THE ARCHITECTURAL FORUM
IN TWO PARTS
ARCHITECTURAL ENGINEERING & BUSINESS
PART TWO
JUNE 1929
SHOP AND STORE REFERENCE NUMBER
PRICE $3
One Proven Responsibility for Elevator Door Operation

Every elevator door requirement is met by R-W equipment: Hangers, closers, checks, interlocks, electric operation and signal systems of all modern types. Write for catalog.

Floor Space Saved
Pays for Equipment

In space saving alone, R-W closers are revolutionary. Single type closers require no space behind doors. Two and three speed types require only one-half inch clearance behind doors, compared with 5 to 7½ inches ordinarily required.

Closer and check are separate mechanisms, giving more power in closing doors and demanding less effort to open them.

Equally important exclusive features belong to R-W hangers and interlocks, truly noteworthy contributions to elevator door engineering.

You can depend on R-W equipment and the PowR-Way Electric Door Operator for complete service in meeting all conditions required by building and safety codes.

Standardize on R-W Exclusive Principle Closers, Hangers, Interlocks.

Call in an R-W engineer any time.
FOR THE PROTECTION OF STEEL WORK

NATCO STRUCTURAL CLAY TILE IS THE RECOGNIZED STANDARD

It is essential that steel columns, and the girders and beams projecting below the floor slab, be protected by at least two inches of fireproofing material. Experience has proven that well-burned hollow tile (vitrified at a temperature of about 2000°, and so immune to flame) has no equal as a covering for structural steel or iron, both to bar fire, and guard against corrosion.

Natco Girder and Column Covering saves from 50 to 75% in weight over concrete or brick covering. There is a shape to fit almost any condition. The fireproofing can be put in place complete for close to the same price it costs to erect box forms about the beams to receive concrete. No forms are needed to hold the tile in place, and there is no period of waiting for shores or forms to be removed. And the tile provides an ideal plastering surface, on which only two coats are needed.

In case of a serious fire, the integrity of the entire structure depends on the proper protection of the steel-work—a responsibility that Natco Girder and Column Covering has demonstrated its ability to adequately meet.

NATIONAL FIRE PROOFING COMPANY
Branch Offices: New York, Chanin Bldg; Chicago, Builders Bldg; Philadelphia, Land Title Bldg; Boston, Textile Bldg.
In Canada: National Fire Proofing Co. of Canada, Ltd., Toronto, Ontario

NATCO THE COMPLETE LINE OF STRUCTURAL CLAY TILE

TURN TO “SWEET’S”
THERE IS ONLY ONE FUEL THAT IS REALLY AUTOMATIC
GAS
FOR HOUSE-HEATING WITH GAS
THE ONE OUTSTANDING BOILER
IDEAL GAS BOILER

EQUIPPED WITH
Throttling Gas Supply Valve—Vitreous Enameled Jackets
Pin Type Heating Sections—Controls of Simplest Design
Vapor-Tension Thermostatic Pilot

THE COST IS REASONABLE

PRODUCT OF
AMERICAN RADIATOR COMPANY

SOLD BY
AMERICAN GAS PRODUCTS CORP.
376 Lafayette Street
New York
VIRTUALLY a one-piece pile—that is the result obtained by the Raymond Method of joining the timber to the concrete in this type of l-o-n-g pile. It is as perfect in the ground as on paper, as this cut-away section demonstrates.

RAYMOND CONCRETE PILE COMPANY
NEW YORK: 140 Cedar St. CHICAGO: 111 West Monroe St.
Raymond Concrete Pile Co., Ltd., Montreal, Canada
ATLANTA BUFFALO DETROIT LOS ANGELES PHILADELPHIA SAN FRANCISCO
BALTIMORE CHICAGO HOUSTON MIAMI PITTSBURGH ST. LOUIS
BOSTON CLEVELAND KANSAS CITY MILWAUKEE PORTLAND ST. PAUL
WASHINGTON, D. C. LONDON, ENGLAND

CAST IN PLACE PILES COMPOSITE PILES PRECAST PILES PIPE PILES
BUILDING FOUNDATIONS BULKHEADS AND DOCKS UNDERPINNING ETC. BRIDGES.
Spread the Original Cost of the Heating Boiler over the 25, 30 and more years a Kewanee will be “on the job” and the purchase price becomes relatively unimportant. The first few extra years of service more than offset any small additional amount originally paid. On top of that, a Kewanee will save fuel every year of its existence. So that in the end it actually is the most economical boiler that can be had. Owners know that a Kewanee in the basement adds to the value of any building. So they “Build from the Boiler — UP,” invariably selecting Kewanee.

For hard coal, soft coal, oil—no matter what the fuel—there’s a Kewanee properly designed and built to burn it economically.

KEWANEE BOILER CORPORATION

Kewanee, Illinois
Branches in 40 Principal Cities
Genasco Trinidad Bonded Roofing
—backed by a surety bond
for 10, 15 or 20 years!

That's something which will interest you, Mr. Architect—because this newest development in roofing will also be of interest to your clients. A line of Genasco Trinidad Bonded Roofing, backed by a surety bond issued by The United States Fidelity and Guaranty Company, Baltimore, Maryland!

When you specify Genasco Trinidad Bonded Roofing, you are absolutely sure of satisfactory service—and once the roof is on you need never give it another thought. Applied in accordance with our specifications by Genasco approved roofing contractors—thoroughly experienced in applying our roofings—Genasco Trinidad Bonded Roofings are guaranteed for ten years, or fifteen years, or twenty years—depending upon the type of construction.

There is a Genasco Trinidad Bonded Roofing for buildings of every type—for flat or steep roofs—for use over boards, concrete, gypsum, or tile.

Genasco Trinidad Bonded Roofings, made with alternate layers of Trinidad Lake Roofing Asphalt—nature's own waterproofer—and layers of Genasco all-rag felt, now include the following:

- Genasco Trinidad 20-year Bonded Roofing with slag, crushed stone or gravel surfacing. Class A Underwriters' Laboratories Classification—guaranteed twenty years by The United States Fidelity and Guaranty Company, Baltimore, Maryland.
- Genasco Trinidad 15-year Bonded Roofing with slag, crushed stone or gravel surfacing. Class A Underwriters' Laboratories Classification—guaranteed fifteen years by The United States Fidelity and Guaranty Company, Baltimore, Maryland.
- Genasco Trinidad 10-year Bonded Roofing with smooth surface. Guaranteed ten years by The United States Fidelity and Guaranty Company, Baltimore, Maryland.

Our Engineering Department is at your service to work with you on any of your roofing problems, and will gladly give you their opinion as to the best type of roof for any building you have on your boards.

The Barber Asphalt Company
New York Chicago Pittsburgh PHILADELPHIA St. Louis Kansas City San Francisco

Genasco
Trinidad Bonded Roofing
R. H. MACY & CO. USES Five G&G TELESCOPIC HOISTS

The Model D Electric Hoist, illustrated at right, is one of five G&G Electric Hoists in use in buildings of R. H. Macy & Co. (The World’s Largest Department Store), New York, N. Y., Robert D. Kohn, Architect.

There are many prominent buildings throughout the country for which G&G Ash Removal Equipment has been selected. Among these are the U. S. Capitol, Washington, D. C.; Independence Hall, Philadelphia; U. S. Chamber of Commerce, Washington, D. C.; Roosevelt’s Birthplace, and Holland Tunnels, New York, etc.

More than 1,800 schools use G&G Telescopic Hoists for ash removal, as well as Banks, Office Buildings, Churches, Factories, Hospitals, Garages, Theatres, etc. 168 Bell Telephone Buildings are G&G equipped.

G&G Telescopic Hoists are noted for their economy in operation, long life and freedom from repairs. Many installations are over 20 years old. The cost of operating the electric models is remarkably low, unbiased tests showing 78 cans of ashes and more raised and lowered at a cost of one cent for current. Hand models, too, for buildings with small volume of ashes to be removed.

Full safety is provided by the G&G Sidewalk Doors and Spring Guard Gate, operating automatically and completely protecting the sidewalk opening at all times. Complies with all municipal ordinances.

GILLIS & GEOGHEGAN, Inc. (Managing also G&G Atlas Systems, Inc.)
544 West Broadway New York, N. Y.
407 Dominion Bank Bldg., Toronto
Catalog in Specification Data, 1929 Ed., pp. 226-227
IN THE WORLD'S LARGEST DEPARTMENT STORE

R. H. MACY & CO., New York, N. Y. (Robert D. Kohn, Archt.), has 327 Pneumatic Tube System lines in the Old Building. Formerly, these were operated by THREE 80-h.p. Connorsville Positive Blowers. Two were operated constantly and one held in reserve. G&G Atlas Power-Saving Controls were installed on all lines. This made it necessary to use only ONE of the 80-h.p. blowers. The second was placed in reserve and the third was taken out.

The 19-story addition to the Macy store is equipped throughout with a G&G Atlas Pneumatic Tube System, and there are now 507 tube lines in both buildings, operated from same power plant, serving 904,283 square feet of selling space.

Other large Department Stores using G&G Atlas Pneumatic Dispatch Tube Systems are Joseph Horne & Co., Pittsburgh; The Halle Bros. Co., Cleveland; L. S. Ayres, Indianapolis; Abraham & Straus, Brooklyn; Stern Brothers, New York; Woodward & Lothrop, Washington; Strawbridge & Clothier, Philadelphia; D. M. Read & Co., Bridgeport; Wise, Smith & Co., Hartford; and many others.

Banks, hotels, hospitals, newspapers, libraries, mail-order houses, retailers, wholesalers, factories and large offices of all kinds use G&G Atlas Pneumatic Dispatch Tubes for speedily distributing mail, telegrams, inter-office papers and light-weight articles among scattered departments. "Mechanical Messengers are faster and more dependable than human messengers."

Catalog in Specification Data, 1929 Ed., pp. 228-229

G&G ATLAS SYSTEMS, Inc.
(Under Gillis & Geoghegan Management)
544 West Broadway New York, N. Y.
407 Dominion Bank Bldg., Toronto
Republic Steel Pipe Assures Enduring Service

Tudor City Apartments
NEW YORK
Financed, designed, constructed and managed by
FRED F. FRENCH COMPANIES

Film Center
NEW YORK
Architects
BUCHANAN & KAHN

Longwood Towers
Apartments
BOSTON, MASS.
Architect
HAROLD FIELD KELLOGG

Concord High School
CONCORD, N. H.
Architects
J. D. DELAND & CO.
Built deep in the walls of many of the finest skyscrapers and public buildings, are their Republic Steel Pipe systems carrying water, heat, air and drainage.

Important to the maintenance of healthful living conditions in the buildings, these hidden structures of tubular steel are in daily service, year after year. They must be dependable; they must endure; they must not fail.

The name "Republic" written in your specifications for Steel Pipe insures to the builder a quality that meets such unyielding demands.

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REPUBLIC
IRON & STEEL CO. YOUNGSTOWN O.
STEEL PIPE
Jennings Vacuum Heating Pumps are furnished in capacities ranging from 4 to 400 g.p.m. of water and 3 to 171 cu. ft. per min. of air. For serving up to 300,000 sq. ft. equivalent direct radiation. Write for Bulletin 85.

The Savoy Plaza Hotel, New York, N. Y. McKim, Mead & White, Architects; Baker, Smith and Co., heating contractors.

Serving—where service comes foremost

CONTRIBUTING to the comfort of suites and guest chambers in the luxuriously appointed Savoy Plaza Hotel, where careful thought is given to the most minute details of service, are two Jennings Vacuum Heating Pumps. Keeping the heating system clear of air and condensation, these pumps assure an instant flow of steam to every radiator whenever heat is needed.

Jennings Pumps
THE NASH ENGINEERING CO. 12 WILSON ROAD, SOUTH NORWALK, CONN.
MODERN department stores guard against sudden darkness. They know that current failure might mean confusion, loss of sales . . . loss of goods . . . loss of important good will. That’s why architects are specifying Exide Emergency Lighting Batteries to dependably protect department stores.

Specially Designed . . . Automatic
Should the normal current supply fail, for any reason, lights are switched to Exides instantly and automatically . . . without a hand touching a switch. And the devices that charge and control these batteries are automatic, simple and foolproof. No added men—no expert experience—needed to attend them.

All over the country these dependable batteries have proven their worth to hospitals, auditoriums, theatres and other places where light failure might have serious consequences.

Five Vital Characteristics . . . Forty-one years of building batteries for every purpose stand behind the Exide Emergency Battery. In this battery are combined to the highest degree these five important qualities: (1) long life, (2) absolute power dependability, (3) freedom from trouble, (4) moderate initial cost, (5) low operating cost.

An experienced Exide representative is at your service at any time. Consultation entails no obligations. Just write what time is convenient.
In the NEW Terminal Tower

FIFTY-TWO stories above the Public Square in Cleveland the tower of the Terminal Building reaches skyward.

In keeping with the size and character of this building, more than ordinary consideration was necessarily given the planning of its pumping and ventilating systems. The fact that Westinghouse motors were selected to drive the main circulating pumps, the fire pumps and the ventilating fans, stands as evidence of the recognized dependability of this equipment. Modern in design, of smooth and quiet operation, these motors assure years of consistent performance.

WESTINGHOUSE ELECTRIC & MFG. COMPANY
EAST PITTSBURGH PENNSYLVANIA
SALES OFFICES IN ALL PRINCIPAL CITIES OF THE UNITED STATES AND FOREIGN COUNTRIES

Westinghouse

Products for buildings include--

Circuit-Breakers Elevators Fans Fuses Heaters Insulating Materials Lamps Lighting Equipment Motors and Control Panelboards Safety Switches Switchboards Transformers Turbines Wiring Devices
Through the years, as new principles of construction justify themselves Titusville adopts them.

Today as during yesterday and as will be tomorrow, Titusville Boilers keep a step ahead—built better than the needs of today, but justified in their performances of tomorrow.

That is why you'll find them in many of New York's prominent buildings.

The Titusville Iron Works Co.

Titusville, Pa.

Titusville SERIES "W" WELDED, FIRE BOX BOILERS
The Plug and Receptacle Principle applied to Lighting Fixtures for Walls

"Kenex" plug and receptacle have many advantages beside that of practical easy installation. Their use enables the electrical contractor to finish and test his work, as fixtures may be quickly attached at any time, without soldering or taping of wires. There are no protruding, taped wires dangling from outlet boxes, endangering the decorator's finishing work. A satisfactory selection of fixtures is assured as they can be easily "plugged in" "on the job" instead of on their confusing selection in crowded showrooms or from catalog. Fixtures can be readily taken down for refinishing, cleaning, replacement or when redecorating.

"Kenex" is installed in a standard switch outlet box and requires no more especial alignment or centering than is given to any switch or convenience outlet device. All wiring connections are made to binding screw terminals. The electrical connection is made by "plugging in".

The mechanical support of the bracket is completed by anyone of three standard methods—threaded stud, two screw or French hook.

Complete bulletins on "Kenex" sent on request.

ORDER THROUGH YOUR JOBBER

THE BRYANT ELECTRIC COMPANY
BRIDGEPORT, CONN., U. S. A.

NEW YORK  PHILADELPHIA  CHICAGO  SAN FRANCISCO

Manufacturers of "Superior Wiring Devices" since 1888—Manufacturers of Hemco Products
GENFIRE announces the last word in Roof Decks

RIGIDECk FOR ROOFS
Insulated to any Degree and Waterproofed

The Most Advanced Type of Roof Construction

In line with Genfire's policy of anticipating building needs with products of advanced engineering design, Genfire now offers Rigideck Steel Roofs. This high quality Roof Deck consists of Armco Ingot Iron units which interlock throughout their length, forming rigid reinforcing ribs and a smooth, continuous, unperforated roof surface. These 6" wide units are positively attached to the purlins on each rib, with all joints staggered.

Rigideck — insulated and waterproofed—is quickly installed and at low cost. It forms a permanent, fire-safe roof for any shape of roof or any kind of building. It is of sufficiently light weight to effect economies both in field labor and supporting framework. Furnished in 6" wide units of either 18 or 20 gauge Armco Ingot Iron with 1 1/4" and 1 3/4" depth of ribs and in lengths up to 30'. Write for full information.

GENFIRE STEEL COMPANY, YOUNGSTOWN, OHIO
Warehouses and Offices in all Principal Cities. Dealers Everywhere
TRANSITE LOUVRES
TYPICAL DETAILS

TRANSITE CORRUGATED ASBESTOS
ROOFING & SIDING

ACOUSTICAL TREATMENT
RIGID ASBESTOS SHINGLES
ASPHALT SHINGLES
BUILT-UP & READY TO LAY ROOFING

Johns-Manville
CORPORATION
NEW YORK • CLEVELAND • CHICAGO • SAN FRANCISCO • TORONTO

ARCHITECTURAL SERIES PLATE No. 4
ENTIRE SERIES SENT ON REQUEST
Concrete floors are subjected to two kinds of wear—abrasion and disintegration. Abrasive wear is best minimized by Master Builders Metallic Hardner. Disintegration, however, is caused by solutions deposited upon concrete surfaces by precipitation and traffic. The attack of these mild chemical solutions, so insidious and commonplace as to pass unnoticed, is none the less real. Through their action the concrete is gradually weakened and prepared for disintegration. In the case of floors, abrasion caused by the wear and tear of traffic produces the final and visible step in the breaking down of this weakened mass. Nine years ago the chemists and engineers of the Master Builders Research Staff set themselves the task of finding the "something hidden" which would check this disintegration. Month after month, year after year, they labored with test tube and test blocks seeking for a something which, perhaps, did not exist. At times they felt that success was very close at hand, only to come against dead ends and blank walls which meant that months of wearying effort had proved futile. Then came a new clue. A new avenue of possibility was explored. A new ingredient was evolved, it was tried, and—the long sought results were achieved. This new ingredient, this discovery of Master Builders Research Laboratory was christened Omicron.
Combined with Master Builders concrete hardners, Omicron fostered a new family of products—the first of which is Metalicron. [*]

Metalicron [Master Builders Metallic Hardner Plus Omicron] comes forward out of a background of nearly twenty years of successful service. During this period Master Builders Metallic Hardner has given building owners protection against abrasive wear. Scores of early installations have stood the test of wear under severe traffic conditions for almost two decades. Today, with the addition of Omicron as a new ingredient, Metalicron is destined to provide an even greater degree of permanence in industrial floors.

Corrosion Ever Present Checked by Omicron

The effect upon concrete of the salt thrown upon icy sidewalks is well known; the short life of concrete drain tile in alkali soils needs no mention; the effect of sea water and the pitting of concrete near equipment containing even mildly corrosive liquids are equally obvious. These injurious factors are not restricted to special isolated conditions but, in one form or another, are present and active on practically all concrete surfaces, attacking the soluble particles that remain in the set concrete.

* Other members of the family are Colormix, which produces colored, wearproof concrete, and Master Mix, the integral hardner so widely used in commercial building construction.
Omicron, now a constituent of the new Metallic Hardner, Metalicron, checks such disintegration by reducing the ratio of these soluble particles, converting them from liabilities to strength-giving factors in the structure. Mild acids and alkalis, which from one source or another come in contact with most floors, particularly in industry, now find this point of attack fortified.

So, not only is abrasive wear checked, but disintegration, that insidious and ever-present enemy of concrete floors, is given no chance to weaken the structure and make it more susceptible to abrasive wear.

**And in addition—Greater Strength**

Combining the proved capacity of Master Builders Metallic Hardner to resist abrasive wear, with the proved capacity of Omicron to check corrosive disintegration, Metalicron also greatly increases the tensile and compressive strength of the concrete.

Exhaustive tests of compressive strength of Metalicron concrete compared with ordinary concrete show an increase of over 31%. Tensile tests indicate an increase of over 42%. Metalicron concrete, after 21 days in a mild sulphuric acid solution, showed a tensile strength of 780 pounds per square inch, ordinary concrete but 400 pounds. After 21 days in sulphate solutions, the tensile strength of Metalicron concrete tested 900 pounds, ordinary concrete 350 pounds. These are the facts — indisputable evidence of new high levels in concrete floor construction, far-reaching in importance to architects, engineers and building owners.

Thus Omicron has, practically overnight, antiquated all outstanding specifications for hardened concrete. It has brought new high standards of serviceability and permanence to industrial floors.
Installations of Metallicron Concrete Floors

With Omicron as the fifth ingredient in the concrete, these floors are protected from corrosive as well as abrasive wear.
An important part of important buildings everywhere

When you specify a Barrett Specification Roof, you specify expert application by a Barrett Approved Roofer—a man who has proved his ability to meet the high standards of Barrett Inspection Service. You specify bonded freedom from roof annoyance for 20 years*, but records show that the owner will probably receive anywhere from 10 to 30 years of service over and above the bonded period—an “extra dividend” which Barrett Roofs have declared hundreds of times.

Such is the Barrett reputation that most important new skyscrapers and civic buildings seem almost automatically to go Barrett—thus joining the ranks of the country’s best-protected buildings. A roll-call of Barrett-roofed buildings would list an imposing array of the country’s best-known industries and finest structures—new and old.

Minneapolis’ new 25-story Rand Tower—a striking, monumental structure erected by Rand Laboratories, consulting engineers—is a typical example. It will be one of the Northwest’s finest buildings. Yet it is only one of many enterprises of similar importance throughout the country for which Barrett Specification Roofs have been chosen.

If grouped together these buildings would make a city of such importance and proportions that even laymen would fully realize why architects and builders everywhere have confidence in Barrett—and always are able to support their judgment by showing nearby examples of Barrett Roofs of Coal-tar Pitch and Felt and gravel which have stood the test of time for 30, 40 and even 50 years.

