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“The Kelvinator Kitchen gives my $8,300 home that $15,000 look.”
RODNEY M. LOCKWOOD

“I’ve just never seen anything to equal that Opening Day. The way on-the-spot purchases mounted was absolutely unique and inspiring.”
JOHN WEINHART

“Over 22,000 people visited our demonstration home in the first week—special interest was shown in the Kelvinator Kitchen. It has great appeal and is very impressive.”
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BUILDING SETS RECORD PACE—housing boom continues, but with caution

Despite the coal crisis, the H-bomb, an unpredictable Congress and the threat of rising unemployment, building boomed on, pointing straight for another peak year. January's whopping $1.5 billion worth of work put in place (16 per cent over last year) set a record for the month. February was almost as good, $1.4 billion. With public construction for the first two months up 24 per cent and private institutional building up 124 per cent, the Associated General Contractors hazarded the guess that 1950 might prove to be an even better building year than 1949. Home-builders, however, were not too sure. Even though housing led the boom ($650 million volume, comprising nearly 60 per cent of all private building), it was almost triple the $970 million for the month. February was almost as good, $1.4 billion. With public construction for the month, $1.5 billion worth of work put in place (16 per cent over last year) set a record. Optimistic reports were piling in:

**Atlanta:** Building of high-priced homes continues. Several architects are planning houses costing from $40,000 up.

**Chicago:** Off to a flying start. January permits for 2,531 housing units valued at $21.3 million were almost triple the 970 units ($7.8 million) for January last year. Optimistic reports were piling in:

**Cleveland:** Realtors are enjoying the busiest winter they can remember. The usual winter slow-down in used-house sales has only touched dealers in homes above $20,000.

**Detroit:** Still not caught up with the heavy postwar demand. Most builders are sold out far ahead of construction crews. All big builders have 500-1,000 unit projects ready to go (at $8,000-$12,000) and even this production will not satisfy the market.

**Denver:** Boom continues to be a rip-snorting affair. January's permits were $4 million, double last January's $2 million. Outlook is for continued heavy residential building.

**Los Angeles:** Houses being built and sold like hot cakes. Biltmore homes have five projects totaling more than 5,000 houses and $15 million underway or planned for 1950. At Lakewood Park, near Longbeach, Biltmore and Aetna Life are putting $8.8 million into land for a 3,375 acre development. First unit will be 2,100 homes representing a total investment of $21 million.

**San Francisco:** Building permits jumped 138 per cent over January last year. New tracts and subdivisions continue to spring up. "You show them a $7,500-$8,500 house and they ask if you have anything better."

Hands full with business. Good weather, easy credit—and a buying surge based on the growing belief that today's house might be worth more than tomorrow's— all helped ring up early 1950's phenomenal housing led the boom ($650 million volume, comprising nearly 60 per cent of all private building). Outgo to a flying start. January permits were $40,000,000, double last January's $2 million.

Heads filled with worries. Could the boom go on through 1950? Not all the news was good. Some signs prompted caution. In San Francisco Builder Bohannon had to cut the initial rental level on some of his new garden apartments (at one time, it was reported, he had a 36 per cent vacancy). In Baltimore, apartments were such a glut on the market that one edge-of-the-city developer offered free station wagon shuttle service to the nearest department store as an inducement to prospective tenants.

The market was getting tougher. Home-builders had the know-how, but they looked anxiously at other requisites: 1) land, 2) labor, 3) capital.

In San Francisco land costs were at an all-time high. In Detroit, which expanded so rapidly during the war, most new lots were on "raw" land, so builders would have to supply improvements whose costs would have to be passed on to purchasers. New ordinances plagued builders, too. Detroit set a new 42-ft. minimum on lots and nearby Dearborn pegged its minimum at 50 ft. Result: builders would get less lots per acre, would be forced to hike prices.

**WASHINGTON**

**LAPSE IN FHA beclouds Spring building as Congress extends co-op hearings**

With FHA's Title I insurance funds expiring March 1, and Title II funds headed for depletion a week later, home builders hesitated as they looked ahead to Spring.

Title I loans (for modernization and repair) had been running at a rate of $50 million a month, and under Title II, FHA was handling some 25 per cent of all one to four-family houses being built. Without prompt action by the Congress, building's Spring blossom might be nipped in the bud.

Crux of the delay was Congress' willingness to wrap FHA extensions in one package with the administration's latest housing scheme—federally-financed aid to non-profit cooperatives.

By insisting on passage of all housing legislation in one bill, the administration, it appeared, was using the carrot and the stick. The carrot was $500 million in modernization loans under Title I and $2.7 billion in small home mortgage insurance under Title II. The stick was the $2 billion plus co-op housing plan, which had been as roundly damned by home-builders, realtors and business groups as it had been praised by public housers, veterans and Big Labor.

Pressure against the controversial co-op provision would cease, its advocates hoped.
The Effect of a Blast Wave Striking a Structure

Air Shock Wave which follows a blast has three different phases: 1) abrupt rise in pressure, which takes place immediately; 2) gradually decreasing pressure, lasting for about a second; 3) suction phase characterized by a decrease below normal atmospheric pressure which lasts for several seconds.

Damage Range: 2 mile radius (outer circle) superimposed on air photo of New Haven, Conn. (pop: 350,000) shows area which would be severely damaged in atomic bombing. Damage within one mile radius (inner circle) would be particularly severe. For details, see table, right.

Atomic Bombing would bring severe structure damage in 2 mile radius

Ever since Hiroshima, scientists have chronicled the effects of atomic blast on human beings. Last month, the Atomic Energy Commission gave the first official indication of the effects of such a blast on building. From its studies of Hiroshima and Nagasaki construction, AEC deduced that the qualities which permit a building to withstand normal bombing and earthquakes (shape, strength, number of openings which can relieve pressure) also apply roughly to the outward and inward pressures (see illustration, left) which follow a blast of a "nominal atomic bomb releasing energy equivalent to about 20,000 tons of T.N.T." Drawing on the Japanese experience, AEC thought a few generalizations could be applied to the atomic resistance ability of U.S. buildings; multistory reinforced concrete buildings which "generally suffered remarkably little damage" in Japan, because they had been designed to resist earthquakes, would be "generally less resistant" in the U.S., where they are designed to withstand wind load only; tall buildings having "heavy steel frames and a long period of vibration" should "withstand the effect of blast very well"; blast damage area to wood frame houses probably "would not exceed 7,500 ft."

Overlaying AEC's table of destruction (below) on New Haven, Conn. (lower, left) gives a rough idea of the structural damage a "nominal" atomic bomb would bring if dropped on the heart of a typical U.S. city.

Radius of 1 mile (inner circle): from point of detonation:
1,000-2,000 ft. — Decks of steel plate girder bridge shift laterally. Mass distortion of heavy steel frame buildings; loss of roofs and panels.
2,000-3,000 ft. — Collapse of reinforced concrete building (10 in. walls, 6 ft. floor). Limit of severe structural damage to earthquake-resistant reinforced concrete buildings. Virtually complete destruction of all buildings, other than reinforced concrete aseismic design.
3,000-4,000 ft. — 18 in. brick walls completely destroyed. Reinforced concrete smoke stack with 8 in. walls overturned.

Radius of 2 miles (outer circle):
5,000-6,000 ft. — Complete destruction of multistory brick building. Destruction of electrical installations and trolley cars. Severe structural damage to steel frame building. Brick walls (9 in.) moderately cracked. Severe damage to entire area.
6,000-7,000 ft. — Roof tiles melted by heat. Structural damage to multistory brick buildings.
7,000-8,000 ft. — Severe damage to homes, heavy damage to window frames and doors, foliage scorched by radiant heat.
8,000-9,000 ft. — Moderate damage to area. Heavy plaster damage.
9,000-12,000 ft. — Blast damage to majority of homes. Severe fire damage possible. Flash ignition of dry combustible materials. Partial damage to structures in area.

Beyond 2 miles — Up to 12,000 ft., AEC recorded: Damage of roof and wall covering on steel frame building, light damage to window frames and doors, moderate plaster damage, complete window damage.

Limit of Light Damage: 8 miles.
as soon as the private building industry realized what it stood to lose without a functioning Title I and II. Said Senator Sparkman: "There is no need of having a lapse of FHA, especially when the people who are most anxious about keeping FHA going are themselves mainly responsible for holding up the overall bill."

The real delay. The people who were "most anxious about keeping FHA going" were, presumably, the home-builders, realtors and mortgage bankers. To credit them with "holding up the bill" seemed slightly fantastic in view of their failure to sway Congress to their way of thinking on public housing or rent control.

The real delay, thought builders, might better be attributed to the serious doubts held by members of the House and Senate Banking committees.

The House Committee—first by a vote of 11-4 and then by a second vote of 13-9—had voted out the bill pretty much as the lapse of FHA, especially when the people as soon as the private building industry enthusiasts would have to look for action. On the House floor looked doubtful, since of setting it up directly under Administration creation of a constituent agency of co-op housing lobby had wanted it. includ­ed Congress to their way of thinking on public housing a loss of 830 million, started foreclosure on the whole idea of a new government cor­poration and the low interest debentures of the co-op corporation which holder would have them replaced by debentures of the co-op corporation which would be fully guaranteed both as to interest and principle.

Strange gimmick. Strangest of all "anti-inflation" devices to which the Committee resorted was the replacement of government-guaranteed debentures with bonds not guaranteed by the government. But there was a catch. In the event there should be a default on any of the bonds thus issued, the holder would have them replaced by new debentures of the co-op corporation which would be fully guaranteed both as to interest and principle.

This queer financial gimmick, admitted Senator Sparkman, might result in co-op housing paying a slightly higher interest rate than originally planned, perhaps as high as 3 1/4 per cent.

The Maybank-Sparkman version passed with no one asking why the measure would not be just as inflationary with the govern­ment guaranteeing the bonds in the second instance.

The Senate bill—which still provided for direct loans to veterans at 4 per cent—and elimination of the combination FHA-VA loan (see page 13)—might, conceivably, pass. But with the House Rules committee blocking passage in the lower chamber, home-building might enter the spring season without benefit of Titles I and II. Senator Maybank saw no need for temporary extension: if builders felt they were going to be hurt by a brief lapse, they should stop trying to delay the whole bill. The administration continued to rely upon the carrot and the stick.

LUSTRON FORECLOSURE leaves RFC seeking exit from $30 million loss

Last month the government wrote finis to its biggest and costlier venture yet into the field of private housing construction. RFC, after weeks of hesitation and saddled with a loss of $30 million, started foreclosure proceedings against Lustron Corp.

At one time, Lustron's steel prefab had seemed to the government a bright promise to the country's housing problem—bright enough to be polished up with $37.5 million worth of loans. RFC's disillusion was slow in coming. But two months ago, with Lustron still 11 units a day behind break­even schedule and still hungry for federal funds, RFC suggested a reorganization, was angered by Lustron's feeble reorganizing attempts. As it announced foreclosure, RFC sadly insisted it had never wanted to wash up the whole Lustron experiment, but was left no other course by Lustron's "uncooperative" attitude.

At month's end, the government was groping for a way to get out with more than the $7 million it could recover in a forced sale of equipment and machinery. It might, according to one widely circu­lated rumor, sell out to Republic Steel. That story was promptly scotched. Then another rumor started making the rounds of Washington: Fruehauf Trailer of De­troit was interested, might take Lustron over. The House Banking Committee had another suggestion: it thought the govern­ment might be able to build houses for the armed forces.

MILITARY HOUSING may get built through revised Wherry Bill

Military housing was getting the congres­sional eye elsewhere. The Wherry Bill to provide privately built rental housing for military personnel (by granting 90 per cent FHA insurance on military reservations) had been a flop right from the beginning. Builders had two main complaints: they could not stretch their equities with write­ups of land costs (since the land was leased from the military), and the military authorities tried to hold rents down to what builders considered unreasonable levels. In the six months of the Wherry Bill's operation, FHA had issued commitments for little more than 3,000 units. So last month the Senate authorized (as part of a $500 million bill to construct military installa­tions) the federal construction of 7,500 houses, on military land, at an aver­age $14,750 each (shaved from a proposed $16,500 by Sen. Paul Douglas), and a limita­tion of 1,080 sq. ft. per unit.

The Department of Defense was report­edly nursing a proposal which would permit builders to build and operate rental projects on military land, without FHA mortgage insurance, but with the armed service involved making up the difference between actual rent collections and the amount required to run the project at a reasonable profit.

DESIGN

LIFE TERMER plans houses

Carl Watson, 41-year-old life termer at the Iowa State Penitentiary in Fort Madison, started reading Forum in 1943. With talent, and plenty of time for study, he took up architectural drawing, made his first com­plete drawing a year later. Two of his houses have been built and a third is under construction.
STATE FIRE CODE readied by Illinois

Spurred by the disastrous St. Anthony’s hospital holocaust which claimed 75 lives at Effingham last April, Illinois’ Fire Marshall, Pat Kelly, has drafted a fire code which, if adopted in April, will make Illinois the third state having a fire code.

Kelly’s code calls for fire walls to provide refuge areas on each floor of large hospitals. Fire detection, alarm and control apparatus would be required in multiple-story buildings. Stairways and open shafts in present structures would have to be enclosed within three years.

The state code is more liberal than the Chicago code in flame spread ratings for interior finishes and in use of drywall for small homes. It would not replace, but would supplement local codes.

MARKET

INDUSTRIAL BUILDING perks up. It may mean nothing, it could mean everything

Little noticed in all the hullabaloo about January’s housing starts, private industrial building rose slightly (up to $69 million from December’s $63 million, up to $70 million in February). True, the increase was hardly more than one per cent, but the interesting fact about it was this: it was the first consecutive two-month upturn in four years (since the beginning of the big post-war industrial building boom).

The figures bore out what local reports had been hinting. In Chicago, during January, for example, more than $22 million went into plant construction, more than three times last year’s total and a record for the month.

For many months most business prophets had been predicting a further drop in plant construction this year (the Department of Commerce guessed it would fall 26 per cent). It was too early to revise their estimates, but the turning trend, and reports of new plants scheduled to come, foreshadowed a possible lessening of productivity.

Why was the possibility important? Home-building could contribute mightily to prosperous times, but it could not, very long, sustain the basic U. S. economy. For homes, though they are capital assets, do not produce new capital. Factories do. And it is new capital that keeps a nation strong.

ECONOMY

SEEKING SECURITY, we may lose it—say economists

Stern warnings went out to the nation last month. Dr. Edwin G. Nourse prophesied that a “pie in the sky” philosophy would lead to “strain and possible breakdown” of the U. S. economy by 1951.

Dr. John Clark, one of the two remaining Members of the President’s Council of Economic Advisers, glumly warned that the coal strike could upset the Council’s recent forecast for good business in 1950.

Director of the U. S. Department of Labor’s Bureau of Apprenticeship, W. F. Patterson, had the gloomiest prediction of all. Said he: “The skilled labor supply of this nation is not being replenished at a rate fast enough to meet the demands of industry.”

Labor’s love lost? Would there be a shortage of labor in the building industry? No, said the statistics. In the first four months of last year, when building was in a slump, construction employment ran above the same months in 1948. After May of ’49, as building began to boom, construction employment fell below the levels of 1948. By the end of last year employment in the building trades was 65,000 below 1948 yet building volume was considerably higher. This looked like proof of greater productivity.

It was, and builders, in some areas, were still lavish in praise of labor. In Atlanta, they said, bricklayers are now doing better than 800 a day compared to 400-500 during the war. But in most cities builders were worried.

St. Louis carpenters had just wrangled a vacation allowance giving them 52 weeks of pay (at 1949’s rate of $2.20) for 50 weeks of work in 1950. In San Francisco, Milton Morris, Executive vice president of the Associated Home Builders, said that increases in wages about canceled increases in productivity. In Detroit labor is expected to ask for another 10 cent hourly boost this month and bricklayers were rumored demanding 12 cents.

January’s extraordinary building volume dropped, seasonally, 7 per cent below December, but construction employment fell less than 5 per cent. Because of inconsistencies in coverage the data are not conclusive. But they are indicative, they point to a possible lessening of productivity.

Builders feared that strong labor demand forced by the private housing boom, and intensified by the pressure of public housing and public works construction, may soak up enough workers to reduce the feeling of competition, make workers slow up, reduce their efficiency and increase labor costs even more. This would put the heat on small builders.

In Detroit, the builders’ association reported a high casualty rate among small builders even at this early stage. With labor’s spring demands, it appeared that only large scale builders could meet the higher costs, that many small builders would be forced out of business.

HIGHER PRICES result from booming demand, lessened supply

Last month rising prices impelled one Pittsburgh builder to raise the tag on his houses by $100. In Detroit another builder raised his $200.

Builders could blame the weather and the government for most of the rise in the cost of materials. Freezing cold in the Northwest stymied lumber output precisely when mild weather in the rest of the country brought greater demand. By early February West Coast Douglas fir 8 ft. 2 x 4’s had risen from December’s $45 per thousand to $53. At month’s end they were $62.

Prices of Southern pine rose too, by $3 to $5 per thousand, largely because of the new law raising minimum wages to 75 cents an hour. Even at the new prices many southern mills found it wouldn’t pay to produce. One southern lumber company reported that 22 mills had closed down in Alabama alone.

The pressure on lumber prices was shown in the mid-February report of 417 mills to the National Lumber Trade Barometer, quoting shipments at some 20 per cent above output and orders exceeding production by almost 50 per cent.

Among the metals, steel prices alone seemed likely to rise, the result of stoppages caused by the coal strike. Copper, lead and zinc were unchanged from last month. Tin—on which the RFC had lost $18.5 million—was down another half cent to 74½.

Engineering News-Record’s building cost index crept up another quarter of a point to 356.48, (against a 1926 index base of 192.70) nearing the all-time high of 357.07 reached in October, 1948.

12 Architectural FORUM March 1950
HOME FINANCE FOR THE VETERAN approaches dangerous crossroads as Congress considers changing FHA and VA programs. Industry leaders plump for combined FHA-VA mortgage to maintain volume of house building

If Congress gives the axe to the combination FHA-VA loan—Section 505(a) of the Servicemen's Readjustment Act of 1944—-as the Sparkman Act proposes, and if some other workable substitute is not adopted, almost 50 per cent of all the houses planned for U. S. veterans during 1950 will not be built. In other words, the veteran market group which accounts for 20 per cent of the total new house market will be sliced in half. Moreover, this 505(a) half includes most of the better veterans' housing, that built for $10,000 and over.

The congressmen who wish to eliminate 505(a) maintain these houses will be built. They take the private housebuilding industry's word for it that they cannot be built under the straight VA program (Section 501) as it now stands, but they think the job could be done under a liberalized 501. Last month, as the axe hovered in congressional hands, there were four liberalizing plans abrewing. The industry examined them carefully:

1. Permission for VA to guarantee 60 per cent (instead of the present 50 per cent) of a veteran's mortgage, up to a maximum of $7,500 (instead of the present $4,000). The lenders would welcome the greater guarantee. (Since VA's guarantee, unlike FHA's insurance, applies to the top part of a loan, lenders would, in effect, be assured total protection on a $12,500 home loan.) But there was one great objection: builders would still be unable to get a free flow of construction money. Construction money is readily granted only when FHA makes a commitment, for FHA's commitment is firm—it will back up its mortgage insurance as soon as the house is built. VA will back up its guarantee only when a buyer for the property is found; banks are notoriously reluctant to grant a builder construction money under this operation without first receiving a premium for their troubles. To get construction loans on houses financed under Section 501, builders in some parts of the country—-notably the West Coast—were last month paying premiums as high as six points. The $300 a builder would thus have to pay to get a $5,000 loan is, of course, passed on to the customer.

2. Permission for FHA to make commitments, at a charge, on houses financed through VA. This would open the way to construction loans, but the $75 commitment charge FHA said it would have to make would impose a sizeable burden on any builder contemplating large-scale operations.

3. Permission for VA to issue firm commitments. Some industry groups looked with favor on this proposal. It would, as Thomas P. Coogan, first vice president of the National Association of Home Builders, pointed out, "reduce the conflict between FHA commitment and VA financing". But its one great difficulty was obvious: if a veteran-buyer were not found, VA would be forced to take over the property itself.

4. While none of these proposals, the industry felt, would do the job that 505(a) had done, there was one other proposal which brought sharp attention: permission for FHA to insure loans 100 per cent to veterans at 4 per cent interest, with no mortgage insurance premium.

Persuasive arguments. The idea of keeping all government mortgage insurance authority under one roof made sense to Bernard Baruch when he recommended to General Omar Bradley in 1945 that FHA handle all government mortgages. It made sense more recently to the Hoover Commission, which picked up and elaborated on the old Baruch report. It makes sense now to HHHFAdministrator Raymond Foley and FHA Commissioner Franklin Richards, who last month had some persuasive arguments for transferring VA's insurance authority to FHA: it would eliminate the duplication of 505(a) and also lighten the load on the Federal National Mortgage Association, the government's secondary mortgage market, which is stuffing itself with unwanted 501's. (Most 505(a) loans stay out of FNMA because the 4½ per cent interest rate on the FHA portion of the loan makes it attractive to private lenders.)

The plan envisioned by Richards and Foley, and backed by an impressive number of big bankers and builders, would retain (and improve on) the virtues of 505(a) as well as eliminate its greatest fault. Even the mortgage bankers' historic objection to 4 per cent loans would disappear in the face of total guarantee. FHA would impose a set of construction standards modeled after its regular standards but would incorporate one VA approach dear to the house-builder's heart: appraisal based on current cost, rather than long range value. (The industry was well aware that VA appraisals are more political than business-like; but it knew too that VA's appraisal system had been—and would continue to be—one of the significant contributing factors to the sustained high volume of construction.) FHA would create a new title to handle this new insurance. VA would certify a veteran's loan eligibility and perhaps pay—from its existing reserves—FHA losses. (An alternative: losses to be paid directly from the Treasury.)

Enthusiasm and caution. To many this seemed—in terms of economy both to the government and the builder—a more attractive plan than 505(a). Stanley M. Stalford, crack New Jersey mortgage banker and one of the nation's leading FHA mortgage specialists (last year's business: $49 million), who helped Baruch prepare his 1945 report, said that by "eliminating delays and effecting prompter settlement of loans," it would "permit the builder to have his working capital freed and the veteran to move into his house faster." Another mortgage banker estimated the proposal would save the government 60 per cent of the amount of money VA now spends in its mortgage insurance program.

But some in the industry were cautious. The Home Builders, particularly, who in many ways stood to benefit from the existence of two rival government organizations, feared granting FHA a "monopoly" on government insurance. (Countered one executive of a large life insurance company: "Of course FHA could get all powerful. But what's the difference? Are two divisions of government better than one?"") The U. S. Savings & Loan League, which has never liked FHA, was not eager to give it any more authority than it already has. (USSL General Counsel Horace Russell said he would prefer to see "four competing government organizations rather than one; competition makes for better service.") The loudest dissenter of all was technically not a member of the housebuilding industry, but nonetheless a most forceful member of any conference on veterans' housing—

(Continued on page 18)
Two insistent voices of demand cut sharply through the 6th annual convention of the National Association of Home Builders in Chicago last month. The first was one with which the house builder was well familiar: the market demand. He had heard it change several times already—in tone and in context—in his postwar operations, and each time he had faced up to it. Now he heard it change once more, and in convention sessions he acknowledged its unmistakable message: the demand for houses has changed to a demand for better houses.

The second was a new type of demand on the private builder, and one which he had become aware of only after it had built up and gathered in force over years of misrepresentation of the industry's backbreaking effort to crack the nation's swollen, war-born housing shortage. It was a demand that the builder now tell his side of the story of American home building to the American people.

NAHB, the only effective medium through which the private builder's voice could be heard, had been forced to watch an incredible postwar spectacle: the builder, despite his record postwar construction of 3.5 million new houses and apartment units, was still held suspect by a public fed on a steady distrust of private opera-
ids, decide to tell their story to the people with a $250,000 public relations program

tions. But saddled with a piddling public relations budget (last year's: $28,000), NAHB had hardly been able to raise a protest voice. Clearly it was time, the builders felt, to sing out.

When Los Angeles Builder Fritz Burns proposed the method—a fund big enough to "tell the American people about the job the housebuilders are doing"—the delegates roared their approval. The fund—NAHB hopes for $250,000—will be voluntarily contributed (assessment was ruled out) and will not be used politically. Said President Elect Thomas P. Coogan: "We don't propose to fight anything with this fund. We've been fighting public housing for many years without much luck."

Just how it would be used was still not clear; the association's directors had not decided. But it would at least give force to the builder's long-stilled voice, and that was what he wanted—and badly needed.

Having disposed of this demand, the builder turned, relieved, back to the first, for here he was on familiar ground—not necessarily safe ground, or easily traveled, for it contained many challenges the builder had not yet had to meet; but at least he was familiar with the overall challenge of the market. Realistically, he admitted the market change characterized by Retiring President Rodney Lockwood: "The desperate need for shelter has been pretty well satisfied in most communities. Now the people who are buying houses are looking for much more than mere shelter—they are looking for good homes ... We will have to stimulate and incite the desire of more people, not for just shelter, but for better shelter—not for just a new house, but for a better new house."

The builders had begun to batten down the hatches for the onslaught of the new "buyer's market" at their annual convention a year ago (FORUM, Mar. '49). They were facing then the second circle of the postwar market, when the challenge was to reduce house costs. Since that time, by steadily shaving square footage and profits, they had managed to push the average price of a new house down to $8,000.

Now they had reached the bottom on cost reduction. (Said Burns: "Next year's house will be no cheaper. "We will do well to keep it at the same price.") And they had also reached the market's third circle: a market not the least bit desperate, but willing to buy if it could find a good buy. This new market would want a house no more expensive than 1949's, and certainly no smaller, but one, for all that, of better quality—a house, in Lockwood's words, of "better design, better arrangement, and superior treatment." The builder's chances of matching last year's construction record of 1 million new houses rested squarely on his ability to meet that demand.

Could he do it? If there was any one worry which transcended his harried anxiety over government interference, it was this. And the answer, he sensed, was inherent in the challenge as Lockwood had framed it. Lockwood's phrase better design rang like a keynote through the convention area. It was sounded from almost every platform. It dominated the majority of discussion groups, both formal and informal.

It raised the clinic on design to the convention's most important and best attended, and revealed clearly the builder's growing willingness to consider the synonymity between "better design" and "contemporary design." The area of agreement among the panel members was so great that there was little room for argument. (Only Chicago's conservative Joseph Merrion defended traditional design in general, and in particular, the pictureless picture window at the front of the house.)

And the builders in the audience, who had long since adapted such contemporary principles as the open plan, listened respectfully to the panel experts tell them it was
high time to adopt others. FORUM's Douglas Haskell assailed the builder's tendencies to pack a "collection of features" into his houses without considering that "quality also means the best possible use of space for modern living," and to "overrate the need for kitchen efficiency and underrate the importance of convenience." Long Island Prefabricator Cy Williams sounded two other distinct sins of the small house: lack of "adequate storage space and a workable play area." Builder Earl ("Flat Top") Smith, of Berkeley, Calif., deplored the industry's "holier-than-thou attitude toward change." Said he: "We are underestimating the intelligence of the buyer," and he cited his own experiences to prove it. Despite the active resistance of local mortgage bankers and the FHA, he built his first modern house 2½ years ago. It sold before completion, nine orders were placed for duplicates, and Smith has built nothing but flat tops since. Whereas he only built 40 houses a year before his switch to modern, this year he will build 1,000, and 450 of these have already been sold. Since better design was to be a heavy enough challenge, it was fortunate for the builder that some of the worries which beset him at last year's convention had been removed. Financing, for instance, was not the headache it was a year ago. There was plenty of mortgage money around, and it was getting cheaper all the time. During 1950, however, the builder had found no aspirin big enough to dissolve the headache completely. Easy financing was still a phrase rather than a reality in too many areas. And the builder's perennial worry about adequate funds for Fanny May remained, for, so far as he could see, his VA-financed work in 1950, just as in 1949, would depend on Fanny May's secondary market. (One financial observer thought money would get cheap enough this year, however, to find lenders vying for 4 per cent GI loans.) Nor could the builder find much relief in the government's curious "sedatives"—its threats to pamper cooperatives, and to eliminate the vital 505(a) loan (see p. 13), its passion for jerky, short term financing legislation instead of the long term financing the builder needed. On these matters—and others—the government—and even other industry groups—had shown themselves reluctant to listen to the men who build the nation's houses. But perhaps now, with his new-found voice, the builder could take his case to the people.
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NEWS

the powerful American Legion. Jealously aware of the Veterans Administration's raison d'être, and of its own considerable influence in VA, the Legion had been plugging right along for the elimination of 505(a) in favor of straight VA loans. It was militantly prepared to defend VA against any further attempt to rob it of its prerogatives. The Legion might eventually yield on other things (it hinted last month it might go along with an attempt to equalize the interest rates on VA and FHA loans provided the equalized rate stayed at 4 per cent for the time being), but it made it pointedly clear that it would tolerate no tinkering with VA's physical structure.

Industry's viewpoint. Against the Legion's dis- sension, all other discussion was difficult, at best. For Congress, its election year ear keenly attuned to the biggest lobby in Washington, was likely to hear little else.

If it wished to see a 1950 housing output approaching last year's however, Congress would be obliged to listen to the point of view of the private housebuilding industry. Last month that point of view was admittedly not too clear; the industry needed cohesion first of all in its attempt to make its wants and needs known. But even through the cross currents and local interests that fanned the discussion the point of view was there to be seen — unheard: a healthy production of veterans' houses depends on 1) congressional adoption of the best substitute for 505(a) thus far advanced; a new title to permit FHA to insure veterans' loans 100 per cent at 4 per cent interest, without insurance premiums and with VA's liberal appraisal policies; or, if Congress is unwilling to brace the America Legion's wrath, 2) Congressional retention of the combined FHA-VA mortgage.

Well-used tool. From the first, 505(a) was strangely inefficient-looking tool to be used in the efficient production of houses. But it was the best tool that could be forged by an industry trying desperately to catch up with war-created demand but impeded by archaic financing methods. Particularly in the large metropolitan markets, many builders, lenders and veteran-buyers found it a distinctly belt tool than 501; it became well-used. Last year it hammered out half of all the veteran houses built. But its faults-as well as virtues—became well known to its users. Last month, as the talk of eliminating it got louder, the industry counted up again marks for and against 505(a). Credits:

(Continued on page 20)
This young man is Charles G. Adams of Conway, Ark.—one of 12,000 brickmason apprentices enrolled in a nation-wide training program being promoted by SCPI.

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NEWS

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2. As a 100 per cent insured mortgage for small houses (the big first mortgage is insured by FHA; the smaller second mortgage is guaranteed by VA), the lender is given almost full protection.

3. The FHA portion of the mortgage gives the lender a 4½ per cent interest rate.

4. The FHA portion, giving the builder a firm commitment, enables him to get construction loans reasonably.

5. The VA portion of the mortgage (roughly 20 per cent) does not use up the veteran’s total VA loan guarantee privilege.

6. A veteran wanting a bigger and better house can usually finance it only through 505(a), since most 501 loans are made with the intent of selling them to FNMA, and FNMA cannot buy mortgages over $10,000.

Overall objection. Against these factors was one overall objection which could not be ignored: the substantial cost of having two government agencies handle double appraisals, double recordings, double title and legal fees. It is an added cost to both the veteran (which he pays either outright or in the hidden cost of the house) and to the government. Long Island Builder Bill Levitt guessed roughly that duplication in 505(a) adds $150 to the price tag of his $7,990 house.

It was a big objection, and it sat heavily on the industry’s conscience. But, in spite of it, for most of the industry the scales were still tipped in favor of continuing 505(a). For more impressive than any of its virtues was the one fact which had not changed in all the five years of postwar homebuilding: there existed no other legislative tool which could put up the houses the U. S. had promised its veterans. The industry’s leaders had testified so emphatically to that. “The results of its elimination” said Milton MacDonald, vice president of the Mortgage Bankers Association, “would be an unwarrantable disaster to the continued production of housing under private enterprise due to the drying up of construction money. Frank Cortright, executive vice president of the National Association of Home Builders, agreed unequivocally that it would “dramatically reduce the volume of new homes constructed for veterans.” Builders nodded emphatically. The 50 per cent reduction in veterans’ houses would be drastic indeed.
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SKYSCRAPER AIR CONDITIONING. In addition to the type of air conditioning equipment required for large areas such as the Capitol Building, Trane also manufactures UniTrane under-window air conditioners for office buildings, hotels and other structures which are made up of many small rooms or offices.

Occupying but little more space than an old-fashioned radiator, these new units heat, cool, remove excess moisture, filter, and circulate air — provide individual room control. Write for "Merely a Matter of Air."

HEAT FOR THE HOME. Write for "How to Live in June All Winter," containing facts about quick-heating, space-saving, economical Trane Convectors.


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LETTERS

UPSIDE DOWN EGG

Forum:
In your December issue I was very pleased to find your article "Shell Concrete" in which you use "a recent chicken egg" as an illustration.

The reason I was pleased to see this is because in my office I am using the egg as a symbol of form, displayed on a wall panel (along with an other unchangeable form, the cross, our slogan "Two plus two equals four," and a quotation from Albert Einstein: "It is a language of proportion which makes evil complicated, and good, simple").

But I would like to find out whether you are ahead of me or whether it is a misprint that the egg is up-side-down on page 106. If there is a reason, I am eager to know, as I am always willing to learn.

The whole issue, mostly the churches, is swell job. Congratulations,

GEORGE FARKAS
Miami Beach, Fla.

• Observant reader Farkas has but little to learn from the Forum's up-side-down egg at the conclusion of the shell concrete article. It was no misprint; but, rather a playful synonym for the words "the end."—Ed.

MEMORIAL BY VETS

Forum:
I have observed the designs for the World War II Memorials (Jan. '49) and I am unable to suppress myself.

I feel that a great wrong has been done that these memorials were not handled by a competition, in which only architects who served the services could compete.

Certainly only those who were a part of the war should have been given the opportunity to design memorials, and certainly only those who were a part of the war could understand and grasp the significance of what they mean.

CALEB HORNBOSTEL, Architect
New York, N. Y.

ETHICS, NOT BURLAP BAGS

Forum:
There is one important aspect of architecture which every architectural magazine seems to ignore today—ethics.

In the field of monumental architecture, let at the United Nations Buildings in New York City, designed by the cream of the architecture profession. Do these buildings express the idea of the United Nations? Do they radiate peace and freedom? Do they express the spirit of loyalty and friendship among nations? Or do they mirror... what may go on inside them: hard bargaining, intrigues, frustration... Ethical speaking, the United Nations Building group at best a burlap bag. Let us not forget that arch
How to choose materials for sound conditioning in schools

Noise-quieting efficiency is not the only factor to consider when selecting acoustical ceiling materials for schools. Other factors, such as cost, fire resistance, appearance, moisture resistance, and insulation value are also important. Since these factors vary in importance in different school areas, it is often advisable to select materials which best meet the requirements of an individual area.

Noise reduction versus cost. In the gymnasium and lunch room, high sound absorption is vital. Armstrong's Arrestone, an enameled metal pan unit with a noise-reduction coefficient of .85, is recommended for these areas. In classrooms, corridors, the library, and the music room, cost should be considered as well as efficiency since these areas comprise a large portion of the school's total ceiling space. Armstrong's Cushiontone is best suited to these areas, being both efficient (.75) and economical.

Installation methods affect cost. When acoustical materials can simply be cemented to the existing ceiling surface, and labor costs are held down, the total cost is comparatively low. Under normal conditions, all Armstrong materials can be applied directly in this manner except Arrestone, which is mechanically suspended on metal runners.

Lowest in total cost is Cushiontone; next, Travertone; then, Corkoustic; and highest, Arrestone.

Where unusual ceiling beauty is desired—in offices, the auditorium, or the foyer—Travertone is recommended for its attractive fissured surface. Armstrong's Corkoustic also has high decorative value. All the Armstrong materials have a smooth, white painted finish both on face and beveled edges.

Fire resistance is required of acoustical materials by many city building codes. Two of the Armstrong materials are incombustible: Arrestone, a metal pan unit with a mineral wool sound-absorbing pad; and Travertone, mineral wool in tile form. Standard Cushiontone can be obtained with a special fire-retardant paint finish.

In high moisture areas—the kitchen, swimming pool, and locker rooms—the acoustical ceiling must be highly moisture resistant. Only Corkoustic is recommended, because of its extremely low-density cork structure.

In one-story buildings or on top floors, heat loss is an important consideration. Corkoustic, with a thermal conductance of only 0.18 B.T.U., offers unusually high insulation value.

All the Armstrong materials offer high light reflection, good thermal insulation, and are easy to maintain. For full details and assistance in making the proper selection, consult your Armstrong acoustical contractor or write Armstrong Cork Company, 5403 Stevens Street, Lancaster, Pennsylvania.

Most acoustical materials have one or more specialized characteristics, such as high efficiency, low cost, ease of maintenance, beauty, resistance to extreme humidity, or fire safety. Proper selection depends upon their ability to meet the most important requirements for each school area.

ARMSTRONG'S ACOUSTICAL MATERIALS

TRADEMARK REGISTRATION PENDING
Front view showing main entrance of the $5,250,000 Hermann Hospital. Franzheim, Hedrik and Lindsley, architects.

KOHLER Plumbing Fixtures in Houston's new HERMANN HOSPITAL

Equipped with the finest modern facilities for combating sickness and suffering, the new Hermann Hospital building at Houston, Texas, is an impressive unit in the projected one-hundred-million-dollar Texas Medical Center. As in many other leading hospitals, clinics and sanitariums throughout the nation, Kohler hospital plumbing fixtures and fittings are used.

Kohler fixtures are safe, sanitary and durable. The surfaces are glass-hard, non-absorbent, easy-to-clean. The smooth, reliable functioning of Kohler chromium-plated brass fittings is the result of competent engineering backed by long experience. Removable units contribute to ease and economy of maintenance. Both fixtures and fittings conform to the plumbing codes of all states, and their designs embody recommendations by leading surgeons.

When preparing hospital specifications, send for our complete Hospital Catalog. You'll find it convenient for reference, with descriptions and illustrations of the entire Kohler hospital line. Kohler Co., Dept. 7-P, Kohler, Wisconsin. Established 1873.

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The days of "Form Follows Function" are over. Today, let us say: Ethics First. The only place where we can see traces of ethics in building seems to be in residential architecture. Here we find a good many houses that are not only pleasant to look at and comfortable to live in but also seem honest. . . . Some body once compared a good small house with a folksong. I cannot think of a better comparison because folksongs are honest too, and they are just as great.

Now, while we are able to create folksongs where are our symphonies? A folksong plays over and over again and louder and louder does not give us a symphony, although this is exactly what many architects are trying to do today.
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For Waterproofing Spandrel Beams

- The Revere-Simplex Reglet System is an economical and efficient method of flashing spandrel beams and column faces with enduring copper. This system offers the following advantages:
  
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  Eliminates the necessity of flashing the entire face of each spandrel beam. In that way, it not only avoids interference with wall ties, stone anchors, angle bolts, etc., but also insures substantial economies through a large saving in flashing material.
  
