of economics.

THE "PROMOTIONAL." Also the purely promotional structure, which was conceived in the mind of a real estate broker to sell the land for a commission, by the architect to design the building for a commission, by the contractor to build the building for a commission, by the loan agent to finance the building for a commission, by the renting agent to rent the building for a commission, has universally come to grief.

ANALYSIS. But enough of the negative side. Today attaining success should be the rule. But it can be the rule only if the architect and owner, in the solution of their problems, use the facilities now available to them. They must analyze and study a million dollar office building for as long a period of time, with as much concentration and detailed revision as does the manufacturer in tests, analyzing his markets, designing his machinery and planning his plant before he introduces an entirely new article into the domestic or foreign field. I know of an office building for which preliminary estimate drawings were under way over a year ago. They have been revised scores of times, and they will be changed many more times before work starts two years hence. Every angle of production, construction and use is being tested through intelligent channels. Prudent business men and skilled architects frequently insure the right solution by such an approach to the office building problem. I know of another office building in another city where the plans were being drawn as the footings were being placed. A $450,000 first mortgage gobbled up this entire $2,500,000 investment before the structure was four years old. Still another unfortunate structure changed hands for less than $500,000, although its first mortgage was about twice that amount. Both of these failures were born, died and were buried within the past five years. Neither would have encountered such experiences if proper, positive action had been taken in the preliminary stages.

THE MARKET INVESTIGATION. The first investigation must be of the extent and type of the market. The extent can be determined through an investment banker who will probably have on file from the National Association of Building Owners and Managers the most recent office building vacancy survey, giving facts such as were presented by President Paul Robertson of that Association at the recent Hoover Conference. An excerpt of that report says: "On October 1,

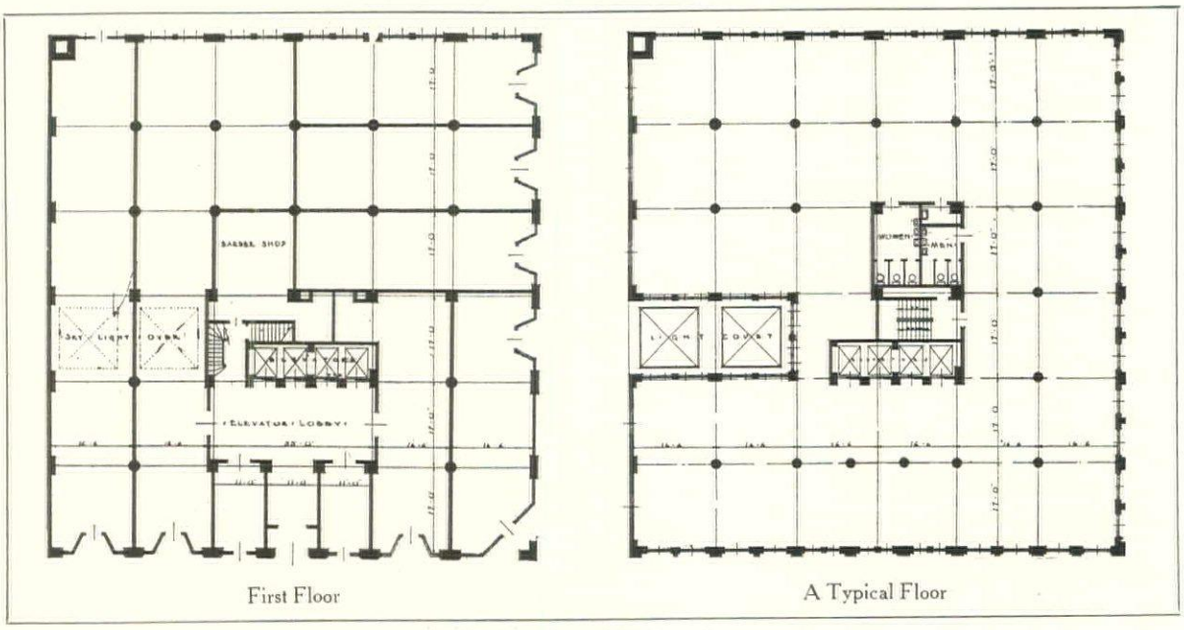
1929, we had a vacancy of 11.55 per cent in space, with $250,000,000 worth under construction. Based on past absorption rates, we face a probable vacancy of 16 per cent on May 1, 1930. That this figure is justified is indicated by our January 1, 1930, survey, exhaustively covering 23 cities, showing a present vacancy of 14.57 per cent. This means that by May 1, 1930, there will be over $500,000,000 of stagnant capital in our business. The field is over-built." National as well as local figures of many years' experience form barometers of present as well as future demands.

OFFICE SIZES AND DEPTHS. The type of the market needs equally close attention. An office about 8 or 9 feet wide satisfies 83 per cent of the business occupants of office buildings in Chicago, 72 per cent of those in Jacksonville, Fla., and 89.7 per cent of those who occupy office building space in Atlanta. In other words, in most markets we find that a room 10 feet wide and 20 feet deep will serve the majority of requirements almost as readily as one 15 feet wide by 30 feet deep. This is particularly true in the southern states. The smaller unit has only four-ninths as many square feet of floor space as the larger unit, and yet in many cases it will command nearly the same price per month.

Exhaustive research in one of the largest cities in the United States showed that 45 per cent of a building there should have rental area 20 feet deep, 45 per cent 25 feet deep, and 10 per cent 30 feet deep or more. Let me show how depths affect rentability by taking mythical building "A" with offices 10 x 20, giving 200 square feet with $3 rental per square foot, totaling $600 per year, or $50 per month. We compare this with mythical building "B" for space 10 x 30 or 300 square feet at $3 per square foot, totaling $900 per year, or $75 per month,—but do you think for a minute that a tenant will pay that additional 50 per cent or $25 a month for one-half again as much space in building "B" as in building "A" when all of the additional area is 20 feet or more from a window? Of course he won't. Usually building "B" will have to rent its space at practically the $50 price. which then gives $2 instead of $3 per square foot. However, it costs just as much to build a square foot of office space away from a window as it does close to the window. Here is the result: Building "A" gets $3 per square foot, while building "B" gets $2, although each required practically the same investment per square foot.

Let's return to the original findings which showed that 45 per cent of the space should be 20 feet deep, 45 per cent 25 feet deep, and 10 per cent 30 feet deep, and let us assume that the converse was constructed, giving 45 per cent of its space 30 feet deep instead of 20 feet deep, 45 per cent 25 feet deep, and only 10 per cent of it 20 feet deep. We then find that such a structure, merely because of having wrong office depths, would bring in only 80 per cent of the gross revenue produced by one with proper depths, and this condition could not be corrected, no matter how efficient the manager might be, because revision in office depths is impossible. Quality is better than quantity.

The average office building opens 52 per cent rented, and then it takes five years for it to reach 90 per cent, which is generally considered normal.



First Floor A Typical Floor

101 Marietta Street Building, Atlanta
Burge & Stevens, Architects

101 Marietta Street, Atlanta. Burge & Stevens, Architects. General View, Showing Simplicity and Attractiveness of Exterior

Original financing must take those five lean years into account.

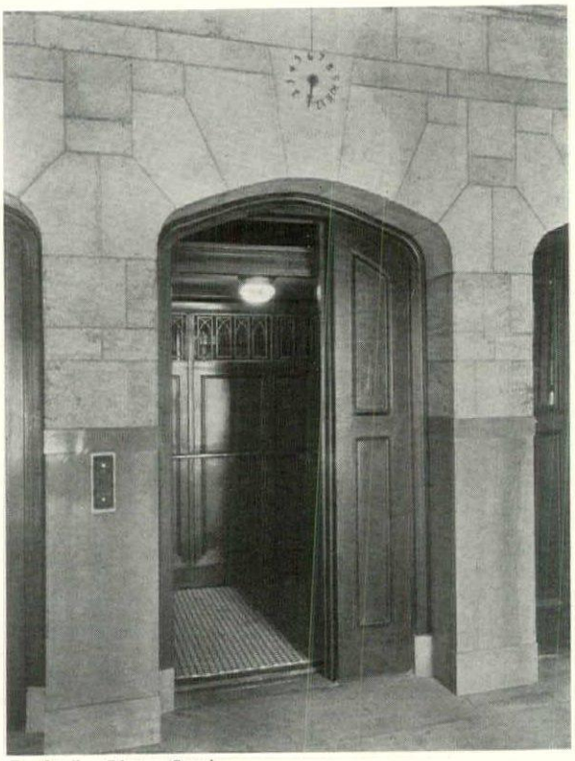
LAND COSTS. When we have found out the extent and type of the market, can we afford to build in it? Land costs help to determine that. We may find that a structure large enough to carry its proper proportion of the land value will create so much space the market will not economically absorb it. A recent statement has been made that it requires a 63-story building to get the maximum return out of $200 per square foot land, considering plot dimensions and various other contributing factors.

All such influences must be taken into account. A merchant must know his rate of turnover to his entire investment, the manufacturer his sales to plant costs, and the office building owner the economic square foot of net rentable area to produce the greatest return on his combined land and building investment.

Ground floor rentals for an office building in a retail, congested area may be 200 per cent above ground floor rentals for a similar office building a few blocks removed, while the difference in upper floor values may be less than 10 per cent between the two buildings. As with a normal office building we will get from 80 to 90 per cent of our gross above the first floor, it can readily be seen that high priced land does not always make the best site for such a structure.

TWO EXAMPLES. But instead of taking up these details one by one as applying to all buildings, let us consider two structures. The first will be of the monumental type, where original investment and eventual income were secondary in importance to impressive appearance. The second structure will be one where every penny invested was expended from the viewpoint of its dividend earning capacity. We must be able to appraise the structural character and see how it affects the operating expenses. Hence the detailed analyses are taken up of two distinctly different buildings.

HOW THE MONUMENTAL WAS BUILT. The first or monumental type was erected to commemorate the name of an individual or corporation. We examine the exterior. It is marble



F. & L. Photo Service

Elevator Entrance, Ground Floor,
101 Marietta Street, Atlanta.
Burge & Stevens, Architects

and covered with costly hand carved ornament. The first floor is 20 feet high. The elevators run 700 feet a minute, and the building extends 15 stories above the street level. The second floor is 15 feet high from floor to ceiling. Each corridor, which is 8 feet wide, has windows at the end for natural light, and glass at a height of 7 feet above a marble wainscot gives additional borrowed light for each office along the corridor.

From the third to the 15th floor the ceilings are 12 feet high. Each typical office has three windows and is 15 feet wide by 30 feet deep. Drinking fountains operating ice water to the public in each corridor are highly carved and decorated. Offices are equipped with fancy ceiling fixtures for electric lights together with elaborate side bracket fixtures. Examination of the electrical plans shows each office floor on not more than three circuits, each floor including many offices. Communicating doors between offices are midway between the exterior walls and interior corridor walls. These subdividing partitions are 4-inch hollow tile. Each office has a chair rail around the wall. The building is "U" shaped, is on a corner with a 20-foot alley making three sites exposed to good light and air with the two legs of the "U" on the blind side. The opening of the light court made by the legs of the "U" is 15 feet wide by 30 feet deep in a building on a city lot approximately 100 feet square.

The building has two very elaborate and large toilets for men, one on the seventh floor and one on the 15th floor. A commodious rest room for women is on the eighth floor. All of these toilets have outside light and ventilation. The floors in the offices are of costly and carefully selected oak. In the basement the space under the sidewalks has been excavated and vault lights installed. Stairs of marble with bronze handrails go from floor to floor and have windows at each landing. Every conceivable item of machinery, from that generating the building's own power down to a $50 pump to help create a vacuum on the heating system is installed in the sub-basement. Between the 15th floor ceiling and the roof there is a 10-foot attic. This space is utilized for storage and locker rooms for the employes.

On the ground floor in the lobby a large brass directory is next to the elevators, giving the names and office numbers of tenants. In the center of the elevator bank is the mail chute. Fire hose in recessed cabinets are on each floor. Elevator gates are of open work bronze. The cabs have very expensive floor covering and are equipped with mirrors. Ceilings in the offices are suspended. Wash bowls in each office are enclosed in cabinets. Awnings are on each window. No cost has been spared by the owner, his architect or the contractor to put in every conceivable feature that might be placed in such a structure. The building could not be duplicated for $1 per cubic foot. So much for the monumental building.

HOW THE DIVIDEND TYPE WAS BUILT. Now let us get back to that other structure we are comparing with the monumental edifice just described. Remember that this is an office building in which each dollar of investment was spent primarily to return dividends. Sustained dividends are the largest factors in determining value.

Instead of marble, we find the exterior of the building a combination of terra cotta and limestone or brick. A pleasant effect is obtained by bold upright lines, and practically no ornament is used, as that means cost in installation and upkeep. The first floor is 15 feet high instead of 20 feet high. This gives enough room for a mezzanine floor and all usual commercial requirements and yet takes 25 per cent fewer cubic feet to produce. Instead of 15-foot ceilings on the second floor, we find them to be 10 feet, and doing the same work as the 15-foot height only with 33 1/3 per cent smaller cubic contents.

Instead of 700-feet-per-minute elevators, these run 450 feet per minute, which is about the maximum speed usable for a structure of this size. The slower cars cost at least 30 per cent less to install and 25 per cent less to maintain than the higher speed cars that never reach maximum

efficiency because of the low rise.

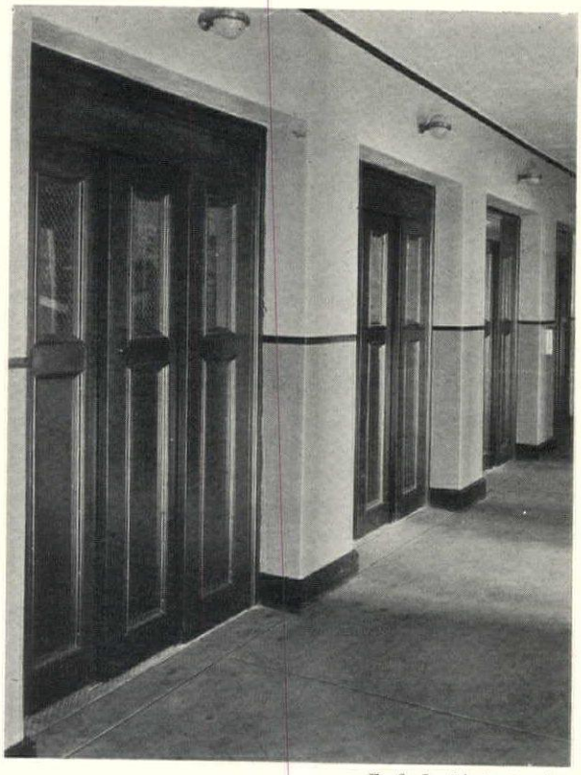
Instead of 8-foot corridors, we find them 5 or 6 feet wide. The other 2 or 3 feet have gone into rentable area,—dividend-producing space. No windows appear at the ends of these halls, because the corridors have been cut short, and the space thus obtained has been made into an office with natural light provided by the window. No borrowed light comes through the corridor partitions because such partitions are costly to install and maintain. A 5-foot marble wainscot is used instead of a wainscot 7 feet high. This results in a saving by using plaster instead of marble totaling about 80 per cent, and the substitution accomplishes practically the same results.

From the third to the 15th floor each ceiling is 10 feet high instead of 12 feet. Each typical office is 10 feet wide and 20 feet deep with a single window. It will be remembered that the other offices were 15 x 30 with three windows, a plan which presents an almost hopeless problem to resubdivide. One has 200 square feet at say $3 per square foot or $600 a year which makes $50 per month. The other has 450 square feet which at the same price would require $112.50 per month, and 30 per cent of its space would be over 20 feet from natural light.

A scientific study made of office depths by W. O. Ballard of W. H. Ballard & Company, Boston, showed on a unit a value of $3 per square foot at 15 feet deep, but the rental shrank to $2.40 at 30 feet and to $1.66 at 50 feet. Mr. Ballard also developed the fact that 72 per cent of all the office building space in Boston is occupied by firms using from one to five small offices. Thomas P. Danahey found that in 34 office buildings in Detroit 40.3 per cent of the number of tenants used 300 square feet of space or less. In other words, small offices command higher rentals and have fewer vacancies than large units.

No drinking water is in the halls, because it requires a circulating system and cooling plant costing thousands of dollars and attracting or holding not one tenant. One non-dust-collecting center ceiling fixture is in the office of the ideal building, with baseboard plugs for droplights instead of fancy side brackets. This layout furnishes the most economical electrical equipment. Every office is on a separate light circuit so that it can be metered individually and the tenants be charged for the current. This effects in operation a saving of thousands of dollars per annum.

Doors connecting offices are near the corridor partition instead of bisecting the distance from exterior to hall wall. Thus they are out of the way, in the darkest space, and allow for more flexible cross partition arrangements. Soundproof 2-inch walls, instead of 4-inch hollow tile save in rentable area and are less costly. No chair rail, which collects dust and rarely protects the wall from chair backs, is used. A light court larger than 15 x 30 is built.



F. & L. Photo Service

Elevator Doors, Typical Floor,
101 Marietta Street, Atlanta.
Burge & Stevens, Architects

Each floor has men's toilets, and every third floor has accommodations for women. It saves considerable elevator traffic where but a few central toilets are used, and the installation cost remains about the same. Every toilet is in the central nonrentable space, making available the class "A" area for office purposes.

Cement floors instead of hardwood are installed. No vault lights are used in the sidewalks. Stairs from floor to floor are of concrete instead of marble, and they are located in the nonrentable part of the building away from window space. Very little machinery is in the basement, since light and heat can be purchased from central plants at less than the cost of individual production. Instead of an attic of 10 feet, only 4 feet are used as an air space. The employes are cared for with their lockers in the basement. This saves 60 per cent in attic cubic contents.

Mail chutes and directory in the lobby are at one side so that they do not interfere with elevator traffic. Elevator gates are steel with wire glass instead of open work bronze, and instead of expensive floor covering heavy mats are in place on the floors. Beams on the ceiling of the offices are exposed, and wash bowls have no closets

around them. There are no awnings, as the tenant puts in his own Venetian blinds if he wants such equipment. This building can be built for 65 cents instead of $1 per cubic foot.

Eliminating light courts, the monumental building has 153,700 gross square feet, and the investment building has practically the same. However, let us recall those high ceilings and that high attic in the monumental building. They help to make the cubic contents 2,028,550 cubic feet, or 13.2 cubic feet to produce 1 square foot.

Our investment building has 1,587,000 cubic feet. Let us remember those low ceilings and that air space instead of an attic. This makes 10.3 cubic feet to produce 1 square foot in the investment building. In other words, it is seen that one structure may be very costly in its actual erection cost, while another building having the same rentable area and doing the same work and getting the same income will require considerably less capital investment, and so will be of more economic value.

But we actually find our monumental building costing $1 per cubic foot or $2,028,550 as against 65 cents or $1,031,550 for the dividend payer. In addition, we find the less costly building yielding a greater gross and net revenue because it has small and shallow offices, and has its utilities in dark spaces. It uses every bit of its class "A" space for rental purposes.

This comparison of buildings has not been overdrawn. There are hundreds of examples showing such diverging extremes, and so when we are told that an office building actually cost $2,000,000 it doesn't really mean that it is worth that much. Much capital may have been wasted. Next door there may be a $1,000,000 building actually worth more in dividend production and rentable area than its $2,000,000 neighbor.

Actual records of two real buildings in the east recently completed show one with 14.3 cubic feet per square foot of rentable area, while the other building has a total of 24 cubic feet per square foot of rentable area. Which is the better from the investment standpoint?

On one of these pages there is an illustration of a Simon-pure investment type of structure, 101 Marietta Street, one of the Palmer Properties in Atlanta, Burge & Stevens, architects, and Turner Construction Company, the contractors.

ACCOUNTING METHODS. Proper accounting methods of all operations are paramount when the structure has become a going concern. At a time when correct charges in a certain city took 61 per cent of the gross income, I have seen statements by misinformed,—rather I should say, uninformed,—promoters basing income estimates on a 25 per cent operating basis, or a variance of 140 per cent from the actual. Often such errors mean the difference between success and failure.

Many a man has been running his business at a loss without his knowledge because his accounting system was inadequate. No matter whether the projects be large or small, its books should be set up so that its items will be grouped into three classes, determined upon by the Experience Exchange of the National Association of Building Owners and Managers. These are called "A" accounts that cover operations; and "B" accounts that cover construction in connection with the building already completed; and "C" accounts, showing the fixed charges. If the books of even the smallest structure are kept in this way, they will allow comparison with many of the small sized structures throughout the nation, that are operating with similar problems. The Experience Exchange of 1928 considered 240 buildings in 56 cities with a total area of 26,266,431 square feet. We may say to ourselves, "Why, I am operating the heat in this building economically." But, if we kept our accounts in such a manner that we could make a comparison through the Experience Exchange with another building of similar size and conditions, we might find that we are very extravagant indeed.

The most helpful method of approach to the success of an office building from the investment standpoint is through the Building Planning Service of the National Association of Building Owners and Managers. Conceived in helpfulness for its own membership, this extraordinary channel for analytical studies is now available to anyone with an office building problem. It gives the experience of the men who are actually living with the structures architects and owners have created. In no way does it take the place of the architect. In its two- or three-day sessions it exhaustively analyzes over 300 separate items.

One approach exclusively to the investment analysis often used by this Building Planning Service takes 25 separate computations to reach comparative net incomes of various proposed plans. Another digest has 13 distinct operations to find comparative gross returns for various floor layouts. That scores of leaders in the architectural profession have utilized this service over and over again is the best indication of its value. Through its use the architect can help his client to succeed from the investment standpoint. Frequently it has placed an office building in the No. 1, "Good," class, when it might have gone into the No. 2, "Bad" or the No. 3, "Indifferent."

INCORPORATING A PARKING GARAGE IN THE OFFICE BUILDING

BY
OWEN N. H. OWENS
Chairman, Downtown Garage Committee
National Association of Building Owners and Managers

A GOOD many building operators, observing the trend toward the incorporation of garage facilities in office buildings, have been wondering whether the idea is a mere evanescent sputter, or whether it is basically and economically sound, indicating, in fact, the standard procedure of the future. I think we may fairly assume that it is not merely a bright idea or a passing sales device. It has its origin in the trends of the time. It is the solution of a definite problem. It is born of pressing economic and sociological forces.

Any man who owns a car, and penetrates with it into busy business or shopping centers, has found it time and time again quite difficult to get rid of his car when wanting to make a business call or a purchase. Who has not issued from his office and wondered where the dickens he left his car that morning? Who has not received an irritating communication from the authorities with reference to too great a proximity to a hydrant or an intersection, or too lighthearted an interpretation of a 60-minute parking sign? It is unfortunately clear that something has happened these last few years; something is out of joint; something has developed too fast,—or something else too slowly.

The problem has been created by a factor which is behind a great many other problems: concentration. Selling and distribution have been severely disjointed by concentration of manufacture in what amounts to a comparatively few factories in relation to our manufacturing habits of a few decades ago. The problem of how to live in respectable surroundings and still pay the rent has been created by the concentration of domiciles. The trouble is that the human race is becoming very rapidly more and more mass-minded, more herd-minded. Always gregarious, it is achieving the peaks of gregariousness. People hate to be alone. They hate to be isolated, either physically or in a social sense. They are eager to live as others live, where others live. They embrace the standardized life, with standardized tastes and standardized habits. And there is no satisfaction in being standardized unless there are a lot of people about to see you doing it.

TRANSPORTATION PARADOX. Progress in transportation, oddly enough, while apparently calculated to distribute people over a larger area, has had the effect of concentrating them even more. Nor has the rapidity of movement made possible by the automobile tended to relieve congestion in crowded centers. The automobile may be capable of offering transportation at 60 miles an hour; but it cannot make good its offer in such streets as it must travel, in the very districts where rapidity of movement is most important. The automobile has, in fact, considerably augmented the blocking of the arteries of communication. A city where automobiles were entirely denied access might well be an easier city to get about in than the average city of today. A bus or street car, carrying a score or more of persons, causes little more congestion than an automobile or a taxi carrying one.

With the growth of prosperity, vehicles of personal transportation have increased enormously in number, and to our detriment. Individually, when we are in our automobiles, we take up too much room on the streets for the public convenience and welfare. And when we park our cars, the space we consume is even more of a handicap to civic economy. We have indeed arrived at this paradox,—that the more convenient the location of a store or an office building, the more useless a car becomes. If we are content to use public vehicles, we can do so to and from a congested area. But the man who enjoys an automobile will often prefer to operate in a location where propinquity to important centers is sacrificed to the opportunity of finding a place on the roads for parking his car.

The man in search of offices is in a dilemma: either he and his staff must endure the discomforts and delays of public vehicles, or else locate in an inconvenient spot. If he goes close into the center of things, he must probably sacrifice the mobility and time saving which the use of a car can confer on him. Hence the office building with parking facilities incorporated. To my mind it is merely the logical solution to a very definite problem. Opinion among building operators is by no means whole-heartedly in agreement with the advisability of incorporating garages in office buildings. Many promoters of buildings, while making sure to provide, in other ways, the very latest facilities, have let this development lag

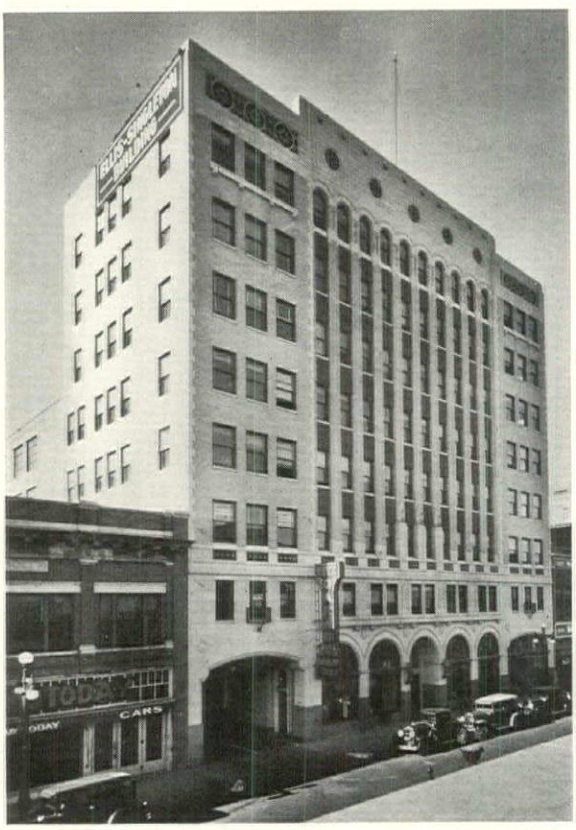
behind others. The reason is, I believe, a certain scepticism about the question of its being possible to make a combined garage and office building a paying proposition.

George J. Beggs, Vice-President of the Commonwealth Trust and Title Company gives his opinion thus: "As a matter of preference, if I were erecting a building, and I could arrange or help to arrange for some other property owner to build a garage adjoining my office building or very close thereto, I would feel that this was preferable to making the investment in my own property. The only exception to this statement would be where the location offered unusual opportunities for obtaining a large volume of transient custom, possibly one directly across the street from a major hotel or theater row. I believe that for the ordinary small sized garage, a substantial amount of the rental received therefrom is not applicable to net earnings, for the reason that some rental value attaches thereto, if basement space rental value attaches to the street area used as an approach thereto, and a deduction must be made to cover the increase in fire insurance rate. These items in some instances will consume practically all rental paid by the garage.

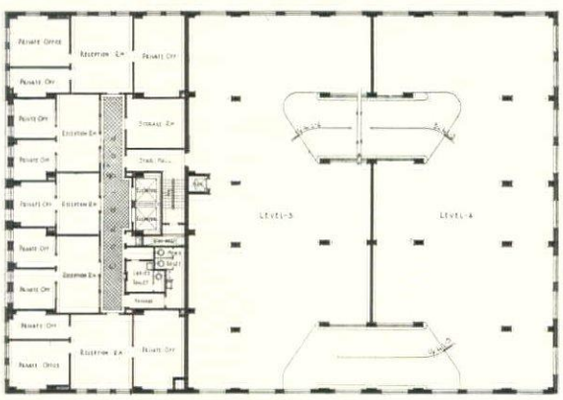
"On the other hand, a well designed garage is often helpful in stimulating office rentals and at good rates, and this is an equation which must be settled by the managing agent, as to whether he wishes to assign to the garage section of his building a credit which would tend to bolster up, theoretically, garage earnings for the benefit it has done the office portion of the building."

Speaking for the contrary opinion, I have a letter from Schmidt, Boucher & Overend, of Wichita, Kas., which runs in part: "We have been much interested in watching the results obtained in the Ellis & Singleton Building, which has a garage in connection, for the reason that it was built in the face of an over-supply of offices, and is also considerably out of the office building district. However, within two and one-half months after completion of the building it was 100 per cent rented, and the owners attribute this success to having the garage in connection."

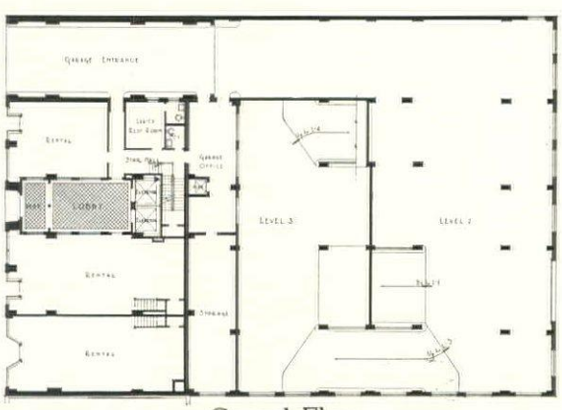
Following the same line of thought is a report from Los Angeles, over the signature of Lemuel Freer, Manager of the Pacific Building: "We were the first in Los Angeles, probably on the Pacific coast, to put in garage service in connection with office buildings. We were very much criticized at the time for doing so, but I assure



Ellis & Singleton Building, Wichita.
Schmidt, Boucher & Overend, Architects



Typical Floor



Ground Floor

Ellis & Singleton Building, Wichita.
Schmidt, Boucher & Overend, Architects

you we found garage service in connection with office buildings to be very profitable, in fact so much so that we wouldn't consider, from any standpoint, building an office building without providing parking space for both tenants and patrons of the building. Besides proving successful in the Pacific Mutual Building, it has also proved a success in the Pacific Finance Building as well as in the Wilshire Medical Building, which was completed less than a year ago, and it is now 100 per cent rented due to no reason other than that we have provided adequate garage space for the tenants and patrons of the building."

PROFIT AND LOSS. The reader will notice a tendency to regard the garage largely as a means of filling the office building, and little mention of the question of profit or loss. The garage business, to the average building promoter, is a dark and uncharted sea. Perhaps it is this fact which has retarded the incorporation of garages in office buildings, and led to the inadequacies of some of the basement garages supplied. Will the garage section of such a building pay? Under the parking rates at present obtaining in the average city today, it is very questionable if it will pay. But that does not settle the matter by any means. It merely means that prevailing parking rates are too low. They are lower than the public will pay willingly in the future.

There is a lot of competition in the garage business. Cars may be parked at the curb and on vacant lots. In the former case, the community pays for the parking space. In the latter, the rate charged is usually figured to cover some of (and rarely all) the taxes on the lot. It very rarely makes any return on the investment. Such parking is irresponsible competition. Basement garages built beneath office buildings are often unsatisfactory. Space of this type is too often so inaccessible and the layout so cramped that it does not offer real convenience to the public, and consequently is not well patronized. There is at least one definite case on record where tenants of a building are preferring to walk two blocks to a better designed public garage than suffer the inconvenience of their own basement garage. Naturally, rates are cut.

It is, however, a matter of experience that a garage, properly located, properly planned and managed with some enlightenment, can obtain a rate which will offer a fair return on the investment. If erected in conjunction with an office building, the return will be found adequate to make good loss of revenue from store frontage, etc. There are signs that subsidized parking will one day be a thing of the past. The International Garage Association, at a recent meeting, sponsored the principle that it is bad business for anyone but the parker to pay the full cost of parking; and it is only a matter of time before this principle is put into effect.

FIGURING COST AND INCOME. It has not been particularly easy to figure costs and returns in advance of erecting a garage, but data are being collected. The old method was to estimate the investment on a cube basis, working out usually in the neighborhood of 20 cents or 25 cents per cubic foot. It is better to estimate on the basis of rentable stalls. On this basis costs, including land, have ranged from $800 to $2,000 per rentable stall. The figure will vary widely according to location and type of structure. However, the higher figure quoted seems excessive for any location, and a cost of $1,200 per rentable stall would be a fair average. If you take this as the investment per stall and expect a 10 per cent net profit, you must earn $10 per month per stall, counting on 100 per cent occupancy. Two garages with which I have been connected show, over a two-year period, an average operating cost of $9.24 per rentable stall per month. This figure of course refers to garages run as separate ventures, not in connection with office buildings. Figures for the latter do not seem available at this present writing. Gas sales, etc., and miscellaneous services, when *proper overhead and rental expenses* are charged against them, rarely, if ever, show a profit. Consequently the rental of parking space must be on a self-supporting basis. In other words, showing a return on a garage investment is a matter of renting space, as in an office building. Average occupancy is a particularly difficult figure to determine, and yet particularly important.

Promoters of office buildings usually figure on 90 per cent occupancy. In the case of a garage, space is used for various types of parking, and traffic will vary during the year. Consequently it is not practicable to use a definite vacancy figure. If one must use one, use a 60 to 70 per cent occupancy. The 90 per cent occupancy figure has been used in the past with disastrous results. It may make a garage proposition look fine financially. But in practice experience shows that the type of storage applied for by the public varies so much according to location, season of the year and even time of day, that it is not practicable to count on an *average* 90 per cent occupancy. A garage may have, at some rare moments, an occupancy figure of 125 per cent. This will be when transient cars are occupying space already paid for by regular patrons on a monthly basis. When seasonal fluctuations take both transients and regulars elsewhere, the figure will fall to 40 per cent. Forty per cent is, unfortunately, a more constantly recurrent figure than

125 per cent. In other words, you cannot count the number of stalls you expect to have in a garage, multiply it by a rate per stall, allow a set vacancy, and come anywhere near the truth.

For instance, there are dead storage and live storage; there are hourly parking and day parking; there is 24-hour parking on a daily basis and on a monthly basis. In certain locations it is possible to fill a large number of stalls twice over for a certain length of time. There may be a certain number of regular 24-hour patrons whose cars are in at nights only. Day parkers can be put in their stalls during office hours. In some cases theater parkers can also be accommodated. Again, room must always be available for transients; it is bad policy to have to turn down any volume of transient business; for one motorist tells another, and you may be in jeopardy of losing the bulk of the trade through turning down some of it. Consequently the figuring of occupancy probabilities is intricate. It must be done by classes of parkers; it must have special reference to local conditions, neighboring office buildings, theaters, stores, etc.; and it needs a good deal of experience before a satisfactory set-up can be made. The problem, moreover, has this additional complication; you may be catering only to day parking, or to day and night parking, or night parking only. And this consideration will materially affect your earnings.

STUDY DEMAND. In every case, an intensive study of local habits and trends must be made. Cars can be counted on the streets. Main arteries must be studied. Real estate and building tendencies are particularly important. And lastly, competition must be noted. Usually there is only so much business to be done in any one area. It is difficult to create new business, and impossible to attract it from a distance. In assessing the occupancy of a garage incorporated in an office building, type of prospective tenants is very important. This factor will also help in determining how much garage space to provide,—if it has been decided to provide it. There are two considerations: the car-owning propensities of the tenants themselves, and the number of car-owning visitors who are likely to wait for them.

Obviously, buildings housing large corporations with huge clerical staffs will find comparatively few cars to be parked by tenants. A medical building or a building occupied by lawyers and the like should be particularly fortunate in having a number of cars to service. Among other considerations, the number of office employes is smaller and the number of rentable feet per person is large. Similarly, medical men attract a good deal of parking by visitors; other tenants have varying numbers of car-using visitors.

SPACE REQUIREMENTS. How much garage space shall be provided in an office building? We will, for the moment, confine ourselves to a consideration of parking accommodation for tenants and their visitors only. In many cases a building can gather parking business from other buildings, and sometimes from apartment houses nearby. But that must be separately evaluated and assessed to match local conditions. It is, first of all, necessary to know how many car stalls tenants and their visitors are likely to require. It is usual to assume from 100 to 120 square feet rentable office area per person in the building. A fair figure, under average circumstances, is one car to each eight or nine persons. This works out roughly at one car per 1,000 feet of rentable area; i.e., one rentable car stall per 1,000 feet of rentable space.

In a well laid out garage, after deducting the space necessary for garage office, wash racks, lobby, services, etc., it is found that a rentable car stall occupies between 250 and 270 square feet. This figure is admittedly higher than that ordinarily given by garage engineers, but in practice it will be found to be fairly conservative if due allowances are made for non-rentable garage space. Thus, 1,000 feet of rentable office space calls, under normal conditions, for around 250 square feet of garage space,—a simple proportion of approximately four to one. These figures are offered with a great deal of hesitation. So little definite information is available as to the actual number of cars per person in various types of office buildings. At their best they will form only a very rough indication for preliminary figuring.

If it has been decided to build a garage under the same roof as an office building, and its approximate size has been worked out, the next question is, where is the garage to be located? In the basement purely? Or behind the building? Or both? This is a matter which must be decided individually for each set of circumstances. One point is all-important. The garage must have an easy, inviting drive-in; it must have a good lobby; it must be able to handle traffic with expedition; otherwise it is doomed to failure. A steep, sloping drive-in is the worst possible advertisement for a garage, especially if snow or ice is any kind of a possibility. For this reason it is impossible to keep the garage entirely to the basement; the lobby and the drive-in must occupy some space on the ground floor.

GARAGE TYPES. Next comes the question of type of interfloor travel. It is particularly true of garages that every one is a study by itself. Office buildings, however awkward the lots, can usually follow a more or less standard layout for their

entrances. Garages must inevitably vary tremendously. Not only must the entrance, the parking lobby, and the approaches to the means of vertical travel take up a good deal of room, and be awkward to fit into any given lot, but the type of vertical travel itself is subject to many variations. There are straight ramps from floor to floor; staggered floors with shorter ramps; sloping floors; sloping floors with modified ramps; spiral ramps with sloping floors; ordinary lift elevators; special elevators, where cars are moved off and on the platform by power other than that of their own engine; endless chains; turntables and possibly others which have not yet come into my ken. Generally speaking, these various methods of interfloor communication divide themselves into two groups, the ramp type and the mechanical type. Numerous garages of the latter type have been erected, and their sponsors have claimed great advantages over the ramp type. It would seem, however, that the staggered type, with short connecting ramps, is the most practical, and will remain so for some time to come. There may be a saving in floor area in favor of the mechanical type, but the most important thing in a garage is ease of entrance and exit. Here the ramp type has been found to excel.

Few things are more prejudicial to the success of a garage than delay in delivering cars to their waiting owners. In all mechanically operated garages there is a very definite limit to the number of cars that can be handled per minute. In the ramp type the limit is very much more elastic. The real test of a garage's efficiency, and to some extent the proof of the measure of its success, comes at those times when a large number of car owners are checking out at the same time, when, for instance, the theater crowd is leaving for home. Ramps enable this crisis to be handled efficiently and without undue delay.

