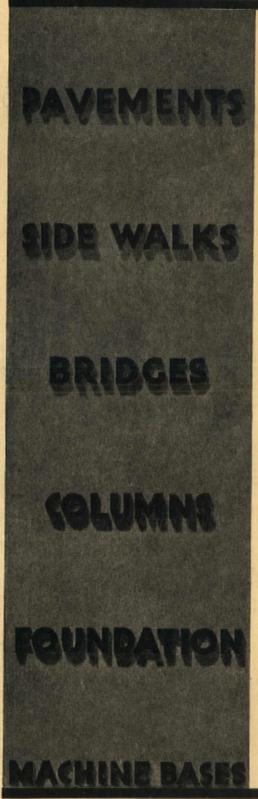


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NOVEMBER 1930

Under New Standard Specifications



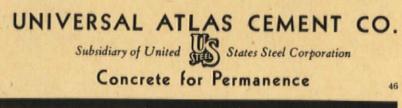
Improved high-early-strength concrete is secured with Universal Atlas methods and cement

> Concrete as commonly mixed, placed and cured has a compressive strength of about 2000 lb. per sq. in. in from 21 to 28 days. A strength of 2000 lb. or more in from 2 to 3 days is now obtained with the same Universal Atlas standard portland cement as is furnished for regular concrete work, by using high-early-strength methods of mixing and placing. Tested methods for obtaining high-early-strength concrete will be furnished by Universal Atlas on request.

• In addition to saving time, this high-early-strength concrete is permanently stronger, more watertight, and more durable than concrete as commonly mixed and placed. Use it to secure quality concrete on your next rush job.

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THE RECORD ARCHITECTURA

Published Monthly by F. W. DODGE CORPORATION, 115-119 W. 40th St., New York Howard J. Barringer, Treasurer Sanford D. Stockton, Jr., Secretary Truman S. Morgan, President

Houses Illustrated (continued)

House of Fred P. Warren, Evanston, Ill.

VOLUME 68

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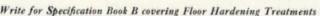


Both of these buildings were designed and are owned by the Santa Fe Railway Co. Sixty tons of Truscon Metallie Floor Hardener were used to protect all floors of both buildings against the wear of traffic.

RUSCON PROTECTION PROVIDES TRAFFIC-PROOF DUST-PROOF FLOORS

2

Possibly no one fact could demonstrate more forcibly the protection which Truscon Metallic Floor Hardener provides than the following. Often in unloading machinery and castings which weigh several tons, it is necessary in these buildings to hook a steel cable to the object in the freight car and drag it across a cement floor to its proper place in a warehouse without rollers or skids. These Truscon hardened floors have withstood this terrific service.



Waterproofings -Dampproofings

RUS

CO

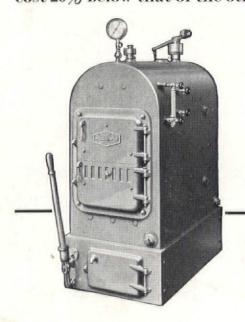
You can Dip

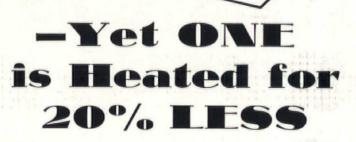
this House





Both of the Cornelissen twin apartment buildings, Boston, Mass., contain the same amount of cast iron radiation. Both are heated with oil, using the same type of oil burner. The only difference in the heating equipment is the boiler. One building is heated with a single pass **Heggie-Simplex Residence Type** Steel Boiler. The other building is heated with a standard make of double pass residence steel boiler. The building equipped with the Heggie-Simplex Residence Type Boiler is heated at a fuel cost 20% below that of the other.

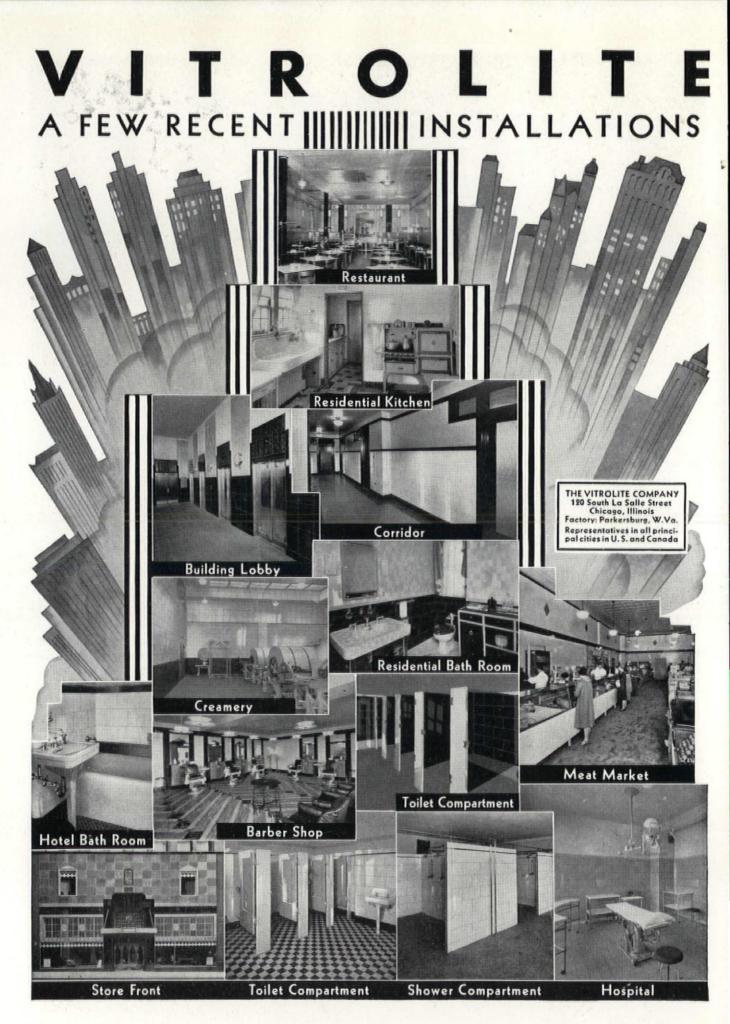


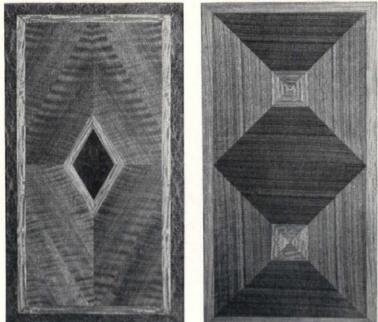


GAIN the single pass Heggie-Simplex Residence Type A Steel Boiler proves its greater economy for residences and small buildings! This modern heating unit is not a "Tom Thumb" edition of the Heggie-Simplex Boiler for large buildings. It is designed specifically for buildings with radiation loads of 1730 sq. ft. or less. It is constructed to meet the requirements of these jobs, and at the same time produce the highest operating efficiency. To operate on the chimneys found in small buildings. To necessitate only morning and evening attention. To make cleaning possible in the shortest period of time and easily. To burn fuel -any fuel-with unmatched economy. To harmonize in a dignified manner with modern basement furnishings. Its durable welded steel construction not only prevents cracks, leaks and costly repairs, but minimizes insurance charges as well. For detailed information - write Heggie-Simplex Boiler Company. Joliet, Illinois — Representatives in all principal cities.



3





A few examples of the infinite possibilities of American Walnut Panels in various types of veneers and combined with other woods. Write for technical specifications for these and other panel designs.

• Quite inimitable, American Walnut's figure is so varied as to harmonize with any type of design. No other material permits such diverse treatment.

Straight lines, gently waving lines, whorls, or intricately conceived patterns are all possible. New methods of producing American Walnut for veneered panels and interior trim are being developed daily.

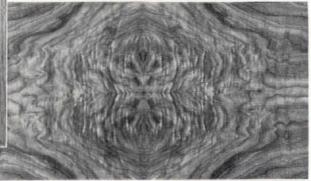
Architects contemplating the use of wood in design will find our technical consultation service of real assistance in devising patterns, panels, and finishes to meet specific situations. Even our personal service is available, gratis, to any architect.

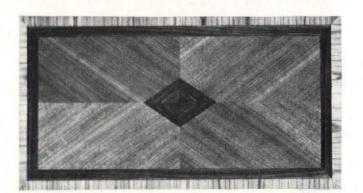
> American Walnut Manufacturers' Association, Room **1740**, 616 South Michigan Avenue, Chicago, Illinois

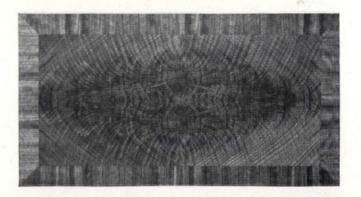


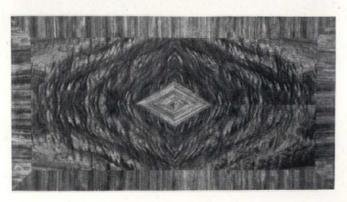
The Architectural Record, November, 1930

so endlessly varying









INEVITABLE ... THE ALL-STEEL CITY

TODAY'S breath-taking spires and spans of steel were "impossible" only a few brief years ago. Now walls of masonry are yielding to solid-section steel windows . . . new beauty comes in steel shapes and new skill devises their application . . . and on the horizon looms the amazing battle-deck floor.

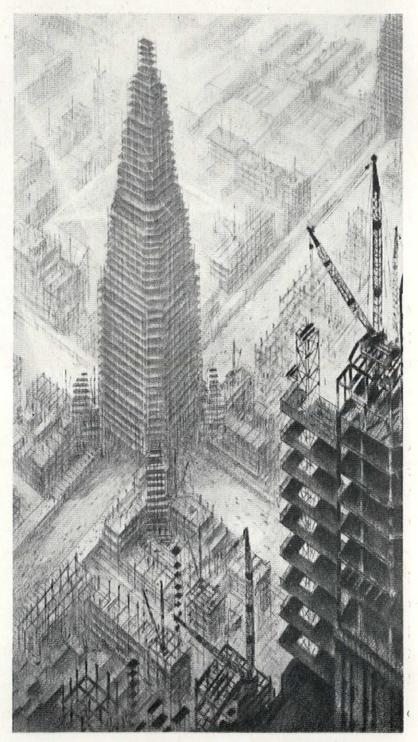
Eventually, cities will be all steel. Not only the skyscrapers and great bridges, but the homes, schools, small apartment and mercantile houses, small factories and small bridges as well. For steel is the strongest, most versatile and fastest building material. Fabricated in mills, weather cannot delay its production—and rain, intense heat, or freezing does not impair its strength. It can be erected anywhere, at any time, as long as men can work—thus earlier returns on invested capital are insured, interest charges are saved.

In cities, too, there is constant change, growth. Small structures give way to larger ones—must be altered, added to or replaced. Steel facilitates alteration and addition—and no other building material has such high salvage value, is so economically recovered, or is so readily marketed afterward.

Before building anything find out what steel can do for you. The Institute serves as a clearing house for technical and economic information on structural steel, and offers full and free co-operation in the use of such data to architects, engineers and all others interested.



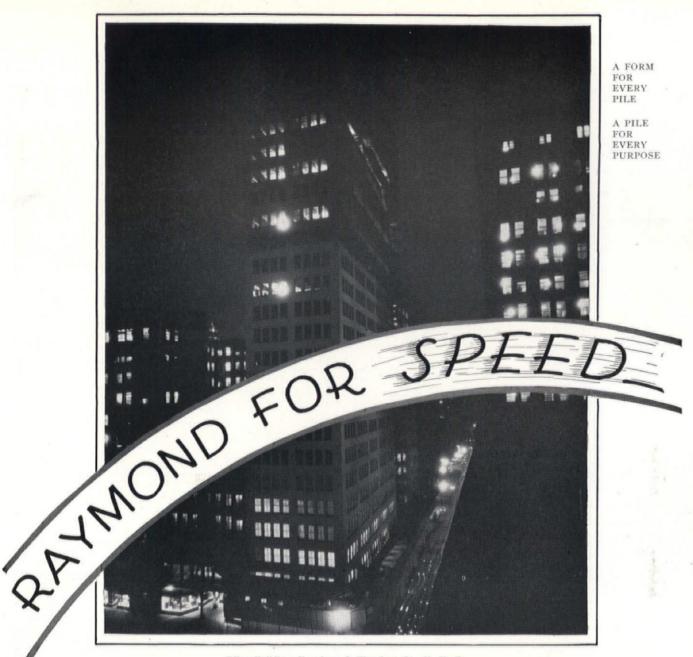
The co-operative non-profit service organization of the structural steel industry of North America. Through its extensive test and research program, the Institute aims to establish the full facts regarding steel in relation to every type of construction. The Institute's many publications, covering every phase of steel construction, are available on request. Please address all inquiries to 200 Madison Avenue, New York City. Canadian address: 710 Bank of Hamilton Bldg., Toronto, Ontario. District offices in New York, Worcester, Philadelphia, Birmingham, Cleveland, Chicago, Milwaukee, St. Louis, Topeka, Dallas, San Francisco and Toronto.



"BUILDING THE CITY OF STEEL"—BY HUGH FERRISS. AN ENLARGE-MENT, ON SPECIAL STOCK FOR FRAMING, WILL BE MAILED WITHOUT CHARGE TO ANY ARCHITECT, ENGINEER OR BUSINESS EXECUTIVE.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

STEEL INSURES STRENGTH AND SECURITY



Office Building, Broadway & Chambers St., N. Y. C. 1754 piles. 25468 ft. piling Architect: E. H. Faile & Co. Contractor: Miller, Daybill & Co.

-- and a dependable foundation

Night work completed this structure in double-quick time—but speed in installing foundations got it off to a flying start. Which demonstrates another reason why Raymond Concrete Piles are selected by so many well known owners, architects and engineers.

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> > 7

Vew

entilating revolutionizes school

millions of dollars will be saved in fuel, maintenance and lowered building costs

UT of many years of study, research, and practical experience in the field of school ventilation a new science has evolved which is the basis of a new ventilation art.

This art in many ways is contrary to past practice.

Most present and past practice has been based on the assumption that harmful and injurious effects resulted from the inhalation of respirated air. Therefore the

object of most ventilation systems was to continuously flood the room with outdoor air in order to dissipate the so-called "crowd poison."

Scientists of today however, as a result of observation and practical experimentation, assert that the theory of outdoor air being the vital requirement of ventilation is unsound. They maintain that

BUFFALO

SCRANTON

the indoor conditions essential to health. comfort and alertness are: 1. Atmospheric activity. 2. Relative humidity. 3. Control of room temperature.

The acceptance of these facts provides a basis for the new Herman Nelson System of Ventilation. This system provides to a nicety the requirements that science now prescribes. With this system instead of introducing a fixed amount of outdoor air into a room, out-of-door air is admitted only when required to control temperature and dissipate odors.

With the Herman Nelson System, proper indoor atmospheric conditions may be maintained automatically through proper



air motion, humidity limitations, and temperature control. Such outdoor air as may be required for the removal of excess body heat and odors is tempered to

The HERMAN NELSON

BELFAST, ME. PORTLAND, ME. BOSTON SPRINGFIELD, MASS. PROVIDENCE, R. I. NEW YORK CITY SYRACUSE ALBANY ROCHESTER

8

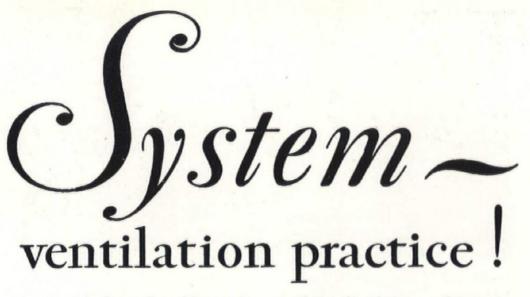
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The Architectural Record, November, 1930



just the right degree through inner-mixture with room air—but is not preheated.

It is estimated that the Herman Nelson System of Ventilation will save approximately half the fuel bill, for it is no longer necessary to heat the large volume of cold outside air, that in the past was admitted into the schoolroom during the winter months.

Further economies result in building

construction through the use of smaller boilers, reduced pipe size, and through the elimination of vent flues.



The Her-Nel-Co Ventilator is the principal equipment used in the Herman Nelson

System of Ventilation. This machine together with the required amount of direct radiation will amply serve the schoolroom.

The cabinet is finished in beautiful morocco enamel with bronzed fittings. The cabinet contains the Herman Nelson Wedge Core radiator for heating the room air which circulates through it—a fan motor for quietly forcing air circulation, a filter for cleansing air of dust and dirt, a steam jet humidifier and dampers either automatically or hand controlled for regulating the admission and intermixture of indoor and outdoor air.

While the Herman Nelson System of Ventilation is a new and radical departure from all previous schoolroom ventilation practices, it is based on fundamental scientific facts long recognized by leading hygienists and engineers. It is welcomed as the most practical solution of the school ventilating problem, for it is the most positive application of the laws which modern research has discovered.

Univent System of Ventilation

The Herman Nelson System of Ventilation is the logical development of the Univent System which has won universal recognition for its outstanding results. The Univent System meets in the simplest, most practical way, those conditions where a continuous supply of outdoor air is desired or specified by state code.

In a like manner the Herman Nelson System of Ventilation fulfills modern ventilation standards with added savings in heating installation and operation costs.

For further information, check coupon and send to The Herman Nelson Corporation, Moline, Illinois

CORPORATION MOLINE ILLINOIS

SCHO VENT PLAC

Makers of the Herman Nelson System of Ventilation, the Univent System of Ventilation, the Herman Nelson Invisible Radiator, the Herman Nelson HiJet Heater, and other heating and ventilating equipment. The Architectural Record, November, 1930

| a La tensi | THE HERMAN NELSON CORPORATION A-1 Moline, Illinois | |
|----------------|--|-----|
| Tenda Tenda | Please send me without obligation, the book "School Ventilation Practice-Yesterday Today and Tomorrow". | r., |
| Tracerta | Name | |
| | Address | |
| | CityState Position (Architect, School Superintendent, etc.) | |
| | J | |

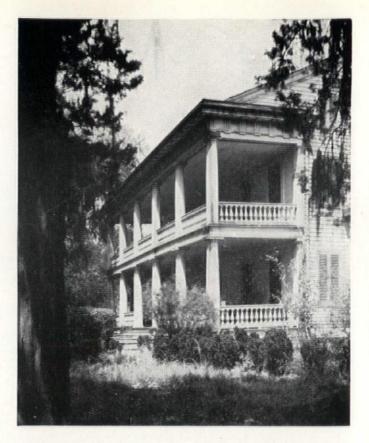
An old-timer of the Old South. The Tidewater Red Cypress on this plantation dwelling in Southern Louisiana has served well over one hundred years. Photograph by Tebbs & Knell.

One century is too short to test the endurance of Cypress

TUNDREDS of Early American houses, built of Tidewater Red Cypress (Coast Type) before the Revolution, are still in sound and serviceable condition.

Their successful battles against 150 . . . 200 years of attacking weather testify to the great endurance of this rugged lumber.

As an ever-increasing number of home-owners recognize the long-run economy in such durability, architects are enabled to increase continually their specifications of Tidewater Red Cypress.



Architects have long favored the Wood Eternal, especially for exterior use-not only because of its lasting qualities, but also because of its easy workability, even surface, and tight coherence with paint.

For an exquisite interior

Many prominent architects are using large quantities of Tidewater Red Cypress to achieve beautiful interior finishes, for its exquisite grain enhances the beauty of any room.

Illustrations of their work have been compiled in "A Book of Interiors" to show you the different ways the Wood Eternal can be used to attain delightful effects.

For your complimentary copy write to the Southern Cypress Manufacturers' Association, Jacksonville, Florida.

If your dealer is not stocked with Tidewater Red Cypress, he can get it for you quickly-or you can write direct to any of the Association Mills listed below.

The Tidewater Red Cypress on this charming residence in Montclair, N. J., should still be young and repair-free one hundred years from now. Arthur T. Remick of New York was the architect. **CYPRESS** TIDEWATER RED

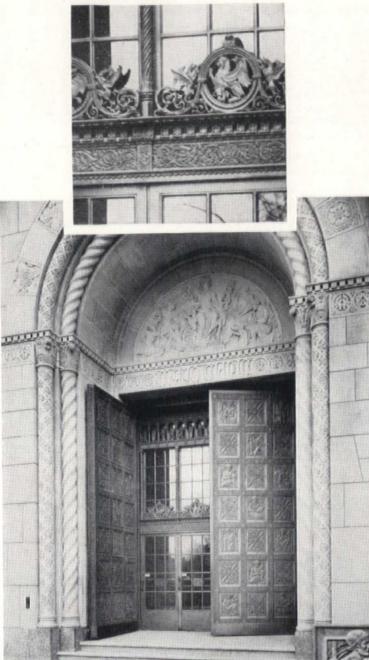
(COAST TYPE) ТНЕ WOOD ETERNAL

This advertisement is published by the following members of the Southern Cypress Manufacturers' Association, Jacksonville, Fla.:

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MAYO CLINIC ROCHESTER MINNESOTA





A Doorway of Remarkable Beauty

THE doorway of the Mayo Building is a symbol of hope to sufferers. None are turned away. + + + Under an impressive archway of Mankato stone stand the huge doors enhanced and beautified by cast bronze. + + + The outer doors weigh nearly three tons. Closed or open they show a paneled design decorated by symbolic ornament. Each leaf is 16 x 6 feet in size. ... The doors are electrically operated and swing with remarkable ease. 1 1 1 Behind the doors is a bronze and glass vestibule screen finished in brown patine on a green background. + + + Bronze ornamentation gives the entrance an effect of thoroughness, completeness and sincerity which must inspire confidence.



Architects . . . ELLERBE & CO. Builders . . .G. SCHWARTZ & CO. Modeler, LOUIS RICHARD KIRCHNER

All ornamental metal work executed by

GENERAL BRONZE CORPORATION 480 HANCOCK STREET, LONG ISLAND CITY, N. Y.

"DISTINCTIVE PRODUCTIONS IN ALL METALS"

This photograph of the Mayo Building entrance shows its outer bronze doors and vestibule screen of glass and bronze.... A detail from the ornament of this screen is shown in the inset above.... At

the right is reproduced one of the panels from the outer door

HESE new Sanymetal Steel Office Partitions offer definite advantages not found in other types.

Symmetry of design is achieved by harmonious, flowing lines, expressive of the best thought in the architecture of modern office interiors. An important saving in floor space is accomplished by the use of more compact posts. By reason of a more rigid construction, longer sections are possible without lateral or ceiling braces. Complete interchange-

MAKE SURE YOUR PARTITIONS HAVE THESE ADVANTAGES

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SANYMETAL

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PRODUCTS

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COMPANY

CLEVELAND, OHIO

ability of all units—door or panel sections—is assured. Your wiring is run through the hollow sections and there is a removable batten on the chair rail for wiring changes. The new assembly results in far easier erection. And—a major improvement—you will find that

movability is much increased by easy and faultless fitting and by absolute standardization of the units.

Your Sanymetal representative will gladly present visual evidence of these basic betterments in steel partition design.

Sanymetal steel office and factory partitions are made in four types for every purse and purpose. Sanymetal also builds steel toilet, shower and dressing compartments, and hospital cubicles. Communicate with Partition Headquarters:



The Architectural Record, November, 1930

12

Building Strains . . . Settling and Shrinkage

Three powerful forces that split and tear ordinary non-resilient building papers wide open, regardless of their strength.

This between-wall splitting, tearing and dragging from the nails naturally leaves many holes for the penetration of moisture, water, dirt, wind and vermin, and is proof positive that only a paper that can adapt itself to meet such strains is good enough to protect the well built house.

Brownskin is the exclusive product of the ANGIER CORPORATION, pioneers in the manufacture of resilient waterproof papers in this country, and is the only paper that embodies all the essential requirements of the perfect building paper in a single sheet.

BROWNSKIN IS RESILIENT—will stretch as much as 11% in all directions without breaking or dragging from the nails.

BROWNSKIN IS MOISTUREPROOF—Even its outer surfaces are impregnated to prevent moisture from penetrating the fibrous texture.

BROWNSKIN IS WATERPROOF—a thick layer of asphalt positively prevents water from passing through the sheet should the slightest moisture penetrate the surface.

BROWNSKIN IS STRONG—It may be handled and laid without scuffing or tearing.

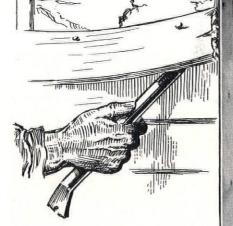
A typical example of what happens between walls to even the strongest non-stretchable building papers when subject to building strains—is illustrated below.

The foremost Architects, Engineers and Builders have learned that these building paper facts are true, and now specify Brownskin exclusively on all building projects.

BROWNSKIN is put up in rolls of 500 to 1,000 square feet in 36, 48, and 60 inch widths

Your samples of BROWNSKIN and further information on this remarkable building paper are ready. Write for them NOW.





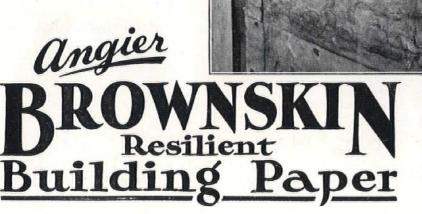
Building

paper

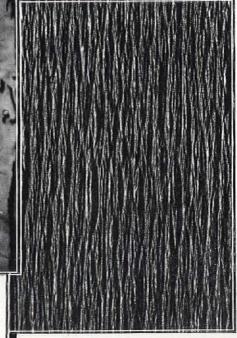
concealed

between

FAUL



Proving that non-stretchables building papers scuff, tear, split and break at the nails under building strains, shrinkage and settling. The house being torn down was fairly modern.



Illustrating BROWNSKIN the Resilient, Stretchable Building Paper that conforms to all building strains and distortions without breaking.



EVEN as nature etches upon the walls of cliff and canyon, patterns of beauty men can't forget, so the architect may embellish with fine designs the work of his own creation. White as new-fallen snow or colorful as a mountain sunset, decorative motifs may harmonize perfectly with that simplicity of form which is the keynote of the architecture of today.

For the reproduction of those unique and lace-like forms, so characteristic of modern ornament—whether geometrical, or otherwise—Northwestern Terra Cotta is the ideal medium.

The accompanying illustrations show a variety of designs all of which are constructed from one master mould of unusual form. Other designs of endless diversity may be invented or arranged. And each unit of terra cotta enrichment can faithfully be duplicated, as often as desired, from an original model, thus linking marked economy with lasting beauty.

THE NORTHWESTERN TERRA COTTA COMPANY DENVER - CHICAGO - ST. LOUIS



PERMANENCY

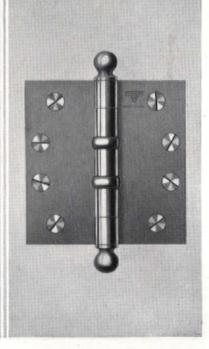
Stanley Ball Bearing Hinges swing the doors of the Baltimore Trust Building.

Symbolic of the institution that it houses, this outstanding bank building is built for permanency. The rigid requirements in materials demanded by Taylor & Fisher: Smith & May — Associated Architects, assures the occupants of every comfort and convenience.

In selecting Stanley Ball Bearing Hinges the architects have guaranteed smooth, trouble-free operation of the doors for the life of the building.

You will find our "Architects Manual of Stanley Hardware" particularly useful in making up hardware specifications. We shall be glad to send you a copy.

THE STANLEY WORKS New Britain, Conn.



STANLEY BALL BEARING HINGES

15

STANLEY]

For Permanence - Utility - Economy Specify WEISTEEL Compartments

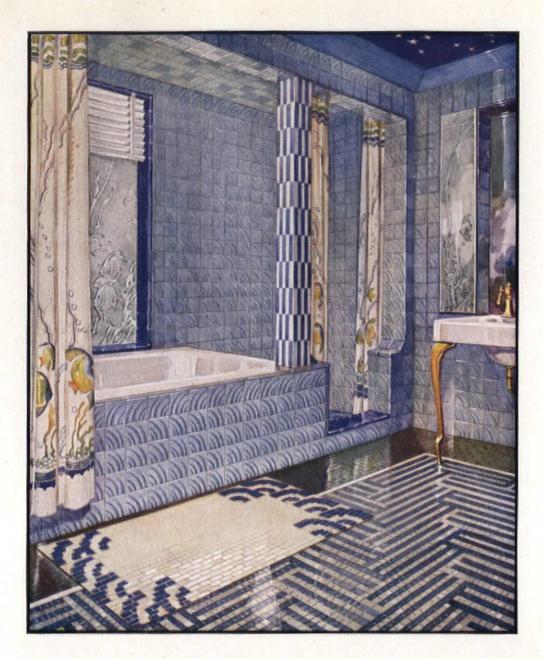
⁶ HE basic features of WEISTEEL construction mean permanence in meeting the most rigid requirements. Consider the facts that partition panels are interlocked with, and welded to, the front posts; this interlocked and welded construction has been used by Weis for more than a decade and has demonstrated its utility in thousands of installations. Consider, too, the strength and sanitary advantage of the WEISTEEL V-rail, which is formed at the top and bottom of each panel as a part of the panel sheet itself. There are no crevices or joints where the dirt can lodge.

Space does not here permit details of WEISTEEL design and construction. They are fully explained in Sweet's 1930 edition, following page B-2388. Should there be any special point not covered in our complete catalog in Sweet's, we shall be glad to work with you on it, without obligation of course.

HENRY WEIS MFG. CO., INC., ELKHART, INDIANA

Toilet and Dressing Room Compartments . . . Hospital Cubicles

16



FIXTURES of conventional white in a modern and colorful setting of Robertson Planatile. Observe the simplified arrangement, giving room and daylight to the built-in shower beside the tub. Notice the novel treatment of Robertson Chromatex in the floor . . . forming a two-rug design in tile. Exclusive incised designs, the lustrous satin-finish and the new shapes may be combined to achieve new effects for foyers, conservatories, recreation rooms and kitchens, as well as bathrooms. Our design department will cooperate with architects and tile contractors in developing new and unusual effects.

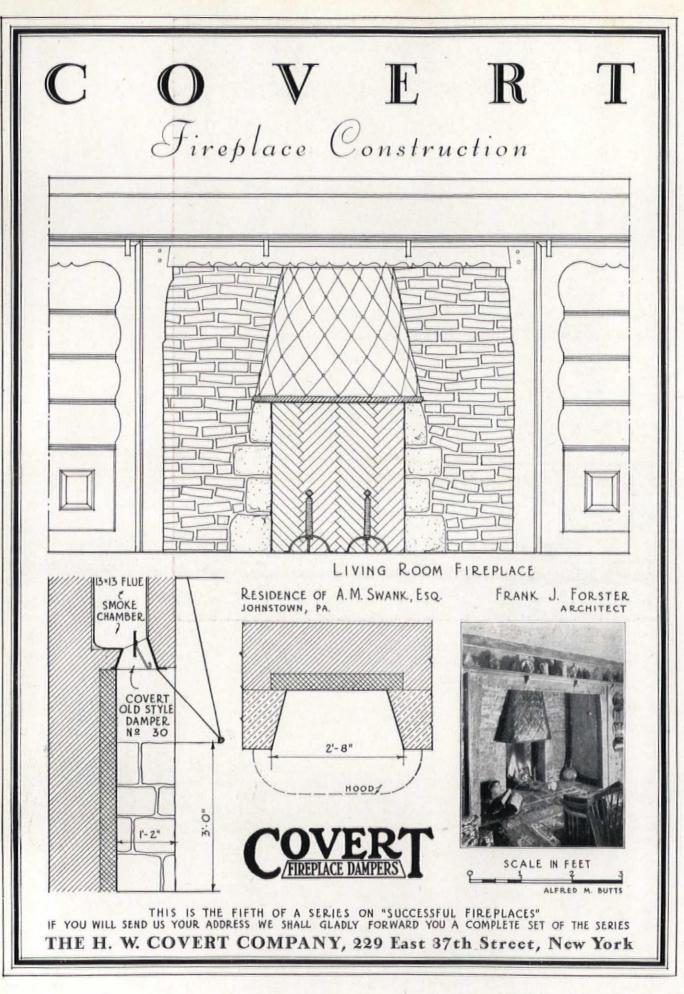


A lad feeding swans in a crystal lake ... the ripples fanning outward became an idea, the idea became a design, and the design became "Pond Ripple," an exclusive Robertson Planatile, one of a series created by Leon V. Solon, distinguished ceramic designer.



ROBERTSON ART TILE CO., TRENTON, N. J. A-5 Please send for my files your new brochure and full data on the new Planatile series.

| Name | |
|--------|-------|
| Street | |
| City | State |



The Architectural Record, November, 1930

18

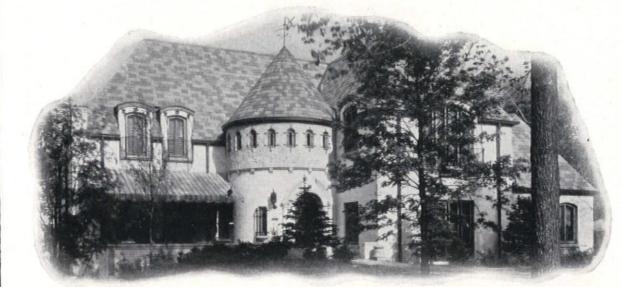
This Sheldon Slate Roof Suffers

from the inadequacy of photography of colors in just black and white

But even if it were as this photograph shows, we should still present it, as illustrating one of the advantages of Sheldon's Slates:

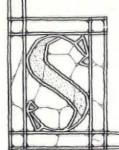
The advantage which enables you to secure any of a complete range of effects, be it a soft, even tone in plain pattern and texture, a roof variegated ingentle gradations, or a quite contrasty roof, as below.

And yet never harsh, strained, or artificial in appearance; but always possessing the deep beauty essential to the class of buildings for which Sheldon's Slates are just naturally specified.

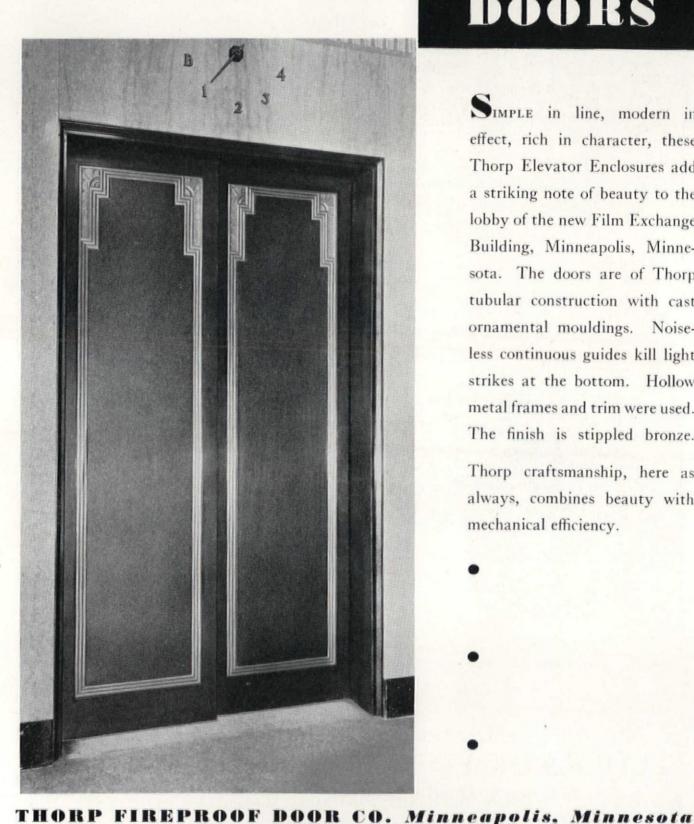


The Royer residence, River Forest, Illinois. Buurma Brothers, Architects

But the unlimited variety of effects obtainable by means of Sheldon's Slates need never cause confusion or make selection difficult; for the service we render you leads, without difficulty, to a roof that eternally has all the beauty of appropriateness. (See also Sweet's, for technical data and illustrations of Sheldon Roofs in colors.)



F.C. SHELDON SLATE CO. GENERAL OFFICES · GRANVILLE · N·Y· · BRANCHES IN PRINCIPAL CITIES · Elevator enclosures, Film Exchange Building, Minneapolis. Design by Larson and McLaren, architects.



Specify THORP DOORS

SIMPLE in line, modern in effect, rich in character, these Thorp Elevator Enclosures add a striking note of beauty to the lobby of the new Film Exchange Building, Minneapolis, Minnesota. The doors are of Thorp tubular construction with cast ornamental mouldings. Noiseless continuous guides kill light strikes at the bottom. Hollow metal frames and trim were used. The finish is stippled bronze.

Thorp craftsmanship, here as always, combines beauty with mechanical efficiency.

Geatherweight Concrete INSULATING ROOF SLABS

the SAME LIGHT STEEL FRAME that carries other roofs

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21



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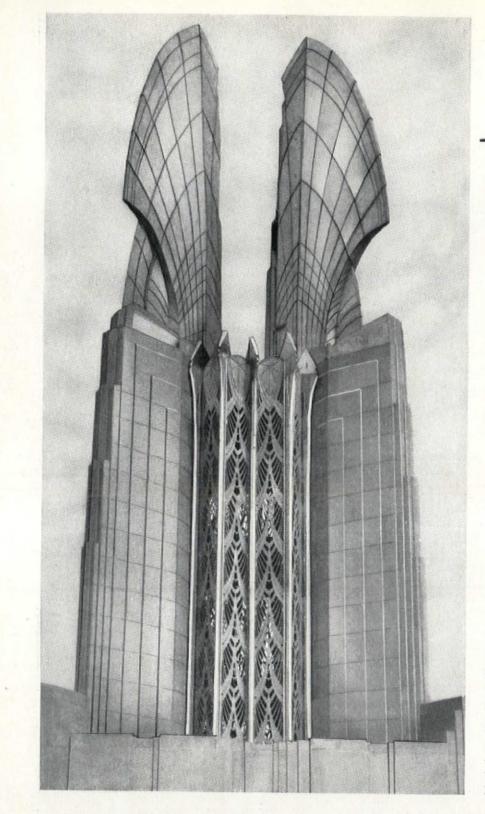
Detroit, Michigan

New York City Warehouse—344-346 East 32nd Street Pacific Coast Office—450 Skinner Bldg., Seattle, Wash.



effects





THE "Wings of Progress" and decorative grilles in the tower of the new Genesee Valley Trust Building emphasize the value of Alcoa Aluminum to the designer in search of a practical structural and decorative material in which to render his artistic visualizations.

The four wings extend from the top of the tower. 42 feet in height, they are cast of Alcoa No. 43 Aluminum Alloy. Their total weight is only 28,000 pounds. The seven grilles in the tower are also cast of Alcoa No. 43 Aluminum Alloy and weigh approximately 1120 pounds. Mullions and flood-light reflectors in the tower are made of Alcoa Aluminum sheet; 8000 pounds of sheet being used in their construction.

On the ground floor, the windows in the banking room are made of Alcoa Aluminum. Five of these windows having fixed sash, eight composed

ABOVE—The Tower, showing the Alcoa Aluminum grilles, mullions, and "Wings of Progress". Flood-lights of Alcoa Aluminum are placed behind the grilles so as to throw light on the wings.

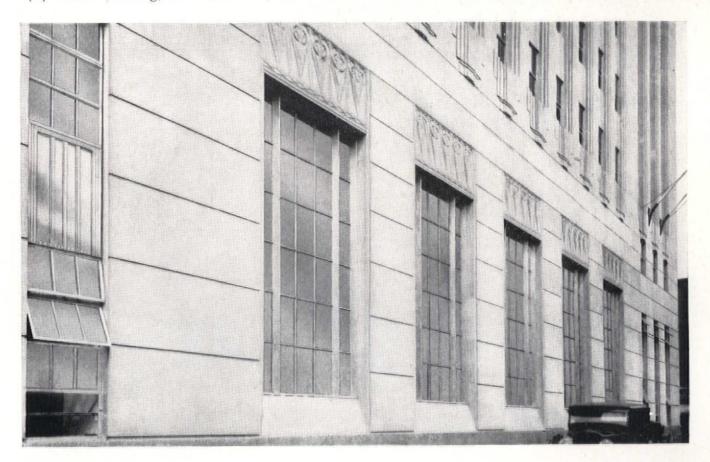
AT RIGHT, NEXT PAGE — Banking room windows made of Alcoa Aluminum. Five having fixed sash are 12 ft. by 19 ft. 6 in. Eight composed of lower projecting window, 4 ft. 8 in. by 8 ft. 8 in., spandrel 4 ft. 8 in. by 6 ft., and upper projecting window, 4 ft. 8 in. x 6 ft. 6 in.

of lower projecting window, spandrels, and upper projecting window. The windows are made of extruded shapes of Alcoa Aluminum—the spandrels are cast of Alcoa No. 43 Aluminum Alloy left in the natural finish.