  Diverts all seepage to the exterior wall face, and prevents rusting of the steel work.
  
  Is based upon the use of the Revere-Simplex Reglet, which is a simple, practical, easily installed receiving device for securing metal flashings in concrete. This patented reglet provides a permanent watertight connection between concrete and copper flashing, for all concrete surfaces.
  
  The Revere-Simplex Reglet not only overcomes installation difficulties experienced with ordinary "open slot" metal reglets, but provides a substantial saving in cost as well. This is due to its many exclusive features, all of which cut down installation time and insure a superior flashing installation.

Write today for your copy of the new 6-page folder which describes the Revere-Simplex Reglet System. This folder includes short form specifications for the Revere-Simplex Reglet System and detail drawings showing where and how copper waterproofing should be used below the roof line.

Revere products now available through Revere Distributors include: Sheet and Roll Copper for roofing, gutters, flashing, etc.; Lead-Coated Copper; Revere-Keystone Thru-Wall Flashing; Revere-Simplex Reglet and Reglet Insert Flashing; Revere-Keystone Vertical Ribbed Siding. A Revere Technical Advisor will always be glad to consult with you without obligation.

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FROM dark storage space to bright, attractive offices... at amazing speed and low cost... that's part of the important performance story as told by Sylvania "Flexi-Module" Luminous Ceiling.

This attractive louvered ceiling is also a modern lighting system... offering your clients the very latest lighting techniques for better vision, better working conditions.

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The Sylvania "Flexi-Module" system is easy and economical to install. The Sylvania fluorescent fixtures are quickly hung on the original ceiling or overhead supports.

The uniformly sized modules (32" x 32") are then attached to and suspended by adjustable hanger straps, and quickly leveled from below with a screw driver. And that's all! No costly buried-in-concrete construction. Telephone and electrical wiring...even air-conditioning ducts are safely suspended in the space between the modules and the old ceiling.

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You'll like the surprising variety of lovely ceiling lighting effects now obtainable with Sylvania's "Flexi-Module" system.

For example, you can design an attractive ceiling from conventional type louvers interspersed with opaque panels. Or, you can use luminous panels and plastic panels. You'll achieve new startling effects in which interior lighting appears as natural as out-of-doors...without obvious fixtures and ugly wiring.

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Include this latest lighting technique in your present building plans. Ideal for stores, and office buildings. Wonderful for remodeling jobs, and for converting extra warehouse or factory space into bright, modern offices or display rooms.

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LETTERS

I thought you might be interested in seeing the similarity of thinking between our scheme and that which has now been adopted.
KENNETH E. WISCHMeyer, Architect
St. Louis, Mo.

BONES VS. CAVITY

Forum:
Let's face it! What has Mies van der Rohe's Promonotory (Jan. '49) to offer the apartment dweller that is extra, or even attractive? The exterior? As Louis Sullivan said, "The character of the soul shows, and no living spirit is discernible." The interior? Same old cabbage-smell corridors; same cells. Zeckendorf (who in infancy was frightened by a pie, chiffon variety?) can give more living, though hardly more esthetics. Nope, Mies van der Rohe should stick to loft buildings and not apartment loft buildings. To become so engrossed with "the bones" (Genther's "return to the first principles of building" is not a compliment) that the form of the cavity is forgotten is senseless.
CHARLES R. SULLIVAN, Los Angeles, Calif.

Forum:
The January issue on apartments was nothing less than an intellectual experience for me. Most refreshing is Mies van der Rohe's pure solution as against the usual reduction of apartment design to "a few tricks like the corner case-

(Continued on page 40)
New STANDARDIZED Building-type Switchboards

Cut Planning Time

Switchboard planning for offices and other commercial-type buildings is greatly simplified with the NEW Westinghouse Standardized Building-type Switchboard.

Unitized construction eliminates special design problems...yet their complete flexibility gives you all the advantages of "custom built" units.

Factory-assembled, wired and tested, they may be shipped as a single unit and quickly placed in service. However, if desired, they can be shipped as individual units and quickly reassembled on the job.

They are specifically designed to feature low-cost circuit breaker protection by means of Westinghouse no-fuze "De-ion" type AB circuit breakers for ratings through 600 amperes. For ratings above 600 amps, Westinghouse type DA breakers are used. Get the complete story. Call your nearest Westinghouse office or write for D.B. 30-990, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.
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DURING the past 60 years leading architects and builders have learned that it pays to back up good design and good workmanship with products bearing the famous Wheeling Red Label. That is why, today, Wheeling is part of the skyline in thousands of cities, towns, villages and across the country. For quality products—turn to Wheeling.
A shower unit designed for Built-in installation in bathrooms . . .

At last . . . a moderately priced shower unit expressly created for recessed installation . . . the only prefabricated metal shower cabinet that provides for continuity of the bathroom wall material. By the elimination of all apparent cracks or joints it becomes an integral part of the structure rather than merely a fixture.

The result is a rich, ultra-smart, custom-built appearance. Yet, the installed cost is considerably less than that of a built-up tile shower. It makes a permanently water-tight installation, will not crack and develop leaks with settling of the building, as often occurs when mortar joints are depended upon for water-tightness.

Reversible side panels, valves can be installed on either side without drilling on the job.

Size 36" x 36" x 80"—Bondcrized galvanized steel walls with baked-on synthetic white enamel—will not rust. Precast terrazzo receptor. Clean interior, no screws or projecting fastenings to mar the bright white smooth enamel finish.

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Three Manufacturing Plants
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In Canada: Fiat showers are made by Porcelain and Metal Products, Ltd., Orillia, Ontario

(Continued on page 44)
At the Horace Mann School in Warren, Ohio, J&L Junior Beams have again demonstrated that they can do a better job in unusual applications, as well as in ordinary styles of buildings.

Notched over lintel beams and cantilevered three feet beyond the outside walls, J&L Junior Beams support not only the roof but also an attractive permanent sun shield over classroom window walls.

Because of their versatility and adaptability, J&L Junior Beams go far towards meeting the demands of today's builders. They cost less to buy and less to erect. At Horace Mann, Warren Engineering Company, who erected the school, assisted by J. A. McMahon, Ltd., Niles, Ohio steel fabricators, has found that lightweight, 12" Junior Beams, 30 ft. long, may be easily raised, placed and bolted directly into place by three men with the aid of only a hand-operated winch.

This means dollars saved—through speed of erection, elimination of secondary operations, and ease of handling. Yet in light structures, J&L Junior Beams often offer all the advantages of heavier structural members.

Junior Beams, made exclusively by J&L, are the lightest weight hot-rolled steel beams available.

In schools, office buildings, apartments, residences, industrial buildings, hospitals, and other light occupancy structures, J&L Steel Junior Beams offer the modern builder many advantages. They are economical . . . fire-safe . . . rigid . . . shrink-proof . . . termite proof . . . easy to install . . . low in maintenance . . . and are permanent.

ARCHITECTS • BUILDERS • CONTRACTORS

It will be worth your while to follow the lead of Arthur F. Sidells, architect for the Horace Mann School, Warren S. Holmes, consulting architect, and William C. Fisher, structural engineer on the job. Send for descriptive literature and engineering data on J&L Steel Junior Beams and J&L Junior Beam floors.

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REPORT ON:
J&L JUNIOR BEAMS

solve unique design problem AT LOW COST

Left—Workman easily guides notched Junior Beam into place during construction of Horace Mann School.
Below—Completed school showing clean functional design and unique cantilever construction.
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1. The $6500-$10,000 house
   Space-saving "minimum" Select-a-Range has deluxe features, "Convenience-Level" cooking at low cost!

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   Larger work areas, increased storage capacity, amazing flexibility add new appeal to Select-a-Range kitchens!

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   Built in "Convenience-Level" cooking and expandable feature provide the ultimate in modern kitchen planning.

Over 25 Select-a-Range Variations from 3 Basic Units!

Select-A-Range gives you new freedom to design striking modern kitchens for houses of every price range. These three basic modular units can easily and quickly be combined into more than 25 different arrangements. Each unit is complete in itself so that it can be installed separately. Or they can be fitted together in combination... with one or more ovens, right or left hand, installed at the "Convenience-Level" your client selects. Select-a-Range versatility meets every cooking requirement... large or small.

Quality and Value since 1842

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Exciting new and different appeal is created in "separ­ated" arrangements... Select-a-Range can be silt in anywhere... extra storage drawers provide such desired additional storage space!

Only Select-a-Range has the dramatic no-stoop "Convenience-Level" oven!

For years, women all over the country have wanted "Convenience-Level" cooking... a range designed to eliminate stooping and bending over a low oven.

Now, for the first time, you can give your clients the kind of kitchen they want... with "Convenience-Level" cooking. The height of the Select-a-Range oven can be easily set to fit the user... by adding or subtracting storage drawers under the oven or by building the oven into a wall or cabinet at the desired height. Here's something new... something different... something women want... to help sell the house. And it's exclusively Universal!

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A special booklet of Universal Select-a-Range kitchen designs created in full color by Royal Barry Wills has been prepared for the building profession. For your complimentary copy, write to Dept. B-D, Landers, Frary and Clark, New Britain, Connecticut.
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LETTERS

attitude has always been that it could not insure anything experimental until after it has been used in actual construction. The reverse should be the case. Two or three per cent of FHA's insurance volume could be devoted to frankly experimental types of construction, planning and architecture without any impact on its mortgage insurance funds at all. The FHA Act itself was established to improve housing standards. Under the terms of the Housing Act of 1949 the Congress called upon the Housing Agency and all of its constituents to devote their efforts to improving methods of construction and of design to the development of better neighborhoods. Thus there seems to be strong legislative justification for establishing a minimum quota of experimental projects under the FHA insurance program...

It seems to me that FHA's mortgage insurance program for single detached housing deserves the same kind of critical analysis. Last year's economy house program had the effect of reducing housing standards in this country below the levels adopted by our ancestors when houses had to be chopped out of the wilderness. A great quantity of FHA insured houses are so small as to be psychologically oppressive and financially the worst kind of investment and risk. The plan of planning standards which FHA pioneered during the thirties have simply disappeared from the FHA scene...

WILLIAM L. C. WHEATON
Associate Professor of Regional Planning
Harvard University
Cambridge, Mass.

REQUEST
Forum:
Please send me any information you might have concerning architecture.
C. R. DIETZ
Brooklyn, N. Y.

• Anything else?—En.

MODERN CHURCHES
Forum:
I didn't think it possible to cram so much ignorance, misinformation, and bad taste into one article. However, Forum has succeeded in its December article on churches. Congratulations?

REV. RICHARD J. KEARNEY
Saint Raymond Penafort Church

Forum:
Your church number should have a good influence on present-day church design.

ARTHUR T. BROWN, Architect
Tucson, Ariz.

Forum:
I take issue with the following lines in your otherwise excellent December article on churches: "More than any other contemporary form, arch construction requires the greatest skill..."
MODERN MERCHANDISING calls for pleasant, efficient surroundings in sales and service departments. And like the Arrowhead Oldsmobile Company in Chicago, many businesses are meeting this requisite with Hauserman Movable Steel Interiors.

Many styles and types of Hauserman Steel Interiors are available to meet sales and service department needs in businesses of every size. There are matching accessories for every specific requirement.

What's more, these handsome interiors can be quickly, easily moved, and all units can be reused again and again without affecting their original beauty and efficiency.

Why not learn all the advantages and economies of Hauserman Movable Steel Interiors? You can get all the facts from the Hauserman office or representative nearby or by contacting The E. F. Hauserman Co., 6760 Grant Ave., Cleveland 5, Ohio. Or if you prefer, write for our fully illustrated, 60-page catalog.
When you specify Curtis Cabinets!

If Mrs. Homeowner prefers shell pink, sage green or powder blue in her kitchen cabinets, she can have what she wants—when you specify Curtis wood cabinets. For these sturdy, lifetime-lasting cabinets are finished two coats at the factory—ready to paint in the color of the owner's choice. Colors can be changed at will, quickly and inexpensively.

Curtis cabinets arrive on the job in dust-proof cartons—ready to fit together, quickly and easily, into any size or shape of kitchen. Built like fine furniture, these cabinets have modern refinements and conveniences—easy-sliding drawers—greater storage space—special cabinet units that fit "around a corner"—expert machining and workmanship—a place for everything! Hardware is furnished for each unit.

Curtis cabinets have a wide range of use in schools, church kitchens, laboratories, libraries, hospitals, laundries and clubs. Domestic science departments in schools and colleges find Curtis cabinets an aid to better teaching.

For true kitchen flexibility—in colors and arrangement—specify Curtis wood cabinets.

A Curtis "cabinet wall" will insure ample storage space in the home. These standard Curtis Units will find a useful place in storeroom, laundry, sewing room, nursery, hall or bathroom.

Curtis makes a complete line of architectural woodwork for the modern home. Make your next house "all Curtis."

Curtis Companies Service Bureau
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Clinton, Iowa

Gentlemen: Please send me literature on Curtis kitchen cabinets and other Curtis Woodwork.

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IT'S 10° below zero in that laboratory "cold room." On the other side of the test panel it's 70° above zero—an average room temperature. This was a test to re-create actual living conditions in an average home. We wanted to compare the insulating value of INSULITE Sheathing and wood sheathing.

HERE'S WHAT THE LABORATORY REPORTED
Delicate instruments measured the heat flow through the materials from the "warm room" side to the "cold room" side. INSULITE performed an amazing insulating job! Here are the facts:

- INSULITE resisted heat loss better than twice as well as wood.
- Engineers call this the "k" factor, and the "k" factor of INSULITE was 222% better than that of wood.
- One layer of INSULITE (%" Bildrite Sheathing) provided more insulating value than 2 layers of wood sheathing.
- Besides double the insulating value, Bildrite also gives you double the bracing strength of wood sheathing horizontally applied. It's water-proofed throughout—every fiber protected.

THAT'S WHY INSULITE builds better—gives more for the money. Warmer homes in winter, cooler homes in summer. Specify Double-Duty INSULITE.

Refer to Sweert's File, Architectural Section 10d/9
Startlingly different — an entirely new conception — Fleetlite is the window you have been demanding for years. Engineered and built as a complete packaged window, Fleetlite provides frame, sash, storm sash and screen as an integral unit, easily installed at one time. Home owners like the self-storing convenience of FLEETLITE — its economy, its beauty, its permanence. Already installed in thousands of homes throughout U.S. and Canada.

"What people are looking for," says Builder.

Gentlemen:

Enclosed is an order for Fleetlite windows for an additional group of homes which I am starting in the early spring. After using your windows in all of my building during 1949, I can truthfully say that the fact that I was featuring your windows accounted for a ready market for my homes and advance orders extending into 1950.

I may interet you to know that recently I had one of these houses open for inspection for one day, and at that time, took orders for twelve additional homes, all to be equipped with your windows. As a result I am convinced that the new design features of Fleetlite Windows are what people are looking for even in low-cost homes, and I am therefore planning on using your products exclusively during the coming year.

Many thanks for your good cooperation and prompt service.

Write today for full details or see your distributor.

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FORMICA FITS ANY FASHION

Decorative themes in kitchens may change from home to home. But beautiful hard working Formica fits them all. Formica helps sell the rooms that sell the house. Colorful Formica surfaces wipe clean with a damp cloth, never need painting or refinishing. Alcohol, boiling water, fruit juices, mild acids and alkalies fail to dim its lasting luster.

In every style and kind of kitchen home makers are asking for Formica by name and looking for its famous label. Write for new color literature of idea stimulating uses for Formica in the home. Formica, 4631 Spring Grove Ave., Cincinnati 32, Ohio.

Look under "Plastics" in your Classified phone book for the name of a local Formica fabricator.

"Just as good" is a fable. Look for the label. Insist on Genuine Beauty Bonded Formica.

New 16 MM color sound movie "Living With Formica" pictures uses and how it is made. Available now for group showings. Write for film.
SHAMROCK HOTEL Houston, Texas
INTEGRAL by Sargent
OWNER: Glenn McCarthy
ARCHITECT: Wyatt C. Hendrick
HARDWARE SUPPLIER: Pedersen and Steel Company
CONSTRUCTION MANAGER: Stone & Webster Engineering Corporation, Tillotson Construction Company
Sargent's Integralock is unique. 30% fewer parts. 50% smaller lock case. Chops 75% off installation time and costs less.

No other lockset with full functions can match the Integralock for simple design, trouble-free service and lockfitting time savings. Not mere claims, these are job-proven facts about Integralock... a rugged Lockset that continues to stand up against rough day-in, day-out handling on thousands of installations including schools, hospitals, all types of commercial and public buildings, and fine residences.

The result of ten years of engineering and design study, the Integralock offers in one simple, maintenance-free mechanism all the advantages of the older Mortise and Unit Locks plus those advantages mentioned above. And mass production techniques make it available at less cost than its pre-war predecessors.

You can give your clients better locks at less cost on the buildings you are now designing by using Integralocks.

utility 11 locking functions, keyhole in the knob
beauty round or square roses, sleek knobs, variety of finishes
security 5 or 6 pin cylinder locks, knob shear pin safety unit
service factory-sealed all brass and steel mechanism, compact for quick mortise and assembly
DETROIT CERTIFIED CONTROLS

Now Backed by National Advertising

IN AMERICA'S TOP MAGAZINES!

SATURDAY EVENING POST
America's foremost advertising medium. Reaching over 4,000,000 "able to buy" people—your potential customers for greater automatic control sales!

BETTER HOMES AND GARDENS
Reaching an audience of over 3,000,000 people vitally interested in matters of home comfort and improvement. A natural market for the best in automatic heating controls!

DETROIT'S aggressive new national advertising campaign will make the American public keenly aware of the vital importance of proper heat control and add impetus to the ever increasing demand for DETROIT Certified Controls. Furthermore, when you specify DETROIT, your clients' assurance of complete heating satisfaction is backed by a trained nationwide sales and service organization.

So specify DETROIT Controls on all your jobs—it's a sure way to give your clients the ultimate in heating control performance! For complete information on DETROIT's amazing Timed Cycling Room Thermostat—"the thermostat with a brain"—and the complete line of DETROIT heating controls, write today for Form No. 1515 and Bulletin No. 227.
MEET HIGHLY SPECIALIZED FLOOR REQUIREMENTS WITH

Plastic-Asbestos Flexachrome

Flooring specifications for hospital x-ray rooms were extremely troublesome... until Flexachrome* provided a simple solution to this complex problem. Its unusual versatility makes Flexachrome suitable for many other flooring needs, too.

Because it's truly greaseproof, you can use Flexachrome in kitchens, dining areas, compounding rooms... anywhere grease creates a problem.

Cost-per-square-foot-per-year is a surprisingly low figure. One reason for this is quick, easy installation. (The unusual flexibility of the tile allows a firm, fast, permanent bond to the sub-floor.) Another is Flexachrome's extraordinary durability. A third is simple, economical maintenance. Flexachrome retains its brilliant beauty under most rigorous service merely with daily sweeping to remove loose dirt, periodic washing and water-waxing (if desired).

And what scope you have in design! The individual tiles can be laid in an almost endless variety of patterns. Functional designs influence traffic, identify departments, enhance safety. Decorative motifs add striking individual beauty to interiors. Custom-cut inserts create truly unique floors.

Flexachrome is unsurpassed for color, too. 33 rich, vivid colors enable you to carry out any decorative mood you wish... gay and bright, or dignified and subdued.

You'll want complete information on Flexachrome, it's yours for the asking.


Other Tile-Tex Flooring Products include: Mura-Tex* Plastic-Asbestos Wall Tile; Tuff-Tex* Heavy Duty Greaseproof Industrial Tile; Tile-Tex*... the Quality Asphalt Tile.

*REGISTERED TRADEMARK, THE FLINTKOTE COMPANY
Here is a door closer that you'll be happy to recommend for appearance as well as utility. The new YALE COMPACT DOOR CLOSER represents the modern concept of economy of size, minimum of detail and smoothness. We've reduced the bulk 36%, simplified the detail and eliminated the bulges. Even the brackets have been modernized. Rotary piston checking improves efficiency while making the new beauty possible. It gives an even circular stroke; continuous checking action, with simple two-speed closing adjustment.

Leading builder's supply dealers are displaying the YALE COMPACT DOOR CLOSER. See it—specify it.

FREE: Literature illustrating simple operating method, famous YALE workmanship, “hold-open” device, etc. Mail coupon now.

THE TRADE YALE MARK

compact door closer

THE YALE & TOWNE MFG. CO.
STAMFORD, CONN.

Please send me free 2-page description and "The Inside Story" on YALE COMPACT DOOR CLOSER.

Name: ........................................
Company: ...................................
Address: ...................................
City: ........................................ Zone: ....... State: ......
THE CURTAIN WALL

The editorial pages of this issue of the FORUM have reviewed and brought together the materials, developing techniques, new theories and widening opportunities which make the principle of the curtain wall more important to more people in the building industry than ever before.

To supplement that information, and to serve as a convenient reference, FORUM also presents this special advertising section devoted exclusively to products which apply to curtain wall construction. Reprints of the combined editorial and advertising sections on the Curtain Wall are available at fifty cents each.
New! KAYLO LAMINATED PANELS Provide Finished Walls

That Resist
HEAT LOSS...
FIRE... ROT...
WATER DAMAGE

FOR CURTAIN-WALLS OR INTERIOR PARTITIONS, new Kaylo Laminated Panels represent a significant development in the building field. Available with a number of different facings, they alone provide this important combination of advantages:

Insulating Value — Two-inch panels have better insulating value than 16 inches of solid concrete.

Fire Protection — The Kaylo core is incombustible. Installed with proper joint systems, Kaylo Laminated Panels (with cement-asbestos, steel, aluminum or Monel facings) meet A.S.T.M. one-hour fire standards.

Permanence — The inorganic Kaylo core is rot-proof, vermin-proof and insoluble in water.

Structural Strength — Kaylo Laminated Panels have great strength and dimensional stability. Facing and core are securely bonded with waterproof adhesives.

Easy Erection — The lightweight panels (weighing only 6 lbs. psf) are easy to handle and move into place; can be sawed, nailed or bored with standard tools.

Kaylo Laminated Panels provide better walls, reduced building load and easier erection for nearly every type of building. Investigate now.

Kaylo Laminated Panels Available with a Variety of Facings

CEMENT-ASBESTOS
PORCELAIN ENAMEL
WOOD VENEER
ALUMINUM
STEEL
PLASTICS
ZINC-COATED STEEL
STAINLESS STEEL
MONEL

Kaylo Laminated Panels with cement-asbestos facing are being produced by Owens-Illinois. Other manufacturers are using inorganic Kaylo cores for laminates with: steel, aluminum, porcelain enamel, zinc-coated steel, stainless steel, Monel, plastics and wood veneer.

The core material for Kaylo Laminated Panels is a remarkable new chemical composition which is completely inorganic, incombustible, rot-proof and undamageable by water. Other Kaylo products include: wood-faced and metal-faced firedoors; insulating roof tile; heat insulating block, and pipe insulation.

OWENS-ILLINOIS GLASS COMPANY
Kaylo Division, Dept. N-12, Toledo 1, Ohio

Gentlemen: Please send me literature on Kaylo Laminated Panels.

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Send Coupon for Sample and Literature

OWENS-ILLINOIS GLASS COMPANY
Kaylo Division, Toledo 1, Ohio

SALES OFFICES AT: Atlanta • Boston • Buffalo • Chicago • Cincinnati • Dallas
Minneapolis • New York • Philadelphia • Pittsburgh • St. Louis • Toledo • Washington


Robertson Q-Panels on the Wilsco Laboratory of the Pratt & Whitney Division of United Aircraft Co., Hartford, Conn. Designed by Albert Kahn Associated Architects & Engineers, Inc. Built by Turner Construction Co.


Robertson Q-Panels on the striking new office building at the General Electric Turbine Plant at Schenectady, N.Y. Stone & Webster Engineering

Your cue to modern curtain-wall construction...ROBERTSON Q-PANELS

Shown here are a few of the many hundreds of Robertson Q-Panel installations on buildings throughout the country. More than 15 years of experience and research have developed the Q-Panel into a modern thin-wall of great architectural usefulness and beauty. Here are a few quick facts about Q-Panels...

MATERIALS—Metallic Coated Steel, Galbestos, Stainless Steel, Aluminum. On both sides or in combination.

SIZE—2'0" standard width. Lengths up to 25'0" depending on material used.

WEIGHT—3 lbs. per sq. ft. in aluminum—6 lbs. per sq. ft. in steel.

INSULATION VALUE—Superior to 12" of masonry with furred plaster.


STRENGTH—Great strength permits widest spacing of horizontal supports to meet any required wind load.

Write for complete details.

H. H. ROBERTSON COMPANY

2403 FARMERS BANK BLDG. PITTSBURGH 22, PA.
VERSATILE ZONOLITE* AGGREGATES
Proved Indispensable in TODAY'S LIGHTWEIGHT BUILDING

Unique Characteristics Provide Manifold Usefulness

FOR MODERN CURTAIN WALLS, Zonolite® Vermiculite concrete can be employed as a back-up with all types of facing materials, providing extreme reductions of weight and bulk. Three inches of Zonolite concrete permitting fire-safety equivalent to 8" of brick, yet weighs only 1/3 as much. Its thermal insulation value far exceeds that of brick or regular concrete.

WALLS—CEILINGS—FIREPROOFING: Up to 66% of dead weight in a building can be eliminated when Zonolite plaster is used for walls and ceilings and for fireproofing structural members. Zonolite Plaster Aggregate used in lieu of sand for suspended ceilings or partition walls and in place of conventional fireproofing for columns and beams permits the use of much lighter steel members at correspondingly lower costs. Furthermore, Zonolite vermiculite aggregate is substantially cheaper to handle and store than the sand it replaces.

A sledge hammer blow merely dents Zonolite plaster and it won't chip when nails are driven into it. Plasterers prefer it, too, because of its lighter weight, easier spreading and fewer droppings.

FIRE-SAFE FLOORS & ROOFS: In short span roof decks, and in various types of floor construction, Zonolite vermiculite concrete unites superior insulation and fire safety with structural material—all applied in one operation. This same concrete—only 1/3 the weight of "ordinary" concrete—can be poured as permanent insulation fill over any existing roof.

An estimated 5,000,000 lbs. of dead weight were eliminated in the construction of a 35-story bank building by the use of Zonolite concrete floors, suspended Zonolite plaster ceilings and the use of Zonolite plaster for fireproofing structural steel members as shown above. Savings effected by weight reduction more than paid for the extra fire-safety and thermal insulation which Zonolite aggregates made possible.

In recent Underwriters' Laboratories tests, columns fireproofed with Zonolite Plaster as pictured above were awarded a 4-hour rating for 1" of plaster and 3 hours for 1/2" thickness. The saving in weight (see inset) as compared with solid concrete fireproofing is obvious.

FULL COOPERATION OFFERED

The uses of Zonolite concrete and plaster shown herewith will undoubtedly suggest many other possible applications such as their use in the new curtain wall construction. Mail the coupon today for a special file of useful reference material, or write us for information on your specific problems.

ZONOLITE COMPANY
Dept. AF-30, 135 S. LaSalle St., Chicago 3, Illinois

ZONOLITE COMPANY—Dept. AF-30
135 S. LaSalle St., Chicago 3, Ill.
Please mail me special file of reference material on use of Zonolite vermiculite aggregates in plaster and concrete.

Name: ..................................................................................
Address: ...............................................................................  
City & Zone .................................................... State ...........

*Zonolite is a registered trademark of Zonolite Co.
a better basic concept of sandwich construction

To modern techniques in curtain wall construction, Crucible has added a fundamental advantage — design freedom, unhampered by the restrictions of standard-sized sandwiches. Now you may apply Crucible design to the floor, window or structural effect of your choosing. Moreover, this particular method of construction means no thermal short circuit!

Crucible’s contribution to the use of stainless steel in curtain wall construction is continuing evidence of a half century of specialty steel leadership. Our staff of architectural advisers, pioneers in this field, can demonstrate the many advantages of Crucible Stainless in curtain wall construction. Investigate now! One call from you puts this experience at your service.

CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.
ERECTION STAGES

1. CONTINUOUS ANGLES BOLTED TO TOP AND BOTTOM OF SPANDREL BEAM.
2. SPANDREL PANELS HUNG AND BOLTED TO ANGLES.
3. PIER PANELS HUNG AND BOLTED TO ANGLES.
4. WINDOW AND MULLION PANELS BOLTED TO SPANDREL PANELS.
Here they are—after years of designing, engineering and testing by Republic engineers and metallurgists—practical insulated steel curtain wall panels. They’re an actuality—not merely an idea—field-proven by Republic’s subsidiary, Truscon Steel Company, in panels fabricated by them and applied to their new Baltimore office and warehouse.

Two steel facings enclose lightweight slabs of insulation. The outer facing of time-defying Republic ENDURO Stainless Steel can be formed to meet specific architectural requirements, and to provide stiffness and ventilation within the panel.

The inner facing of Republic Electro Paintlok is formed into pans spot-welded together to provide the structural part of the panel. The excellent paint adherence of this material makes it suitable as a finished wall—or it may serve as the base for various finishing materials.

The type of insulating material is determined by the required fire rating—with the test range at present up to 2 1/2 hours. Depending upon panel thickness and material used, the “U” factor varies from .076 to .208.

Note these advantages:

1. **LIGHT WEIGHT**—Panels weigh from 6 to 10 pounds per square foot depending upon thickness and insulation. Possible reduction of wall weight from 150 to 10 pounds per square foot with only 1/15 the weight on skeleton frame and foundation.

2. **ADDED FLOOR AREA**—A 5-inch thick panel takes the place of a 14-inch masonry wall. As much as ¾ square foot of rentable floor space can be gained for each linear foot of exterior wall on each floor.

3. **FAST, ECONOMICAL CONSTRUCTION**—Shop preparation of panels means fast, accurate fit. Panels are attached to continuous structural angles fastened to the structural skeleton. Provision for vertical and horizontal adjustment assures accurate alignment.

Would you like to know more about this modern type of construction and how you can apply it to multi-story buildings? Republic engineers and metallurgists are ready to bring you their unequalled experience in curtain wall design and construction . . . Write us.
strikes the modern stainless note
with ALLEGHENY METAL

The 4-story, 460-foot long office building that fronts GE’s new turbine plant in Schenectady is an architectural first. The walls are 3-inch thick insulated stainless steel panels instead of the usual masonry ... and no departure from old, time-worn methods was ever better justified.

Beside the obvious advantages of lustrous beauty and lifetime resistance to atmospheric corrosion, the use of stainless walls meant increased floor space, speedier construction, lower erection costs, and big savings in maintenance and depreciation costs. Insulating qualities were superior to a 12” plastered masonry wall. Weight was so much less than four stories could be placed on structural steel and foundations designed originally for three floors in masonry. Cold-weather construction problems were eliminated, and working conditions were safer and cleaner due to the virtual elimination of material elevators, scaffolding and forms.

Write for your copy of "STAINLESS STEEL CURTAIN WALLS... Progress Report on Methods"

Here’s a brand-new technical brochure for architects and designers—the last word on the revolutionary structural development of stainless steel “sandwich” panels. Presents all the data available to date on leading types of panels—their construction, installation, etc., for your information and selection.

ADDRESS
DEPT. AF-3

Where can you use Allegheny Metal to similar advantage? Let our Technical Staff help you.
Here's a handsome, permanent panel for wall construction

Armco Steelox, long used as a basic building material, now is available in Armco Stainless Steel for wall construction. The strong, light, easily erected wall panels can be obtained in module widths and offer great flexibility in designing walls for all types of buildings—large and small. Full architectural freedom is assured by self-framing Steelox panels, which respond to horizontal or vertical treatment, as shown. Insulation and interior wall combinations are easily made with standard materials. Batts, rigid board, light-weight concrete slabs or insulating plasters can be used conventionally to meet individual requirements. The exterior surface of the panels is a soft, smooth, satin-finish stainless steel—pleasing to the eye and as enduring as it is beautiful. Stainless steel is well known for its great strength and corrosion resistance. It has the further advantage of being easy to clean and keep clean.

With Patented Armco Stainless Steelox, architects and builders are assured of long life, proved construction and sound engineering. Write and outline your problem or interest today.

ARMCO STEEL CORPORATION
981 CURTIS STREET, MIDDLETOWN, OHIO • PLANTS AND SALES OFFICES FROM COAST TO COAST • THE ARMCO INTERNATIONAL CORPORATION, WORLD-WIDE
and now—steel curtain wall
URING the past few years we have accumulated a vast store of information on this advanced type of exterior construction that promises material improvements over present conventional multi-story building practice.

Here are facts and data carefully gathered from many sources that will help you clarify your thinking on the comparative merits and future possibilities of thin, lightweight curtain walls in such handsome, non-weathering, fire-resistant and durable U-S-S Stainless Steel panels. They provide a unique combination of permanence and low maintenance costs, greater ease and greater economy of construction.

Let us show you how these large-size, lightweight, easily-fitted curtain wall panels of U-S-S Stainless Steel can reduce site labor costs and simplify and speed up erection. How readily these panels can be adapted to both vertical and horizontal designs. How ideally stainless Steel pilaster sections can be combined with colorful spandrels of porcelain-enamed steel to produce an infinite variety of attractive wall treatments.

Let us calculate for you the potential economies of such construction—how its greater weight can reduce costs by reducing the tremendous loads of present exterior walls on steel skeleton and foundations...how its thinner section will save space to provide additional rentable area...how it will save money by minimizing upkeep and cleaning costs. Learn, too, how recent and contemplated changes in building codes are paving the way for an ever-widening use of such construction.

These pertinent facts and many more which are essential for a better understanding of this important development are yours for the asking. Write us and tell us what you want to know, or better still, have one of our development engineers call in person to discuss this matter with you.

U-S-S STAINLESS AND PORCELAIN-ENAMELED STEEL: Combined in lightweight, permanently good-looking panels like this, provide a curtain wall that saves weight and space, that speeds up erection, that can be kept clean and weather-tight at minimum cost. The Stainless Steel sections can be produced in a variety of attractive contours, fluted, formed or corrugated, in all architectural finishes. Porcelain-enamed steel sections can be obtained in any color and in any finish and texture desired. These all-steel panels, produced to exact dimensions, can be fabricated in units, one, two or even three stories long, and up to 96 inches wide. All attachments to the building frame are simple and differ only slightly from conventional methods.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO - CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO - NATIONAL TUBE COMPANY, PITTSBURGH - TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST TO COAST - UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U-S-S STAINLESS STEEL
SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL
You can bank on STAINLESS STEEL

at the Pelham Parkway Branch of The Bronx Savings Bank
(Hubert E. Reeves, Architect)

The proven low maintenance cost of stainless steel was a primary reason for its selection for application in the Pelham Parkway Branch of The Bronx Savings Bank.

In this gem of a neighborhood bank, the stainless steel, buffed to a satin finish, gives a pleasing and luxurious appearance.

Stainless steel is also outstanding for its adaptability to architectural forms for both exterior and interior applications, including such a wide variety as curtain walls, window frames, grill doors, ornamental trimmings, and even tiny screws.

To insure the production of consistently high grade stainless steel, the use of ferro chromium of dependable quality and precise analysis is of prime importance. Vancoram Brand Ferro Chromium, made by closely controlled processing methods from carefully selected raw materials, fills these requirements. Low-carbon grades for the manufacture of stainless steel are supplied with a carbon content from 0.06% max. to 2.00% max., all containing from 67% to 72% chromium.

If you have a technical problem involving the making, treatment, fabrication, properties, or performance of stainless steel, our metallurgical engineers will be glad to help you solve it.
THIS complete aluminum service, from mine to you, is as near as your phone. And remember, bright, enduring Reynolds Architectural Aluminum costs less than any of the modern architectural metals. So, whatever your needs, large or small, just call the nearby Reynolds Sales Office listed under "Aluminum" in your classified telephone directory. They can tell you where many of the items may be obtained from local warehouse stock. If it's a fabricated aluminum product they will be glad to recommend the names of dependable suppliers. In any case, when it's aluminum for architectural use, ask Reynolds.

Write for the Reynolds Architectural Aluminum folio. Contains technical data on the complete range of materials and engineering drawings for direct tracing.

REYNOLDS METALS COMPANY
Aluminum Division
2528 South Third Street • Louisville 1, KY.
Again first—Pullman-Standard is pioneering in the fabrication of stainless steel and aluminum for the curtain-wall buildings of tomorrow.

America's most famous streamliners, built by Pullman-Standard, are traveling demonstrations of experience and facilities which now can be directly applied in a new and spectacular field—the use of die-formed metal panels and spandrels in curtain-wall building construction. Pullman-Standard has already entered into discussions of designs and specifications with a number of architects, builders, owners, and metal producers—aimed at the development of the best and most economical methods of fabrication, assembly, and erection. One large-scale project, involving metal panels for a building exterior, has already been undertaken.

These developments at Pullman-Standard are backed by eighty-three years of service to the American economy. Architects, builders, and owners are invited to use the services of Pullman-Standard's engineers... at any stage of their planning.
Demonstrating versatile GEORGIA MARBLE

in the exciting New Technique of
CURTAIN WALL CONSTRUCTION

That Georgia Marble is thoroughly adaptable to contemporary design is evidenced by its application in Curtain Wall Construction in the Detroit Branch of the Federal Reserve Bank of Chicago. A preview of this construction is editorially featured in detail in this issue of Architectural FORUM. As a modern material, versatile Georgia Marble lends the same dignity, beauty and permanence as when used in buildings of traditional design.

In the project illustrated above Georgia Marble was specified in both the original building erected in 1927 and in the addition now under construction. Thus in the span of 23 years, Georgia Marble has been twice employed and demonstrates its flexibility for use in both contemporary and traditional type of design.

The GEORGIA MARBLE COMPANY of Tate Ga.

SALES AND SERVICE OFFICES:

This building may never be built . . . that is, exactly as shown here. It is an architect’s dream, for one of several sites in downtown Cleveland . . . but a dream based on proven principles of modern, lightweight-skyscraper construction and the proven performance characteristics of today’s finer Porcelain enamel.

Light in weight, fire-resistant, absurdly low in maintenance cost and easily erected, LIFETIME PORCELAIN ENAMEL panels bring color, distinction and life to a building. They give building professionals, for the first time, complete freedom of design and color in creating modern curtain-wall structures.

Modern Architectural Porcelain enamel is now available in a rich semi-matte finish, and in a wide range of colors, from pastels to deep hues. It is easily fabricated, to specific specifications. It is easily insulated, in pan or panel form. Its installation in curtain-wall construction is entirely practical—and new, possibly even better application techniques are being studied right now.