When considering mechanical equipment it is particularly necessary to beware of the theoretical speed of handling cars. It is very rarely achieved in practice. It usually works out that the man whose car is behind another comes first for his car, and there is a delay in extracting it. Then again, it usually seems to happen that all the cars wanted at any given moment happen all to be on the same bank of machinery, with the other standing idle,—and so forth. In general it will be found that the actual time consumed in handling cars with mechanical equipment varies greatly with the *estimated* time.

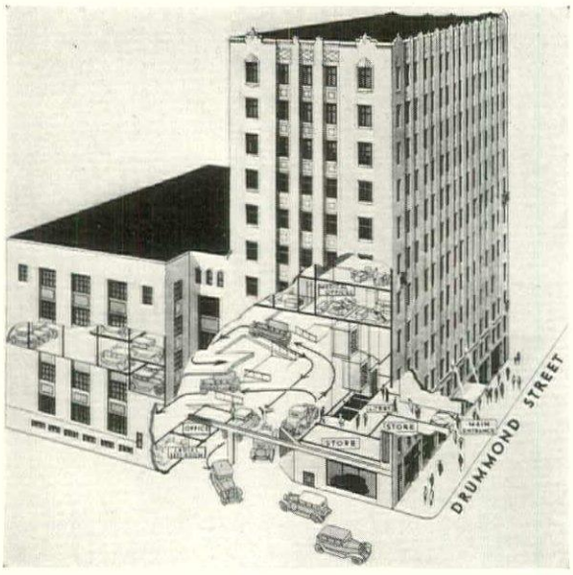
It is possible that insufficient attention has in the past been paid to the creation of the proper atmosphere in garages, the atmosphere which makes for success. We, in our company, have always felt that it is necessary to state to the public by atmosphere the fact that a new spirit has entered the garage business during this latter half-decade. It is easy to go back in memory to the time when the garage business was neither over-ornamental nor over-ethical. Five or ten years ago the word garage conjured up a picture of disused sheds and barns, floors floating in grease, grimy men, decrepit cars stacked in an unwieldy welter. The mental atmosphere was little more sanitary than the physical atmosphere. One felt inevitably that one would pay for more gas than one used; that one's car was quite capable of taking a midnight jaunt unbeknownst to its innocent owner; that repairs were carried out in a way that meant more work for the repair shop within a very short time.

The change in the garage business is due to two factors; one, the entrance into the sphere by large and responsible operators; and the other, the disassociation of the messy repair shop from the parking end of the business. But sufficient traces of the old regime remain, either in fact or in memory, to make it eminently worth while to say unequivocally, by atmosphere, that one's establishment represents a new conception of the garage business.

This is, firstly, a matter for the architect. He must achieve a sense of order and spaciousness; he must adduce what daylight he can come by. He must consider the problem not as a factory or workshop problem, but more as he would approach a hospital or a hotel. What is a parking garage but a car hotel? He will be well advised to make the office a little more like a hotel office than a factory shack, and to obscure mechanical devices as much as possible. When it comes to interior decoration, pleasant color schemes more reminiscent of hospitality than of industry may properly be used, especially in the lobby. Secondly, this is a matter for the management. The objective may be obtained partly by water and brooms and paint. Dust must be anathema. You should be able to eat off the floors. The walls should look like the walls of a hospital ward. It pays. And men should be uniformed and spic and span. Services which necessarily entail messiness should be relegated to unobservable locations. I may appear to overdraw the picture, but it is difficult to overemphasize the psychological effect of such things on the public. A proper atmosphere will express not only efficiency, but courtesy as well, and honesty and a desire to serve the public.

SERVICES. There remains one more question to discuss. What services shall be offered by the garage that is primarily serving an office building? Why is a garage? Its raison d'etre is to make car owning an effortless and griefless

process for its patrons. This consideration will urge the garage operator to think further than of the sale of goods, such as oil, gas, anti-freeze, chains and other minor accessories which are in normal demand. He will have a thought for the convenience of his patrons when they leave or collect their cars. Many will prefer merely to drive to the door and leave it to the garage to see the car to its stall. People of this mind must naturally,—and as experience has shown,—will willingly pay a higher rate than those who take their cars to their stalls themselves. Beyond this there are many services which, while adding immensely to the good will of the garage, can at least be made self-supporting. Washing falls naturally under this head; a man feels better about life when his car is spic and span. But



Drummond-Medical Building and Garage.
Nobbs & Hyde, Architects

other services are, in the long run, more important, because they contribute essentially to the pleasure of car owning. Lubrication, for instance, done on a systematic basis, according to mileage, preserves a car from mechanical trouble. Lubrication can include alemiting, changing engine oil, changing transmission and back axle lubricants, and filling hub caps. Work of this type can be done for a tenant while he is busy in his office, without wasting his time. Similarly, his gas tank and radiator can be kept full, his battery serviced, and his wind screen kept clean. Beyond this, and adjustments (including tire repairs) of a minor nature, it probably is not wise to go. Minor repairs and overhauls invite grief.

In conclusion, some data about the Drummond-Medical Building and Garage, which recently opened for business, may be of interest. The history of the project is unusual. If you drive down Drummond Street, Montreal, you will readily notice a new ten-story office building, bearing the sign "Drummond-Medical Building." There are stores on the ground floor, fronting on the sidewalk. You will notice no signs of a garage, until you pass the head of the lane which runs along the south of the building. There you will discover a 32-foot approach to two wide doors giving into a garage, apparently behind the office building. When the project was conceived, the interest of its sponsors was to locate a garage on or near Drummond Street, between St. Catherine, Montreal's shopping center, and Sherbrooke, the location of Montreal's elite apartment houses, simply because there is room for a garage in that sector; and it was figured, after due consideration, to be a very profitable location.

Unfortunately, a by-law provides that no garage shall be erected in this somewhat exclusive district. It was apparently felt by the city fathers that a garage would lower the tone of the area. More precisely, the by-law provides that no garage shall front on any of the streets within this district. Here was a loophole. Why must the garage front on any of these streets? Why not have it fronting on one of the many lanes? But if so, clearly something must front on the street, to serve as a mask or screen. It was decided to put up an office building, tall, extending the whole width of the lot available, but very shallow from front to rear. Behind this, and to some extent below the rear of the office building, a five-story garage could be inserted.

And so, from a project to erect a garage, there has come the Drummond-Medical Building. Analysis of the area suggested that it is the finest location in Montreal for a successful medical man. The building is being rented only to the medical and dental professions; and only to the so-called "ethical" branches. The garage is a 400-car garage. There are 4,000 feet of rentable store space, and 40,000 feet of rentable office space. Great care has been exercised with the garage. The architects, Nobbs & Hyde, of Montreal, have succeeded in producing exactly the right atmosphere. A combination of sloping floors, staggered floors and the ramp type of construction, makes interfloor travel extremely easy. The parking lobby will hold three cars abreast, and is 120 feet long. Gasolene sales will not impede traffic around the entrance. Servicing is done in the ample light and seclusion of the top floor. The interior decoration has been carried out with reserve and good taste. The gasolene pumps and oil stands have been made an integral part of the scheme. Time will show the virtue (or perhaps the folly) of trying to make this an ideal garage from the car owner's point of view.

ELEMENTS OF MAINTENANCE COST

BY

A. G. SCHILLE, Service Manager, Seattle

CHARLES A. LEHN, Chief Engineer, Marshall Field Estate

THE increasing competition among office buildings has introduced an era of economy in their operation and maintenance. To further the economical operation and maintenance of office buildings, the National Association of Building Owners and Managers has instituted a series of Experience Reports which cover every feature of office building performance. By this interchange of experience knowledge becomes common to the members of that organization, and many of the facts ascertained should be considered by architects in the planning of such buildings.

It is inevitable that everything which is exposed to the air, moisture and varying degrees of temperature will deteriorate to some degree. This is hastened by coming into contact with human beings or being subjected to motion and mechanical work. Materials and machinery must be selected for their resistance to deterioration as well as for their beauty.

The time will come inevitably when the most successful architect will be the man with a reputation for designing office buildings that *pay*. Profit is affected greatly by the cost of operation and maintenance, which extends over the entire existence of the building. It is readily apparent that an additional few cents per day spent on the maintenance of a particular item will aggregate quite a large sum of money during the life of the structure. The distribution of cost is the basis for a proper study of the materials best adapted for economical use.

The 1928 Experience Report of the National Association of Building Owners and Managers, based on 240 buildings, gives the cost of operation per square foot of rentable area per year as:

Item	Cost, Cents	Per Cent of Total
Cleaning	20.9	29.8
Electric system	3.9	5.6
Heating and ventilating	8.8	12.6
Plumbing system	1.2	1.7
Elevators	10.6	15.0
General expense	12.8	18.3
Power	2.3	3.3
Miscellaneous	0.8	1.1
Repairs and maintenance	5.6	8.0
Decorating	3.2	4.6
Total	70.1	100.0

Of the money spent for cleaning, it is distributed, roughly:

Item	Percentage of Total Cost
Janitor work, space actually occupied by tenants	53.
Cleaning walls	8.
Refinishing and waxing floors	6.
Cleaning corridors, lavatories and entrances	22.
Washing windows	7.
Miscellaneous	4.
	100.

It is found that the parts of the building that should receive particular attention during the designing period so as to effect economy in operation and maintenance are, in general, those which can be reached by the hands or feet of the building's occupants. The exterior of the structure should have protection, up as far as persons can reach, against match scratches and pencil marking. Economical maintenance of the rest of the exterior is best secured by using those materials to which soot and dirt do not adhere.

Corridor walls are constantly soiled and disfigured by dirty hands, messenger boys' pencils, match scratches and furniture movers' trucks. The finish of corridor doors must withstand the effect of mops on the bottom rails and must be of such a nature that finger marks will not show readily. The most vulnerable parts of the inside of the office are first the walls and, second, the floors. The finish of the walls is in constant danger of wear from the backs of chairs or other furniture, and the placement of steam radiators has a direct relation to the speed with which the walls are soiled; the floors, if of soft materials, will become cigarette burned, and certain kinds of steel chair castors will soon deface any kind of floor. The darker finishing woods now coming into use show finger marks much more readily than the oak finishes that were used several years ago.

The selection of the type of windows is important because, roughly estimated, it costs 10 cents to wash a double-hung window of the ordinary size. If this cost could be cut in half, it would effect a considerable saving during the life of the building. The use of immovable ornamental iron or bronze close to and in front of glass in entrance doors, elevator enclosures and other

places is a very costly arrangement for cleaning. These parts should be hinged or be removable. In many buildings no provision whatever is made for the easy and quick cleaning of glass so placed. The extensive use of bronze work in the entrance doors entails a considerable expense in maintenance. There is, probably, an economic balance between the value of the appearance of bronze as an attraction for tenants and the cost, both initial and of maintenance. It is an item of such importance, however, that it demands careful consideration. The use of new non-corrosive types of metal and steel for store fronts and entrance doors, frames and grilles may supplant, to a large extent, the use of bronze. The metal can be cast into ornamental forms similar to bronze. The steel can be formed into the same shapes as ordinary sheet steel. The use of these materials will necessitate the development by the architect of new forms in ornamental details which are best adapted to their characteristics. The difficulty of maintaining nickel plated plumbing fixtures has led to the introduction of chromium plated fixtures, which promise to be permanent.

A more specific analysis of the cost of wall and floor maintenance is given here, provided by the chief engineer of an estate that owns and operates several large and important office buildings,—the management of which is noted for its thorough analysis of all the conditions that affect operation and maintenance. For general commercial offices, calcimining ceilings and walls is probably the most practical and inexpensive. It can be done in the smallest length of time, it does not load up the walls with innumerable coats, it does not "check," crack or peel off if properly done, and it will last from one to two years. If paint has been used, there will be ridges in the surface where alterations are made and walls are removed, but this will not occur if calcimine has been used. The idea of using one standard color is obviously good. Less material has to be carried in stock, less time is required in dealing with tenants in regard to color, and the men become more efficient in handling one color. An efficient decorating crew, properly supervised, with work laid out for them so that there is no loss of time, can calcimine, including the washing off of the old calcimine, 15 to 20 squares per eight-hour working day per man, depending upon the layout of the offices, how much furniture has to be moved, and whether there are large or small spaces, etc. Using the $1.75 per hour wage scale, one man turning out 15 squares per day, the cost, including tools and material, is $1.10 per 100 square feet; and when 20 squares are produced, the cost is $.82½ per 100 square feet. The average cost should be $.95 per square.

For offices, such as legal suites, executives' private offices, etc., the trend seems to be toward more elaborate decorating. Canvased walls with two coats of paint, a glazing coat in varied colors and a starched coat finish is the most widely used for this type of office. The cost of this class of work runs from $.12 to $.15 per square foot. In doctors', dentists' and other professional offices, where a higher degree of sanitation is desired, where liquids and other materials are used and where offices are so laid out that people come in contact with the walls, paints, enamels or lacquers are, of course, more practical. The cost of finishing with two coats of paint, stippled, with glue size and a starch coat finish is from $3 to $4 per 100 square feet, depending, as previously explained, on the conditions. This type of work should last from two to three years and can be washed and restarched two or three times. On new wall surfaces the most economical treatment is to use a sealer, such as is produced by most of the first line paint companies, followed by one coat of washable paint.

The most economical floor, from the maintenance standpoint, is covered by either linoleum, rubber tile or something similar. It is easier to clean than the bare floor, it looks cleaner, and is more sanitary. On any office floor where there is ordinary foot traffic varnish is impractical, as it does not last more than two or three months. Where a tenant wants his private office varnished around his rugs, and where the floor does not get very much wear, varnish can be used. Two coats are necessary to make it look well. The cost of this work, including scrubbing, bleaching, staining and applying two coats of varnish is from $.02½ to $.03½ per square foot.

OFFICE PARTITIONS. Changes may be included in the item of operation and maintenance. The change in tenants, which is constant to a limited degree, usually entails a change in the layout of the space. The demolition and rebuilding of masonry partitions is expensive in labor and time because of the work of the several trades involved. To avoid many of the unsatisfactory conditions accompanying the making of these changes, the movable partition was invented. Constant improvements have been made in the style and construction of such partitions so that they permit of great flexibility in making installations. They are removed and installed quickly, with limited defacement of the adjoining floors, walls and ceilings. It is customary for the managers of new office buildings to purchase a sizeable stock of movable partitions and doors for immediate use. Movable partitions are of wood and of sheet steel, finished in various colors.

OFFICE LAYOUTS FOR TENANTS

BY
WARREN D. BRUNER
PRESIDENT, BRUNER & SIMMONS, INC.

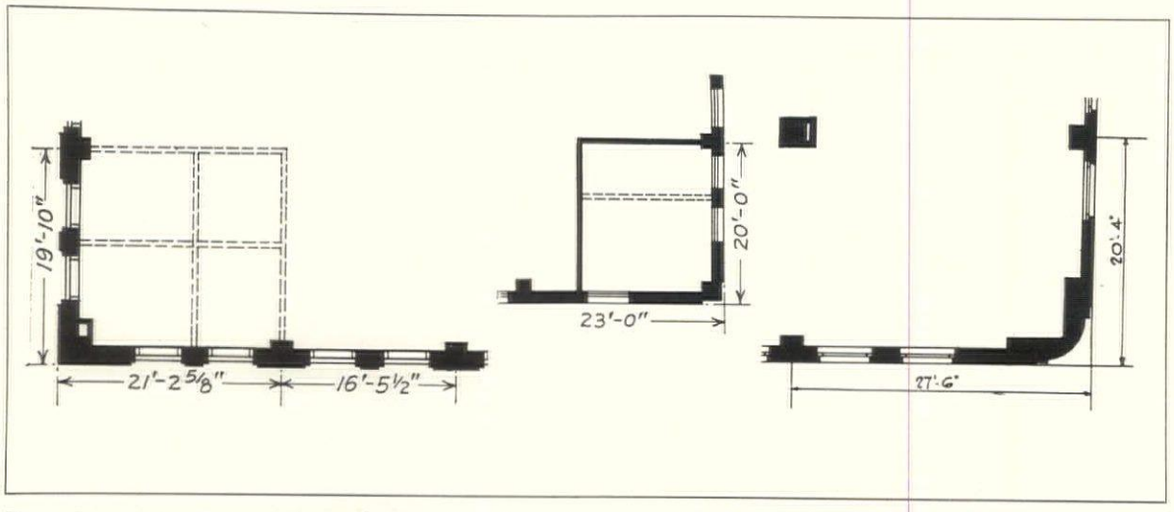
THE tenant considers four things when renting floor area. These are location, appearance of the building, building service, and suitability of the floor space for his needs. The most important factor is the suitability of the floor space for the intended purpose, because it is the effectiveness of the work done in the space that measures the prosperity of the tenant. The suitability of the space is affected largely by the architectural design of the plans and the arrangement of the windows. It is readily apparent that some architects have been concerned with the appearance of the building rather than with its usableness. The conception of office building architecture,—that the design must follow the use,—has been forced by the need for designing buildings for profit, purely an economic problem. As the tenant is the source of profit, the successful building will be that in which "consider the tenant" has been the principal objective, with consideration of course to location, appearance and service.

Some of the principal handicaps to the efficient utilization of floor area and adequate office layout are illustrated. "Architectural treatment" has demanded the use of wide piers at the corners of a building for the purpose of giving the appearance of "solidity" to the structure. This is an inhibition resulting from the pre-steel-skeleton forms of masonry construction. The result is that often the best space in a building is least effective for any purpose. In a recently designed building to be erected at 21 West Street, Manhattan, Starrett & Van Vleck, architects, have eliminated the corner pier. This is feasible from a structural consideration and it will permit of the maximum utilization of the corner space. This is probably the first commercial building in America to be so designed.

Another handicap to floor utilization is found in the spacing of the windows caused by the undue consideration given to "architectural effect." The exterior bays should be from 17 to 20 feet wide, with windows which permit the bay to be divided into 8½-, 9- or 10-foot office units, the minimum for usefulness. Partitions then can be installed with regard for appearance and relation to windows. A bad example from one of our most important and costly buildings is shown, in which the bays are 15 feet wide and do not permit good subdivision of space nor a sightly relation of partitions to windows.

Tenants of a certain kind demand a double door main entrance to their offices, which should be made possible when the plans are studied. An illustration is given which shows how the placing of the plumbing pipes on the wrong side of a column prevented the renting of very desirable space because the desired double door entrance could not be installed at the end of a corridor.

The installation of permanent office partitions, according to a "typical plan" when the building is being constructed, is still done to some extent but the demolition of existing partitions and the erection of new partitions are costly. In a recently



To produce certain exterior architectural effects with wide wall spaces at the corners of these buildings reduced the usableness of the adjacent floor space

Interior view of the all-glass corners of the new 21 West Street Building, New York. Starrett and Van Vleck, Architects

constructed office building six floors were finished according to the "typical plan," and many changes were made for the incoming tenants. The best modern practice is to leave all floors undivided except as rented.

The space is sold by a broker or renting agent, and a tentative layout of the space for the prospective tenant is a valuable assistance in closing the transaction. These tentative and final layouts are made by the architect, the renting agent, or a layout specialist. In any event, the layout must be made by an expert in order to secure the best possible utilization of the space with economical cost of construction. Some architects and renting agents employ special experts with satisfactory results.

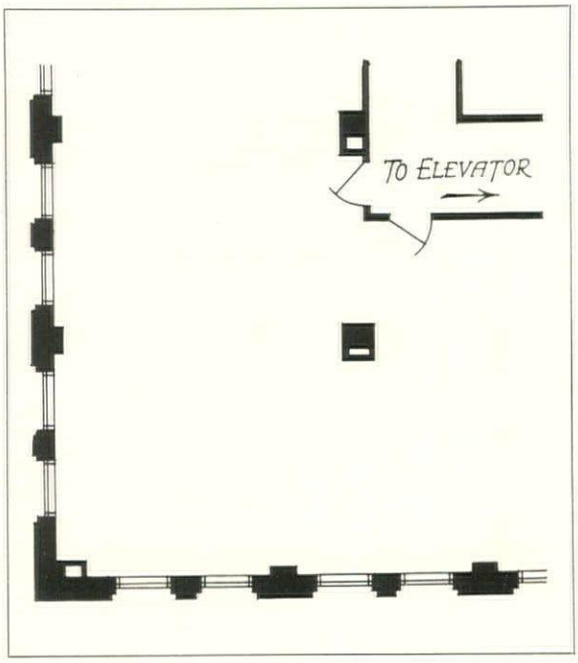
Within the past six or seven years there have developed professional organizations specializing in planning office layouts. A number of building managers consider the best solution to the problem of adequately providing for a tenant's needs lies in the employment of such an organization.

On a number of buildings projected for the future, the tenant has been represented in the drawing of the plans by the combined efforts of the owner, promoter, financier, architect, engineer, building manager and an expert in office layouts.

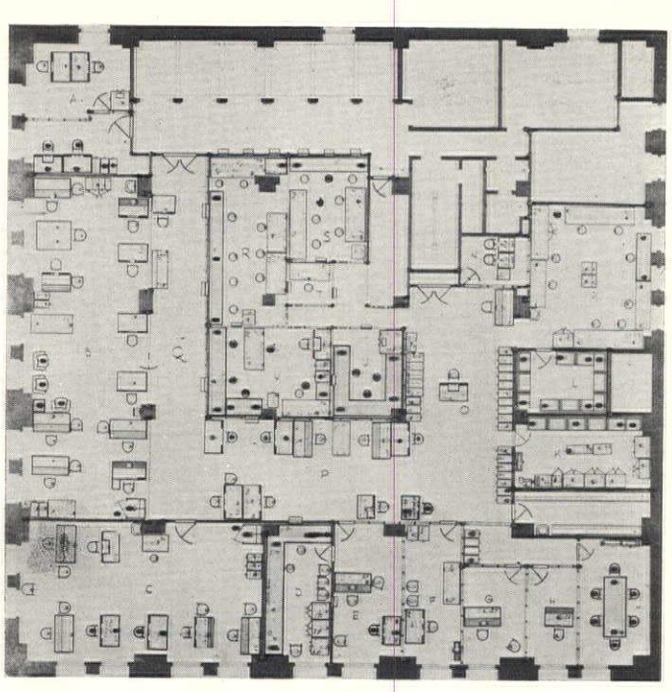
In one building the contractor was permitted to erect typical partitions on the floors not rented at the time he was ready to put up the partitions. On practically every one of these floors it was necessary to remove the partitions and change the position of corridor doors because their initial location had been made with insufficient regard to the needs of prospective tenants. In still a third building, special type, borrowed-light, movable partitions were made standard and stocked. No thought was given to the needs of tenants requiring wickets. As the building caters largely to financial houses, many wickets are required, and many special partitions have been built while large stocks of unused standard partitions are still on hand.

Making tenants' layouts before approval of the final plans for the building may seem fantastic, but this was done in a building in Chicago which is still in the preliminary plan stage. Complete detail layouts, made according to the specifications of a number of actual companies of the class sought as tenants, are being set up on the preliminary plans. To date, one change in the plan has been made, with the tests not yet concluded.

COLLECTION OF DATA. The layout expert's first task is to assemble the essential information. His procedure must be speedy, accurate and comprehensive. The greatest aid is a plan first made of the existing arrangement. This indicates the dimensions of the areas occupied by the different individuals and departments, the location and dimensions of all pieces of furniture, the names of all individuals, and the location of telephones and other communicating devices. With a blueprint of this plan on which all pieces of furniture have been given numbers, a conference is held with the executive and information secured from him regarding expansion, replacement of furniture, general contacts, decoration and other matters. From the office manager or



The prospective tenant demanded a double door main entrance to his space facing the corridor leading to the elevator lobby. The plumbing pipes wrongly placed on the near side of the column prevented this desirable arrangement

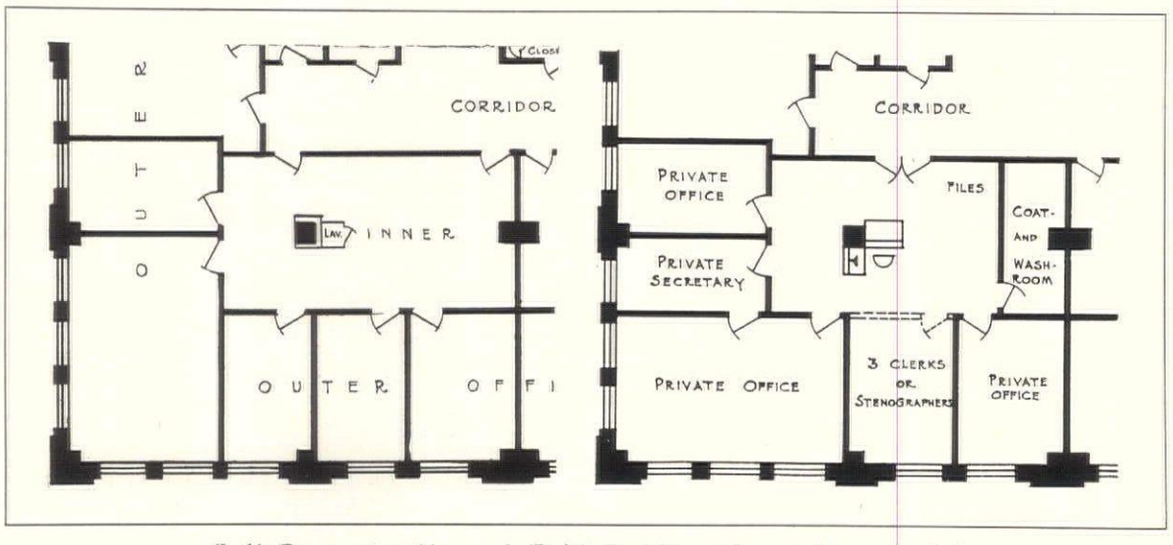


Tenant layouts are made with printed templets of furniture, all kinds of office equipment and partitions made to scale. These templets are shifted about until the plan is satisfactory, the templets tacked in place and the photostat of the templet plan becomes the working plan

from the department heads the details regarding individual contacts, new equipment needed, and other data are secured, all of which is tabulated and summarized.

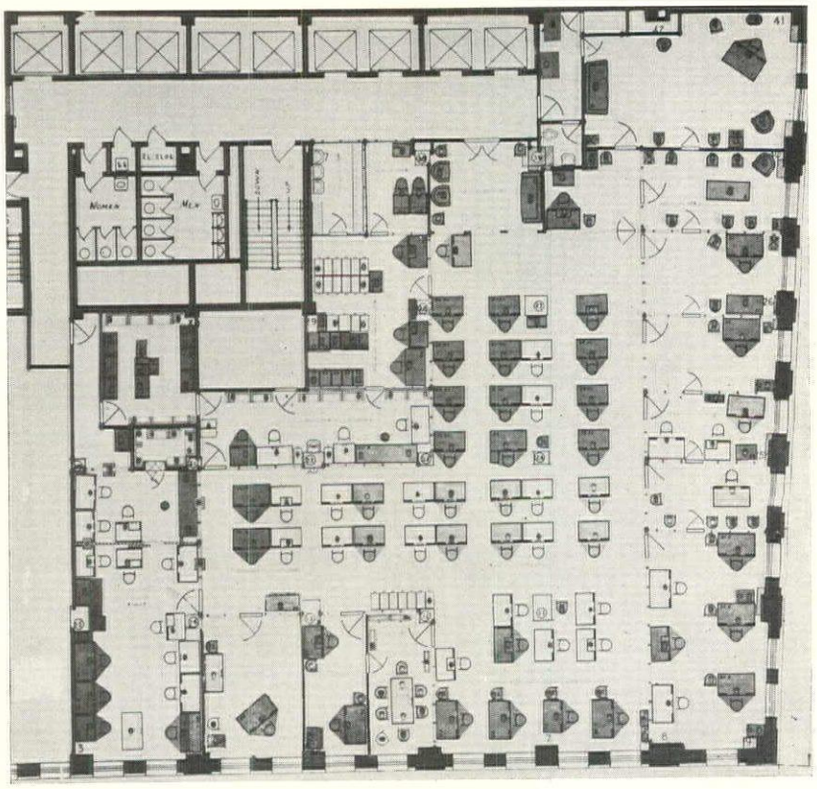
PRELIMINARY PARTITION PLANS. A number of small scale floor plans showing possible arrangements of partitions and other main features in the new quarters are next developed. It is here, and in the next step, that knowledge of the operations of the particular type of business is essential. The most likely of these plans is taken up with the client to determine which in general seems most suitable. Probably revisions of one or two of them are necessary before one plan is tentatively approved.

TEMPLET PLANS. The floor plan finally selected is set up on a layout board on a quarter-inch scale, and templets, representing partitions, door swings and other building facilities as well as furniture, shelving, counters and the like, are moved around to produce the most effective working arrangement. In this process the tentatively approved partition plan frequently becomes unrecognizable, so many changes appearing



(Left) Permanent partitions, and (Right) Final Tenant Layout. Changes required

2 single doors closed up.
2 single doors installed.
1 single door removed.
1 single door changed.
1 pair double doors installed.
2 new partitions installed.
3 old partitions demolished.
1 lavatory removed.



A tenant layout for quarters in an old building. This type of presentation shows the tenant the exact location of the personnel and the office equipment. The method of representation by templets permits the alteration of the plan with minimum expenditure of time and labor

desirable when the furniture and equipment are adjusted to give the best working arrangement. Again more conferences are held and changes made until the ultimate detail plan is decided upon. The locations of telephones, lights, buzzers, tickers and other wire systems are worked out upon the templet board or photostatic prints, and the necessary working drawings are prepared.

TREATMENT OF SPACE. With a very good general idea as to the treatment of the space desired by the client, recommendations are prepared, perhaps accompanied by sketches, photographs and samples, of the wall paneling or surface, cage and rail design, floor coverings, style of furniture, lighting fixtures and the innumerable details that go into the complete furnishing of an office.

At this point the services of the layout expert are almost invaluable. There are so many ways in which the unfamiliar buyer is led to pay too much, to get inferior material or to be misled in one way or another that it is not uncommon for the layout expert to save the tenant a considerable amount.

There are many variations from the procedure described. Occasionally a tenant takes the space as the building prepares it for him and spends little of his own money on decorative features, new furniture and otherwise.

In designing the single-purpose building, the architect can work advantageously with a planning expert. In some cases the latter is called in by, or at the suggestion of, the former to relieve him of the planning of operating arrangements and other details. In other cases the layout specialist is engaged by the client to lay out the operating plan required so that the architect will know in detail exactly what the building is to house, and he will be spared much preliminary study.

The necessity, on account of the cost of office building floor space, of securing its maximum utilization by the tenant has resulted in the development of the layout expert, by exactly the same economic processes that developed the other phases of office building specialists. It is now customary in all well considered building projects to utilize the knowledge and experience of the architect as the coördinator of elements, the realtor, engineers, contractor, financier and more recently the building manager,—all of whom are selected by the owner to best conserve his interests. The tenant, as the source of income, is entitled to the first consideration of all of the parties to the office building project.

THE ENGINEER'S PROBLEMS IN TALL BUILDINGS

BY

LOUIS T. M. RALSTON

CONSULTING ENGINEER

UNDER the several headings of this article an attempt has been made to set forth in brief the important features that confront the engineer who is to design the mechanical and electrical installation in an exceptionally tall building. This outlines all the various problems to be met as based primarily on the result of the preliminary study, design and construction followed in the erection of the Chrysler Building, 43rd Street and Lexington Avenue, New York City, which at this writing is the tallest structure in the world.

On account of the unusually close relationship of the mechanical and electrical equipment with the structural design and planning, as well as their effect on the renting features of a prominent building, it is most essential that a mechanical engineer be retained from the outset of the project and made familiar with all of the problems and aims of the owner, builder, architect and structural engineer. Exceptionally tall buildings must of necessity be constructed on large areas of very valuable property in order to be commercially successful. It is, therefore, only sound reasoning that all of the mechanical and electrical installations should be planned from the viewpoint of ultimate economy rather than low initial cost. This ultimate economy is chiefly concerned with the many features of maintenance, accessibility, appearance, flexibility, maximum usefulness to the occupants of the building and simplicity in operation. The most favorable results can, therefore, be obtained by selecting, as soon as possible, the type and manufacture of materials and machinery to be used and thenceforth working in close co-operation with the architect, steel engineer and real estate interests for a proper arrangement and location of all of these facilities. Present day competition in renting office building space in large cities has made prospective tenants keenly aware of the additional advantages to be obtained in a building where mechanical and electrical installations have not been slighted. In fact, it is a fair statement to make that the building is no better than its mechanical equipment, as only too often a loss in the management of a large building could have been turned into profits with more practical and adequate planning and construction of mechanical equipment.

ELEVATORS

GENERAL REQUIREMENTS. Of primary and special importance is the correct determination of number and capacity and type of elevator equipment. Without discussing in detail the various empirical formulæ and other methods for determining the capacity, travel and number of elevators, it is merely the intention to emphasize at this point that the number of elevators must be ample and lean toward excessive number, rather than lack of possible future capacity. The exact size of hatchways must be determined in close relationship with the structural engineer, so that column locations will not interfere with hatchway sizes and clearances. The best type of modern skyscraper demands and requires the latest safety devices on all elevators and the maximum operating speed that can legally be obtained. All cars should be self-leveling in both directions and have electric type of power door operators to open and close both the hatchway and elevator cab doors. Signal systems must be complete in every detail to insure adequate control of all elevators from a central point in each group. No less than two cars assigned for freight and tenant servicing purposes only should be provided. One of these cars may terminate at the base of the tower portion of the building, and the other car travel to the uppermost story. Both of these service cars should also travel to the lowest story in the building. Consideration should also be given to installing supplementary shuttle elevators in the extreme top of an exceptionally tall building, but this decision must be based on an accurate knowledge of the type of occupancy of the upper portion of the building.

MACHINE ROOMS. After the elevator grouping and hatchway sizes and locations have been determined, the machinery rooms at the different levels must be planned so as to give ample interior space with as little interference as possible with other building facilities, such as stairways, corridors and toilet rooms. These machine rooms should be thoroughly soundproofed as should all portions of hatchway enclosures, which are

adjacent to rentable areas. It is also recommended that elevator machine rooms be finished with tile wainscot, painted floors, plastered walls and ceilings and that all foundations and machines be painted in decorative colors. Under no consideration should any pipe lines carrying water, drainage or steam be passed through any elevator machine room. It is also recommended that in the room containing the controllers a spare controller panel fully equipped, but not connected, be provided so as to furnish a ready replacement of any required spare parts. The ventilation, both as to the introduction of fresh air and exhaust of heated air, must be given particular study. Where motor generator sets are to be installed, it is often found to be economical to group these in large groups in the pipe floors rather than sacrifice additional machine room space at rentable area levels.

ACCESSORIES. Other elevator problems to be met, include the planning of hatchways for possible future private elevators to serve large tenants, such as banks, brokers' offices, automobile or furniture showrooms, private clubs, safe deposit companies and similar purposes. In addition, it is important that only the very best type of elevator ropes are used; that adequate size and number of directional signs are provided, locations determined in co-operation with the architect for all main floor panels required in connection with signal equipment; heavy and securely bracketed guide rail construction; type and arrangement of guide rail lubricators, mileage and trip recorders, arrangement for night service and holiday passenger elevators; a scheduling device for speeding up of cars from terminal floors; telephone system in all cabs and machine rooms and the lining of all hatchways with a suitable construction, preferably metal facias. Finally, only the best type and construction of elevator entrances should be used. This applies particularly to the cab and hatchway doors and hangers. Tight fitting hatchway doors accurately mounted in easy operating position have shown, as result of test, a considerable lessening of strong upward drafts and the ability to decrease radiation on account of better class and workmanship on elevator entrances. The use of center opening single speed solid panel doors is recommended. It is only fair to say that the popularity of an office building can be directly traced to safe, rapid and comfortable vertical transportation.

CHRYSLER BUILDING PLANT. In planning the Chrysler Building, full consideration was given to the design of the elevator plant, and it was decided that the elevator service, which would be provided for the tenants, would be the very latest and most improved type available, as this building is not equaled in height by any business structure in the world.

OPERATION. The elevators selected are of the unit multi-voltage type, having automatic signal-control operation and self-leveling equipment. The operation of these elevators is entirely automatic after the closing of the hatchway door is initiated by the elevator attendant, the following being a brief description of the cycle of operation: As each passenger enters the car at the ground floor, he announces the floor at which he wishes to alight, and the elevator attendant presses buttons in the car corresponding to all of the floors desired. When the starter's signal is given, the elevator attendant initiates the closing of the doors and the cycle is repeated at each floor for which a button has been pressed. If a prospective passenger at an intermediate floor desires to ascend and has pressed the hall button corresponding to that direction, this call will automatically be registered on the controlling equipment and the first elevator traveling in that direction will stop automatically for him, even without previous knowledge of the car attendant. On the descending trip, the car will automatically stop at each floor for which a down hall button has been pressed, also at any floor for which the operator may have pressed a car button as desired by any passenger in the car. The self-leveling feature provides exactly level landings at all floors automatically, and this level landing is maintained at all times without regard to change in load on the platform or stretch of ropes.

ELEVATOR SCHEDULE. The following schedule indicates the number, capacity and speed of the elevators installed in the Chrysler Building:

Group	No. of Elevators	Floors Inclusive	Rise Feet	Capacity Pounds	Speed FPM	Future Speed
Local	8	1st to 12th	126	2500	700	....
1st Express	8	12th to 26th	283	2500	700	800
2nd Express	6	26th to 44th	478	2500	700	900
3rd Express	6	44th to 57th	621	2500	700	1000
Tower Shuttle*	2	57th to 71st	162	2000	700	....
Service	1	Boiler to 23rd	....	3000	700	....
Service	1	Boiler to 67th	....	5000	700	....
Service	1	Sidewalk	....	.....	...	.....

*Starts from 57th floor; all other passenger elevators start from the first floor.

All of the 28 main passenger elevators have car platforms about 7 feet wide by 5 feet, 6 inches deep. All hatchway openings and cars are provided with center opening, single speed, solid panel doors arranged to provide a clear entrance 3 feet, 6 inches wide.

ELEVATOR DOORS. The doors are opened by electric power and closed by spring action, with separate oil checks for opening and closing on each pair of doors. Each elevator is provided with a single operating door engine on top

of the car, equipped with an electric motor and brake. The doors are arranged to open in about one second and to close in about one and one quarter seconds. All doors are interlocked with the self-leveling operation so that they cannot be opened until the car is close to the landing and moving toward it at the slow speed of the self-leveling control. All hatchway doors must be closed before the elevator can be started in either direction away from the landing. The solid, flush type car doors are much safer, quieter and more substantial than gates, and they have the additional advantage of removing the psychological effect of high speed on the passengers as the inside of the hatchway is not visible until the car has arrived and stopped at a landing. All doors are arranged to be manually operated in case of an emergency.

OPERATING DEVICES. The car operating devices are located on the front return panel of the car, directly adjacent to the door opening and within easy vision and reach of the elevator attendant. They are all contained in a single panel, and consist of push buttons for each floor served, operating lever, emergency stop switch, by-pass switch, emergency door operating switch, leveling speed operating switch, fan, light and remote control reversing switches. All cars are provided with illuminated, multi-light floor position indicators, located over each car door which indicate the position of the car in the hatchway by means of illuminated numerals. By means of these indicators, the passengers and attendant are informed of the location of the car in the hatchway and the floor at which it is stopping, so that the passengers may be prepared to leave the car without delay when the door is opened. All of the main elevators are provided with an inter-communicating telephone system, with instruments in each car and each penthouse, connected with master telephones at each starter's section and the engineer's office.

