

AMERICAN ARCHITECT and ARCHITECTURE



A new and more durable type of
BUILT-UP ROOF



**A 4-YEAR
 TEST**

*Proves the Durability of
 "Electro-Sheet" Copper*

These photos (actual size) illustrate continuous 4-year exposure test on small board, coated with asphalt and covered with 2-oz. "Electro-Sheet."



This section of the asphalt was *not* protected by copper at any time during the four years of exposure. As a result, it cracked badly and gave evidence of marked deterioration.



At the end of the 4 years, the "Electro-Sheet" was stripped from the asphalt pictured here. Its uneven surface texture is due to adherence of asphalt to copper. It has fully retained its original softness and pliability — clearly indicating the exceptional service obtainable from copper-asphalt roofing.

Thin copper in long sheets, 30" wide, combined with alternate layers of asphalt...ushers in a new phase of built-up roofing practice.

"Electro-Sheet" Copper, weighing 2 ounces per square foot, is *rust-proof* and *weather-proof*. It prevents deterioration of the "undercoats" of asphalt by providing a seal which eliminates air, moisture and destructive light rays. Thus the copper, firmly bonded to asphalt which retains its original plia-

bility, provides longer life and greatly reduced maintenance in this new-type built-up roof.

Easy to apply and moderate in cost...built-up roofs of Anaconda "Electro-Sheet" Copper are in tempo with the times, offering more service per year per dollar of cost. Roofs applied to date in all sections of the country afford ample confirmation. For further details on this durable roofing, write for Anaconda Publication D-2.

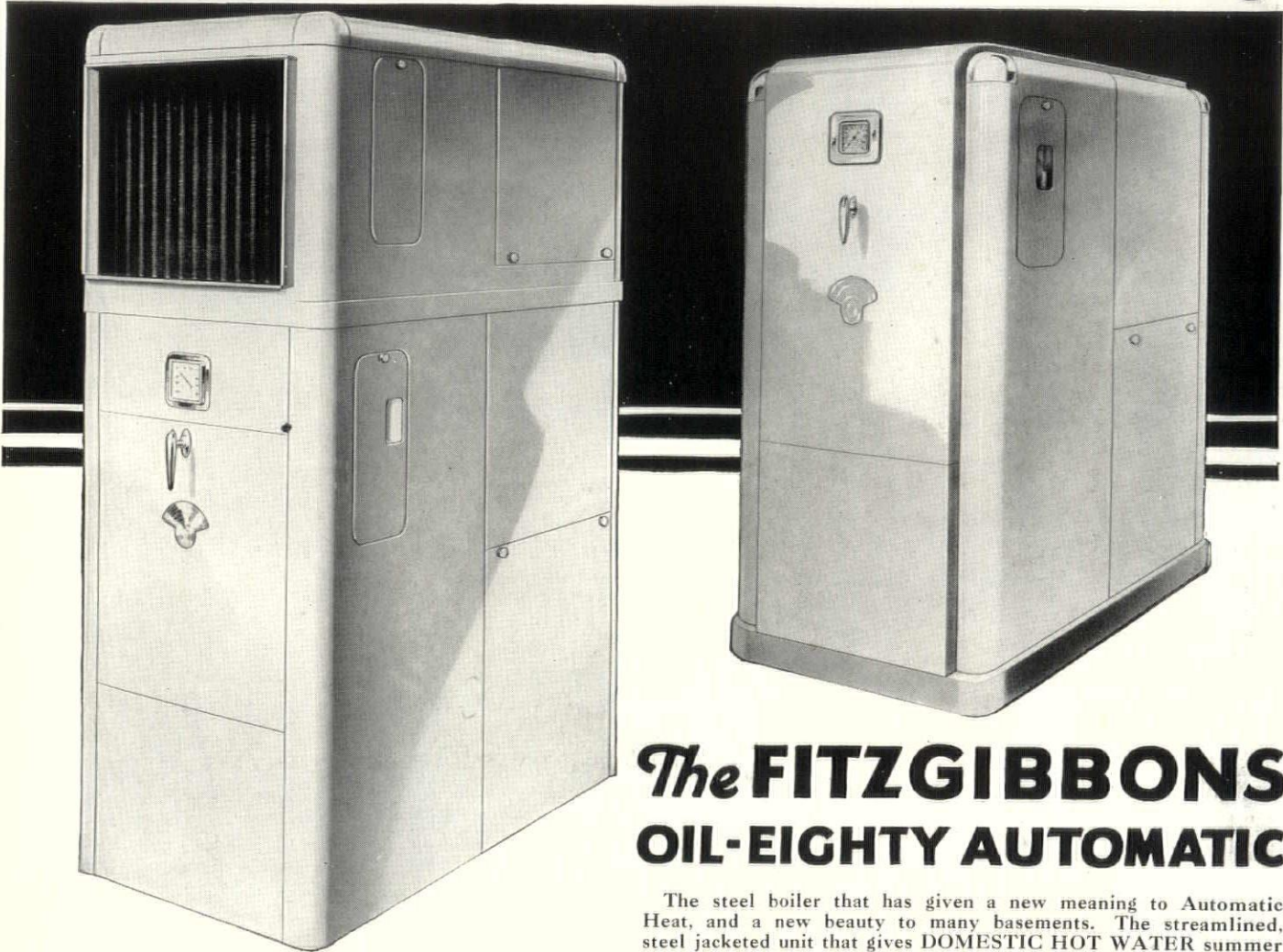


THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut
 Offices and Agencies in Principal Cities

ANACONDA COPPER & BRASS

*Specify these
outstandingly modern units*



The FITZGIBBONS BOILER-AIR CONDITIONER

This is the unit which some say is doing more than any other single influence to get people thinking about air conditioning. In a floor space no larger than the usual heating boiler requires, it gives complete winter AIR CONDITIONING, economical STEEL BOILER HEAT, and year-round HOT WATER SUPPLY with no tank or other accessory needed. Beautiful enough for any basement—and operates with any oil burner, gas burner or coal stoker.



The FITZGIBBONS OIL-EIGHTY AUTOMATIC

The steel boiler that has given a new meaning to Automatic Heat, and a new beauty to many basements. The streamlined, steel jacketed unit that gives DOMESTIC HOT WATER summer and winter, with no storage tank or other visible accessories, while providing a protected space behind easily removable panels, in which practically any burner will be at home and do its work to the best advantage.

Built in 12 sizes, some one of which is certain to be just right for any proposition you may have. A unit which is modern in appearance and in performance.

Here is a line-up of deep interest to you and to your clients. And to help you present the facts in compelling fashion, we are ready with powerful sales ammunition, such as the new catalogs recently published, profusely illustrated and convincingly written from the home-owner's viewpoint—as outstanding in their way as the units which they describe. These catalogs should have their place in your brief-case, and be instantly available in your office. Write us for copies.

Fitzgibbons Boiler Company, Inc.

GENERAL OFFICES:

ARCHITECTS BLDG., 101 PARK AVE., NEW YORK, N. Y.

Works: OSWEGO, N. Y.

BRANCHES AND REPRESENTATIVES IN PRINCIPAL CITIES

American Architect and Architecture, published monthly by Hearst Magazines Inc., 572 Madison Avenue, New York, N. Y. \$3.00 per year; Canada, \$4.00; Foreign, \$5.00. Entered as second class matter April 5th, 1926, at the Post Office at New York, N. Y., under the act of March 3rd, 1879. Issue 2647, dated July, 1936.

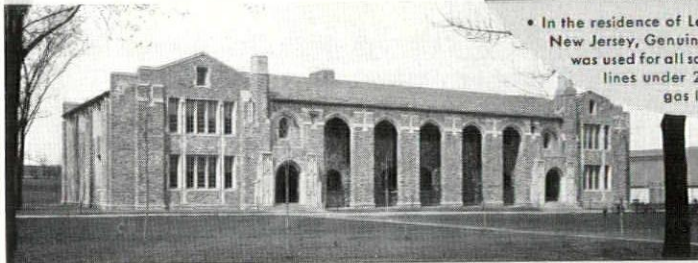
ANALYZING CONDITIONS
SHOWS WHERE TO USE

Wrought Iron

Examples by
BAGG & NEWKIRK
Utica Architects



• In the residence of Lee H. Bristol, Westfield, New Jersey, Genuine Wrought Iron Pipe was used for all soil, waste and vent lines under 2" and for all gas lines.



• Genuine Wrought Iron Pipe used for all soil, waste and vent lines under 2"; all cold water, gas and compressed air lines; and all steam and return lines in Chemistry Building, Hamilton College, Clinton, New York.



• Genuine Wrought Iron Pipe used for all steam and return risers; cold water lines 2" and over; and for drainage lines 2" and under in the Children's Building, Broadacres Sanatorium, Oneida County, New York.

• Besides being able to furnish you quickly with accurate data regarding wrought iron's past and present use, we have now broadened our scope of cooperation with architects and engineers to include an analysis of local conditions.

Fine buildings such as those illustrated are not logical "testing grounds" for new and unproved material. Consequently, leading architects and engineers want, first, an analysis to

determine the corrosiveness of local conditions, then, a review of records of pipe service in order to determine which material will serve best and most economically under those conditions.

Records of wrought iron in corrosive service, covering 30, 40 and 50 years, are readily available and now, without cost, we offer to the architectural and engineering professions the facilities of our research laboratories in the study of water, soils or gases toward the

selection of the ferrous metals best suited for each particular condition.

Forward your request for "analysis of local conditions", through our Division Offices, or write direct to our Engineering Service Department in Pittsburgh. Give location of building and state briefly the services involved. No obligation, of course. A. M. Byers Company, Established 1864. Pittsburgh, Boston, New York, Washington, Chicago, St. Louis, Houston.

BYERS GENUINE WROUGHT IRON PRODUCTS

PIPE - WELDING FITTINGS - RIVETS - SPECIAL BENDING PIPE - O. D. TUBES
PLATES - SHEETS - CULVERTS - FORGING BILLETS - STRUCTURALS - BAR IRON
Specify Byers Genuine Wrought Iron Pipe for corrosive services and Byers Steel Pipe for your other requirements

AMERICAN ARCHITECT and ARCHITECTURE

CONTENTS
JULY, 1936

TRENDS . . . News . . . Events . . . Facts . . . Faces . . . Ideas . . . Opinions . . . Comments . . . presented in a classified and logical sequence	4
FRONTISPIECE. CRAFTSMANSHIP AND THE PREFABRICATED UNIT. A photograph by Schnell	24
BRICK. An appreciation of the prefabricated, fire-born, mass-produced, site-assembled, adaptable, economical, colorful and enduring building material, by Henry H. Saylor	25
THE OREGON STATE CAPITOL COMPETITION. Reproductions of the winning design by Goodhue Livingston and Francis Keally are presented with five of the runner-up designs in a special aquatone section. The manner in which they are presented offers excellent chance for comparative study	27
ELEVEN SMALL HOUSES OF BRICK. In all parts of the country, brick continues to be an important building material no matter what the style house. Eleven small houses, in plan and pictures	35
BETTER CONSTRUCTION IN BRICK. Brick, despite the fact that it is one of the oldest building materials is constantly being experimented with. H. Vandervoort Walsh, the author of this article, points out that craftsmanship and mortar are as important as the brick themselves	47
TOWARD FAIRER FAIRS. At this time when existent and future Fairs are in the public mind, we feel that a brief outline of the meaning and technique of the present-day Fair is important to all architects. Illustrated with examples of the Texas Centennial in Dallas and some European fairs	53
THE DIARY. Henry Saylor, following his special report of the Convention last month, goes back into his own inimitable style in discussing what's what and why in daily architectural happenings	57
BRICK PRECEDENT IN AMERICAN ARCHITECTURE. A pictorial section of unusually fine examples of early American brickwork. There are also included details of brickwork	59
HOUSING HEADED OFF . . . COMPETITIVE GHOSTS . . . Two of the architect's most vital problems, public housing and commercial competition in a professional field, are discussed	67
HOUSE OF MRS. R. BURNHAM MOFFAT. An example of outstanding brick technique in a house designed by Godwin, Thompson & Patterson, architects	68
INTERIOR WINDOW HEADS is Number 117 in the series of collections of photographs illustrating various minor architectural details begun in Architecture in 1926	69
MODERN PLUMBING PRACTICES is the conclusion of a two part article. It includes water supply systems, characteristics of water, water analyses, types of water, water conditioning and both cold and hot water distribution systems	81
TIME-SAVER STANDARDS . . . PLUMBING . . . Plumbing Symbols . . . Domestic Hot Water Requirements . . . Residential Riser Diagrams	90
TECHNIQUES . . . Methods . . . Materials . . . Research . . . Practices	98

KENNETH KINGSLEY STOWELL, A.I.A.,
Editor

HENRY H. SAYLOR, A.I.A.,
Associate Editor

CARL MAAS,
Managing Editor

ROGER WADE SHERMAN,
Technical Editor

TYLER STEWART ROGERS,
Director of Technical Service

R. F. GARDNER,
General Manager

T. W. TOWLER,
Advertising Manager

JAMES A. RICE,
Western Manager

Vol. CXLIX No. 2647

AMERICAN ARCHITECT (Trade-Mark Reg. U. S. Patent Office), with which is combined ARCHITECTURE (Reg. U. S. Patent Office). Published monthly by Hearst Magazines, Inc., 572 Madison Avenue, New York. Other Offices: 919 N. Michigan Avenue, Chicago; General Motors Bldg., Detroit; 132 Newbury Street, Boston. William Randolph Hearst, President; Richard E. Berlin, Executive Vice President; John Randolph Hearst, Vice President; Earle H. McHugh, Vice President; R. F. Gardner, Vice President; T. W. Towler, Vice President; W. R. Peters, Treasurer; Arthur S. Moore, Secretary. Copyright, 1936, by Hearst Magazines, Inc. Single copies, \$1.00. Subscription: United States and Possessions, \$3.00 per year; Canada, \$4.00; Foreign, \$5.00. Entered as second class matter, April 5, 1926, at Post Office, New York, under Act of March 3, 1879. American Architect and Architecture is protected by copyright and nothing that appears in it may be reproduced either wholly or in part without special permission.

TRENDS

NEWS • EVENTS • FACTS • FACES • IDEAS • OPINIONS • COMMENTS

HOLC's Swan Song

Three years ago last month things were considerably tougher than they are today. People were losing jobs instead of finding them. That was just about the bottom of the depression, and the Home Owners' Loan Corporation was one of those emergency organizations that came to the rescue. On June 12, 1936, HOLC, according to the Home Owners' Act, came to the end of the line. The Corporation will make no more loans. Its job has been done.

Up to May 28 of this year, the Corporation had closed 1,016,142 loans throughout the country and its territories to a total of \$3,081,893,559. Practically every application for relief received has been completed as a loan. The original past-due mortgages of the borrowers were taken up by the Corporation through exchange of its bonds with the mortgage holders.

To some 290,000 of the borrowers from the Corporation the arrival of June 13 meant that they will be required to make monthly repayments of principal and interest on their loans instead of interest only. Their mortgages were taken in the early months of the Corporation's work, before Congress repealed that portion of the Act which allowed borrowers an optional moratorium on principal payments until June 13, 1936. These borrowers will have a period of twelve years in which to pay off their loans and own their properties free of debt.

Loans made to the remaining 726,000 borrowers extend over a 15-year term and are payable at the rate of \$7.91 monthly per thousand dollars of loan, including principal and interest at 5 per cent. This amounts to about \$24 per month on the average loan of \$3,023.

Without attempting self-glorification, HOLC on the eve of its swan song briefly recounted its history. Under pressure of acute need to stop the wave of foreclosures which, in the summer of 1933, had reached the record rate of 1000 a day, within less than three months after the Act was passed the Corporation had set up state and district offices in all parts of the country, established its procedure and embarked on the task of creating in a short period the largest and most widespread mortgage institution in the world.

The branch offices were immediately swamped by applicants for loans, many of them ineligible under the law or with a mistaken impression of its purpose. By December 31, 1933, over 720,000 applications had been filed with the Corporation, and over 37,000 loans had been closed. As lending tapered off in 1935



PHOTO: WRIGHT STUDIOS

Carl Milles' huge white onyx figure of an Indian representing "Peace," was recently unveiled in the St. Paul Courthouse as a World War memorial

the Corporation developed its liquidation organization to which gradually the majority of employees have been transferred.

Congress authorized HOLC at a time when it was obvious that existing financial institutions were powerless to check the ruinous deflation of all real estate values. The effects of HOLC refinancing were immediate and far-reaching. Its activity led to the stabilization and recovery of the real estate market.

Today HOLC is in sight of the end of its job. Liquidation, which to date has been very gratifying, remains to be done, but it is a process of time—one that should require no great anxiety.

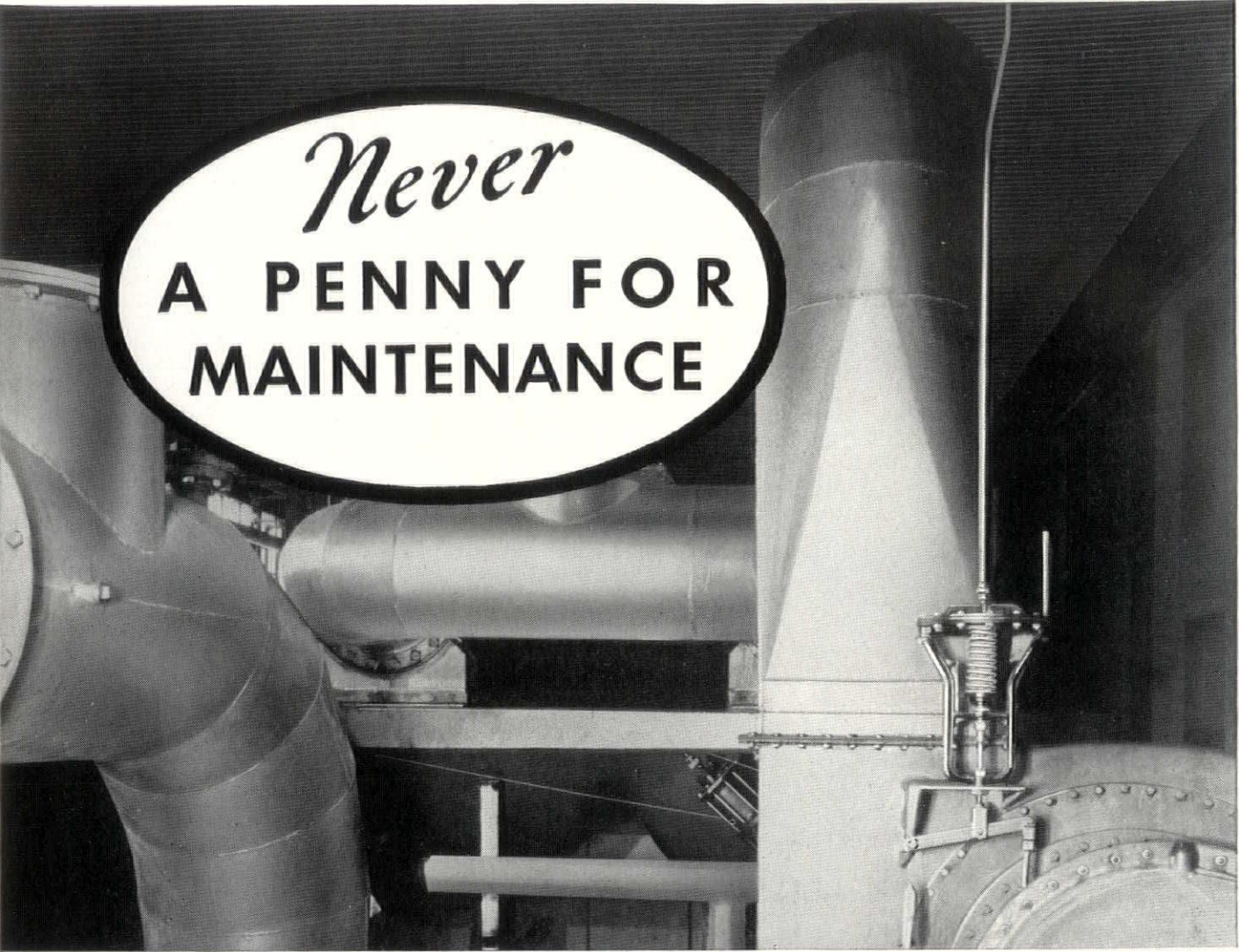
Resettlement Plight

There has been a lot of private chuckling recently over the possibility that Mr. Rexford Guy Tugwell, pater familias to the Resettlement Administration, will soon find himself the head of a fundless bureau. Pinned in a corner, recently, he was forced to admit that half of RA's work has been shifted to WPA and that there are now no new funds in sight for the other half.

Appearing before the Senate Appropriations Committee, considering the plight of the Resettlement Administration, Dr. Tugwell found that only the rural rehabilitation work of the administration is provided for in the bill, and that definitely will be administered by WPA. Of the suburban resettlement, rural resettlement, and land use programs, the relief bill says nothing. And unless President Roosevelt stretches a point in his campaign year budget to give RA more money by July 1, there will be nothing more for Dr. Tugwell to do but finish what he has already started and quit.

At the present time the Resettlement Administration balance sheet shows \$102,000,000 left of the \$275,000,000 with which it started. With these funds all projects already begun can be completed but no new ones started.

Rural rehabilitation was chosen from among the agency's activities to be given further funds because this program is solely for the farmer not reached by WPA. The allocation for continuing this phase of the work appears, however, in the deficiency clause providing \$1,425,000,000 for WPA. Rural rehabilitation would get \$85,500,000. It is within possibility that Harry Hopkins, WPA Administrator, might turn this amount over to Dr. Tugwell, but according to Tugwell's own testimony this is not contemplated.



Never
**A PENNY FOR
MAINTENANCE**

WHERE YOU SPECIFY "JOINED BY WELDING"

YOU can be sure that your client will have a piping system that is permanently leakproof if you specify oxy-acetylene welding as the method for joining the pipe. Air conditioning ducts, also, can be made "jointless" by welding.

Oxy-acetylene welds have the full strength of the pipe or sheet metal. Welds take up less space than any other type of joint, look neater and involve no additional cost or time for construction. Pipe and ducts of all sizes and of any metal

can be joined by the oxy-acetylene welding process.

Linde engineers, from their welding experience on many millions of feet of building pipe, have prepared technical data especially for those interested in designing and specifying "Piping Joined by Welding." Ask the Linde Office in your city for complete details before writing specifications. The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, New York and Principal Cities.

Everything for Oxy-Acetylene Welding and Cutting

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES

FROM



LINDE

UNION CARBIDE



PHOTO: PRICE STUDIOS

Goodhue Livingston of the firm of Trowbridge and Livingston (right) and Francis Keally collaborated in the winning design of the Oregon State Capitol. Their design and five other runner-up designs appear in a special section on pages 27 to 34 of this issue



PHOTO: UNDERWOOD & UNDERWOOD

One puzzling angle to this problem remains. The President, on the eve of leaving Washington for a recent fishing trip with Tugwell and Hopkins, said positively that both WPA and Tugwell's RA would be continued during the coming year. This was a diametrically opposed viewpoint from that held by most Congressmen who believed it wise to concentrate relief spending under one head. Nearly everyone has considered WPA next year's only spending bureau, and the President's positive statement to the contrary comes as a distinct surprise.

With this in mind, and knowing President Roosevelt's way of getting what he wants, it is still more than possible that WPA, PWA and RA all will share in the relief appropriation. As this issue goes to the press, with adjournment of Congress in sight, it is impossible to forecast just what will happen. Anything might.

Lives of Frame Houses

This summer Rhode Island is holding its tercentenary celebration. In connection with this event, Brown University has collected models of early domestic architecture showing the distinct Rhode Island design to be much different from that of the other New England colonies. Many of these houses, it is said, are still "stout, livable, and beautiful."

The point of all this discussion is that the National Association of Real Estate Boards, in a recent survey, put the life

of the modern steel skyscraper at forty years, and decided that the average life of frame houses would be about thirty-three and a third years.

Naturally there is plenty of evidence that frame houses have existed for more than the thirty odd years expected by NARB. But from their generalization it is possible to point out that the life of frame houses varies almost directly in proportion to the growth of cities. Where cities have grown rapidly, frame houses have lived somewhat less than the arbitrary period set up by NARB. And, particularly in rural sections, where there has been little urban growth it is possible to find magnificent examples of residences that have withstood the beating of time for two hundred years or more.

This is particularly true of Rhode Island. Providence has few houses remaining from its early days, few even from Victorian times, but on Rhode Island's countryside, there are many relics of pre-revolutionary architecture.

Thus generalizations like NARB's, while they may be true for the most part, often run into difficulty, especially when they try to forecast time.

Increased Building at Decreased Rate

According to all of the Utopian schemes presented by legislators and house-conscious realtors, 1936 definitely was going to be a boom year for building. And there is no denying that the gratifying pick-up which begun in 1935 has been extended into 1936. Even so, a

careful analysis of the building totals for the first four months of this year makes one thing clear: Building is increasing—but at a decreasing rate.

Figures recently released by the Department of Labor show that in April construction made a gain of 10 per cent over March, and March had shown the greatest volume of any month since May 1931. Total estimated costs of new buildings and alterations amounted to \$122,000,000, of which \$53,000,000 was credited to residential construction. Although this figure represents a gain of 59.2 per cent over April 1935, this increase is still somewhat short of the 122 per cent recorded in January.

Break these figures down into an analysis of "families provided for" and the declining rate of increase becomes even more apparent. In the month of April only 10 per cent more families were provided for than in the same month last year. And for the first four months of this year an equally small increase of 17 per cent more families provided for over 1935 is recorded.

It is in these statistics that the fallacy lies. For although building volume for the year of 1936 should run about 100 per cent ahead of 1935, owing to the increased cost of dwellings, only a relatively small additional number of families will be provided for in new quarters.

In New York City the decline in building activity is much more apparent. April was 15 per cent behind March. At the present rate of construction the 1936 volume will be approximately the same as in 1935.

Here is the Department of Labor tabulation for the first four months of 1936 showing figures for the first 20 cities.

	1st 4 months	April
New York	\$53,062,000	\$12,503,000
Los Angeles	15,790,000	4,922,000
Milwaukee	11,607,000	972,000
Cincinnati	11,251,000	1,699,000
Detroit	9,992,000	3,998,000
Washington	9,914,000	2,825,000
Houston	8,331,000	1,238,000
Philadelphia	6,861,000	3,656,000
Chicago	6,362,000	2,416,000
Dallas	6,135,000	1,273,000
Baltimore	5,433,000	1,686,000
San Francisco	4,763,000	1,493,000
Miami	3,914,000	764,000
Boston	2,985,000	1,011,000
Seattle	2,772,000	435,000
St. Louis	2,753,000	1,059,000
Long Beach	2,620,000	711,000
Cleveland	2,309,000	584,000
Fort Worth	2,131,000	619,000
Providence	1,937,000	301,000

Wage Scale

Throughout the year of 1935, and during the first six months of 1936, there have been repeated statements from those who should know that the great increases in building activity were bound to force up labor rates. But if there has been any widespread labor wage increase, investigators for the

Maybe Some Of Us Are Not So Alfired Smart After All When It Comes to Brick

[Mr. Jefferson Was]



'TOTHER DAY, reckon to be exact, Thursday last, was making sort of a tour of inspection of some quite recently built so-called "Southern Colonial" homes. Ones out Chevy Chase way, near "D. C. Washington," as our colored folks call it, down here in old Virginy. There were two within a whoop-and-a-holler of each other. One

from Westover, Old Shirley and Lower Brandon, all done in a right smart way.

Instead of the half dominantly new, and half oldish look, the other house had, this one gave you a time-toned feeling. Just naturally I started to find out why.

One of the reasons seemed to be the mortar. Instead of being natural color, it had been softened by

house lacked.

So you all can't hardly hold it against me, if I came to the conclusion, that there isn't any much use trying to make a house look old Virginia Colonial, if you don't tone the mortar and use Old Virginia Brick. That is to say, if you really want it honest-to-goodness down to the last detail. If you do, then there just isn't any brick that



WESTOVER



OLD SHIRLEY



LOWER BRANDON

had all the ear and nose marks of being fairish Southern Colonial, far as design was concerned. But, it seemed to kinder lack the right sort of "feel".

Looked to me, as how either the architect didn't bother enough or the owner couldn't see what he tried to tell him. You never can be sure.

Well anyway, the white of the woodwork had been toned down by putting a bit of yellow in the paint, and a dash of lamp black, suspect. It had none of that just-put-on look. But the brick work fairly yowled how new it was. The effect sort of made my back ache.

Then went to the over-yonder house. The design was quite like the other. Sort of here-and-theres

lamp black. Three batches mixed at a time, each varying in amount of lamp black. The hods were filled in rotation from each. As a result, there was a mighty pleasing variation that looked plumb natural. Just as if Old Man Time had a hand at it.

As for the brick, not being so tolerable modest, don't mind admitting they were Jefferson-size Old Virginians. Being born old as they were, they toned in with the mortar and sang the same oldish song. The Jefferson square headers somehow gave a look that the mud-clay standards in the other

will do quite so well as our squarish header Jeffersons.

Of course, I may be prejudiced, being as how we make these born-old-brick. However, I'm not talking just for fun. Am not a bit sensitive about admitting, that holding my job down here as brick maker, hangs on now and again selling a few brick.

HENRY GARDEN

Brick Maker for

OLD VIRGINIA BRICK CO.

with Mr. Jefferson as a Guide

p.s.

Don't forget we make both Standard and Jefferson size. Likewise hand-mades and mould-mades.

OLD VIRGINIA BRICK

Old Virginia Brick Company
Salem, Virginia



PHOTO: SOVPHOTO

Comparatively little Russian architecture has been as radical as Soviet political theories. However, this new theatre at Rostov-on-Don, built of stone, steel and glass is an outstanding example of new Russian architecture. Designed to seat 2,500 people, it is the work of Architects Schuko and Gelfreikh

Department of Labor couldn't find it. In a survey conducted recently it was found that the nation-wide average of trades union hours and scales now stands at \$1.25 for skilled labor, and 81 cents for unskilled—an increase of only \$.001 per hour over 1934.

Rates were obtained by Department of Labor representatives who visited business agents and other trade union officials in 70 leading cities in the country. As far as possible, no wage rates were accepted unless they were so well established that 50 per cent of the employed members were actually receiving the scale. Says the Department of Labor: "It does not follow that quoted rates are the actual wages paid. Individuals or groups of union members may accept work for less than established union scales. The union rate may not be the prevailing rate because union strength varies in different cities."

Therefore, because the Department of Labor averages are weighted by multiplying the rates in each city by the number of men in each trade, then by adding the totals for all cities and dividing by the aggregate membership as given by the unions in the cities, the Department of Labor figures actually are rather misleading and much higher than they possibly should be. When averages are simply the various rates added and then divided by the number of cities, the result probably comes much nearer the actual situation. Why is this true? Because under the Department of Labor method the larger memberships of the large cities bring the average well up toward their own scale.

Comparing the 1935-36 rates with those of 1934, it becomes immediately noticeable that there has been little or no change. About 11 per cent of the trades show minor increases. There are equally microscopic decreases in a few cases. Of 1,983 scale quotations 298 showed increases over 1934 and 61 showed decreases. Largest increases recorded by Department of Labor investigators were 2.3 cents an hour for plumbers and gasfitters, 2.5 cents for composition roofers, and a five cent average increase for electricians.

One interesting sidelight of the research was the revelation that union membership increased for those trades (carpenters, painters) having less than the average wage rate, while membership decreased for those trades (electricians, plasterers, bricklayers) receiving higher than average rates. If any generalization may be made from this statistical trend, it would appear that union membership is on the wane among the higher wage earners.

Also included in the survey was the subject of hours of work per week. Of the 308,000 men included in the compilations the average for all trades was found to be 38.7 hours per week—with engineers registering the high of 40.4 hours and plasterers the low of 37.4 hours. However, nearly 80 per cent of the union members canvassed had working agreements calling for a 40 hour week. Less than 10 per cent of the members had agreements calling for 35 hours, while only 3 per cent worked more than 40.

Listed below is the percentage break-

down by trades as recorded by the Department of Labor. Also included is a supplementary chart prepared by "News & Opinion," bulletin of the Building Trades Employers' Association.

May 15, 1935, Average Union Scales in Building Trades

Trades	U.S.D. of L. Weighted Average of 70 Cities	Average by Unions 70 Cities	N. Y. C.
Asbestos Workers	\$1.221	\$1.00	\$1.40
Bricklayers	1.409	1.25	1.50
Carpenters	1.160	1.12	1.40
Cement Finishers	1.241	1.12	1.40
Electricians, Inside Wiremen	1.335	1.10	1.70
Elevator Constructors	1.312	1.22	1.40%
Engineers, Portable and Hoisting	1.353
Glaziers	1.304	1.12	1.40
Granite cutters	1.149	1.05	1.25
Lathers	1.343	1.25	1.40
Marble Setters	1.386	1.30	1.50
Mosaic and Terrazzo Workers	1.250	1.15	1.43%
Painters	1.194	.90	1.28-4/7
Plasterers	1.385	1.20	1.50
Plumbers and Gasfitters	1.315	1.15	1.50
Roofers, Composition	1.187	...	1.28%
Roofers, Slate and Tile	1.347	...	1.57%
Sheet Metal Workers	1.218	1.10	1.40
Sign Painters	1.395
Steam and Sprinkler Fitters	1.308	1.15	1.40
Stonemasons	1.298	1.00	1.50
Stonemasons	1.380	1.25	1.50
Structural-Iron Workers	1.308	1.25	1.65
Tile-Layers	1.317	1.15	1.43%
Helpers and Laborers			
Building Laborers	.725	.65	.82%
Hod Carriers (Masons' Tenders)	.830	.80	.90
Plasterers' Laborers	.937	.82	1.00
Elevator Constructors' Helpers	.959	...	1.03%
Marble Setters Helpers	.950	...	1.15%
Steam and Sprinkler Fitters' Helpers	.921	...	1.03%
Tile-Layers' Helpers	.863	...	1.06%
Rates			
Under 50c an hour	.5	4.4	
50c and under 75c	3.8	32.6	
75c and under \$1.00	9.2	44.9	
\$1.00 and under \$1.12½	19.7	18.7	
\$1.12½ and under \$1.25	13.1	...	
\$1.25 and under \$1.37½	25.2	...	
\$1.37½ and under \$1.50	12.6	...	
\$1.50 and under \$1.62½	14.2	...	
\$1.62½ and over	1.7	...	

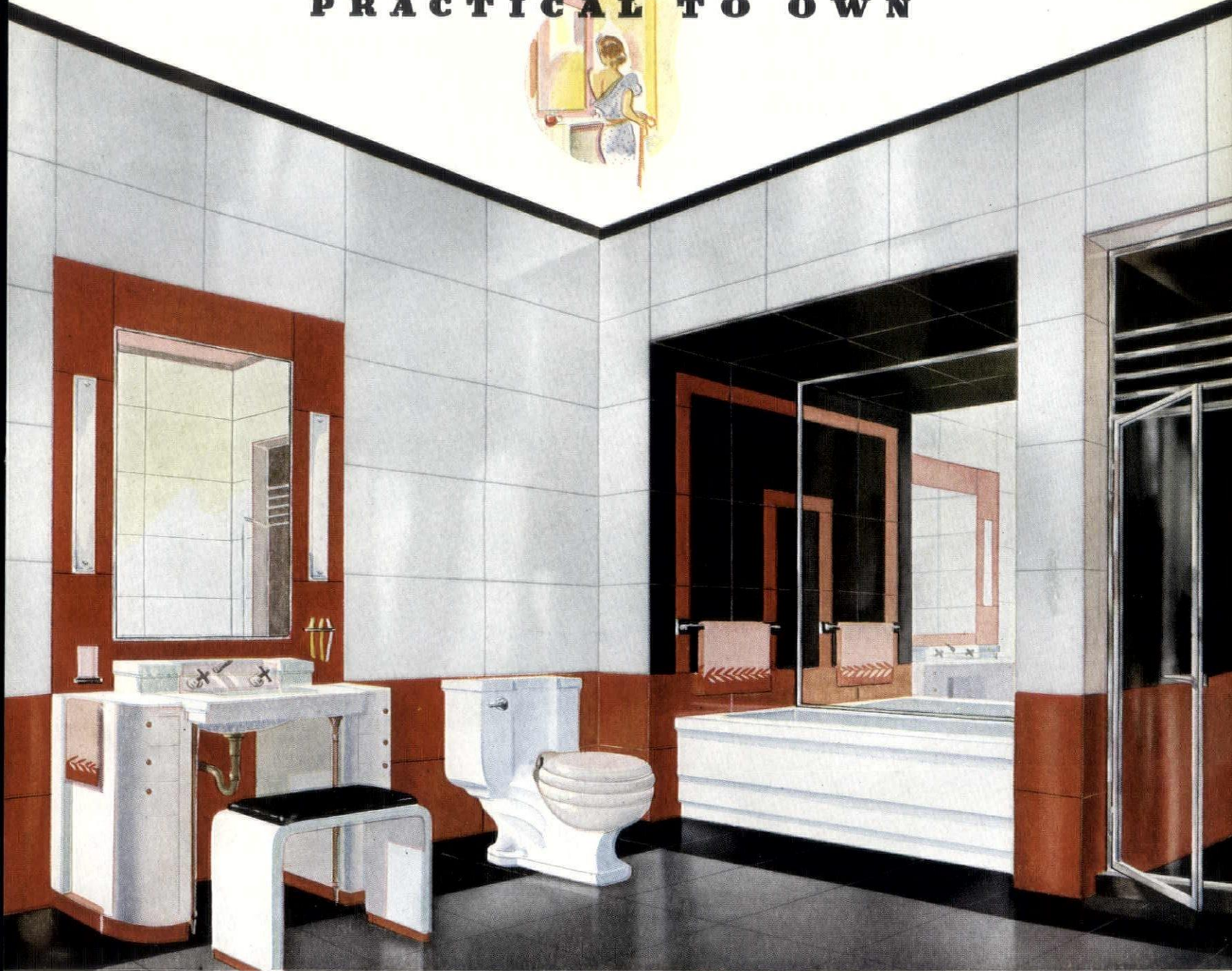
Real Estate and Taxes

Out in Indianapolis last month realtors got together for their annual Great Lakes Regional Convention. And, as is increasingly the custom these days, there was plenty of discussion about tax rates and bases.

Principal point on which most of this talk hinged was the proposed amendment to the State of Michigan's Constitution. Objective of this amendment is to prohibit further taxation of general property upon an ad valorem tax basis to pay the cost of operation of local government. Resolutions adopted by the convention point out that the ad valorem tax upon general property is a capital tax and therefore unsound, and that it is unequally levied. The proposed Michigan (Continued on page 12)

Lovely to look at

PRACTICAL TO OWN



IN A NEW HOME—or in an old one—the use of Vitrolite, the colorful structural glass for bathrooms, achieves almost unbelievable loveliness and practical utility.

Vitrolite's 16 colors and hues, plus the surface effects obtainable through sandblast, afford opportunity and inspiration for working out bathrooms and kitchens of originality and charm. Used with chromium and stainless steel, Vitrolite is stunning.

Vitrolite's practical values are just as outstanding. A damp cloth is all that is ever required to keep its lustrous beauty and endur-

ing qualities of sanitation unimpaired. Vitrolite is installed easily—quickly—in new buildings or in modernizing; it is applied directly over any secure wall. It lasts a lifetime.

Vitrolite is installed only by authorized representatives in each locality, thus assuring satisfactory workmanship. The Vitrolite representative will be pleased to serve you with reference to construction details and cost on any installation. The Vitrolite Art Department will prepare color sketches for the architect suggesting Vitrolite arrangements and color schemes, without obligation.

For windows, specify L-O-F quality glass. For interiors, mirrors of L-O-F polished plate glass, clear or in colors, offer unlimited decorative architectural possibilities.

Vitrolite Division • LIBBEY • OWENS • FORD GLASS COMPANY

VITROLITE

Colorful structural glass



Vitrolite Division, Libbey-Owens-Ford Glass Company
208 W. Washington Street, Chicago

G-7

VITROLITE

Please send New Vitrolite Color Chart of 16 colors—10 solid hues, 6 agate shades, and variety of surface effects—and your new literature for Bathrooms and Kitchens, Store Fronts, Construction Details.

Name.....

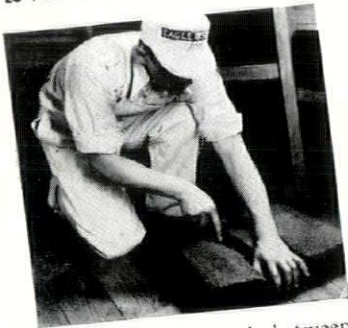
Address.....

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

"I can't recommend a better insulation for your new home than EAGLE!"



Thick, fireproof Eagle Insulation available in two forms



BATS which fit snugly between studdings and joists. Easily cut to fit around doors and windows.



LOOSE-FILL which is blown between studdings and joists by special pneumatic process.

ARCHITECTS! Eagle Insulation rates + + + on these 5 important points . . .

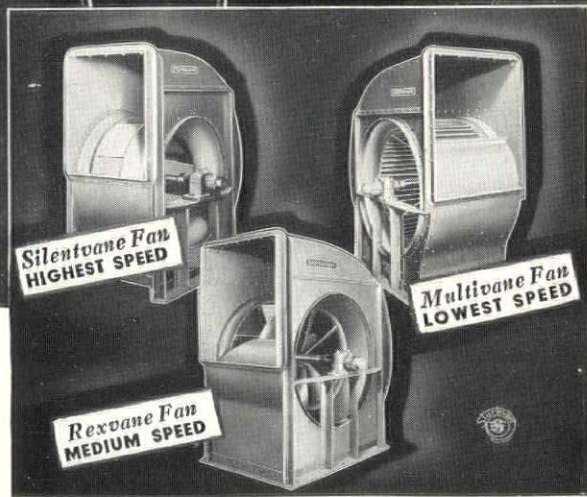
1. **Remarkable Efficiency.** Keeps homes up to 15° cooler all summer . . . soon pays for itself in fuel savings in winter. Eagle Insulation has the remarkable conductivity rating of .27 at 103° mean temperature!
2. **Easy Installation.** Eagle Insulation comes in two convenient forms . . . "bats" for new construction . . . "loose-fill" for homes already built.
3. **Fireproof.** Eagle Insulation will not char or burn. It is absolutely fireproof.
4. **Moisture Repellent.** Eagle Insulation will not absorb moisture. Try dropping a piece in a glass of water . . . it will not sink!
5. **Permanent.** Eagle Insulation does not pack or settle. Contains no vegetable matter to attract bugs and insects. It lasts a house-time.

Eagle **INSULATION**
for Homes and Apartments

THE EAGLE-PICHER LEAD COMPANY, CINCINNATI, OHIO

Fans—
MADE THE STURDY
STURTEVANT WAY

IN WIDEST AVAILABLE
 VARIETY OF ✓ SPEEDS
 ✓ CAPACITIES ✓ OTHER
 CHARACTERISTICS—



3 DISTINCT LINES of sturdy Sturtevant Centrifugal Fans . . . providing such a comprehensive variety of speeds, capacities and other characteristics that any fan requirement may be met with exceptional exactness.

3 new lines . . . incorporating up-to-the-minute improvements in design and construction. Fans built the typical Sturtevant way . . . to thrive on tough service. And soundly engineered from stem to stern . . . on the basis of Sturtevant's 70 years of Air Engineering Experience.

Silentvane: High speed. Backwardly curved blades. Limiting Horsepower Characteristic. (Catalog 381-1).

Rexvane: Medium speed. The modern, improved "paddle wheel", with greatly increased capacity. (Catalog 414).

Multivane: Low speed. Forwardly curved blades. Admirably adapted to ventilation requirements. (Catalog 271-1).

B. F. Sturtevant Company, Hyde Park, Boston, Mass.
 Branches in 33 principal cities

Sturtevant

REG. U. S. PAT. OFF.

Puts Air to Work

SPECIALISTS IN AIR ENGINEERING FOR OVER 70 YEARS



PHOTO: GLOBE PHOTOS

The latest in air-minded England's series of airports was recently opened by Lord Swinton, the Air Minister, in Gatwick near London. Considered the most advanced in Europe, it is served by fast electric trains on the London-Brighton Line

amendment would open real and personal property to taxation on the basis of the income it produces, on a like basis with other productive sources.

Louis G. Palmer, president of the Michigan Real Estate Association and vice chairman of the national committee on real estate taxation of the National Association of Real Estate Boards, pointed to eight reasons in his summary of why the general property tax is suffering breakdown. They were:

(1) "The present so-called *ad valorem* general property tax is a capital levy and bears no relation to the earnings or income from property so taxed. Capital levies are justifiable in only two instances: first, to meet a general emergency, in which case all forms of wealth should bear their proportion of the levy; second, to destroy an enterprise, business or commodity presumed to exist against the interest of the safety, morals and well being of society.

(2) "The assessing authorities do not place upon the tax rolls all of the taxable property within the unit imposing the tax, as statutory and constitutional provisions require. This is particularly true of that class of wealth known as intangible personal property. Intangible property, by reason of this omission, pays no tax whatever. Thus, it is clearly evident that the provision of the Constitution requiring uniform taxation is evaded.

(3) "The entire tax levy is spread upon real and personal tangible property to raise a fiscal budget that legally and morally should be spread to all of the taxable property within the state or taxing unit.

(4) "The fiscal budget, presumed to be based upon the cash value of all property within the unit so assessed at the rate prescribed by the legislative body

is not so determined. The assessed value is merely used for the purpose of spreading a fiscal budget which is determined by the arbitrary decision of the boards, bureaus, commissions and other public officials, who establish the fiscal budget according to their own will, whim and caprice.

(5) "The budgets so established are not only computed for the purpose of the operations and services of the government, but also are inclusive of debt service requirements, that is to say, payment of interest upon and payment of obligations incurred by borrowing, usually through the issuance of bonds secured by faith and credit of the community issuing the same.

(6) "The cash value provision of the Constitution is ignored and the value of the property is determined arbitrarily to permit the spread of the fiscal budget according to the assumed values of the assessing authority.

(7) "The courts cannot be successfully evoked to grant relief under this procedure except where constructive fraud can be established upon the part of the assessing authority. This in fact is an open invitation to our budget making and tax assessing authorities to determine arbitrarily the amount of money to be raised and spent annually.

(8) "Bonding limitations, provided by law, are evaded by arbitrarily raising the assessed valuations as shown by the tax rolls."

Drawing his conclusions from these premises Mr. Palmer found that "The injustice of any system of taxation so open to abuse year after year is not limited to that group of persons which is possessed of real property. It is the largest contributing factor to economic breakdown, and should challenge the attention of all of our American people.

Observation and experience have convinced me that the legislature can and will produce an adequate equitable law for the raising of funds to support government if their task has been preceded by constitutional correction, which is a mandate of the people that they cannot ignore."

The convention also affirmed its support of the six-point proposal for tax action suggested by the National Association of Real Estate Boards, emphasizing especially the principles of an over-all limitation of the tax rate on property, and of assessment of real estate taxation on the basis of its productivity. The convention recommended that a conference be called of all national organizations particularly interested in the problem of real estate taxation to discuss readjustment of the tax structure. This convention would use Michigan's tax modernization plan as a basis on which to work.

Fairs

Cleveland's Great Lakes Exposition is now open. Exhibits and exhibitors are placed. Soon vacationists, sight-seers, and local well-wishers will be pouring into the water-front fair grounds. By fall, 4,000,000 people will have seen and marvelled. But even with this spectacle in Cleveland to gaze at, most viewers already will be making mental comparisons between this exhibit and those to come in 1939 in both New York and San Francisco. Now, three years before their scheduled openings, these two giant shows of 1939 are rivalling in public interest the Great Lakes Exposition. Groups in New York, groups in San Francisco are forming to make their respective exhibits, colossal, stupendous, breath-taking.

Somewhat less grandiloquent than its successors, Cleveland's show will still be quite an eye-ful. One exhibit, expected to attract widespread attention, is the display of rival houses constructed of brick and wood. The lumber house, designed by John Sherwood Kelly, is being erected by the Cleveland Lumber Institute with the co-operation of lumber companies of the Great Lakes states and manufacturers throughout the nation. Brick residential construction will be exhibited in a typical small brick home built by the Cleveland Builders Supply Company for the small house committee of the American Institute of Architects and the Organized Residential Builders of Cleveland.

The "common brick structure" will be 28 by 20 feet—in the \$7500 class. An attached garage makes the over-all structure 40 by 20 feet. With the three

**LINOLEUM FLOORS
LIKE THESE
Attract New Clients**



Armstrong's Linoleum Floor greets visitors at the Texas Centennial Administration Building. Field is No. 29 Cadet Blue; map and letters, No. 23 White; star and inner strip, No. 41 Orange; outer strip, No. 22 Gray.

FLOORS with an "idea"—like this one in the Texas Centennial Administration Building—win attention, attract new clients. And when you choose Armstrong's Linoleum as a medium for your ideas, you have a free hand because there are forty Plain, Jaspe, and Marbelle colors in grades and gauges for every budget. Furthermore, Armstrong's Architectural Service Bureau is always ready to furnish dependable technical assistance in custom-floor installation.

Armstrong's Linoleum Floors meet every requirement for dura-

bility and beauty. Their resilience makes them quiet and comfortable underfoot. They are economical to install and maintain. And with reasonable care, they retain their "just installed" look for years.

Armstrong also offers the only complete line of resilient tiles—*Linotile*, *Accotile*, *Cork Tile*, and *Rubber Tile*—and therefore can make unbiased suggestions on any job. For complete information, see Sweet's or write, on your letterhead, to Armstrong Cork Products Co., 1201 State Street, Lancaster, Penna.



Information Desk in the Administration Building, Texas Centennial Exposition. Floor is Armstrong's Linoleum with field of No. 29 Cadet Blue, inner border of No. 22 Dark Gray, and outer strips of No. 23 White.

ARMSTRONG'S *Linoleum* and RESILIENT TILE FLOORS

LINOTILE • ACCOTILE • CORK TILE • RUBBER TILE • LINOWALL • ACOUSTICAL CEILINGS



PHOTO: GLOBE PHOTOS

Trucks and tractors "huff and puff" to clear swampland near Flushing, Long Island, in preparation for New York's 1939 World's Fair. Since no architectural scheme has definitely been decided upon, the present work will consist largely of leveling and preliminary landscaping

bedrooms and bath, upstairs, living room, dining alcove and kitchen on the first floor, Clayton Grandy of the Brick Manufacturers Association expects the building to show the beauty and benefits of brick construction for the man of average income. A reinforced brick beam on top of the footings makes it possible to move the building after the Exposition closes, when, probably, it will become the home of one of the building associations.

The "traditional house of wood" (so-called by the Lumber Institute) is in the \$15,000 class. Replete with many of the most advanced developments of construction and prefabrication, this house demonstrates, says H. A. Kramer, Institute secretary, the "economy, desirability, and beauty of wood as compared to other materials."

The wood structure is 52 by 34 feet and has twelve rooms. All wall paneling, all stairwork, window frames and the dining room floor are of prefabricated units. Windows move in and out for washing purposes, in addition to the regular up and down movement.

Downstairs, the living room is of old-fashioned strip flooring. The sidewall, where the fireplace is located, is of crotch cypress, prefabricated. A small "powder room" is entirely of knotty pine paneling. The dining room is of prefabricated prefinished units, eight inches square, laid in mastic, making the floor moisture proof. Sidewalls of the dining room are white enameled wood half way to the ceiling. A child's

nursery room upstairs is entirely of selected knotty white pine.

Golden Gate

"Golden Gate International Exposition—A Pageant of the Pacific." This musical, alliterative phrase is now the official name of the 1939 World's Fair on San Francisco Bay. Selected from more than 12,000 titles suggested, this name now formally replaces the more matter of fact "San Francisco Bay Exposition."

Twelve thousand replies in a name selection contest certainly are ample evidence of the great local interest being taken in San Francisco's promotion of a World's Fair. Local sons are rallying; local pride is rising.

Indicative of this home-town attitude is the statement by Brigadier-General H. H. Arnold, Assistant Chief of the United States Army Air Corps. Said he, while in San Francisco recently on a flying inspection of the Pacific Coast air bases: "The San Francisco Bay region is destined to be one of the World's foremost aviation centers, and the 1939 World's Fair has an unprecedented opportunity to show the modern progress of civil and military aeronautics." To Fair promoters this meant just one thing: Federal interest in the Exposition's development.

Press releases from San Francisco related, in glowing terms, what Brigadier-General Arnold visualized as California's aeronautical future. One report said: "California and the cities of San

Francisco Bay should start the ball rolling toward the greatest aeronautical pageant in history, to be held in conjunction with the 1939 International Exposition, and its major theme—Transportation. Spectacular mobile and static displays of commercial and military flying, the National Air Races, and international flying meets, should provide attraction for millions of visitors."

"It is possible," the Brigadier-General continued, "that with well-laid plans the U. S. Army Air Corps may hold its annual maneuvers in the San Francisco Bay area in Exposition year. The World's Fair site, which will become San Francisco's official airdrome following the Fair period, deserves a fitting tribute in the way of dedication that will herald its opening to the world. I should like to see San Francisco Bay Region and the 1939 World's Fair accord the modern progress of aviation its rightful place in the sun."

Important as the Brigadier-General's remarks were, chief interest to outsiders lay in the obvious fact that California promoters aren't "missing a trick" in selling the 1939 venture to the world. With New York planning a similar exposition in 1939, it can be expected that the press will be full of glowing reports, that each organization will attempt to outdo the other in magnificence, originality and exhibits.

New York

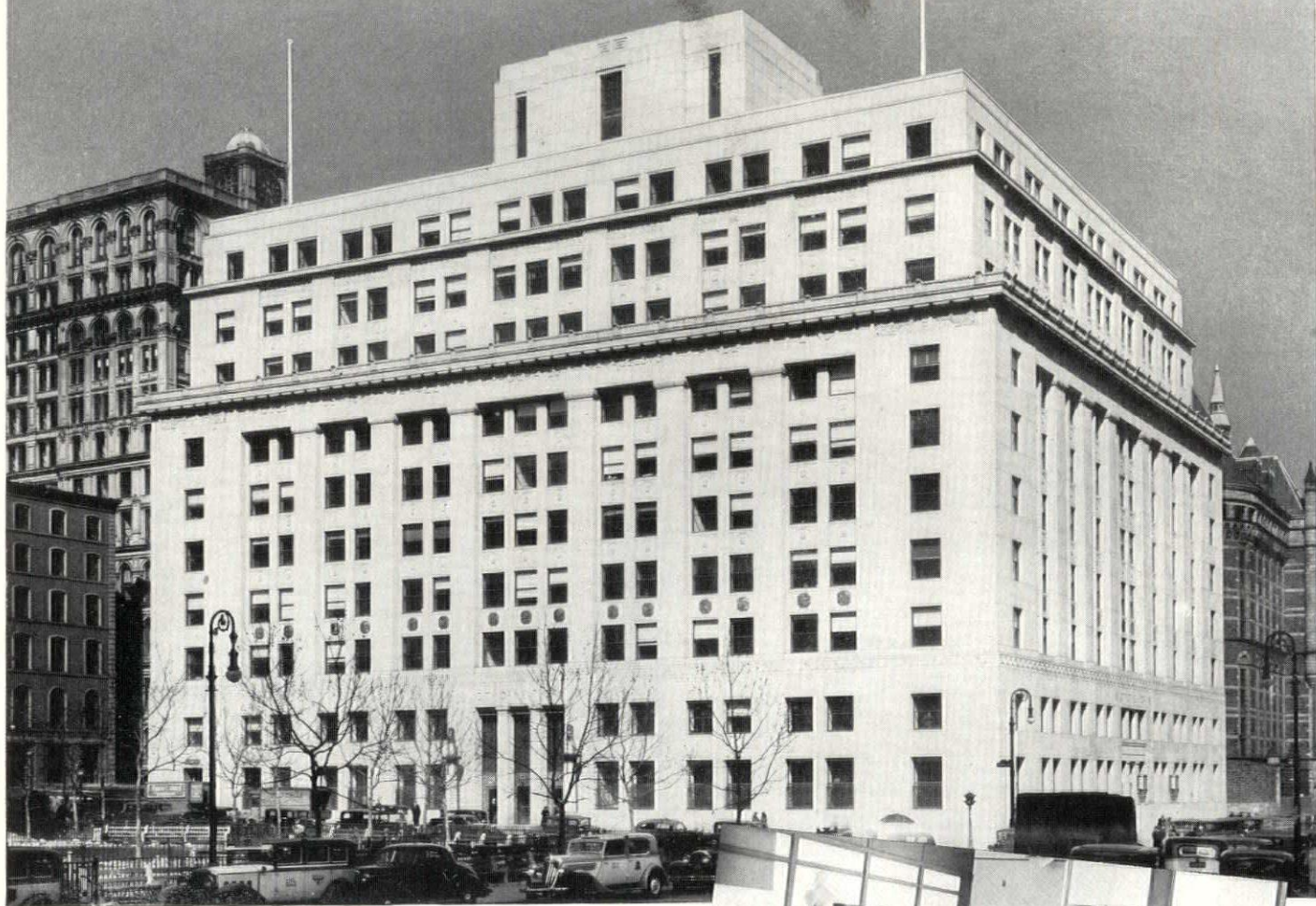
Despite the scope of activities that the San Francisco Exposition undoubtedly will undertake, there is absolutely no reason to believe that the New York World's Fair Committee is letting any grass grow under its feet. Some of the biggest "names" in architectural circles got together recently with George McAneny, Chairman of the Board of the World's Fair, and there was plenty of evidence that this group does not plan to be outdone.

Present at the meeting were Percy S. Strauss, chairman of the World's Fair architectural committee; Stephen F. Voorhees, chairman of the board of design; Edwin Farnham Greene, head of the Fair committee of the textile industry; Lewis Mumford, critic; Gilbert Rohde, director of the PWA design laboratory; Henry Wright, city planner and Fellow of the A. I. A.; Caleb Hornbostel and Albert Mayer architects; Ned H. Dearborn and Harvey W. Zorbaugh, both professors at New York University; and Harvey Wiley Corbett, co-architect of the Century of Progress Exposition, I. Woodner-Silverman, director of Parks, Michael M. Hare, who is the secretary of the Municipal Art Society,

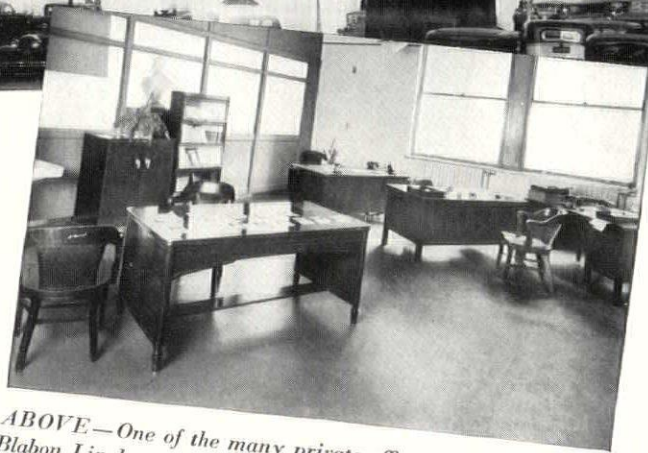
The City of New York selects 14,000 square yards of

SLOANE-BLABON LINOLEUM

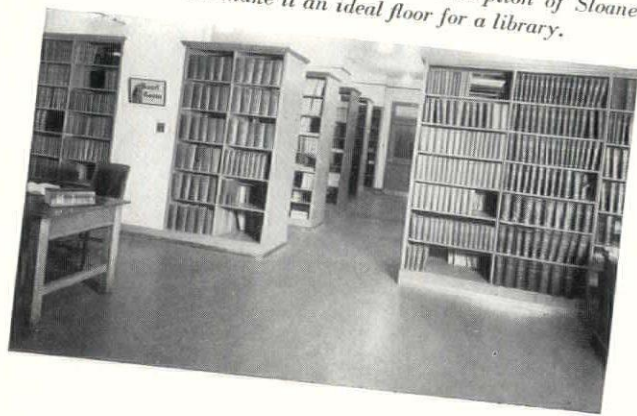
for its new Health, Hospitals and Sanitation Building



The new Health, Hospitals & Sanitation Building of the City of New York. Charles R. Meyers, architect. Straubridge & Clothier, Linoleum Contractors.



ABOVE—One of the many private offices in which Sloane-Blabon Linoleum is used.



BELOW—The resiliency and sound-absorption of Sloane-Blabon Linoleum make it an ideal floor for a library.

For other recent installations and the complete, non-technical story of Sloane-Blabon Linoleum, send for our new Linoleum Handbook. Write W. & J. Sloane, Selling Agents Division, 295 Fifth Ave., N. Y. C.

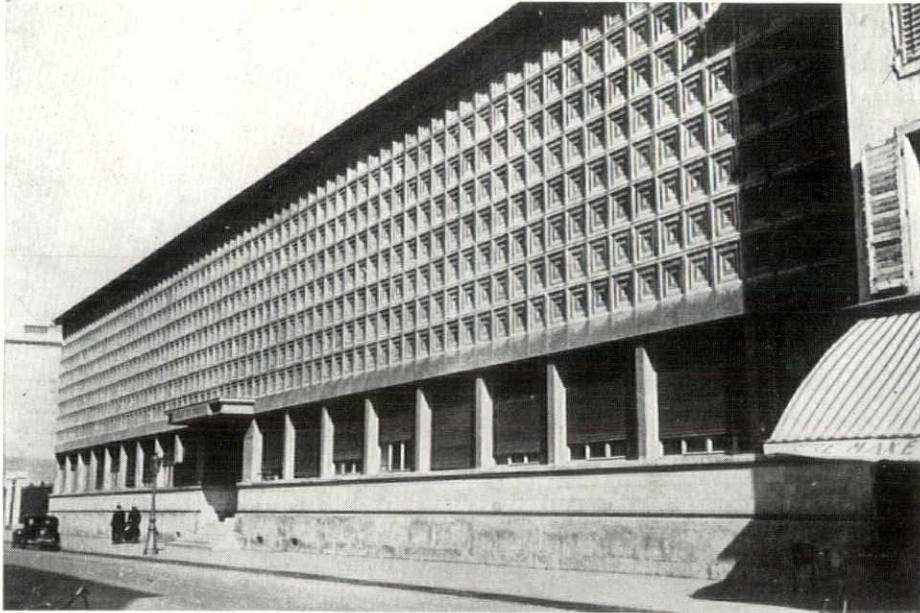


PHOTO: GLOBE PHOTOS

The rhythmic pattern of the relatively unfenestrated concrete façade of the new Zoological building in Nancy, France, indicates the possibilities of all-over geometrical pattern in present day architecture

Lee Simonson, scenic and industrial designer, and about everybody else in New York who had any hope of connecting with the project in some design capacity.