In this one structure, then, Alcoa Aluminum has been used in cast, extruded and sheet form. It can be forged, pressed, rolled, machined and welded. It may also be etched or finished in a number of different ways as required by the decorative scheme.

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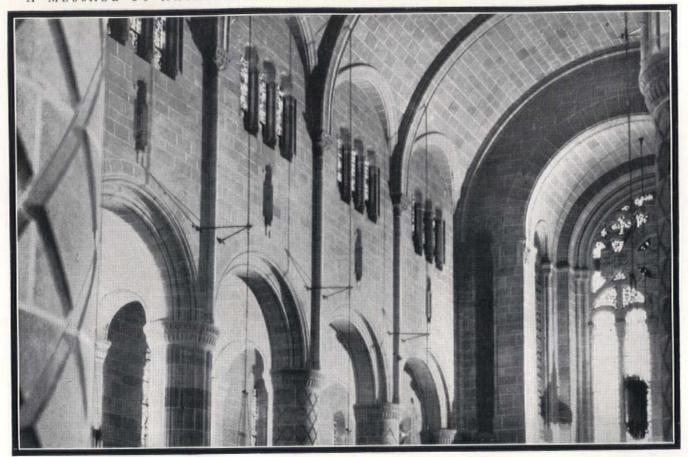
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Church of the Holy Child, Philadelphia. George I. Lovatt, Architect.

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THE AMERICAN INSTITUTE OF ARCHITECTS THE ARCHITECTURAL LEAGUE OF NEW YORK WITH THE ENDORSEMENT OF THE SOCIETY OF BEAUX-ARTS ARCHITECTS THE NEW YORK BUILDING CONGRESS APRIL 18 - APRIL 25, 1931 GRAND CENTRAL PALACE, NEW YORK

Special Exposition Committee RAYMOND M. HOOD FREDERICK G. FROST JULIAN CLARENCE LEVI

Special Committee of the Architectural League ELY JACQUES KAHN, Chairman

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The Architectural Record, November, 1930

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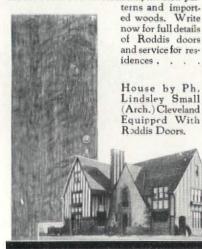
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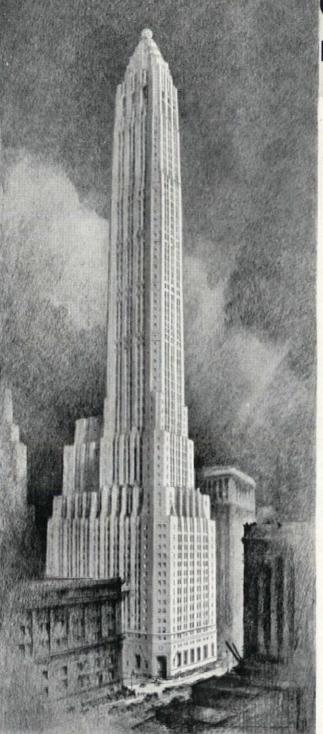
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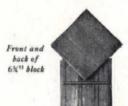
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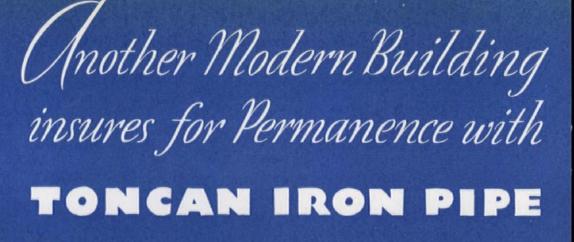
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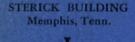
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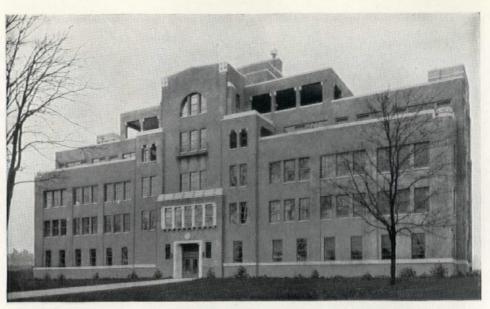




LEAGUE BUILDING, UNIVERSITY OF MICHIGAN, ANN ARBOR Pond, Pond, Martin & Lloyd, Architects, Chicago; Bohnhoff & Meiberer, Painting Contractori, Saginaux; Photo by Korwin, Ann Arbor, Michigan



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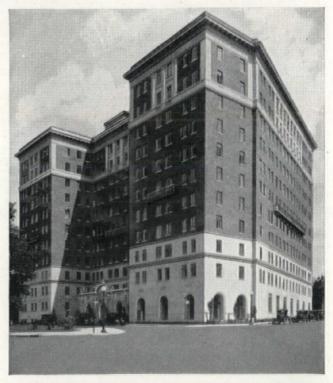


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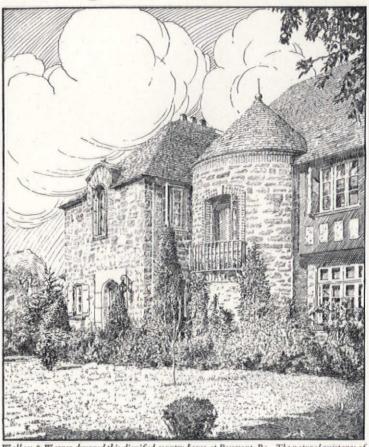
BELVEDERE APARTMENTS -- CINCINNATI, OHIO -- ROLSCREENED Ohio Building & Construction Co., Contractors C. H. Ferber, Architect

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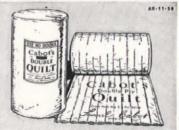
On the south coast of England stands a curious little building called "Domesday Hut". As the name suggests, it was standing in 1086, and its original construction still remains—oak timbers thatched with *Zostera Marina*; the same tough, century-defying sea plant that is the insulating material in Cabot's Quilt. It is no wonder that our pioneer ancestors stuffed this plant into the walls of their houses; an example is the Pierce Homestead at Dorchester, Massachusetts, built in 1635. Zostera Marina is rot-proof, vermin-proof, and fireresistant. It will never pack down, decay, or lose its insulating power. Therefore, you can use it to build a warm house in New Brunswick, a cool house in New Orleans, or a quiet house in New York. And if your client's needs are not so extreme as these, you can nevertheless use it to give him more comfort, health and peace of mind than he thought possible for so little money. The coupon below brings highly interesting information.

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Please send me your new Quilt Book "BUILD WARM HOUSES" and your Laboratory Bulletin No. 4, "How to Measure the Money Insulating Value of Insulation."



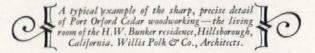
The Architectural Record, November, 1930

Name ... Address

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Minutely grained, Port Orford Cedar takes a lasting porcelain-like enamel finish. No grain





shows through. Never crinkles or blisters. Requires no unusual priming coat.

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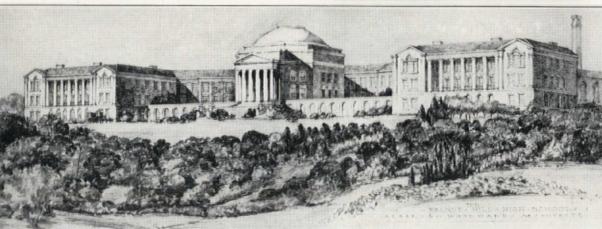
WESTERN HILLS HIGH SCHOOL CINCINNATI GARBER and WOODWARD, Architects.

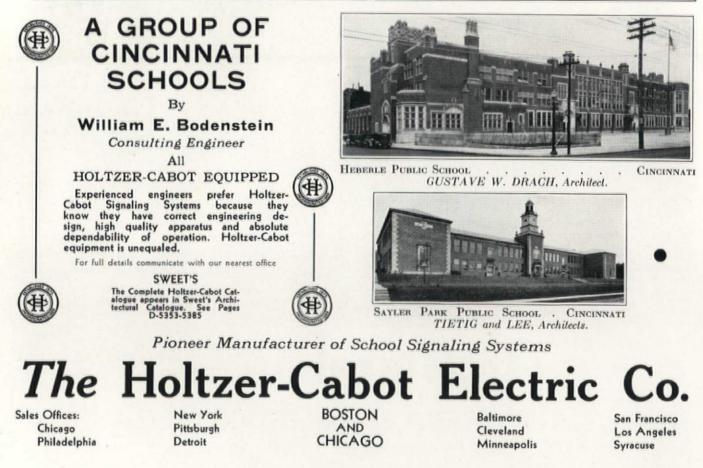
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where there's scarcely room for a yardstick!

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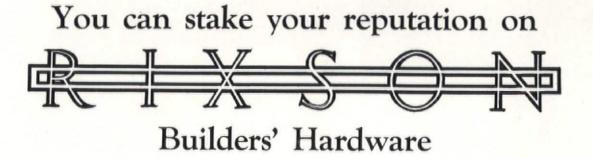
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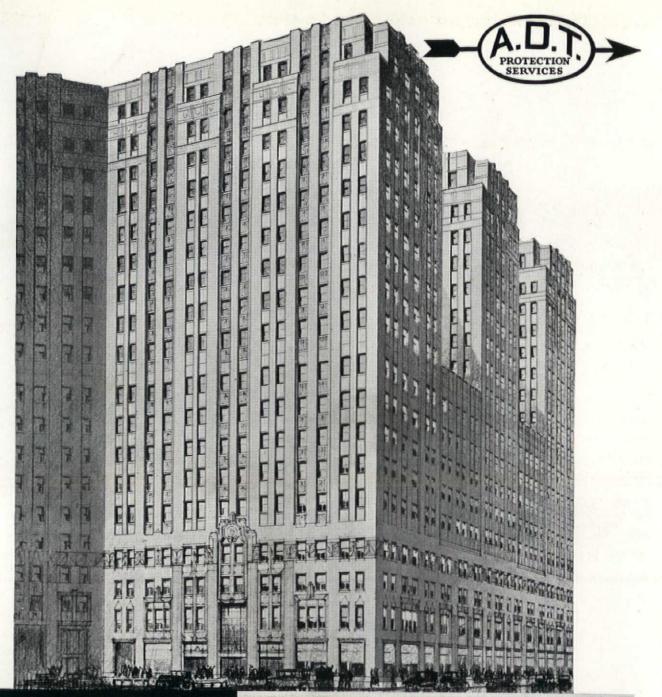
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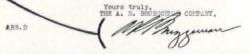
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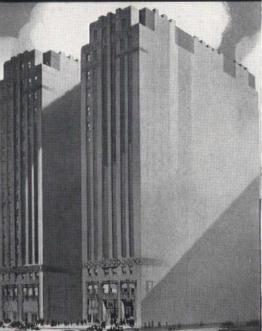
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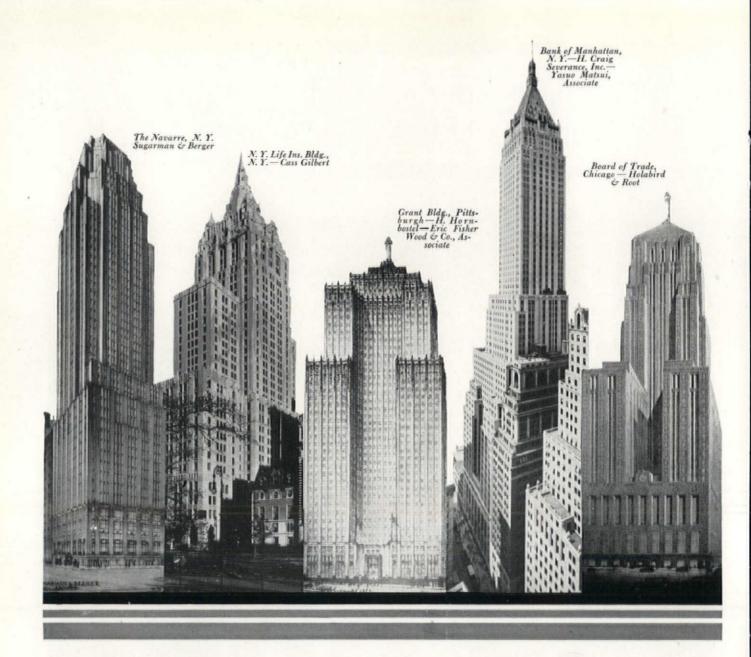
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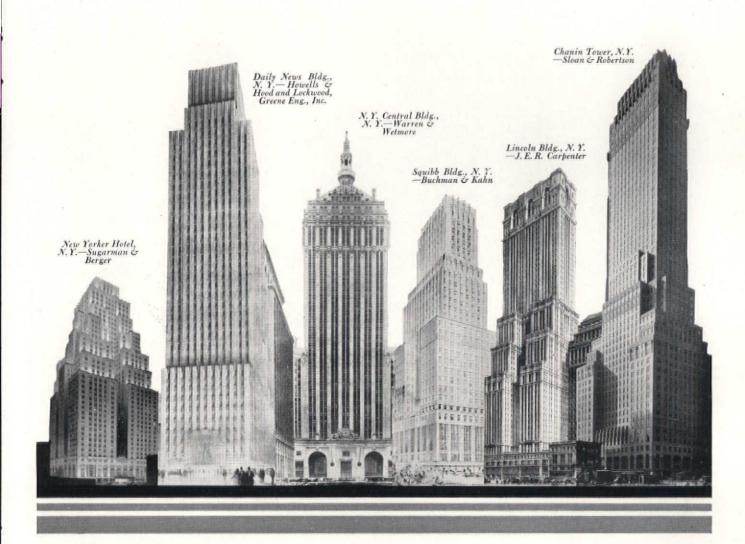
The finest examples of modern building design and construction use

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IN lobbies and corridors—in washrooms and toilets of the country's notable buildings—you'll find partitions and walls of Carrara, the modern structural glass. Some walls will be mirror-like black . . . others will shine with a highly polished, gleaming white surface . . . still others will be white with a slightly rippled surface.

Carrara has the sturdy strength needed for walls and partitions. But it is a decorative as well as a structural material. Carrara's brilliant *beauty* is ideal in carrying out modern decorative effects. In addition, this glass has *hardness*, which makes it impervious to water, chemicals, oils and pencil marks. And *density*, too. It never absorbs dampness—or odors. Its surface is easily kept clean and sanitary.

Carrara can be handled and installed like marble. It comes in slabs of practical sizes. There are three types—Polished Black, Polished White, and Frostex, which is the white glass with a rippled surface. For full information on Carrara Glass and its uses, write to the Pittsburgh Plate Glass Company, Carrara Dept., Grant Building, Pittsburgh, Pa.



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The Architectural Record, November, 1930

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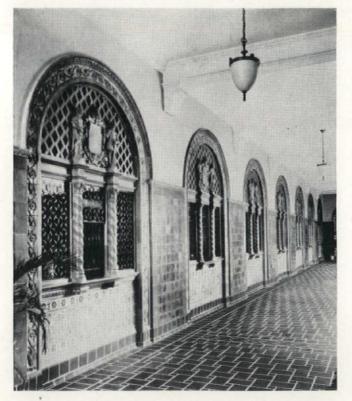
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FEDERAL SEABOARD TERRA COTTA





THE UNITED STATES CUSTOMS HOUSE San Juan, Porto Rico Albert B. Nichols . . Architect J. C. Besosa Builder

TO known material is better adapted to Spanish architecture than terra cotta. This applies to its interior as well as exterior use. Of the two illustrations of the United States Customs House at San Juan, Porto Rico, the one at the top shows Federal Seaboard Terra Cotta in full polychrome as an exterior material. Below, an interior of the same building, the pierced terra cotta grilles and delicate tracery again reflect the architecture of Spain. In all parts of this country and in many other parts of the world there is a constantly growing list of important buildings in which Federal Seaboard Terra Cotta supplies the color and form with the maximum of economy.

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FACTORIES: PERTH AMBOY, N. J. •

The Architectural Record, November, 1930

SOUTH AMBOY, N. J.

The "King" Caesar House, Duxbury, Mass., built of White Pine in 1794, and standing today

GOOD FRIENDS

No one would ever call the house pretentious . . . but it is honestly built. Stairways are beautifully proportioned . . . paneling and woodwork put together with care . . . the charming door still

swings firmly inward, with its courteous, welcoming gesture.

To one acquainted with Colonial architecture, it is not at all surprising to discover that this delightful home was built of White Pine a few years after the Revolutionary War, and is in excellent condition today. The almost perfect state of preservation witnesses not only to the quality of the wood, but to the intelligence and foresight of the craftsmen who selected it.

And Idaho (genuine) White Pine may be used in the homes you plan! Characterized by a delicate straight grain, and a uniformly soft texture, this beautiful lumber takes a high finish and can be stained and waxed with fine effect. It is

STILL PASS THROUGH THE WELCOMING DOORWAY

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To almost every building task, within a house or on the exterior, Idaho White Pine brings a freshness and beauty few other finishes approach. For paneling, with a light enamel treatment . . . a supply cupboard . . . a real playroom for the children . . . a dining-room alcove in the modern manner . . . whatever the work, Idaho White Pine will prove most acceptable.

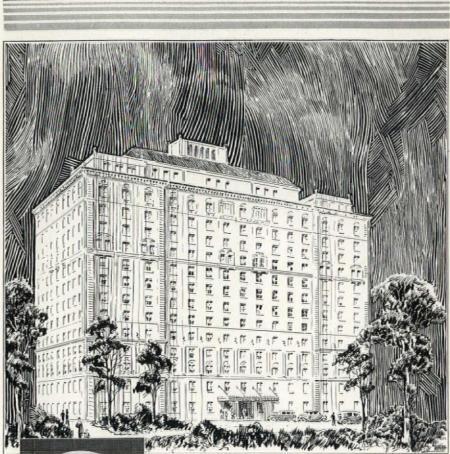
Good lumber yards carry an ample supply of Idaho (genuine) White Pine. Specify it by name. Western Pine Manufacturers Association, Portland, Oregon.

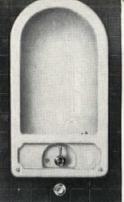
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This trade-mark is imprinted on Idaho White Pine at the mills and is a definite protection for home owner, builder, architect and lumber dealer.

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No. 626

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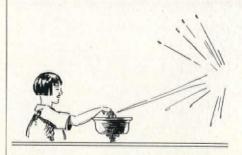
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Hey! What's the idea of hitting him in the eye—he wanted a drink, not a shower.



Well, well, where's the water? Oh, there it is, so low his lips will have to touch the jet—and that's serious—it's unsanitary.



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BUT—when Halsey Taylor Drinking Fountains are installed, there are none of these annoyances to you or your client,—because of practical, patented

AUTOMATIC STREAM CONTROL AND TWO STREAM PROJECTOR

you don't need em!

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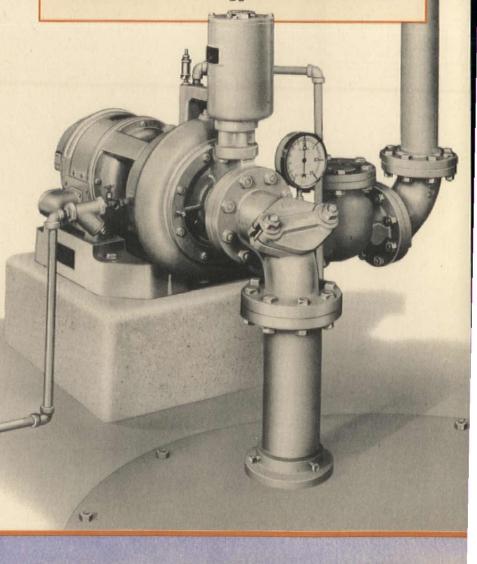
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- Suction elbow is fitted with hand hole plate to permit cleaning suc-tion pipe and impeller without dismanding pump. 6
- 7 Priming unit is a simple, sturdy Nash Hytor.
- 8 Iron catch basin has gas tight cover.
- Controlling float switch is totally enclosed and oil immersed. 9
- 10 Ball float has adjustable stop.



PIERPONT & W. S. DAVIS, Architects, Los Angeles

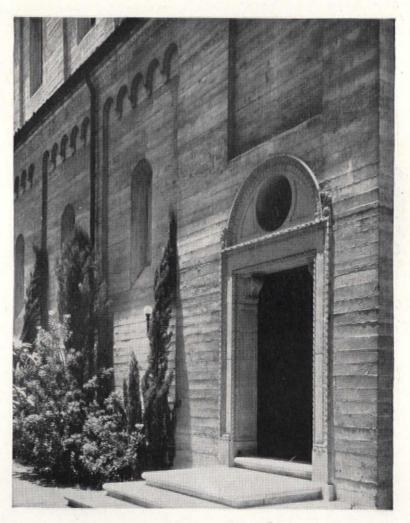


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Because it can be moulded at will, concrete provides a building material that meets nearly every architectural and structural requirement. In fact, it considerably *extends* the architectural possibilities. It combines the richness of hand-tooling with the speed and economy of reproduction from models, permitting decorative motifs which might otherwise be prohibitive in cost.

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WHEN THE CONCRETE IS UNTOUCHED AFTER THE FORMS ARE REMOVED

PORTLAND CEMENT Association

Concrete for permanence and firesafety

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THE BILTMORE HOTEL, LOS ANGELES, CAL.



Parlor in Biltmore Hotel Addi. tion, Los Angeles, Cal. designed by Schultze-Weaver Co. of New York. architects. Built by Scofield Engineering Construction Co. and painted by Arenz-Warren Co. Fourteen tons of Dutch Boy White Lead were used on the Hotel Biltmore Addition.

Another famous West Coast Hotel "CARRIES ON" with DUTCH BOY!

BACK in 1923 when the Biltmore was erected, Dutch Boy White Lead was used in the decoration of its beautiful interior.

The paint made with Dutch Boystood up so well—proved so durable, washable and economical that, when the addition was built in 1927, Dutch Boy was also

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That's the way it goes all over the country-north, south, east and west. Building managers, owners and others responsible for the continued good appearance of much-used corridors, rooms, etc., specify Dutch Boy White Lead for painting jobs that must retain their good appearance in spite of repeated washings.

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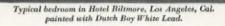
DUTCH BOY WHITE LEAD

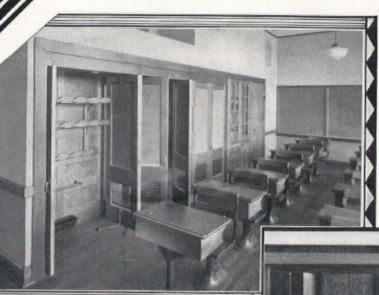
> Save the surface and you save all - But r Kind

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DUTCH BOY

WHITE LEAD





Showing installation in class room of Belmont, Mass. High School. Note how doors do not block aisle when wardrobe is open.

> These Wilson disappearing door wardrobes were installed in College Hill Public School, Cincinnati. Elzner & Anderson, Architects.

What Good

are Cloak Rooms

Anyway?

FIENIC SCHOOL WARDROBES

THE old-fashioned cloakroom has served its purpose, for the most part in demonstrating the useless construction expense attached to a separate walled-in enclosure, its unsanitary characteristics and as an obstacle in the path of educational efficiency.

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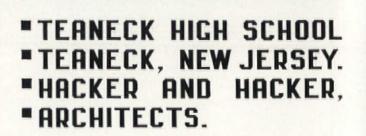
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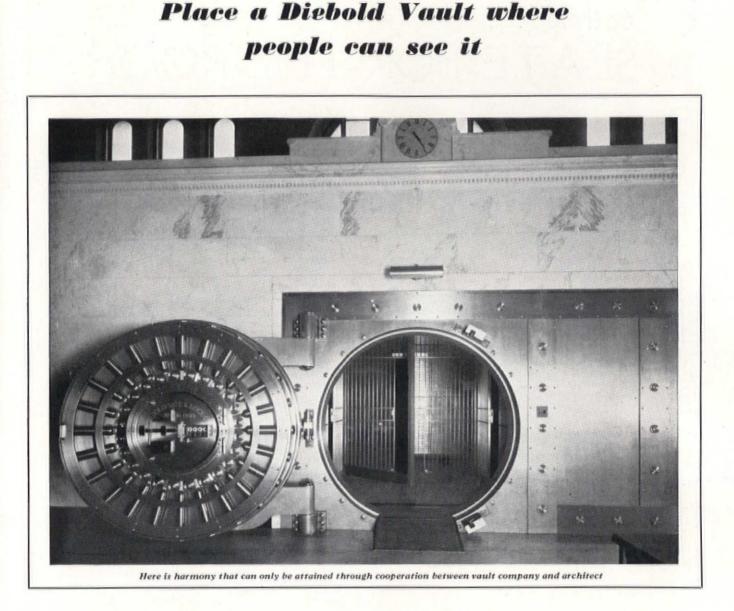
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BLOXONEND...2^{1/2} inches thick...naturally outwears other floorings. But it embodies other exclusive qualities that make a far greater appeal to school officials...SAFETY... safeguarding boys and girls from dangerous splinters, by using wood as the tree grows—the tough "end-grain" up... PERPETUAL SMOOTHNESS...insuring for a life time a more satisfactory playing surface for all types of gym activity...RESILIENCE...providing just the proper degree of firmness to give quick rebound to a basketball, yet so elastic that many confuse it with cork. These and its other inherent quality (non-slip) actually endear

BLOXONEND to those who use the floor. Ask for details from Carter Bloxonend Flooring Company, Kansas City, Mo., or the Bloxonend Representative in your city. See Sweet's.

Mary Institute, St. Louis, one of the most modern educational institutions in America, was designed by Study & Farrar, Architects, and built by the Gamble Construction Company, St. Louis

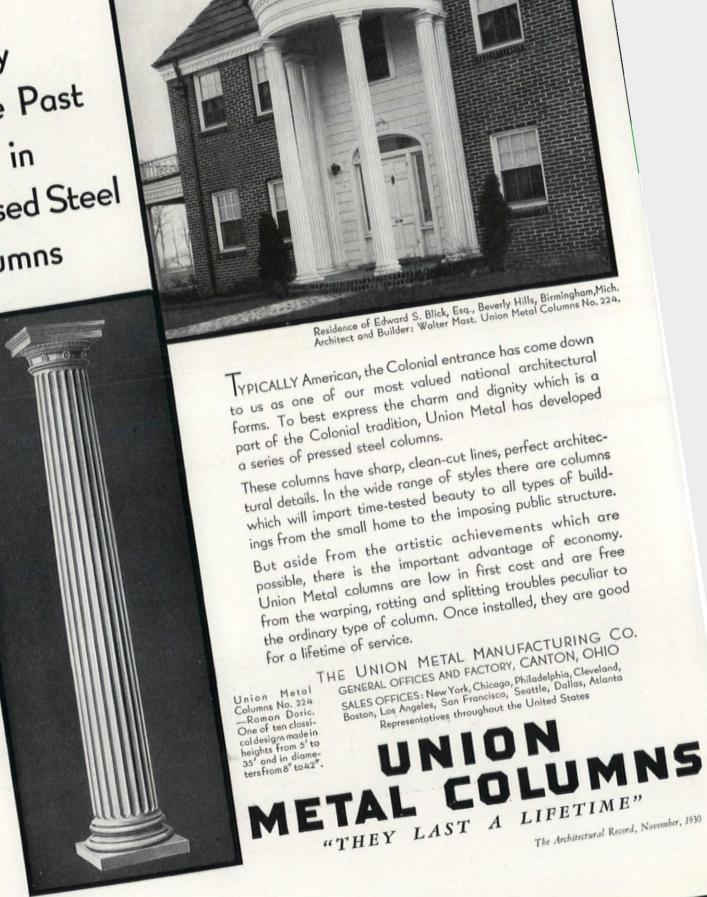
The Architectural Record, November, 1930

IN THE SHOPS OF TO

IDEAL FOR HAND AND SQUASH CO SAFE - NO SPLIN

Interior Antonio

Lay's Smooth Stay's Smooth The Beauty of the Past Lives in Pressed Steel Columns





JOUND SPECIFICATION

The name "Spang" on your heating and plumbing pipe specifications is the soundest guarantee for long-lasting service and satisfaction you can possibly obtain. Every length is backed by the skill and care of America's longest established pipe mill where pipe making has been a mastercraft for over half a century.

Every piece pressure tested—cleanly threaded—easy to cut and safe to bend . . . these are the outstanding qualifications that make "Spang" a preferred brand among leading architects and building contractors everywhere.

SPANG, CHALFANT & CO., INC. General Offices: CLARK BUILDING, PITTNBURGH, PA.

Soles Offices: CHICAGO, ILL. NEW YORK, N. Y. ST. LOUIS, MO. PITTSBURGH, PA. TULSA, OKLA. LOS ANCELES, CAL, Folded Mills: ETNA, PENNA. SHARPSBURG, PENNA. Seamless Mills: AMBRIDGE, PENNA.



Every Piece Hydraulically Tested



BASIC COVERING CHROME-Owned and THE CHEMICAL

Patent Number: Inventor: Expiration Date: Title of Patent: 1,316,817 Benno Strauss September 23, 1936 Articles which require high resistance against corrosion.

Patent Number: Inventor: Expiration Date: Title of Patent: 1,339,378 Benno Strauss May 4, 1937 Objects having great strength and great resistance against the action of acids.

Availability of these patents to American industry, by nonexclusive license from turers, has resulted in the production of Steel Alloys containing Chromium and Nickel manufacture of articles which require high resistance against corrosion and objects purchased from one of our licensees, whose license from us fully protects users of

THE CHEMICAL FOUNDA

Chartered for the Advancement of Chemical and Allied Science

654 Madison Avenue,

PATENTS NICKEL STEEL ALLOYS Controlled by FOUNDATION, INCORPORATED.

Patent No. 1,316,817 covers:

- CLAIM 1. Articles which require a high resistance against corrosion said articles being made from a steel alloy containing 6% to 25% chromium, 20% to ½% nickel and not over 1% carbon, the proportion of chromium increasing as the proportion of nickel decreases and vice versa.
- CLAIM 2. Articles with a high resistance against corrosion which require to be unmagnetic, said articles being made from a steel alloy containing 8% to 25% chromium, 20% to ½% nickel and not over 1% carbon, the proportion of chromium increasing as the proportion of nickel decreases and vice versa.

Patent No. 1,339,378 covers:

CLAIM: Articles having great strength and great resistance against the action of acids, said articles being made from a steel alloy containing from 15% to 40% chromium, 20% to 4% nickel, not over 1% carbon and not less than 55% iron.

The Chemical Foundation, Incorporated, and extensive research by American manufacwithin the ranges specified in these patents. These alloys are available for the having great strength and great resistance against the action of acids, and must be these alloys against all claims for infringement.

TION, INCORPORATED.

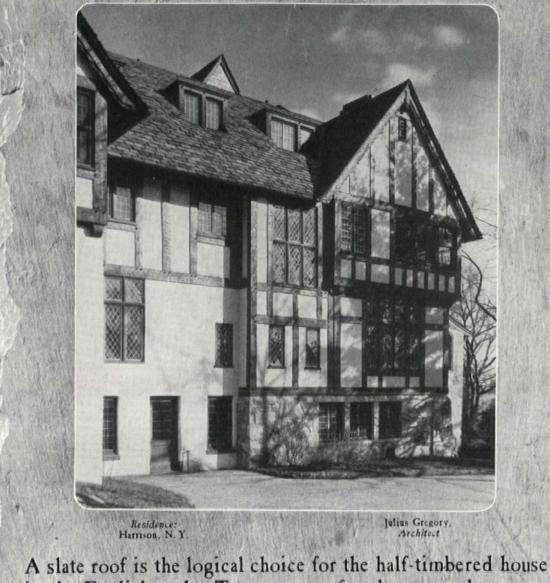
and Industry in the United States without Profit to Itself

New York, N. Y.

FRANCIS P. GARVAN, President.







A slate roof is the logical choice for the half-timbered house in the English style. To secure perfect harmony, however, the roof must be especially designed. Where Tudor Stone is specified our Architects' Service Department co-operates with the building architect in this important detail.

Rising and Relson Slate Company

WEST PAWLET, VERMONT Architects' Service Department: 101 Park Avenue, New York City CHICAGO DETROIT , PHILADELPHIA BOSTON



They Wanted Quiet Classrooms . . . so they used Armstrong's Cork Tile

EDUCATORS realize that silence is essential to perfect concentration. So modern school construction generally includes materials that muffle sound. St. Paul Academy, of St. Paul, Minn., for example, lessens the sound of scuffling feet and subdues the strident note of scraping chairs with comfortable, quiet Armstrong's Cork Tile.

But that's only one of the many reasons why Cork Tile was the floor chosen for the library of this school. Decorative beauty is another.

Armstrong's Cork Tile is made in three warm shades of brown. It is possible to obtain unusual effects by combining two or three of the shades in various patterns. And since the tiles are made in thirty-one different sizes the floor design can be custom-made and custom-laid. Whatever your floor needs might be, here's a floor that you'll want to consider.

Armstrong's Cork Tile has remarkable wearing qualities and, when properly cared for, will give years of flawless service. If lacquered when laid, an occasional light waxing and polishing is all the attention needed to keep it in perfect condition.

Let us send you a copy of our book, "Custom-Built Floors of Cork." It gives additional facts about Cork Tile and also tells you about Linotile, another of the widely popular Armstrong Floors. Armstrong's

Simply write to the Armstrong Cork Co., Custom Floors Department, Lancaster, Pa. Product

Armstrong's Custom Floors LINOTILE CORK TILE

MADE BY THE MAKERS OF ARMSTRONG'S LINOLEUM

ROTECT



Guarded by G-E **RIGID CONDUIT** ELBOWS G-E Whi G-E Blo

THOUSANDS of cars whisk under the Hudson every hour. Traffic lights and telephone signals, electric lamps and huge-volume motor-driven ventilators make wiring vital in the Holland Vehicular Tunnel between New York City and New Jersey. It is safeguarded by "G-E White", the conduit that endures.

"G-E White" can be depended upon anywhere because it defeats rust . . . defies time.

It is hot-dipped galvanized. A heavy zinc coating, outside and in, alloyed onto best grade mild steel tubing enables it to meet tests more severe than any ordinary galvanized conduit.

During installation it works easily, without scuffing the zinc, without cracking at sharp bends. Smooth, clean interior surfaces make wire pulling easy.

The same superior tubing enameled inside and out . . . is "G-E Black". Its enamel is tough and elastic . . . withstands abuse.

G-E Rigid Conduit of either type makes wiring permanent. You can get it anywhere from G-E Merchandise Distributors-or write Section 6-1511, Merchandise Department, General Electric Company, Bridgeport Connecticut.



CLOSE NIPPLES They're "Life Save for men on rush ja

The Architectural Record, November, 1930

SERVICE NIPPLES

luantity Production takes the cast low



SACKS OF



There are mighty good quality and economy reasons for using three coats of Banner Lime • It is sound absorbing; transmits less sound • Has exceptional spreadability. Gives big coverage, enabling plasterers to produce more yardage • Setting is slow enough for the craftsman to square up his angles, corners and cornices • Durable as rock from which it is made; and will outlive the building without pitting, popping or cracking • Preserves metal lath and corner bead from corrosion • Plaster droppings may be retempered, saving loss of material • Produces smooth unbroken base for perfect decoration.

ТН Е

COATS

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A MONUMENT TO MODERN METHODS

IN Cincinnati, on a lot that originally sold for eight dollars, a fourteen million dollar structure is rearing its 47 stories upward toward the clouds.

Embodying every advance of architectural and engineering science, this magnificent building will stand as a monument to the modern progress of America.

Playing an important part in this progress enabling the successful development of plans —is American Steel & Wire Company Wire Fabric (the steel backbone of concrete).

Recognized as the most efficient and economical means of concrete reinforcement, this product is in general use throughout the nation. An evidence of interest on your part will bring detailed information and literature.



The Carew Tower, Cincinnati, Ohio–Walter Ahlschlager, Architect, Chicago– Delano & Aldrich, Associate Architects, New York–Starrett Building Co., Contractors, Chicago–Lieberman & Hein, Consulting Engineers, Chicago



Wire Fabric being laid on floors of Carew Tower



Triangle Mesh Wire Fabric Reinforcement, Furnished in rolls or sheets.

Electric Weld Wire Fabric Reinforcement. Furnished in rolls or sheets.

AMERICAN STEEL & WIRE COMPANY

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The

CHICAGO STUDEBAKER SALES BUILDING



The Chicago Studebaker Sales Building, Chicago, Illinois. Loewenberg and Loewenberg, Architects

A REPRESENTATIVE CRITTALL INSTALLATION

AN INTERESTING example of the adaptability of Crittall Casements to commercial buildings and shops is furnished by the Chicago Studebaker Sales Building.

To this type of architecture they bring many advantages. They permit the openings to be used for light, display and ventilation. And in addition they provide beauty that contributes much to the effectiveness of the design.

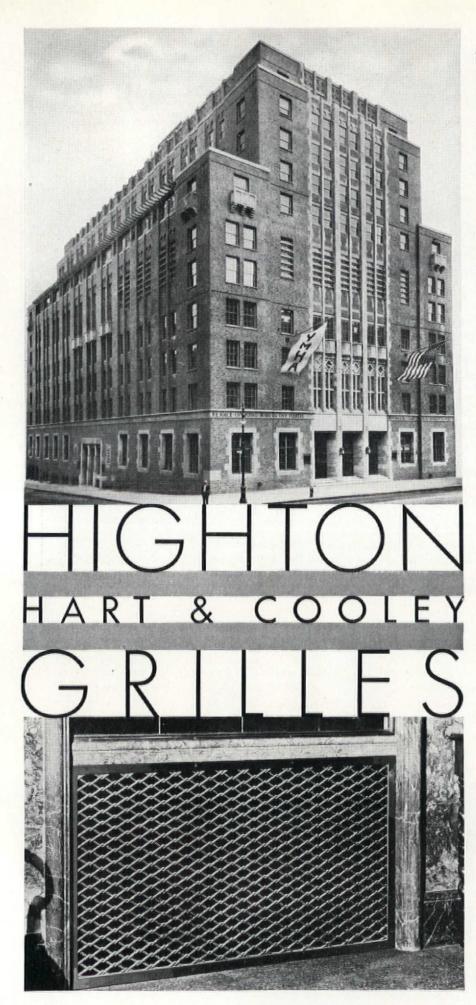
Crittall Casements are offered in three complete and separate lines. Stanwin and Norman Casements are available in a wide variety of standardized sizes—Universal Casements are custom-built in steel or bronze to the architect's own specifications. The world's largest manufacturer of metal casements—with factories all over the globe—Crittall can furnish windows for every type of construction.

See our complete catalog in Sweet's—pages A1131 to A1200—for complete details and specifications of all windows in the Crittall line.

CRITTALL CASEMENT WINDOW COMPANY 10945 Hern Avenue , Detroit, Michigan

STANWIN CASEMENTS + NORMAN CASEMENTS + UNIVERSAL CASEMENTS

CRITTALL CASEMENTS



At the left is pictured the Y.M.H.A. Building at 92nd St. and Lexington Ave., N.Y. C. . Architect— Necarsulmer & Lehlbach, N.Y.C.; General Contractor—J. H. Taylor & Co., N.Y.C.; Mechanical Engineers — Jaros & Boum, N.Y.C.; Heating Contractors — Wolff & Munier, Inc., N. Y. C. . Highton, Hart & Cooley Grilles in Hitoncast Rope Design No. 91, as shown below, were installed.

he outstanding facility of Wm. Highton & Sons-division of Hart & Cooley-in producing ornamental grilles of special design has proved of great value to those architects desiring to lift their buildings out of the commonplace. Here is a company that has been producing truly beautiful grilles for over 70 years — adhering steadfastly to old-time standards in the matter of finish, yet always outstandingly progressive in the creation of new designs . . . No question but that today the Highton line is the most complete which exists in this country. It embraces ornamental grilles in cast iron, cast bronze, cast aluminum -in steel, wrought bronze and perforated aluminum . . . ventilating registers in an extremely wide variety of designs, styles and finishes ... To fully appreciate this line see our insert in SWEET'S or, better still, send for our Catalogue No. 29

WM. HIGHTON & SONS

Division of HART & COOLEY MFG. CO. NASHUA, NEW HAMPSHIRE

BRANCHES IN BOSTON, NEW YORK PHILADELPHIA AND CHICAGO ... AGENCIES IN ALL PRINCIPAL CITIES

The New Dahlquist Turbo-Aquatherm



Automatic Gas Unit with Side Arm



(U. S. Patent No. 1,762,215, June 10, 1930)

Experts have long recognized that the ordinary hot water boiler serves as an efficient sediment trap. This is due to the fact that it contains a relatively large volume of quiet water and hence any sediment or insoluble matter which normally remains in suspension in the water lines gradually sinks to the bottom of the boiler.

This continual accumulation of sediment is one of the greatest enemies of the efficient satisfactory operation of the hot water boiler. If allowed to accumulate long enough it will cause surges of muddy water in the hot water line and in the case of underfired or automatic storage units, it forms an insulating blanket on the bottom between the water and the metal itself which is the greatest cause of burnouts. Furthermore hot water accumulated in the ordinary boiler becomes stagnant and unsuitable for domestic purposes.