In the ground floor lobby of each group of elevators, a motion and position indicator is provided, by which illuminated numerals indicate to the dispatcher, the location and direction of travel of all cars in the group; and combined with this indicator is a waiting passenger indicator, which shows by illuminated numerals, the floors on which buttons have been pressed to call the cars. These numerals remain illuminated until the calls have been answered. An additional panel is located on the opposite lobby wall, which contains the necessary dispatcher's operating switches, call back buttons, and scheduling device control. This equipment gives the dispatcher complete control of all cars in the group. Scheduling devices are provided for dispatching the cars from the terminal landings at suitable intervals. Two jewels are provided in each car operating panel, one for "Up" and one for "Down," and are connected with the automatic scheduling device which signals to the operator the proper time for leaving the terminal landings. The intervals between cars are readily adjustable by the dispatcher. A novel design of triangular hall-waiting passenger lantern is provided for each hatchway door. When any car is stopping at a particular landing, the corresponding hall lantern is illuminated by a green light for the "Up" direction and a red light for the "Down" direction. The lanterns are always illuminated at a landing where a stop is to be made, regardless of whether the car is stopping in response to the pressing of either car or hall buttons. The lanterns are also provided with single stroke bells, calling the attention of the passengers to the stopping elevator, so that they may readily place themselves in front of the doors when they open, thus avoiding delay.

The building is equipped with several service elevators of the unit multi-votage, self-leveling, car switch control type. One of these elevators is arranged to travel from the boiler room to the 23rd floor, serving all floors through that zone, the other service elevator being arranged to travel from the boiler room to the 67th floor, serving all openings through its entire travel. Both of these elevators have a capacity of 3,000 pounds and operate at a speed of 700 feet per minute. The high rise service elevator is also arranged for a safe lifting capacity of 5,000 pounds. Both of the service elevators are provided with Up-Down flashlight annunciator systems connected to push buttons at each landing. In addition, the building is also equipped with one short rise freight elevator and one sidewalk elevator. All of the machines for the 30 passenger elevators, and two service elevators are of the direct drive, gearless traction type, but the machines for the short rise freight and sidewalk elevators are of the worm geared type.

STRUCTURAL STEEL

DURING the entire period of preliminary and final design of the mechanical and electrical equipment for the Chrysler Building, a very close contact was maintained with the office of the structural engineer, which resulted in considerable saving of time and a better understanding between the several offices involved. A matter that was settled first was the correct spacing and loca-

tion of all columns to provide correct arrangement and size of elevator hatchways and elevator entrances. This problem was determined on the basis that the vertical transportation in such a high building was of primary importance and that all other arrangements, both of structural design and architectural design, must be made to conform to the best possible elevator installation. An accurate schedule of location of all mechanical equipment and the weights thereof, was furnished to the structural engineer and, in addition, the detail of all vertical pipe shafts, conduit shafts and ventilating shafts. On account of the extreme height of the Chrysler Building certain groups of riser lines, adjacent to certain columns, are of sufficient weight to make necessary the consideration of this load in computing the column sizes. No mechanical or electrical plans were released for estimating purposes until they had been checked in detail against final structural plans and all necessary adjustments between these two sets of drawings completed. Particular attention was also paid to the arrangement of columns and framing to provide means of entrance and erection for a possible future boiler plant. A special study and detail drawings were also prepared for the steel smoke flue, which was erected from the sub-cellar to the top of the building. Although the possibility of a power plant ever being installed in this building was felt to be remote, it was considered the best policy to provide a metal chimney. This chimney can be used for other purposes until the boiler plant, if any, is installed. Particular attention was paid in designing and locating the future boiler flue to provide for adequate insulation and accessibility. In no case throughout this building were any of the structural steel members pierced by pipe lines or ventilating ducts, and it was necessary to pay particular attention to proper overhead clearances.

SPECIAL SERVICE FLOORS

ON account of the increased rents obtainable in the tower portion of the Chrysler Building it was necessary to secure the maximum rentable floor area by reducing the areas used for equipment to a minimum. To accomplish this purpose, the entire 30th and 60th floors were assigned as "Service Floors." The 30th floor is at the base of the tower and the 60th floor at the base of the tapering dome. The offsets at these places necessitated very heavy steel girders which would affect the headroom in rentable areas. The introduction of these intermediate "upstairs cellars" made it possible to keep the entire portion of the rentable spaces in the tower free from equipment, with the exception of one intermediate fire pump and fire storage water tank. These two levels were used as spaces for heating distribution pipe systems, electrical transformer vaults, elevator motor generator sets and elevator hoisting machines, hot water generating equipment, exhaust fans, drinking water cooling equipment, water storage tanks for house supply, hot and cold water piping distribution systems, plumbing, drainage and vent piping, and other minor miscellaneous equipment. In addition to releasing valuable tower floor area, these intermediate service floors centralized all of the equipment and provided accessibility and easy inspection without possible disturbance to tenants, and also permitted the special sound-proofing treatment of these floors. The service elevators only stop at these floors. The chief operating engineer's office is located in the lowest level, known as the cellar. All indicating devices are placed on the walls of this room, which is centrally located so as to afford a view and be in close proximity to all sub-basement equipment spaces, such as the electric switchboard room, transformer vault, tank and pump room, fan room, refrigerating machine room, vacuum cleaning equipment room, telephone switchboard room, steam meter room, sprinkler alarm valves, etc. In this room are located wall mounted boards containing recording devices, meters, gauges and alarms for all fan motors, house and fire pumps, house and fire tanks, pneumatically operated valves on the heating system, steam pressure gauges, exterior and interior dampers, etc.

PLUMBING AND FIRE SERVICE

PRELIMINARY STUDIES. The Chrysler Building is the first skyscraper to be constructed in New York City which is equipped with a fire protection system as required under the latest revised city code. The locations of all tanks on intermediate floors for storage of water for either house supply or fire system supply were definitely located and locations also selected for all intermediate house pump and fire pump rooms. A preliminary riser diagram sketch was also prepared showing the relative location of all general toilet rooms for men and women on each floor. From a study of this diagram, several changes were made in the floor plan, which materially decreased

the cost of the plumbing work so that these general toilet rooms could be placed as nearly as possible above each other throughout the building. Also it was a simple matter to locate and size all pipe shafts and to indicate which stories should have greater floor to floor heights to accommodate horizontal piping systems. Access doors to all vertical pipe shafts were provided at frequent levels and all shafts were floored over at every floor after the pipes were in place to prevent any up drafts or hazard from fire. This feature also provides easier and safer future working conditions. Suitable suction tanks were located in the lowest basement level for both fire reserve and house supply.

WATER AND FIRE SERVICE. All tanks were hoisted into position during the erection of the steel super-structure. All fire pumps were selected in strict accordance with the new code and for the severe pressure conditions encountered. All piping on the fire standpipe system was constructed of double extra strong pipe and fittings up to the 14th floor of the building and from the 14th floor to the 30th floor of extra strong pipe and fittings.

Cold water supply for the building is pumped from the sub-basement suction tank to an intermediate house tank on the 25th floor. This tank is used as a suction tank to supply a house pump on the 23rd floor, which pumps to an intermediate house tank on the 46th floor, and this tank is used as a suction tank to supply a house pump on the 45th floor, which pumps to the uppermost combination house and fire tank on the 74th floor. These house pumps were designed so that in an emergency they could by-pass any tank which they normally supplied and pump to the tank next above. A spare house pump was also located in the sub-basement which could feed either the house storage tank on the 23rd or the 46th floor. The pump rising lines were sized so that the velocity of the flow of water would in no case be more than 3 feet per second to prevent noise from vibration. Water supply under street pressure was used for all house supply purposes up to and including the 4th floor.

Two hot water storage heaters were located in the sub-basement; one on the street pressure supply system to feed to the 4th floor and the second to supply above the 5th floor. Other hot water storage heaters were located in the pipe service floors at the 30th and 60th floors. All hot water storage heaters were equipped with remote indicating thermometers located in the chief engineer's office and with local recording thermometers. All house and fire tanks were equipped with remote water level indicating devices in the chief engineer's office. Hot and cold water risers were equipped with water pressure regulating valves, so that in no case would the water pressure on any outlet be in excess of 40 pounds per square inch.

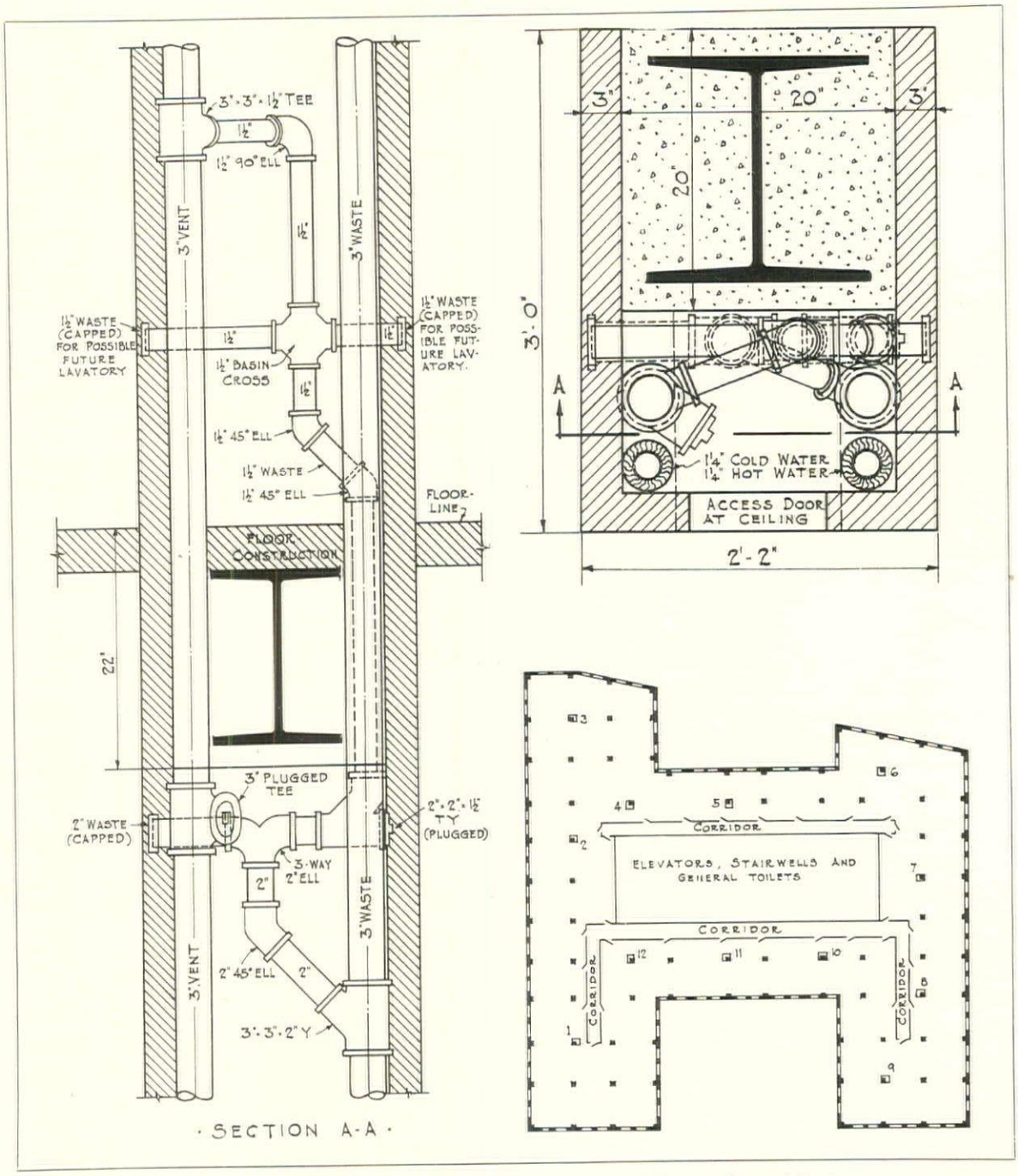
GAS SERVICE. Four 4-inch gas supply risers with plug tee outlets on every floor were installed up to the 16th floor and two 4-inch risers from the 17th floor to the 72nd floor. These risers were run in stair wells on the opposite side from the first standpipe and encased in masonry construction throughout their length.

SPRINKLER SYSTEM. An automatic wet sprinkler system was installed in the entire basement and sub-basement floors complete with central station alarm service. Additional alarm valves and additional risers were installed so that any or all portions of the 1st to 5th floors inclusive could be provided with automatic sprinkler protection in the future. Special type decorative heads are used in all public and tenant spaces.

STREET SERVICES AND BASEMENT WORK. All piping connections from the building to street service mains, such as water supply for sprinklers, fire protection and house demands, sewer connections and gas service connections were awarded as a separate contract to a point inside the foundation walls of the building, in advance of all other work. The plumbing contract started at these points. In the central portion of the sub-basement, a central vacuum cleaning apparatus was installed with a system of large mains distributed on the sub-basement ceiling, feeding risers running up through all floors of the building so as to place vacuum cleaning hose inlet couplings in an arrangement so that any portion of any floor could be reached with a maximum length of 50 feet of cleaning hose. Practically all vacuum cleaning inlet couplings are located in corridors or other locations, so that future subdivision of floor spaces to meet tenant requirements will not necessitate any change in piping. Certain intermediate columns within the rentable area of the building were selected on which to run plumbing stacks to accommodate possible future tenant fixtures.

The drainage from all fixtures on the sub-basement, basement and first floors is handled through a duplex sewage ejector, each with a capacity of 100 gallons per minute. Drainage from all fixtures above the 1st floor is handled by gravity to the street sewers. All horizontal piping in the lower levels of the building was provided with a large number of outlets for future use to accommodate tenancy, such as restaurants, clubs, barber shop, banking space and drug stores.

SERVICE PIPES. All soil, waste, drainage and vent piping on the ejector was constructed of extra heavy cast iron soil pipe and fittings. All waste, soil and drainage pipe on the gravity system was constructed of galvanized wrought iron



Detail of Plumbing Stacks for Future Tenant Fixtures and Location Plan of Stacks

pipe and galvanized cast iron drainage fittings. All vent pipe on the gravity system was constructed of copper bearing black steel pipe and galvanized cast iron drainage fittings. All piping on the vacuum cleaning system was constructed of standard weight black steel pipe and black cast iron drainage fittings. All interior leaders were constructed of black wrought iron pipe and black malleable iron fittings. All gas piping was constructed of standard weight black steel pipe with galvanized malleable iron fittings. All cold water piping 2½-inch and smaller in size was constructed of Muntz metal mixture brass pipe and cast iron pattern brass fittings. Cold water piping 3-inch in size and larger was constructed of galvanized genuine wrought iron pipe and galvanized malleable iron fittings. All hot water piping throughout the building was constructed of Muntz metal mixture brass pipe with cast iron pattern brass fittings. Fire lines were constructed of double extra strong standard weight black steel pipe with steel valves and fittings on the

lower portion and malleable iron valves and fittings on the upper portion.

The illustration shows the method of locating plumbing stacks for future tenant fixtures and the method of roughing in so as to require as little space as possible.

FIXTURES. Urinals in all men's general toilet rooms are vitreous china pedestal type with flush valves. All water closets are extended lip siphon jet bowls with black seats without lids and top inlet and flush valves. All lavatories are vitreous china, 20 by 24 inch, with pop-up waste, separate self-closing hot and cold water faucets and integral individual liquid soap dispensers. A special design was used on all flush valves and lavatory trimmings especially made for this building. All exposed brass work in connection with all fittings throughout the building is chromium plated finish.

All hose reels are set in flush mounted wall cabinets and have chromium plated valves, couplings and nozzles and the cabinets finished to match building standard woodwork. All motors used throughout are of the same type and manufacture. At intake and discharge sides of all pumps and pressure reducing valves, indicating water pressure gauges are installed. Two slop sinks per floor up to the 30th floor are provided in separate tile finished closets and one slop sink per floor above the 30th floor. The number of fixtures in general toilet rooms was computed on the basis of population of one person per 100 square feet of net rentable area and on the basis of one water closet per ten persons and on a basis of three-fifths of the population being male and two-fifths female. Temporary water supply for construction purposes was furnished by means of steel tanks at the same levels as the permanent tanks using temporary pumps and piping connecting them.

STEAM HEATING

WHEN selecting the source of steam for heating, consideration was given to the installation of an independent boiler plant and also to the use of connections to the existing high pressure steam street mains of the New York Steam Corporation. The latter method was adopted. This building is located in one of the most congested traffic centers of a large city and the owners felt that the elimination of trucks for delivering fuel would be an advantage. In addition, the elimination of a large number of employes for operating and maintaining an independent boiler plant would be an advantage. The use of central station steam supply was a considerable saving and advantage for use for temporary heating and steam supply during construction. Consequently, independent mains in two different streets one 10 inches in size and one 8 inches in size bring steam into the steam meter room, at the lowest level of the building, at 130 pounds pressure. These two mains were connected to a common header from which connections were taken through five flow meters discharging into a common header. The initial pressure of 130 pounds was reduced by stages into secondary headers carrying pressures respectively of 80, 40 and 5 pounds. All of the piping work for the street service connections and in the meter room and the various headers was of welded construction throughout, except that flange connections were used at the meter connections.

STEAM DISTRIBUTION. From the 5-pound pressure header in the steam meter room, a circuit of steam mains was run in a pipe gallery around the outside wall of the building in the lowest basement to serve up-feed connections to all radiators on the basement, first, second and third floors. This portion of the building was planned to be used principally for retail stores and display rooms, which would probably have to be heated for longer periods than office spaces and have a separate supply. A separate steam circuit was run in the same pipe gallery in the lowest basement from a connection with the low pressure header to serve up-feed connections for radiators on the 4th to 16th floors inclusive, which comprised the lowest section of the office space of the building. The return mains for each of the above systems were also installed in the pipe gallery in the lowest basement. A circuit of steam mains was also taken from a connection to the low pressure heater in steam meter room to supply the air tempering stacks in the cellar fan room, the returns from which were piped to a separate condensation pump, which in turn discharged the returns to the vacuum pumps serving the rest of the building.

From a connection with the 40-pound pressure steam header in the steam meter room, a main steam riser, 4 inches in size, was run up through the building to supply steam to the heating coils in the hot water generators at the various levels throughout the building, as well as for heating the tank room on the uppermost level of the building. A separate 10-inch main riser connection was taken from the 40-pound pressure header in the steam meter room, which runs up through the building to the 30th floor where a series of pressure reducing valves were provided to reduce

the pressure to 5 pounds, and on the low pressure side of these reducing valves, separate circuits were run in the 30th floor pipe gallery to supply respectively the north and west sides of the building and the south and east sides of the building. These steam main circuits are used to supply steam to down-feed risers supplying radiators on the 29th to 17th floors inclusive, with the returns gathered together separately on the 16th floor ceiling, passed through condensation meters and continued to the vacuum pumps in the cellar.

The 10-inch medium pressure steam riser was reduced in size to 8 inches and continued upward to the 60th floor pipe gallery space, where pressure was again reduced to 5 pounds and separate circuits run to feed the north and west sides of the building and the south and east sides of the building, above and below the 60th floor level. Steam was supplied to down-feed connections to supply the radiators on the 59th to 31st floor with the returns collected separately in the 30th floor pipe space, passed through condensation meters and thence to the vacuum pumps. Separate steam main circuits were used to supply up-feed connections to radiators from the 61st floor to the 75th floor inclusive, with the return mains in the 60th floor pipe gallery where the condensation was again metered separately and thence conducted to the vacuum pumps. All of the steam and return mains were constructed of steel pipe with welded connections throughout. All risers throughout were constructed of wrought iron pipe with screw connections, using extra heavy pipe and fittings for branches to radiator connections.

In addition to the hand-controlled gate valves on all of the several sub-divisions of the medium pressure and low pressure steam and return piping systems, pneumatic valves were also installed, which are operated from a push button control panel located in the basement chief engineer's office. Recording and indicating type thermometers were installed on all hot water generators and steam pressure gauges on high and low pressure sides of all pressure regulating valves with remote indications on a separate panelboard in the chief engineer's office.

All risers through the building were run concealed in furred spaces adjacent to columns on exterior walls. In the tower portion of the building, the risers were installed of one size larger pipe than would ordinarily be the case, as it was believed that the exposed location of these risers would cause a more rapid rate of condensation. All branches from risers to radiator connections were run concealed in horizontal wall chases in the exterior walls. All riser connections from steam mains were equipped with manually operated control valves and approximately one-half of the risers connected with pneumatically controlled valves from the chief engineer's office panel.

VACUUM PUMPS. Three vacuum pumps were installed in the cellar, to which were connected all of the return mains from the several systems. These pumps were arranged in one duplex unit and one single unit; the combined capacity of the duplex unit being two-thirds of the load. The discharge from these pumps was carried through pre-heaters serving hot water generators for the lower section of the building located in the same room with the vacuum pumps. All medium pressure and high pressure drips and returns were conducted to a separate high pressure drip tank and thence to the vacuum pumps. The discharge from the pre-heaters was then passed through a condensate mixing tank thermostatically controlled and thence to the street sewer having a temperature not in excess of 100 degrees Fahrenheit.

HEATING EQUIPMENT. With the exception of the first floor entrance lobby, copper radiators with steel enclosures, window sill outlet grilles and extended-stem direct control supply valves were used throughout the building. In the first floor entrance lobby, unit heaters discharging through ornamental grilles were used. Two of these heating and ventilating units were installed at each street entrance. The air was recirculated throughout the main lobby, which is three stories in height. All air tempering stacks over supply fans were of low pressure type. One expansion joint was installed on the main medium pressure steam riser between the basement and 30th floor and one expansion joint between the 30th floor and 60th floor, on both the main steam risers and the return risers. Suitably spaced expansion joints were also installed on all low pressure risers. All expansion joints are accessible through large access doors. It might be added at this point that throughout this building there are no open pipe shafts over one story in height, as floors have been carried through all pipe shafts to eliminate all danger of fire hazard. All control valves used on any portion of the steam piping system throughout are brass stem gate valves of 175 pound pattern on lines carrying 40 pounds and less, and 250 pound pattern on lines carrying pressures in excess of 40 pounds. The valve chart for this building has been put in the form of a pocket size pamphlet, which, in addition to giving all descriptions, locations and purpose of valves, also contains complete information on location, size and capacity of all vacuum pumps, hot water heaters, compressors, tanks, pre-heaters, fans, motors and a general description of the arrangement and control of each of the several heating systems.

In addition to the gauge board, containing the distant recording and indicating equipment in the chief engineer's office, supplementary gauge boards are also installed in the 30th and 60th floor pipe spaces for indicating the steam pressures, temperatures, etc., for the equipment located in these spaces.

HOT WATER HEATERS. Five hot water generators are used to supply hot water to the fixtures in this building; two of these heaters are located in the cellar steam meter room; one to supply hot water for all outlets up to the 3rd floor inclusive, and one to supply hot water for all outlets from the 4th to 23rd floor, inclusive. The 25th floor heater supplies from the 24th to 45th floors, inclusive; the 47th floor heater supplies the 46th to 59th floor, inclusive, and the 60th floor heater supplies the 60th to 75th floors, inclusive. The three uppermost heaters have a heating capacity of 300 gallons per hour, the low level heater in the cellar a heating capacity of 450 gallons per hour and the intermediate rise heaters in the cellar, a heating capacity of 725 gallons per hour. All heating capacities are based on the temperature rise of 140 degrees Fahrenheit with steam service at 40 pounds gauge.

METHOD OF COMPUTATIONS. In computing the sizes and distribution of radiators for this building, particular attention was given to the flue action caused by the height of the building and the numerous large elevator shafts. This served to greatly increase the size of all radiators up to the first pipe gallery level on the 30th floor, but above this level no addition was made to the size of radiators for this cause. All main corridors of all intermediate floors are heated. The tower portion of the building, above the 30th floor, is calculated for radiator size in accordance with the factors set out in the following table; the factors are based upon a heat emission of 240 B. T. U.'s per square foot of radiation per hour, with a final inside temperature of 70 degrees with an outside temperature of zero.

The two figures indicated under "Wall" refer respectively to the insulated and uninsulated sections of the exterior walls. The three percentages listed under the column headed "Wind" are respectively north, west and east. The column headed "T. D." is for through draught effect.

HEATING FACTORS—CHRYSLER BUILDING

	Wall	Glass	Exp. N.	Exp. S.	Exp. E.	Exp. W.	Flue Action	Wind	T.D.	Roof
1st floor.....	10	3	+25%	0	5	10	30%	.....	..	..
2nd to 10th floor	10	3	35	15	25	35	30	.....	..	..
11th to 16th floor	10	3	35	15	25	35	20	.....	..	..
17th to 18th floor	10/30	3	35	15	25	35	15	.....	10%	..
19th to 23rd floor	10/30	3	35	15	25	35	15	.....	10%	13
24th floor.....	10/30	3	35	15	25	35	10	.....	10%	13
25th to 26th floor	10/30	3	35	15	25	35	10	.....	10%	13
27th to 29th floor	10/30	3	35	15	25	35	..	15-10-8	..	..
31st to 54th floor	10/30	3	35	15	25	35	..	15-10-8	..	..
55th to Top floor	10/30	3	35	15	25	35	..	15-10-8	..	..

The total direct equivalent radiation load in this building is 135,500 square feet for direct radiation and an additional direct equivalent of 44,360 square feet for air tempering stacks and air heaters, making a total direct equivalent load of 179,860 square feet.

VENTILATION

FRESH AIR. The lowest level of the building is given over to a large fan room divided into two sections, namely—one for fresh air supply fans and air conditioning apparatus, and the second for exhaust fans. The main fresh air intake is of approximately 150 square feet of cross sectional area with air taken in at the third floor level at the northeast corner of the building, and carried vertically downward to a tunnel cut out of solid rock under the basement floor leading to the supply fans in the fan room. All air is passed through air pre-heaters before going through automatic filters to air pre-heaters ahead of the supply fans. Tempered filtered fresh air is supplied by two separate fans for the cellar floor, each with a respective exhaust fan. The basement floor immediately above the cellar floor is given over to retail stores, banking space, barber shop and restaurant. A separate supply and separate exhaust fan are provided for delivering fresh tempered, filtered air to the kitchen section of the restaurant. The balance of the basement floor, together with approximately one-half of the 3rd floor, is served by two air-conditioning units.

EXHAUST FANS. In the 30th floor pipe gallery, two exhaust fans are provided for exhausting all toilet rooms and slop sink closets from the cellar to the 29th floor, inclusive. In the 30th floor pipe gallery, an exhaust fan is provided for exhausting air from all the pump rooms and elevator machine rooms between the 13th and 29th floors, inclusive. Other fans in the 30th floor pipe gallery exhaust air from elevator machinery rooms from the 25th to 29th floors, inclusive; a supply fan for providing special tenant requirements on the 26th to 29th floors, inclusive; and an exhaust fan for this system. The other exhaust fans are placed in the 60th floor pipe space for handling elevator machine rooms, pump rooms, toilet room and slop sink closets above the

30th floor. In the cellar fan room, an exhaust fan is provided for the refrigerating machine room. Other exhaust fans are located on the 74th floor for exhausting air from toilet rooms, machine rooms, etc., above the 60th floor.

Kitchen space exhaust and kitchen range hood exhaust are discharged at the 74th floor into the fire tower court. Machine room, toilet room and slop sink exhaust is discharged at the 30th floor and 60th floor respectively. Each fan on any of these systems discharges in a horiozntal direction to two opposite sides of the building so that prevailing winds will not interfere with efficient exhaust. General cellar exhaust and refrigerating machine room exhaust are discharged on the large roof at the 4th floor level. Future connections and foundations have been provided on the 67th floor for air conditioning purposes to ventilate a proposed club and restaurant at this level. At this writing the preliminary tests indicate that the results are very close to the original calculations and requirements.

SOUNDPROOFING

PARTICULAR attention was given to the design and construction of all foundations and enclosures, adjacent to tenant spaces, for all fans, pumps, elevator machines and any other equipment, which would cause noise or vibration. The rear walls of all elevator hatchways adjacent to possible office space were constructed with 6-inch hollow tile blocks, on the outside wall of which were a 2-inch air space and another wall of 4-inch hollow tile blocks over which was placed a 1-inch thick layer of insulating material and then the plaster finish applied. It is impossible in any office space, adjacent to elevator shafts, to detect any noise from the passing of elevators or counter weights. All elevator machine rooms, or pump rooms, located outside of the pipe gallery floors are equipped with double entrance doors fitted tightly to the door opening at all points. In addition, the floors, walls and ceilings of these rooms are constructed as described above for the elevator hatchways to prevent any sound emanating from them. The elevator machinery itself is further mounted on heavy concrete foundations with cork mats at all bearing points. As described in the ventilating section of this article, special heavy frame foundations with cork mats were used for all fans in addition to greatly increasing the gauge of duct work at all fan connections. Intermediate floor house pumps are in rooms constructed similar to elevator machinery rooms with similar type of foundations. Vestibules are provided at the entrance to all general toilet rooms and the walls are greatly increased in thickness. All flushometers have been carefully adjusted so as to operate with a minimum of noise. Special consideration, as well as preliminary investigation and test, was made on several different types of steam pressure reducing valves with a result that the valves as installed operate without any noise whatsoever.

NON-CONDUCTING INSULATION

ALL pipe lines, tanks, ducts, machinery and equipment have been covered with the best quality of non-conducting insulating materials to reduce thermal losses to a minimum. All pipe sleeves through floor arches are filled for the entire depth with asbestos fibre loosely rammed. Extra heavy built-up covering has been used on all pipe lines exposed to outdoor temperatures, or pipe passing through heating and fresh air chambers. Special types of built-up covering have been applied on all pipes in tunnels, trenches or partially excavated spaces. Cold water supply piping and hot water circulating pipe throughout the entire building, except branches run in floor fill, are covered with sectional pipe covering. All pipe, fittings and flanges of the ice water drinking system are insulated. Fire standpipes are covered as required by the city code. Wherever cold water piping is adjacent to steam piping, it has been covered with built-up covering same as piping exposed to outdoor temperatures. All horizontal runs of soil, waste, drainage and leader piping located in pipe galleries or concealed in furred ceilings, have been covered and finished with a canvas jacket. All tanks have been insulated on the top and all sides, except the bottom.

The entire height of the steel boiler chimney flue; the main fresh air intake tunnel in contact with heated rooms; air re-circulating ducts from lobby unit heaters; connections from air intake tunnels and supply blowers and heater casings; all ducts and branches carrying tempered air; exhaust air ducts, carrying high temperature air, such as kitchen exhaust and elevator machine room exhausts; all supply ducts in contact with outside walls of the building or in contact with the main fresh air intake tunnel; duct work in connection with the air conditioning system, including dehumidifiers, fan connections and casings; high pressure steam piping and all flanges

on high pressure and reduced high pressure piping; all low pressure steam piping and all low pressure steam risers and radiator branches are insulated. A double thickness of covering is used where any steam or return piping passes through unusually cold temperatures.

ELECTRICAL WORK

DISTRIBUTION. In adopting the alternating current feeder network system for the Chrysler Building, 120-208 volts, a radical departure was made from existing practice in greater New York City. Three phase feeders carrying the current at 13,800 volts were brought into the building and extended vertically to four transformer banks located at different floor levels. The secondary conductors from these transformer banks were brought to low tension network switches and thence to the associated distributing main light and power switchboards.

This method resulted in the building load being divided into four parts as follows:

Location of Transfer Bank	No. and Size of Each Bank	No. of Net-Work Switches	Supplies Current for Light and Power to Floors
Basement	5-300 K.W.	6	Cellar to 14th floor
30th floor	5-300 K.W.	6	15th to 46th floor
60th floor	4-300 K.W.	5	47th floor to roof
72nd floor	4-150 K.W.	4	Floodlighting

Aside from the continuity of service, the greatest benefit is in the reduction of the lengths of power and lighting feeders required, thus cutting down the voltage drop and decreasing the cross sectional area. Instead of extending feeders from the cellar to the upper floors which, after allowing for slack, horizontal runs, etc., may total 1500 feet or more, it has been possible to keep them down to a maximum length of 350 feet and an average length of 200 feet. This system of employing high tension feeders and transformer banks located inside the building itself, was a pioneer installation in the eastern states.

Another factor generally not given the importance it deserves is that the voltage drop along a lighting feeder up to the point where tenant sub-metering begins, represents a loss of energy which is recorded as part of the total electric current bill paid by the owner and no part of which he recovers from any tenant. It can be shown that the increased cost of keeping down voltage drop by liberal sizing of feeders amortizes itself almost within the same period of time that the building project does as a whole. In addition, there is the advantage of a steady and uniform voltage free from sudden dips and peaks, evident where alternating current is concerned.

In designing the light and power feeders it was decided to give full and careful consideration to all pertinent and associated factors, such as "skin effect" in the larger sizes of conductors, power factor of the power consuming equipment and devices and to provide a flexible and yet economical grouping of feeders and, most important, secure the proper limiting of voltage drop. In calculating the voltage drop of the different lighting feeders, radical departures were made from the conventionally accepted practice. The objective was to obtain 115 volts, or a voltage as near to that figure as possible, at or close to the ends of the branch lighting circuits. The voltage at the various distributing switchboards throughout the building is maintained at 208 between phases, which corresponds to 120 volts between neutral and any live phase. This then meant that 5 volts between neutral and any live phase or 8.65 volts between the three live phases were to be the maximum permissible voltage drops.

The best copper arrangement was found to be that scheme wherein a drop of 2 per cent, or 4.15 volts across phases, was allowed in the feeders and a drop of 2.6 volts between the neutral and any live phase on the average lengths of branch circuits. A value of 4.15 volts across phases is equivalent to 2.4 volts between phase and neutral; the sum of 2.4 and 2.6 is 5, the total drop desired.

FEEDERS. The 1928 National Electric Code recommended method for calculating feeder sizes for office buildings gave the basic unit as 2 watts per square foot of gross area for the first 10,000 square feet and of 0.7 of 2 watts, or 1.4 watts per square foot, for the remaining area. The Electrical Code of the City of New York required that all feeders be sized on the basis of 6 amperes for every active and spare circuit on all the panelboards supplied by them.

Overshadowing was the question of what is the actual load on a feeder after the building was in service, and what adjustments would be necessary to first adequately supply the tenant with current at proper voltages free from objectionable flickering and satisfying the city code.

It was decided to calculate the size of each lighting feeder by three methods; 1st, the actual possible connected load, 2nd, the New York City Electrical Code requirements, and 3rd, the recommendations of the latest National Electrical Code. The last results were only of academic interest; in almost all cases the sizes of conductors obtained were entirely too small and were not employed.

We get for method No. 1 a cross sectional area of 345,600 C. M., method No. 2, 235,200 C. M. and method No. 3, 162,000 C. M. After making back checks on the actual voltage drops

produced by both a 300,000 and a 350,000 C. M. cable, the size selected was the latter. This permitted of the easy installation of four such conductors in a 3½-inch conduit, kept down the skin effect and reactance to reasonable values, fully complied with the New York City Code, and permitted the use of a 400 ampere switch and 300 ampere fuses on the local switchboard. This last benefit is of the greatest value. It provides a certain amount of excess capacity for the future.

Should a feeder as calculated require more than 600,000 C. M. in cross sectional area it was divided into two sets of conductors, connected in multiple at each end. The question of adequate feeder sizes is becoming increasingly important. Competitive office buildings have resulted in a dangerous decrease in the cross sectional areas of conductors and consequent poor illumination with the certainty that in a few years additions would have to be made to the feeder system.

The employment of a load factor on feeder sizes is a dangerous thing. One need but observe representative office buildings and note how many entire floors are fully illuminated at the same time, particularly in the winter months, to realize that load factors are close to 100 per cent for a good deal of the time.

ILLUMINATION. Much study of the problem of general illumination has shown that for ordinary general lighting purposes, one outlet for every 100 square feet is most satisfactory. This gives a uniform spacing of ceiling outlets on 10-foot centers. For convenience outlets it is customary to locate two receptacles mounted on opposite faces, on each interior column and one on all exterior columns. In some cases fan outlets mounted 6 or 7 feet above the floors are also placed in two sides of each column.

UNDERFLOOR SYSTEM. Floor outlets are necessary in modern offices, and underfloor raceways both for lighting and telephone purposes are universal practice. In the Chrysler Building, two independent grid systems were installed in the floor fill of each rentable floor, providing telephone, low tension, or lighting outlets at almost any desired point.

The bay of 400 square feet is used as the working unit in considering the circuiting of the outlets. While the National Electrical Code and most city codes allow twelve outlets to a circuit, experience has shown that the best practice is to place ceiling outlets on a separate circuit from convenience outlets because of the possible blowing of fuses due to trouble in portable devices and also because of the annoying flicker in the lights due to the starting and stopping of many appliances. Therefore, with the bay our unit and four ceiling outlets per bay, one circuit would normally be allotted to them and another to the side wall and column receptacles. In the Chrysler Building it was decided to provide another circuit for the high tension floor outlets which the bay ultimately might have. Thus, there are three circuits to each 20-foot bay, and one home run conduit also provided.

Tie conduits were placed between bays so that if inter-connection of the circuits of two or more bays is desired, a raceway is available. Since the underfloor circuits feed down from the ceiling junction box by way of column receptacles to the nearest under-floor junction box, and the underfloor system is also tied into panel boxes by means of 1-inch conduits, we have a grid system in floor and ceiling which makes it possible to devote existing circuits not needed in one part of the floor to an unforeseen demand in another area. It was also considered desirable for metering purposes to place all of the corridor and utility space lighting on a separate main feeder. By means of empty tie conduits, the entire core of the building is encircled by a raceway, making it possible for any public lighting circuit to be carried to any of the three panelboards on a floor.

SEPARATE CIRCUITS. In order to give the maximum flexibility we have provided a considerably greater number of separate circuits than the number of outlets require. After numerous cross checks, we arrived at two and one-half circuits per bay as the proper number of panelboard circuits to be provided. This ratio gave us enough branch circuits for the actual circuits in use plus at least 10 per cent spares for future requirements. This does not include the provision for public lighting circuits. We found in satisfying the requirements of the city code voltage drop and standard cable sizes that we could provide the building with nearly 4 watts per square foot, or about twice what we concluded one individual in his 100 foot area could use.

SPARE CONDUITS. In the Chrysler Building, spare conduits were installed in each of three electrical shafts and carried to their respective main switchboards in cellar, 30th and 60th floors. There is space available in one of the shafts to install still more conduits between top and bottom of the building and by means of conduit ties there is a way provided for augmenting service at all distribution points in the building.

SPECIAL DETAILS. Special details of construction were adopted enclosing high tension feeders running up through the core of the building and also for the location and construction of the transformer vaults within the building.

No water, drainage or steam piping was permitted to be run in proximity to any electrical devices. Duplicate feeders are provided for the operation of all of the several groups of elevator machines.

Because the Corrosive action of Water VARIES

these TWO *kinds of* Brass Pipe *are now made*

For HIGHLY corrosive water
ANACONDA 85 Red-Brass Pipe

For NORMALLY corrosive water
ANACONDA 67 Brass Pipe

WHEN water flows from the faucet, it is more than hydrogen and oxygen. It contains minerals or compounds absorbed by water before it reaches the reservoir. These compounds vary. In some localities, they make water highly corrosive—in others, normally so. Even within a 25-mile radius, the water supplies may differ considerably in degree of corrosiveness.

Brass pipe outlasts ferrous water pipe under all conditions. But because of these compounds in water, not all brass pipe alloys give equally satisfactory service everywhere. Continuing its efforts to be of service to architects, The American Brass Company has developed two alloys of Anaconda Brass Pipe to give adequate service under any local water condition.