*The Barrett Company also offers a Specification Type “A” Roof which is bonded for 10 years. This type of roof is adaptable to a certain class of buildings. The same high-grade materials are used, the only difference being in the quantities.

Barrett Specification Roofs are constructed of alternate layers of prime quality tarred felt and the finest coal-tar pitch, armored and fire-safed with surface-imbedded gravel, slag or tile. They are laid by Barrett Approved Roofers according to the Barrett Specification and bonded by Barrett against repair or maintenance expense.

It is interesting to note that approximately twelve tons of Monel Metal were used in the new Savarin. The John Van Range Company—the largest single user of Monel in kitchen equipment field, has long been famous for its Monel Metal Equipment.

Once more Van Equipment has stood the most exacting test of all—the test of actual service. After having proved its worth, efficiency and superiority of design in the beautiful Graybar Savarin in the Graybar Building, New York—Van Equipment of gleaming, durable Monel Metal was again selected for the marvelous new Savarin Restaurant in the New York Life Building. This is one more instance in the long record of cases in which Van equipment was chosen after extensive tests, trials and minutest scrutiny. Not by chance has Van Equipment maintained for more than seventy years its reputation as the "standard of the world."
Nearly all prominent school architects specify BLOXONEND for gymnasiums and shops.

Pictured above is a Conde Nast Plant, Stamford, Conn.—one of three plants of that Company floored with a total of 100,000 sq. ft. of BLOXONEND.

Highly glazed paper used in VANITY FAIR, HOUSE & GARDEN and other Conde Nast Publications, is transported on lift trucks. To prevent dislodgement of cargo (with subsequent damage), and to permit the movement of loads with ease, safety and rapidity requires a vibrationless, lastingly smooth trucking floor. BLOXONEND MEETS THESE REQUIREMENTS. It also affords a clean, comfortable, working surface for employees.

America’s greatest industrials are finding BLOXONEND a profitable floor investment because it speeds up traffic and eliminates floor upkeep.

Write for specifications and sample.

CARTER BLOXONEND FLOORING COMPANY
Kansas City, Missouri

Branch Offices in Principal Cities—See Sweet’s.

BLOX-ON-END FLOORING

Bloxonend is made of Southern Pine with the tough end grain up. It comes in 8 ft. lengths with the blocks dovetailed end-wise onto baseboards.
A NEW and SIMPLE WAY to make sure of LUMBER QUALITY

SUBSTITUTION of lumber of cheaper species and lower grades than called for in the Architect's specifications has always been difficult to detect and prevent.

Now the architect can make substitution impossible. You need simply specify 4-Square Lumber of the species and grade you desire. 4-Square Lumber is packaged for identification and protection. The species and grade are marked on the label and guaranteed by Weyerhaeuser.

It comes to the job in the original packages under the original label—for you to see and check. There can be no "mistake."

4-Square Lumber, grade for grade, is the finest lumber you have ever seen. It is properly seasoned—and milled to precise standards of size and finish. Furthermore, 4-Square Lumber is cut to exact lengths and trimmed square at both ends—eliminating needless hand trimming at the job.

Reliable lumber dealers are now prepared to supply—and reliable contractors are using—4-Square Lumber in the items of finishing lumber now manufactured under the 4-Square brand.

WEYERHAEUSER FOREST PRODUCTS
ST. PAUL, MINNESOTA

Weyerhaeuser Sales Co., Distributors, Spokane, Washington
District Offices: Minneapolis, Kansas City, Chicago, Toledo, Pittsburgh, Philadelphia, New York

Species and Grade are Marked and Guaranteed

TRIMMED SQUARE . . . PACKAGED . . . READY TO USE . . . GUARANTEED
A REMARKABLE ALLOY CAST IRON PIPE THAT CAN BE CUT AND THREADED WITH STANDARD PIPE TOOLS. Arco Metal Pipe is made from a special analysis nichrome alloy iron, and cast by a process which gives it greater ductility and tensile strength and, also, greater corrosion and erosion-resisting qualities than ordinary gray cast iron—yet it can be cut and threaded with the same tools used on wrought steel and iron.

Arco Metal Pipe has overcome all of the limitations of cast iron and retained all of its superior qualities.

Arco Metal Pipe is made in the following sizes—\( \frac{1}{2}", 2", 2\frac{3}{8}", 3", 4", 5", 6" \), with the same dimensions as extra strong wrought steel and iron pipe. Each length is tested by hydrostatic pressure from 300 to 1000 lbs. per square inch. All standard flow tables for extra strong wrought steel and iron pipe can be used in figuring capacity for Arco Metal Pipe.

Arco Metal Pipe will insure permanence in sanitary and heating lines and all installations where corrosion is a factor.

"Our experience with the installation of ARCO METAL PIPE in the Medical Arts Building has been satisfactory in every way. We used about eight car-loads of your pipe for soil, waste, and vent lines, including branches of the plumbing system. This pipe was all assembled with screw thread joints. Our men cut and threaded the pipe on the job with the same tools used regularly for wrought steel and iron pipe."

(Signed) A. R. BRUEGGEMAN, President A. R. BRUEGGEMAN COMPANY

Write today for catalog giving complete information

AMERICAN RADIATOR COMPANY

40 West 40th Street, New York
BRANCHES in all PRINCIPAL CITIES
Beresford Apartment (New York) will be equipped with RCA CENTRALIZED RADIO

EVERY suite in the Beresford Apartment, now under construction in Central Park West, New York, will have a radio outlet connected with an RCA Centralized Radio system.

The antenna problem will be solved for both tenants and owners. Three aerials on the roof will serve 182 apartments, and give each tenant the opportunity of "plugging in" his favorite receiver (of any type) as though he had his own individual aerial. Radio reception by this simplified RCA system is very much better than with a multiplicity of antennae.

RCA Centralized Radio is being adopted by hotel and apartment house builders as necessary equipment in modern residence construction. It is available in two principal forms:

1 A single antenna connected with a distribution system to radio receivers in rooms throughout the building. As many as 80 radio sets of different makes can be independently operated from this common antenna, by plugging into wall outlets—and far more satisfactorily than by the use of individual antennae. Additional central antennae may be installed, if required, for additional groups of 80 receivers.

2 Centralized radio receiving equipment to distribute broadcast programs to as many as 3000 rooms throughout a building. Equipment may be installed to transmit a single program, or to make available the choice of programs from two, three or four broadcasting stations.

The first method is ideally adapted for apartment houses, dormitories, office buildings, etc., where tenants desire to have their own receiving sets. It does away with the unsightly multiplicity of individual aerials, and the inconvenience of connecting them with distant rooms.

The second method is particularly designed for hotels, hospitals, sanitariums, schools, passenger ships, etc., where transient occupants of rooms may enjoy radio programs from loudspeakers or headsets, all operated from a central receiving instrument.

Descriptive pamphlets of these two systems, and of the special apparatus designed for them, are available for architects, builders and building owners.

The Engineering Products Division, Radio-victor Corporation of America, at any District Office named below, will answer inquiries, and prepare plans and estimates for installations of any size.
THE interest of the present-day theater is due to a variety of causes, among the chief of which is the use of accessories which in the hands of certain modern wizards of stagecraft might almost seem to have been given their utmost imaginable exploitation. The modern drama originated within the walls of cathedral or church, with ecclesiastics as actors and the gray stone of nave or choir as a setting, the action dealing with some sacred or scriptural theme or else developed in the form of a "mystery" or a "miracle" play. With the setting up of the stage outside the church, though still often using the church as a background, the playing was done by laymen; only when the drama moved from the church into the market place or into the courtyard of an inn did it wholly part with its ecclesiastical tradition—and such was its status when Shakespeare found it in the sixteenth century. The beginning of the use of scenery marked a vast change in the life of the drama, for with scenery there might be made some attempt at creating a setting which would heighten the illusion and make more true to life the drama being worked out upon the stage. But the development of lighting was still in its infancy. The stage, however, made the best use of what means of lighting existed; candles gave way to oil lamps, the lamps yielded to gas, and we are now living in the period when gas has made its final, unconditional surrender to electricity, and electricity in the hands of theater men of the twentieth century is being made to work marvels in the way of stage lighting. This excellent work presents an exhaustive study into every phase of lighting as applied to the modern stage. It has been prepared by one well trained in the technique of stage lighting and fully experienced in the use of the technique. The volume possesses a high value to architects, for architects are finding that each year the matter of equipment becomes more complex and more important, and that almost as necessary as skill and taste in designing and care and accuracy in construction is the matter of planning equipment—all the countless and intricate details which are included in that most comprehensive term. When one remembers that the utility of even the costliest theater depends wholly upon the skill with which its stage is lighted, the importance of the subject may be realized by architects and their assistants.

**STAGE LIGHTING.** By Theodore Fuchs. 500 pp. 6 x 9 ins. Price, $10. Little, Brown & Company, Beacon Street, Boston.

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SCHOOL BUILDING PROGRAMS IN AMERICAN CITIES.
By N. L. Engelhardt, Professor of Education, Teachers' College, Columbia University, 566 pp., with many maps and diagrams. 6 x 9 ins. Price $5. Bureau of Publications, Teachers' College, Columbia University, 525 West 120th Street, New York.

There are few buildings involving greater annual expenditures than schools. It is estimated that the average cost of school buildings in the United States per year is about $400,000,000. The spending of this enormous amount of money presents a problem that in fairness to the taxpayers, as well as to the pupils who are to attend the schools, should be solved in a way to insure the utmost possible return in terms of utility and service, as well as in aesthetic worth. In approaching this problem, those who are charged with the responsibility may well profit by the example of modern business. It is a well known fact that much of the tremendous progress being made in industrial and business fields is due to the fact that every move is carefully planned in advance and is justified by a careful scientific investigation of existing conditions and those likely to arise in the future. Thus money and labor may be expended in the most efficient manner possible. For example, telephone companies lay cables and construct exchanges not only to meet present or isolated conditions, but in terms of estimates of future patronage. Any enterprise that is planned for the purpose of serving the public should be founded on a similar scientific and exhaustive survey.

One of the characteristics of present day building is the quickness with which buildings become obsolete and have to be replaced. In some instances this may be due to unavoidable causes, such as rapid growth, or to conditions and developments that could not have been foreseen. In many cases, however, such wasteful operations are made necessary by a lack of foresight or sufficient study on the part of the planners. This is particularly true in the case of school buildings, as is shown by numerous reports on school building programs. Such careless planning produces, among other things, various conditions in school systems. 1. Sites have been chosen without regard to their desirability from a standpoint of immediate environment, growth and population needs. 2. Small buildings have been constructed with greatly overlapping tributary areas. 3. Buildings have been erected which do not adequately safeguard the health and safety of pupils. 4. Traditional educational practice rather than the more recent trends of educational thinking and practice has dictated the space relationships and the sizes of buildings. 5. New school buildings have been erected without the possibility of making future additions, thus adding unnecessary cost to the school building program. 6. Because of the character, construction, inadequacy of planning, or faulty location, much money has been expended for buildings which could be used for but a few years and which proved to be poor investments. Such unsatisfactory results could very largely be avoided by the preparation of a carefully thought out building program, based on scientific investigation which would permit school boards to plan in terms of the larger policies of school administration, and to ignore private or political interference with the expenditure of school funds which are entrusted to them.

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USE of paints, stains, varnishes and similar materials, perplexing even to most architects and writers of specifications, is generally completely baffling to home owners who attempt to use such materials themselves. To the experienced painter nothing probably appears so simple as to use these products to produce the desired result and to give the necessary wear, but many a home owner finds himself possessed of painted floors which refuse to dry, of varnish which no amount of heat will prevent from being sticky, or outside paint which is washed off after only a few rains.

This is the fourth edition of Mr. Sabin's work, "a book for the householder," but equally valuable to architects and the writers of specifications, to builders, and to others who use painting materials of any sort. It covers glazing, paper hanging, whitewasing, and other operations which ordinarily apply to structures of a residence character. "For every man, woman, and child in this country about two gallons of paint are used every year; and the relative amount is increasing. Paint is a necessity; its use is an economy; it is a means of sanitation; it helps us to keep clean; it keeps us warm in winter and dry in summer; it brings light into dark corners; it raises our assessments; the most ignorant enjoy its benefits; and even the most highly developed people, whose culture is so profound that they have forgotten all they ever learned at college, retain its appreciation. A subject so various in its uses, so universal in its appreciation, deserves attention,—and indeed it merits intelligent study. It is not proposed in this little book to enter largely into the theory of paint manufacture, nor to describe its use for carriage painting and the thousand and one purposes for which special paints and varnishes are made, but to tell simply and plainly the use of preservative coatings of one sort and another for the protection and ornament of common houses, as they are known, or should be, to every one of the author's fellow countrymen. An experience of many years in the manufacture and use of paints and varnishes is the foundation of such knowledge as may be set forth, and while on many points even experts disagree, it will be the intention to set forth fairly sound and safe practice." In 196 pages the author covers all the subjects likely to interest the home owner and deals with them in such a way that scarcely anyone could make a mistake in painting exteriors, interiors, floors or furniture, or in glazing and paper hanging. In fact he even deals with some matters which ordinarily do not concern the home owner. The author dwells sufficiently upon one of the chief of the many functions of paint, which is to act as a preservative, since it spreads over the surface painted a durable film which prevents the penetration of moisture that might cause decay. The use of stains, of course, involves a wholly different result, since the stain penetrates the material, where it is wood, and while on many points even experts disagree, it will be the intention to set forth fairly sound and safe practice. In 438 pages the author covers the thousand and one purposes for which special paints and varnishes are made, but to tell simply and plainly their plans are included and fully analyzed.

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FOUNDATION WORK

STRAWBRIDGE & CLOTHIER DEPARTMENT STORE
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The Architectural Forum
SUCCESSFUL merchandising is dependent upon an increasing and continued patronage due to what is commonly called "consumer loyalty." Patronage is highly susceptible to many influences both favorable and unfavorable. It is the ever-present problem of the merchant to provide favorable and to avoid unfavorable conditions, both of which, in a large degree, are influenced by the character of his building. Occupancy and structure must coordinate to secure maximum utility, and it follows that the necessities of the occupancy will determine the character of the building. The nature of the occupancy must be ascertained first, and merchandising is here defined as a contact between a buyer and a seller of merchandise which results in an exchange. There are certain conditions which facilitate this exchange, and many of them depend upon the character and functioning of the building. Of these, the more important requirements are intended to display the merchandise in a suitable and attractive manner and to provide rapid, comfortable and safe circulation of buyers within the building.

Illumination is one of the most important factors in the proper display of merchandise. The improvement in the design of show windows, show cases and display cabinets has been accompanied by a corresponding improvement in the type and effectiveness of artificial illumination, both resulting largely from the production of more valuable and beautiful merchandise. The general illumination of a store is very important, since it affects the first impression of the buyer upon entering, and it should be of sufficient intensity to produce a cheerful and inviting aspect. This effect is best secured with a high ceiling in which the beam and girder projections are of minimum size or eliminated entirely, and column spacings are made maximum. The general lighting units should be as few in number as possible and of such a kind as to not distract attention from the display plane or level. The specific illumination in show windows, show cases and display cabinets should be of much greater intensity, and the lighting units be concealed. The subordination of structural interferences with the general illumination adds immeasurably to the appearance of spaciousness and dignity of the store.

Buyer traffic is horizontal through aisles and vertical by stairs, ramps, elevators and escalators. Horizontal traffic is the more difficult to make rapid and comfortable because it is in opposite directions within the same aisle. The requisite aisle area is most effectively secured by the maximum elimination of columns and obstructions.

The most important structural features of a merchandising building are the height of the stories, the design of the ceiling, and the spacing and sizes of the columns. Consideration must be given also to the concealing or exposing of the automatic sprinkler system, if it be used. The treatment of these problems in a highly successful manner is illustrated here in their application to three commercial buildings. The mercantile building owned by L. M. Blumstein, Inc., New York, is L-shaped in plan with the principal stem 87'6" wide and 200'0" long, with the smaller stem used for the elevators, stairways, toilets and utility shafts and a very considerable display and sales area. The two rows of interior columns in the principal stem are spaced transversely 23'4", 37'6", and 23'8", respectively, where three rows of interior columns would be used ordinarily. In the longitudinal direction the column spacing varies from 23'0" to 25'0". The floor panels are generally 23'0" x 37'6" and continue through the center of the store. The floor beams are spaced from 7'6" to 8'2" on centers and have a depth of 15". These floor beams cope into and flush with girders of the same depth. These girders are made of two heavy 15" beams which pass on either side of the interior columns and project 7'0" beyond the center of the column into the center span, leaving a span of 23'6" in this span to be filled with two beams of equal size and weight designed as simple beams suspended on the ends of the cantilever girders.

The continuous cantilever girders are each reinforced at the columns by two 9" x 34" x 9'0" flange plates required to resist the bending mo-
The girders are supported by channel diaphragms which are riveted to the columns. The spaces between the girders, adjacent to the columns, are utilized for the passage of ventilating ducts, pipes and conduits that are incorporated in the fireproofing of the columns. The uniform depth of the beams and girders makes possible an unbroken ceiling which increases the appearance of spaciousness and aids in the distribution of the illumination. The automatic sprinkler system piping is concealed in the floor construction and is evidenced only by the unobtrusive projection of the inverted heads.

A similar but heavier construction is found in that portion of the store of R. H. Macy & Company, Inc., which was erected in 1923. The ground area covers a space 125'0" wide and 197'6" long. The transverse column spacing, east to west, is 18'11", 41'11", 40'10" and 20'0", and 25'0" to 30'0" is the longitudinal column spacing. The narrow side bays are used largely for elevators, escalators and utility shafts. This arrangement provides a central space of about 83'0" x 195'0" in which there are only six interior columns, the floor bays being about 30'0" x 41'0" in size. In general, the floor beams are 15" deep, reinforced with coverplates of different thicknesses, and spaced about 8'0" apart. It was decided to use girders of comparatively small depth so that they would project about 6" below the suspended ceiling.
level. These girders are made of two 24" beams placed on either side of the supporting columns and are 3'1" apart, center to center. They are reinforced with 10" wide coverplates of various thicknesses and lengths. Between these girder beams are placed plate and angle diaphragm separators, and the girders are attached to and supported on the columns by a heavy plate and angle diaphragm.

The girder-column connections are designed to take their proportion of the wind-load stresses so as to eliminate many of the undesirable features usually introduced in wind-bracing designs. This type of connection eliminates the usual gusset and angle bracket for large girders. In this building an angle is riveted to the column on which rests the girder for erection purposes only. This type of connection eliminates those structural details which commonly project materially beyond the column and interfere with the architectural treatment of the column head.

There is a cantilever projection of the girders of about 7'9" beyond the center of the central row of columns, the end of which supports girder beams of similar depth designed as simple beams. Sprinkler mains are passed through holes in the webs of the girders around which suitable reinforcing plates are riveted. A ceiling which conceals all of the horizontal pipes of the automatic sprinkler system, is suspended below the floor beams. The sprinkler heads are inverted in the
Sections Showing Typical Floor Construction, Columns and Column Connections, Blackmore Danzig Company, Inc., Store, Elmira

Robert D. Kohn and John J. Knight, Architects Associated.

usual manner and project below the ceiling. On the ninth, tenth and eleventh floors spaces are allowed for motor truck delivery of merchandise, adjacent to truck elevators. To increase the strength of the floor slabs to support the concentrated loads of the trucks, the floor beams, in general 20" deep without cover plates, are placed more closely together.

The structural frame in each of these buildings is so designed as to contribute a spacious and inviting appearance to the store, and to provide adequate aisle space for the use of customers. The Blumstein building was designed by Robert D. Kohn and Charles Butler, associated, and the Macy building by Robert D. Kohn and Associates.

The store building designed for the Blackmore Danzig Company, Inc., Elmira, N. Y., Robert D. Kohn and John J. Knight, architects associated, is of a different type of construction than the two previously described. This building is irregular in shape, and the floor panels average 20'0" x 20'0" in size. There are no suspended ceilings in this building. The floor framing consists of girders only, which support a two-way combination tile and concrete joist floor construction. On this is placed a cinder fill of sufficient depth to enclose pipes, conduits and other utilities and the floor is finished with a 1" cement top.

The columns are of the combination type with a rolled steel H-shaped core encased in spirally hooped concrete reinforced with vertical bars. In the lower stories the steel core is reinforced with two or four angles riveted to the web. The flanges of the girders extending from the spiral hooping to the column are coped to a width of 3" to permit the satisfactory depositing and rodding of the concrete. The lower tier of columns is in four-story lengths, extending from the basement floor to a point above the fourth floor. These lengths vary from 71'9" to 77'0", with those at the elevator shafts 83'9" long. Three stories and basement are to be first constructed, with provision made for future additional stories. As the steel cores are of uniform section, it necessitated the angle reinforcing in the lower stories as just described. The spiral hooping was slipped over the column in proper sequence before erection and raised and secured in position as the floor girders were erected. These combination concrete and steel columns are designed conforming to the specification of the American Concrete Institute. Eugene W. Stern was associated on all these buildings with the architects, Robert D. Kohn & Associates, as consulting structural engineer.

