THE ARCHITECTURAL FORUM

ARCHITECTURAL
ENGINEERING
&
BUSINESS

JUNE 1931

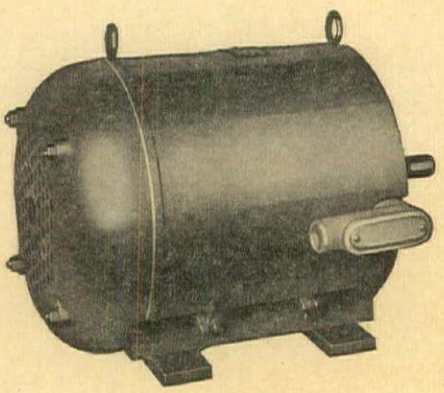
IN TWO PARTS—PART TWO

UNIVERSITY BUILDINGS REFERENCE NUMBER

Stainless Steel . . . that's the new "Linc-Weld" Totally Enclosed Fan Cooled Motor

What's the idea?

A better motor—cooler—
greater overload capacity.



LINCOLN

ELECTRIC COMPANY . . Cleveland Ohio

M-86

JOB 1108—APARTMENT BUILDING—CHICAGO, ILL.
GEN. CONTRACTOR—McLENNAN CONSTR. COMPANY—588 PILES—9,549 FEET

Architect: FUGARD & KNAPP

The service behind Raymond Concrete Piles is as painstaking on small or moderate sized jobs as on the biggest ones. This is not too big a company to be approached by anyone with a desire for thorough foundation work, irrespective of the amount of money involved.

A Form for Every Pile
A Pile for Every Purpose

RAYMOND CONCRETE PILE CO.

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

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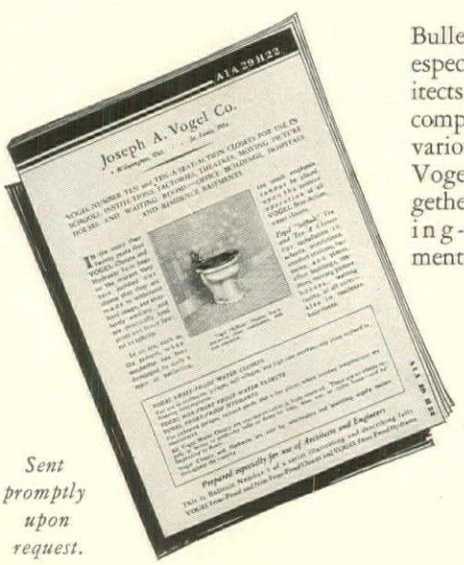
RAYMOND

When you are writing the specifications on . . .

Vogel Number Ten-A Seat-Action Closet with syphon jet bowl. Tank is in the wall. Flushes on air and water pressure.



Sent promptly upon request.

Bulletin designed especially for architects, showing complete details of various types of Vogel Closets, together with roughing-in measurements.

SCHOOLS, COLLEGES FACTORIES, OFFICE BUILDINGS, INSTITUTIONS, WAITING ROOMS

You take absolutely no chance when you specify FLAT Vogel Number Ten or Ten-A closet

These closets are backed by the 23 years' experience of the largest maker of seat-action closets in the world.

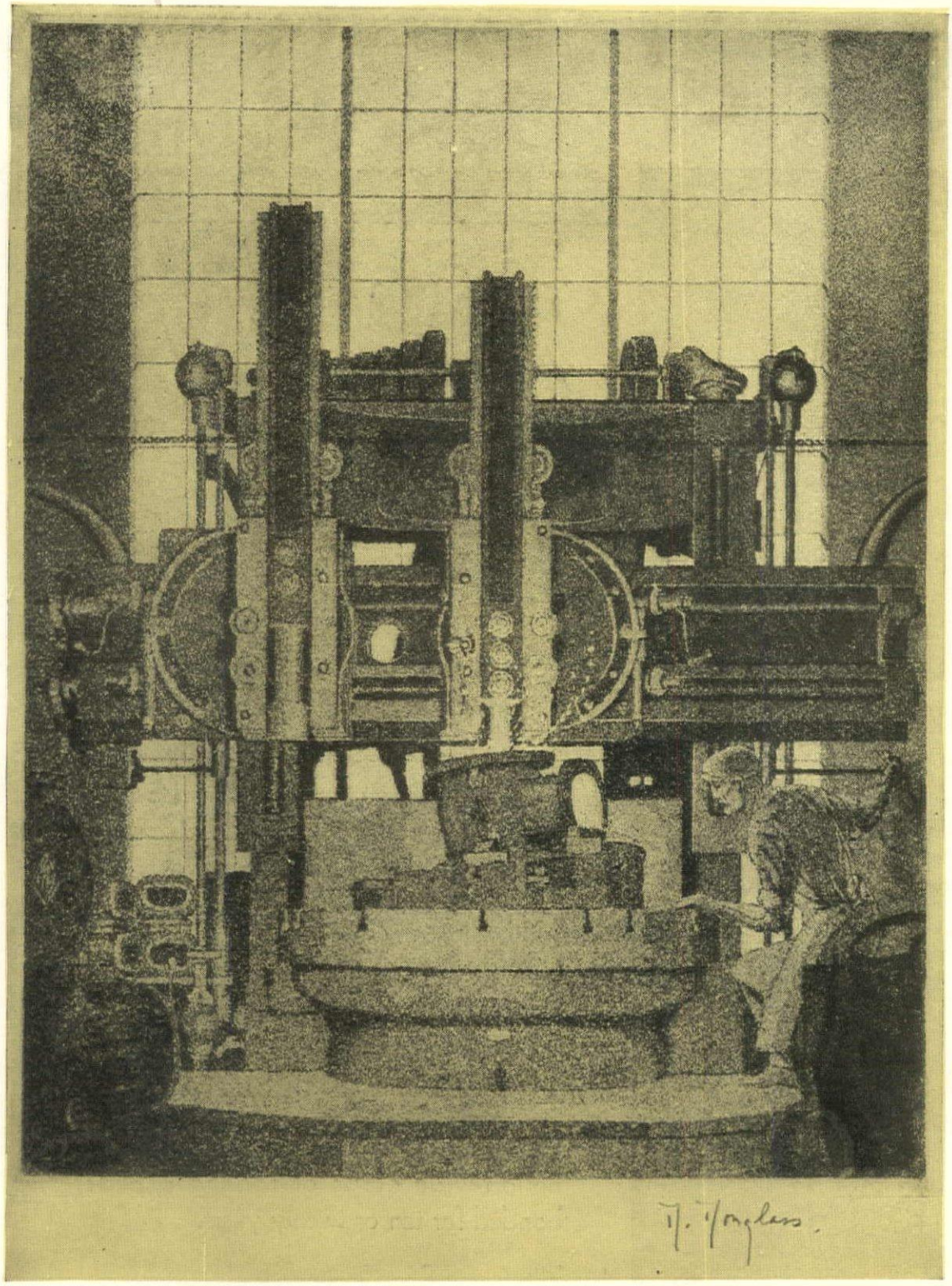
To prove to you and ourselves just how long one of these Vogel Closets would operate without repairs or adjustments, we now have one on an endurance test which started July 16, 1929.

> This closet has flushed 300,000 times without even a washer being renewed—equal to 100 years of use.

Literature of interest to Architects, Specification men, Sanitary Engineers will be sent promptly upon request.

JOSEPH A. VOGEL CO.
Wilmington, Del.
St. Louis, Mo.

. . . VOGEL PATENTED *Products* . . .

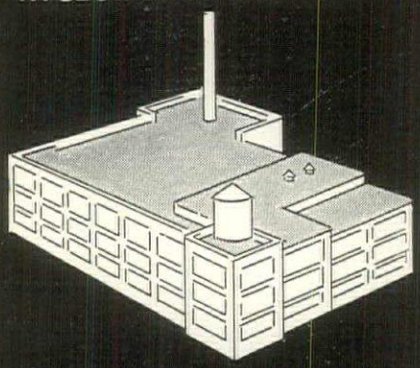


MACHINING...EVERY PART FINISHED TO CLOSE TOLERANCE

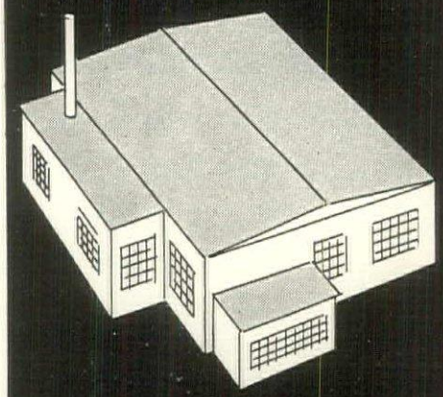
A high standard of precision, carefully maintained, governs every one of the scores of machining operations required in the making of a Jenkins Valve. Continual, systematic gauging assures a finish to the close tolerance necessary for the complete interchangeability of all corresponding parts . . . Precision manufacturing invests every Jenkins Valve with the strength and quality to provide long, leak-tight performance in any power plant, plumbing, heating or fire protection service. Jenkins Bros., 80 White Street, New York; 524 Atlantic Avenue, Boston; 133 No. 7th Street, Philadelphia; 646 Washington Blvd., Chicago. 1121 No. San Jacinto, Houston, Texas; Jenkins Bros., Ltd., Montreal, London.

SPECIFY ROOFS TO MEET SERVICE CONDITIONS

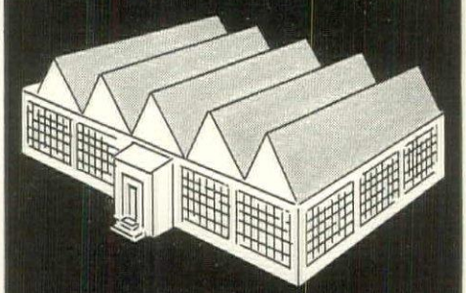
CAREY SPECIFICATIONS INCLUDE ROOFS FOR· ·



FLAT DECKS—



SLOPING DECKS—



STEEP DECKS—
For All Conditions
In All Climates

Carey ROOFINGS

Tar and Gravel . . . . . .
Asbestos or Asphalt . . . . .
Mineral or Smooth Surfaced . .

A ROOF which gives satisfactory, dependable service on a steep pitch area may fail entirely when applied on a dead level deck. A type of built-up roof which gives excellent service in Michigan may prove wholly unsuitable for an identical building in Alabama, Texas or the Orient.

Special care should be exercised in specifying Built-Up Roofs to meet the various service conditions. The two most important factors to be considered are climatic conditions and deck variations.

Only a manufacturer who can furnish Built-Up Roofs of every type can offer unbiased recommendations. Only a roof which is designed for specific conditions can be expected to give the maximum service at the minimum cost. Fifty-eight years of practical roofing experience are back of Carey Built-Up Roofs. They are applied according to rigid specifications by a nation-wide corps of roofing experts, and are bonded for ten or twenty years.

The Carey Specification Book tells exactly what roof to use under given conditions. A copy will be mailed on request.

THE PHILIP CAREY COMPANY
LOCKLAND · CINCINNATI, OHIO
BRANCHES IN PRINCIPAL CITIES

THE STANDARD FOR 58 YEARS

533

DO YOU DESIGN WELDED PIPING?

COMPARE the photos below with any welded jobs you've ever seen before . . . compare the fittings!

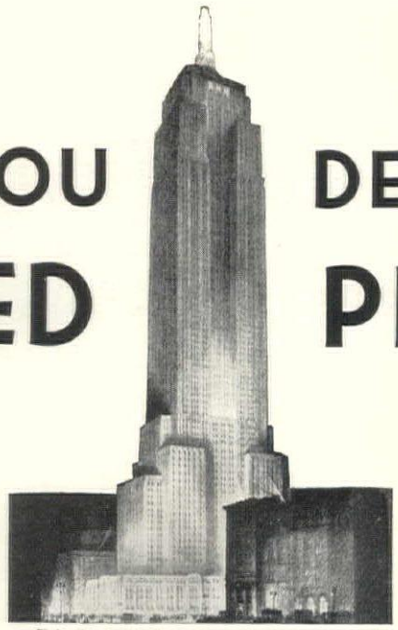
They're not bends. They're not mitres. They're TUBE-TURNS, *the seamless drawn fittings for pipe welding*, now being used on dozens of jobs like the Empire State Building, the New York Hospital and Cornell Medical College Ass'n., the Bank of Manhattan Building, the new Waldorf, the Fidelity-Philadelphia Building, the Union Carbide & Carbon Building, Chicago.

Tube-Turns have seamless, *uniform* walls—no thinning of outside walls, no thickening or buckling of inside walls, no flattening of cross-section.

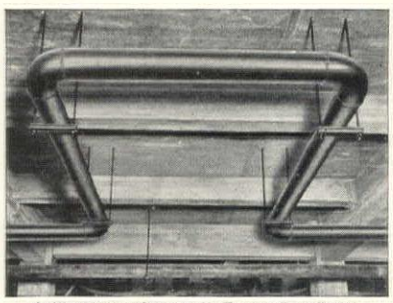
They combine greater strength and less weight than any other type of stock fittings.

They have no interior or exterior projections or shoulders—therefore cause less pressure-loss and can be nested closer, in less space.

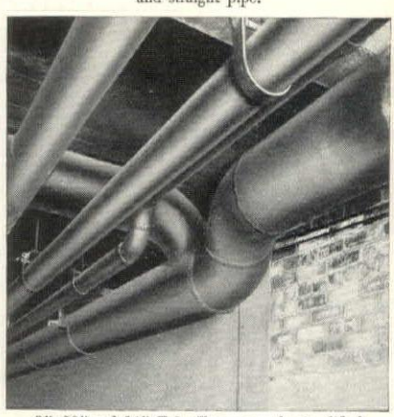
Being made of the same material as the pipe in the line, they have the same factors of expansion and contraction—no leaks, no line strains.



Tube-Turns are extensively used in the Empire State Building. Shreve, Lamb & Harmon, *Architects.* Meyer, Strong & Jones, Inc., *Consulting Engineers.* Starrett Bros. & Eken, *Builders.* Baker Smith & Co., *Heating Contractors.*



A 6″ expansion loop in the Empire State Building, fabricated *on the job* from 90° Tube-Turns and straight pipe.



3″, 10″ and 14″ Tube-Turns greatly simplified the pipe-design of this Chase Copper & Brass Company Plant job at Cleveland. The Austin Co., *Engineers and Contractors.* The Smith & Oby Co., *Piping Contractors.*

Having a constant radius of 1½ times the nominal pipe size, they are easier to design.

They are stocked in 45°, 90° and 180° types—or can be easily cut to form angles of *any* desired degree.

They can be fabricated, *on the job*, into any conceivable offset, compound or "special".

They are installed with easy welds, *straight across the pipe.*

Get All the Facts!

Tube-Turns have many other advantages and economies that can help you to improve your welded piping. All the facts are given in Bulletins No. 103 and 105—the latter a description and cost-comparison of an installation for the U. S. Bureau of Standards. *Use the coupon for getting your copies.* No obligation, of course. Tube-Turns, Incorporated, 1333 South Shelby Street, Louisville, Kentucky.

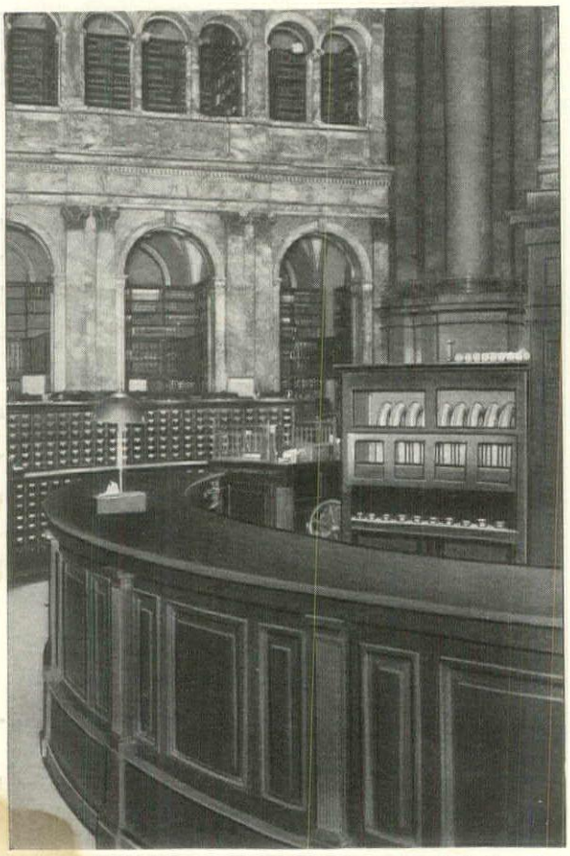
TUBE-TURNS

TUBE-TURNS, Incorporated, 1333 S. Shelby St., LOUISVILLE, KY. Gentlemen: Please send me, without obligation, Bulletins No. 103 and 105, giving full details about Tube-Turns, the seamless steel fittings for pipe welding.

Firm Name..... *Att: Mr.*.....

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

G&G ATLAS PNEUMATIC TUBES



Close up of G&G Atlas Central Tube Station at Call Slip Desk in Rotunda. The front panel has been removed to show G&G Atlas Over Delivery Terminals with sending inlets at base

are in daily use in

THE LIBRARY OF CONGRESS

WASHINGTON, D. C.

A VISITOR to this Library cannot fail to be impressed by the quiet efficiency of its operating staff. If messengers from one floor to another, and from one department to another, were foot messengers, the very movement set up in handling requests for books averaging 1,658 volumes daily would create noise and confusion. It is inevitable, therefore, that mechanical messenger service as provided by G & G Atlas Pneumatic Tube Systems should be installed here to promote the prompt handling of book requests in the most quiet, orderly manner . . . The STERLING MEMORIAL LIBRARY at Yale University, James Gamble Rogers, Architect, is also equipped with this System. . . Libraries constitute only one of the many types of buildings served by G & G Atlas Pneumatic Tube lines.

The G&G ATLAS PNEUMATIC TUBE SYSTEM

Catalog in Sweet's Archt. Cat. 1931 Ed. pp. D-6350-52
Catalog in Specification Data 1931 Ed. pp. 284-285

G&G ATLAS SYSTEMS, Inc.

544 West Broadway « » New York, N. Y.

1344 The Canadian Bank of Commerce Bldg., Toronto

GRANT BUILDING, PITTSBURGH

Architect, Eric Fisher-Wood Co. General Contractor, Thompson Starrett Co.
Engineer, Thomas Payne Plumbing Contractor, W. N. Sauer Co.
Heating Contractor, McGinnis, Smith & McGinnis Co.

Specify

WALWORTH
VALVES
FITTINGS
AND TOOLS
for

PLUMBING AND HEATING

- It is worth noting that the growing tendency to "Walworth throughout" jobs in new and important buildings of this type is by no means limited to New York City.
- All over the United States prominent architects, engineers and contractors know that the high quality of Walworth valves and fittings, the completeness of the line and its ready availability, make it a wise and forward-looking specification.
- All the heating and plumbing valves throughout the Grant Building in Pittsburgh were made and supplied by Walworth.

WALWORTH COMPANY
General Sales Offices: 60 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa. and Attalla, Ala.
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VALVES
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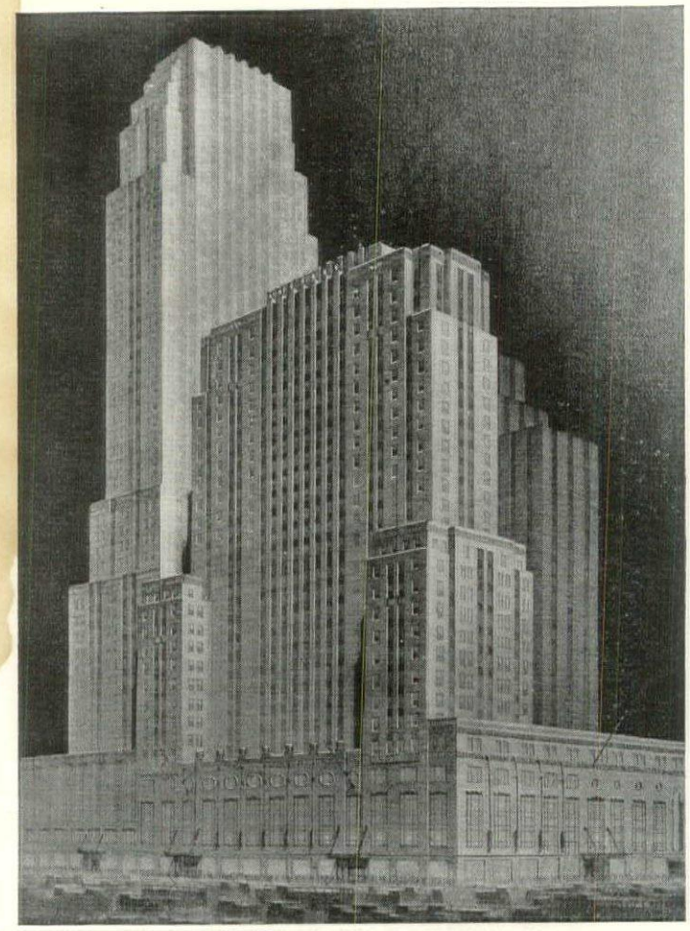
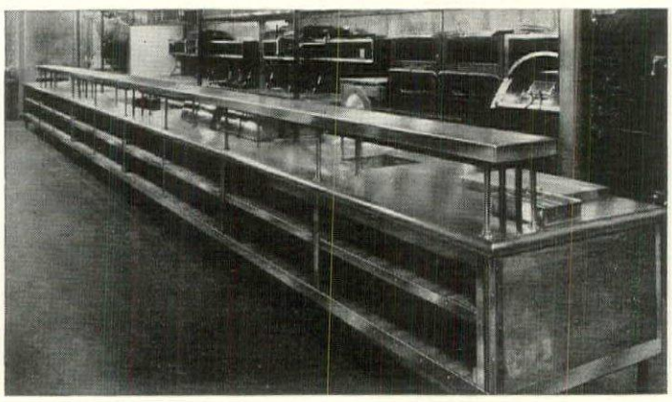
STARRETT'S NETHERLAND PLAZA HOTEL



Starrett's Netherland Plaza Hotel, Cincinnati. Architect: WALTER W. AHLSCHLAGER. Associate Architect: DELANO & ALDRICH.



Monel Metal food service equipment installed in Starrett's Netherland Plaza Hotel, Cincinnati, by THE JOHN VAN RANGE COMPANY, Cincinnati.

"CINCINNATI'S CLASSIC"

Another modern Monel Metal food service installation

ADD another distinguished name to the growing list of leading hotels where Monel Metal shines . . . "Cincinnati's Classic" . . . the magnificent new Starrett's Netherland Plaza.

Here, as in other top ranking hotels throughout the country, the presence of gleaming Monel Metal equipment reflects the owners' desire to maintain the highest standards of food quality and service. It also proves that these farsighted operators are convinced that Monel Metal offers the best available combination of properties from a practical dollars-and-cents point of view.

Monel Metal's crisp, inviting beauty is the outward indication of inherent and enduring cleanliness. This lustrous Nickel alloy cannot rust. Its satin-smooth surface is easy to clean and keep clean. Strong as steel, with no coating to chip, crack or wear off, it keeps its original attractiveness through years of severe hotel service.

Monel Metal's desirable properties are due to its high Nickel content. Nickel is the whitening, strengthening metal that gives greater beauty and durability to Nickel Silver, Stainless Steel and other modern alloys. When you specify new equipment don't forget that "Nickel Alloys Look Better Longer" and that Monel Metal is a high Nickel alloy.

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

A HIGH NICKEL ALLOY

MONEL METAL

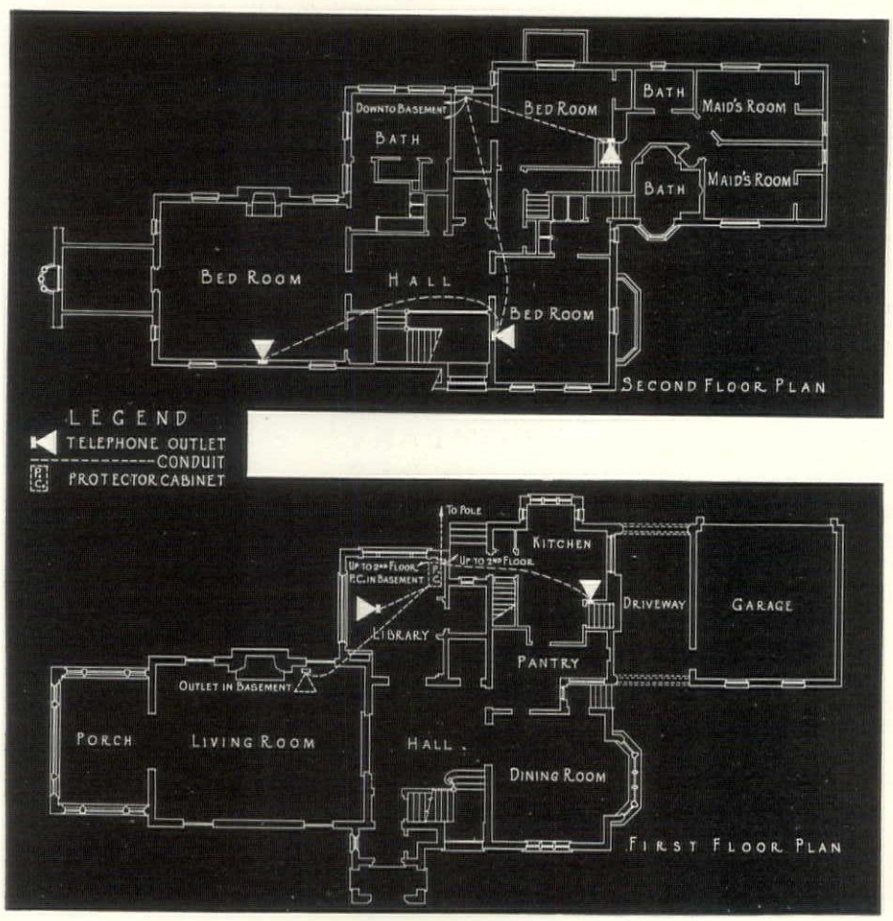
NICKEL ALLOYS LOOK BETTER LONGER

INCO MONEL METAL TRADE MARK

Monel Metal is a registered trade mark applied to a technically controlled nickel-copper alloy of high nickel content. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

Provision is made for telephone convenience in the residence of Mr. J. R. Stewart, 2424 West Lake of the Isles Boulevard, Minneapolis, Minnesota, by built-in conduit serving six telephone outlets, including one in the basement game room. CARL A. GAGE, Architect, *Minneapolis.*

TELEPHONE CONVENIENCE, PLANNED IN ADVANCE, COSTS LITTLE, RETURNS MUCH



FEW modern conveniences contribute as much to living comfort as provision for adequate telephone arrangements. Planned in advance, they yield generous dividends to the home-owner in time and energy conserved, and add little, if anything, to construction costs.

You can assure full, flexible telephone service to your clients, and keep them long content with the homes you plan, by providing for telephone conduit within walls and floors. With built-in conduit, telephone outlets can be located wherever they're wanted throughout the house—and the telephone instruments can be easily shifted to meet changing needs. All wiring is concealed, affording improved appearance and protection against most types of service interruptions.

In planning the telephone arrangements for new or remodeled residences, consult your local telephone company. Their advice and assistance is given gladly, without charge. Just call the Business Office.

Announcing

Medusa STONESET *Cement*

NON-STAINING • WATERPROOFED • HIGH QUALITY

NON-STAINING
◆
WATERPROOFED
◆
WORKABILITY
◆
BOND STRENGTH
◆
COMPRESSIVE STRENGTH
◆
DURABILITY
◆
FLEXIBILITY
◆
LOW SHRINKAGE
◆
FREEDOM FROM EFFLORESCENCE

Medusa Stoneset Cement is a *non-staining, waterproofed* mortar cement for setting, pargeting and pointing cut stone. By non-staining, we mean that it will not stain the stone with which it comes in contact. ◆ Authorities agree that all non-staining mortar must be waterproofed to prevent the staining elements in other materials in back-up masonry from passing into the stone. In the manufacture of Medusa Stoneset Cement, Medusa Waterproofing is mechanically ground in the cement. This process, used in the manufacture of Medusa Waterproofed Cements (White and Gray) has proved ***Successful for 21 Years.*** ◆ The cost of Medusa Stoneset Cement permits its use for mortar in the back-up wall. The use of one mortar throughout the wall has many advantages from the standpoint of economy and convenience. ◆ In Medusa Stoneset Cement is found a carefully balanced combination of the essential properties of a good mortar. These essential properties are shown at the left. ◆ Fill out the coupon below or write us for complete information and specifications.

MEDUSA PORTLAND CEMENT COMPANY
1002 ENGINEERS BUILDING CLEVELAND, OHIO

Manufacturer of Medusa Gray Portland Cement (Plain and Waterproofed); Medusa Waterproofing (Powder or Paste); Medusa White Portland Cement (Plain and Waterproofed); Medusa Portland Cement Paint; Medusa-Mix, the Masonry Cement; and Medusa Stoneset Mortar Cement.

A BALANCED  **MORTAR CEMENT**

Send for A. I. A. Specification Folder

MEDUSA PORTLAND CEMENT CO., 1002 Engineers Bldg., Dept. G, Cleveland, Ohio
Gentlemen: Without obligation please send me a copy of the folder "Medusa Stoneset Cement."

Name_____

Address_____

City_____ State_____

Are buildings *you* plan protected from LIGHT FAILURE?

These college buildings are equipped with Exide Emergency Lighting Battery Systems to insure electric light protection at all times

•

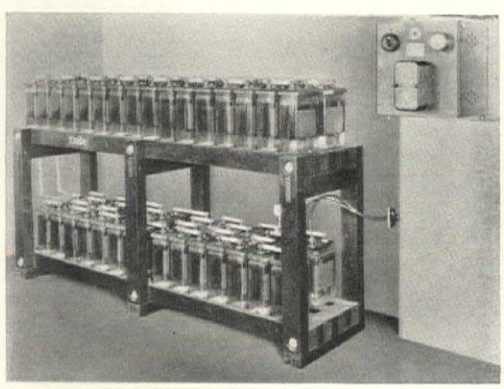
WHAT would happen in a building you had planned if a distant fire, flood or a bolt of lightning brought down power lines? . . . cut off current? Do your specifications provide protection for such emergencies?

Imagine the confusion, inconvenience and possible danger of sudden current failure in hospitals, theatres, schools, auditoriums . . . wherever people may gather. Guard against such risks. Include Exide Emergency Lighting Battery Systems in *all* your building plans and guarantee unfailing current to your clients.

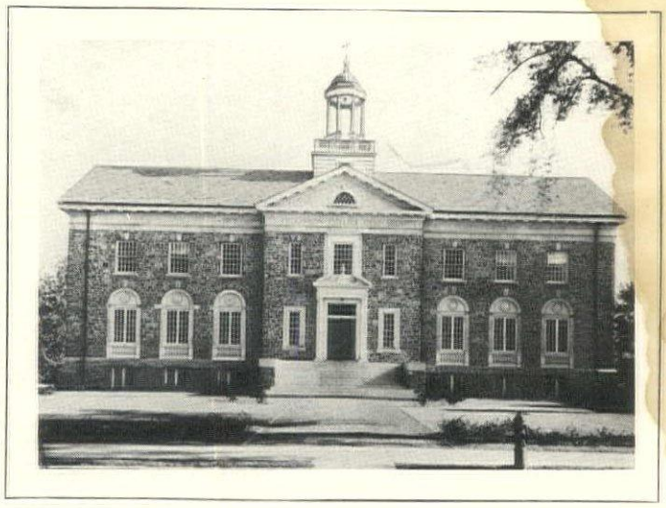
Current failure may seldom happen, but *once* may be too often. Despite every precaution, power companies can't prevent unforeseen interruptions any more than you. But you can have your buildings prepared against such emergencies . . . with an Exide Emergency Lighting System.

Then, should power fail, Exide *instantly* and *automatically* takes over the entire emergency load . . . without a hand touching a switch. Lights keep burning. And when normal power is resumed, the battery is recharged automatically.

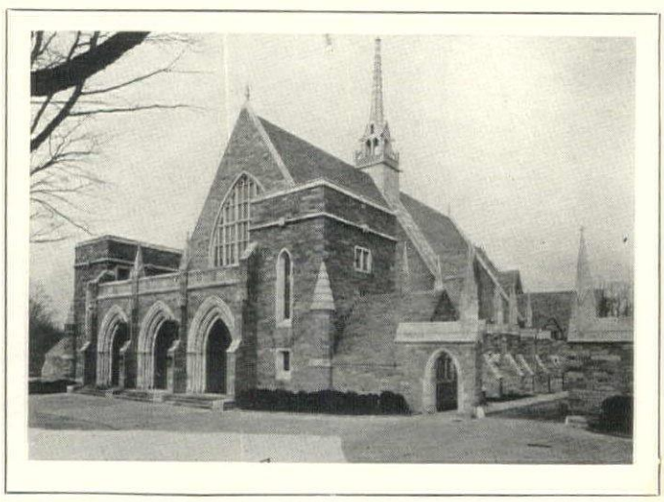
Exide Emergency Lighting Battery Systems are not expensive. Have one of our technical men call and discuss emergency lighting with you. Or write for our Emergency Lighting Bulletin. See pages D5810-11 in Sweet's Catalog.



A typical Exide Emergency Lighting Battery System; ready for action the second current may fail. Control panel may be seen in upper right-hand corner.



Dickinson College Gymnasium makes certain of adequate light at all times. It is equipped with an Exide Emergency Lighting Battery System. Wm. W. Emmart, Baltimore, Architect.



At Bryn Mawr College they take no chances with lights. An Exide Emergency Lighting Battery System in Goodhart Hall, the auditorium, makes current certain. Mellor and Meigs, Phila., Architects.

Exide

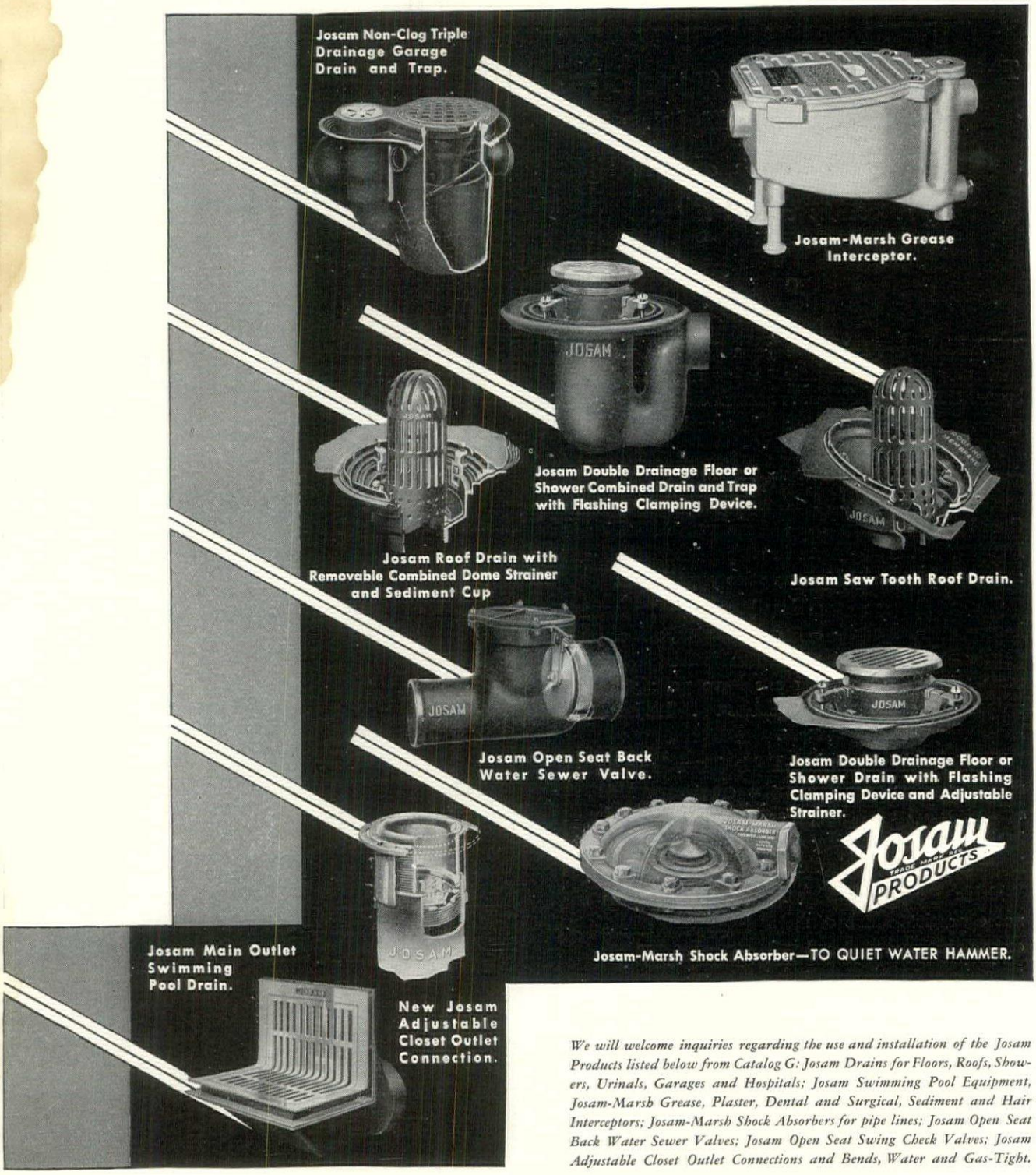
EMERGENCY LIGHTING BATTERY SYSTEMS

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

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

Exide Batteries of Canada, Limited, Toronto

The building industry

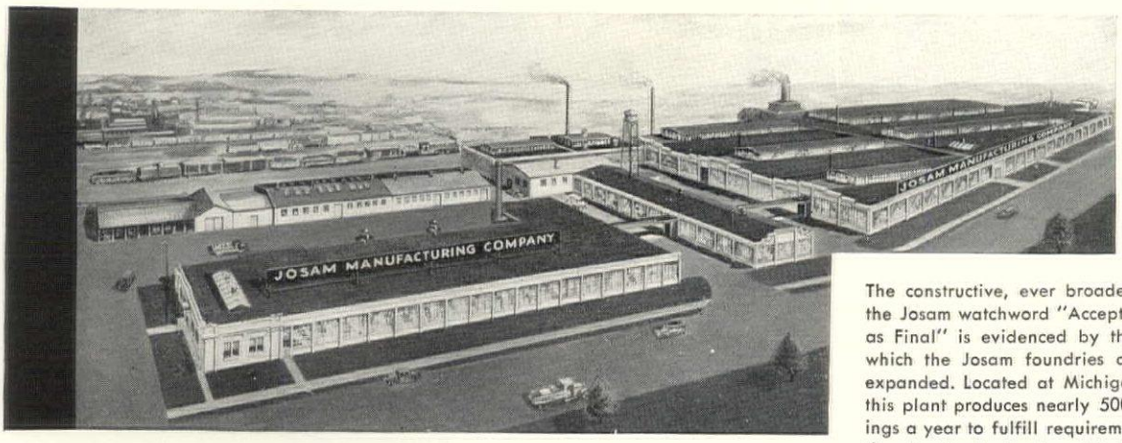


We will welcome inquiries regarding the use and installation of the Josam Products listed below from Catalog G: Josam Drains for Floors, Roofs, Showers, Urinals, Garages and Hospitals; Josam Swimming Pool Equipment, Josam-Marsh Grease, Plaster, Dental and Surgical, Sediment and Hair Interceptors; Josam-Marsh Shock Absorbers for pipe lines; Josam Open Seat Back Water Sewer Valves; Josam Open Seat Swing Check Valves; Josam Adjustable Closet Outlet Connections and Bends, Water and Gas-Tight.

JOSAM PRODUCTS ARE SOLD BY ALL PLUMBING AND HEATING SUPPLY WHOLESALERS

THERE ARE NO SUBSTITUTES

instinctively turns to JOSAM



The constructive, ever broadening influence of the Josam watchword "Accept no Improvement as Final" is evidenced by the proportions to which the Josam foundries and factory have expanded. Located at Michigan City, Indiana, this plant produces nearly 500,000 drain castings a year to fulfill requirements of specifications by hundreds of architects and engineers. Total area of property is 2¾ acres, of which the plant covers nearly 2 acres. Josam growth in so short a time is just another symbol of the achievements of the building industry in the last decade.

YOU may entertain a needless risk in thinking that the building you plan calls for something specially created, when the peculiar necessities of your particular job may be fully met by one or more of the drains comprising the Josam line.

Twenty-four sanitary specialties to May, 1931, (each an engineered device) provide ample assurance that particular requirements covering a wide scope shall be adequately and promptly met without costly experimentation.

To the Josam engineering department, from every part of the country, come the peculiar problems of thousands of architects and engineers. There is a striking similarity in these problems. A majority of them are solved merely by counsel on the application of a Josam sanitary device already in existence—a device engineered by Josam in anticipation of your need.

The completeness of the Josam line is founded upon recognition the building industry accords this practical engineering service. This recognition invigorates Josam pioneering—broadens its scope to serve. Indeed, it is through the offering of problems by thousands of architects and engineers that Josam pioneering is perpetuated. Few problems that come to Josam retain their perplexities because Josam is devoted to a policy of competing against past efforts to produce better products in the future.

Eagerly seeking out the problems that perplex architects and engineers and making them Josam problems, has raised the standard of Josam products and service above the competition of mediocrity. Every one of the twenty-four Josam products symbolizes, to the experienced craftsman's eye, that sense of responsibility for the performance of a product which extends beyond its immediate sale.

Apparently it is considered worthwhile by thousands of architects and engineers to utilize Josam engineering service for the solution of certain sanitary problems. Josam gratefully acknowledges this recognition. Josam representatives are pledged to a policy of practical helpfulness. There is one in your vicinity.

JOSAM MANUFACTURING COMPANY
4907 EUCLID BLDG.
CLEVELAND, OHIO

Factory: Michigan City, Indiana **Branches in all Principal Cities**

Josam TRADE MARK REG PRODUCTS
STANDARD OF AMERICA

SEE OUR Catalogue in SWEETS

FOR JOSAM PRODUCTS

Central America
BANANAS
ARE RIPENED ON DEMAND . . . *in Newark!*

Tropical weather in the heart of a northern winter . . . ripening of bananas properly controlled to meet daily demands . . . this is today's marketing achievement of the food distributing industry. Beneficial alike to Newark, New Jersey or Newark, Ohio.

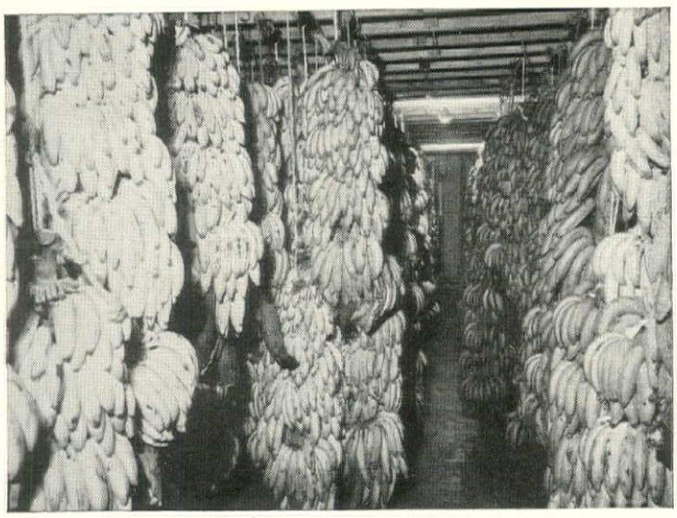
Bananas picked green in Central America are shipped under refrigeration to warehouses here. They are put in ripening rooms containing air which is an exact duplicate of tropical air in warmth and humidity. By controlling these two factors, bananas are correctly ripened according to market demand. Thus the industry economically controls its warehouse "output," eliminates gluts, shortages and losses . . . maintains a steady supply "shock absorbed" to meet a fluctuating demand.

York experience and Air Conditioning Equipment were utilized in engineering and completing the installation of a large number of these ripening rooms.

Air Conditioning and Refrigeration being inseparable, York (for 50 years the refrigerating pioneer) is in a unique position to serve the refrigerating and air conditioning needs of business . . . and to smooth its path to profits.

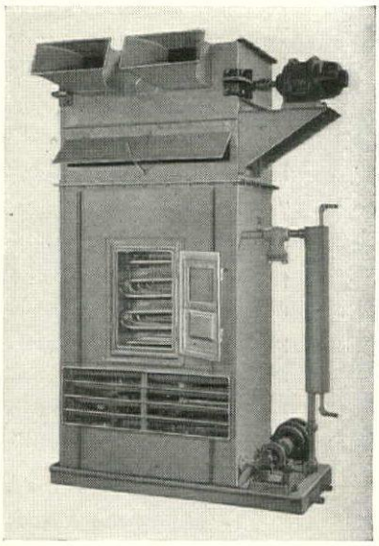
In your own business there may be production or marketing problems that only refrigeration or air conditioning . . . or both . . . can solve. York will be glad to submit an answer. York direct factory branches are in 71 U. S. cities.

YORK ICE MACHINERY CORPORATION
» » YORK » PENNSYLVANIA « «



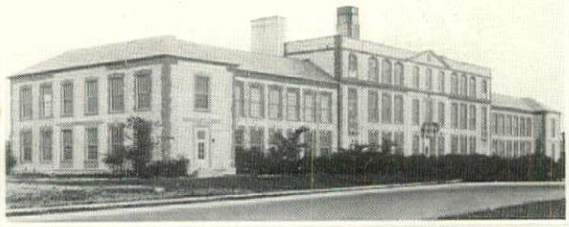
Scene in a banana ripening room in Newark, N. J., where 10,000,000 pounds of Central American Bananas are "schedule-ripened" annually. Similarly, huge quantities are ripened in other "ripening plants" located close to important population centers.

INDUSTRIAL REFRIGERATION DIVISION
•
ICE PLANT DIVISION
•
AIR CONDITIONING DIVISION
•
ICE CREAM AND MILK PLANT DIVISION
•
COMMERCIAL UNIT DIVISION
•
MARINE DIVISION
•
ACCESSORY AND SUPPLY DIVISION
•
EXPORT DIVISION
•
SERVICE AND MAINTENANCE DIVISION



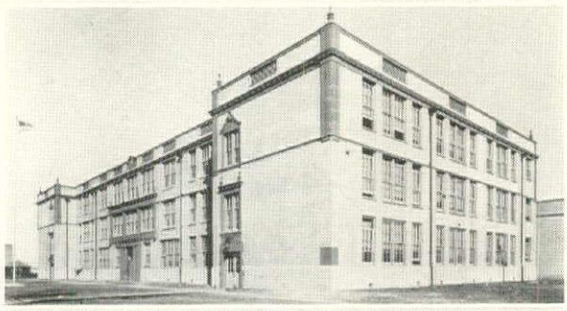
The type of air conditioning unit used in the above plant.

YORK
REFRIGERATION

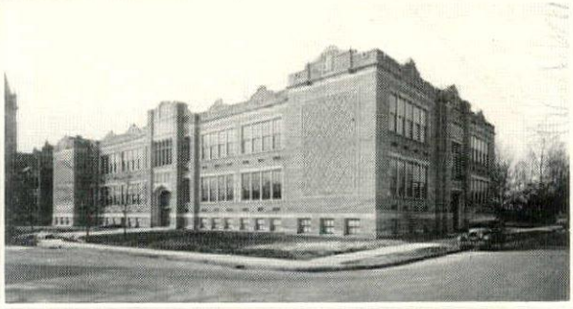


Upper Arlington School, Upper Arlington, Ohio
Architect: Miller & Reeves
Contractor: D. W. McGrath & Sons

Larchmont School, Norfolk, Virginia
Architect: Carlow-Brown & Fitzgibbons
Contractor: Miller Engineering Corp.



Phillis Wheatley High School, Houston, Texas
Architect: Harry D. Payne
Contractor: Bace Construction Co.



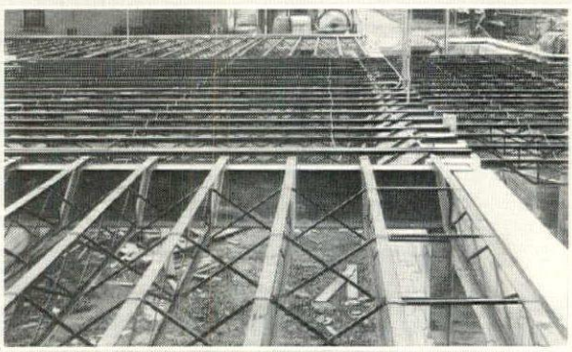
Precious Blood School, Fort Wayne, Indiana
Architect: Pohlmeyer & Pohlmeyer
Contractor: Wm. P. Schenkel

KALMANTRUSS JOISTS INSURE RIGID, FIREPROOF FLOORS FOR SCHOOLS

Throughout the country, a remarkably large number of school buildings are using Kalmantruss Steel Joists and Rigid Bridging in floor and roofs.

Such general acceptance of this construction for schools is convincing proof of its outstanding merit.

The advantages are many. Floors are rigid, noiseless and fireproof. Complete elimination of formwork, faster erection and continuous operations regardless of weather, make this the most economical fireproof floor and roof construction in use.



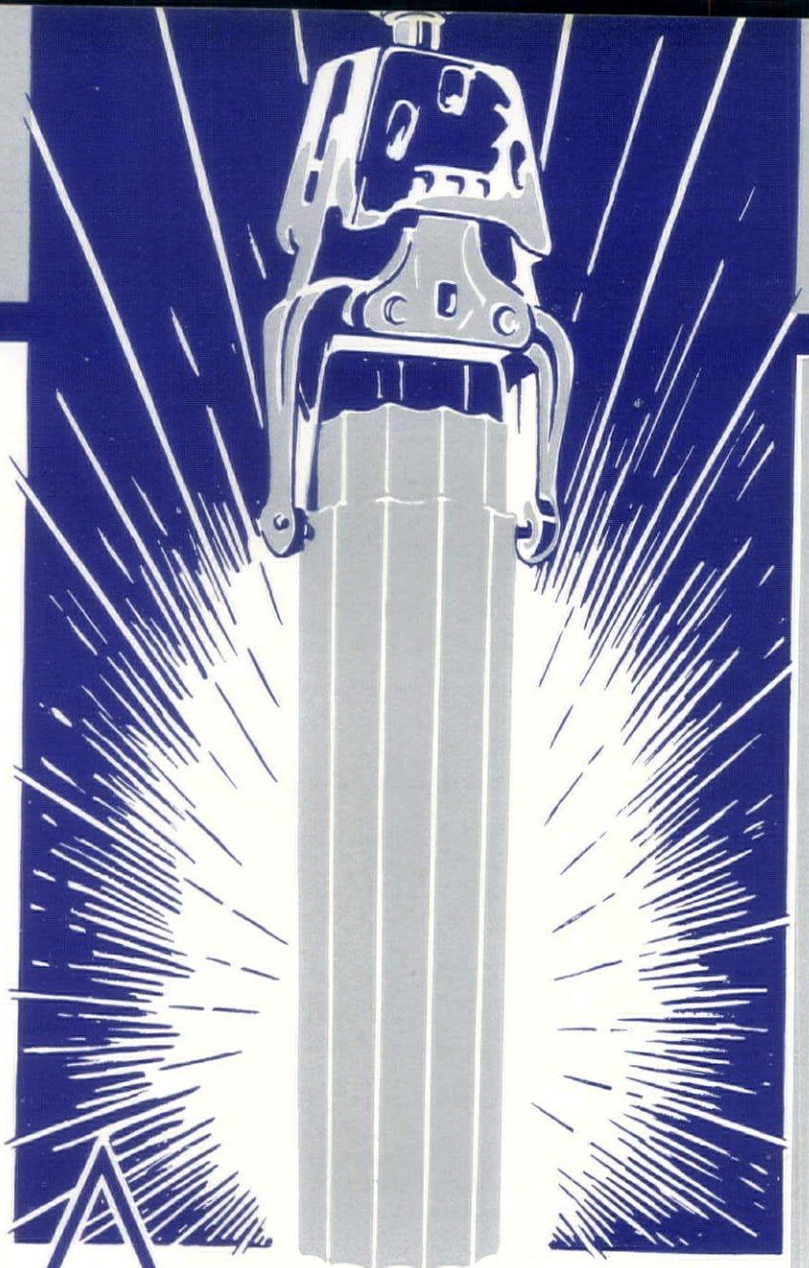
Observe the regular spacing of Kalmantruss Joists and the strong bracing with Rigid Bridging

Rolled from a single piece of steel, the Kalmantruss Joist assures absolute safety at all times. Kalmantruss Rigid Bridging forms a substantial cross bracing which acts both in tension and compression to distribute unequal floor loads. It insures correct spacing of joists and stiffens the entire floor construction.

The above buildings are representative of the many schools constructed with Kalmantruss Steel Joists and Rigid Bridging—also ideally suited for hospitals, homes, apartments and all other light occupancy buildings.

KALMAN STEEL COMPANY

ALBANY · ATLANTA · BALTIMORE · BOSTON · BUFFALO · CHICAGO · CLEVELAND · COLUMBUS · DALLAS · DAYTON
DETROIT · HOUSTON · MILWAUKEE · MINNEAPOLIS · NEWARK · NEW HAVEN · NEW YORK · NILES · PHILADELPHIA
PITTSBURGH · ST. LOUIS · ST. PAUL · SYRACUSE · WASHINGTON, D. C. · YOUNGSTOWN · *EXPORT OFFICE,* NEW YORK



USS Chromium-Nickel Alloy Steels are produced under licenses of the Chemical Foundation, Inc., New York; and Fried. Krupp A. G. of Germany.

A MARK OF CHARACTER for STAINLESS AND HEAT RESISTING ALLOY STEELS

USS

Five of the subsidiary manufacturing companies of the United States Steel Corporation are specializing in the manufacture of high grade Chromium and Chromium-Nickel Alloy Steel products. Communicate with these companies, as listed on the next page, relative to your requirements.

USS

USS STAINLESS AND HEAT RESISTING ALLOY STEELS

CHROMIUM-ALLOY STEELS
Ferritic

USS 12
USS 17
USS 27

CHROMIUM-NICKEL STEELS
Austenitic

USS 18-8
USS 18-12
USS 25-12

Typical Uses:

¶ **AUTOMOTIVE and AERONAUTIC**—For radiator shells, hub caps, lamps, bumpers, moldings, polished parts and fittings, hardware and trim, airplane parts and instruments.

¶ **MANUFACTURING and INDUSTRIAL**—Machinery and furnace parts, dampers, fans, preheaters, pumps, conveyors, turbine blades, nozzles, plungers, and machinery specialties.

¶ **CHEMICAL**—Vats, tanks, stills, digesters, condensers, retorts, paper and pulp manufacturing equipment, circulation systems, and laboratory apparatus.

¶ **OIL REFINING**—Bubble caps, still tubes, linings, heat exchangers, ducts, containers, tanks, agitators, and other refining equipment.

¶ **FOOD HANDLING**—Pasteurizers, tables, hospital and hotel kitchen equipment, restaurant fixtures, cafeteria trays, food preserving and dairy machinery and accessories, ice cream and milk containers and utensils.

¶ **ARCHITECTURAL**—Structural members and supports, hinges and hardware, decorative metal embellishments, flat surface facings, moldings, doors, grilles, panels, and ornamental work.

¶ **HOME APPLIANCES**—Kitchen equipment, cooking and canning utensils, furniture, cabinets, electrical appliances, sinks, plumbing fittings, stoves, ranges, and tableware.

¶ **MISCELLANEOUS**—Packing house equipment, soda fountain counters and fixtures, display cases, humidors, handles, hooks, trays, golf clubs, skates, switch boards, metallic mirrors, laundry machinery, tank cars, railway car parts and fittings, and many other uses where beauty and resistance to corrosion are important factors.

