AMERICAN ARCHITECT and ARCHITECTURE

September 1936 • The Better House • No. 5 Prefabricated Construction

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Copper Tubes are "the Last Word"

1-*Low Cost* . . Anaconda Copper Tubes, assembled with solder-type fittings, cost (installed) little, if any, more than rustable pipe.

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Hot water conveyed through copper tube loses only about *one-half* as much heat as is lost when black iron is used.

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The maximum amount of heat delivered to radiators in the least possible time.

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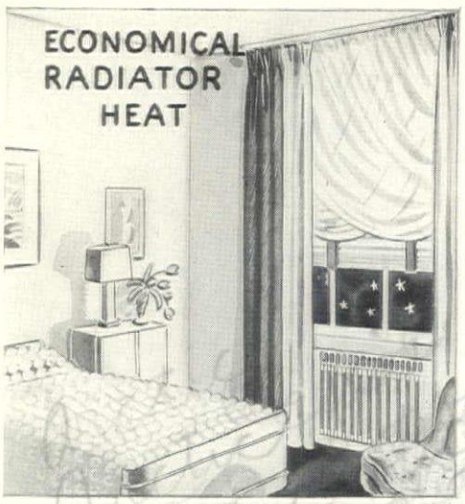
FITZGIBBONS

Boiler-Air Conditioner for "Split Systems"



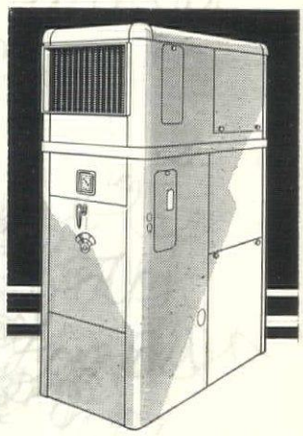
Right in line with the up-to-the-minute view of air conditioning, this versatile unit permits the placing of radiation of those rooms where it is undesirable or unnecessary to supply conditioned air. To all other rooms it will supply cleaned, tempered, humidified, circulated air in the volume desired.

In addition to all this, the Fitzgibbons Boiler-Air Conditioner supplies HOT WATER for kitchen, laundry and bath, ALL YEAR 'ROUND, with no tank or other equipment to mar the appearance of the basement recreation room.

In short, from a single compact and tastefully designed unit, you get CONDITIONED AIR, economical STEEL BOILER HEAT, and automatic, year-'round HOT WATER SUPPLY with no outside equipment. This unique combination of essential functions is proving of tremendous value in the establishing of air conditioning as a normal service in the modern American home.

•

Every architect will want the complete story of this unit. Write us direct, or our representative near you for the new bulletin just off the press.



ANY OIL BURNER is at home in this unit. The jacket has not been enlarged a single inch to provide the required space. When desired, however, the burner can be placed outside the unit.

Every advantage affecting burner performance of the famous OIL-EIGHTY boiler has been retained in this unit.

•

In addition to the unit pictured above, we can supply the FITZGIBBONSAIRE —an individual air conditioning floor unit for use in connection with a Fitzgibbons boiler.

Fitzgibbons Boiler Company, Inc.

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BRANCHES AND REPRESENTATIVES IN PRINCIPAL CITIES

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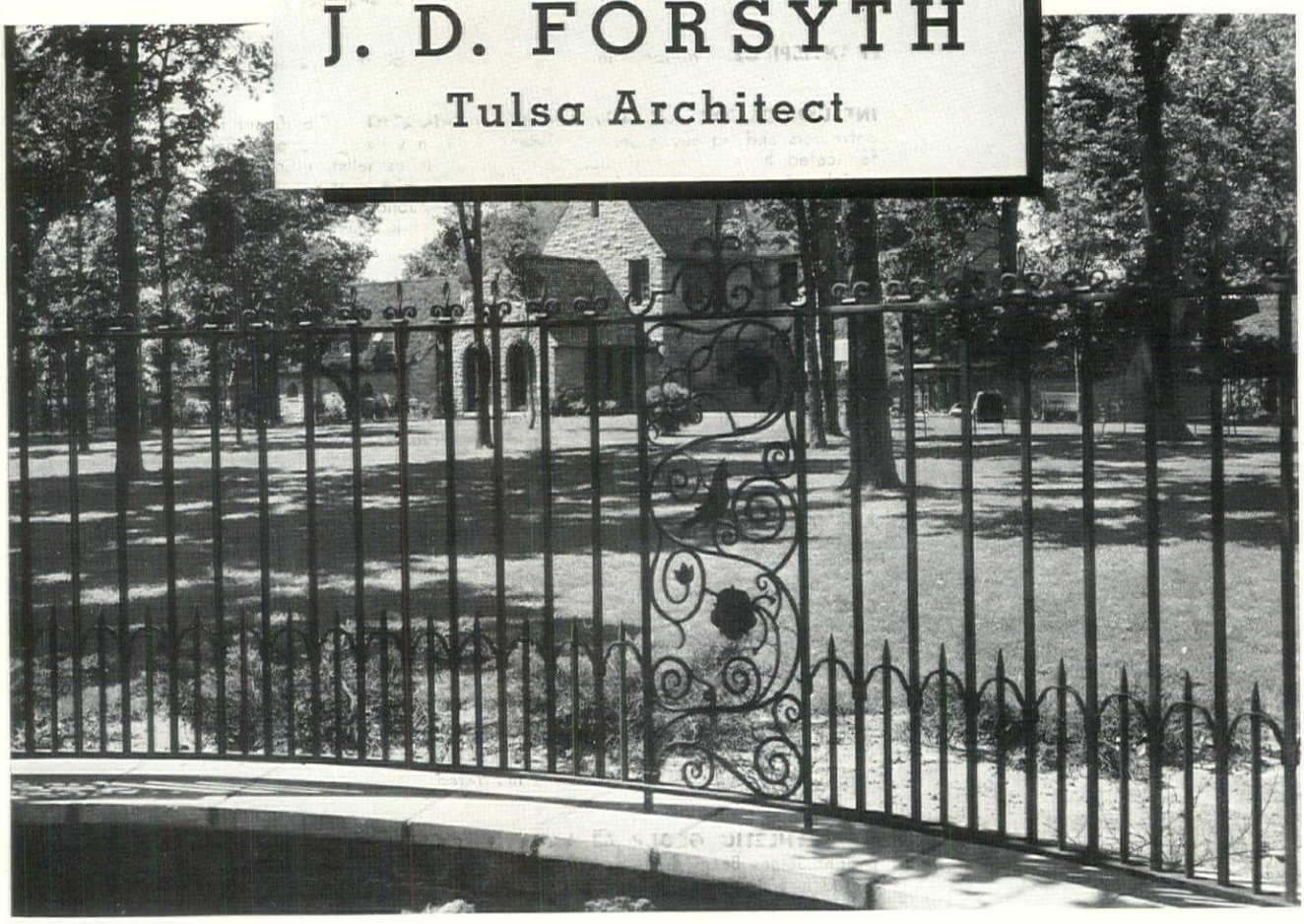
BEAUTY AND UTILITY UNITE

in this fence of

Byers Wrought Iron

J. D. FORSYTH

Tulsa Architect



● Many architects are using wrought iron for fine fences in order to give to the beauty which they have created the long life it so justly deserves. Beauty and utility—design and engineering—go hand-in-hand. Whether it is a fine fence or a fine building, the architect and his engineer see to it that the home, office, public or educational building, as well as the fence, balcony railing, or ornamental hardware, is not only a thing of beauty but that the materials used will preserve that beauty for the years to come.

The gates and panels of this fence, designed by J. D. Forsyth for the estate of John Mabee, Tulsa, were fabricated from Byers Genuine Wrought Iron by the Southern Ornamental Iron Works, Arlington, Texas.

Wrought iron is the logical choice for ornamental iron work, not only because of its superior corrosion-resisting qualities, but because of its "finishing" characteristics, which both architects and engineers say is obtainable only with the "genuine article." In specifying material for fence, railing or other ornamental work, be sure to avoid the use of scrap mixed with wrought iron by specifying bars of Byers Genuine Wrought Iron.

We will be glad to send you a special report on "The Use of Genuine Wrought Iron for Ornamental Iron Work," which has just been prepared. A. M. Byers Company, Established 1864. Pittsburgh, Boston, New York, Washington, Chicago, St. Louis, Houston.

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Specify Byers Genuine Wrought Iron Pipe for corrosive services and Byers Steel Pipe for your other requirements

AMERICAN ARCHITECT and ARCHITECTURE

CONTENTS

SEPTEMBER, 1936

Vol. CXLIX No. 2649

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TRENDS

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

PHOTO: WIDE WORLD

Wheels go under parlor, bedroom and bath to help people escape boredom, zero weather, taxes and the landlord. The Tin Can Tourists of the World, an organization of trailer dwellers, recently held their annual summer convention at the Erie County Fair Grounds in Sandusky, Ohio. This organization numbers more than 97,000 members

FHA Average

One of the most astonishing announcements of the past month was the statement by Federal Housing Administrator Stewart McDonald that the average FHA insured mortgage for the first half of this year was $4,001. While on the surface there seems nothing particularly amazing about this announcement, closer examination shows that here is evidence that FHA is achieving its primary goal.

The avowed object of FHA always has been to make available low-cost homes—to promote family ownership. Hence, when Mr. McDonald announced that the average insured mortgage had dropped from $4048 on December 31 to $4001 on June 30, he was really saying that, despite rising real estate values, FHA is making it possible for potential low-cost home-owners to procure mortgages and that these same people are grabbing at the chance.

Said Mr. McDonald, "The field of investment represented by this demand for homes in the lower-priced brackets has heretofore been viewed with considerable skepticism by many lending institutions. Careful mortgage lenders were wary of becoming involved with the jerry-builders who for years have been building cheap homes for the lower-income groups with consequent destruction of the stability of the real estate market which those lower income groups represented.

"The insured mortgage is an instrument primarily designed to encourage home ownership among persons financially unable to establish large equities in properties. The number of small mortgages being accepted for insurance, plus the widespread interest among subdivision developers in the possibilities of communities of low-priced homes, and the demand which the FHA has encountered for information regarding low-priced houses which meet its standards are all indications of progress in these directions."

Kudos to FHA

Looking for the reason behind the operative builder's comparatively rapid return to prosperity, it becomes immediately apparent that the Federal Housing Administration must be given the lion's share of the credit. There is no occasion for surprise, therefore, when a survey of 1200 operative builders and real estate salesmen in 22 cities discloses that this group is highly complimentary to FHA.

Percentage figures, even though they cannot be accepted as typical of majority opinion, are none the less significant. Of the builders interviewed 87 per cent were acquainted with FHA's plan for insuring home mortgages; 62 per cent expressed a favorable attitude toward the Housing Administration; 22 per cent were neutral; 57 per cent commended the plan to customers; an additional 33 per cent preferred making it optional. A mere 10 per cent expressed out and out disapproval. Nearly all agreed that FHA's program has stimulated new home building by making money more easily available.

Relief Labor

In an effort to clear up some of the misunderstanding that has surrounded PWA policies in regard to relief labor, President Roosevelt last month summoned the few remaining reporters isolated in Washington for the summer. At this conference the President pointed out that the federal government is willing to make a grant of 45 per cent if the local agency is in a position to use that much relief labor. This means, he added, "that a project needing a large amount of unskilled labor would be able to get the entire 45 per cent grant. If the project is of a character requiring a large amount of skilled labor, it probably would mean that the applicant could qualify for only a small part of the 45 per cent."

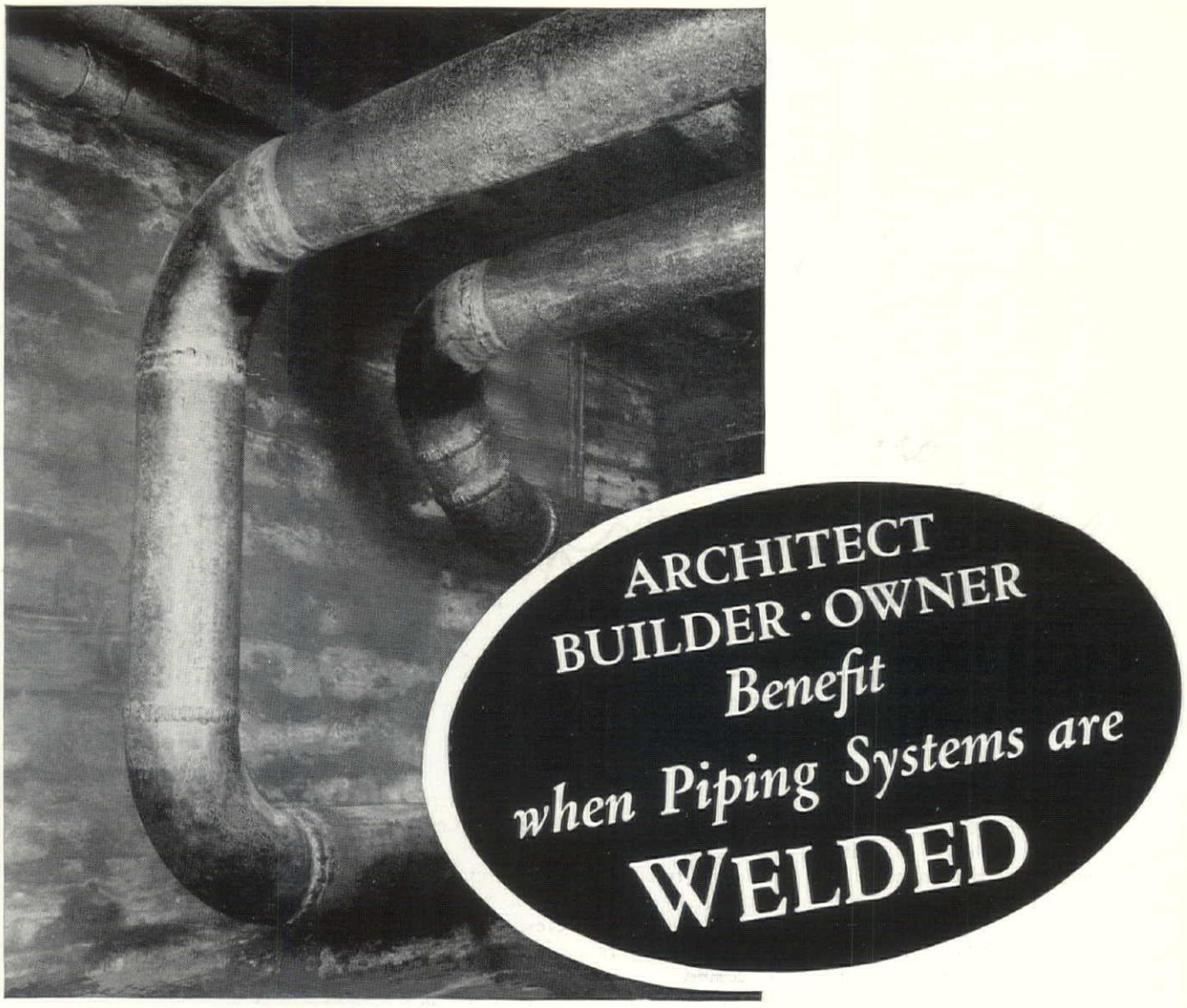
In amplifying the New Deal stand, the President pointed out that there will be no objection to the municipality using as much of its own money as it wishes for skilled labor, but that the federal grant will be limited to the amount of relief labor that can be absorbed. Since, at the present time, there is very little skilled labor still on relief rolls, it undoubtedly will be necessary to draw from wider fields, discarding the former geographical limits imposed. Further, where skilled labor is available on WPA rolls, the President has ruled that these laborers may be transferred to PWA projects.

Secretary Ickes undoubtedly will be not too well pleased with this new policy. If the Federal grant is limited to direct labor cost only, it will amount to an average grant of about 10 per cent with a maximum of 33 per cent. Previous PWA experience shows that only 33 per cent of total project cost goes for direct labor at the site.

Architectural Interview

The report of an interview with no less an authority on architecture than Electus D. Litchfield was circulated last month by the Dow Daily Building Reports. Since what Mr. Litchfield had to say comprises one of the more debatable subjects of architectural practice, his statement is reprinted here.

"When a bank agrees to make a loan upon a building to be constructed, it presupposes that building will be appropriately designed for its prospective use, and that its plans and specifications will provide for safe and durable construction. It presupposes further, that



Welding is a method whereby pipe and fittings are joined into an integral, permanent system. To the architect, welding brings easier designing, fewer mechanical limitations, and simplified specifications. To the builder, welding when properly used simplifies the installation and saves important time and money. To the owner, welding assures an enduring, permanently leakproof piping system at lower cost.

Linde engineers are skilled in the design and installation of pipe by welding. Their cooperation has been extended in the welding of many millions of feet of building and power piping, and more than 20,000 miles of overland pipe lines. This wide experience is available to you through any Linde office. Ask for the technical data especially prepared to aid in designing and specifying "Piping Joined by Oxy-Acetylene Welding". The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, New York and Principal Cities.

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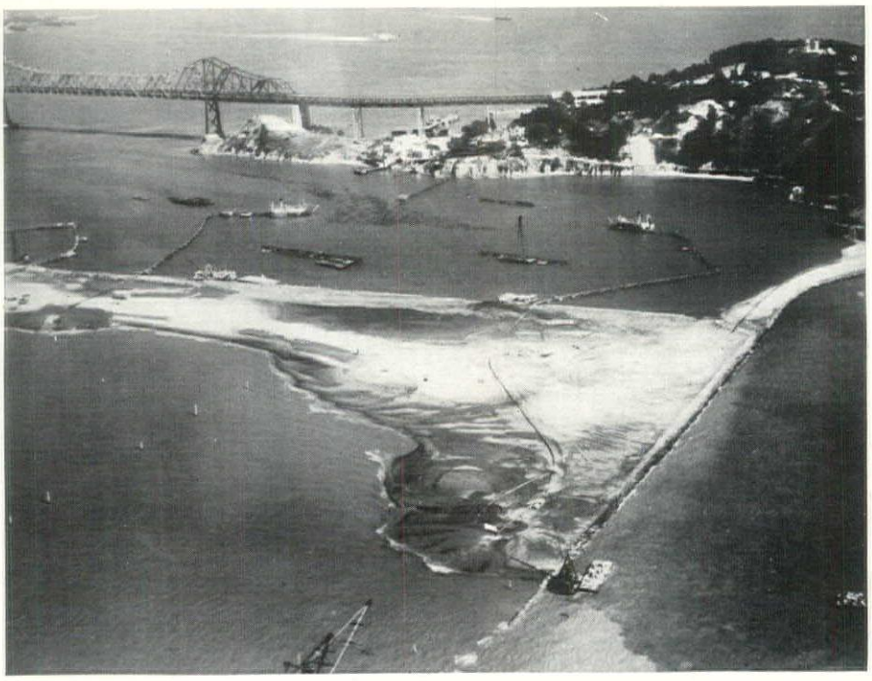
TRENDS

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



PHOTOS: ACME

Nearly 5,500,000 cubic yards of sand have been deposited on shoals near Yerba Buena Island in San Francisco Bay. This will form part of the Exposition Island for the Golden Gate International Exposition site and future municipal airport

the building will be constructed in careful conformance to those plans and specifications. In calculating its loan it figures the cost of the complete building and includes a figure for full architectural service corresponding to the best practice.

"It thereupon permits the owner to employ an architect without regard to his standing or reputation; to shop about, and find the registered architect who will make the plans and file them with the building department for the lowest possible sum, and to make an arrangement with him which shall include no supervision or superintendence.

"If the building falls down or falls apart after a few years use, or never earns its mortgage interest, who is to blame?

"Architecture is a profession—and is unique in that for the same work architects are supposed to charge the same fees. In their calculation of cost of the finished product I have never known the banks to hesitate to include a proper architect's fee and one that would permit the architect to furnish full service. While the fee for this service does not include the provision for a full time superintendent or clerk of the work, who shall follow through all the minute details of construction, laying of brick, mixing of mortar, etc., such a person should be employed at an additional cost of a fraction of a per cent on any large building. But, even without such a clerk of the works the architectural supervision included in the full service of the architect would go far toward insuring proper construction.

"There is nothing which the banks of New York could do which would be more to their interest than to insist that the new buildings upon which they agree to make loans be planned and supervised by architects of character and known ability—and to this end —that the owner shall be required to place on file a contract for such full service, which shall provide for the payment of a reasonable fee. If and when owners are compelled to pay reasonable fees and fees for full service, the incompetent, inexperienced and shyster architect and the irresponsible stock plan factories will have to go out of business, and the more reputable firms will once more begin to earn a living. This will not mean that competent young or small firms will be driven out of business, but on the contrary 'when they can deliver the goods' it will insure them fees which will enable them to pay reasonable salaries to competent draughtsmen and other assistants, and to earn a commensurate return for their own effort."

Golden Gate

Displaced in eastern thinking by New York's own 1939 World's Fair, the Golden Gate International Exposition, San Francisco's 1939 Worlds' Fair, still reigns supreme on the west coast. Last month elaborate ceremonies marked the breaking of ground and the actual start of construction on the site. Federal, military, civic and state officials met at the location of the $715,000 administration building to give the exposition a proper curtain-raising.

More important from a long-range viewpoint was the preview showing of the great Yerba Buena municipal airport—California's heritage from the 1939 Fair, which, during the show, will serve as the administration building. The $800,000 airport terminal will be semi-circular in shape three stories high, and built of concrete and steel. The first floor will contain offices and reception rooms; the second floor will be made up of a dining room, additional offices and social rooms, while the third floor will house a weather station and airport control rooms. Around the outside of the second floor will be a 19-foot wide observation platform for public use. A semi-circular driveway runs the full length of the basement, which will have room for a post office, express office, 150 car garage and the mechanical equipment of the building. The two airplane hangars, each 335 feet long, 275 feet wide, with a height of 42 feet at the center of the arch, will cost $800,000. The landing field itself is 430 acres.

Flushing Meadow

At last the 1939 New York World's Fair, which is scheduled to open in Flushing Meadow Park on October 1, 1939, is beginning to take some definite shape. Ever since the first announcement on September 23, 1935, sponsors have been busy forming a corporation to build and operate the exposition. The administrative staff has been gathered. Arrangements have been completed for participation by Federal, State and City governments. At last the 1939 Fair is definitely out of the cocoon stage.

Within the next thirty days architectural plans for the exposition will be complete. Flotation of a $20,000,000 bond or debenture issue and formal occupation of the Fair site are the next steps in the development. Preparation of the 1,130 acre fair area is already in progress under a $2,186,185 grading contract let by the Park Department. According to contract this tract will be ready for development by the fair corporation by April 1, 1937.

Meantime, The New York World's Fair 1939, Inc., of which Grover A. Whalen is president, has taken permanent offices on the twenty-fourth and eightieth floors of the Empire State Building. Here administrative and

Speaking of Slaves Let's Speak Of Them

[Most of them are mostly white]

'Tother day (to be exact reckon 'twas nearer Tuesday than it was Friday, so it must have been Wednesday) was toting some of you up-North architecting fellows round about old Virginy.

The idea of doing such toting, was a laudable one if not even commendatory. Don't mind admitting to you and a few more "gentle readers" that it was to *unslave* them.

Seems like as soon as we had our slaves nicely freed down South, a whole passel of you up-Northerners started enslaving yourselves. It didn't show up so powerful much, until the last ten years or so. Then it broke out in what we folks call a rash.

About that time numerous architects and would-bes, were noticed scrutinizing our old brick built buildings. Now some of them we are mighty prideful about (I mean the buildings). But there's aplenty we just figger as being no account at all.

Right here and now am going to tell you why, near as can, exactly as I told those architects was toting.

We don't mind admitting that a lot of brick laying before the war, and before that too, was done mostly by apprentices. None too good. They used any old mixture of bonds, sloshed their mortar, and some of them even went so far as to plaid their walls all up with salt headers.

The old President's house at Williamsburg was the second such, the custom house at Yorktown probably being the first. Overnight a lot of the chuch building committees must have caught the disease, sort of like miniature golf took fire a spell of years back and as quickly died. As a result there are a lot of these pock-marked salt header churches in parts of Virginia. But we Virginians don't take them seriously nohow.

But we do take mighty seriously the brick work that came under the scrutinizing eye of Mr. Jefferson. He studied his walls carefully. Sorted his colors. Saw to it the bonds were right. Insisted they be mortared up right. So far as anyone knows, he never speckled his walls with salt headers.

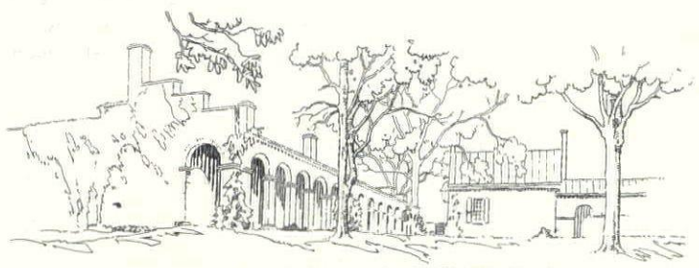
Those walls of Mr. Jefferson's were right when he had them laid. They are right as right today.

So just why you up-North chaps pick out no account buildings as a guide for your brick work is beyond we Virginians. Why be slaves to errors—the slip-shod work of apprentices?

Run your eye over a Jefferson wall and it is unfailingly pleasing. It has plenty of variations, but they are consistent. He never made the reason for their beauty *apparent*. He never allowed his methods to make more noise than his results.

Another notable thing was the size of brick he used. Mostly they had squarish headers just as have the Old Virginia Jeffersons we are burning down here at Salem nowadays. We make them in both hand-mades and mould-mades, just as we do our Standard size old Virginians. All are born old. Have that time-toned something that it takes other brick a hundred years or so to get. And some folks can't wait that long.

After saying which, we bid each other good-bye. Near as I could figger we were still friends, least-wise on speaking terms.



UNIVERSITY OF VIRGINIA, CHARLOTTESVILLE, VA.

HENRY GARDEN
Brick Maker for
OLD VIRGINIA BRICK CO.
with Mr. Jefferson as a Guide

P. S. I left them at Charlottesville studying Mr. Jefferson's walls at the University of Virginia. Most of them are more than likely back by this time.

OLD VIRGINIA BRICK

Old Virginia Brick Company
Salem, Virginia

TRENDS

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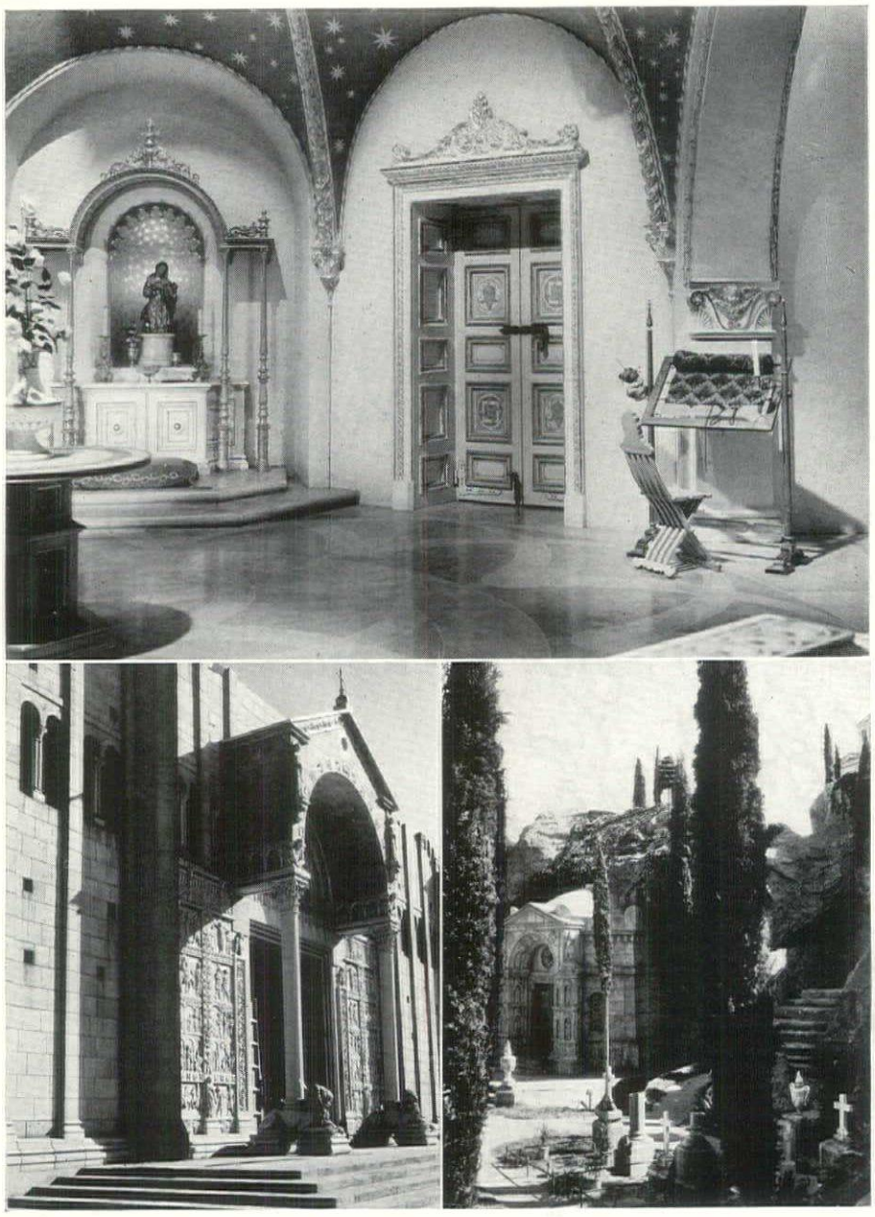

"Shakespeare to Hollywood to Verona" might be the subtitle of Metro-Goldwyn-Mayer's superb production of "Romeo and Juliet." The settings of the Chapel in Juliet's room, the porch of San Zeno and Juliet's tomb by Oliver Messel and Cedric Gibbons were inspired by 15th Century Italian paintings

design staffs, already organized, are functioning on a permanent basis. Construction and operating units are getting under way rapidly so that actual work can be rushed as soon as the fair site is ready.

At the present time 150 persons are working for the corporation. Thirty architects, draftsmen, and technicians, employed by a board of design composed of seven members under the chairmanship of Stephen F. Voorhees, are daily working in their "sky workshop" on the eightieth floor of the Empire State Building. The remaining offices, housing the administrative staff and the president, are situated on the twenty-fourth floor. Here also is the office of W. Earle Andrews, formerly general superintendent of the New York City Park Department, who in his role as general manager will supervise all construction at the fair site. Mr. Andrews also has been designated agent of the Fair to maintain contact with city and state. He will be responsible for all exhibits and concessions and will be directly in charge of maintenance and operation. General Manager Andrews has already prepared a schedule of construction that calls for completion of all fair buildings, utilities, roads and other structures by January 1, 1939.

Other officials of the corporation include: Harvey D. Gibson, chairman of the finance committee; Bayard F. Pope, treasurer; Harold W. Thorne, financial director; Commander Howard A. Flanigan, administrative assistant to the president; Mortimer N. Buckner, chairman of the executive committee; Perley Boone, director of public relations; Mrs. Mary S. Fickett, director of personnel.

Tax Exemption

Brand new ideas of any kind are hard enough to get, but when a new idea that is also a good idea pops up, that's time to take off your hat. Month before last just such an idea appeared—an idea that, through tax exemption, would construction activity be stimulated.

Brought to life by New York's Tax Assessor William Stanley Miller, introduced and passed by an adjourning legislature, this legislation would provide tax exemption for five years on all improvements to buildings which do not increase their cubic area. Legislators and owners alike were at once impressed with the fact that here may be a solution to a minor part of the slum clearance problem. Theory is that slum dwellers would benefit as much from remodeling as from new construction.

The bill, presented before the Municipal Assembly late in July, is now pending in the Committee on Local Laws.

96.9 Ahead

Official figures of the Department of Labor place the June volume of building permits for all types of buildings, including alterations and repairs, at 96.9 per cent ahead of June 1935. The total volume for 1362 cities of $155,635,000 represent an increase of 34.4 per cent over May, 1936.

So phenomenal was this increase that tabulators and statisticians immediately set out to find the "nigger in the woodpile." And they were not long in finding it. Most of the increase, particularly in the residential division, could be traced to New York City. As a result of a rush to file plans under the present building code New York in June experienced its closest approach to a building "boom" in the last six years. Many people believe that the new building code, now awaiting final approval, will materially increase costs. The resulting rush of owners to get permits in June made this month show a disproportionate increase that undoubtedly will be counterbalanced by slight slumps in July and August.

Just how seriously New York owners

(*Continued on page 12*)

Step into the AMBASSADOR

and see how

smart floors attract smart trade

A striking example of the design possibilities of Armstrong's Linoleum is this floor in the dining-room of the Ambassador Hotel, Washington, D. C. Circle is White No. 23 with border of Ruby No. 40. Squares are Cadet Blue No. 29 with interliners of White and outer border of Ruby.

RIGHT underfoot is your big opportunity to dress up for better business. That's the sales tip of this smart dining-room in the Ambassador Hotel, Washington, D. C.

Here an Armstrong's Linoleum Floor creates an inviting atmosphere for people who are real spenders. But linoleum does more than decorate. It's ideal for dancing—comfortable, quiet, and resilient. It has that clean look so necessary where food is served. Yet cleaning costs are cut to the bone, because simple sweeping, waxing, and occasional washing keep its rich colorings beautiful for years.

Besides linoleum, Armstrong also offers the only complete line of resilient tiles—Linotile, Accotile, Cork Tile, and Rubber Tile, from which you may select the exact floor to meet your specific floor needs.

These tile floors may now be purchased with time payments through the Armstrong Finance Plan. For complete information and for a color-illustrated copy of "Better Floors for Better Business," write immediately to Armstrong Cork Products Company, Building Materials Division, 1201 State Street, Lancaster, Pennsylvania.

ARMSTRONG'S *Linoleum* *and* RESILIENT TILE FLOORS

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The REVECON SYSTEM for

. . . DECORATIVE METALS, STRUCTURAL GLASS, CERAMICS,

Questions have flooded in about

Publicity regarding the new Revere REVECON SYSTEM for holding flat sheet materials has brought numerous inquiries from architects, builders and other factors interested in building construction. As a service to architects and others concerned, we publish herewith answers to questions most frequently asked about the Revecon System.

Question: What is the Revere Revecon System?

Answer: The Revere Revecon System is a method of using a framework of extruded aluminum alloy Revecon Sections to construct surfaces with any type of rigid sheet finishing material.

Question: What are some typical examples of decorative and structural sheet materials that can be applied advantageously by means of the Revecon System?

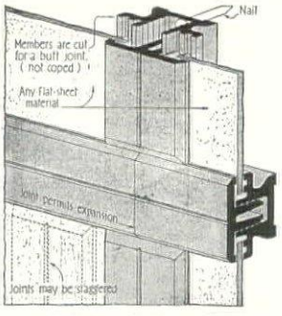
Answer: Any sheet material sufficiently rigid to support itself on edge, and of any standard thickness up to ½", may be used with the Revecon System. Typical are formed edge metal panels of porcelain-enameled steel or iron, aluminum, brass, bronze, copper, nickel silver, steel and other metals and alloys. Also plate, A-A, or structural glass, translucent marble, plastics, ceramics, asbestos-cement, wall and insulating boards, acoustical materials.

Question: What are the general outstanding features of the Revecon System?

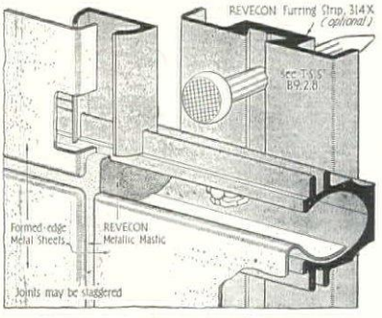
Answer: Sheet material of any or all thicknesses up to ½" may be accommodated in the same Revecon installation. Two basic designs—Capped-Joint and Pointed-Joint—are available, and may be combined in one installation as desired. These features allow unusual freedom in the design of decorative detail and in the use of size, color or texture. The entire finish is an integral structural unit with all elements interconnected, yet free to expand and contract in individual units without distortion.

Question: What are other advantages of the Revecon System?

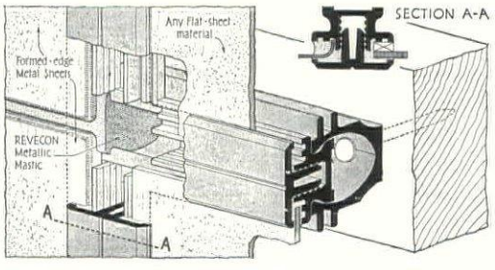
Answer: The Revecon System provides a light-weight, rigid finishing construction—waterproof and air-tight. Standard-sized, flat, decorative or structural sheet building materials are used. Pre-fabrication is required only in pointed-joint construction. Shallow depth required (only ⅜" for flat sheet materials, or 1" for formed-edge metal panels) makes the use of this system particularly adaptable to remodelling projects. Insulation of any type may be used. The installation can be readily erected without special tools or equipment. Structural members require no painting or other maintenance. Damaged panels may be readily replaced without disturbing adjacent panels. Alterations may be made with same Revecon members.



Typical Capped-Joint Construction. Reproduced ½ Full Size



Typical Pointed-Joint Construction. Reproduced ½ Full Size



Typical Combination Construction. Reproduced ½ Full Size

Revere Copper *and* Brass

MILLS: BALTIMORE, MD. • TAUNTON, MASS. • NEW BEDFORD, MASS. • ROME, N. Y.

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c. Revecon Metallic Mastic, which seals the assembly against weather, and permits expansion and contraction within panel area. The composition of this mastic assures permanent plasticity and efficiency in performing these functions.

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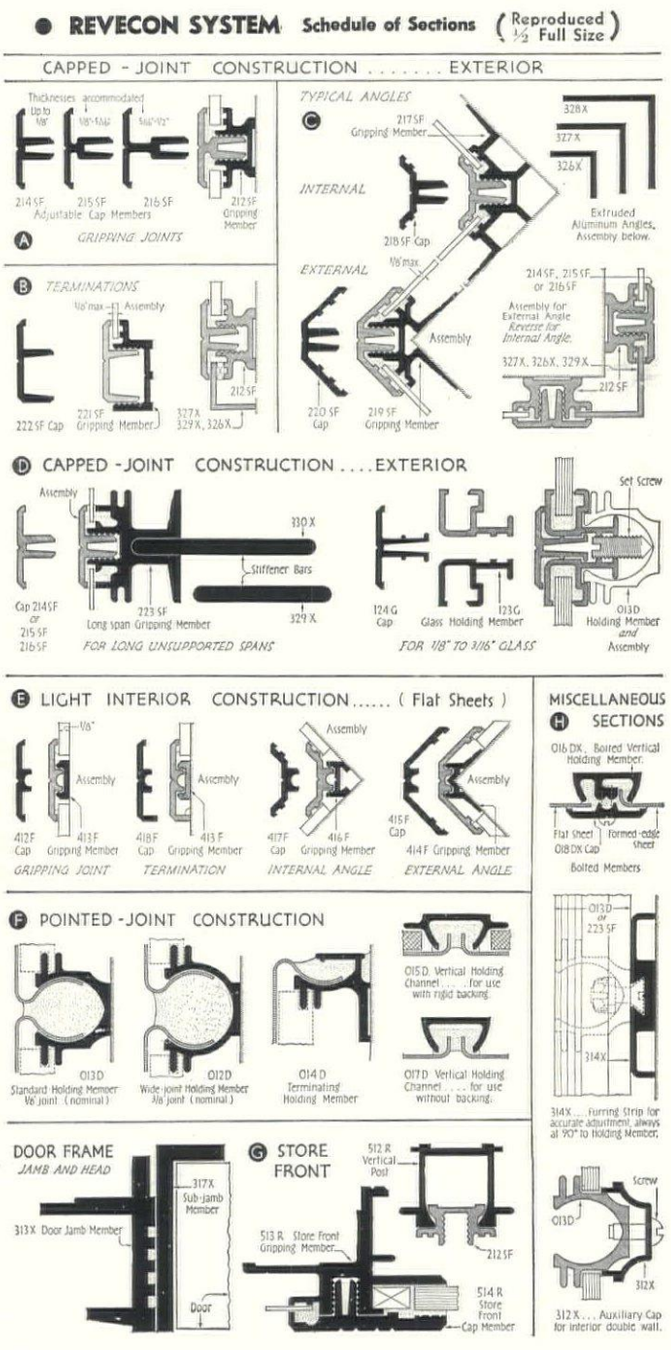
Question: How can I learn more about the Revecon System without obligating myself?

Answer: Write on your own letter-head to Revere Copper and Brass Incorporated, Dept. A, 230 Park Avenue, New York, N. Y., and ask for the Revere *Revecon Handbook*.



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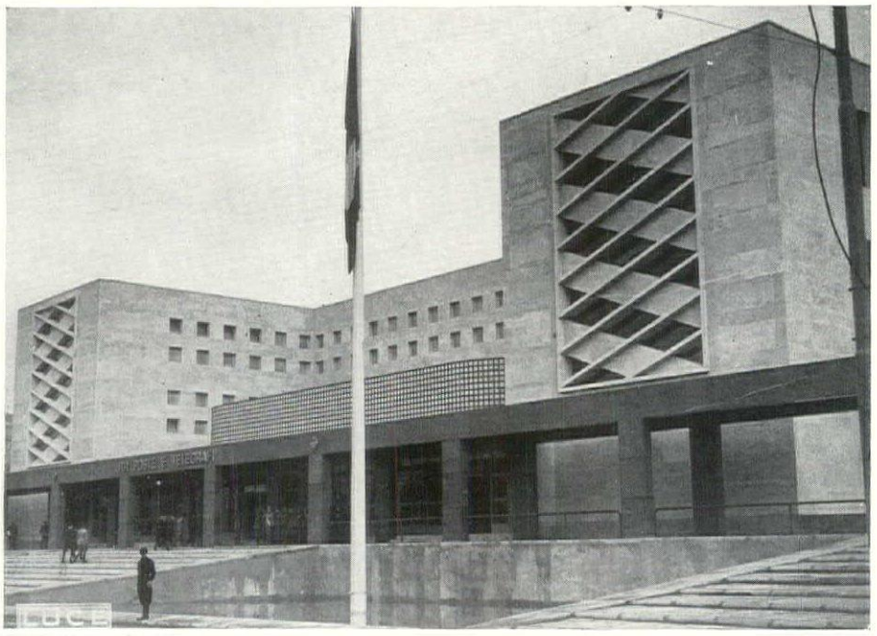


PHOTO: GLOBE

A new post office in Rome strikes a fresh and characteristically vigorous note of present day Italian architecture

took the possibilities implied in the new code is perhaps best shown by a breakdown of the building permits filed. Plans to the total of 5,474, costing approximately $40,000,000, were filed in the five boroughs. One hundred and twenty-four apartments, to be constructed at a cost of $24,000,000, were a major item. Nonresidential construction for the city included 31 buildings for public use at a cost of $7,594,000. All in all, this tremendous June increase made permits for the Bronx total $20,564,000 as against $1,720,000 last year. Manhattan shows $10,833,000 this year compared with $1,639,000 last year.

Eliminating this unorthodox increase in New York City, residential building throughout the country ran at about the same level in June as in May. There was, however, a large increase in nonresidential building permits—40.6 per cent over May. The number of families provided for showed a 48 per cent increase in June over May, for which New York City again was responsible.

The following summary shows the total of building permits in the leading cities of the country for June and for the first six months of this year:

TOTAL BUILDING PERMITS

	June	1st 6 Months
New York	$33,669,000	$107,560,000
Los Angeles	5,885,000	26,994,000
Washington	9,015,000	23,194,000
Detroit	5,266,000	19,046,000
Cincinnati	3,417,000	15,567,000
Milwaukee	875,000	13,149,000
Philadelphia	1,244,000	11,229,000
Chicago	2,994,000	11,222,000
Houston	1,176,000	10,342,000
Baltimore	1,586,000	8,083,000
San Francisco	1,278,000	8,014,000
Dallas	340,000	7,286,000
Miami	1,081,000	5,711,000
Boston	793,000	5,044,000
Fort Worth	1,455,000	4,974,000
Pittsburgh	953,000	4,960,000
Oakland, Cal.	1,900,000	4,443,000
St. Louis	911,000	4,304,000
Long Beach	550,000	3,978,000
Rochester, N. Y.	1,093,000	3,742,000
Seattle	566,000	3,702,000
Cleveland	753,000	3,529,000

City Growth and Planning

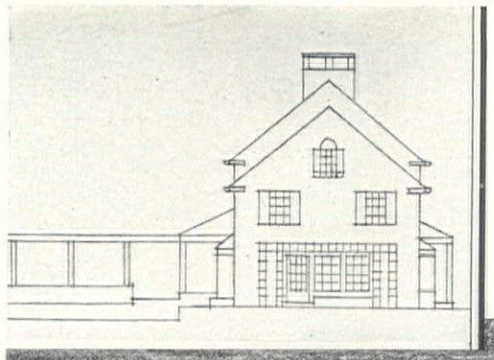
If you accept the theory of Stephen F. Voorhees, president of the American Institute of Architects, you can attribute the failure to develop an adequate national program of reconstruction to a lack of financial support for advance planning.

Said Mr. Voorhees at a symposium of the Land Utilization Committee of the New York Building Congress: "Had the recent government grants to low cost housing been applied to finance advance and exploratory planning and to the development of a methodology for the replanning and gradual replacement of blighted and obsolete districts, we might by this time have been well launched upon a program of reconstruction financed upon an economic basis, instead of finding ourselves thwarted by the inadequacy of capital subsidies. Although the architect has contributed much to the improvement of modern cities by his suggestions, he has made very little more than a beginning at a type of work which is calling for greater and greater expenditure of his talents, ingenuity, and energy. As yet no adequate means has been devised for compensating the architect for this type of work. As a result, too little studying is being done to discover how to do the things that need to be done as well as how to determine the reasonable limits of possible action."

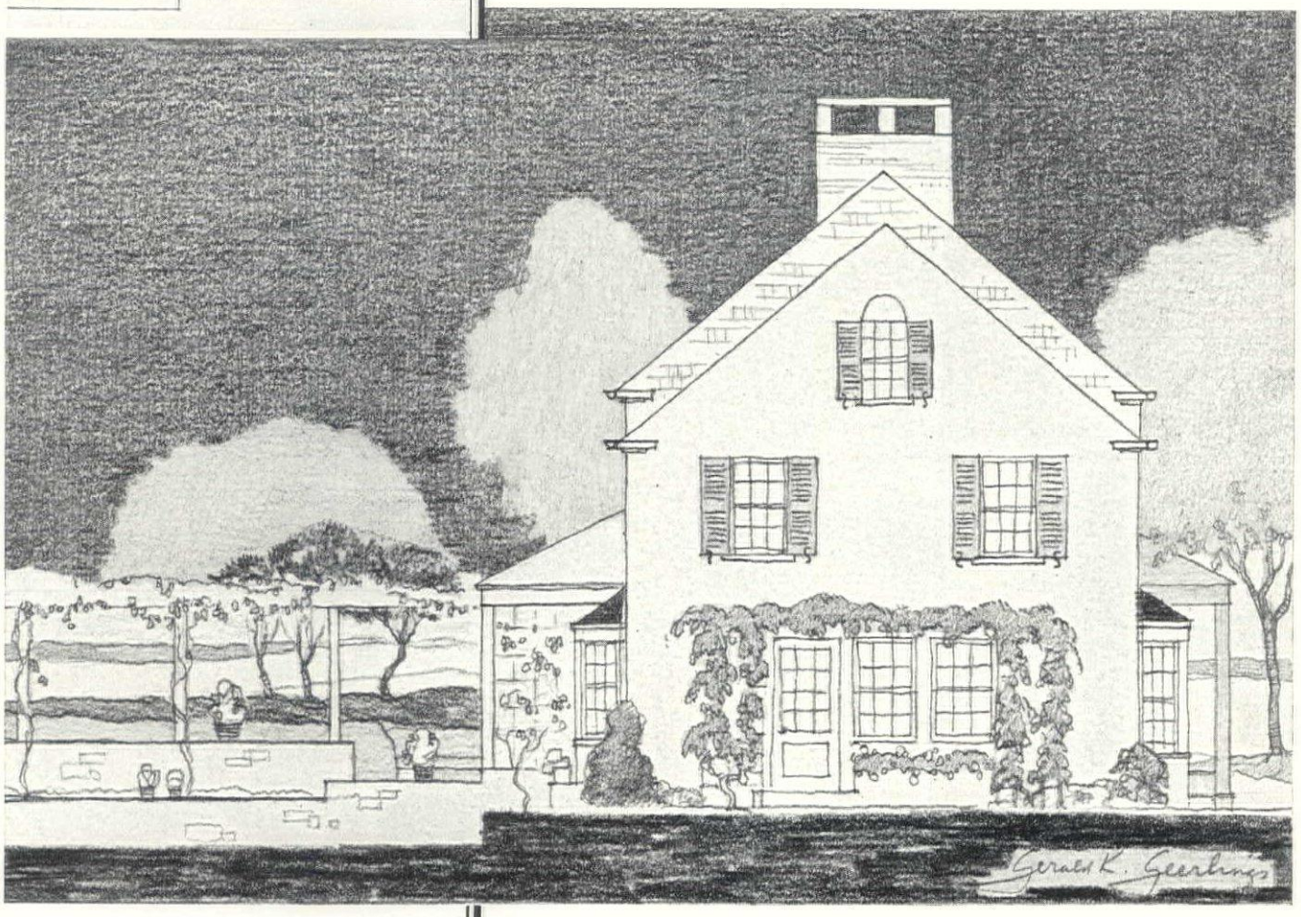
Continuing his summary of what the architect can do for the future in city planning Mr. Voorhees pointed out that "the position which the architect has won for himself in American life is founded upon his ability to conceive and execute plans. The architect is expected to take the lead in the design of better communities. But in spite of the acclaim which he is given the community has not begun to enjoy the benefits which would be possible were the talents of the architect and his brothers, the engineers, fully and properly employed. In the first place the architect cannot act alone. It is his job to analyze the problems of property owners and aid them toward a solution. Furthermore he must know how to utilize the executive and engineering brains in the building industry; how to utilize the abilities of craftsmen and unskilled labor and how to utilize materials. In addition there must be intelligent co-operation with, and the economical performance of necessary services by the local government, including the maintenance of reasonable standards of safety, health, and equity as may be set by local ordinance."

Also present at the meeting, and also seeing eye-to-eye with Mr. Voorhees was William J. Demorest, president of the real estate board of New York. Speaking for the real estate interests, Mr. Demorest promised his co-operation in working out a local plan, and declared that needed city improvements are held up because the way to carry them out has not yet been discovered.

Said he: "Real estate men are well aware that all too often very carefully made plans for the future development of an individual piece of property are set at naught by what happens in a neighborhood. They realize that planning properly operated could generally prevent such misfortunes, and therefore welcome an opportunity to arrive at a method which would make district planning effective. It is my belief that this solution can be reached only by the co-operation of all those interested in city growth and city planning. We must not be impatient if the solution is not quickly reached. It may take years of discussion, analysis and education to bring it about."



Working Drawing into Planting Study



BLACK - LINE PRINT

"Between the time that a rendered perspective is made of a prospective job and the working drawings are complete, there are usually innumerable changes. For the architect's peace of mind, if not for the client's gratification, it is often useful to know what the building will look like when set in its actual surroundings. Or, in the study of its *entourage*, including both structural work and planting, a rendered elevation will be valuable. One of the quickest means is to have a so-called 'black-line' or 'black' print made by your blue-printer. The lines will not come out as dark as you may desire, besides being a bit purplish. But if you will take a soft pencil and sketch freehand over the important lines, then add pergolas, walls, vines, shrubs, flowers and trees, a satisfactory effect can be had in short order."

GERALD K. GEERLINGS.

YOU may doubt it, but the drawing above was done entirely with a Grade 3B Microtomic Van Dyke Pencil, exactly the size of this reproduction. If you will notice the fineness of the lines in the suggestion of shingles or in the definition of leaf forms, you will at the same time wonder how *any* 3B pencil can perform in such a manner and at the same time be willing to go as inky black as the foreground. The secret lies in a special process used in making this sturdy, uniformly graded lead. The gain for you is that it isn't necessary to shift pencils in changing pace, any more than in your new car do you have to shift gears constantly as you did years ago. The Microtomic Van Dyke asks no favors—yet use one and it will perform endless favors for the asking.

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Forceful Answer

To all of its critics, who say that housing by federal agencies is impractical PWA last month gave a forceful answer. Look at Techwood Homes, said Housing Director A. R. Clas. There is the first slum clearance project to be completed. How much are rents? Only $5.58 per room per month, plus $1.81 added to cover the cost of heat, hot and cold water, and electricity for lighting, cooking and refrigeration.

Certainly PWA had plenty of reason to be proud of the success of this Atlanta development. For rents like these tenants will receive modern, sanitary, fireproof homes, carefully laid out in an integrated community where buildings cover only 25 per cent of the land.

"Every effort has been made in the use of materials to facilitate sanitation and cleanliness," writes Mr. Clas in the Real Estate Record. "The stair halls are lined with glazed tile. The living rooms, bedrooms and dining rooms have asphalt tile floors and the kitchen floors are covered with linoleum." Steel casement windows, screens, vermin-proof metal trim, and incinerators are also included.

All of the three-room apartment units are made up of living room, bedroom, bath and full-sized kitchen with modern combination sink and wash tub, electric stove and refrigerator. Bathroom equipment includes toilet, lavatory, and five-foot tub. The four- and five-room apartments are similar except for the addition of bedrooms.

To be eligible for residence in Techwood, families must first come from substandard houses. No family is admitted whose income exceeds five times the rent. In round numbers this means that prospective tenants must have an income not lower than $700 nor higher than $1,800, varying somewhat with the size of the family.

More But Not Better Building

Jump in your automobile some day soon. Point her nose to the east, north, south, west. It won't matter much which way you go, for on every hand you will be bound to see the increases in residental construction that are obvious everywhere. Both small and large cities report housing shortages. Realtors, building supply dealers and manufacturers, speculative builders—all are jubilant because of the home-building increases.

But as you drive along in your automobile, consider all of the articles that you have read about housing reform, about new methods of construction, lower costs and greater permanence. Then look at the buildings that you see.

PHOTO: H. R. VERRY

Viva Bella near Caen in Normandie is a summer resort for Parisian business people. The modern houses are masterpieces of architectural individualism

Analyze them. Are they better built, better designed, better financed than those that were built 15 years ago? These are the questions that sooner or later must be answered.

And, almost inevitably in most cases, it must be said that current practices show little change. For the most part house building today follows time-honored methods of construction, uses old materials and methods, is financed much as it was before the depression. Not only are labor costs as high as they ever were, but there is reason to believe that by 1938 there will be a shortage in building craft workers that will push labor scales beyond pre-depression levels. Speculative building, house marketing—building finance as a whole—is almost as flagrant in its practices as ever before.

There is only one conclusion that can be reached: the long awaited housing reform is still a matter for the future. Housing still needs new financing methods, zoning laws, certified quality to give the home-owner stability in his investment, and improvement of construction by a wider use of better materials.

Better materials are available. Legislation, probably, is the answer to the remaining problems. One promising trend, however, can be noted. Today the much beleaguered "man on the street" is taking increasing notice of the architect. More and more families are learning that the architect is not a "luxury item" in home construction. Statistics show that there is an increase in architect planned construction. And this alone, is all that housing reform has to show for itself.

Younger Borrowers

One of the principal aims, and one of the principal advantages of the long-term, monthly repayment loans has always been the opportunity which they give younger families to buy their own homes. Since this is the major objective of long-term amortization, it is particularly heartening to note that a recent survey of the United States Building and Loan League shows that new loans to home buyers and builders are being granted to heads of families averaging about five years younger than those already registered as borrowers.

Although this swing is now only a minor movement, the League believes that heads of families in their early 30's or late 20's will account for an increasing proportion of the home lending during the next few years. Naturally the past seven years of depression have tended to make the average age of borrowers much older than it would be in prosperous times. Borrowers who might have paid off their loans earlier have been forced to have the lifetime of their loans extended and the payments made smaller. Today, therefore, owing to these extensions of amortization, the average age of home owners whose mortgages are held by the associations is between 45 and 50.

Building and Loan associations regret this noticeable lack of "young blood" among their mortgage customers. The slack period between 1931 and 1934 brought comparatively few newcomers into the borrower group. Further, the average age has been increased by the refinancing activities of the associations during the depression. By far the greater percentage of customers during the 1932-36 period were refinancing customers whose mortgages had formerly been held by some agency whose loan came due periodically.

Says Morton Bodfish, executive vice-president of the League, "There are about twice as many borrowers between 40 and 45 as there are between 30 and 35. There are many more in the age group between 50 and 60 than between 30 and 40. These facts as to the age of borrowers reflect more than anything else the nature of the demand for property ownership and for mortgages which has been characteristic of the depression from which we are now emerging."

On the whole there can be little doubt that younger and younger families will seek loans as real estate conditions continue to improve. And there is no better sign of a healthy home-market.

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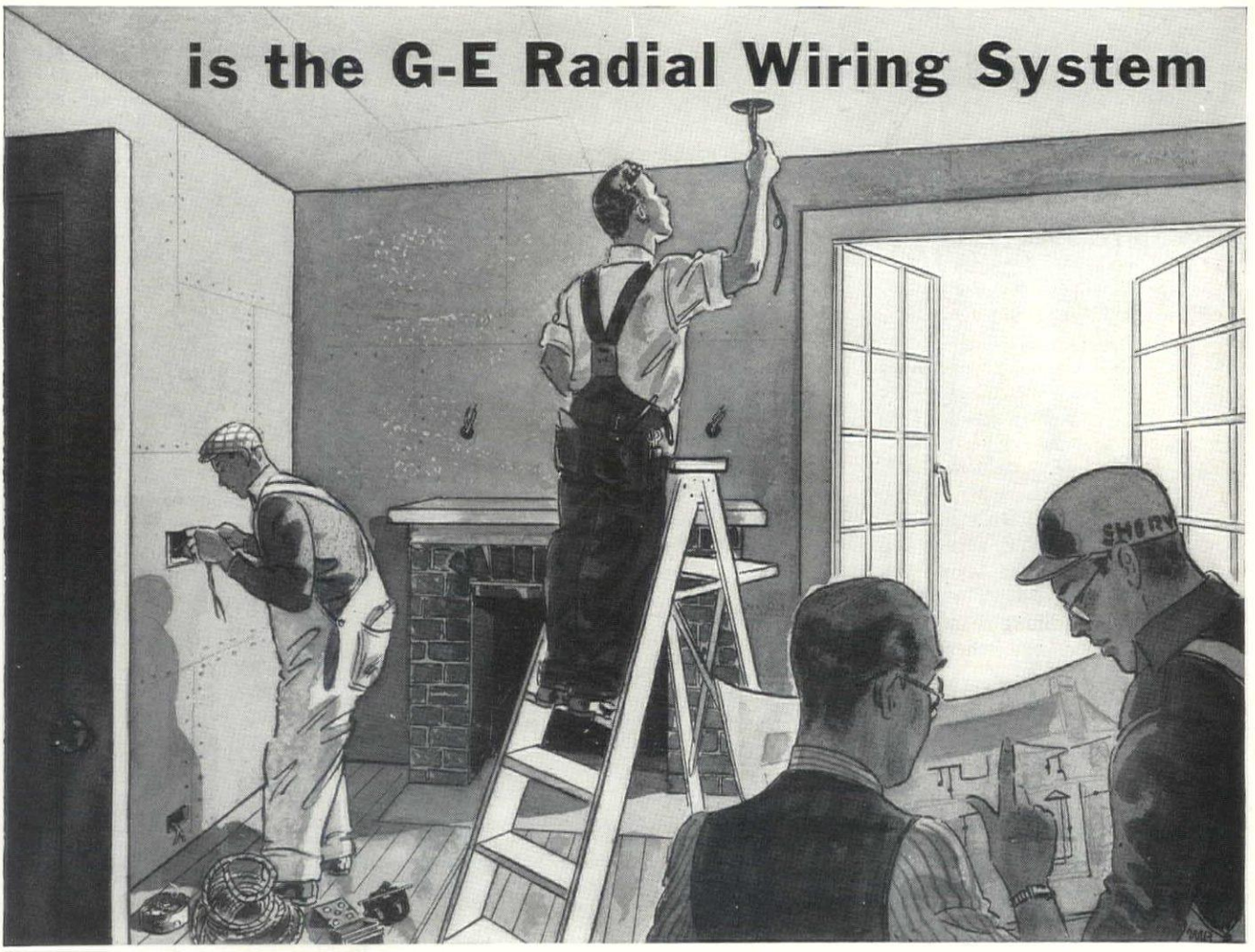

Whether mansion or cottage, the installation of the wiring system marks the real beginning of a modern home. On it depends the home's convenience and comfort, economy and safety.