From this group of independent and liberal architects came what newspapers called a "radical plan" for the World's Fair. In no sense was this an official plan issued by the World's Fair Committee. It was drawn up chiefly by Corbett, Walter Dorwin Teague, industrial designer recently appointed to the Board, Silverman and Hare. The plan was presented at the dinner by Harvey Wiley Corbett.

Briefly the design would consist of a serpentine structure almost one mile in length, the "nerve center" from which would radiate specialized exhibits. Also presented at the dinner was a brochure which urged the name "The Fair of the Future, with the sub-title "A Century in the Making," as the official name for this 1939 Fair. The brochure advocated scrapping the traditional method of chopping an exposition up into transportation, science, agriculture, etc. The alternate plan presented was to arrange the exhibits in a sensible sequence stressing their effect on personal life and activities of the visitor. The following categories were proposed: "Housing, food, drink, health, education, work, recreation, art, government, and religion."

As visualized by this self-appointed committee, the visitor would walk through this elongated building, stop-

ping when "headlines" interested him. Exhibits in which the visitors were particularly interested could be followed up in specific exhibits of individual exhibitors which would be housed in separate buildings erected radially to the main artery.

Chief concern, of this committee, however, was that this Fair should have an underlying "social objective." "It must demonstrate that betterment of our future American life can be achieved only through the co-ordinated efforts of industry, science and art."

There were specific suggestions for exhibits, too. A hospital in operation behind glass; "a great common hall typifying the spiritual union of man"; sports in which the visitors would be able to participate; these were only three of the many suggestions which have been offered.

Besides the plan envisioned for the Fair, there were other significant developments last month. Chief among these were the three bills signed by New York's Governor Herbert H. Lehman. The first appropriates \$250,000 from the state's general fund to construct a boat basin in Flushing Bay. This is in addition to the \$1,888,000 already provided for from bond moneys for the construction of boulevards, roads and bridges leading to and included in the Flushing Meadows area, Queens, where the Fair will be held.

Second bill authorizes, through amendment to the New York City Charter, the Board of Estimate and Apportionment to issue, through the Com-

troller, serial bonds not in excess of \$7,000,000 to acquire additional land in the Flushing area.

Third bill gives power to New York City to lease the park lands to the Fair corporation and, in general, sets up the relations that will prevail between the city government and the corporation. This legislation, which clears the way for concrete planning and makes the Fair the actuality that it has not been, was passed with the complete approval of the Governor. Said he: "I am pleased to give executive approval to these bills."

Following this favorable legislative reaction to World's Fair plans, condemnation of the land to be used was formally begun. A site of more than 1,000 acres has already been condemned, representing an expenditure of \$1,525,428—the property of 462 land-owners.

Speaking editorially to its readers on the morning after the architectural group had presented its plan to the Fair committees, the New York Herald Tribune gave its praise to the manner in which the Fair is shaping up.

Said the editorial: "A hundred architects and industrial designers met last December and launched an aggressive crusade to help shape the architecture and social purpose of the New York World's Fair of 1939 toward the future, not the past. A special committee, named after five months of steady research and planning, last night presented a fascinating design and plan to a distinguished gathering including high Fair officials. The design, if adopted, would make this Fair different from any ever held. It would have the possibility of making its commentary, upon what life could be, so dramatic and appealing that even the Midway would be a second-best feature and not the mainstay, as in other Fairs in which the greatest achievements of man's genius were hitched to the chariot of a fan dancer or a nudist."

Thus, in the plan, the Herald Tribune found praiseworthy notes. But there are other policies of this Fair committee that are meriting equal acclaim. The recent announcement by Grover A. Whalen, president of the corporation, that all employes to be hired at annual salaries of \$3,000 or less will be chosen on the merit system from eligible lists prepared by the Municipal Civil Service System, has been also highly lauded. This would mean that the bulk of the Fair's corporation's employes will be taken from eligible lists embracing the qualifications necessary to the jobs to be filled.

*Rotogravure ink plant of International Printing Ink Co., Chicago.
Built by the Austin Company*



C ONCRETE'S *beauty, firesafety and low cost appeal to factory owners*

STRIKING architectural dress costs little or nothing extra when factory and commercial buildings are designed in concrete.

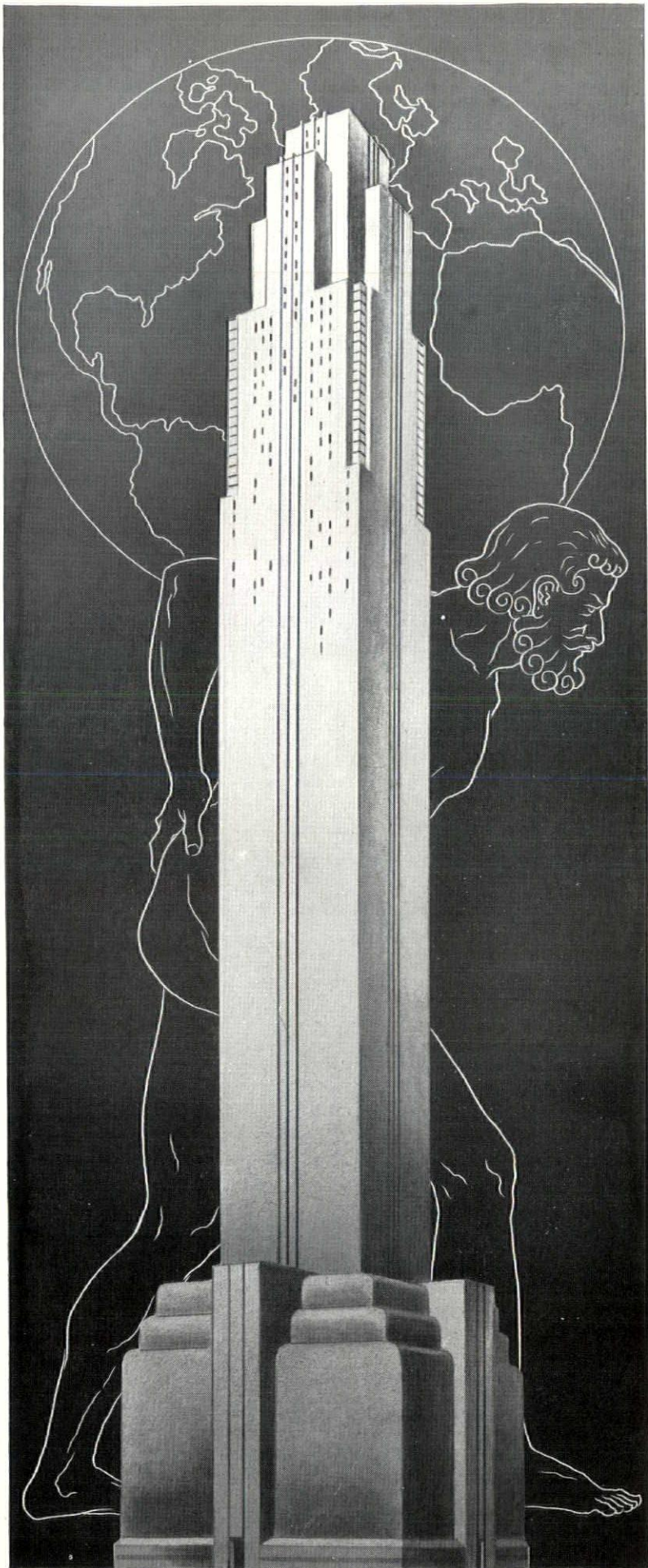
Desired detail and surface texture can be created at low cost by using proper form work and choice of a wide variety of inexpensive surface treatments. Beauty is an integral part of a monolithic structure that has all that any factory owner could ask—firesafety; an absolute minimum of maintenance;

rigidity; slow depreciation; low first cost; and strength to resist floods, tornadoes, hurricanes and even earthquakes.

In scores of different kinds of buildings from machine shops to churches, concrete is giving architects a new design freedom and owners a new set of building values. You and your specification writer will be interested in the practical manual, "*Forms for Architectural Concrete*". Write for free copy.

PORTLAND CEMENT ASSOCIATION, Dept. A7-2, 33 W. Grand Ave., Chicago, Ill.

Architectural Concrete



1936

Bethlehem Steel Products for building construction

BETHLEHEM STEEL STUDS
BETHLEHEM OPEN-WEB STEEL JOISTS
BETHLEHEM WIDE-FLANGE STRUCTURAL SHAPES
BETHLEHEM LIGHT SECTIONS
BETH-CU-LOY GALVANIZED SHEETS
BETHLEHEM STEEL PIPE
STEEL DOOR FRAMES
REINFORCING BARS
KALMANTRIM
METAL LATH
BETHLEHEM INSULATING WOOL
BOLTS AND NUTS—RIVETS
STEEL SHEET PILING
STEEL H-PILING



ATLAS

VERSION

WHEN the Greeks talked of Atlas supporting the world on his shoulders they must have had a vision of the structural steel members which are so integral a part of every major construction project today. The modern world has an Atlas that is no figure of mythology—the structural steel that forms the bone and sinew of so many structures essential to twentieth-century civilization.

Bethlehem Structural Steels have long been important factors in modern building practice. Bethlehem Wide-Flange Sections, introduced twenty-nine years ago, played a major role in the stratospheric flight of building construction which occurred during the second two decades of the century.

Architects and engineers hailed Bethlehem Wide-Flange Sections as a definite contribution to economy in construction. More recent steps by Bethlehem to meet the needs of the construction industry have been the introduction of Bethlehem Light Sections and Bethlehem Open-Web Steel members for residential construction.

A close tie-in with engineering requirements

The development of new steel members to economically meet increasingly complex structural requirements is characteristic of Bethlehem Steel Company's policy of meeting and even anticipating varying engineering and architectural needs. Today, the Bethlehem range of steel products for building construction includes every form of steel for every type of structure from industrial plant or office building to a fire-safe home.

A unique service

The production of so comprehensive a range of steel products by a single company is unique. Only Bethlehem Steel Company can act as a central source of supply for all the steel products used in every field of building construction. Only Bethlehem Steel Company can assume this undivided responsibility for the exact fulfillment of all specifications for any job regardless of its scope or the intricacy of its plan.

BETHLEHEM STEEL COMPANY, General Offices: Bethlehem, Pa. District Offices: Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Seattle, Syracuse, Washington, Wilkes-Barre, York. Export Distributor: Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL COMPANY

Announcing

THE PITTSBURGH GLASS INSTITUTE

AN AUTHORITATIVE SOURCE FOR
INFORMATION ON THE USES OF
GLASS AS A CONSTRUCTION
AND DECORATIVE MATERIAL

THE formation of the Pittsburgh Glass Institute marks a new step forward in the building industry. As an architect, you are aware that glass is playing an increasingly important part in modern building design, that today is, in reality, an era of glass. Yet hitherto there has been no authoritative agency to which the members of the building industry might apply for information on glass. There have been no accepted standards for using built-in glass in construction.

The Pittsburgh Glass Institute, with an advisory board composed of experts in the various

phases of the industry, is intended to remedy this condition. Its primary purpose is to assemble and coordinate all available data on the many uses and applications of glass that have been developed through modern manufacture . . . to establish authoritative standards for the use of glass.

If you have any problems concerned with the functional or decorative use of glass, we invite you to apply to the Pittsburgh Glass Institute for assistance in their solution. We believe the Institute can render outstanding service to the architects and building trade of America.

★ PITTSBURGH ★ GLASS ★ INSTITUTE ★

30 ROCKEFELLER PLAZA

NEW YORK CITY

ARCHITECTURALLY SPEAKING

by

OTIS ELEVATOR COMPANY

WE FEEL we have some very interesting and useful information to offer in this issue. It will come under the head of "Specification Units." Heretofore, a hoistway has been indicated somewhere up through a structure and elevators ordered to fit the space. This is an old-order system, going back to the early days of elevating when no two buildings were alike and the elevators were just sort of "fitted into" the building.



THERE IS no reason why elevators shouldn't be made uniform to a certain degree. There are many buildings that go up with similar elevator needs, either passenger or freight. Using some eighty-four years of elevator experience to guide us, we are now prepared to produce a number of different Specification Units. Each is built to predetermined standards to fit the needs of a given type of building. If, for instance, a small apartment house is suited to Unit 110-P, that elevator will be furnished under a specification which has already been proved under actual conditions as fulfilling the exact requirements. These Specification Units give complete assurance that component parts are absolutely suited to each other, and form a complete, harmoniously working unit. They assure the purchaser that he will have an elevator installation which has been proven to be ideally suited to his building.



HOW WERE Specification Unit standards arrived at? It required long experience and an extensive study of layouts of elevators in thousands of buildings,

with consideration as to the building needs, before it was possible to find that there were certain elevator duties and platform sizes that were in greater demand than others for certain types of buildings. For instance, with the capacities and car speeds determined from this study, it was found that the platform sizes varied only by a few inches for similar conditions. Then on passenger elevators the matter of the elevator doors was a major factor, together with other practical considerations in determining the most desirable width of the platform. When the width was thus settled, the depth was determined mathematically by consideration of the capacity. This will give you an idea of how standards for Specification Units are established.



WE URGE you to keep these Specification Units in mind and use them wherever possible. We think they will place the business of ordering elevators on a more practical basis. We feel the trend should be more and more to this type of installation.



AND NOW an entirely different subject. It is universally accepted that Two-Speed A. C. Control is not entirely satisfactory for elevators from the standpoint of performance. We are now offering a new machine for the medium-range duties which will take alternating current supply and convert it to multi-voltage direct current operation. This machine is very compact and can be furnished at prices comparable to Two-Speed A. C. Control.

Certigrades

do "double-duty*" on this charming cottage!

Let Architect Maxmillian R. Johnke put it in his own words: "I have found by using CERTIGRADE Red Cedar Shingles on this cottage that they serve a double duty, in that they produce a low-cost insulation value in addition to the charming effect of early American architecture most pleasing to the owner. Needless to say, I specify them for most of my work."

• • •
This roomy six-room cottage at Hempstead, New York has both roof and side walls of CERTIGRADE Red Cedar Shingles. Maxmillian R. Johnke was the architect.



* they insulate as they decorate!

MR. JOHNKE strikes the keynote of CERTIGRADE Red Cedar Shingle superiority for both roofs and side walls. Their deep shadow lines, warm color tones and random widths give beauty to practically any type of design. Their unique insulation quality, due to millions of tiny air cells in the wood, resists penetration of heat and cold. Your clients will appreciate the way CERTIGRADES save on fuel in the winter—make homes delightfully cool in summer. And CERTIGRADE Red Cedar Shingles are economical too—first cost is surprisingly low and their extremely long life means

CERTIGRADE Red Cedar Shingles are sold only by established lumber dealers. YOUR dealer will gladly furnish full information and cost estimates.

years of protection from the elements without upkeep cost. For natural beauty, high insulation value, long life and low cost, specify CERTIGRADE Red Cedar Shingles. ••• RED CEDAR SHINGLE BUREAU: Headquarters, Seattle, Washington; Canadian office, Vancouver, B. C.



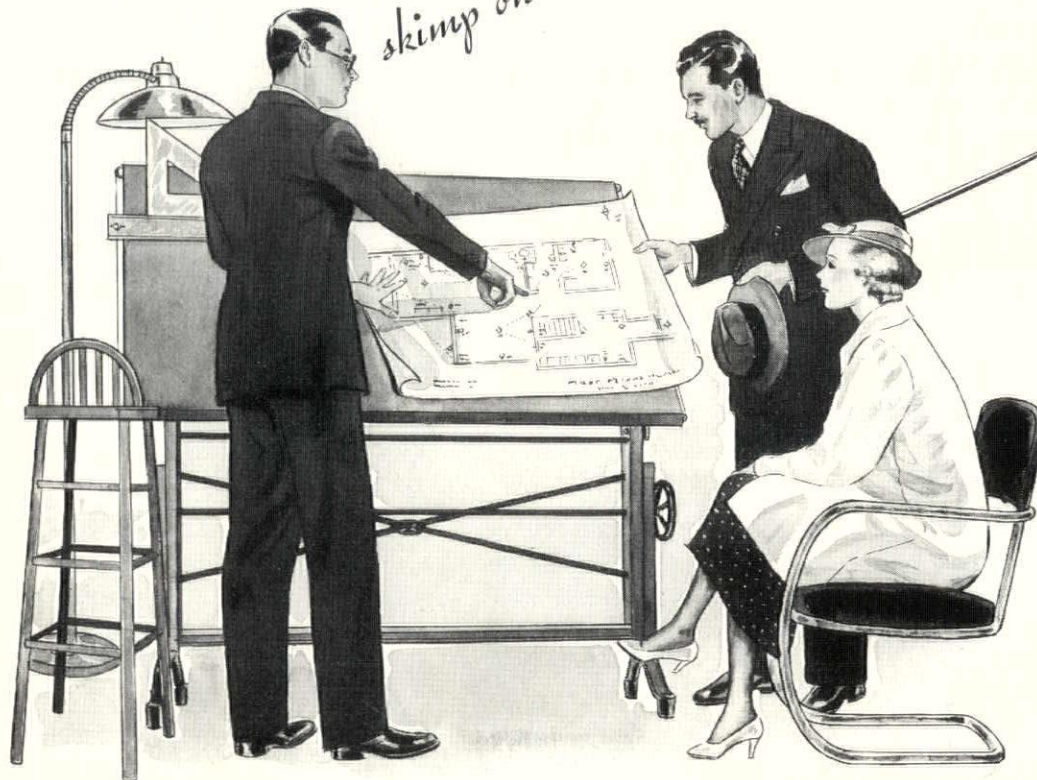
CERTIGRADE DATA for ARCHITECTS

DOUBLE-COURSING: Architects will find real economy for their clients in double-coursing—the applying of No. 1 CERTIGRADES exposed to the weather over No. 2 CERTIGRADES of the same length. Beauty is accentuated by the deep shadow lines and the unusual weather exposure. Two courses of shingles give an added insulation value, which means greater comfort in the home.

• • •
DURABILITY: Heartwood of Red Cedar, used for shingles, withstands weather wear for a lifetime. The wood contains a large quantity of natural preservative. Extensive tests demonstrate that when cut edge-grain, Red Cedar has an amazingly low coefficient of expansion and contraction with changes in moisture content—the result; it weathers slowly and uniformly. It lasts and outlasts!

• • •
INSULATION: Every cubic inch of Red Cedar contains millions of sturdy little air-cells, through which heat cannot penetrate. This is true insulation—comfort in the home.

*It's false economy to
skimp on Electrical Wiring*



SPECIFY THE GENERAL ELECTRIC RADIAL WIRING SYSTEM

"Oh cut down on the wiring. You can save money there." Even today you can hear men saying that especially in regard to home wiring. But it's false economy. Modern living requires the extensive use of electrical equipment and appliances. If the wiring installed when the house is built isn't adequate to supply enough electricity then more wiring must be added later. The confusion, annoyance and expense which this will cause can well make the home owner dissatisfied with his new home.

Now as never before attention must be paid to adequate wiring because the efficiency of the modern home depends upon it. To provide this adequacy, specify the G-E Radial Wiring System. The new arrangement of circuits and ease of

control, the adequate copper sizes, and large number of outlets assure economical and efficient electrical service.

The G-E Wiring Materials which compose the G-E Radial Wiring System are built to General Electric's high standard of quality. The line is complete. The G-E Radial Wiring System is easy to specify and to check during installation. Complete information may be found in "Sweet's 1936 Architectural Catalog", in the "American Architect Time-Saver Standards", or in our bulletin "The G-E Radial Wiring System Manual for Architects". Write for the bulletin to Section CDW-907, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC

APPLIANCE AND MERCHANDISE DEPT., GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

PREFABRICATED, FIRE-BORN, MASS-PRODUCED, SITE-ASSEMBL

PHOTO: SCHNALL



APTABLE, ECONOMICAL, COLORFUL, ENDURING BRICK

BY HENRY H. SAYLOR

ONE meets quite frequently, in these days, the man who insists that building for modern needs means complete abandonment of old methods and old materials. He is likely to argue that we should never again build a stone house of the Cotswold style—it was for another day and another mode of life. Indeed, if encouraged—or perhaps even without encouragement—he will probably go so far as to say that, with our knowledge and our machinery, we should never again pile stone on stone to enclose space; it would be so much easier, quicker, and less expensive to put up two thin sheets of steel, with proper insulation between them. Then, warming to his subject, he will launch the most scornful of his shafts—even though it is somewhat dulled by too frequent use: “Why, we still lay brick on brick to make a wall, just as the Babylonians did before Christ was born!”

Doubtless it would serve to fan our iconoclast into a mute rage if I ventured the opinion that, unless mankind loses or deliberately abandons his search for beauty, we shall be laying brick on brick some thousands of years in the future. If, as someone has well said, all the past is but a prelude to the future, I think I shall have little difficulty in establishing the likelihood of that contention.

From a sun-dried clay tablet made in the time of Sargon of Akkad, founder of the Chaldean Empire, nearly four thousand years before Christ, we have evidence that man patted the clay of his river valleys into cakes, dried them in the sun, and used them for building, some thousands of years before the earliest recorded history.

It is quite likely that some progressive of that dim past wagered with his fellows that some material far better than clay would soon supplant it. Nevertheless, when the Tower of Babel came to be built, it was brick that made it—brick which by that time was burned hard by fire rather than merely dried in the sun. Still later, coming down to the time of Nebuchadnezzar (604-561 B.C.), man was still laying brick on brick to build his walls, but by that time he knew not only how to burn it but how to enamel it as well.

Even in that treasure house of achievement in stone, Egypt, there is one pyramid at Dashur, just south of Cairo, that is of brick, and an inscription boasts of it in words roughly translated thus: “Disparage me not by comparing me with pyramids built of stone. I am as much superior to them as Ammon is superior to the rest of the deities. I am constructed of brick made from mud which adhered to the ends of poles and was drawn up from the bottom of the lake.”

The ancient and honorable art of brick making seems to have originated on the Mesopotamian plains. Eastward it spread to Persia, India, China. Westward it spread to Egypt, Asia Minor, Greece, Rome, and from Rome to Europe and the Western world.

In this long march onward through the centuries, there is one point that should be emphasized. The brickwork of Rome was something more than the brickwork of Babylon; the brickwork of Mediaeval England was something far

more than that of Rome. After Assyria and Egypt had done what they could with brick, Rome borrowed it and built the Baths of Caracalla and the Basilica of Constantine. After Rome, Spain carried the art forward and built the Mosque of Cordova. France lifted higher the torch, with her chateaux, England with her Hampton Court, Holland with her Guild Halls.

When one country after another found brick as used by a neighbor, it found something more than a piece of clay; it found an art. How that art was borrowed, developed to greater and greater heights, and passed on to other men and other lands for further development, is one of the great sagas of architecture.

Take, for example, the story of English brickwork. It was the Roman builders in England who made and used the first brick in a glorious history. These bricks were what we should call tiles—made of clay beaten flat, dried on the ground, stacked on edge in kilns, and burned by wood fires. Naturally, they varied widely in length, breadth and thickness. Sometimes they were triangular in shape, with the best flat edge on the face of the wall, the interior of which was a most heterogeneous conglomerate. Incidentally, these Roman bricks were reclaimed, cleaned and used again in later English work.

The making of brick as an industry appeared in England in the Thirteenth Century, but it was not until the days of Henry VIII (1509-1547) that the craft reached a high degree of excellence—probably attained largely through Flemish influence. Then came the Fire of 1666, and London became a town of brick instead of a town of wood. And even then the art of brick masonry in England was in its infancy. Its full stature was not reached until, after long development through the reigns of Queen Anne and the Georges, it achieved the grand old manor houses of the Eighteenth Century.

Lest we establish brick masonry in our minds as merely a variation in wall texture, let it be recalled that its small units and ease of handling probably brought about the discovery of the arch and the vault. Inevitably these would have been discovered in time by the stone masons, but since Assyria seems to have been the first home of the arch, and the Assyrians were brickbuilders, we shall have to credit the clay product at least with an assist.

Brick, it should be remembered, is also one of the very few building materials that have brought into being a distinctive style. Stone, of course, has achieved this, also wood, and in our own day steel has joined the ranks of those fundamental materials, without which man could not have built certain of his creations. If you should doubt that architectural style has been achieved through the use of brick—a style in which no other form of masonry would have sufficed—consider The Midi of Southern France, centering about Toulouse and Albi. Possibly brick has been used here with greater skill and more taste than anywhere else in the world. Dean William Emerson and Georges Gromort think

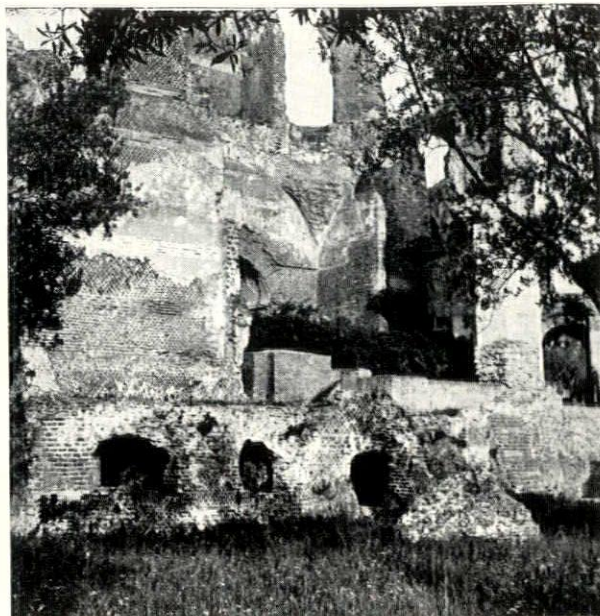
so, and their recent book, "The Use of Brick in French Architecture," is a document in evidence. Again, is it possible to conceive of some of the Dutch work executed in any material other than brick? Brick in The Midi transcends the merely utilitarian role and achieves—as in the Cathedral of Albi—an architectural quality that could not have been attained in marble or stone. In passing, it is worth noting that the individual bricks used in this work are not often over an inch and a half thick, but they are from fifteen to seventeen inches long, and in depth are occasionally eleven inches. The joints in the old work average about three-quarters of an inch, and sometimes reach one and five-eighths.

Speaking of brick sizes, man has never fully made up his mind as to what is the ideal—and the reason, probably, is that what is best for one purpose is not best for another. The dome of Santa Sophia in Constantinople is built of bricks that are twenty-four to twenty-seven inches square and two inches thick. The mortar joints are almost the thickness of the bricks. In this instance the brick serves a purely utilitarian purpose, for it is sheathed on the exterior with lead and on the inside with glass mosaic.

To Vitruvius, just before the beginning of the Christian Era, a brick was about twelve by eighteen inches, and little thicker than a tile. He tells us also that the Greeks measured their bricks by the palm of the hand—the *pentadoron* was five palms square, the *tetradoron* four palms square.

In this matter of size, our familiar mentor, Batty Langley, had at least the germ of the modular idea in his head when he wrote (in 1749) of bricks two and a half inches thick "to rise in four courses to a foot in height."

Experiments looking toward the achievement of a pattern in brickwork must have been initiated by very early craftsmen, but apparently the progress was slow. What is called Old English Bond (alternate courses of headers and stretchers) had come into general use in England in the Fifteenth Century, and it was used almost exclusively until Flemish Bond was introduced about 1625-50. Meanwhile the French were making more rapid progress. What are now called English Cross Bond and Dutch Bond were used by the Mediaeval brick masons in addition to the two bonds mentioned. These masons also developed the scheme of diaper patterns, using vitrified headers or brick of another color—purples, blues, grays, and sometimes almost black. The scheme was welcomed by the French particularly for its aid in lending scale to walls of the larger buildings. Like most aids to the designer, however, it was overdone, and finally reached its limit in the tour de force of a dovecôte for Boos Manor, Rouen. Here the pattern became so marked and intricate, so full of sharply defined panels, as to break the fundamental laws of proper structural bonding. Softened by time, the dovecôte now offers a beauty that it could hardly have possessed when new.



Nor were the brick masons satisfied when they had achieved beauty of texture and color in a wall surface. The third dimension called to them, and they succeeded in getting away from the plane by molding special forms, by grinding ordinary brick to a profile, and by carving rectilinear brickwork after it had set. All three methods were employed from early times.

Naturally, our own beginnings in America took as a point of departure the art as it was then practiced in England and in the Low Countries. Adobe brickwork had been found by the Spaniards in Peru and Mexico, and they developed it in their settlements in our own Southwest. The industry which stems from English and Dutch practice, however, took root in Virginia in 1611, and in Massachusetts in 1629. While the colonies along the North Atlantic were doing an honest, craftsmanlike job of putting up a few brick buildings among their far more numerous structures of wood, the planters farther south, particularly in Maryland and Virginia, were aspiring to the higher reaches of the art.

Brick is perhaps the most widely adaptable of our wall materials. For the poor man it will accept the humblest utilitarian role. From that it responds, all the way up the scale, to every demand made for higher degrees of quality in materials, workmanship and design, lacking no merits that may be required of a material in the class of unlimited cost. It does not compete with stone or marble for the designer's favor, nor does it brook competition from them. At its best, it stands alone, no more to be compared with other materials than an iris can be compared with a peony. Each is comparable only with other members of its own family.

The sad part of it all is that brickwork in our day is so seldom brought to the high estate it deserves. Beauty of brickwork is not easily achieved. In all the thousands of years in which brick has been laid on brick, no formula has ever been devised for assuring its beauty. In one of these printed type characters that you are reading, a change of line direction or thickness of a thousandth of an inch would change utterly its physiognomy, for better or for worse. The character of brickwork is equally subtle. I have noted with the utmost care the size of individual bricks, their color, bond, mortar, width and kind of joint, in a wall of brick. Another wall nearby is mathematically its double, so far as the eye can measure it, and perhaps chemically its double as well, yet one wall is a lovely thing while the other is—just brickwork.

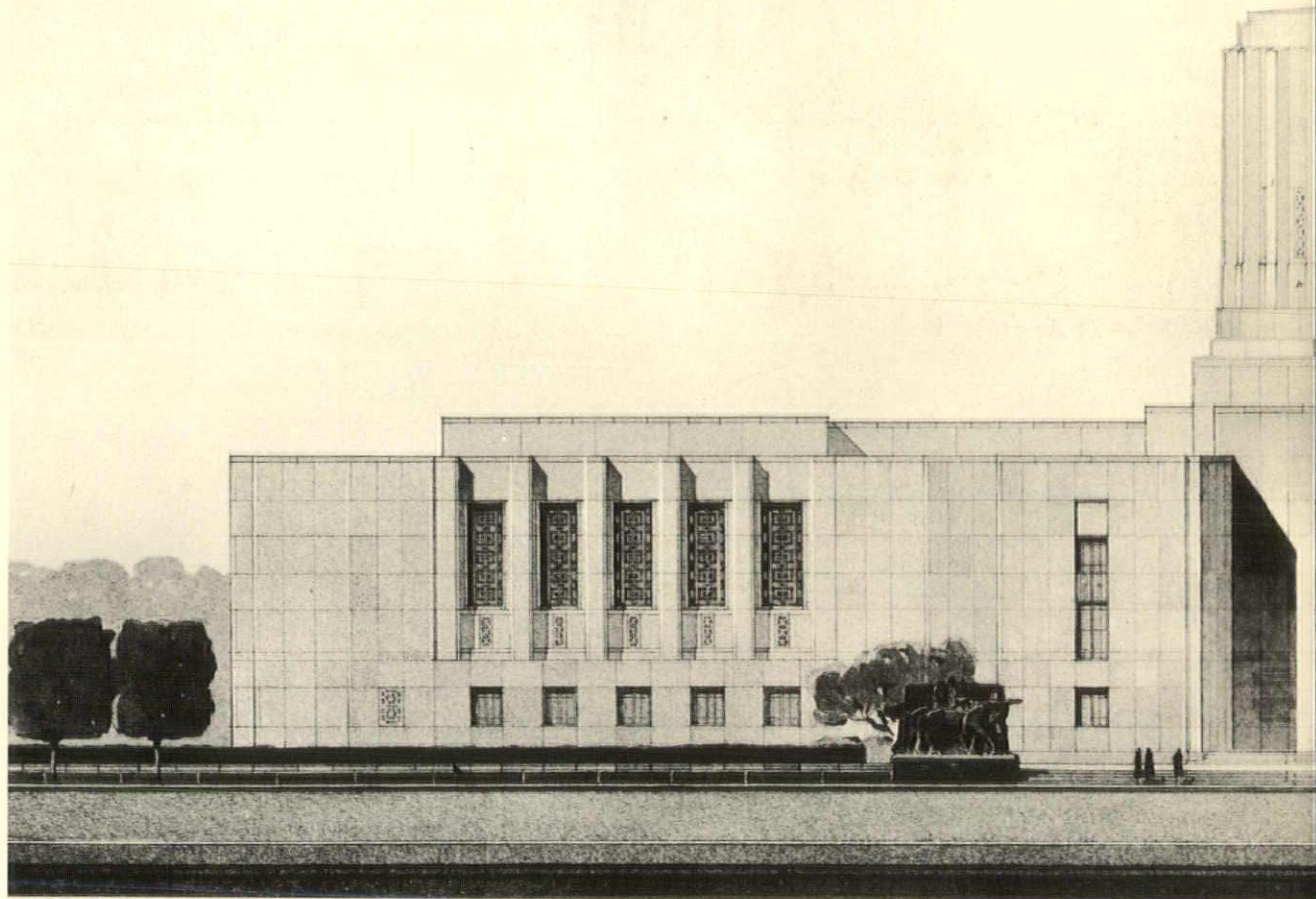
Perhaps it is just as well that this is so. If beauty in a certain form of art expression were easily had, that form of expression would not detain any one of us very long. It is the unattainable that keeps us on the quest. A brick wall that is truly lovely—so much so that one wants to drink in its beauty through the fingers as well as through the eyes—is, after some thousands of years of trying, attainable only occasionally. Is it at all likely that we shall give up trying?

OREGON STATE CAPITOL COMPETITION



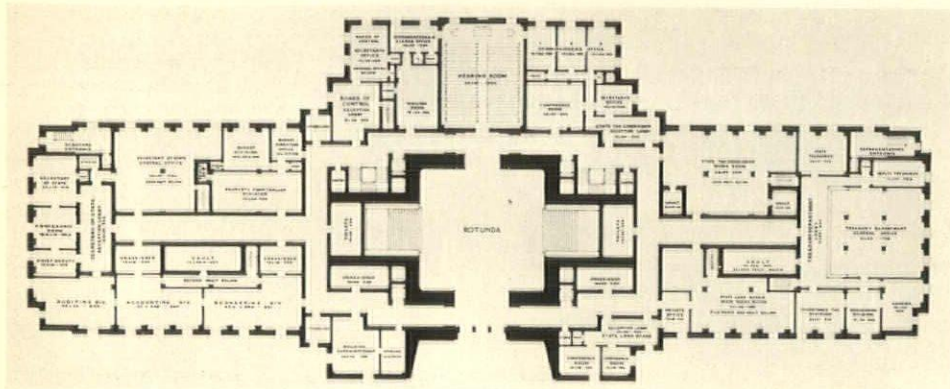
1 9 3 6

ONE HUNDRED TWENTY-THREE competitors submitted designs in the competition for the selection of an architect for the Oregon Capitol Building. Carl F. Gould, F. A. I. A., served as technical advisor to the Capitol Commission. The jury, which was not announced until the drawings were in the hands of the Commission, consisted of David Clark Allison, Los Angeles, and Walter H. Thomas, Philadelphia—the architect members; and T. H. Banfield, Portland, and Mrs. Gordon Voorhies, Medford, the latter two members of the Capitol Commission; and E. B. MacNaughton, a Portland banker. The jury, without additional comment, named as winner the design submitted by Trowbridge & Livingston and Francis Kealy of New York. Five additional designs were premiated by the jury, without determining any order of preference. Reproductions of the winning design and of the designs submitted by the five premiated competitors follow in this folded insert.

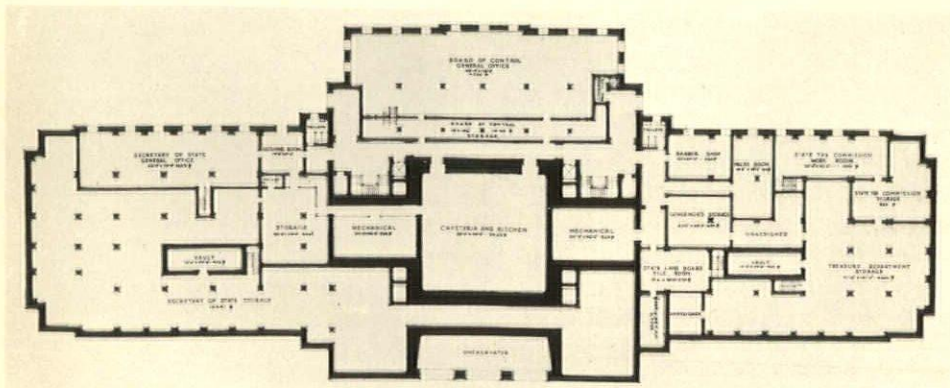


FRO

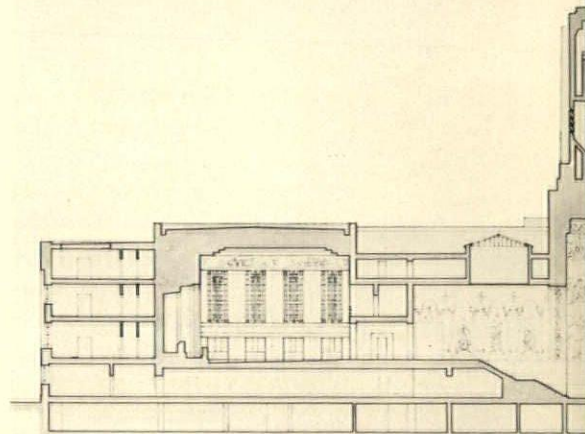
IN APPROACHING the problem there seemed to us to be several governing considerations. The plot was unusually long and narrow; the building should, above all, convey the impression of being a Capitol building and nothing else. It followed that we should use a long, low building with a dome, or another dominant in place of and we preferred the latter. The building should be inviting, avoiding the forbidding monumental flight of stairs



FIRST FLOOR PLAN



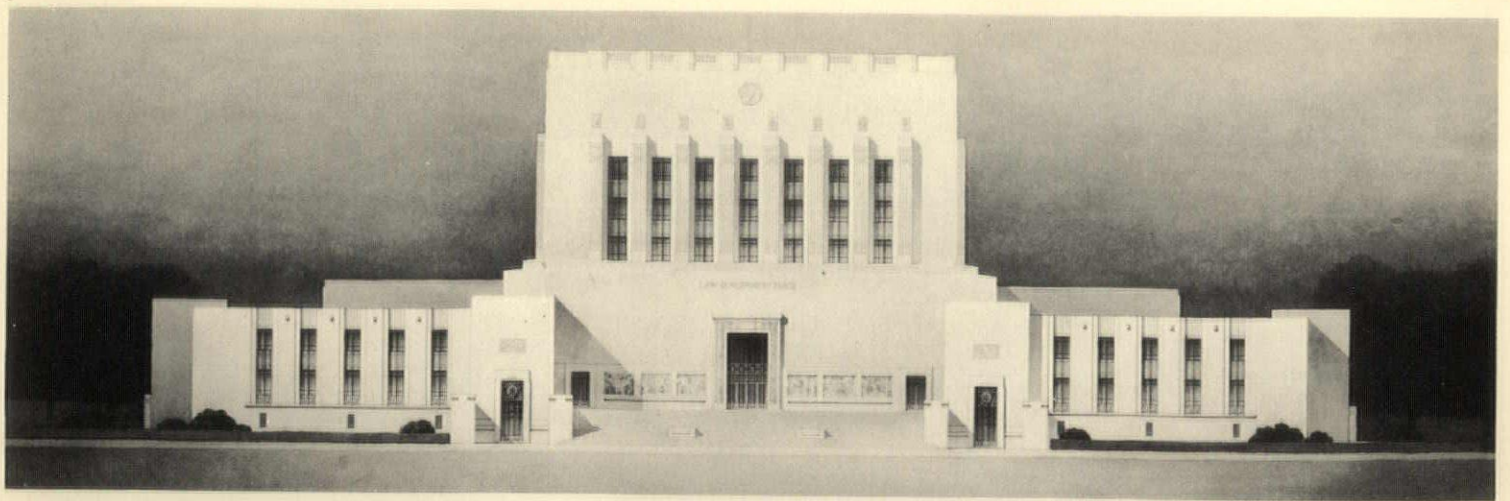
BASEMENT PLAN



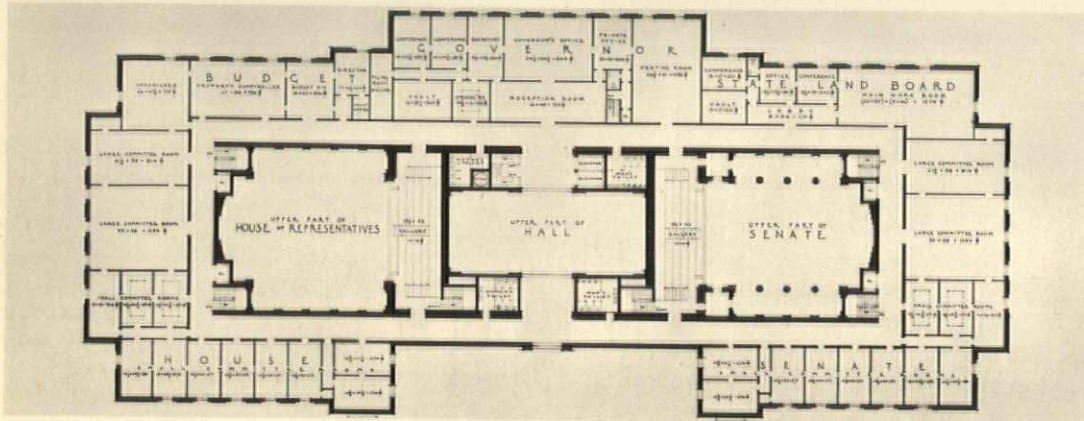
LONGIT

WINNING DESIGN SUBMITTED BY TROWBRIDGE & LITTLE

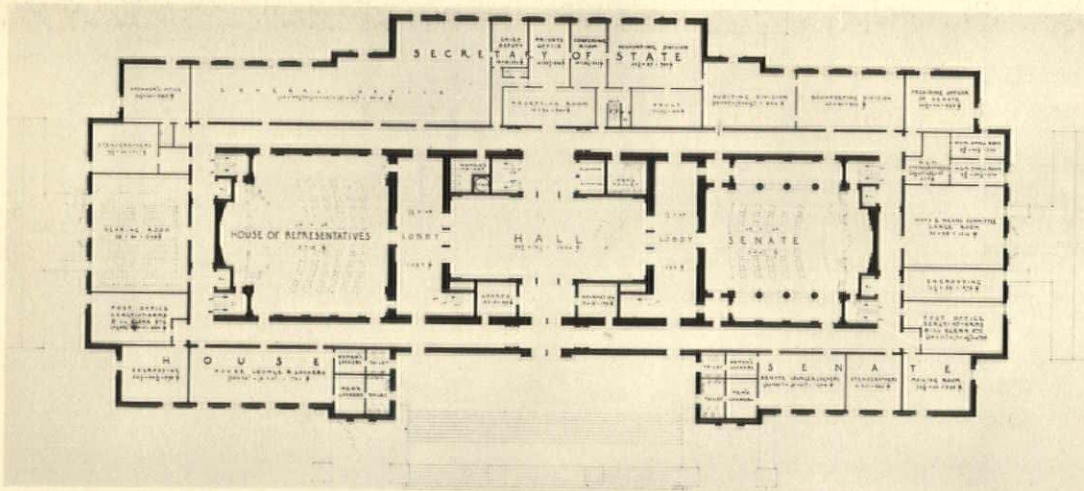
AMERICAN ARCHITECT



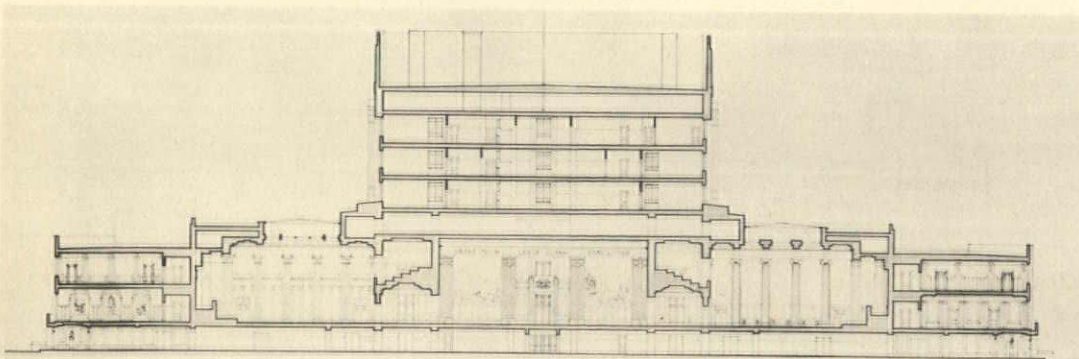
FRONT ELEVATION



SECOND FLOOR PLAN



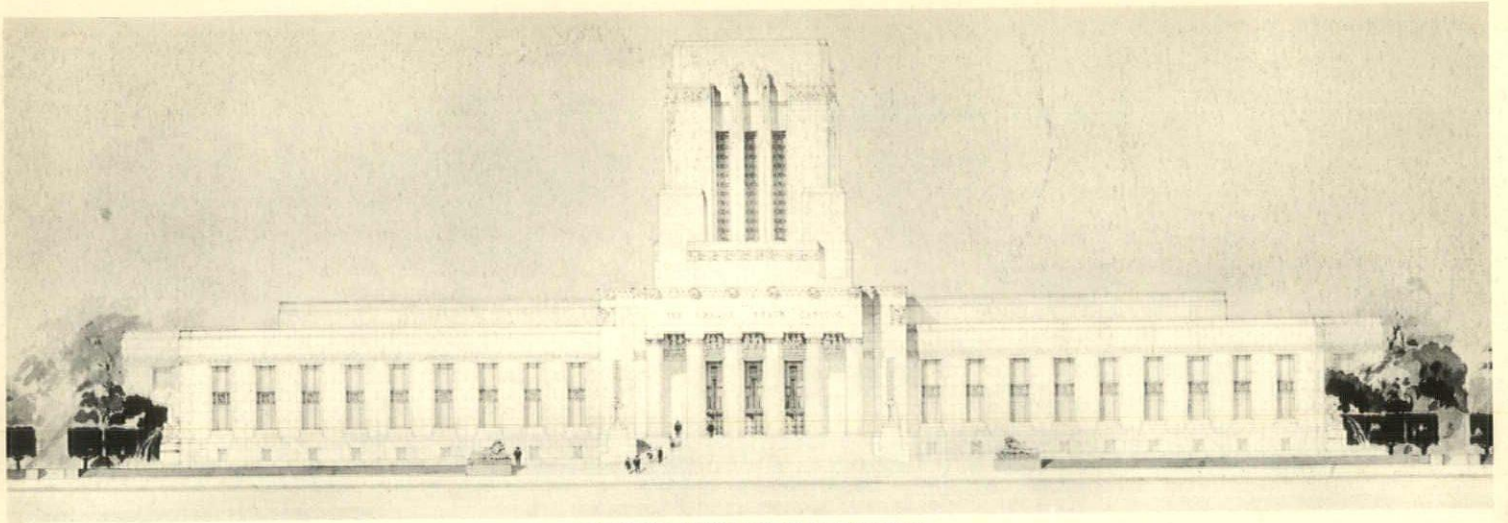
FIRST FLOOR PLAN



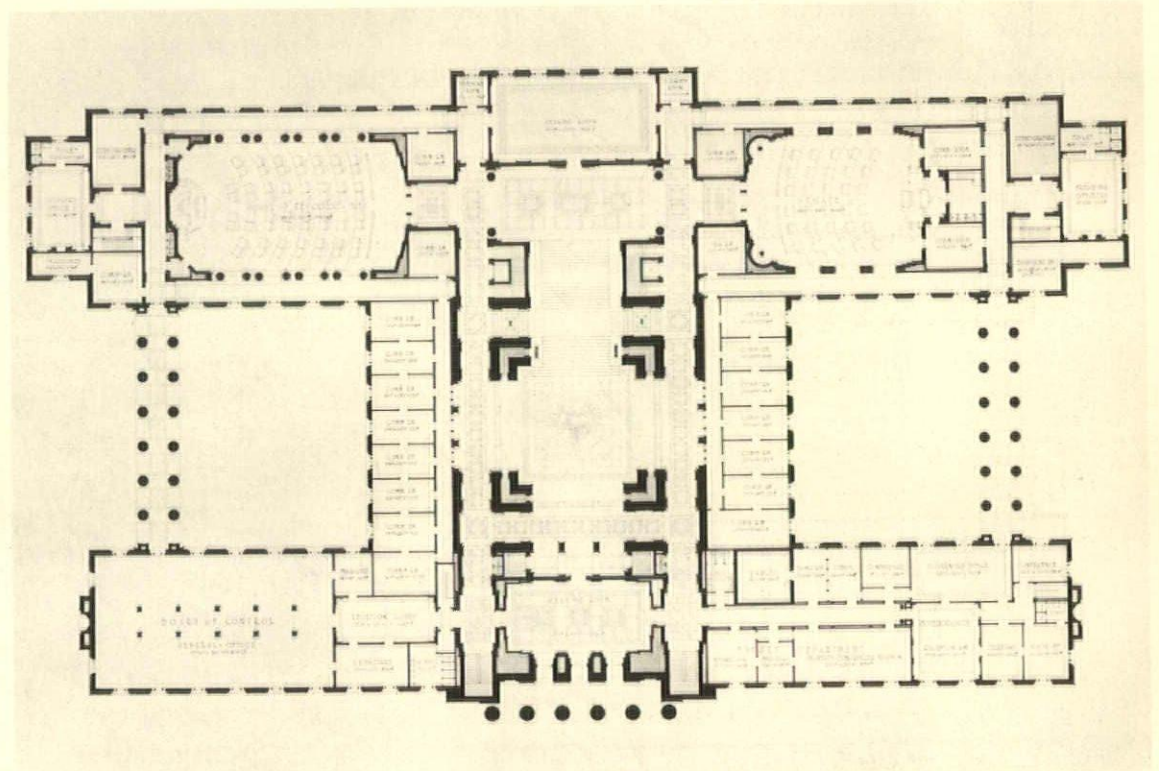
LONGITUDINAL SECTION

"INSTEAD of the customary dome, we preferred to express the dignity of the State's Capitol in the form of a monumental mass, simple as the thoughts and actions of the original settlers, but a mass which would have real use, not a merely decorative value. We felt that there should be expressed the two distinct functions, namely; the public, monumental, large spaces devoted to legislative work; and second, the distinctly administrative office building. This theory lent itself easily to the use of a lower building contrasting with the higher portion."

DESIGN SUBMITTED BY WALTER T. KARCHER & LIVINGSTON SMITH

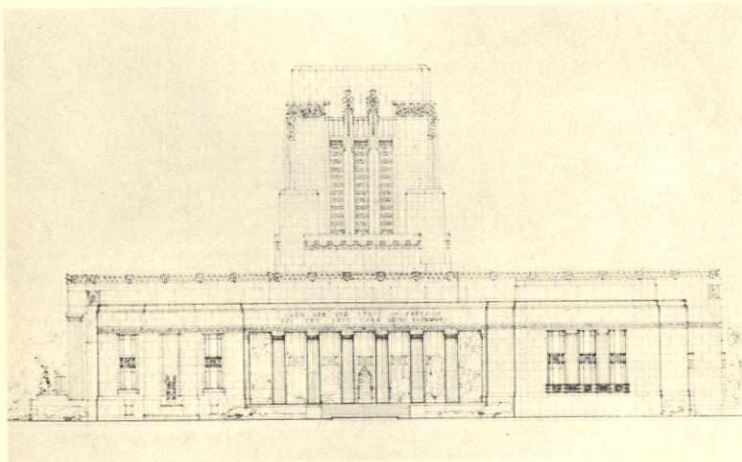


COURT STREET ELEVATION

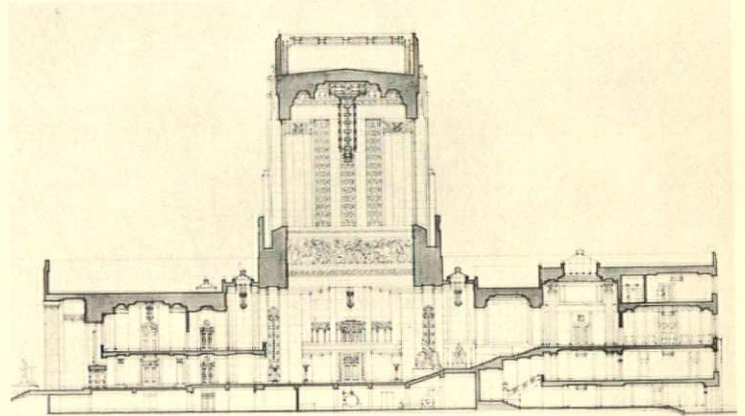


SECOND FLOOR PLAN

"IT WAS DEEMED advisable to deviate from the usual type of dome structure, substituting therefor a central tower of dominant characteristics. It was further believed that the type should be semi-modern in character, with modified Greek details. The problem was approached primarily from the standpoint of plan, with an effort to produce an interesting side façade as well as main façade. Primarily for the purpose of adequate light, and secondarily to enable planting to extend into the courts, the H plan was adopted."

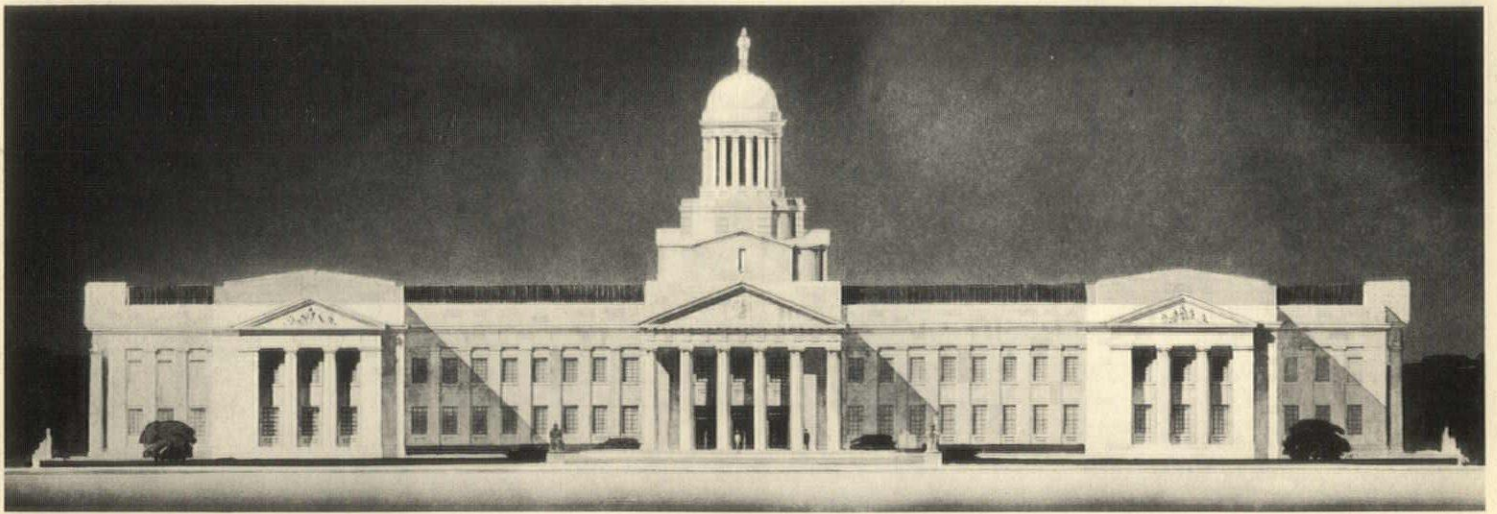


WILSON PARK ELEVATION

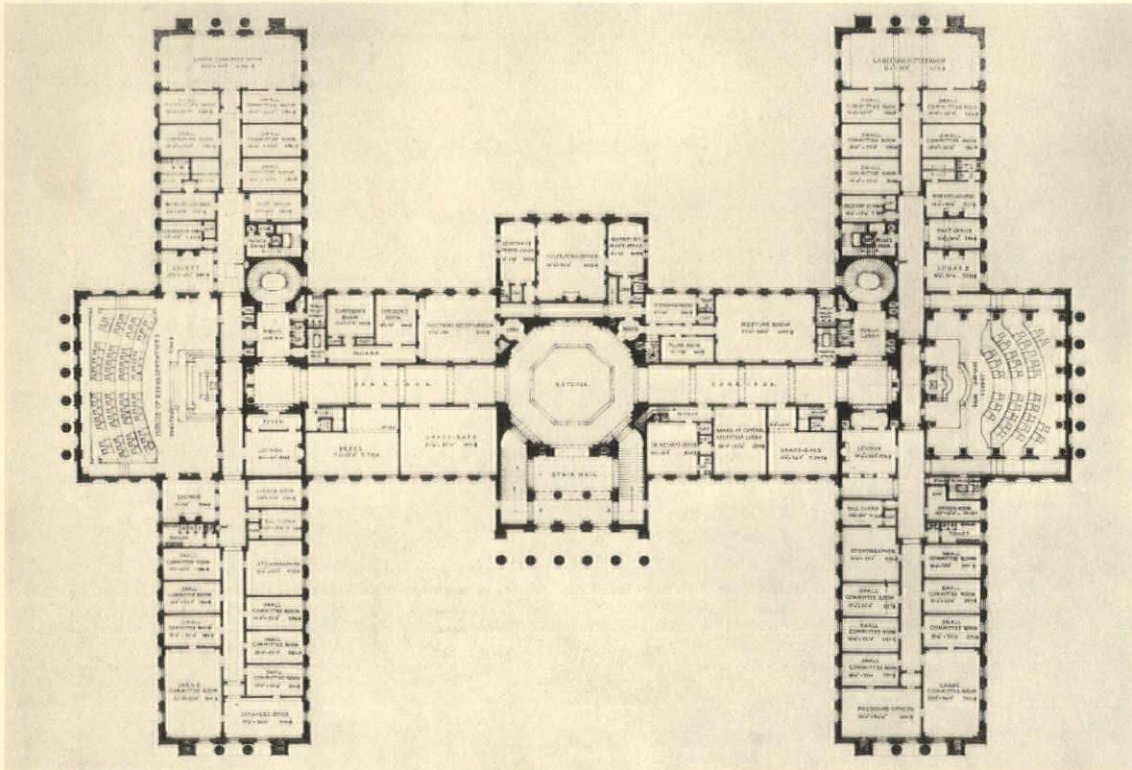


LONGITUDINAL SECTION

DESIGN SUBMITTED BY WILLIAM PEYTON DAY

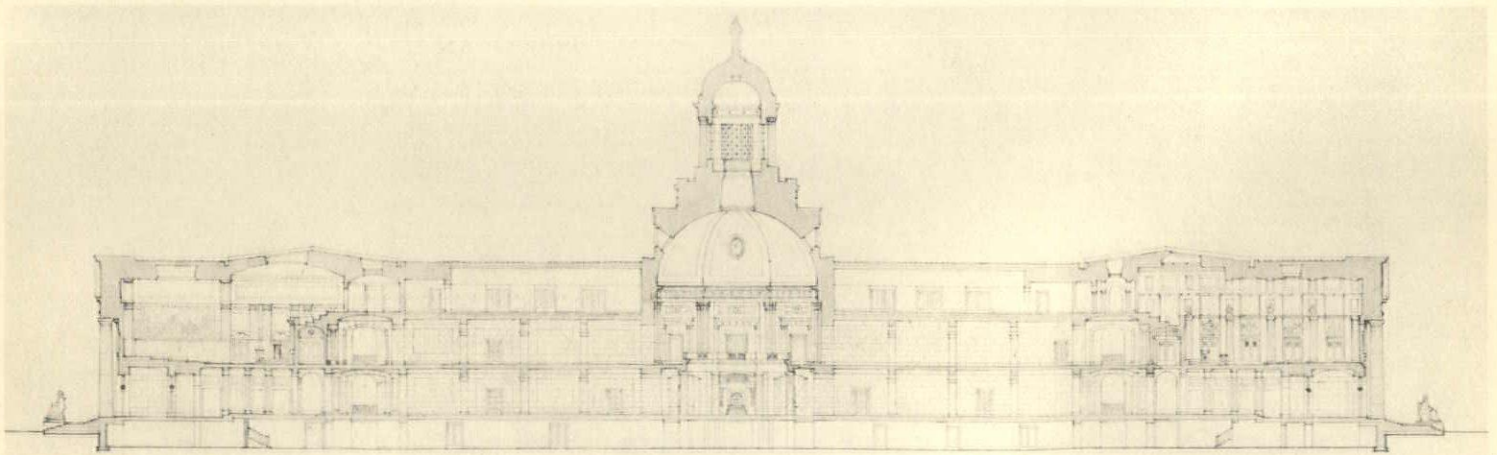


FRONT ELEVATION



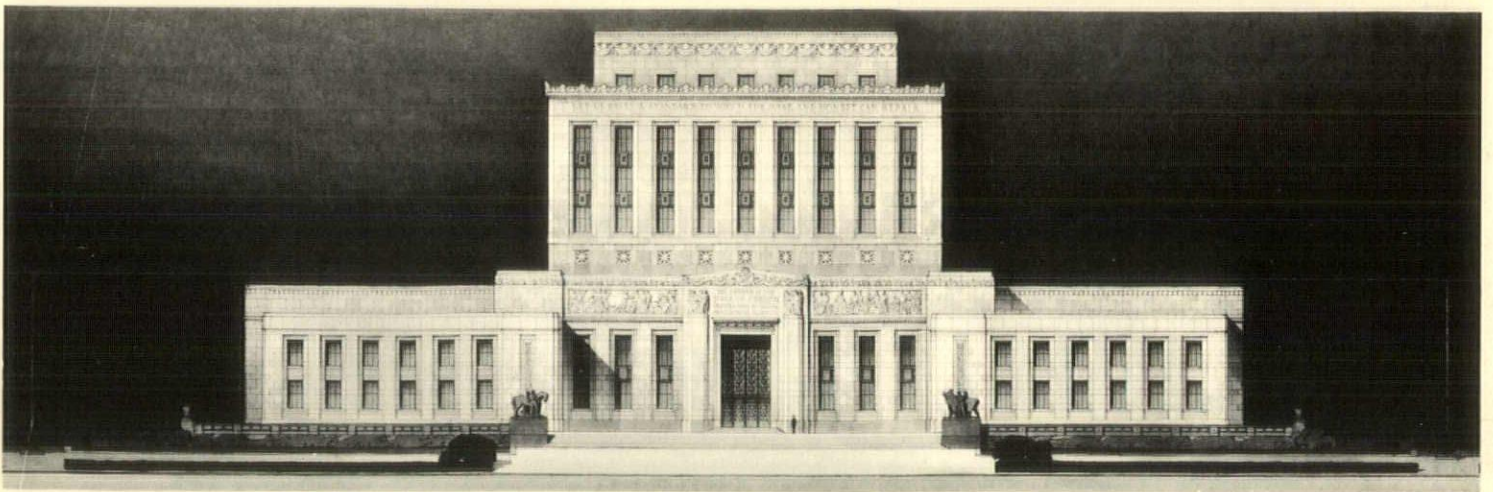
SECOND FLOOR PLAN

"IN WORKING up this design, I was guided more or less by the thought contained in the historical foreword of the program, wherein it was stated that the original settlers came from New England, and that this particular section of the State was similar in topographical character to New England. This led me to the early Federal architecture for inspirational background. Due to lack of funds, I also eliminated as much as possible of the monumental character, reducing the working elements to as compact a space as possible, believing that two axes should be considered."