Merchandising in its many forms is one of the three fundamental elements of commerce which are, in their logical order, manufacturing, transportation and merchandising. They are interdependent, and it is their coincident development that has within a few generations stabilized and expanded American merchandising from that of the pack peddler to the contemporary store.
MECHANICAL EQUIPMENT OF THE DEPARTMENT STORE

BY

E. E. ASHLEY, JR.*

THE store merchant of necessity has recognized the fact that, incidental to the success of his business, the mechanical equipment of his building requires careful design and attention. There is nothing in connection with the mechanical equipment of the modern store building that is a mystery. Consideration must be given to engineering fitness rather than to "sales arguments" when selecting the apparatus and equipment that are required. In building the modern store there are about 50 different mechanical trades to be considered, the major of these being those connected with transportation facilities for persons, packages and cash. These would cover elevators, escalators, spiral chutes, belts and conveyors. Heating and ventilation, sanitation and electrical work are other important considerations. In the modern store building about 30 per cent of the total cost goes into the mechanical equipment, not including in this figure any incidental motorized equipment that goes into the fixturizing; nor does it include the outfitting of such departments as luncheonettes, soda fountains or beauty parlors.

Considering the amount of the investment and the continually increasing cost of labor, it is necessary to conserve every inch of space for selling, and it becomes the duty of the mechanical engineer to think of this in his planning. Too much stress cannot be put on the necessity for providing adequate transportation facilities and proper light and ventilation, for without these the value of the selling space is quickly reduced. It is only within recent years that serious consideration has been given to mechanical equipment.

VERTICAL TRANSPORTATION

The R. H. Macy & Company store, when at 14th Street, New York, had a floor area of approximately 100,000 square feet and used, I believe, eight slow-speed, hydraulic elevators with an average capacity of from 12 to 15 persons. There were, on an average from 20,000 to 25,000 persons entering this store during a busy day, as compared with about 250,000 now entering the present 34th Street store in a similar day. For purposes of determining the transportation facilities, we use the term "transportation area," and this means the area of the building, above or below the first floor, served by elevators and escalators, and used for selling or executive purposes. Until midtown store development, little consideration was given to the scientific study of the transportation problem. The location of entrances, the width of aisles, or the position of elevators was determined more by the architect's ideas of pleasing design than with any thought to the traffic problem. In fact, it has only been quite recently that this problem has been seriously studied.

Again referring to the old Macy store at 14th Street, the sales traffic density for this store was about one person for every 80 square feet of area, whereas, when the 34th Street store was opened, facilities for traffic were based on a density of one person to 32 square feet. This has been gradually increased until today Macy's has facilities for a sales density of about one person to every 19 square feet and, in talking with the managers, it is found to be their belief that they have not as yet reached the density that can be economically handled in their building. It is quite probable that they will increase their transportation facilities in the near future. This is an exceptional example, and it cannot be used as a criterion for estimating transportation facilities necessary for the average store building.

For the general type of department store structure, it is probably safe to assume a density ratio of one person to 25 square feet of transportation area for all floors above the first, and where the basement is used as an under-priced store, a ratio of one person to every 7 square feet. This latter figure is a result of an investigation of the traffic in some of the most successful under-priced basement stores, and it can be assumed to be a proper figure for similar spaces. However, there are many instances where these requirements, owing to the type or the variety of merchandise sold, will not be necessary. For instance, in a specialty shop, or in a store where the average sales check is very high, there will be no necessity of providing transportation facilities for such densities. In the latter type of building, a density ratio of one person to 40 square feet would suffice.

Each store building is a problem in itself, and it requires very careful analysis. The height of the building and the individual floor areas have considerable effect on the individual requirements, and it is not possible to compare the facilities of stores in one city with those in another, because of the fact that the customs of the people or the shopping habits of the people are very often entirely different. Generally speaking, in a well fixtured store, 70 per cent of the entering people will go to the upper floors of the

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building, and the peak requirements for an hour will be about 20 per cent of the total traffic of the day. The wide-awake merchant is acquainted with the fact that without adequate transportation facilities his store is going to lose trade. Several instances can be given where less than 45 per cent of those entering left the ground floor because of inadequate elevator service. The location of the transportation equipment is as important as the amount of equipment, and to locate elevators or escalators poorly is just as bad as not to provide enough of them. There are instances where buildings are over-equipped with elevators, but where people still complain of the lack of transportation facilities because of the fact that the public cannot find them or because they are so located that only a few of the elevators handle the bulk of the traffic.

There are several important considerations which must be known before the number and the locations of the elevators and escalators can be determined. Among them are:

(a) Type of store.
(b) Character of business.
(c) Relation of building to those of competitors.
(d) Local street traffic conditions.
(e) The general arrangement of selling departments on the upper floors.
(f) Where remodeling or addition to a building is being planned, the traffic count of persons entering the store constitutes a factor.

(g) Where in a new location, the traffic passing the contemplated building plot must be considered.

(h) The percentages of people entering the various entrances.

With these conditions or the majority of them known, it is quite simple to establish the traffic densities, and knowing this, together with the size of the transportation area, the amount of equipment can then be decided upon.

Where to place the elevator equipment is another problem. The size of the plot and the locations of the entrances, which should be placed with adequate regard to street traffic, and even the general arrangement of fixturizing and the locations of the distributory aisles, should be taken into consideration. The positions of the elevators or escalators should be such as to prevent traffic jams resulting in loss of business on the first or the ground floor, and planned with regard to the distance to be traveled from the elevators to the various departments on the upper floors. They should be so located as to be easily seen from the principal entrances. For a rough calculation, a modern type elevator, such as is used in a department store, an elevator having a capacity of about 22 persons, will handle about 400 persons an hour in the average ten-story building, and will take about 4 1/2 minutes for the round trip.

With the total patronage known, it is easy to determine the number of elevator cars needed. For practical reasons, it is not advisable to arrange more than eight cars in one group, and preferably not more than six. When the groups are larger than six, there is too much time lost due to the waiting passengers having to travel from one end of the bank to the other, which, in the case of eight cars, would be approximately 100 feet. This not only delays the elevator service but is vexatious to the customers. Where more than eight cars are necessary, it is advisable to arrange them in two independent banks, and, if the floor area will permit, to arrange these banks or groups facing each other in an alignment. This is not always practical, however, in the shallow or narrow plot.

Escalators. Where more than eight cars are required for passenger service, consideration should be given to the installation of escalators for the efficient handling of the traffic, which then ceases to become a matter purely for elevators and is essentially an escalator problem. Escalators are the most efficient pieces of equipment for handling heavy traffic. For comparison, the elevator handles an average of 400 persons per hour, whereas the escalator, depending on its width, handles from 4,000 to 10,000 persons an hour. When the amount of traffic be-
comes sufficient to warrant the installation of escalators, it is advisable to assume that 70 per cent of the traffic will be handled by them, and that 30 per cent will use the elevators. The escalator should be located in direct line with the heaviest traffic. The fixture architect will probably criticize this location, since it will break up, to some extent, his arrangement of fixturizing on the first floor, but the escalator, to be efficient, should be so located. Escalators should always be installed in pairs so as to accommodate both up and down traffic. An escalator going in one direction only impairs the general transportation facilities of the building, and instead of reducing the burden on the elevators, it increases it. The general arrangement of escalators should provide for a continual flow of traffic from floor to floor, avoiding the long walk from the head of one escalator to the foot of the next. In other words, if the landing is on the second floor toward the center of the building, the escalator to the third floor should start adjacent to this landing point. There are two ways of accomplishing this,—by using either the "scissor" type or the "parallel" type, the latter being in the center of the area or else in between two sets of machines. Where local laws do not make it obligatory to enclose the escalator, it should be left open so as to give the customer every opportunity to look over the selling area. Where it is necessary to enclose the escalator, as much glass as will be permitted should be employed.

Elevator Cabs and Equipment. The size of the elevator cabs is important. They should be shallow and wide; preferably about three fifths as deep as they are wide, and the doors should be center-opening so as to permit the largest possible entrance for quick loading and unloading. The doors should be about four fifths of the total width of the car. This will permit a return on the car for the operator's position. The gates on the car should likewise be center-opening, and, with the modern type of elevator, with its automatically-controlled levering, the doors and the gates should be power-actuated and automatically-controlled so as to open on the arrival of the car and close on its departure.

Too much care cannot be taken in the selection of elevator equipment, for there is no demand on elevator service as severe as that of the department store. High speed is not essential, but speeds between 400 and 500 seem advisable. Of course, this is based on the assumption that the average mercantile building is not over ten stories high. Taking into consideration the type of service and the speeds to be maintained, the gearless machine is the most suitable and, with the adoption of variable voltage, it can be used irrespective of the type of electric current provided.

The question of service in store elevators is one that can be answered only by careful study of the individual requirements of the building, for there are so many different methods being employed in the warehousing and storing of stock, and in the handling of incoming and outgoing merchandise and freight, that no set rules can be made for this type of service. Where the customer traffic is handled by elevators alone, it is essential that some cars be provided to handle employees. These same cars can be utilized for the carrying of stock merchandise. The freight cars should be so located as to handle the freight with despatch from the point of entrance to the receiving and marking rooms, and should be liberal in size and capacity. While no set rule can be made for the type of equipment to be used for this service, it is advisable and most practical to standardize on the type of equipment, and to equip all service and store elevators so that they can, in emergency, handle passenger traffic.

HEATING AND VENTILATING

With the planning of the large store building, the problem of ventilation becomes serious, particularly as the basements and first floors are practically hermetically sealed. The two elements which probably cause more fatigue and nervousness, not only to the customer but to the worker as well, are improper ventilation and improper lighting. With the general arrangement of the ground floor, having show windows and en-
Elevators, Davison-Paxon Co., Atlanta
Starrett & Van Vleck, Architects
Hess, Reid & Adler, Associated

trances practically closing up the entire periphery of the structure, the only practical way of taking care of the ventilation of the selling space is to supply fresh air mechanically. The air is the medium for heating this space in the winter and for cooling the area in the summer.  

Duct Work. How to provide space for the ventilating ducts must be carefully studied so as to avoid the loss of valuable selling space. Very often ducts above the show windows for handling the fresh air, and exhaust ducts located in the stock cases can be so installed as to make a very good arrangement. With the introduction of air-conditioning or cooling for the summer, it is necessary to re-circulate approximately 60 per cent of the air, thus requiring considerable additional duct work to bring all the ducts back to the fan rooms. These latter ducts, of necessity, could be run on the ceiling of the basement. There is an objection to this, however, in that every foot added to the thickness of the first floor means that the customers going to the basement have to travel that additional distance. In some instances it has been found practical to excavate below the basement and to run all the ducts in tunnels below the floor; then to have them come up on the columns or sidewalks to the ceiling of the first floor. 

The tendency in the most recently planned buildings is to provide air-conditioning equipment to condition the air of the first floor and basement and, in some instances, also to condition the air in beauty parlors and restaurants. It is my decided opinion that this is only the beginning of the application of air conditioning in store buildings, and I believe that within the next ten years store buildings will be air-conditioned throughout. Where air conditioning has been installed, it has been found that there is less fatigue or illness among the workers, and that there is actually more merchandise being sold. People are sure to go to the building in which it is most comfortable to shop. The problem of the ventilation of the average first floor and basement is affected by the traffic as well as by the tremendous amount of heat given off by both the general lighting and the lighting of show cases. The fresh air inlet is very often carried to the roof and, if not properly located, pulls down fumes and smoke from adjacent chimneys.

Vestibules. The problem of the heating of the vestibules is very difficult. With the amount of traffic coming in and going out, it is almost impossible, without the use of revolving doors, to prevent the inrush of cold air from the street. In the middle west practically all of the store buildings are so equipped. With the use of the revolving door, the depth of the vestibule can be materially reduced. There are some criticisms, however, as to their use, the principal objection being the inconvenience to women with children and to those carrying packages. They reduce or regulate the amount of traffic to be handled during a given time, the average revolving door handling about 1,500 persons per hour. Where revolving doors are not used, probably the best method of handling the problem is to make the vestibule as large as possible with three sets of doors, and to provide a hot-blast system of heating. The larger the vestibule, the simpler becomes the heating problem. It will simplify the problem if the interior set of doors does not parallel the entering doors. In other words, they can be set at an angle so as to deflect the inrush of air drafts. If this cannot be done, it is advisable to arrange them so that screens can be put directly inside of the vestibule.

Thermostatic Control. With the ever-increasing cost of fuel and labor, careful study of the heating requirements should be made. It will probably be found economical, especially in larger stores, to provide thermostatic control of the direct radiation for the heating of the upper floors and for the control of the tempered air for the first floor and basement. With the large areas above the first floor, it is very often necessary to provide exhaust ventilation for the inte-
rior sections, for it will be found that due to lack of circulation the air may become quite foul. All boiler rooms, locker rooms and workrooms should be thoroughly ventilated by mechanical means; irrespective of how many windows there are, they will not be opened in the cold months.

If street steam is available, there is the question of whether or not it is advisable to install a boiler plant, with the high cost of fuel, the high cost of labor, and the inconvenience of handling fuel etc., together with the value of the space necessary. It then becomes an economic problem whether it is not advisable to abandon the use of a plant and to utilize the street service. Each individual case, however, must be worked out on the basis of its particular conditions.

The arrangement of utilities, such as electric control panels on various floors, the sprinkler control valves, clocks, dismissal and executive calls, needs careful thought. One of the most practical plans seems to be to use a shaft adjacent to the stairways, and to place the electric panel inside so as to be accessible from the selling area of the department store. It is also well to provide a cabinet with a glass door in the stairway, and to place in the cabinet the hose outlet, fire extinguisher and sprinkler control valve.

THE SPRINKLER SYSTEM

The purpose of a sprinkler installation is to afford protection against fire, and it should be so considered. It is not purely a means of reduction in insurance rate, but for the protection against interruption of business. Care should be taken in planning sprinkler piping to avoid all unnecessary, excessively long runs, offsets and other complications which reduce the effectiveness of the system. The "wet" type system should never be installed in any location where there is even a remote chance of its freezing. Often the unexpected happens, and either the system is ineffective in case of fire or a heavy water damage results when the frozen water thaws out. The system is widely used, generally perhaps because a dry system cannot be run concealed, as is the practice in better buildings.

The present tendency is to conceal all sprinkler piping. Generally these pipes are run in behind the furred ceiling; occasionally they are run in the floor fill. The latter method should not be encouraged, as it is very difficult to maintain piping, and the method does not lend itself to expansion or alteration. To avoid excessive furring, the girder beams are drilled so that the sprinkler pipes may pass through them. Sometimes considerable objection is raised to the use of dry systems in show windows, which is required owing to the likelihood of sprinklers of the wet type freezing in unprotected or unheated windows. The architect claims that the exposed piping ruins his decorative ceiling. By careful arrangement of heads and piping, however, they can be so placed as to make their detection difficult. In fact, how many persons looking at a show window can tell the kind of ceiling, or whether or not there are pipes in it?

The sprinkler system requires considerable water storage in tanks of the pressure type, which can be placed in the penthouse adjacent to the elevator equipment. This is preferable to using the ugly gravity type placed above the building, which is not only unsightly but difficult to maintain. The layout of sprinkler systems must be flexible to permit of adjustment for the rearrangement of partitions, the location of belts, conveyors and similar equipment, and it is advisable, in sizing the piping, to take these factors into consideration. There should be a special arrangement for flooding such places as rubbish and wastepaper chutes, ammonia compressor rooms, etc., and to amply protect the paper-sorting, packing-paper and excelsior storage houses, so that in case of fire the smoke will not penetrate to the rest of the building. It would seem desirable to use on the doors to such rooms thermal releases so that a sudden change in room conditions can be detected early.
temperature would immediately close the doors, rather than to use the somewhat old type fuse link which takes more time before acting. The thermal release is a very good device to use in connection with the doors at the head of escalator enclosures. This allows of the doors being automatically held open, and closed in case of danger,—allowing free access at all times.

Fire Protection. The general protection of all connecting openings between floors is important, as this is one of the sources of much trouble and raises the insurance rate. This applies particularly to the sheet metal duct work of the ventilating systems, which should always be provided with fire dampers where they go from one fire area to another. The shafts for piping and electric raceways for pneumatic tubes or plumbing stacks should be ample in size to allow ready access to all pipes, but they should be protected by fire cutoffs if a severe penalty in size of insurance rates is to be avoided. Care must also be exercised in the construction of elevator shafts and the doors of such enclosures. Some underwriters require vent openings from the tops of the shafts if they are cut off from the machine rooms by concrete slabs, which, of course, is a necessity with modern chemical equipment.

CONVEYORS AND PNEUMATIC TUBES

The question is often raised as to why one should include such equipment as conveyors, belts and pneumatic tubes in general construction work. The answer is that for all of these kinds of work certain clearances, shafts, and arrangements of openings in floors, and sometimes the shifting of structural members of the building require checking, and in order to avoid confusion, delay and unnecessary changes in other kinds of mechanical work, it is wise to have it designed and installed with the general construction, putting the responsibility for piping installation up to the general contractor.

Whether the building should have a pneumatic tube system or a cash register system depends entirely on the wishes of the management. However, irrespective of the system selected for the financial transactions, there is still a large field for the use of the pneumatic tube in the transmission of messages, orders or correspondence, and it will pay for its installation cost in the reduction in the number of messengers required and in time saved. The general tube used in department store service is 2¼ inches in diameter, but for messenger service tubes as large as 4 inches by 7 inches may be used. These will handle carriers which, when loaded, weigh about 14 pounds. There are a great many applications of the tube system to reducing operation costs.

The pneumatic tube system requires the installation of tubes to the various departments and counters. These terminate in a central station, which is divided into two parts,—one for handling cash transactions and the other for credit authorization. Sometimes the credit section of the desk is placed at a distance from the cash section. That is, it may be in the credit department, which is placed on an upper floor of the building. Generally, for the most rapid service, the cash desk is located on the basement floor or as near the first floor as possible to minimize the travel of the carriers from the first
floor stations. There are many points in favor of this system: that of central control of all cash; silent authorization; and the saving in the work of cashiers. There is also the fact that with tubes there are many other services to which they can be put,—for orders and messenger service. In some stores there is a combination system, using the tube system throughout and supplementing it with cash registers convenient for the very active sections in the under-priced shops and first floors.

Merchandise Handling. The merchant of today is watching carefully every improvement which will reduce operating costs, particularly in the handling of in- and out-going merchandise. The problem of handling merchandise will vary according to the location of the building. In some locations, the bulk of the merchandise is received from the railroad freight yard or dock. In others, it is delivered from the manufacturer's or jobber's warehouse or from the merchant's own warehouse, and the facilities for handling the merchandise will vary. The elevator equipment must be proportioned accordingly. A little care in arranging the size of an elevator will not only add to the efficiency of operation, but to the economy of space as well.

The majority of store owners use the upper floors of buildings for receiving, re-marking and stocking merchandise, except where the stock is carried in warehouses. This means that all the merchandise must be transferred from the stockrooms to various departments throughout the building. This distribution may be handled by elevators, dumbwaiters and spiral chutes, or, generally, by a combination of elevators and spirals. In some cases dumbwaiters are used in place of spiral chutes. The objection is sometimes made that merchandise may be damaged in a spiral chute. This may be true if the merchandise is sent down in a carton box without first being placed in a container or a bag to protect it against the rubbing it would receive while passing down the chute. Some chutes have been designed with what are known as "switch outlets" on several floors, and should a package hit one of these, it is very likely to become damaged. It is possible, however, to design a chute with as many as three blades, allocating the blades to various floors. Properly designed chutes may be very effective, and require little or no maintenance or operating power. Bulk merchandise is generally handled on wheelers or in hampers on the merchandise elevators.

Stockroom and Delivery. There is a growing tendency, owing to the value of space in the store building, to reduce stockroom areas to a minimum, carrying all merchandise in the warehouse, and shipping or delivering from the warehouse all merchandise except that which the customers take with them. Practically all furniture and household supplies are shipped by this method, only samples being kept in the store. This system materially simplifies the delivery problem from the store.

The problem of handling the out-going or sold merchandise involves several problems,—that of checking, authorizing (if on a charge account basis), wrapping, routing, and delivering. There are two methods of handling the out-going merchandise: one where the packages are clerk-wrapped (wrapped by the clerk selling the merchandise); and the other where they are central-wrapped. Where the latter system is used, the bulk of the merchandise is sent, after its sale, to a central wrapping department. With this system, of course, there is a certain amount of merchandise taken out by customers which, of necessity, is clerk-wrapped. Generally all merchandise on the first floor is central-wrapped with the exception of that taken out by the customer. The packages from the first floor are collected on belts which are hung from the basement ceiling and connected with a tube or cash desk in the rear fixture in the accounting department or square. With the central-wrapped system, the merchandise is gathered in hampers, bags or baskets and sent to the central-wrap. Where china and glassware are sold, it is very often arranged so that the packing accommodations, to
gather with excelsior vaults, are located adja-
cently to the department, thereby reducing, to a
minimum, the amount of breakage. Where fur-
niture is carried and shipped from a store, the
finishing and packing room is likewise located ad-
jacent to the department. The tendency, how-
ever, is to handle as much as possible of bulk
material directly from the warehouse, selling
from samples entirely.

Delivery Cars. With the increasing restric-
tions governing the system of using streets for
the parking of automobiles, it becomes necessary
to either resort to the route delivery system, or
to arrange it so that delivery cars may be taken
directly within the building and loaded there.
A New York department store uses a system in
which the cars are all fitted with cartons just the
size of the bodies of the cars. These cartons are
unloaded onto special elevators which carry
them to the delivery concourse within the build-
ing for loading and unloading. Generally these
are left in the evening, and the car is sent to the
garage. In the morning the car calls and collects
the carton, which, in the meantime, has been load-
ed and is waiting to be delivered.

