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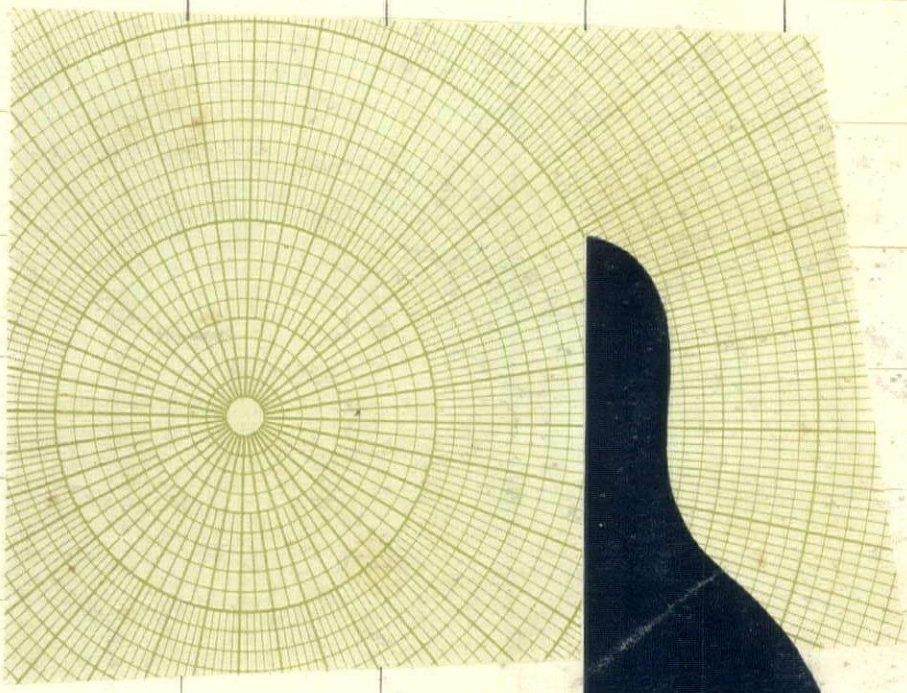

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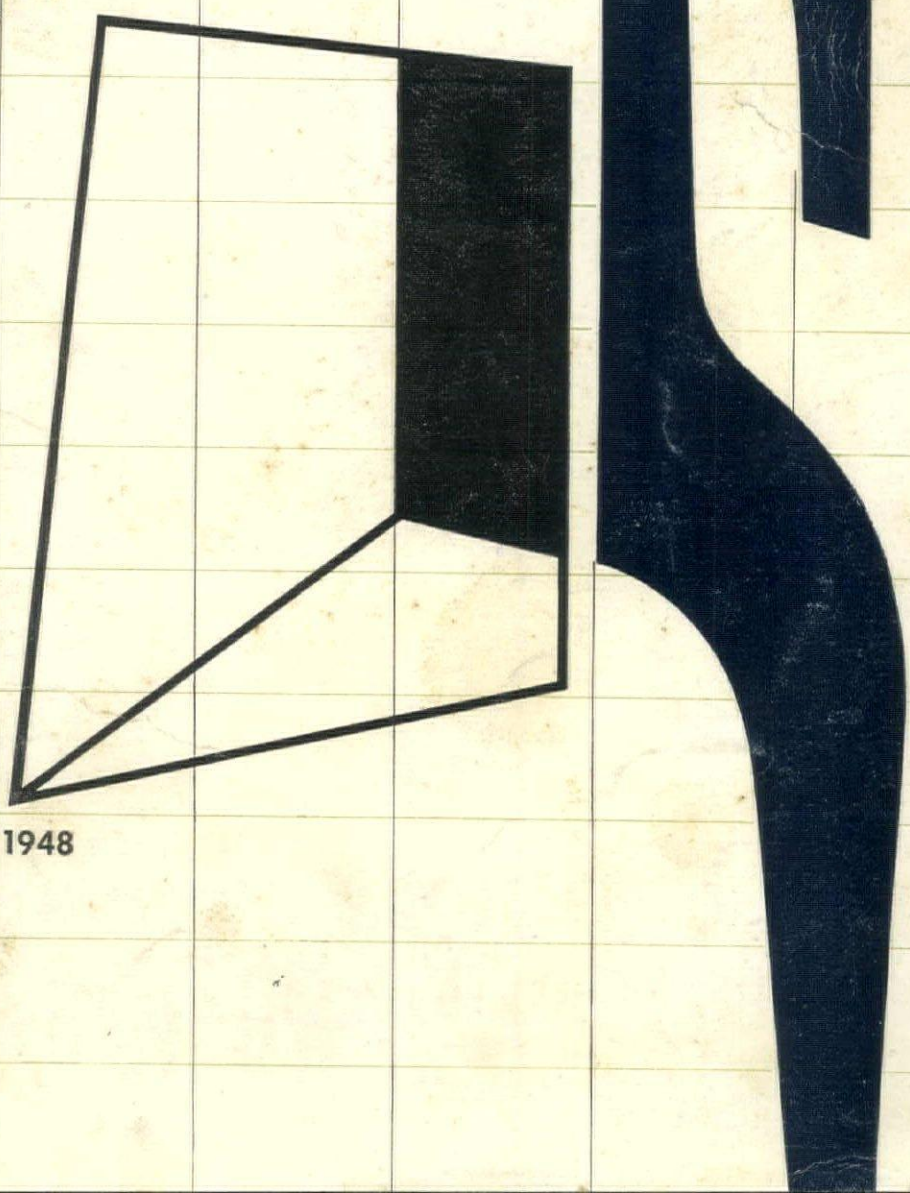

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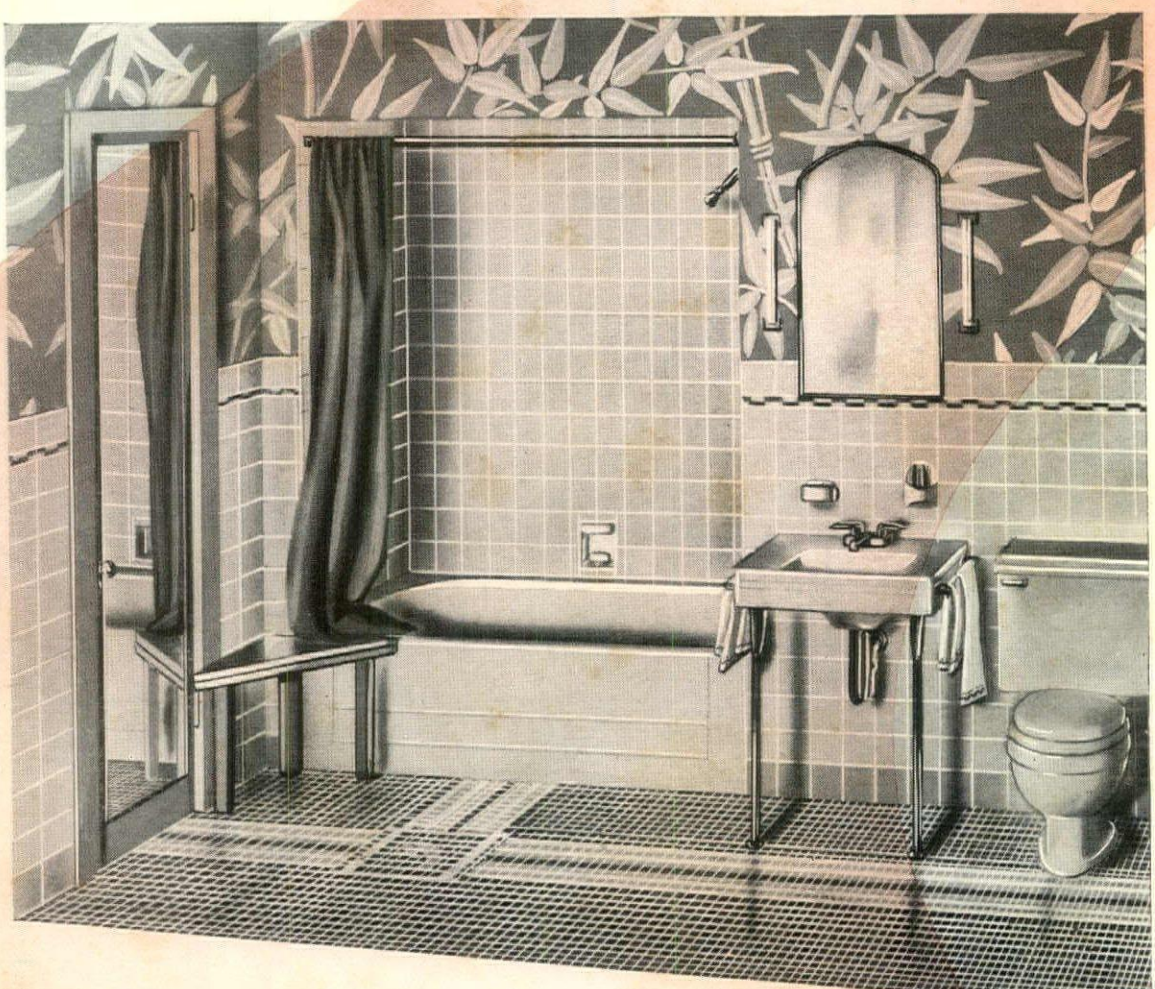

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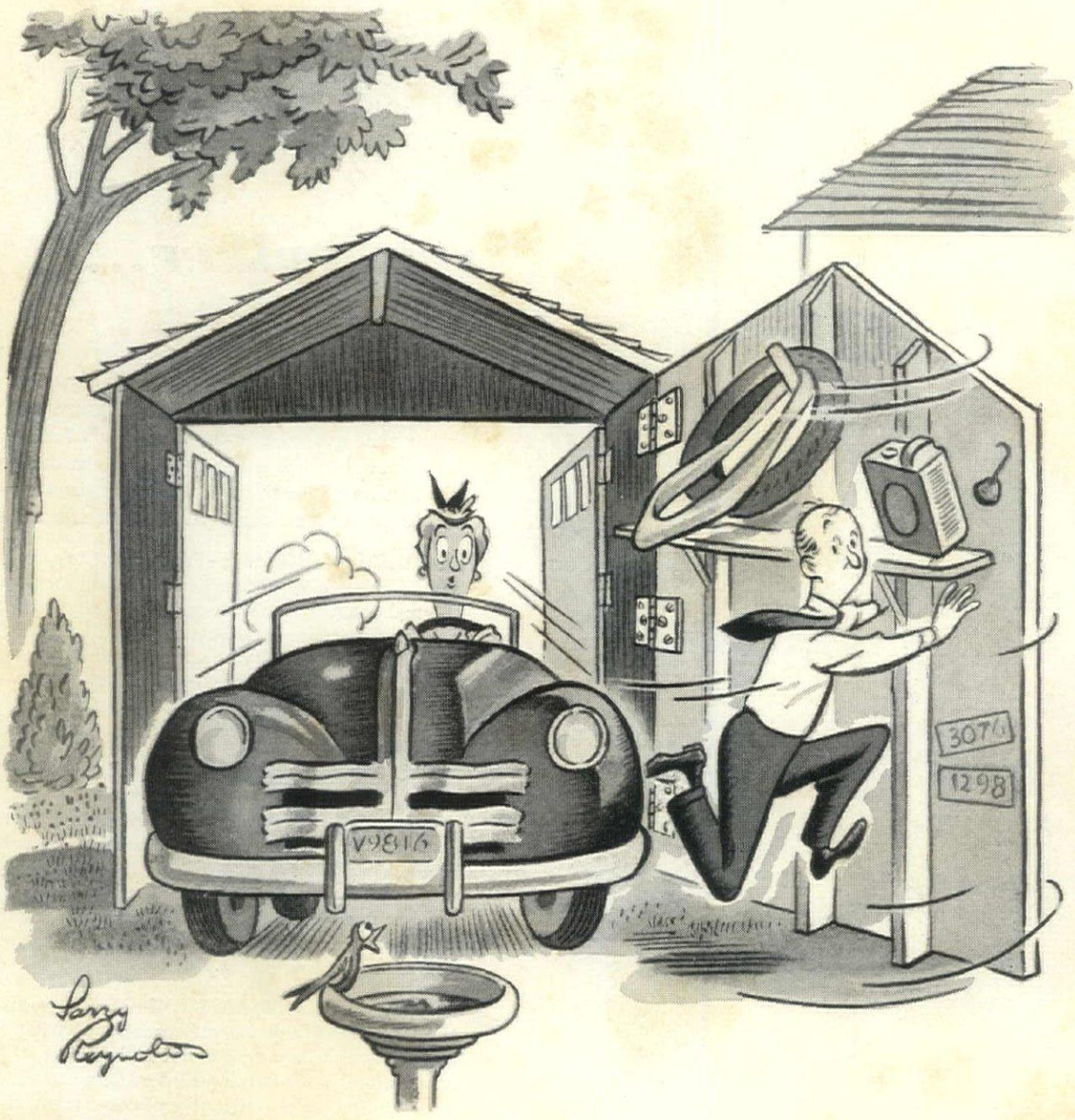

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VOLUME 89, NUMBER 5

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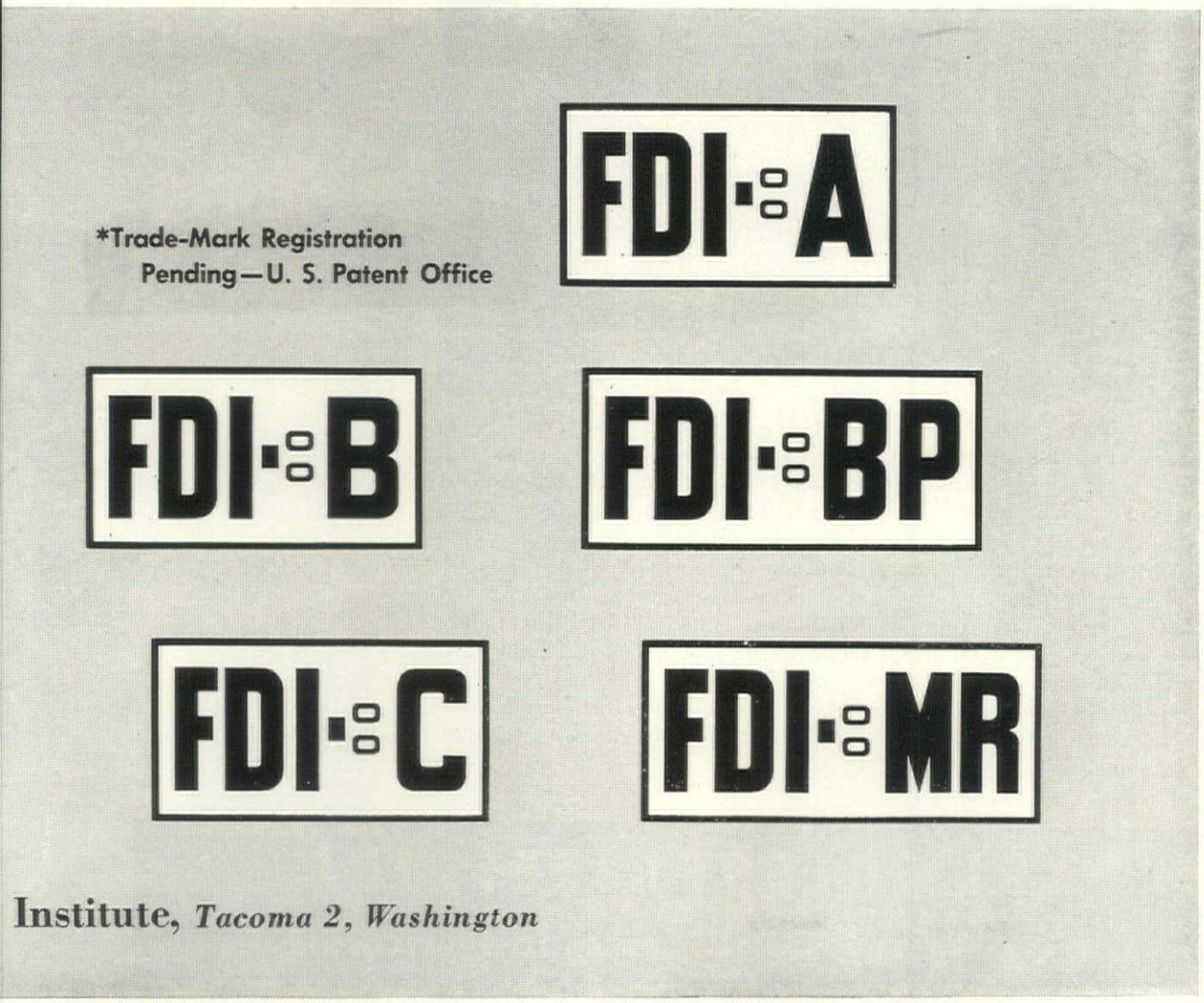

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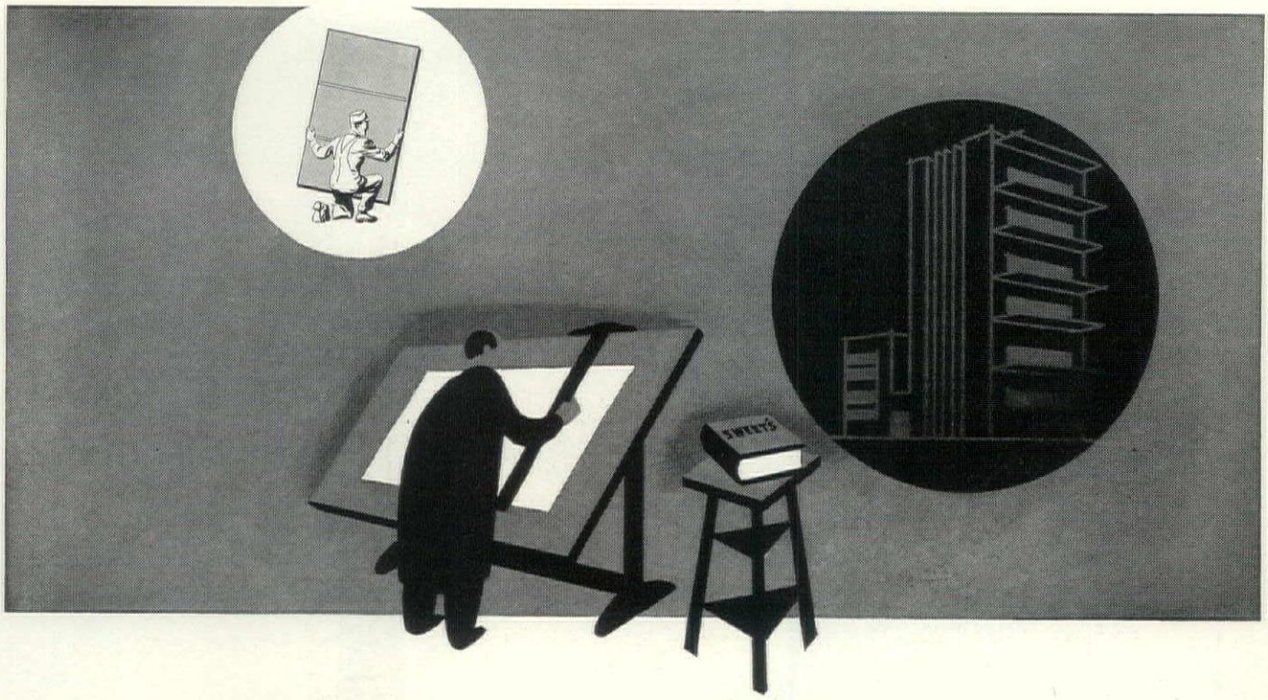

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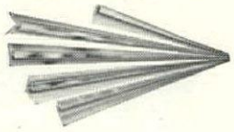

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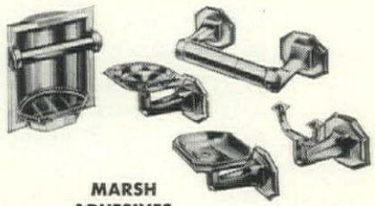

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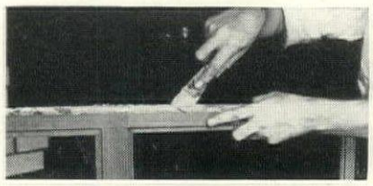
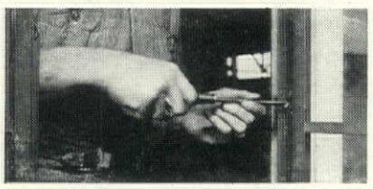


The outside frame and mullions are "buttered" with mastic by the window erector before the casement is placed in the rough opening. Application of mastic is not to be confused with caulking of the casement opening, which is an entirely separate operation.



If the casements are being erected in wood construction, the screws should be applied so as not to distort the casement frames. For instance, screws are never drawn tighter in one hole than in another.

If the job is masonry or brick veneer, the casement should not be used as straight-edge in "building up" an opening. Masonry units should not be forced against the steel casement frame. Instead ⅛" clearance should be left all around the casement for caulking.

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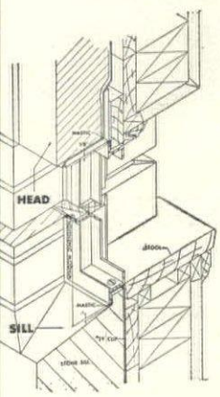

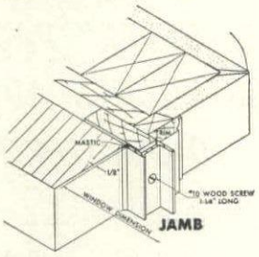

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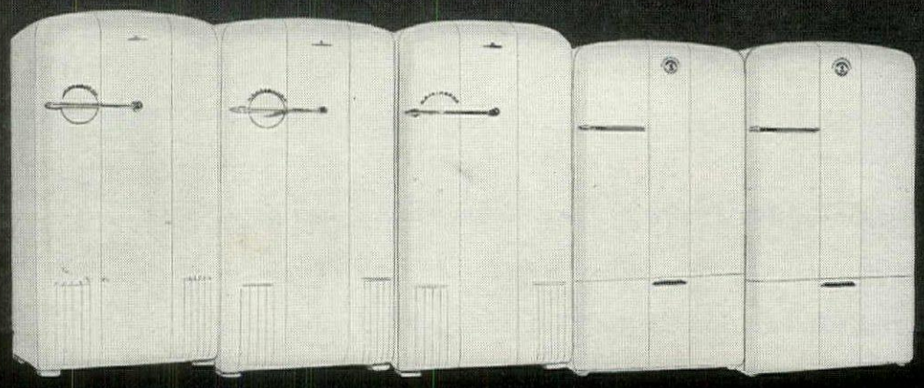

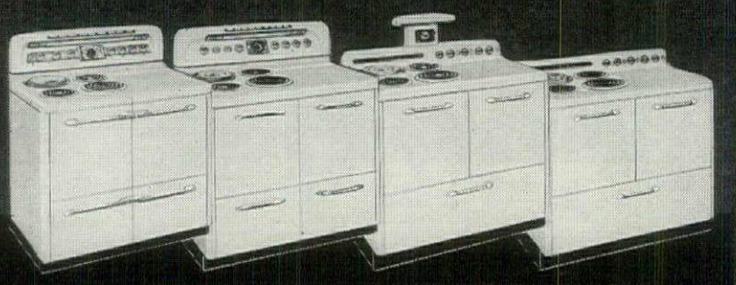

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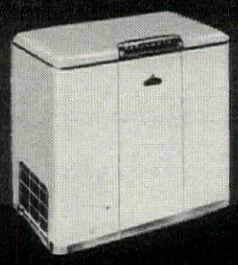

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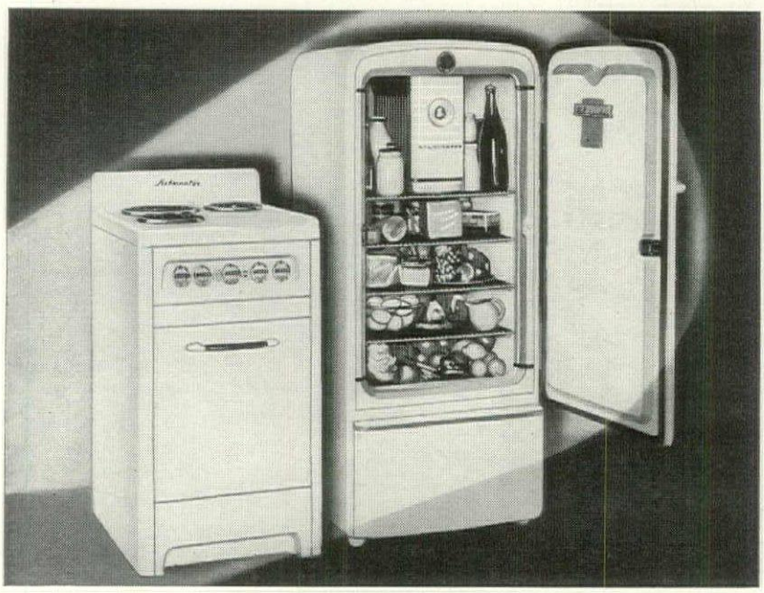

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NEWS

FOUR MORE YEARS WITH HARRY. In the strange pre-election weeks when everybody except Harry Truman seemed certain there would be a new man in the White House, building industry representatives in Washington had worried over no question more alarming than whether New York State Housing Commissioner Herman Stichman (whom they regarded as another Wilson Wyatt) would get the job of No. 1 Federal Houser. On the other hand, the public housers' convention in Seattle had been a gloomy affair. The public housers were broke, they saw no prospect of a Congressional vote for more public low-rent housing, both the Public Housing Administration and many local housing authorities had been battered by Congressional investigators' charges of graft and mismanagement.

Within 24 hours after the election, an abrupt reversal had taken place on both sides of this well-worn battleground. Lee Johnson joyfully summoned National Public Housing Conference board members to an emergency meeting to hammer out a public housing program to be presented to the new Congress. Washington spokesmen for real estate brokers, home builders, savings and loan associations, etc., who have for the last four years been successful in defeating federal appropriations for low-rent housing, now conceded that a new public housing program is inevitable. The private enterprise spokesmen were already retiring to a second line of defense: they were preparing to fight any set-aside program for materials that might favor public housing or any revival of price controls in the industry.

In the post-election recasting of accounts conducted by the pollsters and the press, the continuing shortage of housing was generally held to be one of the issues which had turned the tide for Truman and for many a Democratic Congressman. The voters, impervious to the fact that the housebuilding industry was turning out houses at the break-neck rate of just under one million a year, apparently thought the government ought to do more about housing than the record of the 80th Congress promised.

What the Public Wants

This prevailing opinion was a new operating fact-of-life with which building industry representatives, whether they liked it or not, were now obliged to reckon. One veteran building spokesman in Washington put it this way: "For five times now the people have gone to the polls in a presidential election and lined up solidly behind a candidate who promised to make the government play a more positive role in running the national economy. Call it what you will, that's what the public seems to want. Maybe it is time for business leaders to adjust to this type of thinking and go along where they can without accepting things that are too damaging." But other building groups disagreed. Far from planning to moderate their opposition to government-in-business, they said that even greater vigilance would be required if private building enterprise were not to be pushed to the wall by government competition.

These were the almost-certain prospects that private housebuilding faced:

- Enactment of public housing and slum clearance legislation.
- Extension of rent control beyond the present March 1, 1949 expiration date, with a possible ceiling rise of 15 per cent.
- Vigorous measures to revive interest in the flagging veterans' home loan program and to expedite the rental housing section of the new FHA program (see p. 12).
- Continuation of the present organization of federal housing agencies under the Housing & Home Finance Agency. (The proposals for putting housing finance operations directly under the Treasury Department had been backed by Republicans hostile to the government's role as a direct housebuilder; housing boss Raymond Foley, who accompanied President Truman on his campaign tour of Michigan, would keep his job.)

Public Housing by 1949?

Considerably less certain but possible is new legislation to channel building materials into housing. This would probably take the form of a set-aside program under which the steel producers, for example, would be required to allocate a portion of their output to residential construction.

The question about public housing was no longer whether there would be some but how soon. Every factor in the situation except the decisive one—the expressed will of the electorate—was still the same: the private housebuilding industry was already utilizing all available building materials and manpower; federal appropriations for direct housebuilding threatened further inflationary pressure on building prices; the Administration already confronted a staggering budget in which $15 billion for the armed services and over six billion for the next installment of ERP seemed to preclude any further expansion of federal spending. But strategists high in the Administration said the Democratic leaders in Congress would nevertheless press immediately for a public housing and slum clearance bill. Their theory: legislation promised in the Democratic campaign would have to be passed in the "honeymoon" period when the President's power was at a peak and before stunned Republicans were able to mobilize effective opposition. Department of Labor building experts counted on public housing construction in the last half of 1949. Others believed that Congress might pass a bill early in 1949 but write in a clause delaying actual appropriations until 1950, both to allow for needed survey and planning work by local housing authorities and to ease the pressure on materials and labor.

Private Money Will Be Tighter

Housebuilding money, already digging in as building prices continued their climb,

saw little to reassure it in the new legislative outlook. Everything added up to more, not less, inflation. This meant increased lending risk—and increased lending caution. But, here as everywhere, the threat of direct government competition loomed. The American Legion, at its Miami convention, had already asked for direct government housebuilding loans to veterans. The U. S. Savings & Loan League's Morton Bodfish warned his assembled membership in New York last month that it must make every effort to avoid "the on-the-shelf position of British savings and loans" and confidently predicted that the associations would write between $1 and $2 billion worth of new business next year.

The Administration's power to shove through the legislation it had promised the voters was abundantly clear in the new alignment of the key committees on both sides of Congress.

The Senate Banking Committee, which handles housing and rent control bills, will be chairmanned by Burnet R. Maybank of South Carolina, an old New Dealer who helped steer the T-E-W bill through the upper house last year. Other Democrats who have asked assignment to the Banking Committee: Myers of Pennsylvania, who has some seniority and a voting record favoring public housing; newcomer Hubert Humphrey of Minnesota (see below). Poor health will probably keep New York's Robert Wagner, ranking Democratic committee member, from taking an active role.

The House Banking Committee will no longer be under the control of Jesse Wolcott, who effectively kept public housing legislation off the House floor last year. Wolcott will still be a committee member, but five other Republican members, all bitter opponents of public housing and rent control were election casualties. The new chairman: good party man Brent Spence of Kentucky.

To find out what kind of rank-and-file backing the Administration would have among the new Democratic members of Congress, FORUM queried three of them—one senator, two representatives—who took firm campaign stands for government housing action. The two representatives-elect —Clinton D. McKinnon, San Diego, Calif., and Andrew J. Biemiller, Milwaukee, Wis. —won their seats from Republican incumbents who stood unalterably opposed to government-in-housing. The Senator-elect Hubert Humphrey of Minneapolis who defeated Senator Ball—is a member of the board of the National Public Housing Conference, and has already requested appointment to the strategic Senate Banking Committee.

Despite the present inflationary pressure on building, these new legislators all speak strongly for immediate federal appropriations for public housing and slum clearance. If their views are typical of those of their new colleagues, the country can look for extensive housing legislation to be written by the 81st congress. This is what they said:

Senator-elect Hubert Humphrey

"There should be some definite commitment by the federal government on just how many low-rent housing units it will assist. And we'll have to have some initial appropriation, although I am not prepared at this point to say just what that should be. I think that local and municipal commissions and planning bodies have to know what they can depend upon from the federal government. But, in my view, the problem is not just to build low-rent housing but to tie it in with a sound plan of slum clearance.

"I believe that the government should call in the housing industry—builders, contractors, architects, trade union men, real estate men and financiers — and have a real national conference on housing. Let's not kid ourselves, the people who know the most about housing are the people that are in the industry . . . I'm in favor of getting them all together and having a real housing conference.

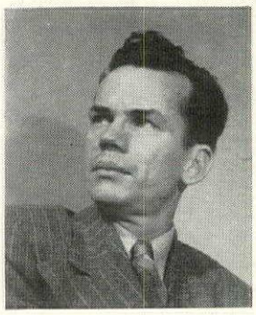
"I think that rent control must be maintained at least until the housing situation is somewhat modified. I am not in favor of any further watering down of the rent control regulations. In fact, I think I would favor a re-examination of rent control with the view of tightening it up somewhat.

"As I see it, the main problem is not low-rent, low-income housing, but the kind of housing that would rent from $40 to $60 a month. That's where the real trouble is. If we could solve this problem of housing for the income group that has from $2,000 to $4,000 a year, we would find that many of our other problems would be taken care of. There would be a trickle-down in the form of houses vacated by this income group. I feel that this middle-range housing constitutes the most serious problem."

Representative-elect Clinton D. McKinnon

"I intend to work for an extension to the housing act of 1948, upping the ceiling on 95 per cent FHA financing to homes costing up to $8,500, and reducing to 50 per cent FHA financing on homes costing more than $12,000, and extending payments to 25 years. This would put the emphasis for private builders to go into low-cost housing and make possible the purchase of homes by average wage earners.

Wilkes



"I believe low-rent public housing is necessary at this time.

"I believe private lending institutions should be encouraged to make adequate loans and if they are unwilling, then I believe the government should take up the responsibility—but only in case private capital is unwilling.

"I favor the provision set forth under the T-E-W Act to clear slums and blighted areas.

"I feel rent controls are necessary until a low-cost home building program gets well under way. I favor Congressional action to see that the administering agency acts fairly to landlords, allowing them in the face of increasing operating costs an adjustment that will give them a net return on their investment from 4 to 7 per cent."

Representative-elect Andrew J. Biemiller

"I go along with the basic principles of the T-E-W Act.

Associated Press

"I believe federal appropriations for low cost housing are essential if we are to provide homes for low income families. I further believe that such legislation should be accompanied by price controls on building materials to stop the flagrant profiteering in that field.

"I think rent control should be continued."

BUILDING MONEY

RENTAL HOUSE BUILDING

FHA finds 608 applications lagging

Rental housebuilding under FHA's new Sec. 608 was not moving at the fast clip FHA had predicted. September (the first full month of operation) had brought in 5,538 housing applications. There had been some increase in October, but nothing like the 16,000 monthly average which had been expected. It looked as if 608 would use up only about half its $800 million underwriting authority by its March 31 expiration date. But everybody expected the new Congress to extend the deadline.

The elements of a rental building landslide had been present after passage of the new housing act. Why hadn't the landslide materialized?

Increased building costs, of course, were partly responsible. The act had limited Sec. 608 valuations to the cost level existing on Dec. 31, 1947, and since then there has been a 10 per cent overall building cost increase. As a result, developers have been unable to get the full 90 per cent mortgage permitted under Title VI.

Also responsible to a degree was FHA's virtual ruling out of more expensive rental housing. On the theory that the higher brackets were pretty well taken care of, FHA had shown distinct preference for projects which would rent for no more than $70 a month. Many builders, even after

watching their costs closely, found it increasingly difficult to make a suitable profit in the low-rent market.

Another contributing factor to the decline in 608 applications: a growing uneasiness among lending agencies over the limitations of the RFC secondary market set-up. Lenders were permitted to sell only half their eligible mortgages to the government. Many were saving the secondary market privilege for smaller homes, including those under the VA home loan program. Lenders hoped the new Democratic congress, in extending the 608 deadline, might also liberalize the appraisal base and the secondary mortgage provisions.

FHA finally defined a "moderate income" rental: it put a national ceiling of $100 on the projects for "moderate income" families whose rent it must approve under the yield insurance (Title VII) program. The ceiling was applied after a great deal of hesitation and over the protests of mortgage men who said it would discriminate against New York and other big cities. It seemed likely that the entire yield insurance program would appeal to no one except, perhaps, the investment trusts, who were looking for safe, long-range yields involving a fair rate of interest.

HOME LOAN WARMUP

VA acts to meet lenders' objections

Dwindling lender enthusiasm for the VA home loan program has most often been laid to the VA-prescribed maximum interest rate of 4 per cent. Last month the lenders told VA there are other reasons. A committee delegated by the Mortgage Bankers Association warned VA Administrator Carl Gray that lenders' interest in veterans' housing would continue to cool so long as VA holds to its unreasonably strict policy on foreclosures.

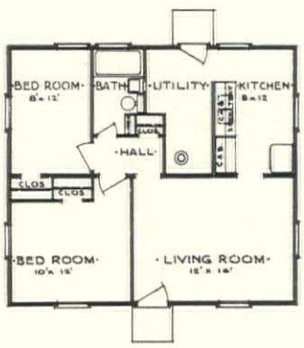
VA, the lenders charged, was haggling over property titles. VA would not accept title company certificates, acceptable to everyone else in the mortgage business, but insisted on an unrealistic letter-perfect type of title, including a step-by-step tracing of every transaction involving the property.

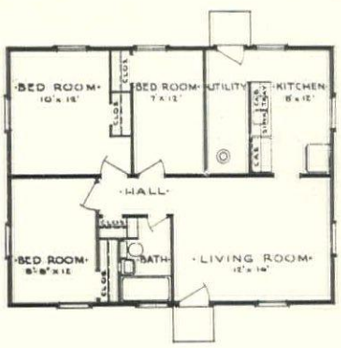
Another objection: VA's contention that it cannot take over foreclosed property so long as the veteran-tenant continues to occupy it. The lenders submitted that it was unreasonable to expect them to oust the tenant before they could recover their money.

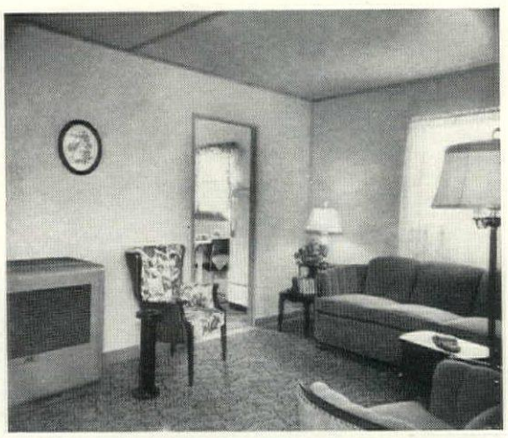
After they left, Gray drew up for VA consideration two regulations meeting the lenders' objections. One would authorize VA to accept titles acceptable to any prudent investor; the other would free the lending agency of the responsibility of evicting the tenant before turning foreclosed property over to VA for payment of the guarantee.

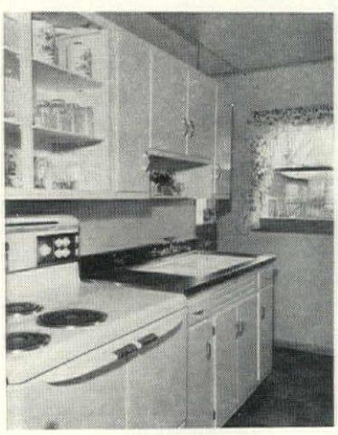
It seemed likely that VA would adopt the new regulations—perhaps even in time to revive investors' lagging interest.

NATIONAL HOMES CORP. offers a $5,750 prefab with lot included









"WHAT AMERICA NEEDS," said Federal Housing Administrator Raymond Foley a couple of months ago, "is a good $6,000 house."

Last month, a leading prefaber, National Homes Corp., Lafayette, Ind. took up Foley's bid. James and George Price, who left Foster Gunnison to start their own firm eight years ago, had already produced 13,500 prefab houses. They had been the first in the industry to devise a system of dealer financing (FORUM, Aug. '47). Now they decided the time and market were ripe for something really spectacular: a five-room house which would sell, complete with lot, for $5,750.

National's new house (28 ft. 6 in. x 24 ft. 6 in.) is approved for FHA mortgage insurance. Assembled from plywood panels, it has cotton composition insulation and concrete slab floor. It is equipped with oil heater, kitchen-dinette containing wall cabinets with 27 lin. ft. of shelving, divided sink with laundry tray and base cabinets, and a utility room with an automatic water heater. It is completely wired, has cross ventilation and weatherstripped doors and windows.

The Price brothers will also produce a similar six-room house to sell (also with lot) for $6,300. The six-room structure is still on paper, but National put up the first of its five-room houses in Lafayette, one day last month. Before the day's end, the Price brothers had sold 300 of them and were making plans to build 36 a day.

PAN-AMERICA

HOTELS GOING UP

Pan Am subsidiary plans an $80 million chain across Latin America

With the dramatic exception of Cincinnati's Terrace Plaza, hotel construction in the U. S. was at a virtual standstill. In Europe there was none at all. Only in Latin America did preparation for tourist travel resemble that of prewar years, and there the hum of that preparation could be heard from Mexico to Argentina. Two hotels were going up in Uruguay and Venezuela, and plans were laid out for the near-future construction of 11 others in eight countries. The 1950's would see the completion of an $80 million hotel chain stretching across the entire Latin American span.

The hotels—those already under construction and those in the planning stages—would show building and design techniques of their respective countries, but they would have in common a U. S. sense of comfort (private baths, refrigeration, convertible bedrooms) and situation near the route of the Pan American World Airways. More than anything else, the hotel chain would resemble the silhouette of a Pan Am clipper. For the hotels were being built by a subsidiary of Pan American—a unique organization knows as the Intercontinental Hotels Corp.

In 1945, according to Pan American, the State Department approached several U. S. airlines with a proposition to help promote hotel construction in South America with the aid of funds from the Export-Import Bank. State's interest was in building up Latin America's dollar supply. The proposition's attraction for an airline was obvious: the greater the hotel accommodations, the higher the rate of air travel.

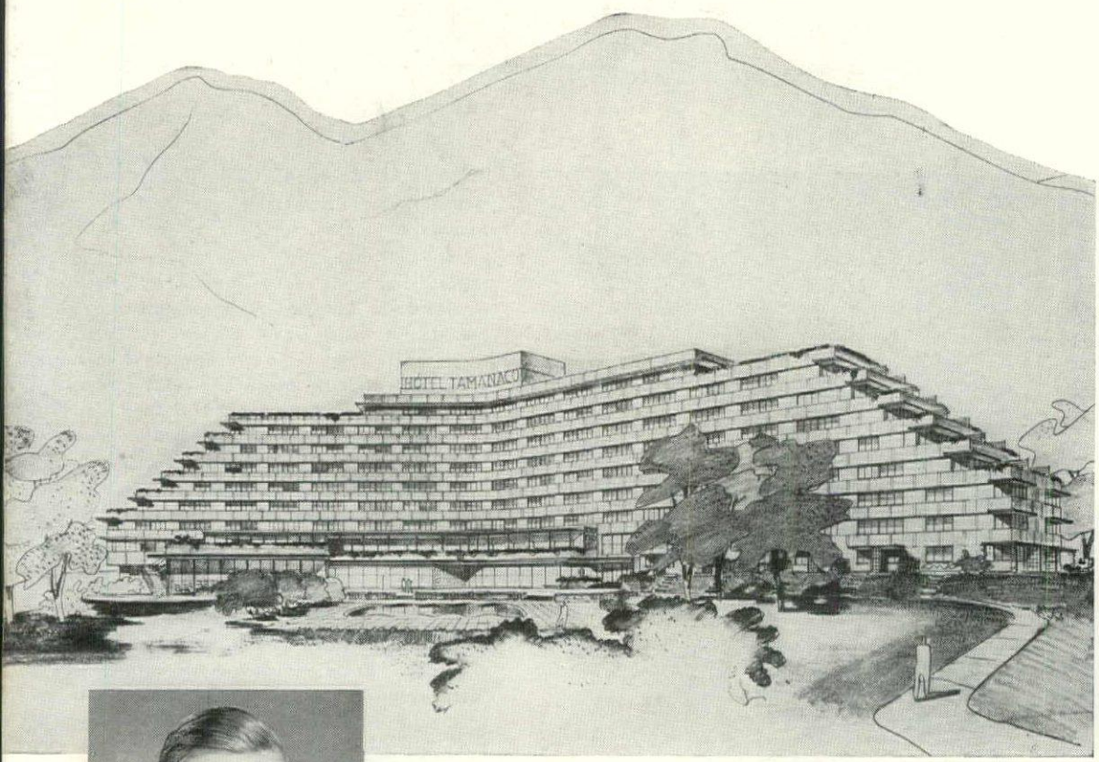
Pan American, concerned with the dwindling size of its postwar tourist trade, accepted State's suggestion. With the endorsement of the Latin American governments, the airlines set up IHC. In rapid succession, the new corporation got a $25 million credit from the E-I Bank, named a president—Wallace Whittaker of General Motors, and began talking business with Latin American countries.

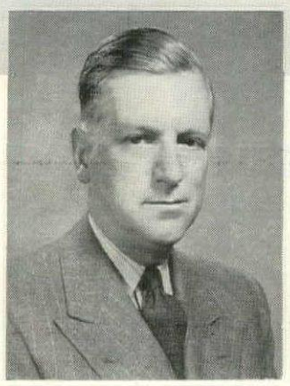
Although financial negotiations vary in each country, the central idea is essentially the same: capitalization (ranging between $5 million and $10 million per hotel) is supplied by local private interests or the local government, or sometimes by both together, with help from the E-I Bank. IHC usually puts in about 1 per cent of the total capital as a "token" interest. After construction, IHC will manage and operate the hotels for a fixed annual fee and a share of the net profits. In each country, the hotel owners name the local architect. Holabird & Root and Burgee of Chicago are U. S. consultants. (The E-I Bank stipulated that an American architectural firm must have a hand in each hotel to guarantee American standards of design and construction.)

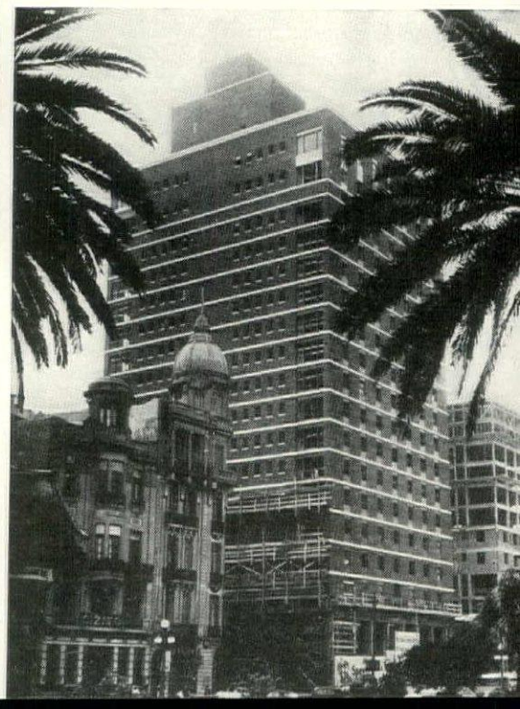
The two projects under construction now are a 350-room in Montevideo, Uruguay, and a 400-room hotel in Caracas, Venezuela. (The Montevideo hotel was already partly built when IHC agreed to operate it; it did not initiate its construction.) Another hotel, in the design stage, will be in Santiago, Chile. Others scheduled for future building are in Bogota, Colombia; Quito, Ecuador; Lima, Peru; Porta de la Cruz and Maricaibo, Venezuela; Rio de Janeiro and Sao Paulo, Brazil; Buenos Aires, Argentina; Guatemala City, and Mexico City.

Pan American, which by last month had put more than $1 million into its venture, estimated that its Latin American traffic will double at least, when the hotels are finally finished. (It emphasized, however, that the hotels would be available to everybody—not just Pan Am customers.)

Although its immediate concern was with Latin America, Pan American has indicated that its hotel construction urge will not stop there. Looking toward an eventual $100 million-a-year hotel program, it has already started feeling-out discussions with Portugal, France, Turkey and South Africa.







INTERCONTINENTAL HOTELS CORP.'S first job—the 400-room, $6 million Hotel Tamanaco in Caracas (above) was financed by Venezuelan private and government funds. Structure is V-shaped, situated in mountain foothills. IHC took over Victoria Plaza Hotel, in Montevideo (right) after construction was started, equipped it with air conditioning, two-purpose bedrooms, and television facilities. Wallace Whittaker (left) is IHC president.

DESIGN

NEW LOOK

Washington bows to functional design

When the $5 million worth of new buildings which the U. S. government says it needs are put up, they are likely to look a lot different from yesterday's Post Office Federal. The Public Buildings Administration last month made its official bow to func-

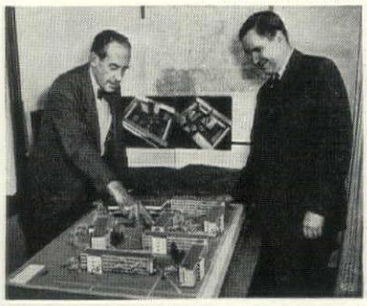
(Continued on page 16)

MODERN GETS A BID FROM THE OLDEST U. S. UNIVERSITY

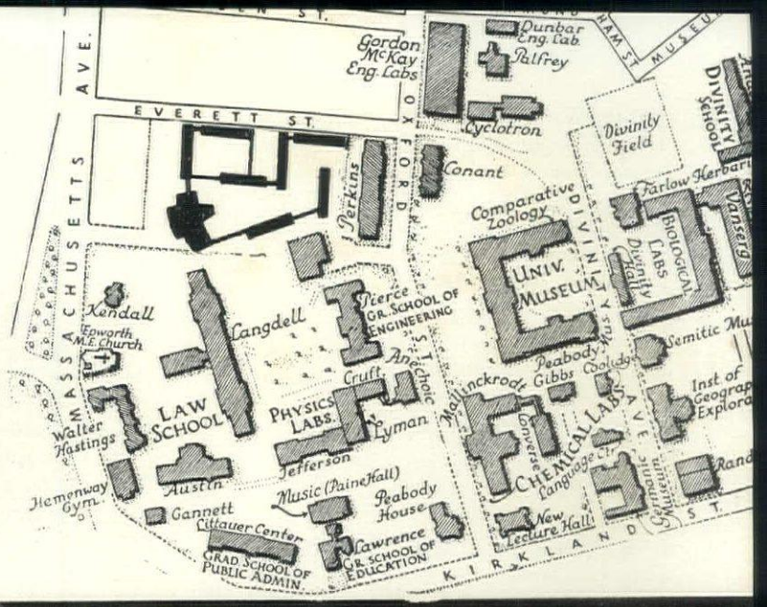
Harvard will build $3 million worth of functional dormitories

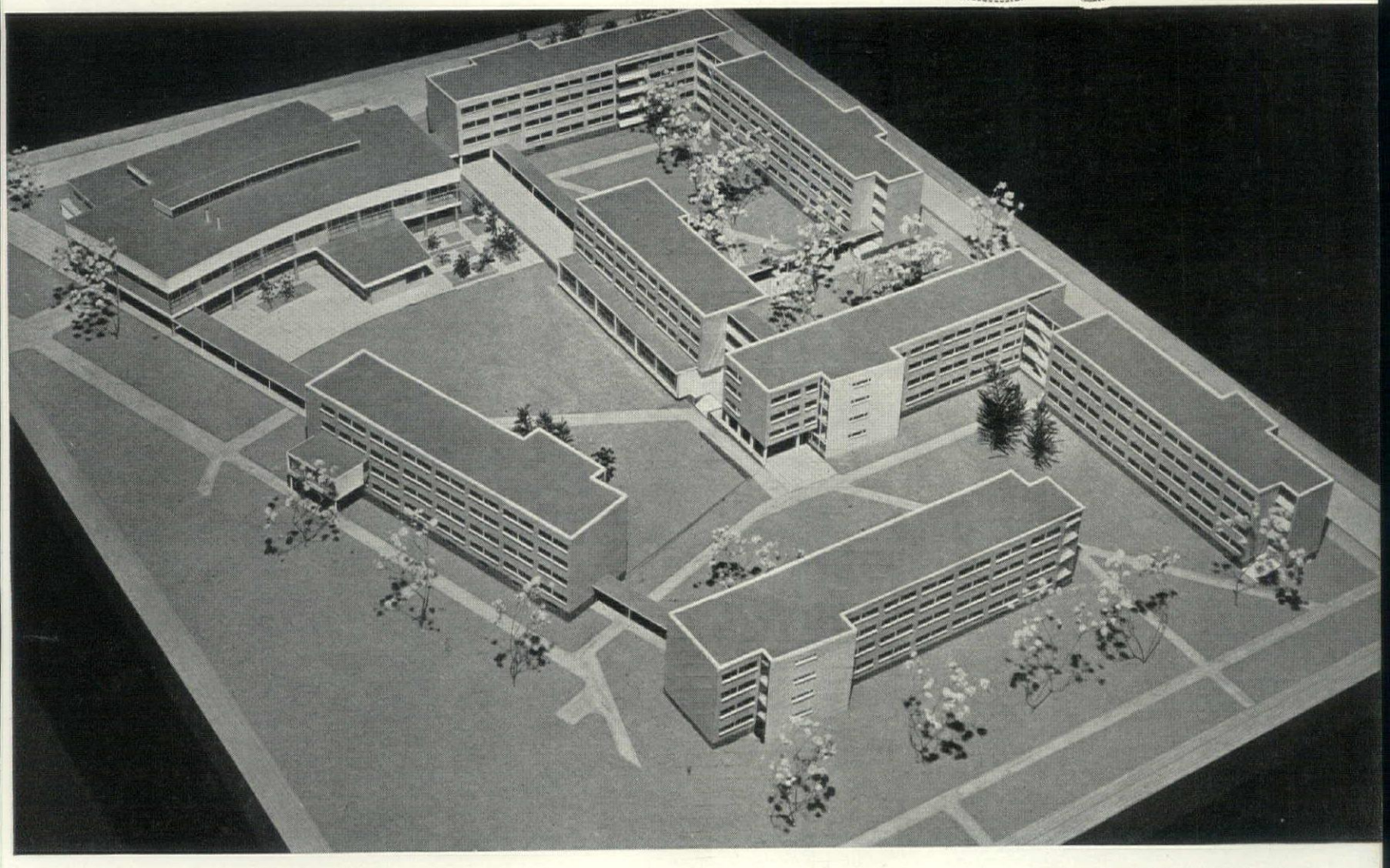
Harvard, the oldest and most eminent of U. S. universities, has gone through three waves of postwar building expansion and is now in the middle of the fourth. Its oldest building, Massachusetts Hall, is a fine example of 1720 American Georgian. After the Revolutionary War, Harvard put up some of Charles Bulfinch's spare-lined Federal. After the Civil War, trustees socked their money in a huge Victorian Gothic Memorial Hall. After World War I, Harvard tried to revive its Georgian past and housed its "gentlemen" in paneled suites with fireplaces.

Walter R. Fleisher



Gropius and Dean Erwin Griswold

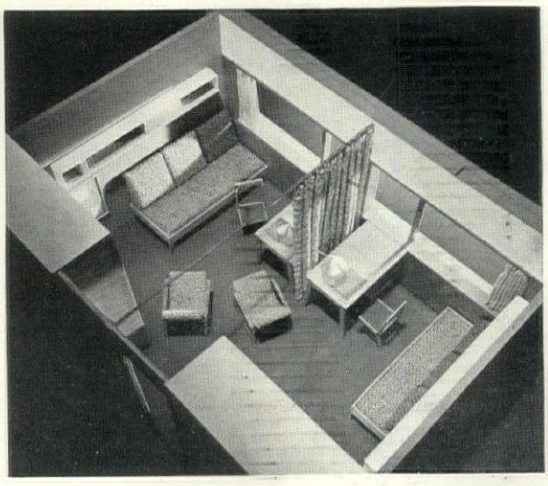




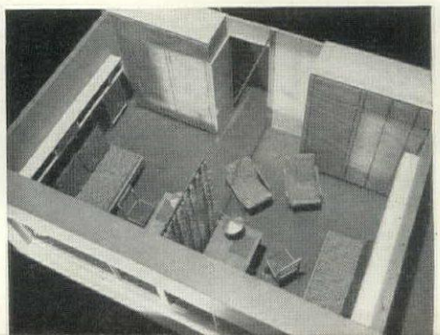
DORMITORY GROUP MODEL shows seven dormitories all linked by covered walks to the curved commons building which has cafeteria, several lounges, a concourse through the center. Glass-enclosed outside stairways connect several dormitories. Faced in buff-colored cast stone, buildings are related in what Gropius calls "a sequence of surprise effects in space."

Now, after eying the handsome contemporary buildings going up across the river at M. I. T., Harvard has turned to the kind of design taught in its own school of architecture, headed by brilliant Bauhaus-founder Walter Gropius. The contract to design a $3 million group of seven graduate dormitories and commons went to The Architects Collaborative. Firm members: Gropius, Jean and Norman Fletcher, Sarah and John Harkness, Robert and Louis McMillen, Benjamin Thompson. Construction will start next June.

Harvard is modern architecture's most influential academic conquest to date. More timid schools may now find it easier to build the kind of buildings they need.



GLARELESS 7 FT. WINDOWS open one wall in each room. Double room shown is 18 ft. width of structural bay.



tional design and to the new building materials and equipment developed over recent years. From now on, government buildings will be likely to have:

- Flat roofs. ("Roof parapets are a source of trouble from leaks.")
- Thermally insulated roofs.
- Resilient floor materials.
- Radiant heated exterior ramps.
- Metal doors and windows.
- Fluorescent lighting.
- Plastic and other new material for interior finishings.
- Clean-lined office furniture.

JOBS

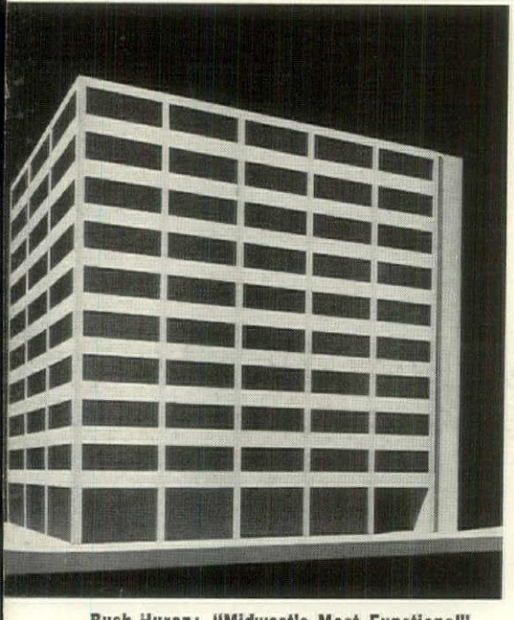
COMMERCIAL CO-OP

Chicago firms buy space in U. S.' first tenant-owned office building

At the convention of the National Association of Building Owners & Managers in Cincinnati last month, President J. Clydesdale Cushman summed up a fact long plain to association members: investment construction cannot, at current costs, be counted on to meet the pressing need for office space in most cities. How, then, would that need be met? Predicted Cushman: by "commercial cooperatives," similar to the cooperative apartment houses which have mushroomed in the big cities over the last few years.

In Chicago, commercial firms were already snapping up space in what will probably be the first tenant-owned office building in the U. S. Enough customers to fill the first four floors of the proposed 10-story building had already signed up, and Architect Henry K. Holsman, executive secretary of the mutual ownership trust sponsoring the project, said the remaining space could be more than filled by other companies indicating interest.

The $1,300,000 structure—known as the Rush-Huron building—was being financed with a 20-year $900,000 construction payout loan at 4½ per cent interest from a Cincinnati insurance company. Prospective tenants buy into it at $6 per sq. ft. through a mutual ownership trust created under an agreement of the Chicago Community Development Trust. Payment on mortgage and operating expenses, the managing trustees figured, would average $1.50 per sq. ft. yearly, decreasing as the principal of the mortgage was retired.



Rush-Huron: "Midwest's Most Functional"

Architect Ludwig Mies van der Rohe, who designed the building in cooperation with Holsman, Holsman, Klekamp & Taylor, and Pace Associates, kept costs at a minimum through strict simplicity of design. Said Trust Secretary Holsman: "Rush-Huron will be the most functional and severely plain office building in the mid-west." Some of its characteristics:

- Exterior wall will have no ornamentation. Interior walls will be of face brick. No plaster will be used.
- Glass, aluminum or stainless steel partitions will be placed wherever the tenant-owners want them.
- Floor radiant heating installation will provide separate thermostatic control for each office, eliminate all exposed piping and radiators.
- Large window area on east, west, and south sides will supply natural light, implemented by artificial light from continuous cold cathode tubes.
- Hopper vents on windows will eliminate necessity of wind guards; mechanical ventilation system will supply four changes of electrostatically cleaned air an hour.

As Rush-Huron's tenant list filled, plans were pushed for early construction. Its owners thought it might be ready for occupancy by next October.

CITIES

CINCINNATI

Businessmen underwrite $5 million worth of housing

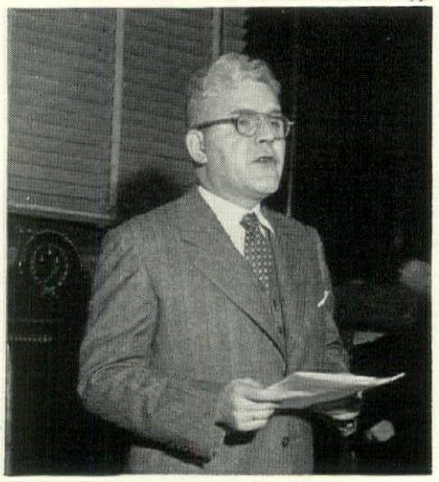
Cincinnati busily completed plans to launch $5 million worth of housing in the spring Mayor Albert D. Cash had just finished a doorbell-ringing campaign which brought in the $500,000 necessary to inaugurate a unique housebuilding enterprise underwritten by Cincinnati's business men.

Convinced that Cincinnati's No. 1 problem was its shortage of 18,000 houses, Cash sold industrial and civic leaders last spring on the idea of organizing the Cincinnati Community Development Co., an institution which would build houses on a large scale. He wanted the new enterprise to be operated on a strictly business basis, he said, as a demonstration that "free enterprise in Cincinnati could meet the housing challenge."

With the Chamber of Commerce footing initial expenses, the new company set about drumming up membership at $1,000 a share. Last month, with its $500,000 equity in hand, it put in its request for $4.5 million worth of FHA-insured loans from local banks and insurance companies. Said Mayor Cash: "We won't have any trouble borrowing the money."

The development company will go first into multi-family construction for middle income groups. It has already picked the site of its first project: a 40-acre tract near Cincinnati's Mill Creek industrial district. At first, it will build only rental housing, with rents to be determined by construction costs. Later, it may build houses for sale.

A. R. Lapp



Mayor Cash: Doorbell Ringing Paid

Inspired by its initial success, the new company was playing last month with the idea of turning its profits into more housing and establishing a revolving fund which would keep working to eliminate completely Cincinnati's housing shortage.

As soon as the organization work was completed and the funds were in, Mayor Cash stepped out of the driver's seat, became only a stockholder. The new company elected a local business man—Joel M. Bowlby, president of the Eagle-Picher Co.—chairman of its Board of Trustees.

NEWTON

Project will pay for itself in taxes

Newton, Mass. joined the list of cities which have launched veterans' housebuilding jobs. It was spending $1,250,000 to fix up an abandoned quarry site and selling 412 lots to a private housebuilder for a startlingly low $50 each.

City officials figured the project would pay for itself in 20 years. The old quarry site had been bringing in less than $2,000 yearly in taxes. After the project's completion early next year, the city's annual tax return on the property would be at least $77,061.

The Kelly Corp., builder of the homes, will sell its basic five-and-a-half-room units for $7,820. Veteran-owners can have their houses equipped with porch, garage, and breezeway for additional cost. Using site prefabrication methods, Kelly had 200 of the houses in varying stages of completion last month.

Newton was restricting its project to its own veterans, but it might well help veterans elsewhere. Last month, it politely answered queries from several interested cities.

(Continued on page 18)

A $10,000 DESIGN CONTEST

conducted
by
THE ARCHITECTURAL FORUM
for
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KENTILE Asphalt Tile®

A new national survey reveals a major trend in flooring—the ever increasing and imaginative use of smooth surface asphalt tile floors, laid tile by tile, in all types of interiors, including every room of the home.

Many factors have stimulated this trend. One is the continued technical refinement of asphalt tile itself. For instance, Kentile has introduced a new post-war resilience that considerably increases the opportunities for installation on wood. Concurrently, an improved formulation has made it one of the most easily cleaned and maintained floors. Its precise die-cutting permits the ultimate in tight fitting, virtually seamless installation. Its better marbleizing and coloring set a new standard for floor beauty.

But most important, probably, is the discovery by architects of the unlimited opportunity for *original design* provided by Kentile. They have come to realize that this modular flooring with 23 colors, each available in 6 standard sizes, plus the functional feature strips in 5 colors, offers infinite scope to their creativeness.

This trend, we believe, affects the entire field of architectural designing and is worth more complete investigation. We therefore are sponsoring this competition to further attract the creative attention of architects, designers, draftsmen and students—to stimulate additional exploration of this new interior design potential.

THE PROBLEM: **Given the essential structural elements of a residential or commercial area, design a noteworthy interior that uses a Kentile floor as an element of the decorative scheme.**

Competitors may choose to work on any one or all of three problems — a kitchen-dining area, a living area, or a candy shop — and need submit only a simple plan that includes the Kentile floor design and a perspective sketch demonstrating the entity of the floor design and the decor.

Both plan and sketch should be quick and simple, prizes being awarded primarily for the design thinking, with skill in presentation considered only insofar as it presents the design ideas clearly and concisely. Painstaking and time-consuming renderings are not sought.

Approved by the American Institute of Architects

54 PRIZES—OVER $10,000

	Kitchen-Dining	Living Area	Candy Shop
First prize	$1,500.	$1,500.	$1,500.
Second prize	750.	750.	750.
Third prize	500.	500.	500.
15 Honorable Awards of $50 in each class	750.	750.	750.
	$3,500.	$3,500.	$3,500.

This competition is limited to residents of the continental United States and Canada. Employees of David E. Kennedy, Inc., of The Architectural Forum or of advertising agencies serving the above, are not eligible. Contestants must register in order to receive the program and complete instructions. The competition closes at midnight, January 10, 1949.

C. Theodore Larson, Professional Adviser, c/o The Architectural Forum
Empire State Building, 350 Fifth Avenue, New York 1, N. Y.

I intend to enter the Kentile Design Competition. Please send me the program, including the conditions governing the competition and awards.

Name.....

Firm (if any).....

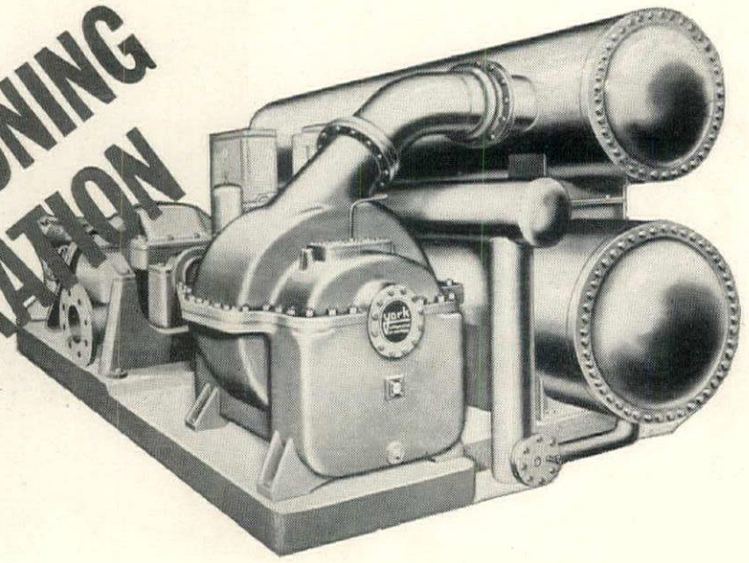
Address.....

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

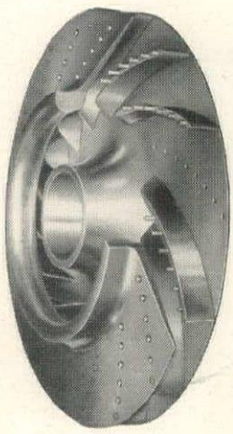
Check one: Architect..... Designer..... Draftsman..... Student.....

Other Occupation.....

AIR CONDITIONING REFRIGERATION



With Turbo Compressors



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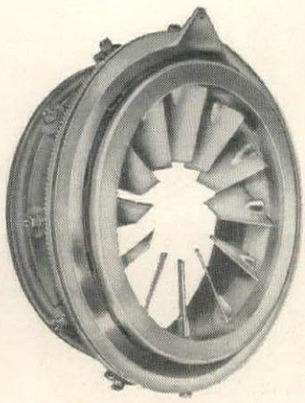
ONLY YORK HAS

Pre-Rotation Vane Control . . .



Exclusive with York, a *gradual acting* multi-radial vaned control, constructed of accurately machined non-ferrous materials. Ring and pinion gear movement insures smooth vane opening and closing—multiple vanes give *precise adjustment* of refrigerant flow down to minimum capacities . . . impart a *flow pre-rotation*. Result—inherent *stability of operation* over the widest capacity ranges.

York gives you these 2 exclusive features at no extra cost. They put the York Turbo in a class by itself!

York Corporation, York, Pennsylvania.

YORK *Refrigeration and Air Conditioning*

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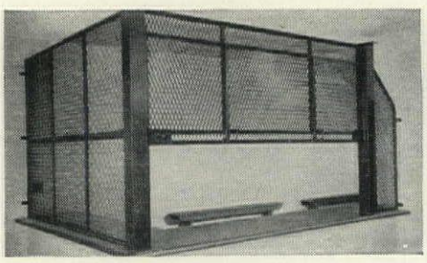
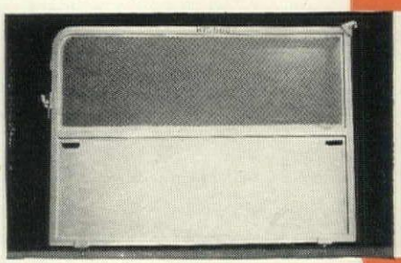
EVERY day more and more Wheeling ExM *goes* into more uses. Railroads, refineries, manufacturing plants and all types of industries find it ideal for long-lasting, strong overhead walks, stair treads, trestle and tower platforms, enclosures, guards, partitions, containers and many other uses. These installations are better because Wheeling ExM is stronger than sheet metal of the same weight. The "diamonds" allow light and air to enter freely and are practically self-cleaning. Write for full facts now. Many mesh sizes and weights available.

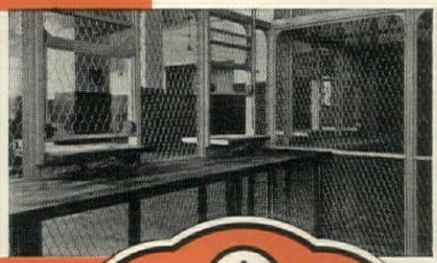
FORMS easily into all kinds of sanitary, easy-to-clean fittings.



PROTECTS against intruders, yet admits light and air.



SOLVES unusual problems, such as partitions for horse cars.



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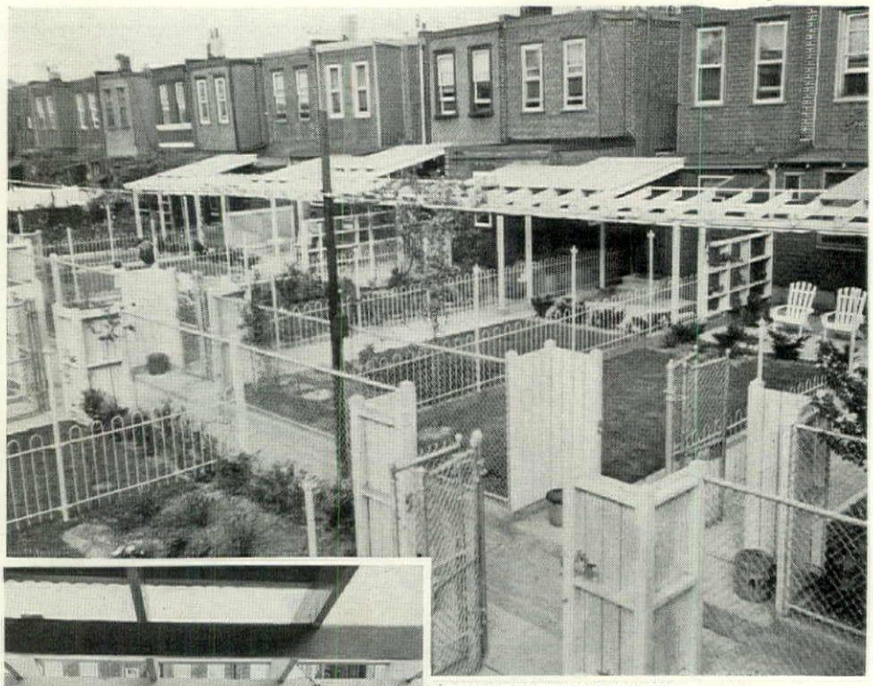
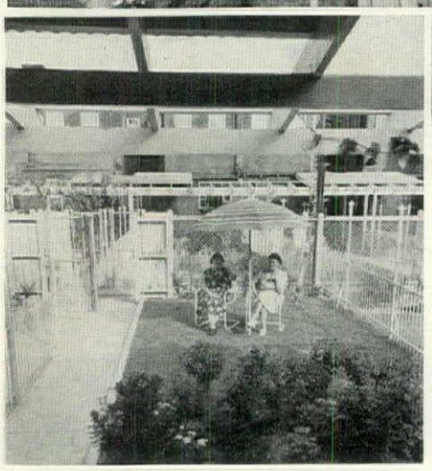
Reg. U.S. Pat. Off.

Philadelphia Bulletin





PHILADELPHIA IS TAKING one horsesense step to city planning and pooling its backyards. Philadelphians were prodded into action by Mrs. Mary Davis Gillies, interiors and architectural editor of "McCall's" magazine. After years of writing about better living for more people, Mrs. Gillies decided to take a hand at moving plans off paper and into action. She persuaded Philadelphians to pick up garden spades and paint brushes, take down fences. One backyard section has already been transformed from dinginess and garbage cans into a bright spacious center of community living. Webbed fences replace high wooden barriers. Colorful trellis shades rear of each home. Architect Oscar Stonorov supervised project.

BARABOO

Decentralization brings town to life

It was clear from the first that with the increasing drift toward decentralization in Industry (FORUM, Oct. '48), many a small but industrially attractive community would find new interest in life. Sometimes, as in the case of Baraboo, Wis., it might find new life.

Last month the Northern Engineering Co., a small transformer manufacturing concern, opened its new plant on part of a 67-acre stretch of industrial area chalked out and reclaimed by a forward-looking organization known as the Baraboo Industrial Expansion Corp. The most interesting thing about this was that the company, with an immediate need for 50 workers, opened its doors at just about the time Baraboo might have been ground under for the second time by the forward push of history.

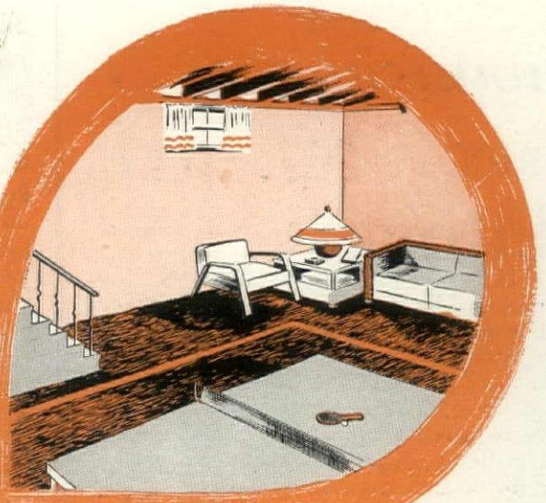
War's end shocked many small towns like Baraboo (pop. 9,000) into a realization that their useful lives were all but ended. When the government closed down its $125 million munitions plant, one-fifth of Baraboo's eligible workers were out of jobs. Business ground to a near halt. The same thing had happened to Baraboo once before: in 1918, Ringling Brothers Circus pulled out after a 30-year stay and the town had to rely on vacation trade to keep it alive. But during the war Baraboo had become part of bigger things. It could not go back now to a tourist economy. Something in keeping with the times had to be done.

Something was done. Baraboo's business men, aware of the decentralization trend and of Baraboo's special attraction (large labor supply, recreation facilities), formed the Industrial Expansion Corp. as an invitation to Industry. They capitalized the corporation at $100,000 by local resident subscription. They bought land near the town's rail and highway connections, developed it for industrial use, offered it at cost to any manufacturing firm wishing to move into Baraboo.

There were indications last month that others besides Northern would accept the invitation; the Corporation was talking things over with several plants. Its goal: to fill up its land with enough industries to keep 750 Baraboo workers employed.

(Continued on page 20)

Add COLOR INTEREST to masonry with low-cost BONDEX CEMENT PAINT



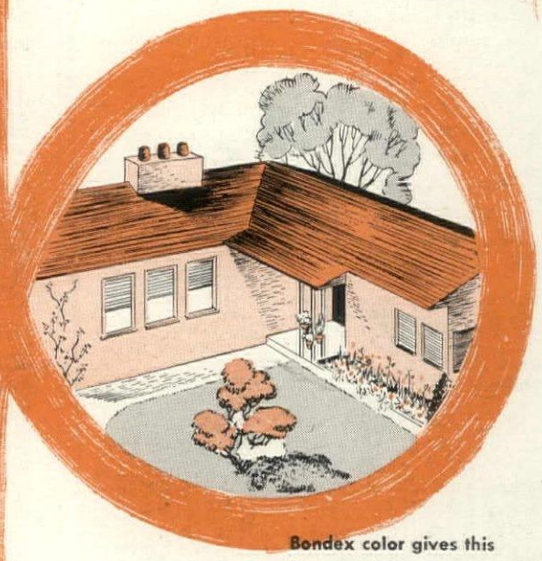
Here Bondex color adds the decorative touch to a game room in the basement.

Every day sees new examples of Bondex colors used to give distinction to masonry walls. The trend covers not only exteriors and basements but interior walls as well.

Bondex Cement Paint with its wide range of shades is particularly suitable for masonry applications for **3** reasons:

- **Bondex and masonry naturally go together because the basic ingredients of both are compatible**
- **Bondex shields masonry against destructive dampness**
- **Bondex protects masonry against surface disintegration**

The reputation and dependability of Bondex is well-established. Use Bondex in colors or white — on concrete and cinder block — on stucco and stone — on new or used brick.



Bondex color gives this low-priced home personality, making it more desirable.

FULL RANGE OF BONDEX COLORS TO CHOOSE FROM

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Antique Ivory • Carthage Cream • Adobe
Tropical Coral • Spanish Buff • Monastery Gray
Grotto Blue • Ivy Green • Brick Red • Pure White

Bondex used to color-style a concrete block garage encourages neatness.

THE REARDON COMPANY • ST. LOUIS 6
Chicago 9 • Los Angeles 21 • Bayonne, N. J.
Montreal 1

BONDEX
THE *Patented*
CEMENT PAINT
that outsells all other cement paints combined

BALTIMORE

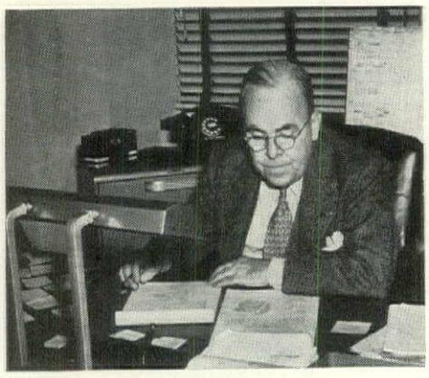
Citizens finally see city's plight, vote dollars for construction

For seven years Baltimore had been working out elaborate plans to halt the slow deterioration of its property values. But each time the real tools to fight civic decay —dollars for construction and slum clearance—were asked at the polls, Baltimore citizens refused to grant them.

Since 1941, the Downtown Baltimore Committee, made up of property owners in the central business district and headed by local businessman G. Harvey Porter, had hacked away at the slow task of improvement. It had started the expansion of one-way streets, sponsored a multiple-story parking garage, offered suggestions for a modern plant to replace the famed, rat-infested Lexington Market. But without the necessary loans for large scale improvement, the committee could do little. Downtown property values had dropped off one-third since 1935. The area was steadily being smothered by slums and strangled by traffic. New business scampered to the city's outskirts.

Why had Baltimore citizens consistently failed to vote the dollars to check this decline? Porter and his committee decided it was simply because they did not know what was happening to their city.

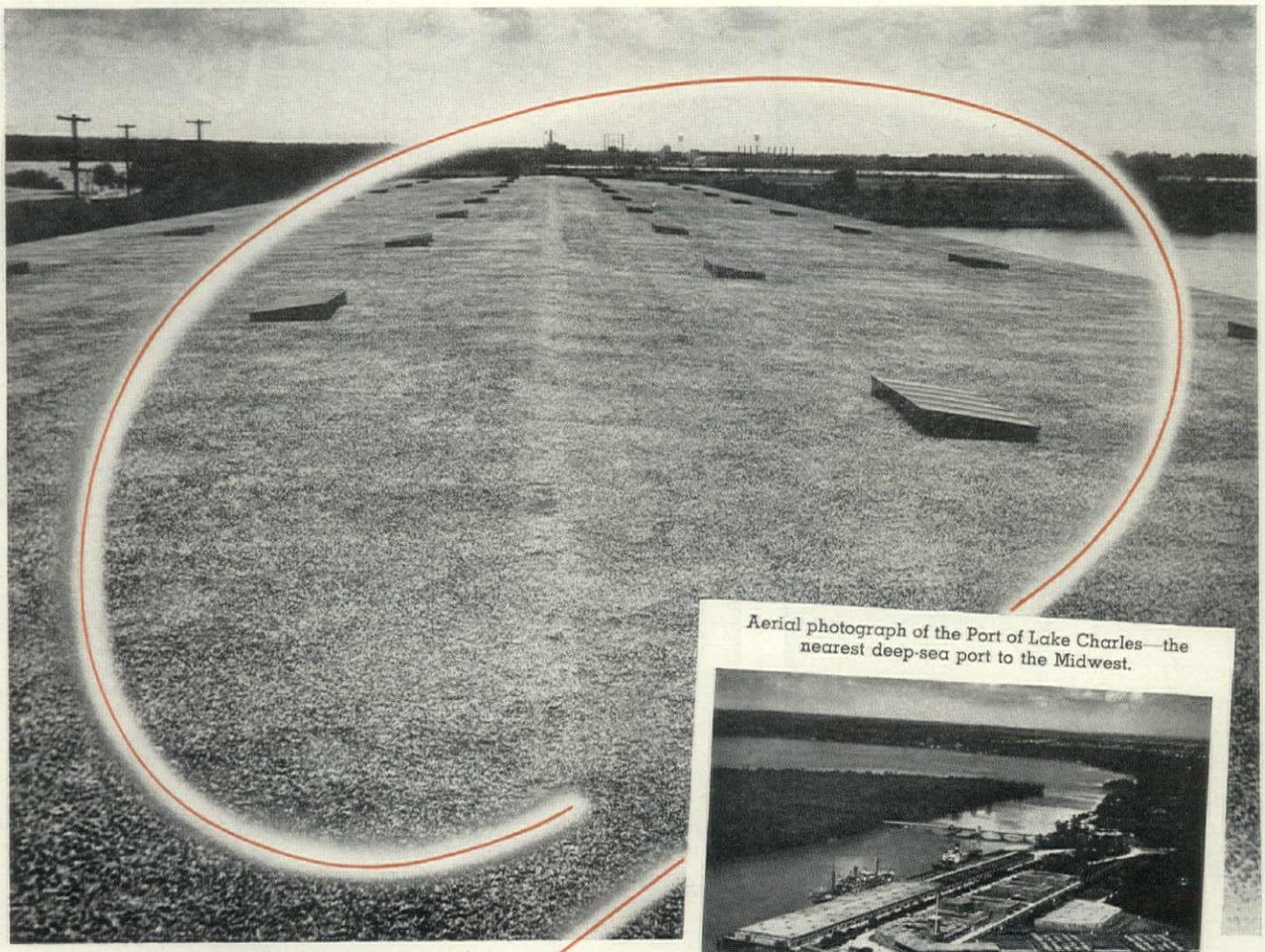
Jack Engeman



PORTER: The citizens didn't know

They took steps to show every voter how urgent the need was and exactly what the building dollars would buy. Last month, three weeks before election time, Mayor Thomas D'Alesandro set aside one week as "Downtown Baltimore Week"; Porter ushered it in with a hoopla voters would remember for at least three weeks. Night parades and simulated bombing attacks by Navy planes brought thousands of citizens into the downtown section, where store windows displayed graphic models of the improvements to be built with each loan the city wanted. Some windows pointed up

(Continued on page 22)



Koppers Bonded Roof built in 1928 for the Port of Lake Charles.

Aerial photograph of the Port of Lake Charles—the nearest deep-sea port to the Midwest.

"AFTER 20 YEARS' cost-free service— this Koppers Roof is still in excellent condition,"

● *says the Executive Assistant of the Port of Lake Charles, Lake Charles, La.*

AND the Port of Lake Charles goes even further in paying compliments to Koppers—"from all outward appearance, this Koppers Roof looks like it is good for another twenty years."

That's whole-hearted praise—and judging by the photograph and by Koppers Case Histories—there's more than an even chance that this Koppers Bonded* Roof *will* give good service for another twenty years.

Koppers Coal Tar Pitch and Tarred Felt Roofs are built to last. They resist prolonged contact with water. They have unusual tensile strength. They are "self-sealing" if small breaks occur. And when gravel or slag is embedded in a heavy pouring of Koppers Pitch, the roof surface is armored against the elements.

Why not learn all the advantages of using Koppers Roofing Materials — the materials which make roofs last longer. Write for further information, or see our catalog in Sweet's Architectural File.

**Koppers Roof Guarantee Bonds indemnify owners against the cost of roofing repairs for 10, 15 or 20 years according to the type of roof applied. These Bonds are issued in such sections of the United States as are covered by Koppers inspection service.*

KOPPERS COMPANY, INC., Pittsburgh 19, Pa.

KOPPERS

• SPECIFY KOPPERS FOR LONG-LIFE ROOFING •

NEWS

the need for a new harbor by showing a neat model of three modern piers and an 830-car parking area to take the place of the sagging wharves along Light Street. Others displayed contrasting models of existing slum areas and the same areas cleared and rebuilt.

BALTIMORE DISPLAYS: Hoopla paid

Election day in Baltimore showed other cities how well hoopla pays. Baltimoreans flocked to the polls to vote a $25,500,000 bond issue for civic improvement, including a $5,000,000 slum clearance program, a new $1,500,000 harbor, construction of a new People's Court building and off-street parking facilities.

SPRINGFIELD

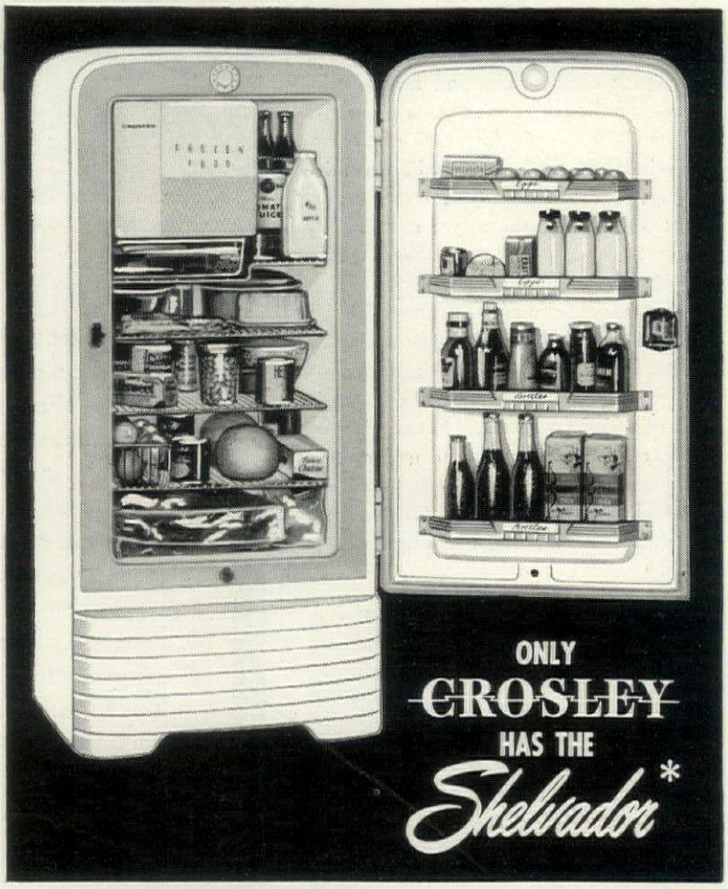
Its obsolete building code may be first in U. S. to go

One day last month an architect, a public utilities man, a contractor and a building inspector gathered around a conference table in the basement of the Chamber of Commerce building in Springfield, Mass. Each carried a briefcase bulging with a statistical description of exactly how much Springfield's restrictive building code adds to the cost of construction. Each spoke hotly of the need for changes. If Future Springfield, Inc., the three-year old civic fact-finding organization which conducted the day-long hearings, has its way, the testimony of these men will shape a new building code for Springfield—a code which will open the door to a lot of new building.

Like many another U. S. city, Springfield has been cramped for years by an ob-

(Continued on page 24)

AT LAST! A BIG REFRIGERATOR THAT FITS SMALL KITCHENS AT LOW COST!



Full 7 cu. ft. capacity in the floor space of a "4"—in the price range of a "6"—plus the exclusive Shelvador* at no extra charge!

IDEAL FOR SMALL HOMES, APARTMENTS! With building costs what they are today, it pays more than ever to get the most out of every dollar, every inch of floor space. You save cost, save space with this new Crosley Shelvador* Refrigerator, yet it provides adequate refrigeration even in the limited space of small kitchens. And it adds sales attraction—every housewife wants the Shelvador*. Ask your nearest Crosley distributor about it, or write to the address below for full particulars.

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Here's one answer to high construction costs!

And its size and styling sure fit in with modern building trends

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solete building code. Last June, FSI,* an organization with less than 100 members but representing the major business and industrial interests in Springfield, got tired of the municipal code revision committee's bungling failure to work out long-needed changes. FSI decided to wade into the problem itself. It hired a consultant—architect Emil Szendy of Cleveland — to draw up a report and list of recommendations which FSI could present to the city.

Last month Szendy brought the first draft of his report back to Springfield to discuss it with Building men and smooth out a few kinks. His biggest problem was whether to recommend building control on the state or local level: overlapping, and in many instances, conflicting requirements of the two had been responsible for much of Springfield's building confusion. FSI's executive director, Sherman Voorhees, said the final report would go to the mayor and the city council by the end of the year. He was sure that changes would follow.

If municipal action is as prompt as Voorhees thinks it will be, Springfield may be the first U. S. city to accomplish a sweeping revision of its building code. (Chicago in 1944 commissioned Pierce Foundation researcher Howard Vermilya to undertake a complete revision of its code, but Vermilya's proposed code, presented to the board of aldermen in 1947, has not yet been approved.)

Don José Browning

VOORHEES: Respect for action

FSI admits that it has undertaken a heavy task, but points out that its three-year history is clogged with projects similarly ambitious: a housing survey, traffic control, and land use studies.

Voorhees, FSI's whip, has none of the professional's hesitancy at the complexities of code revision, but a business man's healthy respect for action. Consultant Szendy cautiously ventured that the final report would "show that Springfield is as deficient in its code provisions as can be said of most codes today." Snorted Voorhees: "The code is in one hell of a mess."

* Many cities have organizations similar to FSI, known as Bureaus of Municipal Research.

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The New Hoffman Panelmatic Control combines in one compact unit all the automatic regulatory features sought by Engineers, Architects and Owners for modern radiant heating systems.

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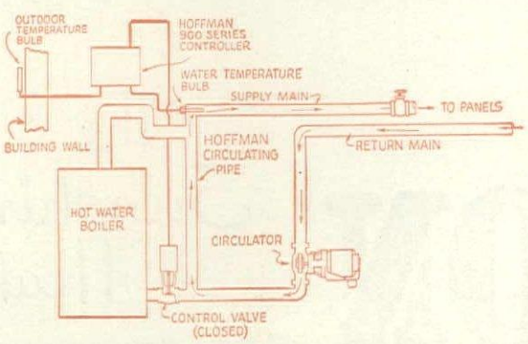
The Hoffman Panelmatic Control can be applied to all radiant hot water heating systems—panels, convectors or baseboards. Zoning of apartments or sections of large residences is readily permitted with Panelmatic Controls, thereby assuring a distribution of heat in direct relation to either personal temperature preference or to the functional activities in the building. Regardless of the size of the system you are designing—you will find Panelmatic your perfect control for Comfort, Economy, Satisfaction. Write today for new Panelmatic Bulletin just off the press and full of facts you will want, no obligation.



HOW THE HOFFMAN PANELMATIC CONTROL FUNCTIONS

The Panelmatic Control is the brain of the Hoffman System. It automatically maintains a constant comfort condition regardless of the outdoor temperature. Its accurate balancing mechanism is connected by capillary tubing to the temperature-sensitive bulb outdoors, and there is a similar one in the supply main. Both bulbs transmit their temperature reactions through the capillaries to the delicate balancing mechanism of the Controller. This mechanism then electrically opens or closes a Hoffman Control Valve so that exactly the proper amount of hot boiler water mixes with the circulating stream at all times.

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Uskon heats by radiation, as does the sun. The heating units are electrically conductive rubber sheets, four feet square, sandwiched between insulating layers. Installed in the ceiling, these panels warm any person or object receiving its rays. The conventional boiler, radiator, pipes, fuel storage, chimney and cellar are eliminated.

Uskon is invisible. The panels become part of the structure and blend into the decorative scheme of the room.

Each room can be controlled and heated separately, eliminating heat in rooms where it is not required. All installation of Uskon panels is done quickly and easily by local electrical contractors.

Uskon is already in use in homes all over the country. Each week sees more and more home-planners specifying this amazing heating system. Let us tell you more about it. Write Uskon, Graybar Electric Company, 420 Lexington Avenue, New York 17, N.Y. or direct to Wire and Cable Department, United States Rubber Company, 1230 Avenue of the Americas, New York 20, New York.

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LETTERS

Prism Lighting Technique . . . Power Rates for Portland's Equitable . . . Houses in Circle and Hexagon . . . Architects and Rent Control . . . Plea for Popularization of Modern . . . Activity on FDR Memorial

LIGHTING AND WHITNEY

Forum:

I have thought for some time, ever since I first learned about it, that the use of prism glass to light the interiors of deep rooms was a shrewd idea. I was mildly astonished to read (FORUM, Sept., '48) that the technique was new. Compared to the clerestory and the hypostyle hall of the ancient Egyptians, yes, but new, as of September, no. I dusted off my Kidder-Parker, as of 1931, and read (p. 1827) that "when a room is from 20 to 60 ft. deep, or even more, and has a skylight of 60° or less, the ribbed and prismatic glass results in a very great gain in effective light. . . ."

Your coverage on lighting trends is good, but sometimes your language confounds me. I wondered what "trilateral" lighting was until I saw from the diagram that you meant lighting from top and sides. Now, inasmuch as a school building you illustrate seems to be illuminated from one end in addition to top and sides, would you say that it is quadrilaterally lighted? If from both ends, quintilaterally? If the building were irregularly shaped with skew walls and pitched roofs you would find yourself in real linguistic difficulty. And who wouldn't?

While we are on the subject of the September issue, I am stumped by your description of Amman and Whitney's airplane hangars as having been designed for minimum stiffness, that "stiffness in such arches is no advantage beyond a certain necessary point, since it does not mean strength . . ."

It would seem to me that you mean maximum stiffness commensurate with economical design. The entire hangar is designed as a shell stiffened by ribs, the shell taking thrust, the ribs resisting both moment and thrust.

Whitney himself has this to say about the design: "A type of thin reinforced concrete shell construction has been developed by the writer for airplane and airship hangars and for other structures requiring very long roof spans. Composed of a thin shell stiffened by integrally cast ribs spaced 20 to 30 ft. apart, it is similar to monocoque construction of airplanes in which the surface veneer acts integrally with the frame . . . The slab not only forms the roof, but also acts as a structural shell carrying part of the load through arch action . . . The integral shell construction stiffened with fixed end arches is more rigid than other types . . . especially important for dirigible hangars . . . The roof arches must be made as light and slender as possible and this introduces the problem of investigating buckling and of determining the effect of distortion of the rib axis on the stresses . . ." (Charles S. Whitney, "Aircraft Hangars of Reinforced Concrete," in *Modern Developments in Reinforced Concrete.*)

M. F. KIRCHMAN

New York

FORUM agrees that use of prismatic glass block is a shrewd idea, disagrees with Reader Kirchman that this is not new in general lighting practice in this country, especially in this technique for classroom lighting, and especially as compared with Egyptian clerestory.

Classrooms of the school in question are arranged in a straight line plan, and are lighted trilaterally with three different methods of admitting light. Only the end rooms have other exposures, and these end rooms, as clearly shown in plan, are not classrooms.

The description of "minimum stiffness" in Charles Whitney's great arched span is not in contradiction to the description quoted later in Mr. Kirchman's letter, "more rigid than other types." The first referred to a discussion of various types of hingeless arches, while the quotation in Mr. Kirchman's last paragraph has to do with a comparison of hinged and hingeless arches. The certain necessary point of stiffness to which the hangars in Chicago were designed was that point of *minimum stiffness* commensurate with *safety against buckling* and *prevention of excessive deformation stresses.* This is the maximum stiffness economical for this type of structure.

The quoted description of the arch in the last paragraph of Mr. Kirchman's letter as being "more rigid than other types" referred to the fact that a fixed hinge arch structure is basically a more stable unit. (This allows members to be designed at any given point with less moment of inertia, and gives a more flexible structure.)—ED.

POWER IN PORTLAND

Forum:

In the September 1948 issue of FORUM appears an extremely interesting article about Portland's new Equitable Building.

The impression that no worthwhile advance in any art or enterprise can come from other than an all-wise and beneficent government bureaucracy has gained an understandable currency during the long 16 years of lunatic New Dealism, which perhaps has plagued the electric industry more than most. Hence it is not surprising to read in your article, on p. 102, that the so-called "heat pump" method of heating and cooling the Equitable Building was made feasible by "low public power rates."

Portland General Electric Co. is a wicked, privately-owned electric utility. It is mean enough to call attention to the following facts:

1. It was in part upon the analyses and the recommendations of PGE engineers that the Equitable Building was designed as the first large office building in the nation to utilize a rather unusual means of heating and cooling.

2. PGE supplies the Equitable Building with electric service, at the same general commercial rate which applies to all other office buildings in the City of Portland.

3. The heat pump method of heating and cooling office buildings is entirely practical and feasible elsewhere—even in some of the "public power" utopias where electric rates are higher than they are in PGE territory.

RALPH H. MILLSAP,
Portland General Electric Co.

Portland, Ore.

The description of Equitable's heat pump installation did not in any sense imply that the progress of such installations was dependent upon public power. FORUM acknowledges PGE's role in developing and providing electricity for the Equitable installation but still thinks that it might not have been possible without the electricity supplied by nearby Bonneville Dam, a public power project. Without Bonneville, the Northwest's present electricity shortage would be crippling rather than slightly restrictive, as it is now. In such a situation, Equitable's heat pump might have gone by the board in favor of some more conventional type. As for cheapness, the rates charged by PGE and other private utilities are undoubtedly affected by the low rate at which they buy a significant part of their power from Bonneville. —ED.

UGLINESS AND NEGLECT

Forum:

. . . Congratulations on the distinguished service you have done for intelligent architecture, and for city and community planning! I travel about this country much, and have long been appalled by the ugliness of the great majority of homes; and by the incredible neglect of rational planning and rebuilding of our cities and towns. "America The Beautiful" is largely limited to the beauties of Nature, but you have fought a great fight to make this include our habitations. Keep it up!

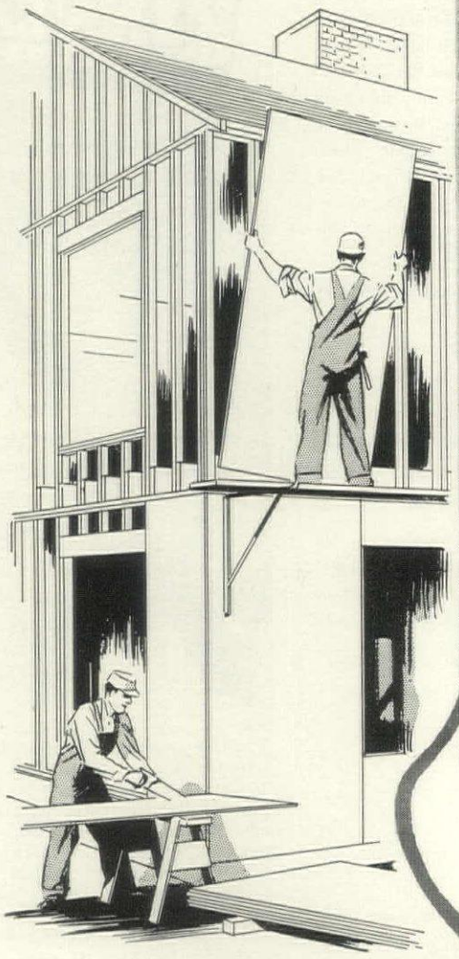
WILFRID LAURIER HUSBAND

Dobbs Ferry, N. Y.

(Continued on page 30)

DOUBLE DUTY
INSULITE

*(BILDRITE SHEATHING)



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Refer to Sweet's File, Architectural Section 10a/9

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11

LETTERS

ABBOT ESTIMATES

Forum:

We have just finished reading your article on the Abbott Pharmaceutical Plant (FORUM, Aug. '48).

I am quite interested to know just what the estimates of $157,544 for the single story building and $117,621 for the double story building included. A rough estimate of the floor area is somewhat more than 50,000 sq. ft. This area compared with the price stated indicates a spectacular discovery in the area-price relationship.

RALPH D. WAGONER,
Piedmont Engineering Co.
Salisbury, N. C.

Below is engineer's estimate of the Canadian project's single story plan of structural steel framing with light-weight precast concrete roof, and the 2-story plan of reinforced flat slab concrete construction. Figures do not represent total cost. Plans were estimated to determine cost differentials. Only those elements which would differ in the two plans were included. For example, interior partitions in the manufacturing area were excluded as they would be practically the same under both plans.

	1-Story Plan	*2-Story Plan*
Foundation walls	$7,300	$4,480
Footings	10,004	3,631
Floor on ground	25,400	14,720
Superstructure	60,640	47,730
Outside walls	14,700	14,280
Roofing and insulation	20,300	11,780
Elevator and stairs	100	7,000
Heating	19,100	14,000
Total	$157,544	$117,621

Note the distinct savings (approximately 35 per cent) of the two story plan over the single story plan.—ED.

PROVINCE SALUTE

Forum:

Congratulations on the wonderful work that The FORUM is doing! It is quite a help to us in the "provinces" to be told in such detail what is being done elsewhere. Particularly in the Building Reporter section.

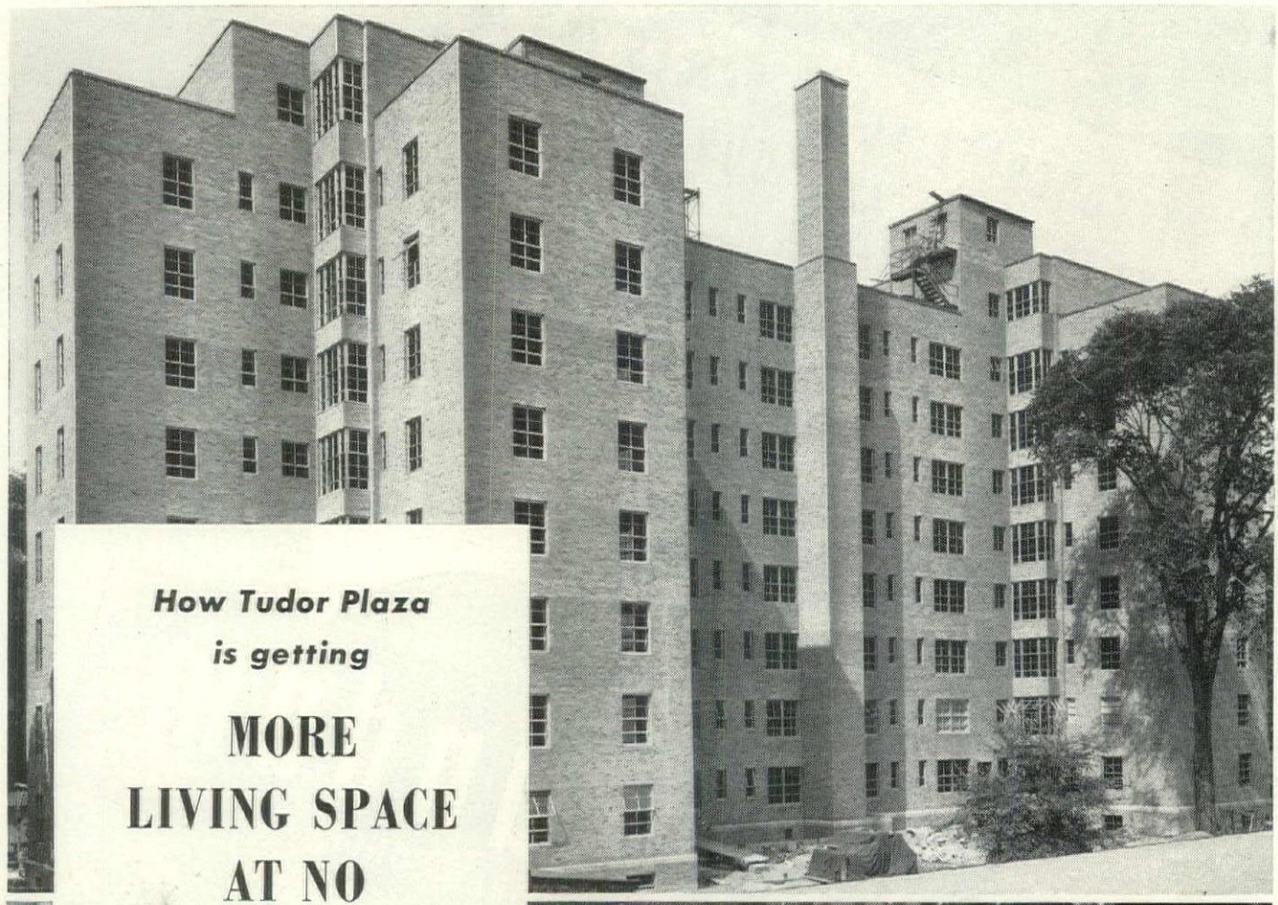
BERNARD A. WEBB, JR., Architect
Macon, Ga.

A SLOW PROCESS

Forum:

We would like more down to earth good architectural design than so much out of this world design. For most people, I think, do not want too unconventional de-

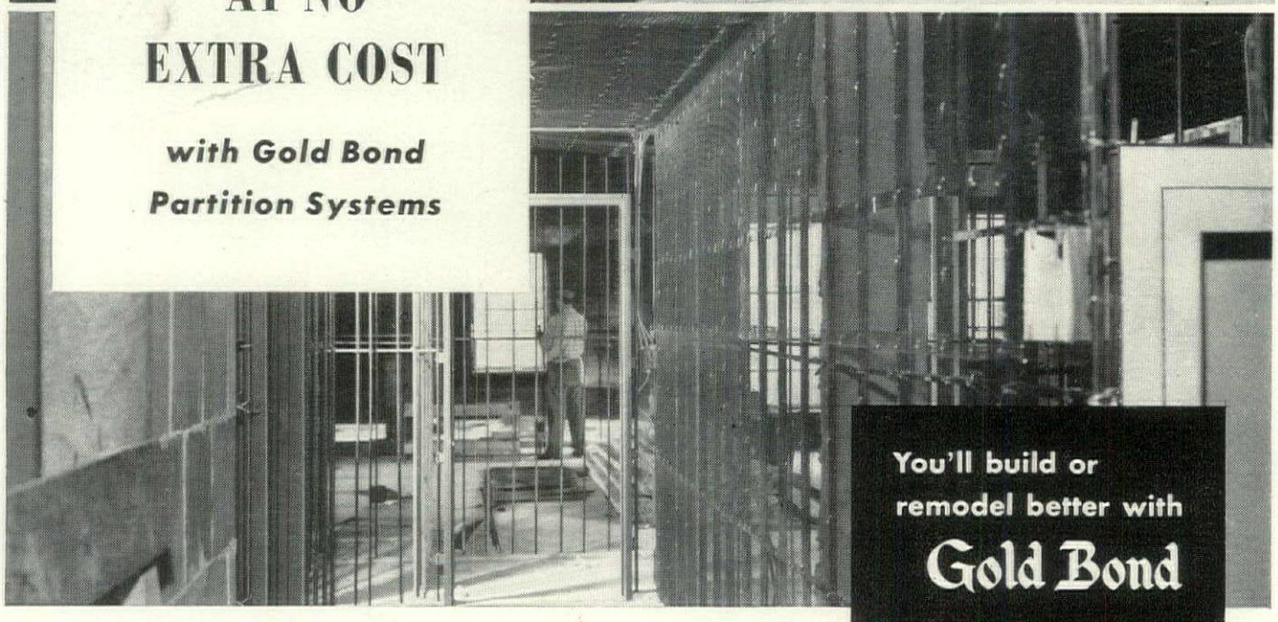
(Continued on page 34)



How Tudor Plaza is getting

MORE LIVING SPACE AT NO EXTRA COST

with Gold Bond Partition Systems



You'll build or remodel better with Gold Bond

"THE very best of everything" is going into the new Tudor Plaza Apartments in Buffalo, N. Y. That's why the architects selected a combination of two sturdy, fireproof Gold Bond Partition Systems for this ultra-modern co-operative apartment.

Apartments are separated by Gold Bond Hollow Walls. In addition to making each unit practically sound proof, this system allows space for piping, wiring and ducts.

Partitions within each apartment are the Gold Bond 2″ Solid Partitions of metal lath and plaster. These streamlined partitions save approximately 4 inches of floor space wherever they occur, providing more spacious living quarters throughout.

For your next job, check up on Gold Bond Partition systems. They're fully described in Sweet's. Or if you'd like a 15 minute demonstration without obligation, just drop us a card.

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Over 150 Gold Bond Products including gypsum lath, plaster, lime, wallboards, gypsum sheathing, rock wool insulation, metal lath products and partition systems, wall paint and acoustical materials.

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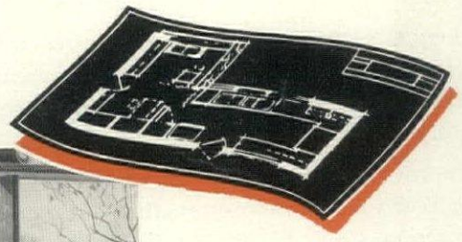
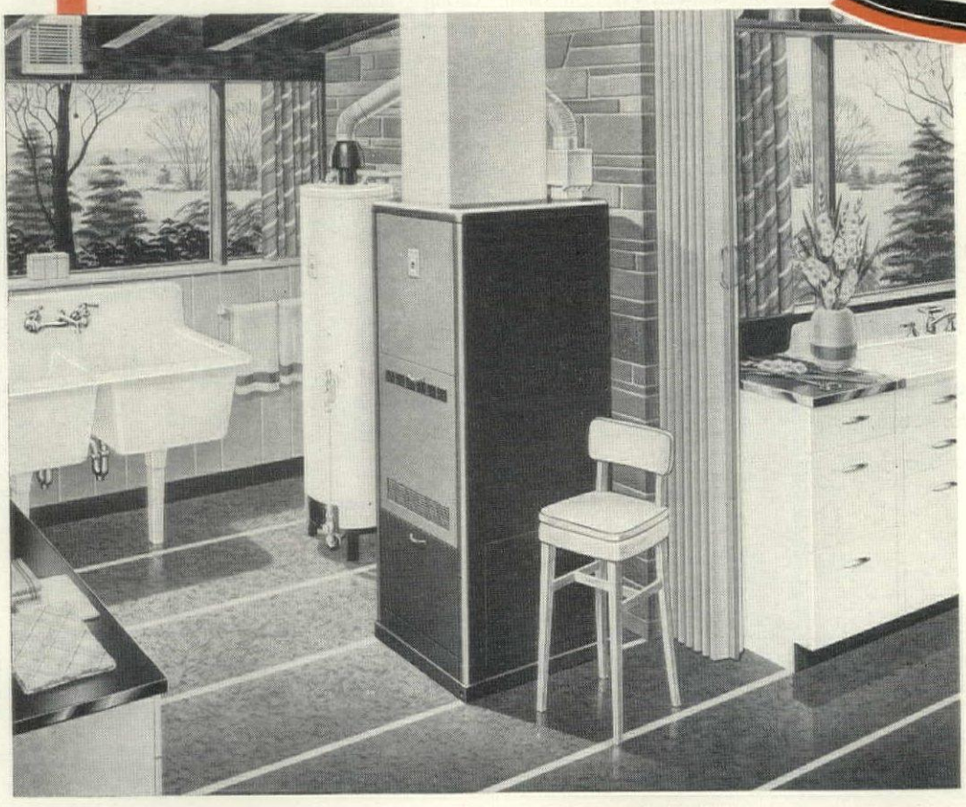
From the research laboratories, throughout every step of production, and on to the last inspector's exacting final check, we leave nothing undone to see that you get products that in quality of engineering, materials, workmanship, and performance are second to none!

American-Standard craftsmen have always proudly adhered to this high code. They always will. We like to believe that's why more American homes have heating and plumbing by American-Standard than by any other single company. For detailed information about the complete line, contact your Heating and Plumbing Contractor. **American Radiator & Standard Sanitary Corporation**, P. O. Box 1226, Pittsburgh 30, Pennsylvania.

AMERICAN-Standard

First in Heating and Plumbing





Planned for maximum convenience, this combination utility room and kitchen is ideal for basementless homes. Comfortable warmth is provided by the gas fired Wyandotte Winter Air Conditioner. The gleaming white, double compartment laundry tray is the smooth, easily cleaned Alden. And the Budget Gas Fired Water Heater stands ready to supply an abundance of hot water for every household need. In the kitchen, a dream of a sink—the Royal Hostess — puts additional luxury and convenience within reach of the homemaker.

AMERICAN-Standard
HEATING · PLUMBING

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON

LETTERS

sign. Although I do think that we should get some of it for this is the way home design is going but it will be a slow process. . . .

C. L. STERE

Youngstown, Ohio

CIRCLES AND HEXAGONS

Forum:

We have read with great interest your accounts of progress in the field of low cost housing. We have been particularly impressed with the success of Mr. William Levitt.

In view of your keen interest in this subject, we thought you would appreciate knowing that by means of entirely different design we have been able to produce homes at a lower cost than even Mr. Levitt. Our circular homes, even though they have not been built under mass production, are from 10 to 20 per cent lower in cost than any home of conventional rectangular design which has equal area and utility.

We have, for instance, many copyrighted plans from which to select a home, and in each case the price is from $1,000 to $2,000 lower than that of comparable rectangular designs. Our plan, "The Champion" is for a home 26 ft. in diameter. It has a complete basement with a warm air furnace, laundry tubs, and coal bin. The first floor has a large semi-circular living room, natural fireplace, beautiful dinette, large kitchen, built-in cabinets, guest closet, and utility closet. The second floor has two bedrooms, one of which accommodates twin beds, one sewing room, three closets, bath and linen closet. Linoleum surfaced floors are used in the kitchen and bath. The rest of the home has oak floors throughout. It is thoroughly insulated and has a solid masonry exterior wall of vitrified face brick. A small porch is also included. In Racine, where building costs are high, the price of this home today is $8,500. This price includes the contractor's profit.

Our recently developed two, three and four unit circular apartment plans are creating great interest. We feel that these particular designs offer an extremely unique solution to the housing problems of many. We feel especially that they offer one method of producing rental housing at a very low capital investment per unit. We offer these designs to the construction industry as an answer to those who feel that only with federal help will we be able to meet the tremendous shortage of rental housing.

One of our three unit apartment plans

(Continued on page 38)

Superior in detail,

low in price,

wide in range of

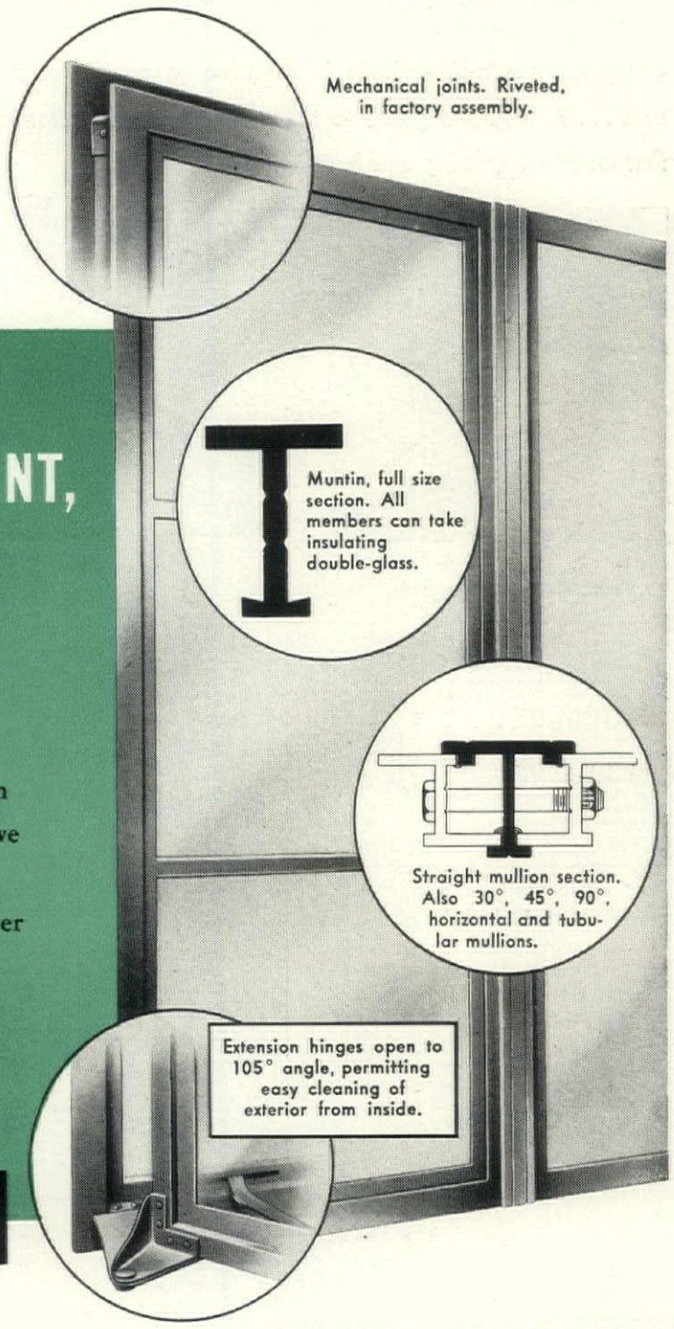
types and sizes...