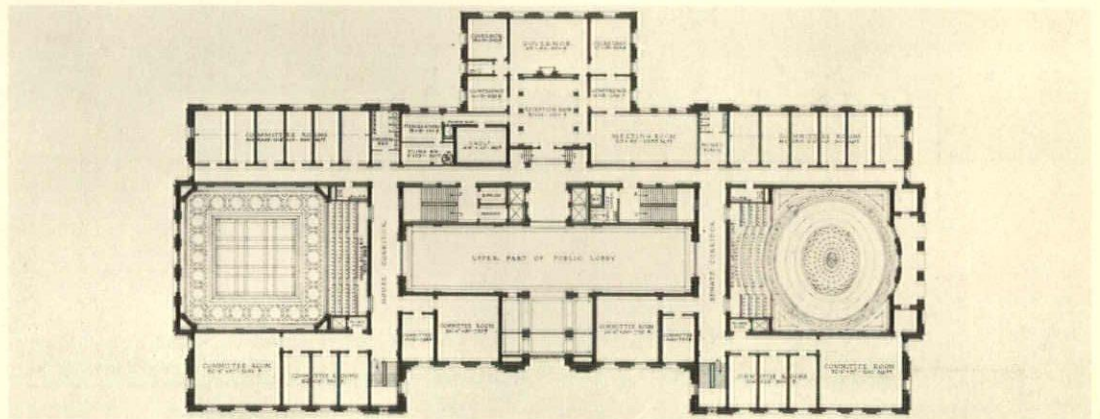


LONGITUDINAL SECTION

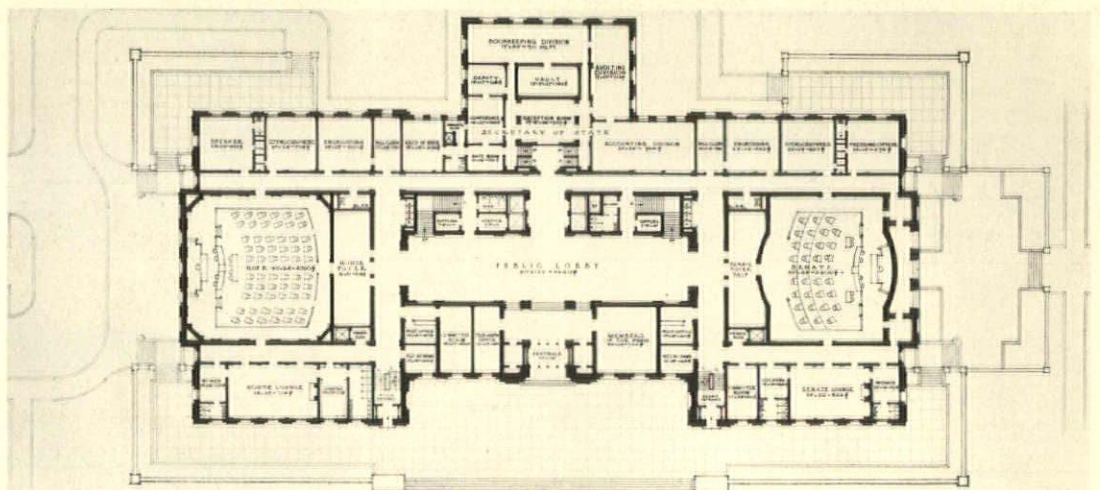
DESIGN SUBMITTED BY WESLEY SHERWOOD BESSELL



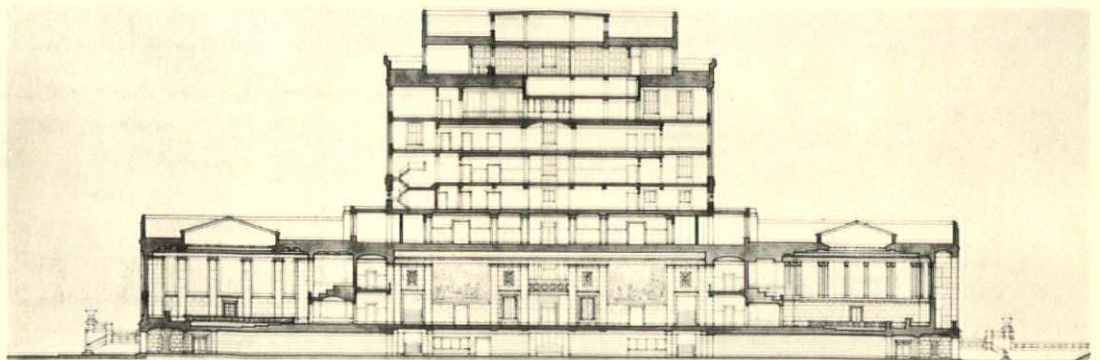
MAIN ELEVATION



SECOND FLOOR PLAN



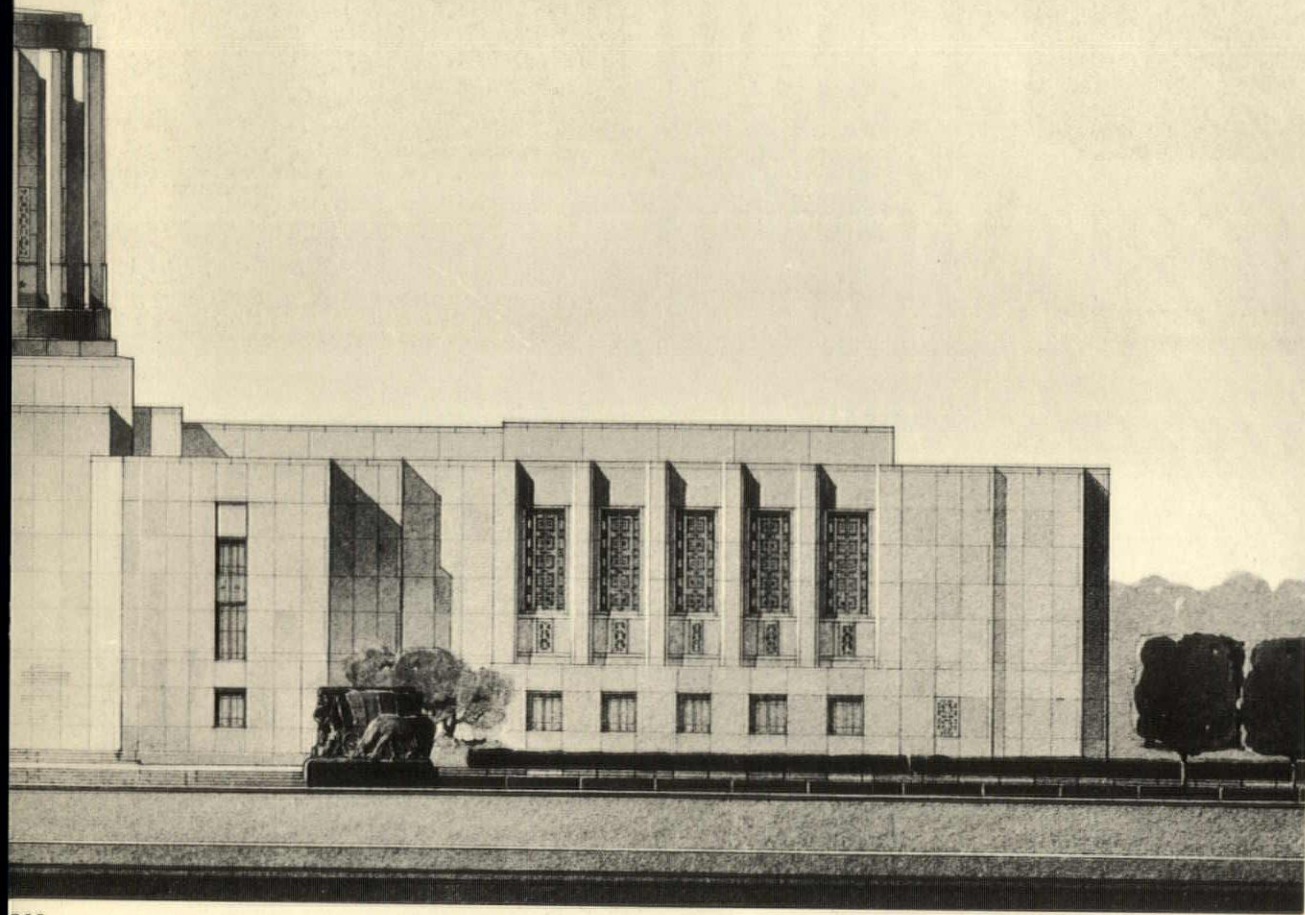
FIRST FLOOR PLAN



LONGITUDINAL SECTION

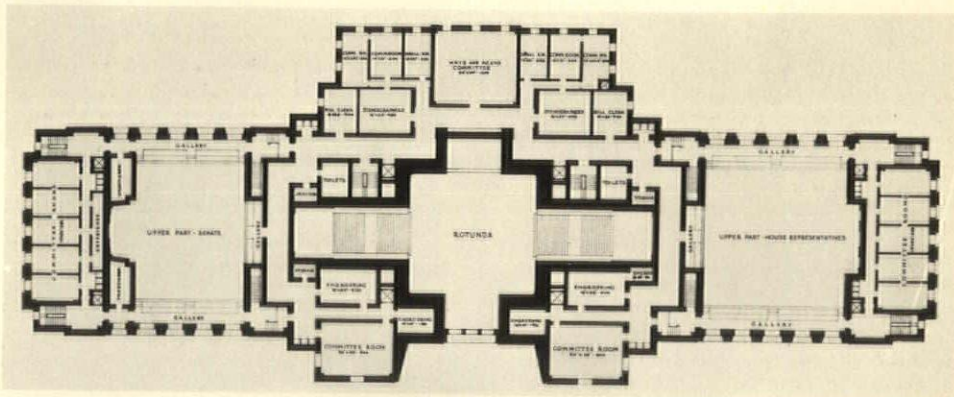
"ANALYSIS of the space requirements in relation to cubical contents and cost limitations indicated little opportunity for monumental space within the building, and its corresponding architectural glory on the exterior. We accordingly adopted a *parti* in which the executive departments, raised into the air above the legislative stories, served to give a commanding mass to the structure, and at the same time produce ideal office floor space. This also provides direct communication between legislative chambers and their offices and committee rooms, and between the two legislative branches."

DESIGN SUBMITTED BY THOMPSON, HOLMES & CONVERSE, INC.

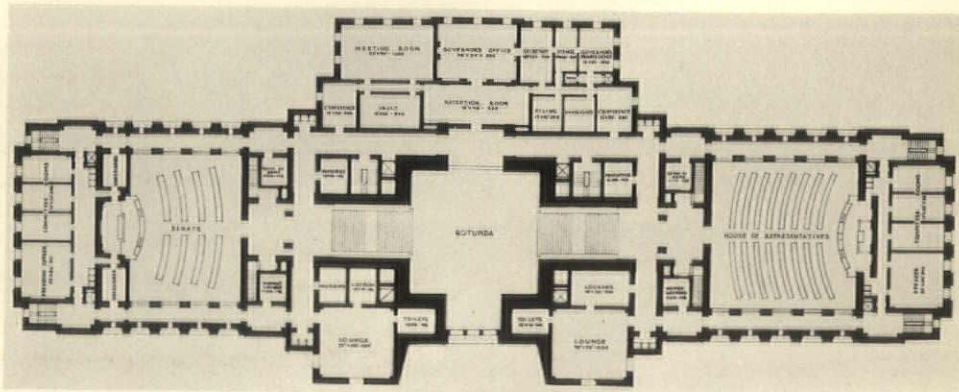


ON

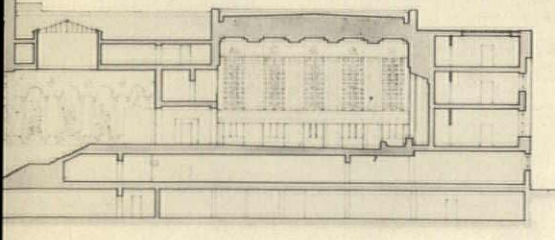
he exterior. The visitor, in our *parti*, comes into the
 ral monumental part of the building at once, no
 ter what department he seeks. We attempted to
 ess the legislative chambers on the exterior. The
 me, as it evolved, provided natural light on both
 s of these chambers. Finally, the building is of today,
 a restrained use of sculpture, mosaic, and murals where
 e contribute to the essential expression."



THIRD FLOOR PLAN



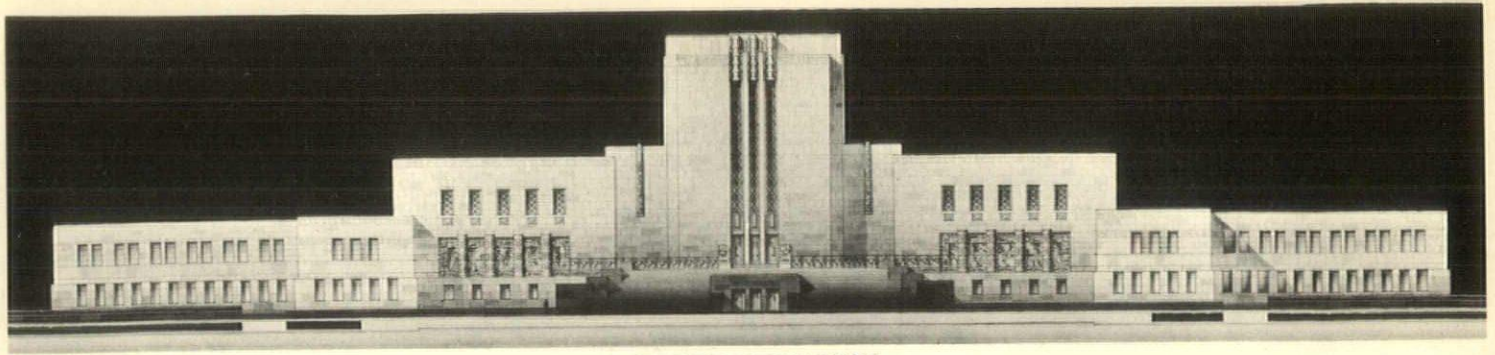
SECOND FLOOR PLAN



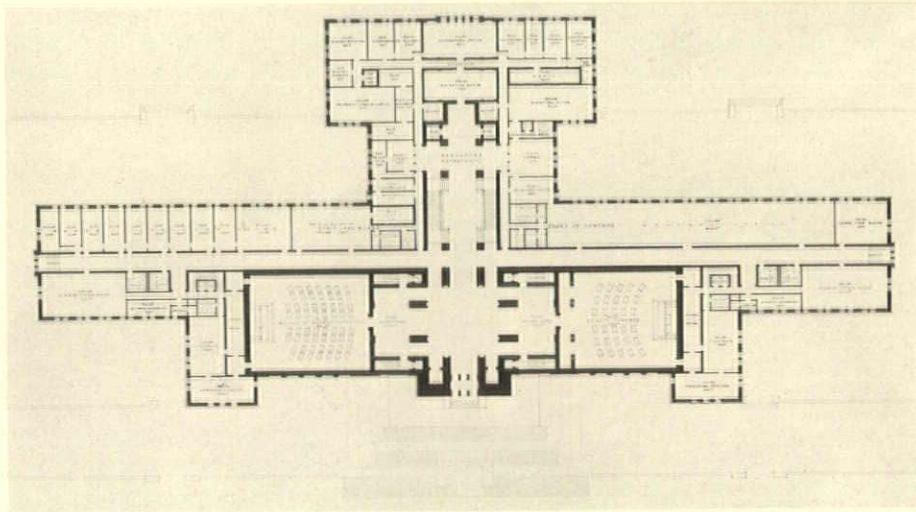
TION

STON AND FRANCIS KEALLY, ASSOCIATE ARCHITECTS

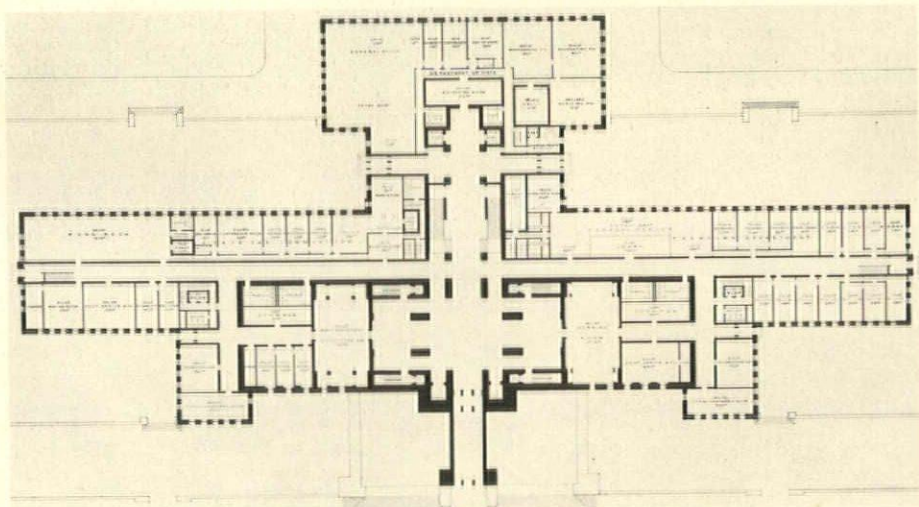
TECTURE. JULY 1936



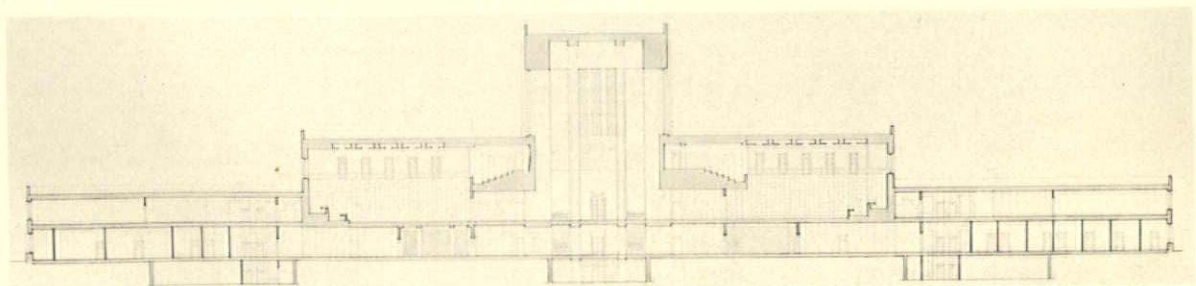
FRONT ELEVATION



SECOND FLOOR PLAN



FIRST FLOOR PLAN



LONGITUDINAL SECTION

"IN OUR DESIGN, the two branches of the Government to be housed, legislative and executive, were clearly expressed both in plan and design by their respective use requirements. Consistent with the character and requirements of the problem, monumental expression on the exterior was reduced to a minimum. Distinction was made between Governmental and departmental intercommunicating circulation which were co-ordinated by an economical use of space."

DESIGN SUBMITTED BY

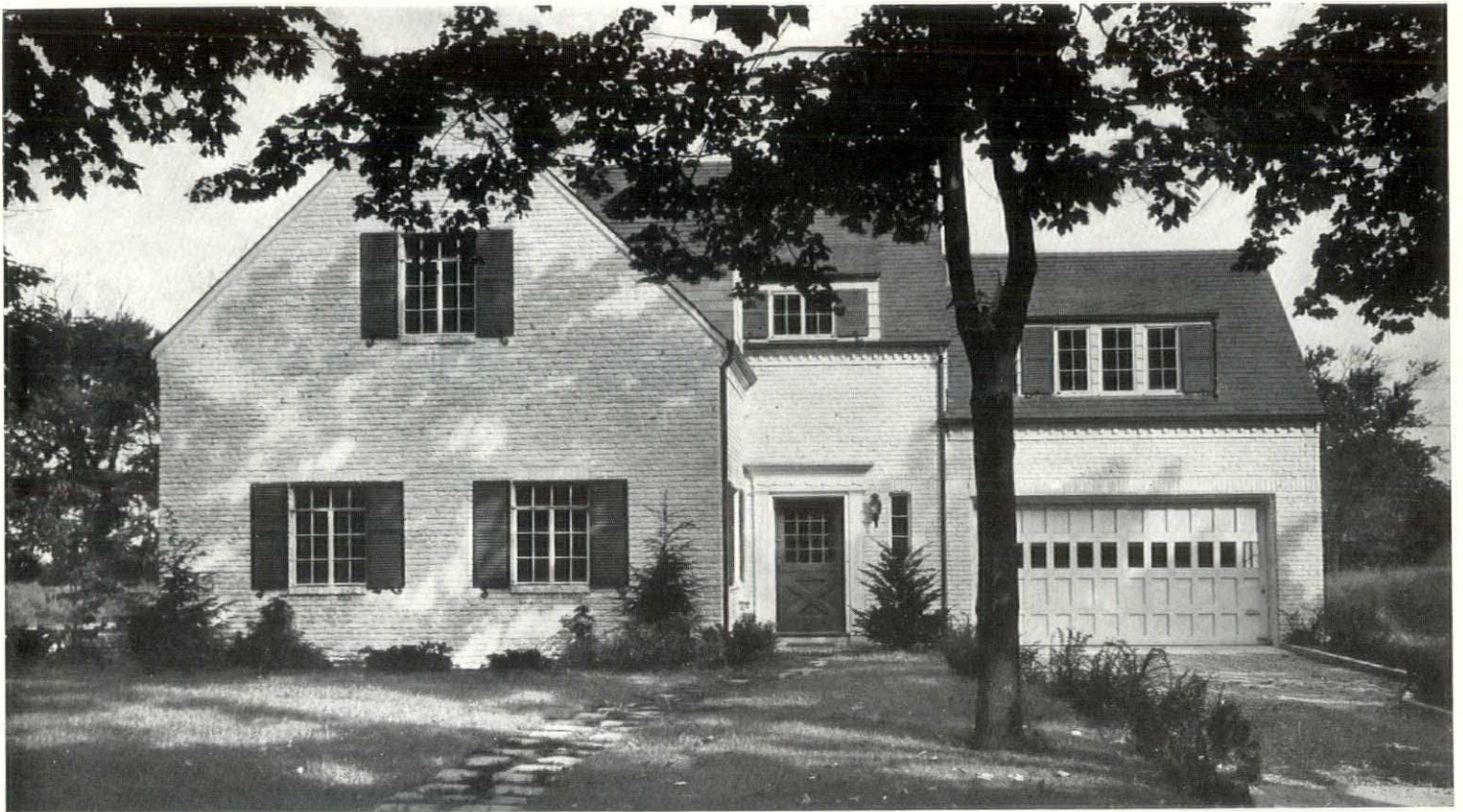
DE YOUNG & MOSCOWITZ; KARL W. ROSENBERG, ASSOCIATED



PHOTO: GUSTAV ANDERSON

ELEVEN SMALL HOUSES OF BRICK

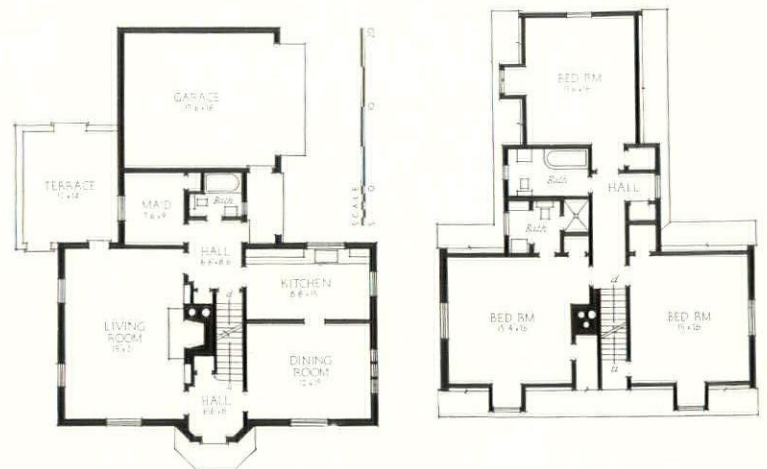
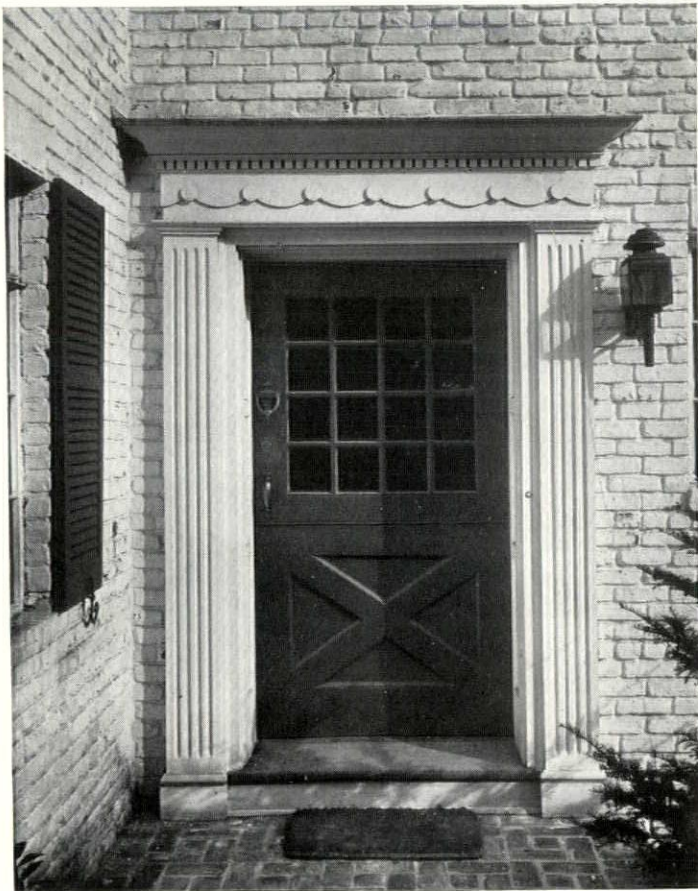
- House of Paul Werner, Garden City, New York. Reinhard M. Bischoff, Architect
 House of Miss Constance Eirich, Tulsa, Oklahoma. Donald McCormick, Architect
 House of David Dietz, Shaker Heights, Ohio. M. A. Norcross, Architect
 House in Greenwich, Connecticut. Frank J. Forster, Architect
 House of Claude Carr, Shaker Heights, Ohio. Munroe Walker Copper, Jr., Architect
 House of Robert Corley, North Haven, Connecticut. Douglas Orr, Architect
 House of Frederick M. Worley, Lansdowne, Pennsylvania. W. Pope Barney, Architect
 House in Beaver Hills, New Haven, Connecticut. Carine Eaglesfield Mortimer, Architect
 House of G. S. Watkins, Westwood, California. Leo F. Backman, Architect
 House of T. C. Middleton, New Orleans, Louisiana. Weiss, Dreyfous & Seiferth, Architects
 House of G. R. Thompson, Hempstead, New York. Godwin, Thompson & Patterson, Architects

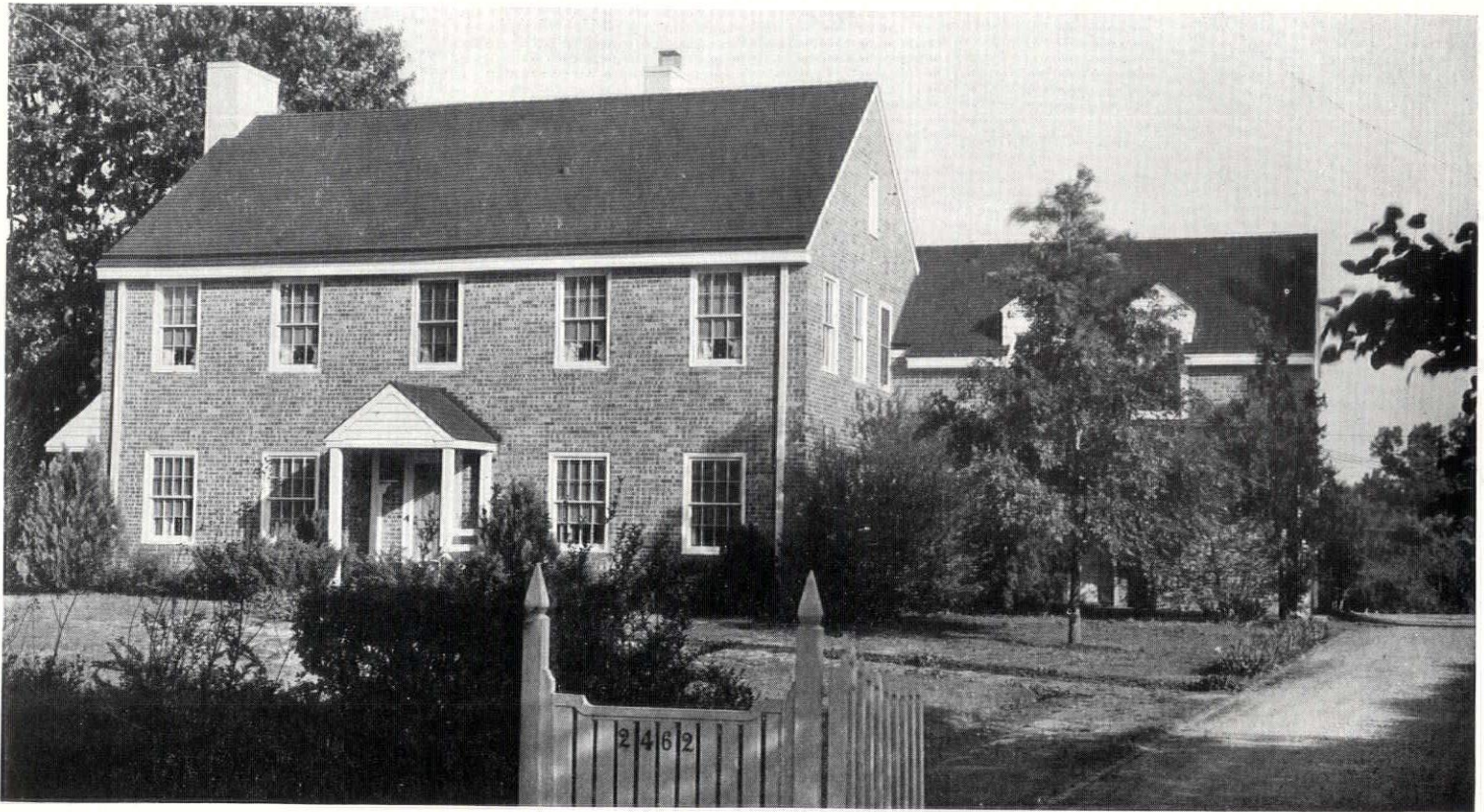


PHOTOS: GUSTAV ANDERSON

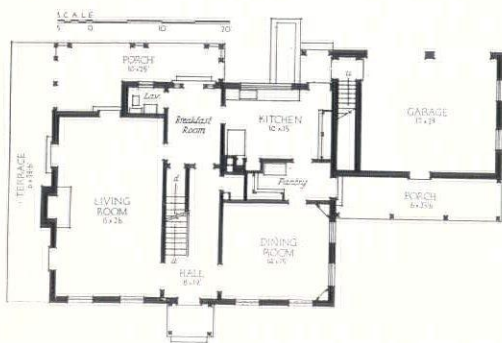
**HOUSE OF PAUL WERNER
GARDEN CITY, NEW YORK
REINHARD M. BISCHOFF, ARCHITECT**

Whitewashed common brick over cinder blocks, and open steel joists as floor beams result in a termite and shrink-proof construction. Dark green shutters and raked joints accent the brick texture. The cost, in 1933, including air conditioning, was \$10,600 for about 40,000 cubic feet.

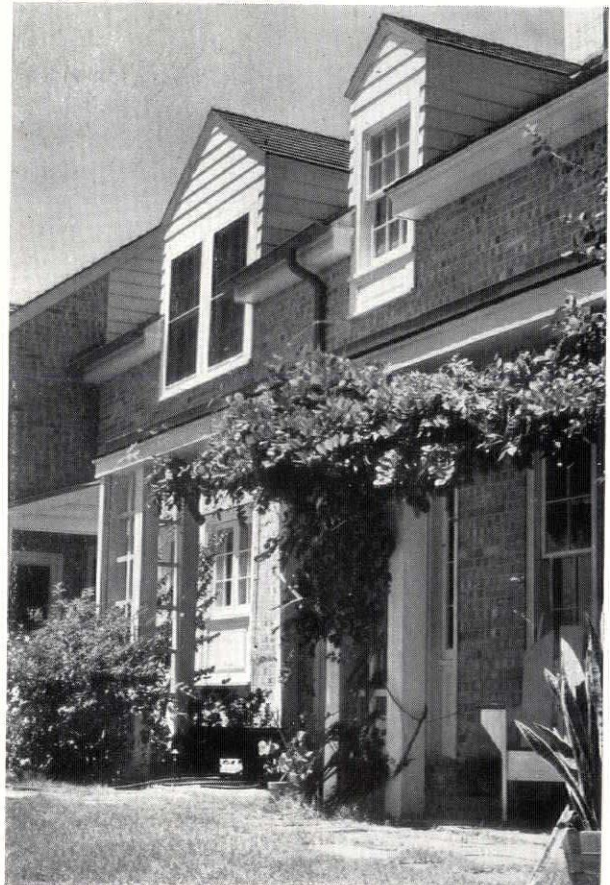




HOUSE OF MISS CONSTANCE EIRICH
 TULSA, OKLAHOMA
 DONALD McCORMICK, ARCHITECT



Selected common brick, with struck joints, veneers this wood frame house. Trim is white and the roof has variegated stained random width shingles

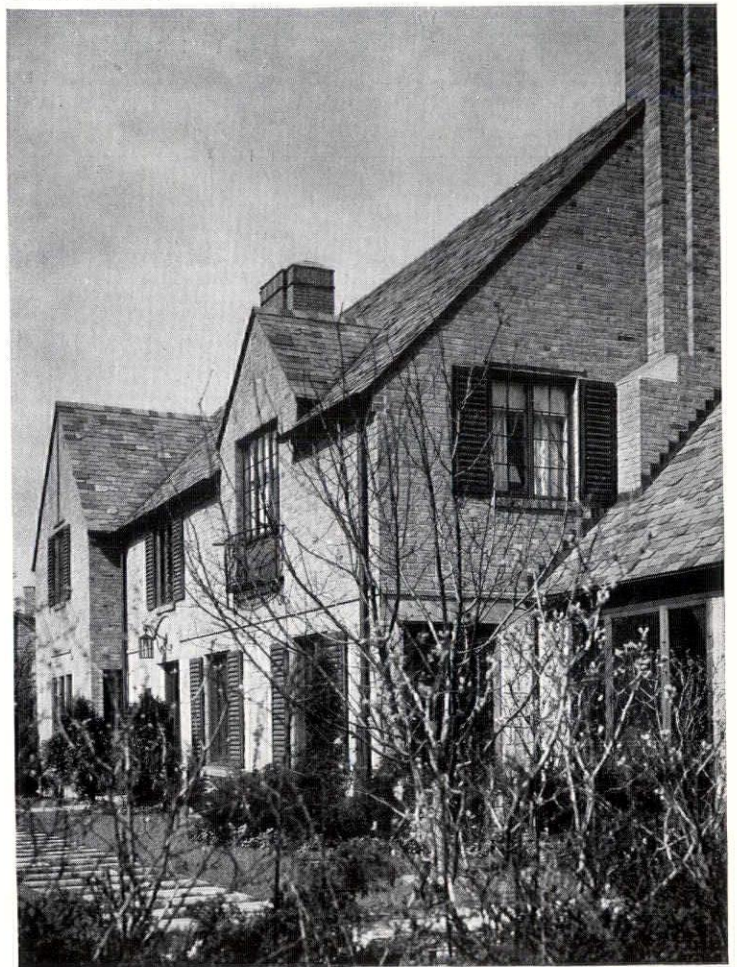


HOUSE OF DAVID DIETZ
 SHAKER HEIGHTS, OHIO
 M. A. NORCROSS, ARCHITECT



Brick veneer walls, laid in a varied manner, result in a house of considerable individuality of style. Trim is metal and the roofing material is slate. Cost, about \$19,000, exclusive of land

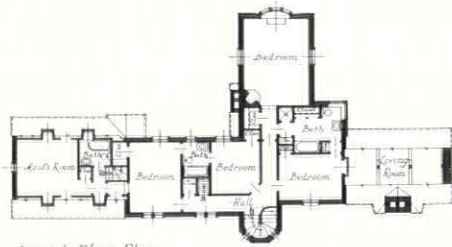
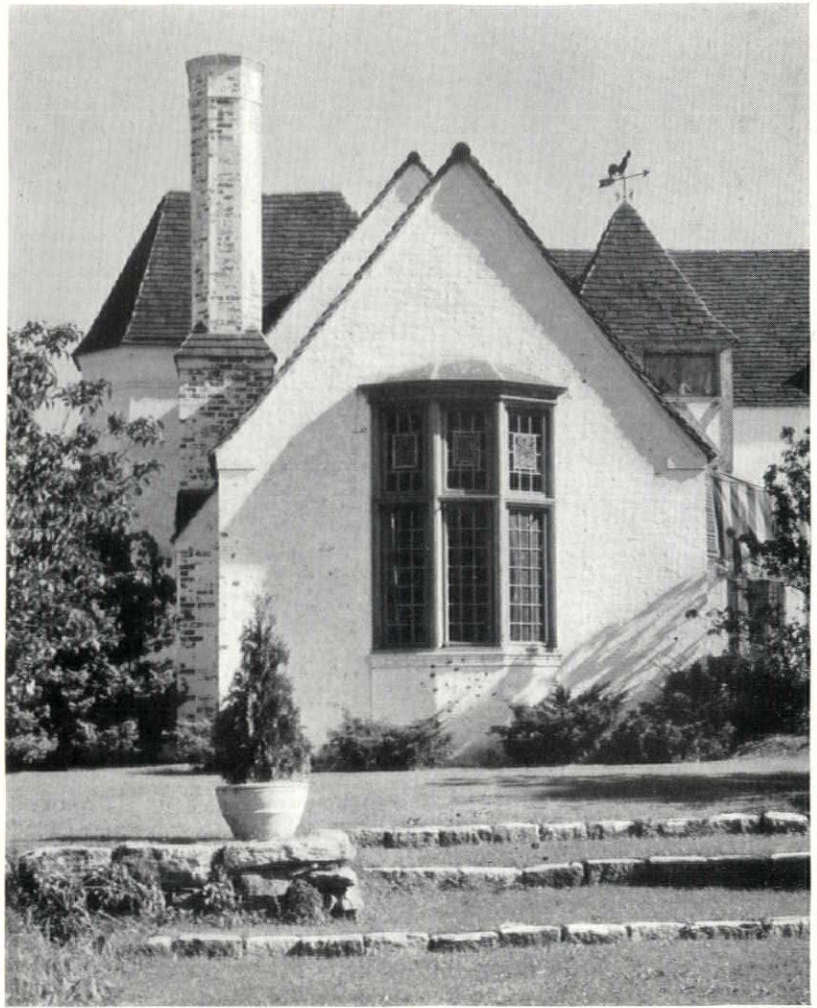
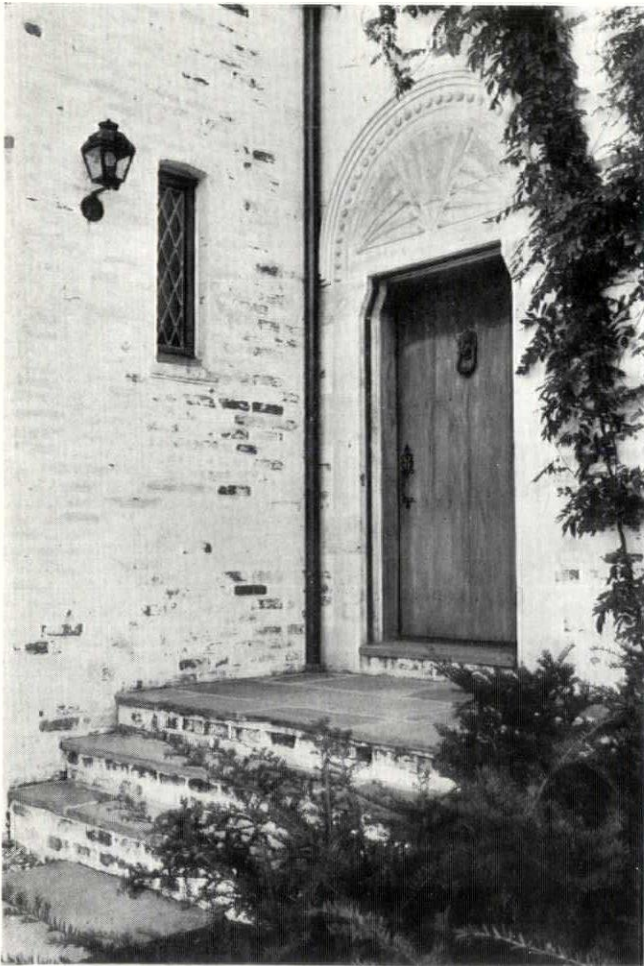
PHOTOS: CARL WAITE



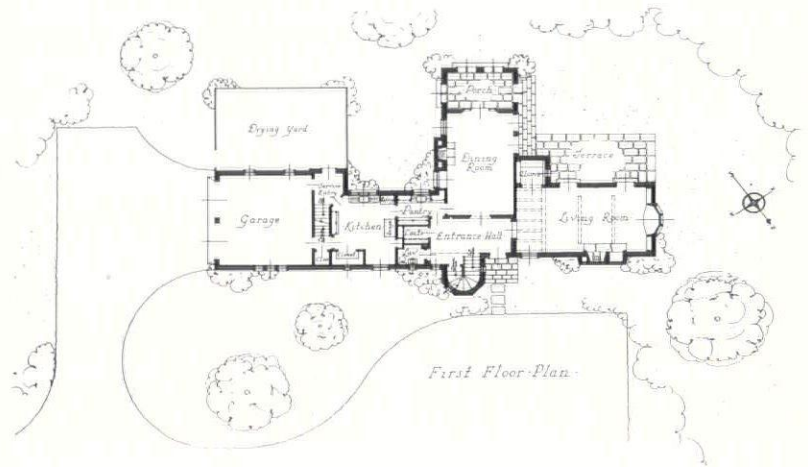
HOUSE IN GREENWICH
 GREENWICH, CONNECTICUT
 FRANK J. FORSTER, ARCHITECT

Brick veneer walls, over frame construction, and exterior mill-work are finished with two coats of whitewash. Hand made clay shingle tiles in reds and browns are used for the roofing

PHOTOS: ROBERT MACLEAN GLASGOW



Second Floor Plan



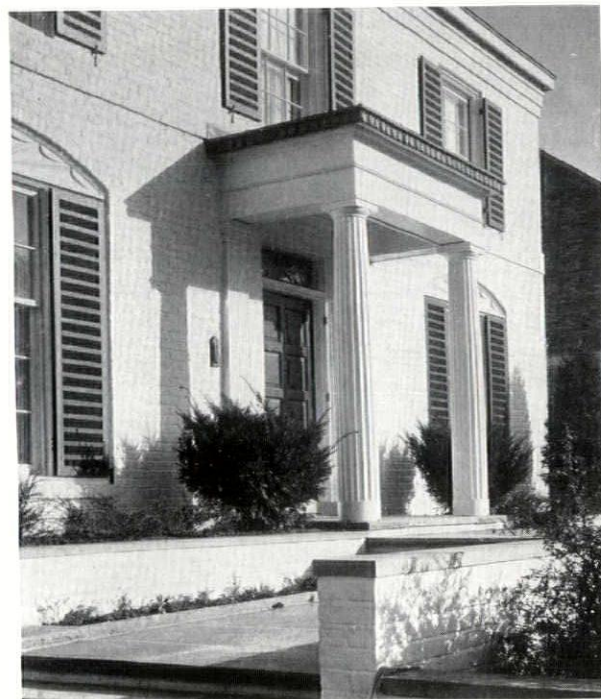
First Floor Plan



PHOTOS: CARL WAITE

**HOUSE OF CLAUDE A. CARR
SHAKER HEIGHTS, OHIO
MUNROE WALKER COPPER, JR., ARCHITECT**

Reclaimed common brick, painted white, enhances the simple grace of the Greek revival style. The cornice of the porch is natural copper color and the door and blinds are blue-green

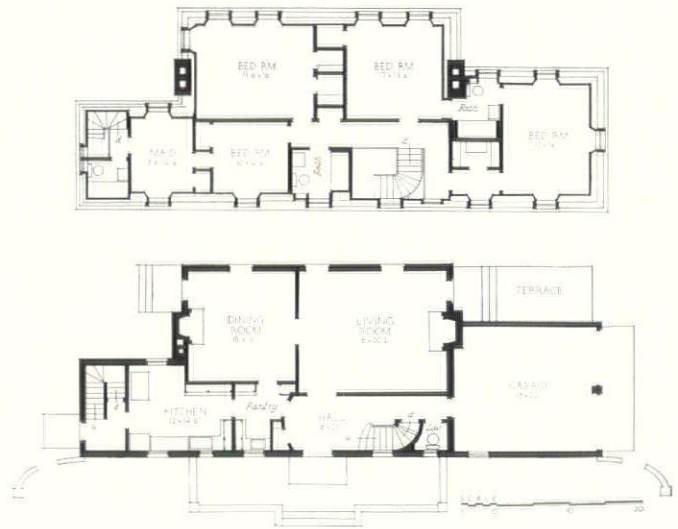
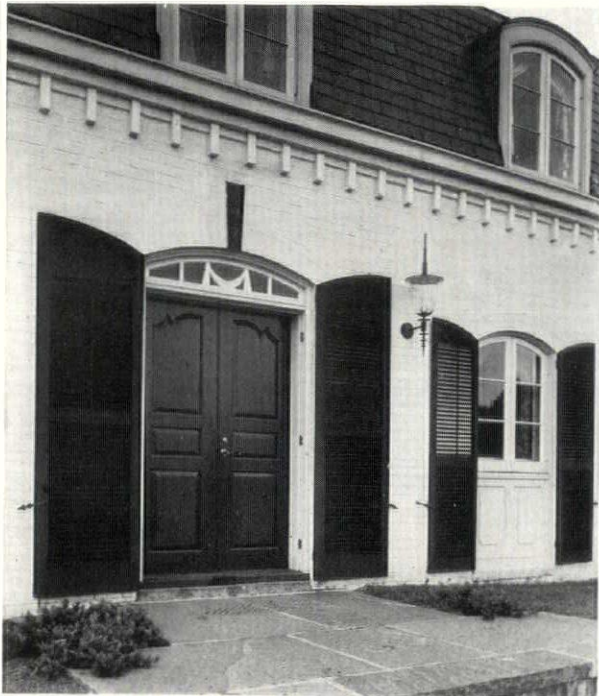


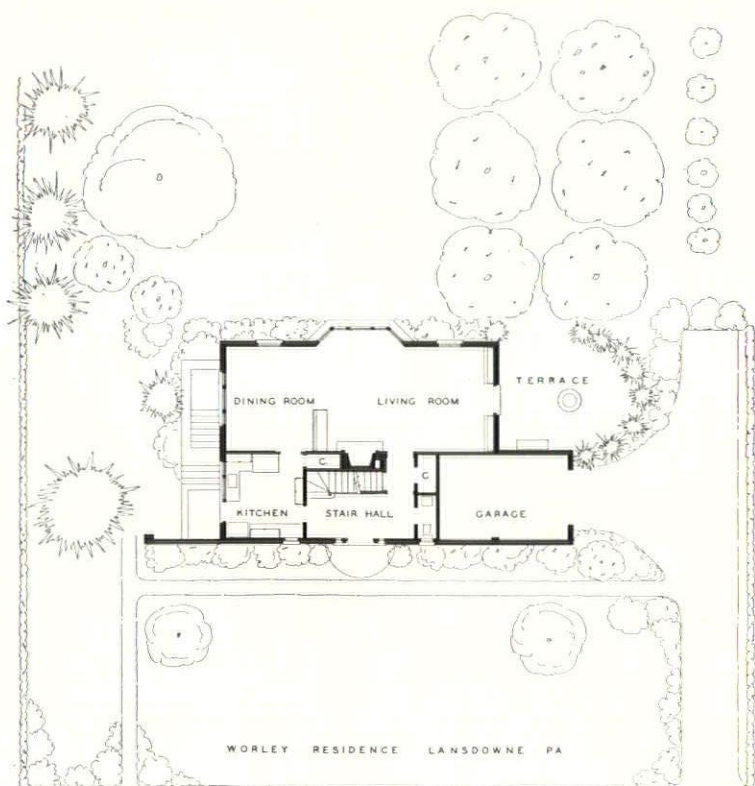
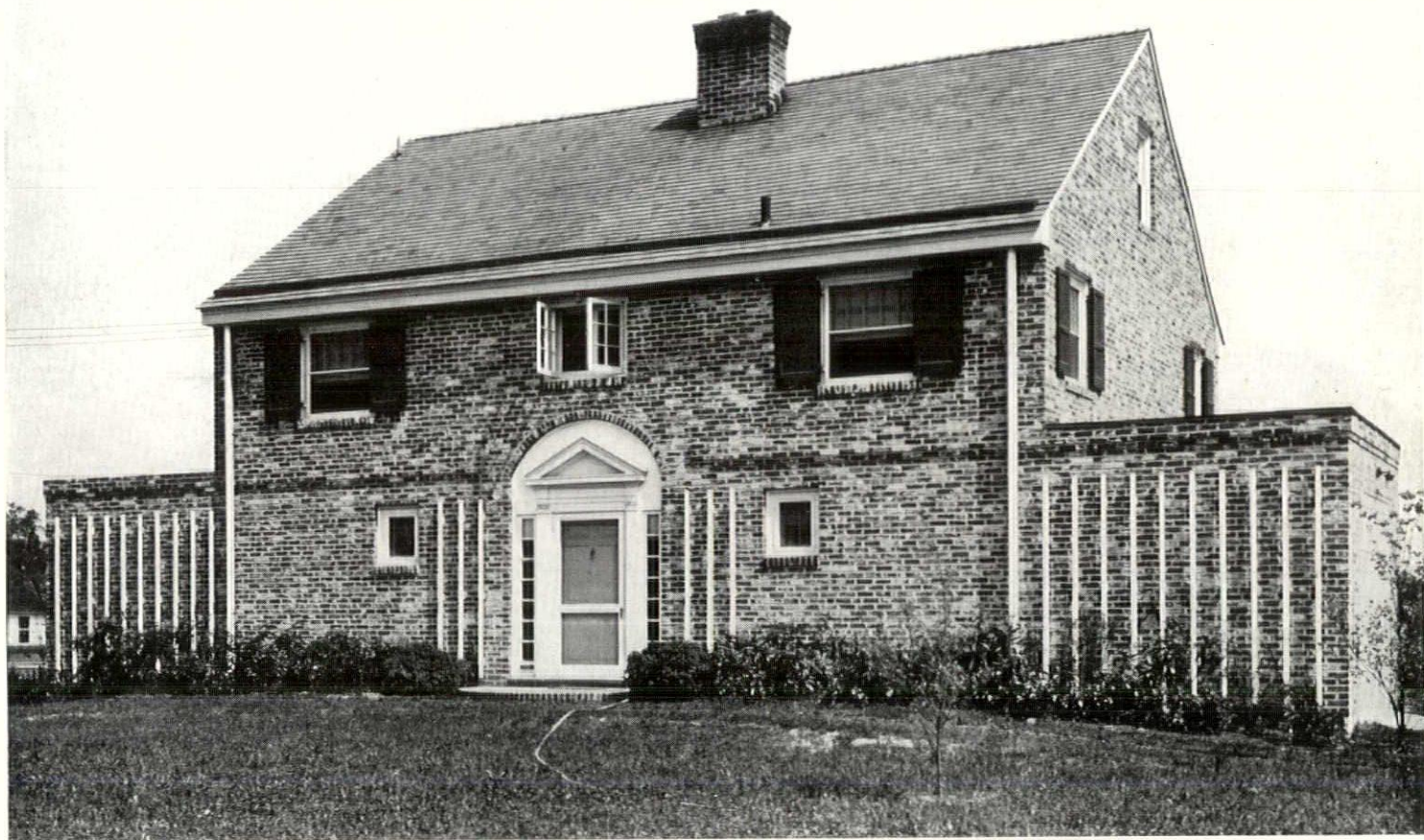


PHOTOS: GEORGE VAN ANDA

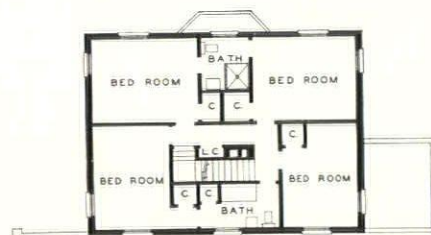
**HOUSE OF ROBERT CORLEY
NORTH HAVEN, CONNECTICUT
DOUGLAS ORR, ARCHITECT**

Brick walls, painted white, are accented by black slate keystones and roofing, gray casements, green shutters and the lacquer red entrance door



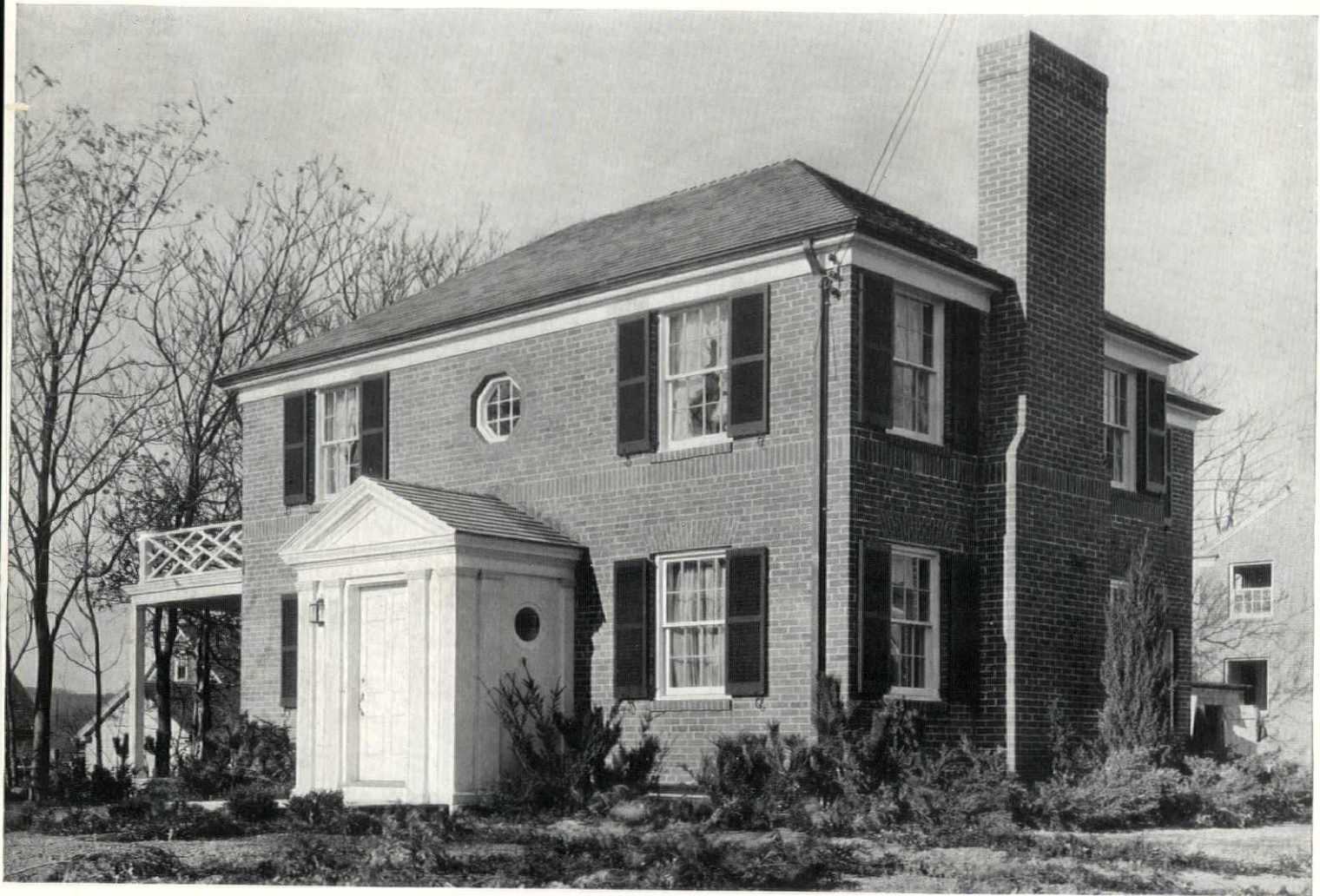


HOUSE OF FREDERICK M. WORLEY
 LANSDOWNE, PENNSYLVANIA
 W. POPE BARNEY, ARCHITECT



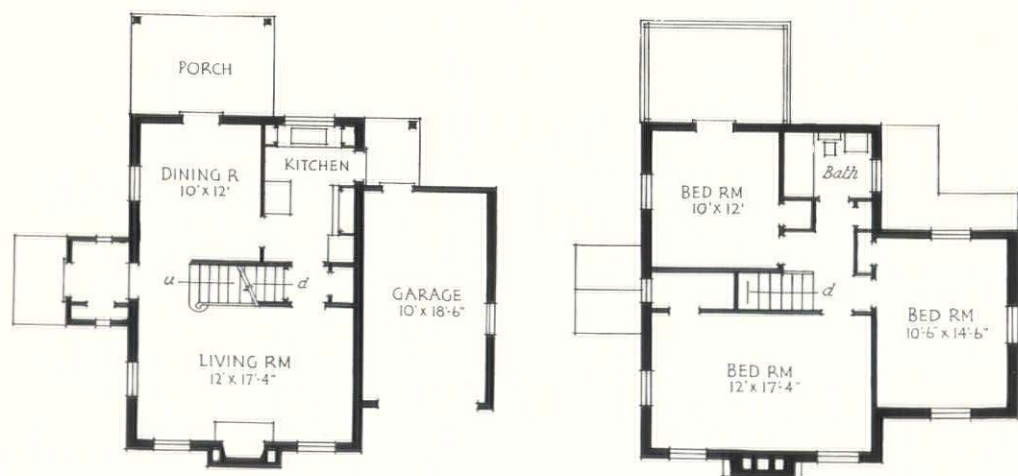
SECOND FLOOR PLAN

Reclaimed brick is used as a veneer on this well-planned house. It is of frame construction except for cement slab in the kitchen, hall and lavatory. Cost, 24.8¢ per cubic foot in July, 1935



**HOUSE IN BEAVER HILLS
NEW HAVEN, CONNECTICUT
CARINA EAGLESFIELD MORTIMER, ARCHITECT**

One of two Colonial type brick houses built as model homes in a real estate development. Completely insulated and equipped with nationally known products, it cost \$7,000 exclusive of the lot



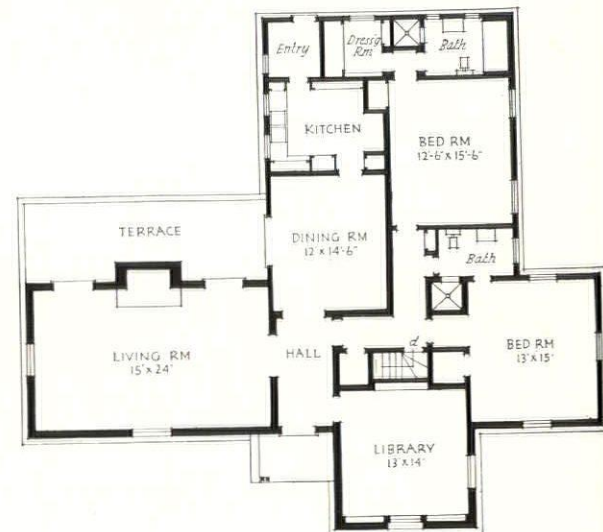


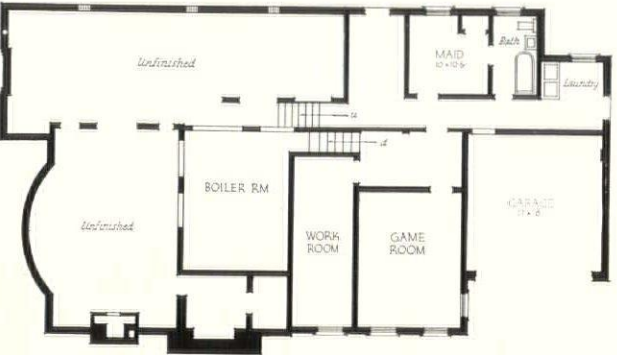
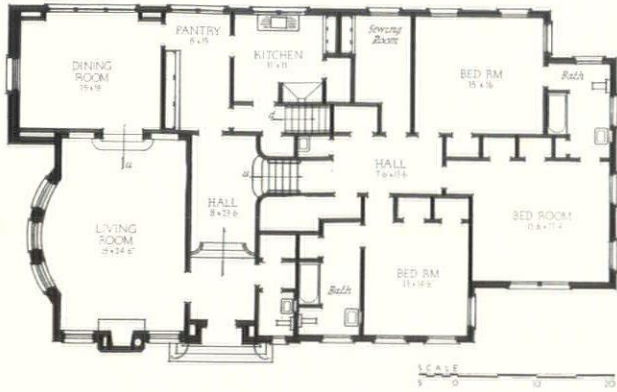
PHOTOS: MOTT STUDIOS

**HOUSE OF G. S. WATKINS
WESTWOOD, CALIFORNIA
LEO F. BACKMAN, ARCHITECT**



Brick, painted white, is admirably suited to the long low lines of the California ranch house style. Textural variety is gained by the use of natural brick treads on the concrete steps





PHOTOS: SAMUEL H. GOTTSCHO

HOUSE OF T. C. MIDDLETON

NEW ORLEANS, LOUISIANA

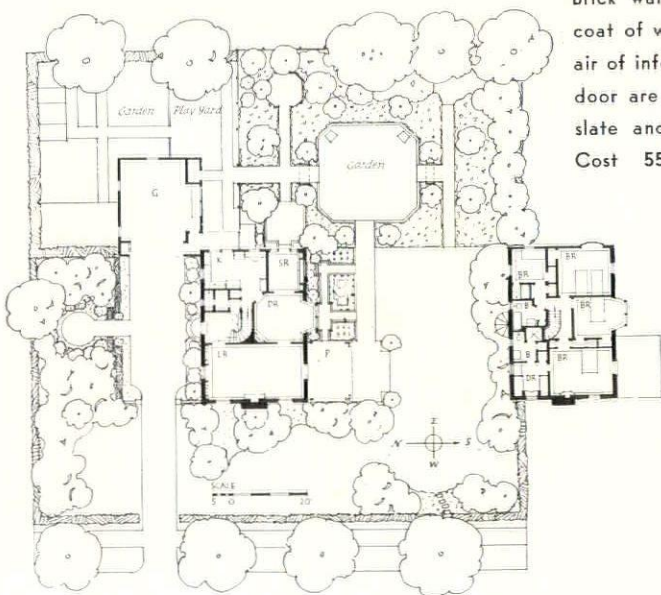
WEISS, DREYFOUS & SEIFERTH, ARCHITECTS

Brick veneer, painted white, cast stone trim and a slate roof are used for this neo-classic house. Air-conditioned for both summer and winter it was built for approximately 40¢ per cubic foot

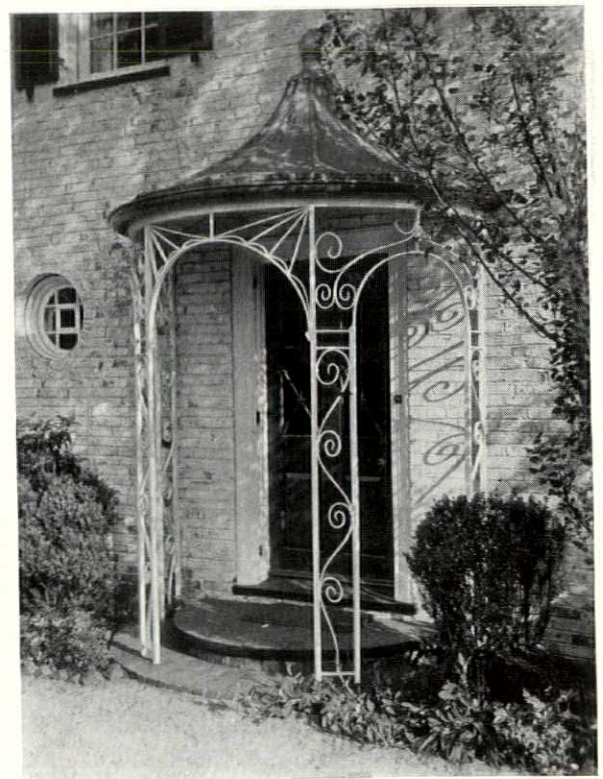




HOUSE OF G. R. THOMPSON
HEMPSTEAD, NEW YORK
GODWIN, THOMPSON & PATTERSON, ARCHITECTS



Brick walls, painted with one coat of white, have a pleasant air of informality. Shutters and door are green. Roof is black slate and porch roof is lead. Cost 55¢ per cubic foot



BETTER CONSTRUCTION IN BRICK

By H. VANDERVOORT WALSH

WALLS OF BRICK. The ideal wall for dwellings might be described as one which is weatherproof, fireproof, vermin-proof, strong, a good heat insulator, economical to build, and with a surface of pleasing texture and color.