Package Routing. In collecting packages
from the first floor, instead of using messengers
and porters, a series of belts is provided on the
basement ceiling. These belts are connected with
the wrapping or cash desk in each department.
After the packages have been wrapped and ad-
dressed, they continue on a belt to the inspection
and authorization department, and then on to the
routing table, where the delivery route number is
placed on each package. From there they are
tossed onto the delivery belt and then go to the
sheet writers' bin, where the delivery sheets are
written up. From here they are passed on to the
delivery bin to be loaded onto the delivery truck.
The packages from the upper floors of the build-
ing are generally placed in a delivery blade of the
spiral chutes, which discharge on belts and are
carried to the central wrapper, following the same
route as that for the first floor. For large or-
izations, where there are many packages, it is
the practice to provide two sets of blades in the
spiral chutes,—one for semi-wrapped and one for
wrapped packages,—so that the wrapped pack-
ages are taken direct to the authorizing and writ-
ting tables. Mail and express packages are sepa-
rated at this table.

The question of the value of space used for
delivery equipment has caused several stores to
remove it entirely from their buildings, using in-

### Summary Charts of Mechanical Equipment

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Summary Charts of Mechanical Equipment Are Useful Records
stead delivery stations located in the various delivery centers. With this system, the merchandise is loaded at the store in hampers, trunks, and, in some few instances, directly in rolls which are transferred to the delivery stations. With any of these route systems, additional elevators will be required to handle the packages. For the handling of furniture and pianos, where they are carried in the building, it is sometimes advisable to provide a van elevator, which will be large enough to bring a furniture van directly into the furniture department, where the furniture may be loaded directly into or out of the van. Whether this method is economical, considering the cost and amount of valuable floor space it occupies, is debatable.

**Waste Handling.** The problem of handling waste paper, boxes and rubbish is one which requires some thought. It is sometimes possible to sell this refuse, but often it costs more to prepare it for sale than the amount obtained. It is therefore quite possible that a waste incinerator or boiler may be considered as part of the store equipment. In many instances, it has been found that the hot water requirements, and sometimes sufficient steam, can be generated for the cafeteria kitchen from the refuse which would otherwise have to be carted away at expense to the store. To collect the paper and refuse, it is advisable to provide chutes running through the building, with hopper doors on each floor. In large buildings, it is advisable to provide separate chutes for paper and rubbish, carrying the refuse to separate sorting or accumulation rooms. Very often a shredding machine may be installed, and some of the paper may be shredded and recovered for packing purposes. The chutes and sorting rooms should be protected against fires, for these are among the places in a building where fires occur more frequently than anywhere else. For wooden crates a machine called a "hogger" is sometimes installed to break up boxes, and they are then fed directly to the incinerator.

**Incinerators.** It is important, in the selection of an incinerator, that all the facts as to quantity and type of rubbish to be burned, and what the waste is to be used for, be known, for without full information serious difficulties will follow.

**Fur Storage.** The handling and the storage of furs in the modern store building require considerable thought, for here is a value which must be protected not only against fire and theft, but...
from moths. There are two systems used in the storage of furs; in one, the furs are thoroughly cleaned and placed in a refrigerated vault; in the other, they are first put into a gas chamber where they are fumigated, and then placed in vaults which are periodically treated with the same fumigating gas. There is considerable difference of opinion as to the merits or advantages of this gas system over those of the refrigerated system.

MAINTENANCE AND UPKEEP

In the large store building, with all its vast amount of equipment, there comes the problem of maintenance and upkeep. Very often the tendency in the design of the building is to minimize the importance of allowing sufficient space for the accessibility to pipes, shafts, and so forth, which results in extremely difficult and costly maintenance. Too much stress cannot be put upon the importance of having large pipe shafts, with the piping so arranged as to be readily accessible. Nor must the accessibility of machinery or equipment be overlooked. Considering the cost of replacing the machinery which cannot be properly maintained due to crowded conditions, it is necessary to consider not only the bare cost but also the inconvenience due to a shut down.

Quality of Materials. In the selection of materials to be used in a store building, it is essential that care be exercised, for it is not merely first cost or replacement cost, but how seriously the replacement will interfere with the operation of the store, that matters. Nothing that is done must interfere with the selling organization. For example, failure of the elevators or the plumbing system during an anniversary week sale would be a catastrophe. Often the engineer is criticized because he wants to use brass water pipes or even return heating pipes. Nevertheless, he has probably been through the mill and is undoubtedly profiting by experience, in spite of the fact that the architect would perhaps rather spend the money involved for more marble in the vestibule or for more extensive decoration.

Considering the fact that the store building is a capital investment to be carried for a term of years, the character of materials should be such that it will require the least maintenance and replacement cost. In the layout and selection of equipment, it is always wise to consider how
simple it can be made, rather than how complicated. There seems to be a tendency to make equipment complicated, and by so doing give the impression that it must be good, whereas the more simple layout will probably cost considerably less and will certainly function as well. It will also relieve the operating department of the cost of keeping one more especially trained man to look out for it. The days of making engineering mistakes with impunity are gone forever. Equipment that is top-notch today may be obsolete tomorrow. There are no dark secrets, and practically all equipment can be seen or, if not, manufacturers are able to produce enough data to substantiate their claims for it. It is best to avoid, as far as possible, using something entirely new and original, particularly where it will affect the operation of the building. A store is no place for making experiments; only tried equipment must be used. This may seem to be contradicting a statement previously made, but it does not, for while some equipment may not have been applied to store work, it may have been developed for other uses, and it can be readily adapted. There is a tendency among some operating engineers not to put labor-saving equipment into a building, just as they at one time balked at buying public service current,—for fear of "loosing their jobs." Thought must be given to this phase of the scheme of things, for anything to
reduce labor cost must be considered. With the development of the central station, with its turbines producing electricity at the rate of 1 kw. for 1½ pounds of steam, there is little likelihood of any engineer's advising the installation of a private generating plant with all its complications, worries and accompanying disadvantages, to say nothing of the incidental costs and relative value of the space it would occupy if converted into selling area,—for after all, the merchant is selling,—not manufacturing.

**Boiler Plant.** By the same token, the question of using a boiler plant as against use of central heat, if such heat is available, should be carefully weighed, and where continuity of service is obtainable at suitable working pressures, it is of course to the advantage of the merchant to use the service of the central plant,—again saving space and avoiding the annoyance of handling coal and ashes. The question as to the type of boiler plant used depends on the size of the building and the uses of the steam. Generally, the average store building is of such size as to require boilers of the water-tube type. Though they are a little more expensive than some of the other types, they are more efficient, safer, more economical, and, with reasonable care, have a long life span. The type of fuel used, whether hard or soft coal, or oil, depends on the location of the building and the cost of the fuel. Of the three types of fuel, the oil is probably the cleanest if the burning equipment is properly selected and installed. With oil, the dust from handling the in-coming coal or the out-going ashes is entirely eliminated. The operating cost with oil may be about the same as with soft coal with high grade stoker equipment; for a rough comparison, oil at 4½ cents a gallon is equivalent, in cost, to coal at $5.50 a ton. The uninitiated should be careful about selecting oil-burning or stoker equipment, for there are many pitfalls.

**LIGHTING AND ELECTRICAL WORK**

There is no detail in connection with the modern store more important than lighting, which cannot be given too much careful consideration and study. The quality of the lighting has a tremendous bearing on the buying public; it has a certain amount of drawing power, just as a poorly lighted place is repulsive. People will shop in the store where the surroundings are most pleasant, cheerful and inviting. Good lighting does not necessarily involve use of the most extravagant fixtures, for lighting that properly displays the merchandise is not glaring or tiring to the customer, and it is one of the store's best salesmen. It is extremely important to so place the outlets as to distribute the light evenly without glare or excessive brilliance of the lighting units, for there is nothing that will cause more fatigue or injury to the eye, and, in fact, to the entire nervous system, than glare. Often we hear women complain of how tiring it is to shop in certain stores. This complaint can be traced to one of two things,—poor ventilation or lighting. If it is fatigue to the customer, how must it affect the clerk, who is in the store day after day?

It is not necessary to have extremely high intensities of light to display merchandise, but it is just as harmful to have too little. There are advocates of high intensities of light. In fact, during the past ten years, the recommendations for proper lighting have jumped from about 4 candles per square foot to between 15 and 20. These latter figures are, in my personal opinion, usually excessive and unnecessary, for with the proper spacing of the outlets, and with well designed fixtures, an evenly distributed light can be produced,—a light which will flood the entire space. The effectiveness of general lighting depends, to a greater or lesser degree, on the reflecting properties of the walls, ceilings and floors, as well as on the colors of the fixtures and the general dimensions of the spaces to be lighted. It is well to avoid use of highly polished or glossy finished surfaces, such as the tops of counters, show cases, etc., for these surfaces only cause reflective or specular glare, which is very injurious to the eye. This can be avoided by using mat or
stippled finishes, by shifting the light source, by reducing its brilliance, or by using an indirect lighting unit. Although there are many instances where artificial light of the color approaching daylight might be desirable, habit seems to demand artificial light of a warmer hue. The color of light plays an important part if the source is concealed, for the surrounding colors are made more effective. Where attempts have been made to produce a light resembling daylight in stores, there were so many surrounding influences, such as the color of carpets, furniture, merchandise, and wall and ceiling tints, that the results were negative. Although very extravagant in current consumption, it is believed most practical, where light approaching daylight is desired, for matching colors, etc., that the local specially designed counter unit be employed.

Lighting Fixtures. In the selection of lighting fittings it is wise to avoid the spectacular, for after all, the store is mainly for the sale of merchandise, and not for the exhibition of lighting fixtures. Perhaps the ideal light for a store building is the light from totally different indirect lighting units, which use the ceiling as a medium of reflection and give a diffused light which floods the entire area. For selling certain types of merchandise, such as linens, no better type of light can be used. The objections raised in regard to this type of fixture are usually based on its appearance and on the fact that it uses more current than the usual semi-indirect bowl. It is quite probable that during this year there will be on the market a fixture which will give all the benefits of the indirect, and at the same time be sufficiently luminous, by using horizontal or vertical louvers, to take away the objections to the indirect. The semi-indirect bowl is familiar to all, and this leaves little to say about it except that it should be large enough to properly diffuse the light and to properly distribute it. The lighting units should be suspended and should be outside of the ordinary range of vision. Special fixtures are often required for such departments as the glass and china departments, silver, jewelry, furniture, etc. Often there will be special display rooms where the lighting must be more of the theatrical type, with spotlights for special effect.

Show Window Lighting. The show window is the silent salesman and must be lighted in such a way as to be dignified and still contain enough of the theatrical to attract the widest possible attention. The exact quantity of light needed will depend very largely on the surrounding conditions, for both day and night use. Naturally, on streets which are brilliantly lighted, the windows, to be attractive, must be more brilliant. However, although a great deal of light is required, it should generally be evenly distributed and not spotty. Usually, reflector lights are provided both at the top and the bottom, near the glass, and these are supplemented by spotlight outlets at either side. All lights in show windows should be arranged so that color screens can be used. It is desirable, although not absolutely necessary, to provide diffusing glass in front of all the border lights. For the best effects it is desirable to keep the top lights well above the top of the window, so that the light source is concealed from public view. The control of the lights should be such that any degree or quality of light may be obtained, as well as any color effect. This is generally accomplished by the use of multiple circuits. Particular care should be exercised in the finish of the backs of show windows. They should not be highly polished, but should have a mat or diffusing surface, which is also more attractive.

In some few instances skylights have been provided over the entire window and the lighting placed behind the skylight, but it is questionable whether the results justify the additional expenditures. For special display it is desirable to obtain as much light as possible, and it is possible, for this purpose, to use efficiently a single flood or spotlight. There are many departments in a store building that will require special lighting,—such places as the workrooms, the delivery department, the tube room, the machinery room, the restaurant, kitchen, beauty parlor, etc., all need special treatment.

General Wiring. In arranging the wiring for general lighting, it is well to have control centers at convenient locations, accessible from the general selling areas, and so that the person operating can see the lights he wishes to turn on or off. The preferred location is adjacent to the stairways. Generally, each light should be individually controlled. In arranging general distribution or feeders it is well to separate the general lighting,—the night lights, case lights and emergency lights,—on separate feeders controlled from the main switchboard. It is very important that there be continuity of service of electric supply, for an interruption in the supply of electric current will not only encourage theft, but may result in serious panic. With the ever-increasing demands on electrical service in the department store, it is well to allow at least 25 per cent reserve throughout all the distributing system.

Besides the general lighting, there are case and display fixture lighting to consider. A great many of the more recent buildings, instead of trying to take care of this work from the ordinary lighting currents, have special rectangular wiring ducts run in the floor, to which the cases
are attached. The use of these ducts makes it very practical to move and re-locate the cases without having to cut up the floor for new current connections. There are also numerous power requirements,—for in addition to the regular pumps, elevators, ventilating fans, etc., that are in every building, there are the workroom requirements. It is not uncommon, in a modern store, to have about 500 motors of various sizes, from 1/4 to 350 h.p.

Other Electrical Work. The executive call systems must be considered. These may be of the audible or gong type, or they may be of the silent type, where the executive’s number is flashed when he is wanted. There is considerable debate as to which type is the more desirable. However, in some of the most recent buildings, the noise of the audible call was considered objectionable, and the visible type was installed. Then there is the usher’s or aisle man’s call from each of the several counters or departments. Unfortunately, up to the present time, no call that is entirely satisfactory has been devised. Some calls have numerous light outlets on columns; others use localized lights on the tops of display fixtures; others make use of annunciators; but all are open to some objection.

In addition to these systems, there are the fire alarm, sprinkler supervising alarm, the watchman’s signal, clock systems, to say nothing of the network of telephone conduits, for there must be telephones in every department, both executive and selling, throughout the building. The fire alarm and watchman and sprinkler supervisory alarms are so closely governed by city and underwriters’ requirements and regulations, that it seems best, except in unusual cases, to lease these systems from established, acceptable companies. With the almost universal adoption of alternating current for use of electrical energy, and with the advent of the telegraph clock, the solution of the clock problem, which has been more or less difficult due to the complications of its batteries, motor clocks, etc., is made easy.

Cash and Credit Handling. For the dispatch of credit and cash transactions, there are two general methods employed,—one using local cash registers and a telephone for authorization for charge accounts; and the other using pneumatic tubes. The telephone and register system is extensively used and is particularly adapted to stores where there is a preponderance of cash transactions. The system requires the installation of special telephones at the various departments and counters, and these terminate in a special control board in the credit department. The telephone has an auxiliary attachment which stamps the charge ticket, which is operated from the central desk, after the clerk has telephoned up for an O. K. The objection to this system is that it discloses to the public the customer’s name and the object of the call, which sometimes causes considerable annoyance.

SPECIAL EQUIPMENT

Among the items which might be classed as special equipment would be those of beauty parlors; soda fountains; cafeterias; restaurants; kitchens; hospital rooms; laundries. The vogue of the beauty parlor has grown to such an extent that it not only requires special plumbing and electrical work, but special ventilation and air conditioning. In some of the modern beauty parlors, there are, in addition to the usual hair dressing, cutting, waving and manicuring compartments, special treatment rooms with their heat treatment, shower and rest rooms. The soda fountain has developed from the “soda bar,” where it was possible to get a soda or a plate of ice cream, to a miniature lunch room where all sorts of sandwiches, salads and pastry are served in addition to broth, soda, tea and coffee. This is generally located in a very prominent part of the store, either on the first floor or in the basement, and it requires very careful ventilation, for there is nothing that will permeate an area more quickly than the odor of coffee.

Besides providing the usual cafeteria for the employees, adjacent to the recreation center on one of the upper floors of the building, there are being installed cafeteria or buffet luncheonettes in basements, some of which serve as many as 3,000 persons during the luncheon period. This naturally requires special equipment and considerable service to handle such a volume of business. The store restaurant is a feature which has to be considered individually.

Every modern store is equipped with a physician’s examination room, an emergency room, and rest rooms for both female and male employees. Some even expand this, and have rooms for eye specialists, chiropodists and dentists who take special care of employees. The equipment for these rooms is generally very simple, consisting of a bathroom, emergency toilet rooms and lavatories in each of the special rooms, together with the necessary electrical equipment for the examination and treatment of patients. Very often a small laundry is installed to handle the various uniforms and goods which have become soiled from handling. A laundry of this sort is quite simple; it requires only a few employees to operate it, and it is economical.
THE requirements of the modern department store have become so varied and exacting that the design, arrangement and construction of the store fixtures and interior equipment are almost invariably handled by a specialist, called, quite correctly, the "fixture architect and designer." This branch of work requires a combination of artistic and technical training, a grasp of the architects' and engineers' problems, and an understanding of department store organization in regard to merchandising, delivery, and the handling of stock and personnel. The fixture problems vary, as the store may be a department store, a dry goods, specialty, or jewelry store, or a store selling furs, shoes, etc. In the larger stores with restaurants, luncheonettes, and beauty parlors, etc., the mechanical requirements demand the closest cooperation between the "fixture architect" and the architect of the building. This cooperation should, and usually does, begin in the preliminary stages of the planning of the store.

Planning. Since the entire department store building project is centered around one primary object,—that of selling merchandise,—the instruments of such selling are the determining factors in every phase of planning and construction. The entire floor space is designed to accommodate, in the most efficient manner, the counters, show cases, and other fixtures, and all the mechanical equipment is designed with the store fixtures in mind. Even the structural frame of the building is planned primarily in its relation to fixture arrangement, and the column spacing itself is determined by the sizes and arrangement of the store fixtures and the aisles between.

The usual procedure in planning an efficient department store is, first, to have the architect of the building work out with the client the general arrangement of the entrances, the probable locations of the elevators, stairways and escalators, and the probable depth of the show windows. The central selling area is for the time being left blank, without even an indication of locations of the columns. The fixture architect, in consultation with the client and the architect, then makes a layout of the fixtures to show the various counters, show cases, center fixtures, aisle tables and wall fixtures. When this fixture arrangement has been approved by the owner from a merchandising point of view,—and not until then,—are the structural columns spotted on the plans. Naturally, adjustments must be made, and the costs of various column spacings and framing must be considered before the columns are definitely located. The main aisles or the aisles opposite the entrances of the building
are necessarily wider than others, and the columns must be spaced accordingly. The resulting spacing may be any distance from 18 or 19 feet up to 30 feet and more. Obviously, a fairly wide spacing is desirable on account of the large open floor areas. As the interior column spacing often varies, the exterior wall columns are usually spaced more or less independently to fit the exterior design.

Wiring. Store fixtures require electric connections for display lighting, and it is advisable to install an electrical connection at the base of each column or a junction box in the under-floor wiring system to serve each "island." The wiring for the telephone service should be installed in conjunction with the work, serving all desired points. A tube system also requires the installation of a great many pipes, and these must be located by the fixture architect in order that they may be installed during construction.

Ventilation. In the ventilation of a modern store building, the air in the first floor and basement is usually exhausted through outlets in the floor connecting to the duct system, outlets which are distributed throughout the sales area. These must be arranged to come up in the fixtures, and they are usually provided with grilles in the faces of the counters or display cases.

Belt Conveyors. The larger stores usually employ a system of moving "belt conveyors" at the basement ceiling to collect smaller packages from the first floor. Holes are provided in the floor to permit the packages to be dropped onto the belt, and this feature must also be taken care of in the general construction in relation to the store fixtures.

Finished Floors. Since past experience has shown that any floor plan is subject to change and alteration, it is an advisable economy to cover the entire floor surface with a finished floor which may be of marble, terrazzo, linoleum or rubber composition, or wood. By this practice an alteration may be quickly made, new aisle spacing created, and the finished floor is all ready to receive it. It is also desirable to have this floor as level as possible, since the pitch in the floor, if any, must be taken up in the base of the fixture, as the tops and shelves must always be level. A slight pitch in a fixture would cause sliding doors to roll out of position.

Unity of Design. With proper thought and cooperation between the architect and the fixture architect, the interior treatment of the building may be planned in a style which will show harmony of detail and character. Elevator doors, plaster ornament, ceiling panels, wood wainscot and fixtures can and should be so designed as to have something in common, which will create, in the eyes of the customer, an impression of co-ordinated beauty, and furnish an atmosphere in
Spaciousness Demanded by Modern Merchandising
Showing Special Display Cases
Saks-Fifth Avenue, New York
Starratt & Van Vleck, Architects

Wall Fixtures and High Display Cases,
Fresh Air Inlet Grilles Above

Making of Plans. The type of store, the methods of merchandising, the funds available, and the plans for the future will determine the style, floor plan and details of construction and finish. When it is realized that the initial cost of the installation of fixtures may run to over $1,000,000 in a large store, and that the average fixture remains in place approximately 3½ years before it is shifted to another location (with the exception of the first floor fixtures, which are shifted more often), one can comprehend the necessity for making a painstaking analysis of the fixture plans and for having the most complete information available at the outset. After a competent fixture architect has been engaged, the first step is the making of preliminary plans. Every department store or chain of stores of any consequence has or should employ at all times in some official capacity a man who has not only a technical training but a department store training as well. This individual should act as the “liaison” officer between owners, architect and fixture architect.

There are no hard and fast rules for the layout of a department store; what holds good in one city or store may be just the reverse in another location, and there is an exception to every rule. The present and the contemplated future sizes and amounts of business of the various departments, and the ideas of the various buyers, department heads and floor managers, must all be collected and analyzed. For gathering this information the “liaison” man is necessarily valuable. Of course the fixture architect could lay out a new store in a strange city, relying only upon his knowledge and past experience, and there is no question but that in many respects it would be desirable and practical, but it is best to gather information of all the local conditions through all channels possible.

The General Arrangement of Departments. In a large store of five stories or more the arrangement might be:

First Floor. Jewelry, novelties, leather goods, handkerchiefs, neckwear, toilet articles, umbrellas, haberdashery.