While we of Ferro Enamel do not profess to know all the answers on curtain-wall construction, we can give you the latest and most authentic information on Architectural Porcelain enamel and its use in this field. Write for your copy of “Porcelain enamel and its use in Curtain-wall Construction”.

Ferro Enamel Corporation does not fabricating of steel, but as a leading supplier of raw materials, is constantly pioneering new products, new processes and new end-uses for Porcelain enamel.

FERRO ENAMEL CORPORATION

4150 East 56th Street

Cleveland 5, Ohio
PROFITS PLUS with G. P. C. PUMICE!

28,700 Tons of Deadweight SAVED with lightweight Pumice Aggregate

28,700 tons of steel and other building materials translated into dollars represent a very handsome profit to the owners of these two buildings, made possible by the use of lightweight aggregates. The same thing can be done in every other city in this type of construction with GPC Pumice. Architects and engineers who design around the multiple characteristics of GPC Pumice are sure to achieve weight-saving, space-saving, and a reduction in the operating cost of a building.

GPC PUMICE CONCRETE Features
- low weight-to-strength-ratio
- passes 4-hour fire test
- low-cost fireproofing for steel
- unusual shock resistance
- an excellent insulator — eliminates furring out
- high acoustical values — sound transmission reduced 50%

Here is a summary of tests on GPC Pumice made by a U. S. Government unit:

<table>
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<th>Cement Sacks</th>
<th>Compressive Strength PSI</th>
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</tr>
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</table>

Write for booklet “DESIGN WITH GPC PUMICE”

General Pumice Corp.
P. O. Box 1445
Sante Fe, New Mexico

70 East 45th Street
New York 17, N. Y.
**THE CURTAIN WALL**


*Facing and paneling of Alberene Serpentine. Station KYW, NBC, Philadelphia, Pa. Architects — Tilden & Pepper*

*Spandrels of Alberene Serpentine. Continental Oil & Gas Building, Houston, Texas. Architect — Kenneth Frankeham*

---

**Distinctive, Durable, Dollar-Saving**

**Veneers or Panels of ALBERENE Stone**

When you're planning thin veneers on masonry backing or panels set in frames, here are the advantages you can count on from Alberene Stone, thanks to its unique combination of natural properties —

- **It's economical.** It can be cut into thin sections — 7⁄16 and 11⁄4" are the usual, practical thicknesses. That means money saved for your client . . . greater flexibility in design for you — for example, it permits greater depth of reveal in spandrel sections. Alberene Stone is reasonable in price and free of maintenance expense for the life of the building.

- **It's attractive.** With two types of stone to choose from — *Regular blue-grey soapstone* and *Virginia Black Serpentine* — you can get a range of dark tones from grey through blue-grey, blue-black, to black. The Regular grade takes a fine honed finish and acquires an interesting, antique-bronze effect over a period of time. The Serpentine takes and retains a high polish.

- **It's durable.** Alberene Stone's moisture-proof surface doesn't chip, scale, or split — it always looks good. Installations of Alberene Serpentine made over a decade ago show no deterioration of polish, are still richly handsome in appearance.

We'll be glad to send you a set of samples, conveniently boxed, showing the range of stones available from our quarries. Just write to —

**ALBERENE STONE CORPORATION OF VIRGINIA**

419 Fourth Avenue, New York 16, N. Y.

Offices in Principal Cities
THE CURTAIN WALL

PERMALITE (Perlite): an ideal lightweight building material effects important economies under new curtain wall building codes. Many uses of Permalite... including its application as an outstanding curtain wall material... are presented here by one of the major producers of perlite aggregates.

FINANCIAL AND REAL ESTATE INTERESTS are thoroughly studying the use of Permalite in new construction planning as it becomes evident that a dead load-live load ratio as low as 1:1 for an ideal low cost, lightweight building is now considered possible through extensive application of this versatile lightweight material.

POSSIBLE SAVINGS OF 80% in dead load for ideal lightweight building.

The many combined uses of Permalite in lightweight building construction result in important savings in structural steel and foundations and make possible a permanent fireproof, lightweight, insulated building with a dead load to live load ratio as low as 1:1. An ideal lightweight building is possible through the combined 5-step use of Permalite as follows:

FIREPROOFING
Step 1) Lightweight Permalite plaster—speedily applied—for fireproofing of all structural steel. This replaces the slow, costly imbedding of structural steel in heavy concrete, at present in use.

CURTAIN WALLS
Step 2) Thin, light Permalite concrete curtain walls (blocks, slabs or monolithic)—easily formed and erected to replace heavy, thick masonry, much more costly erected, in general use today.

FLOORS AND ROOFS
Step 3) Lightweight Permalite concrete used in roofs and floors over lightweight steel decking to replace heavy reinforced concrete in conventional construction.

PLASTER
Step 4) Lightweight Permalite plaster—more crack resistant than sanded plaster—replaces sand plaster at less than half its weight.

ELEVATOR SHAFTS AND STAIR WELLS
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Fire tests conducted by Underwriters' Labs. Inc. as described in U.L. Rep No. 2992, cover a steel floor assembly made up of 2 in. Permalite concrete for cellular steel decking, supported on steel beams with a suspended ceiling of 1 in. Permalite plaster on metal lath. This construction received a 4-hour rating.

18,000 precast Permalite concrete blocks were used as a thin, lightweight curtain wall (4-hour fire rating) in the Employers Casualty Building of Dallas, Texas. Architect: George Dahl; General Contractor: James Stewart & Company, Inc.

Permalite is included in the Underwriters' Labs. Inc. List of Inspected Fire Protection Equipment and Materials under classification Plaster Aggregates.


As a service to the readers of Architectural Forum, Great Lakes Carbon Corporation will make available complete information on Permalite plaster and concrete aggregates, their multiple applications and all test results to date. The Product Engineering Department, Architectural Sales Department and extensive research facilities are available to assist your staff in the actual design of a low cost, lightweight building or other applications of Permalite. Requests should be made to Dept. FM, Building Products Division, Great Lakes Carbon Corporation, 18 East 48th Street, New York 17, N. Y.

PERMALITE plaster aggregate was used to fireproof the structural steel roof support in both the Senate and House Chambers of the Capitol Building, Washington, D. C. Architect of the Capitol Building—David Lynn. General Contractor—Consolidated Engineering Co. Plastering Contractor—McVayl Brothers.
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THE CURTAIN WALL

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CURTAIN WALLS

the long overdue counterpart
of the structural steel frame,
are rapidly emerging as
the prime development of this era
of skyscraper construction

by ROBERT L. DAVISON*

presentation by HENRY WRIGHT**

There is nothing new in the idea of the curtain wall. Without curtain walls, skyscrapers would have been impossible. The last tall building with self supporting walls was the 16-story Monadnock Building (Chicago, 1893), in which the walls reached a thickness of 15 ft. at the base, this being the amount of masonry needed to support the crushing weight of the superimposed masonry. After this, those who wanted to push their structures more than six or eight stories into the air have supported the walls first on cast iron columns, and later on steel columns, which can be depended upon to carry some 50 times the weight that can safely be imposed on the same cross section of masonry piers. In such buildings the walls have become a mere appendage—an appendage which rarely supports even its own weight for more than a single story, and never for more than two or three floors.

Thus the appellation "curtain walls." The term has also been applied to other nonstructural walls such as a false wall within an enclosing foundation, but its most common use has been to describe the facing and enclosure of the structural steel "cage" which supports the entire weight of the modern multistoried building.

As such, the term is only partly apt, since the kind of curtain in which most tall buildings have been draped is a substantial sandwich of 12 in. of masonry materials, or 10 in. of masonry and metal, plus furring, weighing somewhere between 100 and 175 lbs. per sq. ft. of surface area. In the case of a building as large as the Empire State Building, this ponderous shroud has a total weight upwards of 30,000 tons, all of which is added to the loads which must be borne by the structural steel columns and column footings.

What is new is that the building codes of New York and other major cities—which were the factor that forced the architects of the Empire State Building and other skyscrapers to load the building frames with all this dead weight—are beginning to recognize that much
of this masonry is unnecessary, and that many materials, including masonry, can be used to form thinner, lighter curtain walls capable of all the functions such an enclosure is called upon to perform.

In a sense most building codes have always recognized this fact by permitting ordinary windows to occupy up to 100 per cent of the wall area—thus discriminating in favor of curtain walls of glass, and giving a decisive push to designs such as that of the new U.N. Secretariat, (page 81), which—legally speaking—has no outside “walls” at all on its east and west flanks, only windows which extend uninterrupted from column to column and floor to floor. (The fact that on each floor, immediately behind the glass of the lower part of the “window” there is a parapet 2½ ft. high consisting of 1 in. of asbestos insulation and 4 in. of solid cinder block, is legally significant only so far as the inside of the building is concerned; the parapet is designed to meet fire regulations, but in one direction only.)

This basic building-code inconsistency, revealed on a striking scale by the U.N. Secretariat and on a smaller scale by innumerable smaller structures with all-glass facades scattered through our cities, is embodied in all of our municipal codes and remains unresolved, continuing the Alice-in-Wonderland situation in which one part of an office-building wall (which may be all of it) is permitted under one set of standards, while another part, distinguishable mainly by a different name from the first, must meet more stringent standards. What has changed is that the second set of standards, under the new performance-type codes which have been pushed through in most large cities, has been sufficiently relaxed to close somewhat the gap between the two and to permit the use of lighter, thinner curtain walls than were hitherto possible. This has been done without dictating the types of material to be employed.

NEW YORK, one of the cities which formerly required the walls of multistory office buildings of Class I (fireproof) construction to be 8 in. of solid masonry and to resist a 4 hr. fire test (twins requirements which effectively bar thin curtain walls) now will accept nonbearing panel walls of any thickness as long as they will pass a 2 hr. fire test plus the tests for lateral strength. This is by code, but use of curtain walls has been delayed because, until recently, a simultaneous fire and load test procedure, not required by code, were requested by New York’s Board of Standards & Appeals. According to Bernard J. Gillroy, Commissioner, Department of Housing & Building in New York, the fire test must be met only from inside sole fire requirement for outside is incombinability.

CHICAGO’s new code (approved December 1949) is most recent of performance codes of big U. S. cities, and has no specified thickness requirement for curtain walls. The general fire-rating of 2 hrs. is dropped to 1 hr. for the outside of exterior walls more than 30 ft. from another building area and 3 hrs. for inside exposure of exterior walls.

PITTSBURGH’s 1947 code now accepts curtain walls of any thickness if they pass strength tests and get fire ratings of 2 hrs. (1 hr. if approved by Board of Standards & Appeals).

CLEVELAND’s brand new code (June 1949) also accepts 1 or 2 hr. fire-rated curtain walls, depending on set back. No minimum thickness requirement.

LOS ANGELES—Spandrel walls fronting on streets may be constructed of any incombustible materials in Type I buildings. Curtain walls on property line exposures may be of 2 hr. fire resistive construction where the exposure hazard is light.

ST. LOUIS is an example of the numerous cities still hampered by the old requirement of 12 in. of masonry which inhibits efficient curtain wall construction. But a new bill backed by the Building Department and now before the Board of Aldermen will allow sufficiently strong sandwich panels composed of 22 gauge metal, as sheathing for 2 in. of incombustible insulation, for exposures 40 ft. clear, in the center of the city. Actual fire rating on these probably will be about ¾ hr.; connectors must have a 1 hr. rating.

Important in the national code picture—and about to become more important—are the model codes drawn up by several national groups. The National Bureau of Standards recommends an exterior wall fire resistance of 1 to 2 hrs., depending on exposure. Based on combustible contents of the building’s interior, fire resistance would be 2 hrs. Next month, the new Basic Code of the Building Officials Conference of America will be published, and sections of it have already been adopted into several local codes. Significantly, this performance-type code will have no thickness requirement for curtain panel walls. Fire test will be 2 hrs. (interior) and from ¾ hr. to 2 hrs. (exterior) depending on exposure.

The Uniform Building Code of the Pacific Coast Building Officials Conference calls for 1 hr. fire resistance where unprotected openings are permitted, and 2 hr. fire resistive walls where fire protection of openings is required. Thickness requirement: none. Southern Standard Code allows any noncombustible curtain, no thickness stated, which will meet a 2 hr. test where the wall fronts on a street or other public place, and 3 hrs. otherwise.

National Building Code (recommended by National Board of Fire Underwriters) still demands wall panel that will meet a 4 hr. test, but does not require masonry or any other specific material.

As both a result and a cause of these code changes, and in response to the demand of progressive architects, builders and building owners for thinner, weight-saving curtain walls, many of the producers of building materials have initiated the necessary research and development work to produce curta
wall systems capable of meeting the new code requirements—and, almost as important, the Herculean task of convincing city building officials all over the country that code requirements have been met.

**Aluminum Company of America**, basing itself on long experience with cast aluminum spandrels (which until recently had to be used as a decorative facing for 8 or 12 in. of masonry), has given a great deal of attention to the development of thin, fire-resistant back-up materials for panels of cast, sheet, and most recently extruded aluminum. Steel companies, whose products enjoyed wide wartime usage for insulated panel walls for industrial plants and other non-code construction, have been equally active in their efforts to develop methods of rendering steel panels suitable for use in multistoried buildings and capable of meeting code requirements. (Companies now doing active development and promotion work in this field include such steel company giants as Allegheny Ludlum, Armco, Carnegie-Illinois, Crucible and Republic.) In addition, the major steel companies now making stainless steel have recently sponsored **Stainless Steel Producers** with headquarters at the **American Iron & Steel Institute** to undertake promotion of stainless steel in building, with particular emphasis on curtain walls. Among copper producer, **American Brass** has developed a curtain wall design, and in the field of back-up materials **Pittsburgh-Corning** (Foamglas), **Owens-Illinois** (Kaylo Division), **Great Lakes Carbon** (Perlite Division) and **U. S. Gypsum**, **Zonolite**, **Johns-Manville**, are all carrying on research and development work. Fabricators who have been manufacturing and selling curtain walls, largely in non-code areas, include **H. H. Robertson**, **R. C. Mahon**, **Detroit Steel Products** and **The Cemenstone Corp.**, with **Pullman Standard** now entering the field. Thus the curtain wall idea has a roster of sponsors of which the present list is necessarily incomplete, for it is beginning to read like a *Who's-Who* of the building materials field.

**WHY CURTAIN WALLS?**

The diagrams at the right show the reasoning behind all this excitement—the two big reasons why thin curtain walls make sense. Both reasons are economic: thinner walls, it is claimed, can save on construction cost and at the same time increase revenue—buttressing the profit column from both sides. Cost savings may be entirely in the structural frame, due to decreased weight, or in the wall as well, since the thinner wall may be cheaper to build—foot for foot—than conventional masonry. In a tall enough building, on the other hand, weight savings from use of lightweight back-up material will pay for the increased thermal insulation necessary for the thinner wall. In a 20 story building these savings run about $4 per lin. ft. of wall per floor, or enough to compensate for a difference of 60 cents a sq. ft. in the cost of a 6 ft. 9 in. high spandrel wall.

The increased revenue from the increased space which results from thinner walls is of greater relative importance, but requires careful statement to be convincing. It is sometimes argued, for example, that this advantage is illusory, since “the few inches of space added to each office would not result in increased rents.” As a matter of fact, under the standard methods used for computing office rentals, it would; but this is not the point. The point is, that in a building designed on the basis of thinner walls, maximum advantage would be taken of the added space, in whatever way made the most sense. Since such buildings are normally built out to the last inch of available space, this would most frequently take the form of increasing the rentable area; if this were not done, then the thinner walls would result in a smaller building and therefore lowered costs. With the average cost of office building construction above the first floor, including the prorated cost of land, running over $27 per sq. ft. of floor (1948), the value of the space saved or added for each 4 in. reduction in wall thickness is $9 per lin. ft. of wall per floor, or $18 per ft. for a reduction from a 12 in. wall to one 4 in. thick.

A third advantage to be gained from thin curtain walls in some instances is increased thermal insulation, with corresponding savings in heating costs. So long as the basic factor determining the design of such walls remains a matter of meeting fire regulations, this insulation is not likely to be realized to an important degree, since there is a conflict between the properties which make for good thermal insulation, in the ordinary sense, and resistance to the typical fire test. Where arbitrary code regulations need not be considered, however, this advantage can be realized. Many of the insulating materials suitable for thin curtain wall construction are more than 15 times as effective as thermal insulators than ordinary masonry, and it is no trick at all to put together a 4 in. wall with twice the insulation value of 12 in. of brick by incorporating such materials. The value of the resulting fuel saving is likely to be on the order of 2 cents per sq. ft. of wall per heating season, or as much as 50 to 75 cents over the life of the building. This is more than sufficient to pay for any added cost of the insulation, but of no great economic significance relative to the other costs involved in the curtain wall picture, unless the increased comfort, increased usability of space, and ease of heating resulting from the insulation are assigned economic value.
THE PROBLEM

The principal forces which the curtain wall is called upon to resist, under code conditions, are the legal powers wielded by building commissioners. Of course, the curtain wall must exclude the elements, provide reasonable security against unauthorized entrance to the building, conserve or exclude heat, according to the season, let in daylight, etc.—do all of the things that a wall is normally called upon to do except hold up the floors and roof. But the decisive forces which determine its design are wind and fire—wind and fire not in their real form, but in their fictionalized form as embodied in building codes. Thus while the actual wind load might vary widely according to the position of the wall in the building, its height, aero-dynamic shape, etc., etc., the design wind load is a uniform pressure of so many pounds per sq. ft.—usually 30 lbs.—acting uniformly over the entire wall and window area. The need for fire protection, on the other hand, is assumed to stop quite magically at the window sill and jambs—the fire raging furiously below and beyond these points but nonexistent above and within them.

The basic theory of such fire protection is that of protecting the interior of the building, and its contents, from fires of external origin. This is generally broadened to include the function of containing a fire which originates within the building as well, but many codes are not clear as to whether or not this is required, and the point is entirely academic, since in any event the presence of window openings would prevent the wall from actually performing either function.

To meet both requirements, the construction of the curtain wall must be such that one surface will not exceed an average rise of 250° F. within two hours after application of a certain amount of heat—equivalent to a raging fire—to the opposite surface.

Since a loading of 30 lbs. per sq. ft. is equivalent to that normally used as a roof load for light structures, and since the portion of the load acting upon the window area must be added to that acting directly upon the wall, this means that the curtain wall must possess a fairly high degree of strength, both within each unit of surface area, and as a membrane attached to the structure of the building. Assuming the typical office-building frame, the diagrams below illustrate various ways in which the required strength can be achieved. For the sake of simplicity, they are based on the further assumption that the basic material of the wall (either the facing or the back-up material, or both together) is capable in itself of spanning 2 or 3 ft. under the required loading, but requires additional stiffening at about this interval to resist the cumulative effect of the wind load on the wall panel as a whole and the load transferred from the window surface. Each of the methods shown assumes complete neutrality of the curtain wall so far as the structure of the building is concerned; a fourth type would be one in which the curtain wall panel took the place of the regular spandrel beam, becoming a part of the structure of the building and utilizing the full height from window head to window sill to perform this structural function.

CANTILEVER

This solution takes advantage of the fact that in most multistoried buildings the depth of the structural spandrel-beam is relatively great, and the height of the wall beneath the window relatively small. By fastening stanchions—or the panel itself, provided it has the necessary stiffness—to the top and bottom of the spandrel beam, sufficient strength is developed to resist the inward thrust of the wind pressure on the wall and the window above. The cantilever method is understandably popular for ribbon-window buildings.

FLOOR TO FLOOR

Simplest of all methods is that of applying continuous studs to the face of the building frame which span the space between floors like simple beams. Chief disadvantage of this method, of course, is that the studs must be incorporated in the fenestration above the spandrel, but, depending on the type of window used, this can also be a virtue, as when the windows require such stiffening in any event. For the windowless building, or one with few and relatively small openings, this method is unquestionably the most feasible.

COLUMN TO COLUMN

Most logical of all methods where continuous radiator enclosures are to be used is a system of horizontal girts spanning between the columns at the level of the window sills and heads. While the upper member—that at the window sill—must possess considerable stiffness when columns are widely spaced the opportunity exists to give this member considerable width by using it as an inside sill over the normal radiator enclosure.

The column-to-column solution leads naturally to the next logical step: use of the curtain wall panel as a spandrel beam.
FACING MATERIALS

To date, most of the interest in lightweight curtain wall construction has centered around metal-faced walls and panels—most notably, panels faced with aluminum in cast, sheet or extruded form and steel, particularly stainless steel. Copper-faced panels have also been tried out experimentally. Porcelain enamel on steel, and porcelain enamel on aluminum, both obvious contenders because of their extensive use as a facing for masonry walls, and potentially low in cost have yet to enter the field with a developed system of curtain wall construction meeting the codes but will undoubtedly do so.

Appropriate facing materials for thin curtain walls are by no means limited to the metals, however. They include all of the basic types of conventional facing materials; metals, ceramics, vitreous materials and stone. (Two of the first large buildings to employ thin, lightweight walls—the General Petroleum Building in Los Angeles and the Federal Reserve Bank Annex in Detroit—are faced respectively, with terra cotta tile and marble.) The basic requirements remain the same as for any wall facing: durability, resistance to the elements, good appearance, etc., plus the added premium which the curtain wall approach puts on lighter weight and lack of bulk.

In respect to fire resistance, an aluminum facing is rated as "incombustible" but melts at 1215° F. It meets codes satisfied with incombustibility of wall facings but where fire-tests are demanded it requires a more strongly reinforced back-up than, for example, stainless steel or porcelain enamel steel, which are capable of withstanding the fire and contributing to the strength and impermeability of the wall. The bulkier facing materials, such as brick and terra cotta, have the advantage of combining the properties of a facing with some of those usually supplied by the back-up.

The variety of facing materials used for thin curtain walls will probably be greater than the variety used in conventional walls, with the color possibilities of porcelain enamel and structural glass vying with the texture of brick and stone, the ease of fabrication of aluminum, and the strength and fire resistance of stainless steel.

<table>
<thead>
<tr>
<th>FACING MATERIALS</th>
<th>APPEARANCE</th>
<th>PERFORMANCE</th>
<th>COST</th>
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<td><strong>Color</strong></td>
<td><strong>Choice of color</strong></td>
<td><strong>Choice of pattern</strong></td>
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<td>Slight</td>
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<tr>
<td>Extruded</td>
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<tr>
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<tr>
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<tr>
<td>Alumelit</td>
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<tr>
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<td>No</td>
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<tr>
<td><strong>COPPER</strong></td>
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<tr>
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<td>Granite</td>
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Since most of the advantages of thin, lightweight curtain walls hinge on the economics of construction costs and rental values, it is essential that architects, engineers and building owners who are contemplating the use of such walls have accurate information on the relative cost of various systems and comparative costs of conventional construction. Such comparisons, to be really reliable, must be made on the basis of actual prices for a given building, to be built in a given place at a given time. As a general guide to such comparisons, however, and in order to establish the broad outlines of the problem, the Forum retained the Construction Survey Co. of New York, leading estimators, to prepare the cost estimates of various types of wall construction shown on this and the following two pages.

The portion of the table immediately adjoining, and on the facing page, shows the cost of the various elements used in thin curtain wall construction of various types—facing materials, erection, attachments, etc. Subtotals are shown for walls which, while complete in other respects, are not designed to meet a 2 hr. fire test, and on the right-hand portion of the chart the cost of the necessary back-up materials which must be added to produce a wall capable of withstanding such a test, the cost of the structure to support the wall, and the thermal insulating value achieved. On the following page these costs are summarized into total construction cost, "rental value cost"—the capitalized cost of the space the wall occupies—and "total economic cost"—the sum of first two figures.

Although these estimates have been checked by some of the leading authorities in the office building field, it must be borne in mind that the prices of each of the elements involved will inevitably vary in different parts of the country, and may vary in their relationship to one another as well as going up or down at different times in the building cycle.

To simplify comparisons, the Forum's figures are based on a curtain wall cantilevered from the face of the spandrel beam (see page 84), with the height of the wall from window head to window sill taken at 6 ft. 9 in. It has also been assumed, for the purposes of the cost study, that the space between one such spandrel wall and the one above will be filled by a continuous band of windows, and that the inside surface of the wall would not require finish for esthetic reasons since it would probably be covered by a continuous convector cabinet or air-conditioning cabinet (there is allowance for finish, however, on the inside surface of the wall between the head of the window and the ceiling). Prices in all cases are per linear foot of spandrel wall 6 ft. 9 in. high.

### Table: Costs

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<tr>
<th>DESCRIPTION</th>
<th>LOCATION</th>
<th>MATERIAL</th>
<th>FACE</th>
<th>ATTACH. HEAD</th>
<th>WINDOW</th>
<th>TOTAL COST</th>
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<td>7.28</td>
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1. Includes plaster at ceiling at 23 cents per sq. ft.
2. Light weight concrete
3. Concrete sandwich
4. Does not meet 2 hr. fire test
5. Does not meet 2 hr. fire test without furring, lath and plaster
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<th>Subtotal</th>
<th>Thermal Insulation</th>
<th>Steel Inside Face</th>
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<th>Reinf. for Alum. Wall</th>
<th>Furring, Loching, Plaster &amp; Dampprf.</th>
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<th>Total背-Up Cost</th>
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TOTAL COSTS for conventional and thin walls show that space saving has greatest effect on "economic cost"

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<tr>
<th>METAL PANELS</th>
<th>A (Total Cost 2 hr. F. T.)</th>
<th>B (1) Spandrel, Beam &amp; Column Rent Value Cost</th>
<th>C (2) Capitalized heat loss</th>
<th>D (3) Total Economic Cost</th>
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<tr>
<td>Sheet or Extr. Aluminum</td>
<td>14.89</td>
<td>10.00</td>
<td>15.00</td>
<td>.45</td>
</tr>
<tr>
<td>Porcel. Enamel Steel</td>
<td>22.51 (5)</td>
<td>10.00</td>
<td>13.33</td>
<td>.24</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>15.26 (4)</td>
<td>10.00</td>
<td>6.67</td>
<td>.23</td>
</tr>
<tr>
<td>Stainless Steel 2 hr. F. T.</td>
<td>15.42</td>
<td>10.00</td>
<td>15.00</td>
<td>.33</td>
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<tr>
<td>Copper</td>
<td>15.86</td>
<td>10.00</td>
<td>23.33</td>
<td>.33</td>
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<tr>
<td>Stainless Steel &amp; Concrete</td>
<td>19.60</td>
<td>10.00</td>
<td>13.33</td>
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<tr>
<td>Stainless Steel, Concrete &amp; Glass Sandwich</td>
<td>22.75</td>
<td>10.00</td>
<td>13.33</td>
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<tr>
<th>GLASS WALL</th>
<th>A (1⁄4 in. Wire Glass)</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tbody>
<tr>
<td>20.25</td>
<td>10.00</td>
<td>6.67</td>
<td>1.70</td>
<td>38.62</td>
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<table>
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<tr>
<th>MASONRY SLABS</th>
<th>A (Reinf. Brick Masonry)</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<tbody>
<tr>
<td>23.83</td>
<td>12.00</td>
<td>16.66</td>
<td>.48</td>
<td>52.97</td>
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<tr>
<td>Precast Concrete</td>
<td>28.42</td>
<td>12.00</td>
<td>13.33</td>
<td>.48</td>
<td>54.23</td>
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<tr>
<td>2 in. Limestone</td>
<td>28.89</td>
<td>12.00</td>
<td>13.33</td>
<td>.48</td>
<td>54.70</td>
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<tr>
<td>2 in. Granite</td>
<td>35.64</td>
<td>12.00</td>
<td>13.33</td>
<td>.48</td>
<td>61.45</td>
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<tr>
<td>2 in. Marble</td>
<td>32.27</td>
<td>12.00</td>
<td>13.33</td>
<td>.48</td>
<td>58.08</td>
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<tr>
<td>2+2 in. Terra Cotta</td>
<td>39.69</td>
<td>12.00</td>
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<td>.48</td>
<td>72.17</td>
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<table>
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<tr>
<th>MASONRY, METAL VENEERS</th>
<th>A (4 in. Face Brick)</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tbody>
<tr>
<td>17.01</td>
<td>14.00</td>
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<td>.51</td>
<td>74.85</td>
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<tr>
<td>4 in. Granite Veneer</td>
<td>47.38</td>
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<td>43.33</td>
<td>.53</td>
<td>105.24</td>
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<tr>
<td>4 in. Limestone Veneer</td>
<td>37.25</td>
<td>14.00</td>
<td>43.33</td>
<td>.53</td>
<td>95.11</td>
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<tr>
<td>4 in. Terra Cotta</td>
<td>37.25</td>
<td>14.00</td>
<td>43.33</td>
<td>.42</td>
<td>95.00</td>
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</tr>
<tr>
<td>4 in. Cast Stone</td>
<td>24.25</td>
<td>14.00</td>
<td>43.33</td>
<td>.53</td>
<td>82.11</td>
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<tr>
<td>Cast Aluminum</td>
<td>27.59</td>
<td>14.00</td>
<td>43.33</td>
<td>.45</td>
<td>85.37</td>
<td></td>
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<tr>
<td>Sheet or Extr. Aluminum</td>
<td>15.43</td>
<td>14.00</td>
<td>36.66</td>
<td>.39</td>
<td>66.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porcel. Enamel Steel</td>
<td>17.46</td>
<td>14.00</td>
<td>36.66</td>
<td>.45</td>
<td>67.57</td>
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<tr>
<td>Stainless Steel</td>
<td>18.03</td>
<td>14.00</td>
<td>30.00</td>
<td>.29</td>
<td>62.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Allowance is made for the reduced cost of the structural steel frame in the case of the lighter walls. The figures used are based on a 20-story building with 25 ft. column spacing, and work out to $10 per lin. ft. of wall for the lighter walls and $14 per lin. ft. for the heavier walls.

(2) The "rental value cost" of each of the walls was computed as follows: the rental value of the floor space occupied by the wall was taken as $4 a sq. ft. per year—a realistic current figure—and this was capitalized by multiplying by 10 years, giving $40 per sq. ft. as the capitalized value of rentable space. On this basis, the space occupied by a 12 in. wall has a capitalized value of $40 per lin. ft., the space occupied by a wall 3 in. thick only $10.

(3) To show the effect of added heating costs, particularly in the case of the all-glass wall, an amount has been added to the economic cost of each of the walls corresponding to the average office building heating cost (in New York City) for a ten year period using steam supplied from a central source.

(4) Does not meet 2 hr. fire test.

(5) Does not meet 2 hr. fire test without furring lath and plaster.
BACK-UP MATERIALS

Nowhere is the stultifying effect of the building-code fire test more evident than in the selection of back-up materials for the thin curtain wall which must meet code requirements. The reason for this has already been mentioned: there is a basic conflict between the properties contributing to good thermal insulation at normal temperatures and those required to produce a material capable of meeting the fire test. If the fire danger were real, this might be accepted as inevitable; since, in the case of the modern office building wall, it is largely imaginary, and since the protection the wall affords, if needed, is canceled by the nonfireproof windows, it is especially unfortunate.

The origin of this conflict lies in a peculiar physical phenomenon which enables some masonry materials to slow down the rate of heat transfer from the side of the wall exposed to the fire to the opposite side, because of the quantity of heat needed to vaporize the moisture present in the material in chemical combination with its constituent moisture is sufficient to delay the rise in temperature of the inside of the wall—away from the fire—does not rise above 212°, and thus remains well below the 250° F. limit well before the end of the test period. Good thermal insulation, on the other hand, depends upon entrapped moisture, but it will heat up steadily, and even a comparatively small quantity of constituent moisture is sufficient to delay the rise in temperature of the inside surface. Good thermal insulation, being both light in weight and chemically dry are of least value, besides having the disadvantage of melting points, in most instances, that are below the temperatures to which they would be separated from the inside of the building by insulation, this same property causes the brick wall to exert a drag on the heating system, making it slower to warm in the morning, and storing heat which may be given off needlessly at night.

Pound for pound, brick and other ceramic materials do not afford as much fire protection, as defined by the codes, as do the various forms of lightweight concrete and other cast materials such as gypsum block which frequently contain a good deal of water in chemical combination. At the other end of the scale the various forms of thermal insulation, being both light in weight and chemically dry are of least value, besides having the disadvantage of melting points, in most instances, that are below the temperatures to which they would be subjected in fire tests. For these reasons, it seems probable that the development of thin curtain walls to meet code conditions will center around the water-bearing materials, with perhaps the addition of a layer of thermal insulation, at least until these requirements are further modified.

**MATERIAL**

**GENERAL DATA**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Aggregates</th>
<th>Concrete Mix &amp; Comp. Strength</th>
<th>Wt. per cu. ft. lbs.</th>
<th>Wt. per sq. ft. lbs.</th>
<th>&quot;U&quot; Factor</th>
<th>Fire Test</th>
<th>Cost in place in wall (Incl. mortar or cement and reinforcing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cinders</td>
<td>40-50</td>
<td>$1.50 to $3.00 at source</td>
<td>1c-2 or 3c-1</td>
<td>33-40</td>
<td>1.12</td>
<td>2 hr.</td>
<td>Slab</td>
</tr>
<tr>
<td>Expanded Bag</td>
<td>40-60</td>
<td>$2.50 to $4.50 at source</td>
<td>1c-4.9 fines</td>
<td>25</td>
<td>.51</td>
<td>4 hr.</td>
<td>None</td>
</tr>
<tr>
<td>Slate, Slate Clay Base</td>
<td>$3.00 to $5.00 at source</td>
<td>1c-3.4 fines</td>
<td>1c-14 lbs.</td>
<td>17</td>
<td>.23</td>
<td>4 hr.</td>
<td>Labor .20</td>
</tr>
<tr>
<td>Pavine</td>
<td>30-50</td>
<td>$1 to $4 at source</td>
<td>1c-6 (fines up to 1&quot;)</td>
<td>18</td>
<td>.20</td>
<td>4 hr.</td>
<td>None</td>
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<tr>
<td>Diatomite</td>
<td>28-40</td>
<td>$19 at source</td>
<td>1c-7 to 1c-12</td>
<td>18</td>
<td>.25</td>
<td>4 hr.</td>
<td>Slob .38</td>
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<tr>
<td>Vermiculite</td>
<td>5-20</td>
<td>New York $10.80</td>
<td>1c-4 240 lbs.</td>
<td>10</td>
<td>.20</td>
<td>4 hr.</td>
<td>As Concrete or plaster</td>
</tr>
</tbody>
</table>

**DATA ON 4 IN. CONCRETE BACK-UP**

- **Concrete Mix & Comp. Strength**: per sq. in.
- **Wt. per cu. ft. lbs.**: 100-120
- **Wt. per sq. ft. lbs.**: 33-40
- **"U" Factor**: 1.12
- **Fire Test**: 2 hr.
- **Cost in place in wall (Incl. mortar or cement and reinforcing)**: (2) Blocks $1.22

Note: Costs are approximate and subject to change.

Chart prepared by: R. H. McClure

Chlorinated rubber
Pittsburgh
Fire-resistant attachment

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Slab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>None</td>
</tr>
<tr>
<td>Concrete Mix &amp; Comp.</td>
<td>1.11</td>
</tr>
<tr>
<td>Strength</td>
<td></td>
</tr>
<tr>
<td>Weight per cu. ft. lbs.</td>
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</tr>
<tr>
<td>Wt. per sq. ft. lbs.</td>
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</tr>
<tr>
<td>&quot;U&quot; Factor</td>
<td></td>
</tr>
<tr>
<td>Fire Test</td>
<td></td>
</tr>
<tr>
<td>Cost in place in wall</td>
<td></td>
</tr>
<tr>
<td>(Incl. mortar or cement</td>
<td></td>
</tr>
<tr>
<td>and reinforcing)</td>
<td></td>
</tr>
<tr>
<td>Blocks</td>
<td></td>
</tr>
<tr>
<td>$1.22</td>
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<tr>
<td>Slob.</td>
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<tr>
<td>$0.38</td>
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</tr>
<tr>
<td>Lbr.</td>
<td></td>
</tr>
<tr>
<td>$0.40</td>
<td></td>
</tr>
<tr>
<td>Labor</td>
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</tr>
<tr>
<td>$1.25</td>
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<tr>
<td>Reinf.</td>
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<td>$1.40</td>
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<tr>
<td>Lbr.</td>
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<td>$1.00</td>
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<tr>
<td>Slob.</td>
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<td>$0.85</td>
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<td>Lbr.</td>
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<tr>
<td>$1.23</td>
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</tr>
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</table>
systems

Most of the thin curtain wall systems developed to date, and all of the ones shown on this page, which have the more-or-less official sponsorship of various companies, use metal for the outside facing, either stainless steel, aluminum, copper or carbon steel. Only about half were designed originally to meet city code conditions; the balance have either been adapted to meet the fire-test requirement, or are not designed for this purpose. Taken as a group, the systems shown are remarkable for the variety and ingenuity in which the various problems inherent in thin curtain wall design are solved. Further rapid evolution can be expected from continued development research.

Republic

Facing, back-up and inside finish: stainless steel face backed with rib-reinforced panels of carbon steel with two-piece flanges to isolate front and back surfaces, and containing 2 in. of fire insulation. Metal panels form inside finish, may be painted direct.

Republic Steel Corp., Cleveland, Ohio.

Expected to meet 2-hour fire test.

U. S. plywood


Incombustible; not designed to meet fire test.

AllegheNY Ludlum

Facing and back-up: flanged, stainless steel panels, 2 in. deep, with factory-poured calcium hydroxidelate insulation 2 in. thick. Inside finish: facing, lath and plaster or tile-backer plaster board and plaster to maintain stiffness of return edges of panes flanges and to meet fire test from inside.


Expected to meet 2 to 4-hour fire test.

Robertson

Facing, insulation and inside finish: fluted steel or aluminum panels, 2 in. wide, backed with flanged steel plate enclosing 1½ in. rigid glass fiber insulation. Inner and outer panels not in contact. Panels form insul finish, painted direct.


Incombustible; not designed to meet fire test.
ALCOA

CRUCIBLE
Facing and back-up: flanged stainless steel face integral with factory or site-fabricated sandwich consisting of cellular glass insulation between 2 layers of concrete with connecting reinforcing. Inside finish: inside surface may be painted direct.

MAHON
Facing, insulation and inside finish: spaced, flanged panels of carbon or stainless steel or aluminum, containing glass fiber insulation (no fire-resisting back-up). Pans may be arranged as shown, with one set of flanges projecting, or with both sets of flanges turned in. Inner pan has factory applied finish.

AMERICAN BRASS

Incombustible; not designed to meet fire test.

FENESTRA
Facing, insulation and inside finish: double, interlocking flanged panels of steel or aluminum (or combination of both), with panels separated by asphalt saturated felt to avoid through-wall contact, factory-inserted insulation: panel's 3 in. thick. Panels can be used horizontally or vertically, available up to 14 ft. long.