Walls constructed of brick come very close to this specification. When properly laid up in mortar, the resistance of brick walls to rain, sun, abrasion and frost has been proved. By the very nature of their manufacture, under intense heat, bricks make the ideal fireproof wall. As for strength, the weakest brick in a wall is never subjected to more than fifty per cent of its resistance to crushing. We are all familiar with the infinite variety of color and texture created in brick walls in every century, and in almost every country.

About the only characteristics of the ideal wall which brick does not measure up to in full, when compared with some other materials, are economies in conserving heat and in cost of labor to build. Brick walls, like most masonry walls, are not in themselves first class insulators, but this can be corrected by the addition of insulating materials. Although bricks are now highly standardized pre-fabricated units, the cost of hand-labor at the site to lay them is considered by some to be out of keeping with modern trends in mass production methods.

It has been shown that a 25 per cent oversized brick can be laid, brick for brick, as rapidly as the present standard U. S. size. This difference in itself amounts to a saving of approximately 20 per cent in cost of masonry wall construction.

WEATHERPROOF QUALITIES. Hard burned and medium burned bricks are almost indestructible when exposed to the conditions of weathering. On this question the Clay Products Technical Bureau of Great Britain says, "For positions of extreme exposure to frost, only bricks of very close texture (low microporosity) should be employed, since, when there is a large proportion of pores easily filled with water by simple contact, a series of hard frosts following days of continuous rains may produce enough ice in those pores to damage the brick."

U. S. Federal specifications state that, "Soft bricks are generally suitable to positions not exposed to weather or soil. This should not be taken as a rigid distinction, for variations in the physical properties of bricks from different parts of the country make it difficult to predetermine weathering resistance by any simple acceptance tests. . . . The purchasing officer should be guided in part by the known performances of comparable bricks from the same locality in resisting the effects of weathering."

The quality of workmanship, the kind of mortar and the character of the bonds used are as important as the bricks themselves in the building of better houses

"In cases of doubt, and where the time and equipment are available, acceptance in point of weathering resistance can be based on ability to withstand 100 alterations of freezing and thawing conducted according to generally accepted laboratory procedure. . . ."

However, the weather resistance of a brick wall is not alone a matter of the brick used, the *workmanship*, the *mortar* and the character of bond used play their parts. It has long been a matter of speculation how water penetrates a brick wall. That in some cases it does has been common experience. The U. S. Bureau of Standards has been making studies of this problem, and in a recent bulletin reports: "Quality of workmanship has a major influence on the rate of penetration of water."

None of the walls of Class A workmanship leaked, according to this report. When dampness penetrated such walls it was transmitted by capillarity. "With the nearly non-absorbent brick," continues this bulletin, "moisture penetration was more rapid in the mortar than in the brick; with the more absorptive ones it was more rapid in the bricks. The greatest leakage occurred with walls of bricks of low absorption and Class B workmanship."

Investigations along similar lines have been made by the English Building Research Stations. The nature of its conclusions are more definite. It concludes that moisture penetration through walls almost always occurs at the mortar joints. A capillary path is found between bedding mortar and the brick. Such cracks, according to its report, are more likely to occur in the case of non-porous bricks bedded in cement mortar than relatively porous bricks bedded in lime mortar.

ABSORPTION STANDARDS. Federal Specifications for Brick SS-B-656 control the limits of absorption for different grades of common brick as follows:

Grade	Absorption		Modulus of Rupture	
	Average Max. of 5	Individual Max.	Aver. of 5	Indiv. Minimum
Hard	10% or less	12%	600 or more*	400
Medium	16% or less	20%	450 to 600	300
Soft	No limit	No limit	300 to 450	200

*lbs. per sq. in.

EFFLORESCENCE. The appearance of white salts on a brick wall is a most disagreeable phenomenon for an architect to cope with. Although this efflorescence, as these salt deposits are called, washes away in time yet there are many examples where it comes out each spring for a number of years. The subject has been investigated by technicians, but the

suggested methods of correction are not always possible because there are often a number of contributing causes.

The salts may be in the bricks used or in the mortar, or both. As the water in the wall comes out on the surface it carries the salts with it and deposits them when it evaporates. They may be washed off by a diluted solution of hydrochloric acid. Then, if no more water gets into the wall, the salts will not appear again. This is hard to prevent. However, a well pointed brick job, which has been laid in a first class manner with all parapets waterproofed at the back and covered with a coping, and the joints in wash courses and the sills and frames of windows properly filled with elastic caulking cement, ought not to show efflorescence.

To further insure against the salts coming out of the mortar it has been suggested that 2% of barium carbonate be added to it to fix them chemically. Some of the patented ready-mixed cements used in making mortar for brickwork will also prevent this salt scum because they have in them a water repellant material like calcium stearate, which prevents passage of the salty solutions.

Certain clays of which bricks are made contain chemical impurities which, if not burned at a very high temperature, remain in the finished bricks until dissolved by the water used during construction. As this water dries out the salts are deposited on the surface. Bricks of this nature can sometimes be detected if a sample is allowed to stand in a shallow pan of water for some days. Specifications ought to exclude them from use as face bricks.

MORTARS FOR BRICKWORK. There are four kinds of mortar for laying bricks:—(a) lime and sand, (b) cement and sand, (c) cement, sand, and some lime, and (d) ready-mixed cements, containing lime and waterproofing, for use with sand.

Lime mortar was used almost exclusively before the advent of cement. Straight portland cement mortar is not well liked by the mason because it works short and stiff under the trowel. Cement-lime-mortar is smooth, works well under the trowel and is less expensive. The usual proportions are 1 part cement, 1 part dry hydrated lime and 6 parts sand.

Patented ready-mixed jointing materials usually contain cement, lime, and some waterproofing compound. When mixed with 3 parts of sand, the resulting mortar is very plastic and hardens slowly enough to get a good hold in the pores of the brick.

STRENGTH OF BRICKWORK. The compressive strength of brick masonry depends on the strength of the mortar as well as the brick. A minimum factor of safety of about 3.5 in compression stresses is usually found at the foot of a three story 8" dwelling wall, when built on natural ground. This takes into consideration the usual spans for joists, the loads they transmit to the walls, the reduction of bearing area due to openings, the insertion of joists and the eccentric loading usually present. In fact, an 8" thick brick bearing wall for dwellings, up to 30 feet in height, is considered ample, and at the gable ends the wall may go 5 feet higher. There are still some building codes which do not recognize this fact and call for 12" walls as the minimum. No walls are unbraced in a dwelling. The floors, partitions, and corners are usually sufficient to give ample lateral stability.

STANDARDS OF STRENGTH. The American Society for Test-

ing Materials, in its standard specification for bricks, gives the following table of strength requirements:—

Name of Grade	Compressive Strength		Modulus of Rupture	
	Lbs./sq. in. Mean of 5 Tests	Individual Minimum	Lbs./sq. in. Mean of 5 Tests	Individual Minimum
Grade A.....	4500 or over	3500	600 or over	400
Grade B.....	2500—4500	2000	450 or over	300
Grade C.....	1250—2500	1000	300 or over	200

WORKING STRESSES FOR BRICK WALLS

From the proposed Building Code for the City of New York.

	Cement Mortar	Cement Lime-Mortar	Lime Mortar
Solid Brick.....	.325 lbs. sq. in.	250 lbs. sq. in.	100 lbs. sq. in.
Hollow Walls			
(Gross Area)....	150 lbs. sq. in.	125 lbs. sq. in.	50 lbs. sq. in.

HEAT TRANSMISSION IN WINTER. Like all masonry walls, the transmission of heat from the inside to the outside of a brick wall is comparatively high. An 8" wall without lath and plaster will conduct away .5 heat units (British Thermal Units) per sq. ft. per hour—with a temperature difference of 1 degree between inside and outside. A 12" brick wall will conduct .36 Btu.

However, such walls are always furred and plastered, so that this coefficient is usually reduced to .32 for an 8" wall and .24 for a 12" wall. Thus, if the base temperature outside is assumed at zero and the inside at 70 degrees, the number of Btu. to be lost per hour per sq. ft. of wall will be 22.4 for a 8" brick wall, and 16.8 for a 12" wall.

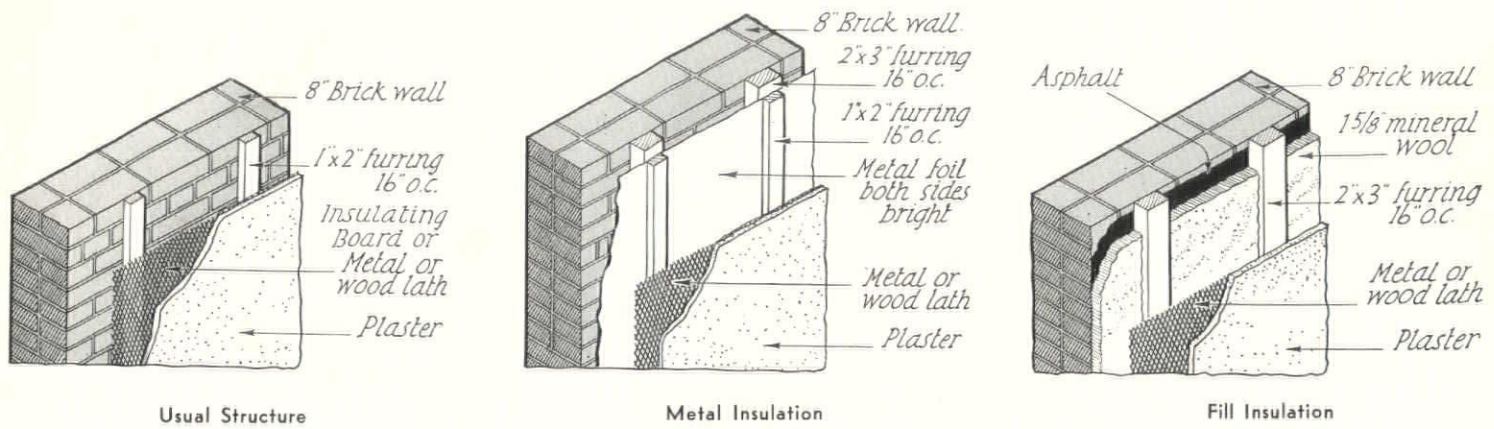
This can again be cut down by applying insulation to the interior of the wall. The insulation should be protected from dampness in order to preserve its efficiency. A good coat of asphalt paint should be applied to the interior brick surface before a loose type of insulation or rock wool is used between the plaster and the wall. If this is done, then a thickness of 1 5/8" of rock wool reduces the coefficient of a brick wall to .13 for an 8" wall, and to .12 for a 12" wall. If metal foil is used, dividing the air space between plaster and brick, the coefficient will be reduced almost the same amount.

The use of a good 1/2" insulating board reduces the coefficient to .22 for the 8" wall and to .19 units for the 12" wall.

Walls of porous bricks laid in lime mortar and poorly built actually allow air to leak through in a wind. It has been calculated to amount to 7.85 cu. ft. per sq. ft. per hour in a 15-mile wind. Hard brick, cement mortar and good workmanship reduces this figure by a third. Plaster applied to the wall reduces it to .0666 cu. ft. per sq. ft. per hour. Thus there was a great deal of common sense used by our Colonial ancestors when they covered the north side of the brick house with stucco.

FIRE PROOFNESS. Fire tests by the Bureau of Standards indicate that an 8" solid brick wall affords sufficient insulation against spread of fire in residences. During the first two hours of the test, in no case did the temperature on the opposite side of the wall from the fire reach a point where it could ignite combustible materials. It should not be forgotten, however, that fire can be transmitted through the window openings.

BRICK SIZES. There is no building material unit that has remained over so long a period of years as uniformly standard



in size as bricks. The varieties of brick sizes are many but they have all been within a very limited range. In England, the bricks used in Little Wendam Hall in 1260 were 9" x 4 1/2" x 2". The modern standard size for English brick is 8 7/8" x 4 5/16" x 2 5/8". This is a remarkably small variation for a period of 676 years.

In the United States, the standard size of brick adopted by the Federal Government and the specifications of the American Society for Testing Materials is 8" x 3 3/4" x 2 1/4", with a permissible variation—plus or minus—of 1/16" in depth 1/8" in width and 1/4" in length. By 1930 about 30% of the manufacturers of common brick had made their product conform to this size. It is estimated that now nearly 50% have accepted it.

The reasons why bricks have remained about the same size are functional. The width of a brick is determined by the normal grip of the average mason. If it is wider than 4 1/2" it cannot be picked up easily and laid in mortar with one hand.

The length is about double the width, so that even bonding can be made when built into the wall. A sort of module system is thereby established (2 headers + 1/2" joint = length).

The depth is determined largely by the limitations of weight. A brick should not be too heavy to lift. Experience shows that it should not weigh over 7 pounds wet. The average U. S. brick weighs about 4 or 5 pounds dry.

In recent years the hollow brick has found an increasing market due to its lighter weight. The holes in it decrease the weight of the finished masonry so that in steel buildings a perceptible savings in tonnage of steel is possible. The frogs or indentations in common bricks are more a matter of custom than of saving weight. The Dutch do not press them into their bricks, and they have advanced the art of brickwork to as high a degree as any other people.

The sizes of bricks have often been increased. In England, they were at one time made larger—not because of improvement in workmanship but to avoid taxes which were based on the number of bricks used.

The Housing Division Technical Research Department of the WPA has recently made studies to see whether the size of bricks can be made greater, thereby lowering the cost of labor. The bricks in the Hillside development in the Bronx, New York City were slightly larger than standard (2 5/8" x 8 x 3 3/4") and it is estimated that considerable saving re-

sulted. So far, these efforts to get the industry to increase the standard size of bricks have just begun to bear fruit.

As long as bricks are laid by hand, their size will be influenced by this limitation but a 25% increase of U. S. Standard Size will not be too much, in view of the size of English brick and estimates of recent government work.

The size of brick is the result of years of experience with its function. The possibility that U. S. size brick will be slightly increased in size is probably not very remote. The fact that for hundreds and even thousands of years we have continued to use this building material with very slight changes in size is a tribute to its perfection, rather than a reflection upon the backwardness of the art of building.

Efficiency methods to speed up the number of bricks laid in a day have been tried out. As far back as 1900 Mr. Gilbreth made photographic studies which illustrated lost motion in brick laying and devised methods of improving the procedure in building brick walls and the output of a mason per day, but labor has the final word in these matters.

The average number of common bricks laid in large city work on a 12" wall ranges from 900 to 1200 in an eight-hour day. In a country house with an 8" wall the number ranges from 800 to 1000 per day.

SAVINGS IN BRICKWORK COSTS. In the average wood-frame house with wooden exterior walls, the cost of such walls related to the total cost of the house is about 8.5%. In other words, the cost of the exterior walls of a \$10,000 house is about \$850. Therefore, if the cost of other exterior walls were 50% more than that of frame walls, the total cost of the house would be increased by only \$450.

Usually, an 8" brick wall will not cost more than 50% more than that of a frame wall. Any radical reduction in the cost of brick walls in a small house cannot affect the total cost very much. For example, if by more efficient methods the cost of the walls was reduced by one-fourth the saving would amount to only \$223.

To get comparative costs it is best to get the figures for brickwork from a local contractor who specializes in brick construction rather than from a contractor who deals more often with other materials. He will be able to be definite in regard to hollow walls, Rolok walls or other types which offer savings.

KINDS OF BRICK. Modern machinery and the principles of mass production have been operating in the brick industry

just as in other fields. The fact that some bricks are still made by hand is largely due to the demand for their textural beauty.

The only method of brick manufacture which resembles the ancient method is to be found in the *soft-clay process*. Here wet clay is pressed into brick molds by means of a machine which closely imitates the hand methods. In some plants the hand process is still used. The texture of these bricks is pleasing and the resulting product is somewhat porous. The old Colonial residences of Virginia afford fine historical examples of this type of brick. When sand is sprinkled in the mold to keep the clay from sticking, the bricks are called *sand-struck*. When water is used, they are called *water-struck*.

The other two methods of making brick are essentially machine processes. The *dry-press brick* is the product of a machine which applies tremendous pressure to a partially dry clay held in molds. The finished bricks are compact and dense. When they were first made, their mechanical perfection was greatly admired. Thirty years ago they were in great demand. Then a reaction against their hard mechanical appearance took place. Now the changing taste of architects to admire again the mechanical smoothness of machine products may revive their popularity.

The *stiff-clay brick* which outrivaled the *dry-press brick* may in turn take a subordinate place. This process makes a rough textured brick. Clay of a stiff consistency is forced through a die or opening in a machine that resembles very closely the ordinary meat grinder. A column of clay issues from it, the width of which corresponds to the length of the brick and the thickness to the breadth. Wires stretched on a frame cut this clay column into brick sizes. Stiff-clay bricks may also be subjected to machine pressure after they have been formed from the clay column. The sand-finish is typical.

After the bricks have been molded by any one of these processes they must be carefully dried to expel the water and then subjected to the fire in kilns. Owing to the unavoidable differences in temperature in different parts of a kiln, some bricks remain softer and more porous than others. That is the reason for the classification of bricks into *hard*, *medium* and *soft*.

The colors which result from clays which burn red, such as are found in the eastern states, range from the salmon color of the underburned bricks to the very dark red or almost black of the well burned bricks. Clays which burn to a buff color, such as are found in Pennsylvania, Ohio, Indiana, and Illinois, may range from golden shades to dark speckled browns.

Salt-glazed bricks of brownish hue are produced by throwing ordinary salt on the brickware during the final stages of burning.

Glazed or enamel bricks have a permanent, opaque ceramic finish applied to them, baked on.

Sand-lime bricks are not clay bricks at all but are made by combining sand and lime under hot steam and high pressure, thus forming calcium silicate. They are durable and compete on a low cost basis with clay bricks for certain purposes.

COMMON AND FACE BRICK. There was a day when no distinction was made between common brick and face brick.

Now we distinguish between the two kinds by having two groups of manufacturers. Face bricks, as their name implies, are used on the exterior of walls and are selected for texture, color and durability. Common bricks, on the other hand, are cheaper and are used for building the load bearing walls and for backing up other masonry. Sometimes the common bricks of one part of the country are selected and sold in another part as expensive face bricks.

In England before the 17th Century, when no special distinction was made between face bricks and common, the so-called English bond was used. This consists of alternate courses of stretchers and headers.* It makes a very strong wall, especially when the mortar is poor as it was then.

When the classic style began to creep in, smoother textured bricks were sought by architects. Inigo Jones, the famous English architect of that period, used specially selected bricks to finish the exteriors of the buildings he had designed. Quoting from an old book of the period, referring to the kinds of bricks used: "there are two kinds, viz.: the common or ordinary sort and another sort, which is made with somewhat more neatness, after the manner of a Grey Stock Brick, which are sold at a shilling a thousand more than the common sort. . . ."

Because of the added cost of these face bricks, the English architects ceased to use the English bond and adopted the Flemish bond, since corresponding economies in the numbers of face bricks required were noticeable. The Flemish bond using more stretchers than the English bond, reduced the number of expensive face bricks about eleven per cent. The Flemish bond thus became fashionable in England and we find it used in most of our Colonial houses.

BONDS AS BRICK PATTERNS. The improvements in the strength of mortar have made the structural qualities of bonds less important. Today most decorative brickwork uses bond motifs as units of design and the headers are usually only half bricks. For example, in the Flemish bond every other brick is a header, but when actually built today, only the headers of each third course are full length bricks. When the face bricks are of a different size from the backing bricks, none of the headers may be full bricks but the face of the wall may be bonded to the back only by metal ties at every sixth course.

In structural load bearing walls built of common bricks, bonding headers are used once in every sixth course.

However, most good patterns in brickwork are derived from the structural Flemish or English bond, the former leading to the greatest variety. The basic unit for all these brick designs consists of a stretcher with a header centered on it in the course above and below. This has been called the brick "eye."

In the Flemish bond, where bricks in each course are alternately header and stretcher, the entire wall pattern is made up of interlocking "brick-eyes."

In the English bond, which consists of alternate courses of headers and stretchers the "brick-eyes" run along the stretcher courses side by side.

On the other hand, the English cross bond or Dutch bond is like the Flemish bond in that it is the interlocking of "eyes"

***Stretcher**—bricks laid with the length of the wall.
Headers—bricks laid across the width of the wall.

over the entire face of the wall. The "eyes" on one stretcher course fit in between the "eyes" on the next stretcher course. This produces diagonal lines across the wall which do not appear in the straight English bond, and for this reason it is more decorative.

All other patterns or bonds are but variations of the English or Flemish bond. The "eyes" are usually separated by more stretchers. For example, the Flemish garden wall uses two or three stretchers to separate the headers. This spreads the "eyes" farther apart.

JOINTING AND POINTING. The color of the mortar, the method of pointing and the width of the joint enhance or diminish the effects of patterns in brickwork. There are no rules to follow in selecting the kind of joint. There are a few general observations to be made, however.

It seems that the rougher the brick is, the wider and rougher the joint should be. Also, the smoother the brick, the narrower and smoother should be the joint.

The stiff-mud bricks that have been wire-cut and given a very rough texture seem to require wide joints. They look well with the set-back or the *raked joint*, which make deep rough shadows. A wide flush-cut joint also harmonizes with them, if grit be embedded in the mortar so that as it is cut with the trowel a rough texture is produced.

On the other hand, the dry-press bricks which have smooth regular surfaces need a narrow joint that is smoothed with a V-tool, or a rod or bead.

The soft-mud bricks which are not too rough in texture or too irregular in shape seem to call for a medium thick joint smoothed with the trowel or with the rod. The trowel joint which is weather-struck seems to go with the smoother varieties.

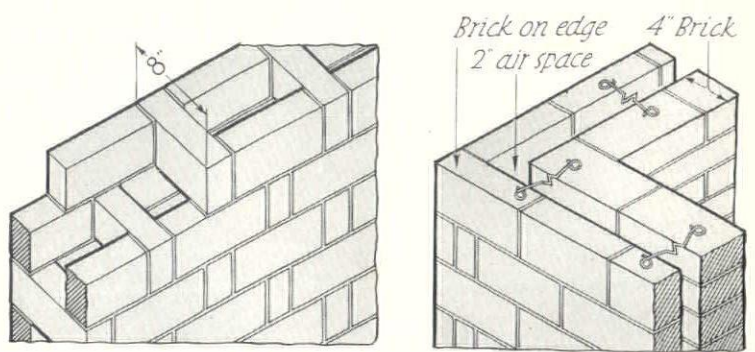
The range in the width of joints is usually from $\frac{1}{4}$ " to $\frac{1}{2}$ " and sometimes up to $\frac{3}{4}$ " and 1". The designer must really base his selection upon experience and examples of brickwork already built. Sample panels of brickwork are always necessary to aid in the final decision. A collection of photographs of good brickwork will often help the architect explain to the mason what he is trying to get.

COLORED MORTARS. Coloring the pointing mortar is also a very delicate artistic problem. Only a sample panel of the wall can finally determine the choice. Colored mortars when wet are so much more intense than when they dry out. The general tone of the whole wall is also greatly affected by the color selected for the joints. An otherwise beautiful brick wall can be ruined by the wrong color in the joints.

When rough textured bricks are used, the mortar in which the bricks are laid is colored. When the tooled joints are used, tuck-pointing with a colored mortar is best.

The ideal practice is to complete the entire wall with an inch-deep raked joint. Then, when the wall has been cleaned down, the tuck pointing should be done on a fair day from one batch of mortar. Especially do blacks require this attention, for if the work is stopped daily, the next day's work usually seems to be a different shade. Ready-mixed colored mortars are a great help, because the addition of color at the factory is strictly uniform.

HOLLOW BRICK WALLS. The purpose of building hollow brick walls for residences is to lower initial costs by using less brick, less mortar and less labor in setting. They have been



All-Rolok

Full-Cavity

used a great deal in England for the last hundred years. The hollow space has a certain insulating value against the penetration of dampness. Its value as a heat insulator is somewhat doubtful.

There are three types of hollow walls: the full-cavity walls, the all-rolok walls, and the ribbed walls.

Full-Cavity Walls. The outer shell is $2\frac{1}{4}$ " thick, with bricks on edge. The inner shell is $3\frac{3}{4}$ " thick, as the bricks are laid flat. The two shells are completely separated by a 2" wide air space, but are bonded together every three courses by wire anchors laid into the joints. The overall width of the wall is 8".

The wire anchors should preferably have a kink at the middle of the air space, so that any water which might start to flow across them will drop off before reaching the inner shell. Care should also be taken to prevent mortar drippings from accumulating and bridging across the air space. With the average mason this is not an easy thing to control. The floor joists get their bearing on the interior four-inch shell.

All-Rolok Wall. The outer and inner shell of this wall is composed of bricks on edge. In each course, every other brick is a bond brick and spans across the air space showing one end on the outside face and the other on the inside face. The general effect of the wall suggests that a larger brick has been laid up in Flemish bond. It is not entirely pleasing.

A more usual appearance can be given to such a wall, when the outside face is built with bricks laid flat, making a four-inch shell. The interior shell is built with bricks on edge. Every sixth course is a header course bonding the two shells together.

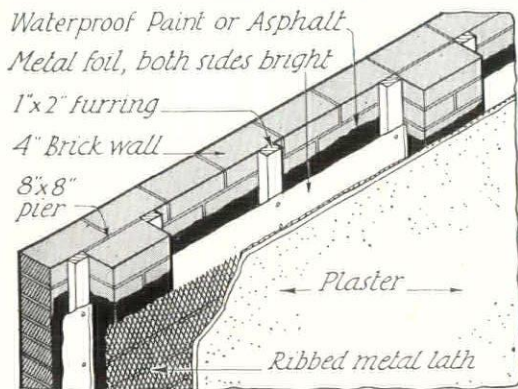
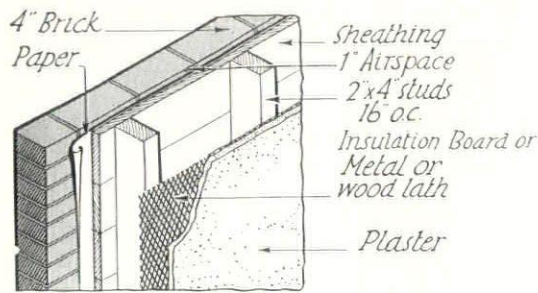
Altogether, there are nine variations of the Rolok brick wall. The one described above, with the four-inch outer shell, is the one most suitable to house construction.

Estimates have been made to support the claim that such a wall is about 30% cheaper than a solid 8" thick brick wall.

Ribbed-Wall. This wall has not been used very much in this country but has many possibilities of development. It is essentially a wall 4" thick, braced at intervals with 8" piers which may or may not be reinforced by vertical steel bars in the center. The piers may be designed to come on each side of every window opening and at the corners. Long spaces between windows may require additional piers.

An application of asphalt paint to the interior is considered by some to be necessary to keep out the dampness. A wire lath with a heavy ribbing can be fastened across from pier to pier and the plaster applied directly to it.

Another method of building this wall is to put the piers



Brick Veneer Methods

on the outside. Then apply furring strips to the four-inch wall on the inside. On this can be stretched metal foil, bright on both sides. Then more furring strips are nailed directly over the others to support the lath for the plaster.

BRICK VENEERS. When it is important to keep down initial costs and at the same time provide for low maintenance costs, the brick veneer over a frame structure presents a number of advantages. No exterior painting of such a wall is necessary and its resistance to external fires is almost as good as an 8" solid brick wall.

From the point of view of insulation against heat loss, it has a lower coefficient (.27) as compared with (.3) of the 8" wall furred and plastered inside. With a layer of building paper, wood sheathing, and an air space between the studs, its resistance to penetration of moisture is perfect.

Another saving to be noted in construction is that the frame can go up to the roof, the second floor and attic joists and rafters can be put on, and the house completely enclosed while the masonry work still goes on. In solid brick construction, the walls must be finished before the second floor joists or roof can be erected.

Against these advantages are to be weighed the fact that a brick veneer is non-elastic and is unable to give with the wood frame behind it. If it is rigidly anchored to the frame, cracks in the wall are sure to develop. But by keeping the veneer away about an inch from the wall-sheathing and fastening it with flexible wire anchors and using elastic seam compound in the joints around windows and doors, much of this difficulty can be avoided.

When steel frame studding is used as a backing, none of these objections can be raised, but there will then be no saving on the initial costs.

HOLLOW BACKUP BLOCKS. Face-brick veneer has been ex-

tensively used over blocks of terra cotta and cinder concrete. The hollow construction of these blocks makes it possible to increase their unit size, thereby cutting labor costs in laying them up. In 12" walls this construction often shows a greater saving than with 8" ones.

The air spaces in the hollow blocks offer resistance to heat loss. The coefficient for an 8" wall backed with a 6" hollow block, furred, lathed, and plastered, is .24.

In all hollow block construction, care must be taken to caulk the joints around windows with elastic cement and to flash with roofing felt over lintels through the entire thickness of the wall. It is safer to fur the inside of these walls the same as any solid walls, but plaster has been applied with success over a good coat of asphalt, directly to the back of the hollow blocks.

LINTEL CONSTRUCTION, ETC. On the inside of openings less than four feet wide, the facing of the wall should be supported on steel angles.

Openings wider than four feet should have lintels of steel, reinforced brickwork or reinforced concrete. Usually two angles back to back are sufficient for the ordinary openings. The sizes of these angles can be selected from this table:

SIZES OF ANGLES TO SUPPORT 4" THICK BRICKWORK

3" x 3" x 1/4"	for spans up to 8'
3 1/2" x 3 1/2" x 5/16"	for spans of 9'
4" x 4" x 5/16"	for spans of 10'
4" x 4" x 3/8"	for spans of 11'
6" x 4" x 3/8"	for spans of 15'
6" x 4" x 1/2"	for spans of 16'

Where floor beams bear upon the wall directly over openings, then the additional loading must be added and computations made for larger lintels. These usually consist of two channels, face to face with an angle to support the face brick.

"Recommended Minimum Requirements for Small Dwelling Construction," published by the Bureau of Standards, does not permit the cutting of chases for pipes in 8" thick solid walls. Some builders, however, do this.

WEATHER PRECAUTIONS. During warm or dry weather all bricks should be thoroughly wet just previous to being laid. This is to insure the presence of enough water in the brick to prevent it from drawing water out of the mortar which would prevent proper setting and bonding.

When the temperature is below freezing and is dropping, the work should stop or artificial heat be provided constantly. If the temperature is rising and is hovering around 28 degrees, the work can safely proceed.

Bricks should be laid *dry* in the winter. For best results the mortar should be warm so that it may have partially set if a freeze should set in.

It is common practice in our northern states to build upon frozen brickwork for small dwellings. However, if the temperature continues low, care should be taken to prevent the brickwork from alternate freezing and thawing.

The Code regulations of the National Board of Fire Underwriters say: "All masonry shall be protected against freezing for at least forty-eight hours after being set. Unless adequate precautions against freezing are taken, no masonry shall be built when the temperature is below 28 degrees F. on a rising temperature or below 32 degrees F. on a falling temperature, at the point where the work is in progress. No frozen materials shall be built upon."

TOWARD FAIRER FAIRS

Pedestrian participation in the dramatic presentation of saleable merchandise instead of gaping mobs in the midway is envisioned for the Fair of the future

WHILE, in most sections of the country, the broadhatted promoters of Fairs still stick to the Barnum slogan of "Bigger and Better," small groups of more serious thinkers have been concerning themselves with the social and cultural possibilities, in the hope of raising Fair standards over the merely "Marvelous, Mammoth and Miraculous."

Social and cultural aspects have always been the tail of the dog, and the question is whether the tail can wag the dog. The dog itself is, of course, the commercial interest in obtaining desirable publicity for saleable products, in exciting the public to be bigger and better buyers through enlarging the horizon of purchasable goods. The tail has been the altruistic education of the people in the various arts and sciences, and the suggestion is that, in the largest of the Fairs scheduled for '39, the Fair might be devoted to the *Art of Living*. But a Fair's a Fair for a' that, and the commercial interests must bear the brunt of the bills, and their hope of return is through the showing of their goods in the best possible light to an admiring and buying public.

It would seem obvious that the display of goods as adjuncts to the *Art of Living* would be the best possible light for goods display. Such a concept as the glorification of the Art of Living as presented in organic, physical terms can be visualized as the most forceful way of making the visitor a participant in the Fair, rather than a gaping sightseer. Such participation would lead to the pedestrian's personal pleasure and portend profits for the producers. The emphasis on what the products *will do for the individual* rather than an emphasis on the things themselves, is a note worthy of consideration by the producers and by the Fair authorities.

The Fair must have crowds, for crowds gather to see a glorious spectacle. They come with every intention of being amazed and like to stand in awe and wonder at the sights they see, so that they will have something astounding to tell to the folks back home. They must have their spectacle and their great dramatizations. Less than 5 per cent want to be lectured to, but 100 per cent want to know that they have seen the show. The dramatization of the Art of Living will have to be stupendous.

Of course, the Fair must entertain, but greater good will come from letting the visitors entertain themselves through the use of the things displayed rather than keeping them at a distance from a splendid spectacle. Other sorts of entertainment will not be lacking, for no Fair is complete without a mountebank, juggler and dancing bear (now spelled bare) or their modern counterparts.

The display of the thousands of adjuncts to the modern *Art of Living* requires organization, classification and segregation in physical plan. Conversely, it seems to require a unification and centralization, so that the relationships be-

tween the parts making up a whole may be evident. This is essentially the problem of the planners, and the relationship of the general to the particular, of the whole to its parts, or of the sublime to the ridiculous, presents physical problems of no mean proportions.

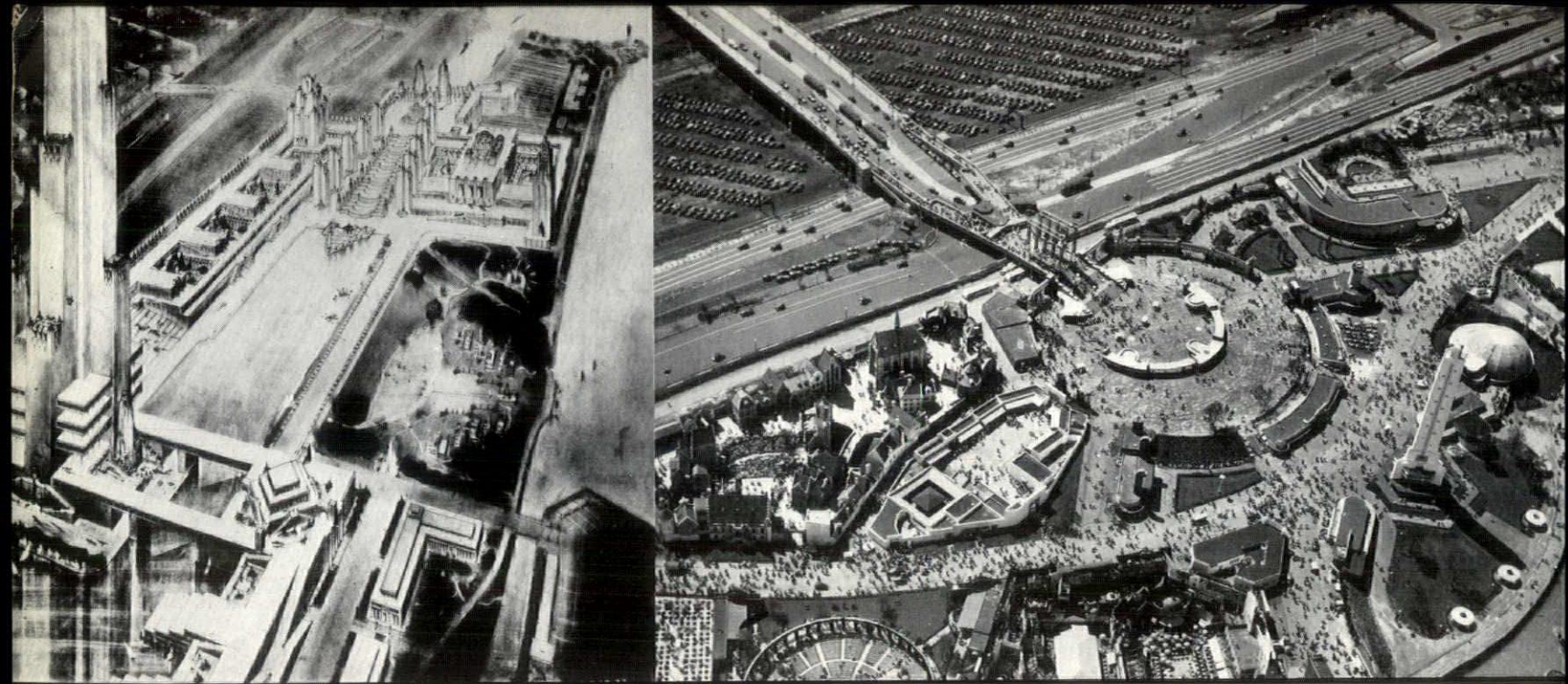
Several types of plan-concept present themselves. The old, obvious arrangement of the straight line of courts and minor courts divided into exhibits related by classification into Agriculture, Industry, Commerce, Art, Religion, Science, Education, Government, and all that, are too subject to revision. One such revision has been suggested to New York's Fair authorities in the form of a stimulating written program called "The Fair of the Future, 1939" by the group of which Michael M. Hare is Secretary*. This concept with a social theme has been presented in its physical aspects in a suggested site plan by I. Woodner Silverman. His serpentine parti for the Flushing Meadows is a fresh note—a departure from the old, grandiose, court-of-honor-major-and-minor-axis-with-lagoon type of planning which has been worn threadbare. While this serpentine plan on analysis may be superseded by another type since it uses but one side of the main artery for its exhibits, it will undoubtedly suggest new possibilities to the Fair planners. It is certainly an improvement over the catch-as-catch-can planning which was forced on the Chicago Fair by the depression.

Undoubtedly, possibilities of a radial or circular plan will be investigated, as well as straight line plans based on triangles or rectangles. A vertical or skyscraper plan has been suggested to save the foot-fag caused by horizontal travel, but obviously the ground can be used to provide floor area much more easily and less expensively than tier upon tier of superimposed floors.

Foot-fag or physical exhaustion from seeing too much is a major factor in planning. Great schemes have been presented for providing moving footwalks, paralleling each other at varying speeds. Chicago provided a bus-line and college-athlete propelled rickshaws, and even power driven "scooters" for semi-standing travel have been suggested. While physical distances cannot be greatly reduced without crowding, apparent distances can be diminished by the clever planning and the psychological effect will diminish the physical fag.

At recent Fairs, the mental fog of fatigue has been increased by the din, sound and fury of loudspeakers and heterogeneous conflicting noises. The audible aspects of the future Fair will undoubtedly be organized, and blatant noise replaced by music, martial or melodic as the occasion demands. We can expect also, an infinite arrangement of lighting effects for the technicians in this field are always experimenting and presenting unique designs for the play of artificial light.

(*American Architect and Architecture, June 1936, page 14.)



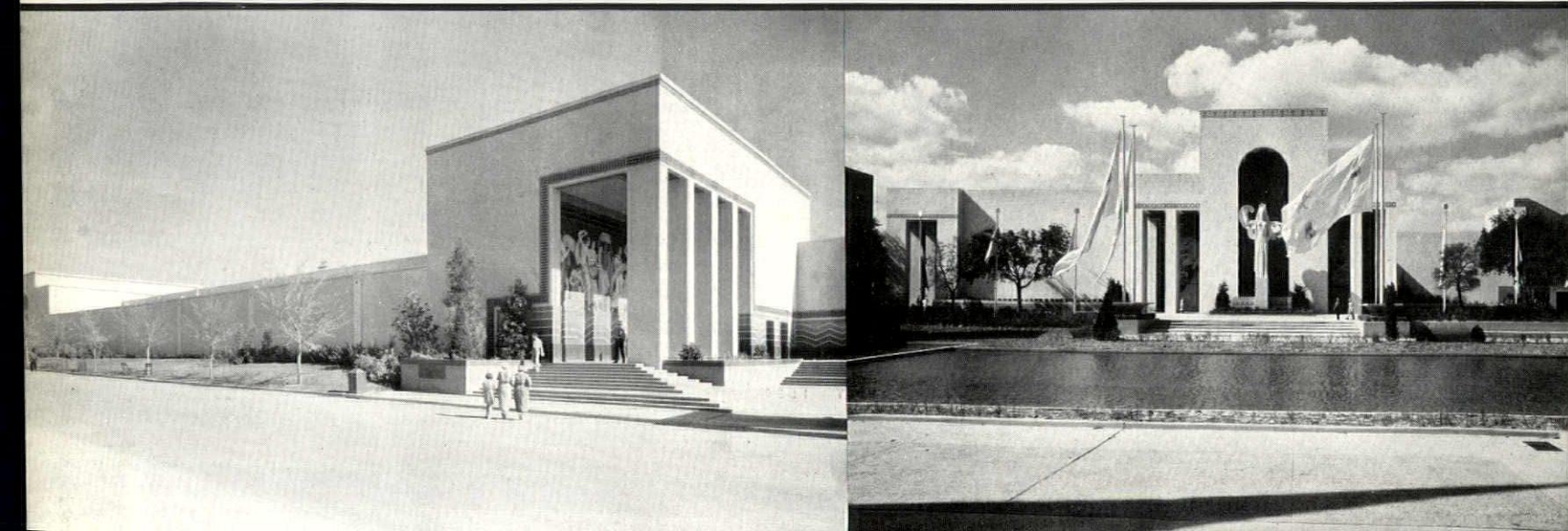
COURTESY: LOUIS SKIDMORE

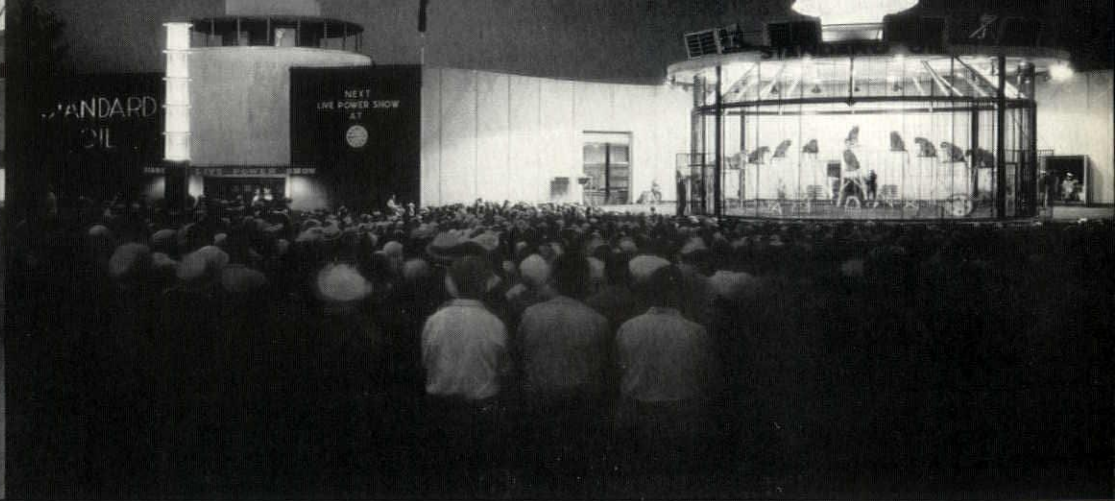
The earlier vertical schemes for the Chicago Fair would have made excellent settings for a Buck Rogers movie. They were soon discarded for more practical plans that had as their major inspiration the control, convenience and comfort of millions of moving, standing and sitting people. Thus at the Century of Progress, the horizontal fair with a modified radial plan was used



PHOTOS: KAUFMANN-FABRY

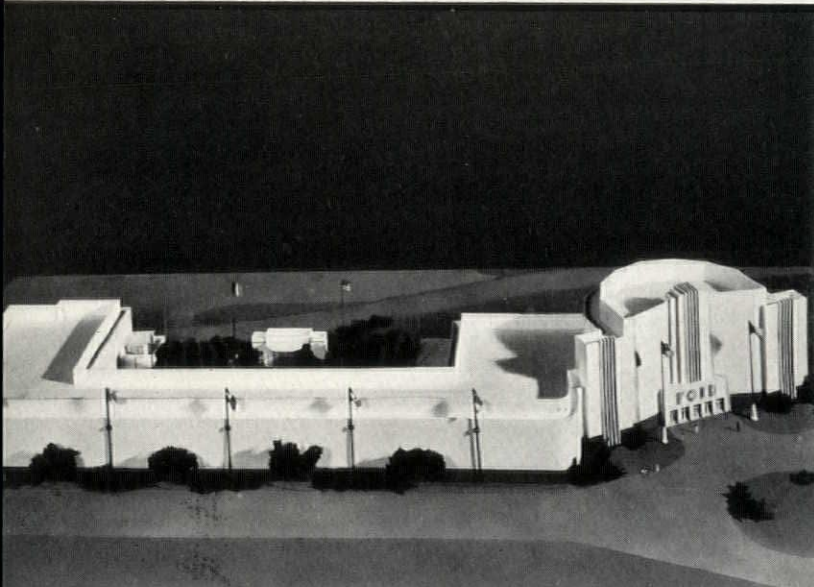
Architectural unity is the keynote of the Texas Centennial Exposition in Dallas. Broad wall surfaces, decorated with brilliant historical murals, characterize the low buildings. Numerous large replicas of the six flags of Texas and an ever changing lighting system furnish additional color. George Leighton Dahl was the Fair Architect and Technical Director





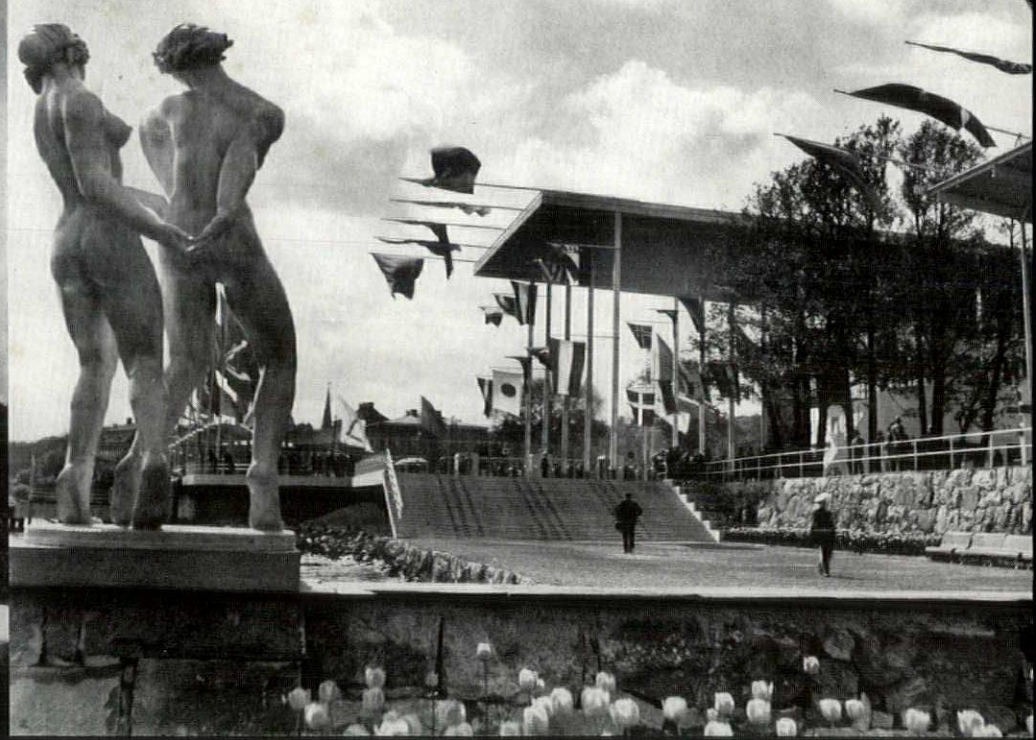
KAUFMANN-FABRY

In the final analysis a fair is designed primarily to make people buy merchandise. The buying instinct apparently may be stimulated by visual education or an animal act. At the Texas Centennial Fair in Dallas the manufacture of cars is the major theme of the new Ford building designed by Albert Kahn, while General Motors redecorated the interior of an old building which they are using as a Concert Hall



The Foods and Beverages Building with murals by Carlo Ciampaglia (left opposite page) is one of the largest buildings at the Texas Centennial Exposition. Buildings facing the Esplanade with its 700-foot reflecting pool (center picture below). The Hall of Negro Life and Culture built by the United States Government (right). George Leighton Dahl, Architect





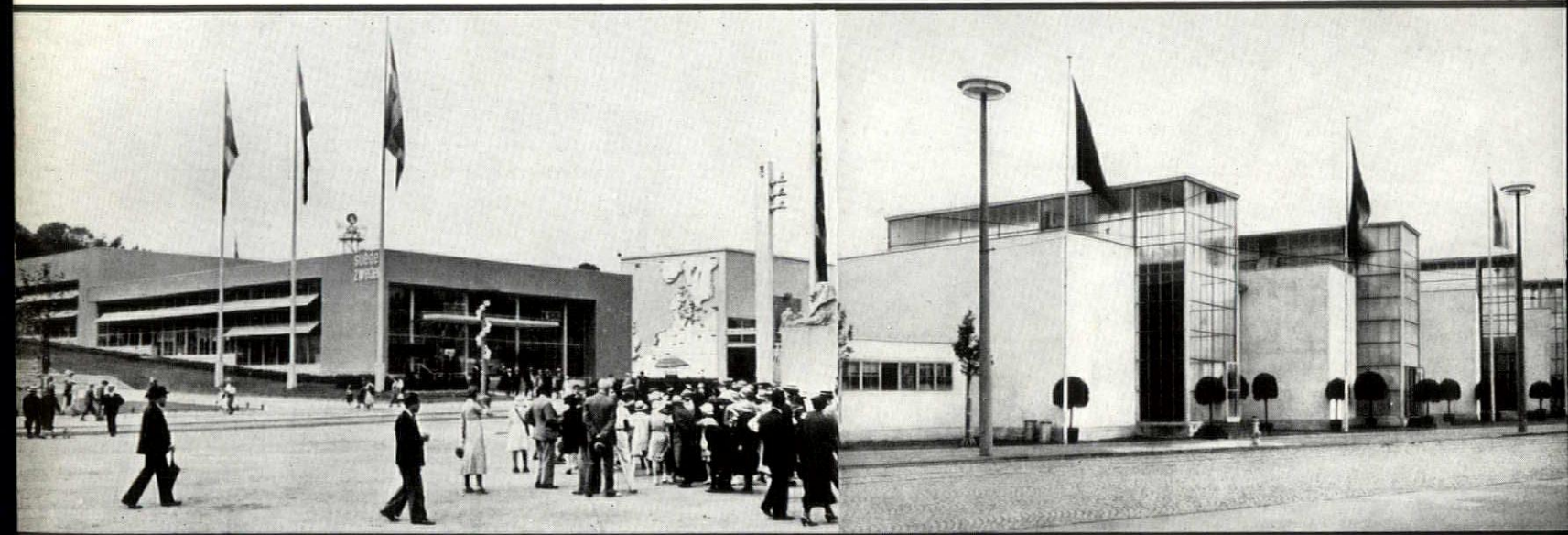
VIENNA-1930

STOCKHOLM-1930

Beginning with Paxton's Crystal Palace for the Great Exposition of 1851 in London, European Fair architecture has been experimental in both structure and design. Part of the reason for this is that European Fairs usually have little of the Midway and a great deal of the market place about them. Another reason is that architects have a real influence on public taste and opinion. The Tourist Pavilion at the Arts and Crafts Exposition in Vienna was designed by Oswald Haerdtl. The Stockholm Exposition was the work of E. Gunnar Asplund. The building at the Brussels Exposition is the Swedish Pavilion, and the Municipalities Pavilions were at the Pressa in Cologne

BRUSSELS-1935

COLOGNE-1928



PHOTOS: COURTESY MUSEUM OF MODERN ART

BACK in New York from Williamsburg, to a new office and a new task in the magazine which, it is hoped, may find a wider opportunity for service to the profession. Meeting with architects from all parts of the United States as we have just done at the Convention, convinces one that the problems of the profession are undoubtedly more varied than ever before in America. I am confident that only by a far more frequent and much wider travel will it be possible to understand these wide variations, and bring to them such help as a professional journal can extend.

ASSISTED a jury of engineers and architects to judge the A. I. S. C.'s annual student bridge competition this evening. We had previously selected ten competitors from the first stage, and had intimated to these students the desirability of developing their designs further, subject to certain conditions and suggestions. It was gratifying to the three architectural members of the jury to find, when the winner had been selected, that he was a student in the architectural school at the University of Michigan—the other four premiated designs coming from engineering students.

UP to Worcester, Mass., to talk with the Brick Manufacturers Association of New England as to the immediate future of architectural trends, and particularly those relating to the clay industry. It was a good opportunity to ride my pet hobby, which is the standardization of brick on a module of eight inches, thereby saving the present and all future generations of architects and draftsmen from dizziness in the head resulting from fractional dimensions. In the eight inch modular system, three courses rise eight inches, and two widths measure eight inches. If a manufacturer and his advisors feel that his particular make of brick is best served by a quarter inch joint, he makes the brick itself larger than the manufacturer whose product calls for a half inch joint. The establishment of such a modular unit, however, would do more than simplify the making of working drawings—and who among us has not had to re-dimension a set of drawings completely because the make of brick was changed at the last moment? It seems to me that if brickwork could be put upon this modular basis, the manufacturers of steel windows, wood frames, masonry backing, and all the other elements that should merge intimately with brickwork, would follow the lead and obviate the enormous waste of time and material in cutting and fitting.

THE DIARY

Henry Taylor



HOW is your production of British thermal units? If you are sitting down and passing off more than four hundred of these little fellows per hour, you will feel cold. On the other hand, you will feel hot if you are losing less than that many. It is a very difficult thing to hit the four hundred right on the dot, and feel perfectly comfortable these days.

RUTH R. TREGENZA of the Fine Arts Faculty, Columbia University Summer Session, says that the interior of the home has changed more in the last ten years than in the previous ten centuries. In her opinion, the informality and directness of modern manners are reflected in modern furnishings just as vividly as the elaborate and formal Victorian code of behavior was reflected in the stuffy furnishings of that period.

EDWARD D. PIERRE tells me of "The Indianapolis Plan" for coordinating the efforts to rebuild America. It is a five-point program: 1. Organizing the construction industry; 2. Establishing a standard for the product; 3. Creating a long-range works program, including demolition and remodeling; 4. Arousing a national consciousness of the need for really good building; 5. Establishing a close co-operation between the building industry, the government, and the people.



ONE of the bright spots of the Williamsburg Convention was the announcement that Edward Langley, an architect of Scranton, Pa., who died a year ago, had bequeathed to the Institute, a fund of \$104,000 to establish one or more scholarships for architectural students. Thus the number of opportunities for the student constantly increases. It seems only a few years ago that the Stewardson and Rotch were the student's only hopes.

SALES of residential building lots during the first three months of 1936 climbed rapidly. A survey of sixty-

eight American cities, made by the Family Economics Bureau of the Northwestern National Life Insurance Company, shows that both speculative builders and individuals are securing land preparatory to building. In the sixty-eight cities which were surveyed, the slowest movement was found in New England and the East.

THERE is an interesting situation in connection with the land on which the Chrysler Building stands in New York City. It seems that the courts have just decided that the city has no power to tax the building, canceling an assessment of twelve million dollars that had been placed upon it. What happened is that the land was added as an endowment by Peter Cooper's heirs, to Cooper Union, which he had established through his gifts. While Cooper Union certainly does not use the property for carrying on its educational work, nevertheless, it is, as a part of the endowment fund, exempt from taxation.

WENT through a dozen pages of *House & Garden's* announcement of its "Ideal House" in Scarsdale, without discovering the name of the architect who made this ideal possible. The newspapers and laymen's magazines show astonishing ingenuity in their avoidance of architectural credits. The particular house just mentioned is the work of Verna Cook Salomonsky, architect, of New York.