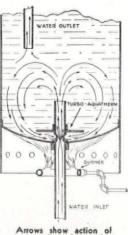
The TURBO-AQUATHERM

(U. S. Patent No. 1,762,215, June 10, 1930)

In order to absolutely prevent the accumulation of sediment which is the great enemy of the efficiency and life of hot water boilers, Theodore W. Dahlquist has invented a device called the TURBO-AQUATHERM which takes advantage of the velocity of the incoming cold water to create a suction

> and a whirl which constantly sweeps and scours the bottom of the boiler carrying every particle offoreign matter out of the system. No sediment can ever accumulate in the Dahlquist TURBO-AQUATHERM Copper Boiler and the water is always as fresh as that in the cold water lines and may be safely used for cooking as well as for other household purposes. Furthermore the danger of burnouts in automatic storage and underfired systems is eliminated and the thermal efficiency of the boiler is greatly increased. The accompanying sketch shows clearly the action of the TURBO-AQUATHERM which may be had with little additional cost on all Dahlquist range boilers and automatic storage systems.

> Write now for full particulars regarding this revolutionary improvement in hot water boilers.



Arrows show action of water when drawn thru TURBO-AQUATHERM scouring bottom of boiler and preventing any accumulation of sediment



Ask for full information regarding the Dahlquist complete line of copper range boilers. Copper, gas, electric and oil combinations. Copper, automatic storage systems and large industrial units for all purposes

30 West 3rd Street

So. Boston, Mass., U. S. A.

NOW. moist air [HUMIDITY] for every radiator-heated building! AS LOW AS 150 Easy payments if desired \$150

(F. O. B. FACTORY . . . INSTALLATION EXTRA)

Ingenious Humidifier banishes dry winter air... the cause of discomfort, colds, and cracked furniture!

FOR years engineers have tried to overcome winter dryness with radiator heating. At last they have succeeded; the Doherty-Brehm Radiator Humidifier is the first and only successful low-priced humidifier. Automatic, silent, it supplies plenty of moisture to the air in any home with radiator heat—steam, hot water, or vapor.

Essential for comfort and health

Into hundreds of fine homes it is now bringing the breath of spring all through the months of winter. Fresh, moist air in every room; no dry, hot air to invite colds, sinus troubles, mastoids, and other winter ills; to wilt plants and flowers; to crack and blemish furniture, floors, and woodwork.

One Humidifier sufficient for average home

To provide this comfortable and healthful atmosphere, the Doherty-Brehm Radiator Humidifier evaporates just the right amount of water—1 to 100 gallons a day, as may be needed! Positive automatic control; no moving parts to get out of order. There is a size and type for every home heated with radiators. One of these humidifying radiators centrally located will properly moisten the air in an entire house or individual apartment. Extra units take care of a building of any size,

DOHERTY-BREHM

HUMIDIFIER



Master craftsmen have produced beautiful wood cabinets for the Doherty-Brehm Humidifier. Also in metal cabinet and for recessing. In metal cabinets, \$150 to \$225. In wood cabinets, \$245 to \$340. Prices, f. o. b. factory, installation extra.

Beautiful cabinets — Easy installation

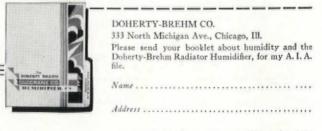
Doherty-Brehm Radiator Humidifiers are enclosed in pleasing cabinets widely varied to harmonize with any kind of interior decoration. Each is both a heating and humidifying unit, simply and quickly installed, and maintained without attention.

Sold on the CRANE Budget Plan

The Doherty-Brehm Radiator Humidifier is sold by **CRANE** through dependable heating and plumbing contractors everywhere. Your clients can buy it under the **CRANE** Budget Plan and pay only 10% down, the rest monthly. Specify it for new buildings. Recommend it for modernized ones.

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You should have this book in your A. I. A. file. If you haven't it, mail the coupon at once.





years ago installed in an

installed in an Oklahoma Garage



years later

sold by owners—at more than its original cost—and installed in a furniture warehouse

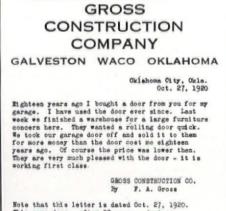


"working first class" (see letter below)



Unusual?

Unusual?... Yes — but it is this delivering dependable, satisfactory service, day-in and day-out for years and years and years that has established for KINNEAR Steel Rolling Doors the pre-eminent position they occupy in the rolling door field today. Why be satisfied with anything less than the best—especially when, service considered, KINNEAR Steel Rolling Doors actually cost less? Write for your copy of the illustrated Kinnear catalog and details of Kinnear Engineering and Estimating Service available without cost or obligation.

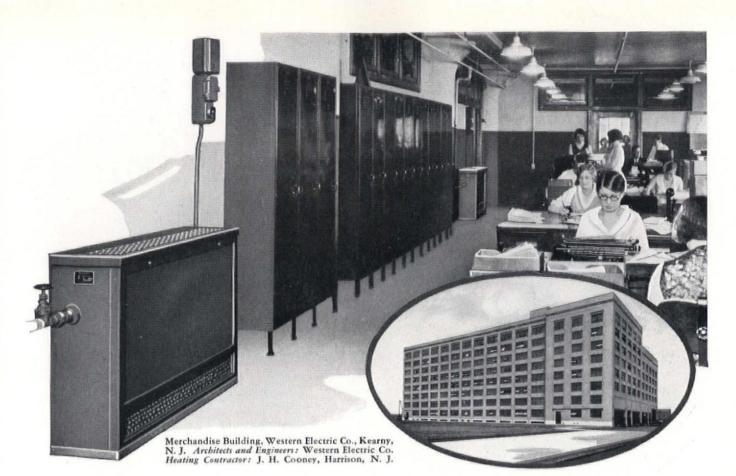


Note that this letter is dated Oct. 27, 1920. This same door - after 28 years - just as Mr. Gross said 10 years ago - "is still working first class."

THE KINNEAR MANUFACTURING CO. 401-451 Field Ave., Columbus, Ohio, U. S. A.

Boston Chicago Cincinnati Cleveland Detroit New Orleans New York Philadelphia Pittsburgh Kansas City Washington

"there ainit no more 0 VICTOR OOLITIC STONE CO. BLOOMINGTON. INDIANA TO THE ARCHITECTS OF AMERICA Every Fall a mysterious rumor is circulated that the supply of Select and Standard Buff has been exhausted - and that if there is any anywhere, the supply is inadequate. Every Fall we kill this rumor with a statement of the facts, which at this writing are as follows: we have ONE MILLION cubic feet of Buff quarried and ready for shipment - and TWO BILLION more arworth. 76 in the state of the second 141 The Architectural Record, November, 1930



Western Electric's Merchandise Offices...

heated by 21 Sturtevant Unit Heater-Ventilators

In the average unit heater-ventilator installation, heating is incidental to the primary ventilating function of the equipment. Consequently the advantages of using these units *solely* as recirculating heaters are often overlooked. These advantages are quick, uniform heating . . . close control of temperature . . . economy in operation.

A typical instance of efficient heating by recirculation is provided by the 21 Sturtevant Unit Heater-Ventilators in Western Electric's Merchandise Building at Kearny, N. J.

Since this equipment mechanically circulates the heated air, the offices are evenly heated throughout. There are no hot or cold spots. Desired room temperature is maintained by automatic control. Sturtevant Unit Heater-Ventilators heat more quickly than direct radiation . . . and give 6 to 10 times more heat! So the offices are quickly heated in the mornings . . . even Monday mornings! No need to keep heat up overnight or over the weekend. Sturtevant Unit Heater -Ventilators are adapted either to hot water heating . . . which is the system used in this building . . . or to steam. In the latter case, there is usually a worthwhile saving in steam, over direct radiation. The units are quiet and unobtrusive . . . both in operation and appearance.

Sturtevant Unit Heater-Ventilators are adapted to infinite installations... schools, stores, hotels, institutions and other places. Have you Catalog 361?

B. F. STURTEVANT COMPANY Main Offices: HYDE PARK, BOSTON, MASSACHUSETTS: CHICAGO, ILLINOIS, 410 No. Michigan Avenue; SAN FRANCISCO, CALIFORNIA, 681 Market Street Branch Offices in Principal Cities: Canadian Offices at: Toronto, Montreal and Galt. Canadian Rep.: Kipp Kelly, Ltd., Winnipeg. Agents in Principal Foreign Countries.



This beautiful portfolio of plates

should be in the files of every architect specializing in

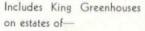
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... in fact wherever greenhouses are used

32 photographs of some of the finest greenhouse layouts in the country. On the reverse side of each is a ground plan and complete description of the job.

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and others of equal prominence





Living room in the house of William B. Betts, Architect, Chicago



Dining room in the bouse of William B. Betts

Casements Opened, Closed, Locked without touching Inside Screens . . . Specified by Chicago Architect for his Own Home

Attracted by their unique practical advantages which include screenfree operation, William B. Betts, Architect, of Chicago, selected Fenestra Steel-Casements equipped with Fenestra Screens for his own home.

Permanent fly tightness is assured by these screened casements, the *flat*, non-warping screen frame making a metal-to-metal contact against the *flat* casement frame.

Construction of Fenestra Casements is by craftsmen in the shops of America's oldest and largest steel window manufacturer. Ask for catalog,

DETROIT STEEL PRODUCTS COMPANY, 2285 East Grand Boulevard, Detroit, Michigan *Factories:* Detroit, Mich. and Oakland, Calif.

Convenient Warehouse Stocks





THE SQUIBB BUILDING, New York City.

Architect: The Firm of Ely Jacques Kahn, New York City Consulting Engineer: H. B. Ochrig, New York City General Contractor: Shroder & Kopel, New York City Plumbing Contractor: F. B. Lasette, Long Island City, N. Y. Heating Contractor: J. L. Murphy, New York City

In a *Worthy Building* for a *Worthy House*

IN the fine neighborhood of the Savoy Plaza, the New Netherlands and the Plaza Hotel, and taking its place rightfully among such neighbors, the new Squibb Building in New York embodies beauty, convenience, and structural soundness, without and within.

Its proportions are lofty and graceful, its external parts all satisfyingly composed, its approaches and immediate setting dignified, its interior rich in effect and interesting in detail.

In such a building, where architects, engineers, and builders have been free to incorporate the best, it is not strange that piping should be carefully considered and that the major tonnage should be NATIONAL—

America's Standard Wrought Pipe

National Tube Co. : Pittsburgh, Pa. Subsidiary of United States Steel Corporation



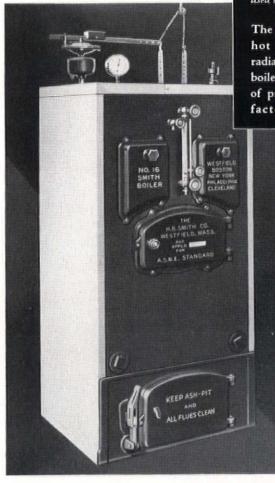
NATIONAL PIPE



The average client about to build a house, knows very little about boilers. He is likely to scan "first cost" from a wrong viewpoint.

He fails to remember that he burns fuel each year equal in cost from one half to the entire original cost of the boiler.

A difference of 15% in efficiency, between boilers, can make a 20% difference in his fuel bill, and he can get his 20% saving every year. An H. B. Smith Boiler, because it has enough Fire Surface to absorb all the



THE H+B+ BHHB BOILERS & RADIATORS Used in fine homes and buildings since 1860

The H. B. Smith Boilers for steam, hot water and vapor heating; radiators; and hot water supply boilers; for every type and size of private home, office building, factory and public building.

that Saves **Your Client** MO than Costs

heat needed without costly waste, soon pays for itself out of fuel savings. In the course of its lifetime, it pays for itself over and over. The New Smith "16" has more Fire Surface than any

other boiler made of the same grate area. It now offers to owners of small-to-medium size homes the same welcome comfort and economy that the larger Smith Boilers (Mills "24", "34" and "44") have been giving owners of large homes and mansions for over fifty years.

Complete information gladly sent on request. Address, The H. B. Smith Co., Dept. E-55, Westfield, Mass.

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The Architectural Record, November, 1930

81

A New Booklet on MODERN GRANITE



KNOWLEDGE of what has and can be done in the production and finishing of granite for architectural purposes is more essential now than ever before if full advantage is to be taken of its aesthetic and economic possibilities... Revised and modernized to include the latest available information on the subject of modern granite technique, this 28-page booklet is available to architects, designers and

QUARRIES ASSOCIATION

31 STATE STREET Boston, Massachusetts

H. H. SHERMAN, Secretary

SEND FOR YOUR COPY

specification writers. Of particular interest will be the 23 color reproductions of standard American granites produced by members of the association, as well as the new and important sections devoted to Granite Veneer and Rubble Ashlar. Other sections give valuable information on the subject of detailing and specifying and the sand-blast process of decoration . . . Use the attached coupon for your copy of "Architectural Granite".

for your files

| Gentlemen : | | |
|-------------|-----------------------------------|--|
| | Please send me a copy of the new | |
| | issue of "Architectural Granite". | |
| Name | | |

The Architectural Record, November, 1930

82

UNEMPLOYMENT OF DRAFTSMEN

The decline in building construction has forced many draftsmen out of employment. The situation demands immediate attention, since improvement in the building industry is expected to be gradual.

One solution of the unemployment problem may be the shortening of working hours and the working week, where possible. Another suggestion is the use of spare time to initiate new building projects, to study improved methods of office routine, and otherwise prepare for more efficient service when new business begins to come in.

Steps for meeting unemployment are now being undertaken by various architectural organizations. The cooperation of all architects and others in the allied fields is invited. The Architectural Record asks that suggestions from architects and draftsmen be sent in to be submitted to a committee now being formed to discuss plans for meeting the situation.

CALENDAR OF EVENTS

| Nov. 12, 13, 14 | National meeting of American Institute of Architects, Detroit. |
|-------------------------|--|
| Nov. 15 | "Man and Machines", an exhibit representing western industrial civilization, at Museums of the Peaceful Arts, 220 East 42nd Street, New York City. |
| Nov. 18-19 | Art Exhibition, Royal Institute of British Architects, London (9, Conduit Street). |
| Dec. 1 | Competition for "esthetic improvement" in design of water tanks, sponsored by Chicago Bridge and Iron Works, Alvert M. Saxe, 430 N. Michigan Avenue, Chicago, architectural advisor. |
| Dec. 1-6 | Ninth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City. |
| Dec. 5-6 | The Florida Association of Architects will meet at Fort Meyers, Florida. |
| Dec. 16 | Address by Arthur Holden, Junior League of the N. Y. Society of Architects. Apply to L. E. Jallade, 15 East 47th Street, New York City. |
| JanFeb. 1 | International Exhibition of Persian Art, Royal Academy, London. |
| Jan. 23 Through Feb. | Beaux-Arts Annual Ball, Hotel Astor. Annual exhibition of the Architectural League of Greater Miami, Florida. |
| March 30- April 4 | House and Garden Exposition, Grand Central Palace, New York City. |
| April 18-25 | Fourth Biennial Architectural and Allied Arts Exposition, Grand Central Palace, New York City. |
| June | International Town Planning and Housing Federation Congress, Berlin. |

ANNOUNCEMENTS

Walter F. Bogner, architect, announces the removal of his office to 45 Newbury Street, Boston, Mass.

Rankin and Kellogg, architects, announce the removal of their offices from 1805 Walnut Street to the Architects Building, 17th Street at Sansom Street, Philadelphia, Pa. Gerad W. Wolf, architect, announces the removal of his office to Central Building, Clayton, Mo.

Carl F. Pilat, landscape architect of 15 Park Row, New York City, has been appointed landscape architect of the Constructing Division of the War Department. He will continue his general practice in New York and Ossining and conduct the duties of his new office through associates and assistants.

JUNIOR LEAGUE OF THE NEW YORK SOCIETY OF ARCHITECTS

The New York Society of Architects has extended its activities so as to admit into this body an auxiliary organization or Junior League. This is intended to be of benefit to the draftsmen or junior architects who are not yet registered under the law.

The object of this new organization is principally educational and partly social. A program for the winter season covers the following subjects:

The Education of an Architect

The Functions of an Architect and His Relations to the Client

Modern Tendencies in Design

- Methods of Studying a Project Beginning with the Sketches
- Taking of Estimates and General Practice of Letting Contracts

Supervision of Work in Field

Technique of Writing Specifications

Office Administration, Organization and Cost of Producing Drawings

Selection of Building Materials

Legal Standpoint of the Profession

The work will be directed by Colonel Louis E. Jallade. Admission to the talks will be opened to all draftsmen who are interested, applying to Louis E. Jallade, 15 East 47th Street, New York City.



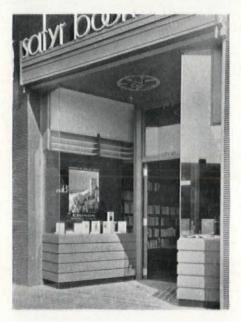
THE DECEMBER ISSUE

includes

among other features . . .

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The Architectural Record, November, 1930

ALUMINUM

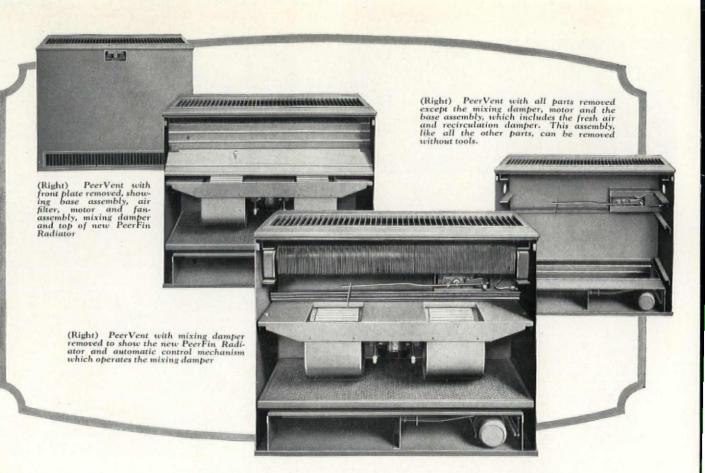
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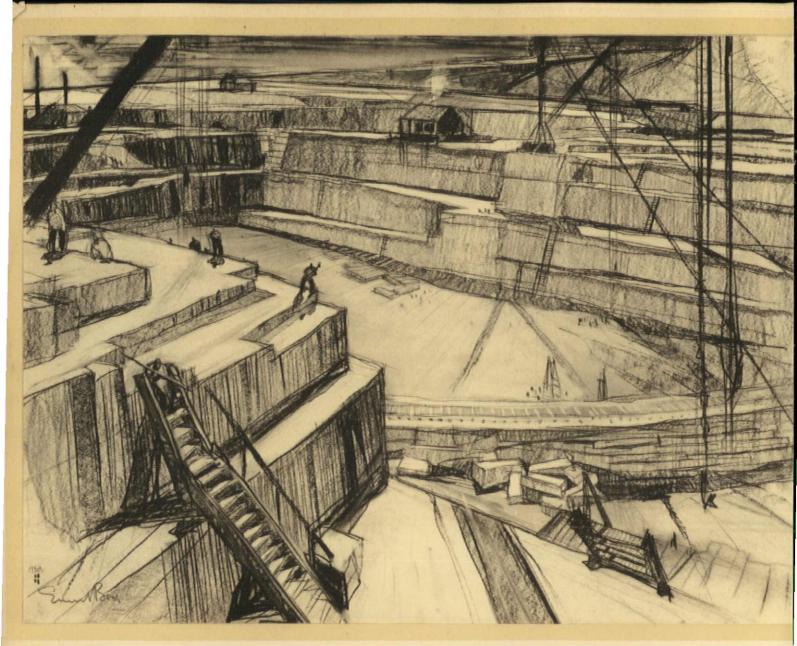
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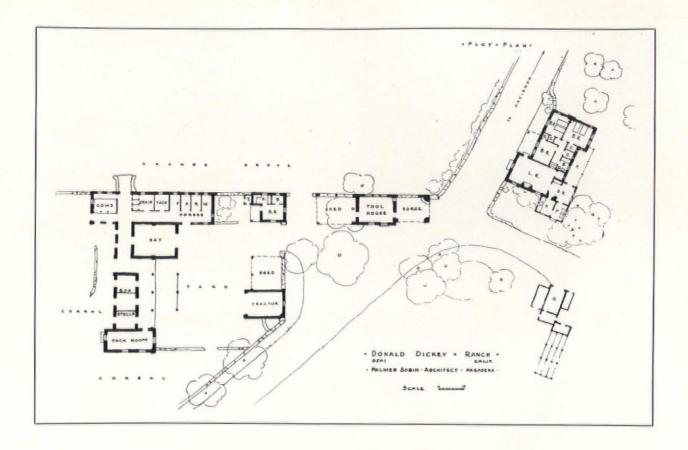
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THE BIG HOLE

Number Two of a series of twelve drawings made at the Fletcher Quarries by Ernest Born.

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Padilla Studios

RANCH HOUSE OF DONALD DICKEY OJAI, CALIF. PALMER SABIN, ARCHITECT (See plan on other side)

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THE ARCHITECTURAL RECORD

AN ILLUSTRATED MONTHLY MAGAZINE OF ARCHITECTURE

VOLUME 68 NUMBER 5

NOVEMBER 1930

THE COUNTRY HOUSE

By HOWARD T. FISHER

ORIENTATION OF ROOMS

In most parts of America sunlight constitutes a precious commodity, especially during the winter, and the ideal room for most uses is one with east, south and west exposures thus enjoying sun throughout the entire day. This will, however, seldom be possible except with perhaps one or two rooms of the house, and the question therefore arises as to the best placing of the other rooms. In certain cases, of course, other considerations, such as view and trees, may be more important than sun in determining the disposition of rooms.

Living room. This room, as well as other rooms that may be extensively used during the day, such as the play room, should be given a southern exposure, and if possible both east and west exposures. Where both of the latter cannot be provided the western exposure is more important as it is probable that the rooms in question will be more apt to be occupied continuously in the afternoon than in the morning.

Dining room. A southeastern exposure is desirable for a dining room as this will give sun both for breakfast and lunch. An eastern exposure alone may be found satisfactory as the morning sun is especially attractive at breakfast. Western sun in a dining room has no particular merit as throughout most of the year the evening meal is eaten after dark.

Bedroom. An eastern exposure for a bedroom is objectionable to many people as the sun tends to wake them up. It has, however, the advantage that the occupants may enjoy the sun while dressing. A western exposure should not be provided for a children's bedroom or nursery as during the summer, especially with daylight saving, the light from the setting sun will keep the children awake long after they are put to bed. A purely northern exposure will be adequate for bedrooms not usually occupied during the daytime. Sleeping porches, however, should not ordinarily open to the north on account of the severity of the wind from that direction.

Bathroom. An east exposure providing sunlight in the morning while dressing is by far the most desirable for a bathroom.

Kitchen. Ordinarily occupied for many hours of the day the kitchen deserves a sunny exposure. Where the housewife does her own work she will be wise to place the importance of the location of the kitchen even above that of the living room. A purely western exposure should perhaps be avoided because of the heat in summer from the late afternoon sun.

Garage. The garage is the one room which can be advantageously located in the middle of the north side of the house as neither sun nor cross draft is of any importance.

Cross draft. In locations subject to hot weather the prevailing winds should be studied and adequate provision for cross draft made in all rooms, especially bedrooms. When bedrooms have windows on only one side the door should connect directly with a hallway through which the air may freely circulate. Louvred doors permitting the passage of air but providing privacy may be worthwhile, especially for guest rooms. To increase the flow of air during the summer, as well as to permit during the winter a more rapid cooling off of the bedroom on retiring, vent ducts, either gravity or fan-operated, may be provided near the ceiling on the wall opposite the windows.

SLEEPING PORCHES

Advantages. In summer the sleeping porch affords a cooler and airier place to sleep. By its use in winter the bedroom may be kept warm thus providing a comfortable room in which to dress in the morning. Perhaps even more important is the fact that in winter it is possible to go to sleep in a cool place instead of having to retire in a room still warm and which may take several hours to cool off.

Location. To assure an adequate cross draft sleeping porches should always be open on at least two sides. Wherever possible they should be located so as to connect directly to the rooms they serve. The ideal arrangement is for each room to have its own porch.

Construction. The porch may be either entirely open except for screens or else equipped with windows so as to be capable of being completely shut. In the latter case in order to get the maximum of air the windows should occupy all or nearly all of the outside wall area and if possible should open to the floor to permit the utmost cross draft in hot weather. Where the porch is left open additional beds will have to be provided inside for use in bad or very cold weather or in case of illness. However, where the porch is heated and capable of being completely closed this is unnecessary and the bedroom can be converted into a private dressing and sitting room.

DINING PORCHES

The dining porch should be directly accessible from the kitchen, or butler's pantry if one is provided, in such a way that a minimum amount of travel is required in serving. If the porch is equipped with windows so that it can be completely enclosed, the total number of days during which it can be used will be greatly increased. On the other hand this should not be carried too far as its porch character should definitely be preserved if it is to have any advantages over the dining room proper.

"PILLAR CONSTRUCTION"

Elimination of basement. Where economy is essential there has been for some time a growing tendency to omit the cellar as a standard feature of house design. With present methods of heating it is no longer necessary to locate the boiler or furnace at a level below that of the rooms to be heated. In smaller houses the laundry tubs can be located in the kitchen and in larger residences, where it may be desired to do the laundry in the house, a special room provided above ground with proper ventilation. The cellar, once required for the storage of coal, food supplies, trunks, window screens, etc., is no longer needed for this purpose. What storage space may be necessary can be better provided elsewhere.

While there may be some excuse for the present practice of remodelling existing cellars so as to provide additional living space instead of storage space no longer needed, there is certainly no real justification for designing a new building with living rooms below the ground level. Rooms intended for human occupancy should be placed where they can have large sunny windows, an attractive outlook and good ventilation. Even when entirely dry a cellar with small windows, no sun, no view and little air is no place for children to play or adults to sit.

Use of piers. With the elimination of the cellar, continuous bearing walls are no longer necessary for the support of the building and it will probably be found more economical to employ isolated piers. With the use of piers, however, the main body of the house can be easily located 9 or 10 feet above the ground.

Economy of cost. The cost of excavating and hauling away earth is reduced to only what may be involved in providing footings below frost for the supports. Beams carried on columns take the place of the continuous basement wall as a means of supporting the floor. Exposed to the outside air on its underside the floor must be insulated, but after insulation the total heat loss will be far less than that normally taking place through the floor and walls of an uninsulated basement.

Planning the ground area. By raising the main body of the house there can be preserved for use as a play or sitting place that ground area ordinarily lost, a fact of real importance where the house is located on a small lot.

The space under the house may be partly planted with grass and flowers, the rest treated as a terrace with flagging, or the entire area may be screened in to make a sitting porch.

Stairs may be either exposed or located in an enclosed stair-well set under the central portion of the house, the latter having the advantage that the approach will be fully sheltered by the building. This arrangement also permits access directly to an interior hallway above. An enclosed stair-well provides a means of concealing and protecting from frost the necessary supply pipes and sewage drains.

The automobile driveway may be carried under the house in such a way as to give the advantage of a porte-cochère. Where a garage is to be provided it should, of course, be located at the ground level under the house. If conditions permitted, doors might be placed at each end of the garage so that the car could be driven in one end and out the other without having to back out or turn around. Where no garage is provided the space under the house would furnish a convenient place to park a car out of the weather.

If desired the boiler or furnace can be located at the ground level in a small room built either in connection with a central stair-well or off the garage. It might be worthwhile to install a dumbwaiter directly accessible from the ground level and, if no incinerator is provided, a built-in refuse box into which waste material could be deposited from above. Where the lot is small the house will have less tendency to cut up the property. There will be no front or rear portions of the building as all parts will be equally finished and equally open and accessible. By raising the living room one-story height above the ground level greater privacy will be procured.

ROOF PORCHES & TERRACES

Advantages of roof location. The roof usually provides a more open outlook and a better view than is possible at a lower level. Less cut off by trees, shrubbery or nearby houses, and open on all sides, it enjoys a cross draft no matter from what direction or how gently the wind may blow. As a result a roof porch or terrace will ordinarily be found far cooler in warm weather than one located at the ground level.

Because of the greater air movement and the height above the shrubbery there will also be less trouble from insects. Even where insects are unusually bad, sitting out of doors on a roof terrace without screens will probably be found possible if lights are not turned on. This constitutes a very considerable advantage in hot weather, as screens greatly reduce any existing air movement.

Raised above the level of the street the roof porch or terrace is more removed from the public view and so provides greater privacy. Also because the sun is less cut off by surrounding trees the roof affords an excellent place for sunbathing. Perhaps the greatest single advantage of porches located on the roof is that during the winter they do not cut the sun off from any of the rooms of the house.

Economy of area. Where sloping roofs are employed their entire area is unusable and so a total loss. In addition to the extravagance of this arrangement the loss of usable area may constitute an item of considerable importance, especially where land is at a premium and the house is located on a small lot. By the use of a flat roof, the ground area occupied by the house is, in a sense, not lost but merely raised to more advantageous position. Where a house is built on a steep slope the flat roof may give a level area not otherwise possible to provide. As a place for children to play, it may even have certain advantages over an equivalent amount of ground area, especially in spring when conditions may be too muddy for regular outdoor play. Constituting a sort of hurricane deck it provides an excellent place for such games as deck-tennis or ping-pong, and can be equipped with sand boxes, slides, etc. As a place to raise plants and flowers it may have advantages as well, the claim being made by Le Corbusier that they



VILLE D'AVRAY FRANCE LE CORBUSIER AND P. JEANNERET ARCHITECTS

grow better in roof gardens than in the open ground on account of the heat furnished by the building.

FLAT ROOFS

Advantages in design. The architect is unhampered by the necessity of providing an area of a size and shape capable of being covered with a sloping roof economical in construction. Freer use may be made of interior rooms, stairs or hallways, ordinarily to be avoided with sloping roofs because of the difficulty of providing with light or air. The total overall height of the building may, where desired, be kept much lower than is possible with a sloping roof.

Advantages in construction. That the flat roof, considered purely as a means of keeping out the weather, is easier or more economical to construct is clearly demonstrated by its almost universal use in commercial buildings. Where used for porch or terrace purposes it must be surfaced in some satisfactory manner to permit its being walked upon but otherwise the problem is essentially the same in residential as in commercial work. What snow may fall on the roof is, of course, permitted to stay there. It can do no harm and will only help to keep the house warm. If by chance it may interfere with the use of the roof as a play area, it can be easily shoveled off.

The flat roof permits the use of interior down spouts. Carried down inside the building where they cannot freeze, these will be found far more satisfactory than the sheet metal gutters and conductor pipes now in common use.

PLANNING THE ROOF AREA

The roof can be used for sitting, eating, sleeping or play purposes. It can be left as an open terrace, or can be covered, either with awnings or a permanent roof to produce a porch. The porch can be either screened or left open, although in most parts of America it will probably be advisable to provide screens during the summer months.

Dining porch. As a place to sit and as a place to play, whether on a screened porch or on an open terrace, the roof offers an ideal location. For dining purposes, however, the roof will probably not be found satisfactory unless a waitress is to be employed and a service pantry is provided together with a high-speed dumbwaiter connecting directly with the kitchen. It has been suggested by Le Corbusier that the kitchen and dining room be built at the roof level to prevent cooking odors from entering the rest of the house. If this were done meals could, of course, be served on a roof porch or terrace with the utmost ease.

Sleeping porch. For sleeping purposes the roof is ideal in every way with the one important exception that for greatest convenience a sleeping porch should connect directly with the bedroom or dressing room of a person who is to occupy it. Where this direct connection is not possible for any reason the roof will be found an excellent location. If convenient the sleeping porch should be located adjacent to an open terrace so that when desired, and the weather and mosquitos permit, the beds can easily be moved out under the open sky.

Sunbathing. As it seems not unlikely that the vogue for sunbathing may increase rather than diminish in the future, provision should be made for this purpose. In warm weather the open roof terrace may be used conveniently where it can be cut off from the rest of the house and is not visible from other houses. To accomplish the latter result and to shut off any wind a curtain which can be pulled around the terrace is frequently used in European houses. In many cases it will be worthwhile to provide a special small room with a cot. This should be equipped with a window of sufficient size and so placed that the direct rays of the sun can enter and fall on the cot during the five or six hours in the middle of the day. The window can be glazed with an ultra-violet glass but this is not necessary as by providing heat it will probably be found possible to keep the window open at all times when the room is in use. The window should be so arranged that persons cannot see in, thus permitting the user to dispense with all clothing.

A more ambitious scheme for providing sun baths calls for a complete glass room to be built on the roof of standard conservatory construction and glazed with ultra-violet glass. Such an arrangement would be of special value as a children's playroom. Even where the owner is interested in having a conservatory for plants rather than for sun baths the roof offers many advantages as a location.

WATERPROOFING

Canvas. For week-end houses or small inexpensive residences a roof of canvas may be found satisfactory if kept well painted. In addition to being economical the material itself constitutes a suitable finished surface upon which to walk. Leaks can be easily repaired in the same manner as with a canoe.

Built-up asphalt roofing is used almost exclusively for flat decks at the present time, and if properly laid will be absolutely watertight and possess great durability. This type of roofing, however, must be covered with some kind of surfacing material as it presents an unattractive appearance and will not withstand much wear.

Auxiliary equipment. To permit the full enjoyment of roof porches or terraces a telephone outlet should be provided at the roof level. Also desirable, especially in connection with a roof sleeping porch, is a small lavatory containing a watercloset. An outdoor fireplace may prove a real pleasure on cool evenings in the fall or spring and will be especially attractive to children for the purpose of cooking picnic suppers. A dumbwaiter running from the basement to the roof might be worthwhile for supplying wood as well as for carrying refreshments. Where the same dumbwaiter is to be used for carrying both heavy and light loads it should be either electrically operated or of the two-speed variety.

Stairs. Access to the roof may be gained either by an interior or an exterior stairway. The latter may be cheaper to construct as no pent house will be required. The exterior stairway may start at the ground level, but where the building is two stories or higher exclusive of the roof this is not necessary, and may at times be objectionable in that the roof will have less feeling of privacy if directly accessible from the ground. Where exterior stairs do not connect with the ground access can be gained to them either directly from a door or indirectly from a second-floor porch or terrace.

An interior stairway, while requiring the construction of a pent house, offers several advantages. The connection between the interior of the house and the roof will be more intimate and the openness will be increased. If equipped with adequate doors and windows the pent house may serve as a source of light for the illumination of an interior hall or stairway, as well as acting as a giant ventilator for the entire house. To prevent excessive heat loss from these windows or doors during the winter they should be double-glazed. A sunny nook with overhanging roof, giving protection from the wind and rain, can be built in one side of the pent house and telephone, lavatory and sunbathing facilities may also be provided. Where economy is essential an interior stairway can be used with a hatch instead of a pent house. This should be of adequate size,

366 THE ARCHITECTURAL RECORD NOVEMBER, 1930 and for ease in opening and closing should be counter-balanced.

Where membrane roofing is used gutters should be avoided if possible and the entire roof surface sloped evenly towards the drains. Where the roof is supported on wooden joists or where there may be possibility of unequal settlement a pitch of not less than one quarter inch to the foot should be provided.

Special care should be taken where the roof meets the parapet wall.

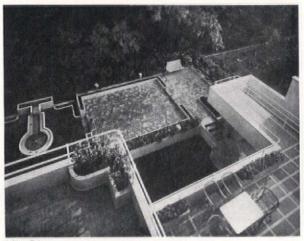
Where the parapet wall is of concrete, sheet metal counter-flashing should be imbedded permanently in the concrete at the time it is poured. The top of this counter-flashing should be high enough above the finished roof surface to prevent all possibility of melting snow seeping in above it. The membrane should be turned up at the wall and the base-flashing carried up to the point where the counter-flashing enters the wall. By carrying the metal counterflashing all the way down over the base-flashing the latter is protected from mechanical injury.

Special care should be taken around chimneys. If an outside fireplace is provided the membrane should be run under the entire hearth and turned up at the back and at each side. The fire-brick lining can then be built in afterwards on top of this membrane. To prevent the heat of the fire from softening the membrane a sufficient thickness of brick should be provided. A fireplace of the Franklin stove variety might be provided in place of one built in the chimney. This could rest on a hearth placed over the membrane roof, and in addition to giving more heat would present no waterproofing difficulties.

Monolithic concrete. In a building of reinforced concrete construction it may be possible to make the structural roof itself watertight, thus eliminating the necessity of providing not only a separate roofing material but all flashing and counter-flashing as well. This result can be accomplished either by an integral waterproofing or by a waterproofing applied to the top surface of the concrete. In either case a sufficient amount of reinforcing should be used to prevent as far as possible the formation of cracks resulting either from unequal settlement or from temperature changes.

Welded metal. One of the major advantages of metal construction as applied to houses would be the ease with which an absolutely permanent watertight roof could be produced by merely welding the joints. The welded steel battledeck floor already in commercial use would constitute an almost perfect solution of the problem if used in connection with steel parapet walls or open metal railings. In addition to its permanence and economy of original cost no separate waterproofing or flashing would be required.

Scuppers. To take care of the possibility of the drains becoming clogged scuppers should be provided a few inches above the roof level.



Cabiers d'Ars

VILLA AT NEUILLY, FRANCE GABRIEL GUEVREKIAN, ARCHITECT

SURFACING THE ROOF

Elements to be considered. Where the roof is to be used for porch or terrace purposes its surface should be finished in such a way as to withstand footwear and be attractive in appearance. If it is to be used as a place for children to play the surface should also be resilient and of a type which will not absorb too much heat in the sun. It should be as permanent as possible, requiring a minimum of upkeep.

Canvas. If canvas is used as the roofing material no further surfacing is required other than paint.

Concrete. Where the construction is of reinforced concrete with integral waterproofing it is not necessary to provide any other surfacing material unless a more attractive appearance or a more resilient surface is desired. Where the waterproofing instead of being integral is applied to the surface it will probably be necessary to cover it in some way, at least with a layer of cement, in order to prevent damage from wear or mechanical injury.

Wooden slats. An inexpensive means of protecting a membrane roof and one which at the same time gives a surface suitable to walk upon is to construct a light flooring of wooden slats setting them a little apart so as to leave spaces through which the water can run. The flooring can be set level, the membrane having a sufficient pitch to assure proper drainage.

Earth with grass or flagging. Probably the simplest and cheapest method is merely to fill in a layer of earth, planting it with grass and flowers and paving it with flagging of some sort where desired. The thickness of fill required will depend on such considerations as the prevailing climate, the type of plants to be grown, etc. In addition to its economy this method has several distinct advantages. As the earth will have a certain insulating value, especially when it comes to keeping the house cool in summer, it will be possible to get along with less insulation

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or even to eliminate it entirely as far as the roof is concerned. As the earth will remain damp and cool most of the time either from rain or from artificial sprinkling the life of the membrane roofing should be greatly lengthened. With the entire structural roof protected from extreme heat and cold there should be less trouble from expansion and contraction and as a result, where concrete is used, less danger of temperature cracks. If a leak should ever develop the removal of the earth where necessary would be an easy matter and one not involving skilled labor.

Flagging can be of stone or of some other material such as brick or tile. If stone is employed it can be either of the thick type such as is usually used for garden walks or of thin sheets of slate or soapstone, the latter having the advantage of lightness. Concrete slabs can be used for this purpose. To reduce the weight an aerated concrete or one made with light aggregates might be used.

Where flagging is used and it is not desired to grow grass or plants a thin fill of sand could be substituted for the earth. This would be found cleaner and less apt to spatter during rain. Whether it will be worthwhile to grow plants or flowers will probably depend largely upon the climate and the interests of the individual owner. Certainly flower beds should not be made an integral part of the architectural design unless the climate is such as to permit their being filled at least during a majority of the year.

An objection to the use of earth is that the roof will be damp after rains and so will not provide a dry place to sit. Also because grass, except in a very mild climate, will not present a satisfactory surface in winter and spring, the flagging should be set with fairly narrow joints. Under porches, especially if screened, it will not be advisable to attempt to grow grass or plants, a fill of sand probably being preferable to one of earth.

Gravel. Another solution employed frequently in Europe is merely to provide a thin layer of gravel. This can be of the round roofing variety, but a material, such as driveway screenings, which will interlock and compact solidly will be found more satisfactory.

Where a layer of porous material such as earth, sand or gravel is used there is probably no necessity for pitching the structural roof to the drains. The only objection to the dead level roof is that where not covered by such a material the slightest irregularity or unequal settlement may produce puddles in the low spots.