For normally corrosive waters—Anaconda 67 Brass Pipe. This pipe contains 67% copper. It is guaranteed structurally sound and physically perfect. It is semi-annealed and seamless.

For highly corrosive waters—Anaconda 85 Red-Brass Pipe. This pipe contains 85% copper, and is offered as the best corrosion-resisting pipe obtainable at moderate cost. It, too, is fully guaranteed.

Seventeen years of careful research in the laboratory and in actual use have demonstrated the necessity for and the efficiency of these two brass pipe alloys.

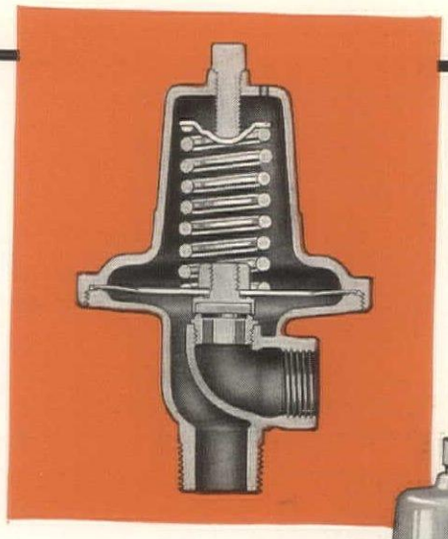
A Service for Architects

The Technical Department of The American Brass Company is prepared to help determine the character of any local water supply and to recommend the alloy of Anaconda Brass Pipe that will best meet specific conditions. The American Brass Company, General Office: Waterbury, Connecticut.

ANACONDA
from mine to consumer

ANACONDA BRASS PIPE

FOR HOT AND COLD WATER LINES



—to make hot water systems safe— MUELLER Diaphragm-Operated Water Relief Valves

MUELLER Diaphragm-Operated Water Relief Valve G-9155

Conforming to the A.S.M.E. Boiler Construction Code and approved by the Underwriters

The danger of explosions from high pressure created in water lines is eliminated with the use of Mueller Diaphragm-Operated Water Relief Valves. Set at a pressure below that of the fixture guarantee, they protect range boilers, automatic heaters, water fountains and domestic hot water systems which are otherwise subject to weakening and leaks from high pressure.

These valves are made to Mueller standards of quality and accuracy—famous since 1857. Their cost is indeed low compared to the safety provided. Write for complete information.

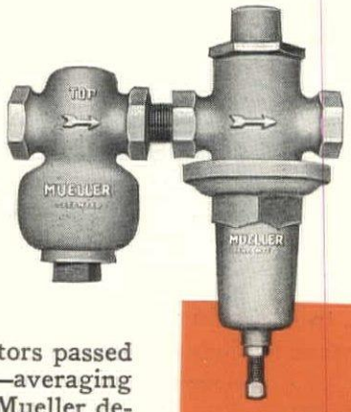
MUELLER

—for protection against high pressure in city mains— MUELLER Pressure Regulators

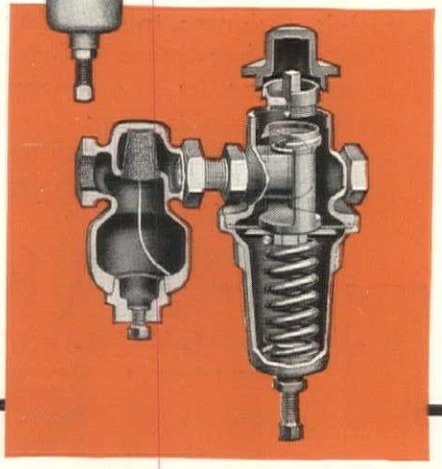
When fire alarms or local conditions call for greater pressure at the pumping station, Mueller Regulators provide ample protection where normal flow is required. Installed on supply lines right after the meters, they prevent water waste, hammering and faucet splashing as well as assuring full volume at fixtures.

In comparative tests, ½" Mueller Pressure Regulators passed as much water as some other makes up to 1¼"—averaging better than twice the capacity! The superiority of Mueller design, the use of virgin metal only, careful workmanship and thorough inspection account for the fact that better than 85% of water works goods carry the Mueller name. Write for complete details.

MUELLER CO. (Established 1857), Decatur, Illinois; Branches: New York, 135th St. and Walnut Ave., Bronx; Chicago, Dallas, Atlanta, San Francisco, Los Angeles; Canadian Factory: MUELLER, Limited, Sarnia.



MUELLER Pressure Regulator G-9000



K3395—New Speakman Anystream Self-Cleaning Shower Head.

LIST PRICE $15.00

(Patented Jan. 2, 1923)

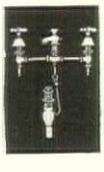
No matter what kind or type of shower is installed this Speakman Anystream Self-cleaning Head should be included

IN addition to being self-cleaning, by means of the lever handle, the new Speakman Shower Head will give a good thorough shower, even with low water pressure.

Also, it enables every person who uses the shower—in residences, hotels, institutions, country clubs, and so forth, to have the shower force each likes best—from a drenching, full-flood shower, to a stinging needle bath.

This new Anystream Self-cleaning shower head (patented) is sponsored by the concern that made the shower the national way of bathing. Literature describing the new revolutionary shower head will be sent promptly.

SPEAKMAN COMPANY, WILMINGTON, DELAWARE



SPEAKMAN
SHOWERS & FIXTURES

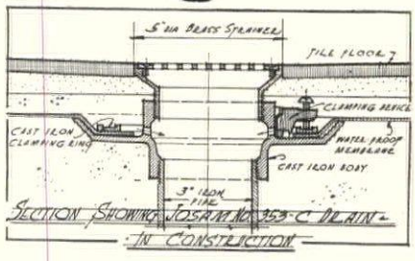
A turn of the lever sluices all sediment away.

Another turn of the lever gives a normal spray.

Here the plungers are set for a forceful needle spray which can be obtained on water pressures as low as ten pounds

And when they decided on the DRAINS

Architects:
Murgatroyd & Ogden, 285 Madison Ave.
New York City
Consulting Architects:
Geo. B. Post & Sons, 101 Park Ave., New York City
General Contractors:
Thompson-Starrett Co. 250 Park Ave., New York City
Plumbing Contractors:
F. B. Lasette, Inc., Long Island City
Roofing Contractors:
Sobel & Kraus., 525 E. 136th St., New York City



Josam came through 100%

Over 500 Josam Drains were installed in the floors, showers and roof of the new Governor Clinton Hotel in New York.

The Josam 300-C, with the clamping device illustrated above, is typical of the numerous double drainage drains installed in the showers of the Governor Clinton.

Josam Catalog G shows the complete line. Have you a copy in your A. I. A. File No. 29 c?

JOSAM MANUFACTURING CO.

Josam Products are sold by all Plumbing and Heating Supply Jobbers

4907 Euclid Bldg., Cleveland, Ohio
Factory: Michigan City, Indiana
Branches in all Principal Cities

SEE OUR CATALOGUE IN SWEETS

There are no substitutes for Josam Products

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

The Josam Line includes: Josam Drains for Floors, Roofs, Showers, Urinals, Garages and Hospitals; Josam Swimming Pool Equipment; Josam-Marsh Grease, Plaster, Dental and Surgical, Sediment and Hair Interceptors; Josam-Graver Floor-Fed, Gas-Fired Garbage and Rubbish Incinerators; Josam Open Seat Back Water Sewer Valves; Josam Open Seat Swing Check Valves; Josam Adjustable Closet Outlet Connections and Bends, Water and Gas-Tight.

EVEN

in handling almost-boiling water...

Hoffman-Economy Vacuum Pumps

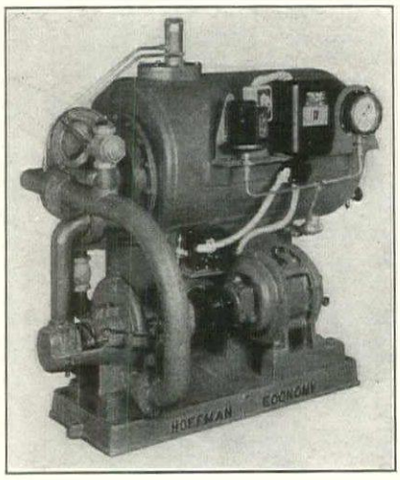
give efficient and Trouble-proof service

Abnormal conditions may not develop on every heating installation, but to make sure of satisfactory performance, equipment should be selected that allows for all contingencies.

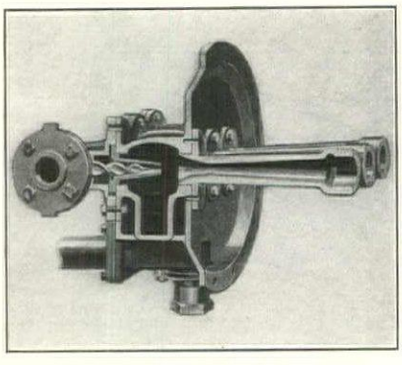
The ability of Hoffman-Economy Vacuum Pumps to handle extremely hot water eliminates one of the most common troubles experienced with such equipment. Positive action in removing air from the system and in returning condensation to the boiler is assured at all times.

The jet type vacuum producer used on Hoffman-Economy Pumps is efficient and trouble-proof. It has no moving parts, never wears out and avoids close clearances on the pump.

Standard Hoffman-Economy Vacuum Pumps "pull" a high vacuum and will operate against 20 pounds boiler pressure. Location of return inlet and float switch close to floor reduces pits and lift fittings to a minimum.



HOFFMAN
ECONOMY
VACUUM
PUMPS

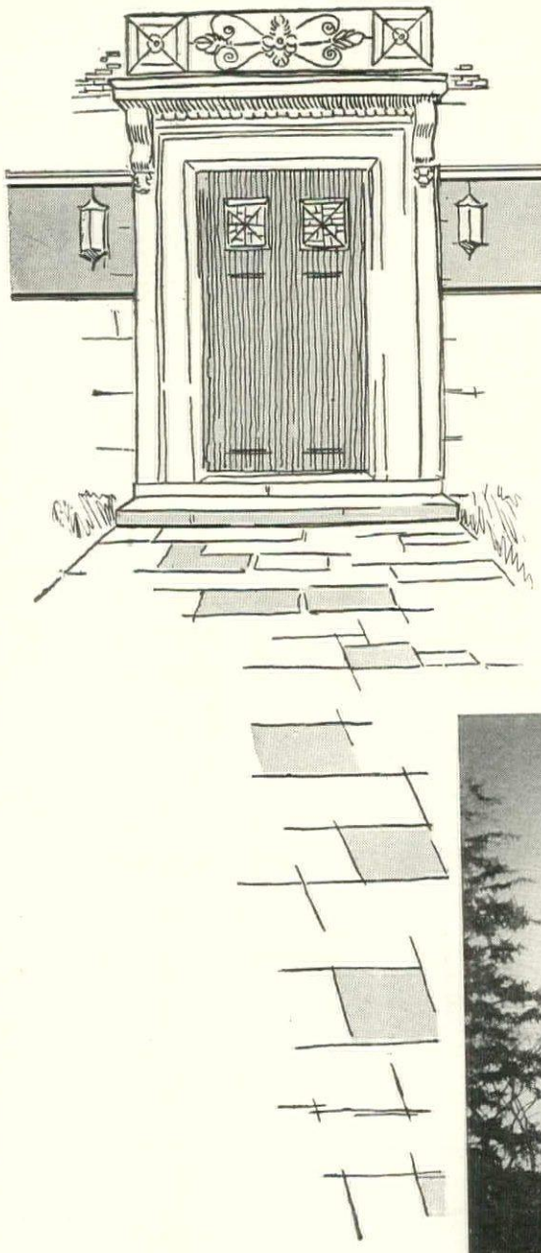


Other types of Hoffman-Economy Pumps are: Horizontal Condensation Pumps, Reciprocating Pumps, Vertical Underground Pumps and Air Line Vacuum Pumps. All units are sturdily constructed, mounted on heavy cast iron base and equipped with motors of standard make and size. Write for complete information. Hoffman Specialty Company, Inc., Dept. EF-19, Waterbury, Conn.

For complete technical information on all Hoffman Heating Equipment, see Sweet's Catalogue, pages D-4815 to D-4874.

* * *

Hoffman-Economy jet type vacuum producer is the simplest and most dependable method for exhausting air and vapor from heating systems.

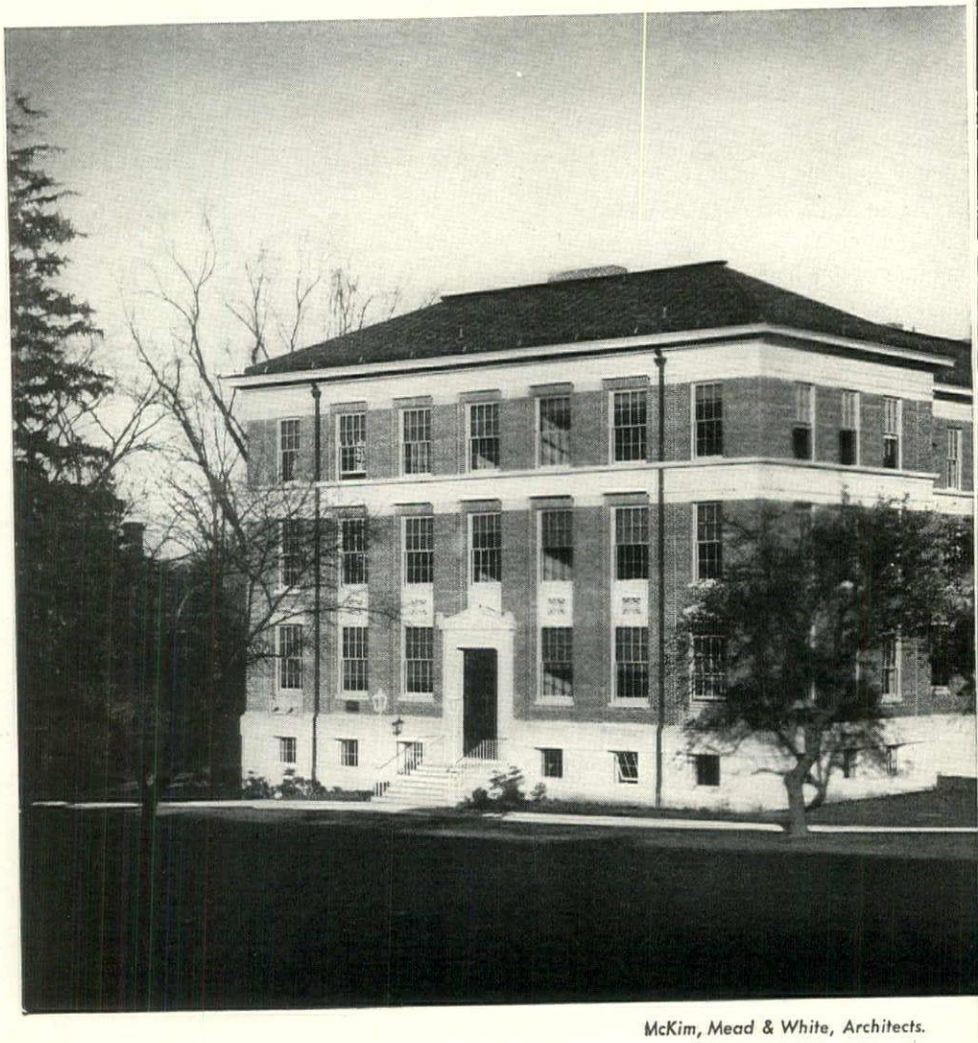


The Endowment

MOORE LABO

Wisely Pro

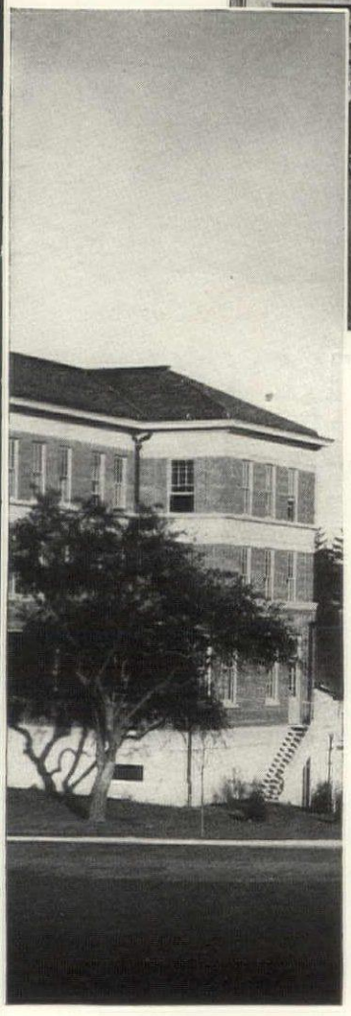
The Moore Foundation for the establishment of the Laboratory of Chemistry at Amherst College carried the stipulation that quality should prevail throughout. This alone would insure the permanency that has been the keynote of Amherst teachings for over a century.



McKim, Mead & White, Architects.

Which Created the RATORY OF CHEMISTRY vided for Leak-proof Drains

One of the laboratories, showing Duriron drain piping hung from the ceiling.



Tenny & Ohms, Engineers.

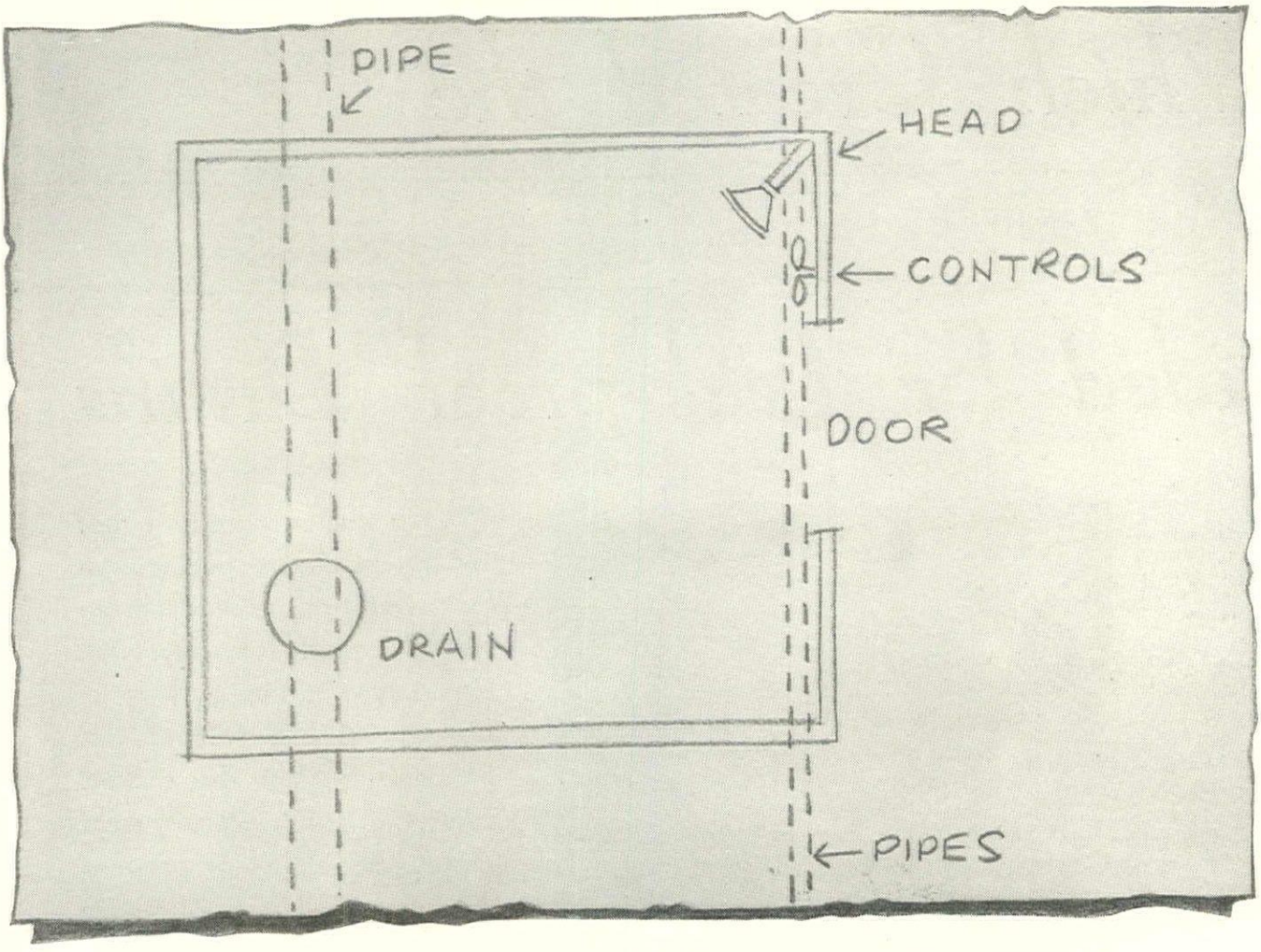
SO it was only natural that the architect's specification for the laboratory waste drain piping called for DURIRON. Not only will the pipe resist all corrosive deterioration indefinitely, but the calked joints, too, are structurally rigid and permanently leak-proof—the latter a definite DURIRON advantage.

The choice of DURIRON is paid-up insurance against building damage due to the leakage of corrosive liquid wastes. It is an ultimate economy. For 17 years a product of The Duriron Co., Inc., Dayton, Ohio.

OUR CATALOGUE IS FILED IN SWEET'S

DURIRON ACID PROOF DRAIN-PIPE

D-42



This Pencil Sketch Made 1,000 Men Cleaner and Happier

Industry everywhere is rapidly swinging to the modern common-sense idea that workers' cleanliness, happiness and health must be zealously guarded in the plant.

For just this reason a large eastern company decided upon a new factory shower bath installation. A Clow Soldier of Sanitation was called in.

His answer was this rough pencil sketch. The ultimate result is an installation that gives the factory's 1,000 men shower facilities that the finest homes cannot equal for sheer practicability.

The shower head is located in a corner to gain the maximum spray area in a minimum space.

Spray is directed against a wall instead of a flimsy door curtain.

Controls are located just inside the door to end reaching through an icy or scalding deluge to adjust water temperatures.

These are simple things. But they help to illustrate how the Clow Soldier of Sanitation does not come in to you merely to show pictures in a catalog. His job is to help you fight ill-health, discomfort, insanitation, pollution and disease.

And to help you achieve this end with the very minimum through-the-years cost.

At his finger tips is the sum total of Clow's 52 years specialized experience—at his back the most complete line of specialized fixtures in the world.

The Clow Soldier of Sanitation is your natural ally on every building job where sanitation is likely to be an acute problem: schools, hospitals, industrial plants, public buildings and the like. Call him in. "Wally." Van B. Claussen, 47 W. 34th St., New York City.

CLOW

CHICAGO

PREFERRED FOR EXACTING PLUMBING SINCE 1878

TESTED IN

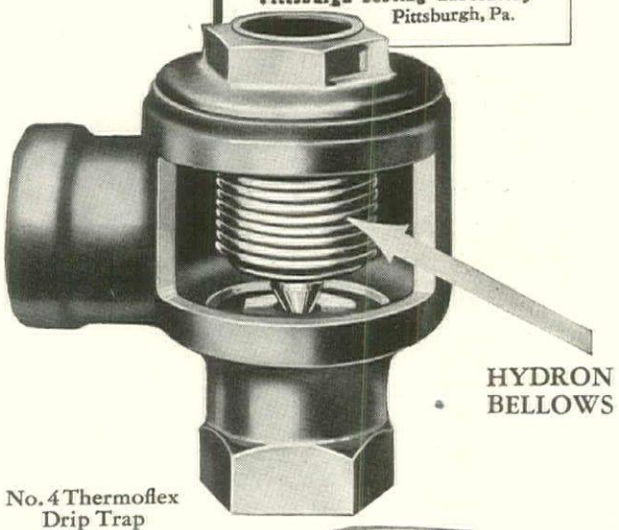
Also certified under operating conditions

To guarantee reliability under operating pressure and temperature, each trap is tested and certified by an engineer of the Pittsburgh Testing Laboratory. He affixes a certificate tag to each trap which passes his test.

Certificate of Inspection

This is to Certify that this **Thermoflex** product has been individually inspected and tested by us, and that this tag is affixed by our engineer as denoting approval in accordance with test requirements outlined on the reverse side of this certificate.

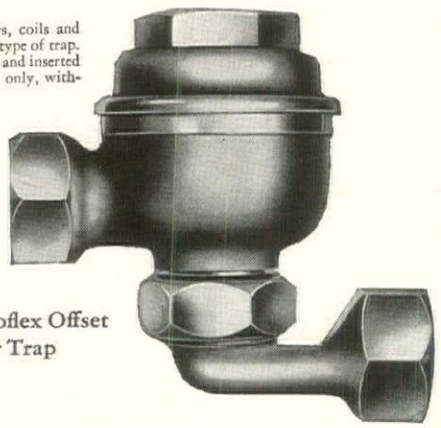
Pittsburgh Testing Laboratory
Pittsburgh, Pa.



HYDRON BELLOWS

No. 4 Thermoflex Drip Trap

For dripping mains, risers, coils and unit heaters, we offer this type of trap. Cast-iron body, bronze cap and inserted bronze seat, angle pattern only, without unions.



No. 3 Thermoflex Offset Radiator Trap

Thermoflex TRAPS

Each Hydron bellows in Thermoflex steam traps is made by internal pressure, which tests its structure infallibly.

If there were the slightest weakness anywhere in its structure the bellows would be destroyed.

Do you know of any device which would be *ruptured and destroyed* while it was being made?

In the Thermoflex trap, the trap with the Hydron bellows, you have a guarantee of strength for each trap on each radiator far beyond any demands in actual use.

Thermoflex is a Hydron *Bellows* Trap

The heart of the Thermoflex trap is the Hydron bellows. This scientifically designed, tested-in-the-making trap is a *proved* trap. It will open and close the drain orifice millions of times a year with *no* signs of giving out. The Hydron bellows is in every Thermoflex radiator trap, drip trap, offset trap, and high pressure trap.

The one trap that meets Grinnell standards

Grinnell Company has discovered in Thermoflex the trap that meets its own exacting standards. It is a discovery of great importance because never before could a trap be pre-tested in its making.

The bellows type trap is the most practicable, the longest-lived trap.

Write for detailed information regarding Thermoflex Traps. Use the coupon on the opposite page.

GRINNELL

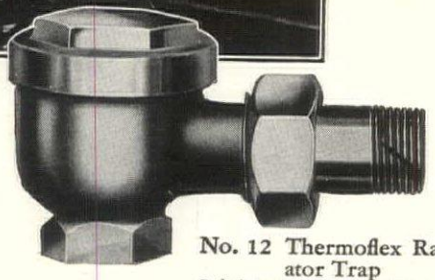
Executive Offices: Providence, R. I.

THE MAKING

Grinnell Company is the exclusive distributor for Thermoflex traps. Years of unfailing service in all types of buildings and under severe and varied conditions have proved their unfailing value, their uniformly high quality, their long efficient service.

Let our sales engineers work with you to insure permanent satisfaction.

No. 100 Thermoflex High Pressure Trap
For pressures up to 125 pounds.



No. 12 Thermoflex Radiator Trap
Body is extra heavy throughout, using a brass forging for the cap and spudnut, highest grade cast brass for the body and spud.

COMPANY

Branches in all Principal Cities

GRINNELL COMPANY, INC.
316 W. Exchange St., Providence, R. I.

I want to read more facts about Thermoflex Traps. Send along your data booklet giving capacities and dimensions.

Name_____

Title_____

Firm Name_____

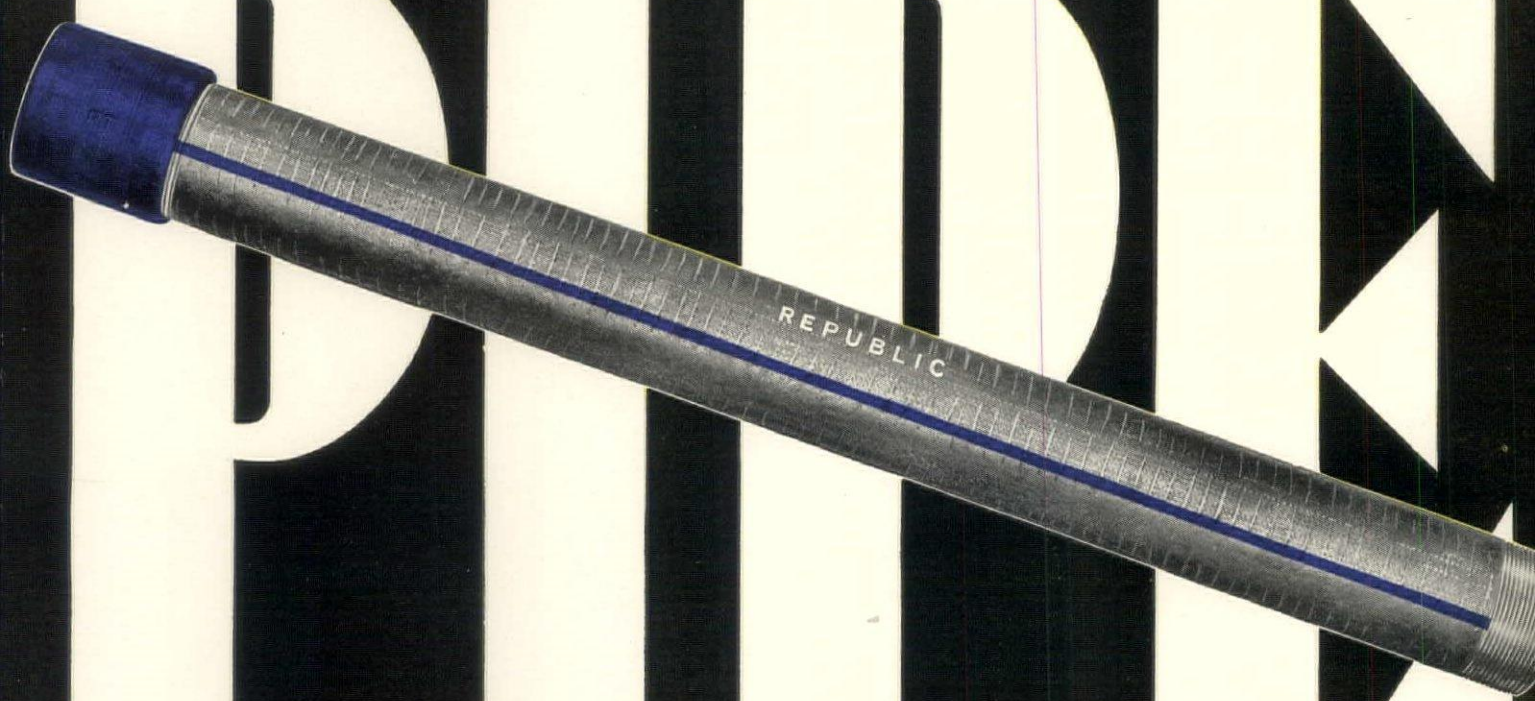
Address_____

REG.U.S.PAT.OFF.

TONCAN

COPPER
MO·LYB·DEN·UM
IRON

PIPE



FOR PERMANENCE

REPUBLIC IRON & STEEL COMPANY, YOUNGSTOWN, OHIO

Pipe for Permanence.

You might think this an appeal—or perhaps a pipe of different character—or the title of a book. As a matter of fact, it is all of these.

Modern engineering practice now requires that you Pipe for Permanence—with Toncan Iron Pipe—and, if you don't know what Toncan is, you can read all about this longer life alloy iron pipe in the book bearing the title "Pipe for Permanence." This new and interesting book should be in the reference library of every architect, engineer, plant superintendent, purchasing agent, technical school—wherever pipe is bought, used or specified for any kind of service. Just a simple exposition of the latest contribution of Science to overcome "This Pipe Problem"—and there's a copy for you all ready to mail upon receipt of your request.

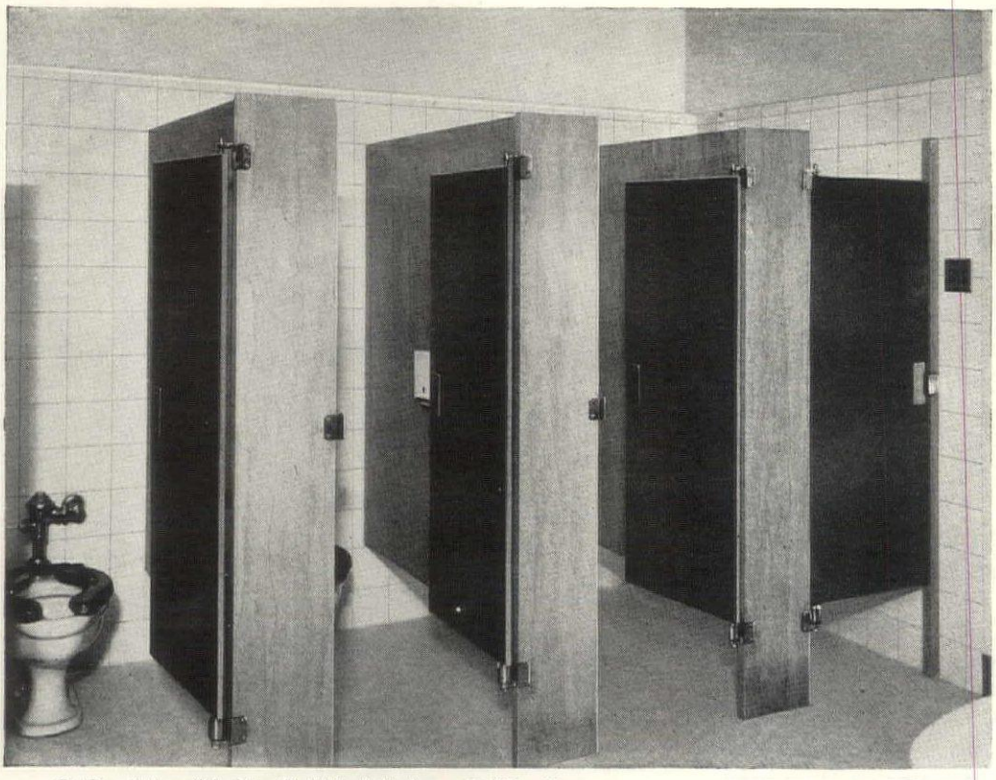
REPUBLIC IRON & STEEL COMPANY

YOUNGSTOWN, OHIO

Birmingham Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit El Paso Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle St. Louis

REG.U.S.PAT.OFF.
TONCAN
COPPER
MO·LYB·DEN·UM
IRON PIPE

As Protection to You, We Mark It BLUE



By Permission of the New York Stock Exchange Building Company

Veneer-Steel
TRADE MARK REG.

IN OFFICE STRUCTURES PARTICULARLY

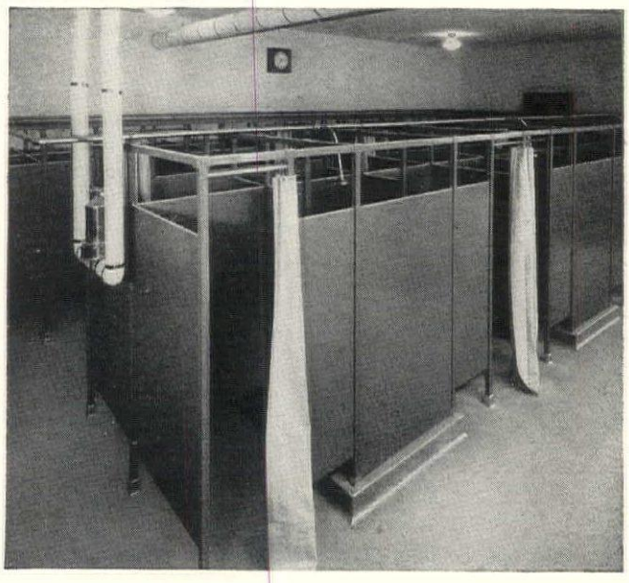
Veneer-Steel sound-proof doors on partitions of marble, structural glass, etc., have found great acceptance in office structures. The hinge used is the famous Hart & Hutchinson ball-bearing gravity type—proved insurance of trouble-proof performance.

. . . DEPENDABILITY HAS BEEN PROVED

VENEER-STEEL Partitions for toilets, showers, dressing rooms—for ward screens and dwarf partitions in hospitals—have thoroughly established their dependability. Here are partitions that will stand up against rough use, time, hot and cold water, and excessive temperature changes.

Veneer-Steel Partitions and Doors are rust-proof, noiseless, non-absorbent and flush-type. They are built of *galvanized* sheets overlaid on a fibre core and cemented thereto with all edges soldered. All posts and wall attachments are sherardized inside and out after fabrication.

Hardware solid white brass buffed bright or pressed brass chromium plated. Because Veneer-Steel Doors and Partitions are solder sealed they are impervious to moisture and cannot absorb or retain odors. Standard finishes for Veneer-Steel Partitions and Doors are olive green and grey. Special finishes and wood grains can also be supplied.



CONCERNING GALVANIZING

W. T. Flanders of the Malleable Iron Fittings Co. says in his book: "GALVANIZING and TINNING"

"IT has not yet been discovered how to regenerate steel. Until such a discovery is made we are compelled to resort to embalming.

"The metallic method of embalming consists of coating the steel with some other metal, and zinc is without doubt, the best protective coating for iron and steel."

Veneer-steel Partitions and Doors are galvanized.

Complete details found in Sweet's or send for bulletins

THE HART & HUTCHINSON COMPANY

BRANCHES IN NEW YORK CITY, PHILADELPHIA AND BOSTON
FACTORY—NEW BRITAIN, CONN. . . AGENTS IN OTHER PRINCIPAL CITIES

NEW JERSEY'S TALLEST

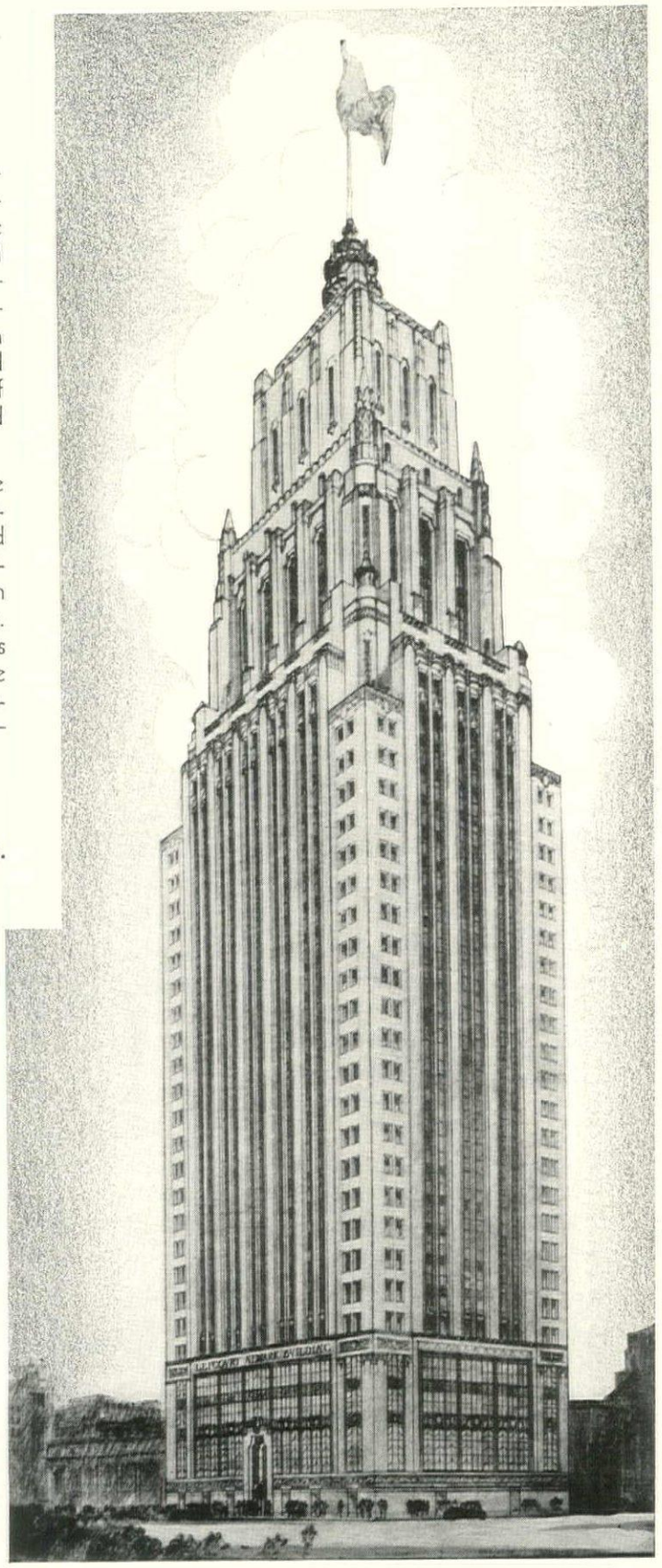
LEFCOURT-NEWARK BUILDING, NEWARK, N. J.
Architect: Frank Grad, Newark, N. J.
Engineer: Eadie, Freund & Campbell, New York City
Plumbing Contractor: Jaehnig & Peoples, Newark, N. J.
Heating Contractor: Schrenell Bros., Newark, N. J.