CLEVELAND is one city that realizes the good that may be accomplished by a really consistent inventory of real property. Not content with one such survey, as so many localities apparently have been, Cleveland makes a complete inventory, not once but annually, of every lot, every home and every other building. Thus the city knows where its needs are, and can plan accordingly.

THE architectural schools continue to put forth strenuous efforts to build and correlate their staffs in these days when architectural education trends are so hard to discern. Columbia has just appointed John C. B. Moore, Donald A. Fletcher, and Edgar I. Williams as associates in architecture to be in charge of instruction in design. In addition, four visiting critics were appointed—Arthur L. Harmon, William Lescaze, J. Andre Fouilhoux, and George Howe. Arthur Harmon tells me that they are to visit the school three or four times a year—I should imagine not in a group, for the critiques of

Lescaze and Harmon, for instance, might vary considerably on the same subject.

DEAN HUDNUT of Harvard, down in New York on a flying visit, repeated at my request the bon mot that excited considerable merriment at the recent convention of the architectural school men. On that occasion he suggested a dual examination for registration—two subjects, design and construction. Those who flunked the construction examination, but passed design, should be registered as architects; those who flunked design, but passed construction, should be registered as engineers. Someone objected that it was conceivable that someone might pass both, in which case, said Dean Hudnut, the obvious thing to do was to register him as an architect-engineer.

STEPHEN F. VOORHEES, in his new capacity as Chairman of the Board of Design for the New York Fair, outlined today at luncheon a few details which had not been made public. One important one is the fact that the appointment of the seven individuals includes their professional partnerships and office organizations. These offices are *hors de concours* in the design of buildings erected by the Fair, the State, the City, and the Government. They are, however, privileged to accept commissions for the work of exhibitors. Another point is that the Board has already added to its personnel, in an advisory capacity, Paul P. Cret of Philadelphia, and Eliel Saarinen of Detroit.

Voorhees says that the Board's mind is entirely open for the reception of any ideas that may be submitted. There is a time limitation, however, for this fluidity of purpose is expected to begin to jell within a month or so, and to come to a final crystallization by September 1, when the Board's recommendations as to the general scheme for the Fair are to be presented.

EUSTACE SELIGMAN gave a luncheon today at the Bankers' Club, for the purpose of discussing the Wagner-Ellenbogen Bill. It is really an encouraging sign to find that after these few years of active discussion upon housing, most of the varied interests that have fought back and forth over the battlefield are practically in agreement as to the benefits of Senator Wagner's measure. It is admitted that it is not satisfactory to some in all respects, but when three men of such diverse ideas as Mayor La Guardia, Peter Grimm, and Louis Horowitz argue for

its passage as they did today, few can be against it. The sad part of it is that there is a rather general feeling that every one is going to be kind to the Bill, so kind as to be willing to let it die in committee while Congress adjourns.

MR. W. L. WOOD, Editor of *The Architect & Building News*, London, brought me a copy of "Vitruvian Nights" on his recent visit to America. It is a volume of lectures and essays on architecture by H. S. Goodhart-Rendel—a great bedside book for which one can reach and read a thought or two before dropping off to sleep.

The author quotes Mr. Bernard Shaw as having remarked that some people regard art as "a costly ring in the nose of nature." Goodhart-Rendel believes that the principal purpose of architecture is to intensify the appearance of what is desirable in the building, and generally, also, adorn what is built. He develops an analogy of the architect's function to that of the actor: it will not do for an actress impersonating an angry woman to work herself up into a fury about something, and then speak her lines with the full impact of that fury. As a parallel in architecture, absolute literal truth in expression is neither necessary nor desirable. The elimination of some matter of appearance, and the intensification of others, can lift mere building into the higher estate of architecture. There is a wide field for discussion and argument in this vital question of just how far architecture should go, if at all, beyond an absolutely rational expression of the necessities of building.



THESE annual Chapter meetings are rather tiresome affairs. It seems only fair to committees that have worked, more or less, during the year, to listen to what they have to say. I wonder, however, whether the main purpose would not be achieved more comfortably by mimeographing these reports and sending them to the members. The annual meeting of the New York Chapter, at least, always starts out very bravely with a good attendance, but after three or four hours of the session, there is left only a corporal's guard to vote that "this report be accepted and filed." Apparently there has yet to be devised an annual chapter meeting that is really sprightly.

ARCHITECTS come and go, form partnerships and unshuffle them, but Rockefeller Center goes on building. An

additional office building, thirty-two stories in height, to cost \$3,500,000 is to rise just south of Rockefeller Plaza. The official list of architects for this is Reinhard & Hofmeister, Corbett & MacMurray, and Wallace K. Harrison and J. Andre Fouilhoux.

A PERENNIAL subject is up again for discussion: someone has just called up asking for a list of the ten best architectural works in the United States. This prompted an examination of some lists that were published about ten years ago as a result of a questionnaire sent out by the Palos Verdes Art Jury. The lists that resulted date themselves very definitely. The same characteristic marks two earlier lists that are available. By vote of its readers in 1885, AMERICAN ARCHITECT published a list as follows: Trinity Church, Boston, Mass.; U. S. Capitol, Washington, D. C.; W. K. Vanderbilt House, New York, N. Y.; Trinity Church, New York, N. Y.; Jefferson Market Court House, New York, N. Y.; State Capitol, Hartford, Conn.; City Hall, Albany, N. Y.; Sever Hall, Cambridge, Mass.; State Capitol, Albany, N. Y.; Town Hall, North Easton, Mass.

Again, in 1900, a list was compiled from the votes of its readers by the Brochure Series, naming: National Capitol, Washington, D. C.; Boston Public Library; Trinity Church, Boston, Mass.; Congressional Library, Washington, D. C.; Columbia University Library, New York, N. Y.; Trinity Church, New York, N. Y.; Madison Square Garden, New York, N. Y.; St. Patrick's Cathedral, New York, N. Y.; Biltmore House, Biltmore, N. C.; City Hall, Boston, Mass.

I am not sure that the Palos Verdes Art Jury's list was ever published, but there were numerous lists submitted to the jury by individuals, among which was the following by Paul P. Cret: Independence Hall, Philadelphia, Pa.; City Hall, New York, N. Y.; The White House, Washington, D. C.; Public Library, Boston, Mass.; University Club, New York, N. Y.; Scottish Rite Temple, Washington, D. C.; Guaranty Trust Building, New York, N. Y.; Pan American Union, Washington, D. C.; Detroit News Building, Detroit, Mich.; Hotel Shelton, New York, N. Y.

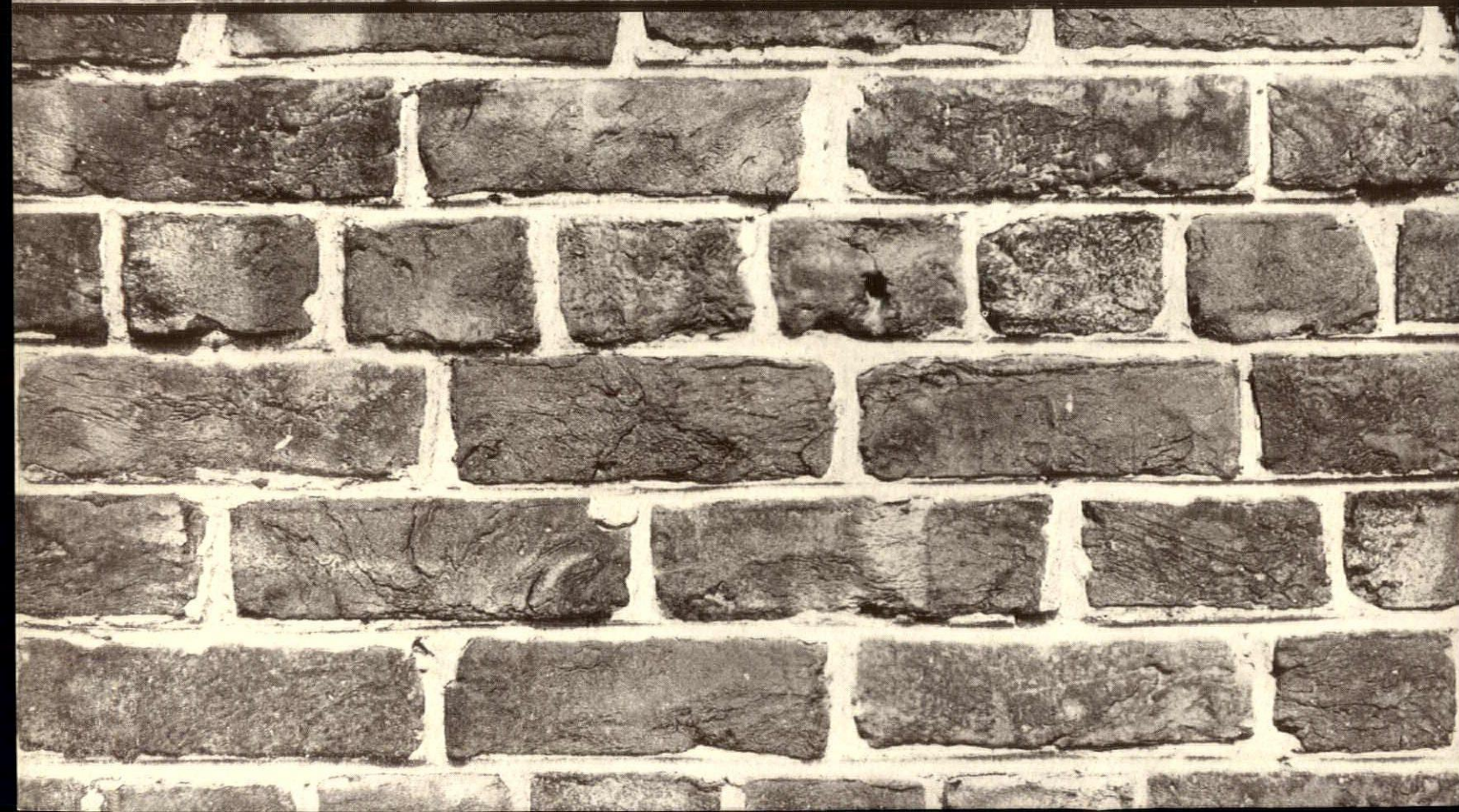
It is quite evident, therefore, that our predilections in these matters are more strongly influenced by our contemporary works than by what has become, shall we say, somewhat out-moded. All of which would make me, at least, very wary about compiling such a specific record of judgment today.

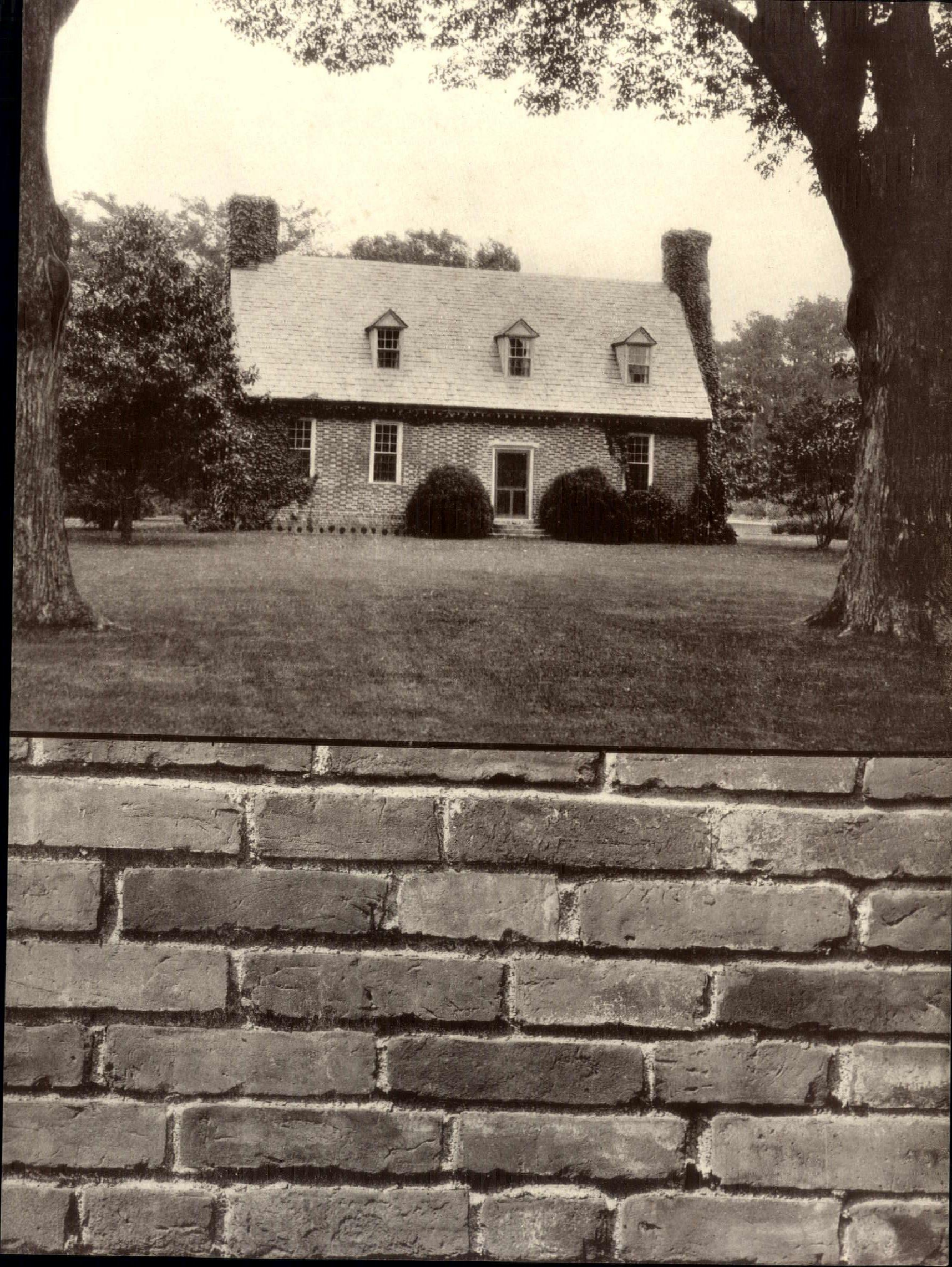


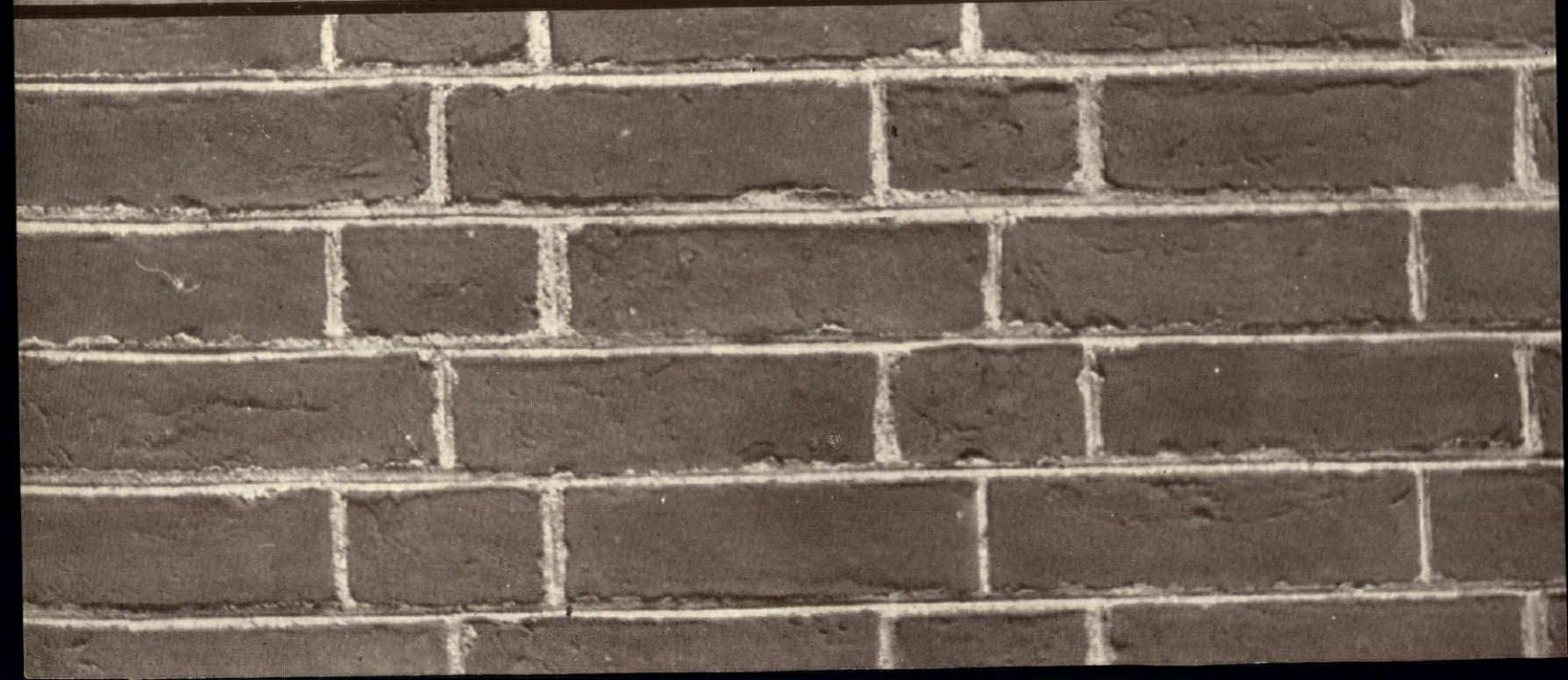
ILLUSTRATIONS COURTESY OF: CHARLES DRAKE TURNBULL, FRED HEATH, JR. AND R. W. TEBBS

BRICK PRECEDENT IN AMERICAN ARCHITECTURE

HOMWOOD, Baltimore, Maryland, was built during the year 1800 by Charles Carroll of Carrollton for his son, Charles. . . PORTER HOUSE, Windsor, Connecticut, built in 1750. Detail of what is probably the oldest brickwork in Connecticut. . . ADAM THOROGOOD HOUSE, Princess Anne County, Virginia, built in 1636, combines English and Flemish bonds. Details of reclaimed 18th Century brick. . . GEORGE READ, II, HOUSE, New Castle, Delaware, begun in 1791 and completed in 1801. Detail of waterstruck body brick in double stretcher Flemish bond, V scored joint. . . DRAYTON HALL, near Charleston, South Carolina. Detail of waterstruck brick in the Armory, Middletown, Connecticut, built in 1730. Every third row is a header row. . . FARMHOUSE on Eastern Shore of Maryland built about 1779. Detail of brick in Old South Church, Boston. . . POPLAR FOREST, Bedford County, Virginia, was designed and built by Thomas Jefferson in 1806. Detail of the brickwork at Poplar Forest. . . BREMO, Fluvanna County, Virginia, designed by Thomas Jefferson and built in 1818. Detail from Warner Memorial, West Springfield, Massachusetts, built in 1750.

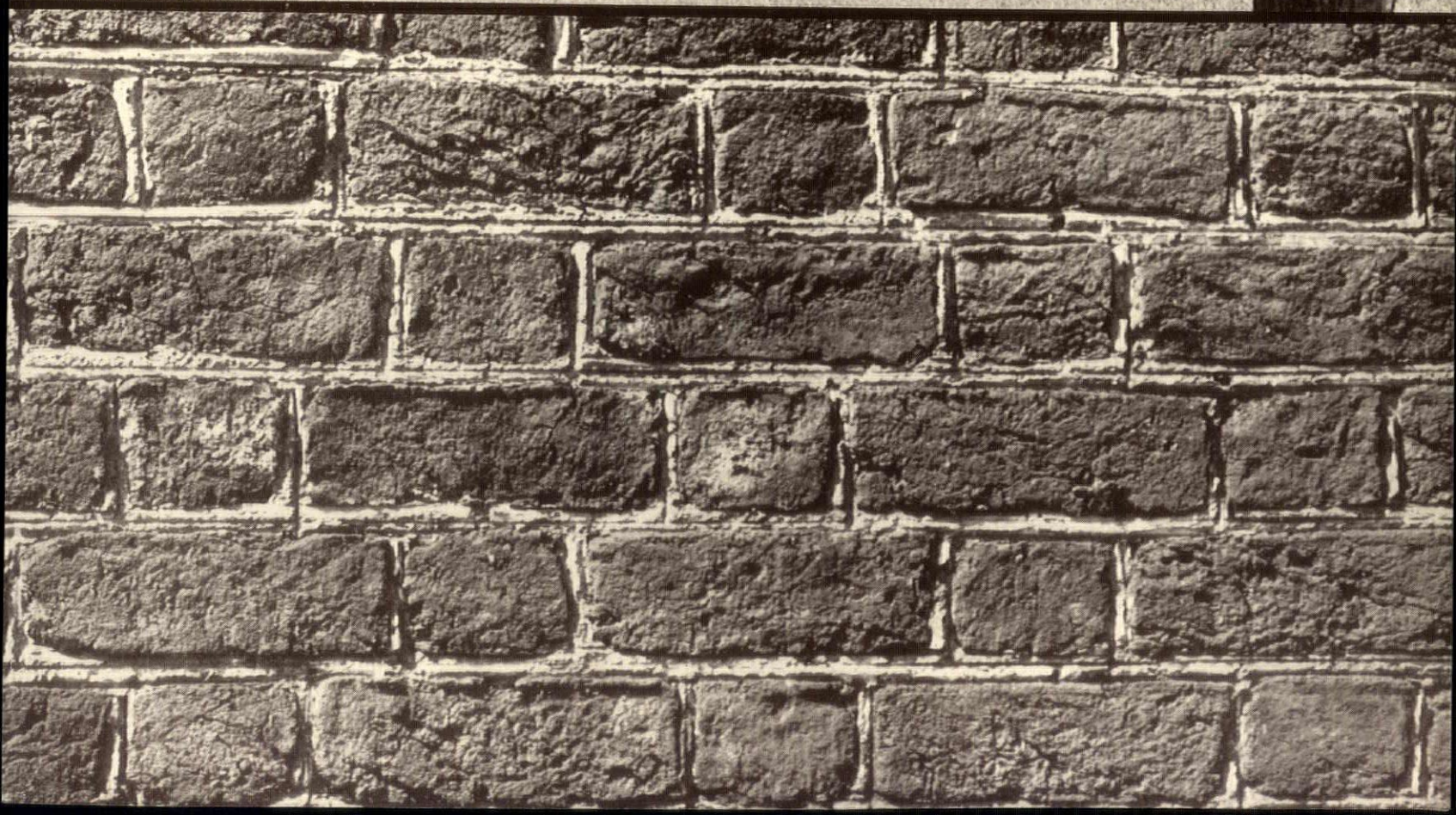


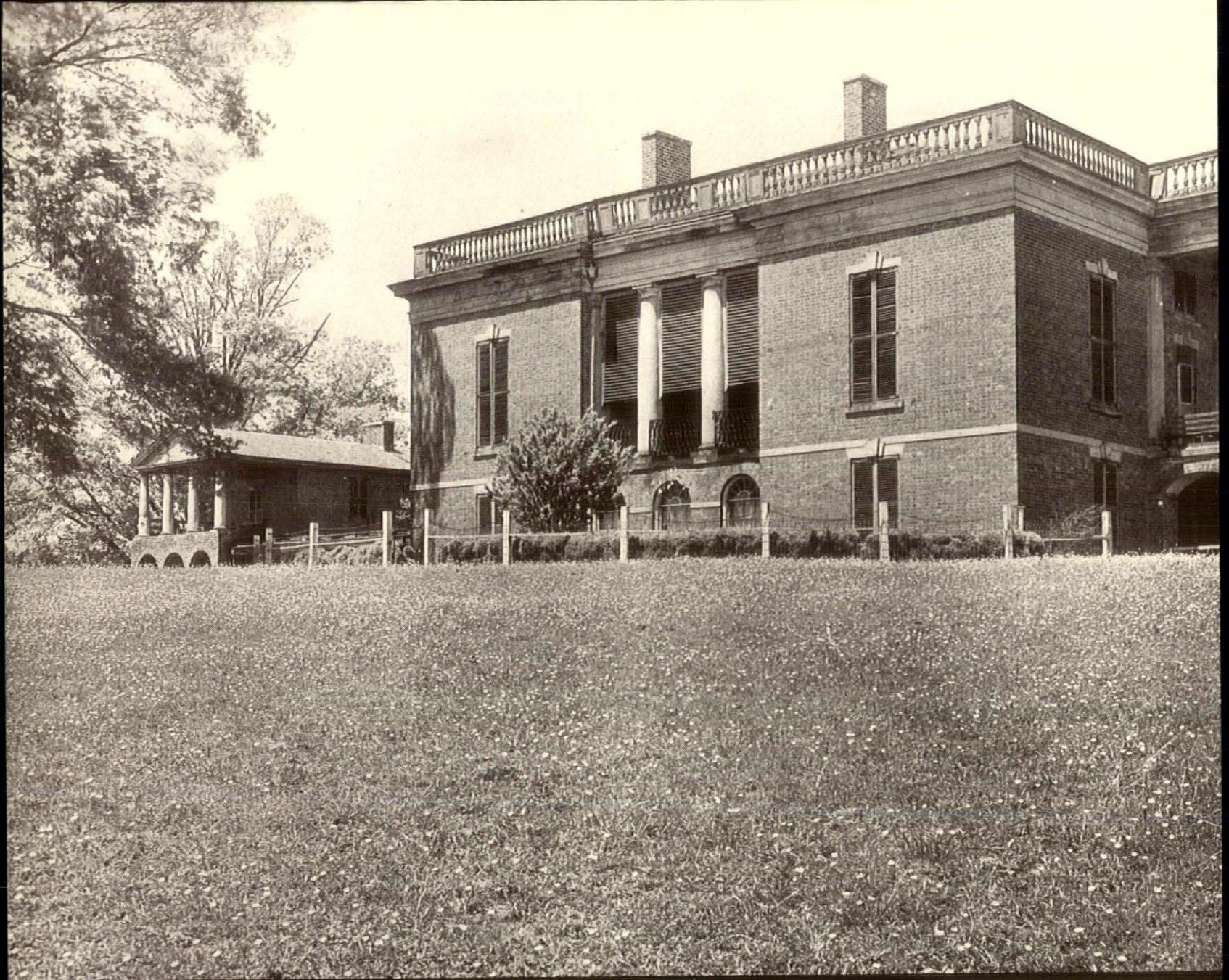












HOUSING HEADED OFF

PLANKS are being planed and polished for political platforms as we go to press, but one which may prove too splintery to handle is that of housing—national housing for lower income groups. It is likely that such a plank will be found too full of “large and unsound knots, shakes, cracks, checks” or other defects, to be useful to a political party, but housers will at least have the satisfaction of knowing that their demands have caused a serious consideration of their favorite theme. Housing may yet become a major political issue, both nationally and locally. In England it is well known that the housing platforms have influenced elections. Today the Democratic platform is being guided by Chairman Wagner of New York, who has been housing’s chief bill writer for the past sessions of Congress. The fact that his housing bill was not reported on in committee and, therefore, died when Congress adjourned, may indicate to him that housing is to be headed off; and it is possible that he, therefore, will not haul out a real housing plank for use in the Democratic platform.

■ The architectural profession is interested in the technical problems involved in site planning, building design and construction, and many of the profession have been engaged in developing such projects for PWA, but there has been no concerted or organized action on the part of the American Institute of Architects, either to formulate a program for lower cost housing, or to endorse any of the various programs

COMPETITIVE GHOSTS

ARCHITECTURAL FIRMS are not anonymous—the product of such firms is usually marked by the architectural abilities of its principals. In these offices many men have been contributing design elements to schemes developed and controlled by the members of the firm. At times, major contributions to the solution of architectural problems have, of course, been made by the employes, but the credit remained within the confines of the office and the staff was recognized in praise, cash or eventually in a partnership in the firm. Due to recent conditions, many such ghost designers have had to seek employment outside of architects’ offices, and to capitalize on their talents as best they might. Thus you will find these men, through no fault of their own, working today for department store decorating staffs, for engineering firms as “our architectural man,” for industrial designers, for contracting companies, for manufacturers who provide technical or architectural design services, or for various government agencies. In such company these blameless ghost designers, seeking their own security, have built up an effective machine for those who compete with “legitimate architects.” The ghosters have been forced frequently, for

presented. While the political pressure for low cost housing, on the part of those who will benefit, is growing, other political considerations and the fact that private residential construction is on the increase, are strong enough to head off housing for the present.

■ Only the Socialists have thus far included a housing plank in their platform, but organized labor is becoming articulate on the subject of slum eradication and decent housing for all. To labor, however, wages and hours are of chief interest at this time rather than housing.

■ The National Association of Real Estate Boards is also intent on keeping the government out of housing, and has set forth “tentative conclusions as to the whole national housing situation.” One of their first conclusions is that “private enterprise in industry is well able to take care of any effective demand for new housing which may occur.” Of course, effective demand, at the present time, has little relation to the needs of the lower income group, and the slum dwelling population never represents any “effective demand.” Public housing advocates and the bills they introduced are intended to deal entirely with a non-effective demand. The N. A. R. E. B. also expressed “its opposition to any plan of subsidies for specific projects.” The fact is that the slums are now subsidized to the extent that their municipal cost exceeds the tax return to the city.

their own livelihood, to join forces with non-professional organizations. This offers serious and increasing competition to the profession that formerly was able to absorb their talents. The question of meeting commercial competition in the professional field merits the full consideration of every architectural organization which strives to strengthen the professional status of its members.

■ Since the competitors have taken the ghost designers to bolster up their weakest departments, should not the professions in a like manner engage business men to encourage clients? Should not the architects solicit commissions in the fields of industrial design for which their training and abilities fit them? We are inclined to believe that the scattering of good architectural designers into many allied fields is salutary both for the designers themselves and for the public taste. However, we believe that the most desirable result, better architecture and better design, can be achieved by retaining and strengthening the professional basis of procedure rather than by adopting all the policies and methods of commercial business.



EDITOR



HOUSE OF MRS. R. BURNHAM MOFFAT
 BERNARDSVILLE, NEW JERSEY
 GODWIN, THOMPSON & PATTERSON,
 ARCHITECTS

This house is proof of the importance of craftsmanship in bringing out the full beauty of brickwork. The brick used for it is a handmade Virginia Colonial size in a full range of reds and browns. Finials (above left), moldings, mullions, capitals (above right) and all other shaped brick details were cut at the job. Additional textural interest is accomplished by means of random raked and tooled joints. Another point of interest is the use of three courses of slate with raked joints above the brick lintels (right)



PORTFOLIO OF WINDOW HEADS (INTERIOR)

NUMBER 117

IN A SERIES OF COLLECTIONS OF PHOTOGRAPHS
ILLUSTRATING VARIOUS MINOR ARCHITECTURAL DETAILS



PORTFOLIOS IN PREPARATION

GARDEN ENCLOSURES August
CHURCH LIGHTING FIXTURES September
ORIEL WINDOWS October
MEMORIAL TABLETS November

PREVIOUS PORTFOLIOS, published in ARCHITECTURE

1926

DORMER WINDOWS
SHUTTERS AND BLINDS

1927

ENGLISH PANELING
GEORGIAN STAIRWAYS
STONE MASONRY TEXTURES
ENGLISH CHIMNEYS
FANLIGHTS AND OVERDOORS
TEXTURES OF BRICKWORK
IRON RAILINGS
DOOR HARDWARE
PALLADIAN MOTIVES
GABLE ENDS
COLONIAL TOP-RAILINGS
CIRCULAR AND OVAL WINDOWS

1928

BUILT-IN BOOKCASES
CHIMNEY TOPS
DOOR HOODS
BAY WINDOWS
CUPOLAS
GARDEN GATES
STAIR ENDS
BALCONIES
GARDEN WALLS
ARCADES
PLASTER CEILINGS
CORNICES OF WOOD

1929

DOORWAY LIGHTING
ENGLISH FIREPLACES

1929—Continued

GATE-POST TOPS
GARDEN STEPS
RAIN LEADER HEADS
GARDEN POOLS
QUODINS
INTERIOR PAVING
BELT COURSES
KEYSTONES
AIDS TO FENESTRATION
BALUSTRADES

1930

SPANDRELS
CHANCEL FURNITURE
BUSINESS BUILDING ENTRANCES
GARDEN SHELTERS
ELEVATOR DOORS
ENTRANCE PORCHES
PATIOS
TREILLAGE
FLAGPOLE HOLDERS
CASEMENT WINDOWS
FENCES OF WOOD
GOTHIC DOORWAYS

1931

BANKING-ROOM CHECK DESKS*
SECOND-STORY PORCHES
TOWER CLOCKS
ALTARS
GARAGE DOORS
MAIL-CHUTE BOXES*
WEATHER VANES
BANK ENTRANCES

1931—Continued

URNS
WINDOW GRILLES
CHINA CUPBOARDS
PARAPETS*

1932

RADIATOR ENCLOSURES
INTERIOR CLOCKS*
OUTSIDE STAIRWAYS*
LEADED GLASS MEDALLIONS*
EXTERIOR DOORS OF WOOD
METAL FENCES
HANGING SIGNS*
WOOD CEILINGS*
MARQUISES*
WALL SHEATHING
FRENCH STONEWORK*
OVER-MANTEL TREATMENTS*

1933

BANK SCREENS*
INTERIOR DOORS
METAL STAIR RAILINGS*
VERANDAS
THE EAGLE IN SCULPTURE
EAVES RETURNS ON MASONRY
GABLES
EXTERIOR LETTERING*
ENTRANCE DRIVEWAYS
CORBELS
PEW ENDS
GOTHIC NICHES
CURTAIN TREATMENT AT WINDOWS

1934

EXTERIOR PLASTERWORK
CHURCH DOORS
FOUNTAINS*
MODERN ORNAMENT
RUSTICATION*
ORGAN CASES*
GARDEN FURNITURE
WINDOW HEADS, EXTERIOR
SPIRES*
BUSINESS BUILDING LOBBIES*
ROOF TRUSSES*
MODERN LIGHTING FIXTURES*

1935

CIRCULAR WINDOWS*
(Gothic and Romanesque)
TILE ROOFS*
MOLDED BRICK*
DORMER WINDOWS*
ENTRANCE SEATS*
OVERDOORS, INTERIOR*
BRICK CORNICES*
SIGNS*
CHIMNEY OFFSETS*
WINDOW HEADS* (Exterior, Arched)
UNUSUAL BRICKWORK*
SHUTTERS AND BLINDS*

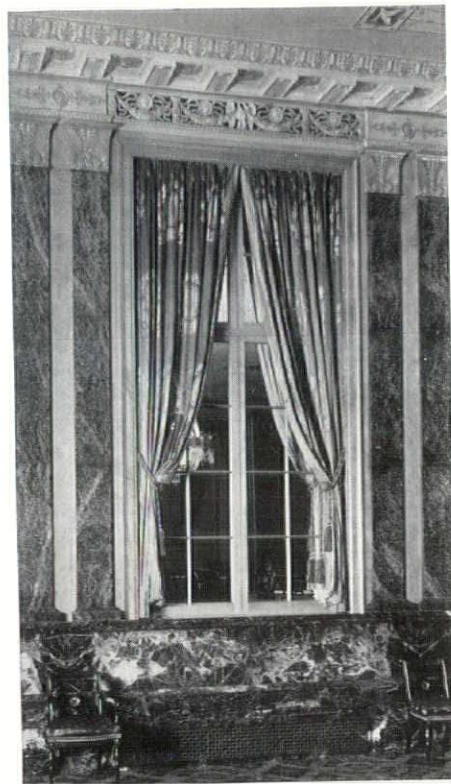
1936

FIREPLACES*
(Mediterranean Types)
PEDIMENTS* (Exterior)
BALCONY RAILING* (Interior)
GOTHIC BUTTRESSES*
CORNER WINDOWS*
SELF-SUPPORTING STAIRWAYS*

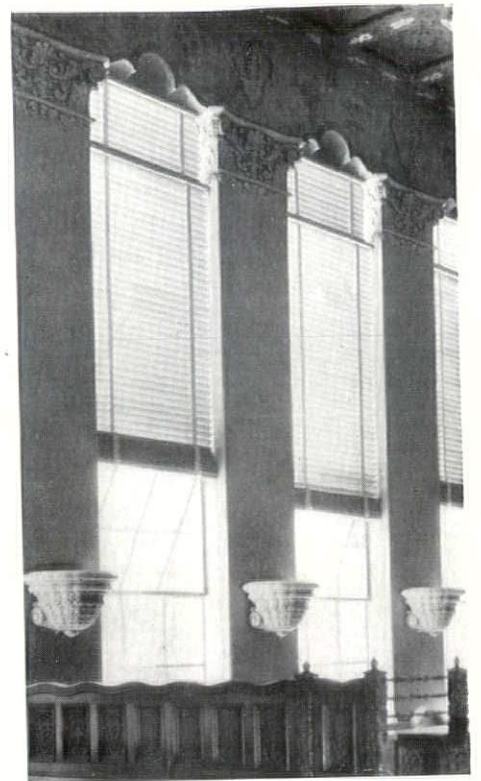
Note: Only those subjects marked with an asterisk are still available to subscribers, and will be sent postpaid at 25 cents each.



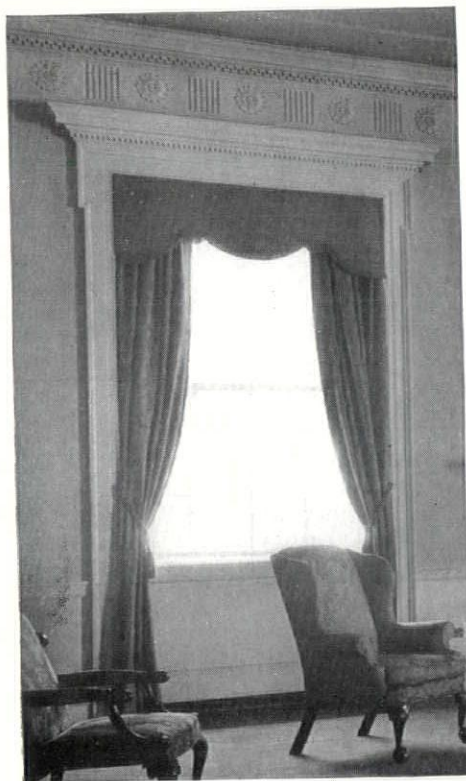
House, New York, N. Y.
Aymar Embury II



Waldorf-Astoria Hotel, New York, N. Y.
Schultze & Weaver



Riverside Finance Corp., Riverside, Calif.
Morgan, Walls & Clements



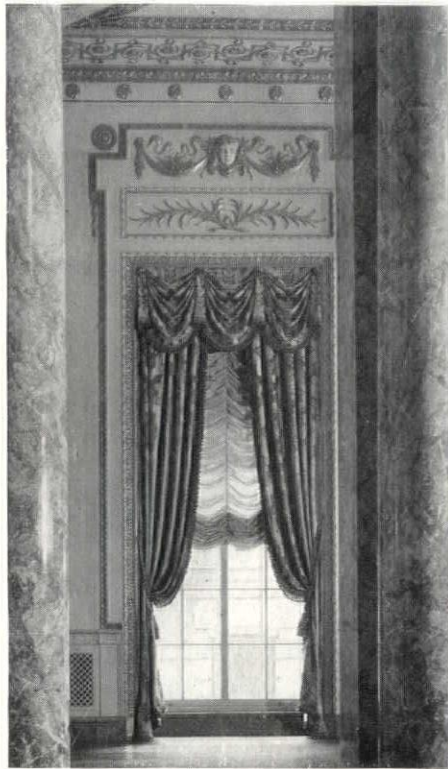
Constitution Hall, Washington, D. C.
Office of John Russell Pope



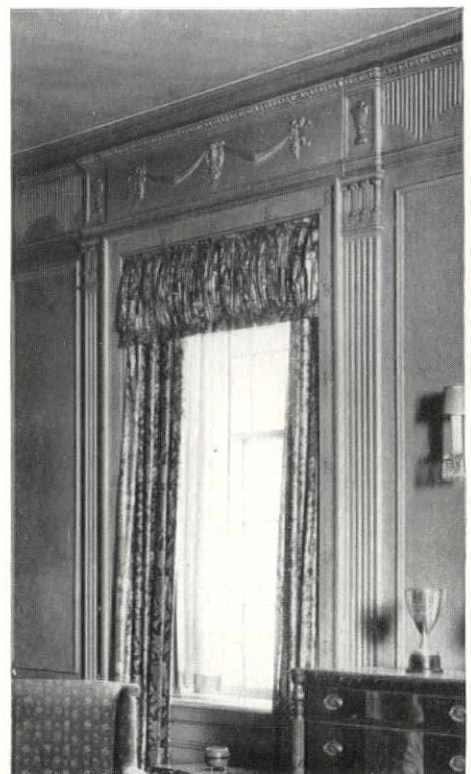
House, New York, N. Y.
Harold W. Vassar



House, New York, N. Y.
Aymar Embury II



Hotel Pierre, New York, N. Y.
Schultze & Weaver



DKE House, Middletown, Conn.
Aymar Embury II



House, Birmingham, Ala.
Warren, Knight & Davis



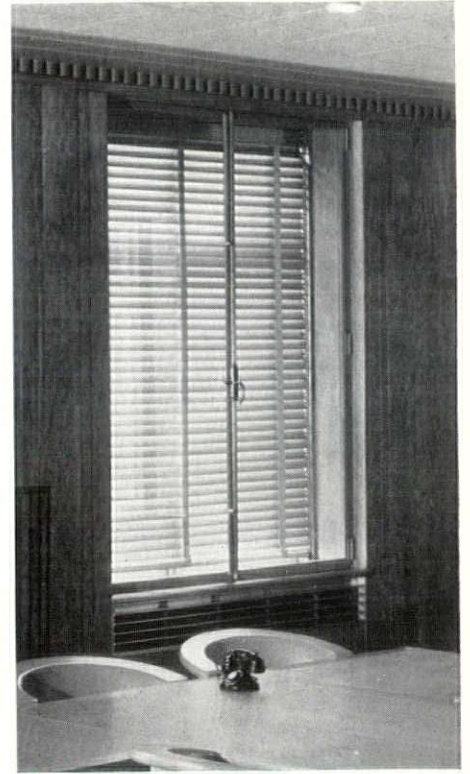
House, Washington, D. C.
Office of John Russell Pope



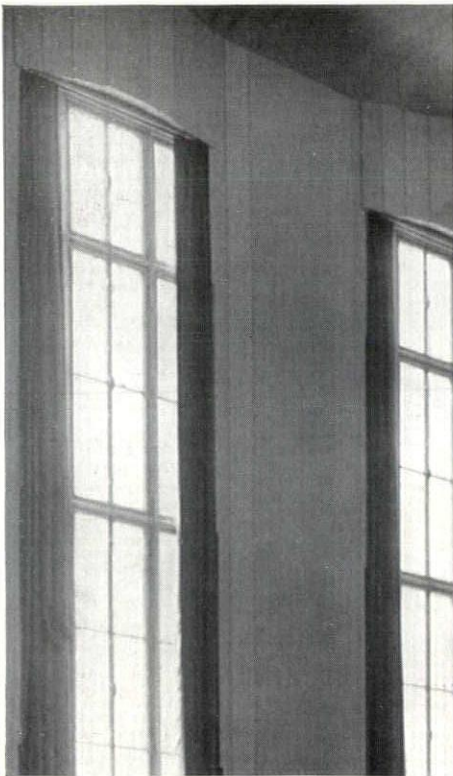
House, Hartford, Conn.
Grosvenor Atterbury



Waldorf-Astoria Hotel, New York, N. Y.
Schultze & Weaver



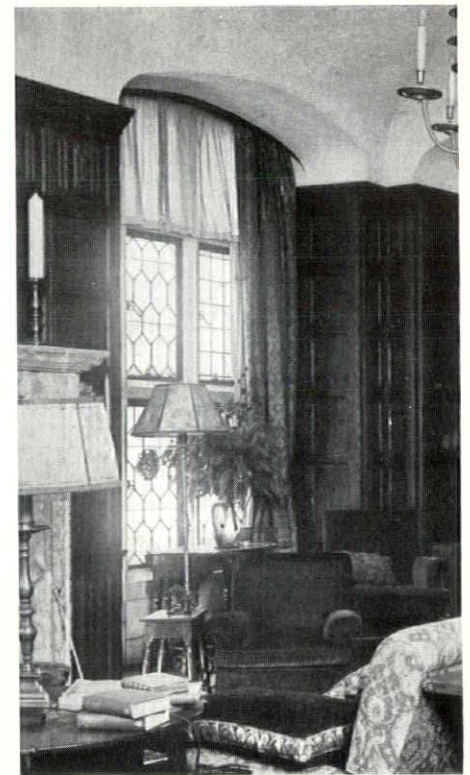
City Hall and Courthouse, St. Paul, Minn.
Ellerbe & Company; Holabird & Root



Western Union Office Bldg., New York, N. Y.
Voorhees, Gmelin & Walker



Office Building of Swedish Match Company,
Jonkoping, Sweden



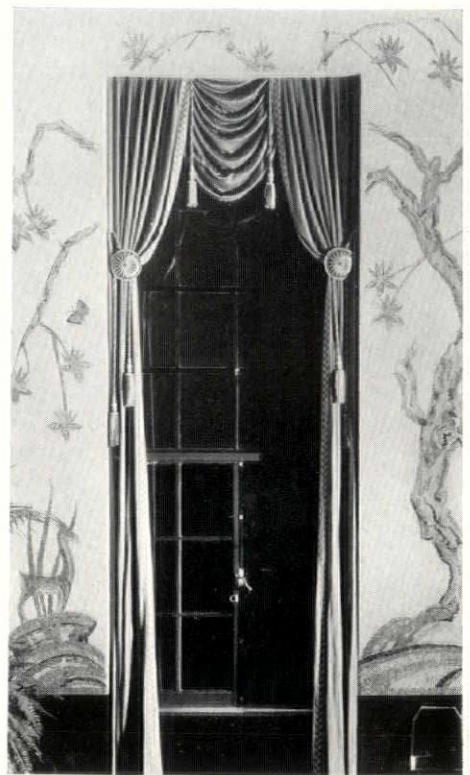
House, New York, N. Y.
Walker & Gillette



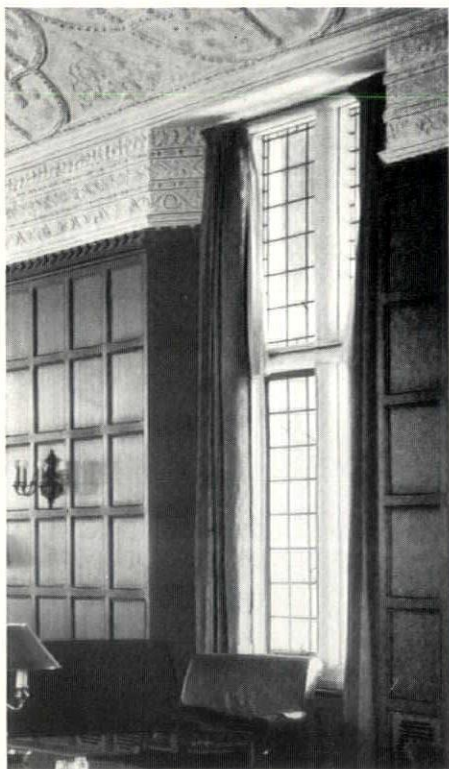
House, Pittsburgh, Pa.
Jules Bouy, designer



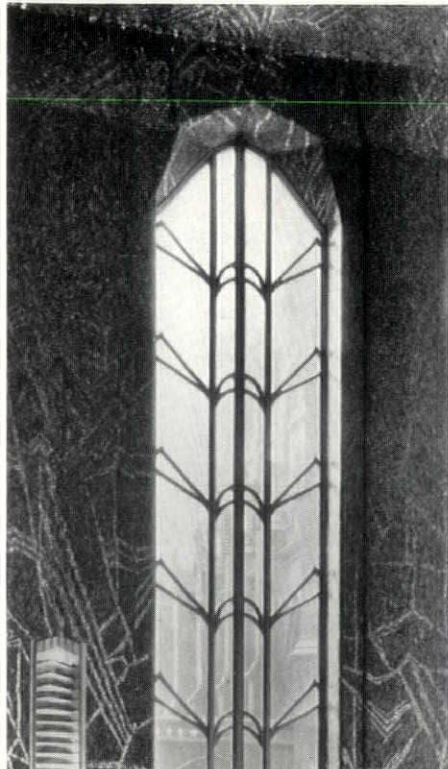
House, Locust Valley, N. Y.
Fuller & Dick



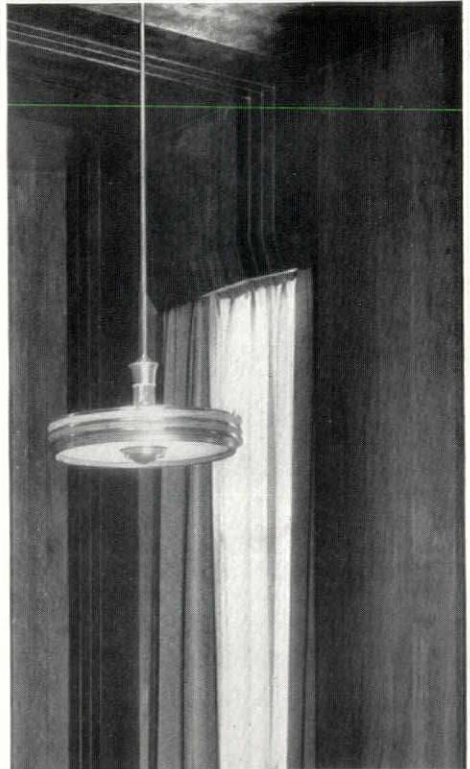
Waldorf-Astoria Hotel, New York, N. Y.
Schultze & Weaver



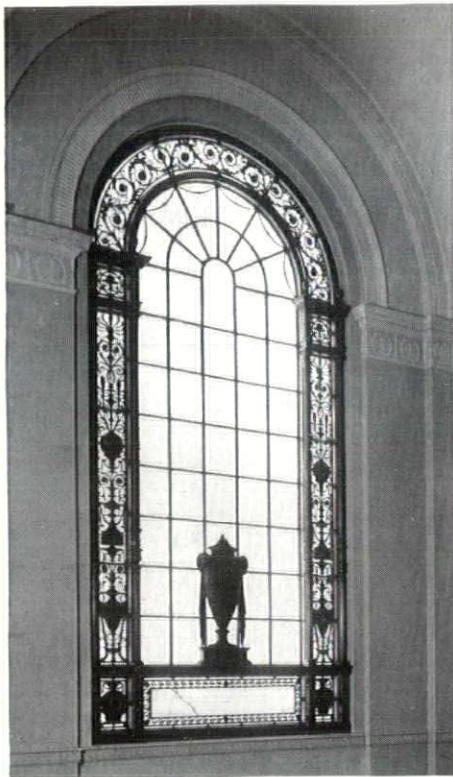
Law Courts Building, Ann Arbor, Mich.
York & Sawyer



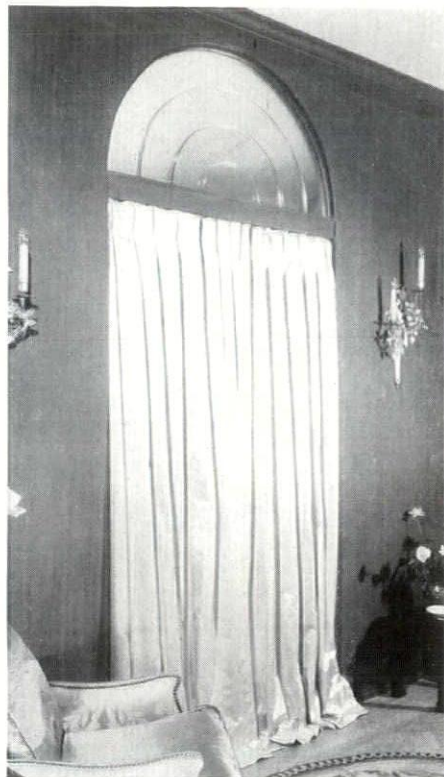
Equitable Trust Building, New York, N. Y.
Voorhees, Gmelin & Walker; Hildreth Meière



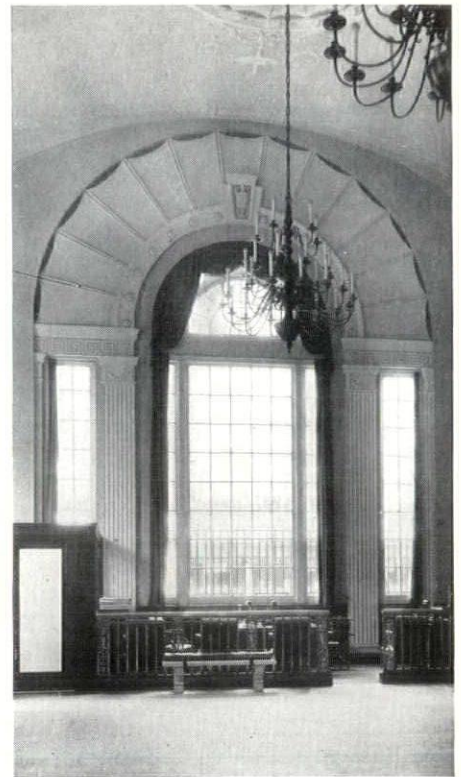
Equitable Trust Building, New York, N. Y.
Voorhees, Gmelin & Walker



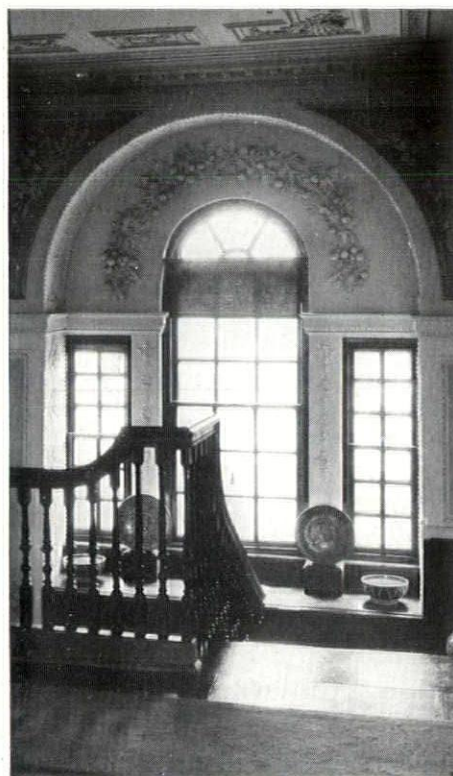
Constitution Hall, Washington, D. C.
Office of John Russell Pope



Pent House Apartment, New York, N. Y.
Nancy McClelland, Inc., decorator



Bank, Lancaster, Pa.
Melvern R. Evans



Harrington House,
Gloucestershire, England



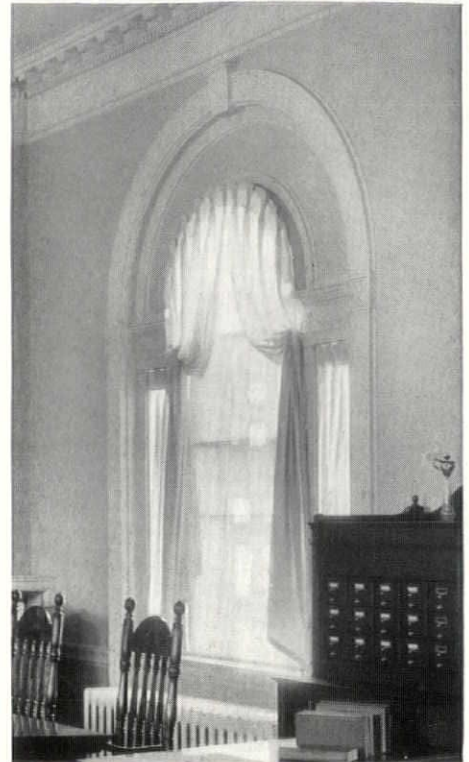
Mount Pleasant, Philadelphia, Pa.
By courtesy of Pennsylvania Museum



United States Trust Company Building,
Newark, N. J. William E. Lehman



Hotel Pennsylvania, New York, N. Y.
McKim, Mead & White



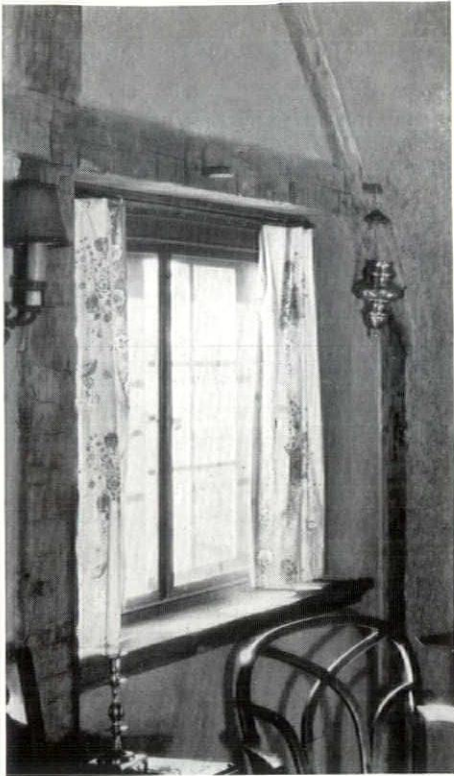
Brewster Public Library, Brewster, N. Y.
Louis E. Jallade



Independence Hall,
Philadelphia, Pa.



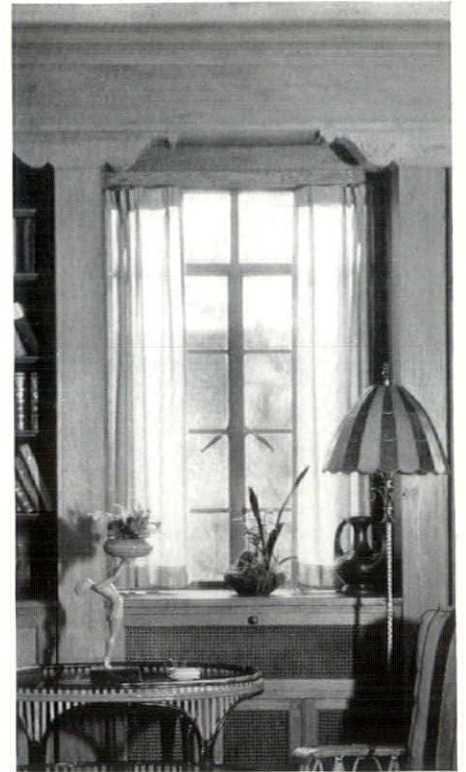
House, Oyster Bay, N. Y.
Office of John Russell Pope; Leonard L. Lock



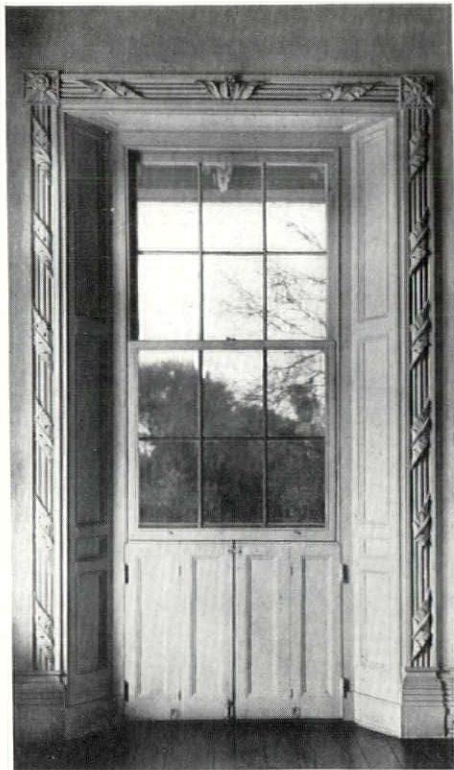
House, Chestnut Hill, Pa.
Walter T. Karcher & Livingston Smith



House, Los Angeles, Calif.
Frank Green



House, New Rochelle, N. Y.
Frederick G. Frost



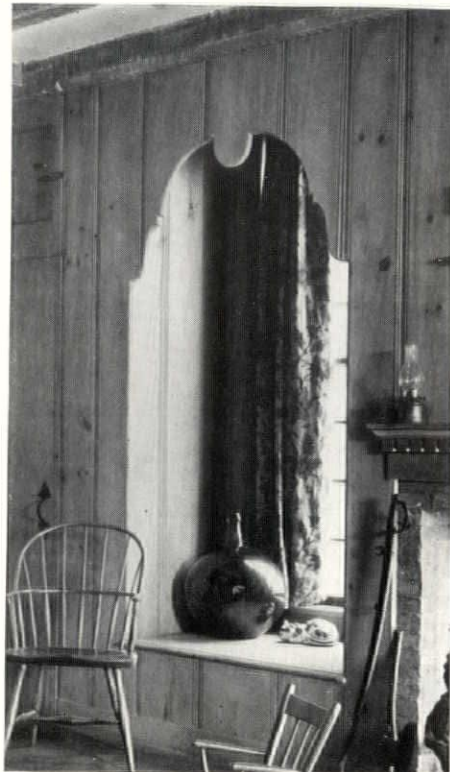
House, New Orleans, La.
Restoration by Armstrong & Koch



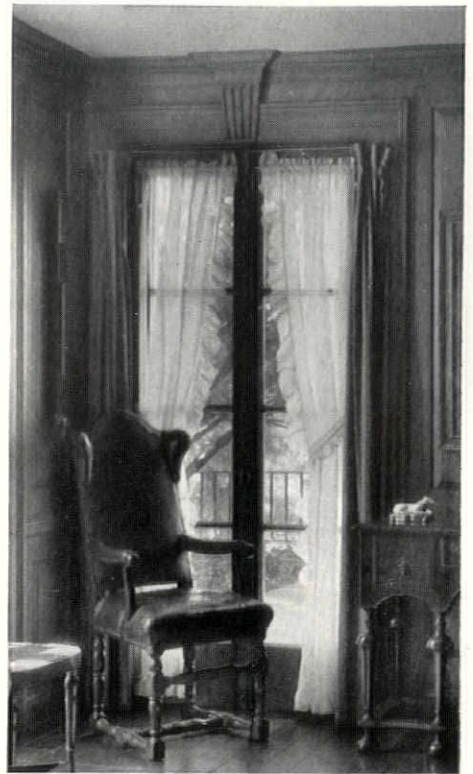
House, Plainfield, N. J.
Arthur G. Nelson, designer



House, Annisquam, Mass.
Rayne Adams



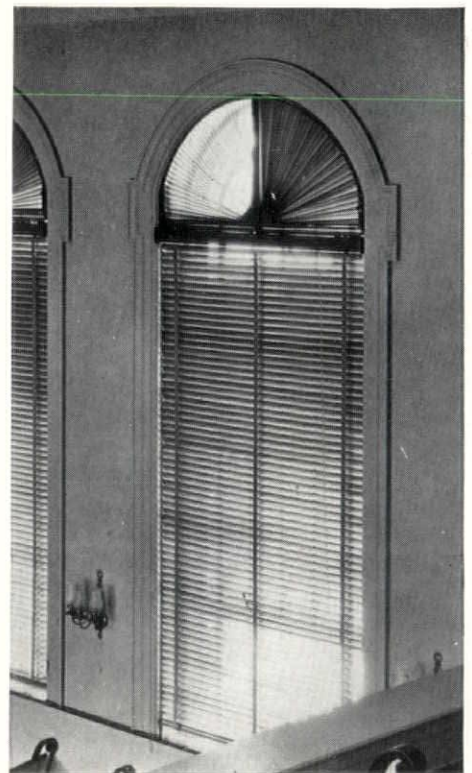
Studio, Cleveland, Ohio
Philip L. Small, Inc.