Tile. In many cases, especially for a covered or screened porch or where the winters constitute a considerable part of the year, the solution discussed above may not be entirely satisfactory or it may be desired to use a more finished material such as tile. Promenade tile, or slate in thin sheets, is frequently set on top of a membrane roof in hot mastic with

mastic joints. This, however, will be found unsatisfactory, as during warm weather the mastic in the joints will become soft and will be tracked all over the roof and into the house. Where the tile is to be set in mastic the joints should be left open and filled later with Portland cement mortar. Every precaution should, however, be made to procure a solid bed of mastic under each tile as otherwise water may fill the voids, freeze and cause the tile to heave.

The tile could be set in a thick bed of mortar in the manner usual for interior work, but this is to be discouraged, especially in connection with a membrane roof, because of the great difficulty of making repairs in case a leak should occur. It is also claimed that tile set by this method is very subject to injury by frost. Wherever tile is set with solid joints, unless the area is relatively small, provision must be made for expansion as otherwise there is danger that the parapet walls may be pushed out or the tile heave. Material used in expansion joints should be such as will not easily be tracked about during hot weather.

Resilient flooring. Tile, while satisfactory in most respects, has the serious disadvantage where roof is to be used for play purposes that it is entirely unresilient. Most of the more resilient flooring materials available are unsuitable for exterior use. Ordinary interlocking rubber tile has however been used for this purpose and there is now available a special rubber tile* made for paving exterior sidewalks which is unusually resilient. Certain types of mastic floors might possibly be used. Zenitherm,** while less resilient, is, according to its manufacturers, able to withstand outside weather conditions. Although not resilient as compared with the above types of flooring, blocks of end-grain wood might be used if adequate provision could be made for expansion.

INSULATION

Type and installation. Where the construction is of reinforced concrete, cork board or some such, insulation can be applied to the under side of the concrete slab. If a filling of earth or sand is to be used over a membrane roof it might be possible to apply the insulation on top of the concrete, although in this position it will be found less effective than if placed on the inside. Where the roof rests on wooden joists the space between the joists can be filled with some form of loose insulation. Rockwool, though possibly subject to criticism when used in a vertical wall on account of the danger of settlement, may constitute a satisfactory and economical solution of the problem. Used on a flat surface any settlement which may occur will do no harm other than to reduce slightly the total insulating value.

^{*} Manufactured by the Wright Rubber Products Company, Racine, Wisconsin.

^{**} Manufactured by Zenitherm Co., Inc., Newark, New Jersey.

Amount of insulation. The real problem, however, is to decide not the type of insulation to use but the amount necessary to guarantee against overheating. There is at present an unfortunate lack of data on this phase of the subject, especially as applied to dwelling houses, which makes it extremely difficult to give any specific recommendations. Manufacturers of insulation all promise to keep your house cool on the hottest days by the application of their products, but it is difficult to take their recommendations seriously as the thickness of material specified to produce the desired result is frequently as little as 1/2 inch. The situation will, of course, be somewhat affected by the color of the roof surface, since the darker that color the more heat is absorbed. Consideration should also be given the heat conductivity of the individual insulating material used as there is considerable difference between the best and poorest of the materials now on the market. Where a filling of earth or sand is used on the roof the amount of insulation required would probably be very greatly reduced.

Upper roof. In addition to insulating the roof proper it is probably equally desirable to insulate the upper roof over any covered porches, as otherwise under a strong sun and with no breeze they may become objectionably hot. Four inches or less of rockwool could be used for this purpose with completely satisfactory results.

Conductor heads. For a foot or so around conductor heads, as well as under gutters if there are any, it is

advisable to omit all insulation. In the winter time this will permit the heat from the house to escape and melt any snow or ice at these points which otherwise might interfere with the rapid run off of water.

PARAPETS AND RAILINGS

Where a railing is used it should be of a type which a child cannot climb. The railing or parapet should be high enough to prevent all possibility of any one ever falling over it, and high enough to discourage any person from carelessly sitting on it. At the same time it should not be any higher than necessary, especially if solid, as otherwise it will cut off the view of persons sitting on the roof. The proper height is probably in the neighborhood of 35 to 37 inches.

SOIL STACKS

One of the problems created by the use of the flat roof is how to handle soil stack vent pipes so as to be unobjectionable. Where it is at all possible to do so the best arrangement is to carry these vents up through the pent house and terminate them just above the pent house roof. If for any reason this cannot be accomplished vents can be carried up in a chimney, the pipes being built in at the time of construction. Where neither of the above solutions is possible, it will be necessary either to leave the pipe exposed, merely carrying it up six or seven feet.

WINDOWS

General considerations. With increase in size windows frequently become more difficult to operate, yet the difficulty of operating a few large windows is preferable to the inconvenience of opening and closing many small separate units. A few larger units give better light and tend less to cut up the wall spaces. Corner windows, giving a wider outlook and a more open effect, will be found attractive.

In general if windows are to open at all they should open as completely as possible. This is especially true of windows for bedrooms where natural ventilation is seldom adequate on hot nights. Where windows become very large and tend to fill the entire outside wall area 100% ventilation is no longer necessary or desirable.

Double-bung. While having the advantage of watertightness and ease of operation the double-hung window furnishes only 50% ventilation. Attempts have been made to cure this by providing pockets in the wall into which the sash can be lowered. The

most unfortunate feature of this style of window is the cross bar, which interferes with vision glass. To provide unobstructed vision double-hung windows should be set at a height which will bring the bottoms of the cross bars not less than 6' above the finished floor.

Casement. Although providing full ventilation the in-opening casement is hard to make watertight against a driving rain and is objectionable in that when the window is open the valves project into the room and interfere with the curtains.

Also providing full ventilation, but not subject to the above faults, the out-opening casement creates a difficult problem of screening. One of the advantages of this type of casement especially if built flush with the outside surface of the building is that the valves can be set to catch a breeze from any direction. The location of the window flush with the outside also gives more space to the interior and by providing a wider sill and more sun furnishes an excellent place to grow house plants. An objection to this type of window is the inconvenience in closing, especially during rain when it is necessary for one's arm to get wet in order to reach the handle of the projecting valve. The latter objection can be eliminated and the closing operation simplified by the use of patented operating devices. Where windows of this type are used care should be taken to see that tight non-removable pins are provided in the hinges, as where bolts and nuts are used the window can be easily opened from the outside by merely using a wrench. Many manufacturers now furnish windows with fixed lights above the movable valves, or at the side. These, no longer supplying full ventilation, lack one of the principal advantages of casement windows.

Sliding. Employed extensively in Europe the horizontal sliding sash, while not providing full ventilation, is especially well adapted for use in long banks of windows.

There are a number of patented sash devices on the market especially suitable for long banks of windows. Screened on the inside these fold out and slide to each end of the window so as to give 100% ventilation.

French casements. Windows opening to the floor provide more complete and rapid ventilation than those with normal sill heights. This is especially valuable in a bedroom as it permits a more rapid cooling of the room upon going to bed. Where a large number of French windows are used in a living room it may be possible to open the room sufficiently to avoid any necessity for providing a sitting porch. The use of French windows will, however, give a far different psychological effect, a room equipped with them being more open and less private. Whether this will be desirable or not will depend largely upon the type of location in which the house is built. Used in connection with a house on a small suburban lot near the street they will probably be less attractive than with a house in the middle of large grounds in the country. Where French doors open out on to a terrace or balcony raised a story or more above the ground level, complete privacy and openness may be procured.

Windows opening to the floor, in addition to being of the casement type, may be of the sliding or slidingfolding variety. With the former it may be possible to slide the sash horizontally into pockets in the wall thus providing 100% ventilation. The latter is particularly adaptable to large window spaces. Where used between a room and a screened porch, the French windows themselves need not be screened and a simpler and more attractive result will be procured.

SPECIAL WINDOW INSTALLATIONS

Windows for growing plants. Where an owner may have a particular interest in growing house plants a special window should be provided for this purpose. This should face directly south if possible, but otherwise easterly rather than westerly, as the morning sun is preferable to the late afternoon sun. To furnish the greatest amount of sun the glass should be set flush with the outside wall or, better, project beyond the wall in the form of a bay. Overhead light is of great importance and where a bay is used glass may be provided not only at the sides, but also at the top. The glass may be double to prevent injury to the plants from cold. Heat and ventilation should be provided in such a way as to avoid scorching the plants or injuring them from cold drafts. This can probably best be accomplished by providing radiators and a small louvred opening through the wall under the plant bench and leaving a narrow space between the plant bench and the wall for the warmed fresh air to rise. An outlet should be provided at the upper part of the window for the air to escape. The bench itself should be arranged with drains so that the plants may be freely watered. Glass shelves may be fastened against the window for smaller plants.

Where it is desired to engage in more extensive indoor gardening than is possible with the above a small conservatory should be provided, together with a greenhouse in which to raise the plants for the conservatory. While these constitute separate units they should if possible have direct access from one to the other.

Bedroom windows. To eliminate the bother of having to get up to shut bedroom windows whenever it begins to rain and to provide ventilation during the rain some arrangement is desirable to permit windows to be left open without letting in the rain. Wide projecting eaves will, of course, accomplish this result, but where these are not provided it may be possible to construct a small hood over each window. If these should cut off some of the midsummer sun it would not be objectionable as long as they did not project far enough to keep out the sun in winter. Windows looking on to porches can always be left open during a storm and are especially desirable in a bedroom for this reason.

Certain of the standard casement windows contain sections above the main valves which are hinged at the top and open out. These may be used to provide ventilation during rain.

Ultra-violet glass. While the best glasses on the market for the purpose of transmitting the ultraviolet rays of sunlight may be worthwhile for the treatment of invalids in hospital solariums, the value of their extended use in residence windows is doubtful. A solarium glazed with special window glass or windows exposed to the direct sunlight are necessary in order to obtain beneficial results in preventing rickets and presumably for general therapeutic purposes. As a result, wherever it is possible, it is better to utilize the direct sunlight by the use of an open solarium or by getting out of doors with as few clothes on as possible. A few minutes in direct sunlight at noon may be worth more than hours sitting indoors behind a window. For a complete discussion of this subject and for data on the different glasses now on the market see Bureau of Standards' Research Paper No. 113, entitled "Data on Ultra-Violet Solar Radiation and the Solarization of Window Materials".

Double-glazing. See discussion under "Humidification". Double-glazing will be especially desirable back of window seats as a means of preventing drafts and reducing the cold from the window.

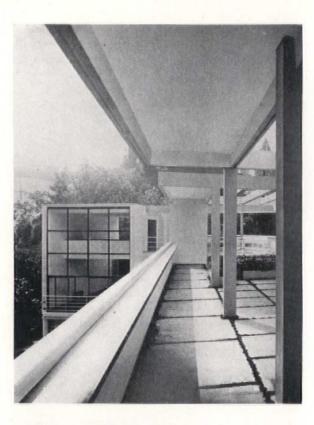
Shutters. Where it is anticipated that a house will be left unoccupied at frequent intervals, built-in steel rolling shutters may be installed over all windows to discourage burglary. Windows of the detention type originally developed for hospitals might be used where there is fear of burglary.

FIXED WINDOWS

Since the science of ventilation was first developed there has been talk of the possibility of employing fixed windows, sealed permanently in place at the time the building was erected and never to be opened. While such an arrangement would preclude, to quote from Lewis Mumford, "any human pleasure that may come from the gesture of throwing wide the window and taking in a breath of purer or cooler air" the idea as applied to house design is not without very considerable merit. In order to get his "breath of purer or cooler air" the occupant will have to step out on to the porch or terrace or turn on the ventilating system. The pleasure of "throwing wide the window", if that operation in itself may be described as a pleasure, he will have to forego, but in its place he will receive more significant if less sentimental benefits. Windows will be preserved not to be opened but to be looked through and to provide light during the day.

Economy. The saving in initial cost through the substitution of fixed sheets of glass for movable windows would be very considerable. In place of sash, frame, glass, pulleys, sash cords, window weights, hinges, handles, locks, screens, screen hardware, weather-stripping, etc., there would be simply a plain piece of glass and a light frame of the type used in store front work. The labor involved in setting single sheets of glass in permanent frames would be very much less than that of fitting and adjusting each one of the movable windows in a residence and of applying the hardware. The advantages of doubleglazing could be provided more effectively at far less cost and with less inconvenience than would be possible with movable windows. With fixed windows sealed tightly in place there would be a minimum of air leakage with a resulting economy of fuel.

Better air conditions. Where the outside atmosphere may contain soot, dirt or dust or when the weather is hot the "purer and cooler air" will be gained not by throwing wide the window but by leaving it





HOUSE AT VILLE D'AVRAY LE CORBUSIER AND P. JEANNERET ARCHITECTS

tightly shut. By proper filtering, all dirt together with hay-fever-producing pollen may be excluded from the house with an increase in comfort and a decrease in cleaning, redecorating and even personal laundry bills. With tightly sealed windows and double-glazing, cooling in summer will be found economically possible and through the reduction of air infiltration a higher and more uniform humidity could be maintained in winter without the nuisance of condensation.

For sleeping purposes either a regular outdoor sleeping porch could be used or else an artificially ventilated bedroom. The latter, in addition to having the advantages mentioned above, would enjoy a uniform controlled night temperature and a positive air movement on warm nights when otherwise, with natural ventilation through open screened windows, there might not be a breath of air stirring. One of the greatest merits of this arrangement would be the complete exclusion of all outside noises. In fact for a residence in a noisy location, such as in the city, near railroad tracks or on an automobile highway, this might constitute its greatest single advantage.

In case of possible mechanical failure of the ventilating system the doors on to porches, etc., would provide sufficient air.

Other advantages. Curved glass could also be used more extensively. The view will be unobstructed by screens or by the necessity of providing frequent dividing bars. Screens will not have to be stored or taken down and put up every year. It will not be necessary to run and shut windows whenever it begins to rain and there will be no damage from water or snow to interior furnishings through carelessness in leaving windows open. Burglary will be discouraged as the windows will not be left open and cannot be jimmied.

INSECT SCREENS

Outside. Screens can be placed on the outside with those types of windows that do not project when open. Outside screens constitute the least inconvenience as having once been put up in the spring they do not have to be touched until they are taken down in the fall. Although with double-hung windows full length screens are not necessary, their use permits the window to be opened at both the top and bottom thus providing better ventilation.

Inside. Where the screens must be placed on the inside they should open and close easily to permit the operation of the window, although where operating devices are installed this is, of course, unnecessary. Inside screens are of three types: hinged, sliding (vertically or horizontally), and roll-up. Screens of the roll-up variety while not always operating with the utmost ease have the advantages that they do not have to be taken down and put up yearly and that wherever a window is closed the screen can be rolled up out of the way where it does not have to be looked through. Hinged and sliding screens have the advantage that when they are taken down in the fall inner storm windows can be put up in their place.

Manufacturers of casement windows realizing the disadvantage under which their product is laboring have recently undertaken to solve the screen problem and some very interesting results have been produced. It is now possible to buy from the same manufacturer both the window itself and the screen design to go with it.

HEATING AND AIR CONDITIONING

Probably the most difficult technical problem with which the architect is faced in residential work is how to produce the best year-round "weather" within his houses.

CENTRALIZED DUCT SYSTEM: WARM-AIR FURNACE

After a period of disrepute the "hot air" heating system of a generation ago is now returning to favor under a significant change in name. With the air circulated at a lower temperature and in greater volume, with more adequate cold air returns, with better designed duct work and the assistance of electric fans to warm more distant or exposed parts of the house and with proper arrangements for humidification, its old faults have been removed or even converted into virtues.

Advantages. These are many. In addition to the fact that the air while circulating through the system can easily be humidified to any desired point, it can also be filtered, ozonized if desired, and cooled and de-humidified in summer. No radiators are needed. As the system contains no water it cannot freeze and does not need to be drained whenever the house is left in cold weather, an especial advantage in a week-end house or a house frequently left empty during the winter. Also of advantage, particularly in a week-end house, is the fact that heat will be delivered to the rooms within a few minutes after the furnace is fired. The absence of drag when a register is turned off as well as when it is turned on

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is of especial advantage in a bedroom as it permits the room to be cooled quickly on retiring and warmed quickly on arising. The warm-air system also produces a more healthful air motion and the air is circulated through the entire house instead of being continually recirculating within a given room where it may become stale.

Disadvantages. One objection to the system at present is that where an oil burner or fan is used the ducts act as speaking tubes to carry the noise throughout the house. This objection can, however, be largely eliminated by the proper installation of a quiet type of burner or fan and by offsetting the ducts and lining them for a short distance with hair felt. Another objection frequently raised is the danger, especially where oil burners are used, that the combustion gases may leak through the joints of the furnace and thus be introduced directly into the house. On this account it is advisable to choose a furnace with as few joints as possible and to inspect the joints yearly after installation.

Gravity system. The air in a warm-air system is circulated either by gravity or by a fan, or by a combination of the two. Where a house is small and compact and the furnace can be located in the center of the basement, thus permitting short runs, the gravity method may be found entirely satisfactory. Some valuable research into the working of this type of system has recently been done by the University of Illinois, in cooperation with the National Warm-Air Heating and Ventilating Association, at its Research Residence in Urbana. The results of these experiments are available in the form of bulletins.

Combination system. Where for any reason the natural flow of air by gravity is insufficient to heat all of the house adequately the system may be supplemented by the installation of a booster fan. This



can be operated by a switch or, where automatic heat is used, it can be wired in series with the burner. By-pass shutters are provided which open and close automatically so that the air placed in motion by the fan can continue to circulate by gravity. These shutters can be operated by direct mechanical means or by the air pressure produced when the fan starts. In either case quietness of operation is essential. If filters are used the shutters should be so arranged as to by-pass the air around them except when the fan is running.

Forced-air system. It is now customary to ignore gravity flow entirely where automatic heat is to be employed and to design the system for forced-air circulation. This has several advantages. Heat is produced throughout the house more uniformly, more positively and more quickly. Ducts may be smaller and greater freedom permitted in their location. It is even possible with a forced warm-air system to locate the furnace on the first floor, thus eliminating the necessity for a basement. Where open metal joist construction is used the space between the ceiling of the first story and the floor of the second story could be used as a duct to carry the warm air to all the rooms.

Where a fan is employed a slight cooling effect due to the movement of the air can be produced by its operation during hot summer weather, but without the addition of water sprays or mechanical refrigeration no great benefit should be anticipated from this source.

Outside vs. recirculated air. Much argument has been devoted to the relative merits of recirculating the air within the house or of introducing outside air. At the present time with houses built so loosely as to permit a constant and steady air change even with all the windows shut, there is probably no real advantage in the introduction of any outside air, and

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to introduce more than a small percentage will be found highly extravagant of fuel. In the future, however, with the construction of air-tight walls and closer fitting windows the introduction of fresh air will probably be a necessity, and the ease of its introduction with this system will probably constitute one of its greatest merits.

Cold-air returns. Where recirculation is used adequate cold-air return ducts are of the first importance. In a very small house one large centrally located return may be adequate, but it is usually desirable, especially in large houses, to provide a separate return from each of the principal rooms. Every room the door of which may be periodically kept closed should have a separate return. Where returns are provided in bedrooms the cold-air register faces should be equipped with shutters in the same manner as the hot-air faces so that they may be closed at night when the windows are open in order to prevent the cold air from being drawn into the system and cooling off the house. No returns should ever be installed in such rooms as the kitchen or garage as it is undesirable to circulate their odors through the house. In the case of a garage there may be the further danger of drawing gasoline fumes into the system with a possible resulting explosion. In order to provide an adequate flow of warm air to such rooms they should be vented outdoors, either by a sheet metal duct or by a chimney flue installed for that purpose. Where a separate exhaust fan is used, as in a kitchen, it can be connected to this vent.

Combination unit.* There has recently been put on the market an interesting device combining in one unit all of the apparatus necessary for a successful forced-air heating system: a gas-burning, warm-air furnace, a humidifier, a viscous oil filter, a blower, and full automatic controls. At present the manufacturers are working on a summer cooling unit to be added to the above as soon as perfected.

CENTRALIZED DUCT SYSTEM: RADIATORS

A centralized duct system essentially similar to the above can be used employing radiators instead of the actual outside surface of the furnace to heat the air.

Advantages. This arrangement, while sharing in almost all the merits of the direct warm-air system, has several further advantages. By the use of a boiler instead of a furnace the domestic hot water supply can be automatically heated the year round. A greater freedom is allowed in the arrangement of equipment as the boiler can be placed in one part of the basement and the ducts and radiators in another. This separation of the air from direct contact with the furnace will eliminate all possibility of danger from escaping combustion gases as well as reduce

* Manufactured by the Carrier-Lyle Corporation of Newark, New Jersey.

the noise resulting from oil-burner equipment. In a large house the ducts need not all be brought to one point, but several different heating centers can be established, perhaps controlled by different thermostats. This, however, should not be carried too far as most of the advantages of a centralized duct system may be lost.

One of the greatest merits of this arrangement is that direct radiators can be used to supplement the duct system wherever it seems desirable, as for example in remote rooms to which it may be difficult to carry ducts, in rooms subjected to an unusually severe exposure, or in special rooms such as garages and kitchens where humidity is not needed and from which it is not desirable to recirculate air.

Disadvantage. The cost will usually be much more than where a furnace is used. This may be somewhat compensated for by the fact that a separate hot water heater is not required.

RADIATOR SYSTEM: DIRECT OR SEMI-INDIRECT

Exposed radiator-unclean, objectionable in looks, and consuming of floor space-and the lack of humidification have probably constituted the two most serious objections to the radiator system of heating. The former can now largely be removed by the use of the new compact sheet metal radiators specially made to be built in the wall, and the latter by installation of a sufficient number of adequate unit humidifiers. Exposed radiators are to be avoided especially in bathrooms where an unclothed person may bump against them and get burned. Where there is insufficient space to build in a bathroom radiator or the expense is objectionable there can be procured a special sheet metal radiator small enough in size to go under the lavatory where it is out of the way. As this type of radiator is placed off the floor it is easy to clean underneath.

Steam and vapor. A steam system is the cheapest to install as the radiators are small and only one pipe to each radiator is required. The temperature of the radiators is, however, extremely hot and may constitute a serious danger with children if left exposed. Vapor requires slightly larger radiators than steam, but they are not quite so hot. The output of heat from a vapor radiator can be more accurately controlled by the valve than with either steam or hot water. Both steam and vapor have the advantage over hot water that the domestic hot water supply can always be automatically heated without the expense and complication of motor valves.

Hot water. If hot water heat is used, considerably larger radiators will be required but they will seldom be dangerously hot. While hot water heat may produce a more uniform radiator temperature it has a very considerable drag, being both slow to heat up and slow to cool off, a quality highly objectionable in bedroom radiators. With a thermostatically controlled system this drag may also be the cause of uncomfortable overheating when a warm morning, as in spring or fall, follows a cold night. Just before the sun rises the thermostat may call for heat. A few hours later, with the sun up and all the radiators full of hot water, the temperature of the house may rise as high as 75° or even 80° .

In order to reduce this drag and produce more rapid circulation, thus requiring a smaller boiler and smaller pipes and radiators, it is now not uncommon to use a small auxiliary pump in the same way that an auxiliary fan is used in a warm-air system. As with a warm-air system it is also possible by this means to locate the boiler on the first floor and thus completely do without a basement.

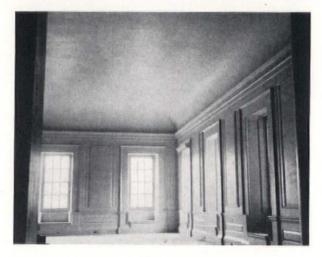
PANEL HEATING SYSTEM

There has recently been developed in England, and now first introduced into this country in the British Embassy in Washington, a new type of patented heating system consisting of concealed hot water pipes placed in the ceiling.* While originally developed as the result of a desire to eliminate exposed radiators and grills it was subsequently discovered that radically new heating principles were involved offering decided advantages.

Principle of operation. The basic arrangement is in all essentials similar to a regular hot water heating system except that, instead of exposed or concealed radiators, coils with welded joints and tested under high pressure are placed in the ceiling just above its lower surface and buried in the plaster, which is of a special type to prevent cracking. Hot water is circulated at a relatively low temperature either by gravity or by pump. By means of these coils the plaster is raised in temperature to a point where the heat radiated from its lower surface is sufficient to warm the room to the desired point. However, as the air cannot be warmed by convection, owing to the location of the source of heat at the top of the room, and as radiant heat does not appreciably warm the air through which it passes, the air in the room is left at a relatively low temperature. The comfort of the occupants does not depend primarily on the warmth of the air but on the heat radiated by the ceiling, in the same way that a person sitting in a protected sunny spot on a cold winter day may be adequately warmed by the radiant heat of the sun although the air may be very cold. The inventors claim that a room heated by the panel system will be entirely comfortable with the air at a temperature of only 62°, and further that with the air heated above that point a sensation of serious over-

* Richard Crittall & Co., Ltd., of London, control the patents; Wolff & Munier, Inc., 222 East 41st Street, New York, are American agents.





PANEL HEATING CONSTRUCTION BRITISH EMBASSY, WASHINGTON

heating will be experienced.** The recent work of the New York State Commission on Ventilation has shown the dangers to health of overheating, and the importance of a matter of even two or three degrees. This commission recommends that the air temperature be maintained as low as is consistent with comfort, and panel heating may provide a means for comfort at a temperature far below that possible with any other system of heating.

At the present time, however, the development of the system is still in its infancy and there are many questions yet to be answered. For example, just how is such radiant heat to be thermostatically controlled, and how is the temperature of the air to be properly correlated with the amount of radiant heat? How is a desirable air motion to be procured when there are no convection currents?

Results of employing radiant heat. A most interesting feature of the system is told in the following

** The humidity conditions accompanying these temperatures are not given in their statement.

quotation taken from the test data made in connection with the British Embassy installation:

"One notable detail of these tests was that the air in the rooms tested felt slightly cooler when one walked briskly through the room than when standing still—a result entirely consistent with the theory that the comfort experienced in the relatively cool air was due to the direct 'pick-up' of radiant heat by the body and clothes. Brisk movement does not change the amount of radiant heat picked up; but by creating an appreciable velocity of the relatively cool air in contact with the body. This should partly counteract the common tendency to become overheated by dancing, or by any other exertion, which is so noticeable in rooms heated by the ordinary methods; and should be a distinct factor in creating additional comfort for those so occupied, when in panel-heated rooms. It is a well-known physiological fact, that slight variations in the effective temperature to which the body is subjected have a tonic and stimulating effect; and this result of panel heating will provide such an effect just at the time (when exerting oneself) it is most valuable. Conversely, whereas with the ordinary heating system one who has been exerting himself may feel chilly upon sitting down or lying down, with panel heating, as soon as he is still, it will appear as though the air temperature had been slightly increased."

It is probable that owing to the ever-present radiant heat and the lower required air temperature it will be possible with this system to have the win-

FUELS

COAL

With the development of small mechanical stokers adaptable to domestic use, certain advantages of automatically controlled heat are now possible even with coal. These stokers are designed to burn both hard and soft coal screenings; where hard coal is used the ashes are automatically removed and deposited in a can, and where soft coal is used clinkers are formed which must be removed by hand.

Disadvantages. In addition to the inconvenience of having manually to fill the hopper of the machine and dispose of clinkers or ashes the coal stoker has the disadvantage as compared with other forms of mechanically controlled heat that it cannot start and stop itself. Having once been started it will run until turned off and then with the return of cold weather must be started again, a situation which may constitute a serious inconvenience during the spring and fall. However, if used in connection with an automatic year-round domestic hot water heating system, this objection would be completely eliminated as the stoker would then be kept in constant operation. It might also be possible to eliminate the manual filling of the hopper by providing a coal bin in such a way as to feed into the hopper by gravity.

Advantages. The coal stoker has the advantage that it produces no odors or oily soot, and that there is no danger of explosion.

dows open much more than at present, not only in the spring and fall but during colder weather as well.

As ordinarily installed insulation is applied above the coils so as to avoid overheating the floor surfaces directly above. In the case of bathroom floors, especially if tile, this insulation could well be omitted, thus permitting them to be heated so as to be comfortable to the bare feet.

Possible development. Suggested by the panel system is the possibility of covering the entire ceiling with exposed heated electric elements. These could be of the heat-producing type used in infra-red lamps or, if desired, light and perhaps even ultra-violet rays could be given off as well. The radiant heat from such elements would be so much greater than that produced by the surface of the ceiling in the panel system that it might be possible to maintain very low air temperatures or even completely to disregard the temperature of the air. One advantage of this system would be that if there were means provided to prevent the water pipes from freezing the heat in a room would never have to be turned on unless the room was occupied.

OIL

Advantages. The greatest advantage of oil heat is probably not its convenience or possible economy but that it is fully automatic, thus insuring a constant temperature in the house at all times—fall, winter and spring—regardless of the greatest and most sudden outside temperature change. In addition, it does not require more than periodic attention, perhaps running an entire season with nothing more than a few oilings. No basement storage space for fuel is required.

Disadvantages. In addition to the possibility of odors, soot and danger from fire, the major objection to oil heat has been the considerable noise usually produced. This is the result of two different causes, the mechanical operation of the burner itself and the combustion of the oil in the fire box. The latter varies with the type of flame produced. The former is usually more apt to be objectionable where the burner is attached directly to the boiler, thus permitting the noise to be conducted through the house by means of the heating pipes. Where possible the boiler should be located under the service portion of the house rather than under the living or dining rooms. If the burner is of a type that can be mounted on a sound-deadening pad on the concrete floor, then the entire boiler and burner could be enclosed in a small room with sound-proof walls and ceiling. If the sound-proofing used is good for heat insulation as well, it will also serve to confine what heat may be produced by the summer operation of the boiler in connection with the domestic hot water supply. Such a small furnace room would have the further advantage of preventing the spread of any odors resulting from the use of oil. In this connection special attention should be called to the necessity of providing a small air inlet to furnish the air needed for combustion. The lack of air is a common cause of trouble with oil burners and even where the boiler is placed in a large basement it would be well to provide a small opening in the outside wall which would always remain open.

Boilers. With the introduction of oil burners, special boilers have been designed to operate more efficiently with this type of heat. As the shape and type of flame as well as the basic method of operation may vary greatly with different makes of oil burners the general type at least should be decided upon before specifying a boiler.

Low water cut-off. If steam or vapor heat is used it is good insurance against a burnt-out boiler to specify a low water cut-off connected into the electric line to the burner.

GAS

Advantages. Although fairly expensive in many parts of the country gas is certainly the most convenient fuel in common use today. In addition to having all the advantages of oil, it is relatively noiseless and it is not necessary to order fuel. The total initial cost will be less as no storage tank is required and as the burner and boiler usually constitute a combined unit. It is not necessary to provide a driveway capable of withstanding heavy trucks, and the boiler or furnace can be placed in any part of the house most convenient without regard to the fuel supply.

Unit system. An interesting system of gas heating, consisting of individual units and permitting separate thermostatic control of each room, has recently been put on the market.* In each room is placed a radiator inside of which gas is burned. The products of combustion pass through the different sections of the radiator, are drawn off through a small pipe by an exhaust fan and finally expelled to the air either through a chimney or a pipe. A partial vacuum is maintained by the fan within the radiator and exhaust line, and an automatic switch is so arranged that if the vacuum is ever broken, through a leak or through failure of the fan, all the burners are shut off.

* Manufactured by the Roberts-Jordan Appliance Corporation, Curtis Building, Buffalo.

ELECTRICITY

Advantages. Electricity has the advantage over gas and oil that it is absolutely clean and noiseless, and that by its use in conjunction with an electric cooking stove all open flames may be avoided, thus reducing the fire hazard to a minimum. By its use it is even possible completely to do without any chimney, a fact which may in the future give it a certain economic advantage where initial building costs must be kept at a minimum.

Off-peak storage system. The most economical system of using electricity is that by which heat is stored in water during the night and then the hot water is circulated through radiators during the day time. This system is fully automatic in operation and has been used successfully in Europe for some years.** But even though it takes advantage of low off-peak night rates it will probably only be found possible where electricity can be procured at a cost not exceeding one cent per kilowatt-hour. Even at this price its use may be quite expensive and thorough insulation of the entire house, including the basement, and double-glazing as well, would probably be advisable.

Unit system. Where the day rates on electricity are not too high individual units may be placed in each room, consisting of heated elements exposed directly to the air. This arrangement has the advantage that each room can be controlled independently of every other room, and that no room need be heated except when occupied. An additional possible method for heating directly by electricity is suggested at the end of the discussion on the panel heating system.

AUTOMATIC CONTROLS

Advantages. The greatest single improvement in heating methods that has been developed during the last generation is the introduction of automatic controls. They make possible the maintenance of a uniform house temperature regardless of weather changes. The value of this is greatest in both comfort and economy not during the coldest winter weather, but during the spring and fall when the outside temperature fluctuations are most extreme, sudden and irregular.

Variability of heat. While it is highly desirable to prevent underheating and especially overheating common with any manually controlled system it is at the same time not necessary to try to keep the temperature absolutely uniform. A certain fluctuation about a predetermined point is probably beneficial as is indicated by Dr. Ellsworth Huntington's statement that "a variable climate is in general much more healthful than a uniform climate even though

** It is being developed in this country by the Hall Electric Company, Inc., 1429 Walnut Street, Philadelphia, Pa. the latter has an almost ideal temperature". Most thermostats have a differential of only one or two degrees Fahrenheit. It might well be desirable to increase this differential to three or four degrees, thus not only introducing a more healthful variation into the extreme monotony of present-day heating but also causing the burner, while running longer each time, to operate less frequently. Under the present system of controlled heating what fluctuations exist usually are the result of poor distribution and while perhaps not objectionable to a person moving about result only in discomfort to a person sitting or working in one place.

Location of thermostat. Where only one thermostat is employed to control an entire house its location is of great importance and every effort should be made to design as carefully a balanced heating system as possible. The thermostat should not be located in the front hall where cold air may blow on it and turn on the heat everytime the front door is opened. Neither should it be located in any room with a used fireplace as the heat from the fire will shut off the thermostat regardless of how great the need for heat may be in the rest of the house. The thermostat should be located in as typical a part of the house as possible and not near radiators or registers, or on an outside wall. It should also never be placed on a wall near concealed air ducts or water pipes. The predetermining of the best location may be very difficult and it is now possible to provide at the time of building several electric outlets in different parts of the house. A portable thermostat of a type made to rest on a table or bookcase may then be used where conditions prove best. Such a thermostat placed in the center of a room may give better results than one permanently attached to the wall and also be less objectionable in appearance.

Clock thermostats. There is considerable question as to the advisability of employing clock thermostats by the use of which it is possible to maintain a lower night temperature. Whether it is better to keep the house warm all night or to let it get cold and then warm it up in the morning may depend on the type of heating used. While a theoretical saving in fuel may result from this system it is apt to be somewhat of a nuisance and its operation may be neglected by the owner even where an 8-day clock is used. If the saving in fuel is worthwhile at all it is probably worth the slight extra cost necessary to install a fully automatic system controlled by an electric clock. Where the owner desires to raise potted plants in a house the possible effect of a lower night temperature should be considered.

Suggestions for more extended use of controls. In spite of the improvement in heating that has been made possible by automatic controls and regulating devices, their use in residential work is still very limited and the possibilities resulting from their more extended application are only beginning to be appreciated. Various parts of a house subject to different exposures and used for different purposes may be advantageously controlled by separate thermostats especially if the heating system is of a type which permits this to be easily accomplished. The average private garage, for example, unless used as a workshop need never be heated more than just above freezing. This temperature can be accurately maintained by a thermostat, but to depend on the handcontrol of valves may only result in frozen water pipes during some cold snap.

Control of night temperature in bedrooms. The bedroom presents a heretofore unexplored field for the application of controlled heat. It has been suggested that as most bedrooms in the average house remain unoccupied during much of the day they be left unheated when not in use but equipped with some form of electric or other heat which will permit their being brought very rapidly to the required temperature when needed. While such a system, if ever worked out, may have the advantage of economy of operation, the question of the proper control of the night temperature of bedrooms seems to be far more important in that it effects both comfort and health. While many persons may be able to sleep night after night with unfailing comfort in the middle of winter under the present system by which the heat is turned off and the windows are opened, there are many others who, while wishing to enjoy all the advantages of fresh moving air and a low temperature, are continually troubled with the cold. This situation is due not to the intensity of the cold but to the extreme variation of temperature. If a bedroom in winter were approximately the same temperature all night and every night no matter how low that temperature might be a sleeper by the use of more or heavier blankets could adjust himself to the existing conditions and be entirely comfortable. As a matter of fact, however, there is the greatest possible variation from night to night as well as during each night. At the time of undressing and going to bed the room will probably be about 70° and although the sleeper turns off the radiator and opens the window it may take several hours before the room has completely cooled off, the exact time depending on the amount of cross draft and the type of heat used. A hot water radiator will frequently stay hot for several hours. If the sleeper covers himself with only enough blankets to be comfortable during the early part of the night he will be cold later, or, what is equally bad, if he uses enough blankets to be warm later he will be too hot to begin with. Even when, with the help of a good cross draft and a form of heat that can be completely shut off, the room can be at once cooled to the desired point, there is still the nightly fluctuations in the outdoor temperature and the even greater unpredictable variation from night to night.

The problem can probably be completely solved

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by the proper use of thermostatic controls. Each bedroom should be equipped with a clock thermostat with a range from about 30° to 70°. This thermostat would control the source of heat to the room by an electric valve, if the heating was by radiation, or by an electrically operated damper, if by warm air. At bedtime, the thermostat would be set for the desired night temperature, a temperature at which the sleeper knows he will be entirely comfortable with a certain number of blankets, and the window would be opened an amount varying with outside conditions. The thermostat will turn the heat on and off during the night so as to maintain approximately the desired temperature. A short while before it is time to get up, the clock on the thermostat will raise the setting to 70° and there will be heat ready in the radiators to warm the room quickly when the window is shut. (Incidentally, the window can also be closed automatically at the same time the heat comes on, by a small device now on the market at a low price.)

FAILURE OF HEATING PLANT

With a mechanically operated heating plant the possibility of its failure may present an important problem, especially where the climate is severe, the electric service is subject to failure, or the location of the building is remote.

Precautions. If an oil burner is to be used the reliability of the local repair service is of the utmost importance. To provide against emergencies where a house is being built in a remote location or where unusually heavy snows are common, there should be specified an extra large storage tank for oil. Further

to prevent the possibility of running out of oil a gauge should be provided, placed in a regularly used part of the house where it will frequently be seen. Many oil burners at present require the use of gas as well as of oil and electricity. Where there is no gas or the gas supply is apt to fail, a burner can be procured which will start with an electric spark.

The necessary electric controls for a gas system may be operated in an emergency by a storage battery kept automatically charged by the current when on.

In case of failure. But in spite of precautions a failure is always possible. In such an emergency fireplaces may be of slight value in keeping the house warm. In most present-day dwellings fireplaces are only provided as an unnecessary luxury in a few of the most important rooms and so are inadequate to prevent the freezing of water pipes in the more distant parts of the house. A few small portable oil heaters if kept on hand might be used to supplement the fireplaces.

The double-duty boiler provides one definite solution to the problem. This type of boiler has two fire boxes, one at each end of the boiler, and each with a separate door. The larger of the fire boxes is used for the oil burner and the smaller as a garbage incinerator. The latter is equipped with grates and during an emergency either coal, a small supply of which may be kept on hand for this purpose, or fireplace wood may be conveniently burned in it, thus keeping the house warm. Certain oil burners are arranged in such a way that they can be removed and temporary grates used during an emergency. While perhaps possible as a last resort, such an arrangement should not be counted upon in a location where the necessary electric supply is subject to failure.

HUMIDIFICATION

Humidity as important as temperature. Humidification presents a problem inseparably connected with heating, yet a problem almost completely disregarded in house design until within the last few years, and still insufficiently studied. The effect of the air is dependent as much on humidity as temperature. The recent work of the American Society of Heating and Ventilating Engineers done in conjunction with the United States Public Health Service and United States Bureau of Mines has clearly demonstrated that as far as sensations of warmness and coolness are concerned it is immaterial whether the temperature is, for example, 74° with a humidity of 20% or 66° with a humidity of 80%. There is, however, a very considerable difference in the comfort, healthfulness and cost of these two conditions.

Healthfulness. That the lower temperature, made possible by the higher humidity, is more desirable

from the health point of view is indicated by the work of the New York State Commission on Ventilation. Experiments conducted in school rooms over a period of two years tend to show that a rise of only two degrees in temperature, from 66.5° to 68.5°, was responsible for an 18% increase in absences due to respiratory sickness and a 70% increase in respiratory sickness among pupils in attendance. In the opinion of this committee the maintenance of low temperatures is by far the most important problem of ventilation. Low temperatures are made comfortable by a high humidity. That a high humidity is in itself healthful has been demonstrated by the exhaustive study of Professor Ellsworth Huntington of Yale. As a result of a careful analysis of weather reports in relation to sixty million deaths in all parts of the world, Dr. Huntington was able to show that a humidity of 80% is associated with a minimum

general death rate and that a higher or lower humidity was accompanied by an increase in mortality. Factory work was also shown to be more efficient at a high humidity, and in studying deviations from the normal for any given month a high humidity produced more favorable conditions unless accompanied by an abnormally high temperature.