Second Floor. Silks, wash goods, corsets, lingerie, blankets, boys' clothing.

Third Floor. Suits, cloaks, dresses, infants' wear, millinery.

Fourth Floor. Shoes, sport clothes, beauty parlor, evening gowns, furs.

Fifth Floor. Household furnishings, rugs, carpets, pianos, furniture.

In a taller building, the household furnishings, furniture, art and lamp departments, display rooms, etc., would probably be expanded proportionately on the upper floors. In recent years, the basement, which was once used for delivery or for the sale of hardware, crockery, etc., has become more valuable when used as a so-called “bargain basement.” Many merchants have found this floor to be most convenient for the quick sale of lower priced articles covering the general range of cloaks, suits, shoes and wearing apparel. However, any plan decided upon must
Special Display Cases Are Often Necessary

Saks-Fifth Avenue, New York

Starrett & Van Vleck, Architects

be more or less flexible, as all departments are subject to enlargement or contraction, subject to seasonable selling, and a well planned layout will permit of such rearrangement without alterations of any consequence in the fixtures.

**Fixtures and Arrangement.** Certain manufacturers make fixtures of stock sizes and design which may be incorporated into a general scheme with probable savings in cost. The purchase and use of fixtures manufactured especially for a particular store not only permit the use of a design individual to the store, but may allow for a certain amount of flexibility in planning. The cost and desired effect usually determine the procedure in this regard.

The modern tendency, in the selling of wearing apparel particularly, is to carry a very small amount of exposed stock. This has diminished the number of hanging and clothing cases, the stock being kept in stock rooms directly on the floor, formed by a rectangular arrangement of display cases or partitions enclosing them. With styles changing rapidly, the store may carry a greater or less amount of stock without the fact being apparent to the public. This arrangement usually permits large open areas which are suitably arranged with tables, settees and chairs to enable the purchaser to relax and feel at ease while the individual garments are brought out for inspection. The rapid growth of small "specialty shops" adjacent to large stores has caused the large stores to construct within their buildings special "salons" or departments of individual design to meet this competition. These are designed to simulate the appearance of a small shop for the sale of a particular style of gown or hat, youths' clothing, important styles, etc. In most stores the constant change of styles, competition, and unusual increase or decrease of sales in certain departments require changes or alterations to the interior arrangements continually during the lifetime of the store.

**Aisle Spacing.** A 14-foot to 18-foot width between counters for main aisles will provide not only ample room for pedestrian traffic but will also permit the placing of tables and bargain squares at rush seasons of the year. Aisles without tables, which are not main aisles, if made 8 feet wide will be found practical. If tables are placed in the aisles, a minimum width of 4 feet should be provided on each side of the table. Aisles on the upper floors will of course be much wider where the floor space itself is used for selling and display purposes. A minimum aisle width of 2 feet should be allowed at the rear of a fixture as working space for the employees.

**Show Cases.** The average show case is 40 inches high; 20 to 28 inches wide, and the length varies to suit conditions. The show case usually has a glass top, front and ends, sliding mirror doors in the rear, reflectors and glass shelves on adjustable metal brackets. The exposed bottom of the show case usually has veneered finish, with drawers below if the base is run to the floor.

**Display Cases.** These are quite similar to show cases in construction and finish. The height varies from 3 feet to 7 feet; width from 6 inches to 4 feet, and length to suit conditions. If small merchandise is to be displayed, glass shelves and mirror back will be used; if larger items are to be displayed and the shelves omitted, a veneer panel back will be more effective.

**Counters.** The width of counters varies from 1 foot, 3 inches to 4 feet; the average height is about 2 feet, 9 inches, and in most cases the counter top overhangs the body of the counter from 3 inches to 7 inches. All exposed surface should be of finished wood as selected, with a glass or linoleum top over the finished wood counter. The interior of the counter may have drawers or open bin spaces for holding stock as desired.

**Tables** are of two types; the first is similar to a library table with free-standing legs, and the second type has an entirely enclosed bottom, either with shelves protected by paneled veneer sliding doors or holding drawers. If the drawers are large, they should roll on patent extension drawer slides. The average table height is from
Low Center Fixtures Add a Sense of Spaciousness
Lord & Taylor Store, New York
Starrett & Van Vleck, Architects

30 inches to 33 inches, and a removable rim about 3 inches high is a valuable addition to provide for each table. The length and width vary in accordance with the amount of the space available.

Center Fixtures. These fixtures, behind counters, vary in height from 4 feet, 10 inches to 5 feet, 6 inches. If the height is kept down and a clear view allowed over the entire floor, a pleasing effect of spaciousness is secured. It is advisable that the tops of center fixtures be made of the finished wood. A minimum width of 4 feet from outside to outside will be found practicable with the drawer cabinets or display cabinets, being built in between the pilasters so that they are removable or inter-changeable except where special sizes may be necessary. If cash registers, wrapping desks or tube stations are to be built in as part of a center fixture, the necessary details for receiving pipes, power, etc., must be allowed for. Where stock is kept on shelves, the shelves should be removable, and if a panel back is built into the fixture, it can be quickly converted into a display cabinet. Glass sliding doors held in metal frames on the fronts of these fixtures not only allow the merchandise to be displayed but also keep the dust from reaching it. If a display case is used, the bottom of the case should be kept at least 2 feet from the floor, as the customer cannot see below that point when standing in the aisle.

Wall Fixtures. The average height of a wall fixture proper will vary from 6 feet, 6 inches to 7 feet, including the main cornice. On top of this are often erected display cases or stock storage spaces, the height of which may be from 2 feet to 6 feet, sometimes bringing the total height of wall fixtures to 12 feet. The depth of the wall fixture should be kept at 2 feet, on the average. It has been found that the highest point to which the average sales person can reach, without the aid of a stool or ladder, is 6 feet, and for this reason it is not advisable to erect either a drawer cabinet or shelf any higher than this. If a display case is erected above, it should have panel back, glass sliding doors, and should be illumi-
nated with reflectors. Display cabinets or drawer cabinets in the fixture proper should be built in between the pilasters so as to be removable. Drawers may be either of uniform sizes or built especially to receive the different articles to be held. Bins also should be sized and constructed so as to hold the specified goods or articles designated. In the layout of wall fixtures, allowance must also be made for the entrances to show windows. Space should be provided which will make entrance and exit convenient.

**Hanging Cases.** With the exception of the children's and infants' departments, hanging cases will average 6 feet, 6 inches in height, with the hanger not more than 6 feet from the floor. The interior may be finished in the same manner as a display case with reflectors. The width should be 2 feet, 6 inches minimum, and the length varying to suit conditions. The front may have either swinging doors or sliding doors of glass in wood or metal frames (the sliding door is preferred). As explained previously, the tendency at this time is to use hanging cases mainly for display.

**Fitting Rooms.** These should be made as attractive as is possible. The size should be 6 feet, 6 inches by 6 feet, 6 inches. Full length mirrors set at the proper angle with reflectors should be installed so that the customer may have the most advantageous view of apparel being tried on. If natural wood finish is used, there is an opportunity to employ fine veneered wood panels. The average height of the walls is from 6 feet, 6 inches to 7 feet. Proper precautions must be taken to insure ample ventilation.

**Special Salons.** The special rooms or “salons” for the display and sale of millinery, furs, evening gowns, furniture, etc., afford an opportunity to create a setting of beauty and interest. The rooms may be done in the styles of the different periods or in the mode of the new “modern” which is now so popular. Beauty parlors, restaurants, etc., also permit of special designs not conforming directly to the store architecture.

**Column Enclosures.** These can be made more than just boxes around the columns by the choice of select veneer, and by special ornament and the installation of mirrors they can be made not only useful but attractive.

**Cash Stands, Tube Stations and Wrapping Desks.** The location of these stations is very important, and special consideration should be given this question, as the efficiency of completing a sale in the shortest elapsed time depends on the proximity of these units. To all of these, service spaces must be allotted for cash books, paper bags, twine, tube pipes, carriers, etc. The sizes vary according to the amount of business to be handled at any given point.

**Lumber and Veneers.** The term “best quality,” when used for cabinet work, should mean nothing but the best. In the past, oak, birch, mahogany and walnut have been used extensively for store fixtures, but in recent years walnut has been used almost exclusively. Rosewood is perhaps the best for show case rails and edges of counters; it has a fine appearance and is a very hard wood, which permits the use of a small cross sectional area, as well as withstanding hard knocks and rough usage from handbags, umbrellas, etc. The “modern” treatment of special rooms has introduced numerous new veneers of beautiful design.

**Glass, Hardware, Reflectors.** Glass and mirrors have an important effect on the display and should be of the best quality. Hardware is also a very large item in cabinet work, and the selection should be made carefully and a complete schedule furnished. Hardware may be of statuary bronze, brush brass, nickel plate, or other material as desired. Proper illumination plays an important part in the display of merchandise, and tests have proved that by increasing and correcting the illumination on merchandise displayed, the percentages of sales consummated increased from 20 to 40 per cent. The finish of the exposed metal on the reflectors should match the hardware. Provisions for wiring and attaching the lighting equipment must be provided in the construction of the fixtures. The reflectors specified should be selected from the stocks of those firms which have specialized in this phase of lighting.

**Setting Up Fixtures.** Fixtures should be fitted together in the factory during the course of construction so that they can be marked. When they are brought to the store, it will be necessary only to scribe them and bolt them together, thereby preventing any loss of time. The finish should also be completed at the factory, and no stain or finish should be permitted to be used at the building.
UPON the dictates of fashion and the modern science of merchandising rests the solution of the problem of department store traffic. If the architect lives up to the laws of both, he has succeeded, and in so doing he must achieve the chic and the economical by the same means. So long as the chic or tone of a large store depends upon a Spanish Renaissance interior or a building permeated with suggestions of the Roman Empire, his problem is to minimize the incongruity of elevators and escalators. In the domed and bemirrored interior of an elevator he may find a somewhat pleasant compromise, resembling the powder room in some palace of antiquity, but costume the thin steel span of an escalator in the manner of ancient stairways, he cannot. One turns hopefully to the fashion of the so-called modern movement, because it alone offers a flexibility which might incorporate under the same roof, smartness, scientific layout, and the design of elevators and escalators that will beautifully express their inherent qualities.

In the department store inadequate vertical transportation facilities so often exist undetected, even over a period of years, that the necessity of an expert solution of the individual problem is more urgent than in the office building, where faulty planning of the traffic results in recognizable symptoms. Whereas an office building tenanted to the extent of its capacity necessary to its financial success will give immediate indication of unsolved transportation problems in the complaints of tenants, it is not so with the customers of a store who, far from clamoring for their needs, will merely go elsewhere. The clientele quickly and quite imperceptibly proportions itself to the facilities of the store, and out of this distinguishing characteristic there arise the determinants of transportation and traffic service. The proportioning of these to the merchandising capacity of the store is imperative. Ostensibly there is greater danger of limiting that merchandising capacity than in incurring increased overhead due to ample provision for traffic. The expert will begin with the merchandising factors and arrive at a ratio of customers per hour to the transportation area or the square footage above the first floor minus dead space. In an active metropolitan department store this calculation may result in such a ratio as one customer per hour to every 25 square feet, or in some stores it may run as low as 1 to 60. This ratio is usually based on the peak load of an average busy day with due regard for Easter and Christmas rush.
periods, into which one third of the total annual sales may be concentrated. However, from this proportioning of sales activity to formula, the expert can arrive at a definite volume of traffic.

In contrast to the office building, where speed and height are criteria, the problem of the department store is quantity transportation, and that is why the escalator unit with a maximum capacity of 8000 passengers per hour figures prominently in the layout. The maximum capacity of the average elevator unit is 400 passengers per hour,—but one twentieth of that of an escalator. While the use of escalators would hardly be substituted for all elevators, their elimination of waiting and crowding places a large proportion of the traffic on them. Their further advantage to the store lies in their continuity of motion, low power cost, independence of operators, and their reversibility, which permits of doubling their efficiency in either direction, a feature useful during the opening of large sales and for the rapidly controlled emptying of the store at closing time. "Data collected from a large number of stores show that with both escalators and elevators there were double the number of customers on the upper floors in proportion to the entrance traffic as compared with adjacent stores of comparable sizes and having elevators only." However, one powerful argument for escalators is their sales promotion quality, carrying customers through departments of the store they might not frequent, and giving them a broad view of the display of goods on each floor. This involves the value of the power of suggestion in merchandising. Determining the escalators in R. H. Macy & Company's store, a total of forty units with a capacity
of 8000 passengers per hour each, a ratio of 1 to 19 was used, which is the more exceptional considering that a future increase of sales and transportation facilities is expected, lowering the factor of 19 square feet. In this instance the escalators carry 80 per cent of the total transportation. The largest escalator installation will be in the Kaufmann store in Pittsburgh—a total of 66. This is a far cry from use of the first escalator, operated at the Paris Exposition of 1900.

Good planning generally leads to the placement of escalator units in the main artery of circulation, presenting them as a first choice to the public and offering their view of the entire floor. Elevators are divided into groups and distributed for convenience. Escalators are made in inside dimensions between balustrading of 2, 3 and 4 feet, carrying a maximum of 4,000, 6,000 and 8,000 passengers per hour respectively. They run on the standard angle of 30 degrees and at the standard rate of 90 feet per minute. There are two types. The "flat step type" up, down and reversible, is generally used in fixed direction escalators because reversibility demands a shunt at both top and bottom landings. The "cleat step type" up, down and reversible, has a comb at the landings and may always be reversed. Motors for each unit are placed underneath the floor at the top of the incline.

Three-dimensionally, the escalator may appear extremely large; that is a problem of design, but in actual floor space an escalator having a capacity of 4,000 persons per hour requires only 84 square feet at both upper and lower landings, making a total of 168 square feet on two separate floors. There are two usual arrangements. The parallel arrangement, as shown in the model, or with an aisle between, is generally used when it is required to take passengers from and deliver them into the same cross aisle space. Continuity from floor to floor is possible only where the aisle is provided between. The criss-cross or bucksaw as shown in the model is best used where continuity from floor to floor is desired. If an aisle is placed between, it is crossed by the continuing passengers, so that this arrangement is most effec-
Escalators Separated by Show Case in Selfridge, Ltd., Store, London

tive where the escalators are planned to be adjacent.

In planning elevator groups very little arises in the special cases of stores in variance to the general elevator problem. Express cars would only exist in special cases where there are top floor restaurants, auditoriums or exclusive service to a specialty shop. The local cars designed for "quantity" and stopping at every floor should be as large as convenient entry and egress will permit, maximum dimensions being 6 feet in depth and 7 in width. The electric elevator has superseded the plunger and hydraulic elevators because of its economic superiority, but it need not be designed to exceed a velocity of 500 feet per minute. A satisfactory signal system is the "dial and light," whereby the passenger may determine at leisure for which car he (or more often she) will wait. The general practice of stopping at each floor whether signaled or not is advisable in department stores because it may suggest purchases to the passengers each time the door is opened, and it facilitates general circulation, though it may slow up the definite round trip. In design the elevator car and landing doors offer opportunities for luxury and comfort uncalled for in other buildings. The department store elevator is one of the few remaining in which a bench across the back of the car can be justified. Decoration and the placement of frames for posters is a matter of taste, but the use of mirrors in some form, whether covering the upper walls entirely for spaciousness or framed small for economy, is a matter of catering directly to the nature of the store's clientele. In high velocity elevator service mirrors have been advised against as a distraction and an indirect cause of landing door accidents. In the department store services the danger is less, but remains a factor to be weighed against their popularity.

In the Bedell Store, New York, the architect, Joseph Urban, has designed an extremely decorative car, the effect of which is only suggested in these illustrations, since the colors of the stylized flowers are brilliant against the black lacquered steel. Picture this car operated by a small Japanese girl in jade green pajamas, and you have an example of a tour de force peculiar to the problem. Obviously, glass is often favored in the landing doors, but their design should be such that no one need search for them. Certainly with them as with the car itself every detail should be as distinguished as the store itself, and the utmost be made of the chance afforded to impress customers favorably.

Designing escalators seems still to belong to the field of the engineer. The architects' opportunity is in creative design, for while a Renaissance design may conceal a splendid steel elevator cab, nothing can hide an escalator. The escalator will always jeopardize its antique balustrading! Fine materials used honestly will easily redeem it from its stark utility, if necessary. Lacquer colors or fine wood veneers may be applied to its housing. The treads of the steps may be painted, and moving hand rails provided in a variety of cast rubber tones. Whereas lightness of coloration recommends itself to effect spaciousness for confining walls of an elevator cab, for the escalator dark coloration affords a diminution in apparent dimensions,—or in both cases the use of mirrors or highly polished surfaces tends to camouflage with reflections the existence of overpowering forms or planes.

An unusual escalator treatment is that in the store of Selfridge, Ltd., London, where the up and down units of a parallel arrangement are separated by a show case flush with the rail and extending the full available length. At one time the use of advertising and display in the elevators of a large New York store was proposed, but it was rejected not only because distracted passengers might run by their stops but also because of the display limitations. There is some difference of opinion as to the wisdom of using an escalator showcase because of the advantage which lies in the view of counters where actual sales take place. However, the illustration shows that the showcase is hardly visible to the descending passengers who naturally take a better view of the ground floor than those ascending, who are more interested in the second floor.
KITCHEN EQUIPMENT FOR DEPARTMENT STORES

BY

WILLIAM DOESSERECK

THE planning of a kitchen and the arrangement of its equipment call for the consideration of several items: (1) Type of service; (2) Number of meals to be served; (3) Number of persons per meal; (4) Number of persons per seating; (5) Location of kitchen in relation to restaurant; (6) Method of provisioning kitchen; (7) Location of receiving room,—if located on upper floor, what elevator service is available; (8) Disposal of garbage,—what provision should be made for handling and storing of refuse. In addition, light and ventilation must be provided and, where at all practical and a choice of location will permit, the kitchen should be located so as to secure natural light and ventilation, which is preferable to artificial conditions. It should be noted that in some cities kitchens and bake shops cannot be placed in basements or areas without natural ventilation.

Efficient Planning. After the location has been decided upon, the general plan of the kitchen should be developed, keeping in mind the rotation of service and the necessity of having every part of the kitchen accessible in the order of culinary operations so that the service may be continuous with as few steps as possible by cooks, waiters and bus boys. A layout requiring cross travel or counter-rotation of service should be avoided. The layout should be planned to require the minimum amount of help, so that the number of employees may be changed as conditions demand without detriment to the service standards to be maintained. Efficiency and prompt service should never be sacrificed. The location of the kitchen with regard to the dining room should be such that the distance to be traveled between the kitchen and the farthest table in the dining room shall be as short as possible. With this arrangement the hot foods will not be cooled in serving. The arrangement of departments should be in the order of their importance and the type of kitchen, keeping together all work requiring heat, and grouping that requiring chilled or cool service, to permit better control of operation and ventilation. The exact location of the various departments depends entirely on the meals to be served. Cafeteria and “quick lunch” service will require that the kitchen be as close as possible to the service bars and allow direct access for replenishing the supplies.

Services. A separate room should be provided for dishwashing in order that the noise and heat may be isolated from the restaurant. Service pantries should be provided as cut-offs between kitchen and restaurant, thus minimizing noise and aiding in keeping out odors. Ample space should be provided for receiving and storing supplies, arranged to require the simplest system of storekeeping, and allowing for careful supervision of all supplies. There should be but one supply entrance from the outside and into the kitchen. The preparation spaces, bakery, pastry and ice cream shops should be kept as close to the service portion of the kitchen as practical, but still out of the way, bearing in mind that the whole arrangement should be compact and yet spacious enough for proper working, easy cleaning, minimizing the distance of travel for service to patrons. Adjacent to the dishwashing room should be a soiled linen room where the linen may be gathered up and bagged, ready for the laundry. A clean linen service room should be placed adjacent to the service pantries where the linen may be sorted and stored until required for use. Storage space should be provided for spare and surplus stock of dishes, table tops, etc.

Ventilation. The matter of ventilation is of great importance. It should be ample to change the air in the kitchen, pantries, etc., at least every three minutes. Special care should be taken to provide ample ventilation for the service counters or bars, giving particular attention to the hoods over coffee urns, as the odor of coffee will penetrate an entire building if the ventilation is not handled properly. The ventilation of the range and dishwashing rooms should be separated from that of the remainder of the kitchen. The range duct work should be provided with adequate fire dampers and bypass around the fan, and the duct work from the dishwashing room should be made watertight and self-draining.

Garbage Disposal. A refrigerator should be installed for the storage of garbage in cans pending its removal at pre-determined periods. The refrigerator box should be arranged to receive two cans for every 70 persons served. This will allow about 100 per cent of surplus in case of Sunday left-overs, etc. The disadvantage of handling garbage in this manner is the possible loss of silver and theft of merchandise, particularly in department store buildings where articles have been placed in the cans and covered with garbage in order to permit of their transportation out of the building. The importance of careful insulation of a refrigerator box or brine pipe line is a matter deserving special attention, since the value of insulation is only that of its weakest point.

Kitchen Fixtures and Details. The arrange-
ment of the kitchen should be such that it may be readily cleaned and easy to maintain. The floor should be waterproof and the drainage piping arranged so as to be accessible. Piping run above the floors should clear it to avoid dirt pockets. Ample cleanouts should be provided, and provision should be made for flushing lines with steam and hot water. The drains for sinks and dishwashers should be taken through a grease trap, and the trap should be large enough to retain the grease. Monel metal is a desirable material for the use of finished pieces of equipment, except where cost makes it prohibitive, because of its wearing and cleaning qualities. The large kettles may be of aluminum or copper, preferably the former, since at a slight increase in first cost they are readily cleaned. They are also very durable and do not require re-tinning from time to time. The dishwasher should be of copper, as the hot water and washing powder tend to corrode the galvanized type, resulting in short life.