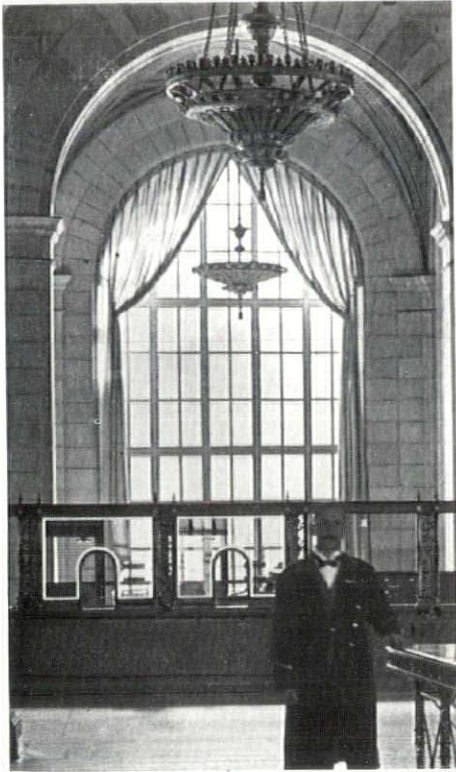
House, Brookville, N. Y.
Bottomley, Wagner & White



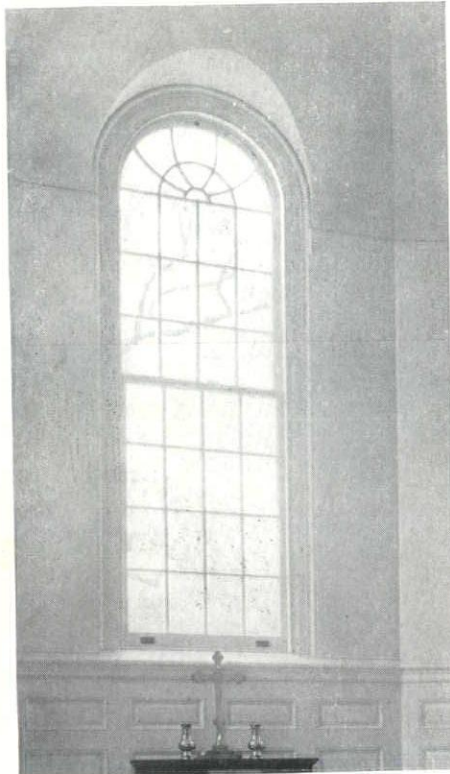
House, New Canaan, Conn.
Alfred Mausoff



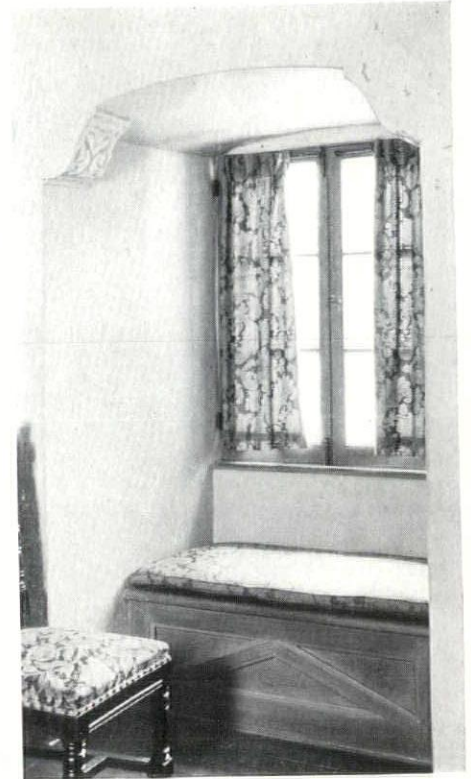
First Church of Christ, Ardmore, Pa.
Davis, Dunlap & Barney



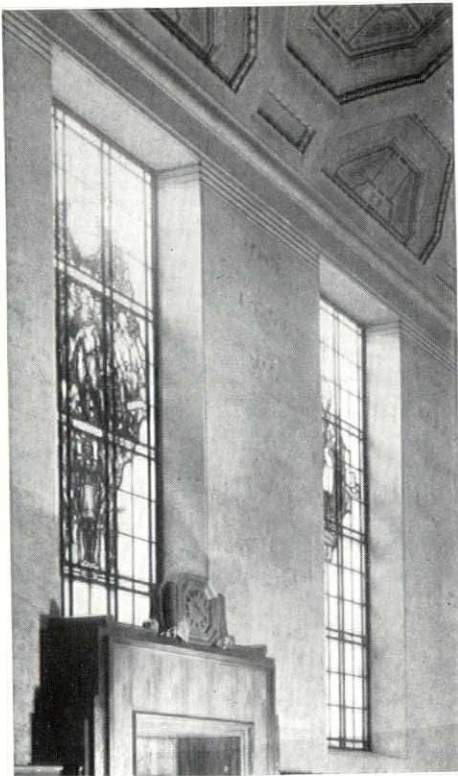
Royal Bank of Canada, Montreal
York & Sawyer



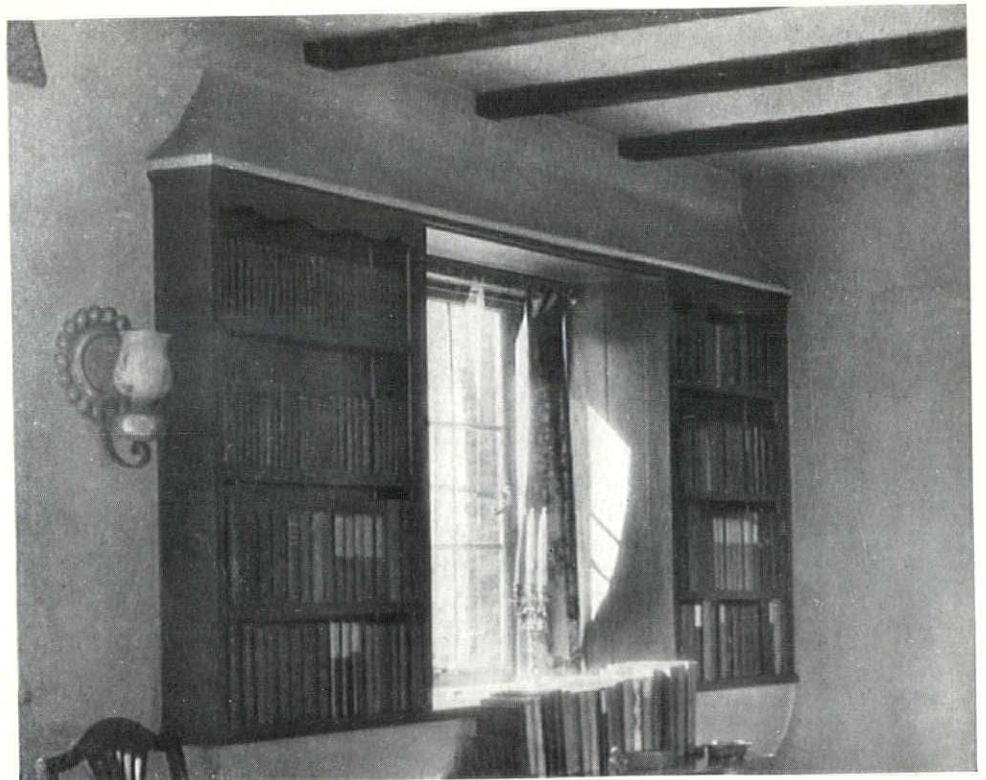
Society for Relief of Destitute Blind,
New York, N. Y. M. L. & H. G. Emery



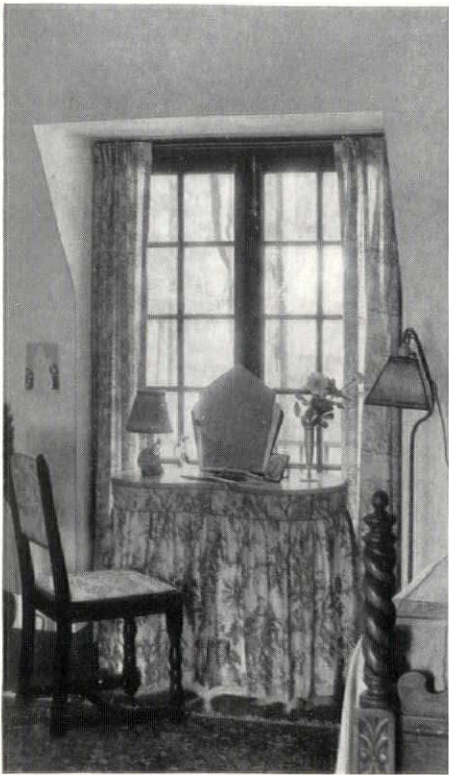
House, Los Angeles, Calif.
Marshall P. Wilkinson



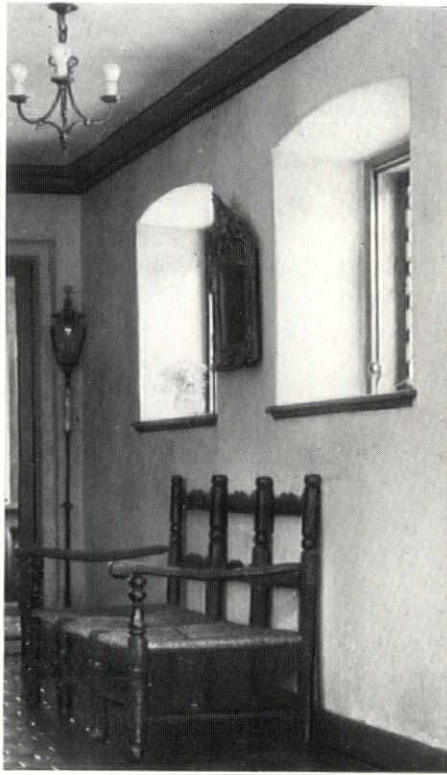
Indiana State Library and Historical Building,
Indianapolis. Pierre & Wright



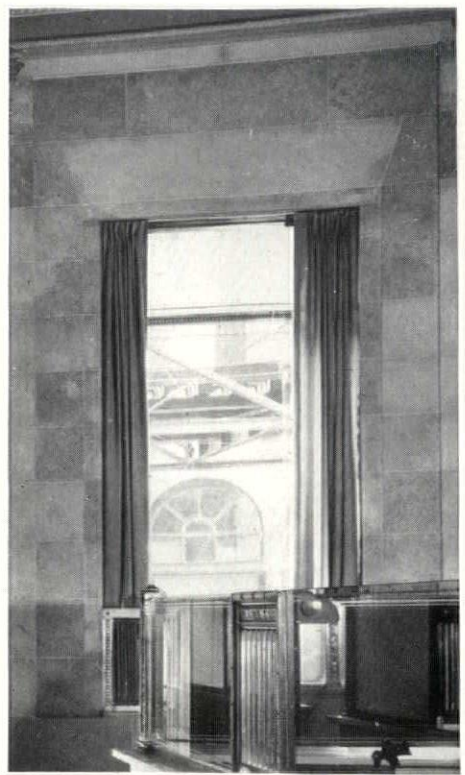
House, Hackensack, N. J.
Wesley Sherwood Bessell



House, Bronxville, N. Y.
Perry M. Duncan and C. Cabell Garrett



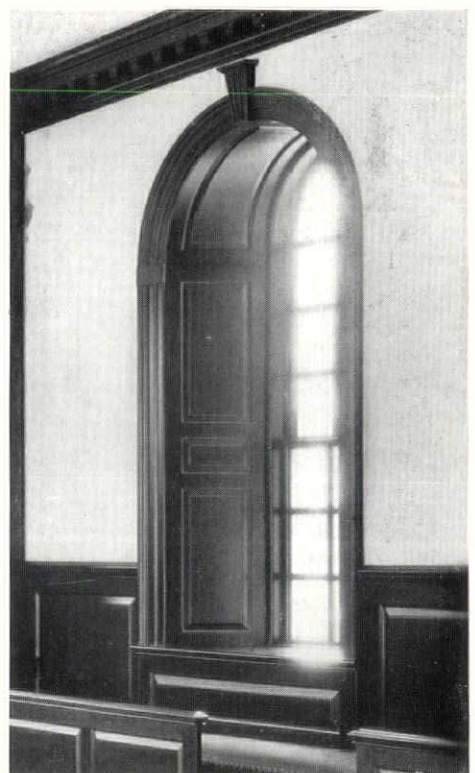
House, Brooklyn, N. Y.
Frank J. Forster; R. A. Gallimore



Central Hanover Bank & Trust Company,
New York, N. Y. George F. Pelham



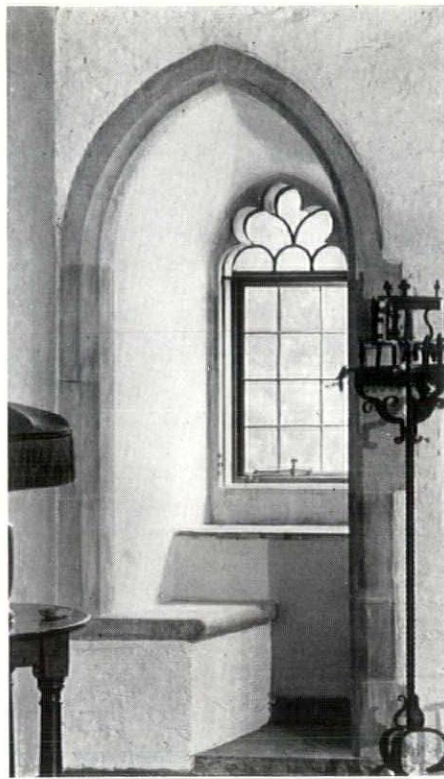
House, Hackensack, N. J.
Wesley Sherwood Bessell



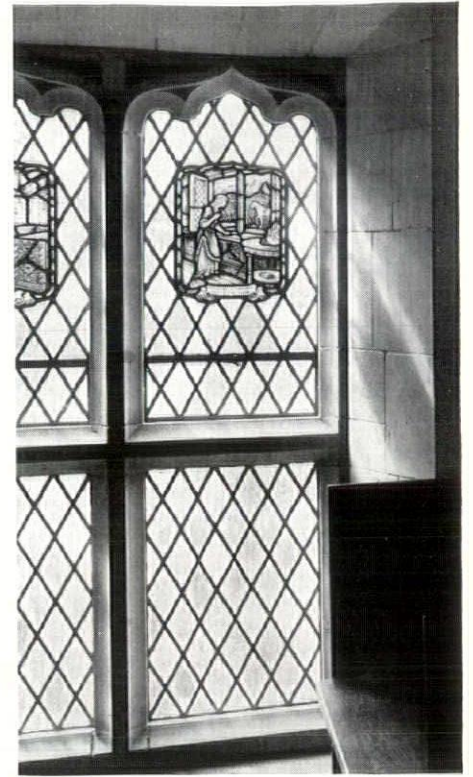
Capitol, Williamsburg, Virginia
Restoration by Perry, Shaw & Hepburn



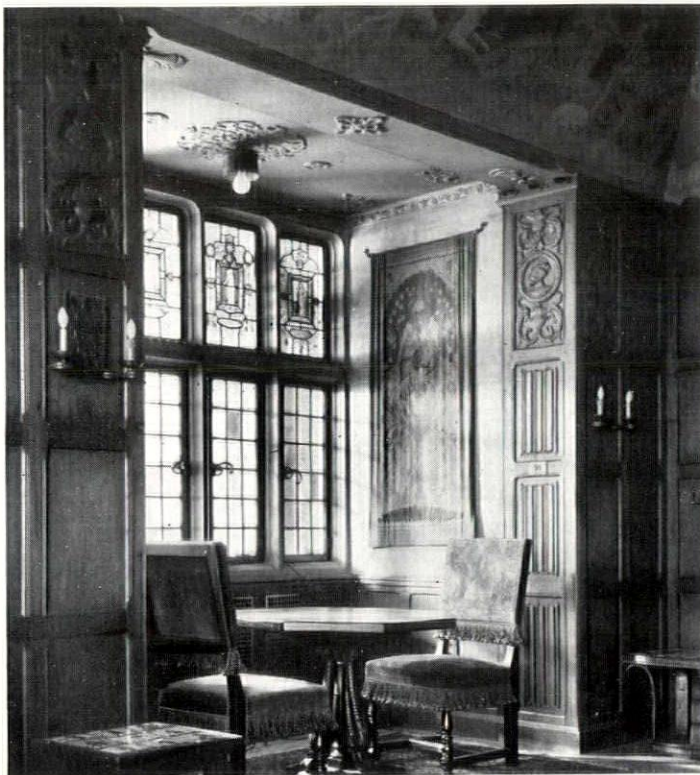
Harkness Quadrangle, New Haven, Conn.
James Gamble Rogers



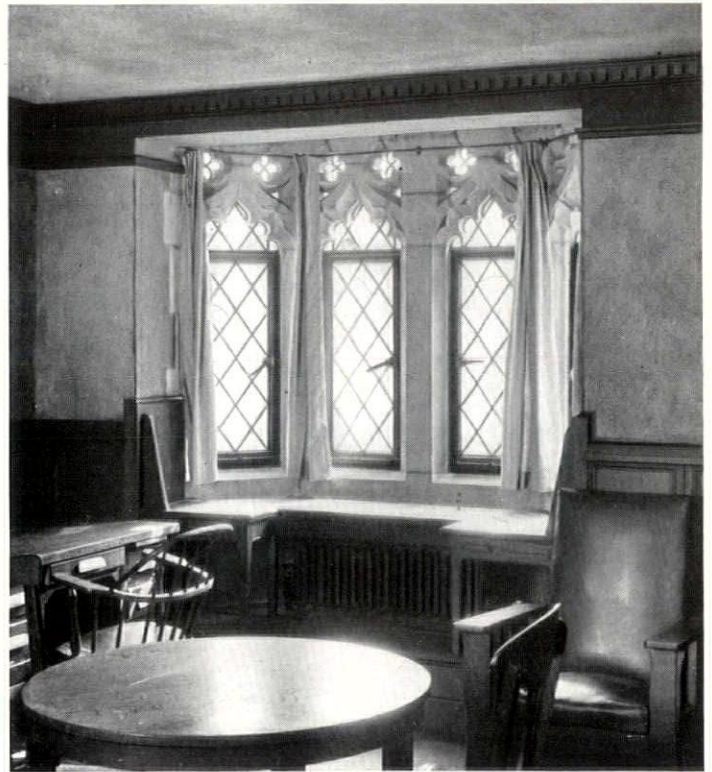
House, New Brunswick, N. J.
Thomas H. Ellett



House, Pasadena, Calif.
Paul R. Williams



Penthouse Apartment,
New York, N. Y.



Harkness Quadrangle, New Haven, Conn.
James Gamble Rogers

MODERN PLUMBING PRACTICE

PART II—WATER AND WATER DISTRIBUTION SYSTEMS

The first part of this article dealt with Drainage Systems and was published in the June issue of this magazine. "Modern Plumbing Practice"—Number 22 in the current series of Reference Data—has been compiled from a variety of authoritative technical sources and prepared in consultation with August E. Hansen, Consulting Engineer. The section dealing with "Water Characteristics," published herewith, was developed in additional consultation with Fletcher Collins of the Wrought Iron Pipe Association, Carter S. Cole of the Copper and Brass Research Association and Henry L. Shuldener of the Water Service Laboratories, Inc., to whom cordial acknowledgment is made.

BY ROGER WADE SHERMAN

Technical Editor, American Architect and Architecture

WHEN concerned with the water supply system within any building, the architect has to deal with a double problem, or—more accurately—with two problems that are closely related in practice. One involves the piping system, the connections, valves, tanks, pumps and whatever other means may be necessary to convey water from the house main to the various fixtures where it will be used. The other concerns the type of water that is to be conveyed and implies the necessity of its conditioning or an adjustment of the mechanical equipment to insure economical and efficient operation throughout the life of the structure.

The separation of these two problems is not academic. In all sections of the country water supply systems apparently adequate in every mechanical detail have been ruined by extensive pipe corrosion or have been clogged because of chemical deposits in pipes and valves. No estimate of the extent of such damage is known. But it must run well into the millions of dollars, most of which might well have been saved by gearing the mechanics of distribution to the kind of water at hand or by adjusting the characteristics of the water itself to prevent the otherwise inevitable damage to the system.

Well-recognized is the fact that the design of a water supply system involves adherence to stabilized methods of engineering which adjust calculations based on physical laws in terms of practical experience. But chemical laws that govern what may be called the "behavior characteristics" of water seem much less well established in the professional mind. This may be due partly to the fact that only within recent years have the problems of corrosion and water conditioning approached a reasonable solution from the scientist's point of view. In part, also it may be due to the vast amount of controversy and apparent contradiction that beclouds the subject. Whatever the reason, the fact remains that the characteristics of water have a vital effect upon the mechanics of its distribution. Thus, a study of water itself becomes basically important as a factor in even the preliminary selection of the proper distribution equipment.

This article, then, can be naturally divided into three general parts: First, The Characteristics of Water; second, Cold Water Distribution Systems; and third, Hot Water Distribution Systems.

CHARACTERISTICS OF WATER

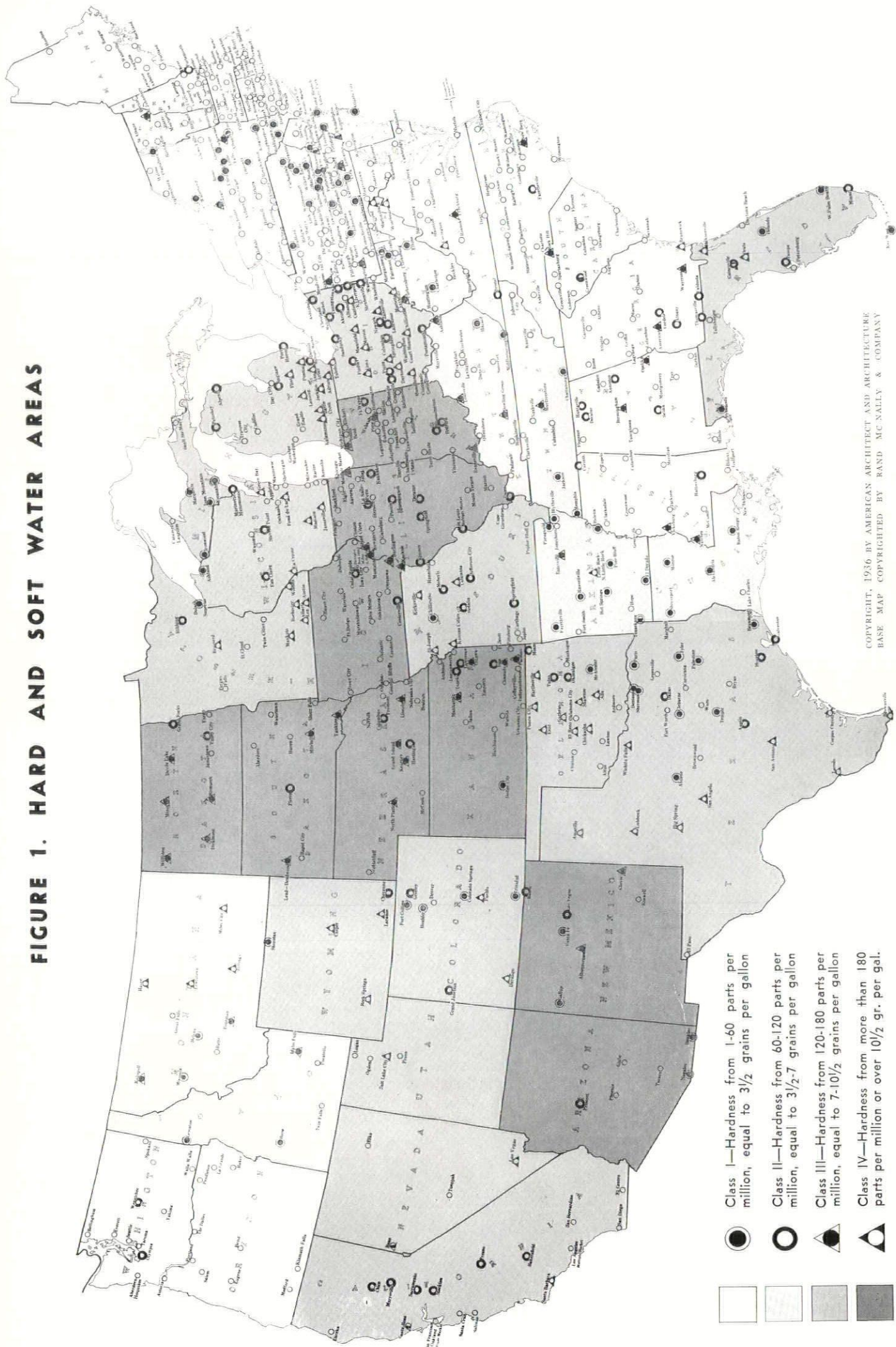
AS any schoolboy knows, water is a chemical combination of hydrogen and oxygen. Pure water is nothing else. But pure water is a laboratory product which is never found in nature. In both public and private supplies water may have come from various sources and carry in solution a variety of acids, bases, metals and metallic compounds in addition to oxygen, carbon dioxide, chlorine and sometimes fluorine and nitrogen. It may be potable so far as being free from those bacteria that are harmful to the human organism. But in no sense can it be called "pure"; and its suitability for industrial or domestic uses depends largely upon the relative proportions of the chemicals carried in solution.

Hard water contains varying proportions of calcium or magnesium compounds. Water hardness is spoken of as "temporary hardness" and "permanent hardness." The first occurs when the water contains a dissolved salt all of which precipitates when the water is boiled. Thus, calcium bicarbonate, $(Ca(HCO_3)_2)$ which is soluble in large amounts and is found in natural—untreated—waters, is a temporary hardness compound. When the water is heated, the compound breaks up into calcium carbonate $(CaCO_3)$ which is insoluble except in minute quantities, carbon dioxide (CO_2) and water, (H_2O) . Much of the calcium carbonate precipitates and the little remaining in solution contributes to the permanent hardness characteristic of the water.









Total hardness of water includes both temporary and permanent hardness. The latter consists principally of sulphates, chlorides and nitrates of calcium and magnesium. Magnesium carbonate $(MgCO_3)$ is contained in most natural waters and is found in combination with carbon dioxide. Like calcium carbonate, it precipitates when heat is applied to a solution. Generally speaking, the effect of hardness upon plumbing and heating equipment is much the same whether due to the presence of carbonates, sulphates or chlorides of calcium or magnesium. Therefore the water conditioning engineer usually expresses water hardness in terms of calcium carbonate.

It has been found that the total hardness of water is proportionately related to the amount of soap that will be destroyed by calcium and magnesium in the water. Thus, a

FIGURE 1. HARD AND SOFT WATER AREAS



COPYRIGHT, 1936 BY AMERICAN ARCHITECT AND ARCHITECTURE
 BASE MAP COPYRIGHTED BY RAND MC NALLY & COMPANY

- 

 Class I—Hardness from 1-60 parts per million, equal to 3½ grains per gallon
- 

 Class II—Hardness from 60-120 parts per million, equal to 3½-7 grains per gallon
- 

 Class III—Hardness from 120-180 parts per million, equal to 7-10½ grains per gallon
- 

 Class IV—Hardness from more than 180 parts per million or over 10½ gr. per gal.

There are two classes of water supplies, ground or well waters and surface waters. Ground waters are generally hard. Surface waters are generally soft. However, either type may be aggressive depending upon the proportion of various chemicals carried in solution. Shown on this map is the distribution of hard and soft water areas by states.

The prevailing condition in each state is indicated by shading, but when water hardness in cities varies from the general condition it is indicated by individual symbols. Information was compiled by the Marketing Division of Hearst Magazines Inc., from data contained in the U. S. Geological Survey and reports from individual cities.

soap solution containing a given quantity of soap can be used to measure the comparative hardness of waters, which, for purposes of analysis can then be expressed in terms of the standard, CaCO_3 , regardless of the calcium or magnesium compounds actually present. Each 1,000 grains of hardness in water will destroy $1\frac{1}{2}$ lbs. of soap, forming insoluble, sticky curds of calcium or magnesium precipitates.

Soft water is characterized by the comparative absence of calcium or magnesium compounds. Soap lathers freely in it. However, it may contain relatively large amounts of iron and free carbon dioxide. Soft water is popularly regarded as preferable to water containing any appreciable hardness. But in most instances it is an aggressive agent of pipe corrosion.

Aggressive water is the chemist's general term for a water that corrodes pipe materials. Contrary to a widespread belief, no metal ordinarily used for water supply pipe within a building is proof against some corrosion from certain kinds of waters.

Generally speaking, waters are aggressive because of chemical reactions between the dissolved compounds, the absorbed gases and the metal walls of pipe. An electrolytic action develops in which microscopic electric cells are formed. In the normal process of polarization the pipe metal is corroded, the extent of corrosion depending upon the electrolytic properties of the water and the kind of metal of which the pipe is made.

Evidently the degree of aggressiveness is not a simple thing to determine. From the standpoint of a water analysis it involves chiefly the alkalinity, the concentration of dissolved mineral compounds, the extent of free carbon dioxide and the pH value.

The pH value expresses the extent of hydrogen ion concentration, and, therefore, the acidity of the water. Chemically pure water, or "neutral" water, is said to have a pH value of 7. This means that in 10,000,000 liters of the water there is one gram of free ionic hydrogen, the figure 7 being a logarithmic expression of this proportion. The greater the concentration of hydrogen ions, the more acid the water and the lower is the pH value. Conversely, the smaller the hydrogen ion concentration, the more alkaline is the solution and the higher is the pH value.

Because the hardness of water is usually a factor controlling alkalinity, soft waters often have a low pH value and are usually aggressive. However, not all soft waters will corrode all kinds of pipe, nor will all pipe be immune from corrosion due to the action of comparatively hard waters. Depending upon the nature of the chemical compounds held in solution, waters with comparatively high concentrations of calcium and magnesium hardness may have aggressive characteristics under certain conditions of use.

Without regard to the acidity or alkalinity of a water, a precipitation of calcium or magnesium carbonate that adheres to the pipe wall acts as a definite protection to the metal. By lining the pipe the carbonate forms a sort of buffer between the water and the pipe wall and thus protects the metal against corrosion. A very soft water with a pH value of 8 is more corrosive to pipe material than a fairly hard water with a pH value of 7, because the carbonate concentration in the soft water is not sufficient to precipitate and

form a protective buffer against corrosion on the pipe wall.

Obviously, then, there are two main characteristics of water that influence pipe corrosion. One is the acidity which is a direct cause of corrosion. The other is the extent of hardness which may or may not produce a buffer as a protection against corrosion. If it were possible to dispose of the corrosion problem in a sentence, the general statement might be made that the balance between the acidity of a water and the mechanical protection afforded by precipitation of carbonate hardness as a buffer is the factor which determines whether or not a given water will readily corrode a plumbing line.

Colored water is rarely encountered in a public supply before it is distributed within the building. Certain untreated private supplies may produce colored water, however. The color may range from a slight amber to a dull, turbid brown, the latter being more pronounced after the water has been exposed to the air. Color of this sort indicates the presence of an undesirable proportion of organic matter or iron which must be removed by aeration and filtration or some other accepted means of treatment before the water can be safely used.

If the water has no appreciable iron content, colored water from pipes within a building is a certain indication that corrosion is under way in supply lines. In the case of iron or steel pipes the color may range from light tan to deep red brown depending upon the extent of the corrosion. Very soft, natural waters high in free carbon dioxide occasionally pick up minute quantities of copper from copper and brass pipe which may stain fixtures, or, in rare cases, may cause the water to appear pale blue. None of these conditions, however, constitute a danger to the health of the building's occupants.

The remedy is to install the kind of pipe that will not be sufficiently corroded to deliver colored water. Otherwise the recourse is to treat the water by the addition of lime or a silicate or some other ingredient to form a protective coating on pipe walls. It may also be possible to raise the pH value of the water, thus bringing about an alkaline solution. Faced with such a condition, the wise architect will secure the advice of a competent water conditioning engineer.

WATER ANALYSES

Before any selection whatever is made for the materials of the plumbing system, the condition of the water supply should be studied in terms of a conclusive analysis. In every case involving development of a private supply the analysis should include a bacteriological examination, as well as the necessary qualitative and quantitative analysis.

Potability is a characteristic that gives no indication that water will prove suitable for certain uses or that certain characteristics will not develop corrosion or clogging of pipes and thus a premature failure of the entire plumbing system.

Behavior characteristics of water are largely controlled by the following:

A. Total Hardness. This is calculated and expressed in terms of calcium carbonate (CaCO_3) parts per million (ppm.) or in grains per U. S. gallon (grs. per gal.) and indicates the concentration of both calcium and magnesium compounds.

B. Alkalinity. This also is expressed as calcium carbonate ppm. This is usually determined by adding methyl-orange to a sample of water and measuring the amount of standard acid solution necessary to neutralize the sample. *Basicity* and *causticity* are also usually determined as subdivisions of the water's alkalinity. The former is determined by testing with phenolphthalein as an indicator. Both are expressed as calcium carbonate in ppm. or grs. per gal. They rarely are encountered in potable waters.

C. Free Carbon Dioxide. An extremely important part of the analysis. It combines with water, particularly when heat is applied to produce carbonic acid which directly attacks metal. The action is accelerated in the presence of oxygen which is usually carried to some extent by most potable waters.

D. Chlorides, Sulphates and Iron. The presence of chlorine or sulphur compounds not only produce distinctive—and to most people unpleasant—taste in water, but may also contribute to its corrosive properties. However, concentrations below 10 ppm. of chlorine and 20 ppm. of sulphur compounds are usually not considered excessive from this standpoint. Iron in solution tends to accelerate corrosion of iron and steel pipe and its presence in excess of .3 ppm. is considered unsatisfactory. Potable water should not contain more than 0.1 ppm. of lead according to standards of the U. S. Public Health Service.

E. pH Value. As stated, this indicates the acidity of the water and as such is a most important part of the water analysis. Generally speaking, waters with low alkalinities (relatively small concentrations of hardness) and high carbon dioxide contents have low pH values and *vice-versa*.

F. Turbidity and Color. These two factors are tested in relation to established color scales and are rated in numerical terms. A satisfactory water will have a turbidity of 10 or less, although 5 is to be preferred. Color should not exceed 20, with a rating under 10 desirable.

G. Total Solids. Concentrations of those solids already mentioned and others which may be present are calculated for this figure which is shown in ppm. or grs. per gal. A natural water satisfactory for drinking purposes should indicate a total solid concentration not exceeding 1000 ppm. (U. S. Public Health Service Standard). For many industrial uses the figure should be much smaller. Silica, or sand, organic matter of various kinds, phosphates and alumina may all be present in the total solid concentration, but have little action of a corrosive or scale-forming nature.

TYPES OF WATER

There exists an infinite variation of water from the standpoint of analysis. And for this reason no conclusive or even satisfactory classification of waters can be attempted for the purpose of anticipating the effects of water upon the materials used in building plumbing systems.

This statement springs from the fact that waters contain so many constituents that may act singly or in combination as agents of pipe corrosion. If water hardness were the chief villain in the piece, classification would be a simple matter. Or if the concentration of carbon dioxide alone were the prime factor, corrosion might, perhaps, be charted with

reasonable safety. But the relative concentrations of these two constituents are of importance. Equally important is the presence of other chemicals, to say nothing of the effect of temperature upon them.

Because of all this, it is difficult to state generally with any degree of accuracy what effect waters will have upon the various kinds of pipe that are available for use in buildings. There exists, in this field, a paucity of authoritative information applicable except in specific cases. Most of what the architect hears regarding the relative corrodibility of plumbing materials is probably true, so far as reflecting a set of a circumstances involved. But, when water is the agent of corrosion, it is also true that a fact proven under one set of conditions may become a falsehood when applied in all sincerity to another set.

The force of this can be shown by example. The water supplies of New York City and of Garden City, Long Island, have a total hardness of approximately 25 ppm. Temporary hardness content is negligible. In New York a certain kind of pipe has stood up well; in Garden City the same kind of pipe fails by corrosion within six to eight years. New York water, which comes from lakes, has a low carbon dioxide content. Garden City water, coming from wells, has a high carbon dioxide concentration. In this case the difference in carbon dioxide concentration is probably the reason for the corrosive violence of Garden City water, but this is not conclusive since there is practically never any one cause for corrosion.

Examples of this type could be cited in cases throughout the country. To solve the problem that it illustrates, the architect has but one course of action which involves two essentials. First, let him study carefully the analysis of the water which is to be used and determine as far as possible the pattern of its chemical character. Then let him investigate the history of these characteristics as told by the condition of plumbing installations in the neighborhood. Thus fortified he can attempt to sift conflicting claims for plumbing materials and equipment and make his selection upon a reasonably safe basis.

Three examples of water analyses will typify the information which an analysis presents. Figures are in ppm.

	No. 1	No. 2	No. 3
Total hardness.....	125.6	19.5	65.
Permanent hardness.....	56.4	18.2	62.
pH value.....	8.2	7.6	6.2
Carbon Dioxide.....	0.0	2.2	4.4
Alkalinity.....	111.	15.	8.5
Basicity.....	4.5	0.0	0.0
Calcium.....	31.3	5.0	15.9
Magnesium.....	11.5	1.2	4.4
Chlorides.....	6.5	3.0	11.3
Sulphates.....	13.0	6.8	53.9

The first of these is a relatively hard water, typical of some major water supplies in the Middle Western states. It is practically non-corrosive and would probably form a slight protective coating on pipes. In hot water lines this might become extensive in time and require cleaning. However, both ferrous and non-ferrous pipes could be safely used with it, so far as corrosion is concerned.

The second water is a comparatively soft water, not far

removed from neutral. In waters of this sort, ferrous pipe rusts quickly. But non-ferrous pipe can safely be used with it, although slight corrosion might take place with non-ferrous alloys.

The third analysis is an aggressive, acid water that will corrode ferrous pipes and those of non-ferrous alloys. However, pipes of copper or red brass would prove satisfactory.

Classification according to hardness only has been attempted in part by the U. S. Geological Survey upon which was based the hard-and-soft water map shown on page 82. However, such a hardness classification serves merely as an indication that softening may be necessary with certain waters. Even then it gives information only regarding the total hardness and therefore is not a safe basis upon which to select material. Thus a comment regarding the classes of hardness is in order.

Class I—Hardness of 1-60 ppm. This includes waters with average hardness of less than $3\frac{1}{3}$ grains per gallon* which can be termed "soft." In ordinary use the carbonate content will not be noticed. However, such waters are usually aggressive, particularly since no precipitation will take place in natural waters of this type. If the pH value is much below 7.5 the water will be dangerously corrosive to almost any pipe material but red brass or copper. Even these materials might be affected if the carbon dioxide content were abnormally high.

Class II—Hardness of 61-120 ppm. This represents an average hardness of $3\frac{1}{2}$ to 7 grs. per gal. which is noticeable in ordinary usage although it may not cause difficulty from excessive precipitation. In general, such waters are not very corrosive if the pH value is above 7 and if the hardness is of the carbonate type. However, if the hardness is caused by sulphates, a water of this concentration would probably be corrosive even with a pH value of 7.5. Conditions similar to this are evidenced in Pittsburgh, Pa., where the water corrodes hot water pipes of both ferrous and non-ferrous materials.

Class III—Hardness of 120-180 ppm. Waters with an average hardness of 7 to $10\frac{1}{2}$ grs. per gal. are objectionable to those who are used to soft waters. For most industrial uses they require softening. With a high percentage of carbonates such waters would probably not be corrosive. But this cannot be stated positively, since so many other factors enter into the equation. There are cases on record in which a water hard enough to block $1\frac{1}{2}$ in. hot water lines completely in 12 years corroded pipes to failure beneath the deposit.

Class IV—Hardness of more than 180 ppm. An average hardness of more than $10\frac{1}{2}$ grs. per gal. cannot be ignored. Water should be softened for almost any purpose. If the proportion of temporary hardness is high, water of this kind probably would not be destructive to plumbing systems as far as corrosion was concerned. But the danger of clogging pipes of both hot and cold water lines would be present. If, on the other hand, the water contained high percentages of sulphates and chlorides of calcium and magnesium compounds

that constitute permanent hardness—the water would be corrosive to most pipe, whatever its pH value or carbon dioxide concentration. In the latter case water would have a brackish character approaching the salinity of a sea water.

WATER CONDITIONING

From the foregoing it is evident that adjustment of water characteristics is an operation which may be fraught with much uncertainty. Given a detailed knowledge of the water by analysis and an historical background of its behavior in local use, a limited number of expedients can be employed to approach a desirable balance between acidity and temporary hardness. Two general types of conditioning exist. The first constitutes an attempt to limit the corrosiveness of soft, aggressive waters. The second involves methods of softening water by removal of temporary hardness.

Limiting corrosion is partly a mechanical and partly a chemical operation. The mechanical part involves the selection of plumbing materials upon which the water of the locality will have little corrosive effect. All kinds of pipe have proved satisfactory under certain conditions of use. In general terms the corrodibility of metallic pipes can be stated. But local experience may not conform to any theoretical pattern. Thus, the usual water analysis may often serve only as a guide to interpret the history of water behavior which is characteristic of the locality.

Another important rule of thumb for selection of materials is this: Fittings should be metal of the same type as the pipes. Galvanic action may cause pipe corrosion in any water. In aggressive waters the action is accelerated; and early failure from corrosion is quite likely to occur wherever metals of different types contact one another in lines carrying aggressive water.

From the chemical point of view, corrosion can be limited somewhat by adjusting the proportions of the chemicals dissolved in water. For example, a comparatively soft water with a high concentration of carbon dioxide may be very aggressive even with a pH value above 7. By passing the water through a bed of marble chips, or limestone the carbon dioxide content can be lowered and the carbonate hardness somewhat increased.

For treatment of domestic water supplies, this process is practical but seldom used. Carbon dioxide can be dissipated to a large degree by aeration, a practical means when conditions allow employment of a fountain or spray pond and the installation of necessary pumping machinery. Much more widely adaptable is the use of sodium silicate preparations which combine with the carbonic acid and also have a tendency to form a film on pipe walls that affords a degree of protection. Liquid sodium silicate is fed into the water in minute amounts which are automatically proportioned to the water flow. For hot water alone, lumps of solid sodium silicate have been used with some success. The lumps are placed in a tank through which the hot water flows.

Water softening to meet individual requirements is most effectively done by units employing the base exchange system. Water is run through natural or artificial zeolite, a substance that contains sodium. During the process the calcium and magnesium bases of the hard compounds are replaced, or exchanged, by the sodium in the zeolite. The resulting com-

*Hardness of water is expressed in terms of parts per million (ppm.) or in grains per gallon (grs. per gal.). There are 17.1 ppm. to each 1 grain per U. S. gallon. Conversely, .058 grains per gallon equal 1 ppm.

pounds are not hard in effect and a "zero hardness" in the water is the result. In time the effectiveness of the zeolite is impaired and regeneration is accomplished by back-washing with a solution of ordinary salt, sodium chloride.

With certain types of waters there is a danger in producing a zero hardness. Many waters hard enough to require zeolite softening are also corrosive in varying degrees. As already indicated a certain amount of hardness constitutes a "buffer" between pipe metal and water when precipitated on pipe walls. Complete softening removes the possibility of a buffer formation and thus allows free rein to whatever corrosive elements may be carried in the water. The zeolite itself does not corrode pipes; and the treatment can be adjusted when necessary by the addition of sodium silicate.

No positive recommendations can be given regarding the need for conditioning water or the means for doing so in the absence of complete information on all factors that make up a given situation. And even then methods can be suggested only from the background of engineering experience in water conditioning practice. Brilliant results have been achieved in this field. But it is still largely an empirical science. And the engineer can recommend no specific cure until he has accurately diagnosed what may be an obscure and complicated water malady.

CORROSION OF PIPE MATERIALS

As indicated, corrosion is galvanic action which may occur in any type of water and which may be accelerated by an almost unlimited number of chemicals which may be held in solution. In practice it can be controlled within certain limits by suitable water treatment. Insurance against damage to the plumbing system also involves selection of pipe that will be least subject to the corrosive effects of the water at hand. The architect's best guide to safe practice in this particular is the history of local conditions. This article can only touch highlights of a problem the solution of which teems with technical complications and is surrounded with apparent contradictions of experience and testimony.

Coatings of zinc, lead or tin on iron or steel pipe furnish excellent protection until damaged from whatever cause. Then however, corrosion of the pipe is hastened if the metallic coating is lower in electromotive series than the pipe metal. In a lead-lined iron or steel pipe, for example, the iron will corrode much more rapidly than usual when in contact with the lead if for any reason the lining becomes damaged. Iron will also corrode faster under similar circumstances if lined with tin. A zinc coating, however protects the pipe wall, for any corrosion caused by joining dissimilar metals such as iron or steel and zinc is at the expense of the zinc. In brass pipes the extent and rate of corrosion depends somewhat upon the proportions of zinc in the alloy. Assuming water conditions to be the same, the greater the percentage of zinc, the more extensive will be the corrosion of the brass.

Lead pipe can safely be used to convey water which is not aggressive. In general, this means a water with a pH value well above 7, with a total hardness concentration above 60 ppm, and with a low proportion of permanent hardness. Such water usually forms a slight covering of insoluble carbonate protecting the pipe against corrosion. Soft, aggressive waters are likely to dissolve lead in dangerous quantities.

Copper pipe or tubing and red brass pipe (85% Cu., 15% Zn.) are highly resistant to water corrosion. As stated before very soft, aggressive, natural waters with high concentrations of carbon dioxide will dissolve small amounts of copper from these pipes. But such waters are rarely encountered in public water supplies.

Yellow brass (67% Cu., 33% Zn.) and **Muntz metal** (60% Cu., 40% Zn.) pipes are satisfactory to convey a wide variety of waters. They stand up well when used with soft, mildly aggressive waters with low carbon dioxide content and a high percentage of carbonates in the total hardness. However, many such waters are often far more corrosive hot than cold. While these pipes are satisfactory for many cold water lines, red brass or copper should replace them for the hot. With severely corrosive waters however, yellow brass or Muntz metal pipes will fail from "dezincification."

Galvanized wrought iron and steel may also be satisfactory with a wide range of waters. In cold water lines little damage from corrosion will take place if waters have a total hardness of more than 50 ppm, with a low percentage of permanent hardness, a low carbon dioxide concentration and a pH value ranging about 7 to 7.5. Such waters are not violently corrosive when cold though they may be mildly aggressive depending upon the actual proportion of constituents. When heated however, their corrosive properties are much more pronounced and galvanized wrought iron or steel pipe may quickly be corroded to failure.

Cement-lined pipe is designed particularly for carrying waters of soft, aggressive character. It does give good protection to pipe metal and with many waters having high percentages of permanent hardness but low solid contents, it would probably prove satisfactory.

The danger points in such pipe are at the joints, as far as corrosion is concerned. In cement-lined pipe a chipped lining may expose the metal and thus open the door to quick damage. Use of gaskets such as lead should be discouraged with such pipes, for with the soft waters carried in cement-lined pipe, lead may be dissolved in what may be seriously dangerous proportions.

Galvanized pipe also corrodes more quickly at the joints, partly because the zinc coating may be damaged, partly because the threads have removed part of the pipe wall and partly because the threading process has set up internal stresses in the metal. Corrosion is also hastened in places where threading operations have left small metal burrs which agitate the water as it flows along.

COLD WATER DISTRIBUTION SYSTEMS

Details of any water supply system are based primarily on the required total water consumption per day and upon the necessity of providing minimum operating pressures at plumbing fixtures.

Water consumption is obviously subject to extreme variations. One technical survey of 14 cities gave 130 gallons per person as an average total daily consumption, the figures ranging from 275 gals. in Chicago to 56 gals. in Dallas, Texas. But these figures represent total gross city consumption not applied to particular buildings. Experience has shown the following to be safe, general estimates.

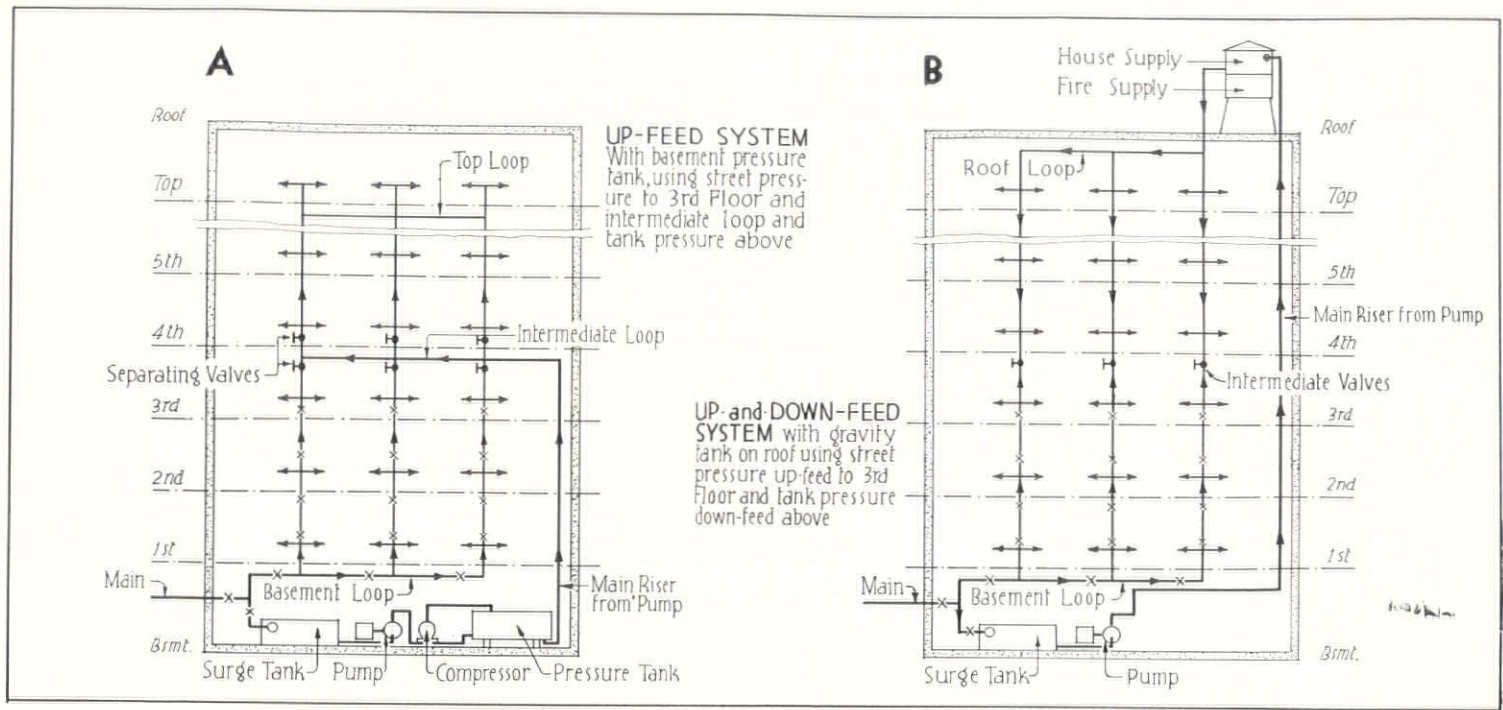


Figure 2. Diagrams showing general methods of distributing cold water

Ordinary residences, total consumption about 50 gals. per day per person.

High class residences or two-family houses, about 100 gals. per day per person.

Apartment house, total daily consumption can be approximated by multiplying the number of bedrooms by 200. This will give the average consumption and a 50 per cent increase should care for the probable maximum peak load. Per person consumption can be figured as about 100 gals. per person.

Office building consumption can be set at an average of 25 gals. per occupant with a probable maximum peak load of 50 per cent additional. An estimate of the probable number of occupants can be made by allowing 125 sq. ft. of floor space per person, exclusive of elevator space, corridors or service areas.

Water storage equipment for cold water supply is rarely a factor in residential work. Tanks are essential for tall city buildings or structures requiring means for raising pressures of street water. In most cities tank capacities need only be calculated on the basis of a 48 hours supply, although in areas subject to great variations in supply systems, a week's storage capacity is considered essential.

Tank sizes can be roughly calculated by the architect by estimating the total requirements of the building for the period involved in terms of average daily consumption per person. This rule-of-thumb is useful as an aid in allocating space necessary for required mechanical equipment. But in all cases involving the necessity of accurate calculations engineering advice should be sought.

Pressure required to operate plumbing fixtures satisfactorily is 15 lbs. per sq. in. for flush valves and 10 lbs. per sq. in. for ball cocks and faucets. These figures refer to actual residual pressures while fixtures are operating and have no

direct relation to static pressures within the system. If static pressure from the street is not sufficient to deliver this operating pressure at the uppermost fixtures in the building, a pressure adjustment must be made by a tank or pump installation of some sort.

Street water pressures range between 15 and 100 lbs. per sq. in. and average about 30 to 50 lbs. per sq. in. Practically, this average is satisfactory for residential requirements, for fixtures operate well up to about 50 lbs. per sq. in. Above that pressure annoying splashing may result accompanied by excessive pipe and fixture noises. Therefore, when the street pressure averages constantly above 50 lbs. a reducing valve should be installed where the main enters the building.

Tanks to raise pressures are of two types—air pressure tanks usually located in the basement, and gravity tanks that must be located about 34 feet above the fixtures on the upper floor to deliver the required 15 lbs. per sq. in. operating pressure for flush valves. A quick method of determining the need for a tank is to multiply the minimum street pressure by 2.3 and subtract 34.5 from the result. The answer will indicate the approximate maximum height of the uppermost fixture above the street main.

Example: Minimum street pressure = 50 lbs. per sq. in.
 1 lb. of pressure = a static head of 2.3 feet
 Minimum operating head for fixture = 15 lbs. \times 2.3 = 34.5 feet.

Therefore $(50 \text{ lbs.} \times 2.3) - 34.5 =$ height of fixture above main or $115. - 34.5 = 70.5$.

Obviously this is useful merely to indicate the necessity of a gravity tank, for the effect of water friction in the pipe is disregarded and the pipe is assumed as a straight run. Air pressure tanks, usually placed in the basement should be sized one-third larger than water requirements demand.

When tanks are used, the house pumps—usually the centrifugal type—are best operated from a surge, or suction

tank, supplied from the city main under an automatic ball float control. If the house pump suction is connected directly to the city line, pressure fluctuations will almost invariably reduce operating efficiency of pumps, may dangerously overload motors at times and may produce excessive noise in discharge lines. However, pump operation is more economical when city pressure is sufficiently constant to permit a direct connection to the main. In any case, where pumps are an essential factor to the building's operation they should be installed in duplicate and designed for automatic alternating operation.

Piping layouts for cold water supply in most residences involve few problems other than those illustrated diagrammatically in Time-Saver Standards Sheet No. 53. The sizes shown assume clean pipes. As such they can safely be followed for the great majority of residential layouts.

Layout problems are by no means so simple in the case of apartment, commercial, or industrial buildings. The economical and efficient sizing of water pipes for both hot and cold water supplies is a matter involving experience with water requirements as determined by the "usage factor" and by the extent of the building. It requires also calculations to establish probable simultaneous and overlapping fixture uses and necessitates the skillful application of friction tables to secure pressure equalization throughout the building. All these are matters for the engineer whose services should be sought early in the planning state of the project.

Three general systems of piping layout are possible when tank installations are necessary. Selection depends upon the extent of the building and upon possibilities of using street pressures.

An Up-Feed System is used when city pressures are deemed sufficiently constant and high, or when a basement pressure tank is used and all piping in the building is under tank pressure. Risers are connected with a bottom loop at the basement ceiling and may be similarly connected at the top. Here, however, the loop should be placed at the ceiling below the highest fixtures so that air accumulations are relieved through the fixtures themselves. Otherwise it may become air-bound.

Up-feed systems may combine street pressure in the lower part of the layout and tank pressure in the upper part when a basement pressure tank is installed. In this case an intermediate loop connects all risers at the height where the city pressure reaches a useful limit. Separating valves are placed on each riser above and below the loop. The lower valves are to separate pressures. The upper set are riser shut-offs in case of emergencies. (See Diagram A, Figure 2).

An Up- and Down-Feed System also uses city pressure in the lower part of the building to the greatest practical height and tank pressure in the upper part. This arrangement is most practical in the case of a gravity tank. Risers are looped at top and bottom and run continuously to the height of the structure. Pressures are separated by intermediate gate valves placed at the level to which the city pressure rises. (See Diagram B, Figure 2).

Water hammer is a phenomenon that may occur in systems when high velocity flows are suddenly stopped by quick-closing valves. It is characterized by noise and a shock through-

out the piping system from suddenly developed pressures that, in recorded instances, have momentarily reached as high as 600 lbs. per sq. inch. It can be relieved by incorporating an air chamber on the supply main on the house side of the meter. In principle this is a pipe capped at the top, and connected through a tee in the main in an upright position. It should be fitted with pet-cocks at top and bottom. Shut-offs should be installed in the main at either side of the tee.

In time water will rise in the chamber because the air will gradually be absorbed. The shut-offs and pet-cocks are essential to permit drainage and to maintain the efficiency of the device. If this cannot be done, it will eventually become as useless as the chambers formed by risers capped some distance above the top-fixture take-off. These top-fixture chambers are enclosed within the wall construction. They cannot be drained and therefore are without practical use, once the air in them has been absorbed. For residential work a 5-foot length of 1½ in. pipe tapped to the supply main is adequate for the entire system.

"Back Siphonage" is primarily due to negative pressures in water supply pipes, acting through fixture valves to siphon the waste contents of fixtures into the water lines. It occurs in rare instances when a low-point water pressure fluctuation coincides with simultaneous and heavy supply demands from a large number of fixtures. But it occurs only in those fixtures the design of which establishes, in such cases, a cross connection between water supply and drainage lines.

"Cross Connections" may be developed through flush valves of toilets or under rim-set spouts on basins or bathtubs when negative pressure in water lines is excessive. Then back siphonage takes place unless the action can be mechanically blocked or prevented by an air relief. Mechanically it can be prevented by setting faucets so the nozzle is above the fixture rim and by the use of flush valves that embody an air valve in their design.

Fundamentally the possibilities of back siphonage and cross connection apparently can be rendered negligible in importance by: (1) Assuring maintenance of adequate and equal pressures in all parts of the systems; (2) Eliminating plumbing accessories that tend to develop cross connections between drainage and water lines. Comparatively little is yet known of the precise remedies for back siphonage beyond what has already been stated. Occurrence of the phenomenon is rare in properly engineered modern buildings. And, except in old and badly overcrowded structures, it appears not to be a generally widespread menace to public health. There have been few recorded instances of its occurrence. But the grave results of these occurrences have placed the problem of cross connection in the limelight of technical concern. Research now under way will, without doubt, determine infallible methods of preventing cross connections and thus will remove the potential danger of water pollution from back siphonage.