Comfort. That a low temperature with a high humidity is far more comfortable than a high temperture with low humidity is obvious. Air of low humidity absorbs moisture from the skin and mucous membrane of the nose and throat producing a dried-out sensation usually accompanied with a nervous keyed-up condition. Cool air with a high humidity on the other hand will have a pleasant freshness producing a sensation similar to that of the outside atmosphere of spring and fall.

Cost. From the point of view of cost it is obviously more economical to heat a building to 66° than it is to heat it to 74° . This, however, cannot be considered as an entirely clear gain, since the process of humidification involves certain initial costs as well as operating expenses.

Present conditions. In connection with Dr. Huntington's recommendation of 80% relative humidity, it is interesting to note the conditions normally existing in unhumidified houses in the middle of winter at the present time. The average probably falls between 20 and 25%, frequently dropping as low as 15% and seldom reaching 30%. This is even lower than the 33% average for the Sahara desert and considerably lower than the 44% average for the Colorado desert. Houses humidified with the usual type of humidifier now on the market will probably not average over 45% and many of them will fall even below that point.

CONDENSATION

The one great inconvenience accompanying a high humidity, and probably the greatest single obstacle to its more universal acceptance, is condensation. With well-insulated walls, however, condensation will occur only on the windows, where it can be taken care of, or even largely eliminated except during the coldest weather.

Remedies: condensation gutters, double glazing. There is nothing inherently objectionable to condensation. In fact, to those persons who appreciate the comfort of a high humidity its presence is a pleasing indication that there is probably at least a fair amount of moisture in the atmosphere. Condensation is, however, the cause of two just complaints: windows covered with condensation cannot be seen through, and when the surplus moisture of condensation runs down off the glass it forms pools of water on the sills which may stain the curtains and walls. The latter objection can be entirely removed by the provision of adequate condensation gutters to carry off this water. Both objections can be reduced to a minimum by the use of double glazing. In addition to largely preventing condensation this has the further advantage that it reduces the total air infiltration and heat loss from the building,* thus saving fuel. Charts prepared by the University of Illinois show that with an inside temperature of 69° and a humidity of 60% condensation will occur on single glass when the outside temperature is only 48 degrees, but will not occur on double glass until the temperature is as low as 19 degrees. Or, expressing this differently, with an outside temperature of 20° condensation will occur on single glass when the humidity reaches 30%, but will not occur on double glass until it reaches 60% Even with zero weather outside double glazing will permit a humidity of approximately 50% unaccompanied by any condensation whatever. The ultimate solution to the problem of condensation as well as heat loss may be found in the vacuumized window pane.

Double glazing can be accomplished in a variety of ways, but the most important requirement is airtightness. Both sheets of glass may be set permanently in the same frame, but in this case the glazing should be done during weather as dry as possible. For greatest efficiency the air space between the glass should not be less than one inch in thickness. Even if the glazing is relatively airtight, dirt will eventually filter in and the glass will require cleaning, which will be difficult to accomplish unless provision is made for the easy removal of the glass. Where such double glazing is contemplated in connection with steel sash it should be remembered that moisture may condense on the interior surface of the metal even if the glass is double. It will usually be found more satisfactory to provide entirely separate frames and glass, placed either inside or outside of the regular window, and stored during the summer. These can be made completely interchangeable with the screens, the same hinges or fasteners being used for both and the putting up of the screens and taking down of the winter sash accomplished at one operation. In order to get as airtight a fit as possible it may be worthwhile to use weather-stripping, perhaps of the cloth-lined variety.

Another way of preventing condensation would be through the direct heating of the glass to a temperature above the dew-point. This method has already been employed to prevent condensation (as well as the accumulation of sleet) on automobile windshields, the heating being accomplished electrically by means of a small element placed in contact with the inside surface of the glass.

^{*} The coefficient of transmission expressed in B.t.u. per hour per square foot per degree Fahrenheit difference in temperature with a wind exposure of 15 miles per hour is, for single glass: 1.13; for double glass .45; for triple glass .281. These values are based on a width of air space between the panes of glass of not less than 1 inch.

Methods for determining humidity. A word should be said concerning the proper means of determining humidity conditions as methods commonly in use are wholly unreliable. The device known as the horse-hair hygrometer is the most convenient in that it gives a direct reading in relative humidity without the use of tables or graphs. It is, however, inaccurate at best, and should never be used unless checked daily with a master instrument. The only reliable instrument, which happens also to be both the cheapest and most accurate, is the wet and dry bulb thermometer. While these instruments are everywhere in common use, it is not usually mentioned in the furnished directions that for results even approximately correct it is necessary to fan the wet bulb until the mercury ceases to fall. The tables are based on an air flow of approximately 600 feet per minute which is not easy to maintain by hand fanning for the minute or so usually required. An electric fan may be used; or a sling psychrometer, a similar instrument made in a form to be swung rapidly in the air, will be found convenient.

METHODS OF HUMIDIFICATION

Elements to be considered. First of all a humidifying device should be adequate to maintain the desired amount of humidity. What this amount may be will depend principally on the feelings of the individuals occupying the house and on such considerations as the prevailing outside winter temperature and the provision made for condensation. The absolute minimum will probably be in the neighborhood of 45% and the maximum around 65% or 70%. Under present conditions the ideal of 80% based on Dr. Huntington's research is difficult to attain without excessive condensation. Although outside and inside air temperatures will have some bearing on the ability of a humidifier to produce given results, the most important consideration is the airtightness of the house. An excessive number of air changes per hour will require the evaporation of very much more moisture and so place a much greater demand on the humidifier.

Another important consideration is the ability of the humidifier to produce an even distribution of moisture throughout the entire house. In bedrooms not commonly occupied except at night humidification is, however, of no great importance. The kitchen and laundry need not be humidified as they are usually too warm and damp to begin with. Theoretically, moisture in the air will spread equally in all directions and produce a uniform humidity throughout any given space regardless of air currents and the location of the source. In practice, however, this will not be found to be the case because the change of air in the house takes place more rapidly than the distribution of the water vapor.

Low cost, both of installation and operation,

quietness and ease of control are other important considerations. It goes without saying that no humidifying device should even be considered which depends on manual filling and in addition to being self-operating automatic control is desirable. The advantages of the automatic control of humidity are similar to those of the automatic control of heat, but there may be an even more important reason where a relatively high humidity is to be maintained. With certain types of humidifiers there is considerable danger that without automatic control on a sudden arrival in early spring of a warm calm day the saturation point might be reached and moisture be deposited all over the walls and furniture. Humidity controls depending on the expansion and contraction of some hygroscopic material such as balsa or animal membrane are, however, almost as simple as thermostats and as accurate and reliable.

Centralized system. Those means of humidification used in connection with a warm-air system or a centralized duct arrangement have many advantages. An even distribution throughout the house is, of course, obtained, and where a noise may be produced it can be eliminated by offsetting the ducts and lining them with hair felt for a short distance. Pans placed over warm-air furnaces, even when fed by a float valve, are usually of little value. In order for the pan method to be effective a large water surface must be exposed and the water must be heated to the steaming point, which can usually only be accomplished by means of immersed steam coils. (With any method of this kind there is apt to be a considerable deposit of lime where the water is hard.)

With a warm-air system good results can be accomplished at a minimum of expense by the drip method. This involves nothing more than letting water controlled by a needle-valve drop in one or more places, either directly on top of the hot dome of the furnace or on a piece of sheet metal placed just above the dome. The surplus in spring and fall can run off through a floor drain, or the flow may be regulated by an electric valve automatically turned on and off by a humidity control. One device of this kind is so made that its flow is regulated directly by an element that expands and contracts with the variation in temperature of the air, thus causing it to drip only when the furnace is operating.

À water spray has the advantage that in addition to producing a high humidity it serves to wash the air and even to cool it in summer. The water used for humidifying purposes will probably have to be heated unless, as with some systems, it is sprayed over hot radiators placed in the ducts. Where the domestic supply of hot water is heated by an expensive fuel this result can be accomplished economically by piping the supply to the humidifier through a small indirect coil tapped into the boiler, or where warm air is used, through an exposed coil in the firebox. Where no fan is used the force of the water spray will help materially in circulating the air through the system.

Separate units. Separate self-contained humidifying units made to be placed in the living portion of the house usually have a low capacity for humidifieation. Even where their output is great, however, the moisture will not be distributed equally throughout the house but will usually be confined principally to the nearby rooms. For this reason two or more units may be required in even a small house.

The most common system employed in this type of humidifier is probably the water spray, which usually has the disadvantage of being noisy. A somewhat similar but more efficient method depends on dripping water on to a rapidly revolving wheel edged with teeth. This breaks up the water into a fine mist and throws it out by centrifugal force into a small chamber through which air is circulated by a fan operated by the same motor as the wheel. The principle of flowing water over heated radiator surfaces is employed by several manufacturers.

One of the most promising devices produces steam in a specially designed coil placed in the firebox. After being piped to different parts of the house this is liberated directly into the atmosphere. Where steam heat is used this principle can, of course, be employed with the greatest ease by merely placing valves on radiators in different parts of the house, and installing an automatic boiler feed. When first tried out the steam may carry objectionable odors but there is no reason why this cannot be eliminated by a thorough cleaning of the system.

CLEANING AIR

Air entering house. In the city, soot and dust may be so bad as to make it highly desirable to filter all air entering a house, but conditions in the suburbs and country are not likely to be such as to warrant this. Where, however, persons suffer from hay fever, the presence of pollen in the air may create another and perhaps even more vital problem. It is now possible by passing the air entering a house through a special bag, to remove completely all pollen particles from the atmosphere.*

Air within house. Even where the outside atmosphere may be clean, there usually accumulates within a house a considerable amount of air-borne dirt which makes constant dusting a necessity and results in considerable damage to walls and furnishings, especially in the vicinity of radiators and registers. If the house is heated by air recirculated through a centralized duct system, most of this air-borne dirt can be removed, as fast as it forms, by the use of a viscous oil filter. Where expense is not of the first importance this filter should be of the automatic type, as those depending on manual cleaning are apt

* Manufactured by Pollenair, Inc., Hickox Building, Cleveland, Ohio.

to be neglected. Where a water spray is used for humidifying or cooling it will, of course, remove most of the dust from the air at the same time.

DE-ODORIZATION

Ozone. Manufacturers of ozone equipment have recommended its use for household de-odorization, especially in kitchens; and various small generators are now on the market. Even if the desired result could not be better produced by ventilation it is probable that the high humidity usually accompanying cooking operations would reduce the output of any such equipment to a point where it would be ineffective.

COOLING

The technique of air-cooling has already been developed in other fields. Its cost is the one obstacle to its immediate and almost universal use in residences. Although a temperature even as low as 86° is apt to cause real danger to the health of small children, in the greater part of America the heat is not so intense as to produce serious discomfort to adults on more than a relatively few days of each year, and so the initial cost of cooling equipment seems unjustified to the average householder. With the introduction of less expensive equipment, however, it is probable that air-coolers will become as common in houses as heating plants and be considered just as essential in those parts of the country where the summers are unusually hot.

Centralized system. There are at present several methods by which houses or parts of them can be cooled without too great expense provided double glazing and proper insulation is used. The method usually employed in theatres, consisting of a spray of either naturally or artificially cooled water, can be used equally well in houses and has the advantage that the uncooled spray may function as a humidifier in the winter time. Instead of the cold water spray it is possible to use in direct contact with the air an artificially refrigerated unit similar to those made to go in iceboxes, but designed with larger fins to handle greater volumes of air. Where a centralized duct arrangement is used for heating purposes these types of coolers for handling an entire house can be very easily installed.

Unit system. For the purpose of cooling a single room there is already on the market a special automatically controlled device** requiring no ducts and consisting merely of a metal cabinet containing a refrigerated unit such as is referred to above operated by a compressor installed elsewhere and a high speed fan to circulate the air over it. This device, costing about \$600 installed, is guaranteed to produce a

^{**} Manufactured by the Frigidaire Corporation, Dayton, Ohio.

temperature drop of at least 10 degrees in a room not to exceed 600 square feet in floor area. With electricity at 3c. per kilowatt-hour the operating expenses would be approximately 5c. per hour. It is said that several other large manufacturers are also working on this problem, and that one of them is about to bring out a combination drinking-water and room cooler for offices which will cost but slightly more than the water cooler alone.

De-bumidification. Of equal importance with cooling is de-humidification. This is, however, automatically accomplished by the cooling process itself. When the warm air with a high humidity passes through the cold water spray or over the cooling coils it is greatly lowered in temperature to a point far below the dew-point and therefore loses all the excess moisture. Although the air will leave the refrigerating chamber 100% saturated it will contain only a fraction of the moisture that it had on entering and when its temperature is again raised as a result of the infiltration of heats its relative humidity will be low.

Desirable temperature. It may be supposed that as a temperature of approximately 68° is considered ideal, it will, with the ultimate development of house cooling, be desirable to keep the temperature down to that point during the summer months. This seems, however, more than doubtful, not only on account of the extra expense but because so low a temperature in summer is not necessary for complete comfort. In fact with the outside temperature at around 90° an actual feeling of chilliness will be

DOMESTIC HOT WATER SUPPLY

SEPARATE SYSTEM

The old-fashioned coal heater requiring daily attention has within the last few years been largely replaced by the automatic gas heater. Where, however, gas is not available or is too expensive the advantages of automatic control can be obtained by the use of a small oil burner.

Instantaneous beaters. For small residences, or wherever pipe runs are very short, instantaneous heaters not requiring a storage tank are available both for gas and electricity. Where the hot water consumption is low or its use is apt to be confined to intermittent periods this arrangement is especially desirable as it does away with the constant heat loss from storage tanks. There has also recently come on the market a small compact self-contained electric heater* complete with spout and valve which can be placed on the edge of the wash basin connected

* Manufactured by the Electric Heater Corporation, Bridgeport, Connecticut.

experienced on entering a room with the air at only 68°. The most comfortable summer indoor temperature will probably rise with the rise in the outdoor temperature so as never to produce too extreme a difference.

Possible development. New possibilities in cheap house cooling are indicated by the work of Claude in Cuba. He is now engaged in building a power plant which will generate electricity by means of steam produced in a vacuum at atmospheric temperature and condensed by the very cold water brought up from the bottom of the ocean. After this water has served the purpose of condensing the steam, although still cold, it is of no further use to Claude and he proposes to furnish it at low cost to the residents of Havana to be pumped through radiators in their houses. He suggests that, if the supply from electric plants is not adequate, water might be specially pumped from the bottom of the ocean for this purpose and that it might even be used effectively out of doors in coils placed in the city streets.

EXHAUST FANS

Independent of any other heating or ventilating arrangements it is now customary to equip the kitchen with a small separate exhaust fan. This not only makes for comfort, but also helps to prevent odors from spreading throughout the house. For the same purposes it would usually be worthwhile to provide a fan in the laundry, especially if located in the basement with poor natural ventilation.

directly to the cold water supply line. When the faucet is turned one way cold water is delivered, when turned the other way the water is heated instantaneously, no further equipment of any kind being required. Such an arrangement might be of value in an out-building or week-end house.

COMBINED SYSTEM, AUXILIARY

It has been customary for many years to make use of the main house heating system during the winter to supplement the hot water heater, especially where a more expensive fuel was used for the latter. This was accomplished either by means of a water jacket, an exposed coil in the firebox, or an indirect coil, the latter usually a separate unit but now also available built into the boiler. During the winter months the water was either completely heated in this way or else the chill was taken off and then its temperature raised to the desired point by a separate heater. The only excuse for this system was that it permitted the substitution of a cheaper for a more expensive fuel, or that it necessitated the care of only one fire instead of two. Contrary to the popular theory there was but slight or no increase in total efficiency. Wherever a boiler is to be used for this double purpose it should be designed of a sufficient size to take care of the extra load.

AUTOMATIC YEAR-ROUND SYSTEM

With steam or vapor heat. With the introduction of oil burners it was found possible by use of an indirect coil in connection with a steam or vapor system to heat the domestic hot water supply automatically the year around. An aquastat with a range from about 150° to 180° is placed in the boiler, thus always maintaining the boiler water at a point hot enough to insure an adequate supply of domestic hot water heated by means of the indirect coil. At the same time the boiler water is never heated hot enough to produce steam unless the house thermostat calls for heat, in which case the burner will run until steam is produced and the house is heated in the usual manner. This system is fully automatic requiring no switches or valves. Regardless of the time of year the water is always hot and the house is never either over or underheated. Any arrangement which depends on the manual operation of valves or switches should be avoided.

With bot-water beat. Recently a similar fully automatic system has been worked out for hot-water heat. Each riser is equipped just above the boiler with a motor valve electrically controlled by means of the house thermostat. These valves open whenever the thermostat calls for heat and close when the desired point has been reached, thus maintaining the house at a constant temperature. Where there are several valves each one, if desired, may be controlled by a separate thermostat placed in that part of the house the heating of which is controlled by the valve. As in the previous arrangement the boiler water is constantly kept by an aquastat at a point sufficient to heat the domestic hot water supply by means of the indirect coil. Some hook-ups call for an extra control to be placed in the hot water storage tank but this is not necessary as the temperature of the water in the tank is controlled indirectly by that of the water in the boiler which in turn can be regulated by adjusting the aquastat. As by this arrangement the water in the boiler is kept at a relatively high temperature a more rapid circulation through the heating system will result when the valves in the risers are opened by the thermostat calling for heat. A certain amount of the drag usual with hotwater heat is thus eliminated. Where the indirect coil is used in connection with a hot-water system it should be placed on a level with the upper part of the boiler considerably higher than is usual with a steam system. In localities where the water is unusually hard it may be well to use a water softener to prevent the loss in efficiency which will result from the indirect coils being deposited with lime. A heater which combines in one unit the indirect coil, a large valve, and all of the necessary controls has recently been put on the market.*

Advantages. As a result of the development of these systems wherever oil burners are used there is no necessity for purchasing separate hot water heaters. In addition to the convenience, the cost of unnecessary equipment is saved and by keeping the burners in constant operation the year around there is no period of extended rest during which they can rust or get out of order. This system has, however, been objected to on the ground that it heats up the basement unnecessarily during the summer. If the boiler, indirect coil and tank are properly insulated this heating effect will be slight and will not be objectionable as it will only be sufficient to prevent the basement from getting damp-and this will be found true even where the boiler is unusually large. While operating most efficiently with oil the systems can also be employed equally well with gas or even coal where mechanically stoked.

* Manufactured by Bell & Gassett Company, $_{3000}$ Wallace Street, Chicago.

CHECK LIST OF HOUSE REQUIREMENTS

Sleeping porches: Cross draft, open on at least two sides Relation to bedroom, direct connection Open or enclosed Heated or unheated Dining porches: Direct access from kitchen or pantry Open or enclosed Sitting porches: Cross draft Privacy Use of roof Roof porches and terraces: Use Sitting Eating (service requirements) Sleeping Sunbathing (privacy, protection from wind), special room (heat) Play

Layout— Open terrace Covered porch (screened) Auxiliary equipment— Lavatory Telephone Dumbwaiter Outdoor fireplace Stairs— Exterior (accessible ground) Interior (pent house or hatch)

Waterproofing-Canvas Built-up membrane Monolithic concrete (integral or surface waterproofing) Welded metal Scuppers, interior downspouts Surfacing-Canvas (painted) Cement (over concrete) Wooden slats Earth with grass (flowers) and flagging (stone, slate, soapstone, brick, tile, concrete slabs) Sand with flagging Gravel Tile (slate) set in mastic (cement joints) Rubber paving tile Zenitherm Wood blocks (end grain) Insulation-Main roof, upper roof Summer, winter Type Quantity (omit under gutters and around conductor heads) Parapets and railings-Open for cross draft and visual outlook Non-climable Height: 35" to 37" Soil stacks-Can be carried up through pent house or in chimney Windows: General considerations-Fewer large units preferable to numerous small units Ease of operation Corner windows Unbroken glass areas Complete opening Types-Double-hung Casement (opening in or out) Sliding Lowering into pockets Sliding-folding Windows opening to floor

Special window installations-Windows for growing plants (heat, ventilation, drain) Bedroom windows, to prevent rain from coming in Ultra-violet glass Double-glazing-To prevent condensation and reduce heat loss Storm sash interchangeable with screens Airtightness Fixed windows Shutters-Rolling steel shutters Insect screens-Outside Inside (fixed, hinged, sliding, roll-up) Curtains and shades-Curtains (heavy, transparent) Pulls Concealed built-in curtain rods Space for curtains at side Venetian blinds Heating Centralized duct system (warmair furnace or radiators)-Gravity system Combination system (booster fan and by-pass) Forced-air system Outside vs. recirculated air (adequate cold air returns) Radiator system-Direct or semi-indirect Steam or vapor Hot water (auxiliary pump) Panel Heating system Fuels-Coal (manual firing or automatic stoking) Oil (sound-deadening, low water cut-off) Gas (central or unit system) Electricity (off-peak storage system or unit system) Automatic controls-Location (portable thermostat) Clock thermostat Special uses (garage, bedrooms, etc.)

Failure of heating system-Oil (reliability of repair service, large storage tank, oil gauge in conspicuous location, double-duty boiler) Gas (storage battery to operate controls) Fireplaces-Built-in firescreen Franklin stove Wood storage Humidification: General considerations-Adequate capacity Even distribution Ouietness Self-operating Automatic control Centralized system-Pans (water must be heated) Drip Water spray (water heated or sprayed over radiator) Individual units-Water spray Humidifying radiators Steam Cleaning air: Air entering house (hay-fever pollen) Air within house Methods-Viscous oil filter (manual or automatic) Water spray De-odorization: Ozone Cooling: Centralized system-Waterspray Refrigerated coils Unit system De-humidification Exhaust fans: Kitchen Laundry Domestic hot water supply: Separate system-Instantaneous heater (gas or electric, central or unit) Combined system-Auxiliary around Automatic year (steam, vapor or hot water)



HOUSE OF M. ALBERT LINTON MOORESTOWN, N. J. EDWARDS AND HOFFMAN, ARCHITECTS

> Site: deep lot with narrow end toward the road and facing south. Roof: variegated gray and green slate.

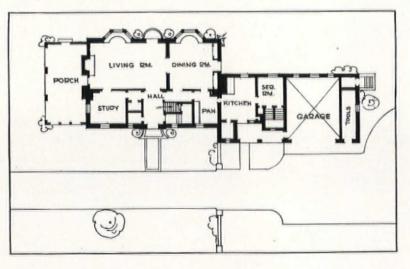
Chimneys: common hard-burned brick with stone caps.

Windows: double hung wood sash.

Walls: common hard-burned brick with struck joints.

Color scheme: brick work, dark red; windows, deep cream; shutters, very dark green; iron work, black.

Cost per cu. ft.: 80c.



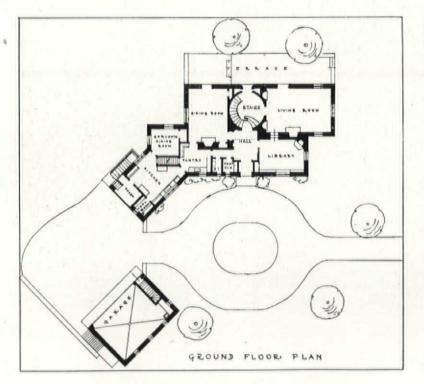


Wallace

HOUSE OF M. ALBERT LINTON MOORESTOWN, N. J. EDWARDS AND HOFFMAN, ARCHITECTS



HOUSE OF MRS. JOHN D. NEWBOLD, JR. CHESTNUT HILL, PA. EDWARDS AND HOFFMAN, ARCHITECTS



Site: house faces north and south on crest of a hill.

Roof: shingle.

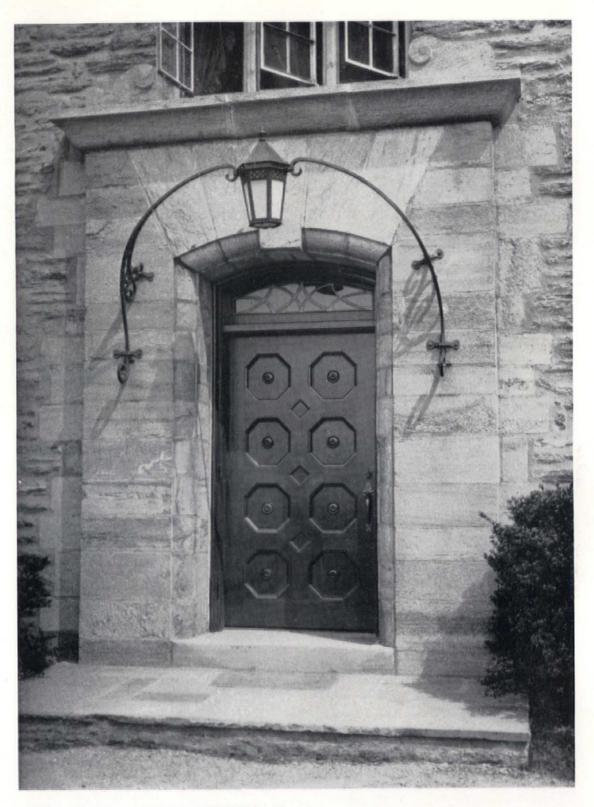
Chimneys: local stone with diaper pattern of brick work.

Windows: steel casement.

Walls: local stone with dressed local stone at front entrance.

Color scheme: stone work slightly rusty in color showing light tones of yellow and brown; windows and frames, painted dark green; front door and frame, oak.

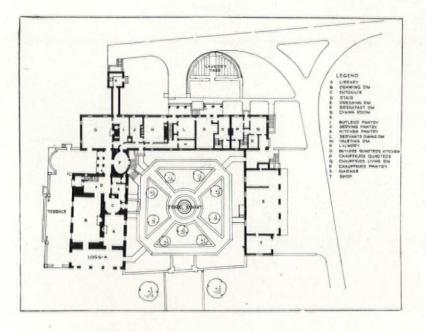
Cost per cu. ft.: approximately 55c.



HOUSE OF MRS. JOHN D. NEWBOLD, JR. CHESTNUT HILL, PA. EDWARDS AND HOFFMAN, ARCHITECTS



HOUSE OF RUSSELL TYSON NORTH ANDOVER, MASS. PERRY, SHAW AND HEPBURN, ARCHITECTS FLETCHER STEELE, LANDSCAPE ARCHITECT



Site: on a slight rise, surrounded by large trees.

Roof: slate.

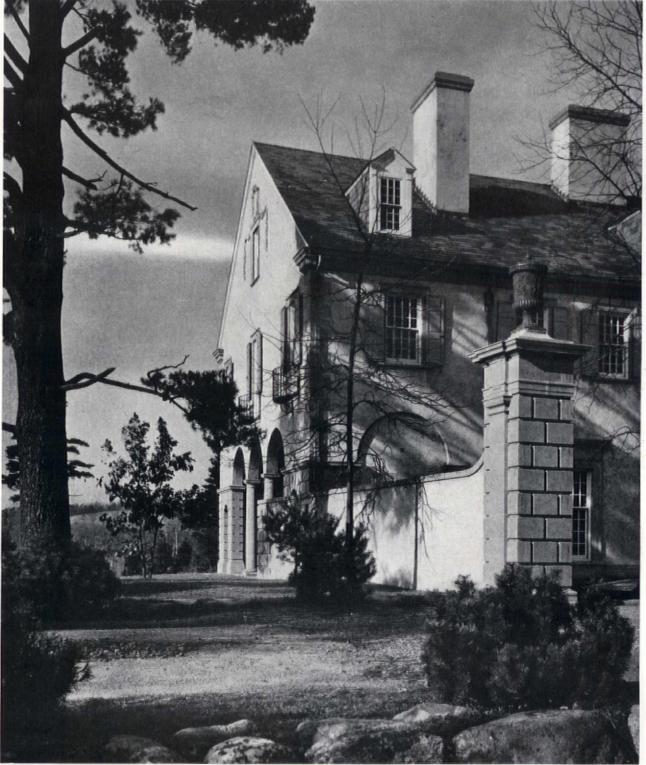
Weber

Chimneys: stuccoed, stone caps.

Windows: wood.

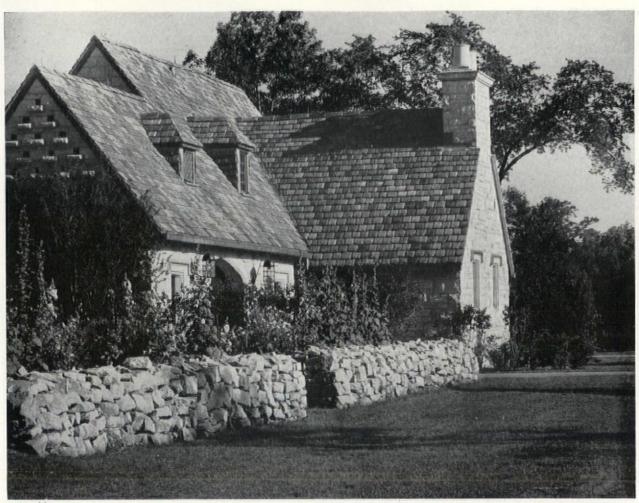
Walls: brick, stuccoed.

Color scheme: pink-gray walls, white woodwork, blue-green shutters.



Weber

HOUSE OF RUSSELL TYSON NORTH ANDOVER, MASS. PERRY, SHAW AND HEPBURN, ARCHITECTS



Taylor and Son

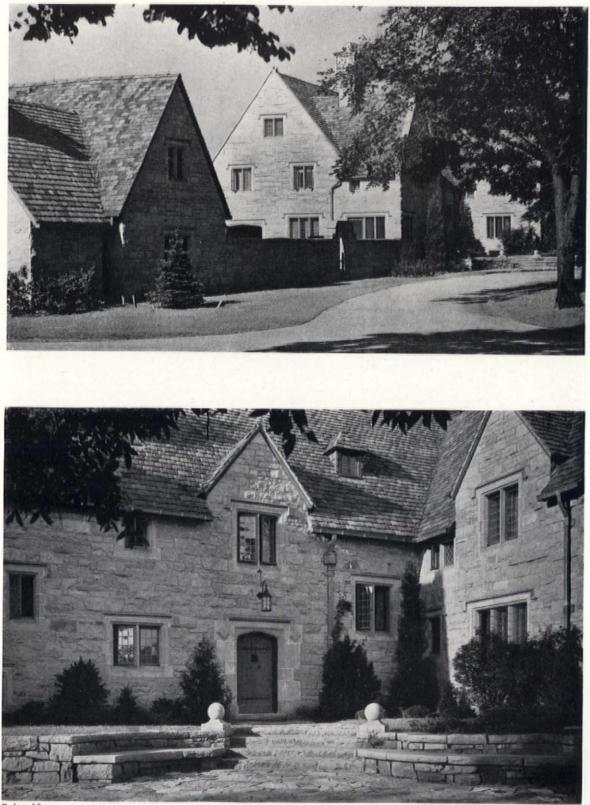
HOUSE OF HAROLD SEAMAN RIVER HILLS, WISCONSIN FITZHUGH SCOTT, ARCHITECT

Site: open field rising gradually from banks of Milwaukee River, with a few fine trees and orchard to north. To raise house and overcome possible flood conditions, entance was terraced on north side following line of drive; a service court walled in on east and the ground graded to river on west and south.

Construction: Cincrete and tile joists for floor; stone and Cincrete blocks for all walls. Lime stone from Madison, Wisconsin; a warm yellow, in blocks of varying size.

Windows: steel casements opening out, screened with roll screens and glazed with leaded plate glass and occasional antique panes.

Roof: handmade Yale Memorial slate tile of large size, rough texture, a soft dark bluish gray. Tile ridge, lead flashing. Gutters, leaders and leader heads of cast lead.



Taylor and Son

HOUSE OF HAROLD SEAMAN RIVER HILLS, WISCONSIN FITZHUGH SCOTT, ARCHITECT



Rittase

HOUSE OF MRS. EMMA ASPLUNDH BRYN ATHYN, PA. HAROLD THORP CARSWELL, ARCHITECT





HOUSE OF MRS. EMMA ASPLUNDH BRYN ATHYN, PA. HAROLD THORP CARSWELL, ARCHITECT

Site: a lot $75' \times 150'$ with the narrow side fronting south; about 5' below sidewalk level; prevailing breeze from the southwest.

Roof: cedar shingles left to weather, slightly rounded valleys.

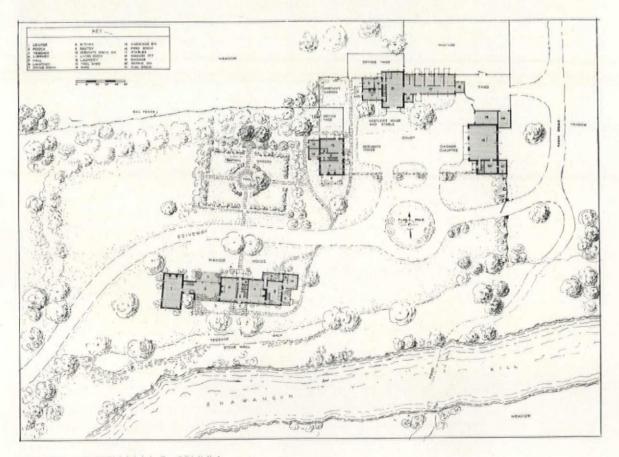
Windows: casement sash.

Walls: hollow stone concrete blocks with common brick for label courses over the windows and for chimney offsets.

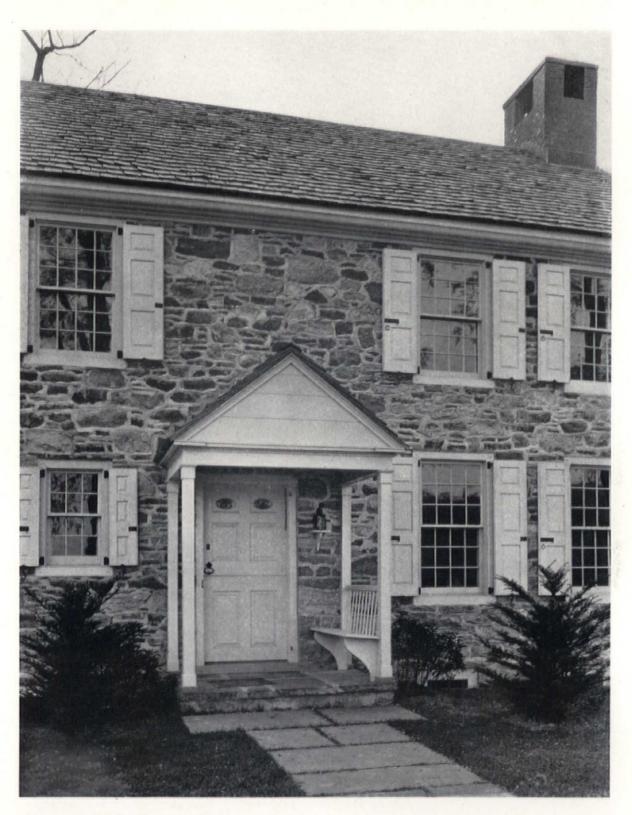
Color scheme: all masonry painted cream-white and brickwork wiped before taking set; woodwork stained creosote, whitewashed, and wiped after twenty-four hours, producing a soft gray with whitewash filling the pores of the wood; casements painted dark green.

Cost per cu. ft.: 52c.





ESTATE OF WILLIAM E. BRUYN ULSTER COUNTY, NEW YORK TELLER AND HALVERSON, ARCHITECTS



HOUSE OF WILLIAM E. BRUYN ULSTER COUNTY, NEW YORK TELLER AND HALVERSON, ARCHITECTS



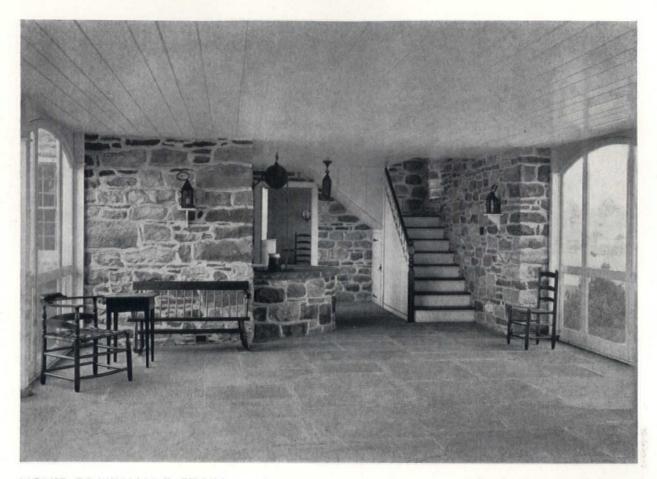
ESTATE OF WILLIAM E. BRUYN ULSTER COUNTY, NEW YORK TELLER AND HALVERSON, ARCHITECTS Servants' Cottage.

Site: on the banks of the Shawangunk Creek.

Problem: the house was a low rambling Dutch Colonial stone house, dating back in the Bruyn family records to 1694, and to make a summer home, the owner desired to restore the old house, enlarging a part by raising it to two stories and adding a wing for the accommodation of guests. This required leveling to the ground all but that part of the old house still occupied, as the kitchen.

Walls: stone to match that of old house left standing, reusing old stone from walls torn down and adding new from the same local source that supplied the original builders.

Floors: wide oak boards of varying widths secured with hand-headed spikes. In most cases the floor beams of the second story form the ceilings of the rooms below.



HOUSE OF WILLIAM E. BRUYN ULSTER COUNTY, NEW YORK TELLER AND HALVERSON, ARCHITECTS

Porch, view toward lounge. Stair leads to guest rooms over lounge room.

Roofs: 24" hand-rived cypress shingles, left to weather.

Chimneys: Ulster County brick, capped with native blue stone flag.

Outside trim: wide white pine clapboarding, log gutters.

Windows: double-hung sash with small lights, old glass $6'' \times 8''$ and $7'' \times 9''$; paneled shutters hung and fitted with hand-forged iron hardware.

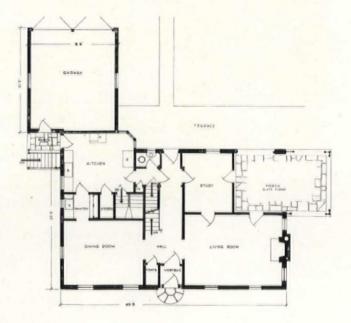
Terraces and porches: native blue stone flag flooring, rectangular in form, laid with broken joints.

Color scheme: walls, gray and pink grit stone with a mingling of blue black and rusty face stone; outside woodwork finished ivory white.



HOUSE OF J. ALLYN OAKLEY MONTCLAIR, N. J. DOUGLASS FITCH, ARCHITECT





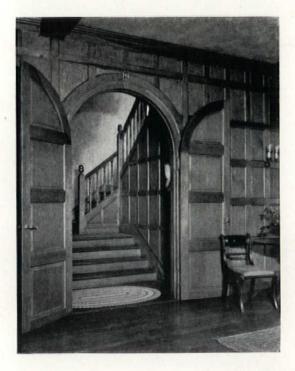


Costain

HOUSE OF ALAN U. MANN SCARSDALE, NEW YORK ELECTUS D. LITCHFIELD, ARCHITECT



HOUSE OF ALAN U. MANN SCARSDALE, NEW YORK ELECTUS D. LITCHFIELD, ARCHITECT



Site: sloping, bordered by giant oaks.

Construction: "stockade blocks," a patented material, composed of excelsior treated with magnesite and other fireproofing materials, compressed into blocks, which are set with reinforced cores of concrete, and stuccoed, whitewashed or painted.

Roof: graduated black slate.

Chimneys: whitewashed brick.

Windows: Crittall steel casement, with rectangular leading, and colored inserts in the stairway windows.

Color: entrance woodwork painted white; window frames a yellow buff.

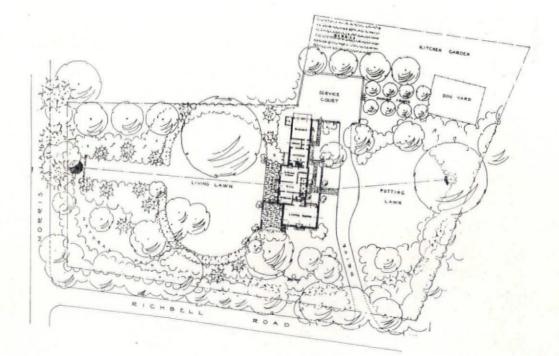
Interior: pine woodwork in natural color; sand-finished walls slightly stained.