REYNOLDS ALUMINUM RESIDENTIAL CASEMENT, FIXED AND PICTURE WINDOWS

How to Write Air Infiltration Specification:

Windows of the type furnished shall have been tested by a recognized laboratory and shall have shown air infiltration not exceeding ½ cubic foot of air per minute per foot of vent perimeter when subjected to static pressure equivalent to a wind velocity of 25 mph.

REYNOLDS ALUMINUM CASEMENT WINDOWS MEET THIS SPECIFICATION.



IF YOU SEE RUST YOU KNOW IT'S NOT ALUMINUM

REYNOLDS METALS

REYNOLDS *Lifetime* ALUMINUM BUILDING PRODUCTS

REYNOLDS *Lifetime* ALUMINUM Gutters and Downspouts

Rustproof permanence at about half the price of other rusproof materials. Three styles available in either plain or stippled-embossed aluminum.

***A.I.A. File Brochures on request from* REYNOLDS METALS COMPANY, Building Products Division, Louisville 1, Ky.**

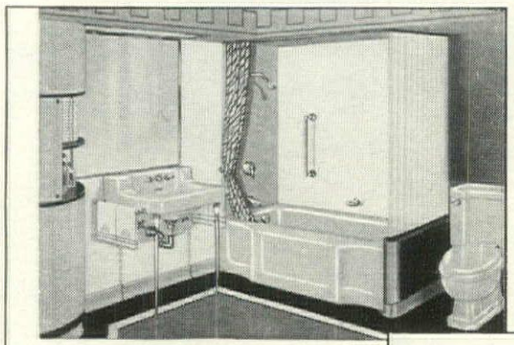
WORLD'S LARGEST PRODUCER OF ALUMINUM BUILDING PRODUCTS:

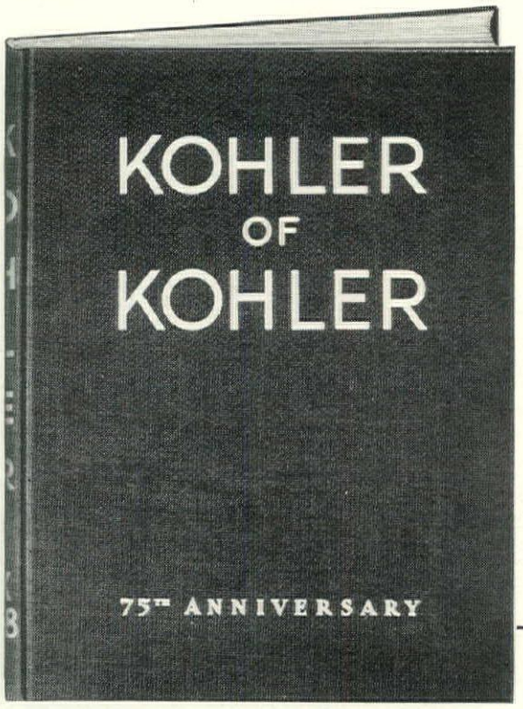
Shingles, Clapboard Siding, Corrugated and 5-V Crimp, Snap-Seal and Standing Seam Roofing, Weatherboard Siding, Built-Up Roofing, Nails, Gutters, Wall Tile, Windows, Reflective Insulation, the "Alumi-Drome" (prefabricated utility building).

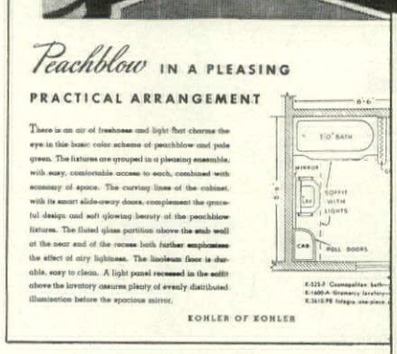
Just Published!

NEW KOHLER CATALOG

Complete, up-to-the-minute information on all Kohler products . . . A valuable guide to the planning and installation of first quality plumbing and heating.



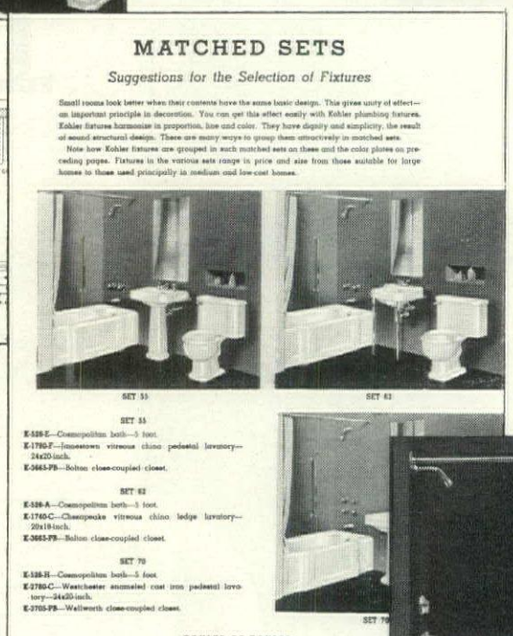




Peachblow IN A PLEASING
PRACTICAL ARRANGEMENT

There is an air of freshness and light that charms the eye in this basic color scheme of peachblow and pale green. The fixtures are grouped in a pleasing ensemble, with easy, comfortable access to each, combined with economy of space. The curving lines of the cabinet, with its smart slide-away doors, complement the graceful design and soft glowing beauty of the peachblow fixtures. The fluted glass partition above the sink wall at the near end of the recess both further emphasizes the effect of airy lightness. The linoleum floor is durable, easy to clean. A light panel recessed in the soffit above the lavatory assures plenty of evenly distributed illumination before the spacious mirror.

KOHLER OF KOHLER



MATCHED SETS

Suggestions for the Selection of Fixtures

Small rooms look better when their contents have the same basic design. This gives unity of effect—an important principle in decoration. You can get this effect easily with Kohler plumbing fixtures. Kohler fixtures harmonize in proportion, line and color. They have dignity and simplicity, the result of sound structural design. There are many ways to group them attractively in matched sets.

Note how Kohler fixtures are grouped in such matched sets on these and the color plates on preceding pages. Fixtures in the various sets range in price and size from those suitable for large homes to those used principally in medium and low-cost homes.

SET 55

SET 82

SET 55

K-520-E—Cosmopolitan bath—5 feet.
K-1790-F—Jamestown vitreous china pedestal lavatory—24x20-inch.
K-3665-PB—Bolton close-coupled closet.

SET 82

K-520-A—Cosmopolitan bath—5 feet.
K-1760-C—Chesapeake vitreous china ledge lavatory—20x18-inch.
K-3665-PB—Bolton close-coupled closet.

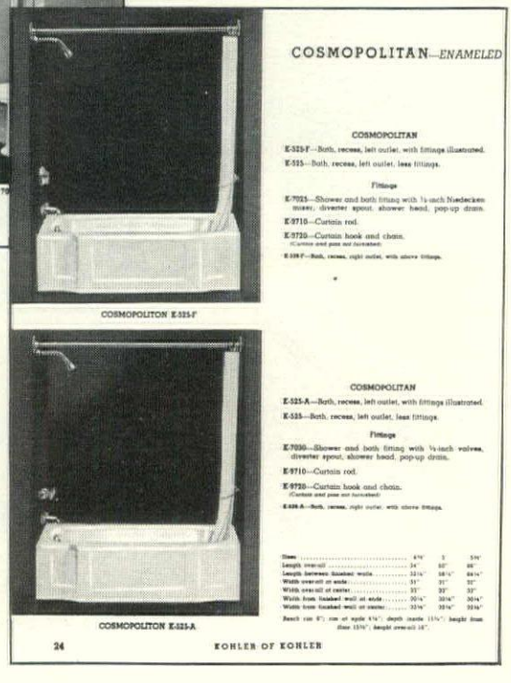
SET 70

K-520-H—Cosmopolitan bath—5 feet.
K-2780-C—Westchester enameled cast iron pedestal lavatory—24x20-inch.
K-3705-PB—Wellworth close-coupled closet.

KOHLER OF KOHLER

This is a reference book of permanent value—filled with information that will help you. The catalog tells of the materials, the research and engineering, the careful workmanship and many inspections that maintain Kohler quality. Distribution of the new K-48 is now being made. If you do not receive your copy in due time, please write. Kohler Co., Dept. 6-C, Kohler, Wisconsin.

Illustrations in full color show complete installations, with floor plans that are helpful in planning and decorating rooms of different dimensions, and for various budgets. They contain practical information on storage and other facilities.



COSMOPOLITAN—*ENAMELED*

COSMOPOLITAN

K-525-F—Bath, recess, left outlet, with fittings illustrated.
K-525—Bath, recess, left outlet, less fittings.

Fittings

K-7055—Shower and bath fitting with ½-inch Needeless mixer, diverter spout, shower head, pop-up drain.
K-9710—Curtain rod.
K-9720—Curtain hook and chain.
(Curtains and posts not furnished)
K-526-F—Bath, recess, right outlet, with above fittings.

COSMOPOLITON K-525-F

COSMOPOLITAN

K-525-A—Bath, recess, left outlet, with fittings illustrated.
K-525—Bath, recess, left outlet, less fittings.

Fittings

K-7030—Shower and bath fitting with ½-inch valves, diverter spout, shower head, pop-up drain.
K-9710—Curtain rod.
K-9720—Curtain hook and chain.
(Curtains and posts not furnished)
K-526-A—Bath, recess, right outlet, with above fittings.

Sizes	4'6"	5'	5½'
Length over-all	54"	60"	66"
Length between finished walls	52½"	58½"	64½"
Width over-all at ends	31"	31"	31"
Width over-all at center	31"	31"	31"
Width from finished wall at ends	30¼"	30¼"	30¼"
Width from finished wall at center	33¼"	33¼"	33¼"

Bench top 8"; rim at apron 4¼"; depth inside 15¼"; height from floor 15¾"; height over-all 38".

COSMOPOLITON K-525-A

24 KOHLER OF KOHLER

Pages like the one above provide useful suggestions for matched sets—showing how to achieve unity of effect with fixtures in groups suitable for large, medium, or low-cost homes.

KOHLER
OF
KOHLER

Hundreds of illustrations, with the latest specifications and data covering every Kohler product for bathroom, kitchen, washroom or laundry—and special installations for hospitals, industrial buildings and other institutions.

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS

Duty-Designed
FOR SMALL HOMES
BY
TIMKEN
Silent Automatic

Timken Silent Automatic "Duty-Designed" Units are especially designed, built and priced to meet small home heating needs. Quietness and reliability of operation are unequaled.

Created Especially for—Not Just Adapted to—Small Home Heating Requirements

There's no compromise with performance, with dependability, with value, in Timken Silent Automatic units that are *"Duty-Designed"* for small home installation!

These compact new units meet every demand of architects and builders—satisfy every owner's need. This is no scaled-down equipment originally intended for larger homes—it is newly engineered from start to finish.

"Duty-Designed" units bear little resemblance, in either appearance or performance, to conventional small home units. Compactness, quietness, reliability of operation, and heating efficiency—all are truly remarkable and prices are equally so.

It will pay you to learn more about Timken Silent Automatic "Duty-Designed" small home units! Write the factory or phone your Timken Silent Automatic Authorized Dealer. He's listed in the "yellow pages".

EQUIPPED WITH A SPECIAL DUTY-DESIGNED WALL-FLAME OIL BURNER, TOO!

The heart of every Timken Silent Automatic "Duty-Designed" small home unit is the same wall-flame type oil burner which, for more than 20 years, has been "The Accepted Standard" for quality and performance in the automatic home heating field.

"Duty-Designed" Hi-Boilers combine in one cabinet a wall-flame oil burner, heating boiler, expansion tank, and water heater. Model shown has copper coil boiler or heat exchanger. Other models have welded steel heat exchanger. Capacities range up to 80,000 Btu. at outlet.

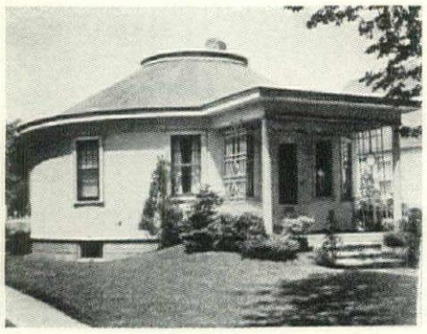
Other "Duty-Designed" units include Lo-Boilers, Hi-Furnaces, coil and tank type water heaters, and standard oil furnaces.

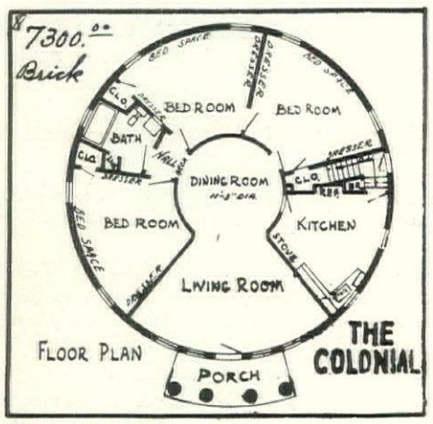
TIMKEN
Silent Automatic
OIL HEAT

TIMKEN SILENT AUTOMATIC DIVISION
The Timken-Detroit Axle Company • Jackson, Michigan

The Accepted Standard
TRADE MARK REGISTERED

consists of a large living room, comfortable kitchen, bedroom with room for a double bed and two dressers, large closet, private bath, and a central utility room used by all three tenants. All units have private entrances. These can be built in Racine,





Two flexible circles

using single story, solid masonry construction, for the sum of $13,850. This is about $4,600 per unit.

These apartment designs are flexible so that any one unit may be enlarged without extensive and costly remodeling. We are certain that all this at such a price cannot be accomplished with conventional rectangular designs.

ANTON KRATOCHVIL, President
Circular Homes, Inc.

Racine, Wis.

Forum:

. . . Why are rooms squares or rectangles? Could they not be hexagonial?

In (a rectangular room) the corners usually are not used . . . The circumference of a hexagon is only 5/6 that of its rectangle; that makes one sure to build just what he needs for 85 per cent of the cost when building on the hexagonal basis.

In a hexagonal room there are usually

(Continued on page 42)

CORNING ANNOUNCES NEW SERVICES

to help you solve any commercial lightingware problem!

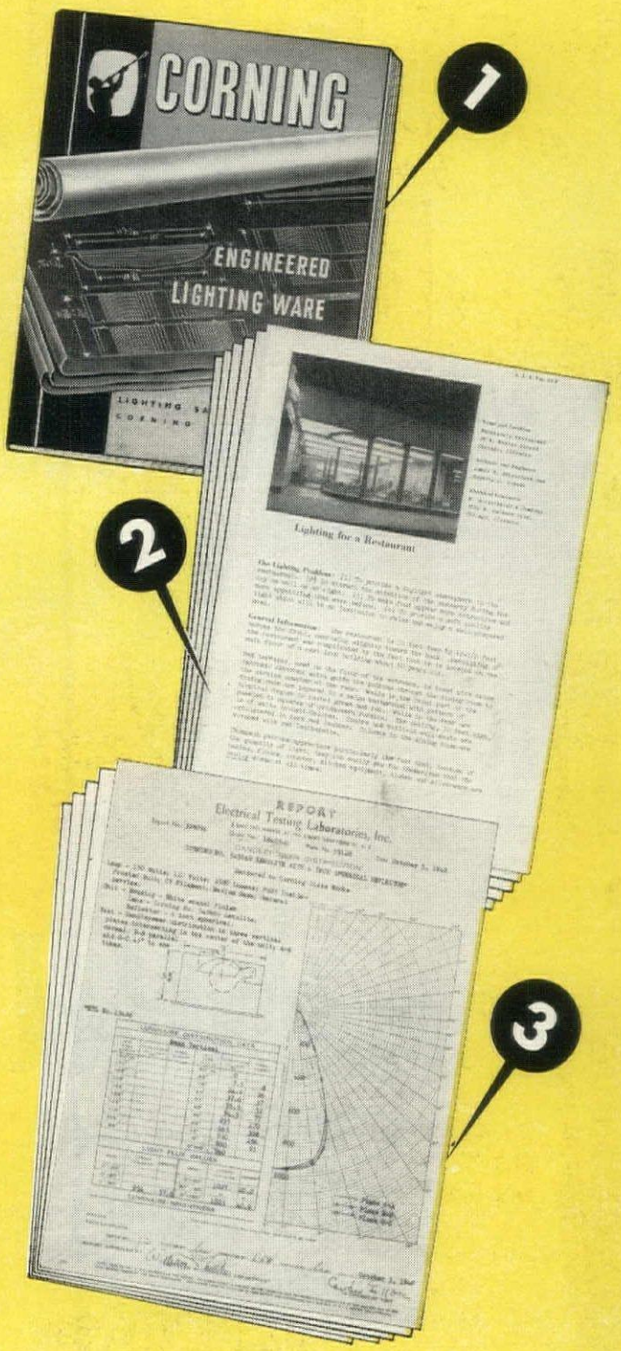
Corning Glass now offers a completely balanced line of commercial lightingware for diffusion and prismatic light control from fluorescent and incandescent light sources. This lightingware is the product of extensive research and is made to high standards of quality and tolerance.

To help you use this lighting effectively, Corning now offers many new services which are available for the asking. Whether you are an architect, lighting engineer, or fixture manufacturer, be sure you have this information in your files:

1. Bulletin LS-17, "Corning Engineered Lightingware," just published, describes and shows you how to use Corning's completely balanced line of lightingware to best advantage. It is a condensed handbook that will save you valuable time.

2. Installation data sheets conforming to the standards of the Illuminating Engineering Society are available on outstanding commercial installations, schools, stores, and institutions. They help you to plan.

3. Electrical Testing Laboratory curves have now been completed for the new Corning curved lens panels, the flat lens panels, and some of the Lenslites. You will find them valuable when planning a prismatic installation.



This information was developed especially to help *you*. Corning is interested in seeing to it that you get it promptly. Call your nearest Corning office, or if you prefer, mail the coupon below.

LIGHTINGWARE

SALES OFFICES

New York
718 Fifth Ave.
Circle 6-8224

Chicago
1470 Merchandise Mart
Delaware 6600

San Francisco
1355 Market St.
Underhill 2727

CORNING means research in GLASS

PYREX T.M. REG. U.S. PAT. OFF.

CORNING GLASS WORKS, DEPT. AF-11, CORNING, N.Y.

Please send me the information checked:

☐ Bulletin LS-17, "Corning Engineered Lightingware"

☐ Installation data sheets ☐ ETL curves

Name ..... Title .....

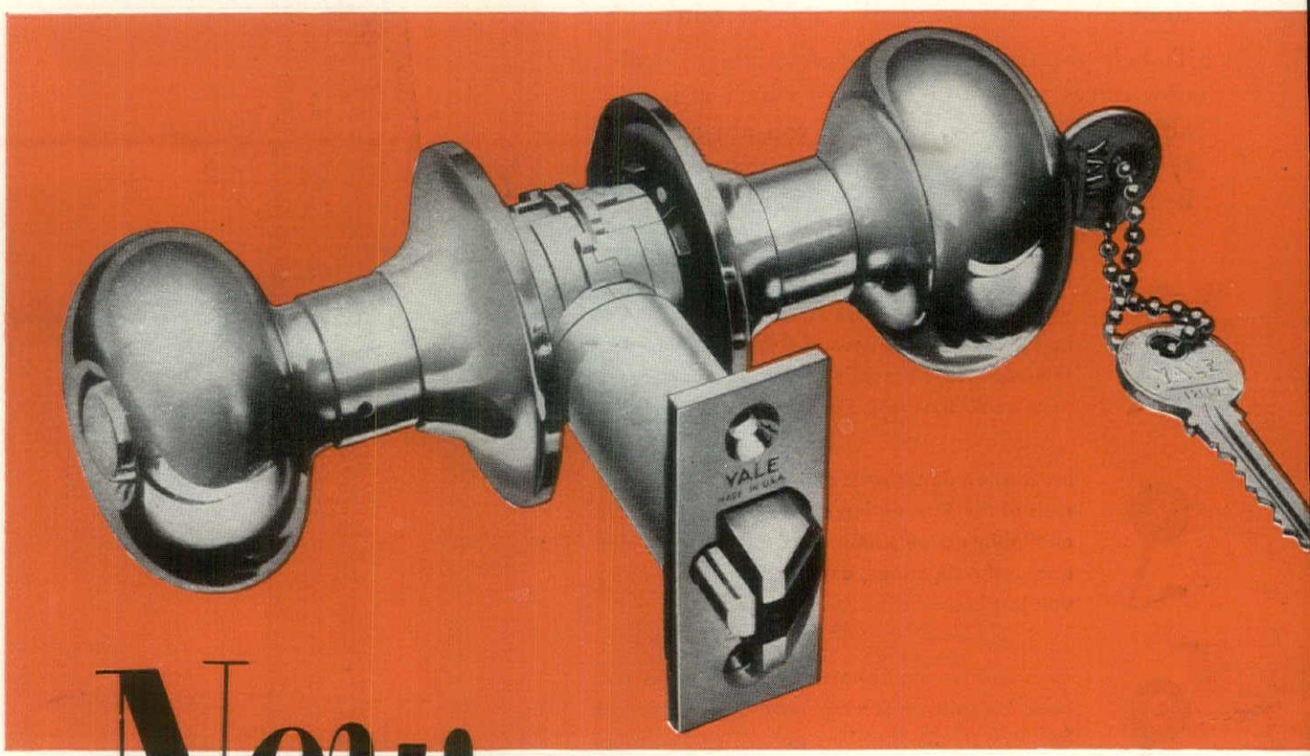
Firm .....

Address .....

City ..... Zone ..... State .....

Function and Beauty

These New YALE Accomplishments Combine



New YALE TUBULAR LOCK

Quick Four-Step Assembly • Modern Key-in-Knob Design

modern YALE design

The classic simplicity of its modern design, unblemished outwardly by screws or surplus plates, permits universal use in buildings of all types, on doors of all types. Finished in the warmth of brass, dignity of bronze, or cool beauty of chrome.

Yale quality in pressure-formed metals for extra strength; Yale precision in construction throughout.

fast installation

Each lockset is packaged in "exploded" form—each part in its proper relative location for quick four-step assembly.

Easily installed. Just bore two small holes and mortise for front. Template positions holes.

Easy adjustment for door thickness. Combined spring washer and lock nut that holds lock in place, compensates for change in thickness of door.

Reversible.

YALE HEAVY-DUTY TUBULAR LOCK

6 Basic Locksets — 11 Functions

Office and Front Door Lock—plain or deadlocking bolt, key outside, push-button inside
Classroom Door Lock—plain or deadlocking bolt, key outside
Entrance Door Lock—plain or deadlocking bolt, key both sides
Corridor, Closet, etc., Lock—plain or deadlocking bolt, key outside
Connecting Door Latch—plain bolt
Communicating Door Lock—plain or deadlocking bolt, buttons both sides

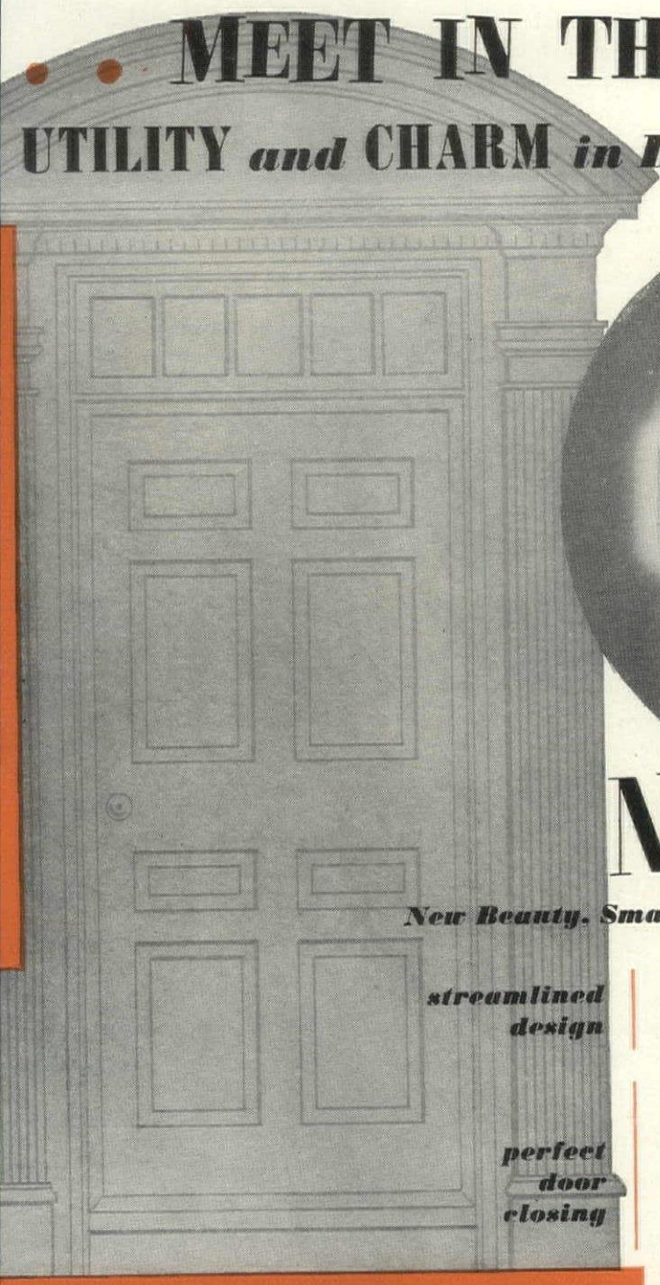
YALE STANDARD-DUTY TUBULAR LOCK

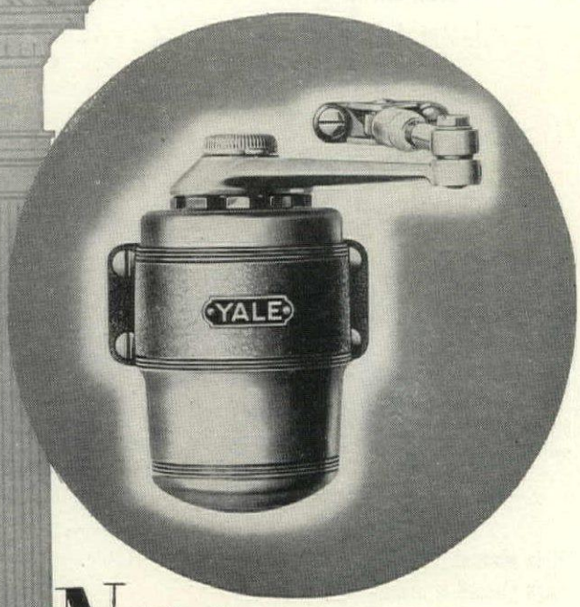
6 Models

Front Door Lock—pin-tumbler, key outside, deadlocking bolt, push-button inside
Front Door Lock—disc-tumbler, key outside, deadlocking bolt, push-button inside
Inside Door Latch—plain bolt
Bedroom Door Lock—push-button inside, emergency feature
Bathroom Door Lock—push-button inside, emergency feature
Side Door Lock—deadlocking bolt, push-button inside
All models of universal application, uniform in appearance and interchangeable.

MEET IN THE DOORWAY

UTILITY *and* CHARM *in Door Hardware*





New YALE COMPACT DOOR CLOSER

New Beauty. Smaller Size, Equal Power, Smoother Action

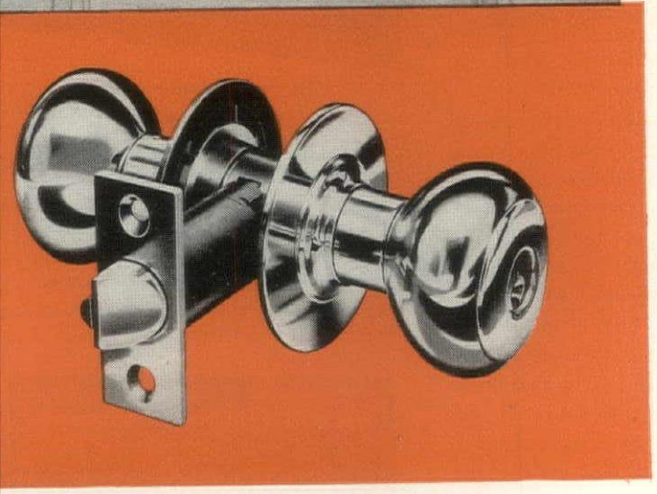
streamlined design

The neat, trim beauty of the YALE COMPACT DOOR CLOSER is achieved by the rotary piston design which makes possible a powerful door closer that is 36% smaller than other closers of equal power—and without ugly bulges.

perfect door closing

The powerful flat ribbon spring, aided by the leverage of the arms, automatically closes the door. The entire closing swing is under the control of the checking action provided by the rotary piston, turning on the axis of the shaft against the checking liquid. Closing speed is regulated by controlling flow of liquid through valve.

The checking is a circular stroke, distributing stress evenly, absorbing the motion and eliminating impact. There is no abrupt side thrust as in other designs. Strain has been eliminated.



less maintenance

Less strain and less friction on moving parts . . . no gear teeth to wear . . . the shaft cannot twist . . . leak-proof shell (no threaded joints) . . . non-gumming mineral oil liquid . . . self-lubricating bronze arm bearings . . . all add up to longer life with lower maintenance cost.

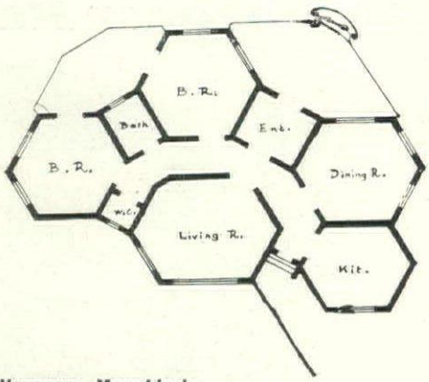
THE YALE & TOWNE MANUFACTURING COMPANY
STAMFORD, CONNECTICUT

TRADE YALE MARK
HARDWARE
Sign of a Well-Built House

LETTERS

three outside walls—a minimum of two and a maximum of five. Such a room can be opened to three directions and is sure to get the breeze and the sun rays.

As to the strength of the house as a whole, the hexagonal one is stronger; the walls are shorter, the span of the roof is



Hexagon: More Lively

shorter and its area is smaller than that of a rectangle; since the corners are six instead of four this makes the unit much stronger and more stable than the other.

The hexagonal house looks more lively and more comfortable.

M. KHATIB

Gaza, Palestine

RENT ACT MASQUERADE

Forum:

If architects knew what rent control means, what its object is, something about its true underlying philosophy, they could work with and help effectuate its objectives.

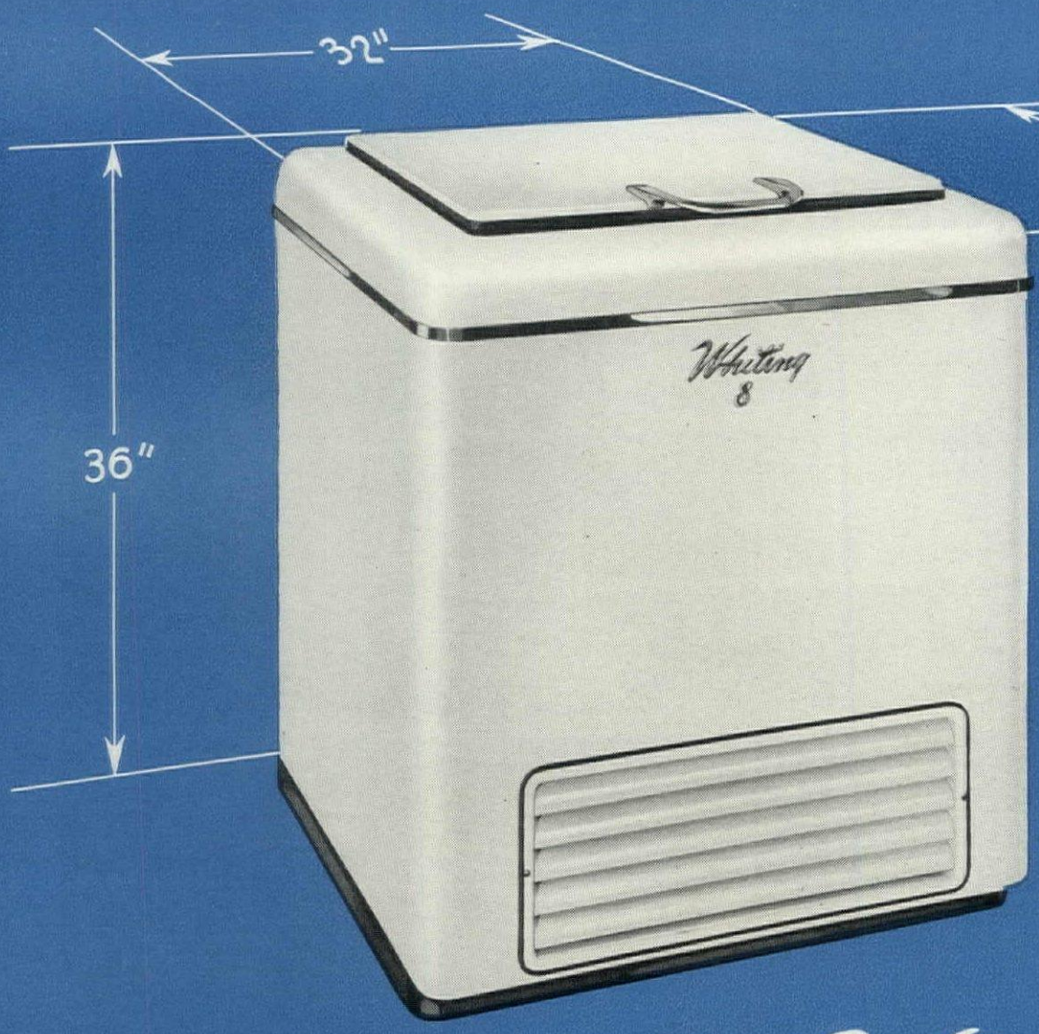
The design of every building should be justified on economic grounds to encourage capital investment.

Rental housing projects dare not be built since the advent of rent control. Even profitable remodeling projects are hung in abeyance from fear of government and its practical working principles underlying the plainly Russian philosophy which rent control has now proven itself to be.

These applied principles in which a confession of guilt is forced, contrary to fact by our own Federal Courts, is now a part of their record. Rent officers have been interviewed in an attempt to fit design into a modern practical answer, not to gain a long profit, but to assure some safety to capital investment for a few years at least.

Not only does this fear of modern democratic government stop new works; it actively promotes decay, blight and slum conditions in existing good houses because

(Continued on page 46)



INSULATED WITH
SANTOCEL
THE WORLD'S MOST EFFICIENT INSULATION

SEE WHAT THE NEW *Whiting 8* CAN DO FOR YOUR KITCHEN PLANS

Into a space only 27" by 32" by 36" it puts 8 cubic feet of food storage

In modern living . . . hence in modern home-plans . . . the food freezer is a "must." And at last here's a freezer compact enough to fit easily into most of your kitchen plans, yet with generous, sense-making capacity, EIGHT CUBIC FEET, holding 280 pounds of food.

Or if the family's large and the home more pretentious, the Whiting 17 fits neatly into the utility room. Holds 17 cubic feet, yet it's only 27" by 36" by 60" . . . the first large freezer that is sufficiently compact to go through an ordinary doorway.

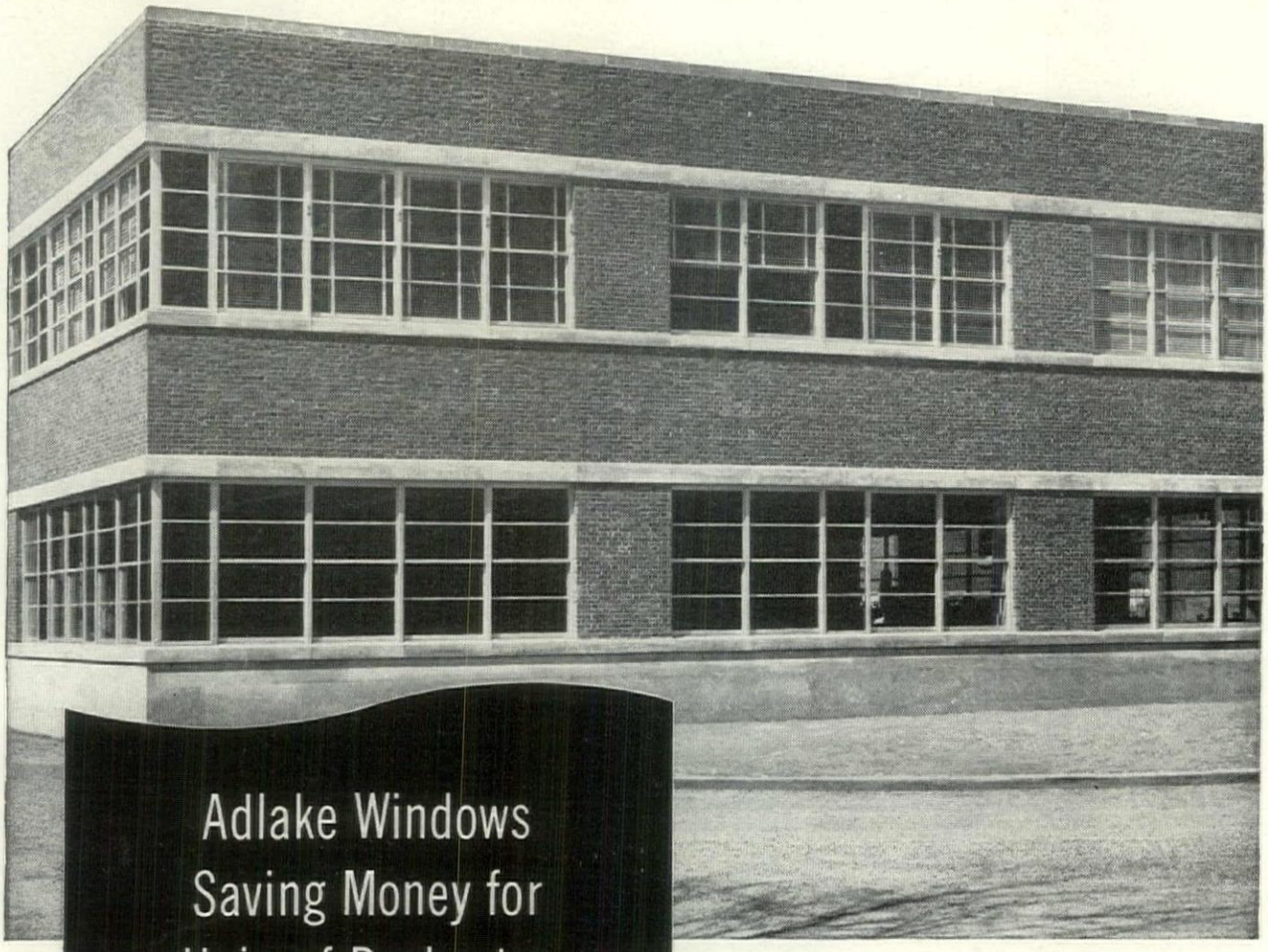
Most important, a Whiting is Dependability itself. You can specify or recommend Whiting without reservation. In every Whiting, your clients get the double advantage of long experience in precision manufacturing, plus expert low-temperature engineering that has made Whiting the great name in food freezers.

WHITING CORP. 1st Natl. Bank Bldg. Chicago

Whiting THE GREAT NAME IN FOOD FREEZERS

Whiting 17—provides 17 cubic foot capacity in space only 27" by 36" by 60"

NO MAINTENANCE COST!



Adlake Windows Saving Money for Univ. of Rochester

*Architects: Kaelber & Waasdorp; Contractor: A. W. Hopeman & Sons

The 103 Adlake Aluminum Windows (Series 600) in the newly-built Engineering Building* of the University of Rochester (New York) will save the university a considerable sum, over a period of years, *eliminating* maintenance costs. The windows will ultimately *pay for themselves* through this economy. Adlake windows require no painting, no maintenance other than routine washing! And they *last as long as the building.*

ONLY ADLAKE WINDOWS have the combination of wovenpile weather stripping and patented serrated guides that assures minimum air infiltration and absolute finger-tip control.

Adlake Windows never warp, rot, rattle, stick or swell. They look lovely and operate smoothly for the life of the building.

INFORM YOUR CLIENTS about the wiping out of maintenance costs and the long, worry-free service they can expect from Adlake Aluminum Windows. For complete data, drop us a post card today at 1101 North Michigan Avenue, Elkhart, Indiana. No obligation, of course.

Adlake Aluminum Windows
have these "plus" features:

• Minimum Air Infiltration • Finger-tip Control • No Warp, Rot, Rattle, Stick • No Painting or Maintenance • Ease of Installation

THE

Adams & Westlake
COMPANY

Est. 1857 • ELKHART, INDIANA • New York • Chicago

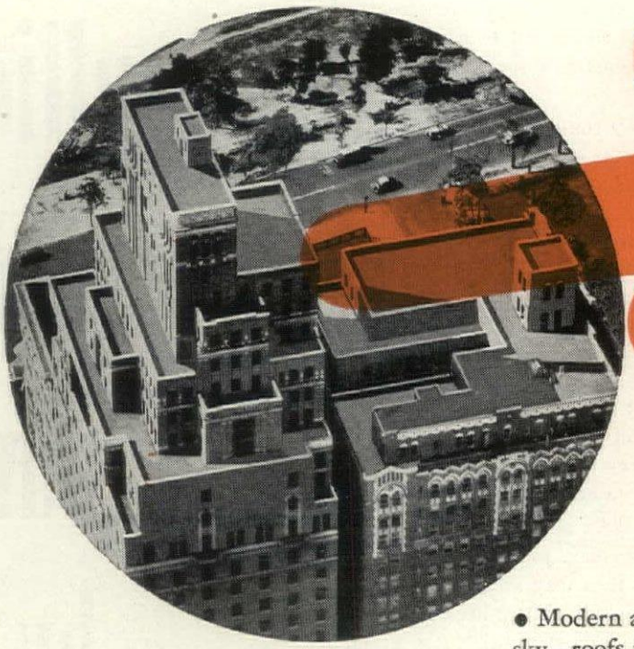
Adlake TRADE MARK

Furnishers of Windows to the Transportation Industry for over 30 years

All Adlake double-hung windows carry this seal

SPECIFICATION DH-A1 QUALITY — An equivalent of this window has been examined by PITTSBURGH TESTING LABORATORY, conforms in Materials, Construction, Strength of Sections and Air infiltration requirements to ALUMINUM WINDOW MANUFACTURERS ASSOCIATION Specification DH-A1 — SPECIFICATION DH-A1 SEAL

MEMBER, ALUMINUM WINDOW MANUFACTURERS ASSOCIATION



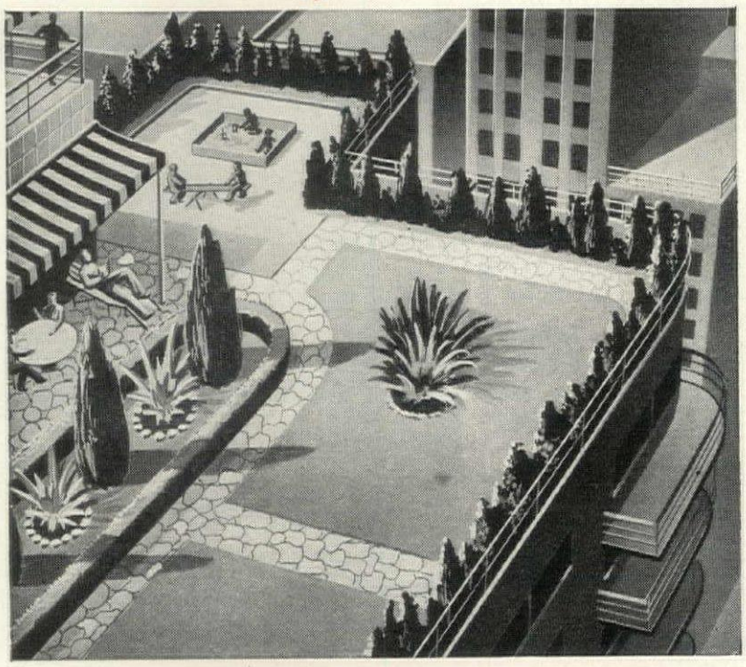
DON'T WASTE THE ROOF!

• Modern architecture is building a whole new world up under the sky—roofs that meet the varied needs of modern life. Garden roofs for apartments and hotels. Promenade roofs for schools, hospitals and office buildings. Heavy traffic roofs for factories and warehouses.

Ruberoid has the specifications to make these new, imagination-stirring developments fully workable and practical. Soundly engineered, fully proved in actual construction. They're available and practicable now.

What building are you planning—commercial, institutional, religious, industrial or public? No matter what type of roof you have in mind for the job, Ruberoid specifications will help you make fullest use of that valuable roof area.

Our nearest sales office will be glad to furnish these specifications to you, or consult your Ruberoid Approved roofer.



← **APARTMENT GARDEN ROOF**

Representative of this trend in modern design, here's a landscaped roof that brings apartment dwellers a pleasant spot for relaxation and play. Flowers, shrubbery, trees and grass high above busy streets—up in the sunshine and fresh air!

The right roof for any job—from ONE source!

Ruberoid makes every type of built-up roof—Smooth Surfaced Asbestos, Coal Tar Pitch with gravel or slag surfacing, or smooth or gravel-and-slag surfaced asphalt . . . in specifications to meet any need. Ruberoid Approved Roofers are not prejudiced in favor of any one type. You are assured of one source for all materials, centralized responsibility, smoother operation, uniform quality!

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they are not permitted by rent control to pay a return sufficient to paint and maintain the property, to say nothing of a small profit.

The direct consequence is that thousands of rental units all over are disappearing to make a bad rent situation. New construction is impossible with the black cloud of government hovering, to release the stroke which means ruin. Federal subsidy only serves to fasten more federal control on all our necks. Once the experience of a federal court hits a client, fear grows to panic. Under the present communist system within Federal Government masquerading as Rent Act of 1947 amended 1948, no rent projects may be undertaken for plain fear created by seven long years of rent control.

It will take a new president and a lot of new congressmen to knock out rent control. Only then may architects find a way to nurse this sick patient back to health.

GEORGE E. EICHENLAUB, Architect
Bloomington, Ill.

LOVERS ON FDR MEMORIAL

Forum:

In England some unchristian, uncharitable, unthinking persons have seen fit to object to the presence of children and young courting couples on the site of the Franklin Delano Roosevelt Memorial in London. These intellectual pygmies, who disgrace the British people by their shameful protests, argue that the dignity of the memorial has been impaired. How in heaven's name can anyone be so urban-spirited as to believe this? What is there about children and young couples which will detract from the dignity of the memorial?

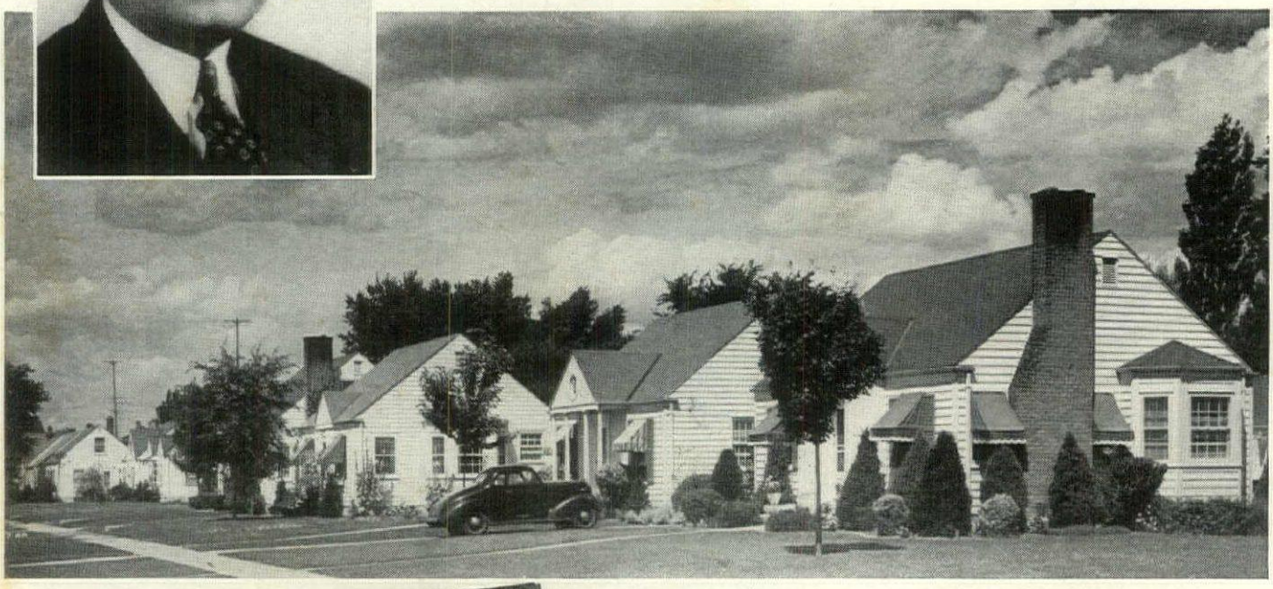
The majority of my countrymen are not deceived by the churlish objections of the critics. They know that the memorial stands to remind us of a noble man who would be the very first to refute these criticisms. He would be glad for the memorial to be surrounded by life as represented in the play of children and the love of young men and women. My countrymen realize that such things will enhance the serenity of the memorial, and in no way detract from it.

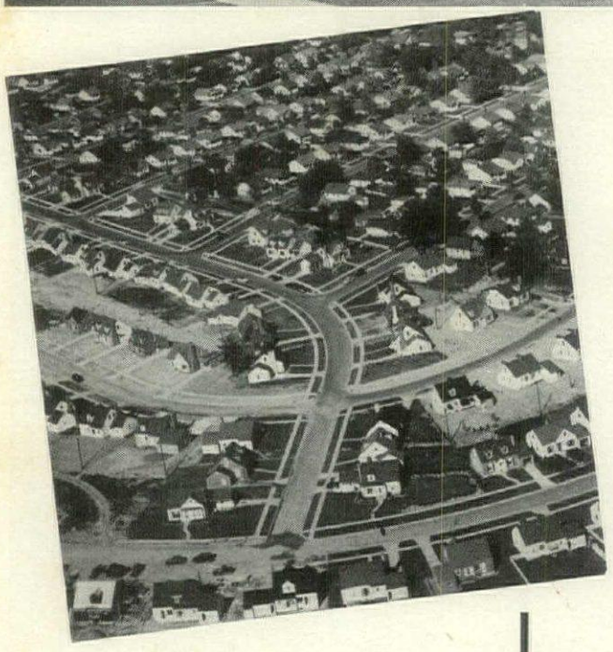
It may be that the somewhat outdated nature of Sir William Reid-Dick's sculpture has fostered a parallel outdated idea in the minds of the few objectors. Certainly a more modern, adventurous work would better fit the modern, adventurous spirit that was Roosevelt's. If this supposition is accurate it is unfortunate, but by

(Continued on page 50)

As Robert P. Gerholz says:

"Asphalt Shingles help houses stand apart–and yet fit together"





NEWEST GERHOLZ PROJECT ZOOMS WITH ON-SITE BUILDING OF TWENTY-FIVE HOUSES AT A TIME

●The experience of 26 years in large home and neighborhood construction is focused in Mott Park of Flint, Mich., latest community development of Robert P. Gerholz and Gerholz Community Homes, Inc. Air view is of Bassett Park, recently completed project handled by Gerholz-Healy Co. All of Bassett Park's 601 homes are roofed with asphalt shingles—as will be all of Mott Park's 250 rambling colonials. Half completed, Mott Park benefits from efficiencies proved in other projects. Construction proceeds year round with 25 houses going up simultaneously. Architect for both developments is Charles Noble of Ann Arbor and Detroit.

Community of spirit pays in *Community Development*

Again and again in modern community building, asphalt shingles are demonstrating their ability to spread charm, individuality, variety throughout an entire development.

Mr. Gerholz, president of Gerholz Community Homes, Inc., and past president of Natl. Assn. of Home Builders, puts it this way: "Asphalt shingles fit each house in an individual, personal way—and they help all houses fit together, in harmony and to the advantage of all."

Color, of course, is one of asphalt's big features. Fire resistance, with its resulting insurance savings, is important, too. Add to these asphalt's low relative cost, its adaptability, its neat modern appearance, the simplicity of proper application, its long, dependable service life and you have reasons to spare for its popularity.

ASPHALT SHINGLES

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ASPHALT ROOFING INDUSTRY BUREAU

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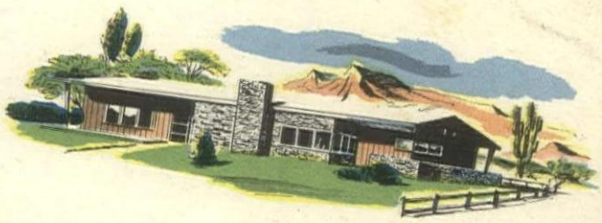
AT HOME ACROSS AMERICA

On blueprints from coast to coast . . . from Connecticut hideaway to California ranch house . . . clay tile sets the style to brighten and beautify today's homes. House Design is on the march . . . and the timeless advantages of genuine clay tile keep pace, with modern colors and patterns that contribute to any decorative theme. Yes, America's homeowners thank you when genuine clay tile is specified.



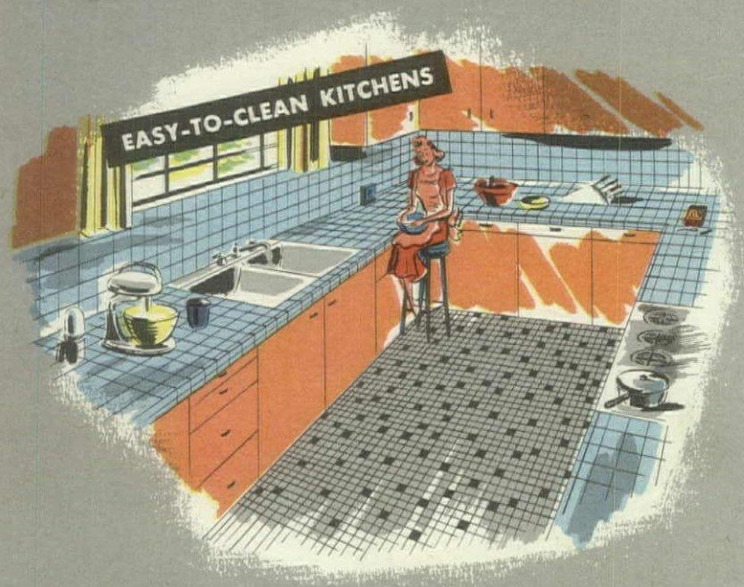
THE MODERN STYLE IS

GENUINE CLAY

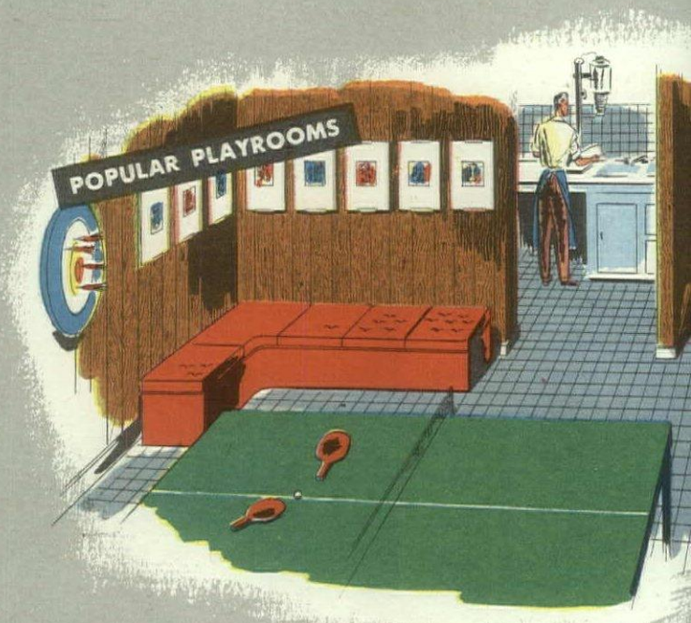
tile

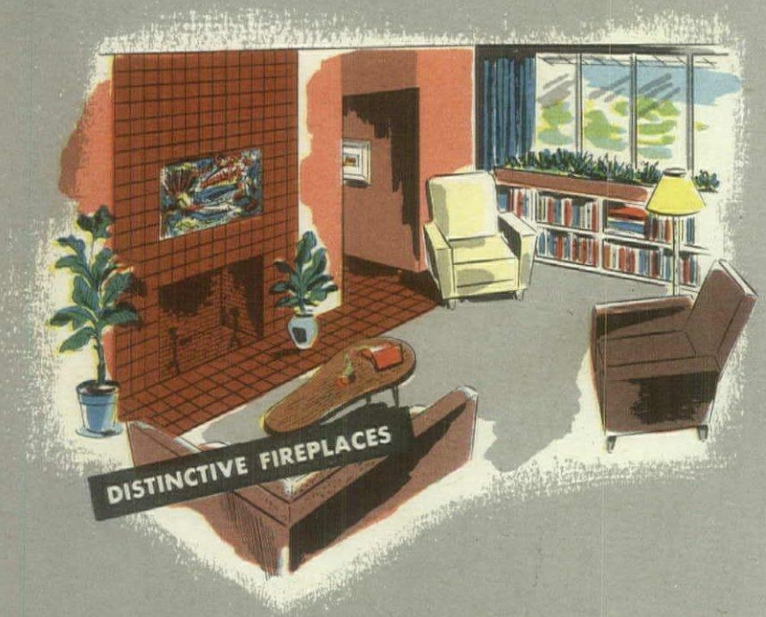
how to plan better rooms

Clay tile for floors, walls, drainboards and counter tops combines brightness, cleanliness and efficiency . . . never needs waxing, polishing or painting.



There's no need to worry about what kind of abuse this floor will take. Tile keeps its fresh, spic-and-span appearance for a lifetime.





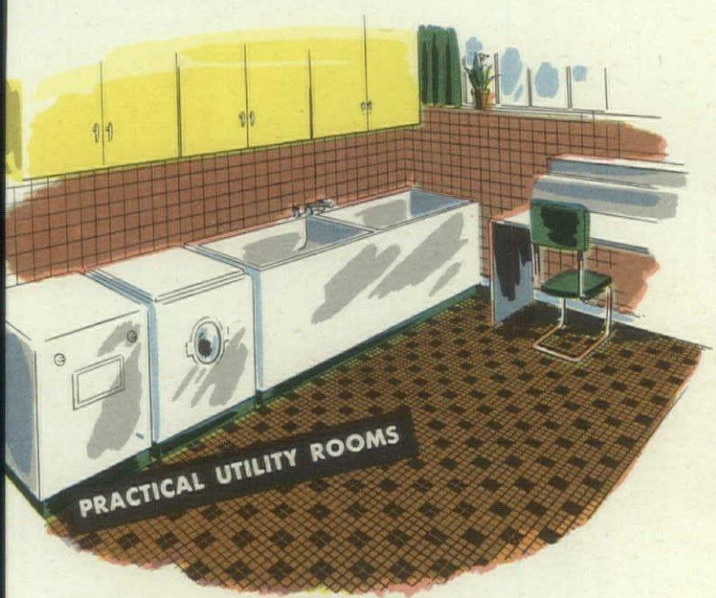
Center the design theme of living-dining area around a colorful tile fireplace. Murals of tile also individualize the room, relate it to the owner's interests.

Sparkling clay tile colors in a modern pattern create a powder room of distinctive beauty . . . as easy to clean and to keep clean as a china dish.

IN THE MODERN STYLE WITH GENUINE CLAY tile

Colorful tile walls and floors highlight any decorative theme . . . and you'll find no recurring charges for repairs, redecoration or replacement.

Genuine clay tile is the first choice of architects and decorators alike because of the design flexibility it offers. Its clear, rich colors in many shapes and sizes make possible modern patterns that are pleasing and distinctive. Lovely to look at —and to live with—tile is always in smart style.



Get gleaming cleanliness and practical efficiency with clay tile walls and floor . . . stainproof, won't fade or darken, is not affected by continued dampness.

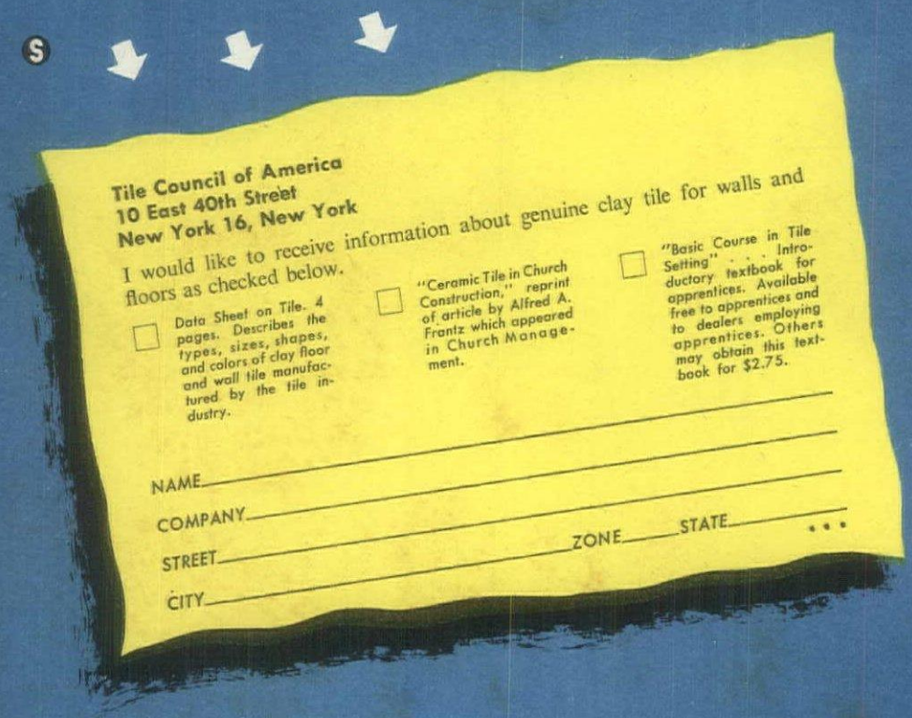
Homeowners will thank you for planning a terrace or outdoor porch floor of genuine tile . . . durable and easy to clean . . . no problems of warping, shrinking or resurfacing.

IMPORTANT

only Clay Tile gives you all these advantages

- ✓Long range economy
- ✓Resistance to cracking, chipping
- ✓Easy to keep clean
- ✓Fireproof
- ✓Permanent color
- ✓Resistance to abrasion
- ✓Unaffected by acids, alkalis
- ✓Low maintenance cost
- ✓Non-absorbent and waterproof
- ✓Stainproof and vermin-proof
- ✓For floors, walls or ceilings
- ✓For indoor or outdoor use
- ✓Modern patterns and colors
- ✓A Lifetime of Service

How to get more information about tile



THE TILE COUNCIL OF AMERICA

ROOM 3401: 10 EAST 40th STREET
NEW YORK 16, NEW YORK

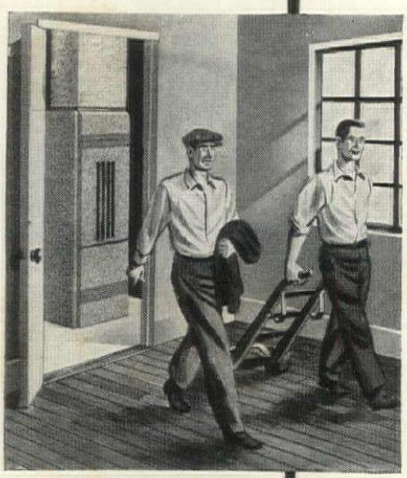
ROOM 320: 639 SOUTH SPRING STREET
LOS ANGELES, CALIFORNIA

The Tile Council of America was formed in January 1945 to provide a central source of information about floor and wall tile, and to sponsor research and development projects designed to increase the usefulness of tile in all types of private and public building.

Participating Companies

American-Franklin-Olean Tile Company
Lansdale, Pennsylvania
Architectural Tiling Company, Inc.
Keyport, New Jersey
Atlantic Tile Manufacturing Company
Matawan, New Jersey
B. Mifflin Hood Company
Daisy, Tennessee
California Art Tile Corporation
Richmond, California
Cambridge Tile Manufacturing Company
Cincinnati, Ohio
Carlyle Tile Company
Ironton, Ohio
General Tile Corporation
El Segundo, California
Gladding, McBean & Company
Los Angeles, California
Mosaic Tile Company
Zanesville, Ohio
Murray Tile Company, Inc.
Cloverport, Kentucky
National Tile & Manufacturing Company
Anderson, Indiana
Olean Tile Company
Olean, New York
Pacific Clay Products
Los Angeles, California
Pacific Tile and Porcelain Company
Paramount, California
Pomona Tile Manufacturing Company
Los Angeles, California
Robertson Manufacturing Company
Trenton, New Jersey
Sparta Ceramic Company
East Sparta, Ohio
Summitville Face Brick Company
Summitville, Ohio
United States Quarry Tile Company
Canton, Ohio

IT TAKES ONLY TWO GOOD MEN 30 MINUTES



TO INSTALL A GE OIL or GAS FURNACE

WHEN YOU'RE OUT to cut costs on building projects, consider the time-saving aspects of General Electric Oil-fired or Gas-fired Warm Air Furnaces.

Project builders have found that two good men can hook up a G-E Furnace in about one half-hour, where ductwork, fuel and power lines are already prepared.

Both G-E Oil and Gas furnaces are remarkably compact... easy to maneuver in utility room, alcove or small basement. They are approved by Underwriters' Laboratories, Inc. for installation two inches from walls of standard construction.

Check Sweet's Catalog, Section 29A-6 for specifications ... or call your General Electric Distributor. *General Electric Company, Air Conditioning Department, Section H81311, Bloomfield, N. J.*

GENERAL GE ELECTRIC

Automatic Gas and Oil Heat

LETTERS

no means excuses the petty-mindedness of these people who have revealed their own lack of understanding in their miserable bleatings about dignity. What can they possibly know about dignity! We may be certain that when a noble spirt such as Roosevelt's is offended by the joyousness of children and lovers then the world has lost all vestige of sanity, all hope of salvation.

GEORGE L. BAURLEY

Yorkshire, England

APARTMENT BUILDINGS

Forum:

We read with interest and pleasure the very fine article on the apartment buildings at 47 East 87th Street and 15 East 91st Street (FORUM, June '48).

Not only are these articles very interesting and, in our opinion, extremely well done, but they should be decidedly helpful to us; and we should like to thank you and the editor for his favorable notices.

H. O. S. BRIDCUTT, President
Richard Crittall Corp.

New York, N. Y.

TRIBUTE FROM SEATTLE

Forum:

When I was about nine years old, a friend gave me a number of FORUMS that had been left in his house by a former owner, and I pored over them avidly. Since then I have been deeply interested in Architecture, so the credit, or I sometimes feel blame, belongs to you.

I still think that FORUM is the best magazine of its kind, far surpassing all others in the field, and I am especially glad to see the prominence often given to Northwest architects and their works. Out here in Seattle, so far away from the metropolitan areas, we are often forgotten, but The FORUM is showing the world that we are here and have something to be proud of.

ROBERT W. BEATTY, Student
University of Washington

Seattle, Wash.

THE LAYMAN AND ARCHITECTURE

Forum:

As a student of architecture at Syracuse University, I would like your publication to bear with me and my fellow students on an issue of local importance outwardly, but of nation-wide architectural significance basically. Needless to say, the theories and applications that the following incident affects, have been promoted by you for years. However, it seems that there is more to be done.

(Continued on page 54)

—*for the great hotels of the world*

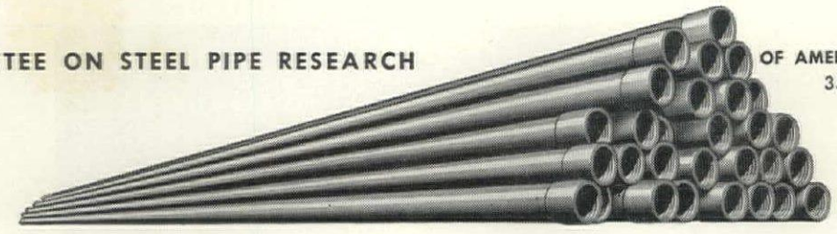
Forty-seven floors of luxury, occupying an entire city block, the famous Waldorf-Astoria has no equal in the hotel world! Into the building of this dream hostelry went the finest architectural and engineering experience in the land . . . and the most modern and appropriate materials and equipment that money could command.

The Waldorf-Astoria's great labyrinth of *steel piping,* for the heating lines, soil, waste and vent lines, fire, air conditioning, and vacuum lines, can be measured in terms of hundreds of miles and thousands of tons!

For such vital services, *steel pipe is the first choice* of technical men who judge the qualifications of every material and product in terms of adaptability, serviceability, durability, and cost. These qualities of *steel pipe* which made it the predominant choice for this cathedral of comfort are the same qualities that have made it the predominant choice for all types of buildings the country over.

Yes, *steel pipe is first choice!*

The interesting story of "Pipe in American Life" will be sent upon request.



COMMITTEE ON STEEL PIPE RESEARCH
OF AMERICAN IRON AND STEEL INSTITUTE
350 Fifth Ave., New York, N. Y.

BIG ATTRACTION FOR YEARS TO COME!

-Vitrolite on a Visual Front

● Perfect combination . . . a Visual Front framed in colorful, lasting *Vitrolite*. Notice how inside and outside are combined into a single visual unit by extension of the *Vitrolite* "through" the clear glass wall at the left. The sign and canopy are painted to match the striking color of the jade *Vitrolite*.

Smart architectural design joins hands with a colorful, practical surface material in this Visual Front.

Panels of *Vitrolite** on the solid areas frame in color the huge windows which permit a full view of the interior. Thus, the entire front is glass. Its look of newness will endure, for glass withstands weathering without harm to its lustrous surface. *Vitrolite* is glass—with color clear through. It washes sparkling clean . . . doesn't need refinishing.

Vitrolite is easily installed on a flat surface. It is available in cadet blue, peach, jade, red, light gray, Alamo tan, mahogany, white and black. These attractive colors blend effectively with each other and with shades currently preferred in decoration.

Your L.O.F. Distributor can provide full information on sizes, weights and methods of installation. Or write to Libbey·Owens·Ford Glass Company, 44118 Nicholas Building, Toledo 3, Ohio. *®

VISUAL L O F FRONT

LIBBEY·OWENS·FORD

a Great Name in **GLASS**

LETTERS

There has been much to do lately about an A.I.A. sponsored city-wide competition for the selection of the Onondaga County War Memorial Building to be located in the city of Syracuse. The winning entry proved very distasteful to the architectural students here at the University. The building as presented was not even slightly contemporary in design or construction. The protest was raised before a local supervisory body, but no consideration given it, as anticipated.

As was realized, it is we, and not the layman who know what is right in our profession, although it is the lay person, through lack of understanding who is perpetrating inferior architecture by his lazy acceptance of it.

Does not the public at large know about penicillin? No medical man need bicker with his patient about the drug. Why? Does the public read about it in the medical journals? Of course not. It is told of it in numerous daily and weekly publications, and so knows just what to expect from the wonder drug. Why, we might ask, if the saving of life is so important, is not its living given more concern. And living means architectural shelter.

Those of us who read The FORUM know of architecture as it should be. The public might see its dazzling aspects presented from time to time and that is all.

To let the public in, is to give architecture its full meaning and value, and I suggest for this enlightenment, the promoting of popular periodicals to "sell" the theory of architecture to the people.

ELI S. EISNER

Syracuse, N. Y.

MORE ON TRAVELLETTI

Forum:

. . . It may not hurt you to hear the opinion of a housewife. I should like nothing better than to build a house similar to the "House Divided" (FORUM, Aug. '48). I believe it would enhance the general appearance of the neighborhood.

. . . I would, given the power to do so, make it a federal law that every new house be built with a "dummy" second floor, or third floor, or wing. Look about you at the people who would gladly take in poor old Grandma, or Aunt Kate, or possibly even have another child, if only the architect had not, in his plans, denied such hospitality.

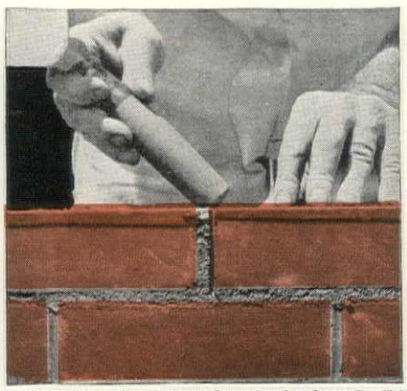
(Name Withheld)

"Old Grandma, or Aunt Kate, or possibly even another child . . ." might, in time, get pretty tired of fumbling around in the dark up there. —ED.

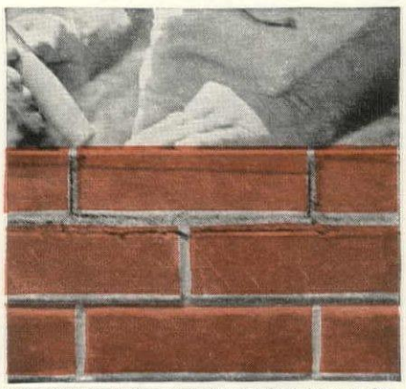
GET BETTER BOND WITH BRIXMENT!

The position of a brick should never be shifted after it has been laid. Shifting the brick breaks the bond and causes cracks between the brick and the mortar. If brick have been improperly spaced so that there is too little or too much space for the closure brick, and if it is therefore necessary to correct the width of the head joints, the brick and mortar should be removed from the wall, and the brick should be relaid with fresh mortar.

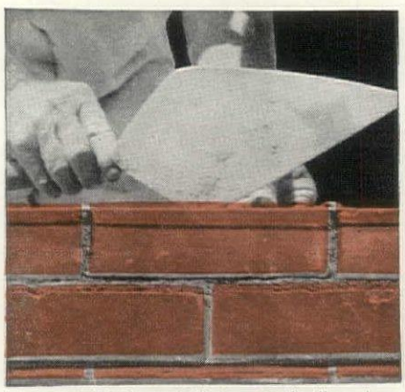
After the brick has once been laid,



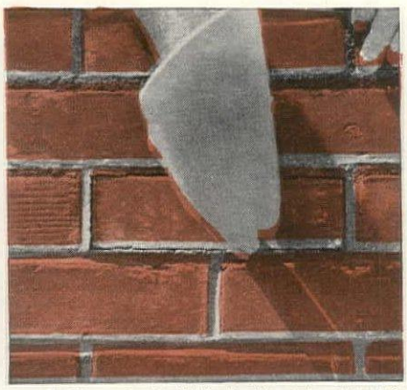
its position should never thereafter be changed. Shifting the brick breaks the bond between the brick and the mortar, and causes cracks in the wall.



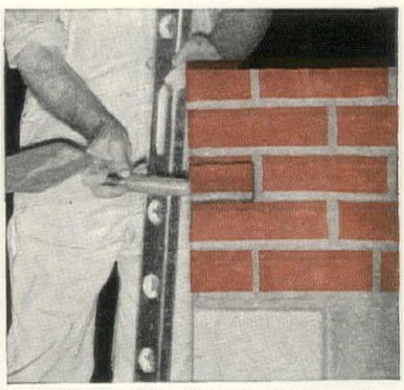
Brick should be laid true to the line, when originally placed. If any delay occurs before they are tapped into place, the bond will be broken and a crack will result. Realignment of a brick should never be attempted after a higher or following course has been laid.



If a brick is not laid true to the line when originally placed, and if the bricklayer comes back and taps it into place later, cracks will result.



Realignment of a brick should not be attempted after a higher or following course has been laid. When a brick is hammered back into line, the bond between the brick and mortar is broken. Cracks due to such realignment are frequently found at the corners of the wall.



BRIXMENT mortar's extreme plasticity greatly encourages accurate bricklaying. Its higher water-retaining capacity also lengthens the time in which adjustments can be made, before the mortar has set.

Once laid, Brixment mortar makes a stronger, more durable bond with the brick because it is ground finer and keys better into the pores of the brick. It is the *combination* of these advantages, plus greater speed and economy, that has made Brixment the largest-selling masonry cement on the market.

LOUISVILLE CEMENT COMPANY, Incorporated, LOUISVILLE, KENTUCKY

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X	**EXCEPTIONALLY ECONOMICAL?** Fiberglas Coated Duct Insulation is lower in price than any material available for this application today.
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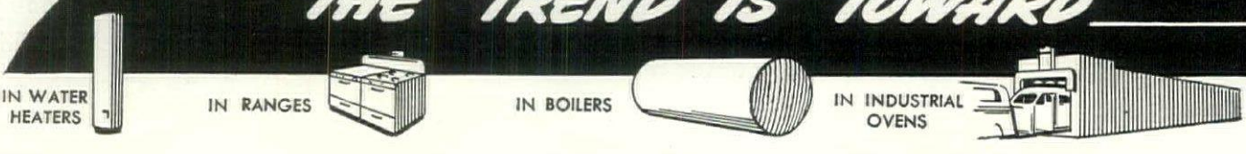
X	**SUITABLE FOR ALL DUCT WORK?** Fiberglas Duct Insulations are the only materials available in forms to suit every application requirement.
X	**FLEXIBLE?** Fiberglas Duct Insulations are available not only in conventional semirigid form, but in the new flexible type ideal for curved surfaces.
X	**HIGHLY EFFICIENT?** Fiberglas Duct Insulations have an exceptionally low thermal conductivity—as low as any available, lower than most.
X	**FIRE-RESISTANT?** Fiberglas Duct Insulations, made of inorganic-base material, will not support combustion.
X	**LIGHTWEIGHT?** Fiberglas Duct Insulations are easy to handle, even overhead. They require no special strength members to support them.
X	**MOISTURE-RESISTANT?** The basic material of which Fiberglas Duct Insulations are composed is resistant to the effects of moisture or condensation, will not rot or decay, will not corrode adjoining metal surfaces.
X	**EASY TO APPLY?** Fiberglas Duct Insulations may be cut to shape with an ordinary knife. No special tools, techniques or skills are required.

THE TREND IS TOWARD



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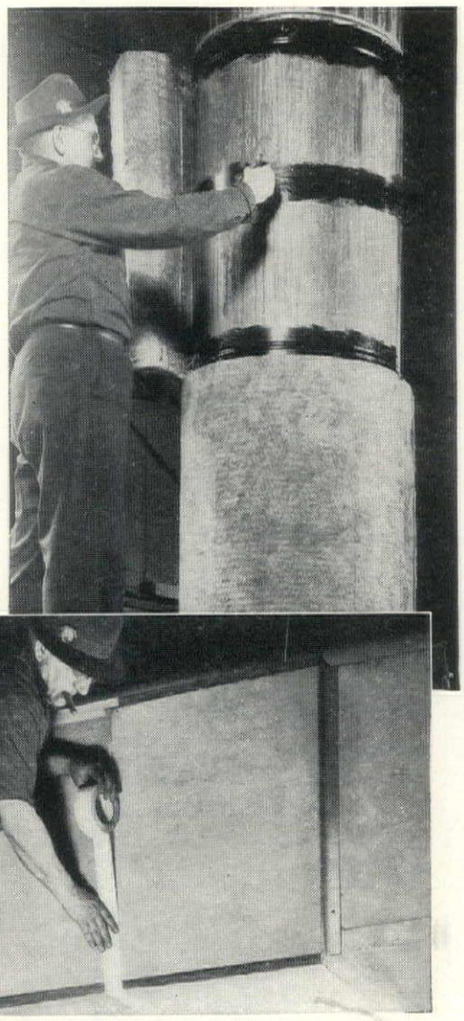
Fiberglas *Coated* Duct Insulation is a new, efficient duct insulating material with a special exterior coating that makes it easier to handle, easier to paint or cover when used on *outside* surfaces of ducts. It is resistant to erosion by high-velocity air streams when applied to inside duct surfaces. Fiberglas *Coated* Duct Insulation is the most economical material available today for *interior* applications, offering satisfactory erosion protection. It is the *only* material offered for *both*.

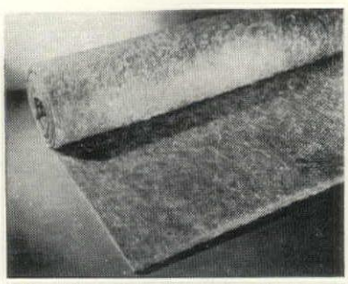
No matter what the requirement, there is a Fiberglas Duct Insulation available to do the job effectively and economically: Fiberglas *Preformed* Insulation, an all-purpose board-type, easy to shape and easy to apply; Fiberglas *Superfine* Insulation, a lightweight, flexible type ideal for concealed and curved ducts; Fiberglas *Insulating Wool*, available in batt or roll form for any number of requirements; Fiberglas *AE* (Asphalt-Enclosed) *Board*, *Metal Mesh Blankets*, and *Sewn Blankets* are for special duct insulation applications and various temperature ranges. No other manufacturer offers you as wide a range of duct insulating materials—and no other has such a record of acceptance. For complete information, write to Owens-Corning Fiberglas Corporation, Department 830, Toledo 1, Ohio. Branches in principal cities.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario.

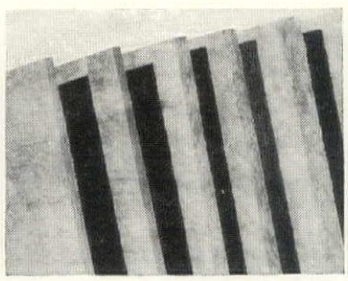


Fiberglas Duct Insulation is available in both flexible (at top) and coated forms (below), each easy to apply. Both have a thermal conductivity as low as any comparable insulation—lower than most.

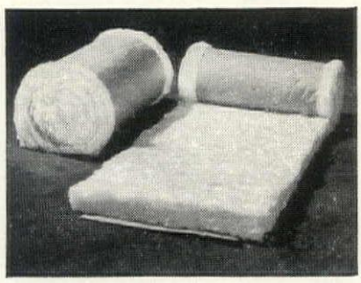
***FIBERGLAS is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.**



Fiberglas Superfine Insulation is lightweight, flexible, highly efficient —useful to 600°F.



Fiberglas PF (Preformed) Insulation possesses excellent acoustical properties, is available in 5 degrees of rigidity—useful to 600°F.



Fiberglas (TW-F) Insulating Wool is a general-purpose type available in batts and rolls—useful to 1000°F.

FIBERGLAS

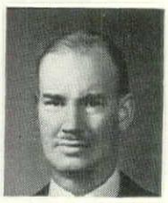
OWENS-CORNING FIBERGLAS

THERMAL INSULATING MATERIALS

In MEASURE, this issue devoted to scientific and technological factors in building design, FORUM'S *consultants included, in addition to architects and engineers, a vast array of physiologists, physicists, chemists, psychologists and mathematicians. Below are a few of the men whose research helped to clarify the approach to architecture presented in the following pages.*

ISAY BALINKIN, associate professor of experimental physics at the University of Cincinnati, is one of America's top researchers in the science of color. Born in the Ukraine, he migrated to Istanbul for study in mechanical engineering, came to the U. S. for his Ph.D. in physics. While designing exhibits for the Hall of Science at the Chicago World's Fair, he began developing the visual teaching devices now used to explain abstruse physical phenomena. Dr. Balinkin is also consulting physicist to the Cambridge Tile Manufacturing Co.

LLOYD H. BECK, 33-year-old assistant professor in experimental psychology at Yale University, has specialized in research into olfaction, vision and psychophysics. A 1937 graduate of Oberlin College, he also took his master's degree there, then switched to Duke University and Brown where, in 1945, he received his Ph.D. for the thesis: "Experimental Investigation of Binoculars as an Aid to Night Vision." Beck has taught at Yale for the past three years. He is a native of St. Louis, Mo.



HAROLD BURRIS-MEYER, associate professor at Stevens Institute of Technology and a former vice president of Muzak Corp., has worked as a "ranch hand, mechanic, gem-cutter, salesman and hack writer." After taking a master's degree at Columbia in 1925, he started his sonic research which laid the groundwork for music in industry and acoustical control in the theater. Current work centers around the Stevens Theater Research Project, investigating sound in the theater and dramatic arts.

DARELL BOYD HARMON is a psychophysiologist with a "special interest in the relation of processes of growth and development to learning." As part of this broad field of study, he has made an analysis of over 160,000 children, demonstrating the effect of bad lighting on their health and learning ability. Planning consultant to a number of schools, he is also technical advisor to numerous manufacturers on child development factors in product design and has published over 50 monographs in connection with his research.

C. R. JACOBS, since 1946 Director of Construction and Building Operations at CBS, is one of America's acoustical pioneers. A graduate of Cornell University, he first worked in the field of sound isolation with Stevens Soundproofing Co., becoming vice president at the age of 25. He has done countless studio designs throughout the U. S. including the original WLW station in Cincinnati, is responsible for most of those in New York's Radio City and, since joining CBS 11 years ago, has done all their studio designing.

RICHARD KELLY, lighting specialist, counts among his plushier illuminating jobs the Cub Room of the Stork Club; Black, Starr & Gorham; Tiffany's; Lilly Dache; and Bonwit Teller's much-publicized new Boston store. A 1932 graduate of Columbia, he first eked a living from interior decoration, opened a lighting business in 1935 to take care of accumulated back rent. Two years time out for an architectural degree at Yale (1942-44) gave him a solid basis for integrating lighting with building.

(Continued on page 62)

Norge Electric Ranges fulfill your specifications

FOR MODERN PERFECTION

Modern apartment buildings are designed for utmost utility . . . for greater comfort and convenience . . . for new beauty. So, too, are Norge appliances! Norge products provide maximum comfort and satisfying economy. For Norge engineers are fulfilling the pattern for modern living with appliances styled to complement good room design, and constructed for functional efficiency. Norge Division, Borg-Warner Corp., Detroit 26, Mich. In Canada: Addison Industries, Ltd., Toronto, Ontario.

A BORG-WARNER INDUSTRY

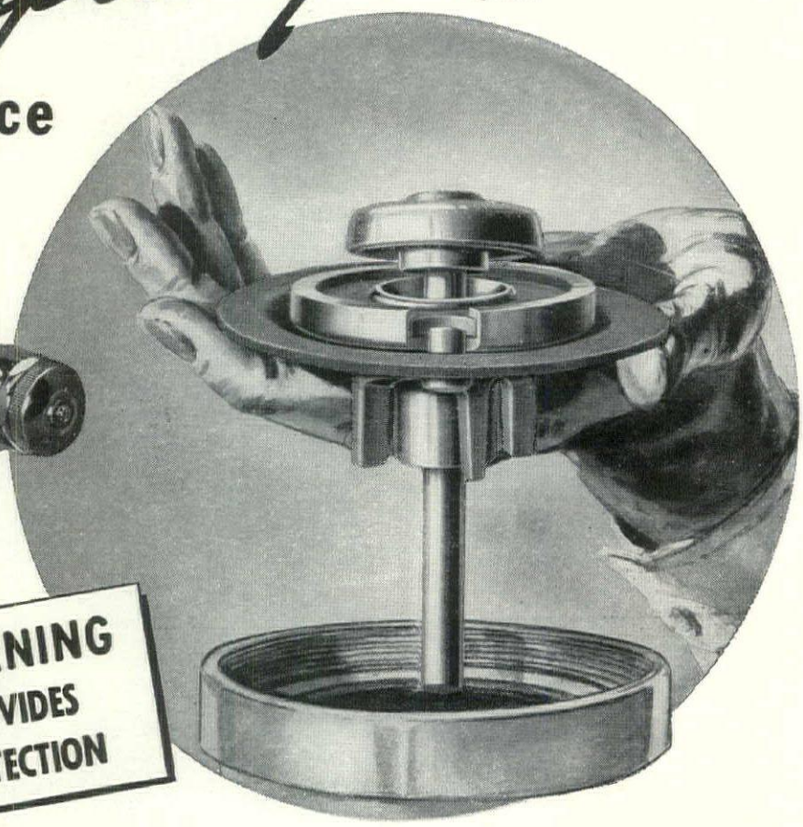
Refrigerators • Electric Ranges • Water Coolers
Washers • Electric Water Heaters • Home Heaters
Gas Ranges • Home Freezers

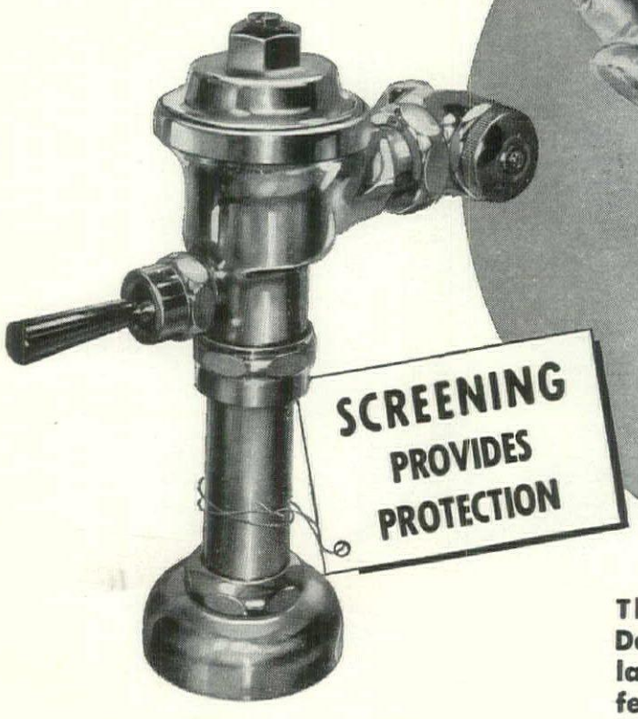
SEE NORGE BEFORE YOU BUY

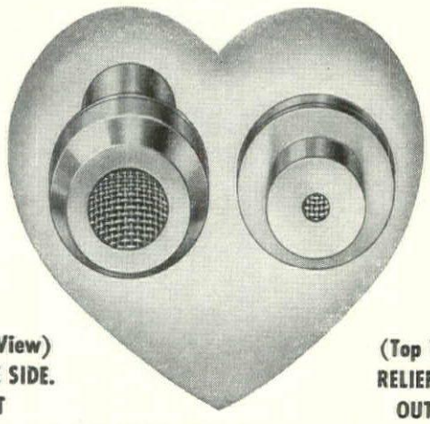
Its *Simplicity*

is your assurance of efficiency

The Delany Flush Valve has only 6 moving parts, the simplest assembly of any flush valve and the quickest and easiest to repair.







(Bottom View) PRESSURE SIDE. INLET

(Top View) RELIEF SIDE. OUTLET

MAGNIFIED VIEW OF DELANY BY-PASS

The simplicity of DELANY VALVES and Delany Vacuum Breakers guarantees long lasting efficiency of operation. One of the features of simplicity and performance is the exclusive design of the DELANY BY-PASS:

1. The simple design, no watch-like moving parts to foul up.
2. Constructed of Monel (Corrosion proof). The orifice is permanent.
3. The anchoring of the screen in the horizontal position, its location in the valve, induces self-cleansing of the screen, preventing clogging and reducing to the minimum, the fouling up of the auxiliary valve seat.
4. DEFINITELY . . The simple DELANY BY-PASS is a major contributing factor in the recognized, efficient performance of DELANY VALVES.

DELANY VALVES are available through all leading supply houses.

SINCE 1879

Coyne & Delany Co.

BROOKLYN N.Y.

FLUSH VALVES · VACUUM BREAKERS · PLUMBING SPECIALTIES

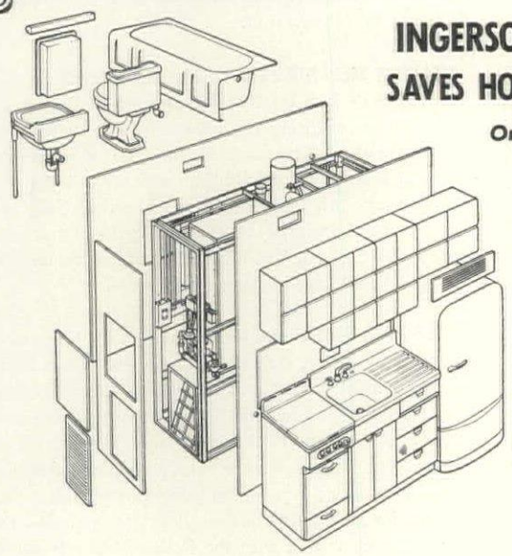
IN CANADA: THE JAMES ROBERTSON COMPANY, LIMITED • MONTREAL • TORONTO • ST. JOHN, N. B.

NO. 1 OF A SERIES

The PROFESSIONAL BUILDERS' BULLETIN

An "Idea Department" from the Engineers of Ingersoll

PRODUCT OF BORG-WARNER



INGERSOLL UTILITY UNIT SAVES HOURS OF DETAILING

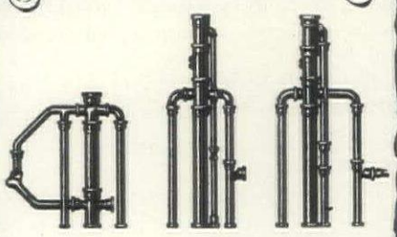
One Specification Provides All Home Utilities

The Ingersoll Utility Unit simplifies the professional builder's problem in small-home design. Exacting details are eliminated. One specification provides for all plumbing and utilities—including all fixtures, appliances, controls and fittings. It is assembled by skilled A. F. of L. mechanics. The Ingersoll Utility Unit provides a well-designed, skillfully engineered installation that makes it easy to meet building schedules.

104 LEADING DISTRIBUTORS ADDED IN LAST 3 MONTHS

Units, Parts and Service Available Everywhere

New Ingersoll wholesalers include such industry leaders as Hajoca Corp., of Philadelphia; W. A. Case & Sons, of Buffalo and Tay-Holbrook, Inc., of San Francisco. The addition of 104 firms to Ingersoll's already widespread coverage, makes the Ingersoll Utility Unit readily available from coast-to-coast and assures adequate service.



New Ingersoll Flexibility Makes Unit Adaptable to Any Code Requirement

A choice of four stack and vent assemblies and five types of undergrounds give the Ingersoll Utility Unit the flexibility necessary to meet the most exacting code requirements. Adaptability to various designs and floor plans is provided by a choice of cabinets and types of heating plants.

The Ingersoll Utility Unit now meets 96 percent of all codes. A choice of oil or gas heating plants and other variations make the Unit adaptable to any small home, with or without basements.

Ingersoll's sales engineering force of specialists in small-home utilities is ready to consult with you at any time. Ask your Master Plumber whenever you desire the advice of these Ingersoll engineers.

COSTS YOU NOTHING!

NEW DESIGN DATA MANUAL for Professional Builders

It's new and up-to-the-minute, a complete manual with more than 30 illustrations and diagrams, including floor-plans, plumbing layouts, heat-loss formulas, types of fixtures for various jobs. Compiled with the help of leading architects and builders, *Architect's Design Data* contains material you can use every day.

Write for yours today!

INGERSOLL UTILITY UNIT DIVISION
Borg-Warner Corporation
Dept. F11, 321 Plymouth Court
Chicago 4, Illinois

New Credit Controls Point-up Advantages of Including Appliances In Small-Home Mortgage

Consumer credit controls, effective Sept. 20th, have spurred investigation by home-buyers into the advantages of buying a home in which stove and refrigerator can be included as part of the mortgage.

Under Federal Reserve Regulation W, down payments on appliances may not be less than 20 percent. Balances under $1,000 must be paid in 15 months. Credits over $1,000 with minimum monthly payments of $70 may be extended to 18 months.

The result of increased down payments and larger monthly payments has enhanced the sales appeal of homes with appliances already installed as an integral part of the house.

IN THE FORUM

Behind the scenes with FORUM contributors

WALDO KLIEVER, Director of Research for the Minneapolis-Honeywell Co. since 1946, heads a large staff currently concentrating on electronics research. For eight years with the Gaertner Scientific Corp., he made studies in stress analysis, strength of materials and photochemistry involving the use and/or design of precision instruments. During the war he worked closely with the Army Air Force on the design of aircraft instruments and controls. He is a graduate of Bethel College in Newton, Kan.

STANLEY McCANDLESS, Yale's famed lighting engineer, has taught in that university's Department of Drama since 1925. Also to his credit are two books on stage lighting; the lighting systems of Kleinhans Music Hall, Rockefeller Center, Bushnell Memorial Auditorium and other theaters; current consulting work for the Century Lighting Co. He took his architectural training at Harvard, gained practical experience with McKim, Mead & White, and as Technical Director of New York's Neighborhood Playhouse.

WILBUR D. RIDDLE, resident architect for General Electric's lamp department, started his career with the firm in 1932 by remodeling a cafeteria into G.E.'s famed Lighting Institute. He also participated in the more recent remodeling of the same building (FORUM, Jan. '47). The interim years have been spent working on the relationship of lighting to architecture in every type of building and display. He is well-known for his lighting of Cleveland's Great Lakes Exposition and for recent work with the Revere Better House Institute.

EDWIN D. TILLSON, nationally known lighting authority, retired last September from his 33-year post as lighting and heating engineer in Commonwealth Edison Co.'s testing department. Under his direction since 1921, Commonwealth's lighting laboratory has expanded to include research in all phases of residential, commercial and industrial illumination and therapeutic equipment. Technical Director of the Chicago Lighting Institute since its inception, Tillson has also served 32 years in the Illuminating Engineering Society.

KENNETH C. WELCH has, since 1920, specialized in store design and in city planning as it affects retail distribution. Perhaps best known for his recent experiments in lighting, he was drawn into this field through an interest in sales display illumination. Welch received his B.A. in architecture from the University of Michigan in 1915, his M.S. at Pennsylvania. He is a member of the Illuminating Engineering Society and the American Society of Planning Officials and vice president of the Grand Rapids Store Equipment Co.

C. E. A. WINSLOW, until 1946 Director of the Laboratory of Hygiene at the John B. Pierce Foundation, has devoted his career to industrial hygiene with special emphasis on ventilation; bacteriology of water, sewage and ice; and sewage purification. A graduate in sanitary science of the Yale Medical School, he also holds degrees from M.I.T. and N.Y.U. Since 1915 he has been a Lauder professor in the Public Health Department of Yale's Medical School, in 1946 was made Professor Emeritus.

L. P. HERRINGTON took over as Director of Research at the Pierce Foundation's Laboratory of Hygiene after Dr. Winslow's resignation in 1946. Both men have for many years been associated with the Foundation and with Yale University's College of Medicine where Herrington is now Research Associate Professor. Trained in psychology (B.A.; M.A.; Ph.D.) at Stanford University, he also studied social science at the Charité Hospital of the University of Berlin as a Research Fellow from 1930-31.

"I SAVED OVER $800 by installing forced warm air heating"

MR. R. D. STIEHL CO-OWNER OF H & S BOWLING ALLEYS IN AU GRES, MICHIGAN

"I intended originally to install wet heat...

... but after receiving estimates on such systems I investigated warm air heating and asked the same contractor (who was the low bidder on the wet heat installation) to estimate the entire job for forced warm air heat and in so doing saved $800.

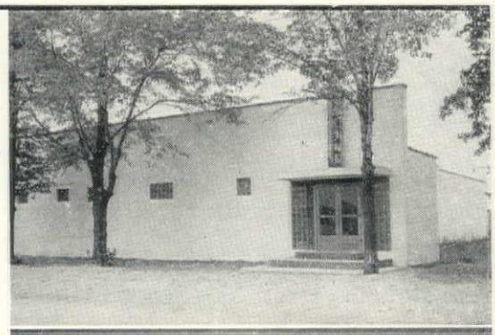
Actually our savings will run much more than that because . . . when we install a summer air conditioning system we will be able to use the ductwork of the heating plant and thus eliminate this feature for the air conditioner.

Air diffusers in the ceiling give an even heat throughout, and there are no heating units suspended from rafters or side walls to detract from the appearance of the interior decorations.

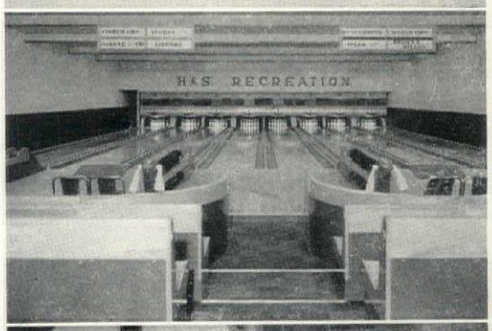
Mr. Edward Tarnosky of the Au Gres Plumbing and Heating Company, estimated both jobs and installed a Jackson & Church oil fired furnace, Model OL-48 with an output of 380,000 Btu's per hour.

My fuel consumption is low, and . . . the bowlers are comfortable because we have the added features of: 1. - frequent air changes, 2. - ample humidification, and 3. - filtered air. My partner, Mr. Roy Holland and I are very glad that we did not overlook the advantages of forced warm air heating." *

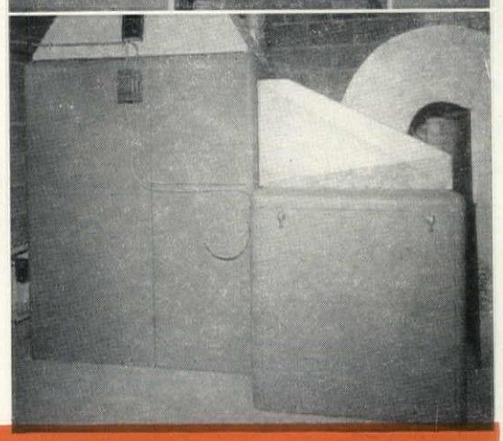
*Statement of Mr. R. D. Stiehl on file with Jackson & Church Company



New H & S Bowling Alley in Au Gres, Michigan.



Interior view of H & S Bowling Alley (note improved appearance due to absence of suspended heating devices.)

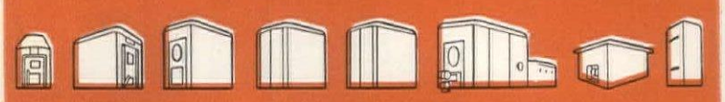


Heating installation showing J & C PoweRated Model OL-48 with output of 380,000 Btu's per hour. Installed by Mr. Edward Tarnosky owner of the Au Gres Plumbing and Heating Company.

Memo: You too can save by installing forced warm air heat. See your nearest J & C dealer or write us at Saginaw.

J&C . . . . AMERICA'S LARGEST AND MOST COMPLETE WARM AIR HEATING LINE

INDOOR COMFORT



A PRODUCT OF

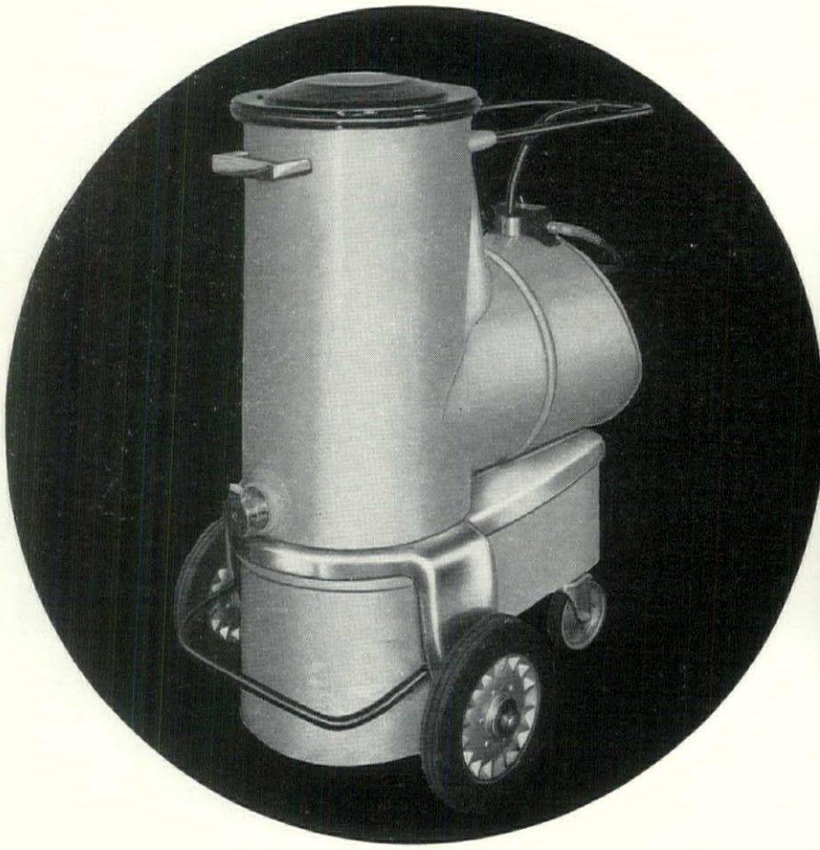
JACKSON & CHURCH CO., SAGINAW, MICHIGAN

"WORK WELL DONE SINCE '81"

For the Discerning Buyer–

WHO KNOWS HIS CLEANING COSTS

The New Spencer Commercial *Multi-Vac*

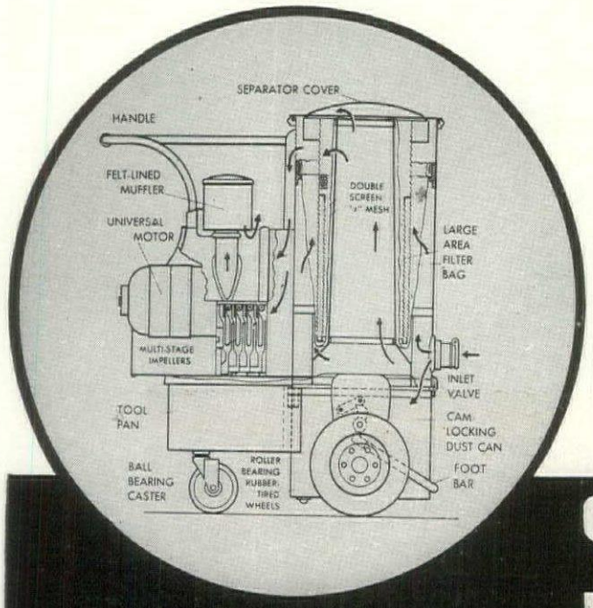


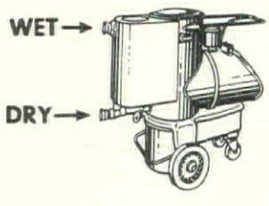
Experienced building operators recognize four different factors in the cost of cleaning:—The time required, the effectiveness of the cleaning, maintenance costs and the first cost of the equipment itself, spread over the life of the machine.

The Spencer Multi-Vac has the power, speed, and thoroughness required for commercial cleaning, and is built to operate in continuous service for years with low per-annum upkeep and amortization.

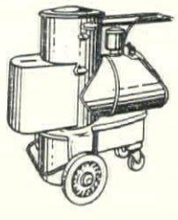
The Multi-Vac, as its name implies, has a multi-stage vacuum producer just like the Spencer Stationary Systems that pioneered heavy duty commercial cleaning. It also uses the same specially designed tools and hose, and a removable dirt can of large capacity that can be rolled on casters and emptied and replaced in seconds instead of minutes. And the large area filter bag is cleaned without removing, — clean side out!

A study of the cross-section below indicates the reasons why men who know cleaning costs select Spencer Portables for the long run.





Wet separator attachment for picking up liquids



Dry mop cleaner attachment

Attachment for skating rinks and gymnasiums

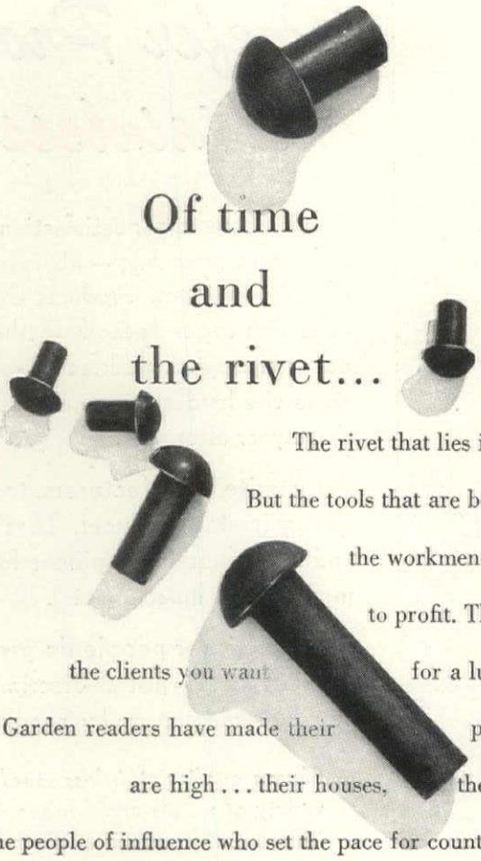
WET OR DRY CLEANING. With the Spencer attachment shown above you can change from dry to wet cleaning or back again in a few seconds by merely changing the hose connection. Or this attachment may be removed and a dry mop attachment added in less than a minute. These are the things that make for faster and better cleaning. It's the next best thing to a Spencer Built-In System. Comparison of its performance and its long-life features is invited.

Ask for Bulletin No. 114-B. There's a Spencer representative near you.

SPENCER
HARTFORD

THE SPENCER TURBINE COMPANY
HARTFORD 6, CONN.

PORTABLE AND STATIONARY VACUUM CLEANERS, ⅓ TO 100 H.P.



Of time and the rivet...

The rivet that lies idle is as useless as a castle built in the air.

But the tools that are being used... the blueprints that have been bought... the workmen that have been hired—*these* are your signposts to profit. They point to the people who are building *now*... the clients you want for a lucrative business.

House & Garden readers have made their plans and are ready to build. Their incomes and taste are high... their houses, the finest. They are the leaders in their communities, the people of influence who set the pace for countless others. Build for them... and you build for profit.

Of those who will build...

49% *of the House & Garden readers who are planning to build or buy houses will do so within the next two years.*

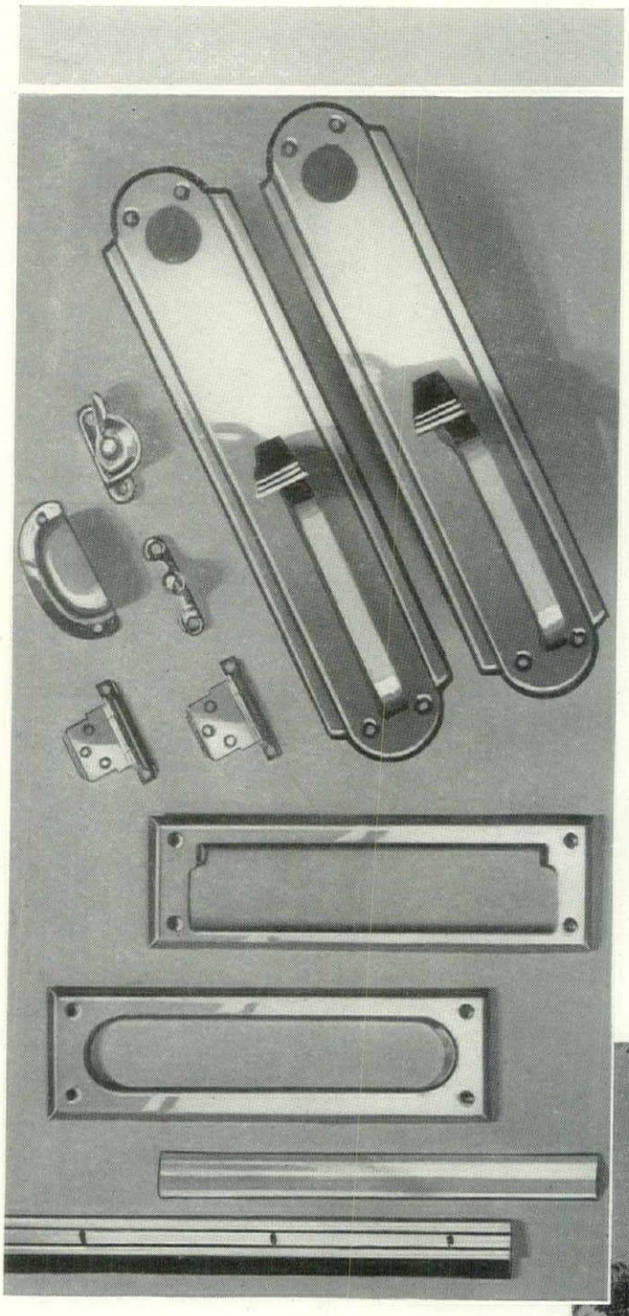
60% *have collected house plans.*

27% *have consulted architects.*

44% *have purchased land.*

House & Garden

Current circulation 380,805.



Particular People Prefer Products of Stainless Steel

To insure customer satisfaction leading designers are today recommending -- wherever possible -- products of stainless steel. Products that won't rust, discolor or tarnish regardless of weather -- products that will not stain adjoining surfaces -- products that will withstand the hardest usage and still retain their original finish year after year.

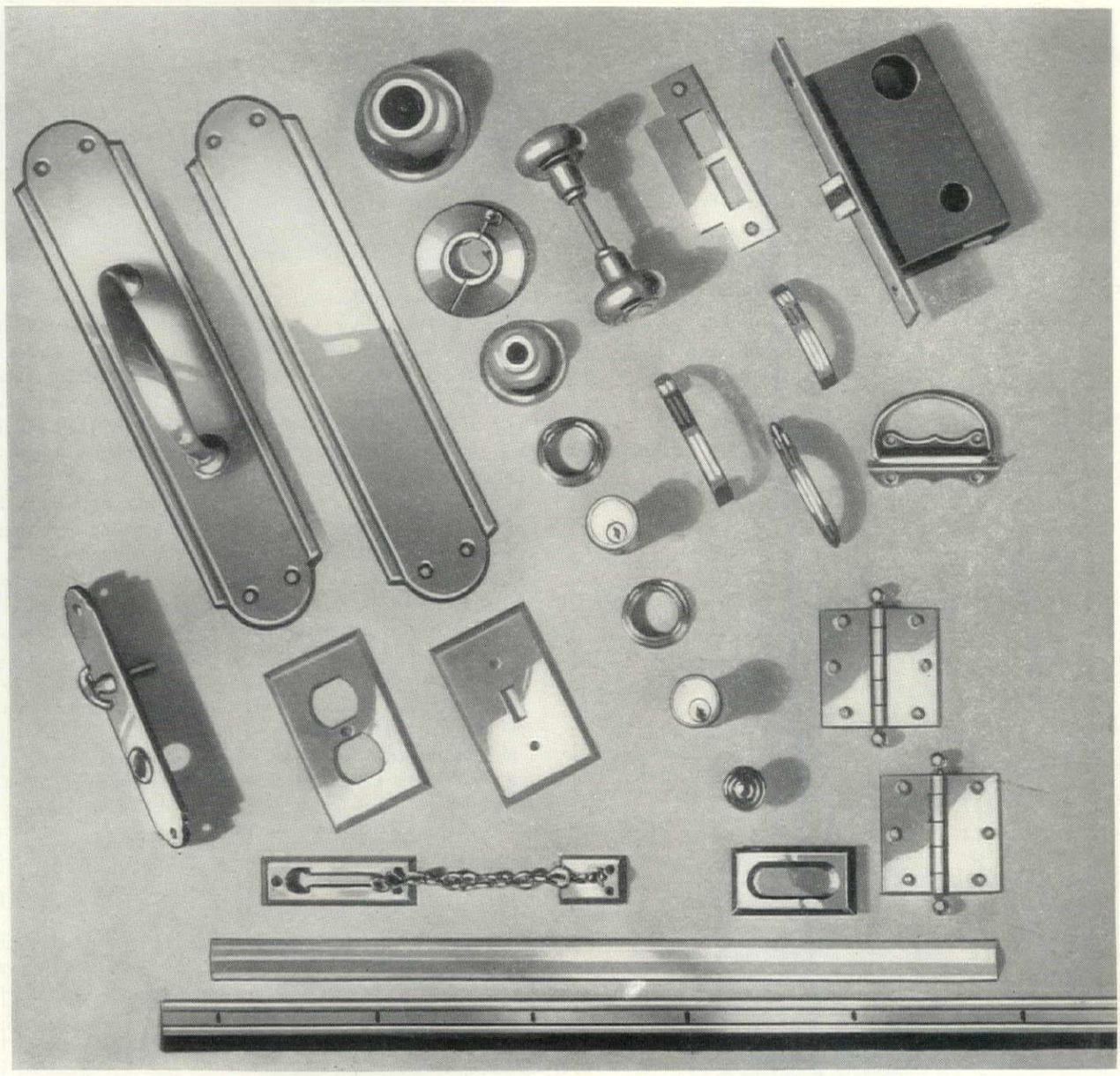
Progressive manufacturers, too, realize the inherent quality in stainless steel. That's why every day more and more functional pieces for the home are being made of this miracle metal.

Yes -- particular people do prefer products made of stainless steel -- just as discriminating manufacturers prefer stainless made by Sharon.

Sharon quality stainless steel is now available in a variety of widths and gauges. For further information contact your nearest Sharon Steel representative.

SUBSIDIARY COMPANIES OF SHARON STEEL CORPORATION: THE NILES ROLLING MILL COMPANY, NILES, OHIO; DETROIT TUBE AND STEEL COMPANY, DETROIT, MICHIGAN; BRAINARD STEEL COMPANY, WARREN, OHIO; SHARONSTEEL PRODUCTS COMPANY, DETROIT, MICHIGAN, AND FARRELL, PENNSYLVANIA; CARPENTERTOWN COAL & COKE CO., MT. PLEASANT, PENNA.; FAIRMONT COKE WORKS, FAIRMONT, W. VA.; MORGANTOWN COKE WORKS, MORGANTOWN, W. VA.

DISTRICT SALES OFFICES: Chicago, Ill., Cincinnati, O., Cleveland, O., Dayton, O., Detroit, Mich., Indianapolis, Ind., Milwaukee, Wis., New York, N. Y., Philadelphia, Pa., Rochester, N. Y., Los Angeles, Calif., San Francisco, Calif., St. Louis, Mo., Montreal, Que., Toronto, Ont.