Carnegie-Illinois
Facing: stainless steel pans reinforced with horizontal carbon steel channels. Back-up and inside finish: optional. Sample illustrated shows steel panel back-up forming inside finish, cavity for optional insulation and/or fire protection to meet fire tests.

Incombustible; not designed to meet fire test.
TECHNICAL PROBLEMS

Every radical change in construction method brings with it a host of new problems—or rather, old problems in new forms. The thin curtain wall is no exception. Internal condensation may be a problem, for example, in walls of all types. In many curtain walls, where the outside surface is formed of a vapor-imperious material such as metal, this problem becomes more acute than when the outer surface is relatively porous, as is true of masonry. The same is true of problems arising from expansion and contraction, moisture penetration, methods of erection, fastening and so on.

In an industry as wedded to empiricism as is building, new and untried methods have a special handicap, since new development must be guided, at least at first, by theory rather than by experience. Like Caesar's wife, they must be above suspicion. Problems must be solved which are not even acknowledged to exist in the case of "accepted" materials.

Condensation

In the past 15 years, the problem of internal condensation in walls has received a great deal of attention, primarily because more efficient insulating materials, by lowering the "operating temperature" of the outer part of the construction, have made possible the condensation of moisture from within the building on the inside of the outer wall surfaces. It is now commonly conceded that insulated walls should be built with a vapor-imperious membrane on the warm side of the insulation, and ventilated on the cold side if possible. The first of the diagrams below shows the principles involved, as well as the theoretical relative vapor pressures on the two sides of the wall under winter heating conditions. With increased use of summer air conditioning, however, the question arises as to what should be done under conditions of summer cooling, when the warm side of the wall becomes the cold side, and vice-versa. This is illustrated in the second diagram.

As the arrows showing the relative vapor pressures indicate, the summer problem is not so great as is the winter problem; moreover, there is no danger of freezing, as is true in winter.

Where code requirements include the fire test, both problems are likely to be entirely academic, since it is unlikely that additional space will be sacrificed to thermal insulation once test requirements have been met, and consequently unlikely that the curtain wall will be sufficiently well-insulated to create a condensation problem.

Where the wall is not designed to meet a fire test, on the other hand, it is very likely to contain enough thermal insulation to raise the question of internal condensation in winter, and with the likelihood of summer air conditioning in summer as well. These considerations have led at least one manufacturer of insulating materials to propose a curtain wall with a vapor barrier in the center, and layers of insulation on either side, as in the left-hand diagram below. In this solution, the outer layer of insulation is assumed to function with full efficiency in the winter, while the inner layer is relied upon to slow down the rate of heat transfer in summer. Another way of accomplishing the same purpose is shown in the right-hand diagram, which pictures a wall in which the insulation is contained in a vapor-imperious wrapping on both sides. The trouble with this solution, of course, is that if the vaporproof wrapping fails at any point the entering moisture will be trapped and will thus accumulate until the insulation is thoroughly saturated. It thus requires either a hermetically-sealed wall, or a type of insulation which is in itself impermeable to vapor throughout its structure.

One moral to be drawn from all this theory is the desirability of ventilating behind the outer surface of the wall, especially when the outer surface is metal, and thus vapor-imperious. It has been shown that such ventilation has little or no effect on the total insulating value of typical wall constructions, while providing a reliable guarantee against the harmful accumulation of condensed moisture within the wall. Carrying this principle still further, it may very well be that the ultimate solution of the condensation problem will be found in a wall structure that is vapor permeable throughout, although containing an air-tight barrier, and is thus able to "breathe" in both directions. This is the principle behind the use of roofers' felt under slate roofs, where it has been found to be the best method of overcoming a severe condensation problem.

Moisture penetration

The desirability of ventilating behind the outer wall surface to provide an exit for condensed water vapor of internal origin is reinforced by a recently-developed theory regarding moisture penetration from the outside. Boiled down to its essence, this theory states that the principal reason why such water enters a vertical wall is pressure differences between the inside and the outside which are the result of wind drawing air out through the cracks on the lee side which must be replaced by air drawn in through the cracks on the windward side. Since, during a rain storm, the latter are covered by a film of water, the entering air brings water with it, causing leaks.

An easy way to avoid this difficulty, according to latest theory, is to create a cavity to act as a sort of buffer state within the wall sufficiently open to the outside so that its pressure will rise to near the point of the outside pressure. In this method, shown in diagram form on the right, the openings to the outside are deliberately made large enough so that they cannot become covered by a water film, but are sheltered from direct raindrops and water running down the outer surface of the wall. Since it is a relative easy matter to provide such a cavity with weep holes to let out any water which comes in, these are usual provided, thus incidental guarding against any contingency which might arise.
the water should refuse to comply with the suction theory on which the ventilation is based. A good example of a wall designed in accordance with this theory is the aluminum faced curtain wall shown on page 91, in which the space formed by the ribs of the aluminum panels becomes a ventilated “buffer state” between the outside and the inside, or, if you prefer, a vertical watercourse down which any water penetrating the outer surface is led back to the outside. The big advantage of such a wall structure is that it does not require outside talking—a big expense in the case of tall office buildings—and permits a consistent design in which the already well established practice of applying spandrel waterproofing to the face of the spandrel beam within the wall is tied in with an internal barrier running from window head to window sill. It also combines very conveniently with many of the typical wall panels used in thin curtain wall construction.

Erection and fabrication

Most of the thin curtain walls developed to date consist at least in part of relatively precise, prefabricated units which must be combined with minimum tolerances and in accordance with a predetermined pattern. Since even a steel-frame building is still very far from being a precision machine, this calls for considerable leeway in the attachment of such panel systems to the fireproofed frame. Various attachment devices have been devised which provide for as much as 2 in. variation (plus or minus 1 in.) both vertically and horizontally, between the panel system and its support, and such attachment is essential, at least in the case of metal panels which do not provide for a cumulative adjustment in their assembly.

Theoretically a back-up consisting of large sized prestressed units should now a considerable saving in labor over a back-up wall built of masonry units. Although such prestressed units have shown savings in factory buildings and two-story housing projects specifically designed for their use, cost figures from actual jobs do not indicate a preponderant price advantage for prestressed slabs when these units are to be reinforced to withstand a 30 lb. wind load. There are several reasons why the costs and the prices obtained to date do not follow the theoretical savings which might be expected of large units. The principal reason is probably that applies to any new construction method: an allowance must be made, in the first instance, for unknown contingencies, educating the workmen, etc. Other reasons include the difficulty, in multistoried office buildings, of handling large back-up units on construction elevators. (In this case a layer of bitumen is provided between the aluminum and the concrete, to prevent a reaction between the two materials). Other possible facings include porcelain enamel, stainless steel, terra cotta and brick. Aside from lightweight concrete, there are several other possible approaches to the large-slab curtain wall unit. One, which may well have an important place in future thin-wall construction, is a sandwich composed of noncorrosive metal face backed with 1 1/2 to 2 in. of concrete, 2 in. of thermal insulation, and 1 1/2 to 2 in. of concrete, with the inner and outer concrete layers connected by reinforcing webs. The thermal insulation used in this unit is foam glass, which has the advantage of being impermeable to vapor penetration from either side of the wall.

Another system, offering a compromise between the large-sized prestressed slab and metal spandrels backed-up with conventional masonry, is a metal pan unit approximately 2 in. deep and 16 to 24 in. wide, extending vertically from window head to window sill, and filled with lightweight, semi-structural insulating material at the plant. The factory-poured fill may be calcium hydroisilicate, lightweight perlite concrete, or cement-bonded vermiculite. Pumice aggregate might also be used, but its high strength characteristics are not as important in this application as its fire-resistant qualities. There are still other lightweight concretes suitable for this purpose.

The function of such a filler is primarily to increase the fire resistance of the wall and secondarily to stiffen the metal pan units. With this type of construction, it is obvious that the inner edge of the metal pan will exceed the temperatures permitted under the regular fire test early in the test period, due to the high heat-conductivity of the metal. For this reason, such walls require an inner finish consisting of furring, lath and plaster (with the plaster containing wood fiber or lightweight aggregate to increase its fire-resistant properties) or fire resistant insulating board. The added cost of the lightweight panel fill, and the necessary furring, will each run about 30 cents per sq. ft.

Beating the law

So long as our building codes contain the basic inconsistency of permitting a nonfireproof window of any size, but requiring fireproof walls, this will provide a powerful incentive for making office-building walls entirely of glass, in the manner of the walls of the U.N. Secretariat. Another way in which this inconsistency may be turned to advantage is by employing the common-sense argument that since an overall window is permitted anyway, thin walls which are demonstrably safer than window glass should also be permitted. This argument was employed successfully in the case of the Federal Reserve Bank office building annex in Detroit (see p. 116). Here the walls consist of a facing of 1 1/2 in. of marble, backed with 2 in. of foam glass, held in a two-way steel channel frame attached to the outer face of the building frame. The inside surface of the wall, being covered by a convactor cabinet, is left unfinished. This construction gives some idea of the thin curtain wall of the future, which should materialize just as soon as building departments in other cities decide to adopt the approach used in this instance in Detroit, and designers are free to devise the most rational, rather than the most expedient solution of the technical problems involved.
APPEARANCE

There is no inherent reason why thin curtain walls should look any different from the outside than many walls which employ the conventional back-up of 8 in. of masonry. Metal facings are already widely used for such conventional walls; conversely, thin walls can be constructed using conventional facing materials such as limestone, brick and terra cotta in new ways, but without affecting their exterior appearance.

Where the facing happens to be metal, the thin curtain wall presents certain problems which are common to all such uses of metal facing materials: problems involving the surface texture and profile of the metal face, avoidance of excessively shiny surfaces, "oil canning" etc. And, in common with other office building walls, thick or thin, it presents the problem of what sort of overall pattern is to be created: vertical or horizontal "stripes," a "plaid" having neither vertical nor horizontal emphasis, the smoothest possible surface or one which expresses the steel-cage frame.

Since the trend in such designs, whatever pattern is striven for, is distinctly away from any effort to make the wall appear massive, and towards a true expression of its real nature as an enclosing membrane, there is no conflict between any of the various design approaches and the thin curtain wall—in fact, the thinner walls are what is being "expressed" whether or not they are actually being used. And even if this were not the case, it would still be possible to create, with a thin curtain wall surface, the visual illusion of massive piers so popular in the Twenties, with the same sacrifice of rentable space always associated with such effects, but with the same relative increase in rentable area for the thin wall over one of conventional thickness. Thus, so far as the overall effect of the thin curtain wall is concerned, the designer is presented with much the same problems, and free to employ the same solutions, as would be true with any other type of wall structure.

There are, of course, design opportunities above and beyond this. One of these is the opportunity to employ color, with the assurance of easy maintenance, which porcelain enamel and several other special finishes for metal panels afford. Another is in the use of decorative patterns and ornament, which, in the case of thin metal panels are functionally necessary to stiffen the surface and avoid "oil canning." One of the handsomest office buildings so far constructed—the Equitable Savings & Loan building in Portland, Ore., designed by Pietro Belluschi, employs a facing of contrasting cast and sheet aluminum panels to create a pattern which emphasizes the structural frame—in this instance reinforced concrete—and provides an ideal foil for the blue-green of the large panels of fixed heat-absorbing glass which constitute the fenestration.

The thing which the Equitable Building demonstrates with great clarity is that it is the imagination and skill of the architect, rather than the supposed limitations of any construction material or method, which determine the ultimate success or failure of such a design. It also shows in a very pure form how much can be accomplished through the avoidance of any visual symbols suggestive of weight, an objective which is, of course, highly appropriate to thin curtain wall construction.

Before this article went to press, FORUM submitted the text to various industry leaders—primarily producers and users of curtain wall materials—for their comments. Despite their understandable complaints that too little attention was paid to the materials and methods in which they have proprietary interests, practically all of these curtain wall experts endorsed heartily the article's underlying purpose and its broad conclusions.

A summary of their comments begins on the facing page.
TWO HANDSOME BUILDINGS of very different appearance which employ thin curtain walls are the Equitable Savings & Loan building (Portland, Ore.) (above), Pietro Belluschi, Architect, and the Alcoa Administration Building (Davenport Iowa), Harrison & Abramovitz, Architects.

Forum:
Thank you for giving me the opportunity to examine the text and tables of the article on curtain walls. The various collaborators on this thoughtful and somewhat all-embracing symposium on the subject are to be congratulated. They have succinctly stated the facts of the case and presented therewith useful tabulations to guide architect, engineer and financial interests in their preliminary thinking on prospective building projects.

Individuals and groups will, without question, find fault with some of the statements made and with tabulated figures and comments. I, too, would question certain specific sentences, comments and items, taken alone. However, the readers to whom this material is directed primarily will recognize it as an able and honest effort to present a general picture of a current particular problem.

For example...I would be inclined to approach conservatively the “building code” situation—advances are being made against older, unrealistic regulations, and building commissioners, in general, do take their responsibility for protecting lives and property seriously, as they properly should—Mother Nature and other not-completely-predictable factors do not always operate within charted minimums and maximums. Good safety factors are still good insurance, in my opinion. In reference to the commentary on the first diagram on page 92, it should be pointed out that a non “sufficiently well-insulated” curtain wall will, at times, have a wet interior surface, with consequent unsatisfactory effects.

The tabulation of various exterior facings as to Appearance, Performance and Cost is, I think, an over-simplified presentation of a great deal of information, which may mislead some too-casual readers into difficulty—to reduce comment to a word or two is an invitation to criticism.

RICHARD A. BEGGS
Director of Architectural Development
Stainless Steel Division
Crucible Steel Company of America
New York, N. Y.

Forum:
We know that this article will prove of great value to all concerned and should result in more permanent easily maintained buildings.

In your discussion of building codes, why not stress the point that the building codes have been changed from 4 hr. exterior walls to 2 hr., wherever unprotected window openings are permitted and, in at least one city, Pittsburgh, the code reads, “1 hr. exterior walls are permissible if the opinion of the Board of Standards & Appeals is that no undue hazard is deemed to exist.” Manufacturers of building materials are becoming vitally interested in the building codes of the country as attested by the number of tests performed by the Bureau of Standards and the Underwriters’ Laboratories as well as the wide attendance at the Building Officials Conference of America—Basic Code meetings.

A study of past disastrous fires shows clearly that a properly fireproofed structural framework will come through a damaging fire despite the fact that from 25 to 50 per cent of the exterior walls were thin glass windows which lasted only a few minutes.

Under the subject of Why Curtain Walls—there are a number of very important advantages
in this type of construction which should not be overlooked:

During construction the minimizing of traffic problems for wall materials using lightweight large panels; elimination of wet construction; elimination of hundreds of miles of joints which are incipient points of failures from water absorption; the use of completely nonporous surfaces; steel surfaces permit no water absorption...which adds unbalanced weight during rains; no problem of dust or dirt going through the wall, through the cracks or air spaces; no problems of chipped materials falling on by-passers; the elimination of calking costs; practical elimination of maintenance costs; presentation of a material to the building industries which can be easily cleaned, an additional sales advantage; and the use of stainless steel and porcelain enameled steel; these materials will be ideal for complete air conditioning and even pressurizing a building to entirely eliminate dirt and dust; the ease of erecting this type of construction will consume less time on the job thus saving money for the owner; steel walls do not store heat...the ease of calculating the strength of sections assists in design; the complete uniformity of materials available in steel assists in design and cost estimates.

In our opinion, too much space is given to the subject of rental costs. The real advantage of steel exteriors is not the small saving made in rental cost, but more particularly in the ease of construction and in the long trouble-free life of stainless steel and porcelain enameled walls.

CARL F. BLOCK
Development Representative
Carnegie-Illinois Steel Corp.
Pittsburgh, Pa.

Forum:
The costs shown seem to be largely theoretical and, with the exception of the relatively few conventional types of constructions, apparently are not based upon construction experience. Certainly, the "rental value costs" of the walls are considerable, but more particularly in the ease of construction and in the long trouble-free life of stainless steel and porcelain enameled walls.

E. VOELZEL, Architect
Valerbury, Conn.

Forum:
I am very well impressed with the presentation.

In this age of machines and metals it is wholly logical that the exterior surfaces of buildings, particularly those of skeleton frame construction, should be of metal. The chief obstacle to progress in that direction at the present time is the antiquated building code. By publishing an article on curtain wall construction, FORUM will awaken the architectural profession, the building industries, and building officials to this realization. What is more, it will also inspire the designer and inventor to work out details of construction for metal exterior wall coverings that will endure the service life of the building with ample strength and rigidity, being reasonably safe against fire and permanently storm tight. In addition, the facing will need to be free of unsightly buckling and the material must lend itself to a durable color treatment or to the application of color.

HENRY E. VOZELZ, Development Engineer
The American Tin Co.
Waterbury, Conn.

Forum:
Your constructive article on panel wall construction should be helpful in calling attention to the need for rationalizing building code requirements and of the necessity of the architectural profession for a concerted action "to do something about it."

Excising out the 3 in. or 4 in. sandwich which I believe to be still in the stage of research, I do believe it possible to reduce the wall to 6 in. or 7 in. However, the convector or air conditioning unit is still a pretty deep affair using floor space so that perhaps it is up partly to the mechanical engineer (not mentioned in your article) to find more effective use for his equipment which uses space not only on the perimeter, but in the interior also. It is customary to rent space in office buildings with the tenant paying for fan room areas on the interior. Are not the convector and cooling units as a result the same in the same category? I am, frankly, not too impressed with arguments of "rental value cost" in connection with wall thicknesses until these other factors can be solved too.

Why not concentrate on a wall panel which can sit on the sill as does a window and with the same sealants? Incidentally, this might provide the battle of too much or too little light. Why not let the tenant design his space by making an insulated panel inter-changeable with a window? It certainly could be easily handled architecturally. At the same time why not also concentrate on the function of the framework in addition to the exterior skin, a multi-wall, along with some proven type of back-up?

May I again congratulate you on getting our backs up!

ROBERT ALLAN JACOBS
Kahn & Jacobs, Architects
New York, N. Y.

Forum:
The use of lightweight curtain walls can result in some important savings not explicit in your article. Curtain wall units of the sort under discussion lend themselves to a much greater degree of sub-assembly than is possible in standard types of construction; they permit the omission of wet materials and as a result hasten the completion time of a structure. The logistics involved in the transportation and installation of prefabricated units can be more orderly and more carefully calculated than for a combination of small, large and plastic materials.

If the time for constructing a building can be reduced, temporary financing costs can be reduced. Curtain walls have an advantage in this regard, as they can be started at an earlier date and the builders can profit by more rapid turnover of labor and materials.

Cost of temporary financing of a 25-story office building, plus an earlier rental date, could amount to as much as $4,000 per day.

EDWARD X. TUTTLE, Vice President
Turner Construction Co.
New York, N. Y.

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EDWARD X. TUTTLE, Vice President
Turner Construction Co.
New York, N. Y.
Spectacular luxury in the Caribbean—the Caribe Hilton Hotel at San Juan, Puerto Rico

Architecture and structural design: TORO, FERRER & TORREGROSA, San Juan, Puerto Rico • Interior design and architectural collaboration: WARNER-LEEDS, New York City (Project staff: Suzanne Sekey, Walker Field) • General contractors: GEORGE A. FULLER CO., New York City • Mechanical and electrical engineering: ZUMWALT & VINTHER, Dallas, Tex. • Landscape architecture: HUNTER RANDOLPH, San Juan, Puerto Rico.

View, above in color, is from behind encrusted wall of historic old fort near hotel; View left is fort from guest room.
This is the kind of hotel which should be built in Florida and California, but never has been.

The Caribe Hilton, in San Juan, Puerto Rico, has the color, texture, and finish demanded by Americans off to the semi-tropics—an atmosphere of relaxed daytime sunniness and, at night, drama dissipating out into a big southern sky. And constant, obvious luxury.

But whether most vacationists to Puerto Rico will recognize it or not, they will be getting this luxurious atmosphere in highly refined, inventive form in the Caribe Hilton. They will be getting their lavish atmosphere shorn of the pretense which usually accompanies it in the design of resort hotels—most other hotels by the sea being built either in some pompous colonial style, charm-conditioned by a posh decorator, or in a kind of bleak Miami Beach moderne).

The primary success—and architectural lesson—in this structure is that such a building can be lavish and still retain a comfortable human scale. The Caribe Hilton has a very large area of public space for its 300 rooms—two entire public floors. But space is spread horizontally, not shot away in lofty high ceilinged spaces for the conventionally impressionable. The impression is of broad, windswept porches built expansively for the true luxury of use. The only high room is the sumptuous gambling casino, where after dinner the players stand as on the brilliantly lit bottom of a pool of darkness, and throw their pebbles on the vivid green, black, and gold roulette boards.

The good climate of Puerto Rico has a temperature spread about 15° over the entire year. When it rains Puerto Ricans wail doorways: they know it will stop soon. Because of this, the ground floor of the Caribe Hilton is almost entirely open. The first door incoming guest comes to is the door of the elevator.

Upstairs, every guest gets a room with a balcony and a sea view. This neat trick was achieved on a site which does not really have sea exposures by setting the axis of the corridors roughly perpendicular to the shore line and bending room partitions out to sea at outside walls, and also canting the glass walls that way. The trick is even more successful than photographs and drawings on these pages indicate. Bedrooms are converted to sitting rooms by day.

The Caribe Hilton is not solely a resort hotel, however. 10 minutes by taxi from the business section of San Juan, it is built for service to businessmen with interests in the Caribbean, and travelers stopping off on the long flight between the Americas.
The hotel was put up, paid for ($7,000,000), and is owned by the local territorial government of Puerto Rico through the Puerto Rico Industrial Development Co., a body formed eight years ago to help rescue the island from its wretched financial status by developing local industries and encouraging continental U. S. industry to establish factories there. The hotel is designed to be the basis for a tourist trade from the states. New York is only 61/2 hours away by plane, the Caribbean islands are worrying Florida hotel operators as rivals. Early in the planning stages the young men of the development company interested the most famous U. S. hotel group in the Caribe hotel, and it became the Caribe Hilton, under the same aging parenthood as some of the most famous other hotels in U. S. (Waldorf-Astoria, Plaza, Mayflower, Town House, etc.). In sum, this building is more than just a gleaming tourist lure; a job done to show visiting industrialists from the states that Puerto Rico can accomplish; plus a set of hotel rooms necessary to Juan. It is the signal of the island's awakened ambition.
Mahogany main stairway, with treads wrapped in carpeting, sits on polished concrete horse before a tall slab of black veined marble. Patterned terrazzo panel in lobby floor is repeated in miniature upstairs (see typical elevator lobby in color, next page). Wood fronting second floor elevators, right, is native capa prieto. Picture at bottom of page is first floor informal area near registration desk. Typical menus are beside it.
Plans of first and second floor emphasize openness and great square footage given to public areas. Note consolidation of all kitchen and service areas near dining areas. Photograph of fourth floor elevator lobby is a good color clue to character of entire design. Each floor’s elevator lobby wall has its own color (see diagram below), which is also imprinted on key tags for rooms on that floor. Furniture in elevator lobby is Puerto Rican product, designed by architect Henry Klumb. Wainscote rails are used frequently in design.
Visitors who search for uniquely native character in this building will not find much of it. There is comparatively little that is Puerto Rican—some blinds in the handsome dining room (above), tile, china, a few chairs, a few feet of lumber, some furniture coverings, and the murals. Torro, Ferrer & Torregrossa, the architects, are native to Puerto Rico, but are young men—and this is a building for a new Puerto Rico, not the old.

The New York consultants, Warner Leeds, achieved a kind of abstracted native spirit in some of their interiors, notably in some of the floor tiles which they designed for manufacture in Puerto Rico. The richness and color which is a part of the Spanish tradition of the island appears in the tile, drawn out of its intricacy. Warner Leeds did the complete design job inside, including such details as china, uniforms and menus.

The Salon del Castillo is a particularly successful formal dining room, but it also was envisioned early in its design as an enclosed porch. It would not seem easy to arrange a marriage of these two diverse characters, but it was done marvelously. The result is a serenely beautiful room, with cheerful alive dignity.

The Puerto Rican Development Co., sponsors of the hotel, leased it to Hilton Hotels International Inc. for 20 years. Terms of the lease call for the development company to get $2/6 of the gross operating profit. The land acquisition story is unusual: These fourteen acres were held on a deed from the federal government by a man named Baker who originally paid $1, plus services. Such deeds generally run 99 years, but the government clerks, it is said, made an error on this one and wrote it for 999 years, considerably beyond the life of many governments. A glance at the cost breakdown below will show what a happy error that was for Mr. Baker:

**COST BREAKDOWN:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$400</td>
</tr>
<tr>
<td>Building</td>
<td>$5,288</td>
</tr>
<tr>
<td>Beach development, swimming pool, roads,</td>
<td>$486</td>
</tr>
<tr>
<td>walks, cabanas, etc.</td>
<td></td>
</tr>
<tr>
<td>Landscaping</td>
<td>$60</td>
</tr>
<tr>
<td>Furnishings</td>
<td>$600</td>
</tr>
</tbody>
</table>

(exclusive of fees)
Left, typical corridor looking past elevator hall. Below, view of one room of luxurious suite at end of corridor, with long window overlooking sea. Bottom, view past bar into living room of smaller suite.

In a typical combination of the designers' imagination and practicality the only wood flooring in this hotel is used on the walls, in oak panels to diversify texture and, usually, back up a chaise lounge. Otherwise, permanent finish is the rule. Floors are native cement tile (the rug in presidential suite is the exception, not the rule) and walls are sand finish plaster. All horizontal furniture surfaces are scratch, alcohol and cigarette resistant, and all fabrics are washable.

Colors in corresponding rooms on the various floors are similar. A striking product of this scheme is the effect from outside the building made by the vivid curtains for the glass end walls. Vertical stripes of color carry through the eight floors of balconied exterior. This is especially arresting at night when the rooms are lighted behind the curtains.

Corridor plan shows the distribution of rooms and suites on a typical floor, and emphasizes again how the rooms are bent toward the sea view. The long corridors of the hotel are widened by small entrance lobbies for each pair of rooms, and at each of these an eggerate lighting fixture is hung to interrupt the plane of the long narrow corridor ceiling (small photo, above).
On these two pages are elements and views of a typical guest room. Individually conditioned, the rooms have two different standard furniture arrangements, necessitated by the dissimilar door positioning. Color view on this page is from near corridor; photo on opposite page shows room as seen from balcony. Floors are pale gray tile; case goods and tables are designed by Warner-Leeds in mahogany with matched position top surfaces. Fixed lamps are used at bed, entrance, mirror, and chest. The desk-vanity, below, lifts to reveal mirror, and chest.

Rooms adjacent on each floor all have different color schemes (one is shown above, a second is indicated in plan below). The drape is the exterior key to the other colors in the room—drapes are matched vertically up the facades from floor to floor.
Combined in bedside cabinet (left) by Warner Leeds are telephone and radio; fabric front is Puerto Rican. Bathroom, right, is lighted by three incandescent bulbs through frosted portholes in mirror surface, plus light leakage around edges. To right of bathroom door is top lift full length mirror.

In San Francisco’s Palace, when a really grand banquet is put on for as many as 2,500 people, the hundred most favored guests find before them a complete service in 18-karat gold. For the Palace, though it has only 700 rooms, is one of the world’s really great hotels. And the city in which it stands has a grand and gracious urbanity beyond that of any other big American town. Nearness to the Orient through the Golden Gate may contribute the levelheaded sense of continuity which everywhere qualifies the San Francisco progressive. Alone in the U. S., San Francisco’s architects of today, even the young ones, consider that they belong to a generation which succeeds and precedes other generations. Among the best, none would wish to “wipe the slate clean” for his own new architectural revelation. Each would labor with might and main to contribute his full share in a joint venture which continues beyond him: the city.

Big Joe McCarthy is a younger man who has been called in by white-haired, oak-hearted Mrs. William B. Johnson in order step by step to “redo the Palace.” He therefore has an unparalleled opportunity to show how contemporary architecture, without compromising itself, can yet harmonize with the spirit of its predecessors.

The first Palace was built in 1875, eight tall stories high, with 755 rooms, few of them less than 20 ft. square, on foundation walls 12 ft. thick; and beneath its huge central court was a reservoir of 650,000 gallons supplied by four artesian wells. (It is still there.) In the great Fire this was later to save the U. S. mint, though at the sacrifice of the hotel. The facade consisted of rank upon rank of those bay windows in which the area abounds and which, even more than the Bay itself, characterize the “Bay” Region. But the great feature was the carriage court, covered with glass at the very top, eight floors above the ground. Into it drove princes and presidents to adulation from tier upon tier of surrounding gallery.

In the post-fire Palace, this glass top was eventually dropped lower, now covers the Garden Court, surrounded by marble columns, lit by crystal chandeliers, where the carriage court once was. George Kelham who designed this present building was an Easterner, steeped in the Renaissance, who came out to supervise the work for Trowbridge & Livingston, but fell in love with San Francisco and stayed as an architect to the end of his life. With reluctance McCarthy had to pull down Kelham’s balcony (“for seeing parades”) that had ringed the top like a lighted fringe, for the supporting iron work had rusted out in the perpetual fogs. Then Joe did all kinds of chores in the guts of the structure and “at the back of the house,” such as replacing miles of pipe, putting in standby compressors to prevent the possible loss of $10,000 a day in food, redoing the elevators with new penthouses, remodeling the telephone room and the top offices.

All this and much more was well done, with full conscience and cooperation of the staff, and about it many stories can be told. Yet the real significance is not there. It began to unfold as the architect reached into the public areas, with an ever more certain hand. Though he seldom matched the vivacity of light racing over marble that we achieved in Kelham’s style, the common denominator is in the solidity of the materials, where all that says so is marble and all that glitters is gold; it is in the big generous scale, the largeness and unison of mood. Here the old and the new clasp hands warmly and declare they can get along. San Francisco says they can.

OFFICE OF FRANCIS JOSEPH MCCARTHY, Architects* TAYLOR & GOERICKE, Contractors

* Structural engineers for all alterations, H. J. Brunier • Mechanical Engineers various parts, Thomas R. Hunter, G. M. Simonson • Electrical Engineers, Charles Von Bergen • Landscape Architects, Eckbo, Rejkalton & Williams • Mural Paint (Corner Room), Antonio Sotomayer.

Photos: Piggott Co., Mercer Photographs
WHERE PRESIDENTS DROVE dramatically, the glass roof has now been dropped down to the first level above the Garden Court Restaurant (photo right, above). "A building that is no longer the last word in style," says Mrs. Johnson, the Palace's owner, "depends on acquiring an atmosphere of its own." This thoroughbred atmosphere is the challenge which the new architect has been able to meet, in his own uncompromised contemporary idiom, in the "Palace Corner" (photo, right).

Photos: Roger Sturtevant
It was in keeping with San Francisco's greater sophistication that a cocktail bar such as the "Palace Corner" should be placed at a front corner of the building, with large windows on the street, rather than buried in the back recesses. Owner and architect felt that the dark dim kind of lounge was a carryover from prohibition days. There would be more fun at a "sidewalk cafe." But the local fog drove it in from the sidewalk. To get service without crossing the lobby, the architect used dumb-waiters to the basement and borrowed space. Situated at the apex of the financial and shopping areas, the Palace serves 3,000 lunches a day, can serve 5,000 meals a day; 66 per cent of its ground floor is devoted to food and beverages. The Corner was soon taxed serving light lunches; and 75 per cent to 80 per cent of its patrons are served at tables, not at the bar (in reverse of the usual S.F. ratio). The various window openings were unified by grids (see photo at right). Since illumination to balance the daylight through the windows would be too bright for use at night, and night light alone would be too gloomy by day, a theatrical dimmer system is employed to provide a wide range of control by mood and hour.
SPECIAL REFRIGERATION keeps flowers fresh

The nearest thing to the existing rococo was McCarthy's redoing of the "Baldocchi" flower shop concession opposite the Palace desk, with the aid of Engineer G. M. Simonson. Through study and inspection, Simonson found that cut flowers thrive on temperatures within a 10° range between 40 and 50°, but the requirement of 85 per cent or higher relative humidity is vital and rigid. Again, air movement must be held to a minimum if wilting is to be avoided. So gravity coils, well baffled, replaced the blowers too frequently used by florists, since damage from excessive air movement would offset any advantage from compactness or easier mounting of blowers. For the sake of high humidity the coils were of generous size permitting a higher coil temperature. (The maximum "split" or difference between coil temperature and temperature inside the case was set not to exceed 10°.) Each case was separately controlled, with cut-off switches as a precaution against freezing. The use of two air-cooled compressors (with auxiliary water cooling) instead of one gave a standby in case of emergency. And Freon 12 replaced the usual commercial refrigerants which damage flowers irreparably even in case of minute leakage. Because flowers must be seen in natural coloring, filament lamps were used, in half silvered tubular pattern, above a plastic louvered ceiling which, incidentally, did not impede air circulation to the cooling coils. And finally the architect incorporated the bulky gravity coils, plus the concealed lighting, plus the requirement of 2 in. insulation alternating with double glass all around, in cases which he made serviceable as well as attractive. Result: roses kept here a whole week were found as fresh as new ones from the market; a bigger stock could be maintained; and business increased 15 per cent against an average 10 per cent decline in the general area.
Well situated for terminals and business, the Palace will be reoriented toward shopping.

One of the factors affecting the Palace has been the shift of the shopping district southward, and up the hill on Market Street, toward Union Square (see maps). And Mrs. Johnson, whose father, Senator Newlands, left San Francisco to develop Chevy Chase in Washington when San Francisco refused to get "big plans" from old Daniel Burnham, is not one to take a planning problem lying down. Based on the old carriage days, the Palace is approached today on New Montgomery Street, which is the side away from Union Square. To open a new entrance close to the southwest corner, which is toward the square, it will be necessary to do away with a string of existing spaces for stores, and connect up the whole area to the main lobby, in a big promenade parallel to the street. (See plan.) This is not silly, no matter how it sounds. Because of the huge crowds that congregate inside the hotel not only at every lunch time but in particular for special events such as conventions, speeches, banquets, such a space can be expected to fill up with people. And they will be in more leisurely movement than any sidewalk crowd, and protected from the weather as they look. And the added fact that the people of San Francisco are expected to accept a "big plan" at last, and vote this Spring for submerging the famous four street car tracks of Market Street under a surface park, will be just beautiful, and very fair indeed to the good old Palace.
FACTORY IN
A STOCK ROOM

Lincoln Electric's new Cleveland plant is designed to cut indirect costs and pay for itself many times

THE AUSTIN CO., Engineers & Builders

Will there be a second wave of postwar industrial building now that the first postwar wave is on the ebb and factory construction is running 37 per cent below a year ago?

In the first four years after the war, American industry spent $6.5 billion for new plants. In each of these years industrial construction ran far ahead of the prewar record of $600 million and about half of 1942’s wartime peak of $3.7 billion. But too many of the plants erected right after the war were built for companies whose need for more space for more production to meet more demand was so pressing that they could not wait for the greater economies and efficiencies a truly postwar building plan might offer. The first postwar factories had much in common with the first postwar homes, which were rushed up to house veterans who might otherwise have slept perforce on park benches.

The pressing need for new plants for volume’s sake has now been met. From now on new plants must justify themselves, not by the increased volume their added area makes possible, but by the increased economy and efficiency they offer.

The Lincoln Electric Plant described on these pages is an outstanding example of the kind of thinking that will set a new standard for the integration of better plant with better production, the kind of thinking which alone can sustain a high volume of industrial construction now that the first demand for room for added capacity has been met.

“Our new plant will pay for itself in so many ways that we ourselves don’t know all the savings it will bring.”

So says James F. (“Jim”) Lincoln. His Lincoln Electric Co. already has a good plant, nothing fancy, but still well above average and quite big enough for 40 per cent more production. But for years he has been thinking up cost cutting ideas that only a particular kind of new building can make possible. That building is now being built outside Cleveland by the Austin Co. President George A. Bryant, of Austin, which has probably designed more industrial plants all over the world than any other builder, says it “reflects an entirely new concept of production.”

Lincoln wanted a plant whose unobstructed floors would give him complete freedom to plan the most economical assembly lines and whose unobstructed height would let him use all the most economical new material handling equipment (“overhead handling will save us 20 per cent on floor space”).

But, significantly, Lincoln calls his dream child “a great big stock room with manufacturing space right next to the stock.” Its 17 acres will be seven acres bigger than the present plant, and almost every inch of the added seven acres will be used not for longer assembly lines but for more economical material handling and for more efficient storage at the point of use. The new building’s complete flexibility should lead to substantial economies on the assembly line too, but these will be an extra dividend. The primary purpose of the $8.6 million investment is to eliminate (not just control) as many as possible of the nonproductive labor costs which in most plants creep up as direct labor costs are brought down. Chief among the costs which Lincoln aims to wipe out are:

• The cost of moving materials around inside the plant, now running 14 per cent of direct labor;
• The set-up cost for switching machinery from one item to another, now running 6 per cent, largely for lack of space for duplicate machinery or to store parts after longer runs;
• The cost of all the paper work and supervision needed to keep paper inventories. (“They’re usually wrong anyhow.”)

In the new plant, with everything stored at the point of use, each worker can see for himself when he is running low on some part or material and “we’ll have no more need of paper records than a corner grocery has.” Already, in a mock-up trial in part of the present plant, on-the-spot storage and visual inventory have enabled Lincoln to transfer 34 persons to directly productive work who were formerly busy keeping records on paper or moving materials from storage to production. These 34 persons represent a saving of more than 25 per cent of all the indirect labor in that section of the plant.

None of the present 900-odd workers will lose their jobs through all this labor-saving in the new plant, for Lincoln believes welding is now reaching only a quarter of its market. He is preparing for a great increase in sales and production, with the fastest growing markets in the replacement of machinery castings with welded steel, in the replacement of rivets in structural steel buildings and as a maintenance on the farm, and in the home. (He has just brought out a farm
welder that sells for $169 and a home welder for $45.) One reason for the new plant is to make room for this expansion. Another is to provide space for more complete integration.

Lincoln is an unreconstructed individualist and a production genius whose famous incentive pay system now combines the lowest labor costs in the electrical industry with the highest employee earnings (a fabulous $6,000 plus per worker in 1949). His goal is to lower his labor costs (in 1929 dollars) another 10 per cent each and every year, and he and his employee-partners have now reduced their costs so low that they have taken over more than half the market.

Even before the war Lincoln decided he must have a new plant to get the full effect of his cost cutting-incentive pay program. His present factory is too long and too narrow, and it has a railroad siding only at one end. It is too low at the sides for traveling cranes to cut his handling costs. It has too many columns and other obstructions that interfere with production streamlining. It is too crowded to let him store more parts closer to the assembly point. In brief, it is always getting in the way, and so thinking and planning for the new plant has been made a top priority assignment for everyone at Lincoln, where the incentive pay-system takes even the sweepers into partnership and gets everyone suggesting new ways to do things better.