Unusually effective in interior plan with its commanding and graceful exterior lines, this recently completed building ranks with some of the finest in the land, a structure of which New Jersey may well feel proud. Thirty-seven stories from street to tower—the highest building in the State of New Jersey—the Lefcourt-Newark Building is the latest addition to Newark's skyline. Naturally the architects and engineers, experienced in specifying for some of America's finest buildings, turned to time-tested and quality-proven material.

Thus, as in many previous instances, they chose NATIONAL for the major pipe tonnage. In addition to NATIONAL Pipe for the heating, soil and waste lines, they specified NATIONAL Copper-Steel Pipe for the vent lines and rain leaders as an additional protection against atmospheric corrosion. Many years of experience and numerous service tests have proven that copper-steel pipe gives added life to those lines exposed to alternate wet and dry conditions. Write for Bulletin No. 11, describing—

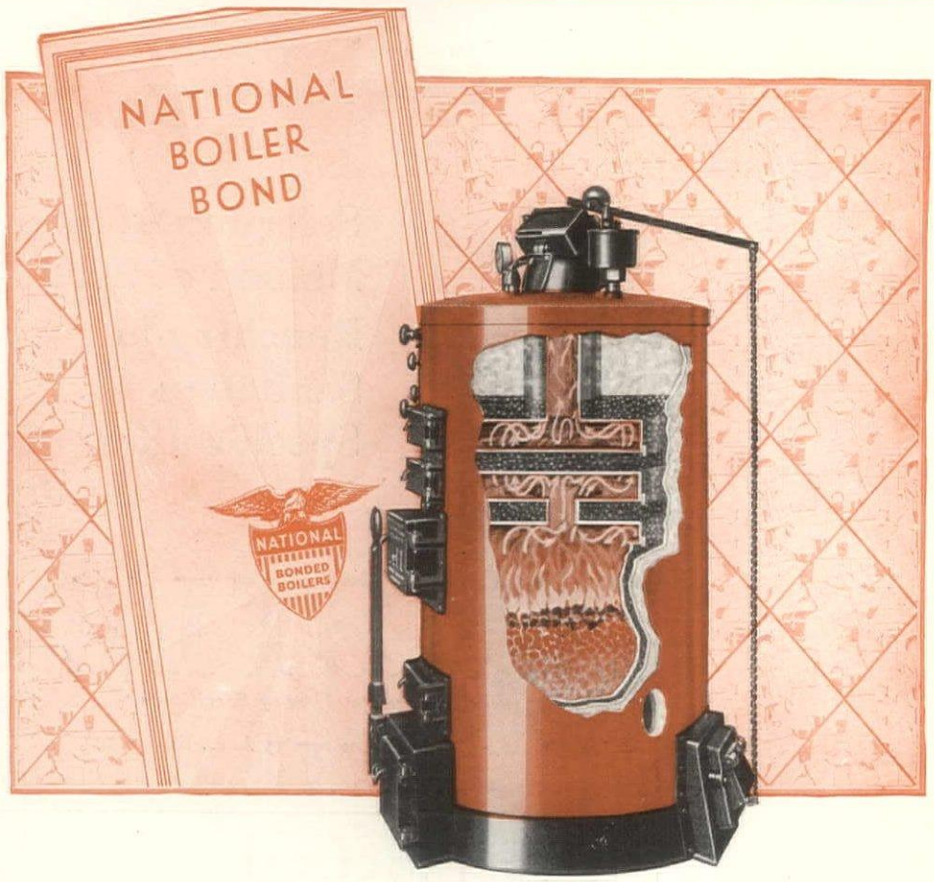
NATIONAL COPPER-STEEL PIPE
The Original Copper-Steel Pipe

NATIONAL TUBE COMPANY—Pittsburgh, Pa.
Subsidiary of United States Steel Corporation



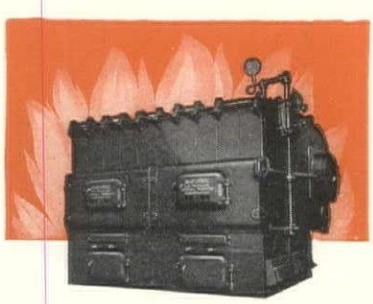
NATIONAL PIPE

THERE'S A NATIONAL HEATING SYSTEM FOR EVERY BUILDING NEED

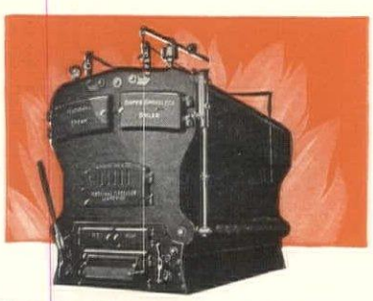


Cutaway view National Crimson Flame Boiler. One of 118 types and sizes.

National Novus Boiler



National Low Water Line Boiler



National Super-Smokeless Boiler

National Bonded Crimson Flame Boiler

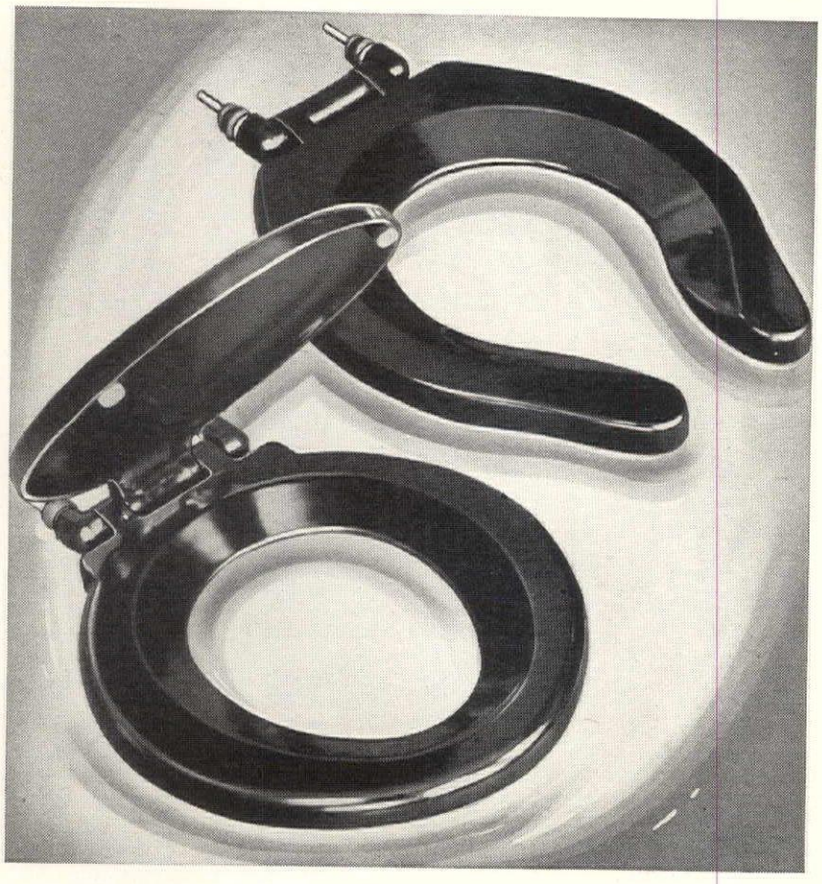
Mushrooms of Flame Bloom Against Each Section

Zig-zagging in and out, the flaming gases take their serpentine way to the stack. They pass through scientifically proportioned, water-surrounded ports, and "mushroom" out over the entire bottom of the section above, before escaping through its ports. The Crimson Flame dependably, efficiently furnishes the flood of friendly warmth which its crimson jacket so vividly promises.

This boiler is designed to perform efficiently with all leading types of fuel; coal, coke, oil and gas. It can be converted on the ground to meet the individual requirements of the fuel selected. Engineering design scientifically coordinates every part to produce economical combustion and thoroughly satisfactory heating. The National Boiler Bond, furnished with each boiler, not only guarantees workmanship, materials, and design, BUT MOST IMPORTANT OF ALL SPECIFIES AND GUARANTEES BOILER PERFORMANCE. We will gladly send additional information.

NATIONAL RADIATOR CORPORATION
JOHNSTOWN, PENNSYLVANIA

NATIONAL *Made-to-Measure* HEATING SYSTEMS



MOLDED IN ONE SOLID, SEAMLESS PIECE —NO EXPOSED METAL FITTINGS

With a hard, glossy smooth surface that is as easily washed as a china dish, Bakelite Molded is a most sanitary material for toilet seats. In addition it has the advantage of being stain-proof and non-inflammable, and so strong that there is little or no chance of splitting, warping or chipping.

Bakelite Molded seats are installed in many important buildings, among them being the State Bank of Chicago, Graham, Anderson, Probst & White, Architects, and the Chicago Medical and Dental Arts Building, D. H. Burnham & Co., Architects. These seats are available in types suited for Hotels, Office Buildings, Factories and Homes, and are made by the San Duro Mfg. Co., Rockford, Ill.

Bakelite Materials are also used for other building equipment including switch and outlet plates, doorknobs and escutcheons, floor plates, lighting fixtures and paneling and trim.

Write to us for a full list with the names of manufacturers.

BAKELITE CORPORATION, 247 Park Avenue, New York. CHICAGO OFFICE, 635 West 22nd Street

BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

BAKELITE

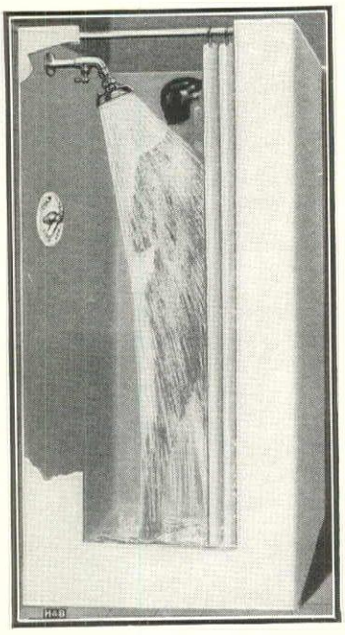
REGISTERED U. S. PAT. OFF.

"The registered Trade Mark and Symbol shown may be used only on products made from materials manufactured by Bakelite Corporation. Under the copyright "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products."

THE MATERIAL OF A THOUSAND USES

NIEDECKEN

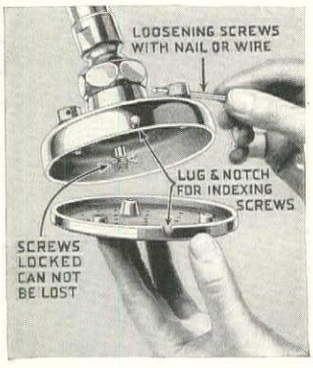
Niedecken Shower Face is radially drilled furnishing the usual generous shower spray with less water: a valuable economy feature



Niedecken Mixer, for shower and tub, is recognized the world over as the foremost in design, construction and efficiency

Positively Leak Proof Shower Stall

Niedecken Shower Stall is made of a continuous 1/8 inch copper bearing steel—which, with the riser, is welded to the bottom: making it positively leak-proof for all time.

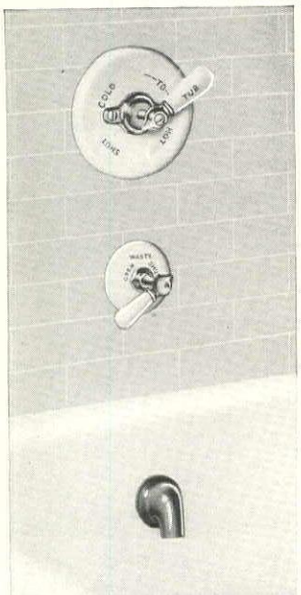


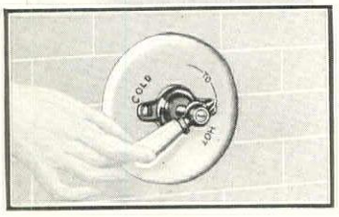
Easy Clean Shower Head

Face of shower head completely removed by simply loosening three screws. After cleaning, face is replaced—a set of notches guiding for correct placement and alignment as when originally assembled.

PATENTED MIXER . . . CONTROL

Patented mixer control, for shower or tub, provides a predetermined maximum hot water temperature. This prevents scalding, and also the waste of water as in ordinarily obtaining the correct water temperature. Also, one valve operates the mixer instead of two, as ordinarily used. Write now for details: acquaint yourself with this new bath advancement, for your own information and the benefit of your clients.

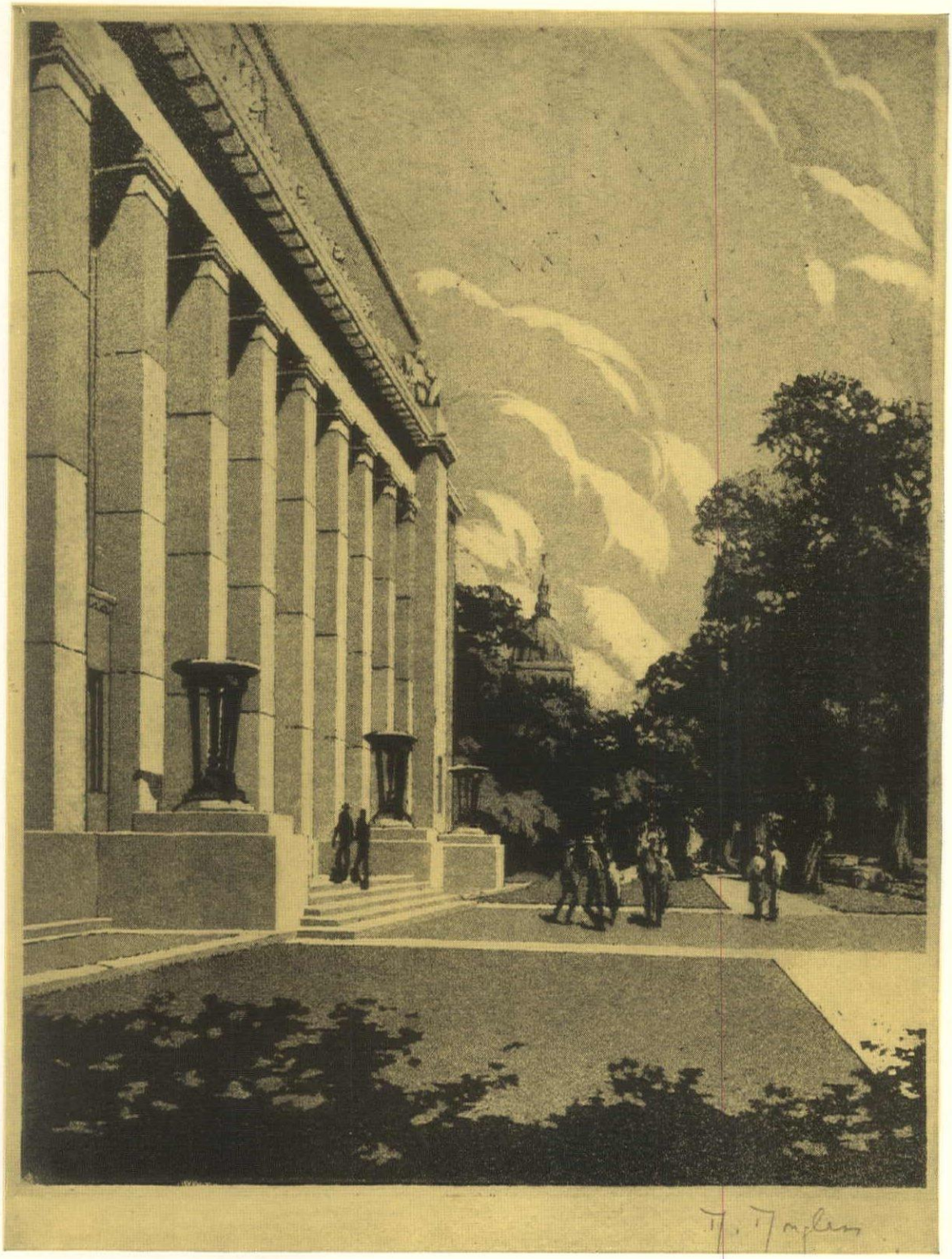


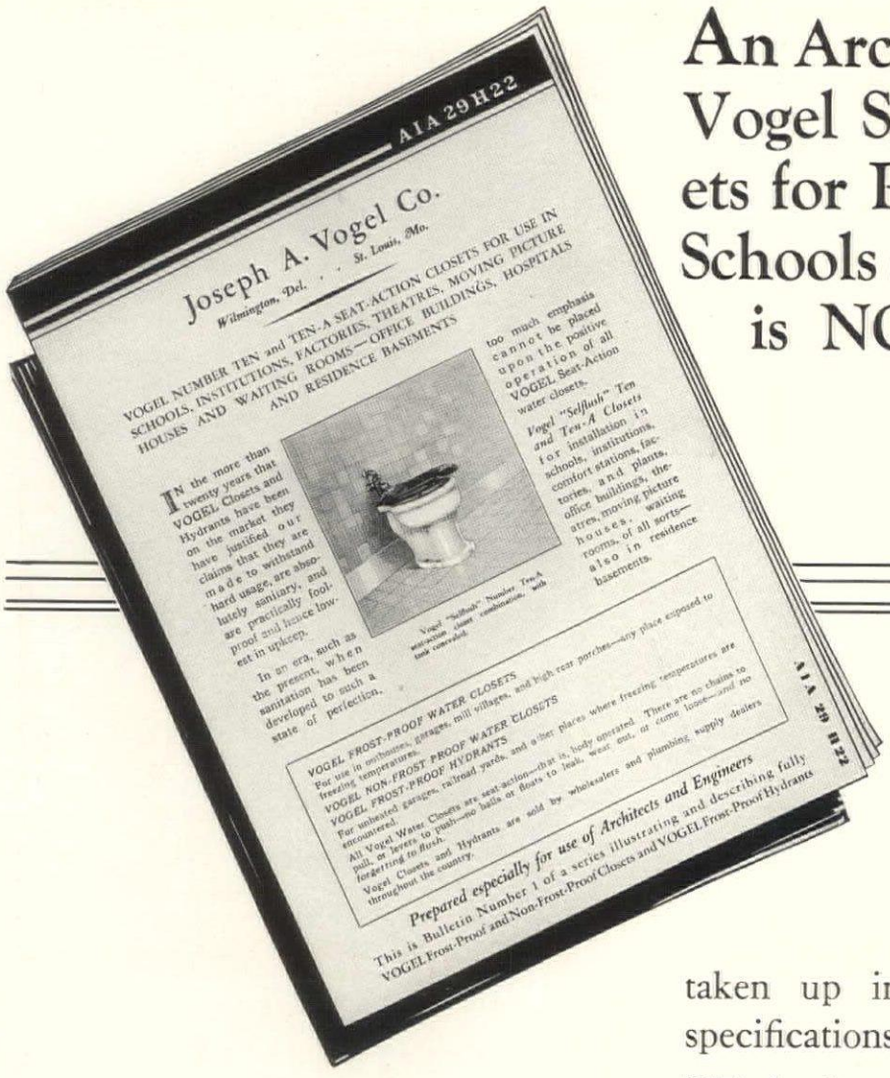


Write for Complete Details Now

Write now for complete details regarding Niedecken Shower and Tub Fixtures and Niedecken Features of unequaled advantages. Have Niedecken in your files—and Niedecken in your mind for the most advanced bath equipment improvements.

HOFFMANN & BILLINGS
. . . . . MFG. CO.
202 BECHER STREET
MILWAUKEE
WISCONSIN





An Architect's Book on Vogel Seat-Action Closets for Plants, Factories, Schools and Institutions, is NOW READY

THIS book is designed especially for architects, just as Vogel Closets are designed especially for factories, schools, and institutions.

It is full of information for the architect. Each part of Vogel Seat-Action Closets — the valve, the tank, the bowl, and the seat, is taken up in detail. Complete specifications are included.

This book, conforming in size to the A. I. A. filing system, will prove invaluable to your office, and especially in the offices of school architects.

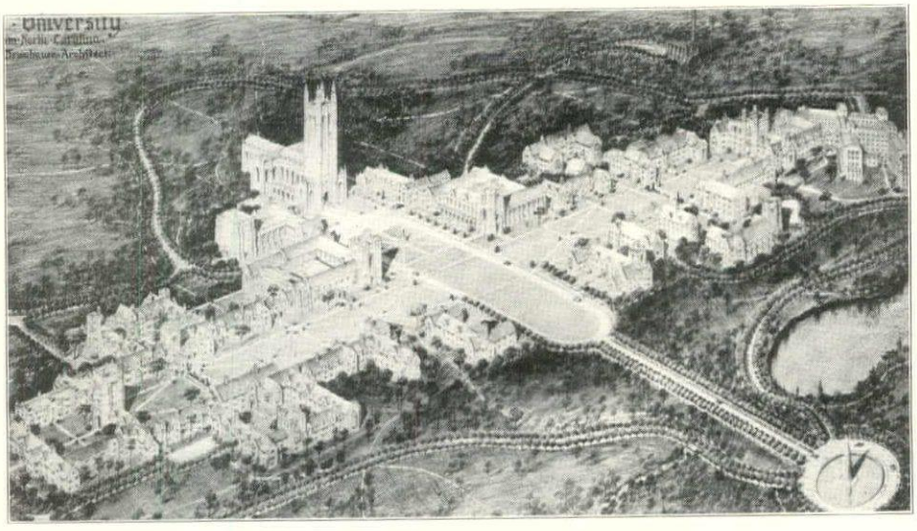
For copies of this book, write to the Joseph A. Vogel Company, Wilmington, Delaware, manufacturers of Seat-Action Closets for more than 23 years.

Joseph A. Vogel Company
Wilmington, Del. St. Louis, Mo.

VOGEL PATENTED *Products*

COUPON
JOSEPH A. VOGEL, Wilmington, Del.
Please send me your architect's booklet on Vogel Closets.
NAME .....
ADDRESS .....
.....

ARMCO INGOT IRON



A panoramic drawing of Duke University, Durham, North Carolina, where Armco INGOT IRON *sheets were used for the ventilating ducts and fume vents and hoods in the Chemistry, Hospital and Medical Buildings. Here, where corrosion is a constant threat, pure iron will render long, trouble-free service. Architect: Horace Trumbauer, Philadelphia. Heating and Ventilating Engineer: Isaac H. Francis, Philadelphia.*

. . . it backs your specifications with *proved performance*

WHEN you specify Armco INGOT IRON, you know beforehand that the construction will endure. For this highly-refined iron has the longest record of actual service of any low-cost, rust-resisting sheets and plates.

Where workability is essential, such as in cornices, marquises, and intricate ornamental motifs, Armco INGOT IRON is again the appropriate sheet metal. It is uniformly soft and ductile, and forms quickly and surely to the most complicated design.

Armco INGOT IRON sheets and plates are available in any standard size, gage or thickness. If you have a job on the board, a member of our architects' service organization will be glad to supply any information on the sheet metal parts that you may want. Just communicate with the office nearest you.

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

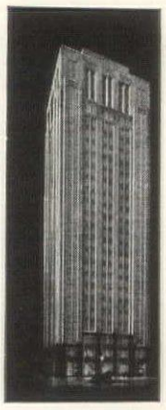
THE AMERICAN ROLLING MILL CO.

Executive Offices: Middletown, Ohio

Export: The ARMCO International Corporation

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

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



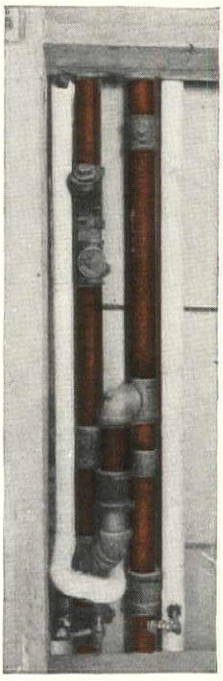
BUCKINGHAM BUILDING
Chicago

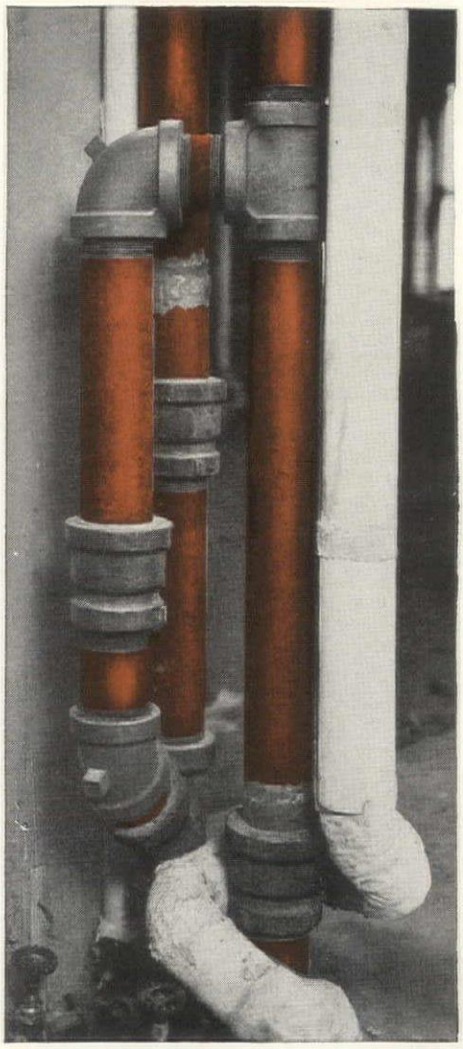
Why OWNERS, ARCHITECT and PLUMBING CONTRACTOR of this modern building chose

ARCO METAL

CAST IRON PIPE

VERTICALLY CAST
SEAMLESS





Arco Metal Pipe is carried in stock and distributed by jobbers of plumbing, heating and mill supplies.

REGULARLY FURNISHED IN 12 FT. LENGTHS

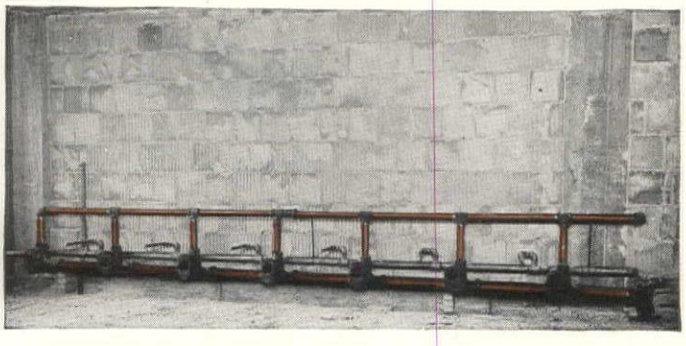
ARCO METAL PIPE IS EASY TO INSTALL. "We experienced no difficulty in handling this installation due to breakage, and the job tested perfectly tight" to use the words of the contractor, M. J. Corboy.

This is made possible by the method of manufacture and the fine grade of cast iron used in producing Arco Metal Pipe.

ARCO METAL PIPE INSURES PERMANENCE. The owners of the Buckingham Building realize the cost and inconvenience of replacing pipe. To guarantee against this they chose Arco Metal Cast Iron Pipe for all soil, waste, vent and down spout lines.

In order to cut and thread cast iron pipe it must be perfectly round, uniform in wall thickness and true in outside diameter the full length of the pipe. The cast iron must be readily machinable and strong enough to stand the usual handling.

Arco Metal Pipe fills all of these requirements. It is cast vertically in dry sand molds which gives a perfectly round seamless tube. The iron is alloyed with nickel and chromium which makes it stronger and even more corrosion-resisting than ordinary cast iron and is easily cut and threaded with standard, hand or power tools.



·ARCO · ARCO AMERICAN RADIATOR COMPANY ·ARCO·

ARCO METAL PIPE DIVISION

40 West 40th Street, New York
816 So. Michigan Avenue, Chicago
1344 Broadway, Detroit
8th and Broadway, Cincinnati
1294 East 55th Street, Cleveland
4201 Duncan Avenue, St. Louis

SOUND SYSTEMS

are of great importance to the Architect.

The best time to provide for a sound system in structures built to accommodate education, treatment of the sick, travel and entertainment, is at the time the housing for the enterprise is being planned. We will gladly send the architect full information about Powerizer for his files or have an expert call and discuss any prospect in installation, either for a new building or for one now existing.

Complete Powerizer Sound Systems are installed and serviced by our authorized electragists everywhere. Powerizer is a perfectly balanced set of units comprising all equipment for pick-up, amplification and distribution. An attractive booklet about the uses of Sound Systems will be sent upon request.

The original of this reprinted advertisement appeared in the April issue of Modern Hospital.

RADIO RECEPTOR CO., INC.
106A Seventh Ave., New York City

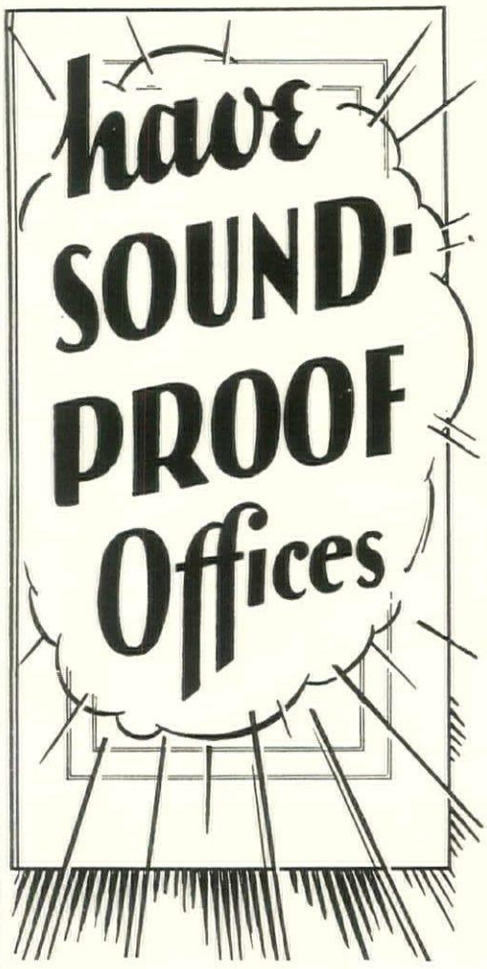
Licensed by the Radio Corporation of America and Associated Companies (A.F. 6-30)

POWERIZER
SOUND SYSTEMS

MEYER
Steelforms
THE STANDARD

Inquiries will establish the fact that Meyer Steelforms are the standard for concrete joist floor construction.

CONCRETE ENGINEERING COMPANY
General Offices: Omaha, Nebraska
Branches in all principal cities



By Using HAMLIN DOORS

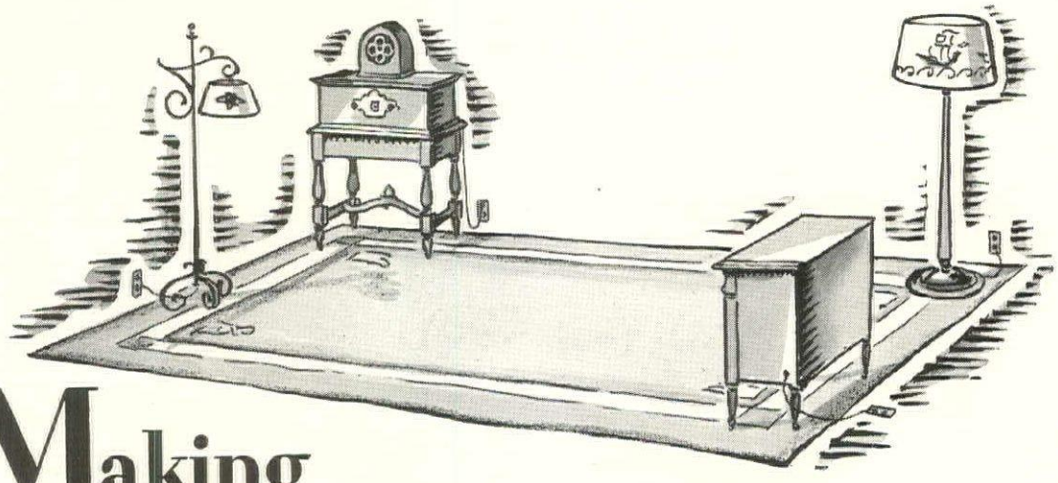
"Have sound-proof offices by using Hamlin doors" is the recommendation that scores of architects are now making to their clients.

Hundreds of modern buildings—skyscrapers, clubs, studios, schools, "talkies," theatres, libraries, homes, hotels, churches, hospitals and institutions, etc., are using Hamlin Sound-Proof Doors and Folding Partitions as a part of the necessary standard equipment of this modern age. No better argument could be had for securing rentals and leases.

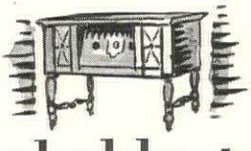
Sound-proof doors today play an important part in business and social life. Privacy is becoming more and more necessary as business and industry progress. Sound-proof offices for executives insure the necessary peace for uninterrupted thought, freedom of outside interference and assurance of complete privacy and quiet.

Write for list of recent installations, complete catalog, prices and services available to architects.

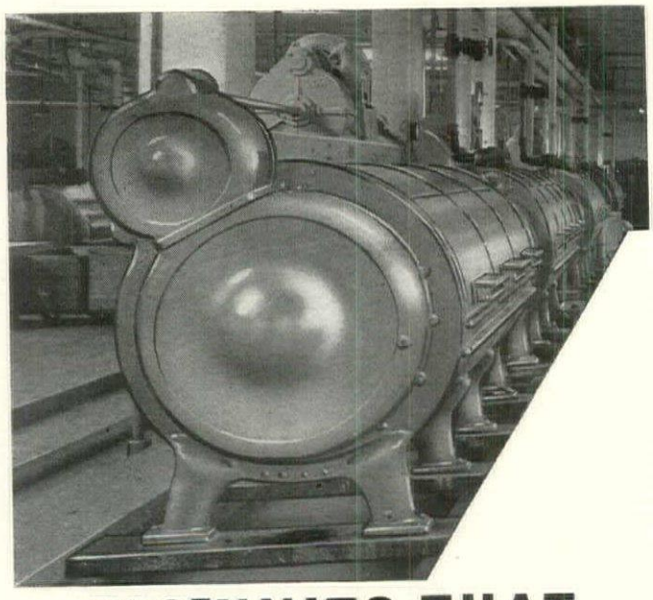
IRVING HAMLIN
MANUFACTURER
1514 Lincoln St.
Evanston, Ill.



Making the living room *livable* with Non-Metallic Sheathed Cable

In the living room of the houses you are building...how many electrical devices will the new and proud owners have? You don't know and neither do we! But, nowadays it's safe to say... aside from permanent lighting fixtures ...there will be a radio,  a phonograph,  and probably two floor

NON-METALLIC



BIG UNITS THAT SAVE SPACE

ARCHITECTS find that General Laundry Machinery fully meets their requirements for conserving space in the design of laundry plants.

Its high production rate is an important factor in planning commercial and institutional laundries, where output must be closely figured on a per-square-foot basis. The General 54″ x 120″ Y-Type All-Metal Washer, for example, sets a record for delivering 12.2 lbs. of work per square foot of floor area for an average run. This efficiency is typified right through the entire General line of equipment.

Superlative construction and mechanical refinements are evidenced by All-Metal Washers with Timken bearings and Alemite lubrication; Tolhurst Extractors with the Center-Slung feature that reduces vibration; Updraft Dry Tumblers with the natural drying action; and General Calenders with air-compression ironing rolls.

Specification bulletins will be sent promptly on request.

GENERAL LAUNDRY MACHINERY CORP.
822 West Washington Boulevard, Chicago, U. S. A.
Factories: Chicago, Ill.; Troy, N.Y.; Green Island, N.Y.; Columbia, Pa.

SALES OFFICES:

Chicago, Ill.
822 W. Washington Blvd.
San Francisco, Cal.
1128 Mission St.
Seattle, Wash.
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New York, N. Y.
183 Madison Ave.
Los Angeles, Cal.
1219 Santa Fe Ave.
Houston, Texas
Houston Merchants Exch. Bldg.
Pittsburgh, Pa., 631 Grant Bldg.

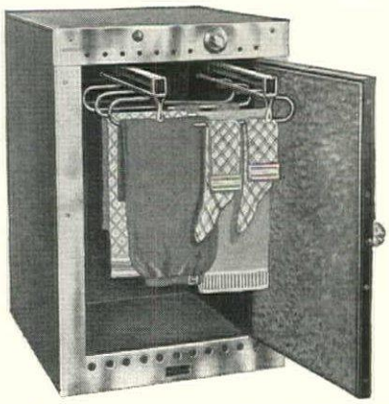
GENERAL
Laundry Machinery

Built to a standard GENERAL LAUNDRY MACHINERY Corporation *— not to a price*

PROMETHEUS
Electric Clothes Dryer

The Prometheus dries clothes quickly at a low cost for current.

Indispensable in golf and country clubs for drying sports wearing apparel, or in the home for drying silk underthings too delicate to send to the laundry.



Heat is easily controlled by a 3-heat switch. A ruby pilot light shows whether the current is on or off.

Chromium plated and beautifully finished.

Has easy-sliding racks with hangers. Two sizes —20 or 36 inches wide —both 30″ high and 22″ deep.

SEND FOR CATALOG

PROMETHEUS ELECTRIC CORP.
358 West 13th St. New York, N. Y.

DETAILS

KERNERATORS are not just a combination of masonry and cast iron, but scientifically designed systems built — by the pioneers of flue-fed incineration — to do a specific job.

Seventeen years of intensive study of incineration, of consistent improvement of the details of construction, have earned for Kernerators a place of leadership.

And a trained, nation-wide service organization that assists in planning Kernerator installations, that supervises their construction and personally instructs owners, insures maximum convenience in Kernerator use.

This attention to details — before, during and after installation — is a typical Kerner service that is valuable to both architect and owner . . . It assures a lifetime effectiveness of the Kerner Guarantee.