For modern home interiors

Stainless Steel

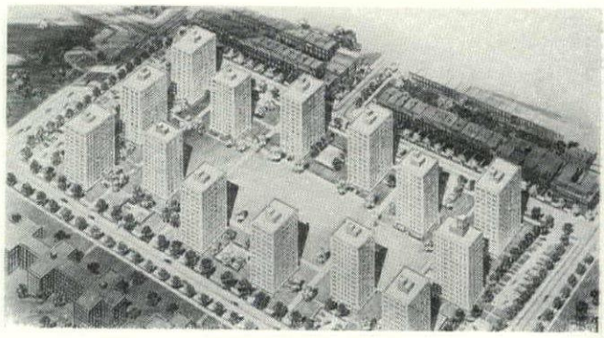
SHARONSTEEL

SHARON STEEL CORPORATION

Sharon, Pennsylvania

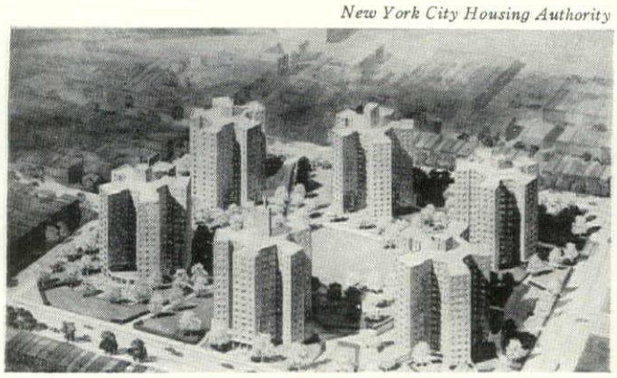
ANNOUNCEMENTS

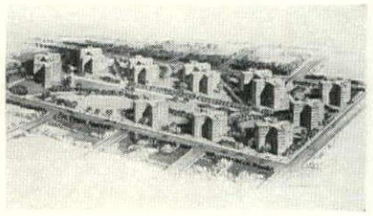
BUILDING PREVIEWS



Most newsworthy housing scheme in New York City this month is Queensview (plausibly located in the county of Queens)—an $8,000,000 cooperative apartment project developed on a non-profit basis. Civic-minded businessmen headed by Gerard Swope and Louis Pink have worked out a plan whereby 728 families of moderate income will be housed in 14 apartment buildings generously surrounded with playground and garden area (only 13 per cent of the land will be covered). Apartments from 3½ to 5½ rooms are estimated to cost not more than $17.75 per room, including operating expenses and mortgage amortization. The Mutual Life Insurance Co. of New York will provide a $6,406,000 loan on a 4 per cent, 25-year mortgage, and remaining capital will be raised through sale of stock and by the cash equities of owner-tenants ($2,500 for an average 4½ room apartment). Rheinstein Construction Co. will build on a cost-plus basis. A provisory clause in Mutual's contract confirms the fact that public and private housing need not compete, may actually help one another. The $6,000,000 loan was made contingent on the development of Ravenswood, a city housing project scheduled for construction next to the site of Queensview.

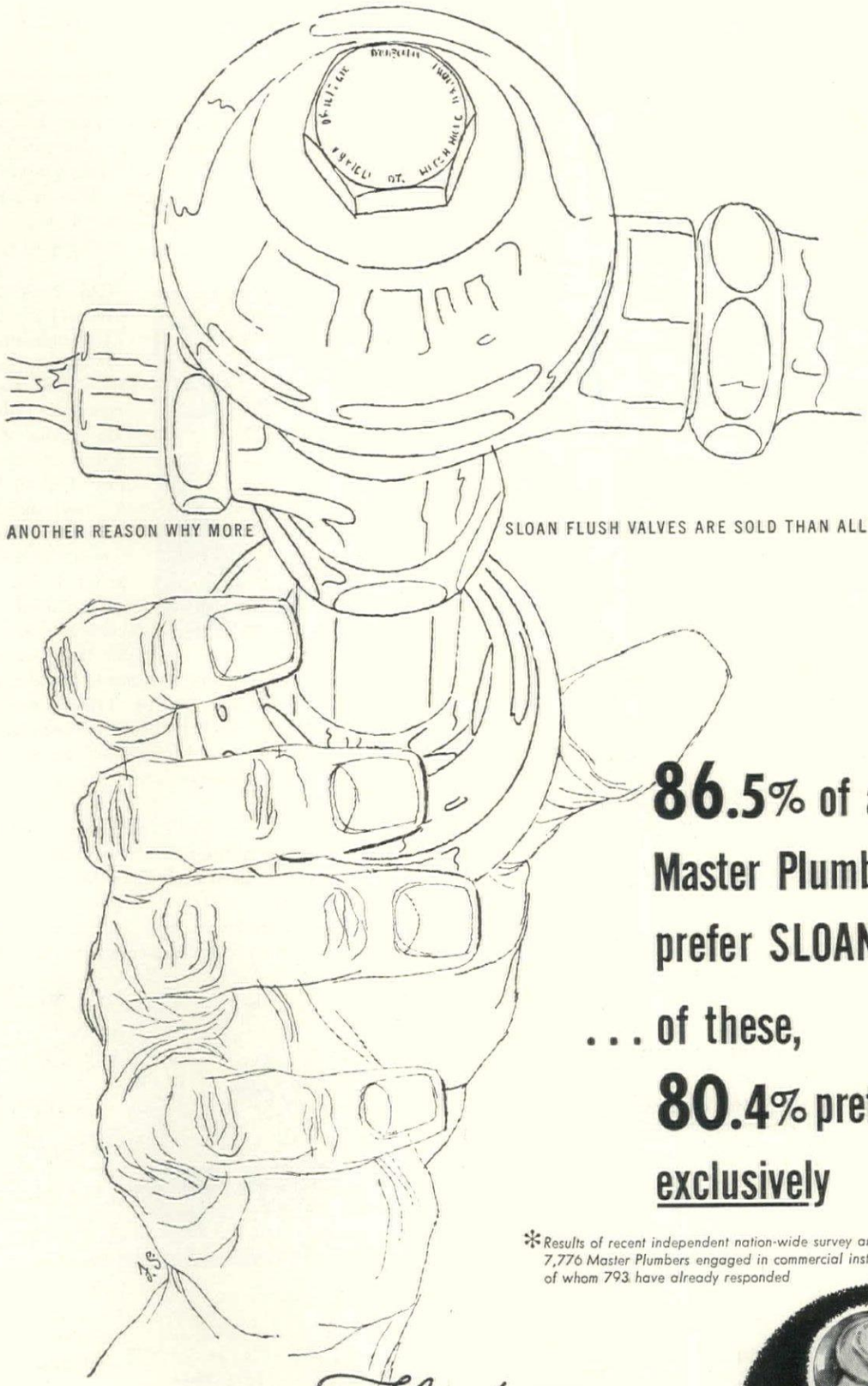
New York City Housing Authority





The Albany Houses in Brooklyn (above) and Bronx Eastchester Houses (right) are typical of New York Public Housing projects going up all around the town.

During the next six months, in all five boroughs, New York Public Housing will reach an all-time high. Its agenda, the most impressive of any city in the U. S. (Boston second, Chicago third) includes 14 distinct development groups which will provide 15,000 completed apartments before the end of 1949. Bronx leads the boroughs in the number and size of its projects, with *(Continued on page 70)*

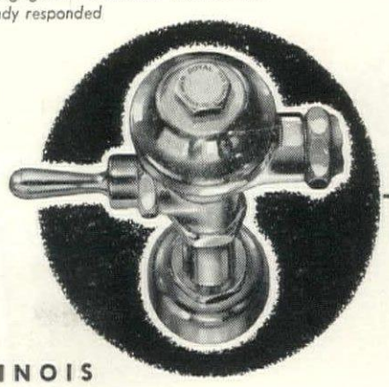


ANOTHER REASON WHY MORE SLOAN FLUSH VALVES ARE SOLD THAN ALL OTHER MAKES COMBINED

86.5% of all Master Plumbers* prefer SLOAN

. . . of these, 80.4% prefer SLOAN exclusively

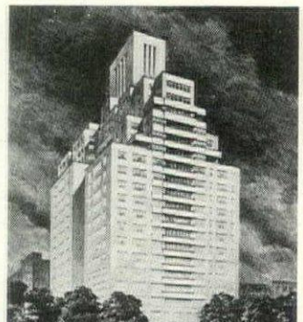
*Results of recent independent nation-wide survey among 7,776 Master Plumbers engaged in commercial installations, of whom 793 have already responded



SLOAN *Flush* VALVES

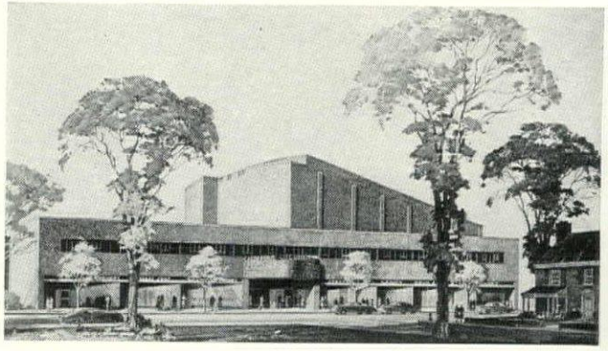
SLOAN VALVE COMPANY • CHICAGO • ILLINOIS

Eastchester, Bronx River, Gun Hill, Pelham Parkway, Patterson and Sedgwick Houses totaling over 7,000 units. Brooklyn ranks second with almost 6,000 units in its Albany, Glenwood, Sheepshead Bay, Nostrand and Boulevard Houses. Manhattan's Governor Smith, Dyckman and Marble Hill Houses provide a combined 3,000; Richmond's South Beach and Todt Hill approximate 900 and Queens' Ravenwood Houses (mentioned p. 66) 2,000. Rents will range from a monthly $8.50 per room in state-aided projects to between $12.50 and $17 in projects with limited or no cash subsidies.



Manhattan's high-fashion Central Park East continues its facade-lifting process. Newest site to exchange a three-story mansion for a pent-house tower is 87th Street and Fifth Avenue where Architect George Fred Pelham has designed a steel and white brick apartment building for Simon Brothers, owners and builders. Eighty-eight suites, 3½ to 8 rooms in size, are housed on its 20 floors. Like numerous predecessors, this 'luxury apartment' features radiant heating, provides television outlets. Typical, too, is its effort to assuage the city dweller's hankering for a front porch all his own—space is snipped from the living room to allow for patching in a petite balcony.

A 2,500 seat movie theater fronted by a row of stores and office level (sketched below)—all parts of the $2,000,000 commercial group designed by William Lescaze—are now being built just outside New York City limits, in Hempstead, L. I. The theater inaugurates a new era of audience comfort—moving stairs eliminate the wearisome climb to upper reaches.



A two-story lobby, mirrored at one end, will present a dual view of Max Spivak's mural mosaic (see left) an abstract design whose gay colors and buoyant forms play the same role in establishing a carefree atmosphere as the Park Terrace Hotel's Miro mural (See Reviews, August '48). The fan-shaped auditorium relies for decoration on skillfully angled planes of alternating acoustical and natural plaster. Plans for future expansion include a department store and restaurant which, with the theater, will open on a central garden-terrace and pool.

(Continued on page 74)

Plywood Announcement!

1 **A New, Simplified A-B-C System of Grade Identification for Douglas Fir Plywood Is Now in Effect.**

2 **Douglas Fir Plywood Is Now Produced in Accordance with New U. S. Commercial Standard CS45-48.**

In order to simplify the identification of Douglas fir plywood grades, manufacturers have adopted a new A-B-C system of grade-marking.

Plywood is manufactured in two distinct types—Exterior and Interior. Within each of these two types are several appearance grades. These grades—of either Exterior or Interior type—are determined by the appearance quality of the *outer plys* (face and back veneers).

Now, there are just four such qualities of veneer—A, B, C and D, in order of appearance quality.

Highest in appearance quality — "A" veneer — is that formerly known as "Sound." "B" veneer is a new quality, also known as "Solid," which presents a firm, solid surface, free from open defects. "C" and "D" veneers may contain certain restricted defects which do not affect panel serviceability, and are used where appearance is not important.

*As the new A, B, C, D veneer designations are being introduced, industry grade-trademarking of panels provides for designation either by letters or by previous terminology. Thus, as listed above, grademarks on panels may read either "PlyShield A-C" or "PlyShield So1S" (Sound 1 Side).

GRADES OF EXTERIOR-TYPE

EXT-DFPA•A-A (Sound 2 Sides)
EXT-DFPA•A-B (Sound 1 Side, Solid Back)
EXT-DFPA•PlyShield•A-C (Sound 1 Side)
EXT-DFPA•Utility•B-C (Solid 1 Side)
EXT-DFPA•Sheathing•C-C
EXT-DFPA•Concrete Form•B-B (Solid 2 Sides)

GRADES OF INTERIOR-TYPE

Interior•A-A•DFPA (Sound 2 Sides)
Interior•A-B•DFPA (Sound 1 Side, Solid Back)
PlyPanel•A-D•DFPA (PlyPanel Sound 1 Side)
PlyBase•B-D•DFPA (Solid 1 Side)
PlyScord• C-D•DFPA (Sheathing)
PlyForm•B-B•DFPA (Solid 2 Sides)

The new U. S. Commercial Standard CS45-48 for Douglas fir plywood becomes effective November 1, 1948. The Commercial Standard booklet contains complete data on the new system of grade identification* and new grade-trademarks, and sets forth more stringent performance requirements for Exterior-type plywood. A free copy will be mailed to any point in the United States. Send the coupon below.

Douglas Fir PLYWOOD

LARGE LIGHT STRONG *Real Wood* Panels

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

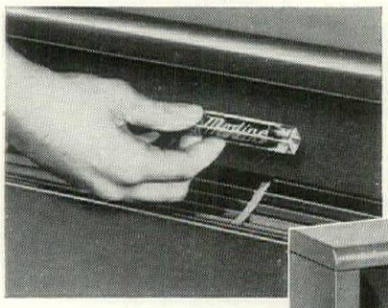
GENTLEMEN: Please send me my copy of the new U. S. Commercial Standard CS45-48, which contains new grade designations and new grade-trademarks for Douglas Fir Plywood.

NAME _____
Firm _____
Title _____
Street _____
City _____ Zone _____ State _____

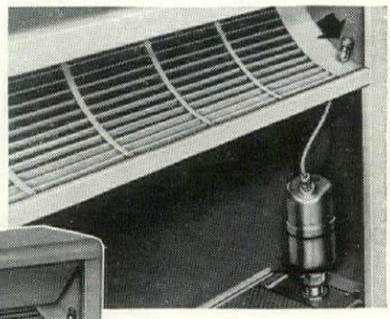
There's more than beauty in the NEW

Modine Convector

Important new features simplify installation . . . provide more convenient operation and control . . . assure superb heating comfort.

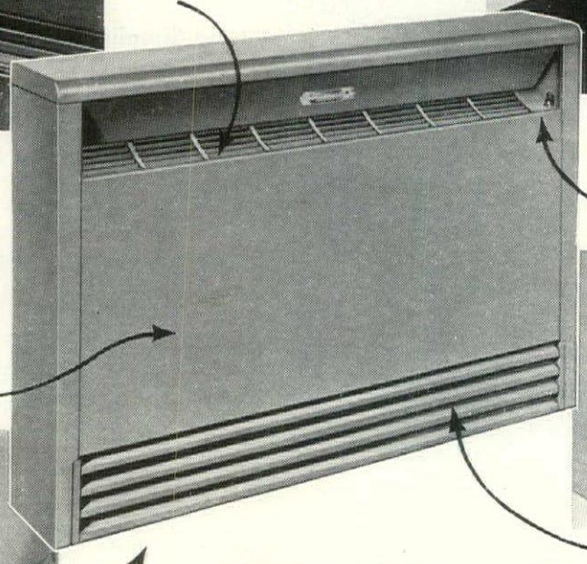


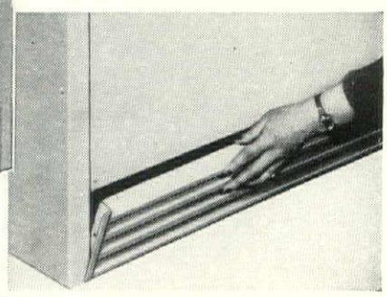
NEW DUAL-PURPOSE DAMPER! A touch of the hand operates the self-positioning damper for convenient temperature control. When closed, damper conceals unique outlet grille . . . blends enclosure into adjoining wall.



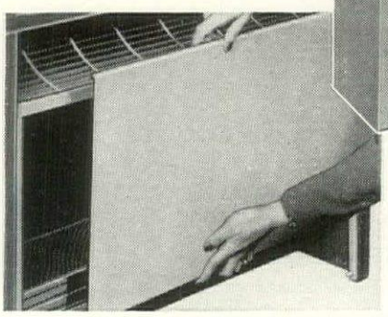
NEW CONVENIENT AIR VENTING! Out of sight, yet instantly accessible, air vent can be rigidly secured to curved outlet grille as illustrated whenever convectors are installed on hot water system.

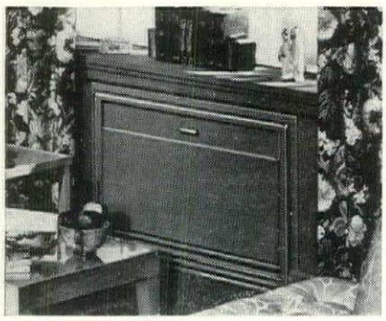
NEW 5-SECOND REMOVABLE FRONT! For easier installation and cleaning, effortless lifting action quickly removes entire front panel. No need to bother with screws, catches or tools. Panel is easy to replace too.





NEW SNAP-IN GRILLE! Completes striking appearance of Modine Convector. An optional feature you can add now or later. Snaps in or out of place without tools. Affords quick access for cleaning beneath cabinet.

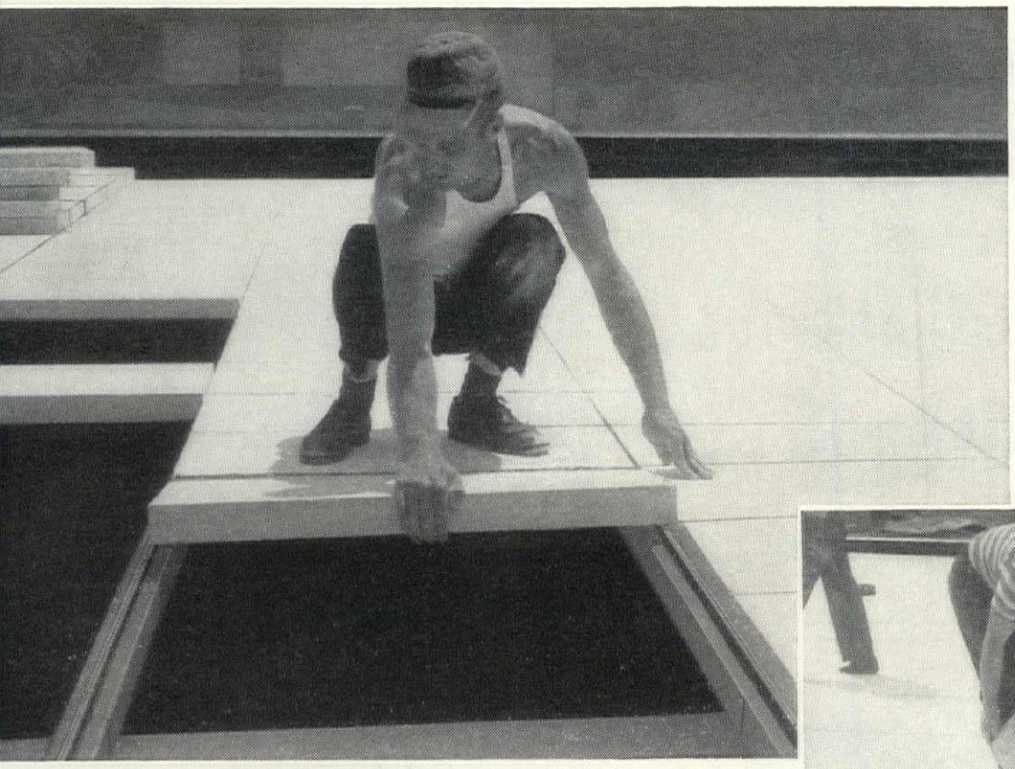




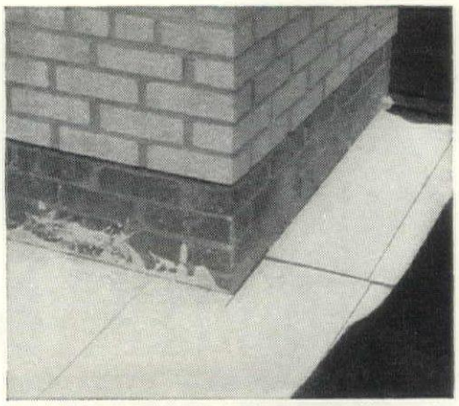
NEW VERSATILE ENCLOSURE DESIGN! Designed for modern interiors, type F Convector (shown with damper closed) is ideal for recessing — either partially or fully (at right) or for exposed installation against wall.

Look, compare, consider . . . see for yourself why Modine is top choice in convector radiation! Note these outstanding features: Modine Convectors are functionally styled to blend perfectly with your up-to-the-minute ideas of interior design. What's more, Modine gives you completely new installation, control and maintenance features that make it really big news in modern radiation design. Available in four beautiful cabinet styles in a wide range of modular sizes. You'll want Modine . . . for the modern home, apartment, school, office, hospital. Call your Modine Representative listed in the "Where-to-Buy-It" section of your phone book . . . or write direct. Modine Mfg. Co., 1507 Dekoven Ave., Racine, Wisconsin.

Modine Convector Radiation

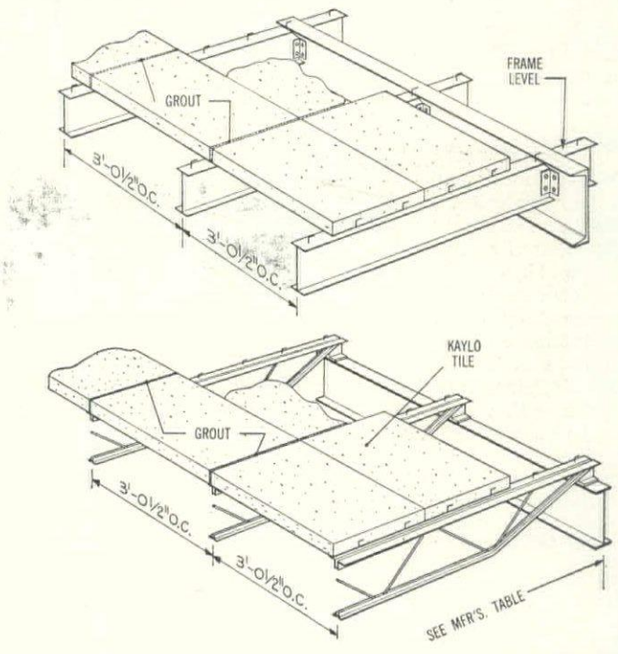


IGHTWEIGHT. Kaylo Insulating Roof Tile is strong, yet lightweight and easy to handle, as shown above. Each tile is 2⅝ x 18 x 36 inches in size, weighs about 21 pounds.



EASY TO FIT. Kaylo Insulating Roof Tile can be cut and fitted with ordinary hand or power tools. Picture above shows example of re-entrant cut made to fit around stack.

WHEN American Structural sub-purlins are used, insulating grout, shown above, provides necessary anchorage by gripping the stem of the sub-purlin. Through the use of bent studs, Kaylo Roof Tile can be applied directly to trussed purlins or standard shapes without the use of sub-purlins, as shown in the drawing below.



Make your roof deck fireproof . . . lightweight and strong

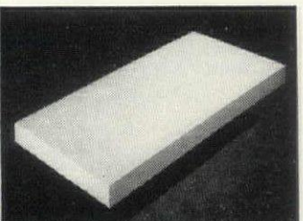
with Kaylo Insulating Roof Tile

STRUCTURAL strength, extreme lightness and high insulating qualities —you can get all these in your roof with one material: Kaylo Insulating Roof Tile.

Kaylo Roof Tile is made of inorganic materials only, and is fireproof.

Whether you're an owner, builder, architect or engineer, Kaylo Roof Tile has many advantages for you. It is easy to install, can be cut to fit right on the job. Its insulating properties reduce fuel costs.

Because Kaylo Roof Tile makes a structural deck that is light in weight, less steel is needed for framing. Get all the facts about Kaylo Insulating Roof Tile . . . send coupon (below) for free illustrated booklet.



KAYLO®
Insulating Roof Tile

AMERICAN STRUCTURAL PRODUCTS COMPANY
Subsidiary of
OWENS-ILLINOIS GLASS COMPANY

All photographs on this page are of the new Morton Hosiery Mills plant in Runnemede, N.J.: Henry Skierski, Owner; Charles C. Duffin, Berlin, N.J., Contractor; W. D. Faint & Company, Pennsauken, N.J., Engineers.

SEND COUPON FOR FACTS

AMERICAN STRUCTURAL PRODUCTS COMPANY
Dept. E-412, P.O. Box 1035
Toledo 1, Ohio

Gentlemen:
Please send me free illustrated booklet, "Kaylo Insulating Roof Tile."

Name_____

Address_____

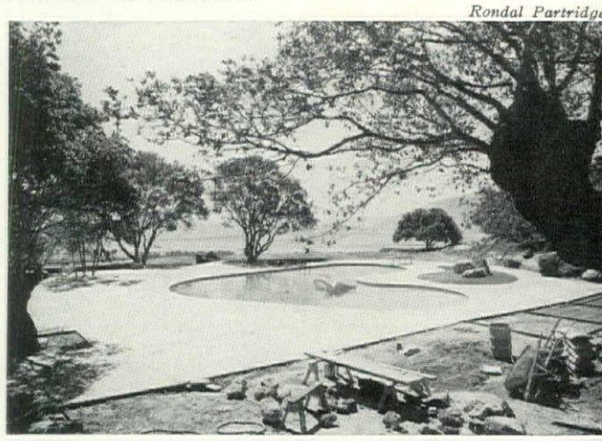
Firm_____

City_____ County_____ State_____

☐ Request for sample is enclosed on company letterhead.

CLASSIC ABSTRACTION

Rondal Partridge



Not even the spatter of workmen's tools in the foreground can destroy the serene beauty of the outdoor pool designed by Thomas Church and Lawrence Halprin. This asymmetric composition of concrete, water and botanical shapes is set into a high, tree-surrounded plateau on the ranch of Mr. and Mrs. Dewey Donnell in Sonoma, Calif. Adeline Kent's sculptured form in the pool is as satisfactory to swim through and recline on as it is to look at. The group—in pictures and models—formed part of the October architectural exhibit at the Mortimer Levitt Gallery, New York City; the show also included a presentation of the Lescaze theater described on the previous page.

FELLOWSHIPS

ROME PRIZE FELLOWSHIPS — 1949-50 — offers 14 stipends of $1,250 a year (plus transportation to and from Rome, studio space, residence at the American Academy in Rome, and an additional travel allowance) for mature students and artists capable of independent work. Anyone interested (he must be a U. S. citizen) should send evidence of ability and achievement to the Executive Secretary, American Academy in Rome, 101 Park Ave., New York 17, N. Y., before February 1, 1949. Fellowships begin October 1, 1949 and hold the possibility of renewal after the year's term.

UNDERGRADUATE COMPETITIONS

ARCHITECTURAL STUDENTS AND DRAFTSMEN in New York State are being encouraged to participate in a state-wide competition for the best designs of low cost single and multi-family dwellings—for families whose weekly earnings range from $46 to $58. Single houses must aim to meet a $7,500 selling tag. This student contest (coordinated with a contest for licensed architects, see FORUM, August '48, p. 66) aims to set architects thinking about new methods and designs to cut housing costs in the present period of shortages. In each division of the student contest $200 is offered as first prize, $100 as second. All entries must reach William Lescaze, professional advisor of the competitions, by November 15th, 1948. Address: State Division of Housing, 270 Broadway, New York, N. Y.

JAMES F. LINCOLN ARC WELDING FOUNDATION again offers the undergraduate bonanza of the year for papers by engineering students on methods and applications of arc welding. Students awards, ranging from $1,000 to $25, total $5,000. Awards to schools where winning students are registered equal $17,500. Papers submitted to the contest must appear in student publications between the dates of September 15, 1948 and April 1, 1949. *(Continued on page 78)*

Get Guaranteed Dimensional Stability with The New Weldwood Flush Veneer Door

New Mineral Core and Precision Manufacture give Weldwood Flush Veneer Doors Extraordinary Dimensional Stability

These beautiful new wood-faced doors always measure up. They won't swell in summer . . . won't shrink in winter.

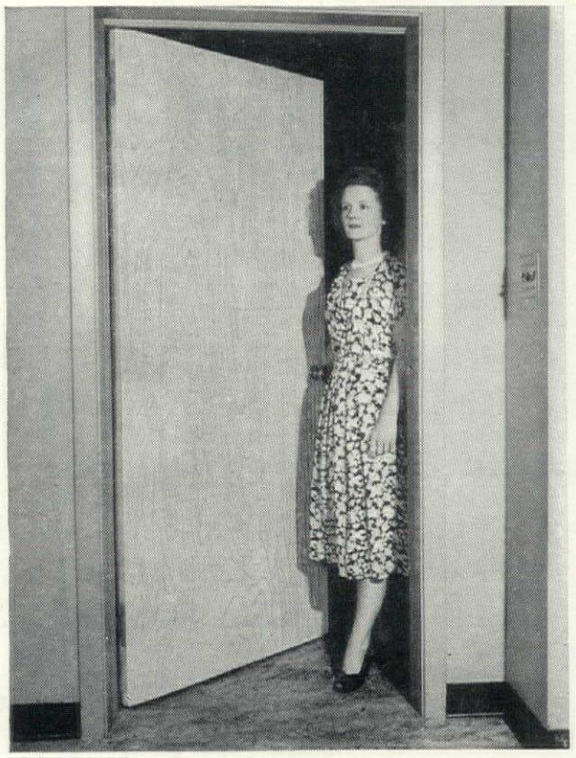
The new mineral core of the Weldwood Flush Veneer Door gives it such a degree of dimensional stability that we back it with the most sweeping guarantee ever given by any manufacturer.

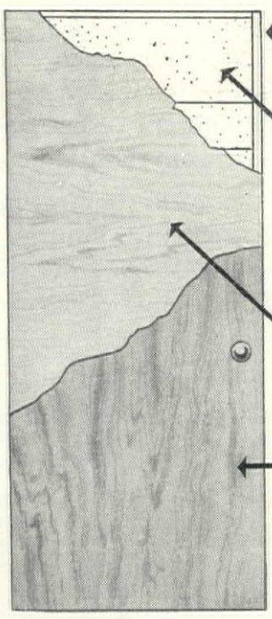
Weldwood Doors are guaranteed against warpage or binding in opening due to any dimensional changes in the door.

Here indeed is a superior door. Just go over this checklist of advantages:

1. **PERMANENT BONDING** *of veneers to core and banding with TEGO Film Waterproof Glue by hot plate process.*
2. **VERMIN AND DECAY PROOF** *mineral core resists fungus, decay and termites for the life of the structure.*
3. **INSULATING PROPERTIES** *are superior to double glazing, such as opening protected by storm door . . . when door is installed in an exterior opening with weather stripping.*
4. **EXCELLENT VAPOR BARRIER.** *TEGO Film Phenolic Glue bond provides a completely effective moisture barrier.*
5. **INCOMBUSTIBLE MINERAL CORE.** *Core has a fibrous binder with a nominal density of 20 lbs. per cubic foot. This material has a sturdiness which assures proper performance of door under the most severe conditions.*

We'll be glad to rush you full specifications on this new door. Write or contact our nearest branch.





EDGE BANDS are thoroughly kiln dried hardwood, built up of two pieces of ¾" stock, securely glued together to provide greater dimensional stability.

MINERAL CORE. Each core is made of three or more pieces, securely bonded together by high frequency process, thus offering a solid piece of homogeneous character. Moisture content not in excess of 4½%. Sized with highly waterproof solution, offering a perfect base for laminating cross bands and faces.

CROSS BANDING of 1/16" veneer is bonded to core with TEGO Film Waterproof Glue.

FACE VENEER. At present, handsome Birch veneer forms the hardwood faces. Wide variety of other decorative woods available on special order.

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Distributing units in Baltimore, Boston, Brooklyn, Chicago, Cincinnati, Cleveland, Detroit, Fresno, High Point, Los Angeles, Milwaukee, Newark, New York, Oakland, Philadelphia, Pittsburgh, Portland, Ore.; Rochester, San Francisco, Seattle. Also U. S.-Mengel Plywoods, Inc., distributing units in Atlanta, Dallas, Houston, Jacksonville, Louisville, New Orleans, St. Louis, Tampa.
In Canada: United States Plywood of Canada, Limited, Toronto.

Why there are no Better Boilers than SPENCER

- HIGHEST QUALITY MATERIALS
- ENGINEERED—DESIGNED AND BUILT TO THE MOST EXACTING STANDARDS
- SKILLED BOILER WORKMEN
- SPENCER CARRIES ON THEIR BOILER RESEARCH AND DEVELOPMENT WORK IN THEIR OWN FULLY EQUIPPED LABORATORIES

Smart Heating Engineers and Experts

SPECIFY SPENCER

EVERY SPENCER BOILER is designed for ease of installation—no wasted labor—no hidden costs. Spencer Boilers are engineered for maximum efficiency . . . all working parts are accessible—easy to maintain and no trouble calls.

One of the oldest names in the heating industry and now a proud member of the AVCO family, Spencer manufactures a complete line of cast iron and steel tubular boilers. There is a size and type Spencer to meet every heating requirement—for every type of fuel. You'll find no higher regard than the buying public has for Spencer Boilers.

So . . . for your protection, Mr. Heating Expert, sell and specify Spencer.

I-B-R REG. U.S. PAT. OFF. FULLY APPROVED

FULLY APPROVED
Built in accordance with ASME Code
Insurance Inspected
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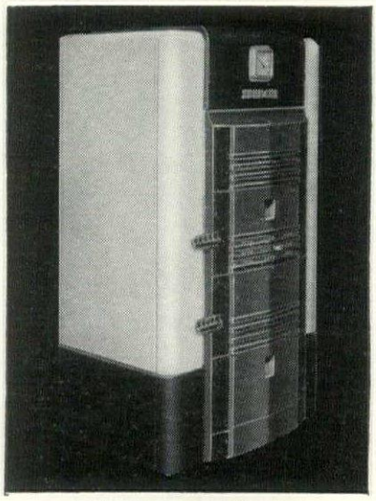
IT'S ANOTHER AVCO PRODUCT!

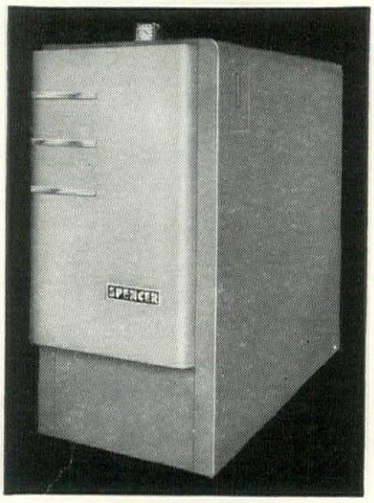
SPENCER HEATER

DIVISION—AVCO MANUFACTURING CORP., DEPT. AA-5, WILLIAMSPORT 2, PA.



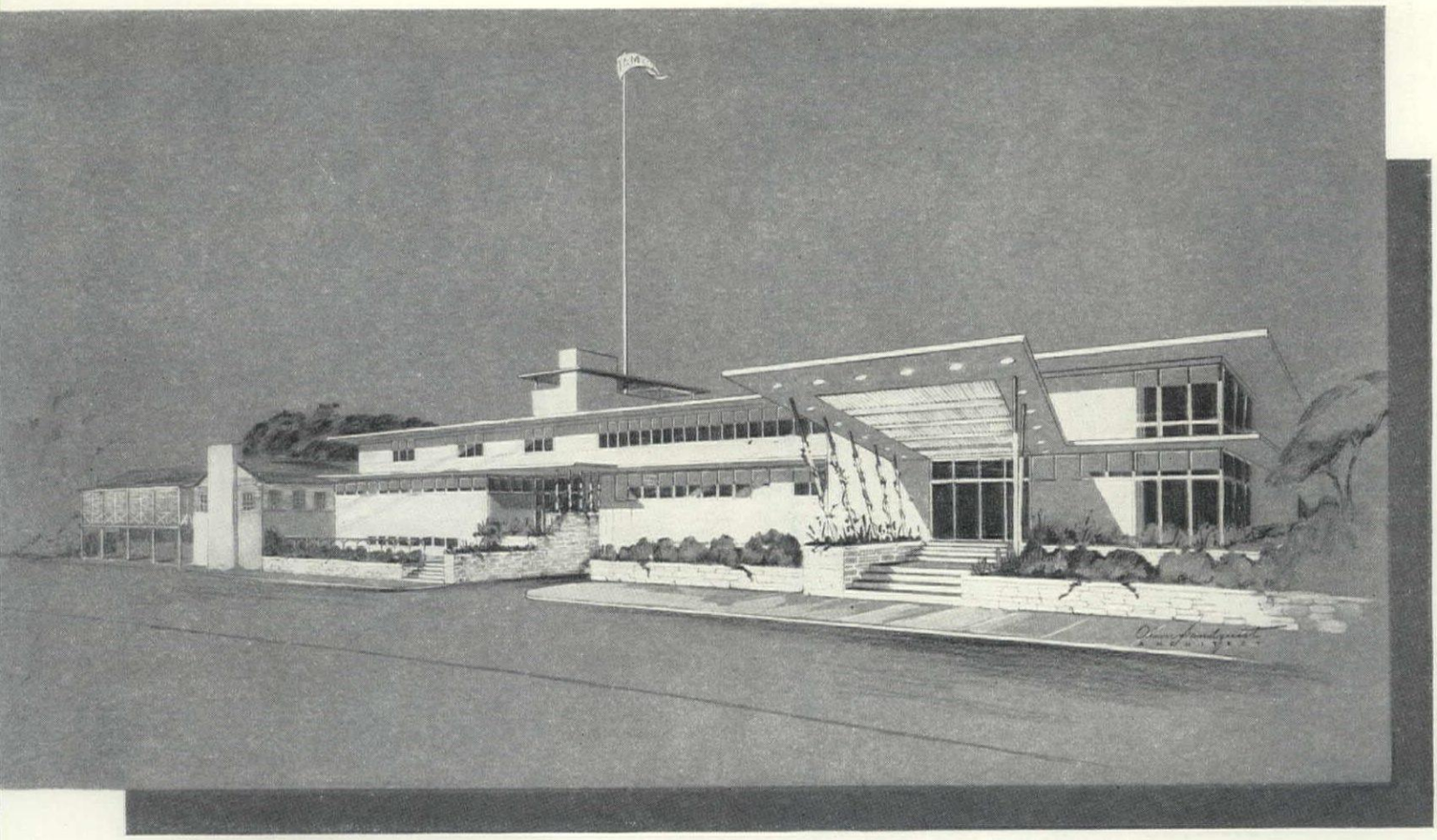
THE NEW SPENCER SERIES "21"

Designed to burn any type of fuel—easily and quickly converted. Year-round domestic service hot water. A sectional boiler designed with iron to iron air tight fit. Attractive jacket combined with modern design door assembly featuring glass observation ports.



FAMOUS SPENCER SERIES "C"

Steel Heating Jacketed Boiler for homes and smaller commercial buildings. For mechanical or hand firing—easily and quickly converted. Features include easy accessibility for cleaning—precision ground water cooled flue and fire door frames. Available with year-round domestic hot water heating method.



TAM O'SHANTER COUNTRY CLUB, NILES, ILLINOIS
OLIVER SANDQUIST, Architect, Chicago · JOSEPH T. CARP, INC., General Contractor, Chicago
CHARLES CAVAN & COMPANY, Painting Contractor, Chicago

PRATT & LAMBERT PAINT AND VARNISH

ONE of the most modern country clubhouses, the Tam O'Shanter Country Club, Niles, Ill., is the scene of the annual All-American tournament. After two disastrous fires, the club management engaged Oliver Sandquist, Chicago architect, to design a new clubhouse. Glass walls, which form murals of natural scenery, are but one of several features of his functional design.

Another interesting feature is the mirrored wall at one end of the lounge and reception room, making this spacious room seem even larger. A further novelty is the plate glass partition between the kitchen and the informal grill room, enabling members to view kitchen activities.

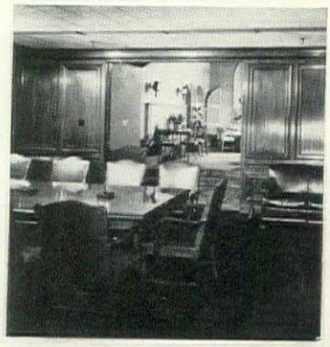
Included in the Pratt & Lambert Paint and Varnish used in decorating this attractive clubhouse, were Lyt-all Flowing Flat, "61" Enamel Eggshell and "38" Pale Trim Varnish.

On request, the P&L Architectural Service Department will aid you in securing appropriate decoration, as well as low-cost maintenance, for any type of structure.

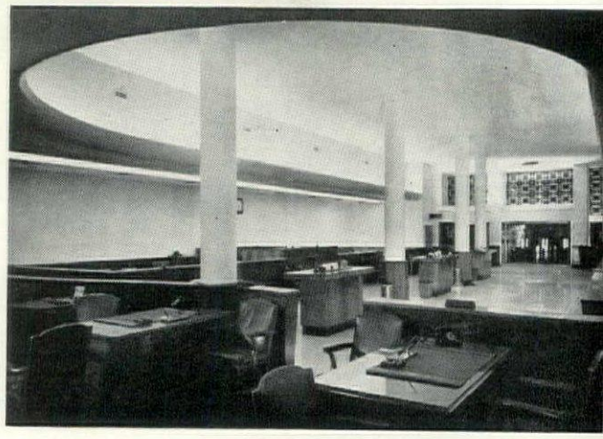
PRATT & LAMBERT-INC., Paint & Varnish Makers
NEW YORK · BUFFALO · CHICAGO · FORT ERIE, ONTARIO

BANKING À LA CREOLE

Photo Associ

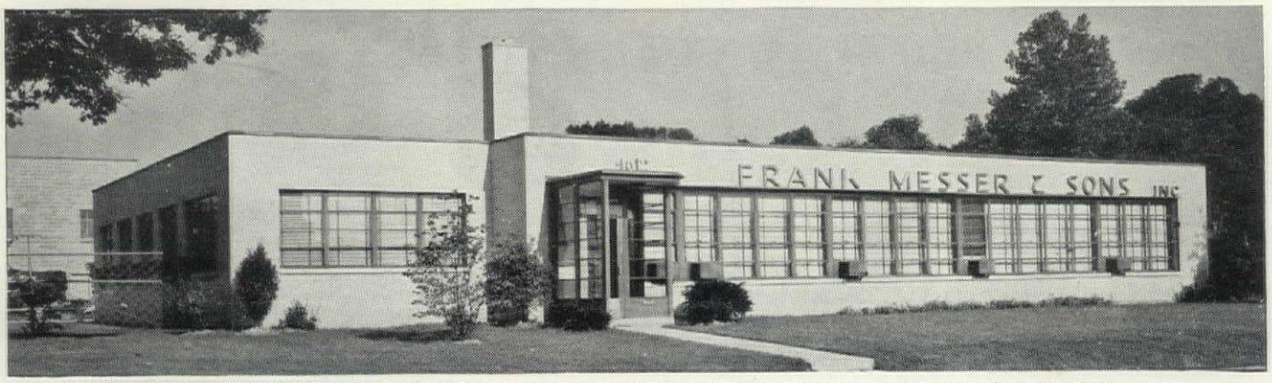


While New Orleans' nosta gia invades the executive dining-room (above) and fillip of modern is percep tible on the main floo (below), the still conserva tive décor of the confer ence room (left) prove that in a changing worl some things remain sacred



A new recipe to keep depositors and deskmen happy and interested has been whipped up by the Empire State Bank of Dallas, Texas. Local architects, Smith & Mill, who produced it from the shell of an old USO building for $400,000, are especially pleased with the Louisiana savor imparted to the executives' dining room through the use of an iron grille-work balcony and stairway. The visiting public is welcomed by mellow cove lighting. Chest-high tellers' counters of processed indestructible wood are effective without emphasis —all money storage is safely beyond reach of outer arms. Banker-like, the Empire State based its reactions on a glance at the tally tab. Its findings *(Continued on page 82)*

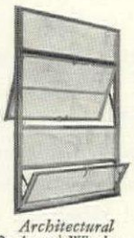
TRUSCON PLANNING BOARD



Truscon Architectural Projected Windows installed throughout main office building of General Contractor Frank Messer & Sons, Inc., Cincinnati, Ohio. Architects: Potter, Tyler & Martin, Cincinnati, Ohio.

Truscon Projected Windows Serve a Wide Range of Architectural Planning Needs

New Greyhound Bus Terminal, Cincinnati, Ohio, features Truscon Architectural Projected Windows and Screens. Architects: Wischmeyer, Arrowsmith & Elswick, Louisville, Ky. Contractors: J & E Warm Company, Cincinnati, Ohio.

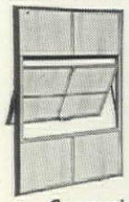


Architectural Projected Window.

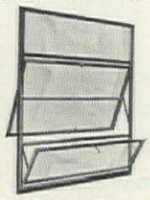
Perfect complement to every type of traditional or modern architecture, Truscon Projected Windows combine efficiency and distinctive appearance with economy and long life.

Advantages of projected window design include maximum flexibility of ventilation control . . . protection from inclement weather . . . ease of screening . . . and choice of different types to meet exact application requirements.

Shown on this page are typical examples of the many recent installations of Truscon Projected Windows in commercial, manufacturing and institutional structures. Write for free catalog containing full information about Truscon Steel Windows.

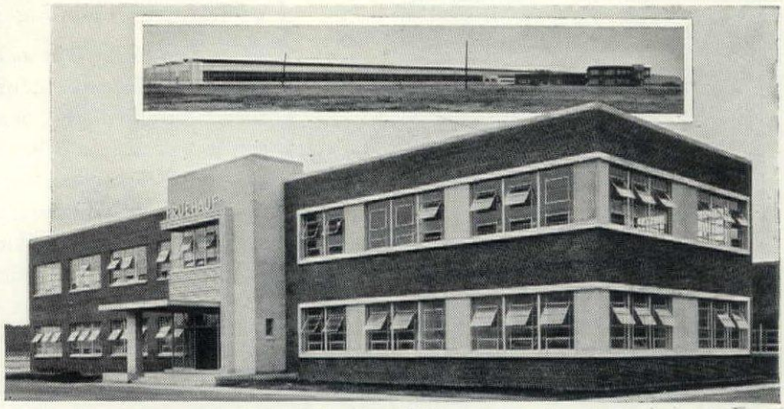


Commercial Projected Window.

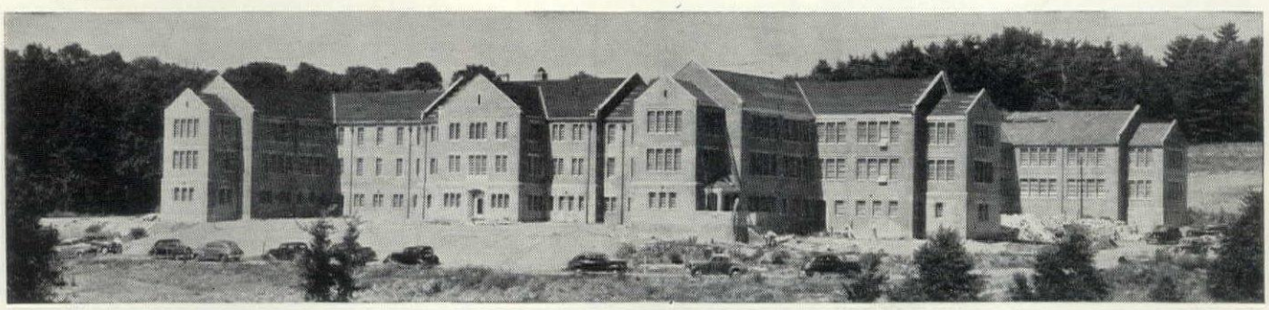


Intermediate Projected Window.

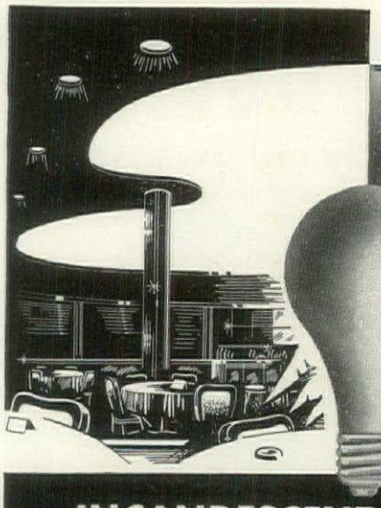
Right inset: *Truscon Commercial Projected Windows are installed throughout the newly completed Fruehauf Trailer Co. plant in Avon, Ohio.* Right: *Truscon Architectural Projected Windows blend perfectly with the modern exterior of the Fruehauf Trailer Co. office building.*



Below: Truscon Intermediate Projected Psychiatric Windows in Ohio State Sanitarium, Mt. Vernon, Ohio. Architects: Walker & Norwick & Templin, Dayton, O. Contractor: Knowlton Construction Co.



TRUSCON STEEL COMPANY YOUNGSTOWN 1, OHIO
Subsidiary of Republic Steel Corporation



DIMMING
BRIGHTENING
BLENDING

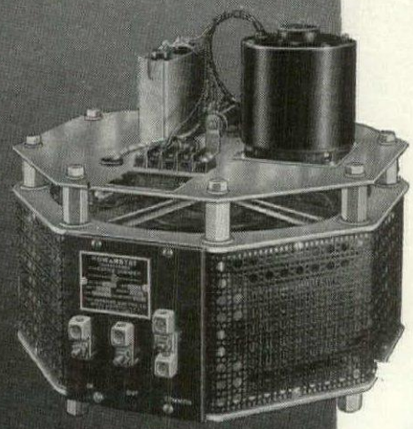
INCANDESCENT

COLD CATHODE

EASY with POWERSTAT

LIGHTING CONTROL EQUIPMENT

TYPE D1700



TYPE DM4600T

There's nothing new about dimming incandescent light . . . but there's *plenty* new about the POWERSTAT method of dimming cold-cathode fluorescent! POWERSTAT Dimmers — plus the proper integration of the components of the dimming system — make cold-cathode fluorescent dimming easy, inexpensive and effective. Select the proper lamps, ballasts and transformers — add a POWERSTAT Dimmer — and your cold-cathode dimming problems are solved.

POWERSTAT Dimmers give top performance with cold-cathode or incandescent lighting treatments. They're easy to install, rugged and maintenance-free. They'll give smooth, stepless, continuously-variable control over long periods of dependable service. Because POWERSTAT Dimmers operate by transformer action, a negligible amount of heat is generated. No special ventilation problems arise with their installation. POWERSTAT Dimmers in your cold-cathode fluorescent or incandescent circuit can be placed wherever they will be most convenient for you.

POWERSTAT Dimmers — available in numerous models and a wide range of capacities — are designed for handwheel, lever action or motor driven operation. There's a POWERSTAT Dimmer for *your* application . . . write today for complete information on what POWERSTAT Dimmers can do for you.

4118 DEMERS AVENUE, BRISTOL, CONNECTICUT

THE SUPERIOR ELECTRIC CO.
BRISTOL, CONNECTICUT

Powerstat Variable Transformers • Voltbox A C Power Supply • Stabiline Voltage Regulators.

Clean, cool comfort—provided by Carrier System Weathermakers—is attracting more customers and selling more merchandise for chain stores everywhere. Proof of this is the many repeat orders placed by leading chains for these dependable, efficient air conditioning units.

Dozens of prominent chains have installed them in as many as 40 to 50 stores—and some have hundreds!

They give the client the full benefit of efficient, made-to-measure air conditioning with all the economy and convenience of a standard, factory-assembled unit. System Weathermakers can be used singly or in groups to fit the individual need. They can be fitted with heating coils for year-round service.

System Weathermakers, like Carrier refrigeration and self-contained units, bear the stamp of Carrier's pioneering research and long experience in air conditioning. Carrier engineers for years have worked closely with architects and consulting engineers to help insure peak performance on every job. Carrier Corporation, Syracuse, New York.

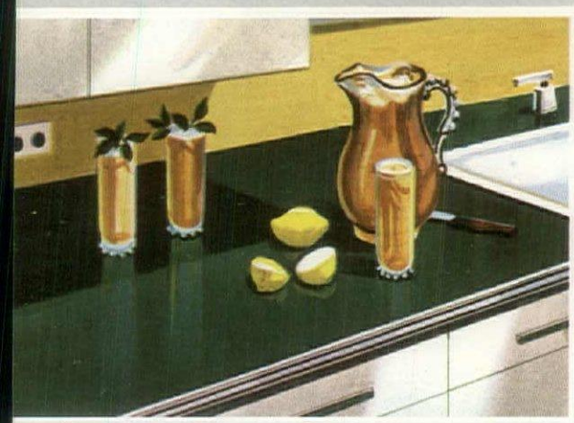
Carrier AIR CONDITIONING • REFRIGERATION • INDUSTRIAL HEATING

What every Architect should know about

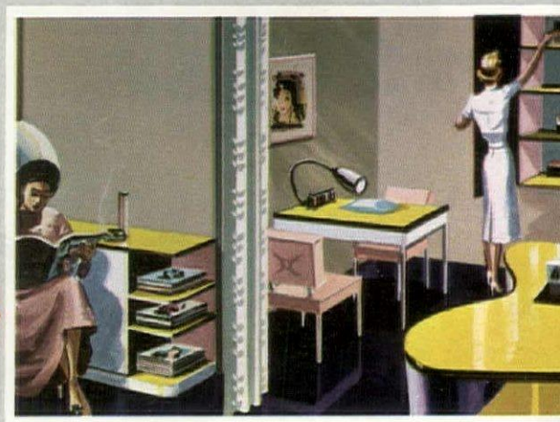
MICARTA

Micarta table tops offer a tough, impervious surface that makes possible "hospital cleanliness." Sanitation is quite as important in soda fountains and public eating places as in hospital operating rooms, where Micarta is extensively used.

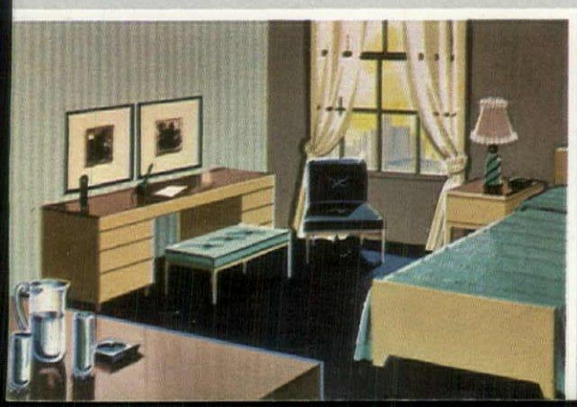
Micartabord; 5/32" thick, provides good looking, sturdy, scuff-resistant, washable walls for corridors. Micarta is also widely used for elevator cars in public buildings, apartments and institutions.



Micarta's well known resistance to all types of food products, and to detergents and household cleansers, makes this beautiful plastic popular for kitchen sinks, counters and all work surfaces.



For beauty shops, barber shops and retail stores of many kinds, Micarta provides bright, colorful work surfaces, walls, counters, and tops for tables and other furniture.



More and more, Micarta is being used for furniture tops in homes, hotels, and institutions. Micarta Truwood, made with genuine wood veneers, is widely used for such applications. Incidentally, Micarta can be worked by hand tools. It can be sawed, trimmed, planed and drilled.

In washrooms, bathrooms, powder rooms and toilets, both in private homes and public institutions, Micarta's easily cleaned surfaces help assure sanitation and good appearance.

Micarta is ideal for bar tops and fronts as well as for fountain tops. It is not marred when cigarettes are snuffed out against it.

If you are uncertain, if you don't know what Micarta will do . . .

Here's a challenging offer:

Try to chip it!

Use silverware, cooking implements, the ordinary tools that would be used in a busy kitchen or pantry. *Just try!*

Try to dent it!

Bang heavy glasses, ash trays, cups, or even cooking pots and pans on it. *Just try!*

Try to stain it!

Spill alcohol on it, boiling water, nail polish, polish remover, even hydrogen peroxide up to 8 hours. *Just try!*

Try to score it!

Gouge it with the edge of a half dollar. You can, of course, scratch it with the point of a sharp steel penknife, but as for anything else, *just try!*

Try to spoil it!

Use it as an ash tray. Snuff out cigarettes against it. Walk on it. Pour boiling water on it. Actually *boil* it in water. Just *try* to spoil it.

MICARTA is a remarkably tough and strikingly handsome plastic laminate, available in 32 colors and finishes. It is widely used in large and small homes, stores, shops, public buildings and institutions.

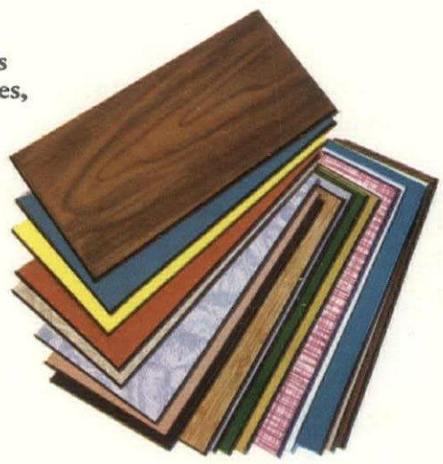
Micarta requires virtually no maintenance. It is not affected by boiling water, alcohol, detergents, household cleansers, dilute acids, condiments, and barber and beauty shop preparations.

While Micarta is highly resistant to cigarette burns, a special cigarette-proof grade is available for *complete* protection. Micarta may be obtained in the following forms:

Micarta Sheet, 1/16" thick, used by fabricators who have the requisite bonding equipment.

Micarta Panel, in ⅞" and 1¼" thicknesses. This is Micarta Sheet, bonded to special cores of mahogany-faced Weldwood Plywood.

Micartabord, 5/32" thick, used generally as a wall surface.



We invite you to send the coupon for a free sample. *Test* Micarta's unusual properties yourself.

Made by Westinghouse. Sold for decorative purposes only by

UNITED STATES PLYWOOD CORPORATION
New York 18, N. Y.

A.F.

United States Plywood Corporation
55 West 44th Street, New York 18, N. Y.

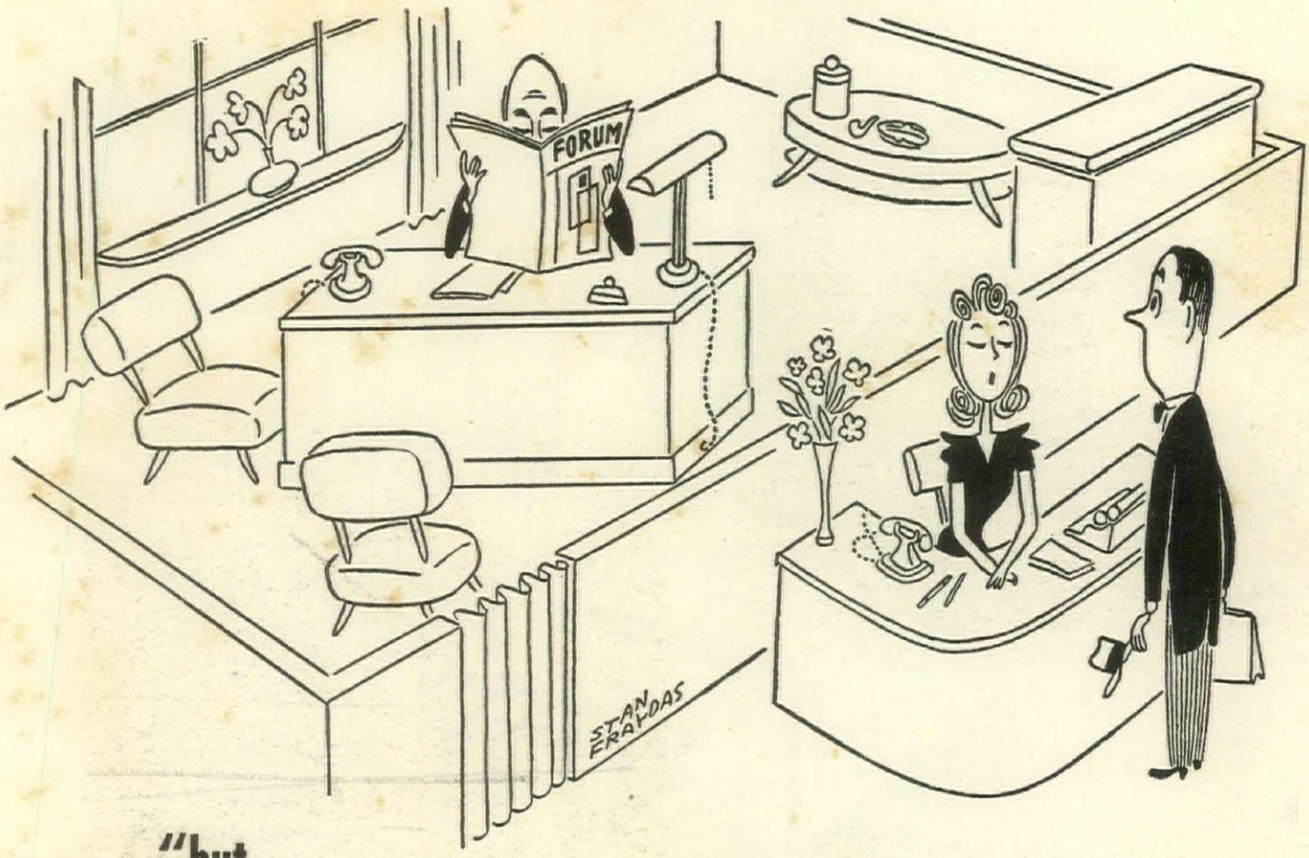
I WANT TO GIVE MICARTA THE "THIRD DEGREE." Without any obligation whatever, send me, *free*, a sample of Micarta so I can see for myself how beautiful, tough, wear-resisting and abuse-proof Micarta really is.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



"but Mr. Glubbens never sees salesmen..."

A tough man to sell, Mr. Glubbens. He is not to be cajoled by the spoken word, the graphic presentation or the power of over-the-desk logic.

But he likes facts and he likes the authoritative way that only the FORUM horizontally covers building—*all* phases of building. Not just the details of the architect, the problems of the builder, the trade winds of the dealer ...but all the integrated common denominators of his business and America's No. 1 vast industry.

Mr. Glubbens, on his way through the pages of the FORUM, reads the advertisements, too. In the FORUM, they invite his attention, arouse his thoughts. So Mr. Glubbens, whether he admits it or not, really *does* see salesmen. Some mighty forceful ones.

Want him—and 62,000 more of building's big decision-makers—to see yours?

The Architectural FORUM

Magazine of Building

Division of TIME, Inc., 350 5th Avenue, New York I, N.Y.

Hour Glass Cocktail Lounge, La Salle Hotel

Officers' Lounge, Hotel Knickerbocker

Walk into these fine Chicago hotels— And you'll walk on Bigelow Carpets

BIGELOW WEAVERS

Walnut Room, Bismark Hotel

Cherub Room, Hotel Belmont

Here are four scenes in one city. Four important hotels all carpeted with Bigelow's famous Hartford-Saxony.

And in city after city, you'll find the same story. For smart hotel managers . . . decorators . . . architects . . . all realize how superbly this carpet pays its own way.

Pays off in year-in, year-out wear because of its exceptionally rugged construction. Pays off in distinctive appearance, because it's always custom-created as to design and color.

What are your carpet needs? Custom-made styles, or a choice of swatchbook beauties? Any questions about installations? Bigelow's prepared to answer them readily.

See Bigelow's Carpet Counsel for sound, expert advice. 25 Carpet Counsel offices are at your service. One of them is near *you.*

Bigelow

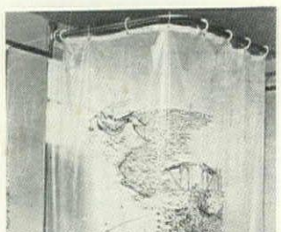
Rugs and Carpets

Beauty you can see . . . quality you can trust . . . since 1825

ANNOUNCEMENTS

could hardly be more satisfactory. Over the competition of 22 rival banks in Dallas, the first day's deposits totaled $5,000,000—2½ times the Texas record.

VAN GOGH IN VINYL



Adaptations from well known paintings, announced as "a complete different conception of design" will soon bring culture to the bathroom via window and shower curtains. The first of these eclectic designs to reach the market is formed of motifs from two Van Gogh canvases, *Bridge at Arles* and *Boats of Saintes Maries*. Starling Products, New York manufacturer, proposes their availability in four combinations of color — all on a frosty white background: black, yellow and gray; turquoise, burgundy and rose; peach, blue and silver and green, lime and turquoise.

CONVENTIONS

NATIONAL HEATING WHOLESALERS' ASSOCIATION Annual Convention, Blackstone Hotel, Chicago, Ill., January 25, 1949.

NATIONAL ASSOCIATION OF BUILDING OWNERS AND MANAGERS 1949 Convention, Mount Royal Hotel, Montreal, Canada, June 20-23.

AWARD

PROFESSOR C. D. WILLIAM, University of Florida and PROFESSOR E. C. HARRIS, Fenn College, have won the $5,000 prize for the best textbook manuscript in the structural engineering field. The award, offered by the James F. Lincoln Arc Welding Foundation, was presented to their work on "Structural Design in Metals" which will be published next year by the Irwin-Franham Publishing Co., Chicago, Ill.

APPOINTMENTS

LOUIS KAHN and ELIOT NOYES, as members of Yale University's Department of Architecture; Sven Markelius, Eero Saarinen, Pietro Belluschi, John Sloan and Hugh Stubbins as visiting critics to supervise individual problems in advanced architectural design throughout the 1948-1949 terms.

ERIC MENDELSOHN to be lecturer during the next year for the Senior Design Class at the University of California School of Architecture, Berkeley, Calif.

MATTHEW NOWICKI, Polish architect and UN Design Board Member, as visiting professor and acting head of the Architectural Department, North Carolina State College; Stanislawa Nowicki, his wife, as assistant professor.

CARL FREDERICK BRAUER and SAM J. GLABERSON, New York architects, and PETER W. BRUDER, consulting engineer, instructors in the Department of Architecture, Cooper Union Art School, New York City. *(Continued on page 86)*

CLEVELAND

ith mass production economies—

by W. D. Riddle, Architect

● The low-cost house for the mass market has long suffered from the lack of cooperation veen builder and architect. The commendable vere Quality House Institute" program is d upon the premise that the combined abili- and experience of a reputable merchant der and a competent architect can produce a erior product at a reasonable price. The results he program thus far indicate that the premise ound and that a real improvement will be cted. This will benefit the purchaser by pro- ng high standards and place the builder in a tion of leadership because of the excellent ie he is able to offer.

n providing a low-cost house for the market s mandatory to consider carefully every ele- nt of design and construction with the idea of plifying necessary elements and eliminating superfluous. This process effects savings ch can be reflected in more generous and effi- nt space and better quality in construction. tting costs does not necessarily mean discard- esthetic values. Sometimes leaving things out s more to create the illusion of space and to ance living, both inside and out, than putting expensive partitions, small window panes, amental bric-a-bric, etc. This open planning hnique is not only easier and as a result less ensive to build, but also contributes to a ing quality which will not be quickly out- ded.

n Cleveland the greatest need seemed to be a three-bedroom house. In order to employ t-cutting, field-fabrication techniques a simple tangular plan was indicated. The plan is 24′ le inside, allowing for the use of pre-assembled sses. This permitted complete flexibility in the ation of non-loadbearing partitions and eens.

The attached garage is large enough for heater, ndry and storage space. Its location, conve- ntly adjacent to the kitchen, provides for lity space and, when the car is out, an ade- ate drying area. During inclement weather the rage can serve as an auxiliary play space and id room under supervision from the kitchen.

A space 16′ x 24′ is divided into cooking, living d eating areas by a partition screening off the tchen. This living and working space has ex- posures with large glass areas on two opposite sides of the house.

A sleeping area provides for three bedrooms, one for twin beds, one for a double bed and one for a single bed. It is possible to omit one partition, thus throwing two bedrooms together as a nursery. The partition can be installed later when the need for more privacy arises. A folding wall is optional between the smaller bedrooms (to make a study guest room) and the living area for occasions when extra living space is required.

The living room can open either to the front or back or to the side by turning the plan 90°. This allows for flexibility in site planning. The simple plan and standard prefabricated construction make possible somewhat larger square foot area than would otherwise be available.

Extreme care has been given to selecting quality materials to match the services required of them. This is especially true in cases where the materials are inaccessibly located and where they affect maintenance and operating costs. Copper Water Tube is used to resist corrosion for hot and cold water and for radiant heating pipes buried in concrete. Also, all metal exposed to the weather is copper. In order to reduce heat loss, besides insulation all double-hung windows are supplied with storm sash and fixed windows are glazed with Thermopane.

In short, leaving out knicknacks and simplifying the plan contribute to more efficient and gracious living. Many problems of construction and sources of future trouble are eliminated by the observance of extreme simplicity. Good materials guard against inconvenience and costly maintenance.

RICHARD LISCHER, designer, as professor of Industrial Design, Bard College.

JOSEPH PALMA, JR., industrial design consultant, to be critic in Product Design, at the Art Institute of Chicago.

ALFRED ROTHMANN, architect, an associate in the firm of Alfred Hopkins & Associates, architects, New York City.

PHILLIP O. REECE, Director of the Timber Development Association, Ltd., London, England.

NEW OFFICES

HENRY V. CHESCOE, architect, 909 Hearst Bldg., San Francisco, Calif.

SIGVALD DUDWIG BERG, A.I.A., (formerly FHA chief architect and appraiser in Montana) general practice of architecture and engineering, 711 Monroe Ave., Helena, Mont.

CARL HERBERT LANCASTER, JR., architect, 421 Washington St., Montgomery, Ala.

GILBERT FEIN, architect, 1995 Marseille Drive., Miami Beach 39, Fla.

BODDY-BENJAMIN ASSOCIATES, INC., architects and engineers for industrial, commercial and public buildings, Detroit Bldg., 2210 Park Ave., Detroit 1, Mich.

G. ROSS HENNINGER, director of publications for the Illuminating Engineering Society, New York City.

PAUL MCCOBB DESIGN ASSOCIATES, 150 E. 35th St., New York 16, N. Y.

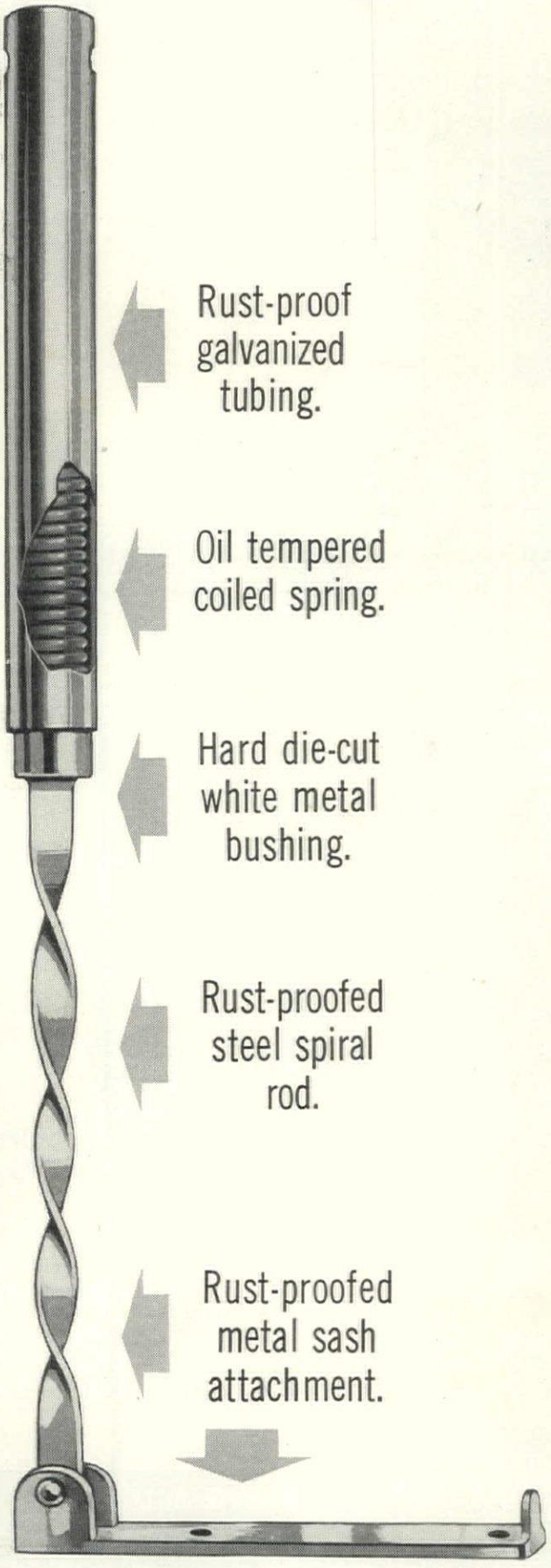
(Continued on page 90)

You get *plus* value with Unique SASH BALANCES

The fine metals used in Unique Sash Balances assure PERMANENCE and continued PERFORMANCE

Unique Sash Balance plants are located in the United States, Canada, Australia, and in England to fill a worldwide demand.

WORLD'S FIRST TUBULAR SASH BALANCE



Rust-proof galvanized tubing.

Oil tempered coiled spring.

Hard die-cut white metal bushing.

Rust-proofed steel spiral rod.

Rust-proofed metal sash attachment.

For further information inquire of

UNIQUE BALANCE COMPANY, INC.

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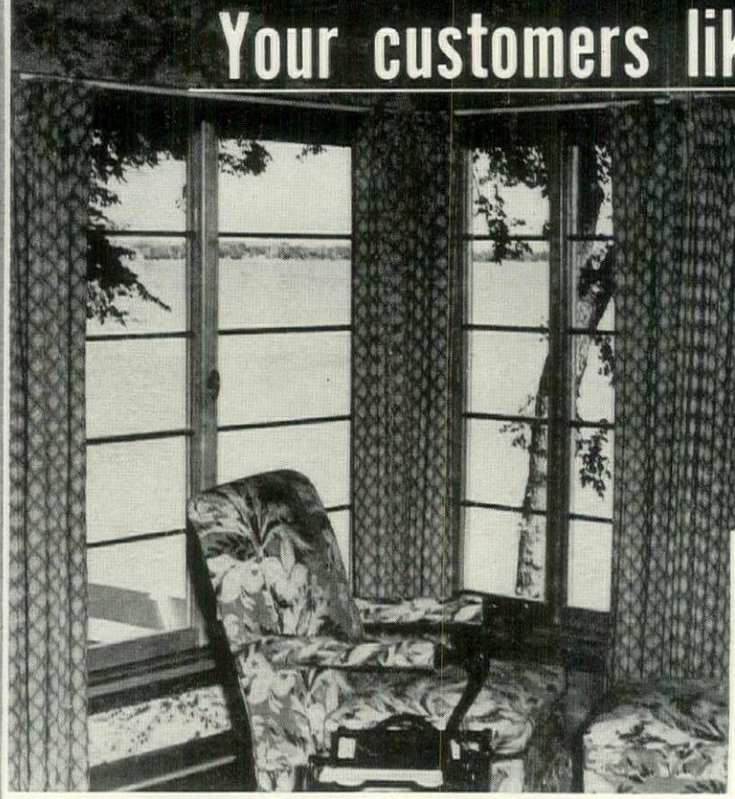
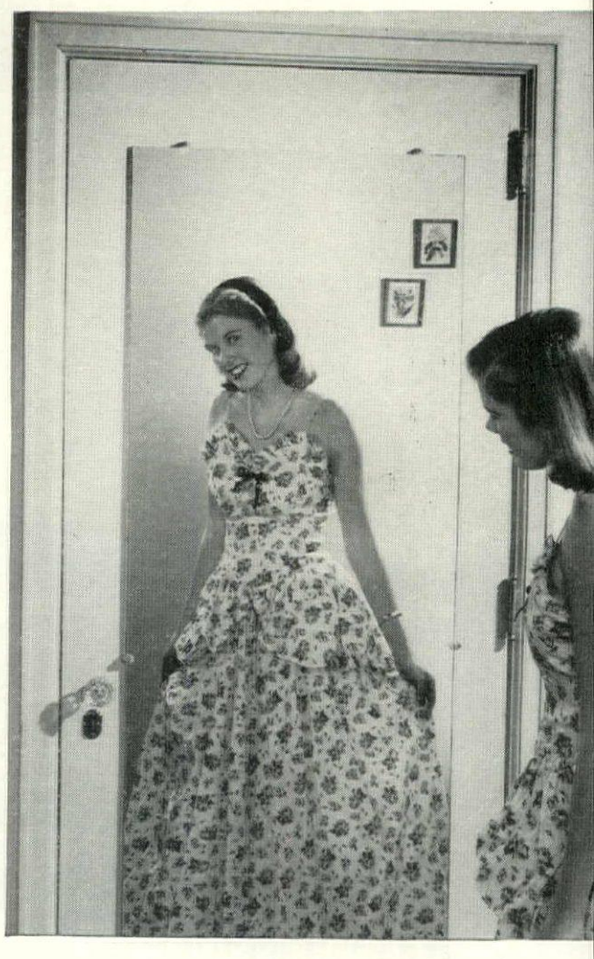
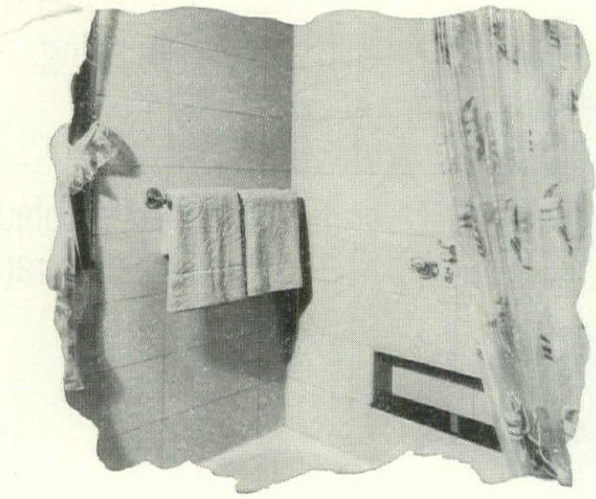
Your customers like the "Modern Look"



People like to make the outdoors a part of their home. Hence the trend toward picture windows. With Twindow — the "Pittsburgh" window that features "built-in" insulation — picture windows are more practical than ever. Twindow greatly reduces heat losses — eliminates downdrafts near windows. Can be set as quickly and easily as a single pane of glass





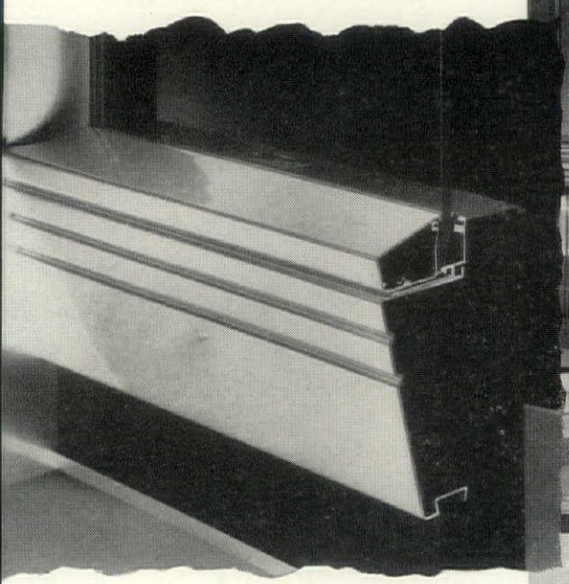
It's easy to understand why so many homeowners want Carrara Structural Glass for their bathroom walls and wainscots. Carrara is easy to keep clean. There are 10 beautiful colors to choose from. And its beauty lasts indefinitely. It's ideal for other rooms, too. Can be used for kitchen walls, behind stove or lavatory—for fireplace surrounds, shelves and window sills.

As important as their clothes and cosmetics—that's how every modern woman feels about full-length door mirrors. And there are many other types of Pittsburgh Mirrors which help make homes more practical, modern and glamorous — and help increase your profits! "Spruce up" mirrors are always appreciated in entrance halls or kitchens. And structural mirrors in living, dining or bedrooms make the rooms seem larger and brighter.

PITTSBURGH PLATE GLASS COMPANY

and that means lots of Pittsburgh *Glass*

The glamor and beauty of glass work wonders in stepping up the sales appeal of any modern store front. Merchants know this—are anxious to take advantage of it. "Pittsburgh" has a complete line of quality glass products—as well as store front metal and the new Herculite Door Frame Assembly to help store owners and you.



Here is the new Pittco DeLuxe sill and sash assembly. Sill and sash are separate members, thus simplifying installation and reducing glass breakage—yet when used together, they give the appearance of a single moulding. The sill has been designed to recess the Carrara Structural Glass bulkhead, providing toe room and protection. The invertible sill members offer variety in styling.

***REE!** We will* gladly send you free our special "Builders Kit" which includes illustrated literature showing how you can use glass effectively on all types of jobs in which you are interested.

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2354-8 Grant Building, Pittsburgh 19, Pa.
Please send me without obligation your "Builders Kit" of illustrated literature.

Name_____

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City_____ State_____

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PITTSBURGH PLATE GLASS COMPANY

ANNOUNCEMENTS

THEODORE HARTMAN, architect and associated engineers (formerly Howe & Hartman) Goetz Theater Bldg., 1702½ 11th St., Monroe, Wis.

CHANGES OF ADDRESS

LEON HYZEN, architect, store-planner and industrial designer, 1129 N. Dearborn St., Chicago 10, Ill.

GARDNER A. DAILEY, F.A.I.A. & ASSOCIATES, architects, 442 Post St., San Francisco 8, Calif.

RICHARD HAWLEY CUTTING, ANTHONY S. CIRESI and associated architects & engineers, 2074 E. 36th St., Cleveland 15, Ohio.

LADISLAS SEGOE & ASSOCIATES, city planners and consulting engineers, Provident Bank Bldg., Seventh St. at Vine, Cincinnati 2, Ohio.

J. HERBERT BURMEISTER, R.A., 89-30 161st St., Jamaica 2, N. Y.

GARO N. DORIAN, designer, 545 Sutter St., Westphal Bldg., San Francisco 2, Calif.

PANORAMIC STUDIOS, architectural models, 6122 N. 21st St., Philadelphia 38, Pa.

CORRECTION

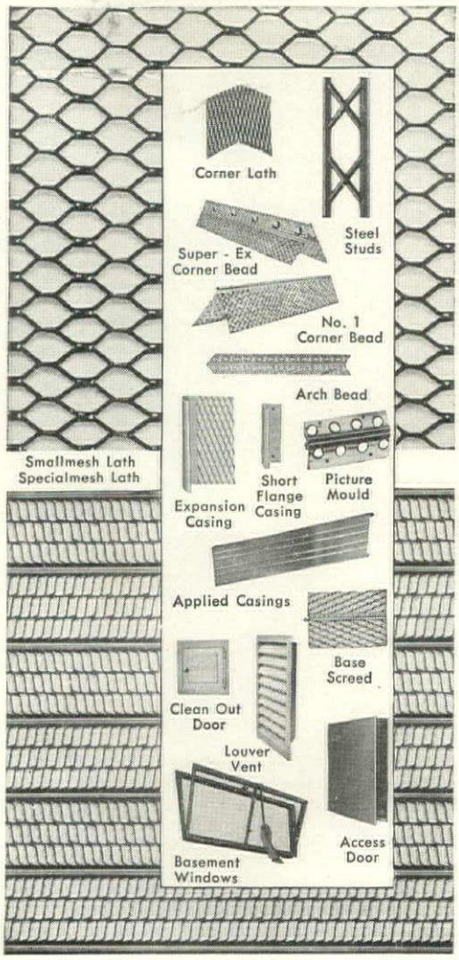
Credit for the development and testing of K-VENEER, a new wall-board material for factory-built homes (see July '48 FORUM, p. 117), should have been given to the Elmendorf Corp., 322 W. Washington St., Chicago 6, Ill.

The feeling is mutual...

There's an affinity, say designers of fine furniture, when discussing the relation between Kencork floors and walls and modern home furnishings. They appreciate how Kencork's golden browns and leafy tans flatter furniture, fabrics and accessories—the decorative contribution of its subtle squares and rectangles—and its interesting, unusual surface. Architects, too, note the physical appeal of Kencork: the comfort of Kencork's resilience—its sound-absorbing qualities—its tendency to insulate against heat and cold. And both architects and builders are often surprised to learn that this cork tile, popularly considered expensive, may now be compared with other floorings or wall coverings of equal durability and quality. To learn the entire story of today's Kencork, consult your flooring dealer. Or write the nearest Kennedy office for informative Kencork color folder and quotations. David E. Kennedy, Inc., 69 Second Avenue, Brooklyn 15, N. Y.—324 Fourth Avenue, Pittsburgh 22, Pa.—1211 NBC Bldg., Cleveland 14, Ohio—1355 Market St., San Francisco 3, Cal.—Bona Allen Bldg., Atlanta 3, Ga.—452 Statler Bldg., Boston 16, Massachusetts—Ring Bldg., 18th & M Streets, Washington, D. C. —58 E. Washington Blvd., Chicago 2, Ill.

KENCORK® *floors and walls*

For walls that can take it come FIRE or WATER...



fire-resistant Milcor Metal Lath and Plaster

the test-proven combination that safeguards your clients' lives and property

One of the strongest features of Milcor Metal Lath is its "built-in" fire insurance. You can depend on it to withstand the most severe fire for more than an hour. It has been given a standard one hour fire protection rating.

Since the first 15 minutes of any blaze is the most critical period, this wide margin is real safety protection for life and property.

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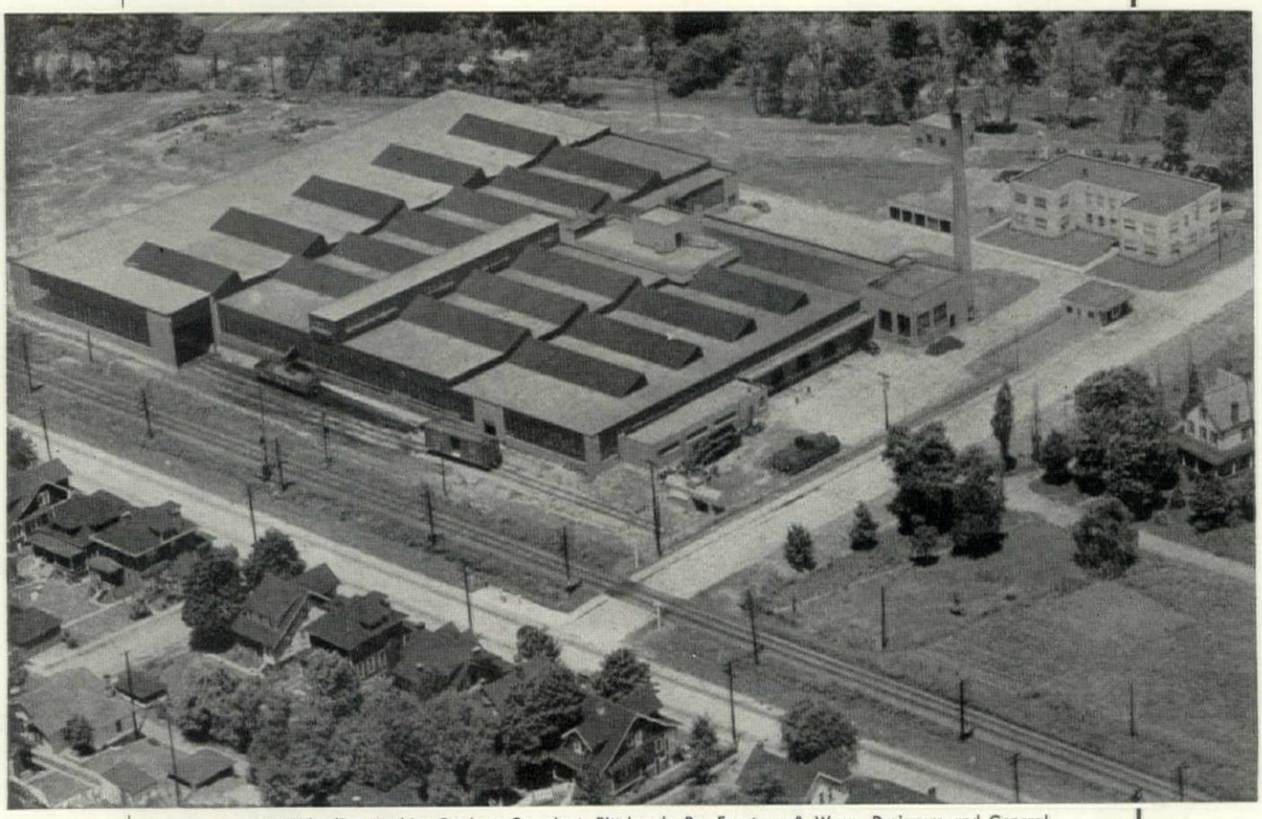

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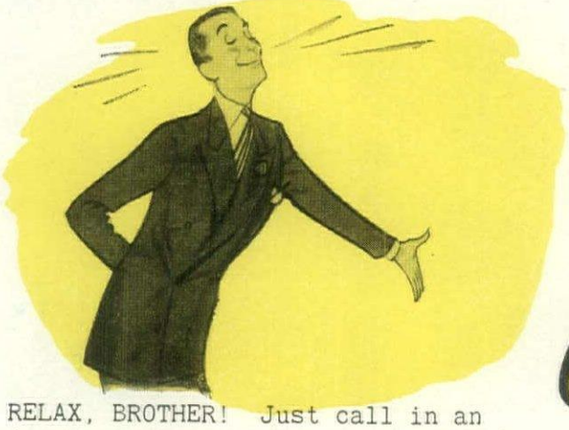

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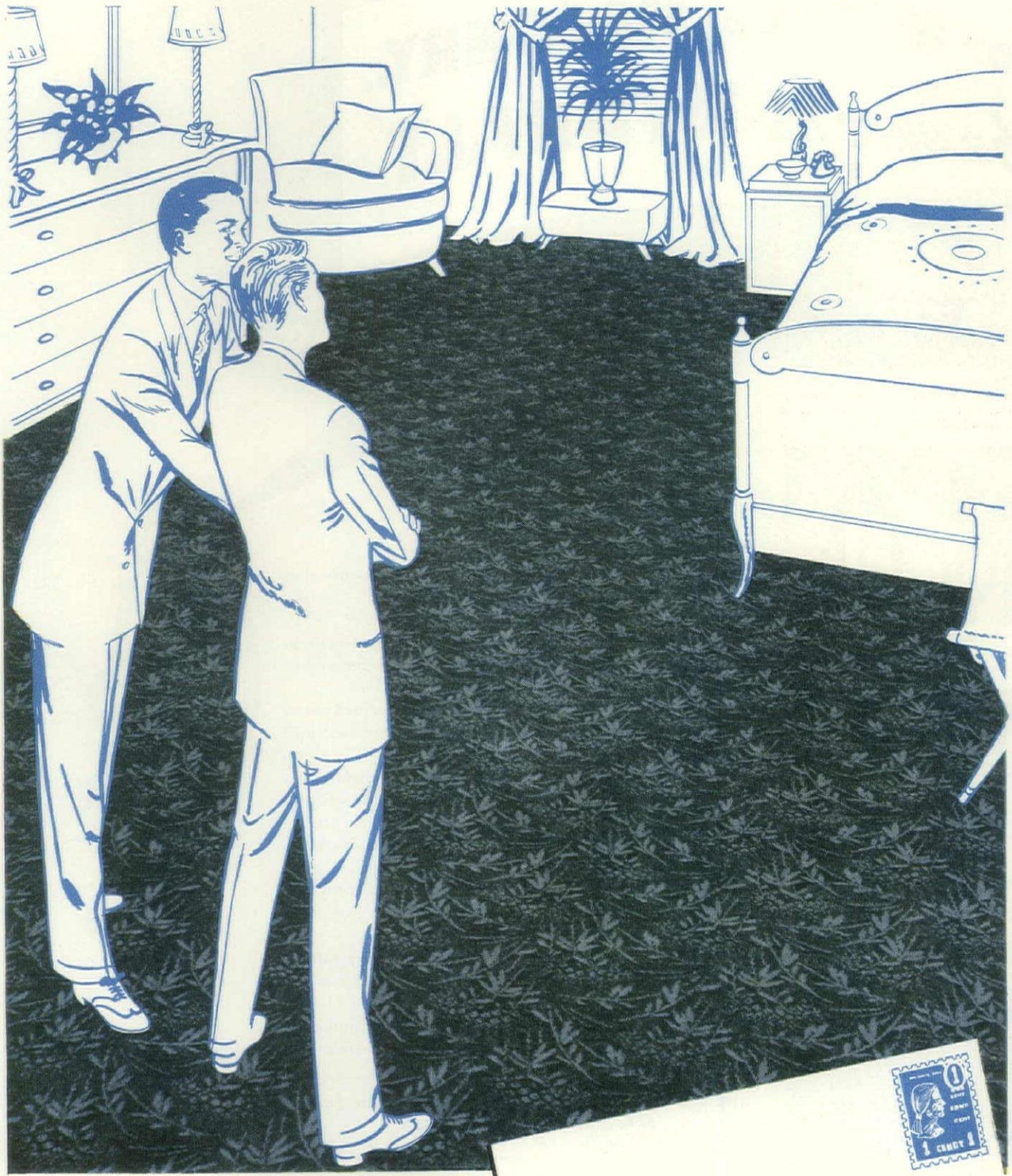

Illustrated: Masland's "Scranton", 1129/35, a Wilton carpet especially suitable for hotels and stores.

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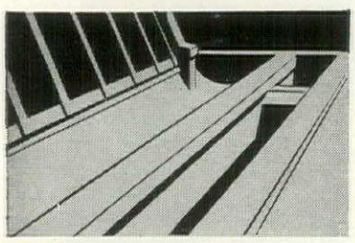

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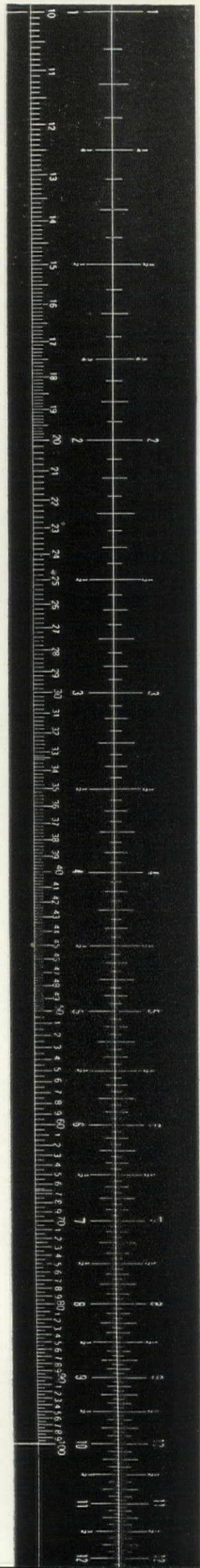


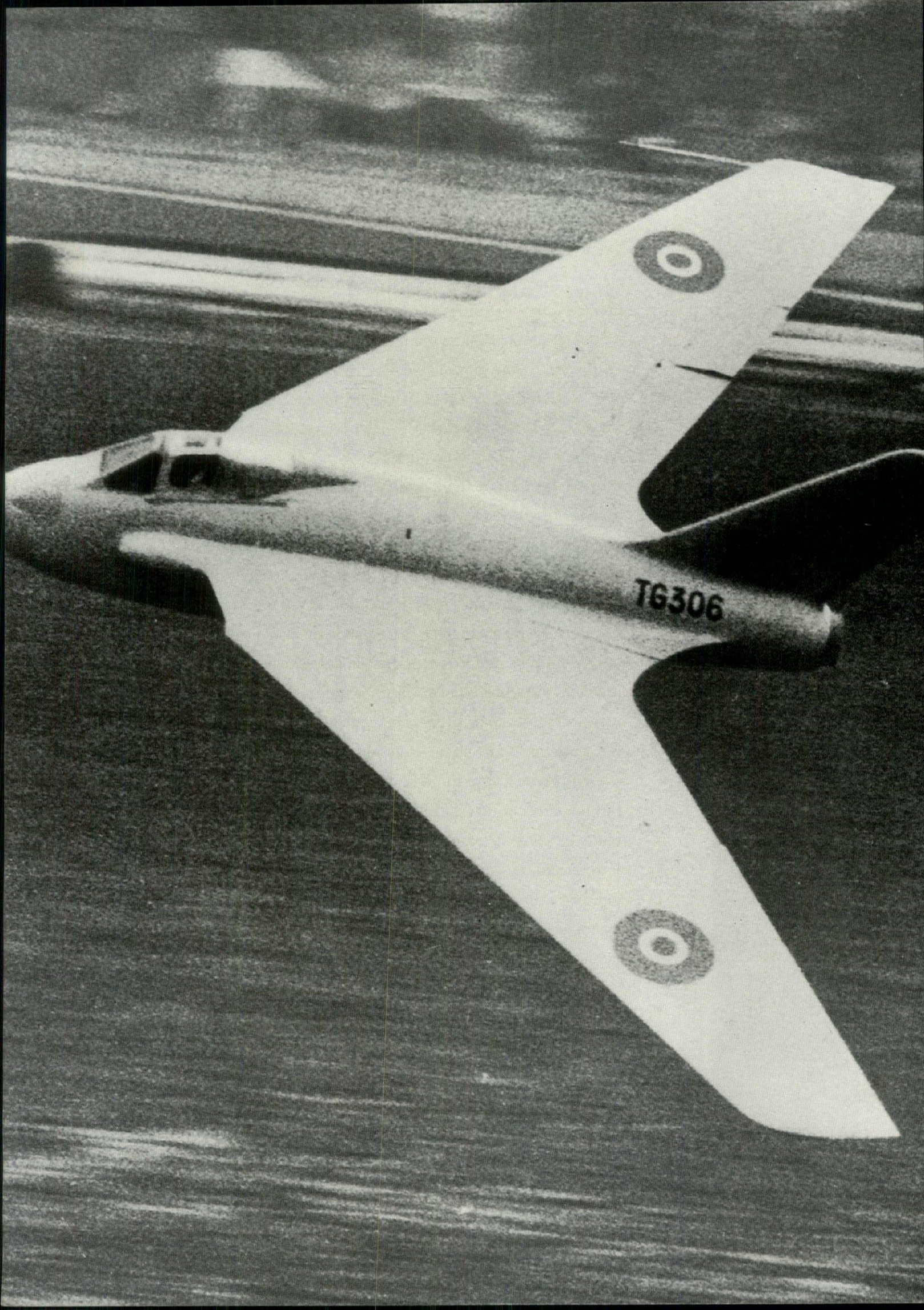
This issue of The FORUM is dedicated to the proposition that yesterday and today and tomorrow are not equal. How unequal we will try to measure in the pages which follow. The difference we are interested in is man's control and conditioning of his environment, a most legible index to man's progress, and a fascinating study in itself.

Yesterday, in building, was 25 years ago. At that time a building was still conceived to be little more than a shelter —an enclosure of space. It had to shut out the weather, of course. It also had to provide light and heat and be hooked up with various utilities and services. Architects worried a lot about fenestration and proportion and mass—the surface "esthetics"—but, beyond being structurally safe and durable, the building was not expected to *do* much else.

Today, 25 years later, vast strides have been made by science and industry and, significantly, in design. We have learned more about the kinds of environment which people need in order to carry on their daily activities most effectively. Materials and devices have been developed to produce such environmental conditions. And, since such material and devices must be incorporated into buildings, the buildings themselves have come to be looked on as means of conditioning the working and living spaces which they enclose. There is a great intricacy in designing and equipping today's buildings, small as well as large. There must be, if each structure is to attain its potential usefulness. We have shown our strength; now we are showing our skill.

But too much of this skill, this building science, is today unrelated. There are too many specialists who have not been introduced. If Tomorrow, with a distinctly higher level of building achievement, is to be reached soon, a correlation of techniques is necessary. It is time to pause and take stock of our advance, to evaluate achievements to date . . . to *measure* the instrumentality of this architecture.

A recent study states that urban man spends 88 per cent of his day in an artificial atmosphere, suburban man 70 per cent, rural man 43 per cent. We work, study, sleep, and make play in an environment which has come under man's control. Mere subsistence standards in this environment obviously are not good enough. The complex demands found in newly explored sensory and psychological areas reveal the minimum as a shameful goal, when there is so much to be enjoyed in health and comfort beyond the minimum. Surely this is one of the important endeavors in our world.


TG306

Few designers or engineers would maintain that any of their buildings could match in design or performance this jet aircraft—which was, for a time, the fastest in the world. The more knowing would insist that it is much more difficult to design a building with the obvious success of a plane. They are right, of course. The problem is not so direct as aeronautical engineering (and the pilot does not have to be pleased with the looks of the plane). But surely the highly purposeful design of many such beautiful mechanical objects in the world today stands as a model and a motive for building. Everyone concerned with the building process, from the architect to the financier, must heed the accumulated body of new environmental knowledge. Buildings are more important than airplanes; they too have to be scientific.

There was a day when building could be done by eye, and that day was just before yesterday. Today the strengths of our materials and methods have outgrown the conception of the eye, and there are few native intuitions which can be trusted to take the place of a structural engineering degree. Structure is just the beginning of this, of course. How many architects are competent to approach the design of an area for maximum acoustical utility? The rhetorical answer is *very few.* Unless the problem obviously calls for an acoustical consultant, the architect usually designs a room which—so far as sound is concerned—could have been designed 50 years ago. And this in the face of a great deal of easily-applied acoustical "know how."

This example brings us immediately to the hard fought question—which dominates, science or design? There is an extreme view which holds, to continue with our example, that acoustics should be devoted to rectifying the deficiencies of a designed space. In parallel, that structural engineering should put a building up, after it is "designed." This outlook has its justifications, although most of them are economic and not theoretical. To oppose this idea is to maintain that building which ignores current scientific knowledge to any considerable degree is wasteful and uneconomic. Technological advance is now just getting into gear and will advance faster tomorrow. It must be expected to shape our structures, and this should be welcomed. There are even now sad indications that some of our most "advanced" architects are settling into a style which had excellent roots in the progress of science between yesterday and today. But this is digging into position too soon.

← *Acme Photo*

But there remains the fear of many that building design which advances too far to meet technology will be swallowed up in the machine, and that the element of esthetic decision will become subordinated. The reasons for such a tragedy, however, would more probably be the designer's reluctance to collaborate truly with technology, rather than over zealousness. An architect who reluctantly parcels out jobs to consulting specialists and does not work with them creatively is handing his job over to the specialists and demolishing himself as a professional.

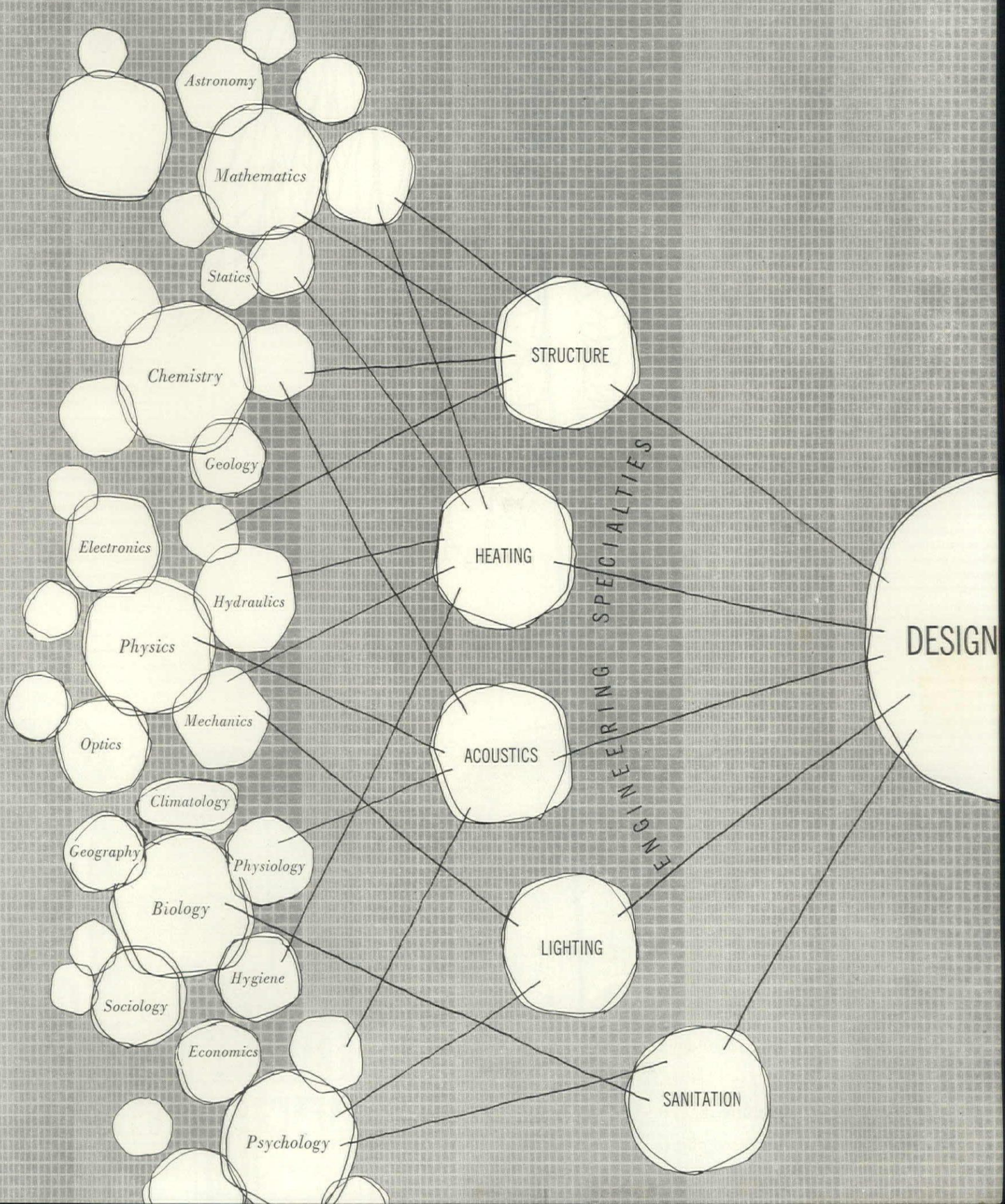
"You will not be soloists; you will have to play in a symphony orchestra. It will not be possible for the architects of the future to be isolationists or to have some sort of provincial or even metropolitan outlook on the world and on the role of designing physical environment. I believe that something very much more will be necessary." Richard Neutra, thus underscored recently the danger of such architectural isolation. His words could as readily be applied to every other building profession.

A glance at the chart across the page is enough to indicate the complexity of today's building job. No man is trained to be master of so much technology, but the man who is truly ignorant is the man who concentrates on only his specialty, and tolerates the others. Building, it is clear, is a compendium—a final result—of all of them.

A committee of engineers is adequate to solve familiar building problems to mechanical satisfaction. But advances in one field are constantly posing new problems in others. It is the architect's job to see that the new materials, new equipment and new techniques make sense in combination; that they compliment one another rather than conflict. And it is for the architect also to make sure that when the body's physical demands have been met, that the mind and spirit are also fed. The pilot's happiness may have to be subordinated in his jet plane, but this should not be so in the hangar or in his home, and human needs are not satisfied if art is lacking in their environment.

The place of the architect in building is that of heavily contributing coordinator and chairman. He must understand the technologists' approach, and they must comprehend his. In this FORUM, as much as can be done in one issue of a monthly magazine, we try to show how truly the process of design combines these functions, and how much greater are its new challenges, today and tomorrow.

The approach to the artificial environment and its effects on building design employed in this issue owes much to James M. Fitch's excellent book American Building *(Houghton Mifflin Co., $5).*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heat

a new knowledge of people's comfort needs—and a technology that can be the basis for serving them—makes possible a scientific thermal environment

OF ALL our environments, it is the thermal with which we are most continually at war. Man can adjust himself to complete darkness or brilliant sunlight without appreciable visual discomfort; he can endure loud noises or dead silence and, with a remarkable degree of safety, the atmospheric impurities in the air he breathes. Even deafness and blindness, although they impair his efficiency, do not stop the process of living. Not so the thermal extremes of heat and cold, against which the body, by itself, has no adequate defense.

A large part of our lives, therefore, consists of an unending struggle to master an unfriendly climate. In this, we are at a certain disadvantage in comparison with the animals. When winter comes, the mink grows a new fur coat. Man, if he can afford it, must buy his insulation. Birds fly south; for practical reasons, but a fraction of the human race can migrate in season. The bear crawls into a cave and sleeps through the cold weather; people, for the most part, must shiver their winters out above ground. Most of us, faced with the choice of moving to a better climate or doing the old one over for another season, must choose the latter. Since the dawn of history, man has been changing his immediate climate to suit a complex of bodily needs.

Home is where the heat is

Heating, like all technological progress, has a long history of trial and error. In primitive times, men warmed themselves at an open fire, discovering the effect, if not the principle, of radiant heat. Lean-tos, thrown up to keep out the sun but admit the air, provided a crude but surprisingly effective means of "air conditioning." Later, fireplaces and stoves permitted the use of fire indoors, although not without risk and certainly not without a highly erratic distribution of heat. "Throw another log on the fire" became a heartwarming thought, but the practice did not always warm anything else, for the fireplace, like the potbellied stove, sent three-fourths of its heat up the chimney.

Yet the result, historically considered, was not unfruitful. The fact that fireplaces and stoves were uneven in heat supply and dirty to manage led man to move his fire farther and farther from the point of heat consumpion, thus making possible a single unit of control.

This was an immense advance, yet for years it led the heating engineer to pursue progress by improving the heat source, rather than controlling the end product. Despite developments that made it possible to condition a building of any size, in virtually any part of the globe, the technology of thermal control remained a self-enclosed system which largely ignored the objectively measurable needs of the heat consumer. The factors of humidity, modulation, heat storage, air movement, radiant heat were, if not esoteric, little understood. Better and more efficient heating plants, cleaner fuels, furnaces that would do their own stoking, burners that manufactured heat automatically (and without much regard to what happened to it afterwards)—this was the general line of advance. Those at whom the improvements were being directed—the family, office worker, factory hand—were left with subjective, and often conflicting, comfort criteria that had little correlation with the physiological requirements of the body. One felt "just right," "too hot," or "too cold;" in a futile battle with the thermometer he opened the window, closed the damper, or set a pan of water on the radiator. Our heating systems became vastly more efficient without proportionately increasing the comfort of their users.

Comfort for everybody

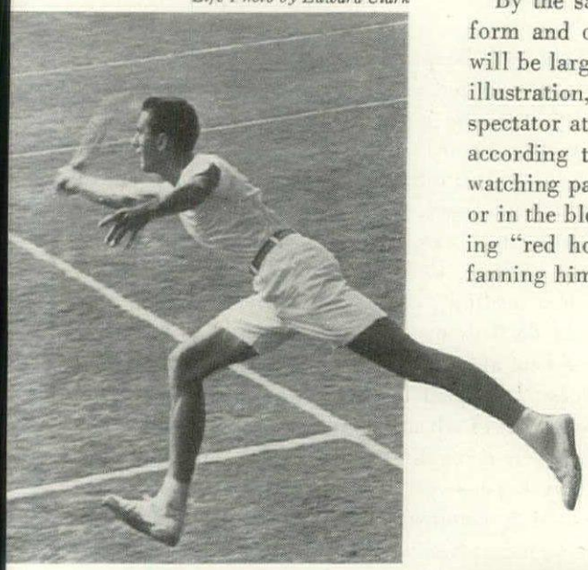
Within rather loose limits, this empirical manipulation of our environment has been adequate. Yet adequacy is far from the ideal. Our present knowledge of the interchange between the human body and the total environment, has made it possible to keep our thermal adjustments at a minimum. In terms of equipment, for example, this may mean the use of such new devices as electronic thermostats. In terms of thinking, it means flexibility in planning a thermal matrix for different occupational groups, activity situations within the family unit, variable study and work conditions within the school or office. The problem which this poses is apparent when we consider factories where an absolutely constant temperature and humidity is required for the manufacture of precision parts; school gymnasiums, in which both spectators and players must be made comfortable despite profound differences in heat output; homes that are called upon to accommodate age levels ranging from infancy to old age. With our present knowledge of people's unique thermal needs, and with the technology at our command for serving them, it has become essential, and possible, to create an environment in which everyone—not just he who is nearest the fan or radiator—can be comfortable.

ROMAN BATH (left) heated by hypocaust system—a remarkable foreshadowing of radiant heating principle in use today. Charcoal-fed central fire in pit beneath baths warmed tile floors with hot air which later escaped to interior of bathing room. Although built more than 2,000 years ago and widely used by Romans in their occupation of England, hypocaust system disappeared after collapse of the Roman Empire, left Europeans at the mercy of flickering fireplaces and sooty stoves until the invention of the furnace centuries later. First panel heat system in modern times was developed within ten miles of ancient Roman hypocaust at Bath, England.

The Bettmann Archive

THREE EXTREMES of heat exchange between the body and its environment. The swimmer is producing as much heat as the tennis player and a great deal more than the officer. But he is undoubtedly more comfortable—from a thermal standpoint—than either. For his immense heat gain (about 2,000 Btu an hour) is almost immediately dissipated by the colder surrounding water, which

Life Photo by Edward Clark



acts as a conductor. The tennis player, who is likewise manufacturing about 2,000 Btu an hour, also feels more comfortable than the officer; a large portion of his heat is being vented to the surrounding air, through which he is moving rapidly.

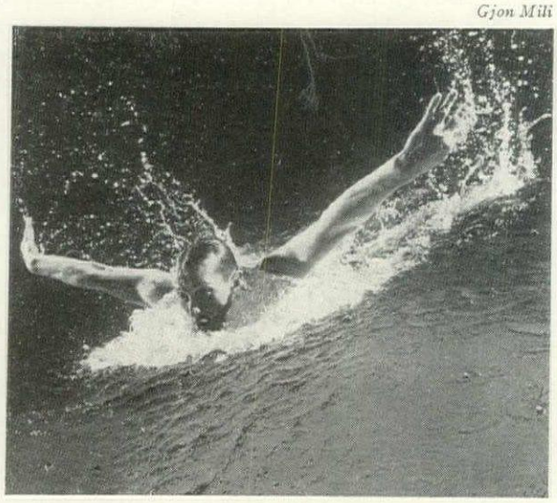
Life Photo by Sam Shere

The officer, whose metabolism is not more than 500 Btu, is the most uncomfortable since he is gaining heat (from sun and air) which he cannot conveniently lose. Result: body heat is squeezed out under stress conditions in the form of unevaporated sweat.

The most striking fact about the thermal environment is its discontinuity in relation to our physical activities. Winter, especially, is a series of thermal shocks to which we are constantly adjusting. We rise in a cold house, heat it to a comfortable temperature, then leave it for a frigid street. We may travel to work on a drafty bus and spend our day in an office, which may be comfortable or not depending upon our position in relation to the heat register and the window.

By the same token, the temperature may be uniform and our activities discontinuous. The result will be largely the same—human discomfort. As an illustration, consider the thermal sensations of a spectator at a baseball game; they will vary greatly according to whether he is rooting vigorously or watching passively; sitting in a shaded grandstand, or in the bleachers; drinking "ice cold soda" or eating "red hot franks;" dressed lightly or heavily; fanning himself or simply letting the sweat roll off. The significant thing is that although he experiences various degrees of comfort or discomfort, *air temperature remains the same.* What happens is that he exchanges heat with his surroundings at distinctly different rates as his activities change.

Gjon Mili



The body is comfortable when this thermal exchange between itself and the environment is approximately in equilibrium. It does not make too much difference how we *gain* heat when we are in short supply, or how we *lose* it when we have a surplus. The important thing is that we do business on a cash and carry basis—the body cannot long remain a debtor or creditor of heat.

Human beings can survive within a fairly narrow range of thermal extremes, although within these limits the body is capable of making highly intricate adjustments.

The thermostat in our brain

No understanding of the problem of thermal control is possible without knowledge of the physiological means by which the body produces, regulates, and releases its heat. This process is the function of an extremely sensitive "thermostat" located in the hypothalamic area of the brain. As a thermometer, this delicate unit of cells registers the temperature of the vital organs and tissues, by means of the temperature of the blood which perfuses it, and also responds to the external heat load that impinges on the skin. As a thermostat, it maintains the internal heat of the body at a constant temperature level of 98.6° F. It signals the heat producing mechanism when more heat is needed, and opens a safety valve when production exceeds demand. The hypothalamus is an activator, stepping up the blood flow and dilating the peripheral blood vessels to bring heat to the skin surface for release, or slowing down the rate of flow and constricting the vessels to keep heat in the body. In summer, it goes further and stimulates the sweat glands; in winter it produces a muscular shivering—the body's way of making us "work" to keep warm.

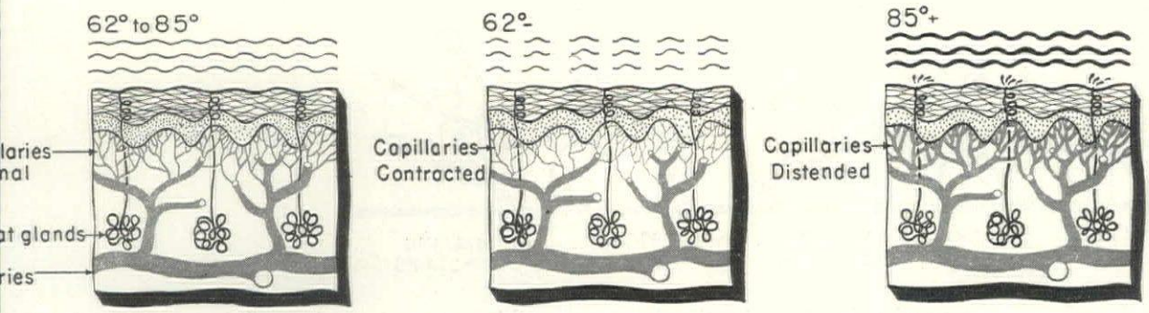
In addition to such automatic regulations, our thermostat forces us into a series of voluntary actions to control body heat loss. Posture is changed—we "hunch up" in cold weather, relax in hot weather. Food intake—our fuel supply—is increased or decreased. Levels of physical activity are altered, clothing is added or removed.