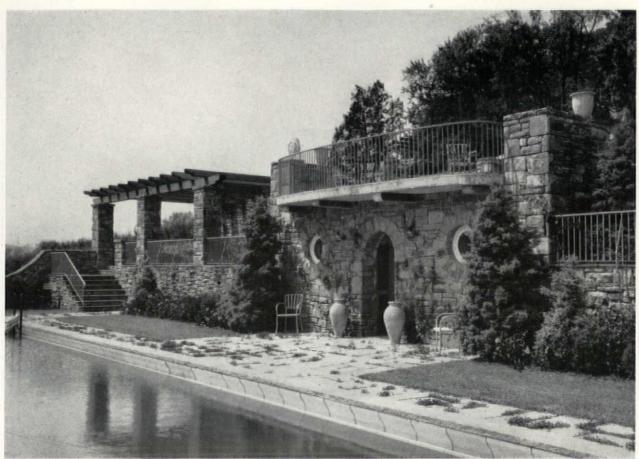
Cost per cu. ft.: 60c.



Costain

HOUSE OF ALAN U. MANN SCARSDALE, NEW YORK ELECTUS D. LITCHFIELD, ARCHITECT L. HARVEY RUDE, LANDSCAPE ARCHITECT





Wallace

ESTATE OF PERCY MILTON CHANDLER BRANDYWINE LODGE, CHADDSFORD, PA. RITTER AND SHAY, ARCHITECTS EXLEY AND KITE, LANDSCAPE DESIGNERS

> Site: a remodelled farmhouse on the site of the battle of Brandywine. Advantage of the contour of the ground was taken in placing the swimming pool and bath houses on a lower level approached by means of steps and terraces.

> Construction: white stucco with dark green shutters and a copper roof; cast iron on upper porches painted white.

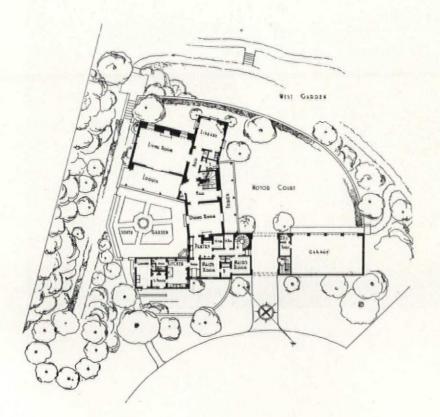


Wallace

ESTATE OF PERCY MILTON CHANDLER BRANDYWINE LODGE, CHADDSFORD, PA. RITTER AND SHAY, ARCHITECTS



HOUSE OF D. C. NORCROSS LOS ANGELES ROLAND E. COATE, ARCHITECT A. E. HANSON, LANDSCAPE ARCHITECT

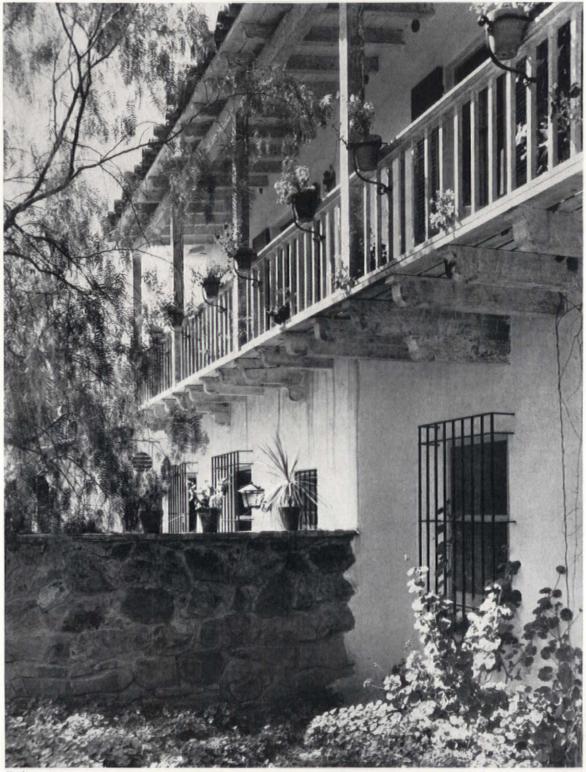


Site: instead of stepping down the various rooms with the grade, ground was excavated so that the house itself rests practically level.

Roof: rough laid hand-made tile, almost yellow in color.

Walls: covered with Gunite which in turn has been given a hand trowelled coat of stucco, resembling old-fashioned lime plaster in texture and color.

Color scheme: walls are pure white. Some windows are painted antique yellow, others green. Shutters are green; likewise the iron work.



Haight

HOUSE OF D. C. NORCROSS LOS ANGELES ROLAND E. COATE, ARCHITECT



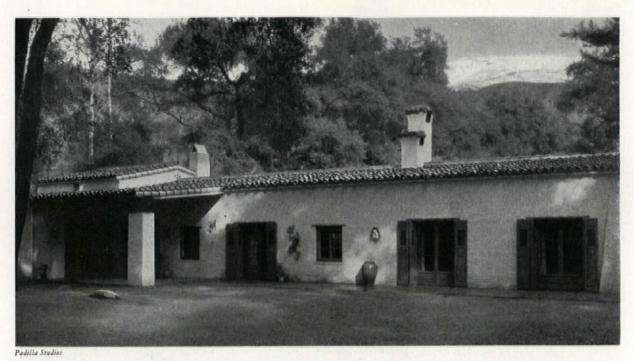
Haight

HOUSE OF D. C. NORCROSS LOS ANGELES ROLAND E. COATE, ARCHITECT



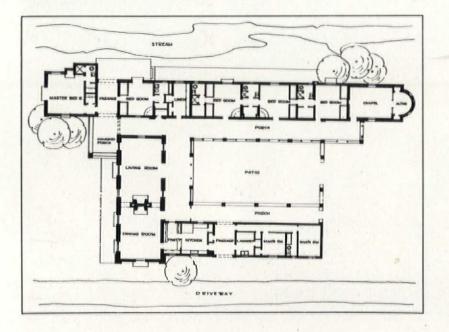
Haight

HOUSE OF D. C. NORCROSS LOS ANGELES ROLAND E. COATE, ARCHITECT



RANCH HOUSE FOR E. L. DOHENY SANTA PAULA CANYON, CALIF.

WALLACE NEFF, ARCHITECT



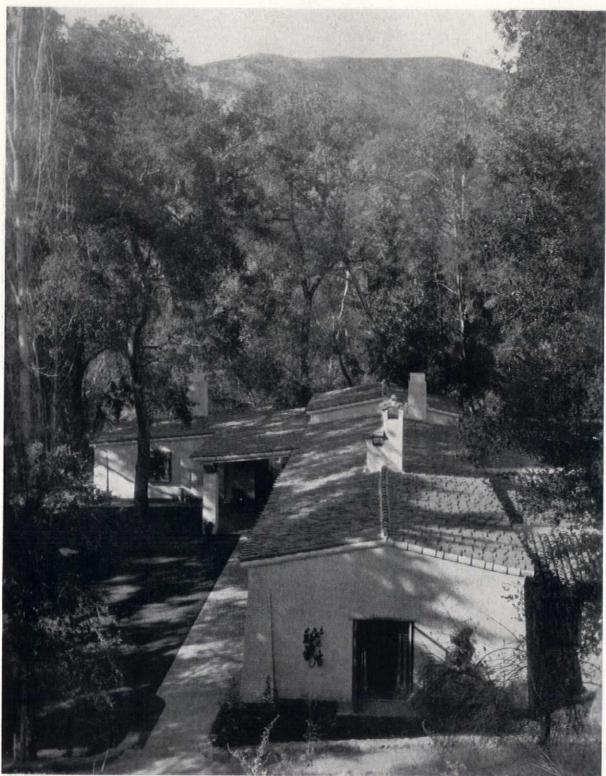
Site: along trout stream banked on each side with tremendous oak trees.

Roof: handmade burned clay tiles. Eaves are kept short^{*} to admit plenty of sunshine.

Chimneys: whitewashed brick with handmade tile caps.

Windows: California sugar pine.

Color scheme: walls of whitewashed brick; windows, shutters and iron work painted turquoise blue; tile floors" and roof of a variegated rose shade.

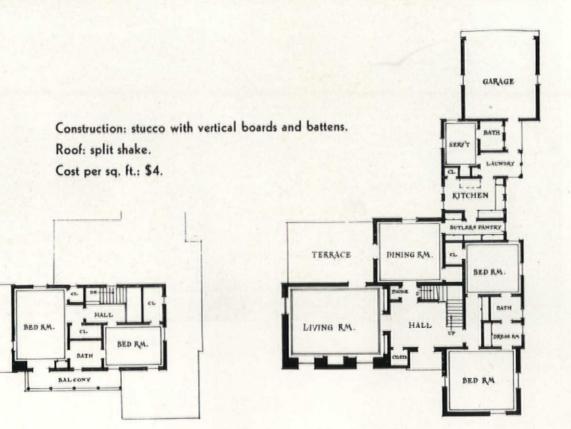


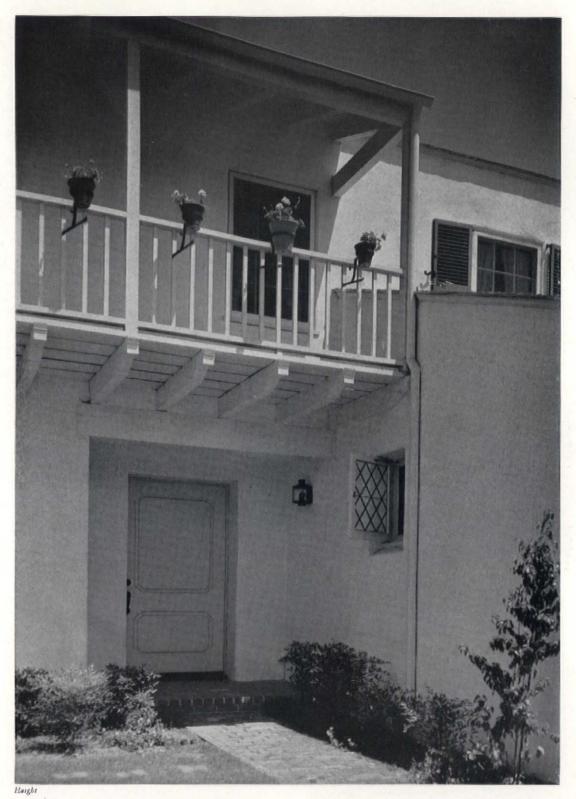
Padilla Studios

RANCH HOUSE FOR E. L. DOHENY SANTA PAULA CANYON, CALIF. WALLACE NEFF, ARCHITECT



HOUSE OF MRS. WILLIAM REDING PASADENA, CALIF. GARRETT VAN PELT, JR., ARCHITECT

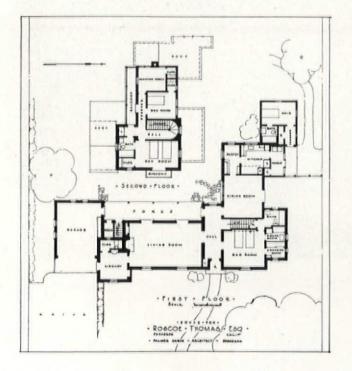




HOUSE OF MRS. WILLIAM RED!NG PASADENA, CALIF. GARRETT VAN PELT, JR., ARCHITECT



HOUSE OF ROSCOE THOMAS PASADENA, CALIF. PALMER SABIN, ARCHITECT



Site: house planned to fit existing basement and original planting. Advantage taken of a large pepper tree and a large oak tree on the property.

Roof: cedar shingles laid slightly random.

Chimneys: common brick seconds from old foundation.

Windows: double-hung, wood.

Walls: common brick seconds slightly random with flush joints.

Color scheme: exterior of walls of whitewashed brick using a thin coat of whitewash to blend the cement-stained brick; all sash sage green; balconies whitewashed and painted white.

Design: full use made of materials from old house. Living room given major importance with garden on the west.

Cost per cubic foot: 45c.



Clarke

HOUSE OF ROSCOE THOMAS PASADENA, CALIF. PALMER SABIN, ARCHITECT



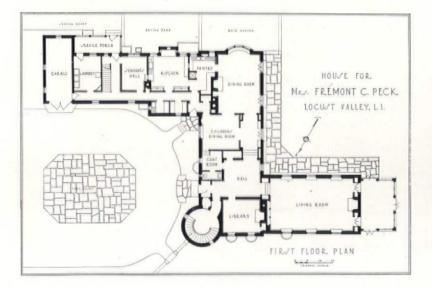
Clarke

HOUSE OF ROSCOE THOMAS PASADENA, CALIF. PALMER SABIN, ARCHITECT



Nybolm and Linco!n

HOUSE OF MRS. FREMONT C. PECK LOCUST VALLEY, LONG ISLAND BENJAMIN W. MORRIS, AND LANSING C. HOLDEN, JR., ARCHITECTS ARMISTEAD FITZHUGH, LANDSCAPE ARCHITECT



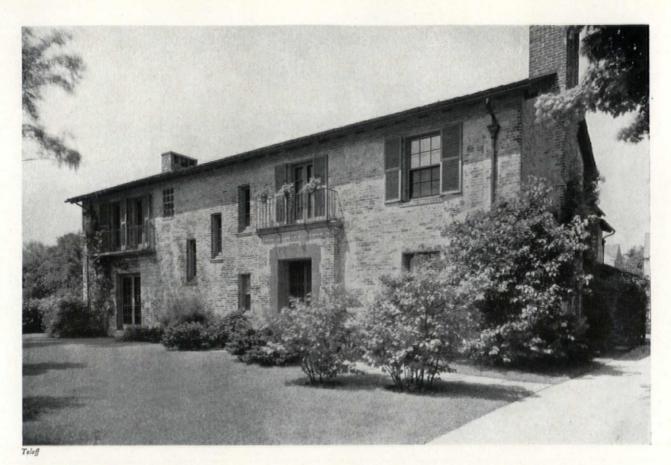
Roof: shingle tile, dark gray-green at the eaves to orange at the ridge.

Chimneys: common brick with burnt headers freely used and terra cotta chimney pots.

Windows: steel casement.

Walls: common brick built without plumb line, painted with a cream color waterproof cement wash. Tower windows and main entrance doorway trimmed with imported French limestone.

Cost per cu. ft.: \$1.07.



HOUSE OF FRED P. WARREN Evanston, Illinois Reginald D. Johnson, Architect Ruth dean, Landscape Architect

Roof: heavy shingles. Chimneys: common brick painted white. Windows: wood casement. Walls: common brick painted white. Color scheme: walls white; shutters green; roof natural. PANTRY HALL LIBRARY LIBRARY

Site: level city lot.



Toloff

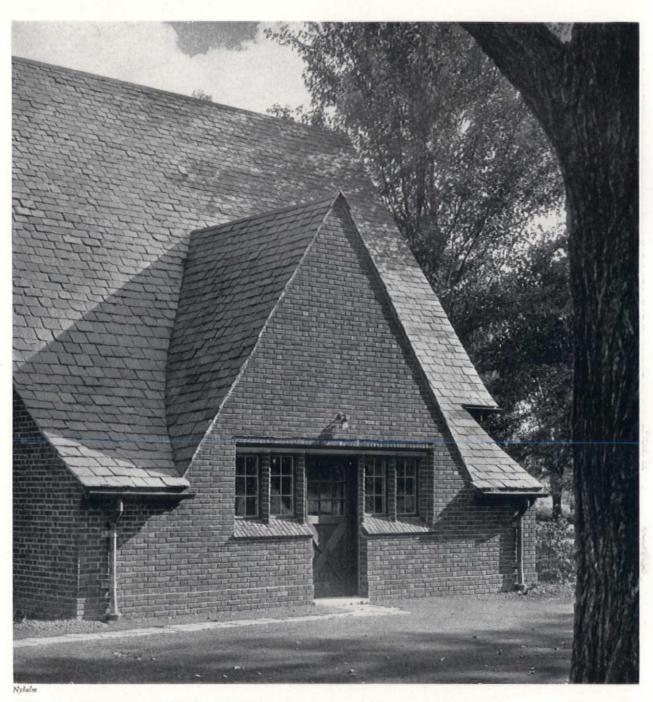
HOUSE OF FRED P. WARREN EVANSTON, ILLINOIS REGINALD D. JOHNSON, ARCHITECT





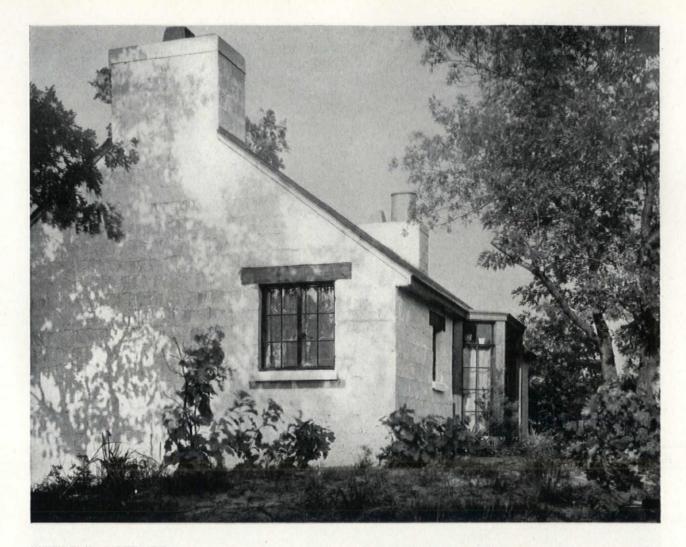
Toloff

HOUSE OF FRED P. WARREN evanston, illinois reginald d. Johnson, Architect

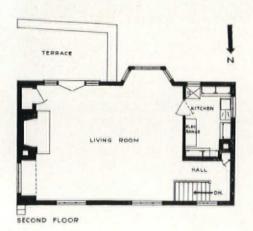


HOUSE FOR JAMES TURNER GROSSE POINTE, MICH. HENRY F. STANTON, ARCHITECT

> Rear of GARAGE, in which is located the heating plant, furnishing washed air as well as heat to the house. Roof: slates. Windows: steel casements with leaded glass. Walls: brick with raked joints.



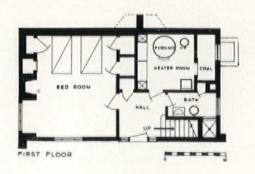
WEEK-END COTTAGE, CLIFTON TIDHOLM AND ELWOOD KOCH OGDEN DUNES, INDIANA HARRY HOWE BENTLEY, ARCHITECT

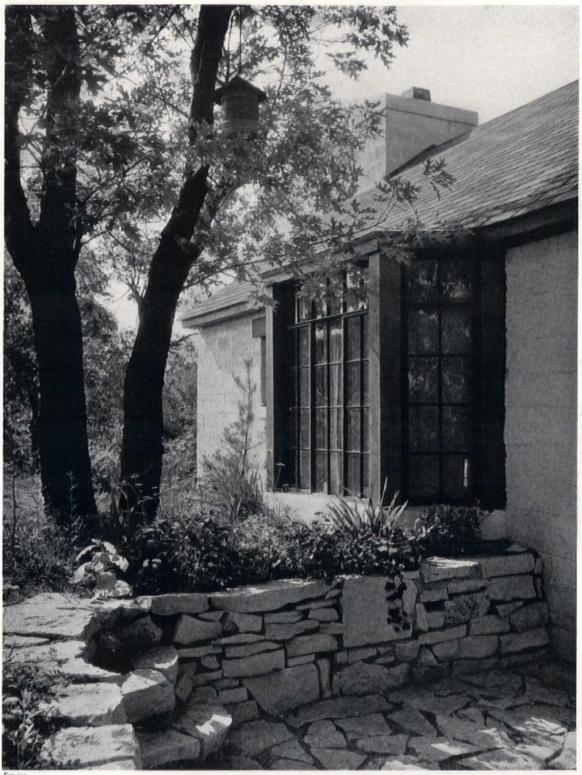


Site: slope of dune allows part of lower story to be above grade: bedroom and bath are placed here, and entire upper floor becomes a large living room.

Construction: haydite blocks, exposed and finished with white cement paint. Windows are metal casements. Roof of asbestos shingles.

Cost per cu. ft.: about 45c, including water supply and sewage disposal systems.



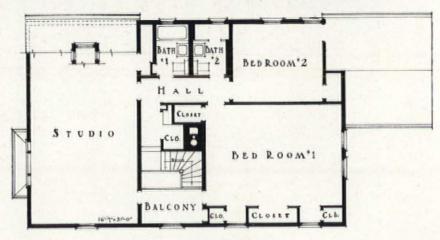


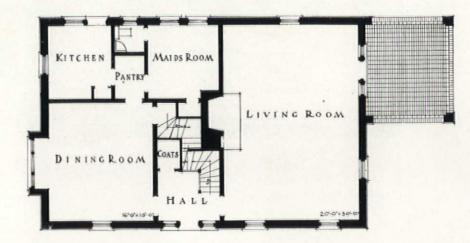
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WEEK-END COTTAGE OF CLIFTON TIDHOLM AND ELWOOD KOCH OGDEN DUNES, INDIANA HARRY HOWE BENTLEY, ARCHITECT



HOUSE FOR E. H. PARKS HAMPTON PARK ST. LOUIS COUNTY, MO. A. B. M. CORRUBIA, ARCHITECT E. H. PARKS, LANDSCAPE ARCHITECT







HOUSE FOR E. H. PARKS HAMPTON PARK, ST. LOUIS COUNTY, MO. ANGELO B. M. CORRUBIA, ARCHITECT

> Site: house set back about 300' from road and about 25' in back of a small creek. Points of interest in design: house was designed primarily as a studio residence and as a setting for a collection of early American furniture.

> Roof: underside left exposed, forming the ceiling of the second floor. Insulation from celotex covered with wood shingles with a 21/2'' air space. Ceilings painted and stained.

Color scheme: brick walls light red; siding and shingles stained brown; shutters painted a gray-green; window frames and main entrance stained brown; kitchen door and frame, porch door and frame, painted blue; copper work left natural. All floors throughout were yellow pine of random widths, being painted in some rooms and stained in others.

Total cost: \$20,000. Cost per cu. ft.: 42c.



Trafts

HOUSE FOR E. H. PARKS HAMPTON PARK, ST. LOUIS COUNTY, MO. ANGELO B. M. CORRUBIA, ARCHITECT



HOUSE OF H. M. LEINBACH WYOMISSING, PA. LEWIS BOWMAN, ARCHITECT ELMER A. MUHS, LANDSCAPE ARCHITECT

Site: a continuous slope. The entrance court was cut into the bank.

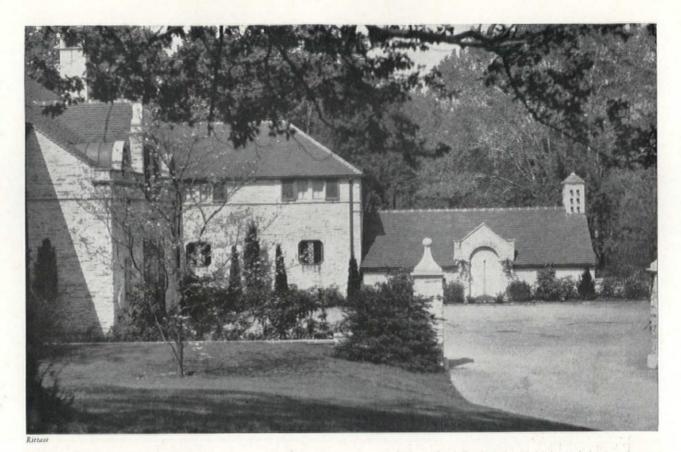
Roof: weathering green and gray slate.

Chimneys: local pale red brick.

Windows: steel, filled with leaded glass.

Walls: native Pennsylvania ledge rock.





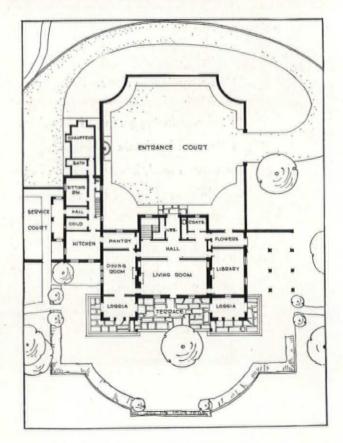
HOUSE OF A. G. B. STEEL CHESTNUT HILL, PA. ROBERT R. McGOODWIN ARCHITECT

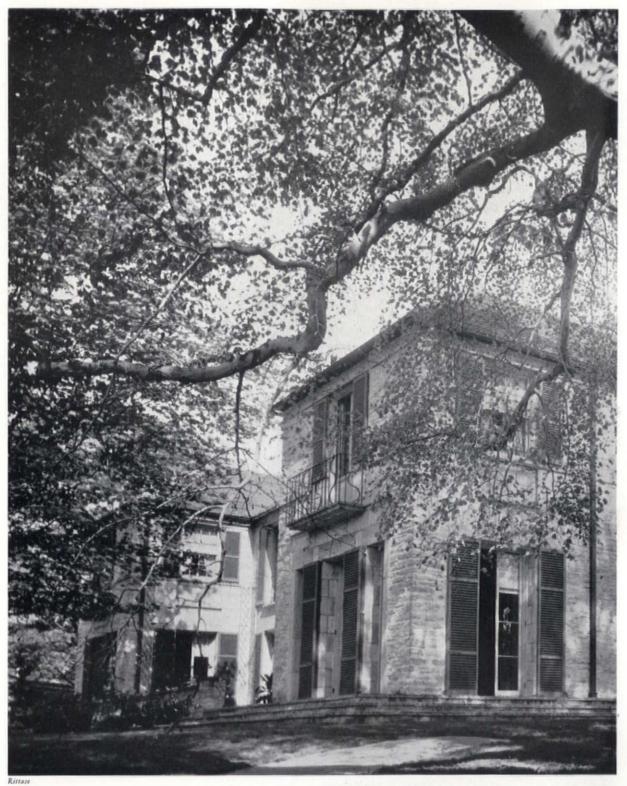
Site: wooded knoll comprising about ten acres. Steep contours permit use of basement of wing for large garage. Principal rooms have privacy, view of garden and southern exposure.

Roof: handmade shingle tiles of varying shades of dark red and brown.

Walls: local stone laid random range with flush joints, and washed grayish-yellow.

Chimneys: brick, washed with same mixture as walls, and capped with flagstone.

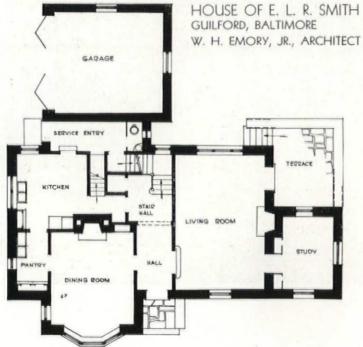




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HOUSE OF A. G. B. STEEL CHESTNUT HILL, PA. ROBERT R. McGOODWIN, ARCHITECT





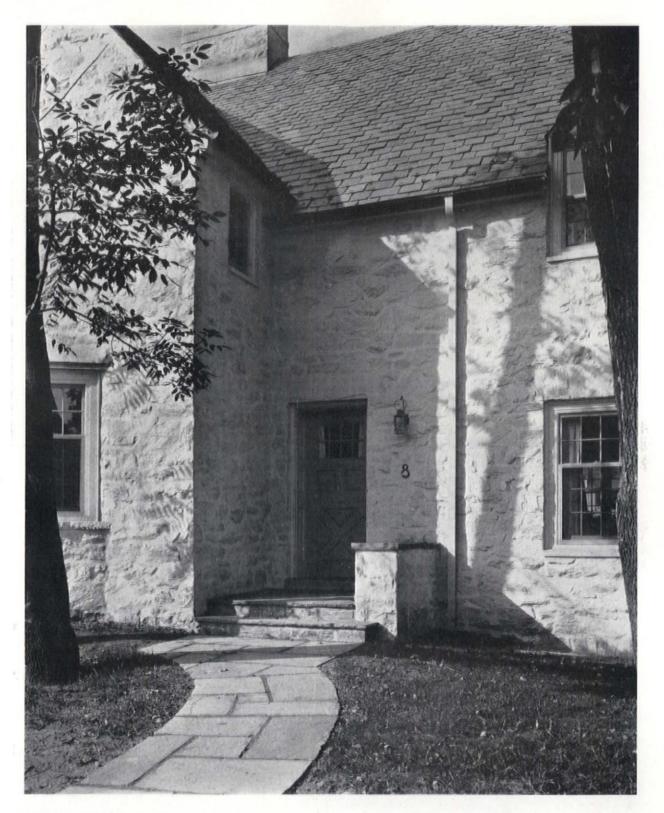
Site: difficulties were experienced in planning because of the narrowness and contours of the lot and location of a fine large oak tree, which it was desirable to keep without disturbing the roots.

Roof: unfaded green and gray-black slate, random widths, graduated, from 10" to 4" exposure.

Windows: double-hung with white exterior trim and very light-green sash.

Walls: local quarry stone laid ordinary rubble with joints struck with trowel.

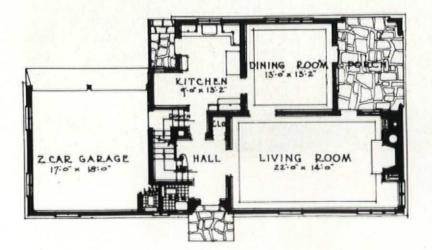
Cost per cu. ft .: about 46c.



HOUSE OF E. L. R. SMITH GUILFORD, BALTIMORE W. H. EMORY, JR., ARCHITECT



HOUSE OF MRS. J. WILLIAM LEWIS Rye, New York Julius Gregory, Architect J. William Lewis, Landscape Architect



Site: a level plot facing south with a brook at the rear.

Roof: shingles stained dark gray brown.

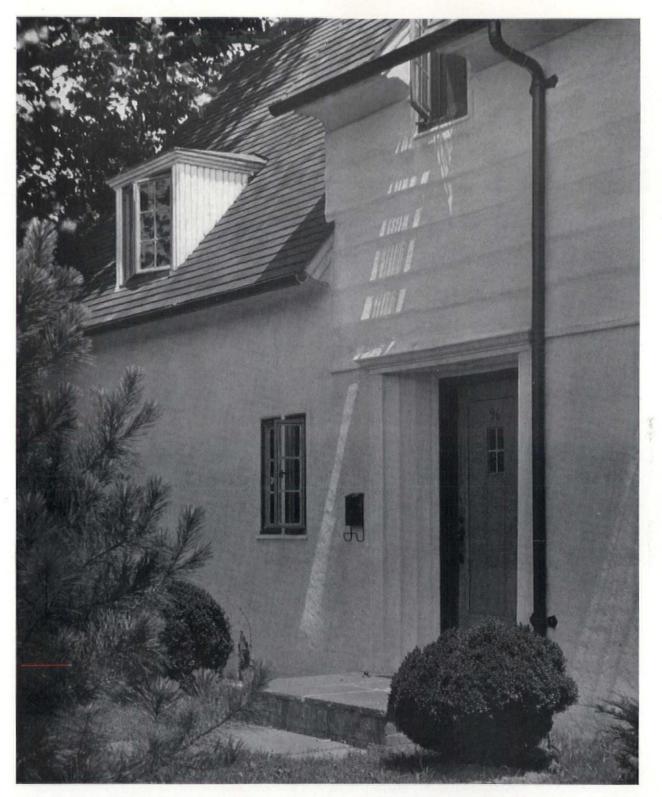
Chimney: white stucco.

Windows: steel casement, vertical glazing bars omitted.

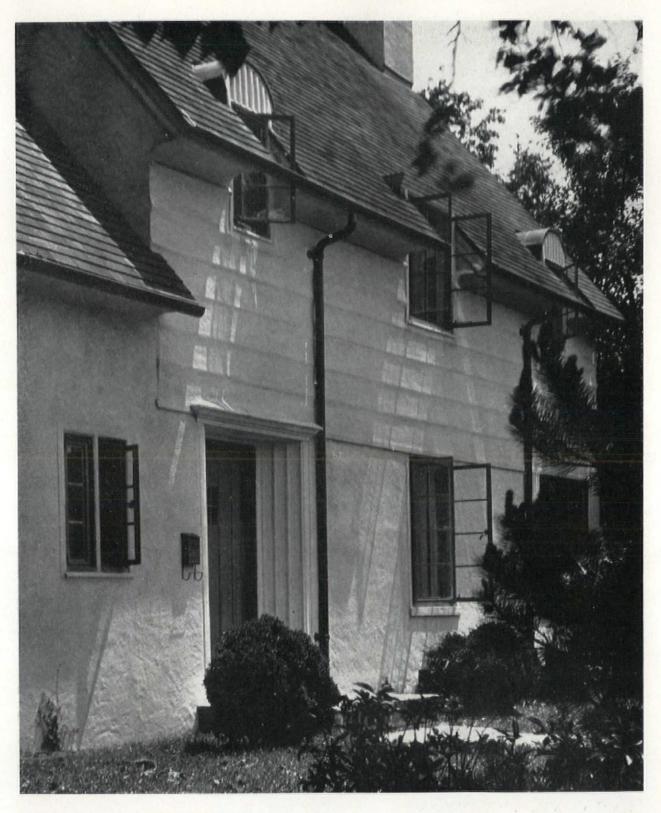
Walls: stucco on metal lath.

Cornices: stucco.

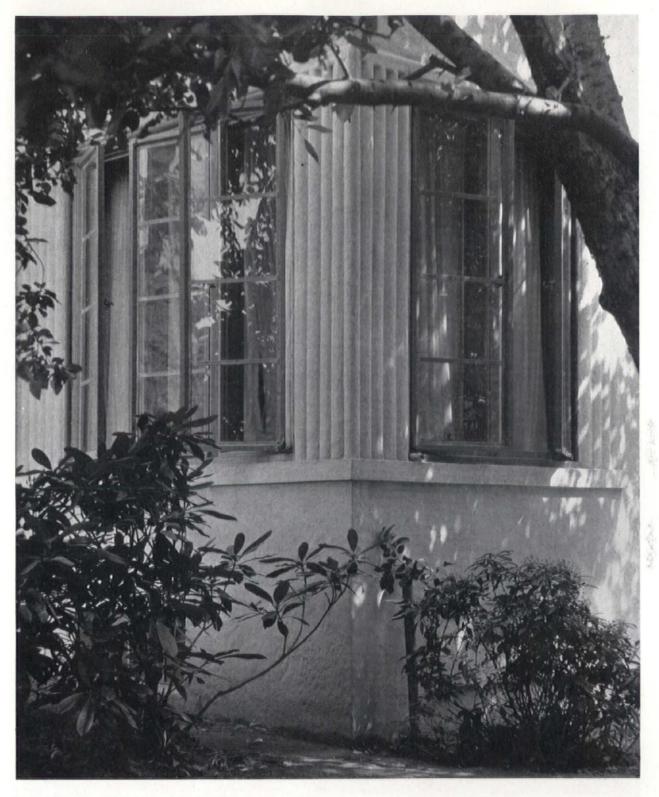
Color scheme: walls white; roof dark; sash warm gray.



HOUSE OF MRS. J. WILLIAM LEWIS RYE, NEW YORK JULIUS GREGORY, ARCHITECT



HOUSE OF MRS. J. WILLIAM LEWIS Rye, New York Julius Gregory, Architect

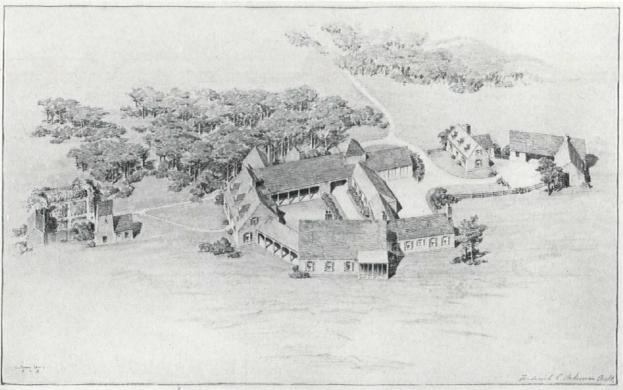


HOUSE OF MRS. J. WILLIAM LEWIS Rye, New York Julius Gregory, Architect

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HOUSE DESIGN COGGINS AND HEDLANDER, ARCHITECTS



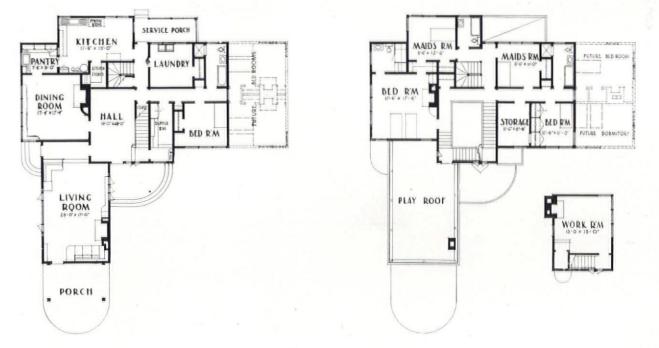
Shannon

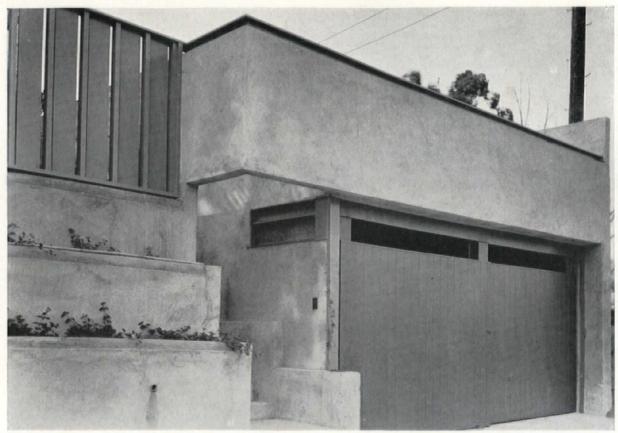
HOUSE FOR RANDOLPH PACK NANTUCKET, MASS. FREDERICK L. ACKERMAN, ARCHITECT Courtyard provides shelter from breezes coming in over the moors. Walls and roof of hand-split shingles. Chimneys of brick. House designed primarily for summer use.



HOUSE OF G. LYMAN PAINE NAUSHON ISLAND, WOODS HOLE, MASS. J. C. B. MOORE, ARCHITECT

The house has no cellar. Exterior is made of 12" Redwood boards running horizontally, between which are rabbetted drip strips of cypress, all finished with oil and laid over 1" furring strips running vertically. These hold very heavy roofing paper in horizontal bands and provide air space. On the inside the walls are finished with $\frac{1}{8}$ " Solidon on insulation board $\frac{1}{2}$ " thick. This board is used on all the ceilings also, $\frac{1}{2}$ " thick on the first floor and 1" under the roofs. Under the roofs the ceilings slope with the rafters and are unplastered.





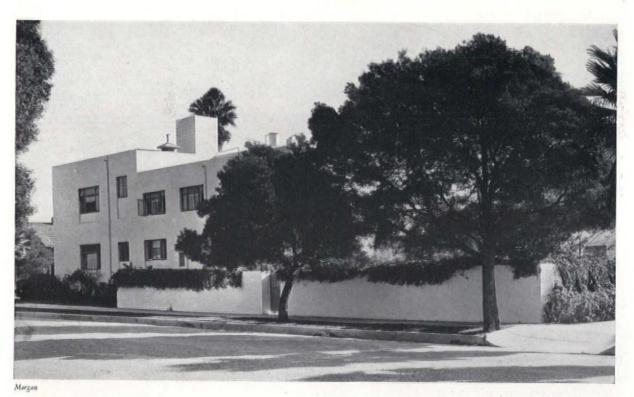
Morgan

ENTRANCE STUDIO OF CONRAD BUFF LOS ANGELES R. J. NEUTRA, ARCHITECT

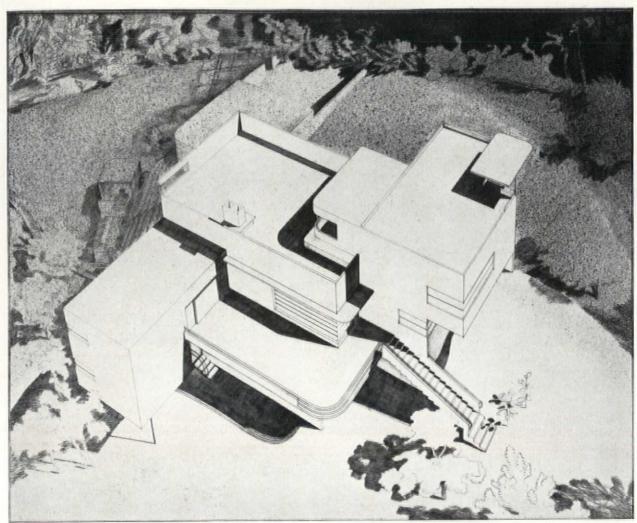




Built in 1911



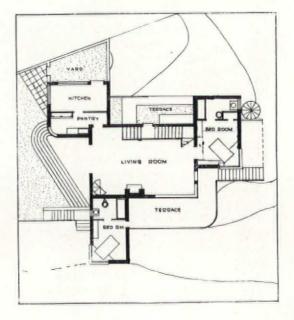
HOUSE OF MARY BANNING LOS ANGELES IRVING GILL, ARCHITECT

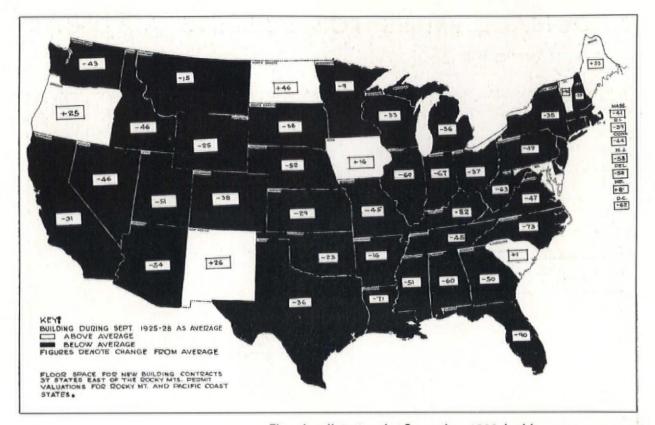


Palmer Shannon

HOUSE FOR MRS. G. F. PORTER OJAI, CALIF. HOWE AND LESCAZE, ARCHITECTS

Building consists of steel frame carried by concrete piers and walls. Wall built of two 3" thicknesses of masonry blocks, either tile or gypsum, with air space between stuccoed surface. Floors of light steel and concrete. Roof of gray flat tile. North and east walls, white; south and west, light blue; sash, dark blue; railing, white.