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Ten Commandments for Building

Probably no one is better qualified to advise prospective home-builders than the men who will decide just how much their properties are worth as mortgage collateral. Consequently, when the National Society of Real Estate Appraisers lays down a ten-point program for families to follow, chances are this decalogue is well worth noting. Here are the "ten commandments for building":

1. Don't build too pretentious a house on a cheap lot or vice versa. The ratio of house to land value should tend toward not less than 3 to 1 and not more than 7 or 8 to 1, in order to qualify before the appraiser and before the mortgagee who depends upon the appraiser's conclusions.

2. Don't put a squatty, low house on a low piece of ground, or a tall, thin house on the crest of a hill. In this connection it is suggested that where plans for the house have been drawn up by an architect for a site different from the one for which they are now being used, extreme care should be taken that they fit the new location. The same warning applies to stock plans—see that they suit the topography of the land.

3. Don't put a large house on a small lot, nor set the house close to the street when you have a deep lot. One of the amenities of home ownership is availability of air, open space, some yard for the indulgence of the owner's sense of landscaping and gardening. When the house takes up practically all of the lot, this great advantage of home ownership is lost.

4. Don't build a garage detached from the house; but provide an entrance to the attached garage from the inside of the house. Make the garage large enough to house two cars.

5. Don't plan the exterior first and then force interior to fit the outside plan. This is often the origin of the poorly laid-out house, an uneconomic use of the space.

6. Don't put cheap or out-of-date products and equipment into a house that is otherwise well built and modern. An example of this mistake is the placing of a bathtub with the old-fashioned leg base in a modern house. It is possible to save $100 on the plumbing and deprive yourself of $500 in the finished home.

7. Don't have non-matching exteriors and interiors, as to quality of materials. It costs far more to repair inconsistencies of this kind after they have been built into the house than to avoid them in the beginning.

8. Provide a convenient space in the kitchen for the installation of a mechanical refrigerator, and avoid installation of antiquated heating systems without automatic control.

9. Have windows, doors, and radiators so placed that the normal amount and type of furniture can be arranged tastefully and easily in the rooms. Watch the location of the light plugs so that most modern electric equipment can be easily used.

10. Allow for closet space on the first floor and for ample closet space in connection with the bedrooms. Closet space is one of the distinct advantages which the single-family home can boast over the apartment dwelling and much potential value in the house is lost if such provision is neglected.

Reading through this list of commandments aimed at the potential home-builder, it is easy to see how precisely all of the details of design and construction can be figured out. It would be practically no trouble at all for a potential builder to sit down with his lead pencil and ruler and do an original, dramatic, and beautifully balanced job of "inside-out" planning. With this list as a guide any layman is qualified to proceed with construction without benefit of architect. Really, there is no need of an architect at all. Hats off to the gentlemen who can so easily reduce architecture from a major art to an avocation that one practices in dull hours. Architecture? Yes.... It's like stamp-collecting.

England's Housing

Today American housing enthusiasts turn covetous eyes toward the achievements of England and Wales. There, new quarters have been provided for more than one-fourth of the population since the War. Now, not satisfied with this prodigious accomplishment, the British government is setting out on the second phase of its broad housing program—a slum clearance campaign that contemplates the removal of more than 280,000 insanitary dwellings and the construction of more than 300,000 new homes as replacement.

Here's the way the Federal Home Loan Bank Review describes the British progress: "In the first stage of the undertaking, from November 1918 to September 1935, a total of 2,804,888 new dwellings were constructed. Nearly 45 per cent of the total construction by private enterprise and local authorities, however, was with governmental assistance. The central government furnished 80 per cent of all subsidies; 20 per cent was supplied by local authorities. Since 1933 the central government has limited its subsidies to slum clearance and the provision of substitute new housing.

Of 1,974,379 new houses built through private enterprise during this period, 442,732 were aided by governmental grants. Municipalities built 830,509 homes. The larger proportion of homes built, including those erected by private enterprise and those in which the government assisted, are of the English cottage type, usually two-story houses.

Despite this wide-range activity, Britain still faces a shortage of suitable homes for the lower income groups. This, British authorities feel, will be in a large measure self-correcting. During the past three years there has been a growing tendency for private capital to invest in dwellings for the lower wage earners. Of the houses built by unassisted private enterprise in 1935, approximately 37 per cent were within the price range of this class, and about one-third were constructed for renting.

The British Housing Act of 1933, however, must be given a major share of the credit for this interest of private capital in housing. Undoubtedly the joint guarantee of loans by central and local governments has done a lot to stimulate private construction. British municipal authorities appear to have been granted extremely wide powers in their drive against slums and overcrowding. They may buy land, may determine when an area is overcrowded, as defined by law, and may arbitrarily order the removal of overcrowded families into other quarters. Couple this widespread authority with the facts that building costs have dropped more than 10 per cent in the last eight years, that interest rates have dropped and you have the answer to the British housing success. Were American building costs and interest rates to drop, were housing laws with "teeth" to be passed, we would have housing success, too.

Clas to Assist Ickes

Ever since the inception of PWA, the work of surveying, setting-up and planning the present PWA low-cost housing program from an architectural and social point of view has been in the hands of Angelo R. Clas. Last month it was announced that Mr. Clas had completed this job and that he will hereafter be Assistant to PWA Administrator Ickes in charge of all PWA investigations, with particular attention to construction methods and practices. Mr. Clas joined PWA after varying experience. He was graduated from Harvard University, practiced as an architect in Chicago, and was an executive of manufacturing and steel corporations.

windows are the eyes of a building. In them is expressed the character and beauty the architect has wrought in his design. From them the average person, spending half a lifetime within four walls, gazes out upon the world. That is why glass should always be the finest quality obtainable.

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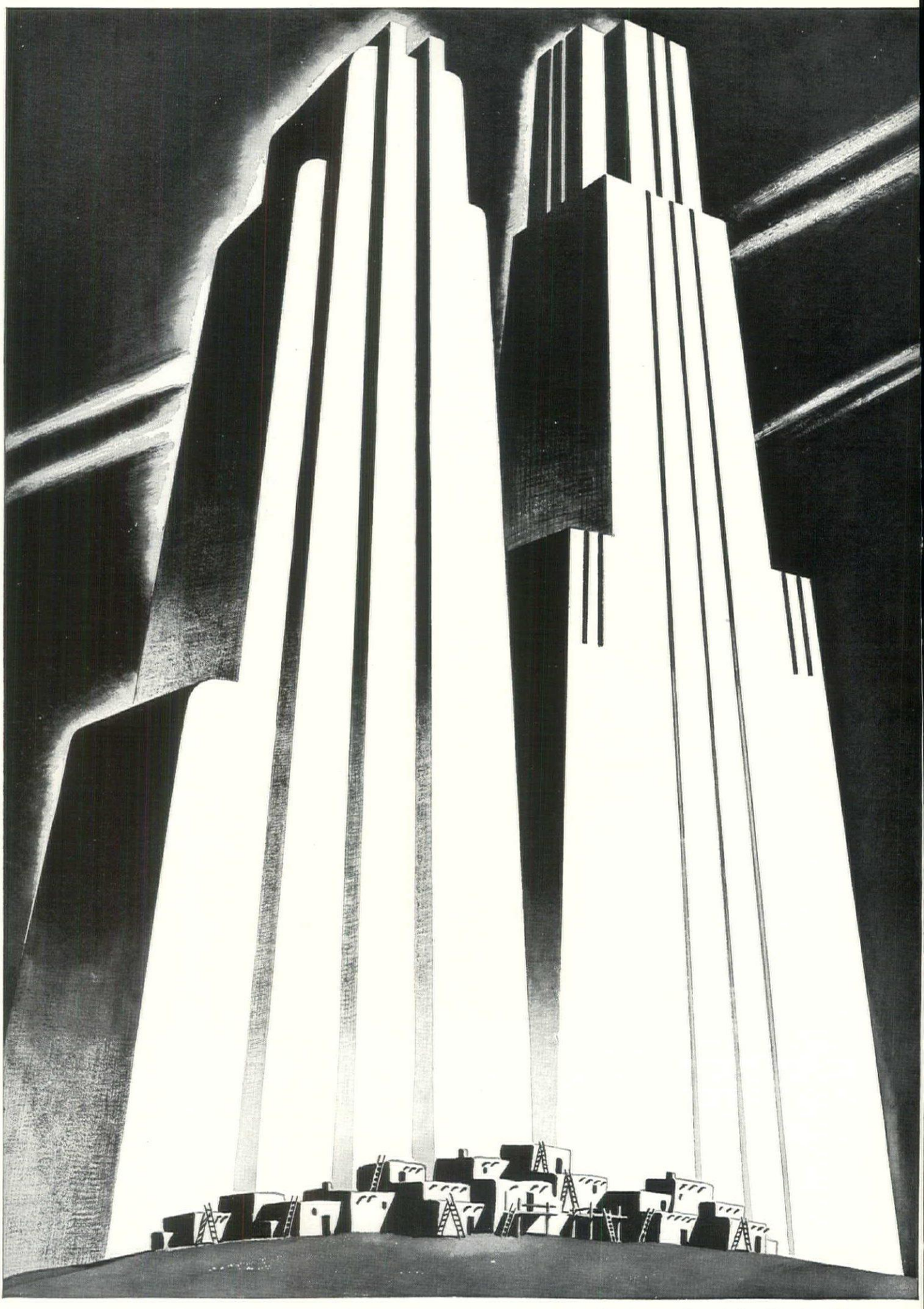

DARWIN WAS RIGHT

that's why Bethlehem keeps an eye on trends

MR. DARWIN'S famous theory applies not only to living things but to purely inanimate objects as well. Just as mankind has progressed and changed so has there been equally steady development and change in architectural forms and construction methods. Each age has produced the type of structure best suited to its own civilization. Here in America we have gradually progressed from the crude pueblo of the Southwest and the pioneer's log cabin to the towering steel-framed structures characteristic of the twentieth century. Now we are entering an era of clean-cut structures designed purely for the functions of modern living.

Naturally, this increasing emphasis on simplicity and clean, direct line has necessitated the development of an entirely new structural technique calling for entirely new types of structural members. No one knows that better than the architectural and engineering professions—and Bethlehem Steel Company, which has consistently forecast these changing requirements and taken the steps necessary to meet them. Bethlehem's success in this endeavor is demonstrated by the widespread acceptance of Bethlehem Structural Steel Members and their use in virtually every type of construction project from small dwelling to giant skyscraper.

DIVERSITY OF MEMBERS— DIVERSITY OF USES

No single construction field has been neglected. Bethlehem Steel Members are equally at home, equally important, in the Golden Gate Bridge at San Francisco and a private home in New Rochelle. That in itself is indicative of the careful and extensive analysis Bethlehem has made of present-day structural requirements and of the unique service offered to architects and engineers.

STEEL FOR HOMES OF TODAY— A CASE IN POINT

The decided increase of general interest in the steel frame house as a permanent structure and a safeguarded investment has created a widespread demand for steel members especially designed for this purpose. Here again Bethlehem forecast a definite trend and perfected members best adapted to the new construction method.

The Bethlehem Steel Stud and Open-Web Steel Joist are even more adaptable than wooden members and are handled in an identical manner, with the cutting torch and

electric arc welder replacing the saw and hammer. Their use does not handicap the designer in any way or affect the appearance of the completed structure in the slightest degree. Used either alone or in combination, these new Bethlehem members greatly enhance the rigidity, permanence and security of the home or other light occupancy structure in which they are used.

CENTRAL SOURCE OF SUPPLY

Bethlehem Open-Web Steel Joists and Studs form only a relatively small part of the complete range of Bethlehem Steel Products for Building Construction. No form of steel required in modern structural practice has been omitted. Architects and engineers can specify from a central and united source of supply the steel best suited to aid in the solution of the problem at hand.

BETHLEHEM STEEL PRODUCTS FOR BUILDING CONSTRUCTION

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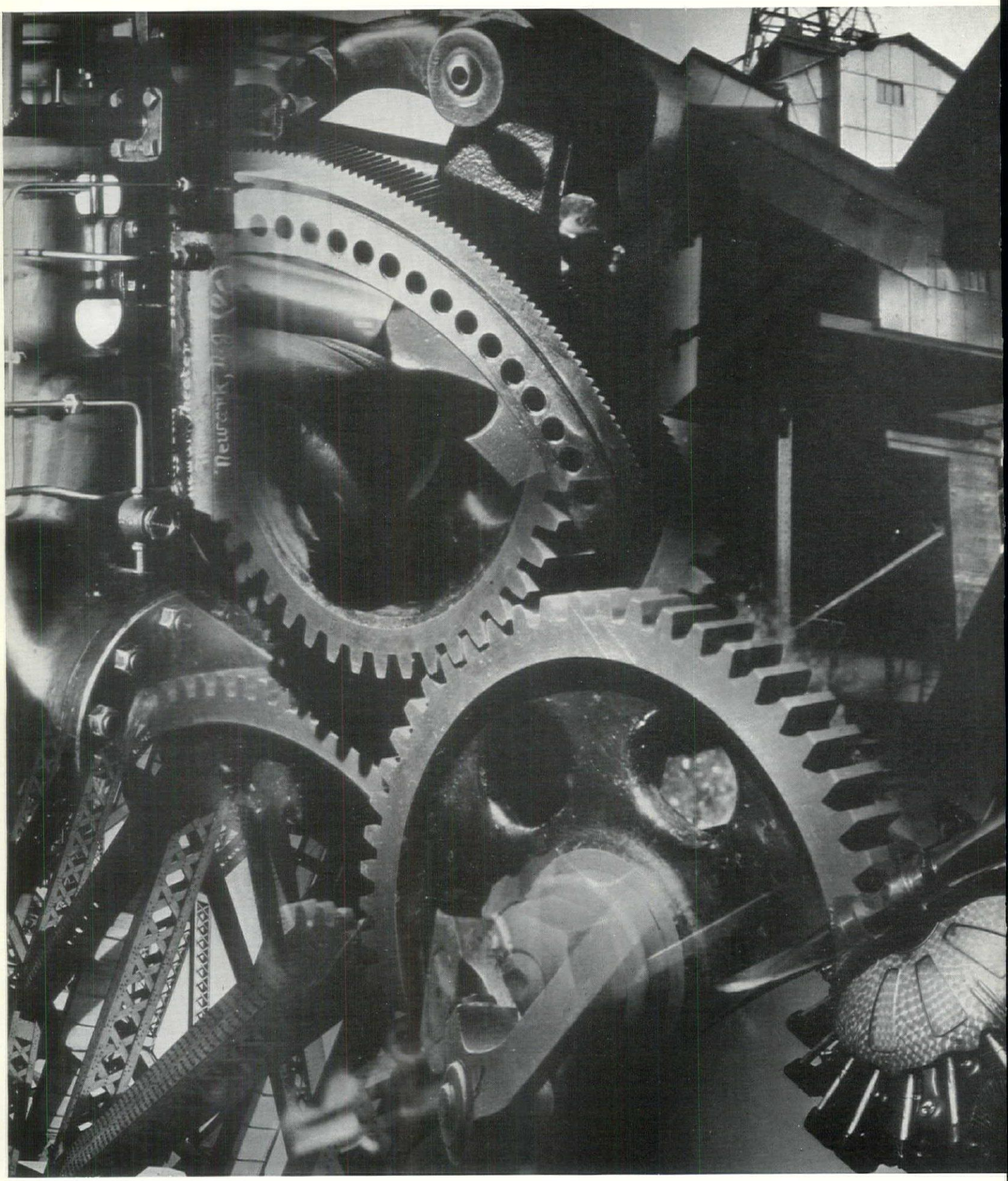


PHOTO: IRVING BROWNING

INFLUENCES FOR AND AGAINST PREFABRICATION

Significant developments cause controversy. In viewing the future of the prefabricated house, we must consider the opinions of the industrialist, consumer, idealist, sociologist, architect, romanticist, nationalist, economist, contractor and speculative builder, labor union, manufacturer and — most powerful — public taste, before we can arrive at a logical answer as to its future.

By EUGENE RASKIN

IN this realistic world of ours, unfortunately, the right and wrong of a theory do not affect its realization as much as does the double-edged question of who favors it? Who's against it?

Various groups of men have expressed and continue to express their attitudes towards the subject of prefabrication in the small house; and the sum total of these attitudes will undoubtedly have a great deal to do with determining the future of prefabrication. It is hoped, therefore, that a listing of the different opinions and the groups which sponsor them will help to clarify our understanding of this much-discussed subject.

INDUSTRIALISTS

Under this classification (for our present purposes) we might include not only large-scale manufacturers, but also those financial and merchandising powers which are so closely allied to actual production. These tycoons cannot help but eye the small house field in much the same way as a hunter might regard newly opened virgin game territory. The field is amazingly rich, abounding in possibilities of profit, seething with activity,—but chaotic, unorganized. It is impossible for any red-blooded industrialist to refrain from visualizing this field "properly" co-ordinated, developed,—integrated into a single large-scale business similar in many respects to the automobile industry. He visualizes profits that are, naturally, enormous; and again naturally, he sees the throne of power occupied by a figure bearing a remarkably close resemblance to himself!

Unquestionably, large-scale industrialists favor prefabrication and it is well known that a good many of them are subsidizing experimental research in prefabrication and have been doing so for some time.

CONSUMER

Quite a number of people in the modest income brackets would eagerly become home owners if they could obtain houses of acceptable quality at a scale of prices within their means. A good many of these people (and some others) believe that such a scale of prices would be possible only with mass production, organized merchandising, and single capital investment. This group also utters an emphatic yes to the question of prefabrication.

IDEALISTS

This category includes a number of very influential people who have long expressed grave concern over the low standards of housing now prevalent. They attribute our housing ills to the existence of the speculative jerry-builder, as far as structural standards are concerned, and lay the blame for our indisputably low aesthetic attainments to the hazards of individual taste.

Prefabrication in the small house field represents to these idealists the only quick, practical means of overcoming these abuses, and consequently, they too give it their endorsement.

SOCIOLOGISTS

Several gray-bearded scholars recently have publicly stated their belief in the approaching death of the popular romantic concept of "Home." To the super-civilized citizen of this century, say these gentlemen, the idea of "Home," as a permanent dwelling place containing an accumulation of personal tradition is definitely dated; our modern man thinks of home as a human relationship among the members of his family, rather than in terms of location and structure. These sociologists maintain that this new attitude is healthy

and fully consistent with normal life in our times. The prefabricated small house, with its mobility and "commodity" character, will, they believe, further the new home concept and allow greater freedom for its development.

For this more or less round-about, but undeniably significant reason, the beards have wagged dignified approval of prefabrication.

ARCHITECTS

The average architect whose practice lies chiefly in the small house field, views the possible advent of prefabrication with an odd mixture of intellectual interest, frank scepticism, and unadmitted fear. As an intellectual, he cannot help but be intrigued by the experimentation in new materials, forms, and structural methods which prefabrication has aroused. As a practitioner, however, he knows that at present he can give his client more house value per building dollar than that client can get in a prefabricated house. But, most important of all, as a professional man, he realizes that the full acceptance of prefabrication would mean his elimination; or at best, his reduction to the status of staff designer as employe of a fabricating concern. All in all, the small house architect who sincerely looks forward to the success of prefabrication is indeed a rare bird!

ROMANTICISTS

These staunch survivors of a much discredited age refuse to countenance the loss of "individualism" in home construction. They maintain that a man's home is just as much an expression of his ego as the things he does, thinks, and says. A home, to these romanticists, should be designed and built from an entirely personal point of view. Any system which entails the ordering of house "B669-R" (or "B669-G" if you want a green roof!) would be a denial of the finer elements in man's nature.

Of all the groups which view prefabrication with disfavor, the romanticists will be the most difficult to quiet. Their conversion will be accomplished (if at all) only by some gentle form of extermination!

NATIONALISTS

Historians of art, and art critics, tell us that any truly great art must be distinctly national in character. As long as it has its basis in folk culture, they say, it retains its virility and aesthetic integrity. Consequently, our patriot-aesthetes have been "viewing with alarm" the influence which the so-called International style is having on our American art. And since most of the prefabricated houses they have seen appear to have been designed in the dreaded International style, they are loud (and will be louder!) in expressing their displeasure.

ECONOMISTS

The last few years have witnessed many denunciations of the degree to which centralization of industrial control has advanced. For the very same reason then, that industrialists find prefabrication alluring, a great many economists (especially those with political aspirations!) are opposed to it. Prefabrication, these economists thunder, would mean even greater centralization of power than already exists, and an attendant increase in the number of abuses which such power generates.

A slogan of some not very far distant day might well be "Drive the house-hatchers from the temple!"

CONTRACTORS AND SPECULATIVE BUILDERS

Under a fully accepted system of prefabrication in the small house field, those fortunate few contractors and builders who survive would be in business as local dealers and service organizations for the national concerns which produce the prefabricated houses. (Or perhaps some of them might specialize as spare parts men!)

Thinking contractors and builders, therefore, are almost unanimous in turning a facade of hearty contempt to the whole subject of prefabrication, though one or two have been heard, in melancholy moments, to express a conviction that the ultimate success of prefabrication is inevitable. Whether or not they are right, the future alone will tell.

LABOR UNIONS

The existing building trades, under a system of prefabrication, would be in very much the same position as the building contractors to whom we have already referred. Since only a few skilled mechanics would be needed to assemble each house on the site, such crafts as plastering, carpentry and others would face virtual extinction. Union leaders consider that eventually these men would be absorbed into the factories where the houses are produced; but such long range optimism would be but poor consolation to a man facing the immediate loss of his livelihood. Without doubt, the growth of prefabrication will not take place without bitter opposition from organized labor.

MANUFACTURERS

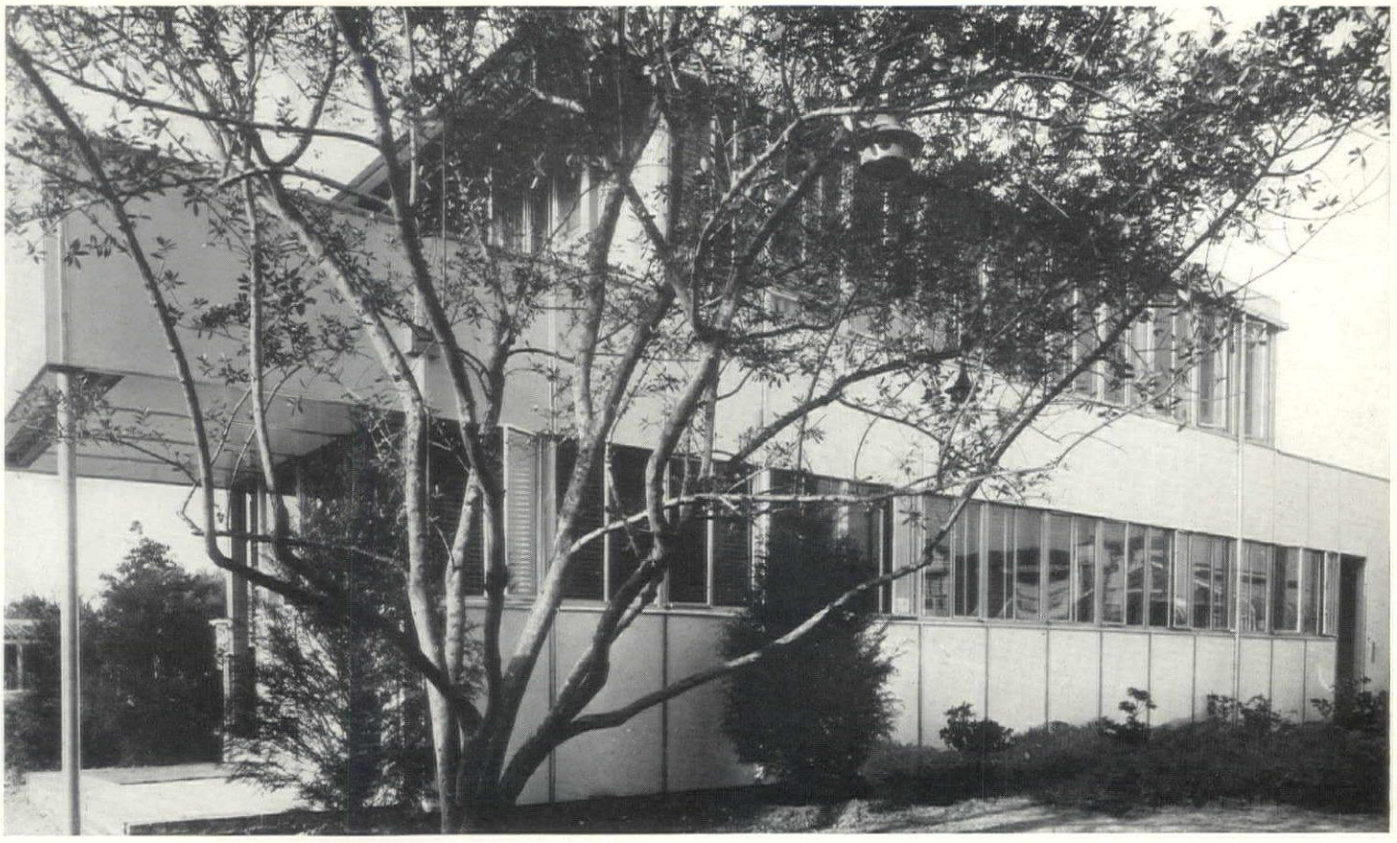
Certain building materials (shingles, for example) would be very little in demand if prefabricated houses were generally accepted. Naturally enough, the manufacturers of such materials will wield whatever influence they possess to protect themselves against the development of any trend which might injure their prosperity.

We may expect a barrage of literature, direct and indirect propaganda, attractive price offers, guarantees of various kinds—all aimed at presenting the individually-built house in a better light than its factory-built rival. How effective this advertising will be, remains to be seen. The backers of prefabrication are no slouches at molding public opinion either!

PUBLIC TASTE

Despite Hollywood and the fashionable journals, the overwhelming majority of Americans still prefer some form of traditional home architecture to that type of dwelling which they so frequently call a "shoe-box," or something even less complimentary. Anyone who has had a sufficiently varied contact with the building public knows that its taste is still very far from won over to what we call modernism. The fact is, that prefabricated houses are forced by fabricating methods to have more or less simple geometrical forms and smooth surfaces. This semblance of modernism counts against the prefabricated house as far as public taste is concerned.

This resistance is not of the militant type, such as that of Labor might very well become, but of the passive Mahatma Gandhi school; and (as the British have discovered) this is a kind most difficult to overcome!



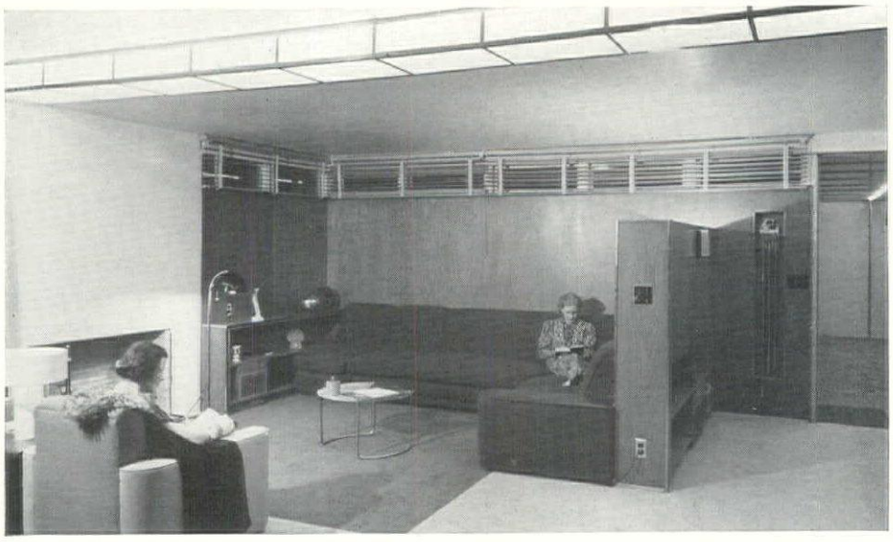
STUDIES IN RECENT PREFABRICATION

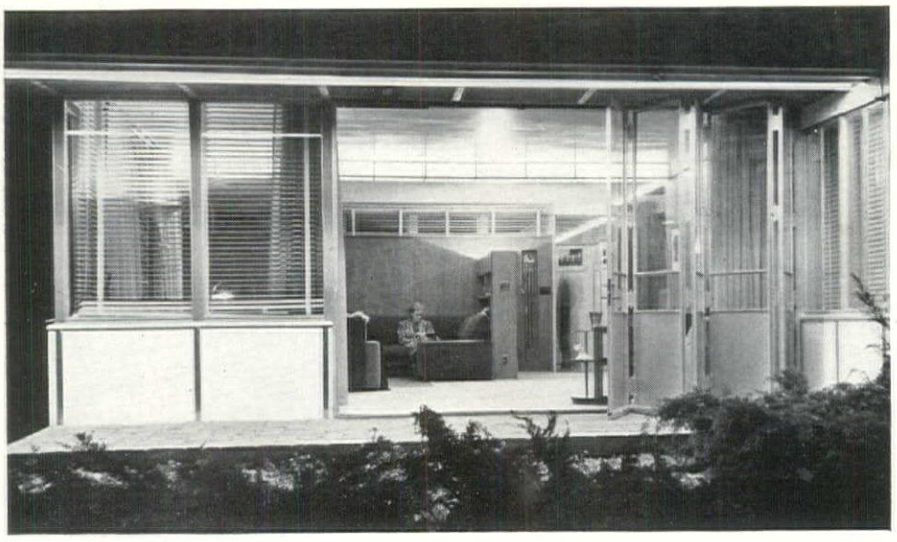
RICHARD J. NEUTRA, ARCHITECT, LOS ANGELES, CALIFORNIA

Richard Neutra has long been concerned with the possibilities of prefabrication. His suggested use of prefabricated blocks based on diatomaceous earth appears as early as 1923. Of the many types and methods of prefabrication he has sponsored since, only the Diatom house (page 35) has not been built. It employs the suspension principle, using central masts from which the double panel diatomaceous walls are suspended in tension. The Super-Plywood model home (above) is based on Mr. Neutra's second prize design in the General Electric Competition of 1935, and expresses the most advanced theories of prefabrication and mobility. The cellular steel unit William Beard House (pages 26 and 27) Gold Medal award in Better Homes in America Competition in 1935, is an admirable example of the complete correlation of function both internally, in the relation of parts and the circulation between them, and externally in relation to orientation and climatic requirements

First Floor

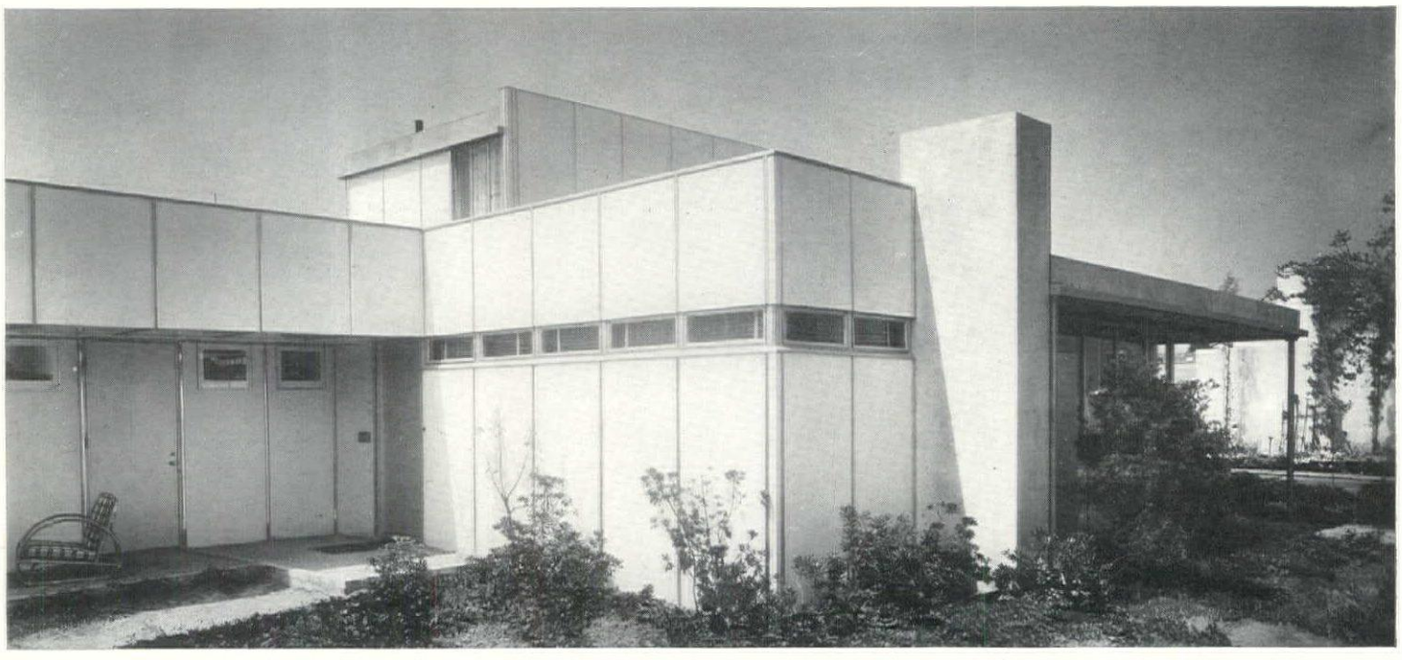
Second Floor

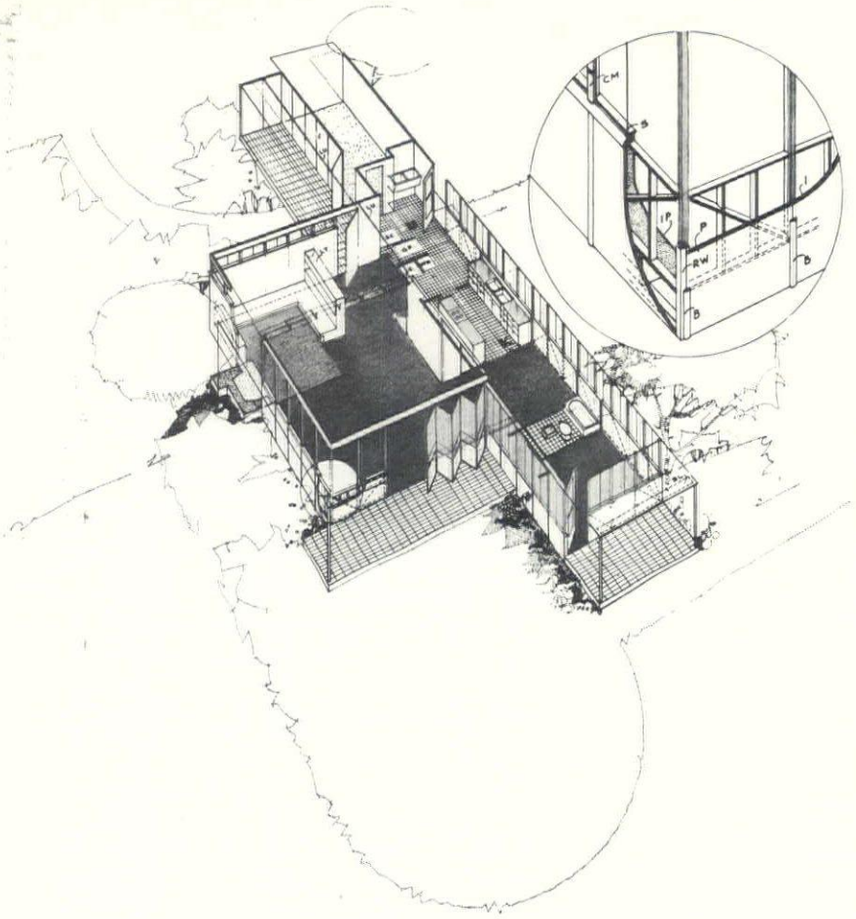




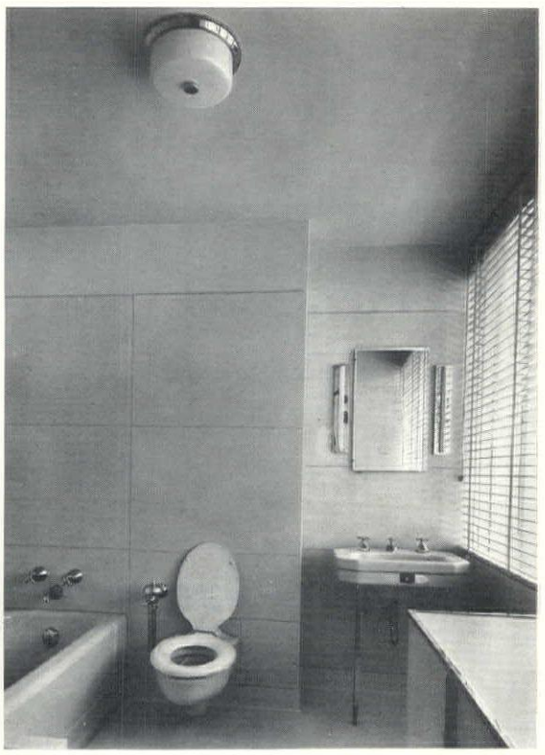
The Plywood Model House is adapted from Mr. Neutra's second prize house in the General Electric Competition of 1935. The structure consists of a unitype chassis with weatherproof plywood panels. Light mill construction results in a transportable house; safe from damage by the selection of its materials. Joints are covered by Aluminum-Kalomein moldings. Composition roofing is finished with a top sheet of granulated artificially oxydized iron, aluminum coated as a heat mirror. Interior walls are mahogany plywood. Privacy is obtained by the use of small high windows on the street side while spaciousness is gained by large windows and folding doors on the garden. Cabinets are cleverly placed to divide living room from entry (top). The living room from the garden showing the Lumiline tubular lighting on the porch. (center). The house from the street side (below)

PLYWOOD MODEL HOUSE
LOS ANGELES, CALIFORNIA

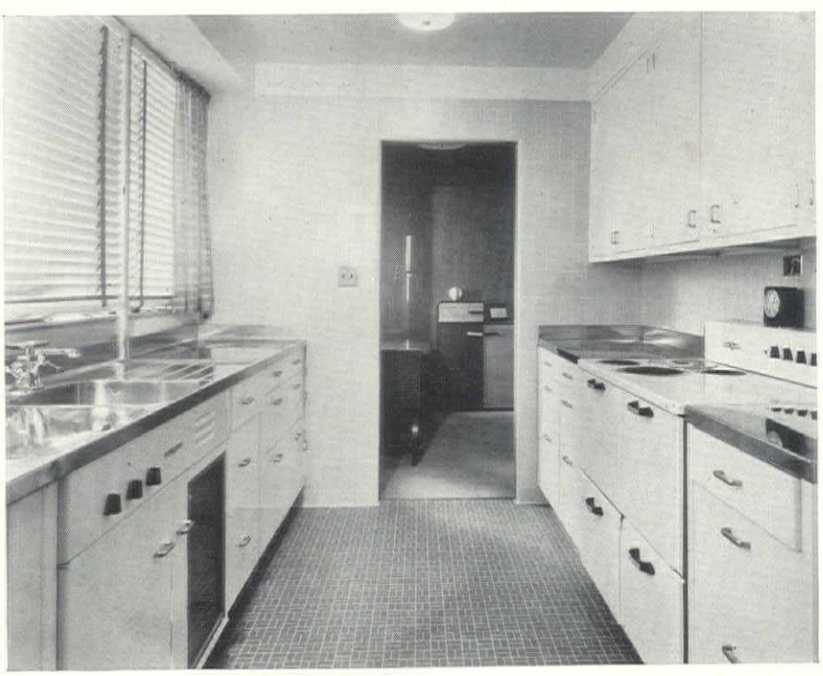


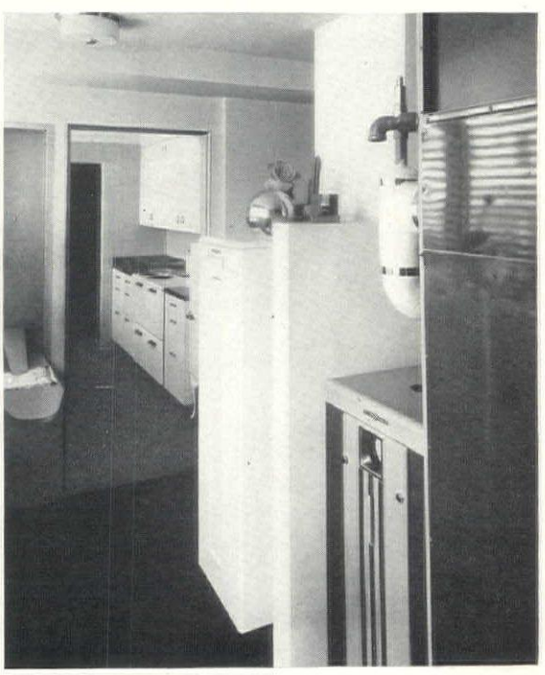


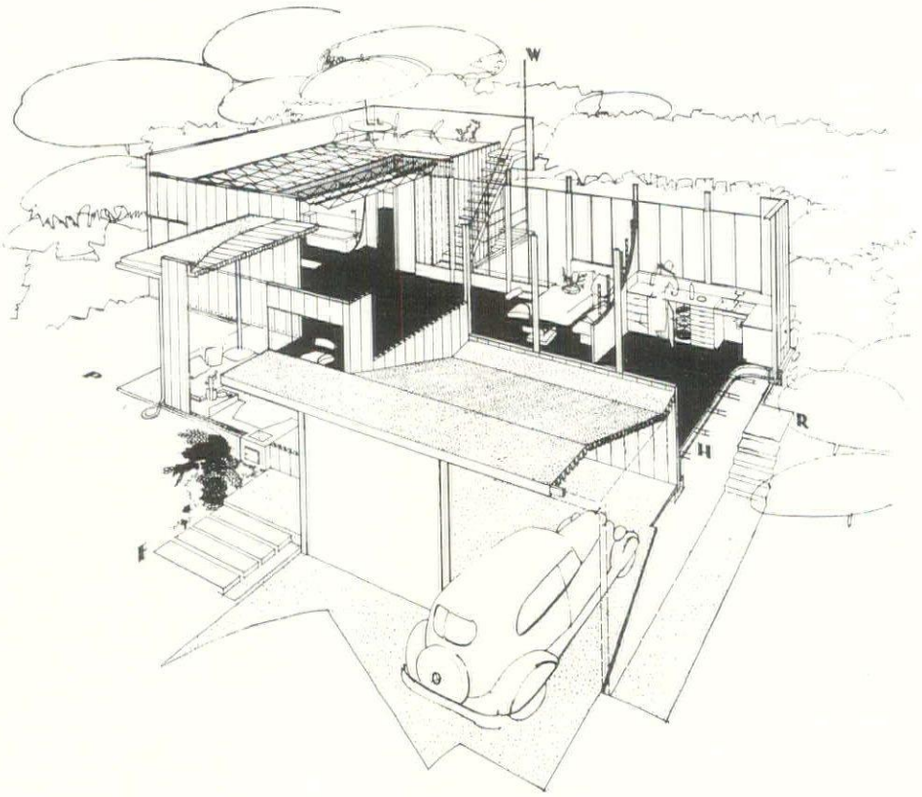
Air conditioning and other General Electric equipment is naturally one of the main features of this house. Among other new devices is a refuse grinder, revolving cooler and a water softener. The upstairs bath has Sanirox Structural glass on the walls and ivory colored linoleum flooring



RICHARD J. NEUTRA, ARCHITECT

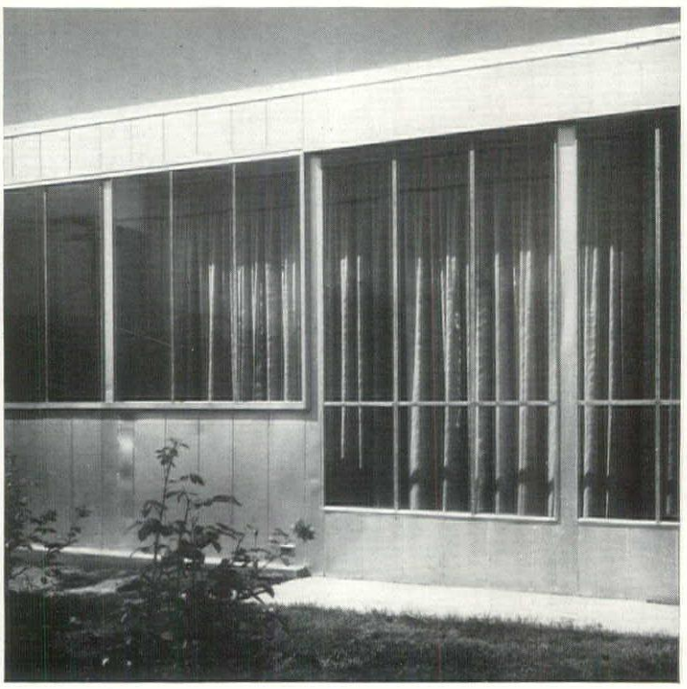






A non-combustible, earthquake resistant, vermin-proof structure, built of copper bearing hollow sheet steel sections inserted in a grooved concrete footing to form the walls. Air intakes at the base of these wall sections have made them self-ventilating by means of heat rays initiating internal air circulation within the unit. The cement composition floor slab acts as a radiating panel due to a hot air plenum underneath. The joints of the standard cellular steel wall sections are caulked with an ever plastic mastic compound, permitting relative elastic movement of the series of bottom fixed cantilevers

HOUSE OF WILLIAM BEARD, ALTADENA, CALIFORNIA



RICHARD J. NEUTRA, ARCHITECT, GREGORY AIN, COLLABORATOR

The house is planned to take advantage of a fine view of the Sierra Madre Mountains and a possible addition of two bedrooms and a bath on the second floor. Horizontal sliding cadmium steel sash and horizontal sliding metal frame glass and steel doors furnish excellent fenestration. A view from the interior through the living room windows (above). A view of the house from the garage side (right)

48 SYSTEMS OF PREFABRICATION...

IT IS TRITE to point out that prefabrication is as old as man-made shelter. Improved manufacturing methods and new applications of various scientific discoveries have broadened the use of factory-made housing. But even today, most prefabrication systems remain largely parts for the house. These parts may be walls complete with doors and windows, wall panels or even a new type building block. The accompanying compilation is a comparative study of the roof, wall and base construction of different systems in three basic methods.

THEY ARE:

A. Frame and Panel construction.

TYPE	NAME	SPONSOR
A-1	Ambler Asbestos Building	Keasby & Mattison Co.
A-2	Enterlocking House	Long-Bell Lumber Sales Corp.
A-3	Bossert House	Louis Bossert & Son
A-4	Forest Products House	Forest Products Laboratory
A-5	Superior Home	Superior Buildings Company
A-6	General Houses	General Houses, Inc.
A-7	Copper Houses, Inc.	Kennecott Copper Corp.
A-8	American Houses, Inc.	American Houses, Inc.
A-9	Berloy House	Berger Manufacturing Co.
A-10	Corkanstele House	Corkanstele, Inc.
A-11	Crowe House Construction	F. Malcolm Crowe
A-12	Ferrocon Corporation House	Ferrocon Corporation
A-13	Phemaloid Compound Lumber House	Haskelite Manufacturing Corp.
A-14	Insul Steel Construction	Joah Brogden
A-15	Novelle System of Construction	Novelle System
A-16	Rostone House	Rostone, Inc.
A-17	Steel House, Inc.	Steel Housing Corporation
A-18	Stran-Steel House	Stran-Steel Corporation
A-19	Structo House	Structo, Inc.
A-20	Van Ness Steel Houses	C. L. Van Ness
A-21	Buell House	T. H. Buell & Co.
A-22	Gropius House	Walter Gropius
A-23	Winter House	E. M. Winter
A-24	Lurie House	Metal Lath Manufacturers Association
A-25	Palmer House	Palmer Steel Buildings, Inc.
A-26	Porcelain Steel House	Porcelain Steel Buildings Co.
A-27	Neutra Diatom	Richard J. Neutra
A-28	"E" Frame House	Housing Company
A-29	Swan House	The Swan House, Inc.
A-30	Unit Panel Construction System House	H. H. Keller

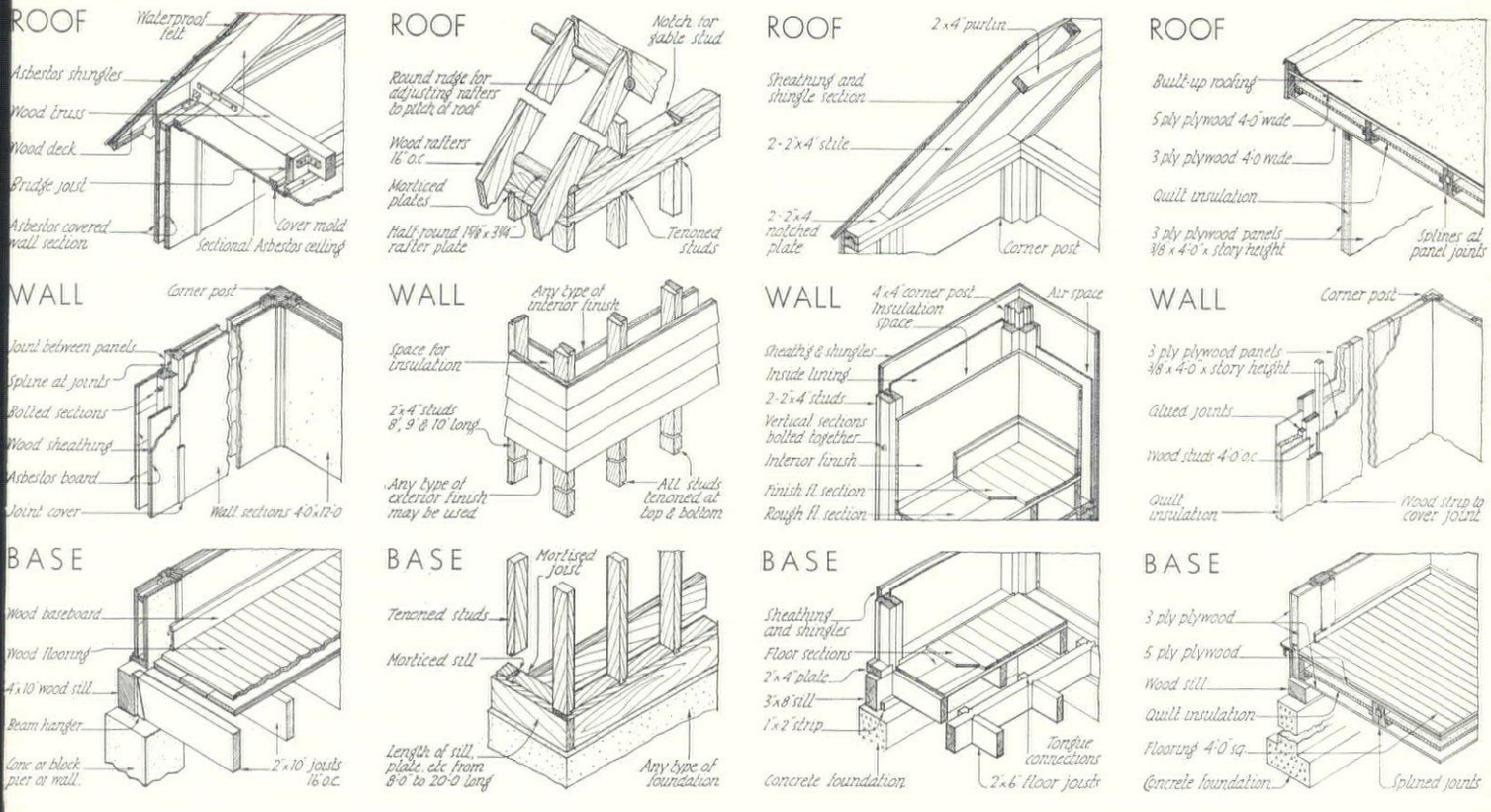
B. Block or Precast Concrete construction.

B-31	Connecticut Precast House	The Connecticut Building Corporation
B-32	Dextone Self-Centering Wall System	The Dextone Company
B-33	Earley System	John J. Earley
B-34	Hahn Concrete Lumber System	
B-35	Lockwood System	Ernest H. Lockwood
B-36	Rockwood Gypsum House	Rockwood Gypsum Lumber Corporation
B-37	Rackle System	George Rackle & Sons Co.
B-38	Underdown System of Reinforced Concrete Structures	Donald Underdown
B-39	Byrne House	Barry Byrne
B-40	V. D. L. House	Van der Leeuw

C. Frameless (cellular steel, etc.) construction.

C-41	Frameless Steel House	Insulated Steel Construction Co.
C-42	Lindsey House	Samuel R. Lindsey
C-43	Steelox House	The Steelox Company
C-44	Lindeberg House	Harrie T. Lindeberg
C-45	Wheeling House	Wheeling Corrugating Company
C-46	Universal House	Universal Housing Corporation
C-47	Wudnhous	Housing Company
C-48	Stockade House	Stockade Building System, Inc.

This study was developed by the American Architect staff in collaboration with Eugene Raskin, Walter Sanders and Elmer Bennett.



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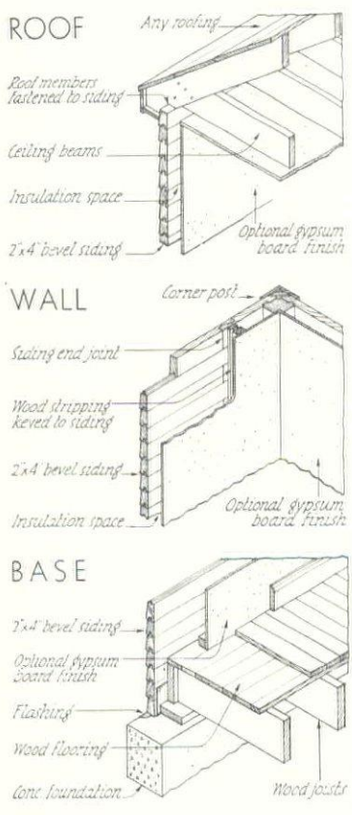
SCALE: 1/4"=1'-0"

A. 1. AMBLER ASBESTOS BUILDING. Sponsor: Keasby & Mattison Co., Ambler, Pa. . . . A completely prefabricated building. It is of wood framing with asbestos covered walls. . . . ROOF consists of asbestos shingles on prefabricated sections supported by factory made wood trusses on 4'-0" centers with rafters between. Ceiling sections of asbestos covered lumber are attached to trusses. . . . WALL sections are in 4'-0" x 12'-0" units made of wood sheathed framing with enclosed air space covered on both sides with asbestos lumber. The vertical sides are bolted together forming a rigid stud. The units are butted together and splined. . . . Wall units with doors, windows and plain surfaces are interchangeable. Interior partitions are similar to wall units. Interior moldings cover all wall unit joists. . . . Sub-floors 1" thick are furnished in the panel units. BASE wood sills 4" x 10" carried on piers or continuous footing and floor joists 2" x 10" on 16" centers are prefabricated. . . . There are two types of units, the "Standards" with exposed interior stud and "Liberty" of heavier construction and eliminating the interior stud.

A. 2. ENTERLOCKING HOUSE. Sponsor: Long-Bell Lumber Sales Corp. New York, N. Y. . . . A patented factory-cut wood framing. The framing members may be quickly and accurately assembled due to two basic kinds of lock—a wedge shaped notch and tongue for studs and joists and a rounded one for the rafters. . . . ROOF: The rafter plate is a half round 1 5/8" x 3 1/4", 8'-0" to 20'-0" long, notched on 16" centers. Rafters 2'-0" x 4'-0" and 2'-0" x 6'-0" in varied lengths have a number of circular notches so located that on a 9" x 12" pitch, each rafter may be used for four different spans of successive 16" multiples. . . . WALL: Studs come in three lengths of 8'-0", 9'-0" and 10'-0". They are tenoned at their ends and may be driven into mortises in sills. Sills and plates are 2" x 4" and 2" x 6" and come in lengths from 8'-0" to 20'-0" and have mortises on 16" centers. . . . BASE: Joist headers 2" x 4" to 2" x 12" and varying in length from 8'-0" to 20'-0" have mortises like those on the sills at 16" centers. Joists 2" x 4" to 2" x 12" come in nine lengths. . . . The company also furnishes pre-cut window and door headers, etc.

A. 3. BOSSERT HOUSE. Sponsor: Louis Bossert & Son, Brooklyn, N. Y. A prefabricated house that has been manufactured for about 25 years. It is of wood framing with sectional wood walls. . . . ROOF sections 3'-0" x 8'-6" are supported by trusses approximately 12" on centers. Gable ends are built in one piece with framing and exterior covering. . . . WALL is of ready made sections approximately 3'-0" x 8'-6" and consisting of a 2" x 4" frame covered with sheathing paper and finish. Bottom members rest on sill and side members are notched continuing down over sill face. The top member is tongued, fitting into a groove in the plate. Sections include wall, door and window units. One bolt fastens roof, wall section and plate together. Tongue and groove jointed, finished flooring and sub-flooring are furnished in panels of 3'-0" x 8'-0". . . . BASE: 2" x 6" joists are used up to 7'-0" spans after which the depth is increased. Joists and girders have semi-circular tongue and groove joists. Girders occur every 6' or 7'.

A. 4. FOREST PRODUCTS HOUSE. Sponsor: Forest Products Laboratory, Madison, Wisconsin. . . . A plywood house developed from the "stressed-covering" principle of airplane construction. . . . ROOF is flat, built of panel units 4'-0" wide by 5 3/8" deep framed by joists about 2'-0" apart and end pieces. Unit top covering is 5/8", five-ply plywood finished with a continuous sheet of built-up roofing and the lower covering is 3/8", three-ply. . . . Roof overhangs side wall by about 1'. . . WALL is 4' wide story height panels with a thickness of about 2". The panels consist of wood framing of vertical studs about 2' apart and horizontal pieces top and bottom with sheets of 1/4", three-ply plywood glued to provide both interior and exterior wall surfaces. Exterior finish consists of four coats of paint and interior finishes are shellac, wax or paint applied directly to the wood. Wall panel joists are joined through a vertical mullioned mastic filled groove. This receives the edges of the plywood panels which project 3/4" beyond the marginal framing pieces.