KERNER INCINERATOR COMPANY
1224 NORTH WATER ST. MILWAUKEE, WIS.

KERNERATOR
REG. U.S. PAT. OFF.
INCINERATION

YOU can easily imagine the inconvenience and expense of pipe in a home that leaks! Concealed in walls, buried under floors, this pipe is hidden danger if it is of inferior quality. Property loss and family discomfort are often the toll of its presence. That is why architects specify Byers Genuine Wrought-Iron Pipe and plumbing and heating contractors welcome it. . . . It is the ultimate in protection. It is a standard specification in the construction of better homes everywhere, an investment in security and service when it replaces pipe that has failed to measure up to the trying tests imposed upon it. . . . General experience has established the fact that, in most cases, Byers Genuine

LASTING PROTECTION OF BEAUTY AND CHARM

Wrought-Iron Pipe outlasts the structures in which it is installed. Today wrought-iron over 100 years old is still rendering satisfactory service. It is the only metal that contains the *Vital Element*—silicate of iron—in quantity to successfully resist the corroding influences of time. . . . In the rolling of wrought-iron, made from the scientific puddling of pig iron, the *Vital Element* divides into tiny ribbons, 250,000 and more to the square inch of metal, as impervious to rust as the silicate in glass. . . . The name "Byers" imprinted in the metal is assurance of quality. The Spiral Stripe is further guarantee. If you would like specific suggestions on any pipe problem, we will take pleasure in aiding you. The benefit of constant research on this important subject is available to you. We will be pleased to send you our booklet which tells more about Byers Genuine Wrought-Iron Pipe and its uses. A. M. Byers Company, Pittsburgh, Pa.

BYERS GENUINE WROUGHT IRON **PIPE**

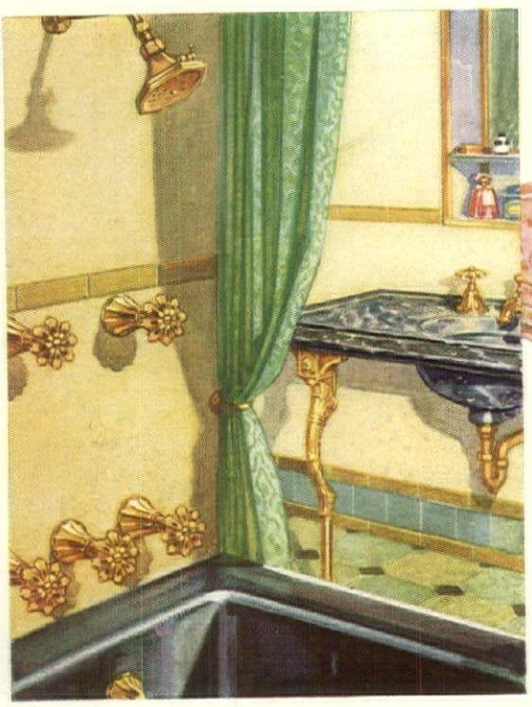
AN INVESTMENT—NOT AN OUTLAY

New BATHROOM FITTINGS
by artists of America and France

Spout from the Espagnol-Flamand group. Gold plated

Spout from the English Georgian group. Gold plated

Moderne-Clochettes legs and trim on a Corwith lavatory. Chromium plated



Exquisitely flower-like Design 45 handles, escutcheons, and spouts here adorn a Neumar lavatory, a bath, and shower. Even the legs of the Neumar are of related design

Trianon legs and trim on a marble lavatory. Gold plating effectively brings out the delicate ornamentation

Interesting examples of the work of American artists are the Designs 50, 45, and 40. Note the pleasing effects of contrasting metal and crystal in Design 50; the exquisite filigree work of Design 45; the modern touch in the octagonal planes of Design 40. Platings may be gold, silver, or chromium, on a base of serviceable brass, applied by a special process to prevent peeling and assure complete coverage.

Beneath the surface loveliness of all the fittings shown above, French as well as American, is such engineering quality as only the Crane stamp assures.

BEAUTIFUL design brought new charm to bathroom fixtures. Why need the fittings remain commonplace? These Crane trimmings for lavatories, baths, and showers answer: "They need not."

New, distinctive, they run the decorative gamut from antique to modern, period to present day. Trianon fittings, inspired by the exquisite ornamental bronze in the palaces of Trianon and Versailles... Espagnol-Flamand, with the charm of fine metal work in a mansion of Madrid . . . Georgian ... Moderne-Clochettes; twenty designs are offered, originated for Crane Co. in the Fontaine ateliers of France. No less beautiful and wholly American are the octagonal Design 40, the fluted Design 45, and the glass-handled Design 50, from our own studios.

See these at nearby Crane Exhibit Rooms. You will recognize their value for homes above the average. The Crane Budget Plan permits Crane Qualified Contractor-Dealers to install them on monthly payments, if desired.

Valves CRANE *Fittings*

FIXTURES, VALVES, FITTINGS, AND PIPING, FOR DOMESTIC AND INDUSTRIAL USE

Crane Co., General Offices: 836 S. Michigan Ave., Chicago + 23 W. 44th St., New York + Branches and sales offices in one hundred and ninety-four cities

Selected List of Manufacturers' Publications

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

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

ACOUSTICS

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

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

ASH HOISTS

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

ASH HOISTS—TELESCOPIC

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

BRICK

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

CABINET WORK

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

CARPETS

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

CEMENT

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

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

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

CHURCH EQUIPMENT

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

CLUB EQUIPMENT

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

CONCRETE BUILDING MATERIALS

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

CONSTRUCTION, FIREPROOF

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

CONSTRUCTION, STONE AND TERRA COTTA

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

DAMPPROOFING

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

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

DOORS

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

DOORS AND TRIM, METAL

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

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

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

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

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

DOORS, SOUNDPROOF

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

DRAINAGE FITTINGS

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

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 185*

DRINKING FOUNTAINS

Halsey W. Taylor Co., Warren, Ohio
Halsey Taylor Drinking Fountains. Architects' Catalog H. 52 pp., 8½ x 11 ins. Ilustrated.

DUMBWAITERS

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

ELECTRICAL EQUIPMENT

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

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

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

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

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.
Variable-Voltage Central Systems as Applied to Electric Elevators. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
Westinghouse Panelboards. Catalog 224. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
Beauty; Power; Silence; Westinghouse Fans. (Dealer Catalog 45.) Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.
Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Cooking apparatus for buildings of various types.
Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.
Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.

ELEVATORS

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

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

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

ESCALATORS

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

FIREPROOFING

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

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

National Fire Proofing Company, Fulton Building, Pittsburgh.
Natco; The Complete Line of Structural Clay Tile. Booklet. 48 pp., 8½ x 11 ins. Illustrated.

FLOODLIGHTING

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

FLOOR HARDENERS (CHEMICAL)

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

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

FLOORS—STRUCTURAL

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

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

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

FLOORING

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

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

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

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

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

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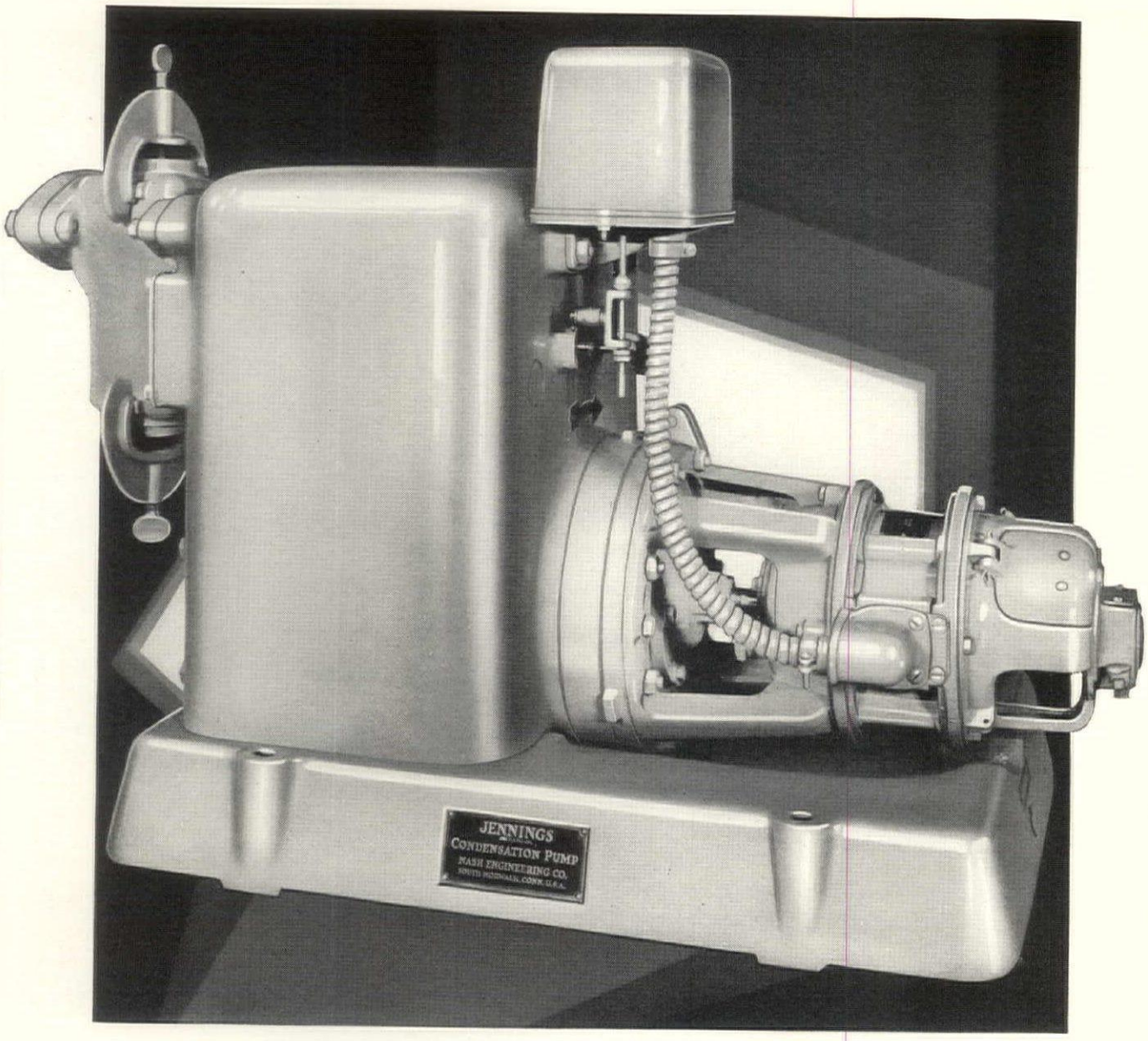

Jennings Pumps

THE receiving tank, pump working parts and driving motor of the Jennings Condensation Pump are built into a single compact assembly. The centrifugal impeller is mounted on a short extension of the motor shaft and supported by the heavy motor ball bearings. There are no bearings in the pump casing. Only one stuffing box. The rectangular form of the complete unit permits installation in a corner against the wall.

Jennings Condensation Pumps are furnished in capacities of 4 to 200 g. p. m. for serving up to 150,000 sq. ft. equivalent direct radiation. Write for Bulletin 99.

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

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 186*

FLOORING—Continued

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

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

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

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

FURNITURE

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

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

GLASS CONSTRUCTION

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

Libbey-Owens Sheet Glass Co., Toledo, Ohio.
Flat Glass. Brochure, 12 pp., 5⅜ x 7¾ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

GREENHOUSES

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

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

GYPSUM

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

HARDWARE

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

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

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

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

HARDWARE—Continued

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

HEATING EQUIPMENT

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

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

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

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

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

Grinnell Company, Providence, R. I.
Grinnell Discovers a Superior Heating Trap. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Hoffman Specialty Company, Inc., 25 West 45th St., New York, N. Y.
Heat Controlled With the Touch of a Finger. Booklet, 46 pp., 5¾ x 8¾ ins. Illustrated.
How to Lock Out Air, the Heat Thief. Brochure, 48 pp., 5 x 7¼ ins. Illustrated.

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

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

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

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Clinton, Mass., Savings Bank; Hutchins & French, Archts., J. E. Chatman, Engr., Lynch & Woodward, Heating Contrs.

The old question of where to put that radiator almost answers itself—when the radiators are Robras 20-20. They fit in the most convenient place of all—in the wall, out of the way and out of sight.

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You will want to know more about this surprisingly flexible, electrically-welded brass radiator. Why not investigate — through one of our offices, Sweet's catalogue, or your A.I.A. file?

ROBRAS 20-20

ROME BRASS RADIATOR CORPORATION, ONE EAST FORTY-SECOND STREET, NEW YORK, N.Y.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 188*

HEATING EQUIPMENT—Continued

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

Modine Mfg. Co., Racine, Wisc.
Modine Copper Radiation. Booklet, 28 pp. 8½ x 11 ins. Illustrated. Deals with industrial, commercial and domestic heating.
A Few Short Years. Folder. 4 pp. 8½ x 11 ins. Illustrated. Heating for garages.
Dairy Plant Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Industrial Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Modine Unit Heater. Folder. 6 pp., 8½ x 11 ins. Illustrated.

Nash Engineering Company, South Norwalk, Conn.
Bulletin 85. Booklet. 12 pp. 10¾ x 7½ ins. Illustrated in color. Describes construction and operation of the Jennings Return Line Vacuum Heating Pump.
Bulletin 87. Brochure. 8 pp. 10¾ x 7½ ins. Illustrated in color. Deals with Sizes T and U Jennings Vacuum Heating Pump for 2500 and 5000 square feet equivalent direct radiation.
Bulletin 63. Booklet. 4 pp. 10¾ x 7½ ins. Illustrated. Describes in detail the Unit Type Motor Driven Jennings Condensation Pump.

National Radiator Corporation, Johnstown, Pa.
The Crimson Flame. Folder, 6 pp., 4½ x 7 ins. Illustrated.
Contento Brings Contentment to Your Home. Folder, 12 pp., 3½ x 6 ins. Illustrated.
National Jacketed Boiler. Folder, 4 pp., 8½ x 11 ins. Illustrated.
National Super-Smokeless Boiler. Folder, 4 pp., 8½ x 11 ins. Illustrated.
Aero, the National Radiator Sizes and Ratings. Booklet, 16 pp., 5 x 7⅞ ins. Illustrated.

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

Rome Brass Radiator Corporation, 1 East 42nd Street, New York.
Proof of the Pudding. Booklet, 24 pp., 8½ x 10½ ins. Illustrated. Describes Robras, 20-20 concealed-within-the-walls, lightweight, all-brass radiators.
Within the Walls. Brochure, 16 pp., 4 x 9 ins. Illustrated. Gives facts regarding modern, out-of-sight, lightweight, Robras 20-20 radiators.
Engineering Data. Booklet, 16 pp., 8½ x 10½ ins. Illustrated. Full data and tables to facilitate selection and installation of Robras 20-20 concealed radiators for steam, water and vapor heating systems.
Small Bathrooms Made More Spacious, Brochure, 4 pp. Illustrated. Gives descriptions, sizes and prices of Robras lightweight cabinet radiators to be installed under wash basins.

Rome Brass Radiator Corp., (Aul-Brass Heater Division) 1 East 42nd St., New York.
Aulbras Hot Water Heaters. Booklet, 12 pp., 8½ x 11 ins. Illustrated in color.

Sarco Company, Inc., 183 Madison Ave., New York City, N. Y.
Steam Heating Specialties. Booklet, 6 pp., 6 x 9 ins. Illustrated. Data on Sarco Packless Supply Valves and Radiator Traps for vacuum and vapor heating systems.
Equipment Steam Traps and Temperature Regulations. Booklet, 6 pp., 6 x 9 ins. Illustrated. Deals with Sarco Steam Traps for hospital, laundry and kitchen fixtures and the Sarco Self-contained Temperature Regulation for hot water service tanks.

Spencer Heater Co., Williamsport, Pa.
Catalog. Booklet, 20 pp., 6⅞ x 9 ins. Illustrated. Complete line of magazine feed cast iron sectional and steel tubular heaters.
Spencer Magazine Heaters, for Steam, Vapor or Hot Water. Brochure, 28 pp., 5¾ x 9 ins. Illustrated.
The Fire that Burns Uphill. Brochure, 24 pp., 6⅛ x 9¼ ins. Illustrated in color. Magazine feed heaters for steam, vapor and hot water heating.

B. F. Sturtevant Company, Hyde Park, Boston, Mass.
Tempervane Heating Units. Catalog 363. Booklet, 44 pp., 8½ x 11 ins. Illustrated. Data on "Heating Every Corner with Maximum Economy."

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

HOISTS, TELESCOPIC

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

HOSPITAL EQUIPMENT

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

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

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

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

Wilmot Castle Company, Union Trust Bldg., Rochester, N. Y.
The Hospital Sterilizer Data Sheets. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on planning sterilizer installations.

HOTEL EQUIPMENT

Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and 34 Cooper Square, New York.
Some Thoughts on Furnishing a Hotel. Booklet, 7½ x 9 ins. Data on complete outfitting of hotels.

INCINERATORS

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

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

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

INSULATION

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

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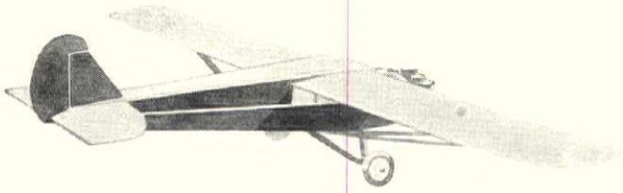

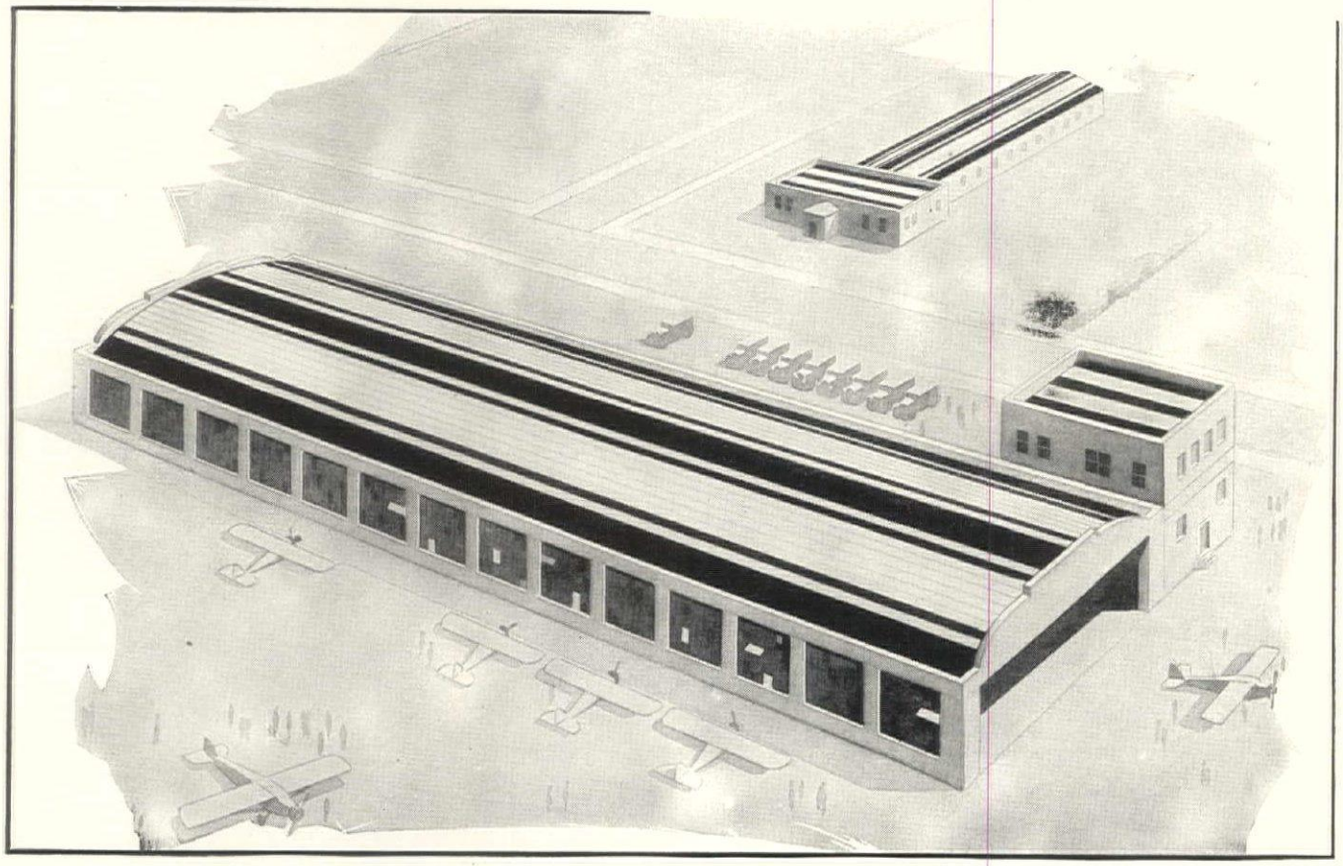

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 190*

INSULATION—Continued

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

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

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

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

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

KITCHEN EQUIPMENT

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

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

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

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

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

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

LABORATORY EQUIPMENT

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

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

LANTERNS

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

LATH, METAL AND REINFORCING

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

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

National Steel Fabric Co., Pittsburgh, Pa.
Better Walls for Better Homes. Brochure, 16 pp., 7¾ x 11¼ ins. Illustrated. Metal lath, particularly for residences.

Steeltex for Floors. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Combined reinforcing and form for concrete or gypsum floors and roofs.

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

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

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

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

LAUNDRY MACHINERY

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

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

LAUNDRY MACHINERY—Continued

General Laundry Machinery Corporation, 608 South Dearborn St., Chicago, Ill.

General All-Metal Washer. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Timken-equipped Monel metal washer with one-lever control.

General Dry Tumbler. Brochure, 16 pp., 8½ x 11 ins. Illustrated. Specifications and details of Up-Draft Dry Tumbler with automatic temperature control.

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

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

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

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

LIGHTING EQUIPMENT

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

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

Holophane Company, Inc., 342 Madison Ave., New York, N. Y.
The Lighting of Schools; A Guide to Good Practice. Booklet. 24 pp., 8½ x 11 ins. Illustrated.

Lighting Specifications for Hospitals. Brochure, 30 pp., 8½ x 11 ins. Illustrated.

Industrial Lighting. Bulletin 448A. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

Holophane Catalog. Booklet, 48 pp., 8½ x 11 ins. Combination catalog and engineering data book.

The Lighting of Schools. A Guide to Good Practice. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

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

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

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Industrial Lighting Equipment. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

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

MAIL CHUTES

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

MANTELS

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

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

MARBLE

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

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

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

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TRUSCON
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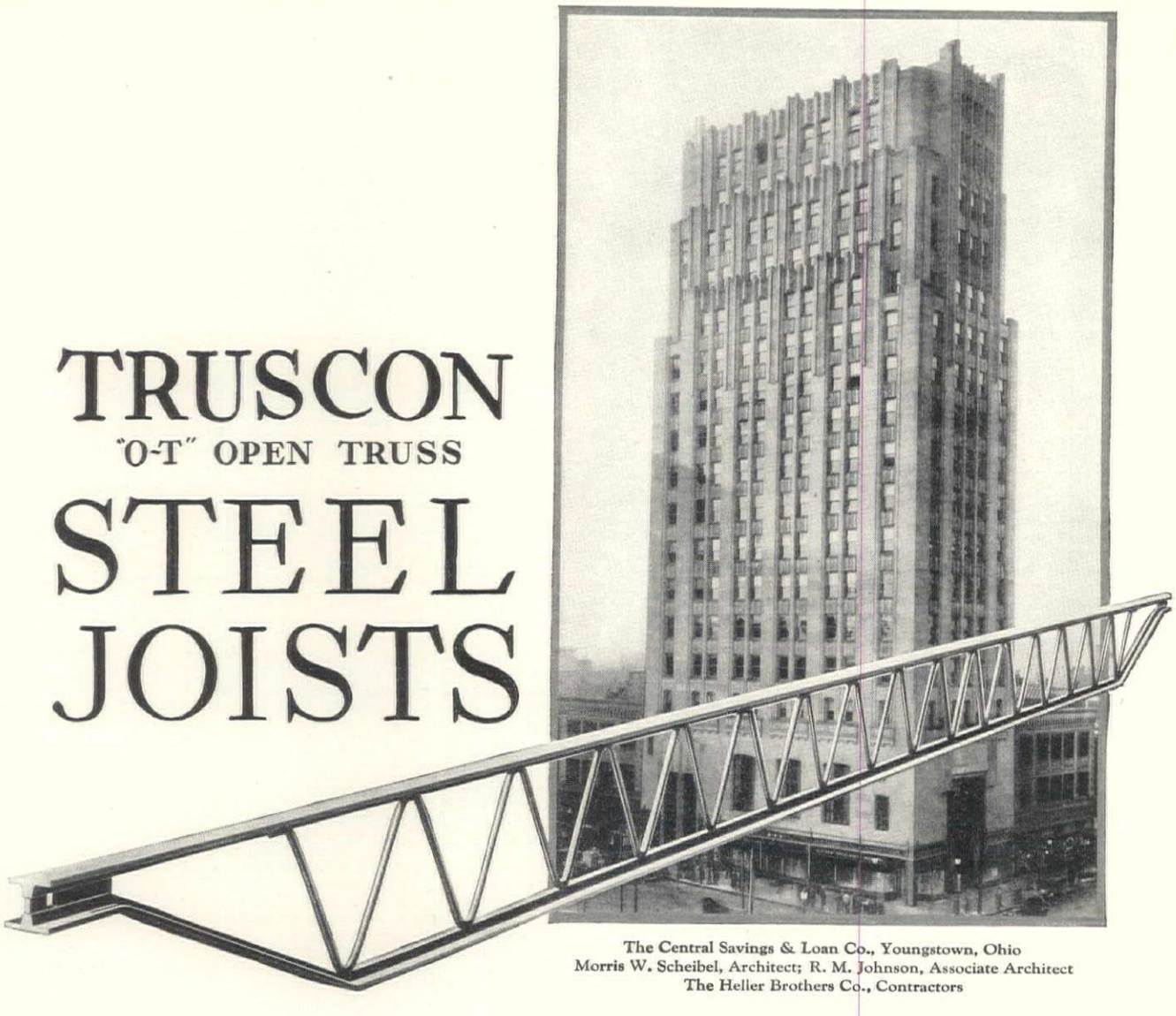
STEEL JOISTS



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Morris W. Scheibel, Architect; R. M. Johnson, Associate Architect
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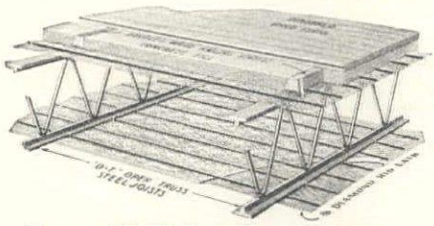

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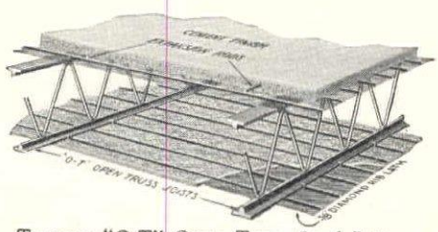

Truscon "O-T" Open Truss Steel Joist construction with cement floor finish. ⅜" Diamond Rib Lath for floor and ceiling.

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

METALS

Aluminum Company of America, Pittsburgh.
Architectural Aluminum. Brochure, 30 pp., 8½ x 11 ins. Illustrated. An excellent booklet on the subject.

Central Alloy Steel Corporation, Massillon, Ohio.
Sheet Iron Primer. Booklet, 64 pp., 5¼ x 7¾ ins. Illustrated.

The Path to Permanence. Brochure, 52 pp., 8½ x 11 ins. Illustrated. Data on sheet iron.

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

MILL WORK—See also Wood

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

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

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

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

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

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

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

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

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

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

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

MORTAR AND CEMENT COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Folder, 8½ x 11 ins., 4 pp. Illustrated in colors, gives full information concerning Clinton Mortar Colors with specific instructions for using them.

Color Card. 3¾ x 6½ ins. Illustrates in color the ten shades in which Clinton Mortar Colors are manufactured.

Something New in Stucco. Folder, 3½ x 6 ins. An interesting folder on the use of coloring matter for stucco coated walls.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

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

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

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

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

Sherwin-Williams Company, 601 Canal Rd., Cleveland, Ohio.
Complete Architectural Specifications for painting, varnishing and lacquering, reprinted from the Sherwin-Williams Architectural Catalogue as it appears in Sweet's Architectural Catalogue. Form Number B 303. 8½ x 11, bound in paper, thirty pages of specifications and color chips; carries A. I. A. file number.

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

PARTITIONS

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

PARTITIONS—Continued

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

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

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

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

Improved Office Partition Co., 25 Grand St., Elmhurst, L. I., N. Y.
(See Henry Klein & Co.)

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

Structural Gypsum Corporation, Linden, N. J.
Service Sheet No. 4. Specifications for Gypsteel Partition File. Folder, 8½ x 11 ins. Illustrated.

Telesco Office Partition, 25 Grand St., Elmhurst, L. I., N. Y.
(See Henry Klein & Co.)

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

PIPE

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

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

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

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

Maurice A. Knight, Akron, Ohio.
Knightware in the Princeton Chemical Laboratory. Booklet, 16 pp., 6¾ x 8½ ins. Illustrated.

National Tube Co., Frick Building, Pittsburgh, Pa.
"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins., 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.

"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins., 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deaereating systems for eliminating or retarding corrosion in hot water supply lines.

"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 ins., 88 pp. This bulletin contains 254 illustrations of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, engineers, etc.

Modern Welded Pipe. Book of 88 pp., 8½ x 11 ins., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.

Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.

Interior Walls Everlasting. Brochure, 20 pp., 6¼ x 9¼ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

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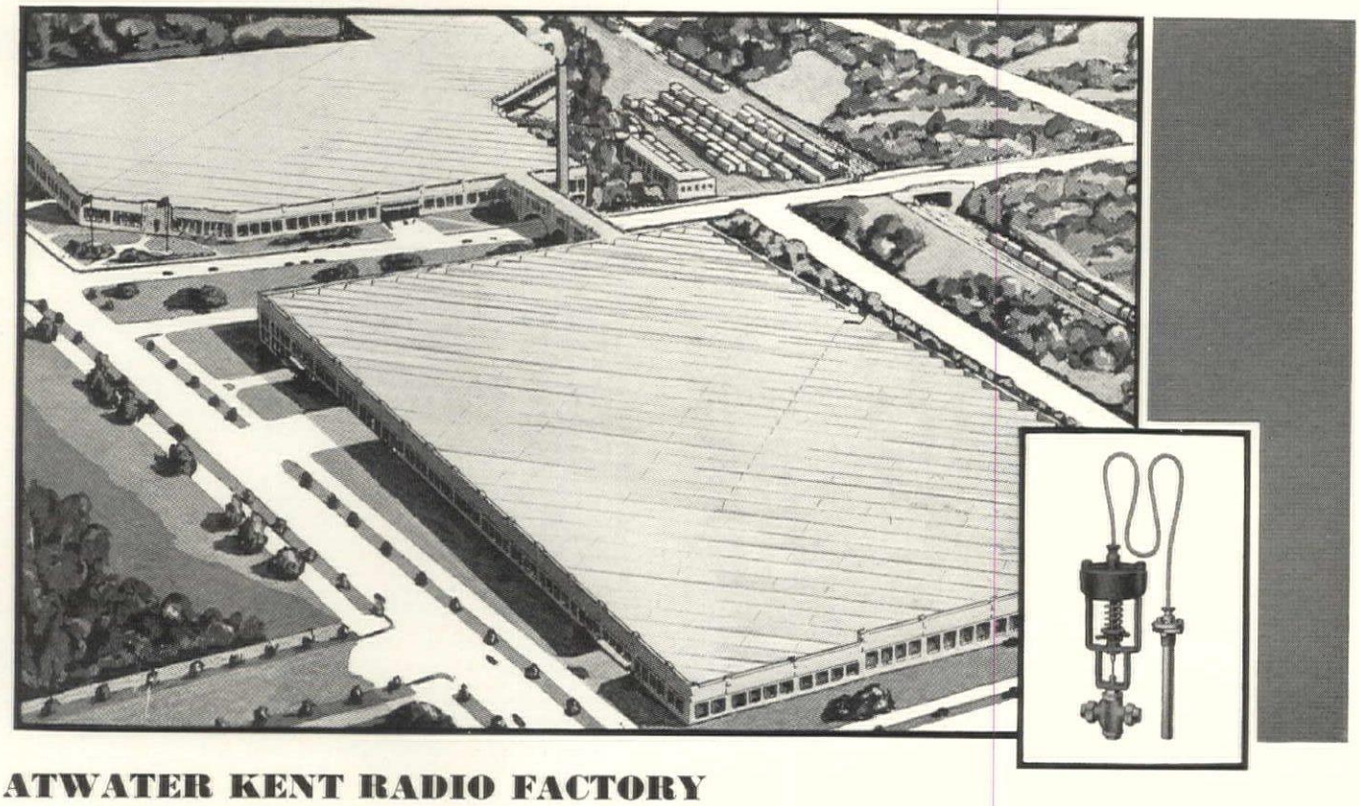

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Canadian Representatives, Darling Brothers, Ltd., 140 Prince St., Montreal, Que., Canada

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

PLUMBING EQUIPMENT

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

Crane Company, 836 S. Michigan Ave., Chicago, Ill.
Plumbing Suggestions for Home Builders. Catalog, 3 x 6 ins., 80 pp. Illustrated.

Plumbing Suggestions for Industrial Plants. Catalog, 4 x 6½ ins., 34 pp. Illustrated.

Planning the Small Bathroom. Booklet, 5 x 8 ins. Discusses planning bathrooms of small dimensions.

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

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

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

PNEUMATIC TUBE SYSTEMS

G & G Atlas Systems, Inc., 544 West Broadway, New York.
12 pp., 8½ x 11. Illustrated booklet of tube systems for retail stores and other buildings.

4 pp., 8½ x 11. Data Sheet showing schematic diagrams for hotel, bank, factory and wholesale buildings, table of sizes, space requirements and preliminary layout steps. A. I. A. 35h21.

PUMPS

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

Nash Engineering Company, South Norwalk, Conn.
Bulletin 52. Brochure. 6 pp., 10½ x 7¾ ins. Illustrated in color. Devoted to Jennings Standard Centrifugal Pumps for house service, boosting city water pressure to supply top stories, for circulating warm water, etc.

Bulletin 97. Booklet. 16 pp., 10½ x 7¾ ins. Illustrated in color. Describes the design, construction and operation of the Jennings Suction Sump Pump.

Bulletin 11. Brochure. 8 pp., 10½ x 7¾ ins. Illustrated in color. Deals with Nash Hytor Vacuum Pumps for air and gases.

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

Yeomans Brothers Company, 1433 Dayton Street, Chicago.
Yeomans Horizontally Split Case Centrifugal Pumps. Booklet, 12 pp., 8½ x 11 ins. Illustrated.

RAMPS

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

Garage Design Data. Series of informal bulletins issued in loose-leaf form, with monthly supplements.

REFRIGERATION

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

REINFORCED CONCRETE—See also Construction, Concrete

North Western Expanded Metal Company, Chicago, Ill.
Longspan ¾-inch Rib Lath. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-Rib expanded metal.

REINFORCED CONCRETE—See also Construction, Concrete

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

RESTAURANT EQUIPMENT

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

ROOFING

Federal Cement Tile Co., 608 S. Dearborn Street, Chicago.
Catalog and Roof Standards. Booklet, 36 pp. 8½ x 11 ins. Illustrated. Describes Featherweight Concrete Insulating Roof Slabs, including complete data, weights and dimensions, specifications and detail drawings. Also includes complete information on Featherweight Nailing Concrete Roof Slabs for use with ornamental slate or copper covering. The catalog is profusely illustrated and contains also a partial list of users.

Examples of Theaters and Theater Roofs. Brochure, 16 pps., 8½ x 11 ins., Illustrated. Contains views of theaters designed by some of the country's leading architects.

Federal Interlocking Tile and Glass Tile. 4 pp., 8½ x 11 ins. Illustrates and describes complete roof or precast concrete slabs requiring no composition covering.

Heinz Roofing Tile Co., 1925 West Third Avenue, Denver, Colo.
Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips.

Italian Promenade Floor Tile. Folder, 2 pp., 8½ x 11 ins. Illustrated. Floor tiling adapted from that of Davanzati Palace.

Mission Tile. Leaflet, 8½ x 11 ins. Illustrated. Tile such as are used in Italy and Southern California.

Georgian Tile. Leaflet, 8½ x 11 ins. Illustrated. Tiling as used in old English and French farmhouses.

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

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

Milwaukee Corrugating Co., Milwaukee.
Milcor Architectural Sheet Metal Guide. Booklet. 72 pp., 8½ x 11 ins. Illustrated. Metal tile roofing, skylights, ventilators, etc.

Milcor Sheet Metal Handbook. Brochure. 128 pp., 8½ x 11 ins. Illustrated. Deals with rain-carrying equipment, etc.

Structural Gypsum Corporation, Linden, N. J.
Relative Effectiveness of Various Types of Roofing Construction in Preventing Condensation of the Under Surface. Folder, 4 pp., 8¾ x 11 ins. Important data on the subject.

Gypsteel Pre-cast Fireproof Roofs. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Information regarding a valuable type of roofing.

U. S. Gypsum Co., Chicago, Ill.
Pyrobar Roof Construction. Booklet, 8 x 11 ins., 48 pp. Illustrated. Gives valuable data on the use of tile in roof construction.

Sheetrock Pyrofill Roof Construction. Folder, 8½ x 11 ins. Illustrated. Covers use of roof surfacing which is poured in place.

SCHOOL EQUIPMENT

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

SEWAGE DISPOSAL

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

Nash Engineering Company, South Norwalk, Conn.
Bulletin 67. Booklet. 16 pp. 10¾ x 7½ ins. Illustrated in color. Describes Type A Jennings Sewage Ejector for handling Unscreened sewage and raising it from basements below sewer level.

Bulletin 103. Brochure. 16 pp. 10¾ x 7½ ins. Illustrated in color. Deals with small size Type B Jennings Sewage Ejector.

Yeomans Brothers Company, 1433 Dayton Street, Chicago.
The Shone System of Pneumatic Sewage Ejectors (Screenless). Brochure. 20 pp., 8½ x 11 ins. Illustrated.

Yeomans Heavy Duty Screenless Submerged Type Sewage Ejectors. Booklet. 12 pp., 8½ x 11 ins. Illustrated.