The Pierce experiments

The precise effect of these multiple activities on human comfort has been studied in a series of experiments conducted by the John B. Pierce Laboratory of Hygiene in New Haven, Conn. In general, these experiments have demonstrated the physiological relationship between *heat production, heat loss,* and the various environmental factors of *air temperature, radiant temperature, humidity,* and *air movement.* Before describing the findings, it is important that the terms involved are clearly understood.

Heat production is the result of body metabolism —the oxidation of body tissue to furnish energy. Bodily activity, and to a lesser extent, age and individual adaptability account for the rate of metabolism, which ranges from 240 Btu per hour in sleep to 2,400 Btu in vigorous exercise. Age effects metabolism—the body rising to peak production at about 10 years, and falling off thereafter to a low-point in old age—and individual adaptability accounts for differences of as much as 20 per cent in comfortable temperatures, and up to 35 per cent in extremes. This faculty, however, is effective only in cold temperatures, since the reverse situation does not create a similar compensation; high temperatures, in fact, actually increase the production of body heat.

In general, the body manufactures more heat than it needs to maintain its thermal stability. Up to a certain point, this excess is stored in the tissues and released at a more or less even rate for several hours, much in the same way that the hot water tank of a furnace holds heat for distribution to the rooms of a house. Heat created in excess of the body's capacity to use or store it is destroyed by evaporation.



BODILY REGULATION of method and rate of heat loss in different thermal environments is shown in these drawings of skin capillaries and sweat ducts. Temperature of the skin is a resultant of heat brought to it by blood, and heat lost by various dissipative processes. The drawing at left illustrates this action when outside temperature is between 62 and 85° F. Body is then in "the normal comfort zone." Thermal adjustments occur with relative ease as heat is carried to the skin by blood vessels and released mainly through convection to surrounding air and direct radiation to cooler objects.

Center drawing shows what happens to skin capillaries as temperature falls below 62° F. and body enters cool environment. Less blood is brought to the skin, temperature is reduced, heat loss is decreased, and thermal balance restored. Under extreme conditions, body's low temperature control system goes into action and shivering takes place. Shivering has been described by physiologists as a "high frequency mechanical vibrator which requires muscular work and increases metabolism."

Drawing at right demonstrates reaction of skin layer when body enters "hot environment." As air temperature goes above 85° F. blood capillaries expand, more heat is brought to surface, skin temperature is raised, and thermal balance maintained.

When air temperature goes up too much, however, body's high temperature control system goes into action, puts regulative burden almost entirely on sweat ducts, increasing heat loss through evaporation. In this zone, relative humidity of the air plays an important part in the body's ability to lose heat. If temperature and relative humidity are too high, sweat is no longer evaporated from the skin and cooling effect is decreased. Up to this point, however, evaporative heat loss at a given temperature is the same whether relative humidity is high or low.

Clothing, of course, modifies this physiological control system by shielding skin surface from air movement—a constant factor in aiding heat regulation in all zones. As more air is circulated past skin, more body heat is carried off by convection.

The thermal equation

From the foregoing, it is evident that conditioning the thermal environment is primarily a matter of regulating *heat loss*. In very hot weather, when surrounding temperatures exceed skin temperature, this becomes a problem of refrigeration—i.e., the stimulation of body heat dissipation by means of fans, air cooling, etc. In cold weather, the problem is to conserve the body's heat by raising the temperature of the environment to a point at which heat loss and gain are about equal. The process can be expressed in a simple equation which describes what happens between the body and its environment when the heat that is dissipated to the atmosphere, and taken from it, are in equilibrium.

$$M - E \pm C \pm R = O$$

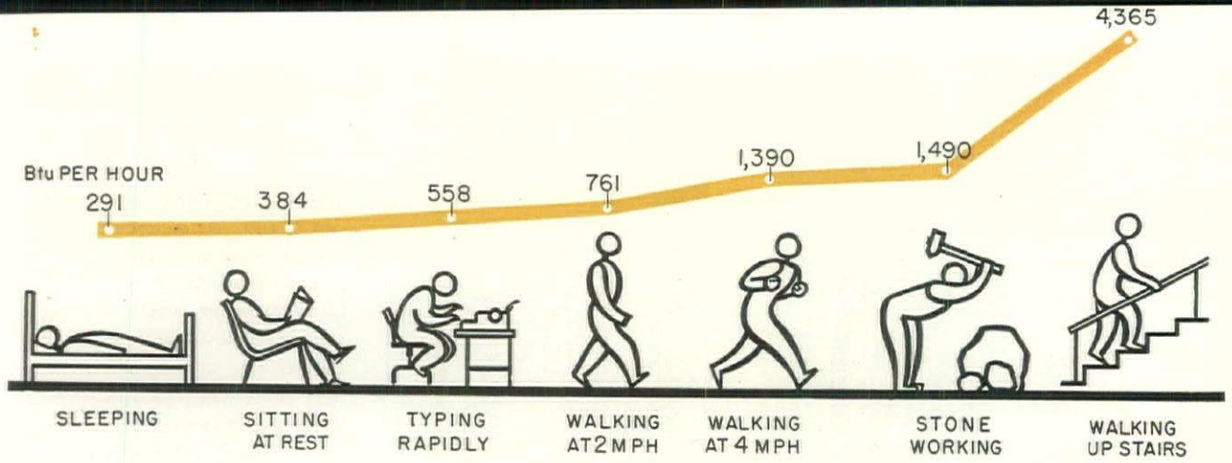
M represents metabolism, E evaporation (sweating and breathing) C heat gained or lost through convection and conduction, and R heat gained or lost through radiation. When the body is heated or chilled, the resulting disequilibrium changes the right side of the equation to plus or minus. If the disequilibrium is great enough, we seek compensation from the environment (extra heat or cooling), added or less insulation in the form of clothing, a change in the rate of heat production through increased or decreased physical activity.

The methods of heat transfer, as the equation states, are four. *Conduction* is the manner in which heat is transferred through the physical contact of two objects (feet on a cold floor), an object and a liquid (food in hot water), and, to a certain extent, an object and the still atmosphere. *Convection* is the way in which heat is lost or gained by contact with moving air and, together with conduction, accounts for about two-fifths of the release of the body at rest. *Evaporation* is heat loss through sweating. It represents a change, in comparison with the other methods of dissipation, of almost radical magnitude and is the controlling factor under high temperature conditions. The final factor — *radiation* — is the method by which heat is transmitted directly between objects that are separated in space. Like light, radiant heat is diffused in straight lines and has virtually no effect on the atmospheric medium through which it passes. The sun is an excellent source of radiant heat, and accounts for the fact that we may feel comfortably warm in our shirt-sleeves when exposed to brilliant sunlight in winter, although the surrounding air is quite cold. The human skin is ideally suited for absorbing this radiant heat, being 99 per cent emissive—and absorptive—of the infra-red rays which make up the radiant band. Under conditions of comfortable uniformity, at rest, the body normally loses two-fifths of its heat by convection and conduction; two-fifths by radiation and one-fifth by evaporation.

Zones of regulation

The manner in which these four factors of convection, conduction, evaporation, and radiation operate depend chiefly on environmental conditions. When the temperature is comfortably warm, and we are not vigorously active, heat exchange between the body and its environment is relatively even, with convection and radiation together accounting for more loss of heat than evaporation. This is the optimum condition of comfort; physiologically, the body through capillary action is regulating its heat loss with the least stress. However, when the temperature drops below, say 62° F. we enter the "zone of body cooling," in which heat loss occurs mainly by convection and radiation, and only slightly by evaporation. A drop in temperature severe enough creates a situation wherein the body cannot manufacture heat as fast as it is lost. Distress signals—chills—are sent out as a warning that the body needs heat, not merely for comfort, but for survival. At the other end of the scale, with temperature above, say, 88° F., the body gains heat by convection and radiation in greater quantities than it can cool itself by these methods, and the burden of heat dissipation is thrown on the evaporative system.

Numerous experiments conducted by the Pierce Laboratory have shown that manipulation of environmental conditions readily affects the rate of heat loss or gain by the different methods. In essence, the experiments confirmed, on a physiological basis, what has long been generally recognized — that "comfort" is the resultant of four main variables: air temperature, radiant temperature, air movement, and relative humidity. Thus, low air temperature can be counterbalanced by high radiant temperature and its effects offset by reduced air movement. The effect of high air temperature can be offset by (a) increased air movement; (b) lowered radiant temperature; (c) decreased relative humidity. In an uncomfortably hot environment, proper "juggling" of these factors can produce comfort.



HEAT PRODUCTION of the human body, in Btu per hour, according to various activities. Metabolism is nearly doubled by light activity, and increased fivefold by vigorous work. Stair climbing accounts for greatest heat output because the body is fighting gravity. These examples indicate the need for thermal leeway in the ordinary indoor environment for maximum degree of comfort.

The thermometer — booby trap in the living room

A thermometer registers air temperature rather than comfort. All of us have experienced times when it indicated that we should be warm, although we were actually chilly. A high air temperature, for example, may not counteract the loss of radiant heat from the body to a poorly insulated wall, or a window. As a result, we often move the heat control on the thermostat when it would be more sensible to move ourselves into a less active zone of heat loss. To make matters worse, most of us do not feel warm when this happens until the heat has made a subjective impression. And by this time we are usually too hot.

The problem is complicated by the fact that we may be comfortable at a given temperature while sitting, but too warm at the same temperature if we are moving about or working. Normal variations in the level of physical activity, measured in heat output, exhibit a seismographic pattern of ups and downs. Thus the housewife is continually at war with the thermometer, because her rate of heat production, as she goes from chore to chore, changes continually. Her environment, as a rule, lacks the thermal leeway to accommodate the more extreme metabolic changes.

One of the goals of thermal engineering is the creation of a broad "comfort zone" to permit such a wide latitude of individual activity, either in series for one person, or simultaneously for many. Thus, a true definition of comfort is possible only if we take into consideration the combined effects of the four principal environmental factors — air temperature, radiant temperature, humidity, and air movement. For measuring three of these factors the thermometer is of no help whatever. Turning up the heat regulator will not counteract the effects of a cold downdraft from cool walls and windows — it may only accelerate the drafts. Nor will deliberately "humidifying" the air increase its effect on thermal comfort in normal indoor winter temperature. The ideal situation is one in one in which the four cooling and heating factors are combined into a single thermo-equivalent sensation of comfort.

A big step in this direction was made by the American Society of Heating and Ventilating Engineers, when it worked out a graph correlating thermo-equivalent conditions for various conditions of air temperature, air movement, and humidity. In effect, the graph recorded subjective comfort sensations derived by the ASHVE after exposing test subjects to various air conditions in two adjoining rooms and letting them vote on the relative comfort of the different conditions. The resultant scale registers what is called Effective Temperature — in substance, the temperature of still air, fully saturated, which induces an equal sensation of warmth. Similar charts have been drawn for progressively higher air velocities.* By reference to the ASHVE graph, and dry- and wet-bulb temperature observations, an Effective Temperature scale can be determined for any given situation.

Certain limitations in the Effective Temperature scale are apparent. From the point of view of the optimum air-wall temperature differential sought in panel heating, its exclusion of the radiant temperature factor is important. The greatest disadvantage, however, is that the *integrated* cooling power represented by the various factors is not what the body — as it responds to the *separate* cooling methods — necessarily feels. Effective Temperature is an equivalent physical condition, not an expression of what takes place physiologically. This partly accounts for the somewhat distorted influence of humidity that has been noted in the ASHVE scale. It is now known, for example, that in sedentary situations within the normal comfort band, evaporation takes place insensibly and is unaffected by changes in humidity. Persons engaged in active labor, however, approach the "critical humidity" point much sooner. For them, the comfort zone is restricted, at its upper limit, to a humidity sufficiently low to permit greater ease in evaporative cooling, demanded by increased body heat.

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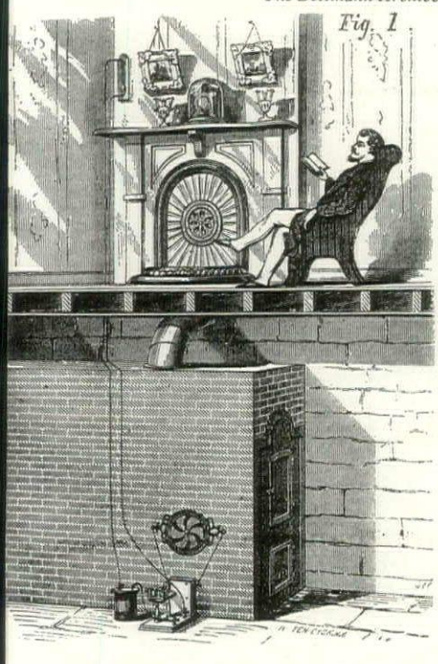
Fig. 1



ELECTRO-MAGNETIC REGULATOR anticipated modern thermostat control in use today. Device was actuated by thermometer over mantel, opened and closed furnace damper to furnish crude "comfort control" of heat.

Operative temperature

The Pierce Laboratory has approached the entire problem from another standpoint and derived a factor known as Operative Temperature, representing the combined influence of air temperature and mean radiant temperature. As an unpublished Pierce publication† points out, Operative Tempera-

* Recently, a new expression — Normal Effective Temperature — has been adopted by many heating and ventilating engineers. It expresses the thermo-equivalent sensation of various temperatures against a base reference of 50 per cent relative humidity rather than fully saturated air. Normal Effective Temperature is a few degrees above Effective Temperature, rising proportionately higher as Effective Temperature goes up.

† Temperature and Humidity in Relation to the Thermal Interchange Between the Human Body and the Environment. By L. P. Herrington and J. D. Hardy.

mfort is a personal thing

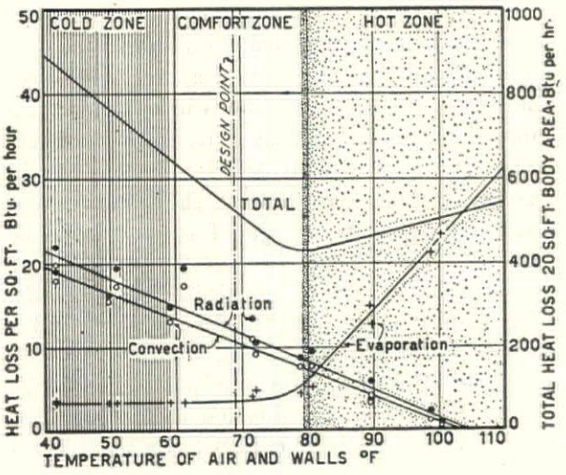
ture is not a physical condition "since it is weighted by the factors of convection area, radiation area, and air movement, but a measure of heat demand which allows for the physiological reactions involved." For ordinary indoor space, however, the qualifications are not too important, since air movement is usually moderate and the convection and radiation constants very close to each other. In general, Operative Temperature is "subjectively similar to the thermal condition (associated) with an air temperature of the same value."

The Pierce method makes no provision for relative humidity, and can also be considered deficient in another respect. Mean radiant temperature, as used in the scale, is measured on the basis of the quantity and intensity of radiant heat affecting a spherical object in the center of the room. Under actual living conditions, radiant temperature will vary according to the position of the occupant in relation to the source of heat and cold surfaces such as walls and windows.

It's not the heat but—

Another method of arriving at a "comfort concept" is to plot the influence of the four environmental factors separately. The charts on this, and the following two pages, indicate how variations in any one of the factors alter the thermo-equivalent functions of the other factors. The condition indicated by the chart on the right is where air temperature and radiant temperature are the same. The percentage of heat loss remains virtually the same for both convection and radiation, regardless of temperature, although *total heat output* by these methods decreases at an even rate as the body passes from the cold zone to the hot zone. Heat loss by means of evaporative cooling, however, is constant until the body enters the hot zone, where it rises sharply and, at a temperature of 100 F. or more, accounts for almost 100 per cent of the dissipative process. For this reason, as we have noted previously, the effects of humidity in the normal comfort zone are not important, because the body is under no compulsion to step up its heat loss through evaporation until the maximum comfort temperature (80° F.) is exceeded.

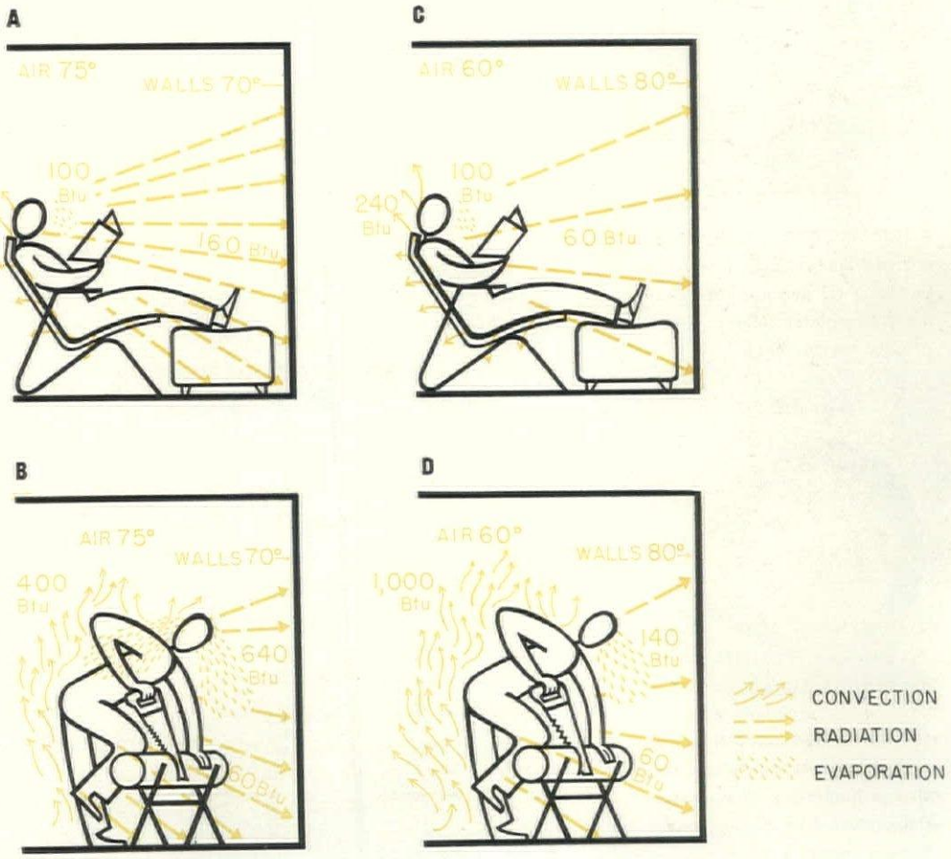
Disregarding air movement (usually minimal in an indoor heating situation), and the factor of humidity in the comfort zone, any shift in either ambient or radiant temperature will change the comfort picture. This is illustrated, under somewhat extreme conditions, by the illustrations at the lower right. To maintain a thermo-equivalent sensation of warmth, a drop in air temperature must be countered with an equal rise in wall temperature. The reverse situation also holds. In summer, cool walls aid body heat dissipation because they provide a blotter for radiant heat when air temperature is high; the result is that the body loses by radiation what it would otherwise have to destroy, with greater stress, by evaporation. In winter, the opposite condition obtains. High wall temperatures effectively

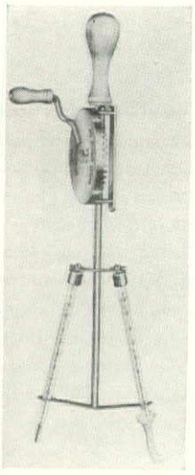


compensate, degree for degree, for low air temperatures. Under these conditions, radiation losses go down and convection losses up, and the range of bodily activity which can comfortably be accommodated is increased, both because such activity stimulates increased convection and evaporation losses in the relatively cool air and because the body is enabled to store heat more comfortably. Where air and wall temperatures are about the same, as in most convection heating systems, no such bodily adjustment takes place, for excess heat due to prolonged exertion finds no outlet in cooler air. Thus the ideal comfort condition, one that is elastic enough to accommodate a broad range of activities without thermal stress, is achieved by keeping air temperature, air movement and humidity down, radiant temperature up.

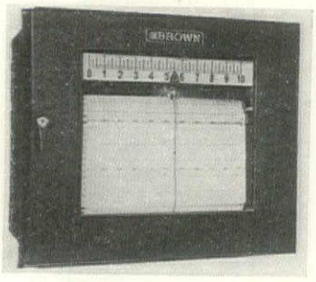
COMFORT SITUATION which will satisfy both resting and working subjects simultaneously, is illustrated below. In figures A and B, air temperature in the room is 75° F. and radiant temperature of the walls is 70° F. So long as the occupant is inactive, this condition will be comfortable. However, the same man at work, with heat output raised to 1,200 Btu, will feel too hot. His environment no longer readily aids in cooling him, and he is forced to "sweat it out."

Figures C and D demonstrate how theoretical manipulation of the ambient and radiant temperatures can eliminate the comfort disparity described above. The man in figure C is losing much less radiant heat to the walls and much more convected heat to the air, which is 15° cooler than the air in Figure A. When he engages in vigorous work (figure D) this wall-air temperature differential is entirely in his favor. The cooler air temperature allows much greater heat loss by convection (1,000 Btu compared with 400 Btu when air is 75° F.) since the occupant in the act of working, is also moving through the air. The result is that he will need to dissipate much less heat through evaporation.

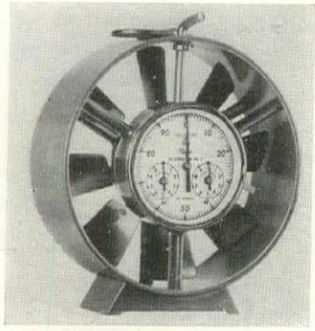




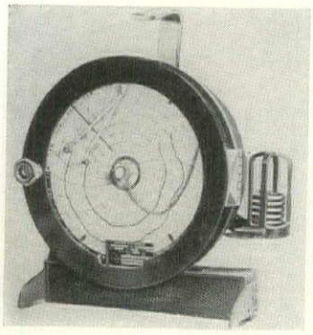
PSYCHROMETER gives relative humidity when wet bulb reading (r.) is subtracted from dry bulb (l.) and difference referred to psychrometric chart. (Taylor)



ELECTRONIC recorder registers temperature (Centigrade) on strip chart for keeping record of changes. (Brown Instrument)



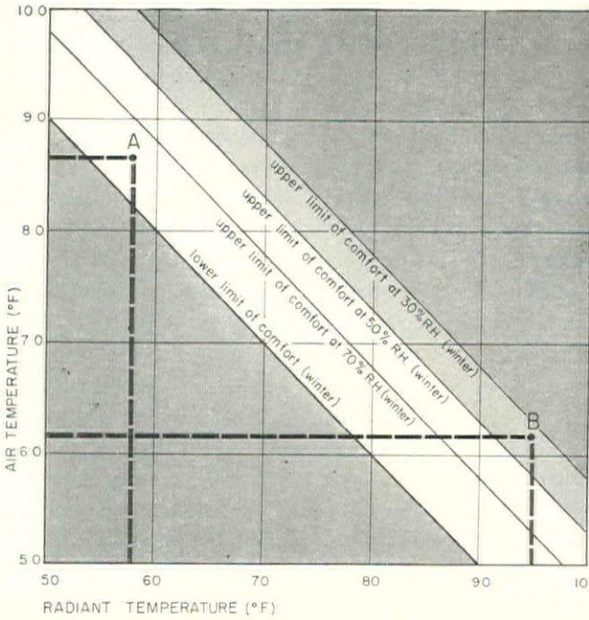
ANEMOMETER (high speed) records air velocity from 1,000 to 10,000 ft. per minute. Other models register lower speeds. (Taylor Instrument)



HYGROMETER uses fine hair (in grill at bottom) to measure relative humidity. Temperature is also plotted on circular chart. (Brown Instrument)

The graphs on these two pages show further the effect of environmental conditions on body cooling and heating. Figure 1 illustrates approximate upper and lower comfort levels for winter heating, expressed in terms of the mean of radiant and ambient temperatures at various relative humidities. In essence, air temperature must shift inversely as radiant temperature changes if comfort is to be maintained. The upper limit of the comfort zone will be bounded by the relative humidity of the air. Thus at an air temperature of 87° F. and a radiant temperature of 58° F., one is well within the comfort band up to a relative humidity of 70 per cent, which is the situation on the graph at point A. Conversely if radiant temperature is extremely high, air temperature must be kept quite low to maintain comfort. Such a situation is common in industry, where radiant heat is emitted incidental to manufacturing processes. In such cases, comfort can also be maintained by lowering the relative humidity (it is about 35 per cent at point B).

Another way of expressing this relationship between temperature and humidity is shown in Fig. 2. Here the humidity is the base reference, against which a comfort situation can be plotted for the average of various air and wall temperatures. As air warms up, the absolute humidity also rises—air retains more moisture at higher temperatures (4.8 grams per cubic meter at zero C, 29.9 grams at 30 C). Thus in climates affected by the presence of large bodies of water, summer humidities are likely to be high, and we will "feel" their effects because it is only in hot weather that we are destroying heat by evaporation. Our sensation of heat discomfort at high temperatures may be the result of the fact that the air is already approaching its saturation capacity, and our perspiration literally has "no where to go." The summer comfort temperature, however, may be raised by lowering relative humidity, thus allowing additional leeway in which evaporative heat loss can take place.



1. RADIANT AND AIR temperatures are inter-related in their effect on winter comfort zone. Rise in either temperature requires corresponding drop in temperature of opposite factor to maintain equivalent comfort condition. The resulting comfort temperature is simply the arithmetical average of the two factors.

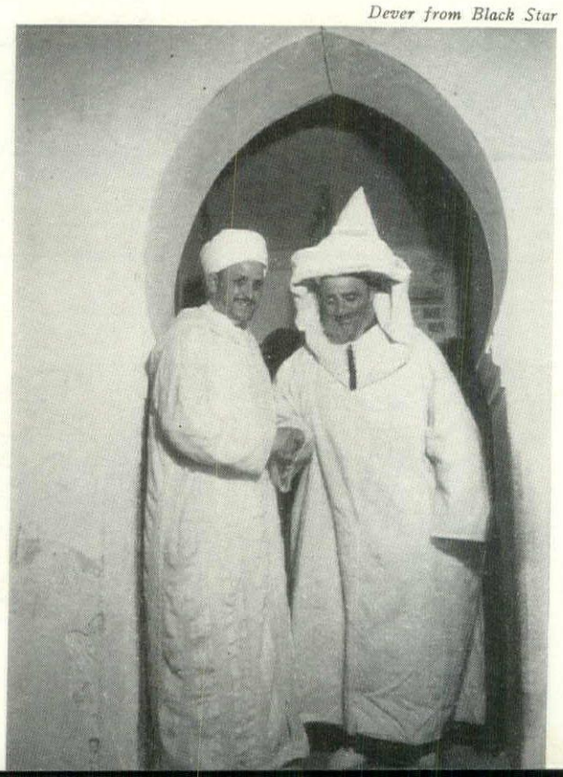
Fair and cooler

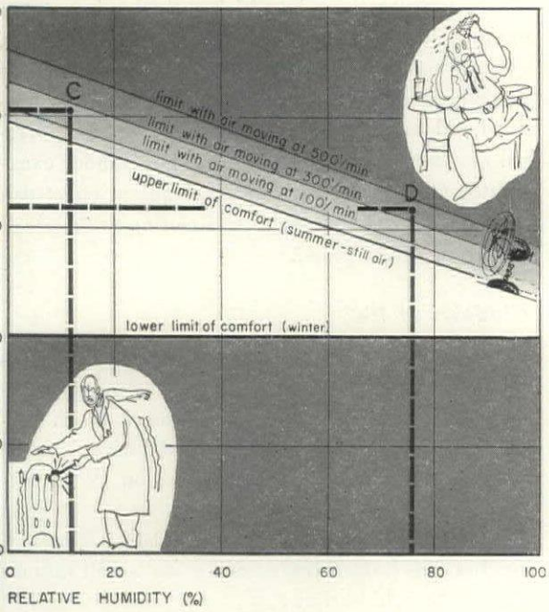
Where temperature cannot be reduced—as in many simple structures—air movement is a satisfactory means of compensating for both high temperature and humidity. It raises the upper limit of comfort according to its velocity on the one hand, and the relative humidity of the air on the other; dry air cools more effectively than moist. The highest limit will always represent the driest air. This principle obtains until one reaches extremely high temperatures, when the effect of air movement becomes insufficient to compensate for the increased evaporative demands which result.

Air velocity as a factor in body cooling is appreciated by everyone who lowers his car windows on a hot day, or pulls up his coat collar to shield his face from a winter wind. Figure 3 shows the influence of air movement on *both* the upper and lower comfort limits. Air movement, in effect, raises the comfort ceiling and pulls the floor up after it; as velocity is stepped up, the range of accommodations is slightly decreased. At the lower limit of comfort, critical in heating work, increased air velocity puts the body in the cooling zone.

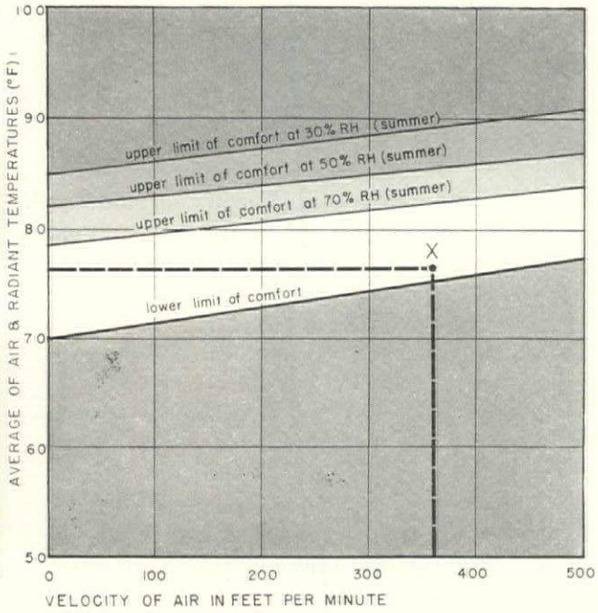
All of these equivalent temperature conditions have long been controlled, in a haphazard way. The two Arabs in the photograph at the left illustrate a unique and seemingly paradoxical method of cooling based on the four factors just discussed. Long an enigma to foreigners, who have generally supposed their custom of dressing in layers of wool garments to be dictated by religion, the Arabs actually wear a primitive sort of air conditioning system. The white, heat-reflectant gowns not only afford protection from the sun's radiation, but they also provide good insulation from the intensely hot air. When

Dever from Black Star





2. HUMIDITY as it affects comfort band. Using preceding graph as basis for temperatures, lower humidities are shown to raise upper comfort levels but to have almost no effect on lower. Upper level is further raised by increased air movement. Greatest cooling effect is obtained when air is relatively dry and moving rapidly.



3. AIR MOVEMENT as it affects body cooling. As velocity increases, upper comfort limit is raised. Air movement becomes still more effective as relative humidity goes down. These graphs are not intended to show precise lines of upper and lower comfort range, but nature and trend of band under influence of various factors.

the individual is moving, the billowing movement of the gowns creates a fair amount of air circulation near the skin; the intermittent contact of the garment with the skin, moreover, affords a larger wetted surface (skin plus gown) from which sweat can be evaporated. The method is not particularly hygienic, as it depends upon sweat absorption by the clothing, but it is a useful adaptation to environment.

How heat gets into a room

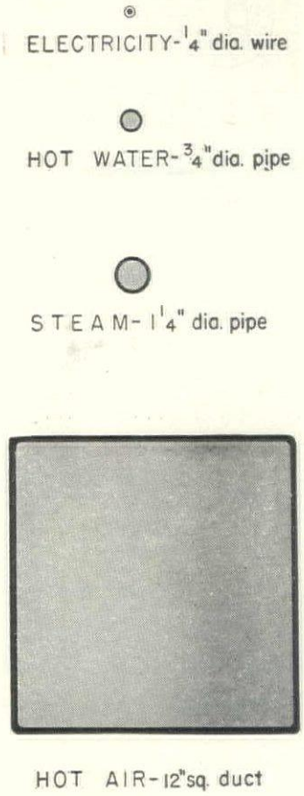
The numerous experiments upon which the foregoing dicussion is based show clearly that the most important single thing about comfort is the need for thermal flexibility. Some heating engineers have gone so far as to define comfort in terms of the "least discomfort" experienced by the greatest number of people in a given environment—a concept which avoids the tendency of the ASHVE charts to fit people into a rather narrow margin of tolerances. Optimum comfort must be defined elastically enough to accommodate both normal changes in the thermal situation (temperature, air movement, humidity), and numerous activity changes on the part of the individuals within it.

From the point of view of application, the problem resolves itself into controlling the thermo-equivalent factors by deciding the *form* in which heat shall enter the room, the *place* at which it shall be introduced, and the *method* by which it shall then be utilized to achieve the desired results.

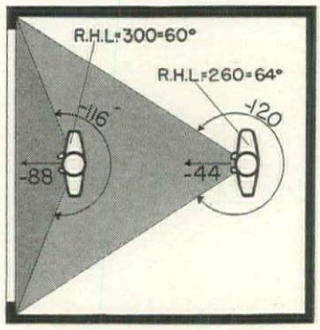
In a sense, a room is similar to the human body in that it must maintain thermal equilibrium with its outside environment in order to maintain the proper internal temperature. The sun furnishes part of this heat in the form of solar radiation, and the occupants themselves supply varying amounts as body heat. But for the most part, winter heat must be provided by artificial methods.

Actually, there are only two forms of heat that are important for this purpose: convected and radiant. In practice, all rooms are heated by a combination of the two, inasmuch as radiating surfaces also form heat by convection (in contact with the air) and convected heat warm room objects to the point where they act as radiators. For the purpose of description, however, we must define the way in which a room is heated in terms of its primary source of heat. In the case of convection, this will be hot air ducts, enclosed radiators (convectors), floor registers, or jacketed stoves. Convected heat is best visualized as molecules of heat energy circulating through the air and moving with the air currents, warming the objects with which it comes in contact. Because hot air rises, convection heat sets up currents, thereby distributing itself around the room. It is a method of heating the room surroundings and people in it by first heating the air.

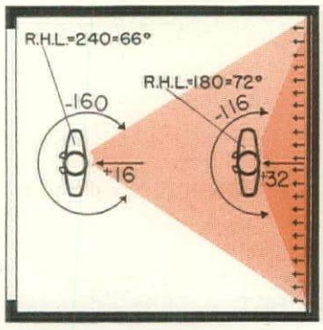
Radiant heat, by contrast, heats surroundings and people directly. It is introduced by means of fireplaces, high wattage lamps, true radiators, and panel surfaces heated by hot water, air, or electricity. Radiant heat is diffused in straight lines from its source and can be thought of as a kind of "buckshot" action, the "shot," or radiant waves, striking objects in their path without altering the intervening atmosphere. Depending upon the nature of the target surface, a certain portion of the "shot" will penetrate the object, while the remainder is reflected back to strike other surfaces. This process continues until all the radiant energy is absorbed. Radiant heating introduced the concept of heating occupants instead of air.



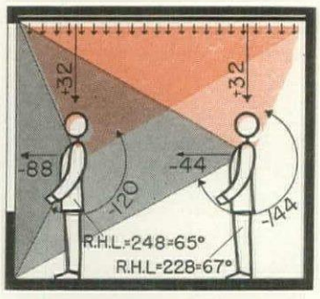
CARRYING CAPACITY of mediums commonly used to convey heat is shown graphically in the diagram above. Conduits shown are capable of carrying an equal quantity of heat over moderate distances at normal pressure and velocity. Note that air as a heat conveyor, requires 150 times as much space as water.



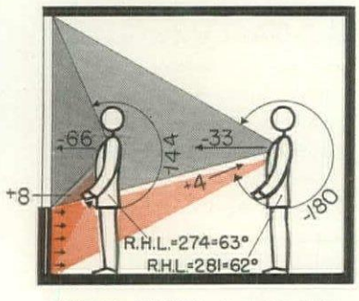
LARGE WINDOW increases radiant heat loss (R.H.L.) according to proximity of man, reduces radiant temperature 4°. R.H.L. is expressed in Btu per hour.



OPPOSITE WALL used as heat source increases radiant temperature gradient as man moves from wall to window, throws heat to cold surface.



CEILING PANEL provides better heat distribution to combat big window. Radiant temperature gradient is reduced to 2°.



EXTRA PANEL beneath window is best solution. Panel neutralizes radiant heat loss, provides higher radiant temperature, smallest room gradient.

Practical limitations of panel heating

In actual practice, rooms equipped with panel systems receive only a portion of their heat by radiation. The panels are primarily effective in neutralizing radiant heat loss from the body, and as soon as walls are heated above air temperature they become low temperature convectors. If maximum utilization of the radiant heat principle were possible, as one manufacturer of panel systems points out, it would be at least theoretically possible to heat an ordinary house for about $1 a year. The ideal situation has been demonstrated under test conditions by the Pierce Laboratory, and others, in rooms lined with copper foil and heated by high-temperature electric coils. Visitors to the Pierce Laboratory are astonished to find that they are uncomfortably warm at an air temperature of 50° F.! Here is a case in which heat is almost completely utilized in warming people rather than walls and air. The heat-reflectant surface mirrors virtually all of the radiant waves striking it.

The process was reversed, in another room, with air temperature at 120° F. and wall temperatures lowered almost to freezing. Here—also to their great surprise—the visitors felt comfortably cool, for the hot air was not sufficient to compensate for the loss of body radiation to the walls.

Such a test situation, naturally, gives an extremely rosy view of panel heating's true potentiality. It assumes no floor covering or furnishings with high emissivity surfaces. On the other hand, metal furnishings, such as chromium chairs and tables, would be constantly cold to the touch. The possibilities of overcoming these disadvantages, furthermore, are compromised by the esthetic factor—i.e. no one is yet willing to live in a room with copper walls. Its future for situations in which esthetics is not too important, however, is considerable. A utility room, workroom, or laundry, where instantaneous heat is needed at intermittent intervals, could easily be foil lined and radiantly heated with high wattage infrared lamps. The drawings below show, under exaggerated conditions, how the best radiant effect can be achieved with the use of foil ceiling to "mirror" heat from a floor panel.

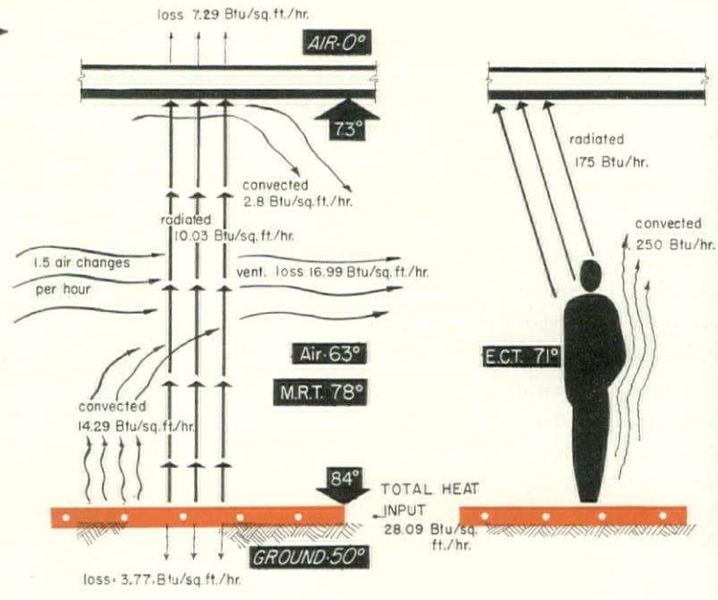
Windows of ice

The gap between optimum panel heat conditions and actual practice may be widened, in many buildings, by the presence of large windows which produce "cold spots" unless adequate provision is made for neutralizing their effect on radiation. With outdoor temperature at zero, an ordinary pane of glass will be about the thermal equivalent of a block of ice. Both the human body and the walls will radiate heat to the cold surface.

The illustrations in the margin of this page represent the situation as it affects the occupant of a room in various positions with relation to the cold surface. In all four examples it will be noted that proximity either to a cold surface (window) or a panel heated wall determines the body's heat exchange by radiation. As the individual moves away from the window, his angle with respect to it is subtended, thus diminishing the amount of body radiation affected by it. A room with large window spaces that is heated by steam or hot air will require a high ambient temperature to overcome the "wall of ice" to which the human occupants radiate heat.

This condition can best be solved in most cases by strategic location of heating panels. A wall panel opposite the window will obviously waste much of

HEAT FLOW as the key to achieving equivalent comfort temperature is shown in panels at right. Assuming an "infinite room," arrows plot movement of radiant and convected heat where panels are the heating source. Although drawings show an exaggerated result where home heating is concerned, condition is comparable to that found in many factories, where large spaces must be heated, and heat flow to walls is unimportant. Note that best air-radiant temperature gradient is obtained with metal foil ceiling. Heat loss from roof and to ventilating air is materially lessened, and total heat input required to produce an equivalent comfort temperature of 71° reduced.



FLOOR PANEL at 84° F. and air entering room at zero results in mean radiant temperature (M.R.T.) of 78° F., and equivalent comfort temperature (E.C.T.) of 71° F. Low ambient temperature of 63° F. is made possible because of high rate of air change—1.5 times per hour. Figures for heat loss are computed on the basis of standard insulation for floor slab and ceiling.

ts heat by direct radiation to the window, and the occupants will move in a discomfort band that ranges from "cold," when they are near the window, o "hot" as they approach the opposite wall.

When heat is introduced at the ceiling, an improved distribution of the radiant waves results. Radiant heat *gain* will then be the same for the individual for all positions. Radiant heat *loss*, however, is still increased as he moves nearer the window. The best location for a panel, for the specific purpose of neutralizing radiation loss, is beneath the window itself. In this case, the quantity of heat lost and gained by radiation is the same no matter where the occupant is standing. A panel of this type would necessarily be a supplementary source of heat, but would effectively "cancel" the cold window factor that makes the use of panel heating in many modern houses a unique problem.

Convection has its points

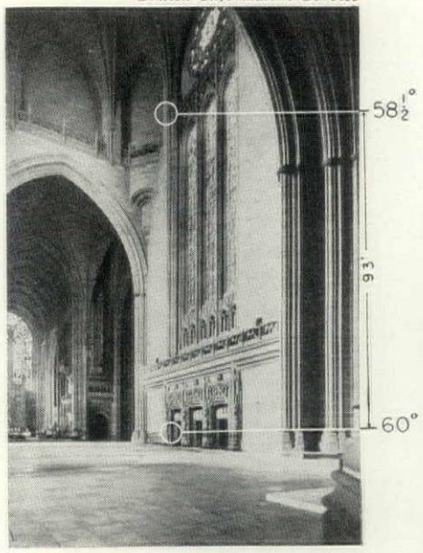
Since the introduction of panel heating in this country a decade or so ago, emphasis on its assumed virtues has tended to obscure its present limitations and to give it a disproportionate value over convection heating. The problem, in most cases, is not what kind of heat is "best," but what kind might best do the specific job that is required. In tightly constructed, well insulated modern houses the difference in various types of heating systems become less important, though not necessarily minimal. Heat loss in a modern, one-story house, built on a slab, for example, is likely to be greater than in a two story house built over a basement, for it is in contact with a larger area of outside surfaces.

In the opinion of some heating experts, panel heated rooms afford too little air circulation in moderate weather. On the other hand, in cold weather it is the system that most nearly achieves its optimum objective, for the inseepage of cold air tends to create a desirable differential between air and wall temperatures. The same results could be obtained, in moderate weather, by the systematic introduction of air from outside. By a reversal of this process, hot air heating becomes more and more self-defeating as its load increases and the system, in effect, works harder. Increased blasts of air create faster convection flow which, in turn, tend to lower equivalent temperature and bring about a need for more heat.

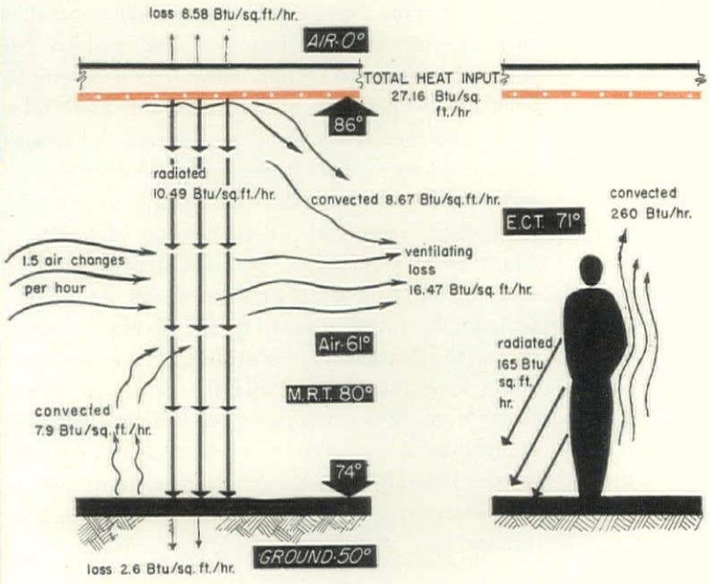
Many claimed advantages for panel heat are valid only when compared with the shortcomings of older, generally obsolete convection systems. The relative merits of the two can best be decided by comparing two opposite types of structure: a windowless department store and a glassed-in restaurant. In the store there will be no significant radiant heat loss, and air and wall temperatures will tend to stabilize regardless of the heating method. The glass surfaces of the restaurant (unless heavily curtained) will drastically reduce the radiant temperature and result in a demand for inordinately warm air. Here panel heating can compensate to a considerable extent for this inherent defect.

Besides increasing comfort, panel heating in this instance may also result in economy. Hotter air results in more heat loss through the ventilator exhaust. With floor or ceiling panels to compensate for the large window space, air temperature could be kept lower, and the amount of heat exhausted by reason of the frequent air changes necessary in public places is greatly reduced.

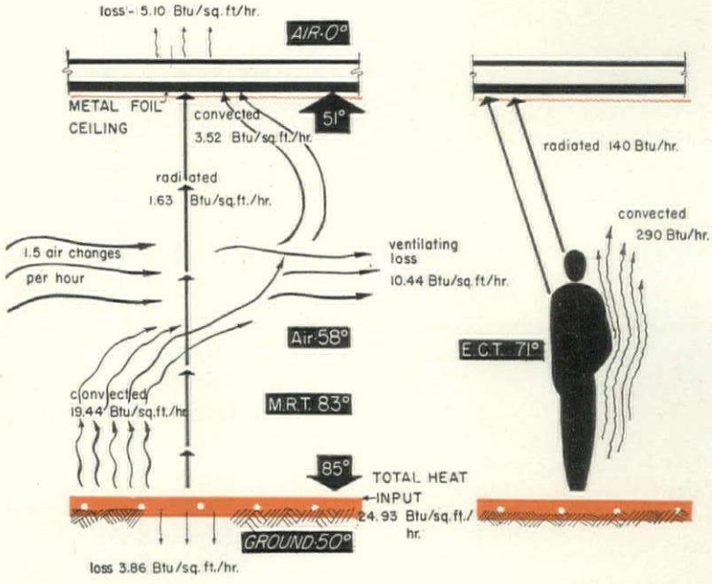
British Information Service



ENTIRE FLOOR of Liverpool Cathedral acts as a radiator in a unique solution to the problem of heating large interior spaces. Temperature of floor panel is only a few degrees higher than that of air; convection effect of rising warm air is thus moderated. Warm air quickly mixes with returning cool air and tends to stabilize ambient temperature. Air 97 ft. above floor is 2° lower than at breathing level.

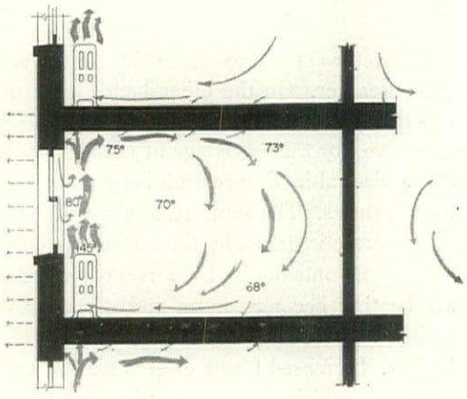


CEILING PANEL has small advantage over floor in creating air-wall temperature differential. Total heat input is slightly less, but biggest difference in two methods is that temperature of ceiling can be raised several degrees, if necessary, to compensate for colder outside air. Floor temperature is limited by comfort tolerance of about 86° F.

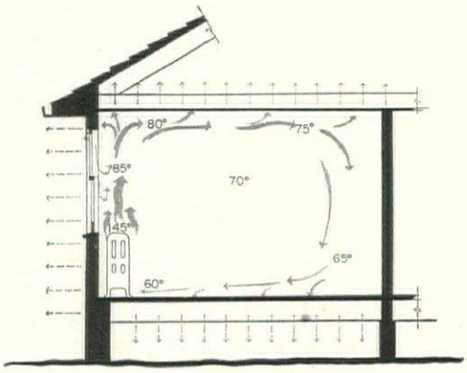


METAL FOIL ceiling provides greatest temperature differential. Although surface temperature of ceiling is only 51° F., it mirrors 90 per cent of radiant heat striking it and has an "apparent radiant temperature" of 81 F. Lower ceiling temperature also helps keep air temperature down by blotting up convected heat. Total heat requirement is substantially reduced.

CONVENTIONAL RADIATORS provide fairly stable air temperature in multi-story buildings, because heat-loss is concentrated at outside wall. But in single-story structures, natural convection may result in an excessive "gradient," as exposed ceiling and floor further cool the air on its return circuit to the radiator.

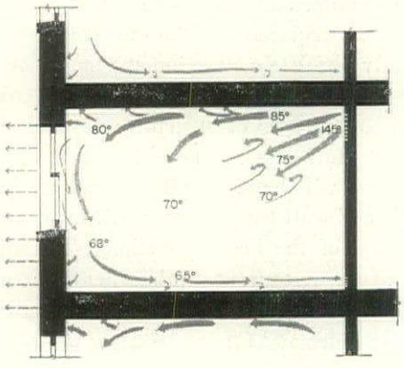


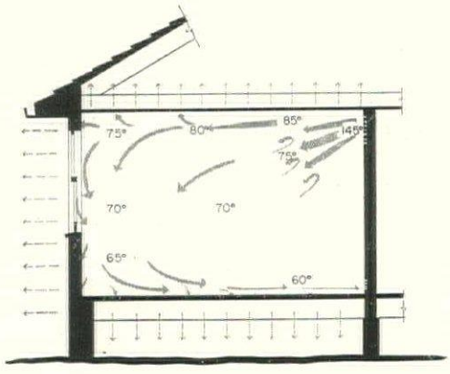
MULTIPLE-STORY UNIT



SINGLE STORY UNIT

FORCED AIR system may have same inherent defect. Reason: heated air mixes with cool window air on way to floor, cools still more in wiping across floor. Adequate insulation can help raise temperature of return air above values shown, but neither system works as well with single as multi-story construction.





This principle might be further illustrated by a schoolroom, where density of occupancy is high, air change frequent, and ventilating heat loss considerable. Here, the possibility exists to deliberately accentuate the difference between air and wall temperature which, when attainable, is the greatest advantage of panel heating. And, with panels supplying most of the needed heat, ventilating air would not have to be raised to such a high temperature, and less heat would be wastefully exhausted.

In any situation where a considerable volume of air must be heated that is not actually used by the occupants, the cost factor becomes important in determining the system to be used. This is especially true of structures such as auditoriums, factories, theaters, and churches. Here, large amounts of hot air are wasted in heating unused spaces at the ceiling in order to maintain comfortable temperatures at the breathing level. The ability of panel heating to solve this problem was shown in the Liverpool Cathedral, where the floor is used as a radiator, supplying heat at such a moderately warm temperature that natural convection takes place most effectively within the zone of occupancy, and in a much reduced fashion above it. In practice, air temperature 4 ft. from the floor is 60° F., compared with a temperature of 58½° F. at a line 97 ft. above the floor—a gradient just the reverse of that encountered in most high enclosures.

Spot comfort

The method used in the Liverpool Cathedral, however, would be an extravagance for a warehouse, where working space might be confined to a relatively small area at one end of the building. Here, "spot" heating with blowers could easily provid localized comfort. Modern convection methods like wise utilize the directional principle by localizin the heat source with high-velocity inlets and mixin it with room air to eliminate "hot blast" effects The result is heat diffusion over a given area at a uniform rate.

For rooms such as libraries and museums that ar ordinarily too spacious to be efficiently heated b hot air, or where the noise of blowers is distracting panels located in pillars can give good zonal heat

Gymnasiums present a unique problem in that they call for a concentration of heat midway between the floor and ceiling, since it is desirable to keep the temperature at the breathing level relatively cool for the benefit of the players, while maintaining warmer temperatures in the elevated seating sections. Panels located in the seating area would produce sufficient heat for the comfort of the spectators while leaving the playing area cool. This method would be aided by the leakage of cold air through the large window spaces of most gymnasiums. The situation is in contrast to that of theaters, where fenestration is nil and the density of occupancy high. In this case, once the structure has been brought to a moderately warm temperature, the patrons literally furnish their own heat, and comfort is maintained with a minimum of help from the furnace.

Storing the heat

The outside wall as a mediating factor between interior and outside environments is discussed fully in Enclosure. Insofar as thermal control is concerned, its chief function is to determine the rate

of heat exchange between the occupied spaces and the out-of-doors. This is perhaps best understood by reminding ourselves that it is the walls, and not the air, that we are primarily forced to heat in order to establish a comfortable environment. If air alone could do the job—if heat had no effect whatever on physical objects—our fuel bill would be but a fraction of its normal amount. It requires only .018 Btu to raise a cubic foot of air 1° F. All of the air needed in an ordinary living room could be raised from zero to a comfortable temperature by three moderately active persons, collectively producing about 2,500 Btu an hour. That such does not happen is due to the fact that a major part of the room heat leaks through the walls to the outside. For walls are not only barriers, but filters; not only insulants, but storage tanks that blot up the heat and cold. In this capacity, they become supplementary heating systems in themselves, producing a "flywheel" effect on the primary heat source and acting as a thermal modulant for the entire structure.

This characteristic is aptly illustrated in the many massive buildings that are constructed in tropical countries, and which remain pleasantly cool during the heat of summer. Here, walls serve as blotters of solar radiation and also cool the air inside the building. The result is especially fortuitous at high altitudes, as in Mexico City, where the peak load is absorbed during the day and released as the temperature falls at night. The exchange, however, is not necessarily favorable in cold climates. In general, massive walls mean sluggish heating in winter, whatever their summer advantages. It is for this reason that floor panels embedded in concrete slabs are slow to warm up in the mornings, slow to cool off at night. They must heat up a mass of concrete—a high storage capacity material—before their real job gets under way.

The wall as a thermostat

Regardless of the type of heating system used, high storage capacity walls have the effect of delaying its response to sudden demands. In winter, this means a lag in heating a cold space to a comfortable temperature. A sharp drop in outside temperature, however, will be less noticeable, since we will be "borrowing" heat from the walls. On the other hand, a rise in outdoor temperature will have the reverse effect—wall transmission will be slowed and heat will "back up" into the room before the thermostat is able to adjust to inside temperature.

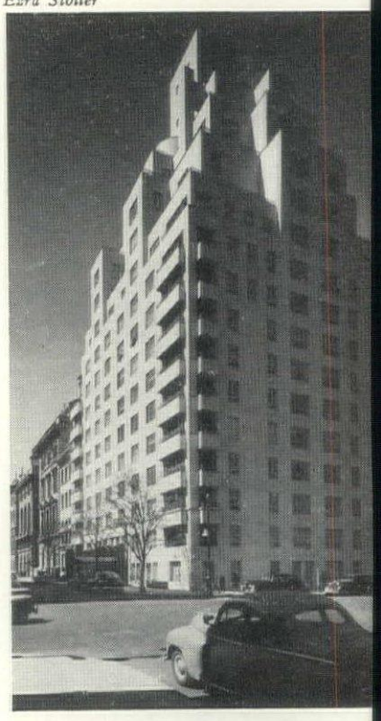
The whole problem of massive walls and heat lag is now subject to control by electronically operated indoor-outdoor thermostats. These precision instruments were developed during the war to maintain constant temperature and pressure in airplane cabins, which might at one moment be on the ground in an outside temperature of 100° F., and half an hour later at an altitude of two miles and a temperature of several degrees below zero. Except for a much smaller range in temperature, this is what happens to a house in the winter. The outside thermostat adjusts for this by sending its weather signals to the furnace in a fraction of a second, anticipating thermal requirements in time for the heating plant to go into action. In still more elaborate arrangements they enable the system to correlate the distribution of heat with the different zonal demands of a building. Where concentration of occupancy is a factor, as in industrial plants and certain kinds of offices, the heat is simply "allocated" to the various zones on the basis of need. However, where heat requirements are pretty much the same throughout a structure, the exposure factor alone will determine proper zoning.

The objective, in all cases, is to supply sufficient heat to that section of the building which is normally coldest without overheating the remainder of the space. This is accomplished by spotting the outside thermostats at points where heat loss is noticeably affected by differences in exposure, and integrating them with regular indoor thermostatic controls. The actual distribution of heat is regulated by a control valve or damper which "feeds" the various zones in accordance with their demands.

In cooling work, the process can be reversed in the summer: conditioned air is allotted in greater quantity to the hot side of the structure. The whole system—whether heating or cooling—has the value not only of supplying a uniform inside temperature regardless of outside climatic variables, but also modulates heat flow according to the time of day. In spring and fall especially, when temperatures fluctuate sharply within a given 24 hours, the outside thermostat equalizes the heat supply in a manner that no indoor control system can duplicate.

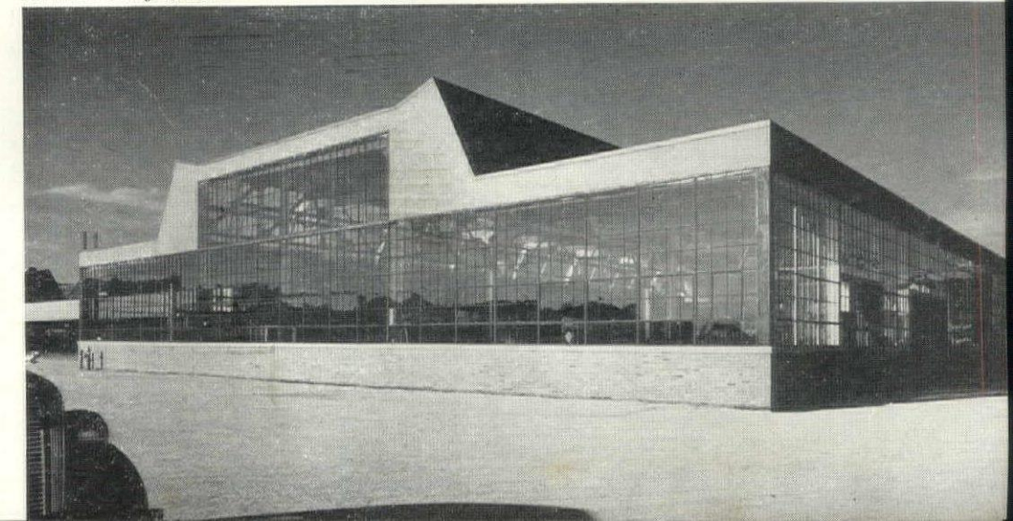
In most houses, "zone control" is empirically carried out by manual adjustment of radiators or registers. Ideal heating design will consider the activity functions of the various parts of a house (bedroom, playroom, library), as well as the degree to which they are occupied at various times of the day. Ordinarily, living and sleeping quarters present distinctly different comfort problems. The kitchen and service rooms pose still another. Morning—when body metabolism is low—will be different from mid-day, when we are active. Multiple automatic control of heat distribution provides a solution to the common problem of overheating one part of the house in order to keep another part comfortable. Comfort is not merely a matter of the right equivalent conditions, but of making sure that they are present in the right places at the right times.

Ezra Stoller



HORIZONTAL AND VERTICAL enclosures create basically different design problems in heat control. Apartment is zoned to keep outside rooms as comfortable as inside rooms. Factory is example of large space in which convection is controlled by strategically located blowers.

Hedrich-Blessing Studio

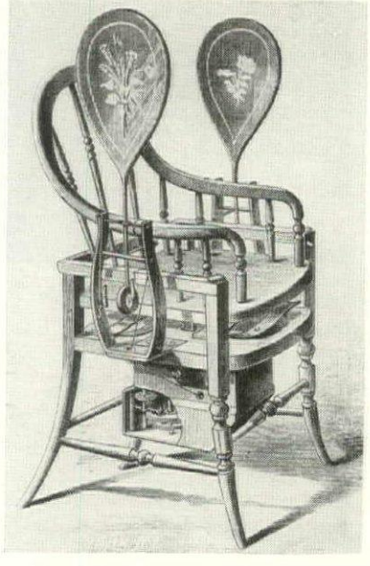


Air conditioning large office and hotel buildings has long been a space-eating bugaboo requiring up to 20 per cent of the buildings' total cubage for fan rooms, vertical shafts and increased ceiling height to pass large ducts under the beams. To cool a building in summer with a conventional convection system requires 2½ to 5 times as much air as is needed for ventilation, and of course this is also far beyond the requirement of the winter heat load.

Two recent innovations promise to liberate the architect and builder from the need to enlarge the building just to do the cooling job. Both are "split" systems in which the cooling and ventilating functions are considered separately and a large part of the cooling is done by circulating cool water rather than by circulating excess quantities of cool air.

The only one of these systems now in commercial production involves the use of a convector, cool in summer and warm in winter, across whose finned coils the amount of dry air needed for ventilation is blown either by a local fan or induced by a high velocity jet entraining and re-cooling (or reheating) enough of the room air to keep all the air in the room at the desired temperature. The system without the fan is perhaps best adapted to hotels where the bedrooms are of a fixed size—a size usually almost ideally fitted to the capacity of a single heating-or-cooling room unit. Such units can be individually controlled by regulating the amount of water passing through them.

The Bettmann Archive



"AIR CONDITIONING NIGHTMARE." This Nineteenth Century chair-fan was operated by clockwork mechanism under seat. Device gained little popularity.

Cooling with panels

A more radical departure in air conditioning, however, has been the development of panel cooling. Like panel heating, this method endeavors to condition the people in a room rather than the air. What occurs, physiologically, is that the body radiates excess heat to surfaces colder than itself. In a series of experiments, the University of Cincinnati's Dr. C. A. Mills demonstrated that the body can keep cool by eliminating its excess heat by radiation alone, without any effect on health.

Mills experiments point to several advantages for radiant cooling. Sharp contrasts between indoor and outside air temperatures can be eliminated and the "shock effect" lessened. (Reason: thus radiant cooling means less evaporation from a moist skin than sudden contact with cold, dry air—the sensation which makes us feel "too cold" when we first enter an air conditioned space.) Moreover, the cooling load can be markedly reduced, since the air and structure will require less conditioning to keep the occupants comfortable.

Unfortunately, the mechanics of radiant cooling are not the simple reverse of radiant heating, as is the case physiologically. If the panels are allowed to drop below the dew point there will be trouble with condensation on the panels. And, furthermore, as the air is gradually cooled by contact with the walls and furnishings, the panel-air temperature differential is minimized and the "radiant" features of the process decrease.

Foiled again

In test situations, this difficulty has been obviated by the use of foil surfaces which act as passive reflectors of radiant heat. An operating room was designed by Dr. Mills utilizing this principle and he is presently preparing to construct an experimental house to further test the idea. Radiant panels may conceivably provide zonal cooling in business establishments, such as banks. Here, it might be desirable to maintain a somewhat lower temperature for employees—who spend the day in one environment—than for customers, whose stay is likely to be brief.

The outstanding development of panel cooling for office building use is the system worked out by engineer Charles S. Leopold for TIME INC. in connection with a proposed office building. As presently designed, heating and cooling would be by water-backed aluminum panels covering one-third of the ceiling and the entire space under the windows.

The water would enter the ceiling panels at 65° F. and under a normal heat load would be warmed 2 or 4° before returning to the refrigerating plant. The water in the panel under the windows would be warm in winter to counteract the cold down-draft and cold radiation from the windows, cool in summer to counteract hot radiation.

Among the advantages of this system are these:

1. It is particularly successful in picking up the large heat loads imposed on the air conditioning system by the higher intensity of modern lighting. Most of this lighting load is in the form of radiant heat, which the cooling panels pick up directly before it ever gets a chance to heat the air in the room. The brighter the illumination the better the panels perform this function; and, paradoxically, the ceiling panels would actually help cool the room if the water behind them were circulated above room temperature, since the water would still be so much cooler than the filaments of the lamps.

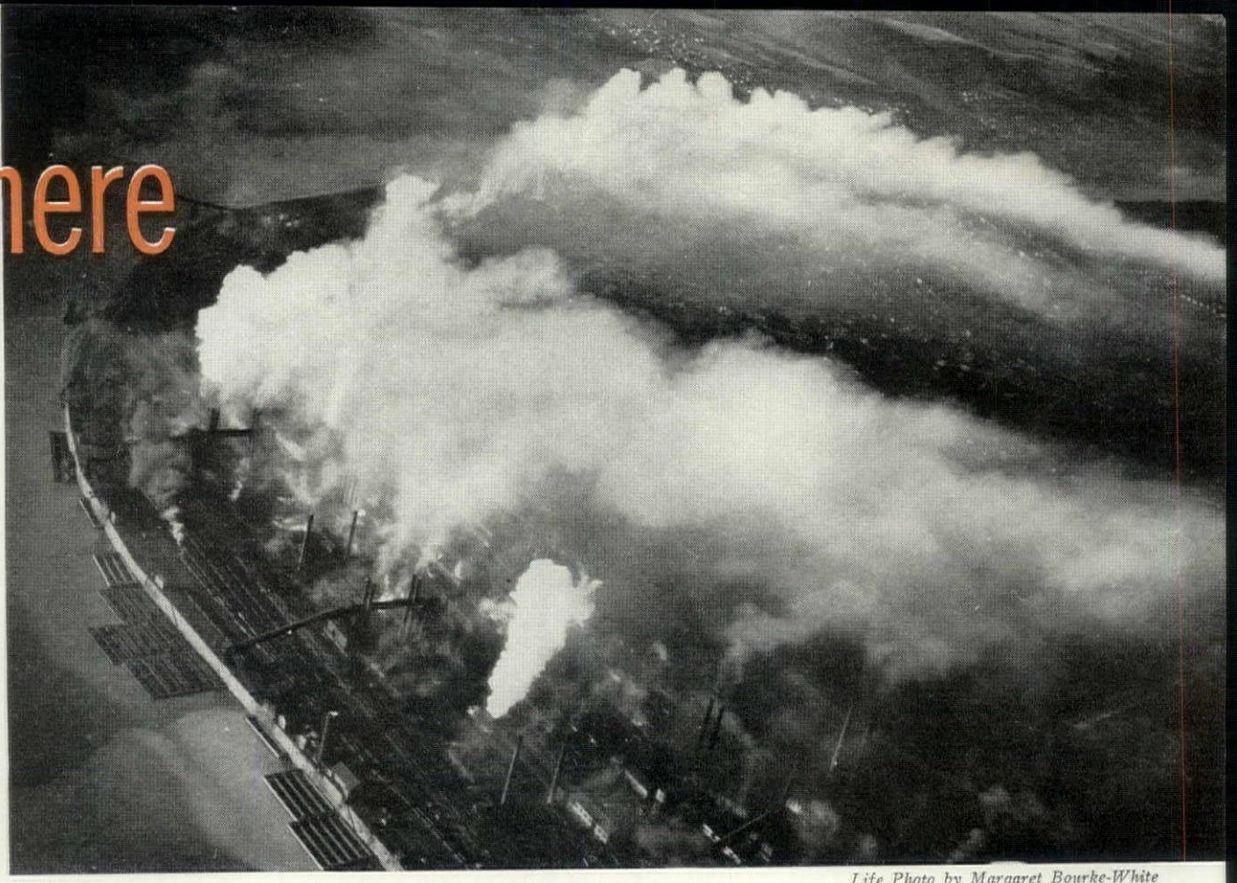
2. Since the radiant panels work directly on the building structure they carry the excess heat or cold off quickly from the structure instead of allowing it to accumulate.

3. It maintains very even temperatures under markedly different conditions. The more heat is brought into the room, the more heat the radiant panels absorb.

4. It is very economical of space, requiring no floor area for radiators and no additional ceiling height for large ducts. It makes it possible to zone the water rather than the air, using air from the same duct system for the various exterior zones and the interior zone and varying the temperature of cooling the water instead if desired. An interesting possibility of the system is that the heat picked up by the water in the cooling process may be added to the zones needing additional warmth. In a limited sense and subject to proper climatic interludes, the design suggests that the system can be used to pass the building's own heat back and forth to stabilize the overall temperature.

atmosphere

smoke, smells, dust, germs, and smog—life would be better without them



Life Photo by Margaret Bourke-White

AMERICANS have long taken for granted the clouds of smoke, soot and industrial waste which envelope them in most large cities. Last month, at Donora, Pa., a mill town 25 miles from Pittsburgh, something happened to wake them up. Smog —a blanket of smoke, fog and presumably, toxic gases—settled oppressively over the city. Hundreds of asthmatics and heart sufferers had to be evacuated to other areas; 19 others died of suffocation in a local hospital. Municipal health officials throughout the nation were shocked into a new awareness of an old menace—air pollution.

What occurred at Donora had happened before. In all likelihood, it will be repeated. Contamination of the air is not in itself unusual; what is unusual is the fact that contaminating agents—belched from the chimneys of nearby foundries—were trapped by the fog when ordinarily most of them would have been carried off by the air. Dilution of used air by fresh—the process that takes place in all venilation—was prevented. Not until the rains came did Donora breathe freely again.

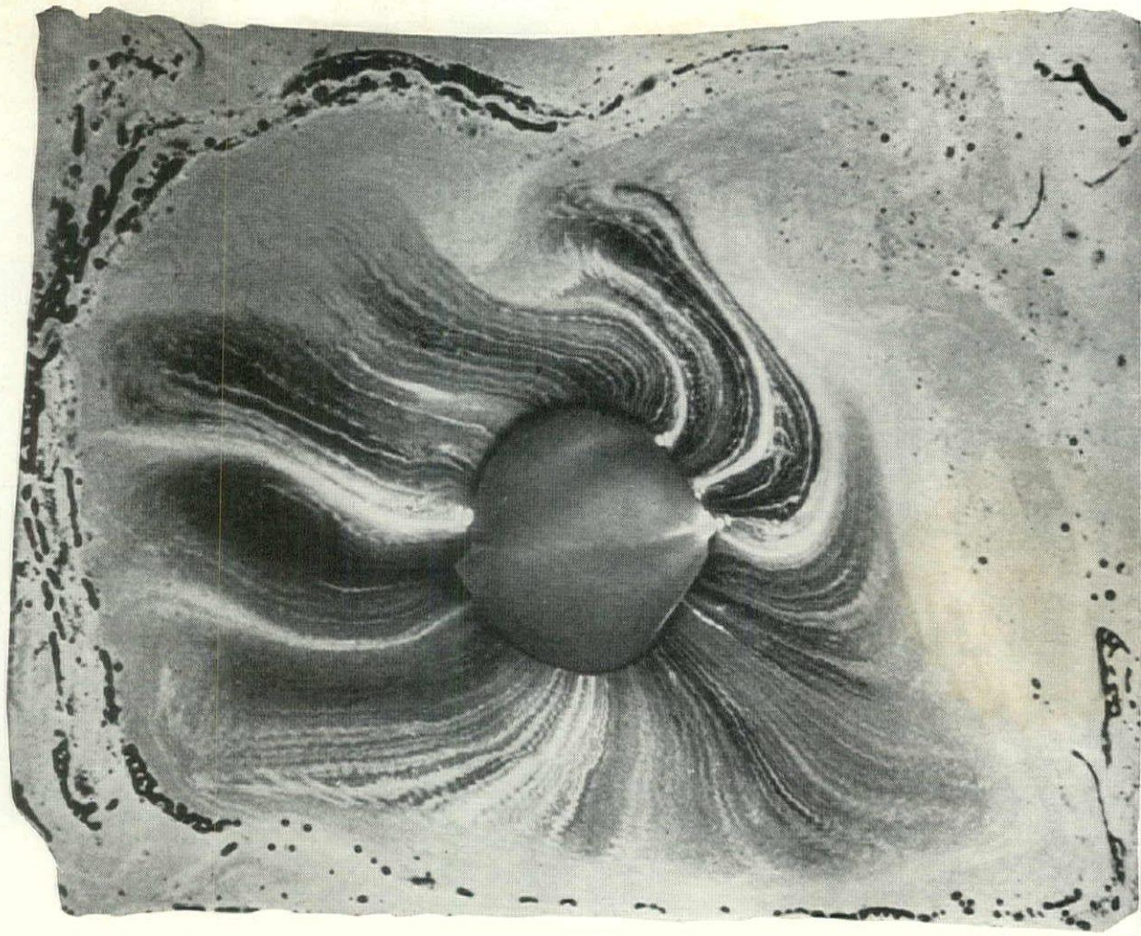
The tragedy at Donora demonstrates that, apart from its thermal qualities, the atmosphere we live in can be quite unfriendly. Dusts can be harmfully irritating, toxic, or abrasive; and mineral dust, such as silica, may result in disease. Fumes—vapors of highly volatile liquids—can be poisonous; factory odors upsetting; smoke irritating to the eyes, throat, and lungs. Luckily, these impurities are rarely fatal, but infrequently serious in their effect on health; usually, they are merely unpleasant.

They form, nevertheless, a very tangible and unsightly part of our atmosphere. Nor is it possible to escape it entirely by moving to the country. Nature herself is partly responsible for the impurities that make the air contact a potential hazard. An unexcelled carrier of organic matter, such as pollens, that excites allergies, it transports an even more deadly weapon in the form of bacteria. And in the final assessment of blame, the home-dweller himself must be charged with a major share of his atmospheric troubles: long after the last factory has consumed its own smoke and deposited its waste beyond reach of the air, the average kitchen will still be spreading odors, grease, and soot throughout the house; the living room will be filling the air with lint, dust, and the smell of last night's tobacco. Clearly, if we are going to control our atmosphere, the easiest place to start is at home: the impurities from both our "outside" and "inside" atmospheres can be removed by proper ventilation.

Keep it clean

Curiously enough, it was not until we began to successfully control our environment that the atmosphere became a major problem. For in the process of enclosing ourselves we also enclosed the pollution incident to daily living. The extent to which this affects our health and enjoyment is realized by every woman who daily cleans up the impedimenta that is deposited on her rugs, walls and furniture. So assumed a part of life has this become that in most civilizations the unpleasant tasks of daily housecleaning have been elevated to the status of a ritual. And in inventing gadgets to make these chores easier, we have in some ways only bound ourselves closer to the older concept of cleaning our environment rather than keeping it from getting dirty. We design our homes to make housecleaning easier; we would be wiser to equip them so that the job would be largely, if not entirely, unnecessary.

In battling the twin problems of an outdoor atmosphere and the contamination resulting from indoor living, we are in reality contending with a number of sub-environments. They are, broadly, the

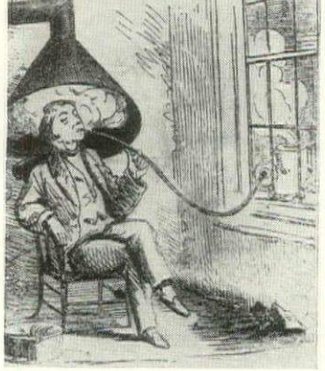


ROSE SMELL photographed in action. Coating of talc on mercury is "blown" into patterns similar to this one by force of odor descending from flower petals. Extent to which talc is disturbed affords objective measurement for intensity of smells, enables perfume manufacturers to determine which kinds of flowers give off most odor.

De Vaux-Breitenbach

osmic, or odor environment; the *colloidal*, dealing with dispersion of germs, pollen, dust, lint, smoke, etc.; and the *chemical*, which includes the oxygen, nitrogen, carbon dioxide and numerous other minor elements that compose the air in its natural state. Each has a direct bearing on our health, efficiency and general enjoyment of life. Until a few years ago, they were considered not as three problems but one—namely, the problem of ventilation. For it was obvious that by "changing" the air—in reality, diluting it—we eliminated most of the impurities, no matter what their form.

The Bettmann Archive



ATMOSPHERE CONTROL, circa 1850. Smoker reduces objections to pipe smoking by ingenious system of remote combustion and overhead exhaust.

Be specific

Recently, it has been demonstrated that ventilation—whether natural or mechanical—has been overdoing itself to meet the supposed problem of oxygen supply; inadequately solving the odor factor, and but partially eliminating the suspended impurities which, because they are largely invisible, have gone unrecognized. With the development of air conditioning it is now possible to combine mechanical ventilation with more precise control of the *specific* elements in the atmosphere. And although the technology of this limits it largely to factories, hotels, stores and office buildings, the basic principle sets up a criterion which even the home builder will find of value.

The trend toward separating the thermal from the ventilating functions of air conditioning expedite this control because it permits working with a much smaller quantity of air. From the ventilating point of view, it is necessary that we have only a sufficient number of air changes to carry off the accumulation of the various body and environmental odors and impurities. Most conditioning systems, charged with the burden of heating or cooling, furnish far more air changes than hygiene demands. The general acceptance of this fact is leading some engineers to design systems such as those discussed under thermal control that introduce a small amount of conditioned air while performing the heating and cooling job in the room proper and to the development of other systems which simply re-circulate used (and treated) air, instead of bringing in a continuous supply of outside air. The advantages of this are two-fold: wherever frequent air change is required because the enclosure is densely occupied, re-circulating the air affords a considerable economy of operation, since the effort that has gone into the conditioning process is not exhausted to the out-of-doors after one trip through the enclosure, but utilized several more times at much less cost than it takes to condition the original supply. Furthermore, this method permits more precise means of eliminating the deleterious matter, for the air is operating in what is, in effect, a closed system. Dust, lint, odors and vapors can be filtered or precipitated out, and no great impurity load will be added by large quantities of incoming air.

The value of such exact control of the indoor atmosphere is not, as might appear to be the case, only that of economy or esthetics — cleaner surroundings. In any situation where density of occupancy is a factor—railway coaches, schoolrooms, theaters—reducing the *specific* hazards of the air contact means not only a pleasanter but a more hygienic environment. An example of this was demonstrated in an experiment conducted by the John

3. Pierce Laboratory of Hygiene, in which odor was dentified as apparently contributing to loss of appe-ite and therefore affecting health. In their experi-ments, Pierce scientists carefully introduced the smell of ordinary house dust—but not the dust it-self—into a closed room the air content of which was otherwise pure. The odor was introduced so gradually as to be imperceptible to the subjects. Comparisons were then made with the same subjects, under the same control conditions, on days when no odor entered the room. Results indicated that the presence of the dust-odor, subtle as it was, definitely affected appetite and accounted for a smaller intake of food. Odors may explain why so many house-wives, after cooking a meal, complain that they "haven't got the appetite to eat it."

A gas mask for buildings

It is indicated from the foregoing that one of the real hazards of the indoor air contact may simply be the presence of odors which may be so slight and constant that we are not even aware of them. If, as is often the case, the odor enters the house from outside, ordinary ventilation will not be of much help. In any event, natural ventilation in summer is made more difficult by the fact that the air may be quite motionless and, due to high temperatures, lacking in its normal ability to exhaust odors and vapors by gravity convection. Air conditioning may not solve the problem since it is a tendency of forced convection to mix air from one part of the building with that of another before re-circulation. More-over, any closed system of conditioning will only magnify this disadvantage by keeping the polluted air trapped for a longer period of time.

Systems which truly "condition" the air and not merely heat or cool it must provide for elimination of the atmospheric impurities. Insofar as odors are concerned, this can be done by the simple expedient of substituting pleasanter "masking" odors or using one of the recently developed chem-ical compounds which, in effect, anesthetize the sense of smell. It is possible, however, that neither remedy will reduce the physiological effects of the original "bad" odor, since the Pierce experiment demonstrated that odors are present—and effective —whether we smell them or not. The best solution would be to get rid of the odor, and this is precisely what the more modern air conditioning systems do. Cannisters of activated carbon—gas masks attached to the conditioning unit—filter out the odorous gases as the air passes through it.

In a similar fashion, modern controls remove the physical and even the bacteriological impurities from the air in a manner that natural ventilation cannot do. In buildings where it is economically feasible, the air is sometimes washed by passing it through sprays of water, eliminator plates and filters. Another, and simpler, method which may well find its way into ordinary home use is that of precipitating impurities from the air by passing it between two electrically charged plates. The air may then be passed under ultra-violet lamps for germicidal treatment and sent back into the room.

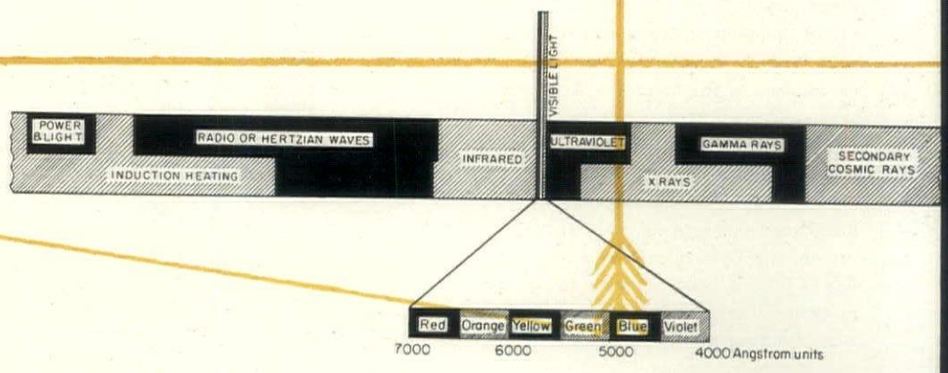
Although presently manufactured largely for commercial installation, there is no reason why all of the features indicated in the foregoing cannot be combined in a single conditioning unit suitable for home use. Some of them, such as the activated car-bon, can be added to systems already installed with comparatively little trouble. In any case, there are simpler and quite adequate controls that will make our contact with the atmosphere pleasanter. Small exhaust fans, placed in the kitchen, will not only keep this hot spot of the house somewhat cooler but eliminate grease-vapor and cooking odors before they make their way to other rooms. Ordinary air filters, in a forced air heating system, will do a good job of detaining the dust and coarser impurities. A fireplace, whether burning or not, is a remarkable piece of ventilating equipment in its own right—provided, of course, that one leaves the damper open. And when exhaust vents are planned, nothing is as important as their location. Wherever grease, soot and dust collect on walls or ceiling, convection has obliged us by designating strategic collection points. All that remains for the builder to do is make these foci of dirt intentional precipitation points, exhausting the air at such locations. Where complete control of the atmosphere is not prac-ticable, design must provide the modern building with aids that help Nature do her own job better. The relative ease with which this can be accom-plished, with quite simple equipment, is illustrated by the Kenneth Welch design shown in "Houses" (p. 150). Besides solving problems of air purity, this system puts under positive control what might be called the "blast cooling effect" that is a normal, and important by-product of natural ventilation, enabling Welch to switch on a breeze whenever he wants one.

Wide World Photo

VENTILATION in Madison Square Garden is governed by necessity of exhausting vast amounts of smoke and smell. Floodlights underline smoke con-tent of the air. Ventilating en-gineers determined psychological limit of tolerance by tests with audiences, geared blowers and exhaust so that density of smoke would not go above it. Result: substantial economy in averting excessive ventilation merely to clear the air of visual impurities.

light

the eye is but part of the man; technique as well as power in illumination is demanded or the entire body suffers



MUCH MORE than the eye meets is included in the known spectrum, as shown above.

THE eye is an imperfect yet flexible instrument. It is imperfect in the insuitability of its mechanics to many visual tasks of today's demanding environment—most pairs of eyes are best suited for a kind of seeing that many people use only at football games. And yet the flexibility of the eye, its ability to do a kind of close vision work that has developed much faster than has the eye's liking for such work, is at times amazing.

This flexibility of human vision is important in understanding *seeing*—and thus lighting—problems in environment, perhaps even more important than the basic truth that our eyes are not designed to function best fixed on a spinning lathe, or on a piece of paper in a typewriter. Ever since man has been aware that his eye can meet the great demands of new tasks, even with strain (supported eventually with an added new set of lenses called spectacles) he has gone on doing them. The zone of flexibility between what the eye should do and can be forced to do has come to be regarded as a legitimate area of adaptability—it has not been considered transgression when man has put his vision to unnatural seeing tasks.

While this flexibility is genuine, and can possibly be proved by the observation that recent generations of close-workers have not become totally blind, the adaptability of the eye has been too generally considered from a limited view. The eye is but part of the man, and recent studies have shown that its functioning and abuse are closely connected with other aspects of physical well being. When man forces his eyes, harmful effects may appear throughout his system. This recent concept greatly reduces the area of safe abuse of the eyes, since the harmful effects of the abuse do appear somewhere, if not only in the vision itself, and are not dissolved in the vitreous humors. Thus the problem of the luminous environment is seen to extend beyond the eye, even in its physical effects.

The eye itself, of course, has suffered grievously in this world of close vision. One of the most recent surveys of school children reveals that more than one fifth of America's children now in school have defective sight, much of it encouraged by the lighting of the schoolrooms. The percentage rises with age, as people go from one poor luminous environment to another. The area of adaptability of the eye has obviously become overpacked. Emotionally, there are few more stirring physical influences on man than light, or the absence of light. The police lineup is a glaring example, the panic of night a dark forbidding one. This general influence of light on man's happiness, the opportunity for light to increase man's pleasure in his leisure as well as his efficiency at his lathe, has been the subject of increasing study in recent years. Resulting have been great advances and additions in lighting techniques, in the last 25 years almost the invention of *technique* in handling artificial light.

The eye itself is often compared to a camera, but again always with the word *flexible* modifying. Its *lens* of transparent ocular tissue is shaped somewhat like the camera's lens of glass. The *iris* of the eye, housing the *pupil*, is the regulator, and has a great deal to do with the flexibility of the instrument. It is composed of loose spongy tissue rich with blood vessels, with the ability to expand and contract freely to regulate the amount of light which is admitted to the interior of the eye. Another purpose for this motility is the accommodation or adjustment of the eye for such close tasks as reading. For these the *pupil* is contracted in accommodative reaction to cut off the outer rays of light which do not focus so perfectly as the center rays. The *retina* is communications headquarters for the eye, receiving the light images on its nerve fibers, called *rods* and *cones*, and transmitting directly through the optic nerve to the brain for interpretation.

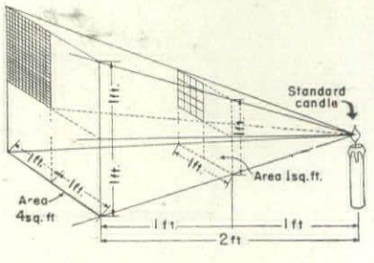
Contained in the *rods* and *cones* is a chemical which has much to do with our seeing, *visual purple*. This, together with another pigment, *visual violet*, actually carries the job load of sensitivity to light. Constant bleaching and regeneration take place in the pigments, not only when in the eye, but even when extracted for laboratory study.

Each time a *retinal cell* is hit by light, its *visual purple* or its *visual violet* is bleached, the cell becomes active and sends a message to the brain—the pattern depending on the succession and arrangement of impulses which enter.

Only a small part of the spectrum is actually visible to the human eye, but all of the spectrum is important in environment. Thus, although the visible spectrum is only from 3,800 angstrom units (violet) through 7,000 angstrom units (red), ultraviolet light and infra-red light are both important to the body. Only interior artificial illumination is considered in this section—for daylight, see Enclosure—but even artificial sources are deeply concerned with production of light outside the visible spectrum for humans.

A growing emphasis on background contrast is

MAN DIFERS from some animals in having both day and night vision, two distinct sets of eye responses to light. Night vision is many times coarser than day vision, losing shadows and colors, but on the other hand is tremendously sensitive to even the faintest lights. On a clear night the light of a candle can be seen 14 miles with night vision.



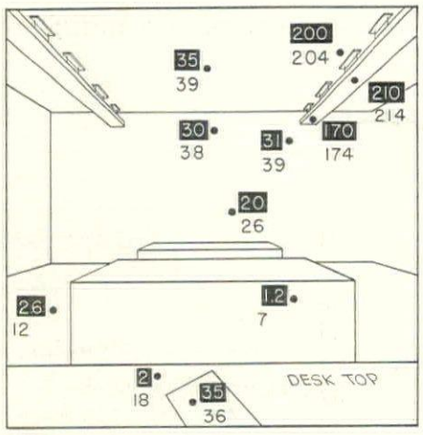
PRIMARY PHYSICAL PRINCIPLE is the measurement of lighting is the inverse square law: The amount of light received on any surface varies inversely with the square of its distance from the light source. Important in practical lighting applications is the fact that brightness of the source does not fade with distance, however, as does illumination cast from the same source. The eye's iris shut down to admit only a small image as reasonable distance intervenes, but keeps the image just as bright. If there is no interference in the atmosphere the glare of a bare light bulb is as intense 30 ft. away as it is at 5 ft., although not so annoying. Seemingly obvious, this is a principle ignored in too many artificial lighting installations.

CHANGE IN SURFACES to raise relative reflectances not only diminished contrast in room diagrammed to right, but also raised illumination levels markedly throughout the room, with no changes in the light sources. White-on-black figures are before refinishing of dark surfaces; black-on-white readings are after change. Diagrams below illustrate change in methods of introducing light into room advancing from wall brackets to projected "directional" application of diffuse source, in emulation of natural lighting.

REFLECTION FACTORS

	Dark desks and floors	Light desks and floors
TASK	70%	70%
DESK TOP	4%	35%
DESK SIDE	7%	40%
FLOOR	7%	30%
WALL	60%	60%
CEILING	80%	80%

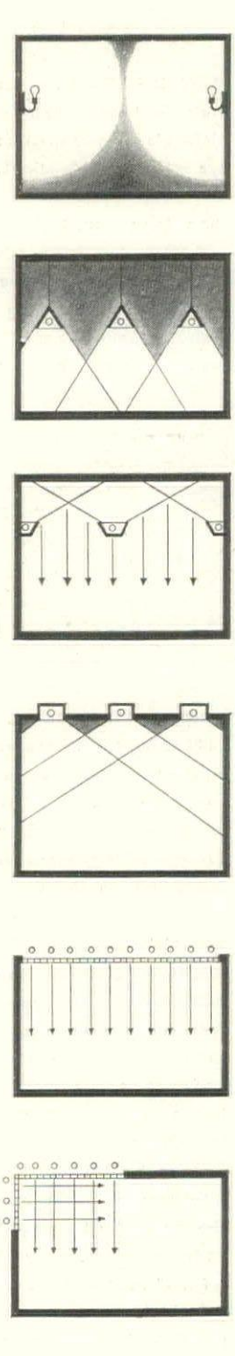
4-40 watt fluorescent lamps per luminaire, glass bottoms



00 = Dark desks and floors
00 Light desks and floors

SIGNIFICANT BRIGHTNESS RATIOS

	Dark desks and floors	Light desks and floors
A. BETWEEN SEEING TASK AND:		
1. DESK TOP	17	2
2. DESK SIDE	29	5
3. FLOOR	13	3
4. MIDDLE OF WALL	1.7	1.4
5. UPPER WALL	1.2	1.0
6. CEILING MAX.	5.7	5.7
CEILING MIN.	1.0	1.1
7. LUMINAIRE		
20° ABOVE HOR.	4.9	4.8
30° ABOVE HOR.	6.0	5.9
B. BETWEEN LUMINAIRE AND BACKGROUND	1.0	1.0
	5.5	4.1

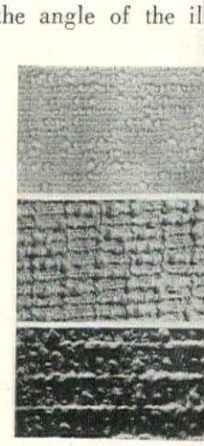


emphatically changing the theory of illumination. Previous stress on level of illumination for acuity has become tempered by a greater interest in light distribution. The foot-candle, as the measure of light from the source, has become overshadowed by the foot lambert, the measure of reflected brightness (a perfectly diffusing surface reflecting one lumen per square foot).

One reason for this shift is the reassuring one that the first problem of the light source—enough light for task visual acuity—has in a great measure been resolved, although not with entire satisfaction. (see discussion on page 125). The foot-candle waned in importance when it became possible to produce a high level of foot-candles economically—now the problem is how to distribute these foot-candles to obtain satisfactory foot lambert readings. No inference should be taken from this general statement that the level of lighting in the nation's schoolrooms, for instance, is actually good or even adequate today. That is not so, with two and three foot-candles a common level. But so far as science and the commercial lighting business is involved, the foot-candle level could be good in all the classrooms —the means have been provided and are being improved yearly. Advanced illuminating engineering attention, therefore, has gone on to consideration of light distribution, and its index, the foot lambert.

Contrast produced by a low brightness appearing against a high brightness can be very useful. The print on this page has a low reflectance, amounting to about 4 per cent of the light directed on it, while the white paper reflects almost 80 per cent. The print is thus made legible by contrast. This same principle applies to much task lighting—the brightly lit blade against the dark background. But when application of the same principle is enlarged from the task to the room, brightness contrasts not only become less valuable, but should be avoided. Whenever there is sharp contrast between an area of high reflectance and one of low, there may be some measure of fatigue to the eye, and there certainly is distraction. Tests have even shown that diminishing the sharp contrast of metal parts of computing machines against the usually somber body background increases both speed and accuracy. In general, while contrast is the basis of all visual discrimination, there is too much useless and annoying contrast in our environment today.

There are two ways to diminish contrast, and provide a comfortably lighted surrounding area. One is to bring the illumination level on the surround up near that of the task or the immediate surface by increasing the area of intense lighting to include the surround. This, in the case of dark surrounds, is difficult, often impossible, to accomplish. The other method is to change the character of the reflectance of the surround, in order to bring its reflectance up high enough to kill contrast with the higher immediate light. This latter method helps not only in relaxing the ratios between immediate surface and surround, but also often reflects enough additional foot lamberts to increase the illuminations level over the entire room without additional expenditure of electrical energy (see readings in sketch example). Color and texture of the surfaces is important in this sort of equation. An example of just how important is available in these three photographs of swatches from the same bolt of tweed. The same amount of illumination was used in all three photographs but in each instance the angle of the illuminating light beam was changed. In the top picture this lighting angle was 45° above the horizontal, in the center 15°, and in the lowest view 5°. Merchants, who have not been slow to adopt modern lighting technology, know well its power to key an environment, and actually to sell merchandise. The approach to these selling problems is as specific as any other application of contemporary lighting principles.



Illuminating men today have many powerful light sources, and know much about their intricacies. Also becoming more familiar is the other end of the equation—what we want in illumination. The open field between is that of methods of directing and applying the sources to obtain the desired results.

and body benefit together

he outstanding demonstrations of the effect of oor lighting conditions upon other parts of the ody besides the eyes are visible in the results of a eries of tests by Dr. D. B. Harmon (first published *Illuminating Engineering* magazine). His famous xperiments in classroom lighting were the first otable illustrations of the far reaching effects of ght-troubled vision; further experiments have since xtended his findings.

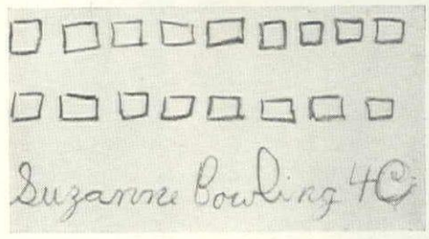
When the eye suffers, the body does too. This is armon's essential, well-proved point. He has own this principally in the work with school chil-ren—a group admirably suited for such experi-ents not only because of their daily, scheduled vailability, but also because of their ready physical actions to environmental change. Their posture doubly important as an index to general health), vidence of nutrition, and incidence of infection can l be improved with careful study and simple scien-fic improvement of the luminous environment in eir classrooms. Present studies in progress under armon's direction in several universities are con-ntrated on adult general health reactions to defec-ve lighting, and early findings in the current rogram support his contention that adults also show rong general physical reactions to lighting, even fter the formative years have been passed: "The me principles apply to the adult, the only excep-on being that the adult has no alteration of growth, ut does have inefficiencies or breakdowns in the ody systems concerned."

Harmon's original set of experiments started in 939 in Texas, with a state growth and health survey f 160,000 Texas elementary school-children. Medi-al, dental, psychological, and other scientific studies f the children showed that they were suffering, in l degrees, from many handicaps. Harmon drew a ouble moral for illuminating engineers and archi-cts from these findings: first, that if these health roblems continued at their present incidence, the luminating engineer or architect would be forced adjust his standards for illumination to fit the ghting needs defined by people's handicaps—rather than basing his standards on the normal needs of healthy people. Second, that preventative measures might be taken in classroom lighting which would reduce the incidence of these physical handicaps.

Harmon's famous program of improvement (see marginal notes) in classroom illumination in the Texas schools is well documented. For evidence of its effectiveness and importance, examine below a chart of health improvement in an elementary school, for one aspect of the problem, nutrition. An examination of all children was made in November 1942; lighting was then adjusted to satisfaction: another examination was made in May 1943, with startling improvements noted.

Nutritional Problems in percentage of students

Grades	1B	2B	3B	4B
Nov. Exams	53.3	80.	85.7	84.6
May Exams	26.6	73.3	21.4	30.7
Both Exams	13.3	66.6	21.4	30.7
New Cases May Exams	13.3	6.6	0.0	0.0
Reduction Nov. Exams	—75.	—16.6	—75.0	—63.6
Total change	—50.	—8.3	—75.0	—63.6



REFLEX MUSCULAR CONNECTIONS between eyes, neck and trunk are important not only in efficient production of work—as demonstrated in standard block aligning tests above—but as an index to many general health and development conditions in children. Girl to left, because of poor lighting conditions, is wasting valuable energy needed for other body functions, and doing her work poorly, as well. Girl in photograph to right has better lighting, performance, health expectancy, reflected in her posture and work.

NATURAL LIGHTING was main medium in Harmon's experiments, but the same principles of avoiding glare and high contrast pertain to artificial illumination as well. First move to improve his classrooms was to eliminate glare. Canvas and metal-and-glass light diffusers (and prismatic glass block panels) in windows helped in this, together with rearrangement of desks in arc pattern, each seat being rotated at a 50° angle away from the front limit of the windows. Next move was to adjust brightness contrasts within room. Light-colored ceilings have 85-90 per cent reflectivity; upper walls from 70 to 75 per cent; lower walls, 50 per cent. Floors are bleached wood, reflectivity, 25 per cent. Yellow-green chalkboards (30 per cent reflectance) replace blackboards (5 per cent reflectance). Brightness contrasts are no higher than three to one, as seen anywhere in room from a pupil's desk. Former contrasts in these schoolrooms, and in most U. S. schoolrooms today, are as high as 50 to one (with sky glare included, 450 to one).

DRAINING RESULTS of physical reflexes to avoid glare are indicated in posture of child to left. Such strained desk-postures as this crouch to protect eyes from direct sunlight are very common in classrooms, and very wasteful of child's energy, leaving her more susceptable to other health menaces.

Austin Compa

NIGHT VIEW in 1944 of Boeing Aircraft factory at Wichita, Kansas, is dramatic example of present-day artificial illumination.

How to produce artificial light has always been a matter of high interest to humans. In the beginning light was identified with heat, in flame, and its sources were deified. In the centuries since then the domesticating of this god into a hand-maiden has been accompanied by attempts to divorce light from its companion, heat. Of equal importance with the attempt to separate heat and light has been also the attempt to spread the source from a small intense flame to a large luminous area.

First artificial illuminant was the torch, a splinter dipped in pitch. Then (as far back as 7,000-8,000 B.C.) came animal-oil lamps, crudely hollowed slabs of stone. Wicks were added to the pool about 1,000 B.C., and artfully made oil lamps were in common use in the Greek and Roman civilizations four centuries B.C. At about the same time Phoenician traders are credited with the first use of crude wax candles. The candle and the oil lamp have lit the world 80 times as long as electricity has.

Mineral oil was first used in place of animal fats in lamps about 50 years A.D., as recorded by Pliny, and by then the Romans also had perfected the tallow candle. Lamps were used more widely than candles—except in religious ritual—until the Sixteenth to Eighteenth Centuries, when, just before the discovery of petroleum as a lighting fuel, most lighting was done by candles, set in what had grown to be an elaborate family of holders. Biggest improvement in the oil lamp up to 1784 had been Leonardo Da Vinci's addition of a chimney in 1490. In 1784 came even a larger advance. A Swiss physicist, Ami Argand, introduced a scientifically designed lamp with a round burner and tubular wick and a chimney for directing and regulating the flow of air to the flame. By this time another importa incentive had been added to the urging of pla science. The patent system had evolved, and A gand was able to register his lamp for commerci protection.

Gas showed up as a controlled illuminant i France in 1784. Before the end of that centur fairly extensive systems were in use in Englan although the general public at that time showe fearful reluctance to use the explosive new mediu And even midway in the Nineteenth Century ele tricity was preying on the minds of many scientis as an illuminant. In 1802, Humphrey Davy ha illustrated in England that strips of platinum coul be heated to incandescence electrically, and in 180 he passed a current through charcoal terminals an produced an arc of flame between them—the firs arc light. Here was a real step away from oxidizin principle of the torch. The Edison incandescen carbon filament lamp—the biggest move towar lighting the world with electric energy—came i 1880, antedating by several years the Welsbac mantle for incandescent gas-lighting. But the Wels bach mantle was so good that gas-lighting continue to gain popularity. It was in this period that poin sources of illumination began to be expanded, a people instinctively masked lamps, both gas an electric, with shades which took the original hig intensity illumination and distributed it as a glo from a larger area.

Chief advances in the incandescent bulb since it original invention have been two: the introductio of the tungsten filament in 1907, greatly upping th filament efficiency, and Langmuir's discovery i 1913 that use of inert gases inside the incandescen

GHT . . . toward a large cool source

mp bulb would permit higher filament tempera-re. Today's incandescent bulb has an improved iled-coil tungsten filament sealed in an atmos-ere 80 per cent argon, 20 per cent nitrogen.

Electric discharge lamps, newest of lighting urces, are not nearly so new as most people think. ven excluding Davy's arc lamp, which used air as excitant, research and development of filament-ss lamps started before the beginning of the pres-t century, culminating ten years ago in the com-ercial presentation of fluorescent lamps. Fluores-nt is the group's youngest member, and the most nportant. Other electric discharge lamps have been use longer than fluorescents, but have generally een suitable only for somewhat specialized tasks ecause of the difficulty of controlling their peculiar pectral distributions. First installations of electrical scharge lamps came in 1902, using 100 foot-tubes lled with nitrogen or carbon dioxide with a high ltage discharge within the tube. Developed by . McFarlan Moore, this was spectacular advance ot only strictly in science of light production, but so in the enlarging of the actual light source from point to a long tube. Also exhibited in 1902 was eter Cooper Hewitt's mercury vapor lamp, a glass be 2.5 cm. in diameter and 1.25 m. long with a ool of mercury as cathode. The shadow free light ot considerable use in factory applications and such installations as composing rooms. Spectral istribution is poor—almost all reds are killed—but nly the refinement of the fluorescent tube has dis-aced the mercury vapor lamp in many installations. ercury vapor lamps, emitting ultra-violet, have se germicidally.

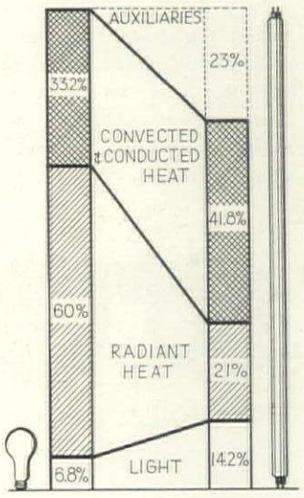
Neon electric discharge lamps, introduced by eorge Claude in 1910, found acceptance by acclaim r a highly specialized use, despite spectral limita-ons—see the store fronts of America at night. odium vapor lights also have been used for a num-er of years in special illuminating applications—ee nightly many parkways and streets.

Fundamental difference between the electric-dis-harge lamp and the incandescent lamp is illustrated the control of current passing through the exci-nt, in one case a coil of metal (closely packed olecules) and in the other case a vapor (loosely acked, firmly contained molecules). In the electric ischarge lamp there is nothing to limit the current, since the resistance of the arc becomes less as the quantity of current passing through it increases. Some sort of series resistor or reactor must be employed. In the incandescent lamp the current is limited by the filament.

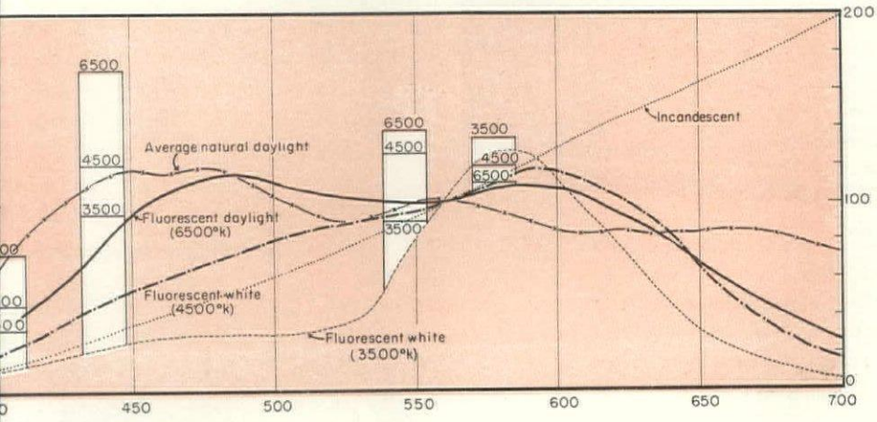
Fluorescent lamps are differentiated as hot or cold cathode. Cold cathode lamps contain few electrons, so a high voltage must be applied to initiate an arc, demanding step-up transformers which supply about 15,000 volts on open circuit. But once the arc strikes, current must be reduced. In hot cathode lamps only 100 or 200 volts are needed for actuation, since a large number of free electrons are present.

Crucial material in today's fluorescent lamps is the phosphor used to coat the inside of the bulbs. This material changes the high frequency ultra-violet radiation into lower frequency radiations in the visible regions. A number of various colors are obtained with different phosphors. In this relatively new field, technicians are working to develop not only new phosphors to improve spectral qualities of electric discharge lamps, but also on new mixes of the gases and vapors in the tubes themselves.

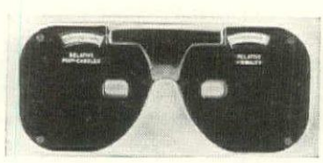
Luminescence, of which fluorescent lamps are the first important application in general use, is the obvious direction the illuminating science has been traveling for many centuries. Luminescent sources are cool and large, a major advance over what has come before. They are still in their infancy, and although it is a very popular infancy, too much should not be expected of them. Architects in general practice can profit by close study of the techniques developed by store designers in combining present cool luminescent sources with incandescents, which do better in picking up the red end of the visible spectrum. Until fluorescents are improved, or displaced by another luminescent, fixture design will be disproportionately important. Control with lenses and filters is as essential as illumination level. The egg crate is an excellent example of design approach, although it is not a complete solution. Each advance in lighting technique, from indirect lighting to the egg crate has come not alone from the technicians in lighting, but as a result of the experience of the men who use the lights. Further advance will demand complete understanding of each new source by architects and designers.



EFFICIENCY of wire filament and fluorescent lamps on the basis of total energy consumed. The percentage of light production of the 40 watt white fluorescent lamp is more than double that of the same size incandescent lamp, and the amount of radiant heat produced about a third of the incandescent.



GRAPH of relative energy distributions of three types of fluorescent lamps, incandescent lamp, and average daylight within the visible spectrum shows their wide variance. None of the artificial illuminants actually are good matches in color for daylight, but combination of fluorescent and incandescent is sometimes effective. The rectangles above the smooth curves indicate mercury lines for the various fluorescent lamps, whose energy distributions are peculiar.



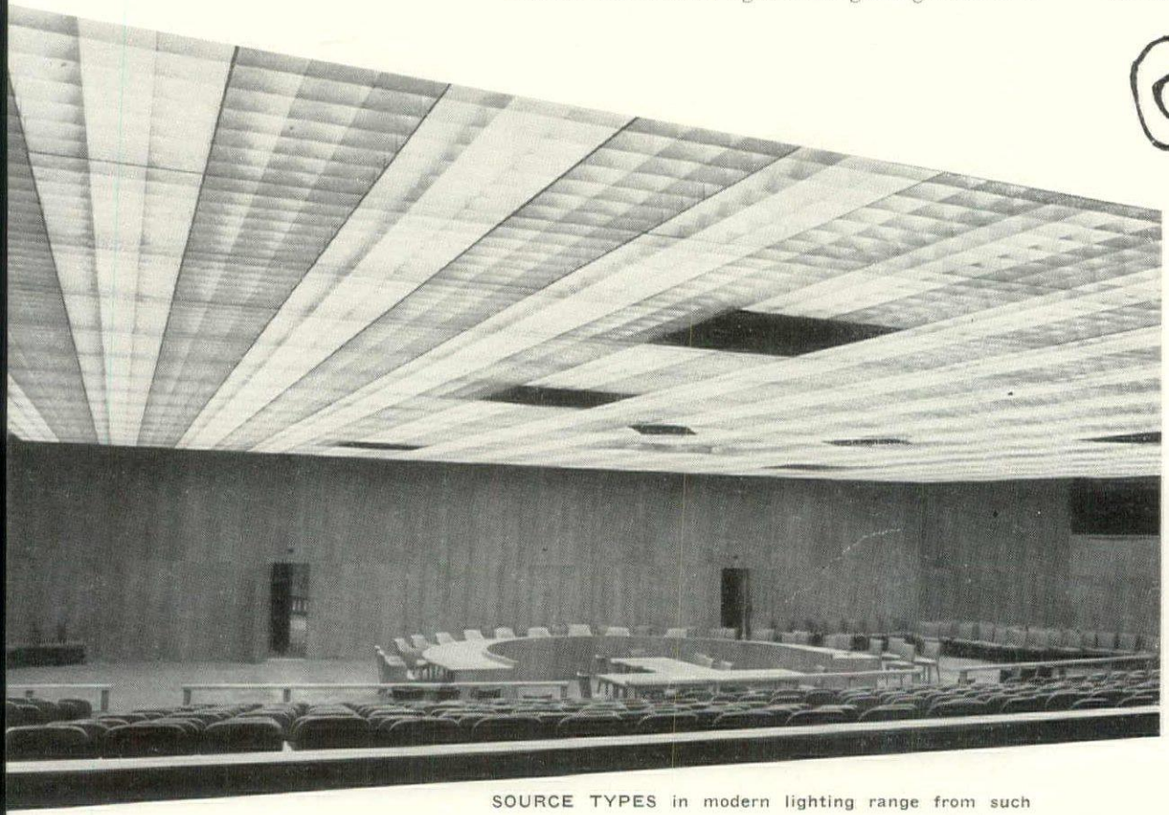
LIGHT MEASUREMENT has progressed a long way since the development of the foot-candle meter. Two new instruments shown here measure brightness (above) and visibility (below).

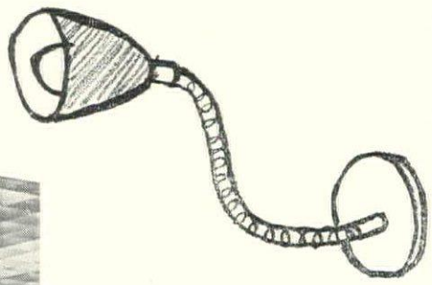
Psychology is an even bigger factor in lighting than in most other aspects of building. In commercial and industrial installations, when the objective is so well defined — utility — the approach is almost always that of overall illumination from large built-in sources. But there are many times and places where this kind of illumination is distasteful to people. In large, light-flooded offices or factories, one objective is to lose shadow—but many people feel lost without their shadows. In those times and places when a simulation of natural diffuse daylight is not suitable, the answer usually is small built-in or portable light sources.

But light fixtures are in a strange design situation. The *I.E.S. Handbook*, in illustrating many of the different situations when table, floor, or desk lamps are the solution to a particular lighting problem, shows pictures of many efficient, available lamps. So far as most contemporary architects are concerned, however, almost all these efficient lamps are of atrocious design. The other side of the situation is represented by the fairly large school of contemporary lighting fixtures which are applauded and used widely by contemporary architects. But these handsome lamps seem designed mainly for display use, since they are largely stern direct light sources, as rigid in their limited areas of real usefulness as they are flexible in their chassis. Most of them are spotlights, electric bulbs in metal cups without diffusing lens in the one direction their light is thrown. Because this kind of light is too glaring to be comfortable for direct application, the spots spend m of the time staring at the ceiling, where they d much less efficient, even less comforting job t the "indirect" fixtures shown in the handbook.

One psychological factor in lighting which g erally receives little consideration is the transit between areas of radically different illuminat levels. An excellent example of this are the trance-exits to a tunnel, when light levels usua change so suddenly as to constitute a menace safety of drivers, in addition to causing their e some pain—especially in the sudden shocked acco modation of the eye when driving from a tunnel i the sunlight. Tunnel practice now is to raise a ficial light level at either end, in order to provi some transitional area, but usually it is a practi impossibility really to solve the problem adequat in this way. Some tunnels at night provide a reve shock, because their lighting level at the mou is not changed and is too bright in contrast w the darkness (creating a situation similar to t in a store window with daylight display wind lighting at night, when contrast of the darkn makes it almost impossible to look at the windo

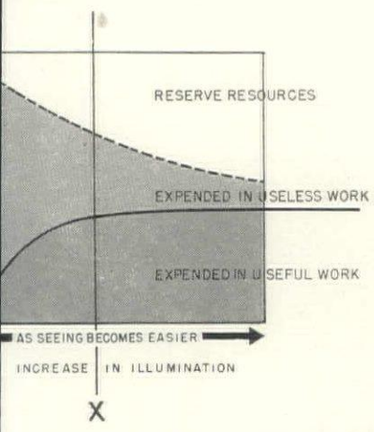
One solution to the tunnel problem might be construct a semi-open slat-topped or glass-roo section over the approaches, letting some natu daylight enter to provide an automatically regulat transitional area. This daylight method, as in number of other lighting problems, would likely not only the cheapest but also the best solution.





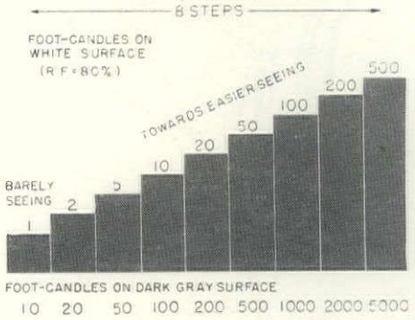
SOURCE TYPES in modern lighting range from such large integral areas as the egg-crate ceiling in the U. N. meeting room at Lake Success, a wonderful example of the light-washed interior, to this small adjustable lighting fixture, one of a number of beautiful fixtures of recent European design. Each is an impressive instrument for effect, and a good luminaire.

ment in high places



X is the important spot in the diagram to the left. The curve represents a general approximation of the rise of visual acuity and efficiency with the rise in illumination level. As far right as X, all authorities agree that general efficiency in seeing rises sharply with rise in illumination. But beyond that point, which is generally pegged at 20 to 30 foot-candles, great argument prevails as to the efficacy of increasing illumination levels further to increase visual efficiency. A graphic argument is expressed in the lines which indicate one faction's estimation of the decrease in expenditure of energy in useless work, as illumination level continues to be increased. But the other faction does not admit this, believes in lower curve only leaving the point . . .

How much light is enough?



SEEING EASE increases with multiplication of candlepower illumination, as in chart above, according to advocates of higher level lighting. But this is questioned in quotes from the lead editorial in the September 1946 issue of . . .

American Journal of Public Health *and* THE NATION'S HEALTH

"Since 1940 . . . there has been an extraordinary and progressive tendency to increase (suggested illumination level) standards so that with every report (of the I.E.S.) the minimum levels rise; and, beyond the minima set, it is suggested that still more astronomical intensities would really be desirable.

"Sanitarians have generally regarded these extravagant standards with justified suspicion. Dr. Tinker analyzes the evidence . . . (and) shows how the physicists have treated light intensity as a purely quantitative factor, almost as if when a certain intensity proved good, more was necessarily better.

". . . Satisfactory results (in setting standards) can only be attained by coordinating the work of engineers, physiologists, and psychologists. Until such coordination is effected, we shall do well to follow the psychologists, since it is human health and comfort which is at stake."

one side of this discussion are most lighting engiers and some physicists who—having developed ht sources which can effectively transcend generly accepted minimal illumination requirements—ntinue to press for higher foot-candle readings the optimums for acuity. A number of psychoolsts, with some lighting researchers, oppose this ising of advised illumination levels. This latter oup believe that once a certain illumination level s been reached, any further raising of the level of little value, and is uneconomic.

In 1938 the candle power rating recommended by e IES code called for 15 foot-candles for classoms, shops, and offices. By 1947 the recommended vel for the same task had risen to 30 foot-candles, ter further research. Dr. Matthew Luckiesh, an lvocate of higher level lighting, says in one of his any papers on lighting: "... the statement is often ade that significant improvements in seeing are not btained for levels of illumination higher than some bitrarily conceived value. In general, this is sually a result of a confused compromise between onomic factors and visual benefits. Obviously, the nclusions derived from behavioristic researches lating to illumination, visual efficiency and ease of eing are in no way related to economic factors. hich only become involved when recommended lues of illumination are specified for various sual tasks."