Though still spotty the September 1930 building map was more favorable than the August map. Eight states showed larger current new contract volumes than average (September 1925-1928); in August only five states showed new building above average.

BUILDING TRENDS AND OUTLOOK

ENGINEERING CONSTRUCTION AS IT RELATES TO BUILDING

The rapid progress in science and engineering during the past decade has wrought striking changes in our modes of living. Coincident with this transition, as much by cause as by effect, has come a remarkable development in the American skyline. Skyscrapers, residences, apartments, hotels, factories, schools are the more visible manifestations. But the broader consideration must count this development as only an incident in the processes that have made it possible. The septic tank, the clay road and the industrial smokestack are fast going the way of the coach and four while new engineering constructionpower and lighting plants, sewerage and water systems, highways, bridges, and myriad lanes of communication-have opened up new fields for even further development in building modes.

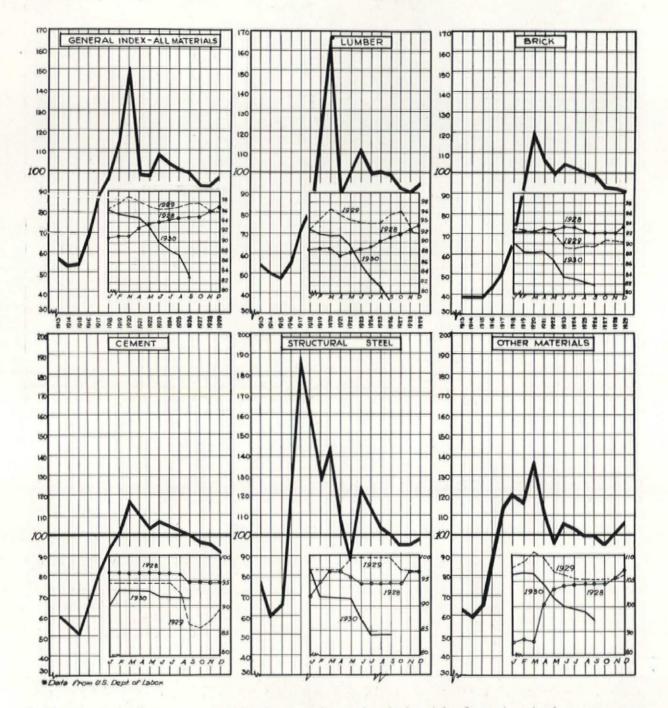
The automobile, the subdivision, intraurban population and business shifts, the electrification of industry—these and many other evidences of our rising living standards have put public authorities to the task of making further advances possible, while our privately owned utilities have methodically planned for this expansion and in this way are obtaining the rewards to which capital and initiative are justly entitled.

The construction of public works and utilities, despite all that has been said of them as a stabilizing influence to business, is still activated for the most part by conditions within the building industry itself and business conditions generally. During the period from 1919 to the end of 1929 public works and utilities representing new permanent improvements and extensions have contributed only 20 per cent to the total construction volume, with the remaining 80 per cent expended on building, both private and

(Continued on page 90, advertising section)

WHOLESALE PRICES FOR BUILDING MATERIALS

1926 monthly average = 100



Building material prices, as measured by the general index, moved downward further during September but showed only slight change during the early weeks of October. General commodity prices likewise declined in September with building material prices approaching the general commodity index. Labor cost indexes still fail to register any perceptible declines, though the General Building Contractor index disclosed for September the first movement in months, which in this case was downward. In the meantime, money is plentiful and continues to accumulate. With increasing activity in residential building, particularly apartments, which has recently manifested itself, it would appear that conditions making for revival in this branch of the industry are growing more favorable.



EGULAR classes by day . . . R adult classes by night . . . basketball and dancing in the gym . . . the modern school plant has come to occupy an important position in community life.

Proper maintenance of buildings and equipment grows constantly more difficult. One problem, however, has ceased to worry many architects, school authorities.

In hundreds of communities, the satisfactory upkeep of painted interiors has been entrusted to Barreled Sunlight.

Conspicuously good looking . . .

surprisingly resistant to dirt and to yellowing . . . readily washable . . . contributing materially to efficient working light . . . easily tinted any desired shade . . . Barreled Sunlight combines to an unusual degree the qualities essential to efficient, economical service in the modern school building.

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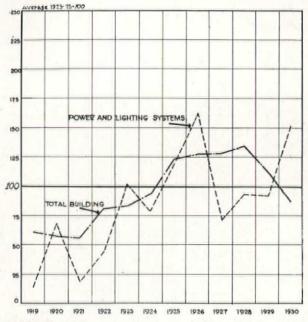


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The Architectural Record, November, 1930

BUILDING IN 27 NORTHEASTERN STATES: 1919-1930

A comparison with typical classes of public utilities; 1930 partly estimated.



BUILDING AND POWER AND LIGHT SYSTEMS

Expenditures for new power and lighting systems over the past few years have paralleled more closely than any other class of public or quasi-public construction the trend in expenditures for new buildings of all types.

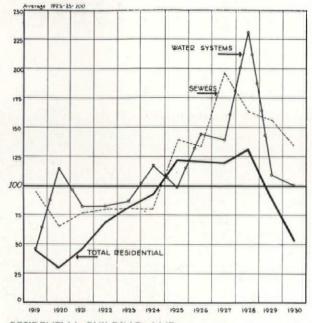
(Continued from page 442, editorial section)

public. None the less, were a sudden halt called in all engineering works the building industry, as we know it now and this goes for our living standards, would soon become decadent, for there is no branch of building which does not derive new life from the arteries of communication, power, light, sewerage and water systems.

Some types of public works and utilities are more readily attuned to building conditions than are others. The line of distinction seems to be one of ownership. Those undertaken by public authorities with public moneys show the lesser relationship, though indeed there is some, while utilities construction financed by private capital shows the greater relationship to building and underlying business conditions.

Thus expenditures for highways, which over the past decade have accounted for about 50 per cent of all public works and utilities, have moved rather independent of conditions peculiar to building, though even here, without larger and ever larger diffusion of automobile ownership and the attendant traffic problems, subdivisions and suburban realty developments could hardly have been possible on the scale of the past decade.

All remaining engineering construction over the



RESIDENTIAL BUILDING AND SEWERAGE AND WATER SYSTEMS

Under stimulus of easy money, rising realty values and larger tax levies, our state and municipal governments have apparently expanded their expenditures on sewerage and water systems beyond what now appears to have been the economic demand.

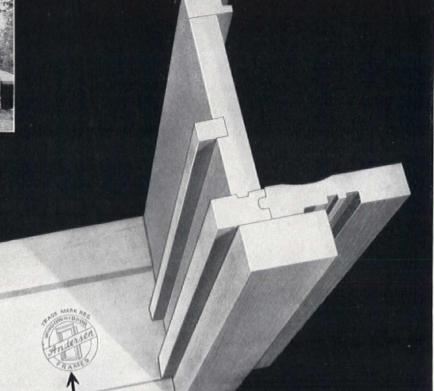
period under review contributed only about 10 per cent of the total expenditure for construction, inclusive of building. Thus it may be seen that railway construction including buildings, bridges, power and lighting systems, sewerage and water systems and water front developments, have had only small influence in the total volume of new construction. But their effects upon building far exceed this indicated small relationship.

Sewerage disposal and water systems, like highways, are principally undertaken by public authority, while railway construction and power and lighting systems are almost entirely privately owned. Expenditures for sewerage disposal and water systems over the past decade have, it would appear, far outrun the demands of new building. Taking the years 1923 to 1925 as a basing point, water systems ranged from 45 for 1919 to an index well above 225 in 1928, the peak building year, though residential building in the same period showed a low point of about 30 for 1920 and a high point of only about 130 for 1928.

Sewerage systems over the same period ranged from a low of about 65 for 1920 to a high of about 195 for 1927. Water systems declined sharply in 1929 and 1930 while the decline in sewer systems, though less

Architects turn to this new frame with locked sill-joint for better construction





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The Architectural Record, November, 1930

drastic, has continued since 1927. The record discloses that during the first half of the period beginning 1919 both water and sewerage systems pretty much paralleled residential building. But for the latter half of the period, under the stimulus of easy money, rising realty values and larger tax levies our state and municipal governments expanded their expenditures on these items beyond what seems now to have been the economic demand. As a matter of fact it may now be said that new residential building had, during the years since 1924, been carried on in a volume in excess of our ability to consume housing, in the light of which the excess construction of sewerage and water systems, particularly in suburban areas, has placed an even heavier burden upon real estate from the investment standpoint. What is said of sewerage and water holds for all other engineering construction under governmental authority. As a result of this our taxing authorities have more or less arbitrarily had to increase realty assessments to provide the needed taxes to retire the indebtedness which this expansion has incurred.

It would appear that this condition presents a real problem to planning commissions, architects and real estate boards, since it may develop as an important limiting factor on new building by private funds.

Where building is financed principally by private funds engineering works are entirely financed by public moneys, present and in prospect, and private capital willing to submit to public supervision.

Expenditures for new power and lighting systems over the past few years paralleled more closely than any other class of public or quasi-public construction the trend in expenditures for new building. Though there have been periods when one or the other was on a higher plane, in general their lines of growth over the past eleven years have been strikingly similar. This is more than accidental. These utility types for the most part are owned by private capital. Their engineers are charged with the task of showing earnings on capital and in this must survey the needs arising out of changing trends in population, housing, shifts in commercial and industrial sections. Conduits, cables, trunk lines-these are part of capital which must bring dividends and pay bond interest even under the limitations of public supervision.

Some considerable time naturally elapses before plant extensions and enlargements can show earnings; so much more, then, is it necessary for the utility companies to anticipate future needs correctly. And this, in the past decade, they seem to have done well. That power plant extensions and enlargements of lighting systems have shown consistent growth since 1926 even in the face of our present depressed building and business conditions is nothing more, it would appear, than a recognition that the long-term demands are still rising and that no time is more propitious for the development of our privately owned utilities than a period of depression when commodity markets, labor conditions and money rates are favorable to economic expansion.

The electrification of industry and the growing use of natural gas in the arts are eliminating the industrial smoke nuisance and providing a greater opportunity for architectural directness in the design of our industrial plants. In this process our factory buildings in many instances are becoming obsolete, and in the rehabilitation which seems likely, because of the relative ease in money and construction costs, American industry may be on the eve of large building activity in which the alert architect will play an increasingly important role.

New architect-planned industrial plants undertaken during the first nine months of 1930 showed a loss of only 25 per cent from the corresponding period of 1929. At the same time, engineer-planned factories which are the more important, showed a loss from 1929 amounting to 32 per cent. As a matter of further interest in this connection all architectplanned non-residential building during the first nine months of 1930 declined only 12 per cent from the corresponding nine months of 1929, while nonresidential building planned by engineers or undertaken from private plans showed a loss of 30 per cent.

In the meantime it is becoming increasingly clear that the stimulus to construction and business generally which has been feebly provided by large public works construction is abating. It is indeed of large significance that the record-breaking awards for public works and utilities for the first nine months of 1930 have been almost entirely due to such undertakings by private capital, principally for the erection of pipe lines and power plant extensions, but for which even engineering would now be running behind 1929.

Quite naturally there are limits to the taxing powers of our states and municipalities. Even the Federal Government, which derives its revenues principally on earned incomes under our present system of taxation, is faced with lower revenues for 1931 in the light of the depressed business conditions of 1930. Then, too, public debt limits of most of our states and municipalities have been either reached or are uncomfortably close.

Thus the relationship between building and engineering construction is of large importance, with a need for closer gearing of publicly owned projects to building demands. To burden land with taxes for public improvements, however meritorious, for which no present reasonable economic need exists seems to offer an obstacle—though by no means the only one—in the way of early restoration of large new-building activity, which of necessity must proceed from a fundamentally sounder basis than has attended the large activity that was so abruptly brought to a close months ago.

L. SETH SCHNITMAN

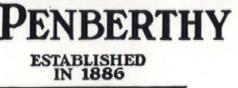
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WESTERN UNION DIDN'T GUESS - - THEY TESTED FLOOR MATERIALS



Covering an entire block, and rising to a height of 400 feet, this new Western Union Building is a noteworthy addition to the New York City skyline. The Bonded Floors of *Sealex* Treadlite Tile were installed in this building by Rollo, Johnson and Seidler, Authorized Contractors of Bonded Floors.

WHEN WESTERN UNION officials decided to erect in New York City the largest central telegraph office in the world they were confronted with a flooring problem of unusual complexity. Operating room floors-with a 24 hour working day-required a material which could withstand extreme wear, absorb a minimum of light and a maximum of sound, at lowest maintenance and repair cost.

The investment involved in this installation (approximately 200,000 square feet) required facts. Guess work was "out," too much was at stake. So test patches of many materials were laid down, in one of the company's older buildings. Service tests were conducted over a period of many months. And the result was the selection of Bonded Floors of Sealex Treadlite Tile for Western Union's new building. This material had once again proved its leadership under the most exacting circumstances.

Handsome and practical, colorful and up-to-date, Western Union's Bonded Floors not only were economical to lay, but held down maintenance costs substantially. And they are backed by a Guaranty Bond!

Write Department F. for details of our nationwide installation service.

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BONDED FLOORS



Bonded Floors are floors of Sealex Linoleum and Sealex Treadlite Tile, backed by a Guaranty Bond. Authorised Contractors of Bonded Floors are located in principal cities.



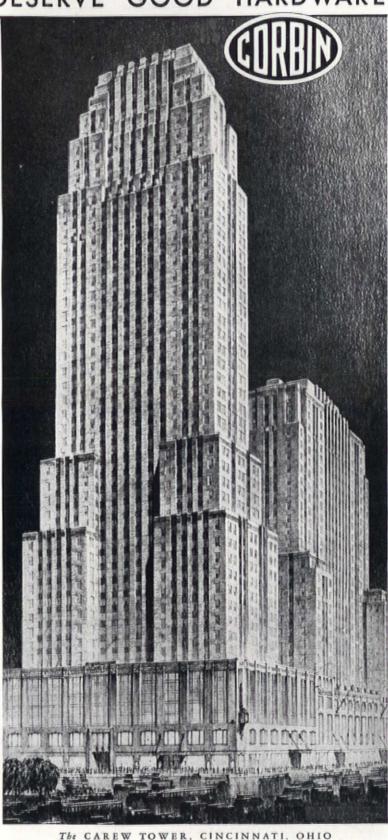


The Architectural Record, November, 1930

GOOD BUILDINGS DESERVE GOOD HARDWARE

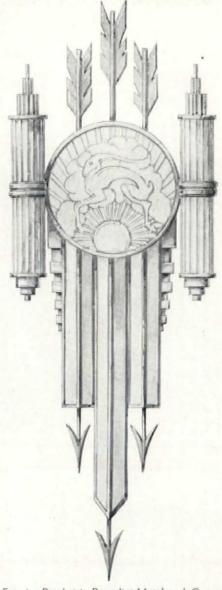
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The CAREW TOWER, CINCINNATI, OF Architect Associate Architects Contractors Hardware Walter Ahlschlager, Chicago Delano & Aldrich, New York Starrett Building Company, Chicago P. & F. Corbin

The Architectural Record, November, 1930



Exterior Bracket in Benedict Metal and Carved Glass for Powhatan Apartments—Chicago— Robert S. DeGolyer, Architect

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increase confidence of prospective purchasers

A BUYER'S market existed in Iowa. A surplus of homes made new building risky. The Ferguson Realty Company, progressive builders of Des Moines, undertook a survey of the housing situation, and decided to beat competition solely with better construction. Hardware, tilework, lighting, trim and decoration were of the highest quality. And Kohler installations throughout, in color!... Ninety-seven lots sold. Fifty-seven with built-to-order homes!

"The results were very gratifying," writes Oscar L. Powell, member of the firm. "Kohler plumbing fixtures met with instantaneous approval of prospective buyers, and speeded up rentals. We are firm in the belief that Kohler fixtures increase confidence of prospective purchasers, and add a margin of safety to speculative projects.

"During the last five years we have used Kohler fixtures exclusively, installing them on over 350 jobs, and we have never had a defective fixture, or any complaint of any kind to make. That is truly a remarkable record, and evidence of the high standards and uniformity of manufacture of the Kohler Co.... We prefer Kohler's pastel colors, which can be easily taken into a harmonious color scheme without increased work or worry.

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Satisfaction with the bathroom usually means satisfaction with the rest of the house. Graceful in design, pleasing in color, soundly constructed, the quality of these fixtures goes straight through to all the hidden particulars that mean efficiency, safety, permanence. Remember that Kohler fixtures deserve Kohler fittings....Kohler Co. Founded 1873. Kohler, Wis. — Shipping Point, Sheboygan, Wis. — Branches in principal cities.... Look for the Kohler trade-mark on each fixture and fitting.



All-Kohler color installations on the operation of the J. C. Ferguson Realty Co., Des Moines, Ia., owners and builders. Guy McDowell, Des Moines, architect. Landis Plumbing Co., Des Moines plumbers. Beckman Bros., Des Moines, jobbers.



VICEROY bath. STANDISH vitreous china lavatory. PENRYN closet with TAUNTON seat. Fittings in the distinguished Octachrome pattern, chromium plated.

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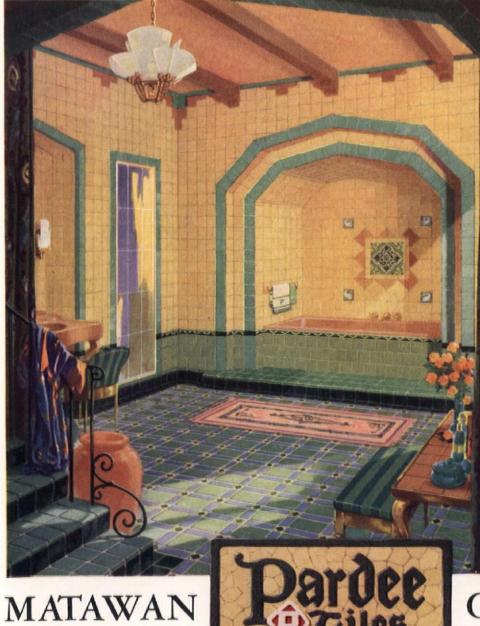
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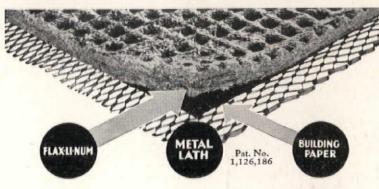
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This beautiful structure is "Modernistic" in design with a plant section containing some of the largest printing presses in the world. Above the ground floor there are 36 stories of offices, all with outside exposure.

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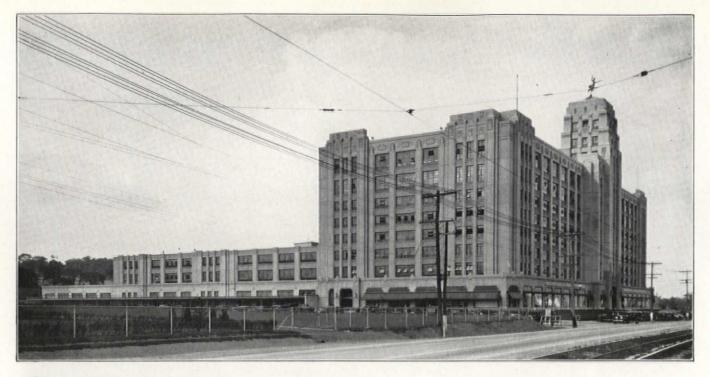


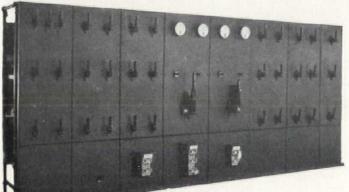
THE NEWS BUILDING, New York

John Mead Howells & Raymond M. Hood (Associated) General Contractors: Hegeman-Harris Co., Inc. Engineers for Plant Section: Lockwood-Greene, Inc.



For the architect's convenience, Russwin Hardware is illustrated and described in Sweet's Catalogue—pages C-3137; C-3216.





A TRUMBULL INSTALLATION

De

This new Montgomery Ward & Co. Building is a 100% Trumbull job

IN the new Montgomery Ward Building at Albany, N. Y. all of the lighting panelboards and power distribution panelboards were of "Circle T" manufacture, as was also the safety type main switchboard illustrated above. Incidentally, all the safety switches used throughout this very modern and interesting building were of "Circle T" construction, making the whole a 100% Trumbull job.

See the Trumbull "Circle T" catalogue in the new 4-volume Sweet's Vol. D, pages 5164-5165.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY PLAINVILLE CONNECTICUT

A GENERAL ELECTRIC OR GANIZATION

Branch Panelboard and Switchboard Factory at Ludlow, Kentucky A. G. Electric Mfg. Co. Division Branch Panelboard and Switchboard Factories Los Angeles Seattle



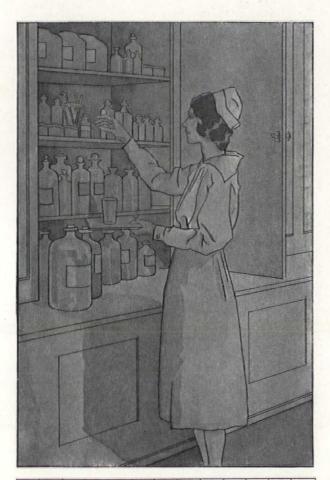
BRIXMENT mortar is used regularly for mid-winter masonry even in the severest northern climates.

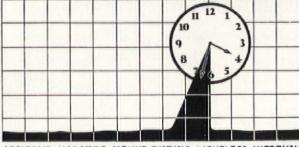
In fact, during the winter months more Brixment is sold in proportion to the volume of building construction *than at any other time*. Louisville Cement Company, Incorporated, Louisville, Kentucky.

CEMENT MANUFACTURERS SINCE 1830



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PROVISION for reducing lightless intervals is as much a part of good lighting as adequate illumination and well-planned lighting circuits. During these lightless intervals workers stand idle . . . busy machines are stopped . . . spoilage increases . . . and accident hazards mount.

Westinghouse Nofuz panelboards decrease lightless intervals to the minimum. Momentary overloads do not open the circuit—but the wiring is protected at all times. When, on abnormal overloads the breaker opens the circuit, service can be restored by anyone by a flip of the handle—provided the overload is cleared. However, the breaker cannot be held closed against an abnormal overload—the mechanism trips free from the handle.

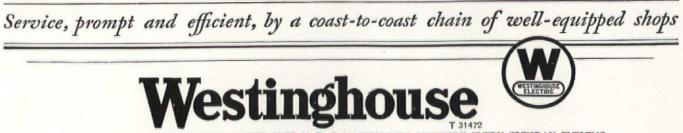
The non-welding contacts on Nofuz panelboard breakers have withstood repeated openings of a 5000-ampere short circuit. Also, breakers have been operated more than 67,000 times at full load without damage.





Above—Nofuz breaker enclosed in a fire and moisture-proof asbestos composition bousing. Left—Nofuz breaker with cover removed.

*Lightless Intervals are periods when lights are out because of a blown fuse or the opening of a circuit protecting device.



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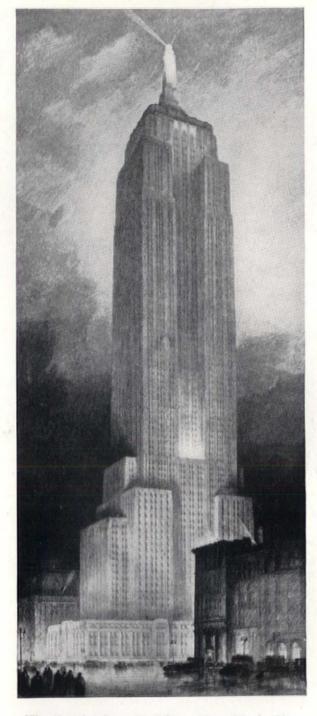
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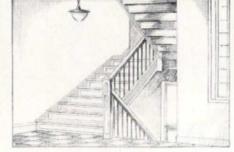
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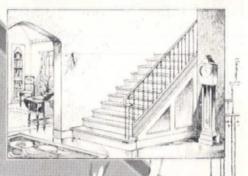
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The Architectural Record, November, 1930

109



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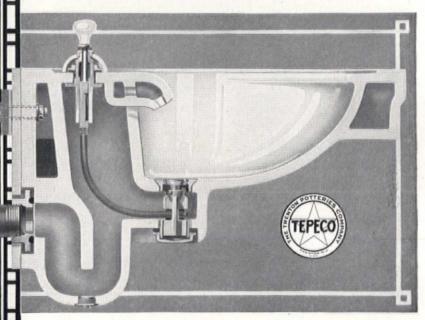
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The Architectural Record, November, 1930

Plate 2081-T Te-pe-co "Gothian" Lavatory with combination Supply Fittings

Plate 2085-T Te-pe-co "Gothian"

Lavatory with Combination Supply Fittings through wall.

Plate 2083-T Te-pe-co "Gothian" LavatorywithAll-China Combination Supply

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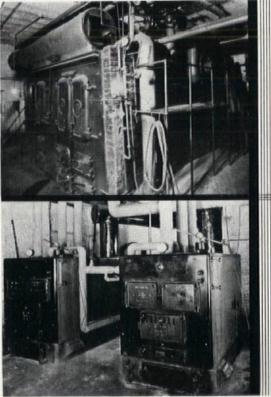
And though the temperature in that northern city is extremely severe the students were warm and comfortable—always.

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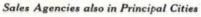
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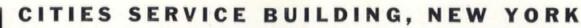
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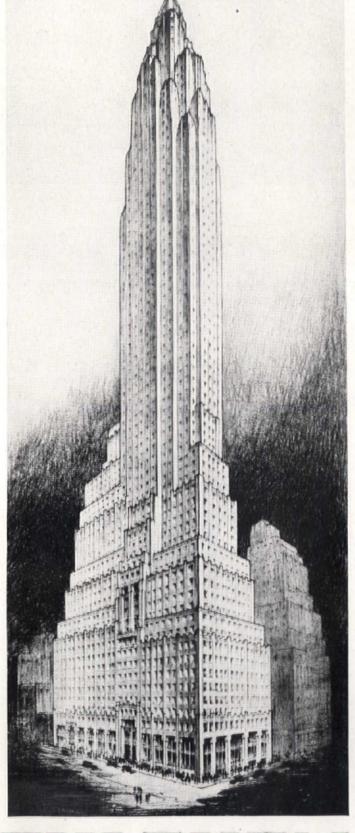




The Architectural Record, November, 1930







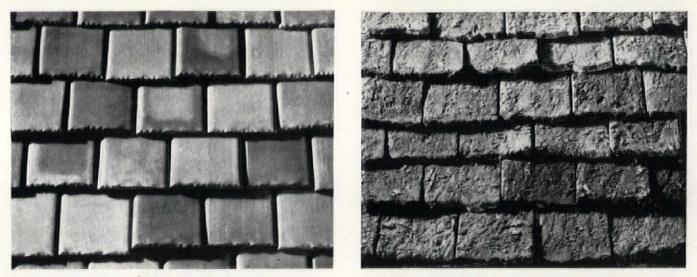
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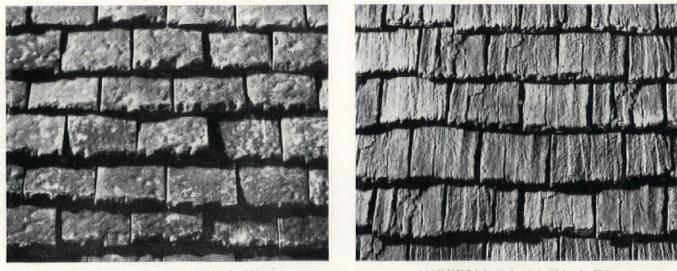


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- the name to remember and insert especially when you get into the drain specification — floors, roofs, showers, urinals — wherever drains are required. Wherever drain engineering is desired refer to Josam catalog G, in which over 100 drains and associated practical sanitary products are illustrated and detailed. (See list below.) Send for your copy today.

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> FACTORY: MICHIGAN CITY, INDIANA BRANCHES IN ALL PRINCIPAL CITIES

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THE BALLINGER COMPANY

DURING its 52 years practice of architecture and engineering the Ballinger Company, of Philadelphia and New York, has been responsible for the designing and supervision of construction of more than 1,500 commercial, industrial and institutional buildings with a value in excess of \$100,000,000.

The staff, numbering about seventy persons, has been carefully organized for the expert design and supervision of erection of buildings and their entire equipment. It consists of architects and civil, structural, mechanical, electrical, heating, ventilating, sanitary and fire protection engineers.

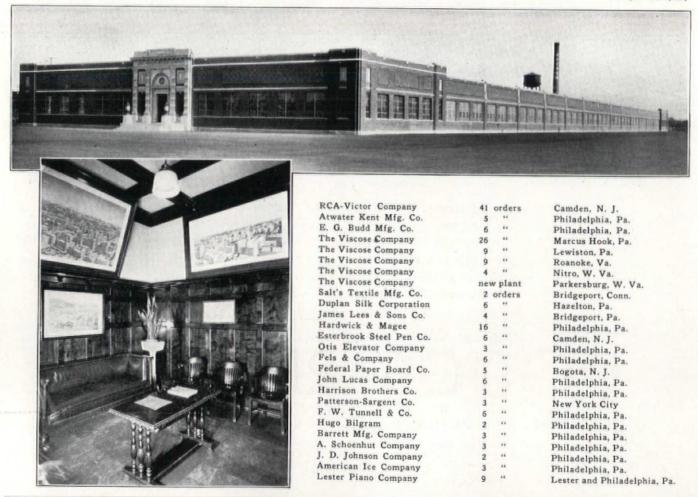
Some notable examples of buildings designed by this organization include those for R C A Victor Company, Watson Stabilator Company, Atwater Kent Company, National Casket Company, York, Hanover and Easton Hospitals; American Chicle and the Viscose Company plants; Barker, Wesley and Union Bank office buildings; Malvern Hall, Embassy and 1900 Spruce Street apartments, Masonic and Methodist Homes for the Aged, and the Philadelphia Home for Incurables.

This distinguished firm was organized in 1878 by Walter H. Geissinger, who took into partnership Edward M. Hales. In 1894, after the retirement of the founder, Mr. Hales associated with Walter F. Ballinger. Mr. Hales retired in 1900 and the firm became Ballinger & Perrot. Ten years ago Mr. Ballinger purchased the entire interest and the present name was adopted. In 1925, upon the death of Walter F. Ballinger, the business was continued by a partnership including:

| | Service |
|---------------------------------|---------|
| Robert I. Ballinger, R.A. | 14 |
| William R. Fogg, R.E. | 26 |
| Clifford H. Shivers, R.A., R.E. | 25 |
| Carl de Moll, R.A., R.E. | 21 |
| Jean Paul Richter, R.A. | 28 |
| Josiah H. Smith, R.E. | 16 |
| George W. Stinson, R.A. | 22 |

Voora of

Below, Watson Stabilator Company building, a recent commission executed by The Ballinger Company. Below, left, reception room in the Philadelphia offices of this firm. Below, right, nationally known clients that have given two or more commissions to The Ballinger Company



Gives News to DODGE

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AN ORGANIZATION C

ARCHITECTS AND ENGINEERS S. E. COR. 12 " AND CHESTNUT STS. PHILADELPHIA September 9, 1930.

Mr. Wm. M. Hunter, F. W. Dodge Corporation, 1321 Arch Street, Philadelphia, Pa.

Dear Mr. Hunter:

I recently saw a chart your organization is using to bring to the attention of your prospective subscribers the value of your report service in directing the operations of salesmen and eliminating useless sales calls.

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This is not done as a courtesy, but because it is good business for us. At one or more periods in the progress of each project we handle, the men in charge need information. When we advise you of our work, we get the data we need when we need it.

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Yours very truly.

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windows, blending ing views. Office effects produced make it a happier **CASEMENT** place in which to live



with interior decorations, provide softer light and shut out disturbpartitions, too, take this decorative treatment. And transoms. The color by art glass lighting lift the drabness from this work-a-day world and

most practical applications of art glass is



cent glass transforms glare stitutes a rose tinge for grayfound in into



Probably one of the skylights. Here opalesfriendly light. Or sub-

ness when clouds hang low without Art in glass is a medium in which you can TRANSOMS work with some nearby craftsman to produce effects that place your work, large or small, in the distinguished achievements of your profession.

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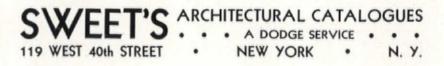
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Here, filed in four compact volumes, are the catalogues of 1,500 manufacturers of building products—new, revised and up-to-date—6,037 catalogue pages.

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Similarly, other patented Nie-



decken features furnish valuable advantages: the far advanced Niedecken Mixer and specially designed, positively leak-proof

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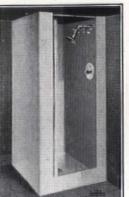
Patented mixer control, for shower or tub, provides a predetermined maximum hot water temperature. This prevents scalding, and also the waste of water as in ordinarily obtaining the correct water tem-



perature. Also, one valve operates the mixer instead of two, as ordinarily used. Write now for details: acquaint yourself with this bath advancement, for your own information and the benefit of your clients.

POSITIVELY LEAK-PROOF SHOWER STALL

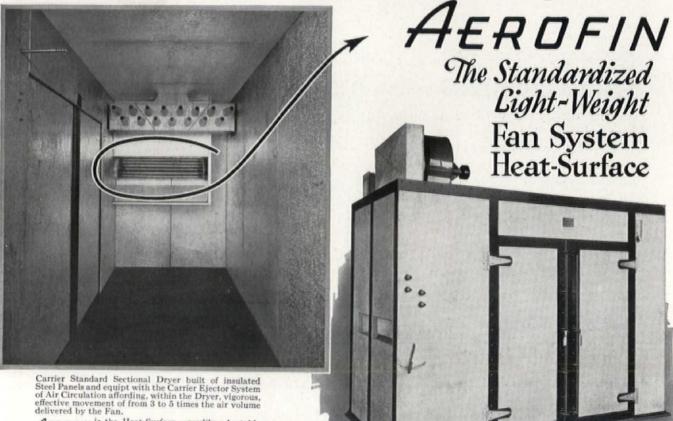
The Niedecken Shower Stall is made of a continuous 1/8-inch copper bearing steel-which, with the



riser, is welded to the bottom. Thus it is positively leak proof for all time. Also, the Niedecken Shower Stall takes less room than others and is low in first cost as well as upkeep. Write immediately for Niedecken literature-to have Niedecken in your files, and in your mind.

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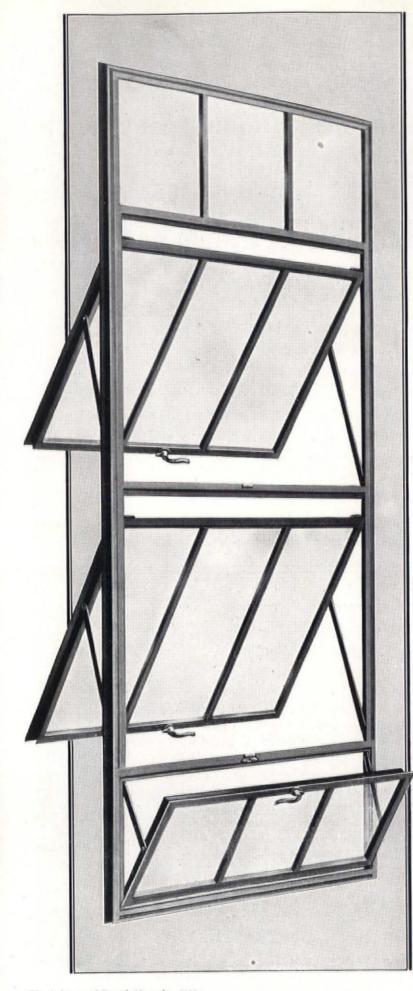
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The Architectural Record, November, 1930



Associated Business Papers, Inc., 1929 awards for editorial excellence

THE ARCHITECTURAL RECORD WON FIRST PRIZE

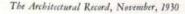
In the class devoted to "Best Article, Series of Articles, or News Report" (in which there were 85 contestants), first prize was awarded to Robert L. Davison, of the editorial staff of The Architectural Record, for the series of articles appearing in The Record under the general heading, "Technical News and Research."

The outstanding qualities which won FIRST PRIZE are indicated in the conditions governing the contest, which state "the Jury will be guided broadly by the timeliness, accuracy, thoroughness, originality, clearness of expression and usefulness as displayed by the particular article or series of articles, etc."

The Technical News and Research section of The Record, inaugurated with the January, 1929, issue, is a new departure in publishing—a creative service designed to meet a pressing need of the architectural profession. It consists of monthly analytical studies, in exhaustive detail, of building problems in relation to specific types of construction; each study verifies and correlates a mass of practical information, elsewhere virtually unobtainable but of a kind urgently needed by the architect for his daily work—although he cannot spare time for the protracted research necessary to assemble it. The studies provide manufacturers with a new avenue of contact with architects, suggest new uses for materials, and simplify the problems of production and marketing by indicating where architects employ products to the best advantage.

The ARCHITECTURAL RECORD

A Dodge publication-119 West Fortieth Street, New York, N. Y. Member A.B.C. and A.B.P., Inc.

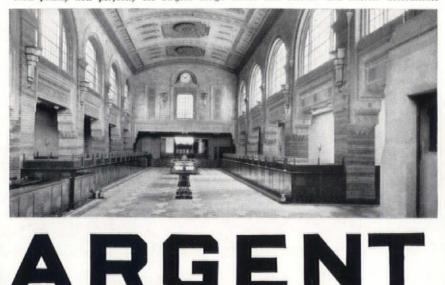


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HARDWARE



The Architectural Record, November, 1930

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Circle Tower, Indianapolis. Rubush and Hunter, Architects.

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May we tell you what these merits are?

For Specifications and Details See 1930 Sweet's-Pages B-2607-2626.

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Kitchen in Coffee Shop of New Yorker Hotel, New York (Architects: Sugarman & Berger, New York). Monel Metal equipment manufactured and installed by THE JOHN VAN RANGE CO., Cincinnati. The "Vulcan" ranges of Monel Metal made by STANDARD GAS EQUIPMENT CO., New York, and Monel Metal refrigerators made by LORILLARD DIVISION OF ALBERT PICK-BARTH CO., INC.



Write for "Modern Kitchens", a booklet on design and specification of food service equipment.



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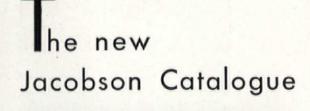
THE new unique Cen-tury Bubblerhead is a phenomenal success. Everywhere it is winning enthusiastic approval with its outstanding performance under actual working conditions. Now, we want you to witness the amazing results of this automatic bubblerhead. See for yourself the convenient, wholesome drinking stream that is produced with each turn of the handle. Note the full stream it produces with a minimum water pressure, then increase the pressure to fifty pounds, to a hundred pounds. The drinking stream never varys. Sudden, splashing gushes are completely eliminated. This is efficiency!

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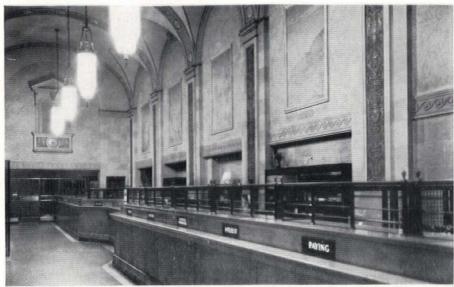
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NOTE: Models listed in former catalogues are always available.