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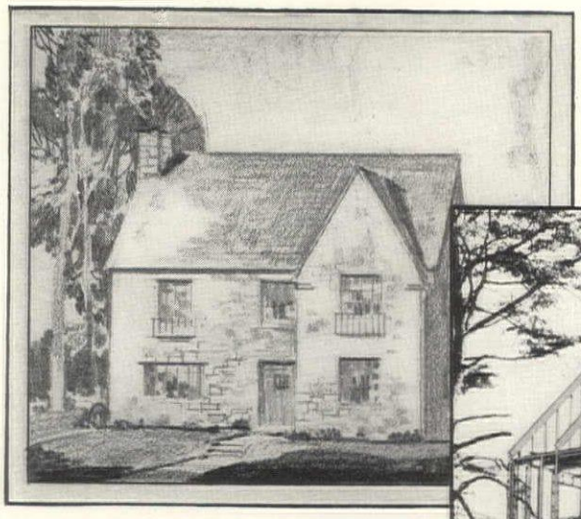

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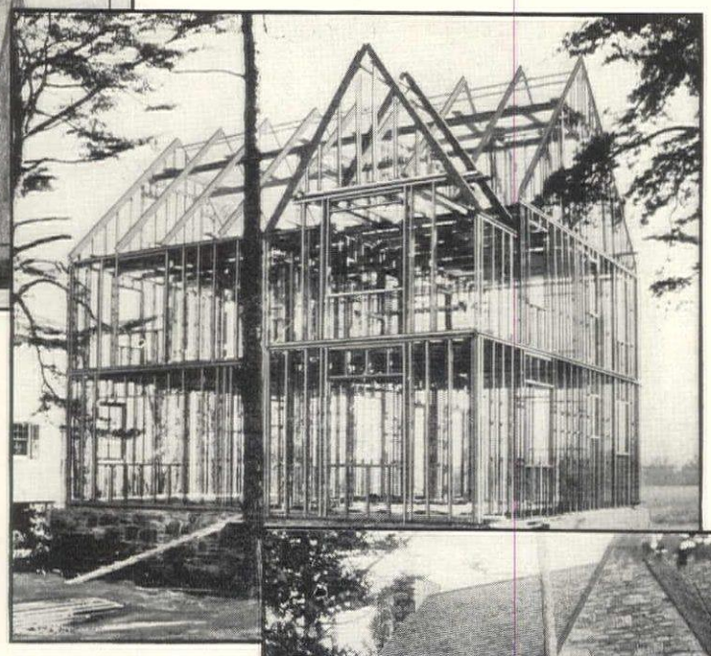

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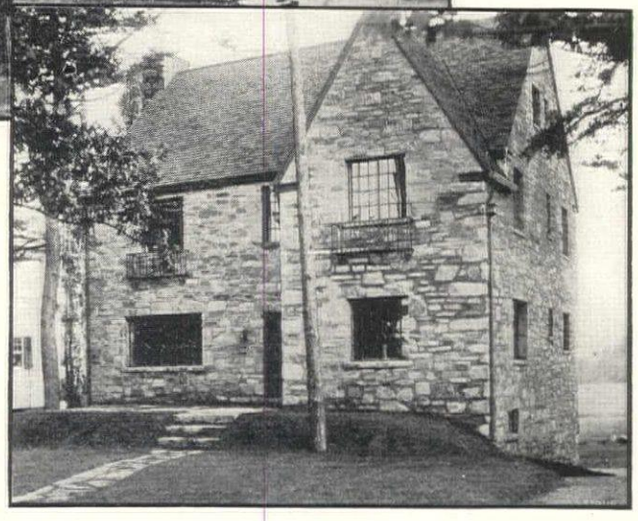

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 196*

SCREENS

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

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

SHELVING-STEEL

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

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.

Steel Frame House Company, Pittsburgh, Pa. (Subsidiary of McClintic-Marshall Corp.)
Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Illustrated.
Steel Framing for Gasoline Service Stations. Brochure, 8 pp., 8½ x 11 ins. Illustrated.
Steel Frame Standard Gasoline Service Stations. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Three standard designs of stations.

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

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.
Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 ins., 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Volume 1. Series B. Indiana Limestone Library, 6 x 9 ins., 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Volume 4. Series B. Booklet. New Edition, 8½ x 11 ins., 64 pp. Illustrated. Indiana Limestone as used in Banks.
Volume 5. Series B. Indiana Limestone Library. Portfolio, 11⅛ x 8¾ ins. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
Volume 6. Series B. Indiana Limestone School and College Buildings. 8½ x 11 ins., 80 pp. Illustrated.
Volume 12. Series B. Distinctive Homes of Indiana Limestone. 8½ x 11 ins., 48 pp. Illustrated.
Old Gothic Random Ashlar. 8½ x 11 ins., 16 pp. Illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Ave., Chicago, Ill.
Catalog No. 33. Series 500. All-Metal Construction. Brochure, 20 pp., 8½ x 11 ins. Illustrated. Deals with store fronts of a high class.
Catalog No. 34. Series 202. Standard construction. Booklet, 16 pp. 8½ x 11 ins. Illustrated, complete data on an important type of building.
Detail Sheets. Set of seven sheets, 8½ x 11 ins., printed on tracing paper, giving full-sized details and suggestions for store front designs.
Davis Solid Architectural Bronze Sash. Set of six sheets, 8½ x 11 ins., printed on tracing paper. Full-sized details and suggestions for designs of special bronze store front construction.

The Kawneer Company, Niles, Mich.
Catalog M, 1929 Edition, 64 pages, 8½ x 11 ins., with the A.I.A. File No., profusely illustrated. General Catalog.
Detail Sheet and descriptive folder, 8½ x 11 ins., with A.I.A. File No. featuring "B" Store Front Construction, designed along modernistic lines.

National Terra Cotta Society, 230 Park Avenue, New York, N. Y.
Terra Cotta Stores and Store Fronts. Booklet, 15 pp., 8½ x 11 ins. Illustrated.

TELEPHONE SERVICE ARRANGEMENTS

All Bell Telephone Companies. Apply nearest Business Office, or American Telephone and Telegraph Company, 195 Broadway, New York.

TELEPHONE SERVICE ARRANGEMENTS—Continued

Planning for Home Telephone Conveniences. Booklet, 52 pp., 8½ x 11 inches. Illustrated.
Planning for Telephones in Buildings. Brochure, 74 pp., 8½ x 11 inches. Illustrated.

TERRA COTTA

National Terra Cotta Society, 19 West 44th St., New York, N. Y.
Standard Specifications for the Manufacture, Furnishing and Setting of Terra Cotta. Brochure, 8½ x 11 ins., 12 pp. Complete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.
Color in Architecture. Revised Edition. Permanently bound volume, 9⅛ x 12¼ ins., containing a treatise upon the basic principles of color in architectural design, illustrating early European and modern American examples. Excellent illustrations in color.

TIMBREL TILE VAULTS

R. Guastavino Co., 40 Court Street, Boston.
Timbrel Arch Construction. Booklet, 8 pp., 8½ x 11 ins.

TILE, HOLLOW

National Fire-Proofing Co., 250 Federal Street, Pittsburgh, Pa.
Natco. The Complete line of Structural Clay Tile. Booklet. 39 pp. 8½ x 11 ins. Illustrated. A General Catalog.
Natco Double Shell Load Bearing Tile Bulletin. 8½ x 11 ins., 6 pp. Illustrated.
Natco Header Backer Tile Bulletin. 8½ x 11 ins., 4 pp. Illustrated.
Natco Face Tile for the Up-to-Date. Farm Bulletin. 8½ x 11 ins.
Natco Unibacker Tile Bulletin. 8½ x 11 ins., 4 pp. Illustrated.
Natcoflor Bulletin. 8½ x 11 ins., 6 pp. Illustrated.

TILE, STRUCTURAL CLAY

National Fireproofing Corporation, Fulton Building, Pittsburgh, Pa.
Natco. The Complete Line of Structural Clay Tile. Booklet, 48 pp., 8½ x 11 ins. Illustrated. A General Catalog.
Natco Vitritile Bulletin No. 164. 40 pp., 8½ x 11 ins. Illustrated. Shows color charts, sizes and shapes, actual installations, etc.
Natco Header Backer Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.
Natco Unibacker Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.
Natcoflor Bulletin. 8½ x 11 ins., 6 pp. Illustrated.

TILES

Flint Faience & Tile Co., Flint, Mich.
Vitocraft Tiles, Unglazed. Folder, 4 pp., 8½ x 11 ins. Illustrated. Details of patterns in full color. Ask for Form A-322.
Faience Tiles for Bathrooms. Folder, 4 pp., 8½ x 11 ins. Illustrated. Ask for Form A-303.
Faience and Vitocraft, Unglazed. Folder, 4 pp., 8½ x 11 ins. Illustrated. Views of installations. Ask for Form A-304.
Flintcraft Files. Folder, 4 pp., 8½ x 11 ins. Illustrated. Machine-made floor or wall tile. Ask for Form A-363.

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

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

TRUSSES

McKeown Bros. Company, 523 South Keeler Avenue, Chicago.
Truth in Architecture. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with use of trusses of wood.
Factory Built Bowstring Trusses. Folder, 4 pp., 8½ x 11 ins. Illustrated.
Timber Trusses. Folder, 4 pp., 8½ x 11 ins., Illustrated.

VALVES

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

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   General Contractor, Wise Granite Construction Co., Richmond
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2. St. Vincent Hospital, Jacksonville, Fla.
   Architect, Gerald A. Barry, Chicago
   Electrical Contractor, L. L. Patterson, Jacksonville
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   Architects, Pringle & Smith, Atlanta
   Electrical Engineer, H. J. C. Pearson, Atlanta
   Electrical Contractor, Sam Donelson, Atlanta
4. Carling Hotel, Jacksonville, Fla.
   Architects, Thompson, Holmes & Converse, New York
   Electrical Contractor, Sam Donelson, Atlanta
5. Lynch Building, Jacksonville, Fla.
   Architects, Pringle & Smith, Atlanta
   Electrical Engineer, H. J. C. Pearson, Atlanta
   Electrical Contractor, H. P. Foley, Washington, D. C.
6. Southern Railway Office Building, Atlanta, Ga.
   Architects, United Engineers and Constructors, Inc., New York and Philadelphia
   Electrical Contractor, Sam Donelson, Atlanta
7. Ingraham Building, Miami, Fla.
   Architects, Schultze & Weaver, New York
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VALVES—Continued

C. A. Dunham Co., 450 East Ohio St., Chicago, Ill.

The Dunham Packless Radiator Valve. Brochure, 12 pp., 8 x 11 ins. Illustrated. Data on an important type of valve.

Jenkins Brothers, 80 White Street, New York.

Office Buildings Yesterday and Today. Folder, 8½ x 11 ins. Illustrated. Valves for use in office buildings.

VENETIAN BLINDS

Burlington Venetian Blind Co., Burlington, Vt.

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

VENTILATION

American Blower Co., Detroit, Mich.

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

Duriron Company, Dayton, Ohio.

Acid-proof Exhaust Fans. Folder, 8 x 10½ ins., 8 pp. Data regarding fans for ventilation of laboratory fume hoods.

Specification Form for Acid-proof Exhaust Fans. Folder, 8 x 10½ ins.

WATERPROOFING

Minwax Company, Inc., 11 West 42nd St., New York.

Waterproofing Stadia. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Transparent Waterproofings for All Masonry Walls and Surfaces. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Data Sheet on Membrane Waterproofing. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Toch Brothers, New York, Chicago, Los Angeles.

Architects' Specification Data. Sheets in loose leaf binder, 8½ x 11 ins., dealing with an important line of materials.

WEATHER STRIPS

Athey Company, 6035 West 65th St., Chicago, Ill.

The Only Weatherstrip with a Cloth to Metal Contact. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on an important type of weather stripping.

WINDOW GLASS

Pittsburgh Plate Glass Company, Grant Building, Pittsburgh, Pa.

Pennvernon Window Glass With the New Flatter Surface. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

WINDOWS

William Bayley Co., 147 North Street, Springfield, Ohio.

Bayley Pivoted Windows. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Sections, hardware, and other details, and illustrations of installations.

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.

Fenestra Blue Book. Brochure, 75 pp., 8½ x 11 ins. Illustrated. Data on steel windows.

The Kawneer Company, Niles, Mich.

Circular, 8½ x 11 with A.I.A. File No. featuring full size details and specifications of Heavy Type Sealair Independent Balanced Sash Window.

Circular, 8½ x 11 with A.I.A. File No. featuring full size details and specifications of Light Independent Balanced Sash Sealair Windows.

Circular, 8½ x 11 with A.I.A. File No. featuring full size details and specifications of In-swinging Sash Sealair Windows. The above to be furnished in non-ferrous metal and steel.

David Lupton's Sons Company, Philadelphia, Pa.

Lupton Pivoted Sash. Catalog 12-A. Booklet, 48 pp., 8½ x 11 ins. Illustrates and describes windows suitable for manufacturing buildings.

Lupton Commercial Projected Windows. Brochure. 24 pp., 8½ x 11 ins. Illustrated. Details and specifications.

WINDOWS, CASEMENT

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.

Fenestra Casements. Booklet, 14 pp., 8½ x 11 ins. Illustrated. Discusses casements, particularly for residences.

Fenestra Screen Casements. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

WINDOWS, CASEMENT—Continued

Decorating With Casements. Booklet, 18 pp., with inserts in color 6 x 8½ ins. Deals with use of decorations, particularly draperies, with casement windows.

Hope & Sons, Henry, 103 Park Ave., New York, N. Y.

Catalog, 12¼ x 18½ ins., 30 pp. Illustrated. Full-size details of outward and inward opening casements.

David Lupton's Sons Company, Philadelphia, Pa.

Lupton Casement of Copper Steel. Catalog C-217. Booklet, 24 pp., 8½ x 11 ins. Illustrated brochure on casements, particularly for residences.

Lupton Creates a Complete Casement. Folder, 8½ x 11 ins. Illustrated data on a casement providing for screens, shades and draperies.

Lupton Heavy Casements. Detail Sheet No. 101, 4 pp., 8½ x 11 ins. Details and specifications only.

Richards-Wilcox Mfg. Co., Aurora, Ill.

Casement Window Hardware. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Shows typical installations, detail drawings, construction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.

Architectural Details. Booklet, 8½ x 11 ins., 16 pp. Tables of specifications and typical details of different types of construction.

List of Parts for Assembly. Booklet, 8½ x 11 ins., 16 pp. Full lists of parts for different units.

WINDOW SCREENS

William Bayley Co., 147 North Street, Springfield, Ohio.

Bayley Pivoted Windows Screened. Booklet, 8 pp., 8½ x 11 ins. Data on screening and window ventilation.

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.

Fenestra Screen Casements. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

WINDOWS, STEEL AND BRONZE

William Bayley Co., 147 North Street, Springfield, Ohio.

Bayley Steel Window Inserts. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Suggestions on correct use of inserts.

David Lupton's Sons Company, Philadelphia, Pa.

A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 8½ x 11 ins. Deals with Pond Continuous Sash. Sawtooth Roofs, etc.

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

Truscon Steel Company, Youngstown, Ohio.

Drafting Room Standards. Book, 8½ x 11 ins., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.

Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet, 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.

Continuous Steel Windows and Mechanical Operators. Catalog 126. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

WOOD—See also Millwork

American Walnut Mfrs. Association, 618 So. Michigan Boulevard, Chicago, Ill.

American Walnut. Booklet, 7 x 9 ins., 46 pp. Illustrated. A very useful and interesting little book on the use of walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.

American Walnut for Interior Woodwork and Paneling. 7 x 9 ins. Illustrated. Discusses interior woodwork, giving costs, specifications of a specimen room, the different figures in Walnut wood, Walnut floors, finishes, comparative tests of physical properties and the advantages of American Walnut for woodwork.

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Minwax Company, Inc., 11 West 42nd St., New York.

Color card and specification for Minwax Flat Finish. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a penetrative, preservative stain finish giving stain and soft wax effect.

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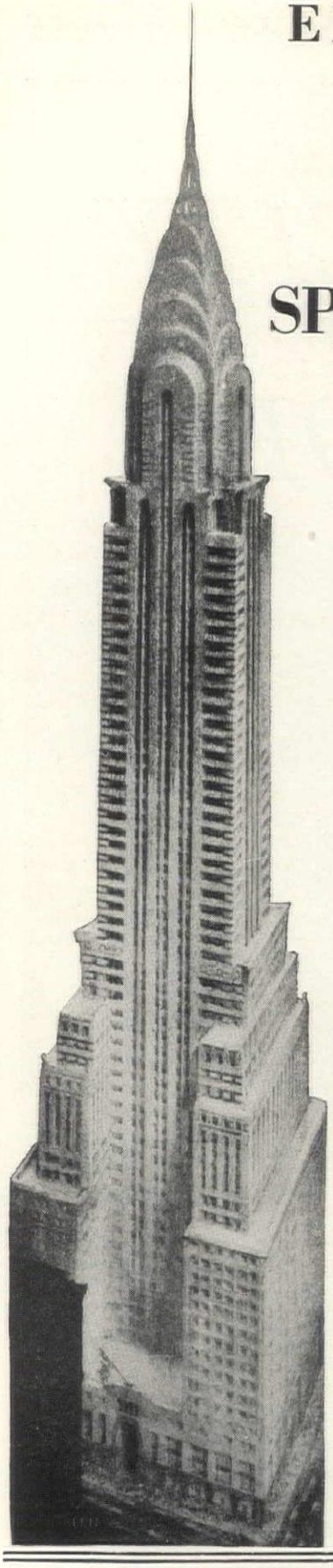

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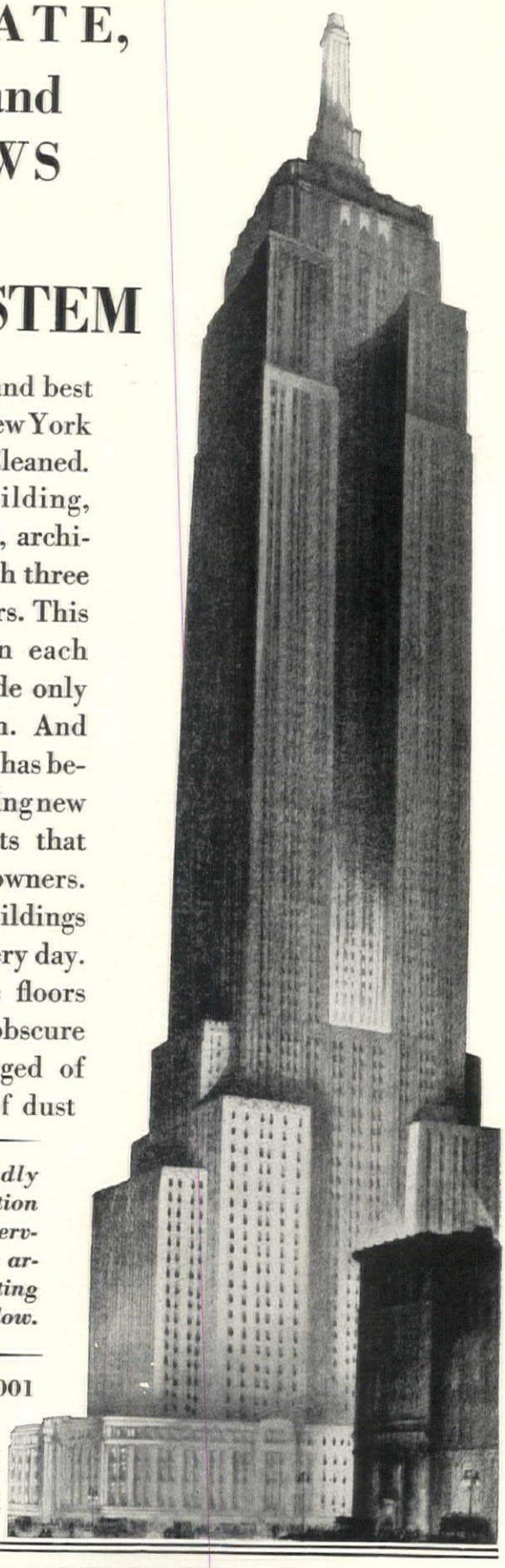

CHRYSLER Bldg. NEW YORK
William Van Alen, Architect

EMPIRE STATE Bldg. NEW YORK
Shreve, Lamb & Harmon, Architects

THE SPENCER TURBINE CO.

HARTFORD, CONNECTICUT — CENTRAL CLEANING SYSTEMS — REPRESENTATIVES IN 50 CITIES

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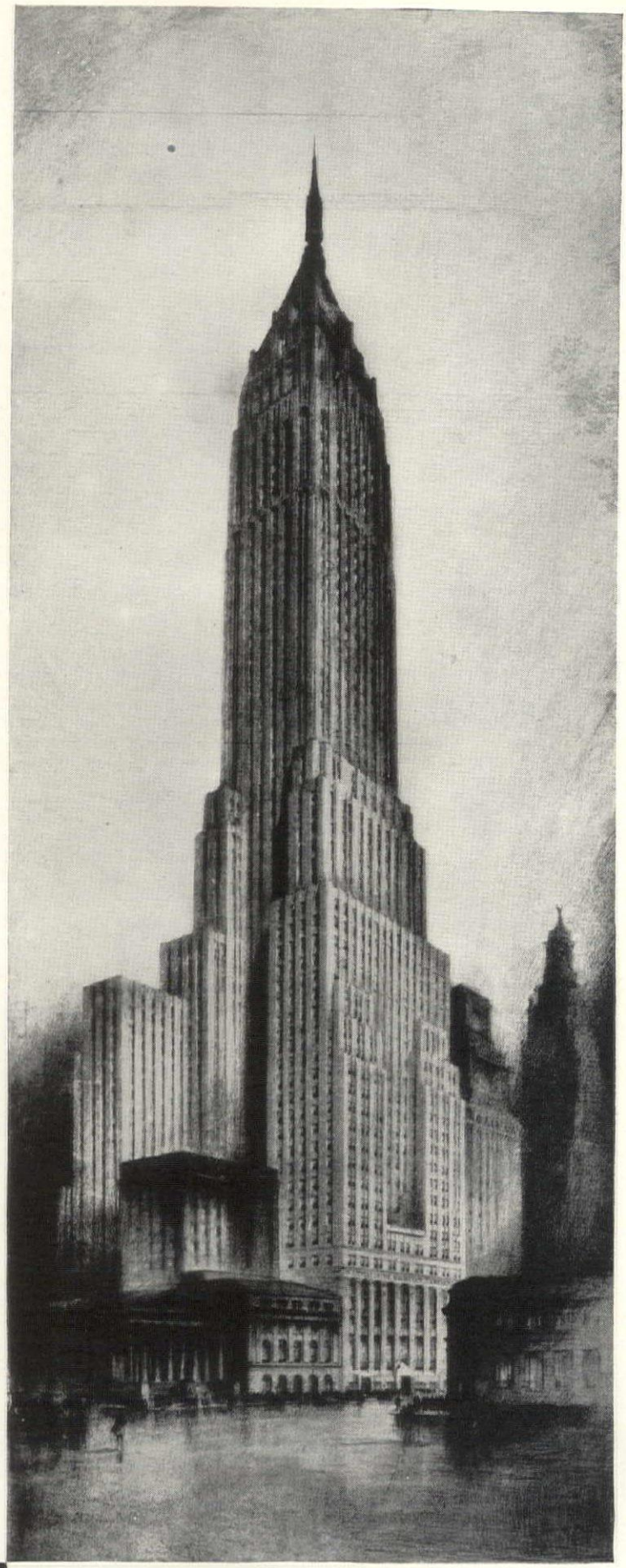

BANK of MANHATTAN BUILDING New York City

Framework of Bethlehem Wide-Flange Structural Shapes

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

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BETHLEHEM

ABSOLUTE QUIET ASSURED

in the National Broadcasting Co. Studios in this colossus of modern buildings — The Merchandise Mart, Chicago. After exhaustive investigation

TRIMOUNT SOUND-INSULATED DOORS

were selected by the architects and the National Broadcasting Co. because of their efficiency in retarding noise and the desirable merits of their sturdy construction. Fifty-seven sound insulated doors were required.

Merchandise Mart, Chicago.
Graham, Anderson, Probst & White, Architects.
U. S. Gypsum Co., Sound Insulating Contractors.

SOME RECENT INSTALLATIONS

National Broadcasting Co. Studios Merchandise Mart, Chicago, Ill. Graham, Anderson, Probst & White.

National Broadcasting Co. Studios New York City. Raymond Hood.

Columbia Broadcasting Co. Studios Washington, D. C. Columbia B. C. Co. Engineers.

Crosley Radio Broadcasting Studios Cincinnati, O. S. Hannaford & Sons.

Radio Broadcasting Studios W G N Chicago, Ill. Howells & Hood.

Radio Broadcasting Studios W B T Charlotte, N. C. WBT Engineers.

New York University, New York City James Gamble Rogers.

Mass. General Hospital, Boston, Mass. Coolidge, Shepley, Bulfinch & Abbott.

Lying In Hospital, Boston, Mass. Coolidge, Shepley, Bulfinch & Abbott.

Eastman Kodak Co., Rochester, N. Y. Stevens Sound-Proofing Co.

Civic Opera Building, Chicago, Ill. Graham, Anderson, Probst & White.

Cooley School Addition, Detroit, Mich. Donaldson & Meier.

Cadillac Motor Co., Engrg. Bldg. Detroit, Mich. Albert Kahn.

Concert Hall, Dupont Est., Longwood Garden, Pa. E. W. Martin.

Fine Arts Building, Tulsa University H. C. Hibbs.

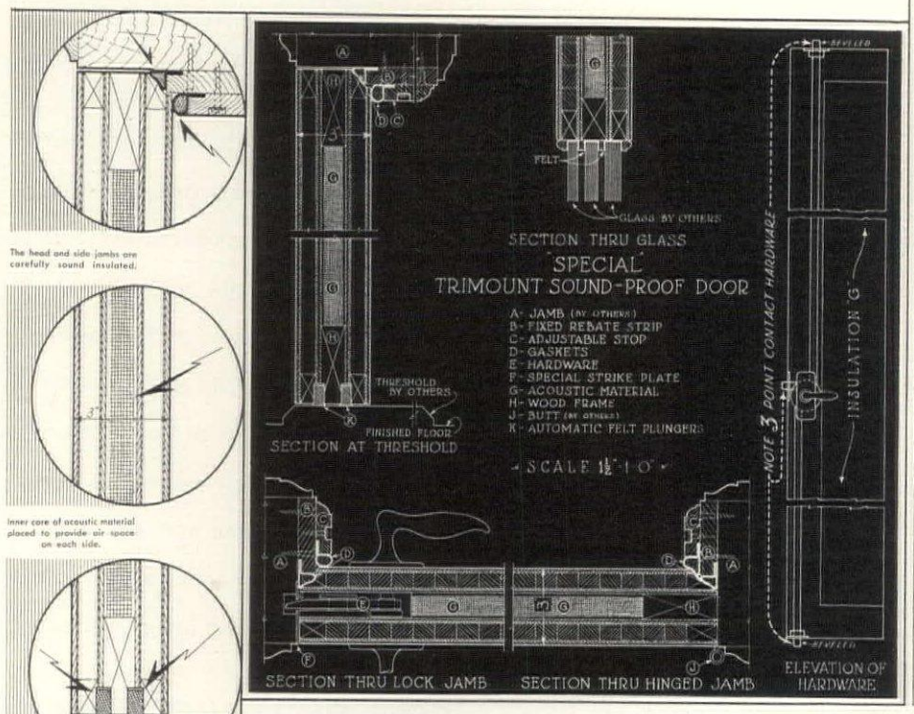
Baker Library Addn., Boston, Mass. McKim, Mead & White.

Johns Hopkins Hosp., Baltimore, Md. Contractor, John H. Hampshire, Inc.

United Research Corp. Laboratories New York, N. Y. Stevens Sound-Proofing Co.

Music Building, University of N. C. Chapel Hill, N. C. Atwood & Nash, Inc.

Cowan & Pringle Studios, New York.



CAN BE FIRE-PROOFED BY PYRONO PROCESS.
PROMPT DELIVERIES GUARANTEED.
SEE OUR CATALOG IN SWEET'S

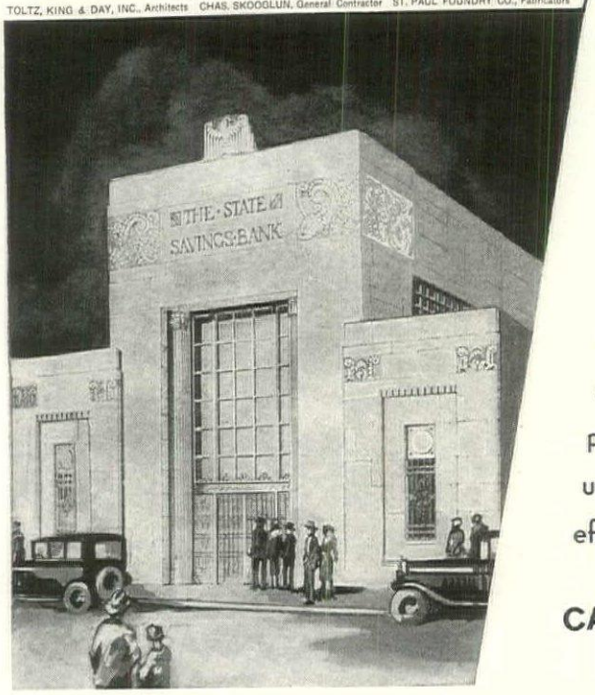
THE COMPOUND & PYRONO DOOR COMPANY
ST. JOSEPH, MICHIGAN

AMERICA'S OLDEST VENEERED DOOR SPECIALISTS

LARGE OR SMALL

MARKET STREET NATIONAL BANK BUILDING, PHILADELPHIA
RITTER & SHAY, Architects and Engineers WM. STEELE & SONS CO., General Contractors AMERICAN BRIDGE CO., Fabricators

STATE SAVINGS BANK, ST. PAUL
TOLTZ, KING & DAY, INC., Architects CHAS. SKOOGLUN, General Contractor ST. PAUL FOUNDRY CO., Fabricators



A conspicuous feature in the success of Carnegie Beams is their adaptability to all construction requirements, regardless of size or type of architecture. For the towering skyscraper challenging the ingenuity of the most skilled structural steel designers, or the small building requiring only a few tons of steel, Carnegie Beams offer a simplicity of detail, an ease of fabrication and erection, and a flexibility of design never before possible in structural steel. Carnegie Beams possess many unique advantages for those interested in economical and efficient steel construction. They merit your investigation.

CARNEGIE STEEL CO., PITTSBURGH, PA.

Subsidiary of United States Steel Corporation 73

CARNEGIE BEAMS

After 26 YEARS

THESE 115 KINNEAR AUTOMATIC FIRE SHUTTERS ARE AS GOOD AS THE DAY THEY WERE INSTALLED

Although intended primarily for fire protection, the doors and shutters on the first floor are lowered every night to prevent unlawful entrance, and those on the wall are used, in the summer, instead of awnings.

The new Kinnear Rolling Door Catalog is mailed free on request. Kinnear Engineering and Estimating Service is available without charge or obligation.

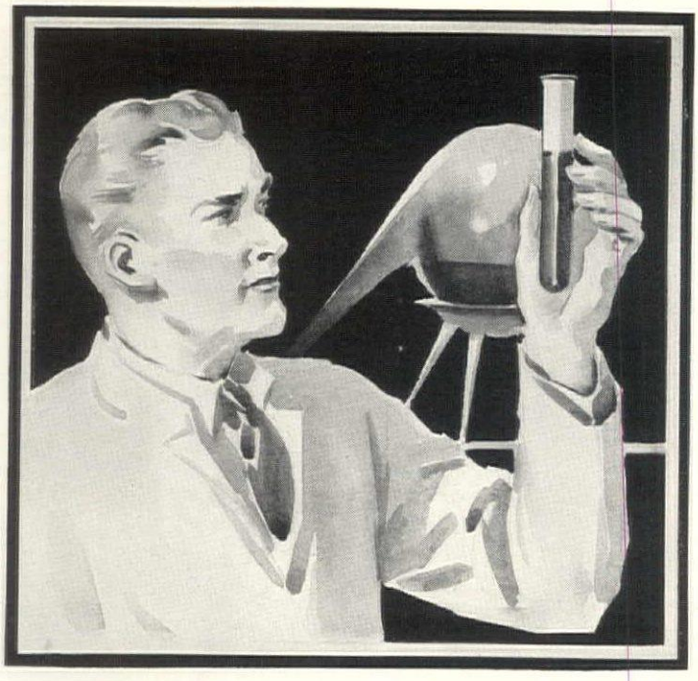
Twenty-six years is quite a spell—a lot of water goes over the miller's wheel in a quarter of a century. Comparatively few mechanical devices made that long ago are in perfect operating condition today. But that's the habit of Kinnear Rolling Doors and Shutters. Ten, twenty, thirty years of perfect, uninterrupted service is the rule, not the exception. They just seem to mellow with age and, if anything, work a little smoother as time goes on.

Such performance doesn't just happen. It's the result of the extra generous factor of safety that is standard in Kinnear Engineering. Naturally, Kinnear Doors cost a little more at the start—but a lot less at the finish.

Kinnear ROLLING DOORS

THE KINNEAR MANUFACTURING CO.
400-440 Field Avenue, Columbus, Ohio, U. S. A.

Boston Chicago Cincinnati Cleveland Detroit New Orleans
New York Philadelphia Pittsburgh Kansas City Washington



Out of the laboratory and specialized factory... *comes the finest of all blackboards!*

IN our 47 years of building fine blackboard, we have produced more blackboard than any other concern in the world. These years have taught and emphasized many times the necessity and value of complete laboratory equipment, specialized machinery, and actual experience in the blackboard business.

Sterling Lifelong Blackboard is the ultimate achievement of our chemists, the triumph of our laboratory, the result of years of research—a product proved in service in thousands of schools.

Sterling has a uniform writing surface that economically takes crayon marks with crisp exactness, producing a sharp, clear, solid mark that is easily read without eyestrain. It erases easily and never wears the eraser excessively. It has a writing surface that cannot be defaced except by malice.

Sterling, a most durable blackboard will perform economically—and indefinitely—under all conditions.

Our pledge of satisfaction stands behind it. Investigate *Sterling.* Know all the facts. It has no equal. Address Department S649 for 15 pages of plans, elevations, and detailed specifications for the installation of *any* blackboard—A. I. A. File No. 35-b 12. Prepared for you by architects. Free for the asking—with a sample of *Sterling,* too.

Sterling Lifelong Blackboard

WEBER COSTELLO COMPANY

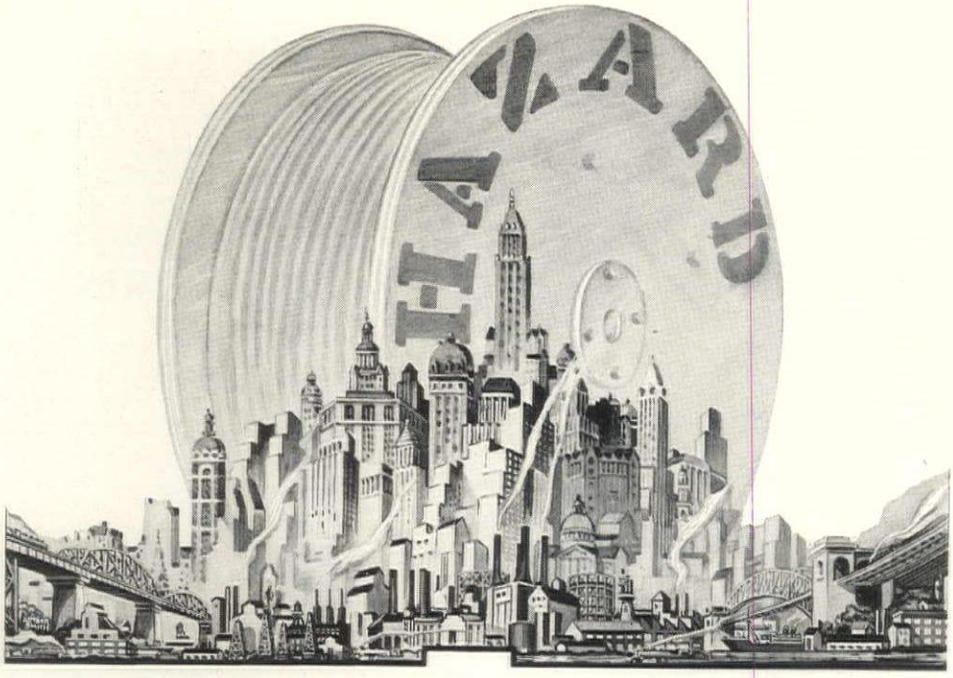
Chicago Heights, Illinois

MAKERS OF *Sterling Lifelong Blackboard—Globes*

TIME TESTED W.C. SCHOOL SUPPLIES

Old Reliable Hyloplate—Erasers Maps—Crayon

55 Distributor Warehouses Assure You Immediate Service



ELECTRICAL wiring is a most important part of any structure. Its cost, however, is a very small part of the total—usually less than one per cent.

The possible savings to be made by skimping on the quality of wire purchased are therefore very small indeed. Much greater savings can be made by specifying Hazard Insulated Wires and Cables and benefiting by their longer life and freedom from continual maintenance.

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A Statement About—

The Dunham Differential Vacuum Heating System

TELEPHONE
GRANT 3300

GRANT BUILDING
INCORPORATED

GRANT STREET
FOURTH AND THIRD AVENUES

PITTSBURGH, PA.
April 10th 1930.

C. A. Dunham Company,
Pittsburgh, Pa.

Gentlemen:- Attention Mr. C. W. Wheeler

We installed your heating system on a guarantee of steam consumption over a six months period ending April 1st. 1930. The guarantee period has just expired and we are pleased to advise you that our records show a consumption of .0534 pounds of condensate per square foot of radiation per heating degree day or 249 pounds of condensate per square foot of radiation per season, which is a saving of 10.38% more than the consumption guaranteed by you.

It is easy to regulate the temperature of the building by raising or lowering the vacuum and to maintain ample heat, with satisfaction to tenants and ourselves alike. If the equipment continues to perform as it has so far, and we have no reason to feel it will do otherwise, we have made a wise choice.

The above results were obtained with manual control. We contemplate the installation of thermostatic and electric valve equipment for the regulation of heat, which we hope will show a further saving.