The refrigerators should be carefully designed, giving thought to accessibility and cleanliness. Very often the boxes may be grouped together and built of concrete with cork insulation. The hardware should be rugged and designed for hard service. No set rule has been made as to the exact number of fixtures required. There is a general tendency to over-fixture a kitchen.

In estimating the requirements for kitchen equipment, the size and capacity of principal items can be calculated about on this basis:

Range: One section, 2 feet, 6 inches for each 100 persons.

Steam Kettles: One 25- or 30-gallon kettle and one 25- or 30-gallon roaster will serve from 250 to 300 persons.

One 40- or 50-gallon kettle and one 40- or 50-gallon roaster will serve from 350 to 450 persons.

Two 30- or 40-gallon kettles and two 30- or 40-gallon roasters will serve from 500 to 750 persons.

Three 30- or 40-gallon kettles and three 30- or 40-gallon roasters will serve from 750 to 1,000 persons.

Coffee Urns: A 3-piece battery (2 coffee and 1 water) for 1,000 persons. Figure 15 cups of coffee to 1 gallon.

Water Coolers: Cooling capacity 1 pint per person.

Steam Tables: A 5-foot unit (2 meats, 4 pots, 2 gravies) will serve from 100 to 250 persons.

A 6-foot unit (2 meats, 4 pots, 2 gravies) will serve from 150 to 350 persons.

A 7-foot unit (3 meats, 6 pots, 2 gravies) will serve from 350 to 500 persons.

Steam tables generally run the lengths of ranges and steam kettles.

Ice Cream: A battery of three 20-quart cans will give 600 portions, using a No. 10 scoop.

It is better to provide separate water coolers for furnishing drinking water for the restaurant and cafeteria service of the department store than it is to use water from the general drinking water cooling system of the building. In this way a lower temperature can be obtained, and the amount of water to be circulated through the building is reduced, thus avoiding circulation losses. In many cases the use of ice in the glasses has been eliminated. Provision should be made in the refrigerating plant for cooling boxes, drinking water and a certain amount of cracked ice for kitchen service use. Generally a ton per day for 500 to 1,000 persons is sufficient.

Fuel and Steam. Gas is usually employed for the ranges and ovens in larger kitchens, and steam for the balance of the equipment,—except in remote places where the rates are low enough to warrant the use of electricity. Dishwashers, kitchen mixing machines, vegetable parers, etc., are driven by electricity, and such equipment as toasters and grills require electric connections. In some cases it is necessary to use electricity for cooking in department stores irrespective of cost, where there is no gas available.

The steam pressure for steam tables, etc., should be not less than 20 pounds or more than 50 pounds, and provided with adequate drips, control valves, etc. Practically all steam fixtures can be arranged for operation with gas with the exception of the double-jacketed kettle. The latest addition to the gas heater appliances is the vegetable steamer.

The average steam requirements for kitchens seating from 300 to 500 persons is 25 h.p., and the annual consumption of steam will be approximately 1,800,000 pounds. For a general restaurant, the current consumption per meal in a completely equipped kitchen will approximate 400 to 500 watts.
THE BUILDING SITUATION

A MONTHLY REVIEW OF COSTS AND CONDITIONS

NEW construction figures for April give every indication that the quiet in building activities prevailing during the first two months of this year was a strictly temporary condition, which has now been definitely overcome. In the money value of contracts awarded, the current April total for the 37 eastern states of $642,060,500 represents the second highest April total on record, according to the F. W. Dodge Corporation. It is 32 per cent above the total for March, just below the high record April of last year, and a monthly total higher than any reached during the record-breaking years of 1926 and 1927. Of the eight districts comprising the territory east of the Rockies, all but Texas showed an increase for April as compared with March, and five of the districts showed more construction than in April, 1928. In the district which consists of New York state and northern New Jersey, April construction amounted to $169,079,700, which was 52 per cent higher than for March and 12 per cent ahead of April, 1928. In the New England states, April work totaled $40,930,200. This represented a falling off of 10 per cent from the figures for April of last year, but was 28 per cent higher than that of the previous month. In the middle Atlantic states, April construction was 80 per cent higher than that of the previous month and 3 per cent above April, 1928. The total was $106,136,700. In the northwest the April total of $10,984,000 was just double the total for March of this year and was 54 per cent higher than for the preceding April. In the southeastern states also the April construction was higher than either that of the preceding month or the corresponding month of the preceding year. The April, 1929, total was $65,790,600. This was 52 per cent ahead of March and 19 per cent ahead of April, 1928. Neither the Pittsburgh district nor the central west came up to the April, 1928 totals, but both exceeded the March figures. In the Pittsburgh district the total of $61,013,200 was 15 per cent ahead of March, but 19 per cent under the preceding April. In the central west the April total was $169,239,100, which was 6 per cent higher than March but 10 per cent below April of the previous year. In Texas the April construction amounted to $18,887,000. This was the only state in which April construction fell below that of March, with a drop of 10 per cent. The total was, nevertheless, slightly higher than the April, 1928 total, according to the reports.

ANNUAL CHANGES

MONTHLY CHANGES

1928 1929

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

BY

WILLIAM S. GAYLOR

THE science of merchandising, as it is developed in the modern department store, recognizes the necessity and value of providing physical comfort to both patrons and personnel. To this end the heating and ventilating systems are contributing a large share. Conditions in the store must be such that the patron will not be conscious of discomfort even in the most congested area, regardless of existing atmospheric conditions on the street. The conditions in the store must also keep the sales force comfortable so that the employees will be able to give full attention to duty.

Areas above the first floor are generally heated by direct radiation. Due to the size of the building and the need of rapid circulation for quick heating up, the system best suited for the purpose is the two-pipe vacuum return system. The system should be designed to operate at a pressure of not over 5 pounds. Due to the necessity of keeping the basement ceiling free of large piping, the direct heating system should be of the down-feed type, with the distributing steam mains run on the ceiling of the top floor, exposed if the area is devoted to stockrooms, or in the furred ceiling if in sales space.

If the building is large, it is desirable to keep the size of the main steam riser at a minimum. This main riser carries steam at boiler pressure, with reducing valve at the level of the distributing main. The average store building requires the use of live steam at various pressures. The heating system, both direct and indirect, is usually operated at less than 5-pound pressure; hot water heating with steam at the same pressure; kitchen utensils require steam at from 35- to 40-pound pressure; pressing machines and other workroom appliances require steam at pressures of up to 60 pounds. To provide the necessary steam for these services alone, it is necessary to operate the boiler plant at a minimum pressure of from 60 to 75 pounds.

The space devoted to the boiler room should be kept at a minimum, due to the fact that in many cases this area must be excavated from rock, and also due to the value of space in this type of building. These factors require that the boiler be of such a type as can be operated at sufficient overload to produce the peak load with a minimum size of boiler. The water-tube boiler, with furnace volume for operation up to 200 per cent of rating, has been found to meet the condition required. A boiler of this type should have a height under the front header of not less than 12 feet. During the non-heating season the steam requirements are for hot water heating, for kitchen and workroom use. For this, it is necessary that at least one boiler be provided for summer use only. The steam requirement for the average department store per year amounts to approximately 3½ pounds of steam per cubic foot of space. The steam for hot water heating, kitchens and workrooms will generally amount to 10 per cent of the total annual heating requirements.

The selection of the proper fuel for the boilers is an important item for consideration. Fuel oil is particularly well adapted to this type of building. Good operating efficiencies can be obtained with this fuel. An evaporation factor of 13½ pounds can be obtained with the type boiler mentioned here. Fuel oil tanks are buried below the level of the boiler room; if the excavation is in rock, tanks are installed above this level. The use of a heavy oil of 14° to 16° is recommended in a plant of this type. An added value to the use of fuel oil in a store building is its cleanliness. The delivery of fuel oil is usually made at hours when street traffic is at a minimum, and without inconvenience to the store. There is also freedom from the dirt and labor of handling ashes. In large cities land value is such an important factor that floor area that can be devoted to selling must be figured at the maximum possible. Coal bunker space is naturally large and must be taken out of area that might be devoted to other uses. Even though the plant is to operate with fuel oil, it is necessary that some space be provided that can, in an emergency, be changed over to coal storage. It is also recommended that the boilers be so designed that coal-burning grates can be installed in a short time in case circumstances arise that curtail the supply of oil. The question of the kind of fuel to be used is also governed to a great extent by the geographical location of the plant in question. In certain locations in the middle west and north it is necessary that coal shall be the fuel. Each particular building presents an individual problem.

The direct heating system, as already said, is installed above the street floor level. Generally, the direct radiators are placed below the windows, hung on wall brackets, or, in the case of certain makes of windows, hung from hangers provided as part of the window aprons. Radiators should be hung not less than 8 inches above the floor to eliminate dust pockets. The higher class of construction provides for a pipe space behind the furring, so that all radiator branches from risers...
One-half Plan of the First Floor of the Davison, Paxon Co., Department Store, Atlanta, Showing the Heating and Ventilating Layout

Starrett & Van Vleck, Architects; Hentz, Kold & Adler, Associated

to radiators are concealed. In this class of construction the concealed radiator branches should be of brass pipe, due to the fact that horizontal piping is more likely to corrode than vertical piping. The new tube type of radiation is used generally from 20 to 26 inches in height, depending on the height of the window sill. The arrangement of direct radiators is dependent largely
on the layout of the store fixtures. The fixture layout is generally different on each floor, and due consideration must be given to this in laying out the heating system. Usually the radiators placed under the windows will be in an alley between the outside walls and the backs of the fixtures. Care must be taken to see that the design of the fixtures is such that it will permit circulation of air over the radiators. The fixture layout is also a deciding factor in the control of the radiators. Thermostatic temperature control is strongly recommended from the standpoints of both economy and comfort. In open floor areas, the radiators are controlled in groups of three or four from one thermostat, generally located on columns along the wall. When radiators are behind the fixtures they are grouped in a similar manner, and the thermostats are, in turn, grouped under the control of a pilot thermostat located on a column in the open sales area, where the temperature is to be maintained. This is convenient.

Main Floor and Basement. The areas in the average store which require special attention are the main or street floor and the basement sales area. The main floor is usually entirely heated and ventilated by the forced blast system of circulated air, designed to operate successfully during both the winter and the summer. Direct radiation is used on the floor only in such places as service halls, stair landings, passageways, etc. Basement sales areas are entirely ventilated by means of a similar forced blast air system. There is little need of any direct heating surface in basements, generally, as the problem there is usually one of overcoming excessive heat even during the winter months. The air supply for the street floor is usually based on an air volume equal to six changes of the entire area per hour. The basement air supply is based on ten changes of air per hour, which will maintain comfortable conditions.

Air Supply. A properly located fresh air intake shaft from the roof to the fan room insures an air supply comparatively free of dust, but to further clean the incoming air, filters of the so-
called automatic type are installed in the intake to each fan unit. From the filters the air passes through tempering stacks with automatic temperature control, then through air washers, where the air, passing through a fine misty spray of water, heated to the required temperature, is washed and given the necessary moisture content to overcome a low relative humidity. Passing through the washer, the air is further heated by a re-heating stack to the temperature required to maintain the degree of comfort necessary in the area supplied. From the re-heating stacks, the supply fans discharge the air through a system of ducts distributing it evenly over the area.

In street floor areas, the distributing ducts are usually run laterally in furred spaces above the show windows, discharging the air through grilles above the tops of fixtures back of the show windows. A variation of this method of distribution has the lateral duct run on top of the fixtures furred in to match, and grilles in panels. The present trend toward modernistic treatment, with recessed panels in the ceilings, permits the lateral ducts to be installed in the furred ceiling, discharge openings being continuous around the panels. In the basement area the most practical treatments of the supply ducts are to also run them in the furred ceiling, providing discharge outlets centered at the lighting fixtures. A sheet metal deflecting plate, hung approximately 8 inches below the ceiling, provides for the horizontal distribution of the incoming air, and it also provides a support for the lighting fixture. The introduction of air-conditioning systems for providing cooled air during the summer months necessitates use of this method of air supply to avoid the downward blasts of cold air.

The exhaust systems for both street floor and basement areas provide for drawing the air from the floor line generally through ducts built into the store fixtures at the columns. This exhaust air is carried through vertical shafts to exhaust fans in the roof and is then discharged to the atmosphere. This exhaust air is also by-passed and used to supply air to the boiler room, machinery rooms, and other areas where large volumes of circulating air are needed.

**Air Conditioning in Summer.** The supply and exhaust systems, as outlined, are primarily for use during the winter months. The same apparatus is used for conditioning the air during the summer. To accomplish this, only slight modifications are made in the systems outlined. To condition the air in the store during the most severe spell of high humidity and temperature, to the point where the temperature maintained in the sales area will be from 10° to 15° below that on the street, with a relative humidity of from 50 per cent to 55 per cent, is the most recent improvement in the ventilation of department stores. To condition the air, as outlined, the water sprayed through the air washer nozzles is cooled to the necessary temperature by means of a refrigerating plant. In the air-conditioning plant approximately 70 per cent of the exhaust air is returned to the supply fan units, there reconditioned and mixed with the makeup air of 30 per cent of the volume, and then returned to the sales area. The use of this large volume of re-circulated air is made necessary to keep the size of the refrigerating plant within practical bounds, and to keep the cost of the operation within the range of economy. In the use of a large volume of re-circulated air, it has been found to be advantageous to introduce ozone into the system at the point of discharge from the supply fans to overcome any possibility of odors being carried through and intensified.

**Vestibules.** The most vital points in the heating of the street floor area develop in the vestibules and the areas adjoining them in the store. Each vestibule presents an individual problem, depending upon its size, arrangement, type of door, exposure, etc. Generally an air supply of from two to three times the volume of the vestibule per minute gives satisfactory results. This air is drawn from either the street floor or basement area, re-heated, and then blown into the vestibules. The temperature control for this air is regulated by thermostats adjacent to the entrance, inside, on the street floor.

**Direct Radiation.** Generally, throughout the store above the street floor, the building is heated with direct radiation. Each building presents its own problems. Areas devoted to beauty parlors, dining rooms, kitchens and special display rooms all present problems for individual treatment. Beauty parlors and dining rooms are areas that require air-conditioning systems similar to the street floor and basements. Kitchens, soda fountains and cafeterias require strong exhaust systems to avoid all possibility of odors penetrating into adjacent areas. The use of ozone in these areas is highly recommended as an agent for preventing objectionable odors. The air of the toilet rooms throughout the building is generally changed on an average of 20 times per hour. Exhaust ducts are usually run in pipe spaces back of compartments, with an individual exhaust grille at each compartment. All work spaces in the building are provided with exhaust ventilation. In areas such as general offices, where the occupants are likely to be congested, additional ventilation is sometimes required for their comfort.
SECTIONS THROUGH BOILER AND PUMP ROOMS, DAVISON, PAXON CO. BUILDING, ATLANTA

STARRETT & VAN Vleck, Architects; Hentz, Reid & Adler, Associated
PLUMBING and its associated equipment in the modern department store have grown, in recent years, to be important features, in a way similar to the advancement that has been made in the plumbing of the modern hospital. The plumbing installation is largely controlled by local plumbing codes, with which the engineer must comply. The plumbing pipes, which are of sufficient size, require special shafts, so that the engineer must also take into account the locations of these pipes in connection with the architectural features of the building. In its humble way, plumbing quietly provides “service” in the department store that is essential to the health and comfort of both the employees and the customers. Every architect realizes that it is necessary to have a sufficient number of toilet rooms scattered throughout the building to adequately serve the employees and customers, and he must consider the desirability of having outside windows in such rooms, the desirability of artificial ventilation, and the absolute necessity of providing mechanical ventilation in toilet rooms without windows. It is not desirable to install fixtures which may never be required, but it is even worse to have an insufficient number of fixtures. The number of occupants per fixture for men in department stores is often planned upon this basis:

<table>
<thead>
<tr>
<th>Water Closets</th>
<th>Urinals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Maximum</td>
<td>Average Maximum</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>250</td>
<td>300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lavatories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Maximum</td>
</tr>
<tr>
<td>100</td>
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<tr>
<td>200</td>
</tr>
</tbody>
</table>

The number of occupants per fixture for women in department stores is:

<table>
<thead>
<tr>
<th>Water Closets</th>
<th>Lavatories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Maximum</td>
<td>Average Maximum</td>
</tr>
<tr>
<td>75</td>
<td>125</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
</tr>
</tbody>
</table>

In arranging the plumbing fixtures in a toilet room, it has been found good practice to locate the water closets and urinals near the outside of the building, providing swinging doors with a 6-foot marble or metal partition separating the toilet compartments from the wash room which one enters from the store. Consideration should also be given to toilet room locations and their accessibility from all parts of the floor, so that they may be reached without walking a great distance. An economical arrangement would be to place the toilet rooms for each sex adjacent one to the other, so as to allow for the use of the same pipe and vent shafts. Care must be taken, however, to keep the doors as far apart as possible, and preferably out of sight of each other.

Toilet room arrangements are governed so largely by local conditions in the building that to suggest anything in the nature of a standard arrangement is almost impossible. Therefore, it is well to remember to put the fixtures requiring the most ventilation next to the outside windows; to keep the entrances to the toilet compartments protected from the view of passers-by; to keep the entrances for toilets accommodating opposite sexes out of sight of one another; and not to make the travel distances too great. If these suggestions are carried out, the main toilet room planning demands will have been met.

A slop-sink closet with a slop-sink is also an important feature to introduce closely adjacent, if not in the toilet rooms, and with either arrangement, the same plumbing risers may be used for both toilet rooms and slop-sink closets. Floor drains are generally installed in toilet rooms and have hose cocks placed at the end of the lavatory batteries in order to keep the water seals in the traps of the floor drains.

Wall-hung water closets, urinals, slop-sinks, lavatories and drinking fountains are the most desirable types of plumbing fixtures for the department store, since they permit ready access to all parts of the floor space in and around any toilet room. Flush valves are part of standard equipment for all urinals and water closets, with self-closing faucets for the lavatories. Metal faucets, flush valves and escutcheons are much more serviceable than china-handled faucets and china escutcheons. Soap-dispensing systems, fed from tanks with soap valves over each basin, are now an important detail in the modern department store toilet room. Mirrors with shelves beneath are an added convenience much appreciated by both customers and employees.

In many instances the basement and sub-basement floors of these stores have higher than the average building story heights. This, in turn, often leaves the level of the street sewers above the basement and sub-basement floors, and all plumbing fixtures on these floors have to discharge their sewage into ejector pots which, in turn, pump the sewage up to the street sewers. Sump pumps are also installed to take drips from pumps, tanks, boiler blow-offs, floor drains, etc., that are also below the level of the street sewers. This waste water is drained to a concrete sump pit generally located in the pump or machine room with vertical centrifugal pumps that will
start pumping automatically when the water in the pit reaches a certain level, and stop when the pit has been emptied.

With constant use of water in this type of building, and the pressure required for perfect operation of the plumbing fixtures, and instant demand, the use of water directly from the street mains is no longer recommended. Therefore, storage of water in either closed suction tanks or open suction tanks is, together with house tanks in the penthouses, the proper way of serving the plumbing requirements for the store. In case of break downs in the street water mains, tanks designed to hold a water capacity to suffice for several hours will serve the store during such a crisis. In order to transfer the water from the suction tanks to the house tanks, usually a distance of several stories, it is necessary to provide pumps, generally in duplicate and of equal capacity, that will convey a sufficient quantity of water to the house tanks to meet the maximum demand per minute. From the house tanks water is supplied to all plumbing fixtures requiring cold water, to the hot water heaters in the pump or boiler rooms, to the drinking water system, and also to the standpipe system.

Vacuum cleaning systems in department stores afford the owner an arrangement whereby the building may be thoroughly cleaned within a few hours. A stationary vacuum cleaning installation consists of pipe risers with the number of outlets on each floor so arranged that 50-foot lengths of hose attached to the risers will reach any part of the floor, wall, show cases or fixtures. Tools are furnished with an installation of this character, so that the vacuum cleaner can be used for rugs, walls, radiators, etc. The vacuum machine is located in the pump room, and connecting with the machine is the separator into which all dirt, dust, pins, etc., are collected. The separator is easily emptied, and the contents are burned in the incinerator or otherwise disposed of.

The sprinkler system layout for the department store of today is important, particularly because the design must meet with the approval of the local fire prevention bureau, the National Fire Insurance Exchange, the local insurance exchanges, the owner, and last but not least, the approval of the architect. Interference with ventilating ducts, electric conduits, lighting fixtures and steel members must be avoided, and still the system, when installed, must be symmetrical and afford the owners 100 per cent sprinkler protection. Penalties in the form of higher insurance rates will be incurred if the system is not properly designed and installed.

Where the appropriation permits, the neatest ceiling for a department store will be obtained when the entire sprinkler installation with the risers, valves, mains, branches and laterals, is concealed. Such a ceiling will have only the sprinkler heads exposed, evenly spaced with column centers, panels and the lighting fixtures. In some buildings this ceiling scheme is carried throughout, though in others it is applied only in the selling areas, and the sprinkler system is run exposed in the utility spaces. Where the resources of the department store do not warrant installing a concealed sprinkler system, the mains, branches and laterals are all run exposed, and the sprinkler heads are, as usual, evenly spaced with column centers, panels, lighting fixtures, etc. Where the sprinkler system is concealed, a more decorative ceiling can be obtained, and if the sprinkler heads are objectionable, they can often be incorporated in the ceiling design, whether it be elaborate Tudor or simple "modern."