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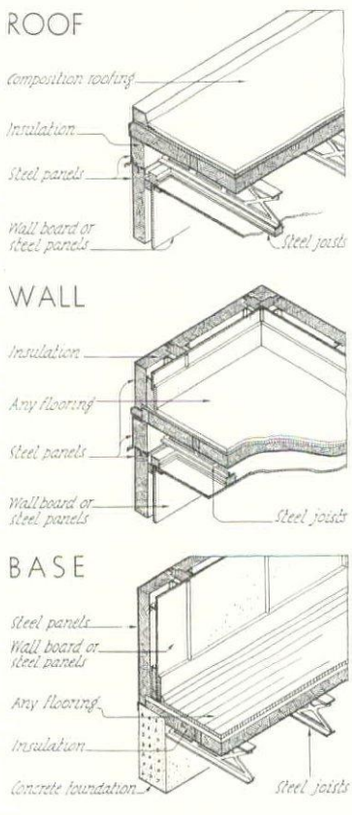

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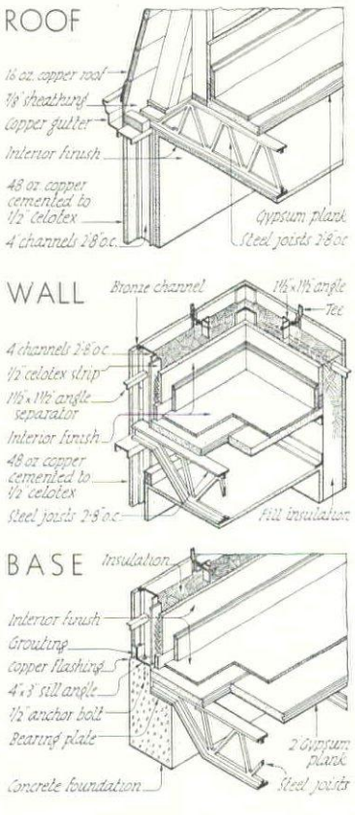

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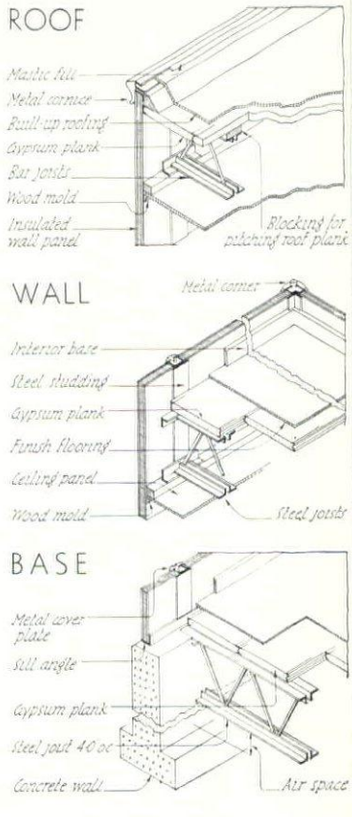

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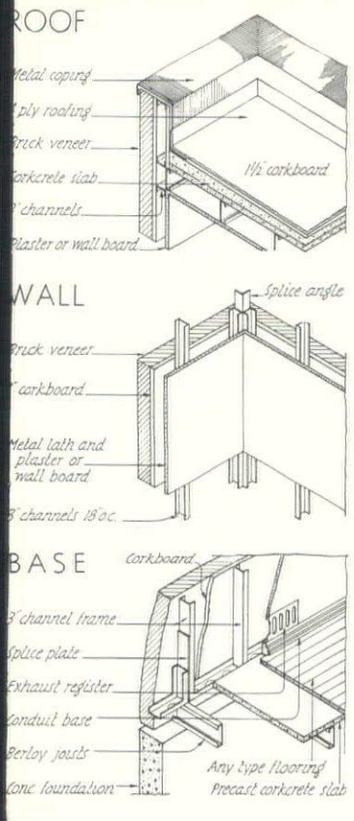
SCALE: 1/4"=1'-0"

A. 5. SUPERIOR HOME. Sponsor: Superior Buildings Company. . . . A patented design for wood house construction which includes provisions to take care of shrinkage of wood. Construction is pre-cut wood framing. The special features are in wall design and method of carrying roof load. . . . ROOF: The roof has no connection with the vertical framing, but is nailed directly to the siding. Roof load bearing on siding presses the boards tightly together and prevents opening of horizontal joints. . . . WALL: Main framing consists of heavy corner posts nailed to a box sill. Siding of horizontal beveled boards, grooved on their lower edges and tongued on upper edges. Siding pieces have inner vertical groove near the end to take tongues that are provided in the corner posts. Beveled edge ends and an exterior corner piece are bolted to secure the siding. . . . BASE consists of a box sill to which the posts are nailed.

A. 6. GENERAL HOUSES. Sponsor: General Houses, Inc., Chicago, Illinois. . . . ROOF: The composition roofing insulated with 3½" of rock wool is supported on expanded steel joists. . . . WALL: 14-gauge rust-resisting copper bearing hollow steel panels with sufficient strength to support all superimposed loads are used for the exterior walls. The interior surface of these walls is of sanded celotex, sheetrock or 20-gauge reinforced steel. Celotex is finished with V-joints, sheetrock with flush joints and steel with panel strips over the joints. Insulation is 3½" of rock wool for steel or sheetrock or 2" for celotex walls. Windows and doors are all furnished and interior partitions are finished to correspond with exterior walls and are insulated. . . . BASE: Prefabricated panels are bolted to a steel base which is attached to the outer edge of the foundation. Steel joists are then bolted to the foundation. Similar joists are bolted to the top of panels. If the house is two stories high, the process is repeated. The house is finished and painted at the job.

A. 7. COPPER HOUSES, INC. Sponsor: Kennecott Copper Corp., New York, N. Y. . . . This house is of standard construction in either steel, wood frame, etc. with a copper panel as a first story facing. . . . ROOF and WALL surfaces are of copper panel. The panels are 2'-8" on centers and run the full story height from base to eaves. Provision must be made to have a stud at the intersection of each panel and structural members at the sill and eaves, and framing for all the openings. The panel is 48 oz. copper sheet backed by 1/2" of celotex. The edge of each panel is crimped back so that it will fit into an extruded bronze track, which is bolted to the structure and runs the height of the panel. The panels are clipped into the tracks from the top. The edges of two panels thus form a dovetail. Any tendency that the exterior wall may have to bulge is prevented by springs which are hooked at several points in the heights to the panel and to the construction. It is claimed that this results in a wall surface that appears to be perfectly flat.

A. 8. AMERICAN HOUSES, INC. Sponsor: American Houses, Inc., New York, N. Y. . . . ROOF: Built-up roofing supported by bar joists spaced at 4'-0" on centers. When a parapet is desired, copper base flashing is screwed tight to asbestos wall panel. . . . WALL panels are 4'-0" center to center of joints and are continuous from the sill to the top of the parapet. They are made of 2" celotex core cemented to an outer and inner covering of asbestos board. Tubular studding which has a steel plate fastened to its inner face to hold the panels in line for setting is used in the construction. The exterior joint is covered by a molded aluminum batten with a snap-on strip to conceal the bolts. . . . BASE: Floor slabs are prefabricated gypsum planks and bar joists. Windows, doors and trim are standard. This company sells only the exterior perimeter of the house and thus considerable variety may be gained by placement of window, door and plain panels and by the interior room arrangement.



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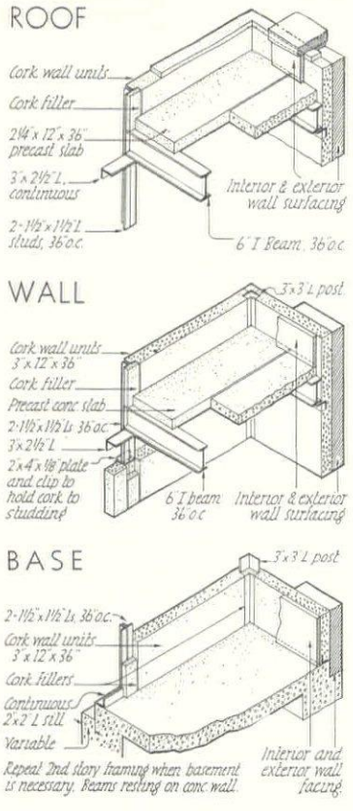

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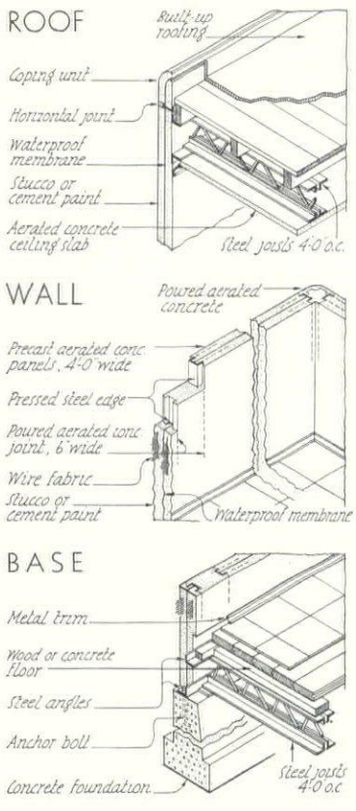

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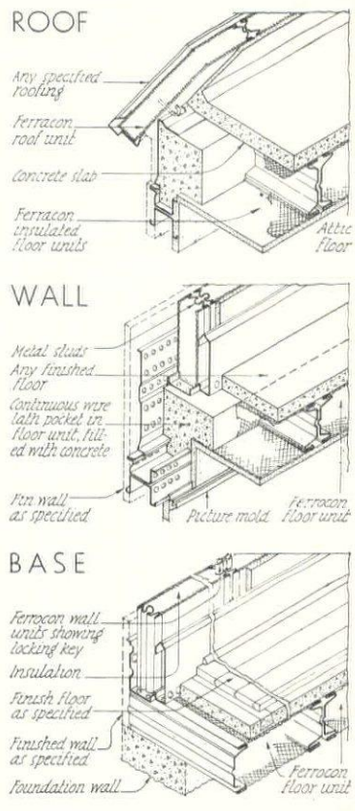

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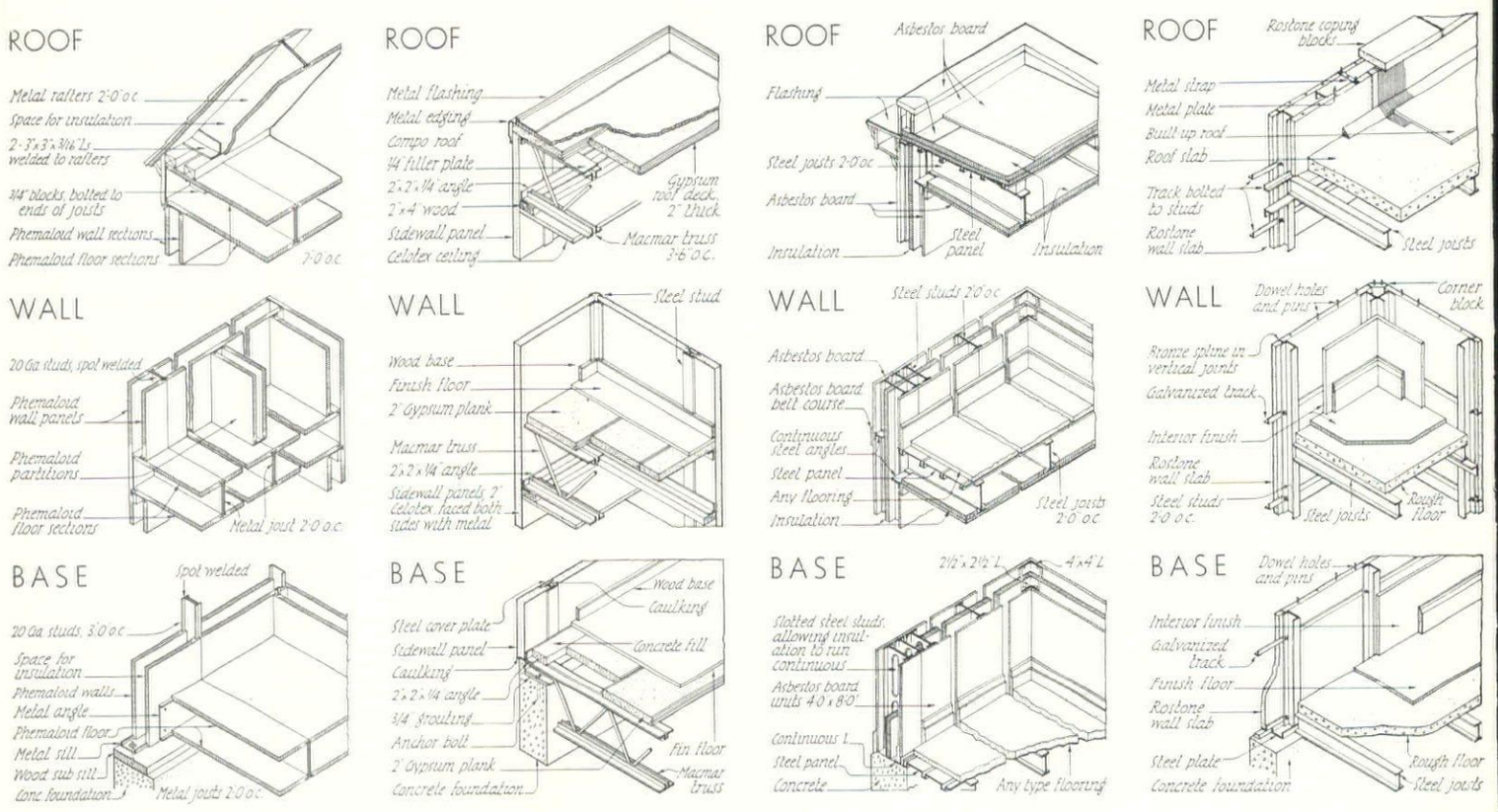
SCALE: 1/4"=1'-0"

A. 9. BERLOY HOUSE. Sponsor: Berger Manufacturing Co., Canton, Ohio, subsidiary of Republic Steel Corporation. . . . ROOF: The basic construction is 16-gauge steel frame throughout. Studs are 3" channels spaced 18" on centers. Patented Berloy channel joists with a flange return spaced 18" on centers are used. Channel studs are welded in groups of three with top and bottom channels of like cross-section to form a panel with flush surface on both sides. Blank wall, window frame, door frame and parapet sections are all provided. Wall panels are interconnected by splice plates through which they are bolted along the wall and by angles at the corner. Splice plates and angles extend continuously from sill to parapet. . . WALL frames parallel to floor framing have no direct support from the joists but are supported at panel-joint locations by struts, which extend from the panel immediately above and are secured to the splice plates.

A. 10. CORKANSTELE HOUSE. Sponsor: Corkanstele, Inc., New York, N. Y. . . . This house has a high heat insulation and may be speedily erected. The frame consists of two 1/2" x 1 1/2" angle studs spaced 3'-0" on center, anchored to a continuous 2" x 2" angle sill. . . . ROOF: Corkcrete (Corkcrete is a patented mixture of cork and cement) slabs on steel "I" beams are used. The finish is optional. The floor system consists of rolled steel beams 3'-0" on center resting on a continuous 3" x 2 1/2" angle bolted to the uprights. Floor slabs are also Corkcrete in precast units 2 1/4" thick and 12" wide. . . . WALL: Notched cork wall units, 3" x 12" x 36", are clipped to studding and held by steel plates. The inner surface is made flush by cork fillers applied to back of studs, forming continuous insulation and protecting the framing from condensation. Exterior stucco and interior plaster may be applied to the slabs. Other finishes may also be used.

A. 11. CROWE HOUSE CONSTRUCTION. Sponsor: F. Malcolm Crowe, Burlingame, California. . . . A patented building system which combines framing members with aerated concrete sheathing slab to form semi-finished panels which are one piece sections of wall. . . . ROOF is of either plank or concrete with built-up roofing, the whole resting on standard truss joists. Ceilings are precast aerated slabs reinforced and made with integral ties for attachment to beams. . . . WALL: Precast aerated concrete panels in two layers with asphaltic moisture-proofing membrane between. Panels are one story in height and may have window or door installed. The panels, 4'-0" wide, are spaced 6" apart at joints. Opposed vertical framing members of adjacent panels are connected by steel spacers, forming structural posts. Open joint spaces are utilized for pipes, etc. Aerated concrete is used to cover the metal membrane across the joint opening and finish it flush with the adjacent panel slab surfaces. Interior bearing walls are similar to exterior walls except that the panel slab is monolithic. The slab is thinner and framing members are smaller in all non-bearing partitions.

A. 12. FERROCON CORPORATION HOUSE. Sponsor: Ferrocon Corporation, Philadelphia, Pa. . . . A patented interlocking steel unit system which consists of prefabricated wall, floor, partition and roof units. . . . ROOF: Both pitch and flat roof may be used with this system. . . . WALL units consist of two heavy gauge cold rolled steel keyways spaced by a heavy gauge expanded and ribbed metal lath with 3" fill of waterproof and fireproof insulation. These units may be had in varying sizes. When being used for construction they are butted together along their vertical edges and the keyways are lined and locked with a heavy gauge steel key. The strong stud members that are the result of this form the structure of the building. Specified exterior and interior coverings are applied directly to the lathed and insulated wall. . . . BASE: Floor units are constructed in the same manner with the result that the abutting units form an I-Beam. A continuous wire lath pocket is formed at the wall end of each floor. Concrete can thus monolithically bind floor and wall together.



A • 13 **A • 14** **A • 15** **A • 16**

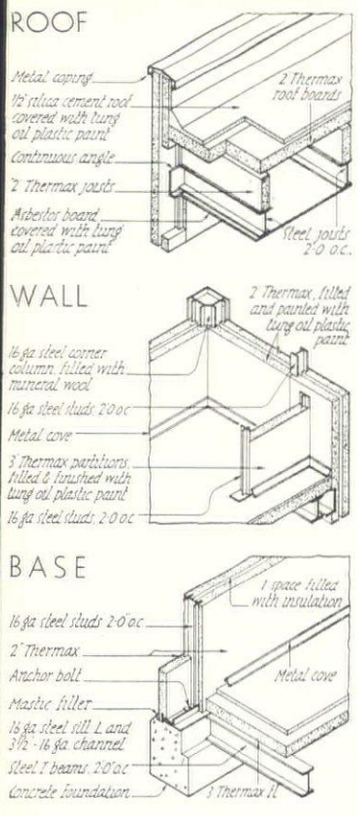
SCALE: 1/4"=1'-0"

A. 13. PHEMALOID COMPOUND LUMBER HOUSE. Sponsor: Haskelite Manufacturing Corp. Chicago, Illinois. . . . This house makes interesting use of a plastic. . . . ROOF: Both pitched or flat roof may be used with this house. Roofing and flashing are standard. . . . WALL: Made of sheet steel channel studs for frames with double 3', 0" plywood panels. The binder for plywood is phenolic formaldeyhyde compound set under heat. This binder is resistant to water, vermin and decay. Exterior panels have a finishing surface of muslin which is fastened to it with the same binder. All joints and grooves are butted with mastic when the finished house is painted. Standard doors and windows of limited size are used. Interior partitions are similar to exterior, but the steel members are smaller. . . . BASE: Wall panels and studs rest on metal sill bolted through wood sub sill to the foundation. All fastening is done with nails through light gauge steel members. All panels are grooved to lock with steel members.

A. 14. INSUL STEEL CONSTRUCTION. Sponsor: Joah Brogden, Philadelphia, Pa. . . . The wall panels for both exterior and interior use of this house are composed of 2" celotex, to the surfaces of which are laminated sheets of copper-bearing galvanized steel. The steel has a one-half inch return over the edges of the celotex. Due to a special asphalt compound as a bond between the celotex and steel, there is no opportunity for internal corrosion. Specially rolled T-shaped members serve as studs. Besides having a sufficient structural value, they also provide a bearing for the panels and have a headed stem tapped to receive the bolts of the caps. Caps for columns and corners are made of 12-gauge copper bearing galvanized steel as standard practice. Stainless steel or other metals may be furnished. Spaces between the special T-shaped members and the caps and in the corner members are insulated with celotex filler strips. Spaces between panels on either side of the T-members and spaces between caps and celotex are filled with mastic. All bearing surfaces of members are buttered with mastic before bolting. This insures insulation at columns, corners and all points of contact.

A. 15. NOVELLE SYSTEM OF CONSTRUCTION. Novelle System. . . . A standard construction of steel floor beams, steel decking, and concrete foundation is used. The wall unit remains the feature of this system. Exterior and interior surfaces of the panel are made of asbestos boards which have a special and strong binder adhering them to steel I-Beam studs. A continuous panel of patented insulation material is possible because of perforations in the I-Beams. These perforations are long rectangles with small bridges separating them for their full length. The units are butt-joined with an extra stud bridging the joint and sealed and united with a special binder. A continuous angle is fastened to the foundation and to each stud in the unit, and a similar angle is attached to the top of the studs and to the under-side of the floor beams. A third angle is attached to the bottom of one set of studs and top of the lower set at the exterior face at the floor line. Standard windows and doors are built into the units and trimmed with asbestos boards. Corners are formed by special angle arrangement with one surface slipping by the other to avoid special corner units. The ceiling is insulated and also has an asbestos board finish. The finished floor is wood laid in mastic. Baseboard and trim are of asbestos and all mechanical work is standard.

A. 16. ROSTONE HOUSE. Sponsor: Rostone, Inc., Lafayette, Ind. . . . This house was developed to utilize Rostone which is a synthetically processed artificial stone containing no Portland cement and available in a wide range of colors. . . . ROOF is flat, built-up roof on slab and steel I-Beam joists. . . . WALL: A factory-made combination of two Rostone wall slabs 1 1/4" thick, each horizontal course supported by galvanized angle tracks bolted to steel studs. The track gauges the stone apart and out from the wall. The horizontal leg is punched to receive dowel pins, so that in erection the bottom edge of the Rostone is set upon the lower shelf angle and held to it by means of dowel pins. The horizontal leg is 3/16" thick and is formed to provide a condensate groove at the back with weep holes. The vertical joint is splined. All joints are caulked with mastic. By means of this system, a flexible wall capable of withstanding great stress is obtained. Corner blocks are provided for exterior angles and mitred slabs are provided for interior angles.



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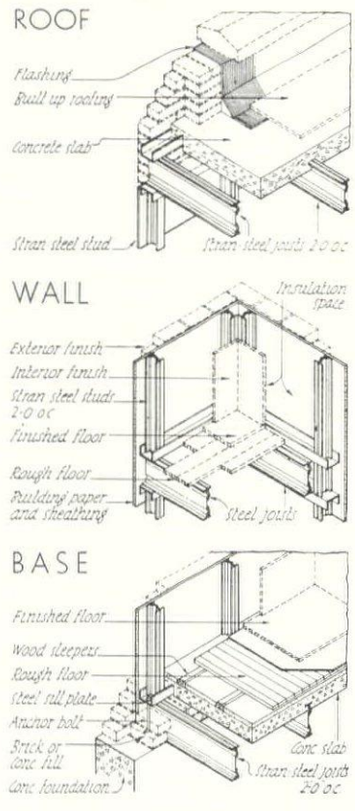

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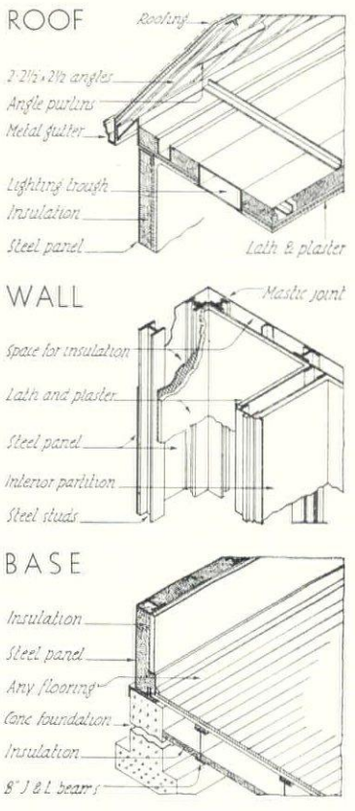

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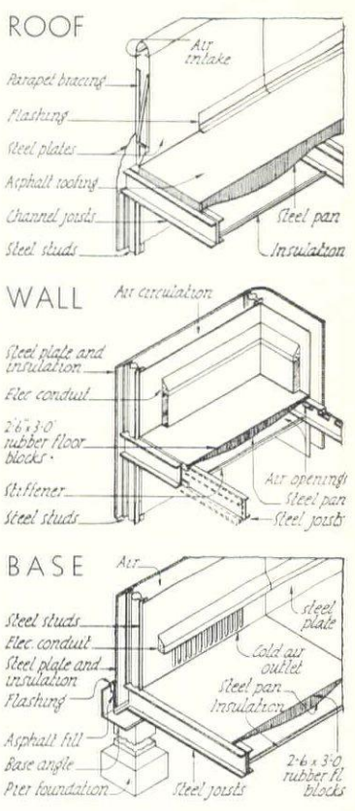


A • 20

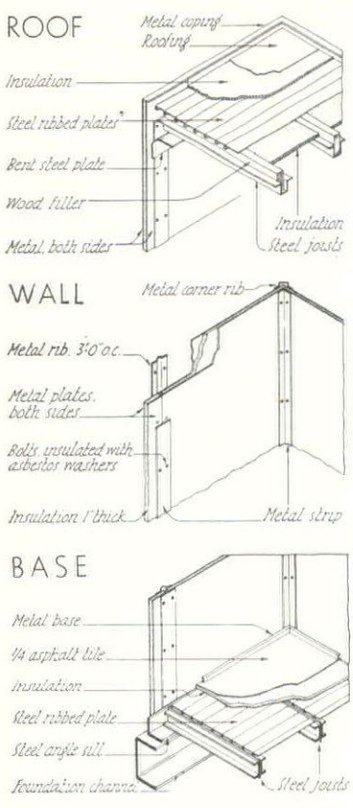
SCALE: 1/4"=1'-0"

A. 17. STEEL HOUSE, INC. Sponsor: Steel Housing Corporation, Chicago, Ill. . . . ROOF: Roof framing is of 16-gauge strip steel joists 2'-0" on centers supporting Thermax joists for increased insulation, with 3" Thermax slabs and silica cement roof covered with Tung Oil plastic paint for the roof. . . . WALL: Exterior walls consist of double shells of 2" Thermax panels set 1½" apart, the space between being filled with mineral wool and the whole being tied together with 16-gauge steel studs or 2', 0" on centers. The exterior finish has silica cement and plastic Tung Oil paint which provides a uniform surface. Asbestos board ceiling is fastened directly to the bottom of the steel roof joists.

A. 18. STRAN-STEEL HOUSE. Sponsor: Stran-Steel Corporation, Detroit, Michigan. . . . This system makes use of rolled strip steel of various sizes as a framework. . . . ROOF may be of either flat or pitched type. A standard roofing and waterproofing as specified may be used with these Stran-Steel structural sections. . . . WALL: May also be of any material specified, but the studs are supplied by Stran-Steel. . . . BASE: Stran-Steel beams are over-laid with wood or concrete floor system as per specifications. This system is especially applicable to residence work, new partitions, and light-load bearing structures. All of the members are rolled and assembled so as to permit nailing of specified materials.

A. 19. STRUCTO HOUSE. Sponsor: Structo, Inc., Kansas City, Mo. . . . This system is a complete steel panel house. . . . ROOF: Steel purlins carry a pitched wood roof on which shingles or any other type finish as per specification may be used. . . . WALL: Walls consist of steel panels interlocked with steel studs. The interior wall finish may be wire lath and plaster, wall board or any other specified material. These wall units are packed with rock wool insulation. . . . BASE: A conventional concrete foundation with 8" I-Beams supporting any flooring material desired. Concrete slab may be used if desired and finished floor may be had according to specification. Sub-floor consists of 1" sheathing applied to wood nailers bolted to the beams.

A. 20. VAN NESS STEEL HOUSES. Sponsor: C. L. Van Ness, Akron, Ohio. . . . This entire system of construction when finished, with the exception of roofing and finished flooring, is of light gauge steel. . . . ROOF: Joists are of 14-gauge channel 5" deep and 3'-0" on centers bolted back to back. Pans have a depression 1½" deep at the center thus forming a parabolic curve which acts as a lateral stiffener. The edges are crimped down between the webs of the floor channels and a molded rubber block is set into each pan to form a flush finish. The finished roof is of asphalt. . . . WALL: Wall sheets are flanged and set between webs of channel columns. This sheet is insulated on the inside and all members are bolted. A similar sheet on the inside forms a space used as a heating duct. Similar heating ducts occur in the ceiling. The exterior sheet is narrower than the interior sheet, an arrangement which throws the exterior sheet in tension. . . . BASE: Foundations are concrete piers 6', 0" on centers. A continuous steel angle sill is anchored to the foundation with a similar girder member running through the center of the house.



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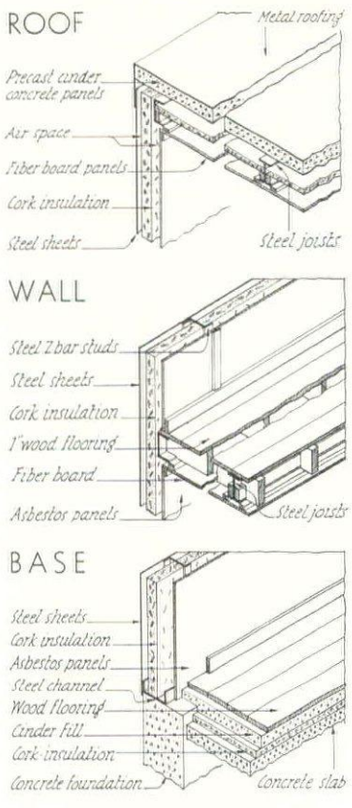

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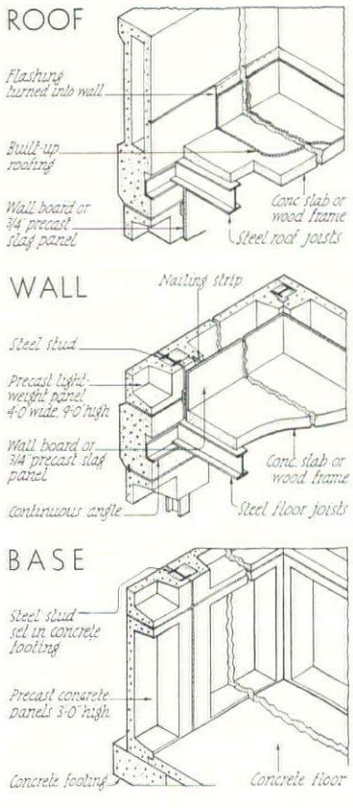

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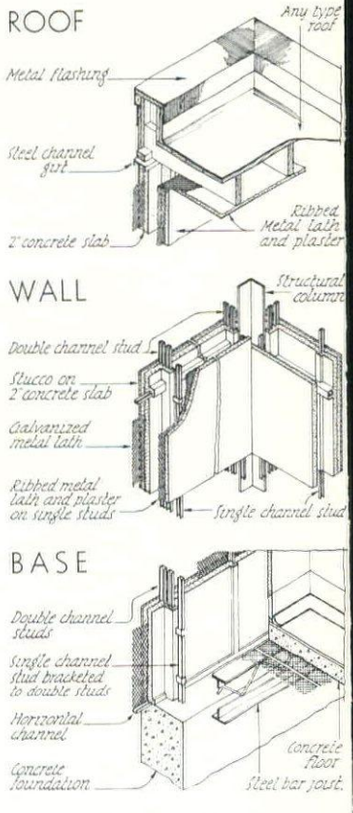


A • 24

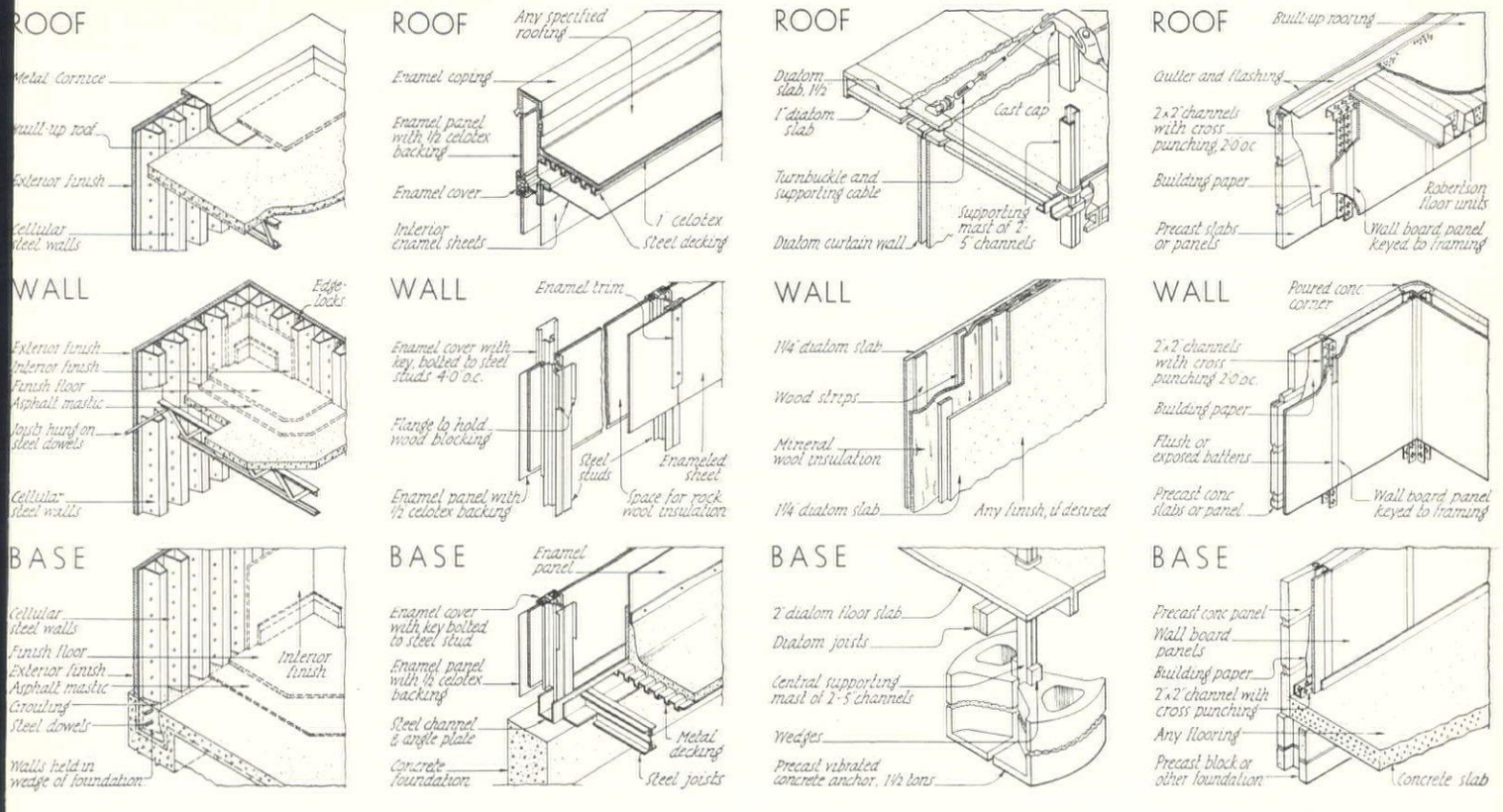
SCALE: 1/4"=1'-0"

A.21. BUELL HOUSE. Sponsor: T. H. Buell & Co., Architects, Denver, Colorado...The construction of this system is entirely job fabricated. The house is primarily intended to be trucked to the site; to be low in cost and relatively short-lived. It is also very light in weight, weighing approximately three lbs. per cubic foot...ROOF: The flat roof construction consists of a finished roofing over insulation on a light steel ribbed plate which, in turn, rests on wood fillers in steel joists. It is similar in construction to an automobile top...WALL consists of a panel of 1" insulation faced with metal on both sides. The panels, 3'-0" wide, are joined by metal ribs, a V-shape on the outside and a flat plate inside, bolted together through the wall panel and forming studs. Bolts used to hold them together are insulated by asbestos washers...BASE: The wall panels are built up outside the sill angle. The floor joists suitable for carrying the steel ribbed plate floor are supported by the sill angle.

A.22. GROPIUS HOUSE. Sponsor: Walter Gropius, Architect, Berlin, Germany...This house is not only a study in prefabrication, but it also incorporates many of Mr. Gropius' theories on sunlight, fresh air and facilities for outdoor exercise...ROOF: The roof is precast cinder concrete panels with a metal exterior surface, supported on steel joists with a fiber board ceiling...WALL: Steel framing; employs Z-bars for studding. These are on 3'-6" centers, which serve as a module. Walls are 3" pressed cork sheets covered with asbestos board on the interior. The face of these sheets is set back from the steel covering plate which is used on the exterior...BASE: On concrete foundations a steel frame employing channels for sills and girts was used. Finished floors are of wood plank with cinder fill, cork insulation and a concrete slab beneath.

A.23. WINTER HOUSE. Sponsor: E. M. Winter, New York, N. Y...This system consists of a structural steel frame welded or bolted and enclosed by precast reinforced light weight concrete panels. Spaces between panels and columns are grouted to form a monolithic wall...ROOF: Flat. Has built-up roofing over concrete slab which, in turn, rests on steel joists...WALL: Units 1½" to 2" thick by 4'-0" wide by 9'-6" long are precast in light weight concrete which uses blown blast-furnace slag as aggregate. These units act as stiffeners for the columns and sway-brace the entire structure. The exterior is finished with a coat of stucco. Interior walls are to have wallboard or precast slag panel finish. Studs are Stran-Steel...BASE: Concrete panel units about 3'-0" high and interlocking, enclose steel studs to form the cellar wall.

A.24. LURIE HOUSE. Sponsors: Metal Lath Manufacturers Association, Chicago, Illinois...The chassis of this house consists of a structural steel frame...ROOF: The roof may be any type and rests on wood joists... WALL: Small metal channels either single or in pairs, are spaced at about 12'-0" intervals. Small horizontal steel furring channels are attached to these vertical members near the outside wall at 32" intervals. Vertical furring channels are attached to the outside flange of the horizontal channels at 16" intervals. Opposite every second one is a similar vertical channel fastened to the inside flange of the horizontal channels. Metal lath is attached to the outside flanges of the vertical studs and is given a scratch coat of stucco. The interior face of the lath and the channels are back-stuccoed to gain a thickness of about 2" over the steel. Spacers, extending inwardly, are fastened to the inner channel of the studs to connect a third set of vertical furring channels that support the inner surface of metal lath and plaster. Finish coats of stucco may be subsequently applied.



A • 25 **A • 26** **A • 27** **A • 28**

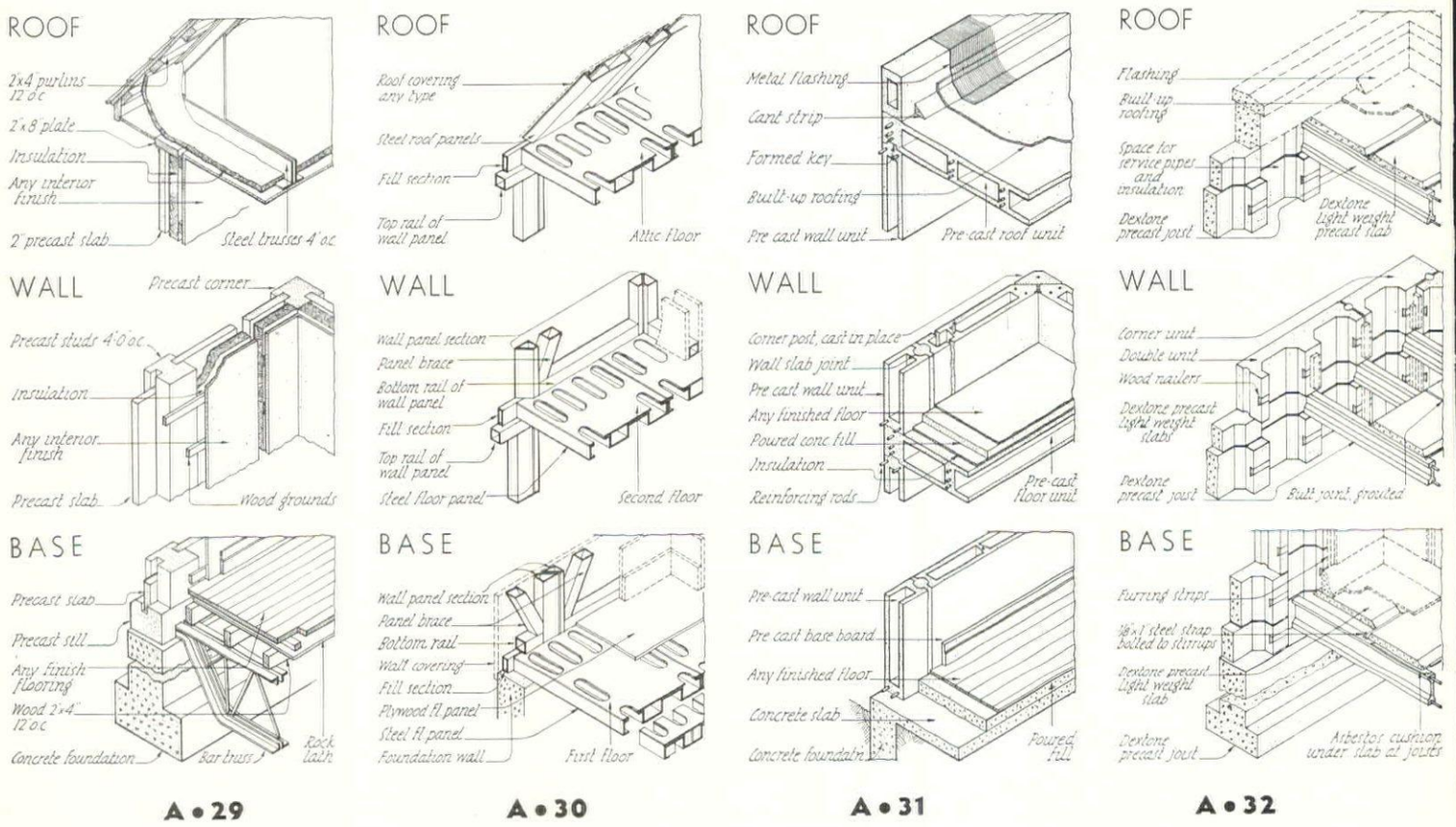
SCALE: 1/4"=1'-0"

A.25. PALMER HOUSE. Sponsor: Palmer Steel Buildings, Inc., Los Angeles, Cal...This system employs the H. H. Robertson Co. cellular steel unit as its fundamental panel...ROOF may be of any specified material...WALL: The panels are made of thin-gauge copper bearing cellular steel with the face plate on the exterior. They may be had in sections 12' wide and a story high. They have a locking device on either side of their length with holes at 4" intervals along their length. (Steel rods pass through the holes to support open-web joists for the floor. These joists support a concrete floor slab and optional finished flooring.) Any finishing material may be selected for both exterior and interior wall surfaces...BASES: A special cast concrete foundation provides a slot into which the units are placed and then grouted in. Steel dowels again hold them firmly in place.

A.26. PORCELAIN STEEL HOUSE. Sponsor: Porcelain Steel Buildings Company, Columbus, Ohio...This company has been erecting steel buildings since 1928. The system was first developed for lunchrooms...ROOF: A deck type roof is insulated with 1" of fiberboard to which a ply roofing is applied in the usual way...WALL: A steel frame of 16-gauge spot-welded studs and girts spaced at about 4'-0" centers, supports by means of bolts and lock washers the exterior facing of porcelain enamel steel. This is backed with insulation and fastened to the frame. The interior finish is Monel or porcelain-finished metal screwed to wood furring strips held by the studding. The finish joints are then covered with screwed-in battens. The exterior finish is also battened but the cover is enameled and keyed to a U-shaped form that holds the sheet to the framing... BASE: Steel joists attached to steel channel and angle plate rest on a concrete foundation. Metal decking rests on steel joists. This decking is covered with concrete. Insulation is provided by filling the inter-stud spaces with rock or glass wool.

A.27. NEUTRA DIATOM. Sponsor: Richard J. Neutra, Architect, Peter Pfisterer, Associate, Los Angeles, California...The design of this system utilizes two principles in combination. One is the use of the suspension principle in which walls are suspended in tension from central masts, and the other is the use of diatomaceous earth panels. Diatom is made of infusorial earth chemically compounded and hardened under steam. It is then treated with other ingredients to make it water-repellent and also to eliminate the need for plaster...ROOF consists of Diatom slabs overhanging side walls...WALL: 1¼" Diatom slabs applied to wood strips with mineral insulation and optional interior finish, supported by cables suspended from central mast...BASE is a precast concrete anchor supporting the central mast of steel channels. The floor consists of 2" Diatom slabs.

A.28."E" FRAME HOUSE. Sponsor: Housing Company, Newton, Mass. This system was designed primarily as a method of furnishing light steel frames suitable to automatic keying-on of finish panels...ROOF: Built-up roofing on concrete filled Robertson floor units...WALL: These units rest on a framing of 2" x 2" steel channels with cross punching, spaced at 2' on centers. Repetitive cross-punching at 2" intervals on the 2" channel to form girts, studs and sills are both light and strong and serve as a fastening for a keyed panel which securely locks wall panels in place. Various types of precast slabs have been used in experimenting with this type of construction...BASE: Concrete slab with any type of finished flooring rests on a concrete foundation. The channels which support the framing members are attached directly to the concrete slab.



A • 29 **A • 30** **A • 31** **A • 32**

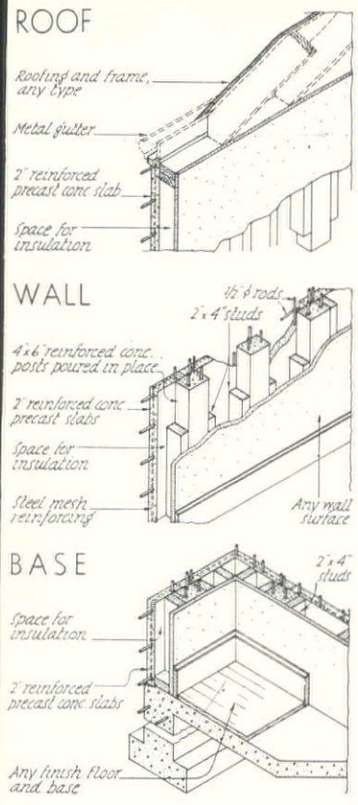
SCALE: 1/4"=1'-0"

A.29. SWAN HOUSE. Sponsor: The Swan House, Inc., Chicago, Illinois...This system consists of precast units, steel members and collateral materials...ROOF may be flat or pitched. A fireproof deck is carried on steel and waterproofed as specified...WALL: Studs of precast reinforced stone on 4'-0" centers are slotted to receive precast stone wall units. Between the walls there is a rock wool blanket for insulation. Interior finish wall may be of wallboard attached to wood grounds, lath and plaster or any other specified finish. The complete wall is approximately 8" thick and is load-bearing. No other exterior finish is required...BASE: Foundations are of conventional type concrete with a precast reinforced stone sill slotted to receive the wall units. Floors may be of wood or concrete on steel bar joists.

A.30. UNIT PANEL CONSTRUCTION SYSTEM HOUSE. Sponsor: H. H. Keller, Engineer for Bitting, Inc., New York, N. Y....This system consists of unit steel panels, filler beams and other accessories...ROOF may be flat or pitched type to be covered with approved insulation over patented steel roof panels...WALL: Tubular, rectangular sections of strip steel diagonally braced are used as bearing walls. The vertical stud is trapezoidal in shape and when combined with the next section forms a rectangle. These sections are butted together and locked. This unit is covered on both sides, at the factory, with an approved panel material...BASE: Foundation follows standard practice by self-supporting steel units combined to form a floor slab. They are built of two welded sheets of metal. The top one being flat while the lower forms a continuous rectangular sill. The top sheets are provided with large perforations for bolting sections together. A finished flooring is applied to this. The system also includes a special metal sash which has horizontal sliding members.

B.31. CONNECTICUT PRECAST HOUSE. Sponsor: The Connecticut Building Corporation (Quentin Twachtman), Greenwich, Conn....This system consists of prefabricated slab units made of Pottsco slab concrete locked together by means of tongue and groove construction between various units and by means of welding projecting reinforcement and poured concrete keys between the wall units...ROOF: Built-up roofing is applied on a slab having a 2" top and 1" bottom shell. These shells are spaced by 4" concrete joists 17" on center. Roof unit slabs are 6'-0" x 15'-0", 20'-0" and 30'-0" and they are 8", 10" and 16½" thick... WALL: Wall slabs are made in thicknesses of 6" and 8", in lengths up to 18' 0" and in story heights. These wall units consist of an inner and outer shell separated by studs 16" on centers. Window and door frames are cast in the units and all plumbing, heating, electric conduits are built into the slabs. The interior surface comes finished and the exterior may be finished as specified...BASE: The entire structure rests on a concrete foundation and each wall is erected as a single unit.

B.32. DEXTONE SELF-CENTERING WALL SYSTEM. Sponsor: The Dextone Company, New Haven, Conn....Units for this system are made in lengths of 16", 32" and 48"...ROOF: Built-up roofing is used on a Dextone precast slab which, in turn, rests on precast joists. Joists are 8", 10" and 12" deep and in lengths as required...WALL: The wall units have continuous wall channels which are formed by the hollow spaces in each unit. These hollow spaces are 4" x 11" and may be readily utilized for electric conduit, air ducts, etc. These spaces are formed by vertical studs 16" on center. Corner units are made of any one unit plus 8" for the return head thus forming a solid corner. Grouting the vertical hole which is formed by butting two units together provides a water stop at each joint. Wood nail strips are cast with the unit and are dovetailed for permanency. Units are reinforced during manufacture. The exterior may be had in either smooth finish for whitewashing or in a special textured finish...BASE: The floor system consists of precast concrete joists which rest on masonry or steel support.



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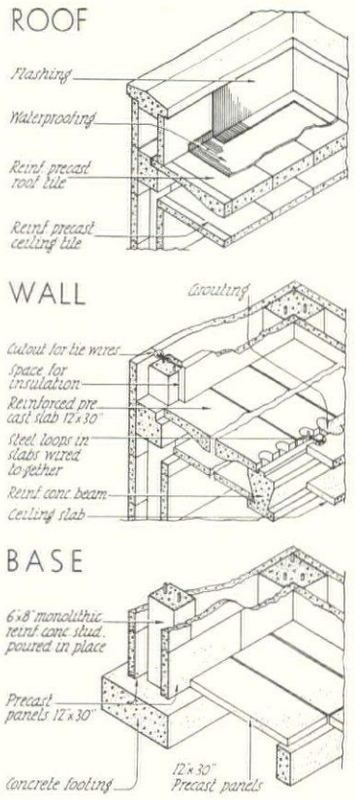

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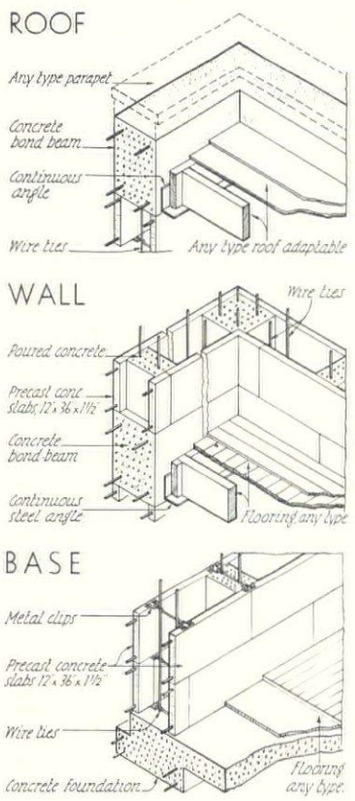

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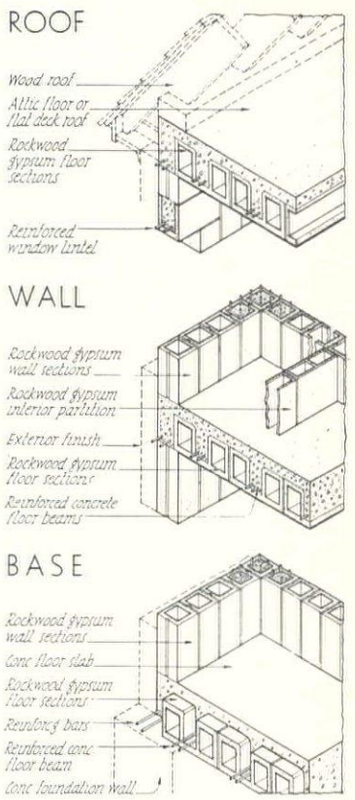


B • 36

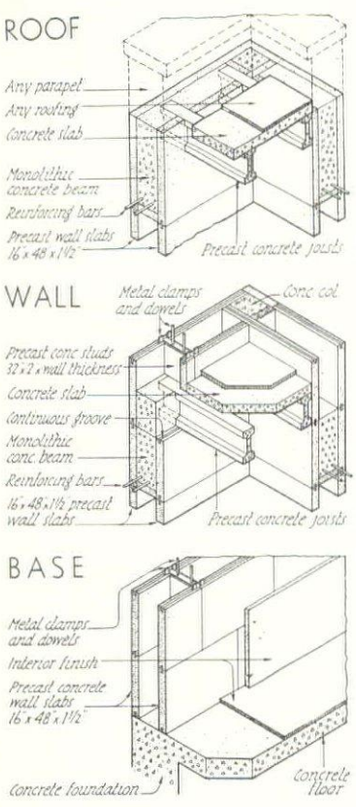
SCALE: 1/4"=1'-0"

B.33. EARLEY SYSTEM. Sponsor: John J. Earley, Washington, D. C.... This system utilizes a precast reinforced concrete slab on reinforced concrete or steel skeleton...ROOF AND ROOFING may be wood or steel, pitched or flat...WALL: Slabs one story high in widths of from 1'-0" to 10'-0" with a maximum thickness of 2" and steel dowels 1/4" in diameter along the vertical edges and embedded in a concrete frame. They may be threaded for bolting to a steel frame. These slabs are made to include windows and doors. Behind the joints between slabs, a strip of waterproofing is placed. Reinforced concrete columns are poured immediately behind the joints. Furring strips separate the interior finish from the exterior and insulation is placed between. Exposed surfaces may be finished in concrete mosaic by means of colored aggregate...BASE: Usual foundation construction is used. When concrete posts are used, the slabs are set up before the posts are poured and are then braced.

B.34. HAHN SYSTEM. Sponsor: Hahn Concrete Lumber System, Decatur, Illinois...This system consists of concrete tiles 1" thick, 12" wide and 16", 32" or 48" in length. These slabs are premolded on wood pallets, the concrete being compacted by hand and struck off...ROOF consists of waterproofing over reinforced precast tile on either wood or precast reinforced concrete joists...WALL: This system of concrete nailing boards may be used with either a wood frame or concrete frame. If wood frame is used, the boards are nailed to the studs. For fireproof type of construction, 2" thick boards are laid 6" apart and tied by wire around reinforcing rods in the poured concrete stud. Reinforced concrete columns are constructed at the corners and at the studs at about 32" intervals, so as to occur at concrete cross ties and thus embed them. The exterior of the wall is stucco and the interior plastered directly on the slabs...BASE: The entire structure rests on a monolithic footing and the floors may be supported by either wood joists or precast concrete joists. The floors may be precast slabs.

B.35. LOCKWOOD SYSTEM. Sponsor: Ernest H. Lockwood, Pasadena California...Precast concrete slabs 36" wide, 12" high and 1 1/2" thick are erected either in single or double rows and attached at intervals to poured reinforced concrete studs...ROOF may be of any type—pitched or flat—with either wood, steel or concrete joists...WALL: The slabs are laid like ashlar. They have a continuous reinforcing and cross ties are used at alternate courses. All of the concrete studs are formed in spaced metal forms...BASE: 2 or 3 rows of wall slabs are erected on a poured foundation reinforced with vertical ties. Any type of finished floor may be used directly on the concrete slab foundation. Other floors are made by means of a typical wood construction resting on a continuous angle bolted to both. Precast concrete joists and slabs could easily be used with this system.

B.36. ROCKWOOD GYPSUM HOUSE. Sponsor: Rockwood Gypsum Lumber Corporation, New York, N. Y....Precast hollow gypsum units in various sizes and sections are combined with stud reinforcing rods and concrete to form this structure...ROOF may be of any conventional construction, flat or pitched...WALL: Hollow, precast gypsum wall units in lengths extending from floor to ceiling are exterior load bearing walls. A tongue and groove method is used for all vertical joints. Wherever required, steel reinforcing rods may be placed in vertical cells and concrete poured in. Reinforced concrete girders are used at the floor lines. Exterior finish is optional. Interior partitions are the same type of gypsum unit in a narrower width. Any finish may be used on this surface...BASE: Precast long span gypsum floor units with three rectangular full length cells are laid directly on a foundation. Reinforcing rods are laid in the cut-outs and concrete is poured in and graded over the units to form a rough floor slab. The flooring finish may be of any type.