Manufactured by the following Subsidiary Companies of the United States Steel Corporation:

American Sheet and Tin Plate Company
Pittsburgh
Steel Sheets and Light Plates

American Steel & Wire Company, Chicago
Cold Rolled Strip Steel, Wire and Wire Products

Carnegie Steel Company, Pittsburgh, and Illinois Steel Company, Chicago
Bars, Plates, Shapes, Special Sections and Semi-Finished Products

National Tube Company, Pittsburgh
Pipe and Tubular Products

Pacific Coast Distributors: COLUMBIA STEEL COMPANY, San Francisco
Export Distributors: U. S. STEEL PRODUCTS COMPANY, New York City

These stainless and low carbon steels, in a series of appropriate compositions, are a distinct contribution to the requirements of modern arts and industries. To their development and production the subsidiary companies have applied vast resources of equipment, organization, and research, aided by the scientific investigations of the Department of Research and Technology of the Corporation. Furthermore, by direct arrangement with Fried. Krupp A. G. of Germany, the processes and patents controlled by that firm have been made available.

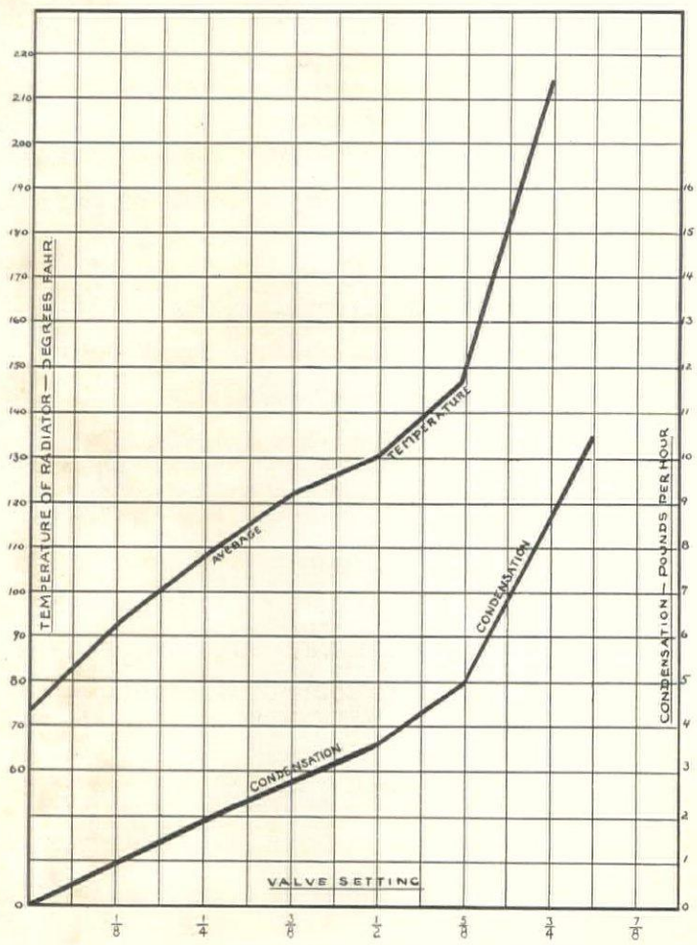
Buyers and users of Chromium and Chromium-Nickel Alloy Steel products are invited to discuss their requirements with the subsidiary companies mentioned above. An interesting booklet describing U S S Alloy Steels will be sent upon request.

The CRYER VALVE Crier

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

Number 10 | New York, N. Y., MUrray Hill 2-7320 | *June, 1931*

The Cryer Valve Gives You "Hot Water" Heat on Steam Systems, and Saves Fuel



How Cryer Valve Cuts Steam Use

(From tests at Vanderbilt University)

Note that the consumption of steam with the Cryer valve wide open is about 10 lbs. per hour on a 40-ft. radiator. But when the valve is open only one-eighth (as on mild days), the condensation is only 1 lb. A saving of 90%.

It is the unique re-circulating effect of the Cryer Radiator Control Valve, as shown by the Flame Test on the right, that effects these great savings. Steam and air in the radiator are used far more efficiently.

You can *feel* the low temperature all over a radiator controlled by a Cryer Valve open one-eighth.

No other valves made can give this effect and such savings because they merely vary the amount of steam admitted, but not the temperature of the part of the radiator that they heat.

Low Temperatures Held in Radiator on Mild Days

Exhaustive tests at Vanderbilt University, charted at the left, show strikingly the great economies in steam consumption given on mild days by the Cryer Radiator Control Valve. Results in actual practice check these figures.

Rooms were heated to a comfortable temperature with the valve open only one-eighth. The radiator temperature was held down to 93°F, and steam consumption was cut to less than one-tenth of the amount when the valve was fully open.

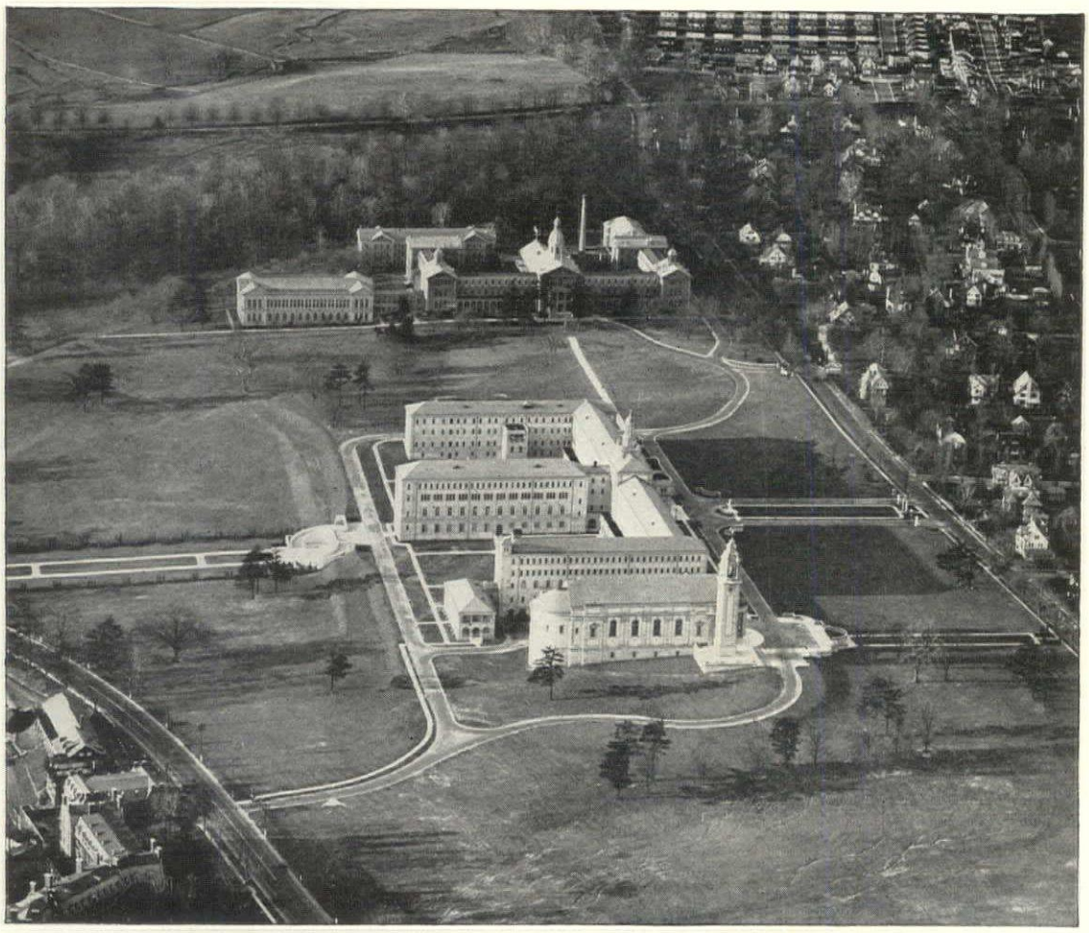
This is a greater saving than can be made by any other known valve.

The low radiator temperatures maintained by the Cryer Valve make two-pipe steam systems (of all kinds) in effect "hot water" systems—at the lower first cost of a steam installation.

See page D 5526 of Sweet's for complete details.

FLAME TEST

A flame is drawn into the sleeve around the Venturi tube, while steam is being emitted. In operation, steam and air in radiator are drawn in, and then recirculated.



The Seminary of St. Charles Borromeo, Overbrook, Pennsylvania

New Group in foreground:
Paul Monaghan, *Architect*
Chambersburg Construction Co., *Heating Contractors*

Alterations to old group in background:
Hoffman - Henon Company, *Architects*
S. Faith & Company, *Heating Contractors*

The Seminary of St. Charles Borromeo

is one of many notable University Groups heated by Webster Systems

Others include Princeton University, Massachusetts Institute of Technology, University of Notre Dame, University of Alabama, William and Mary College, Vassar College, etc.

When the old group (shown in the background) was modernized three years ago the heating system was equipped with Webster MODERATOR Control—in which steam to the entire old group of buildings is actually Controlled-by-the-Weather through a unique Roof Thermostat. Results in terms of fuel economy, enhanced comfort, ease of operation and low maintenance cost deserve the most careful study by university administrators and their architects and warrant the prediction that true Control-by-the-Weather will play an important part in university group heating during the next decade.

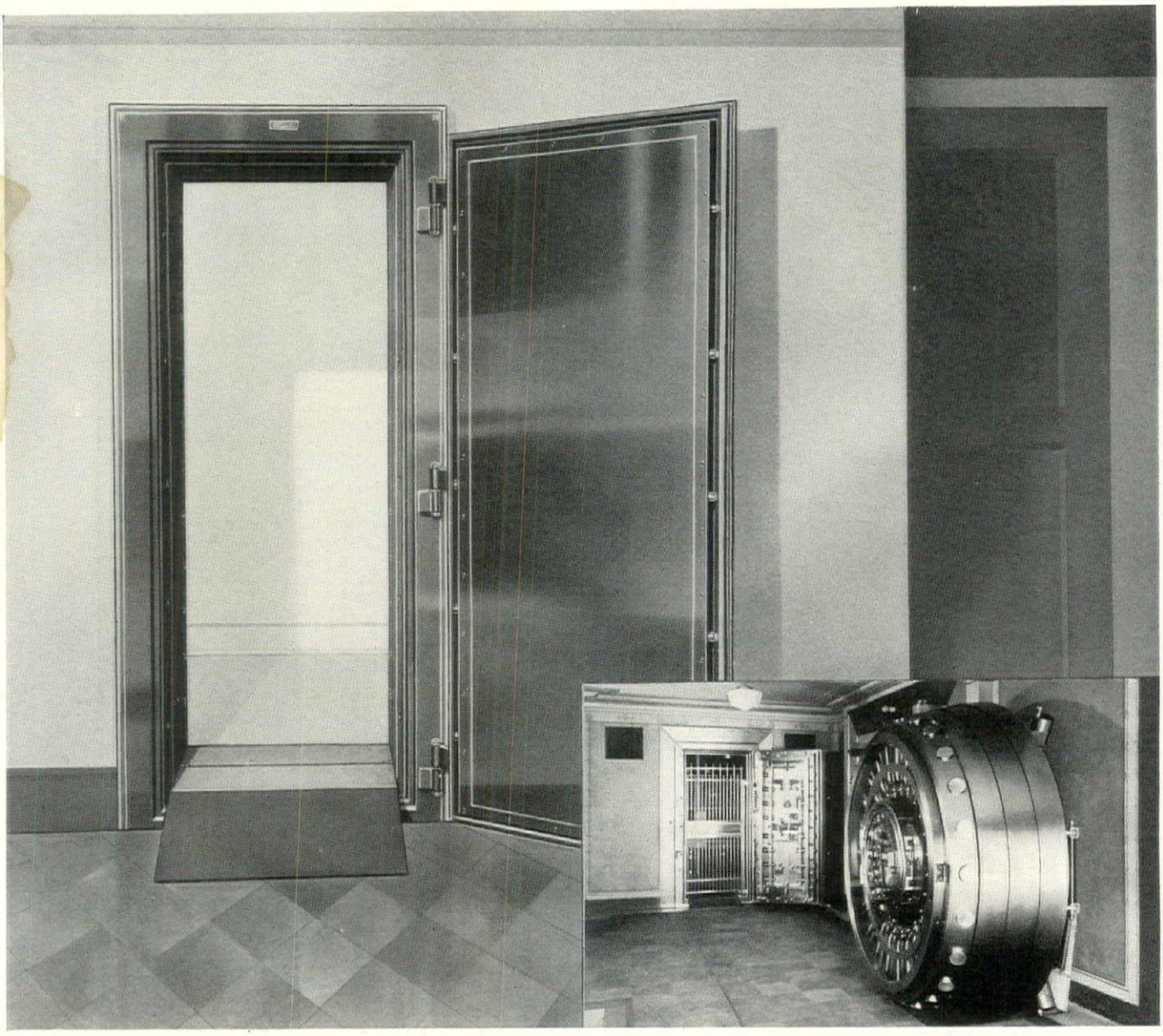
a I 62

–since 1888

Webster

Systems of Steam Heating

For complete details and able cooperation write: Warren Webster & Company, Camden, N. J.



IN GRACEFUL HARMONY WITH

the Architecture

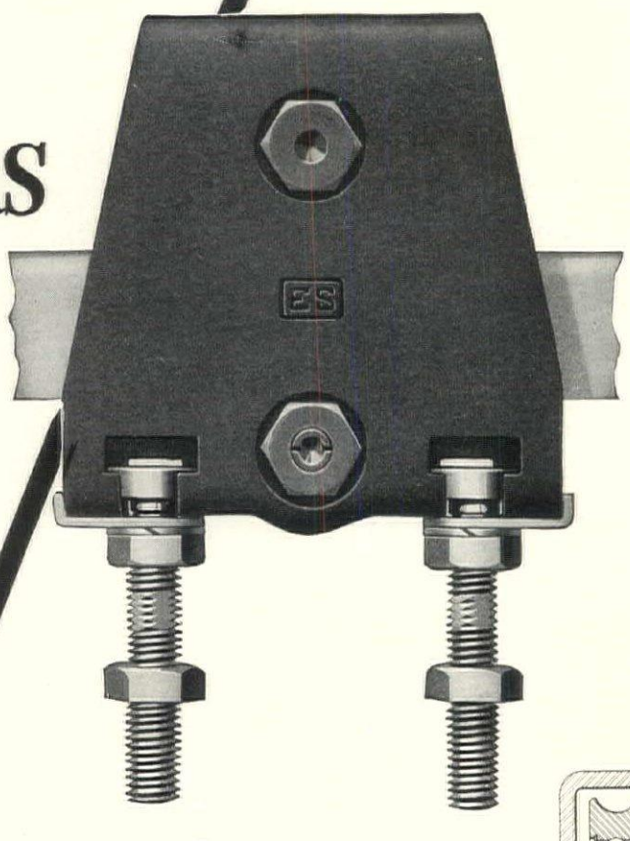
OF THE BUILDING

THE Diebold Vault Door illustrated is designed for severe fire risks. It can be placed without full grouting. A patented offset door jamb provides less bulk and weight, without reducing the protective and fire-resistive qualities of the door. • Diebold Vault Doors are simply and gracefully designed, and harmonize with the architecture of any building. They are made by the makers of the famous Diebold Vaults and Vault Doors for banks. • Diebold engineers are always available for consultation. For specifications and details of Diebold fire-resistive vault doors, see Sweet's Architectural Catalog.

DIEBOLD SAFE AND LOCK COMPANY . . . CANTON, OHIO
SEVENTY YEARS OF BANK SERVICE

specify

ES HANGERS *or equal*



. . . operate elevator doors silently and easily

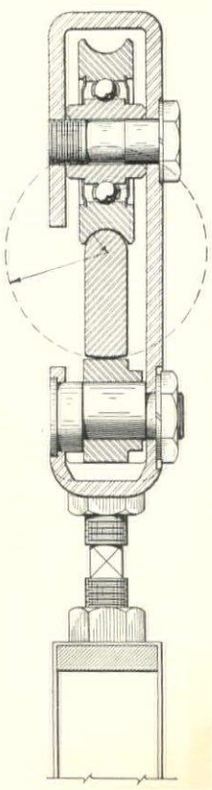
The standard set for elevator service will in a large measure be determined by door operation.

Regardless of how operated, elevator doors must move freely, easily, quietly. Hangers must be sturdy, easily lubricated. They must handle up thrust at the end of door travel; they must roll smoothly. Hangers must operate at minimum maintenance cost throughout the life of the building.

These are rigid specifications. They point to the necessity for careful study of design and construction of hangers —to "ES" for hangers.

"ES" engineers will gladly offer suggestions for your equipment specifications which will assure the kind of service you need.

"ES" or equal in your specifications is for your protection.



ELEVATOR SUPPLIES COMPANY, Inc.

MAIN OFFICE AND WORKS

HOBOKEN, N. J.

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

CANADIAN REPRESENTATIVE

CANADIAN ELEVATOR EQUIPMENT CO., LTD., 92 Sherbourne Street, TORONTO, ONT.

Why Thermoflex TRAPS *are immortal*

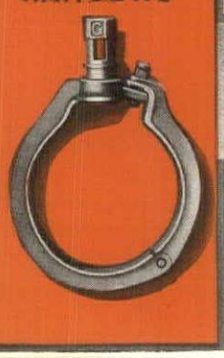
They will outlast the radiator —and even the building itself. Its Hydron bellows will open and close tens-of-millions of times with no signs of giving out.

And that is true of each and every unit. The revolutionary method of forming the bellows avoids all factors which might cause failure—human, metallurgical and manufacturing.

By surviving an internal pressure far greater than the bellows will ever be given in use, each unit is *self-inspected* and *proof-tested* in the making. Never before could a trap be pre-tested by an infallible method. The Hydron bellows is in every Thermoflex radiator trap, drip trap, offset trap and high pressure trap.

Years of unfailing service in all types of buildings and under severe and varied conditions have proved their unfailing value, their uniformly high quality.

HANGERS

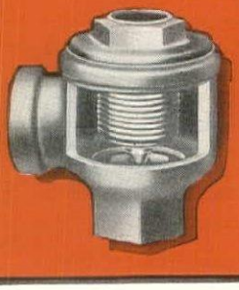


FITTINGS

Pipe fittings, cast and malleable, perfectly threaded, accurately machined and rigidly inspected. Pipe hangers adjustable after the pipe is up. Reduce installation costs and maintenance expense.

This trap, with the famous Hydron Bellows, will operate a radiator for a lifetime without repairs.

THERMOFLEX TRAPS



AUTOMATIC SPRINKLERS

The famous Quartz bulbsprinkler head. In most cases sprinklers will reduce insurance expense from 50 to 90 percent.

Where air dryness adversely affects processes, large savings are made by our humidification equipment.

HUMIDIFIERS

Tested in the making

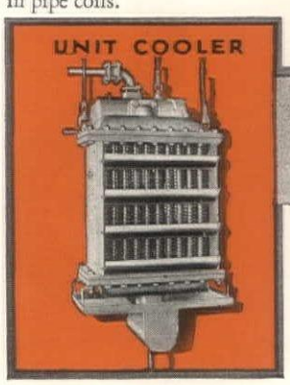
The Hydron bellows would be destroyed in the making if any weaknesses whatever existed in its structure. It is formed from a tube, by tremendous hydraulic pressure internally applied. Since the end fitting has previously been joined to the tube, any bellows which is not destroyed in the making can be truthfully called "immortal".

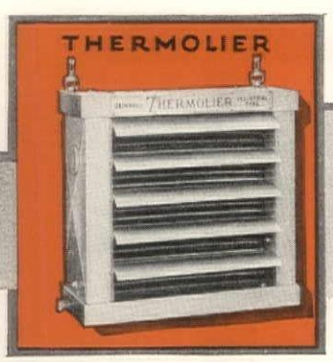
Also Certified Test by the *Pittsburgh Testing Laboratory*. One of their engineers tests each trap under *operating* conditions and affixes a certification tag.

Write for information and catalog to Grinnell Company, Exclusive Distributors. Our sales engineers will work with you to insure permanent satisfaction.

GRINNELL COMPANY
INC.
Executive Office: Providence, R. I.
Branches in all Principal Cities

A revolutionary improvement in refrigeration. It replaces more than ten times its weight in pipe coils.

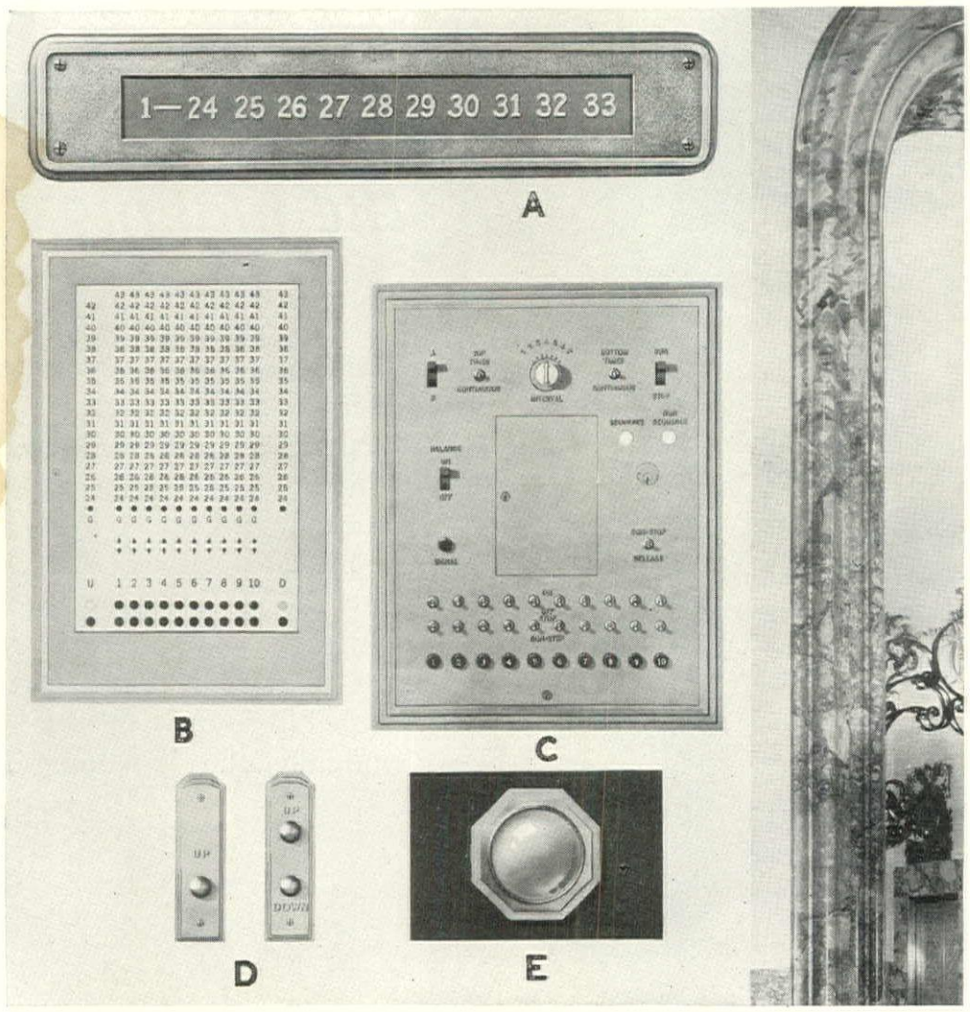


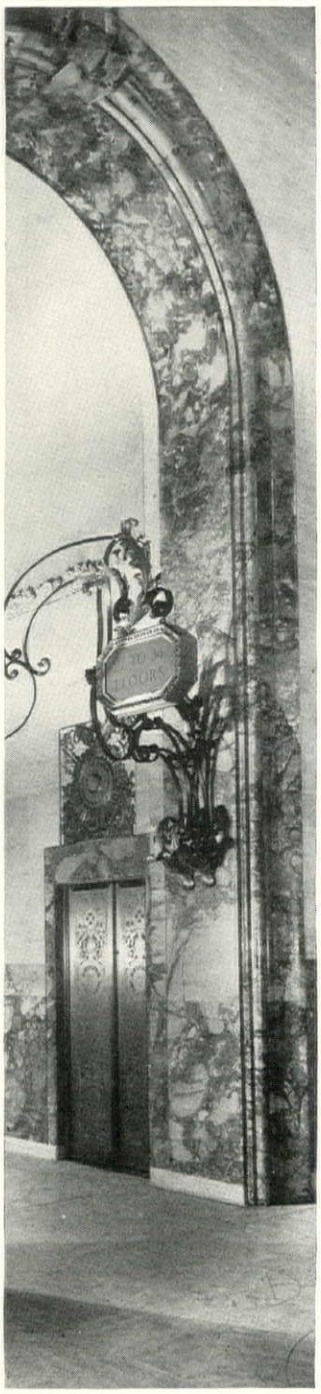


This remarkable Unit Heater is a better and cheaper means of heating industrial and commercial buildings. Heating systems can usually be modernized almost over-night, with a tremendous saving on fuel.

Pipe fabrication, lap joints, pipe bends, forged hangers and welded headers comprise the Triple XXX line for Super Power work. By modernizing to use high temperature steam your yearly savings will often run to five or six figures.

BELOW: *Some signal devices by Otis.* . . . (A) Multi-light position indicator—shows position of elevator to passengers. . . . (B) Starter's indicator panel—shows position and direction of all elevators to starter. . . . (C) Starter's control panel—schedules all cars to meet traffic conditions. . . . (D) Call buttons. . . . (E) Hall lantern.





TO FILL its place properly, an elevator installation must be a smoothly coordinated *whole*, both in operation and appearance. . . . Mechanically, Otis gains this end by manufacturing *all* the equipment necessary to an elevator installation, in each case following a master design conceived as a unit. . . . Artistically, a similar unity can be maintained, following either the architect's or Otis' basic designs. For Otis shops and foundries are fully equipped to produce special ornamental fixtures in any desired metals, alloys and finishes. . . . The signal devices illustrated above give some idea of the way this works out in details of equipment. . . . Such flexibility of manufacture is particularly valuable to the architect, both in the designing of new buildings and the modernization of old.

OTIS

ELEVATOR COMPANY

339 OFFICES THROUGHOUT THE WORLD

ENGINEERED FOR PERFECT WATER-COOLING SERVICE . . .

Refrigeration PLUS!

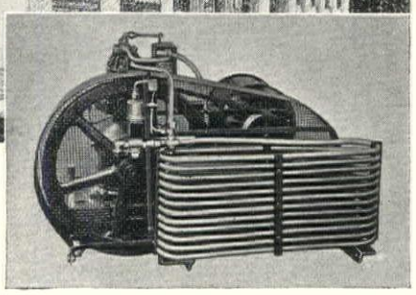
■ Here's the water-cooling system architects and builders have been waiting for . . . quiet, efficient, and economical . . . a new standard of performance for years to come!

IN modern offices and schools, in well-regulated factories and stores, in public buildings of all kinds—you will find Servel Electric Water-Cooling Systems on the job—supplying fresh, chilled water—silently, steadily.

Servel maintains a completely automatic source of palatable drinking water at a correct, healthful temperature. And it does this—day in and day out, summer or winter—without attention or bother.

■ Beautiful wall fixtures and pedestal models are available for installations where the Servel refrigerating unit is operated in a remote part of the building, for either single outlets or circulating systems.

■ The modern skyscraper home of the Central Union Bank in Evansville, Ind., is equipped with a Servel circulating system that provides fresh, chilled water for tenants on every floor.



Because Servel has the extra power to cool water quickly, it costs even less than ordinary water-cooling methods.

Efficient, economical — Servel Water Cooling systems may be readily installed in any building, old or new. Many different types of outlet equipment are available for every requirement.

SERVEL

ELECTRIC REFRIGERATION

■ NEW-STYLE CONDENSERS: *interchangeable; highly efficient.* . . . MULTIPLE VEE-BELT DRIVES: *insuring uninterrupted service and quiet operation.* . . . SIMPLIFIED CONTROLS: *positive action; fully automatic.* . . . ECONOMICAL OPERATION: *low-speed compressors; greater refrigeration for current used.* . . . RUGGED PRECISION CONSTRUCTION: *built for long use, compact and accurate.* . . . WIDE RANGE OF 16 MODELS: *with capacities of 130 to 1510 lbs. ice equivalent per day.*

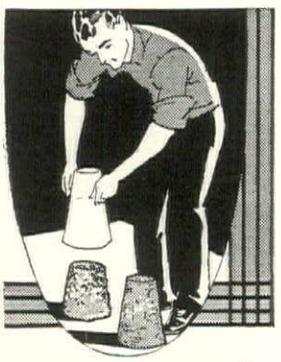
SERVEL SALES, INC., Dept. B-3,
Evansville Indiana.

Gentlemen: Please send me complete information about SERVEL *Refrigeration* PLUS.

NAME .....

ADDRESS .....

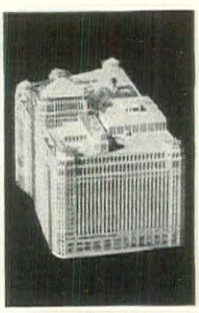
How OMICRON permits the use of a low water-cement ratio



Less water—more strength with Omicron.

City Hall, Los Angeles, Cal. Omicron-protected terrace floors . . Parkinson, Martin & Austin, Architects.

Over 550,000,000 square feet of Masterbuilt Floors have been installed in Master Builders' twenty-one years successful record as America's pioneer and leader in specialized concrete protection and decoration.



Merchandise Mart, Chicago, Illinois. Master Mix floors throughout. Graham, Anderson, Probst & White, Architects

OMICRON (the discovery of Master Builders Research Laboratories) adds to the plasticity of cement mixes without diluting the paste and reducing potential strength. Hence a low water-cement ratio can be used without sacrificing workability and speed.

Added plasticity is but one advantage accruing with the use of a Master Builders Omicron-containing hardening, coloring or water-proofing admixture, for Omicron also checks corrosive disintegration, increases strength and makes a smoother, denser floor finish possible.

Outstanding is the resistance to corrosive disintegration achieved through Omicron's action in largely replacing waste soluble salts (the point attacked by corrosive agents) with useful cementitious products that are highly insoluble.

Protection against corrosive disintegration is a recognized necessity in all industrial and certain commercial buildings; a prudent precaution in buildings of every type. For mild corrosive agents are universally present.

Omicron's practical value has been demonstrated both by laboratory tests and field observations. Over 43,000,000 square feet of Omicron-protected Masterbuilt Floors are giving daily testimony to the finer surface, the greater strength and the high resistance to both corrosion and abrasion that a Master Builders Omicron-containing admixture alone can give.

Complete technical data on Omicron will be submitted upon your request.

OUR CATALOGUE IS FILED IN SWEET'S

OMICRON
available exclusively as a basic ingredient in

Metalicron:	Integral water absorbent metallic hardner. For heavy duty industrial floors. Plain, colored or slip-proof.
Master Mix:	Liquid integral hardener for commercial floors. Hardens, dustproofs and waterproofs.
Colored Masterbuilt Floors:	Integral coloring, hardening, dustproofing and waterproofing ad-mixtures. Three types.

"write corrosion resistance into every concrete floor specification"

The MASTER BUILDERS Co.

FACTORIES: CLEVELAND, BUFFALO, IRVINGTON, TORONTO

CLEVELAND, OHIO

SALES OFFICES AND STOCKS IN ALL PRINCIPAL CITIES

IN CANADA: THE MASTER BUILDERS COMPANY, LIMITED, TORONTO AND MONTREAL.

NEXT MONTH'S FORUM

THE PLATE SECTIONS of the July issue present a wide range of architectural subjects. Among them will be an especially well-planned high school, three houses—one of them by FRANK J. FORSTER—a parish church, a small college dining hall of unusual character, and a bank and office building. This last—the City Bank Farmers Trust Building in New York, for which CROSS AND CROSS were the architects—is especially well illustrated, and will be a valuable reference for work of this kind. Each plate section comprises a monograph of its subject, designed to facilitate filing.

ADEQUATE and economical housing is a question of the utmost importance, especially to the architect, since it is concerned directly with one of the fundamental phases of his business. "The Small House—A Problem To Be Solved," by NORMAN N. RICE, states a broad and logical view of the subject. Frankly, it is a controversial discussion, and its presentation offers to the architect an interesting challenge in both thought and action. Such challenges are the roots of progress, and now, as always, the pages of THE ARCHITECTURAL FORUM present the best in current professional thought.

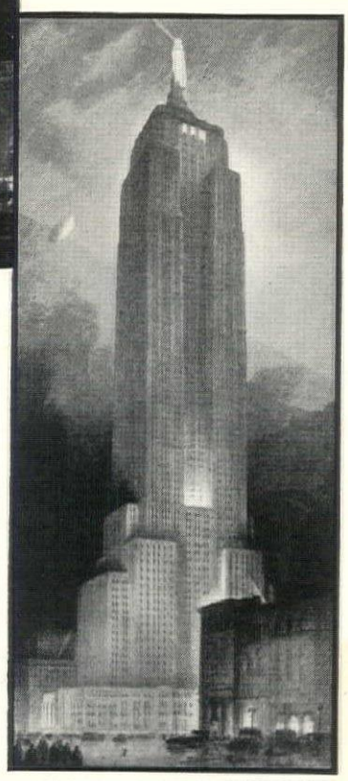
CONSISTENT with our policy of complete presentation and analysis is the survey of the mechanical equipment in the City Bank Farmers Trust Building. It is in effect a compact study of the best practice in the mechanical service of a tall building, as well as an outline specification of materials with the reasons for their use. In addition, the article contains pertinent information regarding special features of foundation work. The charts, pictures and drawings have been placed to clarify the text, which gives the subject an added value as a means of reference.

COMPARATIVELY little is known regarding the thin-shelled concrete structures recently built in Europe. In "Spiderweb Concrete in Europe," MAJOR EUGENE W. STERN explains not only the technical points of the structural design of such buildings, but also the method of their field construction. Many of the things that he describes are applicable to work in this country, and the article, with its numerous illustrations, should mean much to a progressive architect.

OF particular timeliness is an article by a member of our own staff, JOHN CUSHMAN FISTERE. "The Modernized Office Building" is a practical study of financial methods, construction practices, and means by which the architect may promote business of this kind. Examples of actual projects are given, illustrated by plans and charts.

THE *World's* LARGEST *the World's* TALLEST *both* GUARDED BY G-E RIGID CONDUIT

CHICAGO MERCHANDISE MART
Architect Engineer . . . Graham, Anderson, Probst & White
General Contractor . . . John Griffiths & Son Company
Electrical Contractor . . . A. L. Shulman Electric Company
(*all of Chicago*)



THE EMPIRE STATE BUILDING
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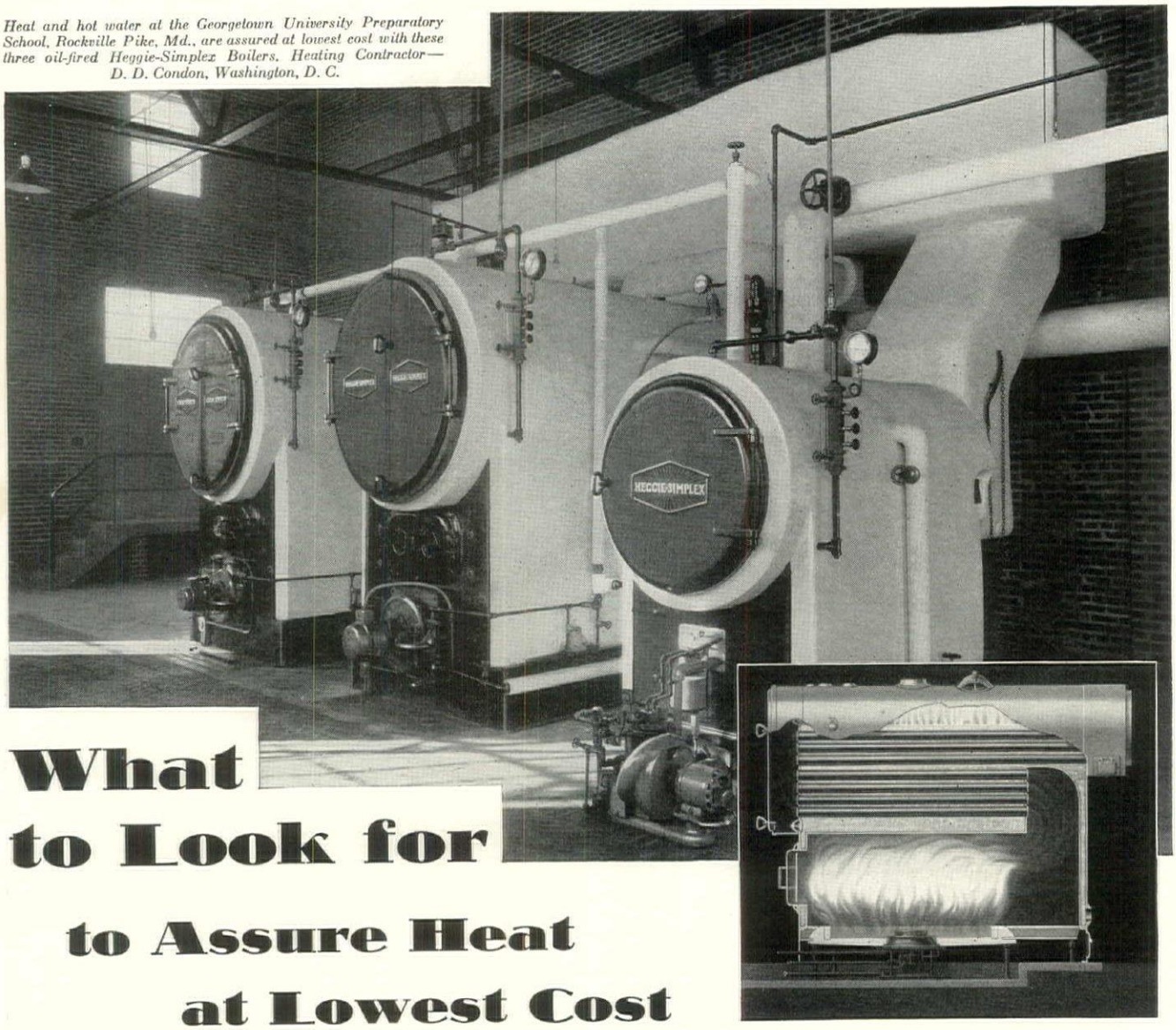
Heat and hot water at the Georgetown University Preparatory School, Rockville Pike, Md., are assured at lowest cost with these three oil-fired Heggie-Simplex Boilers. Heating Contractor—D. D. Condon, Washington, D. C.



What to Look for to Assure Heat at Lowest Cost

Architects and engineers who watch boiler performance carefully recognize four features of design as indispensable to operation at lowest cost.

"Does the boiler," they ask, "give fuel plenty of room to burn?" "How much of the heating surface is in direct contact with the fire?" "Are the gases stripped of heat before they reach the chimney?" "Does the water circulate freely?"

In Heggie-Simplex Boilers, the fire-box or main chamber is extra large. *Fuel* has *plenty of room* to burn. A spacious secondary combustion chamber, at the rear, provides additional space necessary for *complete combustion* of the *valuable* gases. Water legs surrounding these compartments assure the maximum of heating surface in *direct contact* with the fire. Heat is absorbed the instant released.

Numerous rear-front-rear *tubular flues strip the gases* of all usable heat before they reach the chimney.

The water in Heggie-Simplex Boilers—in water legs (front, rear and side) and in the barrel—is *in one body*. No restricted passages to impede the free flow of the heat to the outlet.

Built of steel, electrically-welded into one seamless, crack-proof unit, Heggie-Simplex Boilers are simple to install and economical to maintain. For complete facts, write Heggie-Simplex Boiler Co., Joliet, Ill. Member of the Steel Heating Boiler Institute.

1. **Extra large fire-box**
2. **Secondary combustion chamber**
3. **Numerous rear-front-rear tubular flues to strip gases of heat**
4. **Single body of water free from restricted passages**

HEGGIE-SIMPLEX
STEEL HEATING BOILERS

THE
ARCHITECTURAL
FORUM

VOL. LIV, No. 6 JUNE, 1931

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PART I—ARCHITECTURAL DESIGN

PART II—ARCHITECTURAL ENGINEERING AND BUSINESS

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

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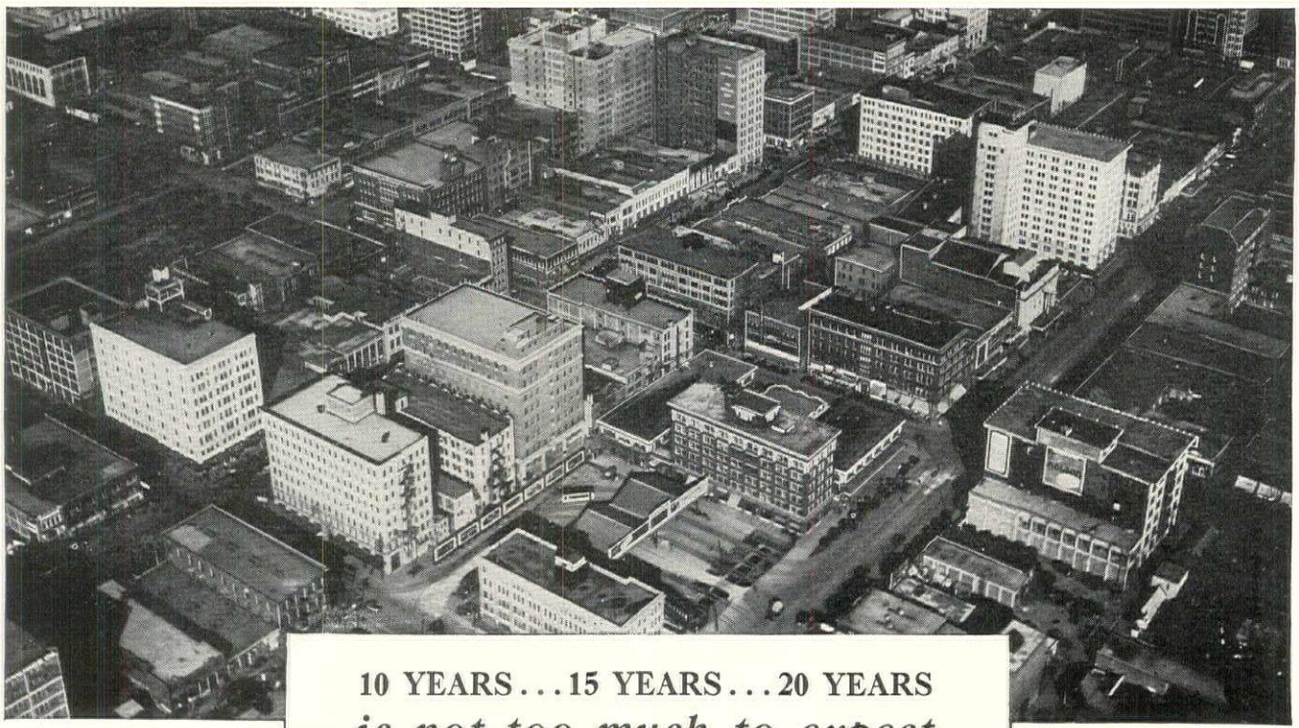
IF ROOF INSULATION HELPS CLIENTS TO SECURE LONG LEASES

It's good roof insulation!



Each roof you see needs insulation that resists moisture. This is a sky-view of Oklahoma City, Oklahoma.

10 YEARS . . . 15 YEARS . . . 20 YEARS
is not too much to expect of insulation that is moisture-resistant

YOUR client, the building owner, finds it unprofitable to rent offices to short-term tenants. It is equally unprofitable to protect his roof with short-term insulation. It's just a case of wasting money and hunting trouble. Getting permanent protection merely means demanding insulation that really resists moisture. For insulation that readily absorbs moisture quickly loses its efficiency.

This resistance to moisture is one of the first things you get when you specify Armstrong's Temlok. Moisture resistance is an outstanding characteristic of the resin-impregnated heartwood fibres of the Southern yellow pine. These supercharged fibres are fabricated into Temlok, an insulating board that permanently resists moisture, and thus is permanently efficient. Its high efficiency is maintained even after years of service. Top-floor comfort is sealed in. Fuel is saved. The roof deck is protected.

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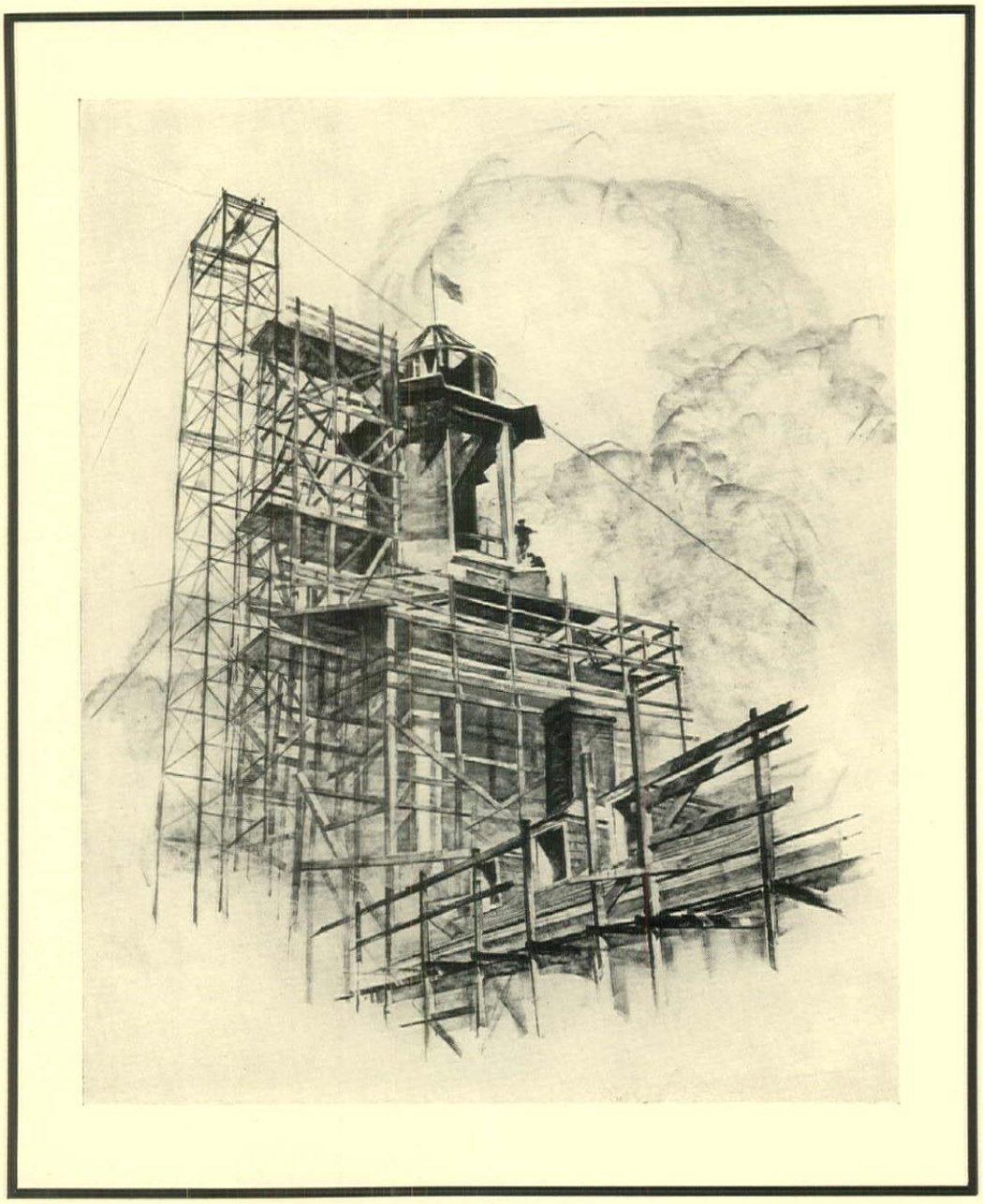


CUPOLA CONSTRUCTION

FROM A FIELD SKETCH OF ELLIOT HOUSE, HARVARD UNIVERSITY BY CONSTANTIN A. PERTZOFF

THE
ARCHITECTURAL
FORUM

VOLUME LIV NUMBER SIX

JUNE 1931

THE UNIVERSITY LIBRARY

BY

JENS FREDRICK LARSON

THE functions of a college library are to obtain, catalog and shelve printed matter; produce the information contained therein speedily on demand; display and make known its contents; provide suitable and comfortable space for reading and study of various sorts; and by architectural dignity and beauty suggest the importance of the printed word.

In order to fulfill the effective accomplishment of an educational institution, the library must, in a very real sense, be, both intellectually and physically, its center. Inasmuch as it contains reference material, it should be so located that it is equally accessible to all college departments.

GENERAL BUILDING PLAN

The library building should be planned to accommodate at least 50% of the student enrollment of the college in the total seating capacity of its reading rooms and stack. It should contain facilities for the accession and storage of books, the lending of books, their use within the building, various specialized forms of service, and the efficient administration of the plant as a whole.

It is well to consider the book storage and service to the books a feature distinct from the rest of the library, to be designed as a unit which is shut off from the circulation of the rest of the building.

THE STACKS

Publications may be obtained from the various manufacturers giving full and complete data on the latest and most efficient development of book stacks. In general, modern library stacks are fairly well standardized in dimensions, the stack height being 7′ 6″ from the floor of one deck to the floor of the next, with the bottom shelf 11″ wide and the other shelves 9″ wide. The stacks are spaced 4′ 4″ o.c. and made up of 3′ 0″ sections.

Inasmuch as the modern stack does not depend on window lighting, the outside windows should be used for tables, carrels, and faculty studies. It is more economical to build the block of stacks from the ground up on its own foundation.

A two story and basement building will accommodate six or seven stack tiers; two to basement, two or three to first floor and two to second floor. Stack tiers can be grouped in sections of two or three floors and vented to prevent draughts.

There are two general classes of construction: namely the stack with cast iron supports, and those built entirely of pressed steel. The stack with cast iron supports is more expensive, but it is recommended because of smaller liability to defacement, simplicity of maintenance, open construction and quietness.

FUTURE GROWTH

The stack structure should be planned on the basis of the unit construction of the stack manufacturers so that all parts will be interchangeable for future expansion. The stack should be in such a location that it can be expanded at will, either horizontally or vertically. In planning the capacity of a library stack, one should allow 25% greater capacity, on the basis of seven volumes to the running foot, than the number of books asked for. This allows for 25% eventual growth.

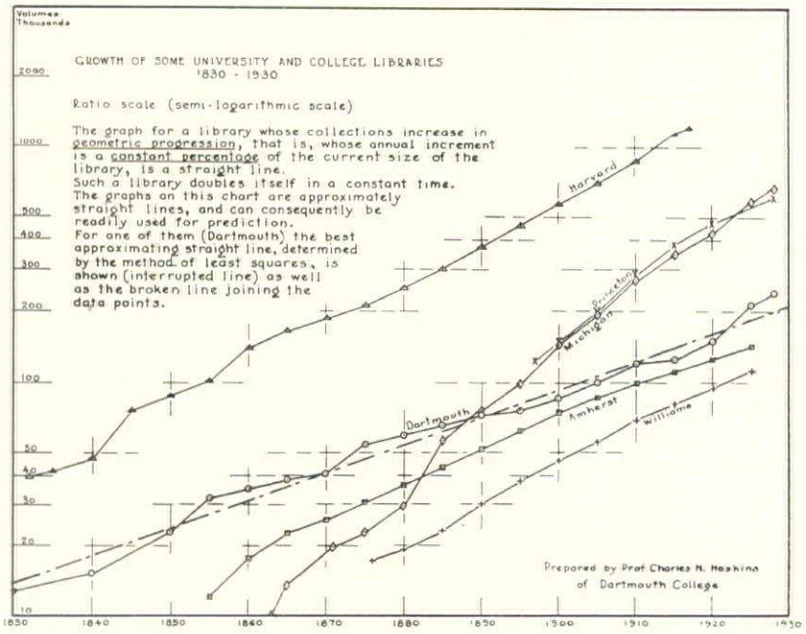


Fig. 1. The growth chart, one method of predicting future space needs of the library stack room

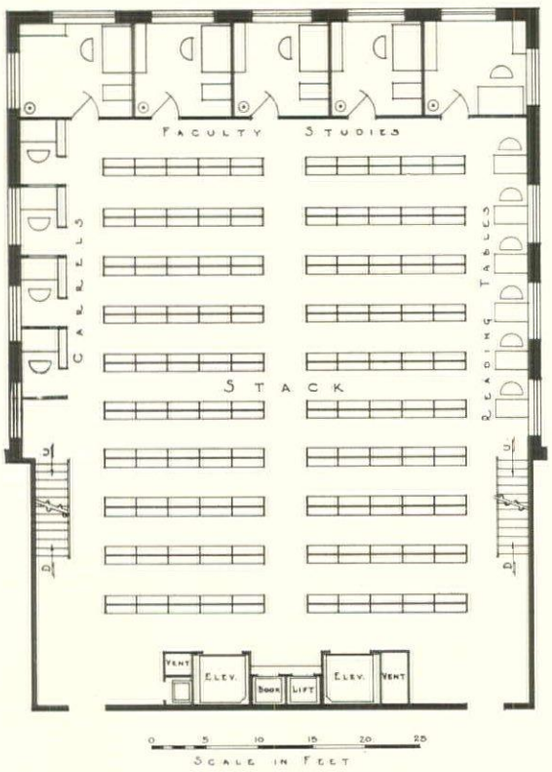


Fig. 2. A stack room plan, showing the student research carrels separated from each other by screens. The studies at the end of the room are allotted to various members of the faculty for use in the preparation of courses or for research work. The furniture shown on the plan is all that is required,—a desk, chair, filing cabinet and a coat tree

It does not mean, however, that any stack tiers will be empty, because the librarian, in allotting his books to the stack, allows for expansion in each subject for current growth. The books, therefore, even with 25% additional stack capacity, seem to fill the stack except for the lower shelves which are for new books as they come in.

The future growth of the stack, however, cannot be accurately predicted. The maximum yearly growth of a number of libraries seems to be 6% of the book capacity; the minimum yearly growth 3%. Certain libraries, such as Michigan and Princeton, practically double the number of volumes in their libraries every ten years; Harvard, every twenty-one years, and Dartmouth every twenty-three years. (See Fig. 1.)

STACK FLOORING

It is important that the flooring of the stack be of as light colored material as possible, so that the artificial light at the ceiling will be reflected up on the bottom rows of books.

White marble, although expensive and difficult to keep clean, has the advantage of providing a diffuse reflecting surface on both faces, which assists materially in the lighting of the stack aisles. Cast iron is relatively inexpensive but noisy. Glass, which transmits some light from one level to the next, is slippery and, therefore, dangerous. Slate is relatively inexpensive, is quiet, and is not slippery; but on account of its dark surface it does not aid by diffuse reflection in the lighting problem, and it is very difficult to keep clean.

A thin concrete slab with light colored rubber tile or cork composition tile would seem to be the

best material for stack flooring from the standpoint of light reflection, noise reduction and maintenance.

STACK USE

At the end of the stack on each level carrels should be provided for student research. The carrels, each furnished with a table and chair, should be screened one from the other and shut off from the stack by a low case to contain folios and the larger size books. (See Fig. 2.)

It is important to provide members of the faculty with an opportunity to carry on research work or the preparation of their courses in close proximity to their book material. For this purpose a number of so-called faculty studies may be provided off each tier of the stack. Sufficient rooms to care for one-fourth of the faculty should be provided. These studies are not administrative offices nor places for consultation, but are merely cubicles for individual study to which a member of the faculty may retire, secure from interruption of any kind. They should be assigned with the idea of placing the occupant as closely as possible to the level containing the material in which he is interested.

The construction should be sound-proof, and the furnishings consist merely of a desk, chair, filing cabinet, and coat tree. There should be no telephone connection, and only noiseless typewriters should be allowed.

NEWSPAPER STORAGE

Bound volumes of newspapers, because of their size and weight and also because of the poor quality of the paper on which they are printed, require special storage facilities. They must be laid flat on the shelves instead of being stacked in a vertical position. This requires a separate shelf for each volume or for, at most, each two or three volumes; only in this way can the books be properly preserved and made readily available for use. This stack room could well be located opening from the Reserve Book space for reference purposes.

A certain amount of dead storage must be provided in any library for books which should be temporarily or permanently retained by the library, but with which it is undesirable to cumber the operating stacks.