Not to be outdone, the Austin staff contributed several important new ideas too, including:

- A special application of tempered air distribution that undercuts the cost of conventional air conditioning by more than 70 per cent.
- A handsome insulated steel and aluminum curtain wall (see page 114-115) 28 ft. high and more than half a mile long, cut months out of the construction schedule.

- A tunnel running the whole 1,400 ft. length of the plant to get all toilets, locker rooms, generators and pedestrian traffic off the manufacturing floor and out of the way.

But the real pride of the Austin staff is that they were able to pick up all the ideas the Lincoln people threw at them (often at 7:30 a.m. planning conferences) and translate them economically into metal and masonry. For all its innovations the new plant has been made a top priority assignment for everyone at Lincoln, where the incentive pay-system takes even the sweepers into partnership and gets everyone suggesting new ways to do things better.

From outside the most unusual feature is the complete disappearance of executive offices usually found in front. These have been hidden away in a two-story building 120 x 360 ft. right under the factory roof, with Jim Lincoln’s own office at the exact center of everything—“just where it should be.” But once inside the plant the new thinking is clearly visible.

Open space—Except for the office block in the center, the entire space, 1,427 x 500 ft., will be virtually unobstructed. All services are along the basement tunnel, and even the columns are spaced nine to the acre. From the office block 650 ft. to the west wall is open space to make welding machines. From the office block 650 ft. to the east wall is open space to make electrodes.

Expandability—When either half has to be enlarged the curtain wall at the end can just be moved further out, as it has been designed for maximum salvage. (Expansion space for the offices is provided by the second floor, which will not be needed at all for the present.)

Receiving dock—The entire north side more than a quarter of a mile long will be an unloading dock where trucks and freight cars deliver parts and materials almost to the exact spot where they will be used. There will be four entry points in the north wall for trucks, two for trains, so either can be unloaded inside the plant. Freight cars spotted initially by the railroad at any point can be readily moved along the receiving dock by electrical car pullers.

Shipping platform—The entire quarter-mile south side will be available for shipping purposes, so finished products can be stored and loaded on trains or trucks right at the end of the assembly lines. Forty feet or more alongside the tracks on both sides of the building will be usable for unloading and shipping needs.

Underpass entrance—Because of the railroad tracks inside the plant along both the north and south sides, the only pedestrian entrance will be through an underpass under the tracks from an entry building opposite the office block. The cafeteria and the school for welders will be located alongside this underpass.

Assembly lines in the welding machine half will run 400 ft. straight across the building from the receiving dock to the shipping platform. (Some will make finished machines; others will assemble parts.) The conveyors will follow the column lines 60 ft. apart, and the space between the lines will be used partly for on-the-spot storage (often on roller conveyors feeding the assembly lines), partly to make sub-assemblies at the exact point where they will be needed on the assembly line.

In the electrode plant (which has always been “closed” to visitors), coating the wire is a continuous process rather than an assembly line operation, with two-directional flow for which the basic pattern of the building is also well suited.

Materials handling—The research Austin did on materials handling for Lincoln was a major reason why Lazarus asked them to design and build the big store warehouse in Columbus. Many different types will be used, including a new double lift fork truck that will pile cases up to 15 ft. high and a new Lincoln-devised traveling hairpin that will run right under the roof of a truck to stack welding machines in the furthest corner. These two Lincoln specials will do much of the moving on the shipping side. On the receiving side and down the aisles between the assembly lines everything will be moved by suspended overhead cranes. This will make it easy to pile stock as high as 17 ft. It will also save all the floor space that would otherwise be needed for trucks and forklifts in the stock area, so there will be only one narrow aisle, from 3½ to 7 ft. wide, near the center of each bay. There will be nine overhead cranes, all capable of traveling the length of the receiving platform and down along any aisle.

Clearance—As in most 1950 factories, clearance under the trusses will be 23 ft., to give operating space for the cranes over the tall machinery and to permit stock storage up to 17 ft.

Trusses—To speed construction, the Austin Co. carries welded H-section trusses 40, 50, 60, 70 and 80 ft. long in stock.
PLANT LAYOUT. New Lincoln Electric plant, now only half roofed over, will look like this when completed. Diagram below indicates how the new plant will be laid out between two lines of railroad tracks inside the building, with the assembly lines running along the columns from unloading dock to loading platform with on-the-spot storage between the assembly lines. The executive offices will be housed in a central building hidden under the plant roof.

PARTS STORAGE. Typical example of how on-the-spot storage on roller conveyors feeding towards the assembly line has been worked out in the mock-up for the new building at the present Lincoln plant. Diagram at the far right shows the layout of a typical bay in the new building with the assembly line next to the columns and on-the-spot storage in between.
**Floor loads**—To give complete freedom to place heavy machinery or heavy stockpiles at any point, the entire factory floor will carry 1,000 lbs. per sq. ft.

**Ventilation**—Because of the high clearances and the truss space, full air conditioning on a volumetric basis would have required more power for cooling than is used by all the lights and machinery in the plant. The Austin Co. met this problem by a new approach to man-cooling which uses only a third as much power—a distribution system that releases tempered air under pressure only along the assembly lines where most of the men will be working.

Outside air for this system is drawn in through the roof to a cooling and heating unit up in the truss space at the center of each aisle. Tempered air is distributed from ducts extending down the columns to a point 8 ft. above the floor. There, outlets direct the air toward the populated areas, where workers are enveloped in a “mound” of comfort, as the air sinks to the floor. From there it spreads into the stockpile areas between the assembly lines and is finally sucked out through the roof. Furnace areas in the electrode plant will be surrounded with metal curtains coming down within 8 ft. of the floor to trap the heat and the process dust at the source and exhaust them both before they get a chance to spread.

**Lighting** from three miles of fluorescent tubes with reflectors will also be focused on the assembly lines, with the two lighting lines in each aisle spaced 10 ft. out from the columns.

**Exterior brickwork**—The bottom 9 ft. of the walls will be brick with a limestone sill. “If we ran a metal curtain wall all the way to the ground, a bar of steel sticking out from the side of a freight car might gash it, and someone would be sure to say the wall was no good,” Austin engineers observe, “but if a masonry wall is damaged, everyone will take it in his stride.” Masonry was also carried to the roof at the corners to avoid the costly details in all-metal wall construction at such points.

**The curtain wall** (see diagram) will take the place of some 3,000,000 bricks. Austin expects the cost on this first installation will be about the same, but on subsequent installations will be substantially less. Its advantage here is to speed construction.

The wall is faced with rolled aluminum box sections 3\(\frac{1}{2}\) in. deep, 15 in. wide and 25 ft. high. The inner wall will be 1\(\frac{3}{4}\) in. steel panels. Between them will be 1 in. glass fiber insulation, acting as vapor barrier. The whole will be 6\(\frac{1}{2}\) in. thick and weigh 3\(\frac{1}{4}\) lbs. per sq. ft., with a heat transfer coefficient of .25 Btu., compared with .50 Btu. for an 8 in. solid brick wall. The open vents formed by the box-like sections will be open at the top to insure constant circulation of air and prevent moisture formation within the wall. The extruded aluminum coping will, in effect, be an awning to keep water from getting in while permitting air to pass out.

The wall is being secured entirely by arc welding and by stud-welded fasteners. First, \(\frac{3}{8}\) in. threaded studs are spotted along girts welded to the frame at three levels (one at the sill line and two at the truss chords). The steel panels, prepunched to fit over the studs, are then welded to the girts. Next an additional girt with a fourth row of studs is welded to the steel, midway between the sill line and the trusses, to provide a fourth attachment for the aluminum. (Specially coated aluminum transition nuts are used to prevent galvanic action between the two metals.) The insulation is applied next and is held in place by 10-gauge headless welding pins, which are stud welded to the steel panels and capped with speed clips.

After application of the insulation, the prepunched aluminum panels are placed over the protruding studs. To allow for the greater expansion of aluminum, the outside panels are firmly attached only at the mid-point, and their excess movement is allowed to slide on aluminum shoulders formed on the transition nuts.
VENTILATION. Distribution system from ceiling unit through overhead horizontal ducts and vertical ducts at columns concentrates conditioned air at work areas along assembly lines.

CURTAIN WALL. Steel interior panels 25 ft. high are welded to steel girt on brick wall and at two points to the roof truss, then covered with glass insulation and aluminum exterior panels.

LIGHTING. Uneven spacing of fluorescent fixtures concentrates light on assembly lines.


Austin Co.
BANK ANNEX  Federal Reserve Bank in Detroit uses marble for curtain wall, harmonizes temporary design with its existing neoclassic palace

LOCATION: Detroit, Mich.

SMITH, HINCHMAN & GRYLLS, INC., Architects & Engineers
MINORU YAMASAKI, Designer

Leinweber, Yamasaki & Hellmuth, a new architectural firm comprised of former staff members of Smith, Hinchman & Grylls, Inc., is now consulting on this project.
A demonstration of new design and construction ideas might be least expected in an annex for a 23 year-old building—and a bank at that. But this annex to the Federal Reserve bank in Detroit breaks sharply with the design of its mother building yet is carefully related to it, thus spiking the dogma that any addition to an old building must match its design. It is set back 30 ft. from the sidewalk on either front to make room for attractive and welcome patches of greenery in the city’s business district. And, in place of its mother’s thick masonry-backed marble side, the annex carries alternate bands of double insulating glass and thin curtain wall spandrels comprised of 1 1/2 in. sheets of marble backed only with 2 in. insulation.

Several choices were open to the Federal Reserve Bank of Chicago in expanding this Detroit branch office: 1) the extension could be an expensive duplication of the old neoclassic building which was built for the bank in 1927 from the plans of Graham, Anderson, Probst & White; 2) the old building could have its face lifted to blend with a conventional vertical treatment of the annex exterior (see sketch); or 3) its shell could be left substantially as is with the new building’s design related to it but otherwise free to exploit the site and 1950 construction methods.

Fortunately, the branch bank’s vice president and manager, E. C. Harris, as well as the designer, were enthusiastically in favor of the third choice—a decision which, incidentally, saved the estimated $250,000 cost of refacing the old building. Under the accepted plan, the old building’s penthouse is being lopped off to make room for a roof-top recreation area for bank employees at the level of the new third floor. The two structures are further bound together by the extension of the existing spandrels into those of the annex. This produced an extra high ceilinged first floor which accommodates the monumental banking room required by the client.

By setting the columns 3 ft. back from the wall, lightness of the strip windows and marble spandrel bands is emphasized to create a harmonious contrast with the old building’s heavy vertical accents—a masterful composition of divergent elements enhanced by the set-back of the annex from the sidewalks.

Because of the narrow 95 ft. width of the annex and the setback of the exterior columns, its structural framing above the fourth floor is economically based on only three rows of columns about 33 ft. apart—one center row instead of the usual two (see plan). This frame can carry four additional expansion floors atop the eight now being erected.

The costliest innovation in the curtain wall is the steel “grid” or framework, faced with stainless steel, into which the fixed window slabs and marble slabs are inserted. The average square foot cost of the total curtain wall is about $10.70, broken down as follows:

<table>
<thead>
<tr>
<th>Material</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marble</td>
<td>$1.25</td>
</tr>
<tr>
<td>Steel grid</td>
<td>$6.15</td>
</tr>
<tr>
<td>Calking</td>
<td>$0.05</td>
</tr>
<tr>
<td>Insulation</td>
<td>$0.22</td>
</tr>
<tr>
<td>Glass</td>
<td>$2.18</td>
</tr>
<tr>
<td>Plaster</td>
<td>$0.32</td>
</tr>
<tr>
<td>Painting</td>
<td>$0.01</td>
</tr>
</tbody>
</table>

These do not represent sq. ft. prices of the individual materials, only the cost of the amount used. For example the sq. ft. of double insulating glass, installed, is not $2.18 but $4.20.)

A detailed study of the unique wall construction, see next page.
Bank's curtain walls have the dignity of marble without its usual high cost

To blend with the old building and give the new annex the dignity expected of it, marble was chosen as the exterior material. But this oldest kind of material will be used in the newest kind of curtain wall. Instead of the usual heavy 4 in. blocks of marble backed up with 8 in. of brick, the new wall will consist simply of 1½ in. marble slabs backed up with 2 in. of rigid foam glass insulation and tied with stainless steel anchors to a steel grid faced with stainless steel (see drawings, right). This grid will also contain the fixed panels of double insulating glass, tinted green to reduce glare.

Although not provided for in the local building code, the new marble curtain wall was approved by the Board of Standards and Appeals on the basis of the designer's argument that it is at least as good as a single sheet of glass which the code allows to extend to the floor on the upper floors of Detroit buildings.

The desires of window washing companies contributed to the decision to use fixed sash exclusively. They preferred to wash from a scaffold rather than climb in and out of double-hung windows, which is unhealthy for the washers, a nuisance for the occupants.
Those who hold that contemporary design appeared suddenly—new and full-blown—like a bolt from the blue will be surprised at the contrary evidence in G. E. Kidder Smith’s forthcoming book, *Switzerland Builds.* Although the book is divided physically into two parts—historic and contemporary Swiss architecture—they are one, unified by a single theme; the reappearance in the best of the new buildings of design ideas evident in the best of the old buildings, improved and adapted to modern building materials, construction techniques and ways of living. Thus, the strip window which has become almost a trademark for contemporary architecture (photo below) is a mere perfection of the strip windows which appeared in Swiss houses 250 years ago (photo left). Similarly, the cantilevered stair treads which are used by many a contemporary architect were known to the medieval Swiss shepherds who set the ends of stone slabs into the exterior walls of their houses to form a simple ladder to the second floor. Even the “modern” curtain wall is nothing new to the Swiss who fabricated such panels of timber.

*Switzerland Builds* is a photographic essay on the nation’s picturesque old and new architecture and the obvious relationship between the two—all set against the scenic grandeur of the country’s rugged landscape. As such, it is a beautiful book; the author’s expert photographs, several of them in full color, are works of art. It is also a useful book; its second part on contemporary architecture is packed with detailed presentations of outstanding buildings of all types, many of them hitherto unpublished, such as those shown on the following pages.

Destined to be an architectural best-seller, *Switzerland Builds* is briefly introduced by Professor Siegfried Giedion who competently sets the scene and tempo, extricating from Switzerland’s history the underlying forces of its present political, economic and social structure. Architect-author-photographer Smith competently takes up from there.

* Published by Albert Bonnier, New York City and Stockholm, 235 pp., 9 x 11¼ in., $7.50.
APARTMENTS

Because of a sloping site, these privately built apartments in Zurich presented a knotty planning problem. All units needed sunlight and a view of the lake to the east. This was achieved by placing the apartments on the upper grade at right angles to a busy street bounding the western side of the property and by concentrating their service areas to the north. The houses on lower ground, nearer the lake, were oriented on a north-south axis, service areas facing west.

An interesting minor feature of the floor plan is the location of a maid’s room at the head of each landing. This room can be used by either of the apartments on the floor and allows the maid complete privacy. Becherer & Frey, Architects.

ROW HOUSES

These cleverly planned row houses, also in Zurich, were built for low income occupancy. Typical of much native building, the ground floor is of masonry construction, the second of wood. For the latter, prefabricated panels of vertical boards were used and the second story walls were erected in a single working day. All major rooms, including the kitchen, face south with only a stair hall and laundry on the north. A full size basement takes care of all storage. (Note that there are no built-in closets). Adjoining each entrance is a small workshop. Heating is by means of a central wood or coal stove fed from the kitchen. Unit setbacks create a warm, sunny outdoor living area for each tenant. Aeschlimann & Baumgartner, Architects.
INDUSTRIAL SCHOOL

Located at Berne, this is the most recent and forward-looking of new Swiss educational buildings. Its trim white rectangle rising above the ground on piles, shows clearly the influence of the Swiss-born master, LeCorbusier. A covered walk connects the school with a large already-existing machine shop (shown in elevation at left). The glass-enclosed entrance level (partially seen in the photo, upper left) serves as student lounge and opens on a garden provided with lunch facilities. The roof, with a magnificent view of the city and the Alpine foothills, is also reserved for student recreation; is unenclosed except for an art studio at the north end.

Corridors (see photo left) make maximum use of natural light, with glass panels along each side and window walls at the ends. Hans Brechbuhler, Architect.

UNIVERSITY CENTER

This is a new building at Basel designed around a beautiful old garden court. Like most Swiss school buildings, it reflects the principles of the famous Swiss pedagogue, Pestalozzi—the first to put forward the idea that schools should be as pleasant and informal as possible. Its one slight concession to the monumentality usually connected with university buildings is the use of marble veneer to cover its concrete frame. The three wings of the building—set to enclose the court and open on it—include a large entrance lounge, a library, auditorium and dining room, as well as lecture rooms of various sizes. Roland Rohn, Architect.
STADIUM

The exterior construction of this vast but unostentatious covered stadium at Zurich-Oerlikon is of reinforced concrete with brick in-fill. Although the interior covers 100,000 sq. ft., it is supported on only four steel columns resulting in extraordinarily good visibility and a great feeling of airiness.

These columns are spanned by 280 ft. steel trusses which support the roof. A dropped ceiling, hung from the roof, hides all but the lower part of the steel work. Though bicycle racing is the main event held in this stadium, the track (right) can be removed and replaced with seats, or the floor can be entirely cleared for exhibition purposes. Karl Egender, Architect.

BATHING PAVILLION

Built as part of the rehabilitation program for the north shore of Lake Geneva this 700 ft. bathing pavillion in Lausanne appears neither ponderous nor overwhelming. Its boldly cantilevered balconies and planted roof do much to soften and break up the huge scale. A circular entrance foyer facing the town contains admission gates, check rooms and offices at ground level with a restaurant above overlooking the beach and lake. At the far end a 50 meter Olympic swimming pool is quickly identified by its bold, free, concrete and metal diving tower (far right). Marc Piccard, Architect.
Imaginative use of glass and planting permits big picture window

LOCATION: Los Angeles
J. R. DAVIDSON, Designer

Too often builders trying to be contemporary use large glass areas for “picture windows” without realizing that the “picture” outside must be at least as good as the window is or the result will be a loss. The glass, which looks like such a “feature” in a preliminary drawing, is invisible, and what actually shows through many a large and expensive sheet of it is a dirty street or the neighbor hanging out her wash.

In planning his own house, Designer Davidson faced a severe test because the neighborhood was drab. Yet no matter which way one looks out of Davidson’s windows and glass walls, the view is not only acceptable but charming. In his hands, glass as a building material was a plus, because he took care to create not only the glass window but the view that was to go with it.

This began with the landscaping and the way the house was placed. The social life of the family is centered in a living room which is united by a floor-to-ceiling glass wall with a sizable outdoor living terrace. This terrace is so arranged that a thickly planted grove of evergreen eucalyptus trees on the property line acts as a permanent distant screen. Where the trees end, the screening is continued by shrubbery and a tall cedar fence. Closer by, directly behind the glass wall, rhododendrons and other plants seen through the glass give a sense of enclosure—with an interruption which marks the big glass sliding door. Consequently the “glass wall” of the living room is far the richest and most interesting wall in the house. Its tapestry is a living one. It has distance and sunlight and the shimmer of growing things. It has privacy and protection too.

On the side away from the living terrace the house and a studio fold themselves around a patio to form another, more private outdoor family space. (As a further refinement, within this larger court is still smaller sub-patio, entirely private to the lady of the house.) All windows facing this family court are high and screened, serving for light but not for view, so that two-way privacy may be maintained.
A solid wall (at top in photo and at right in plan) protects the house from the outside drab world. Entering, the visitor finds himself in the family court, where windows are still kept discreetly high. But as he enters the living room, there bursts upon him, through the living room's glass wall, the lush terrace view seen in the large photograph. Ultimately he comes out onto the living terrace (left), which is surrounded by a soft screen of planting as effective for privacy as the first solid wall.
The use of high windows in the living room, on the side toward the private inner patio, increases wall space available for furniture. The flat walls and smooth rubber floor are in cool contrast with the lush view toward the terrace on the opposite side (photo below). The irregular shape of the room is not arbitrary, but opens the room wider to the terrace. Dining is possible under three conditions: indoors in the breakfast room, semi-indoors in the living-dining room, or under shelter out of doors (see plan).

The bedroom for the mistress of the house provides a tidy sanctuary as a foil for the rich abandon of the patio. (The bamboo is yet another way of enhancing glass used as a screen.) Privacy is the product of two high walls and a woven rustic fence covered with vines. The floor of the patio is patterned of cinder rock, cast at the site in three sizes, as is the living terrace on the other side of the house. The house cost $26,000.
Mill construction is combined with a simple L-shaped plan to produce an economical yet handsome house

LOCATION: Seattle, Wash.
YOUNG & RICHARDSON, Architects
MORSE & MCCORMACK, Contractors

This handsome house has construction reduced to the very minimum. Erected where big timbers are cheap, the walls are nothing but selected vertical planks of 2 x 6 in. matched fir. Along with the posts in the window walls, these planks act as bearing walls supporting the roof. In the mild climate of Seattle they provide their own insulation; and they need no additional surfacing materials inside or out. The same heavy planks form the simple ceiling with a few big beams and long purlins. The materials cost per square foot of plain wall would be under 30 cents at New York prices, compared to better than 60 cents for a conventional stud wall lined inside with 3/4 in. plywood and outside with 1/2 in. sheathing and cedar siding. For contrast the architect used brick cavity construction in the end walls.

The chimney is cleverly placed where three roof ridges meet, partly to mask their offsets in height and width, partly to eliminate cricks and let all water flow downward freely.

Planning is highly sensible. The bedroom wing is isolated, yet all rooms face the terrace with its handsome view toward a lake, and only high windows open to the automobile court. Especially noteworthy is the placing of the kitchen between the dining area and the playroom so the mother can watch the children. And the playroom in turn opens out to the carport, giving the children additional open play space under shelter.


Cost breakdown

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td>$231</td>
</tr>
<tr>
<td>Excavation &amp; foundations</td>
<td>651</td>
</tr>
<tr>
<td>Masonry</td>
<td>2,064</td>
</tr>
<tr>
<td>Ground, finish slabs &amp; sub-grade</td>
<td>1,274</td>
</tr>
<tr>
<td>Structure (framing)</td>
<td>2,367</td>
</tr>
<tr>
<td>Roofing, insulation, flashing,</td>
<td>2,067</td>
</tr>
<tr>
<td>gutters &amp; trim</td>
<td></td>
</tr>
<tr>
<td>Sewer (septic and drainage)</td>
<td>673</td>
</tr>
<tr>
<td>Plumbing</td>
<td>1,818</td>
</tr>
<tr>
<td>Heating</td>
<td>3,442</td>
</tr>
<tr>
<td>Electric wiring &amp; fixtures</td>
<td></td>
</tr>
<tr>
<td>Plastering</td>
<td></td>
</tr>
<tr>
<td>Finish, including casework</td>
<td></td>
</tr>
<tr>
<td>Misc, floor covering, finish</td>
<td></td>
</tr>
<tr>
<td>hware, painting</td>
<td></td>
</tr>
<tr>
<td>Overhead &amp; labor, taxes, insure</td>
<td></td>
</tr>
<tr>
<td>and permits</td>
<td></td>
</tr>
<tr>
<td>Contractor's fee</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>6,954</strong></td>
</tr>
</tbody>
</table>
Lowed openings under fixed glass areas provide for ventilation. Extension of the glazing up into the eave end, protected under wide overhang, gives the house a spacious sense of being wide open to nature in a mild climate. Carpeting over the entire panelized floor adds a warm texture. Basemeniless, the house has extra rooms for storage.
$4,999 BUILDER’S HOUSE includes good design in its budget. Also featured: low cost masonry construction, an aggressive program selling not only houses but a kitchen full of extra equipment.

LOCATION: Seattle, Wash.
W. A. WOLLANDER, Architect
CARROLL, HEDLUND & ASSOCIATES, Builders

Concrete block construction at $7.09 per sq. ft. spotlights this 1,000-house development in the heart of the Northwest lumber country. Side lights: a bargain counter sales tag of $4,999, a highly standardized yet attractive house design and a merchandising program which includes a dishwasher and sink in the basic package mortgage and a list of extra appliances at only $1 each per month.

Sponsored by Carroll, Hedlund & Associates, a Seattle mortgage loan firm, Mountlake subdivision’s 683 sq. ft. two-bedroom units match their attractive price tags with attractive exteriors. Although the exterior walls and interior layout are uniform throughout the project, Architect W. A. Wollander has achieved an uncommon amount of variety with a dozen assorted roof lines (pictures right). Further interest is added to the houses by siting them at different grades on curved streets, by exterior color variations and, finally, by the use of simple wooden trellises and fences to give the houses a longer, lower appearance. The overall result: a welcome change from the plucked-chicken appearance of most minimum-cost subdivisions.

Intelligent interior layout makes the most of 32 x 21 ft. dimensions. Particularly good is the arrangement of the living-dining area with its openness from front to rear. The kitchen is small but with enough wall space to take all the necessary cooking and laundry equipment. The most serious space deficiency is in closets and other storage areas.

In their present project for the under $5,000 market, the builders have drawn upon their experience in constructing 1,500 similar concrete-block units since the end of the war. They started with masonry block construction in 1946 to bypass the lumber shortage, have stayed with it ever since. The firm has also stayed with the low cost market, restricting all its operations to the under $8,000 market. The Mountlake houses are merely stripped down versions of the earlier models, but retain such quality features as steel casement windows, aluminum flashing and heavy-grade red cedar roofs.

Aside from this experience factor, the Mountlake budget was kept slim by a double-check on the cost of every construction material and operation. The only break the builders got in totaling up their costs was in their land buying. The first 50-acre section of the subdivision is built on a tract that had been graded for an airport that was never built and was bought for about $1,000 an acre. Reason for the low price: its location. 13 miles from downtown Seattle. The tract was improved—streets, fire hydrants, water lines and storm sewers—for $40,000.

Construction economies. Other economies were not as easy. The essential simplicity of their wall construction was the most important. Exterior walls are 8 in. x 8 in. x 16 in. concrete block with a 1 in. furring strip to which is attached the interior wallboard. Erection of the walls is speeded by the fact that (Continued on page 140)
House plan, above, shows expansion possibilities with extra bedroom on one side, garage on other, as suggested by the builder in stock expansion plans given to all Mountlake housebuyers. Better arrangement might be to reverse garage and extra bedroom so that one of existing bedrooms is not used as a pass-through to the extension. Houses pictured at right show variety achieved by roof changes, trellises and fences. Landscaping of the houses was done by tenants with plants supplied by builder. This is the only provision for landscaping in builder's budget.

Cost Breakdown

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>$40</td>
</tr>
<tr>
<td>Carpenter &amp; misc. labor</td>
<td>750</td>
</tr>
<tr>
<td>Excavation &amp; backfill</td>
<td>50</td>
</tr>
<tr>
<td>Brickwork &amp; fireplace</td>
<td>320</td>
</tr>
<tr>
<td>Lumber, rough, finish &amp; siding</td>
<td>315</td>
</tr>
<tr>
<td>Millwork, interior &amp; exterior</td>
<td>321</td>
</tr>
<tr>
<td>Concrete work</td>
<td>286</td>
</tr>
<tr>
<td>Plumbing trenches and drain tile</td>
<td>20</td>
</tr>
<tr>
<td>Plastering</td>
<td>312</td>
</tr>
<tr>
<td>Floors (wood) including finish</td>
<td>8</td>
</tr>
<tr>
<td>Hardware, finish, and range</td>
<td>50</td>
</tr>
<tr>
<td>Electric wiring &amp; fixtures</td>
<td>115</td>
</tr>
<tr>
<td>Plumbing</td>
<td>520</td>
</tr>
<tr>
<td>Painting</td>
<td>150</td>
</tr>
<tr>
<td>Roof—labor and material</td>
<td>135</td>
</tr>
<tr>
<td>Septic tank</td>
<td>160</td>
</tr>
<tr>
<td>Water connection</td>
<td>50</td>
</tr>
<tr>
<td>Taxes</td>
<td>100</td>
</tr>
<tr>
<td>Loan costs</td>
<td>194</td>
</tr>
<tr>
<td>Lot (including water line, grading, oil, gravel &amp; rock)</td>
<td>450</td>
</tr>
<tr>
<td>Overhead</td>
<td>195</td>
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<tr>
<td>Architect's fee</td>
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<tr>
<td>Profit</td>
<td>136</td>
</tr>
<tr>
<td>Advertising &amp; selling expense</td>
<td>265</td>
</tr>
<tr>
<td>Total</td>
<td>$4,999</td>
</tr>
</tbody>
</table>
Designed for easy natural ventilation, this house is cool in summer.

This house of cinder block has a quite unusual roof. It has full-length attic ventilators like those of a barn. Air admitted under the eaves rises as it heats up and is exhausted at the ridge with the effect of cooling the entire house. (Even during hot spells the air inside the house has been found 10 to 14° cooler than air outside.) In winter the ridge ventilators are nailed shut and only the eaves ventilators are left open. A ridge beam which also runs the full length of the roof relieves the attic of the usual clutter of trusses at the same time that it relieves the partitions below from the duty of supporting the roof. It is carried on lally columns spotted through the center of the house. The only disadvantage is that any rearrangement of rooms would have to take account of the lally columns, which are now buried in partitions. But the client has already taken advantage of his clear attic to put in an extra bedroom and bath, which he reaches by a retractable ladder stair. Cost: about $1.05 per cu. ft.

LOCATION: Princeton, N. J.
KENNETH KASSLER, Architect
L. C. BOWERS & SONS, Contractor

CONSTRUCTION OUTLINE:
Exterior walls—8 in. cinder block, cement stucco, furring, Celotex Corp. insulated board; inside—plaster. INSULATION—Celotex Corp.

Kitchen wing (above) is directly accessible to the street, but a covered walk and concrete block wall (photo, lower r.) cut off the undesirable street view from the living rooms. Windows are double insulating glass fixed in place, with wooden ventilating doors, hinged to open inward, set behind the louveres below the windows.
The columns on the municipal bus terminal abuilding in New York City are now being stiffened to support a helicopter landing field above its rooftop parking lot. This heliport would permit the shuttling of airline passengers between the mid-town bus terminal and outlying airports via 40 passenger, 000 lb. helicopters of the future. Tentative plans call for a 150 x 200 ft. landing area and two 50 x 100 ft. parking areas for one helicopter each. Such a "field" of lightweight aggregate concrete will require 500 tons of supporting structural steel (about 35 lbs. per sq. ft.) and cost some $400,000, inclusive of mechanical equipment, such as moving stairs.

The Civil Aeronautics Board is currently considering New York City's petition for approval of mid-city helicopter service.

A plan for vertical apartments comprised of nine identical cream-colored brick buildings, Equitable Life's new "Fordham Hill" stands out among New York City's new apartment projects. In the first place, 14-16 story buildings are crowded atop one of the Bronx's other outstanding features are seen mainly in the buildings' unusual plan which accommodates eight apartments per floor: 1) Bedrooms occupy the preferred corner section usually reserved for living rooms and eight extra rooms were added to the building to give every bedroom its own ventilation. 2) As a result of a preference poll among suitable women workers, kitchens are located deep within apartments, get only a second-hand view out of the big living room windows. 3) Divided, two-passenger bathrooms in all two-bedroom apartments—with a lavatory in each half. Sliding kitchen and closet doors. 5) A row of four windows in every living room. 6) A metal panel on the outside the wall between pairs of living room windows—a design element of questionable success.

Rents range from $105 to $133 for one-bedroom units, $135 to $171 for two bedrooms, including utilities—excluding dogs.

 Builders: Starrett Brothers & Eken.

Modern furniture boom

Along with the increasing trend toward contemporary architecture, makers of modern furniture are riding a boom. Within three days last month Hans Knoll Associates in New York booked two orders for $350,000 of furniture—one for a new hotel in Central America, the other for a group of diversity buildings.

Sales by Pascoe-New York, Inc., which recently furnished parts of the Golden Strand Hotel in Miami Beach and the Pont Plaza in Washington, are running 75 per cent ahead 1949. President D. J. Depree of Herman Miller Furniture Co. happily reports "the greatest in its history" with the last quarter sales in 1949 running 24 per cent ahead of 1948's first quarter.

Pens Risom Design, Inc., among whose clients is the Caribe Hilton Hotel (p. 97), is 10 per cent ahead of last year, which is 10 per cent better than 1948.
Free railroad station

Of interest to every debt-ridden railroad in the country is New York, New Haven & Hartford's new-found formula rebuilding its old stations: sell the existing station property for redevelopment as a shopping center built around a new station which will be provided cost-free and rent-free to railroad.

The first such station-shopping center—a $2 million project—will soon replace the New Haven's old commuter station on the New-York-bound side of the tracks in suburban Vernon, N.Y. Preliminary plans by Architects Boak & Roloff provide for 35 shops of various sizes, a 600-seat theater, a department store and, of course, a railroad ticket office and waiting room. Atop the building will be a parking lot for the convenience of commuters and shoppers alike.

The pioneering development was negotiated by Cushnan & Wakefield, Inc., whose President, J. Clydesdale Cushnan, heads the National Association of Building Owners & Managers. It will be built by Schein-Cohen Construction Corp.

Marble palace for the five and dime

Woolworth's, which has long since raised its prices above historic five-and-ten levels, has just finished in Houston, Texas, a new store whose costs defy measurement in nickels and dimes. For a choice downtown lot near the Rice Hotel, Woolworth paid $3 million (about $2,000 a front inch) and erected a marble-faced palace, in the slot-window manner of the early thirties (see photo), which cost another $8 million.

Architect: Kenneth Franzheim.

Low arched auditorium

Engineers Ammann & Whitney claim substantial savings in their design for the Onondaga Memorial Auditorium in Syracuse. In the first place, the light shell concrete roof is placed at the neutral axis of the support arch ribs (not above or below the ribs) which permits light construction and reduces thrust. Secondly, the shell rests on supports which are cantilevered out over the seats. This reduction of the span permits foundations and other supporting members to be of smaller sizes (thrust varies as the square of the roof arch span) and footing problems simplified by the shift in the dead load line closer to the building line. Moreover, the building's cubage is considerably reduced by the lower average height of the roof, these factors contribute to a reduction of 20-30 per cent structural costs. Edgarton & Edgarton, architects. W. O'Neil Construction Co., contractors.
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<table>
<thead>
<tr>
<th>GRAVEL AND CINDER FILL</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDIUM BLUE CLAY</td>
<td>14</td>
</tr>
<tr>
<td>STIFF YELLOW CLAY</td>
<td>32</td>
</tr>
<tr>
<td>MEDIUM BLACK CLAY</td>
<td>12</td>
</tr>
<tr>
<td>CARBONATE</td>
<td></td>
</tr>
</tbody>
</table>

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(Continued from page 132)
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Builder's house

(Continued from page 140)

builders' small profit on their house sales. By leasing their "warehouse" shopping center, they can, within a few years, match their total house-sales profit.

**VA financing.** Like many another economy-house project, Mountlake by-passes FHA financing for the more favorable terms of VA's 501 loan-guarantee program. All but three of the first 205 houses sold were financed under GI, 24-year loan plans. The mortgages were made by Western Life Insurance Co. of Helena, Mont. and by Mutual Benefit Life of Newark, N. J. Western Life also supplied the construction money. The builders were able to get a full $5,000 VA appraisal for their houses, plus a quick processing of their 4 per cent loans. The down-payment for a veteran buying at Mountlake is $112. The monthly carrying charge is $33. This breaks down to: $27 principal and interest, $5 taxes and $1 insurance.

**Merchandising with equipment.** Supplementing this basic financing, an expandible package mortgage system stimulates sales. A kitchen-full of extra equipment may be financed under the mortgage. A refrigerator, washing machine, range and clothes drier can be tucked into a Mountlake mortgage for $8.50 down and $1 per appliance added to the monthly carrying charges. This gives the builder the kind of flexibility he needs in applying the package mortgage principle to low income needs. The terms, of course, are disarmingly attractive; 700 appliances have been sold (at a profit) to buyers of the first 205 houses.

This package-mortgage merchandising is only part of the Mountlake selling program. From past experience, it was known that low cost houses do not sell themselves automatically. There were two reasons for this. First, the houses are pitched to a lower-middle income market which, up to now, had convinced itself that it could not afford a house. A selling job had to be done to show them that this was not the case. Secondly, this potential market had also to be convinced that, despite its price, the Mountlake house was well built. This called for another selling job. Carroll, Hedlund approached both these merchandising problems with an advertising selling budget almost double that of its estimated net profit. (See cost breakdown, p. 133). Advertising Manager James Scott decided to put the merchandising emphasis on the house's durability rather than price. Biggest sales resistance at Mountlake came from the prospective buyer's reluctance to purchase a house which might be too small for his needs. To counteract this, salesmen point out that every housebuyer is given a set of plans "for your larger house" with an added garage and a third bedroom. On the strength of this and similar aggressive salesmanship, the subdivision was sold out quickly. With the first group of its $4,999 houses near completion, Carroll, Hedlund & Associates will continue their operation on an 800-lot adjoining tract.
THEIR HOUSE IS WHAT THEY MAKE IT

Big estate or little cottage, owner-builders design their houses exactly as they want them. Personalized projects...because here are the people who plan ahead-of-the-blueprint stage. For the touch of a bath-dressing room with enormous closets. For all the important "extras" that owner-builders ask for in made-to-order houses. Reach these owner-builders through House & Garden...their authority...and your guide to extra sales. They know specifically what they want...and have the power to specify your product.

House & Garden

...for the OWNER-BUILDER market
FOR LEAKPROOF, TROUBLE-FREE PIPE RUNS

Cut-a-way view of a Walseal Tee showing ring of silver brazed alloy, and completed Silbraz joint.

On all types of piping jobs where Type "B" copper or red brass pipe is used, trouble can be avoided by installing Silbraz* joints — made with Walseal valves, fittings and flanges.

Threadless, patented Silbraz joints are silver brazed (not soft soldered) pipe joints that are leakproof, trouble-free — permanent connections that will not creep or pull apart; that literally join with the piping system to form a "one-piece pipe line". Thus, these modern joints eliminate the need for maintenance and costly repairs — especially important where lowered operating costs are imperative.

For complete details on the modern Silbraz joint, made with Walseal products, write for a copy of Walworth Circular 84.


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adds new wing

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integrates unusual traffic flow with OTIS AUTOTRONIC ELEVATORING

An extremely versatile electronically supervised system will provide the fastest, most efficient elevator service ever devised, for the new wing of the Standard Oil Company of California Home Office Building in San Francisco. Otis AUTOTRONIC Traffic-Timed ELEVATORING will provide 5-car local service between the main and 17th floors; call service to the basement garage; call service from the 17th to 22nd floors; and heavy noontime service to the 20th floor cafeteria. At the same time, it will maintain normal service to all other floors in the new wing and closely integrated service with the newly modernized 8-car installation that serves the main section of the building. 2,600 tenants will be served by these two installations.