The water supply to the sprinkler system comes from either gravity tanks or pressure tanks, located on the roof or in penthouses. In some instances, a combination of gravity and pressure tanks is used. The gravity system of tanks must have twice as much water as a pressure tank system, as the latter is kept under a pressure of 85 pounds at all times. The amount of water used is based on the total number of sprinkler heads in the average area, times 20 gallons per minute for 20 minutes, times 25 per cent for gravity systems, and times 12½ per cent for the pressure systems. Siamese connections must also be provided on the sprinkler system at each street front.

Where sprinkler heads are so located that they may be subject to corrosion, they must be protected with a coating to make them non-corrosive, and where they are subjected to a higher than average temperature, they must be set to discharge at a higher temperature. Sprinkler heads in show windows must be run from what is known as a "dry" valve on a dry system which contains air under pressure in the lines. When the heads go off in a show window, due to a fire, they release the air in the piping system which, in turn, releases an equalizer in the dry valve, and the water then follows the air to the opened sprinkler heads. The actual time for this operation is in seconds, and it has proved its worth in the few show window fires which have occurred.
A MODERN STORE ALTERATION

BY

ARTHUR T. NORTH

THE fickle nature of fashion with its constant and rapid changes has caused a great expansion of the allied industries and commerce with attendant transformations in merchandising methods,—all of which is manifested in the evolution of the store and shop. In the days of drab fashions, the store and shop were equally as uninteresting. The housing was in harmony with the merchandise. The universal demand for the beautiful, the causes of which do not concern us at this time, has been expressed in beautiful merchandise of every kind which requires equally attractive surroundings for its display and sale. With suitable facilities for display there must be adequate provision for inspection and purchase, which necessitates ample space for the circulation of purchasers.

The primary requisite for merchandising is external display to the passer-by,—the potential purchaser. This is had through the medium of show windows. After the attention of the passer-by is attracted to the show window, it is essential to provide conditions which will permit that undisturbed and comfortable inspection which is inducive to purchasing. The congestion of sidewalks by hurrying crowds or hot or inclement weather militates against the ideal condition which is prerequisite to purchasing. To overcome this objection to show window inspection of merchandise, a form of display vestibule has been devised. A recent and most effective construction of this kind is found in the store of The Bedell Company, New York, illustrated on this page. Apparently this feature is considered so important that approximately one third of the first floor of the store area is given over to the display vestibule on the 34th Street front. This display vestibule occupies the entire width of the store.

Large and very attractive show windows are placed on each side of a central, two-story entrance. Between this entrance to the display vestibule and the entrance to the store proper there is a large space which is entirely glass-enclosed. The exterior show windows are glass-enclosed on both sides. Show windows are placed along the side walls of the vestibule and along the front of the store proper. These show windows are very deep and permit the display of merchandise without crowding, giving also spaciousness that is befitting the display of beautiful merchandise. The display vestibule is brilliantly illuminated.

The alterations in this store building have corresponded with its improvements in merchandising methods and with the continuous increase in its volume of business. The first alteration of the show windows and store entrance included the removal of two first-story columns and the erection of a heavy plate girder, extending entirely across the front, to support the columns above. The girder loads were transferred to their original foundations through a load-distributing truss erected in the basement (Figs. 1 and 2). The store was widened recently by including the property adjoining on the east, and the principal feature of the recently altered front consists of a two-story entrance built in the center of the widened store and the complete rebuilding of the show windows. Equally as extensive alterations

Above. New Front of the Bedell Store, New York
Designed by Joseph Urban, Architect
George A. Schonewald, Architect of the Building Alteration

Right. Plan of the shop front, showing unusual arrangement and extent of show windows. The Bedell Store, New York
Bedell Store, New York, before Latest Alteration.
The Building at the Right is Incorporated in the New Store
George A. Schonewald, Architect for the alteration
Joseph Urban, Designer of Shop Front

were made in the structural frame, in the display vestibule, and in the removal of the party walls between the two properties. The successive stages of rebuilding the structural frame of the front are indicated in the diagrams upon this page.

The architectural transformation of this store in its various stages illustrates the ability of the structural engineer to perform the "structural surgery," if one pleases, to make it possible to execute the architectural design regardless of its form and at the same time retain the stability of the structure. George A. Schonewald was the architect for the building alterations; Joseph Urban designed the shop front, and Elwyn E. Seelye was structural engineer for the operation.

Fig. 1. The original structural steel frame

Fig. 2. The large girder and the inverted truss were necessary to accommodate the wide show front shown at the upper left corner of this page

Fig. 3. The alterations in the structural frame shown here were to accommodate the new shop front shown on the preceding page
Tasting doesn't tell

WATERS may taste and look alike but, at the same time, depending upon their sources and treatment, may vary greatly in their effects on plumbing pipe. Purity, from a health standpoint, has no relation to corrosiveness.

In writing plumbing pipe specifications, therefore, the character of the local water supply should be carefully considered. Brass Pipe will outlast rustable pipe under all conditions, but not all alloys of brass will give the same satisfactory service everywhere.

To meet different water conditions, The American Brass Company has developed two alloys of Anaconda Brass Pipe, Anaconda 65 and Anaconda 67.

**Anaconda 67 Brass Pipe**—Where normal water conditions prevail; that is when waters are not drawn from peaty sources, shallow wells, tubular wells or filter galleries in lowlands along river beds and where filtered waters are not of high permanent hardness, Anaconda 67 Brass Pipe is recommended. This pipe contains not less than 67% copper; is seamless, semi-annealed and guaranteed.

**Anaconda 85 Red-Brass Pipe**—For distribution lines carrying ground waters and colored surface waters, particularly when drawn from peaty sources and filtered waters which may be high in carbonic acid content and low in alkalinity, Anaconda 85 Red-Brass Pipe is offered as the best corrosion-resisting pipe commercially obtainable. This pipe, containing a minimum of 85% copper, is seamless, semi-annealed and guaranteed.

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The durability of these two kinds of pipe has been proven by 16 years of exhaustive research during which many copper-zinc pipe alloys were subjected to the action of unusually corrosive water for a period of ten years. Six years' field investigation of actual installations substantiated the laboratory tests and resulted in the adoption of the alloys now known as Anaconda 67 and Anaconda 85.

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The Technical Department of The American Brass Company is prepared to help determine the character of local water supplies. Architects are invited to make use of this service. The American Brass Company; General Offices: Waterbury, Connecticut.

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At the present moment it is strikingly apparent that the beautiful Kohler colored fixtures have much more than their beauty to recommend them. They have a newness which is of great value to the client who is building to sell or rent.

Instances are multiplying to show how Kohler colored fixtures attract buyers or tenants. Builders of apartments and hotels are gaining marked advantage by installing these fixtures. Architects, accordingly, are examining with increasing interest the possibilities of this ware.

The Kohler colors are delicate, restrained, lending themselves to the creation of tasteful effects of enduring charm. Their variety permits the development of a practically limitless range of attractive color schemes — and affords a most stimulating opportunity to the architect.

We especially invite you to examine Kohler colored fixtures at a Kohler display room. And we shall be glad to send you the new book described in the coupon.

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The completing touch — Kohler "Octachrome" fittings in chromium plate

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PLUMBING FIXTURES

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MODERN buildings deserve plumbing fixtures that remain permanently attractive and render long service. Fixtures made of Solid Nickel Silver are not easily marred or broken during installation and retain their attractive appearance through long years of hard service. Their silver-like beauty is comparable to that of Pure Nickel and other high nickel alloys. The hardness, toughness and strength of Solid Nickel Silver assure exceptional wear resistance of valve seats, adding economy to the inherent beauty of these fixtures. The best architectural opinion is in agreement that plumbing fixtures of Solid Nickel Silver meet the highest standards of quality. Specify Solid Nickel Silver fixtures and be insured of permanent beauty, long life and economy in service.

* Diamond Metal is the name used by The Meyer-Sniffen Co. to identify its Nickel Alloy used in manufacturing Nickel Silver plumbing fixtures. This is a solid white metal and contains a high percentage of Nickel.
If I were an Architect

By
Mrs. Marion Holloway

I WOULD review every detail in designing a home, from the standpoint of convenience to women. I would remind myself continually that homes are "lived in" most of all by women; that many appointments of the home continue to ignore the needs of the modern woman.

I would remember that women are shoppers — that one additional household convenience often decides a woman in her choice of an apartment or home. Now there is a modern water closet that is decidedly superior from a woman's point of view.

Countless women have come to know the Improved Madera as the one toilet that really passes a sanitary pad "as easily as a piece of tissue"... that ends forever the fear of embarrassment of stopped-up toilets. Specially built to provide for this sanitary problem, it has an extra large trapway, and powerful twin-jet siphon flushing.

I would specify the Improved Madera — if I were an architect — not only because the millions of women who are reading about it in national magazines will instantly recognize this superior appointment, but because it is thoroughly modern and a counterpart of beautiful bathrooms.

It is properly quiet. The beautiful Durock body is easy to keep clean. It is hygienically designed... long bowl and long comfortable seat. And it is available in white, solid tints and colors, and Blentone colors, to harmonize with any bathroom interior.

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Many architects have expressed keen interest in the Hoffman booklet describing in detail the operation of Hoffman Controlled Heat. You are cordially invited to write for a copy. Address Hoffman Specialty Company, Inc., Dept., EF-6, Waterbury, Connecticut. No obligation.
In hospitals equipped with Clow Hospan closets, a very unpleasant duty of the nurses is made easier. With Hospan closets installed in every patient's room or ward bathroom, carrying bed pans through halls to distant cleansing rooms is avoided. Besides, the Hospan serves all the usual purposes of a closet, with all the usual dependability that makes Clow closets so suited for rigorous hospital work.

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SAY good-bye to Reading 5-Point Pipe when it is installed—you'll probably never see it again during your life or the life of the building!

Once in, Reading 5-Point Pipe is in to stay. This pipe is made of Genuine Puddled Wrought Iron, and Genuine Puddled Wrought Iron has proved, time after time, that it will last for generations! Filaments of rust-defying silicious slag are distributed uniformly throughout the structure of the metal by the puddling process. And Reading 5-Point Pipe makes leak-proof joints because it threads so sharply and easily.

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DIAMETERS RANGING FROM 1/8 TO 20 INCHES
The "Te-pe-co" Integral China Mixing Chamber with the Single-stream Integral Nozzle eliminates exposed metal above the slab.

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The Te-pei-co Integral China Mixing Chamber with Single-stream Integral Nozzle is the most sanitary supply fixture that can be furnished. It makes it possible to wash in running water thoroughly tempered in the mixing. This Integral China Mixing Chamber is exclusively Te-pei-co. It is what makes our integral nozzle lavatory superior to others, since its construction checks the flow of water and thoroughly mixes hot and cold. The result is a splashless stream of water of ample volume and properly tempered.

Many of our country's finest hotels and other buildings have installed this type of Te-pei-co Lavatory along with our other All-Clay Plumbing Fixtures. Every natural, mechanical, chemical and financial resource available is utilized to build one unvarying quality—the best—into this Te-pei-co Ware.

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We make but one grade of ware—the best that can be produced—and sell it at reasonable prices. We sell no seconds or culls. Our ware is guaranteed to be equal in quality and durability to any sanitary ware made in the world. The Te-pei-co trade mark is found on all goods manufactured by us and is your guarantee that you have received that for which you have paid.

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Did it pay the Baptist Temple, Inc., to change over the heating system in the Temple Building, Rochester, N. Y., from a vacuum return line system to a Dunham Differential Vacuum Heating System? The affirmative answer to this question is found in the record of the system's operation for the period from December 16, 1928, to January 15, 1929, as compared with the same period of the preceding year.

This record, reproduced in facsimile, shows a reduction in the steam consumption of 756,490 pounds, a saving for the period of $559.80, or 37.92% decrease. The report regarding this reduced steam consumption is made by the Rochester Gas and Electric Corporation, from whom the steam was bought, and is therefore of special interest.

**Facts Concerning the Temple Building**

The Temple Building is located at North and Franklin Streets, Rochester. It contains a total cubage of 2,589,400 cu. ft. and a total radiation of 27,703 sq. ft. The building was erected in 1925 from plans drawn by Gordon & Kaelber and Carl R. Traver, (associated architects). The original vacuum return line system was installed by Bareham & McFarland, Heating Contractors, and was changed over by them to a Dunham Differential System during the latter part of 1928.
The Beauty of the new Reynolds Building is more than stone deep

GOOD proportions, a surface of excellent limestone, a rich and handsome bronze doorway, lobbies and corridors of marble, and whatever else helps to give the Reynolds Building a look of character, would not make it in fact a good building. All these might be as fine as they are and yet the frame and substance of a really good building might be absent. What makes it likely that the Reynolds Building will be an ornament to Winston-Salem for many a year to come, is that it is well constructed of good materials.

Byers Pipe was on the specification list of the Reynolds Building, just completed at a cost of two million dollars. Byers was used for all cold water supply lines, fire lines, vent lines, and down spouting, and for other incidental purposes.

Extraordinary resistance to corrosion at reasonable cost is commending Byers Pipe to architects and engineers more and more. It is necessarily sold at a higher price than steel; but the difference is trifling when applied to the whole cost of a pipe installation. In the average case, wrought iron piping costs about 5% more.

The Reynolds Building was designed by Shreve and Lamb of New York, architects, the consulting engineers being Thomas J. Ashe and Warren W. Chapin, both of New York. The plumbing contractors were Riggs, Distler & Co. of Baltimore, and the plumbing supply house the Atlas Supply Company of Winston-Salem.

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GENUINE WROUGHT IRON

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It is a complete cost analysis of a large variety of pipe systems and disputes the fallacy that genuine wrought iron pipe is too costly to use. A copy will be mailed gladly on request.
Another triumph in building wonders... New York's tallest and largest hotel... joins America's long list of imposing hosteries. The New Yorker's towering lines of beauty, its luxury and comforts are backed by quality material, particularly in the mechanical part of the structure... its major pipe tonnage bears the name NATIONAL Copper-Steel Pipe... especially resistant to atmospheric corrosion in soil, waste, vent lines and rain leaders.

Ask for Bulletin No. 11—Copper-Bearing Steel Pipe.

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NOT just another jacketed boiler! This new Heggie-Simplex unit is, first of all, of crackproof steel construction; designed to produce heat at an unprecedented low cost.

The sparkling beauty of its jacket is made permanent by tough lacquer finish. Thick blankets of rock wool insulate all sides. Its smart coloring—French grey with black trim—is what women want. They like its dignified, unobtrusive beauty, and practical value in not showing dust.

At a recent exhibit, attended by thousands, this boiler was displayed in a variety of colors, including those usually used on jacketed boilers. When asked their preference, 92% chose this French grey and black.

92% Chose this Grey

Adding the Beauty of Modern Coloring to the Permanence of Steel
A New Standard in Residence Boilers

Rock Wool Blankets Insulate ALL Sides

Ready-cut blankets of Rock Wool that only have to be laid in place, are supplied for all sides of this Heggie-Simplex Boiler. This material the Bureau of Standards has shown is twice as valuable as that ordinarily furnished with jackets.

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This new model not only adds color to the basement, but it operates at a fraction of the cost of ordinary residence boilers. Its spacious combustion chamber, large amount of direct heating surface, tubular flues and unrestricted circulation of water provide the essentials necessary to burn all of the fuel and utilize its heat without waste. The blanket of rock wool insulation that lines the jacket adds further to the boiler's economy.

Its large fuel capacity minimizes care. Its unit construction minimizes installation cost. It is adaptable to any fuel—coal, gas, oil. Full details on request.

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- **service is taken care of with the Kerner.** Gives list of hospitals using Kerner equipment. The Kerner (Chimney-fed) Booklet, Catalog No. 17, 20 pp., 8½ x 11 ins. Illustrated. Data on a valuable detail of equipment.

### INSULATION


- **Roofing of Kerner Condensation. Illustrated book­let, 7½ x 9½ ins., 36 pp. Covering all data on valuable line of roof insulation.**

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### LABORATORY EQUIPMENT

- **Schleicher, Arthur. 119 E. 57th St., New York, N. Y.**

### LATH, METAL AND REINFORCING

- **Structural Gypsum Corporation, Linden, N. J.**

### KITCHEN EQUIPMENT

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

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS

LAUNDRY CHUTES
The Plussler Company, 227 Charter Building, Rochester, N. Y.
Philadelphia Glass-Steel Laundry Chutes. Booklet, $1.50 x 7½ ins., 36 pp. Illustrated. A beautifully printed brochure describes the different types of laundry chutes. The TEFLON GLASS-STEEL LAUNDRY CHUTES. Contains views of installations and list of representative examples.

LAUNDRY MACHINERY
American Laundry Machinery Co., Norwood Station, Cincinnati, O.
Function of the Hotel and Hospital Laundry. Brochure, 8 pp., $1.00. Valuable data regarding an important subject.

Troy Laundry Machinery Co., Inc., 9 Park Place, New York City.
Laundry Machinery for Large Institutions. Loose-leaf booklet, $30.00, $90.00 x 11 ins. Illustrated.

Laundry Machinery for Small Institutions. Loose-leaf brochure, $30.00, $90.00 x 11 ins. Illustrated.

Accessory Equipment for Institutional Laundries. Leather bound booklet, $6.00, $90.00 x 11 ins. Illustrated.

Dry Cleaning Equipment for Institutional Purposes. Brochure, $10.00, $90.00 x 11 ins. Illustrated.

LIBRARY EQUIPMENT
Art Metal Construction Co., Jamestown, N. Y.
Planning the Library for Protection and Service. Brochure, $2.00, $90.00 x 11 ins. Illustrated. Deals with library fittings of different kinds.

Library Bureau Division, Remington Rand, N. Tonawanda, N. Y.
Like Stepping into a Story Book. Brochure, 24 pp., 9 x 12 ins. Deals with equipment of Los Angeles Public Library.

LIGHTING EQUIPMENT
The Pittman Bros., 50 Lexington Avenue, New York, N. Y.
Catalog 415, 8½ x 11 ins, 46 pp. Photographs and scaled cross-sections of lighting fixtures. Screen and partition reflectors, double and single desk reflectors and Polarisite Signs.


Lighting Specifications for Hospitals. Brochure, 30 pp., $90.00 x 11 ins. Illustrated.

Industrial Lighting. Bulletin 461A. Booklet, 24 pp., $90.00 x 11 ins. Illustrated.

Hotel Lighting Catalog. Brochure, 40 pp., $90.00 x 11 ins. Combination catalog and engineering data book.


Hartman & Ober, Inc., Syracuse, N. Y.
Lighting Your Home with Alabaster. Folder, 6 pp., 3 x 6 ins. Illustrated.

Smyser-Royer Co., 1700 Walnut Street, Philadelphia, Pa.
Catalog 1700, 8½ x 11 ins, 12 pp. Photographs and detailed cross-sections of light fixtures. Deeds to libraries and memorials in which Georgia Marble has been used, with photographs of installations and list of representative examples.

Smyser-Royer Co., 1700 Walnut Street, Philadelphia, Pa.
The Georgia Marble Company, Tare, Ga.; New York Office. 1328 Broadway.
Georgia Marble Primer. 8 folders, 4 pp., $90.00 x 11 ins. Illustrated. Alcaluable data on use of monel in kitchens, laundries, etc.

Central Alloy Steel Corporation, Massillon, Ohio.


Architectural and Decorative Ornamented Wood. Booklet, 28 pp., $90.00 x 11 ins. Illustrated. Suitable for hospitals.

How Drivid Period Moldings in Ornamented Wood Set a New Style in Decoration. Folder.

Roddis Doors, Boston, Mass.
Roddis Doors. Booklet, 24 pp., $90.00 x 11 ins. Illustrated picture pages of doors for various uses.

Roddis Doors, Catalog G. Booklet, 184 pp., $90.00 x 11 ins. Completely covers the subject of doors for interior use.

Roddis Doors. Booklet, 16 pp., $90.00 x 11 ins. Illustrated work on hospital doors.

Roddis Doors for Hotels. Brochure, 16 pp., $90.00 x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORBART AND CEMENT COLORS
Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Morton Colors. Folder, $90.00 x 11 ins, 4 pp. Illustrated in colors, gives full information concerning Clinton Morton Colors with specific instructions for using them.

Color Card. $90.00 x 11 ins. Illustrates in color the ten shades in which Clinton Morton Colors are manufactured.

Something New in Stucco. Folder, $90.00 x 6 ins. An interesting color chart on the use of coloring matter for stucco coated walls.

ORNAMENTAL PLASTER
A Book of Old English Designs. Designs, 47 plates, 12 x 9 ins. Deeds with a line fine of decorative plaster work.


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CABOT'S CROSSENE STAINS. Booklet. 4 x $90.00 ins., 16 pp. Illustrated.

Minwax Company, 11 West 40th Street, New York, N. Y.
Color Card—Briick and Cement Coating. Folder, 4 pp., $90.00 x 11 ins. Illustrated. Describes a waterproof paint for stucco, brick, and concrete.

MATERIALS
The Georgia Marble Company, Tare, Ga.; New York Office, 3136 Broadway.
CABOT'S CROSSENE STAINS. Booklet. 4 x $90.00 ins., 16 pp. Illustrated. Describes a waterproof paint for stucco, brick, and concrete.

National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book, $90.00 x 100 pp. Gives directions and formulae for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.

Hurt Building, Atlanta; Senior High School and Junior College, Minneapolis, Minn. Folders, 4 pp., $90.00 x 11 ins. Illustrated.