SERVICE PORTION

THE DELIVERY DESK. The control point between the storage, service of books and the general use of books, in reading rooms or for outside use, is the delivery desk.

The desk itself should be ample to accommodate a corps of trained library workers and have sufficient working space behind it for desks and temporary book storage for returned books previous to their replacement in the stack. One cannot be too emphatic in saying that most libraries allow insufficient space behind the delivery desk for services which develop with better management. (See Fig. 3 for delivery desk and work space.) This working space should have direct access to the Accessions Room and the Catalog Room, and also be in close proximity to the card catalogs.

CARD CATALOGS

The card catalog should be thought of as part of the service of the delivery desk and should be placed in close proximity to it, and also where it is easily accessible to the cataloging room.

The card catalog drawers may be contained in cases and serve as part of the furnishings of the main lobby of the building; or the drawers may be fitted into the partition between the public portion of the library and the catalog room, so that they are accessible to either side. A disadvantage of the latter method is that drawers are too often missing while in use in the catalog room.

Where card catalogs are in the lobby, high

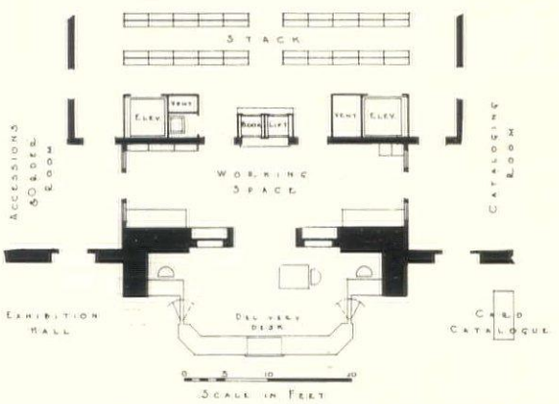


Fig. 3. Plan showing relation of delivery desk to work space, stacks, card catalog, etc.

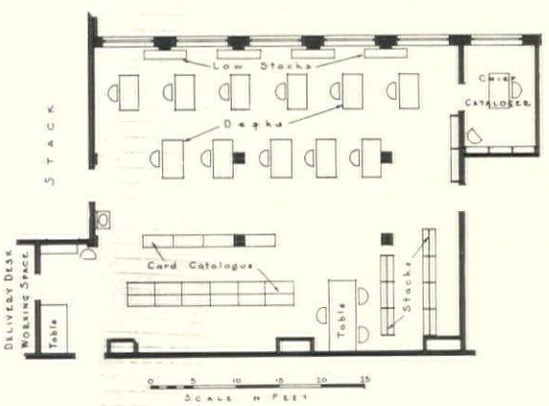
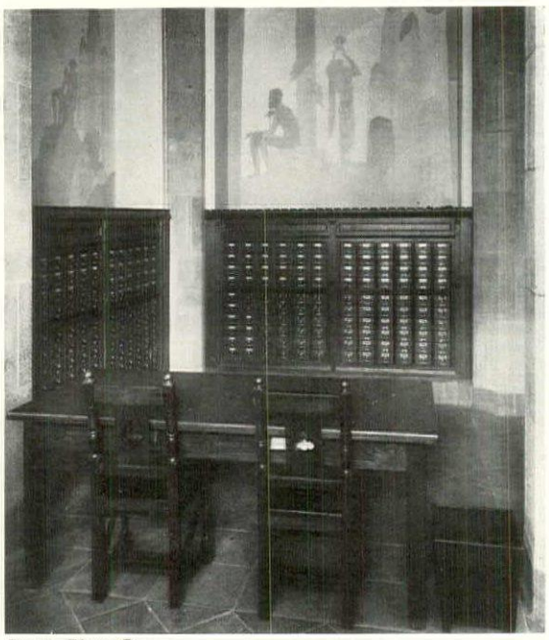


Fig. 4. Cataloging room for a library of 500,000 volumes



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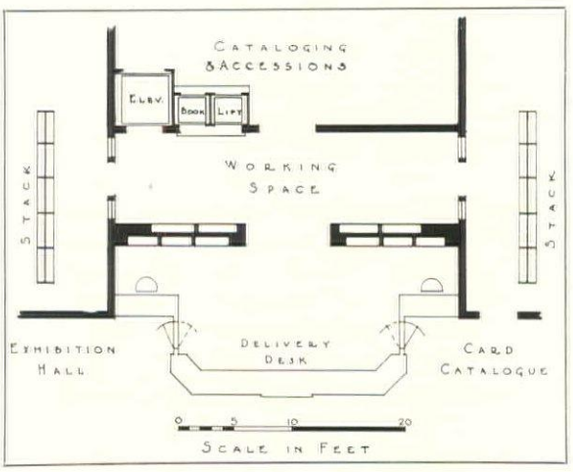


Fig. 5. The plan is of a delivery desk arrangement for a small library. At the left is shown a card catalog. This may be of a special design except for the catalog drawers which are of a standard size

tables should be placed between each cabinet for the use of the catalogers in their work and for the convenience of persons consulting the drawers.

Catalog drawers are standard and can be fixed to cases of special design.

CATALOG ROOM

The Catalog Room should be so located as to have direct access to the card catalog and should be of sufficient size to accommodate a staff adequate to handle the amount of books housed in the library. (See Fig. 4 for a typical layout of this room.) Future expansion, made necessary by greater book capacity, should be provided either by a mezzanine or by greater floor area which can have other use temporarily.

SERVICE ROOMS

Opposite the Catalog Room in the service portion of the building, space should be allotted for the Accessions Department. Off it, on a public corridor, should be the Order Office where new books are handled for the faculty.

Under the Order Room, with access from service drive, should be a Receiving Room of ample dimensions for the reception of crated books and the unpacking and temporary storage before delivery to the Accessions Department. Off this room should be provided an incinerator in which the vast amount of wrapping paper and packing can be burnt.

In small libraries, the Catalog and Accessions Rooms can be combined, care being taken to retain relationship with other services. Such an arrangement is shown in Fig. 5.

Provision should be made in the basement for building service rooms to house steam controls, hot water tank, vacuum cleaning apparatus, automatic control apparatus and the main electric system distribution boards; also office and supply room for the janitor or building superintendent.

The service portion of the building should be absolutely fireproof in construction, including exterior windows, interior trim and fire doors to public portion of plan. It should have internal staircase circulation, and should be equipped with fire-resisting furniture.

READING ROOMS

A careful study of modern library uses seems to show that very large reading rooms or rooms of monumental character should be avoided in planning a library, because of the impression produced by their size, and also because of the noise and confusion which are inescapable in such rooms. Furthermore, the various functions of the library can be most effectively exercised in separate rooms.

It is also important, if property restrictions do not limit the plan, to have windows on two sides and one end of the reading rooms for better distribution of reading tables.

REFERENCE READING ROOM

A most important function of a library is to provide a comprehensive collection of reference books and bibliographical aids of various types under the charge of a trained reference librarian. This room, which will be used mainly for research, should be located near the main circulation of the building, but should be easily

accessible to the Cataloging Room for the convenience of the cataloging staff. Alcoves and galleries give greater book capacity and add much to its charm. The cases which form the alcoves in this room need to be especially designed to take over-size books such as encyclopedias, atlases, etc.

Since a great number of readers do not use the room at one time, a table for two readers in each alcove would be sufficient, with the addition of a long library table in the center of the room.

If possible, a map and chart room should be a part of this service.

PERIODICAL ROOM

To display and make accessible to the reader the current numbers of a large collection of periodicals is one of a library's important functions. It is well to place the Periodical Room near the Reference Room in order that the same custodian may serve both.

Many libraries store their periodicals in closed cabinets from which numbers are issued on request. This method has the advantage of preventing loss, but an argument against it is that the periodicals are not displayed so as to attract attention of readers who may visit the room for any purpose. For this reason it is advised that periodicals be installed on shelves of open cases as shown in Fig. 6, the contents of which may be seen at a glance. The cases may be placed about the walls on either side of windows to form attractive alcoves, giving a certain atmosphere of privacy to a reader and encouraging him to browse among the material before him.

The current magazines are usually filed on shelves for a six months' period, after which they are bound and placed in the stack.

For further display and examination of the magazines, the center of the room should have large tables, approximately 3'-6" wide and 12'-0" long with chairs spaced 3'-0" on centers to allow plenty of room to spread out the magazines.

The architectural treatment of the room should be simple with restful color effects, and perhaps a sofa before a fireplace and a few lounge chairs to give an informal and comfortable atmosphere for the enjoyment of the more popular type of magazine.

STUDY ROOM

A general reading room or study room should be provided. In the case of a co-educational institution, separate study rooms are advisable for each sex. Its purpose is to allow students, who are disturbed in their dormitories and fraternity houses, to have one place in the college where they can study with absolute quiet. Small tables about 3 feet square to seat two, should be placed about the walls so as to take advantage of the window light, and larger tables, with chairs spaced 2'-3" on centers, should be in the center of the room, with a few round tables to break up the monotony. This room may be similar in treatment to the Periodical Room.

TREASURE ROOM

A room should be provided to house the collection of valuable manuscript material and rare books which a library possesses. The book shelves should be protected by metal grilles or glass under lock and key, and glass-topped tables

Comm. Photo Co.

A reading room in the Fisk University Library at Nashville, Tennessee. Henry C. Hibbs, architect. Tables and table-lamps for reading rooms are shown in Fig. 7 and Fig. 9

should be provided for the display of manuscript, book plates and other similar material. There is small need of reading accommodation here as material for popular display would be shown in the main lobby.

In connection with the Treasure Room there should be a vault for the storage of books and records, and working space for assembling various collections of book plates, etc.

The Treasure Room is best located near the librarian's suite where an attendant is always on duty during library hours.

LECTURE ROOM

A small lecture room, sufficient to accommodate the entire staff, should be provided for lectures on library instruction, and other similar purposes.

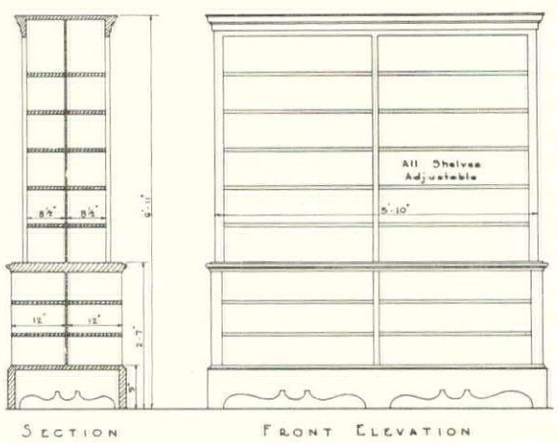


Fig. 6. Details of a periodical case. This type is considered the most advantageous as it leaves the periodicals open to view and thereby attracts the interest of the readers

EXTRA-CURRICULAR READING ROOM

This room is designed primarily for recreational reading, and offers an opportunity for the various departments to popularize their subjects by the display of interesting and descriptive books on subjects pertaining to their courses, each group in a separate alcove. Scattered on tables throughout the room are choice books with beautiful illustrations and bindings, and also the better modern fiction and books of general interest.

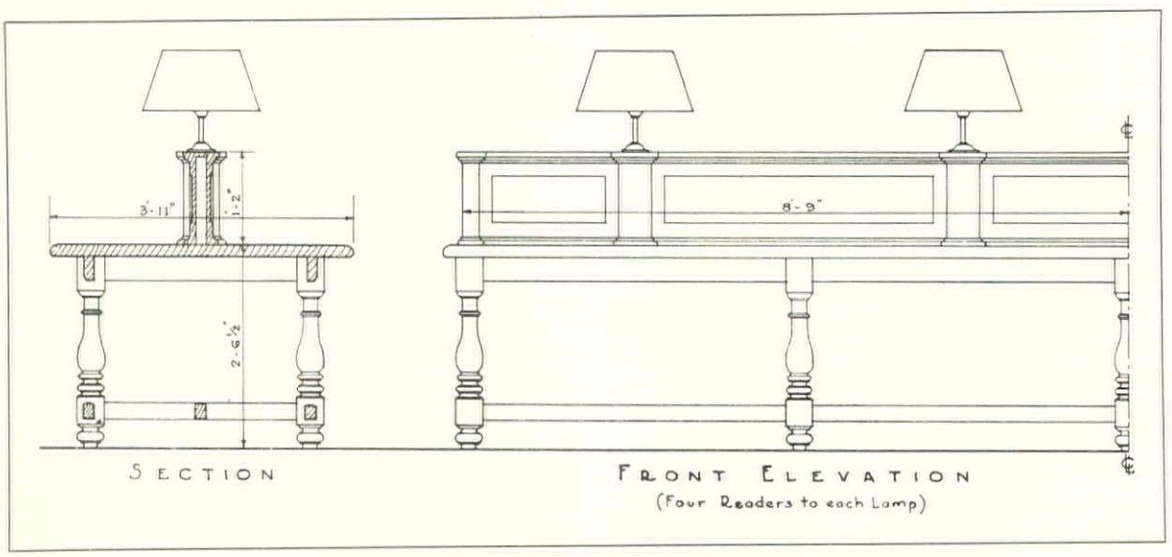
As it requires no service from the stack, this room can be located to advantage on the second floor of the building, away from the distractions of the general circulation of the main floor. In its architectural treatment and furnishings it should have the character of a well-appointed reading room of a large club, and should accommodate about one-eighth of the total seating capacity of the library.

Such a room is of the greatest importance as an educational feature as the student may acquire a love of books here and form reading habits which will remain with him all his later life.

SEMINAR ROOMS

A certain number of small rooms of varying size should be provided to accommodate small groups of students, where they may meet with an instructor and use certain library material. Books which an instructor desires to use are delivered to the seminar or conference room before the exercise and removed at its close. These rooms are in no way class rooms, but are for use simply when a large amount of library material is required for any specific problem.

Fig. 7. A type of library reading table recommended for reserve book room or study room. The use of other types, including those for two persons, or round tables, is suggested in order to prevent monotony



RESERVE BOOK SERVICE

A special group of readers is made up of students using books which are placed on reserve for them by their instructors for quick reading in connection with their courses. Such collections, though relatively small in number, are subject to intensive use, and space should be set apart for them.

This Reserve Book Section, therefore, can be placed to advantage on the ground floor of the building with direct entrance from the street, thereby greatly lessening the circulation on the main floor, which can be closed off from the Reserve Book Section for late hour use.

As no special service is necessary, other than general supervision, this section can be more efficiently served by student help from its own delivery desk located directly under the main delivery desk where it can utilize the same service to the stack. (See Fig. 8.)

The only furnishings necessary in the Reserve Book Reading Rooms are sufficient tables and chairs conveniently spaced throughout the rooms to accommodate about one-third of the total seating capacity of the library. As in the case of the Study Rooms above, in a co-educational institution separate Reserve Book Reading Rooms should be provided for each sex, served of course from the one delivery desk.

EXHIBITS AND NEW BOOK DISPLAY

Realizing that the library is a going concern within a college which must sell its purpose, it is necessary to provide for the display of new books and library material on tables or in wall cases. The main entrance lobby is the ideal place for this purpose.

LIBRARIAN'S SUITE

The size and extent of the Librarian's quarters depend on the size of the library. In a large library it would be well to provide for a Librarian's private office, secretary's and general office, an office for the Assistant Librarian, and a Board Room. Since the Librarian has as many contacts with the faculty as with his staff, his office should be accessible from a public corridor as well as accessible to the service portion of the library.

WOMEN STAFF FACILITIES

It is essential to provide a comfortable lounge room, (with kitchenette in large libraries) in which the women of the staff may spend the lunch hour, and hold staff gatherings. Opening from it should be a locker room, dressing room and well equipped toilet with possibly a shower. This unit should be at the end of some circulation, and should be well lighted and ventilated as the

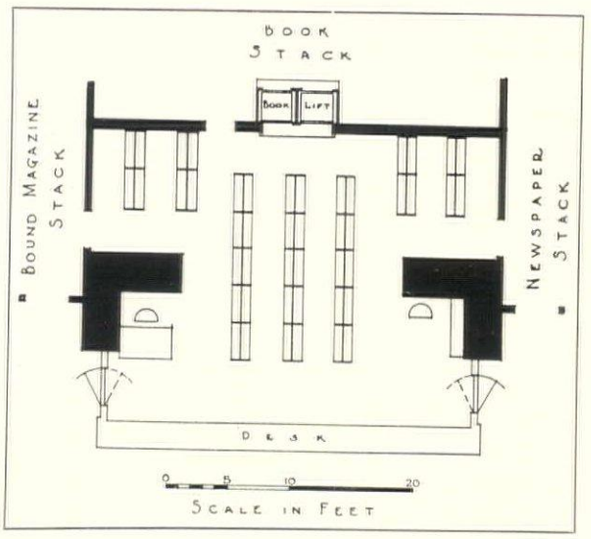


Fig. 8. A delivery desk arrangement for reserved books

comfort of the staff is of the utmost importance to the proper operation of the library.

TOILET FACILITIES: Adequate toilet facilities should be provided in locations most convenient to library users. There should be a toilet in the stack and general toilets on the basement floor and on the second floor at both ends of the building.

LOCKERS AND COAT ROOMS

A locker room should be provided for the student help.

Coat rooms should be located at side entrances.

PHOTOSTAT, PHOTOGRAPH AND BOOK REPAIR ROOMS

These are services which many libraries provide. A book bindery could be considered, but it is generally more economical to have this work done outside to avoid the expensive overhead. Only the large library can afford to maintain its own book bindery.

CONSTRUCTION DATA

The type of construction and material to be used will not be discussed in this article. It is well to consider, however, load bearing walls where possible to do away with reverberation which is so evident in a widespread low building of steel frame.

In general practice today libraries should be absolutely fireproof. It is only a source of regret if a fire occurs.

In general each reading room should be considered for sound proofing. From exterior annoyance double sash and internal ventilation would be recommended. In small communities, where exterior noises are not objectionable, there

is no problem of sound proofing except for private offices and special work rooms where there is machinery.

The halls and public lobbies, where circulation and talking occur, and reading rooms where absolute quiet is needed for concentrated study, require a certain amount of acoustical treatment. Here it would be sufficient to suggest acoustical plaster, acoustical tile, or other material for the walls, and sound deadening material for the floors.

In the seminar and conference rooms, rough cast plaster on the walls and ceiling does very well; but it is much better, if costs allow, to put acoustical treatment on walls or ceilings.

FLOORING

The flooring of the library is of the utmost importance. Rubber tile, or cork composition tile floor and base for public corridors, lobbies and important rooms is recommended and, if the budget allows, may well be used throughout the building. Linoleum is an excellent flooring material for many library rooms.

HEATING AND VENTILATING

Types of Heating Equipment. Preference should be given to types of heating equipment made and guaranteed by reliable manufacturers offering service facilities in the location where the building is being built. Equipment of a standardized type, wherein replacement parts may be obtained without delay in case of necessary repairs is of prime importance. This applies to valves, traps, fans, blowers, motors, pumps, automatic control apparatus, unit heaters, filters, air washers, and radiation. By the use of standardized equipment made by reliable manufacturers, careful design, skilled workmanship, and thorough inspection are assured before the apparatus is sent to the building. This keeps the maintenance and operating costs of the equipment to a minimum.

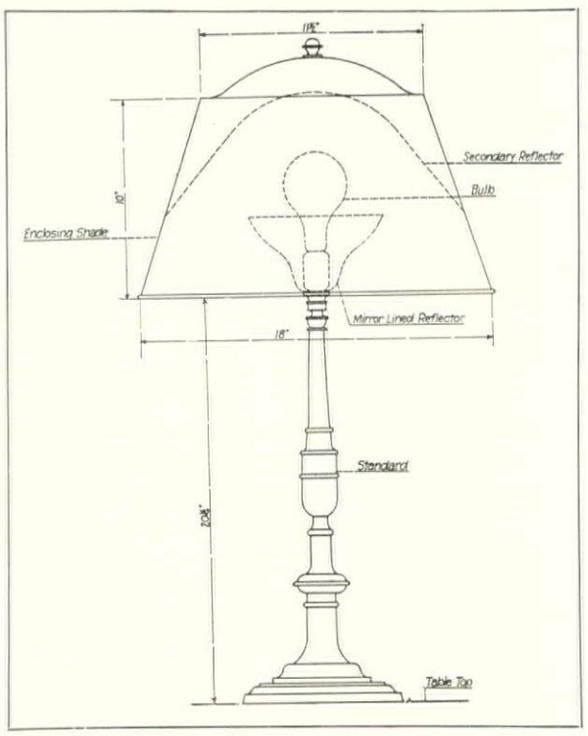


Fig. 9. An indirect table lamp designed for library reading tables

Dust Elimination. The methods of eliminating dust and dirt from the air are either by taking the outside air through air washers, viscous cell filters or dry air filters before the air passes through the supply fans and heaters. Air washers are of three types, which clean the air, (1) by passing it through a fine spray, (2) by passing it over wet surfaces, (3) by passing it through a washer having the combined features of both the spray and the wet surfaces. The latter type, while more expensive, is preferable because of its added efficiency. A well designed air washer, in addition to its cleansing properties is effective in the maintaining of proper humidity and temperature conditions.

Direct Radiation is advisable for use in the Stacks, Seminars, Faculty Studies, Corridors, Offices, Janitors Service, and Unpacking Rooms.

Indirect Radiation is advisable in the Delivery, Card Catalog, Reference Reading, Reserve Reading, Periodical, Study, and Treasure Rooms.

Room Temperatures. For the maintaining of the proper condition of books, manuscripts, etc., effective temperatures of 66° F in winter and 71° F in summer should be maintained at about 60% relative humidity for the greatest human comfort. This condition should be applied in Stacks, Delivery, Reading and Study Rooms, and Staff Offices at all times. Seminars, Faculty Studies, Corridors, and service portions where air is not conditioned, should be kept at 68° F.

Quiet Operation of the plant can be best obtained by isolation of the machinery, or by special construction. Space requirements in the building usually decide the latter method.

Floating concrete foundations covered with cork, felt, or lead on sand should be placed under fans, motors, and pumps. Electric conduits should not be directly connected with apparatus, but wiring should be made from condulets to motors with pig-tail connections. Fan inlets and outlets should be connected to the metal duct work with suitable canvas connectors.

In library ventilating systems a slow velocity of air should be maintained in fan outlets, ducts, and flues, and in grilles opening into rooms.

By carefully observing these conditions, the operating noises of the plant can be reduced to a minimum.

ILLUMINATION

A table of foot candles for each type of room follows:

ROOM	GENERAL	LOCAL
Reserve Book, Delivery, and Reading Room	10 ft. candles	
General Delivery and Card Catalog Rooms	5 ft. candles	8 ft. candles on cases
Magazine and Newspaper Room	10 ft. candles	
Reference Reading Room	3 ft. candles	10 ft. candles
Recreational Reading Room	3 ft. candles	10 ft. candles
Treasure Room	3 ft. candles	10 ft. candles
Study Rooms	3 ft. candles	10 ft. candles
Seminar Rooms	10 ft. candles	
Offices	10 ft. candles	
Faculty Studies	3 ft. candles	10 ft. candles
Entrances	5 ft. candles	
Halls and Corridors	3 ft. candles	
Toilets	5 ft. candles	
Janitors Service, Unpacking Rooms, etc.	8 ft. candles	
Stacks	1½ ft. candles on the vertical plane	

The above table indicates rooms requiring the two types of light sources, that is, a combination of a low intensity general illumination, combined with a high intensity local illumination on the working plane obtained by using table lights for reading and case lights on card catalog cases.

Table Lamps. Careful consideration must be given to the type of table light used in order to avoid specular reflection which is common on books having glossy and heavily coated papers.

The accompanying drawing gives the dimensions and characteristics of an indirect type of table light which is designed so its indirect feature will overcome the annoyance of glare on the paper.

Spacing of Fixtures. Architectural requirements as to size, location, and use of each type of room require individual engineering calculations, both by direct and indirect fixtures, since the spacing, hanging heights, and type of luminaire must be considered for an even distribution of light and for appearance. It is impossible to make up any standard spacing of fixtures, as it is very seldom that parallel conditions are met with in the design of buildings of this nature.

ELEVATORS AND BOOK LIFTS

It has been found that one elevator, 4′-0″x4′-6″, designed for a live load of 1000 lbs. at a speed of 100 ft. per minute, proves satisfactory for a library with 500,000 volumes. For the same size installation, one book lift, 2′-6″ long x 2′-3″ wide and 3′-0″ high with three removable shelves, carrying a weight of 200 lbs. at 75 ft., has been adequate. It is recommended that shafts and electric outlets be provided for a future book lift and elevator for use when the growth of the library indicates that 500,000 volumes will be exceeded.

Comm. Photo Co.

A view of the book chute in the stack room of the Fisk University Library

SEATING

Based on a total seating capacity of 1000 for the library, seating accommodations in the various rooms may be allotted as follows:

Reference Reading Room	75
Periodical Reading Room	100
Study Room	150
Extra-Curricular Reading Room	125
Reserve Book Reading Room	300
Stack	100
Seminars and Special Rooms	150

TABLE SPACING IN READING ROOMS

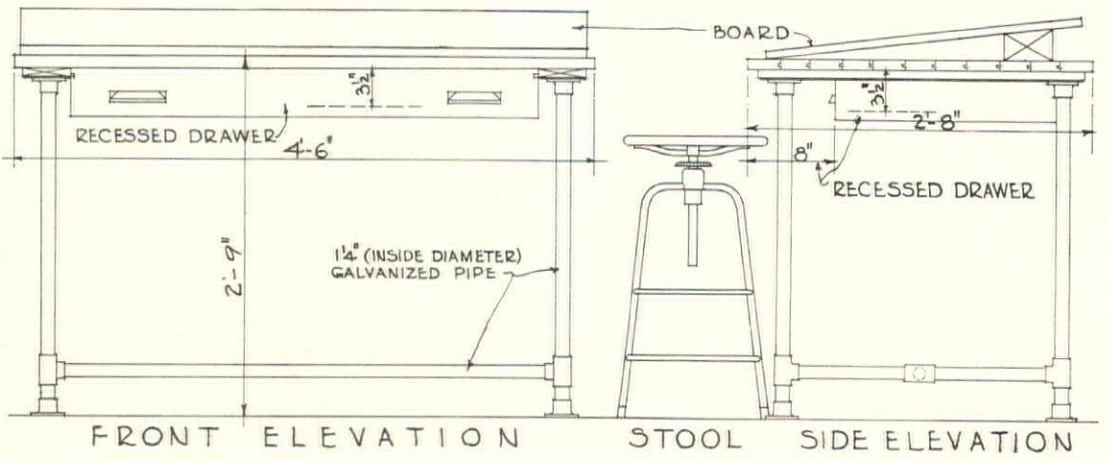
4′-0″ wide tables are spaced 11′-0″ o. c. maximum.

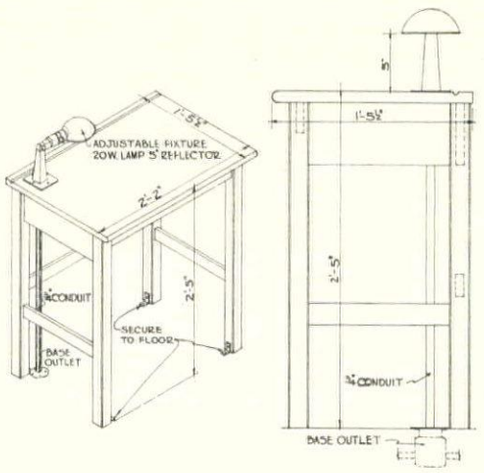
3′-6″ wide tables are spaced 10′-0″ o. c. maximum.

Minimum spacing between tables 6′-0″

Chair spacing maximum 3′-0″ o. c. minimum 2′-3″ o. c.

A recommended type of table for reserve book room or study room is shown in Fig. 7.



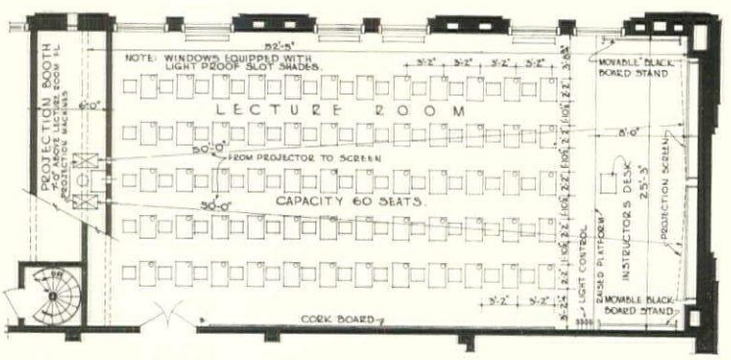


A drafting table for work on boards not exceeding 30 x 40 in. in size. Advantages: Metal understructure provides more leg and knee room by eliminating the apron used in wood construction and allows the seat to be higher in relation to the board. Bending at the hips rather than at the stomach line is accomplished by making the table 33 in. high instead of the usual 36 in. or 37 in. Specifications: length, 54 in., width, 32 in., height, 33 in. Top to be of clear, straight grained white pine T. & G., 1¼ in. thick and not more than 3 in. in width. Finish to be three coats of natural varnish. Understructure to consist of two cleats (1¼ x 4½ in.) with drawer runs on the inside faces as shown and two sets of 1¼ in. galvanized pipe supports, braced and interbraced. One drawer 21 x 40 x 3½ in. (clear inside dimensions) to be provided on one side, recessed 8 in. from the front face of the table top. Sides of drawer to be rabbeted to fit drawer runs. Drawer and cleats to be finished in black enamel

Details of a desk equipped with a cup light for use in a lecture room. The approximate cost per unit is as follows:

Table	$6.00
Chair	4.00
Fixture	2.50
Wiring & Installation	6.60
Total	$19.10

The plan illustrates the seating arrangement and capacity made available by the use of this desk



LECTURE AND DRAFTING ROOM FURNITURE

DESIGNED BY RALPH G. GULLY

PROFESSOR OF ARCHITECTURE, RENSSELAER POLYTECHNIC INSTITUTE

Rembrandt Studio

Administration Group at Louisiana State University, Theodore Link, Architect

ACADEMIC AND SCIENCE BUILDINGS

BY
JAMES VAN ALST

AS the avowed purpose of all institutions of higher education is to provide instruction and facilities for study, the housing of these activities is the first consideration. The administration building and the academic buildings with their classrooms, lecture rooms, and laboratories form the nucleus of the college group.

ADMINISTRATION

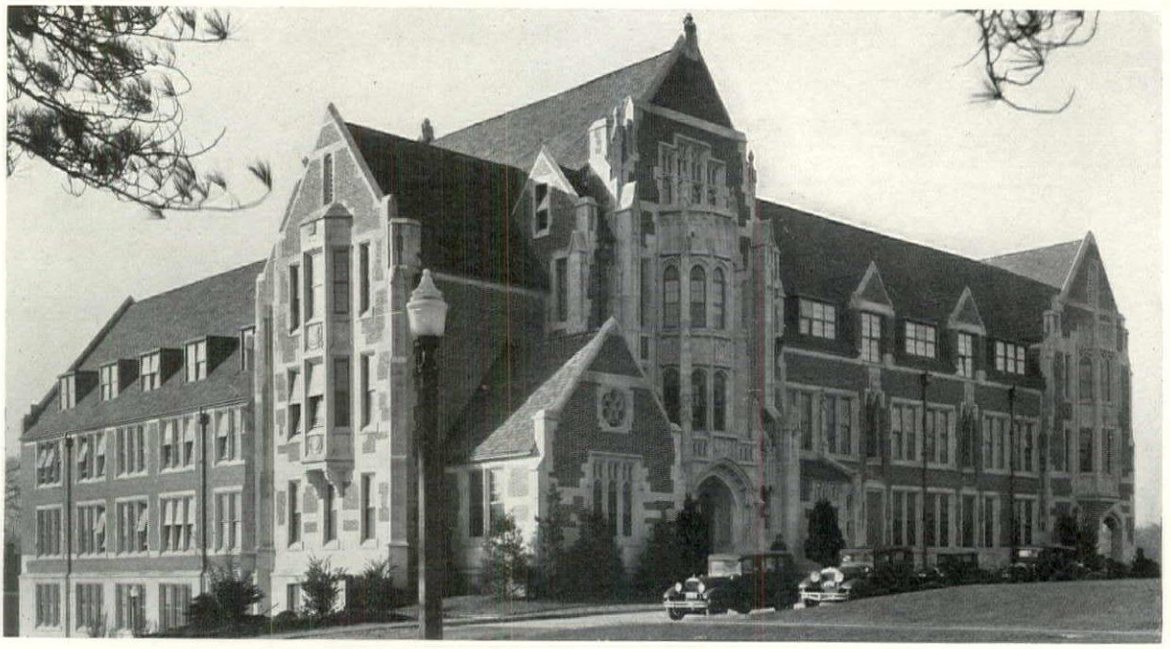
The housing of the executive and administrative functions is of course a primal necessity, but due to the continued expansion and increase in enrollment, the administrative building has not always kept pace with the demands. As the demands for facilities for instruction are the most urgent, the administration is often taken care of provisionally in a modest manner, with the idea that at some future date it will migrate to a building of its own.

As a result of this situation, it is frequently difficult for the visitor to locate these offices. Particularly is this so among the older institutions, or where the buildings of the college merge with those of the town. We find in many colleges and universities that the administration is housed with classrooms, libraries, or in other buildings, and as a rule occupying only comparatively small and makeshift quarters, inefficiently planned.

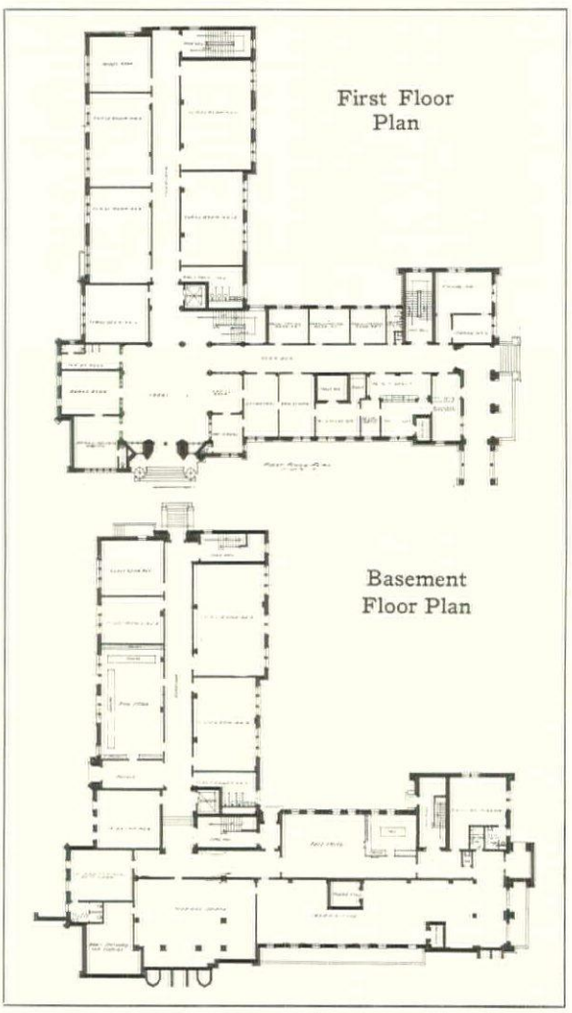
Administration usually consists of four divisions: (1) Academic Administration, represented by the President, the Dean and conferences of the faculty. (2) General Business Administration, as represented by officers of the corporation, the comptroller and the Registrar. (3) Auxiliary Administration, as managed by the Alumni, undergraduate bodies, various student welfare boards and committees. (4) Building and Grounds Department.

The administrative building should have a central location and yet should be near enough to the principal public entrance to the college grounds to be easily distinguished by those having business with the college or university authorities.

The building should make provision for: President's Office and Reception Room; Offices for his Secretaries; Offices for the Dean of the University and his Secretaries; Secretary's Office; Office for the Dean of Men (and of Women if coeducational); Registrars', Recorders', Examiners' Offices; Business Managers' or Bursars' Offices and Clerks; Offices for Comptroller and



The administration building at Agnes Scott College, Decatur, Ga.; Edwards & Sayward, Architects



Accounting Department and File Room; Vaults; Office of the Bursar's Department; Faculty Conference Room and Room for Faculty Records; Faculty Assembly Room; Board of Trustees Room, Committee Room; Office for the Graduate Division; Office of the Department of Buildings and Grounds. These and their relation to each other will no doubt be dependent on the form of organization developed by the institution for the effective carrying on of its work. In any event the buildings should be designed and constructed for flexibility and possible changes and expansion, much as a modern commercial office building, with soundproof office partitions.

The construction of such buildings will follow closely the usual system of fireproof construction used in schools and office buildings. Steel skeleton or part wall bearing construction with any of the systems of floor construction can be used. The bar joist adapts itself admirably to this type of building; reducing the dead load and effecting savings in all supporting members.

ACADEMIC BUILDINGS

Buildings devoted entirely to academic purposes should be planned with the idea of future expansion limited only by the area allotted to it on the group plan. The wide variance in the size of the classrooms, due primarily to the difference in teaching methods and requirements of the subjects of study, makes it difficult to establish any standardized sizes. The requirements of each department must be studied with each department head, allowing for future growth and possible changes in teaching methods.

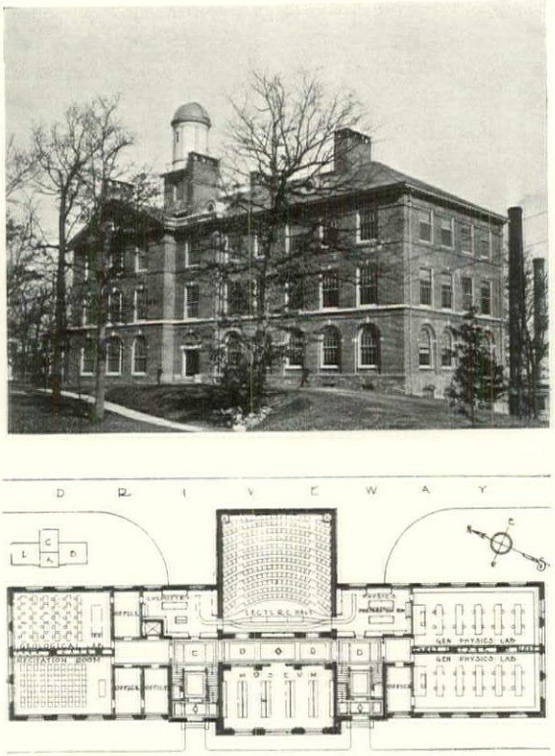
Larger classrooms and lecture rooms should be on the first floor, as far as possible, with the idea of reducing traffic through the building to a minimum. Corridors should be ample in width, —from ten to fourteen feet,—capable of handling the occupants of the building in an orderly fashion with the minimum of disturbance to the classes in session. The wainscots in corridors should be of durable material easily cleaned. This material may be either a matt-glazed terra cotta wall tile which will bond with the partition construction, or a cement plaster which may be painted to give the desirable color scheme. The walls above, if painted, should be kept light in tone to reflect as much light as possible. The floors in corridors must be of a material which is washable, permanent, resilient, noiseless and capable of repair at a moderate cost. Asphalt, either in the mastic or tile form, has met these requirements and has found considerable favor for this use. Linoleum and rubber tile have many advantages and are used extensively. Terrazzo should be divided with metal strip into 3 or 4 foot units. Cement treated both for color and hardness is durable and inexpensive, although the latter does not produce such a quiet floor.

Study rooms and lecture halls should, if possible, be arranged to receive the benefits of natural lighting and should also be provided with adequate artificial light,—at least 10 foot-candles on desks. Higher intensity of illumination for the front blackboard is often installed. Drawing or drafting rooms should be equipped with 25 foot-candles on the working plane. Great care should be taken to avoid glare, for while an inadequate intensity of light causes eyestrain, it must be borne in mind that glare may be even more harmful. The system of direct-indirect lighting is widely used here. Seasonal, temperature and geographical location are the factors which will determine the orientation of classrooms, but generally speaking, east and west lighting is most desirable. North exposure is not considered desirable as a room which does not receive sunlight at some period of the day is losing the benefit of hygienic cleansing and cheerfulness.

The distinction between classrooms and lecture rooms is rather indefinite. Throughout the east, the practice would indicate that when more than thirty seats are provided, the room is known as a lecture room. In the West and Middle West, this figure exceeds eighty, and at Michigan, a classroom seating 248 is now in use. Stepped or sloping floors are limited to use in lecture rooms where demonstrations require a full and unobstructed view of the table or platform.

Opinion varies as to the type of seating and desk to use. Single seats, benches seating four or six, or bench-and-desk combinations, chairs with arms, all have their purposes and places, and this equipment must be determined in conference with the professors. Whether the seating is to be fixed or movable depends on the purpose of the class or lecture room, or on the personal preferences of the instructor. Movable seating has the advantage of flexibility, though it may be more noisy and more easily subject to breakage.

The Faculty and Administration Building at Creighton University; Leo A. Daley, Architect. The building is of fireproof construction, with aluminum spandrels and a limestone facing



The Science Building at Berea College, Berea, Kentucky; George H. Gray, Architect. Notice the arrangement of the offices and laboratories and the location of the lecture room

Ventilation in lecture rooms is of vital importance for drowsiness in lecture halls is a common failing even under the best of conditions, and it should not be encouraged by the architect. A minimum of 30 cubic feet of air per minute for each person, with a velocity below 400 feet per minute, should be provided. Heating and ventilating units placed in the room, which will provide heated fresh air under the control of the person in charge, are convenient and easily installed. The central type of heating and ventilating system supplying all class and lecture rooms with washed and tempered air is positive in action and the "split" system is advocated by many.

Acoustical treatment in class rooms is not considered necessary and its use in lecture halls will depend on the shape, size and the materials used in the interior.

BUILDINGS FOR THE NATURAL SCIENCES

In order to ascertain what facilities the buildings for the natural sciences should provide, it will be necessary for the architect to make a study of the growth of the institution, of its policy toward expansion and its probable increase in demand for instruction in the various branches of each group. The relation of the university to the natural resources of the state will also have a bearing on the grouping or isolation of the numerous divisions of science.

A single science building for the smaller college will take care of Biology, Physics and Chemistry, and perhaps also Mathematics and Astronomy. The customary groupings of the sciences are: Biology and Geology—Physics and Biology—Physics, Biology and Physiology. Universities and large colleges usually have separate buildings for each of the four branches of science which differ in proportion to the demands for instruction of undergraduates and research work.

The plan, structure and the mechanical plant of the science building is dependent on the equipment used, and special provisions are the rule rather than the exception. Therefore the closest cooperation of the architect with the faculty is necessary in making the requisite provisions. The types and sizes of equipment are determined by the science department and are selected from the many standard designs of the manufacturer or designed especially to meet the teaching requirements. The three basic sciences,—Physics, Chemistry and Biology,—are almost universally given in all the colleges and universities. If housed in a single science building, the physics department should usually occupy the ground or basement floor and portions of the first floor, with the others above, as precision instruments require bases with the minimum of vibration.

PHYSICS

A building wholly occupied by the department of physics requires varied apparatus for the study of mechanics, sound, light, electricity and magnetism, thermo-dynamics, radio activity, etc. It should provide for: storage battery room, constant temperature room, general storeroom and small rooms for the storage of glass tubing, iron, wood and brass stock, elevators or dumbwaiters to each floor near storeroom which will be available for the transfer of freight for any of the department. It should also provide: photometry room, generator and switchboard room, the shop, photographic dark room, physical laboratory, spectrometry rooms and electrical laboratories.

The upper floors should contain well lighted lecture rooms with seats arranged on risers so that a good view of the lecture table can be obtained from all parts of the room. Directly back and above the lecture table will usually be found a galvanometer booth provided with several outlets and with electric lights. A heavy I beam may be mounted directly over the lecture table to serve as a support for a transparent galvanometer scale and as a rigid support for demonstrations in the lecture courses.

The electrical measurements laboratory will usually be equipped with wall desks around two sides of the room and provided with ample drawer space and with water, gas, alternating and direct current outlets. High sensitivity galvanometers are mounted on these desks at suitable points along the walls. Provision should also be made for piers in the center of the room to provide supports for tables which are free from vibration.

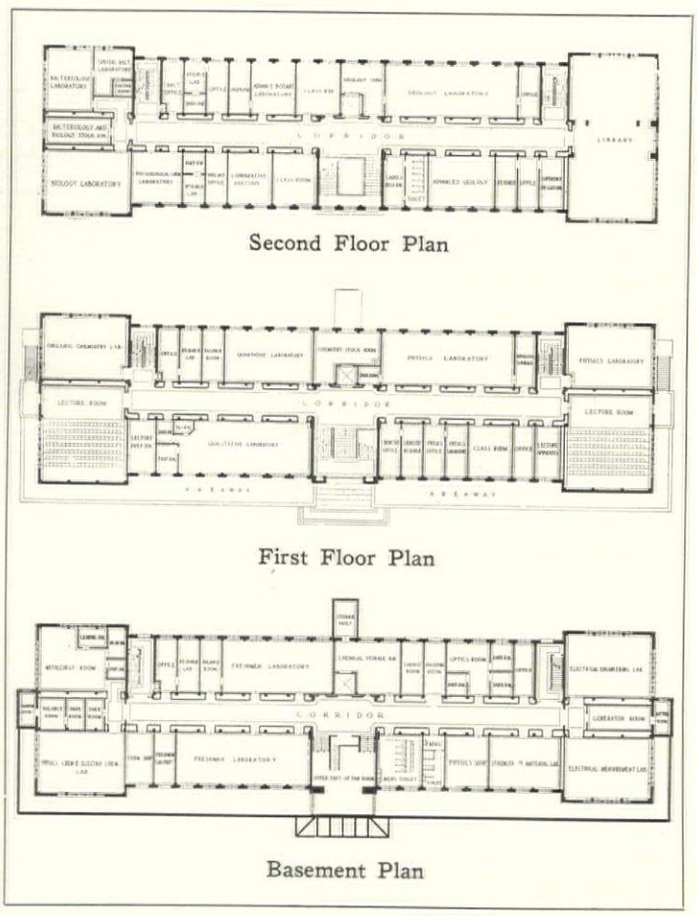
Lecture rooms should be furnished with projecting lanterns and screen and some method for darkening the room, conveniently operated from the lecture table. Devices may be controlled manually or, preferably, electrically from the lecture table, so that a battery of windows may be darkened at one time. An efficient device uses shutters which, like venetian blinds, collapse into a pocket out of sight when not in use. Others are of the roller type with light-proof pockets and shades of artificial leather and steel.

The main physics room should be ventilated by a special fan which introduces warm air through the openings in the ceiling, foul air being removed through the floor ducts by a separately controlled exhaust fan. A distilled water plant heated by steam should be located in the attic, connected to a tin-lined copper storage tank with an automatic control to keep the supply constant, and a system of block tin pipe to conduct the water to the laboratories in all parts of the building.

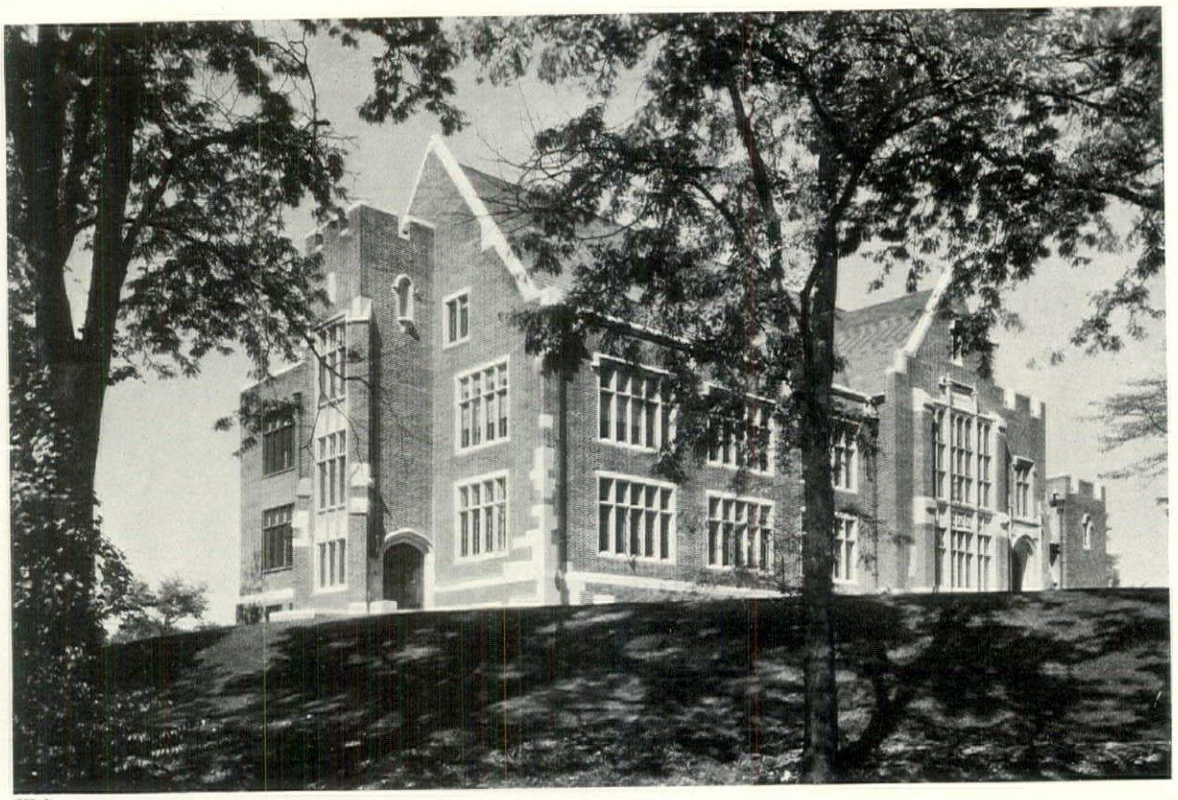
Due to the delicate machinery and the fine measurements taken, this building should be of a heavy type of construction, with great care taken to eliminate vibration and to provide independent foundations for various instruments.

BIOLOGY

A building for biology (zoology and botany) should provide for the following: Department offices, general laboratories with preparation room, large horticultural hall, large physical laboratory, several smaller laboratories, research laboratories, several small rooms for private laboratories for professors, museum, large lecture hall with preparation room, small lecture room, library, drafting room, herbarium, drying and pressing room, fumigating room, constant temperature room, chart room, photographic room, dark room, precision room, stock room, rest room, shop, incinerator room, greenhouses, cold storage room, incubator room, map room, animal room, aquaria, frog tank and abundant space for exhibition cases (often placed in corridors recessed with front flush with corridor wall).



The General Science Building at Antioch College, Antioch, Ohio; Eastman & Budke and Herbert Baumer, Associated Architects. The building has a frame of reinforced concrete and walls of solid masonry, faced with brick. Notice the corridor partitions which carry all the mechanical service lines, and are made in removable panels to facilitate access to pipes and ducts. Notice also that the doors on each floor are located to permit a continuous vertical shaft in each corridor panel. Each room of the building is ventilated by a duct from a plenum chamber located beneath the basement



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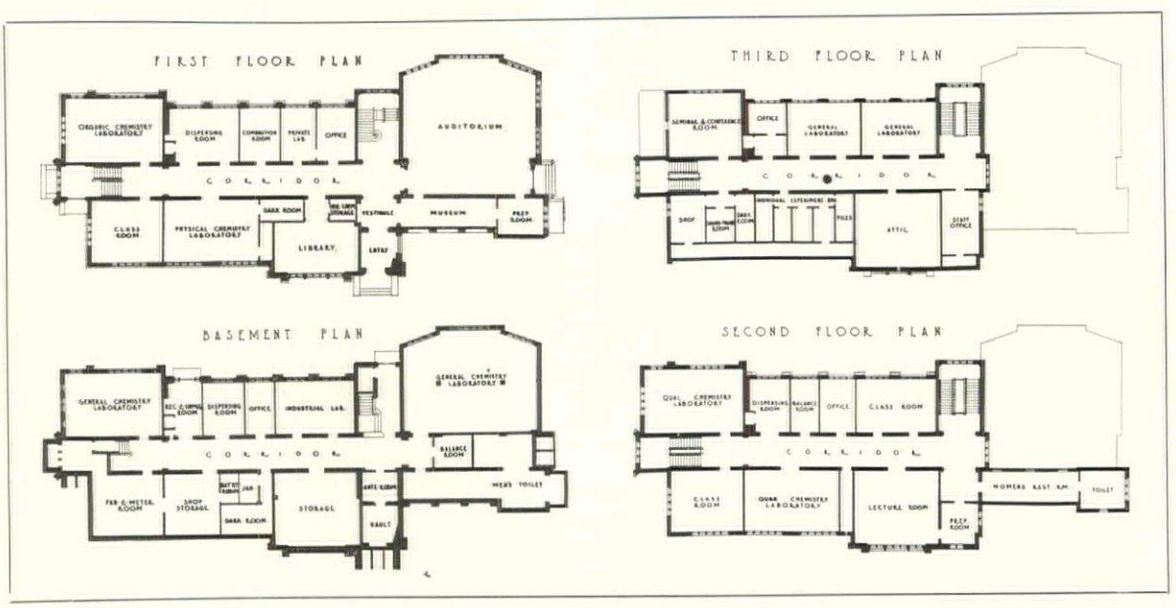


This chemistry building was planned for a college of 850 students. Advantage was taken of the sloping site to make a four-story building, although in the illustration above it appears to be only three. The practical considerations are set forth in the accompanying article. Koch Hall, Chemistry Building, Wittenberg College, Ohio. Robert C. Gotwald and Herbert Baumer, Architects, Associated

THE COLLEGE CHEMISTRY BUILDING

BY

HERBERT BAUMER

PROBABLY one of the most useful ways to treat the subject of the planning, construction and equipment of a building for the study of chemistry is to take an actual example. For this purpose we may take Koch Hall which is occupied by the departments of chemistry and psychology at Wittenberg College, Ohio. A small portion only is devoted to psychology, the building being designed primarily for the teaching of chemistry.

ANALYSIS

When the building was authorized, the regular student body numbered 850. In order to ascertain what facilities the new building should provide for, Dr. R. F. Dunbrook of the department of chemistry made a study of the growth of the college, of its policy toward expansion and of the probable increase in demand for instruction in chemistry. From the results of this study it was decided that the new building should provide for a college enrollment of 1,100 students and that corresponding facilities for the teaching of chemistry should be provided for as follows:

Class	Number of Sections	Students in each Section	Total Number of Students
Freshmen	6	24	144
Qualitative Analysis	2	20	40
Organic Chemistry	1	24	24
Quantitative Analysis	1	15	15
Physical Chemistry	1	18	18
Industrial Chemistry	1	12	12
Bio-Chemistry	1	12	12

With these requirements as a basis, the program for the new building was then prepared, the intention being to provide all adequate and thoroughly modern facilities for the type and amount of instruction called for, but to avoid highly specialized arrangements for which there would be little need at this college.

SITE

The style in which the building is designed was predetermined in order that it might conform to the style of the newer buildings on the campus.

Weber

The main entrance to Koch Hall, the building shown on the opposite page

The building faces east on a site which had been designated for it on a general plan for the development of the college. This site is a peculiar one, the ground rising gradually from south to north but falling away abruptly from east to west. On the east or campus front the building is apparently but two stories high. On the west or rear, however, due to the rapid fall of the ground, the basement becomes a full story above grade at that point.

BASIC UNITS

The design of the building is dictated principally by the site and the size and spacing of its equipment. In the latter case, the standard chemistry desk—4 feet wide and 12 feet long—spaced 9 feet on centers, is the basic unit which governs the width of rooms and, in the case of the laboratories, the length of the rooms. The fenestration, in so far as possible, conforms to the spacing of the equipment.

A simple and efficient system for the distribution of the prodigious number of conduits of all kinds that are required in a chemistry building is of prime importance. In addition to a complicated drainage system that must be easily accessible and the usual heating, hot and cold water and electrical systems, there must be pro-

vided a multiplicity of conduits for live steam, compressed air, vacuum, gas, hydrogen sulphide, distilled water, ducts for the exhaust of fumes, direct storage battery current of any voltage from 2 to 50 volts, direct current of higher voltages, from motor-generators. In this case, the main horizontal distribution system is provided for in a tunnel under the corridor floor of the basement that runs the entire length of the building. Pipes of any length can be taken into or out of it from the area at its south end and it is of sufficient size to allow for inspection and repair. This tunnel also serves as a plenum chamber for the general ventilating system, the ventilating ducts for tempered air opening directly upon it.