HOT WATER DISTRIBUTION SYSTEMS

Estimation of hot water requirements depends largely upon the type of building considered and upon the peak hourly demand as determined by the factor of usage. A common rule of thumb allows from one-quarter to one-third of the total daily water consumption per person for hot water. The peak hourly demand for hot water is usually

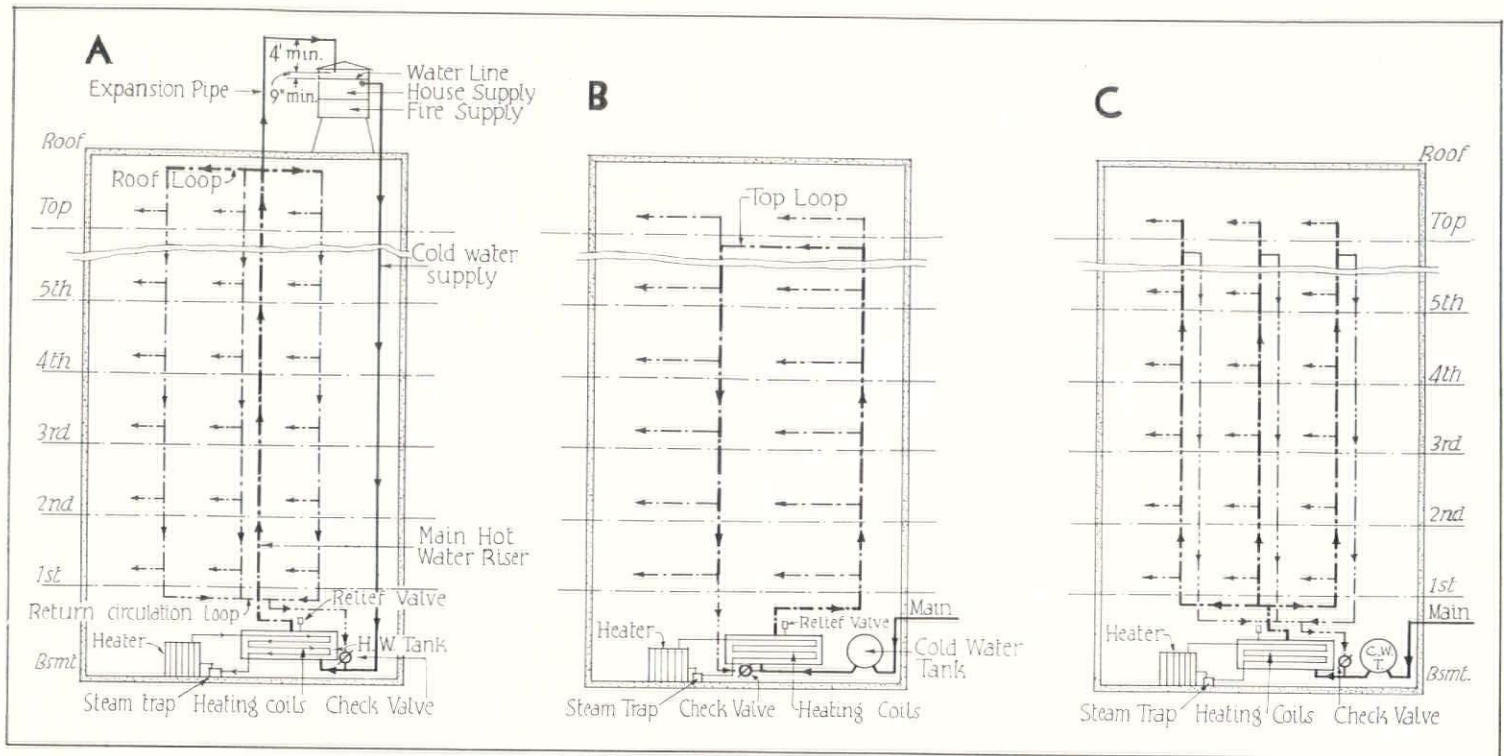


Fig. 3. Diagrams showing hot water distribution with circulating systems

figured at about 10 per cent of the average daily hot water consumption. From this peak hourly demand the additional boiler capacity for heating the water can be determined and also an approximation of hot water storage capacities in view of the total peak demand and the probable extent of its duration.

Detailed accurate calculations vary so widely as applied to various types of building that expert engineering knowledge is required in most cases. Application of rules of thumb and sizes for commonly used storage tanks are shown on Time-Saver Standards Sheet No. 52.

Residential layouts of hot water distribution are indicated in principle on Time-Saver Standards Sheet No. 53. In ordinary small residences it is not always necessary to install a circulating hot water distribution system, for pipe runs are short and hot water is quickly available, particularly if the pipes are insulated. A simple form of circulation can be achieved by tapping risers from a basement loop, starting at the top of the tank and returning to a connection at the bottom.

Two other types of circulating systems are possible. In one, part of the fixtures in the house are tapped from a supply riser and the others are tapped from the return riser, the circulation loop being concealed in the construction of the second floor. The other, more elaborate and expensive, involves serving the basement and first floor fixtures from a main at the basement ceiling. Second floor fixtures are served by risers to the first floor ceiling that return to the basement ceiling, and are connected and extended as a circulation return to the bottom of the hot water tank. In this scheme each second floor bathroom or group of adjacent bathrooms can be served by separate risers, and circulation controlled on each riser by valve adjustment.

In larger buildings three circulating distribution layouts are possible. The one used most frequently has a main riser extending from the hot water tank to the upper floor or sometimes to the roof. At either of these two levels it is connected to a horizontal loop from which risers are run down to the basement. These are tapped for fixtures at the various floor levels and are connected at the basement ceiling into a return circulation loop, that, in turn, is connected to the bottom of the hot water tank. (See Diagram A, Figure 3.)

Another system, involves a main supply riser, tapped at floor levels, to serve part of the fixtures. This is connected to a horizontal loop in the top floor construction, from which a return riser is tapped to serve the remaining fixtures. At the basement the return circulation is connected to the bottom of the hot water tank. (See Diagram B, Figure 3.)

The third system is rarely used except in special buildings, such as hospitals or other institutions requiring a constantly instantaneous supply of hot water at all fixtures. It consists of a series of supply risers and adjacent return risers. The supply risers are tapped to serve fixtures and are connected to the returns at the top floor level. Individual risers are not connected to a horizontal loop at the top floor. At the basement ceiling all return risers are connected to a return circulation loop which extends to the bottom of the hot water tank. (See Diagram C, Figure 3.)

Any of these systems can be installed for operation under street pressure or under pressures from roof or basement tanks. However, in any case an automatic air relief valve must be provided for a hot water loop when installed above the uppermost fixtures, otherwise it will become airbound. When a roof tank is used an expansion pipe to free the water from the air should be installed in place of the relief valve.

When pressure from a roof or pressure tank must be
(Continued on page 98)

PLUMBING SYMBOLS

PURPOSE

Symbols on this sheet will furnish a basis for graphic representation of mechanical equipment. The standard symbols for Plumbing, Piping, Pipe Fittings and Valves were assembled from a number of professional sources, and revised by the Sectional Committee on Standards for Drawings and Drafting Room Practice of the American Standards Association. These symbols were approved by the sponsoring organizations, the Society for the Promotion of Engineering Education and the American Society of Mechanical Engineers, and were accepted as part of the Standard Z 14.2-1935 by the Association in November, 1935.

Since these symbols have only recently been adopted and since they do not agree in every detail with those currently employed in some localities, drawings should bear a legend whenever the indications are used. It is strongly urged that whenever symbols of any sort are used that all be included in a legend on each drawing where they occur in order to avoid confusion and misunderstanding.

Indications for flanged pipe fittings are, as shown in the small cut, similar to those for screwed units. Additional symbols for various kinds of piping are in such common use that they are included for easy reference in the schedule on this page. However, these do not represent recognized standards in all cases and thus may be subject to misinterpretation unless clearly marked in a legend.

Diagram A—Types of Joints



SYMBOLS IN GENERAL USE

Piping indications adapted from those developed by the office of A. E. Hansen, Inc., Consulting Engineer

Soil and Waste, Underground.....	
Soil and Waste.....	
Vent.....	
Leader.....	
Fire Line.....	
Pump Discharge.....	
Cold Water (Street Pressure).....	
Cold Water (Tank Pressure).....	
Hot Water.....	
Hot Water Return.....	
Pump Suction.....	

Additional indications for piping in use by various engineering offices and suggested as symbols for special kinds of piping

Acid Waste.....	
Industrial Waste.....	
Ice Water Supply.....	
Ice Water Return.....	
Refrigeration Supply.....	
Refrigeration Return.....	
Sprinkler Head.....	

PLUMBING SYMBOLS

STANDARD SYMBOLS FOR PLUMBING, PIPING AND VALVES

(Approved by the American Standards Association, November, 1935)

PLUMBING		PLUMBING (continued)		PIPE FITTINGS (continued)			
Corner Bath.....		Drinking Fountain (Trough Type).....		For Welded or Soldered Fittings, use joint indication shown in Diagram A			
Recessed Bath.....		Hot Water Tank.....		Screwed	Bell and Spigot		
Roll Rim Bath.....		Water Heater.....					
Sitz Bath.....		Meter.....					
Foot Bath.....		Hose Rack.....					
Bidet.....		Hose Bibb.....					
Shower Stall.....		Gas Outlet.....					
Shower Head.....		Vacuum Outlet.....					
Overhead Gang Shower.....		Drain.....					
Pedestal Lavatory.....		Grease Separator.....					
Wall Lavatory.....		Oil Separator.....					
Corner Lavatory.....		Cleanout.....					
Manicure Lavatory.....		Garage Drain.....					
Medical Lavatory.....		Floor Drain With Backwater Valve.....					
Dental Lavatory.....		Roof Sump.....					
Plain Kitchen Sink.....		PIPING					
Kitchen Sink, R & L Drain Board.....		Piping, in general.....	_____				
Kitchen Sink, L H Drain Board.....		(Lettered with name of material conveyed)					
Combination Sink & Dishwasher.....		Non-intersecting Pipes.....					
Combination Sink & Laundry Tray.....		Steam.....	_____				
Service Sink.....		Condensate.....	-----		VALVES		
Wash Sink (Wall Type).....		Cold Water.....	_____		For Welded or Soldered Fittings, use joint indication shown in Diagram A		
Wash Sink.....		Hot Water.....	_____		Screwed	Bell and Spigot	
Laundry Tray.....		Air.....	----->				
Water Closet (Low Tank).....		Vacuum.....	----->				
Water Closet (No Tank).....		Gas.....	----->				
Urinal (Pedestal Type).....		Refrigerant.....	-+--+				
Urinal (Wall Type).....		Oil.....	-----				
Urinal (Corner Type).....		PIPE FITTINGS					
Urinal (Stall Type).....		For Welded or Soldered Fittings, use joint indication shown in Diagram A	Screwed	Bell and Spigot			
Urinal (Trough Type).....		Joint.....					
Drinking Fountain (Pedestal Type).....		Elbow - 90 deg.....					
Drinking Fountain (Wall Type).....		Elbow - 45 deg.....					
		Elbow - Turned Up.....					
		Elbow - Turned Down.....					

PLUMBING—Domestic Hot Water Requirements

PURPOSE

A certain amount of calculation is necessary before selection can be made of equipment for heating, storing and distributing domestic hot water. Calculation of precise requirements often involves many technicalities that call for specialized engineering knowledge. But in all cases the architect's attention is required to solve planning problems which arise prior to the installation of any sort of mechanical equipment.

As a basis for preliminary selection of domestic hot water equipment and as an aid in planning for its proper installation, rule-of-thumb approximations can be made which will allow the architect to design within reasonable limits of required dimensions and capacities.

This sheet develops such approximation rules and indicates a method for their application. In addition it presents data on hot water consumption and storage as a basis for calculation.

GENERAL

Planning factors of domestic hot water requirements involve first the capacity of the heating plant and, second, the capacities of one or more hot water storage tanks except in cases where an instantaneous or a tankless hot water heater is to be installed. Both heating plant and tank capacities must be mutually adjusted to solve the particular problem at hand. For example, if space for hot water storage is at a premium, an expedient must be adapted of enlarging the capacity of the heating plant to deliver the required amount of hot water during periods of greatest demand. When tanks are to be used, it is good practice to size heater capacity to deliver hot water sufficient for average hourly demands and to provide a storage tank sufficient in capacity to supply additional demands during peak periods.

Estimation of domestic hot water requirements depends largely upon the type of building and the factor of usage involved. Since the type, characteristics and activities of building occupants are subject to such wide variation, estimation of water consumption must include a generous factor of safety. Thus it is customary to estimate hot water requirements upon the basis of cold water consumption per person.

COLD WATER CONSUMPTION

It has been found that the average cold water consumption per person in a house of average size and equipment is very nearly 50 gallons per day. Upon this basis consumption allowances have been developed for other types of buildings.

For large residences allow 100 gallons per person per day. This includes supply for all normal requirements and wastage.

For low-rent apartments allow 75 gallons per day per person. This figure is a minimum based upon minimum plumbing fixture requirements.

For high-class apartments allow 100 gallons per person per day. An approximate estimate of apartment consumption can also be made by multiplying the number of bedrooms by 200.

For hotels allow 100 gallons per person per day. Approximation of total hotel consumption is commonly made on the basis of 60 per cent occupancy. Thus, 60 per cent of the number of bedrooms multiplied by 100 would give a reasonably safe average figure. However, this figure would not include requirements for the equipment of kitchens, laundries, cold rooms or for any other type of mechanical unit.

For office buildings allow 25 gallons per person per day. To estimate building occupancy, allow 125 sq. ft. of floor space per person, exclusive of elevator space, corridors or service areas.

Probable maximum peak loads for cold water are of relatively little importance in the case of residences. For apartments,

hotels and office buildings which involve installation of cold water storage tanks, an allowance of 50 per cent of the daily average consumption should be made to care for probable maximum peak demands.

EQUIVALENT OCCUPANCY

The average daily total water consumption for any building can be related to the average per person consumption in average residences as a base.

Rule 1. To find equivalent occupancy of any project multiply the number of persons occupying the type of building by the conversion factor in Table 1.

Equivalent occupancy governs the total hot water requirements related to the total cold water consumption.

ESTIMATING HOT WATER REQUIREMENTS

Consumption of hot water is usually rated as one-third of the cold water consumption per person per day.

Heater capacities and storage tank sizes are based upon the maximum probable hourly demand for hot water, or the hourly peak load.

Heating load on boiler or heater required for desired supply of domestic hot water is based primarily upon the average hourly demand for hot water.

Rule 2. To determine total daily consumption of cold water. Multiply the number of building occupants by 50 and then by the related conversion factor as listed in Table 1.

Rule 3. To determine total daily consumption of hot water. Divide the result of Rule 2 by 3.

Rule 4. To determine the maximum probable hourly demand for hot water. Divide the total daily hot water consumption (from Rule 3) by 10.

Rule 5. To determine the average hourly demand for hot water. Divide the total daily consumption of hot water (from Rule 3) by 24.

TO DETERMINE HEATER CAPACITY

Domestic hot water is commonly assumed to be cold water the temperature of which has been raised 100 F. The average range of temperature difference is from 50 to 150 F. Heater ratings are on the basis of the number of square feet of steam or hot water radiation to raise one gallon of water 100 F.

Steam boiler rating. One sq. ft. of steam radiation is equal to 240 Btu. It requires 833 Btu's to raise one gallon of water 100 F. Therefore it will require $\frac{833}{240} = 3.5$ sq. ft. of equivalent direct steam radiation (EDR) to accomplish this result.

Hot water boiler rating. One sq. ft. of hot water radiation is equal to 150 Btu. Therefore it will require $\frac{240}{150} = 5.6$ sq. ft. of hot water radiation to raise one gallon of water 100 F.

Rule 6. To find required capacity of hot water heater in terms of equivalent direct radiation (EDR) per hour.

A—For steam boiler. Multiply average hourly demand for hot water (Rule 5) by 3.5. This is a one-hour rating. For a two-hour rating multiply by 1.75.

B—For hot water heater. Multiply average hourly demand for hot water (Rule 5) by 5.6. This is a one-hour rating. For a two-hour rating multiply by 2.8.

PLUMBING—Domestic Hot Water Requirements

Serial No. 52
JULY 1936

TABLE 1—EQUIVALENT OCCUPANCY—COLD WATER CONSUMPTION			TABLE 2—EQUIVALENT DIRECT RADIATION LOADS FOR HEATING DOMESTIC HOT WATER		
Type of Building	Gals. per person per day	Conversion Factor	HOT WATER	REQUIRED HEATING CAPACITY	
			Max. Probable Hourly Demand in Gallons	Sq. Ft. Radiation Required—Steam	Sq. Ft. Radiation Required—Hot Water
Residence, Average	50	1.0	10	35	56
" Large	100	2.0	20	70	112
Apartments, Low-rent	75	1.5	30	105	168
" High-class	100	2.0	40	140	224
Hotels	100	2.0	50	175	280
Office Buildings	25	0.5	60	210	324
			70	245	392
			80	280	448
			90	315	504
			100	350	560
			150	525	840
			200	700	1120
			250	875	1400
			300	1050	1680
			350	1225	1960
			400	1400	2240
			450	1575	2520
			500	1750	2800
			550	1925	3080
			600	2100	3240
			650	2275	3520
			700	2450	3920
			750	2625	4200
			800	2800	4480
			850	2975	4760
			900	3150	5040
			950	3325	5320
			1000	3500	5600

TABLE 3—RANGE BOILERS			TABLE 4 HOT WATER STORAGE TANKS		
Capacity in gals.	Diameter	Length	Capacity in gals.	Diameter	Length
18	1'-0"	3'-0"	118	2'-0"	5'-0"
24	1'-0"	4'-0"	141	2'-0"	6'-0"
30	1'-0"	5'-0"	220	2'-6"	6'-0"
32	1'-2"	4'-0"	294	2'-6"	8'-0"
40	1'-0"	5'-0"	318	3'-0"	6'-0"
42	1'-4"	4'-0"	428	3'-0"	8'-0"
52	1'-4"	5'-0"	504	3'-6"	7'-0"
66	1'-6"	5'-0"	576	3'-6"	8'-0"
82	1'-8"	5'-0"	720	3'-6"	10'-0"
100	1'-10"	5'-0"	904	4'-0"	10'-0"
120	2'-0"	5'-0"	1008	3'-6"	14'-0"
144	2'-0"	6'-0"	1504	4'-0"	16'-0"
192	2'-0"	8'-0"	1880	4'-0"	20'-0"

Tanks are vertical. Standard pressure is 85 lbs. per sq. in. Extra-heavy pressure is 150 lbs. per sq. in.	Tanks are either vertical or horizontal. Standard pressure is 65 lbs. per sq. in. Extra-heavy pressure is 100 lbs. per sq. in.
---	--

TO DETERMINE STORAGE TANK CAPACITY

On the basis of an hourly demand for hot water, storage requirements can be quickly estimated. To assure hot water at all faucets, it is customary to assume that only 75 per cent of the tank capacity will be available as hot water. Therefore, tanks should be oversized by 25 per cent of the calculated storage requirements.

Rule 7. To determine hourly storage requirements for hot water. Subtract the average hourly demand (supplied by heater) from the probable maximum hourly demand. (Rule 4 minus Rule 5). Then divide by 0.75.

EXAMPLE

Suppose that an apartment building contains 50 bedrooms and is to be heated with a steam boiler plant. What will be the required size of the hot water storage tank and what additional capacity must the boiler have to meet requirements for domestic hot water?

Total cold water consumption...	50 × 200 = 10,000 gals.
Add 50 per cent for peak...	5,000 "
Total	15,000 "
Total hot water consumption	15,000 divided by 3 = 5,000 "
Max. probable hourly demand...	5,000 divided by 10 = 500 "
Average hourly demand.....	5,000 divided by 24 = 205 "
Required tank capacity on an hourly rating	$\frac{500 - 205}{0.75} = 398 "$
Additional boiler capacity required	205 × 3.5 = 717.5 sq. ft. EDR

To select a standard-sized tank meeting the calculated storage requirements, choose that which comes closest above calculations rather than below them. See Table 4.

PLUMBING—Residential Riser Diagrams

PURPOSE

Drawings on this sheet indicate typical good practice in the design of hot and cold water distribution systems for residences. Diagrams include the essentials of distribution covered by various sets of practical conditions, but should not be interpreted as a complete solution to any specific residential problem. However, pipe sizes and arrangements are generally adaptable without substantial change to most small houses, being adequate for dwellings containing two bathrooms in addition to a first floor lavatory and toilet and the usual kitchen and laundry fixtures.

GENERAL

Pipes for both hot and cold water are sized for permanently clean bores. It is assumed that the water supply is comparatively soft so that no precipitated coating will form on pipe walls, thereby reducing inside diameters and preventing free flow of water. In localities where the water contains a concentration of temporary hardness (expressed as calcium carbonate) sufficient to cause even a slight precipitation in cold water lines, it may be necessary to increase pipe sizes in both hot and cold lines or to install a water softener as indicated.

COLD WATER LINES

Tap from the street water main can be $\frac{5}{8}$ in. for very small houses and $\frac{3}{4}$ in. for houses containing a number of fixtures equivalent to three bathrooms in addition to kitchen and laundry fixtures.

Service pipe, or house main, in the first case can be $\frac{3}{4}$ in.; in the second case a 1 in. diameter is minimum.

A pressure reducing valve is not necessary if the street pressure is 50 lbs. or less per sq. in. Street pressures above this should be reduced through a valve located in the house main on the street side of the meter.

Drips should be installed in lower portions of basement lines so that the entire system can be completely drained.

Shut-off valves are necessary in the basement on the street side of fittings in the supply main, adjacent to the air chamber, on the line supplying the hot water heater and at the bases of all supply risers. Fixtures should be individually valved.

An air chamber as shown will prevent water hammer throughout the piping system. It can be located in any convenient part of the main on the house side of the meter. It should be fitted with shut-offs and pet-cocks, for it requires draining when the air within it is absorbed by the water.

Water softeners are available in various sizes and types. Installation requires a salt tank for regeneration. Regeneration can be accomplished manually or automatically, the latter being usually controlled by a meter on the softened water line. A floor drain for disposal of filter wash water is essential if a water softening device is installed.

Insulation of cold water pipes is desirable throughout the building to prevent damage from condensation drips, to maintain proper water temperatures and to muffle flow noises. Wrappings of $\frac{3}{4}$ in. wool felt or similar material is satisfactory.

HOT WATER LINES

A simple form of circulation can be accomplished by connecting the hot water house supply to the hot water return circulation in a simple loop at the basement ceiling. This loop can be tapped by supply risers to serve all fixtures.

The type of circulating hot water distribution shown is adaptable to most residences. A more elaborate type involves individual supply and return risers to serve each bathroom or group of superimposed fixtures.

The hot water heating layout indicates an arrangement of pipes to give unusually quick hot water service from fixtures in a non-circulating system and nearly instantaneous service in a circulating system. This is accomplished by connecting the hot water supply line from heaters to the house supply instead of directly to the tank. When a faucet is opened, water is drawn first from the supply lines from the heater, thus stimulating circulation in the returns from the tank. The location of check valves prevents cold water being drawn into the house hot water supply pipe.

Insulation of hot water lines throughout the building tends to conserve the hot water supply and assure quick service at faucets. Coverings of $\frac{3}{4}$ or 1 in. cellular asbestos is satisfactory.

Pitch of all horizontal hot water pipes should be at least 1/16 in. to the foot.

Drips should be sufficient in number to drain all hot water pipes. Location is desirable approximately as shown in relation to water heating and storage equipment.

Basement shut-off valves are necessary to separate summer and winter tank circulations, to close hot water return circulation and to close individual risers in case of repairs or other emergencies. Fixtures on all floors should be individually valved.

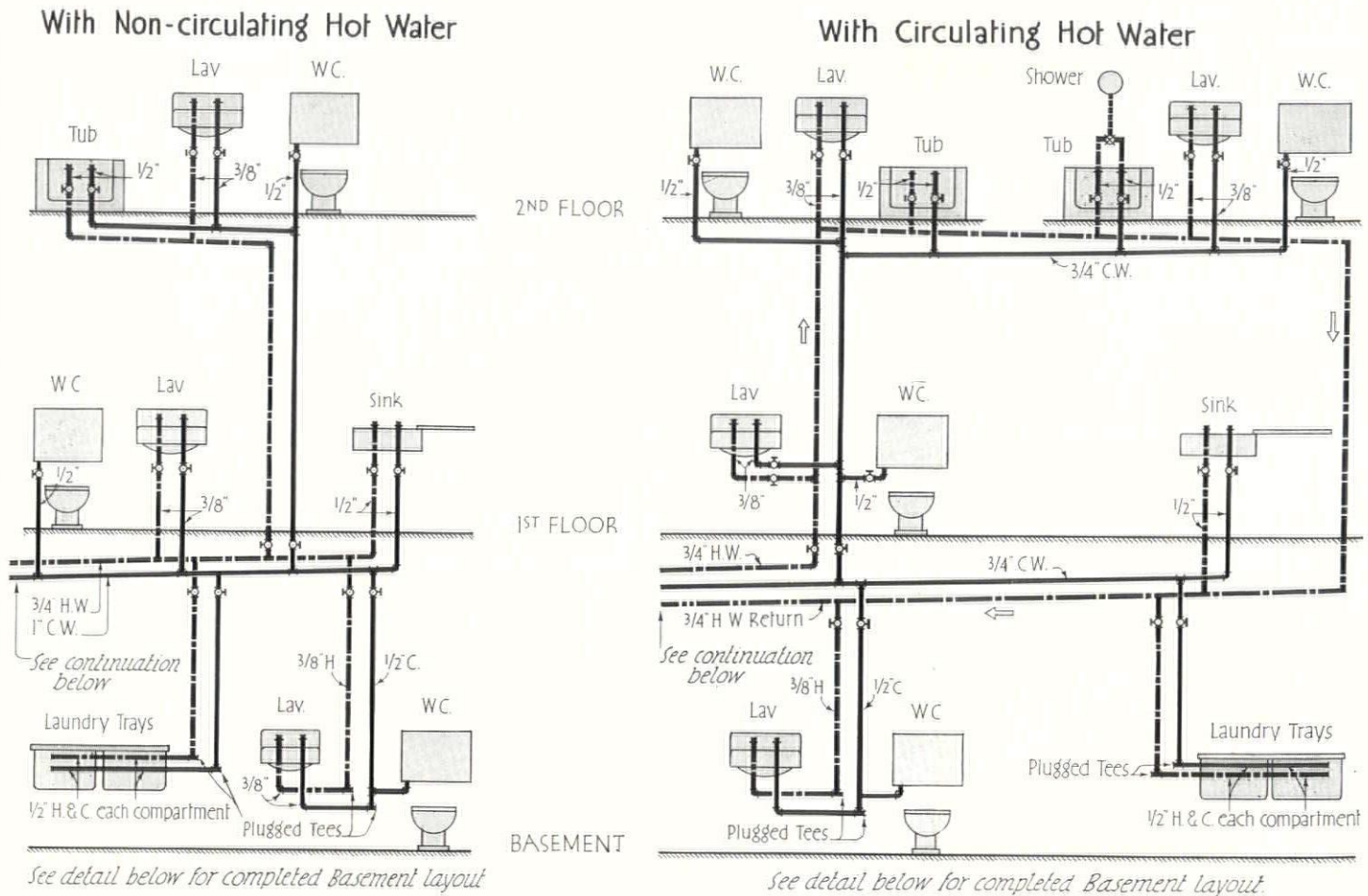
Check-valves should be installed on the heater return from tank, on the cold water supply to heater and on the hot water return circulation line.

Relief valve should be installed on hot water storage tank.

PLUMBING—Residential Riser Diagrams

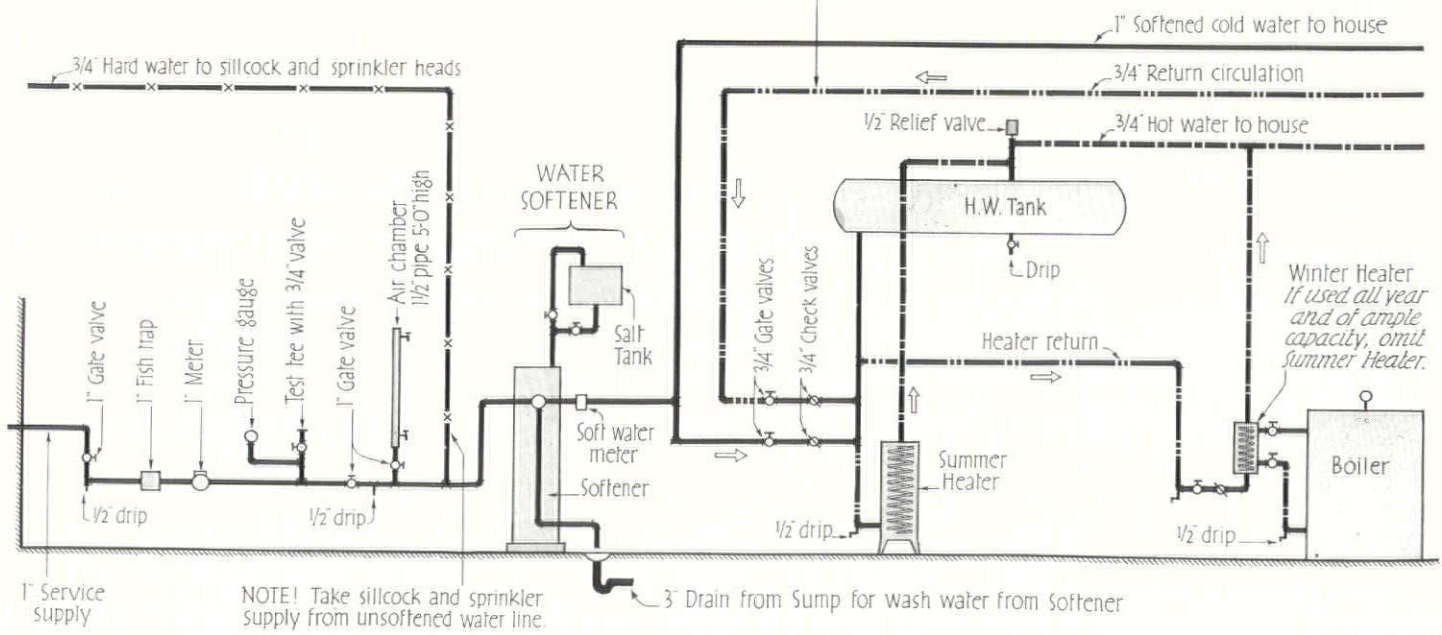
Serial No. 53

JULY 1936



NOTE! These sections are diagrammatic and drawn to no scale.

For Non-circulating systems omit this line



BASEMENT PIPING DIAGRAM (See Sections above for continuations)

SMALL HOUSE COMPETITION

House Beautiful recently announced its Ninth Annual Small House Competition. Because of present concentration of interest on the smaller house, only houses of six to nine rooms are eligible in this year's Classes I and II. The distinction between these classes is based on location rather than size of house, the Mississippi River being the dividing line. Class III calls for still smaller houses of five rooms or less, especially designed for week-end use. Emphasis is put on this type of house because of its present popularity and because of the opportunity it affords for ingenious planning and use of materials. The competition closes on October 15, 1936, and the prize-winning and honorable mention houses will be published in House Beautiful beginning with the January, 1937, issue. There will also be, as in previous years, an exhibition of photographs and plans of fifty houses, both new and remodeled, which will be displayed in larger cities throughout the United States in 1937. First prize for Class I, of 6 to 9 room houses east of the Mississippi is \$500 and second prize is \$300. First prize in Class II of 6 to 9 room houses west of the Mississippi is \$500 and second prize is \$300. Class III, houses of 5 rooms and under, built especially for week-end use, will receive a special prize of \$300. In addition to these prizes, from eight to twelve houses will be selected for honorable mention and will be awarded \$50 each. The jury judging this competition will consist of three members of the American Institute of Architects and the editors of House Beautiful. Copies of the announcement containing the general conditions of the competition may be obtained from House Beautiful, 572 Madison Ave., New York City.

CONFERENCE ON CHURCH ARCHITECTURE

The Interdenominational Bureau of Architecture recently announced that the next meeting of the North American Conference on Church Architecture will be held October 9, 1936, in the Cathedral of St. John the Divine, New York City. The following have been invited to address the Conference: The Right Reverend Bishop William T. Manning, Dr. Ralph Adams Cram, Mr. John Angel (recently granted a doctorate degree by Columbia University) Dr. Francis S. Onderdonk of the University of Michigan, who will talk on Ferro-Concrete construction, and give an illustrated lecture on architectural service for smaller churches, Professor Leopold Arnaud of the School of Architecture of Columbia University and Joseph G. Reynolds, Jr., of Boston, Massachusetts.

COURSE IN COMMUNITY PLANNING

The School of Architecture and Allied Arts of New York University recently announced courses in Community Planning and Housing under the direction of Carol Aronovici. There will be an advisory board consisting of Frederick Ackerman, Harold S. Bottenheim, William H. Connell, George Gove, John Ihlder, Robert D. Kohn, Albert Mayer, Clarence Perry and Frank B. Williams. The courses of study will include the Urban Community, Housing, and Housing and Community Planning. All of the elements that contribute to modern housing theories will be analyzed.

ART FELLOWSHIP AWARD

The College of Fine and Applied Arts of the University of Illinois announces the results of its fifth annual consideration

of candidates for the Kate Neal Kinley Memorial Fellowship. Mary Elizabeth Huff of Chicago, Illinois, has been recommended to the Board of Trustees of the University for the Fellowship, and Theodore Davis Parmelee of Urbana, Illinois, has been nominated as alternate. Miss Huff was graduated with honors from the University in 1932. Following this, she pursued studies in Art History, specializing in Chinese Art at Radcliffe College and at Mills College. She received her M.A. from Mills in 1935. Mr. Parmelee was graduated from the University of Illinois in the Painting Curriculum in June, 1935. Since graduation he has worked in the field of book illustration.

FAIR AND HOUSING EXHIBITION

An exhibition of the Architecture of European and American World's Fairs, and an exhibition of Architecture in Government Housing were recently opened in the Museum of Modern Art in New York and will continue until September 6th. The feature of the Architecture for Fairs exhibition consists of enlarged photographs of significant architectural elements of fourteen previous Fairs from 1914 to the present time. The display of Architecture in Government Housing is shown in co-operation with the Housing Division of the PWA and the Suburban Resettlement Division of the Resettlement Administration, and consists of photographs, plans and models of finished and future projects. The exhibitions have been arranged by Miss Ernestine Fantl, Curator of Architecture and Industrial Arts, with the co-operation of the Architecture Committee of the Museum.

TRAVELING SCHOLARSHIP AWARDED

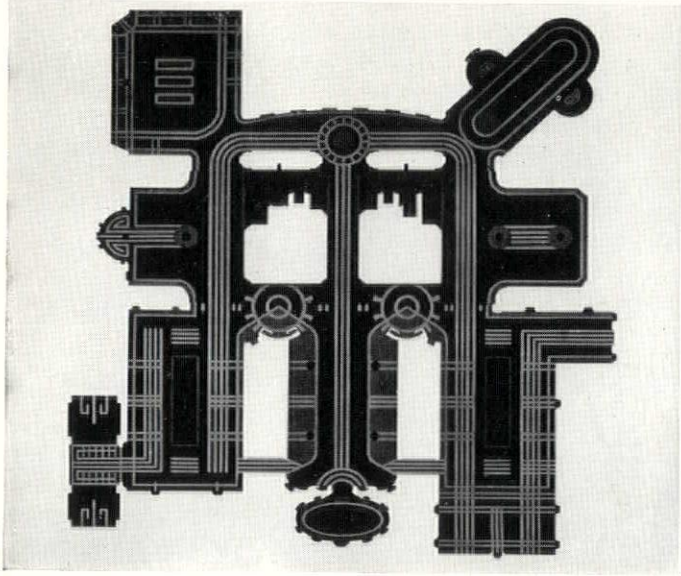
The School of Fine Arts of the University of Pennsylvania recently announced the award of the John Stewardson Memorial Traveling Scholarship in Architecture for 1936 to Mr. S. Robert Anshen of Ambler, Pennsylvania. The subject of the winning thesis was a National Center of Learning located on Analutian Island in the Potomac, Washington, D. C. The John Stewardson Memorial Traveling Scholarship competition is open to all qualified students or architects or assistants under the age of 27 having residence within the State of Pennsylvania for one year prior to the award. Mr. Anshen has been a Graduate Student in Architecture in the School of Fine Arts, University of Pennsylvania, during the past year, receiving his Master's Degree in June. He was born in Boston, January 29, 1911, and received his primary and secondary education in Providence, R. I. He spent one year in the College of the University of Pennsylvania, six months at Sorbonne and five years as an undergraduate and graduate student in the Department of Architecture of the University of Pennsylvania.

STEEL BRIDGE AWARDS

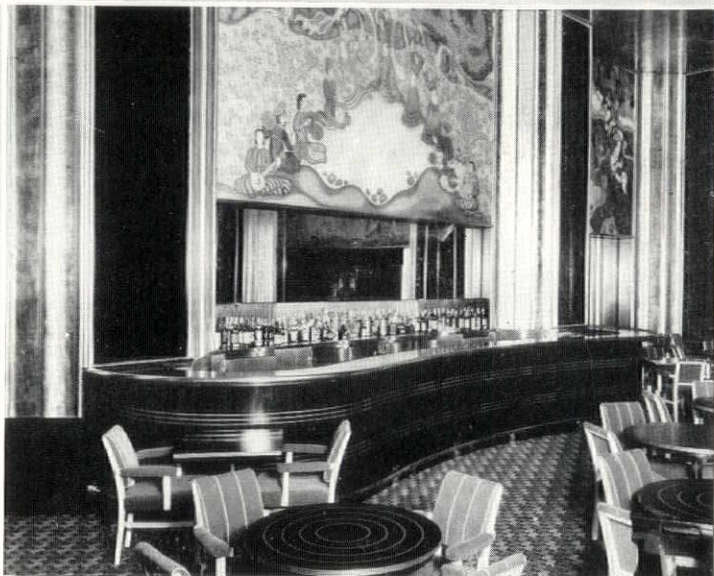
The North Grand Island Bridge in Niagara Falls, New York; the Lorain Road Bridge in Cleveland, Ohio, and the Mortimer E. Cooley Bridge over the Manistee River near Wellston, Michigan, will receive the annual awards bestowed on such structures by the American Institute of Steel Construction, Inc. This is the eighth such judgment by a jury of nationally known engineers and architects. This year the jury consisted of the Messrs. Robert D. Kohn and Arthur Loomis Harmon, Architects of New York; Professor William J. Krefeld of the College of Engineering, Columbia

CARPET COUNSEL

*A service for Architects that is
complete from design to installation*



Sketch worked out under guidance of W. L. Pereira, Architect, for Wm. H. Block Store, Indianapolis. A "Lokweave" installation.



Persian Room, Plaza Hotel, New York. Carpet created for Mr. Irvin L. Scott of Joseph Urban Associates, Architects.



Next time you face a carpeting problem, may we help you solve it? Our Carpet Counsel service is broad, flexible, developed through long experience to give you what you want.

It covers estimating, budgeting, styling, weaving and supervising installation. Our design staff will *create* patterns for you—or *interpret* your ideas. We can suggest the right grades for particular spaces that will best

combine beauty with long wear and economy.

You may turn your entire carpeting problem over to us, if you wish—or simply call upon us for advice on one or two phases.

Bigelow quality and wearability are traditional—your assurance of satisfied clients. And we keep our promises about deliveries.

For the full story of Carpet Counsel service, address Bigelow-Sanford Carpet Co., Inc., 140 Madison Ave., New York.

* Sold and installed under Collins & Aikman license.

BRANCH OFFICES AND SHOWROOMS IN 25 CITIES

University; Mr. Howard C. Baird, Consulting Engineer of New York; and Mr. Kenneth Hayes Miller of New York. Mr. Miller is a well known painter and is the first fine artist ever to serve on the Jury of Award. The North Grand Island Bridge was designed by Waddell & Hardesty and George C. Diehl, Inc., Consulting Engineers. The Lorain Road Bridge was designed and erected under the direction of the Ohio Department of Highways. John Jaster, Jr., Director; Bureau of Bridges, J. R. Burkey, Chief Engineer; W. H. Rabe, Chief Designing Engineer; D. H. Overman, Principal Designing Engineer. The Mortimer E. Cooley Bridge was designed by L. W. Millward, State Highway Bridge Engineer.

PARIS PRIZE AWARDED

The winner of the twenty-ninth annual Paris Prize scholarship in Architecture, valued at \$3,600 and given by the Society of Beaux Arts Architects, was won recently by Frank Montana, twenty-four-year-old graduate of the New York University School of Architecture. Mr. Montana was born in Italy and since coming to this country has worked his way through high school and New York University by doing odd jobs in architects' offices, and more recently by employment in the CWA and PWA. In 1935 he received honorable mention in the competition for the Rome Prize in Architecture given by the American Academy in Rome.

ANNOUNCEMENTS

J. Binford Walford, Architect, successor to Charles M. Robinson, Architect, announces the removal of his offices to 103 East Cary Street, Richmond, Virginia.

Lewis J. Sarvis, Architect, announces the removal of his offices to 201 Bailey Building, Battle Creek, Michigan.

Guerino Salerni, Architect, announces the opening of an office for the practice of general architecture, at 101 Park Avenue, New York City. He requests manufacturers' samples and catalogs.

M. Martin Elkind, Architect, announces the opening of an office at 40-09—82nd Street, Jackson Heights, New York.

Wilbur Henry Adams, Industrial Designer, 2341 Carnegie Ave., Cleveland, Ohio, announces that Charles H. Stark, Architect, is now associated with him for the practice of general architecture. He requests manufacturers' samples and catalogs.

Henry V. Murphy, Architect, announces the removal of his office to the Williamsburgh Savings Bank Building, 1 Hanson Place, Brooklyn, N. Y.

Noah M. Sherman, announces the opening of an office for the practice of architecture, at 338 Albany Street, Brooklyn, N. Y. He requests that manufacturers' catalogs and literature be sent him.

Edward E. Probst, Marvin G. Probst and Wellington J. Schaeffer announce the opening of the office of Probst and Probst, Architects, in the Field Building, Chicago, Illinois.

ERRATA

The architect's drawings showing the elevation and the first and second floor plans which appeared in the American Telephone and Telegraph Company advertisement on page 102 of our May, 1936 issue were designed by Edwin Maxwell Loye, architect, of Bronxville, N. Y., and are his property. These plans are protected by copyright and must not be used without securing permission from Mr. Loye.

MODERN PLUMBING PRACTICES

(Continued from page 89)

used to force hot water to upper floor fixtures, it is common to supply all hot water under tank pressure. Otherwise two hot water distribution systems are required, one under street pressure, the other under tank pressure. In buildings of low height and large area, circulation of hot water will be sluggish. Adjustment of circulation control valves will improve the condition somewhat. But a better practice is to install a hot water circulating pump on the main hot water return line. The main hot water riser should be valved at top and bottom. Each return riser should also be fitted with shut-off valves at the top and bottom and with a check-valve where the connection is made to the hot water tank.

Water Heating Plants can be selected intelligently only in view of conditions peculiar to the problem. If space for hot water storage is at a premium the expedient of enlarging the capacity of the heating plant must be adopted. The ultimate of this is, of course, a heater which is powerful enough to meet all hot water peak demands, or installation of an instantaneous heater. In general, both of these installations are uneconomical, for peak demands are usually not continuous during the day.

This applies with greatest force to large buildings where a general rule of thumb can be applied as follows: Select a heater to provide the average hourly demand. Then provide a tank large enough to supply the additional demand during the estimated peak load period. For example: Suppose the average hourly demand for an apartment building is 833 gallons and the peak hour demand is 2,000 gallons. Thus, the heater can care for the average hourly demand and the tank storage for additional requirements of the peak demand. To do this well it should be assumed that only 75 per cent of storage capacity is available so that water will be hot at the fixtures. Therefore, $2000 - 833 = 1167 / 0.75 = 1556$, which is the required capacity of the storage tank. (See Time-Saver Standards Sheet No. 52).

In residences, tanks are usually not installed in duplicate. In larger buildings however, duplicate installations should be made and in all types of buildings automatic control of tank water temperature is desirable. Also every tank should be provided with a relief valve.

Methods of water heating are, generally, these:

1. By an indirect heater consisting of jacketed coils heated by circulation of boiler water (Indirect).
2. By steam or hot water coils located in the hot water tank itself (Indirect).
3. By direct heat which is applied to coils or to a water back.
4. By heat applied directly to the walls of the hot water tank.
5. By electric immersion heaters.

Selection depends entirely upon the exigencies of the project. Each method outlined performs excellently under the proper circumstances. However, due to simplicity of installation and operation the first two are employed most widely in buildings of all types. The third and fourth are more applicable to residences. The last method is coming into more frequent use where low electric rates make possible an off-peak use of current to heat water during low demand periods, and storing it in unusually large and well-insulated tanks against peak period demands.

TO BROADEN THE USE OF BETTER ARCHITECTURE IN THE AVERAGE HOME

*An Important Message to the Architects of America
from their Local Brick Manufacturers Everywhere*

(AND THE PUBLIC IS CORDIALLY INVITED TO



READ IT OVER THE ARCHITECT'S SHOULDER)

IT IS NOT surprising that there are so many beautiful brick houses and buildings in America, nor that because of these examples the preference for brick construction is more marked today than ever before.

It is simply that brick homes, perhaps more than any other, have received the benefit of architectural service.

This, in turn, is true for three reasons:

FIRST, because brick is the favorite medium of the architect for his finest expression in residential construction;

SECONDLY, because the very permanence of brick argues strongly for more quality in design; and

THIRDLY, because the brick manufacturers of America, counseled by this Association, and its district affiliates, have never ceased to extend this familiar advice to every prospective builder—*"as an additional guarantee of beauty and economy in brick construction, consult an architect."*

This has not been a mere lip-service to secure the good will of the architect, much as we value his favor. But confident of a sincere mutual interest in the design, permanence, fire-safety and economy of brick construction, and in the further advantages and economies to be secured through competent architectural counsel and supervision, the Brick Manufacturers Association always has cooperated fully with the architect as a matter of public service to every community.

The emphasis thus placed by this Association upon the advantages of architectural service, particularly in the design of the average small home, has resulted in the construction of literally thousands of well-designed, beautiful brick homes. In other words, the combination of good architecture, good materials, and good workmanship in one brick home of fine character has been the spark to kindle the desire of hundreds for a residence of equal and lasting charm. Every fine residential community in America bears testimony to this fact.

Today, measured by actual purchases in representative communities, it is obvious that the homes people prefer to buy, are the homes architects prefer to design—brick!

The great need, therefore, in the general interest is to bring the architect's influence to bear more widely upon those who are in the market for small homes now and in the years of productive promise just ahead. We need particularly to dissipate any doubts which may still exist that "architec-

ture" and the "brick home" are within reach of the family of average means, and not the special insignia of those of unlimited resources.

To accomplish that objective, we invite the Architects of America to participate in an interesting departure from the conventional methods of "stock plan" service.

Today, we propose to close the gap between architect and builder, to give practical point and purpose to our injunction—"consult an architect." Specifically we propose to produce a new architectural plan service based upon the following premises:

- (a) That it be *sectionalized* to give local and individual effect to the geographical and architectural design preferences and characteristics incident to particular regions. New England and Southern California shall not snub each other across opposite pages;
- (b) That prospective home buyers in the regions classified shall thus have access to the best examples of architecture suitable to their particular region;
- (c) That home buyers and builders may by this method have more convenient access to the personal services of the architects represented in the book, who are responsible for the development of the outstanding regional architectural motives; and, most importantly,
- (d) That, no plans presented in this service shall be sold by the members of this Association to the public, but all plans and services shall be handled directly by the architects whose designs have engaged a buyer's interest.

We believe that the advantages of this project, which is largely one of organization of material, will appeal to architects everywhere as a practical means to broaden the use of better architecture in the low and medium priced home; and that it will serve to bring the many advantages and economies of personal service and supervision directly to the profit of the home buyer.

We invite correspondence with architects everywhere who may desire to present photographs and plans of recently constructed homes available for this purpose, having special regard for the regional classification proposed.

Naturally, we shall insist on *brick* homes. For it has been ably demonstrated by the profession itself, that when the architect strives for beauty in line, proportion, and function, no *permanent* building material serves his need for expression so completely as the local-made brick whose ageless charm is born in the native clays and shales of his own locality.

Write: **THE BRICK MANUFACTURERS ASSOCIATION OF AMERICA, 2121 GUARANTEE TITLE BUILDING, CLEVELAND, OHIO;** or to these district organizations:

BRICK MANUFACTURERS ASS'N OF NEW YORK
J. H. Hansen, *Secretary*
1716 Grand Central Terminal, New York City, New York

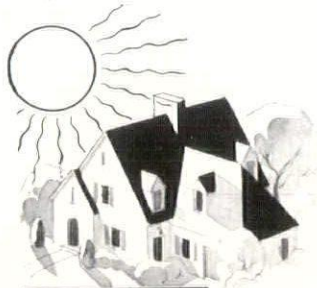
BRICK MANUFACTURERS ASS'N OF CHICAGO
G. E. Miller, *Secretary*
228 North La Salle Street, Chicago, Illinois

BRICK MANUFACTURERS ASS'N OF NEW ENGLAND
Frederick Heath, Jr., *Secretary*
627 State Mutual Building, Worcester, Massachusetts

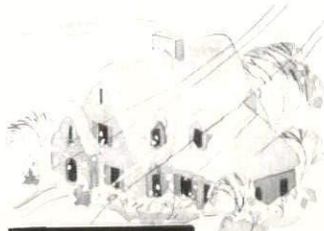
THE NATIONAL AUTHORITY ON BRICK CONSTRUCTION

Now AUTOMATIC HEAT AND AIR CONDITIONING

to fit your client's needs and pocketbook



IN SUMMER
COOL
HEALTHFUL AIR



IN WINTER
AIR-CONDITIONED
WARMTH

For years, the Herman Nelson organization has specialized in the solution of fundamental air-conditioning problems—concentrated upon them to the point where you have come to accept Herman Nelson equipment as a standard of quality, efficiency and practicability.

Now the full value of this vast and intensive pioneering experience is concentrated upon the production of a complete line of automatic heat and air-conditioning equipment for the residential and small commercial building market. Regardless of the requirements of your clients in this market, you can recommend Herman Nelson products of the same quality and efficiency you have known for years. They are made available through carefully selected distributors, trained to the Herman Nelson standards of engineering and workmanship and operating direct to the purchaser.

A COMPLETE LINE OF PRODUCTS

from one manufacturer



I'm glad we can get all these products from one unbiased source.



Feel free to consult the distributor nearest you or write us for complete information for your files.



HERMAN NELSON

Automatic Heat and Air Conditioning

GENERAL OFFICES AND FACTORIES AT MOLINE, ILLINOIS

BOOKS

DECORATIVE ART. The Studio Year Book. Edited by C. G. Holme. 140 pages, 8 by 11¼ inches. Illustrations from photographs, some in color, and plans. Printed in Great Britain. New York: 1936: The Studio Publications, Inc. \$3.50, paper; \$4.50, cloth.

Probably it is necessary that the Studio Year Book should reflect each year the work of the most advanced outposts in design—the book is, after all, a current record of annual progress. Just how that progress is fitted into the march of the arts over a decade, is another matter. A casual glimpse of the illustrations in this volume would convince the unthinking observer that nothing but a somewhat stark and frank manneristic modernism was being built in England in this year of our Lord.

THE BOOK OF FURNITURE AND DECORATION: Period and Modern. By Joseph Aronson. 347 pages, 8½ by 10¾ inches. Illustrations from photographs and line drawings. New York: 1936: Crown Publishers. \$2.75.

In an effort to bring into proper balance a casual knowledge of furniture and decoration for the layman, the author offers significant details of ornament and structure to serve as identification marks in period styles. This much has been done before. The volume's claim for attention is due to its combining a review of past eras with a majority of illustrations showing the more carefully studied examples in our contemporary efforts.

MEMOIRS OF THE AMERICAN ACADEMY IN ROME. Vol. XIII. 220 pages of text, 10¼ by 14 inches, with 53 pages of plates. Illustrations from photographs and drawings. Printed in Italy. Paper binding. New York: 1936: American Academy in Rome. \$5.

Continuing the Academy's policy of putting into printed record form some of the more important research and restoration efforts of the Academy's students. The present volume includes Girolamo Da Prato and His Manuscripts of Sulpicius Severus; Roman Mosaics of the Second Century in Italy; The Forum of Julius Caesar and the Temple of Venus Genetrix.

NEW SMALL HOMES OF CALIFORNIA. Introduction by the publishers. 56 pages, 8½ by 11¾ inches. Illustrations from photographs and plans. Pamphlet binding. Los Angeles, Calif.: 1936: Architectural Book Shop, 816 West 5th Street. \$1.50, flat-stitched or spiral; \$2.00, cloth.

Here is an interesting and well executed effort to supplement the national movement towards devising better ways of serving the small house owner with architectural service. The book explains for the layman what the architect does, and how he is paid—on a ten per cent basis. A group of California architects, the members of which have devoted more than the usual time and effort to the small house, present herein some of their achievements as shown in plan and photographs, together with specific construction data and costs.

STATE PLANNING. Review of Activities and Progress. By the National Resources Board, June 1935. 310 pages, 9¼ by 11½ inches. Illustrations from maps and graphs. Paper binding. Washington, D. C.: 1935: U. S. Government Printing Office. 75 cents.

This is the official report of the National Resources Board as addressed to the President of the United States. It has been compiled from circulars of the National Planning Board and National Resources Board, and from reports of State planning and land planning consultants, official publications of the State planning boards, and from special statements and reports prepared for this purpose.

FORMS FOR ARCHITECTURAL CONCRETE. 64 pages, 8¼ by 10¼ inches. Illustrations from diagrams and photographs. Paper binding. Chicago: 1936: Portland Cement Association. No charge.

The rapid progress made in devising better forms in which to pour concrete has gone ahead of the printed records. Architects in the East, for example, apparently know all too little of the intricacies devised by Pacific Coast men in applying the waste mold. Here is a booklet which brings together the latest knowledge and experience with these new techniques.

HOUSING OFFICIALS' YEARBOOK 1936. Edited by Coleman Woodbury. 244 pages, 6 by 9 inches. Chicago: 1936: National Association of Housing Officials, 850 East 58th Street. \$2.

The second annual effort to summarize in one volume the significant events in housing activities. The editor, Coleman Woodbury, is Director of the National Association of Housing Officials. The names of those who have contributed signed chapters to this outline are well known in connection with the housing movement, not only in America, but abroad.

THE FLORIDA UNIFORM MECHANICS' LIEN ACT. By Myron H. Lewis. 58 pages, 8½ by 10¾ inches. Flexible binding. New York: 1936: Rugere Press. \$2.

In an attempt to clear a situation in which there are wide variations of lien laws in the forty-eight states, a commission under the Secretary of Commerce undertook to draft an act which would serve as a pattern. Florida is the first state to adopt this with, but one slight change, and in this form it is presented.

UNDERWRITING MANUAL. 327 pages, 6 by 9 inches. Illustrations from diagrams. Paper binding. Washington, D. C. 1936: Federal Housing Administration. No charge.

The Federal Housing Administration has compiled this guide to the proper procedure for underwriting and valuation by its agents under Title II of the National Housing Act. Since this is the most comprehensive effort to put appraisal upon a uniform basis for the country as a whole, it should displace other and less carefully devised systems.

SUBSISTENCE HOMESTEADS. Edited by the International Housing Association. 112 pages, 8¼ by 11¾ inches. Illustrations from drawings, maps, and photographs. Pamphlet binding. Stuttgart, Germany: 1936: Julius Hoffmann. RM6.

The International Housing Association has chosen this question of land settlements as one of the themes for the International Housing Congress in Prague. Answering a specific questionnaire, authorities in various countries have summed up their theories and actions in this particular branch of housing. Coleman Woodbury, Director of the National Association of Housing Officials, speaks for the United States.

CHICAGO BUILDING COSTS. By Eugene and Max Fuhrer. Preface by The Board of Governors of the Appraisers Division, The Chicago Real Estate Board. 193 pages, 8¾ by 11¼ inches. Illustrations from photographs, plans, and diagrams. Flexible binding. Chicago: 1935: The Chicago Real Estate Board, 32 West Randolph Street. \$10.

The Chicago Real Estate Board has brought together a working tool for estimating costs of existing buildings. The system provides a division of the major subject into classes, and the breaking up of each class into unit items of cost, both as to square-foot floor area and a cubic-foot basis.

DISTINGUISHED HOUSES OF MODERATE COST. Edited by Raymond T. B. Hand. 85 pages, 10 by 14 inches. Illustrations from photographs and plans. Spiral binding. New York: 1936: Robert M. McBride & Company. \$3.

A collection of excellent plates reprinted from *Arts and Decoration*, and tied together with a brief summary of trends in our domestic architecture.



Burrowes Rustless Screens

CUSTOM MADE FOR EVERY USE

Smartly-designed smaller houses — such as the one shown above — are today usually equipped with Burrowes Rustless Screens. Architects realize that Burrowes Screens are as *essential* in such houses as in the most costly private residence or public building.

In business since 1873, the Burrowes Corporation today produces the highest quality custom-made screens of every type, including — wood-frame screens, metal-frame screens, rolling screens, screen doors and screens for porches. Burrowes Rustless Screens frequently give first-rate service for 40 years or even longer.

Architects...

Always include screens in your original drawings. And be sure to specify BURROWES. Our factory-trained representatives will gladly assist you in your screen problems. Write today for free details about Burrowes' inside all-metal storm sash. It's new, important!



THE Burrowes Corporation

72 FREE STREET, PORTLAND, MAINE

TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES



PHOTO: EUROPEAN

BUILDING MATERIAL OF GARBAGE

Willis Aretz has secured a monopoly on all garbage collected in the city of Berlin, for use in the manufacture of a wallboard which he has invented. It is claimed that it can be sawn, nailed and painted in a manner similar to various other such products. 642M

line treatment which is both utilitarian and decorative. The hardware is essentially functional, the design is unified, and they are easy to clean and operate. In the lavatory, the extraneous decorative hardware and fittings have been eliminated. The waste and water con-

trol fittings have been combined and incorporated as an actual panel in the porcelain section of the lavatory itself. The opening of the lavatory bowl is semi-circular. The flat side of the semi-circle at the front of the lavatory allows for ample shelf space without reducing the capacity for water supply. Three different types of bases have been designed—a pedestal type base and two variations of a metal tubular base. The side of the tub is bowed out providing a seat in the center at one side. Hardware fittings are mounted on a simple wall plate escutcheon. The tub is made for application either in a three-wall or a two-wall installation. A shower nozzle throws an oval spray and concentrates the spray in the tub. The water closet bowl is set into a cradle which acts as a support for the water tank. Piping and mechanics are concealed by a small rectangular-shaped box incorporated in the main body of the water closet. On the lavatory and tub, the words "hot" and "cold" do not appear on the faucets. Narrow lines of red and blue designate which is which. 644M

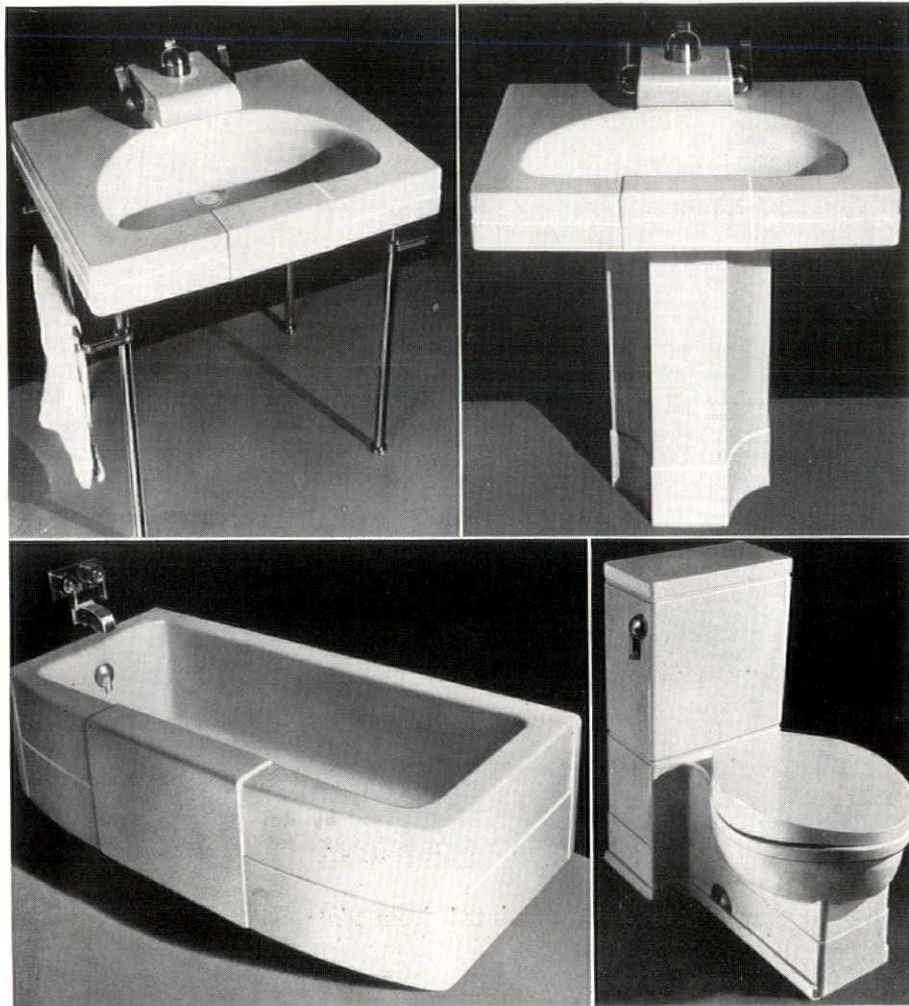
WATERPROOFING MATERIAL

A new type of waterproofing and damp-proofing material consists of Anaconda "Electro-Sheet" Copper, from 2 to 7 oz., coated on both sides with a special acid and alkali-proof compound. The combined product, known as Rubberseal Copper, is said to be exceptionally flexible and to remain so at freezing temperatures. It is unaffected by heat, moisture, or dryness. For many purposes this material is said to bond itself to any dry surface, thus eliminating the need of nailing or other method of attachment. When it is necessary to drive nails through Rubberseal Copper, the compound closes in and around the nail, stopping the passage of air currents or water. This new material is made by the Mitchell-Rand Manufacturing Corp., New York. 643M

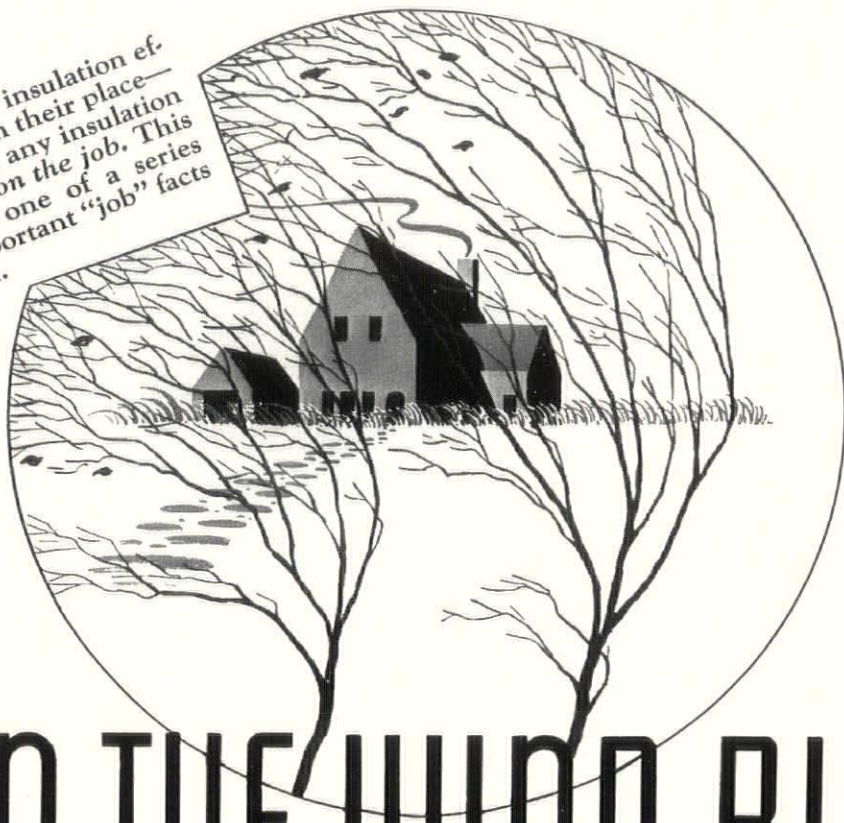
PLUMBING

MODERN PLUMBING FIXTURES

Utilitarianism combined with the modern has been achieved in a new line of plumbing fixtures designed by Henry Dreyfuss, well-known industrial designer, for the Crane Company, Chicago. The new fixtures consist of three units, tub, lavatory and water closet. They are related in design by a band and

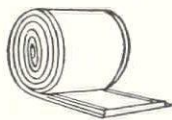


● Laboratory tests of insulation efficiency are useful in their place—but the final test of any insulation is what it will do on the job. This advertisement is one of a series dealing with important "job" facts about insulation.