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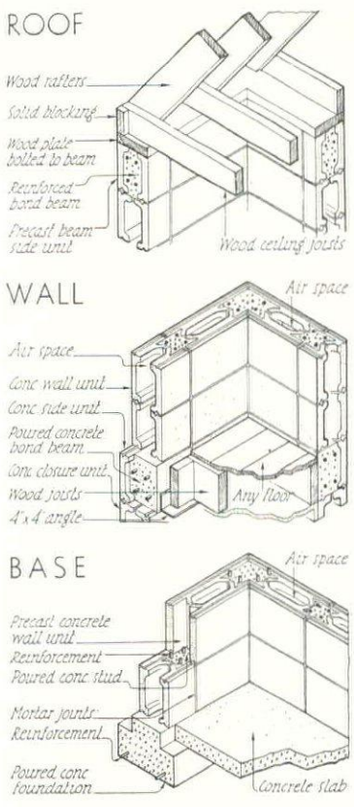

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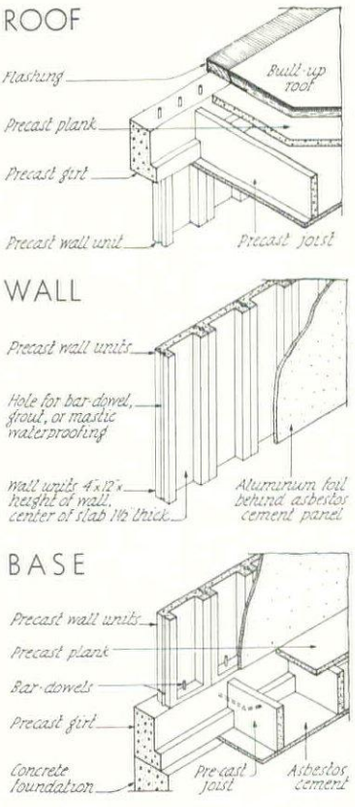

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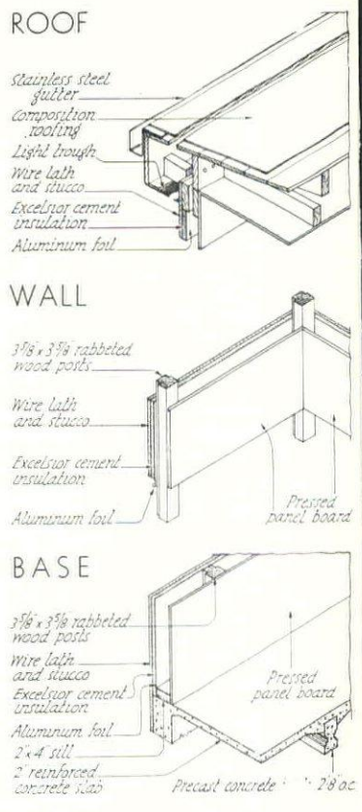


B • 40

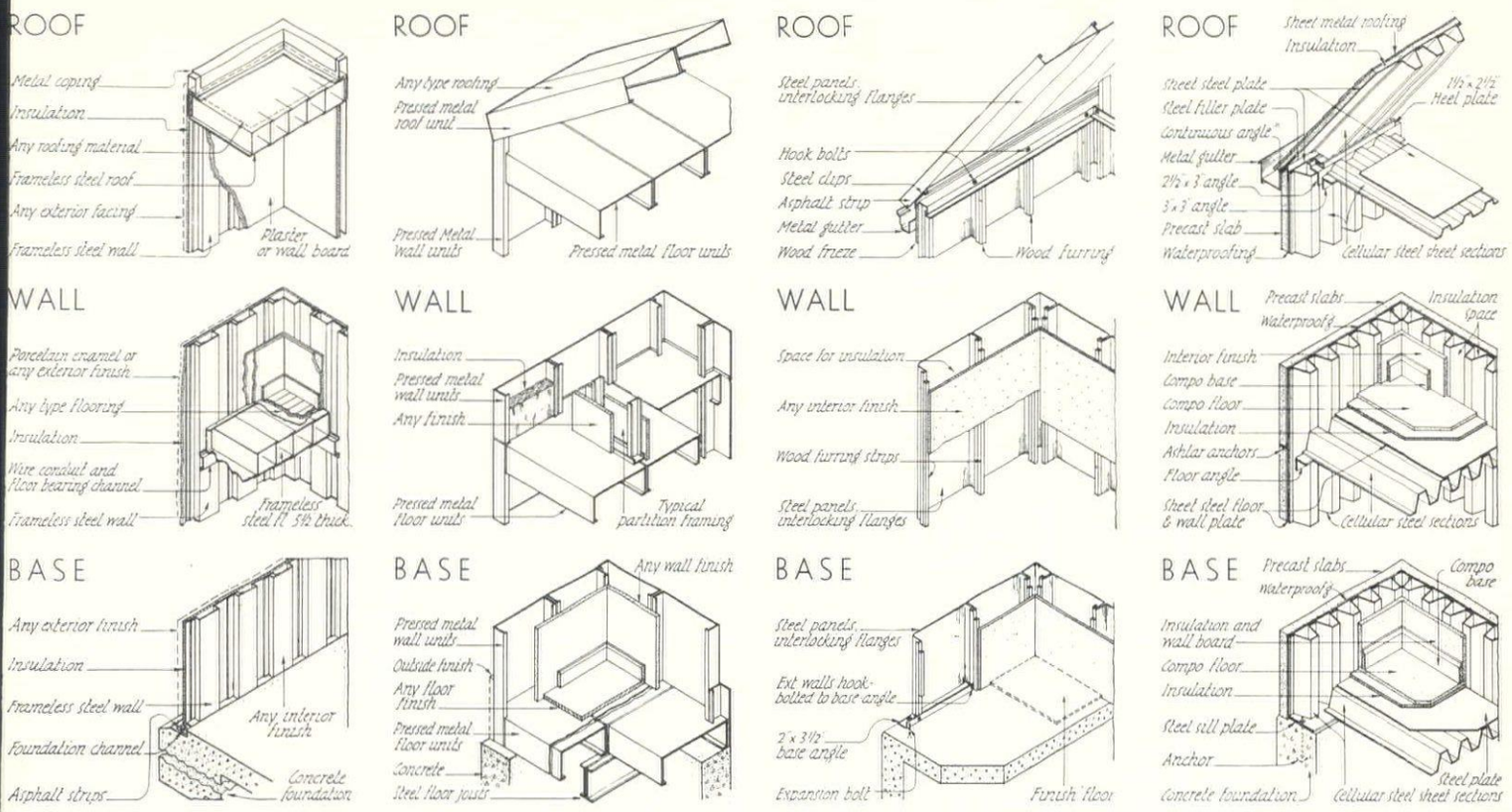
SCALE 1/4" = 1'-0"

B.37. RACKLE SYSTEM. Sponsor: George Rackle & Sons Co., Cleveland, Ohio...This system consists of precast concrete wall units, floor joists and slabs, etc....ROOF: Any type roofing may be used on the concrete slab and precast concrete joists...WALL: Outer and inner rows of precast slab units with precast stud members set at intervals. All edges are grooved. Stud sections are 32" long, 2" thick, the width depending on the desired wall thickness. The studs have projecting dowel bars at one end and dowel holes at the opposite end, thus providing a means of doweling superimposed stud sections. Slabs and studs are erected concurrently. Flanged ends on a special metal clamp fit into slab edge grooves and thus serve to lock the slabs and studs together. The exterior may be stuccoed or painted and the interior plastered...BASE: Dowels lock the studs to a standard concrete foundation.

B.38. UNDERDOWN SYSTEM OF REINFORCED CONCRETE STRUCTURES. Sponsor: Donald Underdown, Los Angeles, California. . . ROOF: Any type of roof and roof construction may be used with this system...WALL: Constructed of precast concrete units erected in two rows with reinforced studs cast in place to tie the units together. They are 12" high, 1⅜" thick and vary from 12" to 36" canted from the end of each unit to form a key into the stud and a vertical rib. Top and bottom edges are flanged out to 2⅝" with grooved mortar beds. All of the units are set in vertical alignment so that ribs and joints are continuous. In an 8" wall the ribs of the outer and inner units touch to become a form for the reinforced stud. In wider walls 26-gauge galvanized iron sheets are bent to shape and inserted as forms for reinforcing studs. Window and door jambs are framed by pouring half a stud. Frames, doors and sash are of usual construction. . . BASE: This entire system rests on a standard poured concrete foundation. Floors are standard practice.

B.39. BYRNE HOUSE. Sponsor: Barry Byrne, Architect, New York, N. Y.... Factory cast concrete wall units channel shape and story height are the basis of this system...ROOF: A built-up roof rests on a precast plank and is tied to a precast girt...WALL: Wall units are 4" thick by 12" wide and of story height. They are finished on the inside with film of aluminum foil and asbestos cement panel. The precast wall units are tied together by bars which run vertically through small holes provided by juxtaposing these units. The hole may be used for a grout or for a pouring of mastic waterproofing...BASE: The wall units are attached by bar dowels to precast L-shaped girts. Precast, reinforced concrete joists rest on the ledges of the L-shaped girts which are let into the ends of the joists and also doweled to them. Precast planks span these joists. Flooring may be of any selected material.

B.40. V.D.L. HOUSE. Sponsor: Van der Leeuw, Los Angeles, California... This system developed by Richard Neutra with the financial aid of Van der Leeuw, the Dutch capitalist, is not only a study in prefabrication, but it is a definite experiment in the art of house design...ROOF: An overhanging roof of wood with composition finish surface incorporates in its overhang, Neutra's technique of using Neon tubes in the soffit of the overhang to eliminate reflections on glass...WALL consists of a unit-type chassis of 4" x 4" wood posts trussed above and below to avoid concentration of lateral stresses. The walls are well designed for insulation and incorporate standard panel board, wire lath and aluminum foil and cement insulation...BASE: The skeleton of the house is bolted to a prefabricated, vibrated, reinforced concrete joist and girder construction. Precast reinforced concrete floor joists are 4" wide and 6", 7", 8" and 10" deep. They are spaced on 2'-8" centers. Due to their profile they co-operate with precast bridging to support form boards for casting the floor slabs without the use of nails. Thus the forms can be reinforced without destroying the joists.



C • 41 **C • 42** **C • 43** **C • 44**

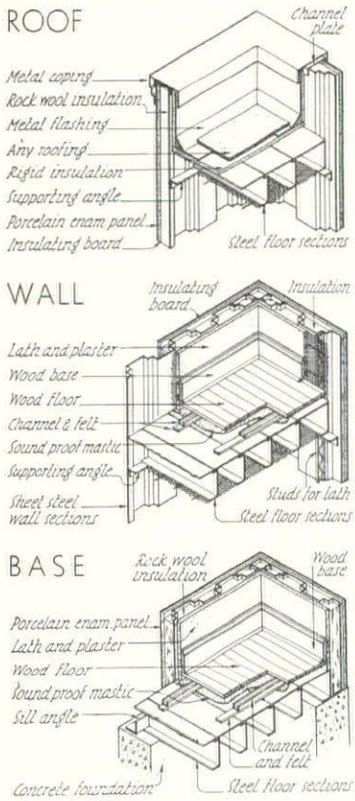
SCALE 1/4" = 1'-0"

C.41. FRAMELESS STEEL HOUSE. Sponsor: Insulated Steel Construction Co., Cleveland, Ohio. . . This system is composed of light gauge steel sheets tamped into channel sections. . . ROOF: Any roofing material may be used over the frameless steel roof. This roof consists of steel sheets stamped into the shape of Z, and assembled to form a cellular system. . . WALL is made of 20-gauge steel stamped into channels that alternately face in and out. Any exterior and interior finish may be used with this system. Window frames and door frames are installed in the wall units before delivery to the job. By telescoping channel sections together to form a column, additional strength in walls may be secured. Walls are 2" thick. . . BASE: Walls are attached directly to a metal foundation channel which rests on a concrete foundation. The floor system consists of sections similar to the roof sections, and of 16, 18, 19 and 20 gauges depending on span and loading. These floors are 5½" deep and may be finished with any type flooring.

C.42. LINDSEY HOUSE. Sponsor: Samuel R. Lindsey, Oakland, California. . . ROOF: Any type finish roofing may be used on the sheet steel channels. . . WALL consists of channels assembled flange to flange which have insulation and may be finished in any desired material. Holes at standard spacing are provided in the flanges for the connection of adjoining channels.. They also are provided in the horizontal web for anchoring floor materials. . . BASE: Floor consists of the same sheet steel channel the web of which is laid horizontally forming a rough floor ready to receive a finished floor. On the first floor they rest on steel floor joists set into the concrete foundation. Any type finish floors and interior wall surfaces may be had.

C.43. STEELOX HOUSE. Sponsor: The Steelox Company, Chicago, Illinois. . . This system consists of an 8' channel shaped panel trade-marked "Steelox". . . ROOF: Slanting roof sections consisting of interlocking Steelox panels are hook bolted to wall plates and side plates. A special ridge cap is then slipped into position. There is no other material used on the roof. . . WALL: Walls consist of 16" wide, story height, 3" deep Steelox panels. The shape of the flange is such that one overlaps the other as a secure lock. The panels are then fastened in position with hook bolts and a furring strip is attached to the flange. Any interior finish may be then applied to the interior wall. Bats of mineral wool 4" thick are used for insulation. A corner is formed by one of the steel panels bent at right angles with 8" on each face. Short sections are used above and below windows and over doors. . . BASE: An angle iron set in asphalt strips reinforced with burlap is attached to the concrete foundation with expansion bolts. Starting at the corner, each wall section is interlocked to the preceding one and hook bolted to the angle iron. A similar angle is laid on the top of the wall sections to which the roof may be bolted.

C.44. LINDEBERG HOUSE. Sponsor: Harrie T. Lindeberg, Architect, New York, N. Y. . . . This system makes use of the Robertson FK-Type Keystone unit. These units are cellular shaped steel sheets with the flat plate welded to one surface. They are 5" in depth, 1' 6" to 2' 0" in width and height as required. . . ROOF: Either flat or deck type roof can be used with this system. The incline roof construction is insulated and has a sheet metal covering. . . WALL: Walls have an exterior face of precast slabs with a film of waterprofing between the slab and the Robertson units. The interior wall is finished with insulation and wallboard. The wedge shaped spaces in the panel accommodate piping and other mechanical requirements. . . BASE: A steel base plate is anchor bolted to a concrete foundation and grouted to level. The steel wall units are field welded to the base plate. The first floor of this house is made up of cellular units with the steel plates for sub-floor and finished with insulation and a composition flooring.



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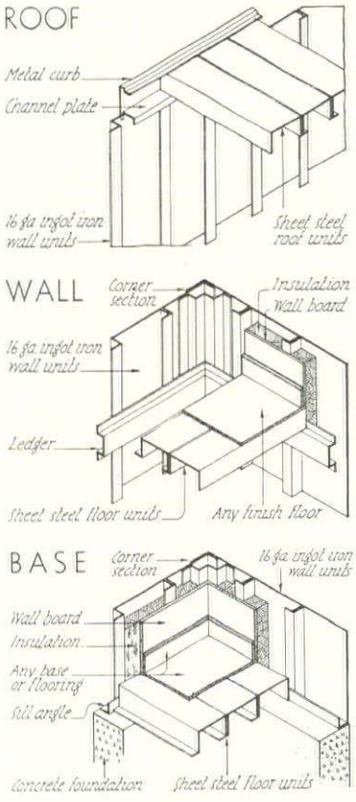

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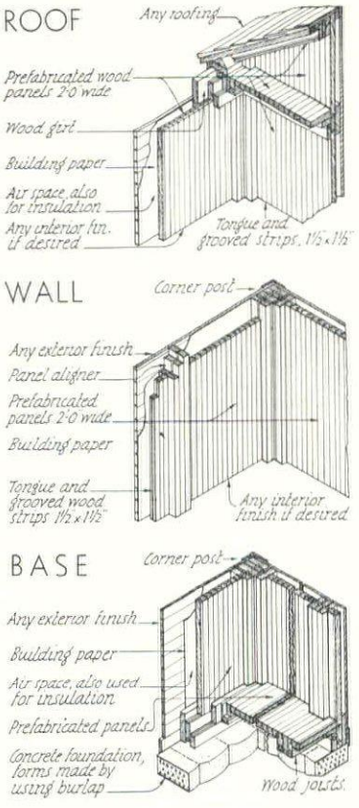

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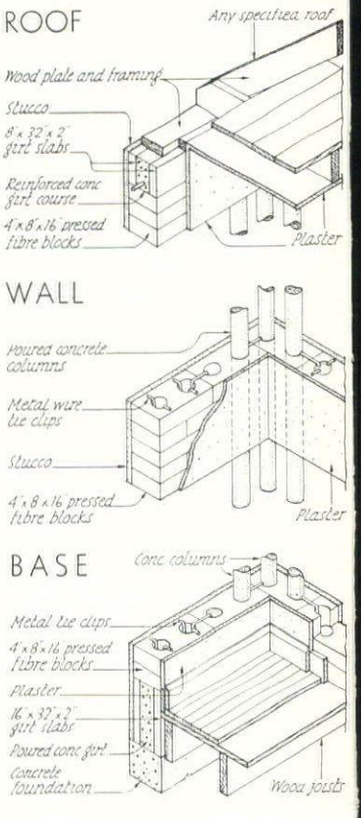


C • 48

SCALE: 1/4" = 1'-0"

C.45. WHEELING HOUSE. Sponsor: Wheeling Corrugating Company, Wheeling, W. Va...This is an experimental house designed by Charles Bacon Rowley and Associates, Architects...ROOF: A series of steel panels resting on a supporting angle carries a rigid insulation and any type of roofing finish.. WALL: Prefabricated steel panels are welded together in the field and open web metal lath studs attached to which interior wall finish is applied. The interior finish is plaster. Rock wool fills the interstices of the wall. Porcelain enamel plates bonded to insulation board are screwed to the outside of the wall panel through furring channels welded to the wall section...BASE: the wall units are connected to a sill angle on a concrete foundation. Finished floors may be of wood or any other specified material and they are carried on the same type of construction that is used for the roof.

C.46. UNIVERSAL HOUSE. Sponsor: Universal Housing Corporation, Zanesville, Ohio...This is a simplified variation of an interlocking steel panel construction...ROOF: The roof consists of these panels resting on a channel plate and finished with a metal curb. These roof panels are made by American Rolling Mill. The finished roof is built up of asphaltum over 1/2" insulating board...WALL: Wall units are made up of 16 gauge ingot iron panels bolted together. The iron, treated with enamel paint, serves as an exterior finish. Window sash, frames and bucks are of steel, and doors and trim are of wood. The space between the metal siding and the finishing wallboard is filled with spun glass for insulation...BASE: The side panels are bolted to a sill angle on a concrete foundation. The floor units are similar to the roof unit and are also made by American Rolling Mill. Finished flooring may be of any specified material.

C.47. WUDNHOUS. Sponsor: Housing Company, Boston, Mass....This system is an effort to utilize lumber that is usually considered unsuitable for structural purposes because of short length or small cross section... ROOF: Any type roof finish may be used on prefabricated wood panels 2'-0" wide...WALL: A number of standard 1 1/2" x 1 1/2" wood units are manufactured in tongue and groove form. The lengths may vary as the joints in the individual lengths have no effect on the construction after they are assembled in the panel. These wood elements are made in panels 2'-0" in width, using tongued and grooved pieces 4 1/2" deep at the panel edges and ends. Because one tongue would be missing in this system, a spline is used where two grooves come together. The panel may be glued or nailed. The latter method is preferred because expansion and contraction are more uniformly distributed. Panels of story height are assembled vertically by means of wood aligners...BASE: Special forms of concrete are made of burlap or electro sheet copper arranged in such a way that the sheets may expand under uniform hydrostatic pressure of the concrete in a form similar to that shown.

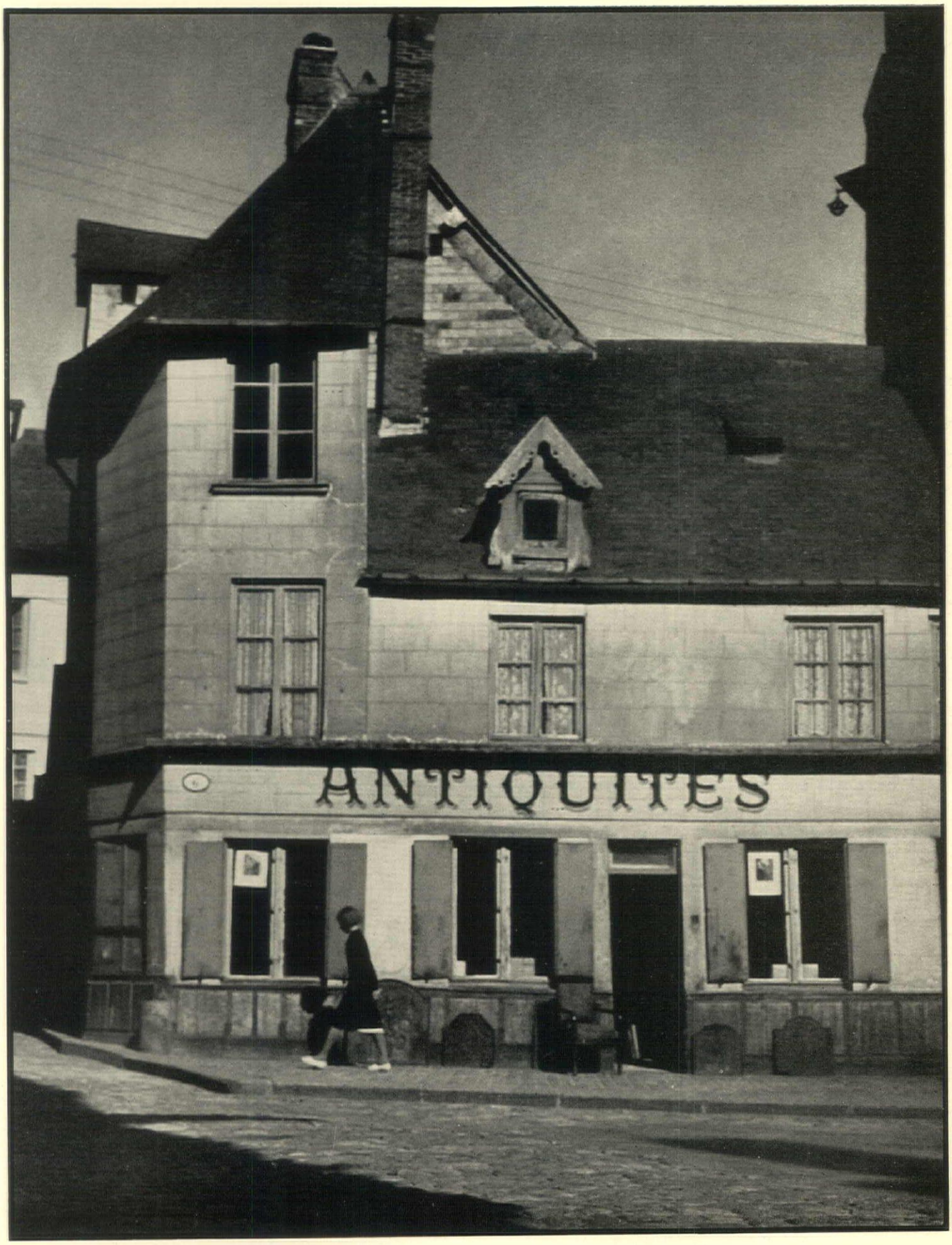
C.48. STOCKADE HOUSE. Sponsor: Stockade Building System, Inc., New York, N. Y....This system was conceived by James Monroe Hewlett, Architect. The basic principle of this system is the division of the walls of the house into two parts—load bearing and weather resisting... ROOF: Any specified roofing on a wood plate and frame is carried on a reinforced concrete girt...WALL: Blocks usually about 8" x 16" x 4" are made of excelsior or other wood fiber and cemented together. Each block has two cores 8" on center running vertically. The blocks are laid directly with joints staggered and the cores in register. Suitable reinforcements are introduced where desired and the cores are poured with concrete thus tying the blocks together and forming concrete studs. .The walls are finished on the exterior with stucco or any other suitable veneer, while the interior walls are of plaster...BASE: Poured concrete girt with girt slabs rest on a concrete foundation. The floors are standard wood construction.

PHOTOS: F. S. LINCOLN

ARCHITECTURAL FRAGMENTS OF RURAL FRANCE

The sum of seemingly unrelated facts is usually the clearest key to the characteristics of a people. Therefore, that Normandie was invaded by the Danish Chief Rollo: that all his descendants including William II (the Conqueror) were wise rulers; that here are made many and fine cheeses; that cider is the typical drink; that the Norman style has been important to architecture; and that today a sober, careful and realistic people are husbanding antique buildings not alone out of sentiment, are all significant. The old house of half timber and brick is in Duclair, Seine Inférieure


PHARMACIE
RUE COURONNE

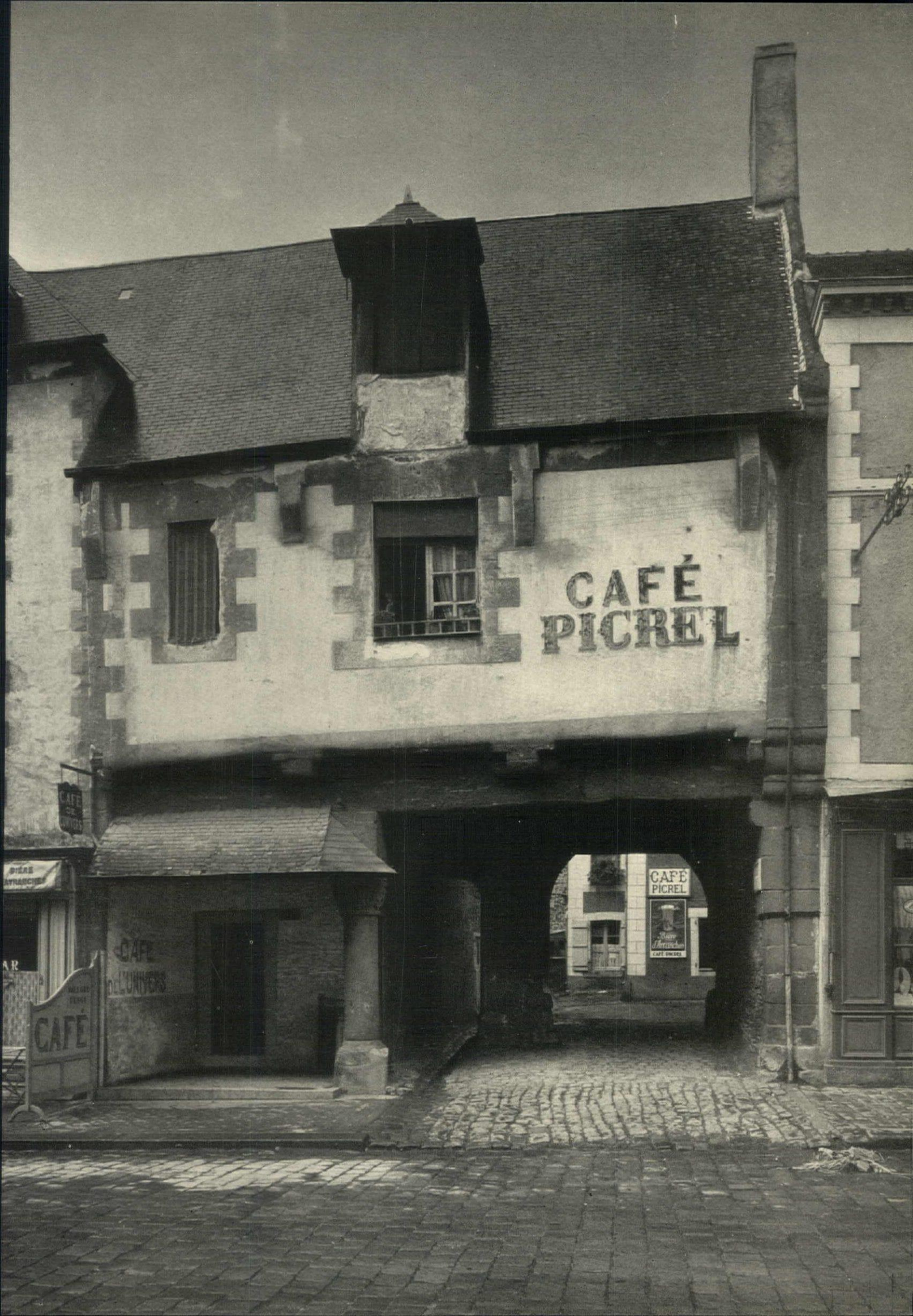


APOTHECARY SHOP IN BIHOREL-LES-ROUEN,
SEINE INFÉRIERE (opposite page)

ANTIQUE SHOP IN CAUDEBEC-EN-CAUX,
SEINE INFÉRIERE

HOUSE IN PONT L'ÉVÊQUE, CALVADOS

CAFÉ PICREL IN DOL, ILLE-ET-VILLAINE (opposite page)


CAFÉ
PICREL
CAFÉ
PICREL
CAFÉ

EGLISE ST. JOHN, LAIGLE, ORNE (opposite page)

COOPER'S SHOP, DOMFRONT, ORNE

FARMYARD, FONTAINE-EN-HENRY, CALVADOS

PREFABRICATION . . . FROM TEPEE TO TRAILER

PREFABRICATION is here, in fact it has always been here. A simple and early example of the prefabricated shelter is that made by pre-cutting and debarking a number of poles and then manufacturing a semi-circle of skins or bark. Erection time was very short and the result was a comfortable and attractively decorated tepee. Salvage value was 100 per cent and easy mobility was one of its chief advantages, the family bronco could drag it along the trail to the next camping grounds. So today we have its modern counterpart, more elaborate to be sure, more complicated, more mobile, and equipped with every convenience,—the trailer, product of the country's fastest growing industry. This is prefabrication with a vengeance, mass-produced, factory-built and assembled, complete and ready for the road at very reasonable prices which will undoubtedly be even less as production increases and competition becomes keener. Already there are some four hundred manufacturers of these prefabricated homes, and the larger automobile manufacturers are momentarily expected to enter the field, fulfilling in part, at last, Douglas Haskell's prophesy of "Houses Like Fords," for this kind of house is adapted to automotive manufacturing methods.

This type of house in its present uncontrolled state, practically untaxed and unregulated, has far-reaching implications economically, politically and socially. If, as Roger Babson prophesies, a third of our population becomes nomadic in these peregrinating, prefabricated homes, one wonders what will become of land prices, of the mortgages that now cover the land and buildings, of the investors in such mortgages and real estate (life insurance companies and savings banks), of the much-heralded residential building booms, of the problem of distribution of goods and services, and so on ad infinitum. There is, too, the problem of local citizenship, government, school sites and administration, to say nothing of the effect of a practically mobile labor group without vested interests to hold them in any locality. Of course, the answer to all this is that the trailers satisfy the demand of but a small percentage of our population—the great majority still desire to 'stay put" as long as employment is available in their chosen location rather than live on the road like turtles in their shells, or adopt the gypsy way of life.

We all live in prefabricated houses even now, for our mechanical equipment is almost entirely machine-made and mass-produced. The same holds true largely of the frame, windows, doors, roof covering, etc., and the waste is usually in backward methods of assembly at the site. We have presented on other pages a compilation of methods of assembling house-shells of prefabricated, interchangeable, replaceable building units. Technicians are particularly interested in the lower cost of building the shell of the house which has resulted in a vast amount of research and experiment in this field. We doubt, however, if the savings thus involved would equal the savings in "cost to use" which would be made possible by reducing the interest rate on building money from 6 per cent to the 3 or 3½ per cent current in other countries. That reduction in cost of shelter is more a question of financial procedure than of the technological development of prefabricated units is emphasized by the demand for the cheap minimal house on wheels.

A COMMERCIAL PROFESSION?

IN COMMON with the professions of law and medicine, the architectural profession has always made its contribution to the advancement of its particular art freely available to all its members. Designs, improvements in techniques, new developments in construction or planning have been published freely for the benefit of the profession as a whole. There have been no "patent medicines" in the architectural field any more than among professional medical men. It has been assumed that each man's contribution to architecture could be freely drawn upon by his contemporaries to the advancement of the art and science of building. Among some architects this is felt to work a hardship on the originator who feels that he does not receive adequate compensation. It seems too great a price to pay for being a professional. He is impressed by the unfairness of having his brain child plagiarized and used for profit by another, even in his own field. Thus far, copyright and patent laws have, by and large, failed to protect architectural designs by making them automatically the property of their originator. However, we cannot help but feel that as long as the profession retains those characteristics which make it a profession rather than a business, such as manufacturing or retailing, architects will continue to give of their best on each project whether or not their designs or ideas may be copied. They will depend for their personal gain on recognition among their fellows and the general public, as the originators and most expert in their particular specialty. Is the commercial penalty of being professional too great?

Kenneth K. Stowell

EDITOR

THE DIARY

Saturday, August 1.—A hastily called gathering of New York Chapter members welcomed Mr. Percy Thomas to the League a few days ago. The President of the Royal Institute of British Architects, William H. Hamlyn, F.R.I.B.A., and an engineer associate, are over for a brief visit to see what America is doing in skyscrapers, large hotels, and railroad stations. Mr. Thomas, in speaking very informally, expressed his keen appreciation of his recent election to Honorary Membership in the A.I.A. From New York the party went to Washington, expecting to go to Chicago and several other western cities before returning to London.

Monday, August 3.—William F. Lockhardt and I drove out to Hightstown today to see the Resettlement project, which was designed by Alfred Kastner. It will be recalled that this is an effort to move textile workers out of almost impossible living quarters in New York City, to a place where fresh air and open space are in abundance. The group of houses is conveniently near a new factory building, so that the residents' means of livelihood is carried with them into the country. We found the houses substantially built, of cinder block painted white on the outside, and furred and plastered within. They have no cellars. On the concrete slab, just above the ground level, oak flooring in small squares is laid in a mastic. There are no second stories—in effect, the dwelling unit is an apartment on the ground level. The roofs are flat concrete slabs, with considerable over-hang. The plans are excellent, the construction enduring, but to my mind, the array of roofs, punctured by chimneys and numerous plumbing and ventilating stacks, is not particularly pleasing. I should imagine, also, that putting an insulated concrete slab roof on a one-story building would show a considerable increase in cubic foot cost over the usual two- or two and a half-story dwelling.

Tuesday, August 4.—Out into New Jersey with Wesley Sherwood Bessell to see and photograph his Kent Place School in Summit, stopping on the way back to look at the Arlington Post Office which he designed while working for the Procurement Division in Washington. Here is one example of a contemporary post office in which the architect has not been satisfied to accept the usual materials that help to stamp most of our public work with its hallmark. Bessell has used the brown stone which the early Dutch builders of New Jersey employed in their more important work, and has used with it small handmade brick and small terra cotta units for cornices and belt courses to match the brick, while the roof is of half-inch black slate. The fear of being unable to "make it look like a post office" has apparently driven many designers away from any attempt at a free and understanding use of varied materials: not so, Bessell.

Thursday, August 6.—The other day Aymar Embury showed me a letter from one of his clients, which he thought would serve to reflect the proper attitude of a client to his professional adviser. The client wanted to build a barn. "I would like the barn to have six stalls, sufficient space for feed and sufficient space for tackle, and, being young and having old ideas, of course I want a hay loft; so if you would work on the premise of a barn to fit in with our place architecturally, 42′ deep, 25′ wide, it would give us 10′ stalls and a 5′ alleyway. Of course, I would want concrete on the first floor and I think a ladder would be sufficient to get up to the loft.

"I am enclosing herewith preliminary sketch and there is one thing that you will have to settle for me and that is this: if cows are left out in the open in the summer time, and in the winter time they are kept in the barn, I understand that in milking them in the barn one has stanchions. If I have just stanchions and not a stall for them, does that mean that a cow does not sit down all winter, and if it does sit down how does it do it with a stanchion around its neck, and if I take off the stanchion why doesn't it walk around the barn? Well, I guess the answer is bigger bottles. Your full advice will be appreciated."

Saturday, August 8.—I never knew John F. Tuohey, who died July 30, but that was my loss. Tuohey was a steeple jack who repaired and painted high spots, particularly in connection with metal work. He fell twenty times during his lifetime, four of the falls being nearly fatal. Back in 1882, when the late Guernsey Mitchell designed the winged god of commerce for the Rochester City Hall, he used Tuohey as a model. It must have been an interesting experience for Tuohey in later years to climb up and repair himself as enlarged in sheet metal.

Tuesday, August 11.—Kenneth Stowell and I lunched with Richard L. Harrison from Lafayette, Ind. today, and he told us, among other things, of the progress being made in Purdue's experimental work in house building. It becomes more and more apparent that the Government or one of the foundations should find a particularly useful service in providing the means of carrying such experimental and research work as this forward on a much larger scale. No one educational institution should be expected to bear the burden of finding out for America how we should build our homes.

Thursday, August 13.—There has been, and still is, considerable speculation as to what will be established as rentals in some of our new low-cost housing developments. The figures are now announced for Techwood Homes in Atlanta, Ga., which was begun, it will be recalled, as a limited dividend project. The basic dwelling rent, as PWA calls it, covers shelter in the house, without heat and utility service. For Techwood, it averages $5.58 per room per month. Tenants also pay $1.81 per room per month for heat, hot and cold water, and electricity for lighting, cooking, and refrigation—the stoves and refrigerators being provided by the project. In selecting tenants to pay these rents incomes must not be lower than $700. nor higher than $1,800, varying with the size of the family. The maximum occupancy is three persons in a three-room apartment, five persons in a four-room apartment, seven persons in a five-room apartment, seven persons in a six-room house (children under two years not being counted). Of course, families who at the present time are able to maintain themselves under tolerable living conditions elsewhere, will not be accepted.

Friday, August 14.—There are signs that we are beginning to recognize the need for a better place to park our automobiles than along the curbs. Claussen & Claussen have recently designed for Portland, Ore., a one-story department store, the whole roof of which is a parking area for the customers' cars. Again in Chicago, the Marshall Field organization, in extending its stores into

the suburban areas, is planning for roof parking. Minneapolis and St. Paul have for some years utilized department store basement space for parking.

Saturday, August 15.—Now that we are looking back upon it, there is more comfort in examining the extent of the building industry's vast dip. Normally, according to the American Federation of Labor's figures, the building industry creates each year more than $10,000,000,000 worth of construction. Workers to the number of 2,300,000 depend upon it for their livelihood. Indirectly 4,600,000 more workers are affected.

Home building dropped from 840,000 homes built in 1928, to 123,000 in 1933. Factory and commercial building dropped to less than 17% of their 1929 value. Public building had gone down to barely 40% of its 1929 total. In March 1933, three-quarters of the industry's workers were out of work.

The building industry has lagged behind other industries on the way back to recovery. At present, it is back to 43% of its 1929 value, and over 400,000 men have gone back to work in the industry. That leaves still, however, over 1,000,000 unemployed in the building industry, if the A. F. of L. figures are correct.

Monday, August 17.—Someone is always trying to bury the piano industry. When the phonograph came along, there were plenty of people who believed and said that this meant the end of the piano. Nevertheless, the piano industry came back with the player-piano, which carried production to its all-time peak in 1923. The player-piano is now almost as extinct as the dodo. The coming of the radio was certain to be another reason why the piano should be on the way out. Nevertheless, shipments from manufacturers to dealers in 1935 were 38% ahead of 1934, 90% ahead of 1933, and 139% ahead of 1932. The ways in which the public takes its music vary widely over the years, but the piano continues to be one of them.

Wednesday, August 19.—Two years ago, as I travelled around among the architectural offices, a majority of the men, having plenty of time to think, were of the opinion that something should be done by the architectural profession to help America get better small houses. Within these two years, however, the architects have become busy, and I find less and less interest in the house costing under six or eight thousand dollars.

Apparently, therefore, we are going right back into the old routine of skimming off the cream, and letting who will, have the milk. It is the easy way, perhaps the only way for the individual practitioner. Nevertheless, the profession, and particularly the organizations in the profession, should not close their eyes entirely to the following pertinent facts: One, the percentage of American citizens earning above $2,000 a year is 19.23; two, assuming that 20% of income should go for shelter, a $2,000 income means a $3,000 house; three, 80.77% of the population requires dwelling units costing less than $3,000.

In a word, therefore, the architectural profession, when it refuses to tackle the problem of a dwelling unit costing less than $3,000, is tacitly admitting that its function is to serve less than 20% of the population. As a matter of fact, this is a rosy view of it, for of the 19.23% having incomes over $2,000 yearly, only 8.32% have incomes of $3,000 or over. If, therefore, the architect descends no lower than a $4,500 house, he is serving no more than 8.32% of the population.

America's real job at the moment, therefore—a job which should rightfully be shouldered by the architect—is to devise ways and means of securing a dwelling unit for the 70% of American citizens whose incomes range from $500 to $2,000 a year.

Friday, August 21.—San Francisco is going right ahead with the preparations for its World's Fair in 1939. New York's Fair of 1939 and 1940 is to cost, I believe, $40,000,000. So is San Francisco's. A $40,000,000 fair ought to be worth seeing, wherever it is, which indicates a grand year in 1939 for the railroads, buses, air planes, as well as a lot of wear and tear on the transcontinental highways.

Saturday, August 22.—What has become of all this uprising on the part of the younger men regarding the competition system? After a minor detonation in Williamsburg, it seems to have gone back into the silences—or is it merely storing up powder for a real noise?

Monday, August 24.—I have just been trying to assemble some data on air conditioning, which bring to mind the fact that although the terms are on almost everyone's lips, the public is extremely hazy about the subject. The General Electric Air Conditioning Institute sent out, anonymously 10,000 questionnaires. Only 9% of those who replied were able to name all six functions performed by modern air conditioning. Apparently, the idea that most people had uppermost in their minds was that modern air conditioning meant cooling. Only forty out of every hundred knew that air conditioning circulates air. Two per cent of those who replied already have air conditioning in their homes. Thirty-eight per cent have thought of it, fifty-one per cent have not.

Wednesday, August 26.—The building industry is facing a stubborn fact: it cannot make money out of building homes, whether for sale or rent, for families with incomes under $1,500 a year. Yet two-thirds of the American families come within that range. Apparently there are only three possible answers: greater purchasing power, or lower building costs, or subsidized housing. It would seem to be impossible for us to depend on any one of these answers for a solution. Just how the answer may be found with a proper balance among all three, is something that the building industry, the architect, and the public would like to know. And the great trouble is that there is really no intensive and properly correlated effort being made to find out.

Friday, August 28.—The old Tiffany house at 72nd Street and Madison Avenue, New York, one of McKim, Mead & White's early works in the Richardsonian manner, is being torn down, and I have not heard so much as a murmur of regret on the part of the public or the press. We do seem to be able to muster some respect for monuments of real antiquity in this country, but give the younger relics short shrift. H. S. Goodhart-Rendel in his "Vitruvian Nights" touches rather neatly on this subject:

"I cannot claim the 'right to live' for the art of the past, since I do not think that anything so abstract as a 'right' comes into the matter. I do think, however, that destroying a work of art is like cutting down a tree;—before doing it you must be much surer than you usually can be that you will never want to put it up again. At the present time there may be, indeed there is, an exaggerated respect for art with a full-grown reputation, but for the saplings—the reputations that will grow to be big some day—we have no care whatever."

NO MORE HIEROGLYPHICS!

The establishment of a system of prefabricating units is bringing to architecture a simplified design language

By ROBERT C. WEINBERG

ARCHITECTS who have spent time and energy developing prefabricated houses during the last few years have had much to say about new methods of construction, financing and other aspects of the problem. However, a point which has not been stressed before is that prefabrication may indicate a new and very much simplified method of designing houses as well as constructing them. The new designing technique will eliminate much of the routine of the architect's office and give him an opportunity to study the essentials of plan and design without entailing the loss or the expense of detailed drafting and specification writing. It may also give freedom and scope to his imagination along new lines.

In discussing matters of design and aesthetics in architecture, analogies are often made to the science of language. These analogies are apt, since the difference between the language of prefabricated units and that of historic "documents" is somewhat akin to the difference between our modern alphabet and the characters used by the ancient Chinese. The average Chinaman who was educated sufficiently to read the daily newspaper must have had a knowledge of some four thousand or five thousand characters. Probably the Chinese classical scholar was familiar with some twenty or thirty thousand such hieroglyphics. While no two of these characters are identical—they fall into certain natural groups according to similarity of original derivation, so that the study of them did not necessarily involve twenty-five thousand different memorizing processes. Nevertheless, Chinese who tried to write in their own language without adequate training must have produced combinations of characters which doubtless offended the Chinese classical scholars as much as the mediocre or inexperienced attempts to imitate architectural "styles" now irritate those able practitioners who really understand them. To carry our analogy further, let us compare the Chinese character system with the modern English alphabet. With the latter, out of twenty-six easily learned letters, an infinite number of words can be made. With combinations of these words we can form phrases, sentences or paragraphs to express our thoughts, whether we are writing a laundry bill or an essay. The degree of accuracy and power of expression attainable by even the average man is therefore proportionately increased. Certainly no one would argue today that because we no longer have to go through the intellectual processes necessary to learn a hieroglyphic system—our writers are therefore less to be admired than those of ancient China.

My point is, of course, that architectural design has been, up to now, in the hieroglyphic stage. The establishment of any system of prefabricated units with which to design

UNIT	COST OF GH MATERIAL TO DEALER	COST TO DEALER OF ERECTION MATERIALS & LABOR	TOTAL COST TO DEALER	SALES PRICE TO CUSTOMER
I. BUILDING STRUCTURE				
Wall Panels Solid (S)				
Wall Panels Window (W1)				
Wall Panels Small Window (W2)				
Wall Panels Entrance Door (ED)				
Wall Panels Kitchen Door (KD)				
Wall Panels Double Door (DD)				
Wall Panels Full Glass Panel (G)				
Wall Panels Garage Door Panel (GD)				
Wall Panels Chimney Panel (including fireplace) (CH)				
Wall Panels Chimney Panel, add for two-story house				
Outside Corner Post				
Reverse Corner Post				
Spandrel (per 4 ft. section)				
Coping (per 4 ft. section)				
Bearing Partition and Beam (per 4 ft. section)				
Non-bearing Interior Partition (per lineal foot including door space)				
Add for each interior door				
Utilities Wall (per 8 ft. section) between Kitchen and Bath or Baths				
Roof and Ceiling Above Upper Floor of House (per square)				
Insulated Linoleum Floor and Ceiling for Intermediate Floors (per sq.)				
Insulated Plywood Floor (per sq.)				
Insulated Linoleum Floor (per sq.)				
Uninsulated Plywood Floor (per sq.)				
Uninsulated Linoleum Floor (per sq.) For Ground Floor Use with Air Space or Cellar Below				
Plain Concrete Floor (per sq.) For Ground Floor Directly on Soil				
With linoleum surface add (per sq.)				
With plywood surface add (per sq.)				
Concrete Sill, 5 ft. deep (per 4 ft. section)				
Concrete Foundation Pier				
II. OTHER INTERIOR EQUIPMENT				
Electric Outlets and Wiring per outlet				
Lighting Fixtures, average per fixture, low cost house, medium cost house, designed to order house				
Meter and installation, approximate				
Lightning protection approximate				
Radio Aerial, built-in				
Overhead Curtain Track (per lineal ft.)				
Bathroom Accessories per bathroom				
Bathroom Fixtures and Equipment per bathroom				
Refrigerator and Range for Kitchenette				
Refrigerator and Range for Standard Kitchen				
Refrigerator and Range for Large Kitchen				
All other Equipment, including Sink and Cases for Kitchenette				
for Standard Kitchen				
for Large Kitchen				
Linen Case (l)				
Wardrobe Case (w)				
Dresser Case (d)				
Telephone Case (t)				
Laundry Chute				
Laundry Trays (per pair)				
Gas Plate				
III. MISCELLANEOUS CHARGES				
Ordering Factor				
Insurance per $1,000				
Freight				
Local Delivery Charges				
Supervision				

FIGURE 1

A sample price schedule with no actual prices shown

A concrete wall separates entrance and service sections from the porch and garden. House of Reverend Charles Penniman, Wilmington, Delaware. plan by R. C. Weinberg, designed and produced by General Houses, Inc.

rooms, houses, buildings, whole towns—the architectural equivalent of words, phrases, paragraphs, books—is bringing to the architect the common alphabet which has been the occidental writer's tool for centuries. To illustrate this, I am presenting the case history of a house designed to meet the needs and purse of a particular client and built under single contract by a producer of prefabricated units.

In addition to simplifying the design process itself, the use of prefabricated units eliminates some of the uncertainty and delay involved because of the numerous steps usually necessary before a definite price for the completed house is reached. Instead of depending upon the architect's guess as to how expensive a house his first sketches represent, and then waiting until working drawings are finished and numerous contractors and sub-contractors have spent weeks going over them before the eventual cost is decided, the units used by the architect under this new system are fixed in price as well as in dimensions. Let it be clearly understood, however, that this does not mean that the units are for sale as individual items at a given price. What is meant is that the total cost to the ultimate consumer of all the work that goes into a house can be so carefully accounted for that it can be prorated on to each unit of the building.

The producer of the house illustrated here developed a full list of standardized units for which unit prices were available to the architect. A sample of the type of price schedule is submitted herewith (Figure I) and a few of the more important units used in designing the major structure of the house are illustrated also (Figure II). The prices released by the producer from month to month are sufficiently accurate to enable the architect using them to ascertain, within at most ten per cent, the contract price to the owner by a company willing and ready to be responsible for the whole job. This is surely close enough to allow the client to come to a definite decision as to whether or not he is going to build a house from a particular plan. Granted that the guess of the experienced architect may be accurate within a like margin of error; nevertheless the one is a guess of a professional advisor in the employ of the owner, whereas the other is a *commitment* from an established firm, publicly undertaking to carry out a commercial contract.

The beauty of this system lies in the flexibility of negotiations which are available to both architect and owner. To illustrate, we have here the case of a client in Wilmington, Delaware, who wanted a particular type of house designed for a definite piece of ground. The architect accordingly visited the site, armed with the "unit price schedule" and a pretty clear idea of the nature of the units available and the possibilities of combining them. Inspection of the site and conferences with the prospective occupants of the house and the local dealer who was to handle the erection, were a pleasant day's work. By evening the architect had developed a mental picture of the sort of house that would be required. Instead of roughly sketching something to show the clients, and following this, possibly a week later, with "presentation" sketches he was able to sit down then and there, equipped simply with a sheet of coördinate paper and a pocket adding machine and work out an eighth-inch scale set of plans in solution of the problem he had spent the day studying. These plans were not the usual "first sketches" but were very definite *keyed diagrams* on which each unit was noted by its symbol and each item of equipment similarly specified. Taking this diagram, then, and listing the number of individual units or items of equipment along one column of a sheet of

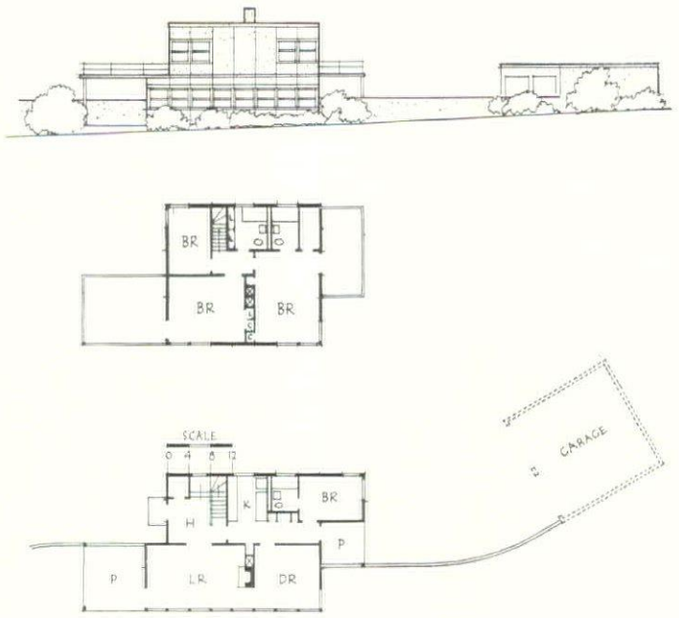


FIGURE II

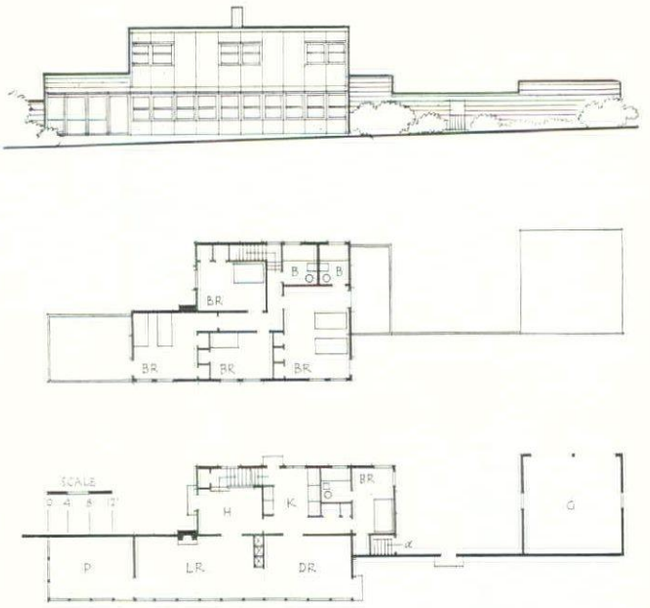


FIGURE III

paper, and setting against them the per-unit and the total cost for each group of units as given on the "unit price schedule," a definite estimate of what the client would have to pay for the architect's first idea was obtained in less than an hour.

Now, supposing the architect had started by being very economical of space, and found that the cost ran lower than he had expected; it was a simple thing to take advantage of this and increase the size of the house or the amount of equipment accordingly. After two or three "trial-and-error" efforts, the sketch illustrated (Figure III) was evolved and submitted to the client with a price. This price and plan seemed, in general, to be acceptable to the client and the sketch was immediately mailed to the producer's headquarters, for confirmation in respect to current prices. By return mail, an estimate was received for substantially the same amount ($10,242 complete).

By the time this confirming estimate had been received, the architect had talked over the original sketch with the client, who felt that he wanted larger living-rooms, as well as one more bedroom, and certain extra equipment. In view of the fact that the price was somewhat lower than the owner had expected it to be, the architect was asked to revise the plans accordingly. He was also told that the final price might be increased $1,000, if the desired extras were included.

Again working with the "unit price schedule," it was a very simple matter to study an enlarged version of the original plan with quite definite knowledge of what each enlargement and change was going to cost. These items would not require any fundamental changes in the design of the house, but would simply add so many "squares" to the floor area, so many each of "solid," window or door panels, or so many more standard cases, etc. Of course, in this process, a certain number of units were also omitted or changed, and unit price as given in the schedule added or substituted, as the case might be. Thus, after a few hours' study, a second design was evolved (Figure IV), for which a price of $11,363 was given to the client then and there. This, in turn, was sent to the producer for verification and the estimated purchaser's contract price was re-submitted as $11,504.

A preliminary contract was signed on the basis of this second sketch and estimate, authorizing the producer to proceed with final contract documents, including engineering drawings for the assembly of this particular house. This stage in the negotiations is still necessary at the present time, due to fluctations in costs of materials, manufacturing relationships and to, as yet, incomplete standardized methods of mass production. The system, of course, is by no means perfect in all of its aspects. Numerous unforeseen circumstances arose in this instance and, until the industry is well established, will continue to arise in other examples of custom-designed houses built by prefabricators. For example, a number of the processes, such as excavation, masonry, erection, trucking, etc., and other items involving local labor where special wage conditions exist, still must be contracted for locally. It is interesting to note that where some of these items came to more than was estimated by the unit price schedule, the increases were more than offset by the dealer's own labor costs, in assembling and erecting panels and other prefabricated materials, which came to considerably

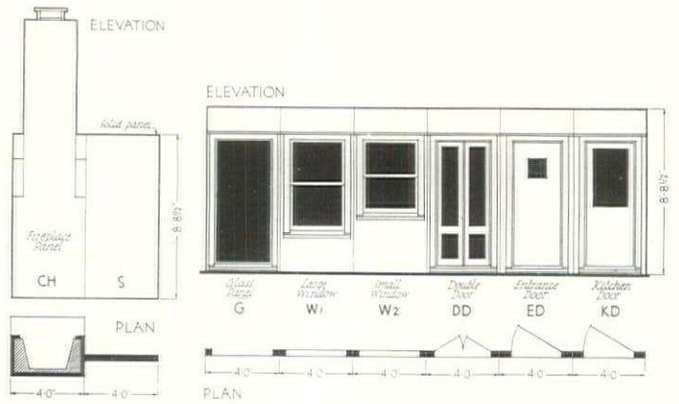


FIGURE IV

less than had been estimated. For after the first few hours of unfamiliarity, on the part of the crew handling the work, the house went together very much more quickly and easily than was expected.

In this particular house the architect's problem was to obtain the maximum amount of southern exposure for both living and bedrooms, as well as to separate definitely the entrance and service portion of the house, on the outside, from the porch, terrace and garden. The walls used to accomplish this, as well as the garage (which is, in effect, a continuation of the walls), were designed to provide a transitional element between the house and the land and to avoid the appearance the house might otherwise give of rising too abruptly out of the hillside. These walls were built of cinder blocks, a prefabricated unit obtainable locally.

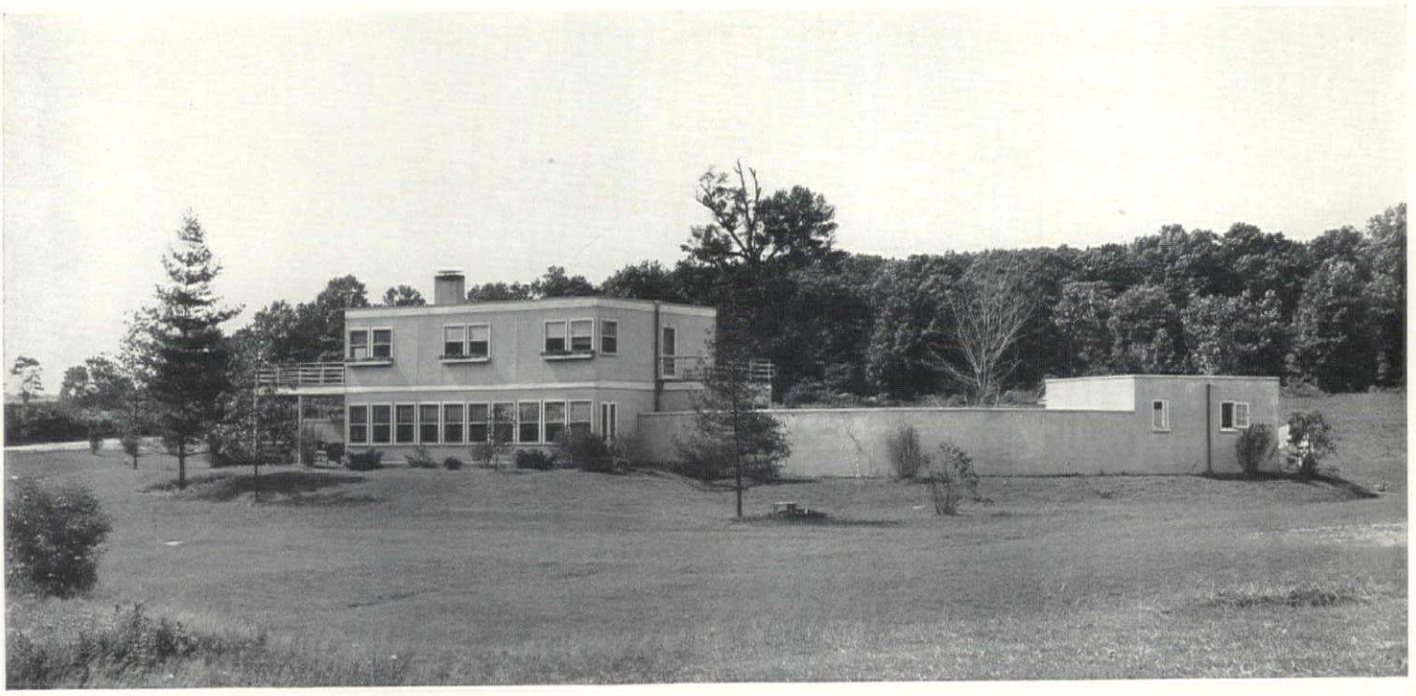
The plan of the house created a much more favorable reaction, at first, than the elevations, and there is no reason why this should not be so. The plan of a prefabricated house is always worked out locally, a special job for an individual client, whereas the detailed design and proportion of panels, doors, windows, chimneys, etc., etc., are necessarily made at a distance and without any direct contact or relationship to the individual owner. With the exception of the general mass and spacing of openings, therefore, the elevations of the house were allowed more or less to take care of themselves, for the simple reason that it was not within the local architect's province, much less his power, to detail any of the standardized units of which the elevations were made up. The alphabet was established: the architect was simply using it to spell out his solution of a particular problem.