LABORATORIES

The exhaust system for fumes from the hoods in the laboratories is also of importance in a chemistry building. In the present case the motors and fans are located in the attic on a concrete slab that forms the ceiling of the corridor on the fourth floor. The hood or hoods in each room have their own individual fan and motor controlled from the hood. The fans and motors are all set on beds of cork to prevent vibration. The hoods are of the open "Cornell" type.

AUDITORIUM

The auditorium is designed to seat 180 students. The program required that the service for this room,—from the preparation room and the museum,—be direct, and this requirement accounts for the arrangement at the north end of the building, as shown in the plans. The inclined floor of the auditorium is taken advantage of in the general chemistry laboratory beneath. Due to the pitch, the west wall of this laboratory from which it receives its light, is much higher than the other basement walls and this has allowed the room to be unusually well lighted in spite of its great depth.

CONSTRUCTION

Fireproof construction is used throughout, the floors being of concrete built with steel pan forms. The walls are of brick and the pitched roofs are covered with graduated slate, the flat roofs being of composition. The windows are steel casements. The trim is of cast stone having the appearance of a buff sandstone. Walls and ceilings are generally plastered (floated sand finish, unpainted) and the color is a rich buff, due to the color of the sand. The stairs are entirely of terrazzo and the corridors have a terrazzo base and border, with buff-colored tile floor. The floors, except in the corridors, are generally of a dark green mastic.

EXHAUST DUCTS

The question of ducts for fume exhaust is important. The most permanent material for this purpose is undoubtedly the special chemical vitreous product. After considerable study it was decided to use, in this building, simply a good grade of vitrified flue lining with butt joints, each joint being thoroughly swabbed with hot asphalt and then wrapped three times with canvas also thoroughly swabbed with hot asphalt as it was applied. One of these conduits thus prepared was tested for leaks by being filled with water for a height of 10 feet and it showed no sign of leakage.

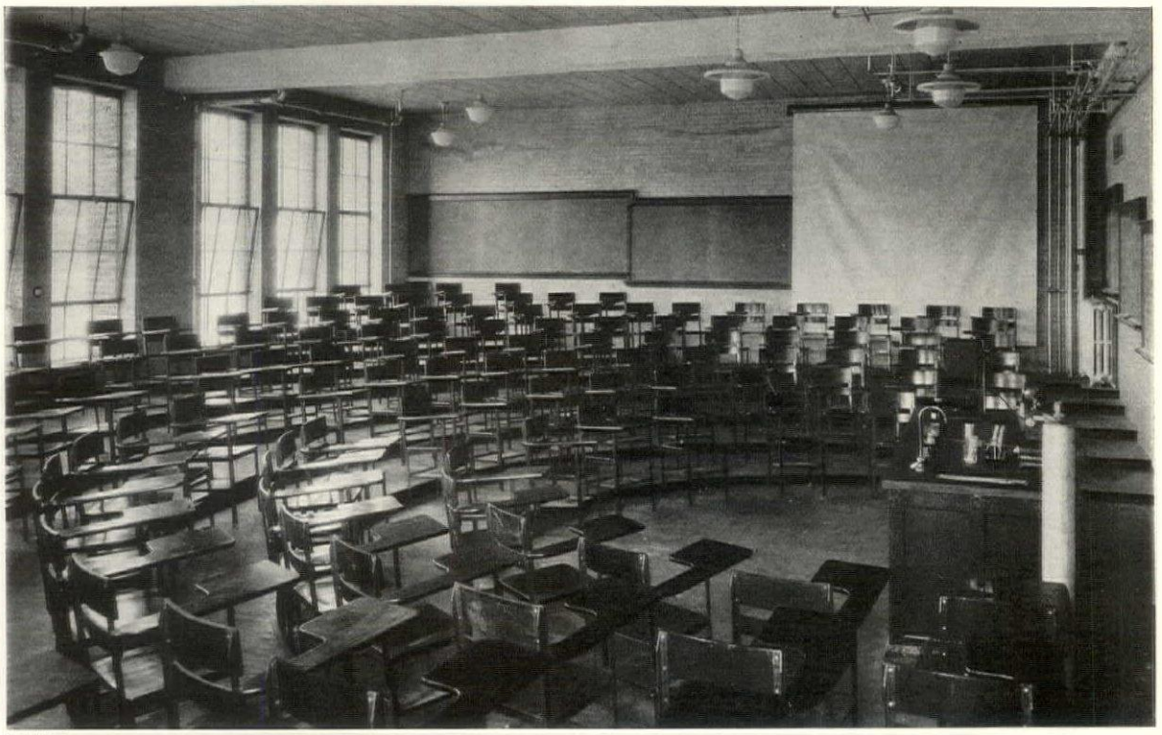
PLUMBING AND DRAINAGE

The best material for the drainage system in a chemistry building is also the special chemical vitreous product but the expense is sometimes prohibitive except for runs that are inaccessible. In Koch Hall the drainage system is made of the ordinary cast iron product except the longer and larger horizontal runs which are made of a special well known corrosion-resisting cast iron. All steam and hot water pipes are insulated, and all cold water pipes which occur overhead in laboratories are also insulated to prevent condensation.

HEATING AND VENTILATING

Direct steam radiation is used throughout. Fresh air is drawn in through the area at the south end of the building, is tempered and forced into the tunnel, as described above. It then passes into ducts leading to various rooms. The Ohio code requires that all rooms have a separate duct system for the exhaust from rooms, exhaust through grilles in doors into the corridors not being permitted in Ohio as in some states. However, in all laboratories having fume hoods, the ducts connecting with these hoods serve also as a means of exhaust for the general ventilating system. Except for the tempering of the air forced throughout the building, there is no air-conditioning system.

The lighting throughout the building is generally by fixtures of the direct-indirect type. There is a vacuum cleaning system, a rubbish chute and special mechanically operated light-proof shutters on the windows of the auditorium. There is a battery switchboard which permits constant voltages in multiples of two volts to be obtained at any or all of the chemical desks at various places in the building. The building was completed in 1927 at a gross cost (not including furnishing) of $170,000, or 38½ cents per cubic foot.

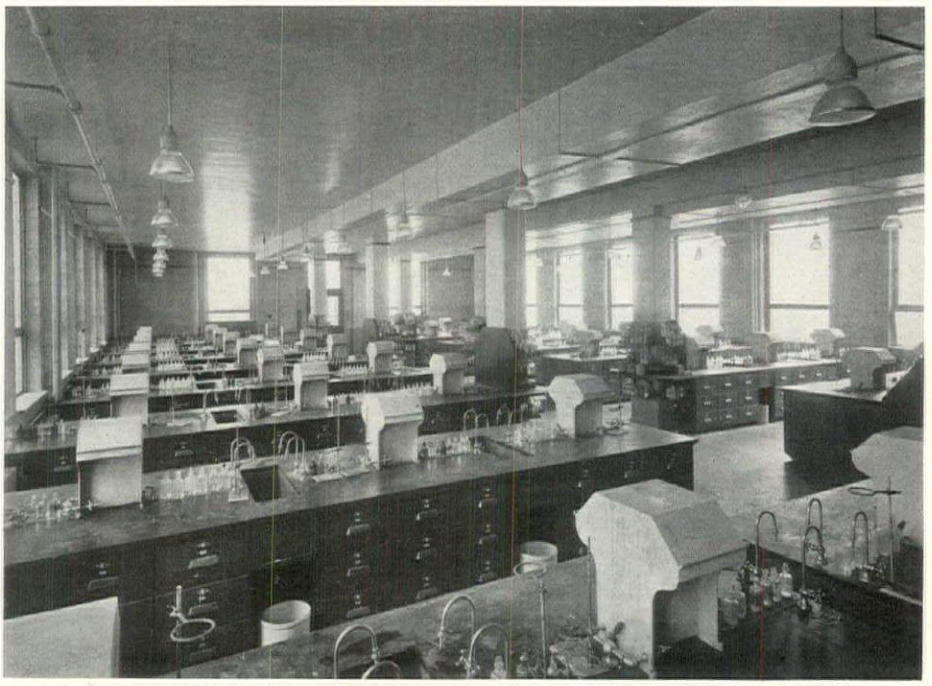


Bagby

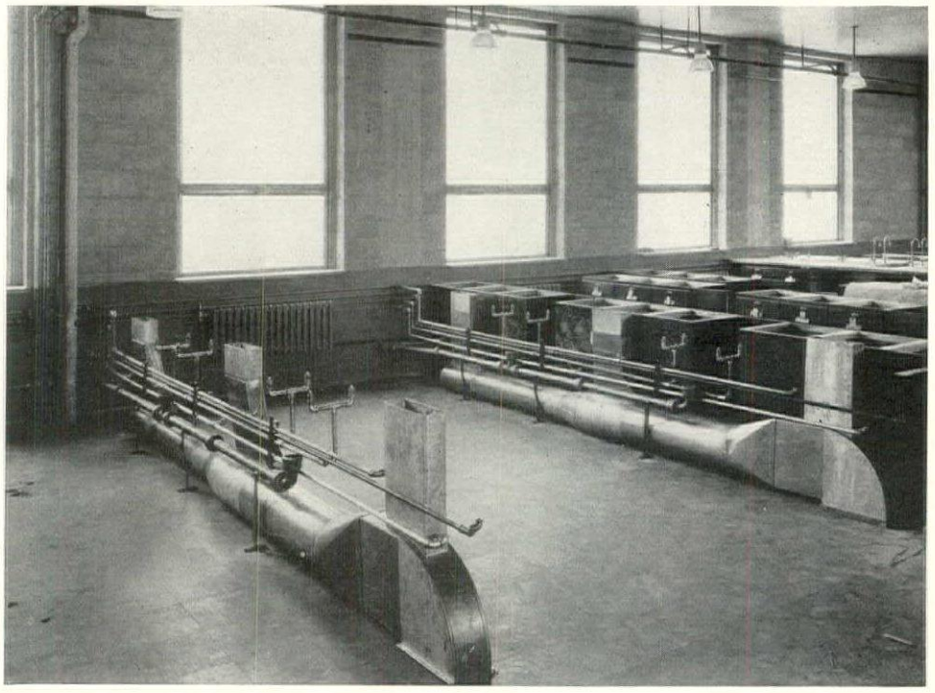
The lecture room of the chemistry building at the University of Richmond; Charles M. Robinson, Architect. Notice the sound-absorbing tile on the ceiling and the type of lighting fixtures near the lecture table

One of the laboratories in McGregory Hall, Colgate University; Walter B. Chambers, Architect. Notice the gutter in the center of the cabinets, and the location of the hoods. These hoods are individually ventilated by fans, located in the attic and controlled in the laboratory by switches

SOME INTERIORS OF UNIVERSITY CHEMICAL LABORATORIES



Notice the abundance of natural light; also the individual sinks and laboratory hoods



Two views of one of the laboratories in the Chemistry Annex at the University of Illinois; James M. White, Architect. The lower one shows the compact arrangement of the various pipe lines and the hood ventilating ducts, and illustrates the successive steps of the equipment installation. The upper picture is of the completed interior

UNIVERSITY HOUSING PROBLEMS

BY

HAROLD R. SLEEPER

ASSOCIATE OF THE FIRM OF

FREDERICK L. ACKERMAN, ARCHITECT

THE interest with which universities are treating the problems of collegiate housing is evidence of the changed aspect of college life and the demand for a wider scope of activity in education. The complete solution of this problem necessitates an appreciation of its history and a thorough understanding of its trends and future possibilities. More is involved than the mere physical housing of students; their spiritual, social and aesthetic development is concerned.

A statement of the problem involves a definite program as to number of students to be housed, areas to be considered for such housing, density of housing, standards of living, sizes of units and types of accommodations.

The goal for such a program should be to provide housing facilities which will offer comfort without ostentation, and which will insure to the student the continuance of a fair standard of living. These facilities must include opportunity for necessary concentration and privacy, for friendly contact with other students when desired, for recreation and for meals. The architect must solve this complicated problem economically, providing a practical efficiency of plan and operation with an atmosphere which will stimulate an interest in social relations on the part of the student.

Our standards of living are high. Until a short time ago, however, the differential between the general standard and that of collegiate housing had been large. Comforts, conveniences, sanitary arrangements introduced by the machine age have gradually lessened this variation, and the barren and cheerless cubicle of yesterday is no longer accepted as an adequate home for a human being during the important formative years of his life.

More than that, the entire system of American university life is under question. Experiments, exemplified by the House System recently introduced at Harvard and Yale, indicate the widening scope and increased importance of collegiate housing units. Certain educational and social elements have been introduced; and libraries, common rooms, dining rooms, and recreational facilities are now being housed under the same roof.

The architect's problem includes, therefore, the provision for these things in the light of a thorough appreciation of the social and psychological requirements that are involved.

The practical solution of this problem is concerned with the technical means to fulfill best the requirements of each individual project. No definite rules may be formulated. Existing facilities, available funds, the type of property and its location—all combine to produce a complication of demands.

The following notes are concerned with types of housing now in operation, and may serve as a guide, as a basis for comparison, and as an indication of technical needs for future work.

PLANNING

PRELIMINARY COMPUTATIONS: There are several methods of making computations upon which the preliminary group plans may be based. First, the density per acre must be determined and on this selection rests the size of courts, the length of buildings and their spacing. If land is not readily available, this density calculation may determine the type of building capable of housing the desired number of students.

The following gives four types that will serve as a guide:

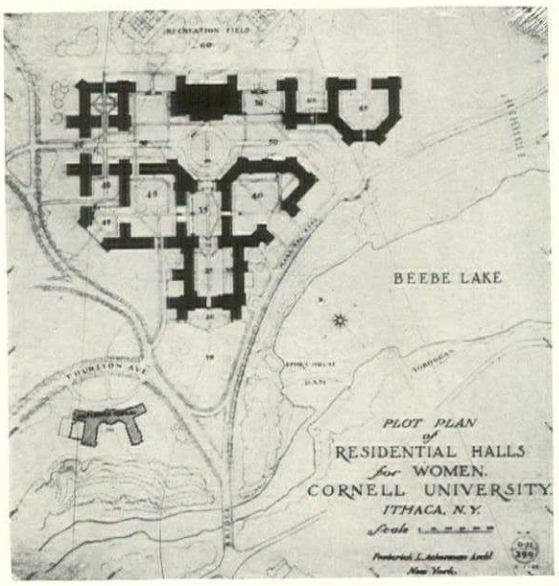
Very Dense
Dormitory Type; small courts, as Harkness at Yale 185 men per acre

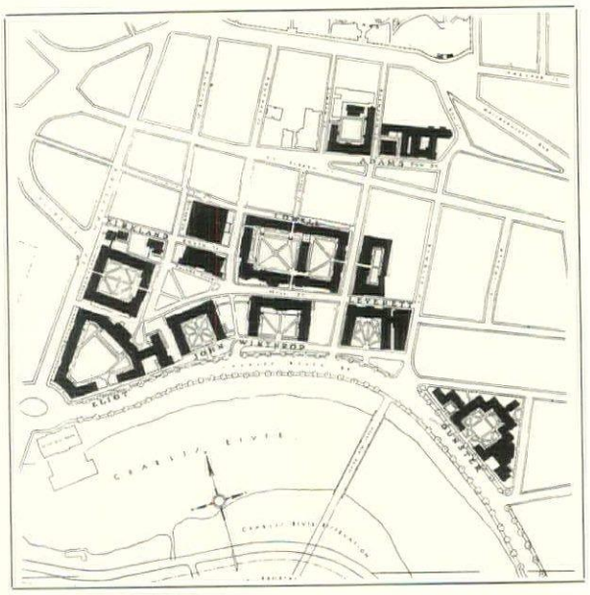
Dense
Dormitory Type; as Men's Dormitory at Cornell .....100 " " "

Spare
Residence Type; larger courts, as Women's Dormitory at Cornell ..... 71 " " "

Very Spare
Dormitory System; large courts, as at Princeton .... 67 " " "

Crowding limits growth of trees in courts, prevents daylight from reaching certain rooms. The only advantage is a saving in land cost and unless this cost is excessive an allotment of ninety men to the acre is a maximum. An allotment of seventy is preferable.





Plot plans of two large housing groups of the residential type. The one at the right shows the relative locations of the new Harvard Houses, Coolidge, Shepley, Bullfinch & Abbott, Architects. At Harvard the study-and-bedroom unit has been used, with small common rooms and a single large dining hall for each House (see pages 658, 666 and 767). At Cornell, the unit is a study-bedroom, and a living room, reception hall, dining room and kitchen has been provided for groups of approximately 60 students

Land coverage will vary directly with occupancy since buildings of the residential type cover more area per student than dormitories. The following coverages are typical of certain groups:

Cornell Men's Dormitories ... 23% coverage
Cornell Women's Dormitories . 21% "
Smith College, new group .... 26% "
Harkness, Yale ..... 41% "

VOLUME: The general scheme of room arrangement will be directly dependent on the volume allotted to each student. If finances are limited, then small rooms and a compact plan will result in a small cubage per student. If the university policy calls for dining rooms and other public rooms, then the cubage per student rises.

In making preliminary assumptions, cubic feet costs must be set up by means of the current index of general building costs and experience in previous building of similar type. The total costs may be roughly assumed by multiplying the cost per occupant by the number of occupants, using the accompanying table, which has been based on a survey of actual work.

Type of Housing	Cost Per Occupant Including Archt. Fee	Cost Per Cu. Ft. Including Archt. Fee	Cu. Ft. Per Occupant	Lin. Ft. Per Occupant
Simple Dormitory	$2,200 to	65¢ to 80¢	2,500 to	2.6 to 2.8
Stairwell serving 4 to 8 rooms	$2,500		3,500	
More elaborate type of dormitory	$3,500	80¢ to 95¢	3,500 to 4,000	2.6 to 2.8
Residential type	$5,000 to $5,200	70¢ to 80¢	6,600	4
Fraternity group (estimate only)	$6,600	70¢ to 80¢	7,100	4.5

The size of the housing unit will depend upon the size and kind of land available, relative building costs and the type of unit.

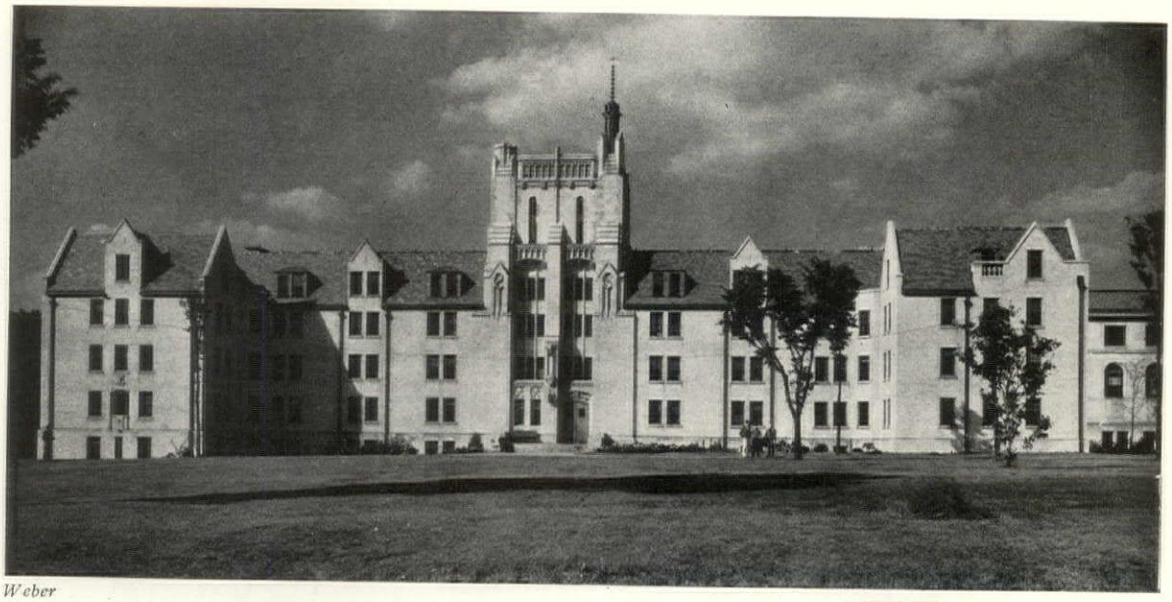
Recent buildings show that the trend is to group men in units of from 100 to 200. Women are being grouped into smaller units of from 50 to 100. Below units of 100 to 125 students, cost and cubage are increased.

TYPES OF UNITS

Experience has shown that except in small details the provision for both men and women is the same. Both are housed in structures that may be divided into two broad types.

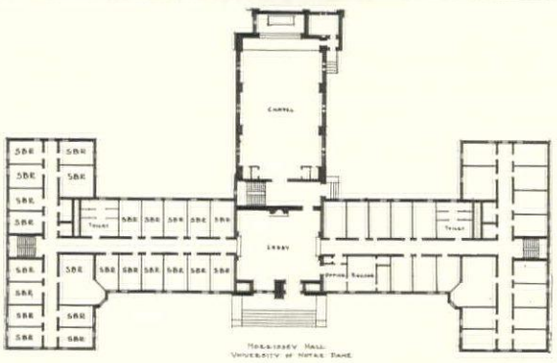
1. RESIDENTIAL TYPE, OR HOUSE: This is a comparatively new development in the field of university housing. Though it is relatively expensive to build, it offers obvious advantages of living and social contact to the student. It usually contains the following:

(a) Bedrooms and studies or study-bedrooms. (advisable for women)
(b) Guest suite and bath.
(c) Master's, tutor's or matron's suite.
(d) Office (mail, keys, etc.).
(e) Social rooms, such as library, living rooms, reception rooms, game room, music room, club or assembly room.
(f) Dining facilities such as dining room, serving room, kitchen, store rooms, and other service rooms. One kitchen may serve 2, 3 or even 4 dining rooms.



Weber

Morrisey Hall at Notre Dame University, Kervick & Fagan, Architects. The plan of this building is typical of the simple dormitory, the unit being a study-bedroom. The absence of dining halls, common rooms and individual baths or toilets makes for economy



(g) Sport facilities, usually limited to squash courts, handball courts, etc.

(h) Baths and toilets. Women's buildings should contain a lavatory for every two rooms accessible to both and may include kitchenette and laundries in larger suites.

(i) Stairs, halls, entrances and lobbies. Stairs should serve from 10 to 12 rooms, for communication between rooms. Longer halls are more economical; wide halls are wasteful and increase the cubic foot cost. Widening long halls at stairways counteracts an institutional appearance.

2. Dormitory Type: The function of this type is to furnish solely a place for the student to study and sleep. In the characteristic arrangement a stairwell serves from 4 to 8 rooms on a floor, each floor being similar to the others. Some buildings, particularly the early type, have continuous halls joining stairwells at the ends of the building.

Dormitories may house from 20 to 200 as there is no social reason for division of units. Dormitories usually contain the following spaces:

(a) Bedrooms and studies or study-bedrooms.

(b) Baths, toilets, lavatories.

(c) An office for mail and service rooms.

(d) Service rooms.

Dormitories, such as Harkness at Yale, may have living rooms but cannot be classified as residential units.

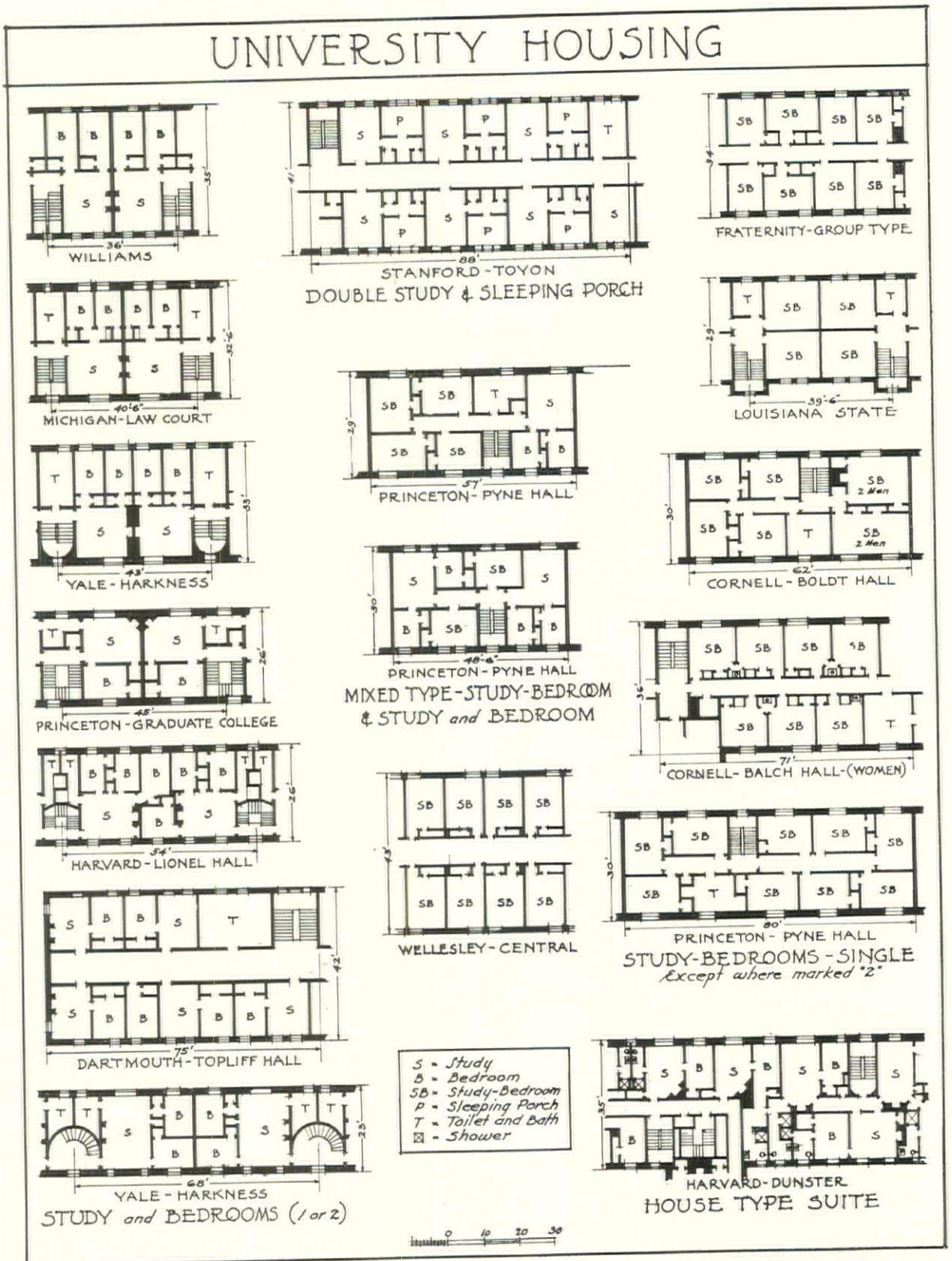
The acceptance of certain arrangements of halls and rooms will govern the building width and unit length (from stair to stair), though widths are dependent to some extent upon the type of roof. For a sloping roof 36 feet is an average width, though this may increase to 48 feet. (See plans on page 764.)

TYPES OF ROOM ARRANGEMENTS

The general standard of living in a university at the time a project is launched will naturally have much influence on the arrangement and size of rooms selected. The criterion must be set by the standard of American life. A student needs a home and not a cell.

The variety of room arrangements may be summarized as follows (sizes are net without closets, walls, etc.):

Types	No. of Students	Sq. Ft. of Area Large	Medium	Small
1. Single study-bedroom	1	180	130	110
2. Double study-bedroom	2	250	225	200
3. Triple study-bedroom	3		Seldom used	
4. Bedroom and study	1	Study 170	150	130
		B. R. 100	85	70
5. Bedroom and study	2	Study 200	185	165
		B. R. 160	100	90
6. 2 Bedrooms and 1 study	2	Study —	Same as No. 4	
		B. R. —	Same as No. 5	
7. 3 Bedrooms and study	3	Study 220	200	190
		B. R. —	Same as No. 4	
8. 1 Bedroom and 2 studies	2	Study —	Same as No. 4	
		B. R. —	Same as No. 4	



Reproduced from forthcoming book "Architects' Drafting Room Guide," by Charles G. Ramsey and Harold R. Sleeper, to be published September 1, 1931, by John Wiley & Sons.

Various types of University housing units now in use. The drawings illustrate what has become common practice in the layout of halls and corridors, stairs, and room combinations, and show approximate widths for different types of existing dormitories

The small sizes are uncomfortable and larger units should be used if economically possible. Variation in room sizes is advisable, however, as it allows the student the choice of a selection based upon the cost of the room and his habitual standard of living.

Special care should be taken in making room layouts to provide proper locations for beds and desks in respect to light, air and convenience.

The following list indicates sizes that have been used by universities throughout the country.

TYPE No. 1, single study bedrooms, is very satisfactory and most in demand for women's residential halls; it should be used either with a washroom in the room or adjoining two rooms (see plans on page 766) or with a small bathroom between rooms.*

Women

Smith College, new dormitories		
10 ft. x 12 ft. 9 in.	127½	Sq. Ft.
Wellesley Tower Court		
10 ft. x 14 ft.	140	" "
Connecticut College		
8 ft. x 12 ft. 6 in.	100	" "
Vassar (smallest)		
9 ft. x 15 ft.	135	" "
Cornell Univ. (Balch Halls)		
10 ft. 6 in. x 12 ft. 6 in.	131	" "

Men

Princeton, Pyne Hall		
10 ft. x 14 ft. 6 in.	145	" "
Cornell, Baker Hall		
10 ft. x 14 ft. 6 in.	145	" "
Chicago, Residence Halls for Men		
10 ft. x 13 ft.	130	" "

TYPE No. 2, double study-bedroom, is not used very frequently.

Women

Cornell, Balch Halls		
14 ft. x 17 ft.	238	Sq. Ft.
Connecticut College		
12 ft. x 15 ft.	180	" "
Vassar		
15 ft. x 18 ft.	270	" "
	3)688	" "
Average	229	" "

Men

Louisiana State University		
13 ft. x 14 ft. 8 in.	190	" "
Cornell, Boldt Hall		
13 ft. x 17 ft.	221	" "
also 21 ft. x 11 ft.	231	" "
	3)642	" "
Average	214	" "

* The averages as given by Klauder and Wise in their book on "College Architecture in America" for this type of room are for men 162 sq. ft. and for women 95 sq. ft.

As given by Klauder and Wise, the average for women—170 sq. ft.

The average for men, taken from 11 dormitories, is 232 sq. ft.

TYPE No. 3, triple study: This type is used only where space will not easily subdivide.

TYPE No. 4, bedroom and study: This type is rather luxurious, but has been used extensively in the new house plan at Harvard. Studies are approximately 12 ft. x 14 ft. (168 sq. ft.) and have fireplace and bath (shower). Bedrooms are approximately 8 ft. x 12 ft. (96 sq. ft.).

TYPE No. 5, bedroom and study for two persons: For men this is a very common type. Sizes are as follows:

Princeton Graduate School		
Study—12 ft. x 16 ft.	192	Sq. Ft.
Bedroom—9 ft. x 12 ft.	108	" "
	300	" "
Average 150 sq. ft. per person		
Stanford, Toyon		
Study—15 ft. x 11 ft.	165	Sq. Ft.
Sleeping porch type—		
8 ft. x 11 ft.	88	" "
	253	" "
Average 127 sq. ft. per person		

This type is also used in the plans of the new Harvard Houses with double studies of 14 ft. x 16 ft. (226 sq. ft.) and bedrooms approximately 8 ft. x 12 ft. (96 sq. ft.).

Calculations based on data given by Klauder and Wise show averages of net areas for rooms as follows:

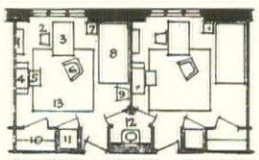
Study (12 men's buildings)	192	Sq. Ft.
Bedroom (13 buildings)	94	" "
Double bedrooms	155	" "

Studies are rarely used separately in women's buildings so no figures are given for such rooms. The other three types are combinations of the former with the following:

Single Sleeping Room Areas

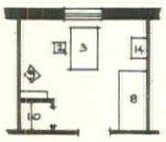
Yale, Harkness		
7 ft. 6 in. x 11 ft. 6 in.	86	Sq. Ft.
Harvard, Lionel		
7 ft. x 10 ft.	70	" "
Michigan, Law Courts		
7 ft. 6 in. x 10 ft.	75	" "
Williams		
8 ft. 6 in. x 11 ft. 6 in.	98	" "
Princeton, Pyne Hall		
7 ft. x 10 ft.	70	" "
Dartmouth, Topliff Hall		
8 ft. 6 in. x 11 ft. 6 in.	93.5	" "
Average	82	" "

UNIVERSITY HOUSING



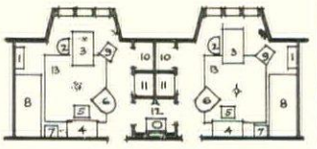
Lavatory-Intercommunicating
Women's Residential Type

AREAS	
Large	180 Sq. Ft.
Medium	130 " "
Small	110 " "



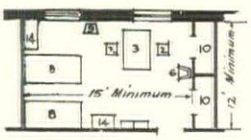
Mens

MIN. DIMENSNS	
Width	8'
Length	10'-6"
Ceiling Height	8'



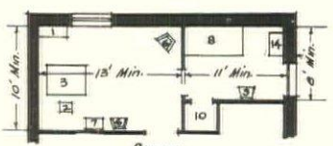
Lavatory-Intercommunicating.
Women's Residential Type-Top Floor.

TYPE NO. 1 SINGLE STUDY - BEDROOMS



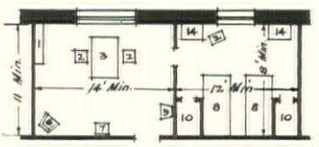
Areas
Large 250 ft. Med. 225 ft. Small 200 ft.
Type #3 similar but larger

TYPE NO. 2
DOUBLE STUDY & BEDROOM



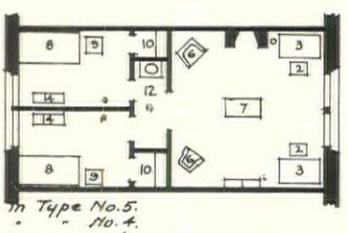
Areas
Study-Large 170 ft. Med. 150 ft. Small 130 ft.
Bedroom- " 100 ft. " 85 ft. " 70 ft.

TYPE NO. 4
BEDROOM & STUDY-1 PERSON



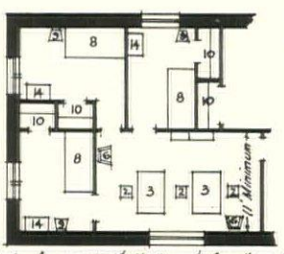
Areas
Study-Large 200 ft. Med. 185 ft. Small 165 ft.
Bedroom- " 160 ft. " 100 ft. " 90 ft.

TYPE NO. 5
BEDROOM & STUDY-2 PERSONS



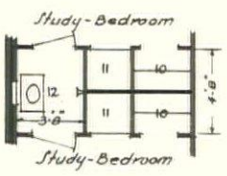
Studies same size as in Type No. 5.
Bedrooms " " " " No. 4.

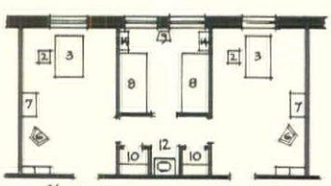
TYPE NO. 6; 2 BEDROOMS and 1 STUDY



Study-Large 220 ft. Med. 200 ft. Small 190 ft.
Bedrooms same as in Type No. 4.

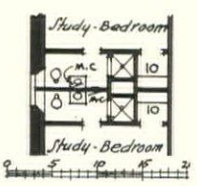
3 BEDROOMS-1 STUDY
TYPE NO. 7



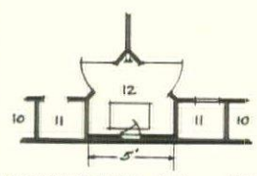


Study same size as Type No. 4
Bedroom " " " " No. 5

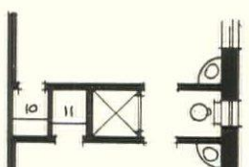
TYPE #8 1 BEDROOM & 2 STUDIES-2 PERSONS



SYMBOLS USED	
1 Book Rack	8 Bed
2 Desk Chair	9 Side chair
3 Desk	10 Hanging closet
4 Dressing Table, Mirror - Lamp	11 Tray closet
5 Bench	12 Lavatory-Med. Cab. Telephone
6 Easy Chair	13 Rug
7 Table-Lamp	14 Dresser



LAVATORIES between ROOMS



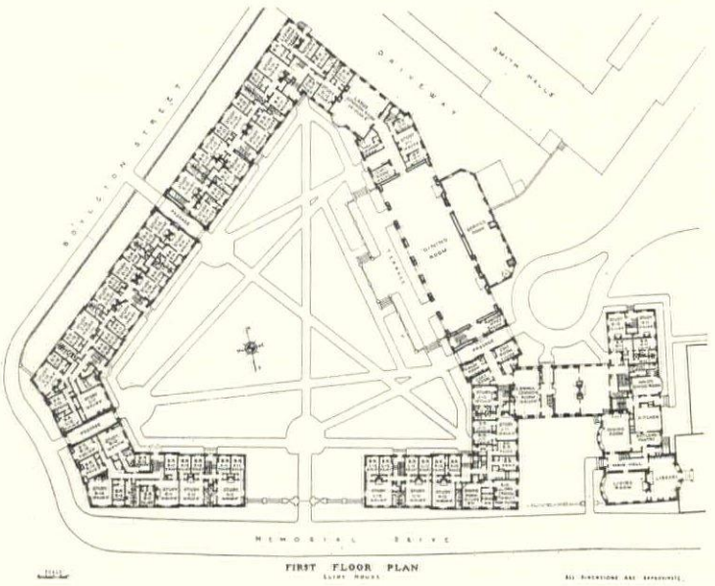
SHOWER BATHS between ROOMS

DORMITORY ROOMS-LAVATORIES and PRIVATE BATHS (Showing Furniture)

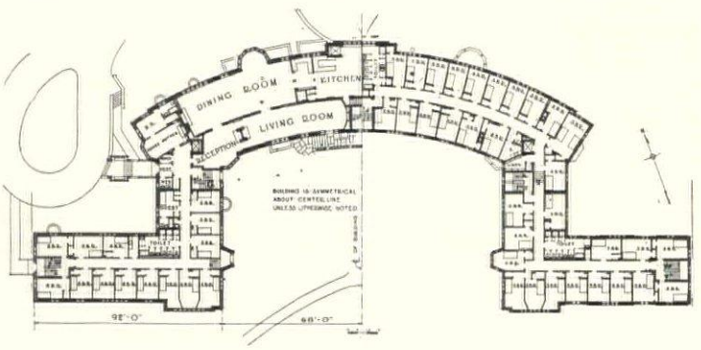
Reproduced from forthcoming book "Architects' Drafting Room Guide," by Charles G. Ramsey and Harold R. Sleeper, to be published September 1, 1931, by John Wiley & Sons.

Details of various room arrangements giving limiting sizes from the general units shown on page 764. In many instances the planning of college dormitories becomes a problem similar in detail to that of a residential, or apartment hotel. Provision for furniture is important

The first floor plan of Eliot House at Harvard University; Coolidge, Shepley, Bullfinch & Abbott, Architects. Each of these Houses has a master's house adjoining, with an entrance to the dormitory through the Senior Common Room. The plan of most of the Houses does not include a kitchen, the food being cooked elsewhere, carried through tunnels, and served to the dining room from steam tables located in the serving room



A plan of Stone-Davis Hall at Wellesley College; Charles Z. Klauder, Architect. The left half is of the first floor, and the right half shows the second floor, the building being symmetrical about the centerline. In effect, the building contains two separate dormitories of the study-bedroom type with a central kitchen serving both units



TOILET FACILITIES

BATH AND TOILET FIXTURES should be arranged to produce a room of minimum size. Medicine cabinets should be provided. No standards exist regarding the number of students per toilet fixture. The following table, developed from existing plans and other data,* will serve as a basis for further investigation. This list should be modified to include private lavatories or baths.

Plumbing Fixtures	No. of Occupants Men	Per Fixture Women
Tubs	75	10 or 11
Showers	5 or 6	10 or 11
Basins	3 to 4	(1 every room) or 3½
Toilets	5 or 10[1]	5 or 6
Urinals	10[1]	

Slop Sinks—1 to every 3,000 sq. ft. fl. and 1 in each Serving Room; 1 in each kitchen.

[1] Use 10 if urinals are included.

CLOSETS should be at least 2 ft. deep, with no provision for trunk storage, which should be located in the basement. Rooms may have built-in trays, thus saving space and one piece of furniture.

* "Collegiate Architecture in America," Charles Z. Klauder and Herbert Wise.

WINDOWS

Most college buildings are poorly lighted because of insufficient window area and deep exterior reveals. A high window will provide a greater intensity of usable light than one of the same area placed near the floor. Window heads should be approximately 7 ft. from the floor. Sills should be 2 ft. 8 in. to 3 ft. from the floor for bedrooms. In public spaces this dimension may become 2 ft. 4 in., in which case transoms should be provided.

Window areas are based on a percentage of room floor area which for adequate lighting should be between 10 and 14 per cent, dependent upon orientation and the general location of the building. The criterion should be the amount of window area which in a particular location would give a mean average of at least 8 foot-candles of daylight upon the working plan.

Space	FLOORS		WALLS		CEILINGS		TRIM	
	Material	Finish	Material	Finish	Material	Finish	Material	Finish
Basement & Serving Spaces	1. Colored cement 2. Plain cement 1. Terrazzo 2. Mastic; cove, base as above (Fin. spaces)	1. None 2. Cement hardener (no paint) 3. Wax or none	Rough concrete; partitions T. C. 1. Glazed blocks, 1. Glazed brick 2. Hard white brick	Cold water paint None for T. C. and brick	Unplastered except in fin. spaces Sound insulation for machines	Cold water paint	Steel	Steel enamel
Kitchen & Serving Rooms	1. Ceramic tile, quarry tile, etc. 2. Non-slip terrazzo, cove base	None	1. Ceramic tile 2. Glazed T. C. blocks	None	1. Cement or plaster 2. Sound absorbing blocks or plaster	Glossy lithophone or enamel	Tile and steel; use bull nose	Enamel or glossy lithophone
Dining Room	1. Cork tile 2. Rubber tile 3. Wood (oak) 4. Terrazzo (cafeteria)	Varnish or lacquer None Stain & wax None	Depends on architectural treatment	Depends on architectural treatment	Sound absorbing plaster or sound absorbing tiles	Depends on materials used	Wood	Stained and waxed
Living Rooms, Library, Lounge, etc.	1. Wood (oak) 2. Cork 3. Rubber	1. Stain & wax 2. Special finish 3. Wax	Plaster; panelled wood boards (wood)	Paint (glazed) Scenic paper (lacquered) Wax, etc.	Plaster, etc. Beams	Depends on architecture	Wood	Stained and waxed
Halls & Corridors on Dormitory Floors	Borders of cement or terrazzo runners of 1. Cork, 2. Rubber, 3. Linoleum Base of cement, terrazzo or wood	Waxed, except cork to have cork finish or may be also waxed	Plaster	Paint (matt) Paper	Plaster	Paint (matt lithophone)	Steel	Steel enamel
Bedroom & Study	1. Cork 2. Wood (maple) 3. Linoleum; base (wood)	Cork finish; Stain & wax Linoleum; Wax or lacquer	Plaster	Paint (matt finish) or lacquered paper	Plaster	Flat lithophone	Steel	Steel enamel
Showers; Gangs or Groups	1. Ceramic tile 2. Terrazzo Use non-slip	None	1. Tile 2. Marble	None	1. Tile 1. Gustavino vault 2. Colored cement	None	Tile Trimmers	None
Toilets & Lavatories	1. Ceramic tile 2. Terrazzo 3. Magnesite terrazzo	None	Tile; terrazzo wainscot; cement or plaster	Plaster Painted	Plaster	Painted; gloss lithophone or lead and oil	Tile trimmers; steel	Steel enamel
Main Stairs	Treads—1. Marble, 1. Precast terrazzo, on steel or reinforced concrete, 2. Stone, 3. Wood. Risers—1. Marble, 1. Precast terrazzo, on steel or reinforced concrete, 2. Stone, 3. Wood.							

TABULATION OF RECOMMENDED FINISHES

The schedule of finishes covers the main interior spaces and relative suitability is indicated numerically. Where no number exists, equal suitability is indicated, though differences in locality, variations in standards, costs, etc., may outweigh a consideration of exact requirements

TABULATION OF CONSTRUCTION RECOMMENDATIONS

ITEM	NON FIRE-PROOF	FIRE RESISTING	F. P. EXCEPT ROOF	FIREPROOF
	Use only when funds are very limited	**Insurance penalty ruggedness questionable; noisy**	**Good construction & very generally used**	**Expensive but best; low depreciation & insurance**
Foundations & Footings	Stone or concrete	Stone or concrete	Concrete	Concrete
Walls & Their Use	Masonry to carry beams	Masonry to carry beams and slabs	Masonry; self-supporting or skeleton construction	Masonry; self supporting or skeleton construction
Beams & Girders	Wood	Junior I-beams or bar joists	Steel or concrete	Steel or concrete
Floor Slabs		2 in. or 3 in. concrete on metal lath	Reinforced concrete; 1 way long span	Reinforced concrete; 1 way long span
Partitions	Stud; plaster on metal lath	Solid plaster; T. C. or gypsum block on stairs	Solid plaster; stair and bath T. C.; large spaces, gypsum block	Solid plaster; stair and bath T. C.; large spaces, gypsum block
Furring & Lathing	Metal lath; wood furring	Metal furring and lath	Metal or T. C. furring; metal lath	Metal or T. C. furring; metal lath
Roofing; Framing, Fireproofing & Finish of Roof	Wood frame; finish of asbestos, slate, or tile (no wood finish)	Wood frame; finish of slate or tile	Wood girders, purlins and planks; finish slate or tile; slow burning	Steel frame fireproofed with gypsum or concrete; nailing concrete, gypsum block or lightweight cement block; slate, tile
Steel Frame Fireproofing		Steel girders fireproofed, with gypsum, T. C. or concrete	All-steel fireproofed with concrete, gypsum, or T. C.	All-steel fireproofed with concrete, gypsum, or T. C.
Stair Framing & Well Construction	Steel in metal lath and plaster well; Kal. doors	Steel in fireproof stair well; Kal. Doors	Steel or concrete in fireproof well; Kal. Door	Steel or concrete in fireproof well; Kal. Doors

ITEMS USUALLY PENALIZED BY INSURANCE RATING BUREAUS

For omitting fireproof doors at stairs and for not fireproofing stairs; for omitting fireproofing on any steel girder or beam, even in frame construction. Openings or shafts through floors, unless in masonry wall with fireproof doors, areas over certain limits that are not subdivided by fire walls of brick (12 in.) and fire doors.

Floor Load Allowance (unless building regulations require more):

Dormitory Floor	40 lbs. per sq. ft.
Living room floors, commons, halls and corridors	75 " " " "
Storage and service	75 " " " "

This standard should pertain on dull days, and means of controlling an excessive daylight intensity should be provided for use on very bright days. This recommendation is based on the supposition that no particular architectural style is being utilized, as it is obvious that the design factor plays an important part in relative window sizes. In any case, window areas should be definitely fixed when the preliminary plan is developed.

The foregoing is based on what should be used rather than on what has been used, and applies to studies or study-bedrooms. The requirements for bedrooms are less by 4 to 6 per cent.

HALLS AND CORRIDORS

These should be planned for minimum practical sizes. From 4 ft. 6 in. to 6 ft. should be ample, wider halls implying service to a greater number of rooms from the same entrance or stair.

The following are approximate widths of halls in a few existing buildings. The length of halls is indicated by the number of rooms which they serve without interruption by a fire wall or stairway.

	Hall Widths	Type of Hall
Cornell, Boldt	Approx. 4 ft.	Short, length of 2 rooms
Princeton, Pyne	" 4 ft. 6 in.	2 rooms long
Cornell, Balch (occasional 10 ft. halls)	" 4 ft. 8 in.	5 rooms long before breaks into 10 ft. space
Stanford, Toyon	" 6 ft. 8 in.	7 rooms long
University of Chicago Residential Halls (now under construction)	" 5 ft.	6 rooms long
Michigan, Martha Cook	" 7 ft.	very long
Smith, new building	" 7 ft.	

DINING ROOMS

SPACING REQUIREMENTS: If the residence type of house is adopted, small tables seating from 6 to 10 students should be used, with a small allow-

ance of 13 to 15 sq. ft. per person. If long tables are used this allotment may be reduced to 10 or 12 sq. ft. with 10 sq. ft. as a minimum.

SEATING: The average area, from a survey of existing dining rooms, is just under 13 sq. ft. per person. The type and size of table is a factor in the definite determination of space allotments. The following give capacities for round, square and rectangular tables.

Round Tables	Allowance at Edge	Table Dia.	Area Per Person Dia. Plus 32 in. for Chair and 30 in. for Aisle
5 at table	22 in.	35 in.	10 sq. ft.
	24 in.	38 in.	11 sq. ft.
6 at table	22 in.	42 in.	10 sq. ft.
	24 in.	46 in.	10½ sq. ft.
7 at table	22 in.	49 in.	9½ sq. ft.
	24 in.	53½ in.	10 sq. ft.
8 at table	22 in.	56 in.	9½ sq. ft.
	24 in.	61 in.	10 sq. ft.

Use 22 in. allowance at edge for service dining tables only.

Square Tables.
3 x 3 ft. table seats 4 persons.
4 x 4 ft. table seats 8 persons.

Rectangular Tables.
Service—width 2 ft. 4 in. and 2 ft. 6 in.
Student—width 2 ft. 8 in. and 2 ft. 10 in.
Allow 2 ft. o.c. for each person.
If ends are used, spacing remains the same for calculations, but actual area occupied will be slightly more. This is, 8 ft. tables will take eight people in either method of seating.

Allowance for Aisles; Allow 16 in. for chairs from edge of table and 2 ft. 6 in. behind chairs for aisle.

Dining rooms, if seating 100, should be a story and a half or two stories high to assure proper ventilation. Dining rooms seating about 50 to 75 may be 11 to 12 ft. high if acoustically treated.

KITCHENS AND DEPENDENCIES

The use of student help and arrangements for their meals influence the plan of development of both the main dining rooms and service areas. The minimum allowance per person should be made in all service dining rooms. Kitchen areas, including all dependent services, occupy nearly as much area as the dining room, though certain spaces may be isolated from the general services and sometimes may be placed on another floor. These include receiving room, food and general storage, refrigerators, vegetable storage and preparation, garbage room, helps' room and toilets, spoiled linen and sewing rooms, and laundry.

The dependencies that should be located near the kitchen are: dietitian's office, serving rooms, service refrigerator, helps' dining room, dishwashing room. Butcher shop may be either with this group or with the former and should contain its own refrigerating facilities.

EQUIPMENT: Each problem is peculiar to itself and should be solved by determining with the college authorities and a consulting specialist upon a definite method of operation, the items of equipment to be used, etc. Much of this should be done with sketch plans so that details of construction can be developed accordingly.

Non-corrosive metal should be used for all sheetmetal parts of equipment, except that certain kitchen sinks may be of heavy galvanized iron. In very large kitchens special attention should be paid to the pan in front of the soup kettle. Heavy steel of some type should be used.

All service spaces should have the extruding corners of walls protected with steel angles to approximately 7 ft. above floor.

OTHER SERVICES

The garbage room should be adjacent to the service entrance with a separate outside entrance. Walls should be glazed brick or glazed machine-made terra cotta. If finances are very limited cement plaster may be used. This space should be ventilated and is sometimes cooled with brine coils so as to render the garbage odorless. Ashes should have a hoist to the service yard and this yard should be carefully screened from view.

MECHANICAL REQUIREMENTS

HEAT AND VENTILATION: Automatic heat regulation in public spaces, either by automatic radiator or room control, is advisable.

Kitchens may be located above grade and hence present ventilating problems not often found in the usual restaurant. An efficient ventilating system is necessary and all steam tables, bain-maries, dishwashers, ranges, broilers and cookers, should be fitted with hoods and pans with duct connections. Hoods may be of non-corrosive metal or of tile held by metal channels and angles. The lower edge of all hoods should contain a trough to catch condensation.

SANITATION AND PLUMBING: The best type of grease trap should be installed in all kitchens. Kitchen waste lines should always be connected with sanitary sewers; and leaders with storm sewers to avoid solidification of kitchen grease in the pipes. Cleanouts must be provided at all bends and at the bottom of all waste stacks. Use over-size house drains in women's dormitories.

Pipe shafts are not necessary as the risers take off as needed from the service lines which are carried in a system of concrete trenches. Trenches should have 6 ft. minimum head room and pipes should be spaced to facilitate repair. Lights and frequent manholes should be installed; and the trenches should be vented with louvres and areas.

Fire lines and built-in hose cabinets should be provided in every stairwell. Underwriters require at least fifty feet of hose. Siamese connections should be installed where outside Fire Department is within calling distance.

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THE COLLEGE UNION

BY
IRVING K. POND

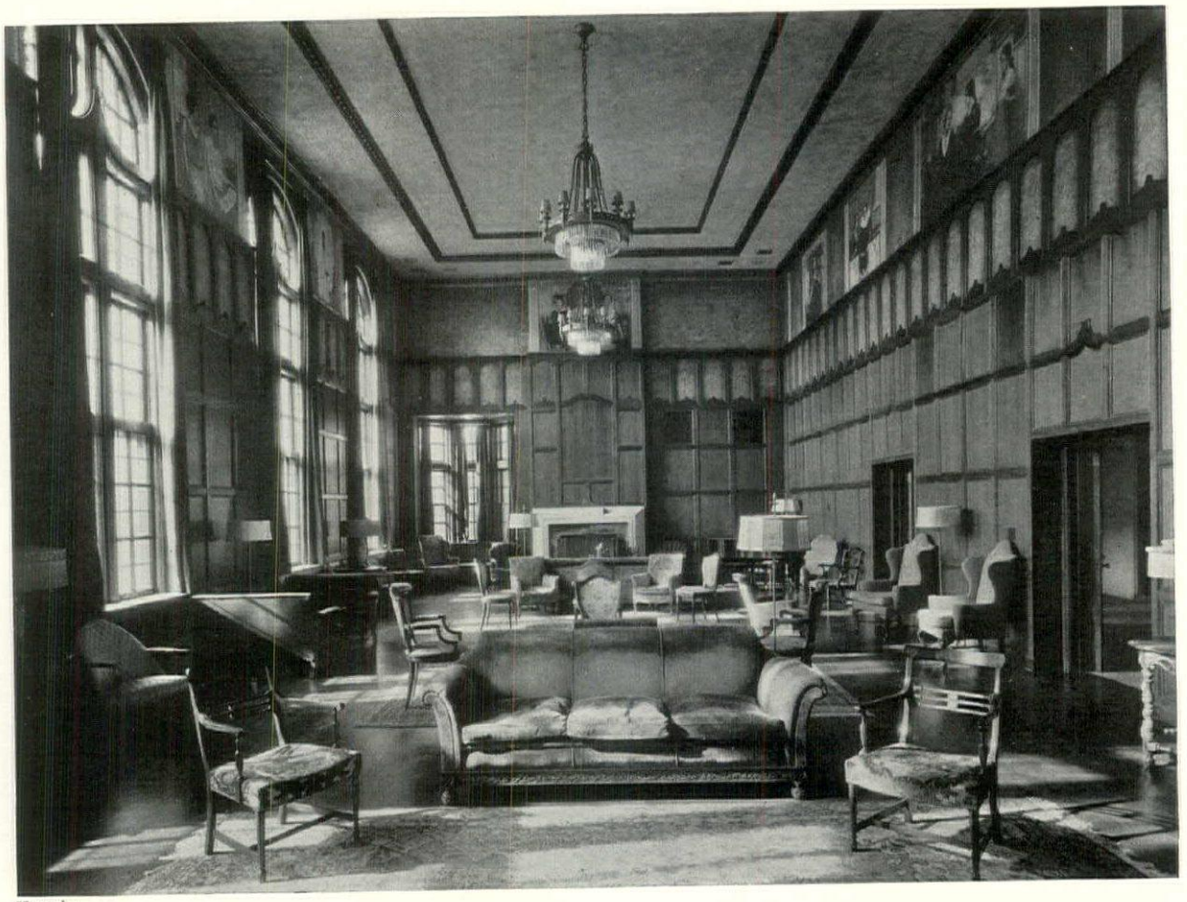
THE term College Union has two connotations. It refers in the first place to an organization directing the operations of various extra-curricula bodies in the social life of the college; and in the second to a building which shall house the activities of such an organization. The activities included in the scope of the Union are such as minister broadly to the social and communal life of the college and are not concerned with such narrow or specialized groups as the fraternities, the student Christian associations, the church guilds, and the individual clubs of one sort or another.