Complex as this traffic flow may seem, it can still be handled with maximum efficiency by the 6 traffic programs that form the basis of Otis AUTOTRONIC ELEVATORING. This versatility of operation—which has been applied to a wide range of traffic patterns in 43 new and modernized office buildings, hotels, banks and department stores—is explained in Otis Booklet B-721-A.

Otis Elevator Company, 260 11th Avenue, New York 1, N. Y.
Specified SONNEBORN PRODUCTS give

- stronger concrete
- better rust prevention
- protection from dampness

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100 PARK AVE.

Erected on one of New York's most valuable and historical properties... with every modern convenience... America's newest skyscraper had to have the finest construction and materials available! That is why so many Sonneborn products were specified!

HOW SPECIFIED SONNEBORN PRODUCTS WERE USED FOR WATERPROOFING, CONCRETE TREATMENT AND RUST PREVENTION

Hydrocide Mastic  All exterior walls were dampproofed with a single coating of Hydrocide Mastic, applied on the interior side of these walls. Observers noted the ease and speed with which Hydrocide Mastic was trowelled on. Since New York's extremes of heat and cold do not make Hydrocide Mastic brittle or runny, weather is not expected to affect the building's dampproofness.

Trimix  The foundation concrete was given extra compressive strength and resistance to water penetration, by adding Trimix during mixing. Less water was needed, so a denser concrete resulted. The extra workability of the Trimix-treated concrete speeded pouring, especially where the concrete was chuted. Trimix was also used in the floor topping, as an integral hardener and densifier.

S.R.P.  As specified by the architect, all structural steel was protected from rust by a primer coat of S.R.P. (Sure Rust Prevention). This was sprayed on at the Bethlehem, Pa., plant of Bethlehem Steel Corp. The elasticity and toughness of S.R.P. also helped prevent corrosion of the steel while it was being encased in masonry.

For further information on any waterproofing, concrete-treatment or rustproofing problems or products, see your local Sonneborn Man...or write direct.

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Elsco Safety Roller Guides have been in successful operation since 1941. They have been approved unanimously by the Board of Standards and Appeals of N.Y.C. up to 1200 f.p.m.
They are adaptable to passenger and freight elevators regardless of capacity or speed, space permitting. They have been installed in leading buildings from coast to coast, and abroad. They are the only safety roller guide with oscillation, traction and knee action. The yoke affixed between the wheels provides a maximum of safety.

YOU OWE IT TO YOUR BUILDING TO INSTALL THE NEW ELSCO SAFETY ROLLER GUIDES
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For further information inquire of your dealer or

ELEVATOR SAFETY CORPORATION / 165 Broadway, New York 6, N. Y.
SAFETY WITH SAVINGS
Home owners and builders who know Durall are saying all the things you read above, and more!

With its first introduction, this remarkable new kind of window screen captured the imagination—and appealed to the good sense and pocketbooks—of home owners and builders alike. Over 2,000,000 are in use today!

**FREE BOOKLET!** Get our special, free Durall booklet, showing complete specifications and prices—for your A.I.A. Files. Write today, Dept. AF-3. See Durall at your building supply dealer's.
"Visual Education of Architects" (seen above as it appeared in M.I.T.'s lofty central hall) traces the experiments of Georgy Kepes and his students in what the eye actually sees in structure. Photographs, compositions in color and black and white, and small three-dimensional models make up this traveling exhibit.

Texture, an important aspect of every building, is modified by distance—an architect should be aware of all the textural possibilities in his design.

Glass is a structural material of almost unlimited possibilities today. At right student compositions portray the various visual effects of translucent sheets.

M.I.T. EXPLORES SIGHT AND STRUCTURE

The laws of vision, points out Georgy Kepes, are as varied and as inevitable as the laws of engineering—and just as necessary for the production of successful building. Visual Education for Architects, an exhibit prepared by Kepes and his students at the Department of Visual Design in Massachusetts Institute of Technology, delineates the part played by visual elements—line, shape, texture and color—in illuminating structural design.

His thesis is hardly new but it is explored with brilliant consistency. The basic principles of organized structure—balance, equilibrium, tension, rhythm, proportion, scale, harmony—reveal themselves first and most fully through the eye. Unless, therefore, the laws of vision are brought into accord with the laws of structure, the most important feature of a building design—intelligibility—will be destroyed or at least diminished.

A series of student experiments illustrate some steps in achieving the visual expression of structure. They probe visual qualities of materials—wood, stone, metal and glass; the reactions of these materials to various tools; the effects of light, color and pattern in modifying and accentuating their form and size. The study of natural forms with their characteristics in motion and at rest. All exercises aim at a single object—to develop "the discipline of visual thinking." Such discipline and sensitivity rather than formulas, Kepe believes, can bring life to our great and still expanding store of structural knowledge.

After a brief preliminary showing at M.I.T., the exhibit will be on view at the University of Minnesota, which sponsored preparation of the show and underwrote its expense. Later, it will be loaned to colleges and art institutes throughout the country.—S.K.

(Continued on page 158)
"Gerald forgot the ladder Ma'am, but I remembered that...

Everything Hinges on Hager!"

The WEIGHT Swings on HARDENED STEEL...Not BRASS!

Knuckle weight is functionally engineered on Hager Ball Bearing Butts to lie against special hardened steel top races. The brass cup, which contains the races and the ball bearings, supports no weight...is subject to no erosive friction that may later wear out or impair performance.

Highest quality chrome steel balls allow the knuckle to glide smoothly and evenly over tempered steel races. Leaves are beveled at the joint. Trim, square outer edges are finely milled sharp and clean.

Specify Hager "BB" Butts on jobs calling for average frequency door service. Hager Frictionless ball bearing gliding action permits even the heaviest doors to silently float back and forth.
This is the new Caribe Hilton. Located in San Juan, Puerto Rico, this new luxury hotel plays an important part in the over-all development of the island's economy. It was designed to be the "showcase" of the Caribbean. Significantly, it is completely air conditioned by Carrier.

EVERY GUEST in each of the more than 300 rooms and suites may dial the weather he prefers. The Carrier Conduit Weathermaster System with its individual temperature control fills the order from the central air conditioning plant.

FOR DINING or dancing in the Caribar, Salon de Castillo and Club Caribe, comfort is made-to-order by Carrier Weathermakers. The refrigerating and ventilating equipment, too, is supplied by Carrier.
It takes a continuous, vertical wiring trough to make a control center really easy to wire. And that's exactly what you get in the new Westinghouse design.

Several new design achievements contribute to this important feature.

**Removable side baffles** in each starter unit simply slide out to provide free access from wiring trough to terminal boards. Baffle grills are notched to clear outgoing leads.

**Removable support bars** between the starter units are easily released by slight pressure to the left. This eliminates the tedious job of fishing wires through blind spaces.

By removing side baffles and support bars you create a continuous wiring trough—unobstructed from top to bottom—providing ample hand room for an easier, faster wiring job.

**Consider all the advantages of this new control center!**

New, Magna-Grip "plug-in" connectors for greater operating simplicity; standardized, modular dimensions for unmatched flexibility; interlocking handles and "tilt position" disconnect for extra safety. These are random examples. The complete story is in Booklet B-4213. For your copy write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.
UNEQUALED IN

APPEARANCE...

PERFORMANCE...

REDUCED YEARLY COSTS...
By every standard, here is the ideal all-metal awning for commercial, institutional, and industrial buildings. Hundreds of installations have conclusively proved its durability, dependability, and economy.

Engineered for long life—precision-made for trouble-free performance—it operates smoothly year after year. By minimizing annual costs and fire hazards, the Kawneer Awning is an important investment in long-range economy and reduced replacement expenses.

Light weight is combined with the structural strength to withstand hard usage and severe climate. Hard surfaced aluminum slats are carefully formed, and positive locking prevents leakage. Easy extension is provided by lateral-hinged arms of sturdy pipe with heavy cast-iron elbows.

This handsome awning meets the highest standards of modern design. Its striking, rich appearance will add distinction to any facade, and its satiny lustrous finish reduces glare.

Furnished as completely assembled package units, Kawneer Awnings are ready for immediate erection. They can be obtained with concealed boxes or with hoods for surface application.

Widths up to 18 feet and roofs up to 8 feet are provided as individual units. When widths of more than 18 feet are required, multiple units are used. For detailed information, write 204 North Front St., Niles, Mich.; or 2564 8th St., Berkeley, Cal.
**PRIZE-WINNING FURNITURE IS REVEALED**

Results of the $30,000 competition sponsored by the Design Project Inc. of New York's Museum of Modern Art were shown in Chicago this month. Winning designs, which had been expected to break new ground in the low cost furniture field, were—frankly—a disappointment. Charles Eames presents a variation of his body-curved chair in plastic: Donald Knorr, a flat curved seat of sheet metal; Charles Pratt, a pneumatic-cushioned substitute for upholstery. The only storage group is that by an English team, Robin Day and Clive Latimer. Economically, as well as design-wise, the results (shown and priced above) are sadly short of spectacular.—S.K.

(Continued on page 162)
Fedders Wall Radiation provides new lower costs...easier and greater space-saving installations...lighter weight...easier handling...easier stocking.

Increased efficiency of transferring heat is assured by the pattern stamped in the fins which creates a turbulent scrubbing action of airflow against fins. This die-formed pattern also produces greater fin strength.

Three styles of enclosures are available as illustrated. Fedders Wall Radiation for steam and hot water lines is available in lengths from 2 to 12 feet in 6 inch increments. 38 and 50 fins per foot on 3/4 inch tube and 24 fins per foot on 2 inch tubes. Write for catalog WR-C1 TODAY.
The Cycle of Contentment in Our Surroundings is Ever Changing

In widely-separated areas of the United States, these modern homes testify to the substantial quality and beauty offered the owner when THOROSEAL is used for exterior masonry protection.

THOROSEAL, to fill and seal masonry surfaces of brick, tile, manufactured block, stucco, adobe or poured concrete, and

QUICKSEAL, in many beautiful tints, to finish off the surface.

The attractiveness of home, office, factory, warehouse, farm or commercial structure of any type is in its adaptability to change. QUICKSEAL (finish coat), in selected color tints, offers many desirable changes.

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Write for our 20 page brochure, pictorially describing masonry problems, and specification writer’s wall chart.

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REVIEW

THE NEW REGIONAL PATTERN. By L. Hilberseimer. Theobald Press. Chicago, Ill. 195 pp. Illus. 8 x 11. $5.50.

The two charts at right sum up the message of The New Regional Pattern. The first depicts present concentration of industries in eastern U. S.—a section of overcrowded and polluted cities; of depleted forests and eroded soil; of uprooted farmers and unemployed workers.

The second chart shows Ludwig Hilberseimer's suggestion as to how these evils can be avoided. Rivers and waterways are fully used. Cities have gradually spread out to form a series of self-sufficient units (about 25,000 people in each) which simultaneously foster industry and agriculture. Land, human health and industry all benefit by the change. Is such a transformation possible? This book sets out to prove—historically, economically, sociologically and structurally—that it is not only possible, but sound and imperative.

The author is no neophyte at planning. He was founder of the department of City Planning in Germany's famous Bauhaus and since 1938 has been Professor of that subject at the Illinois Institute of Technology. This latest book (companion to an earlier volume, The New City) investigates the soil from which every city springs—the region. In presenting his theories, Hilberseimer does not overindulge in dogma. "The diagrams presented here...", he says, "are outlines of possible solutions. Their main usefulness may be to start a discussion about local and regional traffic problems... Planning is an all-comprehensive task which requires a clear theoretical approach."

At the root of today's troubles Hilberseimer finds the tendency to overlook the inevitable operation of regional laws. In contrast to man-made "organized" territories like states, the region is a natural organ—"something which can live and support life... a interrelated part of a country, a natural unit self-containing by reason of geographical advantages, natural resources and soil conditions natural and man-made transportation routes."

Industrial practice has ignored these regional wholes and used only their most evident advantages to enrich larger, artificial, wholes. The rich forests of North Lake States supplied 35 per cent of the nation's greatest lumber from 1870-1920. Today the exhausted soil of the region forms one of the poorest sections of the whole country. Rich central plains, devoted entirely to corn, have already resulted in a dust bowl and seem on their way to becoming a central desert. In devoting the lands of the... (Continued on page 166)
Wet umbrella or forgetful puppy ... there's no staining or fade mark to worry about when floors are surfaced with Genuine Clay Tile. Show your clients how the rich fired-in decorator colors will lend warmth to foyer, kitchen, utility room ... eliminate the drudgery of scrubbing, waxing and refinishing that is necessary for old-fashioned floor and wall surfaces. Moreover, you have a strong selling point in the long-range economies of Genuine Clay Tile. Available now in a wide variety of colors, sizes and patterns.

The Tile Council of America, Room 3401: 10 East 40th Street, New York 16, New York. Room 433: 727 West Seventh Street, Los Angeles, California.
These high-quality, low-cost Fenestra Entrance Doors, Frames and Hardware are used in Eberhard's Super Market, Grand Rapids, Michigan. A fitting entrance to a modern store . . . and tough enough to take years of constant use. Architect: Wilfred P. Mclaughlin, Grand Rapids, Mich. Contractor: George Datema & Sons Builders, Inc., Grand Rapids.

SCHOOL. Two of the 135 Fenestra Hollow Metal Doors, Frames and Hardware used throughout the Robert N. Mandeville High School at Flint, Michigan. These sturdy doors can take a beating from hurrying kids . . . and come up smiling. They can't be carved or splintered — an occasional coat of paint is all they need to look like new. And, of course, they are firesafe. Attractive, ribbed glass in upper panels provides privacy. Architect: Bennett & Straight, Dearborn, Mich. Contractor: Karl B. Foster, Flint, Mich.

OFFICE. Entrance of J. A. Folger & Company is made distinctive and inviting by these handsome Fenestra Hollow Metal Doors. Entrance doors are like a handclasp—they make an important first impression . . . a lasting impression. Engineer: Robert J. Cummins
Doors take the toughest treatment...

..and still look like new!

In and out . . . out and in . . . all day long. A super-market seething with shoppers. School kids opening classroom doors with their feet. A stadium entrance jammed with jostling crowds. That's **tough** treatment! And that's one of the reasons why Fenestra® Hollow Metal Doors were selected for those spots. These attractive, insulated doors won't sag, warp, swell, shrink, or splinter . . . a fresh coat of paint makes them look like new.

**Some of the Other Reasons:**

**High Quality**

Fenestra Hollow Metal Doors are carefully made by craftsmen long skilled in steel fabrication. Each door comes wrapped to protect the gleaming finish.

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Because these doors are standardized, they can be produced in great volume for maximum manufacturing efficiency.

**Complete Unit**

Door, strong steel frame and shining hardware, designed as an attractive unit, ready to install.

**Low Installation Cost**

Mortising, drilling, tapping and prime painting are all done *at the factory*. Installation takes just four steps: Bolt the strong steel frame together. Attach frame to floor and anchor to walls. Screw on template locks and hinges. Hang the door.

**Delivery in 2 to 3 Weeks**

Action is taken promptly upon receipt of your order. Local stocks can usually deliver immediately.

Fenestra Doors with the Underwriters' B Label are also available. See Sweet's Architectural File, Section 16a/8, call your Fenestra representative (listed in the yellow pages of your telephone directory) or mail the coupon.

*Trade Mark

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**STADIUM.** Through these Fenestra Doors of the Stadium in Grand Rapids, Michigan, go thousands of hurrying people every weekend. What harder use can doors have? Yet they look like new—and will, for years of weekends to come.


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Please send me full information on the new Fenestra Hollow Metal Doors.

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WHAT'S BETWEEN
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Only a few inches of wall separate the new basements you build from their greatest enemy ... ground water!
Upon the sound construction of that narrow wall depends the future of the home. Properly constructed with Medusa Waterproofed Gray Portland Cement*, the foundation will always ward off ground water, protecting the home owner against the expense and trouble of a damp or wet basement!

It costs so little, yet means so much, to build lastingly dry construction. Specify Medusa Waterproofed Gray Portland Cement in mortar and poured concrete for foundations. Use this water repelling cement for an outside plaster coating whenever walls are made of masonry construction. This original waterproofed cement contains a stearate waterproofing which repels all water at the surface of concrete. The booklets, "How to Waterproof Concrete, Stucco, and Masonry" and "A Discussion of Integral Waterproofing," contain completed data on waterproof construction. Mail coupon.

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Review:

south to steady cotton growing, planters have not only effectively exhausted the land, but uprooting trees have permitted the Mississippi River to sweep huge quantities of rich earth into the Gulf of Mexico. Most dramatic example of cumulative regional imbalance even now at work in California. The fertile San Joaquin valley encouraged farmers to attempt at more intensive crops than the amount of rainfall permitted. Irrigation on a mammoth scale was introduced from wells formed by water of mountain snows. In addition, this rich swamp land around the river was drained to extend these productive fields. Recent results have become apparent. Not only is the water of underground stores near depletion, but the river, which formerly meandered through the swamps depositing rich land soil, now races right out to the sea. Even worse, the drained land has now settled below sea level, so that at high tide the salt water backs up and is poisoning the valley basin.

This destructive interaction between maladjusted land and ocean areas finds a parallel in the economic maladjustment of our cities and farms. "The cities can no longer absorb the people who are unemployed on the farms. Neither can the farms absorb the people who are unemployed in the cities." An indecision and flow of movement between the two areas creates chaos in both. It produces cities of overcrowded slums and vacant lots nearly one-third of privately-owned city land is currently unusable, points out the Urban Land Institute. "The trend toward decentralization," adds Hilberseimer, "is beyond our power to stem or to prevent. It is therefore of vital importance to direct (it) to a good end. A new kind of planning and zoning needed, one which is able to determine where and what could or should be built."

As a basis for this kind of planning, he envisions a society which will not depend for living on either agriculture or industry alone. Taking the varying resources of each region as a whole, he proposes comprehensive surveys to determine what combination of the two will best answer its needs. All units will have a variety of resources: heavy industry, light industry, commerce, homes, gardens and farms. Each family will be able to supplement industrial wage by work on its own or near subsistence farms. These farms and parks will not only provide food, but will improve health and climate. No less an individualist than Henry Ford is quoted to back Hilberseimer's denunciation of regional specialization: "With a steer raised in Texas should be brought (Continued on page 172)
PLEXIGLAS — Lets in the Light
Keeps out the Glare

Sun glare becomes soft, eye-easing light—pleasant to work or read by—when it's screened with translucent PLEXIGLAS glazing. PLEXIGLAS diffuses artificial or natural light perfectly —lets you see clearly without eyestrain.

In glazing, lighting and a score of other applications, architects are turning more and more to PLEXIGLAS. You'll find this adaptable acrylic plastic in weatherproof, translucent skylights and clerestory panels for daylight admission—in shatter-resistant glazing around curved corners—in wall-to-wall luminous ceilings—entire store fronts—translucent and transparent panels and screens of all kinds. And this is only the beginning of the list.

If you want to know the full range of PLEXIGLAS possibilities, send now for our newest booklet —PLEXIGLAS for Architecture. It gives complete technical data on this light, strong, workable Outdoor Plastic, shows actual installations, suggests uses. Write today on your business letterhead. Ask for samples of plain, corrugated or patterned PLEXIGLAS, clear or in colors.

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plus samples of PLEXIGLAS

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Canadian Distributor: Crystal Glass & Plastics, Ltd., 202 St. Helen's Avenue, Toronto, Ont.
Rooms do double duty with "Modernfold" doors. By folding them against the walls, the entire area is usable as one unit. Close them—and you have private rooms for separate functions. And their efficiency doesn't stop there. Use small "Modernfold" doors in normal openings instead of swinging doors. Their accordion-like action will save you up to six square feet per opening.

Remember, a "Modernfold" door is not a curtain but a strong, durable folding door. Its sturdy metal frame is a firm foundation for beautiful, flame-resistant, washable plastic fabrics. Available in a variety of colors to match any color scheme. Mail coupon for full details, or look in your telephone book under "Doors" for the name of our installing distributor.

"Modernfold" doors are priced from $26.00 (F.O.B. New Castle) and up.

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Please send me your architects' catalog giving full details on "Modernfold" doors.

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Imagine this FLOOR in Radiant Moultile Colors

This attractive floor suggests the endless variety of original designs which can be achieved with Moultile's individually laid tiles. Pictured here is one of several patterns designed by Haxby, Bliss & Belair, Architects, for the Fern Hill School, St. Louis Park, Minn.

Even without the benefit of color, this photograph reveals much of the eye-captivating beauty of Thos. Moulding Moultile floors. It suggests the clarity of tone, the pleasing variegated effect of Moultile's crisp, clear veining. Now let your mind's eye supply the colors, as deep, rich and clear as a rainbow. Then you'll know why so many architects prefer to design their floors in Moultile! Moultile is as practical as it is beautiful. It is quiet, non-slippery, comfortably buoyant underfoot...and practically impervious to ordinary wear. With all its advantages, Moultile is low in original cost and most economical when figured on a cost-per-year basis.

Moultile and the wide range of other Thos. Moulding Floor Materials lend themselves to virtually every flooring need. Moreover, Thos. Moulding is prepared to make special colors, or to modify standard materials for special floor requirements. Architects are invited to submit unusual floor problems to: THOS. MOULDING FLOOR MFG. CO., 165 W. Wacker Drive, Dept. AF-3, Chicago 1, Ill.
Micarta tops 'em All!

NEWER COLORS
Only Micarta has the 9 new Decorator Colors selected by a national jury of leading architects — the smart off-shades preferred today.

BETTER FINISHES
Only Micarta offers both satin and glossy in a true finish... the satin is built-in, not just a glossy finish rubbed down.

THE "BEAUTYMASK"
Only Micarta is covered by a strong manila sheet protecting the surface while work is done — until ready for use.

PANELS ON WATERPROOF PLYWOOD
Only Micarta's 7/16" and 3/4" panels offer the plastic laminate bonded with waterproof resorcinol glue on waterproof Weldwood plywood.

BETTER SIZES
Micarta offers sizes up to 48" x 96" — thus often providing greater economy and covering larger areas with fewer seams.

MORE COLORS
Micarta is offered in 40 colors and patterns, including solid colors, decorator effects, patterns and Truwoods.

MORE STAIN RESISTANT
Micarta can't be stained or discolored by boiling water, milk, grease, food products, fruit juices, household cleansers, detergents, barber and beauty shop materials, even nail polish and nail polish remover.

MORE "ABUSABLE"
Micarta dares you to chip, dent or scratch it. Test it with heavy glasses, cups, silverware, kitchen utensils, and even pots and pans.

CIGARETTE PROOF
Standard Micarta is remarkably resistant to cigarette burns; the cigarette-proof grade is guaranteed against cigarette damage.

Check MICARTA YOURSELF SEND FOR FREE SAMPLE

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I want to check Micarta myself. Without any obligation, please send me a FREE sample.

NAME ____________________________________ TITLE ____________________________
COMPANY ____________________________________
ADDRESS ____________________________________
CITY ____________________________________ STATE __________________________
This is Armstrong's Linoleum

The unusual combination of beauty, durability, and moderate cost offered by Armstrong's Linoleum has made this floor the choice for countless thousands of stores, offices, and public buildings. Popular for many years, it is still a truly modern flooring. Manufacturing improvements have added to its serviceability, increased its beauty, made it easier to clean.

There's almost no limit to the custom designs that can be worked out in a floor of Armstrong's Linoleum. There are six types from which to choose—Plain, Jaspé, Marbelle®, Spatter, Straight Line Inlaid, and Embossed Inlaid. Colors and types can be combined to achieve any desired decorative effect.

Armstrong's Linoleum is made in three gauges: Heavy (1/8"), Standard (3/32"), Light (5/64"). It is not indented by furniture loads up to 75 lbs. per sq. in. This flooring can be specified for both conventional and radiant-heated suspended subfloors.

This is Armstrong's Asphalt Tile

When clients' budgets are limited, Armstrong's Asphalt Tile is the ideal flooring choice. Low in first cost, it's a durable floor that's also economical to maintain. Installed tile by tile, there's almost no limit to the variety of designs and color combinations that can be created.

Unharmed by alkaline moisture, Armstrong's Asphalt Tile can be used in basements or on concrete floor slabs in direct contact with the ground. It performs satisfactorily over radiant-heated subfloors. Made in regular and greaseproof types and in two thicknesses—1/8" and 3/16"; both types and gauges can be installed on wood or concrete floors.

For additional data on Armstrong's Resilient Floors—Linoleum, Asphalt Tile, Arlon Tile, Linotile®, Rubber Tile, and Cork Tile—consult Sweet's Architectural File, Section Number 15a, Catalog Number 2. For samples and specifications, as well as help in solving unusual flooring problems, write to any Armstrong District Office or directly to the Armstrong Cork Company, Floor Division, 2603 State St., Lancaster, Pennsylvania.
On a wave-washed coral beach at San Juan, Puerto Rico, U. S. A., stands the gem of the Caribbean—the new and exciting Caribe Hilton hotel.

Surrounding this all-year magnet of charm, comfort and courtesy is an exotic "Garden of Eden" with a tropical lily pond which extends into the luxurious lobby. Every guest room is "the best one," individualized in decor and furnishings. Each has its own air conditioning, and a private balcony affording a magnificent view of the unbelievably blue sea.

Throughout, from the garden floor to the sun roofs, perfection was the goal. Thus Sloan is justifiably proud that its Royal Quiet-Flush Valves were selected for this fine hotel.

Significantly, Sloan Flush Valves are in service in two out of three of the nation's hotels having fifty rooms or more.

More Sloan Flush Valves are sold than all other makes combined.
Typical Hilberseimer city (above) is set in a segment to avoid smoke carried by prevailing winds.

Chicago and then served in Boston is a question that cannot be answered as long as all the steers Boston needs could be raised near Boston. The centralization of food manufacturing industries, entailing enormous costs for transportation and organization, is too wasteful long to continue in a developed community.

Text as well as charts in the New Regional Pattern show how this scheme can be adapted to a variety of sites and needs. Although the author does not come to grips with the inevitable problem of how to break the costly web of present city systems, his book presents a broad and needed look at the course that future planning should take—and the constructive part it can play in solving economic and social problems. Moreover, Ludwig Hilberseimer faces up to one aspect of the planning problem which is very often avoided—the extent to which true progress must depend on personal and public responsibility far beyond the everyday brand of "enlightened self-interest." He says: "The future seems often to be wholly dependent on technical and economic solutions. But the problems we must solve are basically ethical. The interdependence of the individual and society is based not solely on technical and economic considerations, important as they are, but on a moral and ethical concept."

He gives a challenging reply to those who waive aside all proposals as unrealistic and Utopian. "It is rather unrealistic and Utopian to presume," he remarks, "that evils continue without consequences."—S.K.


"How about our hospitals?" was one of the more important questions that forced itself on New York State officials after the war. In spite of the fact that in 1948 the state could boast 543 hospitals in its territory, not counting 14 Federal ones, and that in that year alone it spent $392 million on hospital care (16.5 per cent of the nation's total) its service was still criticized as inadequate. What were the reasons? Were more hospitals needed, or were present facilities mismanaged? If more hospitals were necessary, what types should get preference? What size should new hospitals be? Where should they be located?

To find the answers to these questions an investigating Commission was set up—a coalition of state officials and experts impartially chosen by Columbia University. All state hospitals—municipal, voluntary and private as well as those directly under state supervision—were included in its survey. For the sake of comparison, consultations were made with key hospitals all over the country. This tightly packed volume is the result of a year's research by the group—the Joint Hospital Survey and Planning Commission. Their findings have certainly far more than state wide interest. A Pattern for Hospital Care is a close tracing (Continued on page 176)

THE CASE:
How to achieve the privacy of partitioned offices without loss of appearance or the brightness derived from borrowed light.

THE SOLUTION:
Mississippi Glass Company's STRUCTURAL CORRUGATED GLASS (Maximum sheet size, 50 inches x 144 inches)

RESULT:
Modern design combined with luxurious simplicity.

A friendly atmosphere for visitors and employees alike...privacy without that "closed-in" feeling. Truly, a shining example of the prominent place which glass has attained in modern office interiors.

This is just one of many cases solved by STRUCTURAL CORRUGATED GLASS. Write for catalog, "Structural Corrugated and Structuralite Glass by Mississippi." Contains suggested applications, photographs and installation data.

For further data, see Sweets' File or contact your nearby distributor of quality glass. Samples gladly furnished on request.

MISSISSIPPI GLASS COMPANY
SAINT LOUIS 7, MO.
NEW YORK · CHICAGO · FULLERTON, CAL.
WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

(Continued on page 176)
The Truscon Series 138 Double-Hung Window has a high-style appearance with a common-sense price. It is so smart, so sensible, so dollar-saving that in standard designs it may be used with a generous hand in any size or type of residential structure. The sill-vent design is particularly adaptable for use in schools. Sash members are of welded tubular construction. Long, quiet, trouble-free action assured by motor-type spring balances with tapes of Republic Enduro Stainless Steel. Complete factory weatherstripping in stainless steel. Modular standards. Wide range of types and sizes offers unusual design opportunity.

Free illustrated literature on request.
"I feel that the success of the Sherwood Forest plan is largely due to the quality materials used—including American-Standard Heating Equipment and Plumbing Fixtures. From experience I have found that the American-Standard name is well known and carries a lot of weight with home buyers."

MORE AND MORE BUILDERS who use American-Standard Heating Equipment and Plumbing Fixtures, are finding this a strong selling point to stress in their own advertising. It tells the public that only the best products were used... creates confidence in the top quality of the whole dwelling.
In this Sherwood Forest, a residential subdivision of Memphis, Tennessee, there's a buzz of activity these days. Here, smart, modern homes—some still in the process of construction—line the streets which bear the names of such legendary characters as Robin Hood, Friar Tuck and Little John. But these quaint street names are about the only connection with the Sherwood Forest of old...for this new residential district is as modern as tomorrow. All houses have central heating. And, naturally, they are equipped with the latest features and conveniences...including both American-Standard Heating Equipment and Plumbing Fixtures.

The idea for the development of Sherwood Forest was conceived by builder Herbert W. Morton. The subdivision contains 568 lots, laid out on contours to preserve as much as possible of the hardwood forest. The cheerful, distinctive houses were built to market for a maximum price of $12,000. In 1946 and 1947, 156 houses were built in Sherwood Forest. These were single family units of brick veneer or frame construction and were sold for prices ranging from $10,000.00 to $12,000.00. During 1948 Mr. Morton built and sold 40 additional units in this same price range. In 1949, 156 houses were erected on some of the remaining lots and sold for prices ranging from $5,500.00 to $10,000.00.

As Mr. Morton says, American-Standard Heating Equipment and Plumbing Fixtures were an important factor in creating the enthusiastic demand for the Sherwood Forest homes.

The outstanding quality of American-Standard products, backed by strong, consistent advertising, has created a public acceptance throughout the country. You will create satisfied customers when you install American-Standard products in the structures you build or remodel. Whatever the type or the size of the project, you will find just the heating equipment and plumbing fixtures you need in the complete American-Standard line. Ask your Heating and Plumbing Contractor for details.

American Radiator & Standard Sanitary Corporation, P. O. Box 1226, Pittsburgh 30, Pennsylvania.
Decorate with VARLAR Stainproof Wall Covering

...and you can "redecorate" with soap and water year in and year out!

VARLAR Washes Like Tile...Cuts Decorating Costs!

NOW, at last, a wall covering as beautiful as the most beautiful wallpaper—yet washes like tile! It's amazing new Varlar Stainproof Wall Covering! Even hot grease won't stain it! Nor will steam, water, hair oil or mercurochrome mar its lasting beauty. Even lipstick, crayons, India ink, salad oil and shoe polish wash right off—with plain soap and water! Resists fire, bacteria and vermin too!

Over 100 Beautiful Styles

Yes, Varlar is a remarkable scientific discovery combining all of the best features of all previous wall coverings. It hangs as easily as wallpaper and stays new looking for years*. You can "redecorate" any time you want—with ordinary soap and water—without any expense, any muss, any loss of time! Your choice of over 100 decorator-approved styles—in smart, colorful florals, plaids, geometrics, pictorials, stripes, tiles, two-tone tints and solid pastels.

Truly, Varlar is amazing! Send for your free sample today, and see how lovely, how stainproof, how washable it is!*

*Rapid laboratory tests show that Varlar STILL looks "brand new" after 50,000 washings.

Varlar, Inc., Dept. AF-3
Merchandise Mart, Chicago 54
Send me my free sample of Varlar. Bet I can stain it!

Name__________________________
Address________________________
City__________________ Zone____ State________

(Continued on page 182)
How an office was designed, decorated and lighted to achieve reflectances, brightnesses and brightness ratios meeting or bettering (except in one instance: the reflectance of the floor covering is too low) all requirements of I. E. S. Recommended Practice of Office Lighting is told in detail in this 8 Page Engineering Survey by an independent consulting illuminating engineer. Write for your copy to THE F. W. WAKEFIELD BRASS COMPANY, VERMILION, OHIO.

ANOTHER WAKEFIELD STAR INSTALLATION

The office described in the Engineering Survey is lighted by 4 continuous rows of Wakefield STARS, each luminaire containing four 4500° white slimline fluorescent lamps 72 inches long. Taken from the Survey is this view looking vertically upward from underneath a luminaire. The Survey says: "This is the brightness pattern that would be reflected by a glossy desk top located under the luminaire. The low brightnesses and brightness ratios found here prove that reflected glare is not a problem in this office." The STAR has a luminous, indirect plastic reflector which slides in and out like a drawer.
Let General Electric help

WHY NOT CAPITALIZE ON SUCCESSES SUCH AS THESE?

A builder in Massachusetts reports: "Sold 125 G-E equipped houses in 10 days!"
From Maryland: "Sold 44 G-E equipped homes from 1 sample in 1 day!"
From Colorado: "Sold 54 G-E equipped homes the first week end!"

Why not follow the success pattern of these builders?
When you equip your houses with the General Electric Kitchen-Laundry you pre-sell your houses.

You give customers what they want—homes designed for better living . . . scientifically designed kitchens that take much of the drudgery out of housework.

And, you know General Electric's reputation for fine products. General Electric appliances are the preferred brand of so many, many people.

As little as $4.80 extra
You can include General Electric living in your houses for as little as $4.80 a month extra when the G-E "Kitchen Package" is included in the long-term realty mortgage!

Furthermore, the economical operation, low maintenance and long life of General Electric appliances may offset the slight increase in monthly payments.

ONLY $9990! "A low-cost luxury home with fully equipped General Electric Kitchen worthy of a $30,000 home!" That's how Messrs. Brisker and Campitelli described their Kensington Estates houses. Included in the kitchen is a G-E family-size refrigerator . . . G-E electric range for automatic cooking . . . G-E sink and electric dishwasher . . . and G-E Disposal® food-waste Unit and storage cabinets. No wonder 250 of these General Electric equipped houses were sold in just 10 days!
sell your houses faster!

From all over the country come enthusiastic builder success stories such as this one . . .

"SOLD 250 G-E EQUIPPED HOUSES IN 10 DAYS!"

Here's what Mr. NATHAN BRISKER, President, and A. CAMPITELLI, Secretary of Kensington Estates, Inc., Brentwood, Md., say:

"We consider our 'Kensington Estates' housing project a huge success. The sale of approximately two hundred and fifty houses in ten days was an attainment far beyond our fondest hopes.

"It is our opinion that the phenomenal success of this project was due to a soundly built house well planned, good financing and the better living built into the homes in the form of the complete General Electric Kitchen.

"We think the public deserves better living in the lower price home as much or probably more than in the more expensive home.

"We want to extend our appreciation to you and the men from the Potomac Electric Power Company for your help and co-operation in manning the houses and demonstrating the G-E Kitchen to the thousands of people who visited these homes."

A COMPLETE MERCHANDISING PROGRAM FOR YOU!

General Electric—the world's largest electrical manufacturer—offers you all these advantages:

- Tested merchandising programs that have helped so many other builders enjoy phenomenal sales results.
- General Electric is the brand of electrical appliances that people prefer to all others.
- Assistance in designing and improving kitchens and layouts for your houses.
- One source of supply for matched equipment—everything but the linoleum and paint.
- Fewer headaches. G-E equipment is world-famous for its dependability.

GET COMPLETE FACTS about the General Electric "Kitchen Package" through your local General Electric distributor, or write to the Home Bureau, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC
HARMONY IN WOOD: Beautiful wood windows blend with wood paneling in this Wisconsin home. And wood gives a hidden beauty to these Andersen Casement Window Units—insulating qualities which no one appreciates more than architects and builders.

The low thermal conductivity of wood combats the vexing problem of condensation in a climate that often hits 10 below zero, and helps these Andersen windows to function simultaneously as windows and as a wall. They are truly a WINDOWWALL that opens a view and admits light and air, yet all the while acts as a weathertight wall that shuts out cold, dust and moisture.

Specification data on ANDERSEN WINDOWWALLS is in Sweet's Architectural and Builders' Catalogs, or will be sent by us upon request. See your local lumber or millwork dealer for further information.

The new Andersen WINDOWWALL Tracing Detail File will be sent at no charge to architects and designers making request for it.

*TRADEMARK OF ANDERSEN CORPORATION

ANDERSEN Corporation
BAYPORT - MINNESOTA
Bramble Exchange, Cincinnati Suburban Telephone Com­pany, Cincinnati, Ohio. The interesting mortar-joint pattern is effected by the use of two sizes of Insulux Glass Block, Pattern Nos. 216 and 416. Insulux is made in a variety of designs, in three sizes.

Functional daylighting . . . and design:

Imaginative use of Insulux Glass Block combines functional daylighting with attractive appearance. In this building, Insulux provides ample daylight and helps protect delicate telephone circuits from the ravages of dust, dirt and moisture.

Insulux Glass Block is a versatile building material. It transmits light, insulates, and reduces transmission of noise. Unusually easy to maintain, it never requires paint and is free from rot, rust and corrosion.

For technical data and installation details, consult GLASS section of Sweet's Architectural Catalog, or write Dept. G-102, American Structural Products Company, P.O. Box 1035, Toledo 1, Ohio.
help raise the level of medical care as well as to lower its costs." The alternative to voluntary increase of payment is quietly but deliberately faced: "If at the end of several years the target figure of 85 per cent has not been approximated, or the major improvements in the coverage of the insurance have not been accomplished, the public must consider the advantages of adopting a compulsory hospital insurance which can be integrated with the existing patterns of workmen's compensation and cash sickness insurance."

Future trends in hospital design and management are closely bound together. Smaller hospitals, it is conceded, are out. They cannot afford to provide adequate equipment; they cannot make adequate use of (or adequate recompense for) a skilled administrative staff. This change will mean a departure from the present setup where 55 per cent of hospitals care for only 17 per cent of patients—providing less than the suggested hospital minimum of 100 beds a piece. Small hospitals have proved not only more expensive individually, but they endanger the precarious economy of the whole system.