BANK LIGHTING that suggests security and dignity

by WILLIAM NEUMANN, A. I. A. of William Neumann & Sons, Architects Jersey City, N. J.

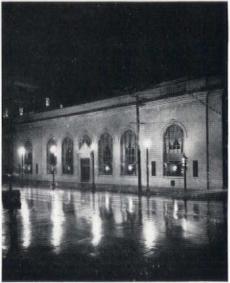
IN the Boulevard Branch of the Hudson City Savings Bank at Jersey City, New Jersey, exterior floodlighting and modern interior lighting lend emphasis to the architectural design of the building and help to create an atmosphere that builds confidence in the bank's services.

In reaching a decision on important points about this lighting installation, the lighting bureau of the local electric service company provided valuable technical advice. The bureau was able to suggest various methods for floodlighting the exterior of the building and to demonstrate the features of these methods in existing floodlighting installations.

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The exterior of the building is floodlighted by five lantern standard units.



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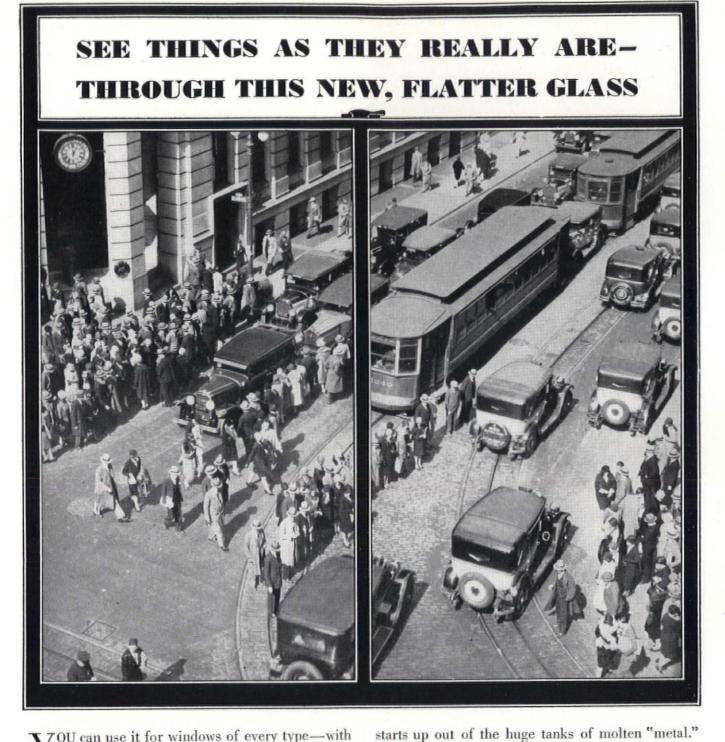
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Write for complete specifications and details, or see our catalogs in "Sweets" on "KANE QUALITY" Rustless Insect Screens, Venetian Blinds and Metal Weather Strips.



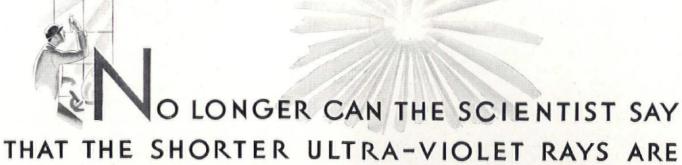
R-S Fountains Are Proven Ones!

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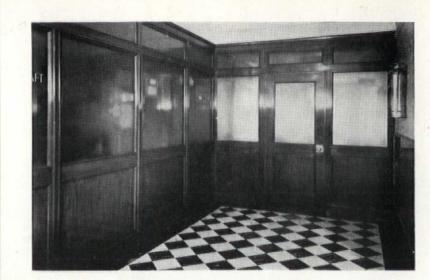
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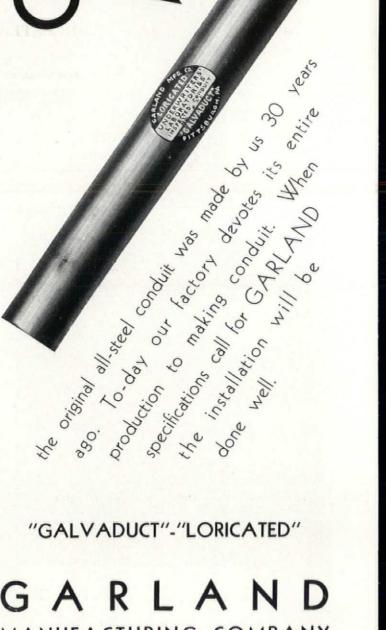
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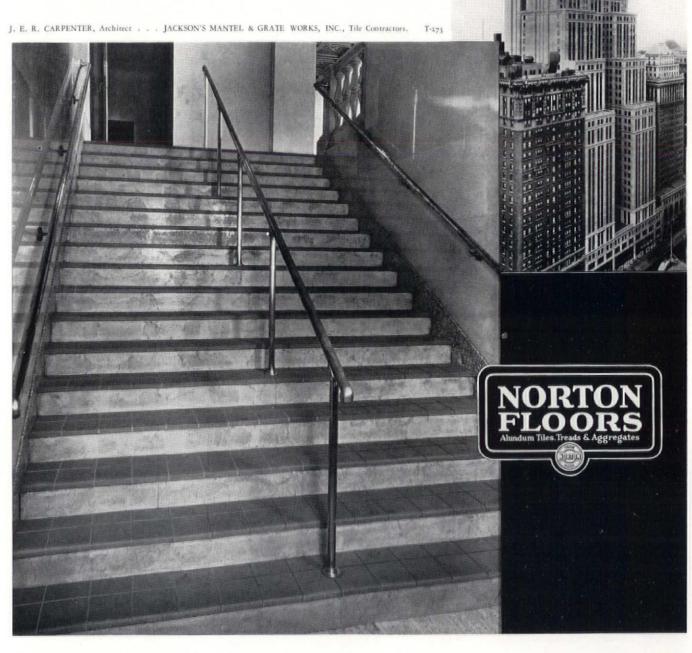
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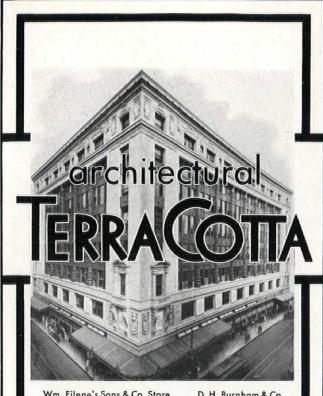
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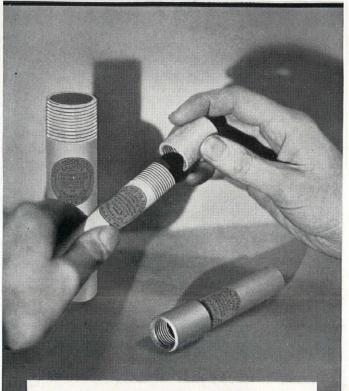
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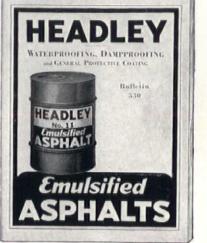
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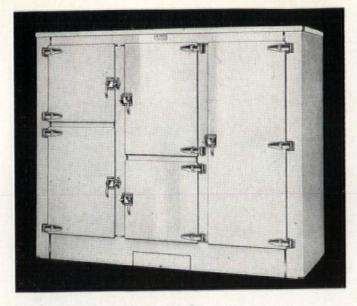
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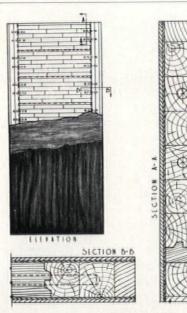
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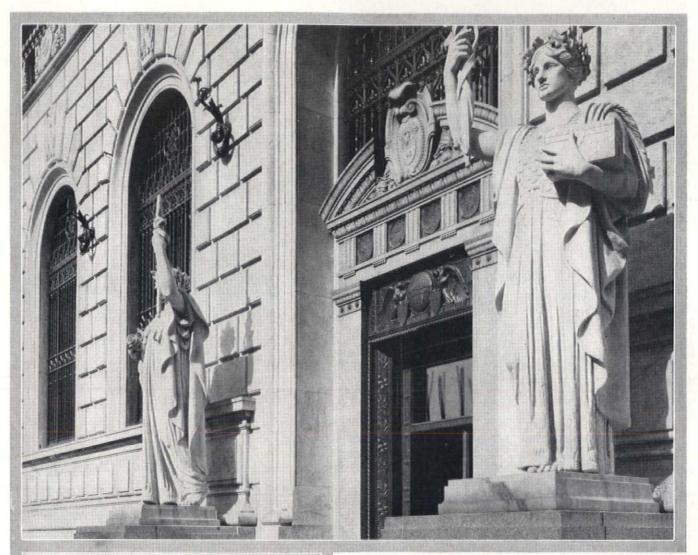
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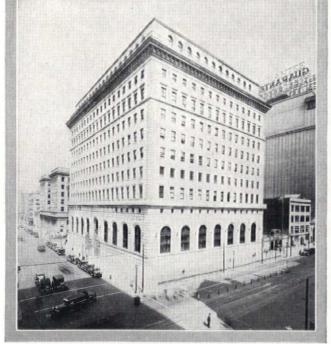
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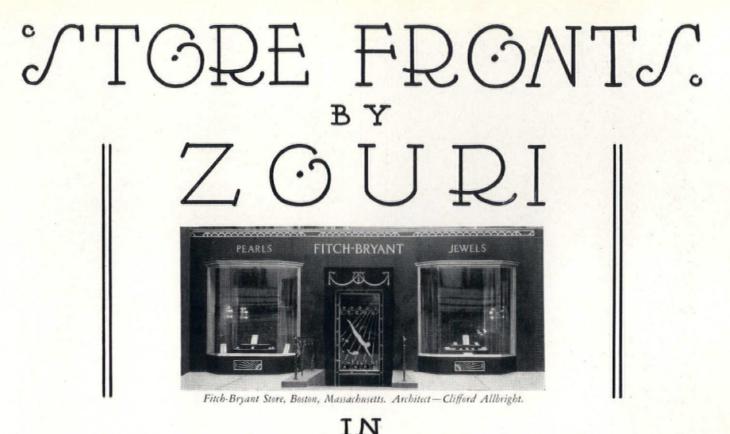
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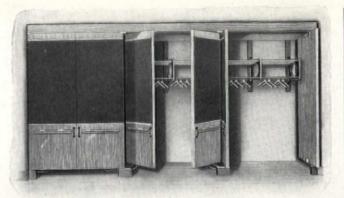
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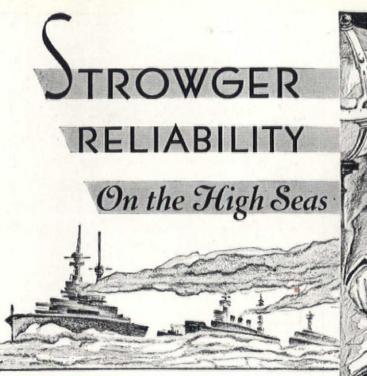
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 State of New York, County of New York, S. before me, a notary public in and for the State and county aforesaid, personally appeared J. A. Oakley, who, having been duly sworn according to law, deposes and says that he is the Business Manager of THE ARCHITECTURAL RECORD, published by F. W. Dodge Corporation, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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The Architectural Record, November, 1930

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MISCELLANEOUS Cutter Mausoleum, Charlotte, N. C. Harkness Mausoleum, New York City Pynchon Memorial Building, Springfield, Mass. Dormitory for Franciscan Fathers Granby, Mass. State Armory, Norwood, Mass. Exchange St. Bridge, Pawtucket, R. I. Steps to Church and Terrace, Chappaqua, N. Y.

ARCHITECTS M. H. Westhoff E. G. Southey **Olmstead Bros. Presbrey-Leland Co. James Gamble Rogers** M. H. Westhoff

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The Ortho-Tone Company, originators of "radio in every room" systems, for hotels, again pioneers in this field with the Ortho-Tone Pra-1-40. A machine which, though smaller, embodies all of the advantages of the larger Ortho-Tone machines. Ortho-Tone Pra-1-40 is designed for small hotels, schools, and high-class tourist camps.

Ortho-Tone also offers their regular line of proved radio fixtures. A ceiling fixture which combines lights, fan, and loud speaker with special non-radiating features which prevent

room-to-room interference, a wall panel which permits the guest a greater selection of program—these are but a few of the advantages to be found in Ortho-Tone equipment.

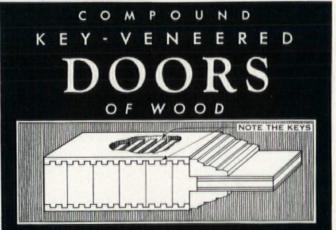
To further aid the profession the Ortho-Tone company has prepared a booklet "Radio in Every Room," in which they offer the results of their experience as builders of fine hotel radio equipment. The widespread use of Ortho-Tone installation gives the manufacturers an opportunity to meet radio needs of any kind. The booklet is yours for the asking.

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Write for your copy.

LEONARD-ROOKE COMPANY Elmwood Station Providence, R. I.



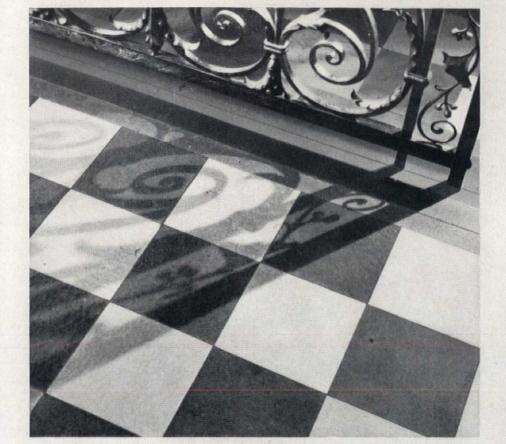
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This window is weather-proof when closed and draft-proof when opened. Both sides of all sashes can be washed from the interior. It will not rattle, and can be operated with ease. The stationary bar between lower and middle sash makes it a safety window. Made

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CLASSIFIED DIRECTORY OF ADVERTISERS

Alphabetical Index to Advertisers, Page 178

After reviewing advertisements in this issue—use Sweet's Architectural Catalogues for 1930 for catalogue and specification information on the products of the most of the manufacturers.

Acid Proof Chemical Stoneware Knight, Maurice A.

Acoustics

Armstrong Cork & Insulation Co. Boston Acoustical Eng. Division of Housing Company

Guastavino, R., Co. Johns-Manville Corp. U. S. Gypsum Co.

Air Conditioner American Blower Co. Buffalo Forge Co. Doherty-Brehm Co. Lewis Corporation

Air Washer Buffalo Forge Co.

Aluminum Co. of America

Architectural Supplies Higgins, Chas. M., & Co.

Artstone—Rackle, George, & Sons Co. Asbestos—Johns-Manville Corporation

Basement, Windows—Steel Detroit Steel Products Co. Kalman Steel Co. Truscon Steel Company

Bathroom Accessories Parker Charles Company

Beads—Corner Metal Kalman Steel Co. Milcor Steel Co. Truscon Steel Company

Beams, Angles, Channels, Etc. Bethlehem Steel Co. Carnegie Steel Company Jones & Laughlin Steel Corp.

Belts—Dayton Rubber Mfg. Co.

Blackboards-Weber Costello Co.

Boilers—American Gas Products Co. American Radiator Co. Dahlquist Mfg. Co. Heggie-Simplex Boiler Co. Pierce, Butler & Pierce Mfg. Co. Smith, H. B., Company, The, Inc. Wood Gar Engineering Co.

Bolts-Door-Corbin, P. & F.

Brass and Bronze See "Ornamental Metal"

Brick-Finzer Bros. Clay Co.

Bridges—Steel—American Bridge Co. Bethlehem Steel Co.

Building Paper Angier Corporation National Steel Fabric Co.

Buildings—Steel Carnegie Steel Company

Butts-Corbin, P. & F. Stanley Works

Cabinet Work—Hyde-Murphy Co. Cabinets—Kitchen Olean Metal Cabinet Works, Inc. Cabinets—Medicine—Parker Charles Company Cabinets—Toilet Paper Victoria Paper Mills Co.

Casement Operators-Rixson, Oscar C., Company

Casements—Bayley, William, Co. Crittall Casement Window Co. Detroit Steel Products Co. International Casement Co. Mesker Bros. Iron Company Michaels Art Bronze Co. Truscon Steel Company

Cast Stone

Cast Stone Institute Cellar Drainer

Penberthy Injector Co.

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Corkboard

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Dishwasher—Electric Conover Company

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Door and Window Frames Andersen Frame Corp.

The Architectural Record, November, 1930

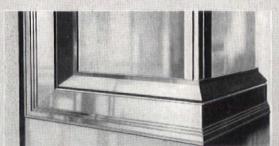
STORE FRONTS



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by a corps of skilled craftsmen. Every rolled, extruded or cast unit is carefully executed and assembled by this trained staff, assuring the architect a faithful rendering, in metal, of his design. Upon request we will send new free Book of Modern Store Front installations, also description and F. S. Details of "B" Construction.



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Cheney Flashing installed in Parapet wall. Note keys ready for mortar to form "The Unbreakable Key Bond"

THERE IS NO SUBSTITUTE—NO IMITATION —AT ANY PRICE—FOR THIS READY-TO-USE, ECONOMICAL THRU-WALL FLASHING

CHENEY INTERLOCKING THRU-WALL FLASHING

prevents Seepage, Leaks and Efflorescence

"Does Not Break the Bond"

Cheney Flashing is Economical. It comes to the job Readyto-use, and is built into the mortar bed as the masonry progresses without fitting, soldering or loss of time.

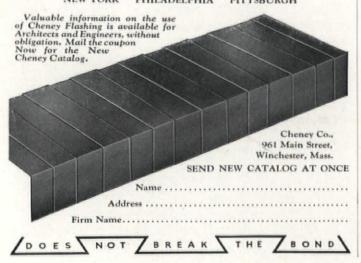
It is the only Ready-to-use Thru-wall copper Flashing made. It runs completely thru the masonry wall and forms a positive unbreakable key-bond in every direction within the mortar bed.

"It does not break the bond," because it is keyed both horizontally and vertically on both sides of each strip. The ends of the strips hook together to form a continuous course.

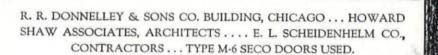
Cheney Flashing scientifically solves the problem of seepage in masonry walls and positively prevents leaks, efflorescence, disintegration of the walls, and the rusting of steel spandrels and lintels from this cause.

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SECO Heavy-duty Doors are rigidly and heavily constructed, with extra heavy trucking bars . . . evenly counter-balanced and truckable . . . and because of their specially lubricated ball-bearing sheaves and anti-friction adjustable shoes, they operate quietly, quickly, and easily, either by hand or when power operated.

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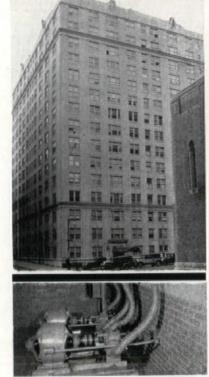
SECURITY FIRE DOOR CO. 3044 Lambdin Ave., ST. LOUIS OFFICES IN NEW YORK . . . BOSTON . . . PHILADELPHIA . . . CHICAGO SAN FRANCISCO . . . LOS ANGELES . . . DETROIT AND OTHER PRINCIPAL CITIES



The Architectural Record, November, 1930

677

HUNDRED PUMPS ITHIN A PUMP ...



In New York City at 100th Street and West End Avenue, a Model 5D5 Westco with 5 h.p. motor delivers 100 g.p.m. at 80 ft.



After hearing the enthusiastic reports of Westco users, you may ask, "What is it about the Westco that enables it to set such a high standard of pump performance?" The answer is just this: "Westco's secret of trouble-free performance, long life and efficiency lies in its simple, sound Turbine Principle."

efficiency lies in its simple, sound Turbine Principle." Water is pumped by the rotation of a solid, one piece bronze impeller which operates with free running clearance. This en-tire absence of metal to metal contact absolutely eliminates the factor of friction within the pump chamber. Westco's impeller is vaned on BOTH sides at its periphery. This characteristic greatly increases the pump's efficiency for it is these vanes that force the water around the pump chamber and send it charging through the outlet. Furthermore, water entering through Westco's double-suction intake is equalized when it strikes the impeller, thus creating a natural hydraulic balance which eliminates all end-thrust at bearing points. The Westco with its multi-vaned impeller is virtually "A Hundred Pumps Within A Pump."



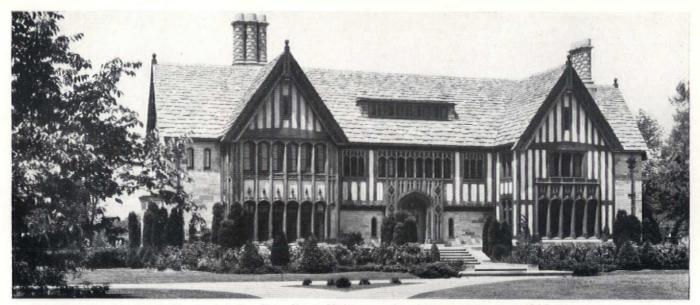
REVIEW THE IMPORTANT WESTCO FEATURES LISTED BELOW Wide operating range. No end thrust at bearings due to perfect hydraulic balance. Only one moving part. No metal to metal contact.

High pressures in single stage. Ball bearing construction. Direct motor driven at standard motor speeds. Capacities from 5 to 400 g.p.m.

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In the residence of Mr. Oscar Webber, 619 Lake Shore Drive, Detroit, Michigan, complete telephone convenience is provided by fourteen telephone outlets, including two in the garage and one on the third floor. Built-in conduit carries the wiring for the telephone system which includes intercommunicating features. LEONARD WILLEKE, Architect, Detroit.

Planning in advance for telephones

contributes to the greater convenience and efficiency of the modern home

ARCHITECTS today generally recognize the desirability of providing for telephone arrangements in their plans for new and remodeled residences. In this way the particular needs of each individual family can be fully met.

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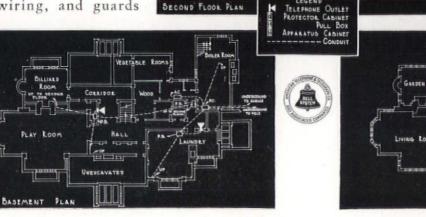
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Your local Bell Company will gladly place

important data about household communication at your disposal, as well as arrange for conferences between its representatives, your clients and yourself.

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167

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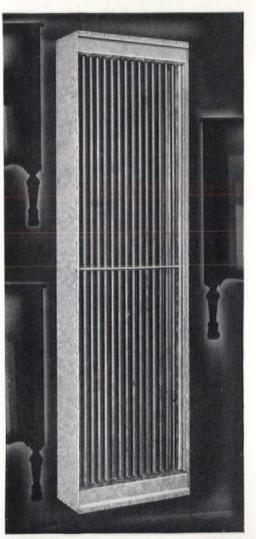
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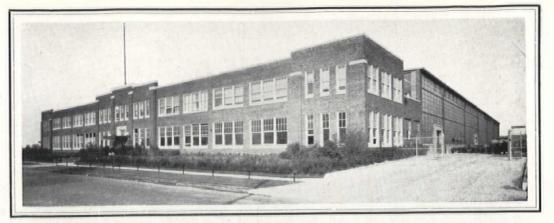
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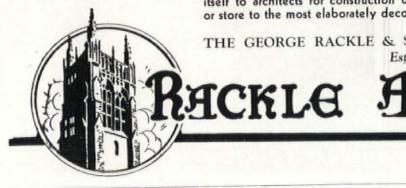
Plant of the Geometric Stamping Company, at Cleveland, Ohio. The Austin Co., engineers and builders



Our catalogue is in Sweet's — pages A 526-527



IT IS INTERESTING TO NOTE the trend of the day in industrial construction—the increasing attention paid to architectural design and its setting. This is well evidenced above in the use of RACKLE ARTSTONE for the entrance, buttress caps, window sills and coping, as also in the landscaping by means of lawns and shrubbery. Of high quality yet inexpensive, RACKLE ARTSTONE has widely commended itself to architects for construction of all types, from the simple manufacturing plant or store to the most elaborately decorated church building.



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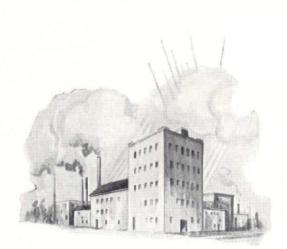
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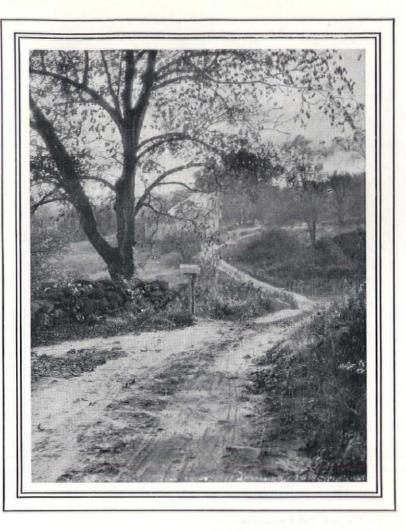
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... he gave his building the quiet that men seek in forest and field"



BUILDINGS have voices. Some are harsh voices that shout and scream. Voices that ceaselessly call, "Don't think . . . hurry, hurry, hurry!" Voices that distract the men who work within their walls.

But here and there you find a quiet, friendly building that hardly whispers. It never, never repeats what is spoken within its walls. Even when people fairly swarm through the corridors you barely hear the building's voice. And then it only says, "Hush . . . we must have no noise here." For the architect planned more than beautiful lines. He gave his building the quiet that men seek in forest and field.

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Armstrong's Corkoustic — strong, resilient panels of cork — applied directly to walls and ceilings, absorbs sound. Echoes and reverberations and other air-borne sounds that abound in offices, schools, hospitals, auditoriums, are hushed.

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Tenants can plug in their radio sets the minute they move in without bothering about antennae, ground connections or lead-ins. Radio reception better than with individual aerials.

RCA Centralized Radio equipment makes any apart-ment building more attractive. It assures each tenant far better radio reception than was ever before possible. Buildings offering this amazingly simple solution rent faster—stay rented!

A single wire antenna system perfected by RCA, replacing the unsightly maze of wires on the roof, amply serves every apart-ment. No wonder prominent architects everywhere are includ-ing the new RCA Centralized Radio system in their plans.

This system can be installed in new or old buildings of any size, regardless of the number of apartments or individual radio outlets.

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For Hotels, **RCA Centralized Radio For hotels**, **Hospitals**, **Schools**... passenger ships, etc., where transient occu-pants of rooms may enjoy radio programs or phonograph record entertainment from loudspeakers or headsets, all operated from a central control.



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An interesting corner of a breakfast room in one of the apartments

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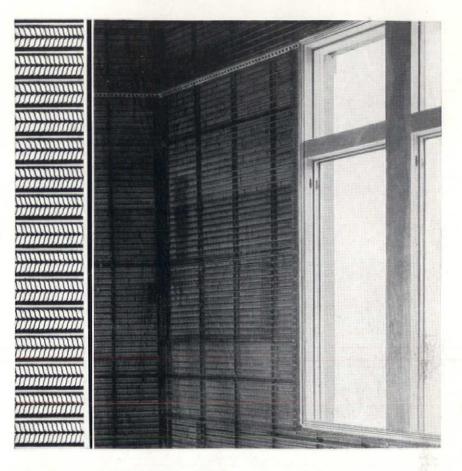
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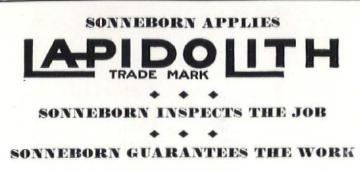
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| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlquist Mfg. Co. Dahlstrom Metallie Door Co. Dayton Rubber Mfg. Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Diebold Safe & Lock Co. Dubois Fence & Garden Co., Inc. Dunham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. | 33 136 -65 164 160 94 180 95 18 142 71 154 73 32 79 79 9 -125 74 150 154 48 154 96 156 | ** **** ***** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlstrom Metallic Door Co. Dayton Rubber Mfg. Co. Datroit Show Case Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Dodge, F. W., Corp. Dubois Fence & Garden Co., Inc. Dunham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. | $\begin{array}{c} 33\\ 33\\ 136\\ -65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 32\\ 71\\ 154\\ 22\\ 79\\ 59\\ 59\\ -125\\ 74\\ 150\\ 154\\ 48\\ 154\\ 48\\ 154\\ 21\\ \end{array}$ | ** **** ***** ** *** *** ** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlquist Mfg. Co. Dahlstrom Metallic Door Co. Dayton Rubber Mfg. Co. Detroit Show Case Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Dubois Fence & Garden Co., Inc. Dunham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. Federal Cement Tile Co. Federal Seaboard Terra Cotta Corp. | $\begin{array}{c} 33\\ 33\\ 136\\ -65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 322\\ 79\\ 59\\ -125\\ 74\\ 150\\ 154\\ 48\\ 154\\ 96\\ 156\\ 21\\ 50\\ \end{array}$ | ** **** ***** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlguist Mfg. Co. Dahlstrom Metallic Door Co. Dayton Rubber Mfg. Co. Detroit Show Case Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Dubois Fence & Garden Co., Inc. Duham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. Federal Cement Tile Co. Federal Co. | $\begin{array}{r} 33\\ 33\\ 136\\ -65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 73\\ 32\\ 71\\ 155\\ 222\\ 79\\ 95\\ -125\\ 74\\ 150\\ 154\\ 48\\ 154\\ 96\\ 156\\ 21\\ 50\\ 100\\ \end{array}$ | ** **** ***** ** *** *** ** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlquist Mfg. Co. Dahlquist Mfg. Co. Dathstrom Metallie Door Co. Dayton Rubber Mfg. Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Dodge, F. W., Corp. Dubois Fence & Garden Co., Inc. Dunham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. Federal Cement Tile Co. Federal Seaboard Terra Cotta Corp. Flax-li-num Insulating Co. Fletcher, H. E. Co. | $\begin{array}{r} 33\\ 136\\ 4-65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 73\\ 32\\ 71\\ 154\\ 73\\ 32\\ 79\\ 59\\ -125\\ 74\\ 150\\ 154\\ 48\\ 154\\ 48\\ 154\\ 96\\ 156\\ 211\\ 50\\ 00\\ 88\end{array}$ | ** **** ***** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlguist Mfg. Co. Dahlstrom Metallic Door Co. Dayton Rubber Mfg. Co. Detroit Show Case Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Dubois Fence & Garden Co., Inc. Duham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. Federal Cement Tile Co. Federal Co. | $\begin{array}{r} 33\\ 33\\ 136\\ -65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 73\\ 32\\ 71\\ 155\\ 222\\ 79\\ 95\\ -125\\ 74\\ 150\\ 154\\ 48\\ 154\\ 96\\ 156\\ 21\\ 50\\ 100\\ \end{array}$ | ** **** ***** ** *** *** ** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlquist Mfg. Co. Dahlytrom Metallic Door Co. Dayton Rubber Mfg. Co. Detroit Show Case Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Duohois Fence & Garden Co., Inc. Dunham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. Federal Seaboard Terra Cotta Corp. Flax-li-num Insulating Co. Fretz-Moon Tube, Co., Inc. | $\begin{array}{c} 33\\ 136\\ 4-65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 32\\ 71\\ 155\\ 22\\ 79\\ 59\\ -125\\ 74\\ 150\\ 154\\ 154\\ 48\\ 154\\ 96\\ 156\\ 156\\ 115\\ 88\\ 148\\ 148\\ \end{array}$ | ** **** ***** ** *** *** ** |
| Cast Stone Institute. Cellized Oak Flooring, Inc. Century Brass Works, Inc. Chemical Foundation, Inc. Compound & Pyrono Door Co. Concrete Engineering Co. Congoleum-Nairn, Inc. Connecticut Tel. & Elec. Corp. Corbin, P. & F. Covert Co., H. W. Crane Co. Crittall Casement Window Co. Cutler Mail Chute Co. Dahlquist Mfg. Co. Dahlquist Mfg. Co. Dathstrom Metallie Door Co. Dayton Rubber Mfg. Co. Detroit Steel Products Co. Diebold Safe & Lock Co. Dodge, F. W., Corp. Dubois Fence & Garden Co., Inc. Dunham, C. A., Co. Du Pont, E. I. de Nemours & Co., Inc. Evans, W. L. Excelso Products Corp. Extension Garment Hanger Co. Federal Cement Tile Co. Federal Cement Tile Co. Federal Seaboard Terra Cotta Corp. Flax-li-num Insulating Co. Fletcher, H. E. Co. | $\begin{array}{r} 33\\ 136\\ 4-65\\ 164\\ 160\\ 116\\ 94\\ 180\\ 95\\ 18\\ 142\\ 71\\ 154\\ 73\\ 32\\ 71\\ 154\\ 73\\ 32\\ 79\\ 59\\ -125\\ 74\\ 150\\ 154\\ 48\\ 154\\ 48\\ 154\\ 96\\ 156\\ 211\\ 50\\ 00\\ 88\end{array}$ | ** **** ***** |

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| Louisville Cement Co Ludowici-Celadon Co MacArthur Concrete Pile Corp McCray Refrigerator Sales Corp Marble, B. L. Chair Co | 103 120 98 150 |
| Louisville Cement Co Ludowici-Celadon Co MacArthur Concrete Pile Corp MeCray Refrigerator Sales Corp Marble, B. L. Chair Co Michaels Art Bronze Co | 103 120 98 150 168 26 |
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| Louisville Cement Co Ludowici-Celadon Co MacArthur Concrete Pile Corp MeCray Refrigerator Sales Corp Marble, B. L. Chair Co Michaels Art Bronze Co Milcor Steel Company | 103 120 98 150 168 26 175 |
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| Louisville Cement Co Ludowici-Celadon Co MacArthur Concrete Pile Corp McCray Refrigerator Sales Corp Marble, B. L. Chair Co Michaels Art Bronze Co Milcor Steel Company Nash Engineering Co | 103 120 98 150 168 26 175 -54 33 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. | 103 120 98 150 168 26 175 -54 33 82 |
| Louisville Cement Co Ludowici-Celadon Co MacArthur Concrete Pile Corp McCray Refrigerator Sales Corp Marble, B. L. Chair Co Michaels Art Bronze Co Milcor Steel Company Nash Engineering Co | 103 120 98 150 168 26 175 -54 33 82 137 |
| Louisville Cement Co Ludowici-Celadon Co MacArthur Concrete Pile Corp McCray Refrigerator Sales Corp Marble, B. L. Chair Co Michaels Art Bronze Co Milcor Steel Company Nash Engineering Co | 103 120 98 150 168 26 175 -54 33 82 137 56 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Lead Company. National Mortar & Supply Co. | 103 120 98 150 168 26 175 -54 33 82 137 56 69 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Lead Company. National Terra Cotta Society. | 103 120 98 150 168 26 175 -54 33 82 137 56 69 148 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nash Engineering Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Lead Company. National Mortar & Supply Co. National Terra Cotta Society. National Tube Co. | 103 120 98 150 168 26 175 -54 33 82 137 56 69 148 80 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nash Engineering Co. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Lead Company. National Lead Company. National Mortar & Supply Co. National Mortar & Supply Co. National Terra Cotta Society. National Tube Co. Nelson Herman Corporation. | 103 120 98 150 168 26 175 -54 33 2 -54 33 2 137 56 9 148 80 8–9 |
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| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Leatric Light Assn. National Terra Cotta Society. National Tube Co. Northwestern Terra Cotta Co. Northor Company. Oak Flooring Mfrs. Assoc. of U. S. | 103 120 98 150 168 26 175 -54 33 82 137 56 69 148 80 8-9 14 145 173 60 |
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| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nash Ville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Mortar & Supply Co. National Terra Cotta Society National Tube Co. Northwestern Terra Cotta Co. North Company. Oak Flooring Mfrs. Assoc. of U. S. O'Brien Bros. Slate Co., Inc. Olean Metal Cabinet Works, Inc. Ortho-Tone Co. | 103 120 98 150 168 26 175 56 69 148 80 8–9 14 145 173 60 138 160 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Lead Company. National Terra Cotta Society. National Tube Co. Northwestern Terra Cotta Co. North Company. Oak Flooring Mfrs. Assoc. of U. S. O'Brien Bros. Slate Co., Inc. Olean Metal Cabinet Works, Inc. Ortho-Tone Co. | 103 120 98 150 168 26 175 -54 33 82 137 56 69 148 80 8-9 14 145 173 60 138 160 99 |
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| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nash Ville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Mortar & Supply Co. National Terra Cotta Society National Tube Co. Nelson Herman Corporation. Northwestern Terra Cotta Co. North Company. Oak Flooring Mfrs. Assoc. of U. S. O'Brien Bros. Slate Co., Inc. Olean Metal Cabinet Works, Inc. Ortho-Tone Co. Pardee, C. Works Paramount Water Softener Corp. Pearlman, Victor S., & Company. | 103 120 98 150 168 26 175 -54 382 137 56 69 148 80 9-9 145 173 60 138 160 99 9158 96 |
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| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nash Nulle Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Lead Company. National Terra Cotta Society. National Trera Cotta Society. National Terra Cotta Society. National Tube Co. Nelson Herman Corporation. Northwestern Terra Cotta Co. Norton Company. Oak Flooring Mfrs. Assoc. of U. S. O'Brien Bros. Slate Co., Inc. Olean Metal Cabinet Works, Ine. Ortho-Tone Co. Pardee, C. Works. Paramount Water Softener Corp. Pearlman, Victor S., & Company. Peelle Company, The. Penberthy Injector Co. | 103 120 98 150 168 26 175 -54 33 82 137 56 69 81 48 80 8-9 14 145 173 60 99 158 96 99 158 96 99 93 |
| Louisville Cement Co. Ludowici-Celadon Co. MacArthur Concrete Pile Corp. McCray Refrigerator Sales Corp. Marble, B. L. Chair Co. Michaels Art Bronze Co. Milcor Steel Company. Nash Engineering Co. Nash Ville Hdw. Flooring Co. Nashville Hdw. Flooring Co. National Bldg. Granite Quarries Assoc. National Electric Light Assn. National Mortar & Supply Co. National Terra Cotta Society. National Tube Co. Northwestern Terra Cotta Co. North Company. Oak Flooring Mfrs. Assoc. of U. S. O'Brien Bros. Slate Co., Inc. Olean Metal Cabinet Works, Inc. Ortho-Tone Co. Pardee, C. Works Paramount Water Softener Corp. Pearlman, Victor S., & Company. Peelle Company, The. 4th Co | 103 120 98 150 168 26 175 -54 33 82 137 56 69 81 48 80 8-9 14 145 173 60 99 158 96 99 158 96 99 93 |

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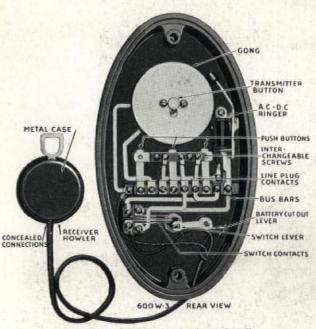
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Rear View—Showing Mechanism in Detail

the Connectaphone tamper proof. By simply removing the screws or bus bars, the instrument can be quickly adapted to other circuits. The body of the phone, containing all mechanism, plugs into a terminal strip mounted on the back plate



Front View Connectaphone

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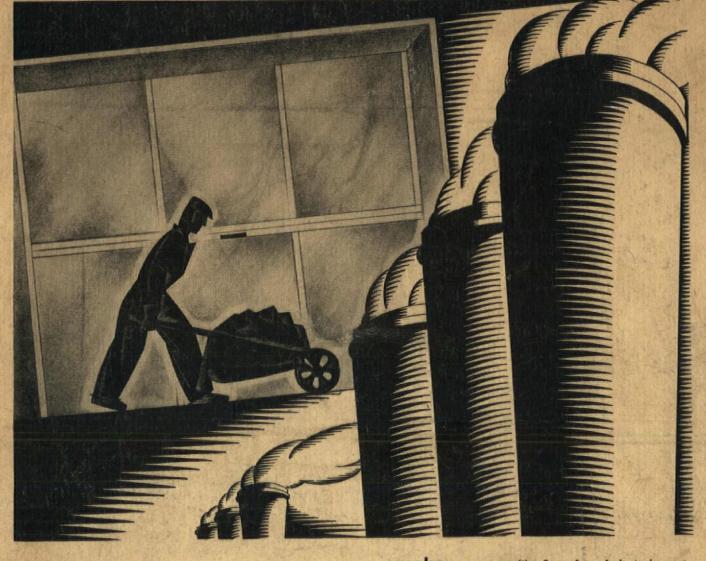
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