Every man's Union has to be planned to accommodate women; and every women's League must be planned in reference to the accommodation of men. In a man's building the very minimum of accommodation for women may quite properly be provided; while in a woman's building the maximum of accommodations must be provided for men. For men will gather in clubs and enjoy themselves without the presence of women, while women, especially college girls, find their enjoyment greatly enhanced by the presence of men or boys. There are psychological as well as sociological problems to be considered in planning a college social center.

Though the college Union, in order to increase its revenues and, in certain cases, its popularity, may see fit to cater to outsiders, yet the outsider's interest must be regarded as secondary. The needs of the student body are of prime importance. However, there is another class whose interests must not be ignored. There is the body of alumni who, though away, are still an integral factor in the college equation; the equation—at least the Union equation—cannot, except in rare instances, be solved without them.

ANALYSIS OF THE PROBLEM

It will be no easy task for a Union board contemplating the erection of a new building to formulate its program; to reconcile conflicting interests and justly apportion the space;—keeping in mind meanwhile the economic problem. It is no easy task to say just what space shall be income producing and just what shall be devoted to the amenities; just what shall be devoted to character building and what to filling the till. Here, at the outset, if the Union committee is wise it will seek the services of an architect; not one entirely ignorant of the sciences of psychology, of sociology, of economics; one versed in the art of living.



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The women's lounge in the Women's League Building, University of Michigan; Pond & Pond, Martin & Lloyd, Architects. The panelling is of walnut; the floors are random width walnut boards

In giving advice on all these various items, which are but a fraction of those to be encountered, the architect will be keeping in mind the purse strings; for he will not in any probability have unlimited means at his disposal. The ground area, the vertical dimensions, the number of features which can be accommodated, the size of the various units—all these, and more of deepest import to the architect, depend upon the limited sum which the purse generally holds. How can that sum be spent to the best advantage?

As there are no hard and fast formulae for planning a college Union, no absolute standards of size, as the analysis is first qualitative and then quantitative, how shall one proceed when the problem is presented for solution? The course has been indicated in what has already been said. Begin the study at the fountain head which is the traditional idealism and spirit of the college to be ministered to. Study other college Unions, perhaps; but not as abstract affairs detached from the compelling factors of their environment. No one can really understand a plan who does not know the conditions which have produced it.

PLAN FACTORS

There follows an incomplete list of the physical factors which may (all) or must (some) enter into the makeup of a college Union building. These factors are not set down in order of importance, for each has about the same relative importance as any of the others in a perfectly complete and unified whole; but the list is made in about the order in which a casual inspection of the building would tend to reveal them. They are: the lobbies; offices; check and toilet rooms; lounges; the cafeteria, the food shop, main dining room and committee dining rooms; assembly room; kitchens; food preparation; serving rooms; china and table linen storage; library; billiard room; game rooms; bowling alleys; bath, plunge and locker rooms; barber shop; beauty parlor; rest room; quiet room; secluded rooms with kitchenettes; sleeping rooms; linen rooms; help's quarters. The theatre; stage and dressing rooms; theatre and stage craft workshops; music and drama club and study rooms. And others. And still others. And then the mechanical plant—with lighting, heating and plumbing branches; re-

frigeration; hot and cold water; pumps; water softeners; air conditioning rooms; filter and fan rooms. The items in this list are susceptible of division and subdivision—almost *ad infinitum.*

LOBBIES

Let us assume that the Union building under consideration serves a good sized group of colleges called a University; one which enthusiastically supports its teams and has a faculty and equipment sufficient to make the town attractive to scientific and cultural bodies in convention. These factors will affect the size and location of the lobbies, the chief of which must be on the main floor of easy access from broad walks and driveways. In the main lobby (convenient to the office counter with cashier, information desk and telephone operator, convenient also to check and toilet rooms), the various groups commingle, and later separate, each to proceed to its own special lobby upon which dining and committee rooms give. Special lobbies will be on each floor, with separate retiring rooms for men and women. Where the women most naturally do congregate a rest room is supplied with cubicles containing each a couch or day bed. This room may for reasons of economy be placed adjacent to a minor woman's toilet and retiring room. (So it is the University of Michigan League.)

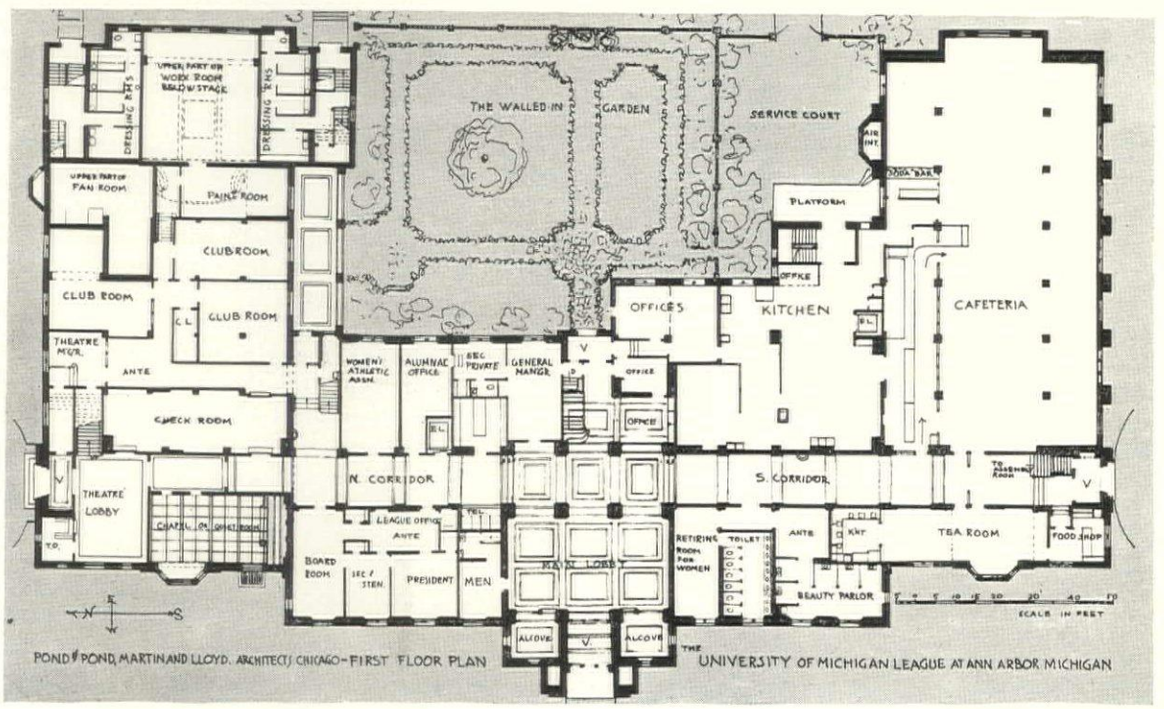
OFFICES

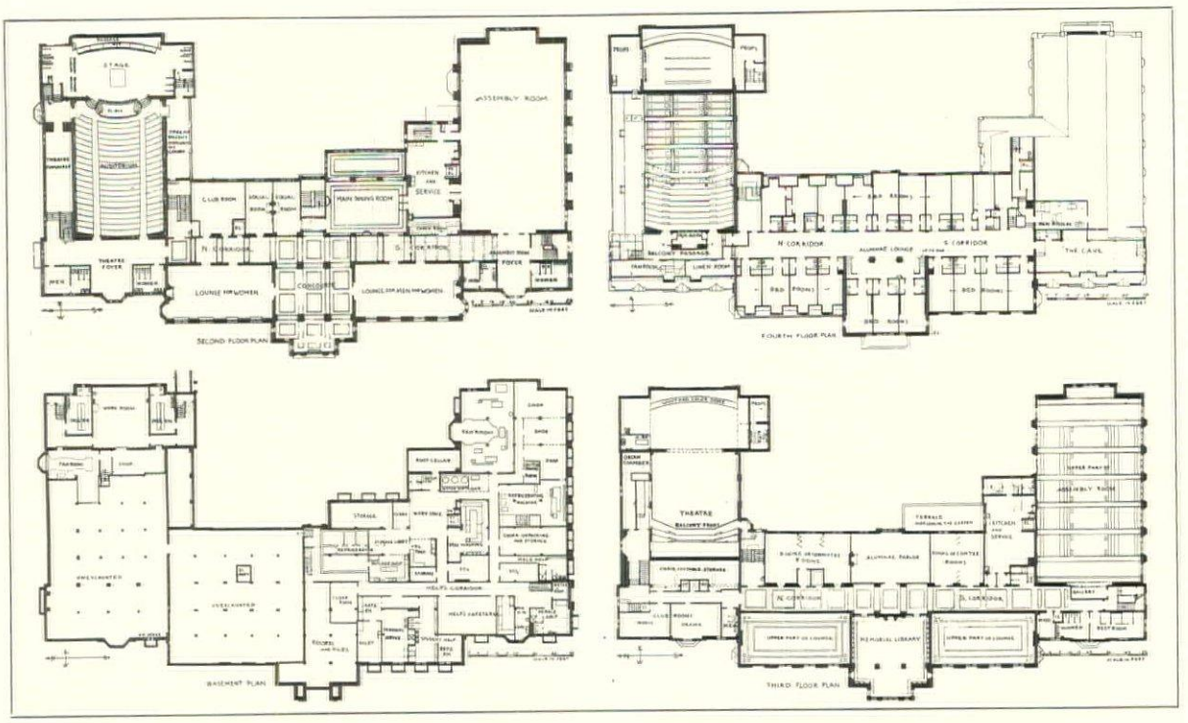
As to offices: two sets and generally three are to be provided. The first suite of general and private offices will be for the management of the building; the third, closely related to the kitchen, having to do with employing and paying help, is sometimes located near the service entrance, sometimes connected with the business office. In office suite number two is carried on all the business of the organization which gives the building its name—offices for the president of the Union, the departmental vice-presidents, the committee men who have the handling of the multifarious and perplexing activities of the organization. A private office or two, and a large general office with space for numerous desks at and about each of which a group may sit in conference, must be provided. This office suite should be upon the main floor if possible and made readily accessible and attractive to the student body.

LOUNGES AND DINING ROOMS

In a coeducational Union there should be one ample lounge for men only, one for women only, and an ample concourse immediately adjacent in which the sexes may commingle. From this concourse it will be well to plan to reach easily the main dining room, in which both sexes may be served. This dining room, too, if not on the main floor, should be reached directly from the main floor so that guests who are not members, but who are privileged on special occasions to dine in the Union, need not intrude upon the space naturally devoted to the membership.

Every room in a Union building which is not dedicated to some especial use, and even if it is, should be in easy communication with the kitchen so that meals may be served therein. The societies





Plans of the Women's League Building at Ann Arbor, Michigan. The first floor plan is reproduced on the preceding page

and committees and organizations which wish to be entertained in a Union are innumerable, and at times each will require "banquet" or dinner service. While it is not to be recommended, yet economically it is often necessary to have rooms in series, separated by folding partitions so that they may be thrown together to accommodate various sized parties. Aesthetics and acoustics vote against this arrangement, economy votes for it—economy of structure, that is; and too often economy wins!

The cafeteria may be located in the basement; but wherever located it must be easily accessible from the street or principal approach. In size it will take all the space one can give. As a rule it should adjoin the main kitchen and should be attractive in color and outlook and as quiet and restful as acoustical material can make it. The cafeteria generally contains the ice cream and soft drink bar. The quantitative equipment of the bar has not as yet been satisfactorily solved. Too large a bar is a dead loss on ordinary days. Too small a bar is an aggravation on days of peak load and sometimes on dance nights.

ASSEMBLY ROOM

The next important room to discuss is the assembly room. Like the bar it never can be made the right size to suit all occasions. It is only upon occasion, and rare at that, that a very large assembly room is needed in a Union building. It is better to overcrowd at times than to have a sense of vacancy pervading most of the time. When great space is in demand for special dances or banquets (the latter is rare) armories or gymnasium floors may furnish it.

LIBRARY

The library is a feature in certain Unions. These rooms generally are memorials, and when such should be endowed sufficiently to cover the salary of a librarian and an assistant, and the purchase of new books. Some studying is done in the Union between classes, but, as the specialized libraries of the college furnish study space and all opportunities for consultation, the Union should cater only to the best of light reading. Therefore the shelf space need not be very extensive. A beautiful quiet room with a modicum of shelving is all that would seem necessary.

THEATRE

The theatre of the Union presents a most interesting problem. Of the necessity of a separate entrance as well as of a foyer and retiring rooms we have spoken. There should be a ticket lobby of ample size with a two-windowed office, one window for current and one for advance sales. The check room may well be off this lobby. As to capacity—two hundred and fifty seats would be a minimum; seven hundred or so probably a maximum. The maximum would require the presence of a balcony. The Michigan League theatre seats seven hundred. Its orchestra pit is

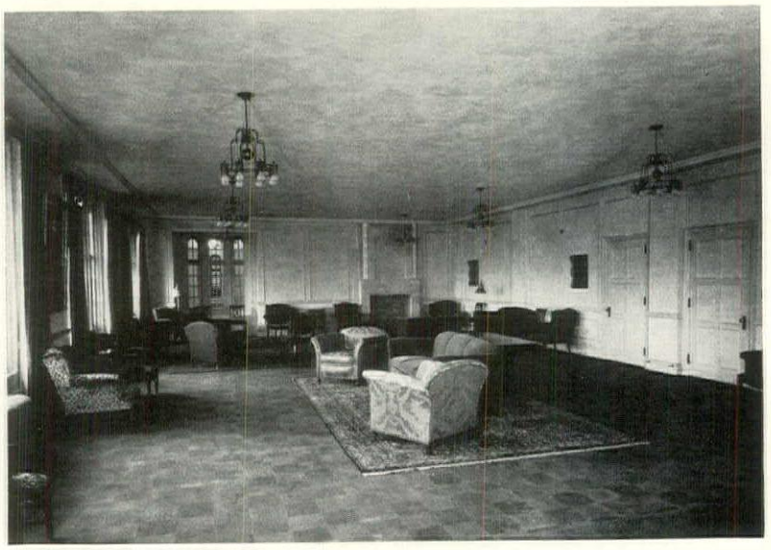
Purdue Memorial Union Memorial Hall looking toward the entrance

deep so that the musicians are not in evidence. The pit contains a piano and an organ console. At the back of the balcony is a well planned and equipped projection booth with two machines and openings for spot lights. There is communication with the stage. Concealed flood lights in the ceiling of the auditorium are controlled from the stage switch board as are all house and stage lights. On the League stage is a sky dome flooded with colored light from a trough on the stage. All the atmospheric effects possible may be produced on this stage. The clear opening of the proscenium is thirty feet wide by seventeen feet high. All sets are taken up by counterbalanced lines operated from the stage floor. The parabolic sky dome extends to the gridiron which is thirty-six feet from the stage. Below stage are two tiers of dressing rooms, one tier on each side. Between the tiers of dressing rooms and reaching to the underside of the stage is a work room where scenery and props may be constructed and taken to the stage through a triple trap operated from a large elevator platform. A paint bridge is on the stage left and a paint room below the orchestra pit. Under the auditorium floor are the manager's office and club rooms, all accessible to the stage, where chorus can dress and wardrobes be manufactured. Chamber music and picture shows, as well as amateur and professional plays and dance programs, have been successfully presented on this stage and in this house which is considered a model. Up to the underside of the balcony and to the top of the balcony rail the room is wainscoted in wide oak panels of rich brown stain. Above the rail line is sand finish lime plaster.

KITCHENS

Now we come to a very important—perhaps the *most* important—practical feature, the kitchens. In designing a kitchen and its accompaniments the progress of the food must be traced from the preparation rooms in the basement up through the main and subsidiary kitchens and serving rooms to the topmost floor on which food is served. The course must be followed from the refrigerator to the range, the broiler, the kettles, onto the dishes, onto the carts and trays to the tables. Then the dishes must be followed from the tables to the trays, carts, elevators, dumb waiters (make them big), the subveyors, to the washing machine and back to the cupboard shelves —or to the dish warmers in the respective kitchens. Plot the course, locating in succession the necessary fixtures, making everything ample for the *peak load,* and give the diagram or plot with instructions to the kitchen equipment experts. Compare their offerings, replot and write the final specifications. There will probably be supplemental kitchens with considerable cooking and warming equipment and dish storage on each floor.

The Men's Lounge in the Purdue Memorial Union. Pond & Pond, Martin & Lloyd, Architects



The Women's Lounge in the Purdue Memorial Union. The walls of this room are painted a soft ivory tone

GAME ROOMS

For uses other than those indicated above are the bowling alleys, billiard and game rooms. Bowling alleys sometimes are deemed to take up considerable space in proportion to the income they afford. This depends on the local attitude toward the sport. Games are played in the concourses and newspaper reading rooms which adjoin the lobby. Writing tables are provided in these spaces. The billiard room is generally popular and provides considerable income. The number depends upon the size and character of the student population. The Michigan Union has twenty-five tables in a room with a floor area of about seventy-five hundred square feet. There are raised seats for spectators of exhibition games. There should be ample toilet facilities immediately adjoining the billiard room. Lights should be strong, but devoid of glare.

On each floor of any Union or League building install conveniently located retiring and toilet rooms for both sexes. One for men should be in close proximity to the barber shop; one for women in conjunction with the beauty "parlors." Fully and attractively equipped barber shop and beauty parlor are absolutely necessary features; and drinking fountains should be installed near them and at other strategic points in the building. Telephone booths should be liberally provided, the greater number convenient to the main lobby. Outlets should make it possible to augment the number at times of peak load, and an instrument should be installed in each bedroom.

BEDROOMS

Every sleeping room should be provided with a bathroom in which is a shower or tub and frequently both, especially in a women's building. In

the private bathrooms should be a full complement of fixtures; and there should be a public toilet room off the alumni lobby. The sleeping rooms need not be large but should be of varying sizes for one or two beds and should be light and airy. These rooms may be made good income producers —and the Union will need all the income it can get. Cement floors smoothly laid are appropriate for these rooms. Upon the floor a carpet may be spread, not tacked, covering about the entire area. These rooms, if above the second story, must be served by passenger and freight elevators. In fact, elevators must be installed to serve the club rooms; for students dread to walk up one flight of stairs. It is well to have rooms set aside for visiting teams with ample showers and toilet rooms. These quarters ought to be planned with a separate entrance.

SERVICE ROOMS

The help must be provided with shower, toilet, locker, and rest rooms and cafeteria; for professional help and student help separately. Receiving rooms for food supplies, root cellar and storage rooms for canned goods and unpacking and storage rooms for china and linen, and storage for wheeled cars or tables are of prime necessity; while the cold storage for meats, fish and perishables must be readily accessible to preparation rooms and kitchens. No hard and fast rule as to capacities can be laid down but it were well to make them ample.

MATERIALS AND EQUIPMENT

What of the materials of the interior? Kitchen floors of baked clay, storage room floors smooth, treated cement; walls in both cases some vitreous clay product; ceilings plaster painted. For the cafeteria, acoustical ceilings and walls; on the latter Zenitherm has been used successfully for color and design, while the same material has been used for floors in club and committee rooms where rugs are used for decoration. In smaller club rooms where especial attractiveness is desired oak in herringbone pattern laid in mastic is used. In women's lounges floors are of random width walnut laid on an under floor, as already noted, and wainscoted richly in the same wood. In men's lounges, as in lobbies and concourses, floor with honed Ridgeway flag in fairly large units, with borders of rose brick or colored tile for contrast; wainscot in oak or walnut to harmonize with the rest of the scheme. Neighboring buildings and local conditions will determine the materials to be used on the exterior if the designer cares to have his building in harmony with the rest.

It will be well at this point to be a bit specific as to the assembly room,—a room with so many different purposes to serve. The large dances are held in the assembly room and so the floor is of high importance. One of the best, all things considered, is a floor of narrow (one and three-eighths) maple, side and end matched, in fairly short lengths laid parallel to side and end walls, the side and end pieces meeting at ninety degrees with a butted rather than a mitered joint. The maple may be laid on a diagonally laid under floor on sleepers (as in the Michigan League) or nailed to a porous concrete (as in the Michigan Union); or, as is not infrequently the case, laid in mastic. A canvas covering should be provided from the first to protect the floor when the room is in use for banquets, when the room is set up for concerts or lectures, or when large receptions are in progress. The lighting fixtures in this room should be equipped with dimmers and be provided with colored lamps. Music and speaking are heard so frequently in an assembly room that

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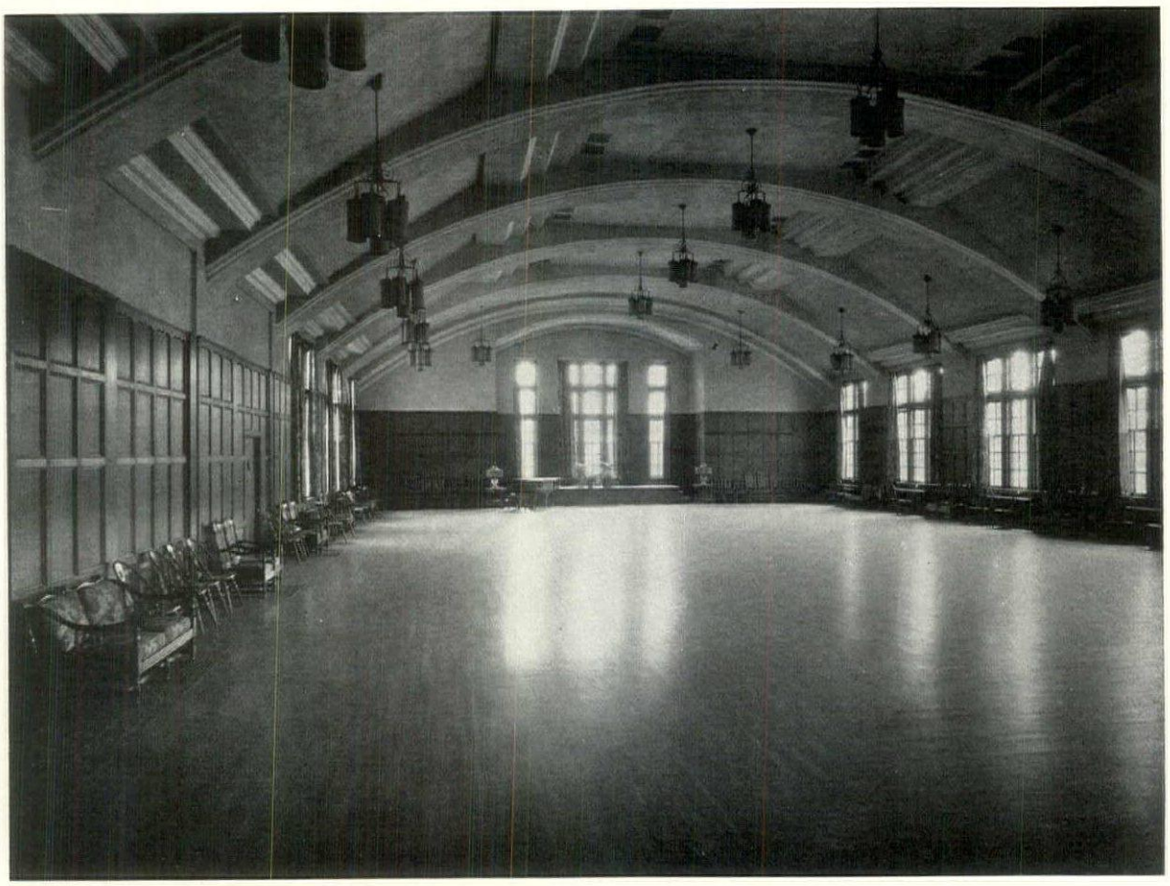
The cafeteria of the Women's League Building, University of Michigan. The floor is of rubber tile, and the walls have a Zenitherm wainscot with plaster above. The ceiling is acoustically treated



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The Assembly Room in the Women's League Building. The ceiling and upper portions of the walls are of float finish, lime mortar plaster. The wainscot is quartered oak, stained a rich brown, wiped out and treated with gray filler. The floor is of maple, which should be covered with canvas when the room is to be used for banquets

the acoustics should be carefully considered. This room, as indeed all the larger rooms of the Union building, can be effectively ventilated by introduced fresh air warmed to seventy degrees Fahrenheit and exhausting it at the floor. Thermostatically controlled radiation near the floor will supply heat. This same method may be employed to good advantage in the theatre and in the larger lounges. In low rooms there should be deflecting surfaces if the air is introduced in the ceiling. To have the air blown down from the ceiling upon one's head is uncomfortable and sometimes dangerous.

There should be an ample lobby or foyer connected with the assembly room, and retiring and toilet rooms for men and women. This same applies to the theatre; and while both of these rooms should be reached from the main portion of the building through controlled passageways, each should have its own separate carriage entrance which will permit direct access from the outside,—precluding, thus, the necessity of an outsider entering from the building. Cloak rooms must, of course, be conveniently located in each case. The theatre and assembly room cannot be combined with good effect in any Union which pretends to serve the fullest need. Dances, plays, banquets, musicales, receptions, etc., must conflict many times a week to the absolute obliteration of one if all must depend upon the use of one room. This doubling of the functions of an important room has proven so generally unsuccessful as hardly to be debatable.

Space does not serve to deal in detail with the mechanical plant. Generally the Union is considered by the authorities as a college building and steam and hot and cold water are brought to the walls. Inside the problem is that of any first class club house. In any event water should be analyzed and pipe used which will best stand the wear.

As to construction: where the building is not more than five stories in height load bearing walls may be used to good effect. Reinforced concrete will serve well for posts, girders and floor systems. The joist and pan construction is very adaptable. If the ceiling below the roof construction is well fireproofed the steel of the roof may safely be left unprotected while the slate or other roofing may be laid on gypsum or on a wood sheathing one and three-fourths inches thick.

BUILDINGS FOR INDOOR ATHLETICS

A practical compilation of the modern trends in planning, design and construction of buildings for collegiate athletics, including paragraphs on the arrangement of elements which will permit the utmost flexibility of use, and on the requirements of the various facilities together with data sheets and details.

BY
DANIEL BOYDE CATHCART

THE prime requisite in the solution of the planning problem of a gymnasium is a thorough appreciation of its functions. This implies a knowledge of the size and tendencies of a student body, the scope of particular needs, and the importance of intra-mural activities. The elements of cost make necessary, within a minimum area and volume, provision for a diversity of activities to attract the maximum of students. To prevent premature obsolescence, such a building must offer the utmost flexibility of use; plan arrangement which will adequately provide for the present facilities is not sufficient. The building must be designed to function under other conditions and must be easily adaptable to changes in requirements, methods of operation, and management. Finally, the building should allow, as far as possible, all the benefits of exercise in the open air.

The large athletic building usually contains most of the facilities which are incorporated in a field house or in a natatorium. The gymnasium of average size will contain: the main gymnasium floor, swimming pool, locker rooms, shower rooms, offices, examination rooms, lecture rooms, separate exercise and activity units and services.

MAIN GYMNASIUM FLOOR

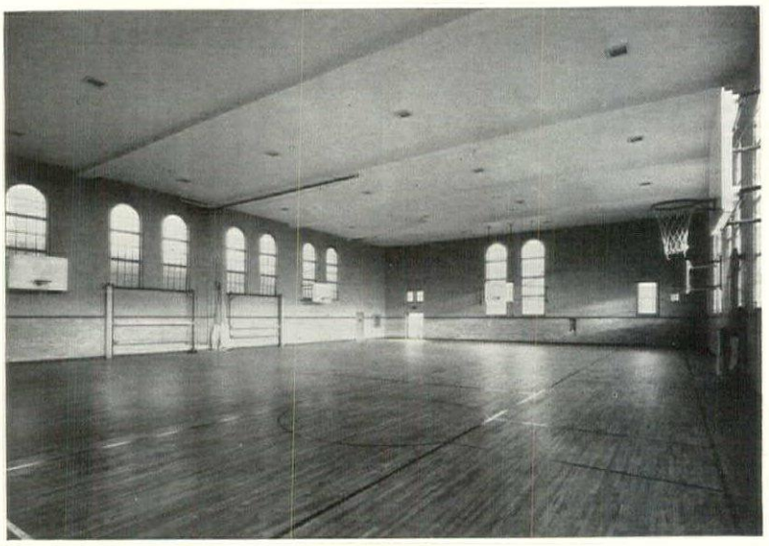
AREA: Provision for all or part of the following should be made: basketball courts, calisthenics classes, apparatus facilities, bleacher space, visitors' gallery, running track, dance floor, banquet facilities and possibly a stage. Basketball court dimensions determine the area and shape of the room. The exhibition court should be laid out longitudinally, the ideal dimensions for official play being 48 feet by 84 feet. This area, plus the required free space around the court, will allow three practice courts of minimum size (35 feet by 60 feet) to be laid out side by side across the floor. The need for adequate natural ventilation in the lower part of the room, and the excessive cost of dampproofing sub-grade construction in most locations, point to a first or second floor location. The problem of exterior design and the necessity, in most cases, for top light, are best met by placing the main gymnasium room in a wing by itself.

CIRCULATION. Spectator and player traffic should be separated, and the former diverted from the playing area. To eliminate confusion between sets of players, the basketball practice courts should have separate entrances; all other doors should be located near the corners of the room. This arrangement gives the uninterrupted wall space necessary for the installation of equipment and for the most convenient arrangement of bleachers.

Stairs and main exits should be kept out of the room. To prevent congestion, the stair runs should be at right angles to the line of exit, offset from the doorway. When spectators are to be accommodated and admission charged, the means of ingress should be controlled.

RUNNING TRACK. Running tracks are not desirable in the main gymnasium room. They are expensive, interfere with the lighting and reduce the clear area of the floor.

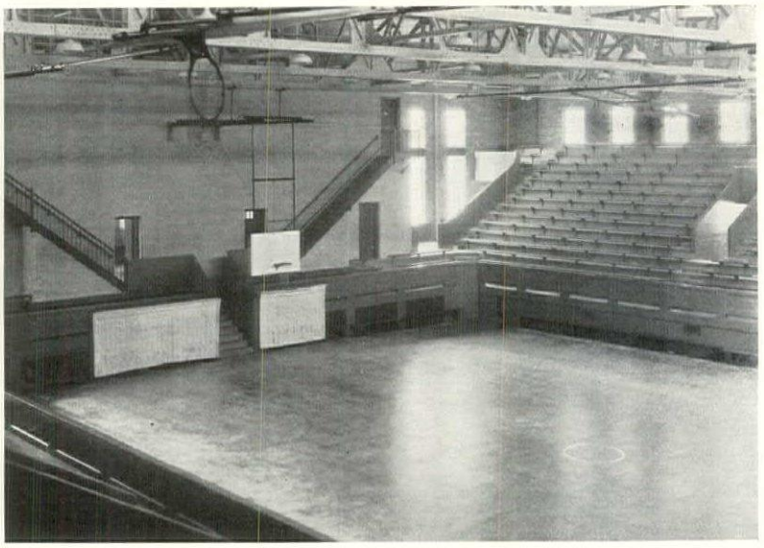
SEATING FACILITIES. Spectators' balconies are of little use unless the gymnasium is large enough to allow an uninterrupted sightline from the topmost row of seats to the nearest edge of the exhibition court. If installed, the underside should be from ten to twelve feet from the floor to allow the installation of apparatus, and lighting units beneath them should be recessed flush with the soffit to prevent glare in the players' eyes. Spectators' galleries at the floor level have been substituted for the balcony in many cases, but these reduce the wall space required for apparatus. Portable bleachers are advantageous, at least for the smaller gymnasium, as they are economical to erect and allow the greatest amount of clear playing area when not in use.



Gymnasium room in the Physical Education Building, University of Southern California. Note the lighting fixtures recessed flush with the ceiling. This type of gymnasium, equipped with a stage, could well be used as an auditorium in a small college

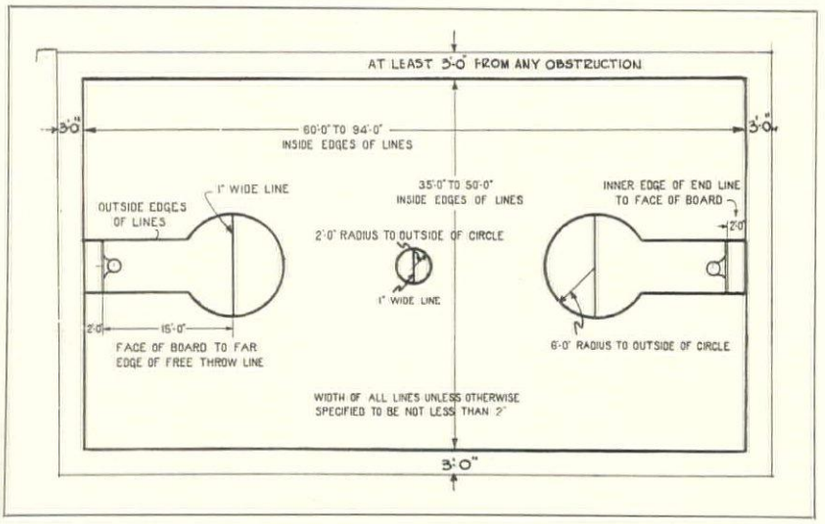
Tebbs & Knell

Main Gymnasium Room, Pomerene Hall, Ohio State University, Columbus, Ohio. The advantages of the skylighted, open ceiling type room are noted in the text. The exposed rafters in this ceiling are effective in the reduction of excessive reverberation common to the gymnasium



Basketball Arena in the Men's College, University of Rochester, Rochester, New York. Permanent seating facilities located near the floor allow an uninterrupted view of the playing area. Basket standards for practice courts are swung out of the way

Maximum and minimum basketball court dimensions and official floor markings. The size and shape of the basketball court determines, in most cases, that of the main gymnasium room



Director's Room. Most gymnasiums provide an office for the director from which he may have an unrestricted view of the main gymnasium floor when seated at his desk.

FINISH MATERIALS

Floors. Long strips of hard maple, 7/8 to 1 1/8 inches wide, machine sanded, are generally used with felt or waterproof paper between the upper and under floors. Wood blocks laid on end are also used for flooring and have found favor among many. Boiling raw linseed oil, or a combination of boiled linseed oil, turpentine and Jap dryer, or one of the special gym floor finishes is recommended for finishing the floor. Varnish should be avoided.

Walls. Walls should be of solid masonry construction with their lower portions smooth enough to prevent injury. Glazed brick, or a wooden wainscot mounted on heavy stringers bolted to the wall may be used. A 2 by 4 angle iron makes an excellent base for protection against movable equipment. An apparatus strip of wood, 8 inches wide, bolted to the wall, is necessary and should extend all around the room. Projections of any kind in the main gymnasium room are to be avoided. Folding doors, canvas curtains or nets having a canvas strip about 4 1/2 feet wide along the bottom are used to separate playing areas.

Ceilings. Ceilings should reflect light and absorb sound. Open ceilings with exposed trusses or beams are preferred unless the room is to be used as an auditorium. The bottom chords of trusses should be at least from 18 to 22 feet above the floor.

LIGHTING

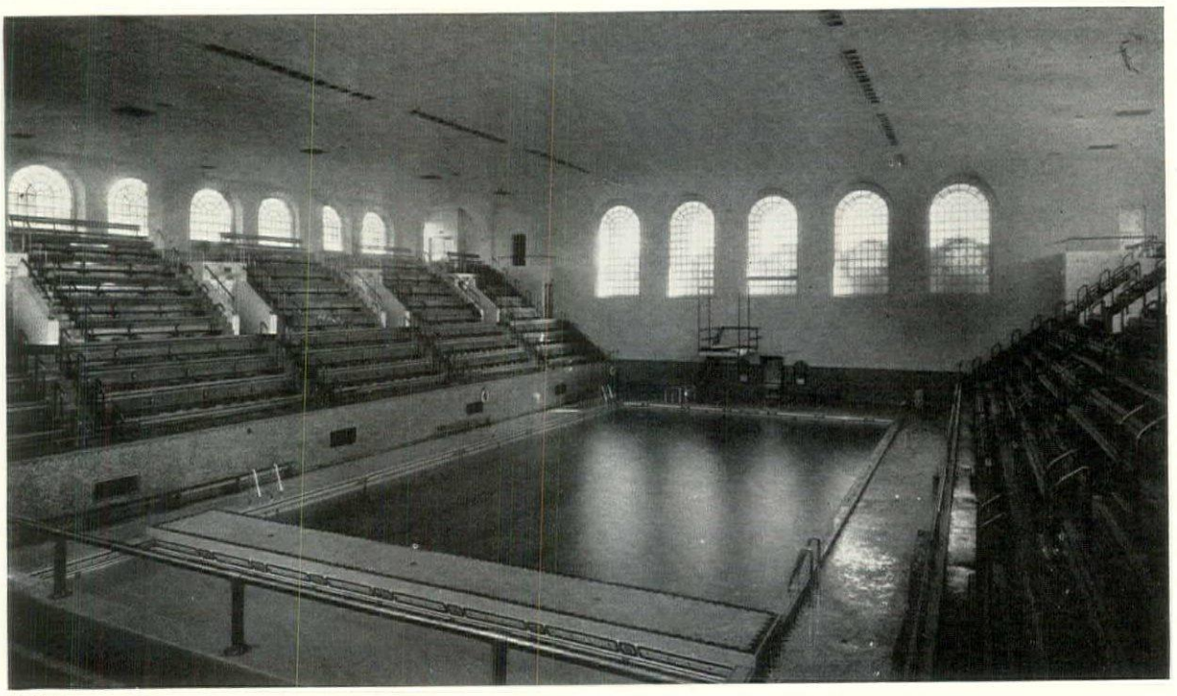
Natural Light. An evenly lighted playing area requires overhead lighting. Side light in a room where players are moving rapidly is not entirely satisfactory. Skylights should be of the monitor or saw-tooth type or of glass blocks set in mastic. The heating and ventilating system must be designed to overcome the down draft of cold air from them in the winter. Provision must be made to prevent condensation water from dropping to the floor. If there are no skylights, the architectural idioms of the exterior should not be allowed to determine the quantity of side light. Mechanically operated sash of the factory type tend to keep out rain and may be opened and closed easily without moving the protecting wire guards. Windows less than 6 feet from the floor interfere with the apparatus strip, require extra-heavy wire guards and allow glare. On the other hand, high windows reduce natural ventilation at the level where it is most needed (about 4 feet from the floor).

Artificial Lighting. Fixtures should be located near the ceiling and between, not on, beams or trusses, and should be so placed that shadow and glare are eliminated. They should be protected by wire guards fixed to the ceiling rather than to the reflector.

HEATING AND VENTILATION

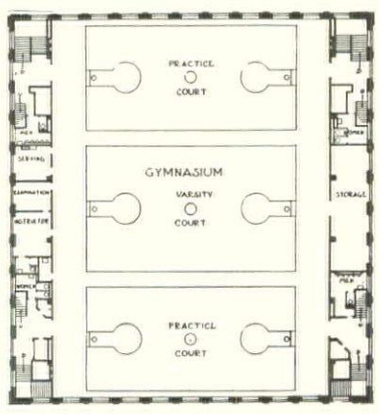
The proper temperature of the room is 60 degrees during exercises or games and up to 65 degrees for other purposes. Radiators or combination heating and ventilating units (unit heaters) recessed in the wall and covered with wire guards are recommended. Steam pipes should never be exposed, even if insulated, as harsh treatment will soon tear the covering off. Hot air, washed and recirculated, is also used.

Natural ventilation is excellent provided the air is kept in motion at the 4-foot level, but this is difficult unless auxiliary ventilation is installed.

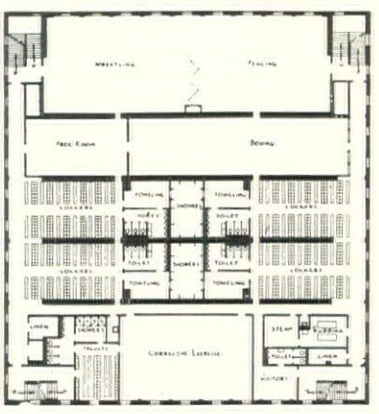


Weber

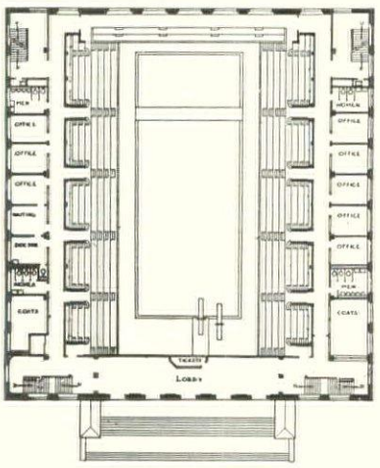
The natatorium in the new Indoor Athletic Building at Harvard University. The large pool is of the constant-depth type. In the foreground may be seen the division between the deep pool and the smaller. The shallow one is used for instruction. Plans of the Indoor Athletic Building are shown below



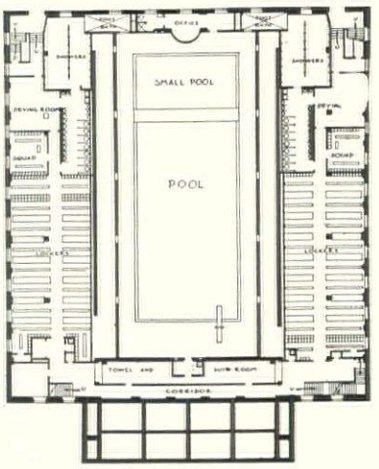
Gymnasium Floor Plan



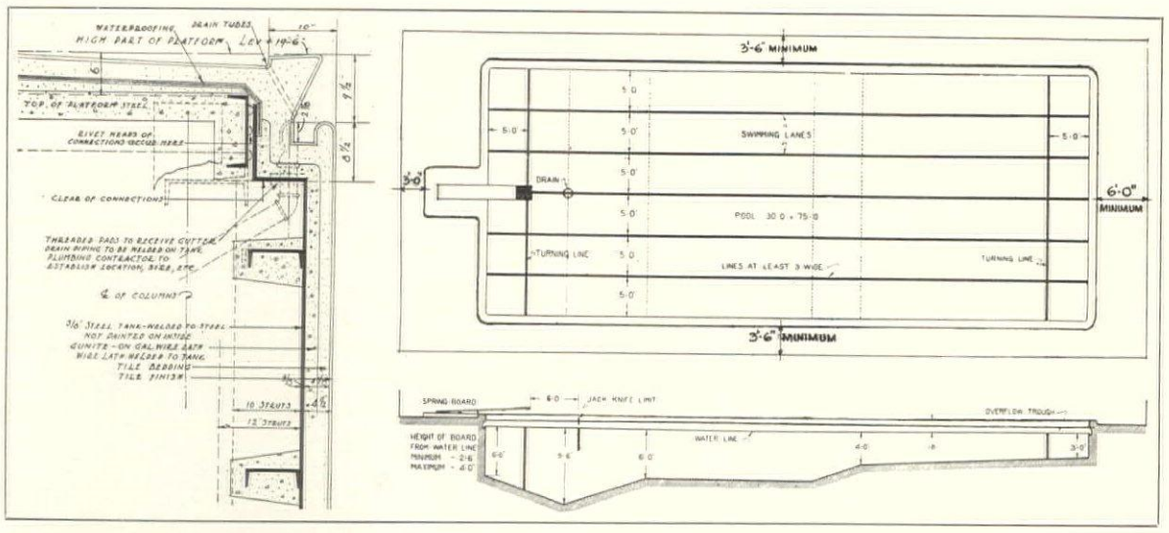
Gym. Locker Floor Plan



First Floor Plan



Basement Floor Plan



The "Double Spoon" type pool, recommended when the length exceeds 60 feet. The plan and section indicate the proper lane and turn markings. The detail is for steel shell construction, having thin, light walls

ACOUSTICS

The unpleasant reverberating qualities of most main gymnasium rooms make it advisable to use some form of acoustic treatment. Felt between upper and under floors, and sound-absorbing wallboard, tile or plaster on walls or ceiling are means of reducing noise.

SWIMMING POOLS

Very few of the recently constructed gymnasium buildings fail to include one or more swimming pools. The size and shape of the pool is determined generally by cost, but 75 feet is the recommended length and 30 or 36 feet the width. A 60-foot pool is also standard. The "double spoon" type illustrated is considered the best by some authorities for a pool over 60 feet long. However, some recently constructed college buildings have pools of the flat bottom type about 8 feet deep for competition with additional shallow pools for instruction. The volume of a graded depth pool is less than that of the flat bottom type and therefore is more economical, easier to clean and requires less water heating.

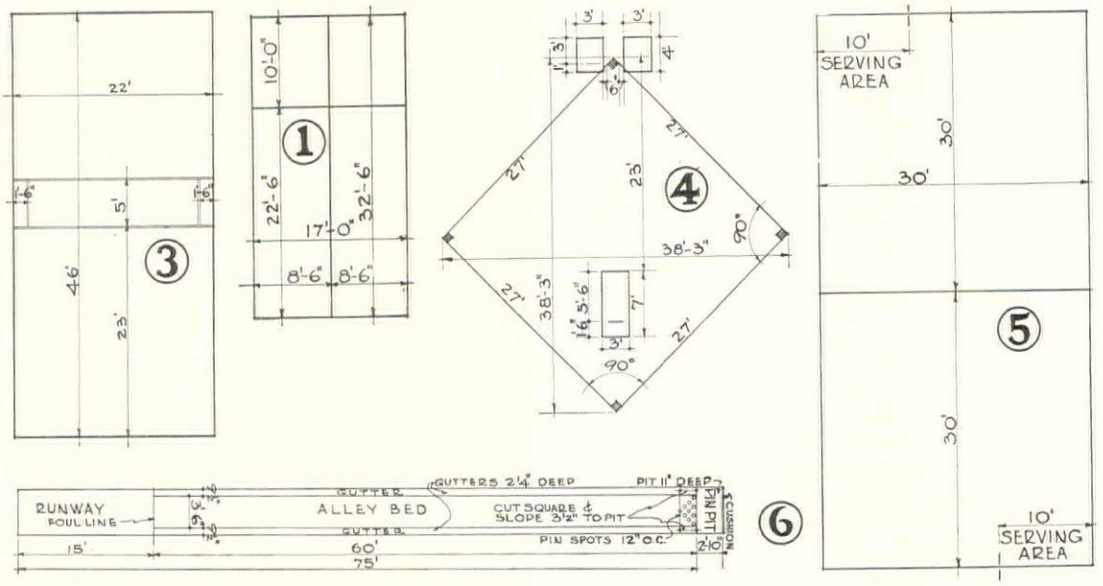
The side walls should be kept about 12 feet away from the pool edge to allow space for instruction. Fifteen feet is recommended from the springboard end of the pool to the wall, and not less than 6 feet for the walkway at the opposite end. The best location for permanent seats is at one or both sides of the pool with the first row at the floor level, as a better view is obtained and the air temperature is more comfortable than in the over-heated upper portions of the room. Splash walls of masonry at least 3 feet high should be provided in front of the first row of seats.

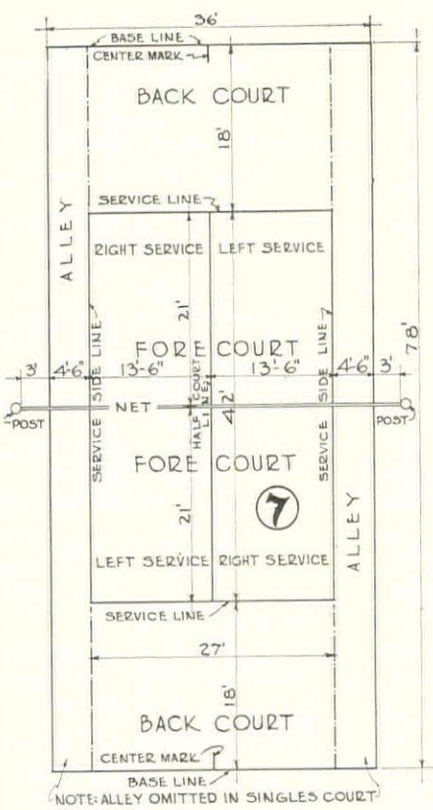
Pool Construction. Floor and walls may be of heavy concrete with membrane and integral waterproofing, or may consist of a welded steel plate outer shell, gunite on galvanized wire lath, tile bedding and the finish tile. An inspection corridor completely around the structural walls of the pool is a necessary feature.

Light-colored tile or glazed brick is the accepted lining material, non-slip tile being used for the floor. Distance, depth, turning and lane markings should be of tile of a contrasting color. Provision should be made during construction for the installation of equipment by placing brass sockets or inserts in the floor and walls. All exposed metal must be such that it will not deteriorate or stain the pool walls. Ladders should be of the recessed or built-in type. Walkways must be of non-slip material.

Walls and Ceilings. Tile or glazed brick are the most widely used materials, but above splash height various sound-deadening materials may well be applied. Pressed cork has been used advantageously for this purpose. The walls of the room should be free of obstructions. Ceilings should be of acoustical material,—plaster, cork or acoustic tile may be used. Unless sound-deadening materials are applied, the echoing will be highly objectionable.

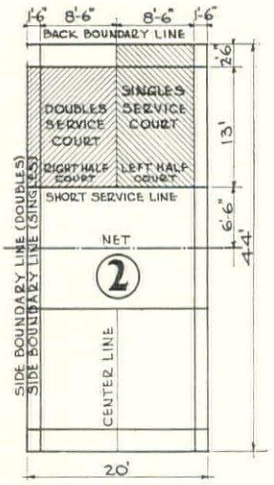
Heating, Lighting, Ventilating. Swimming pool rooms are kept at a temperature of 70 to 80 degrees. Steam, recirculated hot air, or the combination unit system are all equally good. The pool may be located in the basement but it must have abundant natural light and ventilation. Minimum window or skylight area equal to one-half of the room area is a good basis for calculation. All ventilation should be arranged to eliminate drafts.





COURT AND GAME AREAS AND MARKINGS

1. Squash Tennis
2. Badminton
3. Handball
4. Indoor Baseball
5. Volley Ball
6. Bowling Alley
7. Tennis



The court sizes and floor markings given on this sheet were obtained from current guide books published by the Spalding Company. Owing to changes made from time to time by officials, it is well to check all sizes before laying out courts. Squash Racquets court dimensions, not shown here, have been changed recently from 17 by 32½ feet to 18½ by 32 feet

Indirect or semi-indirect lighting fixtures produce the best results and should be accessible from the floor. Underwater lighting is also effective and useful.

WATER FILTRATION, STERILIZATION, AND HEATING. Filtration through the pressure type filter is generally preferred for the college or university pool. Chlorine in solution or as a gas, introduced through the proper apparatus, is one of the methods used for sterilization. The ultra-

violet ray process is also recommended. The water heater should be designed to heat all or part of the circulation water and should be provided with ample surface for heat interchange. It should also be equipped with automatic thermal control.

SANITATION AND DRAINAGE. Outlets of sufficient capacity to drain the pool in four hours or less should be installed. The floor outlet openings should be four times the area of their discharge pipes to reduce suction currents. Scum gutters necessary only on the side walls should be of the type which does not permit matter entering them to be washed out by a sudden surge of water and should have drainage outlets not more than 10 feet on center. Drainage of the floor around the pool should be toward the walls and the water carried off through a narrow gutter.

LOCKER AND SHOWER ROOMS FOR MEN

The area required for lockers will be governed by the system used, which may be either the "permanent" or the "tote box" arrangement. Required area per locker and required area per student during the period at which the locker room is most used are also factors. The following formula, applicable to the permanent system, considers both of these factors, and is accurate enough to be used as a working basis:

$$\frac{\text{8 sq. ft. (minimum allowance per locker) x No. of lockers}}{\text{32 sq. ft. (minimum allowance per student)}} = \text{Size of largest class that may be accommodated}$$

Example: $\frac{\text{8 sq. ft. x 200}}{\text{32 sq. ft.}} = 50$ students per class

The tote-box system permits approximately double the number of persons to be accommodated in the same area but is not as widely used as the permanent system as yet, due to necessity for increased handling of clothes.

Approximately 10½ feet is the minimum ceiling height for locker rooms or 12 feet if the room is lighted from above. Centrally located locker rooms placed on the swimming pool floor level between the swimming pool and the main gymnasium room are the most efficient. Long, fairly narrow rooms with windows between the rows of lockers are advised. Among the many objections to the use of one large locker room are lack of control, appearance and proper ventilation. Fixed lockers may be installed as indicated in the illustration. Lockers built up on concrete bases 4 inches high eliminate dirt pockets beneath them and allow the corridors to be easily cleaned. Benches of the fixed type are recommended.

MATERIALS. Floors may be finished with non-slip tile, cork or linoleum or treated cement. Cork flooring, next to tile, is the most favored.

Walls should be of light-colored tile or brick of the hard-burned variety which does not crumble or shed particles of dust or sand. Steam pipes, ducts, etc., should be concealed.

Ceilings should be furred and plastered where there are many exposed pipes; otherwise the underside of the concrete slab painted a light color, will serve. A ceiling material which will not disintegrate because of shock should be selected, especially if the room is located beneath the main gymnasium floor.

Windows should be near the ceiling and of a type which will insure privacy. They should be glazed with obscure glass with the rough side out for easy washing.

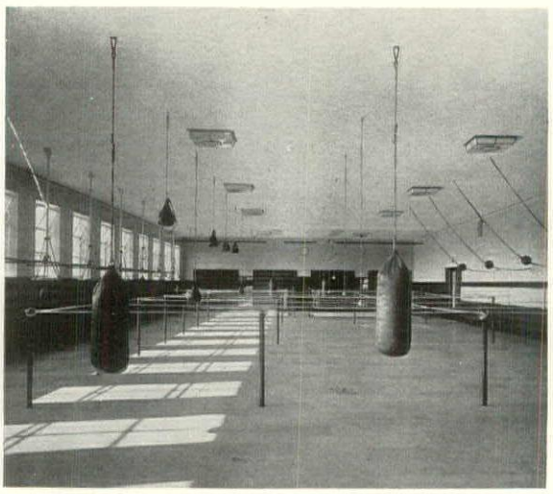
A temperature of 70 degrees is usually maintained in locker rooms. Radiators should be high on the wall or recessed and screened. Positive ventilation must be provided. Ventilation of the lockers themselves is the most important phase of air-conditioning in these rooms. Many layouts provide steam pipes or hot air supply ducts under or between the backs of lockers with exhaust ducts directly above them to dry clothing and to remove foul air.

SHOWER ROOMS. One shower head for every three to five men of the largest class using the shower room is recommended. Twenty-five square feet per shower head multiplied by the number of showers needed will give the required area of the room. The shower room height is variable but the proper shower head location is at shoulder height. Valves of the mixer variety are most favored and controls should be 4 feet above the floor, accessible without reaching through the water streams.

Shower rooms used in connection with a pool should be immediately adjacent to it with access possible only through a foot bath. Traffic from the pool should be through foot bath, shower room and toweling room to the locker room, and traffic to the pool should be the same but in reverse order, for reasons of sanitation in the swimming pool and to keep the locker room floor clean and dry.