Clinics for diagnosis and treatment (not free but at least partially covered by prepaid insurance) should be attached to every hospital. One such institution has been successfully operated for some years through staff doctors at Mt. Sinai Hospital. Such clinics will be of especial help in the care of mental diseases. For this reason the commission recommends a surprising change in the siting of mental hospitals. It suggests that they should be placed either in or near cities where the attached clinic can serve not only for diagnosis but for the far-too-neglected field of rehabilitation. This location would also relieve the crucial problem of getting sufficient and well-trained personnel. Such personnel has been understandably reluctant to accept posts in the out-of-the-way hospitals which cut them off from all social and professional interests.

A Pattern for Hospital Care is a clear and careful report supplying valuable data on the varied administrative demands of the hospital world.—S.K.


Few kitchen designers or restaurant men produce really workable plans, says Arthur Dana—who has had wide experience in both fields. Designers usually fail through lack of

(Continued on page 183)
How You Can Save Time on Air Conditioning Jobs!

It takes no more than a telephone call to your nearest York District office to bring a York-trained air conditioning and refrigeration engineer to your deskside. He's an experienced engineer, fully qualified to help slash hours of drudgery from your preliminary planning, cost and analysis work, and installation chores. His technical assistance is "guaranteed" by data files covering thousands of successful York-equipped installations in every type of business and industry. He can tell you, too, about York's Certified Maintenance Plan...a unique service that assures continuous efficiency, relieves you of time-consuming post-installation responsibility.

"See Your Architect, Engineer, Contractor, First"

York believes in channeling contract work through you...and York gives you unequaled support in providing the finest central station systems possible...

- a complete line of equipment
- competitive prices
- accurate, dependable product ratings
- technical assistance based on "case histories"
- cooperation with architects, engineers, and contractors
- practical help from York-trained engineers
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York offers a complete line of air conditioning and refrigeration products backed by seventy-five years of fruitful research and acknowledged public acceptance. Each York product is designed to be—and has proved to be—a cost-cutter and service-improver wherever installed. A promise from the past, for the present and future, of better, more efficient service for your clients. If you have any air conditioning or refrigeration work on the board, call your nearest York District Office. See how the York-trained engineer can help fractionalize detail work. See how profitably his wide-range technical experience dovetails with your requirements for any type of installation. No obligation, of course. York Corporation, York, Penn.

PIONEERS IN INVENTION AND DEVELOPMENT SINCE 1874

Refrigeration and Air Conditioning

OUR BUSINESS IS IMPROVING YOUR BUSINESS
A low-maintenance fixture ideal for any commercial installation—school, factory, office, hotel, hospital, etc. Closet itself is highest quality Crane vitreous china... cleans with touch of a damp cloth. Triumph Valve features replaceable plunger unit—body has no wearing parts. Consult your Crane Branch or Crane Wholesaler.
MORRISON Opens the Door to OVERHEAD DOOR Satisfaction!

it costs less to buy!
it costs less to ship and store!
it costs less to install!
and it's Four-Sectional!

... the New MORRISON Roly-Door Four-Sectional All-Steel Overhead Residential Garage Door is the first and the only Residential OVERHEAD DOOR in the world with every wanted feature! It has everything — and it's the only overhead residential garage door that has everything!

A New Low Price for a Quality Door!
(Please Read this Twice — it's the most sensational price news in the home-building industry in years!)

Because of its exclusive method of manufacture, the MORRISON Four-Sectional, All-Steel Residential Garage DOOR can be sold and installed for as low as $60, depending on geographical location and installation conditions!

JUST OFF THE PRESS!
The complete story of The MORRISON Roly-Door it's yours for the asking...

MORRISON STEEL PRODUCTS, INC.
ROLY-DOOR DIVISION • BUFFALO 7, N. Y.
TO BE TRULY MODERN A BUILDING MUST BE AIR CONDITIONED

Chrysler Airtemp chosen for MAGIC CHEF’S NEW HOME


THREE 50-TON CHRYSLER AIRTEMP RADIAL COMPRESSORS CONDITION THE AIR IN THIS FUNCTIONAL OFFICE BUILDING

Modern architecture—with its keynote of sleek beauty combined with efficiency and personal comfort—demands a specialized approach to construction problems. That’s why so many architects and builders rely on Chrysler Airtemp equipment and services when planning heating and cooling installations.

Since Chrysler Airtemp builds three basic air conditioning systems, we can provide the best type to fit each job. And, through regional offices, contractors and dealers, Chrysler Airtemp offers the counsel of highly trained engineers. These air conditioning specialists can guide you in selecting the most efficient system for your requirements.

When desired, Airtemp Construction Corporation—wholly owned subsidiary of Chrysler Corporation—will assume entire responsibility and follow your project through from specification to completed installation. Mail coupon today for further information.

Chrysler Airtemp
AIR CONDITIONING • HEATING • COMMERCIAL REFRIGERATION

A typical Chrysler Airtemp water cooling unit... Automatic capacity control... compact... vibrationless... direct connected... no foundations required... dynamically balanced... can be shipped completely assembled.

AIRTEMP DIVISION OF CHRYSLER CORPORATION, Dayton 1, Ohio
We would like the complete story of Chrysler Airtemp service and products.

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HOPE'S

Ocker Hill Power Station

THE HOPE'S LOK'D BAR FACTORY SASH recently installed in this Power Station building are made to special size and layout. Their height, 63', 0", is indicated by the size of the figure in the lower right foreground. The mullions are 10 gauge pressed steel reinforced by structural members. Hope's LOK'D BAR Catalog describes, with full-scale drawings, the exclusive principle of their design, and Hope's Engineering Department will be glad to submit details for similar installations on request.

HOPE'S WINDOWS, INC., Jamestown, N. Y.
THE FINEST BUILDINGS THROUGHOUT THE WORLD ARE FITTED WITH HOPE'S WINDOWS
how much layout and space affect their basic aims—satisfactory working conditions, efficient production, quick service. His discussion considers the needs of formal and specialized restaurants, cafeterias, snack bars and serving counters, as well as dining rooms for industrial institutions. He also gives a valuable chapter on hospital kitchens.

Designing a financially successful restaurant is far more than a matter of decoration. Key to achievement in the field is a true balance between kitchen and seating areas. “Better to have the customers wait outside than inside” was the watchword of E. M. Statler in determining the number of seats accommodated by his restaurants. Although 60 per cent of seating area to 40 per cent kitchen space is a good rough proportion, is is really only a starting point. Factors just as influential in determining relative size of the areas are: the proposed menu, the type of service and the rate of turnover.

Kitchen area must be planned with even more precision than seating space. This is, as James Warren of Hotel Management points out in the Introduction, “the most complicated of all institutional departments—and the most costly.” It should be planned from the portion size up. The serving of a 4 oz. portion of meat, for instance, requires 33 per cent more storage space than does a 3 oz. portion.

Inadequate space allowance for weighing and checking incoming supplies can mean surprising loss. Not only to prevent waste but to ensure a reputation for good food, this elementary procedure must be generously provided for. Good kitchen lighting not only saves eyesight and strain, it cuts down on bills for broken crockery and makes for cleaner dishwashing. Good acoustics not only create a better atmosphere, they prevent misunderstood orders. Since hot flavorful food is the all-important end product, counters for supplying such dishes should be placed nearest the dining room—nothing must slow their route to the table.

The supplement with a model floor plan for a hotel dining room as well as one for a complicated roadside restaurant (with dining room, barbecue pit and quick lunch counter) illustrates the book’s principles in action. One disillusioning point: although Dana has earlier shown the logic of setting up service counters in multiples of 8-10 units (the maximum number that one attendant can serve) his own model counter has 21 seats—design mystery of the month!—S.K.

POrex slabs are used for floors, roofs and acoustical purposes. They are especially recommended for furring and insulating walls. They save so much fuel that the reduced heating plant cost will practically pay for their installation. After this the fuel bill is reduced by one third or more.

POrex has the following distinguishing features:
- Lightweight — 28 lbs. per cu. ft.
- Practically Incombustible
- Moisture Proof
- Frost Proof
- Good Heat Insulation

POrex slabs are made in sizes 24" wide x 96" long x 1", 1 3/4", 3" and 4".
GET STARTED WITH Stainless IN '50

You've been hearing glowing reports about stainless steel as an architectural material. You'll be hearing a lot more—especially about its unique advantages for roof drainage systems.

Residences and commercial buildings protected by Berger Roof Drainage Products of ENDURO Stainless Steel are ready for a lifetime of weather. Berger ENDURO Drainage Systems are stronger and more attractive than ordinary systems. They will not rust or tarnish, and are unaffected by corrosive industrial atmospheres. They stand up under heavy loads of ice and snow. Severe temperature changes won't crack or buckle them. They resist abrasion and denting, do not bleed or discolor paint, require no maintenance and save your clients' money.

Jobbers can supply Berger Roof Drainage Products made of Republic ENDURO Stainless Steel—and competent roofing contractors are familiar with working them. Both will help you get started with stainless in '50.

Like more information for your files? Just write:

Manufacturing Division
REPUBLIC STEEL CORPORATION • CANTON 5, OHIO
Warehouses in BOSTON, PHILADELPHIA and ST. LOUIS • Sales offices in DETROIT, MICH., and INDIANAPOLIS, IND.
THE DAY-BRITE "VIZ-AID"
PUTS ITS PARTS ON THE TABLE

Judge a book by its cover? Judge a lighting fixture by its appearance alone? Not! Not if you want to be sure — dead sure — that the fixture you select will give you years of trouble-free, economical performance. It's insides — quality inside — plus expert engineering, sturdy construction, durable finish and low-cost maintenance features that make the "Viz-Aid" such an outstanding value. Compare the "Viz-Aid" with any other fixture in your own "take-it-apart" test. Be sure! See for yourself how every inch of the "Viz-Aid" is quality built — inside and outside — to give you real economy through long, efficient service.


"DECIDEDLY BETTER"
DAY-BRITE Lighting Fixtures

"ONLY QUALITY IS ECONOMICAL"
Servel's record for rock-bottom maintenance costs figured strongly in the choice of 289 Gas Refrigerators for the Gardencrest Apartments, Waltham, Mass.

Maintenance costs on Servel Gas Refrigerators are lower than they are on motor-driven types—and what's more, they stay low year in, year out. That's the experience of managers of apartments and housing projects from coast to coast.

It's because Servel's exclusive freezing system operates without a single moving part. There are no pistons, no valves, no pumps. No motor to wear. No machinery to break down. Instead, a tiny gas flame does all the work.

As a result, owners enjoy a minimum of trouble and expense. Writes one apartment operator—

"Since installing Servels, I've just about forgotten that I even have refrigerators in the building."

Twenty years ahead of its time, Servel's different principle of refrigeration accounts also for its other big advantages—permanent silence and longer-lasting dependability. And today, the new 1950 Servel—brilliantly styled by the well-known Walter Dorwin Teague—brings tenants and owners the last word in modern refrigerator design, inside and out. For details on the latest models, consult Sweet's or write to Servel, Inc., Evansville 20, Ind.

"For example—
MOBILE, ALA. "After nine years, our 398 Servels cost only $1 a month per unit for upkeep."
PHILADELPHIA, PA. "Exceptionally low maintenance cost over a period of nineteen years."
American Kitchens Put A Valuable "Seal of Approval" on Your Homes!

Flexible American Kitchens Units Save You Both Time and Work...And Often Cost Less Than Wood Cabinets!

You save work—and your clients save money—when you specify styled-in-steel American Kitchens!

You can save hours of tedious planning, because the wide range of sizes of American Kitchens sinks and cabinets, plus big selection of accessories, makes it possible for you to plan a "custom" kitchen—complete with colored counters—in a minimum of time.

And you can give clients the added beauty and convenience of a famous American Kitchen at actually less cost per running foot than comparable quality wood cabinets! In fact, American Kitchens are priced to fit the budgets for even your low-cost homes! Sink fronts, flat rim sinks, continuous tops are available!

Send for our new 1950 Architects File and see for yourself all of American Kitchens many exclusive advantages! Just mail coupon below.

SPECIAL ECONOMY SINKS

The country's lowest price for this high quality. 4 models—42", 48", 54", 66" (twin bowl). Same quality as deluxe styles, but without accessories.

FREE—NEW 1950 ARCHITECTS FILE

American Central Division, Dept. AF-3
AVCO Manufacturing Corp., Connersville, Indiana
Please have my nearest American Kitchens supplier furnish me—without charge or obligation—your new Architects File, complete with specifications and roughing-in diagrams.

Name ____________________________
Address ____________________________
City ____________________________ County ______ State ________

AMERICAN CENTRAL DIVISION AVCO CONNERSVILLE, INDIANA
For Sparkling Cleanliness ... and Low Upkeep

Specify VITRINITE Walls

You solve major problems in maintenance when you specify walls of Vitrolite*. Vitrolite is glass paneling. It's ideal for washroom walls, stiles and partitions ... for lobbies, corridors, kitchens. Its mirror-smooth surface cannot absorb germs and moisture. Quick cleaning with water or window cleaner keeps it sparkling. Even pen, pencil and crayon marks whisk right off.

Another big economy for your clients ... Vitrolite walls never need painting or refinishing. Vitrolite will not craze, warp, swell or fade. It sparkles like new for life. And its twelve correlated colors permit distinctive decorative effects.

In planning office, industrial or public buildings, you can count on Vitrolite to meet modern demands for maintenance economy, cleanliness, beauty. Your L-O-F Glass Distributor can supply more data. Or write for our architects' book on Vitrolite.

Ease of maintenance is of prime importance in a building as large as the new home of the John Hancock Mutual Life Insurance Co., Boston, Mass. To keep washrooms sanitary at minimum expense, Vitrolite was installed in all toilet, shower and dressing rooms. Architects: Cram & Ferguson, Boston.

Choose from these Correlated Colors

- Cadet Blue
- Sky Blue
- Dark Gray
- Light Gray
- Peach
- Alamo Tan
- Mahogany
- Red
- Cactus Green
- Black
- Jade
- White

*80

MADE BY
LIBBEY-OWENS-FORD GLASS COMPANY
5235 Nicholas Building, Toledo 3, Ohio
1 PLANNING
National Disposers fit into design easily. National anticipates varying job conditions and installation problems (such as high waste lines) with two models—the Standard, Model 35-C and the "Shorty," Model 35-CS—shown at right.

2 INSTALLATION—The contractor has no problems where installation of National Disposers is concerned. Nationals are designed for quick, easy installation. It's a matter of record that National Disposers were installed in one apartment house job in an average time of less than ½ hour each!

Both Standard and "Shorty" Models are easily, quickly installed—good design is simple design!

3 PERFORMANCE—National Disposer performance is absolutely tops—compare it with any other brand! Both models have the same powerful ½ h.p. motor, same simple one-piece drain cover control, same one-piece jam-free impeller. Both models handle any legitimate garbage and are not harmed by metal, glass and other objects which may accidentally be dropped into a disposer!

4 SERVICE POLICY
National Disposers are built to strictest quality standards—but if service is required, the work is simply a power unit replacement... so simple it is unique in the entire disposer industry! The user is not deprived of his appliance; there is no involved repair operation in his kitchen.

YOU CAN'T DO BETTER THAN TO SPECIFY NATIONAL DISPOSERS—Nationals meet every requirement from the first planning stage on... every requirement of the architect, contractor, apartment and home owner.

It will pay you to get complete details now... write for "Architect's File" including National Disposer specification sheets and installation data.

Address: Dept-2, Plumbing Equipment Div., The National Rubber Machinery Co., Akron 8, Ohio.

HOLLOW CLAY TILE FLOOR doubles as maintenance-free duct work for heating system.

Warm air circulating through RadianTile transforms the attractive finished flooring into an efficient radiant panel. First used by Architect George Keck, this ingeniously simple floor-radiator is now commercially available from several member manufacturers of the Clay Products Association. Its installed price in the Midwest (with local labor) is about $.55 per sq. ft.

In the RadianTile heating method, four forms of hollow tile are utilized: both closed and perforated supply/return ducts; and tri-channeled blocks (13% in. sq.) with closed and open bottoms. To prevent mortar from falling inside the blocks, special metal sleeves connect the channels. These components are arranged in proper sequence in a closed system to fit almost any floor plan of a one-story structure—simple or involved. Able to withstand crushing loads of 700 lbs. per sq. in., RadianTile may be laid as an unobstructed slab; and heavy partitions, fireplaces and grand piano placed on the finished floor.

Installation details are presented clearly by Clay Products Association in their booklet, "RadianTile." In operation, the heating unit forces warm air into the closed supply ducts beneath the floor. At the location to be heated, the air travels up through perforated ducts into the closed-bottomed blocks and flows through the floor via the continuous channels formed by the closed-bottom blocks laid end to end. It then enters the return ducts, is drawn again into the furnace to be reheated and recirculated in the cycle. No cold air leaks in and the only heat "lost" is that dissipated to the blocks for warming the building. Floor surface temperature need not exceed 90°F, and the system may be controlled thermostatically. The heat produced is the clean, healthy uniform heat of the radiant type. Lag, a bugaboo in massive floor panels, is not so noticeable in RadianTile where the heaviest dimension is ¼ in.

Besides serving as an ideal radiator, the hard moistureproof and verminproof surfaces work togetheher with the air spaces as insulation from the ground, even when the heating system is not in use. The tiles are guaranteed against corrosion, rust and rot. About the only maintenance they require is an occasional waxing.

Licensing Agent: Clay Products Assn., 100 N. La Salle St., Chicago, Ill.

(Continued on page 200)
Be Sure!

Build Your
AIR CONDITIONING
Specifications

AROUND

Curtis

Because . . . . Curtis equipment has an earned reputation for performance that is second to none in the industry

- Curtis units are built by a company with over 96 Years of Successful Manufacturing Experience
- Competitively priced, Curtis units operate economically — are easily serviced
- Engineering help is provided (if needed) by Curtis Engineers

- New additions to the Curtis line provide the correct size and type for any installation, assuring economy . . .
- and Your clients will be pleased with the quiet reliable performance of Curtis Equipment.

Curtis REFRIGERATING MACHINE DIVISION
of Curtis Manufacturing Company
1914 Kienlen Ave. — St. Louis 20, Missouri
96 Years’ of Successful Manufacturing

See the Curtis Catalog
in Sweet’s 1950 Architectural File
Home owners like the comfort and convenience of self-insulating windows. They enjoy freedom from bothering with storm sash spring and fall. Thermopane® all through the house gives them what they want. It adds salability, creates long-lasting satisfaction with the home.

Fifteen companies now manufacture aluminum casement and double-hung windows to accommodate Thermopane. Ten manufacturers make casement and double-hung steel windows for Thermopane. Eight manufacturers have standard wood windows available in both double-hung and casement styles for Thermopane. Many local sash houses regularly fabricate to order double-hung and casement wood windows as well as framing for inexpensive window walls. Write for a list of Thermopane window manufacturers.

Thermopane is made in more than 80 standard sizes for all types of sash—wood and metal. Contact sash suppliers for information on types and sizes available. Write for a list of standard sizes of Thermopane units, or see your L-O-F Glass Distributor.

Casement windows — Thermopane is a simple answer to the problem of insulating them. The entire sash is operated at will because Thermopane is glazed into it.

Double-hung windows — there are 28 standard-sized Thermopane units to fit the most commonly-used dimensions of this type of sash.

Window walls and picture windows—Thermopane units are available in sizes to fit standard wood, steel and aluminum picture windows.

FOR BETTER VISION SPECIFY THERMOPANE
MADE WITH POLISHED PLATE GLASS

MADE ONLY BY LIBBEY-OWENS-FORD GLASS COMPANY
3735 Nicholas Building, Toledo 3, Ohio
Another Major Housing Project
Selects Hotpoint Appliances

Windsor Village
Indianapolis, Ind.

Windsor Village is one of the nation's outstanding rental housing projects. To help produce more desirable homes at no increase in cost—homes that would more than meet today's exacting standards of living—the L & L Building Corporation equipped each of the 540 units with a Hotpoint Range and a Hotpoint Refrigerator.

Similar preference for Hotpoint products is being expressed in scores of communities and building projects throughout the country. Whether you are a large or small operator—whether you plan to build or remodel—apartments or homes—the wide acceptance of the Hotpoint name—the exclusive features and proven quality of Hotpoint products will serve as a plus value from the viewpoint of either buyers or renters.

Moreover, Hotpoint is equipped to give you much helpful information in home appliance arrangement and economy. Write today for free-of-charge literature and full specifications on the entire Hotpoint line—every major unit for the complete electric kitchen and home laundry.

"Prior to the construction of these projects we had used Hotpoint appliances in other projects and were well pleased with their performance. Our past experience together with the increased ease of renting our units to a public which has come to accept Hotpoint appliances as the highest standard of quality led us to use these appliances again in our rental housing projects."

Very truly yours,
L AND L BUILDING CORPORATION
Geo. V. Ginger, Secretary

(A General Electric Affiliate)
IN ALL KINDS OF

PC GLASS BLOCKS complement any architectural plan. Whether in a large structure, like this new generating station of the Potomac Electric Power Co., Alexandria, Va., or in a small home, PC Glass Blocks provide many decorative and utilitarian advantages. They admit plenty of daylight, yet shut out distracting views. They cut heating and air-conditioning costs, because of their superior insulating properties. They eliminate many maintenance problems, since they rarely need repairs or replacements. They lessen eye fatigue among workers. Engineers and Constructors: Stone & Webster Engineering Corp., Boston, Mass.

AT THE NEW PASTEURIZING and bottling plant of the Carnation Company, Houston, Texas, PC Glass Blocks exclude dust and dirt from the processing area. Panels of PC Glass Blocks appeal to your clients for many reasons. One is their ease of cleaning. The entire panel can be cleaned as a unit by wiping with a damp cloth, or by using a hose and long-handled brush. There’s no expensive washing of small, individual panes. Architects: Finger and Rustay, Houston, Texas.
PC Glass Blocks

are "The Mark of a Modern Building"

IT'S HOLLOW! All PC Glass Blocks are hollow. They are made of two pieces of formed glass, fused together, enclosing a partial vacuum. Thus, each block is an insulating unit. Various outer patterns and inner contours enable the single cavity blocks to admit plenty of daylight; to direct, divert or diffuse light to areas remote from openings. Double cavity blocks, in which a fibrous glass screen is inserted between the halves of the block, assure additional light diffusion and insulation. Because of their architectural adaptability . . . because they "make the most of daylight," PC Glass Blocks are specified by America's outstanding architects.

IN THIS DINING ROOM, PC Glass Blocks make family meals more delightful. The light is cheerful and softly diffused. And, being non-transparent, prying eyes can't see into the room. From the outside, glass blocks highlight the beauty of the home. At night, too, the light streaming through them from the inside, adds sparkle to the dwelling.

BY W. P. FULLER & CO. ON THE PACIFIC COAST, AND BY HOBBS GLASS LTD. IN CANADA
THAT GO ALL THE WAY THROUGH

AZROCK and AZPHLEX
ASPHALT TILE

Turn an Azrock or Azphlex tile over, and you'll find the same rich, clear colors on the bottom that there are on the top... because the top-quality pigments in these fine asphalt tiles go all the way through.

Standard Azrock and premium-quality Azphlex offer a wide range of colors, solid and marbled — and Azphlex offers, in addition unparalleled resistance to greases... to indentation... to climatic heat and cold.

There is never any dimming or wearing away of colors in Azrock or Azphlex floors... years of steady pedestrian traffic can’t mar them if they receive even elementary care. Their beauty is lifetime tough.

CORRUGATED TRANSLUCENT PLASTIC is decorative, useful building material.

Corrulux is a strong, attractive paneling made of glass fibers imbedded in polyester resins. It is molded in lengths and widths to correspond with standard corrugated metal or asbestos — on 1¼ and 2½ in. shallow and deep centers and 4.2 in. deep—as well as other shapes, such as curvatures for Quonset-type buildings. Transmitting light but safeguarding privacy, the material makes handsome interior partitions, shower stalls, etc. It is also structurally adaptable to exterior use because of its lightweight shatterproof qualities, and, because of its soft translucency, excellent as skylighting. It nests with other corrugated roofing, and so may be interchanged with sections on existing buildings. Handling is simple. Corrulux may be cut with saws or abrasive wheels, nailed, bolted or drilled like other roofing and siding. It will not sag or buckle and is impervious to mildew, humidity, sunlight and most industrial fumes. Installed costs range from $1 to $1.25 per sq. ft. Standard shades are: soft green, forest green, a light ivory, coral and sunlight yellow. Other colors are available on order.

Manufacturer: Corrulux Corp. Box 6524, Houston 5, Texas.

CERAMIC TILE can be mass produced in any original design at moderate cost.

Glazed and fired in a process which permits the architect and builder to obtain exactly the color and pattern tile they desire—and at mass-produced prices—Cera-Tile has unique, largely unexplored possibilities. Instead of separate firings for each color (required in most other techniques of tile fabrication) all the glaze is applied on the bisque before the single baking. Colors are blended during the firing, the heat acting as palette knife. Flow is controlled so that measured amounts of blue and yellow become the identical shade of green for tile after tile. (Richard Harlan, developer of the process, has noted that a tile-faced wall for a Rio de Janeiro public building took a year to hand decorate. He claims the same job by the Cera-Tile method would take two days.) Cost of stock patterns is $2 per sq. ft. plus packing and shipping charges. Custom de-

signs run slightly higher, depending upon the complexity and scope of the pattern. The firm challenges architects to submit designs it cannot produce—from abstract murals to repetitive.

(Continued on page 206)
The New in Schools is the "Home-Like Look"

Ceco Steel Joist Construction
achieves
Informal Residential Design

One of the new concepts of school construction comes under the high sounding term of "optimum psychological environment." Actually, it is quite simple—it's just making the school seem less formidable, less like an institution, more like home. This informal residential character was achieved by Perkins & Will, Chicago architects, in designing the Blythe Park School, Riverside, Illinois. Here, Ceco steel joists were used to provide large square "flexible" classrooms (30 square feet per pupil). Wide span areas were obtained—also unobstructed floor space and neat trim ceilings, yet there was no sacrifice of strength and safety in construction. The result, a pleasant home-like structure—a child centered school—modern—functional, beautiful too. Steel joists are light, easy to install, self centering. Ducts, wiring, piping are concealed. Cost is low.

CECO STEEL PRODUCTS CORPORATION
General Offices: 5601 West 26th Street, Chicago 50, Illinois
Offices, warehouses and fabricating plants in principal cities

In construction products CECO ENGINEERING makes the big difference
First question, on heating plans, like everything else these days is usually ... "What's the cost?" 

While heating costs include much more than the original installation because of fuel consumption, combustion efficiency, flexibility, maintenance and other factors ... a properly engineered installation of Janitrol Unit Heaters will usually meet all requirements and cut costs.

Whether it's a huge building requiring several million BTU/hr. or the corner store with a single Janitrol Unit Heater, installations are made without the expense of installing extensive duct work.

With unit heaters, heat is directed where it's needed and only when it's needed, an important factor in operating economy.

If building plans call for air conditioning, specially designed Janitrol Gas-Fired Unit Heaters can be quickly installed in the air conditioning duct work. This eliminates duplicating duct work, pipes and blowers, for summer air-conditioning and winter heating use the same distributing system. In hundreds of stores, restaurants, offices, etc. these Janitrol installations conserve valuable space and have proved both practical and economical.

SURFACE COMBUSTION CORPORATION • TOLEDO 1, OHIO
Johns-Manville Announces

A NEW DEVELOPMENT IN MOVABLE WALLS

Asbestos Panels
"INTEGRALLY COLORED" at the Factory

Cutaway of typical J-M Movable Wall construction. The 7/16"-thick asbestos panels, on patented steel studding, are available in a light green and light tan. NOTE HOW THE COLOR GOES ALL THE WAY THROUGH EACH PANEL!

No more painting. No more redecorating maintenance.

In the world's largest laboratory devoted to the improvement of building materials, Johns-Manville scientists have perfected a process for introducing inorganic pigments as an integral part of the asbestos panels used in J-M Movable Walls.

As a result, these beautifully-textured, fireproof panels now come pre-colored.

What's more, you'll have the advantage of "integral coloring," with the color going all the way through each panel, so that it will never wear off. Your walls will have that "first-day newness" every day for years and years to come!

By eliminating painting and redecorating expense, these new Transitone Movable Walls will help you to meet your wall and partition requirements economically.

Transitone panels are hung on steel studs, forming a 4' double-faced partition. Also used as interior finish for the outside walls. Lighter than ever, they are readily installed or relocated. For details or an estimate, write Johns-Manville, Box 290, New York 16, New York. *Reg. U. S. Pat. Off.

Johns-Manville Transitone

MOVABLE WALLS with asbestos panels colored all the way through
One of many full color illustrations in The Color Book of Tile. See color schemes, alternate patterns, bathroom accessories, inserts, decorative tiles.

NOW it's EASY to Specify Tile

SEE it... in COLOR

IN THE NEW COLOR BOOK OF TILE

Here now, ready for big and little home planning, are complete bathroom, kitchen, and game room installations in American-Olean's Color Book of Tile. Here are full color illustrations in easy-to-use form. Tile selections of all kinds are conveniently arranged... offer side-by-side comparison of alternate color and pattern choices.

American-Olean's Color Book of Tile lets your clients visualize the finished installation... lets you plan it by simply copying a 42 word specification (you can choose colors later)... helps the tile contractor satisfy you and your client with exact follow-through of your specifications.

Use The Color Book of Tile for every job. See how easy, how time saving, how sure, specifying tile can be.

American-Olean Tile Company
Executive Offices
900 Kenilworth Ave., Lansdale, Pennsylvania

Free TO EVERY ARCHITECT
American-Olean Color Book of Tile
The most complete, most helpful tile book ever produced. 100 pages, including 30 full color plates of typical installations, also color charts of wall and floor tile, trims, and hand-decorated inserts. Full architectural data and ready-to-use specifications. If you do not have a copy, or if you need another, write us at once.

IT'S REAL CLAY TILE
DESIGNED in the form of a giant "U", this new $3,000,000 structure, in downtown Chicago, contains the offices and plant of The Florsheim Shoe Company. Abundant natural daylight is assured on four sides of the five factory floors.

Occupying one-half of a city block, the new plant consists of over 300,000 square feet of factory and office space. Located just west of Chicago's busy loop district, the building is convenient to all forms of city transportation and several nearby railway terminals.

The interior painting of this imposing industrial plant involved the use of especially-selected Pratt & Lambert wall coatings and enamels, chosen not only for their decorative qualities, but also for their durability.

The Pratt & Lambert Architectural Service Department offers practical assistance to architects everywhere, in planning authoritative decoration.

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

Save the surface and you save all!

The block-long line of upper leather cutters, with die cases conveniently at hand, close to the upper leather source. Such conditions assure maximum speed, efficiency, quality production.

General view of sales and executive office wing. Steel partitions are used throughout; the entire office floor is in asphalt tile; ceilings are soundproofed. Illumination is provided by means of daylight fluorescent through louvered fixtures. The entire office area is air-conditioned.
PRODUCT NEWS

JALOUSIES

The open louvers on Win-Dor Approved jalousies give every room a new "outlook" by providing a completely unobstructed view... and a free flow of air. Louvers may be of clear glass for vision, or obscure glass for privacy. When louvers are closed, they provide protection against inclement weather. Louvers are bracket-mounted in weather-proof frames. They are weather-stripped, and tightly held to prevent rattle, yet easily removable.

All principal parts—housing, tracks and sill strip—are aluminum, and steel accessories are plated to make the entire unit rust resistant. The tube upon which the screen rolls inside the housing contains a sealed oil-tempered spring.

Washing windows from the inside may be accomplished by merely releasing the sill strip. Screen-o-matics require no painting and are guaranteed to be free from material defect. Retail prices range from $3.90 for the 18 in. width to $8.50 for the 50 in. Length in all sizes is about 28 in.


PLASTIC WINDOW SHADES are long-lived, can be sponged clean.

Resistant to moisture, flame, fading and shrinking, Plastishades are priced considerably below quality fabric shades. Made of special vinyl plastic film these smooth surfaced window shades hold their good looks. They cannot ravel, will not tear or puncture in even severe use. Grease, ink and other stubborn stains are said to be removed easily with soap and water. Stock shades are made in 36, 42, and 48 in. widths and in 6 and 7 ft. lengths. Made-to-measure shades are produced in widths up to 48 in. and lengths up to 9 ft. The translucent light colored shades, ivory and white, soften sunlight entering the room. Plastishades are available also in tan and a lustrous green. Retail price for the 3 x 6 ft. shade ranges from $1.59 to $1.79.

Manufacturer: Charles W. Breneman Co., 2045 Reading Rd., Cincinnati, Ohio.

(Continued on page 210)
ONLY Rubber Tile
by the makers of
Kentile

OFFERS YOUR CLIENTS THIS
Exclusive
Beauty
IN COLOR AND DESIGN!

Specify Beautiful
THEMETILE

Only Available in this Rubber Tile

• No other rubber tile gives you these colorful, low-cost, decorative inserts to add individual distinction to each floor design. ThemeTile helps you provide unusual, custom-designed decorating themes for ideal installations in homes, lobbies, restaurants and office foyers. Rubber Tile by the makers of Kentile offers you attractive Feature Strips, too, and beautifully clear, harmonized colors for added effectiveness.

Keep samples of this outstanding Rubber Tile on hand. You can recommend it to your clients for its practical advantages of longer wear, resistance to soil, easier maintenance. Dirt and moisture cannot penetrate its smooth, non-porous surface. It resists chipping, cracking, marring...does not support combustion. Rubber Tile by the makers of Kentile will not dry out and become brittle...keeps its beauty through years of use even under heaviest foot traffic.

DAVID E. KENNEDY, INC.
58 Second Avenue, Brooklyn 15, New York
• Kentile
• Kencork • Rubber Tile
how much do you charge for

More and more successful builders are saving their clients money by refusing to accept the tradition that luxuriously beautiful wall tile must be expensive. They have found that Crown Steel Wall Tile provides the durable beauty and decorative harmony of ordinary wall tile but at much more moderate cost.

Crown Tile's bonded guarantee has proved to their hard-to-win satisfaction that this wall tile will not rust, chip, craze, crack or peel, assuring them of continued client satisfaction. Crown Tile's performance record has been so outstanding that it is becoming recognized as the successor to, not a substitute for, ordinary wall tile.

An investigation of Crown Steel Wall Tile will show you how to incorporate more beauty, at less cost, into your buildings. Write Dept. PB for the name of your nearest dealer.

Crown steel Wall Tile

OHIO CAN & CROWN CO., MASSILLON, OHIO

you can see that Trinity White is the whitest white cement!

Trinity White

You'll get fine results with this extra white cement. It's true Portland Cement made to ASTM and Federal Specifications. If your dealer does not have it, write the office nearest you: Trinity Portland Cement Division, General Portland Cement Co., 111 West Monroe St., Chicago; Republic Bank Bldg., Dallas; 816 W. 5th St., Los Angeles.

Glued Laminated Beams

Glued Laminated Beams

Glued Laminated Beams

...for Durable Construction at Low Cost

Buildings of moderately wide span are erected quickly and economically using glued laminated beams from Timber Structures, Inc. Formed of structural quality kiln dried material welded together under pressure with permanent glues, these members will never shrink, check, twist or warp. Beams of dimensions like those above are highly fire resistive.

When sanded and finished and left exposed, glued laminated beams add a beautiful architectural effect. Cambered and tapered, they frequently are used as primary structural roof members. For complete information on glued laminated beams and other structural members see the Timber Structures office nearest you, or write directly to...

Timber Structures, Inc.

P. O. BOX 3782B, PORTLAND 8, OREGON

Offices in Boise, Idaho; Eugene, Oregon; Kansas City, Missouri; Lawrenceville, N.J.; Chicago; Dallas; New York; Seattle; Spokane

TIMBER STRUCTURES, INC. OF CALIFORNIA, Oakland, Sacramento and Santa Rosa

Local Representatives Coast to Coast
ARE YOU LOSING
25% TO 50% OF YOUR
WATER-HEATING DOLLAR?

Inefficient water-heating equipment wastes 25% to 50% of your dollars that go for providing hot water... and your old equipment probably does not give your tenants hot water at all times.

And if you are heating water with coal or oil, you're paying higher fuel prices.

Because there have been little or no increases in gas rates, you save money in at least two ways with an A. O. Smith Burkay Volume-Flow Gas Water Heater: fuel cost is lower... efficiency is higher.

You also get rid of dust, soot, ashes, and excess furnace-room heat.

For the largest apartment, or the smallest, the A. O. Smith Burkay will give you better hot-water service at lower cost.

Write today to A. O. Smith Corp., Dept. AF-350, Toledo 7, for Bulletin SPH-926A which explains how you can save water-heating money.
Color—Bring out the natural beauty of wood!

BIO/VDE WOOD FMJWES

You can achieve striking effects with PEN-CHROME. Ten modern tints help you control the natural color of any woodwork or paneling—to keep it in harmony with any color scheme. Finish coat seals the surface and dries to a soft, rich, waxlike waterproof finish—revealing the grain and natural beauty of wood.

Use Pen-Chrome for commercial, industrial and residential work. It's economical! See your nearest O'Brien Dealer or write the O'Brien Corporation, South Bend 21, Indiana, today for free sample panel and further details on Pen-Chrome Blonde Wood Finishes.


ACTUAL WOOD SAMPLE—showing color effects produced by 10 Pen-Chrome tints on birch panel, 2½" x 20½" FREE to architects and decorators.

SEND FOR FREE SAMPLE PANEL TODAY!

The O'Brien Corporation
Dept. A-3
South Bend 21, Indiana

Please send free sample panel showing 10 Pen-Chrome tints.

Name

Address

O'BRIEN PAINTS

DIAMOND JUBILEE 1875-1950

ARCHITECTURAL FORUM March 1950

ALUMINUM SIDING for residential construction has baked paint coat.

Sprayed with white, cream or gray paint at the factory and baked, Kaiser's aluminum clapboard siding has a durable semi-gloss finish with a life expectancy said to be several times that of good house paint. Besides its nonrusting and high reflective insulating qualities, the building material boasts several recent design improvements: (1) wider flange at top edge for added contact at joint; (2) flattened upper half for more direct wall contact; (3) deepened joint housing to facilitate installation; (4) a more sharply defined shadow line; (5) curved lower section to prevent buckling; (6) slots situated closer to lower edge for easier nailing, and edge itself rolled for safe handling by workmen.

Course width, as formerly, is 7¼ in. with a weather exposure of 6¾ in. The siding is available in 10, 12, 14 and 16 ft. lengths in two thicknesses of tough aluminum alloy—.030 gauge (FHA approved for new construction) and .025 gauge (for remodeling). Cost per square to builders is about $30 for the heavier gauge, $26 for the lighter. Paint is provided for touching up any marring caused during installation. Siding with a zinc chromate prime will continue to be marketed for those who wish to paint in other than the neutral prefinished shades.

Manufacturer: Kaiser Aluminum & Chemical Sales, Inc. 1924 Broadway, Oakland 12, Calif.