Yours very truly,

GRANT BUILDING, INCORPORATED

W. J. Strassburger, President.

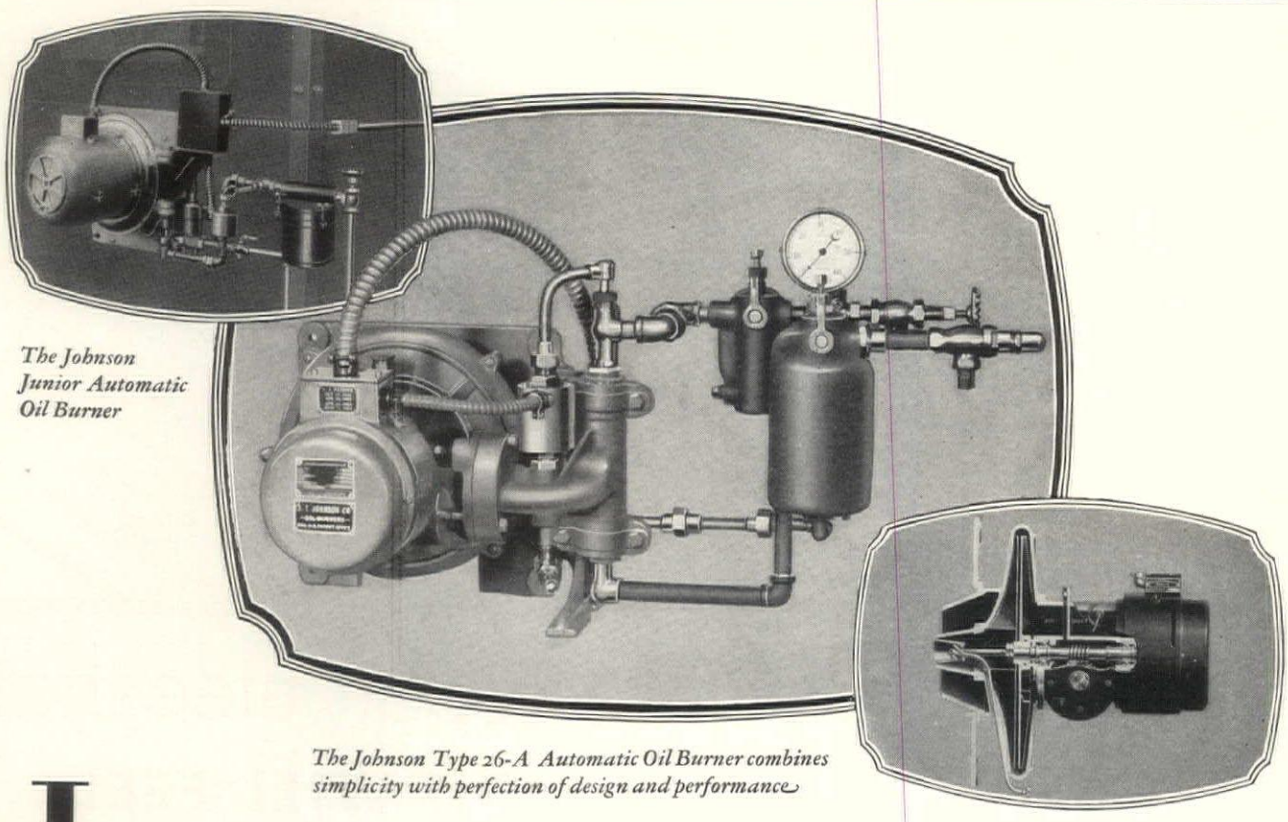
WJS/hfk

Architect for Grant Building, H. Hornbostel; Associate Architects, Eric Fisher Wood & Co.; Consulting Engineer, Thomas Payne; Heating Contractors, McGinness, Smith & McGinness

Central Station steam estimates, based upon vacuum return line operation, indicated that 30,000,000 lbs. of steam would be required. Dunham engineers estimated that 20,000,000 lbs. would be required under Dunham Differential System operation. Actual consumption for the 1929-30 heating season was 17,924,800 lbs., which is 10.38% below the saving promised by the Differential System.

C. A. DUNHAM CO.
450 EAST OHIO STREET

Dunham Building
CHICAGO, ILLINOIS



The Johnson Junior Automatic Oil Burner

The Johnson Type 26-A Automatic Oil Burner combines simplicity with perfection of design and performance

Is there really a problem in Specifying an OIL BURNER?

LAST YEAR 142,000 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 specifying or using 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 25 years of experience in the installation and exclusive manufacture of oil burner equipment. This experience, plus a complete line 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, and in many foreign lands, 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 over a quarter of a century is at your disposal.

* * *

We will also be pleased to send you a copy of our catalogue as published in "Sweet's" for your files. Just write "Bulletin 4-B please," on your letterhead or business card, no obligation incurred, and your copy will be sent without delay.

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Listed as Standard by the Underwriters Laboratories

Manufactured and Guaranteed by

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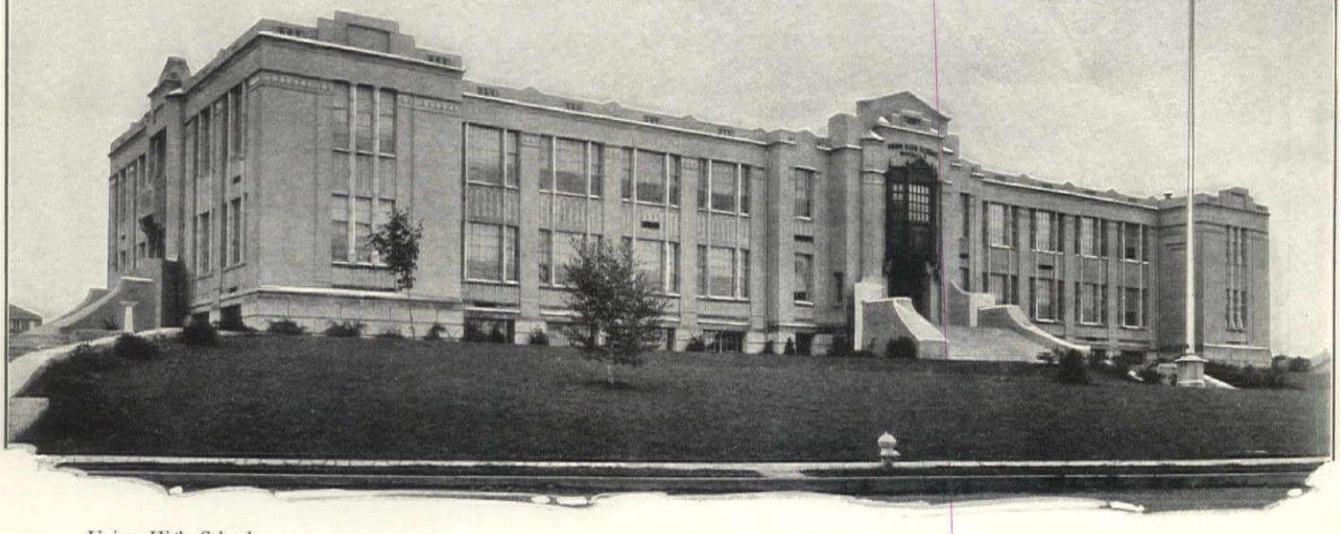
Oil Burning Equipment for Every Heating and Power Purpose . . .

*JOHNSON Rotary Burners, with either semi-automatic or full automatic control, in three styles and seven sizes, giving a range of from 250 to 41,700 square feet of steam radiation or the equivalent. We also manufacture Natural Draft, Whirlwind, Low Pressure Air and Steam Atomizing Oil Burners; also, electric or steam driven oil pumping and preheating equipment.

YOU WILL FIND OUR LOCAL REPRESENTATIVE'S ADDRESS IN YOUR TELEPHONE DIRECTORY

Do you know the fine points of the PEERVENT Unit?



Union High School
Milwaukie, Ore.
equipped with
16 PEER VENT UNITS
F. M. Stokes, *Archt.*
Hastorf-Lord Co.,
Heat. Contractors

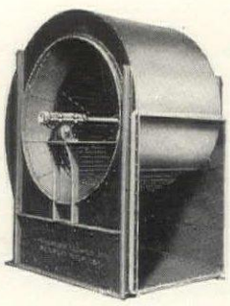
MAKE it a point to visit some of the schools where PeerVent Units are in use and see for yourself how quietly and efficiently these units operate under varying conditions—It will be a revelation to you—Also, remove the front panel from one of these units and look inside—see the new PeerFin Radiator—the silent-running motor—the air filter—the mixing damper. Then you will realize that PeerVent Units are more than mechanical equipment.

PeerVent Units have a proven durability. Units built and installed 18 years ago are still in use and operating satisfactorily.

Based on correct ventilation principles, PeerVent Units ensure a more even temperature than ordinary types of heating systems. When properly installed with correctly located air inlets, PeerVent Units will keep the floor temperature in the schoolroom within 2 degrees of the temperature at the breathing line. With ordinary heating systems this temperature variation is often as much as 10 degrees. PeerVent Units are economical. As each unit is independent from those in other rooms, only the units in occupied rooms need be operated.

Please write if you would like to talk to our local resident engineer. You will be under no obligation.

PEERLESS UNIT VENTILATION CO., Inc.
BRIDGEPORT, CONNECTICUT
Pioneers in Unit Ventilation
Resident Engineers in Principal Cities from Coast to Coast



The Sirocco FAN

QUIET IN OPERATION

Because for a given capacity the Sirocco fan operates at a lower speed than any other fan of the same size.

A "CITY" *in One Building*

Made Possible By Quiet Operating Highly Efficient Sirocco Ventilating Fans . . .

A variety of smart shops, a restaurant, a number of clubs, a theatre, a garage . . . all under one roof. Thousands of people passing to and fro . . . workers and pleasure seekers, executives and clerks, shoppers and theatregoers . . . enjoying the advantages which group location offers, and breathing air as fresh as the ocean breeze.

Sirocco Fans delivering thousands of cubic feet of air per minute make this condition possible in many of the world's largest buildings. They have been selected in most instances for their ability to deliver large volumes of air at slow speeds, which insures longer life, greater efficiency, less vibration and noise.

For more than 49 years American Blower Engineers and Aerologists have aided in the advancement of modern architecture and building by furnishing scientifically designed equipment for air handling. The Sirocco Fan is but one of American Blower's outstanding achievements.

American Blower Engineers, located at branch offices in all the principal cities, will be glad to discuss the ventilating equipment for any projects you may have in mind. Phone today—their experience, data, and technical knowledge may prove invaluable to you.

AMERICAN BLOWER CORPORATION, DETROIT, MICH.
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONT.
BRANCH OFFICES IN ALL PRINCIPAL CITIES
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American Blower

"Sirocco" TRADE MARK

VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

Manufacturers of all Types of Air-Handling Equipment — Since 1881

REVIEWS OF MANUFACTURERS' PUBLICATIONS

DAVID LUPTON'S SONS CO., Philadelphia. "Lupton Casements, the Standard of Quality." Valuable work on their use.

When one thinks of casement windows it is usually in connection with structures of a residence character, and yet the advantages which procure for windows of this type wide use in residences or apartment buildings are quite as applicable to structures of other types. This booklet from the well known Lupton firm contains illustrations showing use of its casements in buildings or structures of a distinctly non-residence nature,—the Memorial Municipal Building, Norwood, Mass.; the Masonic Temple, Detroit; Maricopa Court House, Phœnix, Ariz.; Public Auditorium, Cleveland, and it might not have been difficult to include illustrations of office buildings in which they are used. The brochure contains every detail of data in the form of diagrams and other drawings as well as in text which an architect, engineer or builder would be likely to require, and complete specifications are included for use of the various kinds of Lupton casements.

DIEBOLD SAFE & LOCK CO., Canton, Ohio. "Protection for Cash With Diebold Money Chests."

Securing safety for treasure of any kind has engaged the attention of the human race from time immemorial. The pyramids, built as tombs for the treasured bodies of sovereigns, represented an effort to obtain by sheer bulk and vast weight inviolability which was absolute,—and yet how frail has such protection proved to be! Countless have been the efforts made during even modern times to secure safety for treasure, and yet the ingenuity of men has time and time again baffled the builders of the strongest protection and triumphed over the designers of some treasure vault built upon the most advanced plan as the efforts of builders have been met with equal if not greater ingenuity of men whose business it is to frustrate their efforts. It may be doubted whether it is possible to secure absolute safety if there be no account taken of time or certain other controlling factors; it would seem that the day is not yet. This brochure presents an interesting study into the matter of securing protection not only from theft but also from fire. It has a particular value just now because with the increase in the number of chain stores of different sorts where considerable cash must be kept on the premises, and with the extensive use of the devices by means of which merchandise of certain kinds is had by putting coins into slots, there is presented temptation of the strongest sort to those whose business it is to tap the sources of wealth.

Written as applicable to danger from fire but apropos also to some extent of danger from theft, this booklet has this to say: "1. *You Are Buying Protection Free From Speculation.* No safe expert can accurately forecast the duration or intensity of the fire which may some day visit your plant or office. A one- or two-hour safe may seem to furnish more than adequate protection in a 'fire-proof' building. Yet fires spreading from adjoining buildings or caused by the carelessness of your own employes, may ignite interior trim, wooden desks, files or inflammable stores, resulting in a fire of great intensity and several hours' duration. The only sure protection is a safe that will meet your maximum fire hazard. 2. *You Are Buying Protection That Safeguards Vital Assets.* Your business records represent vital assets, because the present operation and the future prosperity of your business are dependent upon them. Accounts receivable, cost records, research data, patent models, master tracings, audit data, sales reports, prospect lists, insurance policies, contracts,—without them you would be forced to start at the bottom and practically rebuild your business. They are too valuable to be destroyed, because you think a fire can't last for more than two hours. It can. A four-hour safe will protect your records against all reasonable risks. 3. *You Are Buying Protection Unaffected by Contingencies.* Every building represents a different degree of fire risk. Even those designated as 'fireproof' differ widely in their fire-resistive qualities, and many contain hidden fire hazards. You can insure your physical assets against unforeseen dangers, but you cannot insure your vital records. Small defects in construction of heating systems, foundations, or wall supports may become of first importance in case of fire."

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh. "Waste! A Publication in the Interest of Elimination."

Perhaps it is because nature has been so lavish in her gifts to America that Americans are, it is said, the most wasteful people in the world. In a restaurant, for example, one sees people order entire steaks, eat a few mouthfuls and leave the rest, which is no doubt thrown out and wasted,—and this while in other parts of the world people are dying of starvation. The thrifty French, for example, could feed one entire family and perhaps more with what is wasted in one American home. President Wilson during the World War preached in and out of season what he called the "gospel of the clean plate."

"We are a wasteful nation, but increasing competition, both at home and abroad, is awakening us to a realization of the fact that if the United States is to retain its present supreme position in the world, waste elimination and prevention must become a nation-wide habit. Ever since so-called scientific management was introduced, our industries have been giving more or less attention to waste and, while at first, as was but natural, each concern worked more or less independently, the tendency in recent years has been to exchange ideas, the better to attack this common problem. In an attempt to coördinate these various independent efforts, several years ago, five of the important management associations of the United States,—the Management Division of the American Society of Mechanical Engineers, the American Management Association, the Taylor Society, the Society of Industrial Engineers, and the National Association of Cost Accountants, with the coöperation later of the Department of Commerce and the United States Chamber of Commerce,—instituted an annual movement as 'National Management Week.' Organizations of all kinds were asked to devote at least one meeting to a discussion of some phase of management's problems, and this movement was continued until superseded by the Annual Elimination of Waste Campaign, sponsored by the American Society of Mechanical Engineers with the American Management Association cooperating, both prepared to give attention to the movement.

"Many different methods may be employed in conducting a campaign, one of the most effective being the exhibition, on suitable display boards or tables, of various materials that have been wasted due to careless handling, defective machining, wrong ordering, etc. The cost or sales price of each item should be shown with the piece exhibited. The better class of worker realizes that materials cost money, but the careless, indifferent element never stop to think of the cost of materials they are using, and placing the value on the Waste Elimination Boards causes them to realize what it costs when it is necessary to scrap something. Such items as gas, electricity, air, water, steam, etc., which cannot be shown, may readily be indicated by suitable legends such as, for example, 'Our power and light cost is $75 per month. Please keep motors and lights shut off when not in use.' Another valuable adjunct to a Waste Elimination Campaign is a 'suggestion system.' Workmen can in this way be encouraged to submit suggestions covering all sorts of activities, including elimination of waste, and thus a rich source is developed from which are obtained practical ideas for both shops and offices. After a suggestion system is installed, arrangements should be made to continue it indefinitely; that is, it should not be merely incidental to an intensive waste campaign if the maximum benefits are to be secured and if we are really to see an end of waste.

"Elimination and prevention of waste apply not only to the reduction of the scrap pile but can include the substitution of cheaper for more expensive materials as well,—quality being satisfactory for the purpose intended. Simplification and standardization of manufacturing methods, in fact anything that will lead to the saving of time, labor, material, or to improved quality and service, in an attempt to improve efficiency, are also desirable adjuncts. If all industries will join in this movement and assist in making it truly national in scope, a tremendous step forward will be taken, not only in pointing out the evil effects of waste but in contributing toward the establishing of practical and inexpensive methods of accomplishing its elimination."

The movement is in accord with the best principles operating today and should commend itself to the sympathies of all good citizens,—particularly the architects and engineers.

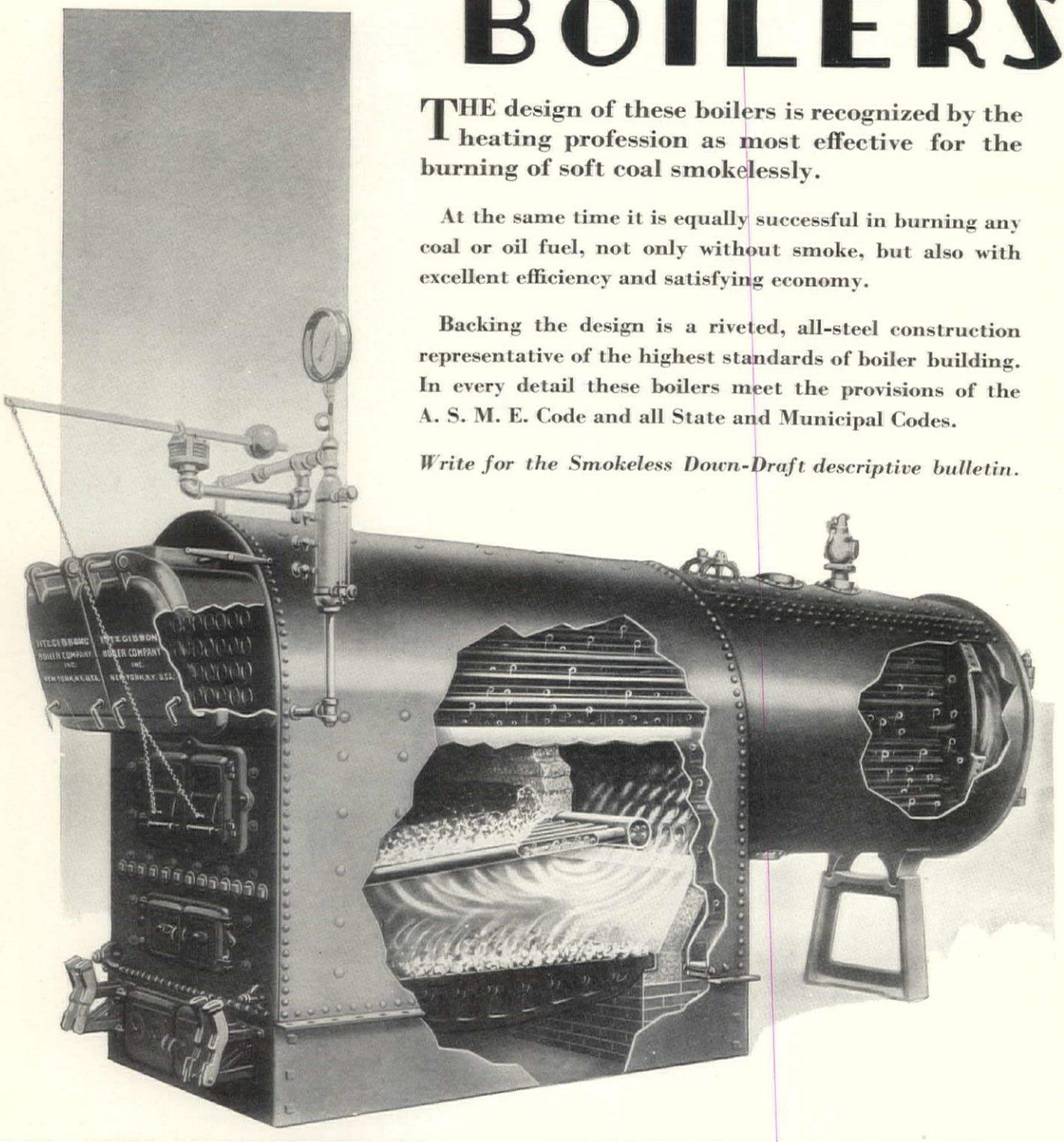
FITZGIBBONS
Smokeless Down-Draft
BOILERS

THE design of these boilers is recognized by the heating profession as most effective for the burning of soft coal smokelessly.

At the same time it is equally successful in burning any coal or oil fuel, not only without smoke, but also with excellent efficiency and satisfying economy.

Backing the design is a riveted, all-steel construction representative of the highest standards of boiler building. In every detail these boilers meet the provisions of the A. S. M. E. Code and all State and Municipal Codes.

Write for the Smokeless Down-Draft descriptive bulletin.



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REVIEWS AND ANNOUNCEMENTS

Joseph G. Ludgin announces the removal of his office to the London Guarantee & Accident Building, 360 North Michigan Avenue, Chicago.

Coggins & Hedlander, and George H. Petit, Associate, announce the opening of new offices at 45 East Putnam Avenue, Greenwich, Conn.

Announcement is made of the dissolution of the firm of Wallin & Comer. Arthur F. Comer has established independent practice at 909 Realty Building, Savannah.

Lutah Maria Riggs and William Allen Horning, for many years in the office of the late George Washington Smith, announce the formation of a partnership for the completion of Mr. Smith's work still in hand and for the general practice of architecture at 17 Mesa Road, Montecito, Cal.

JOHNS-MANVILLE CORPORATION, 292 Madison Avenue, New York. "Sanacoustic Sound-Absorbing Tile."

In large office areas, certain departments of banks, and in many other places where much use is made of adding machines, typewriters and similar items of equipment it is necessary to adopt some means of deadening or at least reducing the noise produced by these highly important tools of business. In other instances it is necessary to provide the best conditions for hearing or prevent the penetration of sound into adjoining areas. Much has been written regarding use of different means of accomplishing these results, and many eminent men have devoted years to the study of what architects and engineers know as "acoustics." The Johns-Manville Corporation is widely known for the variety and excellence of the building materials which it produces, and among its many products there is perhaps none more useful or more widely known than "Sanacoustic Sound-Absorbing Tile." This brochure deals with the subject in the way adopted by the Johns-Manville Corporation in advertising all its materials, describing it in text and fully illustrating it by diagrams and cuts made from actual photographs. That it is being used in structures of many types is proved by the list upon page 7 which names some of the buildings in which Sanacoustic Sound-Absorbing Tile have been installed,—structures in all parts of the country, among them being banks, offices, stores, theaters and auditoriums, churches and schools, hotels and buildings of other kinds.

GRINNELL COMPANY, Providence. "Thermoflex Heating Specialties; Data Sheets." A useful booklet on their use.

Introduction of a new line of heating appliances manufactured by a process that mechanically tests the working parts to many times their designed operating pressures is announced by the Grinnell Company in two recent publications. These devices, comprising the Thermoflex line of traps, valves and related accessories, employ Hydron bellows for all working parts which operate thermostatically. The Hydron bellows are manufactured under hydraulic pressure sufficient to burst the metal if any part is defective. This tested-in-the-making process assures the buyer of uniformly perfect mechanism,—a vital requirement in the satisfactory operation of modern steam and vapor heating systems. In addition to this mechanical testing, the Grinnell Company has engaged, under contract, the services of the Pittsburgh Testing Laboratory to individually inspect, test and certify every Thermoflex device employing the Hydron bellows. Each of these units is thus shipped with a certification tag attached by the inspection laboratory staff representative, giving double assurance to the user that the appliance meets the highest standards. Announcement of these devices was first made in an attractive folder entitled "Grinnell Discovers a Superior Heating Trap." This folder contains a typical data sheet and a specimen tag of the Pittsburgh Testing Laboratory. Supplementing this announcement is a complete Thermoflex data book containing design and specification information relating to these devices.

P. C. Smith, 86 Porchester Terrace, London, W. 2, wishes to receive the catalogs and other publications of American manufacturers.

Ivan H. Riley & Company announce their removal from 3401 South Parkway to the Old Dearborn Bank Building, 203 North Wabash Avenue, Chicago.

Walter A. McDougall announces his removal to new offices in the London Guarantee & Accident Building, 360 North Michigan Avenue, Chicago.

Through inadvertence, THE ARCHITECTURAL FORUM published in its February issue an advertisement featuring the Williamsburg Savings Bank Building, Brooklyn, naming the architect but without mentioning the engineer. Credit for the engineering is due to Frank Sutton.

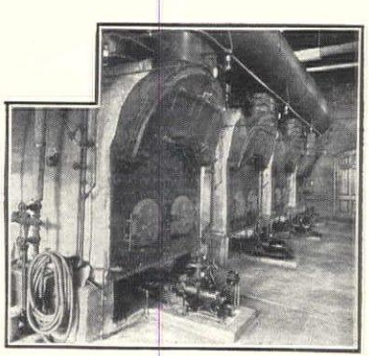
AN ANNOUNCEMENT

In December last, a group of inspecting engineers and representatives of testing laboratories from all sections of the country, met in Detroit, and formed a preliminary organization among those engaged in the practice of testing and supervising the manufacture and use of various engineering materials for construction work of federal, state and city governments, public service corporations, railroad and highway construction and maintenance, bridges, office, manufacturing, educational and other building projects. At a second meeting held April 3 and 4, also at Detroit, the success of the preliminary gathering was continued, and there was finally concluded the formation of the National Engineering Inspection Association. The officers elected were: Watson Vredenburgh, president of Hildreth & Company, Inc., New York, as President; J. D. Stoddard, vice-president of the Detroit Testing Laboratory, as Vice-President; and B. H. Witherspoon, president of the Pittsburgh Testing Laboratory, as Secretary-Treasurer. The Board of Directors includes the officers and a representative from each of the four geographical sections of the country: Henry Gulick, president of Gulick-Henderson Company, New York, for the eastern section; James H. Herron, president of the James H. Herron Company, Cleveland, for the mid-western section; F. B. Porter, president of the Southwestern Laboratories, Fort Worth, for the southern section; Abbot A. Hanks, president of Abbot A. Hanks, Inc., San Francisco, for the western section.

The Association adopted complete constitution and by-laws, and code of ethics. The constitution declares that the object of the Association is "to promote proper understanding and coöperation among those engaged in and concerned with engineering inspection; to establish practices which will prove beneficial to proper service; and to develop and encourage better and more effective inspection methods." Provisions are made also for constant supervision of the affairs of the Association by the officers and Board of Directors as well as for semi-yearly general meetings. The charter membership consists of 20 individuals, partnerships or corporations distributed throughout the country, seven from the eastern section, seven from the mid-western and southern sections, and six from the western section. It is expected that a number of additional memberships will be secured through the method of application and election prescribed by the constitution and by-laws which were recently adopted.

The HARDINGE

will burn the oils *of* 1940



A typical Hardinge commercial installation—in an Eastern orphanage, where in one year the Hardinge saved $2,500 over soft coal.

TO anyone who knows machinery, the Hardinge is a work of art. The trained eye sees all the extra refinements—little things, perhaps, but the same kind of little things that mark the difference between an automobile that merely runs, and another that runs beautifully. The Hardinge is pridefully built by men who express themselves in fine machinery even as you do in fine buildings.

And aside from mechanical excellence, another valuable "extra" that you get in a Hardinge is design foresight. In building a burner to last as long as the Hardinge, the fuels of the future had to be considered. With more and more gasoline being cracked from the crude oil, there will always be fuel oils, but they may change considerably in character.

Burners that require certain prescribed fuel oils may then cost considerably more to operate. But not the Hardinge, for this burner uses any available fuel oil, and moreover, it burns that oil at that oil's highest efficiency. This is a present operating economy, and an assurance of continued and economical service.

We have some handy oil burner working data and a new and informative Hardinge booklet for architects that we'll gladly send you upon request. Hardinge Brothers, Inc., 4149 Ravenswood Avenue, Chicago.

HARDINGE

Fuel Oil Burners for Every Purse and Purpose From Bungalow to Skyscraper

INDEX TO ADVERTISING ANNOUNCEMENTS

Part 1—Architectural Design

Part 2—Architectural Engineering and Business

CLEAR THE COURT!

OF DEAD AIR, DRAFTS, DUST AND NOISE FROM THE STREET!

Courtrooms that are stuffy, dusty and drafty, work a hardship on both bench and bar. Where so much depends on clear heads, the air should be clean... and invigorating!

Just step into this modern courtroom. Here the air is always refreshing, always at the right temperature. Windows are closed... there are no drafts, no noise and dust from the street. Proceedings are not hampered by the depressing effects of bad air.

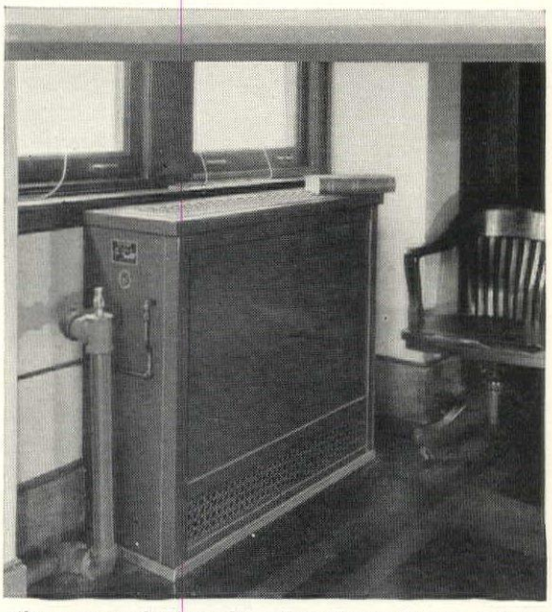
There are 17 Sturtevant Unit Heater-Ventilators in the courtrooms, libraries, and complaint rooms. These units bring in outdoor air, filter it, temper it... then pass it gently into the rooms. They are quiet, automatic, and finished to blend in with the rich oak woodwork.

Sturtevant Unit Heater-Ventilators are adaptable to a wide variety of installations in schools, churches, institutions, office buildings, etc. You will be interested in our Catalog 361... and it will be a pleasure to send you a copy.

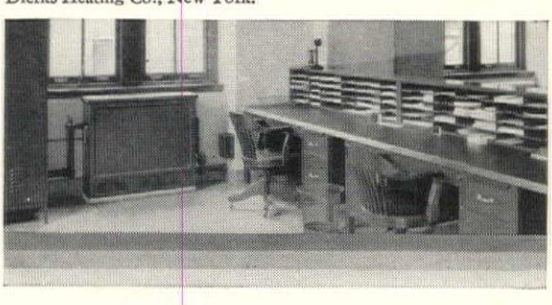
B. F. STURTEVANT COMPANY

Main Offices: HYDE PARK, BOSTON, MASS. ⁘ CHICAGO ILL., 410 No. Michigan Ave., ⁘ SAN FRANCISCO, CAL., 681 Market St.

Branch Offices in Principal Cities. Canadian Offices at: Toronto, Montreal and Galt. Canadian Representatives: Kipp Kelly, Ltd., Winnipeg. Agents in Principal Foreign Countries.



Above, a corner of a library; *below,* the traffic complaint room, in the Washington Heights Court House, New York City; *Architect:* George M. McCable, New York; *Engineer:* J. P. Whiskeman, New York; *General Contractor.* Jas. McWilliam, Inc., New York; *Heating Contractor:* Dierks Heating Co., New York.



Sturtevant Unit Heater-Ventilator

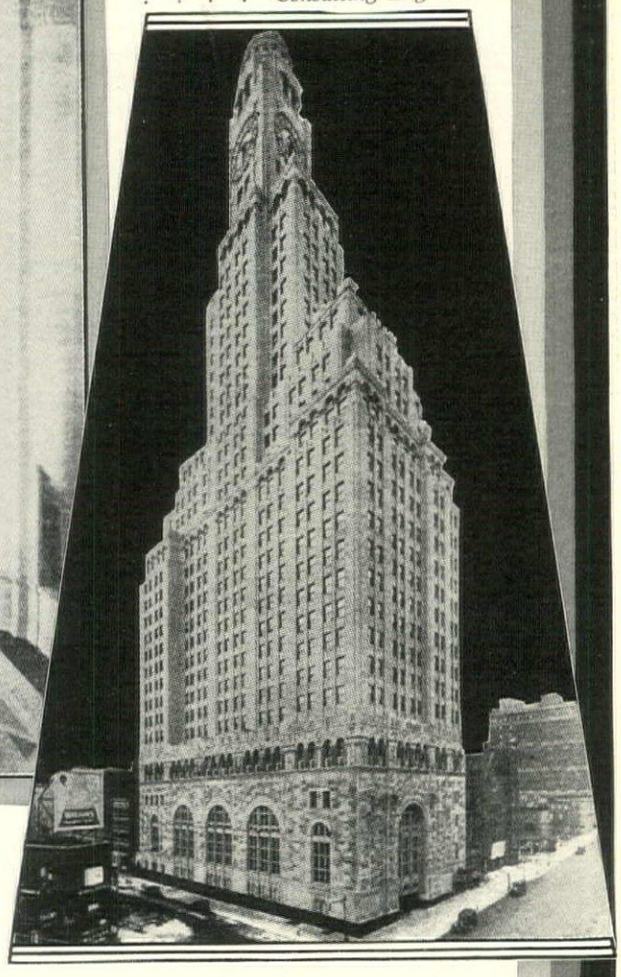
Reg. U. S. Pat. Off.

SUPPLIES OUTDOOR AIR ∾ FILTERED CLEAN ∾ AND TEMPERED

THE WILLIAMSBURGH SAVINGS BANK BLDG. BROOKLYN, NEW YORK

HALSEY, McCORMACK & HELMER, . . . *Architects*

FRANK SUTTON, ... *Consulting Engineer*



JOHNSON Room Thermostats control the direct radiators, separately, in the main banking room, offices, work spaces, etc. in this building.

Pneumatic push buttons are installed to control the vestibule, elevator lobby, entrance halls and additional banking room radiators.

The Johnson System controls each ventilating apparatus in the building: Johnson Cold Air Thermostats placed in the cold air inlet control the first row heater coils; a Johnson Warm Air Thermostat in the fan discharge controls the inner row of the heater coil.

In connection with each ventilating fan apparatus there is placed in the cold air inlet one copper louvre damper, operated by an electric magnetic switch. This switch is connected to the electric wiring to the motor of the fan; and when the fan is turned on to operate it opens the cold air in the louvre damper, and when the fan is stopped, it closes it. This arrangement of pneumatic electric control also applies to all vent fan apparatus.

Humidity control is obtained by humidostats placed in the fan discharge controlling three-way valves in the hot water line entering the spray nozzles. The hot water in connection with each fan apparatus is heated by a closed heater and in addition to controlling the three-way valve we also operate a steam diaphragm valve on the steam inlet to the closed hot water heater; thus preventing overheating of the water in the closed heater when the three-way valve closes off the hot water and is recirculating water from the air washer storage pan which lies at the bottom of the air washer.

SUCH wide-range completeness and thoroughness again emphasizes Johnson leadership, and the recognized value of automatic control for the heating and ventilating apparatus in a building.

JOHNSON SERVICE CO., MILWAUKEE, WIS.

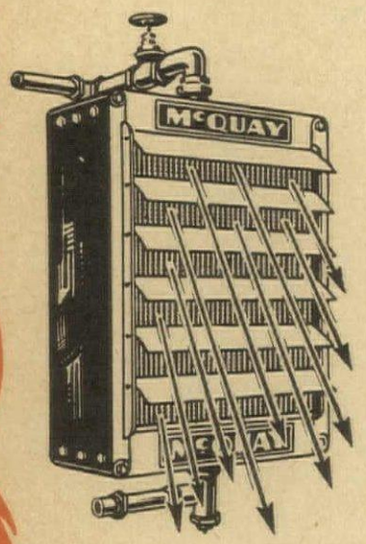
ESTABLISHED 1885

BRANCHES IN ALL PRINCIPAL CITIES

JOHNSON HEAT & HUMIDITY CONTROL

5 Point Superiority

Unit Heaters have proved their unusual efficiency in so many factories, warehouses, garages and salesrooms that it is only a question of which heaters to select. In making a selection consider carefully these 5 points of superiority provided *only* by McQuay.



Off the floor, out of the way, this one McQuay weighing less than 150 pounds will heat 2500 sq. feet—as much as 600 pounds of cast iron.

Built in sizes equivalent to from 50 to 2000 sq. ft. —in many different types —there is a McQuay for every purpose. Also condensing and drying equipment to meet particular needs.

1. An all copper heating unit that greatly increases heat conductivity and resists corrosion.

2. Seamless copper tubes, welded into heavy copper headers provide equal expansion and contraction and eliminate chances of leaks that may occur when tubes and headers are of different metals.

3. After the heating element is welded together it is completely coated—inside and out—by immersion in a tin bath. This gives the tubes a glassy smoothness which prevents "clogging" and makes them immune from attacks by impure water.

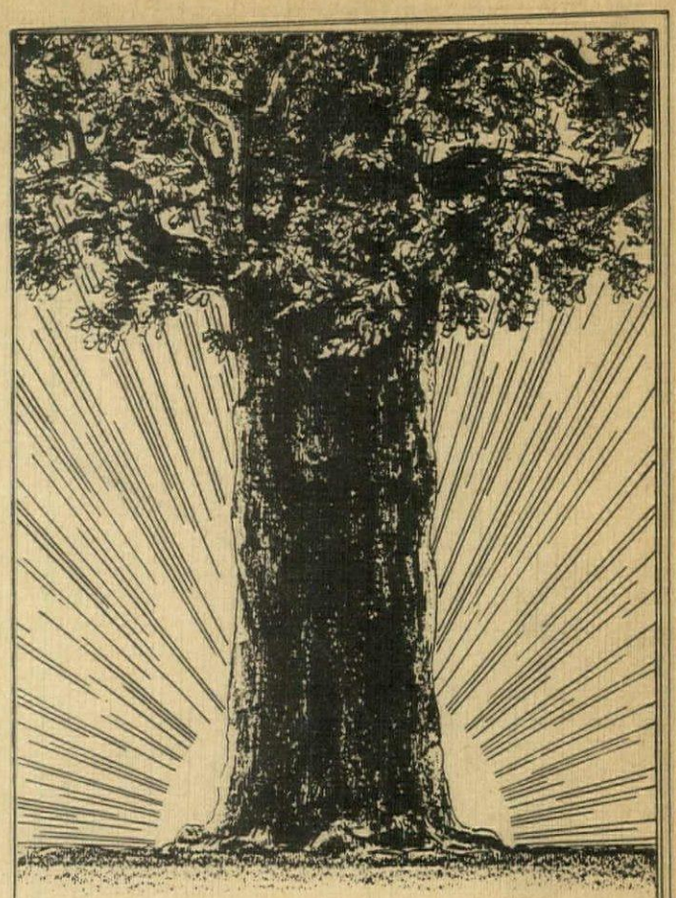
4. The motor rests in a cork insulated saddle which absorbs all vibration, eliminating noise.

5. The heating element is suspended in its frame so that any contraction and expansion strains in the frame are not carried to the heating element—the source of most leakage troubles in some makes.

Try just one McQuay Unit in some "hard to heat" spot. Its heating ability will indicate the advisability of replacing old-time methods with the modern McQuay. Write for complete data, or ask our nearest branch—there's one in most cities.

McQUAY RADIATOR CORPORATION
General Offices: 35 East Wacker Drive, Chicago

McQUAY
UNIT HEATERS



A HERITAGE OF CONFIDENCE

For those who should replace their boilers now

Thirty-three years of faithful performance . .

A solid phalanx of public confidence is back of every Spencer that you specify. The booklet pictured here tells the amazing story of the remarkable growth of this wide-spread feeling. Primarily intended for distribution among the customers of the heating contractor, its message is of vital interest to the Architect. It will be sent to you on request.

Architects and the public in general have learned that nothing is ever promised for the Spencer heater that isn't borne out by actual experience. Rather than be guilty, even in the slightest degree of over statement, the Spencer Heater Company has ever tended to err on the side of conservatism.

This country-wide faith in the statements of the Spencer Heater Company assures you, far more strongly than any words of ours, that a Spencer heater will do everything you expect of it. More than merely satisfying your clients with its low-cost, convenient heat, this heater will enhance your reputation. You know better than anyone else, the value to you of the faithful performance of the materials which you specify. Spencer heaters, specified more and more often for all types of buildings by leading Architects, have been performing faithfully for 33 years. Spencer Heater Company, Williamsport, Pa.

SPENCER
Magazine Feed
HEATERS
for steam, vapor or hot water