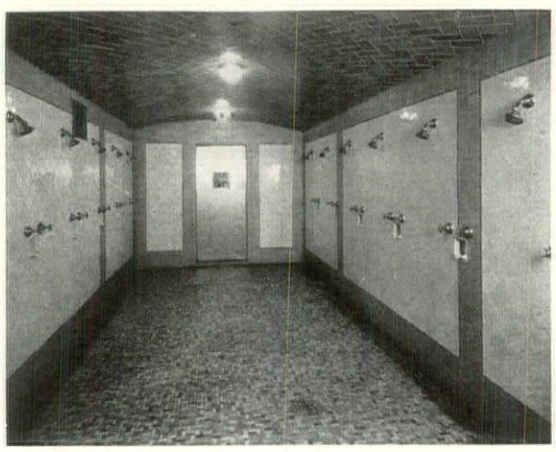
MATERIALS AND CONSTRUCTION. Tile is replacing concrete for the shower room floor. Mosaic, granolithic, terrazzo or non-slip tile may be used but small units in either floor or wall are the best as they reduce the possibility of trouble-making voids occurring behind them. Drainage should be from the center of the floor to narrow drain troughs at the walls. Pipes should not be laid in this floor.

Glazed brick or tile is the material generally used for walls. No piping should be exposed in the shower rooms and all pipe should be non-rusting.

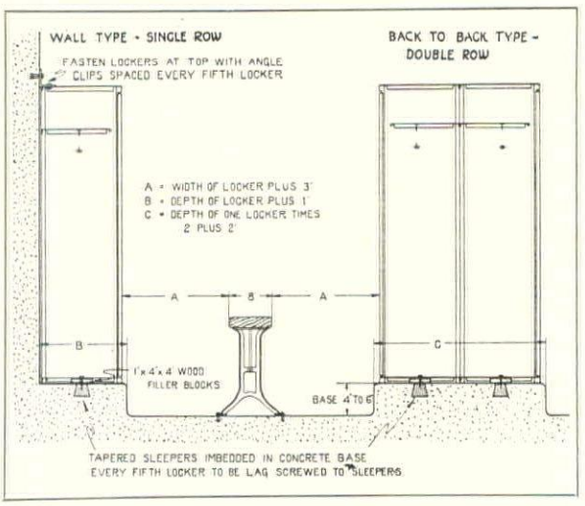


Krükelstein

Boxing room in the Sports Forum, recently constructed at Charlottenburg, Germany



A well planned shower room



Recommended locker installation details for sanitation and permanence

Ceilings slightly arched to drain condensation to the side walls are recommended and should be of waterproof materials. Ordinary plaster will absorb water and permit disintegration of the lath. Tile is the recommended material but a mixture of soapstone and plaster will serve.

Windows and doors must be of non-rusting metal surrfaces. Obscure glass is necessary for privacy and all hardware should be of bronze or other rustproof metal. Natural light is not necessary in the shower room. Artificial lighting systems must be waterproof and lamps should be equipped with vaporproof housings. Radiators of rustproof material, preferably brass, should be placed out of reach. Exhaust ducts should be provided to remove steam which would otherwise drift out into the locker room.

LOCKER AND SHOWER ROOMS FOR WOMEN

Women are usually provided with individual dressing rooms. Various systems have been devised which combine two or four dressing rooms with one shower. The present trend, however, is toward the locker system as used by the men, with additional dressing rooms provided without showers. The combination of dressing rooms and showers is held in disfavor by many physical directors as it allows steam to circulate through the locker rooms. The tote-box locker system generally used in connection with this arrangement is also unsatisfactory because of too much waste movement between locker and dressing room. If the dressing room system is used, the same provision for wet and dry circulation must be made as was outlined for the men's lockers and showers.

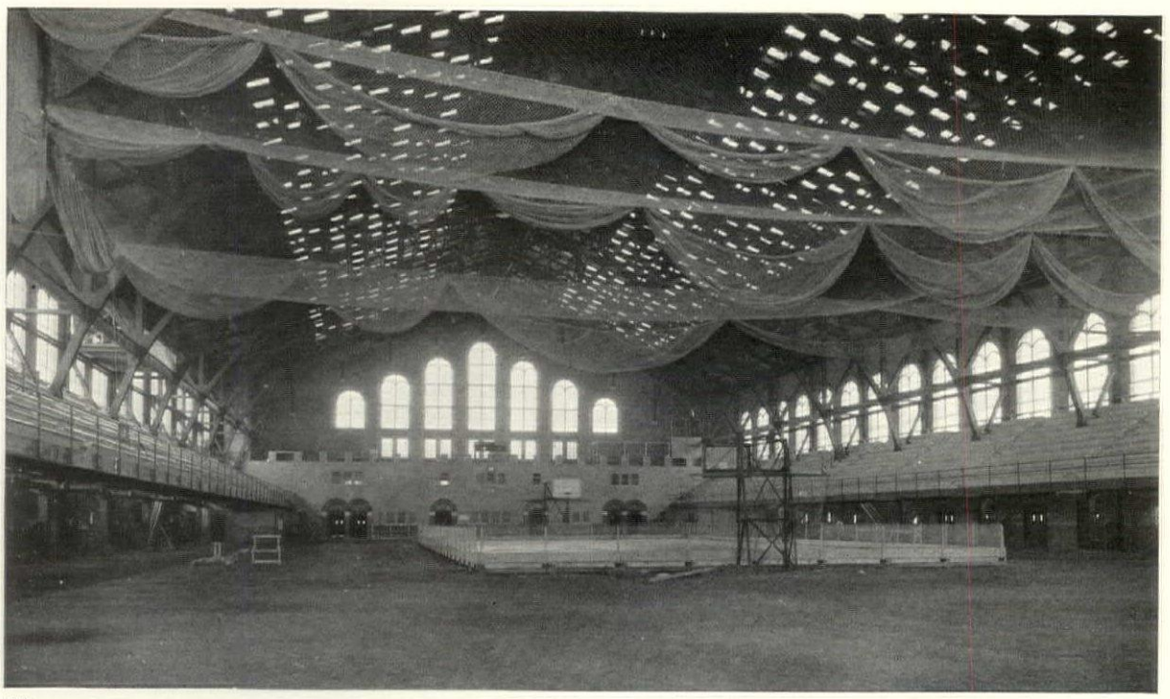
Additional locker and shower rooms will probably be required for: home team, visiting team, visiting officials, corrective class, and faculty.

SEPARATE EXERCISE AND ACTIVITY UNITS

HANDBALL COURTS. The standard four wall court is 20 feet wide, 40 feet long and 18 to 20 feet high. One court of this type for each one hundred students is not too many and most institutions mark off additional single wall courts wherever wall conditions permit.

Floors should be constructed of wood as in the main gymnasium. Walls of solid masonry with a smooth cement plaster finish or of wood are equally good. Flush finished doors with flush hardwood are the only type that should be considered. Lighting must come from overhead and fixtures must be arranged to illuminate the court evenly. They should be fitted with flat wire guards.

Heat, if necessary, should enter through heavy metal grilles located near the floor on the side or back walls. Ventilation grilles should be in the ceiling. All ducts must be kept out of the room and grilles kept flush with wall surfaces.



Ellison

Interior of Yost Field House, University of Michigan, Smith, Hinchman & Grylls, Architects. This field house is 165 feet wide and 345 feet long. Daylight is admitted through the roof by the use of interlocking cement and glass tile

SQUASH COURTS. Standard squash tennis court dimensions are 17 feet x 32½ feet x 16 feet in height and squash racquets courts are 18½ feet x 32 feet x 16 feet in height. The games are rapidly gaining in popularity and as many courts as possible should be provided. Walls of horizontal wood strips are best. The floor may be of maple but wood blocks on end are used extensively, as evidenced by the fact that twenty-one squash courts in the new dormitory buildings at Harvard University are floored with this material.

MISCELLANEOUS FACILITIES

These include: corrective exercise rooms, small gymnasium, faculty gymnasium, boxing rooms, wrestling room, fencing room. The area for the first three rooms may be computed on the minimum basis of 50 square feet per person, and the latter should allow approximately 200 square feet per person. The construction and design of these rooms will be practically the same as that recommended for the main gymnasium room.

Other rooms to be considered are: office, examination room, lecture room, ladies' room, conference room, reception room, trophy room and library.

Services include: stock room, trainer's room, janitor's room, bleacher storage, drying room, apparatus storage, machine and repair room and laundry.

FIELD HOUSE MATERIALS AND CONSTRUCTION

The floor or playing area of a field house differs from that of a gymnasium in that it is of earth instead of wood. A mixture of clay, sand and sawdust has been found to be one of the best flooring materials. The clay gives firmness of footing and the sand and sawdust keep the surface from becoming too hard. A floor of this type must be periodically raked, dragged, sprinkled and rolled to keep it in condition. An occasional light application of sawdust will be effective in keeping the surface moist and free from dust. Many of the larger field houses are equipped with portable basketball floors which are built in sections and only set up for match and practice games during the playing season.

If provision is to be made for an ice rink, the floor will, of necessity, be of concrete with steel taking the place of stone in the aggregate. Pipes for refrigeration should be laid perpendicular to the long side of the rink and alternate pipes should be supplied with refrigerant from opposite sides of the room. The most important feature of piping for this purpose is to maintain equal runs and distribution from the refrigerant source.

With the exception of these features and the engineering problems indigenous to buildings having wide roof spans, the data on gymnasium buildings will, in almost every case, be applicable to the facilities listed for a field house.

TABULATION OF ATHLETIC ACTIVITIES AS A BASIS FOR GYMNASIUM DESIGN

FACILITIES AND THEIR REQUIREMENTS

Facility	Area and Volume				Maintenance		
	Dimensions	Net Area Sq. Ft.	Net Volume Cu. Ft.	Gross Volume Cu. Ft.	Light	Temperature	Ventilation
Calisthenics	60x85x20	5100	102000	175000	Side or Top	55	Nat.
Apparatus	50x75x20	3750	75000	125000	Side or Top	55	Nat.
Rowing Machines	50x60x20	3000	60000	85000	Side or Top	55	Nat.
Rowing Tank	50x60x20	3000	60000	100000	Side or Top	55	Nat.
Two Volley Ball Courts	30x50x20	3000	60000	85000	Top		
Five Basketball Courts	45x75x22	16875	370000	530000	Top	55	Nat. and Mech.
One Basketball Spectator Gallery (500 Cap.)		3570	70000	100000			
Six Handball Courts	30x40x20	7200	144000	190000	Top	55	Nat. and Mech.
Six Handball Courts	15x30x15	2700	41000	55000	Top	55	Mech.
One Handball Court Spectator Gallery (200 Cap.)		1500	25000	35000			
Pole Vaulting, Jumping, etc.	3 Strips 12x120x20 3 Strips 12x45x20	5940	119000	150000	Side or Top	55	Nat.
Tennis, Indoor Soccer Hockey	50x120x25	6000	150000	225000	Top	55	Nat.
One Tennis Spectator Gallery (500 Cap.)		3500	90000	110000			
Fencing	40x45x15	1800	27000	40000	Side or Top	55	Nat.
Wrestling	40x60x20	2400	48000	60000	Side or Top	55	Nat.
Boxing	40x50x15	2000	30000	45000	Side, Side Top	55	Nat.
Swimming Pool	35x75	5500	200000	300000	Top and Side	72 to 75	Mech.
Swimming Pool Spectator Gallery (Cap. 1500)		10500	260000	300000			
Swimming Pool	15x75	3000	90000	120000	Side or Top	72 to 75	Mech.
Corrective Gymnasium	30x40x20	1200	24000	32000	Side or Top	60 to 65	Nat.
Indoor Golf	20x20x15	400	6000	8000	Side or Top	60 to 65	Nat.
Lecture Room	35x40x15	1400	21000	30000	Side or Top	68	Mech.
Medical Examination Room	60x260x15	15000	234000	300000	Side and Top		
Faculty Gymnasium	45x75x20	3375	68000	90000	Side or Top	55	Nat.
Three Thousand Lockers	160x100	16000	200000	275000	Side or Top	65	Mech.
200 Faculty Lockers	28x50	1400	17000	22000	Side or Top	65	Mech.
Sixty Showers	40x50	2000	35000	45000		72 to 75	Mech.
Indoor Track 12 to 16 laps 6 to 9 ft. wide				100000		68	

USE AND EFFICIENCY OF FACILITIES

Facility	Use		Periods			Hours		Area Per Player		
	Total Use	Daily Use	No. of Periods	No. Per Period	Length of Period	A. M.	P. M.	Sq. Ft. per game	Sq. Ft. per day	Min. Standard Sq. Ft. per game
Calisthenics	Class 1000	500	6	85	40 Min.	10–1	2:30 6	60	10	50
Apparatus	Class 1000	500	6	85	40 Min.	10–1	2:30 6	45	7.5	50
Rowing Machines	Class 500	400	Cont.	38	.....	..	2–6	80	7.5	80
Rowing Tank	Class 200	100	Cont.				2–6		30	
Two Volley Ball Courts	Game 200	100	Cont.	20	45 Min.		4–6 3–6	75	30	75
Five Basketball Courts	Game 1000	500	Cont.	10	1 Hr.	10–1	5–6 4–6 2:30–6	337	34	3000
One Basketball Spectator Gallery (500 Cap.)										
Six Handball Courts	Game 300	100	Cont.	4	30 Min.	10–1	5–6 4–6 3–6	300	72	300
Six Handball Courts	300	100	Cont.	4	20 Min.	10–1	5–6 4–6 3–6	112	27	270
One Handball Court Spectator Gallery (200 Cap.)										
Pole Vaulting, Jumping, etc.	200	100	Cont.	14		10–1	5–6 4–6 3–6	400	59	400
Tennis, Indoor Soccer Hockey	200	40	Cont.			10–1	5–6 4–6 3–6		150	Tennis 1800 Hockey 1000
One Tennis Spectator Gallery (500 Cap.)										
Fencing	100	50	Cont.	10		10–1	5–6 4–6 3–6 4–6	180	36	200
Wrestling	250	100	Cont.	12			3–6 2–6	200	24	200
Boxing	250	100	Cont.	10		5–6 4–6	3–6 2–6 4–5	200	20	200
Swimming Pool	3000	300	Cont.			12–1	3–5 2–5		18	
Swimming Pool Spectator Gallery (Cap. 1500)										
Swimming Pool	1000	200	Cont.				2–5		15	
Corrective Gymnasium	300	150	Cont.	25						
Indoor Golf	100	25	Cont.	2						
Lecture Room	200									
Medical Examination Room										
Faculty Gymnasium										
Three Thousand Lockers										
200 Faculty Lockers										
Sixty Showers										
Indoor Track 12 to 16 laps 6 to 9 ft. wide										

EDITOR'S NOTE:

This tabulation as well as the explanation on the following page has been adapted from a list of athletic facilities compiled by Frederick L. Ackerman, Architect, in studies for Cornell University, and published by The Society of Directors of Physical Education in Colleges.

EXPLANATION OF THE TABLE ON THE OPPOSITE PAGE

Facilities. The facilities noted in the table on the opposite page include practically all of the requisites for a gymnasium building.

Total Use. Figures under this head represent the agreed upon assumption as to the maximum number of students that would use a given element or group of elements during the term.

Daily Use. Figures represent the agreed upon assumption as to the maximum number of students that would utilize a given element or group of elements daily.

Number of Periods. Figures represent the agreed upon assumption as to the daily "turnover" or the number of times an element or group of elements would be utilized by different groups for classes, games or play.

Number per Period. Figures represent the assumed number of students that would utilize a given element or ONE unit of a group of elements in class, game or casual play.

Length of Period. Self-explanatory.

Hours. The graphical indication under this head indicates an assumption as to the varying intensity of use during the hours of a day. A detailed study of this aspect of the problem would yield accurate information as to (a) the number of showers, and hence the amount of water required, and (b) the number of lockers necessary in case a tote-box system be used. The number of showers and the number of lockers of a tote-box system are functions of the peak load on gymnasium and fields; they have no direct relation to the enrollment or total number utilizing these features during the year.

Spectators. Spectators' galleries where required in connection with an element, are shown as an area without physical relation to the element served by it. Generally a gallery serves one element of a group. For example: there are six squash courts required; one is served by a gallery seating two hundred.

Natural Lighting. The adequate lighting, both natural and artificial, of the various spaces constitutes an extremely important element of the problem. To state the problem of natural lighting in broad terms, we have:

(a) Certain activities, that is to say, certain rooms, require top lighting. In some cases a maximum sky zone is required. In other cases the sky zone should be definitely limited, the glass set within definite limiting angles with respect to the horizontal, and the glazed area of roof so placed with reference to the floor area as to provide maximum luminosity near a definite wall or portion of the room.

(b) Certain activities, that is to say, certain rooms, are equally well served with light source from top, sides and, in a few cases, from the end of rooms. Under this latter group some activities require high, side or end light. With a few, adequate illumination without special direction as to source is all that is needed.

Temperature. Figures indicate the average temperature required.

Heating and Ventilation. (a) Natural ventilation is far more economical than mechanical in point of first cost and cost of operation. The values involved in a structure of this character are of a necessity large.

(b) The adequate natural ventilation of rooms of the shape, area and volume under consideration requires the provision of windows in the two side walls. Such windows should be reasonably near the floor; but they may be much smaller in area than those which would serve for lighting.

(c) Certain rooms, by reason of the nature of occupancy, must be mechanically ventilated. For example: shower rooms, spectators' galleries, rooms which require solid wall areas for games.

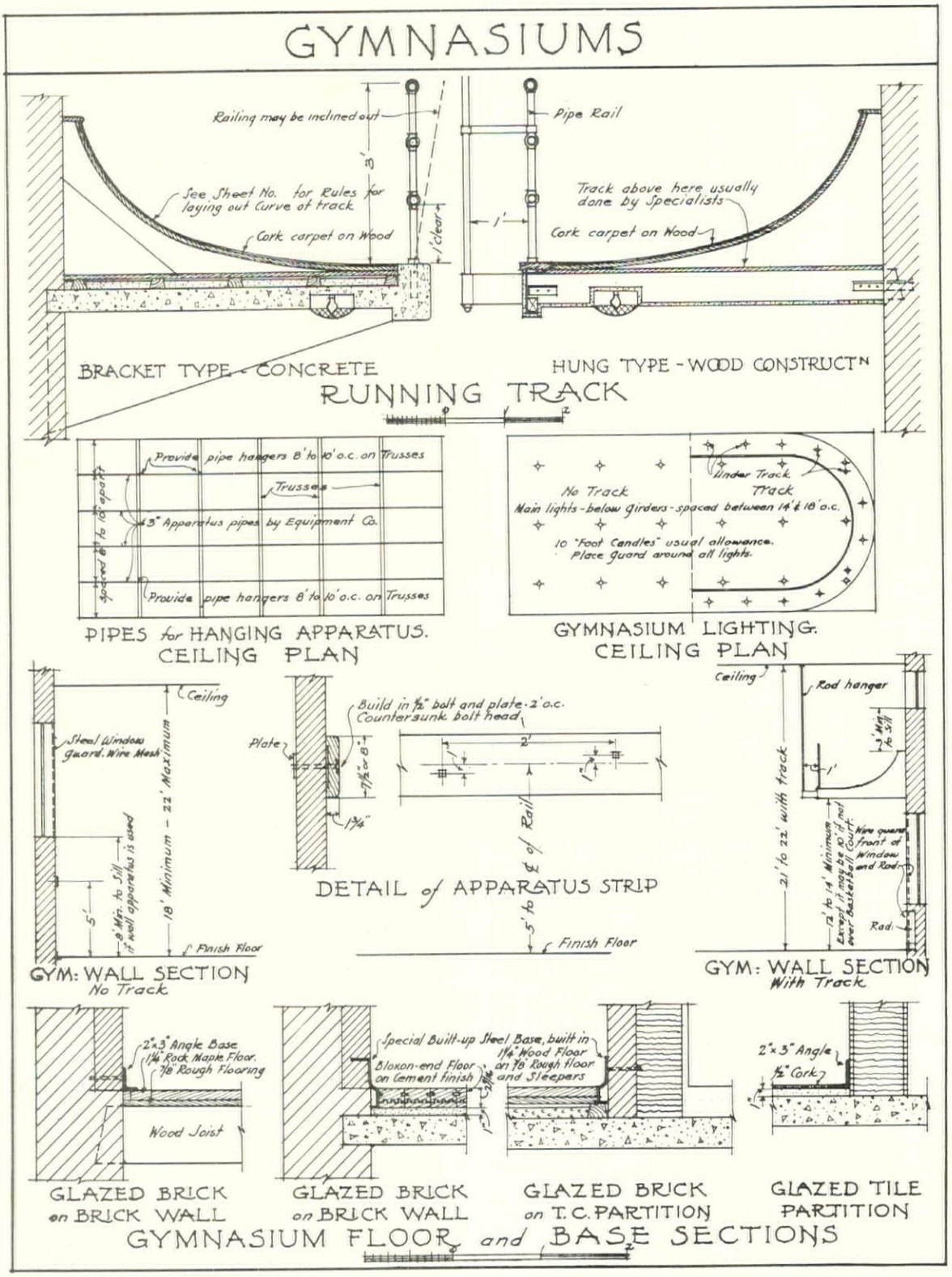
From the above it follows that that type plan in which corridors serve rooms upon either side *must* be eliminated from consideration *wherever* natural ventilation is to be used. Obviously, the entrance to such rooms must be secured by a corridor system so arranged as not to cut off cross circulation of air.

Net Area. Figures represent net area required. In the case of calisthenics, for example, the area is a function of the size of class. In the case of games it is "regulation." The height noted is the height required in the games. In other cases it is assumed and is therefore subject to some modification. Any modification that might be made would not materially affect the total volume.

Net Volume. See the above. The figures represent "interior" or room volumes.

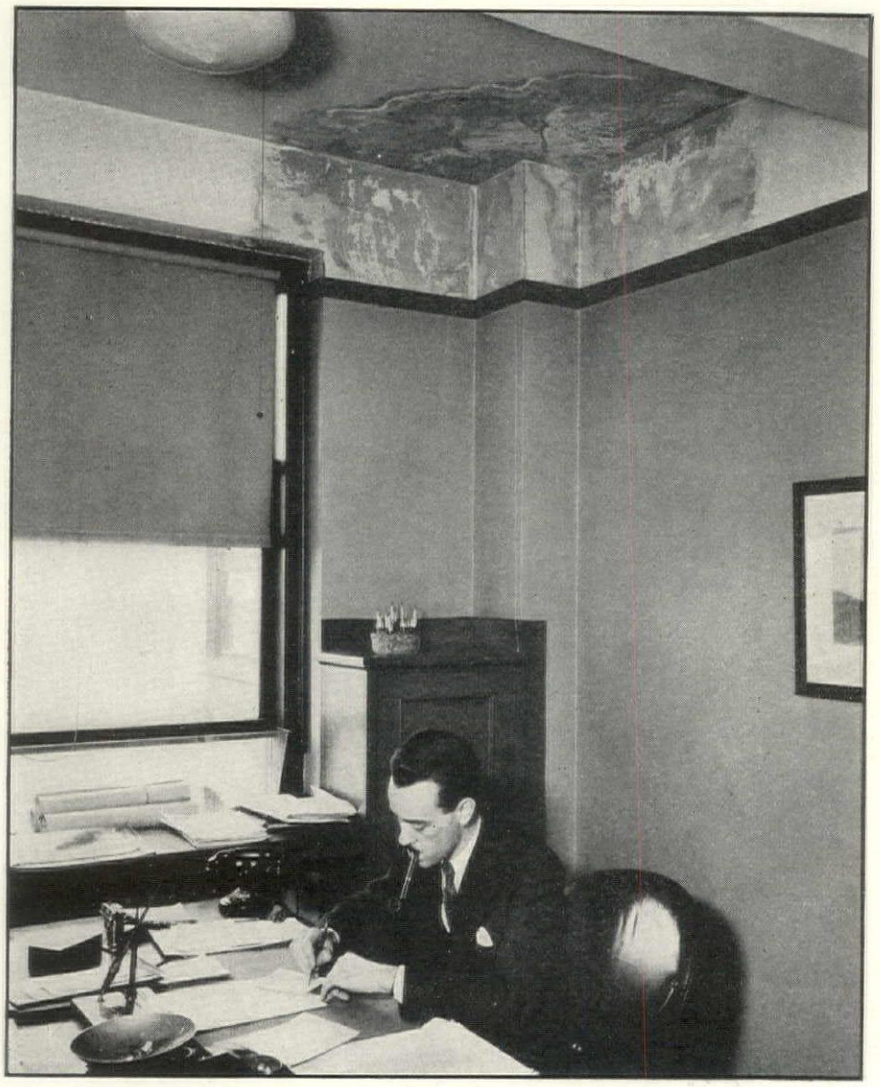
Gross Volume. Figures in this column represent broad assumptions as to the additional volumes required for enclosing walls, floor and roofs. The allowance range from 33 per cent to 60 per cent of the net volumes according to span, etc. In addition to these allowances for structural features, further allowances are noted later to cover halls, stairs, etc., together with foundations.

Efficiency. Under this head and self-explanatory subheads the figures indicate the relative efficiency of the several elements in serving the student body under the assumptions already made as to use. The relation between "efficiency per game" and "efficiency per day" indicates the "turnover" of use. They thus serve to check the assumption, for example, as to the number of basketball courts to be provided and the number of students assumed to use the courts daily.



The page is reproduced from a forthcoming book, "Architect's Drafting Room Guide," by Charles G. Ramsey and Harold R. Sleeper which is to be published September 1, 1931, by John Wiley & Sons, New York

WORKING DETAILS FOR GYMNASIUMS



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INADEQUATE flashing where driving rain and melting snow can gain access to a building often results in a situation like the one illustrated above. These vulnerable points are found chiefly at floor lines, setbacks, spandrels, parapet walls and flat roofs. Durable flashing installed at the time of erection is the only economical way of keeping the building water-tight. . . . . .

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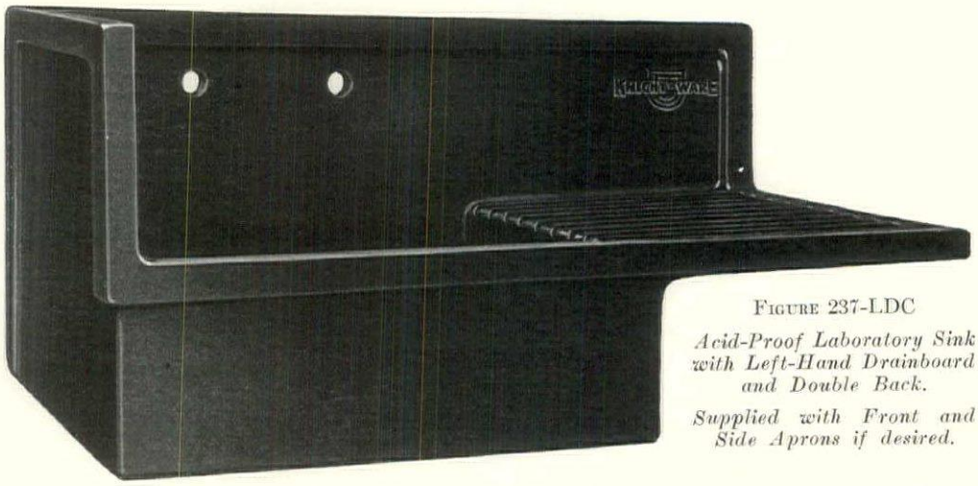

FIGURE 237-LDC

Acid-Proof Laboratory Sink with Left-Hand Drainboard and Double Back.

Supplied with Front and Side Aprons if desired.

FIGURE 269

B & S "P" Trap with Cleanout.

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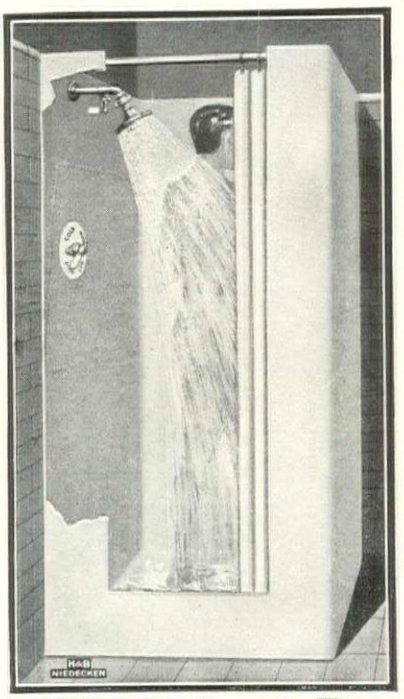

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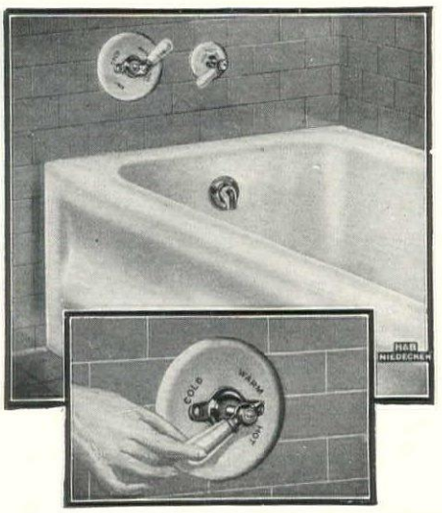

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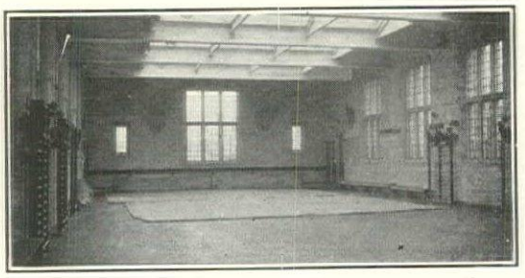

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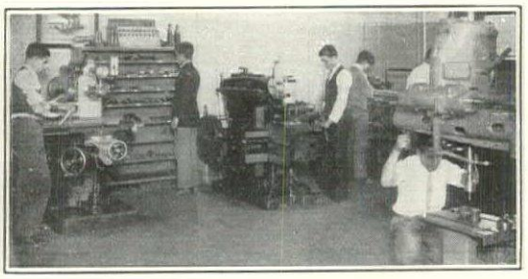

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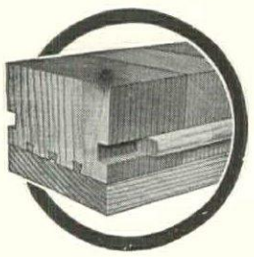

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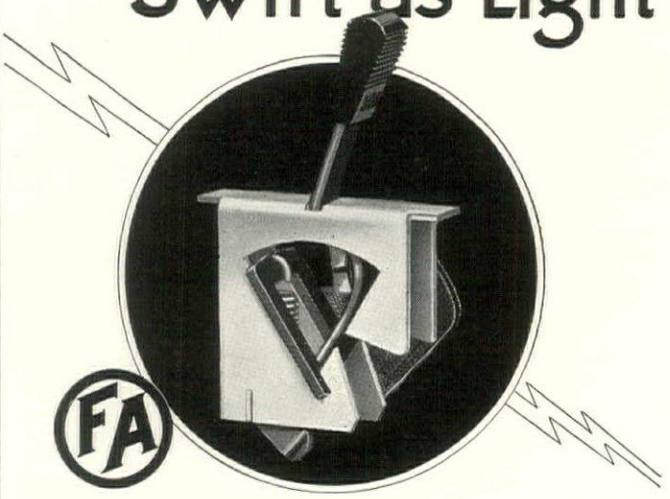

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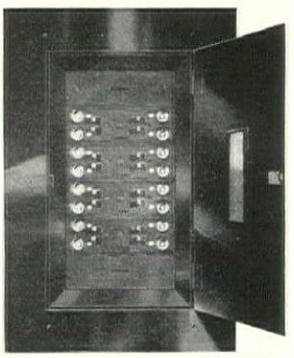

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Administration Building, State Teachers College, San Diego, Calif. George B. McDougall, State Architect.

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The Spencer Central Cleaning System is endorsed by leading educators and architects because it cleans educational buildings better, faster and at less cost than other methods.

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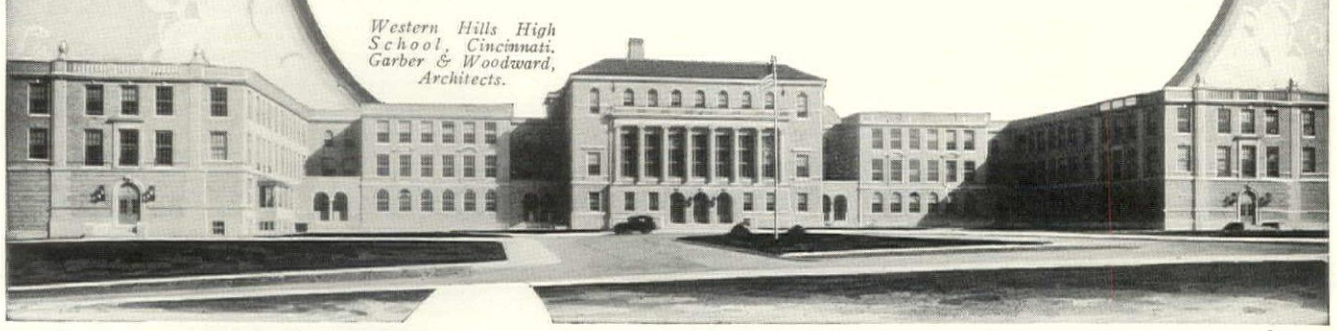

Western Hills High School, Cincinnati. Garber & Woodward, Architects.

KINNEAR ROLLING DOORS

WAGNER FIREPROOF STORAGE AND TRUCK CO.
AUTO TRUCKS FOR CITY AND SUBURBAN MOVING
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Behind this door the ordinary noises of hallway, elevators, kitchens, playrooms, gymnasiums, bowling alleys, stenographic rooms, etc.—in fact any noise common to the occupants of buildings—ceases and becomes only a soft murmur.

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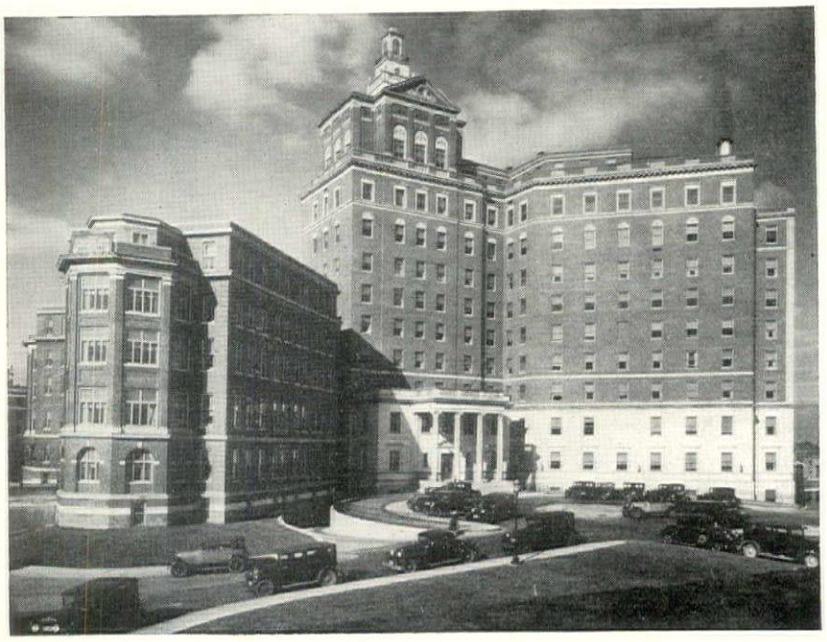
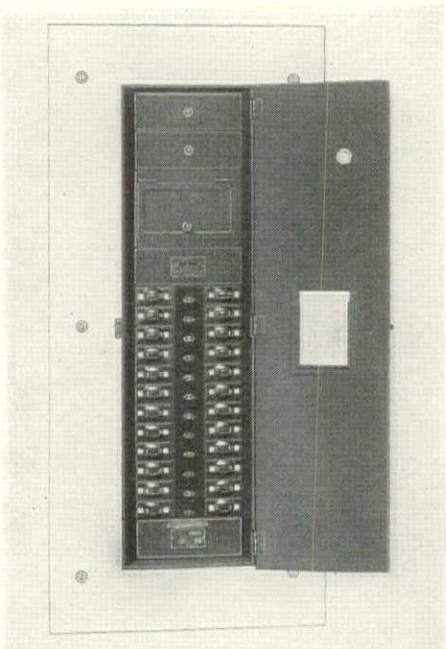


Christ Hospital, Cincinnati, Ohio. Architects: Tretig and Lee. Consulting Engineers: Fosdick and Hilmer. Electrical Contractor: Beltzhoover Electric Company. All of Cincinnati.

WHEN the crisis arrives in a critical case . . . a delicate operation is being performed . . . light is a vital necessity. So, to guard against lightless intervals handicapping surgeons and doctors, Westinghouse Nofuze panelboards were installed in Christ Hospital, Cincinnati.



Nofuze panelboard installed in the first floor corridor of the Christ Hospital. The front has been painted to match the surrounding walls.

If an abnormal overload opens the circuit, the nearest attendant can restore service promptly and safely. It is not necessary to wait for an electrician to replace a fuse—a mere flip of the handle and the circuit is closed. Further, even in the dark, the opened circuit control can be easily found—the breaker handle is mid-way between "on" and "off".

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Selected List of Manufacturers' Publications

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

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

ACOUSTICS

R. Guastavino Co., 40 Court Street, Boston.

Masonry acoustical materials (AKOUSTOLITH Tile and AKOUSTOLITH Plaster) and Timbrel Arch Construction. Brochure, 14 pages, 8½ x 11 ins. Illustrated.

ASH HOISTS

Gillis & Geoghegan, Inc., 544 West Broadway, New York.

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

ARCHITECTURAL BRONZE AND IRON

The Kawneer Company, Niles, Mich.

4-page folder, 8½ x 11 ins. A. I. A. File No. featuring Ornamental Bronze and Iron. This folder is included in Catalog Portfolio "N" which contains 4-page folders featuring Store Fronts, Doors, Windows, Architectural Bronze and Iron and Architectural Metal Mouldings.

ARCHITECTURAL METAL MOULDINGS

The Kawneer Company, Niles, Mich.

Large Sheet folded to 8½ x 11 ins. featuring our various Mouldings. This sheet is included in Catalog Portfolio "N" which contains 4-page folders featuring Store Fronts, Doors, Windows, Architectural Bronze and Iron and Architectural Metal Mouldings.

ASH HOISTS—TELESCOPIC

Gillis & Geoghegan, Inc., 544 West Broadway, New York.

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

BRICK

Hanley Company, Bradford, Pa.

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

CABINET WORK

Henry Klein & Co., 25 Grand Street, Elmhurst, L. I., N. Y.

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

Ensemble Offices for the Banker and Broker. Folder. 4 pp., 8½ x 11 ins. Illustrated.

Luxurious Office Partitions in Walnut, Mahogany and Quartered Oak. Folder. 4 pp., 8½ x 11 ins. Illustrated.

CARPETS

Collins & Aikman Corporation, 25 Madison Ave., New York, N. Y.

"There's Something New Afoot." Booklet, 12 pp., 8 x 11 ins. Illustrated. Description of Seemingly Seamless Carpets.

"Seemingly Seamless Carpets." Booklet, 8 pp., 8½ x 11 ins. Illustrated.

CEMENT

Louisville Cement Co., 315 Guthrie St., Louisville, Ky.

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

Portland Cement Association, Chicago, Ill.

Permanent Improvements for Homes, Schools, Parks, Playgrounds and Industrial Plants. Booklet, 19 pp., 8½ x 11 ins. Illustrated.

Attractive Small Homes of Concrete Masonry. A series of 20 plates, 8½ x 11 ins., in a folder bearing the A. I. A. File No. 10a2.

Concrete Masonry Construction. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Deals with various forms of construction.

CEMENT—Continued

The Key to Firesafe Homes. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

Design and Control of Concrete Mixers. Brochure, 32 pp., 8½ x 11 ins. Illustrated.

Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illustrated.

Concrete in Architecture. Bound Volume, 60 pp., 8½ x 11 ins. Illustrated. An excellent work, giving views of exteriors and interiors.

DAMPPROOFING

Minwax Company, Inc., 11 West 42nd St., New York.

Complete Index of all Minwax Products. Folder, 6 pp., 8½ x 11 ins. Illustrated. Complete description and detailed specifications.

DOORS

The Kawneer Company, Niles, Mich.

4-page folder, 8½ x 11 ins. A. I. A. File No. featuring Metal Doors. This folder is included in Catalog Portfolio "N" which contains 4-page folders featuring Store Fronts, Doors, Windows, Architectural Bronze and Iron and Architectural Metal Mouldings.

J. G. Wilson Corporation, 11 East 38th St., New York City, N. Y.

A 72-page catalog on Rolling Steel Doors and Shutters, including specifications, dimensions and other data including illustrations of installations and drawings.

Two catalogs on Sectionfold Doors Operating Overhead, contain complete information, including photographs, details, specifications and an outline of their many uses.

DOORS AND TRIM, METAL

The American Brass Company, Waterbury, Conn.

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

William Bayley Co., 147 North Street, Springfield, Ohio.

Bayley Tubular Steel Doors. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

Kalman Steel Company, Chicago, Ill.

Finishing Door Openings. A.I.A. file holder with 20 loose-leaf sheets of details and specifications.

Richards-Wilcox Mfg. Co., Aurora, Ill.

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

Truscon Steel Company, Youngstown, Ohio.

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

DOORS—SHOWER BATH

The Kawneer Company, Niles, Mich.

Folder 8½ x 11 ins. A. I. A. File No. featuring our Welded Shower Stall Doors. This folder is included in Catalog Portfolio "N" which contains 4-page folders featuring Store Fronts, Doors, Windows, Architectural Bronze and Iron and Architectural Metal Mouldings.

DOORS, SOUNDPROOF

Irving Hamlin, Evanston, Ill.

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

DRAINAGE FITTINGS

Josam Mfg. Co., Michigan City, Ind.

Josam Products. Booklet, 73 pp., 8½ x 11 ins. Illustrated. A valuable line of accessories.

REQUEST FOR CATALOGS

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

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page* 107

DRAINAGE FITTINGS—Continued

Josam-Marsh Grease, Plaster, Sediment and Hair Interceptors. Brochure. 7 pp., 8½ x 11 ins. Illustrated.

Josam New Saw Tooth-Roof Drain. Folder, 4 pp., 8½ x 11 ins. Illustrated.

ELECTRICAL EQUIPMENT

Bryant Electric Co., Bridgeport, Conn.

Catalog No. 30. Complete catalog of wiring devices 8⅝ x 10½ ins. 152 pp.

An Electrical Specification. Contains information and data useful in connection with the writing of electrical specifications. Illustrated. 8½ x 11 ins. 12 pp.

The Bryant Home of Ideas. Contains data and suggestions useful in connection with residence wiring 8½ x 10 ins. 16 pp.

"KeNeX" and "HooKeX" Bulletin No. 5129. Contains data and specifications pertaining to devices for use in connection with the hanging of lighting fixtures, making such fixtures portable or removable, soldered joints being eliminated. 8½ x 10 ins. 6 pp.

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

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

The Electric Storage Battery Co., Philadelphia.

Emergency Lighting and Emergency Power Data. Booklet. 12 pp., 8½ x 11 ins. Illustrated.

General Electric Co., Merchandise Dept., Bridgeport, Conn.

Wiring System Specification Data for Apartment Houses and Apartment Hotels. Booklet, 20 pp., 8 x 10 ins. Illustrated.

The House of a Hundred Comforts. Booklet, 40 pp., 8 x 10½ ins. Illustrated. Dwells on importance of adequate wiring.

Ward Leonard Electric Co., Mt. Vernon, N. Y.

Mobile Color Lighting. Booklet, 46 pp., 8½ x 11 ins. Illustrated. Valuable work on the subject.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.

Variable-Voltage Central Systems as Applied to Electric Elevators. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.

Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.

Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."

Westinghouse Panelboards. Catalog 224. Booklet, 64 pp., 8½ x 11 ins. Illustrated.

Beauty; Power; Silence; Westinghouse Fans. (Dealer Catalog 45.) Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.

Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Cooking apparatus for buildings of various types.

Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.

Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.

ELEVATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.

Otis Push Button Controlled Elevators. Descriptive leaflets, 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.

Otis Geared and Gearless Traction. Elevators of All Types. Descriptive leaflets, 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.

ELEVATORS—Continued

Escalators. Booklet, 8½ x 11 ins., 22 pp. Illustrated. Describes use of escalators in subways, department stores, theaters and industrial buildings. Also includes elevators and dock elevators.

Richards-Wilcox Mfg. Co., Aurora, Ill.

Elevators. Booklet, 8½ x 11 ins., 24 pp. Illustrated. Describes complete line of "Ideal" elevator door hardware and checking devices, also automatic safety devices.

ESCALATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.

Escalators. Booklet, 32 pp., 8½ x 11 ins. Illustrated. A valuable work on an important item of equipment.

FLOOR HARDENERS (CHEMICAL)

Minwax Company, 11 West 42nd Street, New York, N. Y.

Concrete Floor Treatments. Folder, 4 pp., 8½ x 11 ins. Illustrated.

FLOORS—STRUCTURAL

Truscon Steel Co., Youngstown, Ohio.

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

FLOORING

Armstrong Cork Co. (Flooring Division), Lancaster, Pa.

Armstrong's Linoleum Floors. Catalog, 8½ x 11 ins., 44 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors.

Armstrong's Linoleum Pattern Book. Catalog, 6 x 9 ins., 80 pp. Color plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.

Linoleum Layer's Handbook. 5 x 7 ins., 36 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.

Public Floors of Enduring Beauty. Booklet, 9 x 12 ins., 32 pp. Illustrated in color. Explains use of linoleum for offices, stores, etc., with reproductions in color of suitable patterns, also specifications and instructions for laying.

Carter Bloxonend Flooring Co., 902 Walnut St., Kansas City, Mo.

Bloxonend Flooring for gymnasiums, assembly rooms, auditoriums, play rooms. Descriptive folder, 8½ x 11 ins. Illustrated. Full details of Bloxonend Flooring including specifications for laying.

Bloxonend Flooring for surfaces subjected to trucking or concentrated footwear. Descriptive folder, 8½ x 11 ins. Illustrated. Full details of Bloxonend Flooring, including specifications for laying.

Congoleum-Nairn, Inc., 195 Belgrove Drive, Kearny, N. J.

Facts you should know about Resilient Floors. A series of booklets on floors for (1) schools, (2) hospitals, (3) offices, (4) stores, (5) libraries, (6) churches, (7) clubs and lodges, (8) apartments and hotels. Illustrated.

Specifications for Resilient Floors. Booklet, 12 pp. A reprint from Sweet's.

A New Kind of Floor Service. Brochure, 8 pp. Data on Bonded Floors.

Sealex Battleship Linoleum. Booklet, 12 pp. Illustrated. Shows typical installations.

Sealex Treadlite Tiles. Two booklets, 8 and 16 pp. Illustrated.

Colonial Planks. Brochure, 8 pp. Illustrated.

Goodyear Tire & Rubber Co., Inc., Akron, Ohio.

Beautiful Floors, Architects' Reference Book. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Valuable data on flooring.

Rubber Flooring News Monthly publications. 8½ x 11 ins. Illustrated. Giving data on flooring for buildings of many types.

Manual of Goodyear Rubber Tile Installation Booklet. 7¾ x 10¾ ins. Illustrated.

Stedman Rubber Flooring Company, South Braintree, Mass.

Stedman Ray-Proof Rubber. Booklet, 12 pp., 5½ x 8 ins. Illustrated. For X-ray Rooms.

Stedman Tile, The Original Reinforced Rubber Floor. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Valuable data on flooring.

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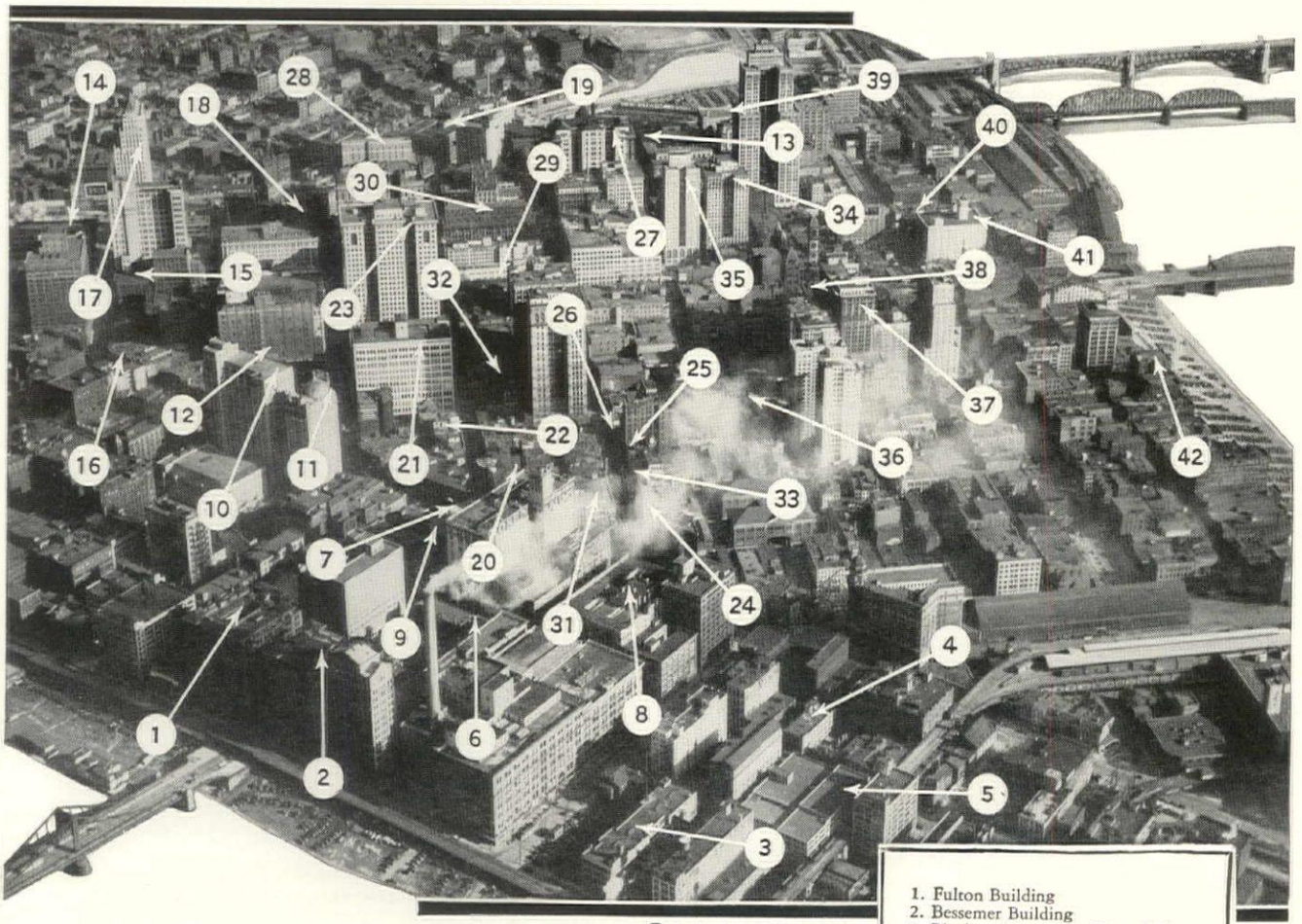

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1. Fulton Building
2. Bessemer Building
3. Pittsburgh Impmt. of Poor Bldg.
4. Professional Building
5. Pittsburgh Parking Gar., West Unit
6. Oppenheim Collins & Co., Bldg
7. Loew's Penn Theatre
8. Jenkins Arcade Building
9. Pittsburgh Life Building
10. Clark Building
11. Keenan Building
12. Monongahela National Bank Bldg.
13. City-County Building
14. Federal Reserve Bank Building (in course of construction)
15. Bell Telephone Co., Grant Exchange
16. Seventh Avenue Hotel
17. Koppers Building
18. Philadelphia Building
19. Union Electric Company Building
20. Women's Exchange Building
21. McCreery & Company Store Bldg.
22. Hardy-Hayes Building
23. Henry W. Oliver Building
24. Diamond National Bank Building
25. Exchange National Bank Building
26. Donahoe's Store
27. Frick Building
28. William Penn Hotel and addition
29. Mellon National Bank
30. Union Trust Building
31. Hacke Building
32. Aaronson Building
33. G. C. Murphy Company Store Bldg.
34. Law & Finance Building
35. Pittsburgher Hotel
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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page* 108

FURNITURE

American Seating Co., 14 E. Jackson Blvd., Chicago, Ill.

Theatre Chairs. Booklet, 6 x 9 ins., 48 pp. Illustrations of theatre chairs.

Kittinger Co., 1893 Elmwood Ave., Buffalo, N. Y.

Kittinger Club & Hotel Furniture. Booklet, 20 pp., 6¼ x 9½ ins. Illustrated. Deals with fine line of furniture for hotels, clubs, institutions, schools, etc.

Kittinger Club and Hotel Furniture. Booklet, 20 pp., 6 x 9 ins. Illustrated. Data on furniture for hotels and clubs.

A Catalog of Kittinger Furniture. Booklet, 78 pp., 11 x 14 ins. Illustrated. General Catalog.

GREENHOUSES

William H. Lutton Company, 267 Kearney Ave., Jersey City, N. J.

Greenhouses of Quality. Booklet, 50 pp., 8½ x 11 ins. Illustrated. Conservatories making use of Lutton Patented Galvanized Steel V-Bar.

HARDWARE

P. & F. Corbin, New Britain, Conn.

Early English and Colonial Hardware. Brochure, 8½ x 11 ins. An important illustrated work on this type of hardware.

Locks and Builders' Hardware. Bound Volume, 486 pp., 8½ x 11 ins. An exhaustive, splendidly prepared volume.

Colonial and Early English Hardware. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Data on hardware for houses in these styles.

Corbin Door Closers, 8½ x 11 ins. A description of the principles of design and performance of Corbin door closers.

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

Cutler Mail Chute Company, Rochester, N. Y.

Cutler Mail Chute Model F. Booklet, 4 x 9¼ ins., 8 pp. Illustrated.

Richards-Wilcox Mfg. Co., Aurora, Ill.

Distinctive Garage Door Hardware. Booklet, 8½ x 11 ins., 66 pp. Illustrated. Complete information accompanied by data and illustrations on different kinds of garage door hardware.

Distinctive Elevator Door Hardware. Booklet, 90 pp., 10½ x 16 ins. Illustrated.

Russell & Erwin Mfg. Co., New Britain, Conn.

Hardware for the Home. Booklet, 24 pp., 3½ x 6 ins. Deals with residence hardware.

Door Closer Booklet. Brochure, 16 pp., 3½ x 6 ins. Data on a valuable detail.

Garage Hardware. Booklet, 12 pp., 3½ x 6 ins. Hardware intended for garage use.

Famous Homes of New England. Series of folders on old homes and hardware in style of each.

HEATING EQUIPMENT

American Blower Co., 6004 Russell St., Detroit, Mich.

Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8½ x 11 ins., on these important subjects.

American Radiator Company, The, 40 West 40th St., N. Y. C.

Ideal Boilers for Oil Burning. Catalog 5½ x 8½ ins., 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.

Corto—The Radiator Classic. Brochure, 5½ x 8½ ins., 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.

Ideal Arcola Radiator Warmth. Brochure, 6¼ x 9½ ins. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.

How Shall I Heat My Home? Brochure, 16 pp., 5¾ x 8½ ins. Illustrated. Full data on heating and hot water supply.

New American Radiator Products. Booklet, 44 pp., 5 x 7¾ ins. Illustrated. Complete line of heating products.

A New Heating Problem. Brilliantly Solved. Broadside, 4 pp., 10¾ x 15 ins. Illustrated. Data on the IN-AIRID invisible air valve.

In-Airid, the Invisible Air Valve. Folder, 8 pp., 3½ x 6 ins. Illustrated. Data on a valuable detail of heating.

The 999 ARCO Packless Radiator Valve. Folder, 8 pp., 3½ x 6 ins. Illustrated.

HEATING EQUIPMENT—Continued

Bryant Heater & Mfg. Co., 17825 St. Clair Ave., Cleveland, Ohio.

Handbook on Heating Buildings with Bryant Gas Furnaces. Booklet, 12 pp., 8½ x 11 ins. Illustrated.

Handbook on Heating Water with Bryant Gas Boilers. Brochure, 20 pp., 8½ x 11 ins. Illustrated.