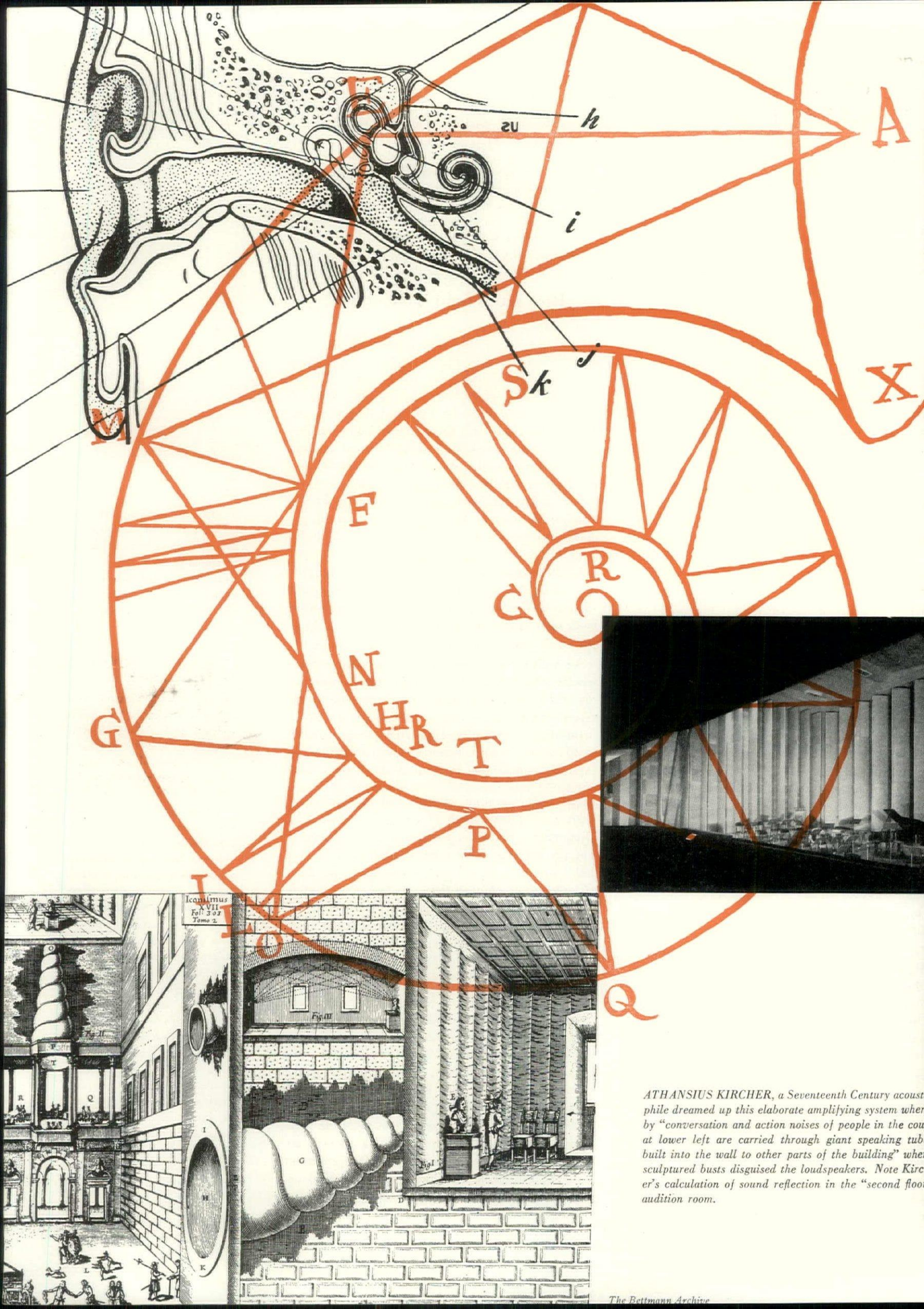
But not only economic factors are involved, cording to some authorities. Fear of harmful ffects on the eye of high intensities is expressed. though high intensity proponents point out that iffuse daylight commonly reaches 2,000 candlepower levels without discomfort or harm. Flexibility f the eye (from white surfaces in direct sunlight threshold values, the range is about 1,000,000 1) is enlisted as an argument for both high intensies and low. For high intensities, the argument is iat the eye evolved doing tasks in sunlight. The witch for low intensities is that the eye evolved also see adequately in caves, and that certain tasks hich have become complicated faster than the eye as evolved to perform them naturally cannot be one under high illumination.

An interesting comparison of the difference in rescribed light levels for various tasks can be made with two sets of recommendations, the first by Luckiesh and the second by Psychologist M. A. Tinker. Luckiesh recommends: 1 to 5 foot-candles for perceiving larger objects and casual seeing; 5 to 10 for visually controlled work which does not involve discrimination of fine details or low contrasts; 10 to 20 for moderate and prolonged tasks of office and factory and, when not prolonged, ordinary reading and sewing on light goods; 20 to 50 foot-candles for moderately critical and prolonged tasks, such as proofreading, drafting, difficult reading, watch repairing, fine machine work, etc.; 100 foot-candles or more for very severe or prolonged tasks such as fine needle work, fine engraving, fine pen work, sewing on dark goods.

According to Tinker there is no valid experimental work now available that indicates a need for over 50 foot-candles intensity for adequate visual discrimination. He recommends 10 to 15 for reading print of good legibility, 15 to 20 for newsprint, 20 to 30 for such tasks as reading handwriting, 30 to 40 for tasks comparable to reading of six point type (six point type).

All in the lighting industry and in lighting research recognize a need to increase intensities of illumination somewhat for people whose vision is not perfect, who have some disability. This also holds true for the aged; old people need more light in order to accomplish the same tasks at the same rate of speed as younger people. But again, the amount of the increase which is necessary and beneficial here is also a matter of dispute among the various authorities. Tinker says 5 to 10 foot-candles increase reaches the limit of effectiveness. Luckiesh's findings are higher.

An actual test run by Commonwealth Edison Co. of Chicago saw a room equipped with light which could be held as high as 225 foot-candles with good color and brightness ratios, or switched lower at the wish of the workers, who were doing drafting and desk jobs. After working in the room over a considerable period of time, occupants rated the preferable intensity at 85 foot-candles. Managers of the test theorized that with a different arrangement of light sources (from one side, simulating windows, instead of entirely from above, see p. 120), preferences would have been for higher levels.



ATHANSIUS KIRCHER, a Seventeenth Century acoust phile dreamed up this elaborate amplifying system wher by "conversation and action noises of people in the cou at lower left are carried through giant speaking tub built into the wall to other parts of the building" whe sculptured busts disguised the loudspeakers. Note Kirc er's calculation of sound reflection in the "second floo audition room.

The Bettmann Archive

sound

form, dimension and materials — all in the architect's domain — govern its behavior and quality

PHYSICS have come a long way since the day when Echo was believed to be a lovelorn nymph who ied away for Narcissus until nothing was left but r voice. The progress of a thousand years is comndable—that of the past 50, staggering. Four nturies have passed since it was discovered that ınd is a movement in air. Today it is easily asured in terms of speed, intensity and scope and n therefore be efficiently controlled.

Since, from an architectural viewpoint, considıtion of the artificial environment grows daily re important, it seems not unlikely that before g competent sound engineering will be consided as essential to good building as good structural sign. Most architects are equipped to handle the ter in its elementary phases. A parallel knowlge of the behavior and control of sound may soon equally necessary.

Because sound can be measured in such familiar ms as lineal feet, because general shape, contour individual surfaces, texture and pattern are essenls of modern sound control, it is practically possible to ignore the natural affinity between chitecture and acoustics. An extreme example of test sound control achievements, a recently cometed conference room which seats 250 has been gineered so that anyone sitting in any given secn can comment in a normal speaking voice and heard by all other conferees. In such an instance, course, the acoustic design entirely determines e architectural form.

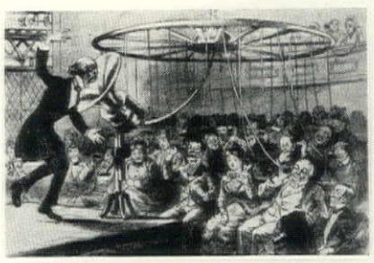
Early attempts at scientific sound control were rgely limited to measures of counteraction through sulation or absorption. More recent research has oved that in many instances sound is best handled its source with planned channeling. Still more ten, a combination of the two methods is desirable.

In contrast to the thermal environment about hich a great deal is known, experts in the field el that, as a science, acoustics is still in its youth, at many facts about sound which architects tend accept as final are in reality first steps toward a uch more profound and elaborate comprehension.

Just as the criteria for hearing music has not yet en (and may never be) rated on a numerical scale cause it is largely a question of esthetics, the iteria for accoustical environment cannot be stated ithin close limits because of the wide variation in e physical and psychological reactions of the indidual. The reactions of someone who is overtired under an emotional strain are very different from ose when he is relaxed and contented. A noise ndition which under one set of circumstances ould drive an individual to distraction, under nother proves entirely bearable. Use of space also bears heavily on the criterion for acoustical environment. For instance, many factory jobs can be carried on satisfactorily under noise conditions that would prove impossible for performing a delicate operation.

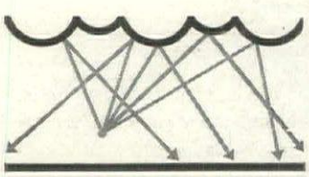
There is a wide divergence of opinion on the effect of noise on the individual. It has been proved that under certain circumstances, providing the motivation is sufficient, the more trying the noise environment, the more efficiently the job is performed. What is not known is to what extent the necessary additional energy may harm the body. In measuring brain pressure, the noted neurologist, Dr. Foster Kennedy, found that it sometimes increased as much as 400 per cent by sudden, loud noise, that noise causes loss of temper, irritability and "undue excitation of the human system." He finds that noise disturbs the blood vessel apparatus, increases the degenerative processes in the heart and arteries and that constant, loud noise not only affects general conduct but also prevents deep and sustained thinking. Thus the question of acceptable noise conditions is extremely complicated and still undecided. However, all conclusions to date bear out one fact, i.e., that the human ear was never designed for the constant subjection to noise annoyance inherent in present day living.

Hearing conditions can today be predicted and controlled with more accuracy and efficiency simply because a great deal more is known about them. Logically, this phase of acoustics has been nurtured by and pushed apace of developments in the fields of radio and television. It is significant that while millions of dollars have been poured into research on broadcasting technique and improved receiving equipment, the amount spent on studying good reception conditions in the home could be comfortable carried in a rather thin wallet. The science of acoustics to date has been largely confined to public buildings such as auditoriums. Its application to general living conditions awaits a vast amount of research and experimentation. However, enough comprehensible scientific data is now available to the architect to enable him to give the control of sound its deserved role in the design of a building. Sound control has two very different aspects. The first, acoustics, provides satisfactory hearing conditions within a given space. The second, sound insulation, is concerned with preventing the transmission of sound through a building or its admission from outside. Acoustical treatment involves overall architectural form, surface contours and applied acoustical materials. Sound insulation, on the other hand, is largely a question of construction plus the use of sufficient heavy material. While these two phases of



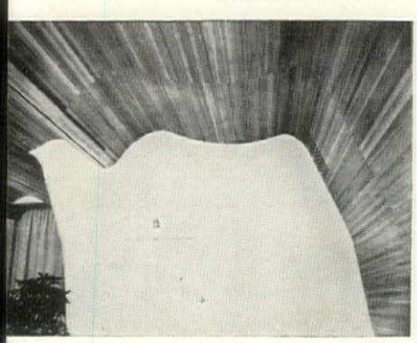
PUCK, the famous comic magazine, suggested installation of this transmission device in churches to enable ministers to compete with the noise of a new elevated railway.

CONCENTRATION of sound in "spots" results from all waves being reflected at the same angle from a concave ceiling.



DIFFUSION is achieved by breaking the angle of reflection with convex surfaces of varying size, is particularly applicable to small room problems.

Museum of Modern Art



LIBRARY - LECTURE HALL designed by Aalto utilizes free contours for the ceiling distributing sound waves in an irregular manner.

sound control are often interdependent, a cleancut distinction must be made between the techniques to counteract considerable confusion that seems to exist in the public mind on this score.

Acoustics as distinguished from sound installation has two further branches: The one with which we are most familiar and in which the most advance has been made is the creation of satisfactory *hearing conditions* as in lecture halls, broadcast studios and theaters. The other, more complex and a great deal broader, involves general *acoustical environment*—the provision of satisfactory working conditions in factories, quietness in a library or the control of night noises entering a hotel room.

Acoustics is the scientific handling of sound waves within a given space. Intentionally or unintentially, every time an architect designs a room he creates an acoustical environment. Most frequently the behavior of a sound wave is explained by comparing it to the old business of dropping a stone in quiet water. While this simile may help to explain its progress and relation to subsequent waves, it somehow conjures up a rather two-dimensional picture. Comprehension of the acoustics becomes much easier if it is understood that a sound wave is spherical in shape and travels in all directions. In approaching an obstacle, it bears as close a resemblance to a weather front as to a water ripple.

The inseparability of architectural form and acoustical engineering is cemented by a simple law governing the behavior of sound waves. They are bent back, or reflected, like light, at an angle equal, and opposite to the angle of incidence. Like many great simplicities this fact was long in discovery. It underscores the natural compatibility of modern architectural forms and good acoustics, explains to a degree the poor hearing conditions in public buildings of classic order. Study of the angle of reflection has proved the domed ceiling to be about the worst possible form of overhead treatment from the standpoint of good hearing since its acutely concave reflective surface concentrates all sound waves in one small "spot" immediately below, leaving the rest of the enclosure a confused jumble of conflicting secondary waves.

In small rooms, a parallel floor and ceiling will volley sound waves back and forth with highly disturbing results. This is why in the most recently designed broadcasting studios, walls, floors and ceilings have been shifted to "cockeyed" angles. However, this cannot be accomplished in a haphazard manner since intersurface relationships other than parallel can also be bad. Opposite surfaces converging from the source of sound force the sound waves toward the wider opening or back upon themselves. Surfaces splaying from the source force sounds away from the small opening. A series of flat planes may produce "following," i.e. adherence of a sound wave to the surface. However, broken planes, correctly angled particularly in the upper portion of the room, can be very useful in directing sound on a large scale.

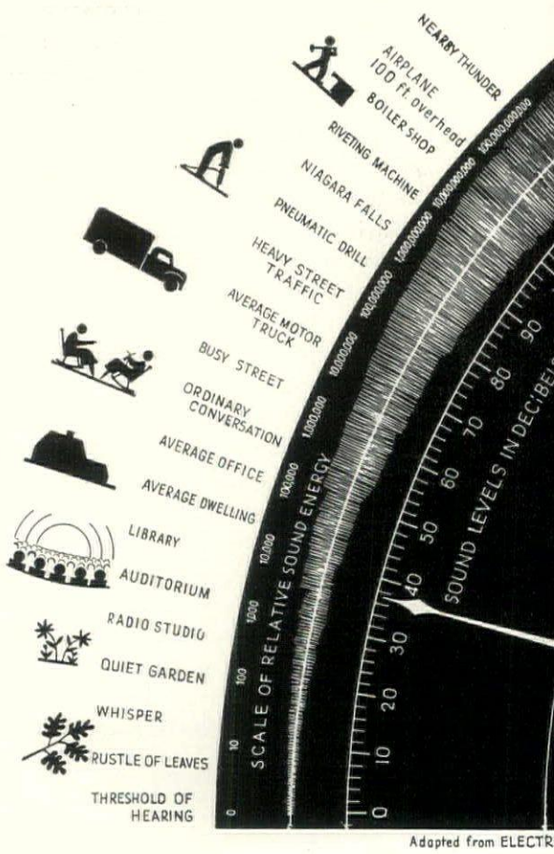
Shape as well as the dimensions of an enclosu can be roughly determined with the help of t simple rules of thumb: 1) the envelope must not p mit more than a 50 ft. travel distance between dir and reflected waves, 2) sound waves will not refl in precise relation to the angle of incidence unl the reflecting surface is at least twice as wide as t wave. Since volume decreases steadily with the pr ress of the sound wave it is often a good idea large rooms or theaters to gradually decrease t vertical cross section of the enclosure toward t rear to maintain intensity.

With these formulae in mind, it is easy to see th organic form is the most logical architectural e pression of good acoustical engineering.

Uniform audibility in a room is most usua achieved through diffusion of sound waves by mea of surface contours scientifically applied to t walls and sometimes the ceiling. In size and sha these too are broadly governed by a couple of simp principles. Convex forms are almost always su fire implements for sound diffusion, whether th be oversize blisters applied to the wall in a rando pattern or a screen of semi-cylinders as in the tw N.B.C. studios (pp. 32). However, such defin mathematical rules as these govern their use: 1) the length of the sound wave is less than 2 ft., t contours must vary in size and depth, 2) if the wa length is more than 2 ft., the apex of the conto elements should not be more than 10 ft. apa

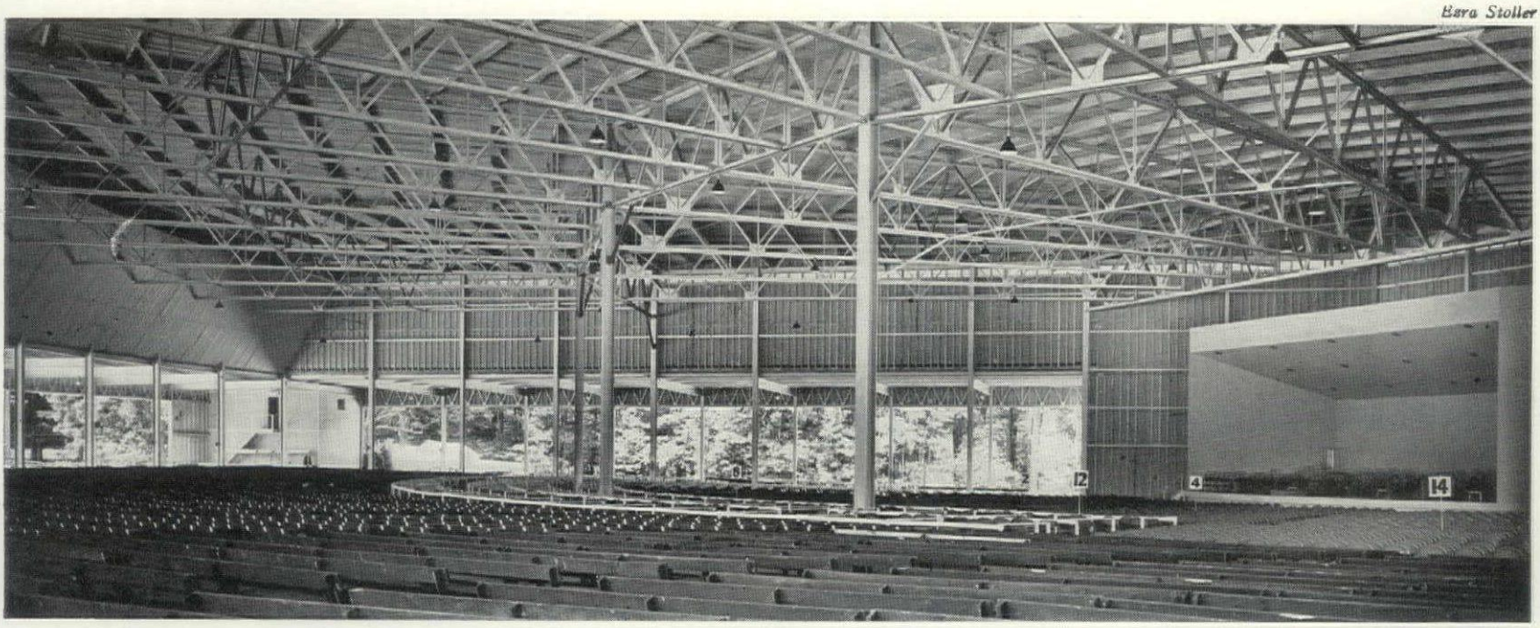
In addition to uniform audibility the task acoustic design is to direct sound along the short path to the listener. Needless to say it must alwa

DECIBEL SCALE is set up in relation to the range human hearing—represents a ratio since it consists logarithmic units (each unit on the scale is double intensity to the next lower one).



Adapted from ELECTR

Ezra Stoller



BERKSHIRE MUSIC HALL, renowned for its good acoustics has simplest possible construction. Low decibel reading of surrounding woodland is largely responsible for good hearing conditions.

be directed along parallel lines to avoid interference. Sound travels at a speed of 1,120 ft. per second and is mechanically measurable for loudness (by decibels), for quality (frequency analysis) and for reverberation time.

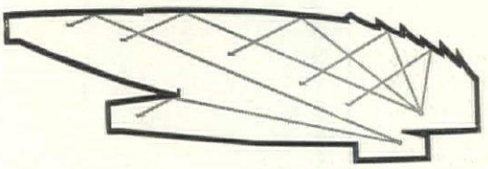
High frequency waves clarify speech, give music its brilliance. As echoes or interference they are the most annoying. Low frequency waves are essential for volume and body in both speech and music, prove less offensive as interference. Waves of similar phase combine to produce amplification.

Frequency too plays a role in determining the shape of the enclosure. Under outdoor conditions high frequency sounds are projected further forward than low ones. Since an enclosure confines all frequencies it must be shaped for uniform distribution of both. Here again an organic shape is indicated.

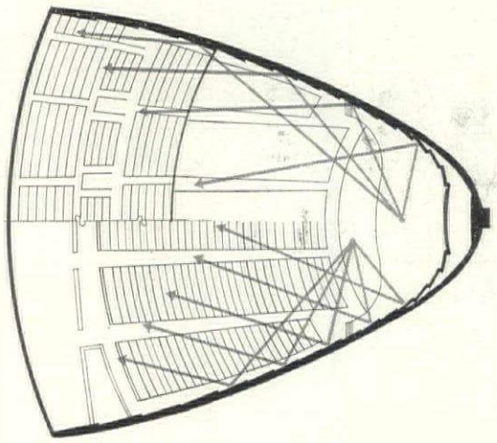
Screens of any height in a room or auditorium act as baffles creating a sound void behind them particularly for high pitched notes. Low frequency tones are prone to bend around obstacles, but since a relationship of both frequencies is always essential this phenomenon has little significance under ordinary circumstances.

Most theaters designed in the grand manner have structural partitions hiding the wings from the audience. From an acoustical standpoint this is the epitomy of bad design. Assuming that the source of sound is at center stage, these partitions cast "shadows" or sound voids on all except the orchestra seats. Seen in cross section, the old fashioned, small proscenium opening is also a sound escaping form since a large percentage of the sound waves is lost in the grid. A general rule for good theater acoustics is to keep the proscenium opening large and direct sound toward the audience by means of reflective surfaces behind and above the speakers' heads.

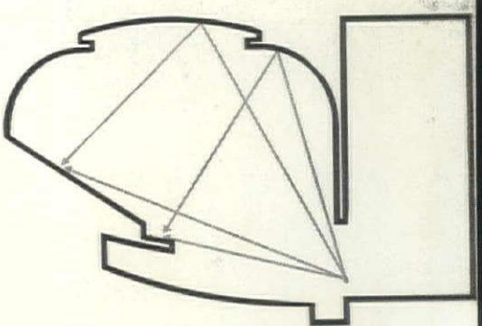
Since convex surfaces are all but infallible for sound dispersion they are ideal for remedying poor acoustic conditions in existing rooms. Concave reflecting surfaces require a long enough radius of

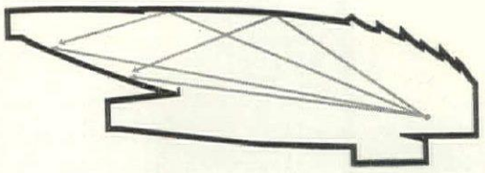


KLEINHANS MUSIC HALL avoids excessive space-volume, utilizes broken planes near the source of sound to direct waves along the shortest path to balcony and rear of theater.

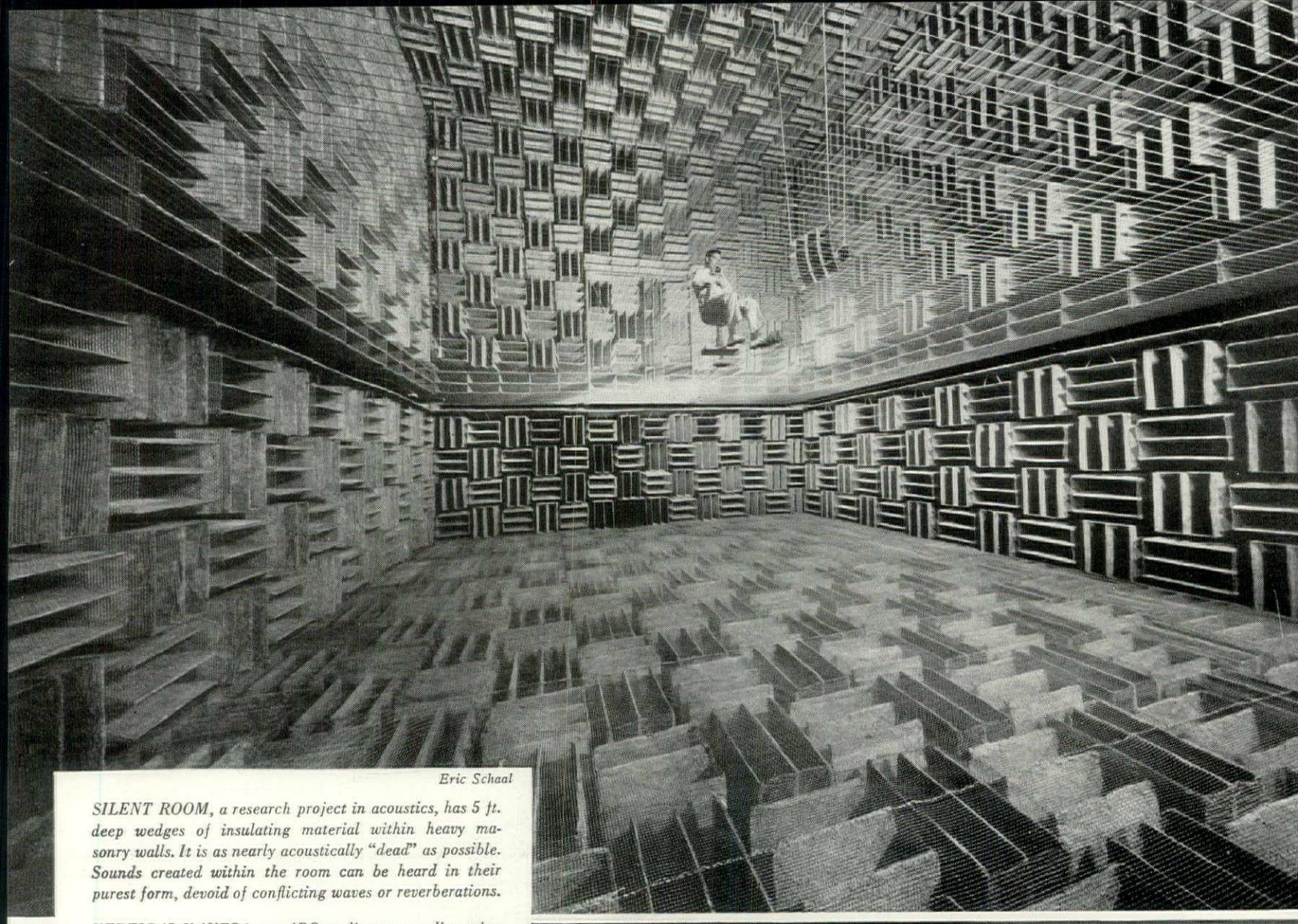


PLAN illustrates how similarly broken wall surfaces direct sound waves toward the center and the rear of the theater. This treatment is designed for two sources of sound, one in the orchestra pit, the other on the stage. Note continuity of stage and auditorium.





SOUND ESCAPING FORM (above) also demonstrates how reflected sound traveling appreciably further than direct sound produces annoying echoes. Desirable form (left) cuts down travel distance for reflected sound, avoids curves that concentrate sound.



Eric Schaal

SILENT ROOM, a research project in acoustics, has 5 ft. deep wedges of insulating material within heavy masonry walls. It is as nearly acoustically "dead" as possible. Sounds created within the room can be heard in their purest form, devoid of conflicting waves or reverberations.

VERTICAL VANES in an ABC studio serve as dispersion elements. Their proximity to the orchestral instruments calls for closely calculated reflection and the individual units are angled accordingly. They amount to a series of resonating panels beamed toward the audience.

Ezra Stoller: Pictorial Services

curvature to locate the focus well outside of the enclosure. In the case of a large radius at least twice the distance to the furthest listener along the radius is required. With small radii, short surfaces are recommended—usually with 2 to 10 ft. maximum curvature.

Reflective surfaces of this type must almost always be used in conjunction with absorptive material to control reflection. In the case of an auditorium the logical location for the latter would be behind the last row of seats to catch high frequency sounds. Low frequency absorption can be more generally distributed.

Electrical amplification, another phase of acoustics, is more a problem of large spaces than small rooms. It goes without saying that intensities can be maintained in all parts of an enclosure by means of directional loudspeakers under individual control. To be satisfactory, this type of installation must be equipped with a delayed amplification system.

Resonance, or natural amplification, is produced by materials vibrating at the same frequency as the sound wave in the manner of percussion instruments. All vibrate to one or more frequencies. Hard rigid materials such as stone or concrete vibrate to low frequency tones. Wood vibrates to the widest range. In almost every instance a certain amount of resonance is desirable. It is essential to the enjoyment of music.

Good acoustic design provides the proper proportions of reflective, absorptive and resonant materials scientifically shaped and located. The characteristics of sound absorbent materials are fundamentally the same as those of resonant materials. Both react to frequency. Draped, porous fabrics tend to absorb high frequencies; resilient materials such as carpeting or upholstery absorb the middle frequencies; stretched membranes absorb the lower frequencies. Engineered sound absorbent materials react over a wide range.

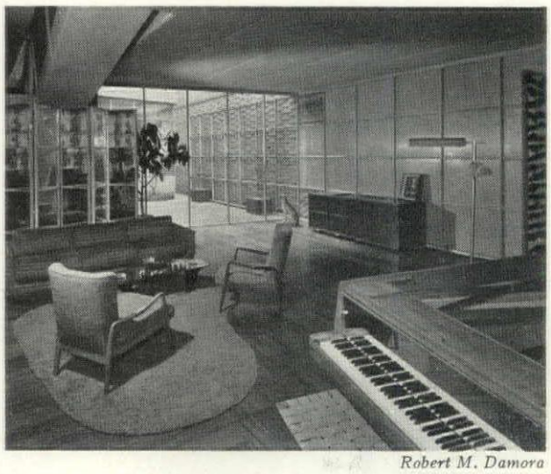
The salient difference between sound control in large and small enclosures is that in the former, the source of sound is usually predetermined, emanates from one spot. In an average room the acoustical treatment must provide for scattered, diverse types of sound. For this reason the problem of directing sound assumes less importance while that of diffusion increases. The greater proximity of reflecting surfaces in a small room tends to produce "flutter" or a conglomeration of sound reflections between parallel surfaces. This is the most familiar type of interference, one that is often encountered in small offices, in bathrooms, in restaurants. In plan, attenuated forms are the greatest offenders in this sense because, soundwise, they behave exactly like an organ pipe, setting up a high degree of resonance—particularly if the end surfaces are parallel. As in larger areas, nonparallel shapes plus absorbing material on one or more walls are advisable. It might not be a bad idea to introduce one surface of acoustically variegated pattern like that in the Kleinhans Music Hall.

Assuming that a small room was to be designed from scratch, free shapes would probably be preferable in most instances, requiring a totally different approach to the acoustical problem. In angular plans, the modified rectangle works out best from a standpoint of sound control. Square shapes have proved no more satisfactory than attenuated ones.

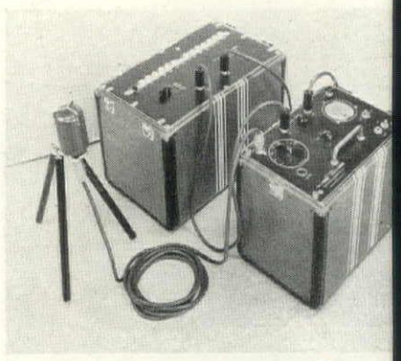
Supplementing acoustical materials, upholstery, rugs and draperies are highly efficient absorptive elements. This explains to a degree why abated sound is invariably associated with luxurious surroundings. It is not true, however, these items are necessarily beyond the reach of the lower income bracket. Even with an elementary understanding of how home furnishings can be used to counteract noise annoyance, effective results can be achieved at little cost. The "sparse" school of modern has actually created acoustical problems by eliminating so many traditional sound absorbent elements.

The American radio, an awesome affair even in its most economical version, is scarcely ever given proper acoustical surroundings. Its multiplicity and volume have driven many into a state of frenzy. The radio can and should be heard by those who want to listen to it, and by no one else. One example of how such hearing conditions can be achieved is shown below. This room is located in a fairly new town house in New York, was designed with the close cooperation of architects and sound engineers. The dead wall is padded to a depth of several inches with mineral wool and surfaced with a porous material that allows sound to pass through it. The live wall is paneled with plywood which acts as a resonating element. These panels are loosely hung to give proper musical brilliance. Both end walls are of glass and are angled to avoid a parallel relationship. The ceiling consists of a wood frame covered with stretched linen. Some portions of the frame contain broken sheets of wallboard to reflect sound in an irregular manner. Other sections are heavily padded with mineral wool.

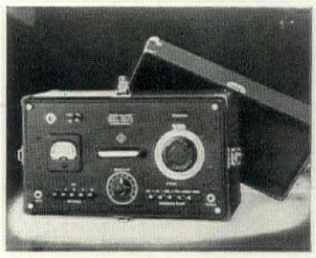
In the average house the kitchen and bath, and perhaps the playroom, is where intramural acoustical treatment is most needed. In all three cases absorptive methods seem the most logical. In almost any kitchen or bath a ceiling of acoustical material would do wonders. Sheet rubber, linoleum or other



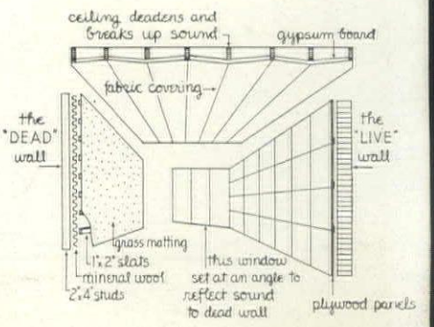
Robert M. Damora

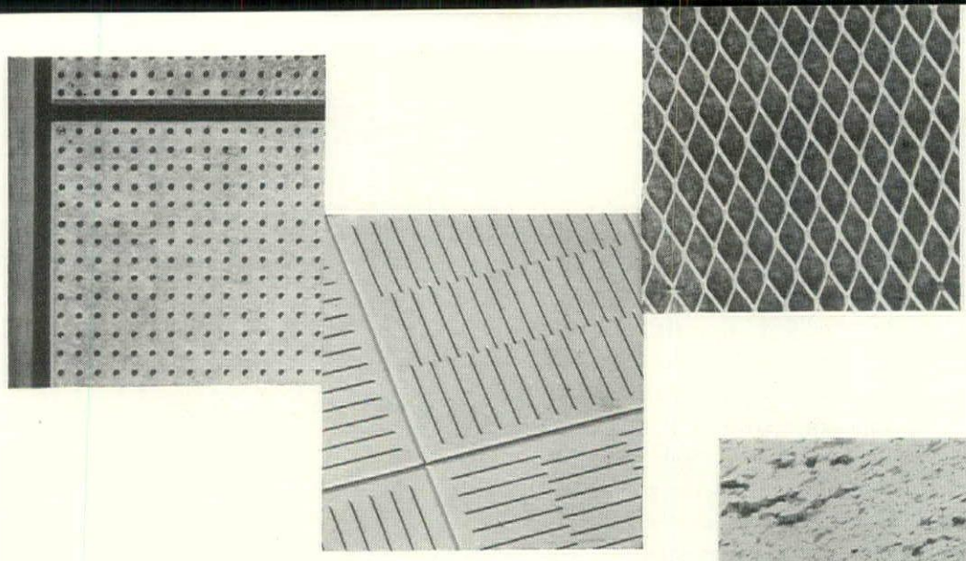


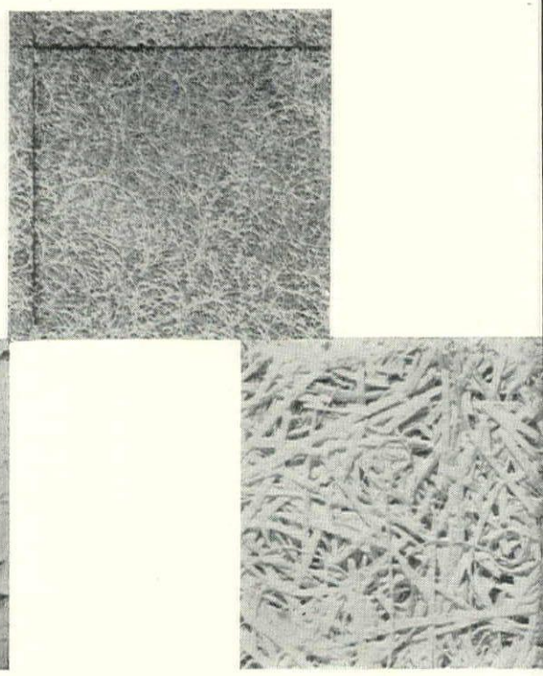
SOUND LEVEL METER used in conjunction with push-button frequency analyzer. This combination is particularly useful in determining the absorption properties of acoustical materials.

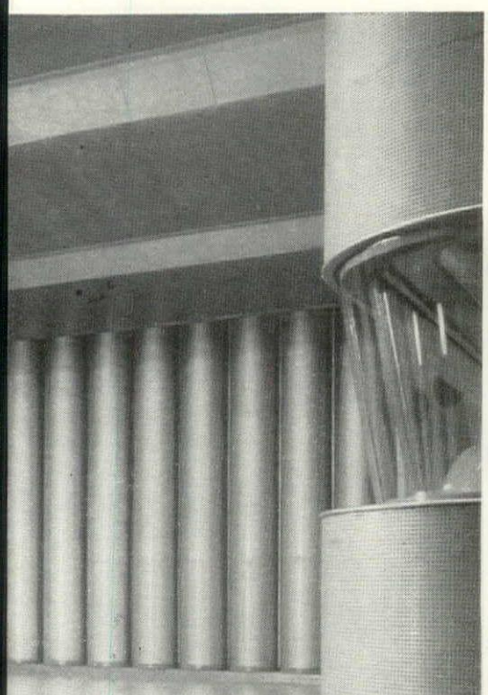


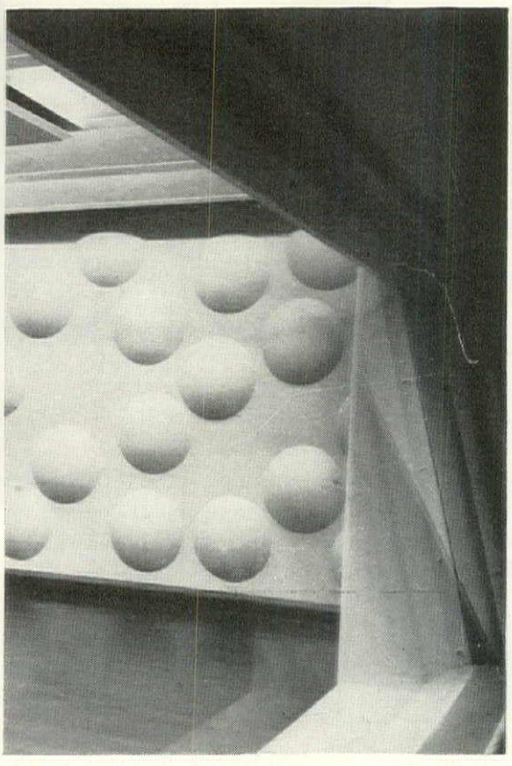
SOUND ANALYZER designed especially for noise levels created by electrical and mechanical equipment—industrial or household.







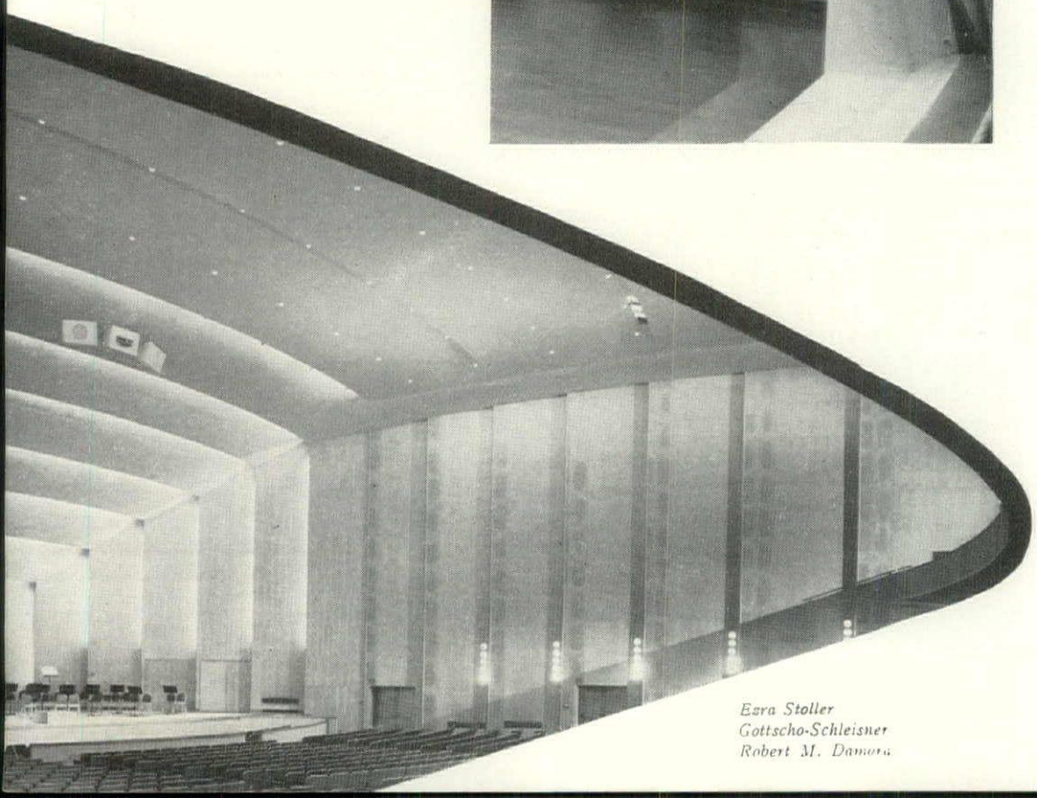




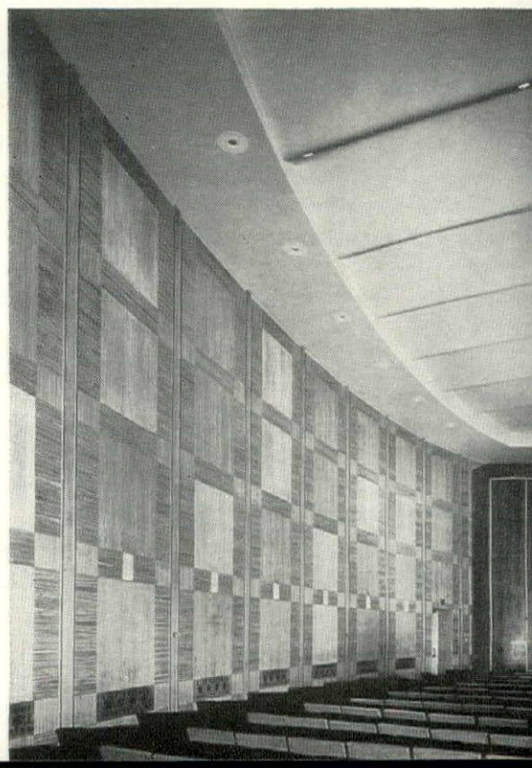
TEXTURE, FORM AND PATTERN, the inevitable tr umverate of design, are expressed in many versions. A absorption materials, like those shown above depend o perforations or cracks for effectiveness. In appearanc they range from Twentieth Century breakfast foods to th purism of open metal lath applied over a deep porou material.

The gamut in form is even broader, extending from th shape of the overall enclosure to the detailed contours interior surfaces. Cylinders and bubbles (left) serve th same purpose—diffusion. One, however, is used behir the stage, the other on the side wall of broadcastir studios. Ascertaining the preferred shapes and locatio in such instances is the job of an engineer—not an arch tect.

Pattern such as that in the Kleinhans Music Hall (be low) is the product of scientific apportioning of reflectin resonating and absorbing materials which, from th straight viewpoint of ornament, offers wide architectur variations and possibilities. This particular wall combine wood, plaster and a perforated material.



Ezra Stoller
Gottscho-Schleisner
Robert M. Damora



SOUND is self propagating — uses a structure as its medium

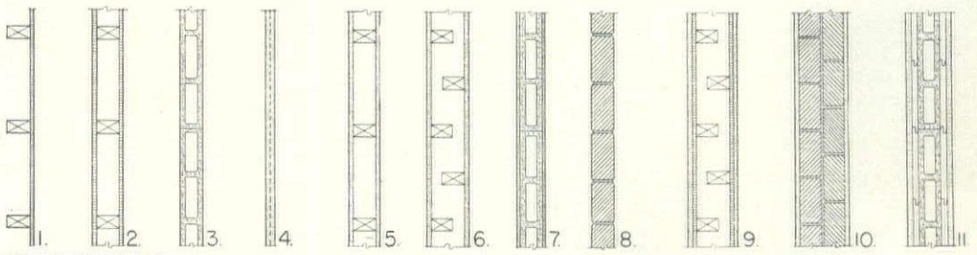
water repellant materials on the walls and floors would help to reduce reflected noise. For most families the living room calls for the most complex acoustical design since its occupants usually vary in age as well as tastes and activities. Properly engineered, it should be possible for one person to read undisturbed at one end of the room while another listens to a soft, well modulated radio program at the other. This would of course call for directing sound as well as its diffusion—such effects are often abetted by the use baffles which can range from ordinary curtains to screens and bookcases.

Taken as a unit, the livable house must be equipped with quiet zones—the bedroom, the library etc.—in addition to a satisfactory acoustical climate within the individual rooms. Mechanical noises such as those of plumbing or heating plants must be kept out of the main living area. This problem and parallel ones in commercial and industrial buildings introduces sound insulation: the technique of preventing the transmission of sound through a building. For purely residential purposes, acceptable conditions can often be achieved through the use of a strategically located fireplace or storage wall. But in every type of building sound insulation is a structural problem and under most circumstances involves something a little more complicated than stringing some closets along the wall between the bedrooms.

Too many architects tend to think of sound insulation as a magic property of particular materials. Instead it is a question of total construction; materials plus the manner in which they are used. Why so many also labor under the illusion that a material that keeps out cold will also keep out noise remains unexplained.

Sound, unlike other forms of wave motion (light) is a purely mechanical motion on the part of tangible media: everyday substances such as air, plaster, brick, etc. When sound waves generated by a source of sound within a room strike the walls of the room, a portion of the energy is reflected and the rest is said to be "absorbed." Of the "absorbed" energy a small part is actually absorbed by the pores of the wall and is dissipated into heat. If there are any cracks or holes, however, sound will pass quite freely through them. A small part of the energy will set up new sound waves in the material of the wall which will, in turn, be transmitted through it, though by acoustical standards the amount will be too small to create a problem of any importance.

Diaphragmatic action, however, is the basis of sound transmission through most air-tight partitions. When sound waves strike a wall they cause it to vibrate as a diaphragm, thus absorbing energy and reproducing the waves on the other side. Consequently, the sound insulating properties of homogenous building materials is almost invariably a function of weight, thickness and area, principally of weight. It is not difficult to estimate, more or less accurately, the sound insulation performance of homegeneous partitions, provided their relative weights are known.



1-2. wood studs and wall board, unplastered, 3. hollow block and light-weight masonry, 4. very thin solid plaster, 5. wood studs, plaster on lath, 6. same with staggered studs. 7. hollow block, plastered, 8. 4 in., brick plastered, 9. staggered studs, three coat plaster on plaster board, 10. 8 in. brick, plastered, 11. hollow block, plaster on resilient furring.

The question of weight in building, an indestructible bit of fat on which architects never tire chewing, assumes its most tangible importance in relation to sound insulation. Lightweight, desirable from the standpoint of prefabrication, is undesirable from the standpoint of sound insulation. This conflict is not irreconcilable, however. In carefully engineered walls it is possible to create light-weight sonic barriers through the use of a series of dissimilar filter units.

If the loudness of a noise which is to be insulated against measures 65 decibels (ordinary conversation level), a partition with a sound reduction factor of 40 db would reduce the sound to 25 db at which point it would be quite audible but probably unintelligible. In order to reduce the sound to 15 db—the point at which it would be barely audible—a partition with a sound reduction factor of 50 db would be required. If however, the sound to be insulated against were about 80 db—that of a very loud radio—this increased sound reduction has less importance. Whereas the better of the two partitions would reduce the sound to only 30 db, the partition with the 40 db reduction factor would reduce it to 40 db.

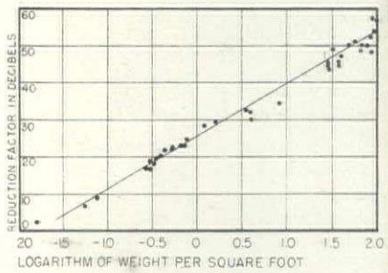
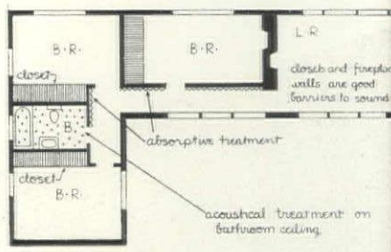


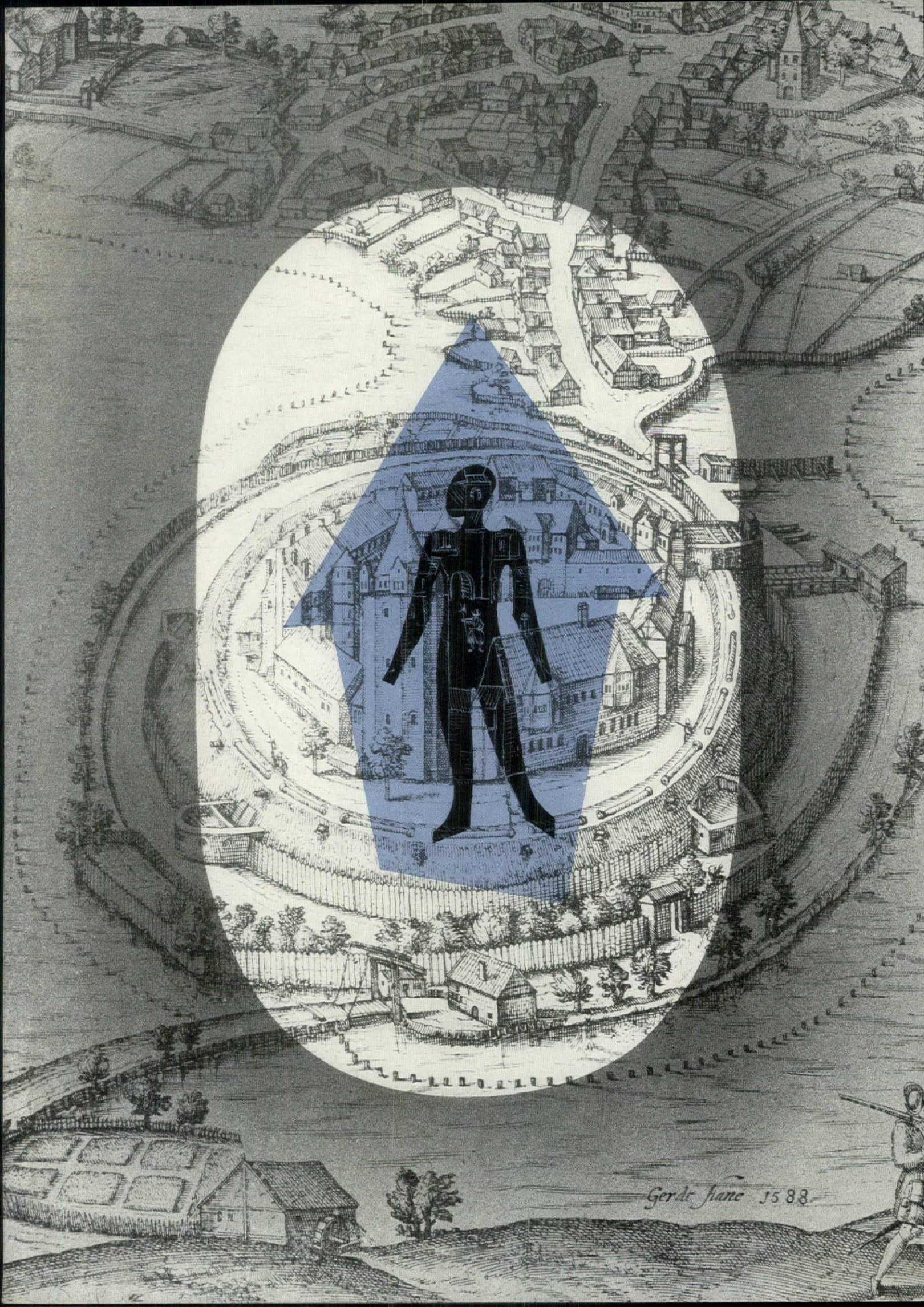
CHART showing results of numerous Bureau of Standards tests, indicate that the sound insulating properties of partitions tested is primarily dependent upon their weight.

In contrast to walls, it has been found that the insulating performance of floors depends less on weight than construction. This is true because the floor problem is more one of "impact" than airborne sounds. In floor construction, good sound insulation hinges largely on "floating" the various elements, so as to reduce the effect of the original impact (feet striking the floor), and breaking the diaphragmatic action by introducing non-conductive materials at strategic joints. A heavy rug is an excellent sound insulator.

The air tightness of a window determines to a large extent its effectiveness in barring sound. Not much has been done in insulating glazed areas against outside noises but practice in the broadcasting field has proved that double glazing of different thickness with a wedge shaped air space between successfully breaks the diaphragmatic action since the heterogenous weights of glass do not vibrate to the same frequency. If the air space extends into the window head and partition wall the insulating value is increased because of the additional area provided for the sound wave to dissipate its energy.



HOUSE PLAN shows how combination of heavy fireplace wall and absorbtive treatment in corridor may be used to isolate bedroom and living areas.


Gerdt Jane 1588

enclosure

the building shell has become a filter between exterior and interior environments rather than a simple barrier

WHEN Neanderthal man had the good sense to creep out of the rain into a nice, warm cave, the primary purpose of building was established. First and foremost it is a protection against the elements. The cave was a rather crude protection, minus thermostatic heat control and even a front door. Eventually it was replaced by mud and stone huts and these in turn by more elaborate structures, at least somewhat more efficient in keeping out a naturally hostile environment. As people became increasingly civilized, building began to branch out from its original purpose of shelter. Great temples were built, not only to protect man from rain and snow, but to express his religious instincts. The Pyramids were erected, not to shelter living human beings, but as catacombs for kings. During the feudal period, when any day might bring a surprise attack from a neighboring lord, castles sprang up with walls 20 ft. thick, tiny slits of windows, moats and drawbridges, and battlements equipped for pouring boiling oil on unwelcome guests. Today, the purposes of building are numberless. The industrial age has spawned factories and skyscrapers whose primary function is production and business. Churches, schools, hospitals, theaters, club buildings, band stands, filling stations—and homes—are but a sampling of our specialized structures.

With this diversification of use, however, has come an expanded realization of building as a protection against the natural environment. We no longer need thick walls and a drawbridge to shield us from sudden marauders. But the complex activities of our complex civilization could never be carried on in the drafty interior of a medieval castle. A precise control of environment never before envisioned by man, has become an absolute necessity. For instance, a building in which to manufacture film must provide absolute control of light and temperature and eliminate natural dust particles from the air. A broadcasting studio must exclude all outside noise while regulating the sound manufactured within. Such environmental controls, developed though they were to serve the needs of modern industry, have implications for every type of structure from skyscraper to three-room bungalow. Inevitably they alter our entire approach to building design.

No longer do we think of the building as a simple barrier against unpleasant weather. It must be constructed to keep out a greater variety of natural elements than the crude structures of the past could have attempted. In addition, according to building type, it must let in more of the pleasant elements—winter sun for heating and cheer, spring and summer breezes, country smells and sounds—which earlier building excluded in its one-way fight against the hostile elements of nature. Thus, the aim of building today, except in specialized industry, is to maintain as intimate a contact with nature as possible, excluding only undesirable phases while exploiting positive advantages to the full.

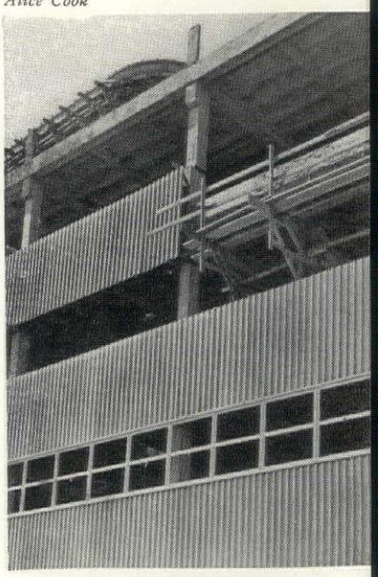
Of equal importance, is the new realization that the structural envelope is subject not only to forces from the outside, but from the inside as well. Not only must cold be excluded in the winter, interior heat must be prevented from escaping. Rain must be kept out, but water vapor necessary to a healthful humidity must be kept inside and prevented from condensing and rotting the walls. Dust, pollen, gases, and insects should be excluded—but cooking fumes and smoke, excess moisture from showers or laundry driers should be vented to the outside. Clatter in a kitchen, workshop or busy office should be absorbed by the enclosing walls, but radio music should be reflected, amplified and refined. Apertures which admit natural light during the day should be protected from loss of artificial light at night.

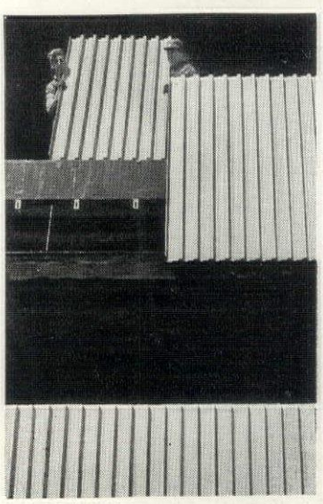
Thus, we no longer see walls, roof and floor as a simple box designed to shut us off from the outside environment, but as a four-way mechanism which keeps out and lets in, keeps in and lets out. Rather than a barrier, the enclosure has become a filter between two environments: the natural climate of the out-of-doors and the man-made climate of the interior. The building shell must almost literally breathe, focus and adjust itself to the shiftings between these two. Naturally, such complex requirements bring radical changes in structural design.

In order to put these new requirements into practice, however, three things were prerequisite: first, scientific research into the action of such natural phenomena as light, heat and sound waves, vapor and air pressures; second, scientific research into the properties of structural materials; third the invention of new materials and methods based on this new-found knowledge. At present these laboratory developments are only beginning to be utilized. When they have become commonplace we may expect a truly contemporary architecture to emerge.

One of the fundamental changes which has already occurred in building design is the shift from a wall whose total structure is load-bearing to the wall composed of a load-bearing frame or skeleton faced with a "skin" which supports no weight, but is merely a finish material. This development, an offspring of modern steel manufacturing processes, was first seen in the steel-framed skyscraper. Here, walls could be made much thinner and buildings could rise much higher because each story of masonry or wood surfacing supported only its own weight. The logical outcome of this type of construc-

Alice Cook





INDUSTRIALIZED ARCHITECTURE: Metal-clad, insulated curtain walls made of standard prefabricated sections are hung on light steel building frames.

tion is the "curtain wall"—a new mass production development which allows the use of factory-made rolled steel or other panels as surfacing — rather than the hand-produced masonry facing of the past. Prefabrication of wall panels or of whole houses and specialized buildings is just beginning to open up new fields for the application of mass production to a hopelessly old-fashioned craft industry.

However, whether the designer is working with mass production or the still preponderantly craft methods of conventional building, the separation of skeleton from skin in the shell of a building changes his basic design approach. For the first time the skin treatment has achieved comparative freedom and can be utilized to solve the many problems inherent in turning the structure into a flexible, filtering mechanism rather than an inflexible barrier.

A new environment in six inches

Virginia Wolfe, the distinguished British novelist and essayist, has inadvertently described some of the discomforts inherent to a simple barrier type of construction. In the *Common Reader* she paints a dismal picture of the Fourteenth Century castle dweller: "There on the hard chair in the comfortless room with the wind lifting the carpet and the smoke stinging his eyes he would sit reading. . . ."

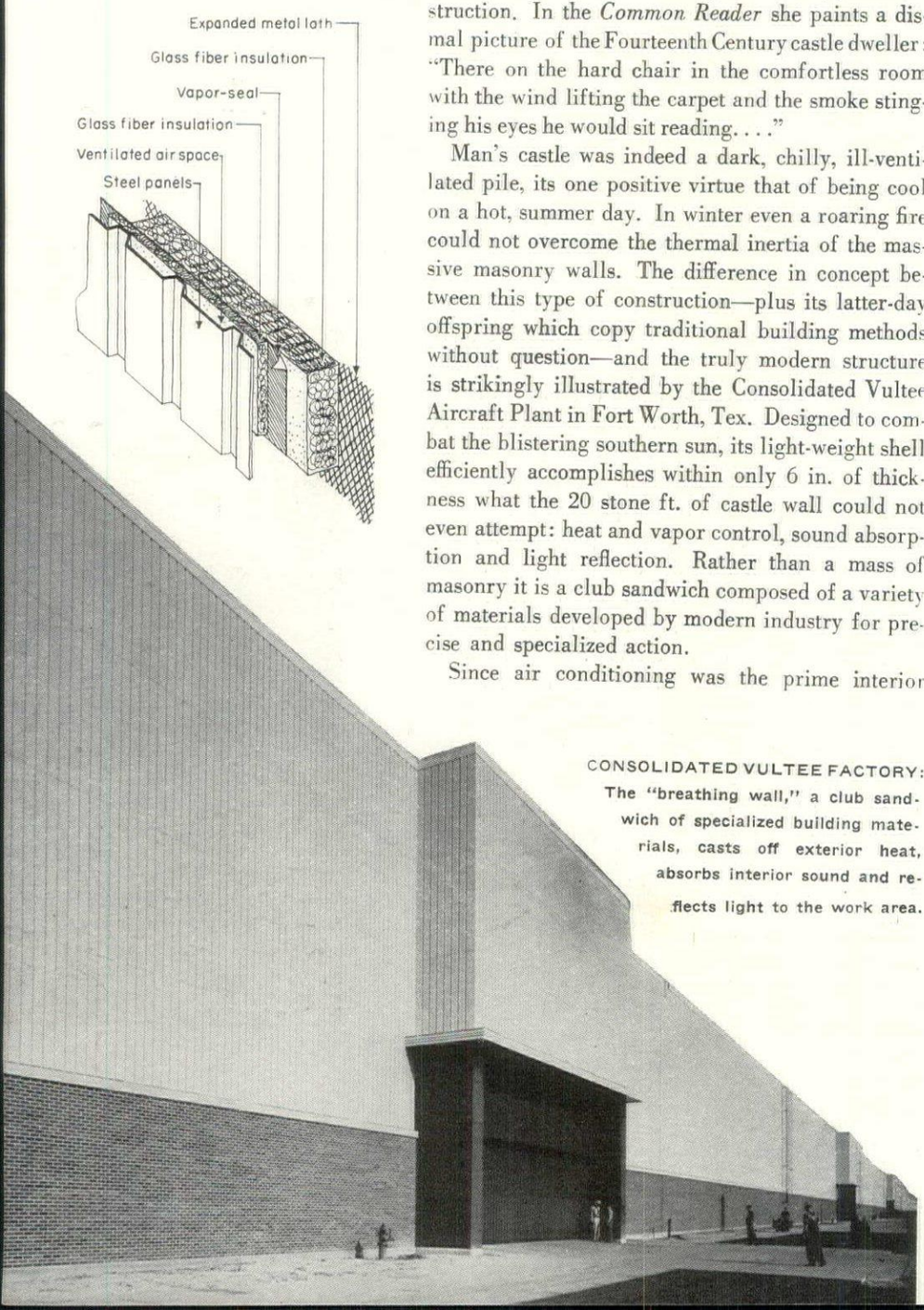
Man's castle was indeed a dark, chilly, ill-ventilated pile, its one positive virtue that of being cool on a hot, summer day. In winter even a roaring fire could not overcome the thermal inertia of the massive masonry walls. The difference in concept between this type of construction—plus its latter-day offspring which copy traditional building methods without question—and the truly modern structure is strikingly illustrated by the Consolidated Vultee Aircraft Plant in Fort Worth, Tex. Designed to combat the blistering southern sun, its light-weight shell efficiently accomplishes within only 6 in. of thickness what the 20 stone ft. of castle wall could not even attempt: heat and vapor control, sound absorption and light reflection. Rather than a mass of masonry it is a club sandwich composed of a variety of materials developed by modern industry for precise and specialized action.

Since air conditioning was the prime interior factor necessary to the manufacturing process and the productivity of workers, the shell's first function was to conserve energy in the conflict between cool inside temperature and extreme outdoor heat. Thus, the exterior of the wall is made of steel to reflect a high percentage of solar radiation. A coat of white paint further steps up this reflectivity. The metal exterior has also been shaped into thin vertical pans, to form a series of chimney-like air spaces inside the wall. Vents at the top of each "chimney" allow the escape of heat absorbed by the outer layer.

The interior surfacing of the wall is made of expanded metal lath, which passes sound through its many small openings. The lathing is painted white to reflect every possible bit of light, an important point since the need for temperature control precluded windows and the building is lighted entirely by artificial means.

Inside the wall itself and directly behind this metal lath surfacing is a layer of fluffy glass fiber insulation which serves the double purpose of heat barrier to outside warm air and sound absorber, sponging up interior noise in millions of tiny air pockets. Between this insulation and the adjacent air space is the tight vapor barrier necessary to ward off condensation always found in a sandwich structure separating two environments of vastly different temperatures and vapor pressures.

To produce this wall, which reflects and "breathes" away external heat, stops the passage of water vapor, absorbs much of the clatter of factory operation and heightens interior illumination, scientific knowledge of natural phenomena has been applied to the choice of materials and their assembly. The result is a wall of different function, form, pattern and texture than any seen before.



CONSOLIDATED VULTEE FACTORY: The "breathing wall," a club sandwich of specialized building materials, casts off exterior heat, absorbs interior sound and reflects light to the work area.

Winter-summer walls

The problems successfully dealt with by the Consolidated Vultee factory include many of those which must be solved by other building types and under different climatic conditions. Complex as the wall is, however, it presents a limited solution to weather, since it is designed primarily to exclude outside heat. Buildings situated above the 35° January isotherm (most of the northern half of the U. S.) must contend with the additional factor of winter cold. The direction of heat flow is thus reversed and methods for halting its passage must be changed accordingly. Since the problem here is to retain heat within the building, reflective materials such as metal foil can be used to advantage on some interior surfaces—the opposite of the Fort Worth solution which places the reflective material outside. Insulation within the wall is still the most familiar and generally acceptable heat barrier, however, and its application is much the same no matter what the direction of heat flow. The placement of the vapor barrier, on the other hand, changes in relation to heat direction, since it must always be applied next to the warmer surface. Thus, in the air-conditioned Vultee building described above, the barrier was

placed toward the outside. In northern construction the vapor barrier is placed next to the interior wall surface. Buildings which use year-round temperature conditioning to combat extremes of cold in winter and heat in summer, must solve both problems within one structure. Johns-Manville has developed an efficient system placing the vapor barrier in the center of the wall with a layer of insulation on either side. This construction works both ways, the exterior insulation being effective in winter, the interior insulation in summer and the vapor barrier at all times.

The ventilation of walls and roofs is an excellent device for carrying off heat and vapor and equalizing vapor pressures within the structural sandwich. It is almost a necessity with the complex walls just described, particularly in warm climates or with summer air conditioning. In the now developing manufacture of curtain walls, however, the opposite tack has been taken by some experimenters. The aim is a perfectly sealed structure made of two heat resistant and vapor tight panels enclosing one layer of insulation. Since no vapor can enter the wall, condensation is eliminated at the source. Thus, a relatively simple wall structure can be made to work in two directions, warding off both outside heat in summer and retaining inside heat during the winter. However, many engineers question the possibility of achieving an absolutely airtight seal, pointing to the disastrous results of this system when used during the war in certain prefabricated wood houses. Because the seal was imperfect and the structural material porous, some vapor got through, condensation occurred and before long the plywood panels started to curl. With the use of metal rather than wood for enclosing panels, it may yet be possible to create a really airtight structure. The virtues of a ventilated outside shell might be matched by an exterior surface of bright metal, which would permit less heat to enter the wall itself and thus less to travel in to the building.

Sunshine and structure

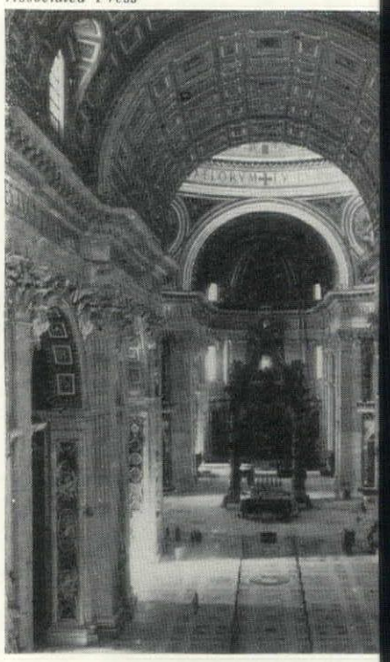
In dealing with the thermal problems of the structural envelope, it is valuable to gain a working knowledge of the energy which must be controlled. All heat is a by-product of solar radiation—the only form in which energy reaches the earth. This radiation (or sunshine) is a mixture of three types of waves—all of them capable of producing heat—which are emitted according to the temperature of the source. The longest waves are invisible infra-red, a large amount of which are contained in sunshine. Shorter waves are visible light which make up the greatest part of the total energy reaching the earth. The shortest waves are ultra-violet which have germ-killing and tanning properties but which represent only a very small part of the energy in ordinary sunshine. As they pass through the atmosphere, all of these waves are in the form of radiant energy and are not turned into sensible heat until they strike an object.

The pertinence of such knowledge to building design is illustrated by a recent experiment conducted by the Building Research Station in England. Tests were run to determine the relative heat reflective efficiency of a bright aluminum roof and the same roof surfaced with white paint. To the surprise of researchers, the white paint was slightly better than aluminum. From this it might be assumed that white painted interior walls would act as an efficient themal insulation, superior to metal foil in reflectivity. This, however, is not true and the reason lies in the type of heat waves reflected by the two materials. Aluminum reflects practically all of the infra-red waves and a portion of the visible light waves. White paint reflects a portion of the infra-red waves and almost all of the light waves. Since both light and infra-red waves produce sensible heat and since there is a substantially larger proportion of light waves in sunshine, white paint wins as an exterior reflector. Inside the house, however, almost all radiation is in the infra-red range and white paint is therefore practically useless as a thermal insulation, although still of value as a light reflector.

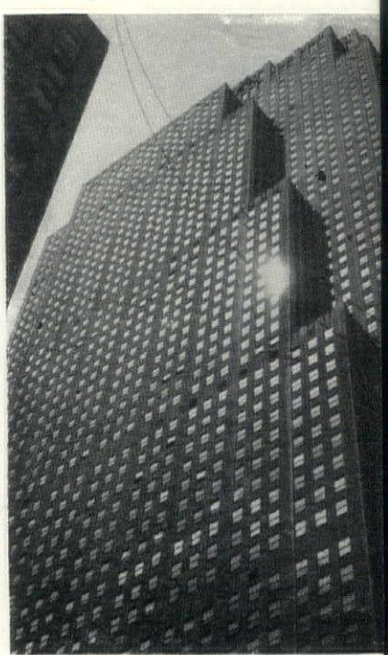
All materials react differently—either by transmission, absorption or reflection—to the various waves of radiant energy, and this reaction is naturally of consequence to building. Glass, of course, is transparent (i.e. transmits) the visible light waves. but absorbs infra-red and ultra-violet. White paint reflects visible light and ultra-violet, but absorbs infra-red. Metals reflect infra-red and many of the visible light waves, absorbing others according to color. Since most of their action is reflective, however, they are classed as having low emissivities, or a low ability to emit and absorb infra-red radiation. Most other building materials such as wood and masonry have high emissivities, absorbing infra-red. ultra-violet and a high percentage of visible light. Metallic paints which are a combination of metal particles in a non-metallic vehicle stand about midway between these two in emissivity.

By now it is obvious how the choice of building materials is influenced by both heat transmission and the content of radiation. We have seen the advantages of reflective metals in excluding outside and retaining inside radiant heat. The absorptive materials, too, are of value if their peculiar properties are taken into consideration. Masonry, for instance, with its high emissivity is capable of storing away great quantities of heat both from the outside sun and from inside air and objects, releasing it later when surrounding temperatures have gone down. Being a dense substance, it also has a high rate of conductivity, so that heat is readily distributed throughout the material. However, because it is generally used in such large mass, this process of absorbing heat is not a fast one, in actuality taking many hours depending on the amount of masonry involved. The practical implication of these facts in designing a building is of tremendous importance. The storing of heat in a heavy masonry structure creates a flywheel effect which works on both a day-to-day and season-to-season basis. For

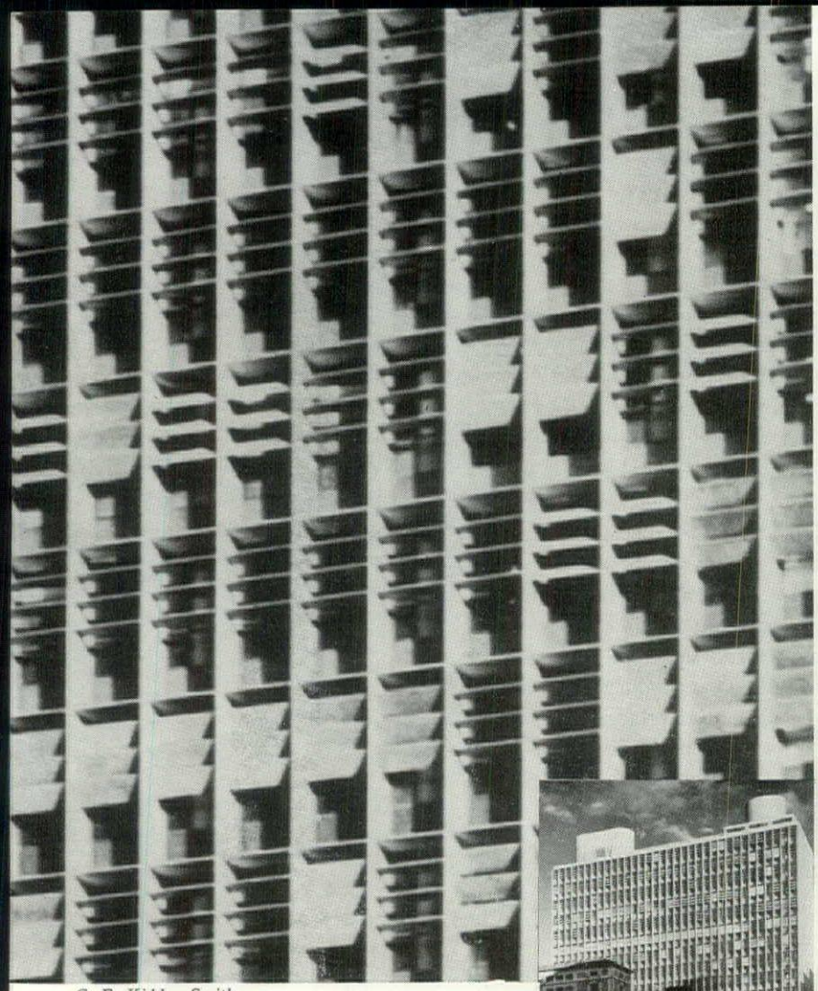
Associated Press



THE MASONRY FLYWHEEL that warms St. Peters Cathedral (above) in winter by releasing stored summer heat also makes New York a blast furnace on summer nights when concrete buildings, sidewalks and streets give off the day's absorption of solar energy. The 6½- acre south wall of the RCA building (below) is hit by 4½ million Btu per hour on a sunny day, enough to bring 3,750 gallons at 60° F. water to the boiling point.

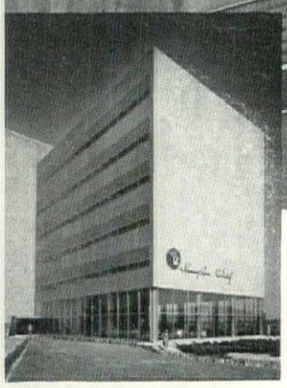


Samuel Chamberlain



G. E. Kidder Smith

SUN BAFFLES of the Ministry of Education building in Rio de Janeiro are designed to keep out heat and glare of tropical sun while reflecting visible light into interior.

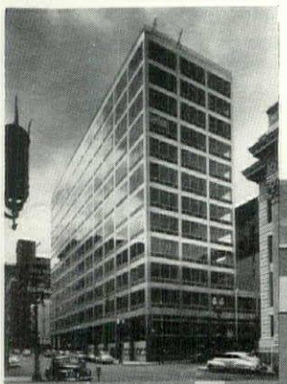


Hedrich-Blessing

DIRECTIONAL GLASS BLOCK in American Stove Co. building, St. Louis, solves problem of illumination for a southern exposure, by-passes question of excluding solar heat.

SUN HOODS placed at mid-story in the Schuckl Canning Co. offices, Sunnyvale, Calif., bounce light into room above eye-level of occupants, also shut out heat and glare.

Roger W. Sturtevant



HEAT INTERCEPTING GLASS, sandwiched with panel of clear glass in Equitable Savings & Loan Co. building, Seattle, acts as thermal insulator, somewhat reduces glare.

Ezra Stoller

nstance, air conditioning engineers have discovered hat office buildings with thick masonry walls store ıp quantities of solar heat during a hot summer day ınd release it at night after the sun goes down. This s a decided asset for this particular type of building ince little heat enters through the walls to discom- fort inmates during the day, while heat is given off at night when the space is unoccupied. On the other ıand, this fact is one of the main reasons why mod- ern cities, composed of masonry buildings, concrete sidewalks and asphalt streets, with few if any trees. are so unbearably hot on summer nights. From every side stored heat is being released by surround- ing masonry.

The flywheel effect works most effectively in a climate such as Mexico City or California where heat storage can counteract the evening drop in tem- perature. St. Peter's Cathedral in Rome represents an example of this phenomenon on a seasonal basis. Built of uncounted tons of travertine and marble, it is cool in warm weather because summer heat is being blotted up by the masonry. Its tremendous bulk accumulates enough heat during the summer to last all winter long. This building has never been heated by artificial means, and though travelers report that it is chilly in the wintertime, it is nonetheless con- siderably warmer than an unheated structure not releasing stored summer heat. The medieval castle with its 20 ft. thick masonry walls operated on the same principle. Since most of these structures were in northern climates, however, the effect was much less pleasant. Summer heat would be lost in short order and most of the fireplace radiation wasted in a fruitless effort to heat up the mass of stone.

With modern knowledge of the action of masonry, however, it can be made a decided asset in building construction, although its properties should be taken into consideration when planning the heating sys- tem. In a year-round house, a wall of this material, of the proper thickness, can act as a heating and cooling agent. Warmed by solar radiation during a winter day, it releases this warmth at night, some- what equalizing temperatures. During the summer it keeps rooms cooler in the daytime by absorbing solar radiation as well as heat from the interior. The action of such a "solar wall" is quite inefficient, however, since most of the useful heat it accumu- lates is given off to the outside.

A more knowing exploitation of the absorptive quality of masonry is its use inside the house in con- junction with solar windows. Applied as a flooring with winter sun focused on it through large glazed areas, masonry becomes a heat storage reservoir, substantially adding to the effectiveness of the solar design. In reverse, a concrete slab floor in contact with the earth can act as a cooling unit in summer, drawing heat from the interior even in sizzling weather. Special care must be taken, however, to protect it from summer sun, especially in bedrooms since, unlike the living areas, they are used at night when the concrete is releasing its store of day heat. Fireplace and chimney areas or interior walls of masonry have a similar winter-summer effect on thermal comfort if windows are designed to focus sun on them during cold months and protect them from solar energy during warm weather.

When the action of masonry is not understood, mistakes can all too easily be made in using it. One particularly bad application is the intermittently occupied structure such as a winter weekend cottage in a cold climate. Here, freezing weather quickly draws off any excess heat stored during the summer. Several days and an enormous amount of fuel is needed to warm the masonry to a point where it is not absorbing heat from every object in the room including people. Result: an uncomfortably cold interior during a few days' stay. Another disadvan- tage of masonry becomes apparent in a humid cli- mate subject to abrupt temperature changes. Be- cause of its slow "reflex," masonry does not respond as quickly as air to shifts in the temperature. If the wall or floor mass has become cold and the air sud- denly rises in temperature, absorbing extra moisture, condensation will occur on masonry surfaces.

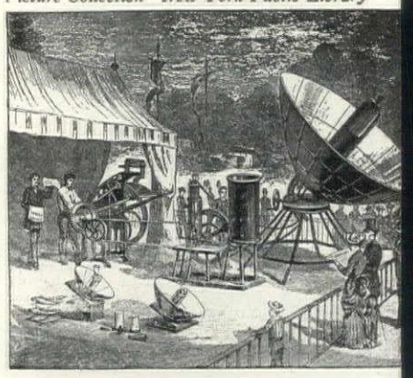
Glass as a thermal agent

In thermal properties (as differentiated from its unique ability to transmit light), glass is very like masonry—having both high emissivity and high conductivity. However, used in thin panels as it is, the action takes place much more quickly and glass is thus constantly absorbing heat by radiation and contact with warm air, releasing it immediately to the cooler side of the wall. This is why one feels cold when sitting near a window in the winter, even though there are no cracks through which air can enter. Radiant heat in great quantities is drawn from the body to the window glass where it is ab- sorbed and thence conducted to the outside. Heat loss from the air to the glass also lowers the tem- perature of air near the window, creating a cold downward current which spills out as a draft along the floor. With an outside temperature of zero, a sheet of glass has the same effect on a room as a chunk of ice of like size. In summertime, of course, the reverse is true. Glass is constantly at work warming up an air-conditioned interior by passing heat through from the out-of-doors.

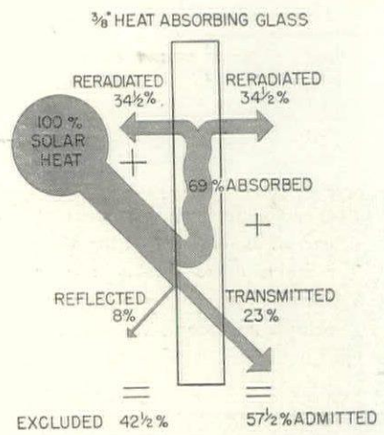
If thermal insulation were the only requirement of the building shell, windows would long since have been eliminated. Since illumination, ventila- tion and view are also rather important considera- tions, the abysmal performance of glass in the ther- mal area must be coped with. Actually, the problem of heat loss through windows is similar in kind to that of the solid wall area, differing only in degree. Even the worst wall is a comparatively good barrier against heat. While it can be improved only slightly, this small improvement may make a decided differ- ence in fuel costs and comfort. Windows, on the other hand, are such bad heat barriers that they can be improved a great deal, and still not be as good as the worst wall.

The most familiar and simplest answer to the problem of heat loss through windows is, of course,

Picture Collection—New York Public Library

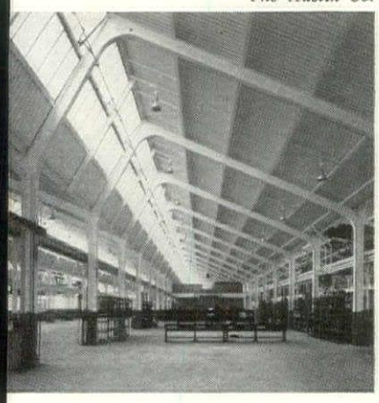


MOUCHOT'S SOLAR ENGINE, 1878. Harnessing the sun is nothing new. Here, radiant energy prints a Nineteenth Century newspaper. The sun's rays are reflected by a huge funnel of mirrors onto a central water tank, thus producing steam to power a steam engine which in turn runs the printing press. Recent experiments in trapping sun energy promise its use as an auxiliary power source for heating both water and air.

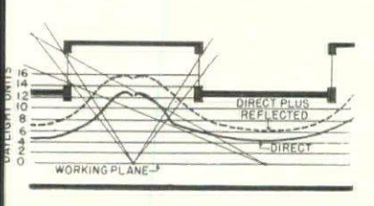


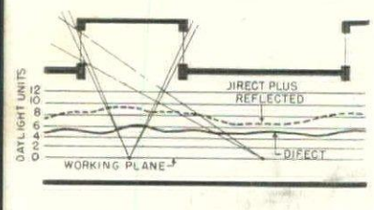
HEAT INTERCEPTING GLASS. One of many Twentieth Century sun controls, this specialized glass reduces the heat content of sunshine which penetrates it. Because it converts solar energy into sensible heat within the glass, it still admits a large percentage of heat when used by itself rather than in conjunction with a vented air space.

The Austin Co.



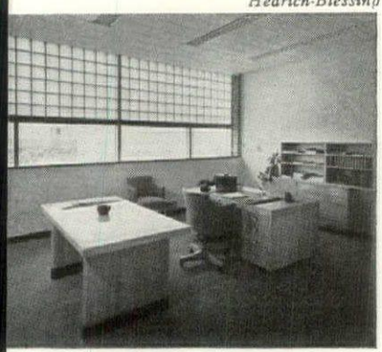
SKYLIGHTING of even the largest building is made practical by modern structural techniques such as the welded, rigid frame used in a Detroit factory.





MONITOR LIGHTING provides many of the advantages of the true skylight, is often more practical for extremely wide floor areas. Diagram above shows superior performance of narrow monitor. Since the glass plane is nearer the under-roof section, illumination at darkest point is increased.

Hedrich-Blessing



DIRECTIONAL GLASS BLOCK of American Stove Co. building provides even, diffused lighting in spite of difficult south exposure. Light is bent by opposed prisms within the block itself, thus eliminating necessity of cleaning irregular surface.

the use of heavy draperies. Thick curtains effectively stop radiation from interior objects to the cold glass. However, they have less effect on loss of heat from warm outside air, and thus do not provide much insulation. Furthermore, although practical at night when artificial light should be kept inside, they are almost useless during the day because of eliminating the window's major function—illumination.

A more practical solution to the over-all problem is therefore the use of double glazing—a system based on the same principle as the insulated sandwich wall discussed previously. At design temperatures (70° F. inside, 0° F. outside) the inner surface of a single sheet of glass goes down to 32° F., while that of a double-glazed window stays at 60° F., or about the same temperature as an uninsulated wall. As a consequence the cooling effect of glass on interior air and radiant temperatures is minimized. The higher inside surface temperature of the glass also prevents condensation of moisture and formation of frost on window panes which otherwise would result in damage to sash, stool and below-window wall areas. In summer the action of double glazing is reversed. Heat transfer from outside air temperature is slowed down and the temperature of the inside glass surface is also lowered, thus pulling more radiant heat from interior objects and people. This summer slowdown is hardly noticeable and, it might be added, hardly worth paying for, in buildings which are not air-conditioned. With year-round temperature control, however, double glazing is almost a necessity. Here, the different solutions to condensation and dust collection within the glass sandwich should be considered. "Breathing" windows which vent water vapor to the outside in a manner similar to Consolidated Vultee's "breathing wall," are one solution to the problem of winter window insulation. With year-round temperature conditioning, however, completely sealed double glass (now perfected) is unquestionably the better choice since it works well in either direction.

The use of large glass areas which gives modern architecture its unique quality of spaciousness and kinship with the out-of-doors is inseparably linked with such technological advances as double glazing and related thermal controls. The delicacy with which solar radiation and interior temperature can now be regulated gives architecture a new freedom from the limitations of both specific weather change and general climatic conditions. New structural systems and specialized materials based on a constantly growing body of scientific knowledge have already set the stage. Of the resulting architectural productions, one of the most telling is the recent Oregon office building designed for the Equitable Savings & Loan Co. (FORUM Sept. '48). Its extremely large windows are made of heat intercepting glass, already proven in airport control towers which must command a view of the sky without roasting the workers inside. A pale greenish-blue in color, this glass cuts down visible light by only 25 per cent while reducing heat transmission to 45 per cent of the ordinary flow. The architect has combined the use of this special glass with double glazing, thus gaining the advantages of both heat absorption and insulation. For hot climates and air conditioned structures, an even better solution might be the mounting of heat intercepting glass at the outer edge of wide sun hoods, with ordinary glass at the building line and vents at top and bottom of the air space thus enclosed. Sensible heat released from the outer pane of glass and from the infra-red rays striking the hood would be vented out the top of the air space before ever reaching the inner pane.

The idea of non-absorptive glass which would actually *reflect* most of the infra-red rays has also been considered. Obviously, it would be even more effective in heat control than intercepting glass. Such a type has not yet been commercially perfected, but experiments have been conducted at Purdue University in applying thin metallic coatings to interior glass surfaces. This cuts down heat radiation to the glass in winter, although slowing up solar radiation from the outside in. It would therefore be useful as insulation but bad for solar heating.

Document glass is yet another special type designed to control the content of radiation. In this case ultra-violet rather than infra-red is the wave length eliminated. A typical golden color indicates that the blue band of the spectrum has been absorbed. This glass is named after its principle use to date—that of protecting valuable documents framed under it from the effects of time. It offers many other potential uses in show windows, restaurants, offices and homes where colors of merchandise, drapery or furniture coverings must be protected from fading. The golden cellophane now used by some shops to protect window displays testifies to the present failure of architecture in this function.

Design for daylight

The problem of excluding certain areas of the solar spectrum is matched by the problem of admitting visible light into the building interior. The small windows of traditional architecture were the best solution possible within the limitations of the structural systems then in currency. But in providing the required amount and quality of illumination, they were hopelessly inadequate. With the freedom given to contemporary design by the steel frame, windows began to expand, but little attention was paid to the diffusion of light in a uniform, non-directional brightness throughout the interior. Today, scientific studies of the visible light rays and their interaction with both surrounding surfaces and the human eye are producing standards of daylighting which should change the face of much of our architecture.

One of the best recent examples of illumination as a controlling factor in design of the structural shell is the American Stove Co. building (FORUM, Oct. '48). West and east exposures have been dismissed at the outset as too troublesome to bother with and walls on these sides are therefore completely

windowless. North offices have simply been given deep ribbon windows of clear double glass, since this exposure offers good light with a minimum of control. Continuous fenestration rather than small separate windows is the important point here. With glass areas more than twice that of conventional fenestration, a relatively greater amount of light is admitted. In addition, the glare produced by contrast between bright glass areas and darker wall areas—a prime source of eye fatigue—is greatly reduced. The south wall poses a more intricate problem since direct sunlight is much too intense for office work. Glass block has thus been used above a narrow vision panel to bend direct rays up to a reflective ceiling and thence down as diffused light into the depth of the room. None of the ideas used in this building is new but the various specialized solutions result in a handsome over-all design guided by functional requirements rather than artistic fantasy.

Another and even more striking example of the change in structure which occurs when natural phenomena are allowed to control design, is the California schoolhouse recently completed in San Mateo (FORUM, Sept. '48). Here, the skylight traditionally preferred by artists and already exploited in factory illumination is applied to a new building type. Center roof fenestration protected from direct sun by slanted louvers and combined with hooded ribbon windows at the side, floods the interior with diffused light 147 foot-candles brighter than that of a conventional "well-lighted" schoolroom. This type of lighting is, of course, impossible except with one-story plans, but its use for all such structures should not be overlooked. More important, the approach to daylighting illustrated here can be applied to any problem. Instead of being guided by man-made tradition, the architect has re-examined the source of illumination and designed accordingly.

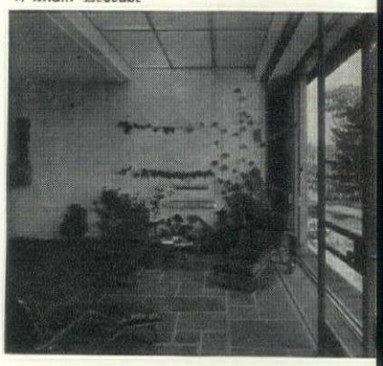
For centuries it has been recognized that the sun itself or its direct rays are harmful to the eye mechanism. Only recently has the knowing exploitation of the other major light source—the sky vault—become a goal of the architect. One important step toward reaching this goal is the adoption of a new measure of light—the "daylight unit." The foot-candle measure came into being with artificial illumination. The daylight unit takes into consideration factors omitted in the other measure. It is usually defined as "1/100th of the light falling on an unobstructed horizontal plane from the whole sky vault, exclusive of direct sunlight." This unit has two advantages for the architect dealing in daylight illumination. First, it is a measure of the illuminating power of the sky, rather than an abstract unit, and its use presumes a specific amount of visible sky (1/100th part for every daylight unit to be exact). Second, its value in foot-candles goes up and down according to outside conditions, being higher on a bright day than on a dull day. Since it is generally recognized that minimum levels of interior illumination should rise and fall in relation to outside conditions, this makes it a flexible tool with which to work. Specifically, it indicates a truism that if a substantial part of the sky is visible from every part of a building and shielded from direct sunlight, the building has generally good illumination.

Sound control

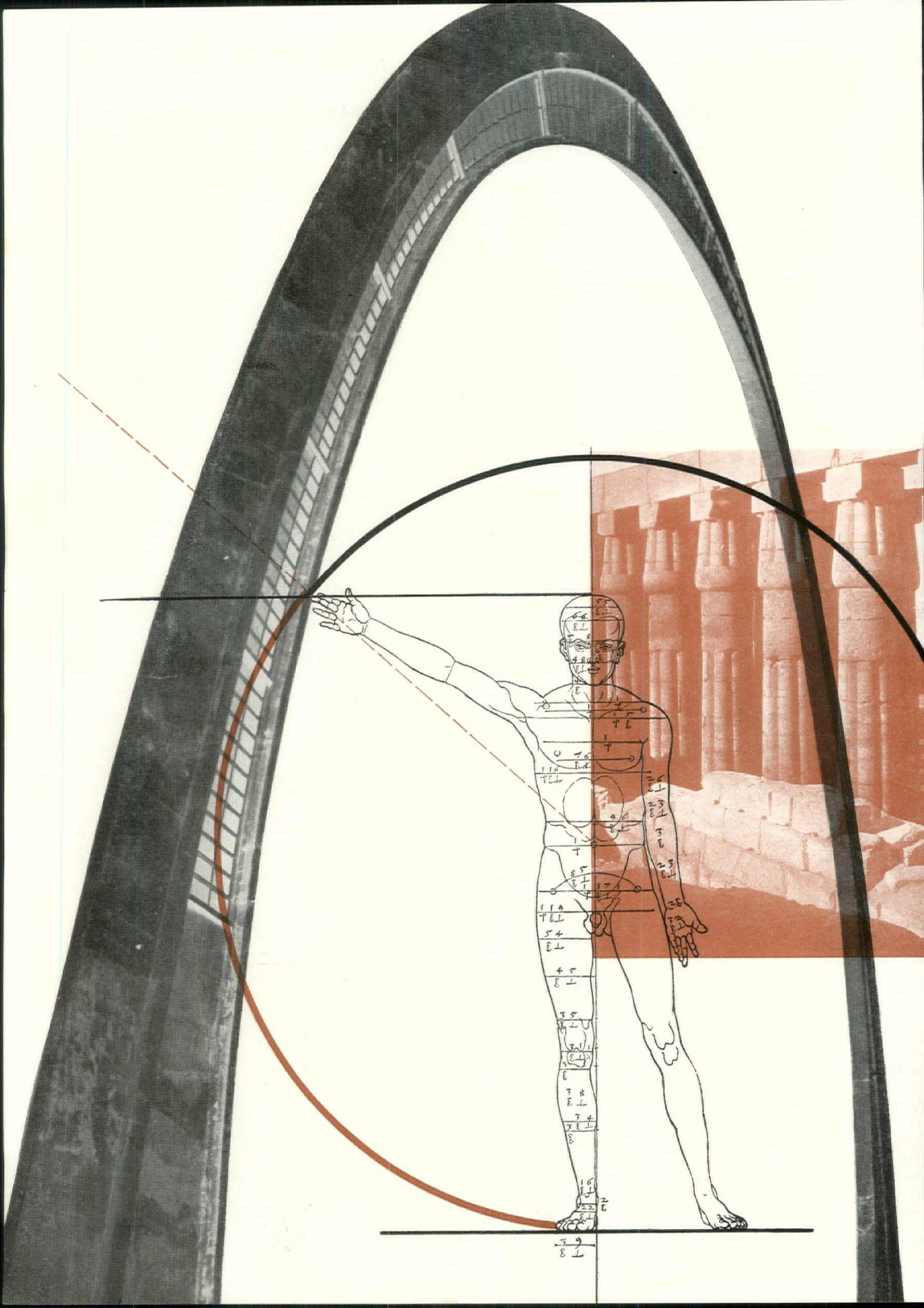
One of the failings of modern buildings is that they have given little attention to sonic standards except in specialized designs such as broadcasting studios. Here, of course, the absorption and reflection of sound has become a science, influencing the shape of the structural shell as well as its interior construction and surfacing. This control of sound within a building or room is discussed at length in the chapter *Sound*. The major sonic function of the enclosing walls and roof, however, is the prevention of sound transmission in and out of a building. Essentially, this is a matter of mass. A masonry wall is therefore excellent, but its sound insulating properties are destroyed the instant a window is opened. One solution which is also valuable from the point of view of thermal insulation is the "double envelope"—a light insulated structure separated from the out-of-doors by a heavy masonry exterior. Except under extraordinary circumstances such a design is both too fancy and too expensive. It is, however, possible to design windows—the prime offenders in sound transmission—in such a way that they can blanket noise. A heavy masonry window ledge extending out from the building line will intercept a high percentage of sound waves from below and might be made to serve the double purpose of reflecting light from its upper surface into the room. Coupled with acoustical treatment on the ceiling just inside the window it is an effective sound barrier. This type of design is important in city dwellings and office buildings where noise from the street below constitutes a real problem.

Many of the requirements of the building shell are contradictory. A good sonic solution, for instance, may preclude a thermal solution of equal merit. Such seeming contradictions are, however, entirely soluble with suitable combinations of structure and materials. For instance, the west wall of an office building facing the street calls for sound exclusion and solar heat absorption on the outside, quick thermal response on the inside. Because of the building's exposure, a solid, windowless masonry wall which both excludes sound and absorbs heat may be the best choice, since it simultaneously solves the first two problems. There still remains the need for quick thermal action which masonry is famous for lacking. This can be provided by adding a thin interior panel of heat resisting material such as the metal foils. It is, of course, impossible to list, much less discuss, the myriad combinations of problems which must be overcome in different structures. But a realization of the existence of these problems and an understanding of the various physical reactions involved—both natural and structural—plus use of the many specialized materials already available will lead to much more effective solutions.

William Lescaze



DOUBLE SHELL provides both sonic and thermal insulation in this residence by interposing a buffer environment between inside and outside climates.



esthetics

the new technology has freed architecture from dishonest symbolism; how far can it be used as the basis of a new art?

EVERYTHING *that Greek architecture did was by means of the stone; everything that Gothic architecture did was in spite of the stone.*

—Worringer

If almost every aspect of man's structural environment now yields itself to measurement and to the disciplined methods of scientific thinking, what about the X-function of building—its esthetic effect? The new technology has enormously increased the precision with which a building can meet the basic physical requirements of keeping warm or cool, seeing and hearing. Can science aid us in dealing with the least measurable aspect of building—its effect on the emotions of the people who see it and use it?

Merely to raise this question is to alienate some who, like Plotinus, believe that the sublime is blighted by every developing form—that analysis murders art. It will also immediately recall the reverse of this point of view: the age-old search for a mathematical guide to the forms of art, an effort most recently represented by LeCorbusier's "Modulor" scale. Before we dismiss this kind of mathematical venture entirely with Frank Lloyd Wright's "Proportion in itself is nothing," it is only fair to concede that pleasing proportion is a great deal better than awkward proportion. But to imply that the esthetic effect can be reduced to a matter of proportion is to reduce the great roaring fire of art to its mere kindling wood.

It would be equally a mistake to suggest that LeCorbusier himself believes that the esthetic end of contemporary architecture can be defined within the limits of proportion. It is easier to remember that LeCorbusier spoke of the "machine-for-living-in" than that he also said "Architecture reaches beyond utilitarian problems. Here, human passion creates a drama out of inert materials." This is a clear enough rebuttal to the vulgarization of functionalist theory which for several decades has given the young architects all the sense of shame about beauty that the horsehair sofa world had about sex.

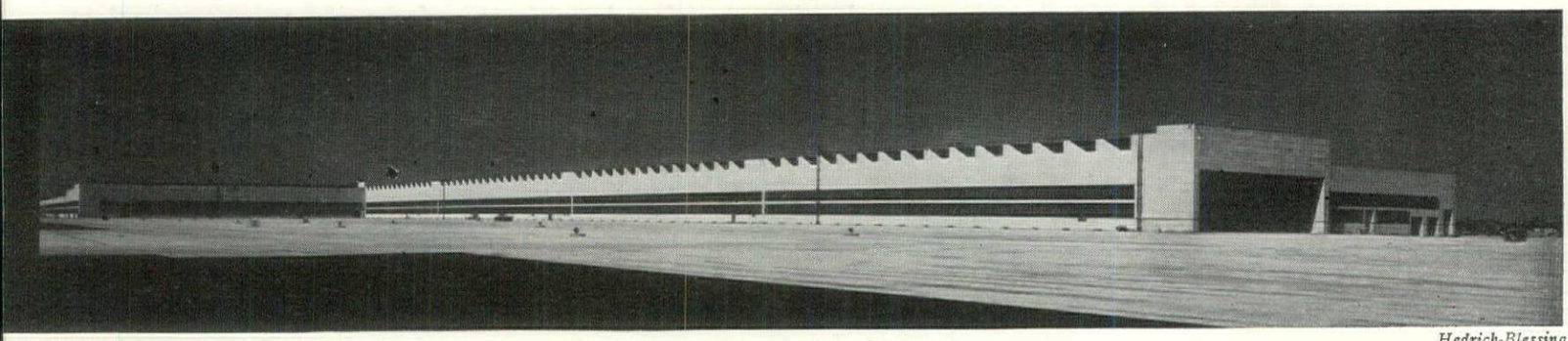
Since there is still enough confusion on the "form follows function" doctrine to have provoked an ameliorative symposium at the Museum of Modern Art last spring, it may be well to say baldly that the most important job of the architect is to create an emotional effect. The real estate broker, the banker, and our own enfeebled sensibilities will make sure that he doesn't create any more of this than is good for us.

If this seems to anyone to open a door long closed on the horrors of eclecticism, let us try to agree immediately on at least one thing. The modern rediscovery of a proposition self-evident to the most primitive builders—that structure should perform its various physical functions as well as possible—is simply the basis for the honest performance of the final or X-function of architecture, and by no means a substitute for it.

The rediscovery of functionalism was an imperative first step toward a genuine esthetic effect. If the intention of functionalism seemed at first the reverse of the esthetic intention, it was only because the practice of architecture, like the society of which it was a part, had lost any genuine sense of creative art. In the clanging nineteenth century—while engineer John Roebling built his suspension bridge and engineer Gustav Eiffel his iron tower—the architects themselves were busy with a variety of what passed for esthetic effects. These were almost exclusively visual effects, and visual judgment became almost the sole measure of structure. By the opening of the twentieth century, this had so distorted the character of building that, except in factories, basic functional requirements had been almost forgotten. It was only when the impelling technical developments of twentieth century science pushed aside these visual distortions that the profession of architecture was able to ignite its functional revolution. The discovery of acoustics ran headlong into the attempt to be grandiose; the development of precise artificial lighting collided with the attempt to be ornate; the invention of plate glass collided with the attempt to be romantic—such a catalogue could be a long one. These were the new forces, culminating in the precise manipulation of artificial environment outlined in the rest of this issue, which finally exploded the multitude of dishonesties—the cornices and the columns, the fake palaces and fortresses—in which the ancient craft-art of building had been almost lost.

The modern practice of architecture as a professional specialty developed during the period when a dishonest use of the symbolic function of building was at its height. On the one hand, the architect was the chief means of executing these special symbolic demands on structure. On the other, he was being divorced more and more from the manual craft of building. His hand had lost the touch of wood; his eye the measure of a span. He had been isolated from the feel and skill relationships with materials which are part of the basis of a genuine esthetics.

When the new functionalism blew through the western world like a great freshening wind, the



Hedrich-Blessing

"The immense possibility of eventual freedom . . .

architect stood shivering and bewildered in the spacious emptiness of his new freedom. The plan had long since been freed from the vertical axis of the chimney stack; it had been freed from daytime dependence on natural lighting; now the very walls themselves were collapsing right and left as the engineers swept the structure up on a steel skeleton. Suddenly anything was possible. And the architect, like all men suddenly plunged into the reality of freedom, hardly knew what to do.

If the architect was confused by the new freedom which had come to him out of the machine, he was no more at a loss than the rest of his society. As the machine stamped out more and more of the forms of living, as mechanization extended even to such an ancient and basic craft as making bread (as Sigfried Giedion has pointed out in his illuminating book, *Mechanization Takes Command*), as hands and minds and spirits were pushed farther and farther away from the basic making of things—the very root of man's satisfaction with his life and with himself seemed to be sapped. Art, far from being the pervasive aspect of life that it had been in the great creative periods, became the detached and precious business of specialists.

In the preindustrial craft societies, almost every workman had been obliged to develop taste—out of the very feel of an appropriate form, out of the sense of a skillful motion. The patterns of skilled motion hold an important clue to the nature of the esthetic effect. Herbert Read says: "What is most economical in an action is also the most rhythmical or graceful; and it is the esthetic perception of this difference, at a very primitive level, which determines the whole process of learning how to do a thing skillfully." Read's statement is based on the concepts of Gestalt psychology, which placed this kind of innate esthetic sense at the very basis of perception and so of man's ability to act upon his environment. We acquire skill by *feeling* the difference between one action and another. Since this difference is one of economy or grace, an esthetic sense seems to be part of the basic equipment of man. But when men lose the need to acquire skills, as happened widely in machine society, this basic sensibility is correspondingly dulled.

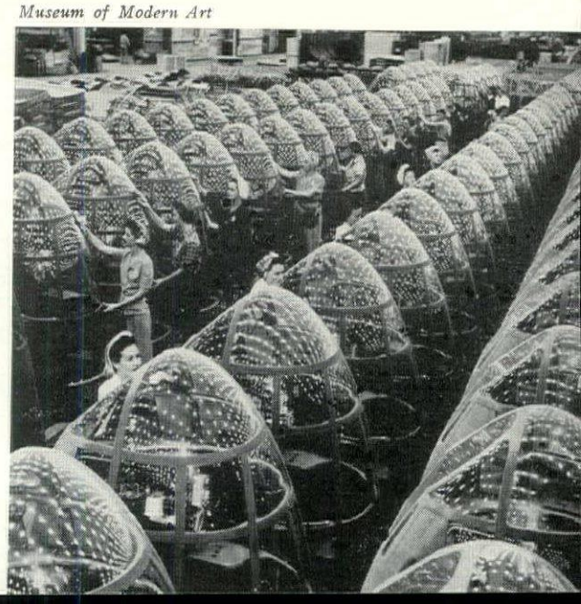
Curved shape economic in modern metal-working is fully expressed in this Italian car, the Cisitalia.

A large number of creative artists grew out of the rich soil of the craft societies. But when a craft esthetic was ploughed under by the overriding machine whose operators seldom had any understanding of its processes, the number of first-rate creative personalities in the arts decreased measurably. Machine-made products were at the mercy of the prettifying drive of the period, since the mass market which bought them had lost its sensibilities of form. Finally, and especially in the U. S. where the technique of mass merchandising was developed, the forms of design were dictated not by the designers, not even by the production engineers, but by the sales department. By the time the "jello school" of design took over the main U. S. mass production industry, automobile manufacture, the country which had led the world in developing the enormous powers of the machine was producing, in general, products inferior by any esthetic judgment to the products of any other industrial country. Moreover, U. S. producers had lost any notion that the esthetic relationship of product to customer could be measured in any way other than sales appeal.

The terrible degree to which the machine, while it conferred the immense possibility of eventual freedom, threatened the very basis of human life was clear to a handful of rebels from the very beginning. Some, like Rousseau and William Morris, wanted to destroy this Frankenstein before it grew any bigger and turn back to the emotional sustenance of a craft society. Later the artists expressed their "shocking protest" of the deadened sensibilities of the bourgeoisie. Duchamps and others showed machines as

Accidental beauty of machine production is a rich source for designers. This factory view shows hundreds of lights reflected in line of bomber noses; light reflectancy is an area of modern decorative value.

Museum of Modern Art



irrational objects, laden with irony." But these ttempts to persuade Western civilization that it was ent on committing suicide failed to influence anyody but the so-called intellectuals—probably beause they overlooked the enormous liberating orces which were equally a part of the machine. The rest of the world went right on chewing bread hat tasted like plastic, buying plastic gadgets that night have been made out of dough, living what was ever before our own era described as "lives of quiet lesperation." Only within the last few years has the errible question of the machine been put in terms wesome enough to produce a general realization of he crisis of man. The social crisis is now far too acute o permit the luxury of irony or of protest. Any rtist—or any architect—who refuses to understand r to work with the machine is destroying his usefulness at a time when society's need for him is vital. For it is perhaps not too much to say that the artist —and especially the artist-architect whose job is o create man's immediate physical environment—s the one force capable of generating a reversal of he continuing alienation of man from himself.

The airplane and the adding machine

What can we do to retrieve our lost sensibilities? Moholy-Nagy and others have suggested part of the way out of our dilemma. We can, first of all, stop fighting the machine and try to see how far it can be used for an esthetic end. We can, for instance, stop simply protesting standardization and learn how standardized parts can be assembled into wholes of considerable diversity. We can stop insisting that a fieldstone wall is an irreplaceable symbol of individuality and recall that a fabricated wall panel may make it possible to build twice as much space for living with twice the spatial flexibility. We can study the processes and forms of machine production as scrupulously as artists—and some architects —have always studied the pure forms of nature.

The airplane—and the immense and general emotion that its forms inspire—is heartening evidence that there is an emerging esthetics in our machine civilization which has a popular base and which is reflected in objects of every day use. Now the airplane is a visible simple resolution of the forces involved in moving through the air at high speed. It is the simplest and purest resolution of these forces which the present level of technology permits. Thus the form of the airplane is, like the skilled motion, an economic form. Its economy is a matter of life-and-death and not of choice. You can't for instance carve horses' heads on its fuselage, although you can, if you want to, paint on Mae West.

To sense this economy in a simpler and purer form, we can look at the parabola which represents the flight of an arrow. The parabola is a resolution of two forces: the thrust of the arrow and the pull of gravity. It is a pure and beautiful form. It is also the pattern of motion, a visible expression of energy.

It has become fashionable to deplore the "streamlining" that has affected the shape of almost every manufactured item from the coffee pot to the toothbrush. Insofar as this disapproval refers to the blubbery inflation of curvatures that registers market appeal in the sales department, it is appropriate. But, quite apart from this kind of dishonesty, there are several good reasons why adding machines now look a little like airplanes. In the first place, the shape of the adding machine expresses in a very honest way our new ability to manipulate materials. We no longer are obliged to make a frame and hang the various parts on it. We can now enclose objects in the more economic shell. We can mold our shells in plastic or stamp them out of sheets.

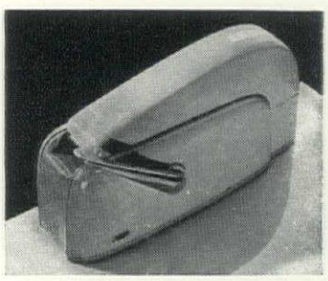
The curved shape is an economic form found widely in organic life, but which man was unable to use extensively before the appearance of the machine and the new materials produced by modern chemistry. But frequently the designer has been so conditioned by the forms of yesterday's hand craftsmanship that he unconsciously sets his form problem within the limits of the skeletal frame.

The monococque principle of the oil tank indicates that new methods of handling stresses are now available to building, which have scarcely been applied except on an experimental basis. Post-and-lintel construction, the building method of the early Egyptians, is still the chief means of supporting structure—the steel cage is actually only a muliplication of this basic principle. Because we have failed to exploit the strength of the new fabricated light-weight materials, we are continuing to carry loads on supports in cases where the materials themselves are capable of carrying the loads.

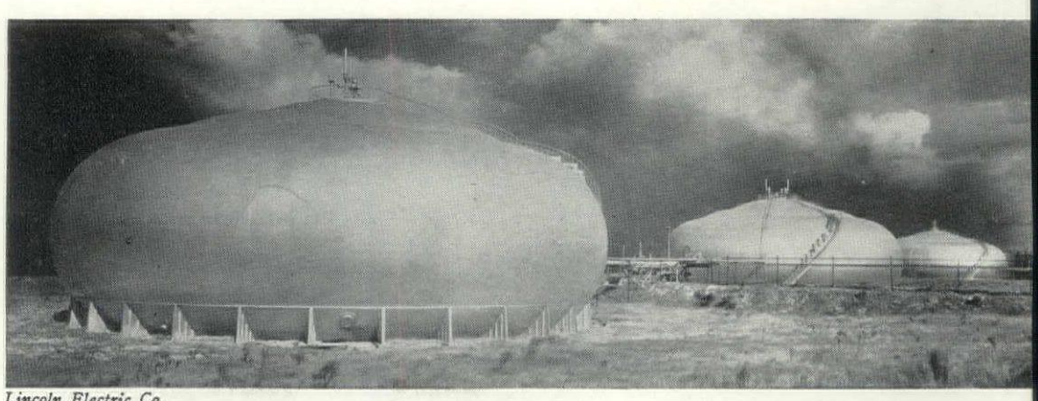
Now, when we are just beginning to take full advantage of the steel cage by use of the fabricated curtain wall, there is reason to believe that future theoretical development may be in the direction of emancipating structure from the right-angle frame itself. A corresponding freedom from rigid forms based on the square can be expected.

Before the precise measurements of modern technology, the forms of structures were largely based on the designer or builder's intuitive sense of the stresses involved. Sometimes an intuitive sense of stress continues to produce more economic forms than the new calculations. In the hands of such masters of structural craftsmanship as the Japanese, for

"Beetle look" of some well-designed items of mass production is evidence of emancipation from skeletal frame.



Spheroid oil tank is a stunning example of economic form applied in structure. The sheer weight of the oil is the biggest factor in this stress equation, and the shape of the tank is an exact expression of the resulting tension in the tank's surface.



Lincoln Electric Co.

example, a wood frame house became a marvel of lightness and simplicity. A structural engineer would tend to heavy up such a light frame, just as engineering calculations have heavied up much U. S. concrete construction as compared to the lucid economy of the Maillart concrete bridges. But this does not prove, as romanticists might like to contend, that science is the enemy of art. It simply means that our calculations, themselves merely abstractions of the reality of use, are still sometimes rough and imprecise compared to an intuitive sense of economic form. This is recognized even in such a precision industry as aircraft, where designers sometimes intuitively execute shapes they cannot calculate but which can be experimentally verified.

Intuition—the faculty of knowing without reasoning—does not, however, imply the mystic ability of knowing without experiencing. Einstein and many other scientists acknowledge how much they owe to the unconscious synthetic process that takes plac after reasoning and examination of data has mo mentarily ceased. But the deep well of the uncon scious, the area of emotions and feelings out o which come these "flashes of inspiration," is fille from the same water of life that informs the con scious mind. If the modern artist's problem is t create an art of the machine, he can do so only b a conscious effort to equip himself with the exper ences out of which the synthesis of art can take plac

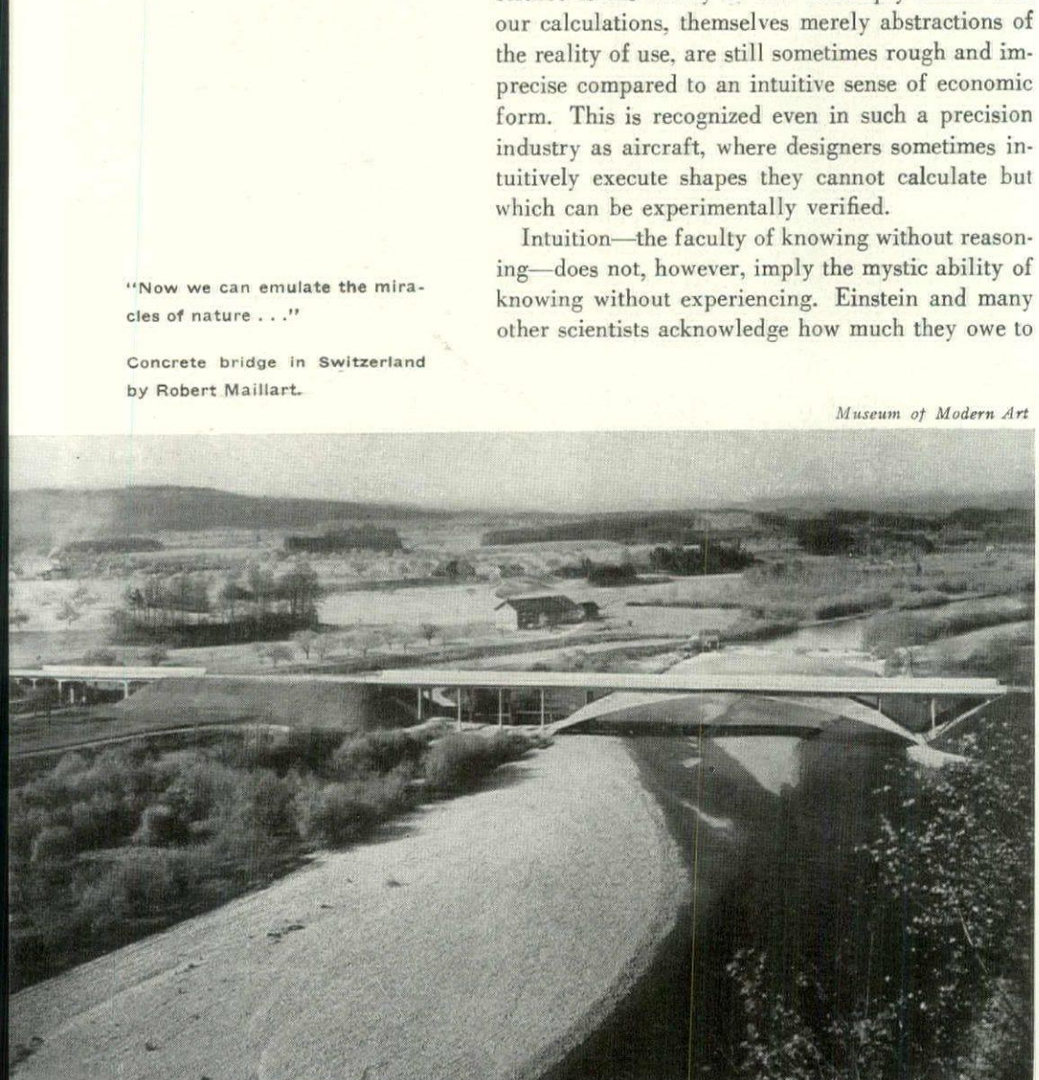
The degree to which the modern designer shoul be an intimate of technology is plain in this almo axiomatic fact: the designer's product is shaped b the prevailing level of technology. Charles Eame for example, certainly did not invent molded ply wood, the rubber joint or the steel tube. But famil arity with these processes inspired his chair desig On the other hand, this technical basis would not o itself have produced the Eames chair. To a ne rationalization of the problem, Eames added th designer's intuitive sense of form, which made th difference between another functional chair and work of art.