MEETS, ALUMINUM COMPANY OF AMERICA, Pittsburgh.
Architectural Aluminum. Brochure, 30 pp., $90.00 x 11 ins. Illustrated.

Central Alloy Steel Corporation, Massillon, Ohio.
Shelton's 100 Surfaces Catalog. Booklet, 40 pp., $90.00 x 11 ins. Illustrated.

The International Nickel Company, 67 Wall St., New York N. Y. Wholesale and retail. 8 folders, 4 pp., $90.00 x 11 ins. Illustrated. Valuable data on use of moneys in kitchens, laundries, etc.

MILL WORK—See also Wood
Curtis Services Company Bureau, Clinton, Iowa.
Architectural Interior and Exterior Woodwork. Standardized Book, 9 x 11 ins, 240 pp. Illustrated. This is an Architects' Edition of the complete catalog of the Workroom, as designed by Trowbridge & Ackerman. Contains many color plates.

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

Curtis Brochure 602. Booklet, $1.50 x 14 ins. Illustrated. Complete details of all items of Curtis woodwork, for the use of architects.

Curtis Cabinet and Stair Work. Brochure, 48 pp., 7½ x 10½ ins. Illustrated.


Curtis Interior Doors. Brochure, 7½ x 10½ ins. Illustrated.


Hartmann-Sanders Company, 2155 Elston Ave, Chicago, Ill.
Catalog 735, 8½ x 11 ins. Catalog. Column Catalog 735, 8½ x 11 ins. 40 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installments.


Klein & Co., Inc., Henry, 11 East 37th St., New York, N. Y.
Two Drivid Interiors. Folder, 4 pp., 60 x 9 ins. Illustrated. Use of moulding for paneling walls.

A New Style in Interior Decoration. Folder, 4 pp., 60 x 9 ins. Illustrated. A complete guide to the new style of decoration.

Roddis Doors, Boston, Mass.
Roddis Period Moldings in Ornamented Wood. Booklet, 28 pp., $90.00 x 11 ins. Complete designs for the new style of decoration.

How Drivid Period Moldings in Ornamented Wood Set a New Style in Decoration. Folder.

Roddis Lumber and Veneer Co., Marshfield, Wis.
Roddis Doors. Booklet, 24 pp., $90.00 x 11 ins. Illustrated price list of doors for various uses.

Roddis Doors, Catalog G. Booklet, 184 pp., $90.00 x 11 ins. Completely covers the subject of doors for interior use.

Roddis Doors for Hospitals. Brochure, 16 pp., $90.00 x 11 ins. Illustrated work on hospital doors.

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Part Two

196 ARCHITECTURAL ENGINEERING AND BUSINESS
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<td>Describes use and advantages of hollow tile for inner partitions.</td>
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ROOFING

The Barrett Company, 40 Rector St., New York City.
Architects' and Engineers' Built-up Roofing Reference Series; Volume 1, Metal Drainage System, 94 pp., 85 x 11 ins. Illustrated.

Federal Cement Tile Co., 608 S. Dearborn Street, Chicago.
Federal Interlocking Roof Slate Folder, 4 pp., 85 x 11 ins. Illustrated.

Kawanee Company, 442 Franklin St., Kewanee, Ill.
Structural Gypsum Corporation, Linden, N. J.

ROOFING SCREENS

American Brass Co., The, Waterbury, Conn.
Orange Screen Co., Maplewood, N. J.
Columbia Mills, Inc., 225 Fifth Avenue, New York, N. Y.
David Lupton’s Sons Company, Philadelphia, Pa.
Steel Frame House Company, Pittsburgh, Pa. (Subsidiary of Mc-Clintic-Marshall Corp.)

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.


Volume 1, Series B. Indiana Limestone Library, 6 x 9 ins., 36 pp., illustrating general information regarding Indiana Limestone, its physical characteristics, etc.


Volume 5, Series B. Indiana Limestone Library, Portfolio, 115 x 85 ins., 80 pp. Illustrated.

Volume 6, Series B. Indiana Limestone School and College Buildings, 85 x 11 ins., 80 pp. Illustrated.

STORE FRONTS

Bracco Manufacturing Co., 323-35 SouthWalsh Ave., Chicago, Ill.

Catalog No. 32, Series 100, All-Metal Construction, Brochure, 20 pp., 85 x 11 ins. Illustrated. Deals with store fronts of a high class.

Catalog No. 34, Series 322, Standard construction, Brochure, 36 pp., 85 x 11 ins. Illustrated. Contains complete specifications and details of special bronze store front construction.

The Kawneer Company, Niles, Mich.

Store Fronts, 96 pp., 6 x 85 ins. Illustrated. Shows different types of Kawneer Solid Bronze Store Fronts.


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Zouri, Drawn Metals Company, Chicago Heights, III.


Store Fronts by Zouri, Booklet, 30 pp., 9 x 12 ins. Illustrated.

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Planning for Home Telephone Conveniences. Booklet, 52 pp., 85 x 11 ins. illustrated.


TERRA COTTA

National Terra Cotta Society, 19 West 46th St., New York, N. Y.


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TILE, HOLLOW


Standard Fireproofing Bulletin 171, 85 x 11 ins., 32 pp. Illustrated. A treatise on the subject of hollow tile as used for floors, girders, column and beam covering and similar construction.


Natio Face Tile for the Up-to-Date. Farm Bulletin, 85 x 11 ins., 6 pp. Illustrated.


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TILES

Hanley Quarry Tile. Folder. 4 pp., 5 x 8 ins. Illustrated.

Crane Works, 9 East 46th St., New York, N. Y., and 360 Walnut St., Philadelphia, Pa.
Pardee Tiles. Bound volume, 48 pp., 8 1/2 x 11 ins. Illustrated.


VALVES

Cranes Co., 836 S. Michigan Ave., Chicago, Ill.
American Blower Co., Detroit, Mich.
The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
Sonneborn Sons, Inc., 116 Fifth Ave., New York, N. Y.
Sommers & Co., Ltd., 342 Madison Ave., New York, N. Y.
Master Builders Company, Cleveland, Ohio.
Minwax Company, 11 West 42nd Street, New York, N. Y.
The Valve Behind a Good Heating System. Booklet.

VENETIAN BLINDS

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.

Durcon Company, Dayton, Ohio.
Acid-proof Exhaust Fans. Folder, 8 x 10 1/2 ins., 8 pp. Data regarding fans for ventilation of laboratory fume hoods.

Staynew Filter Corporation, Rochester, N. Y.

WATERPROOFING

Master Builders Company, Cleveland, Ohio.
Waterproofing and Dampproofing and Allied Products. Sheets in 8 1/2 x 11 ins. Valuable data on different types of materials for protection against dampness.

Minwax Company. 11 West 2nd Street, New York, N. Y.
Color Card—Flat Finish. Folder, 4 pp., 8 1/2 x 11 ins. Illustrated. Details of a penetrating, preservative stain finish, giving stain and a soft, wax effect.

Sommers & Co., Ltd., 342 Madison Ave., New York, N. Y.
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Sonneborn Sons, Inc., 116 Fifth Ave., New York, N. Y.

Toch Brothers, New York, Chicago, Los Angeles.
Architect’s Specification Data. Sheets in loose leaf binder, 8 1/4 x 11 ins., containing such an important line of materials.

The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
Par-Lock Specification “Form D” for waterproofing surfaces to be finished with Portland cement or tile.

Par-Lock Specification “Forms E and G” membrane waterproofing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure.

Par-Lock Waterproofing. Specification Forms D, E and G. Sheets, 8 1/2 x 11 ins. Data on combinations of gun-applied asphalt, and other materials, built up to suit requirements.

Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 8 1/2 x 11 ins. Official Bulletin of Approved Products—Investigating Committees of Architects and Engineers.

WEATHER STRIPS

Athay Company, 6035 West 66th St., Chicago, Ill.
The Only Weatherstrip with a Cork to Insulate Your Contact. Booklet. 36 pp., 8 1/2 x 11 ins. Illustrated. Data on an important type of weather stripping.

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Kawneer Solid Nickel Silver Windows. In casement and weight-bearing types and in drop-down transom type. Portfolio, 12 pp., 9 x 11 1/2 ins. Illustrated, and with demonstrator.

David Lupton’s Sons Company, Philadelphia, Pa.

WINDOWS, CASEMENT

Crittall Casement Window Co., 1061 Hearn Ave., Detroit, Mich.
Catalog No. 22. 9 x 12 ins., 76 pp. Illustrated. Photographs of actual work accompanied by scale details for casements and composite steel windows for banks, office buildings, hospitals and residences.

Hope & Sons, Henry, 103 Park Ave., New York, N. Y.
Catalog, 82% x 10 1/2 ins., 30 pp. Illustrated. Full-size details of outward and inward opening casements.

The Kawneer Company, Niles, Mich.
Kawneer Solid Nickel Silver Windows. In casement and weight-bearing types and in drop-down transom type. Portfolio, 12 pp., 9 x 11 1/2 ins. Illustrated, and with demonstrator.

David Lupton’s Sons Company, Philadelphia, Pa.
Lupton Casements. Catalog No. 11-C-237. Booklet, 26 pp., 8 1/2 x 11 ins. Illustrated brochure on casements, particularly for residences.

Lutron Heavy Casements. Detail Sheet No. 101. 4 pp., 8 1/2 x 11 ins. Details and specifications only.

Casement Window Hardware. Booklet, 24 pp., 8 1/2 x 11 ins. Illustrated. Shows typical installations, detail drawings, construction details, blueprints if desired. Describes All-way Multifold Window Hardware.

Architectural Details. Booklet, 8 1/2 x 11 ins., 36 pp. Tables of specifications and typical details of different types of construction.

List of Parts for Assembly. Booklet, 8 1/2 x 11 ins., 16 pp. Full lists of parts for different units.

WINDOW SCREENS

Orange Screen Company, Maplevood, N. J.
New Vogue Aluminum Frame Screens. Booklet, 12 pp., 7 1/2 x 8 1/2 ins. Illustrated.

WINDOW SHADIES AND ROLLERS

Columbia Mills, Inc., 225 Fifth Avenue, New York, N. Y.
Window Shade Data Book. Folder, 28 pp., 8 1/2 x 11 ins. Illustrated.

WINDOWS, STEEL AND BRONZE

David Lupton’s Sons Company, Philadelphia, Pa.
A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 8 1/2 x 11 ins. Deals with Pond Continuous Sash. Sawtooth Roofs, etc.


Truscon Steel Company, Youngston. Ohio.
Architectural Details. Booklet, 8 1/2 x 11 ins., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Linete, Steel Doors and Mechanical Operators.

Truscon Steel Company, Youngston, Ohio.

Continuous Steel Windows and Mechanical Operators. Catalog LB. Booklet. 32 pp., 8 1/2 x 11 ins. Illustrated.

WOOD—See also Millwork

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 furnishers and 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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Turn on the heat, and the fan, and instantly a flood of warmed air starts to circulate—down in the working areas where it is needed. These photographs taken in one of the buildings of the Minneapolis Thresher Co., tell the story of McQuay efficiency better than words.

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Taken immediately after turning on the heat and fan this photo shows the flow of heated air starting down.

5 Seconds Afterward the heat is down to the floor and starting to spread.

Another 5 Seconds and the heat has spread—along near the floor as far as 75 feet from the heater. Note that all the heated air is forced down into the working area.
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Every year sees the wider and more varied use of metal in building construction, and particularly in structures of a residential character. The advantages of using metal are obvious, one being its being fireproof or at least fire-resisting, while another lies in its not being subject to expansion and contraction with constant changes in atmospheric temperatures. Another advantage is found in the great durability of metal, and still another in the ease with which it is kept clean. This booklet presents in most attractive form the materials made and sold by the Milwaukee Corrugating Company for use in residential buildings,—metal lath, corner beads, door and window casings, base creeds, and picture moldings. All these materials are described, their advantages explained, and illustrations as well as diagrams and other detailed drawings make the methods of their use easily understood. The company is to be congratulated on the excellent taste shown in designing those of its materials in which good taste counts as a factor,— particularly its casings.


One cannot work unless one can see. One cannot see unless one has two things,—eyesight and light. If light is cut down, vision is decreased, just as though one had cut down on an eyeglass. Office lighting must preserve the attention of every executive, and fortunately it is securing that attention in more offices. Business men are realizing daily that the amount of work their employees accomplish, the number of mistakes made, the head and general efficiency of employees pocketbooks are directly affected by office lighting. Artificial lighting in offices is as important as daylight. In the larger cities of New York there are 110 days in the normal year when for six hours a day the daylight can be described as really bright. On other days, artificial light is necessary in most offices during the greater part of the day. A careless analysis of the lighting requirements of an office building of the modern type, bearing in mind the necessity for both economy of operation and efficiency of the workers, leads to a separation of the spaces into certain groups, such as, general office space, private rooms, and executive offices. Entrance halls should not be overlooked, as their appearance is of the utmost importance. This catalog offers valuable information regarding modern office lighting and equipment.

WOLFF CO. 2657 W. Fulton St., Chicago. "Wolff Superior Plumbing Fixtures." A work on bathroom equipment.

The modern bathroom reflects the character of the home, and the increasing preference for the beautifully colored rainbow enameled iron bath tubs and lavatories has brought forth a demand for vitreous chineaware in color to match. Wolff "Duroware" is a high grade product made in all the standard colors, both in one piece finish or in the new colors, including old ivory, turquoise, dove gray, sea foam green, shell pink, dark sea green, and many other excellent colors. In the preparation of the Wolff "G" Eathenware Catalog the organization has endeavored to present a complete line of fixtures such as are preferred by the modern architect and plumber. The selection made will be found to be adequate to meet the requirements of all. The catalog illustrates and describes these fixtures in logical sequence, enabling the architect, plumber, general contractor, builder or owner to make a selection of such material as may be needed to completely fill any specification. Vitreous china ware and solid porcelain ware are carefully graded in accordance with the uniform grading rules adopted by the Sanitary Pottery Institute in cooperation with the U. S. Bureau of Standards of the Department of Commerce. Absolute perfection is commercially impossible in the production of this ware, and when inspected and passed as "regular," selection must be accepted as representing the standard under which sanitary earthenware is sold. Wolff Superior Plumbing has always been the highest quality, and the specification of this product gives assurance of satisfaction. Wolff "Duroware" vitreous china fixtures can be supplied in colors to match Wolff "Rainbow Enamel," and in many styles.

KOHLER COMPANY, Kohler, Wis. "Kohler of Kohler News." A monthly publication issued by the company.

Slow bath tub draining has always been a source of trouble in residences, hotels, apartments, or individual houses. In a home where bathing equipment is limited or the family is large, the bathroom is constantly in demand. The same is true when methods of heating systems are subject to expansion. And often the time lost by a slow-acting bath drain causes inconvenience and embarrassment. The "Rapidrain" described in a recent issue of the Kohler News is all that the name implies. Because of remarkable construction of the removable strainer plate, the large sized holes and increased draining area, a tub is drained with the utmost rapidity,—in fact, the work is done twice as quickly as an ordinary drain does it. The rapid action of the draining water causes friction with the fitting, helping to keep it clean and sanitary. Because of the "Rapidrain's" simple means of access, installation and construction, costs are likely to be considerably reduced. This little publication is issued monthly at Kohler, Wis., and for the Kohler organization.

DETOUR STEEL PRODUCTS COMPANY, Detroit. "Fenestra Screen Casements." An important detail of equipment.

The screen casement has only recently been announced, but it has already been hailed by the architects who have seen it as the solution of the problem of screening open-out structures in which heavy metal contact is permanently assured between flat screen frame and flat window frame, will greatly interest the architect. By screening the house or office casements, one will have extra light; better ventilation; a 100 per cent opening if desired; finger touch operation without swelling, shrinking, warping or sticking; strong, fire-resisting solid steel members; extension hinges that make outside washing easy from within the room. "Fenestra Screen Casements" is a folder published by the Detroit Steel Products Company describing the advantages of the new Fenestra Casement that comes equipped with a screen. For the first time it is possible to use a flat all-metal screen fastened directly to the inside of the casement, or to the window trim. The folder describes how this is accomplished, the types and sizes of screens, and the changes that have been made in the hardware. Write the Detroit Steel Products Company, 2250 E. Grand Boulevard, Detroit, for this folder. It is worth the attention of architects and engineers.


Progress in the development of heating has been largely a matter of development of details for use with heating systems. The booklet noted here deals with the "Hydrolator," described as "a motor-driven centrifugal pump designed to operate on balanced hot water systems, open or closed type. It consists of a sturdy Janette Repulsion-Induction motor mounted on a 12-inch pipe section with the pump and valve assembly located in the pipe section. Pump rotor is located off the line of natural water flow. Rotor and valve are rust-proof and trouble-proof." The brochure says that the "Hydrolator" solves many problems of hot water circulation: (1) "Slugish Circulation." The Hydrolator provides positive, rapid circulation; overcomes sluggishness. (2) Poor Circulation Where Radiators Are on a Level With or Below the Boiler: The Hydrolator will force circulation to every radiator, no matter where located. (3) Heating One Building from Another: A problem encountered where a garage is to be heated from a boiler in the basement of a house. With the introduction of the Hydrolator this is no longer a problem. (4) Long, Horizontal Pipe Runs Through Houses: The Hydrolator provides a rapid circulation heretofore impossible on such system. (5) "Traps" and "Short Circuits": The Hydrolator easily overcomes both of these evils. (6) Heating Additional Rooms Built Onto a House, or providing heat on systems with insufficient radiation. (7) Poor Heating in Bathrooms: The Hydrolator in this case is usually mounted on the return from this section, with a valve placed on the boiler side of the Hydrolator to regulate the flow," all valuable qualities.
“A step forward” sums up the comments of architects and engineers familiar with the various special features embodied in the BROWNELL welded steel boiler.

One of these is the tapered water legs, which are larger at the top than at the bottom. This construction allows for the natural expansion of the water as it takes up heat in its travel upward thru the “legs.” In this way the usual resistance to expansion is lessened with consequent improvement in the entire circulation system.

Another is the provision of considerably more radiant heating surface than usual. Still others are the double section economy grates, and the installation of the service coils in the upper part of the tapered water legs. This last feature makes it possible to have hot water in mild weather without keeping up a full head of steam (low fire sufficient). It also eliminates installation of an auxiliary hot water heater.

This equipment is built for either coal or oil firing, or both at the same time, and is fully illustrated and discussed in special Bulletins ready to mail.

THE BROWNELL COMPANY  Founded 74 Years Ago  Dayton, Ohio
REPRESENTATIVES IN PRINCIPAL CITIES

Brownell
Electric Welded Steel
Boilers
Nearly as important as the provision of daylight is the matter of its proper use, which in turn is dependent upon its correct distribution. A room of realistic proportions, for example, may have windows only at one end, which means that unless those whose desks are placed near the windows are willing to work in the blinding glare of brilliant light it is necessary to draw down window shades which of course darkens the entire area excepting the end near the windows and which often renders the opposite end of the room almost useless. This could easily be prevented by using at the windows Venetian blinds, which, being lowered, render it possible to so regulate the light that its total exclusion may be had, or else it may be filtered, reflected, amplified, or brought in uninteruptedly as desired. Recently, in the research laboratory of a leading university, it was established that with Venetian blinds it is possible to increase the total daylight in the darker portions of a room from 100 per cent to 130 per cent, according to the color, finish and angle of the slats. This conclusively demonstrates the possible practical value of Venetian blinds as a means for increasing as well as controlling the natural light in a room. The findings further reveal that the most scientific and valuable effects of a properly made Venetian blind is, perhaps, a very noticeable improvement in the quality of the natural lighting in a room. While shutting out excessive sunshine or large expanses of bright sky, it is possible to throw a larger part of the intercepted light upon the ceiling or side walls so that it may become effective as an indirect component in the illumination of the room. This useful brochure presents a study into the use of Venetian blinds in making more comfortable and convenient large working areas in banks, stores, lodges, schools and offices, or else such areas as solariums and verandas.

DETROIT STEEL PRODUCTS COMPANY, Detroit. "Sugestions for Use of Steel Sash for Ornamental Buildings." Few people other than architects realize how great may be the effect upon a building's appearance of the sash which are used at its openings. Even an intelligent layman might examine a structure and note with great satisfaction its proportions, and even appraise any possible merit attaching to the spacing of its windows and any good qualities belonging to it because of the care taken in other ways, and yet quite fail to realize that much of a possibly happy result is due to the character of its window sash. It was indeed a fortunate day for architecture when use of steel for making sash was begun, for the extreme slenderness which use of steel makes possible for muntins and other members brought about refinement which sash of wood might never have approached. Even details seemingly unimportant have been made less details involved have met the demands made upon them. Even details seemingly unimportant have been made the objects of endless effort. This folder, for example, deals with a highly improved type of the receptacle or plate widely used with lighting or other forms of electrical service. "Spartan" receptacles incorporate two main features,—interchangeability and standardization. They are designed to receive plugs with prongs or blades which are either parallel or tandem. The "Spartan" design has become standard throughout the world,—is used more extensively than any other in the making of convenience outlets. All Bryant "Spartan" receptacles are made with heavy, high quality composition or porcelain bodies, heavy bronze contact arms and brass contacts, and with large size and full length binding screws. A distinctive Bryant feature is the cupping of the receptacle boss and the forming of a raised rib of composition across the cup between the slots, making easy and convenient the insertion of either type of the prongs of the cap.
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Architect, says—

"The Lapidolith Concrete Floor Hardener and the Lignophol Wood Floor Preservative used on this school were quite satisfactory."

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wood floors

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L. Sonneborn Sons, Inc., 114 Fifth Ave., New York
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