NEW TIE FOR VENEER WALL has rust resistant copper coating over steel core.

Borrowing crimps from the all-efficient hairpin, the Copperweld V-Lok Tie holds brick veneer securely, its V-shaped prongs spreading the strain in two directions. As protection against rust without sacrifice of strength, a thick copper plating is inseparably welded to the alloy steel cores of both the wire prongs and nail which together make up the wall tie. Thus, unaffected by moisture and chemical action of mortar, the V-Lok anchors firmly in the mortar, resisting physical stresses with the strength of steel for the life of the wall. Prongs are round wire; the tie has no sharp edges to injure installer's hands. Retail price for a carton containing 1,000 wires and 1,000 nails is $20. The V-Lok Tie meets specifications of the American Standard Building Code.

Manufacturer: Copperweld Steel Co., Glassport, Pa.

(Continued on page 214)
You've never seen a window that closes so tight!

**AUTO-LOK** the weatherstripped Aluminum Awning Window

Never in window history has there been a window that offers a greater degree of closure than the amazing AUTO-LOK Aluminum Awning Window.

Now you can give your clients all the natural advantages of awning window design: vents that open to almost 90 degrees, protection from rain with window open, vents that drop down for easy cleaning from the inside, PLUS positive protection against all climatic extremes!

AUTO-LOK Aluminum Awning Windows are being specified and used successfully throughout the country, for every type of architecture: residential, schools, hospitals, and institutions.

Unlike other awning windows, Auto-Lok's patented hardware makes it possible to close the vents tight enough and keep them closed, tight enough to make weatherstripping effective. Double metal-to-metal contact, factory-installed lifetime weatherstripping and this remarkable closing action, actually "Seals Auto-Lok Like A Refrigerator!"

But don't take our word for it! Ask your nearest Auto-Lok representative to show you the "Tattle Tale Demonstrator"...convincing and undeniable proof that Auto-Lok is the tightest closing window ever produced.

Consult SWEETS for full details, or contact your Auto-Lok representative (name on request). Write Department No. F-2, LUDMAN CORPORATION, P.O. Box No. 4541, MIAMI, FLORIDA.

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THE **Ultimate** IN AWNING WINDOWS

ENGINEERED FOR LEADERSHIP BY

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*it's sealed like a refrigerator*
FREE

A GUIDE TO QUICK HEATING

Choose The Right HEETAIRE for Every Purpose!

Look at this Table of Contents!

- The Principles of HEETAIRES Types and Sizes
- THERMOSTATIC CONTROLLED Operation
- Series 210 HEETAIRES . . . Fan-Forced Blade Heat
  300 to 6000 Watts
- Series 200 HEETAIRES . . . Radiant Heat
  1000 to 1250 Watts
- Series 240 HEETAIRES . . . Radiant Heat
  1000 to 1250 Watts
- Series 170 HEETAIRES . . . Fan-Forced Blade Heat
  1650 Watts

How to Select the Right HEETAIRE for Every Purpose

Here's the first and only complete GUIDE to the selection of electrical wall-insert and wall-attachable space heaters! It gives all the information about QUICK HEATING you've always wanted—types, sizes, heating principles, thermostatic heat controls recommended wattages—plus an exclusive chart based on the four factors that determine the selection of the correct HEETAIRE.

It's yours for the asking—just drop us a card.

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- 5 Tube AC-DC Superheterodyne with
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- Approved by Underwriters' for "Built-in Installation".
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- Panels in Plastic and Plain Masonite.
- Plastic Panels sold separately in following colors:
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  - Shell Pink
  - White
  - Burnt Amber Mattled
  - Royal Blue
  - Mandarin Red
- Panel sizes 7-13/16" x 11-7/16".

The Radio for every room in the HOMES OF 1950. An "extra" that sells.

LOW COST—Installed for the price of a regular outlet
Retail price only $34.95 Panels extra—Masonite $2.45 Plastic colors $4.45

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IN THE KITCHEN—Bio-Fan installs over the range, where it will whisk out steam, grease, and cooking odors as they rise before they spread.

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IN THE LAUNDRY—In any weather Bio-Fan keeps the laundry clear and fresh. Steam is expelled before it spreads, windows do not fog...air is kept dry and crisp.

A BLOWER draws a smaller amount of air into the vortex, discharging it with great velocity, thus overcoming resistance. A blower delivers power, but it lacks volume.

FAN—75% of the air moved by a breeze fan is thrown from the blade tips. The center is weak when it meets resistance. A fan delivers volume, but it lacks power.

Bio-Fan combines the volume of a fan with the power of a blower. The fan blades feed the vortex of the blower so that the vane are fully loaded. That's why Bio-Fan delivers more air with more power.

HERE'S WHY!

Manufacturers of PRY-LITES...the modern recessed lighting fixtures with snap-on fronts.

Factories: Pomona, California; Newark, New Jersey
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*Trade Mark Reg.
The Roofs of Williamsburg...

Authenticated by...

LUDOWICI TILE

Roof of the reconstructed Colonial Capitol of Williamsburg
Architects: Perry, Shaw and Hepburn - Photographer: F. S. Lincoln

When architectural authenticity, classical beauty and enduring protection are important, Ludowici Shingle Tile is your best choice for a Georgian or Colonial house. That's why it was selected for some of the important buildings of the Williamsburg restoration! Its soft colorings and non-reflecting textures duplicate faithfully the age-mellowed loveliness of the original roofing materials.

Made of hard burned shale, Ludowici Tile provides a fireproof, weatherproof roof that is ever-enduring, never-fading. Ludowici Tile roofs are within range of more building budgets than you might think. Let us help you with your plans or specifications today.

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365 Fifth Avenue 740-13th Street, N.W. 12278 Woodland Av.

SECTIONAL STEEL GARAGE DOOR is plan assembled, prefinished in neutral gray.

This new overhead type residential garage door constructed of rugged rolled steel costs less than $50 installed—a price made possible by its pre-finishing at the factory in a gray baked-on paint and its packaging complete with all necessary accessories. Fitting includes rubber strip at bottom; hangers; brackets; cadmium plated screws, nuts and bolts.

Although fabricated for a standard 8 x 7 ft opening—where it uses only 5 in. of headroom—it may be used in a 6 x 6 ft. opening having the standard 12 in. allowance. Installation is quite easy: tracks are rigged up, door sections dropped in place with rollers inserted, pivot points of adjoining pieces snapped, and the counterbal- anced springs connected. No holes have to be drilled or hinges applied. The cylindrical lock may be keyed from either side. Because parts move on ball-bearings, the door opens with a finger touch. Working is completely within the garage—neither snow nor sleet nor autumn leaves can interfere with its operation.

Manufacturer: Morrison Steel Products, Inc. Door Div., Buffalo, N. Y.

ELECTRICAL OUTLET STRIP has grounded receptacles.

Providing a spread of electrical outlets at either 6 or 18 in. intervals, the new Plug-In Strip Type CF2-G assembly offers industries, hospitals, schools and home owners the opportunity of plugging in grounded or ungrounded portable electrical equipment in every receptacle. Basic construction and fittings of the standard Plug-In Strip have not been changed. However, a third slot has been added to each receptacle, and beneath this aperture is a copper insert securely mounted to the multi-outlet's steel base. This assures a positive grounding facility. To achieve a thoroughly grounded electrical system, however, the strip must be installed with a positive ground to the earth. Either the conventional two blade or three blade grounding plugs may be inserted in the outlets. Underwriters' approved, the new model costs contractors about 60 cents per ft. It may be purchased in 6 ft. lengths and cut anywhere between receptacles to fit the job. Its satin gray finish can be left as is or painted to match interior trim.

Manufacturer: National Electric Products Corp.
Chamber of Commerce Bldg., Pittsburgh, Pa.

(Continued on page 218)
You get positive reinforcement with Pittsburgh Steeltex for Stucco through embedment of the welded wire fabric in the mix. The square mesh of galvanized, cold drawn steel wire provides resistance to strain from any direction. In addition the double ply backing guards against moisture penetration and minimizes stucco cracking—protects the beauty of the finished job—reduces maintenance.

Steeltex for Stucco is easily applied direct to studs or over wood sheathing in one operation. Steeltex is used to advantage both in new construction and the modernization of old structures. For more information on how Pittsburgh Steeltex for Stucco can be used to give you strong reinforcing for economical construction write Dept. AF for bulletin DS 131 or see our catalog in Sweets.
\( 1\frac{3}{4} \) is the standard \( \text{PAINE REZO DOOR} \) 

the wood mesh core flush door that unconditionally guarantees your clients’ satisfaction and your own

\( 1\frac{3}{4} \) is the standard thickness that gives this interlocking air-cell door unsurpassed strength, and dimensional stability.

\( 1\frac{3}{4} \) is the standard thickness that has placed more than four million doors in service in buildings of every type all over the country.

\( 1\frac{3}{4} \) is the standard thickness so widely accepted that Paine has become the largest exclusive producer of cell-type flush doors.

Naturally, you expect this trouble-free door to come ready for installation and with beautifully matched veneer faces —and it does. Dealers from coast to coast now have Rezo doors available—so specify them on all your plans. Your clients' satisfaction and your own are unconditionally guaranteed.

See SWEET'S FILE or write directly for data bulletin.

Manufactured by the \( \text{PAINE LUMBER CO., LTD.} \) \( \text{Oshkosh, Wisconsin} \) \( \text{ESTABLISHED 1853} \)
Startling!! Revolutionary!

The single-riser heating system!

- Eliminates traps and valves in occupied quarters. Only trap is at bottom of riser in basement.
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- Eliminates furring of walls.
- Permits pre-cutting risers, all one size, in shop.
- Benefits contractors, owners and tenants.

Economical to install, operate and maintain... "Metro" piping with Vari-Vac® control is the proved heating system selected for large-scale housing projects financed by The Metropolitan, Equitable, and New York Life Insurance Companies.

"Metro" keeps fuel bills at a minimum. Heat supply and demand are always in perfect balance because steam temperature is automatically regulated according to outside weather. In addition, damper controls permit individual room heat regulation.

Dunham Vari-Vac Heating... the system that makes "Metro" possible... cuts fuel costs up to 40%—A Dunham Vari-Vac Differential Heating System is adaptable to any size structure... old construction as well as new. A Dunham Sales Engineer can quickly tell which of seven different Vari-Vac systems you'll want to specify.

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for "Jewels by Trifari"

Beauty... distinction... durability... these were among the requirements called for in the main display room of the famous New York jeweler, Trifari, Krussman & Fishel, Inc.

The above photograph shows how architects Kahn & Jacobs met these specifications with walls of striking Satinwood Flexwood. The bamboo color of the Satinwood is a perfect complement to the jade green appointments.

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And it's durable! Real wood, in its most architecturally versatile form.

Thin veneers of decorative hardwoods permanently bonded to flexible fabric backing.

Let us send you full information about this modern decorative material... and how you can plan extensive renovations with a minimum of costly structural changes. Write for samples and illustrated folders today.

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Flexwood is manufactured and marketed jointly by United States Plywood Corporation and The Mengel Company.
Where Steel Pipe is first choice for Radiant Heating...

"In the comfort of a valley, home can seem 'a dream come true'," a poet once said... and his words are a perfect description of many a modern American home development. For what can make for more happy living, when the chill winds of winter blow, than the snug warmth of new, radiant heated homes in "Comfort Valleys" everywhere?

Radiant Heating systems in such homes are at their best, of course, when installed with durable, adaptable, economical steel pipe. You see, steel pipe's proved service record in conventional hot water and steam heating systems over more than 60 years would, alone, entitle it to first consideration. But, more than that, the specific piping requirements of the popular new Radiant installations are met in every particular by steel pipe. It's readily formed, easily welded, imparts structural strength, and importantly, has the same coefficient of expansion as concrete, plaster and masonry. It's lower in cost, too, and is made to outlast the useful life of the building.

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Why pay extra money for good quality, dry lumber and then soak it with water — by plastering?

With Dry Wall Construction the owner will never have cracked walls, falling ceilings or buckled floors. Dry Wall Construction is the modern, up-to-date, common sense and fast method — the greatest advance in 300 years of building construction.

For 32 years Homasote has been used for Dry Wall Construction — in millions of dollars of private homes. Since 1936 its use has been supported by intensive research costing more than $500,000.

Dry Wall Construction — with Homasote Big Sheets — offers many major advantages. The average wall is covered with a single sheet; batten strips and unsightly wall joints are eliminated. In a single material you provide lasting insulation value and great structural strength.

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gives them COLOR at
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Briggs four exclusive decorator colors, plus white, now available in both porcelain enamel steel and vitreous china.

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For the first time... customers can get the colored fixtures they want... at a price they can afford to pay. Briggs makes it possible! Offers first-quality fixtures in color for only 10% more* than the same stainproof, lightweight, precision-made fixtures in white. Start featuring Briggs Beautyware colored plumbing fixtures, today... and you can figure on quicker sales, bigger sales every day of the selling year!

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A Schlage installation of heavy-duty cylindrical locks.

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YOUR ELECTRICAL DISTRIBUTION SYSTEM IS THE LIFELINE OF YOUR BUILDING
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NEPCODUCT—An Efficient Electrical System That Fits Any Type of Floor Construction—
With these advantages—

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Provides tenants with complete electric service—economically—without routing concrete or cutting building structure.
Electric service outlets are at the floor surface—already threaded—wherever needed.
Present and future tenants have all the electric service they will ever need. A real office space sales feature!
An electrical system that adds to the economic life of the building.

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Immediate availability of electric service at the floor surface.
No wholesale interruption of office routine when additional service outlets are needed.
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A simplified single-, double-, or triple-duct system that fits any type of floor construction.
A system with a multiplicity of inexpensive outlets located at the surface of the concrete floor—ready for immediate use.
Outlets with a wide radius sweep for easy pulling of large telephone cables.
Reduces cost of electrical extensions and maintenance through easy accessibility of all electric services in one junction through a common hand-hole opening.

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Please send me your NEPCODUCT Electrical Distribution Manual.

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221
MENGEL prefabricated wood wall closets are designed to be used as an integral part of your construction — either fitted against structural walls or as non-load-bearing partitions between rooms. In both cases, they give you several distinct advantages over conventional closet construction, at no increase in cost!

As the diagram indicates, they require 25-40% less floor space, because they do not have thick plaster-lath walls. ... They provide additional "living area" outside the closet because their modern sliding doors eliminate the need for space required to swing the conventional door. ... They allow the housewife to make maximum, flexible use of every cubic foot of space inside the closet because they have a number of adjustable shelves, and clothes rods that are adjustable for height. ... They save space in your overall floor-plan arrangement because they utilize every foot of area to the utmost.

Available in several styles and widths to fit the requirements of any job, Mengel Wall Closets comply with FHA requirements. Mengel Closet Fronts are also available for jobs not requiring complete wall closets. Mail the coupon today for complete information.
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Equipment is “years ahead” in sound engineering and construction; in design—with functional beauty adaptable to any type of installation; and in economy, ease of installation and ease of maintenance. These points of superiority benefit all who use lighting. Ask for complete details on how and why Pittsburgh Permaflector Lighting Equipment gives you the “light for tomorrow”—today!

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Write and tell us whether interested in store, office, school or other type of and a Bulletin covering the will be sent you promptly.
Not so long ago, they couldn't have heard a sales curve fall in the general hubbub of this office. Today, the blessed balm of sound control has cut down the intake of aspirin, boosted the output of work. Today this open space is more productive than private offices—and a lot less expensive. You who read the Forum had a lot to do with this change. In the buildings you design or construct or equip, in the building budgets you approve—the high cost of noise is no longer a threat; the inside space is no longer a waste. But it took a lot of people to help you muffle the din.

—first by manufacturing a product which could do the job for you
—second by making it known that the product is yours for the buying
—third by explaining its virtues so clearly that your vote for sound control was backed up by the men who share decisions with you.

The first of these three assignments was a production and engineering job. The others were advertising's job. For just as you rely on Forum's editors to keep you up to date on new building ideas, so you can rely on Forum's advertisers to let you know when those ideas have been embodied in a new building product; to build acceptance for the product by stating its case repeatedly to all building professionals. It's a good deal all around. Advertising is important to you because it helps you find new products, make the best possible use of old products, analyze competing products. You are important to the advertiser, because you Forum readers buy more building products than any other group in America. And we're proud to be the medium which brings all of you together in an integrated effort to make every new building in America a better answer than its predecessors to the needs of the people it serves.
Everything's up to date at...!

Macy's selected only the most modern equipment and furnishings available for its new Kansas City store...that's why they chose International Van Kannel Revolving Door entrances.

The beauty of International Van Kannel Revolving Doors helps make any store more attractive and adds prestige to any business...an irresistible invitation to customers to come in.

But the greatest value of revolving doors to Macy's, Kansas City, and many other department stores throughout the country, is their utility. Revolving doors cut heating and air conditioning costs up to 25%...keep dust, noise, and drafts out...and make more floor space "pay" space.

Write today for complete information...how International Van Kannel Revolving Doors pay for themselves...and build profits!

For the rest of the Macy's Kansas City Story, see the April issue of Stores magazine.

Cooling Tower with new type of wetted surface affords large water savings.

The Hydro-Miser cooling tower for air conditioning and refrigerating equipment features a wetted surface said to be capable of cutting water consumption as much as 95 per cent. This surface is comprised of a grid of electro-tin-plated bronze wire screens. Each screen forms a slight angle so that water sprayed under pressure onto it clings to the mesh—as water sticks to a hosed screen door. Air, pulled in from the bottom of the tower by centrifugal fans in the top, travels on both sides of each screen, rapidly evaporating and cooling the water.

The gridwork is housed in a galvanized steel case and the entire unit may be removed for cleaning. Hydro-Miser units are compact, the 50 ton tower measuring 97 1/2 in. high, 62 in. deep and 116 1/2 in. wide. Single-drive models with pumps of three to 50 ton capacity, range in price from about $972 to about $3,700. Models designed for use outdoors are slightly higher.

Merits claimed for the Larkin units are: a minimum salt deposit in the sump tank as a result of evaporation; hot dip galvanized tanks, fans, scrolls, wheels, frames and panels; and double drive motors which operate both the fans and pumps. Remote motor units are also available.

Manufacturer: Larkin Coils, 519 Memorial Drive, S. E. Atlanta, Ga.

Square Back Plate for Air Diffuser fits in acoustical tile ceilings.

Joined integrally to the Kno-Draft air diffuser, this lightweight metal panel has been designed for use with all standard acoustical tile ceilings. The adaptation also serves to blend the diffuser unobtrusively into rectangular ceilings. The diffuser retains its features—adjustable angle of air discharge, air volume control, etc. Cost of the 12 inch plate (for the manufacturer's diffusers with 4 to 5 in. neck diameters) is $9.50; $12 for the 24 inch plate (attached to diffusers with 6 to 11 in. neck measurements); and $17 for the 36 in. plate (for KD diffusers with neck diameters of 12 in. or more). Manufacturer: W. B. Connor Engineering Corp., 114 E. 32d St., New York 16, N. Y.

Rockwool Battts contain long interlocking fibers.

A more resilient insulation batt is the result achieved by Johns-Manville's process of manufacturing longer mineral fibers. Because of their springiness, 10 batts may be shipped in the same package that formerly held eight. For greater strength and as protection against sagging, fibers are oriented parallel to the long dimension of the batt (Continued on page 230).
The New FRIGIDAIRE "THRIFTY-30" Electric Range

A completely new idea in electric ranges, the Frigidaire "Thrifty-30" is perfectly sized to meet the particular demands of today's smaller kitchens. Only 30" wide, 43" high (without Cook-Master) and 273/4" deep, it requires a minimum of kitchen space—yet has many of the desirable "big" cooking features of much more costly ranges. One of its chief appeals to homemakers and property owners is its amazingly low price!

Thrifty Giant Oven—biggest oven ever built in any household range! 6200 cubic inches of baking area—enough for 6 pies or a big holiday dinner. Extremely economical, it cooks more food with no more current. Oven stretches clear across the range—provides more space up front where things are easy to reach. One-piece oven—porcelain rust-proof finish inside and out. Sliding shelves adjust to 5 positions. Counter-balanced shelf-type door.

For complete, quick facts about this and other fine Frigidaire products for apartment kitchens and laundries, call your Frigidaire District Office or Dealer. Look for his name in Classified Phone Directory. Or write Frigidaire Division of General Motors, Dayton 1, Ohio. In Canada, Leslie 12, Ontario.

FRIGIDAIRE
Makes a good building better!

New 5-Speed Radiantube Cooking Units cook faster—use less current. 4 standard-size units—including an extra-big one. Tip up for easy cleaning.

New High-Speed, Waist-High Broiler gets steaks just right. Unit recessed in oven top—out of way. Porcelain broiling pan—easy to clean.

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HAVE AN "EAR" FOR HARMONIZING  
THE CARS WITH THE CALLS

selectomatic can turn a loud clamor for up cars, a soft request for down cars or any of 
their various combinations into the kind of close harmony that building managers love. 
selectomatic's unique electrical brain records what it hears and matches the tone of the 
elevator service to the tone of the tenant's demand—instantly and automatically.

The new era for elevators a tenant's call for a car never falls among the "deaf." Selectomatic continuously listens for each call... instantly answers each call... and automatically 
gulates the entire elevator bank so that it gives the most efficient service possible every 
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Selectomatic, an exclusive Westinghouse development, completely supersedes the 
vious accepted elevator standard—signal control.

See and hear the complete story of Westinghouse Selectomatic—science's greatest achieve-
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t no cost of our sound motion picture "Speeding Vertical Transportation With Selectomatic 
evators," Elevator Division, Dept. F-1, Westinghouse Electric Corp., Jersey City, N. J.

YOU CAN BE SURE... IF IT'S

Westinghouse
Like the smooth, rolling action of the wheel, the coiling upward action of Kinnear Rolling Doors involves a basis principle of highest operating efficiency. You can change the wheel's "face" in hundreds of ways, but you can't find a better way to do its job. By the same token, the basic advantages of Kinnear Rolling Doors give you the best answer to door needs.

Kinnear's rugged curtain of interlocking metal slats opens straight upward. It coils compactly out of the way above the opening. Floor, wall and even ceiling space remain fully usable at all times. The door clears the opening from jamb to jamb, and from floor to lintel, completely out of traffic's way. When open, it is safe from damage by wind or vehicles. When closed, it presents an all-metal barrier that assures extra protection against storms, intruders, or fire.

In addition, Kinnear Rolling Doors provide smooth, easy operation under all conditions. They may be controlled manually, mechanically (by chain or crank) or electrically. Motor operated doors can be equipped with any number of remote control switches, for highest convenience. Kinnear Rolling Doors are built of various metals, in any size, for easy installation in old or new buildings. Let us send you complete information.

The KINNEAR Manufacturing Co.
1742 Yosemite Ave. 1760-80 Fields Ave.
San Francisco 24, Calif. Columbus 16, Ohio

Offices and Agents in All Principal Cities
Bilt-Well Products bring greater comforts to Indiana home owners at lower costs

Above picture shows a part of one of Indianapolis, Indiana’s newest housing projects being equipped throughout with Superior Windows and other Bilt-Well Woodwork.

The General Contractors are Bohannon and Moore. Bilt-Well Woodwork is being furnished through Home Lumber Co., Danville, Ind., and supplied by Adams-Rogers, Indianapolis.

Other Bilt-Well Products are:

The Bilt-Well Line: Superior Unit Wood Windows • Exterior & Interior Doors • Entrances & Shutters • Closette Casements • Carr-do Garages Doors • Basement Unit Windows • Louvers & Gable Sash • Breakfast Nooks • Combination Doors • Screens & Storm Saib • Corner (China) Cabinets • Glider Cabinets • Ironing Board Cabinets • Mantels & Telephone Cabinets • Multiple-Use & Linen Cabinets • Stair Parts.

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SUPERIOR WINDOWS ARE IDEAL . . . the sash can be installed and removed while plastering and painting (during construction prior to setting “inside stops”) without damaging the weatherstrip.

SUPERIOR WINDOWS ARE DISTRIBUTED THROUGHOUT THE 37 EASTERN STATES BY RELIABLE BUILDING MATERIAL DEALERS

CARR, ADAMS & COLLIER COMPANY
Dubuque, Iowa
Long-lasting Lumite screens are woven of durable saran ... guaranteed never to rust, never to stain sills or side-walls. They're completely unaffected by salt-air, smoke, rain or snow ... never need protective painting of any kind! That means years of care-free protection for your owners ... means complete owner satisfaction for you. Give Lumite screening, the low-cost extra — it's the ideal screening for every exterior use!

Sold by hardware, lumber, building supply wholesalers and screen manufacturers!

FACTS FOR ARCHITECTS AND BUILDERS

- Effects of acids, alkalies and solvents — Essentially none.
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- Impact strength — Greater than conventional screening, when adequately framed.

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LUMITE DIVISION, CHICopeE MANUFACTURING CORP. OF GEORGIA, 47 WORTH STREET, NEW YORK 13, N. Y.

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B&G

576 families live in this modern housing development in Queens, N. Y. The entire project is heated by a B & G Hydro-Flo System supplied by sixteen boilers in eight boiler rooms.

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FOR B & G Hydro-Flo HEATING

It is not just happenstance that the popularity of B & G Hydro-Flo Heating grows steadily, year after year. You find this forced hot water system in buildings of every size and character, simply because it offers completely outstanding advantages.

B & G Hydro-Flo Heating is amazingly economical in operation—delivers years of trouble-free service—and provides the kind of comfort obtainable only with controlled radiant heat. And B & G Hydro-Flo Heating is competitive in price with heating systems worthy of the name!

The close temperature regulation possible with forced hot water means that fuel is never wasted in supplying unnecessary heat. Indoor temperature is maintained by accurate controls at the comfort level, regardless of how sharply the weather changes.

Whether radiators, convectors, baseboards or radiant panels are used, B & G Hydro-Flo Heating sets the pace for efficiency, low maintenance and comfort.

Best for any kind of radiation

The units required for B & G Hydro-Flo Heating are few and simple. They can be applied to any hot water heating boiler, whether oil, gas or steam fired.
TWINDOW is made up of two or more panes of Pittsburgh Polished Plate Glass, with a sealed-in air space between them. When composed of two panes, it provides almost twice the insulating effectiveness of single-glazed windows. When three or more panes of glass make up the Twindow unit, even better insulation results. 45 standard picture window sizes are available for either wood or steel sash.

FOR HOMES, for buildings of all kinds, Twindow, Pittsburgh’s window with built-in insulation, offers new latitude in window design. Twindow makes it possible to gain all the popular advantages of large windows, without sacrificing heating or air-conditioning economy. Architect: Seymour Joseph, New York.

TODAY, STORE FRONTS try to make sure that passers-by won’t pass them by. And they use large expanses of glass to achieve the desired attraction-power. Architects have proved to their satisfaction that Pittsburgh Glass Products can supply the beauty and appeal they demand in the execution of their store front designs. For example, Carrara Structural Glass, Heresilite Doors, Pittsburgh Plate Glass and Pittco Metal make a wonderful team to help you create store fronts and interiors of distinction. Architect: Maurer & Maurer, South Bend, Indiana.
AT THE SUNNYBROOK HOSPITAL, Toronto, Canada, Pennvernon Window Glass was chosen to glaze the many windows involved. Being window glass at its best, Pennvernon has been found eminently satisfactory for applications of every kind. It has a degree of clarity, beauty and freedom from distortion exceptional in a sheet glass.

applications of GLASS construction

IN THIS SAME hospital, Carrara Structural Glass on washroom walls offers unique advantages. For Carrara is an ever-lasting material, distinctively beautiful, easy to keep clean and sparkling. It has a reflective, flawless surface. And it can be etched, sandblasted, laminated, fluted or bent for all kinds of original effects. Carrara is truly "the quality structural glass of infinite possibilities." Architects: Allward & Gouinlock, Toronto, Canada.

DESIGN IT BETTER WITH Pittsburgh Glass

PAINTS  •  GLASS  •  CHEMICALS  •  BRUSHES  •  PLASTICS

PITTSBURGH PLATE GLASS COMPANY
ALUMINUM. Designing with Aluminum Extrusions. Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky. 138 pp. 6 x 9 in.

Basic engineering principles that enable designers to use extruded aluminum shapes effectively are explained in this informative, liberally illustrated book. Eight basic kinds of sections evolved by the extrusion process are explained in detail with diagrams, charts and pictures of actual parts. Of special interest to architects and builders are the chapters on structural design considerations, joint design (containing 39 different connection methods) and dimensional tolerances. Characteristics of aluminum itself, its fabrication properties, finishes and cost factors are discussed, and 16 tables present invaluable technical data.


Pointing out the economies often effected by use of aluminum in place of a number of materials, this booklet contains descriptive information concerning the various forms in which aluminum is fabricated—from window and door sashes to radiator fins and light fixtures. Illustrations of products containing the manufacturer's aluminum alloys in extruded shapes, tube and sheet form are included as well as a chart listing properties of most wrought aluminum alloys.


Realizing the potentialities of low density concretes and the need for unbiased reliable technical facts on their suitability for dwelling construction, the Housing & Home Finance Agency sponsored an investigation of processed and natural inorganic materials currently marketed as lightweight aggregates. Tests were conducted by both the Bureau of Reclamation (Department of Interior) and National Bureau of Standards. Their findings, revealed in this book, should be helpful to designers, builders, as well as producers themselves. In addition to the aggregates commercially available at the time of the study, the Bureau of Standards furnished three others for experiment. Included in the program were shales or clays, slag, vermiculite, diatomaceous earth, perlite, pumice, scoria, and sintered fly ash. Investigations by both laboratories included tests on the materials' physical properties—crushing strength, absorption, unit weight, etc. Tests of concrete batches containing these aggregates covered compressive and transverse strength, shrinkage, thermal conductivity, weight per cubic foot, elasticity, and resistance to freezing and thawing. A two-page chart summarizes results of the study.


Prepared especially for use by architects, engineers and specification writers, this directory should serve as an index to the maze of hard-to-assemble information on thousands of building products. It lists alphabetically the materials most commonly used in construction, and tells where to find established specifications. The specifications indicated include those created by the American Society for Testing Materials, American Standards Association, Army, Navy, Federal Government, and publications of more than 30 associations and institutes.

(Continued on page 240)
NOW! TIMKEN Silent Automatic
OFFERS NEW HEATING ECONOMIES FOR MULTIPLE DWELLINGS

RELIEVE OWNERS OF ALL HEATING PROBLEMS—GIVE TENANTS INDIVIDUAL HEAT CONTROL!

OIL HI-BOILERS — Combining oil burner, heating boiler, domestic water heater, expansion tank and complete automatic controls, these new units offer fully automatic heat plus unlimited hot water—occupy less than four square feet of floor space. Wall-Flame Burner.

OIL AND GAS LO-BOILERS — Every wanted, needed feature for finest automatic heating is incorporated in these super-compact units. Completely factory-assembled and unit-shipped. Two cabinet types; three heat exchanger types; choice of oil or gas burner.

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Here's the modern, money-saving heat that is “Duty-Designed” specifically for your new “garden-type” multiple dwellings—Timken Silent Automatic Heat!

Whether you're using oil or gas, you save valuable space—even eliminate utility rooms—with these super-compact units. A fuel-thrifty Timken Silent Automatic in each apartment means pinpoint control of heating costs—frees owners from expense and responsibility—pleases tenants, too. This equipment is built to last as long as the house—cuts maintenance costs to the vanishing point.

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Illustration shows sectional view of "National's" underfloor disappearing tube installation. Note that tube disappears without entering main trunk line—for balanced flow of air through main duct and perfect exhaust gas removal. Write for complete literature and costs.

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His Sound Conditioning skills reflect over 25 years of experience and hundreds of thousands of installations. His acoustical products have been tested and proved to meet every building code, specification and requirement.

For custom-made installations of lasting beauty and quiet, make sure to contact the man with the most widely used acoustical products ever developed, plus the most extensive experience in Sound Conditioning.

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A lightweight, rigid unit, combining acoustical efficiency with a durable, smooth surface. Perforations (to within 1/4" of the back) assure repeated paintability and ease of maintenance. Available in a variety of sound-absorbent ratings. Rot proof and vermin proof (patented Pexor process).

ACOUSTI-CELOTEX* MINERAL TILE
Made of mineral fibre, felted with a binder to form a rigid tile with a universal rating of incombustibility. Perforated with small holes extending almost to the back of the tile, high acoustical absorption is provided together with unrestricted paintability by either brush or spray method.

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ACOUSTICELOTEX
Combines a face of perforated steel with a rigid pad of sound absorbing Rock Wool to provide excellent sound absorption, together with attractive appearance, durability and incombustibility. The exposed surface of perforated steel is finished in baked-on enamel. Acoustiteel is paintable, washable, cleanable.


120 S. LaSalle St., Chicago 3, Illinois • Dominion Sound Equipments, Ltd., Montreal, Quebec, Canada

In simple graphic terms this recently revised and expanded edition presents a comprehensive treatment of thermal insulation. Allied topics such as heat and vapor transfer, radiation, convection, conduction and emissivity are included. Photographs and diagrams accompany the descriptions of mass fibrous and reflective insulation materials. Densities, weights, cubic contents and K, C, R, and U factors for all these materials are given and their relative merits are discussed for specific installations.


The bulletin contains pertinent data on the manufacturer's cast iron and copper Monoflo fittings fabricated for use in forced hot water systems, and illustrates their proper application. Unique features of the Monoflo are itemized, and simplified rules for determining requirements for a small "one pipe" heating system are outlined.

TILE. The Color Book of Tile. American Olean Tile Co., Lansdale, Pa., 100 pp. 9 x 11 in.

A complete catalogue of the manufacturer's glazed and unglazed tile products, this volume suggests numerous color and pattern combinations. A novel spiral binding permits the planner to place any one of the 30 color plates of complete bathrooms and kitchens beside any of the eight folders on accessories and floor patterns—not only a convenient but also a stimulating arrangement.


Those concerned with interior design (but not with small budgets) will find this full color catalogue of wool and nylon carpeting a useful aid. Limitless color choice obtainable because of the firm's custom order skin-dyeing service and the many "hand-carved" patterns are two premium advantages of these luxury products. Each step in the weaving process is illustrated in an interesting account of carpet construction.


For architects' and contractors' easy reference, the manufacturer has prepared a file folder with four samples of handsomely textured wall coverings—Oak, Fabriktone, Gold Oak and Pecky Cypress. A brochure contained in the folder pictures other Timbertone dimensional papers and gives complete specifications and price data. Described as sun-fast and washable, the papers are distinctly derivations, not simulations, of woods, fabrics, metals and stone. They are adaptable to many commercial and residential interiors.

TECHNICAL LITERATURE

THE CONSTRUCTION: FIREPROOF . . .

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FIRE WARNING SYSTEM: NONE. And today smoke and charred ruins are the only remaining marks of a hospital that "couldn't burn."

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For Couch Fire Alarm Systems are on the job around the clock ready to help you avoid loss by getting action quickly. From among the many types that are made especially for hospitals, institutions and industrial plants, you're bound to find one right for your needs. Write today for Bulletin 116 for all details.

One of several types of Couch protective equipment . . . each fire and watch station transmits distinctive code signal which is recorded on paper tape along with hour and date . . . may be installed with a wide variety of signal alarms.
Mengel Solid-Core Flush Doors represent a radically new Standard of Stability. Their unique construction does not undertake the impossible job of preventing expansion and contraction caused by changes in humidity—it controls these forces to an extent hitherto unknown.

All Mengel solid hardwood core members are deeply slotted at frequent intervals both with and across the grain. These slots effectively absorb expansion and contraction. Thus the solid wood between the slots can expand and contract as the weather changes, without in any way affecting the stability of the door itself! Furthermore, Mengel's exclusive key-lock dovetails and waterproof hot-press phenolic bonding keep the entire assembly permanently tight.

Get all the facts about Mengel Solid-Core Flush Doors—the really stable doors that cooperate with nature on the inside, ignore it on the outside! The coupon will bring you full information and specifications.

THE MENGEL COMPANY
Plywood Division, Dept. AF-6, Louisville 1, Ky.

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This Easy, Economical Way

BILL, YOU'LL BE GLAD I SPECIFIED NICHOLS NEVER-STAIN ALUMINUM NAILS FOR YOUR HOME. THEY WON'T RUST LIKE ORDINARY NAILS. THEY WON'T STREAK OR STAIN PAINTED SIDING OR CAUSE SIDING TO LOOSEN THROUGH NAIL RUST. YET THEY COST LESS THAN $3.50 MORE THAN ORDINARY NAILS FOR YOUR FIVE-ROOM HOUSE.

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Nichols Never-Stain Aluminum Nails are etched from head to tip for greater holding power . . . drive easy . . . lighter to carry . . . and cost less to apply because no countersinking or puttying is necessary! Billions have been used.

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The permanent baked-on finish won't chip, crack or peel. Flexing won't harm it, either. Blinds of Flexalum stay new-looking . . . save maintenance dollars.

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Be sure the blinds you buy carry the Flexalum "visible-intangible" trade mark. Write for sample tape and slats. Make your own test of Flexalum's cost-saving features.

HUNTER DOUGLAS CORPORATION, RIVERSIDE, CALIFORNIA AND 150 BROADWAY, NEW YORK 7, N. Y.
INVESTIGATE IN-SINK-ERATOR
the only FOOD WASTE DISPOSER
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1 PATENTED REVERSING ACTION alternates direction of shredding with each operation. This automatic "reversing action" doubles life of shredding elements, adds a unique self-sharpening feature, and assures long trouble-free operation.

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Architectural FORUM March 1950
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The Eljer "No-Splash" Stream Control will be furnished on the popular Martha Washington and LaSalle Vitreous China Lavatories, and on the Princeton Enamelled Cast Iron Lavatory... also on all B-9350-R and B-9359-R center-set lavatory fittings.

Remember, the first cost of Eljer Brass Goods is only a very few cents more than ordinary, cheap fittings... an insignificant factor in the total cost of even the lowest-priced house.

It will pay you to sell Eljer Quality Brass... and when you install Eljer Plumbing Fixtures, be sure to use Eljer Brass Fittings. Clients do appreciate Eljer extras... like the "No-Splash" Stream Control. See your Eljer Distributor or write Eljer Co., Ford City, Pennsylvania.

It pays you, it pays us... because we specialize in Plumbing Fixtures and Brass
The trade mark of The "OVERHEAD DOOR," a symbol of quality, appears on every "OVERHEAD DOOR" lock handle. Like all hardware for the door, the handsome, chrome-plated lock handle functions perfectly and gives long lasting service. Its design permits a convenient, firm grip and the door, because of its expertly engineered counterbalancing device, lifts upward and out of the way with only a minimum of effort.

Any "OVERHEAD DOOR" may be manually or electrically operated, whether for residential, commercial, rural or industrial use. Specify this quality door . . . quality cuts costs!

TRACKS AND HARDWARE of Salt Spray Steel