In nature, we have a pure resolution of all force whatever they may be. The tree's form is a beaut ful equation in which static load, wind resistanc maximum sun and water absorption are all factor Now the machine and the new synthetic materia seem to be providing us with the first semblance o a similarly fluid and economic fabricated form Viewed in this light, there does not seem to be th fundamental conflict between the forms of techno ogy and the forms of nature that categorical thinl ing would lead us to believe. On the contrary, w can say that, while the artist has always intuitivel apprehended purity of form, now exact knowledg is simply catching up with his insight. Withou science we were unable to analyze nature, now w can both understand and emulate her miracles.

"Now we can emulate the miracles of nature . . ."

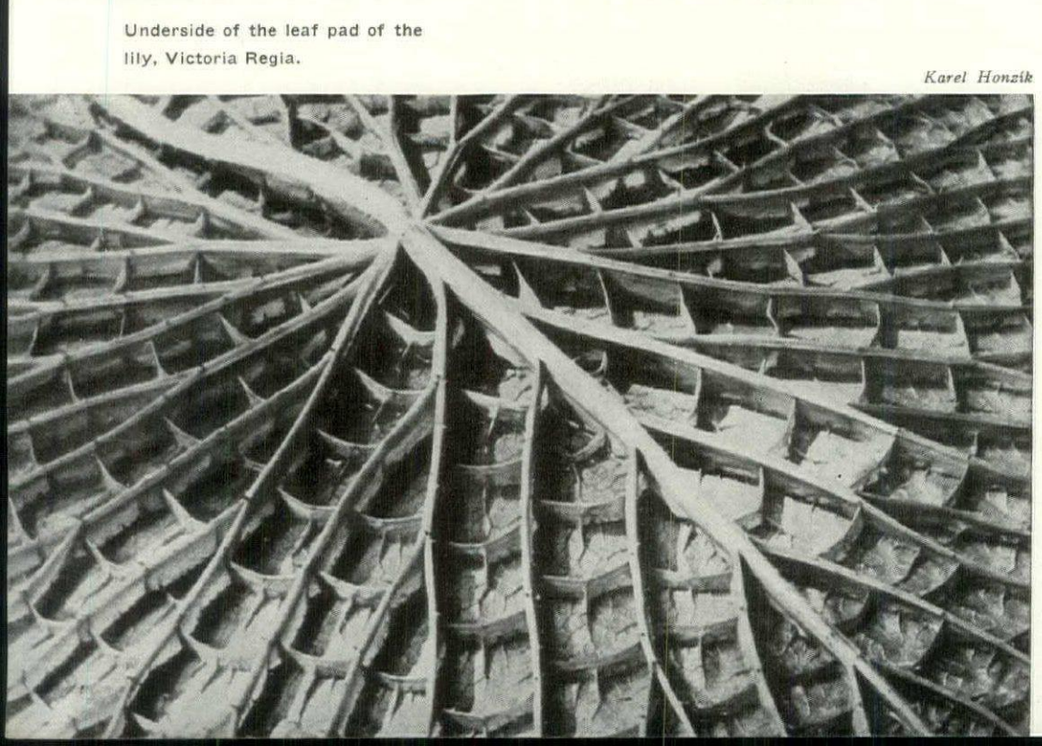
Concrete bridge in Switzerland by Robert Maillart.

Museum of Modern Art



Underside of the leaf pad of the lily, Victoria Regia.

Karel Honzik



The architect is a reformer

Our complex society dictates the pressure for th most exact scientific investigation of the force which constitute our environment. But this panc rama of factual knowledge does not automaticall produce synthesis and organization. This is th creative job. Insofar as the architect is an artis his job is to organize man's immediate physica environment by creating the spatial relationship which will permit maximum human freedom. Thu it is no accident that the social objectives of ou time seem to be more truly expressed in architec tural philosophy than in any other art. If the in dustrial designer is a huckster, the contemporar architect is a reformer. Like all reformers, he ma lack the spontaneity and freedom that can be ex pected when reform is consolidated. But, more tha any other artist, he seems bent on bringing orde and beauty into the forms of our daily living an on creating the structural basis of a rational, har monious existence.

If the architect's job is synthesis, then he is calle upon to relate the assorted elements of our comple

culture as they converge in our building environment. To mention only the simplest elements of his problem in relationships, he must relate the building to the land, machine forms to the forms of nature. On the one hand, the complex demands of modern life dictate the most precise and scientific manipulation of building. On the other, increasing mechanization seems to have awakened a new longing for nature which has to be met in building.

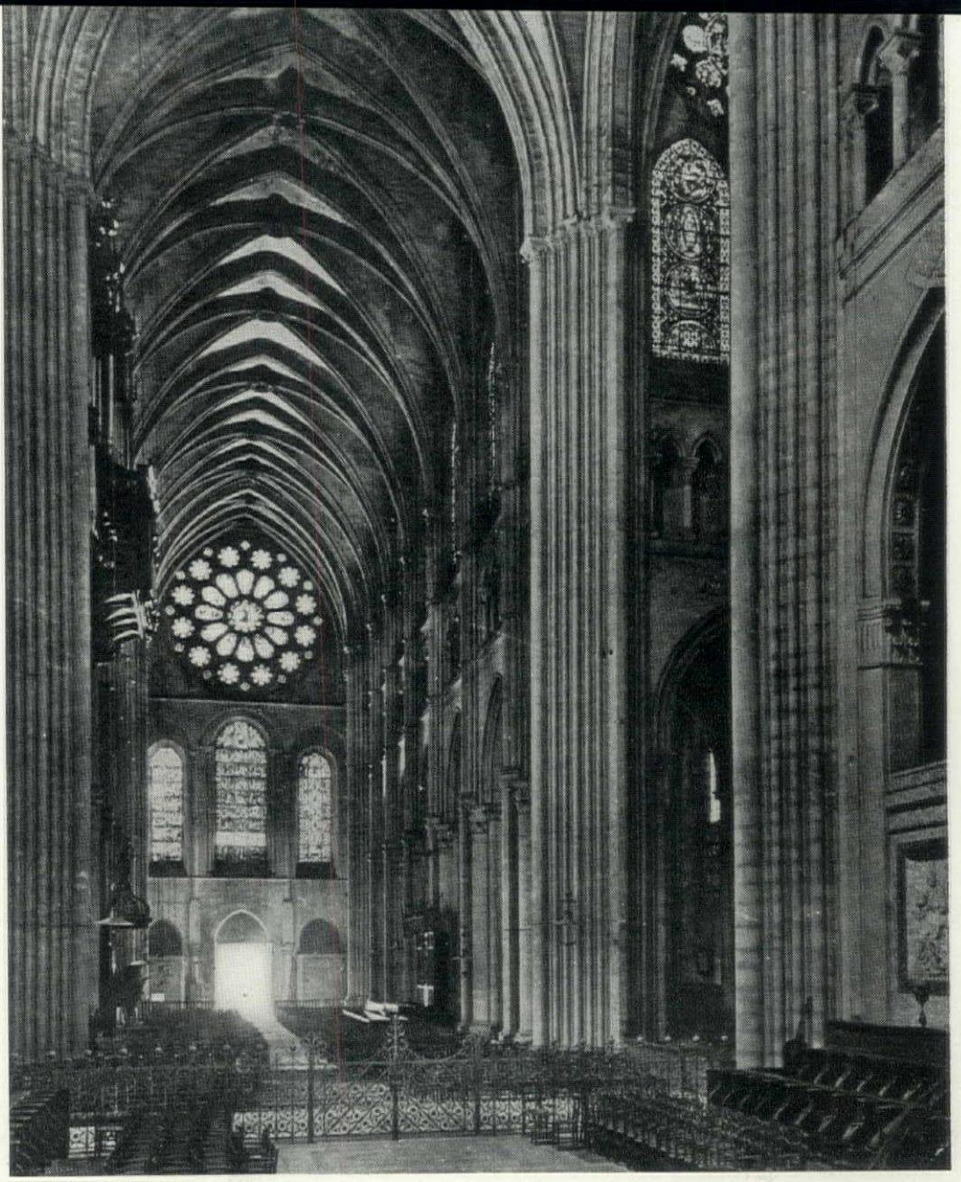
Marcel Breuer has made an excellent statement of the flexibility with which the architect must think about his synthesizing job: "*The most contrasting elements of our nature should be brought to happiness at the same time, in the same work, and in the most definite way. The drive toward experiment is there, together with and in contrast to the warm joy of security at the fireplace. The crystallic quality of an unbroken white, flat slab is there, together with and in contrast to the rough, textured quality of natural wood or broken stone. The perfection of construction and detail is there, together with and in contrast to simplicity, broadmindedness of form and use. The courage of conception is there, together with and in contrast to humble responsibility towards the client. The sensation of man-made space, geometry and architecture is there, together with and in contrast to organic forms of nature and of man 'Sol y sombra,' as the Spanish say: sun* and *shadow, not sun* or *shadow.*"

Matter and energy

We have so far discussed economic form only as a physical manifestation. But if the esthetic effect of a building is its effect on human emotions, how does economic form assist this larger effect? Perhaps it is not too much to say that the basic simplicity of great art is an economy of emotional effect. This is directness and honesty of feeling. No energy has been misplaced or squandered in creating a dishonest emotional effect. Thus the architect who built the palace of an absolute monarch like Hatshepsut could feel deeply about this. His work became an honest expression of his feelings and the prevailing feelings of his society on the subject. But if the problem was designing a residence for a Chicago merchant of the 1890's who wanted to impress the Eastern banking world with a power and importance that he did not in fact possess, it was difficult for the architect to have a genuine emotion about his problem and he was forced to copy the symbolic effects of earlier styles.

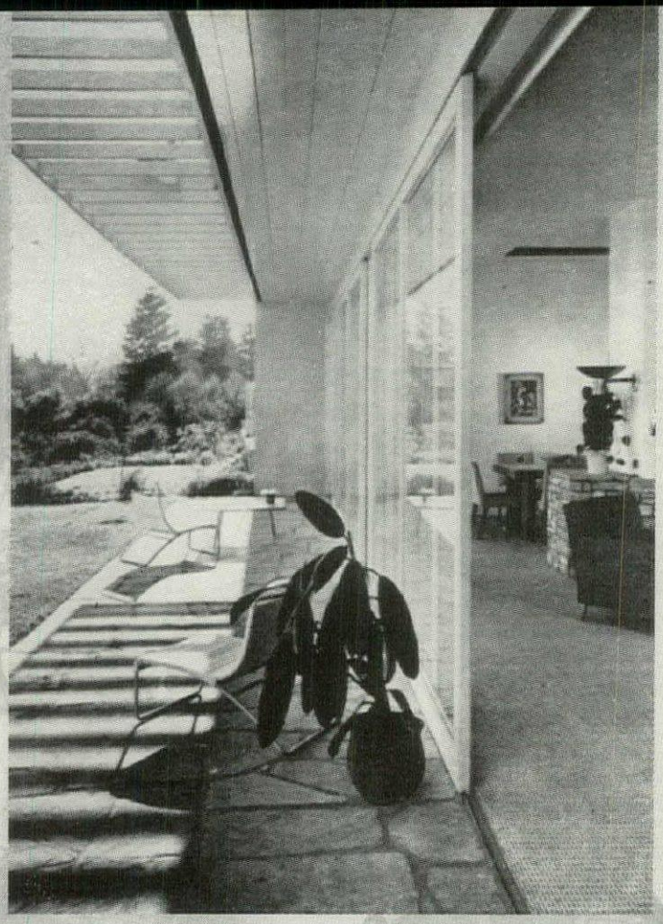
Let's hazard one more generalization which may bring us closer to the nature of the esthetic effect. Economy of form in structure simply means that every available energy inherent in our materials is utilized to maximum advantage. To the degree that we call structure beautiful, it seems to be a visible manifestation of energy. Although structure is a science of statics, sometimes the great works of architecture seem less to express than to transcend the law of gravity. The Gothic cathedral is the most striking example of this transcendentalism, and it is important to remember that the whole of Gothic society had a unity scarcely paralleled by any culture we know about. In the Gothic cathedral, the structure becomes visible energy. It takes on the dynamic quality of a living, growing organism; the eye is not stopped by rigid formal limits, but is drawn from point to point so that the lines of the structure seem to flow and the very space itself seems to become alive. This is something like an intuitive recognition of the fundamental unity of matter and energy.

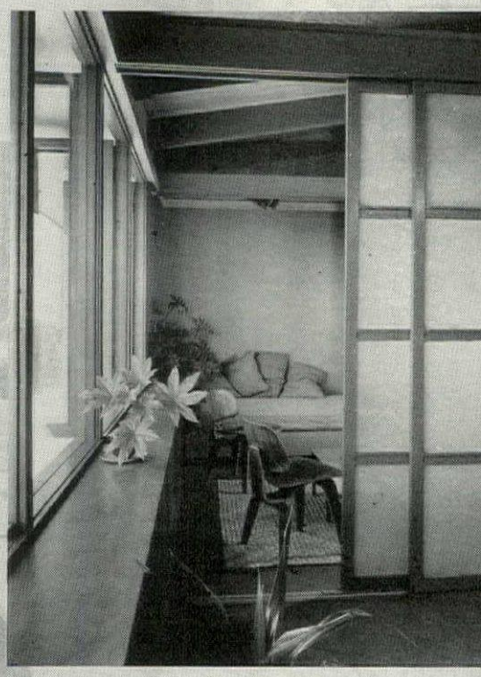
While the total nature of the esthetic effect will probably always (and happily) defy analysis, we can perhaps enlarge our comprehension of it by turning to the findings of the emerging new science of the dynamics of the human personality. Whatever the role of man's intellect in shaping his actions, we now know that it is our emotions which move us to act. Thus the emotional experience of art is a liberating experience, and we can consider art as a means of liberating human energies. When we recall that the mass neurosis of industrial society seems to be a matter of blocked or distorted individual energies, we can appreciate the overwhelming importance that a new sense of creative art might have for us all. To the degree that we can act, creatively and spontaneously, we are alive. This is the great integrative function of art in human life.

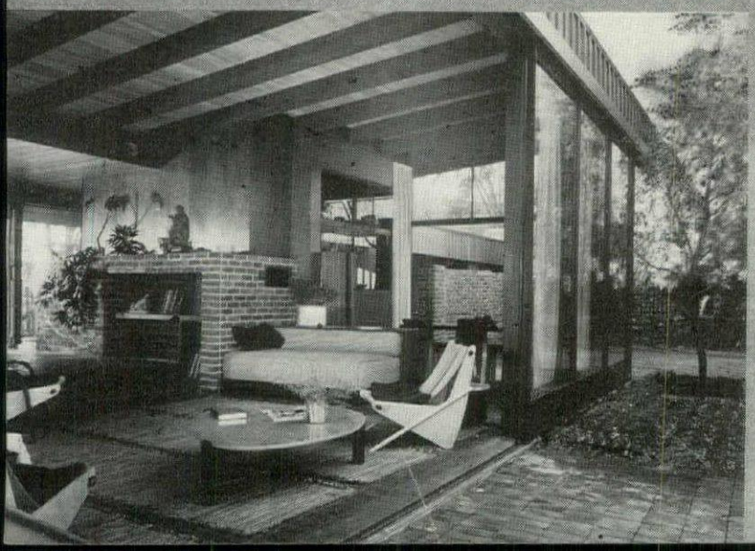


Elizabeth Timberman

"In the Gothic cathedral the structure becomes visible energy." Cathedral of Chartres, France.





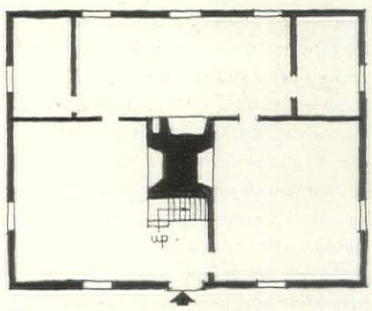


houses much more time and study must be devoted to the thermal, luminous and sonic aspects of their design

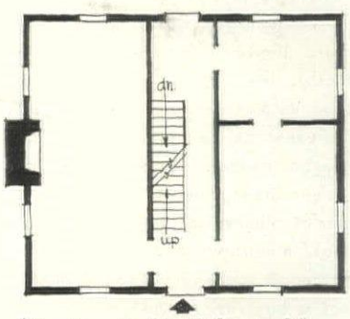
FACTORY, office and store have long employed the benefits offered by modern technology in environmental control; not so the home. Ancient sentimental concepts of what a home ought and ought not to be more often than not make of home environments a series of uncomfortable, unsafe and unhealthful situations. To simplify matters let's look at a typical "center-hall Colonial" house, not because such a house is any worse than many another type, but because it is the epitome of home to the great American majority. The colonial house was developed originally by the American colonists and their progeny to function in a particular way that was indigenous with Eighteenth Century life in the new world. It functioned very well. Building concepts brought here by the earliest colonists were those appropriate for houses for the English countryside. The half timber house with its exposed framing and wattled walls served beautifully in the mother country but when it was duplicated here (as it inevitably was) it was discovered that our climate was terribly unkind to it, that the rapid and marked changes in temperature and other climatic conditions caused the walls to crack and let in cold winter winds. The result was the slow development of the colonial house. The frame was covered on the weather side with clapboards or shingles and on the inside with lath and plaster. The houses had low-ceilinged, small rooms because they were heated by enormous fireplaces and small rooms were economical to heat. Glass was expensive so windows were small. Of course there was no provision for plumbing or for central heating, nor did anyone anticipate electric lighting at a time when the candle was the only available light source. Today's modifications of the colonial house try to absorb the comfort station, the central heating, the electric wiring with its attendant outlets, the "picture window" (glass is cheaper now) while sticking doggedly to its Eighteenth Century form. That the thermal, luminous and sonic environments in the great majority of American homes are as good as they are is a tribute in part to the adaptability of colonial forms and even more to the manufacturers of equipment and materials.

Comfort is a relative matter. We may *know* we're comfortable in certain surroundings but if we had a chance to try other surroundings designed specifically for our individual comfort, our idea of comfort might change. Today's version of the colonial house is a perfect rectangle, divided into three or four rooms on the first floor and two or three rooms and a bath on the second floor. The living room is, of necessity, rectangular. Like every other room it has a series of holes cut through the wall called windows and doors. These are the only means of atmospheric control. When it is hot outside, windows and doors are screened and left open. While functioning as ventilators these openings also permit daylight to enter the rooms in regularly spaced blobs that let blazing sun or excessive sky brightnesses enter at will. If shades are drawn to prevent the latter, the breeze also cannot enter so the occupants sit uncomfortably in their glary surroundings or complain about the heat. Windows are placed at such a height that if there were a view in any direction one would have to stand up to see it. If a "picture window" is introduced often it has no more relationship to the best view than it does to rudimentary control of light and atmosphere. As likely as not it gives a view of the street or highway in front of the house. The occupants, then, become mere objects of curiosity to the passerby. The entrance, in the center, must be kept small to conserve space in the living room that opens off one side and the dining room that opens off the other. The stairway to the second floor goes straight up from the hall. There is no adequate space here for those living in the house or their guests to remove coats, hats or overshoes even if there were any space for their storage after they have been removed. The dining room, since it is used only a few hours a day, wastes approximately one-fourth of the total living space on the first floor. If it doubles for a study or for some other activity, it is obvious to the user that from the comfort standpoint it is being forced to serve a function for which it was never designed. The kitchen may be efficient, especially if equipped with modern cabinets and appliances, but because of space limitations there is no comfortable place to sit down and relax while working. Treacherous slanting walls in the bedrooms and bath invite and administer knots on the head which are far from comfortable.

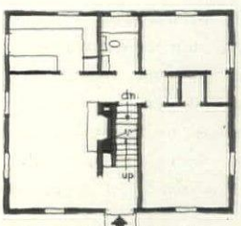
The typical house may be responsible more than we ever could imagine for many of the illnesses from which we suffer. Dr. Harmon proved, in his study of Texas school children, that by redesigning schoolrooms to provide better brightness ratios *alone*, the incidence of eyestrain and eye difficulties was reduced tremendously. In addition, general health of the children improved markedly (see p. 121). Bright-



Genuine Cape Cod



"Center Hall Colonial"

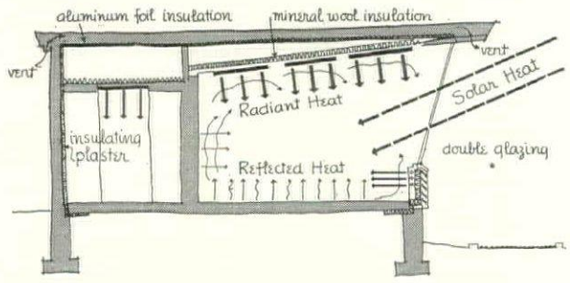


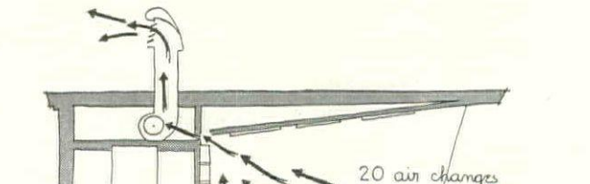
1948 "Cape Cod"

A Grand Rapids architect designs a unique house embodying the most modern thermal, luminous and sonic environmental concepts

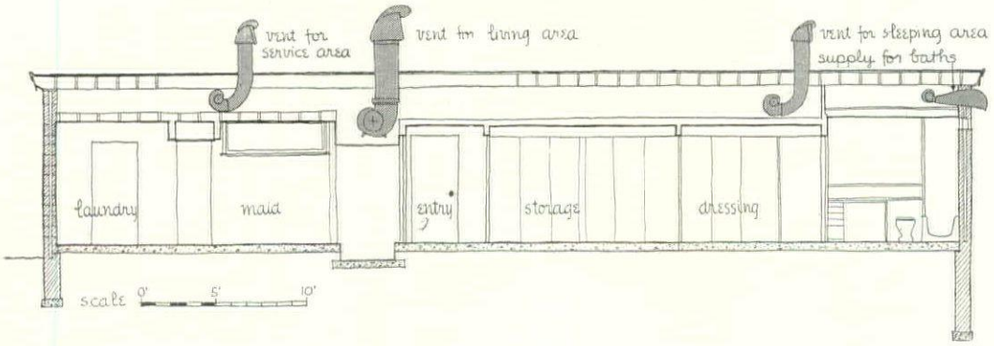
Architect Kenneth C. Welch has recently designed, and is now building near Grand Rapids, Mich., a house for his wife and himself that is very nearly the last word in applying up-to-the-minute technology to creative residential design. It embodies scores of new ideas in lighting, heating and ventilation, here illustrated by a few of the hundreds of thumb-nail sketches which went into the development of the design.

Probably the most interesting feature of the house is its use of electric panel heating combined with a huge solar window spanning the kitchen, dining-living area and the principal bedroom. Electric heating panels located in the sloping ceiling of these rooms are U. S. Rubber's Uskon, a current-conducting, rubberized fabric applied in bands to the finished ceiling. Power for this system will be paid for at off-peak rates and it is anticipated that solar heat, stored in the floor slab during the day, will carry the house through the hours just after sundown when current consumption is at a maximum. This, plus unusually thorough insulation of the entire structure, is expected to keep fuel consumption within feasible economic limits ($70 for the coldest month). Walls are of pumice concrete block with aluminum foil insulation and vapor barrier, plaster board and acoustic plaster. Directly over the Uskon radiant panels in the ceiling is a layer of mineral wool followed by an air space, aluminum foil insulation and another air space vented to the outside. Roof is built-up, gravel surfaced.





Eschewing whimsical natural ventilation through windows, the Welch house depends on a forced ventilation system. In hot weather, the largest fan (¾ h.p.), will affect 20 air changes per hour in the living-dining area. Smaller fans will provide similar air change in bedrooms, baths and kitchen. Since fans are all multiple blade, low speed and direct connected,



ness ratios weren't considered when the colonists first build their houses. These homes were primarily for shelter. Most activity took place outside at tasks that were not exacting for the eyes and where sounds, for the most part, were those of nature. Today we spend the greater part of our time indoors and at tasks, such as reading, that are exacting for the eyes and where our entire environment is more artificial than it is natural. Excessive brightness ratios in the home can be expected to have the same detrimental effect on children (and adults too) when they are studying at home as they do in the schoolroom. Practically no thought has been given to sonics in the home, yet it is increasingly evident that some noises effect us physiologically as well as psychologically.

If we are to include environmental control in home design, we must look to factories and commercial buildings for direction. No one would be foolish enough to hold up the factory as an example of the ultimate in comfort, but the environment, in good modern factories, does have built into it as much comfort for those working in it as the task and modern technology can allow. Many employers discovered long ago that the more comfortable they could make their workers the more efficient would be their performance. They also know that health and comfort are interdependent, at least to some extent, and that controlled atmospheric, thermal, luminous and sonic conditions keep workers in better health. As for safety, the factory owner must concern himself with it or his compensation rates will be prohibitive. Less than half as many deaths occur annually in factory accidents as occurs in the home. The factory owner, because of his very selfish interest in efficiency, has not burdened down factory design with a lot of outworn concepts. The factory is a functional building. Early in the game it was discovered that what mattered was not what the building looked like on the outside but how well it was suited for the production, say, of textiles. Here the engineer was consulted. He decided what would be the most effective way to arrange the machinery and the work spaces to get the maximum production from the building. If the atmosphere must be warm and humid, thermal conditions can be twisted around to provide this while at the same time providing comfortable conditioning for the occupants. Despite lack of interest in the exterior form of the factory, very often these buildings have much to offer from an esthetic point of view because of their very simplicity.

Fortunately, enough architects have started to design houses from the inside out so that we can find numbers of examples of superior environmental control within the home. Some of the superiority results merely from a peculiar scientific intuition. The architect, because he is interested primarily in the comfort, health and safety of the home's occupants, comes up with some solutions to implement these requirements almost automatically. That is, he proceeds merely by "feel," if you will, much as the old-time machinist could measure the thickness of a

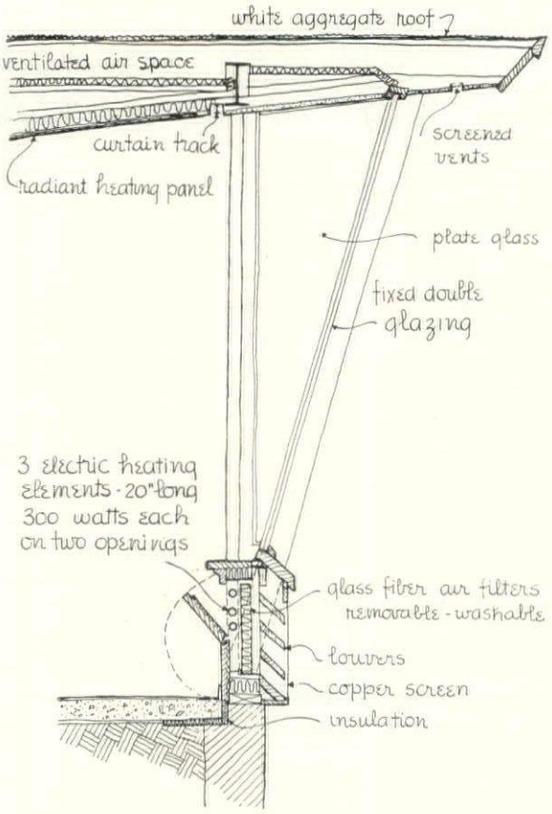
play multiple roles

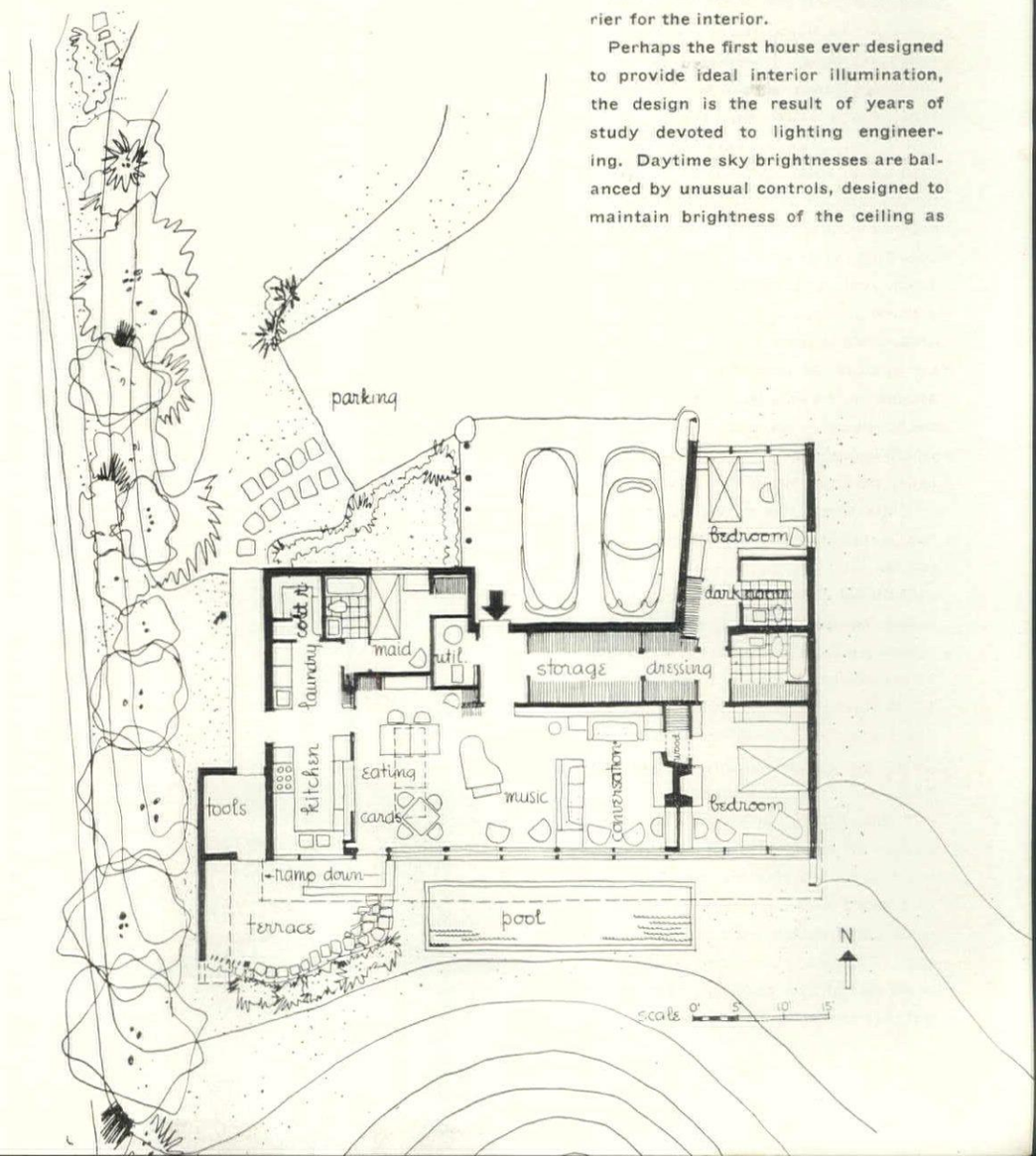
ece of metal, with surprising accuracy, simply by eling it. Not all environmental control is based on is scientific intuition, however. More and more chitects and builders are relying on objective easurement to determine environmental conditions. good handyman wouldn't think of trying to build skyscraper but he will build a house. This leads any to believe that a house is a simple structure. is just beginning to dawn on us that it is, rather, a stly intricate structure. Within and outside its alls it combines in very limited space many of the cilities of a restaurant, laundry, hotel, playground, spital, nursery, schoolroom, tailor shop and office. also must be a garage and it may someday have be a hangar. Hobbyists require that it be a workop, a photo lab, an aviary or studio. These are nly the obvious functions. To be a home it must ossess a lot of indefinite qualities that will vary r every separate house, and must perform additonal functions that none of the above-mentioned uildings are expected to perform. It must be, for xample, a place in which to entertain friends, a lace to relax, a perfectly private place and a lot of ther things besides.

The pace and diversity of Twentieth Century acvity demands, as can be seen, much more of a ouse than was demanded of it even so short a time s 25 or 30 years ago. To further complicate house esign, economic pressures are pushing the walls loser together. The $10,000 house of 1948 conains about 700 sq. ft. of floor space as against about ,000 sq. ft. for the $10,000 house of 1928. The hotographs on page 153 illustrate quite graphically ow great is the shrinkage.

Since the house is smaller, many areas must erve several different functions and the problem f acoustic control is more important than ever. To eep out street noises or to isolate a space for sleepng or quiet activity from an area that is noisy, ound insulation is the deciding factor. Until recenty sound insulation was dependent on mass and eight of materials. The most successful walls were f masonry construction and the thicker the wall the igher the sound transmission loss. In today's maller house this principle could be used to isolate he bedroom wing or the study from the remainder f the house by blocking that area to be isolated rom the rest of the house with the fireplace wall. Newer means for isolating sound would make it posible to accomplish the same end with a much hinner, lighter wall if, for example, no fireplace ere to be included or if orientation demanded that he fireplace be placed elsewhere, but such solutions emand precise engineering beyond the scope of andicraft building. In prefabricated structures here so much emphasis is placed on light-weight, ayers of sound absorbing materials, acoustic plasr, etc., will, when properly combined, provide as nuch sound transmission loss with an approximate eight of 12 lbs. per sq. ft., as an 8 in. brick wall. lastered both sides, weighing 88 lbs. per sq. ft.

One aspect of house design that has received nore attention than others is the relation of the

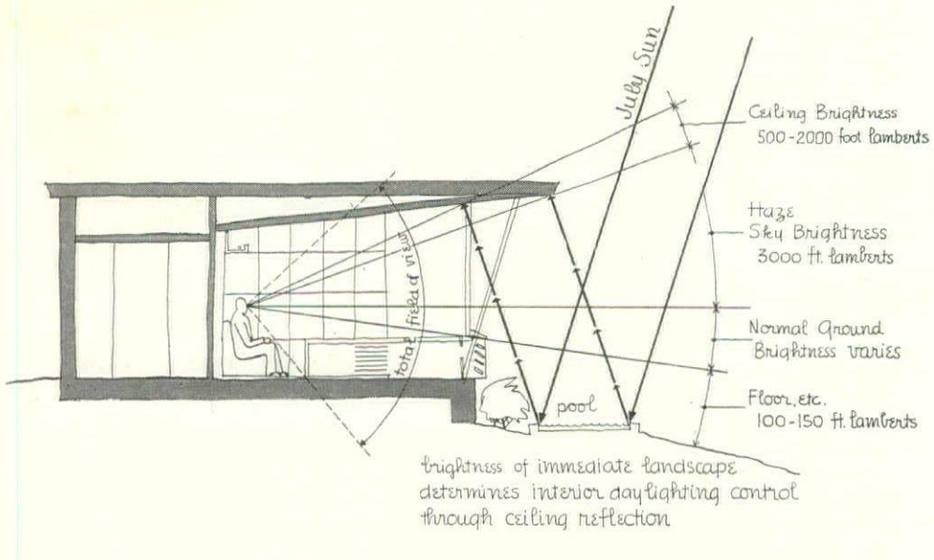




Mr. Welch feels the fans will be quiet. Ventilator exhausts are on the roof. They pull air through louvers located under the glass wall in the living-dining area, through adjustable wall openings elsewhere. Fresh air pulled through the system will be dust and pollen free because of standard, glass-fiber filters located behind these openings. The same ventilation system may be used to clear the air in winter when social gatherings require a greater than ordinary air change, and auxiliary electric convectors beneath the windows, through which the ventilating air will be drawn, will raise the temperature of the entering outdoor air to room temperature when the system is used in this way.

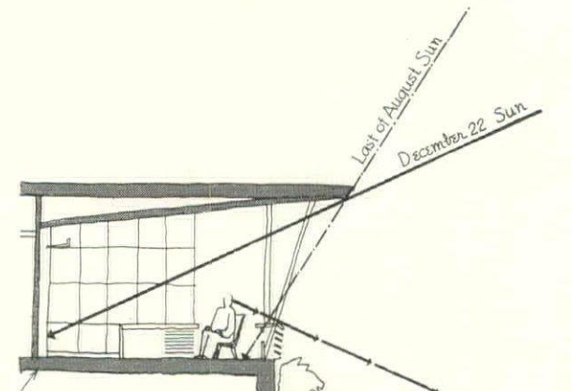
Heating, ventilating, lighting and sound control naturally dictated orientation while business and personal concerns dictated choice of site and topography. The house will be built atop a hill overlooking a wooded area and a brook which is 65 ft. below. It will be on the west side of an acre and a half plot, the east half of which eventually will be the site of another house. Large trees and shrubbery will provide a sonic barrier for the outdoor living area, while pumice concrete blocks serve as an additional sonic barrier for the interior.

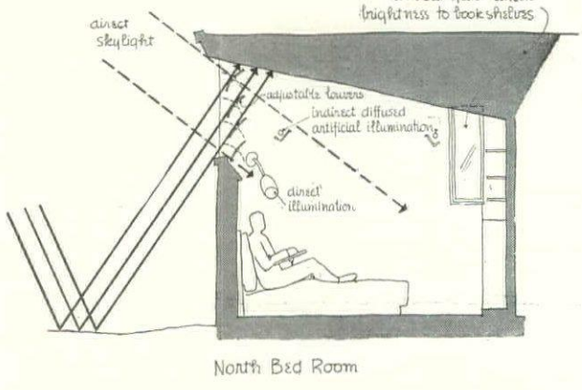
Perhaps the first house ever designed to provide ideal interior illumination, the design is the result of years of study devoted to lighting engineering. Daytime sky brightnesses are balanced by unusual controls, designed to maintain brightness of the ceiling as



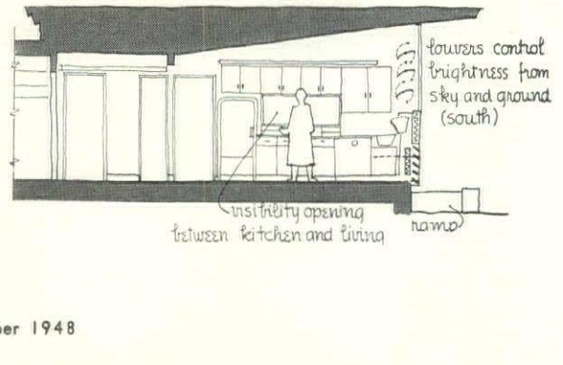
close to that of the sky as possible. The slope of the ceiling, planting beneath the window sill, and a pool to reflect direct rays from the sun onto the ceiling all figure in the solution. Different colored flowers, at different times during the season, will provide changing colors inside. The pool is strategically placed with the bottom painted a brilliant blue-green of about 30 per cent reflectance. Sunlight never enters the room from April through August during which period haze can bring sky brightness up to as high as 3,000 foot-lamberts. When this happens, the pool, which operates from a valve in the living room, will be filled, reflecting cool, diffused sunlight up to the ceiling and overhang. This reflectance with that from the planting, etc., will bring the ceiling brightness as high as to 2,000 foot-lamberts—an almost perfect 1 to 1½ ratio. Draperies provide an interesting decorative effect but this was achieved incidentally. Their real function is to insulate the glass wall when drawn, provide proper reflectance when fully opened. To accomplish the latter draperies are pulled around on the side walls. There are no spandrels or valances because these would bring patches of very low brightness, perhaps 10 to 20 foot-lamberts, into the direct line of vision and spoil the carefully engineered brightness ratios.

Artificial illumination of the principal rooms is designed to create different lighting effects for different activities. This is accomplished by three methods: 1.) down-lighting, 2.) totally indirect lighting and 3.) exterior floodlighting. Downlighting is brightness camouflaged from normal viewpoints. It permits blanketing out visually either the dining or conversational area by the mere snapping of a switch. The indirect system can be used either alone or in combination with the downlighting. Together they create the best working light for reading or other more difficult seeing tasks than eating, con-





North Bed Room



house to the out-of-doors. Designers already a experimenting with the advantages of solar heatin sun shades, movable walls and other design devic to improve this relationship. To a considerable e tent such devices obviate the necessity for mechan cal conditioning. The performance of these intu tive solutions, however, has not received the detaile study it richly deserves. While hundreds, eve thousands, of "solar" houses have been built, onl one or two such designs have had sufficient checkin with objective instruments to determine the actu effect of solar windows on fuel bills. This applie with even more force to the lighting effect of th sloping ceilings and clerestory windows develope by forward-looking architects. This is an are where exact engineering has much to learn fro intuitive design and it is still another instance o the extent to which house design demands the mos knowing engineering study and detailed research

Actually it would require thousands of man hour for the architect adequately to solve even the storag problems presented by the small house. This as sumes that he has the facilities to do so, which woul demand laboratory space and mechanical equip ment for building mock-ups beyond the facilities o even a large office. In addition he must consider th other manifold problems: heating, cooling, lighting sound control. Each of these would require instru mental checking. Obviously these new problems ar making it increasingly difficult for the architect t carry on all by himself. He needs outside help fro the psychologist, the engineer and the manufacture Fortunately this help is forthcoming and the ou look for the small house of tomorrow is brighte than it has been for a long time. Three distinct pos sibilities present themselves immediately:

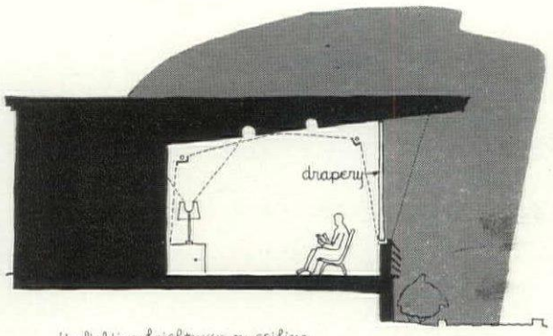
1. Prefabricators and large operative builder recognize the tremendous sales appeal of a house o superior design. They can afford to pay a staf architect or a consulting architect. At least one pre fabricator, Lustron, is going farther. Acoustics lighting and heating in the 1949 Lustron house ar being studied by engineering experts working i collaboration with an outstanding small-house ar chitect, thus bringing to the minimum house, fo perhaps the first time, all the engineering and desig skill that goes into a large building.

2. An apt solution to any house design proble may be used more than once by the architect. H can build up a file of these solutions to be used ove and over again where they will solve problems.

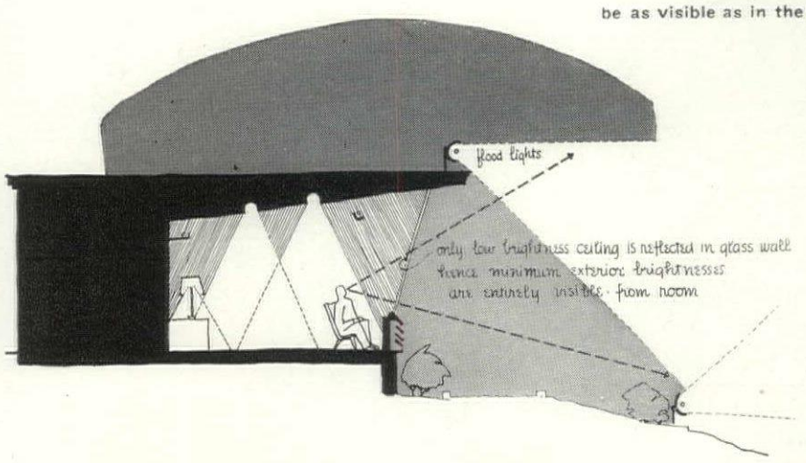
3. Modular planning offers the possibility, large ly unused, of prefabricating parts of a house. Th Storagewall, designed by George Nelson and Henr Wright, is one such part. The big advantage lies i the fact that thousands of families may be consulte before any solution is reached and the thousand of man hours mentioned above may go into th design. The cost for all this time and effort may b distributed, by the manufacturer, among the man houses in which it is used and when its all ove almost the entire storage problem of the house ha been accounted for in the very minimum of space

ving as they shrink

imilarly, an integrated mechanical core like the ngersoll Utility Unit will save long hours of juggl-g plumbing and heating lines and fixtures nd permits the most elaborate detailed study of he relationship of the various parts. Possibilities or this kind of thing are limitless. Furniture manu-acturers might provide prefabricated pieces to build as easily as they can fabricate movable furniture. s the use of built-in furniture increases, the picture f exactly what kind of furniture is most needed nd most useful will become more evident. The ohn B. Pierce Foundation made a study for a gov-rnmental agency during the war for the design of clothes storage unit for single workers in dormi-ory-type housing. After the pilot unit was de-eloped full size, it was field-tested by a group of rained subjects under the direction of a sociologist nd psychologist. The result was a nearly square loset with storage space for all the clothing a single an would need, eliminating the usual chest of rawers, and saving considerable space and money. hese procedures are manifestly impossible in the ase of the individual architect working for the in-ividual client. Only this type of study is capable f producing the kind of solutions that are required. Nor need there be any fear that such standardiza-ion will produce stereotyped design or lack of flexi-ility. Actually flexibility requires painstaking

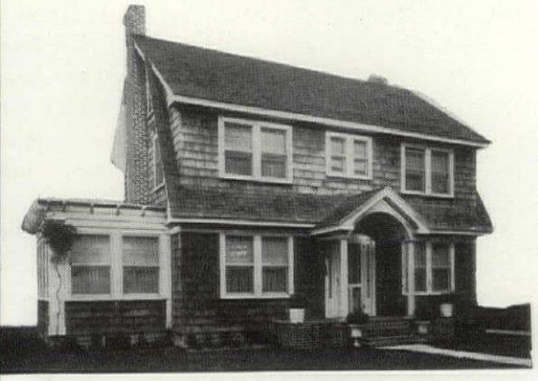


versing or card playing. Downlighting serves another function unheard of in most houses. It allows one to enjoy a view at night with the lights on. There is, of course, an unrestricted view through the entire length of the long wall with no screens or draperies to limit vision. The downlighting keeps ceiling brightnesses very low and because the glass wall slopes outward only the low-brightness ceiling will reflect in its polished surface. When exterior floodlights are turned on, this reflection will disappear entirely and the immediate landscape will be as visible as in the daytime.



Brightness control in other rooms is handled differently. In the north bedroom and in the kitchen light control will be by special 12 in. wide louvers developed by Mr. Welch to permit a maximum amount of reflected light from ground areas to reach the ceilings. Surfaces of the louvers are painted various colors of varying reflectance values. Thus, by adjusting the louvers, brightness and color may be controlled under varying conditions of daylight.

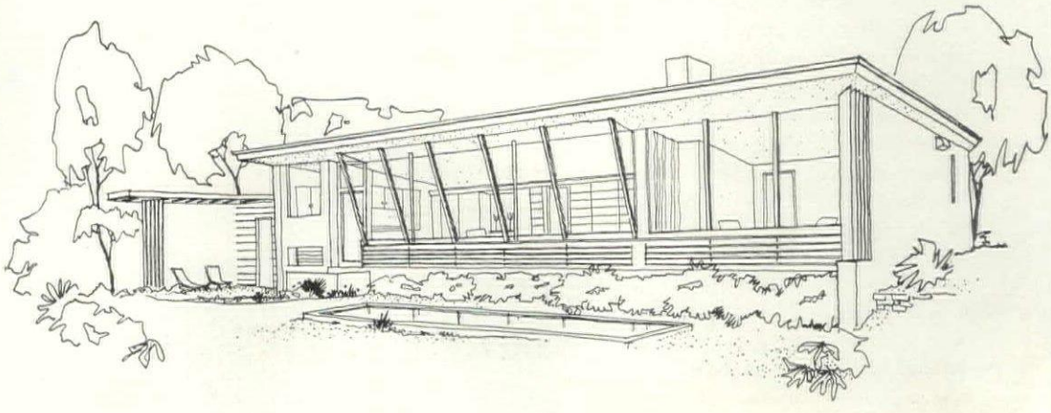
Mr. Welch is more interested in optimum interior comfort conditions and visual stimulation than in "the traditional exterior romanticism found even in most so-called modern styles." He has determined the number of times he'll view the exterior compared with the number of times he'll view the interior. The score, he figures, is .6 to 50, assuming that he drives out of his driveway three times a day.

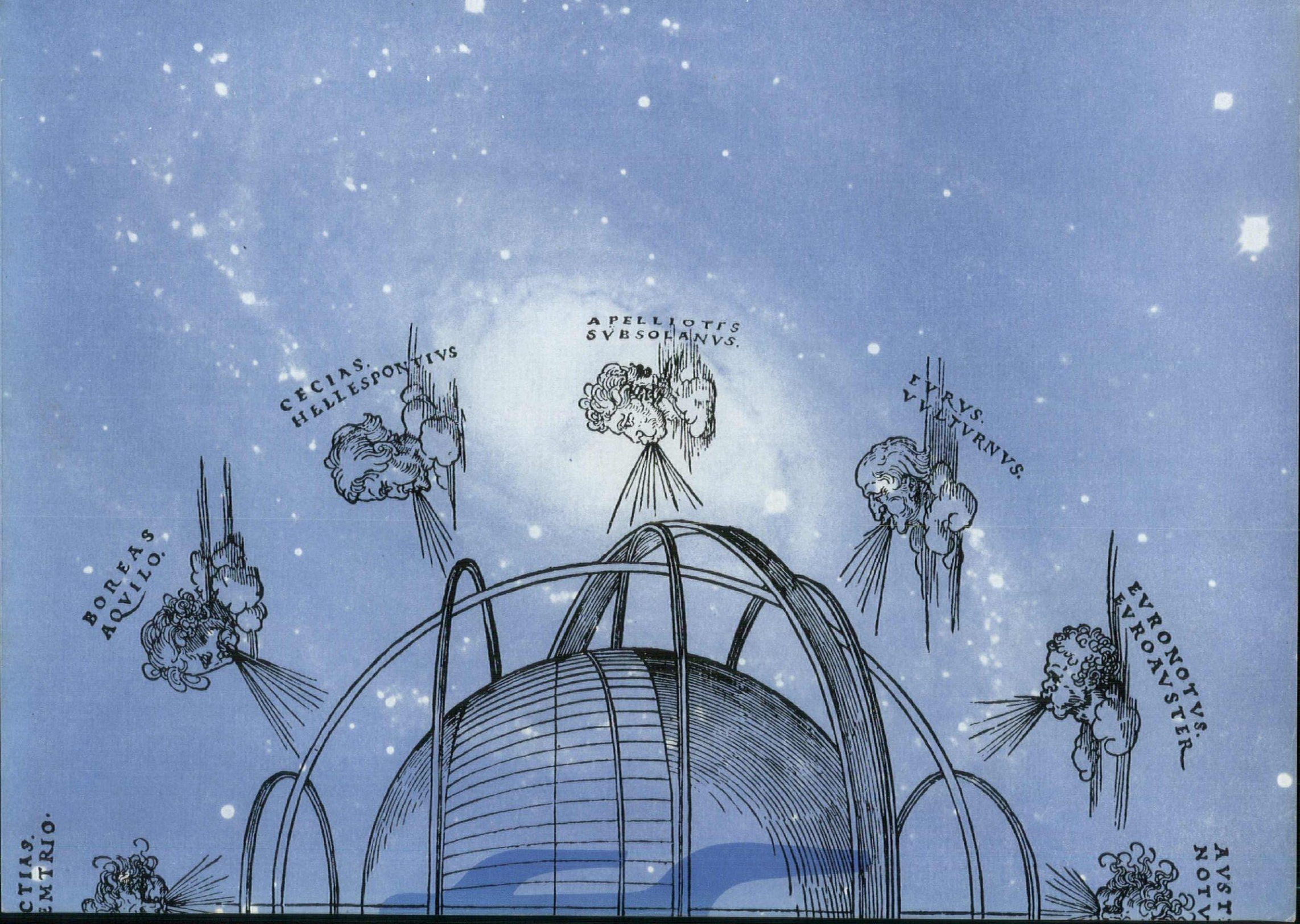


The $10,000 house of 1948 contains about 700 sq. ft. of floor space as against about 2,000 sq. ft. for the $10,000 house of 1928.

tudy. Ability of prefabricated parts to increase lexibility is aptly illustrated by a somewhat similar loset designed by Architect Samuel J. Glaberson of Long Beach, N. Y. It, like the Pierce closet, was designed modularly for 8 ft. ceilings, could easily e fastened in the desired place with a few finishing ails and a strip of molding to become a wall to ivide a room into two sections. One half of the artition wall served as a closet for one of the ooms so realized, the other half, the other room. his idea could be expanded to include a whole line f modularly designed closets of different sizes. Door frame and door could be included as an integ-al part. The future may hold much for such modu-ar prefabrication of parts of a house.

The house has come a long way in the last few ears. The introduction of environmental thinking nto house design will undoubtedly change the com-lexion of suburban and rural America as much in he next 25 years as it has changed the complexion f the city and factory town in the last 25.

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space —the sum of man's relations with his environment—is building's only useful end product, its manipulation the greatest challenge to design

THE law of relativity, too often regarded as having only out-of-this-world application, is everyday practice for the modern architect. It states, according to Albert Einstein, its propounder, that volume and energy around us not only modify each other according to certain laws, but that these laws themselves are modified and changed by other, more fundamental laws. In architecture today, the predictable rules of geometry and mechanics, of light, heat and sound must be applied not only with reference to each other but with reference to human needs. The laws of biology and psychology, with the complicated patterns they involve, are the ultimate reference point of newly developed techniques. While other sciences concern themselves with definite quantities, architecture must correlate their findings to the best advantage of the human beings who developed them.

In building, how high is high enough? How small is large enough? When does "wide" become "narrow," and why? Is there any ratio between these terms and factors like color, light, sound? Architecture is the slide rule that computes such questions of human relation and correlation—new dimensions in building. It is essentially the science, not of volume (there engineering is more at home) but of space.

In the past architects have used space more or less like lumber—so many feet this way and so many feet that way. Lacking true control of materials, they made firmness a supreme criterion and assembled their buildings foursquare. Into the resulting box, human activities were compressed and arranged —the original round peg in a square hole. Today the architect can work the other way round—not padding an incumbent box—but evolving from his knowledge of human need-patterns a shell that allows them to function most fully. He is no longer using space, he is creating it.

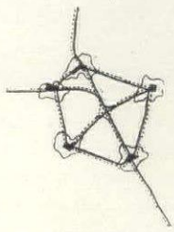
Space is what you make it

To see how human relations create their own space when unhindered by any external limiters, let us imagine a picnic on a wide beach. The extent of the distance to any obstruction is for all practical purposes limitless. However, since the aim of a picnic is to enjoy group activity, the space limits itself in a preliminary way by the desire for proximity. Food is a necessary part of a picnic so the arrangement of food containers together with the number of people who sit around the food creates a space pattern. The most convenient path to the water sets a further direction and children going to play are told to keep within sight or calling distance—other limits. All of these are as clear in form and as recognized by the members of the group as if they were delineated by barriers or planes.

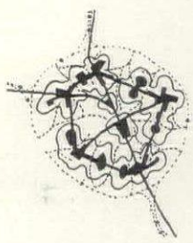
But even in this ideally free space some volume markers may commend themselves. If the sun is too hot an umbrella will be raised. If group custom demands privacy a "surround" may be erected near the central area. Should the picnic last into late evening a fire may be built and a wind-break put up—a change in human pattern due to those cosmic time patterns, day and night. If the notion at any time occurred to one of the party to put up a fence around their functional areas, he would find that the space created by the activities inside would be roughly comparable to that of its structural equivalent, a contemporary house. In terms of space, function is, itself, form.

This basic connection between space and design is one of the most important preoccupations of modern art and science, one that has caused striking changes in the attitudes and methods of both. It has its roots in century-long intellectual battles. Earlier thinkers allotted to space little but negative qualities. Aristotle's definition was the clearest and most comprehensive. To him it was "a continuous quantity . . . in which the presence of body although not actual is possible. There is no space separate from bodies." This seemed to satisfy everyone until Newton's time. Newton's practical mind started the ball rolling again by insisting that not enough attention had been paid to a problem which puzzled the early Greeks—if space had such an essential connection with bodies, what happened after the last star? Didn't space just go on and on and on? This question, which sounded so sane and unanswerable, later showed itself to be founded on a basic fallacy; but modern thought, in proving its contention that space and bodies do have a necessary connection (that they are two parts of one whole) and in defining what their relation may be, has had to revise its preconceptions in every field —philosophy, physics, art—and architecture.

Neighborhoods, social patterns of space . . .

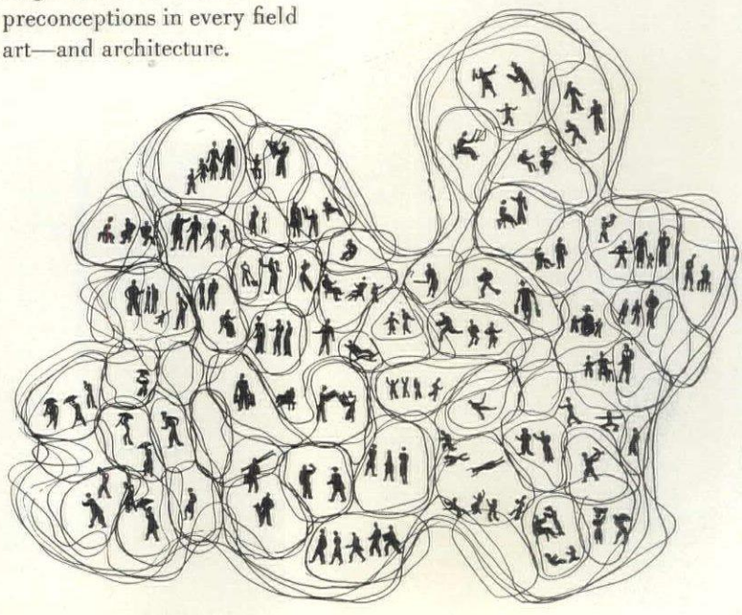


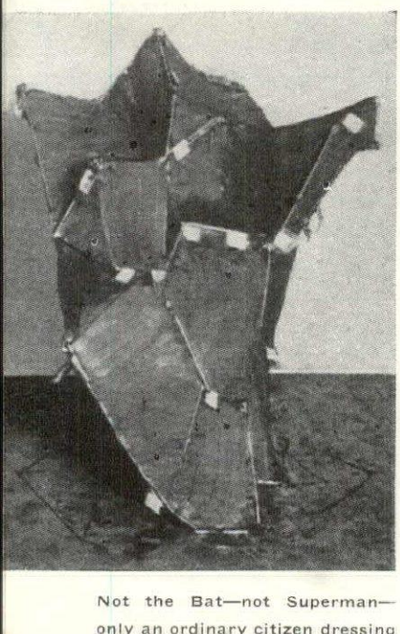
link themselves by roads to form a city . . .



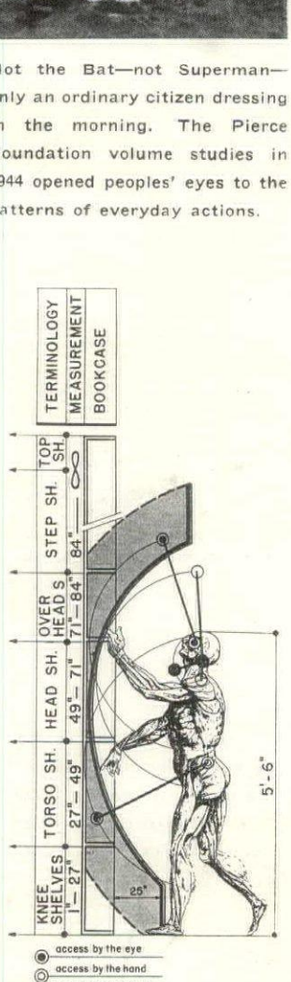
the pattern soon fills, spreads and develops . . .

boundaries shift or contract as, in this study of city growth by Hermann Herrey (FORUM, April '44), space expresses the lives of the people who create it





Not the Bat—not Superman—only an ordinary citizen dressing in the morning. The Pierce Foundation volume studies in 1944 opened peoples' eyes to the patterns of everyday actions.



Frederic Kiesler measured human reaching comfort for the development of his curved, mobile bookcase at Columbia University's Laboratory of Design Correlation.

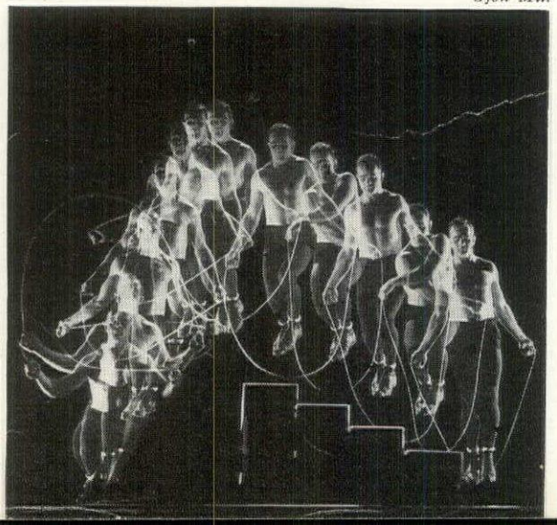
Stroboscopic photographs catch the grace and variety of a human figure in motion—a very popular application of Marcel Duchamps' theme in "Nude Descending the Staircase."

Berkeley, an Eighteenth Century philosopher, was the first to answer Newton's contention that "absolute space" could exist. Such a thing, he said, was only a "phantom of mathematicians"—no matter how far away space extends from the universe, it can only do so because there is a universe for it to extend away from—it always has and always must have this primal reference to bodies. Abstract as this argument of Berkeley's may seem, it effected the all-important step of keeping an intellectual door open for present-day discoveries about space and the vital part it plays in all human experience. The old brain teaser of the chicken and the egg has found a new counterpart—which is more influential: space or the objects which it relates? Modern science would seem to give the nod to space. Einstein, this time speaking of the basis of "field physics" (the parent of nuclear physics and its atomic results) notes as the crucial factor in its development "the scientific imagination required" to realize that the key to the physical world is "neither the charges nor the particles, but the field in the space between the charges and the particles." This powerful *field in the space* is the key to modern architecture as well as modern physics. Frank Lloyd Wright has expressed it—"Interior space is the only reality of a building."

So very great, however, is the assertiveness of objects (the architectural equivalent of charges and particles) that it requires the constant exercise of architectural imagination to develop an adequate spatial awareness. One young architect conscious of the challenge has found his own way of meeting it. He has instituted among his colleagues an ever-recurring space contest—How high is that door? How wide is the distance between those tables? The clank of a well aimed horse-shoe against the stake is no more satisfactory than learning that one has landed the closest guess in this game of experts.

A further complication adds itself to the architect's problem because of the fact that however imperfect his own conception of extent may be, it is far more highly developed than that of his clients. The difference between representation in two dimensions and three encompasses more than easily apparent difficulties. The most accurate model is at fault, space-wise, since it must be viewed from without and above, not from within and below. Horizontal planes assume undue prominence in both plans and models. Most important of all, the vital core of all space

Gjon Mili



relations, human experience, is lacking. The architect's comprehension of it is the only force strong enough to keep all factors in balance until the building is actually finished.

But space includes a great deal more than the elementary relations of length, width and height. For purposes of analysis, we are in the habit of speaking of light, heat and sound abstractly, as if they could exist in themselves. Actually, of course, this is not so—they exist only as elements of space. We see a lighted space, feel a heated space, hear voices and tones in a spatial framework. The architect, using laboratory-evolved rules, finds that his work must consist of understanding and applying them in the particular space relation he is evolving. Relativity is at work again.

For example, extension and its effect on light and sound cannot be solved by a process of simple addition or division. The excellent natural light on the north side of the American Stove Co. office building is produced by a glass strip which runs along its entire length. The whole ceiling acts as giant diffuser and reflector. If the same area had been divided into five partitioned sections, the sum of the light contained in each would not only have differed quantitatively from that of the original whole, but qualitatively as well. Partitions would have blotted up the diffusing and reflecting action of the ceiling. Conflicts from the point of view of human comfort (such as glare and shadow in lighting, echo and flutter in acoustics) result when light and sound are poorly coordinated with extension factors of space.

Space is human

The human criteria necessary to a proper understanding of space, break down most conveniently into three headings—functional, sensory and psychological. As might be expected, our ability to measure each decreases as we rise in the scale. Function, which concerns the moving human volume, is the nearest to linear dimensions, although the variety and complexity of its movements make its computation surprisingly difficult. The improved accuracy of sensory measurements has formed one of the most dramatic advances of modern science, but its very success opens up whole vistas of knowable unknowns. Psychology, most recent recruit to the practical sciences, has been more occupied to date with alleviating mental illness than in ascertaining desirable or optimum reactions. It is a realm whose spatial bearings are still determined by the insight of the individual architect. The extent to which his work delineates the needs of his client often depends on an imagination transcending the scientific.

Space for use

Beginning with function or use space, low man on the critical totem pole, we find that only recently has it received much thoughtful attention. In spite of a few isolated atempts at motion analysis by artists or factory planners, the publication of Pierce Foundation studies in 1944 formed a historic step. Their volume models of the space denoted by everyday actions like dressing and hair washing seemed

ıore like esoteric pieces of sculpture than anything ıe architect had consciously in mind when he de-gned a bedrom or bathroom. Only by an immense mount of experimentation, photographing and ıodeling were these apparently simple movements ccurately shown. Their painstaking efforts remain, ɔ date, the best method for securing precise mea-ıurements of the human volume in action. A proper valuation of use-space, following through on this eginning, would include a mass, yet intimate, study f everyday actions. How much room is needed to se bureau drawers easily? What is comfortable assage between the bureau and the bed? between ıe bed and closet? Data of this kind must be avail-ble before architecture can truly reflect underlying ıuman movement patterns.

Complicating the matter of use-space for the archi-ect is the realization that he is not creating for a ingle human volume, but for man as a social being. This adds another "must" to space design—not only he relation of a moving volume to passive ones, bu f moving volumes to each other. Here time, the neasure of motion, enters the field decisively. A ıost elementary example will illustrate this: if wo people occupy the same room, space minima vill be greatly affected by the knowledge of whether ɔoth will need to dress at the same time. Everyday ıpplications of such an instance are found in the stablishment of "staggered" lunches for large fac-ories, in proposals of the compulsory night unload-ng of trucks to relieve urban traffic conditions. Archimedes summed up the problem over 2,000 years ago—two bodies cannot occupy the same space at the same time.

Except for agreement on the existence of this basic law, however, our concept of use space today is very different from the Greek—it is kinetic instead of static. The space value of a human being is recog-nized as a force, a source of energy. The objects around him—building shell, equipment, furniture, etc.—are energy potentials. Interaction between the two is helped or impeded (defined) by the space (the field) in which both operate.

Reinforcing this concept is the discernible change in our notions of minima and maxima. Formerly these were posed as opposites with respective over-tones of public dole and lavish magnificence. Re-cently they have shown their basic kinship, no longer contrasts but comparisons on a single new scale of measurement—measurement not in terms of money only but of those two more vital expenditures, time and energy.

We can, and do, build larger structures today than ever before. We have factories covering a square mile and skyscrapers a quarter of a mile high. Mechanical skill enables us to cover greater extent (reduces space in terms of time) and manipu-late greater loads (reduces it in terms of energy) but in spite of this apparent temptation to largeness, the scale of building has decreased.

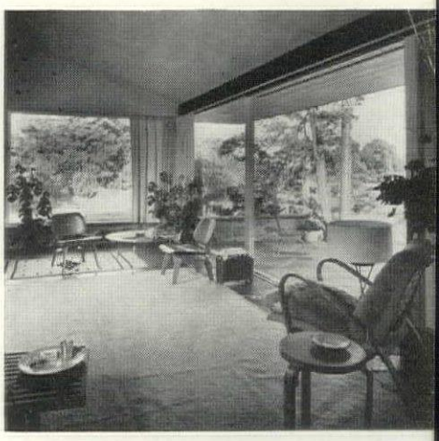
At one point, when the elevator was first made practicable, the vertical relation of planes in many-story buildings, seemed an invitation to infinity. Decades of trial and error have discovered, how-ever, that the law of diminishing returns operates upward as well as horizontally. Proper organiza-tion tends towards a golden mean where minima and maxima approach each other. Joining them is a spatial precept—enough is enough.

An everyday aberration that deflects the architect's would-be functional orbits is caused by furniture and equipment based on an outsize, non-human scale. If its use is forseeable (much is necessarily specified because nothing better is on the market) he has a chance to compensate. Only too often, however, he sees his careful planning disrupted because of a bedroom or dining room "set."

In spite of all such hazards, however, the skill and flexibility with which modern architecture has learned to organize space on a single, on several or on many planes for every purpose from a wax fac-tory to a weekend cottage is one of its soundest achievements. Walter Behrendt was not merely in-dulging a dramatic flair when he stated—"Space has become mobile, its limits are melting away, its walls blasted asunder . . . Rooms penetrate and interlace and mingle in several planes."

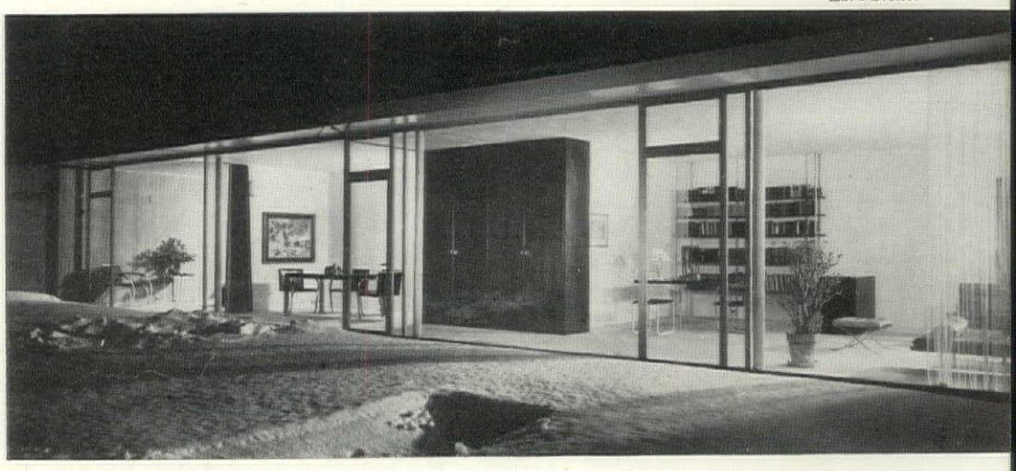
The halfway mark between criteria based on man's volume (his mere robot qualifications) and those formed by the highly perceptive world of his senses is that primal spatial awareness, his sense of equi-librium. Diverse as have been housing practices among the many civilizations, every known one has risen from a flat floor. This remains the one constant a symbol perhaps of his desire for security and predictability.

Along with equilibrium, the first thing he becomes aware of is warmth. In these northern climates the new freedom of space creation is almost entirely due to the improvements in thermal control which have permitted the opening up of building interiors. Un-til these improvements were made, it was impossible to heat a whole building comfortably, and walls were a very important element in preventing the escape of warmth from important "living" rooms. The pene-tration, interlacing and mingling of which Behrendt speaks are possible only when space can be con-sidered as a single thermal environment.



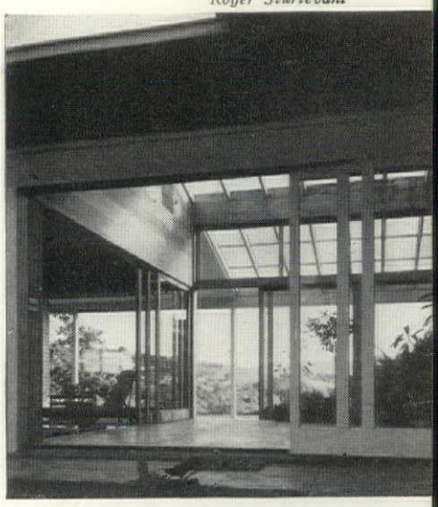
Bringing the outdoors in—the garden becomes a permanent part of this small living-room, making it visually expansive.

Ezra Stoller

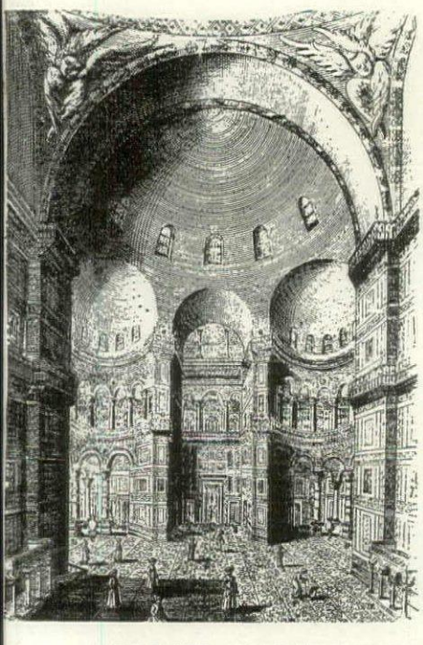


Bringing the indoors out—a se-cluded site or land wall some-times allows the interior to become a part of exterior design.

Roger Sturtevant



Bringing the outdoors through—a view, framed by one area, en-hances the inside court. In a good plan one part helps another.



Santa Sophia—one of the great geometric shapes of history—symbolizes by sheer size and regularity man's power to enclose enduringly and with order the space he could not at that time control.

Advancing and receding barriers

Sensory space relations, even more dynamic in their effects than functional ones, are even less dependent on the boxlike shell whose contents used to represent the sum of human space. Even in the most rigid of houses, we are not confronted with the four walls that logic would indicate. Instead, we experience sensorily a series of advancing and receding barriers whose existence is modified by the volume enclosure, but whose pattern is entirely distinct from its extent. The semi-circle around the fireplace, the circle around the stove, have marked the thermal enclosures of earlier houses. Only recently, with the rediscovery of radiant heating, have thermal and volume barriers approached each other. Even now, glass areas in a room set up a cooling counter movement in their vicinity.

Radiant heating has made unnecessary in mild climates (England, for instance) the outer walls of schoolrooms; and in the U. S. experiments are being made to extend its use to outdoor terraces, rendering them comfortable for all but the few severest months. Although in so many cases like these thermal control opens up interior space, there are some in which it seals and restricts them more closely than ever. Air conditioning, for example, does away with the high ceilings and transoms once believed the most effective cooling method.

The acoustical size of a room is not a matter of foot and inch computation either. Shape and texture are of greater importance than extent. Highly reflective walls and ceilings make a room seem smaller, while treatment of surfaces with sound absorbent material can (by test) double its acoustical size.

As a single-handed space-creator, however, the visual faculty is at once the greatest, the most varied and the least dependent on actual volume. We find that vision, even in the outmoded box-room, has already annexed for its spatial range the view outside the window and (through the door) a wedge of the next room. It is the most active element in determining the idea of size. "Narrow" means little in itself, merely expresses width in terms of length. Added height visually shrinks the horizontal dimensions. Frank Lloyd Wright has exploited these optical quirks by playing one dimension off against another, using sudden breaks in the ceiling level to emphasize adjacent height.

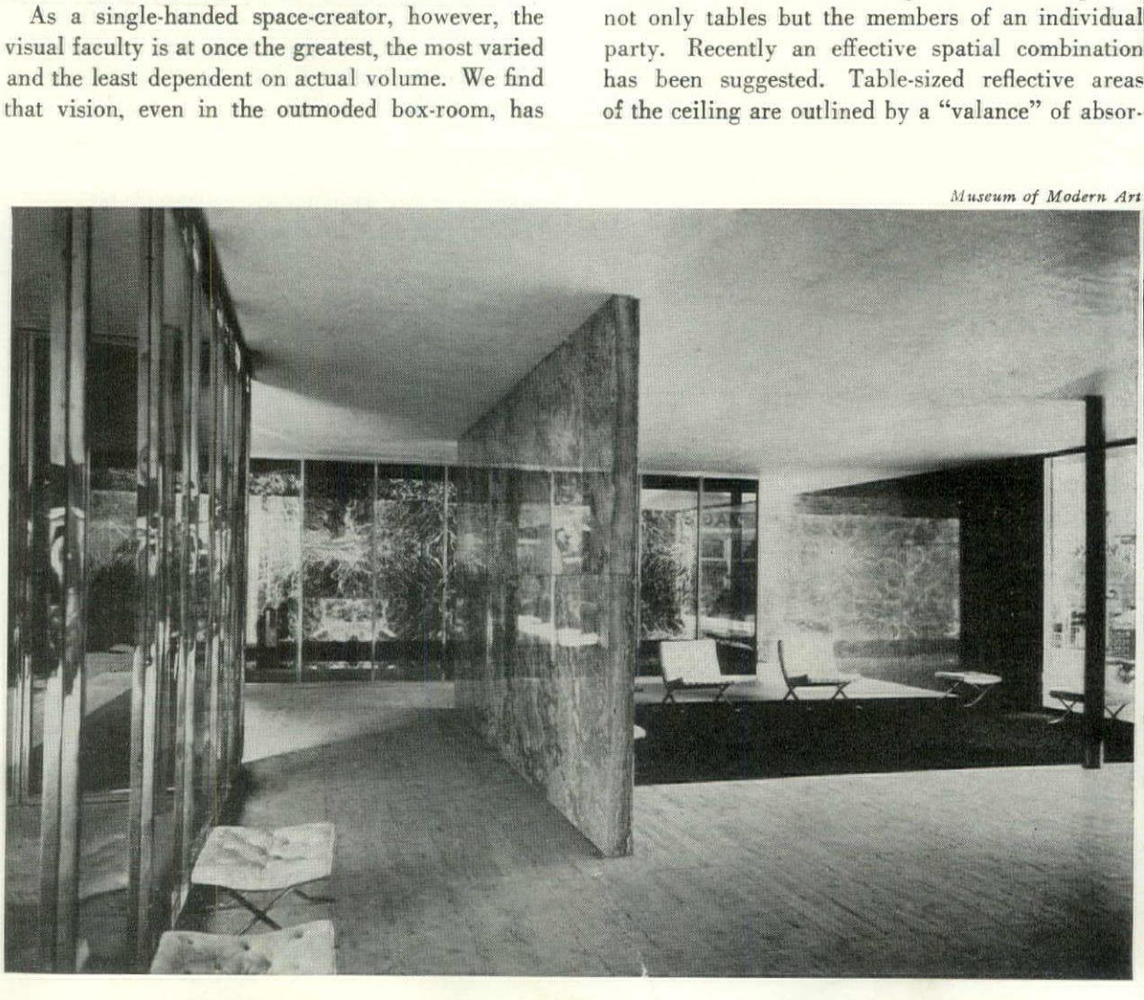
Two visual elements, light and color, are very important as space definers. Light alone has for a long time created dimensions and purpose in the theater. More recently, exhibitions and stores have developed its potentiality to mark out desired direction patterns. Intensity and contrast of color wield similar spatial power—a power used daily for better or for worse by interior designers.

One type of space, fictive space, denotes the application of sensory laws to aggrandize desired spatial qualities and gloss over unwanted or unimportant ones. For a long time sight seemed to have a sole option on this field: the Greeks developed "entasis" to add to their columns' appearance of height; stage scenery still makes the most of the Renaissance-discovered rules of one-point perspective; city rooms visually relieve cramped quarters by the use of a mirrored wall.

Recently, however, acoustics has shown a similar potentiality. Restaurants, for example, always seemed to involve a basic acoustical conflict. Reflective ceiling surfaces allowed people around the same table to hear each other well, but the resulting overall din outlawed such a solution. Absorbent treatment was a lesser evil although it tended to separate not only tables but the members of an individual party. Recently an effective spatial combination has been suggested. Table-sized reflective areas of the ceiling are outlined by a "valance" of absor-

Mies van der Rohe, master modern geometrician, created this dramatic example of free, yet firm, human space for the Barcelona exposition. Van der Rohe's work emphasizes the "classic" features of human space—interpenetrating areas, articulation only for need.

Museum of Modern Art



odies all human relationships

ent material suspended from the ceiling, creating e acoustic illusion of a series of clearly reflecting ooms each partitioned from the next.

When space is understood as the sum of human-nvironmental relationships, the mental barrier hich makes opponents of indoor and outdoor pace is once and for all dissolved. Pride in an arti-cial atmosphere for its own sake (an attitude satir-ed in Andersen's fairytale about an emperor who utlawed the real nightingale when he was given a echanical one with jewel-studded feathers) has o place in a modern architectural humanism. Its deal is not indoor versus outdoor but a proper elation of the two. Human space expands toward avorable corners of the compass to admit sun and ight; shrinks against unfavorable ones bringing old and wind. Outdoor visibility is a constant fac-or in its plan and, in summer when no thermal bar-iers are needed, walls slide up or aside. The creation f true human space eliminates only anti-human lements.

In cases, however, where an interior environment idely differing from the external is desired, thought nust be given to easing the shock experienced by hose passing from one area to the other. Sandhogs, or example, have long known the necessity of a ecompression chamber to allow gradual relief be-ween working and natural environment. Other great ontrasts of space (entering a factory on the night hift from outside dark to great light intensity or riving into a comparatively dim motor tunnel from right sunlight) might profitably be equipped with djustment areas. A gradual intensification of light n the passage or approach to the main area—such a assage is often required for other reasons—would e a true space consideration. Distance would be neasured, again not by arbitrary yards, but by the uman scale of time and energy. Its extent should be uch that time of transversal will equal time of hysiological adjustment.

pace for thought

There is an old Spanish proverb that says—"Crowded caves lead to murder; solitude to mad-ness." It is a reminder that there is nothing new in our realization that space has great impact on mind and emotions. The proverb further tells of a recog-nition that, as there are natural maximal and minim-al boundaries for human functions and senses, so also there are psychological ones.

In modern life, keeping well within the Spanish extremes of murder and madness, we find constant illustration of the pressure and discomfort caused by overcrowding. A single instance of this common complaint: the constriction often felt in small auto-matic elevators. Many interior rooms, also entirely enclosed, induce no such feeling; but the combina-tion of silence, movement and isolation accentuate a claustrophobic reaction.

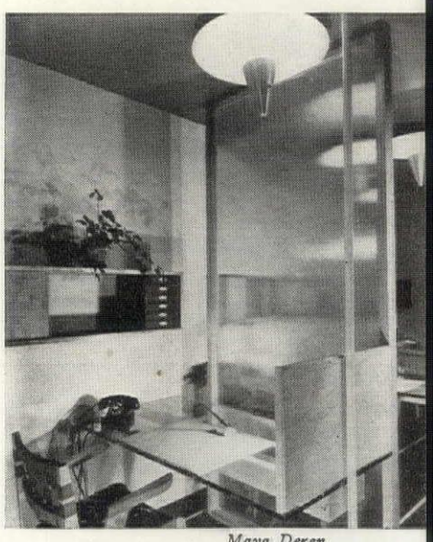
On the other hand, the sense of four protecting walls is often as reassuring to our ego as. lower in the scale, a floor was to our equilibrium. They have a representational as well as a practical value. The ideal of "cozy," compounded to a great extent of the negative satisfaction of having shut out large, windy. damp or cold areas, is often so enticing that the average man prefers to ignore changes that would better the internal organization of his house, fearful of endangering a primal "coziness." One of modern architecture's great victories has been to prove, in its own field at least, that freedom and security are not incompatible.

The extensive, psychological data needed to document our broad span of building needs are not yet available. That this will greatly alter present concepts of building design is evident from the criticism recently made of an otherwise very adequate plan for a research center. Convenient as its functional separation of departments might be, it hampered what was held to be one of the prime purposes of such a building—the day-by-day intermingling of doctors from various branches of research. Even to the point of "wasting" space, it was held desirable to have offices lead past each other and provide a casual basis for familiarity.

Psychological effectiveness, that least measurable of all measures, is almost the sole standard we can apply to churches, monuments and memorials—spaces for awe. Past civilizations had more understanding of this type of space than of any other—the embodying of religious. patriotic and emotional concepts. Egyptian and Greco-Roman structures made use of the attributes of height and extent to uplift their viewers. The compact pyramid made the most of the space around it, thrusting above miles of sand to preserve Pharaoh's memory until a final reincarnation. The Roman arch spread itself—vast, stolid, supereminent—over the central square of a conquered city. Gothic cathedrals in addition to an unprecedented surge of verticals and peaks added another element through their stained glass windows —color. Although modern architecture has not yet produced a universally acceptable structure of this type, it has already made effective use of a further quality—light. A standard theatrical device that has been adapted for churches is a curved shell set behind a screen or colonnade which, flooded with blue light, forms a vast unshadowed area as seemingly endless as the sky—a visual symbol of eternity.

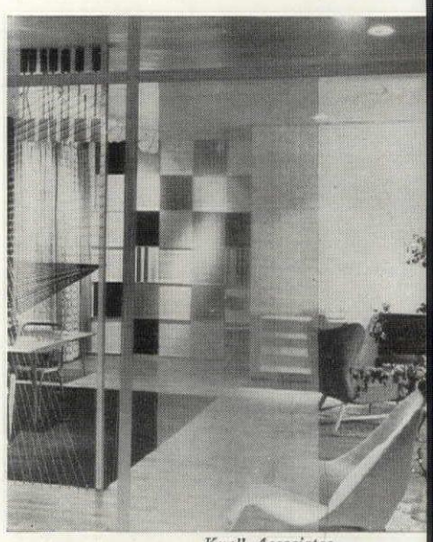
Roger Sturtevant

A narrow shop visually doubles itself by wall mirrors—an example of helpful "fictive" space.



Maya Deren

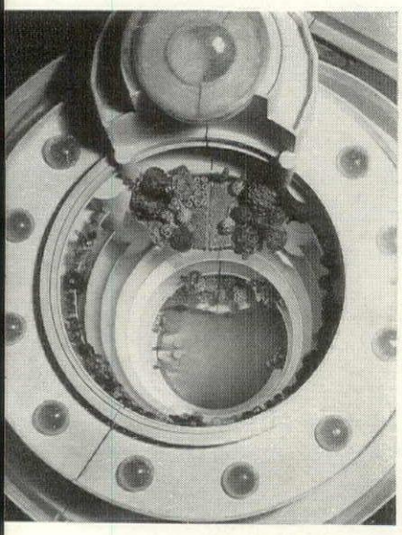
Translucent glass partitions do not absorb light, do provide a needed measure of visual and acoustical privacy.



Knoll Associates

Wire, string, wood strips and semi-transparent hangings are effective in marking space division where permanent heavy partitions are not necessary.

SPACE . . . finds its measure in man



Time, space and structure meet in Wright's spiral tower. The museum—seen from above and through cross - section — illustrates the integrity only achieved through purpose and order.

Several years ago a symposium held at Dartmouth Eye Institute noted that "in contrast to Descartes' Seventeenth Century principle 'I think, therefore I am,' modern man is living on the principle 'I do therefore I am,' which, extended, means 'I turn disorder into order, therefore I am.'" As an expression of dynamic human order (involving the supersensory ideas of purpose and unity) modern architecture has achieved a solid foothold in psychology and philosophy. The *new* space which it creates, far from wantonly piercing, mingling and interlacing, has been informed by a rigorous intellectual discipline.

Organic order

As an example of this new space—unfamiliar in shape, turning accepted geometric notions inside out, and yet following a far more precise scale of measurement than the old—the Guggenheim Memorial Museum designed by Frank Lloyd Wright attains a true significance. Whatever drawbacks actual construction may uncover, the guiding principle of its design will remain valid.

A museum is intended to accommodate the thoroughfare of individuals and groups past a series of art objects. Its space therefore should only be wid enough to allow for comfortable viewing, a distanc negligible compared to the necessary length. Th conventional solution to the problem posed by suc a shape is to string out a series of box units whic on this grand scale, is tiring to walk through an baffling to follow consecutively. The result is creature of unrelated "wings," casually knotted a either end.

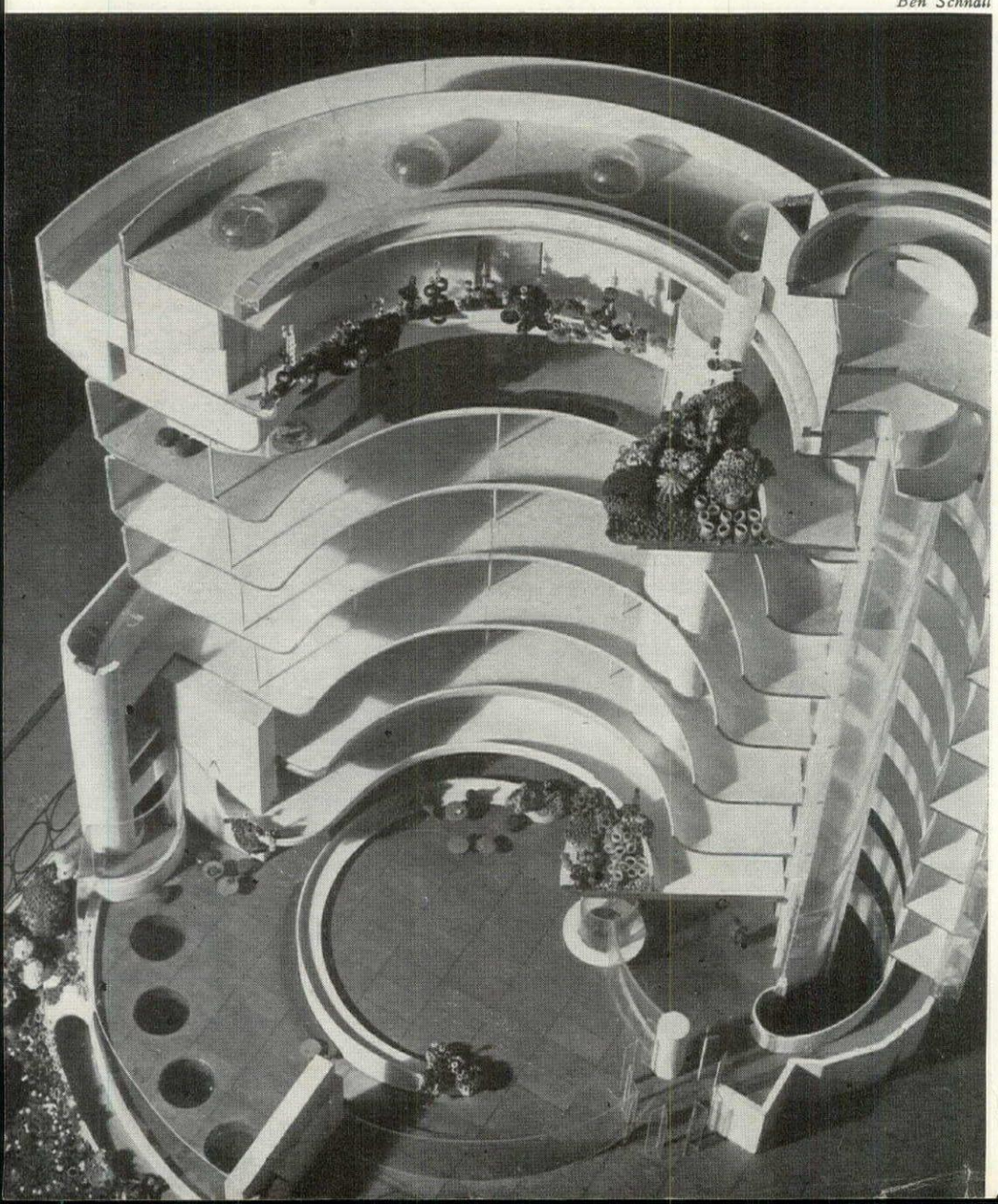
Wright's museum was designed, not only for pic tures, but for people. The very backbone of th building expresses its purpose, a continuous se quence of experience. The necessary long, narrow space (a toothpaste ribbon really) is related bot horizontally and vertically in the coiling shape of helix. From the viewpoint of spatial craftsmanshi this form represents the greatest economy of means from the human standpoint it combines the biologi cal knowledge that the viewer tires less easily walkin downhill, and the technical knowledge that an eleva tor makes it possible to start him off from a height

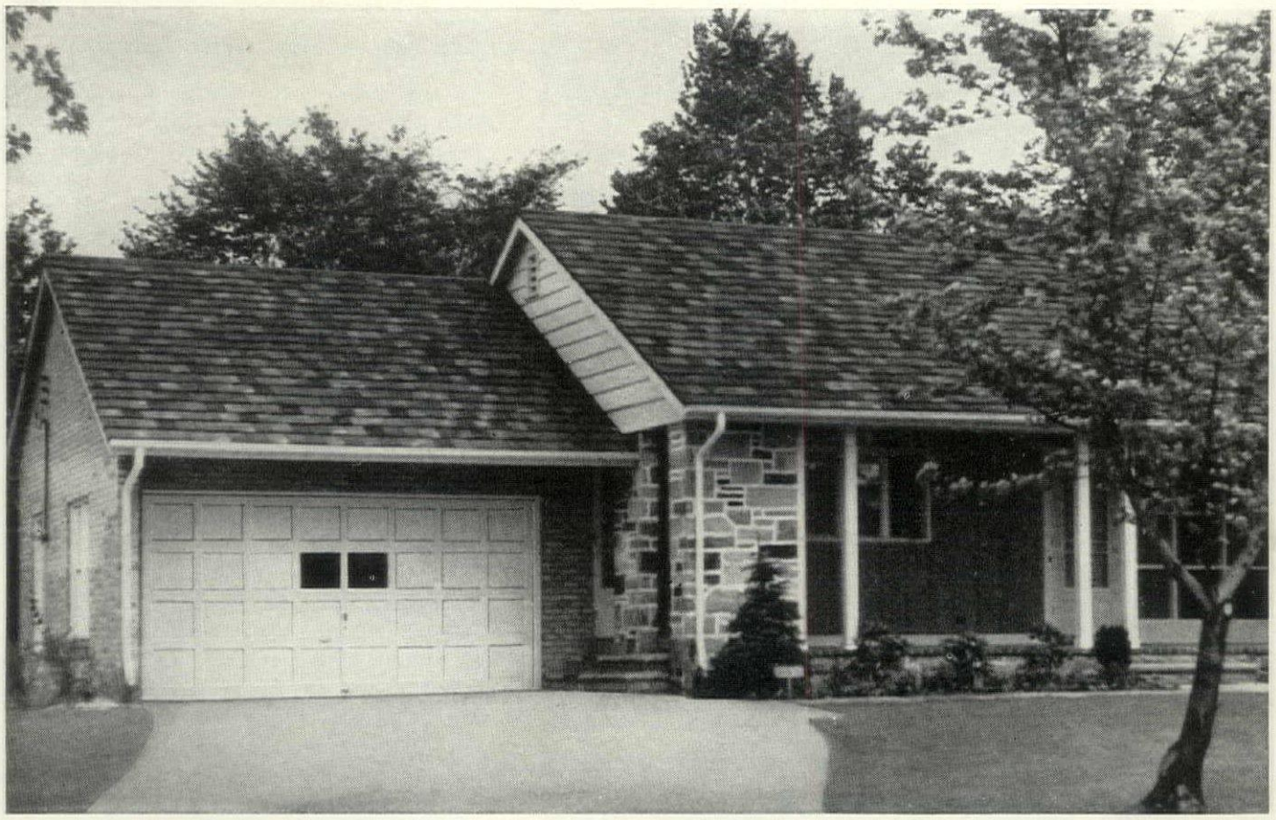
Moving around its sloping course, he cannot help but be constantly aware, visually and perhaps au dibly, of his relationship with the whole extent of th structure. Under a wide glass dome, the open level of curving floor, so many above and so many be low, give him a constant measure of his position Glimpses across the court may at any moment carry him back to levels he has already seen or forward t levels he has yet to visit. Past and future meet i his present place, while before and behind him time and space unroll together.

A similar constant reference to human values i determining structure, scale and organization mus underlie the creation of any really successful humar space. Most thoughtful application so far has beer shown in those two near extremes—the home an the factory. Still awaiting true definition lie a mul tiplicity of complex building types—the apartmen house, the office building, the hospital. A commor psychological principle—that people are more alik than they are different—brings out the fact, too that not only will such study produce better individual buildings but it will make possible, fo the first time in a really understanding way, th development of 'pilot models' for mass-produced buildings.

Space, as the relation of a person with his needs and with the people around him, cannot stop withi the boundaries of a single building. Not only family but community functions find their way into its capacity. Privacy, the effect of planting on tem perature and atmosphere, smoke control, water pol lution, relations of light and shadow and the various heights of buildings—all are parts of its study. And it is only when these are seen in their true spatial context, as related parts of a desirable whole, that we can hope to create communities and cities that are in the true sense—spacious.

Ben Schnall





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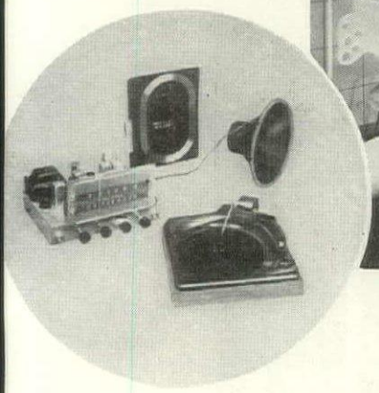
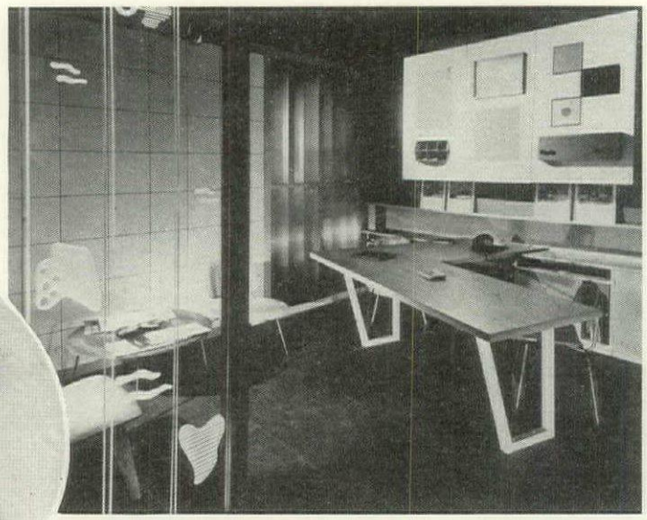
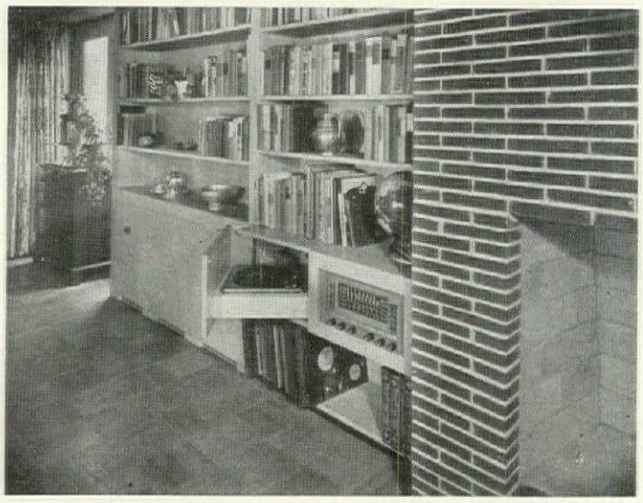


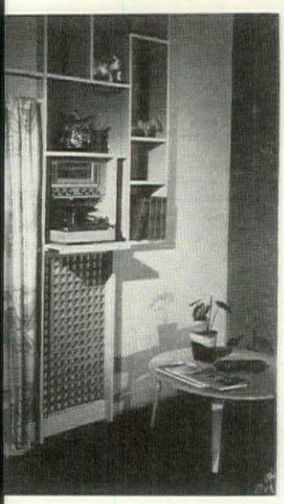


Voice & Vision showroom (top) has television screen, many speakers on panel. At right are television controls.

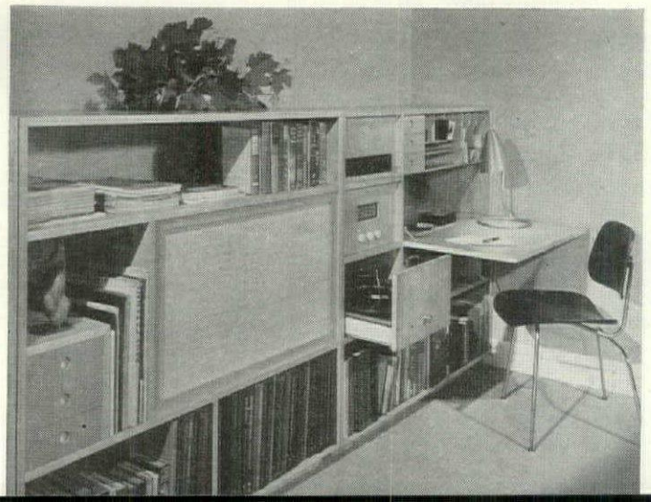
What can be done with simple "innards" (circle) is shown in these three photos of radio-phonograph installations.



V&V, Architect L. Morgan Yost collaborated on the installation above. Speaker is located on other side of fireplace.



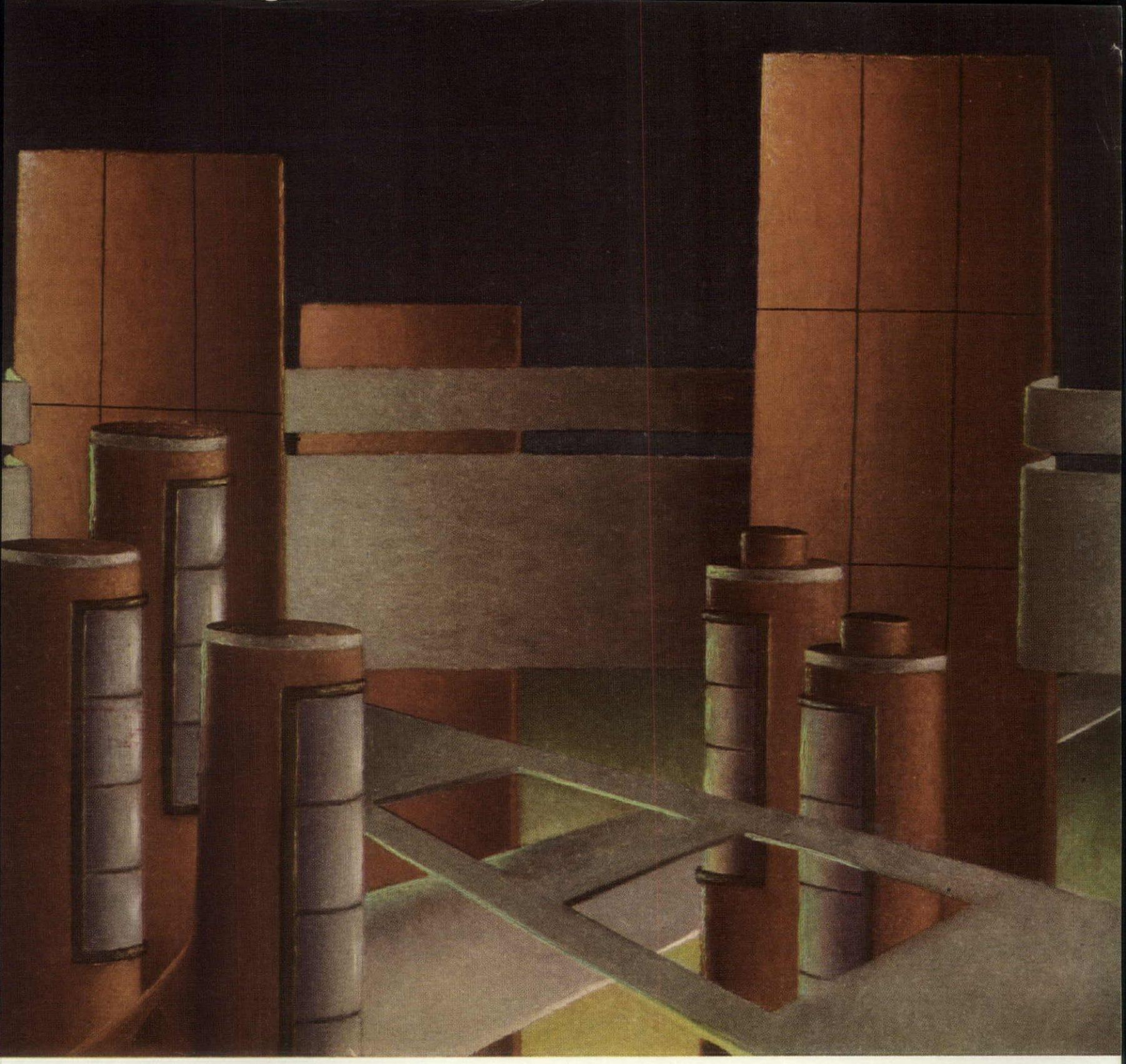
Two other V&V installations are shown at left and below. Speaker, in both cases, is located for good reception.



CUSTOM TELEVISION AND RADIO equipment is designed for sight and sound corner in homes.

Voice & Vision, a new Chicago firm, insists, as it sells its cabinetless radio and television units, that acoustical and visual engineering are part of their game. In other words, the loudspeaker should be placed in such relationship to sound reflecting and absorbing materials that its full tonal value is realized. The television screen should be placed in proper relation to lighting and seating arrangements for comfortable viewing. To implement this concept, the company offers architects and designers blueprints and instructions for building-in V&V equipment to attain maximal results. All units are carefully engineered to be built-in to walls, bookcases and other such logical areas. Radio and television can then become a natural part of the interior scheme of the house. Robert E. Samuelson, who sparked the operation, would have a sight and sound corner in every new and remodeled house with built-in radio and television in place of present-day "bulky, inappropriate radio furniture." The fact that television is fast becoming a factor in influencing modern man's recreational habits leads Samuelson to push his idea for a planned recreational center. Voice & Vision says, further, that their equipment is *all* radio, which is just a snide way of saying that the console is only part radio, the other part being cabinet-work. In considering what V&V is attempting, the important fact that more American homes have radios than have bathrooms and the important estimate that television sets also will soon outnumber bathrooms pops up and slaps us in the face. The unlovely fact is important here only because those homes that were designed for outdoor plumbing are much more easily adaptable to receiving indoor plumbing than the same homes are adaptable to receiving radio and television equipment. Acoustical engineers could count on the fingers of one hand, without using half the fingers, the number of homes that have been designed to include radio equipment. Millions of dollars have been invested to improve radio receivers and loud-speakers while hardly one cent has gone into the special acoustical design problem involved in installing radio equipment. Superior acoustical design should be considered at the time the site is chosen. It can be included at little or no exra cost depending entirely on how much superiority is desired. Such acoustical treatment would add up not only to better radio and television reception, but to better sound insulation and isolation throughout the house. In remodeling houses, the slightest attention given to acoustics, such as the location of the speaker in the room, would be a distinct improvement over present practice. The cost of V&V's equipment is moderate. Radio-phonograph combinations, including receivers, record changers, amplifiers and loud speakers run from $125 to $1,000. The addition of television in the same package brings the cost up to from $500 to $1,700. Their standard television screen is 12 x 16 in. but V&V supplies screens as large as 22 x 30 in. for those willing and able to pay for them. The company has a consulting and installation service in the Chicago area to relieve the architect or designer of any technical responsibility for radio engineering. Plans are being made to extend this service to other parts of the country. Meanwhile V&V's easy-to-install packaged units are shipped anywhere in the country with full instructions for installation included.

Manufacturer: Voice & Vision, Inc., 7320 Bennett Ave., Chicago 49, Ill.



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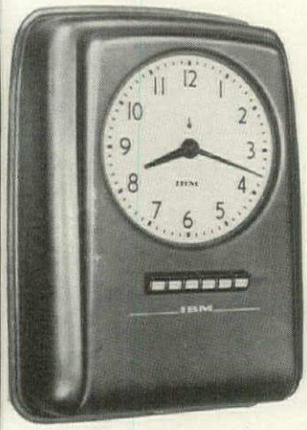
BUILDING REPORTER



TIME SYSTEM is self-regulating, operates from ordinary electric outlets.

No special supervisory or clock wiring is required for IBM's new electric-electronic time system. Clocks and master control all plug into ordinary 60-cycle AC current supply. The control (illustrated) in addition directs the entire system because it is fitted with an electronic tube which transmits a supervisory impulse every hour. The impulse is picked up by an electronic receiver in each clock on the system. If any clock is faster or slower than the master clock it is corrected each hour by means of this electronic impulse. The manufacturer feels the new time system will be a boon to schools, hospitals, industrial concerns and institutions because it is so flexible and yet is economical to install. The IBM system provides coordinated time control throughout a building or group of buildings for indicating recording or signaling units without special wiring. Bells, horns, buzzers, gongs or chimes may be sounded automatically through the same electronic transmitter. By the use of an adapter, the IBM system may be used for such self-regulating impulse units as attendance time recorders, job cost recorders and time stamps.

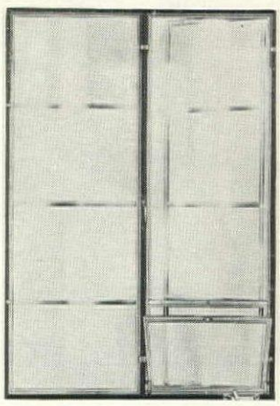
Manufacturer: International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.

NEW LAMINATE RAT REPELLENT is non-poisonous.

A low-cost board, Protekwood, developed by the U. S. Plywood Corp., promises to be a boon to farmers and others who have to protect stored foodstuffs, poultry, and livestock against damage by rats. This damage has been estimated annually at $2 billion in the U. S. alone. Protekwood is a combination of hardwood veneer with impregnated fiber faces. It is non-poisonous so it will not affect poultry or farm animals. Laboratory tests have proven, according to U. S. Plywood, that the material is just too hard for the rats to gnaw through. Tests were made at the University of New Hampshire using an ordinary wood box and a Protekwood box. Rats were able to gnaw through the wood box very readily while the repellent box was barely scratched by the rats teeth.

Manufacturer: U. S. Plywood Corp., 55 W. 45th St., N. Y. C.

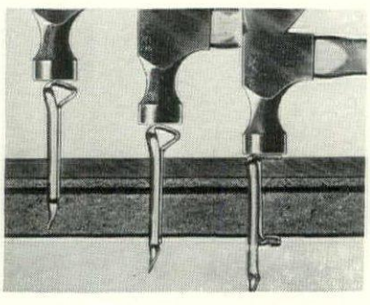
STEEL STORM WINDOW with open-in sill ventilator for casement windows.



Detroit Steel Products announce a steel storm sash especially designed for their Fenestra line of casement windows. The storm windows may be installed easily and safely on the inside without recourse to ladders. The frame of formed steel is equipped with a rubber gasket which prevents metal to metal contact and seals the whole window at the same time. Photograph shows a two-light wide casement with two storm window units, one with a sill ventilator. The manufacturer says that the new storm window will provide draftless fresh air even during stormy weather.

Manufacturer: Detroit Steel Products Co., 3111 Griffin St., Detroit 11, Mich.

FASTENER LOCKS WOOD SHINGLES directly to gypsum sheathing.



Elastic Stop Nut Corp. of America has developed a special fastener, known as the ES nail. Designed to cut construction costs, the nail provides means to lock shingles directly to gypsum sheathing. The photograph shows how the

(Continued on page 168)

why FENCRAFT gives you

Finer Fenestration . . . at Lower Cost

Let's take cost first, since it's an ever-present problem to most of your clients.

The low cost of Fencraft* Steel Windows results from standardization. Our use of standard casement sections permits manufacturing economy without sacrificing variety in window types and sizes. In turn, installation costs are less . . . because Fencraft Window dimensions are coordinated with those of collateral wall materials.

What about window design? The strong steel sections permit extra glass area for abundant daylight. Geared Roto-Adjusters make swing leaves and ventilators easy to operate. Here's beauty—in graceful lines and fine hardware. Durability—in good steel and carefully fitted parts. Utility—in easy screening, safer washing, firesafety, better daylighting and controlled ventilation. Fencraft Casement, Projected and Combination Windows are the product of America's oldest and largest steel window manufacturer.

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Architect: **Warwick & Stevens**

Contractor: **Jerry Maiatico**

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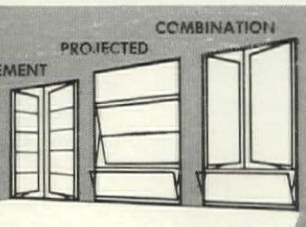
Laboratory
Sloan Kettering Institute, Memorial Cancer Center, New York City

Warehouse & Office
Sullivan, Long & Hagerty Co., Bessemer, Ala.

Factory & Office
L. C. Smith & Corona, Syracuse, N. Y.

Fenestra



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Please send me data on types and sizes of the new Fencraft family of Fenestra Windows:

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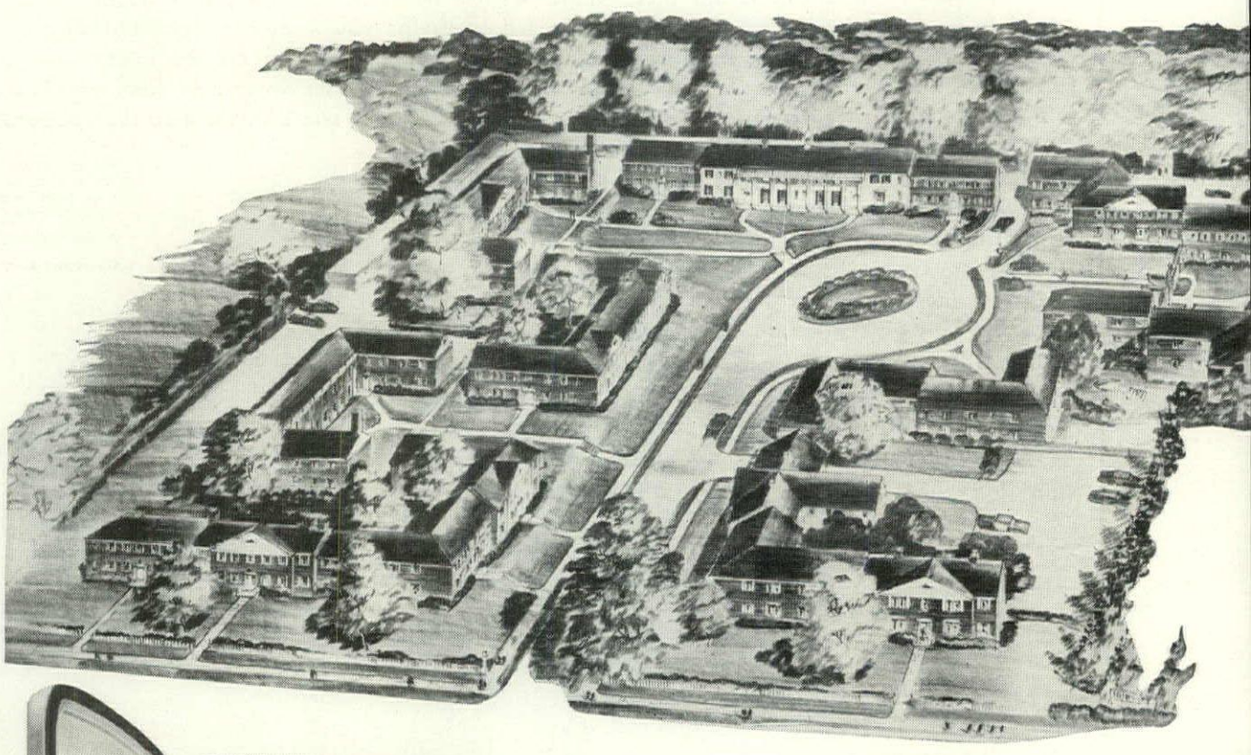
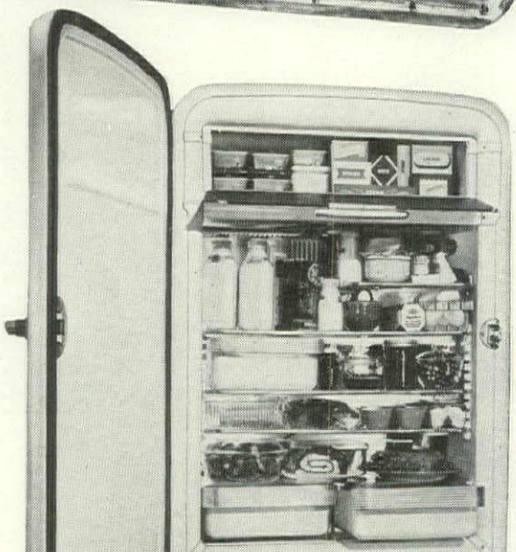
"I wanted dependable refrigeration

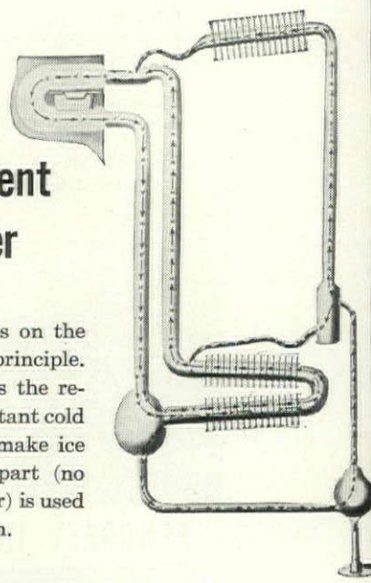
...I chose silent, long





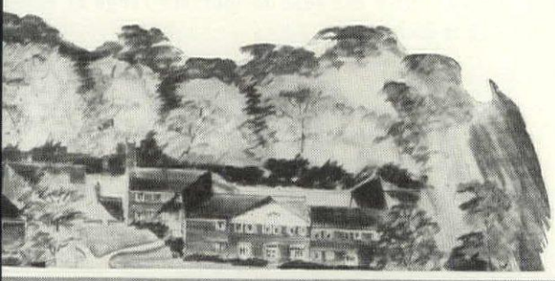
Here's why Servel stays silent ... lasts longer

The Gas Refrigerator operates on the simple continuous-absorption principle. The small gas flame circulates the refrigerant that supplies the constant cold needed to preserve food and make ice cubes. Not a single moving part (no motor, no pump, no compressor) is used in the entire freezing operation.



for my garden apartments

lasting Servel,"



Says Builder of Green Acres, Garden Apartments in Verona, New Jersey

"Last spring—when I was ready to order refrigerators—I wanted to make sure my tenants would get a refrigerator that would be dependable for years. That's why I settled on Servel for my Green Acres apartments. In addition to having all the latest conveniences, Servel is the only refrigerator that has no moving parts in its freezing system to ever need repair or replacement."