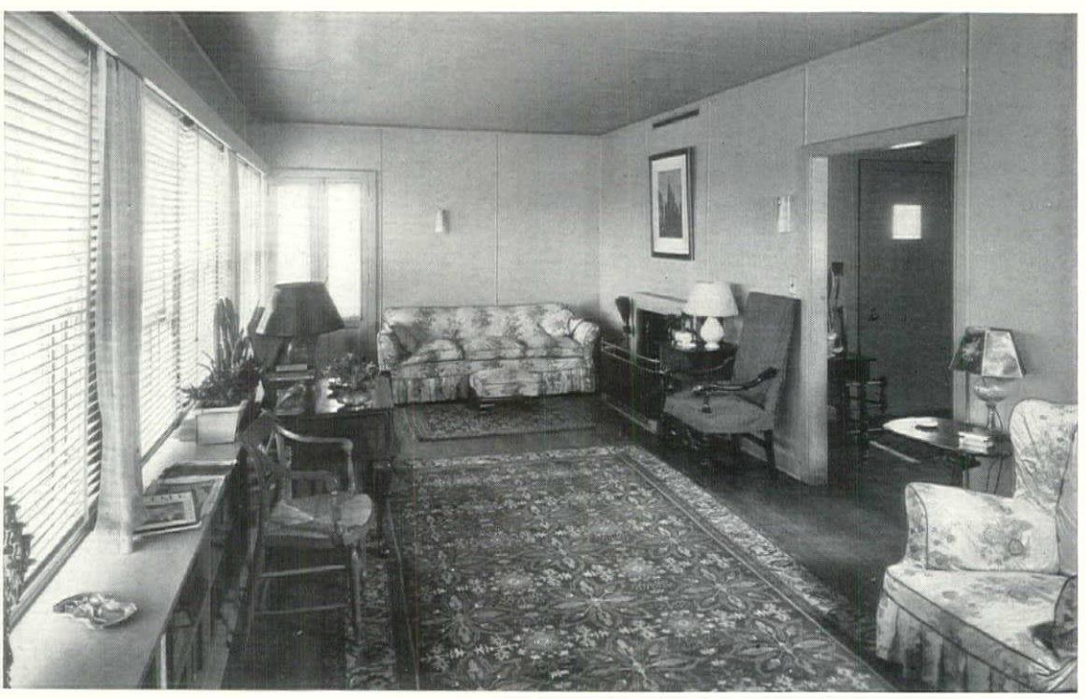
The resulting composition of shape and color, only the former of which is shown in these photographs, can, therefore, be called the design of any one architect in a somewhat more limited sense than the exterior appearance of a house usually is, and it is this point which I call to the attention of architects who read this article. Designers on the central staff of a prefabricated house producer are, in proportion to their own ability and taste, constantly striving to establish the best possible designs for the individual parts that are fabricated by the collaborating manufacturers. Often this effort is not nearly so completely under control of the staff architects as one would suppose, since manufacturing processes have certain difficulties which can be overcome only gradually and step by step. On the other hand, the architectural representative who designs the individual "assemblies" of the pre-designed, as well as prefabricated, units, has no control whatsoever over these details and it is wrong to suppose that he should have. If every architect were to try to vary the details of the individual units, in accordance with his own or his client's particular ideas of the moment, it would slow down and even break down the prefabricated system. Therefore, the local architect who handles such a job, in behalf of an individual client, must frankly and completely put aside any thought of detailed design of the given standardized units.

I, for one, am very glad to do this, as I find that it greatly simplifies the process of designing by giving me at least a few definite things to start from—an alphabet which, however imperfect, is at least a system of letters from which I can make words. How much better it is to have, at last, an alphabet than to continue to be faced with the constantly changing prospect of selecting the suitable hieroglyphics from an infinite number of possible, unrelated, uncoördinated, Chinese characters!

It can be seen how much more important becomes the function of planning the house for livability as well as the

The design of the completed house combines elements of both Figures II and III. House of Reverend Charles Penniman, Wilmington, Delaware, plan by R. C. Weinberg, designed and produced by General Houses, Inc.





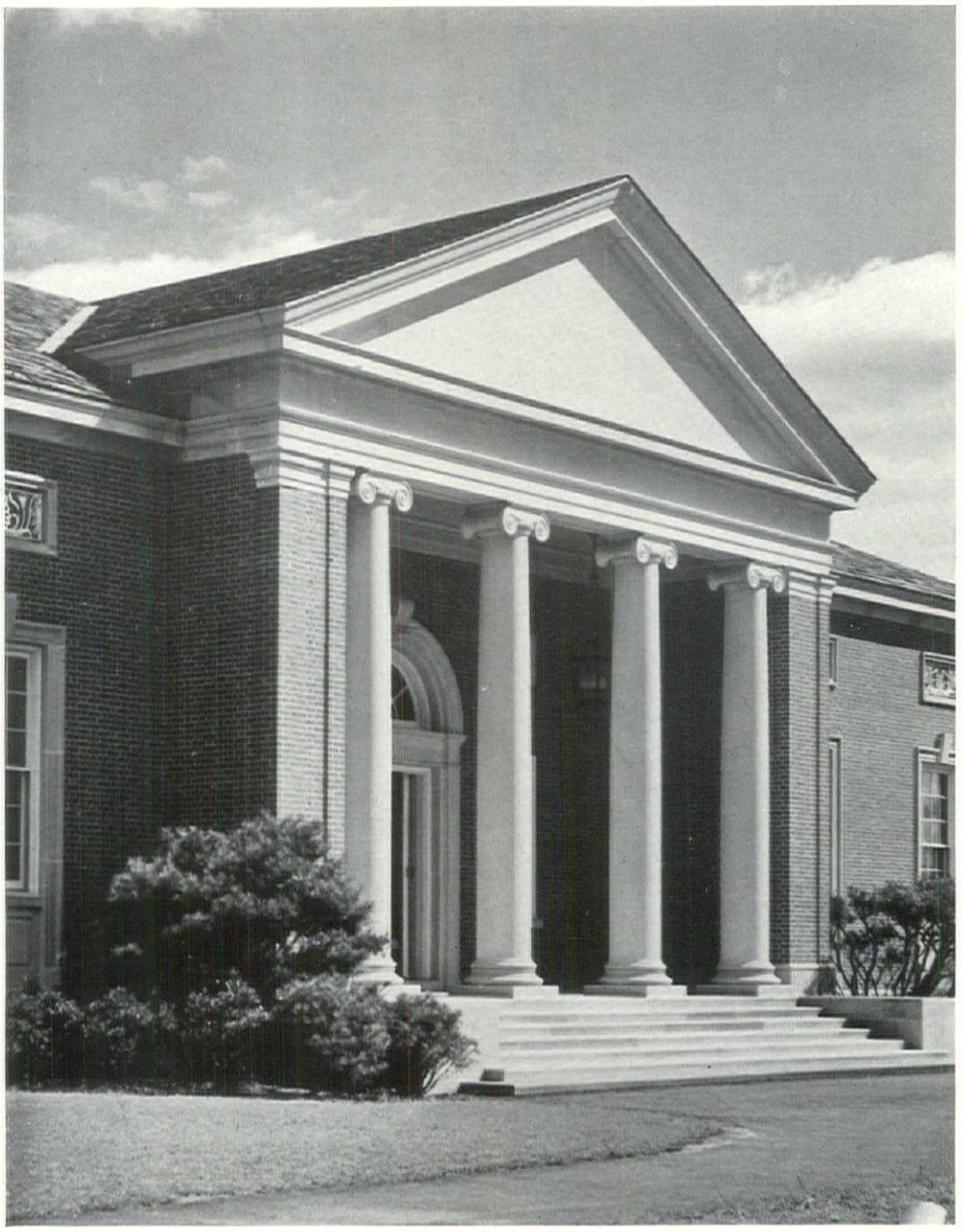
Furniture in the style of the 18th Century is in complete harmony with unadorned window, wall and door panels in the house of Reverend Charles Penniman, Wilmington, Delaware

relationship of the house to the site. It is on the planning of house and site that the architect must base his claim to recognition, rather than on the old basis of "refinement of detail." Do not misunderstand me here. The phrase "refinement of detail" is used just as glibly among designers of houses in the contemporary manner as it is among the traditionalists. Many a house that may, in general external appearance, bear a superficial resemblance to the "modern" forms of prefabricated houses on the market—is every bit as much a collection of Chinese characters as a house designed in a traditional "style." Conversely, a simple sectional building, distinctly traditional in appearance and details, such as the type of prefabricated house put out by the manufacturers who have been making sectional houses in New England for over thirty years, is closer in spirit to the house described in this article than are many that at first glance look more like it. In these old-fashioned sectional houses, an alphabet has been employed, the letters of which still have the appearance of the old hieroglyphics, but which, nevertheless, constitute an alphabet. To put it another way, I believe it preferable and more in the spirit of modern times for an architect to specify "Colonial Doorway No. 999" from the Curtis catalog than to spend hours detailing a sophisticated imitation of an entrance by Le Corbusier.

PHOTOS: SAMUEL H. GOTTSCHO

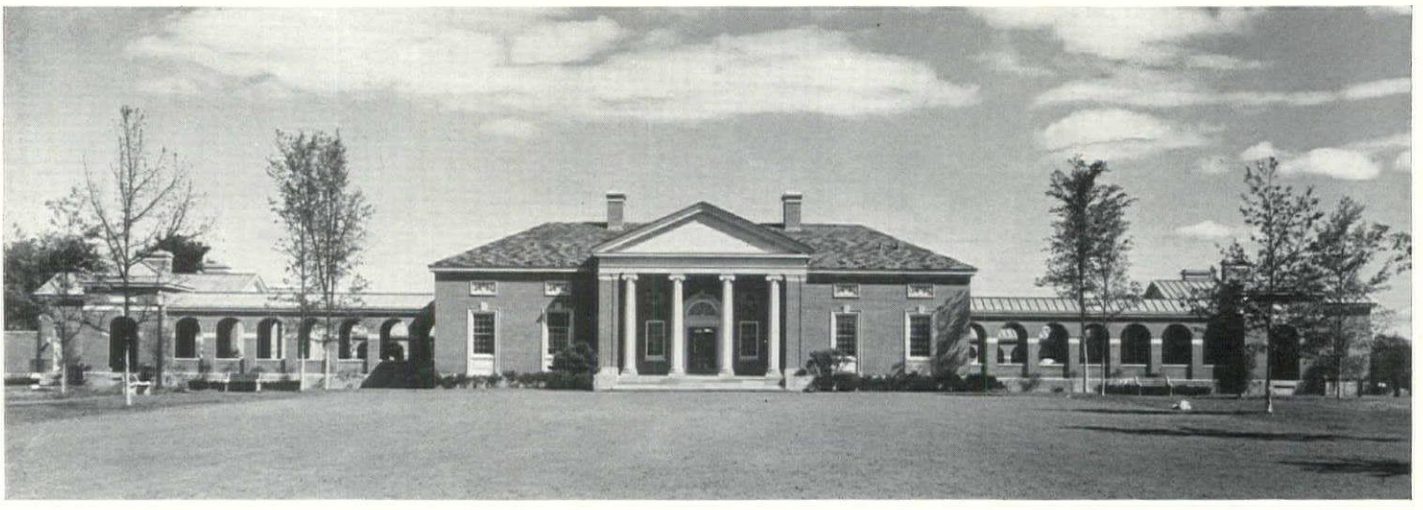
ATHLETIC GROUP, SARATOGA SPRINGS RESERVATION, N. Y.

DWIGHT JAMES BAUM, ARCHITECT



1

Part of a seven year development plan, these buildings are of red "Harvard" brick laid in Flemish bond and trimmed with silver gray limestone. The roofs of both the Administration Building (below and left) and the Gymnasium (opposite page) are of variegated slate while the other buildings, pavilions and arcades have lead-coated copper roofing. The numbered arrows on the plan indicate the location and direction of the camera for the photographs correspondingly numbered



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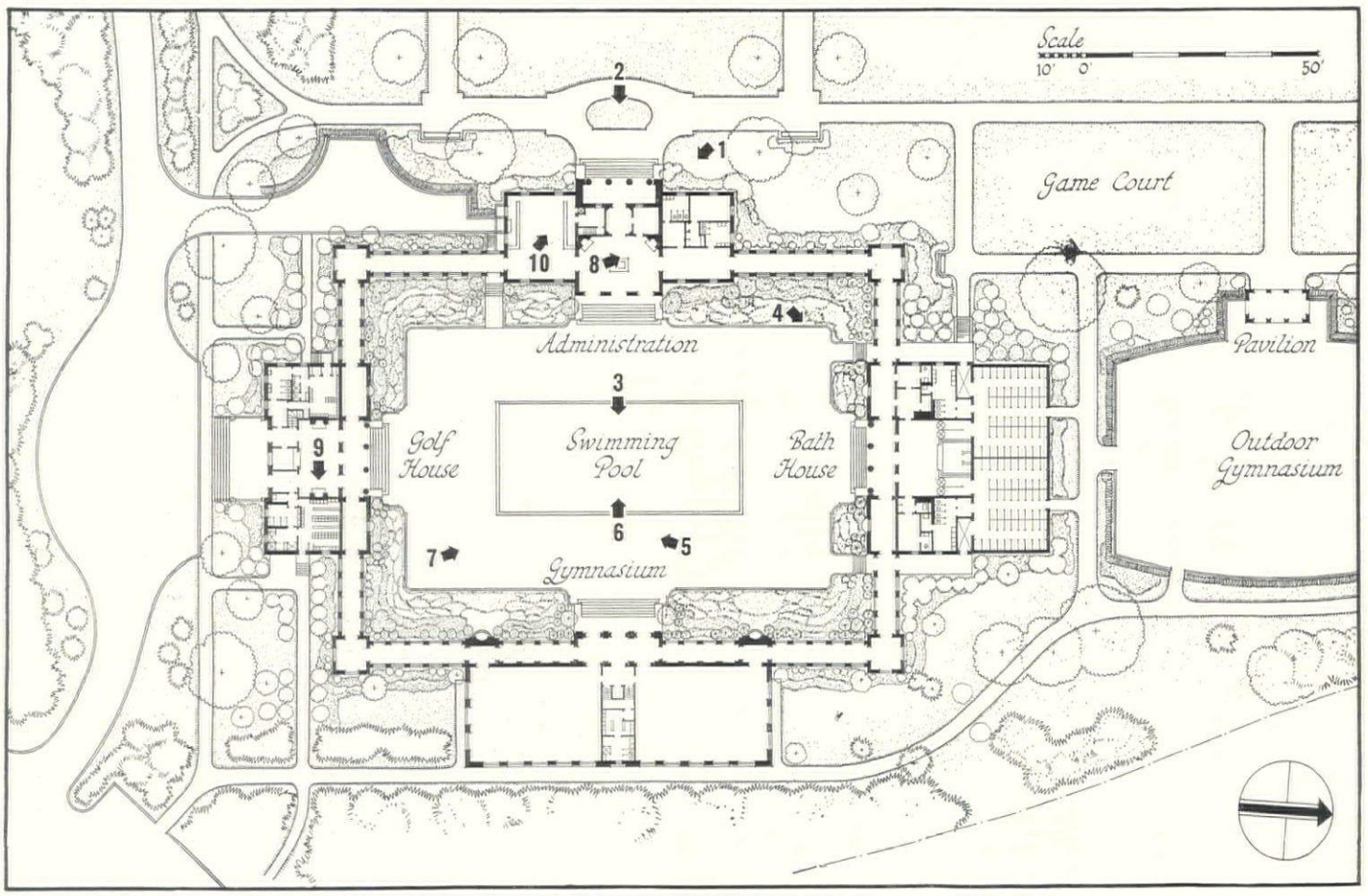
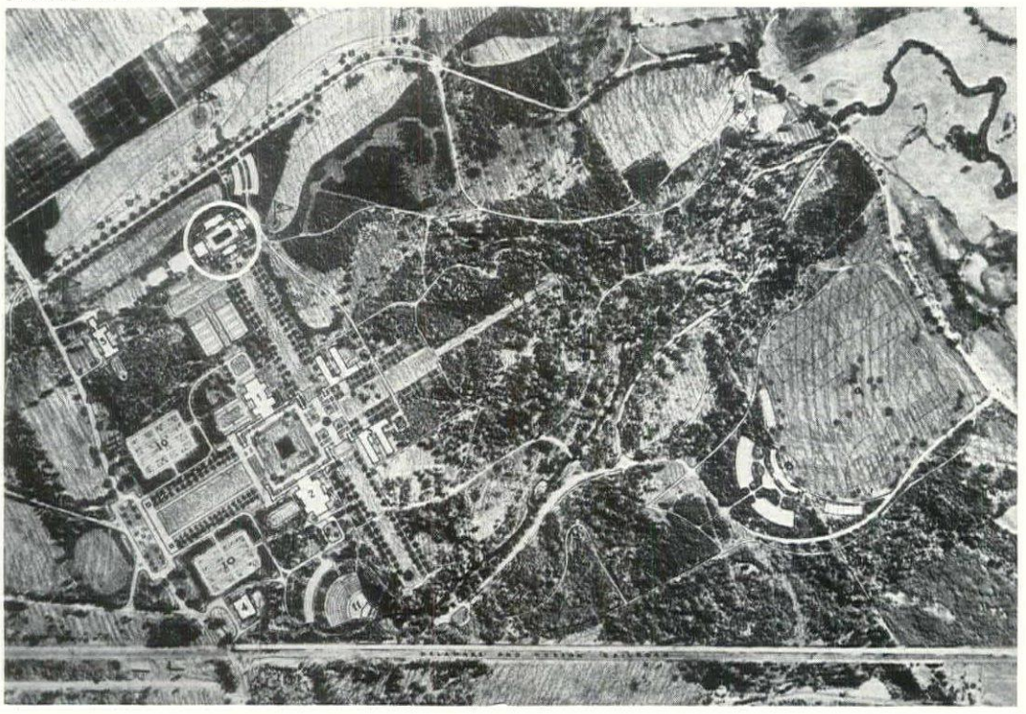

Scale
10' 0 50'
2
1
Game Court
10
8
4
Administration
Pavilion
3
Golf House
Swimming Pool
Bath House
Outdoor Gymnasium
9
6
5
7
Gymnasium

4

PHOTO: FAIRCHILD AERIAL SURVEYS

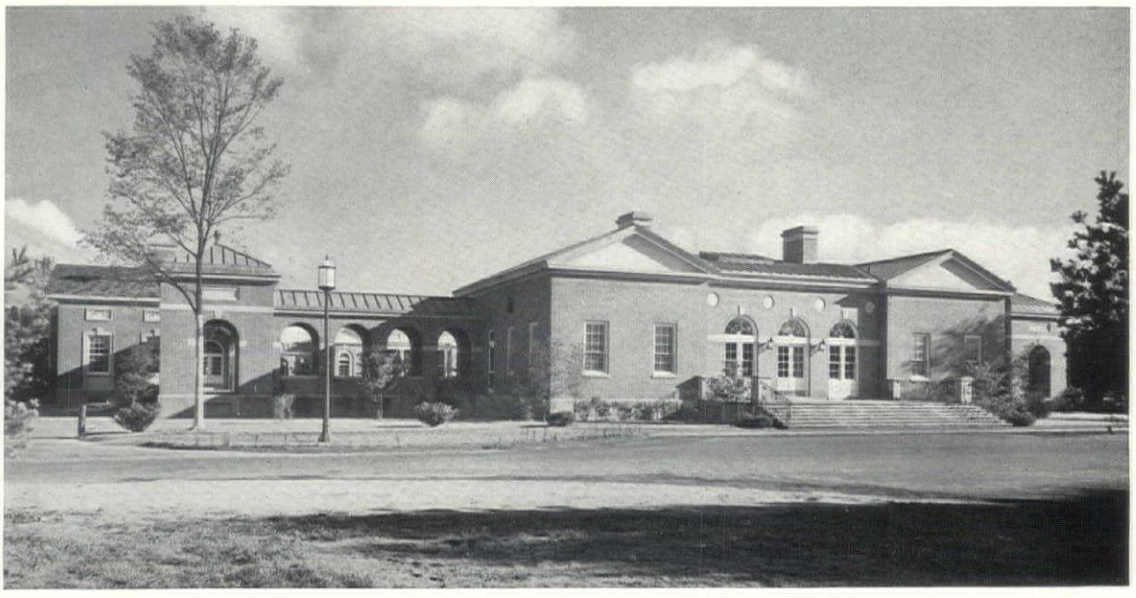


The various new building groups, recreation fields and golf course occupy about 140 acres in Geyser Park. They include the Administration and laboratory, Hall of Springs, Baths, Bottling plant, Gideon Putnam Hotel, Athletic Group (encircled), Future Sanatorium, Athletic field house, Athletic field, Parking field and Amphitheatre. Joseph H. Freedlander, Dwight James Baum, Marcus T. Reynolds, Architects, A. F. Brinckerhoff, Landscape Architect

5

ATHLETIC GROUP, SARATOGA SPRINGS RESERVATION, SARATOGA SPRINGS, NEW YORK. . . DWIGHT JAMES BAUM, ARCHITECT

Although the buildings of the group are in architectural harmony, each is different in its detail. This is evident in comparing the Bath House (opposite page) with the Administration Building (above) both of which are shown from the pool side. The Golf House (below) from the road



6

ATHLETIC GROUP, SARATOGA SPRINGS RESERVATION, SARATOGA SPRINGS, NEW YORK. . . DWIGHT JAMES BAUM, ARCHITECT

Besides their waters, the success of Vichy, Carlsbad, Montecatini and other famous European spas has been due to their doctors, recreational facilities and architecture. When the State of New York acquired the Saratoga Springs reservation, consisting of about 1000 acres in 1909, the waters and the racing season in August of each year were its only attractions. In 1930 the Saratoga Springs Commission was authorized to proceed with a seven year plan for the development of the spa. The pool in the Athletic Group (below). The Directoire lobby in the Administration Building has a black terrazzo floor, green walls and black and gold marble trim (opposite page)

7

8

9

10

The lobby of the Golf House is paneled in light finished knotty pine (above). The Cafeteria in the Administration Building has oak Flexwood walls, oak counters and a terrazzo floor (left)

RESIDENTIAL WINTER AIR CONDITIONING

An effort to bring into sharper focus the methods, elements and terminology, without venturing into the field of the heating engineer

IT IS time to survey this question of air conditioning in an effort to see it and its main elements in better perspective. The public, as well as the profession, is exposed to discussions of air conditioning in articles, advertising, conversation, and it is astonishing how distorted some of the composite pictures are in the layman's mind.

With the idea of simplifying and tabulating the essential elements for the profession in order that the layman client's conception may be clarified, this article is written. Some of it—perhaps most of it—will be elementary material with which the architect is thoroughly familiar. Nevertheless, it seems well to examine the whole picture in the attempt to accent the simple relationships that exist, and to bring these together in a form in which the architect can convey to the client a balanced, rather than a distorted, understanding.

The client's approach to the question of how air conditioning can serve his own particular needs is amusingly vague. "Dew point," "air infiltration," "relative humidity," "sensible heat," "latent heat," "split system," and a host of other technical terms must necessarily be jumbled together in his mind in a vast fog. He will perhaps seek out his architect with the questions: "Air conditioning seems to be the order of the day. What does it mean to me? Is it possible for me to enjoy it in my own home? Is it something that entails vast expense? Is it achievable in progressive stages? What does it mean in capital investment, in maintenance costs, in the necessity for additional insulation?"

Let us see, therefore, whether we can put the essential facts down in some sort of rational order, omitting the technical details that belong in the province of the heating engineer, but including all that the layman needs to know.

There is no mystery about air conditioning; neither is there any reason for confusion or misunderstanding of the subject. It is based on familiar physical laws, and standards that meet most requirements have been established.

In the first place then, as contrasted with the old conception of residential heating, air conditioning—in winter only, for the moment—means a four-fold, rather than a single service. Instead of mere heating, it includes four different operations upon the air that surrounds us indoors, and these are the four in the order of their importance: heating, humidification, controlled air motion, and air cleansing.

Of course, in the old days, before we knew very much of this modern science, it was assumed that the average person would be comfortable in his home within a certain rather narrow range of temperatures. Habits of dress and personal conceptions of bodily comfort figured to some extent, yet we thought in a general way that an indoor temperature of something between 68 and 76 degrees Fahrenheit provided a proper comfort, at least within the range of available facilities. We know now, however, that degrees of temperature in the air are by no means the sole consideration. The amount of moisture in this warmed air, and the degree to which the air is kept in motion also affect comfort; the cleanliness of the air is a more subtle thing, apparent to some of us far more than to others, in the effect of pollen, dust, bacteria and odors, as to both health and comfort.

The building industry, guided by the technicians, has developed four types of apparatus through which we may have about us indoors in winter the proper air comfort. These four are: 1, the Direct Fired (or full warm air) System; 2, the Split System; 3, the Auxiliary System; 4, the Unit System. It may be advisable to run over the characteristics of these four systems briefly at first in order to understand more clearly their relationships to one another. Moreover, in this hasty survey of the four, the client will want to relate to each, first, the extent to which the system will perform each of the four essential functions; second, the initial cost of the system; third, the operating and maintenance cost.

The Direct Fired System, simplest of all in its conception, consists of a furnace, humidifier, blower, vents, ducts, dampers, registers, grilles and a full complement of automatic controls—the old warm air furnace with a college education. We have selected a typical house, plans of which are illustrated herewith, and Figure 1 shows a layout of this Direct Fired System. Such a system, when properly designed and installed, supplies warmed, humidified, cleansed air through individual ducts to every room in the house. Individual vents are provided from kitchens and bathrooms to exhaust the air; with the exception of infiltration losses the remainder of the air is led back to the plant to be filtered, humidified, and warmed again. This recirculation of air is achieved ideally, of course, by the use of both supply and return ducts leading to each room. Measures of budget limitation, however, occasionally necessitate the omission of some of these return ducts and the substitution of a larger duct at one or two strategic points in the house.

The Direct Fired System can, of course, be fired automatically by any of the common fuels, the choice of which would depend upon local prices and service conditions.

In using the Direct Fired System it is necessary to provide an independent means of furnishing domestic hot water.

The Split System provides, as its name indicates, a combination of two major elements: a boiler for steam or hot water which will supply direct radiation in certain parts of the house (usually kitchens, bathrooms, service quarters and garages) and also the steam or hot water to a heat exchanger—which the client may regard as a wholesale radiator. This latter element, in conjunction with a blower, filter, and humidifying equipment, furnishes conditioned air to the remainder of the house through a system of ducts, registers and grilles, such as is used in the Direct Fired

[The Editorial Staff acknowledges with gratitude the aid of James E. Cook, Manager of the Architectural Bureau, Westchester Lighting Company, in the preparation of this article.]

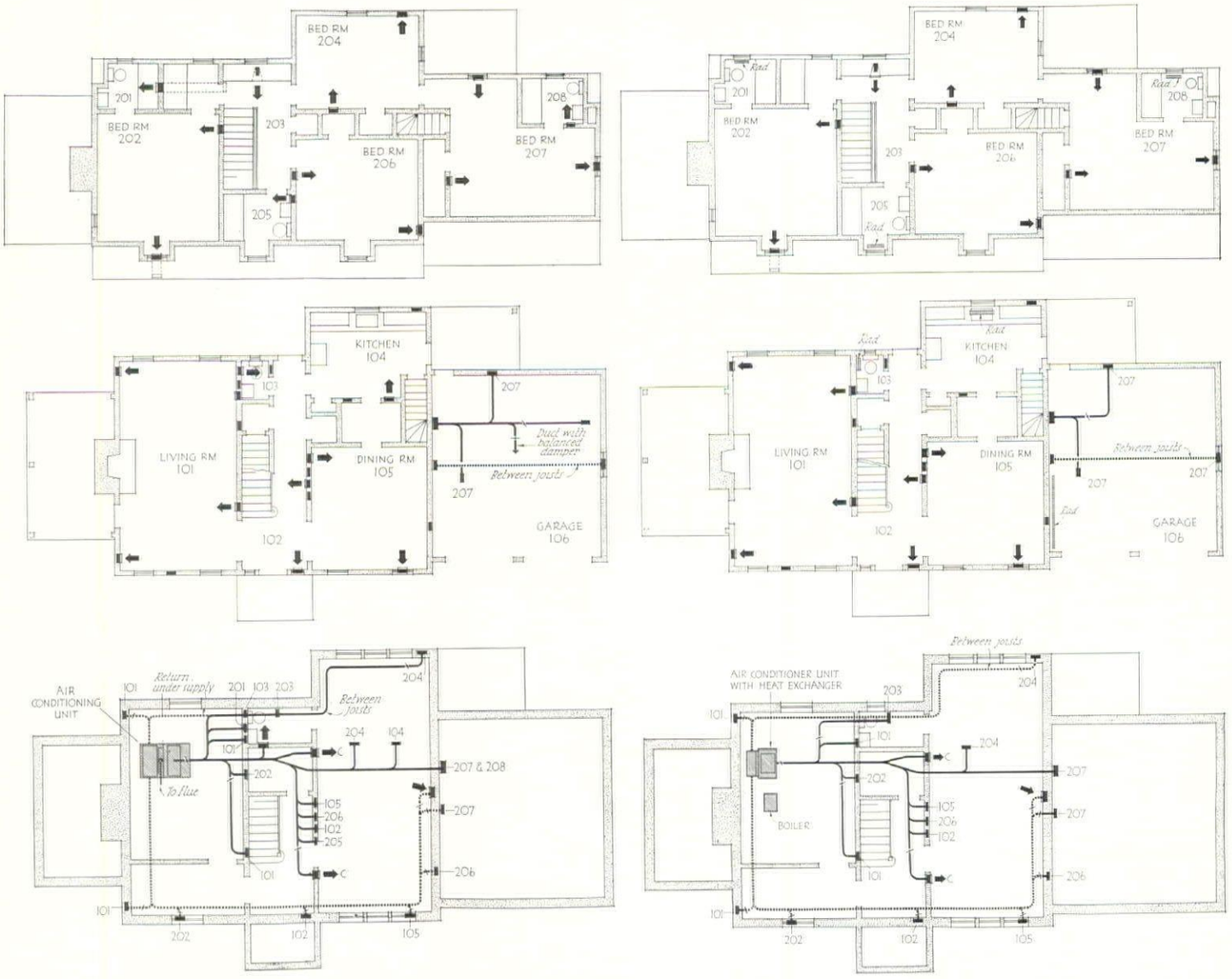


Figure 1. Layout for a Direct Fired System. The house plan is selected as representing a fairly typical problem—the work of William Paries, architect

Figure 2. Layout for a Split System, serving the same house

SUPPLY REGISTERS 2" above baseboard
SUPPLY REGISTERS ..... near ceiling
RETURN GRILLES ..... in baseboard
SUPPLY DUCTS
RETURN DUCTS
VOLUME DAMPERS

Splitter dampers to be located at junction of each supply branch and main duct.

System. Here again, any one of the customary fuels may be employed, and its choice should depend on local prices and service conditions. Obviously, the matter of automatic controls is somewhat more complicated, and calls for specialized technical knowledge.

The supply of domestic hot water may be obtained in this system the year round from the heating boiler through one of the usual coil installations.

Our typical house as designed for a Split System is shown in Figure 2.

The Auxiliary System. The third system might be called by any one of a number of names, and it is young enough to have as yet no generally accepted label. It includes a central boiler for steam or hot water, supplying heat directly to all rooms by means of radiators of any type. An auxiliary unit consisting of a blower, filter, and humidifying element, supplies air (filtered and humidified, and it may be tempered or heated) to certain rooms through the necessary ducts, registers and grilles. In other words, the heating of the house is done independently by direct radiation, while the other essential operations in winter air conditioning are supplied by this auxiliary recirculating system. Obviously, this Auxiliary System can be elaborate, extending ducts to each room, or simple, comprising one or two duct lines.

There is one point in connection with this system that should be kept in mind: in order to achieve humidification, it is necessary to temper, with a steam or hot water coil, both the water to be evaporated and the air which is passed through the humidifying unit.

Domestic hot water supply in the Auxiliary System is usually obtained through a coil attached to, or submerged

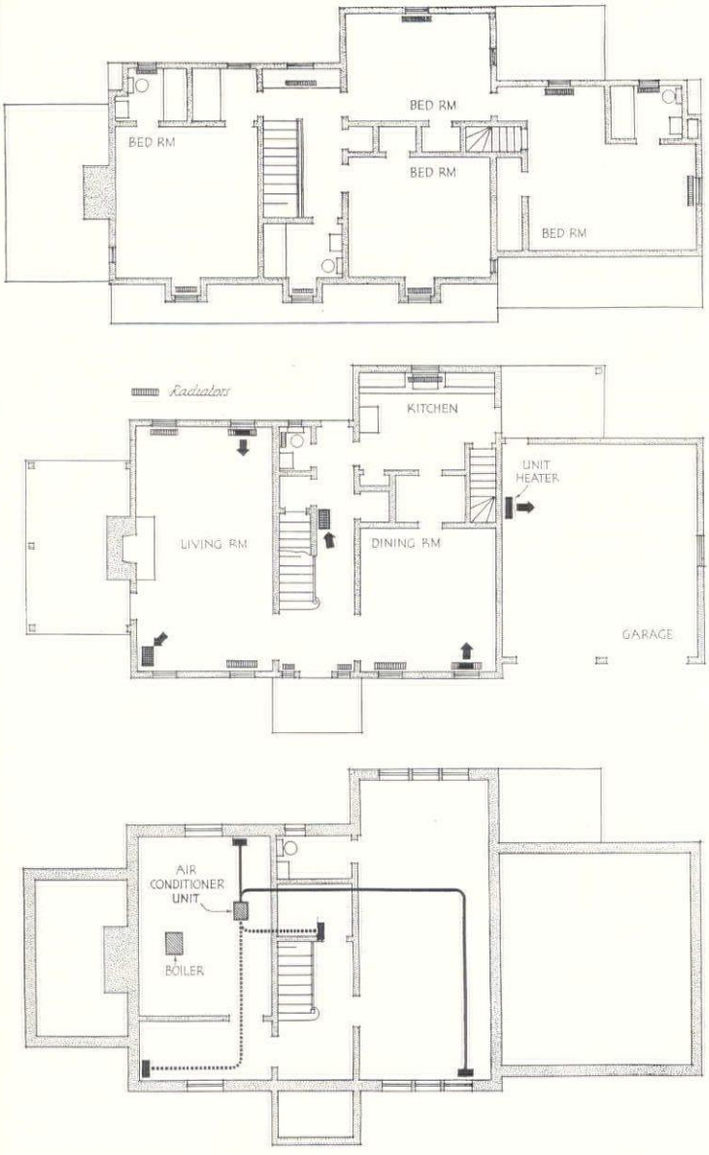


Figure 3. Layout for an Auxiliary System in the same plan as that used for the other two systems

in the steam or hot water boiler as it is in the Split System.

A typical layout of our chosen house plan designed for the use of such a system is shown in Figure 3.

The Unit System is achieved by eliminating the system of ducts and substituting unit conditioners, or humidifying radiators, which usually consist of a convector type radiator, a blower, filter, and evaporator, all in one. This is an improved adaptation of the unit system familiar to the architect in school house heating and ventilating. It is particularly adaptable to existing structures, and can be used in summer air conditioning.

In the above paragraphs, therefore, we have sketched briefly the four available means of achieving winter air conditioning in the home. On the basis of this synopsis, the client, under the architect's guidance, should be able to arrive at a tentative choice.

It is, of course, entirely unnecessary to remind the architect—though there is considerable doubt as to the client's knowledge—of the fact that with winter air conditioning, the tightness and insulation efficiency of the house itself is of paramount importance. In the old days when we were merely supplying warmed air to make our rooms comfortable, we were careless, to say the least, regarding our heat losses. Now, however, that we are doing four things instead of one to this air, for our bodily comfort, it behooves us to keep that air within the prescribed bounds after we have conditioned it. Even with the best insulation it gets away from us at a rapid rate. Insulation, therefore, in walls, roofs, or floors; weather stripping, double glazing, storm windows, and like provisions for maintaining a tight control, are of the utmost importance, both for economic reasons and for the maintenance of bodily comfort.

The fact seems fairly obvious, yet is frequently ignored, that in planning for a winter air conditioning installation, summer conditioning should be considered. It involves at most only a slight additional cost during the planning and design of the work to make easily possible the future installation of a summer conditioning system. In general, there are three requirements to be checked by the architect in this regard: space, water, and power.

THE SYSTEMS IN DETAIL

DIRECT FIRED SYSTEM. Now to a more detailed discussion of each of the three systems, taking up first the Direct Fired System. In the first place, it performs each of the primary functions of air conditioning, and performs these in an easily balanced relationship. Second, the initial cost is usually lower, although there are cases in which the Auxiliary System may be installed more cheaply. Third, operating costs are usually lower, chiefly because there is only a single heat transfer in this system, and therefore, higher thermal efficiency. Again, the maintenance cost is lower, because of the simplicity of the system and the necessity for its comparatively few controls. Another minor advantage is the avoidance of the necessity for draining water out of an extensive system when the house is closed during cold weather.

Together with the amplification of automatic control, there is this further advantage in the Direct Fired System, in that proper balance of the installation to assure even distribution of heat is readily achieved. Provision is readily made for exhausting objectionable odors. One final point: utilization of the blower and the duct system affords an easy means of circulating air through the house in the summer—particularly the cool night air—and this positive circulation of air is one of the four functions of summer air conditioning—a subject beyond the scope of this discussion.

Let us, however, not fail to set down a disadvantage that becomes immediately evident—the necessity of providing domestic hot water supply through an independent heater rather than through a part of the air conditioning plant. As a credit against this disadvantage, there is a marked improvement in the design and manufacture of such independent water heaters. These comparatively new developments are now available for a supply of hot water as efficient and economical as is possible, probably, with any other type of water heating.

In order to point out in still further detail the requirements

of a direct-fired installation and its main provisions, there is appended a suggested specification which is offered, by no means in the belief that it should serve as a text to be copied, but rather as a framework upon which the architect will hang his own more fully developed requirements. The various sections are loosely drawn purposely, since it is expected that the architect will have his own ideas as to the extent to which detailed requirements are to be added.

SPECIFICATIONS FOR WINTER AIR CONDITIONING

DIRECT FIRED SYSTEM

General: It is the intent and purpose of these specifications to cover and include all materials and labor necessary to provide and install a complete system of heating and winter air conditioning. This system is based on maintaining the temperature of 70° F. when outside temperature is 10° above the lowest recorded temperature for this particular locality.

Wherever the term Contractor is used herein, the contractor for air conditioning work is indicated, as distinguished from the General Contractor.

Drawings Nos. —— show and describe the scope and general arrangement of the work contemplated.

In no instance shall there be any deviation from plans or specifications without the written consent of the Architect. Any change requiring additional expenditures must be covered by a written order from the Architect.

Fire Protection: Fire hazard will be guarded against in accordance with all local and fire insurance rules. The insurance carried by the Owner, as provided in the General Conditions of these Specifications, will also protect the Contractor against loss by fire, wind, water, or damage beyond his control.

Testing: When complete, the entire system will be tested in the presence of representatives of the Architect and the Contractor; and all adjustments and changes necessary shall be made by the Contractor to conform to the specifications set forth below.

Air Conditioning Unit: The Contractor shall furnish and erect complete on cellar floor where shown on plans one (1) Air Conditioning Unit with output of ———— Btu, complete with all controls. This unit will include blower, filter, and humidification equipment as furnished by manufacturer (————), and shall be installed strictly in accordance with his instructions. The blower shall be of sufficient capacity and shall operate under the static pressure to satisfactorily deliver the required c.f.m. necessary for correct heating and ventilation. This unit shall be set level and vertical and all points shall be securely packed with the manufacturer's special cement and made tight. The unit shall be made firm and even, and be insulated as to sound from its support.

Water Piping: The Contractor shall furnish and install adequate water line to humidifier and provide in this line a globe valve close to same.

Flue Pipe: The Contractor shall connect the proper outlet on the Air Conditioning Unit into the chimney flue provided and indicated for that purpose. Flue breeching to be constructed of rust-resisting material not lighter than No. 20 gauge.

Thermostat and Controls: The Contractor shall furnish and install a plain (or clock) thermostat and an adequate control system as outlined in paragraphs covering contract proposal for this system.

Electrical Work: The Contractor shall provide all the necessary electrical connections to controls and motors and shall install a snapswitch with pilot light, in the location indicated, to operate the blower in the summer.

Ducts and Risers: Individual supply and return risers shall be run to each room, in an adequate system of main ducts as shown on plans, and of the sizes indicated, the ducts to be constructed of galvanized iron with double-locked parallel seams, installed in a neat manner and air tight. Cover every joint in supply and return trunk lines and branches with a 4″ strip of No. 12 asbestos paper, securely pasted on. All ducts to be suspended from basement ceiling by approved hangers. All bends to be gradual long sweeps and in no way decrease the full area of the ducts.

Provide a positive damper with lock nut in each branch return duct, and adjustable air splits with lock nuts at the junction of each branch in the supply and return ducts.

All risers shall be run as shown on plans and of sizes indicated. Risers to be connected to branch ducts with proper transition fittings. Risers to be constructed of material not lighter than No. 26 gauge galvanized iron. Trunk ducts to be constructed of the following weight material:

4″ to 12″ in width, No. 26 gauge galvanized iron.
13″ to 24″ in width, No. 24 gauge galvanized iron.
25″ to 100″ in width, No. 22 gauge galvanized iron.

Provide vents for exhausting vitiated air as shown on plans.

Canvas Connection: Provide canvas (not lighter than 12-oz.) connection at junction of cold air return duct and fan housing inlet.

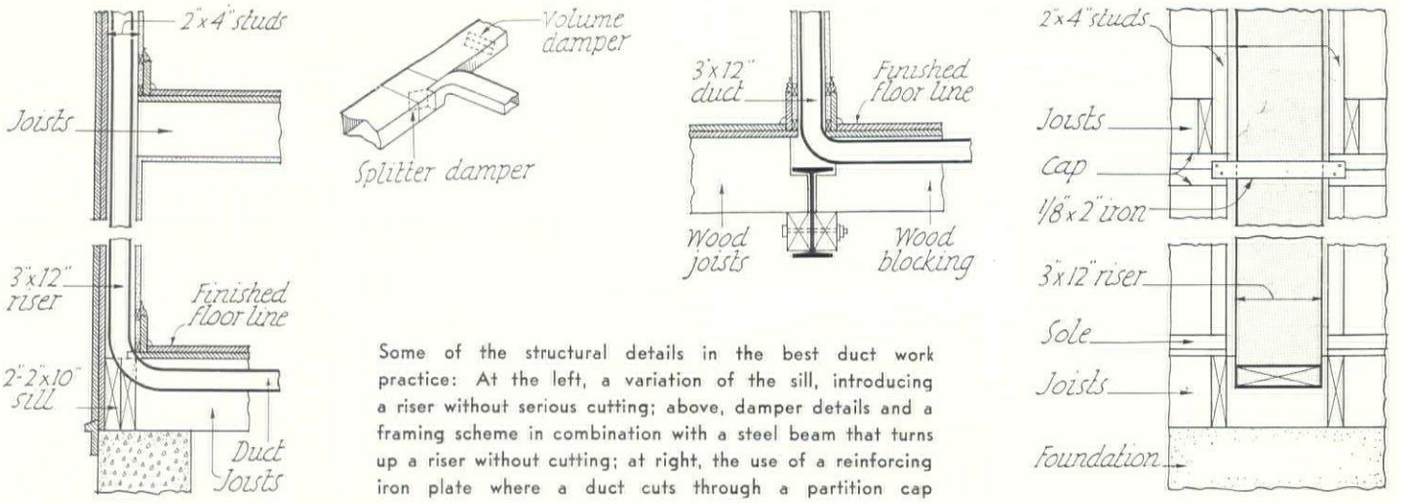
Thermal Insulation: Warm air risers inside of partitions shall be covered with No. 12 asbestos paper, securely pasted on. [Although this provision represents current trade practice, and may even be required specifically by local codes, it does not provide a really satisfactory degree of insulation as measured by advanced engineering standards.] Warm air risers in outside wall to be covered with two-ply air-cell asbestos on exposed sides, securely wired on. Main and branch supply ducts running through garage or unexcavated spaces shall be covered with two layers of two-ply air-cell asbestos, with canvas cover pasted (or sewed) on.

Registers and Grilles: All supply registers shall be of the adjustable damper type, and, unless otherwise noted on drawings, will be located ————[specify]————. All return air grilles to be located in the baseboard. All supply registers and return air grilles shall be of the type and design indicated on the attached schedule. All register and return grilles to be furnished with prime coat only. All return air grilles in bedrooms to be furnished with damper operated from the face.

All sheet metal work visible behind registers and grilles shall be painted with dull black finish.

Cleaning: Before starting basement duct work, the risers and register boxes to all floors shall be thoroughly cleaned.

At the completion of the installation of the entire system the Contractor shall clean the inside of the unit to remove dirt and dust therefrom, so that the heated air will be clean before entering the duct system. Also, all rubbish, unused material or other debris occasioned by this installation shall be removed. The unit is to be protected from damage or



Some of the structural details in the best duct work practice: At the left, a variation of the sill, introducing a riser without serious cutting; above, damper details and a framing scheme in combination with a steel beam that turns up a riser without cutting; at right, the use of a reinforcing iron plate where a duct cuts through a partition cap

stain by the Contractor up to the time of formal acceptance by the Architect.

Work to be Done by Others

Cutting and Patching: The General Contractor shall provide openings and do the patching as required for the installation of this system. The General Contractor will co-operate to the fullest extent in this work in order to facilitate the orderly progress of installation. A suitable reinforcement shall be provided, acceptable to the Architect, wherever the main structure of the house is cut.

Foundation: The General Contractor shall furnish proper foundation for the equipment.

Flue: Under the General Contract there will be furnished a tile flue of size shown to provide proper draft for the heating equipment.

Temporary Heat: Contractor will supply temporary heat if work has progressed sufficiently for the equipment to be operated in the normal manner, fuel costs, as approved by Architect, being paid by Owner.

Final: Nothing herein contained shall be construed as relieving the Contractor from perfecting the work in all its usual details of construction, and it will be his responsibility to furnish and install the necessary material, to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

The Contractor will make all anamometer and temperature tests, setting all dampers and louvers in a locked position after adjustments have been made, to secure satisfactory distribution of air to all parts of premises heated or conditioned.

The Contractor will make good any defects in labor and material furnished by him for this work, which may develop within one year from the completion of this contract, at his expense.

SPLIT SYSTEM. Looking into the merits of the Split System, our second type, it becomes apparent that all four of what we have agreed are the essential functions of winter air conditioning, are not performed by this system to the full extent. Those rooms which are heated by direct radiation do not have a positive circulation of air, nor air cleansing. Humidification is achieved to a larger extent than either of these other functions, but naturally not so fully as with the Direct System. As to costs, the initial investment in a Split System is higher, generally speaking, assuming equal quality, than the Direct Fired System. Moreover, it will be seen that because of the losses in the additional metal of boiler, heat exchanger, pipes and ducts, the thermal efficiency must necessarily be lower than in the Direct Fired System; in the latter there is a minimum of these elements coming between the source of heat and the fully conditioned air.

Among its advantages, the Split System provides for circulation of air in the summer months, and also permits a future installation, without radical structural changes, for summer air conditioning. Nevertheless, it should be noted that these summer functions are performed by the Split System only to the extent to which the system provides for direct air conditioning in winter. In other words, the rooms that are heated by radiators cannot be fully air conditioned either in summer or winter. In the Split System, the rooms from which we desire to exhaust odors may be clarified by local vents or other exhaust methods.

In order to maintain comfortable air conditions in some parts of the house by one means, and in other parts of the house by a different means, a more extensive system of automatic controls becomes necessary. With all of the ingenuity and amazing efficiency of the vast line of automatic controls that apply to our air conditioning problem, obviously the more numerous these become, the more need for servicing must be expected.

There is an advantage of the Split System which should be mentioned, and that is its adaptability to a house formerly heated by radiators and in process of being remodeled. In such a case it is usually the practice to continue the use of radiation for all space above the first floor, removing it from the first-story rooms and replacing it by air conditioning ducts, radiators, grilles as required. This, of course, saves running ducts through existing partitions or furring for them through the first story, since all air ducts reach this lower part of the house through the first floor.

There are occasional conditions under which the designer will almost of necessity choose the Split System: houses of long narrow plan, and houses in which too few partitions carry through both stories, making a workable duct system impracticable.

One of the marked advantages of the Split System, as

has been mentioned, lies in the ready possibility of securing at low cost a domestic hot water supply the year round without supplementary equipment.

In developing a specification to cover the Split System, it may be found helpful to utilize, with the architect's specifications for a radiation heating job, such parts of the specification for the Direct Fired System on page 80 as may apply to the movement, cleansing and humidification of the air.

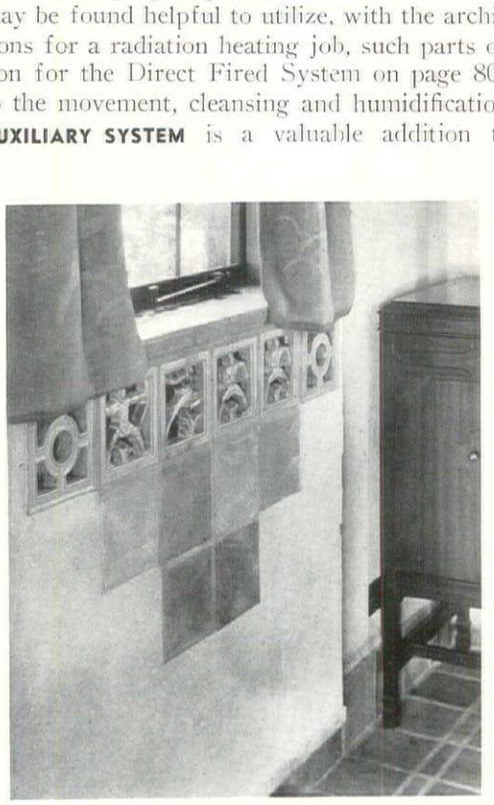
AUXILIARY SYSTEM is a valuable addition to an existing system using radiators, and greatly simplifies remodeling or modernization work, where an extensive system of ducts would be difficult to install. An Auxiliary System is especially well adapted where it is desired to condition only a few rooms.

The Auxiliary System also shows a first cost usually lower than any of the other systems. Maintenance costs should be low, as the system is a simple one. Because of the relatively small air capacity of the auxiliary unit, the system cannot generally be depended upon for a circulation of air in the summer, nor would it normally be possible to introduce more than a very little outside air.

The balancing of this system is an easy one, since by far the largest portion of the heat is distributed by the radiation system.

As in the Split System, provision should be made for exhausting vitiated air from baths, kitchens, etc.

Here again, to specify an Auxiliary System, the architect will find it an easy matter to combine the specifications he writes for a radiation heating system with certain of the provisions given in the Direct Fired System specifications on page 80.

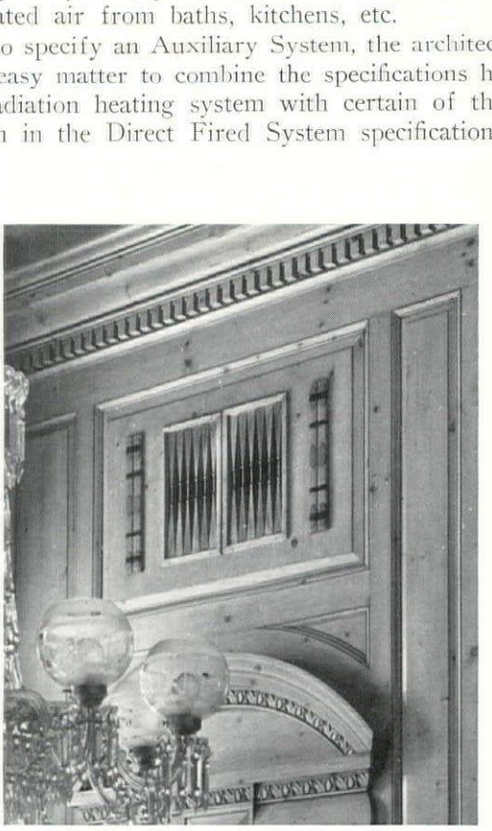


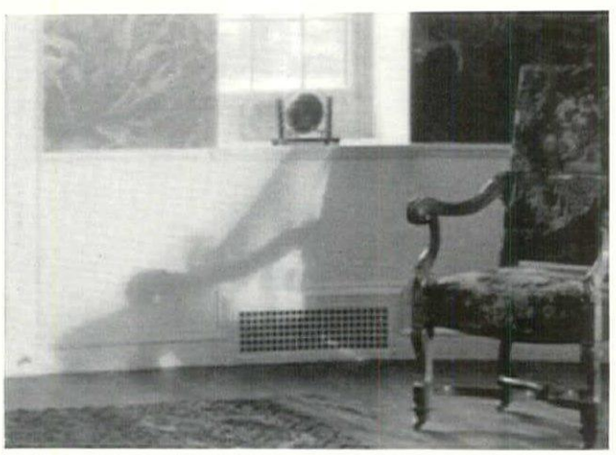
At left, a radiator enclosure as developed by Arthur D. Pickett, architect

At right, a conditioned air duct grille as designed by Delano & Aldrich, architects, for the backgammon room of the Union Club, New York, N. Y.

Below, at left, an unobtrusive cold air return grille

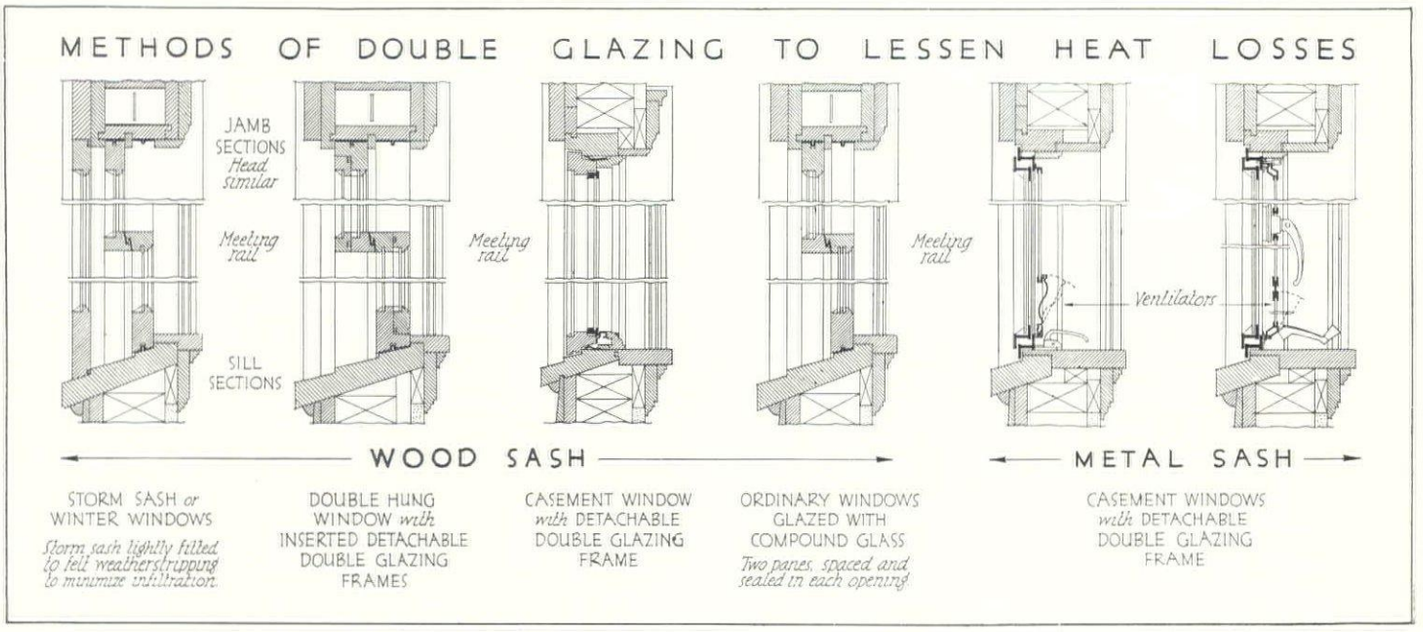
Below, at right, the unit air conditioner in place, as cased for residential use





A FEW TECHNICAL TERMS

Having reviewed in some detail the specific provisions, with the advantages and disadvantages, of each of the systems, there remains the desirability of explaining several commonly used terms in order to avoid any possibility of misunderstanding. These terms are "air changes" and "infiltration." By use of the former term, the air conditioning engineer means the number of times per hour that the air in the enclosed space is reconditioned. When he says "infiltration," he refers to the leakage in and out of doors, windows, chimneys, and other openings, due generally to outside weather conditions—including, usually, bedroom windows



open at night. It is considered good practice in winter air conditioning, to provide a blower of sufficient capacity to furnish three to six air changes per hour. In summer air conditioning this rate has to be increased—just how much is again beyond the scope of this article. "Infiltration" occurs at all times during the heating season in varying degrees, influenced by outside weather conditions, and it comes as a surprise to many to realize that in the average house this leakage is of sufficient extent to provide a complete change of air in the house at intervals of from thirty minutes to say, two hours. Because of the extent of this infiltration, it is usually unnecessary to provide any mechanical means of admitting outside air through the conditioning unit, easy though this will be if conditions require it.

Balancing

Even though a dozen heating engineers were to figure the heating requirements of a house, and were to average their findings to provide what might be thought an ideal balance, the result is always sure to provide more heat than is wanted in one place, and less than is wanted in another. This calls for a process known as "balancing," which can be fully achieved only after the house has been built, furnished, and occupied. In a properly designed system there will be adequate provision for balancing by easily adjustable deflecting fins inside the ducts or at the registers. By setting these to one side or the other, the heat can be divided as desired, within reasonable limits, between a branch and the main stream. It is assuredly the part of wisdom for the architect to place the full responsibility for this balancing process upon the heating contractor, and thus indirectly upon the manufacturer of the equipment.

Duct Work

Speaking of ducts and their construction, where climatic or economic factors so indicate, the ducts, instead of being made of the usual galvanized iron of several gauges, can be made of one of the long-lived special metals. One thing cannot be too strongly emphasized: a duct should provide as nearly as possible frictionless and air-tight means of conveying air under pressure. There are builders who will utilize the space between studs, the space between floor joists, or even chases in a brick wall for conducting conditioned air. Obviously, such practice entails heat losses and difficulty in travel that cannot be countenanced. It would be well, also, for the architect to avoid the necessity for a layout in which the main supply for the second story runs to the attic, with branches feeding down into the various rooms. If the layout is made, as it should be, before actual construction begins, some revision of the framing can nearly always be made to avoid this so-called "down feed."

POSSIBILITIES IN REMODELING

Throughout the foregoing, we have been considering the means available for providing air that is more or less fully conditioned in accordance with our stated criteria—heating, humidification, cleansing, and controlled motion. In the case of a house that is already built and efficiently heated, the owner may ask, "What can be done to improve the existing conditions? Is it possible to add any or all of the other three functions to the mere heating—without, of course, tearing out the present equipment and replacing it?"

If the present heating is by a gravity warm air system, adding humidification to an appreciable degree is readily accomplished. Cleaning the air involves a more extensive alteration, since the introduction of a filter unit involves the use of a blower, and if this latter element is powerful enough, controlled air motion is attained, but only to the degree to which the existing ducts are adequate in size and distribution.