Handbook on Heating Buildings with Bryant Gas Boilers. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

James B. Clow & Sons, 534 S. Franklin St., Chicago, Ill.

Clow Gasteam Vented Heating System. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Deals with a valuable form of heating equipment for using gas.

D.G.C. Trap & Valve Co., 1 East 43rd St., New York, N. Y.

Cryer Radiator Control Valve. Bulletin, 8½ x 11 ins. 12 pp. Illustrated. Explains operation and advantages of this radiator control valve on two-pipe vapor, vacuum or gravity steam systems.

C. A. Dunham Company, 450 East Ohio St., Chicago, Ill.

Dunham Radiator Trap. Bulletin 101, 8 x 11 ins., 12 pp. Illustrated. Explains working of this detail of heating apparatus.

Dunham Packless Radiator Valves. Bulletin 104, 8 x 11 ins., 8 pp. Illustrated. A valuable brochure on valves.

Dunham Return Heating System. Bulletin 109, 8 x 11 ins. Illustrated. Covers the use of heating apparatus of this kind.

Dunham Vacuum Heating System. Bulletin 110, 8 x 11 ins., 12 pp. Illustrated.

The Dunham Differential Vacuum Heating System. Bulletin 114. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for small buildings.

The Dunham Differential Vacuum Heating System. Bulletin 115. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for large buildings.

Dunham Built Dwyer Unit Heaters. Booklet, 31 pp., 8½ x 11 ins. Illustrated.

Dunham Concealed Radiators. Bulletin No. 500, 8½ x 11 ins., 16 pp. Illustrated. General information for the man who is building a home.

Type M Dunham-Built Dwyer Unit Heaters. Bulletin No. 400, 8½ x 11 ins., 4 pp. Illustrated. Description of a compact cabinet type heating unit.

Type V Dunham-Built Dwyer Unit Heaters. Bulletin No. 215, 8½ x 11 ins., 31 pp. Illustrated. Complete data.

Type D Dunham-Built Dwyer Unit Heaters. Bulletin No. 240, 8½ x 11 ins., 16 pp. Illustrated. This type is equipped with two fans so that when full capacity is not required, only one motor need be operated.

Architectural Edition of The Dunham Handbook. Catalogue describing the various Dunham Systems of heating. 8½ x 11 ins., 58 pp. Illustrated.

The Fulton Sylphon Company, Knoxville, Tenn.

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

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

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

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

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

Janette Manufacturing Company, 556 West Monroe Street, Chicago.

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

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

Johnson Oil Burners. Booklet, 9 pp., 8½ x 11 ins. Illustrated.

Bulletin No. 4A. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Data on different kinds of oil-burning apparatus.

Bulletin No. 31. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with Johnson Rotary Burner with Full Automatic Control.

Kewanee Boiler Corporation, Kewanee, Ill.

Kewanee on the Job. Catalog, 8½ x 11 ins., 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.

Catalog No. 78, 6 x 9 ins. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.

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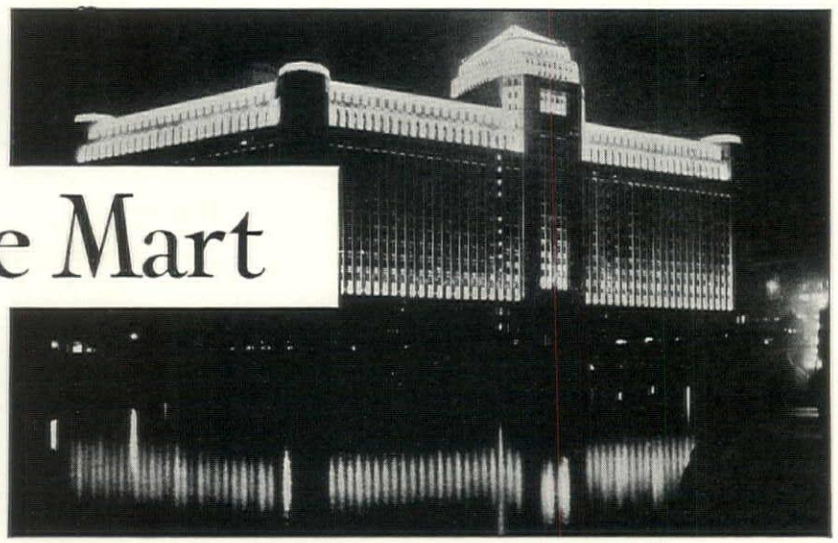
FROM TOP FLOOR *to* TRACK LEVEL *cork insulates*

Chicago's Merchandise Mart



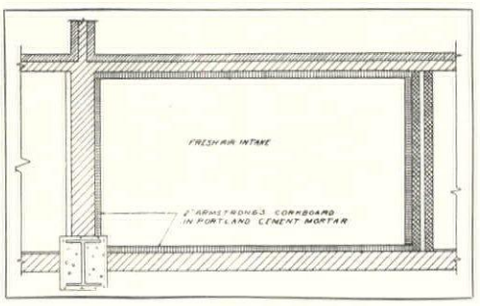
Chicago's Merchandise Mart makes full use of the insulating efficiency of Armstrong's Cork Products. Architects, Graham, Anderson, Probst, and White. General contractors, John Griffiths' Sons.

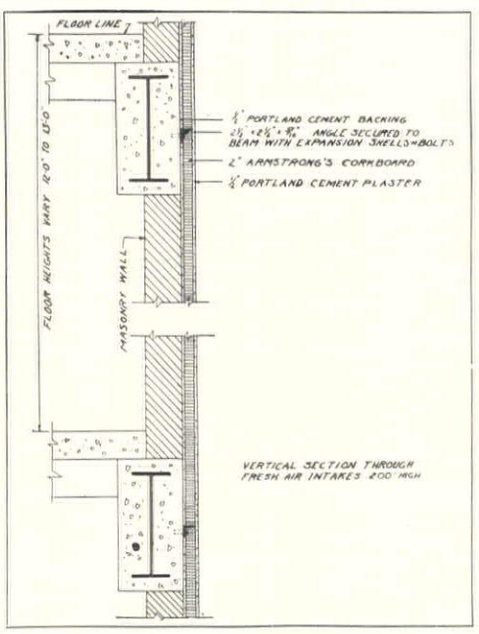
ARMSTRONG'S cork products serve a wide variety of uses in Chicago's huge new Merchandise Mart. Some of them are shown on this page.

Corkboard in cold storage rooms seals in low temperatures. Cork Covering on brine and ammonia lines protects against loss of refrigeration. Corkboard insulates the fresh air intakes from surrounding rooms. On the ceiling of the track level, a 2″ layer of Corkboard shuts out winter's cold from the upper floors of the building.

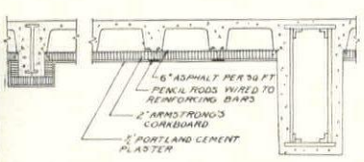
Installed under machinery, Armstrong's Vibracork absorbs vibration and muffles the noise that it causes. In the waiting room, Corkboard is used to line the radiator recesses in the walls, and to prevent the loss of costly heat. The radio station on the roof of the building enjoys comfortable temperatures at all times—thanks to cork. And cork promotes health by maintaining proper temperatures in cold water lines, refrigerators, and soda fountain equipment.

Armstrong engineers are at your service for consultation on any installation involving the use of cork. Address Armstrong Cork & Insulation Company, 900 Concord Street, Lancaster, Pennsylvania.





Workmen installing 172,000 board feet of Armstrong's Corkboard over the track level of the Merchandise Mart. Cork serves throughout the building.



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Armstrong Cork & Insulation Company

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page* 110

HEATING EQUIPMENT—Continued

Catalog No. 79, 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.

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

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

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

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

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

The Modustat, a self-contained automatic room temperature control valve for individual radiators. Leaflet, 4 pp., 8½ x 11 ins. Illustrated.

Modine Mfg. Co., Racine, Wisc.

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

A Few Short Years. Folder. 4 pp. 8½ x 11 ins. Illustrated. Heating for garages.

Dairy Plant Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Industrial Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Modine Unit Heater. Folder. 6 pp., 8½ x 11 ins. Illustrated.

Nash Engineering Company, South Norwalk, Conn.

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

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

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

National Radiator Corporation, Johnstown, Pa.

The Crimson Flame. Folder, 6 pp., 4½ x 7 ins. Illustrated.

Contento Brings Contentment to Your Home. Folder, 12 pp., 3½ x 6 ins. Illustrated.

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

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

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

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

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

Spencer Heater Company, Williamsport, Pa.

Spencer Magazine Feed Heaters. Catalogue No. 31, 26 pp., 5¾ x 9 ins. Illustrated.

The Fire That Burns Up-hill. Booklet, 16 pp., 6 x 9¼ ins. Illustrated.

One Church Service That No One Sees. Booklet, 15 pp., 8½ x 11 ins. Illustrated.

The Fire That Makes Five Profits Is the Fire That Burns Up-hill. Booklet, 11 pp., 8½ x 11 ins. Illustrated.

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

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

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

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

U. S. Radiator Corporation, Detroit, Mich.

Capitol Cast-Iron Concealed Radiators. Catalogue, 32 pp., 8½ x 11 ins. Illustrated.

HOISTS, TELESCOPIC

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

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

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

HOSPITAL EQUIPMENT

Bryant Electric Co., Bridgeport, Conn.

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

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

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

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

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

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

INCINERATORS

Josam Mfg. Co., Michigan City, Ind.

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

INSULATION

Armstrong Cork & Insulation Co., Lancaster, Pa.

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

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

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Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 11¾ ins. Illustrates and describes use of insulation for structural purposes.

JOISTS

Kalman Steel Company, Chicago, Ill.

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

KITCHEN EQUIPMENT

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

Hotels, Restaurants and Cafeteria Applications of Monel Metal. Booklet, 8½ x 11 ins., 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.

LABORATORY EQUIPMENT

Alberene Stone Co., 153 West 23rd Street, New York City.

Booklet, 8¾ x 11¼ ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.

Duriron Company, Dayton, Ohio.

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

Maurice A. Knight Company, Kelly Ave., Akron, Ohio.

Acid Proof Laboratory Equipment. 48 pp. Catalogue, 8½ x 11 ins. Illustrated.

LATH, METAL AND REINFORCING

Kalman Steel Company, Chicago, Ill.

Firesafe Building Products. Booklet, 20 pp., 8½ x 11 ins. Lath, fireplace accessories, beads, etc.

Milcor Steel Co., Milwaukee.

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

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

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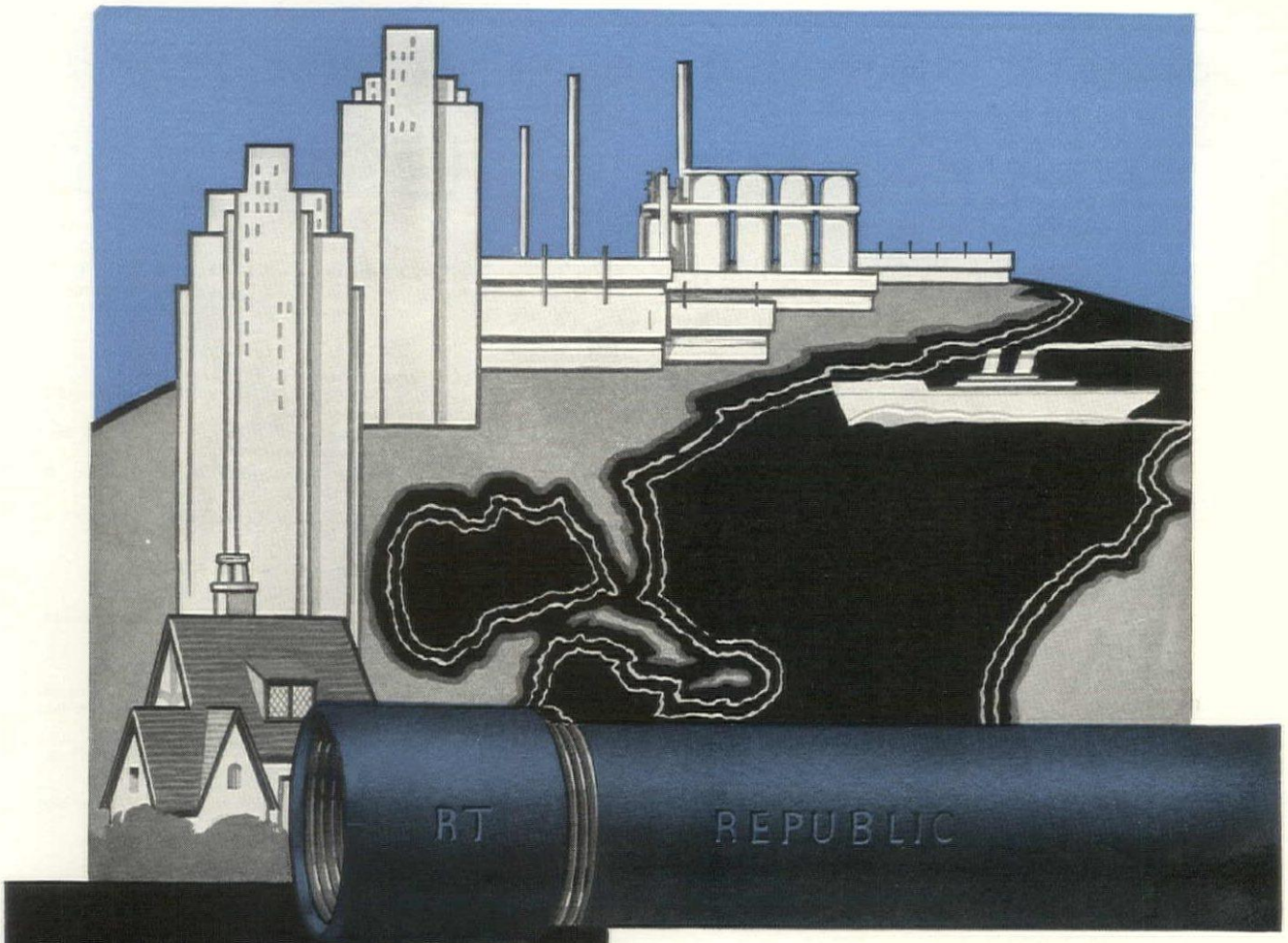

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page* 112

LATH, METAL AND REINFORCING—Continued

National Steel Fabric Co., Pittsburgh, Pa.

Better Walls for Better Homes. Brochure, 16 pp., 7¾ x 11¾ ins. Illustrated. Metal lath, particularly for residences.

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

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

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

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

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

Truscon Steel Company, Youngstown, Ohio.

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

LAUNDRY MACHINERY

The American Laundry Machinery Company, Norwood Station, Cincinnati, Ohio.

The Laundry in the Hotel, Hospital, School, Club, Office Building . . . even in the large Residence. Brochure, 25 pp., 8½ x 11 ins. Arranged in convenient file folder. Illustrated. Contains blue prints of prominent laundry installations.

Troy Laundry Machinery Co., Inc., 9 Park Place, New York City.

Laundry Machinery for Large Institutions. Loose-Leaf booklet, 50 pp., 8½ x 11 ins. Illustrated.

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

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

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

LIGHTING EQUIPMENT

The Frink Co., Inc., 369 Lexington Ave., New York, N. Y.

Catalog 415, 8½ x 11 ins., 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.

Kliegl Bros. Universal Electric Stage Lighting Co., Inc., 321 West 50th Street, New York, N. Y.

Catalogue No. 30, 24 pp., 8½ x 11 ins. Illustrated.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Industrial Lighting Equipment. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

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

Ways of Illuminating Football Fields. Folder, 8½ x 11 ins. Illustrated.

A New Contribution to the Joy of Swimming. Folder, 8 pp., 8½ x 11 ins. Illustrated.

LOCKERS

Durabilt Steel Locker Co., Aurora, Ill.

Steel Storage Equipment for the Modern School Shop. Catalogue, 14 pp., 8½ x 11 ins. Illustrated.

MAIL CHUTES

Cutler Mail Chute Company, Rochester, N. Y.

Cutler Mail Chute Model F. Booklet, 4 x 9¼ ins., 8 pp. Illustrated.

MANTELS

Henry Klein & Co., Inc. 40-46 West 23rd Street, New York.

Driwood Mantels. Booklet. 12 pp. 8½ x 11 ins. Illustrated. Fine line of eighteenth century English and American mantels.

MARBLE

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

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

MARBLE—Continued

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

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

METALS

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

Monel Metal Primer. 8 folders, 4 pp., 8½ x 11 ins. Illustrated. Valuable data on use of monel in kitchens, laundries, etc.

MILLWORK

Klein & Co., Inc., Henry, 11 East 37th St., New York, N. Y.

Two Driwood Interiors. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Use of moulding for paneling walls.

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

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

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

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Minwax Company, Inc., 11 West 42nd St., New York.

Color Card and Specifications for Minwax Brick and Cement Coating. Folder, 4 pp., 8½ x 11 ins. Illustrated.

National Lead Company, 111 Broadway, New York, N. Y.

Handy Book on Painting. Book, 5½ x 3¾ ins., 100 pp. Gives directions and formulæ for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.

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

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

PARTITIONS

Circle A. Products Corporation, New Castle, Ind.

Circle A. Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11¾ ins., 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.

Irving Hamlin, Evanston, Ill.

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

Hauserman Company, E. F., Cleveland, Ohio.

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

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

Henry Klein & Co., 25 Grand Street, Elmhurst, L. I., N. Y.

Telesco Partition. Catalog, 8¼ x 11 ins., 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.

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

Improved Office Partition Co., 25 Grand St., Elmhurst, L. I., N. Y. (See Henry Klein & Co.)

The Mills Company, Cleveland, Ohio.

Mills Metal Partitions. Booklet, 8½ x 11 ins. Illustrated. Installation data and details.

Richards-Wilcox Mfg. Co., Aurora, Ill.

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

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page* 114

PARTITIONS—Continued

Telesco Office Partition, 25 Grand St., Elmhurst, L. I., N. Y. (See Henry Klein & Co.)

J. G. Wilson Corporation, 11 East 38th St., New York City, N. Y. Sectionfold and Rolling partitions also Light Retarding Rolling Shutters. Thirty-two page catalog with illustrations, specification details, etc.

PIPE

The American Brass Company, Waterbury, Conn.

Bulletin B-1, Brass Pipe for Water Distribution. A.I.A. File No. 29B4. 8½ x 11 ins., 32 pp. Illustrated. Discusses the economic advantages of permanent plumbing and the suitability of Anaconda 67 Brass Pipe for normally corrosive waters, and Anaconda 85 Red-Brass Pipe for highly corrosive waters. Contains schedule of weights and sizes of seamless brass and copper pipe, recommended specifications and installation suggestions.

American Rolling Mill Company, Middletown, Ohio.

How ARMCO Dredging Products Cut Costs. Booklet, 16 pp., 6 x 9 ins. Data on dredging pipe.

Bethlehem Steel Company, Bethlehem, Pa.

Bethlehem Wrought Steel Pipe, Catalog P. Booklet, 20 pp., 4¼ x 7¼ ins. Illustrated.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.

Catalog A. 4 x 16½ ins., 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

Duriron Company, Dayton, Ohio.

Duriron Acid, Alkali, Rust-proof Drain Pipe and Fittings. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Important data on a valuable line of pipe.

Maurice A. Knight, Akron, Ohio.

Knightware in the Princeton Chemical Laboratory. Booklet, 16 pp., 6¾ x 8½ ins. Illustrated.

National Tube Co., Frick Building, Pittsburgh, Pa.

"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins., 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.

"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins., 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deareating systems for eliminating or retarding corrosion in hot water supply lines.

"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 ins., 88 pp. This bulletin contains 254 illustrations of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, engineers, etc.

Modern Welded Pipe. Book of 88 pp., 8½ x 11 ins., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

Walworth Company, Statler Office Building, Boston, Mass.

Approved Valves and Fittings for Fire Lines in New York. Folder, 6 pp., 8½ x 11 ins. Illustrated.

C. N. I. Pipe Manual. Booklet, 18 pp., 4½ x 7½ ins. Illustrated.

PLUMBING EQUIPMENT

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.

Catalog M. 9¼ x 12 ins., 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Duriron Company, Dayton, Ohio.

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

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.

Watrous Patent Flush Valves, Duojet Water Closets, Liquid Soap Fixtures, etc. 8½ x 11 ins., 136 pp., loose-leaf catalog, showing roughing-in measurements, etc.

PLUMBING EQUIPMENT—Continued

Scovill Manufacturing Company, Waterville, Conn.

Scovill Flush Valve Catalogue, 45 pp., 8½ x 11 ins. Illustrated.

Speakman Company, Wilmington, Del.

A. I. A. File Catalogue No. 29-H-3. 16 pp., 8½ x 11 ins. Illustrated. Data on shower equipment and installation.

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

PNEUMATIC TUBE SYSTEMS

G & G Atlas Systems, Inc., 544 West Broadway, New York.

12 pp., 8½ x 11. Illustrated booklet of tube systems for retail stores and other buildings.

4 pp., 8½ x 11. Data Sheet showing schematic diagrams for hotel, bank, factory and wholesale buildings, table of sizes, space requirements and preliminary layout steps. A. I. A. 35h21.

PUMPS

C. A. Dunham Co., 450 East Ohio Street, Chicago, Ill.

Dunham Vacuum Pump. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

Nash Engineering Company, South Norwalk, Conn.

Bulletin 52. Brochure. 6 pp., 10½ x 7¾ ins. Illustrated in color. Devoted to Jennings Standard Centrifugal Pumps for house service, boosting city water pressure to supply top stories, for circulating warm water, etc.

Bulletin 97. Booklet. 16 pp., 10½ x 7¾ ins. Illustrated in color. Describes the design, construction and operation of the Jennings Suction Sump Pump.

Bulletin 11. Brochure. 8 pp., 10½ x 7¾ ins. Illustrated in color. Deals with Nash Hytor Vacuum Pumps for air and gases.

REFRIGERATION

The Fulton Syphon Company, Knoxville, Tenn.

Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE—See also Construction, Concrete

Kalman Steel Company, Chicago, Ill.

Building for Permanence. Booklet, 8 pp., 8½ x 11 ins. Reinforced concrete products.

Truscon Steel Company, Youngstown, Ohio.

Shearing Stresses in Reinforced Concrete Beams. Booklet, 8½ x 11 ins., 12 pp.

ROOFING

Johns-Manville Corporation, New York.

The New Book of Roofs. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Roofing from the Architect's point of view.

Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill.

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

Milcor Steel Co., Milwaukee.

Milcor Architectural Sheet Metal Guide. Booklet. 72 pp., 8½ x 11 ins. Illustrated. Metal tile roofing, skylights, ventilators, etc.

Milcor Sheet Metal Handbook. Brochure. 128 pp., 8½ x 11 ins. Illustrated. Deals with rain-carrying equipment, etc.

SEWAGE DISPOSAL

Nash Engineering Company, South Norwalk, Conn.

Bulletin 67. Booklet. 16 pp. 10¾ x 7½ ins. Illustrated in color. Describes Type A Jennings Sewage Ejector for handling Unscreened sewage and raising it from basements below sewer level.

Bulletin 103. Brochure. 16 pp. 10¾ x 7½ ins. Illustrated in color. Deals with small size Type B Jennings Sewage Ejector.

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

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Name .....Business .....

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

SCREENS

American Brass Co., The, Waterbury, Conn.

Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ ins., giving actual samples of metal screen cloth and data on fly screens and screen doors.

Athey Company, 6015 West 65th St., Chicago, Ill.

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

STEEL PRODUCTS FOR BUILDING

Bethlehem Steel Company, Bethlehem, Pa.

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

Bethlehem Structural Shapes. Bound volume, 368 pp., 4¼ x 6¾ ins. Illustrated.

The Kawneer Company, Niles, Mich.

Folder with A.I.A. File No. featuring new Shower Door, furnished in Solid Bronze, Chromium Plated or Solid Nickel-silver.

Lincoln Electric Company, Cleveland, Ohio.

Studies in Structural Arc Welding. Series of plates, 8½ x 11 ins. Illustrated. Deals with design of arc-welded buildings, details and specifications.

Steel Frame House Company, Pittsburgh, Pa. (Subsidiary of McClintic-Marshall Corp.)

Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

Steel Framing for Gasoline Service Stations. Brochure, 8 pp., 8½ x 11 ins. Illustrated.

Steel Frame Standard Gasoline Service Stations. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Three standard designs of stations.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.

ILCO Specification Manual. Standard Specifications for the cutting and setting of Indiana Limestone. 8½ x 11 ins., 24 pp.

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

Volume 4. Series B. New Edition, 8½ x 11 ins., 80 pp. Illustrated. Indiana Limestone as used in Banks.

Volume 12. Series B. Distinctive Homes of Indiana Limestone. 8½ x 11 ins., 48 pp. Illustrated.

ILCO RIPLSTONE. 8½ x 11 ins., 56 pp. Illustrated.

STORE FRONTS

The Kawneer Company, Niles, Mich.

Booklet, 8½ x 11 ins., featuring recent store front installations and suggested designs.

Catalogue Portfolio "N," 8½ x 11 ins., A. I. A. File No. containing 4-page folders featuring Store Fronts, Doors, Windows, Architectural Bronze and Iron and Architectural Metal Mouldings.

TELEPHONE SERVICE ARRANGEMENTS

All Bell Telephone Companies. Apply nearest Business Office, or American Telephone and Telegraph Company, 195 Broadway, New York.

Planning for Home Telephone Conveniences. Booklet, 52 pp., 8½ x 11 inches. Illustrated.

Planning for Telephones in Buildings. Brochure, 74 pp., 8½ x 11 inches. Illustrated.

TIMBREL TILE VAULTS

R. Guastavino Co., 40 Court Street, Boston.

Masonry acoustical materials (AKOUSTOLITH Tile and AKOUSTOLITH Plaster) and Timbrel Arch Construction. Brochure, 14 pages, 8½ x 11 ins. Illustrated.

TILE, STRUCTURAL CLAY

National Fireproofing Corporation, Fulton Building, Pittsburgh, Pa.

Natco. The Complete Line of Structural Clay Tile. Booklet, 48 pp., 8½ x 11 ins. Illustrated. A General Catalog.

Natco Vitritile Bulletin No. 164. 40 pp., 8½ x 11 ins. Illustrated. Shows color charts, sizes and shapes, actual installations, etc.

Natco Header Backer Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.

Natco Unibacker Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.

Natcoflor Bulletin. 8½ x 11 ins., 6 pp. Illustrated.

Natco Double Shell Load Bearing Tile Bulletin, 8½ x 11 ins., 6 pp. Illustrated.

TILES

Flint Faience & Tile Co., Flint, Mich.

Vitocraft Tiles, Unglazed. Folder, 4 pp., 8½ x 11 ins. Illustrated. Details of patterns in full color. Ask for Form A-322.

Faience Tiles for Bathrooms. Folder, 4 pp., 8½ x 11 ins. Illustrated. Ask for Form A-303.

Faience and Vitocraft, Unglazed. Folder, 4 pp., 8½ x 11 ins. Illustrated. Views of installations. Ask for Form A-304.

Flintcraft Files. Folder, 4 pp., 8½ x 11 ins. Illustrated. Machine-made floor or wall tile. Ask for Form A-363.

Hanley Company, Bradford, Pa.

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

TRUSSES

McKeown Bros. Company, 523 South Keeler Avenue, Chicago.

Truth in Architecture. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with use of trusses of wood.

Factory Built Bowstring Trusses. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Timber Trusses. Folder, 4 pp., 8½ x 11 ins., Illustrated.

VALVES

C. A. Dunham Co., 450 East Ohio St., Chicago, Ill.

The Dunham Packless Radiator Valve. Brochure, 12 pp., 8 x 11 ins. Illustrated. Data on an important type of valve.

Jenkins Brothers, 80 White Street, New York.

Office Buildings Yesterday and Today. Folder, 8½ x 11 ins. Illustrated. Valves for use in office buildings.

Walworth Company, Statler Office Building, Boston, Mass.

Walworth Valves, Fittings and Tools, Catalog 88. Bound Volume giving data on a wide variety of details.

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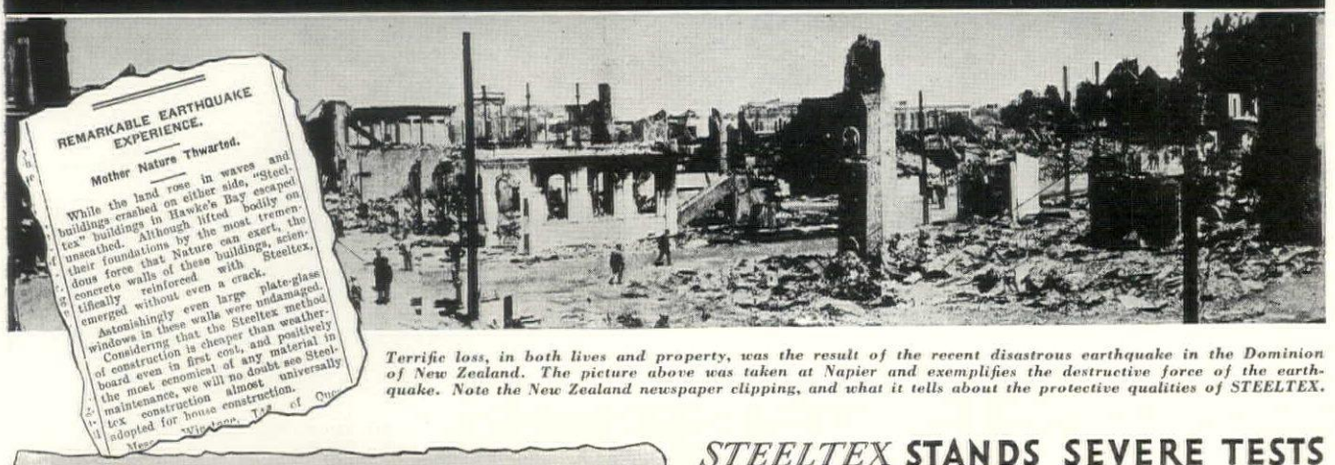
EARTHQUAKE PROOF!



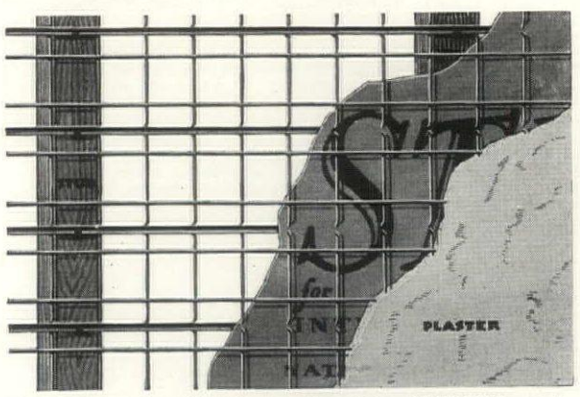
Terrific loss, in both lives and property, was the result of the recent disastrous earthquake in the Dominion of New Zealand. The picture above was taken at Napier and exemplifies the destructive force of the earthquake. Note the New Zealand newspaper clipping, and what it tells about the protective qualities of STEELTEX.

The attractive home, at top, was practically completed when the New Zealand earthquake took place. Only damage done was caused by chimney collapsing. STEELTEX for stucco was used for the exterior walls. In striking contrast, note the condition of the two lower residences of ordinary construction, in which no STEELTEX was used.

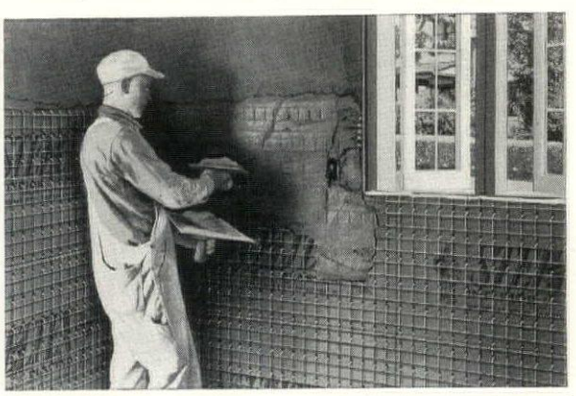
STEELTEX STANDS SEVERE TESTS IN NEW ZEALAND EARTHQUAKE

Earthquakes are not every day occurrences. However, the vibration to which homes and buildings are constantly subjected, warrant the use of modern building materials which do withstand the severest tests. Pause on the sidewalk when a heavy truck or street car passes you by and you will experience one type of "every day" vibration. Vibration, settling or twisting framework cause unprotected plaster walls and ceilings to crack and fall. Thousands upon thousands now solve their plaster worries by using Ribbed *STEELTEX* Lath for interior plaster.

All styles of *STEELTEX* offer the same protective principle of form and reinforcement. There are four distinct styles: Ribbed *STEELTEX* Lath for plaster,—*STEELTEX* for stucco and modernizing,—*STEELTEX* for brick or stone veneer,—*STEELTEX* Lath for floors and roofs,—and *STEELTEX* partitions and suspended ceilings. Another group of products, "NATIONAL REINFORCING" (welded wire fabric) is widely used for reinforcing all kinds of concrete construction. Write for our new, illustrated book, "*Modern Building Methods*" . . . it's free.



When nailed to the wall studs and ceiling joists, STEELTEX materially strengthens the structural framework of the building by its sturdy network of galvanized, welded steel wires . . . and greatly reduces the strains on the entire plaster slab . . . thus minimizing plaster cracking hazards. The illustration above has the insulating backing cut away to show the strengthening network of steel wires.



Ribbed STEELTEX Lath, above, consists of heavy backing, and welded steel wire reinforcing, plus rib stiffeners across the back to give board-like rigidity,—and when plastered, insulates, deadens sound, eliminates lath marks, prevents falling plaster, minimizes plaster cracks . . . and carries the Underwriters' one-hour fire rating. Each sheet of Ribbed STEELTEX Lath measures a little more than one square yard.

NATIONAL STEEL FABRIC COMPANY

UNION TRUST BUILDING — DIVISION OF Pittsburgh Steel Co. — PITTSBURGH, PA., U.S.A.

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

VENETIAN BLINDS

Columbia Mills, 225 Fifth Avenue, New York.
A Manual for Architects. Booklet, 6 pp., 8½ x 11 ins. Illustrated.

VENTILATION

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

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

Specification Form for Acid-proof Exhaust Fans. Folder, 8 x 10½ ins.

Herman Nelson Corporation, Moline, Ill.
Univent Ventilation; The Modern Safeguard of Youth in the Schoolroom. Booklet, 63 pp., 8½ x 11 ins. Illustrated.
Herman Nelson System of Ventilation. Brochure. 103 pp., 8½ x 11 ins. Illustrated.

WATERPROOFING

Minwax Company, Inc., 11 West 42nd St., New York.
Waterproofing Stadia. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Transparent Waterproofings for All Masonry Walls and Surfaces. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Data Sheet on Membrane Waterproofing. Folder, 4 pp., 8½ x 11 ins. Illustrated.

WEATHER STRIPS

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

WINDOW GLASS

Pittsburgh Plate Glass Company, Grant Building, Pittsburgh, Pa.
Pennvernon Window Glass With the New Flatter Surface. Booklet, 16 pp., 8½ x 11 ins. Illustrated.

WINDOWS

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Pivoted Windows. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Sections, hardware, and other details, and illustrations of installations.

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.
Fenestra Blue Book. Brochure, 75 pp., 8½ x 11 ins. Illustrated. Data on steel windows.

The Kawneer Company, Niles, Mich.
4-page folder, 8½ x 11 ins., A. I. A. File No. featuring our new Extruded In-swinging Windows. This folder is included in Catalogue Portfolio "N" which contains 4-page folders featuring Store Fronts, Doors, Windows, Architectural Bronze and Iron and Architectural Metal Mouldings.

WINDOWS, CASEMENT

Detroit Steel Products Co., 2250 E. Grand Boulevard, Detroit.
Fenestra Casements. Booklet, 14 pp., 8½ x 11 ins. Illustrated. Discusses casements, particularly for residences.

WINDOWS, CASEMENT—Continued

Fenestra Screen Casements. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

Decorating With Casements. Booklet, 18 pp., with inserts in color 6 x 8½ ins. Deals with use of decorations, particularly draperies, with casement windows.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Casement Window Hardware. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Shows typical installations, detail drawings, construction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.

Architectural Details. Booklet, 8½ x 11 ins., 16 pp. Tables of specifications and typical details of different types of construction.

List of Parts for Assembly. Booklet, 8½ x 11 ins., 16 pp. Full lists of parts for different units.

WINDOW SCREENS

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Pivoted Windows Screened. Booklet, 8 pp., 8½ x 11 ins. Data on screening and window ventilation.

WINDOWS, STEEL AND BRONZE

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Steel Window Inserts. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Suggestions on correct use of inserts.

Truscon Steel Company, Youngstown, Ohio.
Drafting Room Standards. Book, 8½ x 11 ins., 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.

Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet, 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.

Continuous Steel Windows and Mechanical Operators. Catalog 126. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

WOOD—See also Millwork

American Walnut Mfrs. Association, 618 So. Michigan Boulevard, Chicago, Ill.
American Walnut. Booklet 7 x 9 ins., 46 pp. Illustrated. A very useful and interesting little book on the use of walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present.

American Walnut for Interior Woodwork and Paneling. 7 x 9 ins. Illustrated. Discusses interior woodwork, giving costs, specifications of a specimen room, the different figures in Walnut wood, Walnut floors, finishes, comparative tests of physical properties and the advantages of American Walnut for woodwork.

WOOD FINISH

Minwax Company, Inc., 11 West 42nd St., New York.
Color card and specification for Minwax Flat Finish. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a penetrative, preservative stain finish giving stain and soft wax effect.

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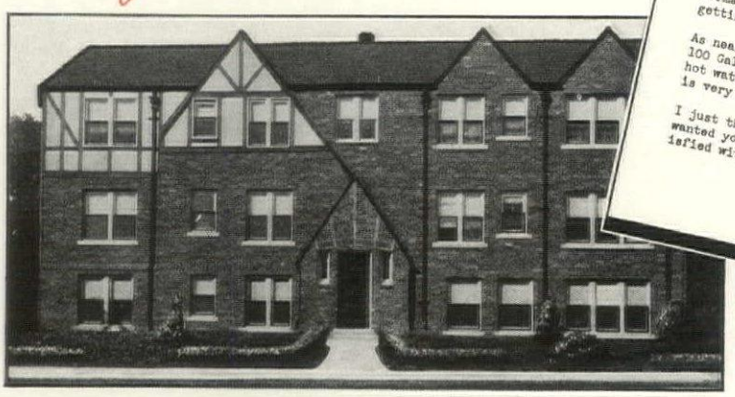
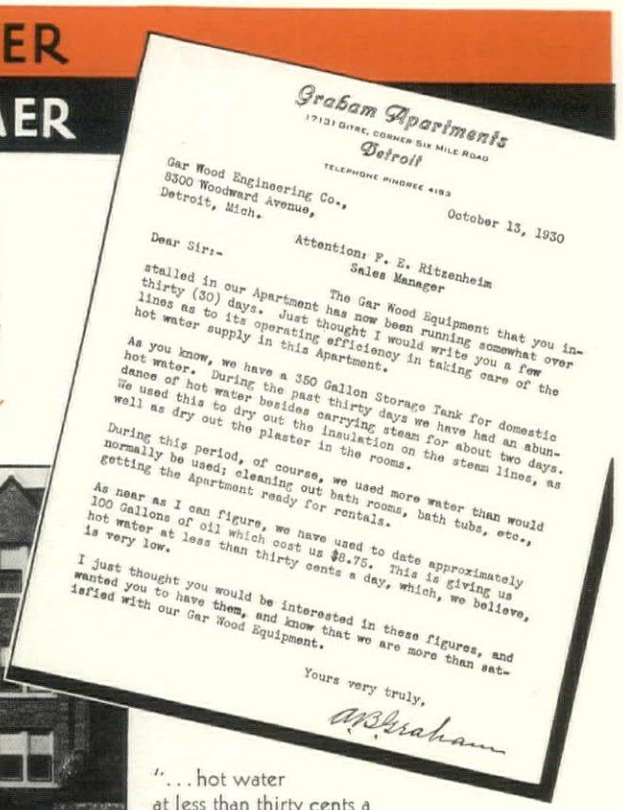
A WARM HOUSE IN WINTER
A COOL HOUSE IN SUMMER

HOT WATER
the year 'round





Graham Apartments
17131 GIRARD, CORNER SIX MILE ROAD
Detroit
TELEPHONE PINGREE 4193

October 13, 1930

Gar Wood Engineering Co.,
8300 Woodward Avenue,
Detroit, Mich.

Attention: F. E. Ritzenheim
Sales Manager

Dear Sirs:-

The Gar Wood Equipment that you installed in our Apartment has now been running somewhat over thirty (30) days. Just thought I would write you a few lines as to its operating efficiency in taking care of the hot water supply in this Apartment.

As you know, we have a 350 Gallon Storage Tank for domestic hot water. During the past thirty days we have had an abundance of hot water besides carrying steam for about two days. We used this to dry out the insulation on the steam lines, as well as dry out the plaster in the rooms.

During this period, of course, we used more water than would normally be used; cleaning out bath rooms, bath tubs, etc., getting the Apartment ready for rentals.

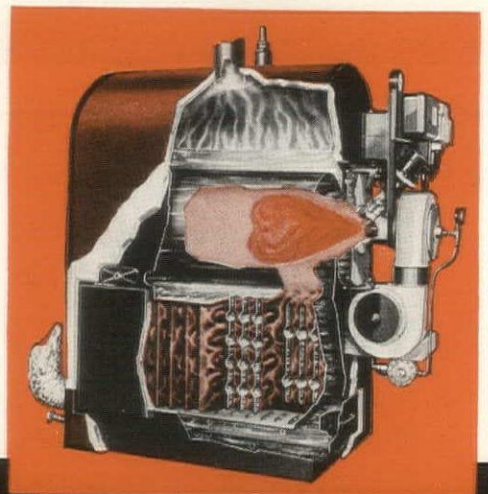
As near as I can figure, we have used to date approximately 100 Gallons of oil which cost us $8.75. This is giving us hot water at less than thirty cents a day, which, we believe, is very low.

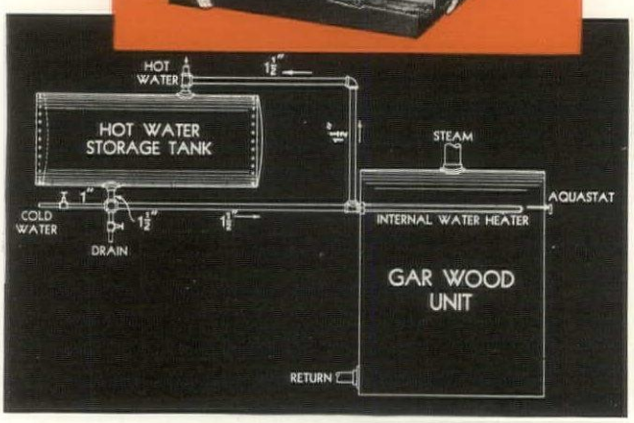
I just thought you would be interested in these figures, and wanted you to have them, and know that we are more than satisfied with our Gar Wood Equipment.

Yours very truly,

A. B. Graham

"... hot water at less than thirty cents a day, which we believe, is very low."





Automatic heat during cold weather at a cost that is less than coal! Hot water the year 'round at 3⅓ cents a day, per family! That's the Gar-Wood. Read what Mr. Graham says in the above letter about the Gar-Wood Built-In Hot Water Heater's performance in his nine-apartment building.

The diagram explains how the Gar-Wood, with its built-in heater, can supply hot water in the summer without heating the house or wasting heat. The heater coils are submerged in the boiler water, at the top of the boiler, its hottest point. To secure a temperature of 130 deg. in a separate hot water storage tank ... the temperature of the boiler water need not exceed 160 deg. With the boiler water temperature under 212 deg. it is obvious that there can be no steam entering the steam mains to heat the house itself. And this condition is controlled by the Aquastat, which automatically maintains the temperature of the domestic hot water as desired. Interconnected with the other Gar-Wood automatic controls, it assures constant, safe, and trouble-free operation.

To include the Built-In Water Heater means but a slight increase in the price of the Gar-Wood installation ... and it will supply plenty of hot water below the cost of any separate automatic water heater. Write for the new Gar-Wood book.

GAR WOOD ENGINEERING CO.
4195 BELLEVUE AVE. ◆ DETROIT, MICH.

Responsible organizations now distributing through the heating trade should investigate the Gar-Wood franchise. Write the factory for details.

Gar-Wood

This Big-Size Lumber

SAVES 20 to 60% LABOR COSTS!

Big Panels of Real Lumber in Convenient Sizes up to 4 feet by 8 feet.

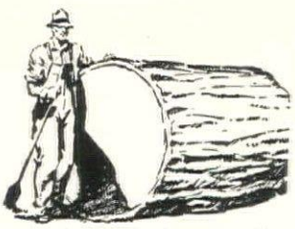
DOUGLAS FIR PLYWOOD gives you larger units of lumber to work with —at twenty to sixty percent saving in the labor of installation.

It reduces the weight of solid lumber by a third to a half—and equalizes its strength in all directions. In addition, this remarkable lumber gives you complete freedom from splitting, shrinking, or swelling, and practically eliminates warping.

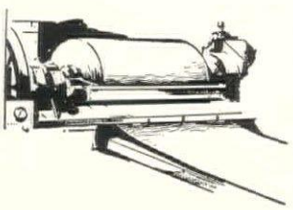
But that isn't all! The *economy* of this lumber makes possible the maximum use of modern design in home and office interiors—for ceilings, walls, panels, cabinets, and built-ins of every description—where once the advantages of plywood construction were limited to costly species.

Not only does Douglas Fir give you the most plywood per dollar—it offers you the utmost in quality and uniformity! Only water-resistant glue is used—stronger and more tenacious than the adjacent fibres of the wood—which means that each panel is welded into one homogeneous unit. (See accompanying diagrams.)

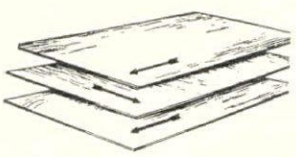
Learn more of this remarkable, inexpensive lumber, and ways in which it is now used by leading architects, contractors, and merchant builders. The coupon below will bring you a sample, and valuable construction details, free.



1 **Selected Douglas fir logs are cut to length and barked.**



2 **Then turned on a giant lathe and peeled off into endless lengths of thin wood sheets.**



3 **These sheets of wood are cut to size, laid cross-grain, and glued together flat with water-resistant glue under hydraulic pressure. (*Arrows show direction of grain.*)**

4 **The result is a new and better lumber having all the good qualities of natural wood plus the size and convenience of wallboard — but with advantages of strength, stiffness, and freedom-from-splitting which neither lumber nor wallboard has.**

DOUGLAS FIR PLYWOOD

For Hundreds of Building Uses

Douglas Fir Plywood Manufacturers, Dept. 631-C, Sixth Floor, Skinner Building, Seattle, Wash.

Gentlemen: Please send me a free sample of Douglas Fir Plywood, and data on its use in construction.

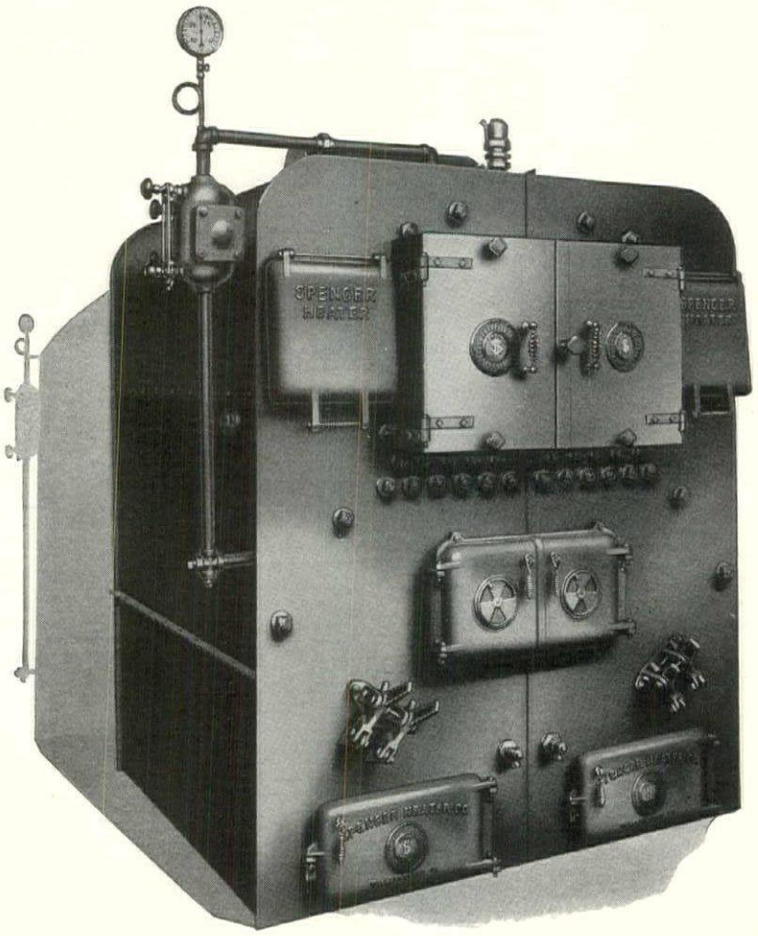
Name_____

Address_____

City_____ State_____

Check here if you are an Architect ☐, Contractor ☐, Merchant Builder ☐, or Draftsman ☐, and additional material will be sent you.

Lowest Cost Automatic Heat

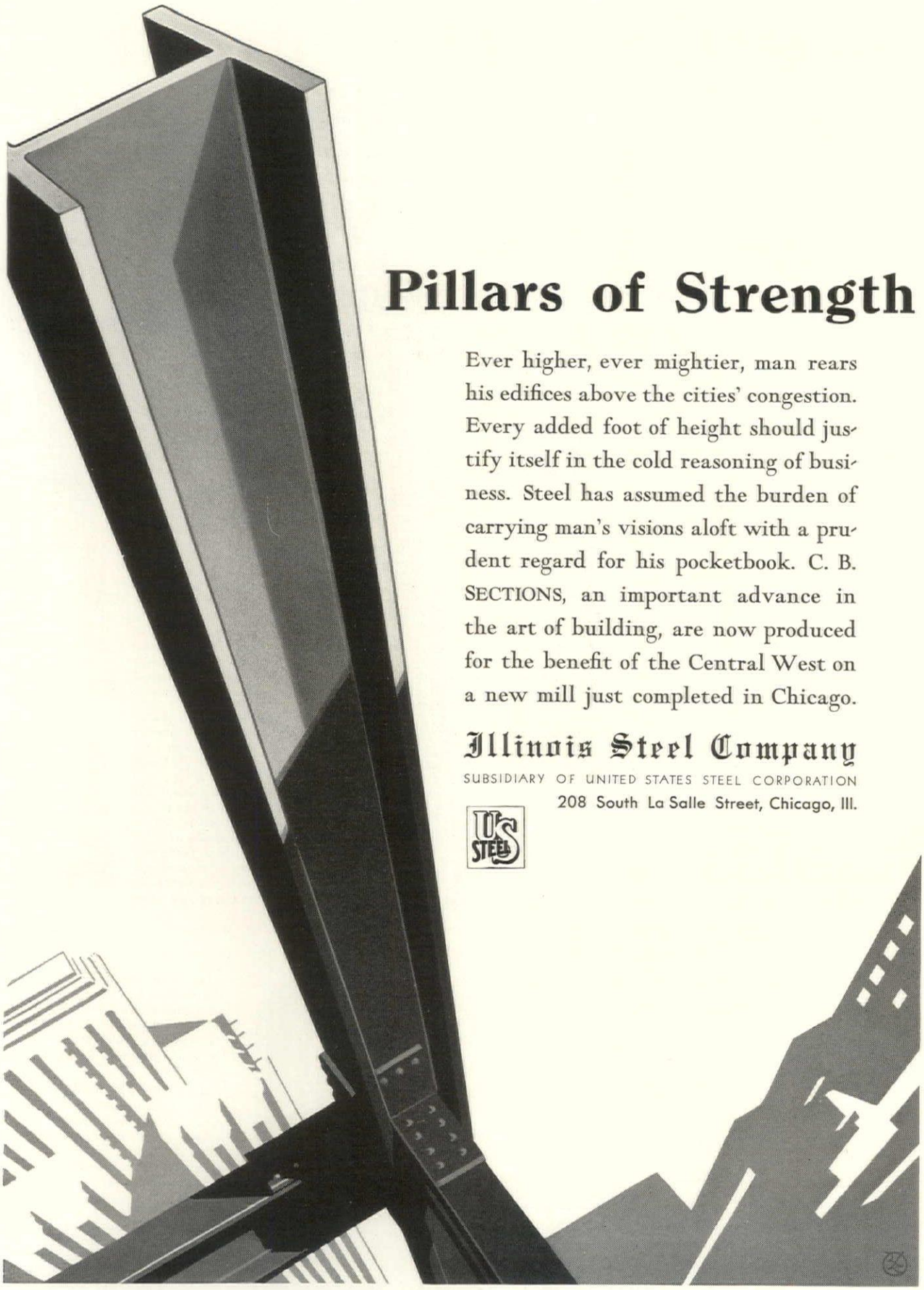


THERE are two costs in connection with every heating plant installation: initial cost and operating cost. Of these, the operating cost is by far the more important, because it is continuous. Spencer Magazine Feed Heaters furnish automatic heat at lowest cost by burning clean, safe, dependable No. 1 Buckwheat Anthracite. In localities where hard coal is not so readily available, small size by-product Coke may be used at a marked saving. As proof of Spencer saving we will gladly supply you with figures showing the Cost Per Square Foot of Cast Iron column radiation, or equivalent, using Spencer Automatic Heat. Spencer Magazine Feed Heaters are built in sizes, capacities guaranteed, to meet the heating requirements of buildings of every size and type. Write for descriptive literature.

SPENCER HEATER COMPANY, WILLIAMSPORT, PENNSYLVANIA

Spencer Heater Company of Canada, Ltd., Toronto, Ont.

SPENCER
Magazine Feed
HEATERS
for steam, vapor or hot water



Pillars of Strength

Ever higher, ever mightier, man rears his edifices above the cities' congestion. Every added foot of height should justify itself in the cold reasoning of business. Steel has assumed the burden of carrying man's visions aloft with a prudent regard for his pocketbook. C. B. SECTIONS, an important advance in the art of building, are now produced for the benefit of the Central West on a new mill just completed in Chicago.

Illinois Steel Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

208 South La Salle Street, Chicago, Ill.

U S STEEL

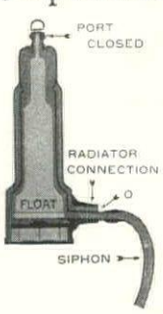
C. B. SECTIONS

Why NO. 2 HOFFMAN VACUUM VALVES *do not hiss or spit*

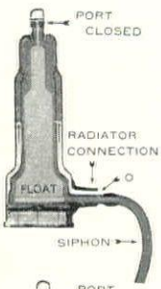
Why risk customers' dissatisfaction and unprofitable service calls by specifying vacuum valves that you cannot guarantee against spitting, hissing and leaking. Especially when there is a valve so constructed that these annoyances are impossible — No. 2 Hoffman Vacuum Valve.

In addition to the exclusive *double air-lock*, Hoffman Valves incorporate another patented feature — *separate channels for air and water.* These insure quick, noiseless venting of air, and positively prevent water leakage through the vent port.

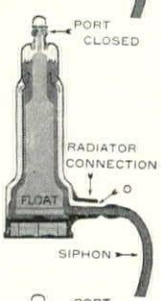
How these channels (found only on Hoffman Valves) work is shown by the following simple illustrations:



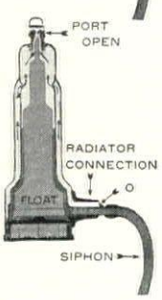
No. 1—*If for any reason water completely fills a No. 2 Hoffman Vacuum Valve, the float rises and closes the port. The valve is now a sealed chamber which air must enter before water can run out.*



No. 2—*Air starts to enter through opening O, and water starts to run out of siphon. But note the difference; instead of bubbling through water as in other valves, the air is compelled to move through special channels, pushing the water ahead of it until these channels are free of water.*



No. 3—*Air is collecting at top of valve and an equal amount of water has run out. Notice particularly that the port remains closed until the air channels are completely cleared of water.*



No. 4—*Enough water has run out to permit the float to drop and open the port. But now the outlets of the air channels are above the water line in the valve. There is no water in the path of the air. No matter how forcefully air may be driven into the valve, it cannot blow water out of the open port.*

The snap action of the float diaphragm insures a wide-open or tightly closed port—the valve will not close before venting is complete. And the perfect siphon provides for quick drainage.