MILTON L. EHRLICH
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The newest idea in American home iving—where the country's fresh out-of-doors is blended with the city's nodern conveniences—is the garden apartment. Naturally the builders nd owners are making their garden apartments as up-to-date and comortable as possible . . . with special emphasis on the kitchen and kitchen appliances. That's why many owners have chosen—and many more are eriously considering—Servel as the efrigerator for their kitchens.

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Tenants find something extra special n their new Servels. To be sure, they get every modern cabinet feature. And something *more*—the finest freezing system of *any* refrigerator. That's because only Servel operates without using moving parts. It has no machinery to make noise or get out of order. Just a tiny gas flame provides dependable, uninterrupted refrigeration year in, year out.

Low operating and maintenance costs please owners

You'll find that it costs surprisingly little to operate an apartment house equipped with Servels year after year. What's more, the upkeep bills amount to almost nothing. All the credit goes to the different operating method of the Servel Gas Refrigerator. There's not a single piston, pump, valve, or compressor in the freezing system to ever lose efficiency or need costly repairs. For full information on Servel, see your Sweet's Catalog . . . or write to Servel, Inc., Evansville 20, Indiana.

Servel
The GAS Refrigerator

ES nail works. It has two legs and a triangular loop at the top. When it is driven into the material, the last blow of the hammer flattens the top and causes the locking action. ES nails may be driven at convenient points without regard to stud location. The nails are 1¾ in. long and made of low carbon steel, zinc coated. They are made for customary concealed method of shingle application and count 200 pieces to the pound.

Manufacturer: Elastic Stop Nut Corp. of America, Union, N. J.

PLASTIC BLOCKS FOR INTERIOR PARTITIONS are lightweight, easy to install.

The Columbia Protektosite Co. has developed a building block which should be invaluable for temporary or permanent interior walls where transmission of light is important. The new block has several advantages; it is light-weight, about one-fifth that of glass, and interlocking. The weight feature has the obvious advantage of cutting down shipping and handling costs. Because the blocks interlock, a temporary wall can be built without the use of adhesives, strips of wood or clamps. Permanent partitions may be erected however by the use of mastics commonly used for tile. Like glass blocks, the new plastic blocks are not transparent but translucent. According to the manufacturer, the plastic blocks have about the same light and sound transmission factors as have glass blocks.

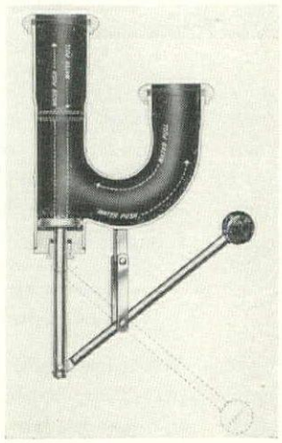
Manufacturer: Columbia Protektosite Co., Carlstad, N. J.

TELEVISION ANTENNA designed to increase range of television by 15 to 25 miles.

Eastern Transformer Co. has announced a new television antenna called Double U. In addition to increasing range of reception, the manufacturer states that Double U is extremely simple to install. Two men can assemble the antenna in less than an hour using only a screw driver and a socket wrench. Other features of Eastern Transformer's product are that it corrects "ghost" images, and eliminates sound and picture disturbances caused by automobiles, X-ray and diathermy equipment. The antenna is engineered to withstand extreme wind, snow and sleet conditions. All connecting screws and hardware are chromium plated to withstand corrosion. The pole itself is 10 ft. long, made of galvanized steel. The manufacturer says that the antenna will give excellent reception at heights much lower than previously thought possible because it has three reflector elements, two director elements and two collector elements.

Manufacturer: Eastern Transformer Co., Inc., 147 E. 22d St., New York 11, N. Y.

PUSH-PULL LEVER makes plumbing trap self cleaning.

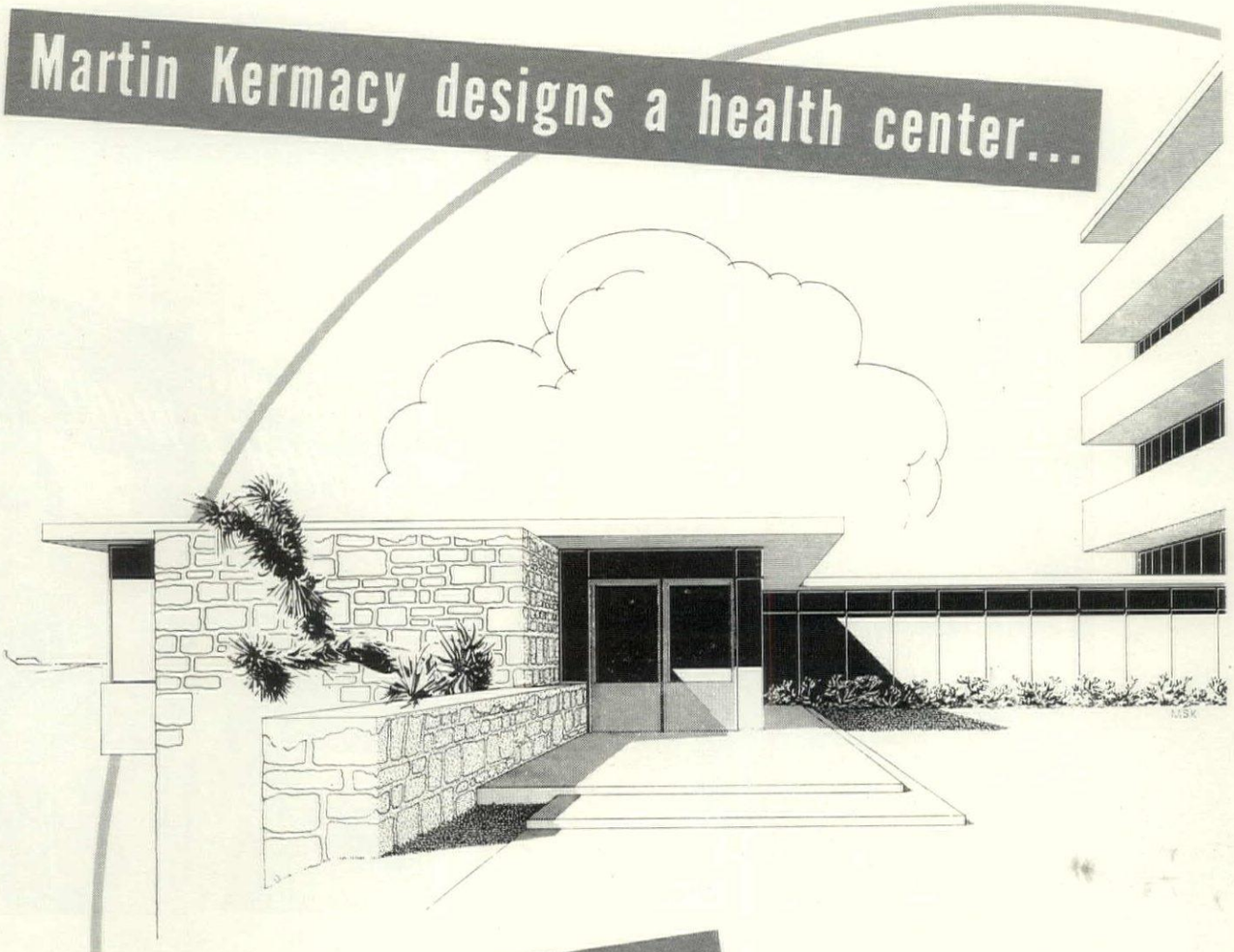


Drainmaster is a hydraulic device which makes a drain assembly self-cleaning. The new product is designed to replace the conventional trap in baths, kitchens and laundries. It becomes a permanent part of the sink drainage system. The piston is arranged in such a way that a manual push-pull motion begins a two way flow of water. This is said to break up and dislodge any obstruction in the line. The manufacturer, Telmor Products Corp., conducted tests in which the trap and adjoining pipes were packed solid with various foreign substances to completely stop the flow of water. Results of the tests showed Drainmaster cleared the obstructions from the pipe in less than a minute. Ordinary small obstructions are said to be disposed of within ten seconds. The body of Drainmaster is of 17-gauge brass, chrome plated. The piston head itself is impregnated to resist grease, acids and alkaloids. It is manufactured in all standard sink-trap sizes and shapes.

Manufacturer: Telmor Products Corp., 1910 W. Lake St., Chicago, Ill.

(Continued on page 172)

Martin Kermacy designs a health center...



Mesker Steel Windows

"The need to make a health center bright, cheerful, sanitary and easy to clean demands a type of fenestration found only in metal windows."

Designed and delineated by
Architect
Martin Stephen Kermacy
Austin, Texas
Assistant Professor of Architecture
University of Texas

For your copy of the Mesker Book of Hospital Windows, write to Mesker Brothers, 4336 Geraldine, Saint Louis 15, Missouri

...and *Planned Lighting* is what Your Store Customers want and need TO BOOST SALES

YOU CAN BE SURE...
IF IT'S
Westinghouse

Westinghouse
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

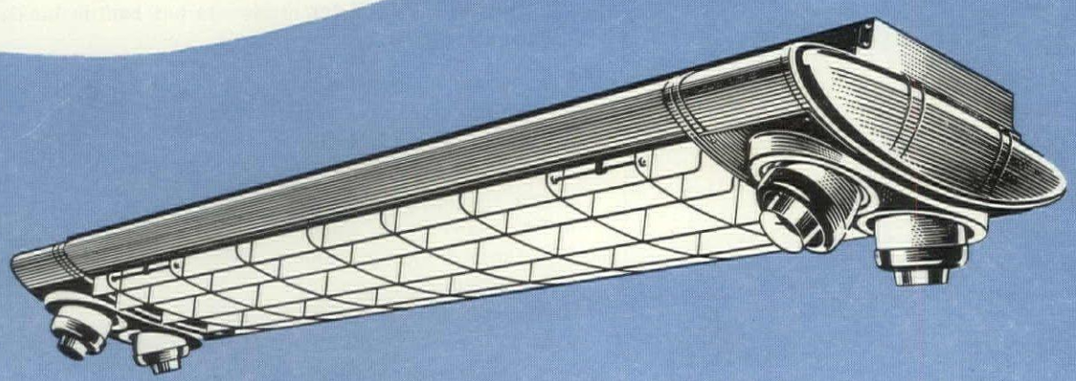
The little girl in the illustration knows what she wants because Planned Lighting pointed it out to her . . . drew her attention . . . kindled her desire. Yes . . . here is positive evidence of a lighting installation—carefully planned, carefully engineered—to do a store selling job.

And here, too, is evidence of a luminaire that was carefully designed and constructed to fit the most exacting layout specifications. The Westinghouse Merchandisers (designed specifically for stores) . . . blend with modern store surroundings . . . put the light on the merchandise . . . combine glare-free general illumination with high-intensity spotlighting . . . provide flexibility of mounting and ease of maintenance.

You can make your planning job easier by specifying the luminaires designed for stores . . . the Westinghouse Merchandisers.

A Westinghouse Lighting Engineer will gladly co-operate with your local Power Company and Electrical Contractor to give your customers the benefits of Planned Lighting. Call your Westinghouse Distributor today for the new booklet B-4076, "Smart Selling Starts with Planned Lighting" or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-04203-A



The Westinghouse "Merchandisers"

The Westinghouse "Merchandisers" combine efficient general lighting with accent lighting for featured merchandise. Spotlight units may be placed at any point where highlighting of special displays is desired. The "Merchandisers" are available in four sizes: two 4-foot units using two or four 40-watt lamps; a 5-foot unit using two 85-watt lamps; and an 8-foot unit with four 96" Slimline lamps. The complete family of "Merchandisers" is designed to give controlled brightness between the fluorescent lamps and the ceiling with effective louvering to minimize glare.

WESTINGHOUSE

Planned Lighting *Pays*

COMMERCIAL • INDUSTRIAL • FLOOD • STREET • AVIATION

WATERPROOFING REINFORCING FABRIC is made of glass yarn.

An inorganic waterproofing membrane, Glasfab, has been introduced by the Lexington Supply Co. The new product is made for use on built-up roofs, for flashing around parapets, walls, chimneys, skylights and ventilators above the ground and for foundation walls, footings, subways and pipelines below grade. Glasfab is a smooth, evenly-woven mesh of glass fibers to permit full impregnation by the tar or asphalt waterproofing compound. Since it is glass, obviously it is impervious to water and hence does not act as a wick if and when water reaches it. In addition the product is said to be impervious to rot and unaffected by heat. The latter means that the fibers will not char under applications of hot tar or asphalt. In fact, the manufacturer says, Glasfab will withstand hot applications up to 1.000° F.

Manufacturer: Lexington Supply Co., 4815 Lexington Ave., Cleveland 3, Ohio.

OIL BURNING BOILER for residences has built-in tankless hot-water heater.

The latest addition to the Smith-Mills residential boiler series, No. 1500, includes a tankless hot water heater designed to supply ample hot water winter and summer. There are four sizes in the new series, all are 24 in. wide with depths varying from 27½ in. to 41 in. overall. Gross output for the smallest boiler is 129,000 Btu, for the largest, 208,000 Btu. According to the manufacturer, The H. B. Smith Co., the boilers are unique in that they take full advantage of heat-producing flue gases that normally go up the chimney. This feature assures that every ounce of usable fuel is converted into heat.

Manufacturer: H. B. Smith Co., Inc., Westfield, Mass.

WARM AIR REGISTER automatically controls room temperature.

Dole Valve Co., has devised a forced air register that acts as its own thermostat. Installed in easy-to-heat rooms, the Dole Thermo-Matic Register automatically prevents these rooms from overheating before hard-to-heat rooms have reached the comfort level. A twist of the dial makes it possible to set room temperature at any point between 65° and 82° F. A heat sensitive metallic element within the register is responsible for the automatic operation of the register. Installation is simple; no wiring is required. The Thermo-Matic is simply attached to the stackhead with four screws. The register is made to fit 10 and 12-in. width openings, 4, 5 or 6 in. in height. An adapter for 14-in. openings will be available soon. Dole's Thermo-Matic is not designed to replace

(Continued on page 176)

Traveler's Aid...

Bright, clean TERMINALS in *Facing tile*

Picture terminal interiors so light, clean and colorful they actually *radiate* cheer.

That's what Structural Clay Facing Tile gives you in place of the dull, dingy atmosphere that has made "station waits" a traditionally unpleasant part of travel. And, for you who design or construct terminals, it's a hard-working helper as well as a "traveler's aid."

Facing Tile gives you flexibility of design . . . efficient modular sizes . . . great load-bearing strength . . . fire-safety . . . a wide range of light-reflecting colors . . . structural beauty that *keeps* an up-to-the-minute look. *And* because Facing Tile is a wall and a finish *in one*, it builds faster, costs less.

The extra-easy maintenance of Facing Tile helps you stretch building dollars still farther. It has an impervious finish that washes down *clean* with soap and water. Refinishing or redecorating is never needed. Glazed or unglazed, it can take the heaviest terminal traffic and never crack, mar or decay.

Remember all these advantages. They make Facing Tile in terminals "just the ticket" for you, whether you're an architect, builder, manager, or just a weary commuter.

SEND FOR 90-PAGE MODULAR FACING TILE HANDBOOK

Free to architects and engineers, fifty cents to others. Write Desk AF-11 of the Institute on your letterhead. You can get further information from Sweet's, the Institute, or any member.

FACING TILE INSTITUTE

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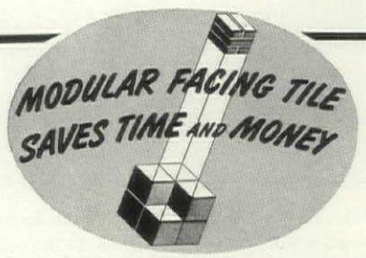
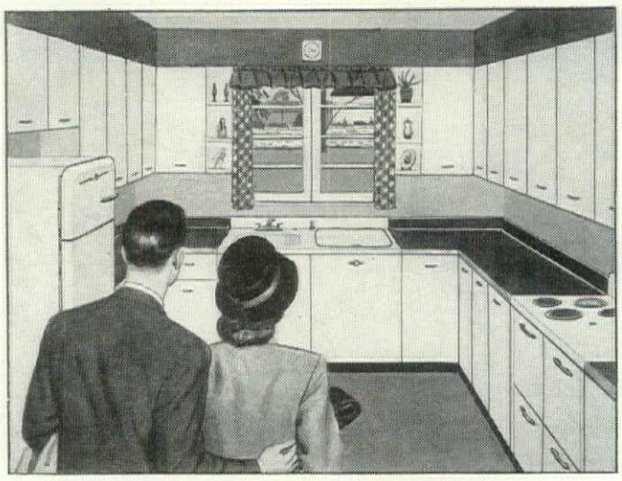


INSTITUTE MEMBERS

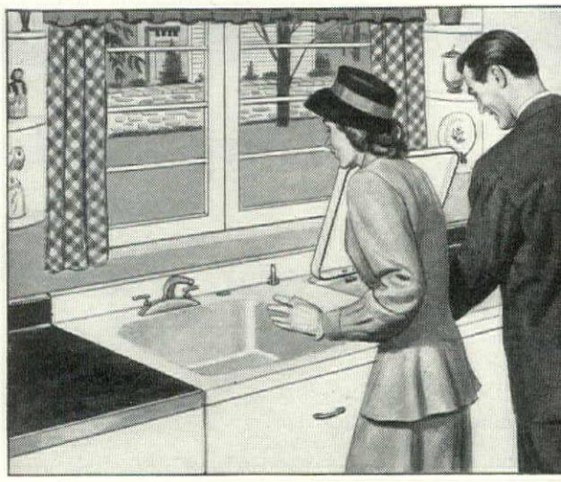
Belden Brick Company, Canton, Ohio
Continental Clay Products Co., Kittanning, Pennsylvania
Charleston Clay Products Co., Charleston 22, West Virginia
Hanley Company, New York 18, N. Y.
Hydraulic Press Brick Co., Indianapolis, Indiana
Metropolitan Paving Brick Co., Canton, Ohio
National Fireproofing Corp., Pittsburgh 12, Pennsylvania
Stark Brick Company, Canton, Ohio
Standard Clay Manufacturing Co., New Brighton, Pa.
West Virginia Brick Company, Charleston, West Virginia
Mapleton Clay Products Co., Canton, Ohio

They're lookin

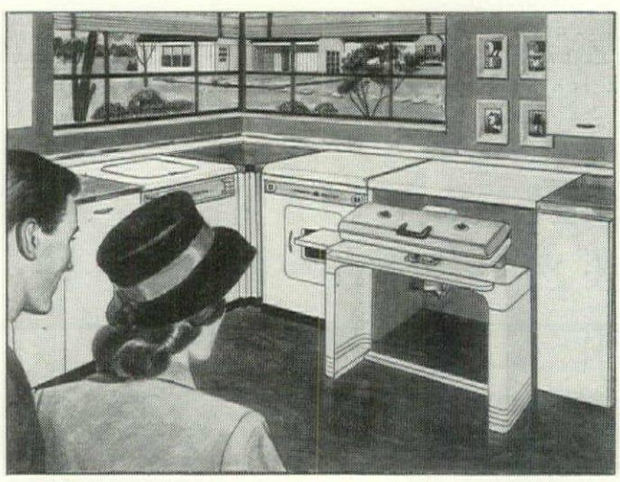
Seeing and Selling a General Electric Equipped Home



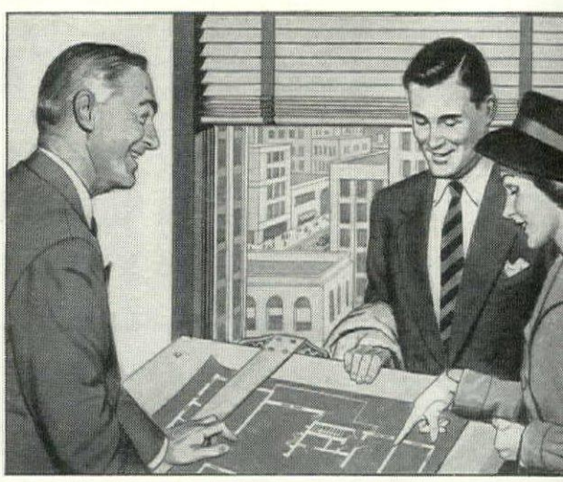
1. This beautiful General Electric kitchen-laundry inspires any buyer. In a nationwide survey, *51 per cent of the men and 53 per cent of the women said they prefer General Electric appliances.* Each appliance brings *you* extra profit.



2. The G-E way of living in action. This Electric Sink e nates messy clean-up jobs. The homemaker saves weeks of each year, gets *hours* of extra leisure each day. Operating mere *pennies* a day!



3. What woman could resist this General Electric Laundry Center? In this bright, sunny corner, the housewife saves time, work, money. Quick-clean washing, fluff drying, effortless ironing, efficient sewing banish washday drudgery.



4. Can they afford the G-E way of living? Yes, definitel a "packaged mortgage." It costs only up to $4.80 extra month, much less than it would cost to buy any one of t appliances on the installment plan!

or a home that features...

The G-E Way of Living!

Today's home buyers seek houses that give them easier living... *electrically!* Let General Electric Home Bureau help you plan G-E equipped homes for extra profit opportunities and prestige—at first cost of only $4.80* extra a month to the buyer! Your cost: *zero!*

What is the "G-E way of living"?

neans living in a house where the burdens of homemaking shifted from *people* to modern *electric appliances!*

he G-E way of living is being enjoyed by thousands and usands of families today in General Electric equipped nes. And today's home "lookers" are learning to insist on comfort, convenience, and economy of the G-E way of ng... in bungalows *and* in mansions.

n project after project—from ten homes to a thousand—as been *proved* that—

-E equipped homes bring the builder *greater prestige*—for -E equipped home combines beauty, efficiency, and econ-y—the best combination for sound sales appeal.

Talking cost and profit

The G-E way of living is *easily* within reach of the average prospect. A complete G-E equipped home costs him only up to $4.80 more a month, under the "packaged mortgage" plan.

And the buyer *saves* on operation and maintenance of efficient General Electric appliances... often, enough to cover the slight increase in the monthly payment!

Each appliance brings *you* extra profit—so your G-E equipped home is a *more profitable* home to sell.

So you see, the G-E way of living is practical for *you*—and for your prospect!

How can Home Bureau help you make profit out of the G-E way of living? Read the story below.

GENERAL ELECTRIC HOME BUREAU SUCCESS STORY OF THE MONTH

Cletus H. J. Jollie, California builder, features the G-E way of living in 76 new homes—sells 20 *before* completion of the project. Offered under the "packaged mortgage" plan, these General Electric equipped homes cost no more per month than similarly priced homes.

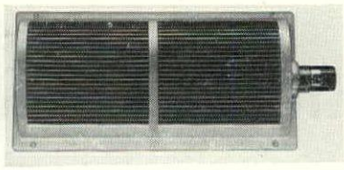
Let us tell you the *whole* story. And let us show you how G-E Home Bureau can help you plan homes for *better living*... and help you sell them *faster!*

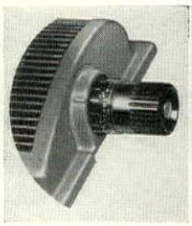
Just drop a post card to the Home Bureau, General Electric Company, Appliance and Merchandise Department, Bridgeport 2, Connecticut.

**When equipment is included in a long-term mortgage.*

GENERAL ELECTRIC

YOU CAN PUT YOUR CONFIDENCE IN GENERAL ELECTRIC





the regular thermostat but to augment its function. When heat is called for the thermostat will start burner and blower as usual. The Thermo-Matic Register then prevents the easy-to-heat room from becoming too warm by closing automatically when the room has reached the desired temperature. This permits excess heat to be sent to other rooms that heat more slowly. The register is said to be unaffected by auxiliary heat from kitchen stoves, fireplaces or the sun and from cooling effects of high winds, or drafts from doors and windows momentarily opened.

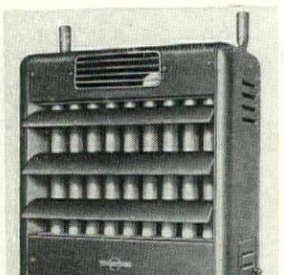
Manufacturer: The Dole Valve Co., 1933 Carroll Ave., Chicago 12, Ill.

HEAT EXCHANGER stamped from 12 gauge steel plate featured in new hot air heater models.

Two gas-fired hot air heaters introduced recently by Bryant Heater Co. feature a new "Hevigage" exchanger designed for space saving and heating efficiency. Made of 12 gauge steel stamped under 2,000 ton pressures into a U shape, the exchanger sections' final seal is made by electric welding; outside electric arc welds join the sections. Number and sizes of the sections vary with the capacities of the equipment in which the "Hevigage" is installed. The two heater models are the Modernaire, a small heater any of whose six sizes will fit into a small closet, according to the manufacturer (inputs range from 45,000 to 145,000 Btu an hour) and the Utilaire, a unit heater designed for all types of commercial and industrial uses, also made in six sizes (inputs from 60,000 to 210,000 Btu an hour).

Manufacturer: Bryant Heater Co., Cleveland, Ohio.

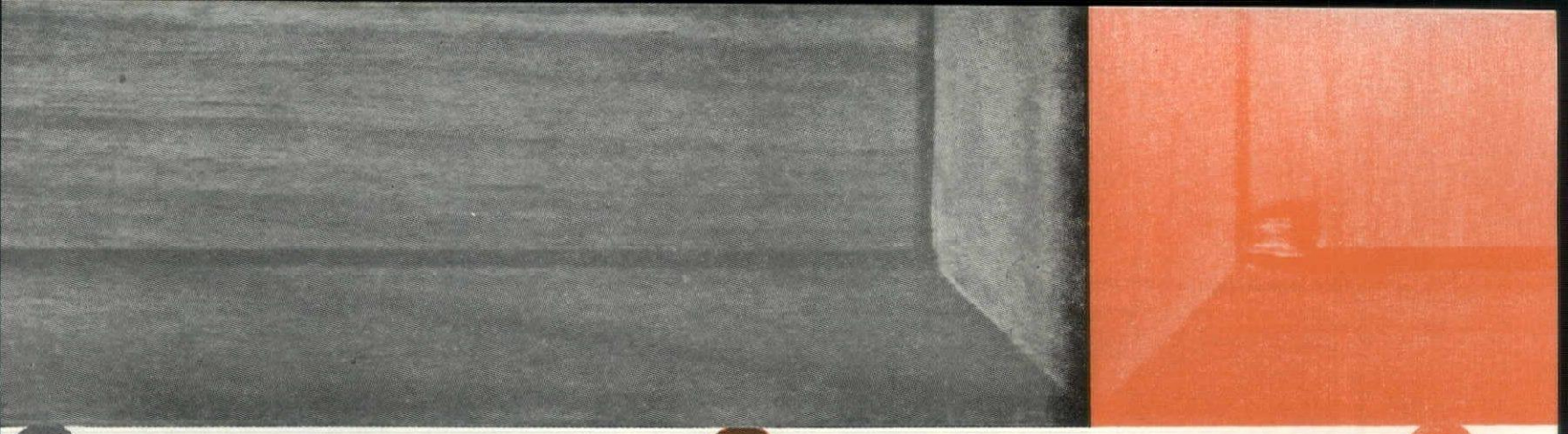
SUSPENDED FAN TYPE GAS HEATER available with or without thermostatic control.

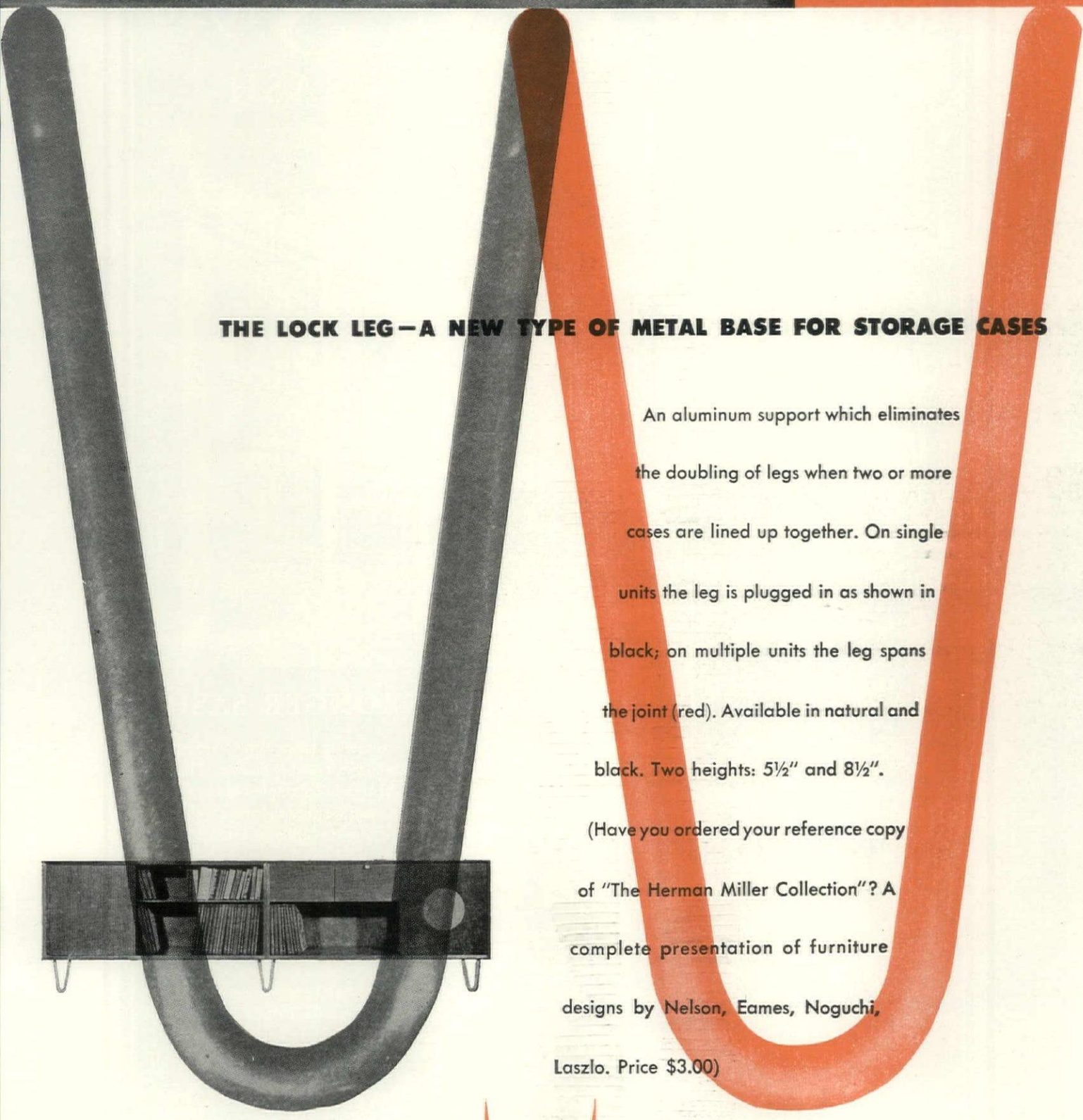


Peerless Mfg. Corp. has introduced a suspended gas heater approved for use with artificial, mixed or natural gas. Input ratings for the five models in the line range from 65,000 to 200,000 Btu. The new heaters are compact in size affording more headroom under the unit. The largest model extends approximately 36 in. below the hangers while the smallest extends down about 29 in. The unit comes complete in one package. All that is required for installation is connection of the hangers to the ceiling support and of the gas and electrical connections to the supply lines. The heater can be operated manually by remote control, by means of a switch or, if desired, may be fitted with an automatic wall type thermostat.

Manufacturer: Peerless Mfg. Corp., Louisville 10, Ky.

(Continued on page 180)



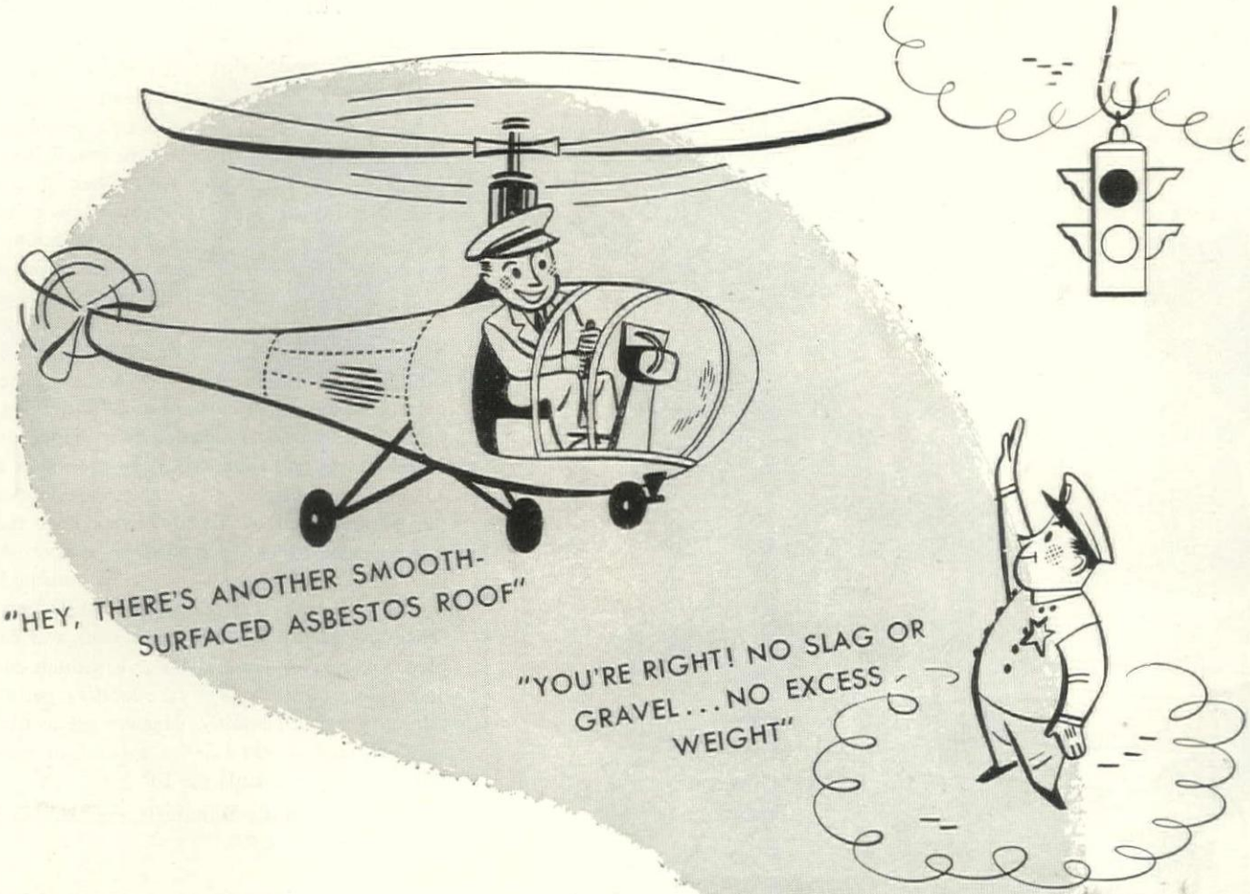


THE LOCK LEG—A NEW TYPE OF METAL BASE FOR STORAGE CASES

An aluminum support which eliminates the doubling of legs when two or more cases are lined up together. On single units the leg is plugged in as shown in black; on multiple units the leg spans the joint (red). Available in natural and black. Two heights: 5½" and 8½".

(Have you ordered your reference copy of "The Herman Miller Collection"? A complete presentation of furniture designs by Nelson, Eames, Noguchi, Laszlo. Price $3.00)

herman iller, zeeland, michigan



Yes-it's Flexstone*

Each ply is a flexible covering of stone!

"AND THESE PERFORATED FELTS SURE GIVE A SMOOTHER JOB"

● The secret of a Johns-Manville Flexstone Roof is in the *felts.* They're made of fireproof, rotproof, enduring *asbestos.*

Flexstone Built-Up Roofs won't dry out from the sun . . . need no periodic coating. They're *smooth-surfaced,* too—permit thorough drainage . . . make any damage easy to locate and repair. They are engineered to each job . . . applied only by J-M Approved Roofers.

J-M asbestos felts are perforated to make application easier . . . give you a smoother job and conform better to irregularities in the roof deck.

Send for Flexstone brochure BU-51A. Contains complete specifications. Address: Johns-Manville, Box 290, New York 16, N. Y.

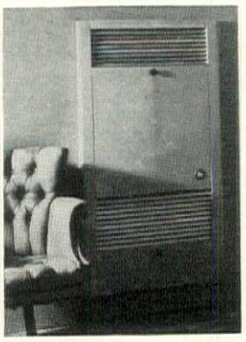
JOHNS-MANVILLE JM PRODUCTS

*Reg. U. S. Pat. Off.

Made of ASBESTOS

Johns-Manville *FLEXSTONE* Built-Up Roofs

GAS WALL HEATER delivers heat on both sides of partition or to two rooms.

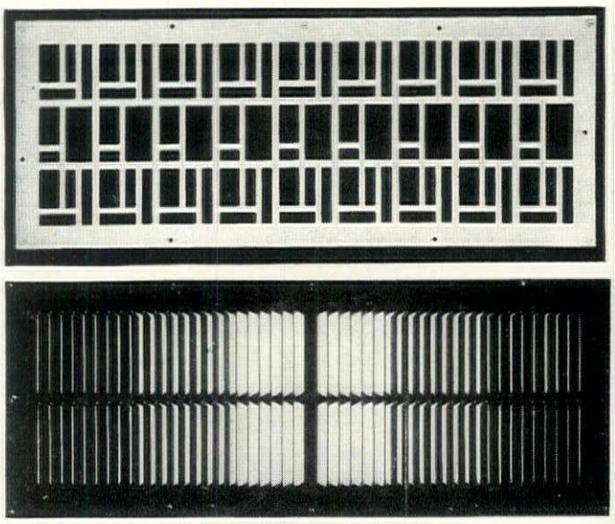


Styled by Walter Dorwin Teague to blend with any room treatment, this new vented gas heater installs within a wall and delivers heat on both sides of the partition. It is especially suitable for second story installations or use on concrete slab floor construction. It requires a wall opening only 28 x 51 in. The heater's panels are finished in baked enamel. The bottom of the panel is off the floor permitting any rug treatment and simplifying cleaning problems. The air inlet is located in a hidden duct beneath the raised panels and efficiently passes the cold air off the floor. The top panel louvers give a downward, outward direction to the warmed air flow while louvers near the base give off radiant heat. All internal parts are concealed from view and there is no vision between rooms. There is no hot spot heating with the new unit. The temperature of the entire panel always remains safely and comfortably cool and furniture can be placed directly in front of the unit without danger. A hinged door gives quick access to all operating parts which are built into an integral assembly. Heaters are available with inputs of 37,000 and 45,000 Btu for natural, or manufactured gas. They are also available for LP gas.

Manufacturer: Holly Manufacturing Co., 875 S. Arroyo Parkway, Pasadena 2, Calif.

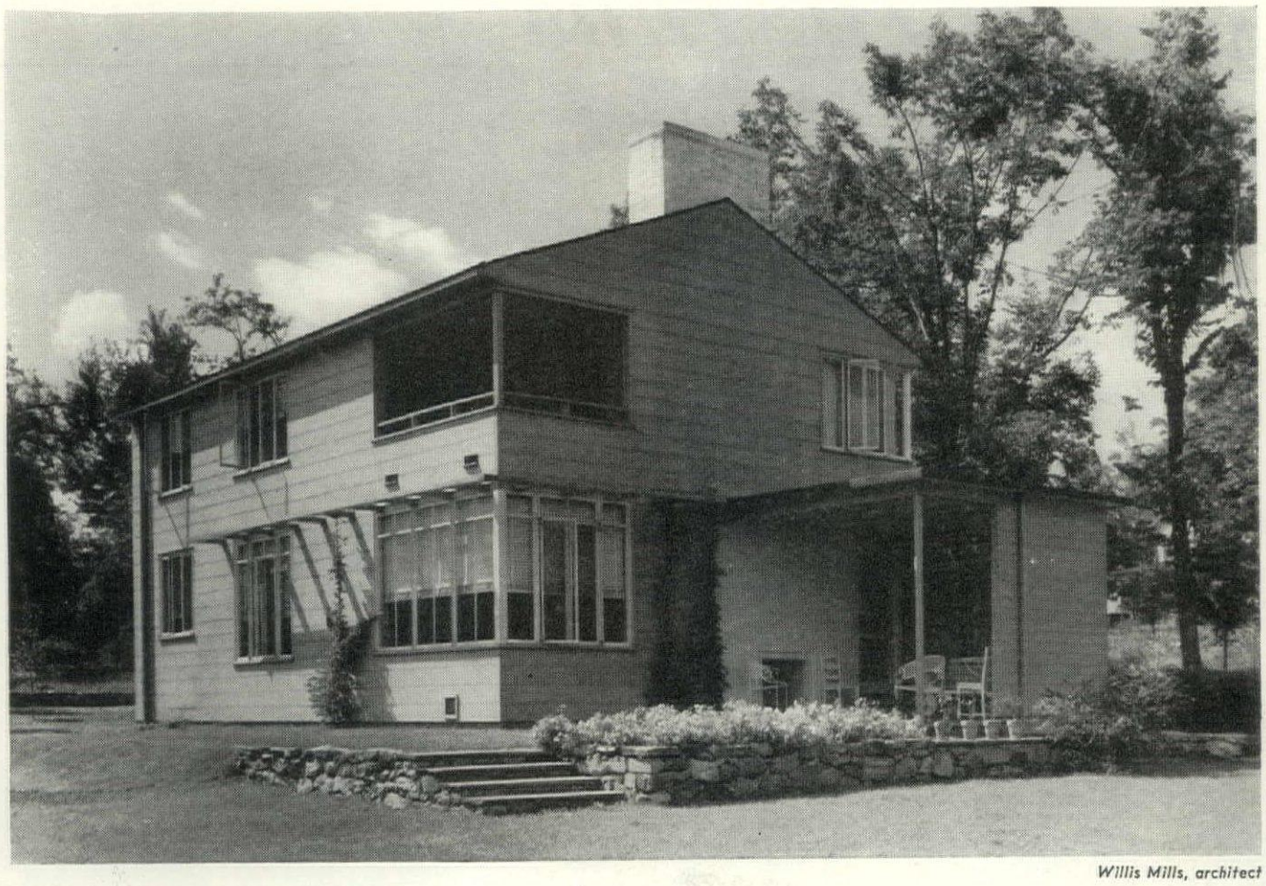
ORNAMENTAL GRILLE combines attractive design with efficient ventilation.

The Hendrick Bulator is Hendrick Mfg. Co.'s answer to the building industry's cry for a deflecting vane grille that is ornamental as well as efficient. Bulator has been tested at the Case Institute of Technology in Cleveland to determine the effect on the spread and throw of air on a deflecting type grille when a specially designed decorative grille was applied



in front of it. The new Hendrick decorative grilles are made in several attractive patterns to harmonize with various decorative motifs. Deflecting vanes are constructed in such a way that air flow can be deflected to right or left, up or down or in a combination of directions when they are installed. The

(Continued on page 184)



Willis Mills, architect

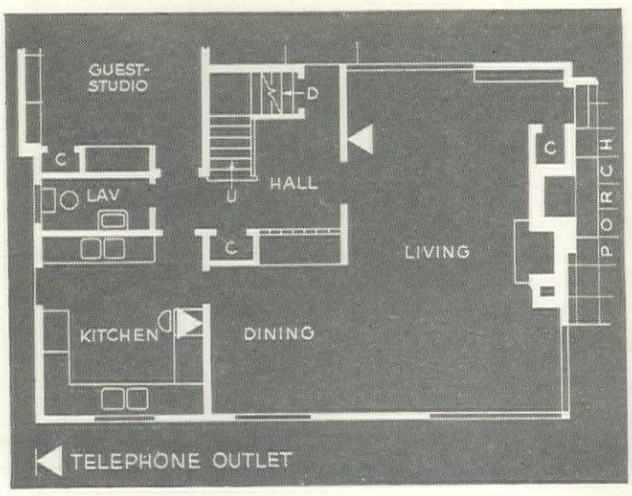
ALL THE COMFORTS OF HOME—INCLUDING TELEPHONE RACEWAYS

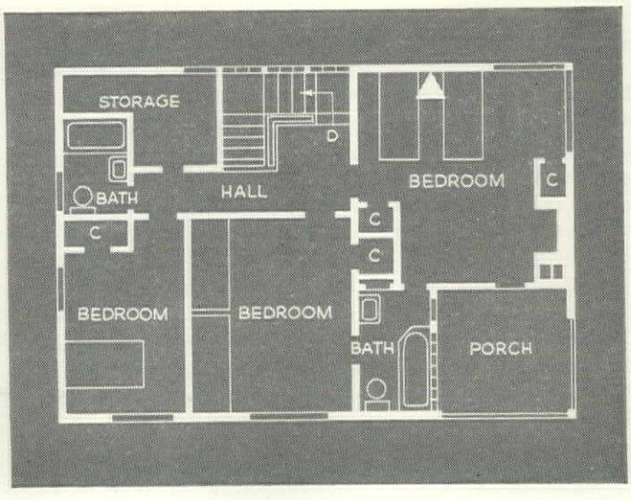
Neat, built-in telephone facilities make it unnecessary to have exposed telephone wiring on walls and woodwork. And they give a full measure of telephone convenience to the owner. That's why telephone raceways are being included in the smaller as well as larger homes.

In most homes, a few pieces of pipe or electrical tubing installed within the walls during construction will carry telephone wires to conveniently located outlets. The cost is low.

For homes of any size, your Bell Telephone Company will be glad to help you plan modern telephone arrangements. Just call your Telephone Business Office and ask for "Architects and Builders Service."

BELL TELEPHONE SYSTEM

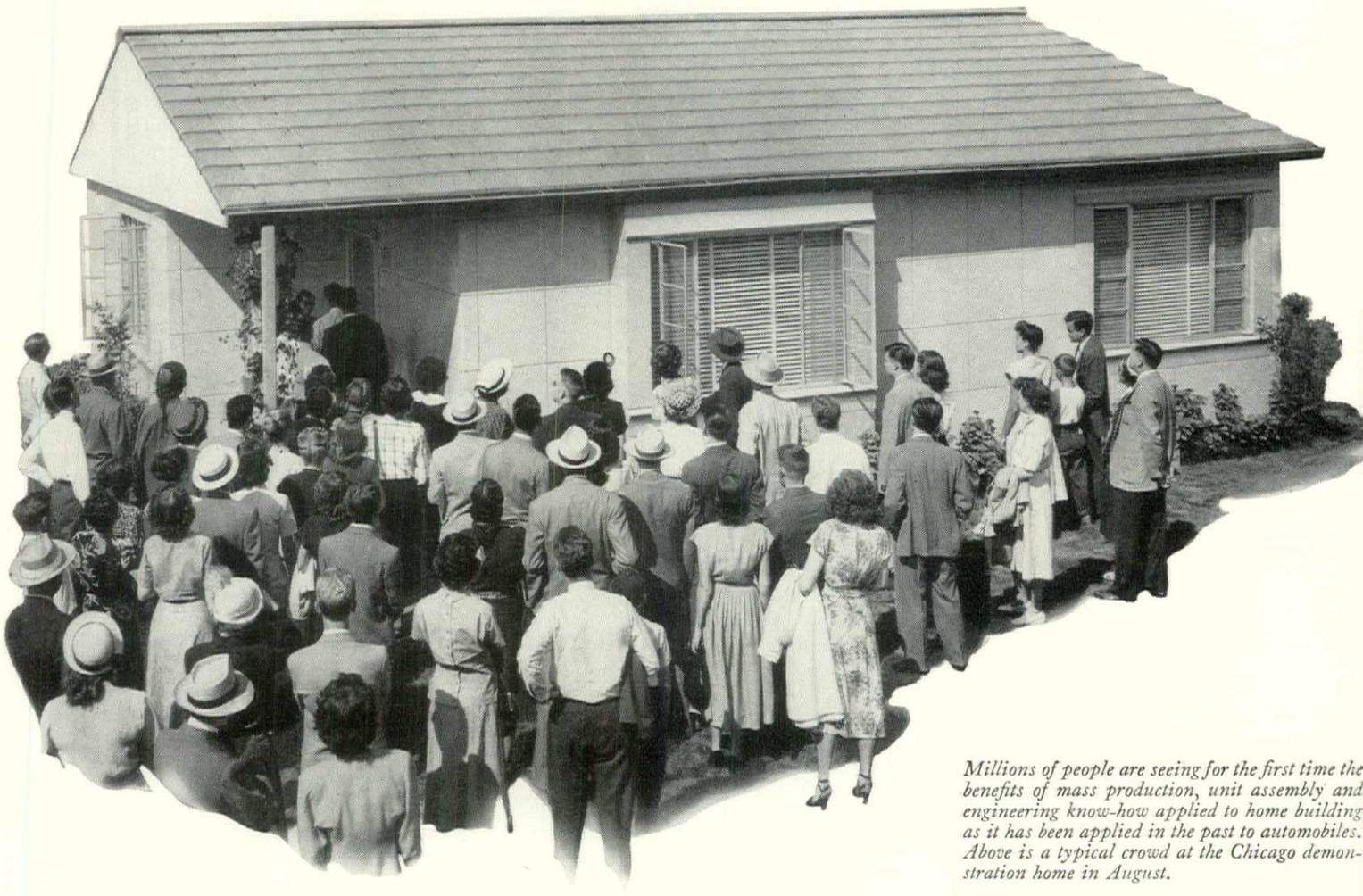




THE LUSTRON HOME

REG. U. S. PAT. OFF.

...now in



Millions of people are seeing for the first time the benefits of mass production, unit assembly and engineering know-how applied to home building as it has been applied in the past to automobiles. Above is a typical crowd at the Chicago demonstration home in August.

THE HOUSE AMERICA IS TALKING ABOUT

During the past few months the public has been invited to visit Lustron demonstration homes in New York, Washington, Chicago, Detroit, Milwaukee, St. Louis, Des Moines, Indianapolis, and many other communities.

Here are five things that impress people most:

Size of Rooms—Visitors are generally surprised and delighted by the size of the rooms and feeling of spaciousness provided in the more than 1000 square feet of floor space—all on one floor.

Built-In Features—Built-in dressing table, built-in bookcase, seven large closets and generous cabinet space are enthusiastically received, as are such features as the combination dishwasher-clotheswasher included with the house.

Atmosphere of Cheerfulness—We have yet to find a woman who does not like the cheerful, tasteful color combinations—both inside and outside.

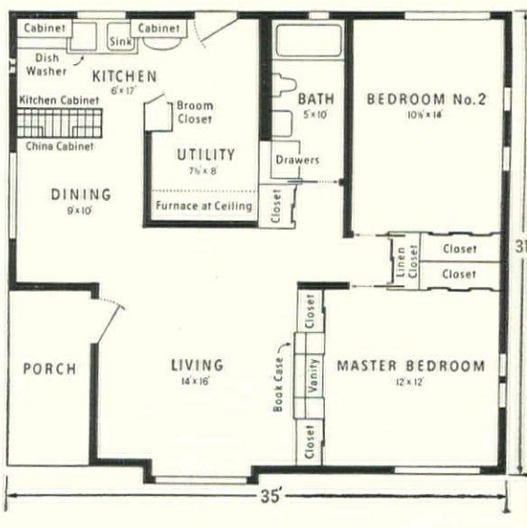
Ease of Keeping Clean—Women immediately recognize the advantages of porcelain enameled steel which can be kept clean with a damp cloth.

Feeling of Permanence and Stability—The sturdiness of all-steel construction is immediately recognized and commented on.

Only actual experience with the Lustron Home will bring out its many other advantages—its healthful radiant panel heating from the ceiling—its complete insulation against heat and cold—the fact that it is fireproof, decay-proof, verminproof, ratproof and stainproof—the fact that it never needs repainting or reroofing.

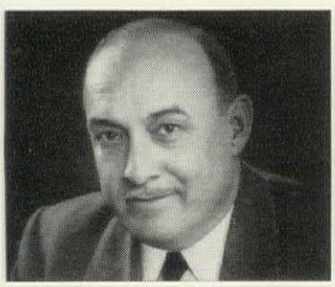
The Lustron Home is sold at a price well within the means of the average American family, who has long deserved a home of its own. . . . Erected on the site by a specially trained builder-dealer.

LUSTRON CORPORATION, Box 2023K, Columbus, O.



volume production

A PRODUCTION REPORT BY CARL G. STRANDLUND, PRESIDENT, LUSTRON CORPORATION



Carl G. Strandlund, Builder

It is now my pleasure to be able to talk in terms of accomplishments rather than objectives. As this statement goes to press, complete Lustron Homes are rolling out of our Columbus plant in ever-increasing number, ready for erection by builder-dealers in various parts of the country.

When you build a new industry from the ground up you can naturally expect some headaches, heartaches and backaches. I can assure you we have had our share.

The fact that we have been able to get started as quickly as we have, after moving into an empty plant last November, is a tribute to the almost superhuman energy, ability and faith of a lot of people.

Lawmakers Recognize Need

It would not have been possible without the bipartisan support of forward-looking senators and representatives who recognize the fact that there are millions of families in this country who deserve good, modern roofs over their heads at a price they can afford.

Naturally we could not have turned a wheel without the cooperation of both our nation's great steel industry and the building trades of the American Federation of Labor.

For a while it looked as though we could not get steel, but that problem, like many others, melted away under the ground swell of public opinion, based on the intrinsic merit of our product and our demonstrated ability to render the public a service long overdue in this great country of mass production.

Cooperation All Along the Line

Also, I want to thank publicly the suppliers of plant equipment who turned themselves inside out to take care of us in record time. Our own engineers—every one of our personnel—worked like beavers. They know how I feel.

The result is comparable only with what was accomplished in some of our big war plants after Pearl Harbor.

We appreciate also the cooperation of municipal officials who, after seeing the Lustron Home, have been quick to approve it under their building codes.

"A New Standard for Living"

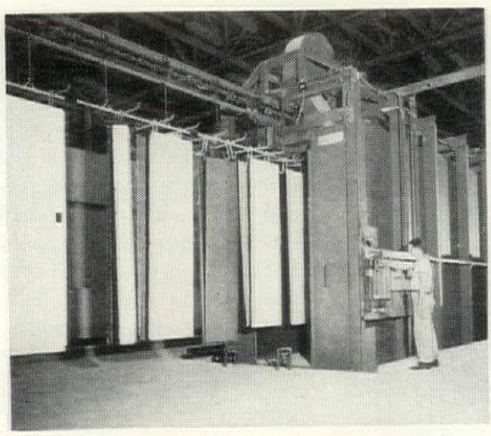
The same goes for mortgage bankers who look on a Lustron Home as first-grade collateral for a maximum loan.

I am gratified to learn that the millions of people who have visited our demonstration homes have found them not just modest-priced houses, but literally "a new standard for living."

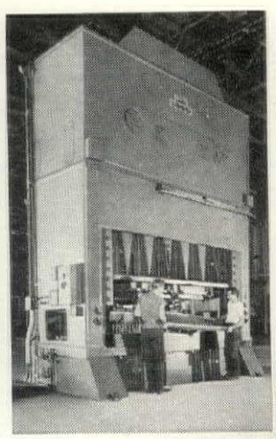
I wish I could tell you when you can get a Lustron Home. All I can say for sure is that the plant is rolling, and we will build—build—build—as fast as human ingenuity, modern machinery and the steel supply will permit.

C. G. Strandlund

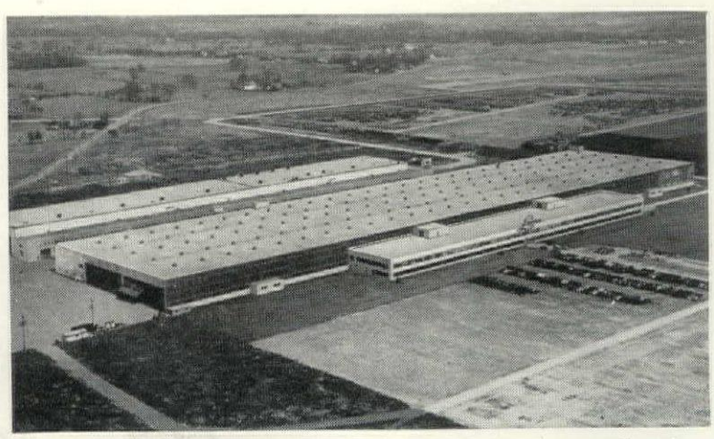
CARL G. STRANDLUND, President



Lustron panels on their way through one of the giant enameling furnaces in the world's largest porcelain enameling plant.



Giant press stamps out roof panels of porcelain enameled steel for new Lustron Homes.

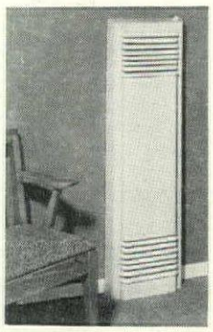


Here is where the Lustron Home is made. More than one million square feet of production area has been completely converted to render the public a service in home building that is long overdue.

tests showed that the presence or absence of a decorative grille of approximately 60 per cent free area, such as the Bulator grille, made little difference on either the air stream pattern or the throw of the deflecting vanes.

Manufacturer: Hendrick Mfg. Co., Carbondale, Pa.

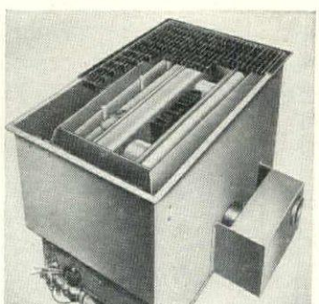
WALL TYPE CIRCULATOR features finger-tip control.



Williams Radiator Co. has added a fully vented gas fired warm air circulator to its line of heating equipment. The new model, known as Warmolator 20, is engineered to fit between 2 x 4 studs, 16 in. o. c. without furring or special framing of any kind. The finger tip control is conveniently located at the top of the grille panel out of the reach of children. The unit is designed primarily for homes, hotel rooms and offices. In addition to a thermocouple safety pilot, Warmolator has a fully shielded ribbed heating element that is safely and comfortably cool at all times. The heater is 51 in. high by 16 in. wide and works equally well on natural, manufactured or LP gas.

Manufacturer: Williams Radiator Co., 1821 Flower St., Glendale, Calif.

GAS FLOOR FURNACE features porcelain enamel heat chamber.



Tennessee Enamel Mfg. Co. has introduced a new product known as the Temco 50,000 Btu Floor Furnace. The unit features a porcelain enamel heat chamber that is guaranteed not to rust, corrode or burn out. Controls are recessed and easily accessible. If specified, automatic electric controls will be installed at the factory. The unit is only 25¼ in. in overall depth and is equipped with 100 per cent safety pilots, according to the manufacturer.

Manufacturer: Tennessee Enamel Mfg. Co., Nashville 9. Tenn.

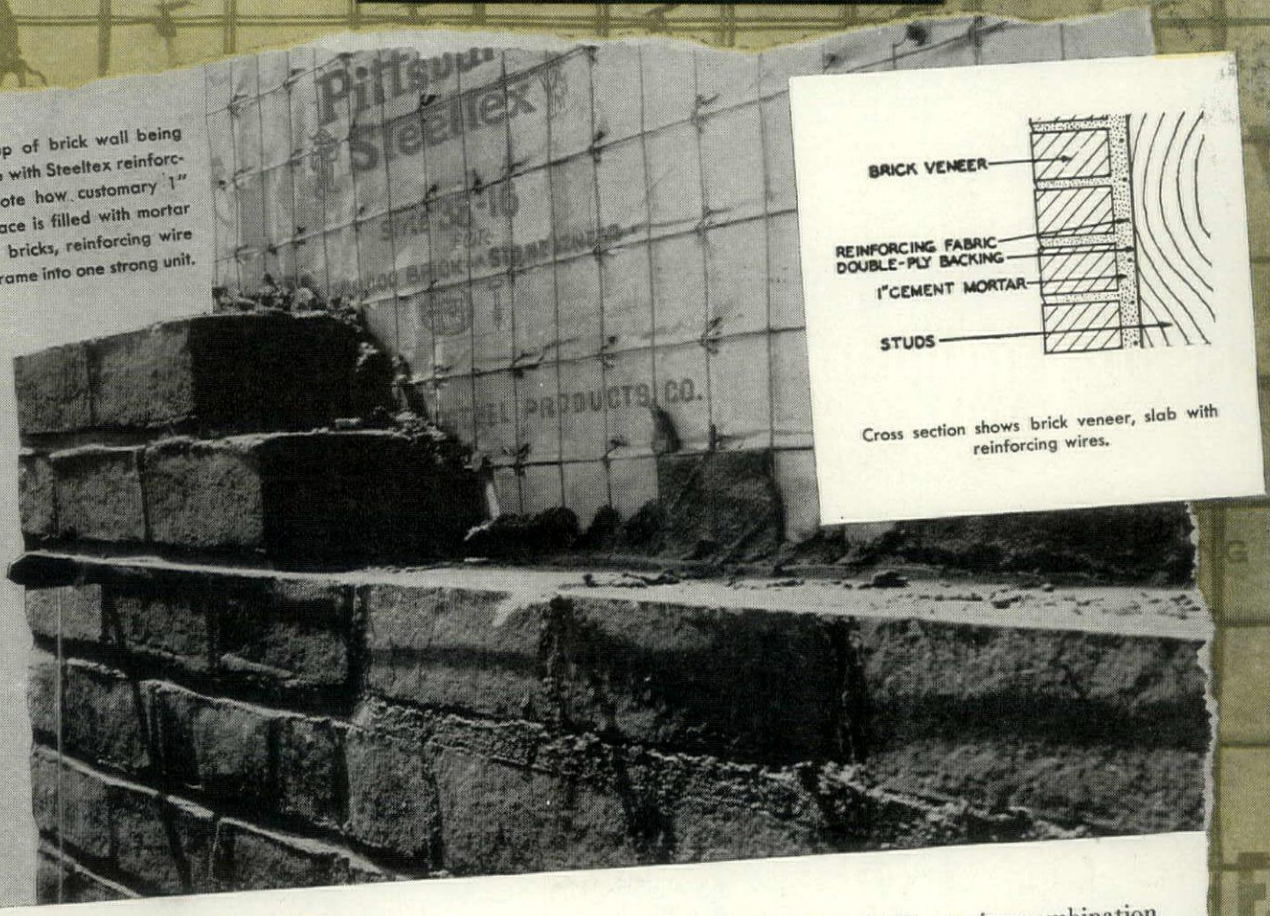
DIAL-CONTROLLED SOFT WATER APPLIANCE eliminates regeneration bother.

Rounding out its line of soft water appliances, Rheem Mfg. introduces an automatic model suitable for use in residences and such small commercial establishments as lunchrooms and beauty parlors. The special feature of the new appliance is that it regenerates the zeolite. a five-step process, automatically. The zeolite softening agent in any water softener eventually reaches a point of saturation. When this happens with the new Rheem softener,

(Continued on page 188)

YOU GET SHEATHING, BUILDING PAPER, PLUS REINFORCED CONSTRUCTION

All in One With Pittsburgh Steeltex for Veneer



Close-up of brick wall being laid-up with Steeltex reinforcing. Note how customary 1" air space is filled with mortar to tie bricks, reinforcing wire and frame into one strong unit.

Cross section shows brick veneer, slab with reinforcing wires.

Pittsburgh Steeltex for Veneer provides sheathing and building paper all in one. But better than that it gives you strong walls of reinforced brick or stone construction with economy. Steeltex will make you proud of the permanent house you have built—make the owner sing your praises as an architect or builder.

Construction with Steeltex provides many advantages—a monolithic concrete slab completely around the structure—positive protection from moisture penetration—greater fire protection through elimination of dead air space and resulting flue action—all mortar joints completely filled—reduces upkeep. In addition it is easy to apply, requires no special tools or methods and takes the place of sheathing and building papers. Many architects and contractors have found it makes for better construction—they specify it on all their jobs.

Pittsburgh Steeltex for Veneer is a combination of cold drawn, galvanized steel wire, welded into two-inch square mesh, laced to a double-ply waterproof backing that is sealed with mastic. The absorbent face of the backing provides a suction bond with the mortar. The mesh provides reinforcing for the mortar which is slushed in behind the veneer. When dry, the wall is a strong unit of brick or stone and reinforced concrete slab, attached firmly to the frame as an integral part of the structure.

The better construction and savings with Pittsburgh Steeltex for Veneer will appeal to owners—you will like the ease with which it is applied. Specify it for all your jobs. For your copy of our catalog D. S. 132, write today to Pittsburgh Steel Products Company, 3232 Grant Building, Pittsburgh 30, Pennsylvania.

This background photo shows Steeltex—one-third actual size.

Pittsburgh Steel Products Company

Subsidiary of Pittsburgh Steel Company

for Light *.....that's right*

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT

When good lighting is a prime consideration, Pittsburgh Permaflector Equipment will give you the illuminating effects and the design patterns you require to do an outstanding job.

Low installation costs and ease of maintenance are other important features of Pittsburgh Permaflector Lighting Equipment. We would like to tell you more about these "standard" units which give you "custom" lighting results.

A PERMAFLECTOR PORTRAIT
The Board Room
Federal Reserve Bank
Pittsburgh, Pennsylvania

Pittsburgh Permaflector Universal Troffers are formed into a rectangular pattern in conjunction with the air conditioning units. The troffers are equipped with hinged Alba-lite glass-panel closures. Multiple switch control provides three levels of illumination.
Electrical Contractor: The Howard P. Foley Company.

"Pittsburgh" Permaflector

WANT THE FULL STORY ABOUT OUR LIGHTING EQUIPMENT?

Send for your copy of Catalog 48-F. It contains complete information, specifications and other data on the troffers used above and other Pittsburgh Permaflector Fluorescent Units and Companion Incandescent Equipment.

PITTSBURGH REFLECTOR COMPANY

OLIVER BUILDING · PITTSBURGH 22, PENNSYLVANIA

MANUFACTURERS OF FLUORESCENT & INCANDESCENT LIGHTING EQUIPMENT

Permaflector Lighting Engineers in all Principal Cities

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT IS DISTRIBUTED BY BETTER ELECTRICAL WHOLESALERS EVERYWHERE

all that is necessary is to turn a dial to "wash" and an automatic timing device backwashes the zeolite with clean water, introduces dilute brine from the brine storage tank into the softener tank, rinses the brine from the softener tank, refills brine tank with water and returns softener to service. While the regenerating process is going on, the water supply bypasses the softener so that fresh water is available at all times. The new appliance will hold a sufficient salt supply for from 4 to 12 months depending upon the degree of hardness of the water used. The manufacturer says the brine storage tank will hold enough salt to soften 100,000 gallons of 10 grain hardness water. This quantity is a normal family average supply for a year. If water is of 20 grain hardness, salt supply will last six months. The unit is 22 in. deep by 36 in. long by 60 in. high, has a baked-enamel finish that may be cleaned by rubbing with a damp cloth.

Manufacturer: Rheem Mfg. Co., 570 Lexington Ave., New York 22, N. Y.

INEXPENSIVE TARPAULIN is introduced to discourage thieves.

Richcraft has developed a tarpaulin which will save money two ways—initially and replacement-wise. Skufpruf is the name of the new covering material. It is a laminated paper product that is waterproof and extremely tough. The tarpaulin material comes in rolls in any width from 3 to 10 ft., and may be cut lengthwise to suit the application. The manufacturer says that Skufpruf may be re-used many times if given reasonable care.

Manufacturer: The Richcraft Co., Builders Building, Chicago 1, Ill.

(Continued on page 192)

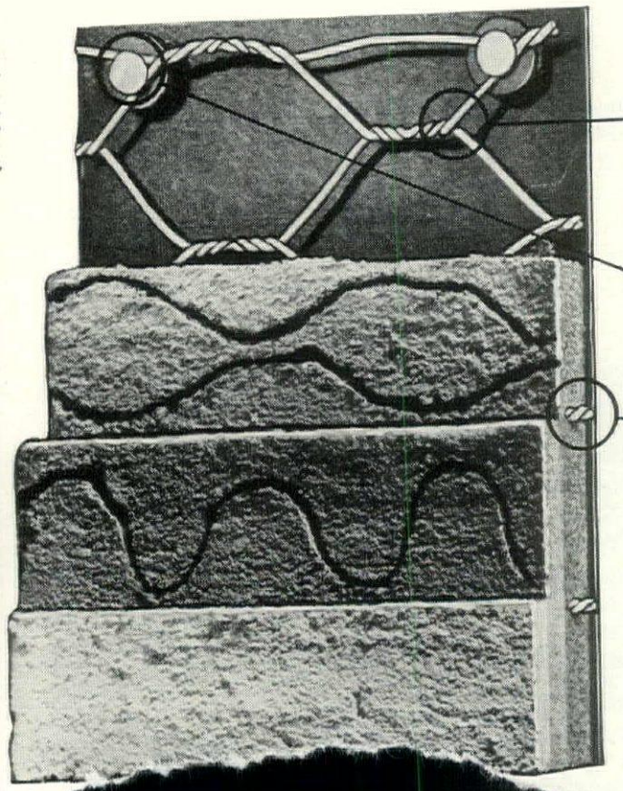
new survey shows

Architects and Builders like Steel-Reinforced Stucco

for these GOOD CONSTRUCTION Reasons

IN a recent coast-to-coast survey, the Architects interviewed showed an overwhelming approval of modern methods of stucco construction—using improved Portland Cements and steel reinforcing. They recognize that steel reinforcing gives stucco the necessary strength for lasting durability and permanent crack-resistance, that homes built with reinforced stucco retain their beauty through the years.

The same survey also showed a strong and increasing trend toward the use of more stucco—a large majority of Architects feel that stucco will be used on more homes in the future because it is appropriate for today's popular home design styles, such as Modern, Ranch-Type, Cape Cod, Colonial and Georgian. They consider steel-reinforced stucco as being *good construction*—low in initial cost and easy to maintain.



Why Keymesh Reinforcing Insures Stronger More Durable Stucco

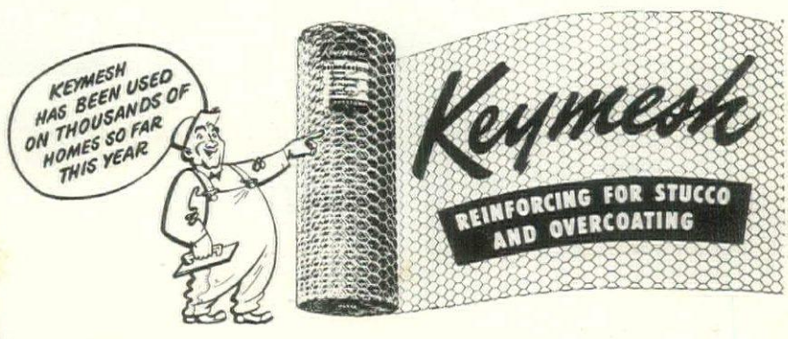
Provides stronger reinforcement—Keymesh is made of strong, copper-bearing steel wire. It's specially woven with a reverse twist—Keymesh lays flat when unrolled. No bumps or bulges to cause uneven thickness of the "scratch" coat. Keymesh is heavily galvanized for protection against corrosion.

Keeps distance from wall—Keymesh is easily furred out with special Keymesh furring nails to keep it at a uniform and proper distance from the wall—to insure full thickness of the scratch coat.

Embeds thoroughly—The special open mesh design of Keymesh allows each steel strand to be completely embedded by the "mud," insuring lasting strength of the wall. Keymesh is the right size for easy troweling, and the right size for holding the scratch coat firmly while setting. Joins easily with compact, smooth laps. No bumps or high spots in the first or following coats.

When you specify Keymesh—for new homes or in remodeling—you are assured of strong, durable stucco—*good construction* that will be of lasting satisfaction to your clients. Write for your copy of the new booklet containing Keymesh specifications.

Keymesh is shipped in rolls 150′ long by 3′ wide. For stucco and overcoating, specify Keymesh 1½″ hexagon mesh, 17-gauge galvanized wire, or 1″ hexagon mesh, 18 gauge.

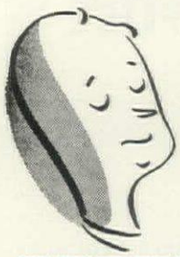


KEYSTONE STEEL & WIRE COMPANY

PEORIA 7, ILLINOIS

What's my Name?

(A 63-second quiz about typical products in our big family of wiring materials.)



1
I never make a bit of noise, yet my smooth, efficient operation results in long service life that is something to shout about! Your clients like to see me in bedrooms, theaters, offices, and many other places where silence and top performance are especially desirable. What's my name?

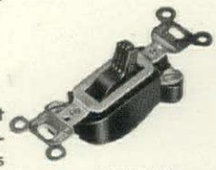
2
Cost-conscious builders have found that it is often advisable to use me in place of lead-covered cable for installations in raceways in wet locations. They find that I am easy to install and can use smaller conduit. I really have two names. What are they?

3
When you step into a smart, modern store, you don't see me, but the fluorescent lighting will need less maintenance, and will stay on the job longer than ever if I'm there. You'll find me in ceiling and showcase fixtures, protecting them from the effects of heat and moisture. My name is a famous synonym for "heat beater." What is it?

4
I am coated inside and out. It's difficult to hurt me with even the toughest treatment. My color is white when I fight atmospheric corrosion, black when I fight chemical action. Many types of boxes and fittings have been designed to go with me perfectly. My name is so well known that it should be easy to identify.

5
I have thousands of parts, of many sizes, types, and capacities. I am readily available in any quantity—all from a single source. My parent has the best-known name in electricity. Know what it is?

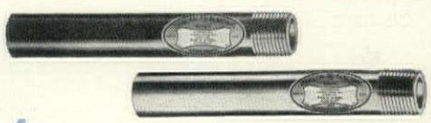
ANSWERS



1
It's General Electric's silent mercury switch, the specification-grade switch that helps you plan to make good wiring better. We'd like to remind you, too, that it is now rated 10 amperes T, at 125 volts, to meet today's heavy loads.

2
My name is either G-E *RW* — for rubber-insulated, moisture-resistant wire — or G-E *TW*, for thermoplastic-insulated wire of the same type. We suggest you specify RW or TW for economy on the next raceway installation in any of the following: (1) underground; (2) in permanently moist locations; (3) in concrete slabs or masonry in direct contact with the earth.

3
It's Deltabeston* fixture wire, the best protection you can specify for the wiring of lighting and fixture installations. And don't forget that *anywhere* you need to "beat the heat," Deltabeston wires and cables are the answer.

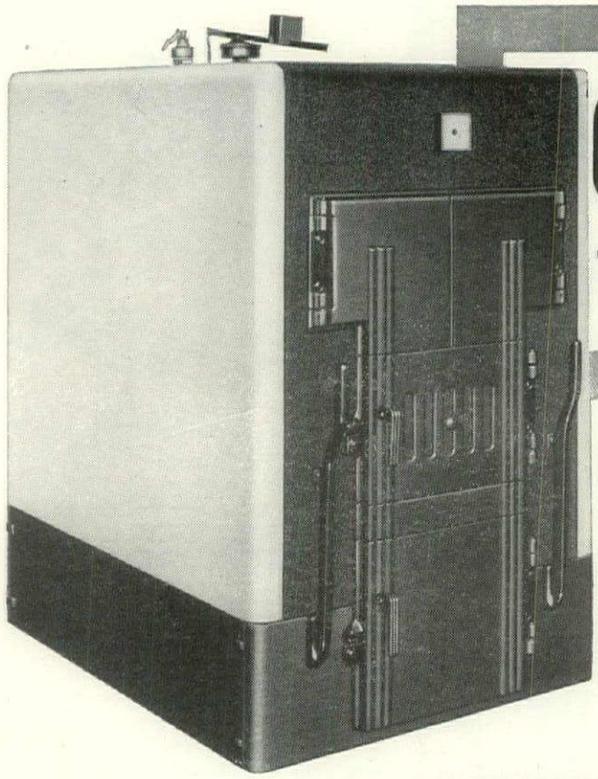


4
If you've ever specified conduit, you've probably guessed that these names are *G-E White and G-E Black* rigid conduit. They are bywords for top quality wherever conduit is used. The rest of the General Electric line of raceways includes boxes, hangers, fittings, "flex," and EMT—all made to work to the best advantage with one another.

5
The answer should be easy—General Electric's full line of wiring materials. Whatever you need—wire, cable, raceways, wiring devices, fluorescent accessories, of every variety—your best single source of supply for dependable quality is always General Electric. We'll be glad to give you full information on any products in this full line. Just write to Section K9-114, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

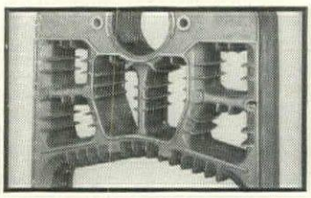
*TRADE-MARK REG. U.S. PAT. OFF.



CONVERTIBLE

TO ANY TYPE OF FUEL

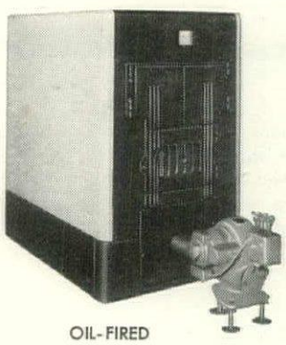
Adaptable to any firing method, the "300" Series National Heat Extractor Boiler, for steam or hot water, assures continuous heating comfort. It can be installed as a hand-fired unit and later converted to automatic firing to take advantage of changing fuel supplies. The "300" Series is particularly suited to larger homes, small apartments and commercial buildings. Radiators, convectors, unit heaters, baseboard heating units or radiant panels can be used with the "300" Series to form a complete and modern heating system.



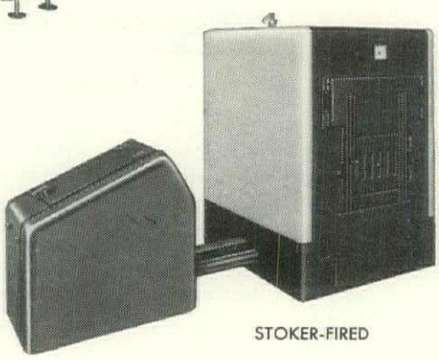
Finger-like projections form extra heating surfaces to capture and hold extra heat, reduce stack losses and fuel bills.

Durable cast iron construction, multiple-flue sections, extended heating surface, extra thick insulation, special baffles (for oil and gas firing) and an attractive jacket are some of its unique features that add up to heating satisfaction.

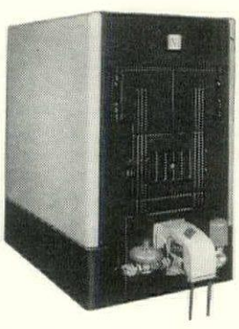
Domestic hot water, year 'round, is another convenience of the "300" Series, offered by the easy addition of an integral tankless type or storage type National Water Heater.



OIL-FIRED



STOKER-FIRED



GAS-FIRED

For complete information on the "300" Series Heat Extractor—or the similarly designed "100" and "200" Series for smaller installations or the "400" and "500" Series for larger installations—phone our nearest office or write to us at Johnstown.

NRC

THE NATIONAL RADIATOR COMPANY

JOHNSTOWN, PENNSYLVANIA

How to Please All Your Clients...

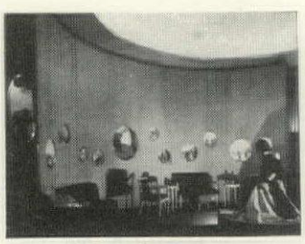
specify WELDWOOD PLYWOOD for commercial installations

OFFICES. Birch Weldwood combined with wallpaper. Valance is decorative and practical — it conceals drape and blind attachments, and provides space for indirect lighting fixtures at the same time.

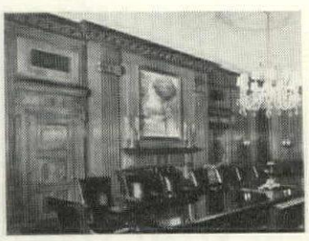
BARS & RESTAURANTS. This beautiful Claro Walnut Weldwood bar front was made for the Cardinal Richelieu Hotel, San Francisco. Walls and columns were covered with the same paneling.

INSTITUTIONS. Mengel Flush Doors and trim of Ribbon Grain Walnut Weldwood set off the diamond-matched bleached Walnut walls and railing. Recessed panels over doors are of Stump Claro Walnut.

HOTELS. Your first impression of the Ottaray Hotel lobby, Greenville, S. C., is one of richness and good taste. Guinea Wood Weldwood in a handsome treatment of walls, columns and stair-rail.



STORES. Window-dress the whole store! Graceful curves and smooth-flowing lines provide an eye catching background for display in this I. Miller shoe salon, New York. The wood is oak Weldwood.



BANKS. Dignity and stability are the keynotes of this luxurious installation of Figured Mahogany paneling in the Conference Room of the Long Island City Savings Bank, L. I. City, N. Y.

Most commercial installations present essentially the same requirements for an interior wall surface. Appearance, durability, ease of maintenance and finished cost . . . these are the major questions.

And here are Weldwood's answers:

APPEARANCE. Man's old-time, all-time structural-decorative favorite . . . wood. Choose from the very finest domestic and imported hardwoods . . . because only selected flitches go into Weldwood panels. Create traditional or modern interiors. You have a wide latitude for numerous effects . . . because Weldwood's lustrous beauty is a perfect complement to any style.

DURABILITY. Weldwood *resin-bonded* panels are laminated under heat and pressure, to produce a modern form of decorative panel that will *never* warp, crack or delaminate, when properly installed.

EASE OF MAINTENANCE. First cost is practically last cost, when Weldwood walls are installed. These beautiful decorative panels maintain their original beauty with minimum care. Maintenance is negligible.

FINISHED COST. Because Weldwood panels combine high structural strength with great decorative beauty, you can specify many short cuts that save both material and labor. Your finished costs will look good, compared to the striking appearance of the finished job.

So look into Weldwood for *all* your commercial clients. Take your choice from fine woods like oak, birch, korina, maple, walnut, gum, mahogany, zebrawood, avodire, rosewood and teak. Make *everybody* happy . . . store-owners, restaurants, bankers, businessmen, hotel-owners and operators of institutions. Specify Weldwood for their interior walls.

SEND FOR NEW BOOKLET ON WELDWOOD FOR COMMERCIAL INSTALLATIONS... YOURS FOR THE ASKING

UNITED STATES PLYWOOD CORPORATION AF-118
55 West 44th Street, New York 18, N. Y.

Gentlemen:
Please send me your free booklet on commercial installations of Weldwood Plywood.

Name_____

Address_____

City_____ Zone____ State_____

WELDWOOD Plywood

Weldwood Plywood and Mengel Flush Doors are products of

UNITED STATES PLYWOOD CORPORATION New York 19, N. Y.
THE MENGEL COMPANY Louisville 1, Ky.

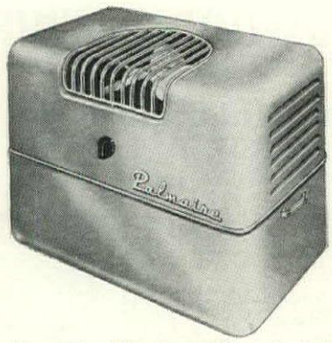
Distributing units in Baltimore, Boston, Brooklyn, Chicago, Cincinnati, Cleveland, Detroit, Fresno, High Point, Los Angeles, Milwaukee, Newark, New York, Oakland, Philadelphia, Pittsburgh, Rochester, San Francisco, Seattle. Also U.S.-Mengel Plywoods, Inc., distributing units in Atlanta, Dallas, Jacksonville, Louisville, New Orleans, Houston, St. Louis, Tampa. *In Canada:* United States Plywood of Canada, Limited, Toronto. *Send inquiries to nearest point.*

Weldwood* Hardwood Plywood
Douglas Fir Weldwood
Mengel Flush Doors
Douglas Fir Doors
Overhead Garage Doors
Molded Plywood
Armorply* (metal-faced plywood)
Tekwood* (paper-faced plywood)
Flexmetl
Weldwood Glue* and other adhesives
Weldtex* (striated plywood)
Decorative Micarta*
Flexwood*
Flexglass*
Firzite*
*Reg. U. S. Pat. Off.

Weldwood
Plastics and Wood Welded for Good

Weldwood Plywood is made in both Interior and Exterior types, the former bonded with extended urea resins and other approved bonding agents; the latter with phenol formaldehyde synthetic resin.

HUMIDIFIER FOR OFFICE AND HOME is portable, also acts as air filter.



Palmaire Automatic Humidifier is a compact unit capable of dispersing 12,000 cu. ft. of washed air every hour. It employs a raindrop dripper system to filter, wash and moisten the air. The air is drawn into the unit by a fan operating on a slow-speed motor and is expelled through a chromium grille in the top of the unit. The humidifier includes a 3 gal. reservoir which may be connected for automatic water refilling. Light in weight, the unit measures 16 in. in length, 11 in. in height and 9½ in. in depth.

Manufacturer: Palmer Mfg. Corp., Phoenix, Ariz.

PLASTIC T-SQUARE is fabricated in one piece.

Instrumaster Industries have just placed on the market a T-Square made of clear plastic which provides an unobstructed view of the whole working area. Because the new instrument is molded in one piece, the manufacturer says it will remain true even if dropped on a hard floor. Ribs, that protrude .02 in. above and below the blade are designed to prevent smudging. The instrument is made in two-blade lengths, 18 and 24 in.

Manufacturer: Instrumaster Industries, 2456-53 W. Jackson Blvd., Chicago 12, Ill. *(Technical Literature, page 196)*

Surface with Satusply

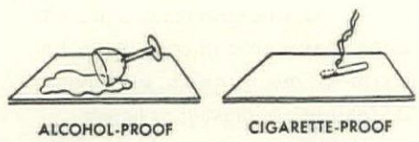
The handsome hard-wearing plastic developed by U. S. Rubber

Satusply is easily applied on the job manually with special cement and *no mechanical pressure*. It is available in rolls of widths up to 48 inches, in continuous lengths or in sheets.

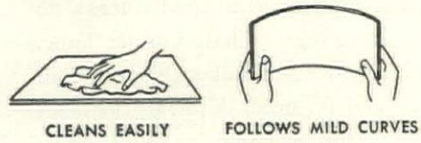
Easy-to-clean Satusply can be ordered in a variety of patterns and colors.

You'll find with cigarette-proof Satusply that table-tops, counters, any horizontal or vertical surface becomes more beautiful, gives more wear under the roughest kind of usage.

Your local distributor will gladly give you a sample. For more information, write Satusply Division, United States Rubber Company, 2638 North Pulaski Road, Chicago 39, Ill.



ALCOHOL-PROOF CIGARETTE-PROOF



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you, too, will want Chase Copper Tube in your Radiant Heating Installations!

EASY TO BEND
LOW COST
SOLDERED FITTINGS
LONG LENGTHS
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LONG LIFE
SMALL DIAMETERS

Pouring concrete over 12,000 feet of Chase Copper Tube. Installation also included 5500 feet for office ceiling and 1200 feet for sidewalk and drive snow removal. Architect: Charles A. Maguire & Associates, Providence, R. I. Building Contractor: A. F. Smiley Construction Co., Pawtucket, R. I. Heating Contractor: J. F. Higgins Heating Co., Providence, R. I.

BIG jobs . . . little jobs, Chase Copper Tube has the advantages that mean fast, economical installation . . . dependability! For instance: you reduce costly, time-consuming connections because Chase Copper Tube is available in coils up to 100 feet long. Its flexibility means quick, easy hand-bending! And no fittings are needed at bends.

In floor installations, as illustrated, there's no need for accurate leveling of Chase Copper Tube. For ceilings, its light weight makes this overhead work easier . . . and its small diameter does not require extra plaster for coverage. Send for instructive, informative booklet that discusses radiant heating in theory and practice. Write Dept. AF-118.

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For modern merchandising

PC Glass Blocks... the mark of a modern building

The International Trade Mart, in New Orleans, initiates a new advance in international merchandising. The ultra-modern building, air-conditioned throughout, will contain corridors of super-lighted display rooms, in which domestic products will be presented to foreign buyers.

These before and after pictures show how an old building was transformed into a thoroughly modern mercantile landmark—largely by the lavish use of PC Glass Blocks. Architect: Rathbone de Buys.

More and more PC Glass Blocks are being used in the construction and modernization of mercantile buildings, mainly for these four reasons:

They improve the appearance of the building, give it a pleasing aspect that attracts discriminating buyers.

Large panels of PC Glass Blocks provide the clear diffused daylight that brings out the full colorful beauty of merchandise on display. Glass Blocks can also be used for interior partitions and screens without restricting the supply of daylight.

Each hollow, thick-walled PC Glass Block is an effective insulating unit, which resists heat travel through light openings into or out of the building. This insulating value facilitates air-conditioning, reduces heating costs.

Panels of PC Glass Blocks can be cleaned quickly and easily. There is no perishable wood or metal sash to need repairs and repainting. The blocks do not break readily, so maintenance costs are kept at a minimum.

Whether you are planning reconstruction or new construction projects, be sure you have the latest, complete information on PC Glass Blocks. We have recently published authoritative booklets on the use of our blocks in residences, in industrial, commercial and public buildings. We shall be glad to send you free copies upon request. Just send in the convenient coupon.

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Distributed by PITTSBURGH PLATE GLASS COMPANY
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Please send along my free copies of your booklets on the use of PC Glass Blocks in all types of buildings. It is understood that I incur no obligation.

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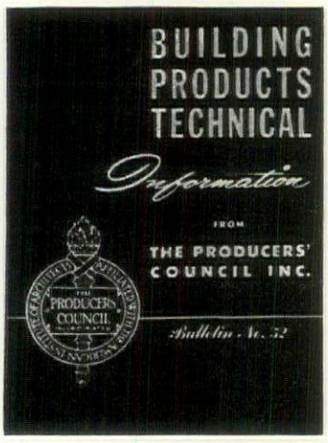
TECHNICAL LITERATURE



BUILDING PRODUCTS. Building Products Technical Information from The Producers' Council Inc., Bulletin No. 52. The Producers' Council Inc., 815 15th St., N.W., Washington, D. C. 80 pp. 8⅝ x 11 in.

Sporting a new format, Bulletin No. 52 of the Producers' Council presents authoritative building product information in convenient reference form. The purpose of the bulletin is to provide architects, engineers and others with reliable, up-to-the-minute technical information about new products and new product applications developed by manufacturers and trade association members of the Council. The products reviewed in this issue range from treated lumber, doors and windows, flooring and heating products to structural and wall tiles, roofing, drainage fittings, etc. A list of members of the Producers' Council, all well-known manufacturers or associations, is also included.

INSULATION AND LIGHT-WEIGHT AGGREGATES. Zonolite Vermiculite Insulation and Light-weight Aggregates. Zonolite Co., 135 S. LaSalle St., Chicago 3, Ill. 8 pp. 8½ x 11 in.

Beginning with a simple explanation of what Zonolite vermiculite is, this booklet goes on to tell of its various uses as a fill insulation and as a concrete aggregate. One of the most important features of Zonolite, according to this booklet, is that it is processed at 2,000° F. which means that it cannot burn. Because of this fact, it is being used widely as an aggregate in plaster and concrete where fire safety is a factor. It has been given a four hour fire rating by the Underwriters' Laboratory where it was tested on a floor construction as a concrete aggregate. In addition, the product, being a mineral, is vermin- and ratproof. It is of particular value as an aggregate, according to the booklet, because it is lightweight. A square foot of Zonolite of 1 in. thickness weighs 1/7 as much as ordinary concrete—less than 2 lbs. per sq. ft. This serves as an advantage also because, as it weighs 216 lbs. per cu. yd., as compared to 2,700 lbs. for sand, it is cheaper to ship and much easier to handle on the job. Included in the booklet are sketches of typical uses for Zonolite vermiculite on roofs, floors, in cavity walls and as a plaster aggregate. The physical properties of the product are listed. They indicate that it has a crushing strength of from 10,000 to 35,000 lbs. per sq. ft. depending upon the mix. Sound absorption coefficients for two coats range from .31 for 128 cycles per second to .84 for 4,096 cycles per second. The noise reduction coefficient for two coats is .65. The latter figures are for Zonolite acoustical plastic, a special ready-mixed preparation.

BETTER CONCRETE. Trimix Makes Better Concrete. Building Products Div., L. Sonneborn Sons, Inc., New York 11, N. Y. 6 pp. 8½ x 11 in.

How to make good concrete better and cut construction time, effort and expense is described in this illustrated folder released by L. Sonneborn. The folder shows how Trimix simplifies and speeds up the handling, transporting and placing of concrete, mortar, stucco and cement plaster mixes, accelerates finishing operations, and increases strength and durability. The folder tells how Trimix can be used to advantage in many types of concrete work, such as ready-mixed, hand-mixed, Gunite process, stucco construction, mortar mixes, patching and maintenance, grouting, foundation walls and footings, floor construction, integral hardening of concrete floors, ramps, platforms and driveways, and other uses. Directions for the use of Trimix are also included in the folder.

MARBLE. Standard Specifications and Scale Detail Plates of Interior Marble. Marble Institute of America, Inc., 108 Forster Ave., Mt. Vernon, N. Y. 43 pp. 9¼ x 11½ in.

This standard specification, both text and illustrative plates, is designed to provide complete information for specifying interior and exterior marble. Actually the work comprises a handbook in addition to the standard specifications for interior marble and exterior veneer. The text clearly and concisely describes marble classifications, finishes, uses and recommends setting materials and procedures. Major sections of the book include: Marble Classifications for Soundness, Handbook for Use of Interior Marble, MIA Standard Specifications for Interior Marble, and Specifications for the Support, Anchorage and Protection of Exterior Marble Veneer. The last portion of the book is devoted to scale detail plates.

(Continued on page 198)

You can depend on Bruce for STYLE in hardwood floors

■ Style is a plus value that lifts anything out of the class of the ordinary, makes people want it. Some products have style. Others do not.

Today home buyers everywhere are very conscious of the value of style . . . more so than ever before. They seek it in the design and in the individual features of their homes.

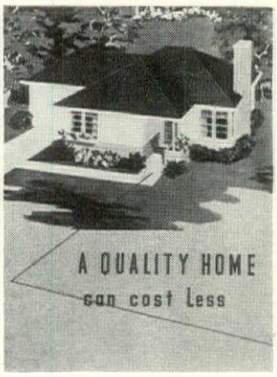
In floors, Bruce offers style that is soundly based on natural beauty and good design. This style is found in all three types of Bruce Hardwood Floors . . . distinctive types which provide a choice to fit individual preferences and architectural trends. There is nothing temporary about this style. It lasts through the years with undiminished beauty and appeal.

When you add style to all the other familiar qualities of hardwood flooring, the result is completely satisfied home owners. That is exactly what you get with Bruce Hardwood Floors—manufactured by E. L. BRUCE CO., MEMPHIS, TENN., World's largest maker of hardwood floors.

BRUCE **BRUCE HARDWOOD FLOORS**

Prefinished and Unfinished

TECHNICAL LITERATURE



QUALITY HOME COSTS. A Quality Home Can Cost Less. West Coast Lumbermen's Association, 1410 S. W. Morrison St., Portland 5, Ore., 8 pp. 8½ x 11 in.

The booklet traces the construction of an actual house, and through a simple step-by-step analysis show where today's home-builder can effect economies through proper use of lumber grades. Though the book is designed primarily for the lumber dealer, it will be valuable to many an architect and builder because it stresses the uses of low cost lumber. The house the association chose to analyze is one of the National Plan Service's stock plans—a simple basementless two-bedroom number. The booklet makes no attempt to talk about anything but the lumber that goes into the house. It does, however, handle this subject for this specific house exhaustively.

ROOF TILE. Kaylo Insulating Roof Tile for Light-weight, Non-Combustible Roof Decks. American Structural Products Co. Toledo, Ohio. 8 pp. 8½ x 11 in.

Physical properties and construction specifications for Kaylo insulating roof tile are included in this booklet. The first section is devoted to a description of the tile, including such information as its strength, insulating value, fire-resistance, ease of installation and strength. The second section lists specifications, design data and details. Construction details are included for various types of construction. Technical data on the tile are included on the last page of the booklet.

HARDWARE. Stanley Announces a Parade of New Items. The Stanley Works, New Britain, Conn. 20 pp. 8½ x 11 in.

A large group of door and cabinet hardware pieces is shown in the booklet, including eight pages of Stanley's new line of black ornamental hardware. The catalogue shows three different designs of solid brass door and drawer pulls which are available in polished brass or chrome. Other items included are cabinet catches, cabinet hinges, hasps with locking staples, surface bolts, door holders, piano hinges, and kitchen cabinet hardware. The new line of black ornamental hardware is nicely styled and includes H and HL hinges, strap hinges, butt hinges, thumb latches, shutter bar latches, ring pulls, knob pulls, blind holdbacks and pintles and surface bolts.

HARDWARE. The Eagle Universal Door Closer. Eagle Industries, Inc., Subsidiary of Bowser, Inc., National Sales Representatives of The Eagle Lock Co., 110 North Franklin St., Chicago 6, Ill. 20 pp. 8½ x 11 in.

A descriptive booklet on Eagle's newest product, the Universal Door Closer, which explains how the closer works, what it is made of and how it is installed and adjusted. The name "Universal" was chosen for this door closer because it will work on a right hand or a left hand door, may be used for hold-open or non hold-open operation. The booklet tells how the door closer may be regulated for fast speed or slow speed. Specifications included in the booklet give the dimensions of the closer as 4 3/64 in. high, 3 7/16 in. wide and 8⅞ in. long and the weight as 6½ lbs. The last two pages list eight advantages of the new product.

LIGHTING. Cold Cathode Fluorescent Lighting Guide. Fluorescent Lighting Association, 501 Fifth Ave., New York 17, N. Y. 8 pp. 8½ x 11 in.

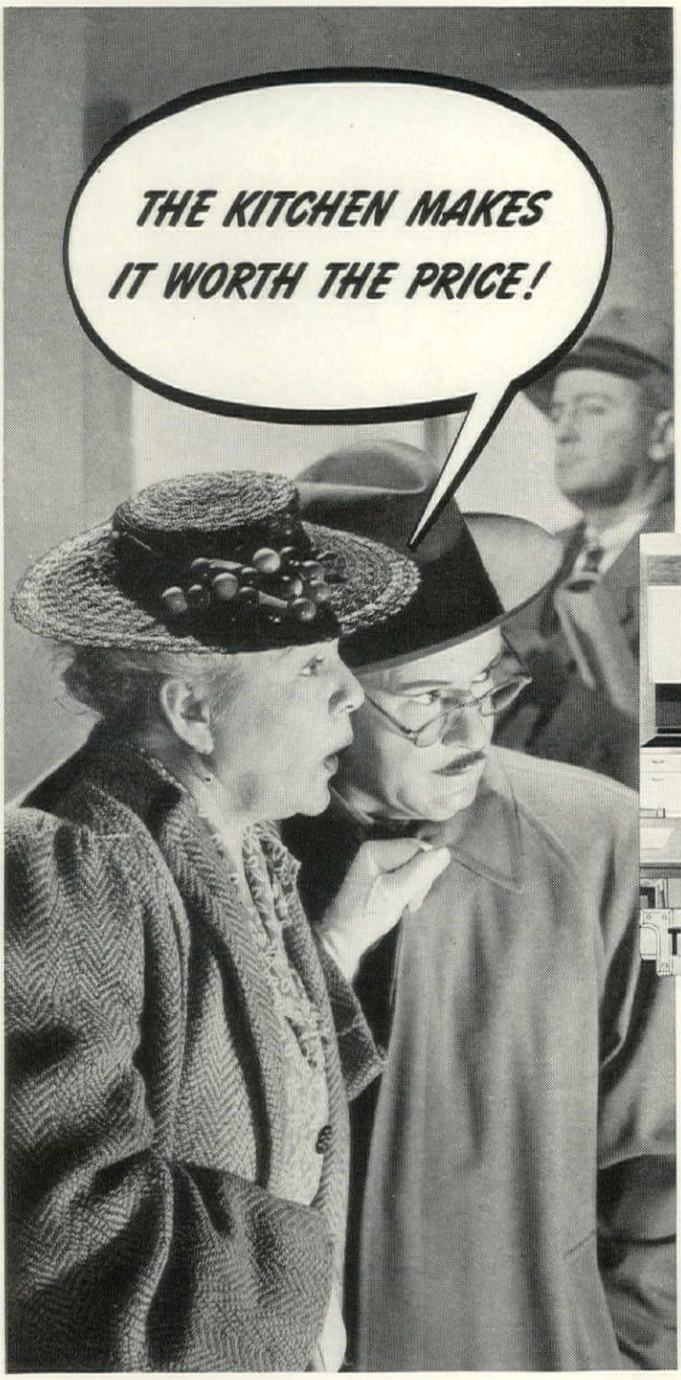
Specifically designed for architects and engineers, this booklet includes an explanation of cold cathode, why, where and how it should be used and a photometric data table for standard cold cathode lamps. The latter, incidentally, is based on averages of manufacturers' published catalogue data and has never before been available. The material is simply and attractively presented, includes both photographs and cartoon sketches.

LIGHTING. Sky-Glo Luminous Louver System. Benjamin Electric Mfg. Co., Des Plaines, Ill. 28 pp. 8½ x 11 in.

A comprehensive bulletin on the new Sky-Glo louvered ceiling lighting system, this publication includes such information as the features, specifications, descriptions, complete illumination and installation data for the Sky-Glo system. Complete general specifications give full data on: composition, basic sizes and shapes of louver sections, dimensions and construction of supporting channels, suspension rod assemblies, etc. The various system components—louver sections, installation fittings and fluorescent units—are illustrated, described,

(Continued on page 202)

Why Hotpoint Kitchens Are The "Measure Of Value"



Confidence Goes Up, Prices Seem Lower, When Home-Buyers Look At The Kitchen

BUILDING COSTS are steep today, but buyers find that prices look more reasonable through the windows of a Hotpoint All-Electric Kitchen. That's because thirty million people know Hotpoint is a reliable measure of value—the finest in electric kitchens.

Alert Builders and architects find that it pays to invest enough extra and make the kitchen a real showplace. For powerful advertising and merchandising have made Americans kitchen conscious. And they look to Hotpoint for the biggest values.

Today the Kitchen is the Measure of Value

Hotpoint All-Electric Kitchens create confidence in the quality of the whole house. The price seems better, too, for in many cases a "package mortgage" can be arranged to include cost of electric appliances.

See Your Sweet's Catalog for details or consult your nearest Hotpoint Distributor. Hotpoint Inc., (*A General Electric Affiliate*) 5651 W. Taylor St., Chicago.

Hotpoint has everything for the kitchen and laundry:

RANGES • REFRIGERATORS • FREEZERS • DISHWASHERS • DISPOSALLS*
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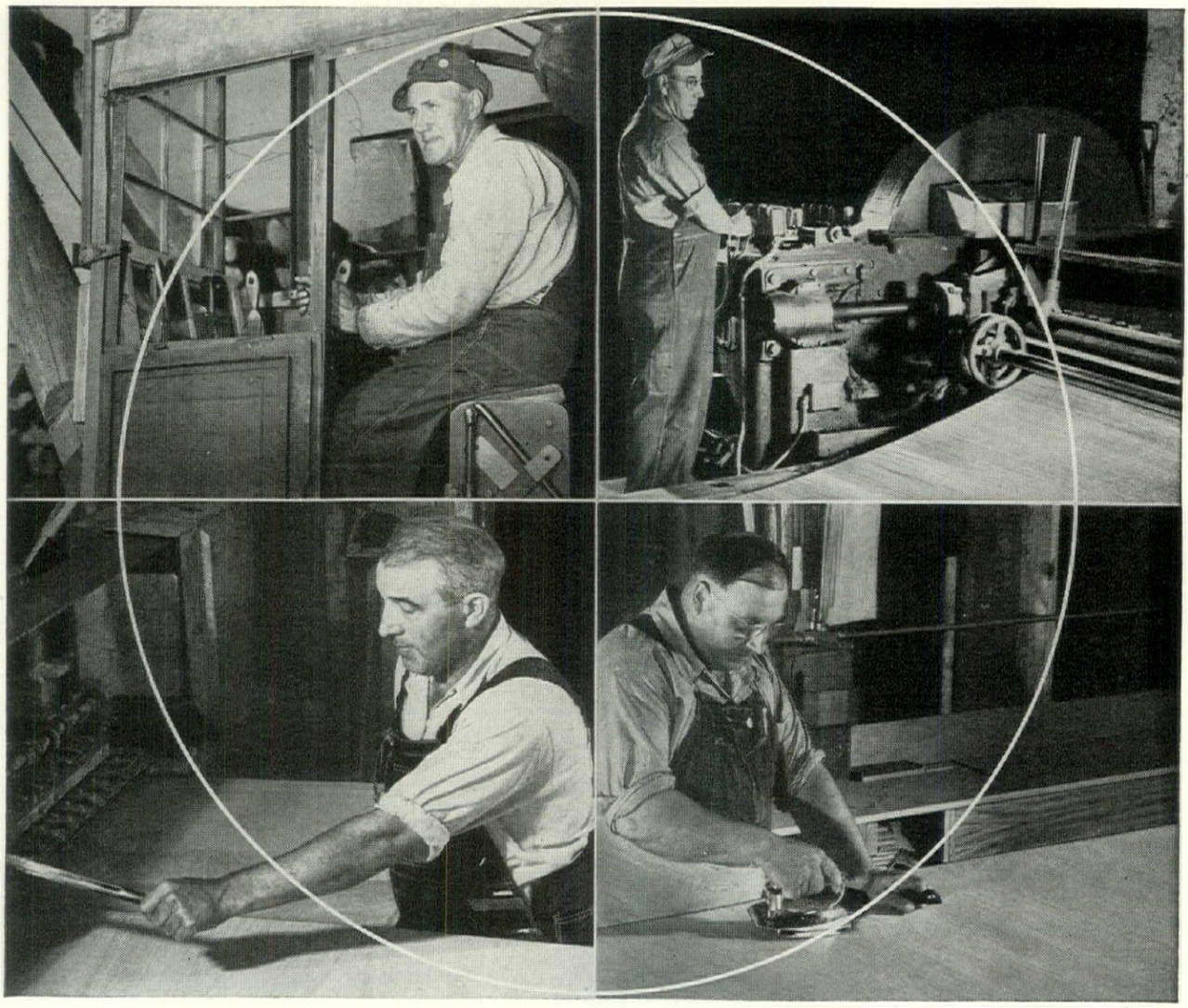
ROTARY IRONERS • WRINGER-TYPE WASHERS • DRYERS

Reg. U. S. Pat. Off.

Everybody's Pointing to **Hotpoint**

PIONEER IN THE ALL-ELECTRIC KITCHEN

Roddiscraft Quality
a family affair



● When you buy or specify Roddiscraft doors or hardwood plywood, you are sure of a craftsman's product.

In spite of modern production methods — in spite of automatic machines—craftsmanship still determines the quality of wood products. The characteristics of wood differ widely. A knowledge of these differences influences log selection, veneer cutting, drying, bonding, sanding, finishing. At Roddis the men who govern these operations are craftsmen who know wood.

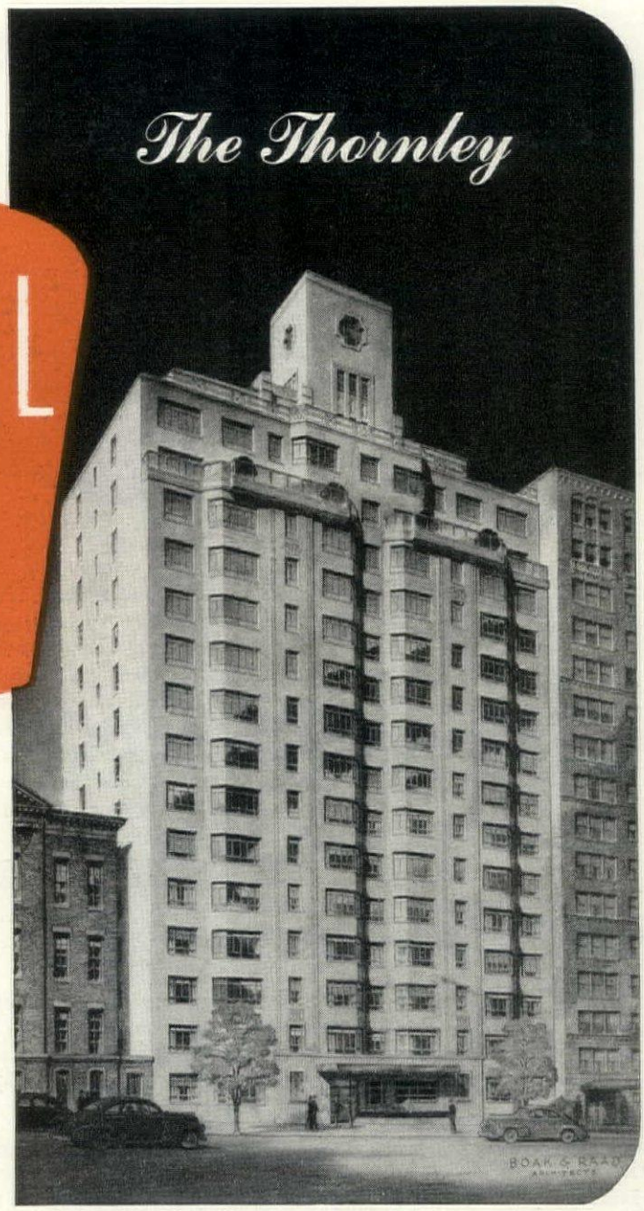
True to tradition at Roddis, craftsmanship is often a family affair. A large part of the personnel is made up of families of craftsmen with many years of experience — your assurance that each production step is in trained hands.

Yes, when you buy or specify Roddiscraft — you are assured of craftsmanship quality doors and hardwood plywood. Compare Roddiscraft and see for yourself.

Another family circle of Roddis craftsmen representing more than 100 years of experience — the Herkert brothers — Charles — log yard jammer operator — responsible for classifying and stacking logs — John, lathe operator whose knowledge of wood is vital to veneer cutting — Louis — on the belt sander where skill and fine touch assure satin smooth finish and uniform thickness — and finally, at the end of the chain — Eddie, plywood inspector and retoucher — a perfectionist — with him it's perfection or rejection.

Roddiscraft
Roddis Plywood Corporation
Formerly Roddis Lumber & Veneer Co.
MARSHFIELD, WISCONSIN

HONEYWELL P.H.C.*



THE THORNLEY, 215 East Seventy-ninth Street, New York City, New York. Boak and Raad, New York City, *Architects;* Carty Heating Corporation, New York City, *Heating Contractor.* Thornley Realty Co., *Owner;* David Rose, *President.*

...in each apartment

THE Thornley, recently completed in New York City, is one of Manhattan's finer apartment buildings. It is truly a showplace in every respect.

Embodying the most modern design and construction developments, including metallic insulation, hardwood parquet flooring throughout, dropped living rooms and independent dining bays, it is to be expected that the owner, Mr. David Rose, would want Honeywell Personalized Heating Control in each apartment.

Honeywell P. H. C.* insures rentability in years to come by permitting tenants to select and maintain their own individual temperature requirements. And just as important, if not more so, P. H. C.* eliminates waste fuel. No longer is it necessary to satisfy the "cold" tenant by overheating the entire building.

You can provide the same advantages for your clients by specifying P.H.C.*— easily and quickly installed in new or existing buildings. Consult your nearest Honeywell branch. Minneapolis-Honeywell, Minneapolis 8, Minnesota. In Canada: Toronto 12, Ontario.

* *Personalized Heating Control*

MINNEAPOLIS **Honeywell**
CONTROL SYSTEMS

dimensioned and priced, and a typical installation is featured. Several installation layouts illustrate how the system is adaptable to square, rectangular, large and irregularly shaped areas, and a section titled "Installing the Sky-Glo Lighting System" gives suggestions for planning and installing their systems. The work, which is fully illustrated with photographs, architectural drawings, tables and charts, contains complete illumination data in its closing pages.

LIGHTING. Sight Savers, Indirect Lighting Designed For Every Room in The House. Silvray Lighting Inc., RKO Building, Radio City, New York, N. Y. 6 pp. 8½ x 11 in.

The various types of Silvray Sight Savers, low-cost, indirect lighting fixtures for home use, are presented in this pamphlet. Both Adaptor fixtures, which screw into the ceiling socket like a lamp bulb, and Suspension type fixtures, which are wired to the ceiling outlet, are illustrated.

INDUSTRIAL LAMPS. Heavy Duty Radiant Lamps. Radiant Lamp Corp., 300 Jelliff Ave., Newark 8, N. J. 4 pp. 8½ x 11 in.

Five different lines of lamps for heavy industrial service are illustrated and described in this bulletin. Included are floodlights for indoor and outdoor use, infrared lamps for industrial drying service, lamps that will withstand hot spatter and rough handling in welding, weatherproof lamps for outdoor illumination of large areas and standard lamps for general lighting service. Complete specifications and application possibilities are given in each case. All of the lamps except the standard line are made of special glass so that they can be used without protective fixtures.

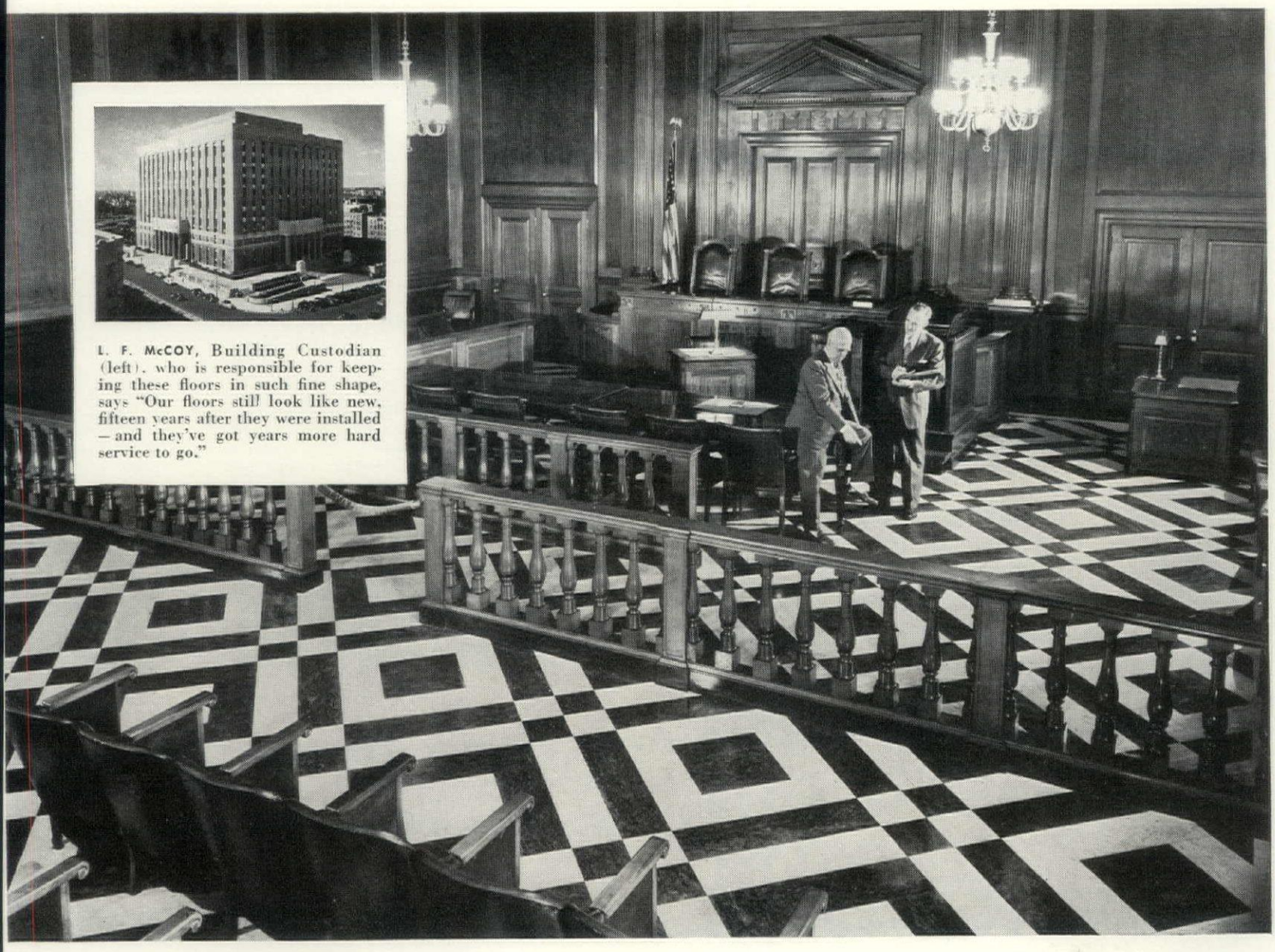
SCHOOLROOM LIGHTING. How to Decorate Classrooms in the Harmon Technique. Luminall Paint Division, National Chemical & Manufacturing Co., Chicago 9, Ill. 8 pp. 8½ x 11 in.

Luminall is to be congratulated for publishing this brochure on classroom decoration. Approved by Dr. D. B. Harmon, consulting educationalist of Austin, Texas, the brochure enables architects to select physiologically and psychologically tested classroom color combinations. The folder explains, in five clearly illustrated steps, the procedure used in arriving at ten possible color combinations for the child-centered classroom. Included in the brochure are perspectives of schoolrooms showing the actual colors recommended as well as how-to-mix and where-to-apply the paints. (For those unfamiliar with Dr. Harmon's work, a brief recap may be in order. Research among 396 children enrolled in five grades of a typical Texas primary school indicated that over 50 per cent of the children had refractive eye problems, 40 per cent had non-refractive eye problems, 70 per cent had nutritional problems and 75 per cent showed signs of chronic infection of the ear, nose and throat. By simple re-arrangement of seating, control of daylight and artificial light to more nearly equalize brightness ratios and by repainting, all of the children improved markedly in all of the above areas. In addition, academic performance showed improvement.)

AUTOMATIC HEATERS. Automatic Heating with Gas, LP-Gas or Oil. The Coleman Co., Wichita, Kan. 12 pp. 8½ x 11 in. 8½ x 11 in.