If the present heating is by steam or vapor, humidification is readily added, either by using a pan radiator to vaporize water, under the control of a humidistat; or by the fine spray type of humidifier. Air motion and air cleansing, in this set of circumstances, are not practicable without recourse to an Auxiliary or Split System.

In the case of hot water heat, humidification by pan evaporation becomes more difficult, though not impossible. Air cleansing and air motion are out of the picture, unless one is prepared to carry through, by the necessary additions, the Auxiliary System or Split System explained previously.

AMERICAN ARCHITECT
TIME-SAVER STANDARDS

Serial No. 57
SEPTEMBER 1936

HEATING and AIR CONDITIONING LOADS—1

PURPOSE

This is the first of three related Time-Saver Standards devoted to correct methods of calculating heating and air conditioning loads in buildings. It is concerned with the first step in a complete computation: the determination of winter heat losses from individual rooms. The second sheet embraces determination of summer heat gain in individual rooms, and the third summarizes these data to determine total loads which in turn govern the selection of equipment units of correct capacity. Reference is also made in these sheets to T-S.S. Serial No. 52 "Domestic Hot Water Requirements" (July 1936), and the accompanying sheet "Air Conditioning—Basic Design Data."

The method used in the following rules is based upon sound engineering practice and should produce accurate results. However, both heating and air conditioning practices involve many considerations not reducible to rules and tables. Experience is essential to success. Competent engineering counsel should be employed in all projects. These rules should be used only for preliminary design purposes when the architect must work out for himself problems which affect the general scheme of his building. The work sheet forms indicated herein (which are available in sets for general office use) may also be effectively employed as standard forms for receiving competitive bids where manufacturers make their own load calculations.

DATA REQUIRED

The following information is required for estimating heating and winter air conditioning loads:

(1) Areas and exposure of all walls, floor, ceiling or roof and glass and door areas between heated and unheated space, and volume in cubic feet, room by room. Take from drawings or direct measurement of the building.

(2) Coefficient of thermal transmission (U) of each type of wall, floor, ceiling or roof construction and of all glass areas and doors. See Time-Saver Standards (to be published) on Thermal Insulation of Buildings or A.S.H.V.E. Guide.

(3) Infiltration of air in cubic feet through crackage of doors and windows and quantity of air (if any) added to infiltration for ventilation purposes. Determine from Tables 2 or 3 as stated in Rule 3.

(4) Desired indoor temperature and relative humidity during heating season. Normal temperature 70F; baths 75F; kitchens, gymnasiums 65-68F. Relative humidity should range from 35 to 45% for comfort without excessive condensation on windows.

(5) Prevailing outside air conditions, including design outside temperature wind direction and velocity in winter, and amount of water to be added to inside air for humidification. All these data can be obtained, for principal cities in the U. S., from T-S.S. "Air Conditioning—Basic Design Data."

WORK SHEETS

All calculations should be clearly recorded for reference and checking. Many required for determining winter loads are used again for estimating summer loads. Any form of record may be used but the accompanying standard forms taken from American Architect Time-Saver Work Sheets are recommended as a guide. For convenience, all rules refer to these forms by number, column and line.

PROCEDURE

For each room to be heated or winter air conditioned, make the calculations embraced in the following rules, recording them separately on forms similar to the one shown herein. (Form No. 1):

Rule 1. To find the maximum winter heat loss through walls, floors, roof, etc.:

1. Multiply the net area of each surface by its coefficient of heat transmission (Column II x Column III). The product is the heat transfer in Btu per hour per degree F for each area (Column IV or Col. VI).

2. Find in Table 1 the allowance to be added for wind and exposure for all outside surfaces. Apply this percentage to the item in Column IV, lines A to F inclusive and enter both percentage and amount in Column V. The sum of Columns IV and V is then entered in Column VI, which gives the total Btu per hour per degree F.

3. Multiply this by the design temperature difference in degrees F. For surfaces exposed to the outside, this design temperature difference (Column VII) is the difference between the desired indoor temperature and the outdoor design temperature. Where surfaces separate heated space from unheated space, such as basement or attic, it is customary to use half this temperature difference where the actual temperature of adjacent cold space is not known. Where floors are on the ground, the temperature difference may range from 5F to 25F. Multiply the total Btu per hour per degree F in Column VI by the design temperature difference in Column VII, and enter the total in Column VIII. This is the total maximum Btu per hour required to offset heat losses through these surfaces.

Rule 2. To find the maximum winter heat loss through glass areas:

1. Multiply the gross area of all windows by the coefficient of heat transmission 1.13 for single glazing or .56 for double glazing to arrive at the loss through glass in Btu per hour per degree F. The areas are entered in Column II, the coefficient U in Column III, and the product in Column IV (or Col. VI).

2. Add the proper allowance for wind exposure where required, and complete the computation, as in Rule 1.

Exposure allowances referred to in the preceding rules are based on experience and recognize two factors: Orientation and wind velocity. While some authorities neglect exposure allowances entirely, others believe their omission fails to recognize the extra heating burden carried by rooms having severe exposures; hence they are included in this procedure. The recommended allowances are shown in the following table:

TABLE 1

Orientation	Walls Not Exposed to Prevailing Winds	Walls Exposed to Prevailing Winds
North	5%	15%
East	0%	10%
South	0%	10%
West	0%	10%

Rule 3. To find the maximum winter heat load due to infiltration and ventilation:

1. Short Method: Select from Table 2 (Col. IV) the average air changes per hour for the given room and multiply the volume of the room in cubic feet by the selected number of air changes. This gives the total infiltration in cubic feet per hour. Compare with local code requirements and if inadequate for proper ventilation provide for a supplemental supply of outside air, and increase the total cubic feet of air to the required amount.

2. Accurate Method: Determine from Table 3 the cubic feet of air entering around doors and windows per lineal foot of crack. First select prevailing wind velocity. Measure lineal feet of crack as follows: For double hung windows, take perimeter, plus length of meeting rail. For casements and pivoted windows take aggregate perimeter of all movable or ventilating sections.

To allow for exfiltration on leeward side determine total effective crackage as follows: In a room having one exposed wall take all the crack. With two exposed walls use the wall having the most crack. With three or four exposed walls, take the wall having the most crack but in no case use less than half the total crack.

3. In either method, enter the total infiltration and ventilation air volume in cubic feet per hour in Column II, line L.

4. Multiply the volume of air to be heated from Column II, line L by the factor .018 (in Column III) and enter the product in Column VI. The total thus entered is the heat required to warm the entering air in Btu per hour per degree F.

5. Multiply this total by the design temperature difference (Column VI x Column VII) to find the hourly heat load due to outside air, which should be entered in Column VIII.

Total Heating Load is the sum of the loads in Column VIII. It represents the maximum Btu required per hour to offset maximum heat losses and is the basis upon which radiation or duct and register sizes are computed. These steps, however, are covered in the third sheet in this series, where all room loads are summarized and totaled.

Winter Air Conditioning Loads, including humidification, air motion and air cleaning, are determined for the building as a whole, and therefore are discussed in sheet III of this series.

AMERICAN ARCHITECT
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HEATING and AIR CONDITIONING LOADS—1

Serial No. 57
SEPTEMBER 1936

FORM NO. 1 INDIVIDUAL ROOM DATA - WINTER CONDITIONS

Project _____ Location _____ Date _____

Outside Design Temperature _____ F Inside Design Temperature _____ F

Outside Design Relative Humidity _____ % Inside Design Relative Humidity _____ %

Prevailing Winds: Direction _____ Velocity _____ m.p.h. Computations made by _____

NOTES _____

Line	Exposure	I ITEM	II Areas, sq. ft. / Volumes, cu. ft. per hr.	III Coefficients U; & Factors	IV Btu. per hour per degree F (net)	V Add for Wind and Exposure %	V Add for Wind and Exposure Amount	VI Total Btu per hour per degree F	VII Design Temp. Diff.	VIII Total Btu per hour (max. load)
		ROOM No. _____ Floor _____ Dimensions _____ x _____ Ceiling Height _____ Volume _____ cu. ft.								
		Room Name _____ No. Air Changes Due to Infiltration _____ Other Air Supplied _____ cu. ft. per hr.								
A		Exposed Wall sq. ft.								
B		Exposed Glass sq. ft.								
C		Exposed Doors sq. ft.								
D		Exposed Wall sq. ft.								
E		Exposed Glass sq. ft.								
F		Exposed Doors sq. ft.								
G		Cold Wall or Partition sq. ft.								
H		Cold Wall or Partition sq. ft.								
I		Glass & Skylights, no wind exp. sq. ft.								
J		Cold Ceiling or Roof sq. ft.								
K		Cold Floor sq. ft.								
L		Infiltration & Air Supply cu. ft. /hr.		.018						
M		TOTALS								

WINDOWS, SKYLIGHTS AND DOORS

Exposed No.	Exposed Size	Exposed Area	Exposed No.	Exposed Size	Exposed Area	Not Exposed No.	Not Exposed Size	Not Exposed Area

TABLE 2. AIR CHANGES AND MOTION RECOMMENDED FOR WINTER AIR CONDITIONING

	Volume per person per minute		Air changes per hour	
	Cu. ft. of air per person per minute from outside	Total cu. ft. of air circulated per person per minute	Recommended number of air circulations per hour	Natural* air changes normally due to infiltration
	Column I	Column II	Column III	Column IV
Residences, general	10	30	3 to 4	1 to 2
Rooms, 1 side exposed				1
Rooms, 2 sides exposed				1½
Rooms, 3 or 4 sides exposed				2
Rooms, no windows or out-side doors				½ to ¾
Entrance Halls				2 to 3
Living Rooms	10	30	3 to 4	1 to 2
Dining Rooms	10	30	6 to 8	1 to 2
Bathrooms				2
Kitchens			30 to 60	
Offices	10			2 to 3
Stores	8 to 10	30	4 to 6	2 to 4
Assemblies	8	30	5 to 7-	

*Note: Values based on average conditions exclusive of air provided for ventilating

TABLE 3. INFILTRATION THROUGH CRACKS AROUND WINDOWS AND DOORS*

Type of window	Condition	Cubic feet per foot of crack for various velocities in miles per hours: 5	10	15	20	25	30
Double Hung	Average window, not weatherstripped	6.6	21.4	39.3	59.3	80.0	103.7
Wood Sash	Average window, weatherstripped	4.3	15.5	23.6	35.5	48.6	63.4
Windows (unlocked)	Poorly fitted window, not weatherstripped	26.9	69.0	110.5	153.9	199.2	249.4
	Poorly fitted window, weatherstripped	5.9	18.9	34.1	51.4	70.5	91.5
Double Hung	Not weatherstripped, unlocked	20	47	74	104	137	170
Metal Windows	Weatherstripped, unlocked	6	19	32	46	60	76
Steel Sash	Residential casement, average	14	32	52	76	100	128
Windows	Heavy Casement sections, average	8	24	38	54	72	92
	Architectural projected	20	52	88	116	152	182
	Hollow metal, vertically pivoted	30	88	145	186	221	242

Adapted from A.S.H.V.E. Guide 1936

*Leakage around doors may be assumed as double the values given for window of similar character and fitting

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HEATING and AIR CONDITIONING LOADS—2

PURPOSE

This is the second of three related Time-Saver Standards devoted to correct methods of calculating heating and air conditioning loads in buildings. This sheet relates to the determination of summer heat gain in individual rooms as the preliminary step in calculating cooling and dehumidification loads. Much of the basic information needed here is also required for the first sheet on determination of winter heat losses from individual rooms, to which reference should be made.

The third of these Standards summarizes the individual room data from this and the foregoing sheet to determine total loads. Reference is also made in this work to the accompanying T-S.S. "Air Conditioning—Basic Design Data."

DATA REQUIRED

The data required for determining summer cooling loads—and the required capacity of equipment—include:

(1) Areas of all outside walls and roof; areas of all floors, partitions and ceilings separating space to be cooled from warmer parts of the building and areas of outside doors. These should be entered in Form 2 as indicated.

(2) Area of all windows, skylights and glass in doors as a total. This should be entered on line E. Also measure separately the area of all glass exposed to the east, south and west, and all flat skylights, and enter on lines R, S, T and U. By flat skylights are meant all skylights receiving direct sunlight; only sloping skylights facing the north should be omitted from sun load calculations, and even these should be included in the gross area of glass shown on line E.

(3) Infiltration and air supply. Determine quantity of outside air as described in Rule 3 in the first sheet of this series, using summer conditions when fixing ventilation requirements.

(4) Number of occupants normally in the room when cooling plant is operated.

(5) Heat producing apparatus including wattage of lights (line L), horsepower of electric motors (line M) and such items as stoves, ranges, steam tables, etc., as listed in Table 4.

(6) Moisture to be removed from the air, part of which is due to excessive outdoor relative humidity and part of the moisture given off by occupants. See Rule 9.

(7) Coefficients of heat transmission *U* as in Form 1.

(8) Design temperature difference, which is the maximum outdoor design temperature (see T-S.S. "Air Conditioning—Basic Design Data") less the desired indoor temperature (Table 5). However, this difference should never exceed 15 F and rarely should exceed 10 F unless occupants remain in the cooled space several hours at a time, except as follows:

Walls and roofs exposed to sun develop higher temperatures than the air because of their absorption of solar heat. Therefore, the normal design temperature difference should be increased according to the construction: frame and masonry walls under 8" thick, exposed to sun, add 25 F; roofs of frame or light masonry, add 60 F; roofs of heavy construction add 40 F. Where heavy masonry walls are in full shade deduct 5 F. If uncooled and ventilated space intervenes between ceiling and roof, the normal temperature difference need not be increased; but if this space is not ventilated at least 20 F should be added to the normal design temperature difference.

With these data entered as indicated in Form 2 or its equivalent for each room under consideration, proceed as follows:

Rule 4. To find the summer cooling load due to walls, ceilings, floors, doors and all glass areas (See Form 2, lines A, B, C, D, E, G, H and I):

Multiply the areas in square feet (Col. II) by the coefficients of heat transmission (Col. III; also identical with those used in Form 1, Col. III) to get the Btu per hour per degree F (Col. IV). Multiply these products by the selected design temperature differences (Col. V) and enter the results as total heat to be removed in Btu per hour in Col. VI.

The Sun Load Through Glass must be clearly distinguished from the normal heat transfer through glass from the air on one side to the air on the other.

Since the sun effect is only on one wall at a time, or is at an extreme angle of incidence if it strikes two walls at a time, the maximum solar heat load on glass is taken as the greatest load on any one wall exposure plus the whole load on flat skylights.

Rule 5. To find additional sun load through windows, skylights and glass in doors receiving direct sunlight:

1. Enter in Form 2, lines R, S, T and U, the sizes and total area of glass according to its orientation as indicated. Multiply by the factors 140 for east, 100 for south, 150 for west and 200 for flat skylights, as shown on this form. In the extreme south decrease south exposure factor to 75; in extreme north increase to 120. In localities where the sun is frequently clouded on extremely warm humid days these factors may be reduced. The product is the gross heat load in Btu per hour due to solar heat entering through glass in bright sunlight.

2. Select from Table 6 the proper percentage allowances for shade cast by trees or buildings or for the use of awnings, shades or curtains. Enter as indicated on Form 2, compute the allowances and deduct from the gross Btu per hour to find the net sun load in Btu per hour. The total of the skylight load and the greatest load on any one exposure as shown in the last column should be entered on line "v" and carried to line F in Column VI.

Summer Infiltration is computed as for winter infiltration (see Rule 3 on sheet 1 of this series) except that the number of air changes due to ventilation may vary in some cases. Refer to Table 2 or 3 on sheet 1 for calculation data. Enter the total cubic feet per hour on Form 2, Col. II, line J, and proceed as follows:

Rule 6. To find amount of sensible heat to be removed from air introduced by infiltration and/or ventilation:

Multiply the volume of air in cubic feet (Col. II) by .018 and enter the product in Col. IV. Multiply this product by the design temperature difference (Col. V) and enter the total heat to be removed due to outside air in Col. VI.

Heat Introduced by Occupants must be included in the majority of projects. This heat takes two forms, sensible heat which is recognized here, and latent heat, considered later.

Rule 7. To find the heat to be removed due to body heat of occupants:

Multiply the number of occupants by 250 (Cols. II and III) and enter the product as Btu to be removed in Col. VI.

Heat Produced by Lights, Motors and Apparatus may be readily calculated from the data given in Table 4.

Rule 8. To find the heat emitted by lights, motors and other equipment:

Find the heat emitted in Btu per hour in Table 4; enter the units in Col. II and the factor in Col. III and the product of these two in Col. VI. This product is the total Btu per hour to be removed. Factors for lights in watts and motors in horsepower input are included in Form 2.

The Total Sensible Heat found by adding lines A to N inclusive in Col. VI is the amount of heat to be removed from the air in a room without reducing its relative humidity.

The Refrigeration Load, upon which the size of equipment is based, is the sensible heat load plus the latent heat load. The latter is the dehumidification load for it represents the capacity required to remove excessive moisture from the air. This is determined in the following manner:

Rule 9. To find the amount of moisture to be removed from the air (dehumidification):

1. Find in T-S.S. "Air Conditioning—Basic Design Data" for the locality the maximum number of grains of moisture to be removed per cubic foot of outside air. Multiply by the number of cubic feet per hour introduced by infiltration and air supply (Form 2, Col. II, line J) to find the number of grains of moisture to be removed from the air before allowing for occupants.

2. To this total add the moisture evaporated from occupants which is found by multiplying the number of occupants by 1000.

3. The sum of these two products is the total grains of moisture to be removed per hour. This should be entered in Form 2, Col. II, line P.

Rule 10. To find the latent heat to be removed by refrigeration:

Multiply the total number of grains of moisture to be removed per hour (as found in Rule 9 and entered in Form 2, 2, Col. II, line P) by .151. Enter the product as the latent heat to be removed in Btu in Col. VI, line P.

Where the adsorption method of dehumidifying is employed the significant factors are basically the same as those found above but are modified by the operation of the particular equipment selected.

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HEATING and AIR CONDITIONING LOADS—2

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FORM NO. 2 INDIVIDUAL ROOM DATA - SUMMER CONDITIONS

Line	Exposure	I ITEM	II Areas, Volumes Grains Moisture Occupants etc. as indicated	III Coefficients of Transmission U and Factors	IV Btu per hour per degree F	V Design Temperature Difference	VI Total Heat to be Removed - in Btu. per hour
		ROOM No._____ Floor_____ Dimensions_____x_____ Ceiling Height_____ Volume_____cu. ft. Room Name_____ No. Air Changes Due to Infiltration_____ Other Air Supplied_____cu. ft. per hr.					
A		Wall Exposed to Sun sq. ft.					
B		Wall Exposed to Sun sq. ft.					
C		Wall Exposed to Sun sq. ft.					
D		North Wall or Warm Partition sq. ft.					
E		Glass, Total Area sq. ft.					
F		Sun Load Through Glass Btu /hr.	(Compute as indicated below and enter max. load here)→				
G		Outside Doors sq. ft.					
H		Warm Floors sq. ft.					
I		Warm Ceiling or Roof sq. ft.					
J		Infiltration & Air Supply cu. ft. / hr.		.018			
K		Occupants Number		250.0			
L		Electric Lights Watts		3.415			
M		Electric Motors Input in H P		2546.0			
N		Other Heat Emitting Apparatus					
O		TOTAL SENSIBLE HEAT per hour					
P		Moisture to be Removed Grains per hr.		.151			
Q		TOTAL, INCLUDING LATENT HEAT					

TO FIND SUN LOAD ON WINDOWS, SKYLIGHTS AND GLASS IN DOORS

	Exposure	No.	Size	No.	Size	Total Area	Btu /sq. ft.	Gross Btu /hr.	Allowance for Shade %	Allowance for Shade Amount	Net Sun Load Btu /hr.
R	East						140				
S	South						100				
T	West						150				
U	Flat Skylights						200				
V	MAXIMUM SOLAR LOAD through glass = the sum of any flat Skylight load and the greatest net load on any 1 wall =										

TABLE 4. HEAT EMISSION IN BTU OF TYPICAL MECHANICAL EQUIPMENT

ELECTRIC EQUIPMENT

Electric lights and appliances	3.415 per watt hour
Electric motors	2,546 per H.P. hour input
Electric ranges - small burner	3,412 per hour
- medium burner	4,100 per hour
- large burner	7,700 per hour
- oven	10,236 per hour
- appliance connection	2,250 per hour
- warming compartment	1,023 per hour

GAS EQUIPMENT

Gas ranges - giant burner	12,000 per hour
- medium burner	9,000 per hour
- oven, per cu. ft. of space	1,000 per hour
- pilot	250 per hour
Natural gas-fired devices, generally	1,000 per cu. ft. gas
Manufactured gas-fired devices, generally	500 per cu. ft. gas

Note: Hoods over ranges, steam tables and other kitchen apparatus will reduce their heat emission to the room by 70 to 80%

TABLE 5. RECOMMENDED INDOOR AIR CONDITIONS FOR SUMMER

Outdoor Temp. (Deg. Fahr.)	Indoor Air Conditions with Dew-Point Constant at 57 F				
I Dry-bulb Temp.	II Dry-bulb Temp.	III Wet-bulb Temp.	IV Relative Humidity %	V Grains of Moisture per cu. ft. of Air	VI Effective Temp.
95	80.0	65.0	44	4.87	73
90	78.0	64.5	47	4.88	72
85	76.5	64.0	50	4.95	71
80	75.0	63.5	53	5.01	70

TABLE 6. DEDUCTIONS FOR SHADE ON GLASS
In Percent of Gross Calculated Sun Load Through Glass

Outside light colored Venetian blinds	90%
Awnings shading whole window	75%
Inside light colored opaque shades or Venetian blinds	40%
Inside draperies and curtains	10% to 30%
Tree shade, heavy	80% to 100%
Tree shade, light	40% to 80%
Windows in constant shade of building	100%

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Serial No. 59

SEPTEMBER 1936

HEATING and AIR CONDITIONING LOADS—3

PURPOSE

This is the third of three related Time-Saver Standards devoted to the correct determination of heating and air conditioning loads in buildings. This sheet cannot be used without first making the individual room calculations for winter or summer conditions (or both) as presented on the first two sheets. Here total loads are determined, as well as other data needed as a basis for selecting equipment units of proper capacity.

PROCEDURE

Enter on Form 3 or an equivalent tabulation the individual room loads (winter loss and summer gain in Btu). Enter identifying room names or numbers in Col. I, the maximum winter load in Btu per hour (total of Col. VIII in Form 1) in Col. II, and the cubic feet of air supplied per hour (from Form 1, Col. II, line L) in Col. VII. If summer air conditioning is involved enter in Col. VIII the maximum sensible heat load in Btu per hour (from Form 2, Col. VI, line 0); in Col. XII enter the total cooling load, including latent heat, (from Form 2, Col. VI, line Q); and in Col. XIII enter the number of grains of water to be removed per hour (from Form 2, Col. II, line P).

Add up the totals of these columns in Form 3 to get total loads. The remaining columns in this form are chiefly of value in determining the distribution of radiation or the sizing and layout of supply and return ducts and grilles.

SELECTION OF EQUIPMENT

The accompanying summary Tables show how the basic information gathered in Form 3 may be translated to determine required capacity of boiler, automatic oil furnace, mechanical refrigeration machines, fans or blowers, humidifiers, dehumidifiers and filters or air washers. The use of these supplementary forms is self-evident, except for the operations covered by the following rules.

Rule 11. To find Equivalent Direct Radiation (EDR) divide the heat load in Btu by 240 for steam or by 150 for hot water radiation systems.

Warm Air Furnaces are usually rated in Btu, but where used for mechanical warm air heating this rating is affected by the volume of air to be heated in cubic feet per minute. This must be determined by completing the data called for in Columns III, IV and V of Form 3, which are also used to find required fan or blower capacities.

Rule 12. To find the capacity in cubic feet per minute required in a warm air furnace:

(1) Choose register temperatures from Table 7, preferably between 130 and 140 F, and enter in Column III, Form 3. Enter the corresponding factor in Column IV.

(2) Multiply the data in Column III by the factors in Column IV. This shows the cubic feet per minute required for mechanical warm air heating of individual rooms, the total being entered in Column V. The total of this column gives the total cubic feet per minute to be handled by the furnace.

TABLE 7—FACTORS USED IN FINDING AIR CIRCULATION

In Cu. Ft. Per Min. for Different Air Temperatures at Inlet Register Openings in Rooms

For Winter Heating Return Air Temp. 65° F.		For Summer Cooling Factors for Different Inside Temperatures		
Inlet Air Temp. °F.	Factor	Inlet Air Temp. °F.	75° F.	80° F.
100	.0265	60	.0618	.0463
105	.0231	62	.0713	.0515
110	.0206	64	.0843	.0579
115	.0185	66	.1030	.0662
120	.0168	68	.1324	.0773
125	.0155	70	.1854	.0927
130	.0143	72	.3090	.1159
135	.0132	74	.9270	.1545
140	.0123	76	....	.2317
145	.0116	..	....	....
150	.0109	..	....	....

Humidification Equipment is rated in terms of the maximum quantity of water evaporated per hour, but the tax this equipment adds to the boiler or furnace load must also be determined.

Rule 13. To find the maximum quantity of water required per hour for humidification:

1. Enter on Form 3, Col. VII the total volume of air in cubic feet per hour to be introduced into each room, taken from Form 1, Col. II, line L, and find the total air introduced by adding this column.

2. Multiply this total by the number of grains of moisture to be added per hour from Table 5, Col. II. This gives the quantity of water in grains required under maximum load. To convert to gallons, divide by 58,100 (based on 7000 grains per pound, 8.3 lbs. per gallon).

Heat required to evaporate this water must be computed as part of the heating load, whether the heat is applied to the air or to the water. Proceed as follows:

Rule 14. To find the maximum heat load due to humidification:

Multiply the maximum grains of moisture required per hour (from Rule 13) by the factor .153. This gives the heating load in Btu per hour and should be added in calculating boiler or furnace size on the reverse of Form 3.

Fan or Blower Capacities should actually be determined after

FORM NO. 3 TOTAL LOADS, WINTER AND SUMMER CONDITIONS

		WINTER CONDITIONS						SUMMER CONDITIONS					
I		II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Room No.	Room Name	Max. Btu/hr Form 1. Col. VIII	Register Temp. Table 9	Factor Table 9	Cu. ft. Air Circulated per min. Col. II × Col. IV	Total Btu per hr. per degree F Form 1. Col. VI	Cu. ft. Air Supply per hour Form 1. Col. II Line L	Max. Btu/hr. Sensible Heat Form 2. Col. VI Line O	Minimum Register Temp. Table 9	Factor Table 9	Cu. ft. Air Circulated per min. Col. VIII × Col. X	Total Btu/hr. including Latent Heat Form 2. Col. VI Line Q	Max. Grains Water Removed per hr. Form 2. Col. II Line P
TOTALS *See Reverse Side*													

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the duct system has been designed. The following rule gives an acceptable short-cut method:

Rule 15. To find approximate fan or blower capacity required for winter and summer air circulation:

1. For winter air circulation follow the procedure described under "Warm Air Furnaces" using Form 3, Cols. II, III, IV and V and the data in Table 7. The total cubic feet of air per minute thus found not only represents the volume to be handled by a warm air furnace but also is the volume to be handled by the fan or blower before allowing for duct losses. Add 15% for duct losses.

2. For summer air circulation, first enter on Form 3 in Col. VIII the maximum Btu per hour of sensible heat (Form 2, Col. VI, line 0) for each room. In Column IX and X enter the desired register temperature and its appropriate factor from Table 7. Multiply the items in Col. VIII by the factors in Col. X and enter the products in Col. XI as cubic feet of air circulated per minute. Add 15% to total of Col. XI to find fan or blower capacity required in summer.

3. Select blowers or fans rated at the total cubic feet per minute (cfm) thus found for winter or summer conditions, when operating against an assumed static head of ¼" to ½" of water unless the actual static head is known.

Note that where summer requirements exceed winter requirements it may be advisable to choose the fan on the basis of the maximum load and operate it at lower speeds in the winter. This may be done by changing pulley ratios or by using a variable or multi-speed motor.

BOILER, Steam, Vapor, Hot Water

(1) Total Room Load, Btu /hr (Form 3. Col. II) _____

(2) Humidification Load, Btu (See Humidifier) _____

(3) Piping Load, 15% insulated - 60% bare of Item (1) _____

(4) Pick-up Load, 25% - 50% of Items (1) and (2) _____

(5) Domestic Hot Water Load (Gals. per hr. x 1000) _____

(6) Total Boiler Capacity in Btu _____

(7) E D R (Divide [6] by 240 for steam, 150 for water) _____

Boiler Selected _____

Humidification load, line 2, is maximum Btu per hr. found in Humidifier calculation, line 4. Piping load varies with length of distribution lines and use of insulation on pipes. Pick-up load minimum for automatic and large heating plants; maximum for intermittently operated boilers, as in churches, schools. For domestic hot water load, see T-S.S.Q4.1.1 "Domestic Hot Water Requirements"

FURNACE, Mechanical Warm Air

(1) Total Room Load, Btu (Form 3. Col. II) _____

(2) Humidification Load, Btu (See Humidifier) _____

(3) Piping Load, 10% - 15% of Item (1) _____

(4) Domestic Hot Water Load, if any _____

(5) Furnace Capacity in Btu _____

(6) C.F.M. Air Required (Form 3. Col. V) _____

Furnace Selected _____

Data from same sources as for boilers. C.F.M. air required governs furnace casing capacity. It also applies to heat transfer units.

HUMIDIFIER, including Heat Load

(1) Cubic ft. Air per hr. (Form 3, Col. VII) _____

(2) Max. Grains Moisture to be added per cu. ft.* _____

(3) Total Max. Grains Moisture per hr. (Item 1 x Item 2) _____

(4) Maximum Btu per Hour (Item 3 x .153) _____

(5) Average Btu per hour (50% of Item 4) _____

(6) Ave. Btu per season (Item 5 x days in season x 24) _____

(7) Max. Capacity in Gals. per hr. (Item 3 ÷ 58,100) _____

Humidifier Selected _____

* See T-S.S."Air Conditioning - Basic Design Data"

Humidifier capacity in grains of moisture per hr. is shown in line 3 and in gallons per hr. in line 7. This total may be applied to a single central unit or proportioned according to the volume of space to be conditioned by each one of several unit humidifiers. Maximum Btu per hr., line 4, is required to determine boiler or furnace size. Average Btu per hr., line 6, is required in computing fuel consumption.

FAN or BLOWER

(1) Winter C F M (Form 3 Col. V plus 15%) _____

(2) Summer C F M (Form 3 Col. XI plus 15%) _____

(3) Auxiliary Night Air Fan _____

Fans or Blowers Selected _____

Select fan or blower on basis of maximum load, lines 1 or 2, and change fan speed during period of lightest load. Capacity of fan used for cooling with night air, if not operated as an auxiliary to summer circulating fan, equals volume of building in cu. ft. x 30 to 35 air changes per hr. divided by 60 to reduce to cu. ft. per minute. If used with central circulating fan deduct central capacity.

FILTER or AIR WASHER

(1) Maximum Cu. ft. per min. (Blower capacity) _____

(2) Velocity at Filter (not over 800) F P M _____

(3) Required Area at not over .25" Static Resistance _____

Filter or Air Washer Selected _____

Capacity is equal to maximum fan or blower capacity. Velocity thru filter should not exceed 800 F.P.M. and static resistance should range above ⅛" to ¼" water pressure.

REFRIGERATION, Mechanical

(1) Total Btu. per hr. incl. latent heat (Form 3 Col. XII) _____

(2) Cap. in Tons at 40 F. Evap. Temp. (Item 1 ÷ 12,000) _____

Compressor Selected _____

Units may be rated in maximum Btu per hr., line 1, or in tons, line 2. Rating should be based on 40 F in evaporator regardless of actual evaporator temperature, in order to make a fair comparison of units. Above calculations include dehumidifier load only where unconditioned air is used to reheat or temper the air cooled to the dew-point temperature.

DEHUMIDIFIER

(1) Max. Grains Water Removed /hr. (Form 3 Col. XIII) _____

(2) Max. Capacity in Gals. per hr. (Item 1 ÷ 58,100) _____

Dehumidifier Selected _____

Dehumidifiers are rated in maximum grains of water condensed per hr. line 1, or in gallons per hr., line 2. If absorption type dehumidifier is employed with an evaporative cooler, additional capacity is needed; see text.

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Serial No. 60
SEPTEMBER 1936

AIR CONDITIONING—Basic Design Data

PURPOSE

All heating and air conditioning load calculations are based on the difference between extreme outdoor conditions prevailing in the locality and the desired indoor conditions. These tables provide summer and winter climatic conditions in selected cities in the United States as they affect the design of heating and comfort air conditioning systems.

Reference is made to these data in Time-Saver Standards relating to Heating and Air Conditioning Loads for data on outside design temperatures, grains of moisture to be removed or added, direction and velocity of prevailing winds. Information included on degree days, length of heating season and approximate length of cooling season may be of value when fuel consumption or operating costs are being calculated.

SOURCES

These tables were originally prepared from the sources noted by Perry West, M.E., consulting engineer, Newark, N. J., and published in American Architect Reference Data No. 12, July, 1934. Data relating to direction and velocity of prevailing winds have been revised to conform to A.S.H.V.E. Guide, 1936.

SUMMER CLIMATIC CONDITIONS IN THE UNITED STATES

STATE	CITY	I Outdoor Design Max. Temp.	II Outdoor Rel. Design Hum. for Cooling.	III Max. Grs. of Moisture to be removed per cu. ft. of Outside Air.	IV Summer Wind Velocity Miles per Hr.	V Prevailing Summer Wind Direction.	VI Approximate length of cooling season in days.
Ala.	Birmingham	93	48	2.97	5.2	S	136
	Mobile	94	50	3.54	8.6	SW	165
Ariz.	Phoenix	110	23	1.20	6.0	W	151
Ark.	Little Rock	95	44	2.75	7.0	NE	133
Calif.	Los Angeles	88	41	.90	6.0	SW	153
	San Francisco	85	42	.46	11.0	SW	77
Colo.	Denver	90	22	—1.59	6.8	S	94
Conn.	New Haven	88	52	2.45	7.3	S	101
D. C.	Washington	95	47	2.81	6.2	S	113
Fla.	Jacksonville	94	50	3.54	8.7	SW	175
	Tampa	94	52	3.88	7.0	E	180
Ga.	Atlanta	91	48	2.52	7.3	NW	130
	Savannah	95	50	3.79	7.8	SW	157
Idaho	Boise	95	18	—1.75	5.8	NW	85
Ill.	Chicago	95	50	2.17	10.2	NE	97
	Peoria	91	48	2.52	8.2	S	100
Ind.	Indianapolis	90	45	1.85	9.0	SW	107
Iowa	Des Moines	92	43	1.94	6.6	SW	90
Ky.	Louisville	94	41	2.03	8.0	SW	117
La.	New Orleans	94	52	3.88	7.0	SW	165
Maine	Portland	85	50	1.50	7.3	S	93
Md.	Baltimore	93	47	2.81	6.9	SW	121
Mass.	Boston	88	50	2.17	9.2	SW	96
Mich.	Detroit	93	46	1.63	10.3	SW	97
Minn.	Minneapolis	93	57	2.18	8.4	SE	91
Miss.	Vicksburg	95	47	3.27	6.2	SW	155
Mo.	Kansas City	92	45	2.26	9.5	S	113
	St. Louis	95	47	2.81	9.4	SW	113
Mont.	Helena	87	24	—1.67	7.3	SW	60
Nebr.	Lincoln	93	41	1.83	9.3	S	96
Nev.	Reno	93	18	—1.93	7.4	W	110
N. J.	Trenton	95	43	2.16	10.0	SW	105
N. M.	Santa Fe	87	24	—1.67	6.5	SE	96
N. Y.	Albany	90	48	2.30	7.1	S	88
	Buffalo	83	60	2.32	12.2	SW	92
	New York	95	48	2.52	12.9	SW	105
N. C.	Asheville	87	48	1.62	5.6	SE	145
	Wilmington	93	54	3.95	7.8	SW	149
N. D.	Bismarck	88	38	.48	8.8	NW	98
Ohio	Cleveland	95	48	1.62	9.9	S	99
	Cincinnati	95	43	2.16	6.6	SW	110
Okla.	Oklahoma City	96	40	2.26	10.1	S	121
Ore.	Portland	83	38	— .34	6.6	NW	100
Pa.	Philadelphia	95	45	2.48	9.7	SW	112
	Pittsburgh	91	43	1.75	9.0	NW	106
R. I.	Providence	85	57	2.40	10.0	NW	99
S. C.	Charleston	94	60	5.22	9.9	SW	150
	Greenville	93	47	2.81	6.8	NE	145
Tenn.	Chattanooga	94	44	2.53	6.5	SW	145
	Memphis	93	49	3.14	7.5	SW	131
Texas	Dallas	99	35	1.93	9.4	S	150
	Galveston	93	54	3.95	9.7	S	160
	San Antonio	100	37	2.52	7.4	SE	156
	Houston	93	54	3.95	7.7	S	160
	El Paso	98	22	— .72	6.9	E	142
Utah	Salt Lake City	95	22	—1.06	8.2	SE	100
Vt.	Burlington	85	50	1.50	8.9	S	98
Va.	Norfolk	91	51	2.98	10.9	S	125
	Richmond	95	42	2.40	6.2	SW	120
Wash.	Seattle	83	27	—1.68	7.9	S	88
	Spokane	89	22	—1.68	6.5	SW	90
W. Va.	Parkersburg	90	34	.21	5.3	SE	111
Wis.	Madison	89	47	1.95	8.1	SW	86
	Milwaukee	93	48	1.62	10.4	S	86
Wyo.	Cheyenne	85	25	—1.73	9.2	S	95

NOTES: Figures in Column 1 from A.S.H.V.E. Guide, 1936. Figures in Column 2 computed from A.S.H.V.E. Guide. Figures in Column 3 computed from figures in Columns 1 and 2 and are for conditions in Table 5 in T-S.S. "Heating and Air Conditioning Loads—2." Figures in Columns 4 and 5 from A.S.H.V.E. Guide, 1936. Figures in Column 6 computed by deducting the length of heating season in days from 285.

Summer cooling season in days does not necessarily indicate the period of operation of cooling equipment.

AMERICAN ARCHITECT
TIME-SAVER STANDARDS

AIR CONDITIONING—Basic Design Data

Serial No. 60
SEPTEMBER 1936

WINTER CLIMATIC CONDITIONS IN THE UNITED STATES

STATE	CITY	I Min. Outdoor Design Temp. Degrees F.	II Max. Grs. of Moisture to be added per cu. ft. of Outside air.	III Av. Wind Velocity Dec., Jan., Feb., Miles per hr.	IV Direction of Prevailing wind Dec., Jan., Feb.	V Degree Days in Heating Season.	VI Approximate length of heating season in days.
Ala.	Mobile	20	2.41	10.4	N	1471	120
	Birmingham	10	2.72	8.5	N	2408	149
Ariz.	Phoenix	15	2.58	6.4	E	1404	134
	Flagstaff	— 5	2.99	7.8	SW	7145	203
Ark.	Fort Smith	—10	3.05	8.1	E	3214	157
	Little Rock	0	2.92	8.7	NW	2811	152
Cal.	San Francisco	30	1.93	7.6	N	3264	208
	Los Angeles	30	1.93	6.3	NE	1504	132
Colo.	Denver	—10	3.05	7.5	S	5873	191
	Grand Junction	— 5	2.99	5.3	NW	5576	181
Conn.	New Haven	— 5	2.99	9.7	N	5895	184
D. C.	Washington	0	2.92	7.1	NW	4626	172
Fla.	Jacksonville	25	2.19	9.2	NE	890	110
Ga.	Atlanta	10	2.72	12.1	NW	2891	155
	Savannah	20	2.41	9.5	NW	1490	128
Idaho	Lewiston	0	2.92	5.3	E	4924	179
	Pocatello	—10	3.05	9.6	SE	7985	238
Ill.	Chicago	—10	3.05	12.5	W	6315	188
	Springfield	— 5	2.99	10.1	NW	5370	178
Ind.	Indianapolis	— 5	2.99	11.5	SW	5297	178
	Evansville	0	2.92	9.8	S	4164	161
Iowa	Dubuque	—20	3.16	7.1	NW	6788	188
	Sioux City	—20	3.16	11.6	NW	7023	185
Kan.	Concordia	— 5	2.99	8.1	S	5556	179
	Dodge City	— 5	2.99	9.8	NW	5034	169
Ky.	Louisville	— 5	2.99	9.9	SW	4180	168
La.	New Orleans	25	2.19	8.8	N	1023	120
	Shreveport	15	2.58	8.9	SE	1938	140
Me.	Eastport	—15	3.09	12.0	W	8531	219
	Portland	—10	3.05	9.2	NW	7012	192
Md.	Baltimore	0	2.92	7.8	NW	4533	164
Mass.	Boston	— 5	2.99	11.2	W	6045	189
Mich.	Alpena	—10	3.05	12.4	W	9540	233
	Detroit	— 5	2.99	12.7	SW	6494	188
	Marquette	—10	3.05	11.1	NW	8692	205
Minn.	Duluth	—20	3.16	12.6	SW	9480	211
	Minneapolis	—15	3.09	11.3	NW	7851	194
Miss.	Vicksburg	20	2.41	8.3	SE	1822	130
Mo.	St. Joseph	0	2.92	9.3	NW	5142	173
	St. Louis	— 5	2.99	11.6	S	4585	172
	Springfield	0	2.92	10.8	SE	4542	168
Mont.	Billings	—20	3.16	...	W	7115	201
	Harve	—25	3.20	9.5	SW	8699	206
Neb.	Lincoln	—15	3.09	10.5	S	6231	189
	North Platte	—20	3.16	8.5	W	6433	182
Nev.	Tonopah	0	2.92	10.0	SE		
	Winnemucca	— 5	2.99	8.7	NE	6359	198
N. H.	Concord	—10	3.05	6.6	NW	6852	187
N. J.	Atlantic City	0	2.92	15.9	NW	5175	182
N. M.	Santa Fe	0	2.92	7.8	NE	6063	189
N. Y.	Albany	—10	3.05	8.1	S	6889	197
	Buffalo	— 5	2.99	17.2	W	6821	193
	New York	0	2.92	17.1	NW	5348	180
N. C.	Raleigh	20	2.41	8.2	SW	3234	159
	Wilmington	20	2.41	8.5	SW	2302	136
N. D.	Bismarck	—25	3.20	9.1	NW	8498	187
	Devils Lake	—25	3.20	10.6	W	10112	198
Ohio	Cleveland	0	2.92	13.0	SW	6154	186
	Columbus	0	2.92	12.0	SW	5323	177
Okla.	Oklahoma City	5	2.83	12.0	N	3613	164
Ore.	Baker	0	2.92	6.9	SE	7166	200
	Portland	5	2.83	7.5	S	4468	185
Pa.	Philadelphia	5	2.83	11.0	NW	4855	173
	Pittsburgh	0	2.92	11.7	W	5235	179
R. I.	Providence	0	2.92	12.8	NW	6014	186
S. C.	Charleston	20	2.41	10.6	SW	1769	135
	Columbia	10	2.72	8.1	NE	2364	145
S. D.	Huron	—20	3.16	10.6	NW	8169	195
	Rapid City	—15	3.09	8.2	W	7163	190
Tenn.	Knoxville	5	2.83	7.8	SW	3670	160
	Memphis	10	2.72	9.7	S	2950	154
Texas	El Paso	15	2.58	10.4	NW	2428	143
	Fort Worth	15	2.58	10.4	NW	2148	140
	San Antonio	15	2.58	8.0	NE	1202	129
Utah	Modena	0	2.92	8.8	W	6600	207
	Salt Lake City	0	2.92	6.7	SE	5553	185
Vt.	Burlington	—10	3.05	11.8	S	7620	187
Va.	Norfolk	15	2.58	12.5	N	3349	160
	Lynchburg	0	2.92	7.1	NW	4019	162
	Richmond	10	2.72	7.9	SW	3725	165
Wash.	Seattle	10	2.72	11.3	SE	4968	197
	Spokane	—10	3.05	7.1	SW	6353	195
W. Va.	Elkins	0	2.92	6.6	W	5697	182
	Parkersburg	0	2.92	7.5	SW	4884	174
Wis.	Green Bay	—15	3.09	10.4	SW	7823	191
	La Crosse	—20	3.16	7.3	S	7290	172
	Milwaukee	—15	3.09	11.5	W	7372	199
Wyo.	Sheridan	—25	3.20	6.0	NW	7993	205
	Lander	—20	3.16	5.0	SW	8266	201

NOTES. Figures in Column 1 from Heating & Ventilating with corrections.

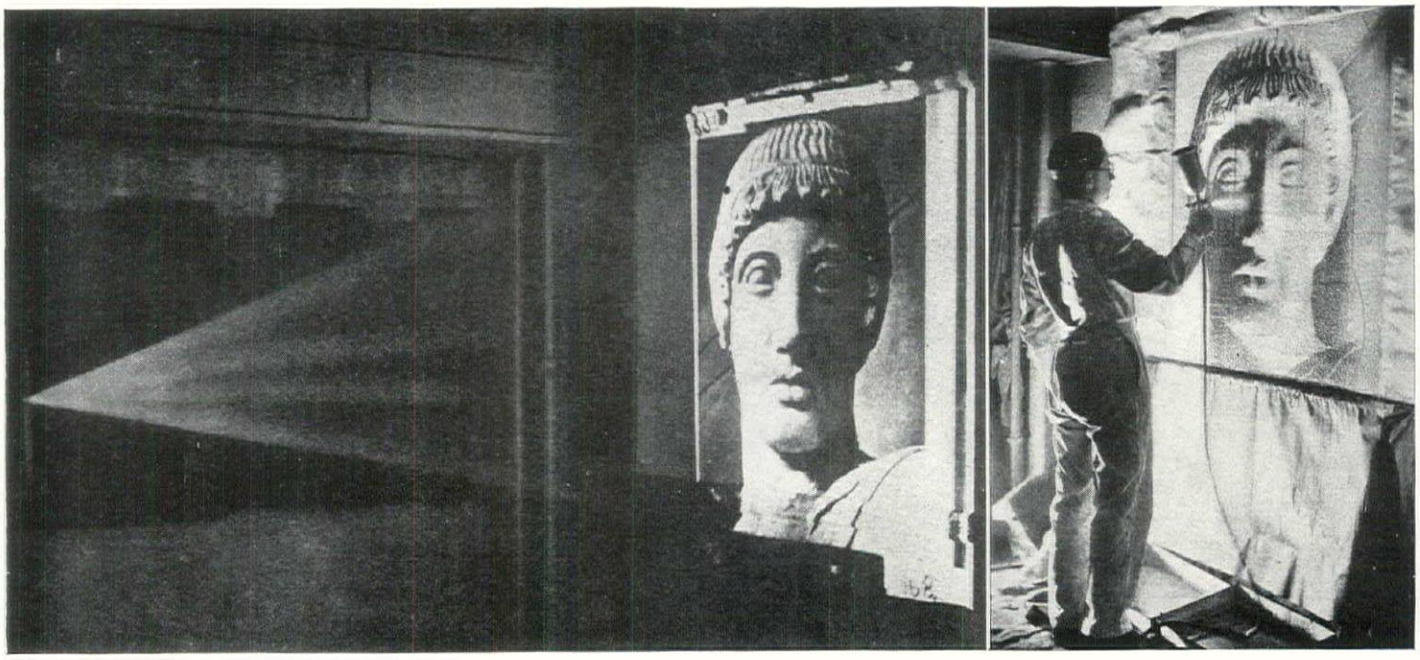
Figures in Column 2 computed for 66⅔% relative humidity at minimum outdoor design temperatures and 40% relative humidity at 70 F indoors.

Figures in Column 5 from A.S.H.V.E. Guide and Fan Engineering.

Figures in Column 6 computed by dividing the degree-days in the heating season by the difference between the average outdoor temperature from October 1st to May 1st and 70 F.

TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES



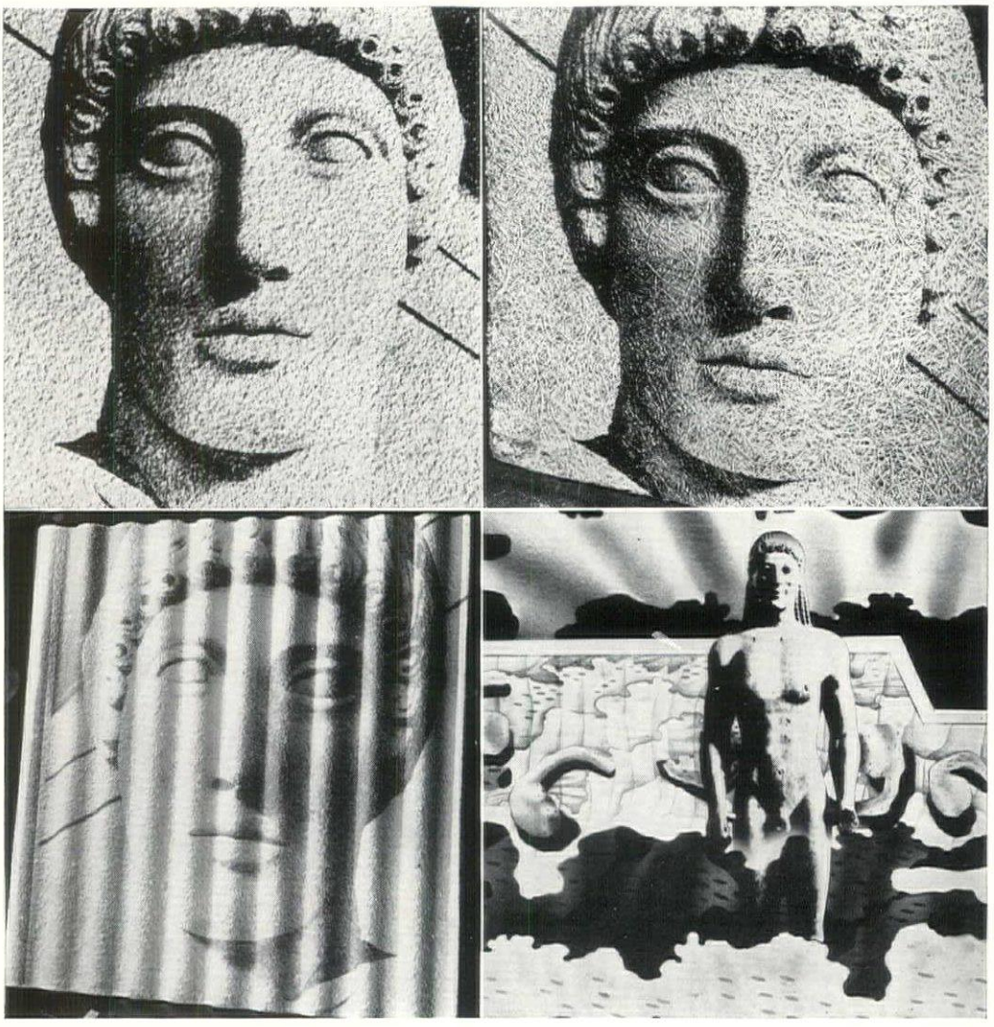
SENSITIZED WALLS FOR PHOTOGRAPHIC MURALS

Photography plays an increasingly important part in decoration. This is true not only of framed photographs, but of photo murals. The photo mural is limited as a wall covering because it is merely an enlargement on printed paper. This makes it somewhat awkward to use on large wall areas, since it has a tendency eventually to come loose and it may be applied only to flat surfaces.

Recently, a young English designer, Eugene Mollo of the firm of Mollo and Egan, has developed a method which consists of sensitizing the wall by spraying it with photo-sensitive emulsion, projecting on it a photographic image by means of an ordinary enlarger and subsequently developing and fixing it again by spraying. The result is a photographic image of any selected size, printed directly on the wall or any other surface to be decorated, in a relatively short time. It has other advantages of being jointless, washable and applicable to any surface, whether corrugated, curved, fluted or textured.

The American rights to Eugene Mollo's photo-spray patent have been given to Venter Exhibits, Inc., of New York, N. Y.

(*Techniques cont'd on page* 126)



KANSAS CITY MUSIC HALL

(IN THE KANSAS CITY MUNICIPAL AUDITORIUM)

Architects: Alonzo H. Gentry, Voskamp and Neville *and* Hoit, Price and Barnes, *Associated Architects*

Unlike many others, the Kansas City Music Hall and Municipal Auditorium is completely finished in an architectural and decorative way. It is *beautiful*, as well as useful.

The architects—Alonzo H. Gentry, Voskamp and Neville—used gay color in the interior in a way unique for a structure of this kind. Color, combined with simple modern architecture, creates an atmosphere of brightness, gaiety and cheer.

Approximately 2800 yards of Bigelow carpeting—in grades and colorings ideally suited for specific spaces—help to give the desired effect. Special designs and colorings were created as a part of our regular service. For greater comfort, better acoustics and longer life, nearly 2600 yards of hair lining was laid under the carpeting.

Bigelow is proud to have served as Carpet Counsel on this important project. We've worked with leading architects for years—have built up a fund of practical knowledge you'll find valuable. May we put it to work for you? Contract Department, Bigelow-Sanford Carpet Co., Inc., 140 Madison Ave., N. Y.

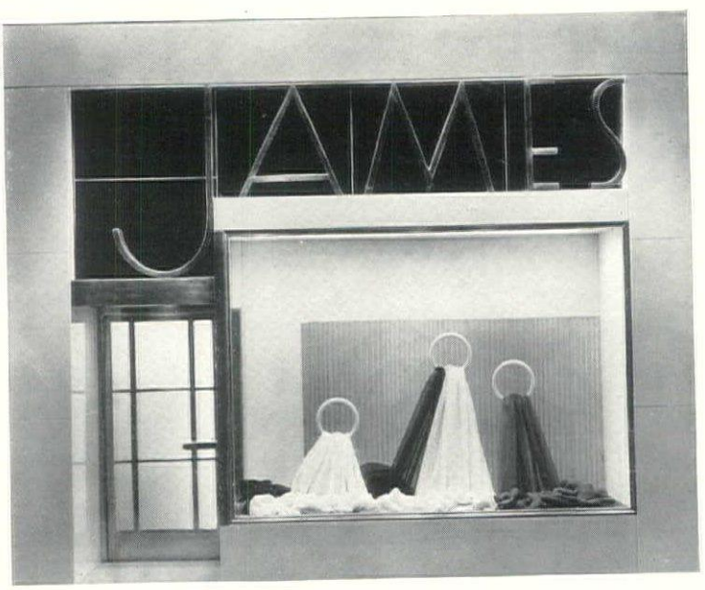
CARPET COUNSEL

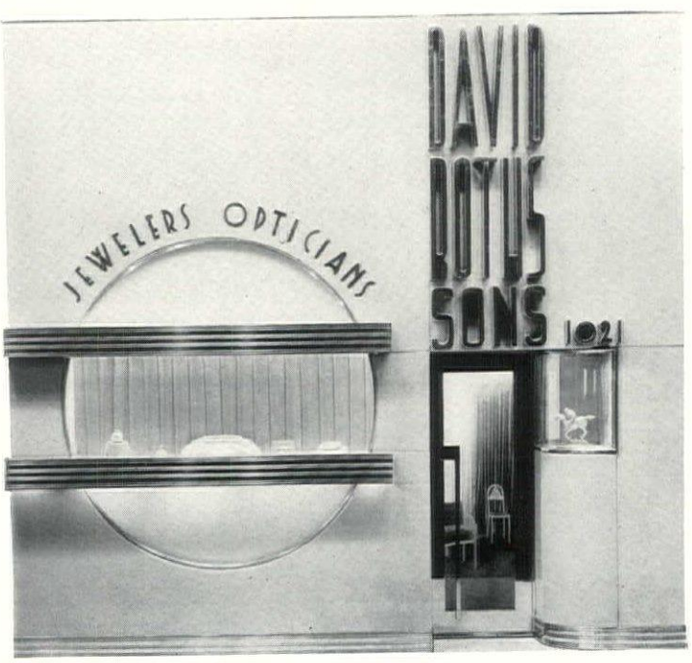
BY THE BIGELOW WEAVERS

SHOP FRONT CARAVAN

Well designed store fronts as merchandising assets, civic beautification and boons to architecture are generally appreciated. Years ago the style change of shop front architecture was slow, while today the change is rapid and shop owners and architects must be alert to every change. Recognizing the need for a medium whereby both client and architect might be informed of these changes, the Pittsburgh Plate Glass Co. has recently developed a scheme in which two trucks, each carrying six store front models, are scheduled to visit 73 of the company's warehouse cities. Cities in the North Atlantic States will be visited until snow flies, after which the caravan will be routed throughout the South and subsequently the remainder of the country. Four demonstrators will be assigned to the caravan and an advance man will contact architects, civic and business organizations in the various cities to be visited.

Each model is beautifully made at a scale of 1½ inches to a foot. They have tiny window displays, are well lighted,





Some of the model shop fronts at a scale of 1½" to 1 ft now being exhibited in the Pittco Caravan.

FLASH

CITY ROOM BREAKS WITH TRADITION

Tradition has it that a newspaper city room must be drab and utilitarian. But the owners of the Columbus Sunday Star saw no reason why utility should not be combined with life and color. They chose Sloane-Blabon Linoleum for the floor. Our Linoleum Handbook, just off the press, shows many other types of rooms in which Sloane-Blabon Linoleum is effectively used. Let us send you a copy. Write W. & J. Sloane, Selling Agents Division, 295 Fifth Avenue, New York.

The city room of the Sunday Star, Columbus, Ohio

SLOANE-BLABON

LINOLEUM

Lincoln Bank Tower, Fort Wayne, Ind.

CENTRAL HEAT CONTROL CUTS COAL CONSUMPTION

Webster Moderator System Saves $781 in Lincoln Bank Tower During '35-'36 Season

Uses "Control-by-the-Weather"

Fort Wayne, Ind.—The Lincoln Bank Tower, equipped when built in 1930 with a modern vacuum system of steam heating, was further improved during the summer of 1935 with a Webster pneumatic-type Moderator System of Central Heating Control.

This improved system reduced coal consumption 150 tons during the 1935-36 heating season, equivalent to a cash saving of $781.50.

During 1935-36, with the Webster Moderator System, the cost of heating the Lincoln Bank Tower was $2,349.71. The old system for a comparable number of degree days would have required a fuel expenditure of $3,131.21.

The effectiveness of the Webster Control is indicated in the following summary:

	Lbs. Coal Fired	*Degree Days*	*Lbs. Coal Per D.D.*
1934-35—Before Webster Control..	1,073,520	6,046	177
1935-36—After Webster Control..	902,900	6,792	132

Investigation of comparable buildings led the management of the Lincoln Tower to the conclusion that addition of Webster "Control-by-the-Weather," with accurately sized metering orifices and convenient manual supply valves, would afford increased flexibility and at the same time effect a modest saving.

The results of the first season's operation show the objectives fully achieved. Comfort has been increased and wasteful window opening reduced to a minimum.

Schwegman-Witte Co., of Fort Wayne, acted as heating contractors. The architects of the building, when it was constructed, were Walker and Weeks of Cleveland and A. M. Strauss of Fort Wayne.

The first step in every Webster Heating Modernization Program is a careful investigation of existing steam-using facilities. When ample opportunity for steam savings is found to exist, Webster engineers work closely with owners, architects and heating contractors until the installation is completed and operating at maximum efficiency.