Before a No. 2 Hoffman Vacuum Valve is complete, 279 operations of hair-line precision are made. Every step of manufacture is rigidly tested. That's why we can guarantee these valves to give efficient, service-free operation for five years. Send today for our booklet that shows you exactly why No. 2 Hoffman Vacuum Valves are superior in every way. Hoffman Specialty Company, Inc., Dept. EF-31, Waterbury, Conn.

THE VALVE WITH THE PATENTED DOUBLE AIR LOCK

IT is a far cry from the little red schoolhouse of our fathers' time to the magnificent new 40-story Cathedral of Learning of the University of Pittsburgh. This imposing structure not only typifies the advance in education, but the great progress in building construction as well. It is fitting indeed that in the City of Steel, its University should be housed in the most spectacular contribution Steel has made to this generation . . . the skyscraper.

CB Sections, representing the most recent improvement in structural steel, were used in the construction of the Cathedral of Learning. A vast number of important educational structures throughout the country testify to the popularity and merit of CB Sections.

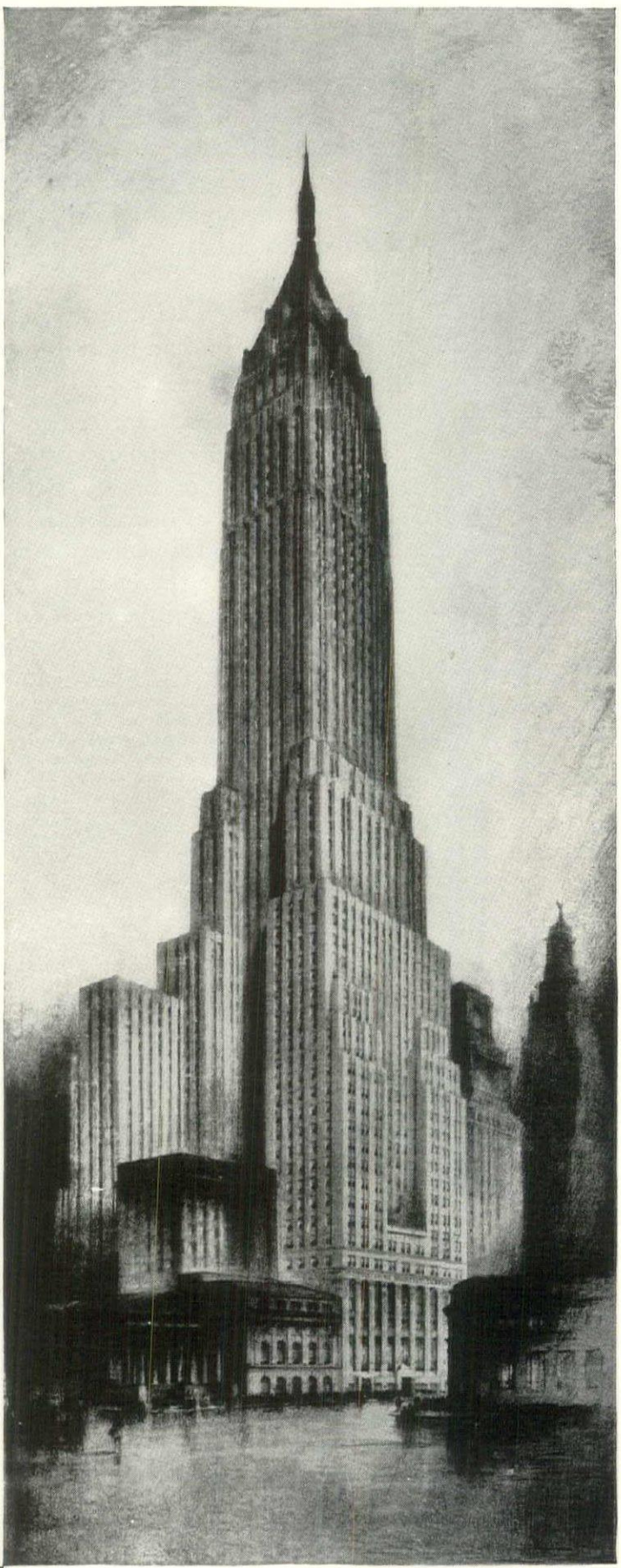
Charles Z. Klauder, *Architect*
H. G. Balcom, *Structural Engineer*
McClintic-Marshall Corporation, *Fabricators*
John L. Mullen Construction Company, *Erectors*
Stone & Webster Engineering Corporation,
Supervision of Construction

CB SECTIONS

CARNEGIE STEEL COMPANY, PITTSBURGH, PA.

Subsidiary of United States Steel Corporation

141



BANK of MANHATTAN BUILDING New York City

Architect: H. Craig Severance
Associate Architect: Yasuo Matsui
Engineers: Purdy and Henderson
Contractors: Starrett Bros., Inc.

Framework of Bethlehem Wide-Flange Structural Shapes

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu.

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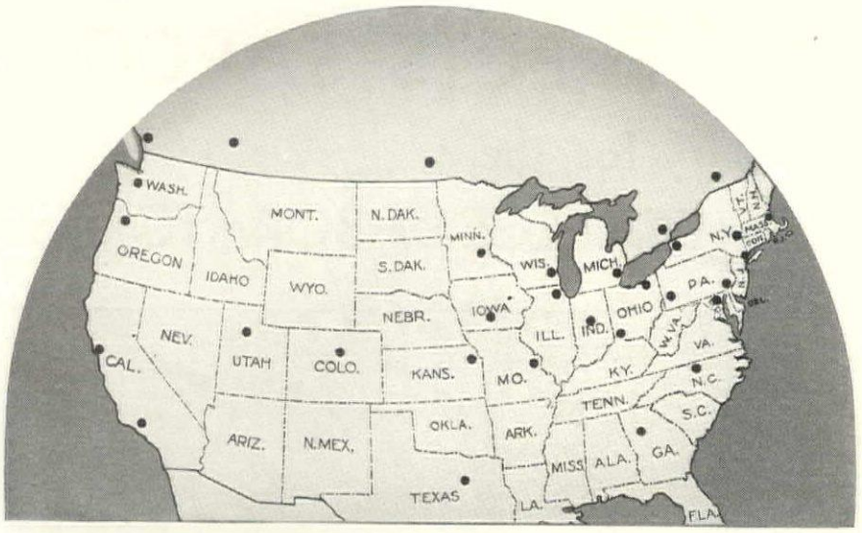
BETHLEHEM



30 Convenient Johnson Branches Insures Emergency Attention within Twenty-four Hours Anywhere. Every Johnson Installation Inspected Annually Without Charge. Each Johnson Installation made by Johnson Mechanics Only.

SERVICE

How Johnson Control Is Applied To This Impressive New Building

Added to the very many notable buildings equipped with Johnson Control is the new Los Angeles Stock Exchange. Four separate systems of air conditioning are in this building: supplying the Trade Room, Two Clearing House Sections and the general offices extending from the sixth to the eleventh floors. All are under The Johnson System Of Control.

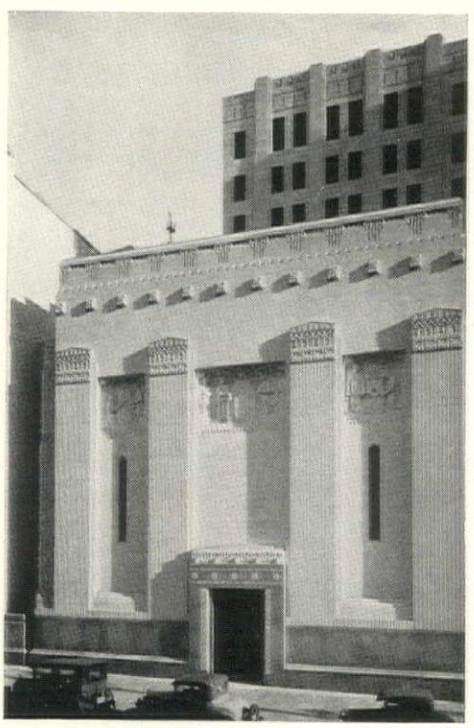
The dry and wet bulb temperatures on each system are controlled by Johnson Wet Bulb Thermostats, located in the fresh air intakes and operating the fresh air and return air dampers in unison.

The temperature of the water in the dehumidifiers is controlled by a Johnson Three-Way Valve in the pump discharge, operating from a Johnson Dry Bulb Thermostat. In addition, a Johnson Three Branch Four-Way Pneumatic Switch is located in the engineer's office, by which these valves are operated manually when desired.

Included in this installation is the standard Johnson Thermostat Control on the radiation and the ventilation throughout the building: automatically maintaining each section and room at the temperature desired, regardless of the weather conditions out-doors; and producing a large saving in heating cost per year by preventing the usual overheating and heat waste . . . . and the excessive, unnecessary fuel consumption thus resulting.

JOHNSON SERVICE CO. 149 E. Michigan MILWAUKEE, WIS.

Albany	Chicago	Des Moines	Los Angeles	Portland	Calgary, Alta.
Atlanta	Cincinnati	Detroit	Minneapolis	St. Louis	Montreal, Que.
Baltimore	Cleveland	Greensboro, N.C.	New York	Salt Lake City	Winnipeg, Man.
Boston	Dallas	Indianapolis	Philadelphia	San Francisco	Toronto, Ont.
Buffalo	Denver	Kansas City	Pittsburgh	Seattle	Vancouver, B.C.

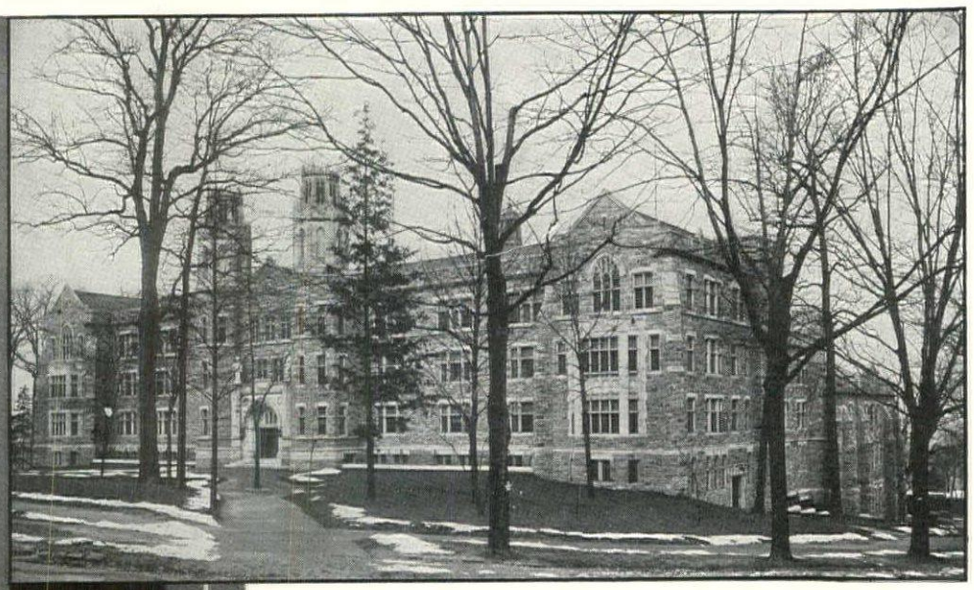


Los Angeles Stock Exchange Building . . . . .
Samuel E. Lunden, ... *Architect*
Ralph E. Phillips, ... *Consulting Engineer*
Thomas Haverty Company, . *Heating & Ventilating Contr's*

The All-Metal System. The All-Perfect Control. The Dual Thermostat [Two Temperature] [Night & Day] Control.

JOHNSON HEAT AND HUMIDITY CONTROL

LEHIGH SELECTS SARCO
for the
"LAST WORD IN COLLEGE LABORATORIES"



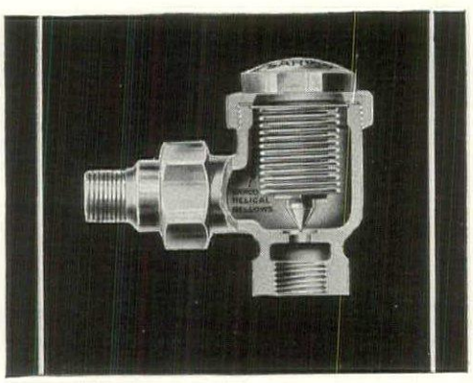
Packard Laboratory, of Lehigh University, Bethlehem, Pa. Architects: Visscher & Burley, New York. Engineer: C. A. Fuller, New York. Contractors: Riggs, Distler & Co., Baltimore, Md.

The magnificent James Ward Packard Laboratory of Engineering, recently dedicated at Lehigh University, has been aptly described as "the last word in college laboratories."

It was only natural that, in selecting the equipment for this model institution, those who designed it and those who will work in it should insist upon proven superiority in performance for every piece of equipment.

It was logical also that, in selecting the heating system, these men should turn to Sarco. Our factory is near the University and for years we have enjoyed the cooperation of the faculty. Our product has frequently been tested there—they just knew they could depend on Sarco.

You, too, will have no hesitation in specifying Sarco Radiator Traps, Inlet Valves and accessories when you know us better. Our new catalog No. AK-40 will get us acquainted. May we send it?



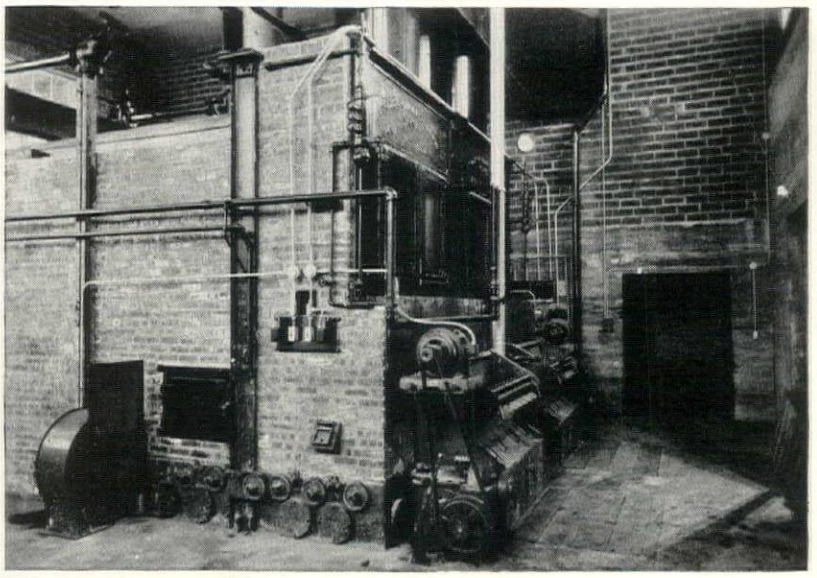
SARCO COMPANY, INC.
183 Madison Avenue, New York, N. Y.

Branches in Principal Cities

SARCO CANADA LIMITED
Federal Building,
Toronto, Ont., Canada

SARCO HEATING SYSTEM

SARCO HEATING SYSTEMS
BUILT TO A QUALITY STANDARD



Installation of two Illinois forced draft chain grate stokers under 100 H. P. boilers at the Ames High School, Ames, Iowa. They were selected for 150% maximum rating, on 9,000 BTU as fired Iowa screenings.

NOW THERE IS A 50-250 H. P. CHAIN GRATE STOKER

» » » » *with the outstanding operating characteristics of the standard size* Illinois Stoker

Architects and engineers have long been familiar with the Illinois Chain Grate Stoker for boilers over 250 H. P.— the stoker that has a world-wide reputation for producing steam at the least cost . . . for burning any coal, from any district, with consequent savings . . . for smokeless operation . . . for high efficiency whatever the load conditions.

Many architects have said: "Why don't you let the smaller boilers also benefit from the exclusive features you have developed for the larger sizes?"

Now that smaller stoker is available — an Illinois "chip off the old block" that is only 14" from top to bottom chain strands, for boilers in the 50 to 250 H. P. range. It is ideal for low-set boilers, requiring little or no excavation and adding low construction cost to low operating expense.

Our illustrated booklet shows some remarkable operating data on this stoker. We'll be glad to send you a copy for your files.

ILLINOIS STOKER COMPANY

» » »

ALTON, ILLINOIS

ILLINOIS CHAIN GRATE STOKERS

AFG—Gray

REVIEWS OF MANUFACTURERS' PUBLICATIONS

KERNER INCINERATOR COMPANY, Milwaukee. "Kernerator for Waste Disposal."

So great is the amount of refuse and garbage from large cities that when it is towed out to sea and dumped or, what is even worse, dumped into such water courses as rivers, lakes or bays, it results in widespread polution of beaches and shores, to say nothing of producing consequences which are much more serious. Of course all this garbage originates in individual homes or buildings, and if the evil were remedied at its source, the problem would cease to exist. All this constitutes a powerful argument for destroying garbage by burning it, a course which is followed by many well regulated communities. This brochure is one of quite a number describing garbage incinerators for use in homes, apartment houses, hotels, hospitals, and other buildings of a sort which produce garbage. The cost of incinerator equipment is not great, its installation is a simple matter, and the cost of maintenance is extremely small when the benefits which follow its use are balanced against the small cost.

AMERICAN ROLLING MILL COMPANY, Middletown, O. "Ventilating the Science Building, Antioch College."

This brochure, "ARMCO Architectural Bulletin, No. 3" is devoted to describing and illustrating the mechanical ventilation of a college building at Yellow Springs, O. "The professor of chemistry and several members of the building committee first made a study of chemistry buildings already in use at various colleges and universities, and their architects worked out what is described as almost the final word in well planned and adequately equipped science buildings or chemical laboratories.

"Two requisites were set up in determining the design of the building. The first was a matter of economy. Of the money available, the greater portion had to be used to furnish the building with the best of modern equipment. The second requisite was a matter of flexibility of design and construction; it was realized that the number of students using the building might very well increase as the school grew larger. Furthermore, it is the theory that the teaching of chemistry, like other scientific developments, is progressing so rapidly that it would be foolhardy to construct the building as a fixed and permanent unit. In other words, the building should be so designed that future changes or additions could be made easily and economically. The building consists of four floors, each poured as one complete unit. A central corridor runs the length of each floor, with class rooms and smaller laboratories opening off on both sides. At each end of these main corridors there are larger lecture rooms and laboratories. Rooms are built with semi-permanent partitions. Thus, should the school ever want to enlarge any of the rooms or change the floor plan in any way, these partitions may easily be removed and replaced. The ventilating system of this modern science building is of particular interest. First, it affords an excellent example of how the requisites of serviceability, economy, and flexibility were obtained. Moreover, it submits some interesting ideas concerning the design of ventilating ducts to carry off acid fumes.

"This system involves an abrupt departure from the customary practice of using tile ducts to carry off acid fumes. Heretofore, use of sheet metal has been confined, in most chemistry laboratories, to the ventilating ducts rather than to the fume ducts. But in this Antioch College laboratory 28 tons of 16-, 18-, and 22-gauge galvanized Armco Ingot Iron were used for the duct work which thoroughly ventilates the entire building,—fume ducts as well as ventilating ducts. Economy and flexibility were the factors that influenced the selection of sheet metal. In the first place there was a considerable difference between the initial cost of sheet metal and that of tile. Furthermore, because of its light weight, sheet metal could be installed easily and at a much lower cost for labor. Serviceability of these sheet metal ducts was assured by using rust-resisting Armco Ingot Iron for all duct work. The ducts were further protected inside with three coats of Bakelite paint and one of Eternium. There are 103 rooms in the entire building, among which 27 rooms are equipped with fume ducts in addition to the ventilating system. The construction and design of this fume duct system present several novel and yet entirely practical features."

CLAUDE NEON LIGHTS, INC., New York. *The Claude Neon News*, Volume 3, Number 3.

To suggest new uses for its excellent system of using light for advertising purposes, and to show uses to which it is being put in different parts of the world, Claude Neon Lights, Inc., issue an interesting publication. The particular number to which attention is directed is that dated September-October, 1930. Its illustrations show many striking and novel uses to which the Neon Lights are being put for every imaginable purpose. The installations illustrated are in every part of the United States, and many of those shown are in foreign parts,—Paris, Havana, Australia, Japan and China. Two pages, at the middle of the brochure, show some of the plants creating Claude Neon displays of different kinds.

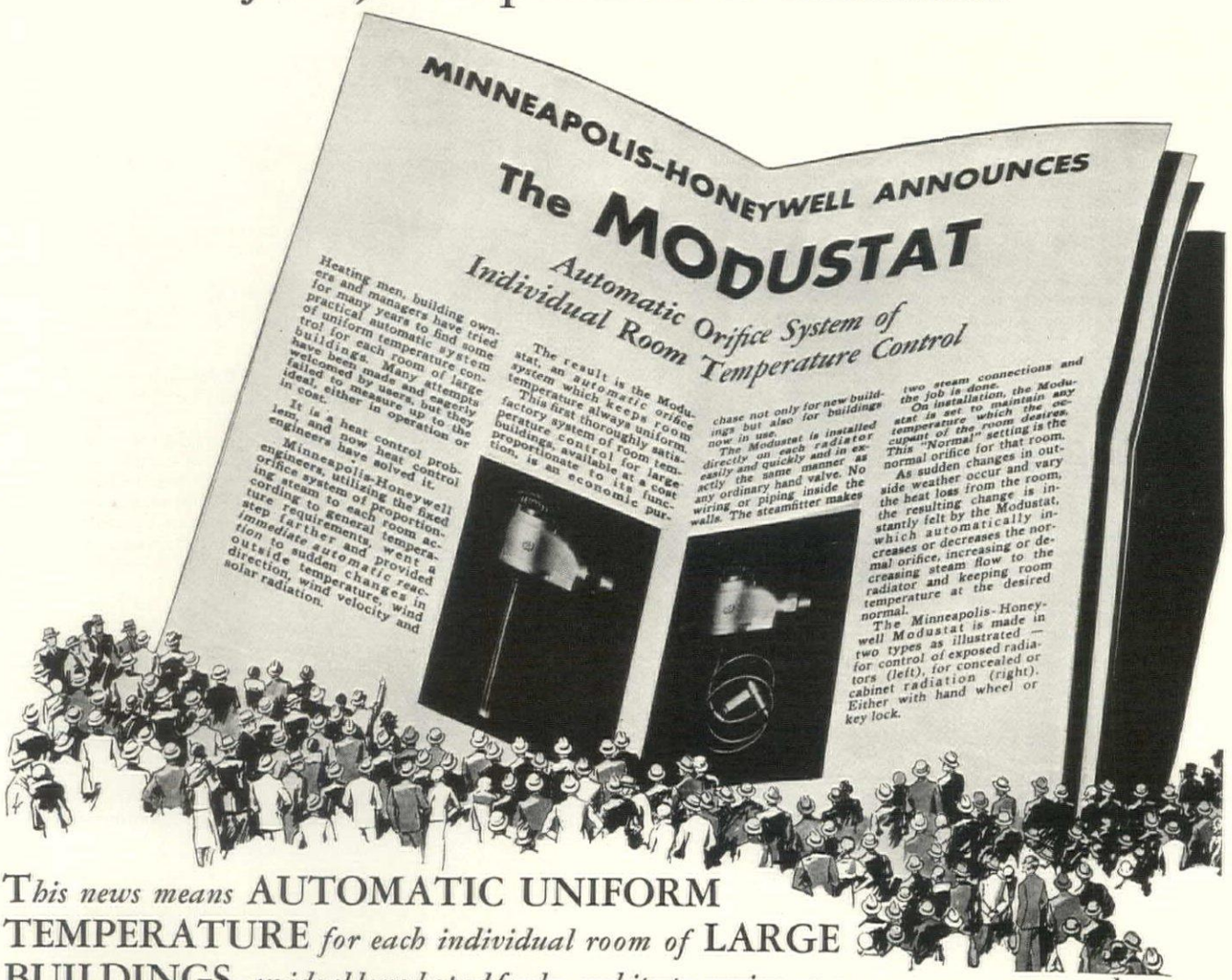
NATIONAL FIREPROOFING CORPORATION, Pittsburgh. "Especially for the Communication Field."

So accustomed are people today to the smoothly functioning telephone and telegraph service that thought is seldom given to the vast amount of equipment and maintenance necessary for giving such service. When the overhead wires which years ago disfigured and even darkened the narrow streets of downtown New York were put underground, it was felt that a great advance had been made, but such has been the growth of telegraph and telephone service since then that what was regarded as extraordinary at that time is regarded as merely routine now. This brochure deals with the clay tile units necessary for building the miles of conduit required to carry these underground wires. "Today, constantly improved service is the desire of the public who are receiving it and the objective of the great telephone and telegraph companies supplying it. Service without interruptions or delays,—service at lower cost,—service that is permanent and mutually profitable. Such an objective is not won without a struggle,—without proper consideration to the wire and cable lines, those arteries of speech, the vital elements in communication service. Such a consideration involves safeguarding these lines against the destructive effects of sleet and wind storms; of fire and soil corrosion; of rot and decay; of vibration; of thermal contraction and expansion; of collapse; of mechanical injury; of bullet punctures or workmen's picks, any of which may mean serious and costly interruptions to service.

"It is generally recognized that the economical way to safeguard wires and cables against this army of destructive agencies, is to place them underground in a permanent conduit system, and the soundness of this procedure is proved by the tremendous growth of underground in recent years. As an instance, interruptions to telephone service in one city were reduced as much as 80 per cent when cables were placed underground in a permanent form of conduit. But even more important are the economic considerations that influence today's practice. The increasing use of labor-saving trenching and excavating machinery and tools; improved design and location of duct runs and manholes; improved methods of joint design; the introduction of portable manhole forms and pre-cast manholes; the introduction of new shapes of underground clay conduit for constructing curves, turning branches, and splaying and transposing duct lines with consequent saving in manholes and in cable splicing and bending; the comparatively low cost of clay conduit; these factors have brought underground costs down to a point where they now compare favorably with overhead costs and, —at the same time,—effect a large saving in maintenance and depreciation. Such a saving is frequently sufficient to pay handsome dividends on investments. Again, the policy of installing telephone cables in a permanent conduit system constitutes the ideal method of providing for growing service demands and for future plant expansion. Protection for additional or larger cables may be thus anticipated, and reserve ducts be provided at the least cost.

"A permanent conduit system also makes possible the substitution at any time of larger cables for smaller, and for the reclamation and salvage of the latter. Line troubles, if any, are readily located and quickly and cheaply corrected,—for the cables are always accessible. Telephone companies with but 400 subscribers are awake to these economic considerations and are anticipating growth and development in the building of permanent conduit systems."

An Announcement to the Public in The Saturday Evening Post
May 30, 1931
of Major Importance to Architects



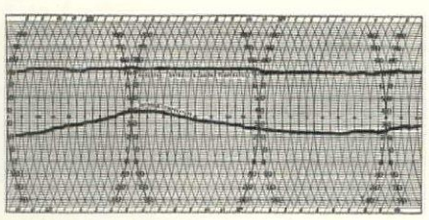
This news means AUTOMATIC UNIFORM TEMPERATURE *for each individual room of* LARGE BUILDINGS, *an ideal long hoped for by architects, engineers, owners, managers and tenants*

You spend an evening in a hotel room—and spend most of the evening shuttling from chair to window to radiator trying to keep the room even partially comfortable.

You put in a day—any day—at the office and repeat the performance, interrupting your work and adding perplexity to the lives of the janitor, the building force, the manager, even the owners.

Your irritation with large building room heating is almost as great as that of heating men. They have tried for years to find some thoroughly satisfactory way to control the temperature of each room automatically at the comfort level the occupant desires. They ask for results and reliability, at a cost appropriate to the purpose.

This challenge to automatic heat control engineers has now been met. Minneapolis-Honeywell engineers, who have made and installed and steadily perfected home heating thermostatic controls for 4,000,000 people, applied their 46 years of experience to the solution of this even more intricate puzzle.



An automatic temperature recorder traces the history of a day in the operation of a Modustat system in a large general office (30x120). Notice the wide variation in outdoor temperature (lower line on graph) and the fact that inside temperature did not vary even in the afternoon, when this room with its Western exposure was subject to maximum solar radiation.

Today Minneapolis-Honeywell presents the Modustat, developed in laboratories with unmatched facilities, perfected and field tested for two years by engineers whose ability and experience has made the name of Minneapolis-Honeywell the sign of final dependability on automatic heat controls for every specialized form of domestic and factory heating, and industrial processes.

Every man who plans, owns, operates, manages, or occupies any building larger than an average-sized residence is invited to mail the coupon for the book which tells how the Modustat was developed, and how it operates automatically to maintain the desired, uniform, comfortable temperature in each room.

Minneapolis-Honeywell Regulator Co., *Executive Offices:* 2803 Fourth Ave. So., Minneapolis, Minn. *Factories:* Minneapolis; Elkhart and Wabash, Ind. *Factory Branches or Distributors in all principal cities.*

THE MINNEAPOLIS-HONEYWELL
MODUSTAT

Automatic Orifice System of Individual Room Temperature Control for public buildings, offices, hospitals, schools, hotels, apartments, large residences

MINNEAPOLIS-HONEYWELL REGULATOR CO.
2740 Fourth Ave. So., Minneapolis, Minn.
Please send me a copy of your book, "The Modustat."

Name.....

Street and No......

City.....

I am interested as (please check) Owner, Manager, Architect, Consulting Engineer, Heating Engineer, Contractor, Tenant.

REVIEWS AND ANNOUNCEMENTS

THE SARCO COMPANY, INC., 183 Madison Avenue, New York. "Sarco Heating Specialties."

The building up of an efficient heating system is largely a matter of choosing appropriate details and using them in the proper way. Heating equipment has been so developed and improved that, as someone has said, it operates with a smoothness which almost seems to be directed by human intelligence. This brochure describes and illustrates the valuable line of heating accessories or specialties made and sold by the Sarco Company, Inc.,—radiator traps, packless valves, radiator valves, air eliminators, receivers, combination floats, thermostatic traps, etc. "For the convenience of architects and contractors, Sarco maintains a competent force of practical heating engineers, who are available for consultation as to the best system to suit given conditions. They will be glad to assist clients with special details of application and to furnish information, based upon long and varied experience, on any phase of vapor or vacuum heating. Sarco also maintains an organization of service engineers whose duty it is to see that entirely satisfactory service is obtained. All Sarco products are guaranteed against defects in material or workmanship, and may be returned within one year from date of purchase, for free repair or replacement, if a defect should be found. Sarco vacuum and vapor heating systems are installed in many hundreds of the finest commercial, public and industrial buildings in the country. Sarco specialties are specified by the foremost architects and heating engineers. They may be used with confidence."

STRUCTURAL GYPSUM CORPORATION, Linden, N. J. "Gypsteel Floor and Ceiling Construction."

With the development of modern building upon a vast scale there have come many revisions of standards and considerable re-defining of terms which have been long used. So with the word "fireproof," for there is probably no material which is absolutely immune to damage from fire long continued. "As architects, engineers, and fire underwriters know, mere incombustibility is but one of several essential qualifications for a satisfactory fireproofing material. To perform its proper function in a modern building, such a material must be more than incombustible. It must be fire-resistive, possessing a degree of non-conductivity of heat that will effectively protect the supporting structural steel work from injury under the most severe conditions of fire that could exist in the building. It should also possess a sufficiently low coefficient of expansion to insure against self-destruction, or even serious injury, throughout the unchecked duration of a severe fire, and also during the subsequent application of a stream of water at high pressure. In selecting a floor system the dependable strength of its construction is just as important as its fireproofing qualities. Many floor systems now in use are based upon unique theories, or upon assumptions derived from tests that cannot be verified by any accepted engineering formula. Even where such calculations may be applied, the strength depends so often upon the human element entering into the installation that the safe load-carrying capacity of the floor can be assured only by an extravagant factor of safety. Gypsteel Pre-Cast Floor Construction, in the interests of which this booklet is published, meets all of the very exacting requirements of modern fireproofing. In addition, it embodies many distinctive advantages and economies that cannot be obtained by other methods of fireproof construction. As a result of the most severe fire, water, and load tests, conducted by well known testing laboratories, Gypsteel Pre-Cast Floor Construction is approved by the building departments of the principal cities throughout the United States as standard fireproof construction for floors, in buildings of the first class."

The brochure deals fully and completely with this method of building, explaining its advantages and making plain by descriptions and illustrations the proper use of the materials concerned. There are also given illustrations of a great number of structures of one kind or another in which use has been made of these materials, and on several pages there are included impressive lists of well known architects all over the country who have specified Gypsteel Floor and Ceiling Construction for specific buildings of various sorts, the buildings and their locations being named.

Galen V. R. Gloyd announces the opening of his new offices in the Pioneer Trust Building, 1016 Baltimore Avenue, Kansas City, Missouri. Mr. Gloyd was formerly of the firm of Archer & Gloyd.

E. Dean Parmelee has removed his offices to the Peoples National Bank Building, 31 Mamaroneck Avenue, White Plains, New York.

Eugene H. Klaber announces the removal of his offices to the Chicago Daily News Building, 400 West Madison Street, Chicago.

Theodore R. Jacobs has moved his offices to the Central Building, 108 West 6th Street, Los Angeles, California.

E. B. La Croix announces the removal of his offices to the Franklin Bank Building, 709 North Eleventh Street, Milwaukee, Wisconsin.

W. Kenyon Drake, A.I.A., has moved his offices to 1202 Barnett National Bank Building, Jacksonville, Florida.

J. G. Braecklein, C. Hubert Swanson and Walter A. Besecke wish to announce the formation of a partnership to practice architecture. They have offices under the firm name of Braecklein, Besecke & Swanson, at 719-A Minnesota Ave., Kansas City, Kansas, and under the firm name of Besecke, Braecklein & Swanson, at 114 West 10th Street, Kansas City, Missouri

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ADVERTISER'S CORRECTION.

The architects for the Los Angeles City Hall were John C. Austin, Albert C. Martin, John Parkinson, Associated Architects, and they, not the Allied Architects, should have been credited in the advertisement of Minwax on page 12 of the advertising section of THE ARCHITECTURAL FORUM for May, 1931.

AMERICAN ROLLING MILL CO., Middletown, O. "Cooling and Ventilating the Minneapolis Civic Auditorium."

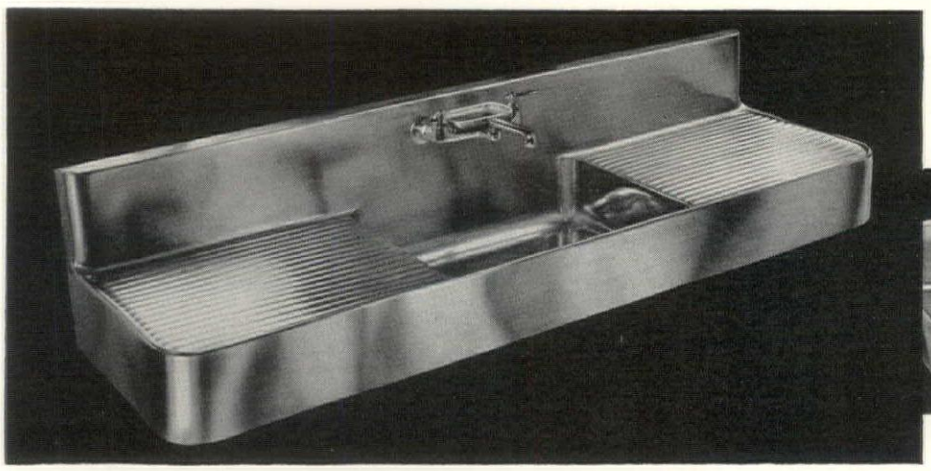
This brochure is issued to describe the system by which cooling and ventilating are had in one of the most important structures of its kind in this country.

"The new Minneapolis Civic Auditorium is one of the outstanding buildings of its type. It was the first municipal auditorium in which adequate provision was made for the comfort of its occupants in hot as well as in cold weather. It stands as a landmark of progress in the science of heating, cooling and ventilating huge buildings. The building is steam heated with direct radiation, a two-pipe vacuum system of steam circulation being used. All portions of the building are adequately ventilated and cooled. Complete automatic temperature control of heating units and certain dampers of the ventilating system is provided for all purposes. The ventilating for the entire building will consist of 10 separate air supply fan systems and an equal number of mechanical exhaust systems, each system constituting a complete unit in itself. Eight of the air supply units are equipped for air cooling; the other two supply air to corridors and main group chorus rooms in the dressing room sections of the arena. The mechanical exhaust systems provide for the removal of air from dressing rooms, toilet rooms, janitor closets, utility work rooms, and from projection rooms. Cooling is accomplished by washing the air with cold well water. In this respect, Minneapolis is endowed with a very valuable asset. It is underlain with a water-bearing formation, easy to reach and abundant in the quantity of its water. This water is pumped directly to a series of spray nozzles in each of the air-washing dehumidifiers, reaching there at a temperature of 50° Fahr. This cold water, pumped at the rate of 3,000,000 gallons per day, is sprayed in a veritable cloudburst, and thoroughly purifies and cools the recirculated air, absorbing all odors and organic matter which otherwise would limit the amount of air which could be recirculated. This water goes to a sewer immediately after it is used for air cooling and washing." It is doubtless an excellent installation.

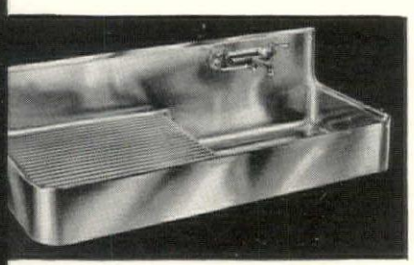
You can NOW SPECIFY

Standardized MONEL METAL Sinks

for the homes you are planning



Double drain board Monel Metal kitchen sink. Made in nominal sizes of 72″x 21″ and 60″x 21″.



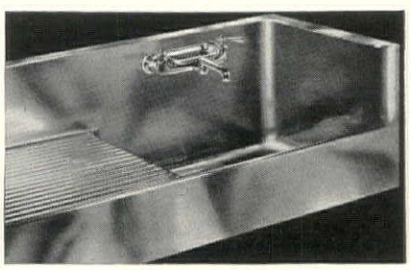
Single drain board Monel Metal kitchen sink. Available in both left- and right-hand drain board models. Made in nominal sizes of 50″x 21″ and 41″x 21″.

Standardized construction and quantity production have brought beautiful Monel Metal kitchen sinks, once the luxury of the few, within reach of millions of average homes!

It means that your clients' kitchens can now bask in the cheerful beauty that only Monel Metal sinks can impart... beauty that merges with every color and scheme of decoration. It means that women may enjoy sinks that always look bright and new in spite of hard daily service.

For the new standardized Monel Metal kitchen sinks set a new high water mark of convenience and durability, as well as attractiveness. Smooth as glass and corrosion-resisting, with no dirt catching corners or seams, they are easy to clean and keep clean. Strong as steel and rust-proof, with no coating to chip off, they stand hard use. Monel Metal is solid clear through—the lustrous, silvery appearance of Monel Metal can never wear away.

Standardized Monel Metal kitchen sinks cost little more than sinks made of less durable materials. On display at leading plumbing showrooms. See them today—and write for descriptive literature and specification details.



Monel Metal corner kitchen sink. Splasher at bowl end, drain board either right- or left-hand. Supplied in nominal sizes of 51″x 21″ and 42″x 21″.

Specifications and Advantages

1. Rich, lustrous beauty with a satiny, glass-smooth surface.
2. Rust-proof . . . highly resistant to corrosion . . . easy to clean and keep clean.
3. Solid metal clear through, with no coating to chip, crack or wear off. Steel-like strength gives lifetime durability.
4. Neutral, silver tone blends with any kitchen color scheme. Gives new freedom to kitchen decoration.
5. 10 standardized models and 6 standardized sizes. A model and size for any type of kitchen.
6. 31% more working space than an ordinary sink of same nominal size.
7. One-piece construction of heavy gauge Monel Metal. No joints or seams. Reinforced and sound-deadened.
8. Standardized construction and quantity production bring prices within reach of the average purse.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

Monel Metal is a registered trade mark applied to a technically controlled nickel-copper alloy of high nickel content. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

A HIGH NICKEL ALLOY

MONEL METAL

MODERN AS TOMORROW

INCO MONEL METAL

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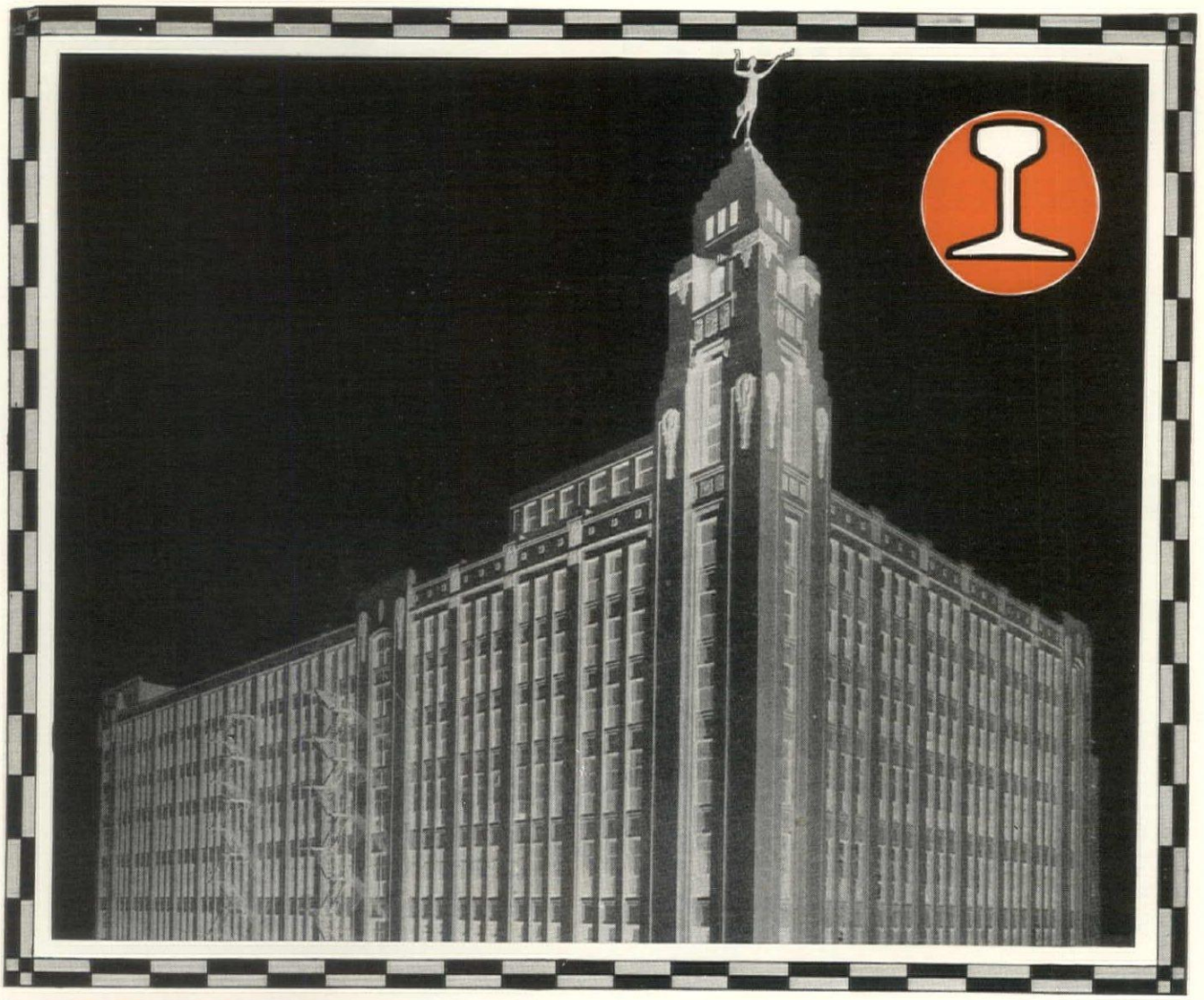

FAMOUS BUILDINGS

The new Montgomery Ward headquarters and retail building is another famous structure reinforced with rail steel bars—produced to meet high standards by—

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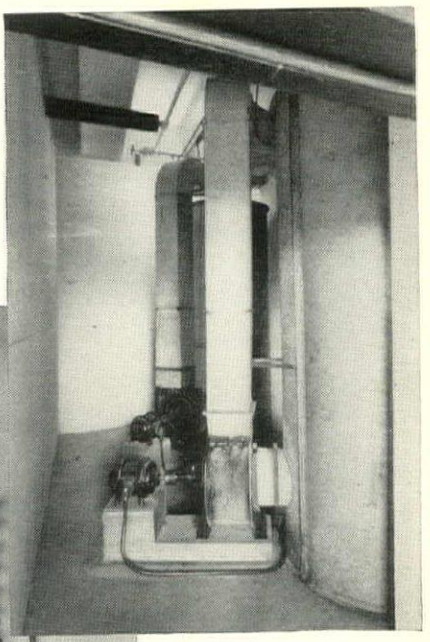
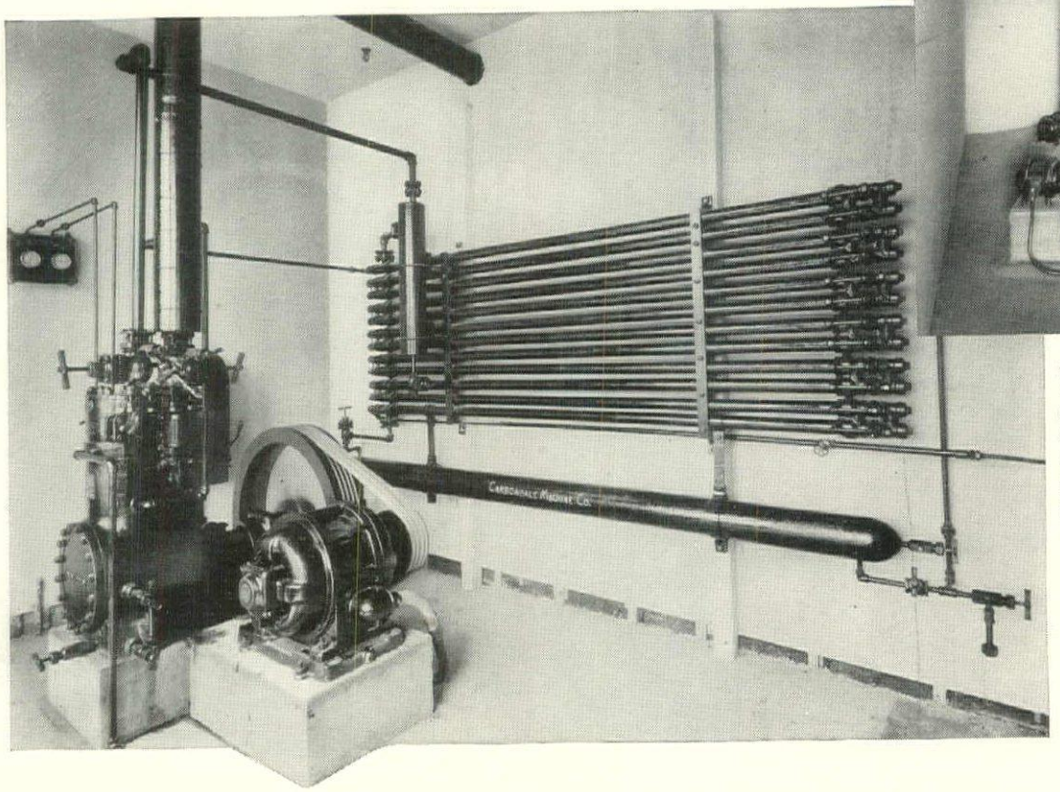
For further Information write
Rail Steel Bar Association, Builders Bldg., Chicago

RAIL STEEL
for concrete reinforcing

COMPACT
Carbondale Air Cooler





Above: the Carbondale Air Cooler which by means of direct expansion helical coils uses the refrigerating effects of the compact 6-ton Carbondale Ammonia Compression System at the left, to cool the air for the two fur storage rooms.

. . . *Protects Furs in storage*

ALL air cooling is not for comfort. The Erie Dry Goods Company, Erie, Pa., uses it for killing in their two fur storage rooms. Moth worms, and other ravagers of furs and fabrics become dormant and soon die when exposed to the freezing temperatures produced by Carbondale Air Cooling Equipment.

Proper control of temperatures and humidity is finding ever increasing use in promoting human comfort . . . improving manufacturing processes . . . providing storage for perishable products. In every conceivable application you will find Carbondale Refrigeration rendering dependable service. Carbondale's success is the result of more than mere refrigerating machinery. It is the engineering of the proper equipment to fit a specific need that produces the economical refrigerating installations for which Carbondale is known.

Whatever you need, if refrigeration plays a part you will find that it pays to consult Carbondale's Engineering Staff.

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

Carbondale Refrigeration

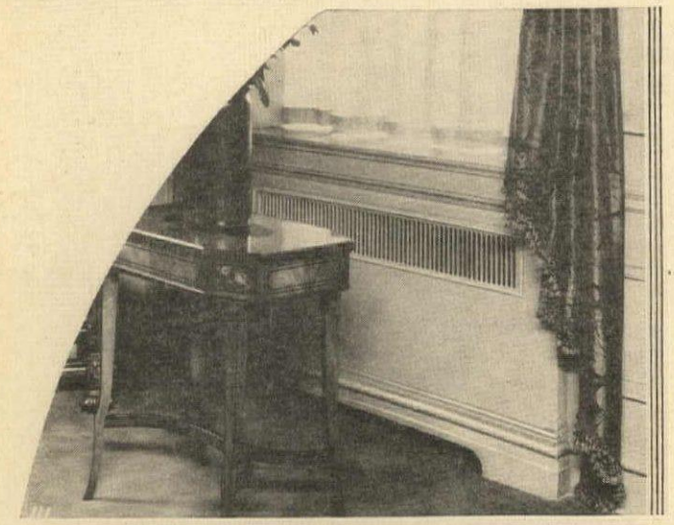
ABSORPTION AND COMPRESSION AMMONIA CARMACO SYSTEMS AND CO_2 COMPRESSION SYSTEMS

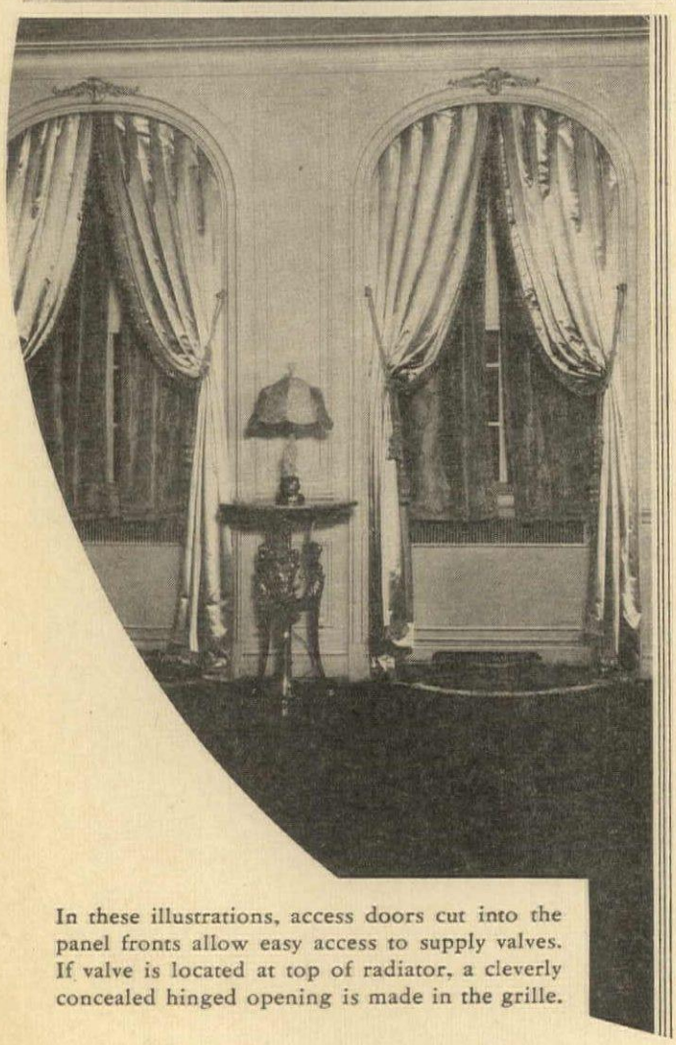
CARBONDALE AMMONIA COMPRESSION REFRIGERATING SYSTEMS USE WORTHINGTON "FEATHER VALVE" COMPRESSORS

MODERN RADIATION *by*

McQUAY

Lends its Beauty to ANY *Type of Interior* - - - -





In these illustrations, access doors cut into the panel fronts allow easy access to supply valves. If valve is located at top of radiator, a cleverly concealed hinged opening is made in the grille.

One outstanding feature of McQuay Radiation is its wide range of application: totally concealed with plaster front . . . completely recessed with panel front . . . . partially recessed with panel front . . . . cabinet type on legs. All types are engineered to diffuse heat in the modern way.

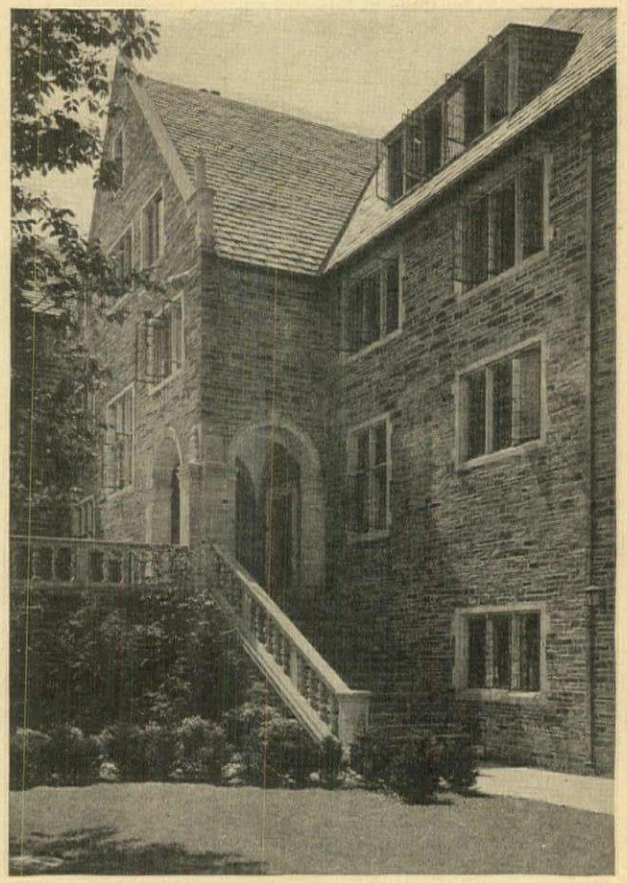
Note the installations illustrated here. One is wholly recessed, the other partially, though both use a baseboard cut-out for inlet air. And both, built to fit a particular type of interior construction, combine beauty, cleanliness, and utility in the highest degree.

A complete set of catalogs, suitably bound, illustrating and describing all types of McQuay Radiation, will be sent at your request.

McQUAY RADIATOR CORPORATION

General Offices: 1600 BROADWAY, N. E., MINNEAPOLIS, MINN.

Within these beautiful walls... *the permanence of* Brass



Balch Hall, Cornell University,
a Revere Brass Pipe installation

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Balch Hall...the new Women's Dormitory at Cornell University. Finely conceived. With strength of line . . . with the forever modern casement . . . and pleasing pattern of wall and roof. Here, too, is the charm of something built to endure.

Inside as well as out, indestructibility keynotes the materials. The permanence that Revere Brass Pipe lends is there. Its utility will remain undiminished with age. There will be no rust to stain the water or stay its flo

It may be anoth
Balch Hall for whi
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