Nine floor furnaces and six hot water heaters for gas or oil are described in this new Coleman booklet. Coleman DeLuxe and Master Gas Floor furnaces and the Coleman oil furnace are described in detail. All nine of the heaters are available in dual wall and flat register types. Btu per hour output, oil rates for high and low settings and minimum oil sizes are

(Continued on page 206)



L. F. McCOY, Building Custodian (left), who is responsible for keeping these floors in such fine shape, says "Our floors still look like new, fifteen years after they were installed — and they've got years more hard service to go."

Fifteen-year veteran floor

and it still looks like new

ONE of the features of New York's multi-million-dollar Bronx County Court House when it was built fifteen years ago was the beauty of its floors. Wingfoot Rubber Flooring by Goodyear — nearly 500,000 square feet of it — was installed in court-rooms, jury rooms, judges' chambers.

The photograph above shows you what the Wingfoot Rubber Floor in the busy Court of Special Sessions room looks like today — after nearly one-and-a-quarter-million people have walked on it, in wet weather and dry — tracking in mud, dust, dirt and grit. Its appearance is typical of other floors in the building — bright, brilliant colors, with a like-new high shine free from scuffs and scratches.

Service like this is usual with this high-quality flooring, even under the most severe conditions, with only ordinary care. You can specify Wingfoot Rubber Flooring for public buildings, stores, offices, homes — anywhere that floor appearance and durability are what you are looking for — with complete confidence.

Wingfoot Rubber Flooring is made by Goodyear in 14 multi-tone and plain colors, to harmonize with any decorative scheme. It comes in tile, and in easily-cut sheets that let you design a wide range of tile, feature strip and patterns in your floor installations.

The colors of Wingfoot go all the way through — won't walk off under heavy traffic or wash off with commercial compounds. It is resistant to fire, alcohol, ink and stains. A damp mop cleans it.

No wonder so many architects are specifying Wingfoot Rubber Flooring for their "prize" projects. They know from experience that it keeps its good looks for years — testifying silently to their good judgment.

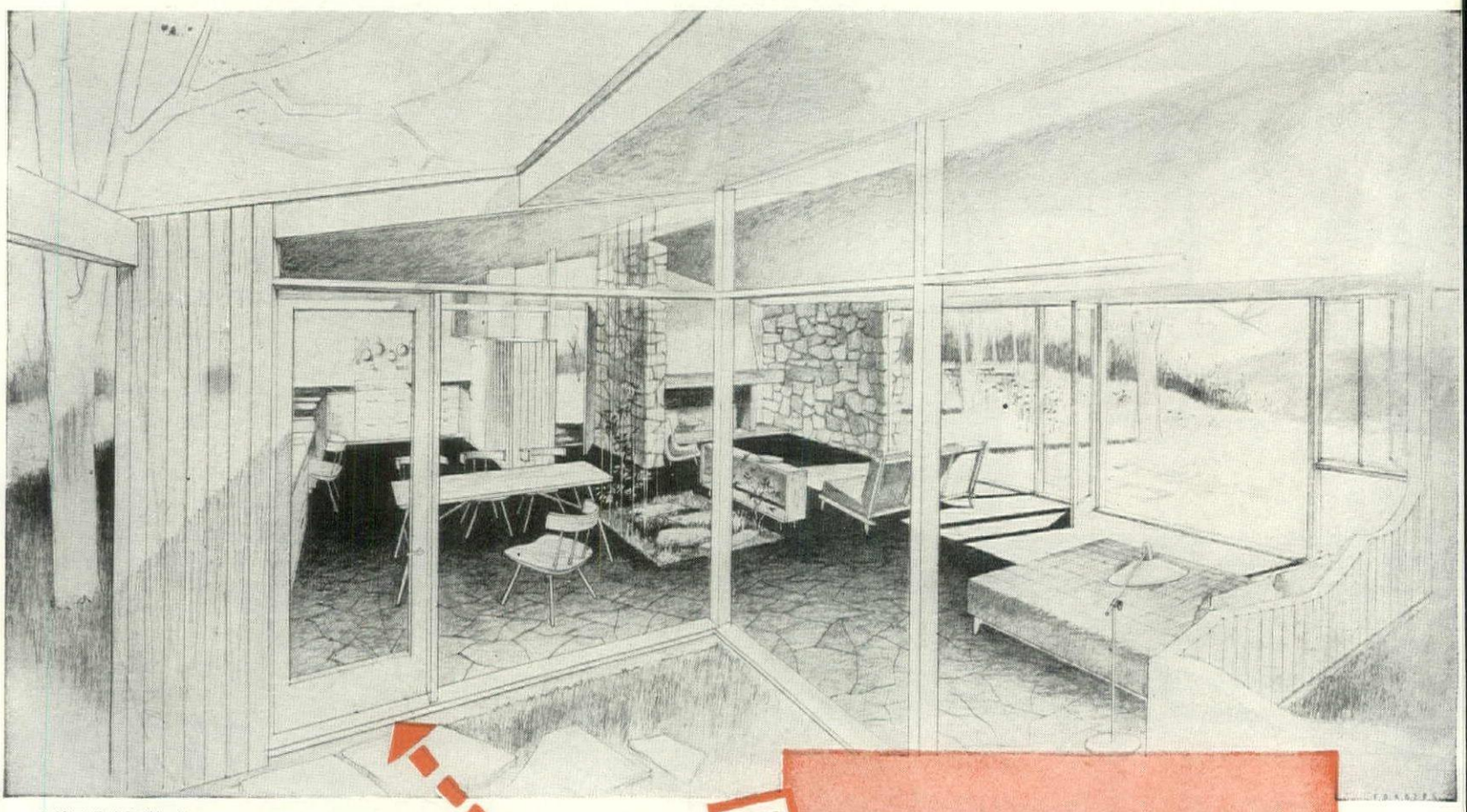
See Sweet's Catalog for complete specifications, or write Goodyear, Builders Supply and Flooring Dept., Akron 16, Ohio.

1898 50 GOODYEAR ANNIVERSARY 1948

WINGFOOT *Rubber* FLOORING { SHEET and TILE

by GOODYEAR

Wingfoot—T.M. The Goodyear Tire & Rubber Company



Architect: Hugh Stubbins, Jr.

TIME will soon put through a change of address when Mr. and Mrs. Joseph W. Semple move into this new home in Milton, Massachusetts.

Presenting THE SHOW-ROOM HOMES *of the Nation*

Look inside the outstanding new homes, traditional and modern, which TIME-families like the Semples are building or remodeling—and you'll find the ideal setting for *your* new construction materials and equipment.

For TIME's 1,500,000 families can well afford "the best that money can buy" to carry out their building plans. Their annual buying power averages *more than double* the U. S. figure; their *extra* income allows a wide margin for building extras.

Besides, TIME-families entertain more than 265,000,000 guests every year. If you sell the TIME market first, these other prospective buyers will see your building products being demonstrated and enjoyed by people they like, admire, look up to.

THE GATEWAY TO THE BUILDING MARKET

TIME

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WHAT DO YOU REALLY KNOW ABOUT ALUMINUM SIDING?

When Kaiser Aluminum Siding is mentioned, perhaps you're inclined to think: "Oh, yes—aluminum siding. Know all about it."

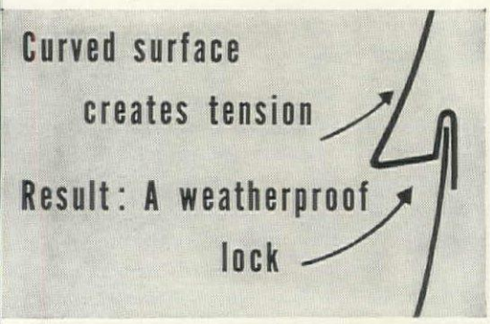
But do you?

Granted you may know that Kaiser Aluminum Siding is made of highest grade aluminum, roll formed by precision machinery.

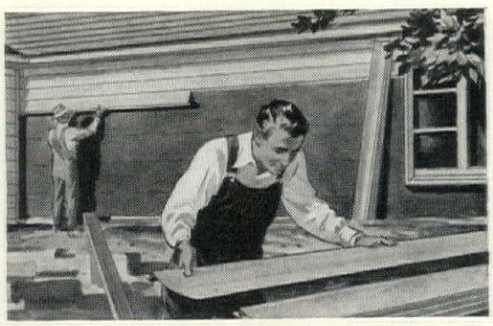
Granted you may know that it's strong and dent-resistant . . . that its permanent beauty can't be marred by splits, knots or sawing scars.

But do you know all these *other* facts which make Kaiser Aluminum Siding superior to any other?

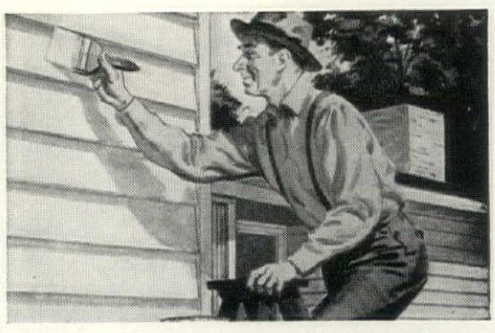
For instance . . .



DO YOU KNOW Kaiser Aluminum Siding has a preformed curved surface—a feature found in no other siding? This deliberately engineered feature makes it the strongest residential siding used. It produces a rigid weathertight joint and creates a tension which eliminates waves or buckles as each piece is nailed down. And it creates clean, even shadow lines, too.



DO YOU KNOW that Kaiser Aluminum Siding costs no more than other fine materials? And that in many ways it *saves* money for builders and home owners? Its light weight speeds construction, cuts labor costs—and it requires no special tools for application. What's more, it takes fewer nails and its non-porous surface requires less paint. Paint goes on faster, too!



DO YOU KNOW that with Kaiser Aluminum Siding on their homes your clients can forget about the usual maintenance problems? That's because Kaiser Aluminum Siding will never rot, rust, warp or crack in any climate. It's fire resistant and can't be damaged by rats or termites. And its surface is especially prepared to assure firm paint adherence and lasting finishes.

Want to know more? Write for additional information on Kaiser Aluminum Siding—the new *material with a unique combination of advantages!*

Kaiser Aluminum Siding specifications:

Length . . 10, 12, 14 and 16 ft. standard lengths
Width . . 6$\frac{13}{16}$" Thickness . . .030"
Weight . 580 lbs. per 1146 base feet (1000 sq. ft.)
Shipped in cartons containing 200 base feet, weighing 106 lbs. overall.

Kaiser Aluminum
SIDING

product of Permanente Metals Corp.

SOLD BY PERMANENTE PRODUCTS COMPANY, KAISER BUILDING, OAKLAND 12, CALIFORNIA . . . WITH OFFICES IN:
Atlanta • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Houston • Indianapolis • Kansas City • Los Angeles • Milwaukee • Minneapolis • New York
Oakland • Philadelphia • Portland, Ore. • Salt Lake City • Seattle • Spokane • St. Louis • Wichita

included in the specification for each floor furnace. Draft meter and automatic controls also are described. There are three gas and three oil hot water heaters in the catalogue. Specifications include capacity, gallons of water heated per hour and Btu input per hour for each of them.

CONTROL VALVE. Cochrane Hydromatic Single Control Valve. Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia 32, Pa. 8 pp. 8½ x 11 in.

This booklet describes the Hydromatic Single Control Valve which is now standard equipment on Cochrane Zeolite Softeners and Pressure Filters. The control valve combines the normal functions of a valve nest into one unit, according to the booklet. The bulletin describes the valve and its workings as well as listing the principle features of the product.

DRAINS and PLUMBING SPECIALTIES. Wade Drains, Catalog W-55. Wade Manufacturing Co., Elgin, Ill. 80 pp. 8¾ x 11 in.

Catalog W-55 provides quick, complete information on the following Wade drains and plumbing specialties: floor, shower, industrial floor type, roof and deck drains; expansion joints, backwater valves, Hydrafilter grease interceptors, cast iron basins, manhole frames and covers, plumbing specialties, Everdri sump pumps and Shokstop sealed air chambers. It literally covers hundreds of items for thousands of uses with text, tables and illustrations. Each group of products is accurately described as to type, size, dimension, weight and price, and each page is arranged for ready reference. Special features of the book include: selector tables for determining roof leader sizes; authoritative, tabulated information on the correction of fluid pressure surges or water hammer, and complete, scientific tables for the correct sizing of grease interceptors.

PORTABLE GASOLINE-ELECTRIC GENERATORS. Homelite Corp., Port Chester, N. Y. 12 pp. 8½ x 11 in.

In words and pictures this bulletin shows the many uses for carryable electric power. Included in the bulletin are descriptions and illustrations, with cutaway photographs, of the complete line of Homelite generators from 500 to 5,000 watts and weighing from 57 to 178 pounds. Six major groups are included in the catalogue. These are 115-volt AC generators for general power services, 120-volt DC generators for universal electric tools and floodlights, 115 or 230-volt AC dual-voltage generators for services requiring both voltages, dual-purpose high-cycle generators for the new high-cycle electric tools, 6 to 160-volt DC generators for battery charging and electric motor-driven generators designed for specific applications. Also included is a guide to help select the proper unit for specific requirements.

MOTORS. Handy Guide For Quick Selection of Electric Motors. Allis-Chalmers Mfg. Co., 715 N. Van Buren St., Milwaukee, Wis. 12 pp. 8⅜ x 10⅞ in.

Brief information on Allis-Chalmers general purpose motors is contained in this *Handy Guide for Quick Selection of Electric Motors*. The bulletin provides detailed specifications covering squirrel cage induction motors and application data, range of sizes and speed torque curves on synchronous, wound rotor and direct current motors. Also covered are applications and features of gearmotors and multi-speed induction motors, with an induction motor selection chart for units from one to 200 h.p. Allis-Chalmers complete line of motor controls for every requirement of motor operation is also featured.

(Continued on page 210)

why have a question... when you can have CRANE?

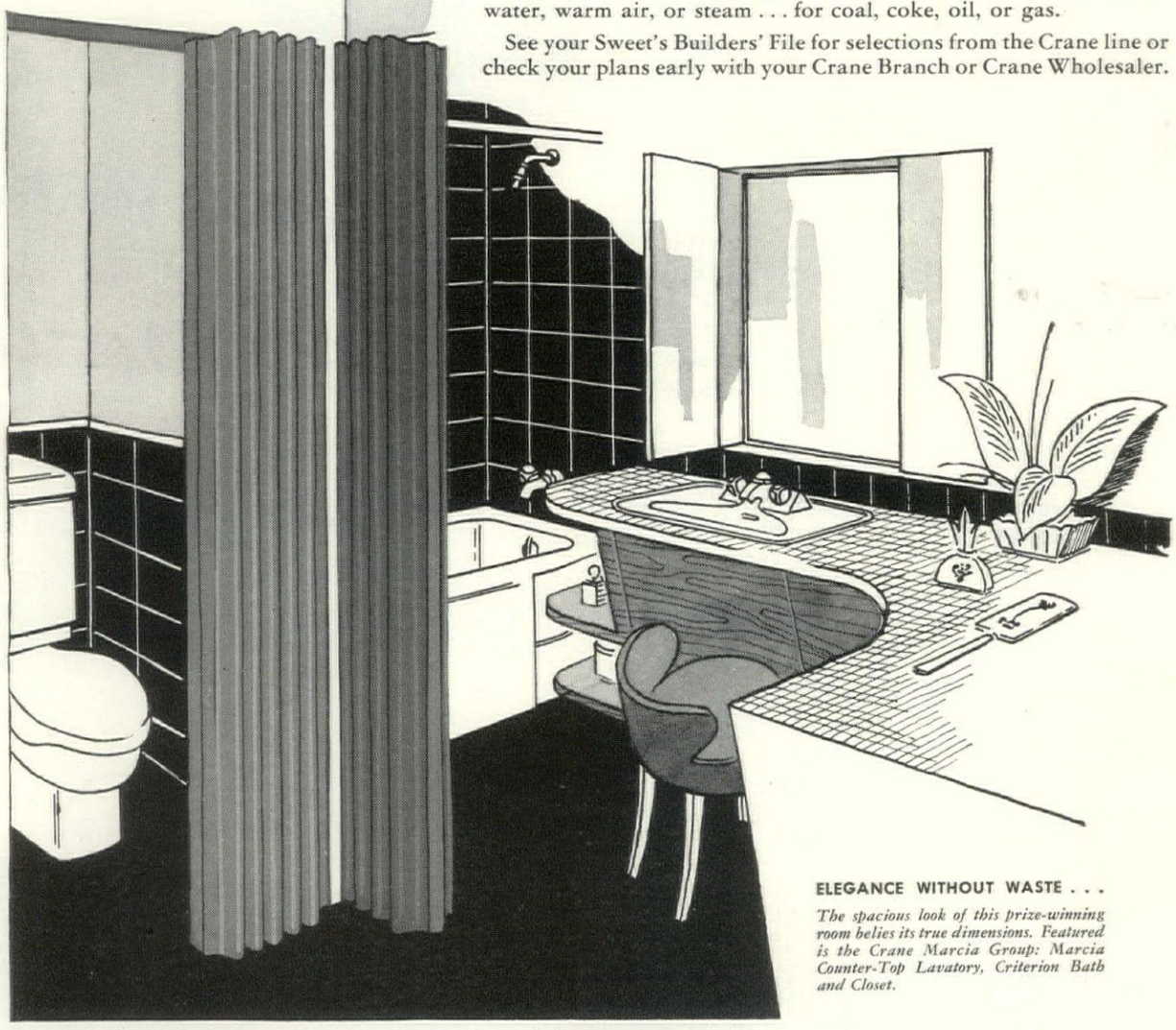
● Why have owners wonder, "Is this the best?" When it's Crane, they *know* it's best! They themselves have chosen Crane in national surveys . . . year after year . . . above all other plumbing brands.

And *you* know it's best for them! The broad Crane line includes a style for every taste—a price for every building budget.

You can offer them Crane quality not only in bathroom fixtures, but in kitchen sinks and laundry tubs . . . each with the most popular development in years—Crane *Dial-ese* controls!

You can offer Crane quality in *heating* . . . complete systems for hot water, warm air, or steam . . . for coal, coke, oil, or gas.

See your Sweet's Builders' File for selections from the Crane line or check your plans early with your Crane Branch or Crane Wholesaler.



ELEGANCE WITHOUT WASTE . . .

The spacious look of this prize-winning room belies its true dimensions. Featured is the Crane Marcia Group: Marcia Counter-Top Lavatory, Criterion Bath and Closet.

CRANE

CRANE CO., GENERAL OFFICES:
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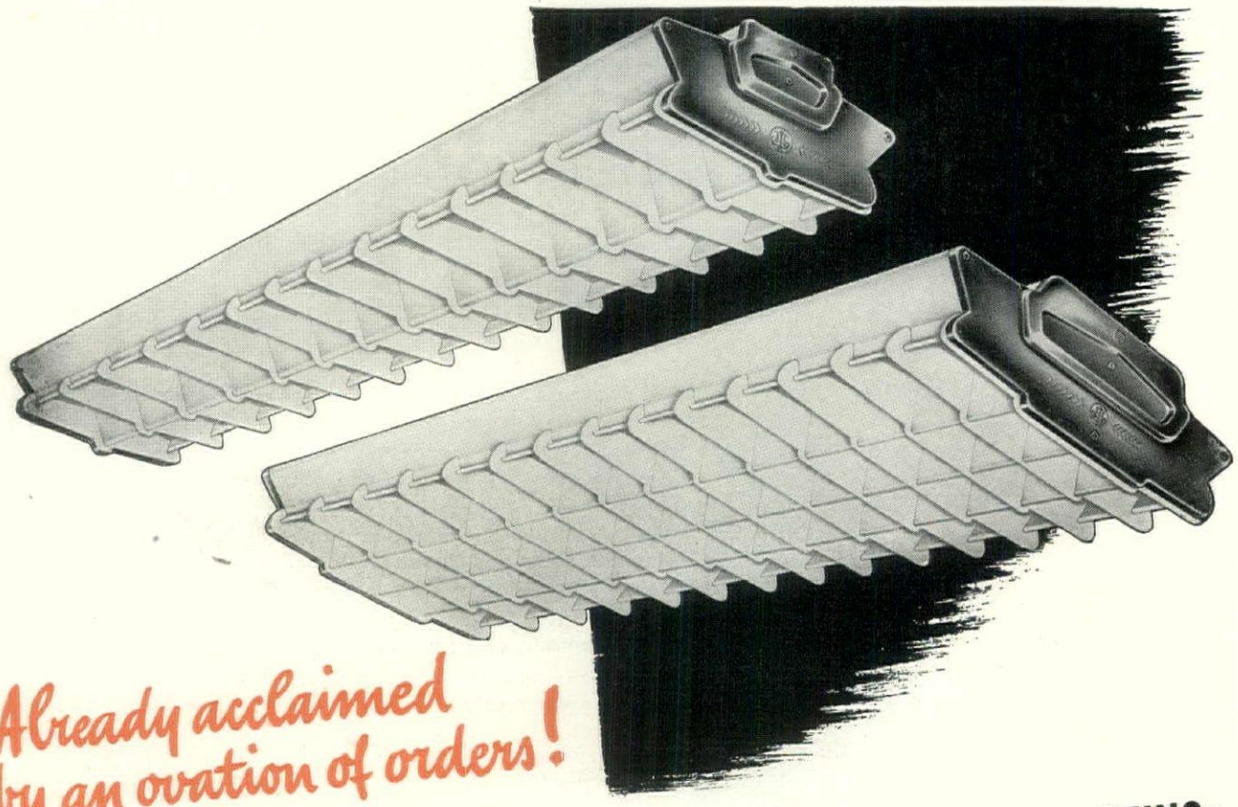
VALVES • FITTINGS • PIPE

NATION-WIDE SERVICE THROUGH BRANCHES, WHOLESALERS, PLUMBING AND HEATING CONTRACTORS



Already acclaimed by an ovation of orders!

THESE NEW TWIN TRIUMPHS OF PRECISION-PLANNED LIGHTING:

LENOX-2*
LENOX-4*

And no wonder! After two years of exhaustive research, Day-Brite has engineered into these superb fixtures all the features you want *most*.

Greater efficiency . . . more ease and economy of installation and maintenance . . . smarter functional styling . . . added flexibility of application . . .

they're **all** yours in the versatile LENOX-2 and LENOX-4.

HIGHLIGHTS OF THE NEW LENOX "TWINS":

- Two 40-watt lamps (LENOX-2) or four 40-watt lamps (LENOX-4) in matching fixtures engineered for low brightness ratios . . . easier-than-ever vision.
- Ceiling or suspension mounting . . . singly or in continuous runs.
- Rugged, rigid all-steel precision-built construction.

409

Send today for the complete LENOX story, including detailed installation and performance data.

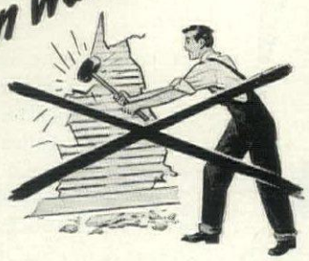
IT'S EASY TO SEE WHEN IT'S **DAY-BRITE** *Lighting*

*T. M. Reg. U. S. Pat. Off., Patents Pending

Day-Brite Lighting, Inc., 5471 Bulwer Avenue, St. Louis 7, Mo.
Nationally distributed through leading electrical supply houses.

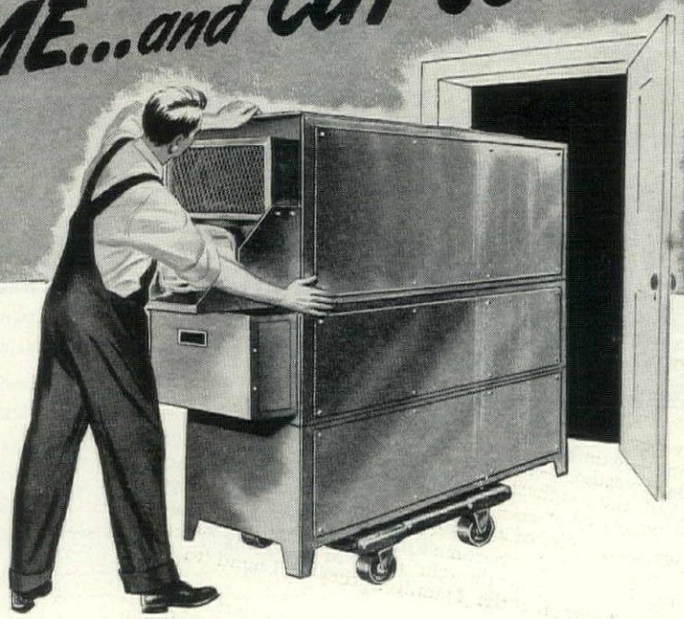
In Canada:
Address all inquiries to Amalgamated Electric Corp., Ltd., Toronto 6, Ontario

DON'T knock down walls



DON'T waste time with small parts

DO SAVE INSTALLATION TIME...and CUT COSTS



...with G-E Central Plant Air Conditioners

ALL sections of the new General Electric Central Plant Air Conditioners can pass easily through a standard 30″ door . . . the two smallest models completely assembled. This compactness allows a wide choice of location for the unit. It means time and money saved in installation, too.

28 different arrangements

Both vertical and horizontal models are designed on the building block principle—12 different vertical arrangments—16 horizontal arrangements. They cover a cooling range from .8 to 58 tons . . . and a heating range from 28,100 to 1,310,000 Btu's per hour.

All units are pre-fabricated, pre-engineered and pre-matched to assure fast assembly if shipped in sections. The welded sheet-steel construction is rigid, light in weight, making it easy to handle, inexpensive to ship.

For a smoother, quicker, less expensive air conditioning job, get full information from your local G-E air conditioning representative today. Or fill in coupon below.

GENERAL ELECTRIC

Better Air Conditioning

General Electric Co.
Air Conditioning Dept., Sect. A8131
Bloomfield, N. J.

Gentlemen: Please send me your new booklet on the new G-E Central Plant Air Conditioners.

Name.....

Address.....

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

Charts list the range of each type of control in voltage and horsepower, together with either NEMA size or Allis-Chalmers type number.

VENETIAN BLINDS. Wardrobe for Your Windows. Venetian Blind Association of America, Inc., 545 Fifth Ave., 24 pp. 8½ x 11 in.

A page of very interesting historical photographs showing the uses of Venetian blinds is included in this brochure on the use of Venetian blinds in decorating. In addition it contains a series of excellent 4-color reproductions of designs by various designers and decorators, as well as a group of photographs of rooms previously shown in such consumer magazines as *Better Homes & Gardens, Mademoiselle, House Beautiful, House & Garden, American Home* and *McCall's*. The booklet is devoted almost entirely to the use of blinds in the home on ordinary windows as well as on window walls, in living rooms, bedrooms, playrooms, kitchens, etc. The last page, however, shows several installations in stores and offices. Another of the pages gives a number of tips on the important subject of cleaning Venetian blinds. Two pages of the booklet are devoted to series of "problem window" hints indicating what can be done with Venetian blinds to improve the appearance of such windows.

ADHESIVE. Colpres 10. Timber Engineering Co., 1319 18th St., N.W., Washington, D. C. 8 pp. 8½ x 11 in.

Colpres 10, a new 10-minute setting, room temperature urea resin adhesive for the woodworking industry is the subject of this pamphlet. After a description of the adhesive and its advantages, the publication includes mixing instructions and data on application, clamping pressure and curing.

REQUESTS FOR LITERATURE

PAUL M. COPE, JR., architectural student, 2310 Pine Street, Philadelphia, Pa.

ROGER COUTURE, draughtsman, 18a, Queen Street, Sherbrooke, P. Q., Canada.

THE FERRO CONCRETE CONSTRUCTION CO., 203 West Third St., Cincinnati 2, Ohio.

HOWARD F. FETTERS, consulting engineer, 336½ Huron Ave., Port Huron, Mich.

JORDAN R. KILBRICK, designer, 1912 West Front St., Alhambra, Calif.

MAN-GOO LOUIE, civil engineer, 1818 10th St., Berkeley 2, Calif.

ROBERT P. MEYERHOF, architectural student, 2519 Etna Street, Berkeley 4, Calif.

K. FRANK ROBINSON, architect, 810 East Commerce, Mexia, Tex.

DORCY L. H. WATLER, draftsman, 2208 Echols St., Bryan, Tex.

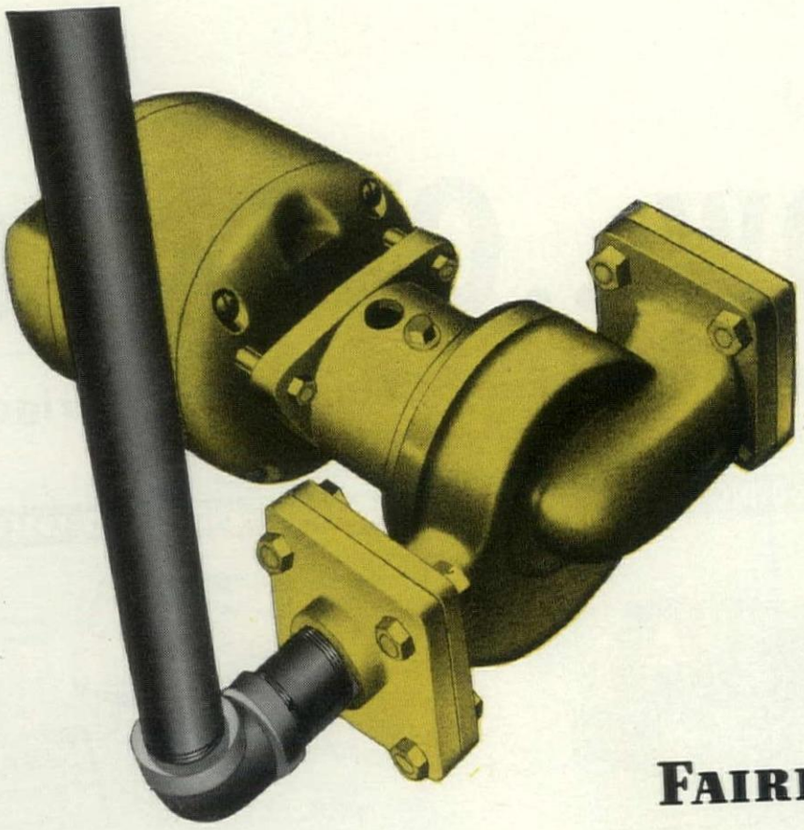
R. B. WHARLDALL, architectural student, 4, Sycamore Terrace, Bootham, York, England.

REQUESTS FOR INFORMATION

AMERICAN OIL CO., Engineering Department, American Building, Baltimore 2, Md., desires product descriptive literature bearing A.I.A. file numbers.

K. SCOTT BINGHAM, architectural student, Lloyds Bank House, Plymton, Devon, England, requests information and literature on building materials, construction and fittings, for all types of building work.

ROBERT S. ZAWADA, builder, Broadway Realty, 7127 Broadway, Cleveland, Ohio, requests information and literature pertaining to the residential building field.



Quieter... Better Hot Water Heat Performance with the *New*

FAIRBANKS-MORSE

Circulating Pump

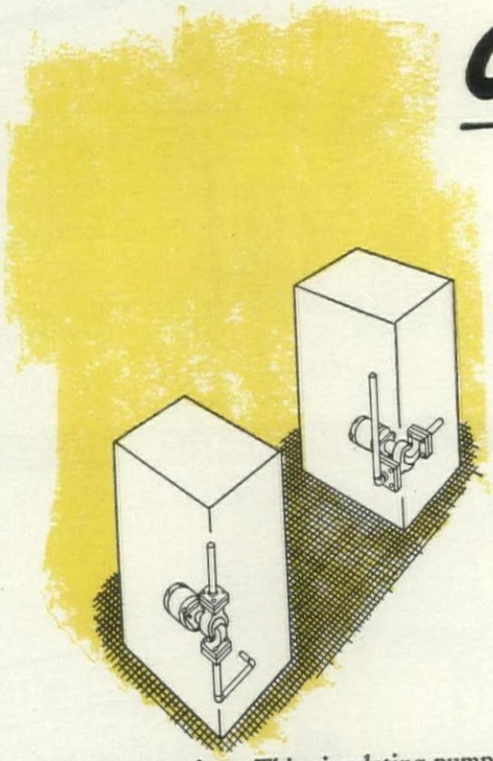
When building plans call for hot water heat, specifications should demand the *new, quiet* Fairbanks-Morse circulating pump. Here's why.

Quieter operation. Motor vibration and noise transmitted through the heating system are eliminated by resilient mountings and molded rubber shaft couplings, lengthening life of motor and pump.

Fuel-saving economy. The *new, quiet* Fairbanks-Morse circulating pump costs relatively little for the savings it can effect. It steps up rate of hot water flow, heats areas faster, thus saving fuel.

Improved efficiency. The *new, quiet* Fairbanks-Morse circulating pump features a sturdy, open-type aluminum impeller . . . long-wearing powdered bronze bearings . . . ample oil reservoir above bearings . . . a face-type mechanical seal that assures positive protection against leakage . . . precision-machined shaft . . . and a rugged cast-iron pump body and fittings.

Model for every need. The *new, quiet* Fairbanks-Morse circulating pump is available in a wide range of sizes and capacities — from 1¼ inches to 2½ inches . . . with capacities from 25 GPM, to 120 GPM.



2-position mounting. This circulating pump can be installed in either horizontal or vertical line, by simply turning pump as shown in illustration.

For your data file . . . Free! Architects, builders, home owners, real estate management men, contractors, and specialists in heating, are invited to send for free literature describing the *new, quiet* Fairbanks-Morse circulating pump. Mail the coupon.

FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • STOKERS • MOTORS • GENERATORS
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AG-233B

Fairbanks, Morse & Co.
Room 707, Fairbanks-Morse Bldg., Chicago 5, Ill.

Gentlemen: Please send us free literature describing the functions of the *new, quiet* Fairbanks-Morse circulating pump.

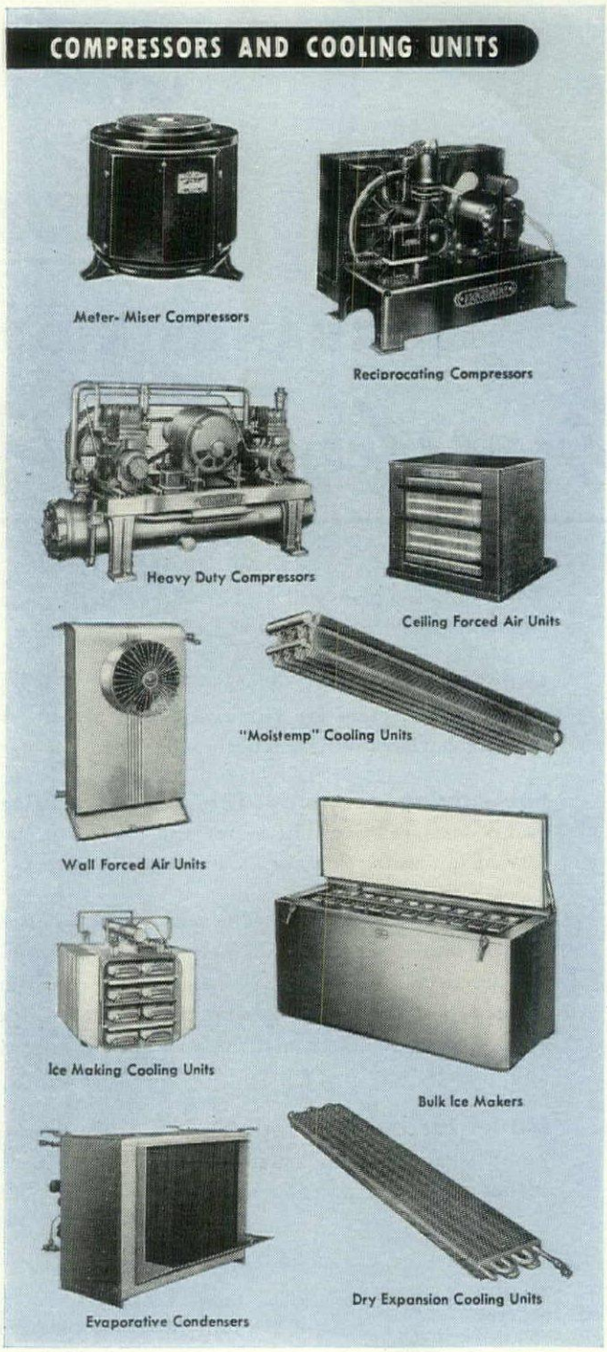
Firm name.....

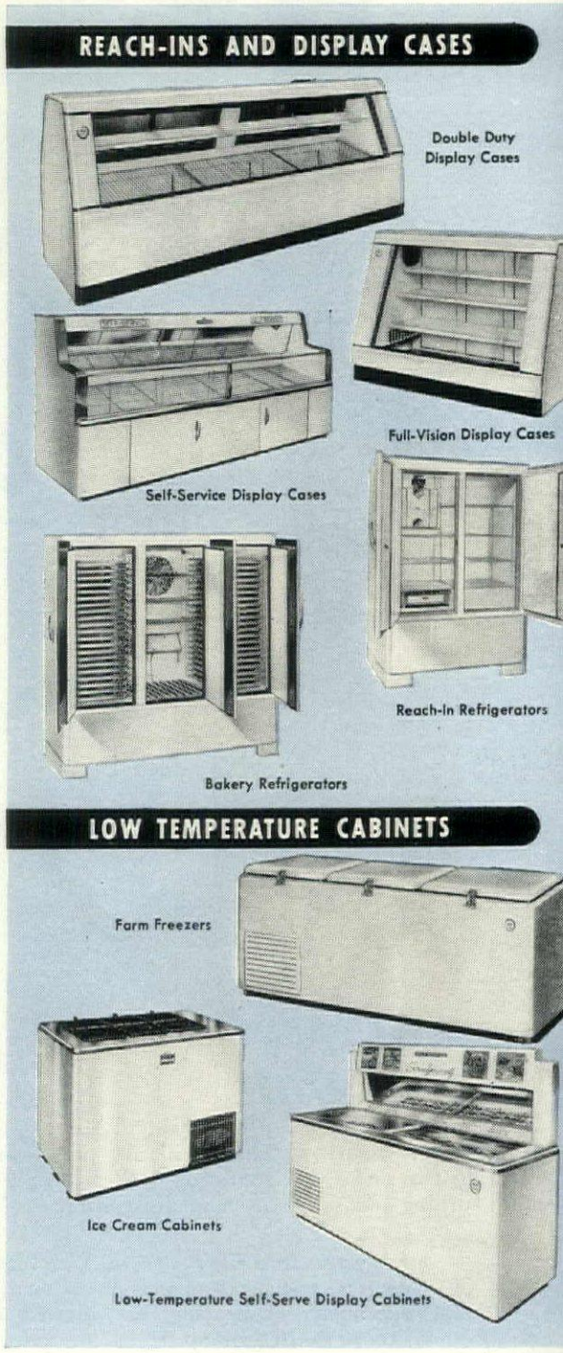
Address.....

City.....Zone.....State.....

NOW...OVER 400

—the most complete line of Commercial Refrigeratio





Why This Full Line Is Important To You

You get the right size and type of equipment when you choose from Frigidaire's full line —never waste money on too much or too little capacity. Moreover, you get the unbeatable quality and service which made Frigidaire world-famous. So remember: for products you can depend on, a name you can depend on, a dealer you can depend on,

FRIGIDAIRE PRODUCTS

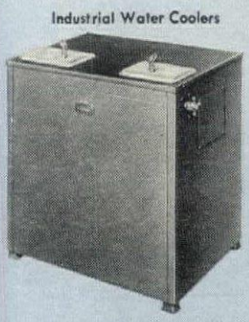
ınd Air Conditioning Equipment in the industry!

WATER COOLERS

Pressure Water Coolers

Bottle Water Coolers

Industrial Water Coolers



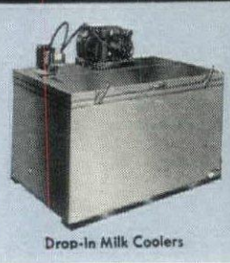
Tank Water Coolers

BEVERAGE COOLERS

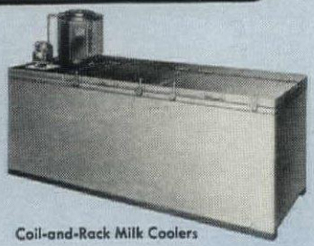
Wet Beverage Coolers

Dry Beverage Coolers

MILK COOLERS

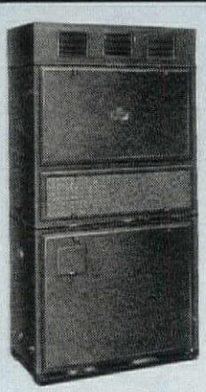


Drop-In Milk Coolers



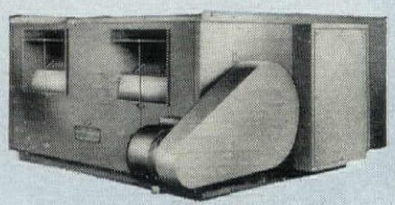
Coil-and-Rack Milk Coolers

AIR CONDITIONING EQUIPMENT

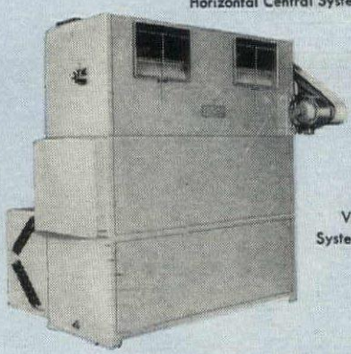


Room Air Conditioners

Store Air Conditioners

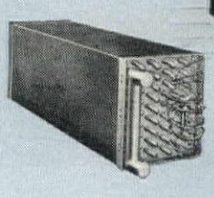


Horizontal Central System Air Conditioners



Vertical Central System Air Conditioners

Suspended Air Conditioners



Multipath Cooling Units

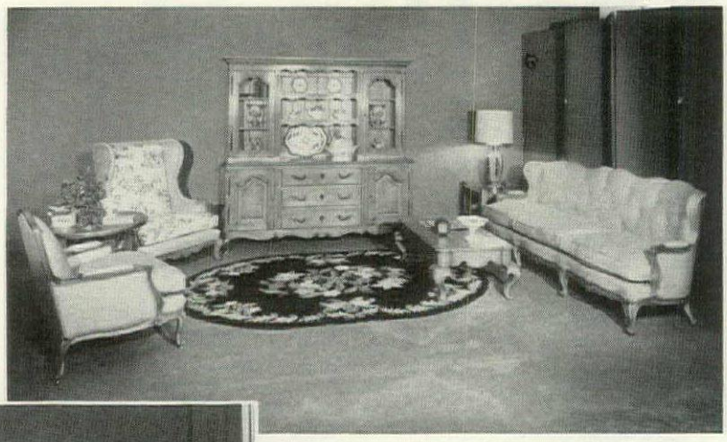
choose Frigidaire. Find your Frigidaire Dealer's name in Classified Phone Directory. Or write Frigidaire Division of General Motors, Dayton 1, Ohio. (In Canada, Leaside 12, Ontario.)

You're twice as sure with two great names

FRIGIDAIRE made only by **GENERAL MOTORS**

HOME FASHIONS WEEK: that old new look

Larry Gordon



Macy's French Provincial — Overscaled and overworked

Typical Department store modern — from Abraham & Straus

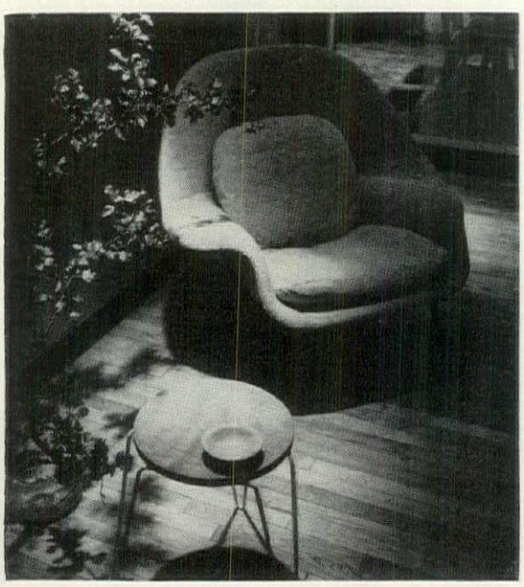
It didn't come up to Mother's Day but, everything considered, Home Fashions Week in New York did all right. Dreamed up last year by a handful of female executives in the furnishings industry, the festival, which will presumably be an annual affair, solicited and got the cooperation of manufacturers all over the country, not to mention local retailers, museums, radio stations and the press. Its avowed purpose was: "To fully acquaint the consumer with the vast contributions of new and fashion-right merchandise of the Home Furnishing Industry; to make women as aware of their homes, in a fashion sense, as they are of their clothes. . . ."

The blast was an impressive one and the idea, with certain reservations, good. As might be expected, however, no design standards could be exercised and one could scarcely expect retail stores to feature anything but the items their established clientele could be counted on to like—and buy. Modern, contemporary or whatever non-period classification you prefer, got a better break than might have been expected from the press, No. 1 entrepreneur of mass opinion and acceptance. The New York *Times*, alone in its class, ran a commendable Sunday supplement called the Special Home Section.

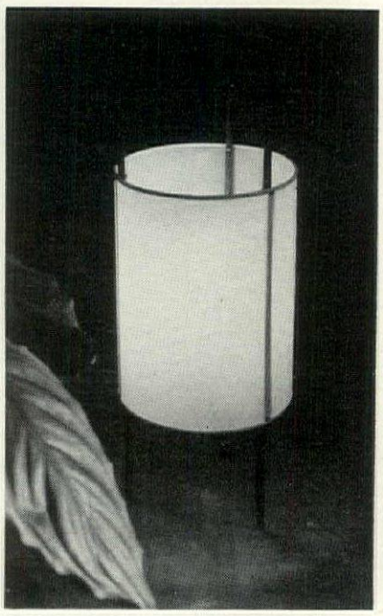
Museums spread themselves. The Metropolitan threw open the American Wing, Brooklyn and Cooper Union Museums plugged textile, wallpaper and ceramics design. As pinnacle of the confab, the Museum of Modern Art staged a special furniture exhibit of new pieces selected and lectured on by Edgar Kaufman, Jr.

Faithful and unbiased, the daily press photographed and recorded all that it saw and heard with heterogeneous results, ranging from Noguchi's splendid new lamp (below) to Macy's oversized and overswollen French provincial (top).

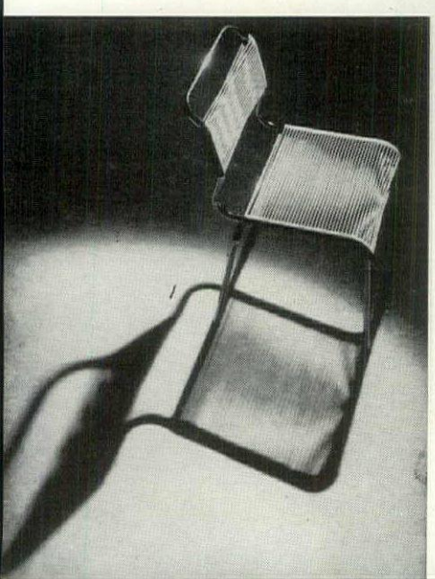
Under its own department headings, The FORUM presents a few typical malapropisms from the New York press which may help clarify what Home Fashions Week can do for the American housewife. *(Continued on page 216)*



Eero Saarinen's admirable armchair



Noguchi's new lamp



Metal stacking chair by by André Dupres

All available at Knoll Associates

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PRESENTING . . . the *first* bookkeeping machine styled in the modern mode—with that rare beauty of truly functional design. And inherent in this distinctive machine are new features that speed and simplify the production of every accounting record.

The *Foremost* is fashioned for efficiency in business administration—fashioned for faster accounts receivable, for more detailed accounts payable, for complete payroll records—as well as for every other phase of management control.

Combining the maximum in owner-utility with singular operator-appeal, this completely electrified bookkeeping machine is designed to produce the results you require—at lower cost. See it today!

Call your local Remington Rand specialist, or write Department AF-11, 315 Fourth Avenue, New York 10, N. Y.

Remington Rand

Double Crossticks

". . . You can get goods now in everything from glass masquerading as gossamer marquisette to plastic film with a velvet touch." (*World-Telegram*) "Decorative notes include aluminum trims which can be painted gold, silver or colored." (*N. Y. Sun*)

Seeing Eye

"In general the nubby, homespun look is gaining ground every day over the satiny smoothness that characterized the upholstery materials of another era. . . ." (*N. Y. Herald Tribune*)

Utter Criterion

"With dining rooms scarce in New York apartments or utilized otherwise in suburban homes, space for dining these days is set aside at the end of the living room on a table that at other times holds family pictures or ornaments. . . ." (*N. Y. Times*)

Etiquette

"A large round coffee table designed by George Nelson has a white linoleum top coated with a new product . . . to protect it from all kinds of mars and stains and make it perfectly acceptable for a man to rest his feet." (*N. Y. Times*)

Dernier Mot

"On the haywire side . . . Mr. Eagan has decorated one wall of an apartment with a series of vertical wires. The effect may be airy and three dimensional but it has a definite Sing Sing barred overtone." (*N. Y. Sun*)

Keynoting the whole affair, said decorator William Pahlman in a press interview: "The most successful jobs I've worked on have been houses where the architect, landscape architect and decorator have worked together from the start. We can visualize how a room is going to look furnished, where the architect can not." (*World-Telegram*) M.S.

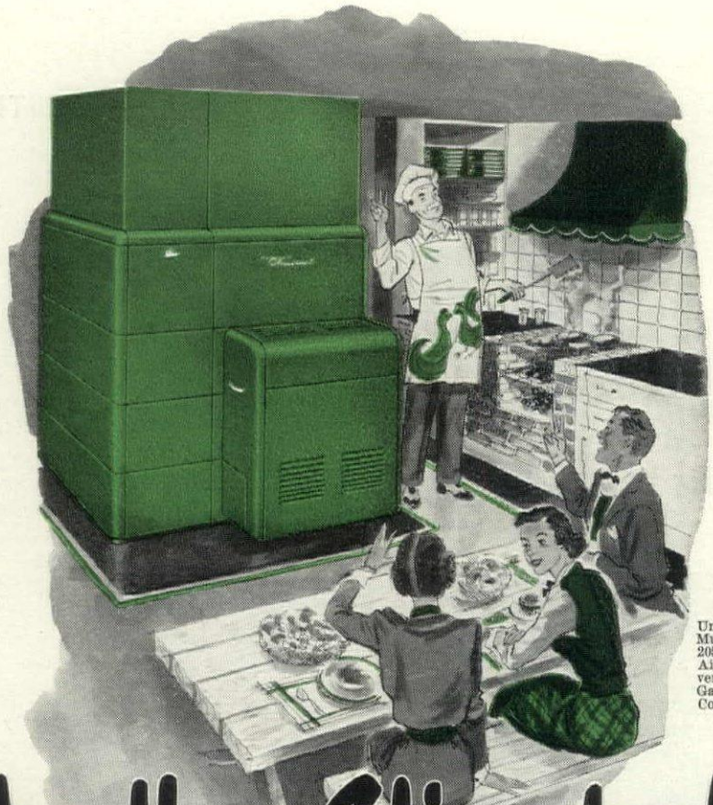
SCANDINAVIANA

Bonniers, New York City headquarters for Scandinavian arts and crafts, opened its doors to the public on October 8th. The store which will be covered by The FORUM in the near future, carries beside the items illustrated here, furniture, glassware, knitted goods, records and greeting cards, all in the best Nordic tradition. After years of hunting about for isolated pieces of china or glass, it will be convenient to find a large assortment of products of Norway, Sweden, Denmark and Finland assembled under one roof.

Handwrought brass service plates and bread tray. Tray, 10½ in., Plates, 9, 11 and 12 in. dia., $20, $30, $40

Translucent china bowls with the Swedish crown motif, in white only. 7½ in. $30, 3½ in., $15

(Continued on page 220)



Unit illustrated is a Mueller Climatrol Type 205 Oil-fired Winter Air-Conditionar (convertible to Type 105 Gas-fired Winter Air-Conditioner).

Mueller Climatrol fuel-thrifty Furnaces

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Yes, a fuel-thrifty Mueller Climatrol Furnace in a home *wins favor for the architect, makes profitable sales for the builder.* And with good reason. The heating plant is the heart of a home. And a Mueller Climatrol Furnace is made to order for today's conditions — with fuel costs high and fuel supplies low.

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Get in touch with your Mueller Climatrol dealer today. Or write for complete information on the Mueller Climatrol line . . . *L. J. Mueller Furnace Co., 2001 W. Oklahoma Avenue, Milwaukee 7, Wisconsin.*

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Tried many insulations, satisfied only with KIMSUL*

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BUILDER

September 22, 1947

Kimberly-Clark Corporation
Neenah, Wisconsin

Gentlemen:

It gives me great pleasure to advise you that in my twenty-five years of building private homes, apartment houses and commercial buildings, I have tried many types of insulation and have never really been satisfied until five years ago when I started using Kimsul.

In the Tompkins house, I used 3200 square feet of Double Thick Kimsul in the walls and ceilings. As a result of this, I feel fuel bills should prove to be very nominal. I have also built ten modern homes in Long Beach, New York, ranging in price from $18,500 to $40,000. And some twenty-five one-family houses selling from $14,000 to $15,000. All of these homes are insulated with Kimsul.

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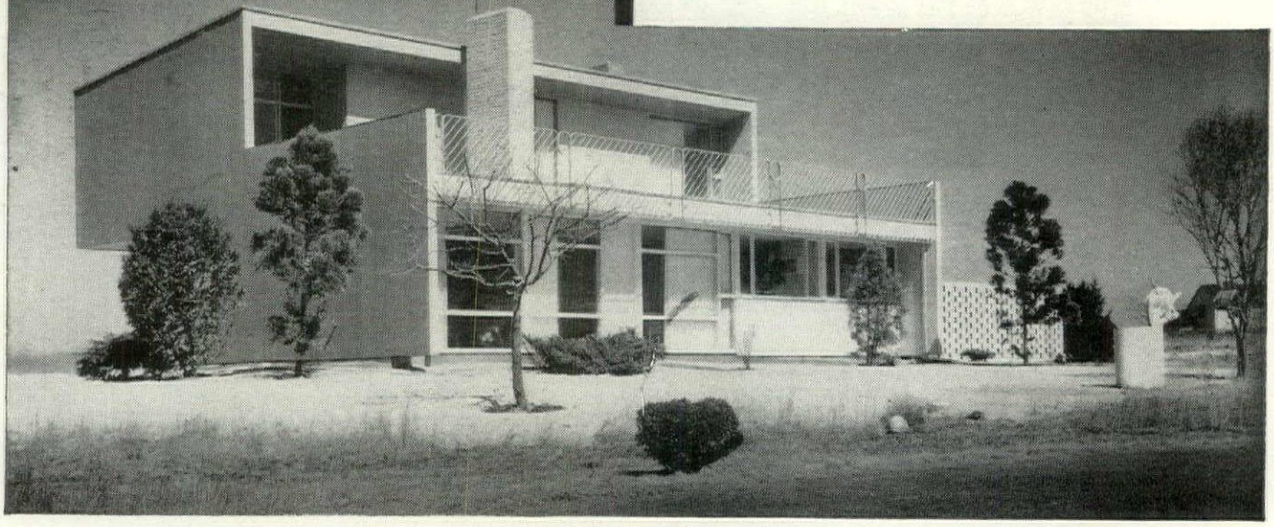
Very truly yours,

GBR:rr

Gordon B. Roth

Gordon B. Roth

The fully KIMSUL-insulated home of Gilbert C. Tompkins in Hewlett Bay Harbor, New York. Marcel Breuer was the architect. Photograph by Ezra Stoller, Pictorial Services.



It's true. Many-layer KIMSUL* insulation is fast becoming the favorite of builders and architects from coast to coast. For KIMSUL automatically provides uniform insulating efficiency over every inch of covered area. Its "k" factor is 0.27. It's the only insulation with the PYROGARD* fire-resistant cover. And one of the easiest to install quickly and profitably—no need for expensive machinery.

KIMSUL comes in handy, compact rolls, compressed to 1/5 installed length. To give maximum protection at lowest cost, specify it by thickness: Commercial Thick (about 1/2 in.) for walls and floors. Standard Thick (about 1 in.) for walls, attics and floors. Double Thick (about 2 in.) for attics.

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Insulate when you build.
Over-all insulation
means ready salability.

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Comfort for All Employees—

B&G *Hydro-Flo** Heating

provides the right temperature for each occupational activity

Welding Room 60°

Machine Shop 65°

Office 72°

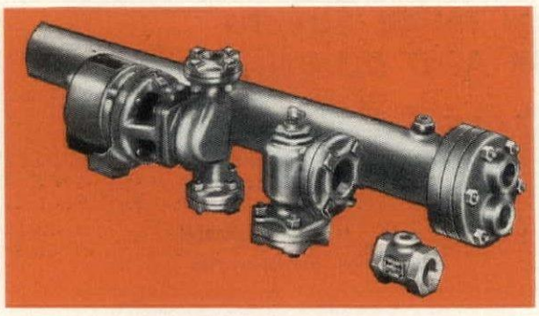
It is generally recognized that the comfort conditions under which employees work have a direct bearing on efficiency. That's why a rapidly growing number of industrial plants are installing or converting to B & G *Hydro-Flo* Heating.

This system takes full advantage of the basic superiority of *mechanically circulated* hot water as a heating medium. It establishes ideal comfort conditions because it can be zoned to deliver automatically the exact amount of heat desired in each department. It automatically changes the rate of heating to meet changes in the weather . . . saves fuel by eliminating over-heating.

The advantages of *Hydro-Flo* Heating are not limited to new installations—existing hot water or steam heating plants can be easily converted. The simplicity of B & G *Hydro-Flo* equipment is assurance of dependable operation and low maintenance.

The preferred system for homes

Hundreds of thousands of B & G *Hydro-Flo* Systems are in successful operation today . . . in homes . . . in apartments . . . and in low-cost housing developments where economy of operation is essential to owners with modest incomes.



Simple, dependable equipment

The equipment of a B & G *Hydro-Flo* Heating System can be installed on any hot water heating boiler or used with a steam convertor. Basic units consist of a B & G Circulating Pump, Flo-Control Valve, Water Heater, Monoflo Fittings.

Plus hot water for washroom or process use

The Water Heater unit of a *Hydro-Flo* System furnishes a virtually limitless supply of hot water, all year 'round. It is connected to the same boiler that heats the building, saving the cost of a separately-fired heater. Hot water is produced at amazingly low cost.

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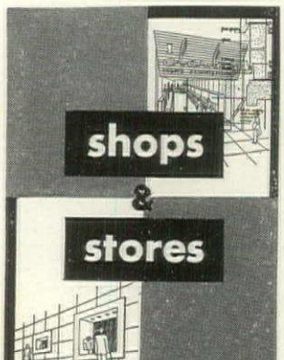


SHOPS AND STORES. By Morris Ketchum, Jr. Progressive Architecture Library, Reinhold Publishing Corp., 330 West 42d St., New York. 302 pp. Illus. 12 x 8¾. $10.

Here is the long awaited and much rumored book by our country's best known and most productive store designer. In its scope, it surpasses all expectations, deals at length not only with planning, equipment and design, but also with materials, construction, economics and the general shopping environment. It masterfully dwarfs the only decent competitive volume on the market: *Contemporary Shops in the U. S.* (FORUM, Sept. '45).

Although a considerable amount of the material is a rehash of previously published jobs, none seem to have suffered in the processing. As a matter of fact, the majority are enhanced by additional research and more exhaustive treatment than the average architectural magazine can afford to give. A typical example: the Davison-Paxon department store i Atlanta. Quite understandably, the percentage of Ketchun designed stuff is pretty high but fair play triumphs in the end

The book provides an impressive stockpile of informatio on the mechanics and psychology of merchandising—its man problems and requirements. It also offers at absolutely n charge a great number of useful rules of thumb—products o the author's wide experience—that should save store planner of the future long hours of research and calculation. Amon these are minimum dimensions, location and installation pa terns for escalators and stairs, the number of elevators tha can be squeezed into one bank without exhausting the sanit and wind of the would-be passenger. The smallest specialt shop, the newest department store and the largest communit shopping center alike come in for close scrutiny. Ketchur discusses the case of the staggered level, specific problems o drive-in merchandising and service, the broad economics o shopping districts, the flexible versus the inflexible ceiling between-level storage, in short, anything you can think of tha has to do with the gentle art of selling.

The one case, however, that is not discussed to the satisfac tion of this reviewer, are the relative merits—economic an psychological—of the department store and the small shop The average shopper would feel a noticeable increase in hi or her life expectancy with the assurance that the horrors o department store shopping might someday be abolished Everyone knows, of course, that the department store is pri marily the product of inflated urban real estate values bu since the replanning of most of our large cities can now b mentioned above a whisper, should not their basic merchandis ing patterns also be revised? Ketchum says: "Small shop will always fulfill a definite function and will always remai a vital problem in store design, but they need not set the over all pattern for our shopping districts." However, wouldn't lif be far pleasanter, if they did? If we can afford to be ideal istic about the survival of cities, we can more than afford t seek out and try for the ultimate in shopping environment The only people who can disagree are the psychiatrists. M.S

SURGING CITIES. Greater Boston Development Committee Inc., Boston, Mass. 279 pp. Illus. 10 x 8. Paper cover $2.25 cloth $3.

Instead of another elaborate report to the taxpayers on the activities of their local planning board, this volume turns out to be a textbook for students of Boston's secondary schools. In most respects it wins, hands down, over conventional city planning reports. It assumes that because the reader is young, he very probably hasn't had much opportunity for travel and therefore includes comparable examples of bridges, airports or superhighways in other sections of the country. And because it was written for adolescents, a mass of technical material is set down in simple, readable language that makes a great deal of sense, even to an octogenarian.

Planned to augment and brighten up the usual civics course, *Surging Cities* makes the entire business of administration extremely realistic to Boston's young people and, consequently, makes the more abstract phases of the subject more comprehensible. Starting with a picturesque historical sketch paralleling the development of five major American cities, it travels on through a general indoctrination of the components of city planning to the specific problems confronting the Boston area and what has been done about them to date.

(Continued on page 224)

Pierre Grill

selects

SABINITE*

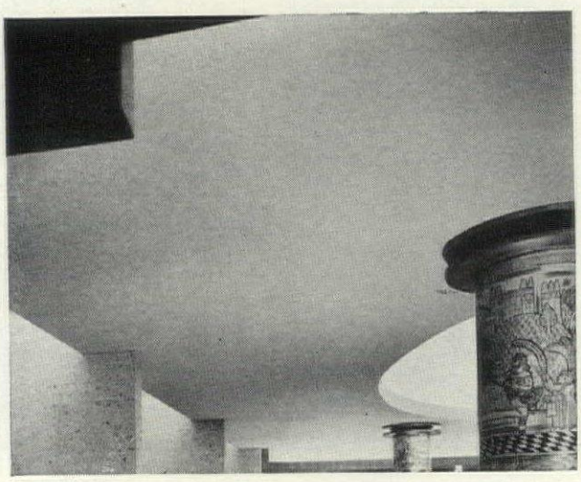
Acoustical

Plaster Ceilings

because...

el A. Marx, Noel L. Flint, Charles W. Schonne, Architects, Chicago; Edward H Klein, General Contractor, New York; Colletti & LaGuidara, Inc., Plastering Contractors, New York.

SABINITE absorbs sound



The smooth, unbroken surface of the Pierre Grill's new SABINITE ceiling complements the beautiful murals and the richly ornamented pillars. SABINITE is unobtrusive—and SABINITE is adaptable!

For discriminating New Yorkers, and for thousands of people who occasionally find themselves in Manhattan, the Hotel Pierre has long played the gracious and considerate host.

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Quiet created by SABINITE, the acoustical plaster finishing coat that absorbs noise. Of all the acoustical materials available, SABINITE was selected because it is the logical solution for the architect's noise correction problem in any building, new or old.

The continuous surface of SABINITE eliminates the mechanical effect generally associated with acoustical treatment, and can be perfectly adapted to any decorative plan. No ceiling pattern is imposed on the designer!

SABINITE is incombustible . . . because it is made of gypsum and other minerals which will not burn.

SABINITE is readily available, and can be applied by any competent plasterer.

Call for your U·S·G representative when working on an acoustical correction problem. He'll be glad to show you how SABINITE can help.

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United States Gypsum, CHICAGO 6

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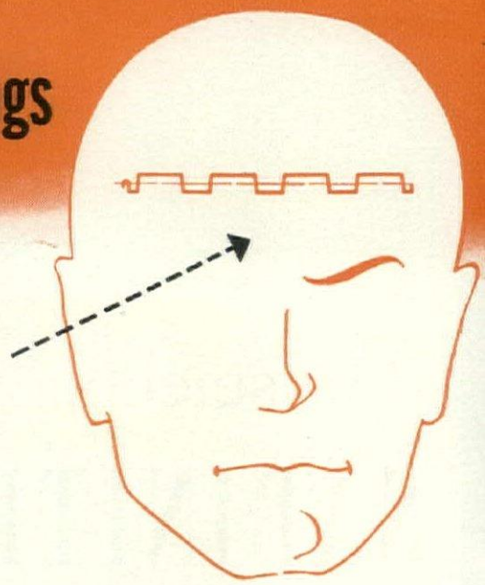
Gypsum • Lime • Steel • Insulation • Roofing • Paint

The shape of a modern

for thinkers of modern buildings



It is the shape of a Q-Unit. A Q-Unit uses metal, the material most characteristic of our times, to express today's ideas to greatest advantage. It is for you what the flying buttress and stone were to Gothic designers.

A Q-Unit engineered with insulation becomes Q-Panel, a building material for curtain walls. It uses steel framework to its full and logical advantages.

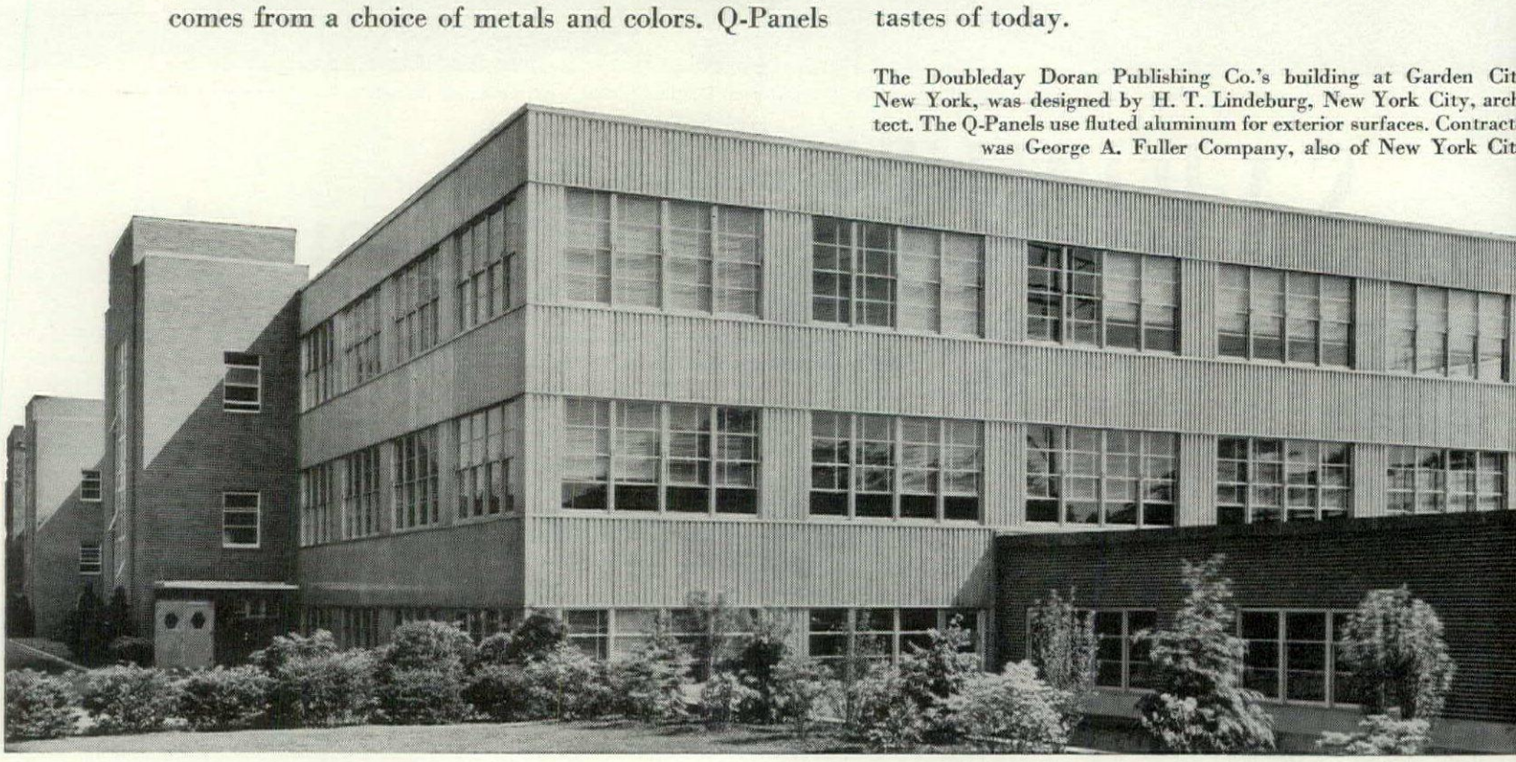
A Q-Unit engineered for electrical availability becomes a Q-Floor. It answers the demand in modern buildings for quick-change of electrical layouts.

Q-PANEL

A Robertson Q-Panel, simply defined, is two sheets of metal with insulation between. It is better defined as a wall unit available in two-foot modules, 3¼ inches thick, and having a better U-factor than a 12″ masonry wall. A wall of Q-Panel may have surface flat or fluted or alternate both. This opens new possibilities in exterior design. Further flexibility comes from a choice of metals and colors. Q-Panels may be metal-coated steel, aluminum, and stainles

Q-Panels are easy to design with, easy to wo with. They reduce the unpredictable elements field erection. A crew of only 12 men has erected area of wall totaling an acre, in just one week. The favorable weight-to-strength ratio and their maint nance-free beauty, are right for the economics a tastes of today.

The Doubleday Doran Publishing Co.'s building at Garden Cit New York, was designed by H. T. Lindeburg, New York City, arch tect. The Q-Panels use fluted aluminum for exterior surfaces. Contract was George A. Fuller Company, also of New York Cit

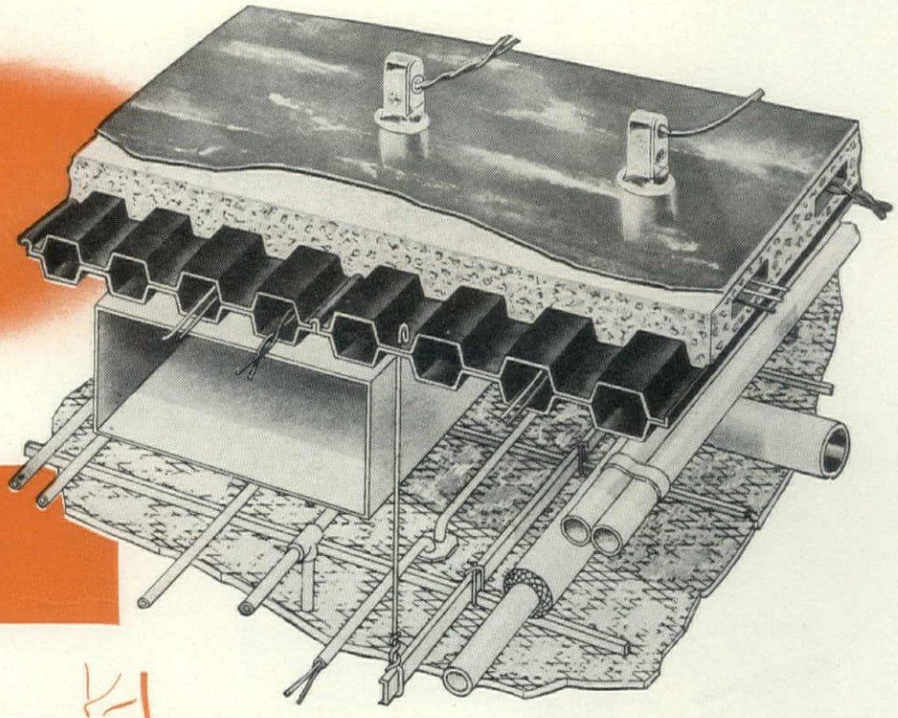


thought

Q-FLOOR

QUICK-IN

QUICK-CHANGE



Steel Q-Floor is shown here with suspended ceiling and a condensed presentation of mechanical equipment needed in a modern building.

Q-Floor is Q-Unit engineered as steel subfloor in answer to this belief: A genuinely modern uilding today must have electricity available at ny point over the entire floor on a few minutes' otice. The steel cells of Q-Floor are crossed over by eaders for carrying wires for every electrical service. An electrician can tap any six-inch area and nstall an outlet in a matter of minutes. This liminates need for planning outlets and par- tions before tenants move in. It eliminates the ness and delay in digging trenches for subsequent hanges. You may see Q-Floor Fittings at any General Electric construction materials distributor's.

Q-Floors, like Q-Panels, respond to the need of our times for speedy erection. They eliminate as much unpredictable field labor as possible. Q-Floors come pre-cut. Two men can lay 32 sq. ft. in 30 seconds. This reduces over-all construction time 20 to 30%. Furthermore, Q-Floors require no preset inserts. They weigh, including a suspended ceiling, less than forty pounds per square foot and enjoy a four-hour fire rating.

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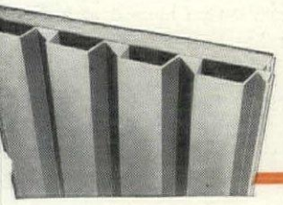

Close-up of Q-Panel

The significance of this book and its underlying goal cannot be overemphasized. Its publication was made possible by a grant from the Edward A. Filene Good Will Fund, Inc. It is made available to schools as a basic element in an education for democracy. In the foreword, John J. Mahoney makes clear the Committee's aim when he says: "Interested citizens will be wrestling with it (city planning) for years to come at which time boys and girls now in the schools will be part and parcel of our adult electorate. . . . It is a very practical task that does and will confront them. Its successful completion will affect in a marked degree their health, happiness and economic welfare." Amen, amen. M.S.

NORFOLK. By R. H. Mottram. Paul Elek, 38 Hatton Garden, London. 47 pp. Illus. 7 x 9. £9/6.

Although a number of this *Vision of England* series has been reviewed with only minor architectural justification, they are of a caliber that cannot be ignored. This last fully lives up to precedent. M.S.

THE ARCHITECTURE OF THE OLD SOUTH. By Henry Chandlee Forman. Harvard University Press, Cambridge, Mass. 184 pp. Illus. 10¼ x 7½. $10.

Though the title has about it something of cold toddies and Scarlett O'Hara, Mr. Forman's scholarly treatise deals with the old, old south as opposed to the old south. The period he examines (roughly from 1520 to 1702), represents an era when northern Virginia included what is now known as New England—the century preceding the founding of Jamestown.

The author's premise is that, "en bloc, American architecture of the Southern Colonies in the Sixteenth and Seventeenth Centuries belonged to the English medieval period, which, far from terminating with the accession of Elizabeth, continued until close to 1700." In substantiating and elaborating on this theme he has produced a major contribution to the annals of American history, covering a little known, little discussed phase in the history of our national architecture. Too many people visualize its origin as a scene of partially cleared land peppered with smoke signals and a generous sprinkling of exemplary salt boxes. But Mr. Forman takes us behind the "colonial" backdrop to a much neglected but no less picturesque time.

Perhaps because the medieval style exerted relatively little influence on succeeding structural expressions, it has been bypassed by so many historians. Even James Marston Fitch, in his exhaustive study, *American Building* (FORUM, Oct. '47), dismisses it with the brief statement that colonial architecture "was preceded . . . by almost a century of experimentation with, and adaption of, late medieval building theories along the eastern seaboard itself."

Mr. Forman's book occupies a rather unique place among the more recent and readable tomes on American architectural history, serves as an adjunct to most. He does a thorough job from both design and building angles and though the text, perforce, is dry at times, it contains many interesting sidelights. One of these is the refutation of the popular belief that southern kitchens were almost invariably built as separate structures because the slaves were housed at a distance from the main residence. Author Forman advances the theory that the original practice was strictly a hangover from medieval times—that "the cooking in the manors of England was done out of doors, or in rough shelters or, by the Fifteenth Century, in separate kitchen buildings with cavern-

(Continued on page 228)

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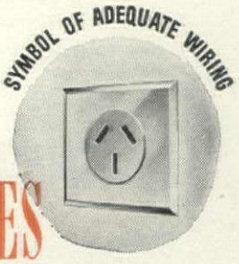
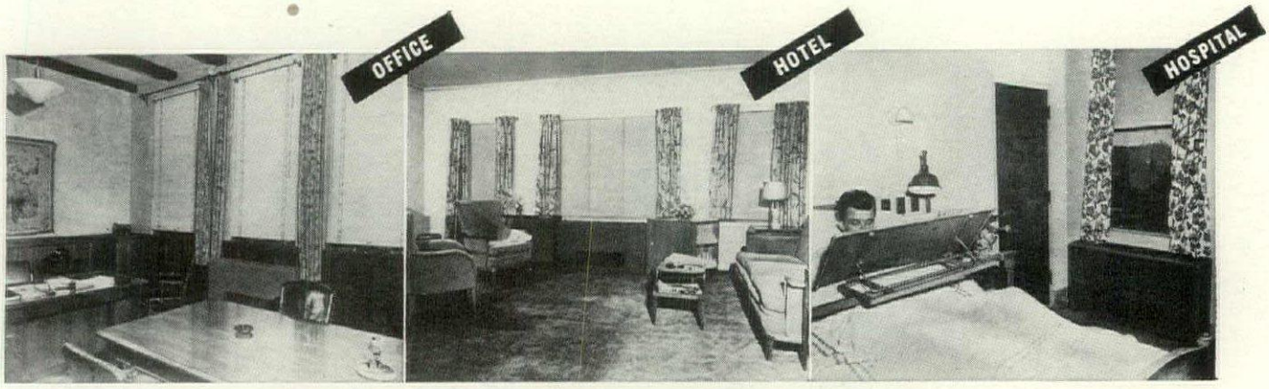


Another 1,000,000 American families switched to Electric Cooking last year



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AIR CONDITIONING

Revolutionary UNITRANE System Changes Entire Concept of Air Conditioning in Multi-room Buildings

OUT OF THE TRANE LABORATORIES COMES UNITRANE—A revolutionary development in true air conditioning. It performs functions hitherto thought impossible in systems of its kind.

It is a "unit" system—each room has its own compact, inconspicuous, under-the-window unit.

MOISTURE CONTROL—These room units automatically regulate *moisture* as well as *temperature.* They correct that clammy feeling that results from reducing temperature without a corresponding adjustment in moisture content of room air.

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Especially applicable to offices, hotels, hospitals, and apartments, UniTrane air conditioning may be used to advantage in any building where efficient temperature and moisture control of a multiplicity of comparatively small spaces is desired.

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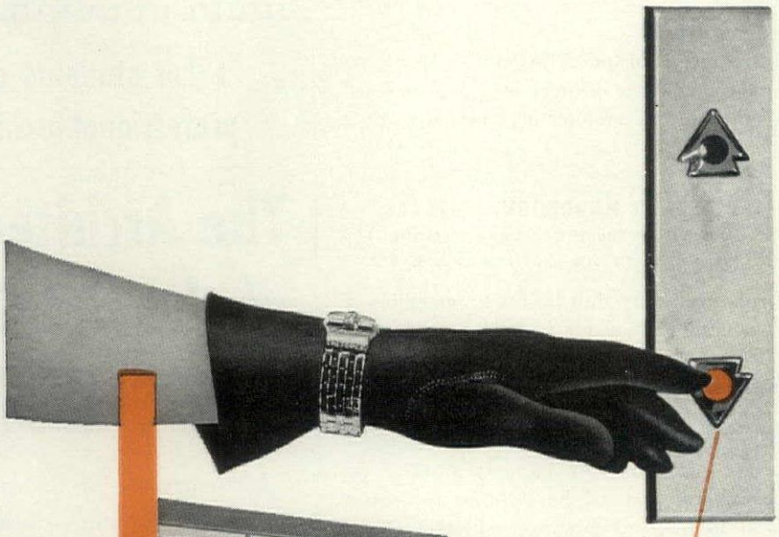

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TO SIGNAL CONTROL ELEVATORS

FOR THE PASSENGERS—it's a 'touch' of magic. It's the newest way to call an elevator. How? By simply *touching*, not pushing, a plastic arrow in the landing fixture. What happens? The electronic 'touch' button lights up. A soft-toned gong announces an approaching elevator as the overhead lantern lights up. The passenger steps toward the entrance, the doors open—and she's on her way. How's it done? With a magic brain—*the electronic panel in the control room*—as pictured below.

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ELEVATORS

AS ALWAYS, OTIS LEADS THE WAY . . . THIS TIME WITH THE MAGIC OF MODERN ELECTRONICS

ous fireplaces. Meals in the middle ages were usually carried across the kitchen courtyard."

This book's significance is historic. However, it should not be shelved simply for an absence of timeliness. It is an essential in the thorough study of architectural development in the U. S. M.S.

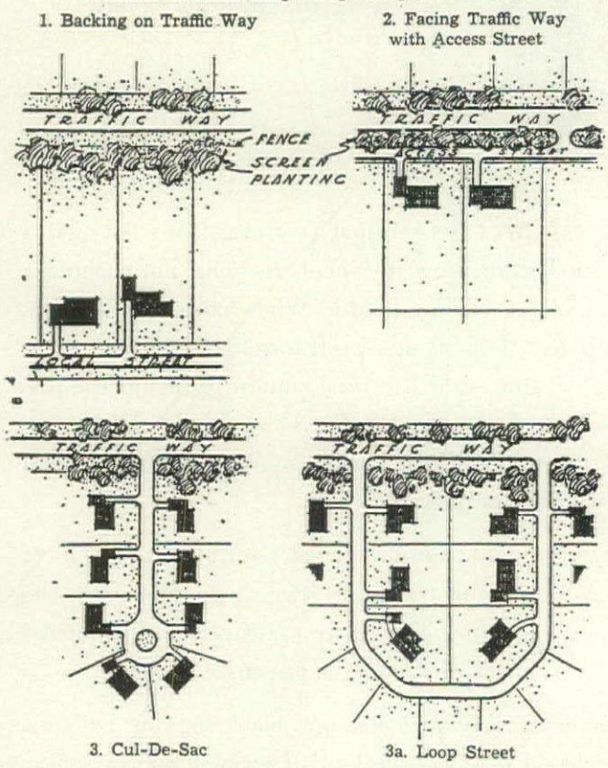
THE COMMUNITY BUILDERS HANDBOOK. Prepared by the Community Builders' Council of The Urban Land Institute, 1737 K St., N. W., Washington 6, D. C. 205 pp. Illus. 6 x 9. $12.

Handbooks as a rule are pretty dull business, something to dip into only when hard pressed for facts. This volume is different—it can be read straight through from cover to cover with genuine interest as well as professional benefit.

The reason for this refreshing quality is of course the subject matter itself. Planned neighborhoods and integrated shopping centers are still a novelty in most parts of the country; they have hardly passed beyond the pioneering stage. Standards are in flux, and there is considerable difference of opinion as to what constitutes good practice in community design. The *Handbook* is an attempt to resolve such conflicts and to present a unified set of recommendations for new land and neighborhood development.

Figure 12.

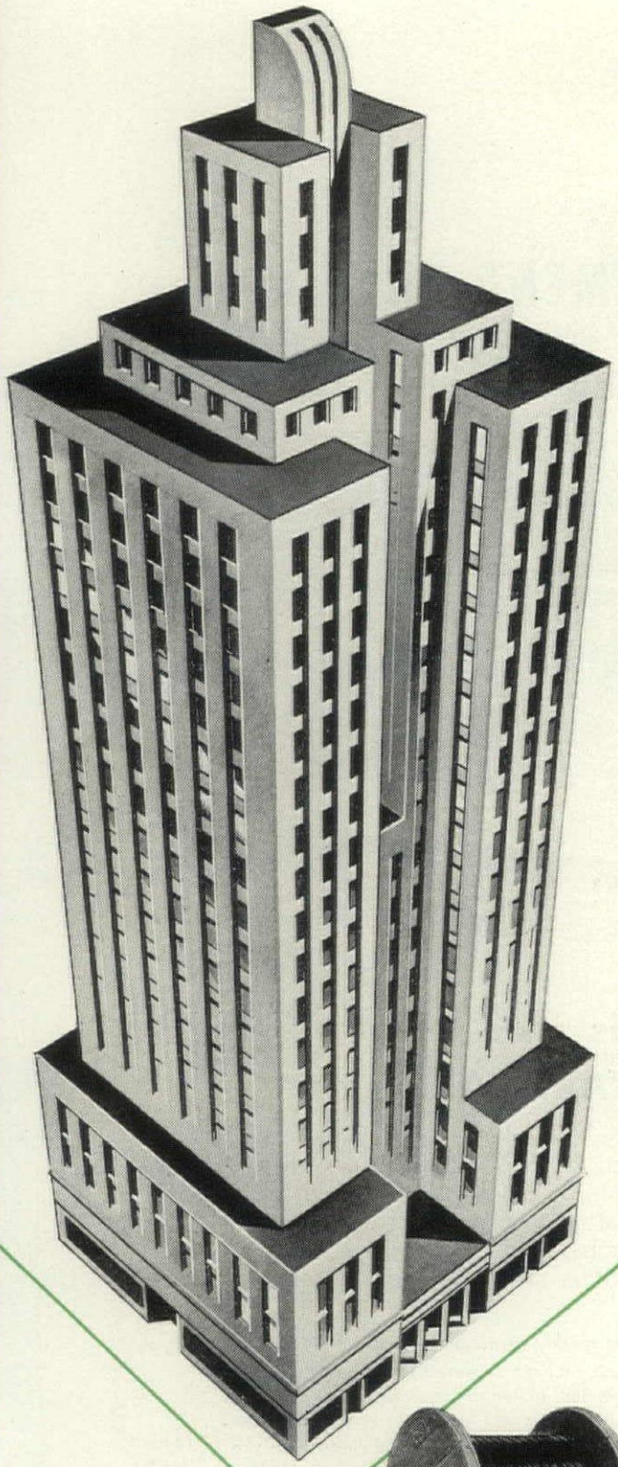
Methods of Subdividing Along Heavy Traffic Ways.



The 27 authors are all men with wide experience as community builders; they include such stalwarts as J. C. Nichols (Kansas City), Fritz Burns (Los Angeles), David Bohannon (San Mateo), Hugh Potter (Houston), Walter S. Schmidt (Cincinnati) and Waverly Taylor (Washington). Since 1944, when they were organized into ULI's Community Builders' Council as a special research group, they have been meeting regularly to compare notes and formulate agreements. This pooled know-how has here been assembled into a working guide by ULI's executive director, Seward H. Mott, and his competent staff.

Hard experience has taught the Council members what

(Continued on page 232)



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A. Use soldered joints, mechanical connectors, or welded terminals.

Soldered joints are easy with Alcoa Solder and Alcoa Flux. Solder flows evenly into the joint at normal soldering temperatures, tins easily, makes a sound termination. Noncorrosive Alcoa Flux need not be removed after soldering.

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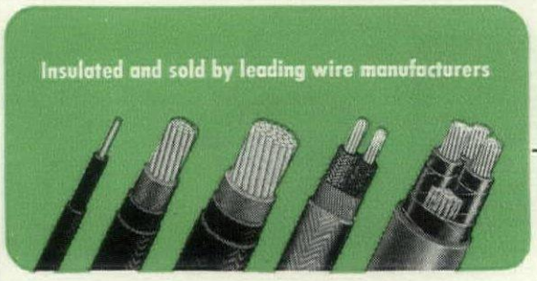
*E. C.: *Electrical Conductor* Aluminum

YOUR SUPPLIER HAS IT

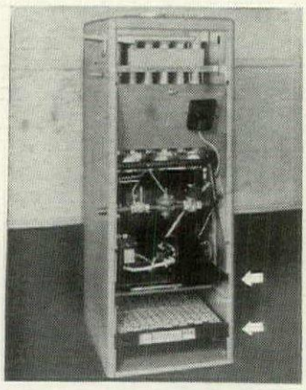


ALCOA EC ALUMINUM

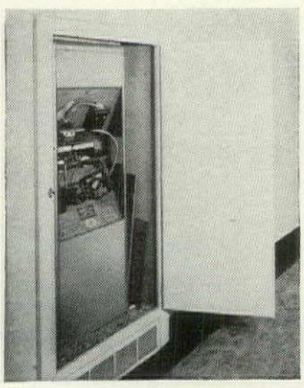
ALCOA ALUMINUM

FOR ELECTRIC WIRE AND CABLE

8 TENANTS IN THIS APARTMENT BUILDING



Panel removed from one of the six gas-fired "Janitrol FAC" Winter Air Conditioners, product of Surface Combustion Corporation, Toledo, Ohio. Arrows indicate location of DUST-STOP Air Filters.



Each unit is recessed in the hallway outside the apartment it serves.

. . . to each his own comfort in modern WARM-AIR heat

Each tenant in the Leamen Apartments, Columbus, Ohio, regulates the heat to his own comfort, pays his own heating bill—in fact, has his own winter air conditioner. He enjoys all of the comforts and economies which have made modern warm-air heat the preference of homeowners everywhere.

The advantages of modern warm-air heat apply to single or multiple dwellings of every type and size. With a winter air-conditioning system, the occupants have:

1. **WARM AIR,** with room temperatures quickly responding to automatic controls.
2. **CLEAN AIR.** Filtered at the heating unit, all heat delivered throughout the warm-air-duct system is free of nuisance dusts, lint, pollen and most air-borne bacteria. Housekeeping burdens are lighter because walls and furnishings stay clean longer.
3. **MECHANICALLY-CIRCULATED AIR** keeps warm air fresh and clean while providing the proper number of air changes per hour. (System can also be used to circulate air on hot summer nights.)
4. **HUMIDIFIED AIR** affords greater physical comfort at lower room temperature.

Architects, builders and contractors who specify and install modern warm-air heating and air-conditioning systems know that circulated air will be cleaned efficiently. For DUST-STOP* Air Filters are the choice of most manufacturers as original equipment. They're the homeowner's choice, too, for replacement DUST-STOP Air Filters are readily available at low cost through suppliers in every community . . . Product of Owens-Corning Fiberglas Corporation, Dept. 830, Toledo 1, Ohio.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario.

OWENS-CORNING
FIBERGLAS
T.M. REG. U.S. PAT. OFF.

MEMBER NATIONAL WARM AIR HEATING AND AIR CONDITIONING ASSOCIATION
INDOOR COMFORT

***DUST-STOP is the trade-mark of Owens-Corning Fiberglas Corporation for impingement type filters made of glass fibers.**

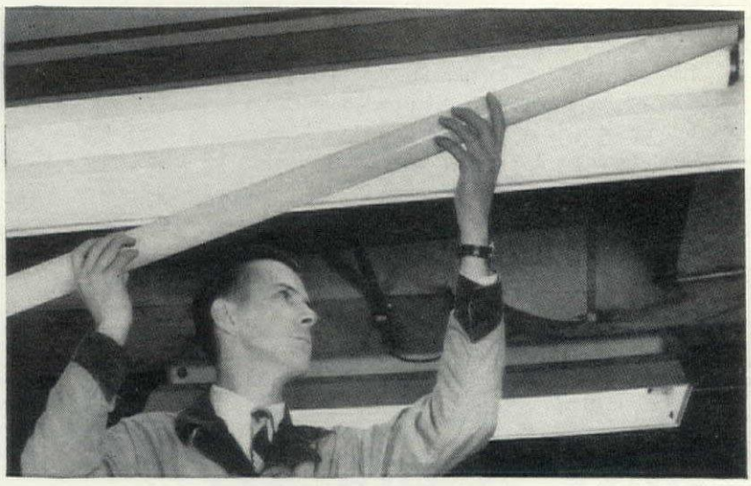
NOW!

Plenty of fluorescent lamps!

A new 85-watt fluorescent lamp!

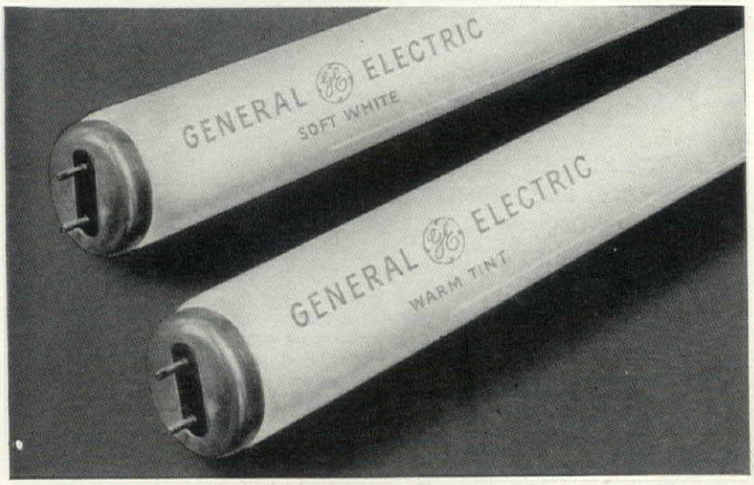
Two new fluorescent lamp colors!

...ALL FROM GE



1. GO AHEAD WITH MODERNIZING PLANS! With plenty of fluorescent lamps available, you can take full advantage of their high efficiency to raise lighting levels—give full scope to modern lighting design! For maximum light output and dependability specify General Electric fluorescent lamps for every job.

2. MORE LIGHT PER WATT! The new 85-watt G-E fluorescent lamp gives as much light as the 100-watt lamp it replaces, and is designed for use with existing 100-watt equipment. It uses rare gas, krypton, for greater efficiency. Here is another example of G-E lamp research that helps you specify improved lighting levels—at minimum cost!



3. FOR NEW FLUORESCENT LIGHTING EFFECTS, use these two new G-E fluorescent colors. The new G-E "soft white" provides subtle flattery for complexions, foods and surroundings, while the new G-E "warm tint" gives color values similar to incandescent light—adds the warmth required in many interiors.

TO MAKE THE MOST of these great new G-E fluorescent lamp developments, call your nearest General Electric Lamp office. G-E lighting engineers will cooperate with you in working out fluorescent lighting that will do the best job in home, factory, store, office, theater or any other building you may be planning.

Lamp Department of General Electric Company, Nela Park, Cleveland 12, Ohio.

G-E LAMPS

GENERAL ELECTRIC

not to do, and they are commendably frank in confessing mistakes and passing on the practical insight they have gained. Nichols, for instance, has found the ratio of 1 sq. ft. of off-street parking space for each square foot of store area, which he used in his Country Club Plaza development, to be inadequate. He is now at great cost buying back land previously sold in order to increase his parking area. (The *Handbook* recommends at least a two-to-one ratio.)

Certain matters stir the Council's emotions. Indiscriminate use of billboards is condemned as "ugly, unsightly and objectionable," and builders are urged to control the size, design, color and location of all signs on their own properties.

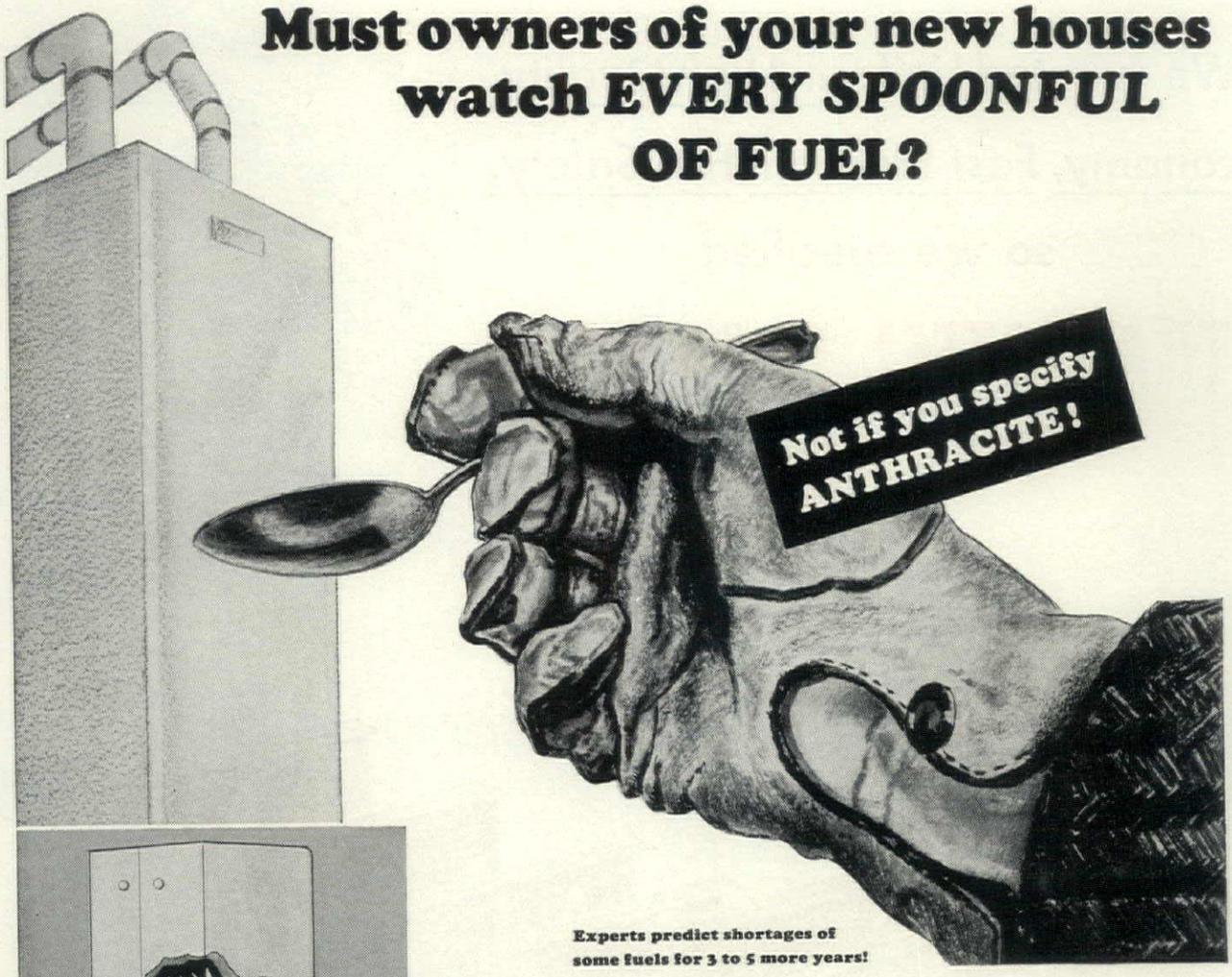
The so-called superblock plan, with its cul-de-sac service drives and a common interior park area, also gets a chilly reception. Loop street patterns with conventional lot layouts are preferred instead. The superblock is considered successful "only where the dwelling units are leased with central maintenance or where there is strong control such as in a company town." It is not recommended.

The Council eschews anything which has not stood the test of time, feels that the house is a family's largest life investment and therefore not the place for "irresponsible experimentation."

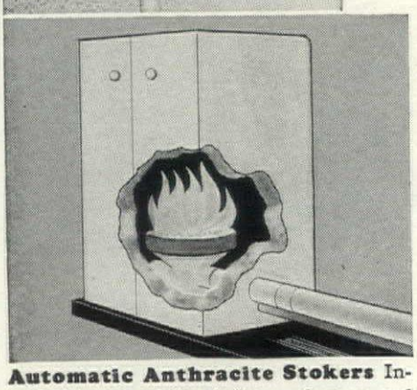
Although this attitude gives the volume its core of practical realism, it also indicates a fundamental shortcoming. The problem of community development goes beyond determining what is good in the things we have already created. New advances by science and industry open up new and better ways of doing things. Willy-nilly there must be experimentation if there is to be continued progress. The question is whether such experimentation should be left to

(Continued on page 236)

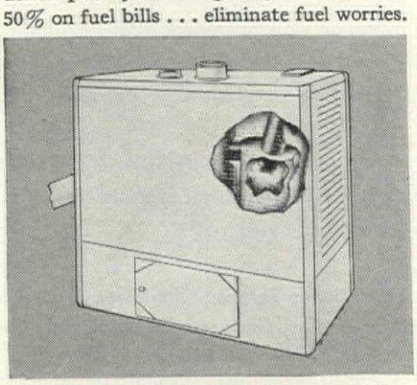
Must owners of your new houses watch *EVERY SPOONFUL* OF FUEL?



Experts predict shortages of some fuels for 3 to 5 more years!



Automatic Anthracite Stokers Installed in an existing boiler or furnace and in new houses, automatic hard coal stokers deliver *plenty* of heat quickly . . . save up to 50% on fuel bills . . . eliminate fuel worries.



The Revolutionary Anthratube The Anthratube saves on fuel bills . . . its proved efficiency is over 80%. This scientifically engineered boiler-burner unit, with "Whirling Heat" and other revolutionary features, produces quicker response and superior performance than units using other types of fuel.

There are No Ifs, Ands or Buts when you specify Automatic Anthracite Equipment

• Owners of your new houses *can* have *plenty* of worry-free heat because there's plenty of hard coal and there is anthracite equipment to fit the heating requirements of every dwelling.

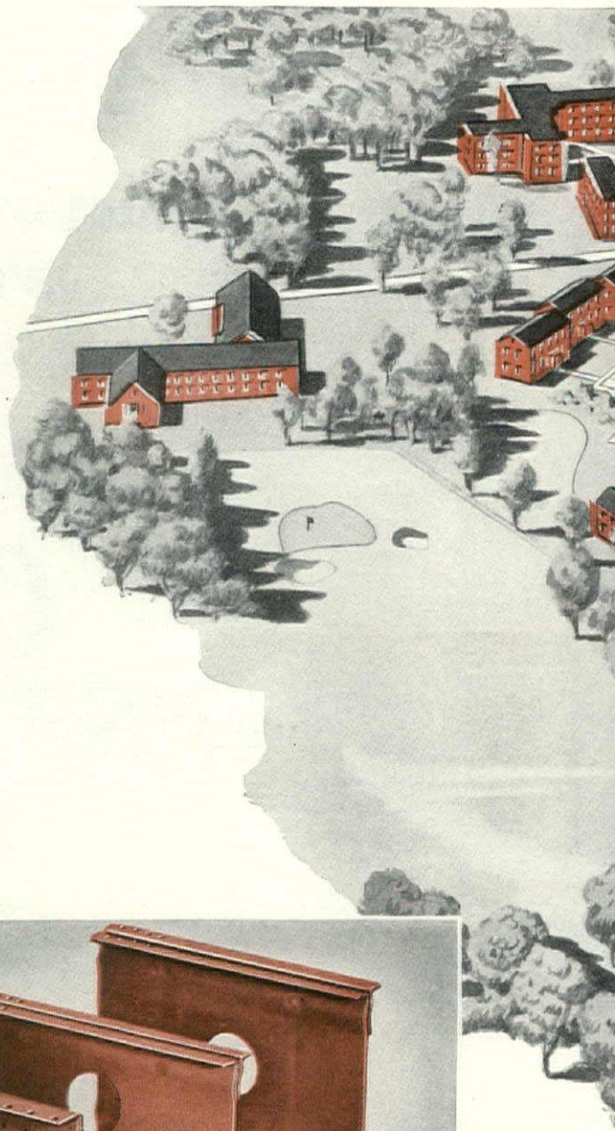
A whole winter's supply of anthracite can be stored easily in advance. Homeowners want this kind of security and convenience. They have *just that* when you specify automatic anthracite equipment.

Look over the two types of anthracite equipment shown here. They burn a cheaper size of hard coal . . . completely automatic from bin feed to ash removal. Then write to us for more detailed information.

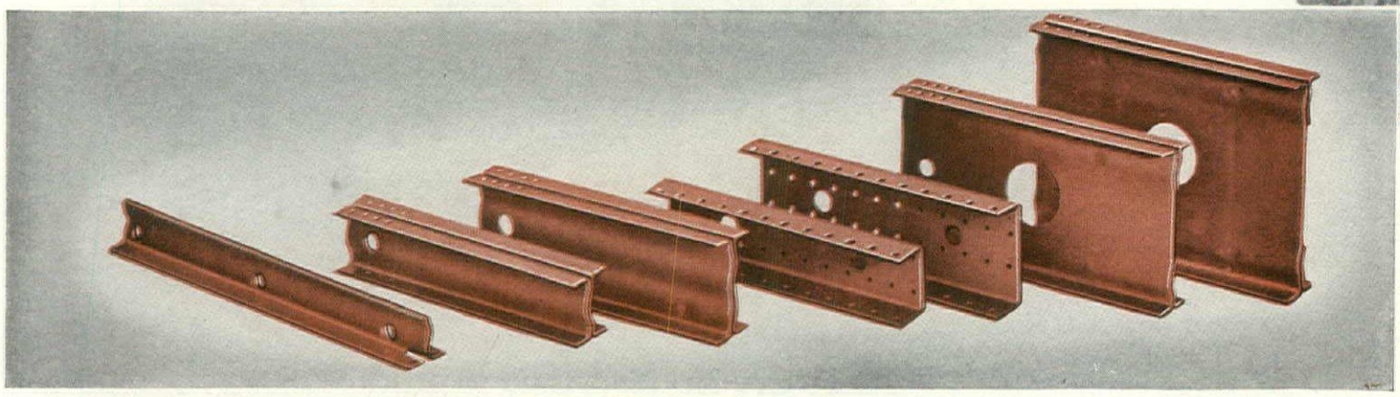
ANTHRACITE INSTITUTE

101 Park Avenue • New York 17, New York

"We wanted Uniform High Quality, Economy, Fast Erection, Fire Safety, so we specified STRAN-STEEL FRAMING"



Roberts Construction Corporation
Kent Village, Prince Georges County, Maryland



When the builder plans to retain ownership of a $14,000,000 housing project, he takes particular care to select only the finest materials for its construction. That's why the Roberts Construction Corporation, owners and contractors, and Berla and Abel, architects, specified Stran-Steel nailable framing throughout the first two of nine blocks of buildings in the Kent Village garden-type apartment project now being erected in Prince Georges County, Maryland, near Washington, D. C.

Financially and structurally, the Stran-Steel framing system satisfied most advantageously the requirements of these builders. They wanted—and got from Stran-Steel framing:

Economy of Framing Construction—Stran-Steel framing members correctly engineered to pre-determined quantities and sizes, are shipped to the job to fit exact requirements. This simplifies assembly and eliminates costly, time-consuming cutting on the job. It reduces delays in close-in time to a minimum. The quick completion possible with Stran-Steel nailable framing means early occupancy and consequent early returns on the owner's investment.

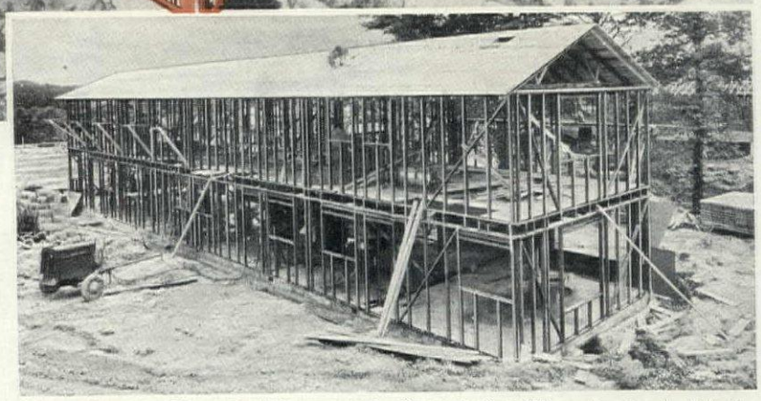
Economical Dry-Wall Construction—The patented nailing groove in Stran-Steel framing members permits plaster board to be nailed directly to the framing members, without any danger of subsequent wall movement from warping and shrinking. For when dry wall is applied to a precision-built steel frame, its permanence and stability through the years is assured.

Fire-Safety—The use of incombustible Stran-Steel framing members for floors, walls and roof greatly increases the fire-safety of the completed structure.

Stran-Steel Framing Supplies a Backbone of Steel for Apartments, Residences, Commercial and Industrial Buildings

Stran-Steel nailable framing has a definite place in the modern building picture. Its superiority has been soundly established in a wide variety of structural applications over a period of ten years. And today an increasing number of builders and architects everywhere are adopting the Stran-Steel framing system for quality buildings.

A portion of Kent Village project similar to first two blocks of buildings now under construction. Entire village, when completed, will have 1,600 family units.



Construction view of Stran-Steel framework for first unit, Kent Village Apartments. Roberts Construction Corporation, owner and contractor; Berla and Abel, architects.

For Stran-Steel framing offers advantages unequalled by any other framing material. It's strong. It's fire-safe, rot-proof, termite-proof. The permanently rigid Stran-Steel framework affords protection against plaster cracks, sagging doors, and other damage caused by warping and shrinking. And the enduring quality of a building framed with Stran-Steel members insures lower maintenance costs and greater salability over the years.

Stran-Steel framing is available today. It can help you to build better. It can help you to build faster. Where quality is a consideration, it can help you to build at less cost. So, why not let our engineers show you how satisfactorily Stran-Steel framing can be applied to the job on your drafting board? Ask your local Stran-Steel dealer for full details, or write for his name and address.

Any collateral material can be nailed directly to Stran-Steel framing members. The nail is automatically clinched as it is driven into the patented nailing groove. The holding power of this groove is much stronger than that of wood, yet nails can be easily removed with a claw hammer.

YOU NAIL TO STRAN STEEL FRAMING

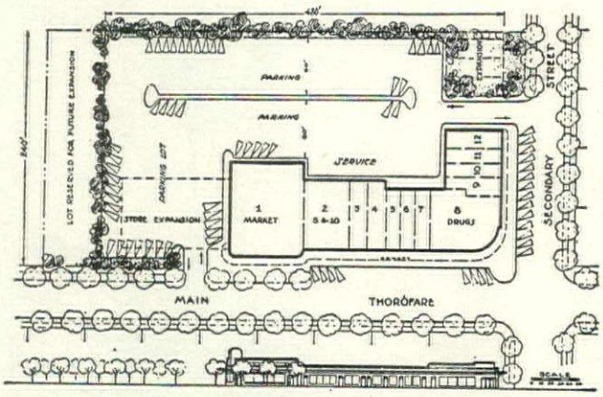
GREAT LAKES STEEL CORPORATION

Stran-Steel Division • Dept. 35 • Penobscot Building • Detroit 26, Michigan

UNIT OF NATIONAL STEEL CORPORATION

Figure 24.

Modern Type of Shopping Center for a Small Community of 500 to 700 Families



1. Market	8,000 sq. ft.	5. Beauty Shop	1,000 sq. ft.	9. Cl. & Dyer	650 sq. ft.
2. Variety	3,300 " "	6. Florist	1,000 " "	10. Radio	900 " "
3. Delicatessen	1,500 " "	7. Gift Shop	1,000 " "	11. Shoe Repair	600 " "
4. Ladies Wear	1,500 " "	8. Drugs	3,200 " "	12. Hardware	2,000 " "

the old trial-and-error method, which by the builders' own admission is likely to be costly and wasteful, or according to a planned program of research.

The Council, as the foreword explains, is continuing its field studies with a view to adding future supplements to the *Handbook*. It is to be hoped that the members will extend their range of interests to include a consideration of what might be done experimentally. The universities, with their rich resources for the study of family and community life, have much to contribute in this connection. A blending of the theoretical and practical points of view should be highly productive. C.T.L.

QUALITY

DEPENDABILITY

ECONOMY

1ST

PRESTIGE

PERFORMANCE

SATISFACTION

A. O. SMITH was the *first* to offer architects a completely satisfactory water heater that, without special attachments or accessories, CANNOT rust or corrode under any water condition.

Permaglas

TRADE MARK REG. U. S. PAT. OFF.

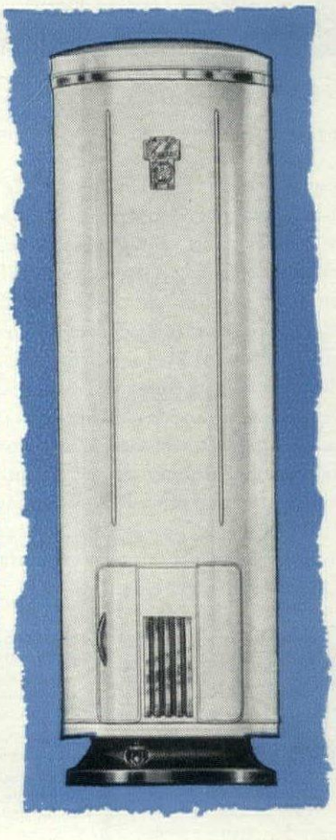
A SMITHway WATER HEATER*

IN THE NEW HOME, the automatic water heater is too often the first thing to fail. But not the *Permaglas* Water Heater! Its glass-fused-to-steel tank CANNOT rust or corrode. Dependably, a *Permaglas* Water Heater provides completely satisfactory hot-water convenience . . . ever free of tank rust and corrosion dirt.

To specify hot-water satisfaction, specify *"Permaglas"* first! The coupon will bring you complete specifications. Send it now!

"Permaglas" Dealers

Display This Emblem



A. O. SMITH CORP.
Dept. AF-1148
Water Heater Division
Kankakee, Illinois

Send us complete specifications on these SMITHway Water Heaters:

☐ Gas ☐ Electric ☐ Both

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International Division: Milwaukee 1 • *Licensee in Canada: John Inglis Co., Ltd.*

SEE OUR CATALOG IN SWEET'S

*Also quality zinc-lined *Duraclad* and *Milwaukee* Water Heaters

SPECIFICATION AN

The advertising pages of FORUM *are the recognized market place for those engaged in building. A house or any building could be built completely of products advertised in* THE FORUM. *While it is not possible to certify building products, it is possible to open these pages only to those manufacturers whose reputation merits confidence. This* THE FORUM *does.*

UYING INDEX

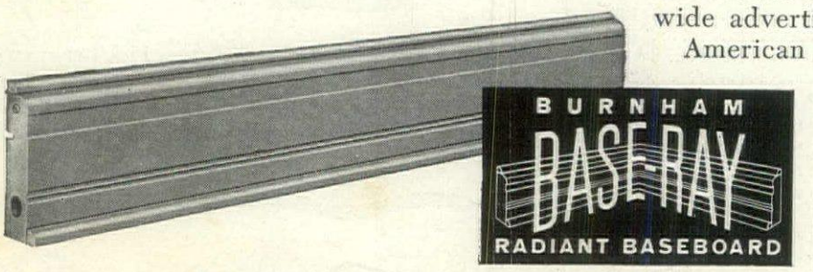
Bill Smith, heating contractor, has his own way of proving

BASE-RAY RADIANT HEATING IS *DRAFT-FREE*

BASE-RAY* Radiant Baseboards, because of their unique construction and placement, provide a room-long source of clean *even* radiant heat. There are no cold spots or hot spots. No drafts. No objectionable air currents. In fact, BASE-RAY heating is so *uniform* the floor-to-ceiling temperature differential, even in zero weather, is less than 3 degrees.

And that's but one of many points of superiority you can claim for this *modern* heating method. Radiant Baseboards, because they replace the customary wooden baseboard, are practically "invisible" when painted to match walls or trim. And because they are only 7" high and 1¾" thick, Mrs. Home Owner can place her furniture and drapes precisely where she wishes without giving a thought to her heating units.

Burnham's Radiant Baseboards are an established product—proven through thousands of successful installations. Millions of people have already learned about this new and better way to heat their homes thanks to Burnham's consistent nation wide advertising in Better Homes & Gardens, American Home, House Beautiful, House & Garden and Small Homes Guide.



*Reg. U. S. Pat. Off.

Mail coupon below for Booklet which gives ratings and installation data on BASE-RAY Radiant Baseboards.

NOW! Increased Base-Ray production reduces delivery time.

Burnham Corporation

"PIONEERS OF RADIANT BASEBOARD HEATING"

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I·B·R — Institute of Boiler and Radiator Manufacturers — Member

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Please send me copy of "Ratings and Installation Guide" on BASE-RAY Radiant Baseboards.

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

The Sylenta

Regular Rim—B-5120
Elongated Rim—B-5130

Quality Features . . . that Cultivate Customers

The Eljer Sylenta Closet Combination combines quality features that every homeowner would prefer to have.

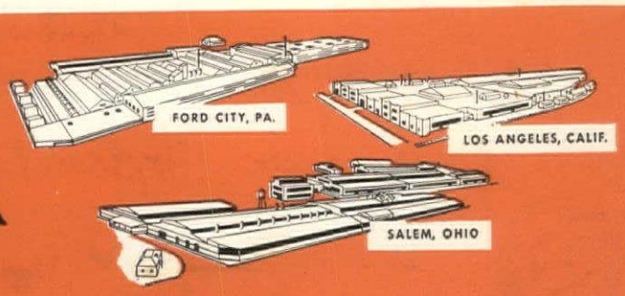
This vitreous china combination is easy to keep spotlessly clean because the hard, glass-like finish resists stains and is impervious to all ordinary acids.

Other features are: syphonic jet-action bowl with "Elvortex" whirlpool jet; overflow and ground-in valve seat of *china*—a part of the tank itself . . . eliminating the need for thin metal parts that are vulnerable to the corrosive action of water; ball cock, adjustable to variations in water pressure . . . means longer service.

The Eljer Line is complete . . . to meet the requirements of every purse and purpose. See your Eljer Distributor for fine plumbing fixtures, in Vitreous China and Enameled Cast Iron . . . available in white or popular pastel colors, or write Eljer Co., General Offices, Ford City, Pennsylvania.

It pays you, it pays us— because we specialize in Plumbing Fixtures and Brass

ELJER



Enduring strength and service!

● Structural strength and mechanical perfection built into The "OVERHEAD DOOR" with the Miracle Wedge insure its long life and faultless operation. The trim, handsome wood construction is light, but stronger than steel of the same weight. The Miracle Wedge allows the door to roll freely upward and out of the way, or to descend easily to a weathertight closure. Any "OVERHEAD DOOR" may be manually or electrically operated. Long lasting construction and instant, dependable performance make this door invaluable in commercial, residential, and industrial structures.

TRACKS AND HARDWARE OF SALT SPRAY STEEL

THE "OVERHEAD DOOR"
TRADE MARK
WITH THE
MIRACLE WEDGE

NATION-WIDE SALES INSTALLATION SERVICE

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