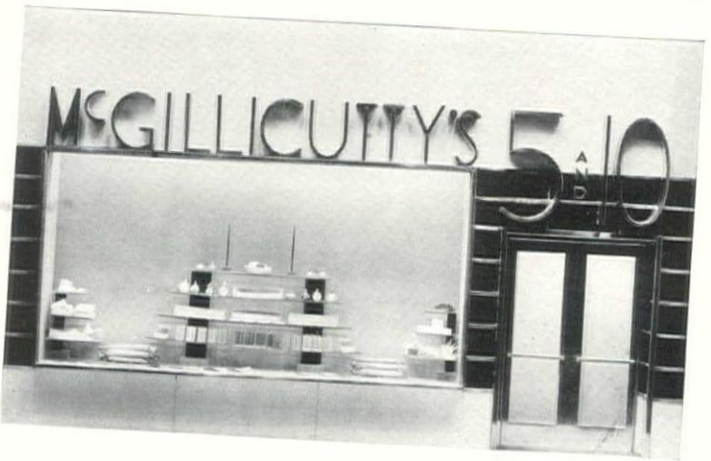
The Lincoln Bank Tower is one of 70,000 installations in which Webster Heating Systems and Webster System Equipment are providing fuel savings, comfortable indoor temperatures, and minimum repair and maintenance bills.

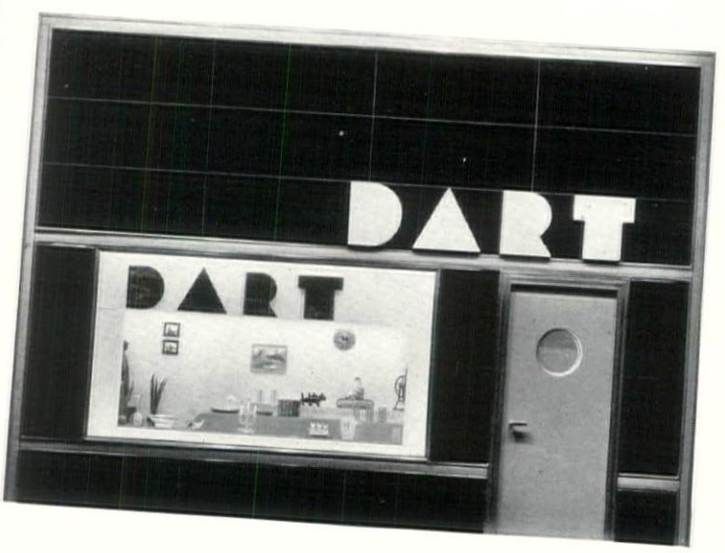
If you are interested in heating *new* buildings, or in improved heating service and lower heating cost in your present building, address

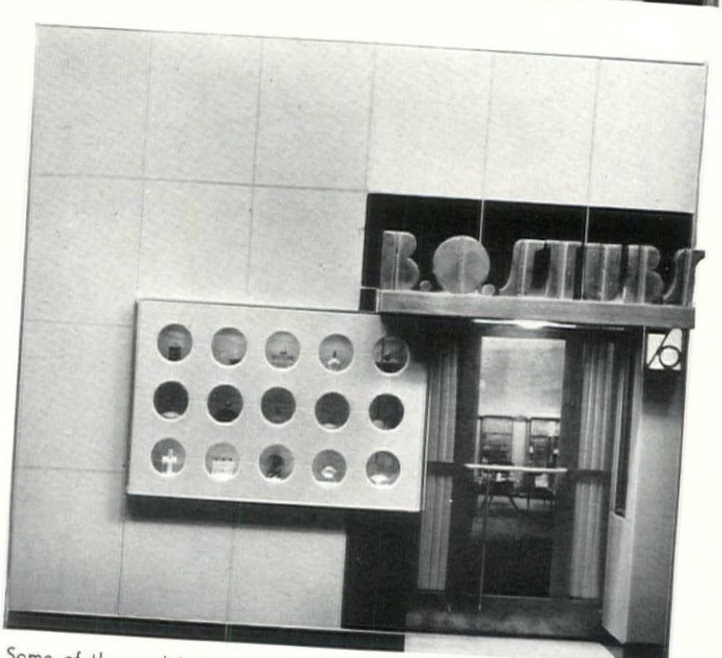
Warren Webster & Company . . . Camden, N. J.
Pioneers of the Vacuum System of Steam Heating
Branches in 60 principal U. S. Cities . . . Darling Bros., Ltd., Montreal, Canada

have glass fronts and in some cases, miniature extruded metal parts are used. Some of the details are so small that jeweler's tools were needed to make them.

Although there are only twelve models in this display they are so designed that each shop front is applicable to at least three different lines of merchandise. Thus the 5 & 10c store shown herewith might also be used as a drug or food shop.

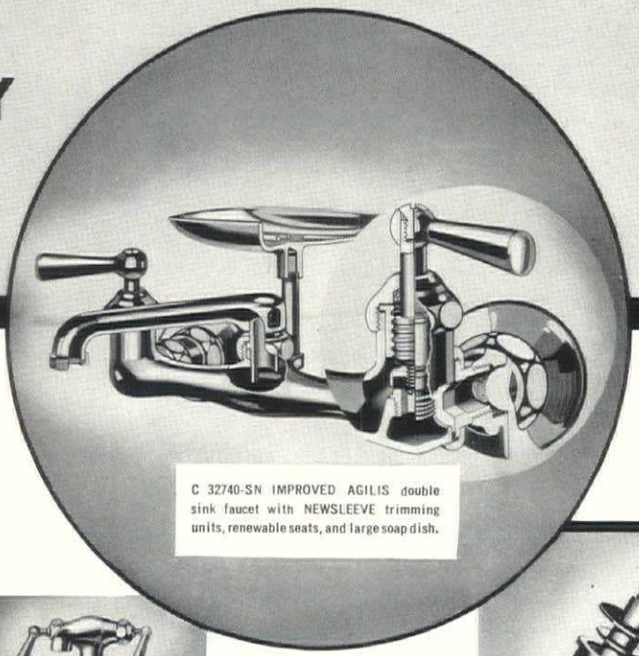






Some of the model shop fronts at a scale of 1½" to 1 ft. now being exhibited in the Pittco Caravan.

SPECIFY *Crane* QUALITY BRASS for DEPENDABILITY APPEARANCE LONG LIFE



C 32740-SN IMPROVED AGILIS double sink faucet with NEWSLEEVE trimming units, renewable seats, and large soap dish.

● Dependability in plumbing fixtures demands the best in working parts—faucets, wastes, valves and traps.

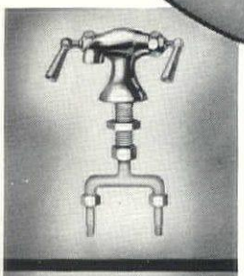
Crane brass fittings are built to endure—to give long service with minimum maintenance. In addition, they are of the most advanced sanitary design.

Of highest quality brass, heavily plated with durable chromium, they are smart and modern in appearance, efficient and convenient to operate.

Their modest cost will repay the owner many times over in enduring beauty, better sanitation and reduced maintenance.

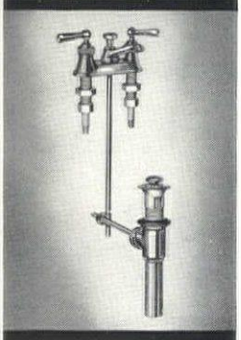
Specify Crane quality fittings on all plumbing equipment for residences, apartments, hotels, office buildings and other structures.

The Crane Finance Plan enables your clients to modernize with no money down, three years to pay.



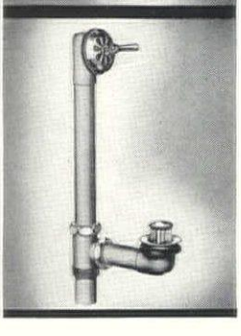
C 31906-N IMPROVED AGILIS double faucet. NEWSLEEVE trimming units.

NEWSLEEVE Trimming Unit used on the AGILIS faucets and RANIER Fitting shown. Makes replacement of disc and operating parts easy.

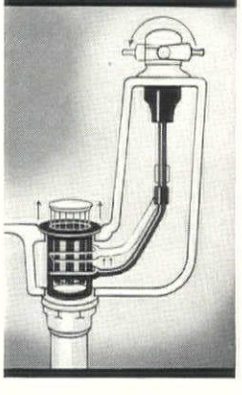


C 32282 RANIER Supply and Pop-Up Waste. Compact moderately priced. Leaves plenty of space. Has NEWSLEEVE trimming units with swivel discs and renewable seats.

DELTA Flushing Valve with VIGILANT Vacuum Breaker. Quantity of water delivered adjustable. Valve closes even though handle is held down. Vacuum breaker prevents back siphonage. Applicable to any closet bowl and flushing valve.



SECURO Lever-Action Waste drains basin in 6 seconds! Readily cleaned. Lever holds stopper open or closed.



ACCESSO Bath Waste. When closed, held tight by the weight of water. Contamination of newly drawn water impossible.

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VALVES, FITTINGS, FABRICATED PIPE, PUMPS, HEATING AND PLUMBING MATERIAL

AMERICAN ARTISTS GROUP

An organization including some of America's best known painters was formed recently with the purpose of returning to the early traditions practiced for centuries by masters of the graphic arts, not limiting or pencil signing their prints. The etchings and lithographs being offered by this organization will be available so long as hand proofs of high quality can be pulled from the original plates and stones. The prints will be sold for a uniform price of $2.75. This group consists of such outstanding artists as George Biddle, Jean Charlot, Mabel Dwight, Wanda Gag, Emil Ganso, Rockwell Kent, Yasuo Kuniyoshi, John Marin, Reginald Marsh, Frank Mechau, Jr., Kenneth Hayes Miller, Nura Waldo Peirce and others. The first exhibit will be held at the Weyhe Gallery, New York City.

ART IN INDUSTRY MOVIE

"We Are All Artists," a motion picture directed by Alon Bement and produced by the Harmon Foundation with the co-operation of the National Alliance of Art and Industry, is now available in 16 millimeter silent film for art schools, colleges, public and private schools, museums, clubs and other groups interested in studying the relationship between modern life and art expression. It is in three reels and may be accompanied by cued victrola music.

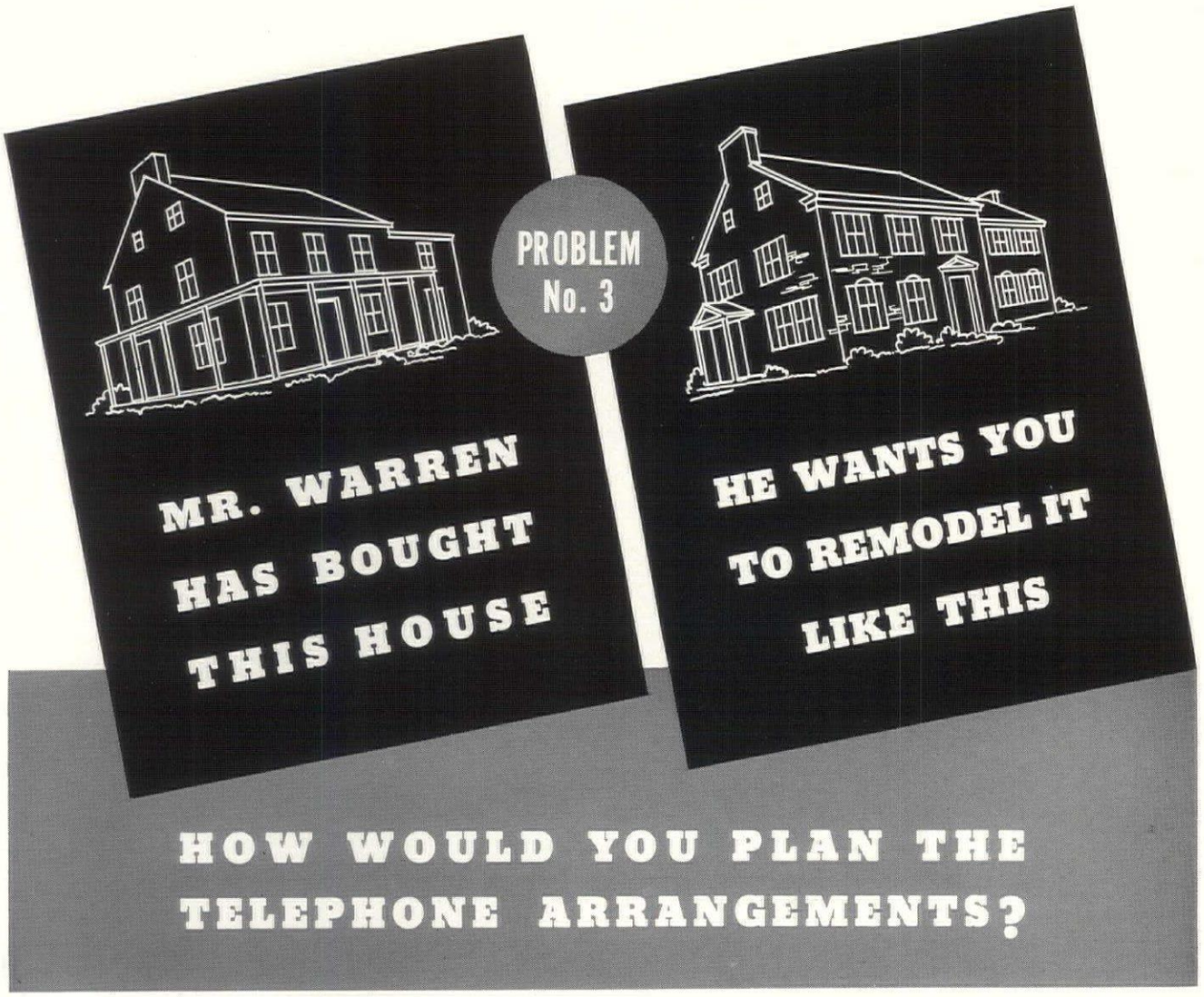
"Making an art theory visually tangible by motion pictures has offered many unique problems," said Mr. Bement. "Probably one of the greatest was gathering together the exact sets we wanted to vitalize our subject matter. We searched everywhere for a beautiful waterfall and finally found one in North Carolina that was photographically possible and answered the requirements from an art point of view. As the film starts with the premise that everyone loves beauty, we had to find a number of forms that are universally accepted as beautiful—the swan, the waterfall, the ballet dancer, and the diver are some that we used. We almost gave up the possibility of a well-developed horse until we had the opportunity to photograph Gallant Fox in Kentucky.

"More than fifty individuals or organizations had to be enlisted to help in furnishing either their time or materials for the film. Museums, department stores, manufacturing companies, designers and others gave exceptional co-operation because they were all so interested in this type of project."

Some of the artists who worked with Mr. Bement were John Vassos, Margaret Bourke-White, Isabel Crocé and Ray Patten.

1939 FAIR COMPETITION

New York architects have been invited to submit designs for proposed buildings for the New York 1939 World's Fair. The first prize will be $1,000, second prize, $750, third prize $500, and twenty honorary mentions of $100 each. The first prize winner will also be commissioned to design at least one building for the Fair. The other prize winners will receive preference in Fair building design. The competition will close October 6th and all drawings must be sent to the New York World's Fair Corporation in the Empire State Building, New York.

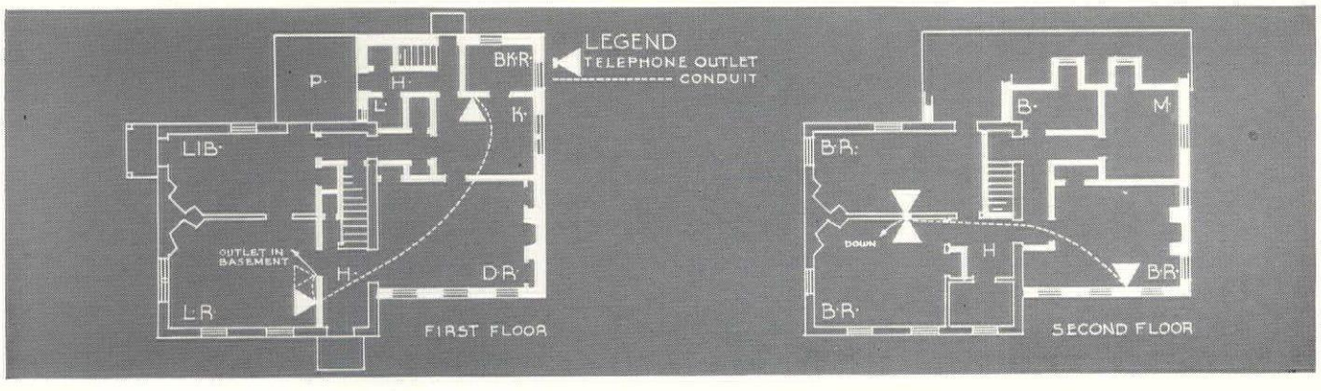


THE WARRENS have found *the* house. Not too far from the city. Splendid view. Plenty of space for Harry, 16, and Tommy, Jr., 18. A big guest-room for week-ends. *What telephone arrangements would you recommend?*

First of all, conduit or pipe from cellar to telephone outlets, to avoid exposed wiring and provide protection against certain types of service interruption. Once it's installed in the walls, leading to the right number of outlets, in the right places, the Warrens won't worry about telephone convenience for many years to come.

Now, for outlets. One in the master bedroom, certainly. One in the boys' room, probably, for a portable telephone. Another for a portable telephone in the guest-room—a gracious touch typical of the Warrens. Outlets, of course, in the living-room and kitchen. And, an outlet for a portable telephone in the basement game-room to save steps when this active family is entertaining.

This is a suggested approach to a typical problem. Our engineers will help you develop efficient, economical conduit layouts at any time. No charge. Call your local telephone office and ask for "Architects' and Builders' Service."



FASTER SCHEDULES AT LOWER COST

These days it isn't news when records are broken for speedy construction. But it *is* news when, in straining and crowding to save every possible minute, money is also saved. And that is precisely what 'Incor' 24-Hour Cement helped to accomplish in speeding completion of ten Texas Centennial Exposition buildings at Dallas. For example: In the sixty-foot monolithic tower (above) and in entrance gates, 'Incor' provided working strengths at least five days sooner than ordinary concrete on each pour; 'Incor' piling for the Hall of State, cast and driven during late Fall, overcame cool weather curing delays, reduced form costs, saved many days on driving schedule.

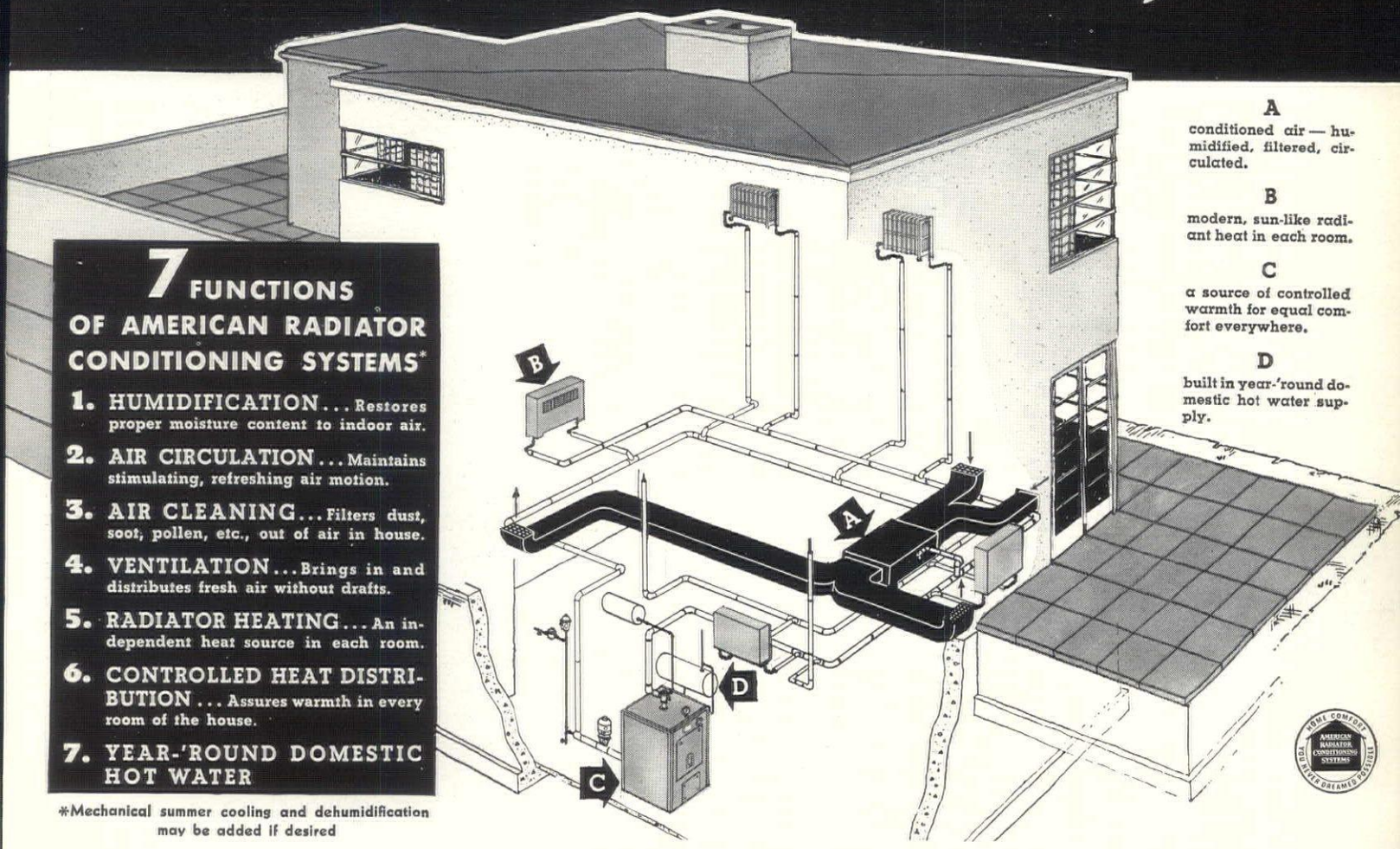
The Exposition's Museum of Fine Arts Building illustrates what these savings mean when translated into dollars and cents. Using 'Incor,' the contractor stripped forms from first half of floor slab in two days, re-used forms on second half. That saved an extra set of forms—lumber worth $1250, plus $300 for labor. 'Incor' also reduced overhead costs, by eliminating ten days of non-productive time at $100 a day. Total saving, $2550. Extra cost of 'Incor,' $272.70. Net saving, $2277.30.

Faster schedules with 'Incor' have helped to solve many an emergency problem. But it goes much deeper than that; for 'Incor'* usually saves money on any job—whether rush or not—by eliminating non-productive time waiting for concrete to harden. For details, write for free copy of new book entitled "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

New AMERICAN RADIATOR CONDITIONING SYSTEMS

For automatic Heating



7 FUNCTIONS OF AMERICAN RADIATOR CONDITIONING SYSTEMS*

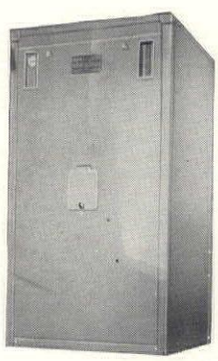
1. **HUMIDIFICATION**... Restores proper moisture content to indoor air.
2. **AIR CIRCULATION**... Maintains stimulating, refreshing air motion.
3. **AIR CLEANING**... Filters dust, soot, pollen, etc., out of air in house.
4. **VENTILATION**... Brings in and distributes fresh air without drafts.
5. **RADIATOR HEATING**... An independent heat source in each room.
6. **CONTROLLED HEAT DISTRIBUTION**... Assures warmth in every room of the house.
7. **YEAR-'ROUND DOMESTIC HOT WATER**

*Mechanical summer cooling and dehumidification may be added if desired

ARCO OIL FURNACE No. 11

For Small Homes

Novel design of combustion chamber and new fin type flue passages assure maximum efficiency. Year 'round domestic hot water supply built in. Extended jacket completely conceals burner and all accessories.



WHAT makes this new kind of air conditioning new—and better—is the fact that heating operates independently of the other functions of air conditioning. The conditioning unit ventilates the home with fresh air that has been filtered, humidified and tempered, even when the heating is off.

Heating is accomplished by a perfected radiator system. It uses the new Arco Oil Furnace No. 11 designed for the small home . . . new radiators which may be entirely concealed . . . new accessories for controlled heat distribution. Year 'round domestic hot water completes the system. American Radiator Conditioning Systems are priced for today's market, for homes in every price range. There are systems for oil, coal or gas; completely automatic or manually operated.

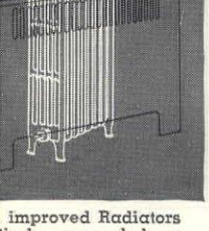
These Conditioning Systems have definite sales advantages for the houses in which they are installed. National advertising in newspapers, magazines and on the air is assuring public demand and acceptance.

AMERICAN RADIATOR COMPANY

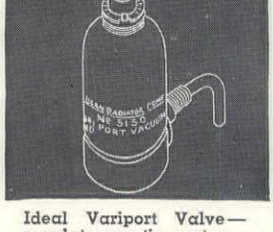
40 West 40th Street, New York, N. Y.

Division of AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

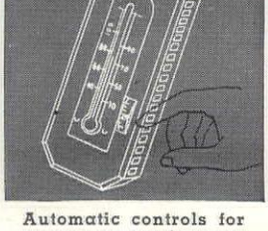
IESE ARE THE PRODUCTS THAT BRING AMERICAN RADIATOR CONDITIONED COMFORT WITH AUTOMATIC OIL HEATING



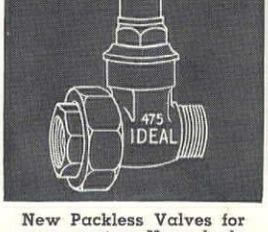
improved Radiators irely concealed or standing.



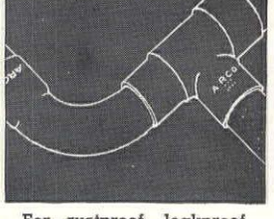
Ideal Variport Valve—regulates venting rate on 1 pipe steam or vapor jobs.



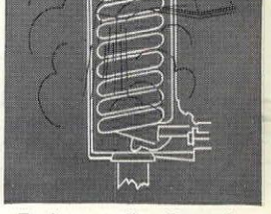
Automatic controls for every purpose: temperature, humidity, pressure.



New Packless Valves for every system. Never leak, never need repacking.



For rustproof, leakproof piping—Arco Wrought Copper Pipe and Fittings.



Equipment for domestic hot water supply—can be part of every system.

LETTERS

Editor, AMERICAN ARCHITECT AND ARCHITECTURE:

The Oregon competition has brought out some glaring errors in competition practice. I, personally, am convinced that future competitions should be guided by the inclusion of program requirements as follows:

1. All the drawings shall be hung in such a way that the jury can go from design to design and compare the elements of each with those of the others. (It is reported that in the case of the Oregon competition, the jury remained seated while each competitor's design was brought up and passed in review, to be discarded or approved; this method tends to discard designs which may, after further study by the jury, be proved worthy.

2. The jury shall adopt a comparative method of judging, whereby the different elements making up a design are given certain ratings according to the importance they bear to the completed design; after this is done, each design shall be rated according to the excellence and skill displayed in developing each of the elements. By this method and this method only can the jury intelligently decide which designer has achieved the best all-around solution to the problem.

3. The holder of the competition shall arrange for a public showing of all the designs and shall prepare a brochure illustrating all the designs submitted, presenting the brochure as a courtesy to all the competitors. (In the case of the Oregon competition, only the prize winning designs were displayed. Designs from many of the best known designers of the country were returned to their owners without any public showing. The jury's award should have been forced to stand upon its own merits against public criticism. It is felt that many of the designs which were sent home must have been of a very fine caliber.)

4. The jury shall be charged with the moral duty of giving each competitor a decent hearing regardless of the superficial appearance of his drawings. (In the case of the Oregon competition, the jury had eliminated all but nine of the designs at the end of the first day. Assuming that the jury had fatigued itself with as much as ten hours of concentration during that day, it would not have had time to give each competitor more than five minutes attention. This is a serious breach of courtesy as each designer had spent from a thousand to three thousand dollars in time and money, and nine weeks of concentrated effort in the preparation of his designs. Five minutes time would not have been sufficient for the jury to read the labels on the plans.)

5. Each competitor should be permitted to make a statement, restricted in length, explaining the elements of the problem which appeared to him to be most important.

HOLLIS JOHNSTON, Architect
Portland, Oregon

Editor, AMERICAN ARCHITECT AND ARCHITECTURE

. . . Since today's trends are tomorrow's history, the presentation of competitions like that for the Oregon Capitol is valuable from our point of view. Back files of the magazine will eventually be consulted for 1936 events just as we now pour over contemporary illustrations of H. H. Richardson buildings in 19th Century issues. . . . More immediately valuable for class use are such illustrations as the Restoration of the William Gibbes House, Old California Missions and Wood and Brick Precedent.

LOUISE HALL
Duke University, Durham, N. C.

CARRARA STRUCTURAL GLASS...

A beautiful permanent material for toilet room walls and partitions

Here are stiles, partitions and walls of lovely White Carrara. The white walls are accented with base and cap of polished Black Carrara.

WHETHER you are engaged in the remodeling of outmoded toilet rooms in old buildings, or in planning toilet rooms for new ones, you will find Carrara Structural Glass an ideal medium to specify for walls and partitions.

Carrara is a ground and polished structural glass, brilliant and reflective of surface, with a hard, fine-textured finish that results in unusually long life. No building's age can be fixed by the appearance of its toilet rooms if they are finished in Carrara! For the passing years have no effect upon Carrara walls and partitions. Carrara does not check, craze, stain or absorb odors. It is impervious to moisture, chemicals, oils, grease, grime and pencil marks. It is as easy to keep clean as any glass . . . just wipe it occasionally with a damp cloth.

Carrara is exceptionally easy to handle, too. It offers the architect a wide scope for original treatments and decorative effects. And its cost is surprisingly reasonable. We invite you to send the coupon below for full information concerning this modern, beautiful material.

CARRARA

THE MODERN STRUCTURAL GLASS

Paint { PITTSBURGH PLATE GLASS COMPANY } Glass

Pittsburgh Plate Glass Company,
2306-B Grant Bldg., Pittsburgh, Pa.

Please send me, without obligation, your book entitled "Carrara Modern Structural Glass."

Name.....

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

HEATING, VENTILATING AND AIR CONDITIONING COURSES

Evening courses in Heating, Ventilating and Air Conditioning are being offered by the Polytechnic Institute of Brooklyn, New York, during the regular 1936-37 school sessions, according to an announcement of Professor E. F. Church, Jr., head of the department of mechanical engineering. Classes will be held on Wednesday and Friday evenings, with registration for the first session in Heating and Ventilating during the week of September 18, 1936. This course will cover the calculations and design for heating and ventilating systems, including heat loss computations, boilers, piping, radiation, fans, air duct design, washers, humidifiers and auxiliary apparatus. Problems will be given to illustrate the application of various systems to residences, apartments, office buildings, schools, factories and theatres.

Beginning in February, 1937, the course in Air Conditioning will deal with advanced considerations in the field of the previous course, and will present fundamental scientific principles and their application to cooling, humidifying and dehumidifying of air. Steam-air mixtures and psychrometric principles related to comfort cooling and commercial air conditioning will be studied. Also in connection with design of systems, the sessions will cover the theory of refrigeration, cooling load computations, surface cooling, by-pass and local recirculation, spray apparatus, chemical dehumidification methods and automatic controls.

Both courses of instruction will be presented by John James of New York City, a graduate of Oregon State College, B.S.M.E., and University of Wisconsin, M.S.M.E., and now a member of the Technical Staff of the American Society of Heating and Ventilating Engineers. For several years Mr. James was connected with the consulting engineering field, designing mechanical equipment for all types of public and private buildings.

HOME OWNERSHIP QUESTIONNAIRE

A questionnaire sent to 20,000 of the Northwestern Life Insurance Company's policy holder families has just been completed and brings to light some interesting facts on home ownership. According to DOMESTIC COMMERCE, the study revealed that the average American couple buy their first home when they have been married five years; when the husband is 32 and the wife is 29. The average price paid by families, according to the survey, was $4,899, almost exactly two years' salary, for the average annual income was reported at $2,452.

Of particular interest to architects was the number of families that built new homes. This amounted to 31 per cent of the survey, while the remaining 69 per cent purchased already built homes. 61 per cent of the families were parents at the time of the purchase of their first home. Forty-nine and nine-tenths per cent of the families interrogated gave as the prime reason for the purchase of their home that it would be "a better place to bring up children" and 47 per cent listed "tired of moving around" or some similar reason for the purchase.

JULY BUILDING

Contracts awarded for non-residential building in the 37 eastern states during July, 1936 reached a total valuation larger than in any other month since October, 1931, according to F. W. Dodge Corporation reports. These new awards brought total non-residential building to date this year to

Chemically active pigment stops cracking and scaling

Can you spare 2 minutes to find out why EAGLE pure WHITE LEAD in Oil outwears all ordinary paints?

Eagle Pure White Lead in Oil has outworn other paints in competitive tests time after time. It is a practically "foolproof" paint that architects can specify to make sure of lasting beauty and protection. Write today for more complete information.

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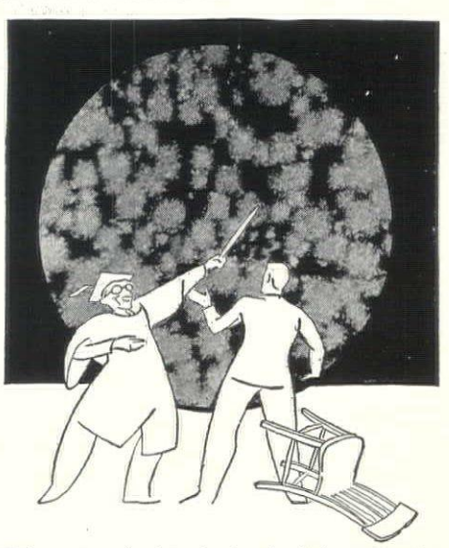
CHOICE OF GOOD PAINTERS SINCE 1843

THE EAGLE-PICHER LEAD COMPANY • CINCINNATI, OHIO

"Eagle white lead is a chemically active pigment. See how pigment particles look when greatly magnified. The irregular, uneven shape of pigment particles is one reason why a film of Eagle Pure White Lead in Oil wears so long!"

"When these white lead particles are mixed with linseed oil, a chemical reaction begins. Particles 'blossom out', making an interlocking mass of pigment and linseed oil. Inert pigments found in many paints do not blossom out."



"The union of white lead and oil forms a paint that seeps into the surface it is applied to . . . sticks on like glue. It stays tough and pliable . . . does not crack when surface expands or contracts."

well over the half billion dollar mark. This represents a gain over the same period last year of more than 85 per cent. Residential building in July also continued to make substantial gains registering a total valuation of over 72 million dollars. This is the second largest reported residential figure in five years. Total residential building for the first seven months of this year amounts to more than $406,000,000. This is a figure within $70,000,000 of the total reported for the entire year of 1935. The total building figure exclusive of civil engineering and public utility projects amounted to $168,218,800 in July, 1936. This was $16,000,000 more than the June, 1936 total and $63,000,000 more than the total reported for the same month last year.

Listed below are the July, 1936 contract totals in some important classes covering both new and modernization projects:

Class	No. of Projects	Valuation
Dwellings	7,231	$47,238,900
Housing Developments	537	12,524,800
Apartments	412	9,910,100
Dormitories	27	1,124,600
Hotels	46	1,295,200
Offices	216	7,916,800
Schools and Colleges	424	21,283,100
Hospitals	52	6,755,700
City Halls, etc.	59	2,772,000
Post Offices	42	2,677,900
Churches	171	2,565,200
Theatres	92	2,050,600
Park Buildings	82	2,634,000
Garages	479	3,342,100
Stores	1,114	10,109,200
Warehouses	226	6,573,700
Factories	408	19,140,000

BOOTH FELLOWSHIP AWARD

The College of Architecture of the University of Michigan announces the award of the George G. Booth Traveling Fellowship Competition in Architecture to Frederick H. Graham of Muncie, Indiana. Mr. Graham graduated this year from the College of Architecture and was an outstanding student in architectural design throughout his course. The subject of the competition was a Co-operative Center of Architecture and Allied Arts where artists and craftsmen might find opportunity for practical work, study and research. The Fellowship was awarded for travel abroad.

A.I.A SCHOOL MEDAL AWARD

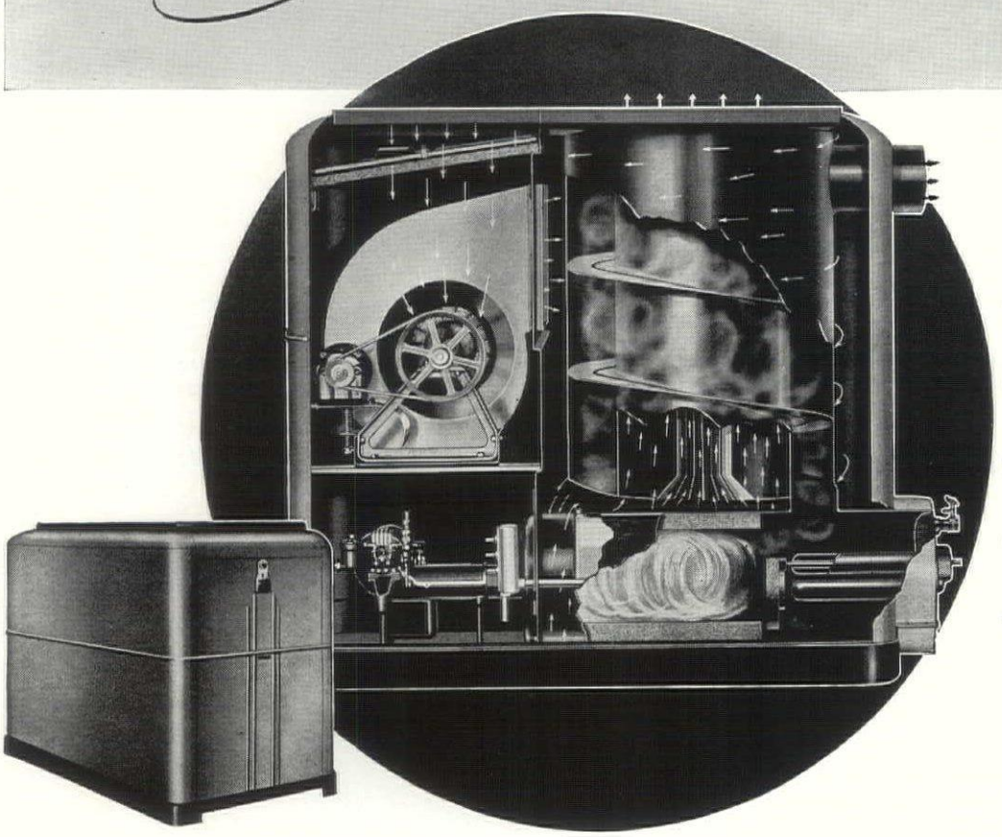
For "general excellence in architecture," thirty graduates of American architectural schools have received the School Medal of the American Institute of Architects, it is announced.

The awards, made by the Institute's Committee on Education, of which Dean William Emerson of the Massachusetts Institute of Technology is chairman, went to the following: Logan Stanley Chappell, Columbia University; Herman C. Litwack, New York University; Serge P. Petroff, Cornell University; William James Taylor, Syracuse University; Joseph Donald Mochon, Rensselaer Polytechnic Institute; Melville C. Branch, Jr., Princeton University; Adrian Nathan Daniel, Jr., Yale University; John A. Valtz, Massachusetts Institute of Technology; Eustis Dearborn, Harvard University; Paul Lucien Gaudreau, Catholic University

Tastes may differ widely in regard to style of architecture, interior decoration and the like. Period furniture and period houses may always be popular with some.

but no one wants a

Period Heating System



- COMPLETE CHANGE OF AIR EVERY 10 MINUTES.
- 95% OF THE IMPURITIES REMOVED FROM AIR.
- OVER 80% EFFICIENT...AS COMPARED WITH 20% TO 40%.
- CONTROLLED HOT WATER THROUGH HEATING SEASON.
- QUIET, EFFICIENT FAN TO CIRCULATE THE AIR.

THIS UNIT (*The Norge Fine-Air Conditioning Furnace Unit*) MAKES THE MODERN HOME MORE MODERN

For the modern home Norge offers the complete solution to the problem of heating and air conditioning. The Fine-Air Conditioning Furnace Unit performs the functions of warming, filtering, humidifying and circulating air with an amazing degree of efficiency—provides plenty of hot water at no additional cost.

In summer this unit may be used to circulate filtered, night-cooled air or—if desired—may be supplemented with cooling and de-humidifying equipment.

Get the detailed facts about the Norge Unit. Call the Norge distributor or write direct to us for descriptive literature.

NORGE HEATING AND CONDITIONING DIVISION Borg-Warner Corporation, *606-670 East Woodbridge Street, Detroit, Michigan*

NORGE

Fine-Air Conditioning Furnace Unit

Get the complete story of Norge home appliances for apartment or home installation. There are distinct advantages in standardizing on Norge equipment, apart from the exceptionally high quality of the products themselves.

of America; Alexander Hamilton Van Keuren, University of Pennsylvania; Eugene Joseph Mackey, Carnegie Institute of Technology; Joseph Frank Balis, Pennsylvania State College; Hollie W. Shupe; Ohio State University; Cyrus L. Baxter, University of Cincinnati; Leon Clement Hufnagel, University of Notre Dame; Paul Bradley Brown, University of Michigan; Ivar Viehe-Naess, Jr., Armour Institute of Technology; Edward Hele Fairbank and Arthur Richard Williams, University of Illinois; Raymond Edwin Lippenberger, Kansas State Agricultural College; Curtis Besinger, University of Kansas; George Victor Davis, Washington University; Robert W. Auvinen, University of Minnesota; Albert C. Martin, University of Southern California; Wendell Ross Spackman, University of California; Yoshio Iwanaga, University of Washington; Richard Nichols Hoar, Alabama Polytechnic Institute; James Lanier Doom, Georgia School of Technology.

NEW COURSES AT COLUMBIA

Studies in noise, sound vibration in buildings, and other disturbing factors which intensify the discomforts of city life and decimate property values will be launched by the Columbia School of Architecture this fall, it is announced by Prof. George M. Allen, who will direct a new program of instruction in University Extension.

Building acoustics, air conditioning, illumination and structural and decorative materials, are included in a large group of evening courses to be conducted by a teaching staff composed of physicists, architects, engineers, and experts from the industries.

The demand for less noise and sound vibration is increasing, Professor Allen said in explaining the work in acoustics of buildings, which, sponsored by the Departments of Physics and Architecture, will be under the direction of Vesper A. Schlenker, a former research engineer in the Bell Telephone Laboratories. Architects, engineers, and others who are responsible for the design and equipment of all types of buildings will be enrolled.

"Rapid improvements in sanitation, fireproofing, heating, air conditioning, and ventilation have brought too much noise and vibration into our modern buildings," the announcement said. "At the same time increased traffic of automobiles, trucks, trains, and construction outside have increased the noise which distresses the occupants of buildings. Public opinion is quite definitely against noise today. It is well known that noise has a profoundly injurious effect on rentals and real estate values."

Demonstration of the properties of sound and vibration will constitute the first part of the study of acoustics, which was described as a basic course of lectures, demonstrations, and projects. Advanced principles, among them the analyses of speech and music by the electrical method, will be employed. Existing buildings will be used for purposes of illustration in the second part of the course, which deals with acoustic design and planning.

Two courses in air conditioning will be given in collaboration with the Department of Mechanical Engineering "to clarify the principles and practical technical requirements of this rapidly growing industry." One, explaining the equipment and the theory of processes for air conditioning, will be directed by R. W. Waterfill of the Buensod-Stacey Air Conditioning, Inc.; and the other, dealing with the technical

(*Continued on page* 112)

ARCHITECTURALLY SPEAKING

by

OTIS ELEVATOR COMPANY

We are at this time announcing to the world at large what we consider an important step in elevator progress. We are now offering, for every type of service (passenger and freight), elevators whose control mechanism is entirely operated by buttons. As a means of identification, these elevators will be classified under the head of Finger-Tip Control.

We're going to run over briefly the various types of elevators with Finger-Tip Control in order to give you a glimpse at the installation possibilities. The logical place to start is with Signal Control, since it is a member of the Finger-Tip Control group that is known to you and has really been the inspiration for the complete Finger-Tip line.

No use going into a lengthy explanation of Signal Control. You have seen it in operation in most of the tall buildings. It is no news to you that it offers the finest type of elevator service available today.

But here's an important addition. Signal Control is now available for geared machines. This means that Signal Control can now be had for the medium-sized building. Geared Signal Control opens up such vast modernization possibilities that it will be discussed at length in "Architecturally Speaking" at a later date.

Next Finger-Tip passenger elevator classification is Collective Control. This machine gives the highest type of service in buildings where a regular attendant is not necessary. In fact, Collective Control can eliminate the elevator operator either wholly or partially in a large number of buildings that now must have an operator because they have Car-Switch Control elevators.

And Single-Call Control — a modified service type for personal operation. Particularly adapted to homes and small apartment buildings.

And now a phase of Finger-Tip Control that deserves special emphasis. Both Signal Control and Collective Control are available for freight elevator service. This should open an extensive new field of modernization, as well as new installation, for it offers the building owner or builder something "way out in front" in freight elevators. Also Double-Button and Dualite Control are offered — two slightly different types of control suited to modified service and neither of which requires a car attendant. Single-Call Control is likewise available for the service elevator installation that will be called upon for light, intermittent service.

The big point to keep in mind about Finger-Tip Control is that *every type* of building has an opportunity to minimize the human element in elevator operation and thereby better elevator service to a marked degree. We feel that Finger-Tip Control is a giant stride in the direction of progress. That it marks a definite milestone in elevator history. These are high-sounding words, maybe — but we are sincere in saying that we feel they are justified.

requirements underlying the design, installation and operation of air conditioning equipment in both the industrial and comfort fields, will be taught by C. A. Bulkeley, chief engineer of the Niagara Blower Company.

Non-structural and decorative materials will be studied in a course in contemporary interior materials and color in which the instructor will be Theodor Carl Muller, designer, teacher and lecturer. In this course, it was explained, a greater understanding of the consumer in terms of reactions to color and materials will be stressed as a growing factor in the effectiveness of contemporary work. Eugene Raskin will be in charge of a course in modern materials.

The Department of Electrical Engineering will co-operate in a course in illumination of buildings to be given by Alvin L. Powell, member of the International Commission on Illumination. "Artificial illumination is constantly playing a more important part in the design of structures," it was pointed out. "A few years ago it was the practice to complete the plans for a building before lighting received consideration. With the modern viewpoint and the availability of a wide variety of efficient light sources, lighting equipment has become a component part of the design and structure. The architect of the future will very definitely plan illumination effects and not leave their design to the electrical contractor or owner."

Alfred T. Glasset, vice president of the Building Contractors' and Employers Association, will conduct studies in estimating building construction. He will be assisted by specialists in the mechanical trades.

Technical and general courses include: The small house, by Emil Fischer; architectural drafting, by Eugene Allison; architectural perspective and shades and shadows by Prof. Allen.

Specialized professional courses in specification writing, construction cost trends, and urbanism and developments are planned. Other courses in the enlarged Extension program include general structural methods, statics, structural design and planning, and the mechanical equipment of buildings; architectural design, elements of architectural rendering, history of architecture, theory, and architectural research.

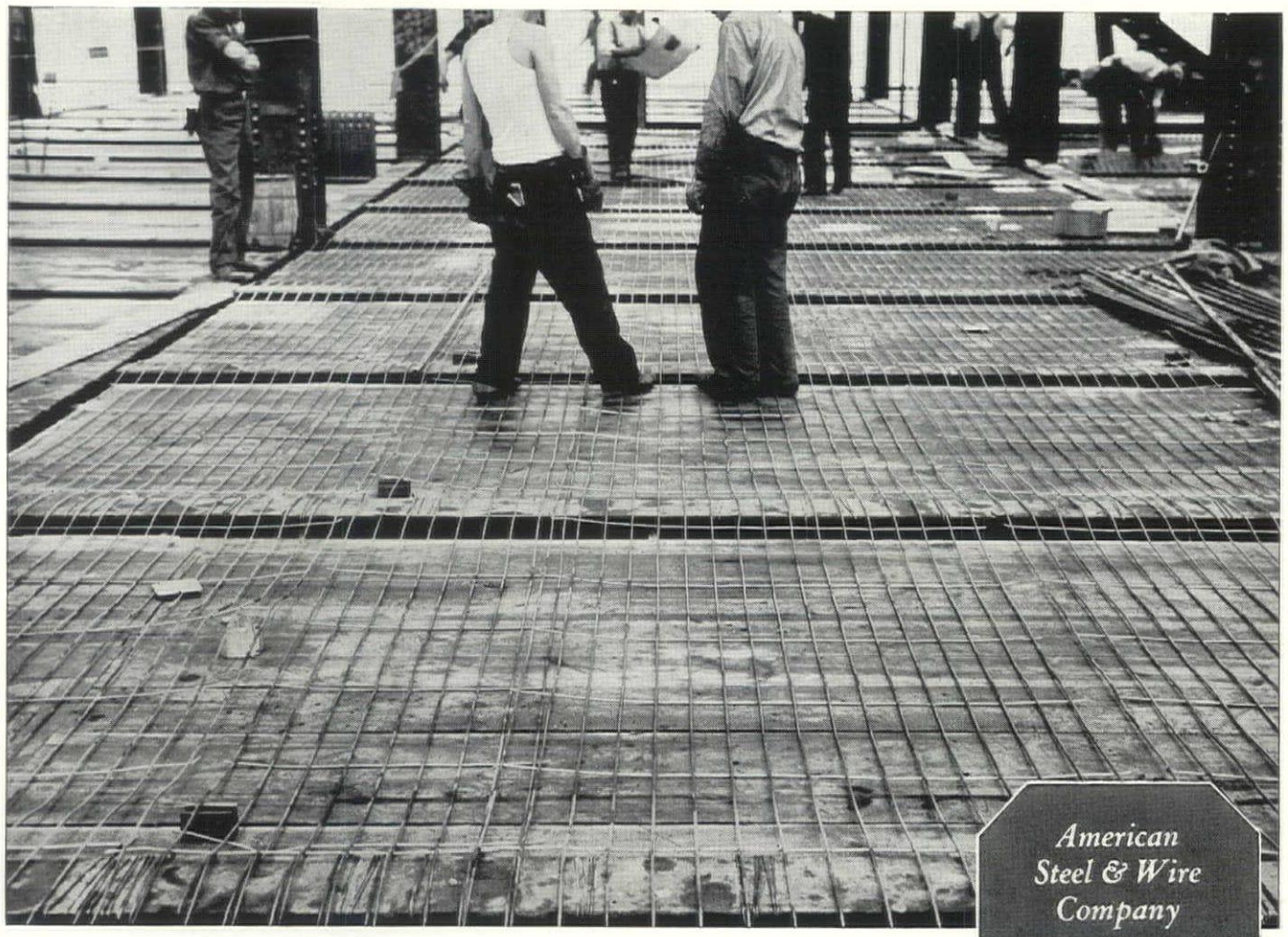
NEW APPOINTMENT AT ARMOUR INSTITUTE

Louis Skidmore, Chicago architect, has been appointed Director of the Department and Professor in charge of senior design at Armour Institute of Technology. Mr. Skidmore will be assisted in administering the Department by Mr. Jerrold Loebl of Loebl and Schlossman, who will serve as Assistant Director. Mr. Loebl, a graduate of Armour in 1921, has served during the past year on the Advisory Committee of Architects.

Mr. Skidmore, a graduate of Massachusetts Institute of Technology, and a winner of the Rotch Traveling Fellowship, spent three years traveling in Europe and studying at the Ecole Beaux Arts and the Academy of Rome. A part of this time was spent in collaboration with Samuel Chamberlain, the etcher, gathering material and preparing drawings which were published under the title "Tudor Architecture in England."

In 1929, after preparing the presentation drawings for Raymond Hood for his solution for "A Century of Progress" general plan, Mr. Skidmore joined the Exposition staff

(*Continued on page* 116)



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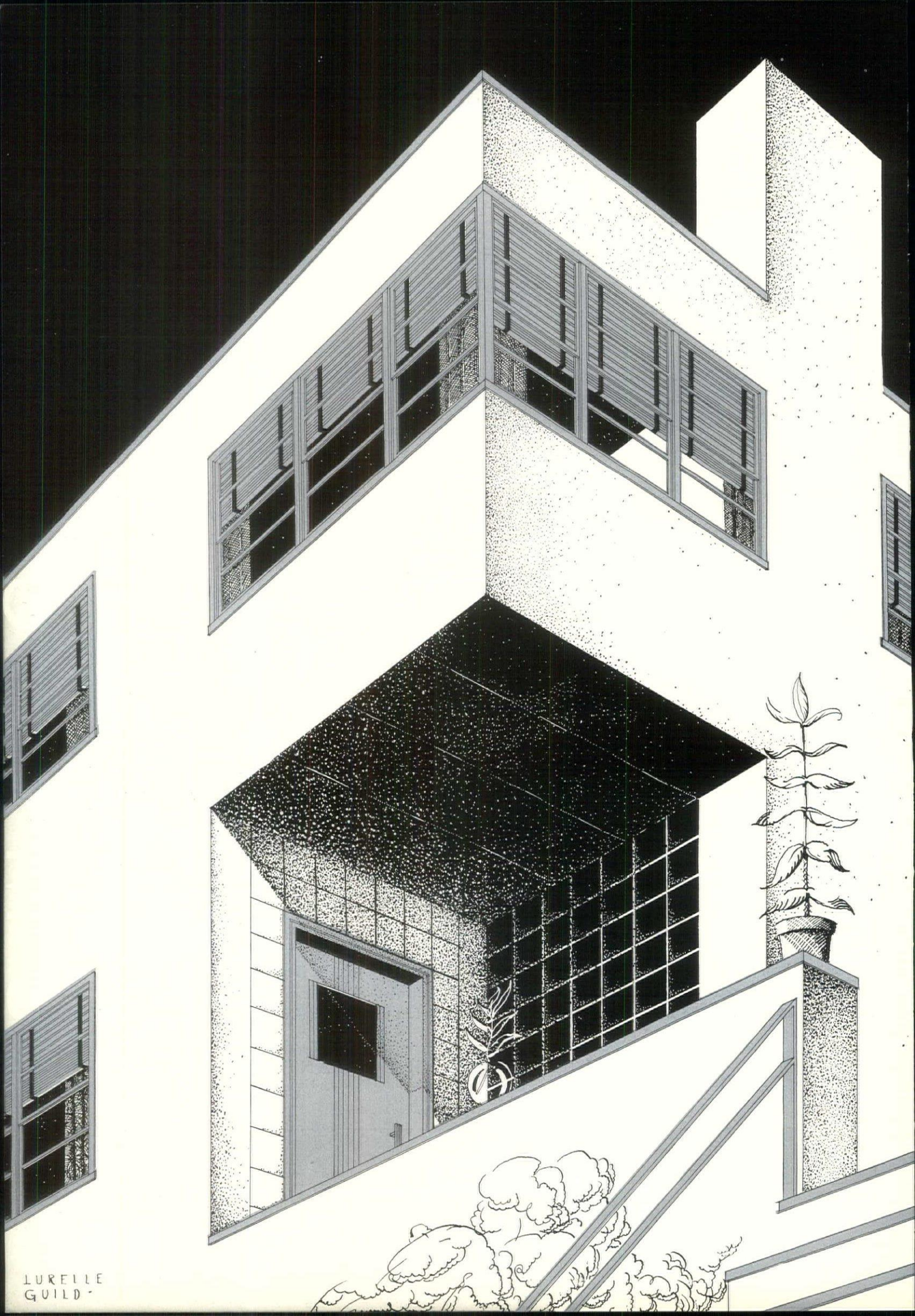
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of Design, he was responsible for the co-ordination of designs prepared by the architectural commission, for the preparation of working drawings of all buildings, and for the development and approval of all sculpture, interior design, and color.

In November, 1933, Mr. Skidmore was appointed Assistant General Manager of the 1934 Fair, in charge of all design and construction. In this position he was responsible for the designing, construction, illumination, and color of the entire 1934 Exposition. Mr. Skidmore is a practicing architect in Chicago in partnership with Mr. Nathaniel A. Owings. He has recently been appointed a member of the Advisory Commission of three architects for the 1939 New York World's Fair, along with Mr. Eliel Saarinen and Mr. Paul Cret.

DEAN SCHNEIDER AWARDED LAMME MEDAL

Dean Herman Schneider of the University of Cincinnati has been awarded the Lamme Medal for achievement in engineering education at the annual dinner of the Society for the Promotion of Engineering Education held in Memorial Union Building at the University of Wisconsin.

This is an annual award to a technical teacher for outstanding accomplishment in his profession or for actual advancement of the art of technical training. It was originated by Benjamin G. Lamme, late chief engineer of the Westinghouse Company, who at his death left a trust fund for the purpose of rewarding the achievements of technical teachers.

Dean Schneider instituted the co-operation plan of education at the University of Cincinnati in 1906. In 1911 the University of Pittsburgh conferred upon him the degree of Doctor of Science. From 1928 to 1932 he was drafted to the presidency of the University of Cincinnati pending the selection of a president. In 1933 the University of Cincinnati conferred the degree of Doctor of Laws on him and made him President-Emeritus of the University.

At the present time at the University of Cincinnati, Dean Schneider heads the interrelated Institute of Scientific Research, the College of Engineering and Commerce, and the School of Applied Arts.

OBITUARIES

Charles E. White, Architect, died recently at his home in Oak Park, Chicago, Illinois. Born in Boston sixty years ago, Mr. White has been associated with the Chicago architectural firm of White & Weber since 1903. Most recent work of his firm has been in designing the recently completed new Oak Park post office and in designing a federal housing project in Chicago's north side.

Colonel John E. Kerby, retired Architect, died recently in New York. He was 78 years old. Colonel Kerby studied architecture at Cooper Institute and at Fordham University. He was the architect for St. John's Hall at Fordham University; St. Joseph's Catholic Church; St. Thomas Aquinas Catholic Church; St. Martin of Tours Catholic Church, and the Church of the Guardian Angels. Colonel Kerby was also interested in the National Guard and was formerly Regimental Commander of the Eighth Infantry, New York National Guard.