WHEN THE WIND BLOWS

Does Insulation really INSULATE?



Your clients buy insulation as a *permanent* investment. But we all know that insulation cannot give lasting protection if, as time goes on, it leaves loopholes for the wind to blow through.

There are two reasons why Balsam-Wool is *windproof*. First, it is sealed in a covering which wind cannot penetrate. Second, it is firmly *fastened* in place. It cannot settle as do fill types of insulation. It tucks into every crack and crevice,

and remains in place regardless of movement of framing members.

Balsam-Wool is also *waterproof*—condensation within the walls of a structure cannot rob it of its efficiency. In addition, it is verminproof and non-combustible. Available in three thicknesses, it allows you to specify the *economical* amount of insulation for any structure. Complete facts, for your file, are yours for the asking. Write us for the whole story!



WOOD CONVERSION COMPANY
Room 159, First National Bank Building
St. Paul, Minnesota

BALSAM WOOL

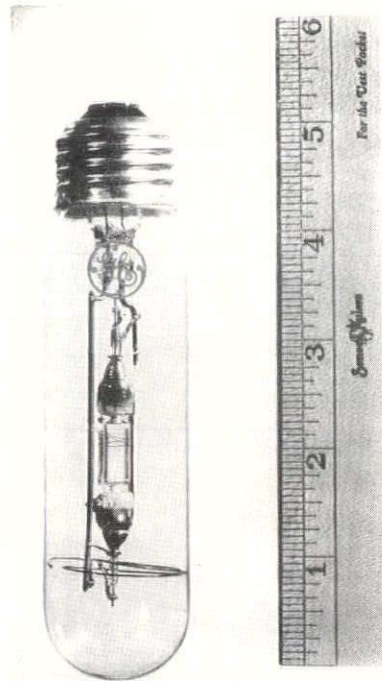


Made By The Makers of
NU-WOOD

WOOD CONVERSION COMPANY

ST. PAUL . . . MINNESOTA

Products of Weyerhaeuser



MERCURY LAMP

A new 85-watt mercury lamp having a light output of 3000 lumens and a high unit brightness has been introduced.

The new lamp represents the latest step in broadening applications for bulb-type mercury lamps, and will find its initial application for scientific and industrial purposes. The actual light source is a minute column of mercury vapor, less than an inch long, raised to an exceptionally high brightness within a sealed quartz tube. This quartz tube is mounted within a Standard T-10 bulb (5½ inches long and 1¼ inches in diameter) equipped with a standard screw base. Light from the new lamp possesses color characteristics generally similar to other mercury lamps. Although there is somewhat more red radiation present, the light is still predominantly "bluish" in color quality. The bulb operates through a ballasting type of transformer on standard A.C. circuits. It is a product of General Electric Vapor Lamp Co., Hoboken, N. J. 645M

INDIRECT LIGHTING UNITS

The Guth Utility Lite and Guth Public Service Lite, two new shallow indirect units, have scientifically designed aluminum reflectors, gracefully curved. The inside of the bottom part of the



bowl is finished in highly polished specular Alzak, providing a reflector which utilizes the light rays to the fullest extent. The broader portion of the inside of the reflector has a diffuse Alzak finish, giving a wide distribution of light. The Utility Lite (illustrated) has a polished band encircling the lower portion of the bowl, concealing port-holes which illuminate the exterior with a soft pleasing effect. The Public Service Lite is identical except for this feature.

(Continued on page 106)

HOUSES with long-term mortgages need long-term ROOFS

In terms of final cost and lasting protection, **A COPPER ROOF OF KENMAR SHINGLES** is a wise selection. It better protects *all* interests involved in construction, financing and home ownership.

Copper will outlast the building it protects. As a roofing material, in Kenmar's practical shingle form, it offers many other functional advantages.



Kenmar Copper Roof. Tuck Shop, St. Georges School, Newport, R. I. Architect: W. T. Aldrich.

A Kenmar Shingle Roof *stays* weather-tight. Copper Shingles will not curl, split or absorb moisture, hence offer real protection to insulation and interior. Copper gives added fire protection and, when grounded, protects against lightning.

No other roof material gives *all* of the 12 advantages secured with a Kenmar Copper Roof.

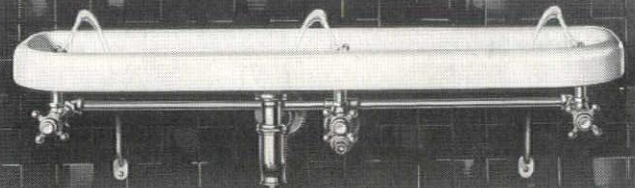
Consult Sweet's—Section 8-36. Write for literature.

The New Haven Copper Co.

MANUFACTURERS OF SHEET COPPER SINCE 1849

Seymour, Conn.

THE FIRST NAME IN FOUNTAINS



THE LAST WORD IN UTILITY •

A FOUNTAIN that is modern in the spirit of its design and yet intensely practical in its three projectors, so as to provide maximum convenience and utility! It's a Halsey Taylor, of course, one of many specially designed for public and parochial schools. Incorporated in its features are PRACTICAL AUTOMATIC STREAM CONTROL and TWO-STREAM PROJECTOR — water never too high, never too low, always *health-safe* and free from contamination. In addition it is non-squirting and tamper-proof! As for our new catalog!

THE HALSEY W. TAYLOR CO., WARREN, OHIO

HALSEY TAYLOR
Drinking Fountains



Architectural Drawing

A PRACTICAL HANDBOOK FOR STUDENTS AND OTHERS

By G. GORDON HAKE, F. R. I. B. A., and E. H. BUTTON

The authors' aim in compiling the present work has been to condense within a reasonable scope, at a price within the reach of all students, such essential data as will form a solid grounding in this important and varied branch of architectural training.

There has hitherto been no satisfactory, concise text-book on the subject dealing with geometry from the point of view of the young architect, and it was with a view to remedying this deficiency that the volume was first conceived—gradually, however, the field was extended so that the book now covers the whole subject of Architectural Drawing.

With 96 pages of text, 8 pages of half-tone illustrations, and many line illustrations throughout, about 150 drawing figures in all. 6 x 8½ inches. Cloth, \$3.75

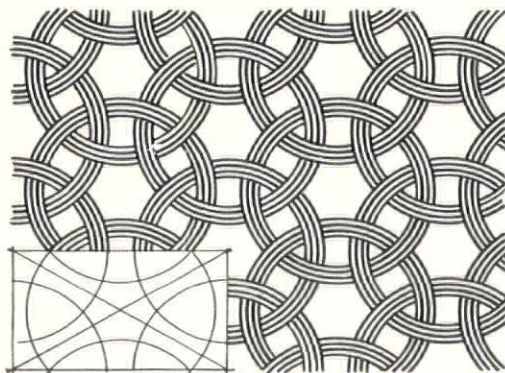
Abstract Design

A PRACTICAL MANUAL ON THE MAKING OF PATTERNS

By AMOR FENN

MR. FENN'S book is both constructive and analytical. It shows how the use of a few simple units may be elaborated indefinitely into original variants, and how even the most elaborate may be nearly always reduced to a judicious arrangement of quite simple motives. His long experience as a teacher has fitted him perfectly to produce what is the most concise yet comprehensive treatment of the subject of Abstract Design yet issued.

The author is a simple and explicit writer, and the thesis of the book is conveyed by a mass of comparative illustrations, nearly



With a frontispiece in color and over 460 illustrations from drawings and design, principally by the author, including diagrams, analyses of patterns in various stages, motives, finished designs, historic examples, instruments, etc., etc.

Price, \$4.50

all of which have been specially drawn for the book by the author and assistants. A number of useful historical examples are reproduced photographically, and there are numerous diagrams and drawings of instruments, motives, methods, spacing, etc. Students, teachers, designers, craftsmen, and, in fact, all who have to do with the subject will find the book a wonderful repository of patterns, besides a succinct analysis of the fundamental principles underlying this type of designing, without a thorough understanding of which no really fine work can be evolved.

CHARLES SCRIBNER'S SONS, New York

TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES

These fixtures, in diameters from 14 to 22 inches, accommodate lamps from 200 to 750-1500 watt capacities. Both units are made by Edwin F. Guth Company, St. Louis, Mo. 646M

HEATING

ANTHRACITE STOKER

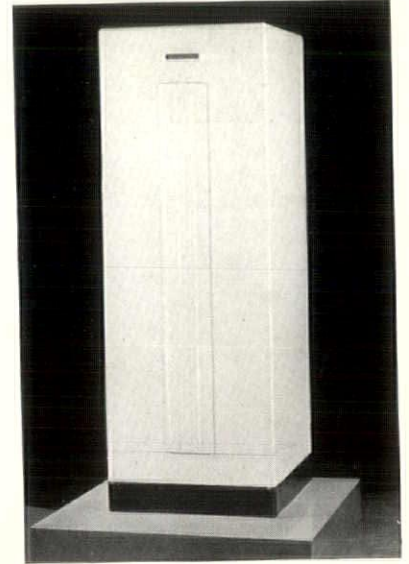


The Anchor Stove and Range Co., New Albany, Indiana, has announced a new anthracite model of the Anchor Kol-stoker. It is furnished in either the

standard type or with automatic ash removal. It is designed for use with steam, vapor, warm air or hot water heating systems, or high-pressure boilers. Special features of the unit include the Oilmotor Drive, which is said to assure silent operation; the cabinet, which is lined with special soundproof insulation; the Feed Worm Inspection Plate, which makes it easy to remove obstacles from the coal feed mechanism; the sectional burner head, which permits expansion and contraction without cracking or warping; the low hopper; and the safety of the cabinet design which completely encloses all working parts. 647M

ELECTRIC WATER HEATERS

Among many new features of construction and design in the new Empire line of electric water heaters is that of the square type exterior casing which allows the heater to set flush with walls and cabinets of modern all-electric kitchens. Finished with high-temperature white Dulux, the new models have a snow white exterior that harmonizes



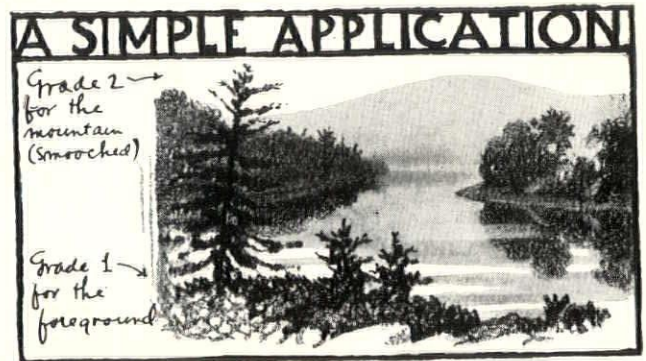
with any color combination. A fluted vertical panel on the front of the heater serves as a cover plate for the heating element openings, as well as adding to the general design of the overall heater body. In the top cover, a 1 3/8" knockout (Continued on page 110)

ANOTHER *Koh-i-noor* PRODUCT

DESCRIBED BY A. L. GUPTILL



EVERY MONTH sees so many new and enthusiastic users of the Hardtmuth Black Chalk that it has proven necessary to offer it in several forms. Pencil No. 190 A (pictured above) comes in 5 degrees (1, 2, 3, 4, 5), selling at 10 cents each. The Ever-pointed carbon pencil below (No. 39 B) is 35¢; the leads (No. 2601) are 25¢ for 6. In stick form (No. 194), it comes in degrees 1, 2 and 3, selling for 5¢ each. All of these black chalk (carbon) leads are of exceptionally fine quality. Try them yourself! CARBON PENCIL WORK HAS NO SHINE



KOH-I-NOOR PENCIL CO., INC.

• 373 FOURTH AVE. • NEW YORK • N. Y. •

NEW CATALOGS...

Readers of AMERICAN ARCHITECT and ARCHITECTURE may secure without cost any or all of the manufacturers' catalogs described on this and the following page by mailing the prepaid post card printed below after writing the numbers of the catalogs wanted. Distribution of catalogs to draftsmen and students is optional with the manufacturers

Lighting

1025 . . . The complete line of Kliegl theatrical, decorative and spectacular lighting equipment is illustrated and described in Catalog 40, a comprehensive 96-page manual issued by Kliegl Bros. Universal Electric Stage Lighting Co., Inc., New York. Stage lighting, studio lighting, outdoor lighting, church illumination, picture lighting are representative of the many subjects covered in this book. Dimensional data, list prices and specifications are included.

Linoleum

1026 . . . Supplementary patterns in the Sloane-Blabon Inlaid Linoleum line are shown in a new catalog issued by W. & J. Sloane, Selling Agents Division, New York. The patterns are reproduced by a process which duplicates the lustrous sheen of waxed finish linoleum. New patterns in Inlaid Linoflor Rugs, Heavy Inlaid, Marbled Inlaid, Standard Inlaid, Linoflor Inlaid, Jaspé and Printed Linoleum are included.

Stokers

1027 . . . Three new booklets on automatic firing with bituminous coal, for boilers up to 300 H.P., have been printed by Link-Belt Company, Chicago. Booklet No. 1541 covers the series of automatic coal burners for the home; another (No. 1537) shows applications of Link-Belt stoker firing to commercial heating plants; and the third (No. 1538) covers automatic generation of process steam, high or low pressure.

Painting Specification Manual

1028 . . . Complete specifications for painting, varnishing, enameling, and lacquering are contained in the fourth edition (revised) of the Specification Manual issued by Pratt & Lambert, Inc., Buffalo, N. Y. The specifications cover general conditions, exterior work and floors, interior floors, trim and work, plaster walls, canvased walls, industrial walls. Filing size; A. I. A. File 25-C.

Precast Gypsum Slabs

1029 . . . Bulletin 36c issued by Structural Gypsum Division, American Cyanamid & Chemical Corp., New York, gives data on Gypsteel Plank, precast slabs for floors, ceilings and roof decks, partition tile and plasters. Dimensions, specifications and details are given. Filing size; 28 pages; A. I. A. File 10.

Gypsum Lath

1030 . . . The fire-resistive story of gypsum, the results of Bureau of Standards fire tests, and a discussion of the physical properties of gypsum lath, the bracing it provides to the structure and its resistance to impact, are all contained in a new 12-page catalog issued by Gypsum Association, Chicago. Complete specifications are also included.

Store Fronts

1031 . . . Over 250 pictures illustrating a wide variety of store fronts in 17 countries feature "The Kawneer Book of Store Fronts" recently issued by The Kawneer Company, Niles, Michigan. Brief descriptions and illustrations of Kawneer Store Front Constructions are also given. Filing size; A. I. A. File 26-B-1.

Wires and Cables

1032 . . . A handy wiring data book has been made available through the Anaconda Wire and Cable Co., New York. It contains an introduction and general description of insulation characteristics; tabulation of all products with key to approved or recommended specific applications; and tables showing specific wire and cable requirements for major types of buildings.

Metal Lath

1033 . . . A new booklet, describing the uses of metal lath and plaster, both for new construction and modernizing, has been received from Metal Lath Manufacturers Assn., Chicago.

Entrances

1034 . . . A portfolio of distinctive entrances in ornamental bronze, aluminum, nickel silver, stainless steel and monel metal, created by Ellison Bronze Co., Inc., Jamestown, New York, has been recently published. Filing size; A. I. A. File 16-A.

Stationary Roof Ventilator

1035 . . . The design and structural features of the new Burt Free-Flow Gravity Ventilator are described in a four-page folder issued by The Burt Mfg. Co., Akron, Ohio. A table of capacities is included. Filing size; A. I. A. File 12-K.

Metal Moldings

1036 . . . Pyramid Snap-On Moldings in chromium, stainless steel, copper, bronze and brass are featured in a 12-page catalog recently released by Pyramid Metals Company, Chicago, Ill. Application data, patterns available, and illustrations of typical installations are included. Filing size; A. I. A. File 16-E-2.

Service Station Lighting

1037 . . . Benjamin Electric Mfg. Co., Des Plaines, Ill., has published a 34-page, filing-sized booklet, which describes the principles of design and methods of using floodlighting in service stations. It explains how to floodlight grounds and buildings, and how to light pump islands, greasing pits, wash racks, etc. It contains a lighting check chart and complete illustrations, photographs, diagrams, prices and other helpful data.

NO POSTAGE REQUIRED ON THIS CARD

AMERICAN ARCHITECT and ARCHITECTURE

July, 1936

New York, N. Y.

Please have the following catalogs reviewed in this issue sent to me.

Numbers

• I also desire further information about the new products described in this month's "Techniques." . . . (See pages immediately following this insert.)

Numbers

• I would like to have catalogs and information concerning the following products advertised in this issue. (Write page number or name.)

Check here for FREE copy of "WHEN YOU BUILD" booklet.

Name

Firm name

Address

City

Occupation

These NEW Catalogs may be obtained through

AMERICAN ARCHITECT and ARCHITECTURE

Air Conditioning Heating Plants

1038 . . . Data on the advantages, features and physical characteristics of Superflex Oil Burning Air Conditioning Heating Plants are contained in a new 12-page, filing-sized catalog just released by Perfection Stove Company, Cleveland. Brief data on other Perfection oil burning products, including range and refrigerator, are given.

Vapor Heating System

1039 . . . The principal elements which make up the Gorton Single Pipe Vapor Heating System are illustrated and described in an 8-page booklet (Bulletin No. 102) published by Gorton Heating Corporation, Cranford, N. J. Filing size; A. I. A. File 30-C-24.

Pneumatic Spreader Stoker

1040 . . . A pneumatic spreader stoker, which floats "steam" size coal into the furnace on a stream of air, is described in a 12-page catalog (No. 3905) issued by the Iron Fireman Manufacturing Co., Cleveland, Ohio. Included are drawings of typical settings under various types of boilers, and photographs of installations and of single-feed and dual-feed machines. Major parts and controls are also described and illustrated.

Heating Boiler

1041 . . . Kewanee Residence Type R Boiler for bungalows, homes and smaller buildings is described and illustrated in a new 16-page booklet (Catalog 88) published by Kewanee Boiler Corporation, Kewanee, Ill. Ratings, dimensions, detail drawings and specifications are given. Filing size; A. I. A. File 30-C-1.

Electric Water Coolers

1042 . . . The Halsey W. Taylor Co., Warren, Ohio, illustrates and gives mechanical specifications for its line of electric water coolers in a 12-page booklet (Catalog D) recently published.

Plumbing Fixtures

1043 . . . A vivid portrayal of the development of formed metal plumbing ware is contained in an attractive brochure just issued by the Plumbing Ware Division of the Briggs Mfg. Company, Detroit. The brochure, which contains 40 pages in four colors, illustrates numerous examples of model bathrooms and kitchens developed by Briggs Department of Design and Color. Individual fixtures are shown in a variety of colors and styles.

Concrete Tables

1044 . . . A booklet, issued by Pennsylvania-Dixie Cement Corp., New York, contains tables and data designed to enable quick estimating of quantities of materials needed for given jobs, to designate the proper types of concrete to use for various kinds of construction, and to determine how to secure concrete meeting requirements of special specifications as to cement content, maximum water permissible, workability, strength, etc.

Wood Preservation

1045 . . . National Lumber & Creosoting Company, Texarkana, Ark.-Tex., has issued a small folder which briefly outlines the "things you ought to know" about protection against termites and decay. Several types of preservatives and preservative methods are described and simple construction rules for assuring protection against decay and termite attack are given.

Welding High Chromium Steels

1046 . . . The effect of chromium on welding procedures is discussed and the recommended techniques for welding the various types of high chromium steels are presented in a new 8-page filing-sized catalog issued by The Linde Air Products Co., New York. Oxy-acetylene cutting of high chromium steel is also described.

The Bidet

1047 . . . The advantages to personal hygiene of the Nu-Bidet, which is a complete unit of toilet seat, bidet and lid combined and which fits on any size toilet bowl, are set forth in a new booklet issued by Kleensan Corp., New York.

Heating and Air Conditioning Systems

1048 . . . The Trane Co., La Crosse, Wis., has issued a 16-page, filing-sized bulletin describing completely all of its residential heating and air conditioning systems, including the Trane Climate Changer System, the Airite System, the Dual System, and the Orifice and Vapor Convecter Systems. While this bulletin contains much valuable data for the architect, it is written in a non-technical style especially for the consumer.

Roof Resurfacers

1049 . . . An illustrated 32-page booklet has been issued by The Barber Asphalt Co., Philadelphia, describing and giving detailed application instructions on Genasco Resurfacers for built-up asphalt roofing, smooth surfaced roofing, mineral surfaced roofing, pitch and gravel roofing and sheet metal roofing.

Unit Fireplace

1050 . . . The Donley Brothers Co., Cleveland, Ohio, has available a new catalog pertaining to its Heat Saver Unit Fireplace. The advantages and features of this unit are described and illustrated. Details and dimensional data are also included.

Guthfan Conditionaire

1051 . . . The Guthfan Conditionaire, available with or without lighting equipment, is described and illustrated in a new 16-page catalog (No. 7) issued by The Edwin F. Guth Co., St. Louis, Mo. Installation data and list prices are given.

Acoustical Plaster

1052 . . . The essential facts about Rockwall Acoustical Plaster for acoustical correction and sound absorption are given in a new 4-page, filing-sized folder issued by Atlantic Gypsum Products Co., Boston, Mass.

Water Mixing Valve

1053 . . . A preprint of the subject matter to appear in Sweet's 1937 edition has been released by Doran Company, Seattle, Washington. It contains illustrations and complete data on the Doran Safe-T-Showr Thermostatic Water Mixing Valve. Roughing-in diagrams and typical specifications are included. Filing size; A. I. A. File 29-H-31.

FIRST CLASS
PERMIT NO. 5
(Sec. 510 P L & R)
NEW YORK, N. Y.

BUSINESS REPLY CARD

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

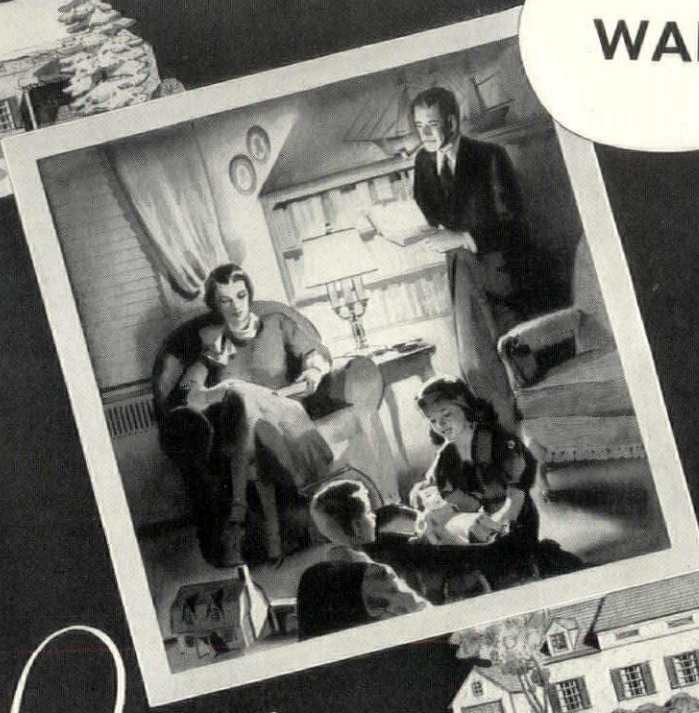
2 c. POSTAGE WILL BE PAID BY

AMERICAN ARCHITECT
and ARCHITECTURE

572 Madison Avenue

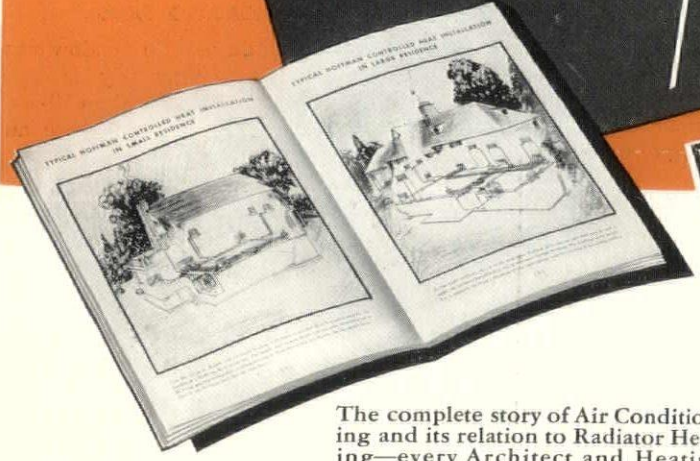
New York, N. Y.

THE BOOK
YOU'VE BEEN
WAITING FOR



Presenting

HOFFMAN CONTROLLED HEAT
with AIR-CONDITIONING



The complete story of Air Conditioning and its relation to Radiator Heating—every Architect and Heating Contractor needs it. An excellent book that will prove to prospects that only Radiator Heat with *auxiliary* Air Conditioning will give them the genuine comfort they expect.

DISTRIBUTED ON REQUEST ONLY
.. SEND THIS COUPON

HOFFMAN SPECIALTY CO., INC.
DEPT. AA-7, WATERBURY, CONN.
Send at once a free copy of your new book on
Hoffman Controlled Heat with Air Conditioning.

Name

Address

City

State

Offered by the makers of Hoffman Venting Valves, Supply Valves, Traps and Hoffman-Economy Pumps

TECHNIQUES

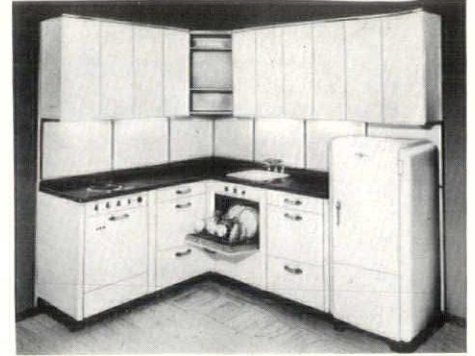
METHODS • MATERIALS • RESEARCH • PRACTICES

has been provided for a temperature relief valve when required. All wiring and plumbing connections are made at the bottom of the heater. When equipped with two Corox units, the heater is controlled by two thermostats, one mounted on each heating unit. Models are available with either galvanized copper-bearing steel or Monel metal tanks. Shredded redwood bark is used as insulation. The five models are presented in this Empire line of square water heaters are manufactured by Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. 648M

PREFABRICATION

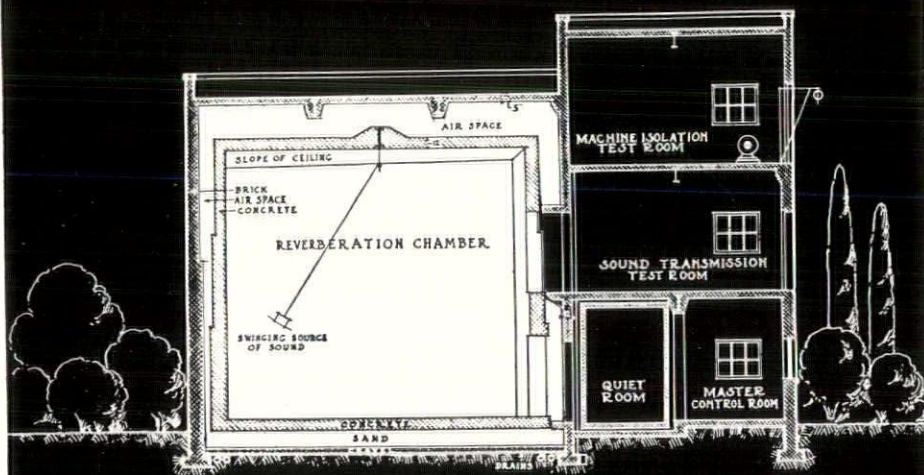
UNIT KITCHEN

The appliance and merchandise department of General Electric Company, Cleveland, Ohio, has announced a new unit kitchen, which includes the electric refrigerator, electric range, electric dishwasher and kitchen cabinets, and which is especially adaptable to low cost houses, apartments, and for home modernization. The individual units can be arranged in any manner desired by the



owner. They can be set side by side along a flat wall or in an L-shape, and they are interchangeable. They can be installed as a packaged article, or may be purchased on the step-by-step plan. The kitchen is of all-steel construction. Adjustable shelves feature the cabinets. Lighting equipment is of the latest design. Work surfaces are of black porcelain on steel and they are resilient. A new type electric dishwasher of a front-loading design which is used in the unit kitchen. Its capacity is sufficient to take care of a 50-piece service. 649M

WHERE SOUND CONTROL BECAME AN EXACT SCIENCE!



Cross section of J-M Acoustical Laboratory Building . . . Headquarters in the War against Noise

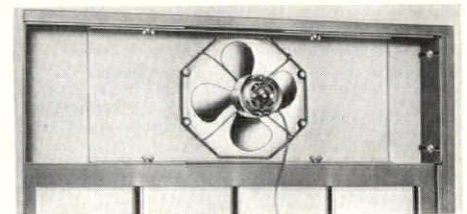
J-M SOUND CONTROL MATERIALS, and the experience of J-M Acoustical Engineers gained in the development of these products, can be of real assistance in solving your own acoustical problems. For here, at Manville, N. J., sound control has progressed from its pioneer stage to an exact science. The fascinating story behind the achievements of this research is told in our booklet, "Noise Fighters," sent on request. Johns-Manville, 22 E. 40th St., New York City.



Johns-Manville

SOUND CONTROL MATERIALS AND ACOUSTICAL ENGINEERING SERVICE

VENTILATING



WINDOW VENTILATING FANS

Two low-priced adjustable window ventilating fans employing newly designed quiet-operating blades, one an 8-inch and the other a 10-inch type, are announced by the General Electric Co., Bridgeport, Conn. Both fans employ a sheet steel frame with sliding end panels that can be adjusted to any ordinary window. The 8-inch fan is adjustable from 23 to 36 inches; the 10-inch fan is adjustable from 25 to 36 inches. Air delivery of the 8-inch fan is 325 cfm. and that of the 10-inch fan 7500 cfm. The motor is rubber-mounted and has self-aligning ball-seat bearings and an oil reservoir that assures proper lubrication. The fans can be mounted quickly and easily and allow the window to be closed in the usual manner. They are finished in cream enamel with nickel trim. 650M

“Tailor-made” Water



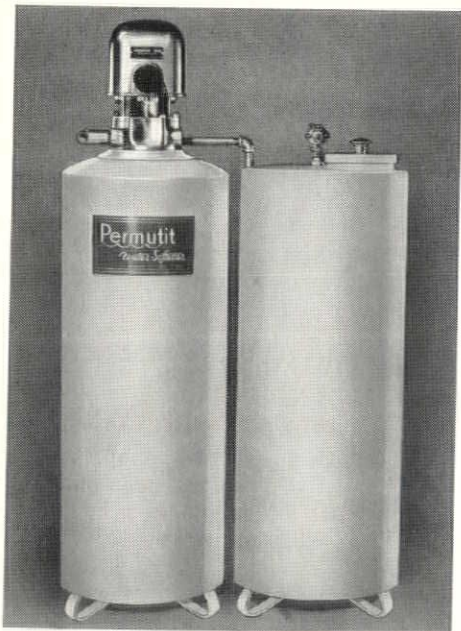
WATER CONDITIONING will remove objectionable hardness, taste, iron, oil, dirt and odor. Specified characteristics can be added. Corrosion can be checked.

NO ELEMENT can be more conducive to dissatisfaction on the part of your client than recurring difficulty and expense with the plumbing. Yet the characteristics of the water handled can completely ruin a plumbing installation which is otherwise carefully planned.

The Architect cannot be a specialist in the highly technical art of water conditioning. But he can rely absolutely on the ability of the Permutit organization to furnish reliable advice, and equipment to

“tailor” any water supply to meet any requirements for any structure — whether factory, commercial building, institution, power plant, natatorium, apartment house, hotel or private dwelling.

Permutit is the oldest and largest organization specializing in all types of water conditioning service. Special Permutit bulletins, respectively covering the principal phases and applications of water conditioning, are available on request. Use the coupon below for information desired.



Fully automatic Permutit Water Softener provides perfectly softened water under permanent electric control.

Permutit Water Conditioning Equipment

THE PERMUTIT COMPANY, Dept. AA
330 West 42nd Street, New York, N. Y.

Please send me information about Permutit Water Conditioning for—

Private Dwellings Apartment Houses Hotels
Industrial Plants Power Plants Hospitals

(If your problem does not fall in one of the above groups, please describe briefly here) _____

Name _____

Firm _____

Address _____

TECHNIQUES

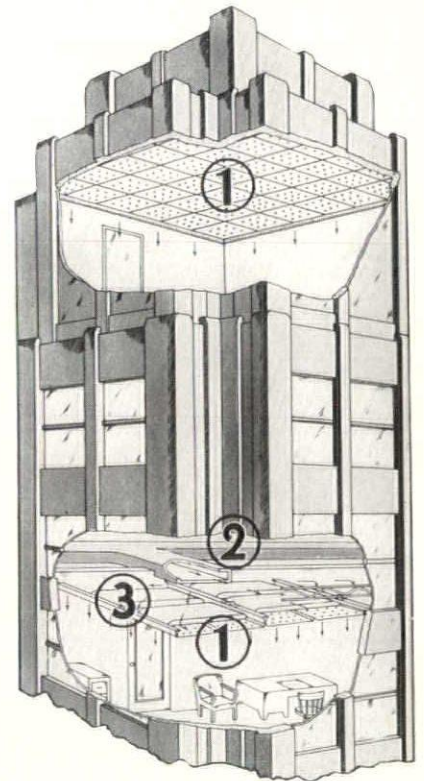
METHODS • MATERIALS • RESEARCH • PRACTICE

AIR DISTRIBUTION-SOUND ABSORPTION SYSTEM

A new system of air distribution which is said to solve, with one type of construction, the dual problem of air circulation without drafts and the quieting of occupational room noises, has been devised. This system comprises a perforated ceiling made of a suitable architectural surface installed slightly below the normal ceiling level of the room. Between the perforated sheet and

the room ceiling is a sound absorbing material that is installed with sufficient clearance to provide a space between this sound absorbing material and the ceiling. This space provides a plenum chamber into which air is introduced through ducts from the ventilating fan.

A uniform, low static pressure is maintained in this plenum chamber and suitable means are provided to cause the air to pass to the underside of the sound absorbing material without passing



through it, and thence through the myriads of small openings in the perforated sub-ceiling into the room. Room noises, upon reaching the perforated metal ceiling, seep through the small perforations and encounter the resilient sound absorbing material placed behind the perforations. These sound waves are absorbed causing a reduction in the noise level of the room. Noises of the ventilating system are also absorbed. The new system is applicable to all air conditioning installations in office buildings, hospitals, restaurants, auditoriums and other places where the dual problem of ventilation and acoustic treatment must be solved. Known as Burgess Acousti-Vent, this system has been devised by the C. F. Burgess Laboratories, Inc., of Chicago. 651M



will be
created with

Castell

DRAWING PENCILS

If H. G. Wells' forecast for the future seems amazing . . . consider what our modern world would have seemed like to our 18th Century forebears, had they been able to visualize it.

In 1761, when the house of A. W. Faber was founded, the world was still a comparatively simple place. But when man's imagination took wing he required drawing materials that would give graphic expression to his genius. Thus began the alliance between A. W. Faber and architects, engineers, artists, draftsmen and designers. The epitome of 175 years of pencil perfection, "Castell" is the choice of pencil craftsmen the world over. We feel it is no rash prediction to say that "Castell" in the future, as in the past, will keep pace with "Things to come".



No. 9022 "Castell" Artists' Refill Pencil and No. 9030 Leads . . . in 16 degrees. Note the knurled grip which prevents slipping, enables you to work smoothly and evenly. U. S. Pat. Office Trade Mark 323640.

A. W. FABER INC. ★ Made in Bavaria in 18 degrees
NEWARK, N. J.

MISCELLANEOUS

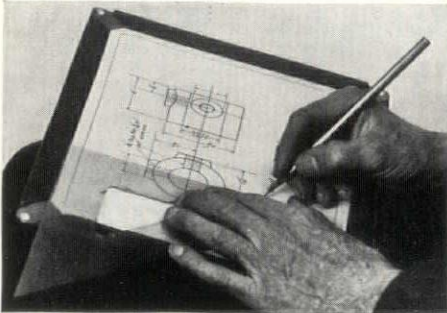
RESIDENCE COMMUNICATOR

A new low-priced communicating system, known as Belfone, simplifies communication with butler, cook, chauffeur or gardener for the owner of large residence. By tripping a key the voice is transmitted to the other part of the house and is clearly and distinctly heard by the other party, who in turn can reply from whatever point he may be standing. It is all accomplished by a simple hook-up of several standard, compact units. By different combinations of the units various multiple

TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES

station systems can be provided. The Belfone system is manufactured by Bell Sound Systems, Inc., Columbus, Ohio. 652M



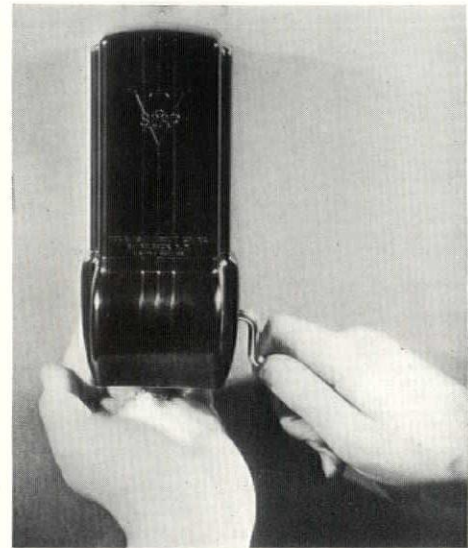
PORTABLE DRAWING BOARD

The new "Pretty Neat" Drawing Board weighs less than a pound and, being only a quarter of an inch thick, can be carried in a brief case. No thumb tacks or "T" square are required. The ends of the triangle guide strips which form the border of the board, and the spring paper clamps are so formed that they

elevate the corners of the triangle above the adjacent side, giving absolute freedom of movement of the triangle beyond the limits of the drawing board. The triangle need not be lifted as it is swung from position to position by rocking it over its right angle corner. The spring paper clamps are lifted by pressure on small buttons provided on the back of the board. Several sizes are available: letter paper size, 8½" x 11", drawing paper size, 9" x 12" and patent drawing size, 10" x 15". Other sizes made to order. H. E. Twomley, Riverside, Calif., is the designer and manufacturer of this device. 653M

SOAP PULVERIZER

Announcement has been made of a new soap pulverizer for lavatory use in home, office or factory, which at the twist of a small crank converts a cake of soap contained within a molded Textolite housing into pulverized form and feeds it into the hands of the user. A fresh cake of soap can be easily inserted since the entire front of the dispenser may be removed when reloading



is necessary. There are said to be 1000 handwashings in each cake of this specially prepared soap. The housing is modern in appearance and is custom-molded for the Voorhis-Tiebout Co., Inc., Rhinebeck, N. Y. by the Plastics Department of General Electric Company. 654M



Genasco Trinidad Bonded 10-Year Built-up Roof, Pepsodent Company Plant, Chicago.

Architect: F. C. Folts, Chicago.
Roofing Contractors: Knauf & Weber Roofing Co., Chicago.
General Contractors: Clearing Industrial Districts, Inc., Chicago.

It's the Top

FOR a really fine roof on a really fine industrial plant the Pepsodent people selected a Genasco Standard Trinidad Built-up Roof.

Genasco Standard Trinidad Built-up Roofing is constructed with alternate layers of Genasco All-Rag Felts and Trinidad Lake Roofing Asphalt.

Trinidad Lake Roofing Asphalt, the waterproofing factor of a Genasco Standard Trinidad Built-up Roof, has been used successfully for almost a half of a century. This material is stable and resistant to roofing's worst enemy—the ultra-violet rays of the sun. That's why Genasco gives such long service.

An interesting book—"For Your Roof"—will be sent if you return the coupon below.



Genasco
Reg. U. S. Pat. Off.

**STANDARD TRINIDAD
Built-up Roofing**

Roof security is felt with Trinidad



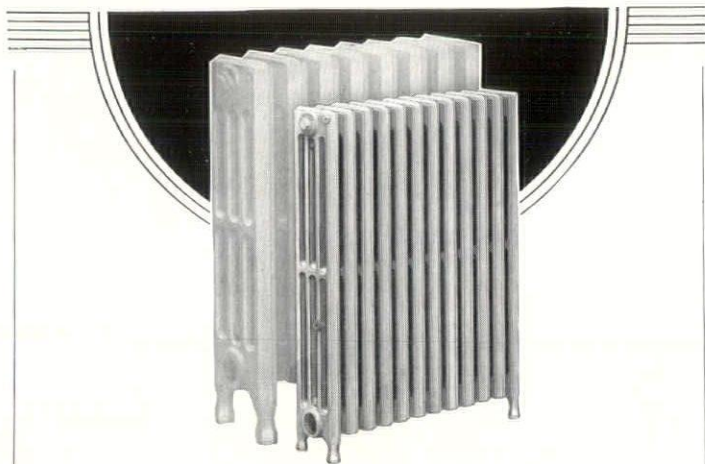
THE BARBER ASPHALT COMPANY
1600 Arch Street, Philadelphia, Pa.

AA7

Please send me a copy of your illustrated book, "For Your Roof," which carries illustrations of many prominent buildings in all parts of the country protected with Genasco Standard Trinidad Built-up Roofing.

Name

Address



**Definite Room-Saving
Figures
on the
Burnham
Slenderized Radiators**

A LTHOUGH made of cast iron, the **new** Burnham Slenderized radiators take up exactly 40% less room than the **old** Tube Type radiator.

A four column **old** Tube Type is 10 inches deep. The **new** Burnham Slenderized four column is but 4-7/16 inches deep.

A five column **old** Tube Type, 12 inches. The **new** Burnham Slenderized five column but 5-11/16 inches. The Burnham Slenderized three column is but 3-1/4 inches deep. They are also proportionately lower in height.

The three and four tube ones can be recessed between studding and not extend beyond the face of the wall.

Furthermore, unbelievable as it may seem, this Slenderized Radiator heats 40% quicker than the old ones that are 40% larger.

The reason is plain enough when pointed out. Glad to tell you about it. Or better yet, send for the Catalog called: "Settling the Argument About Radiators."

Burnham Boiler Corporation

Irvington, New York

Zanesville, Ohio

*Representatives in All Principal Cities
of the United States and Canada*

INDEX TO ADVERTISERS

This index is an editorial feature, maintained for the convenience of readers. It is not a part of the Advertisers' contract and American Architect and Architecture assumes no responsibility for its correctness.

American Brass Co., The.....	Second Cover
Armstrong Cork Products Co.....	13
Ass'n of Gas Appliance & Equipment Mfgs., Gas Water Heater Div.....	115
Barber Asphalt Co., The.....	113
Bethlehem Steel Co.....	18, 19
Bigelow-Sanford Carpet Co., Inc.....	97
Brick Mfgs. Ass'n of America.....	99
Burnham Boiler Corp.....	114
Burrowes Corp., The.....	101
Byers Co., A. M.....	2
Eagle-Picher Lead Co.....	10
Faber, Inc., A. W.....	112
Faber Pencil Co., Eberhard.....	116
Fitzgibbons Boiler Co., Inc.....	1
General Electric Co.....	23
General Insulating & Mfg. Co.....	Back Cover
Hoffman Specialty Co., Inc.....	109
International Cement Corp.....	Third Cover
Johns-Manville	110
Koh-I-Noor Pencil Co., Inc.....	106
Linde Air Products Co., The.....	5
Nelson Corp., The Herman.....	100
New Haven Copper Co., The.....	104
Old Virginia Brick Co.....	7
Otis Elevator Co.....	21
Permutit Co., The.....	111
Pittsburgh Glass Institute.....	20
Portland Cement Ass'n.....	17
Red Cedar Shingle Bureau.....	22
Scribner's Sons, Charles.....	105
Sloane, W. & J.....	15
Sturtevant Co., B. F.....	11
Taylor Co., The Halsey W.....	104
Union Carbide & Carbon Corp.....	5
Vitrolite Div., Libbey-Owens-Ford Glass Co...	9
Wood Conversion Co.....	103

Folks like to forget



*"Thank you,
MR. ARCHITECT!"*



OWNERS want conveniences which they don't have to remember to run. Architects want to specify hot water systems that never cause trouble after the job is installed. Both agree on automatic gas-fired water heaters.

Automatic gas water heaters are now surprisingly economical to run. Their efficiency has been greatly increased. Better designed burners, improved insulation, greater utilization of heat, lower gas rates—all make it possible for you to specify an automatic gas water heater for every home requirement. Their modern appearance and simple connections will grace any basement.

We shall be glad to send you figures on the new economies of modern automatic gas water heaters. These figures have been compiled by unbiased authorities and may be compared with the fuel cost of other systems. Write for comparative costs—and write gas-fired heaters into your specifications.

GAS WATER HEATER DIVISION

ASSOCIATION OF GAS APPLIANCE AND EQUIPMENT MANUFACTURERS • 60 EAST 42nd STREET, NEW YORK

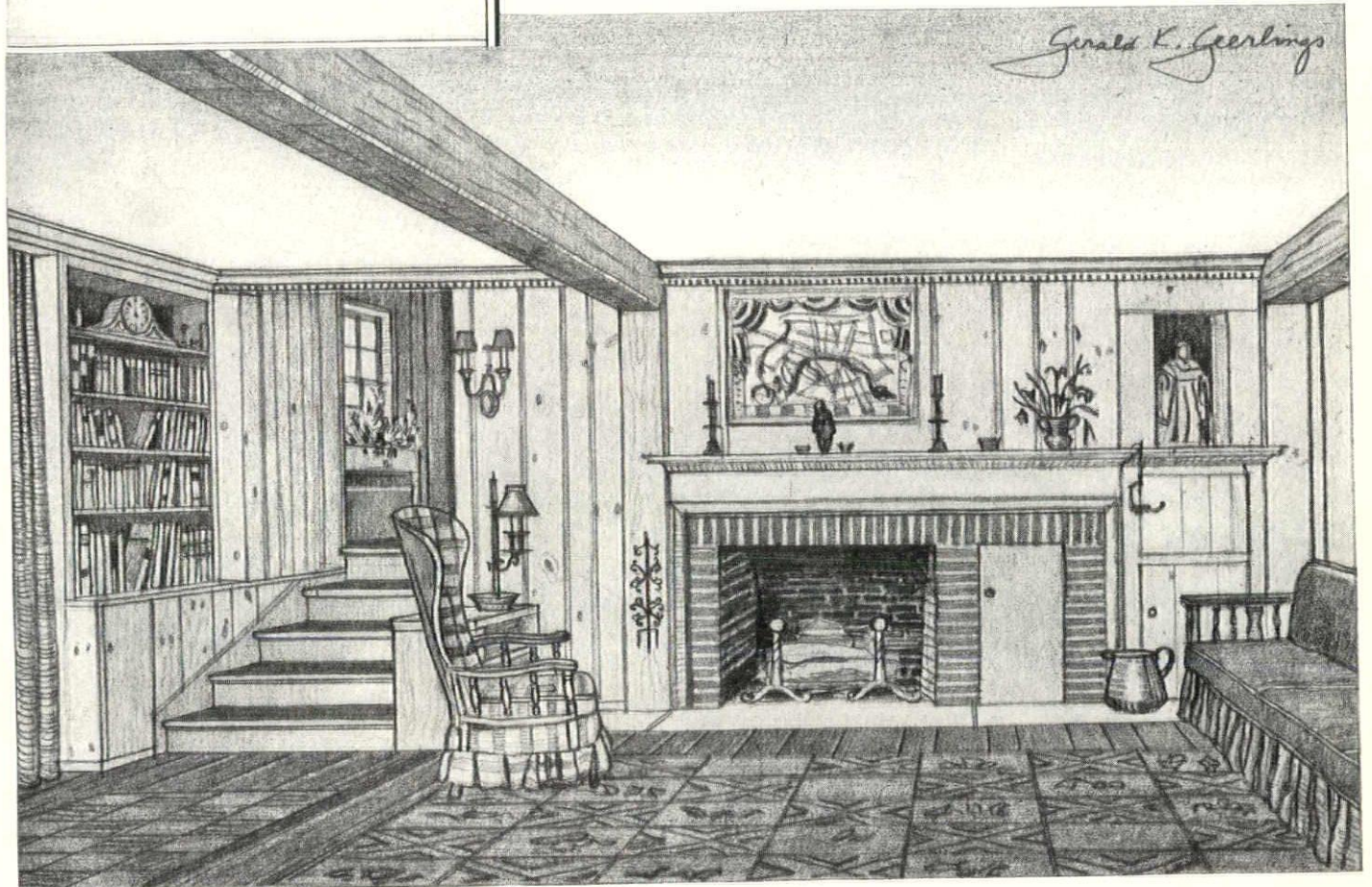
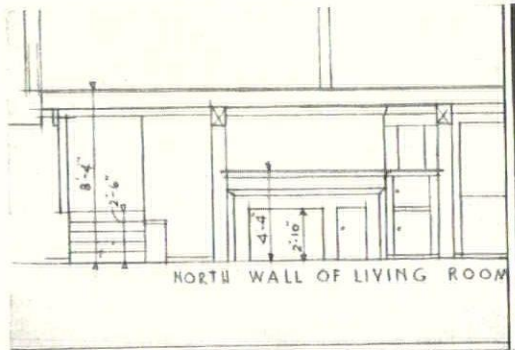
AUTOMATIC GAS WATER HEATER MANUFACTURERS

AMERICAN GAS PRODUCTS CORPORATION
CLEVELAND HEATER COMPANY
CRANE CO., PREMIER HEATER DIVISION
EVERHOT HEATER COMPANY
GAS AND ELECTRIC HEATER COMPANY
GAS EQUIPMENT COMPANY
HANDLEY-BROWN HEATER COMPANY

HOFFMAN GAS & ELECTRIC HEATER COMPANY
HOTSTREAM HEATER COMPANY
HYNES & COX ELECTRIC CORPORATION
LAWSON MANUFACTURING COMPANY
LOVEKIN WATER HEATER COMPANY
J. W. MOORE VALVE CORPORATION
THE PITTSBURG WATER HEATER CORPORATION

RUUD MANUFACTURING COMPANY
SANDS MANUFACTURING COMPANY
SURFACE COMBUSTION CORPORATION
UNITED AMERICAN BOSCH CORPORATION
WELSBACH COMPANY
WHITEHEAD METAL PRODUCTS COMPANY
JOHN WOOD MANUFACTURING COMPANY

Scale Drawing into Interior Perspective



RENDERED INTERIOR

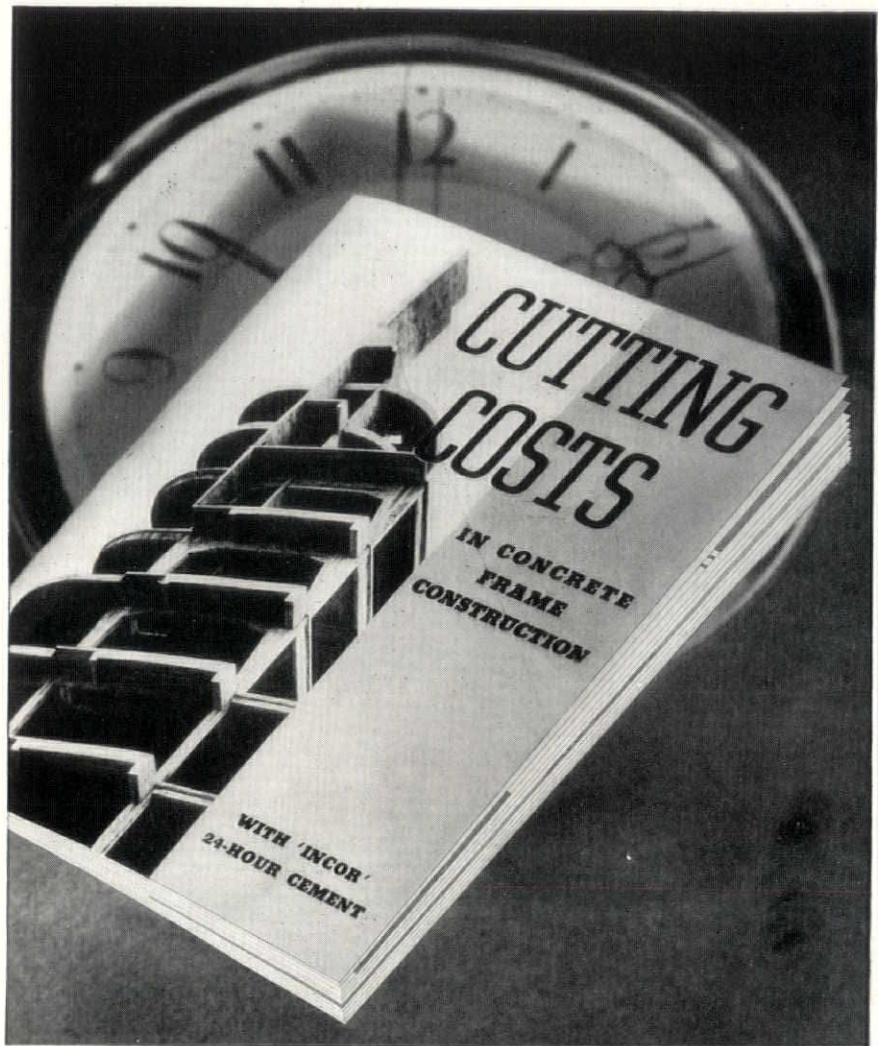
"It is curious that while the architectural delineator is in more constant contact with household furnishings than with volutes, he draws the former with less facility. Furniture is usually so poorly drawn that it detracts rather than adds to the effect of the whole. In an important commission the renderer does well to present the actual furniture which will be used. In any case it is time well invested to draw furnishings from "life," and thereby lay the same groundwork as is done in architectural courses for delineating architectural forms. The most sure procedure is to trace lightly the actual elevation of a room, add what guide lines are necessary for a one-point perspective, and superimpose the furnishings. If it is a conscientious line drawing with tones gradually built up, the rendering is at all times under complete control, with a satisfactory result assured."

GERALD K. GEERLINGS.

THE telephone rings and the next moment you must dash off with your drafting equipment consisting of one or two pencils in your pocket. On the job as you draw vigorously under the client's critical gaze, explaining a detail, sketching his furnishings, or making a sketch of an interior to be altered, the pencil must be equal to its responsibility. On such occasions which demand intense concentration, as well as in long hours of drafting room routine, you will appreciate the dependable qualities of a Microtomic Van Dyke Pencil. The point will not break unless dropped. The wood will sharpen easily. The lead will wear slowly. The tones may be pale or dark, the lines thin or wide. For example, the drawing above was made entirely with a grade B Microtomic on ordinary tracing paper, only one-seventh larger than this reproduction.

MICROTOMIC VAN DYKE
EBERHARD FABER





TIME — THE COSTLY "FOURTH DIMENSION"

Concrete-frame erection is usually considered a "three-dimensional" problem—so many cubic yards of concrete at so much a yard for labor and materials. But here, too, there is a Fourth Dimension—Time. Forms are built, set and filled with concrete. Then, for a week or longer, the job stands still—waiting for the concrete to become self-supporting, so the forms can be stripped, re-assembled and used for the next floor. Thus, if it takes 81 working days to erect the frame of a 6-story building, 39 of them are non-productive—"dead" days when the contractor's fixed overhead expenses run on just the same, adding to the structure's cost.

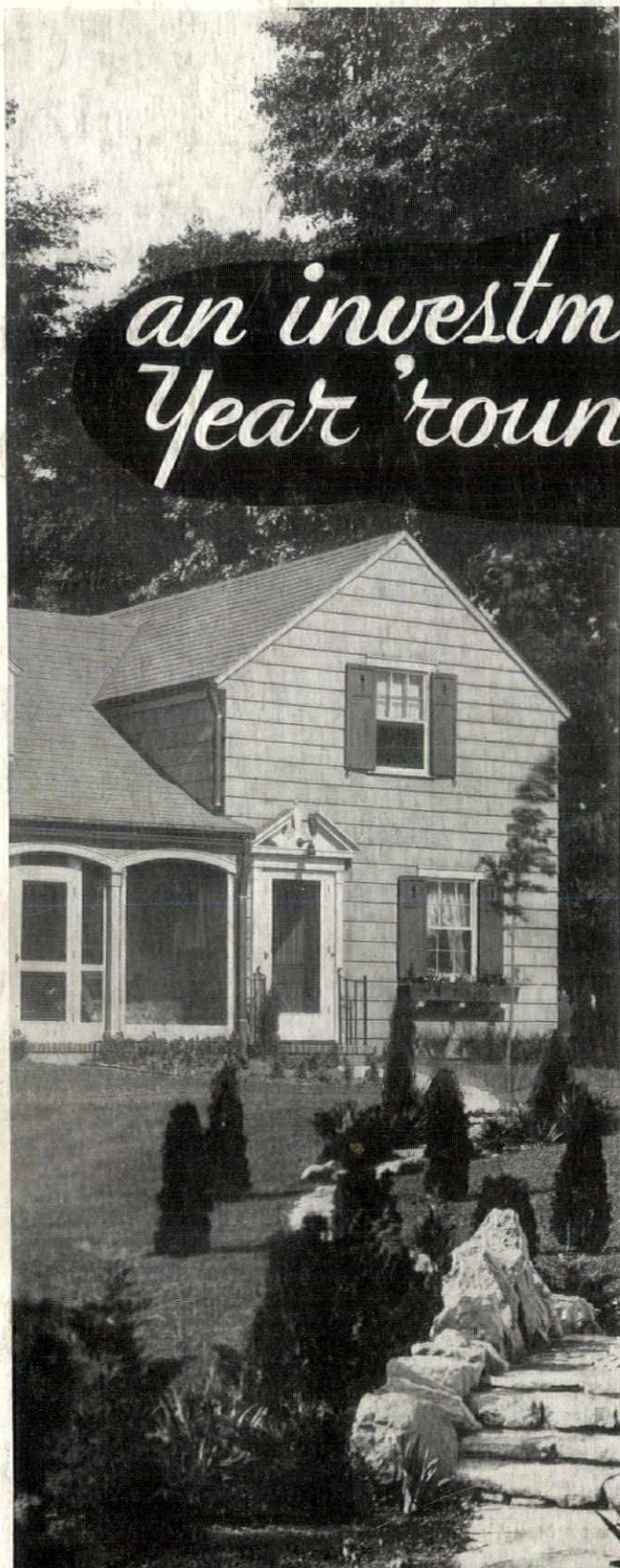
This costly non-productive time is saved by using 'Incor,'* the improved Portland cement, which is self-supporting in 24 hours—permitting continuous construction progress, at a substantial expense saving. Suggesting that contractors be encouraged to estimate under specifications which take full advantage of 'Incor's' dependable high early strength. For simple method of calculating these savings, write for free copy of new, illustrated book, "Cutting Construction Costs"—address Lone Star Cement Corporation (subsidiary of International Cement Corporation), Room 2211, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.

'INCOR' 24-HOUR CEMENT

for low cost
homes, too

an investment in
Year 'round comfort



Outward appearance or "skin-deep" beauty that masks an inefficient or comfortless "inner home" is false economy. True home comfort in the low cost house is just as essential as it is in a house classed in a higher cost bracket.

True home comfort for the low cost house can be specified without involving additional expense. Home comfort, built into the "inner house" with Gimco House Insulation is actually an investment that pays dividends throughout the life of the house. Dividends represented by reduced heating unit cost and by increased comfort all year 'round. Heating costs have been reduced as much as 50% and top floor temperatures have been reduced 15 degrees by this fluffy, wall-thick, fire-proof insulation.

Gimco products have been recognized as leading insulators in industry for over a quarter of a century. The skill and experience of the men who "fathered" Rock Wool from its inception guided the development of Gimco Rock Wool to its present high efficiency as a home insulator.

Through the provisions of the F.H.A. the Gimco Finance Plan provides money for insulation, to be repaid in small monthly installments.

**GENERAL INSULATING
& MFG. CO., Alexandria, Ind.
WORLD'S LARGEST EXCLUSIVE MANU-
FACTURERS of ROCK WOOL PRODUCTS**

Write for File No. 37-b for complete details of the insulation that has pioneered home comfort. Our catalog is filed in Sweets.