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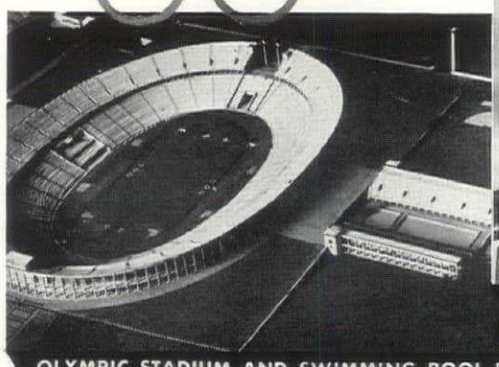
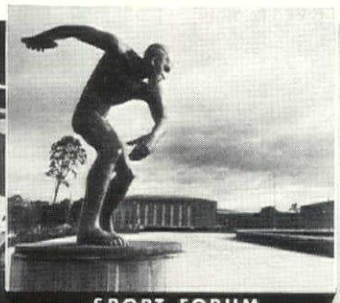
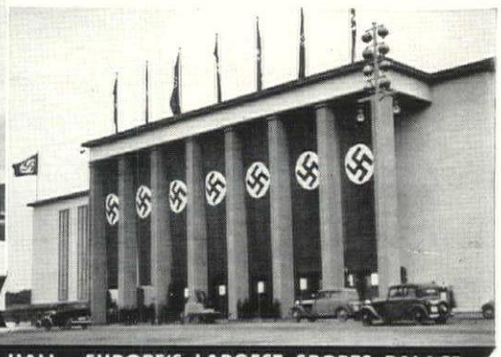


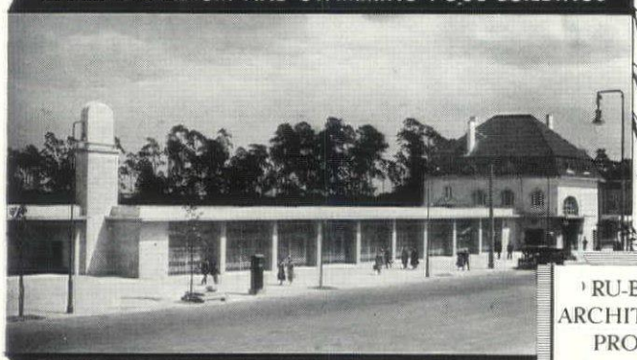
OLYMPIC STADIUM AND SWIMMING POOL BUILDINGS



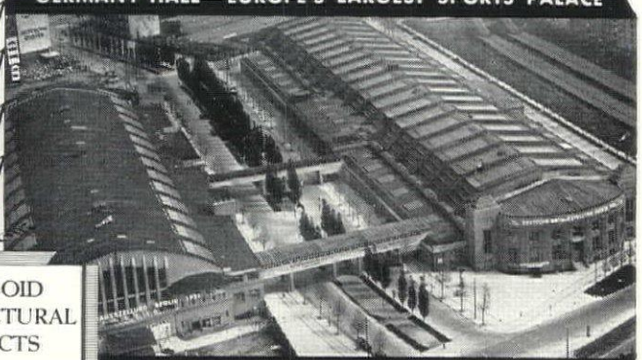
SPORT FORUM ON REICH SPORT FIELD



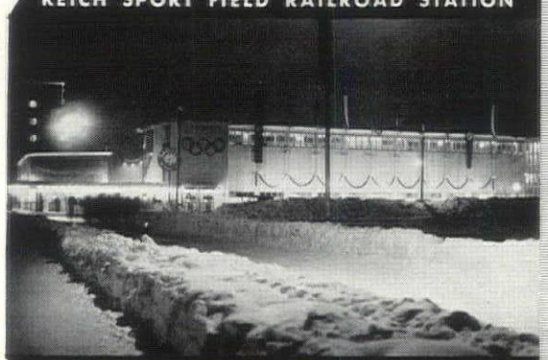
GERMANY HALL—EUROPE'S LARGEST SPORTS PALACE



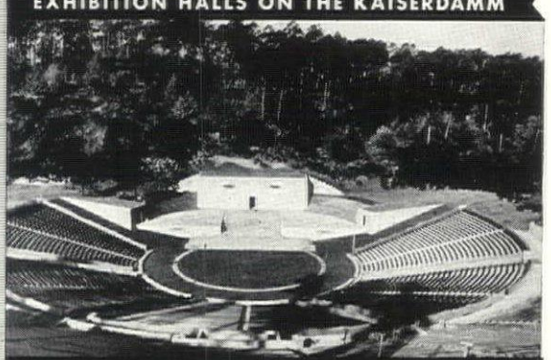
REICH SPORT FIELD RAILROAD STATION



EXHIBITION HALLS ON THE KAISERDAMM



SKATING RINK (GARMISCH-PARTENKIRCHEN)



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BOOKS

THE CAPITALS FROM THE TRAJAN COLUMN AT ROME. By Frederick W. Goudy. 74 pages, 6½ by 10¼ inches. Illustrations from drawings and a photograph. New York: 1936: Oxford University Press. $3.

The master of type design in America, feeling that this inscription is typical of the monumental characters from which most of our early types were derived, has analyzed it in careful detail. There are, of course, variations between any two cuttings of the same letter, which variations Mr. Goudy has fused to secure what he calls the typical form.

HOUSES FOR MODERATE MEANS. By R. Randal Phillips. 112 pages, 7¼ by 10 inches. Illustrations from photographs and plans. Printed in Great Britain. New York: 1936: Charles Scribner's Sons. $2.75.

The book of small houses, whether American, English, or otherwise, seems to be the popular thing these days. There are recent English houses varying in cost between £500 and £2,000, and in style from the most austere flat-roof box to the romantic cottage with steeply pitched roof of thatch. The only criterion controlling the editor's selection is that each be honest in design and construction.

STONE SETTING. The Setting of Cut-Stone Trim in Brick Buildings. Vocational Education Bulletin No. 106. Foreword by J. C. Wright. 226 pages, 5¾ by 9¼ inches. Illustrations from photogaphs and drawings. Pamphlet binding. Washington, D. C.: 1936: U. S. Department of the Interior. 20 cents.

The present revision is in the series of publications on vocational education, and is particularly thorough in its analyses of a wide variety of stone setting problems. The book, as clarifying the best methods of the craft, should be of real value to the architect in detailing and in specification writing.

OAK FLOORING. Commercial Standard CS56-36. 21 pages, 5¾ by 9¼ inches. Illustrations from line drawings. Paper binding. Washington, D. C.: 1936: U. S. Department of Commerce. 5 cents.

THE MOFFATT-LADD HOUSE. Its Garden and Its Period, 1763. By Philip Dana Orcutt. 48 pages, 6¼ by 9½ inches. Illustrations from photographs and old prints. Concord, N. H.: 1936: The New Hampshire Society of Colonial Dames of America. $1.

One of the best known and architecturally elaborate treasures of the late Eighteenth Century in New England, having appeared fragmentally in practically every volume dealing with the period, is now given a little volume of its own. Its history and descriptions are authentically set forth in a particularly charming typographical dress.

LETTERING. A Handbook of Modern Alphabets. By Percy J. Smith. 100 pages, 7 by 9 inches. Illustrations from drawings and photographs. New York: 1936: Oxford University Press. $3.75.

The author, who has been a visiting lecturer at the Camberwell School of Art, and founder of the Dorno Workshop, contributes another volume to the comparatively wide literature on lettering. The merits of this contribution are: first, that it strikes a reasonable balance between traditional types and modern variations; second, that its examples are well chosen; and third, the author's insistence that the form and character of letter should depend mainly upon the tools and materials used in its execution. There is no particular reason why lettering designed for pen drawing should be copied with a chisel in stone, and vice versa.

(*Continued on page* 122)

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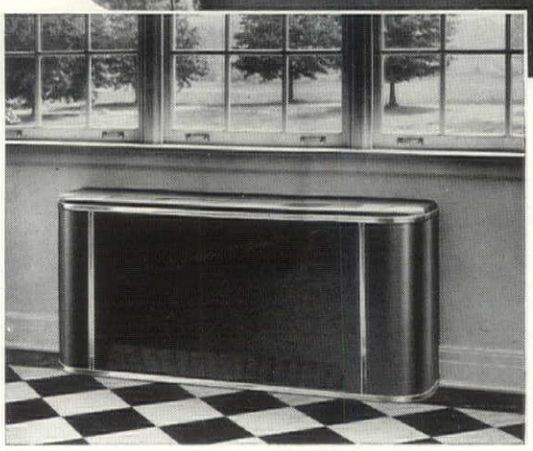

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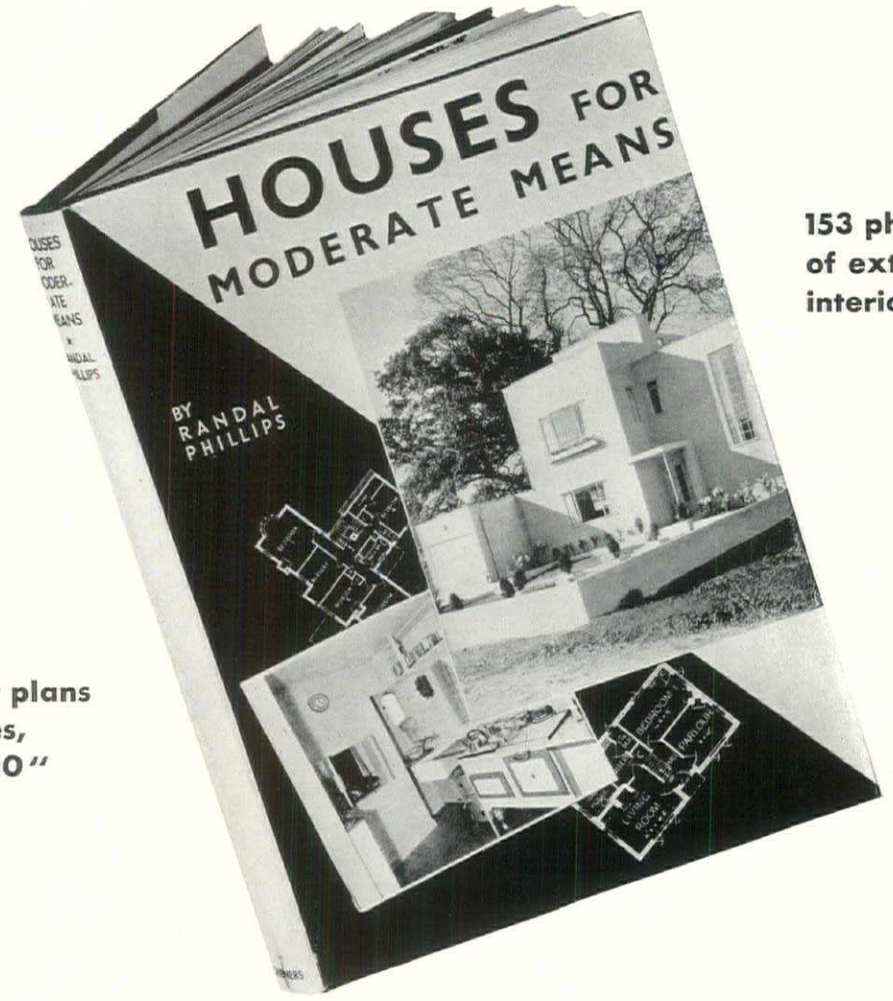

153 photographs of exteriors and interiors

151 floor plans
112 pages,
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HOUSES for MODERATE MEANS

by R. Randal Phillips, *author of "Small Family Houses," etc.*

The seventy selected modern English homes illustrated and described in this book all fall within the $2500 to $7500 price range. The styles are many and various—including numerous examples of the most modern expression with flat roofs, horizontal windows and large unbroken expanses of wall surface, the traditional English country cottage style and the formal Georgian house. Besides the profusion of photographs and floor plans there is a helpful introduction in which style, materials, equipment and building costs are considered, and a description of each house with sufficient details to guide the architect or intending house owner. Builders, architects and prospective owners of small homes will find the book of immediate interest and value. $2.75.

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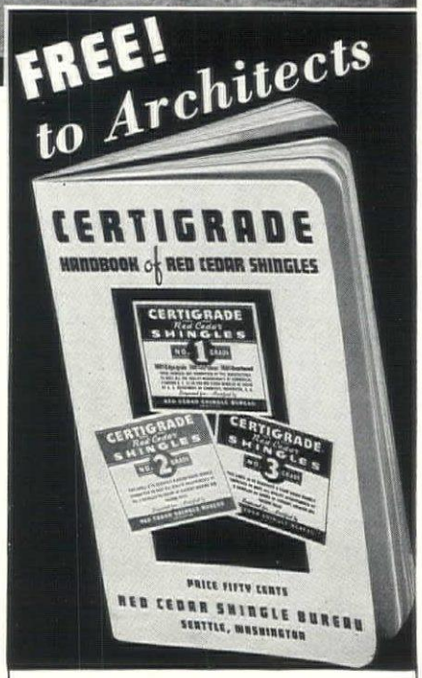

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BOOKS (*Continued from page* 118)

CONSTRUCTION COSTS, Ninth edition. 127 pages, 9 by 12 inches. Illustrations from graphs. Pamphlet binding. New York: 1936: Engineering News-Record. $1.

An annual compilation of quantity and cost data of new construction. There is a tabulation of material unit costs in twenty cities, also a buying guide for these twenty cities covering merchandising practices and material sources.

THE GREAT WALL OF HADRIAN IN ROMAN TIMES. By Paul Brown. Foreword by Parker Brewis and Eric Birley. 125 pages, 4¾ by 7½ inches. Illustrations from drawings. Printed in Great Britain. London: 1936: Heath Cranton Limited. 3s. 6d.

A rather brief text, making no great pretentions to archaeological study, but serving as an admirable thread upon which to string many drawings by the author and Constance Whyte of the buildings along the wall between Tyne and the Solway.

AIR CONDITIONING—Design and Construction of Ducts. By Thomas J. Brett. 226 pages, 5½ by 8¼ inches. Illustrations from photographs and drawings. Chicago: 1936: American Technical Society. $2.50.

With the rapid development of air conditioning equipment, and the spread of installations, duct work becomes of primary importance. A system is no better than the air tightness and proper design of its ducts. The author, who is an engineer for the Board of Education, Chicago, brings together all the tabular matter and formulae, with details of the best modern practice in duct work.

MODERN HEATING. By Harold L. Alt. 219 pages, 5 by 8 inches. Illustrations from line drawings. Chicago: 1936: Domestic Engineering Company. $1.

The author, whose name is well-known in the literature of heating, brings together between these covers, the more recent advances in practice. Recent developments in controls and in a better scientific knowledge of heating principles and methods have moved far beyond the basic principles that characterize most of the books on heating. The present volume uses these fundamental principles merely as a point of departure for modern developments.

PRACTICAL AIR CONDITIONING. By Harold L. Alt. 259 pages, 5 by 8 inches. Illustrations from line drawings. Chicago: 1936: Domestic Engineering Company. $1.

Mr. Alt has chosen as the means of conveying his information, the case system, rather than the usual organization of subject matter. Each chapter tells how to condition the air in some specific location—living-room, a small theatre, a restaurant, and so on. The theory and development of these installations are kept within the limits of understanding possessed by the practical mechanic.

BAU-ENTWURFSLEHRE. By Prof. Ernst Neufert. 298 pages, 8½ by 11¾ inches. Illustrations from drawings. Printed in Germany. Berlin: 1936: Bauwelt-Verlag. RM 19.80.

With the characteristic German flare for efficiency, the author has brought together, with astounding concentration, somewhat the same sort of material that Ramsey and Sleeper combine in their "Architectural Graphic Standards"—subjects as wide apart as, for instance, rules for obtaining ideal orientation, the proper head room over a stairway, the details of a closet coat hanger. All dimensions, of course, are in the metric system, and the text is entirely in German.

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Now homes heated with simple one-pipe steam systems can enjoy, at little expense, the ultra-refinements of modern heating and air conditioning! For the builder or modernizer who must watch his dollars, a Hoffman Air Conditioned One-Pipe Vacuum System offers value entirely out of proportion to its cost.

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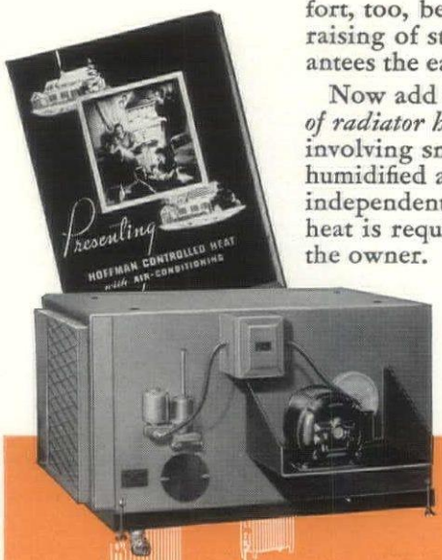

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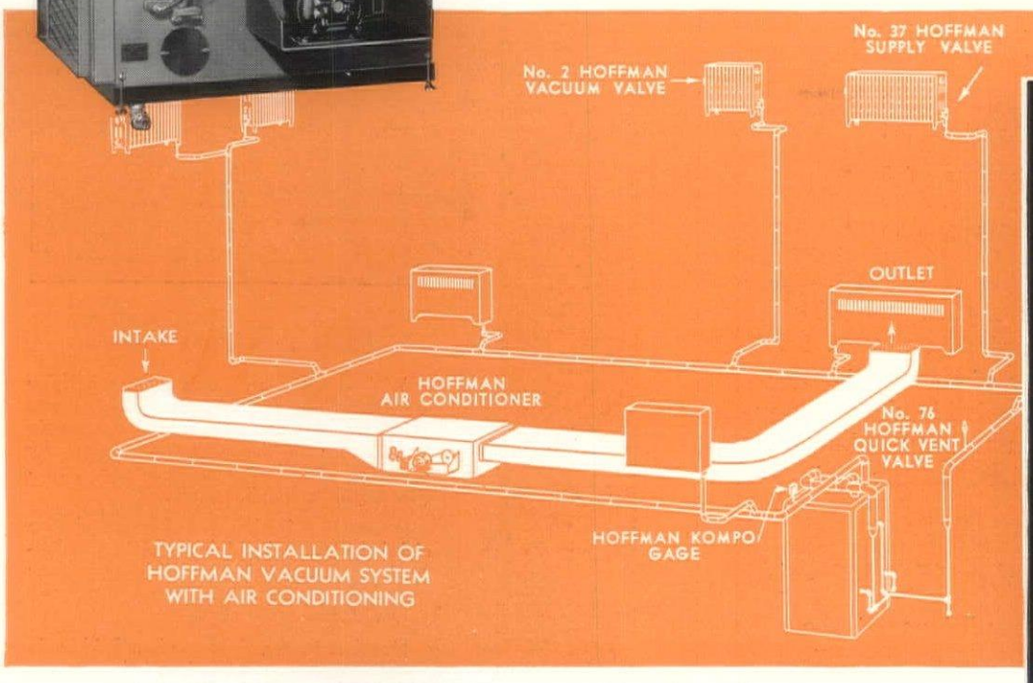

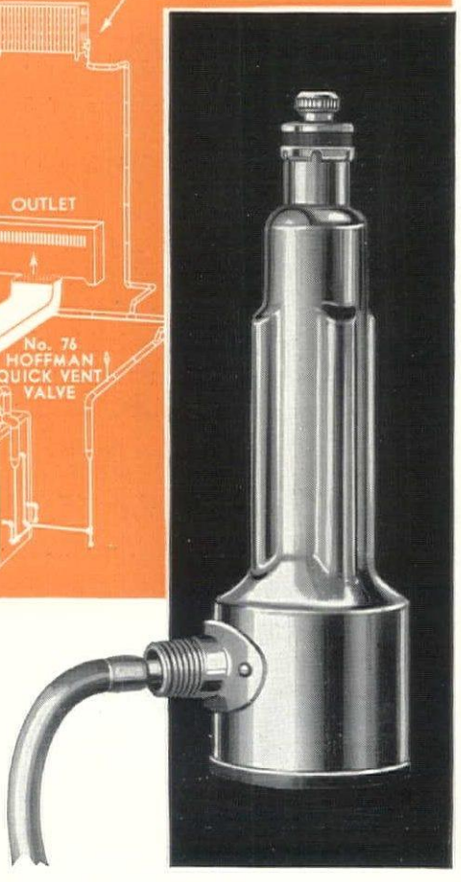

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ANNOUNCEMENTS

Robert P. Woltz, Jr., Architect, announces the opening of an office at 211 Texas National Bank Building, Fort Worth.

Otto G. Hintermann, Architect, announces the opening of new offices at 541 Call Building, 74 New Montgomery St., San Francisco, California.

Charles Bernard Sommer, 3730 Maple Square Avenue, Chicago, requests that manufacturers' catalogs be sent him.

Adolph Witschard, Architect, announces the opening of an office at 188-20 Central Avenue, St. Albans, L. I., and requests manufacturers' catalogs.

Hopkins & Huddleston announce the opening of an office, for the general practice of architecture, at 712 Graham Building, Jacksonville, Florida.

Edward Stotz, Architect, announces that his practice has been transferred to his sons and associates who will continue under the firm name of Charles M. and Edward Stotz, Jr., Bessemer Building, Pittsburgh, Pennsylvania.

Paul W. Hofferbert, Architect, announces the opening of a branch office in the Wilson Building, Anniston, Alabama, and requests manufacturers' catalogs.

Robert F. Rick, Architect, announces the removal of his office to 730 Mattison Avenue, Asbury Park, N. J. and requests manufacturers' catalogs.

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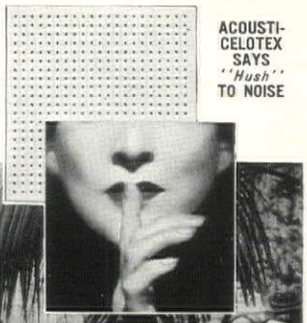

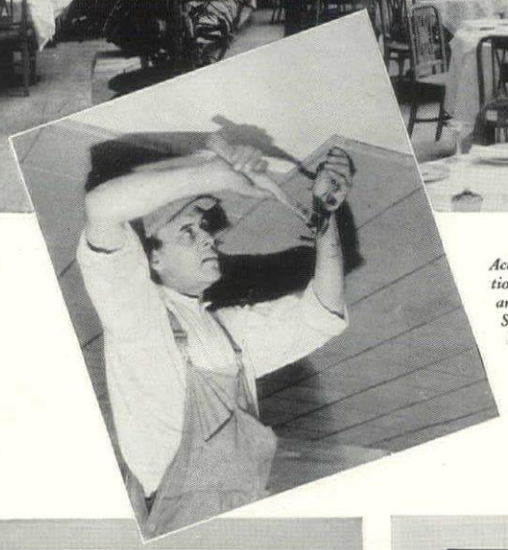

Acousti-Celotex aids in adding distinction to almost any room, using almost any variation of interior treatment. Shown above is the Garden Room, Victor Hugo Cafe, Beverly Hills, Calif.— Acousti-Celotex cemented to concrete walls.

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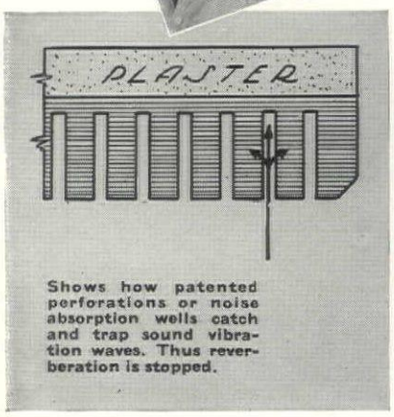
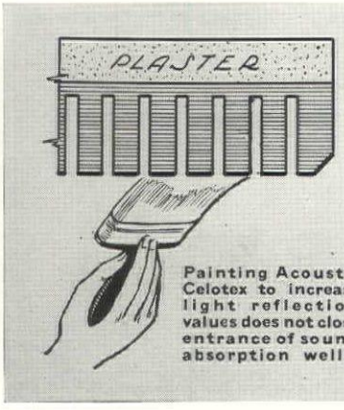
Acousti-Celotex is easily and quickly applied over old ceilings, as well as in new construction.



Shows how patented perforations or noise absorption wells catch and trap sound vibration waves. Thus reverberation is stopped.



Painting Acousti-Celotex to increase light reflection values does not close entrance of sound absorption wells.

PAINTABLE **ACOUSTI-CELOTEX** PERMANENT

TRADE MARK REGISTERED U. S. PATENT OFFICE

ACOUSTI-CELOTEX not only adds comfort and quiet to the rooms you create for your clients, but gives you unusual latitude in the creation of attractive interiors. You'll be delighted at the distinctive adaptability of this efficient noise-deadening material. And equally delighted at the satisfaction it will give your clients.

Let us send you complete information and samples of Acousti-Celotex. Use the coupon or your letterhead.

THE CELOTEX CORPORATION

Sales Distributors in Principal Cities Throughout the World

Celotex Cane Fibre Products are manufactured under the Ferox Process (patented) and resist damage by Fungus Growth, Dry Rot and Termites (white ants). Look for the brand name. Accept no substitutes.

Celotex Corporation AA-9-36
919 N. Michigan Avenue, Chicago, Illinois

Without obligation to me, please send complete facts on Acousti-Celotex, including information on the various treatments in which it can be used.

Name _____

Address _____

City and State _____

TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES

AIR CONDITIONING

Hermetically sealed air-conditioning refrigeration units have been developed by Westinghouse Electric and Manufacturing Company engineers from requirements defined by the sales department, as a result of dealer and consumer research. They were engineered from experience gained in the air conditioning refrigeration and automotive industries. The units are made in two, four and six cylinder models and are normally rated from 7 to 22 tons of refrigeration.

The company claims the following fundamental advantages:

1. Compactness—saving floor space.
2. Reduced weight—saving in cost of handling, transportation, installation and structural supports.
3. Direct drive—eliminating couplings, belts, pulleys and gears.
4. Only one external refrigerant pipe—reducing possibility of leaks, improving appearance.
5. Fewer brazed joints—reducing possibility of leaks and installation costs.
6. Visible refrigerant check—assuring full charge of Freon in the system.
7. Improved oil pump—insuring positive circulation and lubrication of bearings through rifle drilled crankshaft and connecting rods; indicated by pressure gauge and visible oil check.
8. Water cooled motor—permitting installation in unventilated spaces.
9. Quiet—permitting (with compactness and water cooled motor) a wider choice of location of the unit.
10. Vibrationless—reducing noise and vibration; accomplished by design and harmoniously balanced crankshaft.
11. Steel condenser shell and copper condenser coil—assuring long life.
12. Series parallel condenser flow—permitting pressure water or water tower cooling.
13. Pilot operated water valve—assuring positive control of cooling water.
14. Patented compressor valve—improving compressor operation and permitting higher speeds and direct drive.
15. Accessibility—permitting access to internal mechanism through service plates.
16. Interchangeable parts—permitting change of major parts in all models and lowering costs.
17. Hermetically sealed—resulting in no visible moving parts, sealing in of power and elimination of dust, dirt or moisture from working parts.

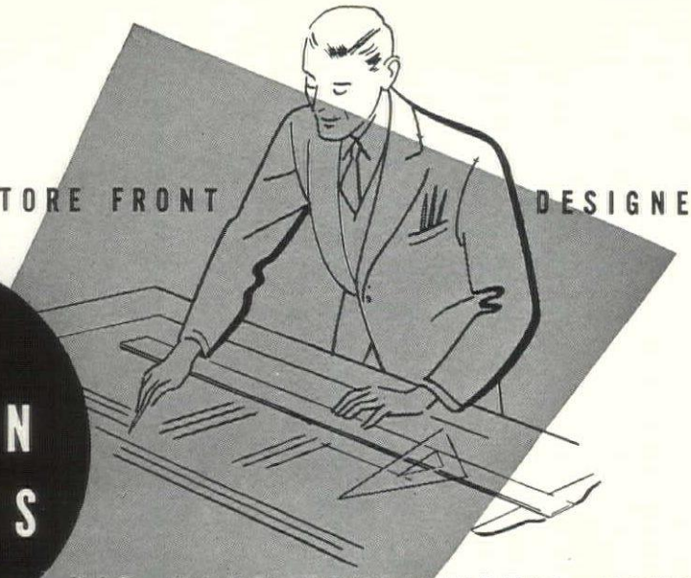
660M

NEW AIR CONDITIONING THEORY

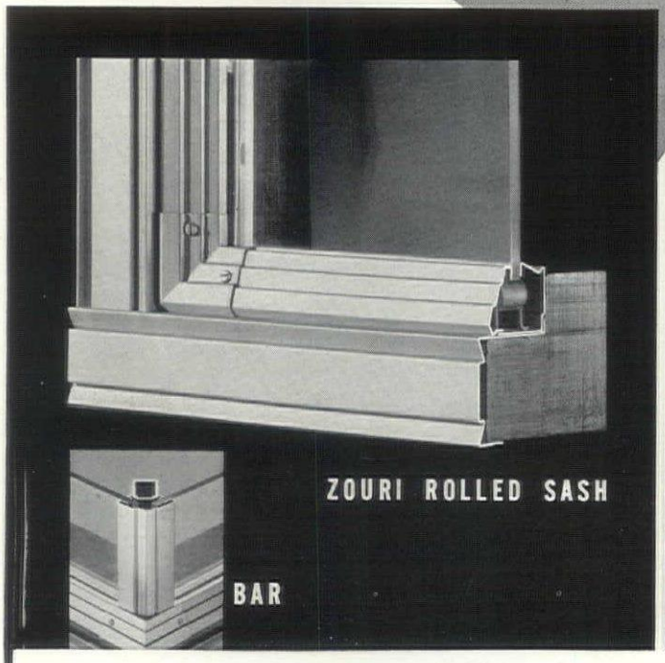
Dramatic changes in summer air conditioning methods are forecast by tests now being conducted on cooling equipment of a wholly new type which does not use any refrigeration equipment or compressors. A New York inventor has recently succeeded in operating two commercial-size test installations at costs of 15 to 25% of the costs formerly incurred when cooling the same space by standard refrigeration equipment. The new system, which will not be announced until patent protection has been fully secured, uses water as the primary cooling medium. A compact, high efficiency, indoor cooling tower keeps water consumption well below that required for ordinary water cooled refrigeration condensers; in fact, one of the test installations showed a reduction in water costs of over 90% as compared with standard refrigeration equipment. A new type of automatic de-humidifier constitutes the second major feature. Its nature has not been revealed but it is said to use a liquid absorbent that can be regenerated

SUGGESTION TO STORE FRONT DESIGNERS:

FOR MODERN EFFECTS

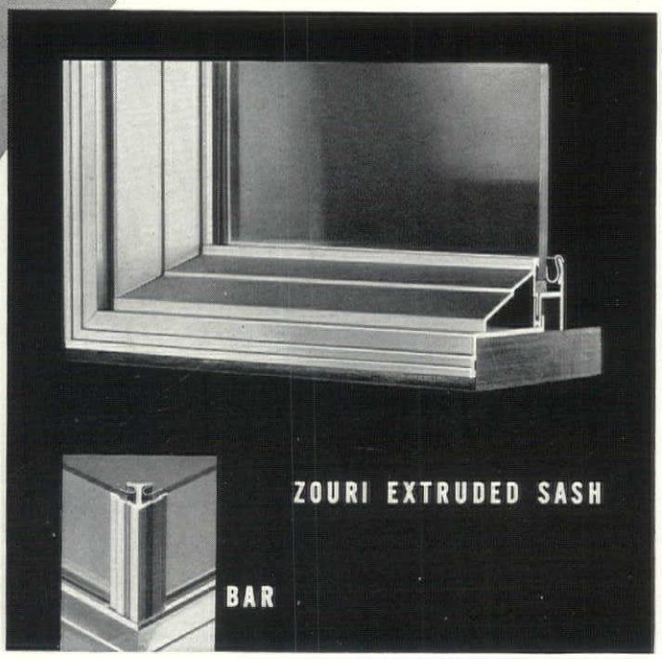


USE MORE ZOURI METAL CONSTRUCTION



ZOURI ROLLED SASH

BAR

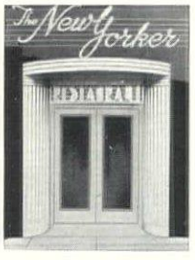


ZOURI EXTRUDED SASH

BAR

Today's store-front design trend indicates a growing appreciation of the smart design possibilities that lie in the wider use of modern metal—as fabricated by Zouri. To meet this demand Zouri offers a full line of members in either rolled or extruded construction. Rolled sash includes the famous Zouri Safety Key-Set features; extruded Spring-Set sash gives continuous cushion grip on glass. A wide range of architectural metal shapes is also available, as well as entrance doors, metal signs, and other special members to architect's details—for every modern structural and decorative function.

Recent developments include the complete extruded line; hood, concealed and recessed awning bars in both constructions; the durable alumilite finish. See the Zouri distributor or write direct for full size details. Catalog in Sweet's.



ZOURI STORE FRONTS,
NILES, MICHIGAN

ZOURI METAL—

★

SASH
BARS
AWNING BARS
TRANSOM BARS
SIGNS
DOORS
MOULDINGS
PILASTERS
ETC.

ZOURI

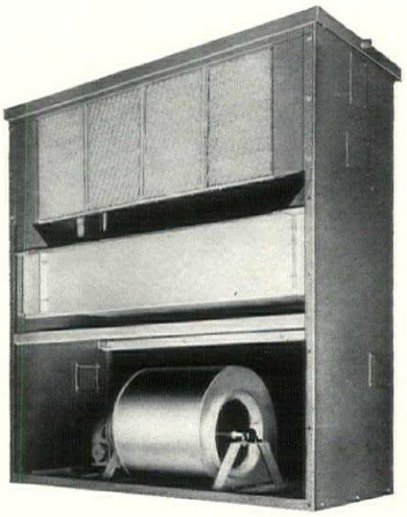
Zouri Store Fronts, Niles, Michigan
Send F. S. Details of ☐ Rolled ☐ Extruded
Zouri Store Front Construction.

NAME AA-9

ADDRESS

continuously at very low operating cost. The underlying theory of this new system centers around the fact that comfort cooling does not require—or even permit—more than a 15° drop in temperature. Higher differentials cause too much shock to the human body. Normally 5 or 10° temperature reduction is adequate if accompanied by a substantial reduction in relative humidity. The new system avoids the necessity for lowering air temperatures to the dew point in order to dehumidify the air, followed by re-tempering with warm air to produce the required over-all differential. It relies first upon effective dehumidification by adsorption and then upon cooling by water which in turn is kept at the required temperature by evaporation.

While the first two installations have been made in commercial establishments and are of relatively large capacity, it is apparent from information revealed exclusively to AMERICAN ARCHITECT AND ARCHITECTURE that the equipment can be adapted to residence size projects. It has been estimated that it will be possible to provide summer cooling for an ordinary house at an equipment cost of less than $1000 and at a seasonal operating cost of perhaps $25 to $35. 661M



VERTICAL AIR CONDITIONING UNITS

A new line of vertical type year 'round air conditioning units has been placed on the market, designed primarily for human comfort air conditioning applications such as department stores, restaurants, hotels, specialty shops, etc. The new vertical units are used for conditioning single rooms or groups of rooms from one unit. In the group system, several rooms with similar load characteristics are conditioned by a single unit, and in large installations several air conditioners may be operated in multiple from a central refrigerating machine. Smallest of the new units is Model FC-308 of about 3-ton refrigerating capacity which can be mounted in either a horizontal or vertical position. This unit is provided with its own plenum chamber, lined with an acoustical material so that its operation is quiet. Larger units are the 600 series with approximately 6 tons cooling capacity, the 1500 series with about 15 tons cooling capacity, and the 3000 series which handles about 30 tons of refrigerating effect per day. All units are arranged for the by-pass method of temperature control, when required, and are manufactured by York Ice Machinery Corp., York, Pa. 662M

AIR CONDITIONING UNIT

The Climate Changer, manufactured by the Trane Company, La Crosse, Wis., has been redesigned to present a more efficient and compact air conditioner for residences and small buildings. A new target-type humidifier that is said to eliminate completely the difficulties of clogging spray nozzles and coated

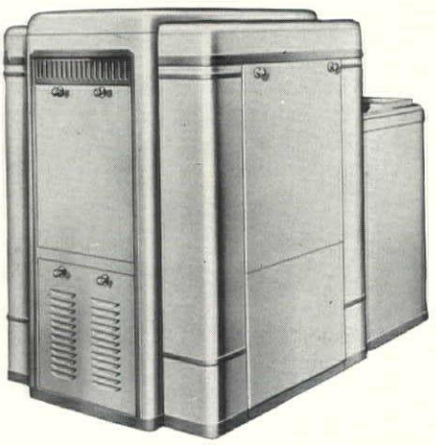
TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES

cascade trays has been added. In operation a fine stream of water at a high velocity is directed against a specially designed target where the force with which it strikes serves to spread it in a fine mist throughout the humidifier chamber. A half-inch layer of insulation lines the bottom of the unit where cold condensation water is drained from the dehumidifying coils. Special arrangements permit easy access to the interior of the unit. Other changes have also been incorporated, but the general cycle of operation that provides winter heating, humidifying and filtering, and summer cooling, dehumidifying and filtering, is the same. 663M

GAS-FIRED AIR CONDITIONING FURNACE

The new DeLuxe Series D Sunbeam Gas-Fired Air Conditioning Unit is encased in a cabinet of heavy 20-gauge, cold-rolled furniture steel finished in glossy, two-tone green enamel. All bolts and screws are concealed. Corners are gracefully rounded and proportions have been carefully balanced. Valves, piping, motor and controls are concealed, yet are readily accessible through large,



removable panels. This unit is suitable for the modernizing of existing homes as well as for new residences. It can be equipped with "zone control" whereby temperature can be controlled in one section of a house independent of the balance of the structure. The unit is manufactured by The Fox Furnace Company, Elyria, Ohio. 664M

AIR CONDITIONER

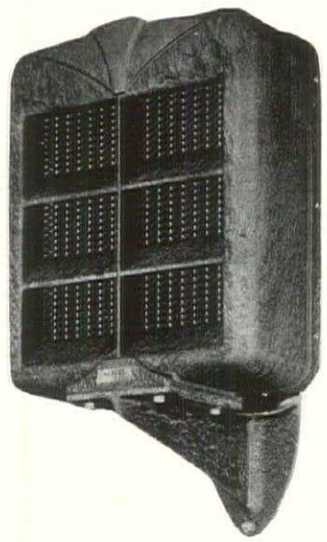
Kewanee Boiler Corporation, Kewanee, Ill., has added an air conditioner for homes and smaller buildings to its line of heating equipment. The sum total effect produced by the new Type RK Conditioner teamed with a Type R Boiler is a controlled supply of clean air automatically warmed, humidified and circulated, and year 'round hot water. Some of the features of the new air conditioner include: Air filter of the viscous throw-away type; a heating coil of copper tubes with aluminum fins rolled into cast-iron headers; thermostatic bulb to check the air delivery if no steam is fed to the coil; control cabinet with transformers to operate humidifying spray nozzle and relays to burner or stoker; self-cleaning spray nozzle in humidifying chamber; blower fan with acoustically lined venturi discharge to set air in motion; and resilient mounted motor driven by silent V-belt. In summertime refreshing ventilation is available. Renewal air drawn from outside into the recirculating system is cleansed by the filters. 665M

ALL ELECTRIC HEATER

With its dual heat control the high heat of a new all-electric unit heater can be used for quickly heating a given area

TECHNIQUES

METHODS • MATERIALS • RESEARCH • PRACTICES



and the low heat for maintaining the temperature. This new unit is a complete electric heating plant in itself. No piping is necessary, and it can be installed any place by connecting it to the electric circuit. The heater has an all-copper core with cast top and bottom tanks. Electric immersion-type heating elements enclosed in the bottom tank heat a non-freezing liquid which balances the temperature at 180 degrees. It is finished in crackle lacquer of antique gold and is completely sealed. Hexcel Radiator Co., Racine, Wisconsin has introduced this new unit heater. 666M

DUCT CORKBOARD INSULATION

A new type of corkboard insulation for ducts has been developed to meet the requirements of small commercial air conditioning installations. The main problem in such installations is to prevent condensation rather than to conserve refrigeration; hence the new type of corkboard, offered in ½-inch thickness, is said to be sufficient to solve this problem. The new material is claimed to be unaffected by moisture, and a thin mastic coating on one side strengthens it, increases its flexibility and provides a finish. It can be readily erected in waterproof cement or asphalt and, because of its light weight, reinforcement with wires or bands is not necessary in many cases. It can be made to conform to sharp curvatures and can be cut and fitted with a sharp knife. This corkboard insulation, known as DI (Duct Insulation) Corkboard is available only in ½-inch thickness and in 12" x 36" sheets, and is manufactured by Armstrong Cork Products Co., Lancaster, Pa. 667M

CONSTRUCTION

NEW PAVING MATERIAL

A new inexpensive paving material, made from the waste in a pulp and paper mill, has been discovered and is now being made commercially. Pulp mill men have puzzled over the fact that one-half their raw material was wasted —run away in muddy streams of what is known as "cooking likker." This "likker" formerly discarded, is now converted through a secret process into "Raylig" which it is said, will turn gravel roads into paved thoroughfares more cheaply than oil or other road binding materials. The new material hardens in a few hours, is unaffected by water (but may be washed off cars that run over it before dry) and will not harm rubber tires. "Raylig" is made by the Rainier Pulp and Paper Co., Shelton, Washington. 668M

BUILD YEAR 'ROUND COMFORT INTO HOMES . . . BUILDINGS

Give Owners the Economy Features of RED TOP INSULATING WOOL

■ For the architect Red Top Insulating Wool comes very close to being the perfect insulation. It combines tremendous efficiency with low cost . . . lets the architect get the results he knows are best at a price the client can pay. A four-inch thickness has eight to ten times the efficiency of typical half-inch insulations. And the cost installed is low, so low that Red Top soon pays for itself in fuel saved.

FIREPROOF PERMANENT. There is no other insulation quite like Red Top Wool. It is unique in its light weight . . . only eight ounces per square foot four inches thick . . . in its life, its resiliency and in its clean white appearance. Red Top stays in place to give long and efficient service. It is genuine wool, made of long staple fiber free from shot and other non-insulating impurities. It is fireproof, vermin proof, permanent.

A PRACTICAL INSULATION. Not a one purpose insulation, Red Top helps to solve many problems . . . insulation of the new home, reconditioning the old home, economical use of automatic heat, reduction of fuel costs in homes expensive to heat and always the achievement of comfort summer and winter.

SPECIAL TYPES. Red Top is now made in new special types with special advantages. Red Top Strip Wool . . . nine-foot strips that fit snugly between studs, ceiling to floor. Each has a face of tough waterproof paper with a flanged edge for nailing to studs or rafters. Red Top Bat Wool also has the same waterproof paper face with flanged nailing edges.

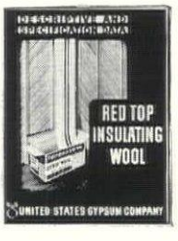
COMPLETE SPECIFICATION DATA. Send for specification book pictured below. Bat Wool, Strip Wool, Junior Bat Wool, Nodulated and Granulated Wool are all described and a specification is provided for each. You will find this a handy manual and a practical reference source on insulating wool. Send for your copy today.

UNITED STATES GYPSUM COMPANY AA-9
300 West Adams Street, Chicago, Illinois
Please send me, free of charge, a copy of USG Red Top Insulating Wool Specification Book.

Name.....

Address.....

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

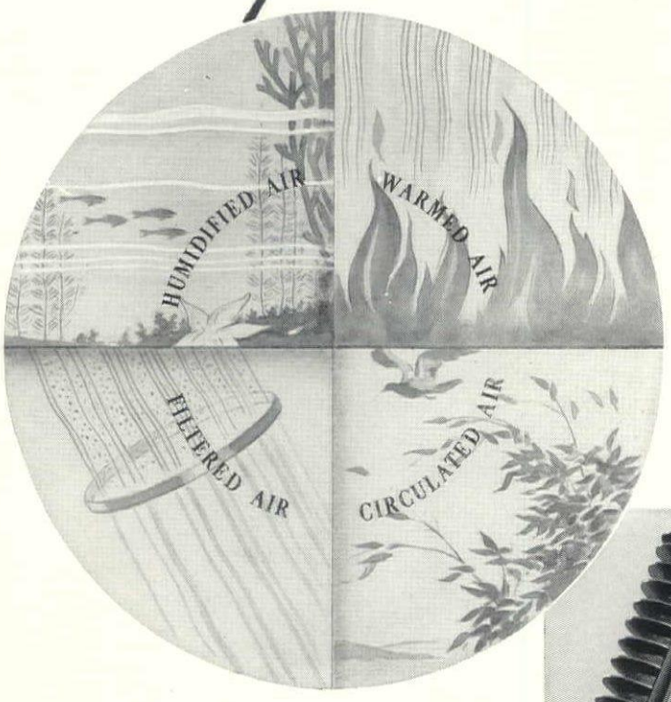


UNITED STATES GYPSUM COMPANY

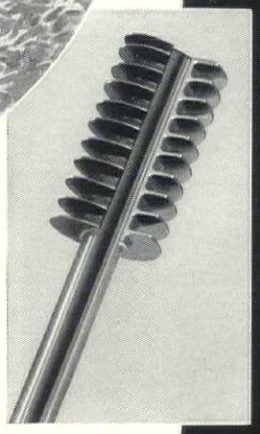
INDEX TO ADVERTISERS

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.

Only GAS ★★★★ CAN GIVE YOU



Fully Automatic HEAT TOGETHER WITH HEALTHFUL REVITALIZED AIR



Detailed description of this copper-fin-and-rod heat exchanger — an exclusive Janitrol feature — will be mailed on request. Write for it.

GAS is the only fuel that is absolutely clean, completely automatic, and readily adaptable to positive, accurate control.

This new Janitrol Gas-Fired Winter Air Conditioner matches this perfect fuel with a highly perfected heater, combining these important features: compactness, attractive styling, finished in opalescent azure blue enamel, with chrome handles and louvres, high heat output, improved humidification and more accurate temperature control.

Measuring only three feet square and six feet high, including the bonnet, in the 90,000 B. T. U. hourly size, this new unit provides high heat output in materially reduced space, through the use of a new copper-fin-and-rod heat exchanger. Additional heat output requires a cabinet of no greater width or height . . . and only slightly increased depth.

Ask for detailed specifications on this and other Janitrol gas-burning house-heating equipment, including conversion gas burners and gravity heaters.

✱ RESEARCH AND DEVELOPMENT

Janitrol Gas-Burning equipment is made by the largest exclusive manufacturer of such equipment in the world. For years, they have specialized in all types of gas-burning units, including many of the largest industrial installations. Janitrol leadership is based upon extensive engineering research. 10% of the Janitrol organization being engaged in research and development work.

SURFACE COMBUSTION CORPORATION

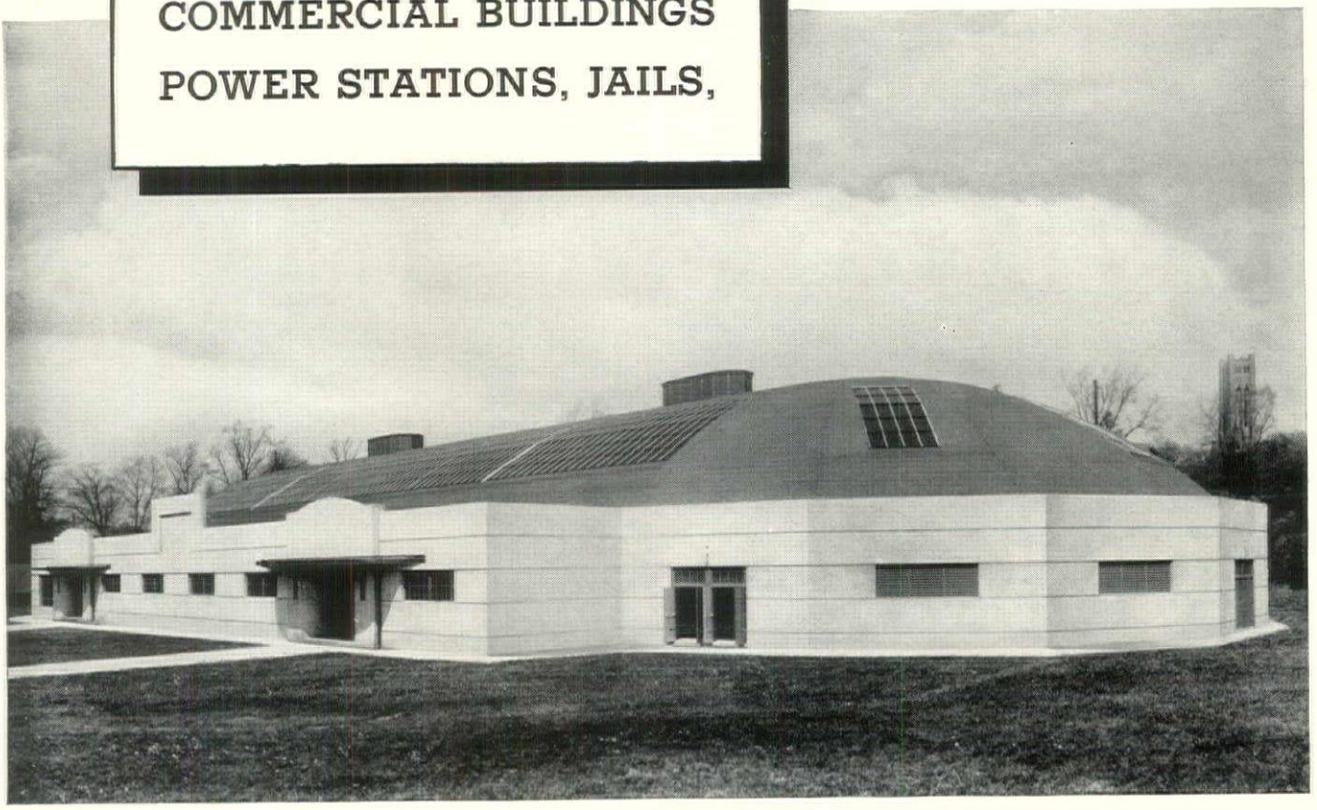
Engineering Service in all Principal Cities

TOLEDO, OHIO

JANITROL GAS-FIRED *Winter* AIR CONDITIONER

CHURCHES, SCHOOLS
HOSPITALS, FACTORIES
COMMERCIAL BUILDINGS
POWER STATIONS, JAILS,

Swarthmore College field house, 326x175 ft. Walls of monolithic concrete matching in color and texture the warm buff and pink of surrounding stone buildings. Architects: Karcher & Smith, Philadelphia. Contractor: Hughes-Foulkrod Co.



AND NOW A COLLEGE FIELD HOUSE—

speak for the versatility of Concrete

Architects with a wide range of buildings from cathedrals to warehouses tell us that concrete has greatly simplified their designing problems.

Consider the case of Swarthmore College field house. The architect was faced with the problem of selecting a material that was economical, that provided the exact surface texture desired, and that had ample strength, density and weather resistance.

Wisely, he designed the building for concrete. Using plywood forms in 4-foot panels, it was easy to obtain the surface texture wanted.

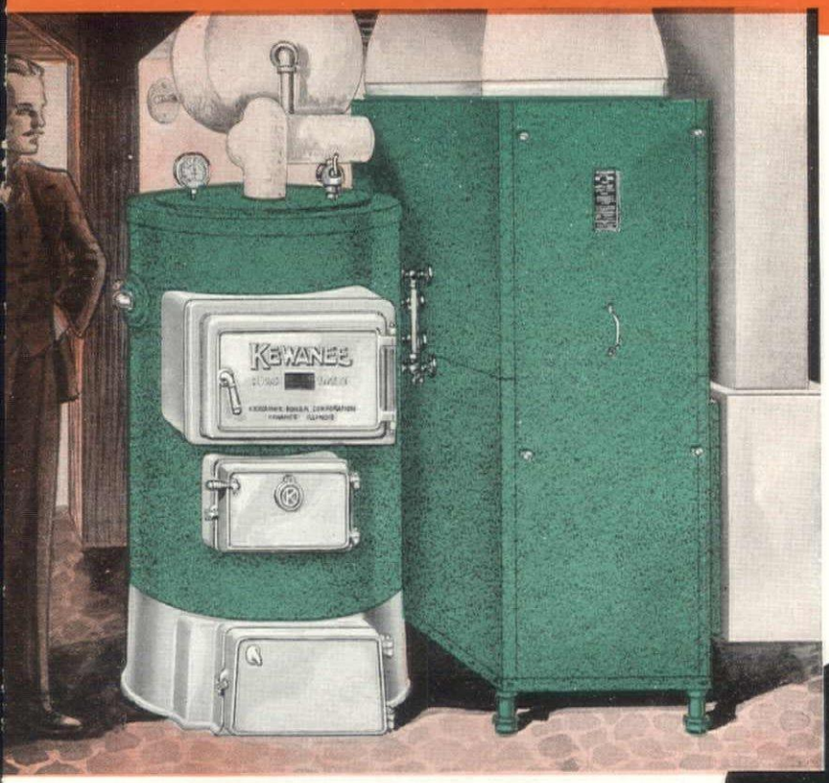
Why not plan on concrete as the combined structural and architectural medium for your next building? Take advantage of its distinctive beauty, its economy, fire-safety and permanence. Let us help by sending information sheets and the new manual, *Forms for Architectural Concrete.*

PORTLAND CEMENT ASSOCIATION
Dept. A9-2, 33 West Grand Avenue
Chicago, Illinois

DEPENDABLE HEAT *Plus* YEAR 'ROUND HOT WATER

Plus Conditioned Air with

KEWANEE BOILER AND CONDITIONER



Typical Set-up of a Kewanee Air Conditioning Installation
Kewanee Round Boiler Type "R", with Copper Coil for Domestic Hot Water and Kewanee Conditioner Type RK.
The Kewanee RK Conditioner is built in 3 sizes to Condition 13,000 cubic feet space and larger . . . capacity 400 to 700 feet of equivalent direct radiation . . . 103,000 to 180,000 Btu. per hour. Cooling and de-humidifying equipment can be added any time.

Homes and small buildings may now enjoy all the advantages of Conditioned Air plus Dependable Heat and Year'round Hot Water through these sturdy, tested products built with all that engineering genius, manufacturing skill and experience which for 68 years has characterized all Kewanee products.

Designed, engineered and built for conditioning spaces as small as 13,000 cubic feet, the Kewanee RK Conditioner, hooked up to a Kewanee Boiler brings to homes the Acme of Comfort at the Minimum of Cost.

1. **WARMS THE AIR** automatically and
2. **HUMIDIFIES IT** simultaneously
3. **FILTERS THE AIR** continuously &
4. **CIRCULATES IT** positively yet quietly
5. **VENTILATES THE HOME,** without draft

Never forget that regardless of the size of the building, or the fuel used, the Success of every Heating and Air Conditioning Plant Depends Primarily on the Boiler.

The Design and Construction of Kewanee Boilers and Conditioners is the result of expert collaboration of skill and 50 years experience of the largest organization in the industry.

Basement of KEWANEE Air Conditioned Residence, 13,000 cu. ft. content. No. 1736 Round "R" Boiler. No. 500 Kewanee Conditioner.

Ask for Circular RK-92

KEWANEE BOILER CORPORATION

KEWANEE, ILLINOIS

Branches in 61 Cities: Eastern District Office, 37 W. 39th St., New York City
division American Radiator and Standard Sanitary Corporation

How J-M Asbestos Felts Prevent "SUN-BURNT" Roofs!

Successfully resisting the sun's intense drying-out action, J-M Asbestos Roofing Felts permanently protect the waterproofing asphaltic oils against evaporation

YOU'VE seen "sun-burnt" roofs . . . dried out, disintegrating, because the waterproofing oils in the asphalt have been drawn out of the felts by the sun.

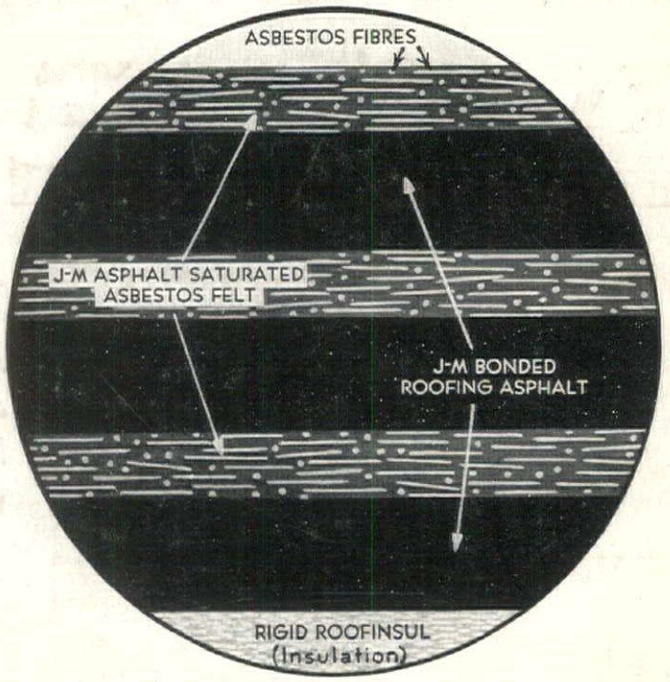
But you will never see that happen to a Johns-Manville Smooth-Surfaced Asbestos Roof. And this is why:

As the drawing on the right indicates, the asbestos fibres in J-M Roofing Felts are *solid, non-capillary*. Where ordinary, hollow fibres act as "wicks" for conducting asphaltic oils to the roof's surface, these solid, rod-like asbestos fibres form a positive barrier against evaporation. The waterproofing oils can't be drawn up through the felts, regardless of the intensity of the sun.

Hence, J-M Asbestos Roofs remain live, elastic. No cracks, no leaks. Maintenance held to a minimum throughout their years of service. And the years are many . . . for asbestos is a fire- and rot-proof mineral of inherent permanence.

Result? Hundreds of J-M Asbestos Roofs—under varying service conditions—are still in their prime after passing the 20-year mark. (A partial "honor roll" is given below.) This is the permanent protection you, too, can expect of J-M Asbestos Roofs.

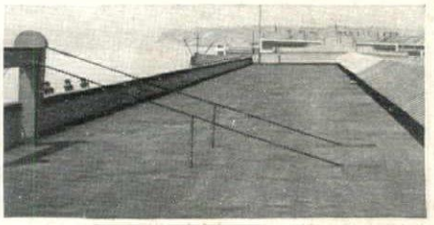
Send for our free handbook, "Facts about Built-Up Roofs"—a complete discussion of all built-up roofing problems and their solution. For your copy, address Johns-Manville, 22 East 40th Street, New York City.



Enlarged Roofing Cross-Section Shows Why J-M Asbestos Felts Protect the Waterproofing Asphalts from the Sun

As this drawing of a 3-ply J-M Asbestos Roof shows, each asbestos fibre is solid, non-capillary. The asphalt cannot penetrate into the fibres, *or be drawn up through them by the sun.* Hence, the asphalt—both within the felts and between the plies—retains indefinitely the lighter oils so essential to effective waterproofing. Moreover, asbestos, being imperishable and rot-proof, insures longer roofing life at minimum upkeep.

Johns-Manville Smooth-Surfaced BONDED ASBESTOS ROOFS



23 YEARS OLD AT SEATTLE, WASH. Applied in 1913, this J-M Smooth-Surfaced Asbestos Roof over the Bell Street Dock, Port of Seattle, is still in excellent condition.

And a few more typical examples of J-M Roofs that have passed the 20-year mark in prime condition . . .

26 YEARS old at South Bend, Ind. (Oliver Farm Equipment Company)

23 YEARS old at Los Angeles, Calif. (Brockman Building)

36 YEARS old at Newark, N. J. (General Leather Co., Bldg. No. 4)

25 YEARS old at Cincinnati, Ohio (American Valve & Meter Co.)

24 YEARS old at Kansas City, Mo. (Kansas City Star)

23 YEARS old at Chicago, Ill. (Sears, Roebuck & Co., Grocery Bldg.)

24 YEARS old at Louisville, Ky. (American Medicinal Spirits Co.)

26 YEARS old at Beach Grove, Ind. (Big Four Railroad Shops)